



1
00:00:28,150 --> 00:00:10,380

[Music]

2
00:00:39,759 --> 00:00:37,630

lived off in less than a century America

3
00:00:41,979 --> 00:00:39,769

has progressed from the sandy hills of

4
00:00:46,060 --> 00:00:41,989

Kitty Hawk along the Atlantic coast into

5
00:00:48,790 --> 00:00:46,070

the vast new ocean of space journeys

6
00:00:51,069 --> 00:00:48,800

been difficult and dangerous but it's

7
00:00:52,960 --> 00:00:51,079

also been rewarding it's given us a

8
00:00:55,829 --> 00:00:52,970

better understanding of our home planet

9
00:00:58,569 --> 00:00:55,839

our solar system and the universe

10
00:01:00,040 --> 00:00:58,579

although humans have dreamed of sailing

11
00:01:02,799 --> 00:01:00,050

outward from the planet Earth for

12
00:01:13,920 --> 00:01:02,809

centuries the realization of that vision

13
00:01:19,810 --> 00:01:15,550

[Music]

14

00:01:22,300 --> 00:01:19,820

I had been working for NACA since 1945

15

00:01:24,880 --> 00:01:22,310

as the young aeronautical engineer right

16

00:01:27,340 --> 00:01:24,890

out of college in airplane flight test

17

00:01:28,540 --> 00:01:27,350

and we were not interested in space at

18

00:01:31,750 --> 00:01:28,550

that time you were interested in

19

00:01:34,810 --> 00:01:31,760

high-speed aerodynamics the x-15 was

20

00:01:36,130 --> 00:01:34,820

being built there's the drop before it

21

00:01:38,859 --> 00:01:36,140

returns to earth again

22

00:01:42,810 --> 00:01:38,869

the x-15 may fly some 60 miles straight

23

00:01:52,170 --> 00:01:42,820

up at nearly 4000 miles per hour

24

00:01:59,899 --> 00:01:54,469

[Music]

25

00:02:04,490 --> 00:01:59,909

we were in Cold War that was darn close

26
00:02:07,399 --> 00:02:04,500
to hot war the Russians and and there

27
00:02:13,910 --> 00:02:07,409
was great concern both the sides had

28
00:02:16,190 --> 00:02:13,920
nuclear weapons you know we grew up

29
00:02:18,199 --> 00:02:16,200
fearing the Russians I can remember when

30
00:02:20,509 --> 00:02:18,209
I was in school going through drills

31
00:02:22,520 --> 00:02:20,519
where we got under our seats so this

32
00:02:24,770 --> 00:02:22,530
idea of them beating us in space was a

33
00:02:27,880 --> 00:02:24,780
pretty awesome idea they were claiming

34
00:02:31,130 --> 00:02:27,890
superiority and we didn't believe that

35
00:02:33,590 --> 00:02:31,140
but they had been launching some rockets

36
00:02:35,850 --> 00:02:33,600
and ours too often had been blowing up

37
00:02:37,020 --> 00:02:35,860
on the launch pad

38
00:02:37,610 --> 00:02:37,030

[Music]

39

00:02:47,429 --> 00:02:37,620

[Applause]

40

00:02:53,259 --> 00:02:49,989

and that was sort of the background to

41

00:03:01,699 --> 00:02:53,269

what happened then in 57 when they sent

42

00:03:08,839 --> 00:03:04,130

there's a Russian of satellite which is

43

00:03:10,820 --> 00:03:08,849

going over every 90 minutes beep and it

44

00:03:12,920 --> 00:03:10,830

didn't take much imagination to know

45

00:03:14,720 --> 00:03:12,930

that that could have been involved I

46

00:03:17,149 --> 00:03:14,730

remember being very surprised that they

47

00:03:19,369 --> 00:03:17,159

had done this and that we had not been

48

00:03:20,930 --> 00:03:19,379

able to do it ahead of them that was my

49

00:03:22,869 --> 00:03:20,940

main concern I think that was the main

50

00:03:25,430 --> 00:03:22,879

concern of most Americans at that time

51
00:03:27,800 --> 00:03:25,440
right then I think we all inwardly

52
00:03:30,559 --> 00:03:27,810
resolved that that one goal laughs would

53
00:03:33,979 --> 00:03:30,569
go do something about it it was just a

54
00:03:37,990 --> 00:03:33,989
faint beep a radio beacon coming from a

55
00:03:41,420 --> 00:03:38,000
shiny little orb circling the earth in

56
00:03:44,420 --> 00:03:41,430
1957 Sputnik signaled the beginning of

57
00:03:47,960 --> 00:03:44,430
the Space Age and the United States was

58
00:03:50,119 --> 00:03:47,970
behind our first successful answer to

59
00:03:53,330 --> 00:03:50,129
Sputnik came with the launch of the

60
00:03:55,430 --> 00:03:53,340
Explorer 1 satellite and within the year

61
00:04:01,420 --> 00:03:55,440
the formation of the National

62
00:04:08,470 --> 00:04:05,589
when I came up here in May of 1958 there

63
00:04:11,440 --> 00:04:08,480

was no Marshall Space Flight Center von

64

00:04:12,790 --> 00:04:11,450

Braun and his team were all part of what

65

00:04:15,820 --> 00:04:12,800

was called an army ballistic missile

66

00:04:18,009 --> 00:04:15,830

agency and it was that agency actually

67

00:04:21,330 --> 00:04:18,019

that built and launched the first

68

00:04:21,340 --> 00:04:39,890

maybe panic

69

00:04:45,450 --> 00:04:42,689

we took enormous pride in that because

70

00:04:48,360 --> 00:04:45,460

although it followed Sputnik Explorer

71

00:04:51,180 --> 00:04:48,370

one had science instruments on it and so

72

00:04:58,170 --> 00:04:51,190

it really marks the first use of space

73

00:05:01,140 --> 00:04:58,180

for scientific exploration gave us the

74

00:05:02,820 --> 00:05:01,150

idea that we were surrounded by

75

00:05:05,290 --> 00:05:02,830

radiation belts that we knew nothing

76

00:05:15,090 --> 00:05:07,150

no Barry

77

00:05:22,290 --> 00:05:18,840

so we were off and running

78

00:05:24,840 --> 00:05:22,300

as a result of Sputnik and it resulted

79

00:05:28,410 --> 00:05:24,850

of course in the establishment of NASA

80

00:05:31,820 --> 00:05:28,420

by President Eisenhower in the summer of

81

00:05:34,500 --> 00:05:31,830

1958 we have one of the most challenging

82

00:05:37,530 --> 00:05:34,510

assignments that has ever been given to

83

00:05:40,620 --> 00:05:37,540

modern man we will be developing and

84

00:05:43,170 --> 00:05:40,630

launching into space vehicles needed to

85

00:05:46,110 --> 00:05:43,180

obtain scientific data and to explore

86

00:05:48,840 --> 00:05:46,120

the solar system we will be preparing

87

00:05:49,630 --> 00:05:48,850

for the day when manned flight goes into

88

00:05:53,510 --> 00:05:49,640

space

89

00:05:59,880 --> 00:05:57,060

Sieg Lennon was really outstanding in

90

00:06:01,620 --> 00:05:59,890

that period of drawing together the

91

00:06:03,930 --> 00:06:01,630

thoughts of the people in the

92

00:06:07,860 --> 00:06:03,940

organization and seeking people from

93

00:06:11,910 --> 00:06:07,870

outside of course I was a young punk at

94

00:06:13,680 --> 00:06:11,920

that time in those early years and I was

95

00:06:16,680 --> 00:06:13,690

a little hesitant about expressing

96

00:06:18,600 --> 00:06:16,690

myself but the way he worked it it got

97

00:06:23,510 --> 00:06:18,610

to a point where was very common for

98

00:06:31,740 --> 00:06:27,900

until I the first active 58mm dr. maura

99

00:06:35,640 --> 00:06:31,750

and about 2,000 of us members of the

100

00:06:40,230 --> 00:06:35,650

team I guess all transitioned from the

101
00:06:43,670 --> 00:06:40,240
Army to Marshall we were blessed here

102
00:06:46,290 --> 00:06:43,680
because the leaders of all of our labs

103
00:06:48,600 --> 00:06:46,300
were original members of the Von Braun

104
00:06:50,760 --> 00:06:48,610
team and these guys were brilliant

105
00:06:53,820 --> 00:06:50,770
scientists they had been there they've

106
00:06:55,800 --> 00:06:53,830
done it they made mistakes

107
00:06:58,590 --> 00:06:55,810
they had blown up more rockets than

108
00:06:59,460 --> 00:06:58,600
anybody could ever conceive on and they

109
00:07:02,370 --> 00:06:59,470
were our Mentors

110
00:07:03,270 --> 00:07:02,380
I don't think but about once every

111
00:07:05,070 --> 00:07:03,280
hundred

112
00:07:09,030 --> 00:07:05,080
here's a person when blood Brown comes

113
00:07:12,300 --> 00:07:09,040

around he was top-notch engineer he was

114

00:07:14,940 --> 00:07:12,310

a top-notch scientists and but he had

115

00:07:18,450 --> 00:07:14,950

something that most other people don't

116

00:07:20,400 --> 00:07:18,460

have and he was a visionary you know it

117

00:07:23,370 --> 00:07:20,410

was crazy bad thing about going to the

118

00:07:26,220 --> 00:07:23,380

moon you know it was crazy in van

119

00:07:31,310 --> 00:07:26,230

brand-new we could do it and afterwards

120

00:07:35,159 --> 00:07:31,320

been around him for a while we have

121

00:07:36,900 --> 00:07:35,169

scientific knowledge with our smaller

122

00:07:39,000 --> 00:07:36,910

people since the Russians have with them

123

00:07:40,440 --> 00:07:39,010

up swapped out once we were trying to

124

00:07:42,030 --> 00:07:40,450

build satellites to try to get things

125

00:07:44,880 --> 00:07:42,040

going trying to catch up with the

126

00:07:46,320 --> 00:07:44,890

Russians passing by and a lot of

127

00:07:57,659 --> 00:07:46,330

exciting things were going all of those

128

00:08:01,170 --> 00:07:57,669

in those early days a near perfect take

129

00:08:03,719 --> 00:08:01,180

off guys like Max was Jay and nopales

130

00:08:05,969 --> 00:08:03,729

aircraft Research Division who had been

131

00:08:09,180 --> 00:08:05,979

designing these rockets over over at

132

00:08:11,700 --> 00:08:09,190

Wallops they had all been dreaming about

133

00:08:14,159 --> 00:08:11,710

man and space I remember walking into a

134

00:08:17,130 --> 00:08:14,169

match for Jays office and there on the

135

00:08:19,980 --> 00:08:17,140

wall he had a picture of a guy in the

136

00:08:21,150 --> 00:08:19,990

fetal position in a little caps ooh yeah

137

00:08:23,460 --> 00:08:21,160

I said what are you gonna do with that

138

00:08:27,000 --> 00:08:23,470

max he said well we're gonna launch a

139

00:08:30,390 --> 00:08:27,010

guy into space yeah I said well you know

140

00:08:32,430 --> 00:08:30,400

that like the G's are very very high he

141

00:08:43,200 --> 00:08:32,440

says oh yeah he'll black out but he'll

142

00:08:46,740 --> 00:08:43,210

come to we knew the Soviets we're gonna

143

00:08:51,060 --> 00:08:46,750

try and apply a man after they they

144

00:08:53,670 --> 00:08:51,070

launched their first satellite and the

145

00:08:55,990 --> 00:08:53,680

Soviets knew we were gonna try to do the

146

00:08:58,220 --> 00:08:56,000

same thing

147

00:08:59,720 --> 00:08:58,230

the nation was getting ready to put a

148

00:09:02,510 --> 00:08:59,730

man in space I mean that was a

149

00:09:03,920 --> 00:09:02,520

commitment and that was the focus we

150

00:09:06,500 --> 00:09:03,930

didn't know much about the space

151

00:09:08,570 --> 00:09:06,510

environment you know a young person like

152

00:09:10,580 --> 00:09:08,580

myself with no experience who was on an

153

00:09:13,700 --> 00:09:10,590

equal par with everybody there's no one

154

00:09:17,060 --> 00:09:13,710

had unique experience and it was it was

155

00:09:20,750 --> 00:09:17,070

exciting times and and any information

156

00:09:23,090 --> 00:09:20,760

you found was valuable and people were

157

00:09:34,410 --> 00:09:23,100

interested in it and looked at it

158

00:09:37,330 --> 00:09:34,420

[Music]

159

00:09:39,370 --> 00:09:37,340

but then when they opened this up for

160

00:09:41,920 --> 00:09:39,380

manned spaceflight and announced that

161

00:09:43,870 --> 00:09:41,930

program and one volunteers for it I

162

00:09:46,300 --> 00:09:43,880

thought that was a natural with the

163

00:09:48,820 --> 00:09:46,310

background I had of test flying and I

164

00:10:06,130 --> 00:09:48,830

met the criteria that they were shooting

165

00:10:10,630 --> 00:10:06,140

for I was a test pilot and the job of a

166

00:10:14,530 --> 00:10:10,640

test pilot is to fly new airplanes here

167

00:10:18,570 --> 00:10:14,540

with the dawn of space flight was an

168

00:10:22,990 --> 00:10:18,580

opportunity to fly an airplane of a sort

169

00:10:27,010 --> 00:10:23,000

that made an order-of-magnitude jump in

170

00:10:28,750 --> 00:10:27,020

height altitude and speed and distance

171

00:10:30,310 --> 00:10:28,760

and they were trying to convince it how

172

00:10:33,370 --> 00:10:30,320

neat it would be to get in a capsule on

173

00:10:34,870 --> 00:10:33,380

top of a rocket I said no way send that

174

00:10:37,300 --> 00:10:34,880

idiot that goes out of the cannon in the

175

00:10:37,690 --> 00:10:37,310

circus let him land on a net and forget

176

00:10:39,580 --> 00:10:37,700

us

177

00:10:40,630 --> 00:10:39,590

there's no no don't don't worry we're

178

00:10:43,030 --> 00:10:40,640

gonna put some monkeys and chimpanzees

179

00:10:45,460 --> 00:10:43,040

in first now I know I want out of here

180

00:10:48,910 --> 00:10:45,470

so I really had a very negative opinion

181

00:10:51,250 --> 00:10:48,920

of it before the first flight we will

182

00:10:53,560 --> 00:10:51,260

have developed our Mercury spaceship to

183

00:10:57,460 --> 00:10:53,570

the point where it will be as reliable

184

00:11:01,630 --> 00:10:57,470

as man can devise today we are

185

00:11:03,790 --> 00:11:01,640

introducing to you and the world these

186

00:11:06,400 --> 00:11:03,800

seven men who have been selected to

187

00:11:10,060 --> 00:11:06,410

begin training for orbital space flight

188

00:11:12,370 --> 00:11:10,070

I feel that this is the future of not

189

00:11:15,250 --> 00:11:12,380

only this country but the world we've

190

00:11:16,300 --> 00:11:15,260

gone about as far as we can on this

191

00:11:19,720 --> 00:11:16,310

globe and we have to start looking

192

00:11:23,170 --> 00:11:19,730

around a bit and it's just the natural

193

00:11:28,060 --> 00:11:23,180

expansion of flight Project Mercury is

194

00:11:30,280 --> 00:11:28,070

just one part of the endeavor - its

195

00:11:31,660 --> 00:11:30,290

space travel I got on this project

196

00:11:32,390 --> 00:11:31,670

because it'd probably be the nearest to

197

00:11:34,730 --> 00:11:32,400

heaven not ever

198

00:11:37,700 --> 00:11:34,740

yet no one to make the most of it these

199

00:11:40,880 --> 00:11:37,710

ladies and gentlemen are the nation's

200

00:11:46,860 --> 00:11:40,890

mercury astronauts

201
00:11:53,750 --> 00:11:46,870

[Applause]

202
00:11:57,560 --> 00:11:53,760

[Music]

203
00:11:59,090 --> 00:11:57,570

echo was 100 feet in diameter and it was

204
00:12:12,410 --> 00:11:59,100

one of the biggest challenges that we

205
00:12:16,380 --> 00:12:12,420

had in like in communication involving

206
00:12:21,790 --> 00:12:19,600

[Music]

207
00:12:24,250 --> 00:12:21,800

the real thing that came out of it was

208
00:12:26,590 --> 00:12:24,260

that every buyer the world saw it they

209
00:12:42,340 --> 00:12:26,600

knew that the United States was in the

210
00:12:45,160 --> 00:12:42,350

spaceman convincing others that humans

211
00:12:48,640 --> 00:12:45,170

could do a job in space that's what we

212
00:12:50,230 --> 00:12:48,650

were up to in Project Mercury a 98% of

213
00:12:51,670 --> 00:12:50,240

the medical community in the United

214

00:12:54,100 --> 00:12:51,680

States did not think the man could

215

00:13:02,320 --> 00:12:54,110

survive in that environment much less do

216

00:13:05,530 --> 00:13:02,330

a job and that was very important to the

217

00:13:08,110 --> 00:13:05,540

future of manned spaceflight because it

218

00:13:11,020 --> 00:13:08,120

allowed us to take advantage of the

219

00:13:13,630 --> 00:13:11,030

human beings thinking capacity his

220

00:13:15,760 --> 00:13:13,640

intelligence and it simplified the

221

00:13:18,490 --> 00:13:15,770

design of the spacecraft frankly and

222

00:13:22,180 --> 00:13:18,500

none of us had ever ever seen a missile

223

00:13:24,400 --> 00:13:22,190

launch and so five four three two one

224

00:13:26,050 --> 00:13:24,410

and the booster launches and it the big

225

00:13:28,810 --> 00:13:26,060

flame and we're standing there walking

226

00:13:30,850 --> 00:13:28,820

up like this and here are these seven

227

00:13:32,800 --> 00:13:30,860

budding astronauts watching as it goes

228

00:13:35,740 --> 00:13:32,810

up in his twenty seven thousand feet and

229

00:13:38,400 --> 00:13:35,750

blew and it just looked like an atomic

230

00:13:40,990 --> 00:13:38,410

bomb went off over our head up there and

231

00:13:42,940 --> 00:13:41,000

I remember I was looking at each other

232

00:13:45,120 --> 00:13:42,950

and saying we got to talk to some

233

00:13:47,410 --> 00:13:45,130

engineers tomorrow

234

00:13:57,530 --> 00:13:47,420

there was the initial launch that any of

235

00:14:01,650 --> 00:13:59,820

nopales aircraft the division is

236

00:14:04,710 --> 00:14:01,660

actually the division that got us into

237

00:14:07,680 --> 00:14:04,720

space because I work from acts with J

238

00:14:10,980 --> 00:14:07,690

and Max version a of course is the one

239

00:14:14,940 --> 00:14:10,990

who did the mercury capsule and invented

240

00:14:16,710 --> 00:14:14,950

that completely I'll tell you it became

241

00:14:19,410 --> 00:14:16,720

immediately apparent to me the only

242

00:14:21,990 --> 00:14:19,420

practical approach was was was on I I

243

00:14:27,600 --> 00:14:22,000

had to propose simply because it

244

00:14:30,240 --> 00:14:27,610

provided the lightest way to do it our

245

00:14:32,640 --> 00:14:30,250

best launch vehicle was Atmos the

246

00:14:35,010 --> 00:14:32,650

mercury the only one who had a chance to

247

00:14:36,470 --> 00:14:35,020

be made light enough to be able to make

248

00:14:39,240 --> 00:14:36,480

orbit on Atlas

249

00:14:44,970 --> 00:14:39,250

we didn't call it mercury that day we

250

00:14:50,460 --> 00:14:44,980

still call it the capsule the concept we

251
00:14:58,260 --> 00:14:50,470
came up with was it was a primate from

252
00:15:06,870 --> 00:15:01,450
I'm a bum ba-bum ba-bum ba-bum ba-bum

253
00:15:11,970 --> 00:15:09,600
and then we started launching monkeys

254
00:15:13,769 --> 00:15:11,980
and then chimpanzees and then they

255
00:15:27,440 --> 00:15:13,779
launched Yuri Gagarin we were totally

256
00:15:34,350 --> 00:15:32,160
Yuri Gagarin and the Soviets got there

257
00:15:36,540 --> 00:15:34,360
first and that was a terrible

258
00:15:37,230 --> 00:15:36,550
disappointment for the nation and for us

259
00:15:40,110 --> 00:15:37,240
of course

260
00:15:44,190 --> 00:15:40,120
Yuri Gagarin was launched into Earth

261
00:15:47,220 --> 00:15:44,200
orbit in 1961 the United States still

262
00:15:49,650 --> 00:15:47,230
wasn't there but the 60s were a decade

263
00:15:52,890 --> 00:15:49,660

of change and NASA would forever change

264

00:15:55,350 --> 00:15:52,900

the course of human exploration we were

265

00:15:57,900 --> 00:15:55,360

getting telegrams like mad from all over

266

00:16:00,180 --> 00:15:57,910

the country from The Associated nurse

267

00:16:03,870 --> 00:16:00,190

Prevention of Cruelty to Animals ASPCA

268

00:16:09,240 --> 00:16:03,880

please stop washing these chimpanzees so

269

00:16:13,310 --> 00:16:09,250

we launched Alan Shepard I always think

270

00:16:16,440 --> 00:16:13,320

that Alan Shepards flight was a

271

00:16:19,500 --> 00:16:16,450

fantastic moment in the history of NASA

272

00:16:22,800 --> 00:16:19,510

and the history of manned spaceflight

273

00:16:25,560 --> 00:16:22,810

but I think back on that and I watched

274

00:16:29,430 --> 00:16:25,570

him come out of that band on the

275

00:16:33,630 --> 00:16:29,440

redstone pad and look up at that rocket

276

00:16:35,940 --> 00:16:33,640

in that silver suit he had on and all

277

00:16:37,650 --> 00:16:35,950

those lights flashing and then people

278

00:16:40,650 --> 00:16:37,660

looking at him and watching and

279

00:16:42,740 --> 00:16:40,660

wondering himself what the hell he was

280

00:16:46,190 --> 00:16:42,750

doing there getting up on top of this

281

00:16:46,200 --> 00:16:55,790

[Music]

282

00:17:00,679 --> 00:16:58,400

I think the biggest surprise I had a

283

00:17:03,130 --> 00:17:00,689

whole series of events of the space

284

00:17:07,399 --> 00:17:03,140

program because after Shepards flight

285

00:17:09,350 --> 00:17:07,409

weeks President Kennedy said I believe

286

00:17:12,829 --> 00:17:09,360

that this nation should commit itself to

287

00:17:15,590 --> 00:17:12,839

achieving the goal before this decade is

288

00:17:18,230 --> 00:17:15,600

out of landing a man on the moon and

289

00:17:21,079 --> 00:17:18,240

returning him safely to the earth I

290

00:17:25,909 --> 00:17:21,089

thought that is the most audacious thing

291

00:17:32,269 --> 00:17:25,919

I have ever heard in my entire life are

292

00:17:35,029 --> 00:17:32,279

we serious about this remember now when

293

00:17:38,539 --> 00:17:35,039

he said that we had met to orbit the

294

00:17:52,340 --> 00:17:38,549

first man in this country John Glenn was

295

00:17:54,620 --> 00:17:52,350

10 months away from flying most of us

296

00:17:56,240 --> 00:17:54,630

thought he was really stretching the

297

00:17:58,460 --> 00:17:56,250

point and frankly I thought he was a

298

00:18:00,409 --> 00:17:58,470

Bismarck we didn't really even have

299

00:18:06,019 --> 00:18:00,419

computers at the start of this we were

300

00:18:08,360 --> 00:18:06,029

all still using our slide rules because

301
00:18:11,690 --> 00:18:08,370
there is new knowledge to be gained and

302
00:18:14,210 --> 00:18:11,700
new rights to be won he was asking us to

303
00:18:17,000 --> 00:18:14,220
do with most people at the time thought

304
00:18:19,850 --> 00:18:17,010
couldn't be done but he was doing it in

305
00:18:23,240 --> 00:18:19,860
an environment in which the Soviet Union

306
00:18:25,010 --> 00:18:23,250
literally own space and he laid the

307
00:18:27,279 --> 00:18:25,020
gauntlet down

308
00:18:29,899 --> 00:18:27,289
American people picked it got lit up and

309
00:18:36,529 --> 00:18:29,909
got to a point where they didn't know it

310
00:18:38,750 --> 00:18:36,539
couldn't be done not because they are

311
00:18:40,820 --> 00:18:38,760
easy but because they are hard

312
00:18:43,880 --> 00:18:40,830
that was all heady stuff and we were all

313
00:18:47,630 --> 00:18:43,890

you know go go man go so to go to

314

00:18:50,180 --> 00:18:47,640

orbital speed do you have to go 17,000

315

00:18:53,810 --> 00:18:50,190

300 miles an hour that's how fast you

316

00:18:57,890 --> 00:18:53,820

have to go to balance gravity so the

317

00:19:02,720 --> 00:18:57,900

first manned flight for orbit was John

318

00:19:05,480 --> 00:19:02,730

Glenn doctors were concerned for

319

00:19:07,549 --> 00:19:05,490

instance that when you're in zero-g for

320

00:19:09,830 --> 00:19:07,559

a while for several hours you're afraid

321

00:19:11,750 --> 00:19:09,840

your eyes might change shape that you

322

00:19:16,880 --> 00:19:11,760

wouldn't be able to even keep your

323

00:19:18,140 --> 00:19:16,890

vision on the instrument panel so we

324

00:19:19,730 --> 00:19:18,150

were out to prove what those things did

325

00:19:25,220 --> 00:19:19,740

not make the difference but and that's

326

00:19:28,710 --> 00:19:27,070

[Music]

327

00:19:33,009 --> 00:19:28,720

[Applause]

328

00:19:35,799 --> 00:19:33,019

when John flew he saw these glowing

329

00:19:38,320 --> 00:19:35,809

particles at sunset and they look a

330

00:19:41,560 --> 00:19:38,330

little like Firefly so he told the

331

00:19:44,169 --> 00:19:41,570

ground its fireflies and it was a major

332

00:19:46,570 --> 00:19:44,179

mystery but I could create these

333

00:19:48,899 --> 00:19:46,580

fireflies by wrapping on the side of the

334

00:19:52,989 --> 00:19:48,909

spacecraft it turned out they were

335

00:19:56,289 --> 00:19:52,999

little chips of ice and they fly past

336

00:19:58,269 --> 00:19:56,299

the window like a firefly might my

337

00:20:02,289 --> 00:19:58,279

mission ended up being controversial

338

00:20:03,789 --> 00:20:02,299

because I overshoot of the landing by I

339

00:20:08,680 --> 00:20:03,799

think 200 miles

340

00:20:11,019 --> 00:20:08,690

so my flight did contribute a lot of new

341

00:20:15,340 --> 00:20:11,029

knowledge to the science of space flight

342

00:20:18,009 --> 00:20:15,350

and it took the form of redesign but all

343

00:20:20,100 --> 00:20:18,019

flights do that you know we stand on the

344

00:20:24,009 --> 00:20:20,110

shoulders of those who go before us

345

00:20:26,320 --> 00:20:24,019

whether or not they overshoot the

346

00:20:28,960 --> 00:20:26,330

interesting part of the mercury mission

347

00:20:31,419 --> 00:20:28,970

of Sigma 7 was that we were over the

348

00:20:33,999 --> 00:20:31,429

South Atlantic and prior to that mission

349

00:20:37,269 --> 00:20:34,009

the Russians had set off a nuclear bomb

350

00:20:39,580 --> 00:20:37,279

at high altitude so at radiation devices

351

00:20:41,769 --> 00:20:39,590

they would measure 10 Rankin's 5

352

00:20:42,489 --> 00:20:41,779

Rankin's 1 Rankine and 1/2 rank or

353

00:20:44,230 --> 00:20:42,499

something like that

354

00:20:46,210 --> 00:20:44,240

I didn't get a reading on any of those

355

00:20:48,070 --> 00:20:46,220

things so it turned out we were ok so we

356

00:20:54,490 --> 00:20:48,080

could go on and let Cooper go over the

357

00:21:01,730 --> 00:20:57,890

it truly was the Age of Aquarius in the

358

00:21:07,400 --> 00:21:01,740

60s the mood around us was always

359

00:21:10,190 --> 00:21:07,410

electric the press revered the

360

00:21:13,820 --> 00:21:10,200

astronauts and it revered those of us in

361

00:21:17,330 --> 00:21:13,830

the front of the program they looked up

362

00:21:20,180 --> 00:21:17,340

to us and we felt the responsibility so

363

00:21:22,480 --> 00:21:20,190

the feeling was mutual the country

364

00:21:26,190 --> 00:21:22,490

supported what we did

365

00:21:26,200 --> 00:21:35,900

we were pushing technology

366

00:21:40,229 --> 00:21:38,330

[Music]

367

00:21:43,080 --> 00:21:40,239

communications hot lights of course came

368

00:21:45,090 --> 00:21:43,090

into being and a lot of other neat

369

00:21:49,169 --> 00:21:45,100

things have happened as a result of that

370

00:21:51,029 --> 00:21:49,179

technology push the country was trying

371

00:21:52,739 --> 00:21:51,039

to build a supersonic transport at least

372

00:21:55,049 --> 00:21:52,749

to do some research and build some

373

00:21:57,570 --> 00:21:55,059

prototypes so by trying to study the

374

00:21:59,249 --> 00:21:57,580

flow fields about these vehicles trying

375

00:22:01,590 --> 00:21:59,259

to compute the sonic booms and their

376

00:22:04,460 --> 00:22:01,600

propagation to the ground was a very

377

00:22:06,779 --> 00:22:04,470

interesting man challenging problem

378

00:22:09,989 --> 00:22:06,789

there was a lot of interest in must

379

00:22:11,759 --> 00:22:09,999

largely because of the publicity which

380

00:22:15,560 --> 00:22:11,769

the planet received at the hands of

381

00:22:20,110 --> 00:22:15,570

Percival Lowell in the early 1900's he

382

00:22:25,780 --> 00:22:23,680

[Music]

383

00:22:27,700 --> 00:22:25,790

we've made out a pretty good case that

384

00:22:31,210 --> 00:22:27,710

the planet must have intelligent life

385

00:22:32,860 --> 00:22:31,220

won and so a lot of interested

386

00:22:36,669 --> 00:22:32,870

environment for them because of

387

00:22:38,710 --> 00:22:36,679

successfully flown past Mars taking some

388

00:22:41,830 --> 00:22:38,720

photographs as it went by

389

00:22:44,890 --> 00:22:41,840

the most important piece of data from

390

00:22:48,310 --> 00:22:44,900

Mariner 4 was the photograph number 11

391

00:22:49,980 --> 00:22:48,320

which showed very clearly a crater which

392

00:22:53,530 --> 00:22:49,990

looked just like the craters on the moon

393

00:22:54,820 --> 00:22:53,540

although by today's standards the

394

00:22:58,630 --> 00:22:54,830

quality of these pictures are pretty

395

00:23:01,330 --> 00:22:58,640

poor they were definitely showing that

396

00:23:04,940 --> 00:23:01,340

Mars were much more like the moon than

397

00:23:11,080 --> 00:23:08,030

Gemini was the program between Mercury

398

00:23:14,000 --> 00:23:11,090

of the single seater in Earth orbit and

399

00:23:20,360 --> 00:23:14,010

Apollo the three seater all the way to

400

00:23:27,500 --> 00:23:25,220

liftoff Germany of course carried two

401
00:23:41,570 --> 00:23:27,510
people but I wasn't the people that it

402
00:23:43,580 --> 00:23:41,580
carried it was the concepts Germany was

403
00:23:47,330 --> 00:23:43,590
a great program because we learned how

404
00:23:56,210 --> 00:23:47,340
to operate in space how to do EBA how to

405
00:23:59,060 --> 00:23:56,220
use computers so what we did with

406
00:24:01,610 --> 00:23:59,070
Germany we did rendezvous which I was

407
00:24:05,180 --> 00:24:01,620
very thrilled to do we did the docking

408
00:24:06,529 --> 00:24:05,190
we did the change of orbit we did a

409
00:24:09,400 --> 00:24:06,539
precise reentry

410
00:24:11,830 --> 00:24:09,410
all of those were very important to the

411
00:24:14,960 --> 00:24:11,840
[Music]

412
00:24:16,760 --> 00:24:14,970
company 12 Houston Capcom there will be

413
00:24:21,850 --> 00:24:16,770

a record beautiful job

414

00:24:28,130 --> 00:24:25,789

Apollo 1 was to be the first man test of

415

00:24:31,010 --> 00:24:28,140

the Apollo spacecraft so it was a real

416

00:24:34,390 --> 00:24:31,020

shocker to find that we lost a crew not

417

00:24:38,299 --> 00:24:34,400

in space but right there on the pad

418

00:24:42,409 --> 00:24:38,309

the fire on the pad was a traumatic

419

00:24:45,510 --> 00:24:42,419

event it ripped us apart to be perfectly

420

00:24:55,540 --> 00:24:45,520

honest with you a terrible day

421

00:24:58,780 --> 00:24:55,550

[Music]

422

00:25:01,020 --> 00:24:58,790

we were not doing a good job we were

423

00:25:05,049 --> 00:25:01,030

running too fast it forced us to

424

00:25:09,040 --> 00:25:05,059

reconsider what we were doing and do job

425

00:25:10,570 --> 00:25:09,050

properly but I thought having happened I

426
00:25:20,380 --> 00:25:10,580
don't think we would have gotten to the

427
00:25:22,180 --> 00:25:20,390
moon in the sixties five weeks later as

428
00:25:23,890 --> 00:25:22,190
the backup crew we inherited the first

429
00:25:26,680 --> 00:25:23,900
manned Apollo mission which turned out

430
00:25:29,710 --> 00:25:26,690
the Apollo 7 but as there were many

431
00:25:33,490 --> 00:25:29,720
things with NASA what was a disaster

432
00:25:35,470 --> 00:25:33,500
with Apollo 1 turned out to be a real

433
00:25:38,410 --> 00:25:35,480
triumph with Apollo 7 because the

434
00:25:48,850 --> 00:25:38,420
spacecraft itself was a was a marvelous

435
00:25:50,500 --> 00:25:48,860
flying machine it went 11 days so we

436
00:25:55,830 --> 00:25:50,510
were quite proud of the fact that we

437
00:26:00,190 --> 00:25:58,510
and that was what Apollo 7 did for me it

438
00:26:05,220 --> 00:26:00,200

proved that we could do all the things

439

00:26:11,160 --> 00:26:08,260

this is Apollo fat on launch control we

440

00:26:19,680 --> 00:26:11,170

had bill go at this time

441

00:26:24,990 --> 00:26:19,690

- - 15 14 13 12 11 10 9 we have ignition

442

00:26:27,550 --> 00:26:25,000

sequence start the engines around 4 3 2

443

00:26:32,320 --> 00:26:27,560

1 0

444

00:26:32,330 --> 00:26:36,870

we have

445

00:26:51,860 --> 00:26:42,690

[Music]

446

00:27:01,140 --> 00:26:57,150

the first Fulop Saturn launch of all the

447

00:27:04,380 --> 00:27:01,150

rockets went to the moon with humans on

448

00:27:06,330 --> 00:27:04,390

it they need him tested individual

449

00:27:08,730 --> 00:27:06,340

stages they just stack them all up stuck

450

00:27:34,980 --> 00:27:08,740

my people up and says let's try it out

451
00:27:40,520 --> 00:27:37,310

[Music]

452
00:27:42,660 --> 00:27:40,530

what I wonder

453
00:27:44,820 --> 00:27:42,670

coming to you approximately halfway

454
00:27:49,110 --> 00:27:44,830

between the moat of the earth we have

455
00:27:51,090 --> 00:27:49,120

about 40 hours left to go to the top the

456
00:27:54,510 --> 00:27:51,100

first time we flew a crew on the big

457
00:27:56,310 --> 00:27:54,520

Saturn 5 we sent them to the moon for 10

458
00:28:09,210 --> 00:27:56,320

orbits not just this way around the back

459
00:28:11,190 --> 00:28:09,220

very bold decision on Apollo 8 when we

460
00:28:13,380 --> 00:28:11,200

wrote into the spacecraft and soften the

461
00:28:16,530 --> 00:28:13,390

very first time the far side of the moon

462
00:28:18,420 --> 00:28:16,540

only 60 miles below we were like three

463
00:28:20,760 --> 00:28:18,430

school kids looking into a candy store

464

00:28:22,500 --> 00:28:20,770

window kind of forgot the flight plan

465

00:28:24,510 --> 00:28:22,510

for a second as those ancient old

466

00:28:39,840 --> 00:28:24,520

craters on the far side slowly slipped

467

00:29:10,840 --> 00:28:45,880

[Music]

468

00:29:17,030 --> 00:29:13,940

frankly I wasn't too optimistic that

469

00:29:19,520 --> 00:29:17,040

Apollo 11 would actually land and

470

00:29:23,420 --> 00:29:19,530

actually return somebody's successfully

471

00:29:26,150 --> 00:29:23,430

I I thought we'd get a get away with our

472

00:29:27,830 --> 00:29:26,160

lives I wasn't too worried about that

473

00:29:30,440 --> 00:29:27,840

but I just thought there were so many

474

00:29:34,100 --> 00:29:30,450

unknowns that I would have given us

475

00:30:12,320 --> 00:29:34,110

about a 50/50 chance of being the first

476

00:30:12,330 --> 00:30:32,140

[Music]

477

00:30:39,410 --> 00:30:34,370

like the fellers gonna go for landing

478

00:30:41,510 --> 00:30:39,420

retro no I don't control oh oh no

479

00:30:43,370 --> 00:30:41,520

surgeon go Capcom we're go for landing

480

00:30:49,280 --> 00:30:43,380

altitude 4200 thing you're go for

481

00:30:52,880 --> 00:30:49,290

landing over there are certain events in

482

00:30:55,220 --> 00:30:52,890

life that you never forget and they the

483

00:30:58,010 --> 00:30:55,230

lunar landing and in particular the last

484

00:30:59,990 --> 00:30:58,020

seconds leading up to the landing will

485

00:31:02,150 --> 00:31:00,000

never be forgotten we battled to get to

486

00:31:04,160 --> 00:31:02,160

the surface we're halfway to our abort

487

00:31:06,130 --> 00:31:04,170

limit about the time we got that started

488

00:31:15,710 --> 00:31:06,140

out we started having a series of

489

00:31:18,650 --> 00:31:15,720

computer program alarms and as the crew

490

00:31:21,830 --> 00:31:18,660

took over at about two minutes prior to

491

00:31:23,810 --> 00:31:21,840

landing searching for a landing site we

492

00:31:39,320 --> 00:31:23,820

knew that they were going to be using a

493

00:31:41,570 --> 00:31:39,330

lot more fuel than we expected have a

494

00:31:43,670 --> 00:31:41,580

good feeling about just how far they

495

00:31:47,300 --> 00:31:43,680

were nasty man even though they kept

496

00:31:50,810 --> 00:31:47,310

going and going and going what were our

497

00:31:54,350 --> 00:31:50,820

chances of landing successfully getting

498

00:31:57,380 --> 00:31:54,360

outside that was pretty easy to do it

499

00:32:00,590 --> 00:31:57,390

was touching down so that later missions

500

00:32:04,370 --> 00:32:00,600

could touch down and then do the rest of

501
00:32:06,770 --> 00:32:04,380
the stuff but the landing with 15

502
00:32:10,490 --> 00:32:06,780
seconds of fuel remaining that was even

503
00:32:13,980 --> 00:32:10,500
important thing for were driven to the

504
00:32:25,680 --> 00:32:18,810
I'm back right okay engine stop we got

505
00:32:34,440 --> 00:32:29,880
a gaudy babe here he go I landed it was

506
00:32:36,330 --> 00:32:34,450
like Jewess rocket tranquility we can't

507
00:32:38,010 --> 00:32:36,340
be on the ground you got a bunch of guys

508
00:32:41,340 --> 00:32:38,020
about to turn blue we're breathing again

509
00:32:42,180 --> 00:32:41,350
thanks a lot okay keep the chatter down

510
00:32:44,100 --> 00:32:42,190
in this room

511
00:32:48,120 --> 00:32:44,110
the unfortunate thing is no controller

512
00:32:51,150 --> 00:32:48,130
had an opportunity to absorb the emotion

513
00:32:54,780 --> 00:32:51,160

of that landing because we had to work

514

00:32:57,600 --> 00:32:54,790

for the next two hours non-stop

515

00:33:02,040 --> 00:32:57,610

okay you want stay no stay retro Hey

516

00:33:04,560 --> 00:33:02,050

right Oh State Patrol calm ANC thank God

517

00:33:07,650 --> 00:33:04,570

thanks urgent hey Capcom or state

518

00:33:13,440 --> 00:33:07,660

forty-one and we're getting a picture on

519

00:33:15,450 --> 00:33:13,450

the TV have you had a good picture up

520

00:33:27,080 --> 00:33:15,460

and tell that moment television have

521

00:33:32,700 --> 00:33:30,300

once we landed safely the only thing

522

00:33:37,260 --> 00:33:32,710

that counted was for us to see the

523

00:33:40,620 --> 00:33:37,270

picture step off the LEM now what I felt

524

00:33:42,930 --> 00:33:40,630

at that moment was the TV better worker

525

00:33:44,910 --> 00:33:42,940

else and if it doesn't really really

526

00:33:46,830 --> 00:33:44,920

will Know Who I am because I'll be the

527

00:33:55,180 --> 00:33:46,840

man who didn't bring you television from

528

00:33:55,190 --> 00:34:29,899

[Music]

529

00:34:33,690 --> 00:34:32,250

the world just marveled at this right

530

00:34:35,460 --> 00:34:33,700

along with us and we more or less made

531

00:34:37,379 --> 00:34:35,470

the whole world our partners in this

532

00:34:38,730 --> 00:34:37,389

thing by inviting people to be there I

533

00:34:40,440 --> 00:34:38,740

think that's one of the best things we

534

00:34:41,780 --> 00:34:40,450

ever we ever did in the space program

535

00:34:44,849 --> 00:34:41,790

and one of the best decisions ever made

536

00:34:52,940 --> 00:34:44,859

with regard the space program was to

537

00:35:03,030 --> 00:35:00,839

I think it was the biggest event from an

538

00:35:05,370 --> 00:35:03,040

aviation point of view and probably from

539

00:35:09,300 --> 00:35:05,380

a scientific point of view that happened

540

00:35:22,370 --> 00:35:09,310

in the 20th century and maybe in history

541

00:35:39,300 --> 00:35:22,380

of man Peyman aids for all mankind

542

00:35:59,350 --> 00:35:39,310

[Music]

543

00:36:06,730 --> 00:36:02,960

but we had a good time on Apollo 12 and

544

00:36:09,620 --> 00:36:06,740

so we were happy to go and anxious to

545

00:36:11,900 --> 00:36:09,630

for the great adventure and so off we go

546

00:36:13,940 --> 00:36:11,910

and we go into a thunderstorm

547

00:36:16,450 --> 00:36:13,950

immediately after launch and get hit by

548

00:36:18,950 --> 00:36:16,460

lightning and it lights up a lot of

549

00:36:34,970 --> 00:36:18,960

caution and warning lights and we didn't

550

00:36:37,070 --> 00:36:34,980

know what to do thank God for Mission

551
00:36:40,820 --> 00:36:37,080
Control because they came up and gave us

552
00:36:42,350 --> 00:36:40,830
some advice and and so we powered it

553
00:36:44,510 --> 00:36:42,360
back up again with their help and

554
00:36:53,900 --> 00:36:44,520
everything worked out okay we went into

555
00:36:56,270 --> 00:36:53,910
orbit and then off to the moon they

556
00:36:57,860 --> 00:36:56,280
landed us perfectly if we had not

557
00:36:59,810 --> 00:36:57,870
touched the controls we would have

558
00:37:03,680 --> 00:36:59,820
landed right in the middle of the crater

559
00:37:06,080 --> 00:37:03,690
that we were shooting for so they

560
00:37:09,080 --> 00:37:06,090
wouldn't have missed it by 10 feet and

561
00:37:11,360 --> 00:37:09,090
when you figure we went 240 thousand

562
00:37:29,120 --> 00:37:11,370
miles that's pretty amazing shows you

563
00:37:31,160 --> 00:37:29,130

the kind of capability that NASA has so

564

00:37:33,440 --> 00:37:31,170

we got out for that time and we can

565

00:37:35,090 --> 00:37:33,450

place some experiments and then we

566

00:37:47,120 --> 00:37:35,100

collected a lot of rocks and made some

567

00:37:49,760 --> 00:37:47,130

observations and then our primary job

568

00:37:51,770 --> 00:37:49,770

had been to land near surveyor which was

569

00:37:54,530 --> 00:37:51,780

an unmanned spacecraft that had landed

570

00:38:07,560 --> 00:37:54,540

on the moon in the ocean of storms some

571

00:38:11,970 --> 00:38:10,350

that look so we were going to land there

572

00:38:13,470 --> 00:38:11,980

and pick up some parts like the TV

573

00:38:15,470 --> 00:38:13,480

camera and the scoop and things like

574

00:38:18,530 --> 00:38:15,480

that bring him back to earth for

575

00:38:34,269 --> 00:38:30,509

[Music]

576

00:38:46,569 --> 00:38:34,279

Apollo 13 was a team effort from very

577

00:38:49,150 --> 00:38:46,579

beginning to the end when the crew threw

578

00:38:51,339 --> 00:38:49,160

the switches to start the crowd stir a

579

00:38:54,640 --> 00:38:51,349

spark jump between the fan and the

580

00:38:57,219 --> 00:38:54,650

heater assembly and the pressure in that

581

00:38:59,140 --> 00:38:57,229

tank rose very rapidly because the

582

00:39:02,709 --> 00:38:59,150

insulation had been damaged on the

583

00:39:05,849 --> 00:39:02,719

system and we now had a fire inside the

584

00:39:09,789 --> 00:39:05,859

tank that blew the dome of the tank off

585

00:39:16,590 --> 00:39:09,799

that series of events started the saga

586

00:39:24,120 --> 00:39:19,320

and we had a pretty large Bank though

587

00:39:27,180 --> 00:39:24,130

they did with the they exact words I

588

00:39:30,210 --> 00:39:27,190

used in Mission Control is we have never

589

00:39:33,000 --> 00:39:30,220

lost an American in space and we sure as

590

00:39:36,180 --> 00:39:33,010

hell aren't gonna lose one this crew is

591

00:39:39,150 --> 00:39:36,190

coming home you gotta believe it your

592

00:39:45,270 --> 00:39:39,160

team must believe it and we must make it

593

00:39:48,090 --> 00:39:45,280

happen when we suddenly realized the

594

00:39:50,220 --> 00:39:48,100

truth is significance of the explosion

595

00:39:52,770 --> 00:39:50,230

seeing the oxygen escape from the rear

596

00:39:54,240 --> 00:39:52,780

of my spacecraft and consequently losing

597

00:39:56,610 --> 00:39:54,250

all the electrical power and the

598

00:39:57,750 --> 00:39:56,620

propulsion system we knew we were in

599

00:39:59,370 --> 00:39:57,760

serious trouble

600

00:40:00,570 --> 00:39:59,380

you called in your backup becomes now

601
00:40:02,850 --> 00:40:00,580
see if we can get some more brain power

602
00:40:06,060 --> 00:40:02,860
and then we got one here ROG throughout

603
00:40:09,030 --> 00:40:06,070
the entire Apollo 13 mission the teams

604
00:40:11,880 --> 00:40:09,040
and Mission Control changed shifts

605
00:40:15,830 --> 00:40:11,890
almost regularly at eight-hour intervals

606
00:40:18,600 --> 00:40:15,840
and the teams kept the mission going

607
00:40:21,660 --> 00:40:18,610
kept working the problem as my team's

608
00:40:23,220 --> 00:40:21,670
tried to come up with the answers go

609
00:40:25,710 --> 00:40:23,230
ahead like I want you to get some guys

610
00:40:26,430 --> 00:40:25,720
figuring out minimum power in the LEM to

611
00:40:28,230 --> 00:40:26,440
sustain life

612
00:40:30,690 --> 00:40:28,240
fortunately the lunar module was

613
00:40:33,810 --> 00:40:30,700

attached to us and when that occurred

614

00:40:36,180 --> 00:40:33,820

with oxygen almost gone and the command

615

00:40:38,540 --> 00:40:36,190

module we transferred the command to the

616

00:40:42,060 --> 00:40:38,550

lunar module and try to use it somehow

617

00:40:43,680 --> 00:40:42,070

some way as a lifeboat to get home let's

618

00:40:46,590 --> 00:40:43,690

solve the problem but let's not make it

619

00:40:49,530 --> 00:40:46,600

any worse by guessing I got a lot of

620

00:40:52,380 --> 00:40:49,540

recognition for the work that we did but

621

00:40:54,570 --> 00:40:52,390

the real heroes of Apollo 13 were the

622

00:40:56,910 --> 00:40:54,580

people in the back rooms and over in the

623

00:41:00,240 --> 00:40:56,920

engineering facilities who came up with

624

00:41:02,670 --> 00:41:00,250

the answers we needed we never talked

625

00:41:06,090 --> 00:41:02,680

among ourselves about not making it back

626

00:41:07,200 --> 00:41:06,100

home it was like playing a game of

627

00:41:09,570 --> 00:41:07,210

solitaire

628

00:41:12,030 --> 00:41:09,580

as long as we had a card and we could

629

00:41:15,000 --> 00:41:12,040

put it someplace the game kept going and

630

00:41:17,310 --> 00:41:15,010

every crisis that we came up to we found

631

00:41:19,860 --> 00:41:17,320

a solution as we rounded the moon and my

632

00:41:21,660 --> 00:41:19,870

two companions looked at the place where

633

00:41:24,390 --> 00:41:21,670

we were supposed to land and there very

634

00:41:28,079 --> 00:41:24,400

much disappointment I said we're on our

635

00:41:30,929 --> 00:41:28,089

way home let's get home successfully

636

00:41:34,859 --> 00:41:30,939

forget about Delaney and then what all

637

00:41:38,400 --> 00:41:34,869

silent big business is that right for

638

00:41:52,650 --> 00:41:38,410

the whole panel is blown out almost to

639

00:41:54,989 --> 00:41:52,660

the Apollo 13 has to rate with anything

640

00:41:57,870 --> 00:41:54,999

we ever do because it took a great deal

641

00:42:02,400 --> 00:41:57,880

of ingenuity a great deal of preparation

642

00:42:04,979 --> 00:42:02,410

years of preparation a lot of guts on

643

00:42:22,140 --> 00:42:04,989

the part of the astronauts themselves to

644

00:42:32,200 --> 00:42:24,240

[Applause]

645

00:42:37,990 --> 00:42:35,020

and so you have to say that Apollo 13

646

00:42:40,569 --> 00:42:38,000

was a fantastic moment in the history of

647

00:42:42,809 --> 00:42:40,579

manned spaceflight I will tell you that

648

00:42:45,040 --> 00:42:42,819

we had one of the most bodacious

649

00:42:48,350 --> 00:42:45,050

splashdown parties that I can remember

650

00:43:10,920 --> 00:42:48,360

and those guys got back

651
00:43:10,930 --> 00:43:44,760

[Applause]

652
00:43:44,770 --> 00:43:56,640

[Music]

653
00:44:03,130 --> 00:44:00,849

about that I'm going out ballet when I

654
00:44:04,000 --> 00:44:03,140

get back you learn another line of work

655
00:44:07,870 --> 00:44:04,010

up here

656
00:44:10,390 --> 00:44:07,880

god you're just beautiful that is that

657
00:44:12,270 --> 00:44:10,400

is the most beautiful sight but there

658
00:44:14,620 --> 00:44:12,280

you're standing arrow around that crater

659
00:44:21,190 --> 00:44:14,630

god I never heard John describe this

660
00:44:23,330 --> 00:44:21,200

beautifully not really well actually he

661
00:44:34,520 --> 00:44:23,340

is on this thing

662
00:44:34,530 --> 00:44:46,000

[Music]

663
00:44:50,050 --> 00:44:48,340

now I said I can't see to the bottom of

664

00:44:55,960 --> 00:44:50,060

it Naaman put there because I'm going to

665

00:44:58,720 --> 00:44:55,970

get all the different steps and all the

666

00:45:03,300 --> 00:44:58,730

different pieces of hardware and all op

667

00:45:06,340 --> 00:45:03,310

it had to work and this just

668

00:45:08,590 --> 00:45:06,350

inconceivable that we could do something

669

00:45:11,050 --> 00:45:08,600

like them the motivation was well honey

670

00:45:13,090 --> 00:45:11,060

and then gonna be my pocket screws up

671

00:45:14,859 --> 00:45:13,100

you know I'm gonna get it right and

672

00:45:18,510 --> 00:45:14,869

apparently everybody else felt the same

673

00:45:29,950 --> 00:45:18,520

way and we did it and did it and did it

674

00:45:36,560 --> 00:45:32,960

Apollo 17 was probably one of the more

675

00:45:39,200 --> 00:45:36,570

interesting missions because we had a

676
00:45:41,240 --> 00:45:39,210
real geologist there and they landed in

677
00:45:47,930 --> 00:45:41,250
a you know you know wonderfully

678
00:45:50,030 --> 00:45:47,940
interesting place the valley of

679
00:45:52,370 --> 00:45:50,040
taurus-littrow was picked as a landing

680
00:45:54,349 --> 00:45:52,380
site for a couple different reasons and

681
00:45:56,839 --> 00:45:54,359
were one it was in an area the moon we

682
00:45:59,540 --> 00:45:56,849
had never even come close to and it was

683
00:46:01,280 --> 00:45:59,550
a valley some 20 miles long and five

684
00:46:03,170 --> 00:46:01,290
miles across which was literally

685
00:46:04,760 --> 00:46:03,180
surrounded by mountain is higher than a

686
00:46:07,170 --> 00:46:04,770
Grand Canyon is deep

687
00:46:09,660 --> 00:46:07,180
[Music]

688
00:46:11,430 --> 00:46:09,670

yeah what point two kilometers is a long

689

00:46:13,980 --> 00:46:11,440

way from the left look at the Challenger

690

00:46:32,850 --> 00:46:13,990

down there they could get a feel for how

691

00:46:35,520 --> 00:46:32,860

big to fail he really is we stopped

692

00:46:37,260 --> 00:46:35,530

obviously at a lot of different planned

693

00:46:38,790 --> 00:46:37,270

places and we did everything from

694

00:46:40,590 --> 00:46:38,800

drilling core sample to set him

695

00:46:49,590 --> 00:46:40,600

experiments to drilling trenches and so

696

00:46:51,360 --> 00:46:49,600

forth and I thought okay this scientist

697

00:46:52,920 --> 00:46:51,370

has been on the moon - humph he's been

698

00:46:58,370 --> 00:46:52,930

he's been breathing too much oxygen

699

00:47:02,070 --> 00:47:00,690

we not only did a lot of work on the

700

00:47:04,920 --> 00:47:02,080

moon but we had a good time

701
00:47:16,530 --> 00:47:04,930
and you know you're only gonna come that

702
00:47:18,900 --> 00:47:16,540
way once in your life I just looked

703
00:47:21,570 --> 00:47:18,910
around and no one we were leaving no we

704
00:47:24,750 --> 00:47:21,580
weren't coming back and yeah I said we

705
00:47:37,750 --> 00:47:24,760
now leave as we once came and God

706
00:48:10,640 --> 00:47:43,940
[Music]

707
00:48:13,910 --> 00:48:10,650
when you look back on that now and see

708
00:48:16,940 --> 00:48:13,920
how long it's been since we've flown to

709
00:48:19,750 --> 00:48:16,950
the moon you realize not only how

710
00:48:24,500 --> 00:48:19,760
difficult it was but how unique it was

711
00:48:26,270 --> 00:48:24,510
how marvelous it was frankly it's hard

712
00:48:29,520 --> 00:48:26,280
for me to believe sometimes that we did

713
00:48:34,320 --> 00:48:32,220

the political achievement not to mention

714

00:48:36,450 --> 00:48:34,330

engineered achievement of putting humans

715

00:48:38,910 --> 00:48:36,460

on the moon and bring them safely back

716

00:48:45,190 --> 00:48:38,920

to earth and improving it won the fluke

717

00:48:51,329 --> 00:48:49,000

that was fantastic we take for granted

718

00:48:53,380 --> 00:48:51,339

today the technology has come from power

719

00:48:55,100 --> 00:48:53,390

we live in a different world today

720

00:49:06,180 --> 00:48:55,110

because of Apollo

721

00:49:09,580 --> 00:49:06,190

[Music]

722

00:49:12,190 --> 00:49:09,590

although gene cernan was the 12th and

723

00:49:15,760 --> 00:49:12,200

last American to set foot on the moon in

724

00:49:16,510 --> 00:49:15,770

1972 the exploration of space did not

725

00:49:20,230 --> 00:49:16,520

end there

726

00:49:23,710 --> 00:49:20,240

it simply turned the page in the decade

727

00:49:25,120 --> 00:49:23,720

of the 70s NASA's unmanned explorers set

728

00:49:28,000 --> 00:49:25,130

out on journeys that would cross

729

00:49:32,080 --> 00:49:28,010

millions of miles and show us worlds

730

00:49:36,920 --> 00:49:32,090

that until now had only existed as tiny

731

00:49:43,309 --> 00:49:41,049

[Music]

732

00:49:46,430 --> 00:49:43,319

yeah I got right in the beginning of

733

00:49:48,890 --> 00:49:46,440

Landsat NASA really really did something

734

00:49:51,349 --> 00:49:48,900

unique in that program but people don't

735

00:49:54,440 --> 00:49:51,359

really recognize we started the whole

736

00:49:56,000 --> 00:49:54,450

digital camera color analysis but it

737

00:49:57,890 --> 00:49:56,010

turned out to have this incredible

738

00:49:59,990 --> 00:49:57,900

characteristic that it could cover large

739

00:50:02,030 --> 00:50:00,000

areas at the same time bring out small

740

00:50:03,829 --> 00:50:02,040

deviations in the characteristics of the

741

00:50:06,260 --> 00:50:03,839

earth and you're gonna use color to

742

00:50:08,080 --> 00:50:06,270

interpret it to therefore calculate what

743

00:50:29,510 --> 00:50:08,090

was in the various areas

744

00:50:32,180 --> 00:50:29,520

[Music]

745

00:50:35,180 --> 00:50:32,190

I was in the desert in Kenya on the

746

00:50:38,240 --> 00:50:35,190

Eclipse expedition and we saw the

747

00:50:39,710 --> 00:50:38,250

fragments around Skylab go over us and I

748

00:50:42,560 --> 00:50:39,720

thought oh brother

749

00:50:45,859 --> 00:50:42,570

there's been an accident in the Skylab

750

00:50:47,180 --> 00:50:45,869

launch my hopes and desires for science

751
00:50:50,420 --> 00:50:47,190
that was gonna come out of science

752
00:50:55,800 --> 00:50:50,430
Skylab I thought well it's cooked

753
00:50:59,320 --> 00:50:55,810
[Music]

754
00:51:03,130 --> 00:50:59,330
1973 I was commander of the second

755
00:51:05,980 --> 00:51:03,140
Skylab mission and Jack Lousma was the

756
00:51:08,290 --> 00:51:05,990
best Eevee a guy that I've ever met and

757
00:51:11,380 --> 00:51:08,300
I said if we send Jack out there and let

758
00:51:13,140 --> 00:51:11,390
him work on that thing he'll find a way

759
00:51:15,490 --> 00:51:13,150
lo and behold he goes out there and

760
00:51:18,610 --> 00:51:15,500
fools around with it awhile trying to

761
00:51:20,200 --> 00:51:18,620
get these connectors undone and finally

762
00:51:22,140 --> 00:51:20,210
gets them undone and puts it all

763
00:51:26,060 --> 00:51:22,150

together to work great

764

00:51:29,680 --> 00:51:26,070

[Music]

765

00:51:32,780 --> 00:51:29,690

and he went on to a Brent scientific

766

00:51:34,790 --> 00:51:32,790

discovery which had to do with coronal

767

00:51:37,640 --> 00:51:34,800

mass ejections and for the first time we

768

00:51:40,190 --> 00:51:37,650

were able to see these we're big chunks

769

00:51:42,620 --> 00:51:40,200

of the corona and blow off it's day

770

00:51:44,680 --> 00:51:42,630

after day of hard work and even though

771

00:51:47,600 --> 00:51:44,690

you have a nice view out the window that

772

00:51:49,850 --> 00:51:47,610

doesn't kind of pay you back for the

773

00:51:52,430 --> 00:51:49,860

constant effort that you have to put out

774

00:51:55,400 --> 00:51:52,440

to be productive in space it's a tough

775

00:51:57,980 --> 00:51:55,410

job and only dedicated humans can do

776

00:52:00,620 --> 00:51:57,990

this sort of thing it operated for about

777

00:52:04,160 --> 00:52:00,630

nine months which was much longer than

778

00:52:05,720 --> 00:52:04,170

in been anticipated and at that time we

779

00:52:07,370 --> 00:52:05,730

understood some things that we'd never

780

00:52:10,570 --> 00:52:07,380

understood before and it gave us some

781

00:52:12,050 --> 00:52:10,580

forward momentum in the science that

782

00:52:14,270 --> 00:52:12,060

continues right now

783

00:52:14,800 --> 00:52:14,280

till today

784

00:52:17,930 --> 00:52:14,810

[Applause]

785

00:52:19,420 --> 00:52:17,940

[Music]

786

00:52:47,740 --> 00:52:19,430

[Applause]

787

00:52:55,880 --> 00:52:51,590

let me call to express my very great

788

00:52:58,910 --> 00:52:55,890

admiration for your hard work your total

789

00:53:02,920 --> 00:52:58,920

dedication in preparing for this first

790

00:53:07,460 --> 00:53:02,930

joint flight today is not far off when

791

00:53:11,740 --> 00:53:07,470

eight missions made possible by this

792

00:53:22,460 --> 00:53:11,750

first joint effort will be more or less

793

00:53:26,180 --> 00:53:22,470

commonplace one of them huge surprises

794

00:53:28,160 --> 00:53:26,190

of the mid 20th century came with one of

795

00:53:31,550 --> 00:53:28,170

the Mariner spacecraft the Mariner

796

00:53:34,300 --> 00:53:31,560

spacecraft started towards Venus and

797

00:53:37,160 --> 00:53:34,310

they found that the sun's magnetic field

798

00:53:38,930 --> 00:53:37,170

far away from the earth was about as

799

00:53:40,670 --> 00:53:38,940

strong as the Earth's magnetic field and

800

00:53:42,800 --> 00:53:40,680

I had been taught and everybody else had

801
00:53:45,170 --> 00:53:42,810
them but the sun's magnetic field will

802
00:53:47,840 --> 00:53:45,180
be negligible and so it presented us was

803
00:53:49,550 --> 00:53:47,850
a tremendous confrontation of how could

804
00:53:59,090 --> 00:53:49,560
that be so

805
00:54:07,590 --> 00:54:03,770
the one planet that was most intriguing

806
00:54:09,510 --> 00:54:07,600
to humans human scientists was Mars

807
00:54:12,750 --> 00:54:09,520
mercury was closer but it was very

808
00:54:14,160 --> 00:54:12,760
inhospitable Venus was the nearest one

809
00:54:18,050 --> 00:54:14,170
to us but it was worried in hospital

810
00:54:21,810 --> 00:54:18,060
because the atmosphere was toxic and hot

811
00:54:24,570 --> 00:54:21,820
Mars showed seasonal variations that

812
00:54:26,190 --> 00:54:24,580
suggested something was alive and I

813
00:54:28,640 --> 00:54:26,200

think that was the basis for creating

814

00:54:32,670 --> 00:54:28,650

Viking to see if there was life on Mars

815

00:54:35,310 --> 00:54:32,680

when we got down and found out how dry

816

00:54:43,710 --> 00:54:35,320

and arid and barren the place really was

817

00:54:49,079 --> 00:54:46,140

we had hoped to find microscopic life

818

00:54:51,680 --> 00:54:49,089

the thing that happened that kind of

819

00:54:54,109 --> 00:54:51,690

left us in a quandary was the three

820

00:54:57,359 --> 00:54:54,119

experiments that were directly life

821

00:54:57,870 --> 00:54:57,369

detecting did it breathe did it eat did

822

00:54:59,910 --> 00:54:57,880

it

823

00:55:01,950 --> 00:54:59,920

do photosynthesis all said that

824

00:55:04,319 --> 00:55:01,960

something here and when you tried to

825

00:55:06,420 --> 00:55:04,329

find the dead bodies you couldn't so

826

00:55:08,400 --> 00:55:06,430

that kind of left us in the position why

827

00:55:10,260 --> 00:55:08,410

the jury is still out in the end we

828

00:55:11,849 --> 00:55:10,270

ended up with two successful Anna's on

829

00:55:14,640 --> 00:55:11,859

the service and two very successful

830

00:55:17,220 --> 00:55:14,650

orbiters that exceeded their lifetime by

831

00:55:19,380 --> 00:55:17,230

many many months so obviously we were

832

00:55:27,660 --> 00:55:19,390

all related then or you could say we did

833

00:55:29,849 --> 00:55:27,670

it we did it when we flew by Neptune

834

00:55:32,460 --> 00:55:29,859

people were standing in line at night at

835

00:55:34,260 --> 00:55:32,470

planetariums in order to be able to see

836

00:55:35,670 --> 00:55:34,270

the images coming in from Voyager

837

00:55:37,290 --> 00:55:35,680

because they weren't on the web in those

838

00:55:38,520 --> 00:55:37,300

days there was no web you had to go

839

00:55:41,309 --> 00:55:38,530

somewhere in the middle of the night to

840

00:55:43,410 --> 00:55:41,319

see it it became a worldwide event when

841

00:55:45,569 --> 00:55:43,420

Voyager was flying by these worlds and I

842

00:55:47,400 --> 00:55:45,579

had no idea that it would have that kind

843

00:55:49,260 --> 00:55:47,410

of an impact and of course that in the

844

00:55:51,210 --> 00:55:49,270

in the long run is the most important

845

00:55:55,560 --> 00:55:51,220

thing Borges dentists show how much

846

00:56:09,920 --> 00:56:04,210

[Music]

847

00:56:12,109 --> 00:56:09,930

the 1970s really saw the start and heavy

848

00:56:14,809 --> 00:56:12,119

activity in the project aircraft area

849

00:56:16,609 --> 00:56:14,819

which initially focused on sto L

850

00:56:17,270 --> 00:56:16,619

aircraft and then moved into the v/stol

851
00:56:19,819 --> 00:56:17,280
arena

852
00:56:23,720 --> 00:56:19,829
so the rotor craft worked under way very

853
00:56:26,420 --> 00:56:23,730
heavily and has continued to today until

854
00:56:32,540 --> 00:56:26,430
it is the remaining flight research

855
00:56:39,810 --> 00:56:36,240
there were about five of us that came

856
00:56:41,430 --> 00:56:39,820
into the space system division that had

857
00:56:48,390 --> 00:56:41,440
been formed to support shuttle

858
00:56:53,460 --> 00:56:48,400
development coming to work was fun to do

859
00:56:56,100 --> 00:56:53,470
that kind of thing that was a little bit

860
00:57:08,940 --> 00:56:56,110
unique kind of like having some very

861
00:57:11,190 --> 00:57:08,950
expensive toys to play with I think that

862
00:57:12,690 --> 00:57:11,200
was a magnificent development program

863
00:57:15,150 --> 00:57:12,700

you know there were an awful lot of

864

00:57:17,310 --> 00:57:15,160

people including some people at Langley

865

00:57:19,760 --> 00:57:17,320

that were very hesitant that the couple

866

00:57:22,290 --> 00:57:19,770

would be successful would all those

867

00:57:26,400 --> 00:57:22,300

thousands of thermal towels underneath

868

00:57:29,730 --> 00:57:26,410

protect it would it burn up it turned

869

00:57:36,920 --> 00:57:29,740

out to be a tremendous opportunity

870

00:57:48,710 --> 00:57:41,730

six five four main engine start

871

00:57:59,330 --> 00:57:48,720

[Music]

872

00:58:02,840 --> 00:57:59,340

a vehicle that could launch into space

873

00:58:05,030 --> 00:58:02,850

as a rocket put 25 tons of cargo into

874

00:58:08,450 --> 00:58:05,040

orbit and land on a runway like an

875

00:58:13,100 --> 00:58:08,460

airplane not just once but over and over

876
00:58:14,930 --> 00:58:13,110
again in the 1980s NASA would rip this

877
00:58:17,390 --> 00:58:14,940
concept from the pages of science

878
00:58:20,000 --> 00:58:17,400
fiction and place it squarely on the

879
00:58:21,770 --> 00:58:20,010
cutting edge of space travel

880
00:58:22,850 --> 00:58:21,780
[Music]

881
00:58:25,680 --> 00:58:22,860
[Applause]

882
00:58:27,720 --> 00:58:25,690
[Music]

883
00:58:31,069 --> 00:58:27,730
going up the launchpad and they're

884
00:58:34,740 --> 00:58:31,079
looking up and seeing you know this huge

885
00:58:36,569 --> 00:58:34,750
rocket that kind of sounds like an

886
00:58:38,849 --> 00:58:36,579
animal you can kind of hear the gurgling

887
00:58:40,250 --> 00:58:38,859
and the hissing and you know it sounds

888
00:58:43,520 --> 00:58:40,260

like it's alive

889

00:58:48,710 --> 00:58:46,280

a few seconds right before liftoff every

890

00:58:51,290 --> 00:58:48,720

time I've done this has been a little

891

00:58:54,080 --> 00:58:51,300

bit of right about whether I really want

892

00:58:56,810 --> 00:58:54,090

to be doing this or not dopamine engine

893

00:58:59,240 --> 00:58:56,820

start I was really just focusing right

894

00:59:02,360 --> 00:58:59,250

on the tasks at hand and trying not to

895

00:59:03,950 --> 00:59:02,370

think about you know the fact that tons

896

00:59:06,050 --> 00:59:03,960

and tons and tons of rocket fuel we're

897

00:59:11,520 --> 00:59:06,060

about to explode around us liftoff of

898

00:59:11,530 --> 00:59:20,100

Roger roll discovery

899

00:59:20,110 --> 00:59:24,550

[Music]

900

00:59:29,970 --> 00:59:27,660

six seconds in this light forces and

901
00:59:32,620 --> 00:59:29,980
sensations are just powerful beyond

902
00:59:34,900 --> 00:59:32,630
imagination they shake you so much that

903
00:59:39,020 --> 00:59:34,910
you can hardly see the displays in front

904
00:59:44,810 --> 00:59:41,480
right after that solid rocket boosters

905
00:59:46,460 --> 00:59:44,820
are jettisoned at two minutes it's a

906
00:59:49,550 --> 00:59:46,470
very smooth ride the acceleration is

907
00:59:52,290 --> 00:59:49,560
very powerful and you're on the way to

908
00:59:55,310 --> 00:59:52,300
orbit with a very different feeling

909
00:59:57,380 --> 00:59:55,320
[Music]

910
01:00:01,430 --> 00:59:57,390
as soon as you achieved orbit the

911
01:00:04,010 --> 01:00:01,440
engines cut off just instantaneously you

912
01:00:06,170 --> 01:00:04,020
go from being pressed in the seat to

913
01:00:13,820 --> 01:00:06,180

hanging in your straps and sort of

914

01:00:15,050 --> 01:00:13,830

floating in the cockpit the fact that I

915

01:00:18,020 --> 01:00:15,060

was going to be the first American woman

916

01:00:20,720 --> 01:00:18,030

to go into space carried huge

917

01:00:23,120 --> 01:00:20,730

expectations along with it and of course

918

01:00:25,460 --> 01:00:23,130

it was very important to me that I

919

01:00:27,320 --> 01:00:25,470

understood my role really well and that

920

01:00:29,570 --> 01:00:27,330

I was really well prepared for the

921

01:00:31,400 --> 01:00:29,580

mission because the last thing that I

922

01:00:33,650 --> 01:00:31,410

wanted to do was get into space and make

923

01:00:35,780 --> 01:00:33,660

a mistake so I wanted to be very very

924

01:00:40,810 --> 01:00:35,790

sure that I was able to meet the

925

01:00:40,820 --> 01:00:48,090

[Music]

926

01:00:54,610 --> 01:00:52,810

but it wasn't from me desire to be the

927

01:00:57,460 --> 01:00:54,620

first african-american in space my

928

01:01:01,150 --> 01:00:57,470

desire was to make a contribution just

929

01:01:03,790 --> 01:01:01,160

to make a contribution and I think I

930

01:01:05,680 --> 01:01:03,800

probably told people that I would

931

01:01:07,540 --> 01:01:05,690

probably prefer not being in that role

932

01:01:09,400 --> 01:01:07,550

versus being in their world because I

933

01:01:11,110 --> 01:01:09,410

figured being a number two that would be

934

01:01:21,090 --> 01:01:11,120

a lot more fun

935

01:01:21,100 --> 01:01:30,120

[Applause]

936

01:01:35,080 --> 01:01:31,920

[Music]

937

01:01:37,470 --> 01:01:35,090

it feels like you weigh twice as much as

938

01:01:40,230 --> 01:01:37,480

you normally do during the entry portion

939

01:01:43,870 --> 01:01:40,240

once you get on final all of the

940

01:01:46,540 --> 01:01:43,880

emotions and in focus or just on that

941

01:01:49,030 --> 01:01:46,550

last little bit of landing and it's a

942

01:01:50,020 --> 01:01:49,040

it's a neat way to end a fight when you

943

01:01:58,230 --> 01:01:50,030

actually get to put your hands on the

944

01:02:06,930 --> 01:02:00,370

engines throttling up three hundred and

945

01:02:14,950 --> 01:02:12,460

[Music]

946

01:02:19,630 --> 01:02:14,960

we come together today to mourn the loss

947

01:02:23,290 --> 01:02:19,640

of seven brave Americans to share the

948

01:02:26,020 --> 01:02:23,300

grief that we all feel and perhaps in

949

01:02:29,920 --> 01:02:26,030

that sharing to find the strength to

950

01:02:33,070 --> 01:02:29,930

bear our sorrow and the courage to look

951
01:02:35,530 --> 01:02:33,080
for the seeds of hope risk is something

952
01:02:38,800 --> 01:02:35,540
we have to just really consider as part

953
01:02:41,500 --> 01:02:38,810
of our life especially an exploration I

954
01:02:42,940 --> 01:02:41,510
know we've had some tragedies and we'll

955
01:02:45,010 --> 01:02:42,950
probably have tragedies in the future

956
01:02:46,600 --> 01:02:45,020
but you know the ones that we've lost

957
01:02:48,850 --> 01:02:46,610
were probably the first ones to tell you

958
01:03:01,470 --> 01:02:48,860
keep pressing on don't stop because of

959
01:03:07,839 --> 01:03:04,989
my role as a mechanical engineer was to

960
01:03:10,089 --> 01:03:07,849
find out you know what fell apart or

961
01:03:13,299 --> 01:03:10,099
what happened and we finally found that

962
01:03:15,849 --> 01:03:13,309
the o-ring supposed to be designed so

963
01:03:20,680 --> 01:03:15,859

the pressure on one side pushes them

964

01:03:23,019 --> 01:03:20,690

more securely into place the the housing

965

01:03:25,720 --> 01:03:23,029

for that big old ring was just the

966

01:03:28,599 --> 01:03:25,730

opposite the pressure actually pushed it

967

01:03:31,599 --> 01:03:28,609

out finally of course when the thing

968

01:03:35,079 --> 01:03:31,609

burned through and actually burned the

969

01:03:37,660 --> 01:03:35,089

nozzle through it's pretty obvious to

970

01:03:42,570 --> 01:03:37,670

see what what the problem so with them

971

01:03:42,570 --> 01:03:42,580

we got the job with the redesign

972

01:03:45,829 --> 01:03:43,940

[Music]

973

01:03:49,539 --> 01:03:45,839

[Applause]

974

01:03:52,750 --> 01:03:49,549

two spaces discovery clears the tower

975

01:03:59,029 --> 01:03:52,760

Roger roll discovery

976

01:04:05,700 --> 01:04:01,980

good morning discovery you gotta go for

977

01:04:08,069 --> 01:04:05,710

HST deploy ops NASA opened the decade of

978

01:04:11,609 --> 01:04:08,079

the 90s by placing the Hubble Space

979

01:04:14,130 --> 01:04:11,619

Telescope into orbit that would peer

980

01:04:17,490 --> 01:04:14,140

farther into space and further back in

981

01:04:19,559 --> 01:04:17,500

time than any other telescope and in the

982

01:04:21,720 --> 01:04:19,569

closing decade of the 20th century

983

01:04:24,509 --> 01:04:21,730

Hubble and a host of other robotic

984

01:04:37,349 --> 01:04:24,519

explorers would provide astonishing new

985

01:04:39,210 --> 01:04:37,359

views and perspectives everybody was up

986

01:04:42,509 --> 01:04:39,220

we were off to discover the secrets of

987

01:04:46,859 --> 01:04:42,519

the universe it was it was great and

988

01:04:48,390 --> 01:04:46,869

then things started to the east wouldn't

989

01:04:50,490 --> 01:04:48,400

scratch your head why is it taking so

990

01:04:52,769 --> 01:04:50,500

long why can't we focus the telescope

991

01:04:54,839 --> 01:04:52,779

what's going on what was wrong with

992

01:04:56,519 --> 01:04:54,849

Hubble is the kind of the same thing

993

01:04:58,829 --> 01:04:56,529

that's wrong with your eyes when you

994

01:05:01,620 --> 01:04:58,839

need glasses basically the shape of the

995

01:05:03,690 --> 01:05:01,630

lens was wrong so in essence the

996

01:05:07,039 --> 01:05:03,700

telescope was nearsighted and it needed

997

01:05:09,839 --> 01:05:07,049

some glasses I was taking a shower in

998

01:05:11,700 --> 01:05:09,849

the hotel in Germany and had these

999

01:05:13,319 --> 01:05:11,710

really funny shower heads where the

1000

01:05:15,359 --> 01:05:13,329

shower head will kind of move up and

1001
01:05:17,849 --> 01:05:15,369
down and back and forth and that's when

1002
01:05:21,420 --> 01:05:17,859
it dawned on me we can have this

1003
01:05:23,880 --> 01:05:21,430
instrument robotically raise up the

1004
01:05:25,650 --> 01:05:23,890
corrective lens flip out if you will

1005
01:05:27,839 --> 01:05:25,660
just like that shower head these other

1006
01:05:29,970 --> 01:05:27,849
corrective optics to correct the

1007
01:05:31,650 --> 01:05:29,980
aberration for all the instruments all

1008
01:05:33,120 --> 01:05:31,660
of the work leading up to the first

1009
01:05:37,440 --> 01:05:33,130
servicing mission is probably the most

1010
01:05:37,450 --> 01:05:44,880
[Music]

1011
01:05:50,349 --> 01:05:47,680
the NASA program changed the nature of

1012
01:05:54,459 --> 01:05:50,359
astronomy we made some extravagant

1013
01:05:57,579 --> 01:05:54,469

promises on Hubble we under sold the

1014

01:06:00,430 --> 01:05:57,589

program whatever we said Hubble did

1015

01:06:03,609 --> 01:06:00,440

better I think it really changed the

1016

01:06:05,380 --> 01:06:03,619

nature of what we know the Hubble is one

1017

01:06:08,170 --> 01:06:05,390

of the most phenomenal things we've ever

1018

01:06:10,180 --> 01:06:08,180

done in space data that we get from

1019

01:06:12,519 --> 01:06:10,190

Hubble will continue to change the way

1020

01:06:15,819 --> 01:06:12,529

we think about ourselves about the

1021

01:06:19,390 --> 01:06:15,829

universe and our place in it you know

1022

01:06:20,410 --> 01:06:19,400

the pictures from Hubble are iconic you

1023

01:06:23,140 --> 01:06:20,420

see them everywhere

1024

01:06:26,799 --> 01:06:23,150

the fingers of God this is the gas

1025

01:06:29,380 --> 01:06:26,809

pillars that are actually many many many

1026
01:06:31,719 --> 01:06:29,390
light-years across so the scale of these

1027
01:06:34,029 --> 01:06:31,729
things is enormous and you actually

1028
01:06:37,509 --> 01:06:34,039
seeing the birth of stars this is a star

1029
01:06:39,309 --> 01:06:37,519
nursery it starts to give you a sense of

1030
01:06:41,589 --> 01:06:39,319
how small we are and how vast the

1031
01:06:44,849 --> 01:06:41,599
universe is and that's my favorite

1032
01:06:48,940 --> 01:06:47,559
NASA especially Goddard was the place

1033
01:06:52,120 --> 01:06:48,950
where I could carry out the dreams that

1034
01:06:53,950 --> 01:06:52,130
I had which were to push forward an

1035
01:06:55,779 --> 01:06:53,960
experiment that would measure the Big

1036
01:06:58,809 --> 01:06:55,789
Bang radiation better than anyone had

1037
01:07:02,979 --> 01:06:58,819
ever tried before and took on the job of

1038
01:07:04,749 --> 01:07:02,989

working on Kobe for many many decades

1039

01:07:06,009 --> 01:07:04,759

people didn't agree with the Big Bang

1040

01:07:08,469 --> 01:07:06,019

Theory they thought and something else

1041

01:07:09,489 --> 01:07:08,479

must be true generations of astronomers

1042

01:07:12,190 --> 01:07:09,499

thought it must have been the steady

1043

01:07:15,309 --> 01:07:12,200

state Theory Einstein didn't like the

1044

01:07:17,049 --> 01:07:15,319

idea so when we got the measurements

1045

01:07:19,539 --> 01:07:17,059

that fit exactly on the theoretical

1046

01:07:21,700 --> 01:07:19,549

prediction for the Big Bang and this

1047

01:07:22,749 --> 01:07:21,710

tremendous sigh of relief went through

1048

01:07:24,519 --> 01:07:22,759

the world as well

1049

01:07:26,979 --> 01:07:24,529

our measurement of the hot and cold

1050

01:07:29,950 --> 01:07:26,989

spots in the Big Bang radiation which

1051

01:07:32,559 --> 01:07:29,960

show us not only is the Big Bang Theory

1052

01:07:34,989 --> 01:07:32,569

right but also it gives us the map of

1053

01:07:38,640 --> 01:07:34,999

the seeds of the structure the things

1054

01:07:43,880 --> 01:07:38,650

that will eventually grow into galaxies

1055

01:07:47,220 --> 01:07:43,890

[Music]

1056

01:07:48,930 --> 01:07:47,230

the Galileo probe which sent its

1057

01:07:51,240 --> 01:07:48,940

spacecraft into the atmosphere of

1058

01:07:53,760 --> 01:07:51,250

Jupiter was the most demanding entry

1059

01:07:54,950 --> 01:07:53,770

probe I ever flown by anyone and it

1060

01:07:59,570 --> 01:07:54,960

worked perfectly

1061

01:08:03,510 --> 01:07:59,580

[Music]

1062

01:08:05,490 --> 01:08:03,520

Europa and some of the other satellites

1063

01:08:09,090 --> 01:08:05,500

where there seems to be accumulating

1064

01:08:12,180 --> 01:08:09,100

evidence water are getting to be very

1065

01:08:14,010 --> 01:08:12,190

very interesting places for exploring I

1066

01:08:16,729 --> 01:08:14,020

mean who knows what's under the ice

1067

01:08:19,050 --> 01:08:16,739

surface and Europa you've got water

1068

01:08:21,390 --> 01:08:19,060

looks like there's salt water you

1069

01:08:25,620 --> 01:08:21,400

wouldn't have water if you didn't have

1070

01:08:27,510 --> 01:08:25,630

her source of energy the odd coloration

1071

01:08:30,269 --> 01:08:27,520

gives some hint of the presence of

1072

01:08:32,280 --> 01:08:30,279

organics when those conditions held on

1073

01:08:35,090 --> 01:08:32,290

the early Earth life developed in a

1074

01:08:42,720 --> 01:08:35,100

couple of hundred million years

1075

01:08:46,979 --> 01:08:42,730

something interesting on Europa way to

1076

01:08:48,329 --> 01:08:46,989

work nowadays we're discovering what is

1077

01:08:51,710 --> 01:08:48,339

the universe really like and it's

1078

01:08:54,390 --> 01:08:51,720

totally magnificent and one can only be

1079

01:08:59,039 --> 01:08:54,400

inspired and awestruck by what we find

1080

01:09:01,260 --> 01:08:59,049

so I think a proper response is complete

1081

01:09:04,559 --> 01:09:01,270

amazement in awe at the universe that

1082

01:09:05,970 --> 01:09:04,569

we're in and how it works is just far

1083

01:09:12,000 --> 01:09:05,980

more complicated than humans will ever

1084

01:09:12,010 --> 01:09:18,609

we have capture

1085

01:09:26,320 --> 01:09:23,999

Muir was a successor to the early Salyut

1086

01:09:29,140 --> 01:09:26,330

Space Station's that the Russians built

1087

01:09:30,879 --> 01:09:29,150

back in the 70s Wow is extremely

1088

01:09:33,939 --> 01:09:30,889

fortunate that I was able to be part of

1089

01:09:35,829 --> 01:09:33,949

the shuttle-mir program obviously there

1090

01:09:36,999 --> 01:09:35,839

were a lot of challenges when you're

1091

01:09:38,559 --> 01:09:37,009

trying to work with a different culture

1092

01:09:40,059 --> 01:09:38,569

I mean it's a challenge for the Russians

1093

01:09:42,430 --> 01:09:40,069

and it's a challenge for the Americans

1094

01:09:45,879 --> 01:09:42,440

but everybody wanted to work together to

1095

01:09:48,550 --> 01:09:45,889

make it come to pass I definitely think

1096

01:09:50,439 --> 01:09:48,560

it started teaching us the lessons we

1097

01:09:52,689 --> 01:09:50,449

needed to learn and it was it was key to

1098

01:09:55,060 --> 01:09:52,699

that very technical things that you know

1099

01:09:58,899 --> 01:09:55,070

seem simple but become very complicated

1100

01:10:01,990 --> 01:09:58,909

just by language and wig cultural

1101

01:10:04,080 --> 01:10:02,000

definitions of things that you know I

1102

01:10:07,589 --> 01:10:04,090

think our guys did a phenomenal job

1103

01:10:10,089 --> 01:10:07,599

bringing all those pieces together

1104

01:10:12,339 --> 01:10:10,099

booster ignition and liftoff of

1105

01:10:15,890 --> 01:10:12,349

discovery with a crew of six astronauts

1106

01:10:21,250 --> 01:10:15,900

heroes one American legend

1107

01:10:28,300 --> 01:10:25,479

while I was on a discovery in 98 we had

1108

01:10:30,490 --> 01:10:28,310

83 different research projects on that

1109

01:10:32,110 --> 01:10:30,500

one flight now you go up for a couple of

1110

01:10:34,510 --> 01:10:32,120

weeks say and you find some of the

1111

01:10:36,700 --> 01:10:34,520

things occurring on the human body that

1112

01:10:38,800 --> 01:10:36,710

are are much the same as getting old

1113

01:10:40,660 --> 01:10:38,810

right here on earth the body's immune

1114

01:10:43,060 --> 01:10:40,670

system changes you get less resistant to

1115

01:10:44,860 --> 01:10:43,070

disease and infection the body's ability

1116

01:10:47,439 --> 01:10:44,870

to replace protein and the muscle

1117

01:10:49,780 --> 01:10:47,449

becomes less and so the question was if

1118

01:10:52,000 --> 01:10:49,790

could we find by comparing my reaction

1119

01:10:53,350 --> 01:10:52,010

to the younger people's action reaction

1120

01:10:56,800 --> 01:10:53,360

to this up there could we maybe get a

1121

01:10:58,930 --> 01:10:56,810

clue as to what within the body turns a

1122

01:11:01,600 --> 01:10:58,940

human system on and off with regard to

1123

01:11:04,180 --> 01:11:01,610

immunity hopefully we can find ways

1124

01:11:05,979 --> 01:11:04,190

maybe to make it possible for younger

1125

01:11:07,930 --> 01:11:05,989

astronauts to go on longer missions

1126

01:11:10,360 --> 01:11:07,940

without having some of the problems they

1127

01:11:11,860 --> 01:11:10,370

have and at the same time cut out some

1128

01:11:16,660 --> 01:11:11,870

of the frailties of old age for people

1129

01:11:29,140 --> 01:11:21,570

[Music]

1130

01:11:29,150 --> 01:11:34,100

[Applause]

1131

01:11:34,110 --> 01:11:37,550

we

1132

01:11:56,630 --> 01:11:50,620

[Music]

1133

01:12:02,100 --> 01:11:59,790

we have initial contact initial contact

1134

01:12:03,450 --> 01:12:02,110

of the Soyuz capsule with the expedition

1135

01:12:08,130 --> 01:12:03,460

1 crew to the International Space

1136

01:12:13,260 --> 01:12:08,140

Station the hatch was opened at 1 0 to 1

1137

01:12:17,550 --> 01:12:13,270

4 0 Universal Time the first expedition

1138

01:12:22,050 --> 01:12:17,560

on Space Station requests permission to

1139

01:12:25,860 --> 01:12:22,060

take the radio car prime our problem we

1140

01:12:28,560 --> 01:12:25,870

are on a true space ship now making her

1141

01:12:30,750 --> 01:12:28,570

way above or any earthly boundary that

1142

01:12:35,859 --> 01:12:30,760

our crews can work together as equals in

1143

01:12:41,439 --> 01:12:38,580

all the other vehicles we had ever built

1144

01:12:45,160 --> 01:12:41,449

could be totally assembled put together

1145

01:12:48,010 --> 01:12:45,170

and tested on the ground before you

1146

01:12:50,350 --> 01:12:48,020

launch them into space the space station

1147

01:12:54,280 --> 01:12:50,360

is so large you know it's 360 feet wide

1148

01:12:56,229 --> 01:12:54,290

doing an 80 feet long 120 feet thick or

1149

01:13:00,160 --> 01:12:56,239

something like that weighs a million

1150

01:13:01,810 --> 01:13:00,170

pounds and it takes 46 or 47 assembly

1151

01:13:04,470 --> 01:13:01,820

flights just to take up all the pieces

1152

01:13:07,089 --> 01:13:04,480

so every time you brought up a new piece

1153

01:13:09,910 --> 01:13:07,099

you had a different spacecraft that had

1154

01:13:13,839 --> 01:13:09,920

a different set of requirements and

1155

01:13:17,609 --> 01:13:13,849

basically a new spacecraft and at each

1156

01:13:20,890 --> 01:13:17,619

stage it has to operate completely

1157

01:13:21,399 --> 01:13:20,900

successfully for an extended period of

1158

01:13:23,830 --> 01:13:21,409

time

1159

01:13:27,580 --> 01:13:23,840

even as the international space station

1160

01:13:31,149 --> 01:13:27,590

was being assembled in orbit Spirit and

1161

01:13:34,419 --> 01:13:31,159

Opportunity would soon Rove the Martian

1162

01:13:37,450 --> 01:13:34,429

landscape but early in this new

1163

01:13:40,510 --> 01:13:37,460

millennium we would endure a tragic

1164

01:13:43,209 --> 01:13:40,520

reminder of the dangers of space travel

1165

01:13:45,220 --> 01:13:43,219

and Columbia Houston we see your tire

1166

01:13:49,650 --> 01:13:45,230

pressure messages and we did not come to

1167

01:13:54,150 --> 01:13:51,209

[Music]

1168

01:13:57,180 --> 01:13:54,160

at nine o'clock this morning Mission

1169

01:14:01,459 --> 01:13:57,190

Control in Houston lost contact with our

1170

01:14:03,900 --> 01:14:01,469

space shuttle Columbia short time later

1171

01:14:09,300 --> 01:14:03,910

debris was seen falling from the skies

1172

01:14:10,200 --> 01:14:09,310

above Texas the Columbia is lost there

1173

01:14:14,900 --> 01:14:10,210

are no survivors

1174

01:14:17,490 --> 01:14:14,910

NASA is been charged with advancing the

1175

01:14:19,290 --> 01:14:17,500

technology and understanding of space

1176

01:14:21,209 --> 01:14:19,300

flight for this country which means

1177

01:14:24,510 --> 01:14:21,219

we're on the cutting edge of what can be

1178

01:14:29,100 --> 01:14:24,520

done then we're going to be taking risk

1179

01:14:32,250 --> 01:14:29,110

and spaceflight is one of the areas

1180

01:14:34,979 --> 01:14:32,260

where we face risk on a daily basis and

1181

01:14:37,590 --> 01:14:34,989

in the process of doing this we develop

1182

01:14:40,110 --> 01:14:37,600

the new technologies new techniques the

1183

01:14:42,750 --> 01:14:40,120

new inventions we make discovery this is

1184

01:14:45,959 --> 01:14:42,760

what's going to keep us powerful and

1185

01:14:48,790 --> 01:14:45,969

safe and secure and assure the economic

1186

01:14:54,250 --> 01:14:48,800

vitality of our nation

1187

01:14:59,600 --> 01:14:57,290

we actually put our many years of

1188

01:15:02,660 --> 01:14:59,610

hypersonic research here at Langley

1189

01:15:05,180 --> 01:15:02,670

into into work into a vehicle that

1190

01:15:08,060 --> 01:15:05,190

actually flew with the HyperX program

1191

01:15:11,660 --> 01:15:08,070

which was indeed an exciting exciting

1192

01:15:14,660 --> 01:15:11,670

program this was put on a Pegasus

1193

01:15:19,550 --> 01:15:14,670

booster taken up to test point and then

1194

01:15:24,650 --> 01:15:19,560

released three two one launch launch

1195

01:15:28,040 --> 01:15:24,660

sequences reset the x43 would

1196

01:15:29,960 --> 01:15:28,050

acknowledge him we had two vehicles Mach

1197

01:15:32,150 --> 01:15:29,970

7 and then we had a mock Terry because

1198

01:15:33,560 --> 01:15:32,160

we broke our own record the Mach 7 was

1199

01:15:35,420 --> 01:15:33,570

the first record breaker and then we

1200

01:15:39,520 --> 01:15:35,430

broke our own record with the Mach 10 as

1201

01:15:39,530 --> 01:15:48,760

[Music]

1202

01:15:54,520 --> 01:15:52,960

I had a great time working on airplanes

1203

01:16:04,500 --> 01:15:54,530

and fighters and stuff

1204

01:16:13,229 --> 01:16:08,399

the agency not only built and flew some

1205

01:16:15,589 --> 01:16:13,239

very cool things we also had a lot of

1206

01:16:20,189 --> 01:16:15,599

research that then got on to other

1207

01:16:23,219 --> 01:16:20,199

airplanes we did a lot of work at that

1208

01:16:27,270 --> 01:16:23,229

you know ultimately led to things that

1209

01:16:30,109 --> 01:16:27,280

are on the f-22 and f-117 and maybe on

1210

01:16:33,060 --> 01:16:30,119

the Joint Strike Fighter we don't build

1211

01:16:36,089 --> 01:16:33,070

747s and we don't build f-22 but we

1212

01:16:37,919 --> 01:16:36,099

certainly did things that helped the

1213

01:16:39,660 --> 01:16:37,929

companies that do build those kind of

1214

01:16:57,479 --> 01:16:39,670

flight vehicles make their airplanes

1215

01:17:00,270 --> 01:16:57,489

better three main engine start the

1216

01:17:02,969 --> 01:17:00,280

reason we send unmanned spacecraft is to

1217

01:17:06,390 --> 01:17:02,979

pave the way for humans the reason we've

1218

01:17:07,859 --> 01:17:06,400

got spirit and opportunity on Mars is to

1219

01:17:09,330 --> 01:17:07,869

tell us a little bit about what it's

1220

01:17:11,669 --> 01:17:09,340

going to be like the things we're going

1221

01:17:13,410 --> 01:17:11,679

to encounter when we get there because

1222

01:17:15,899 --> 01:17:13,420

it's man's intellect its man's

1223

01:17:19,049 --> 01:17:15,909

intelligence that she can never recreate

1224

01:17:23,310 --> 01:17:19,059

this computer we intentionally made them

1225

01:17:25,589 --> 01:17:23,320

so human we gave them 20/20 vision we

1226

01:17:27,270 --> 01:17:25,599

gave them the ability to move around in

1227

01:17:28,259 --> 01:17:27,280

an environment we gave them an arm so

1228

01:17:31,049 --> 01:17:28,269

that they could reach out and touch

1229

01:17:33,000 --> 01:17:31,059

things and then we used them to do

1230

01:17:35,879 --> 01:17:33,010

exactly what we would do if we were

1231

01:17:37,560 --> 01:17:35,889

there one thing that NASA gives us is is

1232

01:17:39,060 --> 01:17:37,570

a very different perspective on the

1233

01:17:41,339 --> 01:17:39,070

whole universe including our own world

1234

01:17:43,199 --> 01:17:41,349

our own worlds place in it when we look

1235

01:17:45,330 --> 01:17:43,209

at other worlds and we look through the

1236

01:17:47,219 --> 01:17:45,340

eyes of a robot at a frozen desert we

1237

01:17:48,949 --> 01:17:47,229

appreciate our own world so much more

1238

01:17:53,520 --> 01:17:48,959

because we see what it could be like

1239

01:17:55,680 --> 01:17:53,530

when they die it will be sad but they

1240

01:17:59,100 --> 01:17:55,690

will have led such long and productive

1241

01:18:02,459 --> 01:17:59,110

lives and will have died honorable

1242

01:18:05,339 --> 01:18:02,469

deaths that I'll be at peace with it

1243

01:18:07,529 --> 01:18:05,349

because of what they've done these are

1244

01:18:08,860 --> 01:18:07,539

machines after all but you feel an

1245

01:18:11,680 --> 01:18:08,870

emotional attachment

1246

01:18:14,050 --> 01:18:11,690

put so much of ourselves into these

1247

01:18:17,710 --> 01:18:14,060

things that when we lose them we'll lose

1248

01:18:28,240 --> 01:18:17,720

a part of ourselves it'll be hard

1249

01:18:32,680 --> 01:18:28,250

I really miss three engines up and

1250

01:18:34,480 --> 01:18:32,690

burning three two one and liftoff of

1251

01:18:37,580 --> 01:18:34,490

space shuttle Discovery beginning

1252

01:18:50,540 --> 01:18:37,590

America's new journey to

1253

01:18:55,770 --> 01:18:53,790

when you approach the space station it

1254

01:18:58,350 --> 01:18:55,780

actually felt like it was enveloping you

1255

01:19:00,270 --> 01:18:58,360

as you got closer because the size of it

1256

01:19:01,740 --> 01:19:00,280

was so immense you could hardly take it

1257

01:19:04,020 --> 01:19:01,750

in and all the windows or your

1258

01:19:05,490 --> 01:19:04,030

peripheral vision and it seemed like it

1259

01:19:07,530 --> 01:19:05,500

you were flying into a canyon like in

1260

01:19:09,630 --> 01:19:07,540

Star Wars almost in it it totally

1261

01:19:11,850 --> 01:19:09,640

surrounded you but it's a wonderful

1262

01:19:13,890 --> 01:19:11,860

feeling to to see the space station

1263

01:19:19,020 --> 01:19:13,900

coming up and it's being framed by the

1264

01:19:21,360 --> 01:19:19,030

the earth below very beautiful views

1265

01:19:23,700 --> 01:19:21,370

trying to distract you from your task of

1266

01:19:27,750 --> 01:19:23,710

flying the space shuttle when you arrive

1267

01:19:29,040 --> 01:19:27,760

on the International Space Station you

1268

01:19:31,530 --> 01:19:29,050

know there's a little bit of a shock

1269

01:19:33,030 --> 01:19:31,540

factor it was very odd when they closed

1270

01:19:35,550 --> 01:19:33,040

the hatch and we weren't on that shuttle

1271

01:19:38,970 --> 01:19:35,560

you saw them flying away and it was like

1272

01:19:41,010 --> 01:19:38,980

wow we're really here man this is gonna

1273

01:19:43,080 --> 01:19:41,020

be a long visit we get scheduled for

1274

01:19:44,850 --> 01:19:43,090

approximately two hours of exercise a

1275

01:19:48,090 --> 01:19:44,860

day and that's to try and counteract

1276

01:19:50,580 --> 01:19:48,100

some of the negative effects of being in

1277

01:19:53,790 --> 01:19:50,590

zero gravity on the musculoskeletal

1278

01:19:57,990 --> 01:19:53,800

system and our cardiovascular system so

1279

01:19:59,400 --> 01:19:58,000

that was an important aspect of every

1280

01:20:01,410 --> 01:19:59,410

day that we're onboard in the station

1281

01:20:04,290 --> 01:20:01,420

the crew members themselves are

1282

01:20:07,260 --> 01:20:04,300

laboratory rats as if you will you know

1283

01:20:09,000 --> 01:20:07,270

because we have a human research program

1284

01:20:10,680 --> 01:20:09,010

trying to understand what happens to

1285

01:20:12,870 --> 01:20:10,690

people when they're in space for long

1286

01:20:14,850 --> 01:20:12,880

periods of time and so we participate in

1287

01:20:18,170 --> 01:20:14,860

those experiments obviously I also think

1288

01:20:21,120 --> 01:20:18,180

the space station offers an incredible

1289

01:20:23,370 --> 01:20:21,130

laboratory we've added additional

1290

01:20:25,290 --> 01:20:23,380

laboratory modules during expedition 16

1291

01:20:28,710 --> 01:20:25,300

and with their most recent addition on

1292

01:20:31,200 --> 01:20:28,720

the last shuttle flight so it's gonna be

1293

01:20:33,750 --> 01:20:31,210

I think a spectacular laboratory as well

1294

01:20:40,770 --> 01:20:33,760

and I'm excited about what the future

1295

01:20:42,780 --> 01:20:40,780

holds for us they're probably the

1296

01:20:44,250 --> 01:20:42,790

biggest legacy of the International

1297

01:20:46,110 --> 01:20:44,260

Space Station I think will be the

1298

01:20:48,810 --> 01:20:46,120

International aspect the fact that we're

1299

01:20:52,800 --> 01:20:48,820

doing this internationally and it's a

1300

01:20:55,470 --> 01:20:52,810

huge technical accomplishment but I

1301

01:20:56,889 --> 01:20:55,480

think the fact that we are overcoming

1302

01:21:02,199 --> 01:20:56,899

these

1303

01:21:04,119 --> 01:21:02,209

people together with this common goal I

1304

01:21:06,310 --> 01:21:04,129

think is one of the most significant

1305

01:21:09,219 --> 01:21:06,320

aspects of the International Space

1306

01:21:13,540 --> 01:21:09,229

Station I believe that human beings

1307

01:21:17,639 --> 01:21:13,550

should expand into space by doing that

1308

01:21:21,369 --> 01:21:17,649

we can learn about ourselves and make

1309

01:21:25,839 --> 01:21:21,379

the society and the world better by

1310

01:21:29,259 --> 01:21:25,849

working together in a cooperative way we

1311

01:21:31,929 --> 01:21:29,269

can bring the world closer together this

1312

01:21:33,459 --> 01:21:31,939

is a great opportunity for Japan and

1313

01:21:37,270 --> 01:21:33,469

other countries to be able to

1314

01:21:46,900 --> 01:21:37,280

participate in a space program like the

1315

01:21:53,180 --> 01:21:50,780

NASA Labs are the pride of the world for

1316

01:21:54,920 --> 01:21:53,190

things that we can do where science and

1317

01:21:57,950 --> 01:21:54,930

engineers meet together and say let's do

1318

01:22:00,770 --> 01:21:57,960

the impossible and and we'll do it our

1319

01:22:03,590 --> 01:22:00,780

space projects are very demanding person

1320

01:22:05,510 --> 01:22:03,600

has to work maybe night and day and

1321

01:22:07,610 --> 01:22:05,520

weekends so when the schedule requires

1322

01:22:19,060 --> 01:22:07,620

it to finish something on time

1323

01:22:23,440 --> 01:22:22,000

we feel I feel that the entire world is

1324

01:22:26,050 --> 01:22:23,450

watching us and waiting for us to do our

1325

01:22:28,000 --> 01:22:26,060

thing and to get it right and it's a

1326

01:22:31,030 --> 01:22:28,010

tremendous opportunity it's also

1327

01:22:32,710 --> 01:22:31,040

tremendous responsibility and it's

1328

01:22:36,100 --> 01:22:32,720

always been pretty clear that we do this

1329

01:22:37,900 --> 01:22:36,110

together as teams and that it's the only

1330

01:22:40,720 --> 01:22:37,910

way you could possibly do these amazing

1331

01:22:42,580 --> 01:22:40,730

projects so I think we can be very proud

1332

01:22:44,560 --> 01:22:42,590

of what we've accomplished we look back

1333

01:22:46,090 --> 01:22:44,570

in history and when we think this

1334

01:22:50,350 --> 01:22:46,100

country was founded in part by a

1335

01:22:52,150 --> 01:22:50,360

scientist Ben Franklin and a future

1336

01:22:54,220 --> 01:22:52,160

president on Thomas Jefferson who was

1337

01:22:56,140 --> 01:22:54,230

very fond of science and so that would

1338

01:22:58,180 --> 01:22:56,150

be so proud and thrilled to see what our

1339

01:23:00,910 --> 01:22:58,190

country has accomplished with science

1340

01:23:02,740 --> 01:23:00,920

and and the engineering miracles that

1341

01:23:04,420 --> 01:23:02,750

have happened in consequence I think

1342

01:23:05,980 --> 01:23:04,430

they never would have guessed but they

1343

01:23:09,280 --> 01:23:05,990

would still be thrilled to see what's

1344

01:23:12,900 --> 01:23:09,290

been done as NASA enters its sixth

1345

01:23:15,910 --> 01:23:12,910

decade it's time to go back to the moon

1346

01:23:19,810 --> 01:23:15,920

this time we'll go back not just for a

1347

01:23:22,590 --> 01:23:19,820

few hours not for a few days but for

1348

01:23:26,200 --> 01:23:22,600

good for the good of exploration

1349

01:23:31,090 --> 01:23:26,210

innovation and inspiration for the good

1350

01:23:35,580 --> 01:23:31,100

of humanity we will give NASA a new

1351

01:23:40,030 --> 01:23:35,590

focus and vision for future exploration

1352

01:23:41,740 --> 01:23:40,040

to gain a new foothold on the moon and

1353

01:23:44,820 --> 01:23:41,750

to prepare for new journeys to the

1354

01:23:49,939 --> 01:23:44,830

worlds beyond our own

1355

01:23:56,570 --> 01:23:54,080

we as a civilization must explore that's

1356

01:23:58,700 --> 01:23:56,580

who we are intrinsically to the human

1357

01:24:00,169 --> 01:23:58,710

racers were explorers and unless we

1358

01:24:04,450 --> 01:24:00,179

continue to explore we're going to

1359

01:24:04,460 --> 01:24:10,479

[Music]

1360

01:24:15,890 --> 01:24:13,520

when we cease to be an explanation when

1361

01:24:18,919 --> 01:24:15,900

we cease to seek knowledge and as

1362

01:24:22,070 --> 01:24:18,929

questions that's the time we will wither

1363

01:24:23,689 --> 01:24:22,080

and die on his plan I think it's

1364

01:24:26,870 --> 01:24:23,699

significantly important that we look to

1365

01:24:29,180 --> 01:24:26,880

the future Mars of course will be the

1366

01:24:33,350 --> 01:24:29,190

next outpost I think will have people

1367

01:24:36,169 --> 01:24:33,360

living on Mars 50 years from now what

1368

01:24:38,209 --> 01:24:36,179

they'll be looking forward to I have no

1369

01:24:41,270 --> 01:24:38,219

idea but I'm sure it'll be fascinating

1370

01:24:43,970 --> 01:24:41,280

I'd like to see the mission to Mars they

1371

01:24:46,129 --> 01:24:43,980

accomplished something I did some work

1372

01:24:48,229 --> 01:24:46,139

on and making the proposal we made I

1373

01:24:51,290 --> 01:24:48,239

think there's a consensus that going to

1374

01:24:53,240 --> 01:24:51,300

Mars is a worthy objective and I'd like

1375

01:24:55,910 --> 01:24:53,250

to see that accomplished perhaps at one

1376

01:24:57,830 --> 01:24:55,920

time in the distant past the at least

1377

01:24:59,450 --> 01:24:57,840

some basic life forms existed on Mars

1378

01:25:01,790 --> 01:24:59,460

and perhaps could again in the future

1379

01:25:03,500 --> 01:25:01,800

these things mean a lot to me I think

1380

01:25:04,790 --> 01:25:03,510

space is important and I think America

1381

01:25:07,580 --> 01:25:04,800

should continue to be in the forefront

1382

01:25:10,700 --> 01:25:07,590

of space exploration no matter where you

1383

01:25:13,640 --> 01:25:10,710

go in the world people know what the

1384

01:25:15,919 --> 01:25:13,650

letters in a essay stand for

1385

01:25:18,919 --> 01:25:15,929

they say NASA and they say it was

1386

01:25:21,320 --> 01:25:18,929

recognition that in and of itself tells

1387

01:25:23,240 --> 01:25:21,330

you that NASA stands for something in

1388

01:25:26,720 --> 01:25:23,250

the world not just in America but across

1389

01:25:28,459 --> 01:25:26,730

the world throughout all human history

1390

01:25:30,830 --> 01:25:28,469

we've we've always had people look up

1391

01:25:31,370 --> 01:25:30,840

and think you know the blue sky what is

1392

01:25:33,110 --> 01:25:31,380

it up there

1393

01:25:35,479 --> 01:25:33,120

do you what it would be like if we could

1394

01:25:38,300 --> 01:25:35,489

go up there in our time our lifetimes

1395

01:25:41,510 --> 01:25:38,310

we've gone up there you know here we are

1396

01:25:44,270 --> 01:25:41,520

and develop that kind of a capability in

1397

01:25:47,540 --> 01:25:44,280

our time what a great time to be alive

1398

01:25:49,910 --> 01:25:47,550

the future mankind depends upon space

1399

01:25:52,790 --> 01:25:49,920

travel if we stand earth will go on and

1400

01:25:55,700 --> 01:25:52,800

having wars but if we go to the Moon and

1401

01:25:59,180 --> 01:25:55,710

Mars will bind ourselves together into

1402

01:26:04,340 --> 01:25:59,190

one single race one color and going to

1403

01:26:19,460 --> 01:26:04,450

[Music]

1404

01:26:28,200 --> 01:26:20,940

remember

1405

01:26:44,600 --> 01:26:40,850

[Music]

1406

01:27:01,030 --> 01:26:44,610

remember