



1  
00:00:33,830 --> 00:00:32,069  
welcome to everyone to uh what we enjoy

2  
00:00:35,270 --> 00:00:33,840  
doing most is sharing the experience of

3  
00:00:36,950 --> 00:00:35,280  
flying in space

4  
00:00:39,030 --> 00:00:36,960  
especially with those that did so much

5  
00:00:40,709 --> 00:00:39,040  
work to make it all happen for us as mr

6  
00:00:41,590 --> 00:00:40,719  
abbey said this was a really successful

7  
00:00:42,549 --> 00:00:41,600  
flight

8  
00:00:44,869 --> 00:00:42,559  
and

9  
00:00:46,950 --> 00:00:44,879  
i think we prove that we're ready to go

10  
00:00:49,350 --> 00:00:46,960  
on to international space station in

11  
00:00:51,350 --> 00:00:49,360  
cooperation with our russian european

12  
00:00:54,150 --> 00:00:51,360  
and japanese and canadian partners and

13  
00:00:56,470 --> 00:00:54,160

and do even bigger and better things

14

00:00:58,389 --> 00:00:56,480

i will introduce the crew of course and

15

00:01:01,910 --> 00:00:58,399

then we'll show you some slides and a

16

00:01:03,670 --> 00:01:01,920

video that highlight the the mission

17

00:01:05,509 --> 00:01:03,680

as i introduce the crew it the thought

18

00:01:07,030 --> 00:01:05,519

comes to mind that it's becoming more

19

00:01:09,590 --> 00:01:07,040

and more of a daunting task for the

20

00:01:11,510 --> 00:01:09,600

commander to make introductions with

21

00:01:13,350 --> 00:01:11,520

part of the crew leaving

22

00:01:15,190 --> 00:01:13,360

being left on orbit leaving the crew on

23

00:01:17,190 --> 00:01:15,200

the way up and a new member of the crew

24

00:01:19,350 --> 00:01:17,200

joining us on the way down

25

00:01:21,109 --> 00:01:19,360

as a matter of fact on the way over here

26

00:01:22,789 --> 00:01:21,119

in addition to those complications of

27

00:01:24,070 --> 00:01:22,799

who's on the crew when

28

00:01:25,830 --> 00:01:24,080

we thought we'd lost jerry this

29

00:01:27,109 --> 00:01:25,840

afternoon when his wife catherine was

30

00:01:29,190 --> 00:01:27,119

about to uh

31

00:01:30,469 --> 00:01:29,200

who is about to give birth was we

32

00:01:32,069 --> 00:01:30,479

thought on our way to the hospital but i

33

00:01:32,950 --> 00:01:32,079

guess that's going to be a little later

34

00:01:34,710 --> 00:01:32,960

but

35

00:01:36,870 --> 00:01:34,720

we're looking forward to a new lineager

36

00:01:37,990 --> 00:01:36,880

in the in the nasa family here real

37

00:01:38,950 --> 00:01:38,000

shortly

38

00:01:40,950 --> 00:01:38,960

um

39

00:01:43,109 --> 00:01:40,960

i guess uh what we ought to do to

40

00:01:44,950 --> 00:01:43,119

introduce the crew is uh start with the

41

00:01:46,389 --> 00:01:44,960

first slide which is the

42

00:01:48,310 --> 00:01:46,399

the crew photo

43

00:01:50,230 --> 00:01:48,320

and uh i will that way be able to

44

00:01:51,749 --> 00:01:50,240

introduce also those that aren't with us

45

00:01:54,149 --> 00:01:51,759

uh today

46

00:01:55,990 --> 00:01:54,159

the uh the crew

47

00:01:57,990 --> 00:01:56,000

as you see it here

48

00:01:59,270 --> 00:01:58,000

has a lot of background with the phase

49

00:02:01,749 --> 00:01:59,280

one program

50

00:02:04,709 --> 00:02:01,759

eileen collins as our pilot uh

51  
00:02:06,310 --> 00:02:04,719  
had made the first approach on discovery

52  
00:02:08,550 --> 00:02:06,320  
sts-63

53  
00:02:10,949 --> 00:02:08,560  
a couple of almost two and a half years

54  
00:02:12,869 --> 00:02:10,959  
ago now i guess and uh at that point in

55  
00:02:14,949 --> 00:02:12,879  
time she was able to wave across the

56  
00:02:17,110 --> 00:02:14,959  
window uh across space through the

57  
00:02:17,990 --> 00:02:17,120  
window at elena kondakova who was on the

58  
00:02:19,990 --> 00:02:18,000  
mirror

59  
00:02:22,070 --> 00:02:20,000  
and uh at the same time mike foale was

60  
00:02:24,710 --> 00:02:22,080  
on board with vladimir tetof on

61  
00:02:27,270 --> 00:02:24,720  
discovery so we have a an ever-growing

62  
00:02:29,750 --> 00:02:27,280  
family here that is continuing to fly

63  
00:02:32,229 --> 00:02:29,760

these missions

64

00:02:33,750 --> 00:02:32,239

the the two primary payloads that we

65

00:02:35,910 --> 00:02:33,760

call them the precious payloads were

66

00:02:38,309 --> 00:02:35,920

jerry lenninger and mike foale as our

67

00:02:40,470 --> 00:02:38,319

phase one crew members

68

00:02:43,350 --> 00:02:40,480

jerry completed a very long and rigorous

69

00:02:44,869 --> 00:02:43,360

program on board the mirror and mike uh

70

00:02:46,550 --> 00:02:44,879

arrived on mir

71

00:02:47,670 --> 00:02:46,560

a beneficiary of a lot of the work that

72

00:02:49,030 --> 00:02:47,680

jerry did

73

00:02:50,550 --> 00:02:49,040

and so

74

00:02:52,150 --> 00:02:50,560

mike is continuing to carry out that

75

00:02:53,589 --> 00:02:52,160

program in fine fashion as we're all

76

00:02:54,710 --> 00:02:53,599

watching with interest the progress

77

00:02:56,309 --> 00:02:54,720

they're making

78

00:02:58,070 --> 00:02:56,319

recovering the mirror and bringing it

79

00:02:59,190 --> 00:02:58,080

back online

80

00:03:01,589 --> 00:02:59,200

the

81

00:03:04,390 --> 00:03:01,599

ms-1 is jean-francois clare of wahoo is

82

00:03:07,670 --> 00:03:04,400

from the european space agency and

83

00:03:09,910 --> 00:03:07,680

he had also done some training in russia

84

00:03:10,949 --> 00:03:09,920

as a backup for an eventual flight on

85

00:03:12,869 --> 00:03:10,959

mir

86

00:03:14,869 --> 00:03:12,879

again another connection from our crew

87

00:03:16,790 --> 00:03:14,879

to the cooperation that we've had with

88

00:03:19,589 --> 00:03:16,800

the russians

89

00:03:20,869 --> 00:03:19,599

our two new flyers uh ed lou and carlos

90

00:03:23,110 --> 00:03:20,879

noriega

91

00:03:26,229 --> 00:03:23,120

carlos was ms2

92

00:03:27,750 --> 00:03:26,239

he was our flight engineer and uh does a

93

00:03:29,270 --> 00:03:27,760

wonderful job at

94

00:03:32,070 --> 00:03:29,280

keeping the pilot and the commander out

95

00:03:33,110 --> 00:03:32,080

of trouble i might add and he comes from

96

00:03:34,550 --> 00:03:33,120

peru

97

00:03:36,070 --> 00:03:34,560

and

98

00:03:37,589 --> 00:03:36,080

his family moved to the united states

99

00:03:39,270 --> 00:03:37,599

when he was only five years old and

100

00:03:41,270 --> 00:03:39,280

similarly ed

101  
00:03:43,670 --> 00:03:41,280  
is of chinese descent his parents moved

102  
00:03:45,030 --> 00:03:43,680  
to the u.s right before he was born so

103  
00:03:46,869 --> 00:03:45,040  
as you look at this group you see a

104  
00:03:48,949 --> 00:03:46,879  
really international mix

105  
00:03:50,470 --> 00:03:48,959  
a representation from

106  
00:03:52,869 --> 00:03:50,480  
basically six different cultures because

107  
00:03:54,949 --> 00:03:52,879  
we count mike foale's british background

108  
00:03:57,190 --> 00:03:54,959  
as a as a yet different culture from our

109  
00:03:58,550 --> 00:03:57,200  
own but it's the kind of thing that i'm

110  
00:04:00,390 --> 00:03:58,560  
sure we're going to see

111  
00:04:03,350 --> 00:04:00,400  
on future international space station

112  
00:04:04,949 --> 00:04:03,360  
flights and it was a pure pleasure for

113  
00:04:07,190 --> 00:04:04,959

us to be able to work together in a

114

00:04:08,630 --> 00:04:07,200

group like this because

115

00:04:11,589 --> 00:04:08,640

we were able to learn from each other

116

00:04:13,270 --> 00:04:11,599

learn about each other's cultures and

117

00:04:14,949 --> 00:04:13,280

and move forward with

118

00:04:16,629 --> 00:04:14,959

new ideas for

119

00:04:17,830 --> 00:04:16,639

future space flights

120

00:04:19,670 --> 00:04:17,840

the uh

121

00:04:21,270 --> 00:04:19,680

the two folks that you don't see here of

122

00:04:23,189 --> 00:04:21,280

course uh

123

00:04:24,790 --> 00:04:23,199

vasily zablev and sasha luzuki in the

124

00:04:28,150 --> 00:04:24,800

mirror 23 crew

125

00:04:30,150 --> 00:04:28,160

who uh both jerry and mike are have

126

00:04:31,189 --> 00:04:30,160

worked with and mike is continuing to

127

00:04:33,110 --> 00:04:31,199

work with

128

00:04:34,150 --> 00:04:33,120

we consider them honorary members of our

129

00:04:35,590 --> 00:04:34,160

crew and

130

00:04:38,550 --> 00:04:35,600

we really look forward to seeing them

131

00:04:40,710 --> 00:04:38,560

return to earth here in september

132

00:04:42,150 --> 00:04:40,720

this is a crew patch and the the most

133

00:04:45,030 --> 00:04:42,160

important thing on a crew patch are the

134

00:04:47,670 --> 00:04:45,040

names of the crew you see here the eight

135

00:04:50,469 --> 00:04:47,680

people involved in this flight the two

136

00:04:53,110 --> 00:04:50,479

uh front seaters charlie and eileen then

137

00:04:55,270 --> 00:04:53,120

uh the two phase one long duration uh

138

00:04:57,189 --> 00:04:55,280

astronauts and uh the other mission

139

00:05:00,070 --> 00:04:57,199

specialist it shows obviously it's a

140

00:05:02,469 --> 00:05:00,080

special flight in low earth orbit

141

00:05:04,950 --> 00:05:02,479

the sixth mission to mere is symbolized

142

00:05:07,670 --> 00:05:04,960

by the six stars around the mir in

143

00:05:09,430 --> 00:05:07,680

cyridic which means means peace and also

144

00:05:11,749 --> 00:05:09,440

world in russian

145

00:05:13,590 --> 00:05:11,759

and the chateau mere flights are part of

146

00:05:15,830 --> 00:05:13,600

phase one of the international space

147

00:05:18,550 --> 00:05:15,840

station program that's why you have the

148

00:05:21,749 --> 00:05:18,560

phi the greek letter phi with one star

149

00:05:23,909 --> 00:05:21,759

which symbolizes the phase one program

150

00:05:25,430 --> 00:05:23,919

also with the rising sun showing the

151  
00:05:26,629 --> 00:05:25,440  
early phase of the space station

152  
00:05:28,390 --> 00:05:26,639  
international

153  
00:05:31,830 --> 00:05:28,400  
program

154  
00:05:33,110 --> 00:05:31,840  
our launch occurred on may 15th at 407

155  
00:05:34,469 --> 00:05:33,120  
in the morning

156  
00:05:35,990 --> 00:05:34,479  
and it was right on time at the

157  
00:05:37,430 --> 00:05:36,000  
beginning of a seven minute launch

158  
00:05:39,350 --> 00:05:37,440  
window

159  
00:05:41,110 --> 00:05:39,360  
we had

160  
00:05:43,110 --> 00:05:41,120  
little to no problems during the launch

161  
00:05:45,029 --> 00:05:43,120  
countdown and the sn itself was

162  
00:05:46,870 --> 00:05:45,039  
absolutely trouble free

163  
00:05:49,749 --> 00:05:46,880

and you know from the bottom of my heart

164

00:05:52,310 --> 00:05:49,759

i want to say again for the whole crew

165

00:05:53,830 --> 00:05:52,320

thanks to all you folks here at jsc and

166

00:05:55,430 --> 00:05:53,840

the folks down at kennedy space center

167

00:05:57,350 --> 00:05:55,440

that did such a wonderful job getting

168

00:05:59,830 --> 00:05:57,360

our orbiter ready for flight

169

00:06:01,270 --> 00:05:59,840

and because the orbiter was in such good

170

00:06:03,110 --> 00:06:01,280

shape during the whole mission we had

171

00:06:05,350 --> 00:06:03,120

time to do the extra things that we had

172

00:06:07,990 --> 00:06:05,360

planned on doing before launch

173

00:06:09,749 --> 00:06:08,000

this is a view of mir from a far

174

00:06:11,510 --> 00:06:09,759

distant uh picture and the reason we

175

00:06:13,189 --> 00:06:11,520

wanted to show this is

176  
00:06:15,510 --> 00:06:13,199  
the first time we saw amir it was a very

177  
00:06:16,390 --> 00:06:15,520  
small star it looked like a star

178  
00:06:18,870 --> 00:06:16,400  
we

179  
00:06:20,629 --> 00:06:18,880  
our main engine cutoff occurred in low

180  
00:06:21,590 --> 00:06:20,639  
very low earth orbit approximately 100

181  
00:06:24,230 --> 00:06:21,600  
miles

182  
00:06:26,629 --> 00:06:24,240  
well below mirror gave us time to

183  
00:06:29,749 --> 00:06:26,639  
catch up to mir and we did several burns

184  
00:06:31,990 --> 00:06:29,759  
over the course of the next uh two days

185  
00:06:34,230 --> 00:06:32,000  
and flight day two we uh

186  
00:06:36,070 --> 00:06:34,240  
we prepared for the rendezvous and on

187  
00:06:38,790 --> 00:06:36,080  
flight day three we did the actual final

188  
00:06:40,629 --> 00:06:38,800

phase of the rendezvous

189

00:06:42,070 --> 00:06:40,639

you see the overhead window in the

190

00:06:43,830 --> 00:06:42,080

flight deck

191

00:06:45,350 --> 00:06:43,840

with mir in the background the

192

00:06:46,950 --> 00:06:45,360

station-keeping

193

00:06:48,550 --> 00:06:46,960

mirror is on the top of the overhead

194

00:06:50,950 --> 00:06:48,560

window and

195

00:06:53,430 --> 00:06:50,960

you can see the handheld lidar which is

196

00:06:55,510 --> 00:06:53,440

a manual laser pointing tool which is

197

00:06:57,749 --> 00:06:55,520

used to uh to have a

198

00:07:00,070 --> 00:06:57,759

very basic measure measurement of the

199

00:07:01,589 --> 00:07:00,080

range and range rate of the target which

200

00:07:03,110 --> 00:07:01,599

is mere

201  
00:07:05,830 --> 00:07:03,120  
to confirm

202  
00:07:07,029 --> 00:07:05,840  
data from other sensors like the tcs or

203  
00:07:10,150 --> 00:07:07,039  
radar

204  
00:07:11,270 --> 00:07:10,160  
the first good hit was about 16 000 feet

205  
00:07:13,909 --> 00:07:11,280  
and

206  
00:07:17,189 --> 00:07:13,919  
that was a very important tool to ensure

207  
00:07:18,150 --> 00:07:17,199  
to the the flying person to charlie that

208  
00:07:22,710 --> 00:07:18,160  
all the

209  
00:07:27,430 --> 00:07:25,589  
this is a view about 400 feet away

210  
00:07:29,270 --> 00:07:27,440  
you start to see a you can identify the

211  
00:07:31,350 --> 00:07:29,280  
different modules at the top

212  
00:07:34,950 --> 00:07:31,360  
you see the soyuz and working your way

213  
00:07:36,390 --> 00:07:34,960

uh clockwise you see a spectre then the

214

00:07:39,350 --> 00:07:36,400

base block

215

00:07:40,790 --> 00:07:39,360

uh below that is command one and a

216

00:07:43,029 --> 00:07:40,800

progress

217

00:07:45,189 --> 00:07:43,039

uh work your way uh continue clockwise

218

00:07:46,790 --> 00:07:45,199

you got covant two right in the center

219

00:07:49,909 --> 00:07:46,800

you see the docking module where we

220

00:07:52,309 --> 00:07:49,919

would dock directly behind that

221

00:07:55,029 --> 00:07:52,319

is cristal which can't be seen and then

222

00:07:57,350 --> 00:07:55,039

beyond on the far side of the node is a

223

00:07:59,029 --> 00:07:57,360

perota

224

00:08:00,950 --> 00:07:59,039

and uh this is the view we have of

225

00:08:02,869 --> 00:08:00,960

course as we're coming up the r bar from

226

00:08:04,150 --> 00:08:02,879

beneath the station during the final

227

00:08:05,029 --> 00:08:04,160

part of the approach

228

00:08:06,390 --> 00:08:05,039

um

229

00:08:08,309 --> 00:08:06,400

you have to imagine that you're waitlist

230

00:08:10,469 --> 00:08:08,319

for a minute and do a 180 flip here

231

00:08:11,909 --> 00:08:10,479

because our view is actually

232

00:08:14,390 --> 00:08:11,919

as if you were standing on your head

233

00:08:16,869 --> 00:08:14,400

because the the actual base block was uh

234

00:08:19,350 --> 00:08:16,879

at the top of our image but uh in any

235

00:08:21,270 --> 00:08:19,360

event uh the sense of direction is not

236

00:08:22,629 --> 00:08:21,280

really all that important in orbit as

237

00:08:24,469 --> 00:08:22,639

far as whether you're upside down left

238

00:08:26,390 --> 00:08:24,479

right or right side up but

239

00:08:27,510 --> 00:08:26,400

we have a view like this essentially

240

00:08:30,150 --> 00:08:27,520

after

241

00:08:32,709 --> 00:08:30,160

we've done a tail forward maneuver to

242

00:08:35,029 --> 00:08:32,719

align ourselves coming up the r bar and

243

00:08:37,430 --> 00:08:35,039

as carlos said about 400 feet from here

244

00:08:39,509 --> 00:08:37,440

on in we're maintaining a vertical

245

00:08:42,070 --> 00:08:39,519

position beneath the station to keep the

246

00:08:43,509 --> 00:08:42,080

docking port of the orbiter

247

00:08:44,870 --> 00:08:43,519

lined up with the docking port of the

248

00:08:46,389 --> 00:08:44,880

mirror

249

00:08:47,750 --> 00:08:46,399

and this shows a little of the activity

250

00:08:49,269 --> 00:08:47,760

that goes on in the flight deck once we

251  
00:08:51,750 --> 00:08:49,279  
get into the manual phase it gets very

252  
00:08:53,670 --> 00:08:51,760  
intense and very busy

253  
00:08:55,509 --> 00:08:53,680  
i've got the rockets

254  
00:08:59,590 --> 00:08:55,519  
go rockets hat on there hoping that

255  
00:09:03,430 --> 00:09:01,269  
in spite of that we had a lot of work

256  
00:09:04,949 --> 00:09:03,440  
going on around us with carlos you can

257  
00:09:06,550 --> 00:09:04,959  
see looking over my shoulder he was the

258  
00:09:08,949 --> 00:09:06,560  
quarterback of the whole operation

259  
00:09:11,269 --> 00:09:08,959  
making sure that everyone was keeping up

260  
00:09:13,750 --> 00:09:11,279  
and synchronized with all the events in

261  
00:09:17,350 --> 00:09:13,760  
the checklist we have essentially five

262  
00:09:20,949 --> 00:09:17,360  
people doing various things in uh

263  
00:09:23,430 --> 00:09:20,959

in sync to make this all work eileen was

264

00:09:25,269 --> 00:09:23,440

working the r-pop or the rendezvous prox

265

00:09:27,030 --> 00:09:25,279

ops

266

00:09:28,630 --> 00:09:27,040

display for us so that we could see our

267

00:09:30,790 --> 00:09:28,640

trajectory relative to the mirror and

268

00:09:32,710 --> 00:09:30,800

make proper corrections

269

00:09:34,070 --> 00:09:32,720

and jean-francois as you saw was using

270

00:09:36,870 --> 00:09:34,080

the handheld laser looking out the

271

00:09:39,190 --> 00:09:36,880

window elena and mike were talking to

272

00:09:42,070 --> 00:09:39,200

the mayor on the vhf radio and ed was

273

00:09:44,070 --> 00:09:42,080

doing an experiment called the osvs or

274

00:09:45,509 --> 00:09:44,080

the orbiter space vision system which

275

00:09:47,829 --> 00:09:45,519

simultaneously with the approach was

276  
00:09:48,550 --> 00:09:47,839  
taking camera data to

277  
00:09:54,310 --> 00:09:48,560  
to

278  
00:09:55,990 --> 00:09:54,320  
sensor for proximity operations

279  
00:09:58,070 --> 00:09:56,000  
this is the

280  
00:10:01,509 --> 00:09:58,080  
view from in close through one of the

281  
00:10:04,470 --> 00:10:01,519  
cameras and the system that charlie just

282  
00:10:06,630 --> 00:10:04,480  
mentioned the osvs system is a system

283  
00:10:07,750 --> 00:10:06,640  
which if you see the three black dots if

284  
00:10:09,509 --> 00:10:07,760  
you look at the orange thing in the

285  
00:10:11,670 --> 00:10:09,519  
middle thinking that 12 o'clock nine

286  
00:10:13,509 --> 00:10:11,680  
o'clock and three o'clock there are uh

287  
00:10:14,389 --> 00:10:13,519  
white squares with a black dot in the

288  
00:10:16,230 --> 00:10:14,399

middle

289

00:10:17,910 --> 00:10:16,240

and we had a system which was looking at

290

00:10:19,670 --> 00:10:17,920

these three dots let's see if we could

291

00:10:21,269 --> 00:10:19,680

figure out our position relative to the

292

00:10:22,870 --> 00:10:21,279

mirror just based upon that it's a

293

00:10:23,829 --> 00:10:22,880

system we'd like to use on the new space

294

00:10:24,790 --> 00:10:23,839

station

295

00:10:27,509 --> 00:10:24,800

and

296

00:10:28,949 --> 00:10:27,519

this was a test of how well that type of

297

00:10:30,630 --> 00:10:28,959

system would work

298

00:10:32,630 --> 00:10:30,640

of course right here in the middle is

299

00:10:33,990 --> 00:10:32,640

the docking target that we use to

300

00:10:38,230 --> 00:10:34,000

visually align

301  
00:10:40,870 --> 00:10:38,240  
in the mirror in the last 30 feet

302  
00:10:42,790 --> 00:10:40,880  
referencing this target

303  
00:10:44,150 --> 00:10:42,800  
well when we finally docked

304  
00:10:45,110 --> 00:10:44,160  
one of the highlights of the mission of

305  
00:10:46,310 --> 00:10:45,120  
course is

306  
00:10:48,870 --> 00:10:46,320  
opening the hatch it was a very

307  
00:10:50,389 --> 00:10:48,880  
emotional period uh you see great grins

308  
00:10:52,389 --> 00:10:50,399  
here but uh you should have seen the

309  
00:10:53,750 --> 00:10:52,399  
grin on jerry's face uh when we actually

310  
00:10:55,350 --> 00:10:53,760  
got through to him

311  
00:10:56,949 --> 00:10:55,360  
uh actually his grain was pretty big

312  
00:10:58,710 --> 00:10:56,959  
before we even opened the hatch just

313  
00:11:02,389 --> 00:10:58,720

looking through the little uh

314

00:11:03,910 --> 00:11:02,399  
window this is a symbolic of uh

315

00:11:05,829 --> 00:11:03,920  
the union up there and how well we work

316

00:11:07,990 --> 00:11:05,839  
together

317

00:11:10,470 --> 00:11:08,000  
well as much fun as the approach was to

318

00:11:13,670 --> 00:11:10,480  
fly as intense it is as it is and as

319

00:11:16,230 --> 00:11:13,680  
rewarding as it is to have it go so well

320

00:11:17,829 --> 00:11:16,240  
being able to join with our colleagues

321

00:11:19,350 --> 00:11:17,839  
on the other side of the interface was

322

00:11:21,910 --> 00:11:19,360  
really a pleasure

323

00:11:23,750 --> 00:11:21,920  
this is a little gift exchange during an

324

00:11:26,150 --> 00:11:23,760  
international meal we had prepared some

325

00:11:28,150 --> 00:11:26,160  
food to take from the various

326  
00:11:30,069 --> 00:11:28,160  
representing the various cultures of the

327  
00:11:31,990 --> 00:11:30,079  
crew members to

328  
00:11:34,870 --> 00:11:32,000  
provide for the mayor crew and give them

329  
00:11:36,310 --> 00:11:34,880  
a chance to relax and during that we

330  
00:11:38,389 --> 00:11:36,320  
during that meal we presented them with

331  
00:11:39,590 --> 00:11:38,399  
some gifts one of which was a photo

332  
00:11:41,430 --> 00:11:39,600  
album

333  
00:11:43,829 --> 00:11:41,440  
that documented the training that both

334  
00:11:46,069 --> 00:11:43,839  
vasily and sasha had done with us kind

335  
00:11:48,230 --> 00:11:46,079  
of a history of their involvement in the

336  
00:11:51,110 --> 00:11:48,240  
joint phase one program

337  
00:11:53,509 --> 00:11:51,120  
and uh here vasily has the his album

338  
00:11:55,910 --> 00:11:53,519

open to a page that is uh near and dear

339

00:11:59,350 --> 00:11:55,920

to me and that's a photograph that uh

340

00:12:01,990 --> 00:11:59,360

was taking taken in two places uh of

341

00:12:03,670 --> 00:12:02,000

vasily and i uh first at baikonur where

342

00:12:06,069 --> 00:12:03,680

i was wearing his russian air force

343

00:12:08,230 --> 00:12:06,079

uniform and then here in houston when he

344

00:12:10,389 --> 00:12:08,240

came to train here and he was wearing my

345

00:12:12,230 --> 00:12:10,399

american air force uniform and so that

346

00:12:14,550 --> 00:12:12,240

was a little bit of a nice exchange for

347

00:12:16,389 --> 00:12:14,560

us and we included that in the uh photo

348

00:12:19,829 --> 00:12:16,399

album

349

00:12:21,269 --> 00:12:19,839

every day we had a many press conference

350

00:12:22,949 --> 00:12:21,279

on the board

351

00:12:25,829 --> 00:12:22,959

usually we spent at this press

352

00:12:27,269 --> 00:12:25,839

conference in space station mirror but

353

00:12:30,150 --> 00:12:27,279

sometimes

354

00:12:33,430 --> 00:12:30,160

in space help because space had

355

00:12:37,030 --> 00:12:33,440

we had double spacecraft it was a

356

00:12:39,990 --> 00:12:38,150

it was a

357

00:12:40,870 --> 00:12:40,000

big free volume

358

00:12:45,430 --> 00:12:40,880

and

359

00:12:50,550 --> 00:12:47,590

it's free for us it was very comfortable

360

00:12:52,949 --> 00:12:50,560

for us in the space hub

361

00:12:54,550 --> 00:12:52,959

the vast majority of our time was spent

362

00:12:56,550 --> 00:12:54,560

obviously working hard and doing the

363

00:12:58,550 --> 00:12:56,560

transfer operations and what we wanted

364

00:12:59,910 --> 00:12:58,560

to show you in this slide was a

365

00:13:02,230 --> 00:12:59,920

reflection of some of the things we did

366

00:13:04,230 --> 00:13:02,240

in the morning when our

367

00:13:07,430 --> 00:13:04,240

fax machine or our we call it our tips

368

00:13:09,750 --> 00:13:07,440

machine sent up the daily activities

369

00:13:11,430 --> 00:13:09,760

and we can thank greg smith and mike

370

00:13:12,790 --> 00:13:11,440

shaub for

371

00:13:14,150 --> 00:13:12,800

all the great work they did on our

372

00:13:17,030 --> 00:13:14,160

flight plan

373

00:13:18,790 --> 00:13:17,040

it was miles and miles long i think but

374

00:13:20,949 --> 00:13:18,800

we had to manage this paper every

375

00:13:22,710 --> 00:13:20,959

morning and cut it up and put it in our

376

00:13:24,470 --> 00:13:22,720

in our plan and it pretty much

377

00:13:26,870 --> 00:13:24,480

documented the activities

378

00:13:29,110 --> 00:13:26,880

that we would do that particular day

379

00:13:31,030 --> 00:13:29,120

on the second day after docking

380

00:13:32,389 --> 00:13:31,040

we had international

381

00:13:35,509 --> 00:13:32,399

dinner

382

00:13:37,750 --> 00:13:35,519

it was jean francois idea

383

00:13:38,870 --> 00:13:37,760

and

384

00:13:41,190 --> 00:13:38,880

that's why

385

00:13:45,910 --> 00:13:41,200

on the orbit we had

386

00:13:47,030 --> 00:13:45,920

food from china france america russia

387

00:13:50,150 --> 00:13:47,040

peron

388

00:13:52,069 --> 00:13:50,160

different different kinds of food on

389

00:13:53,430 --> 00:13:52,079

this picture you can see a

390

00:14:01,910 --> 00:13:53,440

chocolate

391

00:14:03,910 --> 00:14:01,920

over the months of training uh we've

392

00:14:05,670 --> 00:14:03,920

gotten to be uh great friends and we

393

00:14:07,430 --> 00:14:05,680

still are that's why uh

394

00:14:09,350 --> 00:14:07,440

we're all monitoring closely the

395

00:14:10,710 --> 00:14:09,360

activities uh up on me right now because

396

00:14:12,069 --> 00:14:10,720

they are good friends of our in addition

397

00:14:13,590 --> 00:14:12,079

to mike fall

398

00:14:17,110 --> 00:14:13,600

here you see the the two flight

399

00:14:19,990 --> 00:14:17,120

engineers are bart engineers uh

400

00:14:22,550 --> 00:14:20,000

sasha or alexander lizukin but we uh i

401  
00:14:23,829 --> 00:14:22,560  
know sasha he's a good friend of mine as

402  
00:14:25,750 --> 00:14:23,839  
a matter of fact on that uniform right

403  
00:14:28,470 --> 00:14:25,760  
now he's got a little peruvian flag that

404  
00:14:30,629 --> 00:14:28,480  
he uh he wears up there

405  
00:14:33,350 --> 00:14:30,639  
for me it's a good friend and uh this

406  
00:14:34,949 --> 00:14:33,360  
picture kind of shows it i think

407  
00:14:36,870 --> 00:14:34,959  
one of the

408  
00:14:38,069 --> 00:14:36,880  
uh the big things that we had to do was

409  
00:14:40,069 --> 00:14:38,079  
to transfer

410  
00:14:42,550 --> 00:14:40,079  
a couple of thousand kilograms of

411  
00:14:44,629 --> 00:14:42,560  
equipment to the mirror or back from the

412  
00:14:46,230 --> 00:14:44,639  
mirror and jonathan

413  
00:14:48,790 --> 00:14:46,240

jonathan and i were tasked with trying

414

00:14:50,310 --> 00:14:48,800

to keep track of what had already been

415

00:14:51,750 --> 00:14:50,320

transferred over and what needed to be

416

00:14:53,990 --> 00:14:51,760

transferred over

417

00:14:55,269 --> 00:14:54,000

or transferred back and what other room

418

00:14:56,550 --> 00:14:55,279

we had for carrying additional things

419

00:14:57,670 --> 00:14:56,560

over and this is a picture of me and

420

00:14:59,350 --> 00:14:57,680

john prince while going through the

421

00:15:03,590 --> 00:14:59,360

lists of

422

00:15:05,590 --> 00:15:03,600

of equipment and checking off items that

423

00:15:06,870 --> 00:15:05,600

had already come come back over from the

424

00:15:08,710 --> 00:15:06,880

mirror

425

00:15:12,069 --> 00:15:08,720

trying to get mike uh

426

00:15:13,509 --> 00:15:12,079

oriented to the space station and um

427

00:15:15,430 --> 00:15:13,519

let's see where we're looking at here

428

00:15:17,990 --> 00:15:15,440

we're into uh spectre as a matter of

429

00:15:20,150 --> 00:15:18,000

fact showing mike around and uh had

430

00:15:22,949 --> 00:15:20,160

about five days of overlap and it was

431

00:15:25,110 --> 00:15:22,959

very critical time uh just to get him uh

432

00:15:26,550 --> 00:15:25,120

used to his new home he kept wanting to

433

00:15:28,150 --> 00:15:26,560

go and have uh

434

00:15:29,350 --> 00:15:28,160

tea with the crew and i kept saying get

435

00:15:33,590 --> 00:15:29,360

back over here i got to show you

436

00:15:36,949 --> 00:15:35,430

as a matter of fact if i might add just

437

00:15:39,670 --> 00:15:36,959

for jerry

438

00:15:41,829 --> 00:15:39,680

he raised the notch one level up for us

439

00:15:42,949 --> 00:15:41,839

before we docked he had

440

00:15:44,790 --> 00:15:42,959

sent us

441

00:15:46,150 --> 00:15:44,800

plans of

442

00:15:47,350 --> 00:15:46,160

what he would like to do for the

443

00:15:49,590 --> 00:15:47,360

transfer

444

00:15:52,069 --> 00:15:49,600

and i think it was a really well thought

445

00:15:54,389 --> 00:15:52,079

out plan that has put mike in a very

446

00:15:56,550 --> 00:15:54,399

good status and that was that as the

447

00:15:59,189 --> 00:15:56,560

equipment came from the shuttle

448

00:16:01,910 --> 00:15:59,199

normally we would stow it temporarily in

449

00:16:03,829 --> 00:16:01,920

bags that it was transferred in in a

450

00:16:05,269 --> 00:16:03,839

place that was convenient and later

451  
00:16:07,110 --> 00:16:05,279  
after the shuttle left it would be up to

452  
00:16:09,269 --> 00:16:07,120  
the long duration crew member in this

453  
00:16:11,269 --> 00:16:09,279  
case mike to find a place to put that

454  
00:16:13,030 --> 00:16:11,279  
stuff and in this case jerry had an

455  
00:16:14,470 --> 00:16:13,040  
inventory plan already established so

456  
00:16:16,550 --> 00:16:14,480  
that while the crew was there while the

457  
00:16:19,030 --> 00:16:16,560  
shuttle was still there

458  
00:16:21,509 --> 00:16:19,040  
he was able to not only transfer it over

459  
00:16:23,509 --> 00:16:21,519  
but mike and jerry were able to handle

460  
00:16:25,590 --> 00:16:23,519  
most of that equipment and find a place

461  
00:16:28,150 --> 00:16:25,600  
to stow it permanently have it

462  
00:16:28,870 --> 00:16:28,160  
inventoried and film that inventory so

463  
00:16:30,790 --> 00:16:28,880

that

464

00:16:32,790 --> 00:16:30,800

the inventory list could come back to

465

00:16:34,870 --> 00:16:32,800

earth and that had never been attempted

466

00:16:36,550 --> 00:16:34,880

before it sounds easy to do but when

467

00:16:39,189 --> 00:16:36,560

you're talking hundreds and hundreds and

468

00:16:41,269 --> 00:16:39,199

hundreds of items that weigh up to four

469

00:16:43,910 --> 00:16:41,279

thousand pounds like ed said

470

00:16:45,910 --> 00:16:43,920

that's an awful uh daunting task yet

471

00:16:47,990 --> 00:16:45,920

jerry was so organized that it went very

472

00:16:51,030 --> 00:16:48,000

very smoothly and it left mike with a

473

00:16:52,550 --> 00:16:51,040

great status for picking up on his

474

00:16:54,550 --> 00:16:52,560

science mission

475

00:16:57,590 --> 00:16:54,560

and base blocks the containers you see

476  
00:16:59,509 --> 00:16:57,600  
that sasha has there are for food and

477  
00:17:01,990 --> 00:16:59,519  
after we eat the food out of it then we

478  
00:17:04,549 --> 00:17:02,000  
they double for trash containers and we

479  
00:17:06,549 --> 00:17:04,559  
usually put them on

480  
00:17:08,949 --> 00:17:06,559  
progress

481  
00:17:10,390 --> 00:17:08,959  
to re-enter the atmosphere and burn up

482  
00:17:12,069 --> 00:17:10,400  
in this case we're actually able to

483  
00:17:14,549 --> 00:17:12,079  
bring some of those empty ones back on

484  
00:17:18,150 --> 00:17:14,559  
shuttle and also some with a little bit

485  
00:17:20,150 --> 00:17:18,160  
of our nicer trash back on shuttle also

486  
00:17:21,270 --> 00:17:20,160  
you can see things are a bit congested

487  
00:17:24,710 --> 00:17:21,280  
and

488  
00:17:26,549 --> 00:17:24,720

that's not an all unusual view

489

00:17:29,590 --> 00:17:26,559

this is the node where

490

00:17:31,029 --> 00:17:29,600

the internal eva will take place from

491

00:17:33,430 --> 00:17:31,039

should everything be checked out and

492

00:17:35,510 --> 00:17:33,440

clearances and things like that

493

00:17:37,750 --> 00:17:35,520

if you see the red arrow down there that

494

00:17:39,909 --> 00:17:37,760

we put in place after the fire we

495

00:17:41,750 --> 00:17:39,919

decided was a good idea for the shuttle

496

00:17:44,150 --> 00:17:41,760

crew members to be able to find their

497

00:17:47,350 --> 00:17:44,160

way back to shuttle in the case of poor

498

00:17:49,430 --> 00:17:47,360

visibility so that area or that arrow

499

00:17:51,830 --> 00:17:49,440

the red arrow made out of velcro cloth

500

00:17:54,070 --> 00:17:51,840

basically uh marked the quick way back

501  
00:17:56,630 --> 00:17:54,080  
to the shuttle through chris stahl

502  
00:17:58,630 --> 00:17:56,640  
there's bass blocks straight ahead

503  
00:18:01,430 --> 00:17:58,640  
and you can't see too well inside that

504  
00:18:03,990 --> 00:18:01,440  
but if you come out of base block uh

505  
00:18:05,590 --> 00:18:04,000  
oriented properly and you dive down that

506  
00:18:07,590 --> 00:18:05,600  
spectra over that way and so you see

507  
00:18:10,070 --> 00:18:07,600  
some of the uh the ventilation duct is

508  
00:18:13,110 --> 00:18:10,080  
the large duct you see there and some of

509  
00:18:14,710 --> 00:18:13,120  
the cabling that had gone into spectre

510  
00:18:16,630 --> 00:18:14,720  
and of course that had to be

511  
00:18:18,390 --> 00:18:16,640  
disconnected the uh

512  
00:18:21,190 --> 00:18:18,400  
the vent pulled through the hatch

513  
00:18:23,430 --> 00:18:21,200

cleared and then a cover uh was put on

514

00:18:25,750 --> 00:18:23,440

one of these flat covers it's really not

515

00:18:27,430 --> 00:18:25,760

a hatch it's uh it's a free-floating

516

00:18:30,310 --> 00:18:27,440

plug basically

517

00:18:33,510 --> 00:18:30,320

that was then put on over that module

518

00:18:36,549 --> 00:18:33,520

and uh the minute it came close to uh

519

00:18:38,230 --> 00:18:36,559

ceiling it was a pretty solid uh clamp

520

00:18:39,590 --> 00:18:38,240

down due to the differential air

521

00:18:41,510 --> 00:18:39,600

pressure

522

00:18:44,230 --> 00:18:41,520

the future eva we're looking at taking

523

00:18:46,950 --> 00:18:44,240

this more conical cover

524

00:18:47,909 --> 00:18:46,960

and remove a section of that and add

525

00:18:50,150 --> 00:18:47,919

some

526

00:18:52,310 --> 00:18:50,160

hermetically sealed pass-throughs to

527

00:18:54,789 --> 00:18:52,320

that section that charlie's pointing out

528

00:18:57,270 --> 00:18:54,799

and then reconnect some cables that come

529

00:18:59,990 --> 00:18:57,280

from inside the module

530

00:19:03,590 --> 00:19:00,000

that originated the solar batteries

531

00:19:07,909 --> 00:19:05,430

anything else charlie go ahead i guess

532

00:19:09,270 --> 00:19:07,919

did we cover all the modules we could

533

00:19:11,909 --> 00:19:09,280

point out

534

00:19:14,870 --> 00:19:11,919

this should be per road up here correct

535

00:19:16,470 --> 00:19:14,880

and covant ii off this way and uh we

536

00:19:17,350 --> 00:19:16,480

already mentioned chrystal down here and

537

00:19:19,190 --> 00:19:17,360

we're

538

00:19:21,909 --> 00:19:19,200

taking the picture eileen you took it

539

00:19:24,070 --> 00:19:21,919

from inside the soyuz

540

00:19:26,230 --> 00:19:24,080

and you might i might also add this is a

541

00:19:27,990 --> 00:19:26,240

very wide angle view here so you're

542

00:19:29,669 --> 00:19:28,000

you're getting a big distortion of the

543

00:19:31,510 --> 00:19:29,679

reality this is uh

544

00:19:33,750 --> 00:19:31,520

you know kind of a spherical uh

545

00:19:35,190 --> 00:19:33,760

structure with all these hatches uh 90

546

00:19:37,190 --> 00:19:35,200

degrees apart

547

00:19:40,789 --> 00:19:37,200

this is a view of us it's actually

548

00:19:42,310 --> 00:19:40,799

oriented sideways it's of uh me jumping

549

00:19:44,150 --> 00:19:42,320

saw and elena sitting on the wall

550

00:19:45,830 --> 00:19:44,160

actually next to the bio rack which is

551

00:19:47,430 --> 00:19:45,840

the thing at the bottom of the picture

552

00:19:48,950 --> 00:19:47,440

you can see uh things sticking out at

553

00:19:50,710 --> 00:19:48,960

the bottom that's actually the glove box

554

00:19:52,310 --> 00:19:50,720

where you put your hands into and work

555

00:19:54,150 --> 00:19:52,320

with biological experiments which we

556

00:19:56,230 --> 00:19:54,160

carried up we carried about

557

00:19:58,390 --> 00:19:56,240

11 different biological experiments

558

00:20:01,110 --> 00:19:58,400

which we did using this facility at the

559

00:20:02,150 --> 00:20:01,120

bottom uh it included experiments on

560

00:20:04,710 --> 00:20:02,160

plants

561

00:20:06,789 --> 00:20:04,720

white blood cells single-celled animals

562

00:20:07,990 --> 00:20:06,799

and tadpoles of all things

563

00:20:09,990 --> 00:20:08,000

and

564

00:20:12,870 --> 00:20:10,000

you can realize how big is a space hub

565

00:20:15,909 --> 00:20:12,880

as elena said it was the two modules put

566

00:20:18,390 --> 00:20:15,919

together it was a very friendly uh

567

00:20:20,950 --> 00:20:18,400

module to operate and

568

00:20:23,590 --> 00:20:20,960

we had the soft storage bags you can see

569

00:20:25,990 --> 00:20:23,600

the gold bags at the bottom and we had

570

00:20:28,710 --> 00:20:26,000

also hard lockers for

571

00:20:30,230 --> 00:20:28,720

for storage and uh

572

00:20:31,830 --> 00:20:30,240

what you can see here is the what we

573

00:20:33,909 --> 00:20:31,840

used to call the space hub crew versus

574

00:20:36,470 --> 00:20:33,919

the orbiter crew because anna ed and i

575

00:20:39,270 --> 00:20:36,480

we spent more time in space hub than in

576  
00:20:41,270 --> 00:20:39,280  
india any other places in the complex we

577  
00:20:42,710 --> 00:20:41,280  
even slept in space hub that was very

578  
00:20:43,990 --> 00:20:42,720  
comfortable

579  
00:20:45,830 --> 00:20:44,000  
and

580  
00:20:47,430 --> 00:20:45,840  
that was a good module for both

581  
00:20:49,430 --> 00:20:47,440  
scientific experiments and also

582  
00:20:50,630 --> 00:20:49,440  
logistics transport

583  
00:20:52,230 --> 00:20:50,640  
although

584  
00:20:54,070 --> 00:20:52,240  
the the main

585  
00:20:56,470 --> 00:20:54,080  
or most of the experiments we had were

586  
00:20:57,750 --> 00:20:56,480  
in the biorack we had a lot of other

587  
00:20:59,350 --> 00:20:57,760  
experiments in here you see a

588  
00:21:00,630 --> 00:20:59,360

representation of one

589

00:21:02,470 --> 00:21:00,640

i'm actually

590

00:21:04,549 --> 00:21:02,480

using a video camera almost as a

591

00:21:07,510 --> 00:21:04,559

microscope videotaping the growth of

592

00:21:10,149 --> 00:21:07,520

some spores on a sample on a radiation

593

00:21:11,990 --> 00:21:10,159

experiment we had rmd

594

00:21:14,070 --> 00:21:12,000

well this is still the space hub crew

595

00:21:16,470 --> 00:21:14,080

working together on uh

596

00:21:19,270 --> 00:21:16,480

called the samples of barrack that we

597

00:21:20,149 --> 00:21:19,280

have stored in a passive thermal control

598

00:21:21,750 --> 00:21:20,159

unit

599

00:21:23,830 --> 00:21:21,760

that could keep

600

00:21:26,230 --> 00:21:23,840

samples to minus four degrees for

601  
00:21:27,990 --> 00:21:26,240  
several weeks without any

602  
00:21:28,950 --> 00:21:28,000  
power just passively

603  
00:21:31,510 --> 00:21:28,960  
and

604  
00:21:33,029 --> 00:21:31,520  
we had a lot of mini transfer to do of

605  
00:21:34,390 --> 00:21:33,039  
those containers of the various

606  
00:21:36,310 --> 00:21:34,400  
experiments from a freezer to a

607  
00:21:38,310 --> 00:21:36,320  
refrigerator to a passive control

608  
00:21:39,669 --> 00:21:38,320  
terminal unit to the glovebox or

609  
00:21:42,789 --> 00:21:39,679  
incubators

610  
00:21:44,950 --> 00:21:42,799  
and we had about we spent about 40 hours

611  
00:21:46,710 --> 00:21:44,960  
crew time on orbit on these barrack

612  
00:21:47,510 --> 00:21:46,720  
experiments

613  
00:21:49,909 --> 00:21:47,520

well

614

00:21:52,149 --> 00:21:49,919

it's this is uh thinking about getting

615

00:21:56,149 --> 00:21:52,159

ready to go and leave the mirror which

616

00:21:58,390 --> 00:21:56,159

was a very quiet affair for us

617

00:22:00,149 --> 00:21:58,400

we scurried around as i remember we did

618

00:22:03,190 --> 00:22:00,159

something that i thought was really

619

00:22:04,710 --> 00:22:03,200

new and nice uh prior to leaving

620

00:22:05,909 --> 00:22:04,720

we of course had a little uh get

621

00:22:07,990 --> 00:22:05,919

together

622

00:22:10,630 --> 00:22:08,000

for a tv downlink

623

00:22:13,510 --> 00:22:10,640

with the control center and for folks

624

00:22:15,110 --> 00:22:13,520

here on the ground but we also asked to

625

00:22:17,190 --> 00:22:15,120

have an opportunity to speak with a lot

626

00:22:19,830 --> 00:22:17,200

of the controllers directly on the loops

627

00:22:21,830 --> 00:22:19,840

in the control center and it's uh it's

628

00:22:22,710 --> 00:22:21,840

amazing

629

00:22:24,070 --> 00:22:22,720

how

630

00:22:26,789 --> 00:22:24,080

nice it is to have the opportunity to

631

00:22:28,390 --> 00:22:26,799

hear folks voices when you're in space

632

00:22:30,390 --> 00:22:28,400

familiar voices people that you've been

633

00:22:33,029 --> 00:22:30,400

working with and that have put a lot of

634

00:22:35,590 --> 00:22:33,039

effort into this mission so we had uh

635

00:22:37,909 --> 00:22:35,600

helen dutton payload officer we had

636

00:22:39,830 --> 00:22:37,919

greg smith and i'll probably forget all

637

00:22:42,230 --> 00:22:39,840

of them that got on the loops but many

638

00:22:43,830 --> 00:22:42,240

people from the control center uh the

639

00:22:45,750 --> 00:22:43,840

flight directors all got on the loops

640

00:22:48,070 --> 00:22:45,760

with us and said a few words and it was

641

00:22:50,070 --> 00:22:48,080

really a pleasant experience for us and

642

00:22:51,350 --> 00:22:50,080

and uh it's just really nice to be able

643

00:22:53,110 --> 00:22:51,360

to hear the voices of the people that

644

00:22:55,990 --> 00:22:53,120

are putting so much work into an effort

645

00:22:58,310 --> 00:22:56,000

like this but in any event we

646

00:23:00,470 --> 00:22:58,320

we had a little uh ceremony like that to

647

00:23:01,750 --> 00:23:00,480

say goodbye to the mayor crew to say

648

00:23:03,270 --> 00:23:01,760

thanks to all the people on the ground

649

00:23:05,270 --> 00:23:03,280

that did so much great work to make this

650

00:23:07,750 --> 00:23:05,280

such a successful flight and then it got

651

00:23:09,510 --> 00:23:07,760

real quiet and it was time to

652

00:23:10,950 --> 00:23:09,520

to make sure jerry got on the right side

653

00:23:15,510 --> 00:23:10,960

of the hatch but

654

00:23:20,070 --> 00:23:17,350

elena didn't want to leave she wanted to

655

00:23:21,750 --> 00:23:20,080

stay with her friends on the mirror and

656

00:23:24,310 --> 00:23:21,760

mike was of course ready to get on with

657

00:23:26,149 --> 00:23:24,320

his work so uh we finally got the hatch

658

00:23:28,310 --> 00:23:26,159

closed and it was very very quiet and uh

659

00:23:30,470 --> 00:23:28,320

we were ready to to get along with the

660

00:23:32,870 --> 00:23:30,480

the undocking process

661

00:23:34,789 --> 00:23:32,880

uh a view basically another big fisheye

662

00:23:37,029 --> 00:23:34,799

view but you can see spectre there very

663

00:23:39,510 --> 00:23:37,039

well spectre's uh very good thanks

664

00:23:41,510 --> 00:23:39,520

charlie spectre's actually just i think

665

00:23:43,669 --> 00:23:41,520

the most beautiful graceful looking

666

00:23:46,549 --> 00:23:43,679

module it's got these uh four solar

667

00:23:48,310 --> 00:23:46,559

panels of which you can see two here

668

00:23:50,070 --> 00:23:48,320

and the one that uh

669

00:23:51,590 --> 00:23:50,080

that the progress collided with is the

670

00:23:54,149 --> 00:23:51,600

one opposite

671

00:23:55,510 --> 00:23:54,159

inboard uh so it'd be sticking out back

672

00:23:57,510 --> 00:23:55,520

that way the one you see here is the

673

00:23:59,750 --> 00:23:57,520

equivalent solar panel

674

00:24:02,230 --> 00:23:59,760

and the radiator is either the radiator

675

00:24:04,630 --> 00:24:02,240

you see here or one on the other side

676

00:24:05,750 --> 00:24:04,640

that got dented in uh during the

677

00:24:08,149 --> 00:24:05,760

collision

678

00:24:09,750 --> 00:24:08,159

um but it's a spectacular view in

679

00:24:12,070 --> 00:24:09,760

general in these uh

680

00:24:13,510 --> 00:24:12,080

the solar panels for example on uh

681

00:24:15,990 --> 00:24:13,520

spectra are just

682

00:24:18,230 --> 00:24:16,000

made of gold metallic material and they

683

00:24:19,830 --> 00:24:18,240

just glisten in the sun and it's uh it's

684

00:24:22,390 --> 00:24:19,840

really a spectacular sight just looking

685

00:24:24,549 --> 00:24:22,400

at the sprawling complex

686

00:24:26,470 --> 00:24:24,559

before we leave this slide i wanted to

687

00:24:28,789 --> 00:24:26,480

make one other comment a memory that was

688

00:24:30,470 --> 00:24:28,799

particularly special to me

689

00:24:32,710 --> 00:24:30,480

on the night of flight day seven we

690

00:24:34,549 --> 00:24:32,720

closed the hatch and we stayed docked

691

00:24:36,470 --> 00:24:34,559

while we slept and then we undocked the

692

00:24:38,470 --> 00:24:36,480

morning of flight day eight well that

693

00:24:40,310 --> 00:24:38,480

evening i was able to see we were all

694

00:24:42,070 --> 00:24:40,320

able to see in the window the overhead

695

00:24:43,990 --> 00:24:42,080

window out of the shuttle which is where

696

00:24:46,070 --> 00:24:44,000

this photo was taken

697

00:24:47,909 --> 00:24:46,080

into the window and the base block that

698

00:24:50,870 --> 00:24:47,919

charlie's pointing to here

699

00:24:52,549 --> 00:24:50,880

which was uh sasha's room uh mike was in

700

00:24:54,390 --> 00:24:52,559

the window waving to us

701  
00:24:56,549 --> 00:24:54,400  
and the cosmonauts were in the window

702  
00:24:57,990 --> 00:24:56,559  
waving to us and i thought that was a

703  
00:25:01,590 --> 00:24:58,000  
pretty special our

704  
00:25:04,390 --> 00:25:01,600  
last chance to say a silent goodbye

705  
00:25:05,990 --> 00:25:04,400  
next slide is on the undocking

706  
00:25:08,549 --> 00:25:06,000  
we woke up the morning of flight day

707  
00:25:10,950 --> 00:25:08,559  
eight we had very little time to brush

708  
00:25:12,149 --> 00:25:10,960  
our teeth and we had to get on with the

709  
00:25:13,669 --> 00:25:12,159  
undocking

710  
00:25:14,950 --> 00:25:13,679  
checklist

711  
00:25:17,269 --> 00:25:14,960  
and one thing that was different about

712  
00:25:19,269 --> 00:25:17,279  
this undocking from the previous five

713  
00:25:21,350 --> 00:25:19,279

shuttle mirror flights was that we did

714

00:25:23,110 --> 00:25:21,360

not do a fly around we didn't get as

715

00:25:25,029 --> 00:25:23,120

many uh pretty pictures as we would have

716

00:25:27,269 --> 00:25:25,039

liked but we were able to do

717

00:25:28,950 --> 00:25:27,279

a very successful test of the european

718

00:25:31,669 --> 00:25:28,960

space agency's

719

00:25:32,950 --> 00:25:31,679

proxops system that they plan on using

720

00:25:34,950 --> 00:25:32,960

on their

721

00:25:36,710 --> 00:25:34,960

orbital transfer vehicle for

722

00:25:38,390 --> 00:25:36,720

international space station and it

723

00:25:40,630 --> 00:25:38,400

involved a laser

724

00:25:42,710 --> 00:25:40,640

the global positioning system and some

725

00:25:44,070 --> 00:25:42,720

reflectors that you can see actually

726

00:25:46,149 --> 00:25:44,080

they're very difficult to see here but

727

00:25:48,230 --> 00:25:46,159

they're right around that docking ring

728

00:25:51,510 --> 00:25:48,240

we flew straight down uh the radius

729

00:25:53,430 --> 00:25:51,520

specter towards the earth for 3 300 feet

730

00:25:55,350 --> 00:25:53,440

and had a again well he had a very

731

00:25:56,310 --> 00:25:55,360

successful test to that

732

00:25:58,230 --> 00:25:56,320

well we'll

733

00:25:59,909 --> 00:25:58,240

take a quick moment to show you some

734

00:26:01,669 --> 00:25:59,919

views of the earth

735

00:26:04,149 --> 00:26:01,679

each of us of course when we're on orbit

736

00:26:06,870 --> 00:26:04,159

we like to look for where we came from

737

00:26:08,390 --> 00:26:06,880

and this is my hometown right up here

738

00:26:11,029 --> 00:26:08,400

about where that cloud is hudson

739

00:26:12,950 --> 00:26:11,039

massachusetts uh cape cod stands out

740

00:26:15,430 --> 00:26:12,960

like no other point on the earth as far

741

00:26:16,870 --> 00:26:15,440

as ease of recognition

742

00:26:18,549 --> 00:26:16,880

you have

743

00:26:20,310 --> 00:26:18,559

the cape cod bay and buzzards bay

744

00:26:21,510 --> 00:26:20,320

martha's vineyard island and

745

00:26:22,950 --> 00:26:21,520

uh

746

00:26:25,190 --> 00:26:22,960

yeah

747

00:26:27,669 --> 00:26:25,200

i've lost track of it in any event

748

00:26:29,269 --> 00:26:27,679

you've got rhode island boston and the

749

00:26:31,430 --> 00:26:29,279

cape and

750

00:26:33,350 --> 00:26:31,440

just a wonderful view of the state of

751  
00:26:35,029 --> 00:26:33,360  
massachusetts

752  
00:26:37,669 --> 00:26:35,039  
there was an evening when

753  
00:26:38,710 --> 00:26:37,679  
we flew over this same area

754  
00:26:40,549 --> 00:26:38,720  
late

755  
00:26:42,710 --> 00:26:40,559  
oh it was probably actually three or

756  
00:26:44,870 --> 00:26:42,720  
four in the morning houston time and we

757  
00:26:47,110 --> 00:26:44,880  
could actually see it was so clear in

758  
00:26:48,630 --> 00:26:47,120  
the east half of the u.s that we could

759  
00:26:50,789 --> 00:26:48,640  
see from just

760  
00:26:52,470 --> 00:26:50,799  
about the same position looking back to

761  
00:26:54,149 --> 00:26:52,480  
the southwest we could see new york

762  
00:26:56,470 --> 00:26:54,159  
philadelphia

763  
00:26:57,669 --> 00:26:56,480

washington dc all the way to the tip of

764

00:26:59,830 --> 00:26:57,679

florida

765

00:27:01,830 --> 00:26:59,840

the entire peninsula and the coastline

766

00:27:03,430 --> 00:27:01,840

was lit up and you could see all the way

767

00:27:06,549 --> 00:27:03,440

the cities of

768

00:27:09,510 --> 00:27:06,559

memphis atlanta st louis

769

00:27:10,870 --> 00:27:09,520

all the way back up towards boston and

770

00:27:12,230 --> 00:27:10,880

to have a clear night in the eastern

771

00:27:13,909 --> 00:27:12,240

half of the u.s like that was a real

772

00:27:16,070 --> 00:27:13,919

treat

773

00:27:17,909 --> 00:27:16,080

michigan if you spot it there you kind

774

00:27:19,350 --> 00:27:17,919

of have to turn

775

00:27:20,710 --> 00:27:19,360

sideways and you see the hand of

776

00:27:23,190 --> 00:27:20,720

michigan

777

00:27:25,110 --> 00:27:23,200

and charlie can you oh laser great i

778

00:27:28,549 --> 00:27:25,120

won't keep up with it

779

00:27:30,390 --> 00:27:28,559

get in trouble in your home states here

780

00:27:32,390 --> 00:27:30,400

there's michigan here you can see the

781

00:27:35,669 --> 00:27:32,400

the hand print if you turn sideways

782

00:27:37,350 --> 00:27:35,679

everybody got that

783

00:27:39,190 --> 00:27:37,360

just like that you lay your hand this

784

00:27:41,029 --> 00:27:39,200

way and you got michigan and that's the

785

00:27:43,269 --> 00:27:41,039

way all michiganders talk they all say

786

00:27:44,549 --> 00:27:43,279

okay you know you go on your hand and

787

00:27:46,310 --> 00:27:44,559

you say all right you take the freeway

788

00:27:47,430 --> 00:27:46,320

up here and you go over to the mackinaw

789

00:27:49,269 --> 00:27:47,440

bridge and then you're in the upper

790

00:27:51,669 --> 00:27:49,279

peninsula here

791

00:27:55,510 --> 00:27:51,679

and geography 101 of course there's lake

792

00:27:58,070 --> 00:27:55,520

michigan chicago down in this area

793

00:28:00,070 --> 00:27:58,080

traverse city beautiful spot mackinac

794

00:28:02,149 --> 00:28:00,080

island as pretty as it gets

795

00:28:05,430 --> 00:28:02,159

and detroit's down in this area lake

796

00:28:07,590 --> 00:28:05,440

sinclair connecting uh lake huron here

797

00:28:09,909 --> 00:28:07,600

lake superior one of the biggest lakes

798

00:28:11,830 --> 00:28:09,919

in the world up this way this freshwater

799

00:28:13,990 --> 00:28:11,840

uh mass that you're looking at here all

800

00:28:16,470 --> 00:28:14,000

the great lakes is about uh i guess the

801  
00:28:19,029 --> 00:28:16,480  
second largest source of fresh water

802  
00:28:22,070 --> 00:28:19,039  
in the world and it just stands out and

803  
00:28:24,230 --> 00:28:22,080  
then you get down here to lake erie

804  
00:28:25,669 --> 00:28:24,240  
and lake ontario niagara falls right

805  
00:28:27,269 --> 00:28:25,679  
there

806  
00:28:29,269 --> 00:28:27,279  
so it's pretty spectacular you got all

807  
00:28:31,269 --> 00:28:29,279  
the canadian cities here i guess about 8

808  
00:28:32,710 --> 00:28:31,279  
million canadians along the shores and

809  
00:28:34,310 --> 00:28:32,720  
30 some million

810  
00:28:36,310 --> 00:28:34,320  
americans along the shores of the great

811  
00:28:39,269 --> 00:28:36,320  
lakes here and this again is pretty

812  
00:28:42,549 --> 00:28:39,279  
unusual to have such clarity and having

813  
00:28:45,350 --> 00:28:42,559

been up 132 days i would say that when

814

00:28:46,789 --> 00:28:45,360

shuttle was docked and during the return

815

00:28:48,230 --> 00:28:46,799

on shuttle we had some of the best

816

00:28:49,190 --> 00:28:48,240

weather over the united states that i

817

00:28:52,630 --> 00:28:49,200

had seen

818

00:28:58,630 --> 00:28:57,190

corsica the most famous french island

819

00:29:00,549 --> 00:28:58,640

as you can see it's

820

00:29:02,789 --> 00:29:00,559

we could call it the thumbs up island

821

00:29:06,070 --> 00:29:02,799

because there is a finger pointing up

822

00:29:08,710 --> 00:29:06,080

it's called the the island of beauty

823

00:29:15,430 --> 00:29:08,720

this is where napoleon bonaparte was

824

00:29:20,710 --> 00:29:17,070

there is about

825

00:29:24,149 --> 00:29:20,720

250 000 people living there and most

826

00:29:26,789 --> 00:29:24,159

this is kind of our our hawaii islands

827

00:29:28,470 --> 00:29:26,799

just one hour flight from paris

828

00:29:31,269 --> 00:29:28,480

and many french are going there every

829

00:29:34,149 --> 00:29:31,279

summer for the vacation it uh

830

00:29:36,070 --> 00:29:34,159

the population is multiplied by 10 about

831

00:29:37,750 --> 00:29:36,080

in the summer time because it's always

832

00:29:40,230 --> 00:29:37,760

clear like you see no clouds and there

833

00:29:43,190 --> 00:29:40,240

are a lot a lot of little creeks that

834

00:29:45,750 --> 00:29:43,200

you can consider your private creek for

835

00:29:47,190 --> 00:29:45,760

bathing in the sea

836

00:29:48,789 --> 00:29:47,200

well this picture is kind of special to

837

00:29:49,990 --> 00:29:48,799

me um

838

00:29:52,870 --> 00:29:50,000

even though i grew up in california i

839

00:29:54,870 --> 00:29:52,880

was born in lima peru and

840

00:29:56,310 --> 00:29:54,880

that's the town of lima right right in

841

00:29:57,830 --> 00:29:56,320

this area here

842

00:29:59,430 --> 00:29:57,840

typically it's always clouded over so

843

00:30:00,950 --> 00:29:59,440

they told me uh

844

00:30:03,269 --> 00:30:00,960

i probably wouldn't be able to get this

845

00:30:05,269 --> 00:30:03,279

shot nobody's been able to get it before

846

00:30:07,669 --> 00:30:05,279

additionally all we had were night

847

00:30:08,470 --> 00:30:07,679

passes over lima during our waking hour

848

00:30:10,230 --> 00:30:08,480

so

849

00:30:12,070 --> 00:30:10,240

i actually have to stay up one night and

850

00:30:14,070 --> 00:30:12,080

take this picture just a little bit

851  
00:30:16,070 --> 00:30:14,080  
because it seemed like one hour after

852  
00:30:19,190 --> 00:30:16,080  
bedtime every day was when we passed

853  
00:30:21,190 --> 00:30:19,200  
over the west coast of peru

854  
00:30:22,710 --> 00:30:21,200  
but you can see

855  
00:30:24,389 --> 00:30:22,720  
from the coastline you had pretty

856  
00:30:26,310 --> 00:30:24,399  
quickly you get right into the andes and

857  
00:30:28,310 --> 00:30:26,320  
the ground rises pretty steeply to the

858  
00:30:30,389 --> 00:30:28,320  
east

859  
00:30:32,070 --> 00:30:30,399  
this is the island of oahu in hawaii it

860  
00:30:34,830 --> 00:30:32,080  
looks nothing like a hand or fingers or

861  
00:30:38,950 --> 00:30:37,350  
that a

862  
00:30:40,389 --> 00:30:38,960  
beautiful place i was lucky enough to

863  
00:30:45,669 --> 00:30:40,399

get to live there for three years along

864

00:30:49,430 --> 00:30:46,950

at different times but he lived there

865

00:30:51,269 --> 00:30:49,440

too this is the city of honolulu right

866

00:30:53,190 --> 00:30:51,279

here it's really one of the prettiest

867

00:30:54,950 --> 00:30:53,200

places on earth i think

868

00:30:56,630 --> 00:30:54,960

you can see the runway at the airport

869

00:30:58,789 --> 00:30:56,640

there which is a big runway constructed

870

00:31:01,430 --> 00:30:58,799

out of coral which they

871

00:31:03,029 --> 00:31:01,440

dug up off the beaches out here

872

00:31:05,669 --> 00:31:03,039

i lived right about there you can see my

873

00:31:07,669 --> 00:31:05,679

apartment if you look very carefully

874

00:31:09,350 --> 00:31:07,679

there's a small airfield up here where i

875

00:31:11,190 --> 00:31:09,360

used to fly small airplanes off this

876  
00:31:15,269 --> 00:31:11,200  
coast watch whales which would

877  
00:31:21,190 --> 00:31:18,549  
this is a volga

878  
00:31:24,070 --> 00:31:21,200  
vulgar river enters the

879  
00:31:25,990 --> 00:31:24,080  
caspien dispoga delta

880  
00:31:29,669 --> 00:31:26,000  
it's caspian

881  
00:31:29,679 --> 00:31:33,990  
world's largest inland sea

882  
00:31:37,830 --> 00:31:35,830  
at the volga

883  
00:31:39,750 --> 00:31:37,840  
i think it's maybe

884  
00:31:41,110 --> 00:31:39,760  
largest river in the

885  
00:31:41,909 --> 00:31:41,120  
whole world

886  
00:31:44,710 --> 00:31:41,919  
and

887  
00:31:47,190 --> 00:31:44,720  
principle its

888  
00:31:48,870 --> 00:31:47,200

waterway

889

00:31:53,990 --> 00:31:48,880

of russia

890

00:31:55,350 --> 00:31:54,000

on the north part of caspian it's oral

891

00:31:57,110 --> 00:31:55,360

other events

892

00:31:59,350 --> 00:31:57,120

the dimension

893

00:32:02,230 --> 00:31:59,360

the casper

894

00:32:04,549 --> 00:32:02,240

are 70 150 miles

895

00:32:06,389 --> 00:32:04,559

from north to south

896

00:32:08,310 --> 00:32:06,399

and uh maybe

897

00:32:09,350 --> 00:32:08,320

200 miles

898

00:32:11,750 --> 00:32:09,360

from

899

00:32:13,590 --> 00:32:11,760

west to east

900

00:32:17,190 --> 00:32:13,600

onikatan island

901  
00:32:21,350 --> 00:32:17,200  
is one of the several volcanoes

902  
00:32:22,950 --> 00:32:21,360  
this is russian kurillus island

903  
00:32:24,950 --> 00:32:22,960  
chain

904  
00:32:27,350 --> 00:32:24,960  
unakatan has two

905  
00:32:29,430 --> 00:32:27,360  
volcanoes

906  
00:32:32,230 --> 00:32:29,440  
and

907  
00:32:38,389 --> 00:32:34,190  
last erupt in

908  
00:32:42,870 --> 00:32:38,399  
1952 years and other

909  
00:32:46,389 --> 00:32:43,909  
some of the

910  
00:32:48,230 --> 00:32:46,399  
most historically interesting places on

911  
00:32:49,590 --> 00:32:48,240  
earth in my opinion

912  
00:32:51,350 --> 00:32:49,600  
for us were the passes over the

913  
00:32:53,430 --> 00:32:51,360

mediterranean sea

914

00:32:54,830 --> 00:32:53,440

and in this picture

915

00:32:58,070 --> 00:32:54,840

we're looking

916

00:33:00,710 --> 00:32:58,080

west and we see the islands of greece

917

00:33:02,070 --> 00:33:00,720

and if you look closely to the north

918

00:33:04,710 --> 00:33:02,080

actually it would be to the south in

919

00:33:07,190 --> 00:33:04,720

this picture you see africa

920

00:33:09,350 --> 00:33:07,200

we also have turkey at the bottom

921

00:33:12,149 --> 00:33:09,360

and the same amorou

922

00:33:14,470 --> 00:33:12,159

which extends into the black sea

923

00:33:16,389 --> 00:33:14,480

and off close to the horizon is italy

924

00:33:18,789 --> 00:33:16,399

but we can't see that very well because

925

00:33:20,470 --> 00:33:18,799

it's under clouds as well as

926  
00:33:22,310 --> 00:33:20,480  
yugoslavia

927  
00:33:25,909 --> 00:33:22,320  
a couple things that are interesting

928  
00:33:28,230 --> 00:33:25,919  
about greece if you remember from your

929  
00:33:30,310 --> 00:33:28,240  
history classes in grammar school

930  
00:33:33,509 --> 00:33:30,320  
were the wars between

931  
00:33:34,549 --> 00:33:33,519  
spartan and sparta and athens

932  
00:33:36,470 --> 00:33:34,559  
so

933  
00:33:38,710 --> 00:33:36,480  
i looked for where these cities are in

934  
00:33:41,590 --> 00:33:38,720  
athens is right here

935  
00:33:43,029 --> 00:33:41,600  
and they were a seafaring civilization

936  
00:33:45,110 --> 00:33:43,039  
and sparta

937  
00:33:46,789 --> 00:33:45,120  
was just a little bit farther down right

938  
00:33:49,830 --> 00:33:46,799

in here and closed by land and they were

939

00:33:51,509 --> 00:33:49,840

the land warriors

940

00:33:54,549 --> 00:33:51,519

we had one passover greece at night and

941

00:33:56,549 --> 00:33:54,559

you could see a lot of small cities

942

00:33:58,549 --> 00:33:56,559

scattered all around the peninsula but

943

00:34:00,710 --> 00:33:58,559

again just looking down and the many

944

00:34:03,430 --> 00:34:00,720

passes we that we had over this area as

945

00:34:04,789 --> 00:34:03,440

well as the middle east are just

946

00:34:06,389 --> 00:34:04,799

mind-boggling when you think about all

947

00:34:07,750 --> 00:34:06,399

the history that has gone on on the

948

00:34:10,230 --> 00:34:07,760

earth below

949

00:34:12,790 --> 00:34:10,240

oh this uh comet hail bop which all all

950

00:34:14,069 --> 00:34:12,800

of you i'm sure are familiar with was

951  
00:34:15,430 --> 00:34:14,079  
getting farther and farther away from

952  
00:34:17,510 --> 00:34:15,440  
the sun and i'm not even sure if it's

953  
00:34:19,510 --> 00:34:17,520  
still visible now but we were able to

954  
00:34:21,510 --> 00:34:19,520  
take a picture of it from orbit during

955  
00:34:22,389 --> 00:34:21,520  
the time that we were docked the orbiter

956  
00:34:24,069 --> 00:34:22,399  
was in

957  
00:34:26,310 --> 00:34:24,079  
attitude control called inertial

958  
00:34:28,629 --> 00:34:26,320  
attitude hole which meant that we were

959  
00:34:30,790 --> 00:34:28,639  
relatively stable to the background

960  
00:34:33,190 --> 00:34:30,800  
stars and we took advantage of that

961  
00:34:34,710 --> 00:34:33,200  
opportunity to mount a camera just after

962  
00:34:36,629 --> 00:34:34,720  
sunset

963  
00:34:39,430 --> 00:34:36,639

the comet was in the northwest uh

964

00:34:41,909 --> 00:34:39,440

portion of the sky relative to the earth

965

00:34:43,510 --> 00:34:41,919

and this was an eight second exposure we

966

00:34:45,669 --> 00:34:43,520

took everything from

967

00:34:47,589 --> 00:34:45,679

a one second exposure up to

968

00:34:49,270 --> 00:34:47,599

a 30 second exposure and this one came

969

00:34:51,109 --> 00:34:49,280

out the best and you can just barely see

970

00:34:52,149 --> 00:34:51,119

the tail the second tail of the comet in

971

00:34:54,470 --> 00:34:52,159

this picture

972

00:34:56,069 --> 00:34:54,480

a little bit of a structure of mirror is

973

00:34:57,829 --> 00:34:56,079

in the way and of course the earth which

974

00:34:59,670 --> 00:34:57,839

was rotating below has come come out a

975

00:35:01,030 --> 00:34:59,680

little bit smeared in this picture but i

976

00:35:03,670 --> 00:35:01,040

think it's really special because you

977

00:35:05,030 --> 00:35:03,680

can see the earth's horizon

978

00:35:06,870 --> 00:35:05,040

or should i say the earth the higher

979

00:35:08,950 --> 00:35:06,880

levels of the atmosphere

980

00:35:10,870 --> 00:35:08,960

well it's a time to

981

00:35:13,829 --> 00:35:10,880

put everything back away for deorbit

982

00:35:15,349 --> 00:35:13,839

prep and we got back in our lessons

983

00:35:17,750 --> 00:35:15,359

and

984

00:35:20,470 --> 00:35:17,760

prepared for deorbit we were fortunate

985

00:35:22,150 --> 00:35:20,480

to be launched on time and landed almost

986

00:35:24,870 --> 00:35:22,160

on time we had one

987

00:35:27,190 --> 00:35:24,880

rev delay to watch for the weather but

988

00:35:29,349 --> 00:35:27,200

we came in on the expected day to the

989

00:35:30,630 --> 00:35:29,359

kennedy space center

990

00:35:32,230 --> 00:35:30,640

we had a little bit of weather to deal

991

00:35:34,950 --> 00:35:32,240

with as i mentioned but nothing

992

00:35:37,030 --> 00:35:34,960

extraordinary and a great team that put

993

00:35:38,870 --> 00:35:37,040

atlantis together for us

994

00:35:40,550 --> 00:35:38,880

we hope we had brought it back in just

995

00:35:42,230 --> 00:35:40,560

as good of shape it was amazing that

996

00:35:44,230 --> 00:35:42,240

this entire flight

997

00:35:46,150 --> 00:35:44,240

there were zero anomalies within

998

00:35:47,670 --> 00:35:46,160

atlantis and it really speaks well of

999

00:35:49,670 --> 00:35:47,680

the whole nasa team

1000

00:35:52,630 --> 00:35:49,680

uh it is a pure pleasure to be able to

1001  
00:35:54,950 --> 00:35:52,640  
fly a vehicle like this when it goes

1002  
00:35:57,109 --> 00:35:54,960  
perfectly well as it did for us i think

1003  
00:35:59,430 --> 00:35:57,119  
we had maybe one transducer on entry

1004  
00:36:00,870 --> 00:35:59,440  
that was kind of flipping a bit

1005  
00:36:03,510 --> 00:36:00,880  
but other than that we can't really

1006  
00:36:04,470 --> 00:36:03,520  
speak to anything in an anomaly fashion

1007  
00:36:09,670 --> 00:36:04,480  
that

1008  
00:36:12,630 --> 00:36:09,680  
work by the whole team

1009  
00:36:14,550 --> 00:36:12,640  
well to deorbit we fire the engines in

1010  
00:36:16,150 --> 00:36:14,560  
the back to slow us down

1011  
00:36:17,670 --> 00:36:16,160  
and drop us back down into the

1012  
00:36:19,910 --> 00:36:17,680  
atmosphere and this picture was actually

1013  
00:36:22,550 --> 00:36:19,920

taken not during the deorbit burn for

1014

00:36:23,829 --> 00:36:22,560

anyone who's thinking about it because

1015

00:36:25,670 --> 00:36:23,839

when we do fire the engines for the

1016

00:36:27,589 --> 00:36:25,680

deorbit burns the payload bay doors are

1017

00:36:29,030 --> 00:36:27,599

closed and you can't see this so this

1018

00:36:30,390 --> 00:36:29,040

picture was actually taken earlier but

1019

00:36:31,750 --> 00:36:30,400

we put it in this place to talk about

1020

00:36:34,150 --> 00:36:31,760

the deorbit burn

1021

00:36:36,150 --> 00:36:34,160

and you can see uh it was actually taken

1022

00:36:37,829 --> 00:36:36,160

during one of our rendezvous burns we

1023

00:36:39,349 --> 00:36:37,839

were

1024

00:36:40,470 --> 00:36:39,359

adjusting our orbit to catch up with the

1025

00:36:42,870 --> 00:36:40,480

mirror

1026  
00:36:44,630 --> 00:36:42,880  
taken at night and you can see that the

1027  
00:36:46,470 --> 00:36:44,640  
glow from the engines actually makes the

1028  
00:36:49,030 --> 00:36:46,480  
tail glow which is a pretty amazing

1029  
00:36:51,750 --> 00:36:49,040  
sight out the back

1030  
00:36:53,190 --> 00:36:51,760  
and after nine days and a few hours on

1031  
00:36:55,829 --> 00:36:53,200  
orbit we brought atlantis back to the

1032  
00:36:57,990 --> 00:36:55,839  
kennedy space center and

1033  
00:36:59,510 --> 00:36:58,000  
we had a nice day to bring it in for the

1034  
00:37:01,270 --> 00:36:59,520  
landing

1035  
00:37:04,150 --> 00:37:01,280  
we learned a lot i think from the whole

1036  
00:37:05,750 --> 00:37:04,160  
mission and from the landing as well

1037  
00:37:08,550 --> 00:37:05,760  
since the landing eileen and i have both

1038  
00:37:11,030 --> 00:37:08,560

had a chance to go out to ames

1039

00:37:12,150 --> 00:37:11,040

to work the vertical motion simulator

1040

00:37:13,990 --> 00:37:12,160

and

1041

00:37:16,150 --> 00:37:14,000

we had a couple of little things that

1042

00:37:18,230 --> 00:37:16,160

were of interest for the landing

1043

00:37:20,150 --> 00:37:18,240

one of which was a significant crosswind

1044

00:37:23,109 --> 00:37:20,160

gust down below about

1045

00:37:24,630 --> 00:37:23,119

15 16 feet before touchdown

1046

00:37:26,630 --> 00:37:24,640

and uh

1047

00:37:28,950 --> 00:37:26,640

interestingly enough the engineers out

1048

00:37:30,710 --> 00:37:28,960

at ames were able to duplicate that in

1049

00:37:33,270 --> 00:37:30,720

the simulator so that we can show that

1050

00:37:34,310 --> 00:37:33,280

kind of wind gusts to future crews and

1051  
00:37:35,750 --> 00:37:34,320  
it just

1052  
00:37:37,349 --> 00:37:35,760  
was rewarding for us to be able to go

1053  
00:37:39,510 --> 00:37:37,359  
out and see that in the simulator that

1054  
00:37:41,670 --> 00:37:39,520  
something like that could duplicate a

1055  
00:37:43,190 --> 00:37:41,680  
nearly identical condition that we saw

1056  
00:37:44,870 --> 00:37:43,200  
in flight

1057  
00:37:45,910 --> 00:37:44,880  
the orbiter behaved very well in that

1058  
00:37:48,470 --> 00:37:45,920  
gust

1059  
00:37:50,150 --> 00:37:48,480  
elected not to go chasing it we drifted

1060  
00:37:52,150 --> 00:37:50,160  
about 30 feet left of the center line

1061  
00:37:53,510 --> 00:37:52,160  
put the wheels down and then after we

1062  
00:37:54,950 --> 00:37:53,520  
brought the nose down we corrected back

1063  
00:37:57,190 --> 00:37:54,960

to the center line

1064

00:37:59,510 --> 00:37:57,200

and

1065

00:38:02,150 --> 00:37:59,520

we brought atlantis to a stop down there

1066

00:38:02,790 --> 00:38:02,160

about 8 000 feet from the approach end

1067

00:38:05,349 --> 00:38:02,800

and

1068

00:38:07,670 --> 00:38:05,359

gave it back over to uh the sts-89 crew

1069

00:38:09,109 --> 00:38:07,680

is getting ready to go our 86 crew sorry

1070

00:38:11,030 --> 00:38:09,119

who's getting ready to go do this all

1071

00:38:12,710 --> 00:38:11,040

over again for us and continue them

1072

00:38:14,710 --> 00:38:12,720

charlie can i interrupt jerry go ahead

1073

00:38:16,790 --> 00:38:14,720

yeah this is off the wall but i need the

1074

00:38:19,430 --> 00:38:16,800

vote of the audience here um i was in

1075

00:38:21,670 --> 00:38:19,440

space 132 days uh

1076

00:38:23,430 --> 00:38:21,680

four hours one minute

1077

00:38:25,030 --> 00:38:23,440

and my wife catherine was waiting the

1078

00:38:26,630 --> 00:38:25,040

whole time and worrying if i was going

1079

00:38:27,589 --> 00:38:26,640

to get back for the birth of our next

1080

00:38:29,109 --> 00:38:27,599

child

1081

00:38:30,950 --> 00:38:29,119

and she's heading into the hospital

1082

00:38:52,630 --> 00:38:30,960

right about now so i'd like to excuse

1083

00:38:52,640 --> 00:38:56,950

i think we can let him go for that

1084

00:39:01,190 --> 00:38:59,430

thanks jerry

1085

00:39:05,109 --> 00:39:01,200

well with that let's go ahead and roll

1086

00:39:08,870 --> 00:39:06,470

there's another view of our patch and

1087

00:39:09,910 --> 00:39:08,880

we're getting ready to uh go to the

1088

00:39:12,069 --> 00:39:09,920

vehicle

1089

00:39:14,390 --> 00:39:12,079

in the uh opf we're putting on our

1090

00:39:15,910 --> 00:39:14,400

lesses and getting ready to

1091

00:39:17,670 --> 00:39:15,920

to check out

1092

00:39:19,750 --> 00:39:17,680

good pressure integrity in everybody's

1093

00:39:21,990 --> 00:39:19,760

suits

1094

00:39:22,870 --> 00:39:22,000

carlos is buttoned down with the visor

1095

00:39:25,109 --> 00:39:22,880

down

1096

00:39:27,829 --> 00:39:25,119

there's mike and

1097

00:39:33,030 --> 00:39:27,839

he was relaxed and ready to go to space

1098

00:39:36,710 --> 00:39:35,589

elena joining us from russia of course

1099

00:39:39,190 --> 00:39:36,720

and a

1100

00:39:40,550 --> 00:39:39,200

very pleasant day for us to go out

1101

00:39:41,670 --> 00:39:40,560

although it was 4 30 in the morning i

1102

00:39:43,510 --> 00:39:41,680

know many of you probably went down to

1103

00:39:44,550 --> 00:39:43,520

the cape and had to stay up all night to

1104

00:39:46,230 --> 00:39:44,560

see it

1105

00:39:48,069 --> 00:39:46,240

it was a real nice night for us and the

1106

00:39:49,190 --> 00:39:48,079

weather was gorgeous and they tell us

1107

00:39:51,109 --> 00:39:49,200

that we were

1108

00:39:53,190 --> 00:39:51,119

visible almost to mikko

1109

00:39:55,030 --> 00:39:53,200

our liftoff are actually the countdown

1110

00:39:57,670 --> 00:39:55,040

and the liftoff were totally flawless

1111

00:39:58,790 --> 00:39:57,680

from the crew's point of view

1112

00:40:00,310 --> 00:39:58,800

we just

1113

00:40:02,710 --> 00:40:00,320

lit up the sky all the way up and down

1114

00:40:04,150 --> 00:40:02,720

the florida coast so we're told that

1115

00:40:05,349 --> 00:40:04,160

view in the corner is the view i had

1116

00:40:07,190 --> 00:40:05,359

through the overhead window i had a

1117

00:40:09,109 --> 00:40:07,200

mirror in my hand that i could look out

1118

00:40:11,910 --> 00:40:09,119

you can actually see the vab going by as

1119

00:40:13,430 --> 00:40:11,920

we do the roll program

1120

00:40:15,430 --> 00:40:13,440

i like to talk about the feelings that

1121

00:40:17,670 --> 00:40:15,440

you have during a launch it's actually

1122

00:40:19,109 --> 00:40:17,680

very much like the shuttle simulator

1123

00:40:20,950 --> 00:40:19,119

there's a lot of shaking and rocking

1124

00:40:22,950 --> 00:40:20,960

going on inside you can see out the

1125

00:40:24,710 --> 00:40:22,960

window flashes of light

1126  
00:40:26,790 --> 00:40:24,720  
that sometimes can interrupt your vision

1127  
00:40:29,430 --> 00:40:26,800  
if you look outside too much

1128  
00:40:31,030 --> 00:40:29,440  
also the sound is like to me it's like

1129  
00:40:33,829 --> 00:40:31,040  
standing in a room that's on fire it's

1130  
00:40:35,829 --> 00:40:33,839  
just a very uh low level

1131  
00:40:38,470 --> 00:40:35,839  
uh sound that's very similar to what you

1132  
00:40:41,270 --> 00:40:38,480  
hear outside during a launch

1133  
00:40:43,430 --> 00:40:41,280  
a solid rocket booster separation and

1134  
00:40:45,430 --> 00:40:43,440  
uh from this point on we're back to 1g

1135  
00:40:47,030 --> 00:40:45,440  
as we slowly accelerate up to three g's

1136  
00:40:48,470 --> 00:40:47,040  
and then main engine cut off next thing

1137  
00:40:50,150 --> 00:40:48,480  
you know we're in orbit we've separated

1138  
00:40:51,589 --> 00:40:50,160

from the tank and we are taking

1139

00:40:54,470 --> 00:40:51,599

photographs of the tank here crossing

1140

00:40:56,630 --> 00:40:54,480

over northern part of africa

1141

00:40:57,910 --> 00:40:56,640

post insertion main activity is to

1142

00:40:59,990 --> 00:40:57,920

activate the

1143

00:41:01,670 --> 00:41:00,000

experiments and here the space hub the

1144

00:41:03,430 --> 00:41:01,680

main

1145

00:41:05,670 --> 00:41:03,440

cargo in the payload bay and we had to

1146

00:41:07,430 --> 00:41:05,680

open three doors to access into space

1147

00:41:08,550 --> 00:41:07,440

hub through a very long tunnel as you

1148

00:41:10,710 --> 00:41:08,560

can see

1149

00:41:12,710 --> 00:41:10,720

space hub was very clean and we spent

1150

00:41:14,470 --> 00:41:12,720

few hours to set up

1151  
00:41:18,950 --> 00:41:14,480  
the whole module for the experiments and

1152  
00:41:24,069 --> 00:41:21,270  
this is a neat picture of a rendezvous

1153  
00:41:26,870 --> 00:41:24,079  
burn i lost

1154  
00:41:28,470 --> 00:41:26,880  
i lost my hat there momentarily but

1155  
00:41:30,230 --> 00:41:28,480  
we get a pretty good acceleration out of

1156  
00:41:31,589 --> 00:41:30,240  
the ohm's engine when we

1157  
00:41:33,510 --> 00:41:31,599  
make our approach to the mirror we

1158  
00:41:36,390 --> 00:41:33,520  
burned several times here down at the

1159  
00:41:38,150 --> 00:41:36,400  
bottom you can barely see the station

1160  
00:41:40,150 --> 00:41:38,160  
we had a very low bait angle they call

1161  
00:41:43,109 --> 00:41:40,160  
it which is the angle between the sun

1162  
00:41:45,190 --> 00:41:43,119  
and our orbit plane and that meant that

1163  
00:41:46,630 --> 00:41:45,200

the the mirror was actually going to

1164

00:41:48,470 --> 00:41:46,640

eclipse the sun force you see it's

1165

00:41:50,550 --> 00:41:48,480

getting dark in the orbiter and there

1166

00:41:53,030 --> 00:41:50,560

goes the sun and there's the mirror and

1167

00:41:55,349 --> 00:41:53,040

to see that on orbit was amazing because

1168

00:41:57,109 --> 00:41:55,359

the mirror actually glows white because

1169

00:41:58,710 --> 00:41:57,119

the sun that you can't see is still

1170

00:42:00,150 --> 00:41:58,720

bouncing off of our payload bay doors

1171

00:42:03,030 --> 00:42:00,160

and illuminating

1172

00:42:05,109 --> 00:42:03,040

the mirror

1173

00:42:07,030 --> 00:42:05,119

there's a view that jerry was able to

1174

00:42:09,349 --> 00:42:07,040

see of us approaching

1175

00:42:13,829 --> 00:42:09,359

and uh and then again our center line

1176

00:42:17,030 --> 00:42:15,190

this

1177

00:42:19,589 --> 00:42:17,040

step by step we get a little bit closer

1178

00:42:22,870 --> 00:42:19,599

and of course our task is to inch in uh

1179

00:42:24,309 --> 00:42:22,880

gradually according to a given timeline

1180

00:42:26,550 --> 00:42:24,319

and

1181

00:42:27,670 --> 00:42:26,560

everything worked so well for us that we

1182

00:42:29,030 --> 00:42:27,680

had a very

1183

00:42:30,390 --> 00:42:29,040

uh

1184

00:42:32,950 --> 00:42:30,400

docile

1185

00:42:35,030 --> 00:42:32,960

contact and you can see the sun was just

1186

00:42:36,790 --> 00:42:35,040

about to come up and rise over the ohms

1187

00:42:40,069 --> 00:42:36,800

pod as we contacted so this is all

1188

00:42:41,349 --> 00:42:40,079

silhouetted here but we make a very soft

1189

00:42:44,309 --> 00:42:41,359

contact there

1190

00:42:45,670 --> 00:42:44,319

and almost no oscillations after after

1191

00:42:47,270 --> 00:42:45,680

capture

1192

00:42:49,510 --> 00:42:47,280

everything went smoothly on the pressure

1193

00:42:51,190 --> 00:42:49,520

checks so we had the opportunity to open

1194

00:42:53,190 --> 00:42:51,200

the hatch right away and get a good good

1195

00:42:56,230 --> 00:42:53,200

view of

1196

00:42:57,430 --> 00:42:56,240

our colleagues on the other side

1197

00:42:59,270 --> 00:42:57,440

well here in this shot you'll see what

1198

00:43:01,990 --> 00:42:59,280

you weren't able to see in the still

1199

00:43:04,230 --> 00:43:02,000

picture earlier which is the uh the true

1200

00:43:07,750 --> 00:43:04,240

feeling of joy and uh celebration we had

1201  
00:43:09,510 --> 00:43:07,760  
elena brought in traditional black bread

1202  
00:43:11,510 --> 00:43:09,520  
salt and tea

1203  
00:43:13,510 --> 00:43:11,520  
there's a

1204  
00:43:14,950 --> 00:43:13,520  
vasily first time here you'll see jerry

1205  
00:43:17,030 --> 00:43:14,960  
for the first time

1206  
00:43:18,950 --> 00:43:17,040  
and i just looked that smile on his face

1207  
00:43:20,630 --> 00:43:18,960  
uh and i and the obvious need for a

1208  
00:43:21,990 --> 00:43:20,640  
haircut uh

1209  
00:43:23,510 --> 00:43:22,000  
they hadn't had a vacuum cleaner for a

1210  
00:43:25,270 --> 00:43:23,520  
while so we helped fix them up there so

1211  
00:43:27,190 --> 00:43:25,280  
they can get their hair cut

1212  
00:43:29,190 --> 00:43:27,200  
and we proceeded on in

1213  
00:43:30,870 --> 00:43:29,200

to do our first press conference in the

1214

00:43:33,270 --> 00:43:30,880

in the base block

1215

00:43:34,870 --> 00:43:33,280

and uh here's eileen's a attempt to

1216

00:43:36,710 --> 00:43:34,880

confuse all children throughout the

1217

00:43:52,950 --> 00:43:36,720

world as to how we really move around in

1218

00:43:55,910 --> 00:43:54,150

okay

1219

00:43:57,990 --> 00:43:55,920

well we continue to had our uh our first

1220

00:43:59,670 --> 00:43:58,000

press conference uh which was uh shortly

1221

00:44:02,470 --> 00:43:59,680

thereafter followed by eating of the

1222

00:44:04,309 --> 00:44:02,480

bread and uh actually jerry had his uh

1223

00:44:06,230 --> 00:44:04,319

pretzels that he'd been wanting

1224

00:44:09,349 --> 00:44:06,240

and as uh and i already mentioned the

1225

00:44:11,190 --> 00:44:09,359

second evening uh on the dock phase we

1226  
00:44:12,790 --> 00:44:11,200  
had an international meal with food from

1227  
00:44:14,550 --> 00:44:12,800  
all the countries represented by the

1228  
00:44:17,270 --> 00:44:14,560  
crew we had food from

1229  
00:44:18,950 --> 00:44:17,280  
russia america peru china with of course

1230  
00:44:21,109 --> 00:44:18,960  
food from france with foie gras and

1231  
00:44:25,829 --> 00:44:21,119  
coffee here goat cheese

1232  
00:44:29,829 --> 00:44:28,309  
we had barbecue from petey's dehydrated

1233  
00:44:32,150 --> 00:44:29,839  
and

1234  
00:44:35,670 --> 00:44:32,160  
for three hours the ground never called

1235  
00:44:38,230 --> 00:44:35,680  
us and we had a very good time

1236  
00:44:40,230 --> 00:44:38,240  
here you see a chocolate gift from isa

1237  
00:44:40,950 --> 00:44:40,240  
with a logo of the different partners in

1238  
00:44:44,150 --> 00:44:40,960

the

1239

00:44:47,829 --> 00:44:44,160

international space station programs

1240

00:44:50,950 --> 00:44:47,839

all kinds of food down here on the table

1241

00:44:53,270 --> 00:44:50,960

as you can see the chocolate shuttles

1242

00:44:54,790 --> 00:44:53,280

flying around

1243

00:45:03,190 --> 00:44:54,800

eileen thinks that some of them may be

1244

00:45:06,950 --> 00:45:04,550

it was really neat that this was all

1245

00:45:10,630 --> 00:45:06,960

spontaneous too to have that kind of a a

1246

00:45:14,550 --> 00:45:12,309

this is uh some of the handover

1247

00:45:16,710 --> 00:45:14,560

operations between mike and jerry

1248

00:45:18,069 --> 00:45:16,720

as jerry and mike discuss

1249

00:45:19,430 --> 00:45:18,079

the equipment that's being brought over

1250

00:45:21,910 --> 00:45:19,440

and here we are

1251  
00:45:24,309 --> 00:45:21,920  
with uh the commander of the station

1252  
00:45:26,790 --> 00:45:24,319  
vasili trying to figure out uh which

1253  
00:45:28,710 --> 00:45:26,800  
items uh we need to bring over next back

1254  
00:45:30,230 --> 00:45:28,720  
over to the space hub

1255  
00:45:31,510 --> 00:45:30,240  
looks like vasily's stealing something

1256  
00:45:36,390 --> 00:45:31,520  
there but that's actually his checklist

1257  
00:45:40,710 --> 00:45:39,270  
carlos brushing his hair in the mirror

1258  
00:45:45,109 --> 00:45:40,720  
hair management is very important on

1259  
00:45:48,150 --> 00:45:46,950  
this is the mere base block

1260  
00:45:49,910 --> 00:45:48,160  
you can see the table where we had

1261  
00:45:51,990 --> 00:45:49,920  
dinner the other night there's mike uh

1262  
00:45:55,750 --> 00:45:52,000  
having his lunch

1263  
00:45:57,430 --> 00:45:55,760

and uh sasha and vasily you can see uh

1264

00:45:58,630 --> 00:45:57,440

how much equipment is around inside

1265

00:46:00,630 --> 00:45:58,640

there and it's actually one of the more

1266

00:46:01,670 --> 00:46:00,640

spacious modules

1267

00:46:04,230 --> 00:46:01,680

in some of the other modules there's

1268

00:46:06,069 --> 00:46:04,240

quite a bit more stuff

1269

00:46:11,990 --> 00:46:06,079

this is sasha's bedroom you can see that

1270

00:46:12,000 --> 00:46:17,190

there's a shuttle parked out there today

1271

00:46:20,710 --> 00:46:19,270

this is one of these uh beautiful

1272

00:46:24,069 --> 00:46:20,720

historic views that i was telling you

1273

00:46:25,510 --> 00:46:24,079

about earlier um you see the red sea

1274

00:46:28,630 --> 00:46:25,520

the uh

1275

00:46:30,710 --> 00:46:28,640

gulf of sues the gulf of aqaba the sinai

1276

00:46:31,990 --> 00:46:30,720

peninsula of course uh we're dr mir at

1277

00:46:33,670 --> 00:46:32,000

this point

1278

00:46:36,069 --> 00:46:33,680

here's the Nile river

1279

00:46:37,589 --> 00:46:36,079

down at the bottom you can see the Nile

1280

00:46:39,750 --> 00:46:37,599

delta

1281

00:46:42,069 --> 00:46:39,760

as we uh move on further to the east

1282

00:46:43,109 --> 00:46:42,079

this is the Boulder River delta that

1283

00:46:44,630 --> 00:46:43,119

were

1284

00:46:46,069 --> 00:46:44,640

flying over Asia

1285

00:46:47,670 --> 00:46:46,079

at this point

1286

00:46:50,470 --> 00:46:47,680

again you can see the docking module on

1287

00:46:52,870 --> 00:46:50,480

the left side that was added on STS-74

1288

00:46:54,950 --> 00:46:52,880

about a year and a half ago

1289

00:46:57,430 --> 00:46:54,960

in this view up from the docking module

1290

00:46:59,829 --> 00:46:57,440

you see cristal and then spectre to the

1291

00:47:07,430 --> 00:46:59,839

left covant 2 to the right base module

1292

00:47:11,190 --> 00:47:09,430

well all good things

1293

00:47:13,510 --> 00:47:11,200

had to come to an end yeah we worked

1294

00:47:15,030 --> 00:47:13,520

very well together on board uh we worked

1295

00:47:17,750 --> 00:47:15,040

so efficiently we had time to have meals

1296

00:47:19,910 --> 00:47:17,760

together and then we had to say goodbye

1297

00:47:22,309 --> 00:47:19,920

uh this was a much more somber occasion

1298

00:47:24,630 --> 00:47:22,319

than uh we'd had on docking day

1299

00:47:27,270 --> 00:47:24,640

uh it was actually fairly quiet until we

1300

00:47:29,190 --> 00:47:27,280

decided well it was time to start uh

1301  
00:47:31,190 --> 00:47:29,200  
saying goodbye and working our way out

1302  
00:47:33,270 --> 00:47:31,200  
the door uh there was no great rush to

1303  
00:47:34,950 --> 00:47:33,280  
do this and luckily uh the ground was

1304  
00:47:45,510 --> 00:47:34,960  
able to give us all the time we wanted

1305  
00:47:48,950 --> 00:47:47,430  
here we see the uh the hatch closing as

1306  
00:47:50,550 --> 00:47:48,960  
i mentioned earlier

1307  
00:47:52,710 --> 00:47:50,560  
this was quite a sad time for us and it

1308  
00:47:55,589 --> 00:47:52,720  
was very quiet as a poised as opposed to

1309  
00:47:57,829 --> 00:47:55,599  
the very noisy time when we had docked

1310  
00:48:00,630 --> 00:47:57,839  
uh here's the undocking uh you can see

1311  
00:48:03,589 --> 00:48:00,640  
the shuttle jets firing

1312  
00:48:05,349 --> 00:48:03,599  
separation the springs and the

1313  
00:48:07,430 --> 00:48:05,359

in the docking mechanism give us the

1314

00:48:08,309 --> 00:48:07,440

initial push-off from mir

1315

00:48:10,950 --> 00:48:08,319

and

1316

00:48:13,589 --> 00:48:10,960

at approximately uh just a few feet

1317

00:48:15,750 --> 00:48:13,599

two feet after we separated from here i

1318

00:48:18,069 --> 00:48:15,760

fired several jets to

1319

00:48:20,390 --> 00:48:18,079

get us separating down the r bar we had

1320

00:48:21,829 --> 00:48:20,400

extra fuel because charlie had done such

1321

00:48:23,349 --> 00:48:21,839

a great job on the rendezvous we had

1322

00:48:24,950 --> 00:48:23,359

extra fuel to spend during the

1323

00:48:27,589 --> 00:48:24,960

separation

1324

00:48:29,270 --> 00:48:27,599

so we had reached a quite high quite a

1325

00:48:30,790 --> 00:48:29,280

high separation rate

1326

00:48:32,069 --> 00:48:30,800  
to increase the efficiency of the

1327

00:48:34,150 --> 00:48:32,079  
undocking

1328

00:48:35,910 --> 00:48:34,160  
and the test that we were doing view

1329

00:48:38,069 --> 00:48:35,920  
from mirror that was downlinked of the

1330

00:48:39,190 --> 00:48:38,079  
shuttle the mirror had great views of us

1331

00:48:40,630 --> 00:48:39,200  
because they were looking down at the

1332

00:48:42,549 --> 00:48:40,640  
earth but all we had was a view of

1333

00:48:43,510 --> 00:48:42,559  
mirror against the dark sky as we looked

1334

00:48:45,430 --> 00:48:43,520  
up

1335

00:48:46,950 --> 00:48:45,440  
after undock it was time to resume more

1336

00:48:49,430 --> 00:48:46,960  
intense activity on the scientific

1337

00:48:51,670 --> 00:48:49,440  
experiments here you saw barrack

1338

00:48:54,309 --> 00:48:51,680

helena ed and i were all scheduled for

1339

00:48:56,549 --> 00:48:54,319

those about 10 different experiments

1340

00:48:58,230 --> 00:48:56,559

using the baroque facility incubators

1341

00:49:00,710 --> 00:48:58,240

and glovebox

1342

00:49:04,069 --> 00:49:00,720

and you see here elena working on the

1343

00:49:05,589 --> 00:49:04,079

osteo osteomast these experiments on

1344

00:49:07,349 --> 00:49:05,599

bone cells

1345

00:49:09,750 --> 00:49:07,359

we had also

1346

00:49:11,270 --> 00:49:09,760

the glovebox was used for

1347

00:49:13,990 --> 00:49:11,280

experiments where some

1348

00:49:15,510 --> 00:49:14,000

dangerous chemicals were used

1349

00:49:17,270 --> 00:49:15,520

here are some tadpoles that we are

1350

00:49:19,829 --> 00:49:17,280

developing their neural vestibular

1351  
00:49:21,030 --> 00:49:19,839  
systems in 0g and we are not swimming as

1352  
00:49:22,150 --> 00:49:21,040  
the same

1353  
00:49:24,150 --> 00:49:22,160  
tadpoles

1354  
00:49:25,670 --> 00:49:24,160  
grown on earth

1355  
00:49:27,990 --> 00:49:25,680  
this is an experiment to look at the

1356  
00:49:30,309 --> 00:49:28,000  
motion of liquids inside rotating tanks

1357  
00:49:32,230 --> 00:49:30,319  
which you may ask why is that important

1358  
00:49:35,109 --> 00:49:32,240  
and the reason is because

1359  
00:49:37,270 --> 00:49:35,119  
fuel tanks on rotating satellites have

1360  
00:49:38,549 --> 00:49:37,280  
often have a problem where the the fuel

1361  
00:49:39,990 --> 00:49:38,559  
inside them starts to rotate in a

1362  
00:49:40,950 --> 00:49:40,000  
different direction than the rest of the

1363  
00:49:42,549 --> 00:49:40,960

satellite which makes the whole

1364

00:49:44,069 --> 00:49:42,559

satellite wobble

1365

00:49:45,510 --> 00:49:44,079

which is not something that satellite

1366

00:49:48,549 --> 00:49:45,520

designers like to have on their very

1367

00:49:49,910 --> 00:49:48,559

expensive satellites so we had a

1368

00:49:51,750 --> 00:49:49,920

set of rotating tanks here and you can

1369

00:49:54,069 --> 00:49:51,760

see the fluid inside they're rotating

1370

00:49:55,270 --> 00:49:54,079

back and forth around inside that tank

1371

00:49:56,950 --> 00:49:55,280

and as you can see it's rotating in a

1372

00:49:59,270 --> 00:49:56,960

different direction this is a view taken

1373

00:50:00,790 --> 00:49:59,280

from the inside

1374

00:50:03,349 --> 00:50:00,800

we also had several experiments where we

1375

00:50:05,829 --> 00:50:03,359

drew protein crystals

1376

00:50:08,470 --> 00:50:05,839

that's a new field that we've actually

1377

00:50:09,349 --> 00:50:08,480

flown many times now on the orbiter

1378

00:50:10,470 --> 00:50:09,359

and

1379

00:50:12,630 --> 00:50:10,480

it's

1380

00:50:14,390 --> 00:50:12,640

stands to give us some great benefits in

1381

00:50:17,030 --> 00:50:14,400

the future as we develop

1382

00:50:19,030 --> 00:50:17,040

custom medicines uh and for diseases

1383

00:50:20,630 --> 00:50:19,040

that are a challenge to the community

1384

00:50:22,630 --> 00:50:20,640

right now

1385

00:50:24,630 --> 00:50:22,640

this is the output from our fax machine

1386

00:50:26,230 --> 00:50:24,640

that i was talking about earlier

1387

00:50:27,670 --> 00:50:26,240

we wanted to illustrate how long this

1388

00:50:29,910 --> 00:50:27,680

really is extended all the way down the

1389

00:50:32,230 --> 00:50:29,920

tunnel into the space hub

1390

00:50:33,910 --> 00:50:32,240

view from the space hab this is our meal

1391

00:50:35,670 --> 00:50:33,920

time you can see the space hub is

1392

00:50:37,829 --> 00:50:35,680

extremely spacious and it's a very

1393

00:50:40,309 --> 00:50:37,839

comfortable place for astronauts to work

1394

00:50:42,710 --> 00:50:40,319

to live and work

1395

00:50:44,230 --> 00:50:42,720

jerry's showing us

1396

00:50:45,270 --> 00:50:44,240

some of the fresh tortillas that we had

1397

00:50:46,390 --> 00:50:45,280

packed

1398

00:50:48,069 --> 00:50:46,400

that

1399

00:50:49,750 --> 00:50:48,079

lasted the whole mission

1400

00:50:52,790 --> 00:50:49,760

this is not a bubble this is actually a

1401

00:50:54,549 --> 00:50:52,800

blob of water that jean francois had

1402

00:50:56,069 --> 00:50:54,559

made from a straw in one of his drinks

1403

00:50:58,230 --> 00:50:56,079

and we did our own

1404

00:51:00,549 --> 00:50:58,240

liquid motion experiment informally as a

1405

00:51:02,549 --> 00:51:00,559

crew as we watch the behavior of these

1406

00:51:03,829 --> 00:51:02,559

things in space

1407

00:51:05,829 --> 00:51:03,839

one of the things we have to watch out

1408

00:51:07,030 --> 00:51:05,839

for is the degradation to our bodies

1409

00:51:09,030 --> 00:51:07,040

when we're on orbit because we're not

1410

00:51:10,710 --> 00:51:09,040

really fully utilizing all our muscles

1411

00:51:13,109 --> 00:51:10,720

so we had lots of opportunity to

1412

00:51:15,829 --> 00:51:13,119

exercise either on our ergometer or

1413

00:51:17,349 --> 00:51:15,839

cycle or on treadmill

1414

00:51:19,270 --> 00:51:17,359

jerry probably logged more miles on

1415

00:51:21,750 --> 00:51:19,280

orbit than

1416

00:51:23,829 --> 00:51:21,760

at least anybody that i know

1417

00:51:25,829 --> 00:51:23,839

but he provided a lot of feedback to the

1418

00:51:27,750 --> 00:51:25,839

community here on this treadmill that

1419

00:51:29,670 --> 00:51:27,760

we're developing for

1420

00:51:32,470 --> 00:51:29,680

station

1421

00:51:38,309 --> 00:51:32,480

another form of exercise here the mass

1422

00:51:42,390 --> 00:51:40,710

actually right here oh yes that's right

1423

00:51:44,790 --> 00:51:42,400

uh almost missed it going off the top of

1424

00:51:47,270 --> 00:51:44,800

the screen right now is uh is lima once

1425

00:51:49,030 --> 00:51:47,280

again we uh the uh the ground was able

1426  
00:51:50,790 --> 00:51:49,040  
to get this shot for us one uh night

1427  
00:51:52,470 --> 00:51:50,800  
while we were sleeping

1428  
00:51:54,390 --> 00:51:52,480  
in the view right now is the nazca

1429  
00:51:55,750 --> 00:51:54,400  
desert where you have those great lines

1430  
00:51:57,109 --> 00:51:55,760  
in the sand out there we couldn't see

1431  
00:51:58,790 --> 00:51:57,119  
them from on orbit

1432  
00:52:00,230 --> 00:51:58,800  
this again is hawaii that's the big

1433  
00:52:04,150 --> 00:52:00,240  
island up at the top you can see the

1434  
00:52:06,950 --> 00:52:04,160  
string of islands stretching down below

1435  
00:52:08,950 --> 00:52:06,960  
maui molokai we had a very nice

1436  
00:52:11,030 --> 00:52:08,960  
very nice night pass over italy you

1437  
00:52:14,069 --> 00:52:11,040  
recognize the boot of italy and sicilia

1438  
00:52:17,030 --> 00:52:14,079

and the moon glint in on the

1439

00:52:19,829 --> 00:52:17,040

mediterranean sea in between sicily and

1440

00:52:22,230 --> 00:52:19,839

italy

1441

00:52:25,510 --> 00:52:22,240

at our orbital altitude we see about 16

1442

00:52:28,630 --> 00:52:25,520

sunrises and sunsets a day the earth is

1443

00:52:34,710 --> 00:52:30,470

and it looks like a sunset and i guess

1444

00:52:39,990 --> 00:52:37,510

and it's time to come home this is a a

1445

00:52:41,910 --> 00:52:40,000

clip of our deorbit crap everyone suited

1446

00:52:43,670 --> 00:52:41,920

up just though about two hours or so

1447

00:52:45,190 --> 00:52:43,680

before the deorbit burn it's a very

1448

00:52:46,710 --> 00:52:45,200

hectic time there's many things to do

1449

00:52:49,030 --> 00:52:46,720

the payload bay doors are coming close

1450

00:52:50,470 --> 00:52:49,040

it's a major part of the events and

1451  
00:52:53,589 --> 00:52:50,480  
coming home because once the doors are

1452  
00:52:55,270 --> 00:52:53,599  
closed you lose the radiator cooling

1453  
00:52:56,950 --> 00:52:55,280  
this is a view from the mid deck we're

1454  
00:52:57,990 --> 00:52:56,960  
intentionally showing this upside down

1455  
00:52:59,910 --> 00:52:58,000  
because

1456  
00:53:01,910 --> 00:52:59,920  
many times you need to work upside down

1457  
00:53:03,750 --> 00:53:01,920  
in space and do it effectively

1458  
00:53:05,349 --> 00:53:03,760  
on the flight deck you see jean francois

1459  
00:53:09,109 --> 00:53:05,359  
in the middle there's a charlie

1460  
00:53:14,470 --> 00:53:12,150  
and myself we had ed lew in the mission

1461  
00:53:16,630 --> 00:53:14,480  
specialist number one seat

1462  
00:53:19,910 --> 00:53:16,640  
carlos is in the

1463  
00:53:21,670 --> 00:53:19,920

ms2 seat is our prime flight engineer

1464

00:53:23,750 --> 00:53:21,680

the entry you can see out my windows the

1465

00:53:25,510 --> 00:53:23,760

heating we reach

1466

00:53:28,870 --> 00:53:25,520

almost 2000 degrees fahrenheit on the

1467

00:53:31,109 --> 00:53:28,880

outside as we re-enter mach 25 and slow

1468

00:53:32,870 --> 00:53:31,119

down

1469

00:53:34,390 --> 00:53:32,880

you can see the jets fire our plasma

1470

00:53:37,030 --> 00:53:34,400

develops as you know around the orbiter

1471

00:53:40,630 --> 00:53:37,040

and we can see the reflection of that

1472

00:53:45,270 --> 00:53:43,270

well we're back uh close to ksc here

1473

00:53:47,910 --> 00:53:45,280

getting ready to approach subsonic and

1474

00:53:50,069 --> 00:53:47,920

you can see the jets uh pulsing there as

1475

00:53:52,549 --> 00:53:50,079

we approach uh the kennedy space center

1476

00:53:55,030 --> 00:53:52,559

this is a view from the ground of us

1477

00:53:56,630 --> 00:53:55,040

coming around the hack and

1478

00:53:58,630 --> 00:53:56,640

you'll see here again in a minute my

1479

00:53:59,750 --> 00:53:58,640

view out the front window of the head-up

1480

00:54:00,710 --> 00:53:59,760

display

1481

00:54:02,150 --> 00:54:00,720

and

1482

00:54:04,309 --> 00:54:02,160

you've got uh

1483

00:54:06,710 --> 00:54:04,319

airspeed information and altitude

1484

00:54:08,950 --> 00:54:06,720

information on the scales on the left

1485

00:54:10,390 --> 00:54:08,960

and right as well as the position of the

1486

00:54:13,030 --> 00:54:10,400

runway

1487

00:54:15,670 --> 00:54:13,040

outlined for me so that when we come

1488

00:54:17,270 --> 00:54:15,680

down through the clouds here at about

1489

00:54:18,470 --> 00:54:17,280

eight thousand feet we'll break through

1490

00:54:20,309 --> 00:54:18,480

the clouds and you'll see that the

1491

00:54:21,270 --> 00:54:20,319

runway is in fact exactly in that

1492

00:54:22,950 --> 00:54:21,280

position

1493

00:54:24,870 --> 00:54:22,960

showing just how precise the orbiter's

1494

00:54:26,069 --> 00:54:24,880

navigation system is

1495

00:54:27,589 --> 00:54:26,079

and

1496

00:54:29,510 --> 00:54:27,599

you'll continue to see our view down

1497

00:54:32,390 --> 00:54:29,520

through the lower right corner here as

1498

00:54:34,150 --> 00:54:32,400

the orbiter starts its pre-flare

1499

00:54:35,990 --> 00:54:34,160

and uh

1500

00:54:37,670 --> 00:54:36,000

coming into 300 feet eileen puts the

1501  
00:54:38,549 --> 00:54:37,680  
gear down you saw the gear ward flash

1502  
00:54:40,950 --> 00:54:38,559  
there

1503  
00:54:42,790 --> 00:54:40,960  
coming into the overrun here uh with the

1504  
00:54:44,069 --> 00:54:42,800  
gear down at

1505  
00:54:45,589 --> 00:54:44,079  
about uh

1506  
00:54:47,910 --> 00:54:45,599  
50 feet or so

1507  
00:54:49,589 --> 00:54:47,920  
you can see uh with this view the wind

1508  
00:54:52,870 --> 00:54:49,599  
gust that catches us right here at about

1509  
00:54:54,230 --> 00:54:52,880  
20 feet and starts moving us to the left

1510  
00:54:56,549 --> 00:54:54,240  
and we just put the right wheel down

1511  
00:54:58,710 --> 00:54:56,559  
first to arrest the drift and once we

1512  
00:55:00,230 --> 00:54:58,720  
got it on the runway it uh handled quite

1513  
00:55:02,630 --> 00:55:00,240

nicely

1514

00:55:04,309 --> 00:55:02,640

so little surprises come

1515

00:55:05,829 --> 00:55:04,319

from time to time but the orbiter is a

1516

00:55:09,589 --> 00:55:05,839

wonderful machine and it handles that

1517

00:55:13,109 --> 00:55:11,910

we rolled it down the center line stripe

1518

00:55:22,230 --> 00:55:13,119

and

1519

00:55:44,390 --> 00:55:22,240

that's the story of sts-84 thank you

1520

00:55:48,710 --> 00:55:47,270

a shadow a shadow

1521

00:55:51,829 --> 00:55:48,720

it was the shadow of someone who'd gone

1522

00:55:56,789 --> 00:55:51,839

by many years before

1523

00:55:56,799 --> 00:56:29,349

yes

1524

00:56:29,359 --> 00:56:43,109

she had nothing so

1525

00:56:47,430 --> 00:56:45,910

that's not precious of a story

1526  
00:57:30,870 --> 00:56:47,440  
sorry

1527  
00:57:30,880 --> 00:57:50,230  
is

1528  
00:58:07,109 --> 00:57:52,789  
she wasn't taking more than 10 ounces of

1529  
00:58:07,119 --> 00:58:31,990  
okay

1530  
00:58:32,000 --> 00:58:46,069  
i'll go anywhere

1531  
00:58:46,079 --> 00:59:00,390  
let's see

1532  
00:59:00,400 --> 00:59:15,589  
uh

1533  
00:59:15,599 --> 00:59:24,950  
forever

1534  
00:59:24,960 --> 00:59:33,190  
how can you be so insensitive

1535  
00:59:37,589 --> 00:59:34,789  
amy

1536  
00:59:39,349 --> 00:59:37,599  
mr clennam was very disappointed that

1537  
00:59:40,870 --> 00:59:39,359  
you didn't come down to see him this

1538  
00:59:43,430 --> 00:59:40,880

morning