



1
00:00:04,710 --> 00:00:02,790
well good evening ladies and gentlemen

2
00:00:06,389 --> 00:00:04,720
i'm jack daly the john and adrian mars

3
00:00:08,310 --> 00:00:06,399
director of the smithsonian's national

4
00:00:09,750 --> 00:00:08,320
air and space museum

5
00:00:11,990 --> 00:00:09,760
and it's my great pleasure to welcome

6
00:00:14,470 --> 00:00:12,000
you to the 13th annual john glenn

7
00:00:17,990 --> 00:00:14,480
lecture in spacex history

8
00:00:19,429 --> 00:00:18,000
we inaugurated the glenn lecture in 2004

9
00:00:21,590 --> 00:00:19,439
it quickly became one of our most

10
00:00:22,870 --> 00:00:21,600
popular annual events and tonight is no

11
00:00:24,790 --> 00:00:22,880
exception

12
00:00:26,470 --> 00:00:24,800
our program this evening will feature a

13
00:00:29,429 --> 00:00:26,480

historic conversation between a

14

00:00:31,669 --> 00:00:29,439

legendary space pioneer in a visionary

15

00:00:33,430 --> 00:00:31,679

rocket entrepreneur

16

00:00:35,750 --> 00:00:33,440

in addition to those of you lucky enough

17

00:00:38,709 --> 00:00:35,760

to secure tickets many more will be

18

00:00:40,630 --> 00:00:38,719

watching on a live white webcast

19

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

which also will be in our archive so if

20

00:00:43,750 --> 00:00:42,160

you want to review it sometime in the

21

00:00:44,549 --> 00:00:43,760

future

22

00:00:46,389 --> 00:00:44,559

the

23

00:00:48,630 --> 00:00:46,399

young senator glenn can't be with us

24

00:00:51,270 --> 00:00:48,640

tonight but he sends his best regards

25

00:00:53,270 --> 00:00:51,280

his accomplishments as a pilot astronaut

26

00:00:56,630 --> 00:00:53,280

statesmen are all

27

00:00:58,310 --> 00:00:56,640

a great inspiration for all of us

28

00:00:59,270 --> 00:00:58,320

thank you to our speakers for being here

29

00:01:01,830 --> 00:00:59,280

tonight

30

00:01:04,310 --> 00:01:01,840

mr david rubenstein co-founder and

31

00:01:06,149 --> 00:01:04,320

co-ceo of the carlisle group

32

00:01:08,230 --> 00:01:06,159

region of the smithsonian will be

33

00:01:10,830 --> 00:01:08,240

tonight's moderator

34

00:01:13,350 --> 00:01:10,840

mr jeff bezos founder and ceo of

35

00:01:15,350 --> 00:01:13,360

amazon.com and blue origin

36

00:01:17,270 --> 00:01:15,360

is here to discuss what it will take to

37

00:01:18,710 --> 00:01:17,280

unlock space flight for everyone

38

00:01:21,270 --> 00:01:18,720

everywhere

39

00:01:24,149 --> 00:01:21,280
and coming home tonight is major general

40

00:01:26,550 --> 00:01:24,159
michael collins who once held what some

41

00:01:28,310 --> 00:01:26,560
have called the best job in the world

42

00:01:30,230 --> 00:01:28,320
director of the smithsonian's national

43

00:01:36,230 --> 00:01:30,240
air and space museum

44

00:01:39,749 --> 00:01:38,149
as the founding director general collins

45

00:01:41,830 --> 00:01:39,759
was responsible for the design and

46

00:01:43,830 --> 00:01:41,840
construction of this building which

47

00:01:48,469 --> 00:01:43,840
opened as a bicentennial gift for

48

00:01:49,550 --> 00:01:48,479
american people on july 1st 1976

49

00:01:52,469 --> 00:01:49,560
more than

50

00:01:54,789 --> 00:01:52,479
327 million visitors have walked through

51

00:01:58,950 --> 00:01:54,799

this museum since it opened

52

00:02:02,469 --> 00:02:00,310

the uh

53

00:02:04,709 --> 00:02:02,479

it confirm

54

00:02:05,830 --> 00:02:04,719

our doors in confirming that the museum

55

00:02:07,990 --> 00:02:05,840

he built

56

00:02:10,710 --> 00:02:08,000

like the ship he flew to the moon is a

57

00:02:12,869 --> 00:02:10,720

priceless national treasure

58

00:02:15,110 --> 00:02:12,879

in just two weeks on july 1st we will

59

00:02:18,229 --> 00:02:15,120

celebrate four decades of unparalleled

60

00:02:21,190 --> 00:02:18,239

success and rededicate our main gallery

61

00:02:23,270 --> 00:02:21,200

the boeing milestones of flight hall

62

00:02:25,430 --> 00:02:23,280

that gallery where so many millions have

63

00:02:28,070 --> 00:02:25,440

discovered the story of light is one of

64

00:02:30,150 --> 00:02:28,080

the world's great public spaces

65

00:02:34,150 --> 00:02:30,160

and we have boeing to thank for helping

66

00:02:35,910 --> 00:02:34,160

us reinvent it for the decades ahead

67

00:02:37,430 --> 00:02:35,920

over many years boeing has partnered

68

00:02:39,030 --> 00:02:37,440

with the smithsonian on countless

69

00:02:41,350 --> 00:02:39,040

important projects from supporting the

70

00:02:43,350 --> 00:02:41,360

boeing milestones of flight hall and the

71

00:02:45,990 --> 00:02:43,360

boeing aviation hangar at the stephen f

72

00:02:48,550 --> 00:02:46,000

udrihazi center

73

00:02:50,790 --> 00:02:48,560

in chantilly virginia who's sponsoring

74

00:02:52,790 --> 00:02:50,800

the john glenn lecture series

75

00:02:54,550 --> 00:02:52,800

we would not be the museum we are today

76

00:02:56,869 --> 00:02:54,560

without their support

77

00:02:59,190 --> 00:02:56,879

on behalf of the museum and our past

78

00:03:01,910 --> 00:02:59,200

present and future visitors i want to

79

00:03:03,350 --> 00:03:01,920

thank boeing for their steadfast support

80

00:03:05,110 --> 00:03:03,360

we look forward to celebrating the

81

00:03:06,470 --> 00:03:05,120

company the company's centennial

82

00:03:11,589 --> 00:03:06,480

anniversary

83

00:03:14,229 --> 00:03:11,599

along with our country's 240th

84

00:03:15,750 --> 00:03:14,239

anniversary all on the first of july

85

00:03:16,830 --> 00:03:15,760

where we'll have an all-nighter and

86

00:03:18,470 --> 00:03:16,840

you're all

87

00:03:20,949 --> 00:03:18,480

invited

88

00:03:22,869 --> 00:03:20,959

when i disapproved that the first time

89

00:03:27,030 --> 00:03:22,879

they came back and said you're not the

90

00:03:31,509 --> 00:03:29,270

so i'll get it started and i hope you

91

00:03:33,830 --> 00:03:31,519

have a great time

92

00:03:36,550 --> 00:03:35,110

it's a

93

00:03:38,229 --> 00:03:36,560

over the minute let's see i guess i

94

00:03:39,990 --> 00:03:38,239

better get on to the next it's now a

95

00:03:41,990 --> 00:03:40,000

great pleasure to introduce the chairman

96

00:03:44,949 --> 00:03:42,000

president and chief executive officer of

97

00:03:53,270 --> 00:03:44,959

the boeing company company mr dennis

98

00:03:57,830 --> 00:03:55,910

all right well uh good evening and uh

99

00:04:00,149 --> 00:03:57,840

it's really a pleasure to be here with

100

00:04:01,750 --> 00:04:00,159

all of you and jack thank you for that

101
00:04:03,670 --> 00:04:01,760
uh kinder introduction and the kind

102
00:04:06,149 --> 00:04:03,680
words about the boeing company

103
00:04:08,149 --> 00:04:06,159
we are honored uh to support and partner

104
00:04:10,309 --> 00:04:08,159
with you in the national air and space

105
00:04:11,910 --> 00:04:10,319
museum uh it's a really important

106
00:04:13,190 --> 00:04:11,920
mission and uh thank you as well for

107
00:04:15,110 --> 00:04:13,200
your leadership

108
00:04:20,949 --> 00:04:15,120
and your service to our country and

109
00:04:26,790 --> 00:04:24,230
and as as general daly said this is an

110
00:04:28,150 --> 00:04:26,800
exciting year for us the 40th

111
00:04:29,670 --> 00:04:28,160
anniversary of the national air and

112
00:04:31,270 --> 00:04:29,680
space museum

113
00:04:32,550 --> 00:04:31,280

boeing will be celebrating its

114

00:04:35,430 --> 00:04:32,560
centennial

115

00:04:37,830 --> 00:04:35,440
will be 100 years old on july 15 we'll

116

00:04:38,870 --> 00:04:37,840
have that early celebration on july 1 as

117

00:04:41,830 --> 00:04:38,880
you said

118

00:04:43,430 --> 00:04:41,840
and it's one that's involved all aspects

119

00:04:44,870 --> 00:04:43,440
of aerospace and we think about during

120

00:04:47,030 --> 00:04:44,880
that first century

121

00:04:48,469 --> 00:04:47,040
of aviation

122

00:04:50,950 --> 00:04:48,479
people went from

123

00:04:54,150 --> 00:04:50,960
walking on the earth to walking on the

124

00:04:56,469 --> 00:04:54,160
moon and we went from riding horses to

125

00:04:57,990 --> 00:04:56,479
flying in airplanes and spaceships it's

126

00:05:00,070 --> 00:04:58,000

been an incredible journey and and

127

00:05:02,469 --> 00:05:00,080

boeing's been honored to be a part of

128

00:05:05,430 --> 00:05:02,479

that and tonight it's my privilege to

129

00:05:07,270 --> 00:05:05,440

introduce uh the speakers and moderator

130

00:05:08,950 --> 00:05:07,280

that will be leading tonight's

131

00:05:12,230 --> 00:05:08,960

discussion around space and i can tell

132

00:05:14,390 --> 00:05:12,240

you personally as a space enthusiast uh

133

00:05:17,430 --> 00:05:14,400

how excited i am that this is the the

134

00:05:20,230 --> 00:05:17,440

topic for tonight uh first of all again

135

00:05:22,230 --> 00:05:20,240

i want to recognize uh michael collins

136

00:05:25,189 --> 00:05:22,240

it's a it's a privilege to have a

137

00:05:27,189 --> 00:05:25,199

national hero here with us tonight and i

138

00:05:29,590 --> 00:05:27,199

mentioned earlier that uh when i told my

139

00:05:31,510 --> 00:05:29,600

15 year old son that i was going to meet

140

00:05:33,749 --> 00:05:31,520

him this evening

141

00:05:34,710 --> 00:05:33,759

he said no way

142

00:05:35,830 --> 00:05:34,720

and

143

00:05:37,830 --> 00:05:35,840

so uh

144

00:05:39,510 --> 00:05:37,840

he's he's done a lot to inspire the

145

00:05:41,749 --> 00:05:39,520

country and i i think we can all

146

00:05:44,230 --> 00:05:41,759

remember back to uh the apollo 11

147

00:05:45,909 --> 00:05:44,240

mission whether we saw it real time or

148

00:05:47,350 --> 00:05:45,919

have seen it since

149

00:05:50,230 --> 00:05:47,360

boeing was proud to be part of the

150

00:05:52,390 --> 00:05:50,240

apollo missions but the inspiration that

151
00:05:54,550 --> 00:05:52,400
that created and the long-term impact to

152
00:05:56,710 --> 00:05:54,560
our country and to the world

153
00:05:58,790 --> 00:05:56,720
is is well recognized so it's it's great

154
00:06:02,309 --> 00:05:58,800
to have michael here with us tonight the

155
00:06:03,990 --> 00:06:02,319
command uh module pilot for the apollo

156
00:06:05,830 --> 00:06:04,000
11 mission

157
00:06:07,590 --> 00:06:05,840
uh also uh tonight it's a great

158
00:06:08,629 --> 00:06:07,600
privilege for us to be here with jeff

159
00:06:10,390 --> 00:06:08,639
bezos

160
00:06:13,990 --> 00:06:10,400
one of the great entrepreneurs of our

161
00:06:17,189 --> 00:06:14,000
time a great business leader and another

162
00:06:18,390 --> 00:06:17,199
space enthusiast and among other things

163
00:06:20,710 --> 00:06:18,400

at the boeing company we have the

164

00:06:23,990 --> 00:06:20,720

privilege of working with jeff and his

165

00:06:27,110 --> 00:06:24,000

blue origin team on a future rocket

166

00:06:29,749 --> 00:06:27,120

engine and in space opportunities but

167

00:06:33,350 --> 00:06:29,759

more broadly than that jeff is and his

168

00:06:35,830 --> 00:06:33,360

team are breaking barriers in low-cost

169

00:06:38,230 --> 00:06:35,840

reliable space access and just

170

00:06:40,230 --> 00:06:38,240

fundamentally changing the equation but

171

00:06:42,150 --> 00:06:40,240

how we'll get to space in the future and

172

00:06:44,390 --> 00:06:42,160

that is exciting to see and and we're

173

00:06:45,830 --> 00:06:44,400

honored to partner with you in aspects

174

00:06:48,710 --> 00:06:45,840

of that and uh thanks for your

175

00:06:50,710 --> 00:06:48,720

leadership as well and then lastly i'd

176

00:06:52,710 --> 00:06:50,720

like to recognize david rubenstein as

177

00:06:54,390 --> 00:06:52,720

well david's been a great friend and a

178

00:06:56,629 --> 00:06:54,400

business leader community leader

179

00:06:59,350 --> 00:06:56,639

philanthropist well-known here in the

180

00:07:02,550 --> 00:06:59,360

washington dc community and more broadly

181

00:07:04,550 --> 00:07:02,560

also a great historian a great a great

182

00:07:07,029 --> 00:07:04,560

fan of the space business

183

00:07:09,909 --> 00:07:07,039

and uh and also a great supporter of the

184

00:07:12,629 --> 00:07:09,919

national air and space museum and david

185

00:07:14,469 --> 00:07:12,639

will be our moderator uh this evening so

186

00:07:16,870 --> 00:07:14,479

if i could i'd like to welcome all three

187

00:07:18,390 --> 00:07:16,880

of you fine gentlemen uh up to the stage

188

00:07:22,469 --> 00:07:18,400

here and we look forward to the

189

00:07:27,350 --> 00:07:25,830

and my uh i think my last duty here

190

00:07:29,430 --> 00:07:27,360

you're gonna get it

191

00:07:30,629 --> 00:07:29,440

my last duty here was to try to make

192

00:07:33,350 --> 00:07:30,639

this uh

193

00:07:34,950 --> 00:07:33,360

podium descend now i'm a engineer by

194

00:07:37,430 --> 00:07:34,960

training so i suspect this was the real

195

00:07:41,589 --> 00:07:37,440

reason for my invitation tonight

196

00:07:46,469 --> 00:07:45,110

that's boeing technology there

197

00:07:50,869 --> 00:07:46,479

all right thank you very much all right

198

00:07:53,990 --> 00:07:51,670

okay

199

00:07:56,070 --> 00:07:54,000

so how many people here would like to go

200

00:07:57,270 --> 00:07:56,080

into space

201
00:07:58,710 --> 00:07:57,280
okay how many people would like to go to

202
00:08:00,150 --> 00:07:58,720
the moon

203
00:08:01,189 --> 00:08:00,160
okay

204
00:08:05,029 --> 00:08:01,199
all right you can hear a lot about that

205
00:08:06,710 --> 00:08:05,039
tonight uh but first let me start um

206
00:08:08,790 --> 00:08:06,720
you can hear me okay

207
00:08:10,070 --> 00:08:08,800
so let me ask you each individual

208
00:08:11,510 --> 00:08:10,080
question first

209
00:08:13,189 --> 00:08:11,520
if

210
00:08:15,430 --> 00:08:13,199
michael collins

211
00:08:17,589 --> 00:08:15,440
um you were the first director of this

212
00:08:19,830 --> 00:08:17,599
museum getting it off the ground getting

213
00:08:24,390 --> 00:08:19,840

the money for it and so forth was doing

214

00:08:28,070 --> 00:08:25,749

i think it probably would have been and

215

00:08:30,790 --> 00:08:28,080

except it was for barry goldwater who

216

00:08:33,269 --> 00:08:30,800

wanted badly to get this museum uh

217

00:08:34,310 --> 00:08:33,279

underway and what he told me was if

218

00:08:36,469 --> 00:08:34,320

you're ever

219

00:08:39,029 --> 00:08:36,479

here with a kin

220

00:08:41,029 --> 00:08:39,039

please mention them so i'd be delighted

221

00:08:43,829 --> 00:08:41,039

to mention that i'm here with my

222

00:08:46,310 --> 00:08:43,839

daughter kate from chicago who

223

00:08:47,829 --> 00:08:46,320

to some of you soap opera fans is better

224

00:08:48,710 --> 00:08:47,839

known as natalie

225

00:08:49,910 --> 00:08:48,720

and

226

00:08:52,470 --> 00:08:49,920

ann from

227

00:08:54,470 --> 00:08:52,480

boston now and

228

00:08:56,470 --> 00:08:54,480

i don't know about a space buff i asked

229

00:08:58,949 --> 00:08:56,480

her suppose she had been

230

00:09:01,430 --> 00:08:58,959

in neil armstrong's shoes

231

00:09:04,310 --> 00:09:01,440

would she have said uh

232

00:09:05,509 --> 00:09:04,320

one small step for a woman she shot back

233

00:09:14,630 --> 00:09:05,519

so

234

00:09:16,389 --> 00:09:14,640

don't know okay

235

00:09:17,990 --> 00:09:16,399

all right and jeff you've built one of

236

00:09:20,150 --> 00:09:18,000

the greatest technology companies in the

237

00:09:22,470 --> 00:09:20,160

world in just 20 some years you've taken

238

00:09:24,310 --> 00:09:22,480

a company from nothing to amazon which

239

00:09:26,150 --> 00:09:24,320

everybody in the world now knows and

240

00:09:29,110 --> 00:09:26,160

most people in the world seem to use

241

00:09:30,070 --> 00:09:29,120

was that harder to do than trying to get

242

00:09:48,790 --> 00:09:30,080

a

243

00:09:51,829 --> 00:09:48,800

myself

244

00:09:53,509 --> 00:09:51,839

in my 1987 chevy blazer dreaming that

245

00:09:54,790 --> 00:09:53,519

one day i might be able to afford a

246

00:09:57,590 --> 00:09:54,800

forklift

247

00:10:00,470 --> 00:09:57,600

and the internet that's 1995

248

00:10:02,310 --> 00:10:00,480

and you know 21 years later the internet

249

00:10:04,790 --> 00:10:02,320

is this gigantic thing and there are

250

00:10:07,430 --> 00:10:04,800

many many successful companies and

251
00:10:08,790 --> 00:10:07,440
the entrepreneurial dynamism

252
00:10:11,670 --> 00:10:08,800
that you see on the internet is

253
00:10:13,509 --> 00:10:11,680
incredible and really with blue origin

254
00:10:15,269 --> 00:10:13,519
you know that this new challenge that

255
00:10:17,190 --> 00:10:15,279
i'm taking out with blue origin what i

256
00:10:19,269 --> 00:10:17,200
want to do is put the heavy lifting

257
00:10:23,030 --> 00:10:19,279
infrastructure in place

258
00:10:25,269 --> 00:10:23,040
so that the next generation can have a

259
00:10:28,230 --> 00:10:25,279
dynamic entrepreneurial explosion of

260
00:10:29,910 --> 00:10:28,240
ideas and inventions in space just like

261
00:10:32,069 --> 00:10:29,920
we've had with the internet and the

262
00:10:33,350 --> 00:10:32,079
reason you can't do that today is

263
00:10:34,790 --> 00:10:33,360

because there's just too much heavy

264

00:10:37,110 --> 00:10:34,800

lifting involved literally you know

265

00:10:37,990 --> 00:10:37,120

getting to space is so expensive and so

266

00:10:40,150 --> 00:10:38,000

hard

267

00:10:42,630 --> 00:10:40,160

when we started amazon i didn't have to

268

00:10:44,470 --> 00:10:42,640

build a logistics infrastructure system

269

00:10:47,110 --> 00:10:44,480

to deliver parcels there was something

270

00:10:49,350 --> 00:10:47,120

already ups already existed and the u.s

271

00:10:51,030 --> 00:10:49,360

postal service already existed i didn't

272

00:10:53,030 --> 00:10:51,040

need to build a remote payment system

273

00:10:54,630 --> 00:10:53,040

there were already credit cards

274

00:10:56,389 --> 00:10:54,640

and similarly you know there were

275

00:10:57,670 --> 00:10:56,399

computers around and you know that

276

00:10:59,829 --> 00:10:57,680

didn't have to get all those things

277

00:11:01,030 --> 00:10:59,839

would have been tens of billions or

278

00:11:02,630 --> 00:11:01,040

hundreds of billions of dollars of

279

00:11:04,150 --> 00:11:02,640

infrastructure the long distance phone

280

00:11:06,470 --> 00:11:04,160

network became the backbone of the

281

00:11:08,550 --> 00:11:06,480

internet but it already existed

282

00:11:10,790 --> 00:11:08,560

and so you could have this dynamic

283

00:11:12,949 --> 00:11:10,800

entrepreneurial explosion because all

284

00:11:15,509 --> 00:11:12,959

the heavy capex

285

00:11:16,949 --> 00:11:15,519

infrastructure was in place for space

286

00:11:19,430 --> 00:11:16,959

it's not like that the price of

287

00:11:21,509 --> 00:11:19,440

admission is so high so that's the big

288

00:11:23,430 --> 00:11:21,519

difference and what i'm super excited

289

00:11:25,590 --> 00:11:23,440

about is lowering that cost i want to

290

00:11:27,350 --> 00:11:25,600

dramatically lower that cost

291

00:11:29,829 --> 00:11:27,360

so that 20 years from now a new

292

00:11:30,630 --> 00:11:29,839

generation of people with startup money

293

00:11:35,590 --> 00:11:30,640

real

294

00:11:36,870 --> 00:11:35,600

can do amazing things in space think how

295

00:11:39,110 --> 00:11:36,880

cool that would be

296

00:11:40,790 --> 00:11:39,120

let me do a follow-up with you why is it

297

00:11:42,870 --> 00:11:40,800

that the people who are trying to build

298

00:11:44,710 --> 00:11:42,880

great space companies now all have day

299

00:11:46,630 --> 00:11:44,720

jobs doing something else richard

300

00:11:48,310 --> 00:11:46,640

branson has a day job

301
00:11:50,550 --> 00:11:48,320
elon musk has a day job you have a day

302
00:11:52,150 --> 00:11:50,560
job why don't people have full-time jobs

303
00:11:54,230 --> 00:11:52,160
just getting people into space why is it

304
00:11:56,550 --> 00:11:54,240
only people like you who have day jobs

305
00:11:58,629 --> 00:11:56,560
are doing all these things well for one

306
00:12:00,710 --> 00:11:58,639
thing it's expensive you need a

307
00:12:01,910 --> 00:12:00,720
lucrative day job so you can afford your

308
00:12:03,590 --> 00:12:01,920
night job

309
00:12:06,069 --> 00:12:03,600
it's um

310
00:12:07,670 --> 00:12:06,079
and and you know blue origin is i think

311
00:12:09,030 --> 00:12:07,680
going to be a profitable business one

312
00:12:10,550 --> 00:12:09,040
day i certainly want it to be i think

313
00:12:11,509 --> 00:12:10,560

that's healthy and it would be you know

314

00:12:13,430 --> 00:12:11,519

you want businesses to be

315

00:12:16,150 --> 00:12:13,440

self-sustaining so they can do amazing

316

00:12:17,990 --> 00:12:16,160

things but it needs a lot of funding and

317

00:12:20,710 --> 00:12:18,000

it needs a lot of funding for a long

318

00:12:22,230 --> 00:12:20,720

time in that investment phase

319

00:12:24,150 --> 00:12:22,240

and so i'm very happy to do that but

320

00:12:26,389 --> 00:12:24,160

until i can only do it because i was

321

00:12:28,230 --> 00:12:26,399

lucky with amazon michael let me ask you

322

00:12:30,470 --> 00:12:28,240

a question um this is something that's

323

00:12:32,629 --> 00:12:30,480

hard to believe you landed in on the

324

00:12:34,949 --> 00:12:32,639

moon in july or you and your team landed

325

00:12:36,949 --> 00:12:34,959

in july of 1969 we're going to get into

326

00:12:38,150 --> 00:12:36,959

that in a moment but why do you think so

327

00:12:39,750 --> 00:12:38,160

many people in the world or at least

328

00:12:41,509 --> 00:12:39,760

some people in the world still think

329

00:12:44,069 --> 00:12:41,519

that it was fake and that it was

330

00:12:45,509 --> 00:12:44,079

actually in a studio and uh was there a

331

00:12:47,509 --> 00:12:45,519

studio you actually filmed this in or

332

00:12:49,509 --> 00:12:47,519

where did they bring it happen though

333

00:12:51,829 --> 00:12:49,519

no i'd love to get them all together in

334

00:12:53,750 --> 00:12:51,839

one room you know and pick their brains

335

00:12:55,910 --> 00:12:53,760

i think it'd be fun well

336

00:12:58,310 --> 00:12:55,920

the the wright brothers uh flew in kitty

337

00:12:59,750 --> 00:12:58,320

hawk north carolina i think was december

338

00:13:02,790 --> 00:12:59,760

17th

339

00:13:04,870 --> 00:13:02,800

and the evening before the 16th every

340

00:13:07,590 --> 00:13:04,880

year they they they have the meeting of

341

00:13:09,590 --> 00:13:07,600

the man will never fly society

342

00:13:11,750 --> 00:13:09,600

and one year i was their guest speaker

343

00:13:13,750 --> 00:13:11,760

it was one of the finest speeches i've

344

00:13:15,829 --> 00:13:13,760

ever made and

345

00:13:18,870 --> 00:13:15,839

i was forced to reveal that it did take

346

00:13:21,269 --> 00:13:18,880

place if you drive south out of

347

00:13:23,670 --> 00:13:21,279

kitty hawk or this gigantic sand dune

348

00:13:26,389 --> 00:13:23,680

just past the village of rodante and

349

00:13:27,269 --> 00:13:26,399

we'd film just on the other side of that

350

00:13:31,110 --> 00:13:27,279

and

351
00:13:32,870 --> 00:13:31,120
unretouched

352
00:13:35,190 --> 00:13:32,880
nasa photographs

353
00:13:37,509 --> 00:13:35,200
now you see a

354
00:13:40,069 --> 00:13:37,519
crushed pack of marlboros over here and

355
00:13:43,030 --> 00:13:40,079
a dr pepper can over there

356
00:13:45,030 --> 00:13:43,040
that's proof man so i uh what was your

357
00:13:46,710 --> 00:13:45,040
question again quite a pretty good

358
00:13:49,030 --> 00:13:46,720
answer

359
00:13:51,670 --> 00:13:49,040
for both of you um in the heyday of the

360
00:13:53,750 --> 00:13:51,680
uh mercury gemini and apollo program

361
00:13:55,750 --> 00:13:53,760
everybody's attention was kept captured

362
00:13:57,430 --> 00:13:55,760
by it captivated by it congress was

363
00:13:59,269 --> 00:13:57,440

putting up money everybody seemed to

364

00:14:00,550 --> 00:13:59,279

want to have the astronauts go to where

365

00:14:02,470 --> 00:14:00,560

they were going everybody wanted to be

366

00:14:04,790 --> 00:14:02,480

an astronaut why do you think the u.s

367

00:14:06,790 --> 00:14:04,800

government has basically receded a bit

368

00:14:08,629 --> 00:14:06,800

in its mission to go back to the moon or

369

00:14:10,310 --> 00:14:08,639

to go to mars and why is it that

370

00:14:11,350 --> 00:14:10,320

entrepreneurs are now leading the effort

371

00:14:13,030 --> 00:14:11,360

there's nothing wrong with that but

372

00:14:15,269 --> 00:14:13,040

where is the u.s government is it a case

373

00:14:17,269 --> 00:14:15,279

of done there done that been there and i

374

00:14:18,870 --> 00:14:17,279

don't want to do it anymore yes but for

375

00:14:22,629 --> 00:14:18,880

both of you

376

00:14:25,509 --> 00:14:22,639

um well i think most most things uh

377

00:14:28,550 --> 00:14:25,519

especially in the world of economics and

378

00:14:29,750 --> 00:14:28,560

the economy are cyclical and uh

379

00:14:32,069 --> 00:14:29,760

and and we

380

00:14:34,069 --> 00:14:32,079

came to kind of a crest on the wave in

381

00:14:36,470 --> 00:14:34,079

the latter days of the apollo program

382

00:14:39,829 --> 00:14:36,480

and that momentum was hard to keep going

383

00:14:41,829 --> 00:14:39,839

i think we're in a time of hiatus now

384

00:14:44,870 --> 00:14:41,839

and i think the momentum has

385

00:14:49,350 --> 00:14:44,880

possibilities of picking up again i hope

386

00:14:51,670 --> 00:14:49,360

so to me the focus should be on mars

387

00:14:54,150 --> 00:14:51,680

my friend neil armstrong who is a far

388

00:14:56,629 --> 00:14:54,160

better engineer than than i

389

00:14:59,269 --> 00:14:56,639

thought it was worthwhile to

390

00:15:01,670 --> 00:14:59,279

stop off and

391

00:15:04,069 --> 00:15:01,680

get a little more organized on the moon

392

00:15:06,150 --> 00:15:04,079

before heading on to mars i disagree

393

00:15:08,230 --> 00:15:06,160

with that i think we ought to just go i

394

00:15:10,790 --> 00:15:08,240

used to joke that i i thought nasa

395

00:15:13,670 --> 00:15:10,800

should be renamed in nama the national

396

00:15:15,910 --> 00:15:13,680

aeronautics and mars association and i

397

00:15:18,389 --> 00:15:15,920

still uh to some extent would like to

398

00:15:19,750 --> 00:15:18,399

see that but anyway on to mars right so

399

00:15:21,269 --> 00:15:19,760

why do you think it is that the u.s

400

00:15:22,629 --> 00:15:21,279

government basically has receded a bit

401
00:15:23,750 --> 00:15:22,639
and entrepreneurs have the opportunity

402
00:15:25,509 --> 00:15:23,760
to do it do you think there's some way

403
00:15:26,629 --> 00:15:25,519
to recapture the us government's

404
00:15:28,470 --> 00:15:26,639
interest in us

405
00:15:31,269 --> 00:15:28,480
well i don't i think if you think back

406
00:15:33,670 --> 00:15:31,279
to the kind of the heyday of the 1960s

407
00:15:35,749 --> 00:15:33,680
and the apollo program and all of that

408
00:15:37,269 --> 00:15:35,759
excitement

409
00:15:40,710 --> 00:15:37,279
i i

410
00:15:43,590 --> 00:15:40,720
my my my gut instinct on this is that we

411
00:15:45,670 --> 00:15:43,600
as a civilization we as humanity

412
00:15:47,189 --> 00:15:45,680
pulled that moon landing

413
00:15:49,430 --> 00:15:47,199

way forward

414

00:15:50,870 --> 00:15:49,440

out of sequence from where it actually

415

00:15:51,990 --> 00:15:50,880

should have been

416

00:15:56,069 --> 00:15:52,000

it was

417

00:15:56,870 --> 00:15:56,079

a gigantic effort with what is

418

00:15:59,430 --> 00:15:56,880

uh

419

00:16:02,230 --> 00:15:59,440

in many ways it's it should have been

420

00:16:04,629 --> 00:16:02,240

impossible and they pulled it off with

421

00:16:07,269 --> 00:16:04,639

you know barely any computational power

422

00:16:09,590 --> 00:16:07,279

they were still using slide rules they

423

00:16:11,990 --> 00:16:09,600

couldn't numerically model in computers

424

00:16:13,829 --> 00:16:12,000

a lot of these important processes like

425

00:16:15,509 --> 00:16:13,839

combustion inside a rocket engine which

426

00:16:17,030 --> 00:16:15,519

is still hard today but we can do it a

427

00:16:18,790 --> 00:16:17,040

little bit

428

00:16:20,629 --> 00:16:18,800

they didn't have computational fluid

429

00:16:22,470 --> 00:16:20,639

dynamics to really everything had to be

430

00:16:25,430 --> 00:16:22,480

done in a wind tunnel nothing could be

431

00:16:27,990 --> 00:16:25,440

done on a computer so my i think the

432

00:16:31,350 --> 00:16:28,000

reason we've sort of taken a hiatus

433

00:16:33,430 --> 00:16:31,360

maybe in part at least is because we

434

00:16:35,030 --> 00:16:33,440

did we pulled that forward to a time

435

00:16:36,470 --> 00:16:35,040

when it should have been impossible and

436

00:16:37,749 --> 00:16:36,480

then once it was done

437

00:16:39,990 --> 00:16:37,759

we kind of had to wait and let

438

00:16:42,470 --> 00:16:40,000

technology catch up you know the reason

439

00:16:44,389 --> 00:16:42,480

that blue origin and spacex and virgin

440

00:16:46,870 --> 00:16:44,399

galactic and all these companies today

441

00:16:49,189 --> 00:16:46,880

any of these private companies the only

442

00:16:51,350 --> 00:16:49,199

reason that we can do this kind of

443

00:16:53,509 --> 00:16:51,360

endeavor at all is because we're

444

00:16:54,710 --> 00:16:53,519

standing on the shoulders of nasa who

445

00:16:56,949 --> 00:16:54,720

invented

446

00:16:58,389 --> 00:16:56,959

all of this technology we're still using

447

00:17:00,470 --> 00:16:58,399

all the things that they invented back

448

00:17:01,350 --> 00:17:00,480

in the 60s we have refined versions of

449

00:17:03,990 --> 00:17:01,360

it

450

00:17:07,110 --> 00:17:04,000

but even the computer codes that we use

451
00:17:09,909 --> 00:17:07,120
to validate our designs have been you

452
00:17:11,669 --> 00:17:09,919
know honed and and and fine-tuned by

453
00:17:13,669 --> 00:17:11,679
nasa over decades

454
00:17:16,069 --> 00:17:13,679
so this is um

455
00:17:18,309 --> 00:17:16,079
uh i i think we're finally entering i

456
00:17:20,870 --> 00:17:18,319
believe that we are entering a new

457
00:17:23,110 --> 00:17:20,880
golden age of space and space

458
00:17:24,789 --> 00:17:23,120
exploration and that the time has come

459
00:17:26,630 --> 00:17:24,799
for that to happen because we as a

460
00:17:27,750 --> 00:17:26,640
species have

461
00:17:29,350 --> 00:17:27,760
have uh

462
00:17:31,270 --> 00:17:29,360
up leveled ourselves in terms of

463
00:17:34,070 --> 00:17:31,280

technology we're ready to do it now it's

464

00:17:35,750 --> 00:17:34,080

amazing that we did it in 1969. so it's

465

00:17:36,630 --> 00:17:35,760

crazy let's suppose the next president

466

00:17:38,070 --> 00:17:36,640

united states we're having a

467

00:17:40,470 --> 00:17:38,080

presidential election everybody knows

468

00:17:42,310 --> 00:17:40,480

that and whoever is elected suppose that

469

00:17:45,110 --> 00:17:42,320

person calls you up and says i want to

470

00:17:46,710 --> 00:17:45,120

jump start the space program give me

471

00:17:48,390 --> 00:17:46,720

some advice what should i do should i go

472

00:17:50,070 --> 00:17:48,400

to back to the moon should i go to mars

473

00:17:51,750 --> 00:17:50,080

should i go into no planets should i

474

00:17:53,750 --> 00:17:51,760

build a space shuttle again what should

475

00:17:55,669 --> 00:17:53,760

i do and michael what would you say the

476

00:17:57,750 --> 00:17:55,679

next president united states uh about

477

00:17:59,430 --> 00:17:57,760

how to jump straight yeah i've never i'd

478

00:18:01,830 --> 00:17:59,440

probably be so nervous i dropped the

479

00:18:03,830 --> 00:18:01,840

telephone i uh i've never had the

480

00:18:05,510 --> 00:18:03,840

president united states to ask me a

481

00:18:07,750 --> 00:18:05,520

question like that

482

00:18:09,909 --> 00:18:07,760

as i said earlier i happen to believe in

483

00:18:12,950 --> 00:18:09,919

mars i think one of the wonderful things

484

00:18:15,830 --> 00:18:12,960

about the apollo program was what john f

485

00:18:17,590 --> 00:18:15,840

kennedy said uh he was president he said

486

00:18:19,110 --> 00:18:17,600

we want a man on the moon by the end of

487

00:18:20,710 --> 00:18:19,120

the decade

488

00:18:22,230 --> 00:18:20,720

simple i mean did you have questions

489

00:18:24,789 --> 00:18:22,240

about that maybe something about that

490

00:18:27,270 --> 00:18:24,799

you didn't understand i mean we all

491

00:18:29,029 --> 00:18:27,280

understood what it was what we were

492

00:18:30,950 --> 00:18:29,039

supposed to do

493

00:18:34,230 --> 00:18:30,960

and

494

00:18:37,029 --> 00:18:34,240

we need something similar to that today

495

00:18:38,630 --> 00:18:37,039

i don't know what that is

496

00:18:41,190 --> 00:18:38,640

as i say my

497

00:18:43,750 --> 00:18:41,200

i have every hope and

498

00:18:45,830 --> 00:18:43,760

i think mars is is the focus that we

499

00:18:48,070 --> 00:18:45,840

should have but whatever it is we want

500

00:18:49,990 --> 00:18:48,080

to do you need a lot of support from the

501
00:18:52,230 --> 00:18:50,000
president united states

502
00:18:54,390 --> 00:18:52,240
you have to have the feeling that he's a

503
00:18:57,750 --> 00:18:54,400
man or a woman who

504
00:19:00,070 --> 00:18:57,760
thinks about space likes the exploration

505
00:19:02,549 --> 00:19:00,080
of space thinks it's a worthwhile

506
00:19:05,270 --> 00:19:02,559
investment for our government and puts

507
00:19:07,190 --> 00:19:05,280
it pretty high on the priority list

508
00:19:09,190 --> 00:19:07,200
now regardless of parties and who you

509
00:19:11,190 --> 00:19:09,200
like or don't like we we really haven't

510
00:19:13,750 --> 00:19:11,200
had that personal involvement of a

511
00:19:17,190 --> 00:19:13,760
president i don't think since uh john f

512
00:19:19,990 --> 00:19:17,200
kennedy but it was a wonderful help for

513
00:19:22,630 --> 00:19:20,000

us to just say what the president said

514

00:19:24,870 --> 00:19:22,640

there it is it's stark it's outline you

515

00:19:27,190 --> 00:19:24,880

can you could write it on your thumbnail

516

00:19:28,710 --> 00:19:27,200

and off you go jeff what would you do if

517

00:19:30,310 --> 00:19:28,720

the president called you and said i want

518

00:19:31,669 --> 00:19:30,320

to get the government to help

519

00:19:33,830 --> 00:19:31,679

entrepreneurs like you and i want to

520

00:19:35,510 --> 00:19:33,840

jump start public interest in uh in

521

00:19:36,390 --> 00:19:35,520

space what would you recommend to him i

522

00:19:37,350 --> 00:19:36,400

think

523

00:19:41,510 --> 00:19:37,360

a

524

00:19:43,430 --> 00:19:41,520

to do so

525

00:19:45,590 --> 00:19:43,440

the just like darpa has done their darpa

526

00:19:47,990 --> 00:19:45,600

grand challenges to for which really

527

00:19:49,830 --> 00:19:48,000

kicked off self-driving cars

528

00:19:52,630 --> 00:19:49,840

you could for example you know nasa for

529

00:19:54,230 --> 00:19:52,640

many years has planned and done quite

530

00:19:57,029 --> 00:19:54,240

detailed planning on a mars sample

531

00:19:59,750 --> 00:19:57,039

return mission so an automated robotic

532

00:20:01,909 --> 00:19:59,760

vehicle that goes to mars lands on mars

533

00:20:04,390 --> 00:20:01,919

collects some mars

534

00:20:06,630 --> 00:20:04,400

samples and then lifts back off and

535

00:20:08,549 --> 00:20:06,640

comes back to earth and brings some

536

00:20:09,990 --> 00:20:08,559

martian samples back it's a very

537

00:20:12,230 --> 00:20:10,000

expensive mission to do it's a very

538

00:20:13,669 --> 00:20:12,240

complex mission to do

539

00:20:15,350 --> 00:20:13,679

the you know one thing that the

540

00:20:16,710 --> 00:20:15,360

government could do is just offer a very

541

00:20:19,270 --> 00:20:16,720

large prize

542

00:20:20,630 --> 00:20:19,280

to whoever first brings back some mars

543

00:20:23,990 --> 00:20:20,640

samples

544

00:20:25,590 --> 00:20:24,000

it would be very interesting it would be

545

00:20:27,430 --> 00:20:25,600

that kind of horse race would create

546

00:20:29,909 --> 00:20:27,440

lots of attention

547

00:20:31,510 --> 00:20:29,919

people would compete for it

548

00:20:33,750 --> 00:20:31,520

and

549

00:20:35,669 --> 00:20:33,760

who knows how it would end but also if

550

00:20:37,270 --> 00:20:35,679

nobody brings the samples back it costs

551
00:20:40,870 --> 00:20:37,280
taxpayers nothing

552
00:20:42,950 --> 00:20:40,880
so it's a very effective way of getting

553
00:20:44,630 --> 00:20:42,960
a lot of interest and a lot of teams

554
00:20:48,390 --> 00:20:44,640
competing and trying to come up with

555
00:20:51,029 --> 00:20:48,400
creative ways to do that i also would

556
00:20:53,350 --> 00:20:51,039
advise that nasa needs to go after

557
00:20:55,990 --> 00:20:53,360
gigantic

558
00:20:58,070 --> 00:20:56,000
hard technology goals

559
00:21:00,950 --> 00:20:58,080
an example would be an in-space

560
00:21:04,310 --> 00:21:00,960
qualified nuclear reactor

561
00:21:06,070 --> 00:21:04,320
for deep space missions um another very

562
00:21:07,430 --> 00:21:06,080
difficult very challenging not something

563
00:21:09,510 --> 00:21:07,440

that private enterprise is going to

564

00:21:11,909 --> 00:21:09,520

undertake anytime soon another

565

00:21:13,190 --> 00:21:11,919

gigantically hard mission that nasa

566

00:21:15,190 --> 00:21:13,200

could undertake which would be very

567

00:21:17,750 --> 00:21:15,200

exciting would be hypersonic

568

00:21:19,350 --> 00:21:17,760

point-to-point travel so on earth but

569

00:21:20,870 --> 00:21:19,360

that that you know because nasa isn't

570

00:21:23,750 --> 00:21:20,880

just about space

571

00:21:26,070 --> 00:21:23,760

so i think prizes and then really hard

572

00:21:28,630 --> 00:21:26,080

technology programs all right now do

573

00:21:30,230 --> 00:21:28,640

either of you believe in ufos do you

574

00:21:32,070 --> 00:21:30,240

what do you think happened in roswell in

575

00:21:34,870 --> 00:21:32,080

mexico do you think we've ever had any

576

00:21:37,590 --> 00:21:34,880

ufos in our in our earth well one of the

577

00:21:39,830 --> 00:21:37,600

horrible things is that word ufo because

578

00:21:41,909 --> 00:21:39,840

anyone who's flown in the night sky or

579

00:21:42,950 --> 00:21:41,919

the day sky occasionally you see

580

00:21:45,190 --> 00:21:42,960

something

581

00:21:47,270 --> 00:21:45,200

the lubbock lights you know it's a flock

582

00:21:49,830 --> 00:21:47,280

of geese where things just happen to be

583

00:21:52,549 --> 00:21:49,840

pointed properly at it and

584

00:21:55,909 --> 00:21:52,559

so have i ever seen a ufo yes i have

585

00:21:58,149 --> 00:21:55,919

seen an un identified object in the sky

586

00:22:01,029 --> 00:21:58,159

do i think it was inhabited by little

587

00:22:03,669 --> 00:22:01,039

green men from far away no it's some

588

00:22:05,350 --> 00:22:03,679

aberrant lighting condition that caused

589

00:22:07,510 --> 00:22:05,360

it but i'm not answering your question

590

00:22:09,029 --> 00:22:07,520

ask me again what was the question

591

00:22:10,149 --> 00:22:09,039

well on the back side of the moon when

592

00:22:11,830 --> 00:22:10,159

you went on the backside of the moon you

593

00:22:14,070 --> 00:22:11,840

didn't see any little men or women

594

00:22:15,430 --> 00:22:14,080

walking around there did you no no no no

595

00:22:16,789 --> 00:22:15,440

the back side of the moon was kind of

596

00:22:19,669 --> 00:22:16,799

nice you know i couldn't hear mission

597

00:22:23,669 --> 00:22:21,990

apollo 11 do this do that check that

598

00:22:25,190 --> 00:22:23,679

flex the other

599

00:22:26,549 --> 00:22:25,200

was pleasant

600

00:22:27,669 --> 00:22:26,559

you believe there are ufos do you

601
00:22:30,070 --> 00:22:27,679
believe you believe there's life

602
00:22:31,590 --> 00:22:30,080
elsewhere in the galaxy oh yes i think

603
00:22:33,350 --> 00:22:31,600
there's life elsewhere in the galaxy but

604
00:22:35,750 --> 00:22:33,360
i do not think they have visited us and

605
00:22:37,430 --> 00:22:35,760
they're not abducting people and

606
00:22:39,669 --> 00:22:37,440
uh it's not a giant government

607
00:22:41,430 --> 00:22:39,679
conspiracy to hide you no i think when

608
00:22:43,430 --> 00:22:41,440
the ufos come if they ever do they'll

609
00:22:45,430 --> 00:22:43,440
make themselves quite visible okay so

610
00:22:48,149 --> 00:22:45,440
michael let me ask you how did you first

611
00:22:50,630 --> 00:22:48,159
get involved in the space program you uh

612
00:22:52,310 --> 00:22:50,640
were you're a graduate of west point and

613
00:22:53,990 --> 00:22:52,320

you ultimately were a fighter pilot but

614

00:22:55,190 --> 00:22:54,000

how did you get selected initially you

615

00:23:00,070 --> 00:22:55,200

weren't selected initially but how did

616

00:23:04,070 --> 00:23:01,750

ultimately you got selected well i mean

617

00:23:06,470 --> 00:23:04,080

i wasn't eight years old and looked up

618

00:23:09,270 --> 00:23:06,480

into the night sky and said the moon's

619

00:23:11,190 --> 00:23:09,280

for me i used to make model airplanes oh

620

00:23:13,350 --> 00:23:11,200

by the way neely used to make model neil

621

00:23:15,190 --> 00:23:13,360

armstrong made model airplanes he and i

622

00:23:16,149 --> 00:23:15,200

tell me the difference

623

00:23:17,669 --> 00:23:16,159

um

624

00:23:20,149 --> 00:23:17,679

mine that's how you get selected make a

625

00:23:22,230 --> 00:23:20,159

model mine would confuse me a little bit

626

00:23:23,990 --> 00:23:22,240

i wasn't sure we both wanted performance

627

00:23:25,270 --> 00:23:24,000

higher and faster

628

00:23:31,830 --> 00:23:25,280

and

629

00:23:35,990 --> 00:23:31,840

a little bit more a couple extra turns

630

00:23:40,070 --> 00:23:38,310

did you know that i didn't know that

631

00:23:43,190 --> 00:23:40,080

well anyway

632

00:23:44,070 --> 00:23:43,200

i i i got into it step by step i went to

633

00:23:49,750 --> 00:23:44,080

uh

634

00:23:51,590 --> 00:23:49,760

father my brother my uncle had all gone

635

00:23:54,149 --> 00:23:51,600

there but fundamentally i went there

636

00:23:57,350 --> 00:23:54,159

because it was a free education

637

00:23:58,870 --> 00:23:57,360

then i had a choice army or air force my

638

00:24:01,029 --> 00:23:58,880

uncle was

639

00:24:03,510 --> 00:24:01,039

army chief of staff

640

00:24:06,710 --> 00:24:03,520

nepotism i snuck off to the air force

641

00:24:07,669 --> 00:24:06,720

then the choice is fly or don't fly then

642

00:24:09,830 --> 00:24:07,679

fly

643

00:24:11,830 --> 00:24:09,840

big ones are little ones oh little ones

644

00:24:15,830 --> 00:24:11,840

are better than the big ones sorry

645

00:24:19,909 --> 00:24:17,350

but

646

00:24:21,510 --> 00:24:19,919

then fly the same ones over and over or

647

00:24:22,870 --> 00:24:21,520

fly the new ones i want to fly the new

648

00:24:24,630 --> 00:24:22,880

ones

649

00:24:26,390 --> 00:24:24,640

next thing you knew i was a test pilot

650

00:24:28,390 --> 00:24:26,400

and nasa was looking for test pilots it

651
00:24:30,310 --> 00:24:28,400
was that simple just a stair step so

652
00:24:31,830 --> 00:24:30,320
when you finally got selected

653
00:24:33,990 --> 00:24:31,840
and you get to meet the other astronauts

654
00:24:37,029 --> 00:24:34,000
do you say how did i get here or how did

655
00:24:39,110 --> 00:24:37,039
they get here no no no we were

656
00:24:41,590 --> 00:24:39,120
no no back up a bit

657
00:24:42,470 --> 00:24:41,600
before there really was a space program

658
00:24:43,350 --> 00:24:42,480
uh

659
00:24:45,269 --> 00:24:43,360
people

660
00:24:47,990 --> 00:24:45,279
uh this you know the bureaucrats or

661
00:24:49,830 --> 00:24:48,000
whoever the scientists the medics

662
00:24:51,830 --> 00:24:49,840
all got together and tried to figure out

663
00:24:53,029 --> 00:24:51,840

who who did they want to hire what kind

664

00:24:55,269 --> 00:24:53,039

of people

665

00:24:57,590 --> 00:24:55,279

and their you know some of the proposals

666

00:24:58,630 --> 00:24:57,600

were bizarre i mean we couldn't breathe

667

00:25:00,149 --> 00:24:58,640

so we

668

00:25:03,350 --> 00:25:00,159

picked mountain climbers they're used to

669

00:25:05,430 --> 00:25:03,360

that stuff or you're going to become so

670

00:25:08,390 --> 00:25:05,440

enraptured by space you're not going to

671

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

want to return it's similar to some

672

00:25:11,750 --> 00:25:09,840

scuba divers

673

00:25:13,430 --> 00:25:11,760

so you get a scuba diver

674

00:25:15,590 --> 00:25:13,440

some said no it's

675

00:25:17,269 --> 00:25:15,600

it's dangerous so we ought to get

676

00:25:17,990 --> 00:25:17,279

bull fighters huh

677

00:25:21,750 --> 00:25:18,000

and

678

00:25:24,789 --> 00:25:21,760

so all these crazy ideas were compiled

679

00:25:27,190 --> 00:25:24,799

and filtered and put together in a paper

680

00:25:29,990 --> 00:25:27,200

to president eisenhower

681

00:25:32,149 --> 00:25:30,000

and he said okay got to be a graduate of

682

00:25:34,470 --> 00:25:32,159

an accredited test pilot school so

683

00:25:37,669 --> 00:25:34,480

immediately this

684

00:25:39,990 --> 00:25:37,679

pool of billions and today

685

00:25:42,470 --> 00:25:40,000

nasa's looking for i think 12 people and

686

00:25:46,390 --> 00:25:42,480

so a year or so from now so far they

687

00:25:47,269 --> 00:25:46,400

have over 18 000 applicants today

688

00:25:48,870 --> 00:25:47,279

but

689

00:25:50,710 --> 00:25:48,880

if you say you got to be a graduate of

690

00:25:53,110 --> 00:25:50,720

an accredited testbot school that pool

691

00:25:55,750 --> 00:25:53,120

just shrinks and uh

692

00:25:57,830 --> 00:25:55,760

and so i was very fortunate to be one of

693

00:25:59,750 --> 00:25:57,840

few people considered

694

00:26:00,549 --> 00:25:59,760

i never make it today i guarantee you

695

00:26:02,470 --> 00:26:00,559

that

696

00:26:04,870 --> 00:26:02,480

how did you get interested in space how

697

00:26:07,110 --> 00:26:04,880

did i get interested in space um

698

00:26:08,070 --> 00:26:07,120

well actually i

699

00:26:10,390 --> 00:26:08,080

became

700

00:26:13,190 --> 00:26:10,400

inspired uh when i was five years old

701
00:26:15,669 --> 00:26:13,200
when i watched uh apollo 11 you know

702
00:26:18,230 --> 00:26:15,679
this guy and his two pals

703
00:26:21,110 --> 00:26:18,240
go to the moon and um

704
00:26:22,549 --> 00:26:21,120
it was uh i could just tell how excited

705
00:26:24,070 --> 00:26:22,559
everybody was around me and you don't

706
00:26:25,350 --> 00:26:24,080
choose your passions your passions

707
00:26:27,669 --> 00:26:25,360
choose you

708
00:26:30,549 --> 00:26:27,679
and ever since i'm five years old i've

709
00:26:32,950 --> 00:26:30,559
been thinking about rockets and

710
00:26:35,029 --> 00:26:32,960
rocket engines and spacecraft pretty

711
00:26:36,870 --> 00:26:35,039
much every day of my life

712
00:26:38,149 --> 00:26:36,880
everybody is a little boy or maybe a

713
00:26:39,669 --> 00:26:38,159

little girl as well they're interested

714

00:26:41,029 --> 00:26:39,679

in the space area but they don't

715

00:26:42,789 --> 00:26:41,039

actually go ahead and do the kind of

716

00:26:44,390 --> 00:26:42,799

things you did so what prompted you

717

00:26:46,310 --> 00:26:44,400

after you started amazon to start a

718

00:26:48,230 --> 00:26:46,320

whole separate company and how much of

719

00:26:50,870 --> 00:26:48,240

your time do you devote to it

720

00:26:53,830 --> 00:26:50,880

well i had i had been hoping to build a

721

00:26:56,149 --> 00:26:53,840

space company since i was a little kid

722

00:26:57,029 --> 00:26:56,159

and um and then you know

723

00:26:59,510 --> 00:26:57,039

kind of

724

00:27:01,190 --> 00:26:59,520

reality came into play and i realized it

725

00:27:03,830 --> 00:27:01,200

was going to be really expensive to

726

00:27:06,070 --> 00:27:03,840

start a space company and then i kind of

727

00:27:07,510 --> 00:27:06,080

moved on i fell in love with computers

728

00:27:13,269 --> 00:27:07,520

and

729

00:27:16,149 --> 00:27:13,279

hey wait i can do

730

00:27:19,190 --> 00:27:16,159

that original childhood dream now and so

731

00:27:21,669 --> 00:27:19,200

i started this company and um it employs

732

00:27:24,470 --> 00:27:21,679

now we're up to about 700 people

733

00:27:25,990 --> 00:27:24,480

and we're building a suborbital tourism

734

00:27:27,990 --> 00:27:26,000

vehicle which competes with virgin

735

00:27:29,750 --> 00:27:28,000

galactic and we're gonna

736

00:27:31,510 --> 00:27:29,760

our goal there is to make it possible

737

00:27:33,350 --> 00:27:31,520

ultimately for anybody who wants to go

738

00:27:34,710 --> 00:27:33,360

to space to be able to afford it we're

739

00:27:36,710 --> 00:27:34,720

just going to keep working at that goal

740

00:27:38,470 --> 00:27:36,720

patiently until we achieve it

741

00:27:41,269 --> 00:27:38,480

and uh and then we're also building an

742

00:27:42,789 --> 00:27:41,279

orbital vehicle and we'll we'll fly that

743

00:27:43,590 --> 00:27:42,799

at the end of this decade for the first

744

00:27:45,909 --> 00:27:43,600

time

745

00:27:46,630 --> 00:27:45,919

and so it is you know and

746

00:27:50,310 --> 00:27:46,640

my

747

00:27:53,029 --> 00:27:50,320

the cost of space it's all about

748

00:27:55,190 --> 00:27:53,039

reusability you just have to make your

749

00:27:57,029 --> 00:27:55,200

vehicles reusable you can't throw them

750

00:27:58,549 --> 00:27:57,039

in the bottom of the ocean every time

751
00:28:00,710 --> 00:27:58,559
after you use them if you ever want to

752
00:28:03,110 --> 00:28:00,720
dramatically reduce the cost so would

753
00:28:05,510 --> 00:28:03,120
you go on one of these space uh trips

754
00:28:07,750 --> 00:28:05,520
yourself yeah abs absolutely i i fully

755
00:28:10,389 --> 00:28:07,760
expect to go into space myself someday

756
00:28:12,149 --> 00:28:10,399
and um uh told your family that or your

757
00:28:14,630 --> 00:28:12,159
amazon they're sitting here in the front

758
00:28:18,230 --> 00:28:14,640
row so i'm telling them right now they

759
00:28:21,750 --> 00:28:20,710
no i will do it very safely you know i

760
00:28:24,630 --> 00:28:21,760
think that

761
00:28:26,789 --> 00:28:24,640
um you know space travel can be both

762
00:28:29,909 --> 00:28:26,799
much lower cost and

763
00:28:32,230 --> 00:28:29,919

much uh more reliable and safe and in

764

00:28:35,350 --> 00:28:32,240

fact i think reusability will add to

765

00:28:39,669 --> 00:28:35,360

reliability so you don't want you know

766

00:28:41,029 --> 00:28:39,679

i would much rather fly a new boeing 787

767

00:28:42,789 --> 00:28:41,039

after it's been flying a little while

768

00:28:44,870 --> 00:28:42,799

not like the very first flight out of

769

00:28:46,950 --> 00:28:44,880

the factory you know and so

770

00:28:49,510 --> 00:28:46,960

um the when you build these space

771

00:28:51,190 --> 00:28:49,520

vehicles you can't send them on on test

772

00:28:52,389 --> 00:28:51,200

runs uh the way we do them if they're

773

00:28:54,389 --> 00:28:52,399

expendable

774

00:28:56,789 --> 00:28:54,399

their very first mission is also their

775

00:28:59,510 --> 00:28:56,799

very last mission and that just really

776
00:29:01,909 --> 00:28:59,520
hobbles you um in terms of making things

777
00:29:03,350 --> 00:29:01,919
safe and reliable so michael let me ask

778
00:29:05,269 --> 00:29:03,360
you all right when you're selected to go

779
00:29:07,269 --> 00:29:05,279
on apollo 11.

780
00:29:09,190 --> 00:29:07,279
um was there any jockeying saying hey

781
00:29:10,470 --> 00:29:09,200
i'd like to be the first man on the moon

782
00:29:12,549 --> 00:29:10,480
i'd like to be the second man on the

783
00:29:15,990 --> 00:29:12,559
moon i'd like to run the command module

784
00:29:18,630 --> 00:29:16,000
how did they decide who would do what

785
00:29:20,549 --> 00:29:18,640
um you know there was some

786
00:29:22,389 --> 00:29:20,559
small fuss if i remember correctly

787
00:29:24,870 --> 00:29:22,399
before the flight and maybe a larger one

788
00:29:26,789 --> 00:29:24,880

after about who went first but it seemed

789

00:29:30,149 --> 00:29:26,799

to me that neil armstrong should have

790

00:29:31,990 --> 00:29:30,159

gone first he was a commander and

791

00:29:33,110 --> 00:29:32,000

that just seemed more appropriate to me

792

00:29:35,190 --> 00:29:33,120

in a more

793

00:29:35,990 --> 00:29:35,200

normal sequence of events

794

00:29:37,909 --> 00:29:36,000

uh

795

00:29:39,350 --> 00:29:37,919

and i'm glad he did i think you know

796

00:29:41,510 --> 00:29:39,360

neil was

797

00:29:43,750 --> 00:29:41,520

just an amazing

798

00:29:46,389 --> 00:29:43,760

fellow he uh

799

00:29:49,830 --> 00:29:46,399

at that time there were 30 of us

800

00:29:51,909 --> 00:29:49,840

in the astronaut office in houston and

801
00:29:54,389 --> 00:29:51,919
of the 30 there was kind of like one

802
00:29:56,310 --> 00:29:54,399
here and 29 there

803
00:29:58,630 --> 00:29:56,320
in terms of

804
00:30:00,389 --> 00:29:58,640
test piloting experience and that was

805
00:30:03,190 --> 00:30:00,399
what we considered the single most

806
00:30:05,830 --> 00:30:03,200
important yardstick if you will

807
00:30:09,350 --> 00:30:05,840
so neil was in a way because of his

808
00:30:13,190 --> 00:30:09,360
experience out at edwards as a as a test

809
00:30:15,590 --> 00:30:13,200
pilot for nasa and a ca and then nasa

810
00:30:18,789 --> 00:30:15,600
he was almost in a just a class by

811
00:30:21,029 --> 00:30:18,799
himself and also i thought personality

812
00:30:24,230 --> 00:30:21,039
wise people will argue with that they

813
00:30:26,389 --> 00:30:24,240

said well he was too reticent

814

00:30:29,190 --> 00:30:26,399

he didn't get out in front and sell the

815

00:30:30,230 --> 00:30:29,200

program but i think from a personality

816

00:30:32,710 --> 00:30:30,240

point

817

00:30:34,230 --> 00:30:32,720

he was a superb choice

818

00:30:36,549 --> 00:30:34,240

i wouldn't want a

819

00:30:39,029 --> 00:30:36,559

i can get it for you a wholesale pr man

820

00:30:41,510 --> 00:30:39,039

out there trying to sell

821

00:30:44,389 --> 00:30:41,520

i i think that had been dreadful and uh

822

00:30:45,909 --> 00:30:44,399

so i i think if you considered uh

823

00:30:49,110 --> 00:30:45,919

the positions

824

00:30:51,190 --> 00:30:49,120

and on the crew hierarchy and and and

825

00:30:53,990 --> 00:30:51,200

the worth of the man the personality the

826

00:30:56,950 --> 00:30:54,000

sort of person he was i i think was a

827

00:30:58,149 --> 00:30:56,960

wonderful choice so uh if on that flight

828

00:31:00,710 --> 00:30:58,159

uh you could say there are four

829

00:31:01,830 --> 00:31:00,720

complicated parts getting off the earth

830

00:31:04,789 --> 00:31:01,840

you know you don't know if it's going to

831

00:31:05,830 --> 00:31:04,799

work then getting into the moon's orbit

832

00:31:09,430 --> 00:31:05,840

you don't know if that's really going to

833

00:31:11,350 --> 00:31:09,440

work then having the um space the the

834

00:31:13,350 --> 00:31:11,360

lunar module go down and having the

835

00:31:14,389 --> 00:31:13,360

lunar module come back up and hook with

836

00:31:15,990 --> 00:31:14,399

you and then of course go back to the

837

00:31:17,350 --> 00:31:16,000

earth you could say five parts which do

838

00:31:18,630 --> 00:31:17,360

you think was the most dangerous or that

839

00:31:20,789 --> 00:31:18,640

made you the most nervous that would

840

00:31:23,269 --> 00:31:20,799

actually not not happen well you know

841

00:31:26,950 --> 00:31:23,279

going to the moon is a i always liken it

842

00:31:30,230 --> 00:31:26,960

to a daisy chain it's a long complex

843

00:31:32,389 --> 00:31:30,240

daisy chain a lot of lengths fragile you

844

00:31:34,710 --> 00:31:32,399

break one link uh

845

00:31:36,310 --> 00:31:34,720

the rest of them don't matter a lot

846

00:31:38,870 --> 00:31:36,320

um

847

00:31:42,070 --> 00:31:38,880

if you if you think of it that way the

848

00:31:44,710 --> 00:31:42,080

weakest and the worries to me was

849

00:31:46,870 --> 00:31:44,720

getting the limb off the lunar surface i

850

00:31:49,350 --> 00:31:46,880

thought we'd launch okay we'd get to the

851
00:31:51,830 --> 00:31:49,360
moon we could navigate you know someone

852
00:31:55,110 --> 00:31:51,840
asked neil wouldn't it wasn't the uh

853
00:31:57,509 --> 00:31:55,120
navigation terribly complicated and

854
00:31:59,190 --> 00:31:57,519
neil had a very nice little dry center

855
00:32:02,870 --> 00:31:59,200
and he said no he could see the thing

856
00:32:08,470 --> 00:32:06,389
but uh so those things

857
00:32:11,590 --> 00:32:08,480
those things i was i was not worried

858
00:32:13,909 --> 00:32:11,600
about but i was worried about

859
00:32:14,870 --> 00:32:13,919
the ascent and the rendezvous they had

860
00:32:17,110 --> 00:32:14,880
only

861
00:32:18,950 --> 00:32:17,120
we were big on redundancy we wanted two

862
00:32:21,430 --> 00:32:18,960
of everything but the design of the

863
00:32:23,750 --> 00:32:21,440

lunar module was such we just had one

864

00:32:25,029 --> 00:32:23,760

ascent engine one engine bell hanging

865

00:32:26,549 --> 00:32:25,039

out at the bottom

866

00:32:28,389 --> 00:32:26,559

that thing had to work or they were

867

00:32:29,669 --> 00:32:28,399

stuck there forever

868

00:32:32,470 --> 00:32:29,679

and

869

00:32:34,389 --> 00:32:32,480

then things got really complicated from

870

00:32:37,430 --> 00:32:34,399

my point of view

871

00:32:39,990 --> 00:32:37,440

if if they got off on time

872

00:32:43,669 --> 00:32:40,000

burn the engine for the right number of

873

00:32:46,149 --> 00:32:43,679

seconds and precisely the right azimuth

874

00:32:48,950 --> 00:32:46,159

then it was pretty simple but

875

00:32:50,710 --> 00:32:48,960

any variations in their trajectories

876

00:32:53,350 --> 00:32:50,720

gave me fits

877

00:32:56,549 --> 00:32:53,360

you know sometimes then my strategy

878

00:32:58,630 --> 00:32:56,559

would be to drop down into a lower orbit

879

00:33:00,710 --> 00:32:58,640

and try to catch them faster

880

00:33:03,509 --> 00:33:00,720

and if they got past a certain point

881

00:33:06,149 --> 00:33:03,519

then my strategy was to go higher and

882

00:33:08,789 --> 00:33:06,159

slower and let them make an extra turn

883

00:33:11,909 --> 00:33:08,799

around the moon and catch me i had a

884

00:33:14,230 --> 00:33:11,919

book around my neck a big fat eight by

885

00:33:15,110 --> 00:33:14,240

ten uh notebook kind of thing

886

00:33:17,350 --> 00:33:15,120

and then

887

00:33:19,669 --> 00:33:17,360

if i remember right i think it had 18

888

00:33:20,389 --> 00:33:19,679

variations on this theme

889

00:33:23,269 --> 00:33:20,399

so

890

00:33:25,190 --> 00:33:23,279

given the fact that they were

891

00:33:28,149 --> 00:33:25,200

lots could have gone wrong on the lunar

892

00:33:30,070 --> 00:33:28,159

surface uh that single engine might have

893

00:33:32,470 --> 00:33:30,080

had a hiccup uh

894

00:33:34,470 --> 00:33:32,480

uh i might have been able to rescue

895

00:33:35,509 --> 00:33:34,480

obviously i could not go down and land

896

00:33:37,430 --> 00:33:35,519

but

897

00:33:38,870 --> 00:33:37,440

short of that i obviously had a lot of

898

00:33:39,590 --> 00:33:38,880

ways of

899

00:33:41,350 --> 00:33:39,600

of

900

00:33:43,990 --> 00:33:41,360

rescuing them but i'm not sure i knew

901
00:33:46,230 --> 00:33:44,000
all 18 of them as well as i should have

902
00:33:49,269 --> 00:33:46,240
you you've uh you've written and you've

903
00:33:52,630 --> 00:33:49,279
uh said that the most maybe dangerous

904
00:33:54,389 --> 00:33:52,640
job and you had was the uh one of and

905
00:33:55,990 --> 00:33:54,399
perhaps having to come back by yourself

906
00:33:57,830 --> 00:33:56,000
in other words you were you were afraid

907
00:33:59,110 --> 00:33:57,840
that perhaps they didn't come back and

908
00:34:00,389 --> 00:33:59,120
they were stuck on the moon and you

909
00:34:02,230 --> 00:34:00,399
would have to go back by yourself and

910
00:34:03,990 --> 00:34:02,240
you lived in fear that people would

911
00:34:05,509 --> 00:34:04,000
blame you for some reason that that you

912
00:34:07,190 --> 00:34:05,519
hadn't brought them back can you talk

913
00:34:09,750 --> 00:34:07,200

about that you know we never discussed

914

00:34:11,909 --> 00:34:09,760

that uh but i mean it was i think clear

915

00:34:14,389 --> 00:34:11,919

to them and clear to me i was if they

916

00:34:16,869 --> 00:34:14,399

were stuck i was not going to commit

917

00:34:18,950 --> 00:34:16,879

suicide i was coming home but

918

00:34:20,550 --> 00:34:18,960

you know i have been a marked person for

919

00:34:22,629 --> 00:34:20,560

the rest of my life it'd have been just

920

00:34:23,990 --> 00:34:22,639

god awful so anyway i should have

921

00:34:26,550 --> 00:34:24,000

mentioned coming back to the earth is

922

00:34:28,230 --> 00:34:26,560

not exactly a a you know day in the park

923

00:34:29,829 --> 00:34:28,240

a walk in the park because can you

924

00:34:31,829 --> 00:34:29,839

describe how difficult it is to get back

925

00:34:33,990 --> 00:34:31,839

in the earth at the right uh

926

00:34:36,149 --> 00:34:34,000

rotation orbit

927

00:34:38,470 --> 00:34:36,159

it it went as bad as it sounds if you

928

00:34:40,790 --> 00:34:38,480

run the numbers the arithmetic says oh

929

00:34:42,869 --> 00:34:40,800

my god if you go a little too steep you

930

00:34:45,750 --> 00:34:42,879

burn up if you go a little too shallow

931

00:34:47,510 --> 00:34:45,760

you bounce out and we'll we'll see you

932

00:34:49,190 --> 00:34:47,520

six months after you've run out of

933

00:34:51,349 --> 00:34:49,200

oxygen

934

00:34:54,310 --> 00:34:51,359

so those uh those numbers are

935

00:34:56,470 --> 00:34:54,320

frightening however we had uh despite

936

00:34:57,670 --> 00:34:56,480

what jeff says about our extraordinarily

937

00:34:59,510 --> 00:34:57,680

primitive

938

00:35:02,470 --> 00:34:59,520

technology

939

00:35:05,109 --> 00:35:02,480

and it was uh pretty primitive we had a

940

00:35:07,190 --> 00:35:05,119

whole basement full of ibm 5060s or

941

00:35:07,910 --> 00:35:07,200

whatever they were and we had antennas

942

00:35:10,550 --> 00:35:07,920

and

943

00:35:16,790 --> 00:35:13,030

canberra that so

944

00:35:20,069 --> 00:35:16,800

if we got about a one hiccup off our

945

00:35:22,550 --> 00:35:20,079

trajectory on the way back we were told

946

00:35:24,470 --> 00:35:22,560

notified made a correction so all the

947

00:35:26,950 --> 00:35:24,480

way back from the moon fortunately we

948

00:35:28,550 --> 00:35:26,960

didn't have to make many corrections but

949

00:35:31,750 --> 00:35:28,560

we had the

950

00:35:34,069 --> 00:35:31,760

capacity to instead of flying a nice

951
00:35:36,069 --> 00:35:34,079
smooth arc that might have been too high

952
00:35:38,710 --> 00:35:36,079
or too low we were

953
00:35:41,190 --> 00:35:38,720
right exactly on that path when you came

954
00:35:42,550 --> 00:35:41,200
back there was a fear that you had moon

955
00:35:44,230 --> 00:35:42,560
germs with you

956
00:35:46,230 --> 00:35:44,240
and that you had to be quarantined for

957
00:35:48,230 --> 00:35:46,240
weeks what was that all about i mean

958
00:35:49,990 --> 00:35:48,240
i used to pray every night that the mice

959
00:35:51,510 --> 00:35:50,000
didn't die

960
00:35:53,990 --> 00:35:51,520
because

961
00:35:58,230 --> 00:35:55,829
you know we were locked up with i don't

962
00:35:59,829 --> 00:35:58,240
know dozens and dozens of mice and

963
00:36:02,310 --> 00:35:59,839

suppose they'd gotten

964

00:36:04,630 --> 00:36:02,320

able or something

965

00:36:06,230 --> 00:36:04,640

we'd still this day being quarantined

966

00:36:08,390 --> 00:36:06,240

down there so

967

00:36:09,510 --> 00:36:08,400

so when you came back here you've gone

968

00:36:10,870 --> 00:36:09,520

all the way up to the moon you're

969

00:36:12,710 --> 00:36:10,880

circling the moon you've come all the

970

00:36:14,790 --> 00:36:12,720

way back and then you land in the water

971

00:36:15,990 --> 00:36:14,800

and then you take dramamine pills i mean

972

00:36:17,349 --> 00:36:16,000

after having done all that why did you

973

00:36:18,550 --> 00:36:17,359

worry about dramamine

974

00:36:20,470 --> 00:36:18,560

i don't i don't think so i didn't take

975

00:36:21,510 --> 00:36:20,480

any dry i mean i don't think

976
00:36:23,349 --> 00:36:21,520
when they

977
00:36:24,950 --> 00:36:23,359
when on the shuttle when it would landed

978
00:36:26,550 --> 00:36:24,960
on the uh the space capsule landed in

979
00:36:30,470 --> 00:36:26,560
the water i thought you were supposed to

980
00:36:33,109 --> 00:36:30,480
take dramamine because it tilted so much

981
00:36:34,150 --> 00:36:33,119
well i lost a case of beers

982
00:36:35,829 --> 00:36:34,160
but

983
00:36:38,230 --> 00:36:35,839
in the landing uh

984
00:36:41,349 --> 00:36:38,240
it was that uh

985
00:36:43,829 --> 00:36:41,359
i i flew it i flew we switched sweets uh

986
00:36:45,750 --> 00:36:43,839
i switched seats with buzz he sat where

987
00:36:48,630 --> 00:36:45,760
i normally did and he had

988
00:36:49,990 --> 00:36:48,640

i was a navigator coming back and uh he

989

00:36:51,349 --> 00:36:50,000

was the guy who was in charge of the

990

00:36:52,870 --> 00:36:51,359

parachutes

991

00:36:54,230 --> 00:36:52,880

which you know

992

00:36:56,310 --> 00:36:54,240

might have been my domain but it wasn't

993

00:36:59,750 --> 00:36:56,320

at that time in the flight and the thing

994

00:37:01,510 --> 00:36:59,760

was as soon as you hit

995

00:37:03,589 --> 00:37:01,520

he was supposed to

996

00:37:06,310 --> 00:37:03,599

push in two circuit breakers hit these

997

00:37:07,510 --> 00:37:06,320

two switches and the parachutes were

998

00:37:09,829 --> 00:37:07,520

jettisoned

999

00:37:11,750 --> 00:37:09,839

and if he didn't do that swiftly

1000

00:37:12,790 --> 00:37:11,760

um

1001
00:37:15,750 --> 00:37:12,800
we'd

1002
00:37:18,230 --> 00:37:15,760
be caught by the wind and flipped over

1003
00:37:20,150 --> 00:37:18,240
and then we'd be upside down for god a

1004
00:37:21,589 --> 00:37:20,160
couple of hours while he had to pump up

1005
00:37:23,589 --> 00:37:21,599
pumps and

1006
00:37:25,190 --> 00:37:23,599
anyway i had a case of beer bed on

1007
00:37:27,670 --> 00:37:25,200
whether we were we're not going to go

1008
00:37:30,230 --> 00:37:27,680
over and he messed it up and we went

1009
00:37:31,190 --> 00:37:30,240
over and i had to owe him a case of beer

1010
00:37:33,510 --> 00:37:31,200
and it was

1011
00:37:36,230 --> 00:37:33,520
and we got sick we're not physically

1012
00:37:39,030 --> 00:37:36,240
sick but we had to upside down for a

1013
00:37:41,030 --> 00:37:39,040

while and it was a mess but uh it worked

1014

00:37:42,790 --> 00:37:41,040

so jeff um suppose somebody in the

1015

00:37:45,589 --> 00:37:42,800

audience here somebody watching wants to

1016

00:37:47,270 --> 00:37:45,599

go to the student space um where do they

1017

00:37:49,109 --> 00:37:47,280

sign up how much does it cost and when

1018

00:37:52,470 --> 00:37:49,119

will they be able to do it

1019

00:37:54,069 --> 00:37:52,480

well for the suborbital uh mission uh we

1020

00:37:55,270 --> 00:37:54,079

don't we don't know yet exactly what

1021

00:37:57,510 --> 00:37:55,280

we're going to charge it's going to be

1022

00:37:59,750 --> 00:37:57,520

in the same virgin galactic is charging

1023

00:38:01,670 --> 00:37:59,760

i don't know somewhere between 250 000

1024

00:38:03,829 --> 00:38:01,680

and 300 thousand dollars per ticket

1025

00:38:05,270 --> 00:38:03,839

we're going to be in the same range to

1026

00:38:07,030 --> 00:38:05,280

start with

1027

00:38:08,310 --> 00:38:07,040

and then keep working over time to make

1028

00:38:09,670 --> 00:38:08,320

it cheaper and when do you think that

1029

00:38:13,270 --> 00:38:09,680

will be available

1030

00:38:17,109 --> 00:38:13,280

2018. so we'll fly our first test

1031

00:38:18,550 --> 00:38:17,119

astronauts in 20 late 2017 hopefully if

1032

00:38:19,990 --> 00:38:18,560

the if the test

1033

00:38:21,910 --> 00:38:20,000

program continues to go we're flying

1034

00:38:23,750 --> 00:38:21,920

again this friday

1035

00:38:25,510 --> 00:38:23,760

and are webcasting that so you can watch

1036

00:38:27,109 --> 00:38:25,520

that and but if the test program

1037

00:38:30,310 --> 00:38:27,119

continues to go well

1038

00:38:32,230 --> 00:38:30,320

um we should be ready to put people on

1039

00:38:34,310 --> 00:38:32,240

board in late 2017 than paying

1040

00:38:36,230 --> 00:38:34,320

astronauts in 2018.

1041

00:38:37,750 --> 00:38:36,240

and uh how can somebody sign up now or

1042

00:38:40,790 --> 00:38:37,760

you're not taking names now we're not

1043

00:38:43,190 --> 00:38:40,800

taking deposits or anything yet

1044

00:38:45,109 --> 00:38:43,200

um in case of uh people who do want to

1045

00:38:47,670 --> 00:38:45,119

go should they be physically fit or can

1046

00:38:49,829 --> 00:38:47,680

they be out of shape now it doesn't it

1047

00:38:51,589 --> 00:38:49,839

it's it's uh you don't need to be

1048

00:38:54,390 --> 00:38:51,599

especially physically fit there may be a

1049

00:38:56,310 --> 00:38:54,400

few uh criteria but it probably i would

1050

00:38:58,390 --> 00:38:56,320

think of it as you will that'll come

1051
00:39:00,230 --> 00:38:58,400
later we'll have more details on what

1052
00:39:02,069 --> 00:39:00,240
you really need but it's probably like

1053
00:39:04,069 --> 00:39:02,079
if you can ride a roller coaster you can

1054
00:39:06,390 --> 00:39:04,079
probably do this it's not a it's not

1055
00:39:08,870 --> 00:39:06,400
something that requires a special

1056
00:39:13,510 --> 00:39:08,880
physical fitness and will you be able to

1057
00:39:17,349 --> 00:39:14,550
yeah but you won't be able to get it

1058
00:39:19,349 --> 00:39:17,359
delivered up there yeah um but we have

1059
00:39:21,910 --> 00:39:19,359
you know it'll be uh you'll be in it's

1060
00:39:23,349 --> 00:39:21,920
what alan shepard did in the early days

1061
00:39:24,710 --> 00:39:23,359
that's what sub-rural space is so

1062
00:39:26,950 --> 00:39:24,720
instead of going around the earth that's

1063
00:39:29,750 --> 00:39:26,960

orbital you go up and you come back down

1064

00:39:32,470 --> 00:39:29,760

so you're in zero gravity for

1065

00:39:34,390 --> 00:39:32,480

approximately four minutes uh we have

1066

00:39:35,750 --> 00:39:34,400

the largest windows that will have ever

1067

00:39:38,150 --> 00:39:35,760

been in space

1068

00:39:39,990 --> 00:39:38,160

it's gonna people who have been to space

1069

00:39:41,589 --> 00:39:40,000

we could ask mike but i've heard it from

1070

00:39:44,069 --> 00:39:41,599

many many people

1071

00:39:46,390 --> 00:39:44,079

that it does change you it changes the

1072

00:39:47,990 --> 00:39:46,400

way you think about the earth and

1073

00:39:49,589 --> 00:39:48,000

humanity and you get to see that thin

1074

00:39:51,910 --> 00:39:49,599

limb of the earth's atmosphere and the

1075

00:39:53,430 --> 00:39:51,920

big blackness of space and

1076

00:39:55,190 --> 00:39:53,440

so i think people are going to be very

1077

00:39:57,910 --> 00:39:55,200

excited about it michael you've written

1078

00:39:59,430 --> 00:39:57,920

in your book that you wish all

1079

00:40:01,109 --> 00:39:59,440

government leaders could go to outer

1080

00:40:02,790 --> 00:40:01,119

space because when you go to outer space

1081

00:40:04,710 --> 00:40:02,800

you can see the earth as without

1082

00:40:06,470 --> 00:40:04,720

boundaries and borders and you kind of

1083

00:40:08,550 --> 00:40:06,480

realize the fragility is the word you

1084

00:40:10,470 --> 00:40:08,560

used how fragile earth is can you

1085

00:40:11,910 --> 00:40:10,480

comment on that and why you saw the

1086

00:40:13,589 --> 00:40:11,920

earth is so fragile when you were up

1087

00:40:15,910 --> 00:40:13,599

there

1088

00:40:18,309 --> 00:40:15,920

you know the idea of fragility never

1089

00:40:21,030 --> 00:40:18,319

occurred to me before the flight and

1090

00:40:23,030 --> 00:40:21,040

it was kind of a surprise

1091

00:40:24,870 --> 00:40:23,040

speaking of windows i would say in the

1092

00:40:27,349 --> 00:40:24,880

command module there were there were

1093

00:40:28,309 --> 00:40:27,359

five windows so you want to look at the

1094

00:40:30,069 --> 00:40:28,319

earth

1095

00:40:31,910 --> 00:40:30,079

little things see where you came from

1096

00:40:34,470 --> 00:40:31,920

and all of that oh you look out of

1097

00:40:36,230 --> 00:40:34,480

window number one nothing black window

1098

00:40:37,910 --> 00:40:36,240

number two three four five look through

1099

00:40:40,150 --> 00:40:37,920

all five windows you can't it's not

1100

00:40:42,630 --> 00:40:40,160

there so that's that's a very

1101

00:40:45,190 --> 00:40:42,640

interesting starting point right there

1102

00:40:47,030 --> 00:40:45,200

if you stop and think about it

1103

00:40:49,109 --> 00:40:47,040

you spent all your life in this little

1104

00:40:52,309 --> 00:40:49,119

globe you're up away from it you want to

1105

00:40:54,870 --> 00:40:52,319

know about it see it get back to it it's

1106

00:40:57,030 --> 00:40:54,880

gone and in there so but anyway

1107

00:40:59,750 --> 00:40:57,040

obviously you know that sooner or later

1108

00:41:02,309 --> 00:40:59,760

if you twist the spacecraft and roll and

1109

00:41:05,910 --> 00:41:02,319

pitch and y'all around in a certain way

1110

00:41:07,670 --> 00:41:05,920

it'll hold into view and uh and when it

1111

00:41:10,150 --> 00:41:07,680

does it's uh

1112

00:41:13,030 --> 00:41:10,160

very small about about

1113

00:41:15,109 --> 00:41:13,040

got a normal um thumbnail

1114

00:41:17,430 --> 00:41:15,119

hold it up let me see if it's

1115

00:41:20,470 --> 00:41:17,440

yeah okay hold on in front of you

1116

00:41:22,150 --> 00:41:20,480

okay that's that's what you see that's

1117

00:41:23,430 --> 00:41:22,160

what it looks like from the moon it's

1118

00:41:25,270 --> 00:41:23,440

like a

1119

00:41:27,910 --> 00:41:25,280

normal thumbnail out in front of you

1120

00:41:29,109 --> 00:41:27,920

about that big that's pretty small

1121

00:41:30,790 --> 00:41:29,119

and um

1122

00:41:32,550 --> 00:41:30,800

of course we're mostly

1123

00:41:35,349 --> 00:41:32,560

mostly ocean

1124

00:41:37,349 --> 00:41:35,359

so uh you mostly see blue

1125

00:41:39,270 --> 00:41:37,359

see depending on the weather conditions

1126
00:41:41,109 --> 00:41:39,280
but you see quite a few clouds you don't

1127
00:41:43,670 --> 00:41:41,119
see land so much

1128
00:41:44,790 --> 00:41:43,680
it's very shiny the albedo you know the

1129
00:41:46,230 --> 00:41:44,800
amount of

1130
00:41:48,630 --> 00:41:46,240
sunlight that the

1131
00:41:50,870 --> 00:41:48,640
that the moon uh i mean excuse me if the

1132
00:41:52,390 --> 00:41:50,880
earth reflects as far exceeds that of

1133
00:41:54,710 --> 00:41:52,400
the moon

1134
00:41:59,109 --> 00:41:56,870
somehow this little tiny

1135
00:42:00,950 --> 00:41:59,119
blue and white sphere looks lovely and

1136
00:42:04,150 --> 00:42:00,960
clean which it's

1137
00:42:06,230 --> 00:42:04,160
which it's not it looks uh

1138
00:42:07,990 --> 00:42:06,240

fragile which it is

1139

00:42:10,630 --> 00:42:08,000

uh i don't know why it looks fragile

1140

00:42:13,349 --> 00:42:10,640

it's just that was just my reaction god

1141

00:42:16,150 --> 00:42:13,359

it's a beautiful little thing i'll

1142

00:42:17,829 --> 00:42:16,160

be back in a couple of days i hope and

1143

00:42:20,069 --> 00:42:17,839

well but in the meantime it just looks

1144

00:42:22,630 --> 00:42:20,079

so beautiful and fragile fragile

1145

00:42:25,109 --> 00:42:22,640

fragility so let me ask you this you and

1146

00:42:26,390 --> 00:42:25,119

two other men went to the moon and came

1147

00:42:28,870 --> 00:42:26,400

back safely

1148

00:42:31,190 --> 00:42:28,880

um that's incredible bonding experience

1149

00:42:33,270 --> 00:42:31,200

but it didn't seem as if going up you

1150

00:42:34,630 --> 00:42:33,280

were uh though close to each other you

1151

00:42:36,710 --> 00:42:34,640

weren't particularly close friends and

1152

00:42:37,910 --> 00:42:36,720

afterwards you didn't become even closer

1153

00:42:39,589 --> 00:42:37,920

friends what was the nature of the

1154

00:42:41,910 --> 00:42:39,599

relationship between the three of you i

1155

00:42:44,309 --> 00:42:41,920

love them both uh our crew was a little

1156

00:42:47,430 --> 00:42:44,319

i i think the one of the books i wrote

1157

00:42:49,910 --> 00:42:47,440

uh uh i described the crew as amiable

1158

00:42:52,550 --> 00:42:49,920

strangers which in a way we were i

1159

00:42:54,950 --> 00:42:52,560

didn't mean that in a bad way but uh

1160

00:42:57,109 --> 00:42:54,960

unlike most crews most crews were formed

1161

00:42:59,190 --> 00:42:57,119

first they were a backup crew

1162

00:43:01,349 --> 00:42:59,200

nowadays for a couple of years and then

1163

00:43:02,309 --> 00:43:01,359

they worked together as a team and

1164

00:43:04,710 --> 00:43:02,319

became

1165

00:43:06,710 --> 00:43:04,720

primary crew due to a whole set of

1166

00:43:08,870 --> 00:43:06,720

circumstances

1167

00:43:11,270 --> 00:43:08,880

we didn't have that bonding experience

1168

00:43:12,790 --> 00:43:11,280

we all came together about six months

1169

00:43:14,950 --> 00:43:12,800

before the flight

1170

00:43:17,670 --> 00:43:14,960

and then the other uh

1171

00:43:20,950 --> 00:43:17,680

thing that was a little different is

1172

00:43:23,270 --> 00:43:20,960

is where the spacecraft are manufactured

1173

00:43:25,670 --> 00:43:23,280

and where you test them

1174

00:43:27,589 --> 00:43:25,680

neil and buzz would be off in beth page

1175

00:43:29,670 --> 00:43:27,599

long island worrying about grumman

1176

00:43:31,990 --> 00:43:29,680

putting the lamb together i'd be in

1177

00:43:35,670 --> 00:43:32,000

downey california worrying about the

1178

00:43:37,510 --> 00:43:35,680

command module when we got together

1179

00:43:40,150 --> 00:43:37,520

no we weren't together they were too off

1180

00:43:43,589 --> 00:43:40,160

in the lamb simulator i'm in the command

1181

00:43:45,109 --> 00:43:43,599

module simulator so just

1182

00:43:47,190 --> 00:43:45,119

what i would almost call freakish

1183

00:43:49,270 --> 00:43:47,200

circumstances kept us from being as

1184

00:43:51,750 --> 00:43:49,280

close as some of the crews you've now

1185

00:43:54,790 --> 00:43:51,760

been back on earth for quite a while

1186

00:43:56,470 --> 00:43:54,800

back in 69 you had a chance though if

1187

00:43:58,630 --> 00:43:56,480

you'd stayed in the program to go back

1188

00:44:00,550 --> 00:43:58,640

and maybe be a person who went on the

1189

00:44:02,230 --> 00:44:00,560

moon physically why did you choose not

1190

00:44:03,430 --> 00:44:02,240

to do that and to retire from the space

1191

00:44:07,030 --> 00:44:03,440

program

1192

00:44:09,430 --> 00:44:07,040

well it was more a personal thing

1193

00:44:12,069 --> 00:44:09,440

my wife was from boston i don't think

1194

00:44:13,349 --> 00:44:12,079

houston was exactly her first choice of

1195

00:44:14,470 --> 00:44:13,359

habitat

1196

00:44:16,950 --> 00:44:14,480

uh

1197

00:44:19,990 --> 00:44:16,960

and and i would perfectly happy to

1198

00:44:23,030 --> 00:44:20,000

be spending more time at home and left

1199

00:44:25,510 --> 00:44:23,040

less in motel 6 off an east overshoe

1200

00:44:27,030 --> 00:44:25,520

somewhere

1201

00:44:31,430 --> 00:44:27,040

and

1202

00:44:34,230 --> 00:44:31,440

but i'd have to say underlying that

1203

00:44:36,710 --> 00:44:34,240

i i guess i had the wrong attitude

1204

00:44:39,589 --> 00:44:36,720

in the sense that i thought

1205

00:44:42,230 --> 00:44:39,599

apollo 11 was kind of the apex of the

1206

00:44:44,630 --> 00:44:42,240

program to do what john kennedy said to

1207

00:44:46,870 --> 00:44:44,640

land amen on the moon by the end of the

1208

00:44:49,990 --> 00:44:46,880

decade and i'd help

1209

00:44:52,069 --> 00:44:50,000

to do that and rather put up with uh

1210

00:44:53,910 --> 00:44:52,079

what i thought be another perhaps three

1211

00:44:56,630 --> 00:44:53,920

years of uh

1212

00:44:58,870 --> 00:44:56,640

of simulators and motels and this that

1213

00:45:01,589 --> 00:44:58,880

and the other i i just felt it for me it

1214

00:45:02,870 --> 00:45:01,599

was time to bail out okay and um the

1215

00:45:04,870 --> 00:45:02,880

most frequent question you've been asked

1216

00:45:06,390 --> 00:45:04,880

since you've been back since 1969 is it

1217

00:45:08,790 --> 00:45:06,400

what is it like to go to the bathroom in

1218

00:45:10,950 --> 00:45:08,800

space uh do you really like the food

1219

00:45:13,430 --> 00:45:10,960

that you get in space or do you really

1220

00:45:14,630 --> 00:45:13,440

drink tang um any of those questions

1221

00:45:16,710 --> 00:45:14,640

what was the most frequent question

1222

00:45:19,349 --> 00:45:16,720

you've been asked okay the the

1223

00:45:21,430 --> 00:45:19,359

the going to the bathroom is i so help

1224

00:45:23,349 --> 00:45:21,440

me across my heart never been asked if i

1225

00:45:24,630 --> 00:45:23,359

were asked i'd say the answer is

1226

00:45:25,990 --> 00:45:24,640

carefully

1227

00:45:29,349 --> 00:45:26,000

uh

1228

00:45:30,790 --> 00:45:29,359

what was the segment tang

1229

00:45:33,109 --> 00:45:30,800

what about the food asking about the

1230

00:45:34,950 --> 00:45:33,119

food well i used to give i used to rate

1231

00:45:36,550 --> 00:45:34,960

the food and

1232

00:45:38,309 --> 00:45:36,560

i don't think the food preparation

1233

00:45:41,190 --> 00:45:38,319

people in houston were too happy but i'd

1234

00:45:43,589 --> 00:45:41,200

give it spoons you know i think the

1235

00:45:46,230 --> 00:45:43,599

you know the cream of chicken soup is

1236

00:45:48,950 --> 00:45:46,240

gets two spoons is all out of five and

1237

00:45:51,910 --> 00:45:48,960

so the food was decent you know for very

1238

00:45:53,510 --> 00:45:51,920

days who cares i uh you know uh

1239

00:45:56,470 --> 00:45:53,520

now you want to

1240

00:45:58,230 --> 00:45:56,480

stay up on the space station for a year

1241

00:46:00,710 --> 00:45:58,240

like these scott

1242

00:46:03,270 --> 00:46:00,720

scott guy is doing with his twin brother

1243

00:46:05,270 --> 00:46:03,280

is a control down here but

1244

00:46:07,190 --> 00:46:05,280

then things like food and the amenities

1245

00:46:09,109 --> 00:46:07,200

and crew compatibility you know crew

1246

00:46:11,670 --> 00:46:09,119

compatibility is something that the

1247

00:46:14,390 --> 00:46:11,680

psychiatrist always uh

1248

00:46:17,190 --> 00:46:14,400

emphasized and i can recall uh

1249

00:46:20,069 --> 00:46:17,200

sitting next to john young at a gemini

1250

00:46:23,349 --> 00:46:20,079

uh pre-flight uh press conference and

1251
00:46:25,910 --> 00:46:23,359
someone brought up how did i feel about

1252
00:46:27,349 --> 00:46:25,920
crew compatibility and on this what was

1253
00:46:29,430 --> 00:46:27,359
facing us

1254
00:46:34,150 --> 00:46:29,440
you know i said come on for

1255
00:46:35,910 --> 00:46:34,160
four days i'd fly with a baboon and uh

1256
00:46:37,910 --> 00:46:35,920
and you know john's sitting right there

1257
00:46:40,390 --> 00:46:37,920
he didn't get mad he knew exactly where

1258
00:46:42,710 --> 00:46:40,400
i was coming from he laughed

1259
00:46:45,670 --> 00:46:42,720
but that's true you know for a short

1260
00:46:48,550 --> 00:46:45,680
period of time now the thing is

1261
00:46:52,990 --> 00:46:48,560
you talk about mars then whoo i'm dead

1262
00:46:55,750 --> 00:46:53,000
wrong and then you have all kinds of

1263
00:46:57,910 --> 00:46:55,760

compatibility and physiological and

1264

00:46:59,750 --> 00:46:57,920

other medical problems i'm i'm i'm

1265

00:47:01,270 --> 00:46:59,760

rambling on i'm sorry what did

1266

00:47:03,109 --> 00:47:01,280

astronauts really drink tang that used

1267

00:47:05,349 --> 00:47:03,119

to be an advertisement during the

1268

00:47:06,630 --> 00:47:05,359

time really we had some kind of orange

1269

00:47:09,510 --> 00:47:06,640

stuff i don't know

1270

00:47:11,109 --> 00:47:09,520

who or what it was jeff um you're trying

1271

00:47:13,589 --> 00:47:11,119

to get some people to go into space but

1272

00:47:15,510 --> 00:47:13,599

you also have a program to build uh

1273

00:47:17,510 --> 00:47:15,520

rockets that can be relaunched for

1274

00:47:19,030 --> 00:47:17,520

further exploration in space will the

1275

00:47:21,589 --> 00:47:19,040

government the united states ultimately

1276

00:47:24,230 --> 00:47:21,599

use those for its um expiration or who

1277

00:47:26,150 --> 00:47:24,240

would use those rockets yeah the idea is

1278

00:47:28,390 --> 00:47:26,160

to build the infrastructure and once you

1279

00:47:29,990 --> 00:47:28,400

build the infrastructure to get to uh

1280

00:47:31,190 --> 00:47:30,000

earth orbit it can be used for just

1281

00:47:32,390 --> 00:47:31,200

about anything you could use it for

1282

00:47:33,829 --> 00:47:32,400

satellites

1283

00:47:36,069 --> 00:47:33,839

you can use it for

1284

00:47:38,470 --> 00:47:36,079

human rated missions so that's the goal

1285

00:47:41,270 --> 00:47:38,480

the goal is to build

1286

00:47:43,670 --> 00:47:41,280

we want to build a orbital vehicle where

1287

00:47:45,349 --> 00:47:43,680

the price of the propellant the fuel

1288

00:47:47,750 --> 00:47:45,359

actually matters where you start to

1289

00:47:49,829 --> 00:47:47,760

actually think about the cost of fuel no

1290

00:47:51,829 --> 00:47:49,839

rocket has ever been built

1291

00:47:53,349 --> 00:47:51,839

so far in the history of rockets where

1292

00:47:55,670 --> 00:47:53,359

anybody has ever cared about the cost of

1293

00:47:57,910 --> 00:47:55,680

the fuel because the fuel cost is so

1294

00:48:00,390 --> 00:47:57,920

dominated by throwing the hardware away

1295

00:48:01,750 --> 00:48:00,400

so it's about it's about reusability and

1296

00:48:04,150 --> 00:48:01,760

then reusability will lower the cost

1297

00:48:06,790 --> 00:48:04,160

enough to where we can practice so space

1298

00:48:09,430 --> 00:48:06,800

has been in stasis for 50 years we

1299

00:48:11,430 --> 00:48:09,440

launched about maybe 80 missions a year

1300

00:48:13,349 --> 00:48:11,440

globally all over the world

1301
00:48:15,030 --> 00:48:13,359
and that's not even a peak it's come

1302
00:48:18,230 --> 00:48:15,040
down a little bit from the peak maybe in

1303
00:48:19,910 --> 00:48:18,240
the 80s and so we've gotten better at it

1304
00:48:21,030 --> 00:48:19,920
as a society but not appreciably better

1305
00:48:22,470 --> 00:48:21,040
and that's because we don't practice

1306
00:48:24,549 --> 00:48:22,480
enough you know we get good we humans

1307
00:48:27,109 --> 00:48:24,559
get good at everything we practice a lot

1308
00:48:29,270 --> 00:48:27,119
so we need to be fine every day

1309
00:48:31,190 --> 00:48:29,280
and when we're flying every day

1310
00:48:34,470 --> 00:48:31,200
um we'll get better do you support the

1311
00:48:36,790 --> 00:48:34,480
idea of sending men and women to mars or

1312
00:48:38,069 --> 00:48:36,800
why not just send robots and pick up

1313
00:48:40,390 --> 00:48:38,079

whatever's there do you think it should

1314

00:48:43,190 --> 00:48:40,400

be human you can justify

1315

00:48:45,589 --> 00:48:43,200

sending men to mars for

1316

00:48:47,990 --> 00:48:45,599

science reasons i think we have reached

1317

00:48:50,470 --> 00:48:48,000

a state where robots can do that task

1318

00:48:52,069 --> 00:48:50,480

probably better than people can and the

1319

00:48:54,150 --> 00:48:52,079

reason you send people to mars is

1320

00:48:55,190 --> 00:48:54,160

because it's so damn cool

1321

00:49:00,950 --> 00:48:55,200

it's a

1322

00:49:03,190 --> 00:49:00,960

and uh and we should do that now but it

1323

00:49:05,589 --> 00:49:03,200

does you know it does have to be done at

1324

00:49:07,670 --> 00:49:05,599

a certain cost and and we have you know

1325

00:49:09,109 --> 00:49:07,680

we have a lot of other priorities for me

1326

00:49:11,190 --> 00:49:09,119

the big thing

1327

00:49:13,109 --> 00:49:11,200

i'm excited that i hope somebody goes to

1328

00:49:14,710 --> 00:49:13,119

mars because i want to watch it i think

1329

00:49:16,390 --> 00:49:14,720

it would be glorious

1330

00:49:18,710 --> 00:49:16,400

but for me that's not that's not the

1331

00:49:20,470 --> 00:49:18,720

motivator for me for me

1332

00:49:23,109 --> 00:49:20,480

the motivator is

1333

00:49:25,430 --> 00:49:23,119

i want us to have millions of people

1334

00:49:27,670 --> 00:49:25,440

living and working in space we have a

1335

00:49:29,030 --> 00:49:27,680

planet that is fragile and i don't think

1336

00:49:31,829 --> 00:49:29,040

we go

1337

00:49:34,630 --> 00:49:31,839

into space as a kind of plan b i hate

1338

00:49:37,670 --> 00:49:34,640

that idea that we need a backup for

1339

00:49:41,190 --> 00:49:37,680

earth is not motivating for me

1340

00:49:44,390 --> 00:49:41,200

for me plan b is make sure plan a works

1341

00:49:47,030 --> 00:49:44,400

we know a lot about this solar system

1342

00:49:48,309 --> 00:49:47,040

and i can assure you earth is the best

1343

00:49:50,150 --> 00:49:48,319

planet

1344

00:49:52,870 --> 00:49:50,160

we have looked at them all

1345

00:49:54,790 --> 00:49:52,880

and earth is the best one and and we

1346

00:49:56,870 --> 00:49:54,800

have to protect it and we can use space

1347

00:49:58,549 --> 00:49:56,880

to protect earth if you take

1348

00:50:01,190 --> 00:49:58,559

baseline

1349

00:50:03,589 --> 00:50:01,200

energy usage on earth and grow it

1350

00:50:05,910 --> 00:50:03,599

compound it at just three percent a year

1351
00:50:07,589 --> 00:50:05,920
such as the power of compounding that

1352
00:50:09,990 --> 00:50:07,599
just in a few hundred years you'll have

1353
00:50:10,630 --> 00:50:10,000
to cover the entire surface of the earth

1354
00:50:13,910 --> 00:50:10,640
and

1355
00:50:16,309 --> 00:50:13,920
solar cells to power the planet so this

1356
00:50:17,670 --> 00:50:16,319
this is we need to um

1357
00:50:19,829 --> 00:50:17,680
move ultimately over the next few

1358
00:50:22,230 --> 00:50:19,839
hundred years we need to build a real

1359
00:50:23,670 --> 00:50:22,240
space-faring civilization i think what's

1360
00:50:26,950 --> 00:50:23,680
going to happen is that we're going to

1361
00:50:29,430 --> 00:50:26,960
move all heavy industry off earth and

1362
00:50:30,549 --> 00:50:29,440
will zone earth residential and light

1363
00:50:31,510 --> 00:50:30,559

industrial

1364

00:50:34,470 --> 00:50:31,520

and

1365

00:50:36,950 --> 00:50:34,480

we'll protect this glorious jewel of a

1366

00:50:37,990 --> 00:50:36,960

planet because it is unique in our solar

1367

00:50:39,829 --> 00:50:38,000

system

1368

00:50:42,390 --> 00:50:39,839

and we're unlikely to get to new solar

1369

00:50:44,230 --> 00:50:42,400

systems anytime soon so for both of you

1370

00:50:45,510 --> 00:50:44,240

um when you go to outer space you look

1371

00:50:46,790 --> 00:50:45,520

at the earth it's very fragile there's

1372

00:50:48,309 --> 00:50:46,800

no boundaries do you think it really

1373

00:50:49,829 --> 00:50:48,319

makes a difference whether the united

1374

00:50:51,349 --> 00:50:49,839

states is taking the lead on this or

1375

00:50:53,589 --> 00:50:51,359

that china is doing there why not do it

1376
00:50:55,510 --> 00:50:53,599
together why not have those are yeah

1377
00:50:57,030 --> 00:50:55,520
sure for big exploration missions i

1378
00:50:59,030 --> 00:50:57,040
think you would do it together if you

1379
00:51:02,470 --> 00:50:59,040
were gonna you know do that glorious

1380
00:51:04,870 --> 00:51:02,480
journey to mars and uh and and and put

1381
00:51:06,630 --> 00:51:04,880
uh boots on mars or settle mars or any

1382
00:51:08,069 --> 00:51:06,640
of the things like that i think you

1383
00:51:10,790 --> 00:51:08,079
would want to do that in a kind of

1384
00:51:11,829 --> 00:51:10,800
consortium with many nations if it's a

1385
00:51:15,589 --> 00:51:11,839
kind of a separate if you're if you're

1386
00:51:16,390 --> 00:51:15,599
talking about space as a capability um

1387
00:51:18,150 --> 00:51:16,400
it's

1388
00:51:20,230 --> 00:51:18,160

it would be almost impossible to

1389

00:51:22,150 --> 00:51:20,240

overstate the importance of space to

1390

00:51:24,470 --> 00:51:22,160

united states national security we're

1391

00:51:27,589 --> 00:51:24,480

incredibly dependent our military is

1392

00:51:29,750 --> 00:51:27,599

totally dependent on space assets

1393

00:51:31,750 --> 00:51:29,760

all of our guided munitions are gps

1394

00:51:33,829 --> 00:51:31,760

guided those satellites are actually

1395

00:51:35,430 --> 00:51:33,839

very fragile

1396

00:51:37,349 --> 00:51:35,440

the national reconnaissance office

1397

00:51:38,630 --> 00:51:37,359

satellites are super important also

1398

00:51:39,349 --> 00:51:38,640

quite fragile

1399

00:51:41,270 --> 00:51:39,359

so

1400

00:51:43,190 --> 00:51:41,280

and it's very asymmetric because we're

1401

00:51:45,190 --> 00:51:43,200

more dependent on those high-tech assets

1402

00:51:46,950 --> 00:51:45,200

than any other country is that they give

1403

00:51:49,829 --> 00:51:46,960

us great capabilities but they're also a

1404

00:51:51,750 --> 00:51:49,839

vulnerability so if you think of space

1405

00:51:53,349 --> 00:51:51,760

if you think about kind of mars missions

1406

00:51:54,790 --> 00:51:53,359

i think they should be

1407

00:51:56,470 --> 00:51:54,800

done um

1408

00:51:58,950 --> 00:51:56,480

uh cooperatively but if you're thinking

1409

00:51:59,910 --> 00:51:58,960

about national security missions we we

1410

00:52:01,190 --> 00:51:59,920

need to

1411

00:52:03,990 --> 00:52:01,200

preserve our

1412

00:52:06,390 --> 00:52:04,000

our our preeminent uh position in space

1413

00:52:07,910 --> 00:52:06,400

michael um when you came back

1414

00:52:10,230 --> 00:52:07,920

richard nixon president united states

1415

00:52:11,670 --> 00:52:10,240

greeted you on the uss hornet

1416

00:52:13,910 --> 00:52:11,680

but you were quarantined so he couldn't

1417

00:52:15,910 --> 00:52:13,920

really talk to you but he he said at the

1418

00:52:17,270 --> 00:52:15,920

time this was the most important week

1419

00:52:18,870 --> 00:52:17,280

since creation

1420

00:52:20,470 --> 00:52:18,880

which i think you said in your book

1421

00:52:22,950 --> 00:52:20,480

maybe it was a little exaggeration but

1422

00:52:25,430 --> 00:52:22,960

maybe not um

1423

00:52:27,510 --> 00:52:25,440

you were very famous um and the other

1424

00:52:29,990 --> 00:52:27,520

two were very famous but you chose not

1425

00:52:31,829 --> 00:52:30,000

to cash in you had beer commercial

1426

00:52:34,230 --> 00:52:31,839

opportunities and all kinds of things

1427

00:52:35,750 --> 00:52:34,240

why did you try to not really go ahead

1428

00:52:37,829 --> 00:52:35,760

and make a lot of money out of your fame

1429

00:52:39,430 --> 00:52:37,839

and was there a philosophical thing you

1430

00:52:41,349 --> 00:52:39,440

thought about not making a lot of money

1431

00:52:43,190 --> 00:52:41,359

out of it

1432

00:52:44,870 --> 00:52:43,200

i'm not against money i'm not against

1433

00:52:48,230 --> 00:52:44,880

making money but

1434

00:52:50,549 --> 00:52:48,240

i don't know all my life i have never uh

1435

00:52:52,549 --> 00:52:50,559

that's never been my objective

1436

00:52:54,790 --> 00:52:52,559

you know

1437

00:52:56,309 --> 00:52:54,800

every time i've changed jobs what i've

1438

00:52:57,990 --> 00:52:56,319

wanted to do is find something

1439

00:53:03,510 --> 00:52:58,000

interesting

1440

00:53:06,390 --> 00:53:03,520

rather than money producing jobs and

1441

00:53:08,230 --> 00:53:06,400

and if i wanted to have both uh oh my

1442

00:53:10,470 --> 00:53:08,240

god i'd have to make speeches i'd have

1443

00:53:12,950 --> 00:53:10,480

to go to the washington national air and

1444

00:53:15,190 --> 00:53:12,960

space museum and be in the bottom of a

1445

00:53:16,150 --> 00:53:15,200

like a bowl and i can't tell who's up

1446

00:53:19,270 --> 00:53:16,160

there

1447

00:53:21,190 --> 00:53:19,280

and what's going on and um

1448

00:53:24,630 --> 00:53:21,200

so i don't know so now let me ask you

1449

00:53:26,630 --> 00:53:24,640

now you are um 85 years old yes

1450

00:53:28,470 --> 00:53:26,640

and you're in great shape you just did a

1451

00:53:30,470 --> 00:53:28,480

sort of triathlon recently and i guess

1452

00:53:33,190 --> 00:53:30,480

you won your age category maybe you want

1453

00:53:35,270 --> 00:53:33,200

it for younger people as well so um are

1454

00:53:36,950 --> 00:53:35,280

you your motivation in life now what is

1455

00:53:38,950 --> 00:53:36,960

it that you would like to have as your

1456

00:53:39,990 --> 00:53:38,960

legacy for your children and your

1457

00:53:41,910 --> 00:53:40,000

grandchildren for what you've

1458

00:53:43,990 --> 00:53:41,920

accomplished on earth geez i don't know

1459

00:53:45,349 --> 00:53:44,000

about legacy i like doing the triathlon

1460

00:53:47,430 --> 00:53:45,359

although the uh

1461

00:53:49,349 --> 00:53:47,440

that the training regimen is really

1462

00:53:51,829 --> 00:53:49,359

tough i have to

1463

00:53:53,990 --> 00:53:51,839

swim one length in my pool

1464

00:53:56,390 --> 00:53:54,000

run around my backyard and ride my bike

1465

00:53:59,030 --> 00:53:56,400

into the garage it's tough i want to

1466

00:54:04,309 --> 00:54:01,349

but no i uh

1467

00:54:06,069 --> 00:54:04,319

i'm a good retiree i live in florida i

1468

00:54:07,670 --> 00:54:06,079

have a lot of hobbies i

1469

00:54:10,870 --> 00:54:07,680

watercolor paint

1470

00:54:12,309 --> 00:54:10,880

i follow jeff on the stock market and

1471

00:54:27,109 --> 00:54:12,319

i

1472

00:54:29,109 --> 00:54:27,119

anyway

1473

00:54:30,549 --> 00:54:29,119

i can't answer the question i don't know

1474

00:54:32,390 --> 00:54:30,559

ask it a different partner here a

1475

00:54:33,829 --> 00:54:32,400

different way do you have any regrets

1476

00:54:35,589 --> 00:54:33,839

about the career you've had is there

1477

00:54:36,829 --> 00:54:35,599

anything you would do differently no

1478

00:54:39,589 --> 00:54:36,839

i've been very

1479

00:54:43,670 --> 00:54:39,599

lucky you know neil armstrong born in

1480

00:54:45,990 --> 00:54:43,680

1930 buzz aldrin 1930 mike collins 1930.

1481

00:54:48,549 --> 00:54:46,000

you don't call out lucky whoosh we just

1482

00:54:51,430 --> 00:54:48,559

we were there at the right time

1483

00:54:54,470 --> 00:54:51,440

and and so on i've been very lucky jeff

1484

00:54:57,109 --> 00:54:54,480

um your blue horizon what's uh what what

1485

00:55:00,309 --> 00:54:57,119

blue um origin what's the where did that

1486

00:55:02,470 --> 00:55:00,319

name come from blue origin uh is

1487

00:55:05,190 --> 00:55:02,480

earth is the blue planet and it's a

1488

00:55:07,270 --> 00:55:05,200

great place to be from

1489

00:55:09,349 --> 00:55:07,280

um is that a for-profit or a

1490

00:55:11,670 --> 00:55:09,359

not-for-profit company it's for-profit i

1491

00:55:13,990 --> 00:55:11,680

mean well it's not yet i mean it's a

1492

00:55:17,270 --> 00:55:14,000

that's a that's a that's an intention

1493

00:55:18,950 --> 00:55:17,280

for the glorious future um it's it's in

1494

00:55:21,109 --> 00:55:18,960

you know what what we would call

1495

00:55:22,870 --> 00:55:21,119

investment mode right now but

1496

00:55:24,309 --> 00:55:22,880

so but yeah i i think it can be a

1497

00:55:26,549 --> 00:55:24,319

profitable company i think it's going to

1498

00:55:27,990 --> 00:55:26,559

take a long time it wouldn't meet a

1499

00:55:29,430 --> 00:55:28,000

you know i

1500

00:55:31,270 --> 00:55:29,440

i did not go

1501

00:55:33,589 --> 00:55:31,280

i did not make a big list of all the

1502

00:55:35,270 --> 00:55:33,599

business arenas i might enter and pick

1503

00:55:36,470 --> 00:55:35,280

and force rank them and pick the one

1504

00:55:38,710 --> 00:55:36,480

that i thought would have the highest

1505

00:55:40,870 --> 00:55:38,720

return on invested capital

1506

00:55:42,870 --> 00:55:40,880

i'm doing this because i care about it

1507

00:55:44,069 --> 00:55:42,880

because i think it's important

1508

00:55:45,750 --> 00:55:44,079

but i do think it can be a

1509

00:55:47,589 --> 00:55:45,760

self-sustaining profitable business one

1510

00:55:49,589 --> 00:55:47,599

day and do you think this could be your

1511

00:55:51,430 --> 00:55:49,599

greater legacy than even amazon if if

1512

00:55:52,630 --> 00:55:51,440

you successful in all the things that uh

1513

00:55:53,910 --> 00:55:52,640

if you're talking about professional

1514

00:55:55,670 --> 00:55:53,920

endeavors when asked that what do you

1515

00:55:57,510 --> 00:55:55,680

want on your on your tombstone i always

1516

00:55:59,990 --> 00:55:57,520

like warren buffett's answer world's

1517

00:56:01,109 --> 00:56:00,000

oldest man um uh

1518

00:56:03,829 --> 00:56:01,119

but um

1519

00:56:06,150 --> 00:56:03,839

uh you know uh you know i have lots of

1520

00:56:07,589 --> 00:56:06,160

uh of of of things that are that are

1521

00:56:10,150 --> 00:56:07,599

important to me and important to my

1522

00:56:12,390 --> 00:56:10,160

heart and uh so mine are sitting here in

1523

00:56:14,470 --> 00:56:12,400

this row too but if you're talking just

1524

00:56:18,309 --> 00:56:14,480

about professional life

1525

00:56:21,349 --> 00:56:18,319

um i think that if if blue origin could

1526

00:56:23,190 --> 00:56:21,359

um enable that next generation

1527

00:56:25,510 --> 00:56:23,200

to really have

1528

00:56:27,270 --> 00:56:25,520

entrepreneurial dynamism in space

1529

00:56:28,950 --> 00:56:27,280

that would be something i would when i'm

1530

00:56:30,950 --> 00:56:28,960

80 years old i would look back on it i

1531

00:56:32,710 --> 00:56:30,960

would be so happy

1532

00:56:34,630 --> 00:56:32,720

so for both of you you're extraordinary

1533

00:56:36,150 --> 00:56:34,640

americans who had extraordinary careers

1534

00:56:37,750 --> 00:56:36,160

you've done great things for our country

1535

00:56:39,510 --> 00:56:37,760

i want to thank you on behalf of our

1536

00:56:40,710 --> 00:56:39,520

country for everything you've done and i

1537

00:56:42,390 --> 00:56:40,720

for those of you who want to learn more

1538

00:56:44,630 --> 00:56:42,400

about michael collins trip to the moon

1539

00:56:46,470 --> 00:56:44,640

and his entire career i highly recommend

1540

00:56:47,910 --> 00:56:46,480

this book carrying the fire which is i

1541

00:56:49,109 --> 00:56:47,920

think the best book ever written about

1542

00:56:52,710 --> 00:56:49,119

space

1543

00:56:58,470 --> 00:56:54,069

so thank you very much for an

1544

00:56:58,480 --> 00:57:16,549

thank you

1545

00:57:20,630 --> 00:57:18,549

well i want to thank our speakers for a

1546

00:57:22,630 --> 00:57:20,640

truly amazing evening

1547

00:57:24,470 --> 00:57:22,640

i'm a little concerned about michael's

1548

00:57:28,789 --> 00:57:24,480

criticism of this theater though since

1549

00:57:35,829 --> 00:57:32,789

okay he says i max messed it up okay

1550

00:57:38,309 --> 00:57:35,839

the uh oh again thank you boeing for

1551

00:57:40,230 --> 00:57:38,319

making this possible but mostly thanks

1552

00:57:41,910 --> 00:57:40,240

to all of you for being here tonight and

1553

00:57:44,390 --> 00:57:41,920

for coming out and supporting all of our

1554

00:57:46,630 --> 00:57:44,400

programs that we really appreciate it

1555

00:57:48,630 --> 00:57:46,640

uh without the sponsorship we would they

1556

00:57:51,109 --> 00:57:48,640

would not be possible but without your

1557

00:57:53,109 --> 00:57:51,119

support they would also not be worth

1558

00:57:55,510 --> 00:57:53,119

doing so thank you very much