



1
00:00:11,209 --> 00:00:08,629
this is the ascent portion of our

2
00:00:13,310 --> 00:00:11,219
mission mcountdown of the Cape this went

3
00:00:15,049 --> 00:00:13,320
flawlessly we're really really pleased

4
00:00:15,680 --> 00:00:15,059
with the way things went down went on

5
00:00:17,269 --> 00:00:15,690
down there

6
00:00:18,680 --> 00:00:17,279
the engine starting you can see the

7
00:00:20,599 --> 00:00:18,690
shockwaves come out of the throats of

8
00:00:22,250 --> 00:00:20,609
the the nozzles the nozzles vibrate the

9
00:00:25,970 --> 00:00:22,260
engines get up and stable in about six

10
00:00:28,670 --> 00:00:25,980
seconds solid rocket motors fire and

11
00:00:30,349 --> 00:00:28,680
we're off in for a new guy doing this

12
00:00:32,479 --> 00:00:30,359
the first time it's really a thrill and

13
00:00:34,100 --> 00:00:32,489

that thing feels like being on a rough

14

00:00:35,299 --> 00:00:34,110

train while the solid rocket motors are

15

00:00:36,590 --> 00:00:35,309

firing if y'all have been on rough

16

00:00:39,170 --> 00:00:36,600

railroad track that's about what it

17

00:00:41,569 --> 00:00:39,180

feels like and it's a very interesting

18

00:00:42,889 --> 00:00:41,579

ride you can function normally and right

19

00:00:44,240 --> 00:00:42,899

before we lifted off kripp said get

20

00:00:45,860 --> 00:00:44,250

ready for the ride of your lives and he

21

00:00:48,049 --> 00:00:45,870

was right it's the ride of your life

22

00:00:52,189 --> 00:00:48,059

it's totally so big throw on your third

23

00:00:53,750 --> 00:00:52,199

time to the one of the one of the neat

24

00:00:55,130 --> 00:00:53,760

things about this mission was we're

25

00:00:56,569 --> 00:00:55,140

gonna do direct insertion into orbit so

26

00:00:58,279 --> 00:00:56,579

we didn't do an orbital maneuvering

27

00:00:59,479 --> 00:00:58,289

system one burn right after the main

28

00:01:01,610 --> 00:00:59,489

engines cut off so we're going right

29

00:01:03,439 --> 00:01:01,620

into orbit off the pad and we're going

30

00:01:04,310 --> 00:01:03,449

up 250 miles so the trajectory and

31

00:01:06,830 --> 00:01:04,320

everything was a little bit different

32

00:01:10,969 --> 00:01:06,840

and it made made a real interesting ride

33

00:01:13,429 --> 00:01:10,979

out of it the solid rocket motors the

34

00:01:15,080 --> 00:01:13,439

engines and everything just magnificent

35

00:01:17,630 --> 00:01:15,090

we didn't have a glitch the whole essent

36

00:01:18,740 --> 00:01:17,640

which is really nice you don't want any

37

00:01:21,469 --> 00:01:18,750

glitches when this kind of stuff's going

38

00:01:22,460 --> 00:01:21,479

on outside you window we all kept on

39

00:01:25,370 --> 00:01:22,470

watching crippled make sure this is the

40

00:01:27,320 --> 00:01:25,380

way it's really yeah okay solid rocket

41

00:01:29,630 --> 00:01:27,330

motors separated they saw the plumes

42

00:01:31,039 --> 00:01:29,640

from the separation motor so slog up our

43

00:01:32,690 --> 00:01:31,049

windows pretty good up in front they

44

00:01:34,550 --> 00:01:32,700

they put a haze on the on the forward

45

00:01:35,960 --> 00:01:34,560

windows when they go off and you get a

46

00:01:37,819 --> 00:01:35,970

nice flash in the windows but it's a

47

00:01:39,140 --> 00:01:37,829

nice smooth separation this is letting

48

00:01:43,370 --> 00:01:39,150

the bees out of their little house here

49

00:01:45,620 --> 00:01:43,380

kind of we did this a couple times a day

50

00:01:46,880 --> 00:01:45,630

it was good entertainment if nothing

51
00:01:52,719 --> 00:01:46,890
else and we were watching their progress

52
00:01:56,560 --> 00:01:54,850
yeah we were made sure that there was no

53
00:02:03,280 --> 00:01:56,570
way that we're going to get out of it I

54
00:02:05,440 --> 00:02:03,290
checked that okay this is uh more of the

55
00:02:07,300 --> 00:02:05,450
housework I did a lot of a lot of the

56
00:02:08,350 --> 00:02:07,310
cooking in bottle washing and then if

57
00:02:09,639 --> 00:02:08,360
you look out the window there you can

58
00:02:12,640 --> 00:02:09,649
see the snow going by we're doing a

59
00:02:15,040 --> 00:02:12,650
water dump at the same time cooking a

60
00:02:17,710 --> 00:02:15,050
meal was about like doing it on the

61
00:02:19,660 --> 00:02:17,720
ground there this is a bank shot by

62
00:02:23,259 --> 00:02:19,670
Crippin I get my eggs in my mouth okay

63
00:02:26,550 --> 00:02:23,269

do you do tend to eat in space like you

64

00:02:51,130 --> 00:02:36,940

almost almost at least I eat in space I

65

00:02:57,009 --> 00:02:51,140

eat like I do underground that was the

66

00:03:01,449 --> 00:02:57,019

real rotating grapple over gave us time

67

00:03:03,220 --> 00:03:01,459

to play well in this particular sequence

68

00:03:06,819 --> 00:03:03,230

we were showing how we prepare a meal

69

00:03:08,890 --> 00:03:06,829

and we divided these tasks up among all

70

00:03:10,180 --> 00:03:08,900

the crew members a daily usually wound

71

00:03:14,560 --> 00:03:10,190

up doing breakfast because nobody was

72

00:03:16,990 --> 00:03:14,570

quick enough for him making meals is a

73

00:03:21,550 --> 00:03:17,000

fairly easy task on-orbit all you had to

74

00:03:22,930 --> 00:03:21,560

do is essentially like very good it's

75

00:03:26,170 --> 00:03:22,940

such like backpacking you essentially

76
00:03:28,599 --> 00:03:26,180
add water to to the food and it was very

77
00:03:30,819 --> 00:03:28,609
good I'll let Rick describe what we're

78
00:03:33,940 --> 00:03:30,829
doing here well at the risk of endorsing

79
00:03:35,830 --> 00:03:33,950
a product that's an interesting physical

80
00:03:39,099 --> 00:03:35,840
and demonstration on orbit of the fact

81
00:03:40,780 --> 00:03:39,109
that things really are weightless that's

82
00:03:44,100 --> 00:03:40,790
how the crew was rewarded when we did

83
00:03:44,110 --> 00:03:50,630
Rick would release another handful

84
00:04:05,630 --> 00:03:53,090
since Anna didn't wear things right than

85
00:04:08,780 --> 00:04:05,640
anybody she got most of Dave on-orbit

86
00:04:10,820 --> 00:04:08,790
described dr. Owen as as large and

87
00:04:12,830 --> 00:04:10,830
personality but the dominion of stature

88
00:04:14,780 --> 00:04:12,840

whenever his personality got a little

89

00:04:17,449 --> 00:04:14,790

bit too large we would stuff him away in

90

00:04:19,130 --> 00:04:17,459

a walker for a few hours and then when

91

00:04:32,170 --> 00:04:19,140

the TAS needed to be done that was my

92

00:04:37,280 --> 00:04:34,940

this was a somewhat unpleasant task for

93

00:04:41,030 --> 00:04:37,290

me but but Joe Joe seemed to like the

94

00:04:42,560 --> 00:04:41,040

free of the times and the hard part was

95

00:04:53,360 --> 00:04:42,570

putting him back in there again later

96

00:04:55,909 --> 00:04:53,370

once we go here's Gordon getting ready

97

00:04:58,010 --> 00:04:55,919

for one of the many burns with our

98

00:04:59,690 --> 00:04:58,020

smaller orbital maneuvering system

99

00:05:01,930 --> 00:04:59,700

rocket engines here you see us

100

00:05:05,210 --> 00:05:01,940

maneuvering attitude and the small

101

00:05:07,190 --> 00:05:05,220

attitude Jets firing we did an

102

00:05:08,930 --> 00:05:07,200

experiment so you could appreciate the

103

00:05:10,550 --> 00:05:08,940

acceleration we get out of these rocket

104

00:05:12,200 --> 00:05:10,560

engine firings we've put 8 ounces of

105

00:05:15,469 --> 00:05:12,210

water on the mid-deck and here you see a

106

00:05:17,960 --> 00:05:15,479

travel across dr. Bartow is catching it

107

00:05:20,540 --> 00:05:17,970

we also tried to sleep through some of

108

00:05:22,190 --> 00:05:20,550

these burns and we staged this next

109

00:05:25,909 --> 00:05:22,200

scene to show you what it felt like in

110

00:05:33,620 --> 00:05:25,919

the buck that hurt no it was a great

111

00:05:35,810 --> 00:05:33,630

train wreck here we're setting up for an

112

00:05:37,700 --> 00:05:35,820

on-orbit ohm's burn we're getting some

113

00:05:39,290 --> 00:05:37,710

things ready in the mid-deck there's the

114

00:05:43,769 --> 00:05:39,300

Oma's engines firing out at the back and

115

00:05:48,969 --> 00:05:46,779

that's 1/16 of a GE each of the ohms

116

00:05:50,679 --> 00:05:48,979

engine says one foot per second squared

117

00:05:53,079 --> 00:05:50,689

for a total of two feet per second

118

00:05:55,419 --> 00:05:53,089

squared and that 1/16 of a G felt like a

119

00:05:56,379 --> 00:05:55,429

lot to us after being up there for three

120

00:05:57,609 --> 00:05:56,389

or four days and you can see the

121

00:05:59,379 --> 00:05:57,619

acceleration on the tape it keeps

122

00:06:01,119 --> 00:05:59,389

wanting to go back towards the aft

123

00:06:05,399 --> 00:06:01,129

bulkhead because we're accelerating

124

00:06:10,959 --> 00:06:07,809

here we can see the left ohms engine

125

00:06:12,339 --> 00:06:10,969

burn and that's just to start up the

126

00:06:14,489 --> 00:06:12,349

burn lasts for a little while and this

127

00:06:16,799 --> 00:06:14,499

is what it looks like in the mid-deck

128

00:06:21,519 --> 00:06:16,809

Jerry made it right into the airlock and

129

00:06:23,679 --> 00:06:21,529

we've collected all those pieces here's

130

00:06:25,449 --> 00:06:23,689

a picture of Gordo establishing himself

131

00:06:26,859 --> 00:06:25,459

in that area and why don't you move the

132

00:06:32,259 --> 00:06:26,869

coat there Gordo and get it out of the

133

00:06:34,059 --> 00:06:32,269

way okay and of course one of the things

134

00:06:46,330 --> 00:06:34,069

Barrow had to do is brush his hair every

135

00:06:52,970 --> 00:06:50,650

eating was a real pleasure of course

136

00:06:54,890 --> 00:06:52,980

it's impossible to knock your milk off

137

00:06:56,660 --> 00:06:54,900

the table up there kiddos it's there's

138

00:06:58,340 --> 00:06:56,670

no way to get in trouble with mom you

139

00:06:59,570 --> 00:06:58,350

just leave things float around and when

140

00:07:01,700 --> 00:06:59,580

you want them you just grab them out of

141

00:07:07,280 --> 00:07:01,710

thin air and you can eat standing on

142

00:07:12,350 --> 00:07:07,290

your head or however you please girl oh

143

00:07:14,270 --> 00:07:12,360

here this is demonstrating what happens

144

00:07:15,800 --> 00:07:14,280

if you ever drop a cat it always ends up

145

00:07:17,540 --> 00:07:15,810

on it's four feet in a matter what

146

00:07:19,340 --> 00:07:17,550

attitude and that's we've had a lot of

147

00:07:21,400 --> 00:07:19,350

discussions about how this works yes

148

00:07:29,810 --> 00:07:21,410

that's right he's not shoveling the air

149

00:07:32,000 --> 00:07:29,820

it's actually he's he's the one in the

150

00:07:33,560 --> 00:07:32,010

right of course is a magnet the one on

151

00:07:40,270 --> 00:07:33,570

the left is just a pencil and we had no

152

00:07:50,090 --> 00:07:47,630

we're still waiting the results gordo

153

00:07:51,830 --> 00:07:50,100

practicing his uh landing technique you

154

00:07:58,660 --> 00:07:51,840

ready for re-entry

155

00:08:04,370 --> 00:08:02,050

we get up in the morning and um you know

156

00:08:06,260 --> 00:08:04,380

brush our teeth and comb our hair and

157

00:08:08,330 --> 00:08:06,270

the rest of that stuff here some of the

158

00:08:24,850 --> 00:08:08,340

crew equipment we had was limited so we

159

00:08:34,459 --> 00:08:31,999

this this sequence we call hair Wars as

160

00:08:36,499 --> 00:08:34,469

you might expect the commander one of

161

00:08:43,100 --> 00:08:36,509

course I'm not dumb enough to get the

162

00:08:46,100 --> 00:08:43,110

hairbrush away from the commander this

163

00:08:49,730 --> 00:08:46,110

set next scene is not staged this is a

164

00:08:51,680 --> 00:08:49,740

real teleprinter message we set a new

165

00:08:54,230 --> 00:08:51,690

record on this flight for the amount of

166

00:08:57,319 --> 00:08:54,240

teleprinter messages sent up every

167

00:08:59,590 --> 00:08:57,329

single Rev on the night side they send

168

00:09:02,030 --> 00:08:59,600

up a new detailed plan for the

169

00:09:05,120 --> 00:09:02,040

scientists here to accomplish on the

170

00:09:08,540 --> 00:09:05,130

next solar pass and that was an actual

171

00:09:10,670 --> 00:09:08,550

message all full of fine print but

172

00:09:12,740 --> 00:09:10,680

fortunately for me all I had to do is

173

00:09:14,150 --> 00:09:12,750

take it up to the upper deck and pass it

174

00:09:18,050 --> 00:09:14,160

out to the people who really had to read

175

00:09:19,819 --> 00:09:18,060

it we recorded a new space first on this

176

00:09:21,769 --> 00:09:19,829

flight we ran out of teleprinter paper

177

00:09:23,660 --> 00:09:21,779

after five and a half days was the first

178

00:09:25,910 --> 00:09:23,670

time that's happened and story Musgrave

179

00:09:29,569 --> 00:09:25,920

changed out the paper roll in space for

180

00:09:40,100 --> 00:09:29,579

the first time but the hairbrush one

181

00:09:58,160 --> 00:09:40,110

wasn't staged either we had to devise a

182

00:10:04,890 --> 00:10:00,420

little weightlifting and balancing act

183

00:10:12,090 --> 00:10:07,240

now that many of you can do this right

184

00:10:19,680 --> 00:10:14,400

he doesn't put him on one leg at a time

185

00:10:21,480 --> 00:10:19,690

like everybody else as soon as I get

186

00:10:24,829 --> 00:10:21,490

this down I'm gonna get a Dorothy Hamill

187

00:10:27,210 --> 00:10:24,839

wig and try out for the ice cream

188

00:10:30,530 --> 00:10:27,220

and of course Marines aren't happy

189

00:10:33,269 --> 00:10:30,540

unless they do their push-ups every day

190

00:10:35,910 --> 00:10:33,279

that wasn't too tough so you know look

191

00:10:35,920 --> 00:10:43,249

and if you want to even do photos

192

00:10:51,030 --> 00:10:45,449

now if you really got frustrated you can

193

00:10:53,549 --> 00:10:51,040

do here we are sitting down for supper

194

00:10:54,960 --> 00:10:53,559

we had trays you can see some of the

195

00:10:57,809 --> 00:10:54,970

food stuck to the back there

196

00:11:00,629 --> 00:10:57,819

they had trays that we could position on

197

00:11:03,389 --> 00:11:00,639

our laps velcro and then set our food in

198

00:11:05,790 --> 00:11:03,399

them as Steve pointed out this

199

00:11:09,059 --> 00:11:05,800

zero-gravity adds new meaning to the

200

00:11:13,290 --> 00:11:09,069

term past the potatoes they load them

201
00:11:17,869 --> 00:11:13,300
all the way across the cabin the menu

202
00:11:20,160 --> 00:11:17,879
was quite varied and really pretty good

203
00:11:21,960 --> 00:11:20,170
people accused me we had color code and

204
00:11:25,410 --> 00:11:21,970
people accused me of always having my

205
00:11:27,629 --> 00:11:25,420
color on everything exercise was part of

206
00:11:29,759 --> 00:11:27,639
our daily routine on orbit just like it

207
00:11:31,199 --> 00:11:29,769
is back here on earth getting set up on

208
00:11:33,389 --> 00:11:31,209
the treadmill takes a little bit longer

209
00:11:36,840 --> 00:11:33,399
in orbit but it feels just as good to

210
00:11:39,809 --> 00:11:36,850
quit and our sleep Arrangements looked a

211
00:11:41,970 --> 00:11:39,819
lot like summer camp a little bit of

212
00:11:44,639 --> 00:11:41,980
bunks here and there two of us slept

213
00:11:46,499 --> 00:11:44,649

anchored to lockers two of us slept

214

00:11:50,369 --> 00:11:46,509

strung across the room and two of us

215

00:11:52,769 --> 00:11:50,379

slept on the wall and you notice that in

216

00:11:59,840 --> 00:11:52,779

zero-g when you relax your arms tend to

217

00:12:01,829 --> 00:11:59,850

float up it was very comfortable

218

00:12:06,379 --> 00:12:01,839

we didn't always sleep with a nightlight

219

00:12:10,860 --> 00:12:09,299

well it's constantly fascinating just to

220

00:12:13,350 --> 00:12:10,870

watch the way objects behave in

221

00:12:15,360 --> 00:12:13,360

zero-gravity here we have a set of gyro

222

00:12:16,799 --> 00:12:15,370

stabilized binoculars there was a little

223

00:12:18,569 --> 00:12:16,809

bit too much friction in them so they

224

00:12:22,889 --> 00:12:18,579

were actually a bit gyro unstabilized

225

00:12:24,689 --> 00:12:22,899

but still with 14 powered binoculars it

226

00:12:26,910 --> 00:12:24,699

was just amazing what we could see on

227

00:12:29,419 --> 00:12:26,920

the ground and of course I also enjoyed

228

00:12:32,460 --> 00:12:29,429

what I could see up in the sky since I'm

229

00:12:34,799 --> 00:12:32,470

an astronomer we also carried some

230

00:12:39,960 --> 00:12:34,809

science demonstration objects commonly

231

00:12:43,110 --> 00:12:39,970

known as tio YS this was done primarily

232

00:12:45,299 --> 00:12:43,120

to make some educational footage which

233

00:12:47,419 --> 00:12:45,309

we can use and distribute to science

234

00:12:49,829 --> 00:12:47,429

teachers throughout the country here Bo

235

00:12:51,240 --> 00:12:49,839

forgot to spend the gyroscopes up and

236

00:12:52,950 --> 00:12:51,250

somehow it just didn't didn't stay

237

00:12:56,280 --> 00:12:52,960

stable so we're going to

238

00:12:59,370 --> 00:12:56,290

another chance and here he's gonna get

239

00:13:01,500 --> 00:12:59,380

it spinning there we go

240

00:13:03,780 --> 00:13:01,510

of course the principle of gyroscopic

241

00:13:05,910 --> 00:13:03,790

stability has been around a long time we

242

00:13:10,070 --> 00:13:05,920

use it for navigation our satellites use

243

00:13:13,650 --> 00:13:10,080

it when they come out of the cargo bay

244

00:13:15,840 --> 00:13:13,660

but of course without the without

245

00:13:18,330 --> 00:13:15,850

gravity and just being able to float it

246

00:13:20,910 --> 00:13:18,340

free here you can study the behavior of

247

00:13:22,860 --> 00:13:20,920

the gyroscope and and watch the way it

248

00:13:25,050 --> 00:13:22,870

moves around in a way that we never get

249

00:13:28,320 --> 00:13:25,060

a chance to do in laboratories on the

250

00:13:30,660 --> 00:13:28,330

earth I'm sure all of you have held a

251
00:13:34,500 --> 00:13:30,670
gyroscope on a string or on your fingers

252
00:13:37,050 --> 00:13:34,510
and after a while as it spins down the

253
00:13:38,760 --> 00:13:37,060
force of gravity starts to torque it and

254
00:13:41,130 --> 00:13:38,770
it starts to process around of course

255
00:13:42,750 --> 00:13:41,140
that that never happens in in zero

256
00:13:45,240 --> 00:13:42,760
gravity you can keep playing with it

257
00:13:47,460 --> 00:13:45,250
almost up up to the moment where where

258
00:13:49,620 --> 00:13:47,470
it is not spinning at all and it still

259
00:13:51,330 --> 00:13:49,630
stays stable in fact it was just a

260
00:13:52,620 --> 00:13:51,340
constant source of fascination all the

261
00:13:55,350 --> 00:13:52,630
different things you could do with these

262
00:13:57,870 --> 00:13:55,360
very ordinary devices this is a little

263
00:13:59,460 --> 00:13:57,880

magnetic wheeler that I'm using normally

264

00:14:00,870 --> 00:13:59,470

on the earth to start this with gravity

265

00:14:03,600 --> 00:14:00,880

I found it was pretty easy to start it

266

00:14:05,700 --> 00:14:03,610

up using centrifugal force this one as

267

00:14:07,380 --> 00:14:05,710

long as I was holding it behave pretty

268

00:14:08,760 --> 00:14:07,390

much the way it did on the earth but as

269

00:14:13,620 --> 00:14:08,770

soon as you let it go then it does all

270

00:14:18,540 --> 00:14:13,630

sorts of neat things and here comes mr.

271

00:14:20,040 --> 00:14:18,550

yo-yo we had a lot of discussions with

272

00:14:22,650 --> 00:14:20,050

physicists friends of mine about whether

273

00:14:24,570 --> 00:14:22,660

the yo-yo was going to work and it

274

00:14:27,210 --> 00:14:24,580

worked fabulous you could do it fast you

275

00:14:32,490 --> 00:14:27,220

could do it slow you could do it to the

276

00:14:34,680 --> 00:14:32,500

ceiling that's the famous toy Dave did

277

00:14:36,030 --> 00:14:34,690

flying saucers around the moon he's a

278

00:14:37,830 --> 00:14:36,040

real champ and if they don't let him

279

00:14:41,370 --> 00:14:37,840

into the yo-yo Association of America

280

00:14:46,470 --> 00:14:44,100

putting the jacks here

281

00:14:49,019 --> 00:14:46,480

there was constant constant danger of

282

00:14:50,250 --> 00:14:49,029

massive explosions if the ball came back

283

00:14:52,620 --> 00:14:50,260

in the wrong place

284

00:14:54,870 --> 00:14:52,630

we managed to go through without ever

285

00:14:56,730 --> 00:14:54,880

losing the Jackson although it's not on

286

00:15:00,360 --> 00:14:56,740

film ray did manage to do hurt well

287

00:15:02,990 --> 00:15:00,370

teased by the end of the flight if you

288

00:15:05,880 --> 00:15:03,000

if you let up a paper airplane just

289

00:15:07,530 --> 00:15:05,890

float it's pretty much carried away by

290

00:15:09,449 --> 00:15:07,540

the air currents in the shuttle as you

291

00:15:11,130 --> 00:15:09,459

see here and so it really doesn't take

292

00:15:12,660 --> 00:15:11,140

very much force just to start it on the

293

00:15:16,680 --> 00:15:12,670

most beautiful flight that you ever seen

294

00:15:20,400 --> 00:15:16,690

of any paper glider hope you like a home

295

00:15:21,780 --> 00:15:20,410

movie so far the Powerball behaved a lot

296

00:15:24,000 --> 00:15:21,790

like it does on earth in that you can

297

00:15:26,370 --> 00:15:24,010

paddle it in nearly any direction if

298

00:15:27,840 --> 00:15:26,380

you're clever enough I'm not sure I am

299

00:15:31,620 --> 00:15:27,850

clever enough to keep it going in in

300

00:15:33,210 --> 00:15:31,630

each direction as you can see here so

301
00:15:36,660 --> 00:15:33,220
the ins and outs ups and downs we're

302
00:15:43,730 --> 00:15:36,670
about the same it's a little harder to

303
00:15:49,530 --> 00:15:46,050
the straightforward sort of paddle ball

304
00:15:52,980 --> 00:15:49,540
operation is much slower and it's much

305
00:15:55,829 --> 00:15:52,990
easier this one is a little tougher jeff

306
00:15:57,329 --> 00:15:55,839
has here some magnetic marbles I'm not

307
00:15:58,590 --> 00:15:57,339
sure how you shoot marbles in space

308
00:16:02,069 --> 00:15:58,600
because it's a little hard to keep them

309
00:16:03,540 --> 00:16:02,079
in that ring but your shooter seems to

310
00:16:07,889 --> 00:16:03,550
work fine it joins right up with them

311
00:16:09,420 --> 00:16:07,899
all and it forms it forms into a into a

312
00:16:12,000 --> 00:16:09,430
tour right as you might expect with the

313
00:16:13,769 --> 00:16:12,010

magnetic lines and the magnetism that's

314

00:16:16,860 --> 00:16:13,779

inherent in the marbles if you watch

315

00:16:19,079 --> 00:16:16,870

carefully now I'm not this not this one

316

00:16:22,259 --> 00:16:19,089

but the one after this as Jeff sails the

317

00:16:23,880 --> 00:16:22,269

marble past after he repositions the his

318

00:16:26,040 --> 00:16:23,890

ring here with its little tail and

319

00:16:27,900 --> 00:16:26,050

rotated to the horizontal lines on the

320

00:16:30,540 --> 00:16:27,910

on the ball cap behind him watch what

321

00:16:32,870 --> 00:16:30,550

this marble does see a curved upward is

322

00:16:35,009 --> 00:16:32,880

that as the main ache lines of force

323

00:16:36,600 --> 00:16:35,019

passed by the others and here's our

324

00:16:38,590 --> 00:16:36,610

unofficial mascot you might say he

325

00:16:42,510 --> 00:16:38,600

flipped out over the side

326

00:16:45,490 --> 00:16:42,520

rat stuff really had it the slinky

327

00:16:47,830 --> 00:16:45,500

without the sag that you have to contend

328

00:16:50,440 --> 00:16:47,840

with in 1g behave pretty much the same

329

00:16:51,970 --> 00:16:50,450

as a dozen 1g you can start to see that

330

00:16:53,890 --> 00:16:51,980

of course they've set up a sine wave

331

00:16:55,330 --> 00:16:53,900

oscillation here which continues to be

332

00:16:56,950 --> 00:16:55,340

reflected back and forth and now a

333

00:16:58,690 --> 00:16:56,960

double one or perhaps a triple and

334

00:17:00,280 --> 00:16:58,700

perhaps within there you can also see

335

00:17:02,800 --> 00:17:00,290

the standing waves reflected back and

336

00:17:04,210 --> 00:17:02,810

forth the centrifugal force of course

337

00:17:06,460 --> 00:17:04,220

keeps this little car going around its

338

00:17:08,530 --> 00:17:06,470

track on earth when it gets to the top

339

00:17:12,100 --> 00:17:08,540

it would of course fall out in space

340

00:17:14,230 --> 00:17:12,110

what do you expect it's going to do well

341

00:17:21,460 --> 00:17:14,240

with a little help from the doctor sure

342

00:17:23,350 --> 00:17:21,470

enough it falls out see when you've been

343

00:17:24,550 --> 00:17:23,360

in space a little while down is up and

344

00:17:25,060 --> 00:17:24,560

up is down it doesn't make any

345

00:17:29,170 --> 00:17:25,070

difference

346

00:17:31,090 --> 00:17:29,180

it really doesn't mission this complex

347

00:17:33,610 --> 00:17:31,100

requires strict discipline and

348

00:17:35,920 --> 00:17:33,620

fortunately we had a well disciplined

349

00:17:37,540 --> 00:17:35,930

crew of course you know you take four

350

00:17:39,310 --> 00:17:37,550

guys off the farm some of them are able

351
00:17:50,920 --> 00:17:39,320
to respawn a little quicker and learn a

352
00:17:53,320 --> 00:17:50,930
little faster than others we did have a

353
00:17:56,740 --> 00:17:53,330
drill team crack drill trained here that

354
00:17:58,330 --> 00:17:56,750
we practiced every morning so gravity's

355
00:18:01,900 --> 00:17:58,340
got to be fun if you hadn't noticed you

356
00:18:05,190 --> 00:18:01,910
picked up on it but now it's just after

357
00:18:07,810 --> 00:18:05,200
300 hours of spaceflight

358
00:18:09,910 --> 00:18:07,820
you can really learn how to adapt

359
00:18:12,670 --> 00:18:09,920
yourself to zero-g and and and do the

360
00:18:14,410 --> 00:18:12,680
tasks a lot more rapidly than that you

361
00:18:16,330 --> 00:18:14,420
ever could on the ground and and most of

362
00:18:20,020 --> 00:18:16,340
the things like stowing the cabin we're

363
00:18:24,480 --> 00:18:20,030

really no problem at all with some

364

00:18:34,270 --> 00:18:32,830

cables develop a mind of their own this

365

00:18:39,370 --> 00:18:34,280

helps you understand why we didn't break

366

00:18:40,480 --> 00:18:39,380

the camera bad guys the real difficulty

367

00:18:43,659 --> 00:18:40,490

of this scene was holding the camera

368

00:18:48,010 --> 00:18:43,669

still while he was trying not to giggle

369

00:18:49,539 --> 00:18:48,020

it's Bell in the words of an old

370

00:18:51,940 --> 00:18:49,549

philosopher it ain't over till it's over

371

00:18:54,330 --> 00:18:51,950

and I guarantee it's not over yet as we

372

00:18:56,680 --> 00:18:54,340

still have to land and here we are at

373

00:18:59,919 --> 00:18:56,690

runway one-five at the Kennedy Space

374

00:19:01,480 --> 00:18:59,929

Center good calls from the folks in the

375

00:19:03,490 --> 00:19:01,490

air and on the ground John Young weather

376

00:19:06,370 --> 00:19:03,500

pilot the weather was good to the north

377

00:19:09,039 --> 00:19:06,380

so we landed with a slight tailwind and

378

00:19:12,220 --> 00:19:09,049

coming down here at 300 feet they've

379

00:19:13,960 --> 00:19:12,230

deployed the landing gear and the

380

00:19:16,659 --> 00:19:13,970

orbiter flew beautifully just as we

381

00:19:20,200 --> 00:19:16,669

trained for it to fly in the shuttle

382

00:19:21,730 --> 00:19:20,210

training areas being shed off the

383

00:19:24,310 --> 00:19:21,740

wingtips there and when we touched down

384

00:19:26,470 --> 00:19:24,320

you can see how the smoke from the tires

385

00:19:31,149 --> 00:19:26,480

gets caught up in those vortices real

386

00:19:34,390 --> 00:19:31,159

pretty picture touchdown was at about

387

00:19:37,419 --> 00:19:34,400

190 knots understand about 2700 feet

388

00:19:40,779 --> 00:19:37,429

down the runway and we used a total of