1
00:00:51,510 --> 00:00:49,430
all systems go in orbit for the crew

2
00:00:52,950 --> 00:00:51,520
aboard the shuttle columbia astronauts

3
00:00:54,950 --> 00:00:52,960
have been conducting experiments all

4
00:00:56,869 --> 00:00:54,960
week making up for lost ground following

5
00:00:59,349 --> 00:00:56,879
the mission in april which was cut short

6
00:01:01,430 --> 00:00:59,359
due to a defective generator for details

7
00:01:03,110 --> 00:01:01,440
on just what's been accomplished so far

8
00:01:05,429 --> 00:01:03,120
and what's to come in the week ahead

9
00:01:07,590 --> 00:01:05,439
before columbia comes back down to earth

10
00:01:09,510 --> 00:01:07,600
we go far above earth this morning to

11
00:01:11,590 --> 00:01:09,520
the shuttle where we're joined by

12
00:01:13,670 --> 00:01:11,600
mission specialist michael gernhardt and

13
00:01:15,830 --> 00:01:13,680

roger crutch they join us from inside

14
00:01:19,190 --> 00:01:15,840
the space laboratory gentlemen thank you

15
00:01:23,670 --> 00:01:22,070
good morning it's nice to be with you

16
00:01:25,590 --> 00:01:23,680
roger crouch

17
00:01:27,590 --> 00:01:25,600
you got about a week to go left in the

18
00:01:33,429 --> 00:01:27,600
mission you uh it's the first reflight

19
00:01:36,870 --> 00:01:35,190
that seems to be going pretty well we've

20
00:01:38,870 --> 00:01:36,880
got a lot a few little problems that

21
00:01:40,710 --> 00:01:38,880
we're working on but overall i think

22
00:01:42,149 --> 00:01:40,720
everything's working real well

23
00:01:44,069 --> 00:01:42,159
getting some really exciting science

24
00:01:45,670 --> 00:01:44,079
results and we're all real pleased about

25
00:01:46,870 --> 00:01:45,680
it

26
00:01:49,109 --> 00:01:46,880
you're studying in some of your

27
00:01:51,350 --> 00:01:49,119
experience experiments the behavior of

28
00:01:52,950 --> 00:01:51,360
fire in the absence of grav and gravity

29
00:01:54,230 --> 00:01:52,960
how are you conducting that experiment

30
00:01:58,149 --> 00:01:54,240
and what do you hope the results will

31
00:02:02,230 --> 00:02:00,230
we're conducting several experiments of

32
00:02:04,230 --> 00:02:02,240
that type and most of them are in a

33
00:02:05,590 --> 00:02:04,240
self-contained

34
00:02:07,670 --> 00:02:05,600
sort of a

35
00:02:09,510 --> 00:02:07,680
real safe environment so that none of

36
00:02:11,750 --> 00:02:09,520
the fire fuel could get out and cause a

37
00:02:13,350 --> 00:02:11,760
problem they're relatively small tires

38
00:02:15,670 --> 00:02:13,360

some of them are just a little droplet

39
00:02:17,589 --> 00:02:15,680
of fire hanging on a wire so that we're

40
00:02:19,350 --> 00:02:17,599
looking at that what we hope to learn

41
00:02:21,589 --> 00:02:19,360
from that is a better way to make have

42
00:02:23,270 --> 00:02:21,599
more efficient fires on earth so that we

43
00:02:26,550 --> 00:02:23,280
can cut down on pollution and through

44
00:02:28,470 --> 00:02:26,560
efficiency save a lot of fuel

45
00:02:29,990 --> 00:02:28,480
michael because this is the first reef

46
00:02:31,750 --> 00:02:30,000
flight in history what were you able to

47
00:02:37,830 --> 00:02:31,760
learn back in april that's being applied

48
00:02:42,309 --> 00:02:39,750
well actually as you point out this is

49
00:02:44,150 --> 00:02:42,319
the first re-flight in history and uh

50
00:02:46,390 --> 00:02:44,160
it's the fastest turnaround in shuttle

51
00:02:48,869 --> 00:02:46,400
history and the fastest turnaround of

52
00:02:51,110 --> 00:02:48,879
any uh astronaut crew

53
00:02:52,710 --> 00:02:51,120
it's a great opportunity for us because

54
00:02:55,270 --> 00:02:52,720
we trained for a year for the first

55
00:02:57,110 --> 00:02:55,280
mission and then we had a chance to do a

56
00:02:59,430 --> 00:02:57,120
dress rehearsal under fairly demanding

57
00:03:01,910 --> 00:02:59,440
circumstances with the fuel cell power

58
00:03:03,589 --> 00:03:01,920
down and from that we really fine-tuned

59
00:03:05,750 --> 00:03:03,599
all of the salient points of space

60
00:03:07,990 --> 00:03:05,760
flight and this mission has been

61
00:03:09,350 --> 00:03:08,000
really smooth uh roger could talk to the

62
00:03:11,190 --> 00:03:09,360
science we actually learned some things

63
00:03:13,350 --> 00:03:11,200

on the science that helped us

64
00:03:16,710 --> 00:03:13,360
change things and optimize uh this

65
00:03:19,030 --> 00:03:16,720
particular mission based on the past one

66
00:03:20,949 --> 00:03:19,040
michael full i understand by ham radio

67
00:03:27,430 --> 00:03:20,959
what's it like buzzing by seeing

68
00:03:30,390 --> 00:03:29,589
yeah we talked to mike the other day and

69
00:03:32,229 --> 00:03:30,400
uh

70
00:03:33,830 --> 00:03:32,239
at certain points in our orbit we're

71
00:03:36,149 --> 00:03:33,840
able to see the mirror space station it

72
00:03:38,710 --> 00:03:36,159
looks like a very very bright star maybe

73
00:03:40,869 --> 00:03:38,720
uh two or three times as bright as venus

74
00:03:42,630 --> 00:03:40,879
looks from up here and with binoculars

75
00:03:44,789 --> 00:03:42,640
you can actually see the shape of the of

76
00:03:46,869 --> 00:03:44,799
the space station it was great talking

77
00:03:49,430 --> 00:03:46,879
to mike he sounded really good and and

78
00:03:51,030 --> 00:03:49,440
uh things seem to be progressing uh

79
00:03:53,110 --> 00:03:51,040
pretty much the way they want to on

80
00:03:55,589 --> 00:03:53,120
board they just got a new uh

81
00:03:57,509 --> 00:03:55,599
supply of food and and uh spray parts

82
00:04:02,390 --> 00:03:57,519
and so forth so uh the concept was it

83
00:04:07,030 --> 00:04:04,149
we've taken a look into your background

84
00:04:08,949 --> 00:04:07,040
it includes extensive experience in deep

85
00:04:11,030 --> 00:04:08,959
sea diving and oceanography we're

86
00:04:12,949 --> 00:04:11,040
wondering if you see any similarities

87
00:04:16,550 --> 00:04:12,959
between your work on the ocean floor and

88
00:04:20,629 --> 00:04:18,870

well they're actually very similar in a

89
00:04:22,950 --> 00:04:20,639
number of different ways

90
00:04:25,270 --> 00:04:22,960
one is that they're both an operational

91
00:04:27,110 --> 00:04:25,280
environment where you really can't

92
00:04:29,590 --> 00:04:27,120
breathe and work in the atmosphere

93
00:04:32,310 --> 00:04:29,600
without some type of life support system

94
00:04:34,390 --> 00:04:32,320
or shelter and uh

95
00:04:37,030 --> 00:04:34,400
on my first mission i did a space walk

96
00:04:38,790 --> 00:04:37,040
and that was very analogous mentally to

97
00:04:40,230 --> 00:04:38,800
doing the deep sea commercial diving

98
00:04:41,670 --> 00:04:40,240
work that i did

99
00:04:43,909 --> 00:04:41,680
and then the other thing that's real

100
00:04:45,909 --> 00:04:43,919
common is just working as a team with a

101
00:04:48,150 --> 00:04:45,919
with a group of people uh we had to do

102
00:04:50,629 --> 00:04:48,160
that uh in the offshore diving business

103
00:04:52,230 --> 00:04:50,639
and it's it's critical uh of critical

104
00:04:53,830 --> 00:04:52,240
importance that you'll be able to work

105
00:04:56,150 --> 00:04:53,840
as a team in a shuttle mission because

106
00:04:57,909 --> 00:04:56,160
the shuttle is so complex that that no

107
00:05:00,469 --> 00:04:57,919
one person can do it by themselves and

108
00:05:02,950 --> 00:05:00,479
so you know that that kind of teamwork

109
00:05:05,110 --> 00:05:02,960
uh translates very well into space

110
00:05:06,550 --> 00:05:05,120
operations

111
00:05:08,469 --> 00:05:06,560
roger you mentioned your age a little

112
00:05:10,230 --> 00:05:08,479
bit earlier also this week we heard that

113
00:05:12,390 --> 00:05:10,240

former astronaut john glenn said he

114
00:05:14,070 --> 00:05:12,400
would like to fly again even at age 75

115
00:05:15,909 --> 00:05:14,080
and nasa is said to be seriously

116
00:05:17,990 --> 00:05:15,919
considering the idea when you think

117
00:05:19,909 --> 00:05:18,000
about that he is 20 years your senior

118
00:05:21,029 --> 00:05:19,919
think back 20 years now for me is your

119
00:05:22,390 --> 00:05:21,039
body

120
00:05:23,749 --> 00:05:22,400
going to be able to withstand that do

121
00:05:25,350 --> 00:05:23,759
you think going up there learning a

122
00:05:29,270 --> 00:05:25,360
little bit more about what we can do in

123
00:05:34,150 --> 00:05:32,070
oh yeah i think what a lot of times the

124
00:05:37,189 --> 00:05:34,160
chemistry of the body changes as we get

125
00:05:39,590 --> 00:05:37,199
older but i think that a person like

126
00:05:41,510 --> 00:05:39,600
senator glenn as it keeps himself in

127
00:05:43,510 --> 00:05:41,520
good shape i'd be glad to go along with

128
00:05:45,830 --> 00:05:43,520
him as a junior brother or sort of

129
00:05:47,830 --> 00:05:45,840
brother in arms or whatever and then go

130
00:05:49,350 --> 00:05:47,840
again when i'm 75 that'd be kind of a

131
00:05:52,950 --> 00:05:49,360
cool trip i think and then we could

132
00:05:54,870 --> 00:05:52,960
compare my data than his

133
00:05:56,790 --> 00:05:54,880
we saw also as we were setting up for

134
00:05:58,550 --> 00:05:56,800
the interview i believe you had a teddy

135
00:06:03,029 --> 00:05:58,560
bear strapped to your knee uh what's

136
00:06:07,350 --> 00:06:05,350
uh sometimes national lets you do things

137
00:06:09,029 --> 00:06:07,360
that keep you in touch with your family

138
00:06:11,029 --> 00:06:09,039

and i'm that's just a little bear that's

139
00:06:12,309 --> 00:06:11,039
been in my family between myself and my

140
00:06:14,790 --> 00:06:12,319
fiance

141
00:06:16,469 --> 00:06:14,800
and my kids for several years and i take

142
00:06:17,990 --> 00:06:16,479
it on travel with me a lot and this is

143
00:06:19,510 --> 00:06:18,000
just a trip that i thought would be real

144
00:06:22,070 --> 00:06:19,520
nice to bring it along with me and nash

145
00:06:24,950 --> 00:06:22,080
will let me do that

146
00:06:28,710 --> 00:06:24,960
he sleeps with it too

147
00:06:34,070 --> 00:06:31,590
there's the tool you can see it's uh

148
00:06:36,950 --> 00:06:34,080
phillips and on the long ratchet wrench

149
00:07:01,270 --> 00:06:38,950
phillips helps number two from the ism

150
00:07:04,390 --> 00:07:02,870
you can see mike is braced pretty good

151
00:07:06,870 --> 00:07:04,400
to get some good

152
00:07:09,029 --> 00:07:06,880
uh force against the

153
00:07:10,469 --> 00:07:09,039
assembly and and mike uh roger was

154
00:07:13,909 --> 00:07:10,479
turning it while mike was pushing and it

155
00:07:13,919 --> 00:07:30,150
and we see

156
00:07:35,270 --> 00:07:32,629
in columbia houston can you confirm the

157
00:07:41,589 --> 00:07:35,280
uh perhaps point to them the the places

158
00:07:41,599 --> 00:07:46,629
copy the third from the right

159
00:07:55,670 --> 00:07:48,710
and that's the fourth one down from on

160
00:08:03,110 --> 00:07:57,589
and also the fourth one down on the left

161
00:08:06,710 --> 00:08:05,029
that's just so far we haven't tried the

162
00:08:08,950 --> 00:08:06,720
top yet

163
00:08:11,589 --> 00:08:08,960

understand mike and we're asking ifm if

164
00:08:13,670 --> 00:08:11,599
they want to get you to position the

165
00:08:16,309 --> 00:08:13,680
camera for any particular view so stand

166
00:08:31,510 --> 00:08:19,830
okay

167
00:08:36,310 --> 00:08:33,990
and we have not uh attempted to do these

168
00:08:40,310 --> 00:08:36,320
top fasteners yet because that was uh

169
00:08:42,949 --> 00:08:40,320
not where we were in this sequence

170
00:08:44,550 --> 00:08:42,959
okay now i'm on the far as side or the

171
00:08:46,150 --> 00:08:44,560
right side as you face the panel and

172
00:08:47,910 --> 00:08:46,160
going down

173
00:08:50,389 --> 00:08:47,920
you see the corner fasteners still in

174
00:08:54,470 --> 00:08:50,399
because we haven't torqued that yet

175
00:08:56,470 --> 00:08:54,480
the number two fastener is loose

176
00:08:59,430 --> 00:08:56,480
the number three

177
00:09:01,509 --> 00:08:59,440
i believe is stuck

178
00:09:03,110 --> 00:09:01,519
and there's the number four

179
00:09:08,710 --> 00:09:03,120
and the bottom

180
00:09:17,990 --> 00:09:10,710
okay we're moving along from after

181
00:09:22,310 --> 00:09:20,070
and we had

182
00:09:24,550 --> 00:09:22,320
the third from forward on the bottom

183
00:09:27,990 --> 00:09:24,560
here was was stuck like the others and

184
00:09:29,350 --> 00:09:28,000
we managed to get that one out

185
00:09:31,670 --> 00:09:29,360
with the tool that we showed you

186
00:09:33,269 --> 00:09:31,680
previously

187
00:09:37,590 --> 00:09:33,279
okay now we're forward moving up in the

188
00:09:37,600 --> 00:09:42,790

and we're back to the starting point

189
00:09:47,269 --> 00:09:45,509
and columbia mike that was excellent we

190
00:09:49,910 --> 00:09:47,279
really appreciate that that gives us a

191
00:09:51,990 --> 00:09:49,920
good idea of what the situation is and

192
00:09:55,670 --> 00:09:52,000
we'll try to come up with some words for

193
00:09:59,829 --> 00:09:57,750
the other thought that we have and we're

194
00:10:00,870 --> 00:09:59,839
not sure this will work

195
00:10:02,790 --> 00:10:00,880
is the

196
00:10:05,590 --> 00:10:02,800
possibility of

197
00:10:08,550 --> 00:10:05,600
i know i can get the uh

198
00:10:11,269 --> 00:10:08,560
the j13 connector

199
00:10:13,269 --> 00:10:11,279
from the access panel here

200
00:10:14,069 --> 00:10:13,279
and we're wondering

201
00:10:16,069 --> 00:10:14,079
that

202
00:10:17,590 --> 00:10:16,079
we could probably get the j18 if we

203
00:10:18,790 --> 00:10:17,600
removed

204
00:10:21,350 --> 00:10:18,800
the

205
00:10:23,829 --> 00:10:21,360
j17 connector first with a connector

206
00:10:26,949 --> 00:10:25,750
so that's a that's a path that we could

207
00:10:31,190 --> 00:10:26,959
try

208
00:11:21,910 --> 00:10:33,430
okay we copy we'll we'll add that to our

209
00:11:25,110 --> 00:11:24,150
i'm shooting for 95 psi on both of them

210
00:11:30,870 --> 00:11:25,120
is that what you want or you want

211
00:11:36,710 --> 00:11:33,269
95 is fine and steam one says it looks

212
00:11:36,720 --> 00:11:44,389
copy that

213
00:11:48,310 --> 00:11:47,110

okay this is test point zero seven alpha

214
00:11:57,110 --> 00:11:48,320
opening

215
00:12:04,630 --> 00:11:59,509
copy

216
00:12:09,269 --> 00:12:06,949
okay i got a special favorite if

217
00:12:10,150 --> 00:12:09,279
the cm1 team knows ahead of time that

218
00:12:11,990 --> 00:12:10,160
they're going to want me to do a

219
00:12:12,790 --> 00:12:12,000
different procedure than the procedure

220
00:12:14,230 --> 00:12:12,800
book

221
00:12:15,750 --> 00:12:14,240
they could tell me ahead of time then i

222
00:12:18,230 --> 00:12:15,760
can be sure to do it the way they want

223
00:12:20,230 --> 00:12:18,240
from the beginning rather than having to

224
00:12:36,949 --> 00:12:20,240
mess up the first few seconds of the

225
00:12:43,030 --> 00:12:38,629
in columbia houston jim we're with you

226
00:12:47,110 --> 00:12:45,269
okay great you can see susan is

227
00:12:49,110 --> 00:12:47,120
exercising we try to get in and uh we

228
00:12:50,710 --> 00:12:49,120
have an hour scheduled for exercise of

229
00:12:52,629 --> 00:12:50,720
course only about 30 minutes then it's

230
00:12:54,470 --> 00:12:52,639
actually on the bike the only other 30

231
00:12:56,069 --> 00:12:54,480
minutes is spent getting ready and then

232
00:12:57,829 --> 00:12:56,079
afterwards cleaning up and changing back

233
00:12:59,509 --> 00:12:57,839
into the workflows here we've got a

234
00:13:00,710 --> 00:12:59,519
little video here that greg made

235
00:13:02,790 --> 00:13:00,720
explaining some of the combustion

236
00:13:04,550 --> 00:13:02,800
processes back in the lab so what i'm

237
00:13:09,509 --> 00:13:04,560
going to do is give you mid deck

238
00:13:13,030 --> 00:13:11,190

one of the experiments on our mission is

239
00:13:14,710 --> 00:13:13,040
the combustion module one

240
00:13:15,910 --> 00:13:14,720
it's a rack designed for multiple

241
00:13:19,750 --> 00:13:15,920
experiments

242
00:13:21,670 --> 00:13:19,760
now is called the laminar soot processes

243
00:13:24,870 --> 00:13:21,680
experiment the purpose of this

244
00:13:26,790 --> 00:13:24,880
experiment is to study soot formation

245
00:13:28,790 --> 00:13:26,800
in microgravity

246
00:13:30,710 --> 00:13:28,800
investigator the principal investigator

247
00:13:32,629 --> 00:13:30,720
on this project professor jerry faith at

248
00:13:34,790 --> 00:13:32,639
the university of michigan

249
00:13:36,790 --> 00:13:34,800
is one of the preeminent suit

250
00:13:38,310 --> 00:13:36,800
researchers in the world today

251
00:13:40,150 --> 00:13:38,320
and he believes

252
00:13:42,470 --> 00:13:40,160
that by studying soot formation in

253
00:13:44,949 --> 00:13:42,480
microgravity we can learn important

254
00:13:46,829 --> 00:13:44,959
insights about sit formation in many

255
00:13:49,509 --> 00:13:46,839
important practical devices here on

256
00:13:51,670 --> 00:13:49,519
earth soot formation

257
00:13:53,430 --> 00:13:51,680
involves the growth of a solid

258
00:13:56,069 --> 00:13:53,440
particulate

259
00:13:58,550 --> 00:13:56,079
order from gaseous material

260
00:14:01,110 --> 00:13:58,560
and it's indicated here by this model

261
00:14:03,430 --> 00:14:01,120
the soot aggregate is made up of a very

262
00:14:05,110 --> 00:14:03,440
large number of much smaller primary

263
00:14:07,110 --> 00:14:05,120

particles

264
00:14:08,870 --> 00:14:07,120
primary particle joins

265
00:14:11,189 --> 00:14:08,880
to the soot aggregate

266
00:14:14,230 --> 00:14:11,199
and the soot aggregate grows

267
00:14:17,110 --> 00:14:14,240
by studying this process in microgravity

268
00:14:19,829 --> 00:14:17,120
we can learn much about

269
00:14:21,509 --> 00:14:19,839
the soot formation process

270
00:14:23,590 --> 00:14:21,519
well that's it we had a successful day

271
00:14:25,910 --> 00:14:23,600
working uh glove box experiments for

272
00:14:27,430 --> 00:14:25,920
combustion uh dom was busy with that all

273
00:14:29,030 --> 00:14:27,440
day and had a really successful day so

274
00:14:31,430 --> 00:14:29,040
we felt like chalk another one up for