
WASTE

1
00:00:13,990 --> 00:00:11,669
good afternoon welcome to the sts 35

2
00:00:15,910 --> 00:00:14,000
post flight crew press conference i'd

3
00:00:18,310 --> 00:00:15,920
like to introduce to you the commander

4
00:00:19,590 --> 00:00:18,320
vance brand and turn the program over to

5
00:00:21,510 --> 00:00:19,600
him

6
00:00:23,910 --> 00:00:21,520
thank you barbara

7
00:00:26,390 --> 00:00:23,920
well it's a pleasure to be back here

8
00:00:28,150 --> 00:00:26,400
after a mission that

9
00:00:30,630 --> 00:00:28,160
we certainly enjoyed i'd like to

10
00:00:32,790 --> 00:00:30,640
introduce my crew

11
00:00:36,069 --> 00:00:32,800
guy gardner pilot

12
00:00:38,790 --> 00:00:36,079
we have jeff hoffman ms-1

13
00:00:41,590 --> 00:00:38,800

mike lounge ms2

14
00:00:43,270 --> 00:00:41,600
bob parker ms3

15
00:00:44,869 --> 00:00:43,280
sam durants

16
00:00:47,990 --> 00:00:44,879
ps1

17
00:00:49,750 --> 00:00:48,000
ron paris at the end there ps2 we had a

18
00:00:52,229 --> 00:00:49,760
big crew

19
00:00:53,830 --> 00:00:52,239
this flight more than many

20
00:00:54,630 --> 00:00:53,840
demonstrated

21
00:00:56,630 --> 00:00:54,640
the

22
00:01:00,389 --> 00:00:56,640
value of man

23
00:01:04,149 --> 00:01:00,399
in space as a as a flexible element

24
00:01:08,070 --> 00:01:06,149
do troubleshooting

25
00:01:10,550 --> 00:01:08,080
to continue on

26
00:01:12,469 --> 00:01:10,560
with manual control after

27
00:01:14,390 --> 00:01:12,479
automatic systems

28
00:01:16,149 --> 00:01:14,400
have failed to perform like we thought

29
00:01:17,590 --> 00:01:16,159
they would

30
00:01:21,109 --> 00:01:17,600
so

31
00:01:23,910 --> 00:01:21,119
i i was just very pleased that

32
00:01:26,469 --> 00:01:23,920
we had those capabilities on board

33
00:01:28,149 --> 00:01:26,479
to use man as a flexible

34
00:01:30,550 --> 00:01:28,159
element

35
00:01:33,510 --> 00:01:30,560
finally and most important i think our

36
00:01:35,749 --> 00:01:33,520
mission really demonstrated teamwork

37
00:01:39,190 --> 00:01:35,759
people on the ground here really got

38
00:01:41,350 --> 00:01:39,200

with it after we had some space lab

39
00:01:42,950 --> 00:01:41,360
failures and

40
00:01:46,230 --> 00:01:42,960
they came up with ways for us to

41
00:01:48,469 --> 00:01:46,240
continue and in the end

42
00:01:51,590 --> 00:01:48,479
through manual pointing i think our

43
00:01:54,630 --> 00:01:53,749
approaching if not equaling

44
00:01:56,310 --> 00:01:54,640
the

45
00:01:57,990 --> 00:01:56,320
capabilities of

46
00:01:59,590 --> 00:01:58,000
the automatic systems that would have

47
00:02:01,109 --> 00:01:59,600
controlled the pointing of the

48
00:02:03,590 --> 00:02:01,119
telescopes

49
00:02:05,670 --> 00:02:03,600
much of the teamwork

50
00:02:07,590 --> 00:02:05,680
between the marshall space center the

51
00:02:09,669 --> 00:02:07,600
johnson space center

52
00:02:11,589 --> 00:02:09,679
and us and

53
00:02:12,790 --> 00:02:11,599
the crew in orbit

54
00:02:15,270 --> 00:02:12,800
came about

55
00:02:17,510 --> 00:02:15,280
in a short 12-hour period everything was

56
00:02:20,229 --> 00:02:17,520
pulled together here on the ground in

57
00:02:22,949 --> 00:02:20,239
that short of time to

58
00:02:24,550 --> 00:02:22,959
allow us to continue

59
00:02:26,630 --> 00:02:24,560
and

60
00:02:27,910 --> 00:02:26,640
bring in quite a lot of scientific

61
00:02:29,750 --> 00:02:27,920
information

62
00:02:31,110 --> 00:02:29,760
so with that we'd like to show you our

63
00:02:32,150 --> 00:02:31,120

film

64
00:02:34,229 --> 00:02:32,160
and

65
00:02:40,150 --> 00:02:34,239
i'll start out with the narration

66
00:02:45,670 --> 00:02:43,190
our pants in colombia and orion is the

67
00:02:48,070 --> 00:02:45,680
star field you see there a very uh

68
00:02:50,390 --> 00:02:48,080
prominent constellation in the northern

69
00:02:53,030 --> 00:02:50,400
hemisphere seven crew members

70
00:02:56,470 --> 00:02:53,040
astro mission this is what our ship

71
00:02:59,509 --> 00:02:56,480
looked like as it sat on the pad

72
00:03:04,309 --> 00:02:59,519
and we were having breakfast actually

73
00:03:07,670 --> 00:03:05,589
there we

74
00:03:09,430 --> 00:03:07,680
after having received weather

75
00:03:14,869 --> 00:03:09,440
information we're in the suit room

76
00:03:14,879 --> 00:03:17,589
we have guy

77
00:03:22,390 --> 00:03:19,910
we have mike

78
00:03:22,400 --> 00:03:25,350
jeff

79
00:03:25,360 --> 00:03:29,589
ron

80
00:03:35,670 --> 00:03:33,350
and somebody in there there he is bob

81
00:03:37,190 --> 00:03:35,680
bob was helping a manager adjust his

82
00:03:38,550 --> 00:03:37,200
time

83
00:03:41,190 --> 00:03:38,560
seven crewmen

84
00:03:43,110 --> 00:03:41,200
going out to the van

85
00:03:45,190 --> 00:03:43,120
you know we had a

86
00:03:47,589 --> 00:03:45,200
late night or early morning launch

87
00:03:49,830 --> 00:03:47,599
whichever you'd like to call it

88
00:03:50,710 --> 00:03:49,840

so it was a little before midnight as we

89
00:03:54,229 --> 00:03:50,720
were

90
00:03:57,270 --> 00:03:55,750
here come the main engine and ignition

91
00:03:58,949 --> 00:03:57,280
which of course light up about seven

92
00:04:01,350 --> 00:03:58,959
seconds before we lift off so we can

93
00:04:03,270 --> 00:04:01,360
check them out they stabilize we pull

94
00:04:05,350 --> 00:04:03,280
the umbilical light the srbs and we're

95
00:04:08,470 --> 00:04:05,360
off here you can see vance waving to us

96
00:04:11,429 --> 00:04:10,229
and just a spectacular night launch i've

97
00:04:13,350 --> 00:04:11,439
never seen one they say they're

98
00:04:15,990 --> 00:04:13,360
spectacular to watch but it certainly is

99
00:04:18,310 --> 00:04:16,000
spectacular to watch from inside as well

100
00:04:20,069 --> 00:04:18,320
we managed to launch with almost a full

101
00:04:22,390 --> 00:04:20,079
moon and here's a beautiful shot of us

102
00:04:25,430 --> 00:04:22,400
going right by the moon

103
00:04:26,710 --> 00:04:25,440
there was a cloud deck at about 7000

104
00:04:28,310 --> 00:04:26,720
feet

105
00:04:29,830 --> 00:04:28,320
which you'll see us light up here as we

106
00:04:31,110 --> 00:04:29,840
go through it it was really spectacular

107
00:04:33,350 --> 00:04:31,120
look out the windows and watch that

108
00:04:35,350 --> 00:04:33,360
approach

109
00:04:37,270 --> 00:04:35,360
after two minutes the srbs have consumed

110
00:04:39,110 --> 00:04:37,280
their fuel and we jettison them little

111
00:04:41,510 --> 00:04:39,120
rockets fire to push them away from the

112
00:04:43,189 --> 00:04:41,520
orbiter

113
00:04:44,550 --> 00:04:43,199

and we continue to burn the main engines

114
00:04:47,189 --> 00:04:44,560
for a total of about eight and a half

115
00:04:48,710 --> 00:04:47,199
minutes which gets us up to over 17 000

116
00:04:51,189 --> 00:04:48,720
miles an hour and we're up in orbit

117
00:04:52,469 --> 00:04:51,199
around the earth

118
00:04:53,990 --> 00:04:52,479
here we are

119
00:04:55,830 --> 00:04:54,000
finally in orbit about an hour after

120
00:04:57,510 --> 00:04:55,840
launch with a second burn having put us

121
00:04:59,909 --> 00:04:57,520
into a circular orbit

122
00:05:01,270 --> 00:04:59,919
going into the orbit to do astronomy has

123
00:05:03,030 --> 00:05:01,280
two benefits one of course is you get

124
00:05:04,469 --> 00:05:03,040
you above your clouds but that's not the

125
00:05:06,710 --> 00:05:04,479
primary one the primary one is to get

126
00:05:08,950 --> 00:05:06,720
above the atmosphere itself you see a

127
00:05:12,550 --> 00:05:08,960
series of layers of atmosphere sitting

128
00:05:17,029 --> 00:05:15,029
one of the first things we do on orbit

129
00:05:19,110 --> 00:05:17,039
is to begin the opening the payload bay

130
00:05:21,189 --> 00:05:19,120
doors this not only exposes the payload

131
00:05:22,390 --> 00:05:21,199
so the telescopes can see the stars we

132
00:05:24,230 --> 00:05:22,400
came to observe

133
00:05:25,830 --> 00:05:24,240
but also the inner surface of the doors

134
00:05:27,590 --> 00:05:25,840
are radiators and allows us to start

135
00:05:29,350 --> 00:05:27,600
cooling the vehicle

136
00:05:31,350 --> 00:05:29,360
once that's accomplished we began

137
00:05:33,029 --> 00:05:31,360
activating first the space lab itself

138
00:05:34,790 --> 00:05:33,039

with its computers that help us control

139
00:05:36,550 --> 00:05:34,800
things

140
00:05:38,150 --> 00:05:36,560
in the payload bay here you can see some

141
00:05:41,350 --> 00:05:38,160
of the elements of our payload first of

142
00:05:42,790 --> 00:05:41,360
all the x-ray telescope in the far back

143
00:05:45,430 --> 00:05:42,800
from the goddard space center and then

144
00:05:47,270 --> 00:05:45,440
here parts of the space lab which was in

145
00:05:50,710 --> 00:05:47,280
fact produced

146
00:05:52,310 --> 00:05:50,720
in concert with us by the europeans

147
00:05:54,070 --> 00:05:52,320
they activated the space lab we

148
00:05:56,950 --> 00:05:54,080
proceeded on then to

149
00:05:59,189 --> 00:05:56,960
uh activate the ips itself

150
00:06:00,790 --> 00:05:59,199
with its three large telescopes in fact

151
00:06:02,469 --> 00:06:00,800
once this uh

152
00:06:04,070 --> 00:06:02,479
platform with the telescopes was erected

153
00:06:06,390 --> 00:06:04,080
that's about the last we saw of the

154
00:06:07,830 --> 00:06:06,400
x-ray telescope which is hidden

155
00:06:13,590 --> 00:06:07,840
behind this much larger array of

156
00:06:18,150 --> 00:06:15,430
with the

157
00:06:19,430 --> 00:06:18,160
telescopes erected pointing out the bay

158
00:06:21,110 --> 00:06:19,440
towards space

159
00:06:23,430 --> 00:06:21,120
we're now in a position to begin

160
00:06:24,710 --> 00:06:23,440
observing uh first with the orbiter crew

161
00:06:26,950 --> 00:06:24,720
positioning the orbiter you can actually

162
00:06:28,550 --> 00:06:26,960
see a little jet firing here on on that

163
00:06:31,350 --> 00:06:28,560

frame right there

164
00:06:34,230 --> 00:06:31,360
once the orbiter crew gets the orbiter

165
00:06:35,749 --> 00:06:34,240
pointed in the proper direction then the

166
00:06:38,870 --> 00:06:35,759
mission specialist

167
00:06:39,990 --> 00:06:38,880
could in our case begin pointing the ips

168
00:06:41,990 --> 00:06:40,000
the pointing system that had the

169
00:06:43,909 --> 00:06:42,000
telescopes begin pointing it more

170
00:06:46,150 --> 00:06:43,919
precisely sort of fine-tuning towards

171
00:06:48,230 --> 00:06:46,160
the exact star galaxy we're working on

172
00:06:49,909 --> 00:06:48,240
we had troubles with the uh with the

173
00:06:51,430 --> 00:06:49,919
automatic star trackers doing that and

174
00:06:53,430 --> 00:06:51,440
we resorted to what we call the

175
00:06:54,710 --> 00:06:53,440
old-fashioned method of hand guiding

176
00:06:56,950 --> 00:06:54,720
this was done with a lot of help from

177
00:06:58,629 --> 00:06:56,960
the ground which ron will talk about

178
00:07:00,070 --> 00:06:58,639
one of the really great things that

179
00:07:02,870 --> 00:07:00,080
happened this mission was to watch

180
00:07:04,629 --> 00:07:02,880
within one 12-hour shift of bringing up

181
00:07:06,950 --> 00:07:04,639
a whole new way of operating where we

182
00:07:09,270 --> 00:07:06,960
had the johnson space center mission

183
00:07:11,830 --> 00:07:09,280
control center operating the instrument

184
00:07:13,670 --> 00:07:11,840
pointing system commanding it

185
00:07:15,350 --> 00:07:13,680
and the experimenters at the payload

186
00:07:18,710 --> 00:07:15,360
operations control center in huntsville

187
00:07:20,710 --> 00:07:18,720
commanding the the telescopes

188
00:07:26,390 --> 00:07:20,720

and us on board doing the target

189
00:07:29,350 --> 00:07:27,670
towards the end of the mission our

190
00:07:31,430 --> 00:07:29,360
efficiency was getting up to the point

191
00:07:33,749 --> 00:07:31,440
where we were observing just as many

192
00:07:39,110 --> 00:07:33,759
targets if as if we had

193
00:07:48,629 --> 00:07:41,430
so we were we and the scientists also

194
00:07:52,870 --> 00:07:50,870
we were divided into two teams a red

195
00:07:54,150 --> 00:07:52,880
team and a blue team this is the blue

196
00:07:55,510 --> 00:07:54,160
team getting out of bed in the morning

197
00:07:57,189 --> 00:07:55,520
ready to go to work

198
00:07:59,430 --> 00:07:57,199
we tried to maintain a lot of discipline

199
00:08:01,990 --> 00:07:59,440
and do everything by the numbers so

200
00:08:06,070 --> 00:08:02,000
we're going to work by the numbers here

201
00:08:10,070 --> 00:08:08,550
it was a little crowded down there

202
00:08:12,309 --> 00:08:10,080
these wide-angle views make it seem

203
00:08:14,070 --> 00:08:12,319
bigger than it was

204
00:08:15,830 --> 00:08:14,080
it's always fun to experiment in

205
00:08:17,830 --> 00:08:15,840
weightlessness with

206
00:08:20,790 --> 00:08:17,840
things like bubbles of water here and

207
00:08:28,309 --> 00:08:20,800
and observe the dynamics of that

208
00:08:28,319 --> 00:08:42,949
jeff was a little thirsty i guess

209
00:08:48,070 --> 00:08:44,870
meal time is very important a chance to

210
00:08:50,870 --> 00:08:48,080
relax and recap the events of the day

211
00:08:52,710 --> 00:08:50,880
and play with your food a little bit the

212
00:08:54,470 --> 00:08:52,720
school kids we show these two always

213
00:08:58,630 --> 00:08:54,480

like those scenes

214
00:09:00,230 --> 00:08:58,640
some more fluid dynamics experiments

215
00:09:11,430 --> 00:09:00,240
hygiene is very important we

216
00:09:14,949 --> 00:09:13,269
where does that water go

217
00:09:16,949 --> 00:09:14,959
just living in the spaceship creates a

218
00:09:18,790 --> 00:09:16,959
lot of wastewater of course

219
00:09:20,630 --> 00:09:18,800
and normally that's held in a storage

220
00:09:22,389 --> 00:09:20,640
tank and every day or so

221
00:09:24,070 --> 00:09:22,399
we dump that out into space which is

222
00:09:26,150 --> 00:09:24,080
really a gorgeous site if you get the

223
00:09:28,310 --> 00:09:26,160
sun angle just right

224
00:09:30,790 --> 00:09:28,320
it looks like a snow storm or a blizzard

225
00:09:33,430 --> 00:09:30,800
or a heavy heavy rainstorm

226
00:09:35,590 --> 00:09:33,440
really spectacular out the window

227
00:09:37,910 --> 00:09:35,600
as you see this

228
00:09:40,150 --> 00:09:37,920
we had a little clog in the line that

229
00:09:41,910 --> 00:09:40,160
dumped that water overboard so

230
00:09:43,910 --> 00:09:41,920
toward the end of the mission

231
00:09:46,389 --> 00:09:43,920
we rigged up some tubing and and were

232
00:09:48,550 --> 00:09:46,399
able to transfer that waste water

233
00:09:52,790 --> 00:09:48,560
into storage bags on the inside of the

234
00:09:56,550 --> 00:09:54,710
well throughout all this

235
00:09:58,710 --> 00:09:56,560
problems with the orbiter plumbing we

236
00:10:01,350 --> 00:09:58,720
kept right on trucking as far as the

237
00:10:02,790 --> 00:10:01,360
observations and kept getting good

238
00:10:04,389 --> 00:10:02,800

science data

239
00:10:06,470 --> 00:10:04,399
throughout and i'd say really all of

240
00:10:11,269 --> 00:10:06,480
these problems were no more than a minor

241
00:10:14,310 --> 00:10:13,190
we had four people on board who have

242
00:10:16,470 --> 00:10:14,320
actually

243
00:10:19,110 --> 00:10:16,480
at various times in our careers have

244
00:10:21,670 --> 00:10:19,120
taught in universities so we

245
00:10:23,190 --> 00:10:21,680
took this idea of teachers in space and

246
00:10:25,910 --> 00:10:23,200
and the interest that nasa has in

247
00:10:27,269 --> 00:10:25,920
education and we actually taught some

248
00:10:30,310 --> 00:10:27,279
lessons

249
00:10:32,470 --> 00:10:30,320
direct to classrooms on the ground with

250
00:10:34,710 --> 00:10:32,480
students here's sam talking about the

251
00:10:37,590 --> 00:10:34,720
electromagnetic spectrum

252
00:10:39,590 --> 00:10:37,600
showing why we go into space to see some

253
00:10:42,069 --> 00:10:39,600
of the radiation which we can't observe

254
00:10:45,350 --> 00:10:42,079
from the ground and the students

255
00:10:47,590 --> 00:10:45,360
on the ground heard this in in real time

256
00:10:49,590 --> 00:10:47,600
after sam finish i i took over to talk a

257
00:10:51,750 --> 00:10:49,600
little bit about

258
00:10:53,430 --> 00:10:51,760
space operations we're going to give the

259
00:10:57,190 --> 00:10:53,440
students a chance to ask some questions

260
00:11:00,949 --> 00:10:58,150
i guess

261
00:11:02,790 --> 00:11:00,959
some of you have heard about my tie-in

262
00:11:03,990 --> 00:11:02,800
space which i wanted to demonstrate

263
00:11:06,470 --> 00:11:04,000

before the

264
00:11:09,350 --> 00:11:06,480
the actual lesson

265
00:11:11,110 --> 00:11:09,360
i think it uh turned out to be a big hit

266
00:11:14,310 --> 00:11:11,120
with the students and and hopefully it

267
00:11:16,710 --> 00:11:14,320
will inspire some of them to go on and

268
00:11:18,230 --> 00:11:16,720
and study hard and and perhaps go on to

269
00:11:19,910 --> 00:11:18,240
do some work in astrophysics or

270
00:11:21,990 --> 00:11:19,920
astronautics themselves because that of

271
00:11:23,509 --> 00:11:22,000
course is what these projects are all

272
00:11:25,269 --> 00:11:23,519
about

273
00:11:27,030 --> 00:11:25,279
the other shift kept on observing while

274
00:11:28,870 --> 00:11:27,040
we were teaching this lesson and here i

275
00:11:30,870 --> 00:11:28,880
am showing something about how we

276
00:11:33,430 --> 00:11:30,880
observe up on the flight deck

277
00:11:35,269 --> 00:11:33,440
and then after we uh shifted and took

278
00:11:36,550 --> 00:11:35,279
over these students had a chance to ask

279
00:11:38,069 --> 00:11:36,560
questions

280
00:11:43,430 --> 00:11:38,079
took a lot of work on the part of a lot

281
00:11:48,069 --> 00:11:45,990
continuing on in the educational vein

282
00:11:49,829 --> 00:11:48,079
one of our midnight experiments the

283
00:11:50,870 --> 00:11:49,839
shuttle amateur radio experiment or

284
00:11:52,790 --> 00:11:50,880
psarx

285
00:11:55,269 --> 00:11:52,800
head is one of its main objectives to

286
00:11:57,030 --> 00:11:55,279
allow students at various places around

287
00:11:58,550 --> 00:11:57,040
the united states the opportunity to

288
00:12:01,269 --> 00:11:58,560

interact directly

289
00:12:04,790 --> 00:12:01,279
with the shuttle crew

290
00:12:06,230 --> 00:12:04,800
we talked to 28 groups of students

291
00:12:08,790 --> 00:12:06,240
and

292
00:12:12,069 --> 00:12:08,800
many other people just private citizens

293
00:12:16,629 --> 00:12:14,629
in a lot of ways this flight was uh

294
00:12:19,030 --> 00:12:16,639
a preview of what's to come in in the

295
00:12:20,550 --> 00:12:19,040
space station world when we finally get

296
00:12:22,710 --> 00:12:20,560
a space station built

297
00:12:24,790 --> 00:12:22,720
i took the time to put together a short

298
00:12:27,190 --> 00:12:24,800
demonstration of of some of the space

299
00:12:28,710 --> 00:12:27,200
station issues handling trash is one of

300
00:12:31,030 --> 00:12:28,720
the major issues

301
00:12:33,350 --> 00:12:31,040
you saw how we got rid of waste water by

302
00:12:35,670 --> 00:12:33,360
dumping it overboard however any solid

303
00:12:36,470 --> 00:12:35,680
trash we accumulate and over the course

304
00:12:37,990 --> 00:12:36,480
of

305
00:12:40,150 --> 00:12:38,000
nine days with seven people you

306
00:12:40,949 --> 00:12:40,160
accumulate a lot of trash

307
00:12:42,790 --> 00:12:40,959
and

308
00:12:44,629 --> 00:12:42,800
finding places to stow this trash is

309
00:12:46,550 --> 00:12:44,639
always a major problem it gets more

310
00:12:47,430 --> 00:12:46,560
important to solve the longer you fly in

311
00:12:50,470 --> 00:12:47,440
space

312
00:12:53,350 --> 00:12:50,480
we had a trash compactor experiment here

313
00:12:55,350 --> 00:12:53,360

that allowed us to compress the trash by

314
00:12:57,829 --> 00:12:55,360
a factor of three or four

315
00:13:00,069 --> 00:12:57,839
and you see bob extracting this

316
00:13:00,949 --> 00:13:00,079
bag of compressed trash

317
00:13:03,910 --> 00:13:00,959
in a

318
00:13:05,430 --> 00:13:03,920
odor-tight water-tight bag that worked

319
00:13:07,750 --> 00:13:05,440
very well and

320
00:13:09,750 --> 00:13:07,760
allowed us to store that stuff much more

321
00:13:12,389 --> 00:13:09,760
densely

322
00:13:14,310 --> 00:13:12,399
well after uh several days of really

323
00:13:16,310 --> 00:13:14,320
pathfinding ultraviolet observations it

324
00:13:18,389 --> 00:13:16,320
was time to put the instrument pointing

325
00:13:19,430 --> 00:13:18,399
system to bed

326
00:13:20,790 --> 00:13:19,440
lower it

327
00:13:22,230 --> 00:13:20,800
and lock it into the payload bay and

328
00:13:23,750 --> 00:13:22,240
come home

329
00:13:25,750 --> 00:13:23,760
now we were up there to do astronomy and

330
00:13:28,629 --> 00:13:25,760
we could tell from what we had seen that

331
00:13:30,870 --> 00:13:28,639
that we had reaped an immense harvest of

332
00:13:32,949 --> 00:13:30,880
data in ultraviolet astronomy

333
00:13:35,350 --> 00:13:32,959
it was clear from what we saw in the

334
00:13:39,990 --> 00:13:35,360
ground that we had a successful

335
00:13:43,670 --> 00:13:41,910
it was time to come home first of all we

336
00:13:46,470 --> 00:13:43,680
checked out the orbiter

337
00:13:48,069 --> 00:13:46,480
systems started up an apu and cycled the

338
00:13:50,310 --> 00:13:48,079

flight controls and checked out all the

339
00:13:53,990 --> 00:13:50,320
sensors that we use in re-entering the

340
00:13:58,069 --> 00:13:56,069
and here's a picture you see of the

341
00:14:00,230 --> 00:13:58,079
elevons that we're cycling to make sure

342
00:14:01,990 --> 00:14:00,240
that they all work properly this is not

343
00:14:06,069 --> 00:14:02,000
to be confused with this is the way we

344
00:14:10,230 --> 00:14:07,910
but we checked all this stuff out the

345
00:14:11,910 --> 00:14:10,240
day or so before we came back and it all

346
00:14:13,350 --> 00:14:11,920
worked fine and we knew we were had a

347
00:14:15,910 --> 00:14:13,360
good ship for re-entering the earth's

348
00:14:24,230 --> 00:14:15,920
atmosphere after uh nine days up in

349
00:14:28,230 --> 00:14:26,069
well ron and i were the rookies on this

350
00:14:29,829 --> 00:14:28,240
flight and

351
00:14:31,990 --> 00:14:29,839
it's it's really hard to describe and

352
00:14:34,150 --> 00:14:32,000
certainly to put in words or in video

353
00:14:35,670 --> 00:14:34,160
the feelings that you have when you're

354
00:14:36,949 --> 00:14:35,680
watching this it's really an awesome

355
00:14:38,870 --> 00:14:36,959
experience

356
00:14:41,350 --> 00:14:38,880
the first thing you notice is uh how

357
00:14:44,069 --> 00:14:41,360
fast you're going you're traveling about

358
00:14:45,350 --> 00:14:44,079
five miles a second which takes you oh

359
00:14:51,030 --> 00:14:45,360
eight or ten minutes to go all the way

360
00:14:58,870 --> 00:14:54,230
and the earth as seen from there is

361
00:15:02,230 --> 00:15:00,310
one of the things we got to do was a lot

362
00:15:03,750 --> 00:15:02,240
of nighttime observing we were an

363
00:15:05,430 --> 00:15:03,760

observatory

364
00:15:08,949 --> 00:15:05,440
this uh

365
00:15:11,430 --> 00:15:08,959
moon set here is we saw many of those

366
00:15:13,350 --> 00:15:11,440
and at night we had the cabin darkened

367
00:15:15,670 --> 00:15:13,360
so that we got a fairly unique view of

368
00:15:17,189 --> 00:15:15,680
the dark earth because we were dark

369
00:15:19,910 --> 00:15:17,199
adapted in the cabin

370
00:15:21,590 --> 00:15:19,920
and we could see the airglow layer at 95

371
00:15:22,870 --> 00:15:21,600
kilometers and we could see the cities

372
00:15:25,509 --> 00:15:22,880
float by

373
00:15:28,230 --> 00:15:25,519
with lights we could see the us about a

374
00:15:31,750 --> 00:15:28,240
third of the united states at once as we

375
00:15:36,389 --> 00:15:33,990
well this is our

376
00:15:38,150 --> 00:15:36,399
final sunset on the payload bay before

377
00:15:41,030 --> 00:15:38,160
we close the doors

378
00:15:43,750 --> 00:15:41,040
and came home with a very

379
00:15:51,269 --> 00:15:43,760
deep rich harvest of ultraviolet

380
00:15:55,269 --> 00:15:53,509
we landed at night and so in order to

381
00:15:56,710 --> 00:15:55,279
see the shuttle we use these infrared

382
00:15:57,910 --> 00:15:56,720
cameras because the shuttle has no

383
00:15:59,430 --> 00:15:57,920
lights on it and you wouldn't be able to

384
00:16:01,189 --> 00:15:59,440
see us at this point otherwise so this

385
00:16:03,509 --> 00:16:01,199
is infrared photography on the outer

386
00:16:05,350 --> 00:16:03,519
glide slope

387
00:16:07,430 --> 00:16:05,360
with a heavy orbiter we came down on

388
00:16:09,590 --> 00:16:07,440

glide slope at 17 degrees rather than

389
00:16:11,110 --> 00:16:09,600
the 19 degree glide slope of the lighter

390
00:16:12,790 --> 00:16:11,120
vehicles

391
00:16:14,310 --> 00:16:12,800
i consider this the most important part

392
00:16:16,389 --> 00:16:14,320
of the mission right here as the pilot

393
00:16:18,470 --> 00:16:16,399
gets to lower the landing gear

394
00:16:21,509 --> 00:16:18,480
and then vance brought it in for

395
00:16:24,389 --> 00:16:21,519
just a super smooth landing on the hard

396
00:16:26,150 --> 00:16:24,399
surface runway at edwards runway 2-2

397
00:16:27,670 --> 00:16:26,160
right on air speed right distance down

398
00:16:29,030 --> 00:16:27,680
the runway just just the way it ought to

399
00:16:30,310 --> 00:16:29,040
be done

400
00:16:32,150 --> 00:16:30,320
you can see the

401
00:16:37,829 --> 00:16:32,160
gear heat up immediately as they touch

402
00:16:41,350 --> 00:16:39,910
this is what it looks like visually our

403
00:16:42,949 --> 00:16:41,360
family's got to watch this from the end

404
00:16:44,230 --> 00:16:42,959
of the runway and so just spectacular to

405
00:16:46,150 --> 00:16:44,240
not be able to see anything and all of a

406
00:16:48,310 --> 00:16:46,160
sudden this huge shuttle just comes

407
00:16:50,470 --> 00:16:48,320
roaring into the field of view

408
00:16:52,150 --> 00:16:50,480
back to infrared you can see the hot

409
00:16:53,749 --> 00:16:52,160
spots or the white things you see there

410
00:16:55,670 --> 00:16:53,759
the nose of the orbiter is still pretty

411
00:16:57,910 --> 00:16:55,680
hot from its reentry

412
00:17:00,310 --> 00:16:57,920
and the flames you see on the back just

413
00:17:02,150 --> 00:17:00,320

in front of the vertical tail are the

414
00:17:04,710 --> 00:17:02,160
exhaust from our auxiliary power units

415
00:17:07,350 --> 00:17:04,720
the apu's and they are they work by

416
00:17:09,270 --> 00:17:07,360
pulsing the hydrazine

417
00:17:10,870 --> 00:17:09,280
and turning the

418
00:17:12,390 --> 00:17:10,880
motors that keep the hydraulic system

419
00:17:14,870 --> 00:17:12,400
powered and so it looks you see that

420
00:17:15,590 --> 00:17:14,880
kind of engine puffy look coming out of

421
00:17:26,949 --> 00:17:15,600
the

422
00:17:28,309 --> 00:17:26,959
vance did a great job we were

423
00:17:30,230 --> 00:17:28,319
folks came up and said i'd never seen an

424
00:17:31,510 --> 00:17:30,240
orbiter that was parked so precisely on

425
00:17:34,390 --> 00:17:31,520
the center line of runway when it came

426
00:17:34,400 --> 00:17:39,350
the end of just a wonderful mission

427
00:17:42,870 --> 00:17:41,350
here we are coming down the

428
00:17:45,110 --> 00:17:42,880
stairway

429
00:17:46,870 --> 00:17:45,120
you can see we're pleased to

430
00:17:49,029 --> 00:17:46,880
be home we really enjoyed the trip but

431
00:17:50,710 --> 00:17:49,039
it's always nice to get home

432
00:17:53,510 --> 00:17:50,720
all of us were probably

433
00:17:56,230 --> 00:17:53,520
an inch or two taller than uh normal

434
00:17:59,510 --> 00:17:56,240
that point having stretched out a bit in

435
00:18:04,070 --> 00:18:01,750
once again our patch