



1  
00:00:07,099 --> 00:00:04,849  
good morning welcome to Kennedy Space

2  
00:00:09,320 --> 00:00:07,109  
Center we're here to commemorate the

3  
00:00:11,720 --> 00:00:09,330  
decade of flying in the yes on

4  
00:00:13,700 --> 00:00:11,730  
International Space Station NASA's

5  
00:00:14,930 --> 00:00:13,710  
observing a decade of human life work

6  
00:00:17,090 --> 00:00:14,940  
and research aboard the space station

7  
00:00:18,680 --> 00:00:17,100  
and we're kicking off the roundtable

8  
00:00:20,810 --> 00:00:18,690  
discussion here at Kennedy Space Center

9  
00:00:22,370 --> 00:00:20,820  
we be followed by discussions at Johnson

10  
00:00:24,679 --> 00:00:22,380  
Space Center Marshall Space Flight

11  
00:00:26,570 --> 00:00:24,689  
Center and NASA headquarters so

12  
00:00:27,560 --> 00:00:26,580  
introduce our panelists will have some

13  
00:00:29,419 --> 00:00:27,570

discussions and then we'll go to

14

00:00:32,659 --> 00:00:29,429

questions so first I'd like to introduce

15

00:00:34,970 --> 00:00:32,669

our Center Director Bob Cabana also for

16

00:00:37,729 --> 00:00:34,980

time shuttle veteran next we have Josie

17

00:00:39,619 --> 00:00:37,739

Burnett the KSC International Space

18

00:00:42,080 --> 00:00:39,629

Station and spacecraft processing

19

00:00:43,639 --> 00:00:42,090

director sitting next to her we have

20

00:00:45,920 --> 00:00:43,649

bill Dowdell the International Space

21

00:00:49,340 --> 00:00:45,930

Station and spacecraft processing deputy

22

00:00:50,720 --> 00:00:49,350

director for NASA and we have David

23

00:00:53,049 --> 00:00:50,730

buffet the director of the Boeing

24

00:00:56,270 --> 00:00:53,059

companies program management development

25

00:00:59,090 --> 00:00:56,280

so we'll start our discussion today with

26

00:01:01,939 --> 00:00:59,100

let's talk about what did it take to get

27

00:01:03,729 --> 00:01:01,949

ready here at KSC for that very first

28

00:01:07,250 --> 00:01:03,739

flight for the National Space Station

29

00:01:09,469 --> 00:01:07,260

well we were all in a lot different

30

00:01:11,690 --> 00:01:09,479

positions back then it was a long time

31

00:01:13,609 --> 00:01:11,700

ago but the thing I remember most was

32

00:01:15,289 --> 00:01:13,619

the initial plan for a space station

33

00:01:18,200 --> 00:01:15,299

with ship and chip get it to the cape

34

00:01:21,410 --> 00:01:18,210

and launched to space and what really

35

00:01:23,749 --> 00:01:21,420

transpired was a lot different and we

36

00:01:25,310 --> 00:01:23,759

did a lot of testing and David day maybe

37

00:01:28,310 --> 00:01:25,320

you'd like to talk about how do we get

38

00:01:30,950 --> 00:01:28,320

going on that integrated testing that we

39

00:01:32,630 --> 00:01:30,960

ended up did in the miit was it so can I

40

00:01:36,380 --> 00:01:32,640

step back just a little bit a little bit

41

00:01:37,910 --> 00:01:36,390

about before we got to Mei T it was I

42

00:01:40,910 --> 00:01:37,920

really appreciate the fact that one

43

00:01:43,249 --> 00:01:40,920

things that case he did it back in that

44

00:01:45,770 --> 00:01:43,259

day I was in Huntsville and we were in a

45

00:01:48,499 --> 00:01:45,780

factory environment and KSC sent a group

46

00:01:50,480 --> 00:01:48,509

of people up to Huntsville I'd included

47

00:01:53,300 --> 00:01:50,490

folks like bill Parsons was one mark

48

00:01:56,749 --> 00:01:53,310

walsh and mark drones others and tried

49

00:01:59,209 --> 00:01:56,759

to prepare us for the environment of the

50

00:02:02,480 --> 00:01:59,219

lost sight we had no clue what we were

51  
00:02:04,069 --> 00:02:02,490  
coming into having had in a factory

52  
00:02:05,539 --> 00:02:04,079  
where we it was all our equipment we

53  
00:02:09,020 --> 00:02:05,549  
could do what we wanted we could do when

54  
00:02:12,380 --> 00:02:09,030  
we want it they tried to to tell us in

55  
00:02:14,090 --> 00:02:12,390  
advance about the level of integration

56  
00:02:16,370 --> 00:02:14,100  
between the different elements that

57  
00:02:18,830 --> 00:02:16,380  
would be required they tried to tell us

58  
00:02:22,490 --> 00:02:18,840  
about working with multiple elements

59  
00:02:25,940 --> 00:02:22,500  
here they try to tell us about the level

60  
00:02:29,120 --> 00:02:25,950  
of safety that the sensitivity to that

61  
00:02:32,090 --> 00:02:29,130  
at KSC but despite all their efforts to

62  
00:02:34,130 --> 00:02:32,100  
to prepare us it was still quite a shot

63  
00:02:38,270 --> 00:02:34,140

you know it was having been kind of

64

00:02:40,160 --> 00:02:38,280

isolated to come here and then see when

65

00:02:43,250 --> 00:02:40,170

you get to the launch site everything

66

00:02:45,860 --> 00:02:43,260

steps up it was quite an adjustment for

67

00:02:49,640 --> 00:02:45,870

us and it was a lot of fun my plan was

68

00:02:51,560 --> 00:02:49,650

to come here for two weeks and go back I

69

00:02:54,470 --> 00:02:51,570

was not going to like it here I was from

70

00:02:56,120 --> 00:02:54,480

Huntsville that was home but once I got

71

00:02:57,650 --> 00:02:56,130

here I fell in love with the place with

72

00:03:00,560 --> 00:02:57,660

the people with the work with the pace

73

00:03:02,780 --> 00:03:00,570

it was an exciting and exciting time and

74

00:03:04,340 --> 00:03:02,790

things were coming from everywhere we

75

00:03:06,860 --> 00:03:04,350

partnered we partnered with you two day

76  
00:03:09,680 --> 00:03:06,870  
I mean the NASA the NASA Boeing team or

77  
00:03:11,660 --> 00:03:09,690  
was NASA rocketdyne NASA McDonnell

78  
00:03:13,250 --> 00:03:11,670  
Douglas and that's a boy Huntsville it

79  
00:03:14,600 --> 00:03:13,260  
was a partnership all the groups that

80  
00:03:16,610 --> 00:03:14,610  
went to those various sites that brought

81  
00:03:18,680 --> 00:03:16,620  
the hardware the Florida it was like we

82  
00:03:20,900 --> 00:03:18,690  
were we were your spokesperson for the

83  
00:03:22,400 --> 00:03:20,910  
rest of the the KSC rules and

84  
00:03:24,500 --> 00:03:22,410  
regulations and how we do business and

85  
00:03:26,840 --> 00:03:24,510  
that sort of thing so that coming to

86  
00:03:29,180 --> 00:03:26,850  
meet you guys at the factory and then

87  
00:03:30,650 --> 00:03:29,190  
get a hardware to Florida that was part

88  
00:03:32,300 --> 00:03:30,660

of developing the team and that's I

89

00:03:33,770 --> 00:03:32,310

think also one of the reasons why we

90

00:03:35,449 --> 00:03:33,780

were successful when we were able to get

91

00:03:37,610 --> 00:03:35,459

to the the test part you were talking

92

00:03:39,440 --> 00:03:37,620

about Bob so I and I think you know the

93

00:03:40,970 --> 00:03:39,450

hardware was a challenge and I remember

94

00:03:43,400 --> 00:03:40,980

seeing the node when it was an aluminum

95

00:03:45,740 --> 00:03:43,410

shell at Huntsville and then watching it

96

00:03:47,960 --> 00:03:45,750

progress and all it went through down

97

00:03:50,630 --> 00:03:47,970

here but I think more than the hardware

98

00:03:52,580 --> 00:03:50,640

it was the software I remember all the

99

00:03:55,940 --> 00:03:52,590

testing that we did out at the sunny

100

00:03:57,860 --> 00:03:55,950

Carter facility and you know all that we

101  
00:04:00,170 --> 00:03:57,870  
found there but yet when we brought it

102  
00:04:02,660 --> 00:04:00,180  
here we made use of the extra time with

103  
00:04:05,030 --> 00:04:02,670  
the integrated testing we did here the

104  
00:04:07,759 --> 00:04:05,040  
meid testing and we found a ton of stuff

105  
00:04:09,860 --> 00:04:07,769  
on a software that that we were able to

106  
00:04:11,090 --> 00:04:09,870  
fix on the ground I remember when we

107  
00:04:13,310 --> 00:04:11,100  
sent the commands from the half flight

108  
00:04:15,650 --> 00:04:13,320  
deck to power up the space station for

109  
00:04:17,569 --> 00:04:15,660  
the first time I mean nobody was more

110  
00:04:19,729 --> 00:04:17,579  
surprised than me when it all worked I

111  
00:04:21,440 --> 00:04:19,739  
mean everything was perfect but it was

112  
00:04:25,279 --> 00:04:21,450  
perfect because of all the work that we

113  
00:04:26,090 --> 00:04:25,289

did and as well as everybody worked how

114

00:04:27,830 --> 00:04:26,100

hard they work to make

115

00:04:29,510 --> 00:04:27,840

it right before it got here it was a

116

00:04:32,360 --> 00:04:29,520

work that was done at KSC that made it

117

00:04:33,680 --> 00:04:32,370

possible to really work on orbit so the

118

00:04:35,630 --> 00:04:33,690

role that we've been talking about is

119

00:04:37,220 --> 00:04:35,640

really it was a unique role for KSC back

120

00:04:39,230 --> 00:04:37,230

then you know traditionally we were

121

00:04:40,430 --> 00:04:39,240

payloads were brought to KSC and we

122

00:04:42,710 --> 00:04:40,440

processed we did all the ground

123

00:04:44,210 --> 00:04:42,720

processing at the launch site and what

124

00:04:46,670 --> 00:04:44,220

we were asked to do was go out to the

125

00:04:48,470 --> 00:04:46,680

factories like to David some factory in

126  
00:04:52,070 --> 00:04:48,480  
Boeing Huntsville and in other places

127  
00:04:53,480 --> 00:04:52,080  
and to incorporate our expertise and try

128  
00:04:56,620 --> 00:04:53,490  
to prepare folks for the launch site

129  
00:04:58,760 --> 00:04:56,630  
like he'd said it included the sides our

130  
00:05:00,500 --> 00:04:58,770  
government our contractors in the US

131  
00:05:02,240 --> 00:05:00,510  
government international partners as

132  
00:05:03,800 --> 00:05:02,250  
well and so one of the key elements in

133  
00:05:06,590 --> 00:05:03,810  
those first six flights first seven

134  
00:05:09,170 --> 00:05:06,600  
flights um was the space station the

135  
00:05:11,300 --> 00:05:09,180  
Canadian robotic arm the SSR MS and it

136  
00:05:12,830 --> 00:05:11,310  
was it was the only international

137  
00:05:14,930 --> 00:05:12,840  
element at the time that was in the

138  
00:05:17,060 --> 00:05:14,940

critical path for us succeeding to him

139

00:05:19,160 --> 00:05:17,070

to establishing that initial phase a for

140

00:05:21,290 --> 00:05:19,170

the space station and my role back then

141

00:05:24,260 --> 00:05:21,300

was to do like build it and others that

142

00:05:26,420 --> 00:05:24,270

David talked about but go to Canada with

143

00:05:27,890 --> 00:05:26,430

our international partners and and I'm

144

00:05:29,690 --> 00:05:27,900

work with the at the time it was spar

145

00:05:31,550 --> 00:05:29,700

butts the macdonald dettwiler folks so

146

00:05:33,230 --> 00:05:31,560

the difference there was we were dealing

147

00:05:34,580 --> 00:05:33,240

with an international partner I was on

148

00:05:36,590 --> 00:05:34,590

we were working with another government

149

00:05:38,360 --> 00:05:36,600

it wasn't just you know another

150

00:05:40,880 --> 00:05:38,370

contractor it was another government and

151  
00:05:42,770 --> 00:05:40,890  
and it was a contractor that had done

152  
00:05:44,180 --> 00:05:42,780  
business with with NASA for quite a bit

153  
00:05:45,710 --> 00:05:44,190  
of time so you know that the experience

154  
00:05:47,720 --> 00:05:45,720  
at the launch site they had plenty of

155  
00:05:49,910 --> 00:05:47,730  
experience that the launch site but what

156  
00:05:52,760 --> 00:05:49,920  
the value that I brought to that team at

157  
00:05:54,890 --> 00:05:52,770  
the time was the miit they knew that we

158  
00:05:56,870 --> 00:05:54,900  
needed to do a ground test they knew

159  
00:05:59,120 --> 00:05:56,880  
that um we knew that the ship and shoot

160  
00:06:01,370 --> 00:05:59,130  
was was not the right answer and that

161  
00:06:02,990 --> 00:06:01,380  
there would be time to do a full up

162  
00:06:05,180 --> 00:06:03,000  
integrated test with the canadian armed

163  
00:06:07,340 --> 00:06:05,190

and the US lab and be able to flush out

164

00:06:09,260 --> 00:06:07,350

some of those software problems and we

165

00:06:11,840 --> 00:06:09,270

did we found some we film we felt

166

00:06:13,490 --> 00:06:11,850

morally software to if I wasn't a

167

00:06:14,630 --> 00:06:13,500

Russian American power converter or

168

00:06:15,830 --> 00:06:14,640

American Russian power converter

169

00:06:19,820 --> 00:06:15,840

something like that that was that was

170

00:06:21,800 --> 00:06:19,830

bad and an Mei is our nothing again it's

171

00:06:23,840 --> 00:06:21,810

been a while but as I remembers I think

172

00:06:26,210 --> 00:06:23,850

was you know our old boss tipped alone

173

00:06:27,350 --> 00:06:26,220

work with mr. Abby and work with the

174

00:06:30,680 --> 00:06:27,360

course Jay Honeycutt as a senator

175

00:06:31,730 --> 00:06:30,690

director here at the time and Danny

176

00:06:36,020 --> 00:06:31,740

crossed i guess was in the vehicle

177

00:06:37,580 --> 00:06:36,030

office and to get em EIT in place and of

178

00:06:38,230 --> 00:06:37,590

course bill painter was a dis oft where

179

00:06:40,779 --> 00:06:38,240

guy and he

180

00:06:42,129 --> 00:06:40,789

part and parcel that whole deal so it

181

00:06:45,129 --> 00:06:42,139

was a good thing we did it and we found

182

00:06:47,320 --> 00:06:45,139

a lot David David I know you found a ton

183

00:06:49,120 --> 00:06:47,330

of stuff on in the lab the purple DS

184

00:06:51,969 --> 00:06:49,130

have came up the computers crashed or

185

00:06:53,950 --> 00:06:51,979

whatever yep so you know I've been

186

00:06:56,589 --> 00:06:53,960

meaning to ask you since since I was the

187

00:06:59,020 --> 00:06:56,599

trust guy and we had the power on the

188

00:07:03,999 --> 00:06:59,030

trusses we never have gotten your power

189

00:07:07,779 --> 00:07:04,009

deposit I think you still owe us you

190

00:07:09,249 --> 00:07:07,789

still have regulated a okay here's okay

191

00:07:10,839 --> 00:07:09,259

thank you very service thank you very

192

00:07:12,760 --> 00:07:10,849

much let the record show will give it my

193

00:07:15,370 --> 00:07:12,770

get fifty cents and mr. Sorenson yes but

194

00:07:19,029 --> 00:07:15,380

there's okay there you go okay but

195

00:07:21,520 --> 00:07:19,039

anyway Mei T was a it was a it was a

196

00:07:23,020 --> 00:07:21,530

very exciting time for us because we had

197

00:07:24,249 --> 00:07:23,030

flight crews in the building we were

198

00:07:25,719 --> 00:07:24,259

trying to run as close to flight

199

00:07:27,939 --> 00:07:25,729

procedures as possible we're trying to

200

00:07:29,439 --> 00:07:27,949

get z1 and p6 as close to the lab as

201  
00:07:32,909 --> 00:07:29,449  
wiki gex we couldn't get David to move

202  
00:07:35,350 --> 00:07:32,919  
so it was the SS PF looked like a

203  
00:07:37,480 --> 00:07:35,360  
plumbing and electrical nightmare of

204  
00:07:38,379 --> 00:07:37,490  
sorts you know but it was it was

205  
00:07:39,999 --> 00:07:38,389  
interesting getting everything close

206  
00:07:41,830 --> 00:07:40,009  
enough together you get to lash it

207  
00:07:45,279 --> 00:07:41,840  
together power data cooling all that and

208  
00:07:46,839 --> 00:07:45,289  
then flip the switch so we made a lot of

209  
00:07:49,209 --> 00:07:46,849  
changes to the flight crew procedures

210  
00:07:52,420 --> 00:07:49,219  
when we were going through all that it

211  
00:07:53,860 --> 00:07:52,430  
really helped you can you can work stuff

212  
00:07:54,999 --> 00:07:53,870  
in a lab you can work it on a simulator

213  
00:07:57,670 --> 00:07:55,009

all you want but when you're actually

214

00:07:59,110 --> 00:07:57,680

dealing with the real hardware you know

215

00:08:01,060 --> 00:07:59,120

that's when you can really PV the

216

00:08:02,529 --> 00:08:01,070

procedures and get them right I remember

217

00:08:06,730 --> 00:08:02,539

when we were we went over to rush of the

218

00:08:08,830 --> 00:08:06,740

train on the FGB and I think the best

219

00:08:11,860 --> 00:08:08,840

thing about the flight home we were on

220

00:08:13,770 --> 00:08:11,870

the NASA chartered flight in Sergei

221

00:08:17,020 --> 00:08:13,780

krikalev and I it took all our notes

222

00:08:21,189 --> 00:08:17,030

from the testing that we had done over

223

00:08:22,779 --> 00:08:21,199

there and we grabbed the fao folks of

224

00:08:25,420 --> 00:08:22,789

procedure writers we got them together

225

00:08:27,670 --> 00:08:25,430

and we sat down in on that flight home

226

00:08:29,589 --> 00:08:27,680

we wrote the procedures that we used on

227

00:08:32,589 --> 00:08:29,599

orbit we made all the corrections to

228

00:08:35,110 --> 00:08:32,599

what we had head and you know it really

229

00:08:37,620 --> 00:08:35,120

there's nothing like being with the real

230

00:08:40,510 --> 00:08:37,630

hardware to actually get things right

231

00:08:42,670 --> 00:08:40,520

you know and we'd be remiss if we didn't

232

00:08:44,079 --> 00:08:42,680

bring it up you mentioned George Abby

233

00:08:46,269 --> 00:08:44,089

and there was a lot that led up to those

234

00:08:48,579 --> 00:08:46,279

hardware testing that we did I will

235

00:08:51,430 --> 00:08:48,589

never forget the the George Abby

236

00:08:52,310 --> 00:08:51,440

Saturday reviews the gassers every

237

00:08:56,540 --> 00:08:52,320

saturday from

238

00:08:59,420 --> 00:08:56,550

eight to noon or longer every manager

239

00:09:01,490 --> 00:08:59,430

senior manager briefing his system why

240

00:09:03,410 --> 00:09:01,500

it was behind and and all the work that

241

00:09:05,810 --> 00:09:03,420

we had to do to get space to enjoy all

242

00:09:08,540 --> 00:09:05,820

that I remember the connector issues and

243

00:09:10,250 --> 00:09:08,550

all connectors and you know all the all

244

00:09:11,780 --> 00:09:10,260

that we went through to make sure that

245

00:09:14,630 --> 00:09:11,790

everything was right to try and make

246

00:09:16,040 --> 00:09:14,640

schedule it was 7am in canoga park that

247

00:09:18,530 --> 00:09:16,050

i had to be in mr. voice Mitchell's

248

00:09:21,200 --> 00:09:18,540

office for the ten o'clock nine o'clock

249

00:09:22,640 --> 00:09:21,210

whatever central time with mr. Abby I

250

00:09:24,200 --> 00:09:22,650

remember that well so mr. Mitchell the

251  
00:09:26,420 --> 00:09:24,210  
vice president was in there and all his

252  
00:09:29,930 --> 00:09:26,430  
senior staff and it was a there I was I

253  
00:09:32,120 --> 00:09:29,940  
wasn't sure why I was there but it was

254  
00:09:34,310 --> 00:09:32,130  
interesting you know you made a good

255  
00:09:35,540 --> 00:09:34,320  
point a few minutes ago I'd like to to

256  
00:09:37,850 --> 00:09:35,550  
expand a little bit and that was you

257  
00:09:40,100 --> 00:09:37,860  
talked about seeing that node one at the

258  
00:09:42,620 --> 00:09:40,110  
time just being a shell up there in

259  
00:09:44,500 --> 00:09:42,630  
Huntsville you know it I want to make

260  
00:09:47,870 --> 00:09:44,510  
sure that as we sit here and talk about

261  
00:09:49,850 --> 00:09:47,880  
what happened here at KSC and a lot of

262  
00:09:52,400 --> 00:09:49,860  
those the gassers and the S Tom's and

263  
00:09:54,860 --> 00:09:52,410

the other meetings that we had I want to

264

00:09:58,490 --> 00:09:54,870

highlight the the the fact that the

265

00:10:02,810 --> 00:09:58,500

design centers were they took this from

266

00:10:06,110 --> 00:10:02,820

idea to reality and then then we took it

267

00:10:09,020 --> 00:10:06,120

that last little bit but the you know

268

00:10:12,170 --> 00:10:09,030

the notion the idea and the requirement

269

00:10:13,820 --> 00:10:12,180

that they did their work there they

270

00:10:15,680 --> 00:10:13,830

handed it to us and then they continued

271

00:10:18,320 --> 00:10:15,690

to support us all the way through until

272

00:10:19,760 --> 00:10:18,330

we got on orbit was just fantastic and

273

00:10:22,100 --> 00:10:19,770

we you know we just wouldn't have been

274

00:10:25,220 --> 00:10:22,110

successful if they hadn't hung in there

275

00:10:27,200 --> 00:10:25,230

and stayed with us and I also remember

276

00:10:29,810 --> 00:10:27,210

the feeling of being overwhelmed in

277

00:10:31,280 --> 00:10:29,820

those gassers at what was you know we

278

00:10:34,880 --> 00:10:31,290

just had a few things here but the high

279

00:10:38,330 --> 00:10:34,890

bay was full and the S SPF and and the

280

00:10:39,740 --> 00:10:38,340

train of things that were coming and we

281

00:10:41,570 --> 00:10:39,750

had to get things done and get it behind

282

00:10:43,790 --> 00:10:41,580

us get on to the next one how lucky we

283

00:10:46,340 --> 00:10:43,800

were yeah yeah once we got going I mean

284

00:10:47,600 --> 00:10:46,350

seeing the SS PF fill up with hardware

285

00:10:49,520 --> 00:10:47,610

where we couldn't even keep it all in

286

00:10:52,420 --> 00:10:49,530

there we had to use the ONC hi bata

287

00:10:54,800 --> 00:10:52,430

stack up you know trust structure in it

288

00:10:57,940 --> 00:10:54,810

once it got going it was truly amazing

289

00:11:02,300 --> 00:10:57,950

went in fact when you consider you know

290

00:11:04,640 --> 00:11:02,310

NASA in the United States Japan Canada

291

00:11:06,140 --> 00:11:04,650

ISA and all its partners Russia all that

292

00:11:08,780 --> 00:11:06,150

hardware built from around the

293

00:11:10,370 --> 00:11:08,790

world some of the international hardware

294

00:11:12,290 --> 00:11:10,380

being flown here and tested prior to

295

00:11:13,940 --> 00:11:12,300

going up but all of it built all over

296

00:11:15,350 --> 00:11:13,950

the world coming together on orbit for

297

00:11:18,110 --> 00:11:15,360

the first time in heaven everything work

298

00:11:20,030 --> 00:11:18,120

when you the success that we have had on

299

00:11:21,170 --> 00:11:20,040

orbit the wall of EBA everybody said

300

00:11:23,120 --> 00:11:21,180

you're never going to be able to do all

301

00:11:25,820 --> 00:11:23,130

those cvs and look at I'm a sittin at

302

00:11:27,530 --> 00:11:25,830

the frr Friday in in five and a half

303

00:11:29,300 --> 00:11:27,540

minutes with computer graphics they went

304

00:11:31,250 --> 00:11:29,310

through the EBA sit there going to do

305

00:11:34,580 --> 00:11:31,260

and it's like well I'm glad they're not

306

00:11:36,830 --> 00:11:34,590

complicated you know but it's it's

307

00:11:38,360 --> 00:11:36,840

unbelievable when you consider all that

308

00:11:40,010 --> 00:11:38,370

we've accomplished in how well we've

309

00:11:42,110 --> 00:11:40,020

done it and then you throw on top of it

310

00:11:44,480 --> 00:11:42,120

all the different cultures and you know

311

00:11:46,640 --> 00:11:44,490

what we've had to overcome it is a

312

00:11:48,380 --> 00:11:46,650

phenomenal engineering in human

313

00:11:50,150 --> 00:11:48,390

achievement that the space station is

314

00:11:52,520 --> 00:11:50,160

today and to think that we've been on

315

00:11:56,030 --> 00:11:52,530

orbit now with humans for solid for ten

316

00:11:59,450 --> 00:11:56,040

years that's amazing it's one of one of

317

00:12:02,450 --> 00:11:59,460

the things that comes to mind that I

318

00:12:04,460 --> 00:12:02,460

learned on this program and have since

319

00:12:06,830 --> 00:12:04,470

learned in other ways but it was really

320

00:12:09,460 --> 00:12:06,840

brought home here is the universal

321

00:12:12,680 --> 00:12:09,470

language of a good engineering drawing

322

00:12:15,200 --> 00:12:12,690

it doesn't matter where it came from in

323

00:12:17,180 --> 00:12:15,210

the world if it's a good drawing and a

324

00:12:19,760 --> 00:12:17,190

good design you can follow it you can

325

00:12:21,230 --> 00:12:19,770

use it you can read it you know mom I'm

326

00:12:24,170 --> 00:12:21,240

sorry I was just to say I think that's

327

00:12:26,510 --> 00:12:24,180

one of the key things at a working-level

328

00:12:28,900 --> 00:12:26,520

you know there's always politics and in

329

00:12:30,710 --> 00:12:28,910

it a high international level

330

00:12:32,600 --> 00:12:30,720

negotiations get tough I remember

331

00:12:34,070 --> 00:12:32,610

sitting through all the negotiations we

332

00:12:35,810 --> 00:12:34,080

had on the crew code of conduct and

333

00:12:38,600 --> 00:12:35,820

getting international agreements I mean

334

00:12:40,550 --> 00:12:38,610

everything in place it's hard but when

335

00:12:42,860 --> 00:12:40,560

you sat down with a technical issue the

336

00:12:44,330 --> 00:12:42,870

engineers working with each other it

337

00:12:47,060 --> 00:12:44,340

language wasn't a barrier we had a

338

00:12:48,800 --> 00:12:47,070

common language to get things done and

339

00:12:50,270 --> 00:12:48,810

along those lines with the international

340

00:12:53,270 --> 00:12:50,280

partners and the technical solutions

341

00:12:54,800 --> 00:12:53,280

that we had to evolving into them the

342

00:12:55,940 --> 00:12:54,810

one key point is even though we were

343

00:12:57,530 --> 00:12:55,950

coming at it from different points of

344

00:12:59,210 --> 00:12:57,540

view everybody was after that common

345

00:13:00,800 --> 00:12:59,220

goal what do we need to do to make it

346

00:13:02,870 --> 00:13:00,810

work you know we've got a deadline we've

347

00:13:04,280 --> 00:13:02,880

got our hardware or software what what

348

00:13:05,600 --> 00:13:04,290

is it we need to do and the thing I

349

00:13:08,390 --> 00:13:05,610

learned from a lot of those discussions

350

00:13:10,310 --> 00:13:08,400

I was an engineer at the time was the

351

00:13:12,530 --> 00:13:10,320

the different approaches so our

352

00:13:15,440 --> 00:13:12,540

international partners they think

353

00:13:17,180 --> 00:13:15,450

differently not all of the engineering

354

00:13:17,670 --> 00:13:17,190

solutions are come to in the same manner

355

00:13:21,269 --> 00:13:17,680

the

356

00:13:23,880 --> 00:13:21,279

were going towards a common goal just

357

00:13:26,250 --> 00:13:23,890

made it all that more much more special

358

00:13:28,079 --> 00:13:26,260

and I think a lot of our success was due

359

00:13:29,370 --> 00:13:28,089

to the fact that we had an open mind we

360

00:13:31,829 --> 00:13:29,380

could look at how these different

361

00:13:33,750 --> 00:13:31,839

problems needed to be solved and we just

362

00:13:35,280 --> 00:13:33,760

work together it was an achievement from

363

00:13:38,340 --> 00:13:35,290

a hardware standpoint but also a

364

00:13:39,900 --> 00:13:38,350

relationship in a people standpoint just

365

00:13:42,210 --> 00:13:39,910

you know some of the best memories I

366

00:13:43,680 --> 00:13:42,220

have of my entire career where the early

367

00:13:45,540 --> 00:13:43,690

days the station working on i'm

368

00:13:47,370 --> 00:13:45,550

@hardwick trying to you know no

369

00:13:50,550 --> 00:13:47,380

Saturday's my Saturday's were dedicated

370

00:13:53,010 --> 00:13:50,560

to work and you know yet other you know

371

00:13:55,139 --> 00:13:53,020

people sides of things so so David and I

372

00:13:59,130 --> 00:13:55,149

used to and Bill as well we used to

373

00:14:00,990 --> 00:13:59,140

brief our deputy program manager you

374

00:14:03,120 --> 00:14:01,000

know every day almost on the status of

375

00:14:06,000 --> 00:14:03,130

our hardware and so David you worked

376

00:14:08,970 --> 00:14:06,010

bill worked element 3a 4a so to a went

377

00:14:12,240 --> 00:14:08,980

first element 3a for one second David

378

00:14:15,269 --> 00:14:12,250

the lab what 5a went went 3rd and then I

379

00:14:20,220 --> 00:14:15,279

was after David on the element 6a and I

380

00:14:22,050 --> 00:14:20,230

was almost guaranteed to see if let how

381

00:14:24,090 --> 00:14:22,060

do I say this David always spun

382

00:14:25,530 --> 00:14:24,100

everybody up with the lab and so I was

383

00:14:28,320 --> 00:14:25,540

almost guaranteed to have a good

384

00:14:31,470 --> 00:14:28,330

reception whatever came to be when I by

385

00:14:33,210 --> 00:14:31,480

the time that's exactly true so that you

386

00:14:36,030 --> 00:14:33,220

know that but that brings up a very good

387

00:14:37,710 --> 00:14:36,040

point is that during those times and I

388

00:14:40,140 --> 00:14:37,720

don't want to make it to sound like

389

00:14:42,360 --> 00:14:40,150

anyone who wasn't with us during that

390

00:14:44,220 --> 00:14:42,370

time that it was all problems the things

391

00:14:45,360 --> 00:14:44,230

that went smoothly just went smoothly

392

00:14:47,100 --> 00:14:45,370

you know they don't stand out in your

393

00:14:50,220 --> 00:14:47,110

mind it's the times that we had

394

00:14:52,530 --> 00:14:50,230

something we had to pull together solve

395

00:14:54,630 --> 00:14:52,540

the find a solution together someone who

396

00:14:56,490 --> 00:14:54,640

had faced the problem before come over

397

00:15:00,740 --> 00:14:56,500

and help us fix it we pull on the design

398

00:15:04,019 --> 00:15:00,750

centers I recall what a surprise it was

399

00:15:05,400 --> 00:15:04,029

when and it started with 2a and it went

400

00:15:07,710 --> 00:15:05,410

all the way through i guess maybe the

401  
00:15:10,079 --> 00:15:07,720  
lab it was the so complicated that we

402  
00:15:12,240 --> 00:15:10,089  
had so many issues there was that the

403  
00:15:17,160 --> 00:15:12,250  
bigger the issue the more challenging it

404  
00:15:20,579 --> 00:15:17,170  
was a poorly one program dives in on

405  
00:15:22,769 --> 00:15:20,589  
people and kills the messenger but what

406  
00:15:24,420 --> 00:15:22,779  
we what i found especially back in those

407  
00:15:26,069 --> 00:15:24,430  
days and i assume it's the same way

408  
00:15:28,380 --> 00:15:26,079  
today with the leadership is when you

409  
00:15:29,020 --> 00:15:28,390  
encounter a problem the vistas open up

410  
00:15:31,750 --> 00:15:29,030  
how can we

411  
00:15:33,550 --> 00:15:31,760  
and let's go find a solution in it and

412  
00:15:35,740 --> 00:15:33,560  
the walls come down and the barriers go

413  
00:15:37,600 --> 00:15:35,750

away and the badges turn the same color

414

00:15:39,580 --> 00:15:37,610

and we just go find a solution yeah

415

00:15:41,920 --> 00:15:39,590

you'd say I can remember Jay Greene and

416

00:15:43,180 --> 00:15:41,930

those the meeting said you know I when

417

00:15:44,530 --> 00:15:43,190

we came up with something like that he

418

00:15:46,780 --> 00:15:44,540

would tell you I will clear my calendar

419

00:15:48,460 --> 00:15:46,790

and we'll figure out how we need to make

420

00:15:49,860 --> 00:15:48,470

time who we need to get involved to go

421

00:15:51,610 --> 00:15:49,870

fair out how to solve this problem and

422

00:15:53,500 --> 00:15:51,620

it would be later in the afternoon

423

00:15:54,640 --> 00:15:53,510

typically a new board where we'd have

424

00:15:56,560 --> 00:15:54,650

that discussion be later in the

425

00:15:58,000 --> 00:15:56,570

afternoon we convene something as after

426

00:15:59,230 --> 00:15:58,010

we had some time to go get the right

427

00:16:01,570 --> 00:15:59,240

folks together to figure out what we

428

00:16:03,040 --> 00:16:01,580

were going to do talk to our

429

00:16:06,060 --> 00:16:03,050

counterparts in the vehicle office in

430

00:16:09,040 --> 00:16:06,070

Houston and then we talked to Jay and

431

00:16:10,770 --> 00:16:09,050

see how the the thing was going to

432

00:16:14,500 --> 00:16:10,780

evolve how we were going to approach the

433

00:16:17,320 --> 00:16:14,510

solution Jay Jay was a hard taskmaster

434

00:16:18,640 --> 00:16:17,330

but I don't think we'd have a space

435

00:16:22,270 --> 00:16:18,650

station on orbit today if it weren't for

436

00:16:24,340 --> 00:16:22,280

Jay and the work that he did helping the

437

00:16:26,410 --> 00:16:24,350

team get to the right solutions in it

438

00:16:28,090 --> 00:16:26,420

when you when you came to brief him you

439

00:16:29,950 --> 00:16:28,100

better have your yet you better know

440

00:16:32,670 --> 00:16:29,960

what you were talking about yeah he had

441

00:16:36,340 --> 00:16:32,680

a very good nose for a poorly told story

442

00:16:38,440 --> 00:16:36,350

or something like that it didn't have to

443

00:16:40,420 --> 00:16:38,450

be a good story it just had to be a

444

00:16:43,180 --> 00:16:40,430

well-thought-out lyst or inaccurate Yeah

445

00:16:45,280 --> 00:16:43,190

right an actor yeah he has so much

446

00:16:47,110 --> 00:16:45,290

technical depth that there was there was

447

00:16:48,840 --> 00:16:47,120

no bamboos on that guy you were you were

448

00:16:50,890 --> 00:16:48,850

dead meat if you tried that but anyway

449

00:16:54,810 --> 00:16:50,900

it was interesting so I hope he's

450

00:16:56,740 --> 00:16:54,820

watching this now yeah thank you the the

451

00:16:58,900 --> 00:16:56,750

International aspect of it there was

452

00:17:00,040 --> 00:16:58,910

there were signs in the bay in the early

453

00:17:03,220 --> 00:17:00,050

days that were I think they were in

454

00:17:05,610 --> 00:17:03,230

japanese and italian and maybe german

455

00:17:08,530 --> 00:17:05,620

well i do you remember yeah that was I

456

00:17:10,770 --> 00:17:08,540

remember the day when I when it hit me

457

00:17:13,390 --> 00:17:10,780

that we truly were an international

458

00:17:15,580 --> 00:17:13,400

program was the little yellow signs that

459

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

say the floor is wet just a simple

460

00:17:19,390 --> 00:17:17,600

little communication like that and I

461

00:17:21,430 --> 00:17:19,400

walked out one day and the floor was wet

462

00:17:25,320 --> 00:17:21,440

and I realized that it was in English

463

00:17:28,300 --> 00:17:25,330

and Japanese and Russian and German and

464

00:17:30,070 --> 00:17:28,310

n-butane might even have been it well I

465

00:17:31,540 --> 00:17:30,080

don't read Italian don't read any of

466

00:17:33,580 --> 00:17:31,550

those I just kind of recognized a little

467

00:17:36,100 --> 00:17:33,590

bit but it was but it truly hit home

468

00:17:37,870 --> 00:17:36,110

that the importance of communicating

469

00:17:39,190 --> 00:17:37,880

even the simple stuff to a lot of

470

00:17:40,610 --> 00:17:39,200

different people in a lot of different

471

00:17:43,640 --> 00:17:40,620

languages

472

00:17:46,070 --> 00:17:43,650

a and plus it made for a lot of fun

473

00:17:48,530 --> 00:17:46,080

because as Josie had said in those

474

00:17:52,160 --> 00:17:48,540

sometimes in those noon boards an issue

475

00:17:53,990 --> 00:17:52,170

would come up and the solution would

476

00:17:56,690 --> 00:17:54,000

simply come from a different cultural

477

00:17:59,150 --> 00:17:56,700

starting point and so as a person worked

478

00:18:01,190 --> 00:17:59,160

through to a solution several of us

479

00:18:03,320 --> 00:18:01,200

might be sitting there going what in the

480

00:18:04,790 --> 00:18:03,330

world are they thinking but as they went

481

00:18:06,080 --> 00:18:04,800

through their logic and came to how they

482

00:18:07,850 --> 00:18:06,090

arrived at it turned out to be a

483

00:18:11,660 --> 00:18:07,860

perfectly good solution it was just a

484

00:18:15,140 --> 00:18:11,670

different approach richer well first

485

00:18:16,460 --> 00:18:15,150

crew on orbit and we'll jump to the

486

00:18:18,200 --> 00:18:16,470

actual first crew that man is Space

487

00:18:20,270 --> 00:18:18,210

Station manama I come back and I got a I

488

00:18:23,990 --> 00:18:20,280

got a couple stories I got to tell but

489

00:18:25,850 --> 00:18:24,000

Shep's launch he launched on October

490

00:18:28,160 --> 00:18:25,860

thirty-first and they rendezvous Glenn

491

00:18:30,200 --> 00:18:28,170

in the space station November second so

492

00:18:31,760 --> 00:18:30,210

this October thirty-first would be the

493

00:18:34,280 --> 00:18:31,770

10-year anniversary is sent and equip

494

00:18:35,960 --> 00:18:34,290

the space station and that was Eureka

495

00:18:37,850 --> 00:18:35,970

zdenko sergei krikalev and bill Shepard

496

00:18:39,080 --> 00:18:37,860

Yuri was the commander of the Soyuz and

497

00:18:41,660 --> 00:18:39,090

bill was the commander of the space

498

00:18:43,490 --> 00:18:41,670

station and we had a huge NASA

499

00:18:45,380 --> 00:18:43,500

contingent that went over to see the

500

00:18:47,810 --> 00:18:45,390

launch and so we're flying on this

501  
00:18:51,200 --> 00:18:47,820  
Russian airplane from Moscow down to the

502  
00:18:53,480 --> 00:18:51,210  
baikonur cosmodrome in kazakhstan and

503  
00:18:55,730 --> 00:18:53,490  
the weather was really bad and we kept

504  
00:18:58,970 --> 00:18:55,740  
delaying and delaying leave in Moscow

505  
00:19:00,950 --> 00:18:58,980  
and so we finally get in and go I mean

506  
00:19:03,430 --> 00:19:00,960  
it's like it's go now or we're not going

507  
00:19:05,600 --> 00:19:03,440  
to see the launch right so we're

508  
00:19:08,090 --> 00:19:05,610  
descending into our final approach

509  
00:19:12,950 --> 00:19:08,100  
they're at the what was the Brawn

510  
00:19:16,340 --> 00:19:12,960  
landing facility Jubal any at Kazakhstan

511  
00:19:17,900 --> 00:19:16,350  
it Baikonur and you know the pilots

512  
00:19:19,490 --> 00:19:17,910  
making his approach and it's cloudy out

513  
00:19:21,320 --> 00:19:19,500

the windows and you know we had a bunch

514

00:19:23,510 --> 00:19:21,330

of pilots on the airplane and everything

515

00:19:24,860 --> 00:19:23,520

else and he pulls the power he's in his

516

00:19:27,440 --> 00:19:24,870

flare and i'm waiting for the wheels to

517

00:19:28,940 --> 00:19:27,450

touch down all of a sudden the power

518

00:19:32,750 --> 00:19:28,950

comes back up and I look out the window

519

00:19:37,070 --> 00:19:32,760

and all I see is dirt yeah we go up and

520

00:19:40,549 --> 00:19:37,080

we're all talking you know and he comes

521

00:19:42,110 --> 00:19:40,559

he comes in again in the same thing only

522

00:19:43,640 --> 00:19:42,120

this time the guys on one side of the

523

00:19:46,220 --> 00:19:43,650

airplane cease mint and the guys on the

524

00:19:48,860 --> 00:19:46,230

other side see dirt yeah we go around

525

00:19:52,340 --> 00:19:48,870

again the next time we landed in we got

526  
00:19:53,870 --> 00:19:52,350  
out to the launch pad and do you know we

527  
00:19:57,170 --> 00:19:53,880  
made it in time to see Shep lines

528  
00:20:00,290 --> 00:19:57,180  
and you know it was it was awesome you

529  
00:20:02,870 --> 00:20:00,300  
know the the excitement in everything

530  
00:20:04,400 --> 00:20:02,880  
but the rocket lifted off and it

531  
00:20:06,020 --> 00:20:04,410  
disappeared we never saw it again I mean

532  
00:20:07,760 --> 00:20:06,030  
we saw it for just a few seconds and

533  
00:20:09,640 --> 00:20:07,770  
that was it they were off the space

534  
00:20:12,140 --> 00:20:09,650  
station but that was the beginning in

535  
00:20:15,140 --> 00:20:12,150  
seen those guys on orbit being in the

536  
00:20:17,000 --> 00:20:15,150  
Mission Control Center in in Moscow when

537  
00:20:18,470 --> 00:20:17,010  
they opened the hatch and the three of

538  
00:20:19,910 --> 00:20:18,480

them got the I can still see him you

539

00:20:22,940 --> 00:20:19,920

know putting their hands together and

540

00:20:26,060 --> 00:20:22,950

talking to our then administrator mr.

541

00:20:27,800 --> 00:20:26,070

golden and Yuri captive the head of the

542

00:20:29,930 --> 00:20:27,810

Russian space agency from up there

543

00:20:32,090 --> 00:20:29,940

starting off and we've had a crew on

544

00:20:39,110 --> 00:20:32,100

orbit ever since then for ten years that

545

00:20:40,160 --> 00:20:39,120

that's that's amazing golly so first you

546

00:20:43,220 --> 00:20:40,170

know one of the questions that i got

547

00:20:44,480 --> 00:20:43,230

from the media before we launched was

548

00:20:47,150 --> 00:20:44,490

who's going to be the first person in

549

00:20:51,560 --> 00:20:47,160

the space station and I wouldn't tell ya

550

00:20:53,800 --> 00:20:51,570

and you know oh gosh what what a neat

551  
00:20:55,940 --> 00:20:53,810  
flight that was I remember you know

552  
00:20:59,090 --> 00:20:55,950  
first off Nancy curry was just

553  
00:21:00,860 --> 00:20:59,100  
phenomenal with the arm lifting node one

554  
00:21:02,720 --> 00:21:00,870  
out of the had to be very careful with

555  
00:21:06,200 --> 00:21:02,730  
it you didn't I didn't want to hurt it

556  
00:21:08,390 --> 00:21:06,210  
David but I it was like watching grass

557  
00:21:10,490 --> 00:21:08,400  
grow the speed I didn't know you could

558  
00:21:11,990 --> 00:21:10,500  
fly the arm that slow when she lets get

559  
00:21:13,460 --> 00:21:12,000  
it out of the payload Bay because she

560  
00:21:15,800 --> 00:21:13,470  
only had a couple inches of clearance on

561  
00:21:17,990 --> 00:21:15,810  
either side and we got it attached to

562  
00:21:20,690 --> 00:21:18,000  
the orbiter docking station and then we

563  
00:21:23,390 --> 00:21:20,700

were rendezvous was sorry and now it was

564

00:21:24,770 --> 00:21:23,400

pretty neat seeing it you know and

565

00:21:26,780 --> 00:21:24,780

flying it around and bringing it right

566

00:21:28,490 --> 00:21:26,790

down in the payload Bay and I couldn't

567

00:21:30,950 --> 00:21:28,500

see it out the windows because the node

568

00:21:34,220 --> 00:21:30,960

was blocking our view out the overhead

569

00:21:36,560 --> 00:21:34,230

in back windows so we were fine prox

570

00:21:38,570 --> 00:21:36,570

hops on it with a camera on the center

571

00:21:39,950 --> 00:21:38,580

line the payload Bay and another one on

572

00:21:41,840 --> 00:21:39,960

the end of the arm and so I got the two

573

00:21:43,850 --> 00:21:41,850

monitors over there and I'm keeping it

574

00:21:46,070 --> 00:21:43,860

centered up you know about three feet

575

00:21:47,240 --> 00:21:46,080

from the end of the arm so all Nancy has

576

00:21:49,130 --> 00:21:47,250

to do is reach over and grab it

577

00:21:51,200 --> 00:21:49,140

affecting the simulator the orbiter fly

578

00:21:52,490 --> 00:21:51,210

so good every night in it before she

579

00:21:55,160 --> 00:21:52,500

could reach over and grab it I just fly

580

00:21:58,760 --> 00:21:55,170

it onto the arm I didn't do that on

581

00:22:00,320 --> 00:21:58,770

orbit so but so we're fine we're waiting

582

00:22:03,080 --> 00:22:00,330

to get over a Russian ground site so

583

00:22:04,820 --> 00:22:03,090

that they can say that the the FGB is in

584

00:22:07,100 --> 00:22:04,830

free drift so that when we grapple it it

585

00:22:08,210 --> 00:22:07,110

doesn't fight the arm and break it

586

00:22:12,770 --> 00:22:08,220

and so we're just waiting to get over

587

00:22:14,799 --> 00:22:12,780

and get the Gopher for grapple so the

588

00:22:17,030 --> 00:22:14,809

orbiter maintains attitude control and

589

00:22:18,590 --> 00:22:17,040

pitch roll and yaw with the auto it's

590

00:22:20,120 --> 00:22:18,600

too hard to fly all six degrees of

591

00:22:22,549 --> 00:22:20,130

freedom at lunch so we let the autopilot

592

00:22:26,780 --> 00:22:22,559

hold attitude and then we just control

593

00:22:28,130 --> 00:22:26,790

the translations manually and the

594

00:22:30,020 --> 00:22:28,140

orbiter drifts while it's up there well

595

00:22:31,549 --> 00:22:30,030

it had drifted to the edge of the dead

596

00:22:33,320 --> 00:22:31,559

band where it has to fire the jets to

597

00:22:34,549 --> 00:22:33,330

Center things back up again and keep it

598

00:22:36,980 --> 00:22:34,559

in the right attitude when it does that

599

00:22:39,590 --> 00:22:36,990

it fires the big jets and the rolling

600

00:22:41,840 --> 00:22:39,600

couples into a translation and all of a

601  
00:22:43,430 --> 00:22:41,850  
sudden is 45 thousand pound mass is

602  
00:22:46,370 --> 00:22:43,440  
coming into the payload band toured the

603  
00:22:48,169 --> 00:22:46,380  
arm so I start firing the thrusters to

604  
00:22:49,840 --> 00:22:48,179  
back away from it and nothing happens

605  
00:22:52,909 --> 00:22:49,850  
we're not moving it's still coming at us

606  
00:22:54,950 --> 00:22:52,919  
because I was in the bead app for very

607  
00:22:56,510 --> 00:22:54,960  
fine attitude control and you program

608  
00:22:57,770 --> 00:22:56,520  
the digital auto pilot ahead of time saw

609  
00:22:59,360 --> 00:22:57,780  
real quick i reached over and hit the

610  
00:23:01,580 --> 00:22:59,370  
adap so i could get some more control

611  
00:23:03,919 --> 00:23:01,590  
power and it got it back to way again

612  
00:23:07,490 --> 00:23:03,929  
and everything and we moved back in got

613  
00:23:11,140 --> 00:23:07,500

all stable again ready to jim newman who

614

00:23:14,840 --> 00:23:11,150

is he wrote you know the rendezvous

615

00:23:18,409 --> 00:23:14,850

software for the pgs see that we use our

616

00:23:20,750 --> 00:23:18,419

pop for manually backing up the

617

00:23:22,640 --> 00:23:20,760

computers and watching the rendezvous

618

00:23:23,810 --> 00:23:22,650

profound stuff all through the Rhondda

619

00:23:24,950 --> 00:23:23,820

but he's given me advice what do you

620

00:23:26,690 --> 00:23:24,960

think about a couple minutes how about

621

00:23:28,730 --> 00:23:26,700

enough you know okay you know and I'm

622

00:23:30,650 --> 00:23:28,740

watching all the data and filtering all

623

00:23:33,320 --> 00:23:30,660

this when this happened he was just

624

00:23:35,360 --> 00:23:33,330

totally silent didn't say a word so we

625

00:23:37,549 --> 00:23:35,370

got everything all sweetened up again

626

00:23:38,900 --> 00:23:37,559

we're ready to grab it I said Jim you

627

00:23:40,430 --> 00:23:38,910

didn't you didn't offer me any advice

628

00:23:44,900 --> 00:23:40,440

during any of that he says well I know

629

00:23:48,020 --> 00:23:44,910

when to keep my mouth shut I had that

630

00:23:49,789 --> 00:23:48,030

that really got our attention so anyway

631

00:23:51,770 --> 00:23:49,799

we finally got everything hooked up and

632

00:23:55,610 --> 00:23:51,780

did re VA's and it was time to go inside

633

00:23:59,570 --> 00:23:55,620

and I will never forget that that was

634

00:24:01,909 --> 00:23:59,580

really cool we opened up the the first

635

00:24:04,850 --> 00:24:01,919

hatch and we got to the where the crew

636

00:24:06,350 --> 00:24:04,860

was going to go into the PMA one to get

637

00:24:09,289 --> 00:24:06,360

access to the big hatch to get inside

638

00:24:11,600 --> 00:24:09,299

the node and I got Sergei krikalev up

639

00:24:13,280 --> 00:24:11,610

alongside me and we got the hatch open I

640

00:24:16,390 --> 00:24:13,290

just wave my arm in the two of us went

641

00:24:18,409 --> 00:24:16,400

in side-by-side and it was a

642

00:24:19,760 --> 00:24:18,419

International Space Station and we had

643

00:24:20,330 --> 00:24:19,770

an international crew and I said we're

644

00:24:23,720 --> 00:24:20,340

going to open it

645

00:24:26,090 --> 00:24:23,730

thing together but that was cool I got

646

00:24:29,990 --> 00:24:26,100

it no I'm talking about but one more

647

00:24:31,940 --> 00:24:30,000

story so we're docked with the space

648

00:24:33,590 --> 00:24:31,950

station we've got it all opened up we're

649

00:24:35,390 --> 00:24:33,600

inside everything's powered up it's

650

00:24:37,789 --> 00:24:35,400

working good and we had a ton of

651  
00:24:39,620 --> 00:24:37,799  
procedures that we had to do pulling

652  
00:24:40,970 --> 00:24:39,630  
launch restraints and everything else

653  
00:24:43,159 --> 00:24:40,980  
trying to get it ready for the crew to

654  
00:24:46,370 --> 00:24:43,169  
get up there when the service module got

655  
00:24:48,529 --> 00:24:46,380  
there and we had way more than what we

656  
00:24:51,140 --> 00:24:48,539  
could accomplish in you know you want to

657  
00:24:52,730 --> 00:24:51,150  
get it all done and you or more if you

658  
00:24:54,080 --> 00:24:52,740  
can to make it easier for the next crew

659  
00:24:57,200 --> 00:24:54,090  
to make it easier for the crew when they

660  
00:24:59,149 --> 00:24:57,210  
actually get up there and so if you were

661  
00:25:01,070 --> 00:24:59,159  
on a sleep schedule where you went to

662  
00:25:02,090 --> 00:25:01,080  
bed at eleven and got up at seven in the

663  
00:25:04,850 --> 00:25:02,100

morning that was your eight hours of

664

00:25:06,620 --> 00:25:04,860

sleep I had some crew members it really

665

00:25:08,419 --> 00:25:06,630

needed eight hours and the rule was if

666

00:25:09,980 --> 00:25:08,429

you wanted to be up on a flight deck and

667

00:25:12,230 --> 00:25:09,990

send email home or look out the window

668

00:25:14,000 --> 00:25:12,240

and take pictures that was great but

669

00:25:17,840 --> 00:25:14,010

when you got to the sleep period time

670

00:25:19,850 --> 00:25:17,850

the flight the mid-deck was dark it was

671

00:25:22,370 --> 00:25:19,860

quiet you had to be really quiet not

672

00:25:25,549 --> 00:25:22,380

wake anybody up and jim newman always

673

00:25:27,139 --> 00:25:25,559

stayed up late and so he's up there and

674

00:25:29,029 --> 00:25:27,149

he says I want to go get another look at

675

00:25:32,899 --> 00:25:29,039

the space station tonight before we

676  
00:25:34,820 --> 00:25:32,909  
undocked the next day and so he comes

677  
00:25:37,820 --> 00:25:34,830  
down off the flight deck through the

678  
00:25:39,860 --> 00:25:37,830  
mid-deck back through where the airlock

679  
00:25:41,870 --> 00:25:39,870  
used to be when it was on the mid-deck

680  
00:25:43,220 --> 00:25:41,880  
and we moved it external in that area

681  
00:25:44,899 --> 00:25:43,230  
was filled with these we call them

682  
00:25:46,909 --> 00:25:44,909  
refrigerator bags you mounted to to the

683  
00:25:48,860 --> 00:25:46,919  
floor to the ceiling because we carried

684  
00:25:50,720 --> 00:25:48,870  
a ton of stuff up there and i was

685  
00:25:52,340 --> 00:25:50,730  
sleeping between two of them over on one

686  
00:25:56,600 --> 00:25:52,350  
side Nancy crew was between the other

687  
00:25:58,659 --> 00:25:56,610  
two and Jerry rawson rickster Co were in

688  
00:26:01,190 --> 00:25:58,669

sleeping bags plastered to the wall and

689

00:26:02,899 --> 00:26:01,200

so he says I don't want to wake Bob you

690

00:26:05,720 --> 00:26:02,909

know and he's being real quiet as he

691

00:26:07,130 --> 00:26:05,730

sneaks by and goes into the airlock and

692

00:26:09,350 --> 00:26:07,140

turns up into the PMA and when he gets

693

00:26:13,899 --> 00:26:09,360

up there he finds me and Sergei krikalev

694

00:26:16,490 --> 00:26:13,909

into space station and the three of us

695

00:26:18,710 --> 00:26:16,500

worked through the night and I just I

696

00:26:20,779 --> 00:26:18,720

mean we talked about the future of the

697

00:26:23,389 --> 00:26:20,789

space station what it what it was what

698

00:26:24,769 --> 00:26:23,399

it meant you know this international

699

00:26:27,440 --> 00:26:24,779

cooperative effort what we were going to

700

00:26:28,940 --> 00:26:27,450

learn from it and it was just that was

701  
00:26:30,350 --> 00:26:28,950  
really a special night we stayed up to

702  
00:26:31,730 --> 00:26:30,360  
like three thirty in the morning planet

703  
00:26:32,960 --> 00:26:31,740  
I said we got to get some sleep guys

704  
00:26:33,620 --> 00:26:32,970  
it's going to be a really busy day

705  
00:26:36,140 --> 00:26:33,630  
tomorrow

706  
00:26:37,760 --> 00:26:36,150  
everybody leave and we went back to bed

707  
00:26:40,460 --> 00:26:37,770  
but that was a that was a special

708  
00:26:43,040 --> 00:26:40,470  
evening the three of us in there working

709  
00:26:45,860 --> 00:26:43,050  
on the space station you know talking

710  
00:26:47,890 --> 00:26:45,870  
about the future and and seeing what

711  
00:26:49,610 --> 00:26:47,900  
it's become now it's just it's

712  
00:26:52,340 --> 00:26:49,620  
everything that we thought it could be

713  
00:26:55,340 --> 00:26:52,350

and more and I truly believe space

714

00:26:58,100 --> 00:26:55,350

station it's a fantastic scientific

715

00:27:00,260 --> 00:26:58,110

laboratory but even more so what a

716

00:27:03,560 --> 00:27:00,270

phenomenal edge and engineering test bed

717

00:27:05,810 --> 00:27:03,570

for proving the systems that we need to

718

00:27:07,790 --> 00:27:05,820

live beyond our home planet to really be

719

00:27:09,200 --> 00:27:07,800

able to go exploring and I think that's

720

00:27:13,100 --> 00:27:09,210

going to be worth what its real worth

721

00:27:14,600 --> 00:27:13,110

it's going to be so Bob you you moved

722

00:27:15,860 --> 00:27:14,610

into a position where you got to select

723

00:27:18,230 --> 00:27:15,870

astronauts were there any particular

724

00:27:20,090 --> 00:27:18,240

challenges for selecting crizzle space

725

00:27:22,250 --> 00:27:20,100

station first off we couldn't have done

726

00:27:24,440 --> 00:27:22,260

the space station had we not done

727

00:27:26,960 --> 00:27:24,450

shuttle Mir with the Russians that

728

00:27:28,580 --> 00:27:26,970

really set the how we work with our

729

00:27:32,900 --> 00:27:28,590

international partners how we work with

730

00:27:35,570 --> 00:27:32,910

the Russians that enabled us to do the

731

00:27:37,730 --> 00:27:35,580

space station and those initial space

732

00:27:39,680 --> 00:27:37,740

station crews I mean space station in

733

00:27:41,000 --> 00:27:39,690

the astronaut office back then when I

734

00:27:43,310 --> 00:27:41,010

was chief astronaut office we were

735

00:27:45,650 --> 00:27:43,320

flying 78 shuttle flights a year nine I

736

00:27:47,810 --> 00:27:45,660

mean shuttle was really booming and

737

00:27:49,940 --> 00:27:47,820

there was a lot going on and you know

738

00:27:52,940 --> 00:27:49,950

folks looked at a year training to go

739

00:27:54,710 --> 00:27:52,950

fly a shuttle mission or you know I got

740

00:27:57,290 --> 00:27:54,720

to learn Russian I got to spend two to

741

00:27:59,270 --> 00:27:57,300

three years training for a space station

742

00:28:02,120 --> 00:27:59,280

flight all this travel back and forth it

743

00:28:04,670 --> 00:28:02,130

was hard it was really hard and then the

744

00:28:07,640 --> 00:28:04,680

shuttle was designed I mean you had you

745

00:28:09,470 --> 00:28:07,650

know from the 5th to the 95th percentile

746

00:28:12,410 --> 00:28:09,480

male and female can fit in the shuttle

747

00:28:14,420 --> 00:28:12,420

it's a phenomenal vehicle as far as you

748

00:28:16,250 --> 00:28:14,430

know crew size whereas if you go to

749

00:28:19,340 --> 00:28:16,260

space station in back then it was prior

750

00:28:21,920 --> 00:28:19,350

to the tma Soyuz TMA the restrictions on

751  
00:28:23,240 --> 00:28:21,930  
the crew the Soyuz was the lifeboat that

752  
00:28:24,560 --> 00:28:23,250  
got two grew home so even if you were

753  
00:28:26,960 --> 00:28:24,570  
fine up and down on shuttle you had to

754  
00:28:28,640 --> 00:28:26,970  
fitness so use and that eliminated a

755  
00:28:31,550 --> 00:28:28,650  
significant number of the astronaut

756  
00:28:34,070 --> 00:28:31,560  
corps for being able to assign them to a

757  
00:28:35,900 --> 00:28:34,080  
flight and then the standards for a long

758  
00:28:37,250 --> 00:28:35,910  
duration flight from a health medical

759  
00:28:39,320 --> 00:28:37,260  
point of view are a little more

760  
00:28:40,790 --> 00:28:39,330  
stringent than they are for a for a

761  
00:28:42,770 --> 00:28:40,800  
shuttle mission so he had to meet all

762  
00:28:45,050 --> 00:28:42,780  
those requirement so even though I had

763  
00:28:46,850 --> 00:28:45,060

you know 100 and some astronauts the

764

00:28:47,210 --> 00:28:46,860

number that were actually available to

765

00:28:49,549 --> 00:28:47,220

go

766

00:28:52,549 --> 00:28:49,559

why on the space station from a physical

767

00:28:54,140 --> 00:28:52,559

point of view was a lot smaller and then

768

00:28:56,720 --> 00:28:54,150

you wanted to have the right experience

769

00:28:58,549 --> 00:28:56,730

and everything to and then to sign up

770

00:29:00,890 --> 00:28:58,559

that commitment to learn all that they

771

00:29:04,310 --> 00:29:00,900

had to learn I mean I learn enough

772

00:29:06,500 --> 00:29:04,320

Russian to be socially active over there

773

00:29:08,570 --> 00:29:06,510

but to learn all the technical Russian

774

00:29:11,090 --> 00:29:08,580

to actually fly on us so use and work

775

00:29:13,399 --> 00:29:11,100

the Russian systems that was asking an

776

00:29:14,899 --> 00:29:13,409

awful lot of somebody so those first

777

00:29:18,740 --> 00:29:14,909

cruise it was really difficult finding

778

00:29:20,270 --> 00:29:18,750

the right folks and getting the

779

00:29:22,460 --> 00:29:20,280

commitment from him to do it and I never

780

00:29:24,409 --> 00:29:22,470

expected it would be as long as it was

781

00:29:26,060 --> 00:29:24,419

from when they got assigned to when we

782

00:29:28,190 --> 00:29:26,070

actually flew we had some slips there

783

00:29:30,710 --> 00:29:28,200

with the service module getting it on

784

00:29:33,649 --> 00:29:30,720

orbit to get the cruise up there but it

785

00:29:37,039 --> 00:29:33,659

all worked out and I remember Susan

786

00:29:39,529 --> 00:29:37,049

Helms in gym boss flew together with

787

00:29:43,070 --> 00:29:39,539

Yuri Ushakov on the on the second

788

00:29:45,860 --> 00:29:43,080

increment and Susan really didn't want

789

00:29:48,830 --> 00:29:45,870

to do it I don't think but she said yes

790

00:29:50,659 --> 00:29:48,840

and she threw herself into it and I was

791

00:29:52,460 --> 00:29:50,669

when she got back from her mission she

792

00:29:53,539 --> 00:29:52,470

said Bob I'm so happy that you assigned

793

00:29:55,340 --> 00:29:53,549

me to that flight that was such a

794

00:29:58,490 --> 00:29:55,350

wonderful experience it was so great to

795

00:30:00,919 --> 00:29:58,500

be on the space station in and do what

796

00:30:03,500 --> 00:30:00,929

we did and I think if you talk to any

797

00:30:05,330 --> 00:30:03,510

space station crew I'd give anything to

798

00:30:07,039 --> 00:30:05,340

go have a long-duration flight that's

799

00:30:10,490 --> 00:30:07,049

what it's really like to be in space

800

00:30:11,899 --> 00:30:10,500

shuttles phenomenal you know and but but

801  
00:30:13,669 --> 00:30:11,909  
living in space for an extended period

802  
00:30:15,470 --> 00:30:13,679  
of time that that's what it's all about

803  
00:30:18,049 --> 00:30:15,480  
so yeah those first space station crews

804  
00:30:20,840 --> 00:30:18,059  
it was it was hard and it's still hard

805  
00:30:21,919 --> 00:30:20,850  
it it asks an awful lot of folks but

806  
00:30:24,500 --> 00:30:21,929  
we've gotten a lot better at how we

807  
00:30:26,390 --> 00:30:24,510  
train we've shorten the training time I

808  
00:30:28,310 --> 00:30:26,400  
think things are working a lot better

809  
00:30:30,049 --> 00:30:28,320  
from that point of view but initially

810  
00:30:32,000 --> 00:30:30,059  
there was a lot of learning that had to

811  
00:30:33,560 --> 00:30:32,010  
go on to get to the point where you know

812  
00:30:35,000 --> 00:30:33,570  
we could get folks up there and work

813  
00:30:38,529 --> 00:30:35,010

together with the Russians to make it

814

00:30:42,529 --> 00:30:38,539

happen you talk about station as a

815

00:30:46,070 --> 00:30:42,539

wonderful engineering test bed it was

816

00:30:47,870 --> 00:30:46,080

also a wonderful test bed for for

817

00:30:50,840 --> 00:30:47,880

learning procedures and processes and

818

00:30:53,530 --> 00:30:50,850

and I'll share one small and the sense

819

00:30:56,840 --> 00:30:53,540

we're into the storytelling part

820

00:30:58,370 --> 00:30:56,850

that was particularly important to be

821

00:31:01,520 --> 00:30:58,380

and was going to be important to you if

822

00:31:05,480 --> 00:31:01,530

we if we hadn't fixed the issue and it

823

00:31:07,100 --> 00:31:05,490

was on bill was one of the ones who was

824

00:31:08,600 --> 00:31:07,110

telling us find it on the ground and fix

825

00:31:10,610 --> 00:31:08,610

it on the ground I think he was the one

826

00:31:14,090 --> 00:31:10,620

who was trying to beat that into us

827

00:31:16,700 --> 00:31:14,100

those of us who were who had been media

828

00:31:18,680 --> 00:31:16,710

wasn't well are here well I should know

829

00:31:22,070 --> 00:31:18,690

you back and you mellowed a lot he was

830

00:31:24,650 --> 00:31:22,080

working is pretty good he was right and

831

00:31:27,190 --> 00:31:24,660

as an example for those of us who had to

832

00:31:30,169 --> 00:31:27,200

come out of that factory environment

833

00:31:33,110 --> 00:31:30,179

just the attention to detail that was

834

00:31:35,810 --> 00:31:33,120

required was a level above two things

835

00:31:37,340 --> 00:31:35,820

the notion of no travelled work nothing

836

00:31:40,430 --> 00:31:37,350

you can't have traveled work when you

837

00:31:42,230 --> 00:31:40,440

when you leave the cape traveled risk

838

00:31:43,730 --> 00:31:42,240

you want as little traveled risk as you

839

00:31:46,360 --> 00:31:43,740

can possibly live with when you leave

840

00:31:49,549 --> 00:31:46,370

the cape and that's a different

841

00:31:51,940 --> 00:31:49,559

mentality for folks who have started out

842

00:31:55,549 --> 00:31:51,950

in the factory well I remember we would

843

00:31:57,230 --> 00:31:55,559

unload one before we when we got

844

00:32:00,530 --> 00:31:57,240

everything done she was finished she was

845

00:32:03,230 --> 00:32:00,540

just complete and the the notion came up

846

00:32:05,540 --> 00:32:03,240

of well let's we've got an extra day so

847

00:32:07,220 --> 00:32:05,550

let's just do a whistle test and for

848

00:32:09,290 --> 00:32:07,230

those wouldn't we were called a whistle

849

00:32:11,390 --> 00:32:09,300

test was you just put a little pressure

850

00:32:16,010 --> 00:32:11,400

on it just to make sure that everything

851  
00:32:17,450 --> 00:32:16,020  
seals up and we were supremely confident

852  
00:32:19,130 --> 00:32:17,460  
that the whistle test was going to pass

853  
00:32:23,000 --> 00:32:19,140  
we had one day we might as well do it

854  
00:32:25,610 --> 00:32:23,010  
okay well we'll go do this so we hooked

855  
00:32:29,110 --> 00:32:25,620  
up a tank we put a little pressure on

856  
00:32:32,450 --> 00:32:29,120  
put a little air into it no pressure

857  
00:32:35,419 --> 00:32:32,460  
well our pucker factor went up we put a

858  
00:32:38,030 --> 00:32:35,429  
little more air into it no pressure well

859  
00:32:40,130 --> 00:32:38,040  
at that point it's it's really one of

860  
00:32:42,710 --> 00:32:40,140  
those everybody helped we're sounding

861  
00:32:44,600 --> 00:32:42,720  
the fire alarm Josie's come and running

862  
00:32:47,120 --> 00:32:44,610  
bill everybody's coming to try to figure

863  
00:32:49,220 --> 00:32:47,130

out what what to what was going on and

864

00:32:52,370 --> 00:32:49,230

we kept trying and kept working with it

865

00:32:54,230 --> 00:32:52,380

could not figure out what was why we

866

00:32:56,630 --> 00:32:54,240

couldn't why it was not holding pressure

867

00:32:59,690 --> 00:32:56,640

and and that means it's not holding air

868

00:33:02,390 --> 00:32:59,700

and for there not to be air in it when

869

00:33:04,280 --> 00:33:02,400

Bob goes to open up the hatch on orbit

870

00:33:05,570 --> 00:33:04,290

would have been disastrous I mean it

871

00:33:09,110 --> 00:33:05,580

would have been the end of the program

872

00:33:10,700 --> 00:33:09,120

as it turns out we took what's called a

873

00:33:13,370 --> 00:33:10,710

sniffer and went around and at every

874

00:33:16,430 --> 00:33:13,380

single place where all over we were

875

00:33:18,140 --> 00:33:16,440

trying to find as we were putting helium

876

00:33:20,180 --> 00:33:18,150

in trying to find what was coming out in

877

00:33:23,690 --> 00:33:20,190

and we were going along and then at one

878

00:33:26,360 --> 00:33:23,700

place we got a big spike as turns out it

879

00:33:27,770 --> 00:33:26,370

was on one of the hatches we opened up

880

00:33:28,850 --> 00:33:27,780

the cover for the hatches and there was

881

00:33:30,890 --> 00:33:28,860

something called a manual pressure

882

00:33:32,960 --> 00:33:30,900

equalization valve and it's very simple

883

00:33:34,460 --> 00:33:32,970

it's on either side of a hatch and it

884

00:33:37,130 --> 00:33:34,470

has a little thing you just go like that

885

00:33:38,360 --> 00:33:37,140

you turn it one way and it's open you

886

00:33:42,080 --> 00:33:38,370

turn it the other way and it's closed

887

00:33:44,930 --> 00:33:42,090

well everything that we'd studied and

888

00:33:47,450 --> 00:33:44,940

understood and logic are logic which was

889

00:33:49,370 --> 00:33:47,460

flawed told us you turn it one direction

890

00:33:50,960 --> 00:33:49,380

and on the other side it's going to go

891

00:33:52,970 --> 00:33:50,970

right it was those things that made you

892

00:33:55,460 --> 00:33:52,980

think it went like that no it went like

893

00:33:57,410 --> 00:33:55,470

this you could do one side or the other

894

00:34:01,310 --> 00:33:57,420

and when you closed one it didn't

895

00:34:04,610 --> 00:34:01,320

necessarily close the other so this was

896

00:34:07,940 --> 00:34:04,620

just a simple a small little detail of

897

00:34:10,160 --> 00:34:07,950

the most minor nature and had we not

898

00:34:12,590 --> 00:34:10,170

found it had we not done that one little

899

00:34:16,220 --> 00:34:12,600

extra thing on that one little extra day

900

00:34:18,140 --> 00:34:16,230

just to make sure that we hadn't made

901  
00:34:20,630 --> 00:34:18,150  
some kind of a mistake it would have

902  
00:34:23,120 --> 00:34:20,640  
been a very bad outcome and I just can't

903  
00:34:25,460 --> 00:34:23,130  
tell you the number of little things

904  
00:34:28,430 --> 00:34:25,470  
like that i mean we proved to be pretty

905  
00:34:30,740 --> 00:34:28,440  
good at dealing with the big risks that

906  
00:34:33,680 --> 00:34:30,750  
we understood and studied and we had

907  
00:34:36,020 --> 00:34:33,690  
lots of people work on them the EIT was

908  
00:34:38,750 --> 00:34:36,030  
an example of a big test that came up

909  
00:34:40,070 --> 00:34:38,760  
with all kinds of little things that not

910  
00:34:42,170 --> 00:34:40,080  
because of in competence were

911  
00:34:44,780 --> 00:34:42,180  
unforeseeable because of the cold

912  
00:34:47,660 --> 00:34:44,790  
complexity and when you get a whole

913  
00:34:50,180 --> 00:34:47,670

bunch of things working together they

914

00:34:51,800 --> 00:34:50,190

might not all work that they have a

915

00:34:53,540 --> 00:34:51,810

personality the hardware has its own

916

00:34:57,860 --> 00:34:53,550

personality and you have to accommodate

917

00:35:00,410 --> 00:34:57,870

that so that was the day that I got it

918

00:35:02,300 --> 00:35:00,420

you know my knees went weak thinking

919

00:35:04,670 --> 00:35:02,310

about what would have happened had we

920

00:35:07,880 --> 00:35:04,680

gotten on orbit and they're not been air

921

00:35:10,190 --> 00:35:07,890

in the note it was something that simple

922

00:35:11,480 --> 00:35:10,200

that we were sure we understood and you

923

00:35:13,160 --> 00:35:11,490

could look at it and see that when the

924

00:35:14,450 --> 00:35:13,170

hatch was up you couldn't see the inside

925

00:35:16,340 --> 00:35:14,460

and when the hatch was down in coverage

926  
00:35:18,080 --> 00:35:16,350  
you couldn't see the outside so even

927  
00:35:18,870 --> 00:35:18,090  
through all of our configuration it was

928  
00:35:20,519 --> 00:35:18,880  
one little thing

929  
00:35:22,349 --> 00:35:20,529  
slip through and it could have been that

930  
00:35:25,019 --> 00:35:22,359  
one little disastrous thing and and you

931  
00:35:29,039 --> 00:35:25,029  
guys who were Native KNC folks who had

932  
00:35:30,839 --> 00:35:29,049  
been shuttle launch ntds are done other

933  
00:35:33,120 --> 00:35:30,849  
things that had the heritage to come to

934  
00:35:36,740 --> 00:35:33,130  
us and explain to us how a small thing

935  
00:35:39,660 --> 00:35:36,750  
can lead to a very bad result was was

936  
00:35:41,910 --> 00:35:39,670  
instrumental and everybody getting

937  
00:35:44,700 --> 00:35:41,920  
behind taking the extra time to do the

938  
00:35:47,249 --> 00:35:44,710

extranet in that I think that attitude

939

00:35:48,509 --> 00:35:47,259

is prevalent through the program in all

940

00:35:50,759 --> 00:35:48,519

the center's and all of our industry

941

00:35:53,039 --> 00:35:50,769

partners and so on that and enough you

942

00:35:55,410 --> 00:35:53,049

guys out here followed the pump module

943

00:35:56,819 --> 00:35:55,420

work that the guys in Houston Boeing and

944

00:35:57,990 --> 00:35:56,829

NASA guys take care when we had to pump

945

00:36:00,089 --> 00:35:58,000

module fail on orbit and how we

946

00:36:02,880 --> 00:36:00,099

recovered from that that same kind of

947

00:36:05,430 --> 00:36:02,890

thinking that same kind of how do we go

948

00:36:06,420 --> 00:36:05,440

fix this problem I mean you know we're

949

00:36:07,920 --> 00:36:06,430

calling out the has everything you need

950

00:36:09,420 --> 00:36:07,930

us to do or whatever and those guys are

951  
00:36:11,160 --> 00:36:09,430  
all busted they're trying to figure out

952  
00:36:12,809 --> 00:36:11,170  
how to how to take care of that that

953  
00:36:14,819 --> 00:36:12,819  
same kind of spirit has been prevalent

954  
00:36:16,829 --> 00:36:14,829  
since day one of this program and that's

955  
00:36:19,109 --> 00:36:16,839  
a just a more recent example of that

956  
00:36:21,089 --> 00:36:19,119  
very same thing it's a team effort and I

957  
00:36:22,829 --> 00:36:21,099  
think that's what space station has

958  
00:36:25,380 --> 00:36:22,839  
shown more than anything else is how we

959  
00:36:26,849 --> 00:36:25,390  
work together as a team and not just the

960  
00:36:28,950 --> 00:36:26,859  
international partners but hollow the

961  
00:36:31,259 --> 00:36:28,960  
NASA centers work together you know I

962  
00:36:33,569 --> 00:36:31,269  
was very fortunate because my position

963  
00:36:35,009 --> 00:36:33,579

that I got to travel around and see the

964

00:36:36,990 --> 00:36:35,019

hardware at all the different centers

965

00:36:38,490 --> 00:36:37,000

and work with the different centers but

966

00:36:40,980 --> 00:36:38,500

it didn't matter whether I was going to

967

00:36:44,009 --> 00:36:40,990

Marshall working out at Sonny Carter

968

00:36:46,019 --> 00:36:44,019

coming here to the Cape it was one team

969

00:36:48,059 --> 00:36:46,029

pull them together to make it work and

970

00:36:50,460 --> 00:36:48,069

that we're still that way I think that's

971

00:36:52,829 --> 00:36:50,470

really really important say another

972

00:36:55,829 --> 00:36:52,839

thing that very much to the credit of

973

00:36:57,509 --> 00:36:55,839

NASA is and I'll pick on Mei T as an

974

00:36:59,880 --> 00:36:57,519

example or when we did some of the tests

975

00:37:02,460 --> 00:36:59,890

with the arm Josie was instrumental to

976

00:37:05,400 --> 00:37:02,470

when we would uncover something that was

977

00:37:08,039 --> 00:37:05,410

out of family it would be very easy to

978

00:37:10,049 --> 00:37:08,049

start looking for who to blame and that

979

00:37:11,940 --> 00:37:10,059

was never the case we would sit down and

980

00:37:14,069 --> 00:37:11,950

we'd say okay is the problem on your

981

00:37:15,990 --> 00:37:14,079

side or on my side maybe it's on both

982

00:37:17,519 --> 00:37:16,000

maybe it's all neither and there's

983

00:37:20,910 --> 00:37:17,529

something else that's coming in and and

984

00:37:22,380 --> 00:37:20,920

sitting down not creating creating a

985

00:37:25,170 --> 00:37:22,390

team environment and not creating an

986

00:37:27,839 --> 00:37:25,180

adversarial environment was allowed us

987

00:37:29,999 --> 00:37:27,849

to work through problems that were very

988

00:37:31,950 --> 00:37:30,009

complicated and do it pretty quickly or

989

00:37:32,680 --> 00:37:31,960

at least we felt like we were trying to

990

00:37:34,270 --> 00:37:32,690

get them soft

991

00:37:35,920 --> 00:37:34,280

wait I think I think all of us were so

992

00:37:37,720 --> 00:37:35,930

passionate about what we were doing it

993

00:37:40,240 --> 00:37:37,730

never occurred to anybody whenever the

994

00:37:41,589 --> 00:37:40,250

problem did occur to point fingers it

995

00:37:43,210 --> 00:37:41,599

was all about what do we need to do to

996

00:37:45,970 --> 00:37:43,220

get it done who could help us answer

997

00:37:48,370 --> 00:37:45,980

this question and and you learn to think

998

00:37:50,530 --> 00:37:48,380

big Lee here sorry broadly he you know

999

00:37:52,690 --> 00:37:50,540

it wasn't just who in this general team

1000

00:37:54,520 --> 00:37:52,700

can we go look to its you know who

1001  
00:37:56,589 --> 00:37:54,530  
across the nation who across the world

1002  
00:38:00,550 --> 00:37:56,599  
can can help us solve these problems it

1003  
00:38:03,579 --> 00:38:00,560  
was really an incredible experience you

1004  
00:38:06,099 --> 00:38:03,589  
were talking about the stories I had one

1005  
00:38:09,339 --> 00:38:06,109  
before that is not as exciting as Bob's

1006  
00:38:12,730 --> 00:38:09,349  
story I am I so I was a little different

1007  
00:38:14,349 --> 00:38:12,740  
than the rest of our station team in

1008  
00:38:15,579 --> 00:38:14,359  
those early days simply because of the

1009  
00:38:18,670 --> 00:38:15,589  
you know when working with them the

1010  
00:38:21,130 --> 00:38:18,680  
international partners I I was on I

1011  
00:38:23,290 --> 00:38:21,140  
would go and support them the integrated

1012  
00:38:25,480 --> 00:38:23,300  
test in Canada when those big big

1013  
00:38:27,010 --> 00:38:25,490

element tests would occur and they

1014

00:38:29,920 --> 00:38:27,020

always occurred in the middle of the

1015

00:38:31,950 --> 00:38:29,930

winter in Toronto right so Florida girl

1016

00:38:33,880 --> 00:38:31,960

native Florida flirty and I go in

1017

00:38:35,920 --> 00:38:33,890

january-february margin also always took

1018

00:38:37,809 --> 00:38:35,930

three months to do to these tests and

1019

00:38:39,910 --> 00:38:37,819

you know is wonderful when he was a lot

1020

00:38:42,040 --> 00:38:39,920

of work we did the 12-hour days on great

1021

00:38:43,630 --> 00:38:42,050

teamwork there we'd bring in some of our

1022

00:38:45,309 --> 00:38:43,640

other NASA and contractors would come in

1023

00:38:47,890 --> 00:38:45,319

as well from from the u.s. to support

1024

00:38:49,150 --> 00:38:47,900

these tests but um you spent 12 hour

1025

00:38:50,980 --> 00:38:49,160

days you get to know the folks they

1026

00:38:52,210 --> 00:38:50,990

sometimes invite you home to their to

1027

00:38:53,770 --> 00:38:52,220

their families and you have dinner with

1028

00:38:57,280 --> 00:38:53,780

them I you know I learned to play to

1029

00:38:59,349 --> 00:38:57,290

curl I learned how to play snooker and I

1030

00:39:02,230 --> 00:38:59,359

learned to appreciate french fries with

1031

00:39:06,250 --> 00:39:02,240

cheese curd and mayonnaise I'm just

1032

00:39:08,829 --> 00:39:06,260

these unique things but usually right

1033

00:39:10,359 --> 00:39:08,839

towards the end of those home tests you

1034

00:39:13,030 --> 00:39:10,369

know you start to burn out a little bit

1035

00:39:14,260 --> 00:39:13,040

and I do remember being in you know the

1036

00:39:16,960 --> 00:39:14,270

hotel room so there's a lot of hotel

1037

00:39:18,670 --> 00:39:16,970

time as well and some in the hotel room

1038

00:39:20,589 --> 00:39:18,680

i'm watching TV and it was it would have

1039

00:39:22,510 --> 00:39:20,599

been in February I suppose and it was

1040

00:39:24,250 --> 00:39:22,520

the State of the Union and so it was the

1041

00:39:26,230 --> 00:39:24,260

President of the United States talking

1042

00:39:29,380 --> 00:39:26,240

to our nation about you know the state

1043

00:39:31,329 --> 00:39:29,390

of the union and they pan into the

1044

00:39:35,050 --> 00:39:31,339

audience and and sitting next to the

1045

00:39:38,800 --> 00:39:35,060

first lady was vodka vana in his blue

1046

00:39:41,829 --> 00:39:38,810

suit and so maybe that was the moment

1047

00:39:43,660 --> 00:39:41,839

for me David when I when I realized wow

1048

00:39:45,910 --> 00:39:43,670

what I'm doing some I'm doing something

1049

00:39:46,420 --> 00:39:45,920

that's larger than than anything I've

1050

00:39:48,130 --> 00:39:46,430

ever done

1051

00:39:51,339 --> 00:39:48,140

for this is really important building

1052

00:39:52,750 --> 00:39:51,349

the station is is um it's a grand thing

1053

00:39:55,299 --> 00:39:52,760

you know it's comparable to building the

1054

00:39:57,069 --> 00:39:55,309

pyramids and I think at that moment in

1055

00:39:59,620 --> 00:39:57,079

the hotel room I really really

1056

00:40:01,960 --> 00:39:59,630

appreciated the little role that I was

1057

00:40:05,260 --> 00:40:01,970

given in building this enormous some

1058

00:40:07,270 --> 00:40:05,270

enormous accomplishment you know it just

1059

00:40:09,190 --> 00:40:07,280

to see Bob and the blue suit sitting

1060

00:40:13,960 --> 00:40:09,200

next to the first lady was was just made

1061

00:40:15,430 --> 00:40:13,970

my whole I'm glad I made your day it was

1062

00:40:17,650 --> 00:40:15,440

kind of fun where my flight jacket and

1063

00:40:19,390 --> 00:40:17,660

sitting there yeah the the people that

1064

00:40:21,160 --> 00:40:19,400

sit next to the first lady are supposed

1065

00:40:23,020 --> 00:40:21,170

to be folks at him you know there's key

1066

00:40:24,609 --> 00:40:23,030

messages within the state of the union

1067

00:40:25,900 --> 00:40:24,619

address and they were going to it was

1068

00:40:27,940 --> 00:40:25,910

actually written in there to talk about

1069

00:40:29,620 --> 00:40:27,950

the first that was the year we flew the

1070

00:40:31,990 --> 00:40:29,630

first space station assembly mission and

1071

00:40:33,520 --> 00:40:32,000

stuff in the speech got rewritten a

1072

00:40:35,260 --> 00:40:33,530

little bit it still talked about NASA in

1073

00:40:37,299 --> 00:40:35,270

the future and stuff but the primary

1074

00:40:39,579 --> 00:40:37,309

emphasis and was John Glenn flying he

1075

00:40:41,799 --> 00:40:39,589

flew him he flew the flight before if

1076  
00:40:43,870 --> 00:40:41,809  
you remember the node going into space

1077  
00:40:47,650 --> 00:40:43,880  
and got a lot of a lot of attention

1078  
00:40:49,420 --> 00:40:47,660  
rightfully so good man you know talking

1079  
00:40:51,490 --> 00:40:49,430  
about the space station and what made it

1080  
00:40:54,400 --> 00:40:51,500  
successful you Randy Brinkley was a

1081  
00:40:56,920 --> 00:40:54,410  
program manager when we launched the FGB

1082  
00:41:00,190 --> 00:40:56,930  
in node 1 and he really pushed to to get

1083  
00:41:02,349 --> 00:41:00,200  
them up there we had some delays before

1084  
00:41:03,520 --> 00:41:02,359  
we got the the service module up there

1085  
00:41:07,780 --> 00:41:03,530  
and could actually get a crew on board

1086  
00:41:10,240 --> 00:41:07,790  
but Tommy Holloway following Randy did a

1087  
00:41:13,059 --> 00:41:10,250  
truly outstanding job pulling together

1088  
00:41:16,480 --> 00:41:13,069

what was a program that had a lot of

1089

00:41:18,460 --> 00:41:16,490

budget problems getting a surplus built

1090

00:41:21,250 --> 00:41:18,470

back up keeping things on track bringing

1091

00:41:24,039 --> 00:41:21,260

technical solutions and in ops

1092

00:41:27,039 --> 00:41:24,049

experience to bear from his shuttle

1093

00:41:31,710 --> 00:41:27,049

experience in a Modi experience to make

1094

00:41:36,250 --> 00:41:31,720

it successful I remember after I flew my

1095

00:41:38,680 --> 00:41:36,260

my mission I was with the George Abby

1096

00:41:41,680 --> 00:41:38,690

was the center director at JSC at the

1097

00:41:44,349 --> 00:41:41,690

time and I was the commander gets some

1098

00:41:46,420 --> 00:41:44,359

time with the director to talk about the

1099

00:41:48,160 --> 00:41:46,430

mission and stuff and I just it was a

1100

00:41:51,910 --> 00:41:48,170

phenomenal flight from start to finish

1101

00:41:54,250 --> 00:41:51,920

it was perfect and I was just I was

1102

00:41:55,480 --> 00:41:54,260

telling George you know and he was tell

1103

00:41:57,099 --> 00:41:55,490

me what a great job we did and

1104

00:41:58,250 --> 00:41:57,109

everything and I said George I don't

1105

00:42:00,770 --> 00:41:58,260

know how I can top that

1106

00:42:04,220 --> 00:42:00,780

and he said well I don't know why you'd

1107

00:42:08,030 --> 00:42:04,230

want to try I said that's it I'm going

1108

00:42:09,650 --> 00:42:08,040

to be wearing a tie from now on and he

1109

00:42:12,830 --> 00:42:09,660

asked me to go down and work in the

1110

00:42:16,190 --> 00:42:12,840

space station program about a year after

1111

00:42:19,990 --> 00:42:16,200

that and I went to work for fur Tommy

1112

00:42:22,730 --> 00:42:20,000

and tommy was just an outstanding

1113

00:42:23,900 --> 00:42:22,740

program manager I learned an awful lot

1114

00:42:25,460 --> 00:42:23,910

from him as his manager for

1115

00:42:28,490 --> 00:42:25,470

international operations and we were

1116

00:42:30,680 --> 00:42:28,500

still doing a lot of negotiations even

1117

00:42:32,300 --> 00:42:30,690

back then on with our international

1118

00:42:35,180 --> 00:42:32,310

partners getting to where we needed to

1119

00:42:37,640 --> 00:42:35,190

be and Tommy had it right though you

1120

00:42:40,100 --> 00:42:37,650

know how space shuttle launches go

1121

00:42:41,540 --> 00:42:40,110

there's always a delay for weather or

1122

00:42:44,210 --> 00:42:41,550

something or some technical problem

1123

00:42:46,100 --> 00:42:44,220

Tommy would go to all the fr RS because

1124

00:42:47,960 --> 00:42:46,110

he knew that was a finite period of time

1125

00:42:50,330 --> 00:42:47,970

that he'd be down here and all that real

1126  
00:42:51,980 --> 00:42:50,340  
technical stuff would get discussed and

1127  
00:42:53,420 --> 00:42:51,990  
then he'd send me to the launches so

1128  
00:42:55,700 --> 00:42:53,430  
that he could stay and do work back in

1129  
00:42:57,830 --> 00:42:55,710  
Houston and I'd be the one down here to

1130  
00:43:00,320 --> 00:42:57,840  
handle all the media questions that what

1131  
00:43:04,280 --> 00:43:00,330  
was going on and suffer the delays you

1132  
00:43:06,560 --> 00:43:04,290  
know hit done here but he did a great

1133  
00:43:09,950 --> 00:43:06,570  
job and then you got to give bill

1134  
00:43:12,470 --> 00:43:09,960  
Gerstenmaier credit for for all that he

1135  
00:43:15,140 --> 00:43:12,480  
did his space station program manager

1136  
00:43:16,970 --> 00:43:15,150  
continuing to be frugal I remember when

1137  
00:43:21,080 --> 00:43:16,980  
I was over in Russia bill what's the

1138  
00:43:23,360 --> 00:43:21,090

space station program manager and he was

1139

00:43:24,980 --> 00:43:23,370

trying to I ended up basically cutting

1140

00:43:26,630 --> 00:43:24,990

my budget in half over in Russia and

1141

00:43:30,170 --> 00:43:26,640

given the money to him so that he could

1142

00:43:32,660 --> 00:43:30,180

keep hardware movement and stuff he so

1143

00:43:34,970 --> 00:43:32,670

in course well now that i mentioned bill

1144

00:43:38,360 --> 00:43:34,980

you got to mention south and you know we

1145

00:43:41,240 --> 00:43:38,370

we've hit a great team leading the space

1146

00:43:42,950 --> 00:43:41,250

station absolutely you know you look at

1147

00:43:44,210 --> 00:43:42,960

i guess that i used to get to talk to

1148

00:43:45,980 --> 00:43:44,220

Bob in the morning when he was at the

1149

00:43:48,740 --> 00:43:45,990

deputy program manager and mr.

1150

00:43:50,660 --> 00:43:48,750

Gerstenmaier came along and

1151  
00:43:52,460 --> 00:43:50,670  
and Mike Mike was in the vehicle office

1152  
00:43:53,990 --> 00:43:52,470  
at the time not a lot of conversation

1153  
00:43:55,460 --> 00:43:54,000  
with him so I I count myself lucky

1154  
00:43:56,750 --> 00:43:55,470  
getting to call you guys up and talk

1155  
00:43:58,640 --> 00:43:56,760  
about what was going on in Florida that

1156  
00:44:00,950 --> 00:43:58,650  
was that was a fun part of the job being

1157  
00:44:02,720 --> 00:44:00,960  
able to interface with you guys and also

1158  
00:44:03,980 --> 00:44:02,730  
you guys are all hardware junkies so you

1159  
00:44:06,890 --> 00:44:03,990  
know that made it even easier things

1160  
00:44:09,440 --> 00:44:06,900  
that was the neat thing so I'm is set I

1161  
00:44:11,540 --> 00:44:09,450  
think you know it's it's great being at

1162  
00:44:13,280 --> 00:44:11,550  
the level we're at now but I still miss

1163  
00:44:16,520 --> 00:44:13,290

getting into the technical discussions

1164

00:44:18,500 --> 00:44:16,530

and I I still don't have my blackberry

1165

00:44:20,570 --> 00:44:18,510

on me so it doesn't buzz but I still get

1166

00:44:22,220 --> 00:44:20,580

notes from the MER on what's going on

1167

00:44:25,040 --> 00:44:22,230

with Space Station even though I'm over

1168

00:44:28,010 --> 00:44:25,050

here just like II keep track that's one

1169

00:44:29,870 --> 00:44:28,020

of the things that I always found

1170

00:44:31,280 --> 00:44:29,880

intriguing is it as a tall level I mean

1171

00:44:33,230 --> 00:44:31,290

that the leaders that you were talking

1172

00:44:35,720 --> 00:44:33,240

about there and all the broad skills

1173

00:44:38,390 --> 00:44:35,730

that that are necessary but no matter

1174

00:44:39,920 --> 00:44:38,400

what problem we encountered you could

1175

00:44:43,250 --> 00:44:39,930

never tell who was going to walk through

1176

00:44:45,140 --> 00:44:43,260

the door with a solution or where they

1177

00:44:48,080 --> 00:44:45,150

were going to come from or what their

1178

00:44:51,050 --> 00:44:48,090

background was going to be you know they

1179

00:44:54,320 --> 00:44:51,060

but some of the most surprising people

1180

00:44:56,030 --> 00:44:54,330

had a depth of knowledge how to go

1181

00:44:58,550 --> 00:44:56,040

practically solve some really

1182

00:45:00,980 --> 00:44:58,560

complicated problem that was just

1183

00:45:02,300 --> 00:45:00,990

fantastic and they were all always

1184

00:45:05,660 --> 00:45:02,310

willing to do it always enthusiastic

1185

00:45:08,480 --> 00:45:05,670

about jumping in and and you know that

1186

00:45:11,120 --> 00:45:08,490

really we didn't have the skills here to

1187

00:45:12,950 --> 00:45:11,130

solve a lot of the problems you know it

1188

00:45:14,990 --> 00:45:12,960

required that somebody from outside come

1189

00:45:17,000 --> 00:45:15,000

in and help us and the enthusiasm with

1190

00:45:19,460 --> 00:45:17,010

which they did that both in the

1191

00:45:21,740 --> 00:45:19,470

contractor world endin and NASA was just

1192

00:45:24,110 --> 00:45:21,750

fantastic so all that hard technical

1193

00:45:26,630 --> 00:45:24,120

work that we did over the years you know

1194

00:45:28,430 --> 00:45:26,640

there had to be a little socializing to

1195

00:45:31,280 --> 00:45:28,440

that went on and I think we did we had

1196

00:45:33,950 --> 00:45:31,290

some great team-building exercises now

1197

00:45:37,340 --> 00:45:33,960

over in Russia team-building can take on

1198

00:45:38,600 --> 00:45:37,350

a whole new context and we had our crews

1199

00:45:42,850 --> 00:45:38,610

that were over there the Russians

1200

00:45:45,500 --> 00:45:42,860

actually built three cottages duplexes

1201  
00:45:47,780 --> 00:45:45,510  
for the crews in their families to stand

1202  
00:45:52,220 --> 00:45:47,790  
while they were training over in Russia

1203  
00:45:54,800 --> 00:45:52,230  
and Shep being the first crew there were

1204  
00:45:57,320 --> 00:45:54,810  
two things that in its cottage number

1205  
00:45:59,780 --> 00:45:57,330  
three he had to have first off you had

1206  
00:46:02,390 --> 00:45:59,790  
to have a gym Shep was a weightlifter so

1207  
00:46:04,460 --> 00:46:02,400  
in the basement of cottage three there

1208  
00:46:08,150 --> 00:46:04,470  
there's a gym with a lot of free weights

1209  
00:46:11,890 --> 00:46:08,160  
and in other stuff and and then ship

1210  
00:46:15,430 --> 00:46:11,900  
built chefs bar in the other side and

1211  
00:46:19,160 --> 00:46:15,440  
it's a it's an amazing place it's a real

1212  
00:46:20,569 --> 00:46:19,170  
social gathering place over there when

1213  
00:46:24,140 --> 00:46:20,579

at the end of the day when trainings

1214

00:46:24,980 --> 00:46:24,150

done and you know it's got I can't tell

1215

00:46:26,779 --> 00:46:24,990

you the number of people that have

1216

00:46:29,569 --> 00:46:26,789

signed this thing Tom Hanks has signed

1217

00:46:33,859 --> 00:46:29,579

it you know when he was over there it's

1218

00:46:35,480 --> 00:46:33,869

a it's a unique environment to get

1219

00:46:38,960 --> 00:46:35,490

together over there after a launcher

1220

00:46:42,260 --> 00:46:38,970

landing and in have a have social time

1221

00:46:43,789 --> 00:46:42,270

with with everybody I think we have a

1222

00:46:44,960 --> 00:46:43,799

time for a few questions I think some

1223

00:46:46,190 --> 00:46:44,970

some folks at the audience if you'd

1224

00:46:47,690 --> 00:46:46,200

raise your hands and they wait for the

1225

00:46:51,529 --> 00:46:47,700

mic and identify yourself we'll start

1226

00:46:55,549 --> 00:46:51,539

with Dan billow dan billow from w/e sh t

1227

00:46:57,829 --> 00:46:55,559

be and i appreciate the discussion it

1228

00:47:00,440 --> 00:46:57,839

for Bob and anyone else who wants to

1229

00:47:03,620 --> 00:47:00,450

jump in we kind of don't appreciate

1230

00:47:06,620 --> 00:47:03,630

things till they're gone sometimes could

1231

00:47:08,990 --> 00:47:06,630

you discuss a little bit how the space

1232

00:47:11,630 --> 00:47:09,000

station is kind of a monument to the

1233

00:47:13,250 --> 00:47:11,640

capabilities of the space shuttle we

1234

00:47:15,250 --> 00:47:13,260

couldn't we could not have done the

1235

00:47:18,559 --> 00:47:15,260

space station without the space shuttle

1236

00:47:20,420 --> 00:47:18,569

it wouldn't be there today when you look

1237

00:47:22,609 --> 00:47:20,430

at what the Space Shuttle can do the

1238

00:47:24,559 --> 00:47:22,619

math it can carry to orbit the crew

1239

00:47:27,410 --> 00:47:24,569

capability the EV a capability the

1240

00:47:30,710 --> 00:47:27,420

robotic capabilities the flexibility

1241

00:47:33,620 --> 00:47:30,720

that the that the shuttle provides for

1242

00:47:36,829 --> 00:47:33,630

getting stuff up and down it just it

1243

00:47:42,829 --> 00:47:36,839

wouldn't happen without the space

1244

00:47:44,990 --> 00:47:42,839

shuttle absolutely and certainly the the

1245

00:47:47,569 --> 00:47:45,000

expertise of people who were involved

1246

00:47:51,019 --> 00:47:47,579

here at i'm sure all over the country

1247

00:47:53,329 --> 00:47:51,029

but my experience here at KSC who had

1248

00:47:55,069 --> 00:47:53,339

shuttle program experience and then

1249

00:47:57,980 --> 00:47:55,079

brought that directly from the north end

1250

00:47:59,630 --> 00:47:57,990

of que se down to the industrial area to

1251

00:48:02,180 --> 00:47:59,640

help us make sure that we learned for

1252

00:48:04,940 --> 00:48:02,190

the lessons of the shuttle program was

1253

00:48:06,799 --> 00:48:04,950

just invaluable in our success you

1254

00:48:08,620 --> 00:48:06,809

another question the front row ken did

1255

00:48:11,540 --> 00:48:08,630

you have one

1256

00:48:13,970 --> 00:48:11,550

hi ken kremer for Space Flight magazine

1257

00:48:16,520 --> 00:48:13,980

well I'm very impressed by your very

1258

00:48:18,650 --> 00:48:16,530

complexity of the ISS you talked about

1259

00:48:20,120 --> 00:48:18,660

all these insidious little little

1260

00:48:23,870 --> 00:48:20,130

difficulties I think the public doesn't

1261

00:48:25,820 --> 00:48:23,880

have any really idea about this was

1262

00:48:27,650 --> 00:48:25,830

there anything that that you missed in

1263

00:48:30,370 --> 00:48:27,660

all of these problems a problem that you

1264

00:48:32,900 --> 00:48:30,380

found on orbit and I'm also wondering um

1265

00:48:34,640 --> 00:48:32,910

Hubble did you learn any lessons from

1266

00:48:36,800 --> 00:48:34,650

Hubble the difficulties initially with

1267

00:48:39,260 --> 00:48:36,810

Hubble that you were able to apply it

1268

00:48:41,750 --> 00:48:39,270

maybe even in a management perspective

1269

00:48:47,359 --> 00:48:41,760

to how you dealt with problems on the

1270

00:48:49,970 --> 00:48:47,369

ISS well I think ISS was designed for

1271

00:48:51,829 --> 00:48:49,980

crew interaction not just in the

1272

00:48:54,620 --> 00:48:51,839

internal environment but from an eda

1273

00:48:57,920 --> 00:48:54,630

point of view to be able to change

1274

00:49:00,530 --> 00:48:57,930

modules I mean you can talk more about

1275

00:49:05,050 --> 00:49:00,540

that bill well it what I was what struck

1276

00:49:07,550 --> 00:49:05,060

me in your question you know from how we

1277

00:49:09,620 --> 00:49:07,560

built and tested the early elements

1278

00:49:11,839 --> 00:49:09,630

point of view we took the approach when

1279

00:49:13,460 --> 00:49:11,849

we went to work with the Boeing guys the

1280

00:49:15,320 --> 00:49:13,470

rocketdyne guys it was at the time on

1281

00:49:17,060 --> 00:49:15,330

canoga park we took the approach we're

1282

00:49:18,650 --> 00:49:17,070

going to write requirements to go

1283

00:49:20,780 --> 00:49:18,660

certify this vehicle for flight we're

1284

00:49:23,270 --> 00:49:20,790

going to write down everything and I

1285

00:49:24,920 --> 00:49:23,280

mean everything that we think we need to

1286

00:49:26,300 --> 00:49:24,930

do to certify this hardware we don't

1287

00:49:27,800 --> 00:49:26,310

we're not going to look at is it

1288

00:49:30,500 --> 00:49:27,810

possible to do this test or is it

1289

00:49:31,760 --> 00:49:30,510

possible to do this work on the ground

1290

00:49:33,740 --> 00:49:31,770

we're going to write it down then we're

1291

00:49:35,839 --> 00:49:33,750

going to figure out afterward if we can

1292

00:49:37,490 --> 00:49:35,849

or can't and what that means to us from

1293

00:49:40,250 --> 00:49:37,500

a risk point of view and then tell the

1294

00:49:43,010 --> 00:49:40,260

boss is how we're doing and so with that

1295

00:49:47,930 --> 00:49:43,020

kind of approach I think I think we

1296

00:49:50,089 --> 00:49:47,940

precluded not finding things that would

1297

00:49:52,370 --> 00:49:50,099

have been a showstopper or that or that

1298

00:49:55,040 --> 00:49:52,380

the the problems that you encountered on

1299

00:49:57,800 --> 00:49:55,050

orbit whirr whirr of a nature that we're

1300

00:49:59,540 --> 00:49:57,810

fixable and you know we we can upload

1301  
00:50:00,829 --> 00:49:59,550  
software we can you know if a piece

1302  
00:50:02,300 --> 00:50:00,839  
isn't working we can take something up

1303  
00:50:04,070 --> 00:50:02,310  
and next time but there there's never

1304  
00:50:07,579 --> 00:50:04,080  
been something really it was so big or

1305  
00:50:09,079 --> 00:50:07,589  
so problematic that we couldn't make do

1306  
00:50:11,000 --> 00:50:09,089  
with what we had on orbit and get on

1307  
00:50:13,099 --> 00:50:11,010  
with the next mission and again I think

1308  
00:50:15,560 --> 00:50:13,109  
that comes back to the the whole gang

1309  
00:50:17,300 --> 00:50:15,570  
looking at the how you're going to go do

1310  
00:50:19,660 --> 00:50:17,310  
this work on the ground to certify for

1311  
00:50:22,299 --> 00:50:19,670  
flight and make sure that it that it

1312  
00:50:24,549 --> 00:50:22,309  
fit the bill and I would say we were we

1313  
00:50:26,650 --> 00:50:24,559

were successful we were we did a good

1314

00:50:28,780 --> 00:50:26,660

job of that but we did find stuff I mean

1315

00:50:30,490 --> 00:50:28,790

every mission I think there's been some

1316

00:50:33,010 --> 00:50:30,500

little thing that's popped up on my

1317

00:50:35,109 --> 00:50:33,020

flight one of the those hatches on the

1318

00:50:37,390 --> 00:50:35,119

space station are very complex the large

1319

00:50:40,720 --> 00:50:37,400

ones in we had a hat it wouldn't open

1320

00:50:42,520 --> 00:50:40,730

all the way and as a result of that we

1321

00:50:44,230 --> 00:50:42,530

studied it came back and we had to

1322

00:50:46,059 --> 00:50:44,240

readjust how we do the hatch systems

1323

00:50:48,099 --> 00:50:46,069

wats that I hatches that we've done the

1324

00:50:50,230 --> 00:50:48,109

MPL ms are going up they got those mods

1325

00:50:52,630 --> 00:50:50,240

that I've know to got the mod no three

1326  
00:50:55,299 --> 00:50:52,640  
got the mod so you know we've learned

1327  
00:50:57,970 --> 00:50:55,309  
and kept right on doing so you know it's

1328  
00:50:59,500 --> 00:50:57,980  
like the covers on the cupola one of

1329  
00:51:01,089 --> 00:50:59,510  
them not being able to be installed

1330  
00:51:03,250 --> 00:51:01,099  
right away because of the little

1331  
00:51:05,380 --> 00:51:03,260  
different you know so I mean there's

1332  
00:51:06,910 --> 00:51:05,390  
been stuff like that but if we haven't

1333  
00:51:08,470 --> 00:51:06,920  
been able to fix it most of the times we

1334  
00:51:11,230 --> 00:51:08,480  
get it fixed well the shuttle is up

1335  
00:51:12,640 --> 00:51:11,240  
there during that mission sometimes we

1336  
00:51:14,230 --> 00:51:12,650  
gotta study a little bit more and send

1337  
00:51:17,440 --> 00:51:14,240  
up something else on the next flight but

1338  
00:51:18,819 --> 00:51:17,450

you know overall there is there hasn't

1339

00:51:20,530 --> 00:51:18,829

been any showstoppers there's been

1340

00:51:23,109 --> 00:51:20,540

nothing critical that has not been

1341

00:51:24,460 --> 00:51:23,119

caught on the ground you again you're

1342

00:51:26,140 --> 00:51:24,470

going back to the pump module thing that

1343

00:51:27,849 --> 00:51:26,150

we dealt with not too long ago on orbit

1344

00:51:29,980 --> 00:51:27,859

you look at that I mean that is a

1345

00:51:32,530 --> 00:51:29,990

testament to what we're capable of doing

1346

00:51:34,030 --> 00:51:32,540

and you just you know again being a

1347

00:51:36,940 --> 00:51:34,040

bystander for that but i'm just still

1348

00:51:39,190 --> 00:51:36,950

amazed that that worked as well so the

1349

00:51:40,990 --> 00:51:39,200

combination that that flight ops team in

1350

00:51:42,339 --> 00:51:41,000

houston the ground ops team around the

1351  
00:51:44,349 --> 00:51:42,349  
rest of the agency i think we did a heck

1352  
00:51:46,480 --> 00:51:44,359  
of a job flushing all that stuff out so

1353  
00:51:47,740 --> 00:51:46,490  
we didn't have a showstopper and that

1354  
00:51:50,650 --> 00:51:47,750  
was done without the shuttle being up

1355  
00:51:53,530 --> 00:51:50,660  
there that was all ISS crew pre-planned

1356  
00:51:56,829 --> 00:51:53,540  
with hardware store spares stowed on

1357  
00:51:59,260 --> 00:51:56,839  
orbit ready to get the job done pretty

1358  
00:52:01,180 --> 00:51:59,270  
amazing even today you can reach across

1359  
00:52:03,370 --> 00:52:01,190  
the entire agency for problem solving

1360  
00:52:04,750 --> 00:52:03,380  
same and that problem occurred some of

1361  
00:52:06,400 --> 00:52:04,760  
the folks that worked on the ground from

1362  
00:52:08,500 --> 00:52:06,410  
from years past you know they still have

1363  
00:52:10,780 --> 00:52:08,510

contacts back with it with the myrrh and

1364

00:52:14,079 --> 00:52:10,790

so again even those on orbit problems

1365

00:52:15,760 --> 00:52:14,089

our team efforts to resolve the phones

1366

00:52:17,890 --> 00:52:15,770

we all turned off when we walked in here

1367

00:52:20,170 --> 00:52:17,900

to talk to you guys you're turned on the

1368

00:52:21,670 --> 00:52:20,180

other 24 hours a day in case something

1369

00:52:23,289 --> 00:52:21,680

comes up that the guys in Houston or

1370

00:52:25,230 --> 00:52:23,299

wherever around the country if they want

1371

00:52:27,800 --> 00:52:25,240

our help they know how to get all those

1372

00:52:31,020 --> 00:52:27,810

and we're glad to provide

1373

00:52:33,420 --> 00:52:31,030

Steve del black fox Orlando Bob you'd

1374

00:52:37,410 --> 00:52:33,430

said the real worth was in learning how

1375

00:52:38,820 --> 00:52:37,420

to live on in orbit is the mission now

1376  
00:52:40,470 --> 00:52:38,830  
going to change a little bit after the

1377  
00:52:42,720 --> 00:52:40,480  
shuttle retires in the in the next ten

1378  
00:52:45,210 --> 00:52:42,730  
years of doing more science ages what's

1379  
00:52:46,770 --> 00:52:45,220  
going to change now with shuttle

1380  
00:52:48,510 --> 00:52:46,780  
retirement in the last 10 years of this

1381  
00:52:50,990 --> 00:52:48,520  
space absolutely we're going to do more

1382  
00:52:56,220 --> 00:52:51,000  
science I mean it is a phenomenal

1383  
00:52:57,690 --> 00:52:56,230  
science lab a national asset and you

1384  
00:52:59,220 --> 00:52:57,700  
know we've finally gotten to the point

1385  
00:53:00,630 --> 00:52:59,230  
where we've completed it we got a crew

1386  
00:53:03,570 --> 00:53:00,640  
of six on board they're already doing

1387  
00:53:05,100 --> 00:53:03,580  
outstanding science up there in learning

1388  
00:53:08,280 --> 00:53:05,110

a lot so yes it's going to be a

1389

00:53:10,500 --> 00:53:08,290

phenomenal science test bed me being an

1390

00:53:13,320 --> 00:53:10,510

engineer not a scientist I look at what

1391

00:53:14,700 --> 00:53:13,330

can we learn we're going exploring we're

1392

00:53:16,350 --> 00:53:14,710

going to leave our home planet we're

1393

00:53:17,820 --> 00:53:16,360

going to you know have commercial

1394

00:53:18,960 --> 00:53:17,830

operations to low Earth orbit we're

1395

00:53:21,390 --> 00:53:18,970

going to build something that allows us

1396

00:53:23,010 --> 00:53:21,400

to to leave Earth well what do we need

1397

00:53:24,480 --> 00:53:23,020

for that you know we've got a lot of

1398

00:53:26,720 --> 00:53:24,490

systems that we have to prove if you

1399

00:53:29,850 --> 00:53:26,730

look at the the oxygen generation system

1400

00:53:31,410 --> 00:53:29,860

on the space station the carbon dioxide

1401

00:53:34,920 --> 00:53:31,420

removal system we are constantly

1402

00:53:37,140 --> 00:53:34,930

tweaking in repairing them up there you

1403

00:53:39,960 --> 00:53:37,150

know we have to have totally reliable

1404

00:53:42,300 --> 00:53:39,970

systems when we leave our home planet

1405

00:53:43,350 --> 00:53:42,310

for an extended period of time and we're

1406

00:53:45,150 --> 00:53:43,360

not going to be able to carry all the

1407

00:53:48,090 --> 00:53:45,160

spare parts along with us or have all

1408

00:53:49,800 --> 00:53:48,100

the you know the resupply as we're going

1409

00:53:53,220 --> 00:53:49,810

to a new destination it's got to work

1410

00:53:55,680 --> 00:53:53,230

when we go and we're learning that on

1411

00:53:57,600 --> 00:53:55,690

Space Station we're figuring that out I

1412

00:54:02,970 --> 00:53:57,610

think that that's really important to me

1413

00:54:06,300 --> 00:54:02,980

I folks I Greg below news 13 appreciate

1414

00:54:08,160 --> 00:54:06,310

the briefing today tomorrow whether you

1415

00:54:10,500 --> 00:54:08,170

know it or not is the one-year

1416

00:54:12,990 --> 00:54:10,510

anniversary of the area's 1x rocket test

1417

00:54:15,600 --> 00:54:13,000

rocket curious to know from each of you

1418

00:54:17,460 --> 00:54:15,610

or whoever would like to jump in the

1419

00:54:19,080 --> 00:54:17,470

thoughts of what has become the

1420

00:54:20,190 --> 00:54:19,090

International Space Station what still

1421

00:54:21,780 --> 00:54:20,200

will become the International Space

1422

00:54:25,230 --> 00:54:21,790

Station over the next several years and

1423

00:54:27,930 --> 00:54:25,240

also the unwritten chapters that are to

1424

00:54:29,850 --> 00:54:27,940

be the next step which we do not know

1425

00:54:32,039 --> 00:54:29,860

now that constellation has kind of been

1426

00:54:35,269 --> 00:54:32,049

put on hold your thoughts

1427

00:54:37,679 --> 00:54:35,279

yep I think it's very clear through the

1428

00:54:40,679 --> 00:54:37,689

authorization act that's been put into

1429

00:54:42,569 --> 00:54:40,689

law it's it's telling us that we are

1430

00:54:45,239 --> 00:54:42,579

going to go with commercial access to

1431

00:54:48,749 --> 00:54:45,249

the space station we're going to make

1432

00:54:51,689 --> 00:54:48,759

that work we've the CC dev effort that's

1433

00:54:54,599 --> 00:54:51,699

going on Planning Office is leading that

1434

00:54:57,829 --> 00:54:54,609

here at KSC working very closely with

1435

00:55:00,779 --> 00:54:57,839

our folks at the Johnson Space Center

1436

00:55:03,140 --> 00:55:00,789

that is where we're going we have been

1437

00:55:06,539 --> 00:55:03,150

directed to build a heavy lift rocket to

1438

00:55:09,269 --> 00:55:06,549

to come up with this architecture that

1439

00:55:12,209 --> 00:55:09,279

allows us to go anywhere to asteroids to

1440

00:55:15,150 --> 00:55:12,219

the moon Mars you name it we have a

1441

00:55:18,569 --> 00:55:15,160

future and I think it's very clear we're

1442

00:55:26,999 --> 00:55:18,579

going to make that happen any other

1443

00:55:29,249 --> 00:55:27,009

questions I think we I know I read a ESO

1444

00:55:30,509 --> 00:55:29,259

was talking about using space station in

1445

00:55:32,939 --> 00:55:30,519

the future in the next 10 years as a

1446

00:55:35,669 --> 00:55:32,949

kind of a platform to launch from for

1447

00:55:37,679 --> 00:55:35,679

even further earth or you know further

1448

00:55:39,900 --> 00:55:37,689

space exploration longer term the moon

1449

00:55:41,939 --> 00:55:39,910

Mars is there any discussion about that

1450

00:55:45,449 --> 00:55:41,949

using it just beyond the orbit but as a

1451  
00:55:47,969 --> 00:55:45,459  
platform for further human exploration I

1452  
00:55:50,640 --> 00:55:47,979  
haven't had those discussions I haven't

1453  
00:55:52,559 --> 00:55:50,650  
directly but but um it's not a leap of

1454  
00:55:54,329 --> 00:55:52,569  
faith to envision the International

1455  
00:55:56,640 --> 00:55:54,339  
Space Station as a platform to do future

1456  
00:55:58,410 --> 00:55:56,650  
exploration it's in a position on orbit

1457  
00:56:00,959 --> 00:55:58,420  
where international partners can reach

1458  
00:56:03,059 --> 00:56:00,969  
and so it's kind of a logical orbit to

1459  
00:56:04,739 --> 00:56:03,069  
be able to involve international

1460  
00:56:06,359 --> 00:56:04,749  
partners but a lot of that again I

1461  
00:56:09,179 --> 00:56:06,369  
haven't been involved in any direct on

1462  
00:56:12,509 --> 00:56:09,189  
conversations that you know no but the

1463  
00:56:14,039 --> 00:56:12,519

capability is there and you know it's

1464

00:56:16,169 --> 00:56:14,049

it's an orbiting laboratory but it's

1465

00:56:18,660 --> 00:56:16,179

also a platform for future exploration

1466

00:56:20,939 --> 00:56:18,670

yeah I think that's another key thing

1467

00:56:22,349 --> 00:56:20,949

that the space station has given us when

1468

00:56:24,179 --> 00:56:22,359

you look at the international model and

1469

00:56:26,279 --> 00:56:24,189

how we work together and what we've

1470

00:56:28,169 --> 00:56:26,289

accomplished up there it really has set

1471

00:56:30,660 --> 00:56:28,179

the standard for when we leave our home

1472

00:56:33,209 --> 00:56:30,670

planet how we press forward with

1473

00:56:35,939 --> 00:56:33,219

international cooperation in and make it

1474

00:56:37,979 --> 00:56:35,949

work because it you know exploration in

1475

00:56:40,919 --> 00:56:37,989

space it's very expensive it's difficult

1476

00:56:43,349 --> 00:56:40,929

it's hard it's challenging you know I

1477

00:56:44,759 --> 00:56:43,359

was talking out at the pad today looking

1478

00:56:45,750 --> 00:56:44,769

at the vehicle I went out there this

1479

00:56:48,690 --> 00:56:45,760

morning you did it

1480

00:56:50,730 --> 00:56:48,700

down with the crew it's sunrise and you

1481

00:56:53,220 --> 00:56:50,740

look at that orbiter and what it takes

1482

00:56:54,780 --> 00:56:53,230

to process it and get it ready and the

1483

00:56:56,820 --> 00:56:54,790

general public doesn't appreciate that

1484

00:56:58,320 --> 00:56:56,830

they see a rocket take off and I think

1485

00:57:00,030 --> 00:56:58,330

wow that's really neat you know they see

1486

00:57:01,560 --> 00:57:00,040

the space station on orbit and the crews

1487

00:57:04,410 --> 00:57:01,570

flying through it and all that stuff and

1488

00:57:06,120 --> 00:57:04,420

they don't realize the effort that we go

1489

00:57:09,870 --> 00:57:06,130

through on the ground to make it

1490

00:57:11,340 --> 00:57:09,880

successful to keep humans alive and safe

1491

00:57:14,310 --> 00:57:11,350

up there in that harsh environment of

1492

00:57:15,990 --> 00:57:14,320

space it's you know it's a vacuum it's

1493

00:57:18,060 --> 00:57:16,000

really cold in the shade and it's really

1494

00:57:19,800 --> 00:57:18,070

hot in the Sun and there's no air to

1495

00:57:22,320 --> 00:57:19,810

breathe and it's easy to put a satellite

1496

00:57:24,090 --> 00:57:22,330

up there but to put a human up there and

1497

00:57:27,020 --> 00:57:24,100

keep them alive and safe and bring them

1498

00:57:29,460 --> 00:57:27,030

home safely it's a lot of hard work and

1499

00:57:31,590 --> 00:57:29,470

the international effort that we have

1500

00:57:33,270 --> 00:57:31,600

going on how we're working together I

1501

00:57:35,130 --> 00:57:33,280

think it's going to be a great model for

1502

00:57:38,970 --> 00:57:35,140

how we proceed when we leave our home

1503

00:57:41,130 --> 00:57:38,980

planet and on that note that's all the

1504

00:57:43,590 --> 00:57:41,140

time we have here at Kennedy for for our

1505

00:57:45,240 --> 00:57:43,600

portion of the anniversary of the space

1506

00:57:46,890 --> 00:57:45,250

station so we'd like to wrap this up

1507

00:57:48,960 --> 00:57:46,900

thank you for coming the next briefing