



1
00:00:19,990 --> 00:00:18,710
we think our path symbolizes the

2
00:00:21,429 --> 00:00:20,000
teamwork

3
00:00:23,910 --> 00:00:21,439
not only here at the johnson space

4
00:00:24,870 --> 00:00:23,920
center but across the nasa contractor

5
00:00:26,710 --> 00:00:24,880
team

6
00:00:27,750 --> 00:00:26,720
and bridging the oceans all the way over

7
00:00:28,630 --> 00:00:27,760
to russia

8
00:00:30,150 --> 00:00:28,640
i think

9
00:00:32,150 --> 00:00:30,160
the successful accomplishment of

10
00:00:34,389 --> 00:00:32,160
shannon's long-duration mission

11
00:00:36,310 --> 00:00:34,399
and our successful docking and joint

12
00:00:43,190 --> 00:00:36,320
operations aboard the mir

13
00:00:46,790 --> 00:00:45,110

we had a pretty spectacular night launch

14

00:00:48,790 --> 00:00:46,800

at the end of our day

15

00:00:50,709 --> 00:00:48,800

uh let me tell you there wasn't anybody

16

00:00:52,229 --> 00:00:50,719

that uh that was dozing off on the

17

00:00:53,750 --> 00:00:52,239

flight deck though because as soon as we

18

00:00:56,229 --> 00:00:53,760

cleared the tower the master alarms

19

00:00:57,590 --> 00:00:56,239

started going off

20

00:00:59,510 --> 00:00:57,600

and it seemed like they were going off

21

00:01:01,830 --> 00:00:59,520

all the way to main engine cutoff about

22

00:01:03,510 --> 00:01:01,840

uh eight and a half minutes later

23

00:01:07,830 --> 00:01:03,520

uh

24

00:01:08,870 --> 00:01:07,840

tell the mirror that atlantis is

25

00:01:10,950 --> 00:01:08,880

underway

26
00:01:12,789 --> 00:01:10,960
and then we heard that the shannon even

27
00:01:15,270 --> 00:01:12,799
saw us all the way to main engine

28
00:01:20,469 --> 00:01:15,280
cut-off from from the mirror which was

29
00:01:23,990 --> 00:01:21,990
right after we got in orbit you can see

30
00:01:25,670 --> 00:01:24,000
it was a night launch but where we were

31
00:01:28,469 --> 00:01:25,680
in the world it was already daytime and

32
00:01:30,710 --> 00:01:28,479
we saw the sun rise on orbit and uh

33
00:01:33,670 --> 00:01:30,720
immediatly put terry to work not only

34
00:01:35,350 --> 00:01:33,680
on the apu subsystem but uh but also on

35
00:01:38,069 --> 00:01:35,360
the overhead panel and

36
00:01:40,310 --> 00:01:38,079
and this is what starts turning uh what

37
00:01:42,789 --> 00:01:40,320
is a rocket ship there for eight and a

38
00:01:44,550 --> 00:01:42,799

half minutes into a spacecraft for

39

00:01:47,030 --> 00:01:44,560

10 days

40

00:01:49,030 --> 00:01:47,040

it's it's just an amazingly versatile

41

00:01:49,990 --> 00:01:49,040

ship that we have the orbiter

42

00:01:51,429 --> 00:01:50,000

and

43

00:01:53,190 --> 00:01:51,439

as you can see here terry's in the

44

00:01:59,429 --> 00:01:53,200

overhead panel and we're reconfiguring

45

00:02:02,870 --> 00:02:00,630

one of the things you might have noticed

46

00:02:04,310 --> 00:02:02,880

in that slide was that i wasn't sweating

47

00:02:05,670 --> 00:02:04,320

one of my little crew members pointed

48

00:02:07,830 --> 00:02:05,680

out that was the first time he had seen

49

00:02:09,990 --> 00:02:07,840

anyone get to orbit and not be drenched

50

00:02:11,589 --> 00:02:10,000

and that's in large measure to the

51
00:02:13,830 --> 00:02:11,599
liquid cooling garment that we wear

52
00:02:15,589 --> 00:02:13,840
under our spacesuit now and i tell you

53
00:02:17,670 --> 00:02:15,599
we'd all like to to thank the people

54
00:02:19,830 --> 00:02:17,680
that came up with that for us

55
00:02:21,510 --> 00:02:19,840
once we got on orbit we had a few days

56
00:02:23,589 --> 00:02:21,520
to do science before we docked with the

57
00:02:25,110 --> 00:02:23,599
mirror this is one of our experiments

58
00:02:26,309 --> 00:02:25,120
car walls is holding something called

59
00:02:27,910 --> 00:02:26,319
mgm

60
00:02:30,390 --> 00:02:27,920
or it's called

61
00:02:31,190 --> 00:02:30,400
the mechanics of granular materials

62
00:02:33,030 --> 00:02:31,200
and

63
00:02:35,190 --> 00:02:33,040

it studies the behavior of materials

64

00:02:37,670 --> 00:02:35,200

like sand which is what's in that that

65

00:02:39,270 --> 00:02:37,680

container or any other granular material

66

00:02:40,630 --> 00:02:39,280

and we hope that with this experiment

67

00:02:42,470 --> 00:02:40,640

engineers will be able to use the

68

00:02:44,550 --> 00:02:42,480

information to strengthen building codes

69

00:02:46,309 --> 00:02:44,560

and earthquake areas

70

00:02:48,869 --> 00:02:46,319

get more information about what triggers

71

00:02:51,270 --> 00:02:48,879

avalanches study beach erosion even the

72

00:02:52,630 --> 00:02:51,280

behavior of materials in silos it was a

73

00:02:57,030 --> 00:02:52,640

good experiment and they got good

74

00:03:00,630 --> 00:02:58,550

bill can you back up one i just want to

75

00:03:02,869 --> 00:03:00,640

say one more thing please

76

00:03:04,470 --> 00:03:02,879

you might notice that carl's hat there

77

00:03:07,990 --> 00:03:04,480

he was wishing that he had a st louis

78

00:03:08,000 --> 00:03:11,190

next slide please

79

00:03:15,030 --> 00:03:13,030

the we called this slide the attack of

80

00:03:16,470 --> 00:03:15,040

the water bags

81

00:03:19,110 --> 00:03:16,480

one of the things we transferred to here

82

00:03:20,630 --> 00:03:19,120

was was water unlike us where we make

83

00:03:22,229 --> 00:03:20,640

water with our fuel cells when we

84

00:03:24,070 --> 00:03:22,239

produce electricity

85

00:03:25,750 --> 00:03:24,080

they don't make water and it has to be

86

00:03:26,949 --> 00:03:25,760

carried up to them and they use it they

87

00:03:28,390 --> 00:03:26,959

break it apart to get their breathing

88

00:03:31,110 --> 00:03:28,400

oxygen of course they use it in their

89

00:03:32,710 --> 00:03:31,120

galley to drink and rehydrate food with

90

00:03:34,470 --> 00:03:32,720

each of those bags weighs about 100

91

00:03:36,630 --> 00:03:34,480

pounds we transferred 20 of them i think

92

00:03:37,750 --> 00:03:36,640

it was a new record over 2 000 pounds of

93

00:03:39,830 --> 00:03:37,760

water

94

00:03:41,750 --> 00:03:39,840

and we figured well we filled eight of

95

00:03:43,830 --> 00:03:41,760

them before we docked when the hatch

96

00:03:45,030 --> 00:03:43,840

opened the first thing i want to do was

97

00:03:47,430 --> 00:03:45,040

because you can see they're like sea

98

00:03:49,110 --> 00:03:47,440

cows floating around with valerie where

99

00:03:50,550 --> 00:03:49,120

do you want all this water and he said

100

00:03:52,630 --> 00:03:50,560

just keep it on the shuttle until you

101
00:03:54,789 --> 00:03:52,640
get ready to leave but

102
00:03:56,869 --> 00:03:54,799
we managed to find a spot for it and get

103
00:03:59,589 --> 00:03:56,879
it over to the to the mirror next slide

104
00:04:02,550 --> 00:04:01,350
uh this is uh basically how we start our

105
00:04:04,630 --> 00:04:02,560
day we didn't really launch with the

106
00:04:06,630 --> 00:04:04,640
flight plan uh it was tip step to us the

107
00:04:08,229 --> 00:04:06,640
first thing every morning and you can

108
00:04:09,670 --> 00:04:08,239
see the tips machine there and and the

109
00:04:11,350 --> 00:04:09,680
roll of paper

110
00:04:13,270 --> 00:04:11,360
that comes out it was pretty extensive

111
00:04:15,190 --> 00:04:13,280
and it took us a while to cut and paste

112
00:04:17,349 --> 00:04:15,200
into our flight plan every day

113
00:04:19,830 --> 00:04:17,359

jay also has on a headphone there that's

114

00:04:22,150 --> 00:04:19,840

connected to our vhf radio we use that

115

00:04:24,469 --> 00:04:22,160

for ship to ship conversation with the

116

00:04:26,070 --> 00:04:24,479

mirror and also for an experiment called

117

00:04:27,590 --> 00:04:26,080

sarx which turned out to be a really

118

00:04:29,510 --> 00:04:27,600

good deal and i'm sure it'll be

119

00:04:31,510 --> 00:04:29,520

important to long duration crew members

120

00:04:32,950 --> 00:04:31,520

because each of the crew members on 79

121

00:04:34,629 --> 00:04:32,960

got to make a personal phone call to

122

00:04:36,469 --> 00:04:34,639

their families and i can tell you that's

123

00:04:38,390 --> 00:04:36,479

a real boost for morale after you've

124

00:04:40,469 --> 00:04:38,400

been up there for a while and we also

125

00:04:42,950 --> 00:04:40,479

used it to find out sports scores things

126

00:04:45,110 --> 00:04:42,960

like that with random contacts

127

00:04:47,590 --> 00:04:45,120

and just to the right of jay is one of

128

00:04:49,510 --> 00:04:47,600

our freezers the blue box there and that

129

00:04:51,430 --> 00:04:49,520

was used to return

130

00:04:53,350 --> 00:04:51,440

biological samples uh from shannon's

131

00:04:54,830 --> 00:04:53,360

stay on mir back to earth

132

00:04:57,909 --> 00:04:54,840

next

133

00:05:00,150 --> 00:04:57,919

slide on flight day four we got ready to

134

00:05:02,150 --> 00:05:00,160

do our rendezvous bill got back in his

135

00:05:04,070 --> 00:05:02,160

commander's chair and picked out the the

136

00:05:06,550 --> 00:05:04,080

rendezvous checklist and

137

00:05:11,749 --> 00:05:06,560

did a series of burns of course to start

138

00:05:14,950 --> 00:05:13,350

well you just can't imagine what a

139

00:05:18,230 --> 00:05:14,960

breathhtaking sight it is to see

140

00:05:20,790 --> 00:05:18,240

something in the crew optical sight

141

00:05:22,870 --> 00:05:20,800

that is the mirror at approximately 600

142

00:05:24,550 --> 00:05:22,880

feet away and of course we can see it

143

00:05:26,469 --> 00:05:24,560

much further out as the brightest star

144

00:05:29,029 --> 00:05:26,479

in the sky but uh

145

00:05:30,629 --> 00:05:29,039

as soon as we had done all our mid

146

00:05:32,390 --> 00:05:30,639

course correction burns you could start

147

00:05:34,550 --> 00:05:32,400

to see a little glimmer and then and

148

00:05:36,469 --> 00:05:34,560

then you'd see detail and the solar

149

00:05:38,629 --> 00:05:36,479

arrays and then the modules but but i

150

00:05:40,629 --> 00:05:38,639

think this this picture here at 600 feet

151
00:05:42,070 --> 00:05:40,639
shows you just what a remarkable complex

152
00:05:43,510 --> 00:05:42,080
it is that they've assembled over the

153
00:05:45,430 --> 00:05:43,520
last 10 years

154
00:05:47,110 --> 00:05:45,440
of course the difference uh

155
00:05:48,550 --> 00:05:47,120
between our flight and the previous one

156
00:05:50,870 --> 00:05:48,560
was uh the orbiter was a little

157
00:05:52,310 --> 00:05:50,880
different with a double space ave module

158
00:05:53,749 --> 00:05:52,320
and the other thing was the mirror was a

159
00:05:56,310 --> 00:05:53,759
little bit different because during

160
00:05:58,629 --> 00:05:56,320
shannon's stay on board the prorota

161
00:06:01,189 --> 00:05:58,639
which means nature science module had

162
00:06:02,629 --> 00:06:01,199
arrived so we had a different orbiter

163
00:06:07,270 --> 00:06:02,639

configuration and a different mirror

164

00:06:11,430 --> 00:06:09,510

this is a shot that shannon took of our

165

00:06:14,870 --> 00:06:11,440

arrival and we're uh

166

00:06:16,870 --> 00:06:14,880

inside 170 feet at this point

167

00:06:20,150 --> 00:06:16,880

you can see towards the aft part of the

168

00:06:21,670 --> 00:06:20,160

payload bay the double space have module

169

00:06:23,510 --> 00:06:21,680

and then towards the forward part you

170

00:06:25,430 --> 00:06:23,520

can see the orbiter docking system with

171

00:06:27,590 --> 00:06:25,440

the androgynous docking adapter there at

172

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

the top the black part

173

00:06:32,230 --> 00:06:30,319

you can also see our ku band radar

174

00:06:34,309 --> 00:06:32,240

slung over there

175

00:06:35,990 --> 00:06:34,319

on top of the radiator on the right-hand

176

00:06:37,029 --> 00:06:36,000

side of the orbiter

177

00:06:38,870 --> 00:06:37,039

we're uh

178

00:06:40,230 --> 00:06:38,880

we've got our noses pressed to those

179

00:06:42,469 --> 00:06:40,240

overhead windows those two little

180

00:06:44,870 --> 00:06:42,479

windows they're looking at shannon as

181

00:06:46,870 --> 00:06:44,880

she's looking at us as you might imagine

182

00:06:48,230 --> 00:06:46,880

and you can also see the reaction

183

00:06:53,830 --> 00:06:48,240

control jets kind of around the

184

00:06:58,550 --> 00:06:56,390

this is a picture shortly after we were

185

00:07:00,469 --> 00:06:58,560

docked and and we show you this

186

00:07:02,070 --> 00:07:00,479

because another change to the mirror

187

00:07:04,230 --> 00:07:02,080

configuration from the previous flight

188

00:07:06,390 --> 00:07:04,240

was in the upper corner of the picture

189

00:07:08,070 --> 00:07:06,400

you can see the cooperative solar array

190

00:07:09,189 --> 00:07:08,080

which was deployed during shannon's

191

00:07:13,510 --> 00:07:09,199

mission by

192

00:07:15,909 --> 00:07:13,520

uh yuriana friendco and yuri usochov

193

00:07:17,990 --> 00:07:15,919

that array extends down below the nose

194

00:07:19,510 --> 00:07:18,000

of the orbiter during the approach

195

00:07:21,270 --> 00:07:19,520

the other thing that you see extending

196

00:07:23,749 --> 00:07:21,280

over the forward part of the payload bay

197

00:07:25,990 --> 00:07:23,759

is one of the base block arrays on the

198

00:07:28,070 --> 00:07:26,000

mirror station that extended down within

199

00:07:29,990 --> 00:07:28,080

a couple feet of the overhead window you

200

00:07:32,309 --> 00:07:30,000

can see it in its unfeathered position

201
00:07:34,629 --> 00:07:32,319
right now after we've arrived and the

202
00:07:35,909 --> 00:07:34,639
solar rays are trying to trying to track

203
00:07:38,710 --> 00:07:35,919
the sun

204
00:07:40,870 --> 00:07:38,720
and gather solar energy but during the

205
00:07:42,950 --> 00:07:40,880
actual docking that particular array was

206
00:07:49,350 --> 00:07:42,960
cutting across the

207
00:07:52,870 --> 00:07:50,870
well after we get the hatches open we

208
00:07:55,270 --> 00:07:52,880
got down to what i considered was uh the

209
00:07:57,430 --> 00:07:55,280
primary purpose of sds-79 and that was

210
00:07:59,830 --> 00:07:57,440
the crew exchange and to accomplish this

211
00:08:02,390 --> 00:07:59,840
cruise change we had to get john's suit

212
00:08:04,629 --> 00:08:02,400
from the shuttle over to mir and his

213
00:08:06,469 --> 00:08:04,639

seat liner and all the periphery

214

00:08:08,230 --> 00:08:06,479

equipment that he needed for the soyuz

215

00:08:10,869 --> 00:08:08,240

in case they have to use the soyuz as an

216

00:08:12,790 --> 00:08:10,879

emergency uh escape vehicle and then we

217

00:08:14,869 --> 00:08:12,800

had to get john in his suit and then he

218

00:08:16,790 --> 00:08:14,879

had to get in the soyuz and do a

219

00:08:19,510 --> 00:08:16,800

pressure check and after the pressure

220

00:08:21,510 --> 00:08:19,520

check on the scaphandra came out okay

221

00:08:23,830 --> 00:08:21,520

then the russians would accept john as a

222

00:08:26,950 --> 00:08:23,840

crew person for mayor

223

00:08:29,510 --> 00:08:26,960

next slide

224

00:08:32,149 --> 00:08:29,520

and after we got john's suit uh

225

00:08:34,469 --> 00:08:32,159

checked out and it was uh deemed okay

226

00:08:36,949 --> 00:08:34,479

then it was time to take my ponder out

227

00:08:39,029 --> 00:08:36,959

of the soyuz where he'd been uh

228

00:08:41,509 --> 00:08:39,039

you know for the entire flight

229

00:08:43,350 --> 00:08:41,519

and bring it over to the shuttle and get

230

00:08:45,030 --> 00:08:43,360

ready to come home and there sasha is

231

00:08:47,670 --> 00:08:45,040

helping me get that out he's the board

232

00:08:50,310 --> 00:08:47,680

engineer that's now up on mir

233

00:08:55,750 --> 00:08:52,870

and this is a shot of valeri the

234

00:08:57,509 --> 00:08:55,760

commander that's now up there on mir in

235

00:08:59,350 --> 00:08:57,519

the base block

236

00:09:02,550 --> 00:08:59,360

this was the third commander that

237

00:09:05,030 --> 00:09:02,560

i had worked with since um oh march so

238

00:09:06,470 --> 00:09:05,040

that's not bad

239

00:09:08,630 --> 00:09:06,480

and then right after this shot then i

240

00:09:10,470 --> 00:09:08,640

was officially a member of the

241

00:09:12,470 --> 00:09:10,480

shuttle crew so then i was with my

242

00:09:14,230 --> 00:09:12,480

fourth commander and

243

00:09:16,070 --> 00:09:14,240

that's not a bad way to work you know

244

00:09:20,790 --> 00:09:16,080

four different commanders in six months

245

00:09:26,470 --> 00:09:22,870

well in addition to uh john and

246

00:09:28,230 --> 00:09:26,480

shannon's personal gear and the transfer

247

00:09:29,829 --> 00:09:28,240

of that over very early in the mission

248

00:09:31,990 --> 00:09:29,839

we also had

249

00:09:33,910 --> 00:09:32,000

for the first time a double space had

250

00:09:35,910 --> 00:09:33,920

and the aft uh

251
00:09:37,990 --> 00:09:35,920
part of that space hab is where we had

252
00:09:39,590 --> 00:09:38,000
most of the other logistics and supplies

253
00:09:42,070 --> 00:09:39,600
we were going to transfer

254
00:09:44,949 --> 00:09:42,080
over to mir and then used to return the

255
00:09:46,790 --> 00:09:44,959
items from mir that shannon and and the

256
00:09:49,269 --> 00:09:46,800
russians were sending home

257
00:09:50,790 --> 00:09:49,279
this kind of became a transfer

258
00:09:52,949 --> 00:09:50,800
headquarters here in this corner that's

259
00:09:55,430 --> 00:09:52,959
where we kept our paperwork and our

260
00:09:57,430 --> 00:09:55,440
procedures you can see there something

261
00:09:58,630 --> 00:09:57,440
that's also unique is

262
00:10:01,110 --> 00:09:58,640
the brown

263
00:10:03,910 --> 00:10:01,120

cloth lockers in front of me

264

00:10:05,110 --> 00:10:03,920

those were for weight savings in space

265

00:10:07,110 --> 00:10:05,120

hab and you can of course see the

266

00:10:09,670 --> 00:10:07,120

regular hard lockers over my right

267

00:10:11,590 --> 00:10:09,680

shoulder so we had a variety of

268

00:10:13,350 --> 00:10:11,600

different things we could stow items in

269

00:10:15,430 --> 00:10:13,360

large and small

270

00:10:17,829 --> 00:10:15,440

behind my back there is where we had

271

00:10:19,590 --> 00:10:17,839

three batteries we were taken up to mir

272

00:10:21,590 --> 00:10:19,600

and also right behind my head you can

273

00:10:23,670 --> 00:10:21,600

see a couple of the powered science

274

00:10:25,910 --> 00:10:23,680

experiments that we later were going to

275

00:10:26,870 --> 00:10:25,920

transfer to mirror i also noticed the

276

00:10:29,590 --> 00:10:26,880

colored

277

00:10:31,110 --> 00:10:29,600

labels on those cloth lockers

278

00:10:33,590 --> 00:10:31,120

the blue ones meant they already had the

279

00:10:35,509 --> 00:10:33,600

return items in them pink ones meant

280

00:10:38,949 --> 00:10:35,519

items still to go to mirror and white

281

00:10:41,990 --> 00:10:38,959

cards meant items not to be transferred

282

00:10:45,350 --> 00:10:43,750

as i mentioned we transferred some

283

00:10:47,350 --> 00:10:45,360

russian things over this is a piece of

284

00:10:49,750 --> 00:10:47,360

russian hardware weighed about 250

285

00:10:51,910 --> 00:10:49,760

pounds it's a gyrodyne this is bill

286

00:10:54,630 --> 00:10:51,920

transferring it from space hab through

287

00:10:56,630 --> 00:10:54,640

the tunnel almost into the ods module

288

00:10:58,949 --> 00:10:56,640

and he'd make a straight up turn out of

289

00:11:01,750 --> 00:10:58,959

the picture here to go up in

290

00:11:03,509 --> 00:11:01,760

to the mirror these gyrodynes they have

291

00:11:07,350 --> 00:11:03,519

several on mirror and they're used for

292

00:11:12,470 --> 00:11:08,630

this is our

293

00:11:16,310 --> 00:11:14,790

and that uh shannon is this is much like

294

00:11:19,350 --> 00:11:16,320

a couple of days later in the mission

295

00:11:21,590 --> 00:11:19,360

shannon is where the gyrodyne came from

296

00:11:23,269 --> 00:11:21,600

and she assured us she didn't weigh

297

00:11:27,509 --> 00:11:23,279

quite as much and we did move her for

298

00:11:33,030 --> 00:11:30,550

transferred uh some scientific samples

299

00:11:34,949 --> 00:11:33,040

over just to leave in microgravity for a

300

00:11:37,590 --> 00:11:34,959

long period of time this is actually a

301

00:11:39,590 --> 00:11:37,600

crystal uh growth

302

00:11:41,990 --> 00:11:39,600

large dewar it's actually like a big

303

00:11:44,310 --> 00:11:42,000

thermos bottle that uses liquid nitrogen

304

00:11:46,389 --> 00:11:44,320

for cooling and we placed it over

305

00:11:49,030 --> 00:11:46,399

in cavan juan behind a panel and it will

306

00:11:51,590 --> 00:11:49,040

stay there until sts-81 goes and

307

00:11:57,110 --> 00:11:51,600

retrieves it as we retrieve two that the

308

00:12:01,269 --> 00:11:59,269

well you know i spent a year in building

309

00:12:03,030 --> 00:12:01,279

one doing management training and this

310

00:12:06,710 --> 00:12:03,040

is what i really spent most of my time

311

00:12:10,230 --> 00:12:08,790

this is up on the flight deck a typical

312

00:12:13,269 --> 00:12:10,240

flight deck picture you can see the

313

00:12:15,030 --> 00:12:13,279

camera equipment back behind me there

314

00:12:17,190 --> 00:12:15,040

one of our

315

00:12:19,509 --> 00:12:17,200

seats there behind me that we use on

316

00:12:22,069 --> 00:12:19,519

ascent and entry and

317

00:12:23,670 --> 00:12:22,079

pretty much where we spent a lot of time

318

00:12:25,110 --> 00:12:23,680

taking pictures out the window and you

319

00:12:29,750 --> 00:12:25,120

could always see mirrors you looked out

320

00:12:33,670 --> 00:12:31,990

this was obviously a staged picture

321

00:12:35,269 --> 00:12:33,680

because i don't think we ever saw tom

322

00:12:36,949 --> 00:12:35,279

like this the entire mission other than

323

00:12:39,190 --> 00:12:36,959

when they were taking this i'll tell you

324

00:12:41,269 --> 00:12:39,200

he had total control of the the transfer

325

00:12:45,750 --> 00:12:41,279

ops from start to finish i don't think i

326

00:12:50,470 --> 00:12:48,710

well here's john uh working in the

327

00:12:53,350 --> 00:12:50,480

in his new home

328

00:12:54,389 --> 00:12:53,360

on mir this is the pre-rota module

329

00:12:56,629 --> 00:12:54,399

and

330

00:12:59,509 --> 00:12:56,639

the on the left

331

00:13:02,550 --> 00:12:59,519

and on the right are racks

332

00:13:06,310 --> 00:13:04,069

equipment

333

00:13:07,190 --> 00:13:06,320

racks like the ones we have in the space

334

00:13:09,269 --> 00:13:07,200

shuttle

335

00:13:10,710 --> 00:13:09,279

and they're filled with

336

00:13:12,389 --> 00:13:10,720

the scientific equipment that we

337

00:13:15,350 --> 00:13:12,399

transferred from the mid deck and the

338

00:13:17,509 --> 00:13:15,360

space have over over to mir

339

00:13:18,790 --> 00:13:17,519

and in the foreground

340

00:13:21,030 --> 00:13:18,800

you can see

341

00:13:25,509 --> 00:13:21,040

an ex a french experiment called alice

342

00:13:27,269 --> 00:13:25,519

and so here's john in his laboratory

343

00:13:29,829 --> 00:13:27,279

working very hard he just started right

344

00:13:31,269 --> 00:13:29,839

away and as we were undocking

345

00:13:33,110 --> 00:13:31,279

you could hear john on the other air to

346

00:13:35,509 --> 00:13:33,120

ground trying

347

00:13:36,710 --> 00:13:35,519

working very hard to fix

348

00:13:38,470 --> 00:13:36,720

one of the other payloads that we

349

00:13:41,190 --> 00:13:38,480

transferred that had a problem the

350

00:13:42,310 --> 00:13:41,200

bioreactor and he got it fixed squared

351
00:13:45,110 --> 00:13:42,320
away

352
00:13:51,350 --> 00:13:48,710
i'm uh i'm here in the uh

353
00:13:53,829 --> 00:13:51,360
in the f portion of the double space hab

354
00:13:57,030 --> 00:13:53,839
uh with uh

355
00:13:59,269 --> 00:13:57,040
a new friend the uh orlan space suit uh

356
00:14:01,430 --> 00:13:59,279
the airline spacesuit is the eva suit

357
00:14:02,389 --> 00:14:01,440
that the russians use

358
00:14:04,150 --> 00:14:02,399
and

359
00:14:05,670 --> 00:14:04,160
up until this time the russians had

360
00:14:07,910 --> 00:14:05,680
never been able to bring one of these

361
00:14:10,389 --> 00:14:07,920
suits back to earth

362
00:14:13,110 --> 00:14:10,399
to analyze and and to see how they did

363
00:14:15,189 --> 00:14:13,120

after several uses in space

364

00:14:17,350 --> 00:14:15,199

and so we're the first ones to be able

365

00:14:18,790 --> 00:14:17,360

to bring an orlan suit back

366

00:14:20,550 --> 00:14:18,800

and

367

00:14:23,910 --> 00:14:20,560

this suit will

368

00:14:24,870 --> 00:14:23,920

first go to russia and be refurbished

369

00:14:27,030 --> 00:14:24,880

and

370

00:14:28,629 --> 00:14:27,040

examined by the engineers at the zvezda

371

00:14:31,829 --> 00:14:28,639

company there in russia

372

00:14:34,310 --> 00:14:31,839

and then we'll be upgraded and return to

373

00:14:36,710 --> 00:14:34,320

johnson space center for testing with

374

00:14:38,389 --> 00:14:36,720

the space station

375

00:14:40,629 --> 00:14:38,399

airlock

376

00:14:41,990 --> 00:14:40,639

test assembly and

377

00:14:43,430 --> 00:14:42,000

we'll prove it out

378

00:14:47,910 --> 00:14:43,440

for use in the international space

379

00:14:50,710 --> 00:14:48,790

now

380

00:14:53,030 --> 00:14:50,720

we tried to use every

381

00:14:54,470 --> 00:14:53,040

possible nook and cranny

382

00:14:58,310 --> 00:14:54,480

for transfer

383

00:15:02,310 --> 00:14:58,320

and in fact on our eris rack which is a

384

00:15:07,509 --> 00:15:05,189

test rack that we flew for space station

385

00:15:09,430 --> 00:15:07,519

we filled that with russian food

386

00:15:11,110 --> 00:15:09,440

containers and

387

00:15:13,030 --> 00:15:11,120

near the end of our mission we removed

388

00:15:15,430 --> 00:15:13,040

those food containers

389

00:15:17,829 --> 00:15:15,440

from from that rack and transferred them

390

00:15:20,069 --> 00:15:17,839

to mir and then we took empty food

391

00:15:21,509 --> 00:15:20,079

containers which you see in this picture

392

00:15:22,790 --> 00:15:21,519

and

393

00:15:24,470 --> 00:15:22,800

shannon

394

00:15:26,790 --> 00:15:24,480

and

395

00:15:28,710 --> 00:15:26,800

sasha there are taping them together to

396

00:15:33,590 --> 00:15:28,720

be inserted back into the heiress so we

397

00:15:37,750 --> 00:15:35,269

we have a picture here

398

00:15:40,389 --> 00:15:37,760

in the central node and that's

399

00:15:43,030 --> 00:15:40,399

the mirror commander valerie corzone in

400

00:15:44,389 --> 00:15:43,040

the node and and that is uh where all

401
00:15:47,030 --> 00:15:44,399
the modules

402
00:15:48,710 --> 00:15:47,040
uh come together in mirror

403
00:15:50,550 --> 00:15:48,720
and we would come up through the cristal

404
00:15:51,509 --> 00:15:50,560
module into this node

405
00:15:54,310 --> 00:15:51,519
and then

406
00:15:56,550 --> 00:15:54,320
you just sort of look around and try to

407
00:15:59,269 --> 00:15:56,560
figure out which module you wanted to go

408
00:16:00,069 --> 00:15:59,279
in and you'd have to look up and down

409
00:16:03,269 --> 00:16:00,079
and

410
00:16:05,590 --> 00:16:03,279
it was

411
00:16:07,350 --> 00:16:05,600
probably the most disoriented i've ever

412
00:16:09,030 --> 00:16:07,360
been in space

413
00:16:11,509 --> 00:16:09,040

you'd look into the base block and you

414

00:16:13,509 --> 00:16:11,519

would see people in the normal attitude

415

00:16:15,990 --> 00:16:13,519

and then you'd uh

416

00:16:17,910 --> 00:16:16,000

pan your body 90 degrees and you would

417

00:16:19,829 --> 00:16:17,920

see somebody standing on what appeared

418

00:16:22,069 --> 00:16:19,839

to be the ceiling although

419

00:16:25,910 --> 00:16:22,079

what really was was the module was uh

420

00:16:27,829 --> 00:16:25,920

clocked 180 degrees and so those kind of

421

00:16:29,670 --> 00:16:27,839

visual things happened all the time on

422

00:16:33,670 --> 00:16:29,680

mir and it was it was very exciting very

423

00:16:36,870 --> 00:16:34,870

one of the

424

00:16:39,749 --> 00:16:36,880

things that consumed a lot of our time

425

00:16:43,670 --> 00:16:39,759

during our dock phase was

426
00:16:45,910 --> 00:16:43,680
filming imax tom akers and i and

427
00:16:49,189 --> 00:16:45,920
our commander bill reedy spent a lot of

428
00:16:52,710 --> 00:16:49,199
time setting up imax scenes

429
00:16:54,550 --> 00:16:52,720
both in mir and on the shuttle

430
00:16:56,150 --> 00:16:54,560
and we've had a chance to look at those

431
00:16:58,150 --> 00:16:56,160
and they look really good

432
00:17:00,069 --> 00:16:58,160
and we're looking for the incorporation

433
00:17:02,710 --> 00:17:00,079
of this uh

434
00:17:05,750 --> 00:17:02,720
these scenes into the new imax

435
00:17:06,630 --> 00:17:05,760
film about our phase one program tamir

436
00:17:09,429 --> 00:17:06,640
and

437
00:17:13,350 --> 00:17:09,439
that's supposed to be released

438
00:17:16,390 --> 00:17:13,360

in march of 97 to a theater near you so

439

00:17:21,990 --> 00:17:18,949

and there's this is a a picture of

440

00:17:24,150 --> 00:17:22,000

shannon and uh this is in the tunnel

441

00:17:26,309 --> 00:17:24,160

adapter of the uh of the space shuttle

442

00:17:33,750 --> 00:17:26,319

she made sure she was on the right side

443

00:17:38,070 --> 00:17:36,230

fortunately with all the science and

444

00:17:39,590 --> 00:17:38,080

transfer activities going on we each

445

00:17:41,270 --> 00:17:39,600

still managed to find time to look out

446

00:17:43,110 --> 00:17:41,280

the window and take pictures of our

447

00:17:45,669 --> 00:17:43,120

planet and we'll show you some of those

448

00:17:46,950 --> 00:17:45,679

pictures at the end of the slides and

449

00:17:49,669 --> 00:17:46,960

something else we were taking pictures

450

00:17:51,510 --> 00:17:49,679

of what's the mirror next slide please

451
00:17:53,190 --> 00:17:51,520
we had a detailed test

452
00:17:54,710 --> 00:17:53,200
numbered 11 18

453
00:17:57,270 --> 00:17:54,720
and it was the photo survey of the

454
00:17:58,950 --> 00:17:57,280
mirror so we tried to take pictures of

455
00:18:00,630 --> 00:17:58,960
literally every square inch of the

456
00:18:03,190 --> 00:18:00,640
mirror that was visible to us the solar

457
00:18:05,350 --> 00:18:03,200
panels the the modules everything that

458
00:18:07,190 --> 00:18:05,360
we could and the engineers here at jsc

459
00:18:08,950 --> 00:18:07,200
will study those pictures and will

460
00:18:11,190 --> 00:18:08,960
determine how well the materials that

461
00:18:13,830 --> 00:18:11,200
mir is made out of have withstood 10

462
00:18:15,669 --> 00:18:13,840
years or less in space and they can use

463
00:18:17,830 --> 00:18:15,679

those to see where what materials have

464

00:18:19,510 --> 00:18:17,840

degraded what materials have oxidized

465

00:18:20,470 --> 00:18:19,520

and you can use the location of some of

466

00:18:22,230 --> 00:18:20,480

the

467

00:18:23,350 --> 00:18:22,240

off gas materials for instance that have

468

00:18:25,590 --> 00:18:23,360

stained another part of mirror to

469

00:18:27,510 --> 00:18:25,600

determine exactly where it's coming from

470

00:18:29,909 --> 00:18:27,520

what it is and we hope to our space

471

00:18:31,750 --> 00:18:29,919

station people will avoid

472

00:18:33,990 --> 00:18:31,760

those types of materials on the space

473

00:18:35,830 --> 00:18:34,000

station that storm by the way is in the

474

00:18:37,750 --> 00:18:35,840

southern india ocean and southern indian

475

00:18:39,510 --> 00:18:37,760

ocean and it's one of several that we

476

00:18:41,590 --> 00:18:39,520

saw while we were in space

477

00:18:43,750 --> 00:18:41,600

next slide

478

00:18:44,789 --> 00:18:43,760

well we got ready to say goodbye and one

479

00:18:46,549 --> 00:18:44,799

of the things we want to do is take a

480

00:18:48,070 --> 00:18:46,559

picture the first crew picture of the

481

00:18:49,590 --> 00:18:48,080

new mirror crew

482

00:18:51,350 --> 00:18:49,600

and you can see the three of them there

483

00:18:56,070 --> 00:18:51,360

and john and his uh

484

00:19:01,029 --> 00:18:59,190

shannon says she has mixed feelings uh

485

00:19:02,390 --> 00:19:01,039

about leaving i'm certain that she did

486

00:19:04,630 --> 00:19:02,400

the cosmonauts

487

00:19:06,549 --> 00:19:04,640

treated us and heard very very well that

488

00:19:07,750 --> 00:19:06,559

it was a real team up there and

489

00:19:09,110 --> 00:19:07,760

anyway it was time for her to say

490

00:19:11,430 --> 00:19:09,120

goodbye and

491

00:19:14,390 --> 00:19:11,440

come aboard shuttle for the trip home

492

00:19:19,430 --> 00:19:17,350

after we closed the hatches uh we spent

493

00:19:20,870 --> 00:19:19,440

the night attached to the mere still and

494

00:19:23,029 --> 00:19:20,880

then the next morning we got up and

495

00:19:24,630 --> 00:19:23,039

undocked and i was fortunate enough to

496

00:19:26,710 --> 00:19:24,640

to get to do the fly around the mirror

497

00:19:28,630 --> 00:19:26,720

and this is a shot from that you can see

498

00:19:30,150 --> 00:19:28,640

the docking module clearly at the top of

499

00:19:33,270 --> 00:19:30,160

the screen this is a picture of the

500

00:19:35,190 --> 00:19:33,280

mirror at the terminator and

501
00:19:36,470 --> 00:19:35,200
you can see the blackness on the dark

502
00:19:37,990 --> 00:19:36,480
side of the earth at the top and of

503
00:19:39,590 --> 00:19:38,000
course we're leaving the light at the

504
00:19:40,870 --> 00:19:39,600
bottom

505
00:19:43,430 --> 00:19:40,880
people have asked me if the mirror was

506
00:19:44,950 --> 00:19:43,440
easy to see on the dark side and it was

507
00:19:47,430 --> 00:19:44,960
very easy to see they have aviation

508
00:19:49,510 --> 00:19:47,440
lights red and green and even flashing

509
00:19:51,430 --> 00:19:49,520
lights located on a mirror it was very

510
00:19:54,470 --> 00:19:51,440
easy to to see the thing during the fly

511
00:19:59,270 --> 00:19:57,190
well our joint program with

512
00:20:01,909 --> 00:19:59,280
the russians didn't stop when we

513
00:20:04,310 --> 00:20:01,919

undocked one of our

514

00:20:06,710 --> 00:20:04,320

objectives is to

515

00:20:08,870 --> 00:20:06,720

do a program of earth observations of

516

00:20:10,630 --> 00:20:08,880

particular sites of interest to

517

00:20:12,549 --> 00:20:10,640

scientists both in russian right here at

518

00:20:13,909 --> 00:20:12,559

the johnson space center where a

519

00:20:16,390 --> 00:20:13,919

fantastic

520

00:20:19,110 --> 00:20:16,400

group of people studies

521

00:20:20,870 --> 00:20:19,120

the earth from space and disseminates

522

00:20:23,190 --> 00:20:20,880

all that information to scientists all

523

00:20:24,390 --> 00:20:23,200

around the world on a continuous basis

524

00:20:26,549 --> 00:20:24,400

we carried

525

00:20:28,950 --> 00:20:26,559

plenty of film and plenty of hasselblad

526

00:20:29,830 --> 00:20:28,960

cameras to bring you back a few shots

527

00:20:31,990 --> 00:20:29,840

and we're just going to show you a

528

00:20:33,430 --> 00:20:32,000

couple here but we have uh several

529

00:20:35,430 --> 00:20:33,440

thousand more that we'll be showing you

530

00:20:37,430 --> 00:20:35,440

over uh the next couple of years as they

531

00:20:38,870 --> 00:20:37,440

trickle out of building eight next slide

532

00:20:41,590 --> 00:20:38,880

please

533

00:20:43,750 --> 00:20:41,600

this is uh the view out the aft windows

534

00:20:45,830 --> 00:20:43,760

of an area that's been in the news uh

535

00:20:47,510 --> 00:20:45,840

uh quite a bit this is the middle east

536

00:20:48,789 --> 00:20:47,520

the tale is pointing to the city of

537

00:20:51,510 --> 00:20:48,799

jerusalem

538

00:20:54,470 --> 00:20:51,520

in israel and the jordan river connects

539

00:20:55,830 --> 00:20:54,480

the dead sea at the bottom or center of

540

00:20:59,350 --> 00:20:55,840

the picture

541

00:21:01,830 --> 00:20:59,360

to the sea of galilee up near the top

542

00:21:03,270 --> 00:21:01,840

and just a fabulous area of the world to

543

00:21:04,310 --> 00:21:03,280

fly around of course it's a desert so

544

00:21:05,590 --> 00:21:04,320

you can see it there's not a lot of

545

00:21:07,750 --> 00:21:05,600

clouds

546

00:21:11,270 --> 00:21:07,760

and we enjoyed very much flying over it

547

00:21:13,430 --> 00:21:11,280

pretty much every day next slide

548

00:21:15,909 --> 00:21:13,440

this is an area that i saw for the first

549

00:21:17,669 --> 00:21:15,919

time but because it had not been cloudy

550

00:21:20,149 --> 00:21:17,679

when they talk about deforestation in

551

00:21:23,909 --> 00:21:20,159

the rain forest this is it

552

00:21:27,270 --> 00:21:23,919

this is an area the size of about

553

00:21:29,830 --> 00:21:27,280

half of pennsylvania in

554

00:21:33,190 --> 00:21:29,840

the brazilian state of rondonia along

555

00:21:34,230 --> 00:21:33,200

brazilian road 364 and we've watched in

556

00:21:35,510 --> 00:21:34,240

pictures from the shuttle that are

557

00:21:37,909 --> 00:21:35,520

analyzed here at the johnson space

558

00:21:40,310 --> 00:21:37,919

center this area just getting less and

559

00:21:42,470 --> 00:21:40,320

less of the dark forest and more and

560

00:21:44,230 --> 00:21:42,480

more of the light green farmland

561

00:21:46,710 --> 00:21:44,240

unfortunately the farmland is not usable

562

00:21:49,190 --> 00:21:46,720

for very long uh after as little as

563

00:21:51,750 --> 00:21:49,200

three to four seasons the soil becomes

564

00:21:54,149 --> 00:21:51,760

unusable it's just not suitable for uh

565

00:21:56,230 --> 00:21:54,159

farming and uh they abandoned it and

566

00:21:57,590 --> 00:21:56,240

take the chainsaws a little further into

567

00:22:00,310 --> 00:21:57,600

the rainforest

568

00:22:01,750 --> 00:22:00,320

next slide please

569

00:22:03,590 --> 00:22:01,760

this is uh

570

00:22:05,110 --> 00:22:03,600

an awesome example of the power of

571

00:22:07,830 --> 00:22:05,120

nature as well as the power of man to

572

00:22:10,149 --> 00:22:07,840

transform the planet this is typhoon

573

00:22:10,950 --> 00:22:10,159

violet just northeast of the philippines

574

00:22:13,590 --> 00:22:10,960

and

575

00:22:15,430 --> 00:22:13,600

you can almost feel the atmosphere

576

00:22:17,430 --> 00:22:15,440

getting sucked down into that giant low

577

00:22:18,950 --> 00:22:17,440

pressure area where the hole is at the

578

00:22:21,350 --> 00:22:18,960

eye of the storm there in the center

579

00:22:23,590 --> 00:22:21,360

hundreds of miles away from us

580

00:22:25,590 --> 00:22:23,600

next one

581

00:22:26,950 --> 00:22:25,600

and uh we'll end our earth observations

582

00:22:29,590 --> 00:22:26,960

with uh

583

00:22:31,110 --> 00:22:29,600

a beautiful scene of the aurora uh and

584

00:22:33,270 --> 00:22:31,120

the tail of the orbiter lit up by

585

00:22:35,110 --> 00:22:33,280

moonlight while the stars flicker in the

586

00:22:37,190 --> 00:22:35,120

background there and you can see some of

587

00:22:39,190 --> 00:22:37,200

the stars that appear to be uh closer to

588

00:22:41,350 --> 00:22:39,200

us than the planet there that's uh

589

00:22:42,390 --> 00:22:41,360

because there's a little air uh that you

590

00:22:44,390 --> 00:22:42,400

can actually see through and there's

591

00:22:46,549 --> 00:22:44,400

that yellow layer right at the top of

592

00:22:48,630 --> 00:22:46,559

the atmosphere that's up about 60 miles

593

00:22:49,909 --> 00:22:48,640

that you can see through so that's

594

00:22:51,990 --> 00:22:49,919

that is our

595

00:22:54,549 --> 00:22:52,000

fragile planet down here and protected

596

00:22:57,029 --> 00:22:54,559

by this very thin layer of uh of earth

597

00:22:59,270 --> 00:22:57,039

and we as a crew were very happy to

598

00:22:59,990 --> 00:22:59,280

be able to fly the spaceship that you

599

00:23:02,470 --> 00:23:00,000

all

600

00:23:06,470 --> 00:23:02,480

built and operated for us to get get up

601
00:23:10,789 --> 00:23:08,549
this is just a portrait of our crew

602
00:23:11,750 --> 00:23:10,799
taking the base block of the mirror

603
00:23:13,590 --> 00:23:11,760
station

604
00:23:19,350 --> 00:23:13,600
and the 64 thousand dollar question is

605
00:23:23,029 --> 00:23:21,430
well that concludes the slides we uh we

606
00:23:24,710 --> 00:23:23,039
have a short movie that we'd like to

607
00:23:26,710 --> 00:23:24,720
show you

608
00:23:29,430 --> 00:23:26,720
the footage that we

609
00:23:34,390 --> 00:23:29,440
assembled from from our mission

610
00:23:34,400 --> 00:23:39,750
the crew patch

611
00:23:44,390 --> 00:23:41,350
this is uh shooting up before we're

612
00:23:44,400 --> 00:23:48,549
terry welcome the pilot

613
00:23:48,559 --> 00:23:52,870

j app ms1

614

00:23:52,880 --> 00:23:56,870

ms2 tom akers

615

00:24:04,310 --> 00:23:59,830

ms3 carl walls

616

00:24:04,320 --> 00:24:08,870

nasa mirror number three

617

00:24:13,190 --> 00:24:11,350

on our way out to the astrovan

618

00:24:15,510 --> 00:24:13,200

still awfully awfully dark at that hour

619

00:24:19,830 --> 00:24:15,520

of the morning let me tell you

620

00:24:21,750 --> 00:24:19,840

about the light up though big big time

621

00:24:26,149 --> 00:24:21,760

six seconds there prior to liftoff the

622

00:24:26,159 --> 00:24:30,230

and we're on our way

623

00:24:30,240 --> 00:24:35,510

first master alarm

624

00:24:39,190 --> 00:24:37,029

the diagonal thing was shaking so much

625

00:24:40,870 --> 00:24:39,200

that terry and i had uh a real time

626

00:24:42,950 --> 00:24:40,880

trying to read the uh the scratch pad

627

00:24:45,110 --> 00:24:42,960

line of what was going on unfortunately

628

00:24:46,950 --> 00:24:45,120

we had tom there to mid value select

629

00:24:49,110 --> 00:24:46,960

between the pilot and the commander and

630

00:24:51,669 --> 00:24:49,120

he properly informed us what what was

631

00:24:52,789 --> 00:24:51,679

going on with our vehicle

632

00:24:55,269 --> 00:24:52,799

i think the folks that were there at the

633

00:24:57,990 --> 00:24:55,279

cape had a real spectacular view uh not

634

00:25:00,310 --> 00:24:58,000

only of the srb separation here a little

635

00:25:01,269 --> 00:25:00,320

after two minutes

636

00:25:04,710 --> 00:25:01,279

but

637

00:25:08,630 --> 00:25:05,990

we're going to get a little bit closer

638

00:25:13,750 --> 00:25:10,870

and a special camera in the umbilical

639

00:25:17,510 --> 00:25:13,760

wells that was able to capture that

640

00:25:20,149 --> 00:25:17,520

unfortunately the external tank came off

641

00:25:22,230 --> 00:25:20,159

in darkness so there wasn't any residual

642

00:25:23,669 --> 00:25:22,240

light from the from the main engines or

643

00:25:25,350 --> 00:25:23,679

anything to capture that

644

00:25:27,029 --> 00:25:25,360

well once we got on orbit we opened the

645

00:25:29,430 --> 00:25:27,039

payload bay doors

646

00:25:31,669 --> 00:25:29,440

to reject some of the heat of course

647

00:25:33,990 --> 00:25:31,679

produced by the fuel cells and got a

648

00:25:35,350 --> 00:25:34,000

first real good look at the space tab

649

00:25:37,110 --> 00:25:35,360

and the back end of the payload bay and

650

00:25:39,350 --> 00:25:37,120

the orbiter docking system and the

651
00:25:40,549 --> 00:25:39,360
trajectory control sensors those boxes

652
00:25:42,710 --> 00:25:40,559
right on the beam in the front of the

653
00:25:44,549 --> 00:25:42,720
cargo bay very happy to see everything

654
00:25:46,950 --> 00:25:44,559
was in good shape we opened up the hatch

655
00:25:49,830 --> 00:25:46,960
to get back into the space hab a couple

656
00:25:51,590 --> 00:25:49,840
hours after launch uh after verification

657
00:25:53,990 --> 00:25:51,600
that all the atmosphere back there was

658
00:25:56,789 --> 00:25:54,000
good and it's the first flight of a new

659
00:25:58,870 --> 00:25:56,799
habitable volume it went just great what

660
00:26:00,870 --> 00:25:58,880
a wonderful place to work and have all

661
00:26:03,750 --> 00:26:00,880
the logistics and live and sleep it was

662
00:26:05,350 --> 00:26:03,760
just huge uh i mean it was like a big

663
00:26:07,110 --> 00:26:05,360

building inside

664

00:26:08,630 --> 00:26:07,120

those of you who have offices around jsc

665

00:26:12,789 --> 00:26:08,640

know what i mean when i say this is a

666

00:26:16,789 --> 00:26:15,029

terry's getting ready here to transfer

667

00:26:18,710 --> 00:26:16,799

some of the water specifically squeezing

668

00:26:21,430 --> 00:26:18,720

out a sample into a sample bag for

669

00:26:22,470 --> 00:26:21,440

analysis on the ground and boy

670

00:26:24,149 --> 00:26:22,480

it's a good thing he was in the best

671

00:26:26,230 --> 00:26:24,159

shape of anybody on the crew except

672

00:26:29,190 --> 00:26:26,240

maybe shannon go do that that's it was

673

00:26:29,830 --> 00:26:29,200

pretty hard here we are checking out one

674

00:26:33,029 --> 00:26:29,840

of

675

00:26:34,549 --> 00:26:33,039

the jsc experiments on board a

676

00:26:38,149 --> 00:26:34,559

bioreactor

677

00:26:39,990 --> 00:26:38,159

so called it it is designed to supply

678

00:26:41,909 --> 00:26:40,000

nutrients to all

679

00:26:44,470 --> 00:26:41,919

sides of a cell in three dimensions

680

00:26:46,070 --> 00:26:44,480

unlike a two dimensional petri dish

681

00:26:49,269 --> 00:26:46,080

cells can grow just like they do in the

682

00:26:52,070 --> 00:26:49,279

living body we took sterile samples of

683

00:26:54,230 --> 00:26:52,080

that as john will do every week that

684

00:26:56,149 --> 00:26:54,240

he's up on orbit to ensure for the

685

00:26:58,310 --> 00:26:56,159

principal investigator or doctor up at

686

00:27:00,549 --> 00:26:58,320

massachusetts institute of technology

687

00:27:02,630 --> 00:27:00,559

that everything is working well

688

00:27:04,789 --> 00:27:02,640

if all goes well we'll learn how well

689

00:27:07,830 --> 00:27:04,799

cartilage like is in your knees or your

690

00:27:09,750 --> 00:27:07,840

nose grows up there on orbit

691

00:27:11,269 --> 00:27:09,760

here we are on the second day of the

692

00:27:13,110 --> 00:27:11,279

flight preparing the active rack

693

00:27:16,230 --> 00:27:13,120

isolation system a risk mitigation

694

00:27:18,310 --> 00:27:16,240

experiment for space station for test we

695

00:27:19,909 --> 00:27:18,320

tilted the rack out just as people will

696

00:27:22,390 --> 00:27:19,919

do hundreds of times on the

697

00:27:24,630 --> 00:27:22,400

international space station uh and this

698

00:27:26,950 --> 00:27:24,640

thing that uh about the size of a big

699

00:27:29,029 --> 00:27:26,960

vending machine here and uh about the

700

00:27:29,990 --> 00:27:29,039

same weight too we're real careful with

701
00:27:32,070 --> 00:27:30,000
and

702
00:27:33,510 --> 00:27:32,080
took all three of us to get that out

703
00:27:36,070 --> 00:27:33,520
there and make sure

704
00:27:37,750 --> 00:27:36,080
it was all in good shape then carl and i

705
00:27:39,190 --> 00:27:37,760
went to work

706
00:27:41,029 --> 00:27:39,200
setting it up for

707
00:27:43,669 --> 00:27:41,039
what turned out to be many days of tests

708
00:27:45,430 --> 00:27:43,679
on board the idea of that system was to

709
00:27:46,710 --> 00:27:45,440
isolate the small vibrations that you

710
00:27:48,310 --> 00:27:46,720
have in space

711
00:27:50,549 --> 00:27:48,320
for the benefit of experiments such as

712
00:27:53,990 --> 00:27:50,559
this one this is a furnace

713
00:27:55,669 --> 00:27:54,000

that was to melt metals sintered metals

714

00:27:58,149 --> 00:27:55,679

are used in everything from machine

715

00:28:00,310 --> 00:27:58,159

tools to exotic space structures here we

716

00:28:01,669 --> 00:28:00,320

are inserting a sample into that furnace

717

00:28:04,710 --> 00:28:01,679

for melding and

718

00:28:07,029 --> 00:28:04,720

later analysis on the ground

719

00:28:08,870 --> 00:28:07,039

back in the back tom was examining all

720

00:28:09,830 --> 00:28:08,880

of his transfer items and getting

721

00:28:10,789 --> 00:28:09,840

everything

722

00:28:11,669 --> 00:28:10,799

ready

723

00:28:12,870 --> 00:28:11,679

for

724

00:28:15,590 --> 00:28:12,880

transfer and here he's getting a

725

00:28:17,430 --> 00:28:15,600

computer out that john will need on

726

00:28:19,110 --> 00:28:17,440

mirror and putting it into a bag where

727

00:28:21,110 --> 00:28:19,120

it can be efficiently transferred as

728

00:28:22,470 --> 00:28:21,120

soon as we get docked did a fabulous job

729

00:28:24,149 --> 00:28:22,480

getting everything ready so that when we

730

00:28:26,870 --> 00:28:24,159

dock bang it was ready and everything

731

00:28:28,470 --> 00:28:26,880

got over uh it was just super

732

00:28:29,590 --> 00:28:28,480

that bright star that you see in the

733

00:28:32,070 --> 00:28:29,600

center of the

734

00:28:34,230 --> 00:28:32,080

optical site there is the mirror station

735

00:28:36,310 --> 00:28:34,240

and at this point we're about two miles

736

00:28:37,510 --> 00:28:36,320

away

737

00:28:39,990 --> 00:28:37,520

and we're going to show you just a

738

00:28:41,269 --> 00:28:40,000

couple time slices here

739

00:28:43,510 --> 00:28:41,279

now we're about

740

00:28:47,830 --> 00:28:43,520

a mile away

741

00:28:51,590 --> 00:28:49,430

and this is how we had the cockpit laid

742

00:28:53,350 --> 00:28:51,600

out terry was uh in the front and he was

743

00:28:55,909 --> 00:28:53,360

doing the mid-course burns

744

00:28:57,430 --> 00:28:55,919

jay had the master checklist

745

00:28:58,630 --> 00:28:57,440

and then tom was doing the handheld

746

00:29:00,789 --> 00:28:58,640

laser

747

00:29:02,789 --> 00:29:00,799

and carl was working the camera as well

748

00:29:04,950 --> 00:29:02,799

john was our communicator

749

00:29:06,870 --> 00:29:04,960

and that left me free to do a little bit

750

00:29:09,350 --> 00:29:06,880

of flying and what you can see here are

751

00:29:13,029 --> 00:29:09,360

the ford reaction control jets uh firing

752

00:29:15,750 --> 00:29:13,039

as we're approaching the mirror station

753

00:29:17,909 --> 00:29:15,760

this is approximately 170 feet as we're

754

00:29:19,430 --> 00:29:17,919

continuing to close and you can

755

00:29:21,750 --> 00:29:19,440

you can see the whole mirror station at

756

00:29:27,590 --> 00:29:21,760

that point

757

00:29:31,590 --> 00:29:29,510

here we're about 10 feet and you can see

758

00:29:34,549 --> 00:29:31,600

the docking module very well coming into

759

00:29:36,470 --> 00:29:34,559

the the payload bay

760

00:29:38,549 --> 00:29:36,480

this is a view out of our

761

00:29:41,350 --> 00:29:38,559

truss camera that was located adjacent

762

00:29:43,590 --> 00:29:41,360

to our docking system

763

00:29:46,470 --> 00:29:43,600

and you can see that the closure is just

764

00:29:49,190 --> 00:29:46,480

ever ever so slow it's uh

765

00:29:53,510 --> 00:29:49,200

about a yard in in 30 seconds so you

766

00:29:57,190 --> 00:29:55,669

about this time tom is calling pedal

767

00:30:00,149 --> 00:29:57,200

overlap and then when we get to two

768

00:30:01,990 --> 00:30:00,159

inches we fire uh post contact thrusters

769

00:30:03,430 --> 00:30:02,000

to just nudge the two vehicles together

770

00:30:12,149 --> 00:30:03,440

so that we get uh

771

00:30:12,159 --> 00:30:17,269

and there was great rejoicing

772

00:30:17,279 --> 00:30:22,710

on the other side of the hatch too

773

00:30:26,470 --> 00:30:24,710

and uh this is uh this is shannon in the

774

00:30:28,950 --> 00:30:26,480

docking module uh

775

00:30:31,029 --> 00:30:28,960

waiting expectantly for uh our hatch to

776

00:30:32,470 --> 00:30:31,039

open here and uh bill is doing that

777

00:30:35,510 --> 00:30:32,480

right now

778

00:30:38,870 --> 00:30:35,520

and of course uh uh the mirror 22 crew

779

00:30:40,470 --> 00:30:38,880

uh valeri and sasha and shannon are

780

00:30:41,669 --> 00:30:40,480

are there on the other side waiting for

781

00:30:43,269 --> 00:30:41,679

us

782

00:30:46,549 --> 00:30:43,279

so bill goes to

783

00:30:49,269 --> 00:30:47,430

gets

784

00:30:50,950 --> 00:30:49,279

brought into the docking module here and

785

00:30:52,310 --> 00:30:50,960

so

786

00:30:56,070 --> 00:30:52,320

and this is a view from from their

787

00:30:59,430 --> 00:30:57,029

and

788

00:31:01,590 --> 00:30:59,440

of course it was it was a great just a

789

00:31:03,590 --> 00:31:01,600

tremendous celebration meeting together

790

00:31:03,830 --> 00:31:03,600

in

791

00:31:05,750 --> 00:31:03,840

and space

792

00:31:06,630 --> 00:31:05,760

course here's john and shannon

793

00:31:09,269 --> 00:31:06,640

um

794

00:31:11,430 --> 00:31:09,279

you know glad to be together uh again

795

00:31:13,190 --> 00:31:11,440

after about a six-month

796

00:31:15,190 --> 00:31:13,200

separation since they were training

797

00:31:17,269 --> 00:31:15,200

together star city

798

00:31:18,789 --> 00:31:17,279

and shannon had the traditional greeting

799

00:31:21,190 --> 00:31:18,799

of bread and salt

800

00:31:24,070 --> 00:31:21,200

it's a traditional russian greeting and

801

00:31:26,389 --> 00:31:24,080

we celebrated together

802

00:31:28,789 --> 00:31:26,399

well with mere hard docked to the

803

00:31:30,149 --> 00:31:28,799

shuttle and the welcoming ceremonies

804

00:31:32,789 --> 00:31:30,159

complete

805

00:31:34,470 --> 00:31:32,799

it was time to go to work and we got uh

806

00:31:36,630 --> 00:31:34,480

quite a bit of the transfer operations

807

00:31:38,310 --> 00:31:36,640

done that first day this is terry and i

808

00:31:39,430 --> 00:31:38,320

back in the space lab you can see one of

809

00:31:40,950 --> 00:31:39,440

the large

810

00:31:43,509 --> 00:31:40,960

russian pieces of hardware we were

811

00:31:46,470 --> 00:31:43,519

bringing home already there occurs unit

812

00:31:48,630 --> 00:31:46,480

we had two of those we also did for the

813

00:31:50,710 --> 00:31:48,640

first time powered transfers where we

814

00:31:52,470 --> 00:31:50,720

had uh scientific experiments under

815

00:31:54,870 --> 00:31:52,480

power on shuttle that we powered down

816

00:31:57,590 --> 00:31:54,880

and moved over to mir this is jay

817

00:32:00,389 --> 00:31:57,600

one of two uh incubators that keep a

818

00:32:01,269 --> 00:32:00,399

controlled temperature environment for a

819

00:32:04,789 --> 00:32:01,279

different

820

00:32:07,430 --> 00:32:04,799

in those

821

00:32:10,630 --> 00:32:07,440

took it over to the new module on mirror

822

00:32:15,029 --> 00:32:10,640

perota and inserted it in a locker and

823

00:32:19,509 --> 00:32:17,430

during all of the transfer operations

824

00:32:22,789 --> 00:32:19,519

and other activities shannon every day

825

00:32:24,870 --> 00:32:22,799

we were there exercised for two hours

826
00:32:26,070 --> 00:32:24,880
each day here on the treadmill and the

827
00:32:27,669 --> 00:32:26,080
base block

828
00:32:30,470 --> 00:32:27,679
and one of the final transfer items

829
00:32:32,470 --> 00:32:30,480
which carl uh mentioned was the 350

830
00:32:34,149 --> 00:32:32,480
pounds of russian food we had in the

831
00:32:35,750 --> 00:32:34,159
heiress experiment

832
00:32:37,750 --> 00:32:35,760
and this is uh just checking to make

833
00:32:40,149 --> 00:32:37,760
sure we hadn't left any m before we

834
00:32:42,389 --> 00:32:40,159
stowed the empty containers

835
00:32:45,590 --> 00:32:42,399
now we'll take a quick look a quick tour

836
00:32:47,190 --> 00:32:45,600
of uh mir this was my home for six

837
00:32:48,230 --> 00:32:47,200
months now as you see we're going

838
00:32:50,070 --> 00:32:48,240

through here we were going through the

839

00:32:51,269 --> 00:32:50,080

docking module and now this is in uh

840

00:32:53,269 --> 00:32:51,279

cristal

841

00:32:55,269 --> 00:32:53,279

um you can see that there's lots of

842

00:32:57,750 --> 00:32:55,279

ventilation tubes there's lots of wires

843

00:32:59,269 --> 00:32:57,760

there's uh lots of equipment that's

844

00:33:01,350 --> 00:32:59,279

stored there

845

00:33:04,310 --> 00:33:01,360

and there's a bungee cord that sort of

846

00:33:05,350 --> 00:33:04,320

helps you navigate back and forth

847

00:33:06,870 --> 00:33:05,360

actually

848

00:33:08,870 --> 00:33:06,880

oh well first we're going to stop off

849

00:33:12,149 --> 00:33:08,880

here at the

850

00:33:14,389 --> 00:33:12,159

greenhouse uh due to the slip i was

851

00:33:17,029 --> 00:33:14,399

fortunate and was able to uh get this

852

00:33:19,590 --> 00:33:17,039

started and it was really sort of neat

853

00:33:22,230 --> 00:33:19,600

to see the wheat see it uh uh start to

854

00:33:25,509 --> 00:33:22,240

grow it reminded me of oklahoma you know

855

00:33:27,190 --> 00:33:25,519

where i used to live and uh

856

00:33:29,110 --> 00:33:27,200

for the first time just before i left

857

00:33:31,430 --> 00:33:29,120

the wheat was actually going to seed and

858

00:33:33,509 --> 00:33:31,440

so for the first time in space we had

859

00:33:35,669 --> 00:33:33,519

started with the seed and it had gone to

860

00:33:37,509 --> 00:33:35,679

seed and so i think that's just

861

00:33:40,230 --> 00:33:37,519

pretty neat

862

00:33:42,149 --> 00:33:40,240

going on this is perota the new module

863

00:33:43,990 --> 00:33:42,159

that came while i was there and it's

864

00:33:45,909 --> 00:33:44,000

full of various scientific equipment as

865

00:33:47,750 --> 00:33:45,919

you can see there's the glove box and it

866

00:33:49,669 --> 00:33:47,760

just worked outstanding actually

867

00:33:50,950 --> 00:33:49,679

everything that all the united states

868

00:33:53,509 --> 00:33:50,960

equipment that was there in parody

869

00:33:55,430 --> 00:33:53,519

worked really really well this chair

870

00:33:57,190 --> 00:33:55,440

there in the middle is one of the french

871

00:33:59,029 --> 00:33:57,200

experiments that came up on progress and

872

00:34:01,830 --> 00:33:59,039

it's left there there's just lots of

873

00:34:04,149 --> 00:34:01,840

equipment uh in mir there's german

874

00:34:06,470 --> 00:34:04,159

equipment french equipment there's the

875

00:34:08,550 --> 00:34:06,480

united states equipment and it's all

876

00:34:10,950 --> 00:34:08,560

there and it's very difficult to find

877

00:34:14,069 --> 00:34:10,960

places to store uh store stuff

878

00:34:15,750 --> 00:34:14,079

in the back of proto you can see the bts

879

00:34:19,349 --> 00:34:15,760

and the rest of the united states

880

00:34:21,990 --> 00:34:19,359

experiments now this is uh the node

881

00:34:23,669 --> 00:34:22,000

and everything joins up here and when

882

00:34:25,750 --> 00:34:23,679

after proto came and then after a

883

00:34:27,109 --> 00:34:25,760

progress claim uh yuri pointed out to me

884

00:34:29,270 --> 00:34:27,119

that for the first time in the history

885

00:34:31,669 --> 00:34:29,280

of the station of mir all the nodes were

886

00:34:33,030 --> 00:34:31,679

occupied and that was a new record

887

00:34:34,710 --> 00:34:33,040

that's what it was designed for and

888

00:34:38,149 --> 00:34:34,720

that's how it uh

889

00:34:43,510 --> 00:34:40,790

oh and this is inside soyuz which was

890

00:34:44,710 --> 00:34:43,520

there and there's our founders in case

891

00:34:46,389 --> 00:34:44,720

there was an emergency we could have

892

00:34:47,750 --> 00:34:46,399

gotten into soyuz and

893

00:34:50,149 --> 00:34:47,760

come home

894

00:34:57,589 --> 00:34:50,159

and the soyuz is still there and it's

895

00:35:01,750 --> 00:34:59,430

this is in the base block

896

00:35:03,349 --> 00:35:01,760

and you can see the

897

00:35:04,550 --> 00:35:03,359

table back there valerie's back there by

898

00:35:08,310 --> 00:35:04,560

the table the table was sort of the

899

00:35:10,230 --> 00:35:08,320

central place in mir and that's where

900

00:35:12,950 --> 00:35:10,240

if you weren't working somewhere else

901
00:35:15,270 --> 00:35:12,960
you sort of congregated there to talk

902
00:35:17,349 --> 00:35:15,280
talk to the ground eat and do all the

903
00:35:18,550 --> 00:35:17,359
various activities that

904
00:35:20,870 --> 00:35:18,560
you have

905
00:35:23,510 --> 00:35:20,880
and then

906
00:35:24,710 --> 00:35:23,520
you could look the cosmonauts each had a

907
00:35:26,470 --> 00:35:24,720
small

908
00:35:27,829 --> 00:35:26,480
cabin on each side which is very nice

909
00:35:29,510 --> 00:35:27,839
they could keep their personal things

910
00:35:31,670 --> 00:35:29,520
there and then they had a little window

911
00:35:34,470 --> 00:35:31,680
that they could look out

912
00:35:36,950 --> 00:35:34,480
and this happens to be uh sasha's uh a

913
00:35:39,270 --> 00:35:36,960

little cabin and the pictures of his

914

00:35:41,829 --> 00:35:39,280

family he has a three-month-old son and

915

00:35:43,270 --> 00:35:41,839

so he had his pictures hanging up there

916

00:35:45,589 --> 00:35:43,280

and then all their personal equipment

917

00:35:47,510 --> 00:35:45,599

their toothpaste and everything to be

918

00:35:49,109 --> 00:35:47,520

kept in one place

919

00:35:51,190 --> 00:35:49,119

and then the sleeping bag was hung up on

920

00:35:52,550 --> 00:35:51,200

the wall and as you looked out the

921

00:35:57,829 --> 00:35:52,560

window when the shuttle was there then

922

00:36:01,670 --> 00:36:00,470

also in the base block was the ham radio

923

00:36:03,270 --> 00:36:01,680

and uh

924

00:36:05,589 --> 00:36:03,280

we used it

925

00:36:07,670 --> 00:36:05,599

to talk many times we were coming over

926

00:36:09,910 --> 00:36:07,680

houston you could talk to your family

927

00:36:12,470 --> 00:36:09,920

and valerie and sasha also like to use

928

00:36:14,069 --> 00:36:12,480

the ham radio a lot this is another view

929

00:36:16,950 --> 00:36:14,079

in the base block going toward the

930

00:36:18,790 --> 00:36:16,960

central post and valeri was

931

00:36:20,310 --> 00:36:18,800

headed in that direction and you can see

932

00:36:22,310 --> 00:36:20,320

the bungee cords that were stretched out

933

00:36:24,710 --> 00:36:22,320

there that help you navigate back and

934

00:36:27,190 --> 00:36:24,720

forth this is inspector john has just

935

00:36:29,510 --> 00:36:27,200

moved in it was all nice and clean and

936

00:36:30,790 --> 00:36:29,520

all picked up but then all the new stuff

937

00:36:32,870 --> 00:36:30,800

got in there

938

00:36:34,550 --> 00:36:32,880

and you can see uh i like to read and i

939

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

had lots of books i put them in bookcase

940

00:36:37,910 --> 00:36:36,240

up there uh about halfway through the

941

00:36:39,109 --> 00:36:37,920

flight and yuri came in he looked and he

942

00:36:40,550 --> 00:36:39,119

said what are you doing i said well i

943

00:36:42,470 --> 00:36:40,560

like to have my books out i like to look

944

00:36:44,069 --> 00:36:42,480

at it makes me feel good and he said

945

00:36:48,550 --> 00:36:44,079

well what's john going to think about

946

00:36:52,870 --> 00:36:51,190

and this is the back end of spectre and

947

00:36:54,390 --> 00:36:52,880

you can see

948

00:36:56,550 --> 00:36:54,400

those are the big great things are two

949

00:36:59,030 --> 00:36:56,560

cameras uh earth viewing cameras but

950

00:37:00,630 --> 00:36:59,040

then those white bags are all the

951
00:37:02,150 --> 00:37:00,640
science equipment that we transferred

952
00:37:04,150 --> 00:37:02,160
over for john they're all stacked up

953
00:37:05,990 --> 00:37:04,160
there and then that's where i had all

954
00:37:06,630 --> 00:37:06,000
the bags the science equipment stacked

955
00:37:09,030 --> 00:37:06,640
up

956
00:37:10,790 --> 00:37:09,040
uh to take over to

957
00:37:12,310 --> 00:37:10,800
the shuttle

958
00:37:14,390 --> 00:37:12,320
this is another one of the large storms

959
00:37:15,910 --> 00:37:14,400
we saw where we were up there typhoon

960
00:37:20,870 --> 00:37:15,920
yates unfortunately none of them were

961
00:37:23,670 --> 00:37:22,230
they were they were just simply

962
00:37:26,069 --> 00:37:23,680
spectacular if you could see those at

963
00:37:27,430 --> 00:37:26,079

night uh you saw all kinds of lightning

964

00:37:29,750 --> 00:37:27,440

we had the mirror crew over to the

965

00:37:32,150 --> 00:37:29,760

shuttle for a dinner that we hosted uh

966

00:37:35,030 --> 00:37:32,160

we treated them to some freeze-dried

967

00:37:36,790 --> 00:37:35,040

local cajun barbecue

968

00:37:39,430 --> 00:37:36,800

they enjoyed that very much

969

00:37:42,150 --> 00:37:39,440

and it was time to go and unfortunately

970

00:37:44,310 --> 00:37:42,160

we had our formal farewell ceremony say

971

00:37:47,270 --> 00:37:44,320

goodbye to really two very close friends

972

00:37:49,670 --> 00:37:47,280

of ours uh valeria and sasha and then we

973

00:37:50,790 --> 00:37:49,680

said goodbye to the new mere crew member

974

00:37:52,710 --> 00:37:50,800

and

975

00:37:54,470 --> 00:37:52,720

it was a very emotional flight i'd have

976
00:37:56,230 --> 00:37:54,480
to say it was emotional picking shannon

977
00:37:57,349 --> 00:37:56,240
up and it was emotional saying goodbye

978
00:37:58,470 --> 00:37:57,359
to john

979
00:38:00,069 --> 00:37:58,480
if you look at the hatch that they're

980
00:38:02,069 --> 00:38:00,079
closing you can see the docking target

981
00:38:03,589 --> 00:38:02,079
on it and if you look carefully at a

982
00:38:06,150 --> 00:38:03,599
still picture you can see the repair we

983
00:38:07,589 --> 00:38:06,160
made to it while we were up there

984
00:38:09,349 --> 00:38:07,599
this is the undocking early in the

985
00:38:11,670 --> 00:38:09,359
morning there are springs in the docking

986
00:38:13,829 --> 00:38:11,680
mechanism that push the two uh space

987
00:38:16,470 --> 00:38:13,839
vehicles apart and then once you get two

988
00:38:18,950 --> 00:38:16,480

feet away we activate the jets and

989

00:38:27,829 --> 00:38:18,960

then bill gave some pulses to separate

990

00:38:31,910 --> 00:38:29,990

this is a view out one of the

991

00:38:33,430 --> 00:38:31,920

the trust camera we call it is an

992

00:38:35,270 --> 00:38:33,440

auctioning

993

00:38:39,349 --> 00:38:35,280

alternate docking camera

994

00:38:43,829 --> 00:38:41,910

away from us we drifted out to uh

995

00:38:45,990 --> 00:38:43,839

about 150 feet and then bill and i

996

00:38:48,150 --> 00:38:46,000

traded places so that i could do the fly

997

00:38:49,990 --> 00:38:48,160

around and my hat's off to all the

998

00:38:52,390 --> 00:38:50,000

ground people that arranged the timing

999

00:38:53,990 --> 00:38:52,400

so we got pictures like this this is the

1000

00:38:56,310 --> 00:38:54,000

southern island of new zealand the

1001

00:38:57,589 --> 00:38:56,320

southern alps are on there

1002

00:38:59,589 --> 00:38:57,599

our geologists are particularly

1003

00:39:01,510 --> 00:38:59,599

interested in this area because it has a

1004

00:39:04,790 --> 00:39:01,520

lot of volcanoes and some geologic

1005

00:39:08,790 --> 00:39:07,030

again the mirror in another attitude

1006

00:39:10,550 --> 00:39:08,800

during the fly around it seemed to

1007

00:39:12,630 --> 00:39:10,560

change colors depending on how close we

1008

00:39:14,550 --> 00:39:12,640

were to the terminator it was really

1009

00:39:17,190 --> 00:39:14,560

really beautiful

1010

00:39:18,710 --> 00:39:17,200

this is off the coast of australia

1011

00:39:20,150 --> 00:39:18,720

and that's that island that the mirror

1012

00:39:22,310 --> 00:39:20,160

is approaching right now is fraser

1013

00:39:24,550 --> 00:39:22,320

island and the town of bisbane is just

1014

00:39:26,150 --> 00:39:24,560

up the coast from that

1015

00:39:28,470 --> 00:39:26,160

here's the northeastern part of

1016

00:39:29,910 --> 00:39:28,480

australia again it's

1017

00:39:31,829 --> 00:39:29,920

one of the capes up there and what

1018

00:39:33,910 --> 00:39:31,839

you've got on the left side as we look

1019

00:39:35,270 --> 00:39:33,920

at is the great barrier reef and on the

1020

00:39:39,829 --> 00:39:35,280

right side of australia there is the

1021

00:39:44,630 --> 00:39:41,510

again we did the fly around to set up

1022

00:39:47,829 --> 00:39:44,640

shots for uh for the imax and again for

1023

00:39:49,750 --> 00:39:47,839

a mere photo survey

1024

00:39:51,190 --> 00:39:49,760

then it was really was time to go home

1025

00:39:58,150 --> 00:39:51,200

we finished up the science and the

1026
00:40:05,589 --> 00:39:59,589
i couldn't figure out why shannon wanted

1027
00:40:09,589 --> 00:40:08,150
then we turned our space shuttle into

1028
00:40:11,589 --> 00:40:09,599
the re-entry vehicle that it was

1029
00:40:14,550 --> 00:40:11,599
designed to be the pink out the windows

1030
00:40:16,470 --> 00:40:14,560
is the fire or the plasma that surrounds

1031
00:40:18,230 --> 00:40:16,480
the orbiter during re-entry that stuff

1032
00:40:19,829 --> 00:40:18,240
seems to reach a critical mass up around

1033
00:40:21,910 --> 00:40:19,839
the tail and you get the explosions like

1034
00:40:24,230 --> 00:40:21,920
that that give the orbiter a thump every

1035
00:40:26,470 --> 00:40:24,240
time you see an explosion that's sunrise

1036
00:40:29,990 --> 00:40:26,480
over my right shoulder

1037
00:40:34,069 --> 00:40:31,349
well we had

1038
00:40:36,550 --> 00:40:34,079

almost a 360 degree turn to get aligned

1039

00:40:38,710 --> 00:40:36,560

with runway 1-5 at the cape and it was a

1040

00:40:40,069 --> 00:40:38,720

right-hand turn all the way around so i

1041

00:40:42,390 --> 00:40:40,079

looked at nothing but instruments and

1042

00:40:45,109 --> 00:40:42,400

terry had a real nice view of the cape

1043

00:40:46,470 --> 00:40:45,119

uh got rolled out on final and uh it was

1044

00:40:48,310 --> 00:40:46,480

just the most perfect day you can

1045

00:40:50,630 --> 00:40:48,320

imagine to come back to florida just a

1046

00:40:53,270 --> 00:40:50,640

lo light breeze about 80 degrees and

1047

00:40:55,030 --> 00:40:53,280

bright sunshine

1048

00:40:58,150 --> 00:40:55,040

terry put the gear down there at 300

1049

00:41:01,670 --> 00:40:59,990

doing the final flare here at about 50

1050

00:41:05,510 --> 00:41:01,680

feet we never did see the birds by the

1051
00:41:08,309 --> 00:41:07,109
and coming on in

1052
00:41:10,230 --> 00:41:08,319
and i'll tell you the orbiter just

1053
00:41:12,950 --> 00:41:10,240
handles like a dream

1054
00:41:14,710 --> 00:41:12,960
you can see uh

1055
00:41:16,470 --> 00:41:14,720
a little bit of oscillation as the drag

1056
00:41:17,510 --> 00:41:16,480
shoot comes out

1057
00:41:19,270 --> 00:41:17,520
nose

1058
00:41:22,309 --> 00:41:19,280
is cushioned onto the runway by the drag

1059
00:41:24,630 --> 00:41:22,319
shoot this reefing and then

1060
00:41:26,230 --> 00:41:24,640
dog on drag chute works so good that you

1061
00:41:28,230 --> 00:41:26,240
just don't even need any brakes hardly

1062
00:41:29,589 --> 00:41:28,240
at all and about 90 knots and just kind

1063
00:41:31,589 --> 00:41:29,599

of tested them just to make sure they

1064

00:41:33,990 --> 00:41:31,599

were working

1065

00:41:44,950 --> 00:41:34,000

and we stopped with about 3000 feet to

1066

00:41:51,510 --> 00:41:46,950

we had a surprise mystery guest welcome

1067

00:41:56,550 --> 00:41:53,829

i'll tell you we were

1068

00:41:58,309 --> 00:41:56,560

just terrifically honored and proud to

1069

00:42:00,470 --> 00:41:58,319

be there to be with

1070

00:42:02,150 --> 00:42:00,480

shannon and welcome her home to be the

1071

00:42:05,030 --> 00:42:02,160

first to welcome her home i guess from

1072

00:42:08,950 --> 00:42:05,040

uh from space

1073

00:42:11,109 --> 00:42:08,960

president clinton and uh mr golden

1074

00:42:13,510 --> 00:42:11,119

we got a chance to give him one of uh

1075

00:42:14,950 --> 00:42:13,520

one of our crew symbols and uh crew hat

