



1  
00:00:50,760 --> 00:00:48,000  
this is shuttle launch control at

2  
00:00:54,150 --> 00:00:50,770  
t-minus three hours and holding with

3  
00:00:57,630 --> 00:00:54,160  
about 32 minutes remaining in our hold

4  
00:00:59,520 --> 00:00:57,640  
this morning we're standing by for a

5  
00:01:01,200 --> 00:00:59,530  
live video of the crew donning their

6  
00:01:02,610 --> 00:01:01,210  
flight suits and the crew quarters which

7  
00:01:05,760 --> 00:01:02,620  
is located in the operations and

8  
00:01:07,740 --> 00:01:05,770  
check-out building and we have that

9  
00:01:12,330 --> 00:01:07,750  
video commander

10  
00:01:14,600 --> 00:01:12,340  
dick Covey looked like he's all ready to

11  
00:01:17,340 --> 00:01:14,610  
fly making some last-minute adjustments

12  
00:01:23,840 --> 00:01:17,350  
he's preparing to make his fourth flight

13  
00:01:26,040 --> 00:01:23,850

into space today his pilot Ken Bowersox

14

00:01:34,020 --> 00:01:26,050

preparing to make his second flight into

15

00:01:42,000 --> 00:01:36,780

ken considers Bedford Indiana to be his

16

00:01:45,570 --> 00:01:42,010

hometown relaxed story Musgrave mission

17

00:01:48,000 --> 00:01:45,580

specialist the veterans veteran of

18

00:01:50,010 --> 00:01:48,010

spaceflight he is preparing to make his

19

00:01:55,160 --> 00:01:50,020

historic fifth flight aboard the space

20

00:01:57,390 --> 00:01:55,170

shuttle today other crew members who are

21

00:02:00,540 --> 00:01:57,400

have already been suited up and they're

22

00:02:03,960 --> 00:02:00,550

standing by for their commander and

23

00:02:06,570 --> 00:02:03,970

pilot to finish up Kathy Thornton

24

00:02:09,840 --> 00:02:06,580

mission specialists preparing for her

25

00:02:22,660 --> 00:02:09,850

third flight she is going to be one of

26  
00:02:22,670 --> 00:02:30,350  
Tom makers

27  
00:02:38,330 --> 00:02:35,450  
mission specialist Jeff Hoffman relaxing

28  
00:02:40,420 --> 00:02:38,340  
before the walk out to the Astro van

29  
00:02:43,280 --> 00:02:40,430  
that will carry them out to the pad and

30  
00:02:46,780 --> 00:02:43,290  
finally a representative from European

31  
00:02:58,339 --> 00:02:46,790  
Space Agency Claude Nikolay

32  
00:03:04,920 --> 00:03:01,080  
commander Covey waving to members of the

33  
00:03:07,739 --> 00:03:04,930  
media through a president maybe there's

34  
00:03:09,509 --> 00:03:07,749  
a great waving well giving signs of

35  
00:03:56,300 --> 00:03:09,519  
here and showing it they're ready

36  
00:04:04,580 --> 00:03:59,510  
OTC CDR how do you read this morning

37  
00:04:26,119 --> 00:04:06,930  
that's your Saint George let's do it

38  
00:04:30,450 --> 00:04:28,529

members of the closeout crew are shown

39

00:04:32,700 --> 00:04:30,460

in the video monitors wearing the white

40

00:04:34,459 --> 00:04:32,710

coveralls and the astronauts of course

41

00:04:37,350 --> 00:04:34,469

are dressed in their orange flight suits

42

00:05:29,260 --> 00:04:37,360

the closeout crew consists of both NASA

43

00:05:34,730 --> 00:05:32,030

the orbiter access arm is now being

44

00:05:36,470 --> 00:05:34,740

retracted away from the vehicle this is

45

00:05:39,050 --> 00:05:36,480

the walkway used by the crew to gain

46

00:05:40,400 --> 00:05:39,060

entry into and out of the vehicle and it

47

00:05:54,629 --> 00:05:40,410

can be returned to position within

48

00:06:09,020 --> 00:05:56,760

hey off the air puppy see Sakura

49

00:06:09,030 --> 00:06:25,230

t-minus four minutes and Counting

50

00:06:29,339 --> 00:06:28,089

t-minus three minutes 30 seconds and

51  
00:06:32,050 --> 00:06:29,349  
counting

52  
00:06:34,089 --> 00:06:32,060  
also we are the three main engines are

53  
00:07:02,590 --> 00:06:34,099  
being given as a final test before

54  
00:07:07,100 --> 00:07:05,120  
everything continues ready to fly today

55  
00:07:12,350 --> 00:07:07,110  
on NASA's four and a half million pound

56  
00:07:26,810 --> 00:07:12,360  
space shuttle vehicle t-minus two

57  
00:07:29,930 --> 00:07:26,820  
minutes and Counting t-minus one minute

58  
00:07:32,540 --> 00:07:29,940  
45 seconds everything continues to look

59  
00:07:34,430 --> 00:07:32,550  
good for launch this morning in about 90

60  
00:07:37,280 --> 00:07:34,440  
seconds the space shuttle Endeavour will

61  
00:07:38,660 --> 00:07:37,290  
begin at C 11th its 11 day flight to

62  
00:07:41,300 --> 00:07:38,670  
visit the orbiting Hubble Space

63  
00:07:43,880 --> 00:07:41,310

Telescope but not before lighting up the

64

00:07:46,160 --> 00:07:43,890

nighttime florida sky the launch should

65

00:07:47,570 --> 00:07:46,170

be visible for hundreds of miles the

66

00:07:51,920 --> 00:07:47,580

mission and the record five spacewalks

67

00:07:53,900 --> 00:07:51,930

will be watched worldwide t-minus 31

68

00:07:54,950 --> 00:07:53,910

seconds and we have a go for

69

00:07:56,780 --> 00:07:54,960

autosequence start

70

00:07:58,760 --> 00:07:56,790

endeavours onboard computers have

71

00:08:06,070 --> 00:07:58,770

primary control of all the vehicles

72

00:08:22,270 --> 00:08:14,649

t-minus 15 seconds 11 10 9 and we have a

73

00:08:24,760 --> 00:08:22,280

go for main engine start 5 4 3 2 1 and

74

00:08:26,379 --> 00:08:24,770

we have liftoff liftoff of the space

75

00:08:27,790 --> 00:08:26,389

shuttle Endeavour on an ambitious

76

00:08:37,800 --> 00:08:27,800

mission to service the Hubble Space

77

00:08:42,730 --> 00:08:40,389

ether napkin tolling endeavors and away

78

00:08:50,220 --> 00:08:42,740

rolled on course born hold it with the

79

00:08:50,230 --> 00:08:58,370

then all these battles involving

80

00:09:02,699 --> 00:09:00,840

me and it got endeavour call the pack

81

00:09:03,900 --> 00:09:02,709

53rd brought up to prepare the shuttle

82

00:09:30,880 --> 00:09:03,910

to pass through the area of maximum

83

00:09:38,000 --> 00:09:35,900

endeavour go at throttle up Roger go at

84

00:09:40,580 --> 00:09:38,010

throttle up Deborah's three main engines

85

00:09:44,120 --> 00:09:40,590

now back at full throttle all flight

86

00:09:48,520 --> 00:09:44,130

control positions are go altitude now 10

87

00:09:54,740 --> 00:09:48,530

miles 7 miles east of launch pad 39b

88

00:09:56,000 --> 00:09:54,750

Deborah speed 1,700 miles an hour one

89

00:09:58,370 --> 00:09:56,010

and a half minutes and slipped off

90

00:09:59,600 --> 00:09:58,380

endeavours already used more than two

91

00:10:00,890 --> 00:09:59,610

and a quarter million pounds of

92

00:10:03,040 --> 00:10:00,900

propellant in the shuttle weighs less

93

00:10:05,180 --> 00:10:03,050

than half of what it did at launch

94

00:10:06,980 --> 00:10:05,190

flight controllers are now standing by

95

00:10:38,100 --> 00:10:06,990

for burnout and separation of the twin

96

00:10:48,900 --> 00:10:39,980

please prompter confirms a good

97

00:10:49,680 --> 00:10:48,910

endeavoured to engine banjo jettison of

98

00:10:51,329 --> 00:10:49,690

a solid rocket

99

00:10:52,949 --> 00:10:51,339

exhale also indicates an endeavor can

100

00:10:54,150 --> 00:10:52,959

now perform an emergency transatlantic

101  
00:10:59,690 --> 00:10:54,160  
landing if needed

102  
00:11:02,340 --> 00:10:59,700  
and ever performance nominal performance

103  
00:11:04,410 --> 00:11:02,350  
also endeavours performance as far has

104  
00:11:06,780 --> 00:11:04,420  
been just as planned altitude now 35

105  
00:11:10,079 --> 00:11:06,790  
miles 48 miles east to the Kennedy Space

106  
00:11:18,290 --> 00:11:10,089  
Center deborah traveling 3,400 miles an

107  
00:11:23,009 --> 00:11:20,759  
boost arsenal confirms a good jettison

108  
00:11:25,590 --> 00:11:23,019  
of the external fuel tank endeavour

109  
00:11:36,690 --> 00:11:25,600  
Houston we see a nominal Miko ohms one

110  
00:13:24,740 --> 00:11:36,700  
not required it looked awfully good from

111  
00:13:24,750 --> 00:13:43,690  
hello Clark

112  
00:13:43,700 --> 00:13:52,060  
hey sex

113  
00:13:52,070 --> 00:14:22,600

hey cabbie

114

00:14:22,610 --> 00:14:32,500

hey Thomas

115

00:14:32,510 --> 00:15:01,460

hey Katie

116

00:15:01,470 --> 00:15:44,700

hello story

117

00:15:50,430 --> 00:15:48,720

this television from endeavor is from a

118

00:15:53,040 --> 00:15:50,440

camera mounted on the mechanical arm as

119

00:15:56,070 --> 00:15:53,050

it moves over the forward portion of the

120

00:15:59,400 --> 00:15:56,080

cargo bay area where the replacement

121

00:16:01,470 --> 00:15:59,410

solar arrays in this view is an end of a

122

00:16:04,050 --> 00:16:01,480

replacement solar array for the Hubble

123

00:16:08,270 --> 00:16:04,060

Space Telescope in their carrier where

124

00:16:14,010 --> 00:16:11,790

also the carrier where the old arrays

125

00:16:22,110 --> 00:16:14,020

will be stored once they're removed from

126

00:16:26,610 --> 00:16:22,120

the telescope this television from

127

00:16:28,470 --> 00:16:26,620

endeavour shows the umbilical that would

128

00:16:30,060 --> 00:16:28,480

be connected to the Space Telescope once

129

00:16:49,010 --> 00:16:30,070

it's perfect we have a really good

130

00:17:10,689 --> 00:16:51,140

debora were on the west and we got the

131

00:17:18,240 --> 00:17:13,329

not as colorful but as you see we have

132

00:17:22,780 --> 00:17:20,980

it's live television views from a camera

133

00:17:25,449 --> 00:17:22,790

that's mounted in the front right-hand

134

00:17:28,090 --> 00:17:25,459

corner of endeavours cargo bay looking

135

00:17:30,490 --> 00:17:28,100

back over the support equipment two

136

00:17:34,299 --> 00:17:30,500

mounted throughout the bay in the

137

00:17:36,280 --> 00:17:34,309

foreground is the right-hand side of the

138

00:17:38,110 --> 00:17:36,290

solar array carrier and one of the

139

00:17:40,630 --> 00:17:38,120

replacement solar arrays for the Hubble

140

00:17:43,480 --> 00:17:40,640

Space Telescope in the background

141

00:17:46,630 --> 00:17:43,490

emitting about midway down the bay are

142

00:17:53,530 --> 00:17:46,640

the two scientific instrument protective

143

00:17:55,720 --> 00:17:53,540

enclosures in the radial site the site

144

00:18:00,370 --> 00:17:55,730

that scientific and protective

145

00:18:02,530 --> 00:18:00,380

instrument enclosure it runs crossways

146

00:18:05,230 --> 00:18:02,540

across the bay holds the wide field

147

00:18:08,740 --> 00:18:05,240

planetary camera to instrument or with

148

00:18:11,080 --> 00:18:08,750

pic to the axial scientific instrument

149

00:18:13,419 --> 00:18:11,090

protective enclosure the enclosure that

150

00:18:16,419 --> 00:18:13,429

runs said lengthwise about the middle of

151  
00:18:18,909 --> 00:18:16,429  
the cargo bay holds the corrective

152  
00:18:23,770 --> 00:18:18,919  
optics space telescope axial replacement

153  
00:18:25,900 --> 00:18:23,780  
or co-star instrument the smaller

154  
00:18:33,280 --> 00:18:25,910  
enclosures on the right-hand side of the

155  
00:18:34,930 --> 00:18:33,290  
cargo bay hold the new CRO processor

156  
00:18:43,030 --> 00:18:34,940  
that will be added to the telescope to

157  
00:18:48,760 --> 00:18:43,040  
increase its computer memory in the

158  
00:18:51,549 --> 00:18:48,770  
larger enclosure and in the small

159  
00:18:53,590 --> 00:18:51,559  
enclosure are the new rate sensor units

160  
00:18:56,320 --> 00:18:53,600  
the new gyroscopes that will be added to

161  
00:19:00,039 --> 00:18:56,330  
the telescope the electronics control

162  
00:19:02,200 --> 00:19:00,049  
units that will be added and the goddard

163  
00:19:07,450 --> 00:19:02,210

high resolution spectrograph redundancy

164

00:19:11,230 --> 00:19:07,460

kit again the survey the cargo bay found

165

00:19:12,460 --> 00:19:11,240

no problems reported with any of the

166

00:19:18,230 --> 00:19:12,470

equipment it all appears to be in

167

00:19:22,940 --> 00:19:20,660

this is Mission Control Houston on board

168

00:19:27,680 --> 00:19:22,950

the crews in their lunch break the

169

00:19:30,049 --> 00:19:27,690

midpoint of their day controllers from

170

00:19:31,280 --> 00:19:30,059

the Space Telescope operations Control

171

00:19:32,900 --> 00:19:31,290

Center at the Goddard Space Flight

172

00:19:59,270 --> 00:19:32,910

Center in Greenbelt Maryland they've

173

00:20:06,590 --> 00:19:59,280

reported a whole lot of astronomers who

174

00:20:08,540 --> 00:20:06,600

worked really hard we copy that Jeff

175

00:20:11,510 --> 00:20:08,550

thanks for the great words and I think

176  
00:20:13,610 --> 00:20:11,520  
you're correct I think HSP has done its

177  
00:20:34,680 --> 00:20:13,620  
job and we're ready to have you guys and

178  
00:20:39,070 --> 00:20:37,690  
story will be happy to work ium you

179  
00:20:49,240 --> 00:20:39,080  
check out with you as soon as your

180  
00:20:55,030 --> 00:20:49,250  
hunger is stated well look and hand up

181  
00:20:56,190 --> 00:20:55,040  
and let's bag is gonna feel better bad

182  
00:21:13,590 --> 00:20:56,200  
habit

183  
00:21:45,700 --> 00:21:31,060  
we can't wait to see the video sex Jeff

184  
00:21:47,530 --> 00:21:45,710  
we are all ears go ahead we started

185  
00:21:51,310 --> 00:21:47,540  
looking again came out of the sun's

186  
00:21:55,830 --> 00:21:51,320  
glare and the right hand full of a as we

187  
00:22:12,310 --> 00:21:55,840  
can see it is one side of it is way over

188  
00:22:17,770 --> 00:22:12,320

clearly we have a dynamic situation we

189

00:22:29,820 --> 00:22:17,780

copy endeavor to keep a live monitor is

190

00:22:35,820 --> 00:22:32,340

again the actual capture of the

191

00:22:37,979 --> 00:22:35,830

telescope requires some precision flying

192

00:22:41,129 --> 00:22:37,989

by the commander in this case dick Covey

193

00:22:43,080 --> 00:22:41,139

to maneuver the shuttle into position to

194

00:22:46,220 --> 00:22:43,090

within about 35 feet or so of the

195

00:22:49,019 --> 00:22:46,230

telescope at that point claude nicollier

196

00:22:52,350 --> 00:22:49,029

operating the robot arm can maneuver the

197

00:22:55,289 --> 00:22:52,360

arm into place to capture the spacecraft

198

00:22:56,850 --> 00:22:55,299

by attaching the end of the arm to one

199

00:23:16,019 --> 00:22:56,860

of the two grandpa'll fixtures on the

200

00:23:32,549 --> 00:23:19,570

is that endeavor has a firm handshake

201  
00:23:34,720 --> 00:23:32,559  
with telescope that's quite a sight

202  
00:24:12,350 --> 00:23:34,730  
Deborah Houston we've got a great elbow

203  
00:24:31,740 --> 00:24:15,350  
yeah I get the Frollo angry that is

204  
00:24:40,680 --> 00:24:36,650  
a second kick a couple feet below the

205  
00:24:43,620 --> 00:24:40,690  
obvious one that is on the the backside

206  
00:24:45,690 --> 00:24:43,630  
there of that section of the by stem not

207  
00:24:48,240 --> 00:24:45,700  
quite as bad but it it does have a

208  
00:25:04,889 --> 00:24:48,250  
little crease in it the good news is the

209  
00:25:08,619 --> 00:25:07,060  
this is Mission Control Houston we're

210  
00:25:10,570 --> 00:25:08,629  
now receiving live television from

211  
00:25:12,070 --> 00:25:10,580  
endeavours lower deck as mission

212  
00:25:15,850 --> 00:25:12,080  
specialist Jeff Hoffman and story

213  
00:26:08,190 --> 00:25:15,860

Musgrave go through the first steps of

214

00:26:40,490 --> 00:26:10,169

and we're looking at stories handsome

215

00:26:45,300 --> 00:26:43,320

okay it's daylight outside so you might

216

00:27:00,080 --> 00:26:45,310

want to put your visors down through the

217

00:27:03,480 --> 00:27:02,310

so check you're gonna have your hands

218

00:28:07,460 --> 00:27:03,490

full you might want to go ahead and set

219

00:28:13,799 --> 00:28:11,610

endeavour Houston for tongue go ahead

220

00:28:16,610 --> 00:28:13,809

the rsu's have been powered off they

221

00:28:25,409 --> 00:28:16,620

will complete their spin down at 19

222

00:28:26,220 --> 00:28:25,419

26:33 okay copy 1926 33 through about

223

00:28:27,779 --> 00:28:26,230

five minutes

224

00:28:45,860 --> 00:28:27,789

complete step-down that looks good

225

00:28:50,039 --> 00:28:48,450

mr. reminder you've got a yaw maneuver

226

00:28:55,860 --> 00:28:50,049

coming up at 19:30

227

00:29:35,350 --> 00:28:55,870

to keep an eye on the doors stay copy we

228

00:30:16,990 --> 00:29:43,300

and look at that hey hey hold it you

229

00:30:23,520 --> 00:30:17,000

wouldn't let me watch you get out of the

230

00:30:29,440 --> 00:30:27,430

seven foot okay just for my paperwork

231

00:30:31,000 --> 00:30:29,450

you read me the serial numbers off oh

232

00:30:42,310 --> 00:30:31,010

well I'm pretty ready to put a little

233

00:32:33,470 --> 00:30:42,320

earth there's been three that's that's

234

00:32:33,480 --> 00:33:37,110

okay I'm sorry

235

00:34:51,240 --> 00:33:39,370

I'm going to try to get on the battle

236

00:34:51,250 --> 00:36:36,530

okay

237

00:36:36,540 --> 00:36:59,650

and we got your downlink video Jeff

238

00:37:04,210 --> 00:37:01,600

now I have live television from

239

00:37:06,460 --> 00:37:04,220

endeavours lower-deck it's for you

240

00:37:08,440 --> 00:37:06,470

showing um mission specialist Tom Akers

241

00:37:11,680 --> 00:37:08,450

at putting on the bottom half of his

242

00:37:14,890 --> 00:37:11,690

spacesuit during this spacewalk Akers

243

00:37:22,780 --> 00:37:14,900

and Thornton can be told apart from a

244

00:37:26,470 --> 00:37:22,790

distance in the television scenes they

245

00:37:29,020 --> 00:37:26,480

can be told apart too by the markings on

246

00:37:31,390 --> 00:37:29,030

the legs of their space suits Thornton

247

00:37:33,550 --> 00:37:31,400

will have a broken red stripe around the

248

00:37:36,100 --> 00:37:33,560

legs of her suit while Akers will have a

249

00:37:40,210 --> 00:37:36,110

diagonally broken red stripe around the

250

00:37:42,720 --> 00:37:40,220

legs of his suit this fee now shows

251

00:37:45,490 --> 00:37:42,730

Thornton in the airlock

252

00:37:48,070 --> 00:37:45,500

she continues that donning the suit and

253

00:37:49,960 --> 00:37:48,080

I putting on the communications cap

254

00:37:51,460 --> 00:37:49,970

sometimes referred to as a Snoopy cap

255

00:37:54,460 --> 00:37:51,470

which holds the receivers and

256

00:39:33,420 --> 00:37:54,470

microphones used for communications

257

00:39:33,430 --> 00:39:40,290

then you just cloud a command when to go

258

00:39:47,350 --> 00:39:45,970

your inches out 6 inches 8 inches okay

259

00:39:59,140 --> 00:39:47,360

I'd be happy for you to build with the

260

00:40:07,240 --> 00:39:59,150

arm and you're not clear right okay I'm

261

00:40:16,470 --> 00:40:07,250

ready go thanks keep going forward pot

262

00:40:28,150 --> 00:40:25,570

hey you're passing me right now it looks

263

00:40:30,100 --> 00:40:28,160

like flying in a t-38 and looking down

264

00:40:51,930 --> 00:40:30,110

at lights on the ground at the stars

265

00:40:51,940 --> 00:41:02,160

okay they say you gotta go for release

266

00:41:02,170 --> 00:41:44,570

okay that's a stables you left

267

00:41:44,580 --> 00:42:04,940

and ever check free drift

268

00:42:04,950 --> 00:43:13,800

Oh

269

00:43:23,950 --> 00:43:20,800

30:13 holder then you got that just come

270

00:43:27,460 --> 00:43:23,960

right up easy just like your door spring

271

00:43:29,170 --> 00:43:27,470

to fall with up a little horn and coming

272

00:43:38,650 --> 00:43:29,180

straight on it looking real good I'm

273

00:44:26,860 --> 00:43:38,660

gonna let go okay story leave my ethics

274

00:44:33,760 --> 00:44:29,200

okay stories all-seated the Seder

275

00:44:35,680 --> 00:44:33,770

alignment she is obviously in place it

276

00:44:39,250 --> 00:44:35,690

looks like it's ready to tighten the

277

00:44:44,170 --> 00:44:39,260

state of clamp double check my to go on

278

00:44:48,580 --> 00:44:44,180

one from the policy go forth on to high

279

00:44:51,160 --> 00:44:48,590

and low speed correct okay I'm going to

280

00:44:52,810 --> 00:44:51,170

have to touch it a little bit tricky you

281

00:44:56,130 --> 00:44:52,820

can see that side over there right of

282

00:45:02,410 --> 00:44:56,140

the fader alright looks good to me

283

00:45:05,680 --> 00:45:02,420

there we go out of the feel my band

284

00:45:54,690 --> 00:45:05,690

that's closed get my mini workstation

285

00:45:54,700 --> 00:47:15,100

yeah

286

00:47:15,110 --> 00:47:32,870

in the picture you're back in here

287

00:47:59,480 --> 00:47:36,979

it's seated all the way down at the hold

288

00:48:04,650 --> 00:48:01,800

time just want to let you know that

289

00:48:08,010 --> 00:48:04,660

Jerry Ross and the rest of us send our

290

00:48:10,320 --> 00:48:08,020

congratulations to you for now being the

291

00:48:23,460 --> 00:48:10,330

record holder for the most Eevee a time

292

00:48:48,480 --> 00:48:23,470

and the shuttle program well you get it

293

00:48:50,070 --> 00:48:48,490

overnight anyways never Houston some

294

00:49:24,320 --> 00:48:50,080

good news for you we had a good

295

00:49:24,330 --> 00:49:33,539

so there there there

296

00:49:33,549 --> 00:49:42,949

and we're with you in the fight thing

297

00:49:42,959 --> 00:50:14,449

you look no worse for the wear from your

298

00:50:32,099 --> 00:50:30,059

I don't think a yeah we just saw the

299

00:50:33,809 --> 00:50:32,109

CERN marching up the side of the

300

00:50:36,359 --> 00:50:33,819

telescope there between the lipstick and

301  
00:50:38,849 --> 00:50:36,369  
you have to yes right well we have a

302  
00:50:42,809 --> 00:50:38,859  
little balancing act going on and we're

303  
00:51:01,100 --> 00:50:42,819  
not protected until after sunset okay

304  
00:51:24,570 --> 00:51:04,200  
Hoffman now I carrying the hand hold up

305  
00:51:27,330 --> 00:51:24,580  
to the with offens now about to release

306  
00:51:32,070 --> 00:51:27,340  
a ground strap a grounding strap that's

307  
00:51:33,750 --> 00:51:32,080  
located on the outside of the drawer in

308  
00:51:35,610 --> 00:51:33,760  
the handle is now attached onto the

309  
00:51:38,790 --> 00:51:35,620  
guide studs that's the handle that will

310  
00:51:43,610 --> 00:51:38,800  
be used to hold it when Hoffman slides

311  
00:54:10,510 --> 00:51:43,620  
the instrument out of the telescope

312  
00:54:10,520 --> 00:55:32,670  
I want you to send me up again

313  
00:57:54,630 --> 00:55:40,450

copy Stewart let's let it stop stop a

314

00:58:07,349 --> 00:57:58,560

check your mechanisms story I give

315

00:58:07,359 --> 00:59:10,910

thanks hunter okay you're holding steady

316

00:59:16,230 --> 00:59:14,220

with the camera now installed claude

317

00:59:19,170 --> 00:59:16,240

nicollier will reposition jeff hoffman

318

00:59:47,340 --> 00:59:19,180

so that he can now completely latch the