1
00:00:29,840 --> 00:00:27,110
this is shuttle launch control at

2
00:00:32,179 --> 00:00:29,850
t-minus three hours and holding we're in

3
00:00:35,930 --> 00:00:32,189
the final hours of the STS 32 launch

4
00:00:37,490 --> 00:00:35,940
countdown at this time everything is

5
00:00:41,150 --> 00:00:37,500
proceeding smoothly here in the firing

6
00:00:42,950 --> 00:00:41,160
room at the launch control center got a

7
00:00:46,280 --> 00:00:42,960
full 10-day mission planned for this

8
00:00:48,830 --> 00:00:46,290
flight primary objective of is to deploy

9
00:00:51,530 --> 00:00:48,840
the simcom satellite retrieves a long

10
00:00:52,790 --> 00:00:51,540
duration exposure facility and to

11
00:00:54,710 --> 00:00:52,800
demonstrate the capability of

12
00:00:59,389 --> 00:00:54,720
modifications for an extended mission

13
00:01:01,370 --> 00:00:59,399

duration and we've got the STS 32 flight

14
00:01:03,979 --> 00:01:01,380
crew again this morning for breakfast

15
00:01:08,990 --> 00:01:03,989
mission specialist Marsha Ivins making

16
00:01:11,060 --> 00:01:09,000
her first trip into space today mission

17
00:01:14,719 --> 00:01:11,070
specialist Bonnie Dunbar making her

18
00:01:16,219 --> 00:01:14,729
second trip into space and commander Dan

19
00:01:18,249 --> 00:01:16,229
brandenstein this will be his third

20
00:01:21,410 --> 00:01:18,259
flight his second one to command

21
00:01:30,559 --> 00:01:21,420
there's pilot James Weatherby and

22
00:01:33,080 --> 00:01:30,569
mission specialist David Lowe we've now

23
00:01:35,050 --> 00:01:33,090
joined the STS 32 flight crew in the

24
00:01:37,190 --> 00:01:35,060
operations and check-out building

25
00:01:48,880 --> 00:01:37,200
getting into their flight suits once

26
00:01:54,830 --> 00:01:51,970
they all fly crew members being assisted

27
00:01:58,940 --> 00:01:54,840
with the gear that they have to wear on

28
00:02:14,010 --> 00:01:58,950
the launch today it's mission specialist

29
00:02:22,650 --> 00:02:18,960
mission specialist Marsha Ivins getting

30
00:02:29,880 --> 00:02:22,660
her head gear on and mission specialist

31
00:02:32,250 --> 00:02:29,890
David Lowe and we've got the flight crew

32
00:02:34,410 --> 00:02:32,260
commander Dan Brendon Stein mission

33
00:02:37,850 --> 00:02:34,420
specialist Bonnie Dunbar pilot James

34
00:02:41,970 --> 00:02:37,860
Weatherby leading the crew out of the

35
00:02:43,920 --> 00:02:41,980
side door there we've got the other two

36
00:02:48,930 --> 00:02:43,930
mission specialists Marsha Ivins and

37
00:02:50,880 --> 00:02:48,940
David Lowe being greeted by Kennedy

38
00:02:54,780 --> 00:02:50,890

Space Center employees and we're wishing

39
00:02:59,750 --> 00:02:54,790
them well for today's flight and the

40
00:03:35,030 --> 00:03:03,150
today I'm looking at favorable weather

41
00:03:40,970 --> 00:03:38,000
my crew now at the white room at launch

42
00:03:43,220 --> 00:03:40,980
pad 39a commander Dan brandenstein is

43
00:03:45,650 --> 00:03:43,230
being assisted now with the rest of his

44
00:04:15,199 --> 00:03:45,660
gear before boarding the orbiter of

45
00:04:15,209 --> 00:04:31,080
all right

46
00:04:38,710 --> 00:04:33,790
coming up on retraction of the orbiter

47
00:05:02,650 --> 00:04:38,720
access arm this arm can be extended in

48
00:05:12,980 --> 00:05:06,970
LT LTZ before making you pre-start

49
00:05:14,990 --> 00:05:12,990
as IP restarts at work main engines now

50
00:05:24,230 --> 00:05:15,000
being gimballed will be put in the ready

51
00:05:26,570 --> 00:05:24,240
to start position now retracting the

52
00:05:46,760 --> 00:05:26,580
gaseous oxygen vent hood away from the

53
00:05:51,050 --> 00:05:46,770
vehicle back to the launch position two

54
00:05:52,730 --> 00:05:51,060
minutes 31 seconds we have a go for

55
00:05:54,650 --> 00:05:52,740
autosequence start Columbia's for

56
00:05:56,450 --> 00:05:54,660
redundant computers have primary control

57
00:06:07,010 --> 00:05:56,460
of critical vehicle functions for the

58
00:06:16,400 --> 00:06:10,219
t-minus 10 9 we have a go for main

59
00:06:20,510 --> 00:06:16,410
engine start five four three two one

60
00:06:25,070 --> 00:06:20,520
zero booster ignition and liftoff of

61
00:06:28,010 --> 00:06:25,080
Columbia a new decade from the tower and

62
00:06:37,159 --> 00:06:28,020
over to Houston complete roll program

63
00:06:39,680 --> 00:06:37,169

initiated that roll confirmed as

64
00:06:43,010 --> 00:06:39,690
Columbia heads out on the proper launch

65
00:06:45,439 --> 00:06:43,020
azimuth or the race to catch Elda now

66
00:06:47,180 --> 00:06:45,449
throttling down through 102 percent for

67
00:06:49,010 --> 00:06:47,190
the passage through maximum dynamic

68
00:06:52,969 --> 00:06:49,020
pressure they'll take the engines down

69
00:07:10,070 --> 00:06:52,979
to 65% three good AP use three good fuel

70
00:07:15,860 --> 00:07:12,520
now twelve nautical miles downrange

71
00:07:17,869 --> 00:07:15,870
velocity 3200 feet per second three good

72
00:07:20,990 --> 00:07:17,879
main engines three good fuel cells three

73
00:07:34,010 --> 00:07:21,000
good AP use 15 nautical miles downrange

74
00:07:34,020 --> 00:07:43,420
standing by for SRB staging

75
00:09:16,590 --> 00:07:46,629
now at 4,400 feet per second 40 miles

76
00:09:20,610 --> 00:09:18,000
okay John what you're looking at right

77
00:09:21,870 --> 00:09:20,620
now is the CENTCOM satellite that's an

78
00:09:24,480 --> 00:09:21,880
acronym that stands for synchronous

79
00:09:27,660 --> 00:09:24,490
communications it's built by the Hughes

80
00:09:28,770 --> 00:09:27,670
communication services incorporated for

81
00:09:30,620 --> 00:09:28,780
the United States Navy it's actually

82
00:09:33,180 --> 00:09:30,630
leased to the United States Navy's for

83
00:09:35,580 --> 00:09:33,190
communications and the UHF frequency

84
00:09:38,060 --> 00:09:35,590
with its worldwide sleep you can see it

85
00:09:41,010 --> 00:09:38,070
coming out of the payload Bay right now

86
00:09:45,090 --> 00:09:41,020
rotating at about 1.7 rpm and

87
00:09:49,680 --> 00:09:45,100
translating away at about about 1.5 g

88
00:09:52,530 --> 00:09:49,690

per second it was held in the bay by a

89
00:09:55,080 --> 00:09:52,540
cradle in a cradle we had four pins that

90
00:09:57,720 --> 00:09:55,090
we released one by one and then finally

91
00:10:07,410 --> 00:09:57,730
at deploy time we had a a pyrotechnic

92
00:10:10,530 --> 00:10:07,420
device it push it away rpm this picture

93
00:10:12,560 --> 00:10:10,540
here about 80 seconds into the deploy

94
00:10:16,140 --> 00:10:12,570
and the omni antenna you can see

95
00:10:18,060 --> 00:10:16,150
deploying at this time as you can see

96
00:10:19,470 --> 00:10:18,070
this spacecraft is XO deployed out of

97
00:10:56,509 --> 00:10:19,480
the payload Bay when the payload Bay is

98
00:10:56,519 --> 00:11:03,259
good morning Columbia

99
00:11:09,240 --> 00:11:07,650
good morning earth we thought you'd

100
00:11:20,400 --> 00:11:09,250
appreciate a little Bing Crosby to wake

101
00:11:21,960 --> 00:11:20,410
up to this morning it was wonderful oK

102
00:11:23,759 --> 00:11:21,970
you've got the hunt steps on the left

103
00:11:29,519 --> 00:11:23,769
and water coming out on the right

104
00:11:31,230 --> 00:11:29,529
Roger them what you can see but you

105
00:11:32,369 --> 00:11:31,240
probably can't see very well TV but

106
00:11:33,689 --> 00:11:32,379
right along the leading edge you're

107
00:11:36,360 --> 00:11:33,699
studying about where the light is now

108
00:11:37,980 --> 00:11:36,370
the water comes up about a quarter away

109
00:11:42,329 --> 00:11:37,990
just a little bit below where the floor

110
00:11:43,920 --> 00:11:42,339
line now is and it goes back over here

111
00:11:45,809 --> 00:11:43,930
here comes up to about the floor line

112
00:11:48,689 --> 00:11:45,819
it's just a few waters you indicated it

113
00:11:50,309 --> 00:11:48,699

was like on 27 on the front around the

114
00:11:56,129 --> 00:11:50,319
end here we can't see anything

115
00:11:57,780 --> 00:11:56,139
but on the back stuff there's a little

116
00:11:59,759 --> 00:11:57,790
Ridge along the bottom and you just see

117
00:12:02,670 --> 00:11:59,769
that there's just some water there

118
00:12:03,960 --> 00:12:02,680
looking down it is the bilges anyone's

119
00:12:06,120 --> 00:12:03,970
alive you can see little blob of water

120
00:12:08,189 --> 00:12:06,130
down there and till we get this on so be

121
00:12:09,689 --> 00:12:08,199
kind of hard to tell because we can't

122
00:12:12,840 --> 00:12:09,699
give a bit of you don't pass this

123
00:12:14,579 --> 00:12:12,850
canister enough Columbia Houston we

124
00:12:15,720 --> 00:12:14,589
can't tell very well from the video what

125
00:12:17,249 --> 00:12:15,730
you're seeing can you give us a little

126
00:12:29,050 --> 00:12:17,259
bit of a description what what you got

127
00:12:35,890 --> 00:12:32,380
I'll kind of start on the water tank up

128
00:12:38,650 --> 00:12:35,900
here there are few globules and on the

129
00:12:43,180 --> 00:12:38,660
side of the wet trash storage there's

130
00:12:47,200 --> 00:12:43,190
one big blob and then down along the

131
00:12:50,980 --> 00:12:47,210
side of the wet storage system or then

132
00:12:53,110 --> 00:12:50,990
on the deck and along these cables are

133
00:12:56,140 --> 00:12:53,120
some big globs and then also on the home

134
00:12:59,860 --> 00:12:56,150
step far there's a big glob a grand told

135
00:13:01,030 --> 00:12:59,870
probably of court if you probably

136
00:13:41,950 --> 00:13:01,040
something all up and that's a pretty

137
00:13:43,690 --> 00:13:41,960
rough good morning Columbia we like to

138
00:13:48,910 --> 00:13:43,700

wake up music so much today we thought

139
00:14:14,320 --> 00:13:48,920
we play it for you twice good morning

140
00:14:19,330 --> 00:14:16,810
Columbia Houston we have a Tallyho on L

141
00:16:27,780 --> 00:14:19,340
deaf and it looks even better than the

142
00:16:37,540 --> 00:16:34,810
we were extremely happy we were ready to

143
00:16:39,790 --> 00:16:37,550
continue at this point it doesn't show

144
00:16:43,000 --> 00:16:39,800
up anywhere in the video or anything but

145
00:16:44,590 --> 00:16:43,010
Lex we took over and manually flew to

146
00:16:47,370 --> 00:16:44,600
protect attitude and maintain that

147
00:16:51,850 --> 00:16:47,380
attitude throughout the photo survey and

148
00:16:53,170 --> 00:16:51,860
Marcia took more photos and I'm clear to

149
00:16:55,870 --> 00:16:53,180
tell you but she'll tell you in her film

150
00:16:59,620 --> 00:16:55,880
report tonight and they think that

151
00:17:02,770 --> 00:16:59,630
that'll all go well towards documenting

152
00:17:06,160 --> 00:17:02,780
and helping with the data that they hope

153
00:17:07,600 --> 00:17:06,170
to get off fell death Lumbee houston we

154
00:17:10,920 --> 00:17:07,610
have a message for you from the

155
00:17:13,600 --> 00:17:10,930
administrator if you're ready ready

156
00:17:16,000 --> 00:17:13,610
today as you flawlessly executed the l

157
00:17:18,400 --> 00:17:16,010
def retrieval literally millions pause

158
00:17:20,170 --> 00:17:18,410
from their daily routines and quietly

159
00:17:22,449 --> 00:17:20,180
watched America's space program and its

160
00:17:24,520 --> 00:17:22,459
very best thanks for providing us

161
00:17:28,059 --> 00:17:24,530
earthbound folks with such an inspiring

162
00:17:58,919 --> 00:17:28,069
start for the 1990s sign Vice Admiral

163
00:18:09,580 --> 00:18:07,990

good morning Columbia Houston your music

164
00:18:11,440 --> 00:18:09,590
this morning is courtesy of the L def

165
00:18:38,460 --> 00:18:11,450
project who are obviously very happy

166
00:18:47,200 --> 00:18:44,879
and we're getting good downlink we think

167
00:18:49,389 --> 00:18:47,210
that's I guess that there's a dogs

168
00:18:51,549 --> 00:18:49,399
question for earlier we pulled up a

169
00:18:53,799 --> 00:18:51,559
notify yesterday we was a little

170
00:18:55,869 --> 00:18:53,809
flirting with a special filter on but we

171
00:18:57,849 --> 00:18:55,879
saw something that was kind of strange

172
00:19:00,639 --> 00:18:57,859
so we got it on the camera corner and we

173
00:19:02,499 --> 00:19:00,649
thought we'd show it to you so probably

174
00:19:03,639 --> 00:19:02,509
the first of a long line of experiments

175
00:19:07,060 --> 00:19:03,649
with the tomatoes that have been out

176
00:19:09,099 --> 00:19:07,070
there yeah it's great we're just

177
00:19:12,009 --> 00:19:09,109
crossing the Andes this about to come

178
00:19:13,749 --> 00:19:12,019
into a bunch of clouds but now you can

179
00:19:15,190 --> 00:19:13,759
see it but there's a religious ecology

180
00:19:22,509 --> 00:19:15,200
down in the mountains in this part of

181
00:19:27,070 --> 00:19:22,519
the world we're getting a great view dan

182
00:19:29,169 --> 00:19:27,080
thanks this machine is the American

183
00:19:32,649 --> 00:19:29,179
Floyd echocardiogram is an off-the-shelf

184
00:19:34,089 --> 00:19:32,659
ultrasonic imaging system that it's a

185
00:19:36,580 --> 00:19:34,099
standard piece of equipment that's used

186
00:19:39,269 --> 00:19:36,590
to get a non-invasive picture of the

187
00:19:42,639 --> 00:19:39,279
heart and other other soft tissue

188
00:19:44,739 --> 00:19:42,649

attorneys got the transducer that does

189
00:19:47,969 --> 00:19:44,749
the ultrasonic imaging and we're putting

190
00:19:50,999 --> 00:19:47,979
a gel on it which is sort of goopy water

191
00:19:54,369 --> 00:19:51,009
okay that that gives us a better picture

192
00:19:57,519 --> 00:19:54,379
the way the ultrasound works is that the

193
00:20:00,129 --> 00:19:57,529
ultrasound waves will basically bounce

194
00:20:02,529 --> 00:20:00,139
off different structure with different

195
00:20:04,119 --> 00:20:02,539
different densities in it and that's how

196
00:20:06,099 --> 00:20:04,129
we see a picture of the heart what we're

197
00:20:08,379 --> 00:20:06,109
doing with this experiment is measuring

198
00:20:10,409 --> 00:20:08,389
the cardiovascular changes that

199
00:20:13,509 --> 00:20:10,419
microgravity causes on the body

200
00:20:15,129 --> 00:20:13,519
this data was taken on a spree flight

201
00:20:17,919 --> 00:20:15,139
will be done post flight and then we're

202
00:20:20,409 --> 00:20:17,929
gathering the data right and so they can

203
00:20:22,330 --> 00:20:20,419
measure the different sizes of these

204
00:20:48,590 --> 00:20:22,340
chambers of the heart and tell what

205
00:20:52,919 --> 00:20:51,960
Gimli of the bread mob looks like it's

206
00:20:55,710 --> 00:20:52,929
paid for

207
00:20:58,799 --> 00:20:55,720
even fans and on the past two days

208
00:20:59,909 --> 00:20:58,809
almost all of them have gone stamped it

209
00:21:01,770 --> 00:20:59,919
looks like the growth is about

210
00:21:03,180 --> 00:21:01,780
two-thirds of the way down the to one I

211
00:21:05,640 --> 00:21:03,190
lost all of the white list we're gonna

212
00:21:07,200 --> 00:21:05,650
take some photographs and then if you

213
00:21:18,960 --> 00:21:07,210

have nothing else we'll go under the red

214
00:21:40,799 --> 00:21:20,820
those are the farts they're looking for

215
00:21:46,440 --> 00:21:43,060
Columbia Houston we have some real-time

216
00:22:04,730 --> 00:21:46,450
downlink of your water depth looks great

217
00:22:04,740 --> 00:22:19,480
totally interesting move this him

218
00:22:35,930 --> 00:22:22,710
Frankie said April

219
00:22:40,490 --> 00:22:38,850
okay Jason we what you can see here is

220
00:22:43,080 --> 00:22:40,500
the lower body negative pressure device

221
00:22:46,380 --> 00:22:43,090
or lb NP as we've been calling it here

222
00:22:49,830 --> 00:22:46,390
which is a candidate reconditioning

223
00:22:53,870 --> 00:22:49,840
protocol that we hope might be able to

224
00:22:55,850 --> 00:22:53,880
use to be used for overcoming or

225
00:22:58,140 --> 00:22:55,860
bettering orthostatic intolerance

226
00:23:02,700 --> 00:22:58,150
orthostatic intolerance and one gravity

227
00:23:04,860 --> 00:23:02,710
is the inability to stand up without

228
00:23:06,799 --> 00:23:04,870
feeling dizzy or lightheaded or even in

229
00:23:10,580 --> 00:23:06,809
the worst case I'm catching out her

230
00:23:12,690 --> 00:23:10,590
thank you okay so what we've got here is

231
00:23:15,029 --> 00:23:12,700
the lower body negative pressure device

232
00:23:17,220 --> 00:23:15,039
the last time we flew one of these in

233
00:23:19,520 --> 00:23:17,230
the u.s. space program was on a scarlet

234
00:23:21,630 --> 00:23:19,530
message exactly we were on all three

235
00:23:23,149 --> 00:23:21,640
stations it looked a little bit

236
00:23:27,600 --> 00:23:23,159
different from this in fact it was a

237
00:23:29,100 --> 00:23:27,610
solid can that we flew in this case

238
00:23:30,330 --> 00:23:29,110

there's entire device and all the

239
00:23:31,919 --> 00:23:30,340
equipment that you see right here can be

240
00:23:38,250 --> 00:23:31,929
folded up and put into one of our

241
00:23:40,919 --> 00:23:38,260
lockers here what we're doing here is at

242
00:23:43,680 --> 00:23:40,929
the same time that bonnie has a lower

243
00:23:46,950 --> 00:23:43,690
body a little pressure on a lower body

244
00:23:48,419 --> 00:23:46,960
right now Marcia is using the American

245
00:23:51,930 --> 00:23:48,429
flight echocardiogram and taking some

246
00:23:53,310 --> 00:23:51,940
pictures of her heart so the

247
00:23:55,440 --> 00:23:53,320
measurements that we take while we're

248
00:23:59,820 --> 00:23:55,450
doing this we are constantly measuring

249
00:24:01,680 --> 00:23:59,830
blood pressure heart rate and EKG and in

250
00:24:04,169 --> 00:24:01,690
fact EKG and heart rate are being

251
00:24:06,029 --> 00:24:04,179
constantly downlink to the ground blood

252
00:24:07,350 --> 00:24:06,039
pressure is the only one up here we're

253
00:24:07,830 --> 00:24:07,360
the only ones that have the deep blood

254
00:24:09,450 --> 00:24:07,840
pressure

255
00:24:11,220 --> 00:24:09,460
we're monitoring that on this automatic

256
00:24:13,399 --> 00:24:11,230
blood pressure device and it's also

257
00:24:16,110 --> 00:24:13,409
being taped down here on a recorder

258
00:24:17,250 --> 00:24:16,120
right now we've only got when we come

259
00:24:19,620 --> 00:24:17,260
out of this mission we are only going to

260
00:24:21,270 --> 00:24:19,630
have two data points which really isn't

261
00:24:25,140 --> 00:24:21,280
enough to draw any conclusions from but

262
00:24:27,930 --> 00:24:25,150
we'll be able to measure Bonnie's and my

263
00:24:30,750 --> 00:24:27,940

heart rate blood pressure and EKG when

264
00:24:32,880 --> 00:24:30,760
we return to Edwards in a few days and

265
00:24:34,919 --> 00:24:32,890
see if we think there was any effects

266
00:24:36,899 --> 00:24:34,929
from this but more importantly when we

267
00:24:39,210 --> 00:24:36,909
fly this on some more shuttle flights

268
00:24:40,740 --> 00:24:39,220
and also you know we have any iteration

269
00:24:41,490 --> 00:24:40,750
is that any suggestions what we might be

270
00:24:43,080 --> 00:24:41,500
able to make to this

271
00:24:44,700 --> 00:24:43,090
iterations between this and the

272
00:24:46,120 --> 00:24:44,710
ground-based studies

273
00:24:47,170 --> 00:24:46,130
hopefully

274
00:24:50,860 --> 00:24:47,180
in the future we'll be able to come up

275
00:24:52,390 --> 00:24:50,870
with a fairly good or maybe even a more

276
00:24:57,850 --> 00:24:52,400
effective countermeasure to orthostatic

277
00:24:58,540 --> 00:24:57,860
intolerance Dave would copy all that

278
00:25:00,910 --> 00:24:58,550
them

279
00:25:40,430 --> 00:25:00,920
we appreciate the brief on lb NT y'all

280
00:25:45,389 --> 00:25:43,310
hi Dan this is Larry Bird

281
00:25:47,639 --> 00:25:45,399
congratulations to you and the crew on

282
00:26:14,810 --> 00:25:47,649
the slam dunk with Elvia happy birthday

283
00:26:25,950 --> 00:26:17,279
good morning Columbia and a happy

284
00:26:29,639 --> 00:26:25,960
birthday to Danny Boy thank you very

285
00:26:31,499 --> 00:26:29,649
much I was hoping that side of my 25 you

286
00:26:36,749 --> 00:26:31,509
didn't age and this wasn't gonna happen

287
00:26:38,430 --> 00:26:36,759
this year no that's not the way it works

288
00:26:40,350 --> 00:26:38,440

he already heard birthday greetings from

289
00:26:42,690 --> 00:26:40,360
the astronaut office and from Larry Bird

290
00:26:44,669 --> 00:26:42,700
during the wakeup music but the L deaf

291
00:26:46,200 --> 00:26:44,679
team and all the rest of us here in mcc

292
00:26:59,639 --> 00:26:46,210
wanted to wish you a happy birthday to

293
00:27:03,269 --> 00:26:59,649
Dan so how old are you anyway Cynthia

294
00:27:04,799 --> 00:27:03,279
Doris is a classified business it's a

295
00:27:07,259 --> 00:27:04,809
pleasure to bring you back aboard

296
00:27:09,450 --> 00:27:07,269
columbia again what we'd like to do

297
00:27:11,519 --> 00:27:09,460
today is give you a demonstration of

298
00:27:13,799 --> 00:27:11,529
some of the equipment we have on board

299
00:27:16,759 --> 00:27:13,809
the shuttle I know you're all are very

300
00:27:19,200 --> 00:27:16,769
aware of the many pictures that people

301
00:27:21,299 --> 00:27:19,210
see coming down from the shuttle real

302
00:27:23,940 --> 00:27:21,309
time and also the photographs that are

303
00:27:26,340 --> 00:27:23,950
brought back the full of documentation

304
00:27:28,139 --> 00:27:26,350
on board the shuttle missions is done

305
00:27:30,200 --> 00:27:28,149
with of a variety of photographic

306
00:27:33,419 --> 00:27:30,210
equipment and the purpose of the

307
00:27:35,850 --> 00:27:33,429
documentation is for earth observations

308
00:27:38,669 --> 00:27:35,860
for technical documentation of various

309
00:27:41,070 --> 00:27:38,679
experiments and payloads and so it is

310
00:27:43,799 --> 00:27:41,080
just pure aesthetics to demonstrate show

311
00:27:46,710 --> 00:27:43,809
people of America that support our space

312
00:27:50,549 --> 00:27:46,720
program how beautiful this universe is

313
00:27:51,520 --> 00:27:50,559

that we live on so with that in mind I'd

314
00:27:54,730 --> 00:27:51,530
like to introduce them

315
00:27:56,080 --> 00:27:54,740
simon's who's going to show you and

316
00:27:58,240 --> 00:27:56,090
demonstrate some of the things we do

317
00:28:11,790 --> 00:27:58,250
with the 70 millimeter camera and here's

318
00:28:16,470 --> 00:28:14,640
we are 70 millimeter camera that we used

319
00:28:18,270 --> 00:28:16,480
for mostly earth observations is a

320
00:28:20,190 --> 00:28:18,280
Hasselblad it's the standard Hasselblad

321
00:28:23,010 --> 00:28:20,200
that's pretty much not modified for our

322
00:28:32,600 --> 00:28:23,020
use has a motor drive on it it has a

323
00:28:40,130 --> 00:28:37,070
the data makes about 95 or 100 frames of

324
00:28:42,440 --> 00:28:40,140
film and it has a stator on the back

325
00:28:47,330 --> 00:28:42,450
that basically tells us the MEP that's

326
00:28:49,430 --> 00:28:47,340
what we're shooting for some test that

327
00:28:51,289 --> 00:28:49,440
we're flying I have some regular roles

328
00:28:54,560 --> 00:28:51,299
in 120 film which is what happen that

329
00:29:09,830 --> 00:28:54,570
normally uses and I have the little back

330
00:29:11,750 --> 00:29:09,840
for that two cameras are one bracket and

331
00:29:13,490 --> 00:29:11,760
they're connected to a button when I get

332
00:29:15,799 --> 00:29:13,500
one button I fire both cameras at the

333
00:29:51,740 --> 00:29:15,809
same time we slide three different

334
00:29:56,450 --> 00:29:51,750
lenses on this camera in the camera it

335
00:29:58,399 --> 00:29:56,460
requires that you so our spot gives us

336
00:30:00,470 --> 00:29:58,409
an exposure but we also use a spot meter

337
00:30:06,370 --> 00:30:00,480
looking out the window to average the

338
00:30:23,320 --> 00:30:09,950

that's about it for the 1735 we'll be

339
00:30:28,510 --> 00:30:26,260
this is a standard 35 millimeter camera

340
00:30:30,940 --> 00:30:28,520
that most folks have at home we use it

341
00:30:32,890 --> 00:30:30,950
here onboard the shuttle for documenting

342
00:30:34,930 --> 00:30:32,900
through actions and taking still

343
00:30:36,550 --> 00:30:34,940
photography of some of the Patek

344
00:30:38,620 --> 00:30:36,560
experiments that were accomplishing and

345
00:30:41,680 --> 00:30:38,630
also some action out in the payload Bay

346
00:30:45,820 --> 00:30:41,690
or for example L def in our case and

347
00:30:47,710 --> 00:30:45,830
Earth Observation photography we used on

348
00:30:57,030 --> 00:30:47,720
this camera various different lenses

349
00:31:01,390 --> 00:30:57,040
ranging all the way from fisheye lens

350
00:31:04,390 --> 00:31:01,400
for documenting action in the mid-deck

351
00:31:06,400 --> 00:31:04,400
when you need to have a wide field of

352
00:31:07,960 --> 00:31:06,410
view and it's the standard for

353
00:31:13,480 --> 00:31:07,970
photograph that you see that slightly

354
00:31:16,840 --> 00:31:13,490
distorted out on the side one of our

355
00:31:18,640 --> 00:31:16,850
favorites 35 70 zoom for taking earth

356
00:31:24,640 --> 00:31:18,650
observations you can frame the picture

357
00:31:26,350 --> 00:31:24,650
pretty nicely with that and all the way

358
00:31:31,510 --> 00:31:26,360
up to my favorite the 300 millimeter

359
00:31:33,550 --> 00:31:31,520
lens we're using this lens to compare it

360
00:31:40,870 --> 00:31:33,560
with 70 millimeter photography that

361
00:31:45,249 --> 00:31:42,879
some of the features are on this camera

362
00:31:47,710 --> 00:31:45,259
of course a standard flash that we use

363
00:31:49,090 --> 00:31:47,720

it has an automatic features they don't

364
00:31:51,190 --> 00:31:49,100
have to worry but any times they're

365
00:31:53,620 --> 00:31:51,200
setting the lights or taking meter

366
00:31:57,419 --> 00:31:53,630
readings down in the mid-deck it's

367
00:32:00,399 --> 00:31:57,429
automatic and you just view it and shoot

368
00:32:02,200 --> 00:32:00,409
we have a data back under on the back of

369
00:32:04,870 --> 00:32:02,210
the camera that automatically prints the

370
00:32:07,899 --> 00:32:04,880
MIT on the photograph useful for Earth

371
00:32:10,600 --> 00:32:07,909
Observation so we can locate the little

372
00:32:12,190 --> 00:32:10,610
picture that we've taken and of course

373
00:32:14,019 --> 00:32:12,200
my favorite the murder drive he just

374
00:32:18,190 --> 00:32:14,029
points shoot and it rewinds and you're

375
00:32:34,070 --> 00:32:18,200
ready for the next shot Davis next and

376
00:32:40,019 --> 00:32:37,409
we've got here is a 16 millimeter flex

377
00:32:41,669 --> 00:32:40,029
motion picture camera this is actually

378
00:32:43,080 --> 00:32:41,679
an identical camera to camera that's

379
00:32:47,580 --> 00:32:43,090
used widely in the motion picture

380
00:32:49,289 --> 00:32:47,590
industry on board we use it to document

381
00:32:51,629 --> 00:32:49,299
almost all the activities that we do

382
00:32:53,970 --> 00:32:51,639
here in fact most of the films that we

383
00:32:55,409 --> 00:32:53,980
take when we go talking throughout the

384
00:33:00,450 --> 00:32:55,419
country about our space flights are

385
00:33:01,980 --> 00:33:00,460
taken with this camera here what we've

386
00:33:04,490 --> 00:33:01,990
got two different kinds of lenses here

387
00:33:08,639 --> 00:33:04,500
what we've got on here right now is the

388
00:33:09,990 --> 00:33:08,649

ten to 100 millimeter lens

389
00:33:12,600 --> 00:33:10,000
the nice thing about this is that it's

390
00:33:14,279 --> 00:33:12,610
also got an auto feature to it that will

391
00:33:16,769 --> 00:33:14,289
take care of your f-stops for you it's

392
00:33:22,409 --> 00:33:16,779
all you have to do is point focus and

393
00:33:26,899 --> 00:33:22,419
then shoot the camera is battery-powered

394
00:33:30,810 --> 00:33:29,460
that's 16 millimeter magazines right

395
00:33:32,909 --> 00:33:30,820
here we carry about 12 of these onboard

396
00:33:34,860 --> 00:33:32,919
with us and it can be these magazines

397
00:33:36,450 --> 00:33:34,870
can be daylight loaded so the camera

398
00:33:51,090 --> 00:33:36,460
itself is just this portion here that

399
00:33:53,159 --> 00:33:51,100
you see and with that I think Bonnie

400
00:36:06,109 --> 00:33:53,169
Dunbar is going to talk about the CCTV

401
00:36:10,109 --> 00:36:09,420
that we want to use and when we want it

402
00:36:14,490 --> 00:36:10,119
to go

403
00:36:17,510 --> 00:36:14,500
we can also recently on several shuttle

404
00:36:19,960 --> 00:36:17,520
flights we have been evaluating

405
00:36:22,630 --> 00:36:19,970
camcorders and we

406
00:36:25,060 --> 00:36:22,640
one here several different models we

407
00:36:31,000 --> 00:36:25,070
found these are very useful for in cabin

408
00:36:32,620 --> 00:36:31,010
photography and for successful that we

409
00:36:34,870 --> 00:36:32,630
have at least two experiments on this

410
00:36:37,900 --> 00:36:34,880
flight that utilize off-the-shelf

411
00:36:40,540 --> 00:36:37,910
camcorders and macro lenses for

412
00:36:42,310 --> 00:36:40,550
documenting experimental results well

413
00:36:44,740 --> 00:36:42,320

this gives you a quick view of the video

414
00:36:45,970 --> 00:36:44,750
systems that we have onboard and that we

415
00:36:49,030 --> 00:36:45,980
definitely like to thank all the people

416
00:37:02,359 --> 00:36:49,040
who are doing this and now I'll get you

417
00:37:06,380 --> 00:37:04,370
well the last camera system we have on

418
00:37:10,759 --> 00:37:06,390
board is probably the the granddaddy of

419
00:37:15,109 --> 00:37:10,769
all cameras and it should be coming into

420
00:37:18,670 --> 00:37:15,119
the view right here that's a very large

421
00:37:22,099 --> 00:37:18,680
format camera it's called IMAX it's

422
00:37:24,890 --> 00:37:22,109
actually a payload it flies on specific

423
00:37:26,449 --> 00:37:24,900
Shuttle missions and has documented the

424
00:37:30,499 --> 00:37:26,459
dream is alive is one of the movies it's

425
00:37:32,749 --> 00:37:30,509
shown in several theaters I think about

426
00:37:34,279 --> 00:37:32,759
100 theaters worldwide very special

427
00:37:36,920 --> 00:37:34,289
theaters that's the only sort of format

428
00:37:40,640 --> 00:37:36,930
the the format of each frame is 17

429
00:37:42,289 --> 00:37:40,650
millimeters high by 120 long and it

430
00:37:44,719 --> 00:37:42,299
gives a very high fidelity picture as

431
00:37:49,039 --> 00:37:44,729
you can see it's a very large camera and

432
00:37:50,209 --> 00:37:49,049
it's not something you you use in a spur

433
00:37:51,949 --> 00:37:50,219
of the moment you pretty won't have to

434
00:37:53,870 --> 00:37:51,959
plan your shots ahead of time you can

435
00:37:56,209 --> 00:37:53,880
see I'm holding inside some handles

436
00:37:59,299 --> 00:37:56,219
which allow you to maneuver it like that

437
00:38:01,519 --> 00:37:59,309
and we also like to get the best shots

438
00:38:02,679 --> 00:38:01,529

that are most stabilized we have a rig

439
00:38:04,939 --> 00:38:02,689
where we can mount it at the window

440
00:38:20,290 --> 00:38:04,949
right over here and it takes a shot

441
00:38:24,640 --> 00:38:22,240
so using it this way it's very

442
00:38:27,940 --> 00:38:24,650
stabilized and we get some very good

443
00:38:30,670 --> 00:38:27,950
pictures all as you can see we have a

444
00:38:32,680 --> 00:38:30,680
wide variety of cameras on board a

445
00:38:34,840 --> 00:38:32,690
couple things I think worth noting that

446
00:38:36,160 --> 00:38:34,850
the marsh alluded to in the 70

447
00:38:39,370 --> 00:38:36,170
millimeter that we were running some

448
00:38:41,440 --> 00:38:39,380
tests we've normally used only one or

449
00:38:43,210 --> 00:38:41,450
two types of film and on this flight we

450
00:38:44,800 --> 00:38:43,220
have a great number of films that we're

451
00:38:47,350 --> 00:38:44,810
doing the side-by-side comparison

452
00:38:49,660 --> 00:38:47,360
hopefully to enhance the photo

453
00:38:52,510 --> 00:38:49,670
photography and I get better pictures in

454
00:38:54,280 --> 00:38:52,520
the future once again these photographs

455
00:38:56,650 --> 00:38:54,290
are used for a wide variety of things

456
00:38:59,830 --> 00:38:56,660
for instance on the l def retreat to

457
00:39:02,440 --> 00:38:59,840
document the various experiments before

458
00:39:04,480 --> 00:39:02,450
it even readers the in the shuttle and

459
00:39:07,960 --> 00:39:04,490
gets baby bounce around a little bit

460
00:39:09,970 --> 00:39:07,970
when we land it Marsha took over seven

461
00:39:11,470 --> 00:39:09,980
hundred seven hundred photographs with

462
00:39:13,900 --> 00:39:11,480
the 70 millimeter to document each

463
00:39:16,120 --> 00:39:13,910

individual tray on the ldap so a quite a

464
00:39:20,040 --> 00:39:16,130
bit of technical data are collected on

465
00:39:24,150 --> 00:39:20,050
the photographs and the tapes and the

466
00:39:26,560 --> 00:39:24,160
movies we take in addition to the other

467
00:39:29,350 --> 00:39:26,570
around the life on the shuttle as we're

468
00:39:31,210 --> 00:39:29,360
doing right now and with that hopefully

469
00:39:32,320 --> 00:39:31,220
is lend a little insight into some of

470
00:39:34,030 --> 00:39:32,330
the equipment we have onboard the

471
00:39:35,680 --> 00:39:34,040
shuttle and we'd like to turn the

472
00:39:39,100 --> 00:39:35,690
cameras back to the ground you also can

473
00:39:56,990 --> 00:39:39,110
control the TV cameras and they can look

474
00:40:04,380 --> 00:40:00,500
I'm filming this right now

475
00:40:06,450 --> 00:40:04,390
it really isn't quite and sometimes we

476
00:40:09,600 --> 00:40:06,460
do get down to microchip but normally

477
00:40:11,760 --> 00:40:09,610
we're about 1/100 to 1/100 thousands of

478
00:40:14,010 --> 00:40:11,770
the teeth and it turns out that can be a

479
00:40:17,640 --> 00:40:14,020
very important variable not only in

480
00:40:20,070 --> 00:40:17,650
system processes NASA got involved in

481
00:40:21,930 --> 00:40:20,080
that research during the Gemini and

482
00:40:34,710 --> 00:40:21,940
Apollo days and trying to determine how

483
00:40:37,110 --> 00:40:34,720
they would I think everybody is

484
00:40:40,530 --> 00:40:37,120
demonstrated with the orange juice and

485
00:42:49,280 --> 00:40:40,540
I'll be no exception Lewis responds

486
00:42:55,410 --> 00:42:52,500
connected to what would be on the ground

487
00:42:59,580 --> 00:42:55,420
a vertical wall with the shuttle landing

488
00:43:06,460 --> 00:42:59,590

position the modulation respond directly

489
00:43:10,630 --> 00:43:08,859
Space Station and two other man's

490
00:43:15,700 --> 00:43:10,640
laboratory that we can learn how to

491
00:43:16,990 --> 00:43:15,710
isolate our exercise equipment we like I

492
00:43:18,760 --> 00:43:17,000
think many people would like to think

493
00:43:20,410 --> 00:43:18,770
that we could one day automate all of

494
00:43:25,870 --> 00:43:20,420
this but I think what a very embryonic

495
00:43:28,359 --> 00:43:25,880
research stage and we've got a good view

496
00:43:50,340 --> 00:43:28,369
of which be running on the treadmill now

497
00:43:54,300 --> 00:43:52,410
Columbia Houston he's looking real

498
00:44:45,650 --> 00:43:54,310
strong but he's smiling so he needs to

499
00:44:45,660 --> 00:44:53,180
by 2 and I 3

500
00:44:53,190 --> 00:46:06,390
like anybody

501
00:46:12,990 --> 00:46:08,210
we're gonna looking at graphics

502
00:46:16,320 --> 00:46:13,000
generated by systems at the Gold Room

503
00:46:18,830 --> 00:46:16,330
had Dryden Columbia's energy and

504
00:46:21,570 --> 00:46:18,840
navigation are all in good shape

505
00:46:23,940 --> 00:46:21,580
descending at a rate of three hundred

506
00:46:25,920 --> 00:46:23,950
and fifty feet per second they're at

507
00:46:28,620 --> 00:46:25,930
about fifty three thousand feet they're

508
00:46:30,840 --> 00:46:28,630
approaching the intersection with a

509
00:46:33,060 --> 00:46:30,850
heading alignment circle and we'll be

510
00:46:42,410 --> 00:46:33,070
making a left overhead turn to line up

511
00:46:48,990 --> 00:46:45,420
xenon lights illuminating the approach

512
00:46:50,610 --> 00:46:49,000
end of the runway at edwards Columbia

513
00:46:52,710 --> 00:46:50,620

we'll come into our field of view when

514
00:46:55,400 --> 00:46:52,720
we have this camera up to the right of

515
00:46:58,220 --> 00:46:55,410
the frame and we'll roll out the left

516
00:47:01,490 --> 00:46:58,230
like a state vector transfers the BFS

517
00:47:10,140 --> 00:47:01,500
surface winds are two six zero at five

518
00:47:12,420 --> 00:47:10,150
altimeter three zero one one this view

519
00:47:14,160 --> 00:47:12,430
again from an infrared camera at Edwards

520
00:47:18,240 --> 00:47:14,170
and we see the Columbia making the left

521
00:47:21,840 --> 00:47:18,250
overhead turn turn now about ten and a

522
00:47:26,250 --> 00:47:21,850
half nautical miles out altitude 15,000

523
00:47:30,000 --> 00:47:26,260
feet touchdown

524
00:47:31,830 --> 00:47:30,010
one minute 56 seconds flight dynamics

525
00:47:37,800 --> 00:47:31,840
officer ed Gonzales reports they look

526
00:47:45,560 --> 00:47:40,110
Columbia is now processing the microwave

527
00:47:50,580 --> 00:47:45,570
landing system now a minute 42 touchdown

528
00:48:01,109 --> 00:47:50,590
lusty our altitude 11,000 feet range 7.2

529
00:48:35,069 --> 00:48:03,339
mommy here we see our flights up

530
00:48:58,210 --> 00:48:38,390
range now five nautical miles altitude

531
00:48:58,220 --> 00:49:34,180
gear down

532
00:49:47,970 --> 00:49:37,940
and Claudia rolls out after a successful

533
00:49:54,660 --> 00:49:50,520
this view from an infrared camera again

534
00:50:21,680 --> 00:49:54,670
and of course those images in lighter

535
00:50:27,180 --> 00:50:24,180
Roger Columbia welcome home

536
00:50:28,890 --> 00:50:27,190
outstanding job he showed us the shuttle

537
00:50:30,990 --> 00:50:28,900
at its best deploying and retrieving

538
00:50:33,059 --> 00:50:31,000

satellites a great way to start the

539
00:52:41,740 --> 00:50:33,069
decade stand by for your post-landing

540
00:52:50,300 --> 00:52:44,240
all right you all go to close that back

541
00:52:55,490 --> 00:52:50,310
to keeping me this is Mission Control

542
00:53:28,660 --> 00:52:55,500
Houston the crew of STS the space

543
00:53:28,670 --> 00:53:36,460
see Bonnie Dunbar

544
00:53:55,800 --> 00:53:38,190
am

545
00:54:00,480 --> 00:53:58,890
crew members now boarding the astro van

546
00:54:03,900 --> 00:54:00,490
and here in the Mission Control Center

547
00:54:08,190 --> 00:54:03,910
the MCC has officially handed over to

548
00:54:10,140 --> 00:54:08,200
the convoy team and the blacking

549
00:54:11,850 --> 00:54:10,150
ceremony about to begin here in Mission