



1
00:00:40,869 --> 00:00:39,590
the dogs have their

2
00:00:42,389 --> 00:00:40,879
their famous

3
00:00:43,830 --> 00:00:42,399
dog movie

4
00:00:44,790 --> 00:00:43,840
which we're which we're going to show

5
00:00:46,709 --> 00:00:44,800
you now

6
00:00:49,510 --> 00:00:46,719
and we will

7
00:00:51,270 --> 00:00:49,520
we will narrate it

8
00:00:53,270 --> 00:00:51,280
for you as as it goes through and then

9
00:00:56,150 --> 00:00:53,280
we'll show you some slides talk a little

10
00:00:59,830 --> 00:00:56,160
bit about the mission and uh invite you

11
00:01:01,910 --> 00:00:59,840
to share with us uh as best as best as

12
00:01:04,229 --> 00:01:01,920
it can be done through the medium of of

13
00:01:05,750 --> 00:01:04,239

the film and and the slides uh the

14

00:01:08,149 --> 00:01:05,760

terrific experience that you made

15

00:01:09,990 --> 00:01:08,159

possible because the people in this room

16

00:01:11,030 --> 00:01:10,000

and and a lot of them who aren't here of

17

00:01:14,070 --> 00:01:11,040

course because they're doing other

18

00:01:16,469 --> 00:01:14,080

things are the people who deserve the

19

00:01:19,030 --> 00:01:16,479

credit for this

20

00:01:19,910 --> 00:01:19,040

and many other successful space flights

21

00:01:20,950 --> 00:01:19,920

and

22

00:01:25,030 --> 00:01:20,960

we

23

00:01:27,190 --> 00:01:25,040

as part of a team i'm really proud and

24

00:01:28,870 --> 00:01:27,200

pleased to have some of that team here

25

00:01:30,149 --> 00:01:28,880

and i know that you all are going to do

26

00:01:31,350 --> 00:01:30,159

terrific work

27

00:01:33,590 --> 00:01:31,360

henceforth

28

00:01:36,069 --> 00:01:33,600

for the rest of the folks and and for

29

00:01:38,069 --> 00:01:36,079

the rest of the missions coming up

30

00:01:40,149 --> 00:01:38,079

with that i think we can we can roll the

31

00:01:43,270 --> 00:01:40,159

movie

32

00:01:48,149 --> 00:01:43,280

and probably bring down the house lights

33

00:01:51,590 --> 00:01:50,230

there's our patch it was a challenge to

34

00:01:54,069 --> 00:01:51,600

come up with a good patch for this

35

00:01:57,429 --> 00:01:54,079

mission but we if we think we did and

36

00:01:58,950 --> 00:01:57,439

now a quick view of our suit up process

37

00:02:01,429 --> 00:01:58,960

you saw me there and there's there's

38

00:02:05,190 --> 00:02:01,439

cujo ken cockrell

39

00:02:10,469 --> 00:02:06,830

that's probably

40

00:02:12,229 --> 00:02:10,479

underdog and there of course is pluto

41

00:02:14,630 --> 00:02:12,239

and last but not least my payload

42

00:02:16,470 --> 00:02:14,640

commander dog face

43

00:02:18,390 --> 00:02:16,480

we were happy to be going flying as you

44

00:02:20,470 --> 00:02:18,400

know we had a few little

45

00:02:22,630 --> 00:02:20,480

bumps in the road getting there

46

00:02:24,470 --> 00:02:22,640

but finally walking out to a resounding

47

00:02:29,030 --> 00:02:24,480

chorus of wolves at the kennedy space

48

00:02:35,670 --> 00:02:30,470

the training team might be pleased to

49

00:02:39,350 --> 00:02:37,750

the time engine's uh starting up and the

50

00:02:40,390 --> 00:02:39,360

vehicle twanging forward on the launch

51
00:02:41,670 --> 00:02:40,400
pad and

52
00:02:45,670 --> 00:02:41,680
five screaming

53
00:02:45,680 --> 00:02:48,710
sort of young anyway

54
00:02:52,150 --> 00:02:50,550
we had some interesting atmospheric

55
00:02:53,830 --> 00:02:52,160
conditions that weren't really evident

56
00:02:56,470 --> 00:02:53,840
to us as we were going uphill but they

57
00:02:58,470 --> 00:02:56,480
did create some good flow visualization

58
00:02:59,270 --> 00:02:58,480
of the mock waves on

59
00:03:01,270 --> 00:02:59,280
uh

60
00:03:03,270 --> 00:03:01,280
the rough parts of the the shape of the

61
00:03:05,589 --> 00:03:03,280
vehicle around the booster nozzle or the

62
00:03:07,990 --> 00:03:05,599
booster cones and

63
00:03:09,350 --> 00:03:08,000

and just above the cabin uh creates some

64

00:03:12,869 --> 00:03:09,360

shock waves as we're going through mach

65

00:03:15,030 --> 00:03:12,879

1 and going past the speed of sound

66

00:03:16,869 --> 00:03:15,040

this is kind of a rough part of the ride

67

00:03:18,550 --> 00:03:16,879

very exciting the boosters let you know

68

00:03:20,550 --> 00:03:18,560

for sure that there's a lot of thrust

69

00:03:22,550 --> 00:03:20,560

back there when they separate the ride

70

00:03:24,470 --> 00:03:22,560

smooths out a bunch

71

00:03:25,509 --> 00:03:24,480

but it's only just part way beginning in

72

00:03:27,910 --> 00:03:25,519

fact

73

00:03:29,509 --> 00:03:27,920

there's six and a half more minutes of

74

00:03:31,910 --> 00:03:29,519

powered flight to go

75

00:03:33,589 --> 00:03:31,920

and lots more that can happen

76

00:03:34,949 --> 00:03:33,599

as the training team would be glad to

77

00:03:39,110 --> 00:03:34,959

share with you

78

00:03:42,309 --> 00:03:41,030

once we get on orbit we have a lot of

79

00:03:43,589 --> 00:03:42,319

things we had to do and we had a

80

00:03:45,910 --> 00:03:43,599

tremendous number of things to get out

81

00:03:47,190 --> 00:03:45,920

and get ready for our flight dave and

82

00:03:49,350 --> 00:03:47,200

cujo

83

00:03:50,550 --> 00:03:49,360

were up on the flight deck reconfiguring

84

00:03:52,390 --> 00:03:50,560

the

85

00:03:54,550 --> 00:03:52,400

digital processing system and getting

86

00:03:56,149 --> 00:03:54,560

the orbiter ready for orbit operations

87

00:03:59,030 --> 00:03:56,159

and underdog was downstairs looking for

88

00:04:03,270 --> 00:04:00,869

uh jim was reconfiguring uh getting

89

00:04:04,550 --> 00:04:03,280

things set up this was the ergometer we

90

00:04:06,149 --> 00:04:04,560

had a lot of things to get out put in

91

00:04:08,470 --> 00:04:06,159

place take out of the lockers and get

92

00:04:10,470 --> 00:04:08,480

ready for our orbit operations before

93

00:04:12,949 --> 00:04:10,480

the next day when we started our primary

94

00:04:15,589 --> 00:04:12,959

payload ops

95

00:04:17,749 --> 00:04:15,599

this is the uh our first major payload

96

00:04:20,229 --> 00:04:17,759

of the of the mission the spartan it's a

97

00:04:21,909 --> 00:04:20,239

solar science satellite uh aimed at

98

00:04:23,990 --> 00:04:21,919

studying the solar wind and ultimately

99

00:04:25,830 --> 00:04:24,000

its effects on satellite communications

100

00:04:27,990 --> 00:04:25,840

and weather on earth here

101

00:04:30,070 --> 00:04:28,000

uh it was a great satellite it was all

102

00:04:32,629 --> 00:04:30,080

uh autonomous so all we had to do was

103

00:04:33,990 --> 00:04:32,639

unbirth it and uh turn it loose and then

104

00:04:35,590 --> 00:04:34,000

it went off and

105

00:04:37,909 --> 00:04:35,600

flew around did its thing for a couple

106

00:04:39,510 --> 00:04:37,919

of days um you'll see a little bit later

107

00:04:40,950 --> 00:04:39,520

it actually shut down

108

00:04:42,790 --> 00:04:40,960

a little bit early as it turns out we

109

00:04:43,990 --> 00:04:42,800

got 95 percent of the science done

110

00:04:45,030 --> 00:04:44,000

though

111

00:04:47,830 --> 00:04:45,040

and that's

112

00:04:49,909 --> 00:04:47,840

at the aft flight deck window

113

00:04:51,909 --> 00:04:49,919

during the release process

114

00:04:53,430 --> 00:04:51,919

uh it did a little pirouette where it

115

00:04:55,270 --> 00:04:53,440

rotates uh clockwise and

116

00:04:56,950 --> 00:04:55,280

counterclockwise to signal that

117

00:04:57,990 --> 00:04:56,960

everything is okay

118

00:04:59,430 --> 00:04:58,000

and

119

00:05:01,110 --> 00:04:59,440

it's really beautiful to see the thing

120

00:05:03,189 --> 00:05:01,120

as we separated from it and to look back

121

00:05:06,790 --> 00:05:03,199

down at the earth and see this little

122

00:05:10,629 --> 00:05:08,150

a great site

123

00:05:12,310 --> 00:05:10,639

i might mention that thanks to excellent

124

00:05:15,510 --> 00:05:12,320

training among other things underdog did

125

00:05:16,950 --> 00:05:15,520

a perfect job of deploying the spartan

126

00:05:18,390 --> 00:05:16,960

we had a lot of secondary experiments

127

00:05:20,310 --> 00:05:18,400

that we did while the spartan was out

128

00:05:22,950 --> 00:05:20,320

one of them was the commercial generic

129

00:05:24,710 --> 00:05:22,960

bioprocessing apparatus it's a large

130

00:05:26,390 --> 00:05:24,720

tube filled with a bunch of small test

131

00:05:29,110 --> 00:05:26,400

tubes that have different experiments in

132

00:05:30,790 --> 00:05:29,120

them you turn the crank to activate the

133

00:05:32,870 --> 00:05:30,800

uh each tube

134

00:05:34,310 --> 00:05:32,880

and then later we turn the crank to fix

135

00:05:37,270 --> 00:05:34,320

the things that have done their thing in

136

00:05:39,350 --> 00:05:37,280

zero g then they're all brought back to

137

00:05:41,110 --> 00:05:39,360

evaluate the effects of zero g on all

138

00:05:43,270 --> 00:05:41,120

these different experiments

139

00:05:45,590 --> 00:05:43,280

this is a mass measurement device it

140

00:05:47,110 --> 00:05:45,600

uses a linear acceleration that at times

141

00:05:48,230 --> 00:05:47,120

to figure out how much something weighs

142

00:05:50,150 --> 00:05:48,240

on orbit

143

00:05:53,590 --> 00:05:50,160

it's kind of like getting the miniature

144

00:05:56,950 --> 00:05:53,600

cat shot so a couple of navy guys here

145

00:05:56,960 --> 00:06:00,469

here's one of our more interesting

146

00:06:04,309 --> 00:06:02,070

one of our more interesting experiments

147

00:06:06,309 --> 00:06:04,319

the training team remembers vividly me

148

00:06:08,710 --> 00:06:06,319

going around seeking victims for this

149

00:06:10,230 --> 00:06:08,720

while we were practicing prior to flight

150

00:06:11,990 --> 00:06:10,240

but it actually

151

00:06:13,510 --> 00:06:12,000

is a

152

00:06:15,909 --> 00:06:13,520

a way to test

153

00:06:17,430 --> 00:06:15,919

blood on on orbit or any place in a

154

00:06:19,029 --> 00:06:17,440

field situation

155

00:06:21,909 --> 00:06:19,039

with this portable clinical blood

156

00:06:23,749 --> 00:06:21,919

analyzer nifty little gadget

157

00:06:25,350 --> 00:06:23,759

in the training for it was actually kind

158

00:06:27,590 --> 00:06:25,360

of tricky because

159

00:06:30,309 --> 00:06:27,600

there's a lot more to taking blood than

160

00:06:32,070 --> 00:06:30,319

one realizes and we were able to do it

161

00:06:38,870 --> 00:06:32,080

pretty well on orbit although some pain

162

00:06:42,230 --> 00:06:40,469

yeah this is the spartan rendezvous

163

00:06:44,230 --> 00:06:42,240

we're returning to pick up

164

00:06:46,710 --> 00:06:44,240

the spacecraft and

165

00:06:49,270 --> 00:06:46,720

it was as we mentioned earlier a perfect

166

00:06:51,029 --> 00:06:49,280

deploy the laundry itself wasn't nominal

167

00:06:53,749 --> 00:06:51,039

let me let the underdog talk about the

168

00:06:58,870 --> 00:06:56,790

basically uh things went uh real well um

169

00:07:00,550 --> 00:06:58,880

it was spin a little bit and uh between

170

00:07:02,870 --> 00:07:00,560

the training that we'd had and then the

171

00:07:04,469 --> 00:07:02,880

incredibly uh proficient teamwork

172

00:07:07,029 --> 00:07:04,479

amongst the whole crew we did the fly

173

00:07:11,029 --> 00:07:07,039

around and did a a rate uh track and

174

00:07:12,469 --> 00:07:11,039

capture uh very successfully and and uh

175

00:07:14,390 --> 00:07:12,479

i was real proud to be part of the team

176

00:07:16,230 --> 00:07:14,400

on that one

177

00:07:17,029 --> 00:07:16,240

this is the birthing of the spartan

178

00:07:19,589 --> 00:07:17,039

which

179

00:07:21,670 --> 00:07:19,599

went pretty much like we expected and uh

180

00:07:23,350 --> 00:07:21,680

after that exciting uh rendezvous

181

00:07:24,870 --> 00:07:23,360

grapple we're real happy to get that

182

00:07:27,749 --> 00:07:24,880

that sucker

183

00:07:29,270 --> 00:07:27,759

clamped down in the payload bay

184

00:07:30,710 --> 00:07:29,280

this is a view back florida in the

185

00:07:32,790 --> 00:07:30,720

background and the

186

00:07:34,550 --> 00:07:32,800

bahama islands andros island

187

00:07:37,270 --> 00:07:34,560

particularly in the center center of the

188

00:07:39,110 --> 00:07:37,280

screen and just to the lower right of

189

00:07:41,830 --> 00:07:39,120

that is the deep dark blue is the tongue

190

00:07:46,710 --> 00:07:44,469

a very spectacular views passing over

191

00:07:48,710 --> 00:07:46,720

the bahamas in florida with the spartan

192

00:07:50,710 --> 00:07:48,720

uh back in the bay

193

00:07:52,390 --> 00:07:50,720

it perfectly blocked our direct viewing

194

00:07:54,469 --> 00:07:52,400

of the weight shield so we had to pull

195

00:07:56,150 --> 00:07:54,479

the wake shield up

196

00:07:57,589 --> 00:07:56,160

from behind the spartan

197

00:07:58,950 --> 00:07:57,599

and then

198

00:08:00,390 --> 00:07:58,960

it's going to grow some semi it was

199

00:08:02,869 --> 00:08:00,400

planned to grow some semiconductors so

200

00:08:05,510 --> 00:08:02,879

we took it off to one side into the ram

201
00:08:08,309 --> 00:08:05,520
in order to clean the very clean side of

202
00:08:10,070 --> 00:08:08,319
it the uh the wake side and use the

203
00:08:11,749 --> 00:08:10,080
atomic oxygen in low earth orbit to

204
00:08:13,749 --> 00:08:11,759
clean it then we moved it over to the

205
00:08:16,390 --> 00:08:13,759
other side in order to test out the

206
00:08:18,230 --> 00:08:16,400
attitude control system

207
00:08:20,869 --> 00:08:18,240
after getting through that

208
00:08:22,950 --> 00:08:20,879
mike running the systems and me running

209
00:08:25,350 --> 00:08:22,960
the arm at that point we brought it up

210
00:08:27,430 --> 00:08:25,360
to the overhead deploy position in order

211
00:08:28,550 --> 00:08:27,440
to do a gravity gradient deploy for

212
00:08:30,950 --> 00:08:28,560
which one of the awards was given

213
00:08:32,630 --> 00:08:30,960

earlier the we didn't touch the the

214

00:08:35,110 --> 00:08:32,640

attitude control system on the orbiter

215

00:08:37,350 --> 00:08:35,120

for about five hours prior to deploy and

216

00:08:39,430 --> 00:08:37,360

then for a few hours after that as well

217

00:08:41,990 --> 00:08:39,440

the arm is now clear of the wake shield

218

00:08:45,030 --> 00:08:42,000

it turns on a two ounce nitrogen gas

219

00:08:47,110 --> 00:08:45,040

thruster and it thrusts away from the

220

00:08:48,070 --> 00:08:47,120

shuttle in order to maintain that very

221

00:08:51,030 --> 00:08:48,080

clean

222

00:08:53,430 --> 00:08:51,040

environment which we had set up

223

00:08:55,110 --> 00:08:53,440

we were able to track it using the laser

224

00:08:57,110 --> 00:08:55,120

out to about fifteen thousand feet and

225

00:08:59,910 --> 00:08:57,120

dog face holds the record for that

226

00:09:02,710 --> 00:08:59,920

this is the wake shield science center

227

00:09:07,269 --> 00:09:02,720

and we had two computers which we used

228

00:09:10,470 --> 00:09:08,949

here's a little work on the mid-deck uh

229

00:09:12,310 --> 00:09:10,480

jim rowling and mike working with a

230

00:09:14,150 --> 00:09:12,320

secondary experiment yeah this was the

231

00:09:15,750 --> 00:09:14,160

c-mix experiment and it was always a

232

00:09:17,829 --> 00:09:15,760

great challenge to uh

233

00:09:19,269 --> 00:09:17,839

hunt down these uh test tubes that kept

234

00:09:20,470 --> 00:09:19,279

coming loose because the velcro didn't

235

00:09:22,310 --> 00:09:20,480

work well but

236

00:09:24,230 --> 00:09:22,320

the science was really was really great

237

00:09:27,110 --> 00:09:24,240

one of the things that we worked on was

238

00:09:28,710 --> 00:09:27,120

a crystal that could result in a drug

239

00:09:30,230 --> 00:09:28,720

that could prevent the spread of breast

240

00:09:32,070 --> 00:09:30,240

cancer and

241

00:09:34,230 --> 00:09:32,080

so we're real real happy to be working

242

00:09:36,389 --> 00:09:34,240

on that

243

00:09:39,030 --> 00:09:36,399

we did get to exercise a fair amount on

244

00:09:40,790 --> 00:09:39,040

this flight and when you don't have

245

00:09:48,870 --> 00:09:40,800

gravity to constrain you can ride your

246

00:09:52,150 --> 00:09:50,710

dave is uh studying a little bit on the

247

00:09:53,910 --> 00:09:52,160

middeck there and as we're going to pan

248

00:09:55,509 --> 00:09:53,920

around and take a quick look at part of

249

00:09:58,070 --> 00:09:55,519

the orbiter wide web this is the mid

250

00:10:00,230 --> 00:09:58,080

deck implementation that's the the

251
00:10:02,150 --> 00:10:00,240
global positioning satellite pgsc on the

252
00:10:04,069 --> 00:10:02,160
right the computer that allowed us to

253
00:10:06,870 --> 00:10:04,079
tell where we were quite accurately

254
00:10:09,829 --> 00:10:06,880
using the onboard gps receivers to the

255
00:10:12,630 --> 00:10:09,839
left is the goddard pgsc which allowed

256
00:10:15,269 --> 00:10:12,640
us to command the goddard payloads

257
00:10:17,350 --> 00:10:15,279
now it's time to bring back wake shield

258
00:10:18,790 --> 00:10:17,360
uh more more realistically to go and get

259
00:10:20,470 --> 00:10:18,800
it this is the view out of the

260
00:10:22,949 --> 00:10:20,480
commander's window

261
00:10:25,110 --> 00:10:22,959
the overhead window window nine

262
00:10:27,590 --> 00:10:25,120
you can see the gun side appearance of

263
00:10:29,910 --> 00:10:27,600

the coast there and the

264

00:10:32,230 --> 00:10:29,920

wake shield itself out in the

265

00:10:34,150 --> 00:10:32,240

out in the ether we could always see it

266

00:10:36,310 --> 00:10:34,160

even though we were 30 miles away at

267

00:10:37,990 --> 00:10:36,320

times it's shown like a bright star it

268

00:10:40,949 --> 00:10:38,000

was very very visible

269

00:10:43,030 --> 00:10:40,959

and we because the spartan rendezvous

270

00:10:44,550 --> 00:10:43,040

had been a bit challenging in some parts

271

00:10:47,030 --> 00:10:44,560

particularly the prox ops were very

272

00:10:48,949 --> 00:10:47,040

confident and comfortable again due to a

273

00:10:50,870 --> 00:10:48,959

lot of good training and simulation and

274

00:10:52,790 --> 00:10:50,880

the fact that the flight control team

275

00:10:53,829 --> 00:10:52,800

had worked very closely with us setting

276

00:10:55,590 --> 00:10:53,839

this up

277

00:10:58,150 --> 00:10:55,600

so the rendezvous and the prox ops went

278

00:11:00,230 --> 00:10:58,160

very nominally

279

00:11:02,949 --> 00:11:00,240

unlike some of the wake shield science

280

00:11:06,230 --> 00:11:02,959

operations and we got

281

00:11:07,829 --> 00:11:06,240

into close proximity

282

00:11:09,590 --> 00:11:07,839

it's really a beautiful satellite we

283

00:11:11,590 --> 00:11:09,600

have some we have a gorgeous view coming

284

00:11:13,430 --> 00:11:11,600

up here shortly i think the sun was

285

00:11:16,310 --> 00:11:13,440

eclipsed there by the wake shield that

286

00:11:17,990 --> 00:11:16,320

has just come out right before sunset

287

00:11:20,230 --> 00:11:18,000

the the free flight of the wake shield

288

00:11:22,310 --> 00:11:20,240

was challenging and we gave awards out

289

00:11:24,389 --> 00:11:22,320

for that today we're very

290

00:11:25,670 --> 00:11:24,399

proud to to have that help it really

291

00:11:27,350 --> 00:11:25,680

made a difference in the entire

292

00:11:29,670 --> 00:11:27,360

operation of the wake shield from

293

00:11:30,710 --> 00:11:29,680

beginning to end there were challenges

294

00:11:32,630 --> 00:11:30,720

at every

295

00:11:34,150 --> 00:11:32,640

step of the way but we're confident with

296

00:11:35,750 --> 00:11:34,160

their help that they'll be able to take

297

00:11:38,790 --> 00:11:35,760

that information back to the wake shield

298

00:11:40,550 --> 00:11:38,800

program and help them get a really good

299

00:11:41,670 --> 00:11:40,560

flight on their next flight way shield

300

00:11:43,750 --> 00:11:41,680

three

301
00:11:45,829 --> 00:11:43,760
we did grapple the weight shield we did

302
00:11:46,870 --> 00:11:45,839
another day's worth of experimentation

303
00:11:48,630 --> 00:11:46,880
with it

304
00:11:50,550 --> 00:11:48,640
looking at the charging

305
00:11:52,790 --> 00:11:50,560
of the wake shield in order to help

306
00:11:54,230 --> 00:11:52,800
assess the impact of charging of

307
00:11:55,190 --> 00:11:54,240
spacecraft

308
00:11:56,790 --> 00:11:55,200
in that

309
00:11:58,150 --> 00:11:56,800
environment

310
00:12:00,230 --> 00:11:58,160
well of course while you're in orbit you

311
00:12:02,550 --> 00:12:00,240
have to eat and we're provided with this

312
00:12:05,350 --> 00:12:02,560
uh galley arrangement here that lets you

313
00:12:07,590 --> 00:12:05,360

rehydrate dehydrated food and also warm

314

00:12:09,110 --> 00:12:07,600

it up if it needs warming up and here i

315

00:12:12,310 --> 00:12:09,120

am i must be fixing some food for

316

00:12:16,550 --> 00:12:12,320

underdog and

317

00:12:20,550 --> 00:12:18,230

mike spends a lot of time contemplating

318

00:12:21,990 --> 00:12:20,560

what he's going to do and this is some

319

00:12:24,069 --> 00:12:22,000

cream of mushroom soup and i think it's

320

00:12:25,750 --> 00:12:24,079

really very good but it took a while to

321

00:12:28,870 --> 00:12:25,760

decide that he was actually going to eat

322

00:12:32,790 --> 00:12:30,550

this is getting ready for the eva

323

00:12:34,389 --> 00:12:32,800

preparing our helmets with some anti-fog

324

00:12:36,870 --> 00:12:34,399

a lot of equipment that we had to get

325

00:12:38,629 --> 00:12:36,880

ready for it we spent six to eight hours

326

00:12:40,550 --> 00:12:38,639

getting all of our equipment and tools

327

00:12:42,629 --> 00:12:40,560

ready to go outside

328

00:12:45,350 --> 00:12:42,639

here we are preparing some of the tools

329

00:12:47,590 --> 00:12:45,360

the rigid tether in my hands

330

00:12:49,030 --> 00:12:47,600

and jim newman had

331

00:12:50,550 --> 00:12:49,040

a hope that mike shoulder wouldn't get

332

00:12:52,389 --> 00:12:50,560

better and he'd get the opportunity to

333

00:13:01,190 --> 00:12:52,399

go outside

334

00:13:04,470 --> 00:13:03,030

if there's any chance of him doing it he

335

00:13:05,670 --> 00:13:04,480

just lasted when we shoved him under

336

00:13:08,550 --> 00:13:05,680

there because we banged him right into

337

00:13:15,030 --> 00:13:10,310

this is a shot in the airlock with mike

338

00:13:19,030 --> 00:13:16,870

we spent about 40 minutes pre-breathing

339

00:13:21,269 --> 00:13:19,040

in there and here cujo is closing the

340

00:13:27,350 --> 00:13:21,279

door on us shutting up the hatch and

341

00:13:31,350 --> 00:13:30,069

here's mike headed out the door

342

00:13:35,670 --> 00:13:31,360

now we didn't know if it even had an

343

00:13:38,150 --> 00:13:35,680

automatic closing thermal cover

344

00:13:40,710 --> 00:13:38,160

one of the first things we did was

345

00:13:42,870 --> 00:13:40,720

remove a debris shield from a task board

346

00:13:45,350 --> 00:13:42,880

and you see that right here

347

00:13:47,030 --> 00:13:45,360

really all of the tasks we did work

348

00:13:49,189 --> 00:13:47,040

excellent and

349

00:13:50,629 --> 00:13:49,199

as a sort of a midterm exam of where

350

00:13:52,629 --> 00:13:50,639

we're headed for space station i think

351
00:13:54,550 --> 00:13:52,639
we're in really good shape we were

352
00:13:56,310 --> 00:13:54,560
pleasantly surprised by essentially

353
00:13:57,430 --> 00:13:56,320
everything that that we did

354
00:13:59,350 --> 00:13:57,440
there's a

355
00:14:01,030 --> 00:13:59,360
shot of me maneuvering the debris shield

356
00:14:03,110 --> 00:14:01,040
and we tied that off on that forward

357
00:14:05,030 --> 00:14:03,120
bulkhead there were two major objectives

358
00:14:07,110 --> 00:14:05,040
to the eva one was testing tools and

359
00:14:09,189 --> 00:14:07,120
procedures for space station all of

360
00:14:10,949 --> 00:14:09,199
those worked extremely well

361
00:14:12,790 --> 00:14:10,959
and the other was the

362
00:14:14,629 --> 00:14:12,800
thermal environment for the suit testing

363
00:14:16,870 --> 00:14:14,639

modifications to the suit and seeing if

364

00:14:19,189 --> 00:14:16,880

they were here i have the rigid tether

365

00:14:21,590 --> 00:14:19,199

on with a

366

00:14:23,750 --> 00:14:21,600

pfr attached to the inner portable foot

367

00:14:25,990 --> 00:14:23,760

restraint a large mass it was a pretty

368

00:14:27,990 --> 00:14:26,000

awkward uh arrangement that we had to

369

00:14:30,150 --> 00:14:28,000

then put behind us to translate down the

370

00:14:32,069 --> 00:14:30,160

silt and here mike is he's very

371

00:14:34,230 --> 00:14:32,079

stationary if you look just to his the

372

00:14:36,150 --> 00:14:34,240

left of his elbow you see the body

373

00:14:37,910 --> 00:14:36,160

restraint tether which is a device used

374

00:14:39,910 --> 00:14:37,920

to hold you in place in orbit and it

375

00:14:41,189 --> 00:14:39,920

worked very well holding held you very

376

00:14:43,509 --> 00:14:41,199

rigid

377

00:14:45,750 --> 00:14:43,519

this is uh during the thermal eval and

378

00:14:47,509 --> 00:14:45,760

we had the opportunity to spend 45

379

00:14:49,269 --> 00:14:47,519

minutes hanging upside down on the arm

380

00:14:51,189 --> 00:14:49,279

and i can tell you the view is just

381

00:14:52,310 --> 00:14:51,199

exceptional and

382

00:14:54,470 --> 00:14:52,320

that's probably the last chance we'll

383

00:14:56,790 --> 00:14:54,480

have to actually spend 45 minutes doing

384

00:14:59,430 --> 00:14:56,800

nothing but observing moving the guys

385

00:15:01,110 --> 00:14:59,440

around on the end of the arm was a was

386

00:15:02,550 --> 00:15:01,120

was kind of fun actually if i found if i

387

00:15:05,910 --> 00:15:02,560

moved him quick enough i could shake him

388

00:15:11,269 --> 00:15:09,350

which he did a couple of times

389

00:15:12,550 --> 00:15:11,279

it was a great view and the eva went

390

00:15:14,069 --> 00:15:12,560

very well when we were done we had to

391

00:15:16,150 --> 00:15:14,079

clean up all the mess we made out in the

392

00:15:17,670 --> 00:15:16,160

payload bay we had to pack up mike was

393

00:15:19,750 --> 00:15:17,680

taking off one of the thermal cubes to

394

00:15:21,189 --> 00:15:19,760

measure the thermal environment and the

395

00:15:23,269 --> 00:15:21,199

sack i have in my hand has all of our

396

00:15:24,629 --> 00:15:23,279

tools it was a great tool bag and we

397

00:15:27,269 --> 00:15:24,639

carried that back to the airlock for

398

00:15:29,030 --> 00:15:27,279

putting everything away

399

00:15:31,030 --> 00:15:29,040

we were out for about six and a half

400

00:15:32,710 --> 00:15:31,040

hours and accomplished all the major

401
00:15:34,870 --> 00:15:32,720
objectives for the eva

402
00:15:38,069 --> 00:15:34,880
it went besides being a great experience

403
00:15:43,430 --> 00:15:41,829
and this is the final stages of ingress

404
00:15:46,069 --> 00:15:43,440
uh it was uh

405
00:15:46,949 --> 00:15:46,079
a great experience and um

406
00:15:48,949 --> 00:15:46,959
uh

407
00:15:50,790 --> 00:15:48,959
i think we're in good shape to to do the

408
00:15:53,269 --> 00:15:50,800
station this is back in the airlock and

409
00:15:54,710 --> 00:15:53,279
buttoning things up to come home

410
00:15:57,430 --> 00:15:54,720
had to put everything away after we got

411
00:15:58,870 --> 00:15:57,440
back inside clean up the suits and

412
00:16:05,030 --> 00:15:58,880
for the possibility of having to reuse

413
00:16:08,150 --> 00:16:06,310

one of the good things you can do when

414

00:16:09,189 --> 00:16:08,160

you have people in space is to look out

415

00:16:11,110 --> 00:16:09,199

the window

416

00:16:12,470 --> 00:16:11,120

and use your mind to figure out what's a

417

00:16:14,230 --> 00:16:12,480

good thing you could take a picture of

418

00:16:16,230 --> 00:16:14,240

and what might help geologists

419

00:16:18,310 --> 00:16:16,240

meteorologists and

420

00:16:20,629 --> 00:16:18,320

all kinds of scientists on the ground in

421

00:16:23,110 --> 00:16:20,639

their study of the earth this is the tip

422

00:16:25,030 --> 00:16:23,120

of somalia and one of the single

423

00:16:26,389 --> 00:16:25,040

tombolos that sticks out into the red

424

00:16:28,790 --> 00:16:26,399

sea

425

00:16:30,550 --> 00:16:28,800

from a meteorologist meteorologist point

426

00:16:32,470 --> 00:16:30,560

of view the

427

00:16:35,269 --> 00:16:32,480

our flight had great opportunities to

428

00:16:39,269 --> 00:16:35,279

see two large hurricanes one was luis

429

00:16:42,870 --> 00:16:41,350

luis was so big you could hardly see it

430

00:16:45,350 --> 00:16:42,880

all

431

00:16:47,590 --> 00:16:45,360

through one window it covered more

432

00:16:48,949 --> 00:16:47,600

almost more than the horizon

433

00:16:51,110 --> 00:16:48,959

we also had a small problem you may have

434

00:16:53,110 --> 00:16:51,120

heard about with our potty we had to

435

00:16:54,629 --> 00:16:53,120

dump our water into a bag and this is

436

00:16:56,710 --> 00:16:54,639

just getting ready that's a filter

437

00:16:58,389 --> 00:16:56,720

that's attached to a tube that then

438

00:16:59,910 --> 00:16:58,399

gets attached to a bag

439

00:17:01,990 --> 00:16:59,920

at this point in the flight i felt like

440

00:17:04,230 --> 00:17:02,000

i had done just about anything you could

441

00:17:06,710 --> 00:17:04,240

hope for on your first flight but no and

442

00:17:14,789 --> 00:17:06,720

we got a chance to excel at being space

443

00:17:20,150 --> 00:17:16,470

underdog found out why plumbers make so

444

00:17:24,150 --> 00:17:22,470

the cabin stow was uh getting ready to

445

00:17:25,669 --> 00:17:24,160

come home we're pulling all the bags out

446

00:17:27,029 --> 00:17:25,679

of the airlock and trying to find places

447

00:17:29,270 --> 00:17:27,039

for them so we're stuffing them into the

448

00:17:30,950 --> 00:17:29,280

sleep bunks and arranging them to try to

449

00:17:32,710 --> 00:17:30,960

get ahead of the timeline the orbit prep

450

00:17:35,270 --> 00:17:32,720

timeline is fairly tight so the day

451
00:17:38,870 --> 00:17:35,280
before we pulled all the bags out and

452
00:17:42,230 --> 00:17:40,310
and here's a

453
00:17:45,430 --> 00:17:42,240
gorgeous shot fortunately we had some

454
00:17:47,029 --> 00:17:45,440
great photographers on board both the

455
00:17:49,110 --> 00:17:47,039
and dogface are exceptionally good

456
00:17:51,830 --> 00:17:49,120
photographers they captured some some

457
00:17:53,990 --> 00:17:51,840
great scenes and this one sort of

458
00:17:55,590 --> 00:17:54,000
was a nostalgic one for us because we're

459
00:17:57,909 --> 00:17:55,600
getting ready to come home a great

460
00:17:59,590 --> 00:17:57,919
experience at an end we had tried hard

461
00:18:01,270 --> 00:17:59,600
to milk the program for another day but

462
00:18:03,430 --> 00:18:01,280
we just couldn't do it

463
00:18:04,950 --> 00:18:03,440

and here's the entry this obviously is

464

00:18:07,350 --> 00:18:04,960

late in the entry

465

00:18:08,549 --> 00:18:07,360

ken had a great view of houston as we

466

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

came over it

467

00:18:13,510 --> 00:18:10,160

by now we're in the range of the long

468

00:18:17,110 --> 00:18:15,430

and this is approaching

469

00:18:18,789 --> 00:18:17,120

the hack turn in fact it's probably on

470

00:18:21,029 --> 00:18:18,799

the hack now

471

00:18:22,230 --> 00:18:21,039

we made a right-hand turn

472

00:18:23,909 --> 00:18:22,240

entry

473

00:18:27,350 --> 00:18:23,919

to

474

00:18:28,710 --> 00:18:27,360

runway 3-3 at kennedy space center

475

00:18:30,070 --> 00:18:28,720

kind of a personal triumph i've been

476
00:18:31,830 --> 00:18:30,080
trying to land in my home state ever

477
00:18:33,909 --> 00:18:31,840
since my first mission

478
00:18:35,669 --> 00:18:33,919
and the last two have gone to california

479
00:18:37,350 --> 00:18:35,679
so we were glad to get back to to

480
00:18:39,270 --> 00:18:37,360
florida with this one

481
00:18:41,270 --> 00:18:39,280
the weather was really good we got great

482
00:18:42,870 --> 00:18:41,280
support from the entry team making sure

483
00:18:45,430 --> 00:18:42,880
the weather was good and that all the

484
00:18:47,990 --> 00:18:45,440
facilities were good

485
00:18:49,750 --> 00:18:48,000
and finally

486
00:18:52,470 --> 00:18:49,760
returning to

487
00:18:54,230 --> 00:18:52,480
light at the kennedy space center

488
00:18:56,070 --> 00:18:54,240

really really enjoyed

489

00:18:59,110 --> 00:18:56,080

the whole flight and the culmination of

490

00:19:00,390 --> 00:18:59,120

it here to land on florida soil was

491

00:19:01,830 --> 00:19:00,400

really nice

492

00:19:05,909 --> 00:19:01,840

there not being any place to land here

493

00:19:09,510 --> 00:19:08,070

shoot came out we hardly had to use the

494

00:19:10,710 --> 00:19:09,520

brakes because the shoot worked really

495

00:19:12,150 --> 00:19:10,720

well

496

00:19:14,150 --> 00:19:12,160

we had a little tailwind so we rolled

497

00:19:19,750 --> 00:19:14,160

quite a ways but we knew we were going

498

00:19:22,830 --> 00:19:21,270

and rolled down pretty close to where

499

00:19:26,150 --> 00:19:22,840

the convoy was and

500

00:19:28,070 --> 00:19:26,160

stopped at 69 knots we

501
00:19:29,350 --> 00:19:28,080
jettison the drag chute and you do it at

502
00:19:31,830 --> 00:19:29,360
a little bit of airspeed so that it

503
00:19:33,590 --> 00:19:31,840
pulls cleanly away from the engine bells

504
00:19:35,830 --> 00:19:33,600
because this after all is a reusable

505
00:19:38,950 --> 00:19:35,840
spacecraft it was a ninth space flight

506
00:19:43,270 --> 00:19:38,960
of endeavour the 71st space flight of

507
00:19:57,110 --> 00:19:44,549
and the

508
00:20:00,310 --> 00:19:58,549
everything about this patch was a

509
00:20:01,590 --> 00:20:00,320
challenge including getting it produced

510
00:20:03,430 --> 00:20:01,600
and it's still a challenge for some

511
00:20:05,430 --> 00:20:03,440
people to figure out which way is up on

512
00:20:07,029 --> 00:20:05,440
it it's supposed to be oriented so that

513
00:20:10,149 --> 00:20:07,039

the shuttle is going straight up but it

514

00:20:11,190 --> 00:20:10,159

almost never gets projected that way

515

00:20:12,870 --> 00:20:11,200

the two

516

00:20:15,029 --> 00:20:12,880

constellations that you see there are

517

00:20:17,270 --> 00:20:15,039

canis major and canis minor

518

00:20:19,510 --> 00:20:17,280

we considered it

519

00:20:20,789 --> 00:20:19,520

a small triumph over bureaucracy to get

520

00:20:23,350 --> 00:20:20,799

that through headquarters without

521

00:20:24,710 --> 00:20:23,360

anybody complaining about that

522

00:20:27,669 --> 00:20:24,720

they um

523

00:20:29,990 --> 00:20:27,679

we wove the 69 motif in there we think

524

00:20:31,830 --> 00:20:30,000

very subtly we were later accused of

525

00:20:34,470 --> 00:20:31,840

having attracted hurricanes by putting

526
00:20:37,190 --> 00:20:34,480
the

527
00:20:38,549 --> 00:20:37,200
and we did attract quite a few

528
00:20:40,390 --> 00:20:38,559
but uh

529
00:20:43,590 --> 00:20:40,400
the the colors of the flag and the

530
00:20:45,590 --> 00:20:43,600
colors of nasa the the wake shield

531
00:20:49,750 --> 00:20:45,600
is and the spartan are both represented

532
00:20:50,630 --> 00:20:49,760
by the the vaguely satellite shaped

533
00:20:52,950 --> 00:20:50,640
center

534
00:20:54,390 --> 00:20:52,960
depiction of the astronaut symbol

535
00:20:56,710 --> 00:20:54,400
and of course we have our favorite

536
00:20:59,110 --> 00:20:56,720
spacecraft going up and coming down

537
00:21:01,350 --> 00:20:59,120
safely depicted there

538
00:21:02,470 --> 00:21:01,360

i might mention that underdog wrote a

539

00:21:03,430 --> 00:21:02,480

beautiful

540

00:21:05,350 --> 00:21:03,440

piece of

541

00:21:06,710 --> 00:21:05,360

of verbiage to go along with this to

542

00:21:08,950 --> 00:21:06,720

send it up to headquarters to get it

543

00:21:11,029 --> 00:21:08,960

approved and for those of you who have

544

00:21:13,750 --> 00:21:11,039

the stickers and the patches and the

545

00:21:16,390 --> 00:21:13,760

crew pictures that stuff is on the back

546

00:21:18,549 --> 00:21:16,400

there he did that and i was impressed

547

00:21:20,470 --> 00:21:18,559

with the way that worked out

548

00:21:23,029 --> 00:21:20,480

here we are lifting off

549

00:21:25,110 --> 00:21:23,039

a gorgeous shot every time i'm amazed at

550

00:21:27,350 --> 00:21:25,120

how how good the photography is and i'll

551
00:21:29,029 --> 00:21:27,360
mention here those boosters that you see

552
00:21:31,270 --> 00:21:29,039
working so well there

553
00:21:32,549 --> 00:21:31,280
if you'll remember we had worries about

554
00:21:35,350 --> 00:21:32,559
pre-flight

555
00:21:37,110 --> 00:21:35,360
an absolutely terrific effort on the

556
00:21:39,029 --> 00:21:37,120
part of everybody from the thigh call

557
00:21:41,270 --> 00:21:39,039
folks to the cape folks to the people

558
00:21:42,549 --> 00:21:41,280
here who made sure it all was checked

559
00:21:45,270 --> 00:21:42,559
out properly

560
00:21:47,270 --> 00:21:45,280
to get that booster situation resolved

561
00:21:48,789 --> 00:21:47,280
and get us some fine boosters and as

562
00:21:50,950 --> 00:21:48,799
most of you may have heard

563
00:21:54,950 --> 00:21:50,960

we found the boosters uh to be in

564

00:21:58,230 --> 00:21:55,830

phase

565

00:21:59,510 --> 00:21:58,240

this is our payload bay and you can see

566

00:22:01,350 --> 00:21:59,520

all of our payloads it's not a very good

567

00:22:02,390 --> 00:22:01,360

picture for earth obs but for the bay it

568

00:22:06,549 --> 00:22:02,400

is

569

00:22:07,830 --> 00:22:06,559

closest to us behind it the wake shield

570

00:22:09,350 --> 00:22:07,840

you can see how difficult it would be to

571

00:22:10,470 --> 00:22:09,360

observe it if you were down in front of

572

00:22:11,830 --> 00:22:10,480

the spartan

573

00:22:13,430 --> 00:22:11,840

and then behind it another panel we

574

00:22:15,590 --> 00:22:13,440

haven't talked about yet the

575

00:22:18,070 --> 00:22:15,600

ieh international extreme

576

00:22:21,190 --> 00:22:18,080

ultraviolet hitchhiker which had a lot

577

00:22:23,190 --> 00:22:21,200

of different science payloads on it that

578

00:22:24,630 --> 00:22:23,200

cujo was responsible for and primarily

579

00:22:27,190 --> 00:22:24,640

involved maneuvering the orbiter

580

00:22:29,110 --> 00:22:27,200

pointing the instruments at celestial

581

00:22:31,350 --> 00:22:29,120

objects for taking all of its science

582

00:22:32,950 --> 00:22:31,360

and it proved to be very successful also

583

00:22:34,950 --> 00:22:32,960

the bay was quite full

584

00:22:37,110 --> 00:22:34,960

and in front which you can just barely

585

00:22:38,230 --> 00:22:37,120

see in front of spartan is our

586

00:22:40,230 --> 00:22:38,240

eva

587

00:22:44,070 --> 00:22:40,240

development flight test task board which

588

00:22:45,110 --> 00:22:44,080

occupied the forward bays of the orbiter

589

00:22:46,390 --> 00:22:45,120

well

590

00:22:48,149 --> 00:22:46,400

this is the

591

00:22:49,510 --> 00:22:48,159

fun part for me i guess because i get to

592

00:22:51,590 --> 00:22:49,520

talk about my crew and they are a

593

00:22:52,710 --> 00:22:51,600

terrific lot

594

00:22:58,789 --> 00:22:52,720

one of the

595

00:23:00,870 --> 00:22:58,799

cujo and i both being naval officers

596

00:23:02,070 --> 00:23:00,880

got a chance to promote our favorite

597

00:23:04,950 --> 00:23:02,080

army officer

598

00:23:06,390 --> 00:23:04,960

and make him a real bird colonel

599

00:23:08,149 --> 00:23:06,400

this was set up

600

00:23:10,149 --> 00:23:08,159

with cooperation from the flight control

601
00:23:11,990 --> 00:23:10,159
team and the army space command

602
00:23:14,310 --> 00:23:12,000
and we wanted to make sure everybody

603
00:23:15,990 --> 00:23:14,320
could tell that it was done in space so

604
00:23:18,549 --> 00:23:16,000
we got him upside down and took his

605
00:23:20,870 --> 00:23:19,669
and

606
00:23:23,750 --> 00:23:20,880
that

607
00:23:26,149 --> 00:23:23,760
was a highlight for me the dog face

608
00:23:29,190 --> 00:23:26,159
and i flew together on my previous

609
00:23:30,789 --> 00:23:29,200
flight and he did a terrific job it was

610
00:23:34,230 --> 00:23:30,799
pretty meaningful for me being a career

611
00:23:36,549 --> 00:23:34,240
army officer to be promoted in space

612
00:23:38,470 --> 00:23:36,559
you can see his university uh he managed

613
00:23:40,310 --> 00:23:38,480

to sneak auburn

614

00:23:42,950 --> 00:23:40,320

park posters into every single picture

615

00:23:46,789 --> 00:23:44,390

if you look carefully in the back you

616

00:23:49,750 --> 00:23:46,799

can see the uh the auburn poster could

617

00:23:52,630 --> 00:23:49,760

just taken over control of it

618

00:23:53,830 --> 00:23:52,640

underdog our rookie um he reluctantly

619

00:23:55,990 --> 00:23:53,840

acknowledged that he was a rookie

620

00:23:58,149 --> 00:23:56,000

towards the end of the flight just after

621

00:23:59,190 --> 00:23:58,159

we gave him the contingency wastewater

622

00:24:02,070 --> 00:23:59,200

uh

623

00:24:04,070 --> 00:24:02,080

ifn said okay fine i'm a rookie now

624

00:24:05,510 --> 00:24:04,080

get out of this

625

00:24:07,350 --> 00:24:05,520

but mike came to us with a lot of

626
00:24:09,830 --> 00:24:07,360
undersea experience which was helpful in

627
00:24:11,510 --> 00:24:09,840
the eva he came to us with a credible

628
00:24:14,789 --> 00:24:11,520
science

629
00:24:17,190 --> 00:24:14,799
phd and a ton of native intelligence

630
00:24:18,789 --> 00:24:17,200
which we used extensively for

631
00:24:21,029 --> 00:24:18,799
for a guy on his first flight he was

632
00:24:23,190 --> 00:24:21,039
really challenged primary responsibility

633
00:24:26,789 --> 00:24:23,200
for spartan wake shield systems

634
00:24:28,310 --> 00:24:26,799
responsibility arm operator eva

635
00:24:30,149 --> 00:24:28,320
it's a it was a

636
00:24:32,710 --> 00:24:30,159
wonderful opportunity for him he rose to

637
00:24:34,230 --> 00:24:32,720
every challenge he's going to now go do

638
00:24:36,070 --> 00:24:34,240

terrific things i think in the space

639

00:24:37,669 --> 00:24:36,080

station era and it was a

640

00:24:39,190 --> 00:24:37,679

he's a close personal friend of mine

641

00:24:41,750 --> 00:24:39,200

before the flight and the friendship was

642

00:24:44,390 --> 00:24:41,760

cemented during it and just really

643

00:24:46,230 --> 00:24:44,400

proud to have had underdog along and

644

00:24:48,549 --> 00:24:46,240

he learned a lot and in the process i

645

00:24:51,029 --> 00:24:48,559

think he did finish to hit all the

646

00:24:52,630 --> 00:24:51,039

all the corners of every square that

647

00:24:55,830 --> 00:24:52,640

could be filled as a rookie and he did

648

00:25:00,310 --> 00:24:58,710

cujo who used to call himself taco and

649

00:25:03,990 --> 00:25:00,320

his mother calling ken but i don't think

650

00:25:09,029 --> 00:25:07,269

was a joy to fly with the perfect plt he

651
00:25:10,390 --> 00:25:09,039
covered all my mistakes up as well as

652
00:25:11,269 --> 00:25:10,400
anybody could

653
00:25:12,230 --> 00:25:11,279
and

654
00:25:14,470 --> 00:25:12,240
flew

655
00:25:16,149 --> 00:25:14,480
really well when i tried to give him

656
00:25:19,590 --> 00:25:16,159
opportunities to fly because i knew he

657
00:25:22,390 --> 00:25:19,600
would fly beautifully and he did he did

658
00:25:24,390 --> 00:25:22,400
his share and more of the science he

659
00:25:26,230 --> 00:25:24,400
helped pull the team together at every

660
00:25:29,510 --> 00:25:26,240
at every turn

661
00:25:31,190 --> 00:25:29,520
he managed the most complex photo tv

662
00:25:32,950 --> 00:25:31,200
setup that i've ever seen in a space

663
00:25:35,110 --> 00:25:32,960

flight and he did that all with

664

00:25:36,710 --> 00:25:35,120

incredible skill and aplomb and told

665

00:25:40,950 --> 00:25:36,720

some of the worst jokes that i've ever

666

00:25:44,470 --> 00:25:42,149

he's not going to let me talk about it

667

00:25:47,590 --> 00:25:44,480

anymore at that point

668

00:25:50,710 --> 00:25:47,600

pluto our science officer

669

00:25:52,230 --> 00:25:50,720

manager uh owner operator of the orbiter

670

00:25:53,669 --> 00:25:52,240

wide web

671

00:25:54,870 --> 00:25:53,679

we had

672

00:25:59,110 --> 00:25:54,880

probably

673

00:26:00,950 --> 00:25:59,120

in orbit anyway of small computers he

674

00:26:03,750 --> 00:26:00,960

made them all sing

675

00:26:05,750 --> 00:26:03,760

he was also the ms2

676
00:26:07,750 --> 00:26:05,760
consummate flight engineer did a

677
00:26:09,430 --> 00:26:07,760
terrific job on the wake shield deploy

678
00:26:10,390 --> 00:26:09,440
and manage the wake shield science and

679
00:26:12,549 --> 00:26:10,400
did the best

680
00:26:14,789 --> 00:26:12,559
that anybody could do to

681
00:26:16,710 --> 00:26:14,799
make sure that that went smoothly he

682
00:26:19,029 --> 00:26:16,720
wasn't able to make it go smoothly but

683
00:26:21,110 --> 00:26:19,039
he was with the help of a great team on

684
00:26:24,870 --> 00:26:21,120
the ground able to salvage a lot of it

685
00:26:27,190 --> 00:26:24,880
and i think carry on uh a good a good

686
00:26:29,350 --> 00:26:27,200
concept into the into the future

687
00:26:32,149 --> 00:26:29,360
i can't think of enough things to say

688
00:26:33,669 --> 00:26:32,159

about pluto we we named in that uh it

689

00:26:35,350 --> 00:26:33,679

was really a compliment because his

690

00:26:38,710 --> 00:26:35,360

orbit was so far out that none of us

691

00:26:41,750 --> 00:26:38,720

could even begin to keep up with him and

692

00:26:43,510 --> 00:26:41,760

everything he did he did as so well that

693

00:26:45,669 --> 00:26:43,520

we were started logging his little

694

00:26:46,870 --> 00:26:45,679

mistakes when he would make one in order

695

00:26:48,870 --> 00:26:46,880

to see if we could catch him at

696

00:26:51,510 --> 00:26:48,880

something finally did because he didn't

697

00:26:53,190 --> 00:26:51,520

know what a probiscus is but

698

00:26:54,950 --> 00:26:53,200

it took that long and that was eight

699

00:26:56,310 --> 00:26:54,960

days into the mission

700

00:26:58,470 --> 00:26:56,320

uh we didn't

701
00:27:00,789 --> 00:26:58,480
we don't have and i'm sorry we don't uh

702
00:27:02,390 --> 00:27:00,799
a picture just of dave but we have

703
00:27:04,149 --> 00:27:02,400
sitting to my left here

704
00:27:06,630 --> 00:27:04,159
the finest shuttle commander you could

705
00:27:08,870 --> 00:27:06,640
hope to fly with he's he's a lot of fun

706
00:27:10,310 --> 00:27:08,880
he takes care of his crew he takes care

707
00:27:11,750 --> 00:27:10,320
of the people that are working with us

708
00:27:14,230 --> 00:27:11,760
and working for us

709
00:27:17,190 --> 00:27:14,240
and he's just a joy to be around and

710
00:27:19,669 --> 00:27:17,200
and fun to try to keep up with i anybody

711
00:27:21,909 --> 00:27:19,679
out there that's a fellow crewman you do

712
00:27:23,750 --> 00:27:21,919
well to fly with this man

713
00:27:25,590 --> 00:27:23,760

that's a great compliment

714

00:27:26,950 --> 00:27:25,600

well let's move on to some great

715

00:27:28,870 --> 00:27:26,960

pictures of the earth and i'm going to

716

00:27:31,430 --> 00:27:28,880

turn it over to cujo for that because he

717

00:27:32,950 --> 00:27:31,440

was the photographer and earth observer

718

00:27:34,710 --> 00:27:32,960

par excellence

719

00:27:36,870 --> 00:27:34,720

well i mentioned during the movie that

720

00:27:38,710 --> 00:27:36,880

it's a great opportunity to uh

721

00:27:40,870 --> 00:27:38,720

to have humans in space and to be able

722

00:27:42,710 --> 00:27:40,880

to look down and with intelligence uh

723

00:27:44,950 --> 00:27:42,720

such that well i guess we had dogs in

724

00:27:47,430 --> 00:27:44,960

space this time but anyway with some

725

00:27:48,630 --> 00:27:47,440

level of intelligence look at

726
00:27:50,310 --> 00:27:48,640
something interesting that's happening

727
00:27:52,070 --> 00:27:50,320
on the ground and take a picture of it

728
00:27:53,830 --> 00:27:52,080
it's a picture of an am of the amazon

729
00:27:56,870 --> 00:27:53,840
river and another another river that

730
00:27:59,029 --> 00:27:56,880
runs parallel to it uh and

731
00:28:00,549 --> 00:27:59,039
south america was remarkably cloud free

732
00:28:01,830 --> 00:28:00,559
so we got some great views for the

733
00:28:04,789 --> 00:28:01,840
earth's

734
00:28:07,909 --> 00:28:04,799
office here at jsc

735
00:28:11,110 --> 00:28:07,919
these are called von carmen vortices

736
00:28:13,029 --> 00:28:11,120
just simply the shape that clouds take

737
00:28:14,549 --> 00:28:13,039
as the wind blows over an island near

738
00:28:16,950 --> 00:28:14,559

the bottom of the picture is guadalupe

739

00:28:18,549 --> 00:28:16,960

island off the coast of mexico and when

740

00:28:21,430 --> 00:28:18,559

the wind is the right speed about

741

00:28:23,909 --> 00:28:21,440

between five knots and 13 knots and when

742

00:28:26,789 --> 00:28:23,919

you have a high pressure system holding

743

00:28:28,549 --> 00:28:26,799

a cloud layer down close to the

744

00:28:30,549 --> 00:28:28,559

the island itself

745

00:28:35,350 --> 00:28:30,559

it creates this uh very interesting

746

00:28:38,549 --> 00:28:37,029

as we mentioned we saw

747

00:28:39,510 --> 00:28:38,559

some great shots of

748

00:28:41,430 --> 00:28:39,520

two

749

00:28:43,510 --> 00:28:41,440

large hurricanes the biggest was luis

750

00:28:45,110 --> 00:28:43,520

and this is luis and we didn't have a

751
00:28:45,909 --> 00:28:45,120
camera lens that could see it all at

752
00:28:47,750 --> 00:28:45,919
once

753
00:28:48,630 --> 00:28:47,760
very impressive

754
00:28:51,269 --> 00:28:48,640
system

755
00:28:54,230 --> 00:28:51,279
sure glad that it didn't go in over any

756
00:28:55,830 --> 00:28:54,240
more populated area than it did

757
00:28:57,590 --> 00:28:55,840
it was a beautiful thing for us to look

758
00:28:59,190 --> 00:28:57,600
at we had to stop and remind ourselves

759
00:29:00,870 --> 00:28:59,200
that there are some people down there

760
00:29:05,350 --> 00:29:00,880
that aren't thinking this thing is quite

761
00:29:09,830 --> 00:29:07,430
this is an interesting photo in that it

762
00:29:12,549 --> 00:29:09,840
shows what you can see and pick up on

763
00:29:14,470 --> 00:29:12,559

very quickly and that you may never

764

00:29:16,950 --> 00:29:14,480

realize this from from a ground point of

765

00:29:18,950 --> 00:29:16,960

view but this green area which stands

766

00:29:19,909 --> 00:29:18,960

out in the deserts of oman

767

00:29:23,590 --> 00:29:19,919

is

768

00:29:25,909 --> 00:29:23,600

unusual heavy rains that occurred

769

00:29:28,389 --> 00:29:25,919

probably because the area that's green

770

00:29:30,950 --> 00:29:28,399

is higher terrain and as the

771

00:29:31,830 --> 00:29:30,960

moist onshore wind at a certain time of

772

00:29:35,190 --> 00:29:31,840

the year

773

00:29:38,070 --> 00:29:35,200

blow blows it it creates

774

00:29:40,630 --> 00:29:38,080

rainfall or graphic lifting that creates

775

00:29:42,149 --> 00:29:40,640

rainfall and it gives you a good insight

776

00:29:43,830 --> 00:29:42,159

as to what could be going on with the

777

00:29:45,669 --> 00:29:43,840

land in

778

00:29:47,190 --> 00:29:45,679

countries that are really not accessible

779

00:29:50,630 --> 00:29:47,200

enough for us to really monitor any

780

00:29:55,830 --> 00:29:53,830

same thing for the sinai peninsula and a

781

00:29:56,789 --> 00:29:55,840

particular note in the in the Nile river

782

00:29:59,029 --> 00:29:56,799

valley

783

00:30:01,190 --> 00:29:59,039

is this flood plain here that's sort of

784

00:30:03,350 --> 00:30:01,200

shaped a little bit like a heart and

785

00:30:04,070 --> 00:30:03,360

each shuttle flight that goes over this

786

00:30:17,269 --> 00:30:04,080

i

787

00:30:18,950 --> 00:30:17,279

can expect from

788

00:30:24,310 --> 00:30:18,960

egypt and other countries along the Nile

789

00:30:30,710 --> 00:30:26,710

this is uh a picture of literally

790

00:30:32,230 --> 00:30:30,720

hundreds of center pivot irrigation

791

00:30:33,750 --> 00:30:32,240

fields

792

00:30:35,029 --> 00:30:33,760

wells are drilled

793

00:30:37,029 --> 00:30:35,039

straight down into the earth you see

794

00:30:39,990 --> 00:30:37,039

these out in west Texas and New Mexico

795

00:30:42,549 --> 00:30:40,000

as well but in Saudi Arabia they're

796

00:30:44,389 --> 00:30:42,559

they're done extensively

797

00:30:46,549 --> 00:30:44,399

and there's a mixture of fields

798

00:30:48,789 --> 00:30:46,559

currently in production and and fields

799

00:30:50,710 --> 00:30:48,799

that aren't in production perhaps the

800

00:30:52,710 --> 00:30:50,720

water has dried up in the area of those

801
00:30:55,110 --> 00:30:52,720
wells some of those wells go down 3000

802
00:31:00,230 --> 00:30:55,120
feet to tap into the ancient

803
00:31:05,909 --> 00:31:01,990
and finally a couple more pictures this

804
00:31:06,870 --> 00:31:05,919
is in a city of surabaya in indonesia we

805
00:31:08,310 --> 00:31:06,880
took it

806
00:31:10,470 --> 00:31:08,320
once with

807
00:31:11,750 --> 00:31:10,480
color film and you can see the city

808
00:31:13,750 --> 00:31:11,760
right here

809
00:31:15,830 --> 00:31:13,760
you can get a good idea of

810
00:31:17,590 --> 00:31:15,840
the kind of fluid that's in the water

811
00:31:18,789 --> 00:31:17,600
using the color film and then we had

812
00:31:21,430 --> 00:31:18,799
another shot

813
00:31:23,029 --> 00:31:21,440

using the color infrared film and using

814

00:31:24,310 --> 00:31:23,039

the two from two different kinds of

815

00:31:25,430 --> 00:31:24,320

films you can bring out different

816

00:31:27,509 --> 00:31:25,440

contrasts

817

00:31:30,870 --> 00:31:27,519

and the contrast that color infrared

818

00:31:33,909 --> 00:31:30,880

brings out the best is that between what

819

00:31:35,110 --> 00:31:33,919

shows up as red lush vegetation and rich

820

00:31:38,070 --> 00:31:35,120

farm fields

821

00:31:40,630 --> 00:31:38,080

and the the blues and greens of

822

00:31:42,070 --> 00:31:40,640

of areas that are either have less

823

00:31:46,630 --> 00:31:42,080

vegetation or have been stripped of

824

00:31:49,190 --> 00:31:48,149

wow

825

00:31:50,710 --> 00:31:49,200

well

826

00:31:53,669 --> 00:31:50,720

we've about come to the end of our

827

00:31:55,590 --> 00:31:53,679

presentation we this sort of symbolizes

828

00:31:57,669 --> 00:31:55,600

our feelings about humans in space and

829

00:31:59,029 --> 00:31:57,679

the eventful mission that we had

830

00:32:03,110 --> 00:31:59,039

we can see

831

00:32:04,470 --> 00:32:03,120

here one of our men in space and in the

832

00:32:06,070 --> 00:32:04,480

actually this is taken when we're in our

833

00:32:07,190 --> 00:32:06,080

thermal

834

00:32:08,630 --> 00:32:07,200

testing

835

00:32:12,149 --> 00:32:08,640

and

836

00:32:14,389 --> 00:32:12,159

we can tell that because we can see most

837

00:32:15,990 --> 00:32:14,399

of it if it was Luis we'd not be able to

838

00:32:19,350 --> 00:32:16,000

see anything but

839

00:32:25,269 --> 00:32:22,389

and another gorgeous shot

840

00:32:27,509 --> 00:32:25,279

which we view with with nostalgia for

841

00:32:28,389 --> 00:32:27,519

for having had a wonderful time on orbit

842

00:32:30,549 --> 00:32:28,399

and

843

00:32:32,149 --> 00:32:30,559

we wish that we could take every one of

844

00:32:33,990 --> 00:32:32,159

you with us up there

845

00:32:36,470 --> 00:32:34,000

you are there in our hearts

846

00:32:40,230 --> 00:32:36,480

and we thank you for having made it

847

00:32:43,909 --> 00:32:41,110

there's

848

00:32:46,389 --> 00:32:43,919

home plate uh in terms of landing

849

00:32:47,830 --> 00:32:46,399

gorgeous view of florida

850

00:32:50,389 --> 00:32:47,840

which we took just before the end of the

851
00:32:52,149 --> 00:32:50,399
mission we were checking our own weather

852
00:32:55,669 --> 00:32:52,159
the day before actually

853
00:33:00,950 --> 00:32:58,870
during the entry out the overhead window

854
00:33:04,310 --> 00:33:00,960
using my kneeboard mirror mike and i

855
00:33:05,990 --> 00:33:04,320
could see the plasma trail behind us in

856
00:33:07,430 --> 00:33:06,000
addition to the orange glow that

857
00:33:10,870 --> 00:33:07,440
envelops the

858
00:33:12,149 --> 00:33:10,880
orbiter the plasma trail stretches

859
00:33:13,669 --> 00:33:12,159
hundreds and thousands actually

860
00:33:15,669 --> 00:33:13,679
thousands of miles behind us as anyone

861
00:33:18,070 --> 00:33:15,679
would know who got up that morning and

862
00:33:20,630 --> 00:33:18,080
watched a streak across the northern uh

863
00:33:21,750 --> 00:33:20,640

houston sky

864

00:33:24,389 --> 00:33:21,760

we found

865

00:33:26,230 --> 00:33:24,399

it particularly

866

00:33:27,669 --> 00:33:26,240

wonderful to be passing over houston in

867

00:33:29,509 --> 00:33:27,679

the pre-dawn darkness i haven't done

868

00:33:31,110 --> 00:33:29,519

that since my first flight

869

00:33:33,430 --> 00:33:31,120

that time we went south this time we

870

00:33:35,430 --> 00:33:33,440

went north and cujo had the good view

871

00:33:37,750 --> 00:33:35,440

out his window of

872

00:33:39,029 --> 00:33:37,760

of looking down at houston and could see

873

00:33:40,789 --> 00:33:39,039

that we were

874

00:33:42,389 --> 00:33:40,799

crossing home and

875

00:33:44,710 --> 00:33:42,399

people that we've talked to subsequently

876

00:33:46,070 --> 00:33:44,720

talked to us and it was kind of neat

877

00:33:47,750 --> 00:33:46,080

that they had gone out and looked at

878

00:33:49,269 --> 00:33:47,760

this and they'd gotten back inside just

879

00:33:51,350 --> 00:33:49,279

in time to see us

880

00:33:53,830 --> 00:33:51,360

land on tv at the cape it gives you some

881

00:33:57,110 --> 00:33:53,840

appreciation for how quickly the orbiter

882

00:33:58,950 --> 00:33:57,120

crosses the earth and how much energy is

883

00:34:02,230 --> 00:33:58,960

being harnessed

884

00:34:05,750 --> 00:34:02,240

by man's technological capability

885

00:34:07,110 --> 00:34:05,760

for our abuse pleasure and and mankind's

886

00:34:08,310 --> 00:34:07,120

benefit

887

00:34:09,750 --> 00:34:08,320

again

888

00:34:11,430 --> 00:34:09,760

humans can do some pretty terrific

889

00:34:14,069 --> 00:34:11,440

things when they set their mind to it as

890

00:34:16,950 --> 00:34:15,750

and finally here we are

891

00:34:19,109 --> 00:34:16,960

at the end of

892

00:34:21,510 --> 00:34:19,119

what was for us a very pleasurable and

893

00:34:23,030 --> 00:34:21,520

and we think uh for nasa a very

894

00:34:27,349 --> 00:34:23,040

successful mission

895

00:34:30,710 --> 00:34:29,750

this uh this represents

896

00:34:33,349 --> 00:34:30,720

for us

897

00:34:35,510 --> 00:34:33,359

the fact that every shuttle mission is

898

00:34:37,030 --> 00:34:35,520

only a part of the big picture

899

00:34:38,950 --> 00:34:37,040

here's the moon

900

00:34:40,629 --> 00:34:38,960

the moon mars the outer planets and the

901
00:34:41,990 --> 00:34:40,639
stars are where we believe we ought to

902
00:34:43,669 --> 00:34:42,000
be going

903
00:34:45,909 --> 00:34:43,679
we took another small step in that

904
00:34:48,310 --> 00:34:45,919
direction with this flight and each

905
00:34:50,869 --> 00:34:48,320
subsequent flight will be playing its

906
00:34:52,069 --> 00:34:50,879
role and making its contribution as you

907
00:34:54,230 --> 00:34:52,079
will

908
00:34:56,550 --> 00:34:54,240
to that eventual goal

909
00:34:58,950 --> 00:34:56,560
and thanks again for being here for all