



1  
00:01:57,850 --> 00:01:56,110  
and Houston disorient you we're starting

2  
00:02:00,540 --> 00:01:57,860  
at six o'clock we're going around

3  
00:02:02,830 --> 00:02:00,550  
clockwise to show you the markings

4  
00:02:05,170 --> 00:02:02,840  
leonarda's our perception that there was

5  
00:02:09,850 --> 00:02:05,180  
no movement of the hatch when we

6  
00:02:56,540 --> 00:02:09,860  
repressurized back to 14.7 thank you

7  
00:03:02,550 --> 00:03:00,059  
just in Columbia as you saw we walked

8  
00:03:05,250 --> 00:03:02,560  
around slowly throughout the entire

9  
00:03:08,309 --> 00:03:05,260  
hatch perimeter we can't detect any

10  
00:03:11,160 --> 00:03:08,319  
displacement rider leash and we

11  
00:03:12,720 --> 00:03:11,170  
certainly see no gross motion as

12  
00:03:15,809 --> 00:03:12,730  
measured against the markers and we put

13  
00:03:17,790 --> 00:03:15,819

around the door yesterday in Ted 2 so we

14

00:03:28,360 --> 00:03:17,800

don't have any Delta's to show you any

15

00:03:36,290 --> 00:03:32,840

ok we are full close that is in the

16

00:03:39,340 --> 00:03:36,300

direction of closed and now I'm going as

17

00:03:42,830 --> 00:03:39,350

far open as the handle will go easily

18

00:03:44,720 --> 00:03:42,840

and now i'm going to push those extra

19

00:03:56,500 --> 00:03:44,730

couple of degrees or we really come to a

20

00:04:03,640 --> 00:03:59,410

okay we really appreciate that Tammy

21

00:04:06,100 --> 00:04:03,650

yeah close to us yeah that gave us a

22

00:04:09,160 --> 00:04:06,110

very good idea of what you had told us

23

00:04:11,080 --> 00:04:09,170

in words a couple of days ago so we

24

00:04:15,520 --> 00:04:11,090

really appreciated that and that

25

00:04:17,890 --> 00:04:15,530

concludes our our requirements for for

26

00:04:27,430 --> 00:04:17,900

downlink of of the hatch thank you very

27

00:04:30,270 --> 00:04:27,440

much I was excellent you're welcome okay

28

00:04:34,090 --> 00:04:30,280

used in the Columbia I did the first

29

00:04:37,600 --> 00:04:34,100

series here on the Cape and we'll start

30

00:04:39,400 --> 00:04:37,610

now with the b3 setting on the power

31

00:04:41,740 --> 00:04:39,410

tool it was very easy holding on to the

32

00:04:44,110 --> 00:04:41,750

handrail of the hatch minute like the

33

00:04:45,430 --> 00:04:44,120

tool through the b3 and b4 settings

34

00:04:47,560 --> 00:04:45,440

there was only a slight amount of torque

35

00:04:56,800 --> 00:04:47,570

applied with a size know it all the way

36

00:04:58,770 --> 00:04:56,810

down to the hard stuff we copy and you

37

00:05:04,230 --> 00:04:58,780

have to watch us run through the series

38

00:05:07,779 --> 00:05:04,240

but the basic finding at b5 was that the

39

00:05:13,089 --> 00:05:07,789

body position was disturbed quite a bit

40

00:05:16,120 --> 00:05:13,099

by the b5 hard stop force and b6 and b7

41

00:05:17,620 --> 00:05:16,130

well attempted really swung the body

42

00:05:19,270 --> 00:05:17,630

around to the point where the tool was

43

00:05:26,200 --> 00:05:19,280

hopping off the bolt or you could not

44

00:05:28,060 --> 00:05:26,210

hold your body position in Houston

45

00:05:32,260 --> 00:05:28,070

always still have a few minutes sku l

46

00:05:34,810 --> 00:05:32,270

can just say briefly that we all sound

47

00:05:37,689 --> 00:05:34,820

very similar results that the b3 setting

48

00:05:40,390 --> 00:05:37,699

corresponding 25 foot-pounds was

49

00:05:42,939 --> 00:05:40,400

certainly acceptable as was before but

50

00:05:45,279 --> 00:05:42,949

we get to be five settings 15 foot

51  
00:05:52,060 --> 00:05:45,289  
pounds that's a fair amount of force to

52  
00:05:54,129 --> 00:05:52,070  
react through your wrist b6 again we got

53  
00:05:56,409 --> 00:05:54,139  
low torque readings indicating that we

54  
00:05:58,060 --> 00:05:56,419  
let go of the trigger early and if we

55  
00:06:00,610 --> 00:05:58,070  
have enough time in this K you down like

56  
00:06:02,500 --> 00:06:00,620  
you'll see when i get to that setting my

57  
00:06:04,780 --> 00:06:02,510  
body will get spun around much like toms

58  
00:06:07,160 --> 00:06:04,790  
did

59  
00:06:09,380 --> 00:06:07,170  
one thing to think about when you're

60  
00:06:12,040 --> 00:06:09,390  
setting up your test is as Tom mentioned

61  
00:06:14,750 --> 00:06:12,050  
was that we will be on umbilicals

62  
00:06:16,670 --> 00:06:14,760  
handrail position is very important this

63  
00:06:19,070 --> 00:06:16,680

handrail position is not ideal a

64

00:06:20,390 --> 00:06:19,080

handrail on the floor would have been a

65

00:06:25,220 --> 00:06:20,400

little bit more comfortable when

66

00:06:26,930 --> 00:06:25,230

reacting the higher torque and we're

67

00:06:29,750 --> 00:06:26,940

wondering if we have enough clearance in

68

00:06:32,180 --> 00:06:29,760

the mid deck in a suit without our legs

69

00:06:34,310 --> 00:06:32,190

contacting the walls and by seeing the

70

00:06:35,930 --> 00:06:34,320

data if you're truly looking for us to

71

00:06:37,550 --> 00:06:35,940

hold the tool and react all that torque

72

00:06:40,010 --> 00:06:37,560

through the wrist and not use our body

73

00:06:51,110 --> 00:06:40,020

in any way as previously briefed before

74

00:07:00,230 --> 00:06:54,830

is this story up my data came out of the

75

00:07:04,159 --> 00:07:00,240

same as Demi's it pumps basically up

76  
00:07:07,000 --> 00:07:04,169  
through while 15-foot bounce we're very

77  
00:07:11,300 --> 00:07:07,010  
well I'll be on that in this particular

78  
00:07:15,290 --> 00:07:11,310  
unsuited environment it's not reasonable

79  
00:07:16,850 --> 00:07:15,300  
i intuitively think that this is going

80  
00:07:21,170 --> 00:07:16,860  
to go a whole lot better when you're

81  
00:07:23,629 --> 00:07:21,180  
suited because instead of having 160

82  
00:07:27,650 --> 00:07:23,639  
pounds of body inertia you have about

83  
00:07:30,670 --> 00:07:27,660  
480 pounds help us stabilize the body

84  
00:07:34,340 --> 00:07:30,680  
when the tool reaches its final torque I

85  
00:07:36,560 --> 00:07:34,350  
also intuitively think that a gloved

86  
00:07:40,240 --> 00:07:36,570  
hand is going to hang under the pistol

87  
00:07:43,070 --> 00:07:40,250  
grip a lot better did the bare hand does

88  
00:07:46,490 --> 00:07:43,080

it is also a lot more strength and

89

00:07:50,750 --> 00:07:46,500

stability at least ability India the

90

00:07:52,670 --> 00:07:50,760

wrists and arms of a suit so I didn't we

91

00:08:05,510 --> 00:07:52,680

think it is gonna go lot better than a

92

00:08:11,119 --> 00:08:08,390

space shuttle Columbia astronauts Tammy

93

00:08:12,830 --> 00:08:11,129

Jernigan and Tom Jones are with us the

94

00:08:14,270 --> 00:08:12,840

two of you thanks for letting us be with

95

00:08:16,369 --> 00:08:14,280

you in the middle of your day we can't

96

00:08:17,749 --> 00:08:16,379

start without talking about the fact you

97

00:08:19,580 --> 00:08:17,759

didn't get to go outside and conduct

98

00:08:21,589 --> 00:08:19,590

your spacewalks everybody on earth is

99

00:08:24,020 --> 00:08:21,599

talking about it what went through your

100

00:08:30,050 --> 00:08:24,030

mind Tammy when you tried to turn that

101  
00:08:32,180 --> 00:08:30,060  
hatch handle and it didn't work I was

102  
00:08:35,000 --> 00:08:32,190  
certainly surprised that the handle

103  
00:08:39,110 --> 00:08:35,010  
would not rotate as I had trained for it

104  
00:08:41,269 --> 00:08:39,120  
to rotate certainly was frustrated and

105  
00:08:42,949 --> 00:08:41,279  
so we tried to rotate a little harder

106  
00:08:44,780 --> 00:08:42,959  
and Ashley end up working for a couple

107  
00:08:47,120 --> 00:08:44,790  
hours trying to get the hatch open so we

108  
00:08:49,699 --> 00:08:47,130  
were certainly disappointed but also

109  
00:08:51,530 --> 00:08:49,709  
thinking that there was a lot of time

110  
00:08:53,300 --> 00:08:51,540  
left in the flight and we knew that the

111  
00:08:55,160 --> 00:08:53,310  
ground team and the crew would work hard

112  
00:08:58,460 --> 00:08:55,170  
together to perhaps think of a

113  
00:09:01,160 --> 00:08:58,470

workaround yeah Tom you got into the act

114

00:09:03,470 --> 00:09:01,170

after that in that very cramped airlock

115

00:09:09,170 --> 00:09:03,480

with Tammy what did you think the

116

00:09:11,230 --> 00:09:09,180

problem was well this way I just thought

117

00:09:13,610 --> 00:09:11,240

we had a sticky hatch and the fact that

118

00:09:15,380 --> 00:09:13,620

Tammy's initial rotation wasn't able to

119

00:09:17,090 --> 00:09:15,390

free it up was just an indication that

120

00:09:20,240 --> 00:09:17,100

we'd have to put a little bit more elbow

121

00:09:22,190 --> 00:09:20,250

grease into it she certainly tried and

122

00:09:24,290 --> 00:09:22,200

then asked me to give it a shot that I

123

00:09:26,389 --> 00:09:24,300

wasn't able to budget either and we were

124

00:09:29,360 --> 00:09:26,399

both putting it putting out about the

125

00:09:32,090 --> 00:09:29,370

maximum force we ever tried to put in to

126  
00:09:34,130 --> 00:09:32,100  
a mechanical systems in our water tank

127  
00:09:35,810 --> 00:09:34,140  
training back in Houston and said that

128  
00:09:38,360 --> 00:09:35,820  
point I started to think that we had a

129  
00:09:40,069 --> 00:09:38,370  
jam of some sort that our strength

130  
00:09:42,350 --> 00:09:40,079  
wasn't going to be able to overcome and

131  
00:09:44,060 --> 00:09:42,360  
say during those two hours in the air

132  
00:09:46,400 --> 00:09:44,070  
lock while we juggled our bodies around

133  
00:09:48,680 --> 00:09:46,410  
and tried to find it more mechanical

134  
00:09:50,780 --> 00:09:48,690  
advantage I was also thinking about

135  
00:09:52,519 --> 00:09:50,790  
perhaps coming back the next day of

136  
00:09:54,740 --> 00:09:52,529  
trying this with their support strategy

137  
00:09:56,660 --> 00:09:54,750  
what were the two of you trained to do I

138  
00:09:58,760 --> 00:09:56,670

guess let's start with Tom on this one

139

00:10:00,949 --> 00:09:58,770

in case you were able to get the airlock

140

00:10:02,420 --> 00:10:00,959

open but then you couldn't get it to

141

00:10:07,850 --> 00:10:02,430

seal completely when you were finished

142

00:10:10,069 --> 00:10:07,860

with you spacewalks well we had physics

143

00:10:13,160 --> 00:10:10,079

working for us in that case once we got

144

00:10:15,439 --> 00:10:13,170

back inside the airlock after dva the

145

00:10:17,260 --> 00:10:15,449

airlock glides up against it's filled

146

00:10:19,750 --> 00:10:17,270

with a very easy motion

147

00:10:22,120 --> 00:10:19,760

turning the crank handle merely engages

148

00:10:24,040 --> 00:10:22,130

some mechanical dogs that hold the hatch

149

00:10:25,390 --> 00:10:24,050

mechanically tight but if we could get

150

00:10:27,940 --> 00:10:25,400

it close enough where it would actually

151

00:10:30,250 --> 00:10:27,950

touch the seal as soon as we let air in

152

00:10:31,900 --> 00:10:30,260

from inside the orbiter cabin and that

153

00:10:33,790 --> 00:10:31,910

air pressure would slam that hatch shut

154

00:10:35,560 --> 00:10:33,800

up against the seals and it would stay

155

00:10:37,600 --> 00:10:35,570

closed no matter how strongly we pulled

156

00:10:41,380 --> 00:10:37,610

on it so we were pretty confident that

157

00:10:44,070 --> 00:10:41,390

we would be in a bad situation but

158

00:10:46,330 --> 00:10:44,080

there's always a potential and trying to

159

00:10:47,500 --> 00:10:46,340

get her without mechanically with some

160

00:10:49,540 --> 00:10:47,510

of the things we are on board that we

161

00:10:51,040 --> 00:10:49,550

might damage or what the hatch such a

162

00:10:52,870 --> 00:10:51,050

way that those fields could be damaged I

163

00:10:54,850 --> 00:10:52,880

think that's the conservative approach

164

00:10:56,950 --> 00:10:54,860

that the soul program has taken here

165

00:10:59,980 --> 00:10:56,960

they didn't want to damage the hardware

166

00:11:01,330 --> 00:10:59,990

for the objectives of their CDA which

167

00:11:03,520 --> 00:11:01,340

could be rescheduled the throne of a

168

00:11:05,410 --> 00:11:03,530

later flight yeah that's the question

169

00:11:06,910 --> 00:11:05,420

that a lot of people have now what are

170

00:11:08,950 --> 00:11:06,920

the two of you going to do about your

171

00:11:11,920 --> 00:11:08,960

training as a space station construction

172

00:11:13,870 --> 00:11:11,930

workers that's the best place to do that

173

00:11:16,510 --> 00:11:13,880

is out where the space station would be

174

00:11:18,610 --> 00:11:16,520

outside in the in the cargo bay or very

175

00:11:20,230 --> 00:11:18,620

near it what do you think it's going to

176

00:11:24,460 --> 00:11:20,240

mean to you and enter the overall

177

00:11:26,080 --> 00:11:24,470

program is a the failure of the hatch to

178

00:11:30,630 --> 00:11:26,090

open slowed down Space Station

179

00:11:34,960 --> 00:11:32,980

certainly think there was interest in

180

00:11:36,490 --> 00:11:34,970

conducting these two eda so a lot of

181

00:11:39,190 --> 00:11:36,500

time and effort put into building the

182

00:11:40,750 --> 00:11:39,200

hardware and orchestrating the test plan

183

00:11:42,900 --> 00:11:40,760

so that we get tests all this hardware

184

00:11:45,610 --> 00:11:42,910

in our concepts for station construction

185

00:11:48,520 --> 00:11:45,620

and so certainly it is a bit of a

186

00:11:50,410 --> 00:11:48,530

setback however there are setbacks in a

187

00:11:53,260 --> 00:11:50,420

program its ambitious is NASA space

188

00:11:54,670 --> 00:11:53,270

program and NASA will figure out a way

189

00:11:56,710 --> 00:11:54,680

to get the information they need to

190

00:11:59,020 --> 00:11:56,720

successfully construct the station

191

00:12:00,700 --> 00:11:59,030

decide where they fly in a later site or

192

00:12:02,920 --> 00:12:00,710

then they use some more extensive ground

193

00:12:04,750 --> 00:12:02,930

testing to get the information they feel

194

00:12:07,900 --> 00:12:04,760

don't need but they will certainly take

195

00:12:10,000 --> 00:12:07,910

the steps to ensure that we have enough

196

00:12:11,440 --> 00:12:10,010

knowledge to have a successful station

197

00:12:14,050 --> 00:12:11,450

construction and maintenance program

198

00:12:16,300 --> 00:12:14,060

sure well the two of you God let me just

199

00:12:18,280 --> 00:12:16,310

add that we select the last ten months

200

00:12:20,440 --> 00:12:18,290

training extensively for these two

201  
00:12:23,290 --> 00:12:20,450  
spacewalks and a lot of the work that we

202  
00:12:25,360 --> 00:12:23,300  
did underwater in Houston and onboard

203  
00:12:27,850 --> 00:12:25,370  
the LA live training aircraft down there

204  
00:12:29,890 --> 00:12:27,860  
as well they spent validating the

205  
00:12:30,610 --> 00:12:29,900  
approaches and the techniques that we

206  
00:12:32,860 --> 00:12:30,620  
would use here

207  
00:12:34,270 --> 00:12:32,870  
orbit and to a lot of magic said we have

208  
00:12:36,070 --> 00:12:34,280  
a lot of confidence those techniques

209  
00:12:38,560 --> 00:12:36,080  
because we worked so hard on them on the

210  
00:12:40,150 --> 00:12:38,570  
ground so I think the final icing on the

211  
00:12:42,580 --> 00:12:40,160  
cake and the final conservation hero

212  
00:12:44,200 --> 00:12:42,590  
that would have been really valuable to

213  
00:12:46,480 --> 00:12:44,210

us that certain we've learned a great

214

00:12:47,890 --> 00:12:46,490

deal allows not a tent but just in the

215

00:12:50,410 --> 00:12:47,900

developmental and practice what we've

216

00:12:51,760 --> 00:12:50,420

got ahead trading for the spacewalks yes

217

00:12:53,620 --> 00:12:51,770

the two you're making the best of this

218

00:12:55,540 --> 00:12:53,630

course and we've been watching you test

219

00:12:57,190 --> 00:12:55,550

some of the space station tools you're

220

00:12:59,230 --> 00:12:57,200

going to be using when you build the

221

00:13:00,970 --> 00:12:59,240

station later on how do the tools work

222

00:13:06,580 --> 00:13:00,980

in the tests that you've conducted on

223

00:13:08,920 --> 00:13:06,590

them over the past couple of hours so

224

00:13:12,220 --> 00:13:08,930

the ISS tower to list has preferred

225

00:13:14,800 --> 00:13:12,230

performs well and as expected during the

226

00:13:17,530 --> 00:13:14,810

tests we did on the mid-deck and we were

227

00:13:19,900 --> 00:13:17,540

able at least to fulfill some of the

228

00:13:21,550 --> 00:13:19,910

objectives for the flight by doing the

229

00:13:24,010 --> 00:13:21,560

power tool check out and then swimming

230

00:13:26,800 --> 00:13:24,020

that data down to the ground all right

231

00:13:28,840 --> 00:13:26,810

demio I've talked to Tammy Jernigan and

232

00:13:31,000 --> 00:13:28,850

Tom Jones at several times over the past

233

00:13:32,440 --> 00:13:31,010

couple of years and you know maybe it's

234

00:13:34,150 --> 00:13:32,450

my question maybe my questions are

235

00:13:35,710 --> 00:13:34,160

bummer questions for you guys but the

236

00:13:37,900 --> 00:13:35,720

two of you despite the fact that you're

237

00:13:40,750 --> 00:13:37,910

always optimistic and almost bubbly

238

00:13:43,090 --> 00:13:40,760

seemed pretty much subdued as we talk

239

00:13:45,130 --> 00:13:43,100

right now am i right about this or is it

240

00:13:51,040 --> 00:13:45,140

my questions leading you down a very

241

00:13:53,920 --> 00:13:51,050

serious and somber path today no I think

242

00:13:57,190 --> 00:13:53,930

certainly that we are feeling some

243

00:14:01,960 --> 00:13:57,200

combination of disappointment at the

244

00:14:03,940 --> 00:14:01,970

failure of the hatch but yet pleasure in

245

00:14:06,900 --> 00:14:03,950

being part of this mission has been in

246

00:14:09,550 --> 00:14:06,910

every other way very successful and

247

00:14:11,200 --> 00:14:09,560

we're both technical people and so when

248

00:14:14,410 --> 00:14:11,210

you ask us the technical question you

249

00:14:16,450 --> 00:14:14,420

get a technical answer I'm glad to see

250

00:14:17,860 --> 00:14:16,460

some smiles from both of you Tom any

251

00:14:23,350 --> 00:14:17,870

final comments he's only got about a

252

00:14:26,230 --> 00:14:23,360

minute left well disappointment

253

00:14:27,820 --> 00:14:26,240

naturally comes into our feelings and I

254

00:14:30,940 --> 00:14:27,830

hope for better times on future missions

255

00:14:33,730 --> 00:14:30,950

where I've assigned to a spacewalk be an

256

00:14:35,830 --> 00:14:33,740

optimist about that too but you can't

257

00:14:37,960 --> 00:14:35,840

take away at a fabulous nature of this

258

00:14:41,350 --> 00:14:37,970

experience and personally last night

259

00:14:43,340 --> 00:14:41,360

even after ed A's were canceled I spent

260

00:14:45,290 --> 00:14:43,350

an entire night orbit of yours

261

00:14:47,420 --> 00:14:45,300

looking down at understorms and added to

262

00:14:49,340 --> 00:14:47,430

southern constellations and watching the

263

00:14:51,140 --> 00:14:49,350

lightning flicker out the surfaces of

264

00:14:54,290 --> 00:14:51,150

the orbiter and that's such an

265

00:14:55,550 --> 00:14:54,300

experience that is unreachable on the