1
00:01:24,390 --> 00:01:20,710
mr golden uh columbia is ready go ahead

2
00:01:27,670 --> 00:01:25,910
what are you doing with this atomic

3
00:01:29,190 --> 00:01:27,680
oxygen experiment i noticed that you're

4
00:01:32,310 --> 00:01:29,200
going to be doing an atomic oxygen

5
00:01:42,710 --> 00:01:32,320
experiment before you reel in the wake

6
00:01:46,230 --> 00:01:45,030
satellite and do a free flyer activation

7
00:01:48,469 --> 00:01:46,240
hanging out

8
00:01:52,230 --> 00:01:48,479
on the end of the arm at a certain angle

9
00:01:54,389 --> 00:01:52,240
which will let the ram uh atomic oxygen

10
00:01:56,389 --> 00:01:54,399
impinge upon the substrates

11
00:01:59,190 --> 00:01:56,399
and that is a way of uh

12
00:02:03,590 --> 00:01:59,200
it's a way of almost like a micro lathe

13
00:02:08,790 --> 00:02:07,030

i see i see

14
00:02:10,229 --> 00:02:08,800
however how much more work do you have i

15
00:02:11,670 --> 00:02:10,239
i guess you folks want to stay up an

16
00:02:16,309 --> 00:02:11,680
extra day to make up for the day that

17
00:02:19,990 --> 00:02:18,470
you're reading your mind sir um

18
00:02:23,030 --> 00:02:20,000
we've got quite a bit more work to do

19
00:02:25,190 --> 00:02:23,040
two more evas two ebas as you know on

20
00:02:27,910 --> 00:02:25,200
flight days 10 and 12 and then we have

21
00:02:30,550 --> 00:02:27,920
to retrieve orpheus spas on

22
00:02:32,869 --> 00:02:30,560
flight day 14 as it's currently planned

23
00:02:34,229 --> 00:02:32,879
and plenty of other science that's in

24
00:02:36,790 --> 00:02:34,239
the mid deck

25
00:02:39,990 --> 00:02:36,800
on columbia that we'll be working uh in

26
00:02:42,790 --> 00:02:40,000
the hours in between those activities

27
00:02:44,710 --> 00:02:42,800
you know i just noticed uh uh looking at

28
00:02:47,270 --> 00:02:44,720
the schedule while we'll all be eating

29
00:02:49,350 --> 00:02:47,280
turkey and relaxing on thanksgiving

30
00:02:50,630 --> 00:02:49,360
tammy and tom will be doing the space

31
00:02:52,470 --> 00:02:50,640
walks

32
00:02:53,990 --> 00:02:52,480
at least you'll get a chance to work off

33
00:02:58,070 --> 00:02:54,000
your holiday meal what do you plan to

34
00:03:03,589 --> 00:03:00,630
mr gold mrs tom jones the

35
00:03:05,190 --> 00:03:03,599
ms2 aboard and we'll be hitting the deck

36
00:03:07,990 --> 00:03:05,200
running that morning when we wake up on

37
00:03:10,070 --> 00:03:08,000
eva day on thanksgiving and so we'll

38
00:03:12,390 --> 00:03:10,080

jump right into our eva uh

39
00:03:14,309 --> 00:03:12,400
uh underwear if you will and get right

40
00:03:16,390 --> 00:03:14,319
into the space you check out we'll have

41
00:03:17,589 --> 00:03:16,400
a breakfast a quick one before we get

42
00:03:20,309 --> 00:03:17,599
into the suits

43
00:03:22,309 --> 00:03:20,319
and it's about a six and a half hour eva

44
00:03:24,470 --> 00:03:22,319
and when we get back inside believe me

45
00:03:25,910 --> 00:03:24,480
uh we'll be hungry for that thanksgiving

46
00:03:26,789 --> 00:03:25,920
turkey we've got some

47
00:03:27,990 --> 00:03:26,799
uh

48
00:03:29,990 --> 00:03:28,000
off-the-shelf

49
00:03:31,750 --> 00:03:30,000
kind of supermarket

50
00:03:32,789 --> 00:03:31,760
room temperature stabilized turkey

51
00:03:34,309 --> 00:03:32,799
dinners

52
00:03:35,990 --> 00:03:34,319
uh that we'll be uh digging into right

53
00:03:37,509 --> 00:03:36,000
after i get out get that helmet off when

54
00:03:39,990 --> 00:03:37,519
they come back in from the eva so i'll

55
00:03:41,350 --> 00:03:40,000
be hungry and we'll all be uh i think

56
00:03:44,229 --> 00:03:41,360
anxious to have a meal together after

57
00:03:44,239 --> 00:03:49,990
you didn't make it sound too appetizing

58
00:03:54,710 --> 00:03:51,990
one has to make do with the resources at

59
00:04:01,190 --> 00:03:57,910
hey story i tell you uh we're all very

60
00:04:05,589 --> 00:04:04,070
i think that what you're showing is

61
00:04:08,470 --> 00:04:05,599
it is not

62
00:04:10,229 --> 00:04:08,480
a chronological age that counts

63
00:04:11,990 --> 00:04:10,239

it's what's in your heart your mind and

64
00:04:14,309 --> 00:04:12,000
your body

65
00:04:15,990 --> 00:04:14,319
and you're doing a terrific job up there

66
00:04:18,229 --> 00:04:16,000
you're setting the record for the oldest

67
00:04:21,270 --> 00:04:18,239
astronaut in space

68
00:04:24,390 --> 00:04:21,280
and i i think this is just wonderful i i

69
00:04:28,550 --> 00:04:24,400
i congratulate you and uh i stand in awe

70
00:04:32,790 --> 00:04:30,550
thank you very much sir it's been a

71
00:04:34,790 --> 00:04:32,800
incredible privilege and experience to

72
00:04:36,150 --> 00:04:34,800
have been able to follow my calling for

73
00:04:38,150 --> 00:04:36,160
30 years

74
00:04:40,150 --> 00:04:38,160
i think that's the important thing uh

75
00:04:41,670 --> 00:04:40,160
it's not just in a mold although in my

76
00:04:43,510 --> 00:04:41,680
60s

77
00:04:44,950 --> 00:04:43,520
i do feel really privileged to get to do

78
00:04:46,710 --> 00:04:44,960
these kind of things i think the

79
00:04:48,629 --> 00:04:46,720
important thing though is that i have

80
00:04:52,469 --> 00:04:48,639
had the opportunity to follow my calling

81
00:04:57,749 --> 00:04:55,270
you know one other thing that we noticed

82
00:04:59,749 --> 00:04:57,759
that uh both you and tammy

83
00:05:01,110 --> 00:04:59,759
are joining the thousand hour club in

84
00:05:02,950 --> 00:05:01,120
space

85
00:05:04,310 --> 00:05:02,960
and uh this is another notable

86
00:05:06,870 --> 00:05:04,320
achievement

87
00:05:08,790 --> 00:05:06,880
and again i stand in awe and i i gotta

88
00:05:11,110 --> 00:05:08,800

say i'm a little bit jealous i'd like to

89
00:05:12,550 --> 00:05:11,120
get just two hours in space but it

90
00:05:21,270 --> 00:05:12,560
doesn't look like it's going to happen

91
00:05:24,550 --> 00:05:23,189
hi mr gold and i i think that your

92
00:05:25,909 --> 00:05:24,560
feelings are shared by a lot of people

93
00:05:28,070 --> 00:05:25,919
on the ground we wish

94
00:05:29,590 --> 00:05:28,080
this opportunity was widely available to

95
00:05:30,550 --> 00:05:29,600
everyone i hope that's coming in the

96
00:05:32,550 --> 00:05:30,560
next

97
00:05:34,469 --> 00:05:32,560
few years with uh commercialization of

98
00:05:35,749 --> 00:05:34,479
space maybe even some tourism but i'll

99
00:05:37,590 --> 00:05:35,759
tell you the two hours that you should

100
00:05:39,510 --> 00:05:37,600
pick to have in space and not the first

101
00:05:40,790 --> 00:05:39,520
two hours you should choose ones on

102
00:05:42,150 --> 00:05:40,800
about flight day five and everyone's

103
00:05:45,270 --> 00:05:42,160
feeling terrific and

104
00:05:49,189 --> 00:05:47,830
you all look terrific

105
00:05:51,830 --> 00:05:49,199
keep it safe

106
00:05:53,510 --> 00:05:51,840
we're very very very proud of you i

107
00:05:55,430 --> 00:05:53,520
think this is just a wonderful mission

108
00:05:57,990 --> 00:05:55,440
you look very relaxed

109
00:06:00,390 --> 00:05:58,000
and i'll be watching you on nasa tv over

110
00:06:03,189 --> 00:06:00,400
the holidays and when you eat the turkey

111
00:06:04,550 --> 00:06:03,199
uh i'll recognize what you're doing

112
00:06:09,430 --> 00:06:04,560
you're wonderful you're the america's

113
00:06:15,749 --> 00:06:11,110

thanks for the kind words mr goldman and

114
00:06:20,150 --> 00:06:17,990
the next step in columbia's mission is a

115
00:06:22,150 --> 00:06:20,160
spacewalk scheduled for thanksgiving day

116
00:06:23,990 --> 00:06:22,160
mission specialists thomas jones and

117
00:06:26,150 --> 00:06:24,000
tamara jernigan will spend six hours

118
00:06:27,830 --> 00:06:26,160
walking in space thursday with the start

119
00:06:29,909 --> 00:06:27,840
of construction on an international

120
00:06:31,909 --> 00:06:29,919
space station just one year away nasa is

121
00:06:34,469 --> 00:06:31,919
anxious to learn as much as possible

122
00:06:35,909 --> 00:06:34,479
about zero gravity working conditions

123
00:06:37,909 --> 00:06:35,919
joining us this morning from shuttle

124
00:06:40,230 --> 00:06:37,919
columbia are three nasa crew members

125
00:06:42,070 --> 00:06:40,240
they are pilot kent rominger commander

126
00:06:43,510 --> 00:06:42,080
ken cockrell and mission specialist

127
00:06:47,430 --> 00:06:43,520
story musgrave gentlemen good morning

128
00:06:52,309 --> 00:06:50,230
good morning from columbia

129
00:06:53,749 --> 00:06:52,319
cockrell all the delicate maneuvering

130
00:06:55,830 --> 00:06:53,759
during satellite deployment and

131
00:06:57,189 --> 00:06:55,840
retrieval takes time as we have seen in

132
00:06:58,390 --> 00:06:57,199
the past now you had to pull the

133
00:07:00,790 --> 00:06:58,400
wakefield

134
00:07:07,270 --> 00:07:00,800
facility satellite early to avoid a

135
00:07:11,350 --> 00:07:09,589
well there's nothing close really about

136
00:07:13,589 --> 00:07:11,360
it the two satellites were about 14

137
00:07:15,430 --> 00:07:13,599
miles apart when we flew between them to

138
00:07:17,670 --> 00:07:15,440

retrieve

139
00:07:19,830 --> 00:07:17,680
uh it's just a question of uh

140
00:07:21,589 --> 00:07:19,840
making sure that we have proper

141
00:07:22,390 --> 00:07:21,599
clearance in case we

142
00:07:23,430 --> 00:07:22,400
uh

143
00:07:25,510 --> 00:07:23,440
for

144
00:07:28,070 --> 00:07:25,520
inaccuracies and in our sensors or

145
00:07:30,230 --> 00:07:28,080
anything other going wrong we should

146
00:07:32,150 --> 00:07:30,240
deviate from the straight and narrow as

147
00:07:33,670 --> 00:07:32,160
it turns out we were very accurate and

148
00:07:35,270 --> 00:07:33,680
and what we thought the satellites were

149
00:07:37,430 --> 00:07:35,280
and we flew about seven miles away from

150
00:07:39,029 --> 00:07:37,440
each one of them

151
00:07:41,589 --> 00:07:39,039
story musgrave could you tell us a

152
00:07:43,350 --> 00:07:41,599
little bit more about the uh the wake

153
00:07:48,629 --> 00:07:43,360
shield what it does and how we will

154
00:07:52,710 --> 00:07:50,869
the purpose of lake hill time is to grow

155
00:07:55,510 --> 00:07:52,720
some

156
00:07:57,670 --> 00:07:55,520
as perfect as possible semiconductors

157
00:08:00,150 --> 00:07:57,680
electrodynamic materials

158
00:08:01,909 --> 00:08:00,160
classically as you know silicon has has

159
00:08:03,990 --> 00:08:01,919
been the

160
00:08:06,469 --> 00:08:04,000
material of choice

161
00:08:08,950 --> 00:08:06,479
we're using more advanced materials such

162
00:08:10,309 --> 00:08:08,960
as arsenic gallium

163
00:08:12,710 --> 00:08:10,319

aluminum

164
00:08:15,430 --> 00:08:12,720
and what we're doing is molecule by

165
00:08:17,430 --> 00:08:15,440
molecule we're making perfect layers in

166
00:08:18,629 --> 00:08:17,440
a vacuum which is about 10 to the minus

167
00:08:20,629 --> 00:08:18,639
14

168
00:08:22,629 --> 00:08:20,639
versus 10 to the minus 6 which you can

169
00:08:25,270 --> 00:08:22,639
make down here on earth so there's no

170
00:08:27,189 --> 00:08:25,280
contaminating molecules in those layers

171
00:08:28,710 --> 00:08:27,199
we go up there with a substrate that has

172
00:08:31,749 --> 00:08:28,720
a certain form

173
00:08:33,990 --> 00:08:31,759
we inject layers of molecules on top of

174
00:08:35,110 --> 00:08:34,000
that form they replicate that form in

175
00:08:37,990 --> 00:08:35,120
layers

176
00:08:39,870 --> 00:08:38,000
and that's what we're up to is exploring

177
00:08:41,990 --> 00:08:39,880
the possibility of making perfect

178
00:08:44,230 --> 00:08:42,000
semiconductors up there

179
00:08:46,310 --> 00:08:44,240
not only uh studying commercial

180
00:08:47,750 --> 00:08:46,320
viability but also if you do make

181
00:08:49,110 --> 00:08:47,760
perfect uh

182
00:08:51,670 --> 00:08:49,120
materials

183
00:08:53,670 --> 00:08:51,680
um how much better are they than the

184
00:08:57,350 --> 00:08:53,680
ones that are made down here so it's a

185
00:08:59,509 --> 00:08:57,360
very state-of-the-art uh exploration

186
00:09:01,269 --> 00:08:59,519
uh pilot kent rominger the orpheus

187
00:09:02,949 --> 00:09:01,279
telescope which has also been deployed

188
00:09:05,350 --> 00:09:02,959

from the shuttle how does it function

189
00:09:10,070 --> 00:09:05,360
and what can it see that the the hubble

190
00:09:14,070 --> 00:09:11,990
on the orifice it's primarily looking at

191
00:09:16,150 --> 00:09:14,080
uv and it's really there to study not

192
00:09:18,310 --> 00:09:16,160
only stars which is hubble's primary

193
00:09:20,790 --> 00:09:18,320
focus but also the medium the

194
00:09:22,949 --> 00:09:20,800
interstellar medium the medium out there

195
00:09:24,310 --> 00:09:22,959
in between the stars and being a pilot i

196
00:09:26,070 --> 00:09:24,320
didn't realize there was really much in

197
00:09:27,910 --> 00:09:26,080
that great vacuum but the

198
00:09:29,350 --> 00:09:27,920
astrophysicists on board have educated

199
00:09:31,190 --> 00:09:29,360
me that in fact

200
00:09:32,710 --> 00:09:31,200
there is material in that medium in

201
00:09:33,670 --> 00:09:32,720
between the stars and the interstellar

202
00:09:35,430 --> 00:09:33,680
medium

203
00:09:38,550 --> 00:09:35,440
and from that we can learn a lot about

204
00:09:40,710 --> 00:09:38,560
the history of where the world came from

205
00:09:43,110 --> 00:09:40,720
uh curiosity question for anyone who

206
00:09:45,829 --> 00:09:43,120
wants to answer it in zero gravity there

207
00:09:47,829 --> 00:09:45,839
is is no up or down your heads up to the

208
00:09:49,509 --> 00:09:47,839
camera relative to the camera but the

209
00:09:51,110 --> 00:09:49,519
shuttle might be upside down relative to

210
00:09:58,870 --> 00:09:51,120
earth how do you how do you deal with

211
00:10:02,790 --> 00:10:01,190
tom i think you go into space uh

212
00:10:04,949 --> 00:10:02,800
the best way to adapt is going to space

213
00:10:07,269 --> 00:10:04,959

with a totally open mind to go into

214
00:10:09,590 --> 00:10:07,279
space realizing you've been created and

215
00:10:11,590 --> 00:10:09,600
evolved with this gravitational field

216
00:10:13,430 --> 00:10:11,600
which has designed you and designed the

217
00:10:14,550 --> 00:10:13,440
senses with which you perceive your

218
00:10:16,069 --> 00:10:14,560
environment

219
00:10:17,910 --> 00:10:16,079
now you're in a totally different kind

220
00:10:19,829 --> 00:10:17,920
of environment and i think an openness

221
00:10:22,710 --> 00:10:19,839
to the possibilities

222
00:10:25,190 --> 00:10:22,720
that at times the floor is down at times

223
00:10:27,269 --> 00:10:25,200
the ceiling is down being able to put

224
00:10:29,590 --> 00:10:27,279
that perceived down direction in any

225
00:10:31,990 --> 00:10:29,600
direction you'd like or do away with it

226
00:10:34,710 --> 00:10:32,000
to expect some kind of illusions where

227
00:10:36,949 --> 00:10:34,720
you're felt the body sense of what is

228
00:10:39,030 --> 00:10:36,959
going on is very different from the

229
00:10:42,310 --> 00:10:39,040
abstract intellectual knowledge of what

230
00:10:44,949 --> 00:10:42,320
is going on if you can live comfortably

231
00:10:47,030 --> 00:10:44,959
with conflicts between those two and

232
00:10:49,110 --> 00:10:47,040
different sensory conflicts coming from

233
00:10:51,269 --> 00:10:49,120
different sensors such as the vestibular

234
00:10:52,870 --> 00:10:51,279
system the joints and muscles the

235
00:10:54,550 --> 00:10:52,880
cardiovascular system then you're going

236
00:10:56,230 --> 00:10:54,560
to be a lot more comfortable a lot

237
00:10:58,790 --> 00:10:56,240
faster

238
00:11:00,710 --> 00:10:58,800

story this is your final nasa mission

239
00:11:03,030 --> 00:11:00,720
i'm just wondering if there are any uh

240
00:11:12,150 --> 00:11:03,040
any pangs of sadness creeping in as you

241
00:11:16,389 --> 00:11:13,910
absolutely none and i think you said it

242
00:11:17,670 --> 00:11:16,399
exactly right it has been a glorious

243
00:11:19,110 --> 00:11:17,680
career

244
00:11:21,269 --> 00:11:19,120
the important thing is i've had the

245
00:11:24,470 --> 00:11:21,279
privilege an opportunity to follow what

246
00:11:26,230 --> 00:11:24,480
is a calling uh for 30 years

247
00:11:28,550 --> 00:11:26,240
uh nasa has told me not to expect

248
00:11:30,949 --> 00:11:28,560
assignment to another mission um

249
00:11:32,710 --> 00:11:30,959
medically physically ability perform i

250
00:11:35,269 --> 00:11:32,720
could go on and do more but it may be

251
00:11:37,190 --> 00:11:35,279
the right decision at the right time

252
00:11:38,870 --> 00:11:37,200
they and other people do know that i'm

253
00:11:40,630 --> 00:11:38,880
unable to walk away from this kind of

254
00:11:42,710 --> 00:11:40,640
thing i still love it too much i would

255
00:11:45,670 --> 00:11:42,720
keep on doing it forever until someone

256
00:11:48,550 --> 00:11:45,680
were to tell me it's about that time

257
00:11:50,310 --> 00:11:48,560
and so there are aspects such as that uh

258
00:11:52,790 --> 00:11:50,320
you want to share space flight with as

259
00:11:54,150 --> 00:11:52,800
many people as you can i've had a

260
00:11:56,470 --> 00:11:54,160
privilege of

261
00:11:57,829 --> 00:11:56,480
six flights a lot of time a lot of very

262
00:12:00,069 --> 00:11:57,839
good missions

263
00:12:01,509 --> 00:12:00,079

and i've run a i've run a wonderful race

264
00:12:03,910 --> 00:12:01,519
but there are people waiting for the

265
00:12:05,509 --> 00:12:03,920
baton you also want to be sure that you

266
00:12:07,190 --> 00:12:05,519
leave this kind of job when you're at

267
00:12:08,949 --> 00:12:07,200
your peak and i consider the last

268
00:12:11,350 --> 00:12:08,959
initial hubble repair mission in this

269
00:12:12,470 --> 00:12:11,360
one i'm really about it might be

270
00:12:14,550 --> 00:12:12,480
so there are

271
00:12:16,310 --> 00:12:14,560
there are factors in the entire equation

272
00:12:17,350 --> 00:12:16,320
which which maybe would support this

273
00:12:19,910 --> 00:12:17,360
decision

274
00:12:21,990 --> 00:12:19,920
but no i have no regrets at all i look

275
00:12:24,069 --> 00:12:22,000
as you said at the glory of a fantastic

276
00:12:25,990 --> 00:12:24,079
career the important thing is that