1
00:00:44,470 --> 00:00:28,870
when i up down touch the ground it puts

2
00:00:44,480 --> 00:00:52,549
i improve my appetite when i exercise

3
00:00:56,830 --> 00:00:54,869
well i'm guessing that that was for a

4
00:00:59,110 --> 00:00:56,840
chubby little cubby little

5
00:01:01,430 --> 00:00:59,120
bear well endeavor that music was

6
00:01:07,590 --> 00:01:01,440
brought to you by tigger and eeyore and

7
00:01:15,830 --> 00:01:10,070
and john about another minute or so and

8
00:01:15,840 --> 00:01:50,870
and your stripes are nicely aligned now

9
00:02:06,830 --> 00:01:54,710
this is um for all of you or anyone

10
00:02:12,309 --> 00:02:09,109
yeah um the experiment you're referring

11
00:02:13,750 --> 00:02:12,319
to is our fluid generic bioprocessing

12
00:02:15,510 --> 00:02:13,760
apparatus

13
00:02:17,270 --> 00:02:15,520

coca-cola is the

14
00:02:18,309 --> 00:02:17,280
major corporate sponsor for that

15
00:02:22,949 --> 00:02:18,319
experiment

16
00:02:25,910 --> 00:02:22,959
two-phase system meaning it does involve

17
00:02:27,910 --> 00:02:25,920
a liquid and a gas uh the liquid uh

18
00:02:30,229 --> 00:02:27,920
basically being um

19
00:02:31,830 --> 00:02:30,239
a uh sweetened beverage and then the

20
00:02:36,070 --> 00:02:31,840
coke or coke

21
00:02:39,430 --> 00:02:36,080
and the uh and the gas being uh the co2

22
00:02:42,390 --> 00:02:39,440
um no pun intended but it has had a

23
00:02:45,430 --> 00:02:42,400
little bit of mixed success uh some of

24
00:02:47,830 --> 00:02:45,440
it has worked perfectly um and uh it

25
00:02:50,949 --> 00:02:47,840
tastes just like it does uh on earth and

26
00:02:52,390 --> 00:02:50,959
in fact um several of us commented that

27
00:02:53,910 --> 00:02:52,400
a lot of times when we're up here and

28
00:02:55,430 --> 00:02:53,920
you know the meals that we eat aren't

29
00:02:57,670 --> 00:02:55,440
exactly what you can

30
00:02:59,589 --> 00:02:57,680
go down to your local restaurant or eat

31
00:03:01,589 --> 00:02:59,599
at home so

32
00:03:03,509 --> 00:03:01,599
they do tend to get old after a while

33
00:03:04,949 --> 00:03:03,519
and it really was kind of nice to have

34
00:03:06,869 --> 00:03:04,959
something uh different but it pretty

35
00:03:09,589 --> 00:03:06,879
much uh tasted the same

36
00:03:11,830 --> 00:03:09,599
we've had problems uh or we've had

37
00:03:15,270 --> 00:03:11,840
some problems with differences in the

38
00:03:17,030 --> 00:03:15,280

amount of carbon dioxide that does end

39
00:03:19,030 --> 00:03:17,040
up in solution and that's the whole

40
00:03:22,229 --> 00:03:19,040
problem about this experiment is

41
00:03:24,470 --> 00:03:22,239
controlling how much co2 goes into

42
00:03:28,949 --> 00:03:24,480
the solution and transferring it and

43
00:03:34,550 --> 00:03:31,670
stephen young with reuters question for

44
00:03:36,070 --> 00:03:34,560
john casper when they come to write the

45
00:03:37,990 --> 00:03:36,080
history books on this mission and the

46
00:03:40,149 --> 00:03:38,000
flight has to be condensed to a few

47
00:03:42,070 --> 00:03:40,159
short lines what do you think will be

48
00:03:45,990 --> 00:03:42,080
the one or two highlights of this

49
00:03:49,190 --> 00:03:47,509
i think the dramatic highlights are

50
00:03:50,710 --> 00:03:49,200
going to be the uh the visual

51
00:03:52,869 --> 00:03:50,720
stimulating part

52
00:03:54,949 --> 00:03:52,879
which are the inflatable antenna and the

53
00:03:57,429 --> 00:03:54,959
small test satellite unit

54
00:03:59,509 --> 00:03:57,439
uh i think some of the more dramatic

55
00:04:01,350 --> 00:03:59,519
results in the long term may be these

56
00:04:03,910 --> 00:04:01,360
semiconductor crystals

57
00:04:05,429 --> 00:04:03,920
that we're growing uh it's it's hard to

58
00:04:07,589 --> 00:04:05,439
know in the future

59
00:04:09,750 --> 00:04:07,599
what the what the most beneficial thing

60
00:04:11,750 --> 00:04:09,760
will be that comes out of this flight as

61
00:04:13,990 --> 00:04:11,760
i said we have over 30 experiments on

62
00:04:16,949 --> 00:04:14,000
board they're in many different areas of

63
00:04:19,749 --> 00:04:16,959

technology and also commercial areas uh

64
00:04:21,030 --> 00:04:19,759
plant uh plant animal science medical

65
00:04:23,430 --> 00:04:21,040
experiments

66
00:04:25,590 --> 00:04:23,440
uh in the years to come who knows it may

67
00:04:27,830 --> 00:04:25,600
be something completely different that

68
00:04:30,310 --> 00:04:27,840
we we didn't pay much attention to but

69
00:04:33,590 --> 00:04:30,320
it will prove to be a definite benefit

70
00:04:36,790 --> 00:04:33,600
to humankind

71
00:04:38,870 --> 00:04:36,800
bill horowitz cbs news uh on pam stew

72
00:04:40,390 --> 00:04:38,880
would whichever one of you is the expert

73
00:04:43,110 --> 00:04:40,400
on that system if you cannot get the

74
00:04:44,710 --> 00:04:43,120
laser system to work like you want it to

75
00:04:46,150 --> 00:04:44,720
tomorrow

76
00:04:47,430 --> 00:04:46,160
what does that mean to the overall

77
00:04:49,350 --> 00:04:47,440
experiment in other words how good is

78
00:04:51,189 --> 00:04:49,360
the data you get from radar and cameras

79
00:04:54,870 --> 00:04:51,199
and stuff versus not having the radar

80
00:05:00,310 --> 00:04:57,510
well i i can't tell you exactly i know

81
00:05:02,390 --> 00:05:00,320
that the that the camera data we have is

82
00:05:05,270 --> 00:05:02,400
not quite as precise

83
00:05:07,430 --> 00:05:05,280
as uh as the laser in the payload laser

84
00:05:10,150 --> 00:05:07,440
in the payload bay is my understanding

85
00:05:11,350 --> 00:05:10,160
could get the angle could resolve the

86
00:05:14,550 --> 00:05:11,360
angle

87
00:05:15,990 --> 00:05:14,560
satellite makes

88
00:05:17,990 --> 00:05:16,000

to us

89
00:05:20,469 --> 00:05:18,000
to within a degree or less probably

90
00:05:22,870 --> 00:05:20,479
within a tenth of a degree now the video

91
00:05:25,749 --> 00:05:22,880
that we get i believe we'll be able to

92
00:05:29,029 --> 00:05:25,759
get it within uh on the order of a few

93
00:05:31,670 --> 00:05:29,039
degrees so it's not quite uh probably

94
00:05:34,070 --> 00:05:31,680
not quite as exact as they would want

95
00:05:43,510 --> 00:05:34,080
but uh fortunately

96
00:05:47,990 --> 00:05:45,590
setting up the cameras that and

97
00:05:49,670 --> 00:05:48,000
fortunately we did have some cameras on

98
00:05:51,590 --> 00:05:49,680
board with low light capability that

99
00:05:53,270 --> 00:05:51,600
they could actually individually we

100
00:05:55,350 --> 00:05:53,280
could see

101
00:05:59,270 --> 00:05:55,360
the retro reflectors that are located

102
00:06:01,510 --> 00:05:59,280
along uh or around the outside

103
00:06:03,590 --> 00:06:01,520
are just inside the diameter of the skew

104
00:06:06,070 --> 00:06:03,600
satellite and that's how they determine

105
00:06:08,150 --> 00:06:06,080
the angle of the satellite and i believe

106
00:06:12,150 --> 00:06:08,160
with that video they'll still be able to

107
00:06:15,990 --> 00:06:13,590
mark i wonder if you could talk a little

108
00:06:17,590 --> 00:06:16,000
bit about the aquatic research facility

109
00:06:28,230 --> 00:06:17,600
and specifically the sea urchin

110
00:06:33,350 --> 00:06:30,950
yes the art facility is basically a

111
00:06:36,550 --> 00:06:33,360
whole bunch of little aquariums and in

112
00:06:38,070 --> 00:06:36,560
those aquariums we've put sea urchins

113
00:06:41,110 --> 00:06:38,080

starfish

114
00:06:43,189 --> 00:06:41,120
and blue clams now these aren't big like

115
00:06:45,350 --> 00:06:43,199
the ones you might see by the seashore

116
00:06:48,309 --> 00:06:45,360
they're very small

117
00:06:49,430 --> 00:06:48,319
embryos really and what we want to do is

118
00:06:51,589 --> 00:06:49,440
to

119
00:06:53,990 --> 00:06:51,599
let them develop for a little while and

120
00:06:55,749 --> 00:06:54,000
then fix them in other words we stop

121
00:06:57,749 --> 00:06:55,759
their development so that we can then

122
00:06:59,589 --> 00:06:57,759
see back on the ground

123
00:07:01,430 --> 00:06:59,599
how they have developed in some cases

124
00:07:03,430 --> 00:07:01,440
over a matter of a few hours in

125
00:07:05,589 --> 00:07:03,440
weightlessness and sometimes over a

126
00:07:07,029 --> 00:07:05,599
matter of a few days

127
00:07:09,110 --> 00:07:07,039
what we're interested in seeing

128
00:07:11,990 --> 00:07:09,120
basically is how does this development

129
00:07:14,070 --> 00:07:12,000
occur without the effect of gravity in

130
00:07:14,870 --> 00:07:14,080
other words what effect does gravity

131
00:07:16,710 --> 00:07:14,880
play

132
00:07:19,830 --> 00:07:16,720
in the development of these marine

133
00:07:21,909 --> 00:07:19,840
species uh we hope in the process to

134
00:07:24,230 --> 00:07:21,919
learn a little bit more about

135
00:07:26,629 --> 00:07:24,240
i suppose the equivalent to human bone

136
00:07:28,550 --> 00:07:26,639
formation but in this case

137
00:07:31,029 --> 00:07:28,560
we're talking about shells and and the

138
00:07:33,830 --> 00:07:31,039

bodies of these small marine animals

139
00:07:36,870 --> 00:07:33,840
so that possibly we can infer other

140
00:07:38,550 --> 00:07:36,880
things about bone development

141
00:07:40,110 --> 00:07:38,560
and

142
00:07:42,469 --> 00:07:40,120
possibly even something like

143
00:07:44,790 --> 00:07:42,479
osteoporosis which happens in human

144
00:07:47,189 --> 00:07:44,800
beings and certainly is a possibility

145
00:07:50,629 --> 00:07:47,199
with astronauts who spend long periods

146
00:07:54,790 --> 00:07:52,390
this is stephen young with reuters again

147
00:07:56,710 --> 00:07:54,800
a question for kurt brown

148
00:07:59,589 --> 00:07:56,720
this mission was described as a

149
00:08:01,589 --> 00:07:59,599
commander and pilot stream flight

150
00:08:03,430 --> 00:08:01,599
beforehand i wonder if you could talk a

151
00:08:05,430 --> 00:08:03,440
little bit about the flying that's

152
00:08:06,710 --> 00:08:05,440
involved in the the rendezvous you've

153
00:08:08,629 --> 00:08:06,720
been doing and the rendezvous that's

154
00:08:09,990 --> 00:08:08,639
planned tomorrow and whether there's any

155
00:08:11,830 --> 00:08:10,000
analogy

156
00:08:14,469 --> 00:08:11,840
between the station keeping you do and

157
00:08:15,909 --> 00:08:14,479
something that may take place down here

158
00:08:18,150 --> 00:08:15,919
on the ground such as a helicopter

159
00:08:19,749 --> 00:08:18,160
hovering over a particular site or a

160
00:08:25,350 --> 00:08:19,759
ship fighting against the current to

161
00:08:28,950 --> 00:08:27,749
well the uh the flight itself has turned

162
00:08:31,589 --> 00:08:28,960
out to be

163
00:08:34,070 --> 00:08:31,599

very much as expected pre-flight

164
00:08:37,190 --> 00:08:34,080
uh it is a uh i think the commanders and

165
00:08:39,589 --> 00:08:37,200
pilots dream we have completed

166
00:08:42,389 --> 00:08:39,599
uh three rendezvous so far the flight

167
00:08:44,389 --> 00:08:42,399
looking for our next one tomorrow

168
00:08:46,630 --> 00:08:44,399
the training we received on the ground

169
00:08:47,910 --> 00:08:46,640
was excellent for for what we wanted to

170
00:08:49,750 --> 00:08:47,920
do

171
00:08:51,670 --> 00:08:49,760
it looked just like

172
00:08:53,670 --> 00:08:51,680
we were in the simulator but the view

173
00:08:56,470 --> 00:08:53,680
out the windows were was obviously much

174
00:08:59,750 --> 00:08:56,480
more spectacular

175
00:09:01,990 --> 00:08:59,760
the best way to describe flying a a

176
00:09:04,230 --> 00:09:02,000
station keeping such as we're doing on

177
00:09:06,230 --> 00:09:04,240
the pam's 2 satellite

178
00:09:09,269 --> 00:09:06,240
is very similar

179
00:09:11,910 --> 00:09:09,279
to flying formation in an aircraft which

180
00:09:13,670 --> 00:09:11,920
a lot of folks do on the on the earth

181
00:09:16,310 --> 00:09:13,680
the only difference is we're traveling

182
00:09:19,269 --> 00:09:16,320
at much much greater speeds

183
00:09:20,949 --> 00:09:19,279
uh however the relative motion between

184
00:09:23,990 --> 00:09:20,959
the two bodies the satellite and the

185
00:09:26,630 --> 00:09:24,000
shuttle is very very small

186
00:09:28,630 --> 00:09:26,640
so it's almost almost imperceptible the

187
00:09:29,990 --> 00:09:28,640
the changes that are taking place and

188
00:09:31,430 --> 00:09:30,000

because of that

189
00:09:32,790 --> 00:09:31,440
we have

190
00:09:35,269 --> 00:09:32,800
quite a few different instruments on

191
00:09:37,030 --> 00:09:35,279
board to help us out we have a coast

192
00:09:39,509 --> 00:09:37,040
which is a

193
00:09:41,269 --> 00:09:39,519
optical alignment device or a site very

194
00:09:43,350 --> 00:09:41,279
much like the crosshairs on a telescope

195
00:09:44,949 --> 00:09:43,360
to help us perceive motion

196
00:09:46,870 --> 00:09:44,959
we have a

197
00:09:48,550 --> 00:09:46,880
radar that's in the payload bay which we

198
00:09:49,430 --> 00:09:48,560
carry on every shuttle flight we use it

199
00:09:51,110 --> 00:09:49,440
as a

200
00:09:53,910 --> 00:09:51,120
range and range rate and an angle

201
00:09:55,670 --> 00:09:53,920
tracking device which locks onto the

202
00:09:57,670 --> 00:09:55,680
satellite and tracks it

203
00:10:00,389 --> 00:09:57,680
we also have

204
00:10:02,870 --> 00:10:00,399
a handheld laser which is very much to

205
00:10:04,710 --> 00:10:02,880
uh similar to the uh the ones the police

206
00:10:06,389 --> 00:10:04,720
departments use to uh make sure folks

207
00:10:08,310 --> 00:10:06,399
are not going too fast

208
00:10:10,630 --> 00:10:08,320
and we shine it out the windows and

209
00:10:11,670 --> 00:10:10,640
measure range and also range rate to the

210
00:10:13,269 --> 00:10:11,680
satellite

211
00:10:15,110 --> 00:10:13,279
and then finally

212
00:10:16,470 --> 00:10:15,120
in recent years we have a laptop

213
00:10:17,829 --> 00:10:16,480

computer which we put all this

214
00:10:20,069 --> 00:10:17,839
information we're getting from the other

215
00:10:22,790 --> 00:10:20,079
three devices into this laptop

216
00:10:25,190 --> 00:10:22,800
and it gives us a exact position in

217
00:10:27,030 --> 00:10:25,200
relation to the satellite and also gives

218
00:10:27,990 --> 00:10:27,040
us predictors to show us where we'll be

219
00:10:31,030 --> 00:10:28,000
going

220
00:10:32,389 --> 00:10:31,040
in the next say 10 15 20 minutes and by

221
00:10:34,470 --> 00:10:32,399
knowing that we can use orbital

222
00:10:36,389 --> 00:10:34,480
mechanics to our benefit

223
00:10:39,030 --> 00:10:36,399
and by using orbital mechanics which is

224
00:10:40,790 --> 00:10:39,040
pure physics we can save a lot of props

225
00:10:42,470 --> 00:10:40,800
and as shown on this flight due to our

226
00:10:44,230 --> 00:10:42,480
great training we've had

227
00:10:46,949 --> 00:10:44,240
we've started off

228
00:10:49,110 --> 00:10:46,959
a couple hundred pounds in the negative

229
00:10:51,430 --> 00:10:49,120
and right now i think our last um

230
00:10:53,590 --> 00:10:51,440
our total uh after the first three

231
00:10:55,829 --> 00:10:53,600
rendezvous we've made up basically about

232
00:10:57,990 --> 00:10:55,839
400 pounds so we've uh

233
00:10:59,509 --> 00:10:58,000
we've done a good job and we can't take

234
00:11:00,870 --> 00:10:59,519
credit for it up here it has to be the

235
00:11:03,030 --> 00:11:00,880
folks on the ground that did all the

236
00:11:05,269 --> 00:11:03,040
planning all the training and all the