



1
00:00:47,729 --> 00:00:20,250
hi I'm Scott almond commander of sts-125

2
00:00:53,700 --> 00:00:51,119
and here are the astronauts now walking

3
00:01:07,560 --> 00:00:53,710
out of the quarters boarding the

4
00:01:07,570 --> 00:01:15,410
right

5
00:01:22,680 --> 00:01:19,530
got Altman now climbing on board here he

6
00:01:23,160 --> 00:01:22,690
comes through the hatch onto the flight

7
00:01:31,410 --> 00:01:23,170
deck

8
00:01:33,990 --> 00:01:31,420
from the lower crew cabin we're joined

9
00:01:37,680 --> 00:01:34,000
now here in firing room 4 with astronaut

10
00:01:39,480 --> 00:01:37,690
Janice Voss 1 once you're on board and

11
00:01:41,040 --> 00:01:39,490
as we're seeing here they're helping

12
00:01:45,630 --> 00:01:41,050
them strapped into their seats and

13
00:01:48,210 --> 00:01:45,640

things and is everyone very preoccupied

14

00:01:49,800 --> 00:01:48,220

with the activities that I have to do to

15

00:01:52,140 --> 00:01:49,810

get ready for the launch at this point

16

00:01:54,660 --> 00:01:52,150

or are they thinking about more about

17

00:01:57,450 --> 00:01:54,670

what's coming up on orbit or what's the

18

00:01:58,890 --> 00:01:57,460

mindset when you're getting ready to

19

00:02:01,260 --> 00:01:58,900

beat the wind you're being strapped in

20

00:02:02,010 --> 00:02:01,270

getting ready to go a little bit of all

21

00:02:05,040 --> 00:02:02,020

of the above

22

00:02:07,380 --> 00:02:05,050

there are duties that you have assigned

23

00:02:08,400 --> 00:02:07,390

that change with time until you're

24

00:02:09,900 --> 00:02:08,410

thinking you had to make sure that

25

00:02:12,660 --> 00:02:09,910

you're ready for the next thing you're

26
00:02:13,949 --> 00:02:12,670
supposed to do you also have a process

27
00:02:16,080 --> 00:02:13,959
you have to go through that includes

28
00:02:18,000 --> 00:02:16,090
context that you need to get done in a

29
00:02:19,979 --> 00:02:18,010
smart fashion so you don't slow up the

30
00:02:21,750 --> 00:02:19,989
timeline so right now they are very

31
00:02:23,040 --> 00:02:21,760
focused on just the seat stuff for

32
00:02:24,780 --> 00:02:23,050
decision getting your seat and they move

33
00:02:26,310 --> 00:02:24,790
on to the next person then they're

34
00:02:28,140 --> 00:02:26,320
listening to all the communications that

35
00:02:30,270 --> 00:02:28,150
come in all the ground launch sequencer

36
00:02:31,920 --> 00:02:30,280
stuff that's going on in trying to

37
00:02:35,120 --> 00:02:31,930
monitor any issues that might be arising

38
00:02:43,050 --> 00:02:35,130

might affect what they'll be doing next

39

00:02:47,580 --> 00:02:43,060

atlantis director okay look it's a great

40

00:03:19,229 --> 00:02:47,590

day to go flying on behalf of the crew

41

00:03:21,000 --> 00:03:19,239

and because it was because it was hard

42

00:03:24,809 --> 00:03:21,010

getting to this point has been

43

00:03:26,830 --> 00:03:24,819

challenging but the whole team everyone

44

00:03:29,020 --> 00:03:26,840

is pulled together we're taking a little

45

00:03:30,580 --> 00:03:29,030

all of us in the States and at this

46

00:03:33,610 --> 00:03:30,590

point all I got left to say is let's

47

00:03:38,970 --> 00:03:33,620

launch Atlantis thank so much thank you

48

00:03:42,509 --> 00:03:41,650

yeah let's go fall over there accents on

49

00:03:46,119 --> 00:03:42,519

return

50

00:03:48,309 --> 00:03:46,129

atlantis OTC that's a buck upgrading

51
00:04:00,210 --> 00:03:48,319
agency to increase our knowledge four

52
00:04:04,150 --> 00:04:00,220
light years to come also check of the

53
00:04:06,479 --> 00:04:04,160
SRBs firing chain is armed sound

54
00:04:14,750 --> 00:04:06,489
suppression water system armed

55
00:04:22,330 --> 00:04:18,129
to

56
00:04:32,820 --> 00:04:25,200
against the vision of Hubble

57
00:04:36,920 --> 00:04:35,100
I've had across-the-board scooter no

58
00:04:38,420 --> 00:04:36,930
action

59
00:04:39,620 --> 00:04:38,430
used to now control

60
00:05:00,220 --> 00:04:39,630
Atlantis on its way

61
00:05:01,810 --> 00:05:00,230
now throttling down as the area begins

62
00:05:05,260 --> 00:05:01,820
that the vehicle passes through the area

63
00:05:21,040 --> 00:05:05,270

of maximum dynamic pressure Atlanta

64

00:05:21,050 --> 00:05:24,840

[Music]

65

00:05:31,950 --> 00:05:26,870

seven miles in altitude

66

00:05:31,960 --> 00:05:41,700

altitude 49,000 feet

67

00:05:46,379 --> 00:05:43,890

flight control team discussing the minor

68

00:05:47,939 --> 00:05:46,389

transits that were seen at liftoff all

69

00:05:55,350 --> 00:05:47,949

three engines are in good shape the

70

00:05:57,210 --> 00:05:55,360

vehicle is headed downrange all three

71

00:06:01,680 --> 00:05:57,220

hydraulic systems in good shape as are

72

00:06:05,909 --> 00:06:01,690

the fuel cells Atlantis is 18 miles an

73

00:06:08,779 --> 00:06:05,919

altitude downrange 23 miles already

74

00:06:11,100 --> 00:06:08,789

traveling 2,500 miles per hour

75

00:06:13,230 --> 00:06:11,110

approaching staging the burnout of the

76
00:06:14,839 --> 00:06:13,240
twin solid rocket boosters which have

77
00:06:29,520 --> 00:06:14,849
been burning fuel at a rate of about

78
00:06:29,530 --> 00:06:34,240
[Music]

79
00:06:38,920 --> 00:06:36,370
solid rocket boosters have done their

80
00:06:41,020 --> 00:06:38,930
job Atlantis is continuing in its dew

81
00:06:45,360 --> 00:06:41,030
easterly course to catch up with the

82
00:06:45,370 --> 00:06:54,570
Atlantis single-engine band jewel 104

83
00:06:59,320 --> 00:06:57,610
that call indicating that Atlantis could

84
00:07:01,570 --> 00:06:59,330
reach ban jewel in The Gambia although

85
00:07:10,950 --> 00:07:01,580
that is not a transoceanic abort landing

86
00:07:16,090 --> 00:07:14,290
the achill rolling - heads up now to get

87
00:07:18,340 --> 00:07:16,100
good communications through the tracking

88
00:07:20,910 --> 00:07:18,350

and data relay satellite system six

89

00:07:24,040 --> 00:07:20,920
minutes 25 seconds into the flight

90

00:07:28,780 --> 00:07:24,050
downrange from the launch site 4,000 30

91

00:07:40,300 --> 00:07:28,790
miles altitude 350 3,000 feet or about

92

00:07:41,860 --> 00:07:40,310
67 miles like good first day in space

93

00:07:43,240 --> 00:07:41,870
how's it going first full day you

94

00:07:44,350 --> 00:07:43,250
already had you know you let you blast

95

00:07:47,050 --> 00:07:44,360
it off yesterday how you feeling today

96

00:07:49,270 --> 00:07:47,060
don't much better today yeah that's a

97

00:07:51,909 --> 00:07:49,280
very exciting liftoff yeah a trip to

98

00:07:53,950 --> 00:07:51,919
space here we are get a little sleep

99

00:07:55,420 --> 00:07:53,960
have a little chow look great we're

100

00:07:57,490 --> 00:07:55,430
doing our work here getting the airlock

101
00:07:59,350 --> 00:07:57,500
ready so we can go outside and do epa's

102
00:08:01,530 --> 00:07:59,360
alright this is why we're here

103
00:08:04,690 --> 00:08:01,540
the whole idea Andrew what are you doing

104
00:08:05,980 --> 00:08:04,700
I'm using the Cape there any reason why

105
00:08:07,840 --> 00:08:05,990
do you have sunglasses on in the

106
00:08:12,430 --> 00:08:07,850
mid-deck where there's no lights let me

107
00:08:16,390 --> 00:08:12,440
know son ah my man what are you doing in

108
00:08:19,360 --> 00:08:16,400
here welcome you getting space suits

109
00:08:21,370 --> 00:08:19,370
ready can the airlock ready sounds if

110
00:08:21,909 --> 00:08:21,380
he'll be here after seven years oh it's

111
00:08:26,189 --> 00:08:21,919
wonderful

112
00:08:28,379 --> 00:08:26,199
alright thanks friend excellent

113
00:08:31,050 --> 00:08:28,389

all right hey drew how was your first

114

00:08:31,409 --> 00:08:31,060

day in space it was good yeah I enjoyed

115

00:08:33,810 --> 00:08:31,419

it

116

00:08:35,610 --> 00:08:33,820

you're unbelievable man you were working

117

00:08:36,990 --> 00:08:35,620

like a maniac right from the get-go like

118

00:08:39,149 --> 00:08:37,000

you you know you were born here

119

00:08:41,430 --> 00:08:39,159

I like this floating in space it's fun

120

00:08:43,680 --> 00:08:41,440

in it listen Ryan we're in the mid-deck

121

00:08:45,870 --> 00:08:43,690

of space shuttle Atlantis my buddy John

122

00:08:50,900 --> 00:08:45,880

Grunsfeld over here but the person we

123

00:08:55,340 --> 00:08:50,910

want to talk to is behind the camera now

124

00:08:59,699 --> 00:08:55,350

on camera that's Megan McArthur who is

125

00:09:01,530 --> 00:08:59,709

our flight engineer and Megan what are

126

00:09:04,079 --> 00:09:01,540

you doing now well we just finished the

127

00:09:05,970 --> 00:09:04,089

starboard survey of the orbiter GPS and

128

00:09:07,829 --> 00:09:05,980

we're going to get my lunch so I go to

129

00:09:10,259 --> 00:09:07,839

this locker here that says ms2 meals on

130

00:09:12,240 --> 00:09:10,269

it pull it out it shows me all the food

131

00:09:13,710 --> 00:09:12,250

with the green dots that's mine that's

132

00:09:15,389 --> 00:09:13,720

in here so I looked up kind of what I

133

00:09:18,210 --> 00:09:15,399

want to eat this is what I was looking

134

00:09:26,240 --> 00:09:18,220

for ravioli oh man it was great I just

135

00:09:26,250 --> 00:09:40,329

Houston that looks better dust

136

00:09:45,109 --> 00:09:43,639

now how do you like the food so far well

137

00:09:48,019 --> 00:09:45,119

so far all I've had is a peanut butter

138

00:09:50,030 --> 00:09:48,029

sandwich that was good

139

00:09:51,049 --> 00:09:50,040

I'll have using a computer and just like

140

00:09:52,069 --> 00:09:51,059

you've been pewter at home we have

141

00:09:53,869 --> 00:09:52,079

computers in space

142

00:09:55,369 --> 00:09:53,879

I'm checking our flight plans do we need

143

00:09:57,109 --> 00:09:55,379

to do it I also can check my email I've

144

00:09:59,739 --> 00:09:57,119

already got some email from my wife and

145

00:10:02,989 --> 00:09:59,749

my kids and it's great to be able to say

146

00:10:04,189 --> 00:10:02,999

and it's a great way for us to tell our

147

00:10:05,900 --> 00:10:04,199

friends where we were going and maybe

148

00:10:07,819 --> 00:10:05,910

even send to Twitter once in a while not

149

00:10:09,199 --> 00:10:07,829

that often but once in a while but

150

00:10:10,669 --> 00:10:09,209

you're setting up for IMAX you've also

151

00:10:12,669 --> 00:10:10,679

set up for what other kind of video

152

00:10:14,509 --> 00:10:12,679

there are all kinds of photo

153

00:10:17,389 --> 00:10:14,519

high-definition so we got some high

154

00:10:21,290 --> 00:10:17,399

definition down yesterday of the EG tank

155

00:10:24,410 --> 00:10:21,300

you know this is high definition and

156

00:10:25,910 --> 00:10:24,420

then we'll do kind of a crew summary at

157

00:10:27,079 --> 00:10:25,920

the end of the day so how you like

158

00:10:30,079 --> 00:10:27,089

filmmaking you think it might be a

159

00:10:32,329 --> 00:10:30,089

second career for you kid B yeah what

160

00:10:34,999 --> 00:10:32,339

kind of movies would you make they'd be

161

00:10:38,359 --> 00:10:35,009

all humorous movies Marvin it makes a

162

00:10:39,319 --> 00:10:38,369

lot great it was a wild Essen anything

163

00:10:43,730 --> 00:10:39,329

else one say to your family

164

00:10:46,069 --> 00:10:43,740

I love being space I miss them that I'll

165

00:10:49,100 --> 00:10:46,079

see you soon hey and what about that hat

166

00:10:50,720 --> 00:10:49,110

what you gotta do let's just 125 hat

167

00:10:52,519 --> 00:10:50,730

it's pretty sharp do you think it got

168

00:10:54,139 --> 00:10:52,529

paint spelled on like everybody else no

169

00:10:54,410 --> 00:10:54,149

I think it looks good I think it looks

170

00:10:58,100 --> 00:10:54,420

great

171

00:11:01,639 --> 00:10:58,110

it's Hubble pictures yeah looks awesome

172

00:11:04,549 --> 00:11:01,649

so I had to fly it I wanted to take it

173

00:11:06,439 --> 00:11:04,559

with me very inspired that's it hey

174

00:11:08,239 --> 00:11:06,449

thanks a lot for being such a great

175

00:11:09,710 --> 00:11:08,249

commander and I hope we can do as well

176

00:11:11,150 --> 00:11:09,720

the rest of missions we've done so far

177

00:11:13,759 --> 00:11:11,160

in the first two days out what do you

178

00:11:15,559 --> 00:11:13,769

think I think we will I think the best

179

00:11:17,329 --> 00:11:15,569

part about being a commander here is

180

00:11:21,379 --> 00:11:17,339

having a great crew that does everything

181

00:11:23,210 --> 00:11:21,389

and I just sit around alright anybody

182

00:11:26,500 --> 00:11:23,220

watching us remember this is not edited

183

00:11:28,990 --> 00:11:26,510

and we're not professionals so yeah

184

00:11:32,400 --> 00:11:29,000

a twin orbital maneuvering system

185

00:11:35,410 --> 00:11:32,410

engines on the tail of Atlantis firing

186

00:11:36,970 --> 00:11:35,420

supporting the altitude increase to

187

00:11:40,600 --> 00:11:36,980

support the rendezvous with the Hubble

188

00:11:43,480 --> 00:11:40,610

Space Telescope the glow in the center

189

00:11:45,390 --> 00:11:43,490

is the vertical tail of Atlantis the

190

00:11:48,820 --> 00:11:45,400

twin orbital maneuvering system engines

191

00:11:53,080 --> 00:11:48,830

the ohm's engines providing 6000 pounds

192

00:11:58,600 --> 00:11:53,090

of thrust each man is Houston good burn

193

00:12:17,200 --> 00:11:58,610

no trim required he's landed first our

194

00:12:19,180 --> 00:12:17,210

tracker scooter glass that's terrific

195

00:12:22,300 --> 00:12:19,190

news I guess the last time we've seen

196

00:12:26,260 --> 00:12:22,310

Hubble up close was March of o2 so

197

00:12:27,820 --> 00:12:26,270

that's that's great to hear thank you we

198

00:12:37,990 --> 00:12:27,830

hope to get a lot closer so we'll

199

00:12:41,740 --> 00:12:38,000

continue good go and Houston copies

200

00:12:45,790 --> 00:12:41,750

thanks from 200 feet the Hubble Space

201
00:12:49,540 --> 00:12:45,800
Telescope first time it's been seen

202
00:12:52,150 --> 00:12:49,550
since March 2002 the most recent

203
00:12:54,430 --> 00:12:52,160
servicing mission Atlantis essentially

204
00:12:57,040 --> 00:12:54,440
station-keeping while the final command

205
00:13:01,860 --> 00:12:57,050
sequence being completed before moving

206
00:13:06,240 --> 00:13:01,870
in for the final approach to grapple

207
00:13:10,930 --> 00:13:06,250
shuttles robotic arm is in position and

208
00:13:15,130 --> 00:13:10,940
awaiting the commanding from Megan

209
00:13:17,890 --> 00:13:15,140
McArthur as she will be in charge of the

210
00:13:20,640 --> 00:13:17,900
shuttles remote manipulator system for

211
00:13:23,200 --> 00:13:20,650
the grapple of the telescope

212
00:13:29,290 --> 00:13:23,210
okay that's okay it's many drifted

213
00:13:32,530 --> 00:13:29,300

slightly left closure myrrh Stalin minus

214

00:13:33,960 --> 00:13:32,540

0.05 at 151 feet okay I just don't want

215

00:13:47,850 --> 00:13:33,970

to see the numbers get bigger

216

00:13:52,770 --> 00:13:51,360

I left how to shoot well suppose I see

217

00:13:56,430 --> 00:13:52,780

you set up the party but you're not a

218

00:14:00,780 --> 00:13:56,440

major Gaza omicron Jericho and I agree

219

00:14:06,240 --> 00:14:03,090

350 miles above the Indian Ocean

220

00:14:09,000 --> 00:14:06,250

Atlantis with the robotic arm and view

221

00:14:11,740 --> 00:14:09,010

closing in on the Hubble Space Telescope

222

00:14:13,870 --> 00:14:11,750

directly underneath the telescope now

223

00:14:18,190 --> 00:14:13,880

that the two vehicles are in the proper

224

00:14:29,770 --> 00:14:18,200

position for grapple inside 100 feet to

225

00:14:31,510 --> 00:14:29,780

Hubble gradually copy and we're pulling

226

00:14:35,770 --> 00:14:31,520

down the kayuu right now we see that

227

00:14:37,990 --> 00:14:35,780

thank you the bottom of Hubble coming

228

00:14:41,110 --> 00:14:38,000

into view through the remote manipulator

229

00:14:43,900 --> 00:14:41,120

systems end-effector camera this same

230

00:14:46,630 --> 00:14:43,910

view seen through one of the

231

00:15:02,410 --> 00:14:46,640

closed-circuit televisions up on the

232

00:15:05,380 --> 00:15:02,420

flight deck of Atlantis - houston we

233

00:15:07,480 --> 00:15:05,390

copy nice job Megan nice job and the

234

00:15:19,300 --> 00:15:07,490

procs flying as well it's great to be

235

00:15:21,010 --> 00:15:19,310

back with telescope an old man of 19

236

00:15:25,030 --> 00:15:21,020

years and space still looking fantastic

237

00:15:27,550 --> 00:15:25,040

shape Megan McArthur who worked the arm

238

00:15:31,590 --> 00:15:27,560

and grappled the telescope Scott Altman

239

00:15:33,820 --> 00:15:31,600

our commander who flew the space show in

240

00:15:38,590 --> 00:15:33,830

formation with the telescope going how

241

00:15:42,850 --> 00:15:38,600

fast 17,500 miles an hour very fast very

242

00:15:45,820 --> 00:15:42,860

very fast just like this unbelievable so

243

00:15:48,040 --> 00:15:45,830

Megan how do you feel what was it like I

244

00:15:49,530 --> 00:15:48,050

feel good you know it was it was very

245

00:15:51,259 --> 00:15:49,540

smooth it was very straightforward

246

00:15:53,480 --> 00:15:51,269

scooter got

247

00:15:55,069 --> 00:15:53,490

really no doubt all the rates it was

248

00:15:56,809 --> 00:15:55,079

just rock solid it was like grabbing

249

00:15:58,549 --> 00:15:56,819

something that wasn't leaving so dope

250

00:16:00,019 --> 00:15:58,559

good glad to have that behind us so the

251

00:16:01,579 --> 00:16:00,029

UVA guys can get to work

252

00:16:03,019 --> 00:16:01,589

it's scooter what about you what you

253

00:16:05,269 --> 00:16:03,029

think in a rendezvous how was it it was

254

00:16:05,629 --> 00:16:05,279

exciting with you Center challenges

255

00:16:07,489 --> 00:16:05,639

there

256

00:16:09,559 --> 00:16:07,499

you said it was a little fast Sarah we

257

00:16:11,269 --> 00:16:09,569

came in and we had kind of a little

258

00:16:14,900 --> 00:16:11,279

extra closure with a lot of plane

259

00:16:16,730 --> 00:16:14,910

maneuvering trying to get up to the

260

00:16:19,970 --> 00:16:16,740

telescope had to do some braking and

261

00:16:22,309 --> 00:16:19,980

then the telescope wasn't rotated for us

262

00:16:24,019 --> 00:16:22,319

we had to wait when we got there and

263

00:16:26,030 --> 00:16:24,029

then do it your arm I knew all this oh

264

00:16:28,730 --> 00:16:26,040

my gosh look at that see it's just a

265

00:16:31,069 --> 00:16:28,740

ball with that telescope ganache but you

266

00:16:32,389 --> 00:16:31,079

are an f-14 pilot right yes so going

267

00:16:55,829 --> 00:16:32,399

fast that's not a big deal

268

00:16:55,839 --> 00:16:59,970

any words for growing up everybody

269

00:17:04,020 --> 00:17:02,460

I'm excited it's not it just like the

270

00:17:07,590 --> 00:17:04,030

NBL trying to get a last bite to eat

271

00:17:13,570 --> 00:17:07,600

full go I'm a little more excited than

272

00:17:26,439 --> 00:17:16,420

so you hit the big time here rayji this

273

00:17:38,240 --> 00:17:30,229

Dover's open math great job we see you

274

00:17:47,989 --> 00:17:44,739

[Music]

275

00:17:50,779 --> 00:17:47,999

veteran space Walker John Grunsfeld out

276

00:17:52,700 --> 00:17:50,789

of the airlock recognizable by the red

277

00:17:55,310 --> 00:17:52,710

stripes around his pant legs and up on

278

00:17:57,700 --> 00:17:55,320

the backpack of his suit the the

279

00:18:00,360 --> 00:17:57,710

backpack housing all of his life-support

280

00:18:18,010 --> 00:18:00,370

equipment

281

00:18:18,020 --> 00:18:40,750

[Music]

282

00:18:48,640 --> 00:18:45,250

I just like to say that the are in

283

00:18:57,909 --> 00:18:48,650

Hayden Indy this is sublime and I'm

284

00:19:00,340 --> 00:18:57,919

plowing from here to here throughout the

285

00:19:04,630 --> 00:19:00,350

space walk we'll get helmet cam video

286

00:19:07,570 --> 00:19:04,640

from the two crew members the the

287

00:19:09,370 --> 00:19:07,580

highlighted soft number down in the

288

00:19:11,560 --> 00:19:09,380

right lower portion of the screen will

289

00:19:13,990 --> 00:19:11,570

indicate which crewmembers helmet cam

290

00:19:14,620 --> 00:19:14,000

you're looking at number 20 is drew

291

00:19:17,680 --> 00:19:14,630

Feustel

292

00:19:36,700 --> 00:19:17,690

if you see a number 19 that'll be John

293

00:19:46,280 --> 00:19:36,710

grunts tell me just a minute okay I'm

294

00:19:51,039 --> 00:19:47,490

[Music]

295

00:19:52,780 --> 00:19:51,049

Lana Houston that is a good plan that's

296

00:19:56,560 --> 00:19:52,790

what we're discussing mask we think

297

00:20:00,370 --> 00:19:56,570

short adjustable with contingency MTL is

298

00:20:02,500 --> 00:20:00,380

probably the best next action John

299

00:20:05,680 --> 00:20:02,510

Grunsfeld headed down to the airlock to

300

00:20:08,770 --> 00:20:05,690

retrieve a short adjustable ratchet to

301
00:20:12,280 --> 00:20:08,780
assist with breaking the torque on the

302
00:20:23,620 --> 00:20:12,290
grounding strap bolt which has been a

303
00:20:35,140 --> 00:20:23,630
little troublesome and releasing mass

304
00:20:37,210 --> 00:20:35,150
I'm sorry again that's exactly right and

305
00:20:39,909 --> 00:20:37,220
as soon as he does if he's successful

306
00:20:41,560 --> 00:20:39,919
start to have some motion in the latch

307
00:20:45,780 --> 00:20:41,570
we'd like him to go ahead and stop at

308
00:20:45,790 --> 00:20:49,440
[Music]

309
00:20:57,460 --> 00:20:52,169
that's why he'll stay there

310
00:20:58,270 --> 00:20:57,470
what John said is correct thanks okay

311
00:21:03,120 --> 00:20:58,280
here we go

312
00:21:07,870 --> 00:21:03,130
I think I got it

313
00:21:11,140 --> 00:21:07,880

definitely turn yep it's turned and it's

314

00:21:13,120 --> 00:21:11,150

turning easily though okay and Lana's

315

00:21:14,590 --> 00:21:13,130

Houston freebie we copied and saw that

316

00:21:19,180 --> 00:21:14,600

that's great news at this point we'd

317

00:21:37,450 --> 00:21:19,190

like to to put the MTL back in in series

318

00:21:40,150 --> 00:21:37,460

with the short adjustable 20 Thank You

319

00:21:44,580 --> 00:21:40,160

van and recounted a total of 22 plus the

320

00:21:54,640 --> 00:21:52,240

guess and the wide field planetary

321

00:21:57,280 --> 00:21:54,650

camera 2 is clear of the structure of

322

00:21:59,650 --> 00:21:57,290

the telescope and now oyster will be

323

00:22:01,900 --> 00:21:59,660

maneuvered by Megan McArthur to the

324

00:22:04,750 --> 00:22:01,910

temporary storage location along the

325

00:22:37,240 --> 00:22:04,760

left side of the payload Bay

326

00:22:45,919 --> 00:22:43,399

a new camera now installed the next step

327

00:22:49,310 --> 00:22:45,929

will be to engage the bolt of the a

328

00:23:04,909 --> 00:22:49,320

latch again expecting about 22 turns on

329

00:23:06,110 --> 00:23:04,919

the pistol grip tool settings that's

330

00:23:07,789 --> 00:23:06,120

awesome news then

331

00:23:09,380 --> 00:23:07,799

thanks these guys did a great job and

332

00:23:22,460 --> 00:23:09,390

they appreciate all the great support we

333

00:23:25,340 --> 00:23:22,470

got from the ground the crew has been

334

00:23:27,860 --> 00:23:25,350

given a go for the second major task of

335

00:23:30,470 --> 00:23:27,870

EBA number one that is the removal and

336

00:23:32,440 --> 00:23:30,480

replacement of the science instrument

337

00:23:36,230 --> 00:23:32,450

command and data handling system that

338

00:23:38,690 --> 00:23:36,240

malfunctioned last September delaying

339

00:23:52,220 --> 00:23:38,700

the servicing mission from October to

340

00:23:56,060 --> 00:23:52,230

now I think it's really a testament to

341

00:23:57,620 --> 00:23:56,070

the whole team board here onboard the

342

00:24:00,260 --> 00:23:57,630

planet and of course on the ground

343

00:24:01,909 --> 00:24:00,270

the last christy and everybody else they

344

00:24:04,820 --> 00:24:01,919

got a team that we were able to overcome

345

00:24:07,130 --> 00:24:04,830

them and that we have a light field

346

00:24:08,360 --> 00:24:07,140

camera 3 in the telescope which will

347

00:24:10,519 --> 00:24:08,370

help unlock the secrets of the universe

348

00:24:12,980 --> 00:24:10,529

and a new scientific instrument command

349

00:24:19,580 --> 00:24:12,990

and data handling thanks for everybody

350

00:24:25,250 --> 00:24:19,590

for all the hard work Mike Massimino

351

00:24:28,220 --> 00:24:25,260

first out of the airlock he is beginning

352

00:24:42,840 --> 00:24:28,230

his third spacewalk and third to service

353

00:24:47,799 --> 00:24:44,860

welcome to the wonderful world of

354

00:24:51,490 --> 00:24:47,809

working in a vacuum review with your

355

00:24:54,430 --> 00:24:51,500

name on it waiting for you am I good now

356

00:24:56,140 --> 00:24:54,440

in the foot restraint Megan McArthur in

357

00:24:58,210 --> 00:24:56,150

control of the robotic arm she'll be

358

00:25:01,600 --> 00:24:58,220

taking him back to a protective

359

00:25:04,710 --> 00:25:01,610

enclosure the small oru orbital

360

00:25:08,560 --> 00:25:04,720

replacement unit protective enclosure

361

00:25:13,149 --> 00:25:08,570

referenced by the acronym soap he will

362

00:25:15,820 --> 00:25:13,159

be in charge of retrieving the new rate

363

00:25:18,549 --> 00:25:15,830

sensor units and handing those off to

364

00:25:28,500 --> 00:25:18,559

Mike Massimino who will be mounted on a

365

00:25:38,070 --> 00:25:34,409

okay Mike Massimino reflection in the

366

00:25:41,440 --> 00:25:38,080

ass shroud of the Hubble Space Telescope

367

00:25:43,480 --> 00:25:41,450

he prepares to open the doors

368

00:25:51,029 --> 00:25:43,490

protective doors over the fixed head

369

00:25:56,409 --> 00:25:54,010

okay Mike your uh your specs are over

370

00:25:58,590 --> 00:25:56,419

the top of the booth plate here I think

371

00:26:01,840 --> 00:25:58,600

you can go in now getting up

372

00:26:04,060 --> 00:26:01,850

Massimino now being assisted by Michael

373

00:26:05,470 --> 00:26:04,070

good with positioning inside the

374

00:26:07,450 --> 00:26:05,480

astronaut of the telescope you're

375

00:26:11,350 --> 00:26:07,460

looking directly at one of the star

376

00:26:12,909 --> 00:26:11,360

tracker shields and if you look

377

00:26:16,000 --> 00:26:12,919

carefully there's a little ingredient

378

00:26:22,520 --> 00:26:16,010

that says story was here somewhere are

379

00:26:22,530 --> 00:26:36,380

I've got it well Tim saw the PGP okay

380

00:26:42,150 --> 00:26:38,060

Mike I got it

381

00:26:53,670 --> 00:26:42,160

and the first rate sensor unit removed

382

00:26:55,260 --> 00:26:53,680

now from the telescope you can handle an

383

00:26:57,780 --> 00:26:55,270

excuse in free VA we have a good

384

00:27:13,020 --> 00:26:57,790

aliveness test on our su tu ru have a go

385

00:27:15,180 --> 00:27:13,030

for RSU 3 change out ready okay if you

386

00:27:20,410 --> 00:27:15,190

want to get inside that other cable or

387

00:27:24,700 --> 00:27:22,930

two hours 42 minutes into the spacewalk

388

00:27:27,790 --> 00:27:24,710

the crew members are having a little bit

389

00:27:31,150 --> 00:27:27,800

of trouble seating the new unit into its

390

00:27:34,750 --> 00:27:31,160

plate before being able to drive the

391

00:27:37,420 --> 00:27:34,760

three bolts this one feels different

392

00:27:38,950 --> 00:27:37,430

than the last one the last thing I was

393

00:27:40,990 --> 00:27:38,960

able to just put on the plate this one

394

00:27:43,600 --> 00:27:41,000

feels like it won't sit what's on the

395

00:27:46,270 --> 00:27:43,610

plate if I get it's kind of rotting on

396

00:27:47,620 --> 00:27:46,280

it I think it might be that you know

397

00:27:54,820 --> 00:27:47,630

those pins a diamond drew a little

398

00:27:56,700 --> 00:27:54,830

tighter even I had a little trouble on

399

00:28:00,190 --> 00:27:56,710

this side as well

400

00:28:02,500 --> 00:28:00,200

the view from Mike Goods helmet camera

401
00:28:04,450 --> 00:28:02,510
as he is being repositioned down to the

402
00:28:07,330 --> 00:28:04,460
protective enclosure he'll be stowing

403
00:28:10,090 --> 00:28:07,340
this great sensor unit this is the one

404
00:28:14,050 --> 00:28:10,100
that was on the telescope originally and

405
00:28:16,840 --> 00:28:14,060
since 1999 it's been removed he's going

406
00:28:20,800 --> 00:28:16,850
to stow that permanently and retrieve

407
00:28:23,320 --> 00:28:20,810
the other replacement RSU for an attempt

408
00:28:26,680 --> 00:28:23,330
to install that one in the number three

409
00:28:29,500 --> 00:28:26,690
slot mike massimino holding his position

410
00:28:32,280 --> 00:28:29,510
inside the telescope at the install

411
00:28:54,580 --> 00:28:50,320
okay okay mass Boyd oh yeah apa2 what do

412
00:28:56,500 --> 00:28:54,590
you think I was gonna say it's like a

413
00:28:59,020 --> 00:28:56,510

heavyweight funny don't like guys who

414

00:29:02,950 --> 00:28:59,030

was just Hubble was throwing a lot of

415

00:29:05,240 --> 00:29:02,960

punches at us we we fought back that's a

416

00:29:16,830 --> 00:29:07,440

it was a great team effort though

417

00:29:21,060 --> 00:29:16,840

between everybody inside here Cody b2

418

00:29:23,010 --> 00:29:21,070

and maybe a two and a half and I don't

419

00:29:26,310 --> 00:29:23,020

know how it all worked out but

420

00:29:30,030 --> 00:29:26,320

apparently it did somehow nothing was

421

00:29:31,680 --> 00:29:30,040

going right from the beginning we got

422

00:29:33,510 --> 00:29:31,690

that stuff they got geniuses figuring

423

00:29:34,740 --> 00:29:33,520

stuff out too like the nanometer right

424

00:29:37,080 --> 00:29:34,750

or whatever if you know this book and

425

00:29:39,390 --> 00:29:37,090

it's still not fitting we're both trying

426

00:29:55,140 --> 00:29:39,400

stuff I don't know what's going on out

427

00:29:59,800 --> 00:29:57,790

with all the curves the couple's been

428

00:30:01,570 --> 00:29:59,810

throwing up there's no question that

429

00:30:02,460 --> 00:30:01,580

we're all living in the hope itself up

430

00:30:04,720 --> 00:30:02,470

Elena

431

00:30:07,630 --> 00:30:04,730

what kind of curves you think Hubble

432

00:30:09,790 --> 00:30:07,640

throw am I don't know it's been Dave

433

00:30:11,260 --> 00:30:09,800

surprises each day that was only the

434

00:30:13,180 --> 00:30:11,270

first day but we had a second day

435

00:30:15,810 --> 00:30:13,190

surprises I'm sure today will be a third

436

00:30:23,200 --> 00:30:15,820

but I'm not too worried we've managed to

437

00:30:25,150 --> 00:30:23,210

sort of power through both days and what

438

00:30:27,070 --> 00:30:25,160

do you think the the real challenge is

439

00:30:28,750 --> 00:30:27,080

today what's the big challenge we're

440

00:30:30,820 --> 00:30:28,760

taking out the white field sorry we're

441

00:30:32,230 --> 00:30:30,830

taking out the costar today and given

442

00:30:34,420 --> 00:30:32,240

the problems we had with wide field

443

00:30:37,690 --> 00:30:34,430

that's been in telescopes since 1993

444

00:30:40,060 --> 00:30:37,700

co-star has been in since 1993 a little

445

00:30:42,160 --> 00:30:40,070

bit concern that the a latch the left

446

00:30:43,870 --> 00:30:42,170

really holds it in tight or the B laughs

447

00:30:45,760 --> 00:30:43,880

which brings it up and down may be bound

448

00:30:46,330 --> 00:30:45,770

up the way it was on the wide field

449

00:30:52,360 --> 00:30:46,340

camera

450

00:31:19,529 --> 00:30:52,370

yikes yep AF shroud doors coming open at

451
00:31:40,060 --> 00:31:26,889
she made it copy before day one is he

452
00:31:43,779 --> 00:31:40,070
made it pp one by one and they keep to

453
00:31:46,750 --> 00:31:43,789
this they made it not the old connectors

454
00:31:52,889 --> 00:31:46,760
are debated this is the note we've been

455
00:31:54,990 --> 00:31:52,899
waiting for my slap is only takes to HST

456
00:32:05,549 --> 00:31:55,000
how would we know that

457
00:32:07,480 --> 00:32:05,559
hmm I've got your foot okay thanks okay

458
00:32:10,930 --> 00:32:07,490
yeah you guys know the drill

459
00:32:17,470 --> 00:32:10,940
let's remove co-star and Megan let's

460
00:32:19,510 --> 00:32:17,480
start it out you can call the P light

461
00:32:22,200 --> 00:32:19,520
study when you see it up you like he

462
00:32:25,269 --> 00:32:22,210
read to get that thank you

463
00:32:29,799 --> 00:32:25,279

co-star is free and now it's ready to be

464

00:32:34,120 --> 00:32:29,809

removed from the telescope installed

465

00:32:36,700 --> 00:32:34,130

back in December 1993 to correct the

466

00:32:40,570 --> 00:32:36,710

spherical aberration that was detected

467

00:32:55,400 --> 00:32:40,580

in the telescope's mirrors after its

468

00:33:08,510 --> 00:32:58,490

[Applause]

469

00:33:12,350 --> 00:33:08,520

a unique view from John Grunsfeld helmet

470

00:33:17,660 --> 00:33:12,360

camera looking forward to the AFT flight

471

00:33:19,700 --> 00:33:17,670

deck of atlantis as he faces the long

472

00:33:21,350 --> 00:33:19,710

end of the protective enclosure with the

473

00:33:25,070 --> 00:33:21,360

new cosmic origins spectrograph

474

00:33:28,250 --> 00:33:25,080

instrument which soon will become a

475

00:33:30,290 --> 00:33:28,260

permanent fixture aboard the hubble

476
00:34:07,370 --> 00:33:30,300
space telescope just above and behind

477
00:34:10,580 --> 00:34:07,380
him the cosmic origin spectrograph now

478
00:34:13,700 --> 00:34:10,590
in the telescope ready for final bolting

479
00:34:34,100 --> 00:34:13,710
and connecting of the mating of the

480
00:34:36,530 --> 00:34:34,110
electrical and data connections at 11:22

481
00:34:38,600 --> 00:34:36,540
a.m. Central time the report from the

482
00:34:41,240 --> 00:34:38,610
Space Telescope operations control

483
00:34:43,790 --> 00:34:41,250
center a good aliveness test on the

484
00:34:46,310 --> 00:34:43,800
newest science instrument for the hubble

485
00:34:49,430 --> 00:34:46,320
space telescope the cosmic origin

486
00:34:51,919 --> 00:34:49,440
spectrograph through foist 'el with the

487
00:34:55,580 --> 00:34:51,929
old instrument co-star which has

488
00:34:58,790 --> 00:34:55,590

completed its job after 16 years in the

489

00:35:00,800 --> 00:34:58,800

telescope being carefully placed in a

490

00:35:03,740 --> 00:35:00,810

protective canister for the return trip

491

00:35:09,020 --> 00:35:06,980

[Music]

492

00:35:11,660 --> 00:35:09,030

we treat those from the bag and brake

493

00:35:16,520 --> 00:35:11,670

torque on all the faster we're going to

494

00:35:21,130 --> 00:35:16,530

retighten 1 28 and 29 work a very

495

00:35:23,839 --> 00:35:21,140

intricate procedure to swap out some

496

00:35:26,599 --> 00:35:23,849

electrical cards essentially some

497

00:35:29,150 --> 00:35:26,609

computer cards that failed due to an

498

00:35:36,620 --> 00:35:29,160

electrical short inside the advanced

499

00:35:39,430 --> 00:35:36,630

camera for surveys the fastener capture

500

00:35:44,559 --> 00:35:39,440

plate now removed having done its job of

501
00:35:50,930 --> 00:35:44,569
capturing the 33 32 tiny screws inside

502
00:35:55,040 --> 00:35:50,940
the protective enclosure and the card

503
00:36:02,839 --> 00:35:55,050
extraction tool being secured to the CEB

504
00:36:15,349 --> 00:36:02,849
or the charge coupled device electronics

505
00:36:22,520 --> 00:36:15,359
box takes a few more turns to get it out

506
00:36:25,400 --> 00:36:22,530
of the connector after the matter slide

507
00:36:29,569 --> 00:36:25,410
locks in the bet in the 4 card the slide

508
00:36:34,870 --> 00:36:29,579
lock is engaged ok copy number 1 is in

509
00:36:40,789 --> 00:36:37,819
now he's resetting the index on the side

510
00:36:43,400 --> 00:36:40,799
of the extraction tool to the number two

511
00:36:51,740 --> 00:36:43,410
slot and he'll repeat this task four

512
00:36:53,120 --> 00:36:51,750
times to remove all four cards this is

513
00:36:56,030 --> 00:36:53,130

where we're living here in orbit on

514

00:36:58,940 --> 00:36:56,040

space shuttle Atlantis and I think the

515

00:37:01,099 --> 00:36:58,950

success of boats cost especially 80s did

516

00:37:03,680 --> 00:37:01,109

all the diligence of all the people who

517

00:37:06,740 --> 00:37:03,690

live in that hotel semolina and made the

518

00:37:09,010 --> 00:37:06,750

fantastic tools and septic techniques

519

00:37:12,109 --> 00:37:09,020

that we use today and of course the

520

00:37:13,989 --> 00:37:12,119

inventive mind that developed the CVR

521

00:37:15,639 --> 00:37:13,999

technology

522

00:37:17,639 --> 00:37:15,649

borrowed from the next-generation

523

00:37:20,439 --> 00:37:17,649

telescope the James Webb Space Telescope

524

00:37:22,799 --> 00:37:20,449

was all fantastic and enabled us through

525

00:37:27,159 --> 00:37:22,809

our work today

526

00:37:32,499 --> 00:37:27,169

okay I'm ready for the doors hey eyes

527

00:37:35,639 --> 00:37:32,509

can be first on the bottom close-up view

528

00:37:39,849 --> 00:37:35,649

of the Hubble Space Telescope worksite

529

00:37:42,249 --> 00:37:39,859

by the helmet cam on Michael good as he

530

00:37:44,619 --> 00:37:42,259

looks down into the payload Bay at the

531

00:37:49,419 --> 00:37:44,629

bottom working the berthing and

532

00:37:52,559 --> 00:37:49,429

positioning system post locking that

533

00:37:54,969 --> 00:37:52,569

into place to provide the additional

534

00:37:57,039 --> 00:37:54,979

stability to the telescope during the

535

00:38:06,399 --> 00:37:57,049

work he's down there in the bottom of

536

00:38:09,069 --> 00:38:06,409

the payload Bay Mike Massimino and a

537

00:38:11,439 --> 00:38:09,079

foot restraint inside the after out of

538

00:38:13,899 --> 00:38:11,449

the telescope Michael good on a foot

539

00:38:16,619 --> 00:38:13,909

restraint on the end of the shuttles

540

00:38:20,219 --> 00:38:16,629

robotic arm the fastener capture plate

541

00:38:23,559 --> 00:38:20,229

visible there on the end of the mini

542

00:38:26,049 --> 00:38:23,569

workstation or the work stanchion on the

543

00:38:30,069 --> 00:38:26,059

foot restraint up to the upper right

544

00:38:32,949 --> 00:38:30,079

near the upper backpack of Michael good

545

00:38:36,929 --> 00:38:32,959

the next step is to use a clamp removal

546

00:38:41,459 --> 00:38:36,939

tool to assist with the removal of that

547

00:38:45,159 --> 00:38:41,469

yellow handrail you see that handrail is

548

00:38:50,159 --> 00:38:45,169

obstructing the attachment of the

549

00:38:52,629 --> 00:38:50,169

fastener capture plate to the worksite

550

00:38:55,740 --> 00:38:52,639

they'll probably just snap it right yeah

551
00:38:58,290 --> 00:38:55,750
which is just a really really slow

552
00:38:59,860 --> 00:38:58,300
for last like 10 types of key graphics

553
00:39:01,870 --> 00:38:59,870
and animations

554
00:39:04,630 --> 00:39:01,880
the problem the problem is the job

555
00:39:07,120 --> 00:39:04,640
doesn't come I think if he loads up too

556
00:39:09,430 --> 00:39:07,130
slowly it's just being abandoned at some

557
00:39:11,530 --> 00:39:09,440
point it'll fatigue but it'd be yeah but

558
00:39:15,280 --> 00:39:11,540
I don't want any little bits shooting

559
00:39:22,580 --> 00:39:18,390
here you take them back to the telescope

560
00:39:28,650 --> 00:39:26,790
as for the today been Jules that's her

561
00:39:29,130 --> 00:39:28,660
point we've been over and I Drive a

562
00:39:41,890 --> 00:39:29,140
photo

563
00:39:41,900 --> 00:39:46,140

we're gonna be able to get this true

564

00:39:55,890 --> 00:39:47,819

I think once he busts off the handrail

565

00:39:58,300 --> 00:39:55,900

the rest can turn handrail sunset in 11

566

00:40:01,650 --> 00:39:59,509

[Music]

567

00:40:03,239 --> 00:40:01,660

well we're gonna do something back we're

568

00:40:04,920 --> 00:40:03,249

gonna break something the nighttime and

569

00:40:08,970 --> 00:40:04,930

then we're gonna do the good stuff get

570

00:40:12,180 --> 00:40:08,980

the card in the top half of that

571

00:40:15,299 --> 00:40:12,190

handrail was freed by the fasteners

572

00:40:17,880 --> 00:40:15,309

being released very easily the lower one

573

00:40:21,539 --> 00:40:17,890

one of the fasteners did not come loose

574

00:40:24,420 --> 00:40:21,549

and mike massimino used essentially

575

00:40:27,589 --> 00:40:24,430

brute force to remove the handle at the

576

00:40:31,980 --> 00:40:27,599

lower portion it is now free and

577

00:40:34,980 --> 00:40:31,990

carefully stowed away and now they're

578

00:40:36,809 --> 00:40:34,990

basically in the process of conducting

579

00:40:40,259 --> 00:40:36,819

some tool management before they get

580

00:40:42,450 --> 00:40:40,269

back into the task I've got a real good

581

00:40:45,029 --> 00:40:42,460

black line on a roll right Mike yeah

582

00:40:46,920 --> 00:40:45,039

on the upper on the upper right here I

583

00:40:48,779 --> 00:40:46,930

can just see the band of black I really

584

00:40:53,849 --> 00:40:48,789

can't see it sticking out but I can see

585

00:40:55,380 --> 00:40:53,859

a little band the black right right but

586

00:41:00,870 --> 00:40:55,390

on the lower left the candidates the

587

00:41:03,150 --> 00:41:00,880

band the black - you seen great

588

00:41:04,559 --> 00:41:03,160

description by mass there we copy and

589

00:41:07,289 --> 00:41:04,569

understand we're happy with their

590

00:41:09,749 --> 00:41:07,299

current config for the removal when we

591

00:41:25,220 --> 00:41:09,759

get the cover off and we'll want to Snug

592

00:41:30,890 --> 00:41:29,120

okay so it's loose and I think we're in

593

00:41:33,560 --> 00:41:30,900

good shape isn't like I see the wires

594

00:41:37,010 --> 00:41:33,570

okay just like let me get my hips little

595

00:41:40,130 --> 00:41:37,020

don't back off really small okay that's

596

00:41:44,480 --> 00:41:40,140

good stop stop stop

597

00:41:46,700 --> 00:41:44,490

you know I cut it and it's clear in the

598

00:41:50,690 --> 00:41:46,710

video now my good is on Massimino is

599

00:41:54,440 --> 00:41:50,700

left side reaching in with the cutters

600

00:41:58,940 --> 00:41:54,450

to clip two bundles of two wires which

601
00:42:01,099 --> 00:41:58,950
will make the cover of fully detached

602
00:42:06,440 --> 00:42:01,109
from the Space Telescope imaging

603
00:42:09,560 --> 00:42:06,450
spectrograph and now moving on to

604
00:42:13,480 --> 00:42:09,570
replace the low voltage power supply

605
00:42:19,520 --> 00:42:13,490
card to finish up the repair to the

606
00:42:19,530 --> 00:42:24,860
[Music]

607
00:42:30,800 --> 00:42:27,340
[Applause]

608
00:42:33,530 --> 00:42:30,810
and also the fact that I want you to

609
00:42:35,090 --> 00:42:33,540
take a look around because your walk

610
00:42:36,290 --> 00:42:35,100
with Hubble is about to come to an end

611
00:42:42,590 --> 00:42:36,300
we're bringing you and as soon as you

612
00:42:44,180 --> 00:42:42,600
close the door it was magnificent it's a

613
00:42:45,680 --> 00:42:44,190

great to work with the world going by

614

00:42:48,920 --> 00:42:45,690

and being out here with a good friend I

615

00:42:53,500 --> 00:42:48,930

could is the pleasure what do you got

616

00:42:56,359 --> 00:42:53,510

Mike that's a good word facet is that

617

00:43:01,099 --> 00:42:56,369

really awesome if the others be out here

618

00:43:04,070 --> 00:43:01,109

doing it EMDR three but this is just

619

00:43:07,160 --> 00:43:04,080

completely awesome out here a lot of

620

00:43:08,359 --> 00:43:07,170

work but they're well worth it the real

621

00:43:09,890 --> 00:43:08,369

privilege to get to see what we're

622

00:43:13,099 --> 00:43:09,900

saying and get to work on a speculative

623

00:43:21,420 --> 00:43:13,109

machine could it be a be any more

624

00:43:28,260 --> 00:43:25,100

I look out there it looks done

625

00:43:30,060 --> 00:43:28,270

hey buddy you want to say hello - yeah

626

00:43:33,960 --> 00:43:30,070

I'd like to say hello to every washing

627

00:43:36,420 --> 00:43:33,970

my family and like to say a special

628

00:43:39,830 --> 00:43:36,430

happy birthday to my father-in-law PJ

629

00:43:49,110 --> 00:43:39,840

but I grew up in the Cornwall Ontario a

630

00:43:51,060 --> 00:43:49,120

warm sunny and enjoyable day I still be

631

00:43:52,200 --> 00:43:51,070

wearing the all-white spacesuit today

632

00:43:54,210 --> 00:43:52,210

which is how you'll be able to

633

00:43:56,660 --> 00:43:54,220

distinguish him from mission specialist

634

00:44:00,530 --> 00:43:56,670

John Grunsfeld who will be wearing a

635

00:44:02,640 --> 00:44:00,540

spacesuit marked with a solid red stripe

636

00:44:04,110 --> 00:44:02,650

and there's mission specialist John

637

00:44:10,620 --> 00:44:04,120

Grunsfeld making his way out of the

638

00:44:11,850 --> 00:44:10,630

airlock now and as you can see in

639

00:44:16,950 --> 00:44:11,860

principle is wearing the suit with a

640

00:44:18,720 --> 00:44:16,960

solid red stripe Efram mission

641

00:44:21,840 --> 00:44:18,730

specialist John Grunsfeld helmet camera

642

00:44:24,000 --> 00:44:21,850

looking directly at the bay 3 that he'll

643

00:44:28,610 --> 00:44:24,010

be working in to replace the batteries

644

00:44:32,490 --> 00:44:28,620

inside directly to the left of it is the

645

00:44:34,290 --> 00:44:32,500

bay - where Mike Massimino Mike good

646

00:44:44,340 --> 00:44:34,300

replaced batteries during the second

647

00:44:49,499 --> 00:44:44,350

spacewalk of the mission nice silhouette

648

00:44:58,840 --> 00:44:58,499

beautiful spaceship one guy you for a

649

00:45:01,000 --> 00:44:58,850

miss

650

00:45:02,800 --> 00:45:01,010

specialist John Grunsfeld helmet camera

651
00:45:04,210 --> 00:45:02,810
now holding both the new and the old

652
00:45:08,140 --> 00:45:04,220
batteries getting ready to hand the old

653
00:45:10,990 --> 00:45:08,150
back to Drew hoist tool and then make

654
00:45:14,680 --> 00:45:11,000
his way back to the telescopes Bay 3 to

655
00:45:16,870 --> 00:45:14,690
install the new one why no happy to

656
00:45:18,790 --> 00:45:16,880
report good aliveness test on the bay

657
00:45:21,430 --> 00:45:18,800
tree battery you have a go for the L 12

658
00:45:27,190 --> 00:45:21,440
steps in step 13 your column copy it

659
00:45:28,720 --> 00:45:27,200
going step 13 then I stopped it a little

660
00:45:33,070 --> 00:45:28,730
over six because I can see that the

661
00:45:36,190 --> 00:45:33,080
sample is up against the divots in it

662
00:45:38,530 --> 00:45:36,200
not good job let's even get there

663
00:45:39,670 --> 00:45:38,540

otherwise I'm just gonna pop this

664

00:45:43,220 --> 00:45:39,680

without I don't want to touch up the

665

00:45:54,390 --> 00:45:50,750

pants out of the bathtub copy flying

666

00:45:58,170 --> 00:45:54,400

across the Texas coast headed across the

667

00:46:00,360 --> 00:45:58,180

Gulf of Mexico the two astronauts two

668

00:46:02,640 --> 00:46:00,370

hours two minutes into today's final

669

00:46:12,270 --> 00:46:02,650

spacewalk to service the Hubble Space

670

00:46:15,270 --> 00:46:12,280

Telescope to try again with the EDA

671

00:46:22,710 --> 00:46:15,280

ratchet and setting of 38 I'm looking on

672

00:46:24,120 --> 00:46:22,720

page 16 55 damn steps disengage I think

673

00:46:26,370 --> 00:46:24,130

that's where we are we would need to use

674

00:46:30,180 --> 00:46:26,380

to continue the MTO which is luckily on

675

00:46:38,360 --> 00:46:30,190

the tool handle today if you agree yeah

676
00:46:44,990 --> 00:46:41,180
per the procedures to break the torque

677
00:46:47,240 --> 00:46:45,000
they'll switch to the torque limiter an

678
00:46:51,260 --> 00:46:47,250
extra additional tool they have on the

679
00:46:53,780 --> 00:46:51,270
tool caddy on the stanchion as part of

680
00:47:11,480 --> 00:46:53,790
the portable foot restraint on the end

681
00:47:32,870 --> 00:47:11,490
of the shuttles robot arm go for full

682
00:47:32,880 --> 00:47:39,289
[Music]

683
00:47:43,930 --> 00:47:41,710
negative buddies maneuver

684
00:47:46,420 --> 00:47:43,940
happy that they're going to the attic

685
00:47:48,870 --> 00:47:46,430
sure John Grunsfeld being maneuvered on

686
00:47:53,040 --> 00:47:48,880
the end of the shuttles robotic arm by

687
00:47:55,930 --> 00:47:53,050
Megan McArthur to temporarily stow the

688
00:47:58,599 --> 00:47:55,940

fine guidance sensor just removed from

689

00:48:01,810 --> 00:47:58,609

the telescope that sensor will be

690

00:48:07,080 --> 00:48:01,820

returning home once the new FG s is

691

00:48:13,420 --> 00:48:10,120

John Grunsfeld assisting with the final

692

00:48:20,349 --> 00:48:13,430

connectors on the port or the left side

693

00:48:23,260 --> 00:48:20,359

of the new fine guidance sensor this is

694

00:48:25,800 --> 00:48:23,270

a really tremendous adventure that we've

695

00:48:27,790 --> 00:48:25,810

been on a very challenging mission

696

00:48:30,310 --> 00:48:27,800

publishing sister satellites

697

00:48:32,710 --> 00:48:30,320

it's about humanity's quest for

698

00:48:34,180 --> 00:48:32,720

knowledge the few people that are very

699

00:48:37,180 --> 00:48:34,190

special too helpful that I'd like to

700

00:48:39,849 --> 00:48:37,190

thank Lyman Spitzer and John Bacall was

701
00:48:41,620 --> 00:48:39,859
deceased but without whom we wouldn't

702
00:48:44,859 --> 00:48:41,630
have a Hubble Space Telescope with this

703
00:48:46,870 --> 00:48:44,869
amazing adventure but if she were still

704
00:48:51,089 --> 00:48:46,880
with us being very productive scientists

705
00:48:53,740 --> 00:48:51,099
feedback with and President Bill Smith

706
00:48:56,829 --> 00:48:53,750
senator Mikulski Ned Wyler without whom

707
00:49:00,520 --> 00:48:56,839
we wouldn't have a servicing mission for

708
00:49:01,960 --> 00:49:00,530
and of course Mike Griffin I think we'd

709
00:49:04,599 --> 00:49:01,970
all agree that without surfy none of

710
00:49:08,890 --> 00:49:04,609
this would have happened a tour de force

711
00:49:11,410 --> 00:49:08,900
of tools and human ingenuity this

712
00:49:13,630 --> 00:49:11,420
mission in particular as I see Clark

713
00:49:16,420 --> 00:49:13,640

says the only way of finding the limits

714

00:49:19,510 --> 00:49:16,430

of the possible despite going beyond

715

00:49:22,030 --> 00:49:19,520

them into the impossible in an efficient

716

00:49:24,150 --> 00:49:22,040

we tried some things that many people

717

00:49:27,550 --> 00:49:24,160

said was impossible fixing fifth

718

00:49:30,760 --> 00:49:27,560

repairing ACS keeping all the content

719

00:49:33,609 --> 00:49:30,770

that we have and efficient but we've

720

00:49:36,609 --> 00:49:33,619

achieved that and we wish all the very

721

00:49:38,079 --> 00:49:36,619

best it's really a sign of the great

722

00:49:39,730 --> 00:49:38,089

country that we live in that were able

723

00:49:41,550 --> 00:49:39,740

to do things like this on a marvelous

724

00:49:44,560 --> 00:49:41,560

spaceship like space shuttle Atlantis

725

00:49:46,660 --> 00:49:44,570

and I'm convinced that if we can solve

726
00:49:48,730 --> 00:49:46,670
problems by preparing Hubble getting to

727
00:49:51,849 --> 00:49:48,740
space being the surfacing we do

728
00:49:53,740 --> 00:49:51,859
traveling 17,500 miles an hour around

729
00:49:54,850 --> 00:49:53,750
the earth that we can achieve other

730
00:49:56,770 --> 00:49:54,860
great things

731
00:49:59,920 --> 00:49:56,780
like solving our energy problems and our

732
00:50:04,090 --> 00:49:59,930
climate problem all things that in the

733
00:50:05,590 --> 00:50:04,100
middle of NASA's time and core values as

734
00:50:07,960 --> 00:50:05,600
you and I go and feel like I want to

735
00:50:09,640 --> 00:50:07,970
wish Hubble its own set of adventures

736
00:50:12,370 --> 00:50:09,650
and with the new instruments we've

737
00:50:20,920 --> 00:50:12,380
installed that it may unlock further

738
00:50:29,310 --> 00:50:20,930

mysteries of the universe which is an

739

00:50:29,320 --> 00:50:35,980

I'm back in a way no see you gotta know

740

00:50:42,670 --> 00:50:39,270

clear the pin mode switches an off

741

00:50:42,680 --> 00:50:50,240

clear the antenna

742

00:50:56,950 --> 00:50:53,390

Ray J I'm calling for ten down pulses

743

00:51:00,320 --> 00:50:56,960

when we do this caller gaming team

744

00:51:02,710 --> 00:51:00,330

see you moving away nicely

745

00:51:08,330 --> 00:51:02,720

working to get away from the antenna

746

00:51:12,800 --> 00:51:10,250

and I can five feet from the telescope

747

00:51:14,360 --> 00:51:12,810

not yet five feet from antenna and I'll

748

00:51:17,800 --> 00:51:14,370

need a time when you do those scooter

749

00:51:20,560 --> 00:51:17,810

but I think I'm gonna hear you

750

00:51:26,240 --> 00:51:20,570

and I call that tyki mikk gotta go for

751
00:51:29,660 --> 00:51:27,830
and just verify your flight control

752
00:51:32,540 --> 00:51:29,670
powers on fighting for hours

753
00:51:37,400 --> 00:51:32,550
your motion is stop skirt okay here

754
00:51:37,410 --> 00:51:42,510
[Music]

755
00:51:50,220 --> 00:51:46,740
[Applause]

756
00:51:57,370 --> 00:51:50,230
that's ten okay my controllers awfully

757
00:51:57,380 --> 00:52:02,020
[Music]

758
00:52:09,350 --> 00:52:06,230
24 feet okay is that the teeth keel

759
00:52:11,840 --> 00:52:09,360
camera on monitor - for me 28 the actual

760
00:52:18,640 --> 00:52:11,850
monitor - center of 8:30 bottom half and

761
00:52:21,380 --> 00:52:18,650
he'll scooter inertial 35 thank you

762
00:52:33,329 --> 00:52:21,390
supposed to be at a red ball of about 65

763
00:52:33,339 --> 00:52:37,530

standby for

764

00:52:37,540 --> 00:52:48,630

[Applause]

765

00:52:48,640 --> 00:52:54,350

it's not

766

00:53:03,530 --> 00:52:58,530

81 feet we've been 1.2 is it show that I

767

00:53:08,400 --> 00:53:03,540

think that through 40 okay that's good

768

00:53:11,320 --> 00:53:08,410

that's good to parties on you once yes

769

00:53:14,280 --> 00:53:11,330

from getting it reads 99 feet

770

00:53:19,440 --> 00:53:14,290

[Music]

771

00:53:22,020 --> 00:53:19,450

hundred fifty oh thanks

772

00:53:26,710 --> 00:53:22,030

[Applause]

773

00:53:36,040 --> 00:53:26,720

if she were to lock PCH mode at some

774

00:53:46,310 --> 00:53:38,530

it's good right no whole 500 is when I

775

00:53:49,100 --> 00:53:47,930

do you have your maneuver ready to go

776
00:53:50,660 --> 00:53:49,110
put them in

777
00:53:56,470 --> 00:53:50,670
you can do the item 19

778
00:54:15,520 --> 00:53:58,320
yes

779
00:54:15,530 --> 00:54:20,900
- hi Pete

780
00:54:28,310 --> 00:54:23,360
20 seconds Peter

781
00:54:29,300 --> 00:54:28,320
20 seconds for the manoeuvre 3 9000 over

782
00:54:31,610 --> 00:54:29,310
front 0

783
00:54:32,810 --> 00:54:31,620
okay you got the item 19 go ahead and

784
00:54:37,460 --> 00:54:32,820
give me 2 out of 19

785
00:54:43,050 --> 00:54:37,470
hey intense in about 8 seconds 2 1 3

786
00:54:52,320 --> 00:54:49,890
just keep shooting five minutes if I

787
00:54:55,080 --> 00:54:52,330
said we were at 3:30 you at five minutes

788
00:54:55,710 --> 00:54:55,090

no I keep it up they going to give you

789

00:55:02,730 --> 00:54:55,720

the message

790

00:55:11,780 --> 00:55:02,740

give me the auto Atlantis is traveling

791

00:55:17,340 --> 00:55:14,610

views as the crew sees it through the

792

00:55:22,020 --> 00:55:17,350

forward windows of the orbiter through

793

00:55:24,510 --> 00:55:22,030

the head of heads-up display the twin

794

00:55:26,630 --> 00:55:24,520

sonic booms heralding the arrival of

795

00:55:29,510 --> 00:55:26,640

Atlantis to the landing site

796

00:55:37,190 --> 00:55:29,520

[Music]

797

00:55:40,260 --> 00:55:37,200

Atlantis honest to 180 walking on any

798

00:55:42,840 --> 00:55:40,270

pilot Greg Johnson now flying Atlantis

799

00:55:44,850 --> 00:55:42,850

the orbiters halfway around the heading

800

00:55:48,630 --> 00:55:44,860

alignment circle to line up with runway

801
00:55:53,180 --> 00:55:48,640
2 to the northeast Southwest approach

802
00:55:59,930 --> 00:55:57,260
[Music]

803
00:56:01,960 --> 00:55:59,940
and commander Scott Altman now flying

804
00:56:06,170 --> 00:56:01,970
Atlantis the rest of the way

805
00:56:09,890 --> 00:56:06,180
time to touch down two minutes Atlantis

806
00:56:19,380 --> 00:56:09,900
on at the 90 he's been a land of copies

807
00:56:19,390 --> 00:56:40,339
[Music]

808
00:56:49,430 --> 00:56:46,050
altitude 12,000 feet in the Atlantis

809
00:56:51,730 --> 00:56:49,440
field inside at 10,000 feet

810
00:57:03,730 --> 00:56:51,740
toppy field in sight

811
00:57:24,990 --> 00:57:03,740
[Music]

812
00:57:35,210 --> 00:57:25,000
7,000 feet 4,000 feet

813
00:57:37,310 --> 00:57:35,220

[Music]

814

00:57:39,650 --> 00:57:37,320

2,000 feet

815

00:57:42,840 --> 00:57:39,660

commander Scott Altman beginning to

816

00:57:45,600 --> 00:57:42,850

flare out the vehicle pitch the nose up

817

00:57:57,980 --> 00:57:45,610

as the approaches runway to two from the

818

00:57:57,990 --> 00:58:10,729

[Music]

819

00:58:10,739 --> 00:58:22,830

main gear touchdown

820

00:58:28,890 --> 00:58:27,330

nose gear touchdown space shuttle

821

00:58:31,460 --> 00:58:28,900

atlantis is rolling out on runway two

822

00:58:34,080 --> 00:58:31,470

two at Edwards Air Force Base completing

823

00:58:35,940 --> 00:58:34,090

197 orbits of the earth while traveling

824

00:58:38,400 --> 00:58:35,950

five million two hundred seventy six

825

00:58:40,350 --> 00:58:38,410

thousand miles this landing marks the

826
00:58:41,510 --> 00:58:40,360
53rd shuttle mission to end at Edwards

827
00:58:44,010 --> 00:58:41,520
Air Force Base

828
00:58:45,960 --> 00:58:44,020
Atlantis spent seven days servicing the

829
00:58:48,600 --> 00:58:45,970
Hubble Space Telescope that included

830
00:58:51,870 --> 00:58:48,610
five spacewalks totaling a record 37

831
00:58:54,210 --> 00:58:51,880
hours Atlantis has completed his 30th

832
00:58:56,850 --> 00:58:54,220
mission in the 126th in the history of

833
00:58:58,650 --> 00:58:56,860
the space shuttle program the Hubble

834
00:59:01,020 --> 00:58:58,660
Space Telescope's final servicing

835
00:59:02,630 --> 00:59:01,030
mission is complete but its mission of

836
00:59:24,359 --> 00:59:02,640
discovery is just beginning

837
00:59:32,740 --> 00:59:28,950
Houston Atlantis will stop Edwards - -

838
00:59:36,190 --> 00:59:32,750

welcome home Atlantis congratulations on

839

00:59:39,099 --> 00:59:36,200

a very successful mission giving Hubble

840

00:59:43,620 --> 00:59:39,109

a new set of eyes that will continue to

841

00:59:49,599 --> 00:59:46,780

Thank You Houston it was a thrill from

842

00:59:52,270 --> 00:59:49,609

start to finish we've had a great ride

843

00:59:54,700 --> 00:59:52,280

it took a whole team across the country