1
00:00:52,559 --> 00:01:05,030
houston columbia for rendezvous

2
00:01:05,040 --> 00:01:10,149
go ahead for a round of it

3
00:01:13,270 --> 00:01:11,830
bill we've been talking over the

4
00:01:15,109 --> 00:01:13,280
situation

5
00:01:16,630 --> 00:01:15,119
here with uh possible contingency

6
00:01:19,670 --> 00:01:16,640
rendezvous today

7
00:01:21,910 --> 00:01:19,680
and um also been noting how well the

8
00:01:25,270 --> 00:01:21,920
science is going with wake shield

9
00:01:27,030 --> 00:01:25,280
and we'd like to offer that um

10
00:01:28,710 --> 00:01:27,040
during the previous five days of this

11
00:01:29,590 --> 00:01:28,720
fight we've been getting excellent rest

12
00:01:33,990 --> 00:01:29,600
and

13
00:01:35,670 --> 00:01:34,000

towards the end of the day

14
00:01:37,749 --> 00:01:35,680
if it comes down to it and we do need to

15
00:01:40,710 --> 00:01:37,759
rendezvous with wake shield today the

16
00:01:42,550 --> 00:01:40,720
crew is ready and willing to stay up

17
00:01:44,630 --> 00:01:42,560
almost as late as you'd like

18
00:01:45,830 --> 00:01:44,640
to make that happen as late as possible

19
00:01:47,590 --> 00:01:45,840
so that

20
00:01:51,429 --> 00:01:47,600
wakes you can get more of its mission

21
00:01:56,789 --> 00:01:54,230
that's that's super taco and we'll uh

22
00:01:59,350 --> 00:01:56,799
we'll throw that into the equation um

23
00:02:02,630 --> 00:01:59,360
right now we're we're developing uh some

24
00:02:05,109 --> 00:02:02,640
criteria uh that will apply that we will

25
00:02:05,990 --> 00:02:05,119
apply at around the time of the nc 11

26
00:02:07,990 --> 00:02:06,000
burn

27
00:02:09,109 --> 00:02:08,000
and basically if it just gives us

28
00:02:10,550 --> 00:02:09,119
confidence

29
00:02:16,869 --> 00:02:10,560
that

30
00:02:18,710 --> 00:02:16,879
distance between wake shield and spas

31
00:02:20,630 --> 00:02:18,720
that's going to be

32
00:02:22,390 --> 00:02:20,640
be our desire to

33
00:02:23,910 --> 00:02:22,400
do exactly what uh what you said and

34
00:02:26,949 --> 00:02:23,920
let's try to get all the wake shield

35
00:02:31,270 --> 00:02:28,790
yeah we certainly hope we can do the

36
00:02:33,190 --> 00:02:31,280
rendezvous on schedule tomorrow um just

37
00:02:35,190 --> 00:02:33,200
wanted to let you know we if it has to

38
00:02:37,589 --> 00:02:35,200

be today we can do it as late today as

39
00:02:39,910 --> 00:02:37,599
as possible to make it better

40
00:02:40,949 --> 00:02:39,920
and uh pass our regards on to mr britt's

41
00:02:43,750 --> 00:02:40,959
hope he's

42
00:03:19,430 --> 00:02:43,760
having a good time doing this analysis

43
00:03:25,589 --> 00:03:21,589
columbia houston with some words on the

44
00:03:25,599 --> 00:03:33,270
ready to copy mark

45
00:03:39,910 --> 00:03:36,869
yes taco as you know fido has been

46
00:03:43,430 --> 00:03:39,920
taking in some c-band radar tracking

47
00:03:44,949 --> 00:03:43,440
data on spas for the last few revs

48
00:03:47,350 --> 00:03:44,959
and the

49
00:03:49,430 --> 00:03:47,360
the news is encouraging the separation

50
00:03:53,990 --> 00:03:49,440
appears to be growing uh

51
00:03:57,589 --> 00:03:54,000
for the range at ti at the nominal ti

52
00:04:01,670 --> 00:03:57,599
it's now 12.1 if we assume a worst case

53
00:04:04,710 --> 00:04:01,680
k con of 1.1 so right now it looks as

54
00:04:06,789 --> 00:04:04,720
though we're going to be doing a nominal

55
00:04:09,429 --> 00:04:06,799
retrieve for wake shield

56
00:04:10,550 --> 00:04:09,439
the only question in our mind is whether

57
00:04:14,470 --> 00:04:10,560
or not

58
00:04:16,390 --> 00:04:14,480
we'll continue to keep spas in mind drag

59
00:04:19,030 --> 00:04:16,400
attitude for a little while longer that

60
00:04:21,349 --> 00:04:19,040
is under discussion at this point

61
00:04:25,110 --> 00:04:21,359
with respect to wake shield retrieve we

62
00:04:28,550 --> 00:04:25,120
will be retrieving it two orbits early

63
00:04:33,590 --> 00:04:28,560

and we will be going with the eight mile

64
00:04:38,310 --> 00:04:36,230
okay uh we copy all the words on the big

65
00:04:39,830 --> 00:04:38,320
picture sure hope it works out that way

66
00:04:41,270 --> 00:04:39,840
and that we can keep

67
00:04:43,110 --> 00:04:41,280
both satellites pumping out their

68
00:04:45,990 --> 00:04:43,120
science

69
00:05:06,469 --> 00:04:46,000
with the two revs early

70
00:05:10,390 --> 00:05:08,550
in columbia for taco

71
00:05:12,469 --> 00:05:10,400
that's affirmative the plan is for you

72
00:05:17,350 --> 00:05:12,479
to go to bed an hour earlier and to get

73
00:05:17,360 --> 00:05:22,469
okay we understand

74
00:05:26,550 --> 00:05:24,550
we'll start with you dr musgrave how

75
00:05:36,710 --> 00:05:26,560
serious are those particle dings in the

76
00:05:41,029 --> 00:05:39,830
jim they are very very small

77
00:05:42,150 --> 00:05:41,039
hits

78
00:05:44,070 --> 00:05:42,160
i uh

79
00:05:47,749 --> 00:05:44,080
would estimate uh

80
00:05:49,510 --> 00:05:47,759
oh no more than uh depth of 1 32nd of an

81
00:05:50,629 --> 00:05:49,520
inch and that's just of course in the

82
00:05:58,710 --> 00:05:50,639
outer pane

83
00:06:03,430 --> 00:06:00,710
i understand you almost had a super ding

84
00:06:05,590 --> 00:06:03,440
with that 4 600 pound super conductor

85
00:06:07,670 --> 00:06:05,600
growing satellite what happened was that

86
00:06:11,189 --> 00:06:07,680
a case of a thruster malfunctioning or

87
00:06:16,870 --> 00:06:13,270
no what really happened was when we

88
00:06:18,790 --> 00:06:16,880

released the wake shield we waited uh

89
00:06:20,390 --> 00:06:18,800
at least a minute to verify that its

90
00:06:22,230 --> 00:06:20,400
attitude control system was functioning

91
00:06:23,990 --> 00:06:22,240
normally and that took a little bit

92
00:06:25,830 --> 00:06:24,000
longer than expected to verify that the

93
00:06:28,629 --> 00:06:25,840
wake shield was controlling its attitude

94
00:06:30,790 --> 00:06:28,639
properly and while we were waiting uh it

95
00:06:32,230 --> 00:06:30,800
was drifting ever so slightly towards us

96
00:06:33,270 --> 00:06:32,240
probably due to

97
00:06:34,390 --> 00:06:33,280
a small

98
00:06:36,710 --> 00:06:34,400
impulse

99
00:06:38,469 --> 00:06:36,720
and part of when we moved the robot arm

100
00:06:40,230 --> 00:06:38,479
away from the satellite and so that

101
00:06:42,469 --> 00:06:40,240
small closure rate if we allowed it to

102
00:06:43,749 --> 00:06:42,479
drift for minutes would have carried it

103
00:06:45,029 --> 00:06:43,759
closer to the columbia than we were

104
00:06:47,430 --> 00:06:45,039
comfortable with

105
00:06:49,430 --> 00:06:47,440
but in the event we started the wake

106
00:06:51,350 --> 00:06:49,440
shield zone thruster and that carried a

107
00:06:52,790 --> 00:06:51,360
clear of our cockpit and of course at

108
00:06:54,550 --> 00:06:52,800
any time we could have moved columbia

109
00:06:56,390 --> 00:06:54,560
out of the way had we thought there was

110
00:06:57,670 --> 00:06:56,400
a real collision hazard but we didn't

111
00:06:58,469 --> 00:06:57,680
want to disturb

112
00:07:00,309 --> 00:06:58,479
the

113
00:07:01,830 --> 00:07:00,319

contamination free

114
00:07:03,670 --> 00:07:01,840
wake side of the satellite which was

115
00:07:05,430 --> 00:07:03,680
going to conduct our science over the

116
00:07:07,510 --> 00:07:05,440
next few days so we tried to hold off

117
00:07:09,029 --> 00:07:07,520
any thruster firings and that's what we

118
00:07:10,950 --> 00:07:09,039
were able to do was let it drift off

119
00:07:12,150 --> 00:07:10,960
without any movement by the columbia at

120
00:07:14,390 --> 00:07:12,160
all

121
00:07:16,469 --> 00:07:14,400
if my congressman had his way we would

122
00:07:17,909 --> 00:07:16,479
have no more manned space flight what

123
00:07:20,230 --> 00:07:17,919
are some of the latest and greatest

124
00:07:25,909 --> 00:07:20,240
benefits that i can educate him about to

125
00:07:29,670 --> 00:07:27,589
well i like to talk about the wake

126
00:07:32,469 --> 00:07:29,680
shield facility that's trailing us now

127
00:07:35,909 --> 00:07:32,479
by about 20 nautical miles it's our uh

128
00:07:38,230 --> 00:07:35,919
prototype chip manufacturing facility

129
00:07:39,749 --> 00:07:38,240
maybe it's the wave of things to come in

130
00:07:42,390 --> 00:07:39,759
space where we'll actually use the

131
00:07:44,070 --> 00:07:42,400
resources in space like the pure vacuum

132
00:07:46,150 --> 00:07:44,080
generated by the wick shield to

133
00:07:48,629 --> 00:07:46,160
manufacture either high quality

134
00:07:50,550 --> 00:07:48,639
electronic components like this example

135
00:07:52,710 --> 00:07:50,560
or some other

136
00:07:55,110 --> 00:07:52,720
manufactured product like biomedical

137
00:07:57,749 --> 00:07:55,120
supplies medicines or pharmaceuticals

138
00:07:59,749 --> 00:07:57,759

that would actually directly be sold on

139
00:08:02,309 --> 00:07:59,759
earth and we'd actually produce them in

140
00:08:04,070 --> 00:08:02,319
space make money up there make a profit

141
00:08:06,230 --> 00:08:04,080
and that of course that would expand our

142
00:08:08,629 --> 00:08:06,240
activity in space so this is the way to

143
00:08:11,110 --> 00:08:08,639
go in space exploration is to find a way

144
00:08:13,029 --> 00:08:11,120
to use the spaces space's own resources

145
00:08:14,629 --> 00:08:13,039
to benefit us back on earth and that's

146
00:08:16,629 --> 00:08:14,639
the first step that we're taking here

147
00:08:18,629 --> 00:08:16,639
with the wakefield experiment but uh

148
00:08:21,189 --> 00:08:18,639
does ham radio still play a part in

149
00:08:23,430 --> 00:08:21,199
emissions and if so is it um

150
00:08:31,670 --> 00:08:23,440
a vital part or is it just a kind of a

151
00:08:37,190 --> 00:08:33,829
i had the ham radio 1

152
00:08:38,070 --> 00:08:37,200
51 f which was close to 11 or 12 years

153
00:08:39,670 --> 00:08:38,080
ago

154
00:08:42,070 --> 00:08:39,680
i think it plays on two roles it

155
00:08:43,430 --> 00:08:42,080
communicates what space is all about it

156
00:08:45,829 --> 00:08:43,440
lets people

157
00:08:47,829 --> 00:08:45,839
vicariously live with his face it lets

158
00:08:49,910 --> 00:08:47,839
people come on board with us

159
00:08:51,430 --> 00:08:49,920
it's also a very valid way of

160
00:08:52,790 --> 00:08:51,440
communications

161
00:08:55,110 --> 00:08:52,800
uh there are times when i've been a

162
00:08:57,269 --> 00:08:55,120
capsule communicator in mission control

163
00:08:59,670 --> 00:08:57,279

and we had long losses from the

164
00:09:01,350 --> 00:08:59,680
satellite we communicate with and we

165
00:09:04,230 --> 00:09:01,360
have actually gone up to the shuttle

166
00:09:06,870 --> 00:09:04,240
through a ham radio operator i think

167
00:09:09,190 --> 00:09:06,880
it's an integral part of the electronic

168
00:09:11,350 --> 00:09:09,200
net that we are building you can see the

169
00:09:12,949 --> 00:09:11,360
computers and you can see uh the

170
00:09:14,630 --> 00:09:12,959
camcorders which are bringing you

171
00:09:17,350 --> 00:09:14,640
information maybe in the background you

172
00:09:19,829 --> 00:09:17,360
can see all the wires i think ham radio

173
00:09:22,230 --> 00:09:19,839
is part of the integral information that

174
00:09:24,870 --> 00:09:22,240
which we are bringing into the shuttle

175
00:09:28,949 --> 00:09:24,880
which uh and it's a way of bringing a 25

176
00:09:31,350 --> 00:09:28,959
year old technology into this century

177
00:09:33,269 --> 00:09:31,360
senator and former astronaut john glenn

178
00:09:35,430 --> 00:09:33,279
has volunteered to do geriatric

179
00:09:37,990 --> 00:09:35,440
experiments in space although you're at

180
00:09:39,750 --> 00:09:38,000
61 not quite up to mr glenn's age would

181
00:09:42,710 --> 00:09:39,760
you be ever interested in that dr

182
00:09:46,150 --> 00:09:44,310
well of course they're doing one on me

183
00:09:48,389 --> 00:09:46,160
right now

184
00:09:49,670 --> 00:09:48,399
what i wanted to ask do you do any type

185
00:09:52,389 --> 00:09:49,680
of

186
00:09:54,230 --> 00:09:52,399
simulations or experiments on the ground

187
00:09:55,829 --> 00:09:54,240
or what possibly could go wrong or do

188
00:09:59,990 --> 00:09:55,839

you just keep your focus on your

189
00:10:04,070 --> 00:10:02,070
a good question we spent

190
00:10:06,710 --> 00:10:04,080
about nine months training for this

191
00:10:08,389 --> 00:10:06,720
flight all five of us on the crew and we

192
00:10:10,470 --> 00:10:08,399
trained intensively over the last few

193
00:10:12,470 --> 00:10:10,480
months especially to handle any kind of

194
00:10:13,829 --> 00:10:12,480
emergency especially during the critical

195
00:10:15,990 --> 00:10:13,839
phases of launch

196
00:10:17,829 --> 00:10:16,000
and entry and we often joke once we

197
00:10:20,150 --> 00:10:17,839
arrive in space when things are going so

198
00:10:22,069 --> 00:10:20,160
well as they are on sts-80 here that a

199
00:10:24,790 --> 00:10:22,079
lot of our emergency procedures training

200
00:10:26,150 --> 00:10:24,800
seems to have been wasted because we

201
00:10:27,990 --> 00:10:26,160
arrive in space here and never have to

202
00:10:30,470 --> 00:10:28,000
use all that training that we've uh

203
00:10:32,870 --> 00:10:30,480
spent so many weeks uh acquiring but

204
00:10:34,230 --> 00:10:32,880
really uh that's a necessary uh part of

205
00:10:36,389 --> 00:10:34,240
training for space flight you've got to

206
00:10:38,310 --> 00:10:36,399
be ready just in case something does go

207
00:10:39,990 --> 00:10:38,320
wrong and we view it as an investment in

208
00:10:42,310 --> 00:10:40,000
our own safety and our own success on

209
00:10:44,870 --> 00:10:42,320
this mission i was calling for uh ken

210
00:10:46,630 --> 00:10:44,880
cockrell my brother oh my goodness this

211
00:10:47,910 --> 00:10:46,640
is ken cockrell's brother yeah this is

212
00:10:49,829 --> 00:10:47,920
phil

213
00:10:52,310 --> 00:10:49,839

i believe they selected

214
00:10:53,910 --> 00:10:52,320
uh dr jones and dr musgrave to be a part

215
00:10:57,190 --> 00:10:53,920
of this but i suspect they could relay a

216
00:10:59,269 --> 00:10:57,200
message okay oh my what do we have here

217
00:11:03,030 --> 00:10:59,279
i see on the screen here another person

218
00:11:06,710 --> 00:11:04,710
hi phillip i'm not part of this event

219
00:11:08,230 --> 00:11:06,720
but uh go ahead with your questions i

220
00:11:09,509 --> 00:11:08,240
just heard about it on the radio the

221
00:11:10,949 --> 00:11:09,519
other day and i thought well i'd give it

222
00:11:12,790 --> 00:11:10,959
a shot and i didn't have a question i

223
00:11:15,430 --> 00:11:12,800
just wanted to relay what uh miriam

224
00:11:16,870 --> 00:11:15,440
thought of the launch

225
00:11:18,470 --> 00:11:16,880
after you had

226
00:11:20,870 --> 00:11:18,480
after about two minutes it passed we

227
00:11:22,150 --> 00:11:20,880
asked her what she thought and in her

228
00:11:27,190 --> 00:11:22,160
four-year-old

229
00:11:31,990 --> 00:11:29,670
gosh i hope she's right

230
00:11:34,550 --> 00:11:32,000
i do too i did have one question for you

231
00:11:36,550 --> 00:11:34,560
though okay go ahead i wanted to know if

232
00:11:41,750 --> 00:11:36,560
uh just before launch if you roll down

233
00:11:52,150 --> 00:11:43,590
thanks phillip and no

234
00:11:56,310 --> 00:11:53,030
we've

235
00:11:57,670 --> 00:11:56,320
set up a cockpit here we're doing now

236
00:11:59,269 --> 00:11:57,680
supporting our

237
00:12:04,389 --> 00:11:59,279
lake shield ops

238
00:12:04,399 --> 00:12:08,470

see down here to right on

239
00:12:08,480 --> 00:12:12,310
up here

240
00:12:16,389 --> 00:12:14,150
now this is our

241
00:12:17,829 --> 00:12:16,399
payload 1 up here of course the command

242
00:12:19,910 --> 00:12:17,839
pgs

243
00:12:23,110 --> 00:12:19,920
most of the time we run the event log on

244
00:12:26,069 --> 00:12:23,120
here so we can follow the sequences

245
00:12:28,550 --> 00:12:26,079
command click reference cards up here

246
00:12:31,670 --> 00:12:28,560
the ops concept for signs over here got

247
00:12:34,310 --> 00:12:31,680
a couple blocks in here

248
00:12:37,350 --> 00:12:34,320
the computer down here is uh

249
00:12:39,509 --> 00:12:37,360
the monitor pgsc

250
00:12:41,990 --> 00:12:39,519
back in here i've got all the updates

251
00:12:45,190 --> 00:12:42,000
that came up on the

252
00:12:46,710 --> 00:12:45,200
tips and i got my payload system

253
00:12:48,629 --> 00:12:46,720
back here

254
00:12:53,509 --> 00:12:48,639
that's the way uh columbia's been

255
00:12:59,269 --> 00:12:56,230
and mr elowitz asks how will the orpheus

256
00:13:01,430 --> 00:12:59,279
spies uv observatory complement other

257
00:13:04,150 --> 00:13:01,440
ultraviolet observatories

258
00:13:07,509 --> 00:13:04,160
like fuse and euve

259
00:13:09,509 --> 00:13:07,519
these are other satellites that uh

260
00:13:10,629 --> 00:13:09,519
look at stars and

261
00:13:12,230 --> 00:13:10,639
other

262
00:13:14,150 --> 00:13:12,240
sources of radiation in the universe

263
00:13:15,509 --> 00:13:14,160

that only radiate mainly in the

264
00:13:17,030 --> 00:13:15,519
ultraviolet

265
00:13:19,350 --> 00:13:17,040
and

266
00:13:22,150 --> 00:13:19,360
we can we can't see this radiation down

267
00:13:24,150 --> 00:13:22,160
on earth's surface at most observatories

268
00:13:25,750 --> 00:13:24,160
that we have already built there because

269
00:13:27,350 --> 00:13:25,760
of the earth's atmosphere and the ozone

270
00:13:29,509 --> 00:13:27,360
layer absorbing that ultraviolet light

271
00:13:31,990 --> 00:13:29,519
so we have to build satellites

272
00:13:34,870 --> 00:13:32,000
like the two that mr elliott's mentioned

273
00:13:36,389 --> 00:13:34,880
and orpheus and for example the hubble

274
00:13:39,030 --> 00:13:36,399
space telescope to go above the

275
00:13:41,670 --> 00:13:39,040
atmosphere to look at ultraviolet light

276
00:13:43,990 --> 00:13:41,680
and the advantage that orpheus spas has

277
00:13:44,949 --> 00:13:44,000
in looking at ultraviolet light is that

278
00:13:47,430 --> 00:13:44,959
it has

279
00:13:48,949 --> 00:13:47,440
a wavelength range or a sensitivity to

280
00:13:51,110 --> 00:13:48,959
the radiation coming from these

281
00:13:53,829 --> 00:13:51,120
interesting objects like black holes and

282
00:13:56,150 --> 00:13:53,839
white dwarf stars that's farther into

283
00:13:57,990 --> 00:13:56,160
the infrared uh i'm sorry into the

284
00:13:59,430 --> 00:13:58,000
ultraviolet region

285
00:14:01,189 --> 00:13:59,440
than

286
00:14:03,509 --> 00:14:01,199
observatories like the hubble have for

287
00:14:05,509 --> 00:14:03,519
example so we can see more energetic

288
00:14:07,750 --> 00:14:05,519

radiation from higher temperature

289
00:14:10,550 --> 00:14:07,760
objects that way and also the

290
00:14:11,829 --> 00:14:10,560
instruments on ortho spas have a finer

291
00:14:13,430 --> 00:14:11,839
resolution in other words the

292
00:14:14,870 --> 00:14:13,440
fingerprint of the object they're

293
00:14:18,790 --> 00:14:14,880
looking at an ultraviolet light the

294
00:14:20,949 --> 00:14:18,800
spectrum is much more well defined in

295
00:14:23,350 --> 00:14:20,959
these sensitive instruments on orpheus

296
00:14:25,990 --> 00:14:23,360
we can see more details in that spectrum

297
00:14:27,430 --> 00:14:26,000
or fingerprint and thus understand the

298
00:14:29,269 --> 00:14:27,440
physics and the composition of the

299
00:14:30,949 --> 00:14:29,279
object that we're looking at thanks for

300
00:14:33,189 --> 00:14:30,959
your question

301
00:14:35,590 --> 00:14:33,199
dave also had another question and that

302
00:14:37,269 --> 00:14:35,600
was what role will the space station's

303
00:14:39,509 --> 00:14:37,279
robot r play in the assembly of the

304
00:14:42,949 --> 00:14:39,519
international space station and at what

305
00:14:45,590 --> 00:14:42,959
stage will they be operational

306
00:14:47,430 --> 00:14:45,600
well dave um the rms is going to play a

307
00:14:50,550 --> 00:14:47,440
critical role in assembling the space

308
00:14:52,230 --> 00:14:50,560
station in fact we um hope to fly the

309
00:14:54,389 --> 00:14:52,240
first space station flight the end of

310
00:14:56,710 --> 00:14:54,399
next year in which we will attach the

311
00:14:59,829 --> 00:14:56,720
fgb to the node

312
00:15:01,670 --> 00:14:59,839
on flight assembly flight 2a thank you