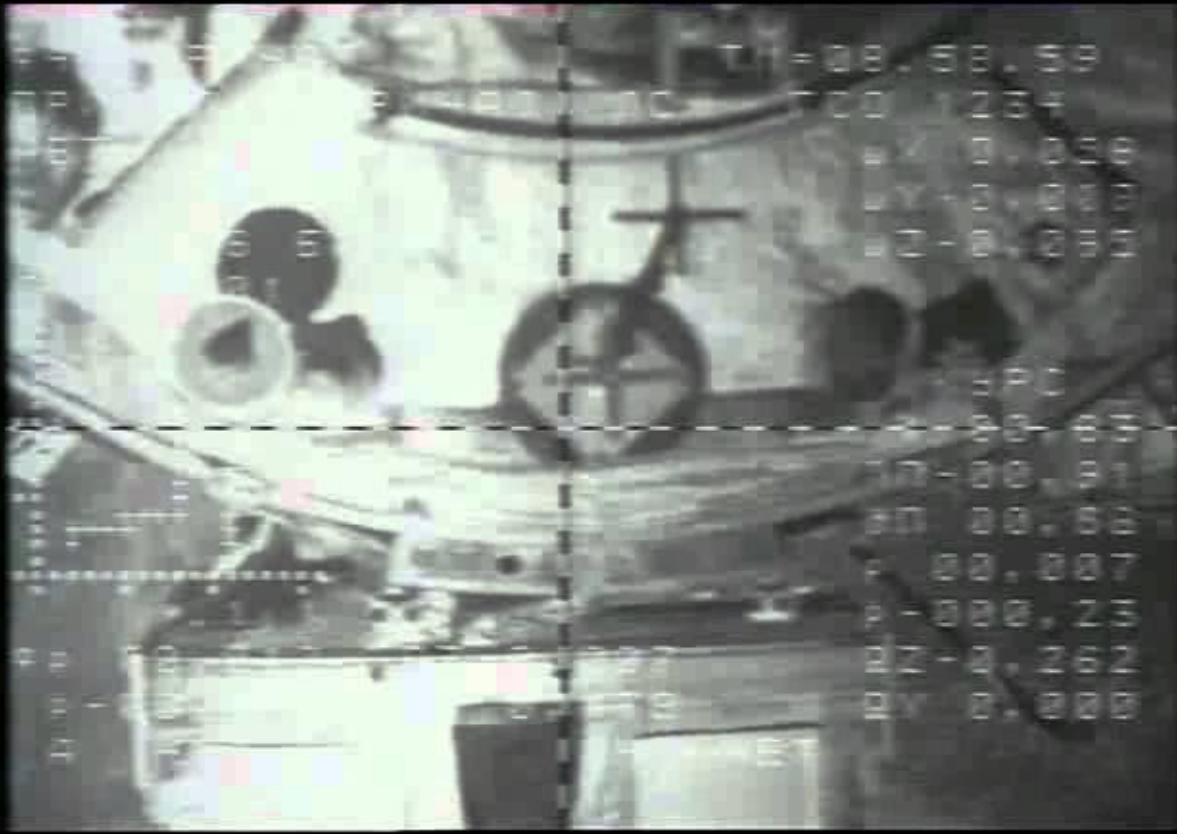

1
00:00:36,900 --> 00:01:33,990
you

2
00:01:37,680 --> 00:01:35,910
and joining us this morning from aboard

3
00:01:39,750 --> 00:01:37,690
Columbia our mission specialist Mike

4
00:01:41,700 --> 00:01:39,760
Earnhardt and payload specialist Roger

5
00:01:45,050 --> 00:01:41,710
crowd we crouched we say good morning to

6
00:01:48,630 --> 00:01:45,060
you and welcome to night side gentlemen

7
00:01:50,400 --> 00:01:48,640
good morning how are you doing great and

8
00:01:52,260 --> 00:01:50,410
you all look wonderful i should point

9
00:01:54,090 --> 00:01:52,270
out that when it comes to that

10
00:01:56,760 --> 00:01:54,100
sporting-goods equipment you are talking

11
00:01:58,980 --> 00:01:56,770
about golf clubs the information that we

12
00:02:00,270 --> 00:01:58,990
received we have to point out that's not

13
00:02:02,070 --> 00:02:00,280

the main reason you're flying in space

14
00:02:04,590 --> 00:02:02,080
although some golfers would be flattered

15
00:02:07,889 --> 00:02:04,600
first of all a primary objective of your

16
00:02:15,180 --> 00:02:07,899
mission is micro gravity science explain

17
00:02:18,720 --> 00:02:15,190
that fourth microgravity science is

18
00:02:20,880 --> 00:02:18,730
really just what people multi think of

19
00:02:23,880 --> 00:02:20,890
as laboratory sciences like physics and

20
00:02:25,710 --> 00:02:23,890
chemistry and biology and convention

21
00:02:27,810 --> 00:02:25,720
science and material science that's done

22
00:02:30,000 --> 00:02:27,820
in space and the reason for the micro

23
00:02:32,310 --> 00:02:30,010
means that there's a microgravity

24
00:02:34,350 --> 00:02:32,320
environment that means about one part in

25
00:02:36,570 --> 00:02:34,360
a million of the Earth's normal gravity

26
00:02:38,070 --> 00:02:36,580
and what that does is allow you to study

27
00:02:40,590 --> 00:02:38,080
things with that the influence of

28
00:02:42,060 --> 00:02:40,600
gravity which scientists have wanted to

29
00:02:44,210 --> 00:02:42,070
do for hundreds of years and we finally

30
00:02:47,310 --> 00:02:44,220
getting a chance to start doing it

31
00:02:49,350 --> 00:02:47,320
alright your crew has been setting fires

32
00:02:50,789 --> 00:02:49,360
during these experiments and it sounds a

33
00:02:52,500 --> 00:02:50,799
little scary now what's the purpose and

34
00:03:01,720 --> 00:02:52,510
can you explain the behavior of flames

35
00:03:06,160 --> 00:03:04,119
I think either the question is why are

36
00:03:09,550 --> 00:03:06,170
we studying fires up in weightlessness

37
00:03:11,170 --> 00:03:09,560
and there's a couple of good answers to

38
00:03:14,110 --> 00:03:11,180

that one is that it's really impossible

39
00:03:17,140 --> 00:03:14,120
to truly understand fires on earth

40
00:03:20,170 --> 00:03:17,150
because of the fact that to give you a

41
00:03:22,449 --> 00:03:20,180
simple example if you light a match you

42
00:03:25,479 --> 00:03:22,459
instantly create warm air which rises

43
00:03:28,030 --> 00:03:25,489
because women weighs less than colder

44
00:03:31,000 --> 00:03:28,040
air and that convective process of the

45
00:03:33,520 --> 00:03:31,010
warm air rising carries the fuel away

46
00:03:35,259 --> 00:03:33,530
from the fire and tremendously

47
00:03:37,660 --> 00:03:35,269
complicates the combustion process

48
00:03:40,240 --> 00:03:37,670
making it difficult for us to really

49
00:03:42,640 --> 00:03:40,250
understand the basic physics and

50
00:03:44,319 --> 00:03:42,650
chemistry of combustion and some of the

51
00:03:46,390 --> 00:03:44,329
experiments there Roger and the payload

52
00:03:48,729 --> 00:03:46,400
crew are doing up here will allow us to

53
00:03:51,130 --> 00:03:48,739
more fundamentally understand combustion

54
00:03:53,289 --> 00:03:51,140
which is really important to our life on

55
00:03:55,089 --> 00:03:53,299
Earth so it turns out about ninety

56
00:03:56,979 --> 00:03:55,099
percent of the energy that drives our

57
00:03:59,110 --> 00:03:56,989
whole society comes from combusting

58
00:04:01,599 --> 00:03:59,120
fuels and if some of the research that

59
00:04:04,300 --> 00:04:01,609
these guys are doing up here can improve

60
00:04:06,849 --> 00:04:04,310
combustion only one or two percent that

61
00:04:08,740 --> 00:04:06,859
will save billions a year into our

62
00:04:12,789 --> 00:04:08,750
economy and also result in less

63
00:04:14,680 --> 00:04:12,799

pollutants I want to ask you Michael

64
00:04:17,080 --> 00:04:14,690
what do you think about the Mars

65
00:04:21,129 --> 00:04:17,090
Pathfinder news what's the reaction of

66
00:04:23,350 --> 00:04:21,139
the crew there we're all just

67
00:04:26,409 --> 00:04:23,360
tremendously excited about the Mars

68
00:04:28,420 --> 00:04:26,419
Pathfinder it's a tremendous engineering

69
00:04:30,000 --> 00:04:28,430
accomplishment in a great tribute to the

70
00:04:33,610 --> 00:04:30,010
folks at NASA in the Jet Propulsion

71
00:04:35,529 --> 00:04:33,620
Laboratory we also feel very clear rates

72
00:04:37,300 --> 00:04:35,539
to be orbiting the Earth in the space

73
00:04:41,170 --> 00:04:37,310
shuttle Columbia during this historic

74
00:04:43,420 --> 00:04:41,180
occasion I think that symbolizes the

75
00:04:47,230 --> 00:04:43,430
synergistic role between humans and

76
00:04:49,480 --> 00:04:47,240
robots in space exploration it turns out

77
00:04:51,339 --> 00:04:49,490
the Pathfinder and several robotic

78
00:04:55,810 --> 00:04:51,349
spacecraft that are planned behind it

79
00:04:57,969 --> 00:04:55,820
will help document the conditions on

80
00:05:00,640 --> 00:04:57,979
Mars in terms of the atmosphere and a

81
00:05:03,490 --> 00:05:00,650
planet surface in that information will

82
00:05:05,920 --> 00:05:03,500
help us design a spacecraft system that

83
00:05:08,620 --> 00:05:05,930
could carry humans to Mars in the future

84
00:05:11,290 --> 00:05:08,630
to help colonize Mars and and the other

85
00:05:20,290 --> 00:05:11,300
planets and so we're just tremendously

86
00:05:27,760 --> 00:05:24,010
being reduced can you see this nebulous

87
00:05:31,570 --> 00:05:27,770
what get report it's 120 degrees away

88
00:05:36,550 --> 00:05:31,580

based on the grid squares maybe even

89
00:05:42,350 --> 00:05:36,560
closer than that for you the velocities

90
00:05:44,809 --> 00:05:42,360
point zero okay the jitters firing the

91
00:05:46,370 --> 00:05:44,819
progress resupply ship has television

92
00:05:49,040 --> 00:05:46,380
cameras providing this view of the

93
00:05:52,210 --> 00:05:49,050
docking target at the back of the cove

94
00:05:56,899 --> 00:05:52,220
on one module on the MIR space station

95
00:06:02,080 --> 00:05:56,909
this it's about half a degree upwards of

96
00:06:10,370 --> 00:06:02,090
the crosshairs the distance is about

97
00:06:13,070 --> 00:06:10,380
four meters you will fade you tonight

98
00:06:15,230 --> 00:06:13,080
let's about a slightly a profitable part

99
00:06:18,110 --> 00:06:15,240
was really horizontal line before you

100
00:06:20,149 --> 00:06:18,120
put it by the potato lady right here

101
00:06:24,140 --> 00:06:20,159
well it's going down now it's all right

102
00:06:39,370 --> 00:06:24,150
there is captured there's contact with

103
00:06:45,490 --> 00:06:42,610
it also states that four LIF I'm

104
00:06:48,760 --> 00:06:45,500
complete through steps p dot 27 then

105
00:06:56,200 --> 00:06:48,770
we'll wait for the experiment go time in

106
00:07:16,879 --> 00:06:56,210
the pcap to continue okay Dom we copy

107
00:07:35,429 --> 00:07:22,399
first column 506 echo eight Niner five

108
00:07:45,089 --> 00:07:35,439
118 1685 5160 1 147 k 6 5 11 30 7 second

109
00:07:50,509 --> 00:07:45,099
column 6148 19 and 64 x alpha 10 to 50

110
00:07:53,329 --> 00:07:50,519
repeated four times 5 52 I hope the

111
00:07:56,069 --> 00:07:53,339
adjustment points in the US which here

112
00:07:58,499 --> 00:07:56,079
and we think we do you may actually have

113
00:08:00,899 --> 00:07:58,509

to just up we're quite unsure about the

114
00:08:02,969 --> 00:08:00,909
smoke ID on this one because basically

115
00:08:09,509 --> 00:08:02,979
completely threw us off the map previous

116
00:08:11,069 --> 00:08:09,519
test okay I copy that and I guess we'll

117
00:08:13,889 --> 00:08:11,079
letter to go here so if they spoke to

118
00:08:16,859 --> 00:08:13,899
your words of wisdom and reported it

119
00:08:18,299 --> 00:08:16,869
burn keep talking keep on talking to

120
00:08:21,059 --> 00:08:18,309
alan who can talk to me during the birth

121
00:08:22,350 --> 00:08:21,069
so we can work it out we were always I

122
00:08:23,369 --> 00:08:22,360
thanks for all your help on this we're

123
00:08:28,799 --> 00:08:23,379
looking forward to this one this will be

124
00:08:30,419 --> 00:08:28,809
interesting putting a good word for it

125
00:08:35,040 --> 00:08:30,429
to everybody on the same one can you

126
00:08:37,079 --> 00:08:35,050
guys doing a great job we big likewise

127
00:08:38,699 --> 00:08:37,089
in Reverse even when I've done a great

128
00:08:44,309 --> 00:08:38,709
job force us far nor we think if your

129
00:08:46,040 --> 00:08:44,319
help yes we're ready for the downlink if

130
00:08:48,749 --> 00:08:46,050
you if you have it all right Jebidiah

131
00:08:53,579 --> 00:08:48,759
yes sir we got a great view from the a

132
00:08:55,110 --> 00:08:53,589
flight deck okay great we have a little

133
00:08:58,110 --> 00:08:55,120
red tape you about four minutes long

134
00:09:00,179 --> 00:08:58,120
with the nice variety of science and

135
00:09:02,790 --> 00:09:00,189
living in space stuff on it so let me go

136
00:09:10,610 --> 00:09:02,800
to play and we will start narrating the

137
00:09:15,690 --> 00:09:13,770
hey Jim we just hit the k-band worm how

138
00:09:17,700 --> 00:09:15,700

about holding up on the down link for my

139
00:09:19,950 --> 00:09:17,710
first here you see a fatal me back in

140
00:09:22,470 --> 00:09:19,960
the lab earlier today one of my duties

141
00:09:25,380 --> 00:09:22,480
just about every day is the videotape a

142
00:09:28,830 --> 00:09:25,390
stroke PG ba this is part of the Express

143
00:09:30,420 --> 00:09:28,840
rack and the part that of interest here

144
00:09:32,490 --> 00:09:30,430
are the plants that you see right here

145
00:09:33,810 --> 00:09:32,500
some of the screen inspires I think

146
00:09:35,790 --> 00:09:33,820
there might be some humidity on the

147
00:09:38,010 --> 00:09:35,800
camera lives but beyond that you can see

148
00:09:39,540 --> 00:09:38,020
some of the green plants growing if i

149
00:09:42,980 --> 00:09:39,550
remember correctly we have some sage

150
00:09:45,870 --> 00:09:42,990
some pine saplings some periwinkle

151
00:09:47,310 --> 00:09:45,880
spinach is growing in there and i would

152
00:09:48,870 --> 00:09:47,320
be hard pressed to tell you which one is

153
00:09:50,280 --> 00:09:48,880
which we also get several different

154
00:09:52,230 --> 00:09:50,290
views this is another view of some of

155
00:09:53,490 --> 00:09:52,240
the plants that are going in there over

156
00:09:55,080 --> 00:09:53,500
the last few days that I've been doing

157
00:09:58,440 --> 00:09:55,090
this video I have been able to see that

158
00:10:00,690 --> 00:09:58,450
they are growing one thing people always

159
00:10:02,550 --> 00:10:00,700
ask us what it's like living us see

160
00:10:05,100 --> 00:10:02,560
Regina yeah I'm trying to demonstrate

161
00:10:07,050 --> 00:10:05,110
what flex try and sit down what happens

162
00:10:08,340 --> 00:10:07,060
is that just you starts floating away

163
00:10:10,220 --> 00:10:08,350

and then you quickly get away from the

164
00:10:12,510 --> 00:10:10,230
thing you're sitting on and you can't

165
00:10:14,760 --> 00:10:12,520
can't get back very well until you reach

166
00:10:17,670 --> 00:10:14,770
the ceiling they coming up next I'm

167
00:10:20,250 --> 00:10:17,680
gonna try and walk and a similar problem

168
00:10:23,100 --> 00:10:20,260
happens so we need to modify it maybe

169
00:10:24,510 --> 00:10:23,110
two things space here you can sort of

170
00:10:26,460 --> 00:10:24,520
hold yourself down but as soon as you

171
00:10:30,510 --> 00:10:26,470
let go you quickly move away and walking

172
00:10:33,600 --> 00:10:30,520
is not very practical every morning we

173
00:10:36,140 --> 00:10:33,610
have to tape in procedure changes to our

174
00:10:40,200 --> 00:10:36,150
books and so first few times we do this

175
00:10:41,790 --> 00:10:40,210
it thinks it's not quite as smooth as it

176
00:10:44,310 --> 00:10:41,800
is after a few days put the book down

177
00:10:45,660 --> 00:10:44,320
book comes up with hook down give it a

178
00:10:47,370 --> 00:10:45,670
good press so it stays there as well

179
00:10:49,110 --> 00:10:47,380
comes back up with this paper down is

180
00:10:50,670 --> 00:10:49,120
going on top of the book getting both

181
00:10:53,160 --> 00:10:50,680
breasts so they stay down they come back

182
00:10:54,570 --> 00:10:53,170
up and grab his tape and court trying

183
00:10:56,520 --> 00:10:54,580
tape it down quickly as soon as you have

184
00:10:59,310 --> 00:10:56,530
a few things going on it gets out of

185
00:11:02,340 --> 00:10:59,320
control but then we have things to help

186
00:11:03,600 --> 00:11:02,350
us so we reach her a bag and try and get

187
00:11:05,910 --> 00:11:03,610
out one of those things that will help

188
00:11:08,280 --> 00:11:05,920

us and this is where anti-gravity comes

189
00:11:10,500 --> 00:11:08,290
into sex not zero gravity it's

190
00:11:13,200 --> 00:11:10,510
anti-gravity things coming out of

191
00:11:15,660 --> 00:11:13,210
packages as though they're being held by

192
00:11:22,530 --> 00:11:15,670
some other force and we have to

193
00:11:28,390 --> 00:11:25,450
here I'm working on the large isothermal

194
00:11:29,950 --> 00:11:28,400
furnace this is odd facility built by

195
00:11:31,630 --> 00:11:29,960
the Japanese this is the fourth time

196
00:11:33,250 --> 00:11:31,640
that it's flown in space and I've had

197
00:11:34,780 --> 00:11:33,260
the great pleasure and honor flying with

198
00:11:37,510 --> 00:11:34,790
it on three of the four times and it's

199
00:11:39,280 --> 00:11:37,520
been in space this is one of the

200
00:11:41,260 --> 00:11:39,290
international experiments and payloads

201
00:11:43,480 --> 00:11:41,270
that we have on board we have other ones

202
00:11:46,060 --> 00:11:43,490
from Germany another major facility

203
00:11:47,560 --> 00:11:46,070
tempest and these are two other major

204
00:11:49,480 --> 00:11:47,570
partners putting together the

205
00:11:52,600 --> 00:11:49,490
International Space Station I'm putting

206
00:11:54,790 --> 00:11:52,610
a sample in here for diffusion processes

207
00:11:55,990 --> 00:11:54,800
involved semiconductors comes from my

208
00:11:58,000 --> 00:11:56,000
alma mater Case Western Reserve

209
00:12:00,520 --> 00:11:58,010
University up in Cleveland Ohio and the

210
00:12:03,400 --> 00:12:00,530
P is Dave Matheson and we're looking at

211
00:12:04,570 --> 00:12:03,410
how certain impurities and dopants and

212
00:12:06,460 --> 00:12:04,580
some semiconductor materials

213
00:12:08,320 --> 00:12:06,470

particularly germanium which is a

214
00:12:13,510 --> 00:12:08,330
technological importance for

215
00:12:15,250 --> 00:12:13,520
electro-optic devices all the things is

216
00:12:17,350 --> 00:12:15,260
very important to the flight crew is to

217
00:12:19,420 --> 00:12:17,360
exercise his face the lower part of the

218
00:12:20,890 --> 00:12:19,430
body doesn't get used in space like it

219
00:12:23,320 --> 00:12:20,900
does on the earth so you have to come up

220
00:12:25,540 --> 00:12:23,330
with inventive ways of stretching your

221
00:12:27,940 --> 00:12:25,550
muscles and working your muscles so that

222
00:12:32,410 --> 00:12:27,950
your muscles are atrophied due to lack

223
00:12:34,870 --> 00:12:32,420
of use it's also after a few days in

224
00:12:37,480 --> 00:12:34,880
space we start with calcium in our burn

225
00:12:41,320 --> 00:12:37,490
so it's important to put some force on

226
00:12:43,450 --> 00:12:41,330
your legs so that that can be reduced as

227
00:12:45,970 --> 00:12:43,460
much as possible it'll take us a good

228
00:12:47,770 --> 00:12:45,980
two weeks to feel normal after we get

229
00:12:50,980 --> 00:12:47,780
back in space and be able to work out

230
00:12:52,810 --> 00:12:50,990
normally your heart doesn't get as much

231
00:12:55,030 --> 00:12:52,820
use in space it doesn't have to pump

232
00:12:57,490 --> 00:12:55,040
blood up to our health so it's very

233
00:13:00,070 --> 00:12:57,500
important for the flight crew to work

234
00:13:02,710 --> 00:13:00,080
out cardiovascularly every day otherwise

235
00:13:05,020 --> 00:13:02,720
it would be hard to get the ball coming

236
00:13:06,730 --> 00:13:05,030
up to a head on we every day and it's

237
00:13:08,250 --> 00:13:06,740
important for the flight crew to stay

238
00:13:10,480 --> 00:13:08,260

awake

239
00:13:12,190 --> 00:13:10,490
okay well that's our crude Swiss

240
00:13:13,300 --> 00:13:12,200
downlink but today we hope they gave you

241
00:13:15,550 --> 00:13:13,310
a little bit better feel about what's

242
00:13:17,230 --> 00:13:15,560
going up on up here we'd like to take

243
00:13:18,370 --> 00:13:17,240
the subject and say hello to all of our

244
00:13:20,500 --> 00:13:18,380
loved ones back on the earth who

245
00:13:21,940 --> 00:13:20,510
hopefully get a chance to see this we we

246
00:13:23,800 --> 00:13:21,950
miss you we love you and we're looking

247
00:13:25,390 --> 00:13:23,810
forward to getting back home here at the

248
00:13:27,730 --> 00:13:25,400
end of the mission and then seeing you

249
00:13:29,290 --> 00:13:27,740
again also thanks the mysteries go for

250
00:13:30,870 --> 00:13:29,300
looking over our shoulder 24 hours a day

251
00:13:35,350 --> 00:13:30,880
and making this a successful flight

252
00:13:37,060 --> 00:13:35,360
thanks a lot see you later question this

253
00:13:38,950 --> 00:13:37,070
is one of our rack sighs when's the drop

254
00:13:40,690 --> 00:13:38,960
of combustion experiment that's the

255
00:13:44,920 --> 00:13:40,700
volume where the droplets are bird it's

256
00:13:46,270 --> 00:13:44,930
very carefully designed we have clamps

257
00:13:47,800 --> 00:13:46,280
joint when playing at that seal the

258
00:13:49,960 --> 00:13:47,810
chamber so you can open up to get inside

259
00:13:52,240 --> 00:13:49,970
to work but it's very safe when the

260
00:13:53,680 --> 00:13:52,250
hobbits themselves are burning this of

261
00:13:58,180 --> 00:13:53,690
course wanted support equipment around

262
00:14:00,730 --> 00:13:58,190
this also use during the runs we have

263
00:14:02,380 --> 00:14:00,740

camera equipment just camera here that's

264
00:14:04,900 --> 00:14:02,390
a high-speed film Carol I can use for

265
00:14:08,140 --> 00:14:04,910
making movies that takes it to the drop

266
00:14:10,930 --> 00:14:08,150
small sprain we also have a electronics

267
00:14:13,480 --> 00:14:10,940
box control things a camcorder and I

268
00:14:15,550 --> 00:14:13,490
can't ask for that takes all kinds of

269
00:14:17,880 --> 00:14:15,560
different pictures and different bands

270
00:14:20,170 --> 00:14:17,890
of the spectrum at different speeds

271
00:14:22,780 --> 00:14:20,180
recorded on the end these all the data

272
00:14:24,190 --> 00:14:22,790
for post my analysis and a laptop

273
00:14:25,870 --> 00:14:24,200
computer just like we used in the orbit

274
00:14:27,640 --> 00:14:25,880
it allows the crew members to control

275
00:14:29,980 --> 00:14:27,650
all this equipment like the power

276
00:14:31,510 --> 00:14:29,990
systems from onboard the ground can also

277
00:14:33,760 --> 00:14:31,520
do some commanding for some of the runs

278
00:14:36,820 --> 00:14:33,770
but this is how we do it when a clue is

279
00:14:38,710 --> 00:14:36,830
running the experiments this whole thing

280
00:14:42,340 --> 00:14:38,720
of course is stacked tiny into space lab

281
00:14:44,800 --> 00:14:42,350
systems we have a little monitor how

282
00:14:46,450 --> 00:14:44,810
does my boys tomorrow that film is also

283
00:14:48,070 --> 00:14:46,460
said sumantra in the lab that goes to

284
00:14:50,560 --> 00:14:48,080
ground we hold on something well box

285
00:14:53,020 --> 00:14:50,570
that lets us see some UV images that are

286
00:14:54,400 --> 00:14:53,030
in part of an internal camera and also

287
00:14:55,960 --> 00:14:54,410
under in the experiment you can see we