



1
00:00:15,120 --> 00:00:18,780

you

2
00:00:22,710 --> 00:00:20,980

this is shuttle launch control at

3
00:00:24,760 --> 00:00:22,720

t-minus three hours and holding

4
00:00:27,310 --> 00:00:24,770

approximately 25 and a half minutes

5
00:00:29,740 --> 00:00:27,320

remaining in this built-in hold the ice

6
00:00:33,160 --> 00:00:29,750

inspection team is currently documenting

7
00:00:36,040 --> 00:00:33,170

what appears to be some light frost on

8
00:00:41,890 --> 00:00:36,050

main engine number one but at this time

9
00:00:44,500 --> 00:00:41,900

the the team does not appear to be too

10
00:00:47,229 --> 00:00:44,510

concerned about what they're seeing it

11
00:00:49,600 --> 00:00:47,239

is somewhat moist today so there's a lot

12
00:00:51,310 --> 00:00:49,610

of humidity and it's quite possible with

13
00:00:54,880 --> 00:00:51,320

the super cold temperatures up around

14

00:00:58,360 --> 00:00:54,890

the upper portion of the main engines

15

00:01:05,529 --> 00:00:58,370

where the temperatures are very very

16

00:01:07,660 --> 00:01:05,539

cold that some frost could form we're

17

00:01:10,060 --> 00:01:07,670

going down to the astronaut quarters the

18

00:01:14,050 --> 00:01:10,070

suit-up room where we see commander dick

19

00:01:17,290 --> 00:01:14,060

Richards being outfitted with his helmet

20

00:01:20,139 --> 00:01:17,300

or a final check of his helmet and all

21

00:01:22,210 --> 00:01:20,149

the crew now in there dayglo orange

22

00:01:28,030 --> 00:01:22,220

launch and entry suits there's a pilot

23

00:01:30,030 --> 00:01:28,040

plane Hammond Lane Hammond a colonel in

24

00:01:35,499 --> 00:01:30,040

the Air Force and an astronaut since

25

00:01:37,840 --> 00:01:35,509

1984 flown previously on STS 39 a

26
00:01:39,730 --> 00:01:37,850
Department of Defense mission in 1991

27
00:01:45,370 --> 00:01:39,740
has a hundred and ninety nine hours in

28
00:01:48,520 --> 00:01:45,380
space there's mission specialist Mark

29
00:01:50,200 --> 00:01:48,530
Lee he'll be performing one of the you'd

30
00:01:51,990 --> 00:01:50,210
be one of the ev8 crewmembers toward the

31
00:01:57,880 --> 00:01:52,000
end of this mission

32
00:02:06,520 --> 00:02:04,180
there is Susan Helms she is a lieutenant

33
00:02:08,980 --> 00:02:06,530
colonel in the US Air Force and his

34
00:02:10,749 --> 00:02:08,990
phone previously on STS 54 on a

35
00:02:12,760 --> 00:02:10,759
deployment of a tracking and data relay

36
00:02:15,730 --> 00:02:12,770
satellite she has a hundred and forty

37
00:02:17,880 --> 00:02:15,740
three hours in space and from Portland

38
00:02:28,540 --> 00:02:23,080

Carl Meade dr. Carl Meade has say an MD

39

00:02:32,050 --> 00:02:28,550

and a PhD practiced medicine in the

40

00:02:38,100 --> 00:02:32,060

Medical Corps in the US Navy and there

41

00:02:38,110 --> 00:02:46,030

on the medical corps astronaut

42

00:02:55,059 --> 00:02:49,229

he's from East port or East Point

43

00:02:56,770 --> 00:02:55,069

Michigan and Coronado California this is

44

00:02:58,780 --> 00:02:56,780

shuttle launch control at t-minus two

45

00:03:01,839 --> 00:02:58,790

hours fifty-five minutes thirty seconds

46

00:03:03,670 --> 00:03:01,849

in counting and we see our STS 64

47

00:03:06,520 --> 00:03:03,680

astronaut flight crew now headed down

48

00:03:08,530 --> 00:03:06,530

the corridor toward the elevator in the

49

00:03:11,830 --> 00:03:08,540

operations and check-out building some

50

00:03:15,399 --> 00:03:11,840

of the employees at the after office

51
00:03:19,400 --> 00:03:15,409
wishing them well dick Richard Blaine

52
00:03:31,100 --> 00:03:25,820
mark me jerry linenger all need and

53
00:03:33,440 --> 00:03:31,110
Susan Ellen's this is shuttle launch

54
00:03:35,900 --> 00:03:33,450
control at t-minus two hours 45 minutes

55
00:03:37,730 --> 00:03:35,910
10 seconds and counting the Astro van

56
00:03:40,280 --> 00:03:37,740
now passing the Vehicle Assembly

57
00:03:43,130 --> 00:03:40,290
Building and the launch control center

58
00:03:46,310 --> 00:03:43,140
now immediately on the left of the astro

59
00:03:49,730 --> 00:03:46,320
van space shuttle launch director Bob

60
00:03:52,600 --> 00:03:49,740
Sieck has just called for the mission

61
00:03:55,010 --> 00:03:52,610
management team and Houston flight to

62
00:03:56,410 --> 00:03:55,020
gather on the Weather Channel here in

63
00:04:00,350 --> 00:03:56,420

about another 5 minutes or so for

64

00:04:06,860 --> 00:04:00,360

another assessment of our launch

65

00:04:08,960 --> 00:04:06,870

conditions we are still red for flight

66

00:04:12,640 --> 00:04:08,970

through clouds greater than 4,500 feet

67

00:04:22,970 --> 00:04:12,650

thick and for flight through

68

00:04:24,770 --> 00:04:22,980

thunderstorm debris clouds look like

69

00:04:26,450 --> 00:04:24,780

space for a meteorology group is going

70

00:04:29,660 --> 00:04:26,460

to give us a go if we can take a line

71

00:04:33,700 --> 00:04:29,670

right away we're go for launch request

72

00:04:37,090 --> 00:04:33,710

we proceed immediately please and also a

73

00:04:39,920 --> 00:04:37,100

quarter Wilco

74

00:04:45,050 --> 00:04:39,930

discovery closing lock your visors and a

75

00:04:47,510 --> 00:04:45,060

pitot tube low it's time to fly that's

76

00:04:55,659 --> 00:04:47,520

complete I'll see you all in a week or

77

00:05:03,409 --> 00:05:01,009

t-minus ten nine eight seven six main

78

00:05:08,779 --> 00:05:03,419

engine start three engines up and

79

00:05:11,209 --> 00:05:08,789

burning two one liftoff of space shuttle

80

00:05:12,859 --> 00:05:11,219

discovery developing new techniques to

81

00:05:20,600 --> 00:05:12,869

monitor our Earth's environment from

82

00:05:22,189 --> 00:05:20,610

space Roger roll discovery Houston now

83

00:05:25,429 --> 00:05:22,199

controlling Discovery's rolling on

84

00:05:28,159 --> 00:05:25,439

course for a 57 degree inclination 140

85

00:05:38,080 --> 00:05:28,169

nautical mile orbit on its 19th trip to

86

00:05:44,120 --> 00:05:40,850

discovery speed already 400 miles an

87

00:05:45,950 --> 00:05:44,130

hour elf to 9000 feet three engines

88

00:05:47,420 --> 00:05:45,960

onboard discovery now throttling back to

89

00:05:48,950 --> 00:05:47,430

two-thirds throttle to prepare the

90

00:06:04,770 --> 00:05:48,960

spacecraft to pass through the area of

91

00:06:16,570 --> 00:06:08,710

discovering outgoing supersonic speed

92

00:06:20,770 --> 00:06:16,580

now 1023 miles an hour four miles east

93

00:06:28,180 --> 00:06:20,780

at the launch pad altitude is 47,000

94

00:06:29,680 --> 00:06:28,190

feet discovery go at throttle up three

95

00:06:32,860 --> 00:06:29,690

engines on board discovery now back at

96

00:06:38,170 --> 00:06:32,870

full throttle good hydraulic systems get

97

00:06:40,810 --> 00:06:38,180

electrical systems on board one and a

98

00:06:42,040 --> 00:06:40,820

half minutes since liftoff Discovery's

99

00:06:43,570 --> 00:06:42,050

already burned more than two and a

100

00:06:45,160 --> 00:06:43,580

quarter million pounds of propellant and

101
00:06:47,440 --> 00:06:45,170
weighs less than half of what it did it

102
00:06:49,180 --> 00:06:47,450
launched flight controllers now be

103
00:06:53,650 --> 00:06:49,190
standing by for burnout and jettison and

104
00:06:56,350 --> 00:06:53,660
the twin solid rockets Discovery's

105
00:06:58,440 --> 00:06:56,360
altitude now 108 thousand feet sixteen

106
00:07:16,619 --> 00:06:58,450
miles east of the Kennedy Space Center

107
00:07:20,279 --> 00:07:18,299
booster officer confirms a good

108
00:07:23,489 --> 00:07:20,289
separation jettison the twin solid

109
00:07:25,320 --> 00:07:23,499
rockets altitude now 167 thousand feet

110
00:07:27,779 --> 00:07:25,330
32 miles east of the Kennedy Space

111
00:07:33,299 --> 00:07:27,789
Center discovery traveling three

112
00:07:56,290 --> 00:07:33,309
thousand four hundred miles in the

113
00:07:56,300 --> 00:08:01,290

Bishan

114

00:08:06,719 --> 00:08:03,360

this is Mission Control Houston is

115

00:08:12,290 --> 00:08:06,729

discovery now passing above the Atlantic

116

00:08:15,540 --> 00:08:12,300

coast of Brazil at an altitude of about

117

00:08:17,520 --> 00:08:15,550

140 nautical miles with the mission

118

00:08:28,210 --> 00:08:17,530

specialist Susan Helms continuing

119

00:08:33,640 --> 00:08:30,700

this checkout of the mechanical arm puts

120

00:08:36,640 --> 00:08:33,650

its through its various drive modes its

121

00:08:40,990 --> 00:08:36,650

primary and backup modes and primary and

122

00:08:43,120 --> 00:08:41,000

backup powering devices to thoroughly

123

00:08:44,890 --> 00:08:43,130

check it out in preparation again for

124

00:08:49,540 --> 00:08:44,900

operations with the shuttle plume and

125

00:08:55,150 --> 00:08:49,550

Hinzman flight experiment one great

126
00:08:56,440 --> 00:08:55,160
picture is going okay we've got you to

127
00:09:00,850 --> 00:08:56,450
enjoy that one we'll go ahead and

128
00:09:02,410 --> 00:09:00,860
proceed temperatures to going thanks a

129
00:09:15,900 --> 00:09:02,420
lot you got a great-looking payload Bay

130
00:10:29,030 --> 00:09:19,270
okay this is position number 61 day 20

131
00:10:38,340 --> 00:10:32,760
robot arm operator confirms that the arm

132
00:10:41,340 --> 00:10:38,350
is now captured the area back on the

133
00:10:45,420 --> 00:10:41,350
flight deck the procedures are pressing

134
00:10:47,640 --> 00:10:45,430
on for the release of the Spartan

135
00:10:58,510 --> 00:10:47,650
satellite on time at about 4:30 this

136
00:10:58,520 --> 00:11:18,759
and we're seeing the release now

137
00:11:24,579 --> 00:11:22,379
spartans at 2,800 pounds satellite

138
00:11:27,780 --> 00:11:24,589

shortly after they released the

139

00:11:30,460 --> 00:11:27,790

satellite on its own began a

140

00:11:41,160 --> 00:11:30,470

pre-programmed it's a great release

141

00:11:45,539 --> 00:11:43,769

again shortly after the release the

142

00:11:48,629 --> 00:11:45,549

satellite on its own I went through a

143

00:11:53,479 --> 00:11:48,639

pre-programmed series of pirouettes to

144

00:11:59,009 --> 00:11:57,210

once those were completed that signaled

145

00:12:01,289 --> 00:11:59,019

a healthy spacecraft and allowed

146

00:12:03,599 --> 00:12:01,299

Discovery's crew to slowly maneuver the

147

00:12:06,119 --> 00:12:03,609

orbiter away from the satellite to a

148

00:12:07,859 --> 00:12:06,129

point station-keeping point about 50

149

00:12:10,379 --> 00:12:07,869

nautical miles or so away from this

150

00:12:13,609 --> 00:12:10,389

Spartan where it will remain for about a

151

00:12:16,609 --> 00:12:13,619

40 to 48 hour period of time prior to

152

00:12:18,809 --> 00:12:16,619

rendezvous and retrieving capturing and

153

00:12:23,509 --> 00:12:18,819

replacing this satellite back in the

154

00:12:31,280 --> 00:12:26,189

this satellite on the Sun's corona and

155

00:12:34,639 --> 00:12:31,290

the solar wind will be collected onboard

156

00:12:37,109 --> 00:12:34,649

good morning space shuttle Discovery

157

00:12:38,699 --> 00:12:37,119

right now your light instrument is

158

00:12:41,309 --> 00:12:38,709

lazing and we're collecting great

159

00:12:43,559 --> 00:12:41,319

atmospheric environmental data as we

160

00:12:49,220 --> 00:12:43,569

speak and it's a great day for an

161

00:12:54,299 --> 00:12:52,139

discovery Houston we see you on internal

162

00:13:00,449 --> 00:12:54,309

power for the EMU so you have a go for

163

00:13:04,079 --> 00:13:00,459

EPA last week a plan they have access to

164

00:13:19,890 --> 00:13:04,089

the galley a copy of the putting the

165

00:13:40,830 --> 00:13:24,810

okay so Deimos the way back I'm gonna

166

00:13:40,840 --> 00:14:16,329

smile right there

167

00:14:22,280 --> 00:14:20,780

before food is installed discovered the

168

00:14:28,570 --> 00:14:22,290

film of every is closed

169

00:14:33,400 --> 00:14:28,580

pull it off for the translation cat

170

00:14:35,750 --> 00:14:33,410

center of the page perform at aah aah

171

00:14:47,980 --> 00:14:35,760

I'm gonna get mascara the bay then take

172

00:14:47,990 --> 00:14:59,009

to make a fraction of the collection

173

00:15:03,279 --> 00:15:01,629

this is Mission Control Houston again

174

00:15:05,590 --> 00:15:03,289

mission specialist Marc Lee here

175

00:15:08,129 --> 00:15:05,600

performing his first calibration flight

176

00:15:10,659 --> 00:15:08,139

of this simplified aid for Evy a rescue

177

00:15:14,739 --> 00:15:10,669

box shape trajectory above the payload

178

00:15:16,029 --> 00:15:14,749

Bay and from the looks of it James it's

179

00:15:19,779 --> 00:15:16,039

working beautifully you can see him

180

00:15:22,179 --> 00:15:19,789

control himself one axis at a time are

181

00:15:25,409 --> 00:15:22,189

in rotation and then along one axis at a

182

00:16:16,750 --> 00:15:25,419

time and translation and it looks like a

183

00:16:23,570 --> 00:16:19,840

using forgery

184

00:16:33,430 --> 00:16:23,580

go ahead story and you know we need to

185

00:16:39,260 --> 00:16:36,920

without a question or statement yes sir

186

00:16:40,520 --> 00:16:39,270

can you want us to cycle the valve and

187

00:16:41,090 --> 00:16:40,530

bet is that would you like us to try

188

00:16:47,630 --> 00:16:41,100

again

189

00:16:49,850 --> 00:16:47,640

bless you are you looking good the

190

00:16:51,920 --> 00:16:49,860

process that we see that will occur

191

00:16:53,900 --> 00:16:51,930

throughout this spacewalk is recharging

192

00:16:56,180 --> 00:16:53,910

the safer unit with gaseous nitrogen

193

00:16:59,480 --> 00:16:56,190

which is used to propel the astronaut

194

00:17:01,340 --> 00:16:59,490

around the payload Bay there is a hose

195

00:17:03,440 --> 00:17:01,350

that's attached to that unit to recharge

196

00:17:06,170 --> 00:17:03,450

it and that hose builds up pressure in

197

00:17:08,000 --> 00:17:06,180

it as well as the backpack does and

198

00:17:09,350 --> 00:17:08,010

before the hose is disconnected at me

199

00:17:15,679 --> 00:17:09,360

down or the pressure needs to be

200

00:17:18,410 --> 00:17:15,689

relieved from that hose all that appears

201
00:17:21,260 --> 00:17:18,420
to be the problem there was it required

202
00:17:23,150 --> 00:17:21,270
a little bit longer time about 30

203
00:17:24,800 --> 00:17:23,160
seconds or so to bleed the pressure down

204
00:17:27,380 --> 00:17:24,810
in that line before disconnecting it

205
00:17:31,670 --> 00:17:27,390
from the backpack Mark Lee is now on his

206
00:17:34,370 --> 00:17:31,680
way for the next step in the evaluation

207
00:17:36,790 --> 00:17:34,380
of the safer unit safer against standing

208
00:17:40,010 --> 00:17:36,800
for the simplified aid for every a rescue

209
00:17:42,590 --> 00:17:40,020
discovery is just beginning the 109th

210
00:17:45,760 --> 00:17:42,600
orbit of the mission about to move from

211
00:17:48,800 --> 00:17:45,770
daylight into darkness as it flies over

212
00:17:58,120 --> 00:17:48,810
Europe on a northeasterly track getting

213
00:18:03,110 --> 00:18:02,570

mark lee now translating using the safer

214

00:18:04,640 --> 00:18:03,120

unit

215

00:18:08,330 --> 00:18:04,650

he's untethered from the spacecraft

216

00:18:12,860 --> 00:18:08,340

he'll be translating along the left side

217

00:18:18,920 --> 00:18:12,870

of the payload Bay back to the aft end

218

00:18:22,040 --> 00:18:18,930

of the payload Bay and then he will turn

219

00:18:24,500 --> 00:18:22,050

around and fly back to the forward

220

00:18:35,450 --> 00:18:24,510

bulkhead this is part of the system

221

00:18:38,140 --> 00:18:35,460

engineering evaluation he'll fire the

222

00:18:41,140 --> 00:18:38,150

Jets on the backpack for one second and

223

00:18:45,230 --> 00:18:41,150

then he'll Coast for about five seconds

224

00:19:02,080 --> 00:18:45,240

and then conduct a one-second braking

225

00:19:07,250 --> 00:19:05,480

throughout the test the backpack has a

226

00:19:09,169 --> 00:19:07,260

data recorder that will capture the

227

00:19:41,780 --> 00:19:09,179

information during the performance

228

00:19:55,230 --> 00:19:47,760

hey idiot so we're ready to see your

229

00:19:57,810 --> 00:19:55,240

role so you to stop but there are little

230

00:20:02,040 --> 00:19:57,820

bit fast we maxed out you can back off

231

00:20:06,570 --> 00:20:02,050

the arm check off the arm little one

232

00:20:13,440 --> 00:20:06,580

more time let's back off a little bit by

233

00:20:39,620 --> 00:20:13,450

feedback I ate it is a little bit of

234

00:20:49,919 --> 00:20:45,150

okay part of me that's it

235

00:20:52,950 --> 00:20:49,929

a to that okay good got you 59 and 60

236

00:20:55,440 --> 00:20:52,960

bring your backs occasionally said I was

237

00:20:59,910 --> 00:20:55,450

there must have been sixty degrees or so

238

00:21:11,520 --> 00:20:59,920

we need to cut it down if this look like

239

00:21:17,100 --> 00:21:13,710

I'm glad it's better that was stuffy

240

00:21:21,810 --> 00:21:17,110

scary okay here we go

241

00:21:25,289 --> 00:21:21,820

59 at 62 59 at C could be doing with

242

00:21:27,840 --> 00:21:25,299

that town there further is no okay I

243

00:21:30,419 --> 00:21:27,850

play this play about fun if you told us

244

00:21:39,029 --> 00:21:30,429

if you hold of that this was going to be

245

00:21:42,149 --> 00:21:39,039

B y'all hey Carl meme now set to slowly

246

00:21:43,980 --> 00:21:42,159

spend Marc Lee once again the first one

247

00:21:50,520 --> 00:21:43,990

was a little too fast and that crews

248

00:21:54,600 --> 00:21:50,530

comments were evident okay that's

249

00:22:06,279 --> 00:21:54,610

perfect 25th back here 27 degrees with

250

00:22:06,289 --> 00:22:27,010

beautiful discovery

251

00:22:33,279 --> 00:22:29,169

our entity to do fallopian last banana

252

00:22:36,909 --> 00:22:33,289

we're not gonna have a gas okay bye 51

253

00:22:43,330 --> 00:22:36,919

and 55 catch it catch takes a long time

254

00:22:45,389 --> 00:22:43,340

for that the damn file slavery and about

255

00:23:12,310 --> 00:22:45,399

a minute and a half the sunrise fish

256

00:23:14,430 --> 00:23:12,320

feel a bit of your pitch and we're right

257

00:23:21,130 --> 00:23:19,029

fifty-one and fifty million three little

258

00:23:28,810 --> 00:23:21,140

Brook an adjustment a little break this

259

00:23:39,760 --> 00:23:28,820

place hey ready okay what's your room

260

00:23:55,600 --> 00:23:39,770

here there you go three to fifteen in

261

00:23:55,610 --> 00:24:13,340

I can hear those Jets firing

262

00:24:13,350 --> 00:24:24,130

you I tap step okay you can stop them

263

00:24:28,000 --> 00:24:26,410

Carl Meade mounted on the end of the

264

00:24:30,550 --> 00:24:28,010

shuttles robot arm and Mark Lee

265

00:24:58,470 --> 00:24:30,560

free-flying using the safer unit in its

266

00:25:24,470 --> 00:25:00,850

1341 I'm gonna go once around and I'm

267

00:25:24,480 --> 00:25:37,799

soppy on every step

268

00:25:42,180 --> 00:25:40,539

check and make sure age I didn't engage

269

00:25:45,609 --> 00:25:42,190

it

270

00:25:46,499 --> 00:25:45,619

39 and 53 sing you into the test

271

00:25:54,249 --> 00:25:46,509

position

272

00:25:58,719 --> 00:25:54,259

my neural Karl meat is slowly spinning

273

00:26:00,789 --> 00:25:58,729

him in various different axes to allow

274

00:26:13,970 --> 00:26:00,799

the attitude hold system to stabilize

275

00:26:13,980 --> 00:26:34,420

see that book seven to plow six seven

276

00:26:41,020 --> 00:26:39,010

you can see mark engage the attitude

277

00:26:47,470 --> 00:26:41,030

hold and it brings him right to a stop

278

00:26:49,990 --> 00:26:47,480

it seems to be very quickly acting just

279

00:27:01,870 --> 00:26:50,000

for you guys a reference and right at

280

00:27:03,670 --> 00:27:01,880

the top of the envelope now okay about

281

00:27:06,310 --> 00:27:03,680

thirty and forty two Thurmond good shape

282

00:27:20,030 --> 00:27:06,320

coming towards you when arm all the way

283

00:27:25,700 --> 00:27:23,120

with the attitude hold engaged now the

284

00:27:27,980 --> 00:27:25,710

arm is pulling away from Mark Lee and

285

00:27:33,020 --> 00:27:27,990

he's demonstrating a capability of

286

00:27:46,000 --> 00:27:33,030

flying across the payload Bay almost

287

00:27:46,010 --> 00:27:54,160

25:38 system has been in this booth good

288

00:28:17,220 --> 00:27:58,390

the way let's just bring it on down

289

00:28:22,090 --> 00:28:20,440

Susan Helms now slowly lowering the two

290

00:28:26,800 --> 00:28:22,100

astronauts back down into the payload

291

00:28:30,010 --> 00:28:26,810

Bay views from the payload Bay as

292

00:28:31,840 --> 00:28:30,020

discovery moves into sunrise crossing

293

00:28:44,770 --> 00:28:31,850

the Southern Pacific Ocean beginning a

294

00:28:48,010 --> 00:28:44,780

northeasterly track in step 16 vent the

295

00:28:55,240 --> 00:28:48,020

gm2 until the Reg pressure is less than

296

00:28:57,520 --> 00:28:55,250

50 and then you'll press on from there

297

00:29:01,960 --> 00:28:57,530

and what that will do will seal off the

298

00:29:04,840 --> 00:29:01,970

line going to the orbiter step 20 in

299

00:29:09,160 --> 00:29:04,850

order to set up safer for the next

300

00:29:12,340 --> 00:29:09,170

recharge depressurize d press the lock

301
00:29:16,890 --> 00:29:12,350
button and rotate the coupler clockwise

302
00:29:20,950 --> 00:29:16,900
to the open to flow position on the QD

303
00:29:32,530 --> 00:29:20,960
attached to the srs and reattach the TM

304
00:29:35,050 --> 00:29:32,540
gene okay agnus quick disconnect coupler

305
00:29:44,410 --> 00:29:35,060
a tester for commanders will see little

306
00:29:48,340 --> 00:29:44,420
bit but I just go out over there all

307
00:29:51,250 --> 00:29:48,350
right that's the first a lot but

308
00:29:55,690 --> 00:29:51,260
counterclockwise to our 783 to de close

309
00:29:58,570 --> 00:29:55,700
the flow position mark Lee now with a

310
00:30:01,780 --> 00:29:58,580
recharge backpack on his way for the

311
00:30:07,710 --> 00:30:01,790
final evaluation in his assessment of

312
00:30:11,680 --> 00:30:07,720
the safer unit this is a fight flight

313
00:30:14,490 --> 00:30:11,690

qualification evaluation or a flight

314

00:30:17,440 --> 00:30:14,500

quality evaluation

315

00:30:20,260 --> 00:30:17,450

he will assess how precisely he can

316

00:30:38,920 --> 00:30:20,270

maneuver with the safer unit following

317

00:31:06,980 --> 00:30:41,720

this is again an evaluation to determine

318

00:31:11,720 --> 00:31:06,990

how precise this safer unit can fly this

319

00:31:13,520 --> 00:31:11,730

final evaluation for mark lee is one of

320

00:31:19,850 --> 00:31:13,530

the most important points during the

321

00:31:23,060 --> 00:31:19,860

safer evaluation to ensure that FLE free

322

00:31:26,150 --> 00:31:23,070

flying astronauts can maneuver in very

323

00:32:30,210 --> 00:31:26,160

tight spaces as may be required around a

324

00:32:30,220 --> 00:32:35,600

this time as you're looking at right now

325

00:32:35,610 --> 00:32:44,600

great view of the elbow camera down here

326

00:32:44,610 --> 00:33:21,540

about the beach and other brothel camera

327

00:33:27,930 --> 00:33:24,270

so we mentioned that it was it earlier

328

00:33:31,050 --> 00:33:27,940

the only comment that that is that I

329

00:33:33,240 --> 00:33:31,060

could say all of you all of my

330

00:33:36,000 --> 00:33:33,250

classmates at the 20th reunion at their

331

00:33:39,090 --> 00:33:36,010

Force Academy I wish I could be there

332

00:33:43,500 --> 00:33:39,100

but as you see some have got a fall high

333

00:33:45,630 --> 00:33:43,510

cover for all of you well I think that's

334

00:33:48,140 --> 00:33:45,640

staying exactly where I want to be so

335

00:34:13,590 --> 00:33:48,150

this is this is working really good

336

00:34:13,600 --> 00:34:40,010

you

337

00:34:46,110 --> 00:34:43,590

throughout the evaluation Markley will

338

00:34:50,850 --> 00:34:46,120

be heard reading numbers basically

339

00:34:54,510 --> 00:34:50,860

giving remaining nitrogen available in

340

00:34:56,520 --> 00:34:54,520

the safer unit and the reports from a VA

341

00:34:58,950 --> 00:34:56,530

officer sue rainwater here in Mission

342

00:35:02,190 --> 00:34:58,960

Control are that he's actually using

343

00:35:05,910 --> 00:35:02,200

less nitrogen for this process than was

344

00:35:07,560 --> 00:35:05,920

trained for the battery power usage is

345

00:36:45,049 --> 00:35:07,570

about right on the money as to what the

346

00:36:45,059 --> 00:37:34,819

35 and 21 topic

347

00:37:39,779 --> 00:37:37,529

markley now very carefully rounding the

348

00:37:43,349 --> 00:37:39,789

corner the elbow position on the robot

349

00:37:56,269 --> 00:37:43,359

arm making the final turn coming back

350

00:38:01,140 --> 00:37:58,499

Kyle looking at the picture you can see

351
00:38:03,359 --> 00:38:01,150
how relatively easy it seems to be to

352
00:38:05,819 --> 00:38:03,369
fly he can take his his hand off the

353
00:38:08,489 --> 00:38:05,829
controller and the motion continues in a

354
00:38:10,019 --> 00:38:08,499
very smooth way it's like a bit like

355
00:38:13,589 --> 00:38:10,029
taking your hand off the steering wheel

356
00:38:22,380 --> 00:38:13,599
in this case if the motion recedes

357
00:38:24,839 --> 00:38:22,390
straight ahead very smooth Joe did you

358
00:38:28,559 --> 00:38:24,849
get the same sense when you flew the MMU

359
00:38:29,999 --> 00:38:28,569
of having command over that unit feeling

360
00:38:31,979 --> 00:38:30,009
the full control over the

361
00:38:35,489 --> 00:38:31,989
maneuverability like it appears that

362
00:38:39,269 --> 00:38:35,499
Mark Lee is having here absolutely it's

363
00:38:41,910 --> 00:38:39,279

quite it's it's easy to can control in a

364

00:38:43,829 --> 00:38:41,920

very precise way it's a considerably

365

00:38:45,630 --> 00:38:43,839

more complicated than this and that

366

00:38:48,109 --> 00:38:45,640

you're controlling both the rotation and

367

00:38:51,089 --> 00:38:48,119

the translation at the same time I say

368

00:38:54,989 --> 00:38:51,099

complicated it's more versatile one

369

00:38:59,009 --> 00:38:54,999

couldn't move this in such a rapid way

370

00:39:01,349 --> 00:38:59,019

with a lot of motions all at once but

371

00:39:10,160 --> 00:39:01,359

because this is a safe - a safing device

372

00:39:19,849 --> 00:39:16,130

okay whatever as we look at the TV

373

00:39:22,220 --> 00:39:19,859

picture it's very easy to see Carl

374

00:39:24,859 --> 00:39:22,230

making inputs into the hand controller

375

00:39:28,940 --> 00:39:24,869

and you can then pretty much see with

376

00:39:30,710 --> 00:39:28,950

your your own eyes that the unit reacts

377

00:39:32,930 --> 00:39:30,720

in other words he moves once the input

378

00:39:38,630 --> 00:39:32,940

goes in it's very slow very deliberate

379

00:39:41,990 --> 00:39:38,640

almost dreamlike and so we were talking

380

00:39:46,730 --> 00:39:42,000

just a minute ago about whether or not

381

00:39:48,859 --> 00:39:46,740

you had conversations with your Co flier

382

00:39:50,599 --> 00:39:48,869

on your spacewalk Dale Gardner after

383

00:39:52,190 --> 00:39:50,609

Yuri VA because he was going to go out

384

00:39:53,990 --> 00:39:52,200

the next day and do the same thing and

385

00:39:56,390 --> 00:39:54,000

you were coming that she really didn't

386

00:39:58,549 --> 00:39:56,400

debrief that much because it flew so

387

00:40:01,039 --> 00:39:58,559

well and you were relating that to what

388

00:40:04,250 --> 00:40:01,049

they're doing here yes

389

00:40:06,529 --> 00:40:04,260

because Mark and Carl have not been

390

00:40:08,509 --> 00:40:06,539

talking about how it flies differently

391

00:40:11,329 --> 00:40:08,519

than they expected I think we can almost

392

00:40:13,339 --> 00:40:11,339

presume that it's flying pretty much the

393

00:40:21,380 --> 00:40:13,349

way they're simulators and trainers had

394

00:40:27,710 --> 00:40:21,390

indicated it would you can see clearly

395

00:40:30,289 --> 00:40:27,720

the plumbing of the control thrusters

396

00:40:34,059 --> 00:40:30,299

plumbing the tether from time to time the

397

00:40:37,039 --> 00:40:34,069

tether will bounce and that's the the

398

00:40:39,950 --> 00:40:37,049

gaseous nitrogen being jetted out of the

399

00:40:52,500 --> 00:40:39,960

controlling devices that Carl is using

400

00:40:52,510 --> 00:41:08,860

very cold

401
00:41:24,860 --> 00:41:23,570
okay any good work by you like these

402
00:41:33,790 --> 00:41:24,870
y'all coming there

403
00:43:01,320 --> 00:41:39,860
34 it is roads so next day

404
00:43:01,330 --> 00:43:29,280
okay they're complete there

405
00:43:34,290 --> 00:43:32,040
Carl Meade has completed a rotation

406
00:43:37,200 --> 00:43:34,300
evaluation he's already done a

407
00:43:38,010 --> 00:43:37,210
translation back to the rear part of the

408
00:43:40,440 --> 00:43:38,020
payload Bay

409
00:43:42,720 --> 00:43:40,450
he's now completed a rotation evaluation

410
00:44:17,050 --> 00:43:42,730
and then now we'll maneuver back to the

411
00:44:22,280 --> 00:44:19,880
discovery is tracking northeast across

412
00:44:33,590 --> 00:44:22,290
the Pacific Ocean on the latter portions

413
00:44:36,920 --> 00:44:33,600

of orbit 110 and Kyle we can see three

414

00:44:40,610 --> 00:44:36,930

satellites in this picture there's the

415

00:44:42,530 --> 00:44:40,620

satellite discovery the satellite planet

416

00:45:14,580 --> 00:44:42,540

Earth satellite of the Sun and satellite

417

00:45:19,630 --> 00:45:17,350

Susan Helms maneuvering the arm now to

418

00:45:21,970 --> 00:45:19,640

allow Mark Lee to climb into the

419

00:45:25,330 --> 00:45:21,980

portable foot restraint attachment

420

00:45:38,320 --> 00:45:25,340

device which is located on the tip of

421

00:45:49,540 --> 00:45:38,330

the robot arm inside ready to your

422

00:45:55,780 --> 00:45:49,550

father please this will be roll right

423

00:46:16,020 --> 00:45:55,790

back wait I see when I tell you approve

424

00:46:16,030 --> 00:46:43,310

stay back away it's pretty sick happy

425

00:46:46,640 --> 00:46:45,440

there's no baseball going on cause I

426

00:46:54,470 --> 00:46:46,650

guess I have to catch you

427

00:46:58,690 --> 00:46:54,480

Jeff oh hey Josh and we're back and go

428

00:47:08,810 --> 00:46:58,700

back to rescue demo position are my move

429

00:47:12,920 --> 00:47:08,820

61 64 captain okay how do I pay one will

430

00:47:23,630 --> 00:47:12,930

faster yeah it's a little bit fast any

431

00:47:46,060 --> 00:47:23,640

off as 23 roll step three to play there

432

00:47:51,230 --> 00:47:48,530

again this is an evaluation of the

433

00:47:55,790 --> 00:47:51,240

attitude control system on the safer

434

00:48:01,580 --> 00:47:55,800

unit and its ability to provide a itself

435

00:48:03,560 --> 00:48:01,590

as a rescue device once Markley releases

436

00:48:07,730 --> 00:48:03,570

Carl Meade and and puts him into a

437

00:48:12,020 --> 00:48:07,740

gentle spin the arm is backed away and

438

00:48:16,010 --> 00:48:12,030

Carl Meade is supposed to fly the safer

439

00:48:37,100 --> 00:48:16,020

unit back to his his coworker on the end

440

00:48:37,110 --> 00:48:54,820

okay back to rescue down opposition 33%

441

00:48:54,830 --> 00:49:37,200

50/50 on 41

442

00:49:43,170 --> 00:49:41,160

the two astronauts using lights on their

443

00:49:47,670 --> 00:49:43,180

helmets now as the orbiter moves into

444

00:49:52,079 --> 00:49:47,680

darkness the last of the rescue

445

00:49:55,880 --> 00:49:52,089

demonstration sequences had Markley spin

446

00:49:59,220 --> 00:49:55,890

Carl Meade and a multi-axis rotation

447

00:50:02,430 --> 00:49:59,230

then Susan helm slowly moves the robot

448

00:50:09,650 --> 00:50:02,440

arm across the orbiter while Mark Lee

449

00:50:16,289 --> 00:50:12,299

again to demonstrate the capabilities of

450

00:50:19,160 --> 00:50:16,299

the safer unit as a rescue device should

451
00:50:21,690 --> 00:50:19,170
an astronaut become untethered from

452
00:50:52,690 --> 00:50:21,700
which is just approaching the five hour

453
00:51:01,640 --> 00:50:55,609
that's half an hour ago the said of your

454
00:51:22,819 --> 00:51:01,650
cells that I'm going to get that far and

455
00:51:30,089 --> 00:51:28,140
using for Carl hold up yeah at 18

456
00:51:32,370 --> 00:51:30,099
percent battery sir we suggest you start

457
00:51:53,450 --> 00:51:32,380
to prison approach from your present

458
00:51:58,470 --> 00:51:56,940
those words to Carl Meade are that the

459
00:52:01,859 --> 00:51:58,480
battery power is getting a little low

460
00:52:04,560 --> 00:52:01,869
and so instead of following that profile

461
00:52:06,089 --> 00:52:04,570
back down to the shoulder joint he's

462
00:52:08,040 --> 00:52:06,099
going to go ahead and fly the precision

463
00:52:16,349 --> 00:52:08,050

approach to the aft flight deck windows

464

00:52:18,450 --> 00:52:16,359

of the orbiter clearly in view is the

465

00:52:21,510 --> 00:52:18,460

primary payload on the mission the lidar

466

00:52:23,550 --> 00:52:21,520

in space technology experiment housed in

467

00:52:29,220 --> 00:52:23,560

the forward portion of Discovery's

468

00:52:31,920 --> 00:52:29,230

payload Bay and Kyle we can see on his

469

00:52:34,170 --> 00:52:31,930

his forearm there the electronic

470

00:52:36,720 --> 00:52:34,180

checklist that he's been evaluating or

471

00:52:39,270 --> 00:52:36,730

will evaluate the other checklist more

472

00:52:40,859 --> 00:52:39,280

normal the one I was used to is is on

473

00:52:43,530 --> 00:52:40,869

his other arm and you see the pages of

474

00:52:47,790 --> 00:52:43,540

it flapping in the breeze from time to

475

00:52:50,010 --> 00:52:47,800

time yeah remember a little while ago we

476
00:52:52,500 --> 00:52:50,020
were noticing or you were noticing that

477
00:52:56,370 --> 00:52:52,510
the actually the jet firings on the

478
00:53:08,499 --> 00:52:56,380
backpack were fluttering the the paper

479
00:53:12,349 --> 00:53:10,609
guidance navigation and control officer

480
00:53:14,719 --> 00:53:12,359
reports commander dick Richards is now

481
00:53:16,670 --> 00:53:14,729
manually flying the spacecraft as it

482
00:53:18,109 --> 00:53:16,680
contends it's turn around the heading

483
00:53:21,109 --> 00:53:18,119
alignment cylinder again an imaginary

484
00:53:22,849 --> 00:53:21,119
cylinder around which it will fly a 330

485
00:53:26,390 --> 00:53:22,859
degree left turn to align with runway oh

486
00:53:28,519 --> 00:53:26,400
four cylinder created by the microwave

487
00:53:52,310 --> 00:53:28,529
scan beam landing system in place at

488
00:53:52,320 --> 00:54:28,359

scurries out to 30,000 feet

489

00:54:40,010 --> 00:54:30,440

discovery Houston we show you slightly

490

00:54:42,320 --> 00:54:40,020

low at the 180 commander dick Ridge

491

00:54:43,970 --> 00:54:42,330

Richards continuing a right turn around

492

00:54:45,620 --> 00:54:43,980

the heading alignment cylinder created

493

00:54:49,670 --> 00:54:45,630

by the micro you scan beam landing

494

00:54:56,790 --> 00:54:49,680

system at Edwards altitude is now 22,000

495

00:55:02,350 --> 00:55:00,670

discovery on energy at the 90 call

496

00:55:05,110 --> 00:55:02,360

indicating that discovery is right on

497

00:55:07,120 --> 00:55:05,120

course and on track for its touchdown

498

00:55:09,180 --> 00:55:07,130

touchdown this now about two minutes

499

00:55:12,870 --> 00:55:09,190

away

500

00:55:18,160 --> 00:55:12,880

scary's altitude 18,000 feet

501
00:55:44,570 --> 00:55:18,170
airspeed 260 knots discovery completing

502
00:55:55,970 --> 00:55:49,050
discovery now

503
00:55:58,440 --> 00:55:55,980
line performing a subsonic maneuver test

504
00:56:04,640 --> 00:55:58,450
as part of a test objective on the

505
00:56:11,540 --> 00:56:09,590
altitude 6500 feet discovery on glide

506
00:56:16,610 --> 00:56:11,550
slope on centerline winter now zero

507
00:56:18,170 --> 00:56:16,620
seven zero at four peak ten call

508
00:56:20,540 --> 00:56:18,180
indicating Discovery's descent is right

509
00:56:22,970 --> 00:56:20,550
on target and commander dick Richards is

510
00:56:39,710 --> 00:56:22,980
aligned with the center of runway au for

511
00:56:39,720 --> 00:56:51,410
altitude 600 feet

512
00:56:51,420 --> 00:56:59,259
landing gears down and locked

513
00:56:59,269 --> 00:57:06,490

main gear touchdown

514

00:57:13,750 --> 00:57:11,680

drag chute deploy nose gear touchdown

515

00:57:14,910 --> 00:57:13,760

discovery rolling out on runway Oh for

516

00:57:21,460 --> 00:57:14,920

at Edwards Air Force Base California

517

00:57:58,120 --> 00:57:21,470

after 177 trips around the world in 11

518

00:58:03,970 --> 00:58:01,120

the question was have you seen any they

519

00:58:08,530 --> 00:58:03,980

don't know can you tell if Kevin payload

520

00:58:12,880 --> 00:58:08,540

2 is on we can tell Kevin fiddled Maine

521

00:58:15,580 --> 00:58:12,890

a is on and that's all and if you give

522

00:58:21,460 --> 00:58:15,590

me a time sometimes I'll check for any

523

00:58:24,640 --> 00:58:21,470

anomalous data and I get a time plane ok

524

00:58:26,380 --> 00:58:24,650

I thought we'd turn that on in the post

525

00:58:27,040 --> 00:58:26,390

insertion somewhere but I may be

526
00:58:30,790 --> 00:58:27,050
mistaken

527
00:58:32,760 --> 00:58:30,800
oh the busses you're right the cabin

528
00:58:36,820 --> 00:58:32,770
payload bus has been on a long time but

529
00:58:38,470 --> 00:58:36,830
the action 5 X action that might have

530
00:58:45,660 --> 00:58:38,480
caused the spike was when we first tried

531
00:58:51,210 --> 00:58:48,599
so we needed a buy one day two hours ten

532
00:58:54,180 --> 00:58:51,220
minutes that has that's a little lead

533
00:58:58,890 --> 00:58:54,190
time for configuration positioning or

534
00:59:00,660 --> 00:58:58,900
whatever my tank oh yes sir we're back

535
00:59:02,279 --> 00:59:00,670
on the flight deck crew has a system in

536
00:59:22,060 --> 00:59:02,289
panels so they've got it for the moment

537
00:59:22,070 --> 00:59:36,690
our Mazzello over how we know hover

538
00:59:42,240 --> 00:59:39,779

like GNC yes sir flight wearing a nine

539

00:59:46,859 --> 00:59:42,250

Auto burn they are and look like they're

540

01:00:03,410 --> 00:59:46,869

working TCS activation okay I know and

541

01:00:12,680 --> 01:00:06,350

let it go yes we are configured to take

542

01:00:15,920 --> 01:00:12,690

Diego to weigh copy we're two minutes to

543

01:00:16,640 --> 01:00:15,930

attainder cell OS we will get you

544

01:00:56,290 --> 01:00:16,650

through

545

01:01:00,200 --> 01:00:58,520

he sees an initial drop in pressure

546

01:01:02,780 --> 01:01:00,210

which indicates the toggle valve is

547

01:01:04,460 --> 01:01:02,790

closed he needs to continue to vent for

548

01:01:09,170 --> 01:01:04,470

about 30 seconds to ensure that the hose

549

01:01:11,690 --> 01:01:09,180

is entirely bled down that's no seizures

550

01:01:16,880 --> 01:01:11,700

regulator's regulating on the recharge

551
01:01:23,720 --> 01:01:16,890
hose pressure not on the tank that's

552
01:01:25,160 --> 01:01:23,730
what we need to get across to know

553
01:01:49,980 --> 01:01:25,170
what's better inside than it did in the

554
01:01:58,140 --> 01:01:52,950
I go back and go back to it again all

555
01:02:04,859 --> 01:01:58,150
the difference move let's go up stick to

556
01:02:06,839 --> 01:02:04,869
full time this could be tough

557
01:02:11,210 --> 01:02:06,849
Oh a VA that was a double with a full

558
01:02:20,280 --> 01:02:11,220
twist every staff just called the 2.73

559
01:02:21,470 --> 01:02:20,290
chop roll early I'm presenting roll your

560
01:02:31,830 --> 01:02:21,480
net

561
01:02:41,099 --> 01:02:31,840
OAH okay then Carl we are thinking about

562
01:02:46,830 --> 01:02:41,109
your battery status slider being used to

563
01:02:49,650 --> 01:02:46,840

expedite approach yep looks like just uh

564

01:02:52,829 --> 01:02:49,660

put on put in an extra hole security so

565

01:03:07,420 --> 01:02:52,839

much portrait Mikey stomach that son

566

01:03:13,570 --> 01:03:09,350

discovery Houston we're with you on the

567

01:03:13,580 --> 01:03:27,540

let's head on boyfriend

568

01:03:36,580 --> 01:03:29,780

break iPhone

569

01:03:42,790 --> 01:03:38,830

yogurt issue God's been able Auto

570

01:03:48,640 --> 01:03:42,800

literally copy ground speed enable auto

571

01:03:52,900 --> 01:03:50,560

these congratulations on an outstanding

572

01:04:03,810 --> 01:03:52,910

oh you guys did a fantastic job up there

573

01:04:08,290 --> 01:04:06,520

well thanks dick we appreciate those

574

01:04:09,670 --> 01:04:08,300

words seem like you were reading our