



1  
00:01:13,429 --> 00:01:10,630  
well good afternoon houston

2  
00:01:15,109 --> 00:01:13,439  
i'm tom jones mission specialist on the

3  
00:01:17,749 --> 00:01:15,119  
space shuttle columbia

4  
00:01:20,469 --> 00:01:17,759  
on mission sts 80. i'm here on the

5  
00:01:23,109 --> 00:01:20,479  
flight deck of columbia we're about 220

6  
00:01:25,350 --> 00:01:23,119  
miles above the surface of the earth

7  
00:01:26,630 --> 00:01:25,360  
eastward across the western pacific

8  
00:01:28,550 --> 00:01:26,640  
ocean now

9  
00:01:30,870 --> 00:01:28,560  
at a speed of about

10  
00:01:32,390 --> 00:01:30,880  
five miles every second about 17 000

11  
00:01:35,830 --> 00:01:32,400  
miles an hour

12  
00:01:37,749 --> 00:01:35,840  
we're on the fifth day of our mission

13  
00:01:39,350 --> 00:01:37,759

had a very successful deploy of two

14

00:01:41,429 --> 00:01:39,360

satellites so far in the flight they're

15

00:01:42,550 --> 00:01:41,439

trailing us in formation out there

16

00:01:44,789 --> 00:01:42,560

behind us we just saw them in the

17

00:01:47,350 --> 00:01:44,799

windows a few moments ago

18

00:01:49,670 --> 00:01:47,360

one's an astronomy satellite and one is

19

00:01:51,910 --> 00:01:49,680

a material science satellite

20

00:01:53,990 --> 00:01:51,920

helping us understand how to make

21

00:01:55,109 --> 00:01:54,000

higher performance semiconducting

22

00:01:57,590 --> 00:01:55,119

materials

23

00:01:59,030 --> 00:01:57,600

for the electronics industry in space

24

00:02:01,749 --> 00:01:59,040

our astronomy mission is out there

25

00:02:03,350 --> 00:02:01,759

looking at stars throughout the universe

26

00:02:05,590 --> 00:02:03,360

looking especially at

27

00:02:08,790 --> 00:02:05,600

very hot objects in the universe black

28

00:02:10,710 --> 00:02:08,800

holes white dwarf stars and the

29

00:02:13,589 --> 00:02:10,720

cool gases that float in between those

30

00:02:15,670 --> 00:02:13,599

bright hot stars and our own uh

31

00:02:18,070 --> 00:02:15,680

world we're finding out a lot about the

32

00:02:20,229 --> 00:02:18,080

universe and our own future in space

33

00:02:22,229 --> 00:02:20,239

with those two satellites out there

34

00:02:23,990 --> 00:02:22,239

columbia also is a flying research

35

00:02:26,309 --> 00:02:24,000

laboratory in its own right we have a

36

00:02:27,670 --> 00:02:26,319

lot of experiments going on downstairs

37

00:02:29,030 --> 00:02:27,680

even as we speak

38

00:02:30,869 --> 00:02:29,040

in the middeck

39

00:02:32,390 --> 00:02:30,879

we're looking at an experiment called

40

00:02:33,589 --> 00:02:32,400

ucpl

41

00:02:35,030 --> 00:02:33,599

and that's a

42

00:02:36,630 --> 00:02:35,040

heat transfer device that could be used

43

00:02:38,630 --> 00:02:36,640

on future satellites

44

00:02:40,630 --> 00:02:38,640

out in the payload bay we have

45

00:02:42,150 --> 00:02:40,640

some research experiments going on too

46

00:02:43,589 --> 00:02:42,160

one in particular i'd like to talk to

47

00:02:47,030 --> 00:02:43,599

you about today is called space

48

00:02:48,710 --> 00:02:47,040

experiment module or sem

49

00:02:51,670 --> 00:02:48,720

and the purpose of the space experiment

50

00:02:53,350 --> 00:02:51,680

module is to inspire and excite the

51  
00:02:54,869 --> 00:02:53,360  
young people down there on our own

52  
00:02:56,710 --> 00:02:54,879  
planet today

53  
00:02:58,630 --> 00:02:56,720  
to look for a better education for

54  
00:03:00,790 --> 00:02:58,640  
themselves and perhaps careers in math

55  
00:03:01,830 --> 00:03:00,800  
and science and space exploration one

56  
00:03:03,670 --> 00:03:01,840  
day

57  
00:03:05,350 --> 00:03:03,680  
but we have a more direct way to inspire

58  
00:03:06,710 --> 00:03:05,360  
people today by using our research

59  
00:03:09,190 --> 00:03:06,720  
facilities on the columbia that's with

60  
00:03:10,309 --> 00:03:09,200  
the space experiment module it gives

61  
00:03:11,509 --> 00:03:10,319  
students a chance to actually

62  
00:03:13,589 --> 00:03:11,519  
participate

63  
00:03:15,670 --> 00:03:13,599

in experiments in space

64

00:03:17,589 --> 00:03:15,680

and we hope that that will give students

65

00:03:18,630 --> 00:03:17,599

around the country a hands-on

66

00:03:19,350 --> 00:03:18,640

opportunity

67

00:03:21,670 --> 00:03:19,360

for

68

00:03:23,670 --> 00:03:21,680

a learning experience that will inspire

69

00:03:26,309 --> 00:03:23,680

their future careers in math and science

70

00:03:28,470 --> 00:03:26,319

and space exploration we hope then

71

00:03:31,270 --> 00:03:28,480

hope the space experiment module work

72

00:03:32,550 --> 00:03:31,280

will spur them to a greater interest in

73

00:03:34,630 --> 00:03:32,560

career fields that we'll all benefit

74

00:03:37,030 --> 00:03:34,640

from one day and generally we hope that

75

00:03:38,390 --> 00:03:37,040

this will just lead students to perform

76

00:03:40,630 --> 00:03:38,400

better in school and take a greater

77

00:03:42,070 --> 00:03:40,640

interest in their own education

78

00:03:44,550 --> 00:03:42,080

now let me give you some facts about the

79

00:03:46,710 --> 00:03:44,560

space experiment module it's about the

80

00:03:49,030 --> 00:03:46,720

size of a large trash can and flies out

81

00:03:51,190 --> 00:03:49,040

in the payload bay of columbia it weighs

82

00:03:53,990 --> 00:03:51,200

about 700 pounds and has about five

83

00:03:56,949 --> 00:03:54,000

cubic feet of usable volume

84

00:03:58,550 --> 00:03:56,959

inside the sealed canister which is just

85

00:03:59,589 --> 00:03:58,560

like a getaway special that we find on

86

00:04:01,110 --> 00:03:59,599

other missions

87

00:04:03,350 --> 00:04:01,120

is a

88

00:04:05,830 --> 00:04:03,360

pressure of one atmosphere so inside the

89

00:04:07,190 --> 00:04:05,840

can we have a weightless environment but

90

00:04:09,990 --> 00:04:07,200

one that's pressurized to the same

91

00:04:12,229 --> 00:04:10,000

atmosphere atmosphere we have on earth

92

00:04:15,030 --> 00:04:12,239

and the space experiment module

93

00:04:15,750 --> 00:04:15,040

teaches kids to use the tools of science

94

00:04:17,670 --> 00:04:15,760

to

95

00:04:19,430 --> 00:04:17,680

explore the world around them

96

00:04:22,469 --> 00:04:19,440

and it gives teachers the opportunity to

97

00:04:24,390 --> 00:04:22,479

use a new way to teach science and math

98

00:04:27,110 --> 00:04:24,400

and inspire their students with real

99

00:04:29,670 --> 00:04:27,120

space activities

100

00:04:31,749 --> 00:04:29,680

students use this lab on columbia to do

101  
00:04:34,390 --> 00:04:31,759  
experiments in the payload bay

102  
00:04:35,749 --> 00:04:34,400  
and they as a result get hands-on

103  
00:04:37,270 --> 00:04:35,759  
experience with

104  
00:04:39,430 --> 00:04:37,280  
a real working experiment that they

105  
00:04:41,749 --> 00:04:39,440  
construct themselves with nasa's help

106  
00:04:42,870 --> 00:04:41,759  
now nasa provides the laboratory

107  
00:04:45,270 --> 00:04:42,880  
if you will

108  
00:04:46,870 --> 00:04:45,280  
we provide the laboratory workbench the

109  
00:04:49,270 --> 00:04:46,880  
bunsen burners the test tubes the

110  
00:04:50,870 --> 00:04:49,280  
electricity even the computers for the

111  
00:04:52,230 --> 00:04:50,880  
students to do their experiments just

112  
00:04:54,150 --> 00:04:52,240  
like we would in a laboratory on the

113  
00:04:56,390 --> 00:04:54,160

earth here those facilities are in the

114

00:04:59,189 --> 00:04:56,400

space experiment module and the students

115

00:05:01,189 --> 00:04:59,199

then provide the imagination the ideas

116

00:05:02,550 --> 00:05:01,199

for the experiments and the energy to

117

00:05:04,469 --> 00:05:02,560

carry them out

118

00:05:06,230 --> 00:05:04,479

and we hope after these 16 days in orbit

119

00:05:08,150 --> 00:05:06,240

the space experiment module

120

00:05:09,749 --> 00:05:08,160

will return a lot of successful and

121

00:05:11,110 --> 00:05:09,759

exciting results to all of the young

122

00:05:12,710 --> 00:05:11,120

experimenters across the country that

123

00:05:13,670 --> 00:05:12,720

are participating

124

00:05:14,950 --> 00:05:13,680

now

125

00:05:16,070 --> 00:05:14,960

nasa here

126  
00:05:17,749 --> 00:05:16,080

provides

127  
00:05:20,150 --> 00:05:17,759

some basics for the space experiment

128  
00:05:21,590 --> 00:05:20,160

module we'll give the students a small

129  
00:05:24,150 --> 00:05:21,600

module we have 10 of those that fit

130  
00:05:25,749 --> 00:05:24,160

inside the can outside the payload bay

131  
00:05:27,749 --> 00:05:25,759

it's a mounting plate really that the

132  
00:05:29,749 --> 00:05:27,759

students can build their experiment on

133  
00:05:32,550 --> 00:05:29,759

and we also provide a ground electronics

134  
00:05:33,749 --> 00:05:32,560

module that interfaces the computer

135  
00:05:35,909 --> 00:05:33,759

commanding or the electronic

136  
00:05:37,909 --> 00:05:35,919

measurements back into the recording

137  
00:05:39,189 --> 00:05:37,919

devices and computers aboard the space

138  
00:05:41,350 --> 00:05:39,199

experiment module

139

00:05:43,590 --> 00:05:41,360

and the students can use that mounting

140

00:05:44,950 --> 00:05:43,600

plate and electronics capability to

141

00:05:47,029 --> 00:05:44,960

construct whatever kind of experiment

142

00:05:49,749 --> 00:05:47,039

they'd like we have ten experiments on

143

00:05:51,990 --> 00:05:49,759

sts-80 seven of them are active in that

144

00:05:53,909 --> 00:05:52,000

they use the microgravity environment of

145

00:05:55,990 --> 00:05:53,919

space to record actual measurements

146

00:05:57,749 --> 00:05:56,000

about their materials in the environment

147

00:05:59,029 --> 00:05:57,759

and three of them are passive

148

00:06:00,629 --> 00:05:59,039

in other words we're just testing the

149

00:06:02,550 --> 00:06:00,639

effects of microgravity on some

150

00:06:04,070 --> 00:06:02,560

materials and they'll be examined upon

151

00:06:05,350 --> 00:06:04,080

their return to earth

152

00:06:08,390 --> 00:06:05,360

let me give you some examples of the

153

00:06:10,309 --> 00:06:08,400

kinds of material we have on board

154

00:06:12,390 --> 00:06:10,319

from albion junior high school in ohio

155

00:06:15,110 --> 00:06:12,400

we have a heat transfer experiment where

156

00:06:17,029 --> 00:06:15,120

students heat up one end of a copper rod

157

00:06:19,029 --> 00:06:17,039

and the copper rod is actually

158

00:06:19,749 --> 00:06:19,039

instrumented to measure heat flow down

159

00:06:24,230 --> 00:06:19,759

the

160

00:06:26,150 --> 00:06:24,240

actually made of stacks of pennies so we

161

00:06:27,590 --> 00:06:26,160

have some pennies stacked up that we're

162

00:06:28,469 --> 00:06:27,600

heating up out in the cargo bay right

163

00:06:29,990 --> 00:06:28,479

now

164

00:06:30,870 --> 00:06:30,000

we also have a group

165

00:06:33,189 --> 00:06:30,880

from

166

00:06:34,629 --> 00:06:33,199

albion that's flying some bacterial

167

00:06:37,189 --> 00:06:34,639

experiments we're looking at bacterial

168

00:06:38,550 --> 00:06:37,199

growth in a series of six test tubes

169

00:06:41,189 --> 00:06:38,560

and the

170

00:06:42,230 --> 00:06:41,199

growth changes in terms of color can be

171

00:06:44,629 --> 00:06:42,240

recorded

172

00:06:46,550 --> 00:06:44,639

in the module during the flight here

173

00:06:48,870 --> 00:06:46,560

we have a can do group of experimenters

174

00:06:50,710 --> 00:06:48,880

from charleston south carolina and they

175

00:06:52,629 --> 00:06:50,720

have a series of experiments

176

00:06:54,950 --> 00:06:52,639

one is measuring the shuttle's own

177

00:06:57,029 --> 00:06:54,960

accelerations in space by using a

178

00:06:59,189 --> 00:06:57,039

pendulum that's balanced very carefully

179

00:07:00,550 --> 00:06:59,199

and it can measure the shocks and shakes

180

00:07:01,990 --> 00:07:00,560

on the shuttle

181

00:07:04,150 --> 00:07:02,000

from their thruster firings as we

182

00:07:05,830 --> 00:07:04,160

station keep with our two satellites

183

00:07:07,990 --> 00:07:05,840

we have some more bacteria growth

184

00:07:09,589 --> 00:07:08,000

cultures provided by that group and

185

00:07:12,469 --> 00:07:09,599

they're also growing some crystals in

186

00:07:14,390 --> 00:07:12,479

microgravity using solutions of salt and

187

00:07:17,350 --> 00:07:14,400

alum some common household materials we

188

00:07:19,270 --> 00:07:17,360

have on the ground and those crystal uh

189

00:07:21,110 --> 00:07:19,280

growth patterns will be recorded in the

190

00:07:23,510 --> 00:07:21,120

module we're even measuring earth's

191

00:07:25,029 --> 00:07:23,520

magnetic field with a series of iron

192

00:07:26,870 --> 00:07:25,039

filings that are shaken up in a small

193

00:07:28,390 --> 00:07:26,880

chamber and that we hope will align

194

00:07:30,390 --> 00:07:28,400

themselves in the magnetic field of the

195

00:07:31,909 --> 00:07:30,400

earth and they can be imaged while we're

196

00:07:33,749 --> 00:07:31,919

here in microgravity to see if those

197

00:07:34,950 --> 00:07:33,759

field lines are visible

198

00:07:37,110 --> 00:07:34,960

from

199

00:07:38,790 --> 00:07:37,120

norfolk virginia and pakistan virginia

200

00:07:39,589 --> 00:07:38,800

we have a group of experimenters that

201  
00:07:41,670 --> 00:07:39,599  
are

202  
00:07:43,749 --> 00:07:41,680  
looking at how immiscible materials

203  
00:07:46,070 --> 00:07:43,759  
materials that don't mix on earth like

204  
00:07:47,830 --> 00:07:46,080  
oil and vegetable vegetable oil and

205  
00:07:50,230 --> 00:07:47,840  
water behave in the microgravity

206  
00:07:52,150 --> 00:07:50,240  
environment of space so they're mixing

207  
00:07:53,909 --> 00:07:52,160  
salt water and vegetable oil and then

208  
00:07:57,510 --> 00:07:53,919  
seeing how those two materials separate

209  
00:08:01,189 --> 00:07:58,469  
and from

210  
00:08:03,189 --> 00:08:01,199  
greenbr greenbrook north high school in

211  
00:08:05,990 --> 00:08:03,199  
illinois we have a surface tension

212  
00:08:07,909 --> 00:08:06,000  
experiment where fluids are spread on a

213  
00:08:10,469 --> 00:08:07,919

slick surface of paper and we're

214

00:08:12,070 --> 00:08:10,479

watching how that fluid beads up and how

215

00:08:13,749 --> 00:08:12,080

surface tension drives the behavior of

216

00:08:14,950 --> 00:08:13,759

that liquid these are all active

217

00:08:16,950 --> 00:08:14,960

experiments that we have on space

218

00:08:19,029 --> 00:08:16,960

experiment modules we have some college

219

00:08:21,510 --> 00:08:19,039

experimenters from purdue university

220

00:08:23,909 --> 00:08:21,520

looking at fluid thermal convection and

221

00:08:25,350 --> 00:08:23,919

how fluids transfer heat without gravity

222

00:08:27,749 --> 00:08:25,360

to cause convection as we know it on

223

00:08:29,909 --> 00:08:27,759

earth and they also are raising some

224

00:08:32,149 --> 00:08:29,919

brine shrimp on a little shrimp farm out

225

00:08:33,509 --> 00:08:32,159

in the space experiment module

226

00:08:35,829 --> 00:08:33,519

some of the materials in our passive

227

00:08:37,829 --> 00:08:35,839

experiments include seeds from both

228

00:08:40,389 --> 00:08:37,839

trees and tomato plants

229

00:08:41,589 --> 00:08:40,399

we have some yeast cells out there

230

00:08:44,630 --> 00:08:41,599

popcorn

231

00:08:46,070 --> 00:08:44,640

soybeans soil and even some materials

232

00:08:48,230 --> 00:08:46,080

that are going to interest our youngest

233

00:08:50,150 --> 00:08:48,240

experimenters some crayons and some

234

00:08:52,550 --> 00:08:50,160

silly putty and they'll be examined for

235

00:08:53,910 --> 00:08:52,560

how the microgravity environment

236

00:08:55,430 --> 00:08:53,920

changes those materials while they've

237

00:08:56,630 --> 00:08:55,440

been in flight

238

00:08:59,030 --> 00:08:56,640

here's some

239

00:09:00,949 --> 00:08:59,040

silly putty i've brought on board myself

240

00:09:02,630 --> 00:09:00,959

to show you some kinds of behavior that

241

00:09:06,310 --> 00:09:02,640

we might expect to see

242

00:09:07,750 --> 00:09:06,320

in a putty type material on orbit

243

00:09:09,750 --> 00:09:07,760

you see it's

244

00:09:12,150 --> 00:09:09,760

pretty easy to manipulate

245

00:09:14,230 --> 00:09:12,160

and quite interesting to watch

246

00:09:15,910 --> 00:09:14,240

i hope the space experiment module

247

00:09:17,829 --> 00:09:15,920

experimenters will get some

248

00:09:20,150 --> 00:09:17,839

sort of similar satisfaction when they

249

00:09:21,190 --> 00:09:20,160

get to watch their experiments on return

250

00:09:22,710 --> 00:09:21,200

to earth

251

00:09:25,030 --> 00:09:22,720

well that's a short summary of what the

252

00:09:26,790 --> 00:09:25,040

space experiment module does and what we

253

00:09:28,710 --> 00:09:26,800

hope it will do for our useful

254

00:09:30,310 --> 00:09:28,720

experimenters back on earth

255

00:09:31,670 --> 00:09:30,320

we know that the space experiment module

256

00:09:33,030 --> 00:09:31,680

experiments will fly again with

257

00:09:35,030 --> 00:09:33,040

different groups of student

258

00:09:36,470 --> 00:09:35,040

experimenters from across the country we

259

00:09:37,990 --> 00:09:36,480

look forward to those opportunities on

260

00:09:39,430 --> 00:09:38,000

the shuttle in the future

261

00:09:41,430 --> 00:09:39,440

space experiment module is a good

262

00:09:43,430 --> 00:09:41,440

example of how the space program

263

00:09:45,829 --> 00:09:43,440

inspires our young people to better

264

00:09:47,750 --> 00:09:45,839

education how they can improve their own

265

00:09:49,190 --> 00:09:47,760

academic performance by using some

266

00:09:50,790 --> 00:09:49,200

exciting experiments that they can

267

00:09:52,949 --> 00:09:50,800

really get involved in

268

00:09:55,910 --> 00:09:52,959

and i think it is just a nice example of

269

00:09:57,910 --> 00:09:55,920

how the space program in general can add

270

00:10:00,710 --> 00:09:57,920

educational opportunities and excitement

271

00:10:02,389 --> 00:10:00,720

to all sorts of subjects across the

272

00:10:04,790 --> 00:10:02,399

disciplines that we study in elementary

273

00:10:06,630 --> 00:10:04,800

and high schools and even college in our

274

00:10:08,790 --> 00:10:06,640

country so it's a pleasure to work with

275

00:10:10,790 --> 00:10:08,800

the space experiment module on sts-80

276

00:10:12,630 --> 00:10:10,800

and this is tom jones signing off to

277

00:10:32,949 --> 00:10:12,640

have some more fun with my own silly

278

00:10:32,959 --> 00:10:53,030

now

279

00:10:56,710 --> 00:10:54,949

i understand you had some excitement

280

00:10:58,949 --> 00:10:56,720

last night when you were attempting to

281

00:11:01,350 --> 00:10:58,959

launch a satellite that came within 10

282

00:11:05,829 --> 00:11:01,360

feet of the crew's cabin

283

00:11:10,069 --> 00:11:08,310

i know that was not a close call off

284

00:11:11,910 --> 00:11:10,079

this vehicle is an incredibly good

285

00:11:14,310 --> 00:11:11,920

flying machine in terms of relative

286

00:11:16,470 --> 00:11:14,320

motion we have flown satellites like

287

00:11:18,470 --> 00:11:16,480

intel sat right down in the payload bay

288

00:11:21,269 --> 00:11:18,480

and we routinely in terms of rendezvous

289

00:11:23,509 --> 00:11:21,279

and proximity ops we bring objects right

290

00:11:24,470 --> 00:11:23,519

down into the payload bay if during a

291

00:11:26,949 --> 00:11:24,480

space

292

00:11:29,030 --> 00:11:26,959

walk we drop some tool we were able to

293

00:11:31,269 --> 00:11:29,040

fly that tool right down to the hand of

294

00:11:33,670 --> 00:11:31,279

the space walker so the hand can reach

295

00:11:35,990 --> 00:11:33,680

out and grab it we have those kinds of

296

00:11:38,230 --> 00:11:36,000

capabilities the thing we were up to

297

00:11:41,350 --> 00:11:38,240

yesterday was that for seven straight

298

00:11:43,750 --> 00:11:41,360

hours we did not fire a single jet on

299

00:11:47,509 --> 00:11:43,760

this vehicle to keep a pristine

300

00:11:50,069 --> 00:11:47,519

environment for the wake shield facility

301  
00:11:52,470 --> 00:11:50,079  
we could have flown away at any time the

302  
00:11:55,110 --> 00:11:52,480  
reason we hesitated and did exactly what

303  
00:11:57,430 --> 00:11:55,120  
we did was not to fire a jet

304  
00:12:01,030 --> 00:11:57,440  
and we had good view on that television

305  
00:12:03,350 --> 00:12:01,040  
cameras and we let it float on by

306  
00:12:05,190 --> 00:12:03,360  
you were told by nasa before you took

307  
00:12:07,829 --> 00:12:05,200  
off on this mission that this would be

308  
00:12:09,430 --> 00:12:07,839  
your last space flight

309  
00:12:12,150 --> 00:12:09,440  
in the program

310  
00:12:13,990 --> 00:12:12,160  
knowing that has it approached the

311  
00:12:21,829 --> 00:12:14,000  
change the approach of the way you have

312  
00:12:26,470 --> 00:12:23,990  
surprisingly it has not i'm such a

313  
00:12:27,910 --> 00:12:26,480

long-term investor in this program space

314

00:12:30,150 --> 00:12:27,920

is my calling

315

00:12:32,870 --> 00:12:30,160

uh whether i'm on the ground or in

316

00:12:34,310 --> 00:12:32,880

flight or whatever my next participation

317

00:12:35,990 --> 00:12:34,320

in space flight will be i'm such a

318

00:12:38,310 --> 00:12:36,000

long-term investor

319

00:12:39,190 --> 00:12:38,320

that i know there'll be a continuity to

320

00:12:42,790 --> 00:12:39,200

it

321

00:12:44,710 --> 00:12:42,800

work for about 30 years both on the

322

00:12:47,030 --> 00:12:44,720

ground and in space

323

00:12:48,790 --> 00:12:47,040

and i also have the kind of imagination

324

00:12:50,470 --> 00:12:48,800

that i've had enough experience up here

325

00:12:53,590 --> 00:12:50,480

that my imagination will be able to put

326

00:12:55,430 --> 00:12:53,600

me up here in the future

327

00:12:56,949 --> 00:12:55,440

are there certain images of space though

328

00:12:59,829 --> 00:12:56,959

that you're trying to freeze in your

329

00:13:03,509 --> 00:12:59,839

mind so you simply just don't forget the

330

00:13:07,750 --> 00:13:05,430

well i worked very hard in that all the

331

00:13:09,829 --> 00:13:07,760

time and not only to technically do the

332

00:13:11,590 --> 00:13:09,839

job i need to do but to be in a way a

333

00:13:14,230 --> 00:13:11,600

parallel processor that has an

334

00:13:15,670 --> 00:13:14,240

experience of space uh what is going on

335

00:13:17,670 --> 00:13:15,680

in the head what is going on in the

336

00:13:19,670 --> 00:13:17,680

heart what is going on in the soul so to

337

00:13:21,190 --> 00:13:19,680

continue up in space you are having a

338

00:13:23,190 --> 00:13:21,200

human experience

339

00:13:25,590 --> 00:13:23,200

i try to catch those experiences and

340

00:13:27,030 --> 00:13:25,600

bring them home and express that to

341

00:13:28,470 --> 00:13:27,040

other people such that they can

342

00:13:30,069 --> 00:13:28,480

vicariously

343

00:13:32,470 --> 00:13:30,079

also

344

00:13:35,190 --> 00:13:32,480

get into space and so that we as a

345

00:13:37,829 --> 00:13:35,200

species can evolve into being

346

00:13:40,150 --> 00:13:37,839

space creatures which we actually are

347

00:13:42,069 --> 00:13:40,160

and so even on this flight here too now

348

00:13:43,829 --> 00:13:42,079

there are some images i could go over

349

00:13:45,750 --> 00:13:43,839

hundreds of them but just a picture of

350

00:13:46,949 --> 00:13:45,760

the baja california the picture of

351  
00:13:49,110 --> 00:13:46,959  
mexico

352  
00:13:50,870 --> 00:13:49,120  
is being embedded in my mind right now

353  
00:13:52,150 --> 00:13:50,880  
even though i've seen it many times

354  
00:13:54,629 --> 00:13:52,160  
before

355  
00:13:57,350 --> 00:13:54,639  
the look of saudi arabia the near east

356  
00:14:00,230 --> 00:13:57,360  
the now swinging over the himalayas as

357  
00:14:02,470 --> 00:14:00,240  
we've done multiple times those images

358  
00:14:05,430 --> 00:14:02,480  
are being implanted those experiences

359  
00:14:07,750 --> 00:14:05,440  
are being carried forward

360  
00:14:10,310 --> 00:14:07,760  
as you look out the windows of the

361  
00:14:12,870 --> 00:14:10,320  
shuttle uh are you trying to concentrate

362  
00:14:17,910 --> 00:14:12,880  
on different things this time around for

363  
00:14:21,509 --> 00:14:19,670

and have an experience you look at what

364

00:14:23,750 --> 00:14:21,519

opportunities

365

00:14:25,990 --> 00:14:23,760

are available to you that may be that

366

00:14:28,310 --> 00:14:26,000

maybe weren't on earlier flights but you

367

00:14:29,430 --> 00:14:28,320

tried to enrich the previous ones you've

368

00:14:31,269 --> 00:14:29,440

had

369

00:14:34,550 --> 00:14:31,279

it's spectacular to look out there to

370

00:14:36,389 --> 00:14:34,560

sunrise uh and to see our two satellites

371

00:14:38,949 --> 00:14:36,399

out there trailing behind us to look at

372

00:14:40,949 --> 00:14:38,959

the two bright stars that are out there

373

00:14:42,629 --> 00:14:40,959

um we've never flown a poor body problem

374

00:14:44,870 --> 00:14:42,639

we had an earth a spaceship two

375

00:14:47,269 --> 00:14:44,880

satellites before so to look out behind

376

00:14:49,110 --> 00:14:47,279

you and see uh the two satellites that

377

00:14:52,310 --> 00:14:49,120

you're working to see them follow along

378

00:14:54,790 --> 00:14:52,320

behind you is a unique experience

379

00:14:57,590 --> 00:14:54,800

we recognize how fit you have to be to

380

00:14:59,430 --> 00:14:57,600

participate in this program but a lot of

381

00:15:02,389 --> 00:14:59,440

a lot has been made of the fact that you

382

00:15:04,310 --> 00:15:02,399

are 61 years old do you feel any

383

00:15:05,910 --> 00:15:04,320

differently physically on this mission

384

00:15:11,990 --> 00:15:05,920

than let's say you did on your first

385

00:15:16,949 --> 00:15:14,150

um i think it's pretty much the same uh

386

00:15:18,949 --> 00:15:16,959

as i as i told my colleagues here uh one

387

00:15:20,470 --> 00:15:18,959

of them tom jones was working over here

388

00:15:22,550 --> 00:15:20,480

that you spoke with on an earlier

389

00:15:24,870 --> 00:15:22,560

mission uh he was sitting next to me i

390

00:15:26,710 --> 00:15:24,880

had the easiest launch i've ever had

391

00:15:29,030 --> 00:15:26,720

i am uh usually pretty frightened during

392

00:15:30,949 --> 00:15:29,040

launches because i'm not a risk taker

393

00:15:33,670 --> 00:15:30,959

and i was frightened before this one but

394

00:15:35,430 --> 00:15:33,680

once we got underway uh i had total

395

00:15:37,509 --> 00:15:35,440

faith and confidence that it was going

396

00:15:39,670 --> 00:15:37,519

to take me into space i had the easiest

397

00:15:41,509 --> 00:15:39,680

launch i've ever had this time

398

00:15:46,870 --> 00:15:41,519

does that mean you completely got rid of

399

00:15:51,110 --> 00:15:48,389

well i don't get butterflies i just get

400

00:15:54,470 --> 00:15:52,550

i don't blame you

401  
00:15:57,350 --> 00:15:54,480  
i understand that that one of your

402  
00:15:59,590 --> 00:15:57,360  
favorite things is is to enjoy the the

403  
00:16:01,910 --> 00:15:59,600  
weightlessness that that you feel in

404  
00:16:03,509 --> 00:16:01,920  
space i'm wondering if if you can give

405  
00:16:05,430 --> 00:16:03,519  
us any sense of

406  
00:16:10,710 --> 00:16:05,440  
what that might feel like or or look

407  
00:16:15,350 --> 00:16:12,710  
yeah floating is a delicious kind of

408  
00:16:17,590 --> 00:16:15,360  
thing to do because we as creatures are

409  
00:16:20,150 --> 00:16:17,600  
created and evolved here on earth we

410  
00:16:22,310 --> 00:16:20,160  
have been designed by the force between

411  
00:16:23,430 --> 00:16:22,320  
us and earth and now you have a unique

412  
00:16:25,269 --> 00:16:23,440  
environment

413  
00:16:27,590 --> 00:16:25,279

that maybe we weren't designed to

414

00:16:29,189 --> 00:16:27,600

perceive or to live in

415

00:16:31,110 --> 00:16:29,199

and so that's what makes it totally

416

00:16:33,670 --> 00:16:31,120

unique but the the three-dimensional

417

00:16:34,790 --> 00:16:33,680

orientation in which you can make that

418

00:16:39,749 --> 00:16:34,800

direction

419

00:16:42,230 --> 00:16:39,759

this is down and feel that that is the

420

00:16:44,230 --> 00:16:42,240

ceiling and put that anywhere you would

421

00:16:47,110 --> 00:16:44,240

like eventually

422

00:16:48,790 --> 00:16:47,120

the idea of uh just as the engines are

423

00:16:51,189 --> 00:16:48,800

shutting down

424

00:16:53,030 --> 00:16:51,199

you can close your eyes just before the

425

00:16:54,949 --> 00:16:53,040

main engine shut down and then you can

426

00:16:57,030 --> 00:16:54,959

free fall through the dark and i don't

427

00:16:58,069 --> 00:16:57,040

know if you've ever free fall through

428

00:17:00,470 --> 00:16:58,079

the dark

429

00:17:02,949 --> 00:17:00,480

but that is one delicious experience to

430

00:17:04,870 --> 00:17:02,959

be able to simply fall through a dark

431

00:17:07,270 --> 00:17:04,880

environment forever

432

00:17:09,909 --> 00:17:07,280

i think i've done that in my dreams uh

433

00:17:12,870 --> 00:17:09,919

can you give us a a demonstration

434

00:17:16,470 --> 00:17:12,880

uh right now of of what weightlessness

435

00:17:21,909 --> 00:17:18,549

oh i don't have much you want but

436

00:17:29,590 --> 00:17:21,919

there's a real art in how you uh

437

00:17:34,950 --> 00:17:33,029

once you put the model out to tom

438

00:17:37,029 --> 00:17:34,960

this is the best example i got you've

439

00:17:39,510 --> 00:17:37,039

seen us spin things around and you've

440

00:17:43,110 --> 00:17:39,520

seen us throw things but i think there's

441

00:17:43,120 --> 00:17:53,190

you do a good job tom

442

00:17:57,430 --> 00:17:55,270

yeah that's uh that says as much as

443

00:17:58,470 --> 00:17:57,440

anything right there you've seen us play

444

00:18:01,190 --> 00:17:58,480

with uh

445

00:18:02,630 --> 00:18:01,200

water that's another good way to do it

446

00:18:04,789 --> 00:18:02,640

these things are moving now because

447

00:18:06,950 --> 00:18:04,799

there's an airflow

448

00:18:08,710 --> 00:18:06,960

oh it looks extraordinary from here uh

449

00:18:10,150 --> 00:18:08,720

have any of the scientists at nasa been

450

00:18:12,070 --> 00:18:10,160

able to figure out

451

00:18:14,310 --> 00:18:12,080

what impact all this weightlessness

452

00:18:18,789 --> 00:18:14,320

you've experienced has had on your own

453

00:18:22,870 --> 00:18:20,870

we're working on that all the time but

454

00:18:24,950 --> 00:18:22,880

it's basically uh the free flow

455

00:18:27,190 --> 00:18:24,960

condition in which your cardiovascular

456

00:18:28,630 --> 00:18:27,200

system the air is picking up the bottom

457

00:18:31,029 --> 00:18:28,640

of the shuttle there

458

00:18:33,110 --> 00:18:31,039

things such as not having to use bones

459

00:18:35,110 --> 00:18:33,120

up here the cardiovascular system not

460

00:18:39,430 --> 00:18:35,120

having to move blood uphill and those

461

00:18:43,830 --> 00:18:41,190

what maybe we could study more is the

462

00:18:46,070 --> 00:18:43,840

cognitive psychology of space

463

00:18:48,630 --> 00:18:46,080

different kinds of perceptions

464

00:18:50,310 --> 00:18:48,640

of what's up and what's down i think

465

00:18:54,230 --> 00:18:50,320

that's where some of the exciting areas

466

00:18:59,350 --> 00:18:57,750

that date will be really exciting

467

00:19:01,590 --> 00:18:59,360

one of the things that you have been

468

00:19:05,110 --> 00:19:01,600

quoted in the past about is being

469

00:19:07,350 --> 00:19:05,120

receptive to extraterrestrial life

470

00:19:10,070 --> 00:19:07,360

do you have any indication that exists

471

00:19:14,710 --> 00:19:10,080

or is that just an extension of your

472

00:19:19,430 --> 00:19:16,470

i have no physical evidence i've never

473

00:19:21,669 --> 00:19:19,440

made any i've never seen a signature of

474

00:19:24,150 --> 00:19:21,679

of intelligent beings out here

475

00:19:26,630 --> 00:19:24,160

i think it's a common sense rational

476

00:19:27,990 --> 00:19:26,640

individual as a scientist i know it's

477

00:19:30,070 --> 00:19:28,000

out there because you're dealing with

478

00:19:31,750 --> 00:19:30,080

billions and billions of galaxies

479

00:19:33,590 --> 00:19:31,760

i know there are other universes other

480

00:19:35,669 --> 00:19:33,600

than our own and a lot of this has been

481

00:19:38,950 --> 00:19:35,679

around for billions of years the

482

00:19:40,070 --> 00:19:38,960

probability is a certainty that it's out

483

00:19:44,950 --> 00:19:40,080

there

484

00:19:49,270 --> 00:19:47,669

a human being who is

485

00:19:51,750 --> 00:19:49,280

part of the human species which is

486

00:19:53,590 --> 00:19:51,760

evolving to recognition of their place

487

00:19:55,029 --> 00:19:53,600

in the universe and what the universe is

488

00:19:56,230 --> 00:19:55,039

all about

489

00:19:58,549 --> 00:19:56,240

um

490

00:20:00,470 --> 00:19:58,559

i try to acknowledge those living

491

00:20:02,950 --> 00:20:00,480

creatures out there and just simply take

492

00:20:05,350 --> 00:20:02,960

quiet moments and say yes yes i know

493

00:20:08,230 --> 00:20:05,360

you're out there and i also communicate

494

00:20:11,110 --> 00:20:08,240

in ways such similar to prayer that uh

495

00:20:12,470 --> 00:20:11,120

if you hear me come get me

496

00:20:14,310 --> 00:20:12,480

but i have no

497

00:20:16,470 --> 00:20:14,320

physical evidence i have seen no

498

00:20:18,390 --> 00:20:16,480

signatures i'm also as grounded as

499

00:20:20,230 --> 00:20:18,400

anyone around i know that the

500

00:20:22,549 --> 00:20:20,240

probabilities are one trillionth

501  
00:20:24,789 --> 00:20:22,559  
trillionth or less that anyone is going

502  
00:20:26,950 --> 00:20:24,799  
to hear but i think it's important in

503  
00:20:29,270 --> 00:20:26,960  
terms of our evolution the way we think

504  
00:20:31,990 --> 00:20:29,280  
of ourselves to recognize

505  
00:20:33,990 --> 00:20:32,000  
uh that we are not alone

506  
00:20:35,590 --> 00:20:34,000  
we also recognize even though you will

507  
00:20:37,270 --> 00:20:35,600  
not fly in any more of these missions

508  
00:20:40,149 --> 00:20:37,280  
you will continue to be involved with

509  
00:20:41,750 --> 00:20:40,159  
nasa on an ongoing basis what is it that

510  
00:20:43,510 --> 00:20:41,760  
you think americans should understand

511  
00:20:45,430 --> 00:20:43,520  
about the future of the space program

512  
00:20:47,190 --> 00:20:45,440  
particularly at a time when a lot of

513  
00:20:49,350 --> 00:20:47,200

americans seem to have doubts as to

514

00:20:51,750 --> 00:20:49,360

where this really is taking us

515

00:20:58,710 --> 00:20:51,760

particularly when they look at the vast

516

00:21:02,870 --> 00:21:00,950

i think we need to have a very far

517

00:21:05,110 --> 00:21:02,880

reaching vision

518

00:21:07,110 --> 00:21:05,120

i think we need to conduct space where

519

00:21:09,510 --> 00:21:07,120

space is safe and not for any other

520

00:21:11,190 --> 00:21:09,520

reasons when it's used for other reasons

521

00:21:13,350 --> 00:21:11,200

under the pursuit of space i think then

522

00:21:15,350 --> 00:21:13,360

we get off the track

523

00:21:16,789 --> 00:21:15,360

for myself

524

00:21:19,190 --> 00:21:16,799

i'm always working kind of at the

525

00:21:22,390 --> 00:21:19,200

philosophical level i'm interested in

526

00:21:24,710 --> 00:21:22,400

the great big very long term pictures i

527

00:21:26,710 --> 00:21:24,720

think space is very important for us as

528

00:21:28,830 --> 00:21:26,720

human beings to show us what our place

529

00:21:31,270 --> 00:21:28,840

in the universe is what it means to be

530

00:21:33,190 --> 00:21:31,280

human i think that is one of the most

531

00:21:35,750 --> 00:21:33,200

important reasons that we're into space

532

00:21:37,990 --> 00:21:35,760

is the quest the reach out there for

533

00:21:40,070 --> 00:21:38,000

meaning down here

534

00:21:41,830 --> 00:21:40,080

so i think we need to not only do the

535

00:21:44,549 --> 00:21:41,840

practical things but i think we need to

536

00:21:46,230 --> 00:21:44,559

have a very very far-reaching vision a

537

00:21:48,470 --> 00:21:46,240

unified vision and have that

538

00:21:51,750 --> 00:21:48,480

communicated and have a very solid path

539

00:21:56,630 --> 00:21:54,310

in closing tonight what is it that you

540

00:21:58,470 --> 00:21:56,640

think you will reflect upon most when

541

00:22:00,710 --> 00:21:58,480

you come back to earth

542

00:22:03,110 --> 00:22:00,720

at the end of this mission knowing that

543

00:22:04,549 --> 00:22:03,120

that this was your final mission in

544

00:22:06,630 --> 00:22:04,559

flight and that you are in fact the

545

00:22:10,830 --> 00:22:06,640

oldest astronaut to attempt what you

546

00:22:16,310 --> 00:22:13,750

done i'm very glad to be in space and be

547

00:22:17,990 --> 00:22:16,320

doing the other things that i am

548

00:22:20,390 --> 00:22:18,000

at the age that i am

549

00:22:22,230 --> 00:22:20,400

but the the age is only coincident with

550

00:22:24,070 --> 00:22:22,240

the fact that i have had the incredible

551  
00:22:25,590 --> 00:22:24,080  
privilege of pursuing my calling for

552  
00:22:27,909 --> 00:22:25,600  
almost 30 years

553  
00:22:29,510 --> 00:22:27,919  
a space is not just a job and a life for

554  
00:22:30,789 --> 00:22:29,520  
me it's a calling it's something i

555  
00:22:32,630 --> 00:22:30,799  
believe in

556  
00:22:34,390 --> 00:22:32,640  
and it's something i have a passion for

557  
00:22:36,789 --> 00:22:34,400  
i have a heart for it and i've had the

558  
00:22:37,990 --> 00:22:36,799  
privilege an opportunity to do it for 30

559  
00:22:39,909 --> 00:22:38,000  
years

560  
00:22:41,990 --> 00:22:39,919  
and so i love doing these kind of things

561  
00:22:43,590 --> 00:22:42,000  
at my age but the important thing is is

562  
00:22:45,909 --> 00:22:43,600  
that i've had the privilege of doing it

563  
00:22:48,789 --> 00:22:45,919

throughout my entire lifetime that i've

564

00:22:51,190 --> 00:22:48,799

had something which which is a calling

565

00:22:53,750 --> 00:22:51,200

that i have had something in which the

566

00:22:55,750 --> 00:22:53,760

passions could push me and give me the

567

00:23:02,870 --> 00:22:55,760

energy to attempt to always do things

568

00:23:08,310 --> 00:23:05,510

columbia for story a surgeon tells us he

569

00:23:10,549 --> 00:23:08,320

has your albedo for your head on file

570

00:23:13,029 --> 00:23:10,559

we'd like to compare it to

571

00:23:14,470 --> 00:23:13,039

your current albedo so if you can if

572

00:23:24,870 --> 00:23:14,480

everybody else can stand back a little

573

00:23:24,880 --> 00:23:36,630

he says it's increased substantially

574

00:23:41,029 --> 00:23:38,870

i tell these uh sts

575

00:23:49,190 --> 00:23:41,039

80 folks are real magicians uh they can

576

00:23:49,200 --> 00:23:53,510

good teamwork

577

00:23:53,520 --> 00:24:54,950

well we're good for another five days

578

00:24:58,789 --> 00:24:56,870

this again is from the students at

579

00:25:00,470 --> 00:24:58,799

thames elementary school hattiesburg

580

00:25:03,909 --> 00:25:00,480

mississippi

581

00:25:05,830 --> 00:25:03,919

story musgrave ms3 in this fight

582

00:25:08,390 --> 00:25:05,840

we hear that being in space decreases

583

00:25:09,830 --> 00:25:08,400

the size of your bones and your heart do

584

00:25:12,470 --> 00:25:09,840

you feel any different when you come

585

00:25:14,390 --> 00:25:12,480

back to earth

586

00:25:16,549 --> 00:25:14,400

we certainly do

587

00:25:19,269 --> 00:25:16,559

uh out here floating around in zero g we

588

00:25:20,230 --> 00:25:19,279

don't need the bones that carry our

589

00:25:22,950 --> 00:25:20,240

weight

590

00:25:24,950 --> 00:25:22,960

they carry that force between us and uh

591

00:25:26,950 --> 00:25:24,960

and the earth they carry our weight down

592

00:25:28,710 --> 00:25:26,960

there because we don't need the bones

593

00:25:30,470 --> 00:25:28,720

it's just like a muscle if you don't use

594

00:25:32,310 --> 00:25:30,480

your muscle the muscles tend to get

595

00:25:33,269 --> 00:25:32,320

smaller and weaker and so now using your

596

00:25:34,310 --> 00:25:33,279

bones

597

00:25:36,390 --> 00:25:34,320

out here

598

00:25:37,590 --> 00:25:36,400

they tend to become smaller and a little

599

00:25:40,149 --> 00:25:37,600

less

600

00:25:42,549 --> 00:25:40,159

strong like bites with a heart the heart

601  
00:25:44,630 --> 00:25:42,559  
doesn't have to pump blood uphill

602  
00:25:46,390 --> 00:25:44,640  
against gravity and you don't need to

603  
00:25:48,870 --> 00:25:46,400  
carry as much blood by them so those

604  
00:25:50,390 --> 00:25:48,880  
things diminish in size too when you

605  
00:25:52,310 --> 00:25:50,400  
come back to earth just like when you

606  
00:25:53,990 --> 00:25:52,320  
come into space you have to adapt to the

607  
00:25:54,870 --> 00:25:54,000  
space environment when you come back to

608  
00:25:57,190 --> 00:25:54,880  
earth

609  
00:25:59,110 --> 00:25:57,200  
you've gotten very used to space

610  
00:26:00,710 --> 00:25:59,120  
balls muscles and hearts have started to

611  
00:26:01,830 --> 00:26:00,720  
adapt to space and so they have to

612  
00:26:06,070 --> 00:26:01,840  
re-adapt

613  
00:26:09,909 --> 00:26:08,470

and my name is ken cockerell and the

614

00:26:11,269 --> 00:26:09,919

third question the final question we

615

00:26:12,950 --> 00:26:11,279

have today from

616

00:26:14,149 --> 00:26:12,960

thames elementary in hattiesburg

617

00:26:16,070 --> 00:26:14,159

mississippi

618

00:26:17,990 --> 00:26:16,080

is um

619

00:26:20,070 --> 00:26:18,000

we have played the cd-rom software the

620

00:26:21,909 --> 00:26:20,080

magic school bus in the solar system to

621

00:26:24,710 --> 00:26:21,919

help us learn about space

622

00:26:27,190 --> 00:26:24,720

do you ever use computer for learning

623

00:26:29,190 --> 00:26:27,200

well i'd say that we are surrounded by

624

00:26:31,430 --> 00:26:29,200

computers the space shuttle is run by

625

00:26:32,549 --> 00:26:31,440

five computers and in addition to that

626  
00:26:34,950 --> 00:26:32,559  
we have

627  
00:26:37,269 --> 00:26:34,960  
eight laptop computers that run various

628  
00:26:39,110 --> 00:26:37,279  
other aspects of our mission uh here

629  
00:26:41,430 --> 00:26:39,120  
with us on the flight deck so when we

630  
00:26:42,549 --> 00:26:41,440  
train for this mission we use computers

631  
00:26:44,149 --> 00:26:42,559  
all the time

632  
00:26:45,990 --> 00:26:44,159  
we use similar computers to the ones

633  
00:26:47,909 --> 00:26:46,000  
that are in the space shuttle in our

634  
00:26:50,149 --> 00:26:47,919  
simulators on the ground

635  
00:26:51,669 --> 00:26:50,159  
and we also can use the computers that

636  
00:26:53,269 --> 00:26:51,679  
we have at our desk to run various

637  
00:26:55,350 --> 00:26:53,279  
training programs that help us learn the

638  
00:26:57,350 --> 00:26:55,360

details about our mission and about how

639

00:26:59,029 --> 00:26:57,360

the space shuttle operates so we

640

00:27:00,149 --> 00:26:59,039

certainly do use computers we use them a