



1
00:00:03,830 --> 00:00:02,149
for the past couple of weeks we've been

2
00:00:05,990 --> 00:00:03,840
celebrating the 15th anniversary of the

3
00:00:08,230 --> 00:00:06,000
international space station back in

4
00:00:09,830 --> 00:00:08,240
november of 1998 the russians launched

5
00:00:11,430 --> 00:00:09,840
zarya the first piece of the

6
00:00:12,789 --> 00:00:11,440
international space station and a couple

7
00:00:15,110 --> 00:00:12,799
of weeks later that was followed by

8
00:00:16,630 --> 00:00:15,120
unity that was the first u.s piece of

9
00:00:18,470 --> 00:00:16,640
the international space station the

10
00:00:21,029 --> 00:00:18,480
shuttle was endeavor that took it up the

11
00:00:23,029 --> 00:00:21,039
mission was sts-88 we are happy now to

12
00:00:24,550 --> 00:00:23,039
be joined by bob cabana the current

13
00:00:26,230 --> 00:00:24,560

director of the kennedy space center

14

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

down in florida who just so happens to

15

00:00:29,589 --> 00:00:28,160

be the commander of that mission so bob

16

00:00:31,990 --> 00:00:29,599

welcome let's talk about what you

17

00:00:34,069 --> 00:00:32,000

remember about that particular mission

18

00:00:36,870 --> 00:00:34,079

which was a pretty historic

19

00:00:38,869 --> 00:00:36,880

oh josh it it was awesome you know i

20

00:00:40,549 --> 00:00:38,879

think back to the evening of november

21

00:00:43,270 --> 00:00:40,559

20th we had the whole crew over to our

22

00:00:46,310 --> 00:00:43,280

house for dinner and dessert and we were

23

00:00:49,029 --> 00:00:46,320

watching nasa tv watching the launch of

24

00:00:51,110 --> 00:00:49,039

zarya on the proton rocket from baikonur

25

00:00:52,950 --> 00:00:51,120

with great anticipation because we knew

26
00:00:54,310 --> 00:00:52,960
that once zarya was safely on orbit we

27
00:00:56,630 --> 00:00:54,320
were going to be able to launch a couple

28
00:00:59,750 --> 00:00:56,640
weeks later and so we were all really

29
00:01:01,029 --> 00:00:59,760
glad to see zarya make it safely to

30
00:01:03,590 --> 00:01:01,039
space

31
00:01:06,469 --> 00:01:03,600
then we got ready for uh for our flight

32
00:01:09,910 --> 00:01:06,479
and we continued training and we got

33
00:01:11,270 --> 00:01:09,920
down to the cape and the the first night

34
00:01:13,510 --> 00:01:11,280
the weather wasn't that great it was

35
00:01:15,510 --> 00:01:13,520
raining we had a problem starting one of

36
00:01:18,070 --> 00:01:15,520
the apu's and we counted down to 18

37
00:01:19,990 --> 00:01:18,080
seconds and didn't go and of course the

38
00:01:21,190 --> 00:01:20,000

crew was disappointed but you know in

39

00:01:22,870 --> 00:01:21,200

retrospect

40

00:01:25,429 --> 00:01:22,880

things just weren't going smoothly that

41

00:01:27,830 --> 00:01:25,439

night and we went back to crew quarters

42

00:01:29,830 --> 00:01:27,840

and a great story my daughter and i are

43

00:01:31,749 --> 00:01:29,840

our wizard of oz aficionados and right

44

00:01:34,230 --> 00:01:31,759

before we went into quarantine they

45

00:01:36,789 --> 00:01:34,240

re-released the wizard of oz totally

46

00:01:37,830 --> 00:01:36,799

restored and she and i went to see it

47

00:01:39,190 --> 00:01:37,840

and

48

00:01:40,390 --> 00:01:39,200

it was just

49

00:01:42,389 --> 00:01:40,400

cool because

50

00:01:44,230 --> 00:01:42,399

that next day after we didn't launch

51
00:01:46,069 --> 00:01:44,240
they had a picture of endeavour sitting

52
00:01:47,990 --> 00:01:46,079
on the launch pad with this beautiful

53
00:01:49,510 --> 00:01:48,000
rainbow over it and it was ended up in

54
00:01:51,350 --> 00:01:49,520
the paper the next day

55
00:01:53,030 --> 00:01:51,360
and that night we went out and the

56
00:01:54,710 --> 00:01:53,040
weather was great and we went through

57
00:01:57,670 --> 00:01:54,720
the whole launch count and everything

58
00:01:59,270 --> 00:01:57,680
was just perfect in uh and we launched

59
00:02:02,149 --> 00:01:59,280
got safely to orbit

60
00:02:02,950 --> 00:02:02,159
and the next morning our wake up music

61
00:02:04,709 --> 00:02:02,960
was

62
00:02:06,709 --> 00:02:04,719
judy garland singing somewhere over the

63
00:02:08,550 --> 00:02:06,719

rainbow and i always tell folks

64
00:02:09,990 --> 00:02:08,560
somewhere over the rainbow dreams come

65
00:02:12,229 --> 00:02:10,000
true because we launched over that

66
00:02:13,830 --> 00:02:12,239
rainbow and it was definitely a dream

67
00:02:15,670 --> 00:02:13,840
flight from start to finish everything

68
00:02:17,190 --> 00:02:15,680
just went flawlessly

69
00:02:18,390 --> 00:02:17,200
now whenever you got up in space these

70
00:02:21,430 --> 00:02:18,400
you know we talk about this a lot these

71
00:02:23,030 --> 00:02:21,440
two pieces had never gone together they

72
00:02:24,229 --> 00:02:23,040
they'd never been even on the same side

73
00:02:26,309 --> 00:02:24,239
of the planet but they went together

74
00:02:28,630 --> 00:02:26,319
pretty flawlessly were you guys nervous

75
00:02:29,910 --> 00:02:28,640
at all about actually attaching the two

76

00:02:33,350 --> 00:02:29,920

pieces of the space station was there

77

00:02:35,509 --> 00:02:33,360

any trepidation or fear about it at all

78

00:02:37,509 --> 00:02:35,519

sure absolutely i mean we had a number

79

00:02:39,670 --> 00:02:37,519

of challenges i mean the first of which

80

00:02:41,910 --> 00:02:39,680

was the software for the space station

81

00:02:44,470 --> 00:02:41,920

we spent hours out at sunny carter

82

00:02:47,030 --> 00:02:44,480

testing the software the boeing facility

83

00:02:47,990 --> 00:02:47,040

at nasa's software lab there

84

00:02:49,910 --> 00:02:48,000

and

85

00:02:51,270 --> 00:02:49,920

then you know the original philosophy on

86

00:02:52,550 --> 00:02:51,280

the space station was ship and shoot

87

00:02:54,550 --> 00:02:52,560

ship it to the cape and shoot it to

88

00:02:55,509 --> 00:02:54,560

space no testing

89

00:02:59,509 --> 00:02:55,519

and

90

00:03:01,350 --> 00:02:59,519

the meit test at the cape the mission

91

00:03:04,149 --> 00:03:01,360

essential integration test

92

00:03:06,550 --> 00:03:04,159

where we used emulators for the fgb and

93

00:03:09,110 --> 00:03:06,560

continued to test the software with the

94

00:03:11,190 --> 00:03:09,120

real hardware at the cape and we found a

95

00:03:13,190 --> 00:03:11,200

number of problems and so

96

00:03:15,910 --> 00:03:13,200

the testing that we did there

97

00:03:18,229 --> 00:03:15,920

ensured our success on orbit we also had

98

00:03:20,470 --> 00:03:18,239

issues with how we aligned

99

00:03:23,110 --> 00:03:20,480

the fgb with

100

00:03:25,110 --> 00:03:23,120

unity once nancy pulled it you know

101
00:03:26,630 --> 00:03:25,120
unity out we got it safely attached to

102
00:03:29,030 --> 00:03:26,640
the orbiter docking station fired the

103
00:03:32,630 --> 00:03:29,040
jets and brought it together but

104
00:03:35,190 --> 00:03:32,640
lifting the fgb up on top of unity it

105
00:03:38,070 --> 00:03:35,200
was almost at the full reach of the arm

106
00:03:39,830 --> 00:03:38,080
and we didn't have any way to properly

107
00:03:41,750 --> 00:03:39,840
align it other than some camera views

108
00:03:44,869 --> 00:03:41,760
that weren't as precise as we would like

109
00:03:47,030 --> 00:03:44,879
but we practiced in the simulator

110
00:03:48,949 --> 00:03:47,040
we had the space vision system uh that

111
00:03:50,070 --> 00:03:48,959
we used and through all that data we got

112
00:03:52,630 --> 00:03:50,080
everything aligned and we're able to

113
00:03:54,789 --> 00:03:52,640

dock it but on the day that we fired up

114

00:03:56,149 --> 00:03:54,799

the computers we were using our laptops

115

00:03:57,910 --> 00:03:56,159

from the flight deck to send the

116

00:04:00,550 --> 00:03:57,920

commands to the space station to get

117

00:04:02,470 --> 00:04:00,560

everything operable and uh sergey krieg

118

00:04:03,990 --> 00:04:02,480

love and i were sending the commands and

119

00:04:05,670 --> 00:04:04,000

i'll tell you nobody was more surprised

120

00:04:07,429 --> 00:04:05,680

than me when we sent the commands and

121

00:04:09,110 --> 00:04:07,439

everything worked perfect all the

122

00:04:11,270 --> 00:04:09,120

software everything it just all the

123

00:04:13,350 --> 00:04:11,280

displays it all worked and

124

00:04:15,509 --> 00:04:13,360

it's a testament to the testing that

125

00:04:17,590 --> 00:04:15,519

went into it prior to getting those two

126
00:04:19,830 --> 00:04:17,600
pieces together in space the team just

127
00:04:22,230 --> 00:04:19,840
did a phenomenal job and i think you

128
00:04:24,790 --> 00:04:22,240
know when you consider you got

129
00:04:26,950 --> 00:04:24,800
japan the united states the european

130
00:04:29,189 --> 00:04:26,960
space agency and all its partners canada

131
00:04:30,870 --> 00:04:29,199
russia all this hardware being built

132
00:04:33,350 --> 00:04:30,880
from around the world coming together in

133
00:04:35,749 --> 00:04:33,360
space for the very first time and having

134
00:04:37,990 --> 00:04:35,759
everything operate perfectly what a

135
00:04:39,990 --> 00:04:38,000
testament to the team in the testing

136
00:04:41,189 --> 00:04:40,000
that we do it's just phenomenal

137
00:04:42,629 --> 00:04:41,199
there's a lot of questions about who

138
00:04:44,870 --> 00:04:42,639

would be the first to go inside the

139

00:04:45,909 --> 00:04:44,880

newly minted international space station

140

00:04:47,110 --> 00:04:45,919

at the point of time you guys kind of

141

00:04:48,469 --> 00:04:47,120

did something a little bit different

142

00:04:49,830 --> 00:04:48,479

that was very symbolic of the

143

00:04:52,150 --> 00:04:49,840

international partnership talk about

144

00:04:52,950 --> 00:04:52,160

that with you and sergey

145

00:04:54,469 --> 00:04:52,960

well

146

00:04:55,830 --> 00:04:54,479

in fact that was a big media buzz before

147

00:04:57,030 --> 00:04:55,840

we launched i kept getting asked who's

148

00:04:58,710 --> 00:04:57,040

going to be the first one inside the

149

00:05:01,029 --> 00:04:58,720

space station i wouldn't tell anybody i

150

00:05:01,830 --> 00:05:01,039

didn't even tell the crew and on ingress

151
00:05:03,189 --> 00:05:01,840
day

152
00:05:04,230 --> 00:05:03,199
as we went through all the procedures

153
00:05:07,189 --> 00:05:04,240
and we got to the point where we opened

154
00:05:08,710 --> 00:05:07,199
a hatch i waved sergey forward and

155
00:05:10,550 --> 00:05:08,720
through all the hatches as we went into

156
00:05:13,749 --> 00:05:10,560
unity and into the fgb

157
00:05:16,070 --> 00:05:13,759
sergey and i entered side by side it was

158
00:05:18,230 --> 00:05:16,080
an international space station it was an

159
00:05:20,390 --> 00:05:18,240
american and a russian module and i felt

160
00:05:23,029 --> 00:05:20,400
it really important that we enter as an

161
00:05:25,430 --> 00:05:23,039
international crew not as any one

162
00:05:27,270 --> 00:05:25,440
country and i think it set the example

163
00:05:29,350 --> 00:05:27,280

for how we operate on space station even

164

00:05:31,510 --> 00:05:29,360

today i mean we have all our partners

165

00:05:33,189 --> 00:05:31,520

working together as one up there and

166

00:05:34,950 --> 00:05:33,199

it's a model for how we're going to

167

00:05:36,550 --> 00:05:34,960

explore when we go beyond planet earth i

168

00:05:38,469 --> 00:05:36,560

think we have learned so much working

169

00:05:39,990 --> 00:05:38,479

together and and when we explore beyond

170

00:05:41,430 --> 00:05:40,000

planet earth you know it's not any one

171

00:05:42,790 --> 00:05:41,440

country that should leave planet earth

172

00:05:44,070 --> 00:05:42,800

but we should leave as the people from

173

00:05:46,310 --> 00:05:44,080

planet earth and i think the space

174

00:05:48,070 --> 00:05:46,320

station has just been a tremendous model

175

00:05:49,189 --> 00:05:48,080

for how we work together

176

00:05:50,310 --> 00:05:49,199

last question for you what's your

177

00:05:51,430 --> 00:05:50,320

reaction whenever you look at it now i

178

00:05:53,830 --> 00:05:51,440

mean this thing weighs almost a million

179

00:05:55,110 --> 00:05:53,840

pounds it's enormous uh it's grown

180

00:05:56,710 --> 00:05:55,120

incredibly now that we've sort of

181

00:05:58,550 --> 00:05:56,720

finished assembly now it's moved into

182

00:05:59,510 --> 00:05:58,560

science here in the research era you

183

00:06:00,790 --> 00:05:59,520

know what are your thoughts on it now

184

00:06:03,350 --> 00:06:00,800

with where it is

185

00:06:05,350 --> 00:06:03,360

well i mean first off uh i went i

186

00:06:07,830 --> 00:06:05,360

watched our post flight crew movie video

187

00:06:09,670 --> 00:06:07,840

the other day about 30 minutes long and

188

00:06:11,430 --> 00:06:09,680

what great memories it brought back all

189

00:06:13,590 --> 00:06:11,440

the challenges and stuff and i'll share

190

00:06:15,749 --> 00:06:13,600

one more story in the end here but

191

00:06:17,670 --> 00:06:15,759

uh at the end of it you know there's

192

00:06:18,950 --> 00:06:17,680

this picture of unity and zarya floating

193

00:06:20,390 --> 00:06:18,960

in space together the birth of the

194

00:06:22,469 --> 00:06:20,400

international space station

195

00:06:24,629 --> 00:06:22,479

and then it shifts to a computer

196

00:06:27,270 --> 00:06:24,639

animation and it shows the assembly

197

00:06:29,189 --> 00:06:27,280

sequence all the modules coming together

198

00:06:30,230 --> 00:06:29,199

in this video that's a computer

199

00:06:30,950 --> 00:06:30,240

animation

200

00:06:32,870 --> 00:06:30,960

and

201
00:06:35,510 --> 00:06:32,880
we did that what was a computer

202
00:06:37,350 --> 00:06:35,520
animation 15 years ago it's reality on

203
00:06:40,309 --> 00:06:37,360
orbit today i mean it's just a

204
00:06:42,550 --> 00:06:40,319
phenomenal complex all those modules

205
00:06:44,309 --> 00:06:42,560
all have come together work perfectly

206
00:06:45,670 --> 00:06:44,319
you know the wall of eva that we used to

207
00:06:47,029 --> 00:06:45,680
talk about we're never going to be able

208
00:06:48,469 --> 00:06:47,039
to surmount this it's just going to be

209
00:06:50,469 --> 00:06:48,479
too challenging

210
00:06:52,550 --> 00:06:50,479
look at all the evas we did spacewalks

211
00:06:54,629 --> 00:06:52,560
assembling the space station and how

212
00:06:56,469 --> 00:06:54,639
important it was to have humans tackle

213
00:06:58,469 --> 00:06:56,479

the problems that arose as we were out

214

00:06:59,749 --> 00:06:58,479

there but they all went perfectly you

215

00:07:01,110 --> 00:06:59,759

know there were some hiccups along the

216

00:07:03,589 --> 00:07:01,120

way but

217

00:07:05,909 --> 00:07:03,599

because of the team and our ability as

218

00:07:07,670 --> 00:07:05,919

humans to overcome and adapt

219

00:07:09,830 --> 00:07:07,680

we met all those challenges we corrected

220

00:07:11,670 --> 00:07:09,840

the problems we have a working space

221

00:07:14,390 --> 00:07:11,680

station on orbit that is just a

222

00:07:16,710 --> 00:07:14,400

tremendous scientific research and

223

00:07:18,309 --> 00:07:16,720

engineering facility

224

00:07:19,990 --> 00:07:18,319

you know i i truly believe it's a

225

00:07:22,150 --> 00:07:20,000

stepping stone to exploration beyond

226

00:07:23,749 --> 00:07:22,160

planet earth we are going to prove the

227

00:07:24,710 --> 00:07:23,759

systems we need

228

00:07:26,790 --> 00:07:24,720

for

229

00:07:28,469 --> 00:07:26,800

long duration space flight away from

230

00:07:30,469 --> 00:07:28,479

planet earth on the international space

231

00:07:33,350 --> 00:07:30,479

station we are going to learn about how

232

00:07:35,189 --> 00:07:33,360

the human body behaves for an expanded

233

00:07:37,270 --> 00:07:35,199

extended period of time in a

234

00:07:38,790 --> 00:07:37,280

microgravity environment aboard the

235

00:07:40,469 --> 00:07:38,800

international space station the science

236

00:07:42,790 --> 00:07:40,479

that's coming from it is phenomenal and

237

00:07:44,550 --> 00:07:42,800

even greater things are going to come

238

00:07:45,830 --> 00:07:44,560

i would give anything to be able to go

239

00:07:47,670 --> 00:07:45,840

back there i think one of the neatest

240

00:07:48,390 --> 00:07:47,680

things right now on the space station

241

00:07:50,469 --> 00:07:48,400

and

242

00:07:52,150 --> 00:07:50,479

it's the cupola to be able to look down

243

00:07:54,309 --> 00:07:52,160

on the earth from inside that cupola and

244

00:07:56,869 --> 00:07:54,319

just watch it go by what a tremendous

245

00:07:59,029 --> 00:07:56,879

view what a unique opportunity that is

246

00:08:01,189 --> 00:07:59,039

because i tell you there's nothing more

247

00:08:03,110 --> 00:08:01,199

special than watching the earth go by