



1
00:01:22,660 --> 00:01:21,100
as la mentioned we had several launch

2
00:01:25,270 --> 00:01:22,670
attempts before we finally got off the

3
00:01:26,410 --> 00:01:25,280
pad we were so desperate that last day

4
00:01:28,990 --> 00:01:26,420
ago we decided to go ahead and turn her

5
00:01:31,390 --> 00:01:29,000
hat around hats around backwards our

6
00:01:38,740 --> 00:01:31,400
rally caps it must have worked because

7
00:01:43,110 --> 00:01:38,750
we managed to launch here we are in the

8
00:01:45,070 --> 00:01:43,120
launch pad the final few seconds and

9
00:01:47,260 --> 00:01:45,080
feeling like we're finally going to go

10
00:01:49,990 --> 00:01:47,270
we heard the main engines start at about

11
00:01:51,609 --> 00:01:50,000
6 seconds prior to launch we could feel

12
00:01:54,190 --> 00:01:51,619
the twang as they call it and then at

13
00:01:55,600 --> 00:01:54,200

booster ignition off we went I'll tell

14

00:01:56,830 --> 00:01:55,610

you it was quite a ride I guess from the

15

00:01:58,780 --> 00:01:56,840

ground it looked pretty spectacular

16

00:02:03,520 --> 00:01:58,790

because the shuttle was hidden by the

17

00:02:04,980 --> 00:02:03,530

smoke and vapor right after liftoff as I

18

00:02:07,810 --> 00:02:04,990

mentioned before we were all pretty

19

00:02:09,310 --> 00:02:07,820

happy on SN having an opportunity to

20

00:02:10,900 --> 00:02:09,320

look out the window feeling comfortable

21

00:02:12,400 --> 00:02:10,910

and and one name I didn't mention that I

22

00:02:14,590 --> 00:02:12,410

really ought to is Joy bar called she

23

00:02:16,750 --> 00:02:14,600

was a team lead of all the trainers and

24

00:02:20,560 --> 00:02:16,760

she really pulled us and them together I

25

00:02:22,150 --> 00:02:20,570

think we were going uphill pretty

26

00:02:24,880 --> 00:02:22,160

quickly at this point you'll start to

27

00:02:26,320 --> 00:02:24,890

see some vapors as the shockwaves build

28

00:02:28,240 --> 00:02:26,330

up on the nose of the orbiter and

29

00:02:30,750 --> 00:02:28,250

external tank as we pass through the

30

00:02:33,640 --> 00:02:30,760

region of maximum dynamic pressure here

31

00:02:35,800 --> 00:02:33,650

the shuttle really vibrates a lot it's

32

00:02:37,930 --> 00:02:35,810

you know it's the Rottier life that's

33

00:02:41,020 --> 00:02:37,940

it's about all I can say this is a nice

34

00:02:42,850 --> 00:02:41,030

view of us as we punch through a cloud

35

00:02:46,080 --> 00:02:42,860

deck there and the shadow gets cast on

36

00:02:48,280 --> 00:02:46,090

the top of the clouds SRB separation was

37

00:02:50,590 --> 00:02:48,290

just like it is in the simulator I

38

00:02:52,240 --> 00:02:50,600

thought a bright flash a little pop and

39

00:02:55,449 --> 00:02:52,250

all of a sudden the ride changes from

40

00:03:00,940 --> 00:02:55,459

being really abrupt to and vibration to

41

00:03:03,190 --> 00:03:00,950

very smooth opening doors and deploy the

42

00:03:05,979 --> 00:03:03,200

cube and that was my job in Mike's job

43

00:03:08,410 --> 00:03:05,989

and that of course is the source of all

44

00:03:11,590 --> 00:03:08,420

the TV and on this particular mission we

45

00:03:13,840 --> 00:03:11,600

had digital digital data six channels of

46

00:03:15,819 --> 00:03:13,850

digital TV down for the experiments

47

00:03:17,410 --> 00:03:15,829

which was really just great in terms of

48

00:03:19,030 --> 00:03:17,420

data management and resource management

49

00:03:21,340 --> 00:03:19,040

for us onboard and the folks on the

50

00:03:23,800 --> 00:03:21,350

ground but the first job that right

51
00:03:25,420 --> 00:03:23,810
after opening the doors what mike and

52
00:03:27,910 --> 00:03:25,430
Fred and I had to do as the blue shift

53
00:03:29,740 --> 00:03:27,920
or the night shift was go to bed this is

54
00:03:31,330 --> 00:03:29,750
probably the hardest thing that we had

55
00:03:33,610 --> 00:03:31,340
to do the whole mission because it

56
00:03:36,580 --> 00:03:33,620
just I just can't tell you how exciting

57
00:03:38,350 --> 00:03:36,590
acent was it as Mike said it's the ride

58
00:03:40,360 --> 00:03:38,360
of your life and it's something I just

59
00:03:42,580 --> 00:03:40,370
still look back on and just grin and

60
00:03:46,000 --> 00:03:42,590
going to bed well I'll just say at least

61
00:03:47,710 --> 00:03:46,010
we shut the doors in addition to wearing

62
00:03:49,420 --> 00:03:47,720
our caps backward I wore my lucky socks

63
00:03:50,830 --> 00:03:49,430

on the day they finally got launched

64

00:03:52,449 --> 00:03:50,840

that was the key to it to st.

65

00:03:54,089 --> 00:03:52,459

Christopher medals didn't get us off on

66

00:03:57,009 --> 00:03:54,099

the second attempt but the socks did it

67

00:03:58,210 --> 00:03:57,019

after 30 days of quarantine I knew I was

68

00:04:00,820 --> 00:03:58,220

ready to launch but I wasn't sure I

69

00:04:02,350 --> 00:04:00,830

could remember what the mission was but

70

00:04:03,910 --> 00:04:02,360

when it came time to do space lab

71

00:04:05,500 --> 00:04:03,920

activation it was just like in the

72

00:04:07,270 --> 00:04:05,510

simulator only nothing broke and

73

00:04:09,729 --> 00:04:07,280

everything powered up just like it was

74

00:04:11,259 --> 00:04:09,739

supposed to we didn't power off the lab

75

00:04:13,449 --> 00:04:11,269

and we didn't do didn't do any hot

76

00:04:14,949 --> 00:04:13,459

coupler swaps so he stayed in good

77

00:04:17,050 --> 00:04:14,959

graces there everything came up just

78

00:04:19,990 --> 00:04:17,060

like it was supposed to we were amazed

79

00:04:21,250 --> 00:04:20,000

and delighted we had a fairly light day

80

00:04:23,560 --> 00:04:21,260

scheduled on the first day to

81

00:04:25,360 --> 00:04:23,570

accommodate anybody who might not feel

82

00:04:27,129 --> 00:04:25,370

well or Spacelab systems it might not

83

00:04:28,659 --> 00:04:27,139

feel well and we didn't have any of

84

00:04:30,159 --> 00:04:28,669

those problems so what we ended up doing

85

00:04:33,640 --> 00:04:30,169

on our first day has really set the

86

00:04:36,430 --> 00:04:33,650

laboratory of well for a two-week space

87

00:04:37,719 --> 00:04:36,440

station make it useful to do all the

88

00:04:40,330 --> 00:04:37,729

experiments we needed to do over that

89

00:04:42,070 --> 00:04:40,340

time well Cathy now we're setting up the

90

00:04:44,050 --> 00:04:42,080

lab Kent and I were doing a trim burn to

91

00:04:46,360 --> 00:04:44,060

get us just in the right orbit and we

92

00:04:47,980 --> 00:04:46,370

rolled the payload bay door partially in

93

00:04:50,409 --> 00:04:47,990

on the portside and went into the

94

00:04:51,969 --> 00:04:50,419

gravity gradient attitude in the next 15

95

00:04:55,000 --> 00:04:51,979

days were pretty much the same and they

96

00:04:56,260 --> 00:04:55,010

usually started like this yeah much like

97

00:04:58,029 --> 00:04:56,270

out here on earth you brush your teeth

98

00:04:59,529 --> 00:04:58,039

the what I wasn't prepared for was after

99

00:05:01,120 --> 00:04:59,539

I was done pushing my teeth

100

00:05:02,920 --> 00:05:01,130

there's no sink up there to spit this

101
00:05:05,740 --> 00:05:02,930
stuff out in and so yeah I had to have

102
00:05:07,029 --> 00:05:05,750
an alternate plan and mine was to kind

103
00:05:09,940 --> 00:05:07,039
of swallow it and didn't work out that

104
00:05:11,350 --> 00:05:09,950
well for you sigh all shaven which is

105
00:05:12,879 --> 00:05:11,360
very much like here on earth and Mike

106
00:05:14,890 --> 00:05:12,889
now is riding the air gamma tur and that

107
00:05:17,469 --> 00:05:14,900
was our main means of exercise and we

108
00:05:19,120 --> 00:05:17,479
exercised every day on orbit the along

109
00:05:21,279 --> 00:05:19,130
with exercise though comes a the

110
00:05:23,409 --> 00:05:21,289
overhead of cleaning up and without a

111
00:05:25,719 --> 00:05:23,419
shower the sponge baths take a while and

112
00:05:27,129 --> 00:05:25,729
then also wash on our hair wet Arista

113
00:05:29,529 --> 00:05:27,139

shampoo that worked really well and

114

00:05:31,150 --> 00:05:29,539

Katie's demonstrating it for us here and

115

00:05:34,480 --> 00:05:31,160

you'll see any minute she's managed to

116

00:05:36,520 --> 00:05:34,490

get her hair dry if I keep my hair clean

117

00:05:37,810 --> 00:05:36,530

everybody can it worked out just great

118

00:05:39,760 --> 00:05:37,820

actually I was a little worried about it

119

00:05:41,940 --> 00:05:39,770

before flight but keep it clean up there

120

00:05:44,400 --> 00:05:41,950

was no problem

121

00:05:46,080 --> 00:05:44,410

now this is I'm at the glove box doing

122

00:05:48,030 --> 00:05:46,090

that protein crystal growth there and

123

00:05:50,340 --> 00:05:48,040

I'm actually using a restraint system

124

00:05:52,170 --> 00:05:50,350

developed here at JSC called Albert we

125

00:05:54,450 --> 00:05:52,180

refer to this as Albert the thing as

126
00:05:56,490 --> 00:05:54,460
opposed to Albert the payload specialist

127
00:05:58,620 --> 00:05:56,500
I'm working on protein crystal growth

128
00:06:00,930 --> 00:05:58,630
and as you know these are these crystals

129
00:06:03,630 --> 00:06:00,940
are used to help design drugs for

130
00:06:05,400 --> 00:06:03,640
diseases and is kind of a lock and key

131
00:06:08,340 --> 00:06:05,410
sort of effect where if we can grow more

132
00:06:11,240 --> 00:06:08,350
perfect crystals we know what the lock

133
00:06:13,590 --> 00:06:11,250
looks like and the drug is then the key

134
00:06:15,390 --> 00:06:13,600
here I'm at the glove box again on

135
00:06:18,780 --> 00:06:15,400
Albert on Albert so to speak or else

136
00:06:21,240 --> 00:06:18,790
quit and working in the glove box and

137
00:06:23,190 --> 00:06:21,250
I'm really looking at mixing profiles

138
00:06:24,240 --> 00:06:23,200

it's very important as Eli community

139

00:06:25,950 --> 00:06:24,250

some of the see like community don't

140

00:06:28,260 --> 00:06:25,960

recognize that but it is when you bring

141

00:06:29,970 --> 00:06:28,270

two reacting liquids together and

142

00:06:31,680 --> 00:06:29,980

on-orbit we have some special problems

143

00:06:33,210 --> 00:06:31,690

this is the bubble generation here we

144

00:06:35,520 --> 00:06:33,220

talk about bubbles so sometimes we don't

145

00:06:37,050 --> 00:06:35,530

want those bubbles and so now that we

146

00:06:39,060 --> 00:06:37,060

have them what do we do and what we do

147

00:06:40,440 --> 00:06:39,070

with them and this is the main

148

00:06:43,770 --> 00:06:40,450

experiment that I use that information

149

00:06:45,720 --> 00:06:43,780

to to power up and to generate because

150

00:06:47,400 --> 00:06:45,730

you'll see me rotate this this cylinder

151
00:06:49,590 --> 00:06:47,410
which has the solutions in them after we

152
00:06:51,540 --> 00:06:49,600
mix them and we rotate it not to take

153
00:06:53,490 --> 00:06:51,550
advantage of centrifugal force and throw

154
00:06:55,170 --> 00:06:53,500
the heavier fluid to the outside the

155
00:06:57,120 --> 00:06:55,180
bubbles to the inside so to make one big

156
00:06:58,920 --> 00:06:57,130
bubble which doesn't have what we call a

157
00:07:00,990 --> 00:06:58,930
lot of nucleation sites and allow us to

158
00:07:02,280 --> 00:07:01,000
grow fewer but larger crystals with

159
00:07:03,690 --> 00:07:02,290
fewer defects so that's one of the

160
00:07:06,960 --> 00:07:03,700
things that we had learned in u.s. mo1

161
00:07:09,810 --> 00:07:06,970
and confirmed again when space have this

162
00:07:11,550 --> 00:07:09,820
is called cgf would do an electronic

163
00:07:14,130 --> 00:07:11,560

crystal growth here and Kathy's in the

164

00:07:17,430 --> 00:07:14,140

glove box of closed area very difficult

165

00:07:18,810 --> 00:07:17,440

task to take in and out we called Sakas

166

00:07:20,400 --> 00:07:18,820

and I helped her a little bit once in a

167

00:07:21,900 --> 00:07:20,410

while and the commanders documenting it

168

00:07:24,120 --> 00:07:21,910

so if we make a mistake everybody knows

169

00:07:31,020 --> 00:07:24,130

we made a mistake but we didn't make any

170

00:07:33,510 --> 00:07:31,030

mistakes that will admit - Here I am

171

00:07:36,570 --> 00:07:33,520

taking a sack of very carefully down to

172

00:07:37,590 --> 00:07:36,580

stow because as all pis including myself

173

00:07:40,530 --> 00:07:37,600

they're a little bit paranoid about

174

00:07:42,060 --> 00:07:40,540

shaking and vibrating so it'd be a

175

00:07:43,860 --> 00:07:42,070

terrible thing for one of the PI's to

176

00:07:50,629 --> 00:07:43,870

ruin a crystal so I made sure we didn't

177

00:07:55,669 --> 00:07:53,549

in this shop I'm interacting with the

178

00:07:58,489 --> 00:07:55,679

geophysical fluid flow sail experiment

179

00:08:02,159 --> 00:07:58,499

this experiment again simulates

180

00:08:03,329 --> 00:08:02,169

conviction on planetary atmospheres in

181

00:08:05,309 --> 00:08:03,339

this view you can think of it as a

182

00:08:06,659 --> 00:08:05,319

weather satellite basically looking at

183

00:08:09,179 --> 00:08:06,669

the southern hemisphere of the planet

184

00:08:10,709 --> 00:08:09,189

the pole is at the bottom of the screen

185

00:08:12,269 --> 00:08:10,719

and the equator is at the top and you

186

00:08:15,359 --> 00:08:12,279

can see waves propagating around the

187

00:08:19,369 --> 00:08:15,369

equator and somewhat reminiscent of cold

188

00:08:24,480 --> 00:08:22,350

another fluid experiment was the surface

189

00:08:26,040 --> 00:08:24,490

tension driven convection experiment we

190

00:08:26,489 --> 00:08:26,050

all spent a lot of time on that one as

191

00:08:28,829 --> 00:08:26,499

well

192

00:08:31,829 --> 00:08:28,839

basically in that experiment you can

193

00:08:34,139 --> 00:08:31,839

heat the top surface of the liquid and

194

00:08:36,480 --> 00:08:34,149

because there's a variation in surface

195

00:08:40,079 --> 00:08:36,490

temp in surface tension with temperature

196

00:08:41,999 --> 00:08:40,089

a fluid flow occurs at the surface and

197

00:08:43,800 --> 00:08:42,009

also drags around the interior of the

198

00:08:47,249 --> 00:08:43,810

fluid this experiment has a lot of

199

00:08:50,249 --> 00:08:47,259

importance not only to the film a coding

200

00:08:52,829 --> 00:08:50,259

industry but also has impact on crystal

201
00:08:55,410 --> 00:08:52,839
growth in this fluid experiment we were

202
00:08:58,259 --> 00:08:55,420
looking at manipulating a drop using

203
00:09:00,569 --> 00:08:58,269
acoustic fields this experiment also had

204
00:09:02,879 --> 00:09:00,579
applications to drug delivery systems

205
00:09:04,740 --> 00:09:02,889
and there's a lot of interest in

206
00:09:11,660 --> 00:09:04,750
surfactants in this particular case

207
00:09:15,929 --> 00:09:14,100
to do get up in the morning you're

208
00:09:17,850 --> 00:09:15,939
always changed tempted to actually

209
00:09:19,439 --> 00:09:17,860
change the payload activity plan so that

210
00:09:21,990 --> 00:09:19,449
you'd be the one doing drop physics

211
00:09:24,749 --> 00:09:22,000
because as you can see each input that

212
00:09:27,120 --> 00:09:24,759
you make to this acoustic chamber

213
00:09:29,280 --> 00:09:27,130

actually changes very dramatically what

214

00:09:31,139 --> 00:09:29,290

the drop does and so we have a chamber

215

00:09:32,639 --> 00:09:31,149

with speakers on all sides and we're

216

00:09:35,879 --> 00:09:32,649

changing literally the speaker pressure

217

00:09:38,189 --> 00:09:35,889

to distort the drop and also to do to

218

00:09:41,249 --> 00:09:38,199

maybe spin it around like this what

219

00:09:43,170 --> 00:09:41,259

you're gonna see coming up is in just a

220

00:09:44,579 --> 00:09:43,180

minute is one particularly interesting

221

00:09:46,590 --> 00:09:44,589

experiment that we did where we actually

222

00:09:48,420 --> 00:09:46,600

brought two fluids together this isn't

223

00:09:50,220 --> 00:09:48,430

quite it yet but we use this experiment

224

00:09:52,110 --> 00:09:50,230

to learn what happens when we do have

225

00:09:55,290 --> 00:09:52,120

two fluids with what happens when we

226

00:09:56,579 --> 00:09:55,300

have a bubble inside a bubble but when

227

00:09:58,139 --> 00:09:56,589

we brought these two fluids together

228

00:10:00,269 --> 00:09:58,149

they actually had an interface in

229

00:10:01,750 --> 00:10:00,279

between them which we refer to as the

230

00:10:04,450 --> 00:10:01,760

beach ball and what this is

231

00:10:06,610 --> 00:10:04,460

to be used for it was a development

232

00:10:09,040 --> 00:10:06,620

model for actually forming vesicles for

233

00:10:11,050 --> 00:10:09,050

drug delivery systems now we didn't

234

00:10:13,000 --> 00:10:11,060

really develop a drug delivery system

235

00:10:16,950 --> 00:10:13,010

but we did look at the way to fluids

236

00:10:22,870 --> 00:10:19,120

you can see that's what happens when you

237

00:10:25,720 --> 00:10:22,880

do the wrong thing with the knob we had

238

00:10:28,150 --> 00:10:25,730

Kady said six channels of video down and

239

00:10:30,340 --> 00:10:28,160

this may be the first space flight space

240

00:10:32,230 --> 00:10:30,350

lab flight ever where video downlink was

241

00:10:35,560 --> 00:10:32,240

not the limiting resource in planning

242

00:10:36,910 --> 00:10:35,570

and also most of the P is left Marshall

243

00:10:38,770 --> 00:10:36,920

at the end of the mission with all of

244

00:10:40,690 --> 00:10:38,780

their data whereas in u.s. ml one it

245

00:10:42,580 --> 00:10:40,700

took seven and a half months to get all

246

00:10:44,380 --> 00:10:42,590

their data out to them so this was the

247

00:10:45,610 --> 00:10:44,390

first demonstration of that it's

248

00:10:49,750 --> 00:10:45,620

something they will certainly need for

249

00:10:51,640 --> 00:10:49,760

space station and that in the data

250

00:10:52,810 --> 00:10:51,650

uplink and downlink we had we're kind of

251
00:10:57,900 --> 00:10:52,820
the first demonstrations of tella

252
00:11:01,660 --> 00:11:00,010
another fluids experiment we had onboard

253
00:11:03,520 --> 00:11:01,670
which was an awful lot of fun was the

254
00:11:06,970 --> 00:11:03,530
fibre supported droplet combustion

255
00:11:09,010 --> 00:11:06,980
experiment we put a small drop of fuel

256
00:11:10,270 --> 00:11:09,020
on a fiber and the only purpose of the

257
00:11:13,030 --> 00:11:10,280
fiber was to keep the drop core we

258
00:11:14,440 --> 00:11:13,040
wanted it to be and ignite it in one

259
00:11:16,240 --> 00:11:14,450
camera view this one you could just see

260
00:11:18,580 --> 00:11:16,250
the drop shrinking as it's being

261
00:11:20,650 --> 00:11:18,590
consumed and another camera view you can

262
00:11:22,600 --> 00:11:20,660
you can't see much of the color of the

263
00:11:24,700 --> 00:11:22,610

flame front but all you but you can see

264

00:11:26,740 --> 00:11:24,710

that the fibre on either side of the of

265

00:11:31,690 --> 00:11:26,750

the drop is being heated and that's

266

00:11:33,190 --> 00:11:31,700

where the flame front is propagating we

267

00:11:35,110 --> 00:11:33,200

learned a lot from doing a drop physics

268

00:11:36,430 --> 00:11:35,120

module and how to deploy these drops and

269

00:11:37,150 --> 00:11:36,440

get these these guys burning there's a

270

00:11:38,980 --> 00:11:37,160

little bit of trouble with this

271

00:11:41,620 --> 00:11:38,990

experiment anybody worked the flight

272

00:11:44,800 --> 00:11:41,630

here knows Mike was our IFM person on

273

00:11:47,170 --> 00:11:44,810

this and got it working we also had

274

00:11:49,840 --> 00:11:47,180

another series of theoretical I'd call

275

00:11:51,250 --> 00:11:49,850

them experiments on crystal growth and

276

00:11:52,990 --> 00:11:51,260

what we were looking at is hard sphere

277

00:11:55,030 --> 00:11:53,000

models and how they would represent the

278

00:11:56,650 --> 00:11:55,040

formation of a crystal structure and the

279

00:11:57,520 --> 00:11:56,660

interface between that crystal structure

280

00:12:00,580 --> 00:11:57,530

and the fluid from it

281

00:12:02,500 --> 00:12:00,590

which it formed and we also use lasers

282

00:12:04,990 --> 00:12:02,510

to look at diffraction patterns to find

283

00:12:06,970 --> 00:12:05,000

out exactly where that interface was and

284

00:12:08,350 --> 00:12:06,980

what kind of crystal formed and the

285

00:12:10,090 --> 00:12:08,360

crystal structures that were form were

286

00:12:11,870 --> 00:12:10,100

not those that were predicted they're

287

00:12:15,319 --> 00:12:11,880

still analyzing why that is

288

00:12:16,819 --> 00:12:15,329

so that was kind of a surprise yeah why

289

00:12:18,170 --> 00:12:16,829

the pelo crew the for them were in the

290

00:12:19,939 --> 00:12:18,180

lab the orbiter crew we had some

291

00:12:22,069 --> 00:12:19,949

experiments up in the mid-deck t that we

292

00:12:23,780 --> 00:12:22,079

were working on we activated and

293

00:12:26,540 --> 00:12:23,790

deactivated some protein crystal growth

294

00:12:28,009 --> 00:12:26,550

experiments we also an from potato

295

00:12:29,329 --> 00:12:28,019

company in Colorado was pretty proud of

296

00:12:32,660 --> 00:12:29,339

the fact we managed to grow five

297

00:12:36,710 --> 00:12:32,670

potatoes in space and well it might talk

298

00:12:40,180 --> 00:12:36,720

about that this is just an example of me

299

00:12:42,949 --> 00:12:40,190

giving some co2 to the plants inside and

300

00:12:45,410 --> 00:12:42,959

the real goal behind the experiment was

301
00:12:46,970 --> 00:12:45,420
to determine how to make a nutrient

302
00:12:49,670 --> 00:12:46,980
delivery system both water and other

303
00:12:51,170 --> 00:12:49,680
nutrients to the plants in case we you

304
00:12:53,420 --> 00:12:51,180
know for long-duration missions we need

305
00:12:56,059 --> 00:12:53,430
to know how to grow those foods so that

306
00:12:58,790 --> 00:12:56,069
we don't have to take them with us the

307
00:13:00,949 --> 00:12:58,800
we also did our part for medical science

308
00:13:02,900 --> 00:13:00,959
and here I'm doing a new vestibular DSO

309
00:13:05,629 --> 00:13:02,910
and it has to do with the Irate your

310
00:13:08,240 --> 00:13:05,639
eyeball contract well this is how we got

311
00:13:10,430 --> 00:13:08,250
all those earth-observing of the

312
00:13:11,780 --> 00:13:10,440
presentation take one was a big

313
00:13:13,970 --> 00:13:11,790

Hasselblad cameras pointing out the

314

00:13:17,389 --> 00:13:13,980

window and this is the scene that the

315

00:13:19,850 --> 00:13:17,399

operator would see up in the top is the

316

00:13:21,379 --> 00:13:19,860

west coast of california and you can see

317

00:13:23,090 --> 00:13:21,389

the the greens or the trees and the

318

00:13:24,559 --> 00:13:23,100

mountains and then the yellow stripe

319

00:13:28,699 --> 00:13:24,569

there in the middle is the northern San

320

00:13:31,550 --> 00:13:28,709

Joaquin Valley the next green stripe is

321

00:13:35,629 --> 00:13:31,560

the Sierra Nevada and then you'll see

322

00:13:37,579 --> 00:13:35,639

the Browns of the high desert Lake Tahoe

323

00:13:39,860 --> 00:13:37,589

and Pyramid Lake will just start to come

324

00:13:41,329 --> 00:13:39,870

into view you see it does it go by very

325

00:13:45,290 --> 00:13:41,339

fast most of you've seen this sort of

326

00:13:46,939 --> 00:13:45,300

view before but you really realize

327

00:13:48,949 --> 00:13:46,949

you're you're going fast when you think

328

00:13:53,900 --> 00:13:48,959

of it the distance involved and just

329

00:13:56,179 --> 00:13:53,910

this 30 or 40 second picture first week

330

00:13:59,840 --> 00:13:56,189

we had really clear views of almost the

331

00:14:01,639 --> 00:13:59,850

whole United States so we got to take a

332

00:14:04,400 --> 00:14:01,649

lot of shots of a lot of different

333

00:14:16,850 --> 00:14:04,410

cities especially a potato country in

334

00:14:21,980 --> 00:14:18,890

this next sequence here is over the

335

00:14:23,480 --> 00:14:21,990

we're currently over India now looking

336

00:14:25,430 --> 00:14:23,490

north and those are the Himalayas

337

00:14:28,940 --> 00:14:25,440

they're in the middle of the screen with

338

00:14:30,380 --> 00:14:28,950

the Brahmaputra River both on the south

339

00:14:32,210 --> 00:14:30,390

side of the Himalayas and also on the

340

00:14:34,870 --> 00:14:32,220

north side of the Himalayas and you can

341

00:14:38,030 --> 00:14:34,880

see the vast difference in both color

342

00:14:41,900 --> 00:14:38,040

which basically is vegetation and also

343

00:14:44,500 --> 00:14:41,910

elevation this was super typhoon Angela

344

00:14:48,020 --> 00:14:44,510

which was taken over the Philippine Sea

345

00:14:50,450 --> 00:14:48,030

which hit that set of islands with winds

346

00:14:52,400 --> 00:14:50,460

over 200 miles an hour and you can just

347

00:14:55,070 --> 00:14:52,410

make out the circular formation in the

348

00:14:58,310 --> 00:14:55,080

clouds although on this particular shot

349

00:15:00,260 --> 00:14:58,320

you don't really get any sense of an eye

350

00:15:02,170 --> 00:15:00,270

in the middle of that hurricane but it

351

00:15:04,700 --> 00:15:02,180

was certainly strong nonetheless

352

00:15:07,520 --> 00:15:04,710

this was an attempt at a night scene

353

00:15:11,360 --> 00:15:07,530

we're over a sort of central United

354

00:15:14,060 --> 00:15:11,370

States here looking west and with that

355

00:15:15,590 --> 00:15:14,070

line on the left isn't to the horizon

356

00:15:17,060 --> 00:15:15,600

believe it or not it's the edge of the

357

00:15:19,130 --> 00:15:17,070

atmosphere and that'll become more clear

358

00:15:21,350 --> 00:15:19,140

in a second but if you watch this star

359

00:15:23,240 --> 00:15:21,360

up here it'll actually go below it and

360

00:15:24,560 --> 00:15:23,250

you'll see it what what will look like

361

00:15:25,820 --> 00:15:24,570

through the earth so that's clearly not

362

00:15:27,920 --> 00:15:25,830

the edge of the earth so this is a

363

00:15:30,490 --> 00:15:27,930

thickness of the atmosphere and these

364

00:15:33,050 --> 00:15:30,500

are the lights of big cities there were

365

00:15:35,750 --> 00:15:33,060

Washington Baltimore Philadelphia and

366

00:15:38,090 --> 00:15:35,760

here comes the Big Apple and as the Sun

367

00:15:40,240 --> 00:15:38,100

rises which is about to do it washes out

368

00:15:42,950 --> 00:15:40,250

the camera the sensitivity changes and

369

00:15:50,060 --> 00:15:42,960

sort of made our own fade to white I

370

00:15:55,080 --> 00:15:53,490

the Bailey maintance was done in filter

371

00:15:56,730 --> 00:15:55,090

cleaning and being the palette I got to

372

00:15:58,260 --> 00:15:56,740

do that and the filter clean and I

373

00:16:01,800 --> 00:15:58,270

enjoyed a lot more than that keeping the

374

00:16:03,510 --> 00:16:01,810

WCS clean the like here on earth dust

375

00:16:05,640 --> 00:16:03,520

there's no floor there's no dance what

376

00:16:06,990 --> 00:16:05,650

dust accumulates in the different places

377

00:16:08,220 --> 00:16:07,000

in the filters because it's always

378

00:16:10,500 --> 00:16:08,230

floating in the air so anywhere it's

379

00:16:13,650 --> 00:16:10,510

drawing you've got to make sure you get

380

00:16:15,660 --> 00:16:13,660

to it space did lend itself to some

381

00:16:18,540 --> 00:16:15,670

innovative cleaning styles that were a

382

00:16:21,180 --> 00:16:18,550

lot more fun up there than on earth we

383

00:16:23,520 --> 00:16:21,190

carried out another computer on board to

384

00:16:26,010 --> 00:16:23,530

do the pilot simulation that was a

385

00:16:27,210 --> 00:16:26,020

really useful piece of gear I thought to

386

00:16:28,680 --> 00:16:27,220

help me prepare for my first space

387

00:16:32,130 --> 00:16:28,690

shuttle landing and this would have

388

00:16:35,490 --> 00:16:32,140

looked like on the scene just like at

389

00:16:37,890 --> 00:16:35,500

the window of the real order this is the

390

00:16:39,690 --> 00:16:37,900

blue crew enjoying a lunch as you can

391

00:16:41,580 --> 00:16:39,700

see I'm finishing up my lunch back there

392

00:16:43,950 --> 00:16:41,590

fred is cleaning his silverware with a

393

00:16:46,020 --> 00:16:43,960

handy white and katie has probably read

394

00:16:48,390 --> 00:16:46,030

the news some humorous story but we did

395

00:16:50,670 --> 00:16:48,400

that we got an hour off in the middle of

396

00:16:53,010 --> 00:16:50,680

our 12-hour day and the mail would get

397

00:16:59,620 --> 00:16:53,020

up electronically on a keyboard sort of

398

00:17:04,360 --> 00:17:02,170

we got our mail up on the KCA link I'll

399

00:17:05,800 --> 00:17:04,370

talk about anything yeah you may have

400

00:17:07,210 --> 00:17:05,810

seen us we got the chance to throw out

401
00:17:08,410 --> 00:17:07,220
the first pitch in Game five of the

402
00:17:13,150 --> 00:17:08,420
World Series which is really a lot of

403
00:17:14,890 --> 00:17:13,160
fun and more importantly we got a chance

404
00:17:16,449 --> 00:17:14,900
to watch it you see us in the lower

405
00:17:18,610 --> 00:17:16,459
right hand corner watching the monitor

406
00:17:22,060 --> 00:17:18,620
and we're seeing the image that you see

407
00:17:23,680 --> 00:17:22,070
in the upper left hand corner and that

408
00:17:24,939 --> 00:17:23,690
at the end of the mission are close to

409
00:17:26,230 --> 00:17:24,949
the end of the mission we had put

410
00:17:27,610 --> 00:17:26,240
everything where we're getting a little

411
00:17:35,710 --> 00:17:27,620
bored so we decided that would do a

412
00:17:37,570 --> 00:17:35,720
little magic show and I've tried for

413
00:17:40,280 --> 00:17:37,580

years to do that never been able to do

414

00:17:58,040 --> 00:17:42,660

how the trick was to get it down without

415

00:18:02,540 --> 00:18:01,220

I was a pretty good magician it's

416

00:18:05,000 --> 00:18:02,550

important to take those breaks on-orbit

417

00:18:08,360 --> 00:18:05,010

they help you stay recharged and and do

418

00:18:09,800 --> 00:18:08,370

good work while you're up there all good

419

00:18:11,060 --> 00:18:09,810

things have to come to an end and this

420

00:18:11,510 --> 00:18:11,070

is how we started getting ready to come

421

00:18:12,950 --> 00:18:11,520

home

422

00:18:15,860 --> 00:18:12,960

checking out the systems on the orbiter

423

00:18:16,550 --> 00:18:15,870

and it was time to close up the payload

424

00:18:17,830 --> 00:18:16,560

bay doors

425

00:18:22,880 --> 00:18:17,840

say goodbye to the view out the window

426

00:18:24,500 --> 00:18:22,890

and get ready to come home the entry was

427

00:18:26,630 --> 00:18:24,510

spectacular being a first-timer sitting

428

00:18:28,040 --> 00:18:26,640

up in the front the orange pink glow was

429

00:18:29,840 --> 00:18:28,050

just fantastic looking through the

430

00:18:32,660 --> 00:18:29,850

windows this was a shot on entry taken

431

00:18:34,730 --> 00:18:32,670

from a game Danvers on top of his house

432

00:18:36,590 --> 00:18:34,740

with his just his handy cam and sent it

433

00:18:39,260 --> 00:18:36,600

to us anyway we came around the hack

434

00:18:41,240 --> 00:18:39,270

shortly after sunrise coming down the 18

435

00:18:43,190 --> 00:18:41,250

of a glide slope of 300 knots socks just

436

00:18:45,950 --> 00:18:43,200

had the guidance Neill doing a beautiful

437

00:18:48,380 --> 00:18:45,960

job it's very dynamic it's like trying

438

00:18:50,330 --> 00:18:48,390

to land a bomb because this little

439

00:18:52,970 --> 00:18:50,340

bombing profile that you'd fly in the

440

00:18:54,560 --> 00:18:52,980

Navy I got the gear out of 300 feet they

441

00:18:56,150 --> 00:18:54,570

came across the threshold right where we

442

00:18:58,160 --> 00:18:56,160

should have been touched in 2500 feet

443

00:18:59,660 --> 00:18:58,170

down the runway and the landing was so

444

00:19:02,750 --> 00:18:59,670

smooth I'd like to take this chance to

445

00:19:04,100 --> 00:19:02,760

brag about socks it's uncharacteristic

446

00:19:07,610 --> 00:19:04,110

of a Navy pilot but this line it was so

447

00:19:09,560 --> 00:19:07,620

smooth I was like on an airline landing

448

00:19:11,240 --> 00:19:09,570

when the landing is so smooth everybody

449

00:19:12,650 --> 00:19:11,250

in the cabin just claps and cheers and

450

00:19:14,480 --> 00:19:12,660

in fact that's what happened on landing

451
00:19:17,540 --> 00:19:14,490
when we touched down they could barely

452
00:19:18,650 --> 00:19:17,550
tell it touched them Kant had to do the

453
00:19:19,850 --> 00:19:18,660
most important thing on the mission

454
00:19:23,270 --> 00:19:19,860
they'll get the gear down you can see he

455
00:19:26,000 --> 00:19:23,280
did that successful Columbia was a

456
00:19:27,410 --> 00:19:26,010
beautiful vehicle it's a little slow

457
00:19:28,910 --> 00:19:27,420
getting off the pad but it was worth the

458
00:19:32,030 --> 00:19:28,920
wait because when we got out there there

459
00:19:33,950 --> 00:19:32,040
were very few problems and it really

460
00:19:37,160 --> 00:19:33,960
proved itself to be a wonderful platform

461
00:19:38,660 --> 00:19:37,170
for science this is our KU patch and a

462
00:19:40,850 --> 00:19:38,670
couple things jump out at you right away

463
00:19:41,990 --> 00:19:40,860

and those are the colors the I was in

464

00:19:44,330 --> 00:19:42,000

charge of the patch and we wouldn't

465

00:19:45,530 --> 00:19:44,340

baptists very democratically I basically

466

00:19:47,330 --> 00:19:45,540

asked the crew what colors they liked

467

00:19:51,060 --> 00:19:47,340

the commander like purple and hence

468

00:19:55,330 --> 00:19:53,859

that's not exactly - there also there

469

00:19:57,039 --> 00:19:55,340

was a common thread in the orbiter crew

470

00:19:58,720 --> 00:19:57,049

which is represented by the background

471

00:20:03,279 --> 00:19:58,730

and although that may look black it is

472

00:20:05,139 --> 00:20:03,289

actually a navy blue the different

473

00:20:07,450 --> 00:20:05,149

polyhedrons you see only of the patch

474

00:20:10,080 --> 00:20:07,460

they represent Chris Eyre the basic

475

00:20:12,220 --> 00:20:10,090

elements fire earth air and water and

476

00:20:14,109 --> 00:20:12,230

what we're trying to show here is the

477

00:20:15,879 --> 00:20:14,119

Space Shuttle encompassed by the shape

478

00:20:18,580 --> 00:20:15,889

of its patch itself which is thought to

479

00:20:21,190 --> 00:20:18,590

have represent the cosmos dodecahedron

480

00:20:24,310 --> 00:20:21,200

is the Space Shuttle doing science on

481

00:20:26,889 --> 00:20:24,320

the basic elements the one symbol looks

482

00:20:29,489 --> 00:20:26,899

like an infinity sign we refer to that

483

00:20:31,930 --> 00:20:29,499

as the Fred Leslie sign although the

484

00:20:33,789 --> 00:20:31,940

crystal like looking figures are

485

00:20:35,950 --> 00:20:33,799

actually polyhedrons which in turn

486

00:20:38,440 --> 00:20:35,960

represent fluids we put this other

487

00:20:40,749 --> 00:20:38,450

symbol on to emphasise fluids for Fred

488

00:20:46,080 --> 00:20:40,759

Leslie on the troca the next slide

489

00:20:51,399 --> 00:20:49,450

well this was a great moment here after

490

00:20:53,499 --> 00:20:51,409

seven attempts and three strappings we

491

00:20:56,619 --> 00:20:53,509

finally got to launch on October the

492

00:20:59,529 --> 00:20:56,629

20th I get a lot of questions about

493

00:21:02,710 --> 00:20:59,539

whether I was scared or not and and I

494

00:21:04,330 --> 00:21:02,720

really in honesty was not scared and I

495

00:21:05,980 --> 00:21:04,340

think there's two reasons for that one

496

00:21:08,320 --> 00:21:05,990

was because it was our seventh attempt

497

00:21:12,279 --> 00:21:08,330

and the second was because of our

498

00:21:14,409 --> 00:21:12,289

training team we had a great group of

499

00:21:16,899 --> 00:21:14,419

folks that helped us out and in fact I'd

500

00:21:18,609 --> 00:21:16,909

like to recognize Tory Palmer who was

501
00:21:21,129 --> 00:21:18,619
our data processing system and nav

502
00:21:24,460 --> 00:21:21,139
instructor Francisco Hernandez our

503
00:21:28,299 --> 00:21:24,470
control prop @eq Tran was our common

504
00:21:30,909 --> 00:21:28,309
instrumentation and heckle and Jeckle

505
00:21:33,669 --> 00:21:30,919
tom evans I mean Tom Hanson and Craig

506
00:21:35,769 --> 00:21:33,679
will thing whereas orbiter systems and

507
00:21:38,049 --> 00:21:35,779
Tommy Tom Evans and Rodney Brown taught

508
00:21:39,789 --> 00:21:38,059
us or Space Lab systems and I think

509
00:21:41,560 --> 00:21:39,799
largely due to their efforts we were

510
00:21:43,629 --> 00:21:41,570
really comfortable going uphill I mean

511
00:21:45,249 --> 00:21:43,639
as a first-time flyer this is quite an

512
00:21:47,980 --> 00:21:45,259
experience and it was nice to be able to

513
00:21:49,419 --> 00:21:47,990

really just enjoy the ride and feel that

514

00:21:51,070 --> 00:21:49,429

I was confident along with the rest of

515

00:21:56,830 --> 00:21:51,080

the crew to be able to handle any

516

00:21:59,019 --> 00:21:56,840

contingency that came up I also like to

517

00:22:01,840 --> 00:21:59,029

thank Don carico who is our photography

518

00:22:03,220 --> 00:22:01,850

instructor who without whose help we

519

00:22:03,970 --> 00:22:03,230

could have taken some great shots like

520

00:22:06,580 --> 00:22:03,980

these

521

00:22:08,530 --> 00:22:06,590

and this is a shot of the eastern

522

00:22:10,720 --> 00:22:08,540

Mediterranean here and it's it's

523

00:22:13,120 --> 00:22:10,730

interesting for a couple of reasons one

524

00:22:14,350 --> 00:22:13,130

check out on top here this how black the

525

00:22:16,810 --> 00:22:14,360

space is that was something that really

526

00:22:19,750 --> 00:22:16,820

hit you during the daytime when you

527

00:22:21,820 --> 00:22:19,760

can't see the stars the blackness of

528

00:22:24,610 --> 00:22:21,830

space is just that it's the blackest

529

00:22:26,650 --> 00:22:24,620

black I've ever seen and then you can

530

00:22:28,270 --> 00:22:26,660

see quite a myriad of colors here this

531

00:22:30,850 --> 00:22:28,280

down here is the eastern Mediterranean

532

00:22:33,460 --> 00:22:30,860

this is the eastern end of the island of

533

00:22:35,049 --> 00:22:33,470

Cyprus this is Western Turkey and you

534

00:22:37,840 --> 00:22:35,059

can see some coastal mountains here and

535

00:22:43,570 --> 00:22:37,850

a higher plateau this would be Syria and

536

00:22:44,890 --> 00:22:43,580

Lebanon down here yeah as we're flying

537

00:22:46,570 --> 00:22:44,900

along there were different regions and

538

00:22:48,700 --> 00:22:46,580

different colors that stood at and this

539

00:22:51,250 --> 00:22:48,710

was one area when you cross the the east

540

00:22:52,510 --> 00:22:51,260

coast of the US Florida the Bahamas and

541

00:22:54,909 --> 00:22:52,520

this is actually in the Gulf of Grand

542

00:22:57,250 --> 00:22:54,919

Cayman the coral reefs and the coral

543

00:22:59,169 --> 00:22:57,260

shells were just incredibly brilliant

544

00:23:02,169 --> 00:22:59,179

blue aqua that you can see in this

545

00:23:04,150 --> 00:23:02,179

region and so it's amazing but I bet all

546

00:23:06,280 --> 00:23:04,160

the islands even the secure islands the

547

00:23:07,870 --> 00:23:06,290

Solomon Islands in the Pacific we wind

548

00:23:10,720 --> 00:23:07,880

up getting a lot of shot at shots up

549

00:23:14,039 --> 00:23:10,730

because the contrast is just so great it

550

00:23:15,850 --> 00:23:14,049

captures you and they make lovely photos

551

00:23:20,820 --> 00:23:15,860

unfortunately the photos don't do it

552

00:23:25,450 --> 00:23:23,680

this is a shot of another shot of the

553

00:23:27,120 --> 00:23:25,460

eastern Mediterranean but this time on

554

00:23:29,320 --> 00:23:27,130

the southern end this is the

555

00:23:31,090 --> 00:23:29,330

Mediterranean Sea here this is the

556

00:23:34,150 --> 00:23:31,100

coastline obviously and this right here

557

00:23:35,320 --> 00:23:34,160

is a border between Egypt on this side

558

00:23:36,970 --> 00:23:35,330

and Israel on this side and what's

559

00:23:38,860 --> 00:23:36,980

interesting about this is you can really

560

00:23:40,570 --> 00:23:38,870

see the difference in the way the two

561

00:23:43,180 --> 00:23:40,580

countries use a land it's not often you

562

00:23:44,680 --> 00:23:43,190

can see a political boundary visually

563

00:23:46,930 --> 00:23:44,690

from space and this is a nice

564

00:23:48,730 --> 00:23:46,940

opportunity to be able to do that this

565

00:23:54,610 --> 00:23:48,740

part up here is the Gaza Strip and this

566

00:23:59,139 --> 00:23:56,860

the here we're coming across San

567

00:24:00,730 --> 00:23:59,149

Francisco Bay area and it was amazing

568

00:24:02,710 --> 00:24:00,740

the detail you could see and we were

569

00:24:04,539 --> 00:24:02,720

fortunate that we had a lot of super

570

00:24:07,180 --> 00:24:04,549

clear days and we could look down and

571

00:24:08,560 --> 00:24:07,190

just see incredible detail in this slide

572

00:24:10,749 --> 00:24:08,570

it's a little tougher but right here is

573

00:24:12,730 --> 00:24:10,759

the Golden Gate Bridge you can see with

574

00:24:14,470 --> 00:24:12,740

your naked eye buildings and depending

575

00:24:17,409 --> 00:24:14,480

on the lighting you could see shadows

576

00:24:19,659 --> 00:24:17,419

but you come on down and in this region

577

00:24:21,669 --> 00:24:19,669

of San Francisco International and down

578

00:24:23,529 --> 00:24:21,679

on toward down towards San Jose which is

579

00:24:25,480 --> 00:24:23,539

actually under the tail Alameda Naval

580

00:24:27,460 --> 00:24:25,490

Air Station is over here off of this

581

00:24:29,950 --> 00:24:27,470

base yeah

582

00:24:31,180 --> 00:24:29,960

they a one-one comment we got back from

583

00:24:32,859 --> 00:24:31,190

all the folks that looked at our photos

584

00:24:33,940 --> 00:24:32,869

where they said boy you know we can we

585

00:24:35,049 --> 00:24:33,950

should know where their airports are

586

00:24:37,350 --> 00:24:35,059

because in the center of every one of

587

00:24:39,190 --> 00:24:37,360

our photos are having to be an airport I

588

00:24:40,690 --> 00:24:39,200

don't know if that anything to do with

589

00:24:42,999 --> 00:24:40,700

the three of us being pilots on the

590

00:24:44,560 --> 00:24:43,009

flight deck or not but the runways

591

00:24:46,629 --> 00:24:44,570

because they're so long and straight

592

00:24:48,460 --> 00:24:46,639

they stand out and there's something

593

00:24:49,749 --> 00:24:48,470

that catches your naked eye or if you're

594

00:25:00,430 --> 00:24:49,759

looking through a telephoto camera lens

595

00:25:02,259 --> 00:25:00,440

they really stick out next time the this

596

00:25:04,629 --> 00:25:02,269

is just it kind of represent the

597

00:25:06,009 --> 00:25:04,639

different colors that you see when we

598

00:25:07,930 --> 00:25:06,019

get on a little but open the payload bay

599

00:25:10,029 --> 00:25:07,940

doors this looks like to me like the

600

00:25:12,489 --> 00:25:10,039

shot over Australia representing the red

601
00:25:13,989 --> 00:25:12,499
land of Australia the other thing it

602
00:25:16,600 --> 00:25:13,999
shows you is the attitude that we flew

603
00:25:19,649 --> 00:25:16,610
in the because of orbital debris we had

604
00:25:21,609 --> 00:25:19,659
the one door rolled in part way in

605
00:25:22,989 --> 00:25:21,619
unfortunately it did cut down quite a

606
00:25:25,930 --> 00:25:22,999
bit on our opportunities for earth

607
00:25:27,519 --> 00:25:25,940
obstacles as far as lead time we would

608
00:25:29,710 --> 00:25:27,529
see him who would seem once they get to

609
00:25:32,619 --> 00:25:29,720
the tail and go on the left side of us

610
00:25:34,149 --> 00:25:32,629
basically Dan wind from us the up and

611
00:25:36,129 --> 00:25:34,159
coming targets were difficult to see

612
00:25:38,350 --> 00:25:36,139
what the door in this position the good

613
00:25:41,710 --> 00:25:38,360

news is our family didn't take a hit and

614

00:25:45,070 --> 00:25:41,720

they lasted the whole flight that's also

615

00:25:46,960 --> 00:25:45,080

is a good reminder the awards that you

616

00:25:48,730 --> 00:25:46,970

saw before what the thermal teams this

617

00:25:50,019 --> 00:25:48,740

door being partially close like that

618

00:25:52,869 --> 00:25:50,029

really caused a lot of headaches on the

619

00:25:54,430 --> 00:25:52,879

ground and and thanks to them for us it

620

00:25:57,930 --> 00:25:54,440

was by and large transparent but they

621

00:26:00,999 --> 00:25:57,940

did a lot of work to work these problems

622

00:26:02,710 --> 00:26:01,009

the picture before last was a big area

623

00:26:04,299 --> 00:26:02,720

and in just about a minute and a half

624

00:26:06,070 --> 00:26:04,309

after the bay area this is what we're

625

00:26:07,590 --> 00:26:06,080

looking at and it was really interesting

626

00:26:09,090 --> 00:26:07,600

taking photos we'd be

627

00:26:10,950 --> 00:26:09,100

in trading on say the barrier taking

628

00:26:14,070 --> 00:26:10,960

shots or whatever coastal city we were

629

00:26:15,270 --> 00:26:14,080

over at California and you'd look up and

630

00:26:16,830 --> 00:26:15,280

the next thing under the tail there

631

00:26:18,779 --> 00:26:16,840

would be a view of this which is a large

632

00:26:20,580 --> 00:26:18,789

contrast to what you just seen and this

633

00:26:22,610 --> 00:26:20,590

is an Arizona in Utah Lake pal it's

634

00:26:24,720 --> 00:26:22,620

about 180 miles along the Colorado River

635

00:26:27,000 --> 00:26:24,730

which is dammed up and then eventually

636

00:26:29,400 --> 00:26:27,010

goes on into the Grand Canyon but the

637

00:26:38,430 --> 00:26:29,410

contrasting colors are just gorgeous on

638

00:26:39,899 --> 00:26:38,440

this shot this is clearly Cape Cod we

639

00:26:43,289 --> 00:26:39,909

have a couple crewmembers who have roots

640

00:26:44,880 --> 00:26:43,299

there Katie and al al obviously is from

641

00:26:47,880 --> 00:26:44,890

Worcester which if I'm not mistaken is

642

00:26:49,590 --> 00:26:47,890

right around there and this is a real

643

00:26:51,539 --> 00:26:49,600

nice shot on 39 degree inclination

644

00:26:54,330 --> 00:26:51,549

flight we don't quite get up to be able

645

00:26:56,250 --> 00:26:54,340

to take this shot Nader but as you can

646

00:26:58,740 --> 00:26:56,260

see on a clear day you can really get a

647

00:27:01,380 --> 00:26:58,750

really nice synopsis here's the city of

648

00:27:08,250 --> 00:27:01,390

Boston here and in the bottom Nantucket

649

00:27:09,630 --> 00:27:08,260

and Martha's Vineyard the in addition to

650

00:27:12,419 --> 00:27:09,640

shoot in color feeling like you just saw

651
00:27:14,820 --> 00:27:12,429
we shoot some color IR photos this is a

652
00:27:17,520 --> 00:27:14,830
shot of Maui and you can see the clouds

653
00:27:18,810 --> 00:27:17,530
the IR does a real nice job of cutting

654
00:27:21,000 --> 00:27:18,820
through haze although there wasn't that

655
00:27:22,590 --> 00:27:21,010
much haze at Maui on this shot but

656
00:27:25,169 --> 00:27:22,600
certain times you go over cities like

657
00:27:27,360 --> 00:27:25,179
Mexico City a population of over 20

658
00:27:29,850 --> 00:27:27,370
million very hazy and smoggy to the

659
00:27:31,740 --> 00:27:29,860
naked eye and the Colorado film can help

660
00:27:33,120 --> 00:27:31,750
cut through that significantly and you

661
00:27:35,070 --> 00:27:33,130
can just see it helps represent the

662
00:27:36,899 --> 00:27:35,080
different contrasts or fluid levels in

663
00:27:43,100 --> 00:27:36,909

plants and help you draw lines of

664

00:27:48,830 --> 00:27:47,510

this is a San Diego Bay here you'll

665

00:27:49,940 --> 00:27:48,840

notice the detail in this shot you'll

666

00:27:51,650 --> 00:27:49,950

notice the colors are a little bit

667

00:27:53,480 --> 00:27:51,660

different what's kind of remarkable is

668

00:27:55,580 --> 00:27:53,490

this is an electronic still camera shot

669

00:27:57,799 --> 00:27:55,590

which means the image could be down on

670

00:28:00,470 --> 00:27:57,809

the ground within 50 minutes of when we

671

00:28:03,260 --> 00:28:00,480

took the picture and out on the internet

672

00:28:05,720 --> 00:28:03,270

maybe an hour two hours later if all

673

00:28:06,860 --> 00:28:05,730

adjust except for it so it's nice to be

674

00:28:09,350 --> 00:28:06,870

able to send this kind of information

675

00:28:11,180 --> 00:28:09,360

from space down to the ground and with

676

00:28:15,460 --> 00:28:11,190

almost the the detail that we can get

677

00:28:20,000 --> 00:28:18,530

and now we wanted to throw you in

678

00:28:21,980 --> 00:28:20,010

another shot here if you look real close

679

00:28:24,049 --> 00:28:21,990

you can see the Johnson Space Center in

680

00:28:26,000 --> 00:28:24,059

the center of that picture and clear

681

00:28:27,260 --> 00:28:26,010

like we leave it up there second so you

682

00:28:29,240 --> 00:28:27,270

can kind of soak it in

683

00:28:32,030 --> 00:28:29,250

Ellington fields on the left if you need

684

00:28:36,039 --> 00:28:32,040

to get your bearings hope we can

685

00:28:38,810 --> 00:28:36,049

continue to fly these Spacelab missions