



1  
00:00:04,470 --> 00:00:03,030  
all right good morning uh i'm captain

2  
00:00:07,430 --> 00:00:04,480  
bruce i'm the commanding officer of the

3  
00:00:10,070 --> 00:00:07,440  
pacific missile range facility uh we're

4  
00:00:11,830 --> 00:00:10,080  
uh the navy's premier training and test

5  
00:00:13,669 --> 00:00:11,840  
and evaluation range and we're hosting

6  
00:00:16,630 --> 00:00:13,679  
nasa for a program called the low

7  
00:00:18,390 --> 00:00:16,640  
density supersonic decelerator

8  
00:00:19,670 --> 00:00:18,400  
if you're watching this you probably

9  
00:00:21,510 --> 00:00:19,680  
already know what that is so i'm not

10  
00:00:22,950 --> 00:00:21,520  
going to waste any time explaining it

11  
00:00:26,470 --> 00:00:22,960  
because it's pretty awesome and pretty

12  
00:00:28,150 --> 00:00:26,480  
complex the reason we're here at kauai

13  
00:00:30,790 --> 00:00:28,160

and at the pacific missile range

14

00:00:32,549 --> 00:00:30,800

facility is because we have a lot of

15

00:00:34,709 --> 00:00:32,559

space and if you're not familiar with

16

00:00:37,110 --> 00:00:34,719

our range we have 2.1 million square

17

00:00:38,470 --> 00:00:37,120

miles of extended range complex

18

00:00:40,310 --> 00:00:38,480

and although the balloon's not going

19

00:00:43,430 --> 00:00:40,320

very fast it is going to use up a lot of

20

00:00:44,470 --> 00:00:43,440

real estate and especially in altitude

21

00:00:46,869 --> 00:00:44,480

so

22

00:00:49,750 --> 00:00:46,879

in order for us to launch it safely and

23

00:00:51,430 --> 00:00:49,760

then recover it safely and track it and

24

00:00:53,510 --> 00:00:51,440

seem like the logical place

25

00:00:54,790 --> 00:00:53,520

we've also supported nasa's stuff here

26

00:00:55,750 --> 00:00:54,800

in the past

27

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

and

28

00:00:59,349 --> 00:00:57,840

i know i'm personally very excited about

29

00:01:00,950 --> 00:00:59,359

watching this thing

30

00:01:03,349 --> 00:01:00,960

take off

31

00:01:05,509 --> 00:01:03,359

go active and then do all of its things

32

00:01:07,510 --> 00:01:05,519

it has to do before it goes in the water

33

00:01:09,910 --> 00:01:07,520

and i'm even more excited about the

34

00:01:12,310 --> 00:01:09,920

possibility of getting to test the

35

00:01:13,990 --> 00:01:12,320

follow-on concepts here at the pacific

36

00:01:15,830 --> 00:01:14,000

missile range facility

37

00:01:18,390 --> 00:01:15,840

we're really happy to be uh partnering

38

00:01:20,070 --> 00:01:18,400

here with nasa and jpl and all the other

39

00:01:21,590 --> 00:01:20,080

folks that are out here for

40

00:01:25,749 --> 00:01:21,600

well you've been here for months now it

41

00:01:27,510 --> 00:01:25,759

seems like so you're almost comma i know

42

00:01:30,390 --> 00:01:27,520

i don't have a lot more to say except

43

00:01:32,469 --> 00:01:30,400

i'm again super happy to uh

44

00:01:35,030 --> 00:01:32,479

be sharing our range with our friends

45

00:01:37,429 --> 00:01:35,040

from nasa and uh showcasing the

46

00:01:40,550 --> 00:01:37,439

fantastic people we have here at uh the

47

00:01:42,710 --> 00:01:40,560

pacific missile range facility thank you

48

00:01:44,870 --> 00:01:42,720

thanks for that welcome captain hay

49

00:01:46,870 --> 00:01:44,880

i'm dave steves from nasa headquarters

50

00:01:49,830 --> 00:01:46,880

office of communications

51  
00:01:51,190 --> 00:01:49,840  
and i want to welcome everybody as well

52  
00:01:52,149 --> 00:01:51,200  
our friends in the media who are here

53  
00:01:53,749 --> 00:01:52,159  
today

54  
00:01:56,069 --> 00:01:53,759  
i'd also like to introduce the rest of

55  
00:01:58,789 --> 00:01:56,079  
our panel in addition to captain haye we

56  
00:02:00,870 --> 00:01:58,799  
have dr michael gazerick

57  
00:02:03,670 --> 00:02:00,880  
mike's the associate administrator for

58  
00:02:05,350 --> 00:02:03,680  
space technology at nasa headquarters in

59  
00:02:08,389 --> 00:02:05,360  
washington

60  
00:02:10,710 --> 00:02:08,399  
uh to mike's left we have ian clark ian

61  
00:02:13,589 --> 00:02:10,720  
is the principal investigator for the

62  
00:02:15,910 --> 00:02:13,599  
low density supersonic decelerator fro

63  
00:02:18,630 --> 00:02:15,920

and ian's based at nasa's jet propulsion

64

00:02:21,990 --> 00:02:18,640

lab in pasadena california

65

00:02:24,390 --> 00:02:22,000

and next to ian is dr mark adler mark's

66

00:02:26,550 --> 00:02:24,400

the program manager for the

67

00:02:29,670 --> 00:02:26,560

low density supersonic decelerator or

68

00:02:32,070 --> 00:02:29,680

ldsd marks also with nasa's jet

69

00:02:34,229 --> 00:02:32,080

propulsion lab in pasadena

70

00:02:35,910 --> 00:02:34,239

we'll hear some opening remarks from

71

00:02:37,270 --> 00:02:35,920

mike ian and mark and then we'll take

72

00:02:39,030 --> 00:02:37,280

questions from folks here in the

73

00:02:41,270 --> 00:02:39,040

audience and then we'll also take

74

00:02:42,790 --> 00:02:41,280

questions from reporters joining us on

75

00:02:45,350 --> 00:02:42,800

the telephone

76

00:02:48,309 --> 00:02:45,360

you can also ask questions via our

77

00:02:50,390 --> 00:02:48,319

hashtag asknasa if you're following us

78

00:02:53,830 --> 00:02:50,400

on twitter we'll be entertaining

79

00:02:55,750 --> 00:02:53,840

questions from the public on hashtag ask

80

00:02:58,470 --> 00:02:55,760

nasa during the briefing

81

00:03:01,110 --> 00:02:58,480

and with that i'll turn it over to

82

00:03:02,229 --> 00:03:01,120

dr gazarick mike

83

00:03:04,229 --> 00:03:02,239

thanks dave

84

00:03:06,390 --> 00:03:04,239

and thanks captain hay uh i really

85

00:03:07,990 --> 00:03:06,400

appreciate your hospitality for allowing

86

00:03:09,589 --> 00:03:08,000

us to be here for months i don't know

87

00:03:11,990 --> 00:03:09,599

what we promised you

88

00:03:13,350 --> 00:03:12,000

we will leave though eventually um but i

89

00:03:15,589 --> 00:03:13,360

want to really uh you know thank your

90

00:03:18,229 --> 00:03:15,599

team uh for hosting us here for this

91

00:03:20,470 --> 00:03:18,239

important and exciting test

92

00:03:22,710 --> 00:03:20,480

this test kicks off really three months

93

00:03:25,190 --> 00:03:22,720

of increased focus by nasa on the

94

00:03:27,750 --> 00:03:25,200

importance of technology technology to

95

00:03:29,589 --> 00:03:27,760

to achieve our ambitious future science

96

00:03:31,990 --> 00:03:29,599

and robotic missions and eventually

97

00:03:33,750 --> 00:03:32,000

human missions to mars

98

00:03:35,430 --> 00:03:33,760

so before mark and ian kind of take you

99

00:03:36,949 --> 00:03:35,440

through the details let me just step

100

00:03:39,030 --> 00:03:36,959

back a little bit and talk to you about

101  
00:03:40,789 --> 00:03:39,040  
why it's so important to invest in

102  
00:03:42,789 --> 00:03:40,799  
technologies

103  
00:03:44,630 --> 00:03:42,799  
in order to go to an asteroid or go to

104  
00:03:46,470 --> 00:03:44,640  
the moon or go to mars

105  
00:03:49,270 --> 00:03:46,480  
we need sustained and substantial

106  
00:03:51,430 --> 00:03:49,280  
investments in space technology without

107  
00:03:53,110 --> 00:03:51,440  
these investments we really can't go

108  
00:03:55,509 --> 00:03:53,120  
beyond the international space station

109  
00:03:57,910 --> 00:03:55,519  
you know where we have crew there today

110  
00:04:01,270 --> 00:03:57,920  
technology drives exploration and in fact

111  
00:04:03,509 --> 00:04:01,280  
technology is the surest path to mars

112  
00:04:05,830 --> 00:04:03,519  
the space technology mission directorate

113  
00:04:07,910 --> 00:04:05,840

a little over a year old now and running

114

00:04:09,830 --> 00:04:07,920

is responsible for a lion's share of the

115

00:04:12,070 --> 00:04:09,840

technology development which is critical

116

00:04:14,229 --> 00:04:12,080

again for exploration above the low

117

00:04:15,990 --> 00:04:14,239

earth orbit we continue in the

118

00:04:18,229 --> 00:04:16,000

directorate to look at a variety of

119

00:04:20,310 --> 00:04:18,239

technologies and and also to engage the

120

00:04:22,469 --> 00:04:20,320

best and the brightest in the nation we

121

00:04:25,670 --> 00:04:22,479

have connections and programs that

122

00:04:27,749 --> 00:04:25,680

involve academia we have now over 450

123

00:04:29,990 --> 00:04:27,759

activities with over 120 u.s

124

00:04:32,390 --> 00:04:30,000

institutions and all working on the

125

00:04:34,390 --> 00:04:32,400

tough difficult problems we have at nasa

126

00:04:36,469 --> 00:04:34,400

for space exploration and for the

127

00:04:37,830 --> 00:04:36,479

broader aerospace community all the

128

00:04:40,550 --> 00:04:37,840

while all the while doing these

129

00:04:43,510 --> 00:04:40,560

investments we're making improvements

130

00:04:45,749 --> 00:04:43,520

and gains in the american economy in the

131

00:04:46,950 --> 00:04:45,759

innovation economy

132

00:04:48,790 --> 00:04:46,960

we're looking at high priority

133

00:04:50,790 --> 00:04:48,800

challenges as we move forward

134

00:04:52,230 --> 00:04:50,800

in expiration in fact we have seven

135

00:04:54,390 --> 00:04:52,240

launches in the space tech mission

136

00:04:55,909 --> 00:04:54,400

directorate in the next 24 months that's

137

00:04:57,830 --> 00:04:55,919

seven launches plus what we're going to

138

00:05:00,310 --> 00:04:57,840

do here tomorrow

139

00:05:03,110 --> 00:05:00,320

in the next two years

140

00:05:04,790 --> 00:05:03,120

the investments uh span a broad variety

141

00:05:07,110 --> 00:05:04,800

of areas and i'll talk about that in

142

00:05:09,110 --> 00:05:07,120

just a minute but they are important for

143

00:05:10,950 --> 00:05:09,120

us and they are important for the nation

144

00:05:13,110 --> 00:05:10,960

to explore

145

00:05:15,510 --> 00:05:13,120

just last week the agency introduced

146

00:05:17,749 --> 00:05:15,520

what we call the evolvable mars campaign

147

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

it's a series of steps to really to lead

148

00:05:22,469 --> 00:05:20,160

to pioneer to mars not just explore but

149

00:05:25,189 --> 00:05:22,479

pioneer the technology is certainly one

150

00:05:27,029 --> 00:05:25,199

of those steps and in fact as charlie

151  
00:05:28,950 --> 00:05:27,039  
bolden the nasa administrator had said

152  
00:05:31,189 --> 00:05:28,960  
and the president's science advisor dr

153  
00:05:33,749 --> 00:05:31,199  
john holdren technology development is

154  
00:05:35,189 --> 00:05:33,759  
the surest path to mars

155  
00:05:36,550 --> 00:05:35,199  
when we look at mars you know we've been

156  
00:05:38,390 --> 00:05:36,560  
there before

157  
00:05:40,550 --> 00:05:38,400  
eight successful landings on the surface

158  
00:05:42,310 --> 00:05:40,560  
of mars the united states leads this

159  
00:05:44,150 --> 00:05:42,320  
area and landing on mars it's one of the

160  
00:05:45,670 --> 00:05:44,160  
more difficult challenges and clearly

161  
00:05:48,230 --> 00:05:45,680  
the jet propulsion laboratory and these

162  
00:05:49,270 --> 00:05:48,240  
two gentlemen here to my left know a lot

163  
00:05:51,029 --> 00:05:49,280

about that

164

00:05:53,670 --> 00:05:51,039

when we look at the curiosity rover

165

00:05:55,189 --> 00:05:53,680

which landed a year ago or two years ago

166

00:05:57,350 --> 00:05:55,199

it's about a metric ton on the surface

167

00:05:59,110 --> 00:05:57,360

of mars we know that for expiration for

168

00:06:01,189 --> 00:05:59,120

future robotic exploration for future

169

00:06:02,629 --> 00:06:01,199

human exploration we need more than that

170

00:06:04,309 --> 00:06:02,639

and how do we do that and that's what

171

00:06:06,390 --> 00:06:04,319

we're about here today we have been

172

00:06:08,070 --> 00:06:06,400

living really on the on the shoulders of

173

00:06:10,070 --> 00:06:08,080

the giants who developed the entry

174

00:06:11,830 --> 00:06:10,080

descent landing technology decades ago

175

00:06:13,990 --> 00:06:11,840

in fact there's a picture of it now from

176

00:06:15,189 --> 00:06:14,000

the viking area back in the 1960s and

177

00:06:17,510 --> 00:06:15,199

70s

178

00:06:19,990 --> 00:06:17,520

and so for us it's it's the challenges

179

00:06:22,309 --> 00:06:20,000

of mars how do we get there how do we

180

00:06:23,590 --> 00:06:22,319

land there how do we live there how do

181

00:06:25,270 --> 00:06:23,600

we leave there

182

00:06:27,110 --> 00:06:25,280

and today in the event we're talking

183

00:06:29,189 --> 00:06:27,120

about focuses on that very difficult

184

00:06:30,950 --> 00:06:29,199

challenge of landing there

185

00:06:32,469 --> 00:06:30,960

we know this we need to test and we need

186

00:06:34,469 --> 00:06:32,479

to learn and we need to do it quickly

187

00:06:36,550 --> 00:06:34,479

and efficiently and that's again why

188

00:06:39,590 --> 00:06:36,560

we're here

189

00:06:41,110 --> 00:06:39,600

the specifics of the deceleration

190

00:06:43,510 --> 00:06:41,120

technologies we're going to talk about

191

00:06:45,189 --> 00:06:43,520

again we'll leave to the experts here

192

00:06:47,189 --> 00:06:45,199

but it will enable more mass to the

193

00:06:49,110 --> 00:06:47,199

surface it's about more mass going to

194

00:06:52,469 --> 00:06:49,120

more elevations on the surface of mars

195

00:06:54,309 --> 00:06:52,479

and landing more accurately

196

00:06:56,629 --> 00:06:54,319

edl is actually one of one of many

197

00:06:58,550 --> 00:06:56,639

technical challenges to get to mars and

198

00:06:59,909 --> 00:06:58,560

in the next 18 months the space tech

199

00:07:01,909 --> 00:06:59,919

mission directorate has a number of

200

00:07:03,749 --> 00:07:01,919

substantial investments in a broad

201  
00:07:05,830 --> 00:07:03,759  
number of areas let me just highlight a

202  
00:07:07,430 --> 00:07:05,840  
few in addition to the entry descent

203  
00:07:09,350 --> 00:07:07,440  
landing technology we're talking about

204  
00:07:10,710 --> 00:07:09,360  
here also the idea of getting there

205  
00:07:14,629 --> 00:07:10,720  
propulsion

206  
00:07:16,950 --> 00:07:14,639  
have a substantial investment in this

207  
00:07:19,189 --> 00:07:16,960  
area that has broad applicability for

208  
00:07:20,629 --> 00:07:19,199  
nasa the first step for us is moving

209  
00:07:22,390 --> 00:07:20,639  
beyond the low earth orbit of the

210  
00:07:24,070 --> 00:07:22,400  
international space station and going

211  
00:07:25,909 --> 00:07:24,080  
and retrieving an asteroid and bringing

212  
00:07:27,909 --> 00:07:25,919  
it to the earth moon space we call this

213  
00:07:29,670 --> 00:07:27,919

the asteroid retrieval mission in that

214

00:07:31,350 --> 00:07:29,680

mission with a robotic spacecraft we

215

00:07:32,469 --> 00:07:31,360

will use high power solar electric

216

00:07:34,309 --> 00:07:32,479

propulsion

217

00:07:36,390 --> 00:07:34,319

this technology not only can help move

218

00:07:38,390 --> 00:07:36,400

asteroids but also can serve as cargo

219

00:07:40,230 --> 00:07:38,400

vehicles to get to mars and has broad

220

00:07:42,230 --> 00:07:40,240

applicability for our nation's

221

00:07:43,830 --> 00:07:42,240

commercial spacecraft

222

00:07:45,589 --> 00:07:43,840

it has number of applications it's a

223

00:07:46,629 --> 00:07:45,599

multiple win not only for nasa but for

224

00:07:48,390 --> 00:07:46,639

the nation

225

00:07:50,469 --> 00:07:48,400

likewise we have investments in robotics

226

00:07:52,629 --> 00:07:50,479

and avionics spirit and opportunity the

227

00:07:54,550 --> 00:07:52,639

rovers on mars covered 10 kilometers in

228

00:07:55,670 --> 00:07:54,560

about 10 years we're trying to work on

229

00:07:57,510 --> 00:07:55,680

technologies that can throw 10

230

00:07:58,869 --> 00:07:57,520

kilometers in a week and how do we do

231

00:08:01,350 --> 00:07:58,879

that we know we need advances in

232

00:08:03,029 --> 00:08:01,360

avionics and robotics and sensing we're

233

00:08:04,550 --> 00:08:03,039

also looking at optical communications

234

00:08:06,469 --> 00:08:04,560

and the ability to send pictures and

235

00:08:07,909 --> 00:08:06,479

high definition data back

236

00:08:09,670 --> 00:08:07,919

materials and structures of course

237

00:08:11,670 --> 00:08:09,680

remain a key component for any type of

238

00:08:13,510 --> 00:08:11,680

exploration

239

00:08:15,990 --> 00:08:13,520

so these are the areas we invest in we

240

00:08:18,629 --> 00:08:16,000

know from uh from previous history it is

241

00:08:20,150 --> 00:08:18,639

about risk we need we need to address

242

00:08:22,710 --> 00:08:20,160

risk and certainly the testing we're

243

00:08:24,550 --> 00:08:22,720

doing here has some risk in it

244

00:08:26,390 --> 00:08:24,560

but we need to take and address the risk

245

00:08:29,029 --> 00:08:26,400

today and these kinds of tests to reduce

246

00:08:30,869 --> 00:08:29,039

the risk for missions for mars tomorrow

247

00:08:32,870 --> 00:08:30,879

and that's why we're here testing and

248

00:08:34,469 --> 00:08:32,880

learning as fast as we can

249

00:08:35,990 --> 00:08:34,479

so regardless of the outcome we know we

250

00:08:37,430 --> 00:08:36,000

will learn many important things we'll

251  
00:08:38,870 --> 00:08:37,440  
learn many important things about this

252  
00:08:40,949 --> 00:08:38,880  
technology and again this is the first

253  
00:08:42,709 --> 00:08:40,959  
step we'll be back next year

254  
00:08:45,190 --> 00:08:42,719  
i hope you knew that we'll be back next

255  
00:08:47,030 --> 00:08:45,200  
year right for future testing

256  
00:08:48,949 --> 00:08:47,040  
so with that let me turn it over to dr

257  
00:08:51,110 --> 00:08:48,959  
ian clark the incredible pi of this

258  
00:08:53,509 --> 00:08:51,120  
effort he is the edl he's the architect

259  
00:08:55,350 --> 00:08:53,519  
behind what you're about to see ian

260  
00:08:57,430 --> 00:08:55,360  
thank you mike and thank you everybody

261  
00:08:59,590 --> 00:08:57,440  
for attending uh personally this is

262  
00:09:01,990 --> 00:08:59,600  
extremely exciting time for me and i

263  
00:09:03,430 --> 00:09:02,000

really enjoy the juxtaposition of uh

264

00:09:06,150 --> 00:09:03,440

here we are in one of the greenest and

265

00:09:08,870 --> 00:09:06,160

luscious places that i've ever been

266

00:09:11,030 --> 00:09:08,880

testing technologies to eventually

267

00:09:12,949 --> 00:09:11,040

enable much broader more capable

268

00:09:14,870 --> 00:09:12,959

missions to land on the surface of mars

269

00:09:17,509 --> 00:09:14,880

a planet that

270

00:09:19,910 --> 00:09:17,519

has beauty in a number of other ways

271

00:09:22,949 --> 00:09:19,920

and so we're here because

272

00:09:24,949 --> 00:09:22,959

four decades ago the viking rovers

273

00:09:26,870 --> 00:09:24,959

landers excuse me were some of the first

274

00:09:28,230 --> 00:09:26,880

missions to land on another planet the

275

00:09:29,910 --> 00:09:28,240

united states and the world for that

276

00:09:32,310 --> 00:09:29,920

matter was learning what it means to

277

00:09:34,230 --> 00:09:32,320

land a spacecraft on another planet and

278

00:09:36,710 --> 00:09:34,240

the technologies that were developed

279

00:09:38,790 --> 00:09:36,720

over four decades ago are some of the

280

00:09:41,910 --> 00:09:38,800

same technologies that we still rely on

281

00:09:43,990 --> 00:09:41,920

today to land our spacecraft on mars and

282

00:09:45,670 --> 00:09:44,000

one of the the remnants of that

283

00:09:48,230 --> 00:09:45,680

technology development program if you go

284

00:09:50,389 --> 00:09:48,240

to the uh the next image

285

00:09:52,310 --> 00:09:50,399

here uh this was some of the testing

286

00:09:54,630 --> 00:09:52,320

that was done as a precursor to the

287

00:09:56,550 --> 00:09:54,640

viking program uh at the time they were

288

00:09:58,710 --> 00:09:56,560

trying to develop supersonic parachutes

289

00:10:00,389 --> 00:09:58,720

that would enable them to decelerate the

290

00:10:03,269 --> 00:10:00,399

vikings spacecraft to land on the surface

291

00:10:06,230 --> 00:10:03,279

of mars and we've been using that same

292

00:10:07,829 --> 00:10:06,240

parachute for several decades now and as

293

00:10:09,829 --> 00:10:07,839

we start looking towards the horizon

294

00:10:11,829 --> 00:10:09,839

want to land more capable missions on

295

00:10:13,990 --> 00:10:11,839

the surface of mars heavier to higher

296

00:10:15,430 --> 00:10:14,000

altitudes with more relevant science

297

00:10:17,430 --> 00:10:15,440

associated with them and land them more

298

00:10:19,829 --> 00:10:17,440

accurately and as we want to land

299

00:10:21,430 --> 00:10:19,839

eventually humans on the surface of mars

300

00:10:22,949 --> 00:10:21,440

we realize that we need to develop new

301  
00:10:24,630 --> 00:10:22,959  
technologies that will enable us to do

302  
00:10:27,670 --> 00:10:24,640  
that and the technologies that we're

303  
00:10:30,310 --> 00:10:27,680  
testing here uh two new technologies uh

304  
00:10:31,990 --> 00:10:30,320  
associated with the the mars program are

305  
00:10:34,069 --> 00:10:32,000  
a supersonic inflatable aerodynamic

306  
00:10:34,870 --> 00:10:34,079  
accelerator you can go to the next image

307  
00:10:39,990 --> 00:10:34,880  
uh

308  
00:10:41,750 --> 00:10:40,000  
left is a cyad supersonic inflatable

309  
00:10:44,949 --> 00:10:41,760  
aerodynamic decelerator this is an

310  
00:10:46,870 --> 00:10:44,959  
inflatable uh taurus or drag ring uh

311  
00:10:49,509 --> 00:10:46,880  
that we inflate at several times the

312  
00:10:51,350 --> 00:10:49,519  
speed of sound to provide more drag to

313  
00:10:52,870 --> 00:10:51,360

slow the vehicle down as it enters the

314

00:10:54,630 --> 00:10:52,880

martian atmosphere and then the

315

00:10:56,150 --> 00:10:54,640

technology on the right is a new

316

00:10:57,910 --> 00:10:56,160

supersonic parachute something

317

00:10:59,750 --> 00:10:57,920

significantly larger than any parachute

318

00:11:01,509 --> 00:10:59,760

that's ever been tested or flown

319

00:11:02,949 --> 00:11:01,519

supersonically in the past and will

320

00:11:05,110 --> 00:11:02,959

enable us to grow the landed mass

321

00:11:06,710 --> 00:11:05,120

capability on the surface of mars

322

00:11:07,990 --> 00:11:06,720

by at least twice

323

00:11:11,190 --> 00:11:08,000

and we think it's extensible to

324

00:11:15,350 --> 00:11:11,200

something even more beyond that

325

00:11:18,150 --> 00:11:16,870

thank you so some of the testing that

326

00:11:20,069 --> 00:11:18,160

we've had to do to develop these

327

00:11:21,670 --> 00:11:20,079

technologies there's a lot of questions

328

00:11:23,590 --> 00:11:21,680

that we have associated with these how

329

00:11:24,710 --> 00:11:23,600

do they deploy how do they inflate are

330

00:11:26,870 --> 00:11:24,720

they going to be strong enough to

331

00:11:29,110 --> 00:11:26,880

survive the the extreme environments of

332

00:11:30,550 --> 00:11:29,120

mars how are they going to behave

333

00:11:32,310 --> 00:11:30,560

aerodynamically what is the performance

334

00:11:34,069 --> 00:11:32,320

of these devices and some of the testing

335

00:11:35,910 --> 00:11:34,079

that we've already done on these is to

336

00:11:38,150 --> 00:11:35,920

answer the question is are they strong

337

00:11:39,829 --> 00:11:38,160

enough to survive and so to answer that

338

00:11:41,750 --> 00:11:39,839

we started developing

339

00:11:43,670 --> 00:11:41,760

new test capabilities we would have

340

00:11:44,949 --> 00:11:43,680

loved to have test these in wind tunnels

341

00:11:46,630 --> 00:11:44,959

but unfortunately there are no wind

342

00:11:48,630 --> 00:11:46,640

tunnels in the world that are big enough

343

00:11:49,670 --> 00:11:48,640

to test the size of devices that we we

344

00:11:53,110 --> 00:11:49,680

need to test

345

00:11:54,069 --> 00:11:53,120

so we've started developing new ways to

346

00:11:56,389 --> 00:11:54,079

do that

347

00:11:58,790 --> 00:11:56,399

something that uh nasa hasn't had to do

348

00:12:00,069 --> 00:11:58,800

for several decades but again uh this is

349

00:12:01,829 --> 00:12:00,079

an exciting time and as we start

350

00:12:04,389 --> 00:12:01,839

thinking about trying to do

351

00:12:06,629 --> 00:12:04,399

even more capable missions on mars uh

352

00:12:08,310 --> 00:12:06,639

issues that we have to wrestle with uh

353

00:12:11,110 --> 00:12:08,320

is how do you do those tests and so one

354

00:12:13,430 --> 00:12:11,120

of those was uh working with our navy

355

00:12:15,430 --> 00:12:13,440

colleagues at the china lake uh naval

356

00:12:17,750 --> 00:12:15,440

air weapon station we started coming up

357

00:12:18,949 --> 00:12:17,760

with an idea of using a rocket sled uh

358

00:12:21,509 --> 00:12:18,959

it's a

359

00:12:22,870 --> 00:12:21,519

20 foot tall siege tower if you will uh

360

00:12:25,110 --> 00:12:22,880

that we accelerate to several hundred

361

00:12:26,389 --> 00:12:25,120

miles an hour in a fraction a few

362

00:12:28,949 --> 00:12:26,399

seconds

363

00:12:31,110 --> 00:12:28,959

and uh what we do is we inflate actually

364

00:12:32,230 --> 00:12:31,120

if you could go back to the previous uh

365

00:12:34,150 --> 00:12:32,240

video please

366

00:12:35,269 --> 00:12:34,160

uh

367

00:12:36,790 --> 00:12:35,279

thank you

368

00:12:38,870 --> 00:12:36,800

we accelerate this sled at several

369

00:12:41,590 --> 00:12:38,880

hundred miles an hour in a few seconds

370

00:12:43,670 --> 00:12:41,600

and we use that to replicate the

371

00:12:45,350 --> 00:12:43,680

aerodynamic loading that some of our

372

00:12:46,790 --> 00:12:45,360

technologies will see in particular the

373

00:12:48,629 --> 00:12:46,800

supersonic inflatable aerodynamic

374

00:12:51,110 --> 00:12:48,639

decelerator so the images that you're

375

00:12:52,389 --> 00:12:51,120

seeing are this first one is a shakeout

376

00:12:54,310 --> 00:12:52,399

test of that and now you're going to see

377

00:12:56,310 --> 00:12:54,320

it inflate this is actually a slow

378

00:12:58,389 --> 00:12:56,320

motion video the inflation of the side

379

00:12:59,990 --> 00:12:58,399

occurred over about 0.2 seconds a

380

00:13:01,509 --> 00:13:00,000

fraction of a second

381

00:13:03,509 --> 00:13:01,519

and all the testing that we've done to

382

00:13:05,269 --> 00:13:03,519

date shows that these devices work

383

00:13:07,190 --> 00:13:05,279

extremely well

384

00:13:09,110 --> 00:13:07,200

very exciting for sure

385

00:13:09,990 --> 00:13:09,120

but what we have to do is test them to

386

00:13:11,910 --> 00:13:10,000

make sure they're going to be strong

387

00:13:13,430 --> 00:13:11,920

enough and

388

00:13:14,870 --> 00:13:13,440

associated with the side we have the new

389

00:13:15,670 --> 00:13:14,880

parachute you can go to the next video

390

00:13:17,430 --> 00:13:15,680

on that

391

00:13:18,949 --> 00:13:17,440

we had to develop new ways of doing the

392

00:13:20,150 --> 00:13:18,959

parachute testing to make sure that it

393

00:13:21,509 --> 00:13:20,160

was going to be structurally strong

394

00:13:24,389 --> 00:13:21,519

enough and so the video that you're

395

00:13:26,069 --> 00:13:24,399

seeing is similarly using a rocket sled

396

00:13:27,829 --> 00:13:26,079

and there's a little bit of an ingenious

397

00:13:29,829 --> 00:13:27,839

idea here again working with our

398

00:13:31,829 --> 00:13:29,839

colleagues at the the naval air weapons

399

00:13:34,310 --> 00:13:31,839

station at china lake where we used a

400

00:13:36,389 --> 00:13:34,320

helicopter to to take the parachute up

401  
00:13:38,870 --> 00:13:36,399  
to several thousand feet altitude where

402  
00:13:40,470 --> 00:13:38,880  
it was released uh dropped and inflated

403  
00:13:42,389 --> 00:13:40,480  
and you see it inflating now and there

404  
00:13:44,230 --> 00:13:42,399  
is a long rope that goes several

405  
00:13:46,470 --> 00:13:44,240  
thousand feet down to the ground

406  
00:13:48,069 --> 00:13:46,480  
wraps around the pulley you see the the

407  
00:13:50,150 --> 00:13:48,079  
rope passing around that pulley and then

408  
00:13:52,629 --> 00:13:50,160  
we light a rocket sled that would

409  
00:13:54,069 --> 00:13:52,639  
accelerate horizontally down a track

410  
00:13:56,150 --> 00:13:54,079  
and pull the parachute towards the

411  
00:13:58,230 --> 00:13:56,160  
ground and we could generate over a

412  
00:13:59,430 --> 00:13:58,240  
hundred thousand pounds of force to make

413  
00:14:01,269 --> 00:13:59,440

sure that the parachute was going to be

414

00:14:03,430 --> 00:14:01,279

structurally strong enough to survive

415

00:14:04,949 --> 00:14:03,440

the environments that it would see if we

416

00:14:07,430 --> 00:14:04,959

were to use it at mars and that's just

417

00:14:09,590 --> 00:14:07,440

some of the testing that we would uh do

418

00:14:11,269 --> 00:14:09,600

in in preparation for a mars mission and

419

00:14:12,230 --> 00:14:11,279

then mark is going to talk a little bit

420

00:14:15,110 --> 00:14:12,240

about some of the testing that we're

421

00:14:16,230 --> 00:14:15,120

doing here uh in addition to that

422

00:14:17,829 --> 00:14:16,240

all right good morning i'm going to talk

423

00:14:20,310 --> 00:14:17,839

about what we're actually doing here out

424

00:14:22,790 --> 00:14:20,320

in kauai tomorrow is our first launch

425

00:14:23,990 --> 00:14:22,800

opportunity for getting this balloon and

426

00:14:26,150 --> 00:14:24,000

test vehicle launched i'll talk to you

427

00:14:27,590 --> 00:14:26,160

about exactly how that all works we have

428

00:14:29,269 --> 00:14:27,600

opportunities over the next two weeks

429

00:14:31,269 --> 00:14:29,279

depending on the winds and the weather

430

00:14:33,269 --> 00:14:31,279

this is our first experimental test

431

00:14:35,430 --> 00:14:33,279

flight of this vehicle that is designed

432

00:14:36,629 --> 00:14:35,440

to carry the side and the parachute that

433

00:14:37,910 --> 00:14:36,639

ian talked about to the proper

434

00:14:40,230 --> 00:14:37,920

conditions very high in earth's

435

00:14:42,150 --> 00:14:40,240

atmosphere and very fast so it looks

436

00:14:43,990 --> 00:14:42,160

like to the to these articles to these

437

00:14:45,269 --> 00:14:44,000

technologies that they're flying at mars

438

00:14:47,350 --> 00:14:45,279

that they have the same conditions they

439

00:14:48,629 --> 00:14:47,360

have there so we test them at full scale

440

00:14:49,670 --> 00:14:48,639

in those conditions to make sure that

441

00:14:51,110 --> 00:14:49,680

they're going to work on mars we want to

442

00:14:52,710 --> 00:14:51,120

test them here where it's cheaper before

443

00:14:54,230 --> 00:14:52,720

we send it to mars to make sure that

444

00:14:56,470 --> 00:14:54,240

it's going to work there

445

00:14:58,870 --> 00:14:56,480

now this um this shakeout flight is if

446

00:15:00,629 --> 00:14:58,880

you can get the first first graphic here

447

00:15:03,110 --> 00:15:00,639

has two stages to it we first launched

448

00:15:05,670 --> 00:15:03,120

in a very large 34 million cubic foot

449

00:15:07,750 --> 00:15:05,680

helium balloon that balloon carries our

450

00:15:09,670 --> 00:15:07,760

7 000 pound test vehicle which is this

451

00:15:12,550 --> 00:15:09,680

this vehicle right here

452

00:15:14,790 --> 00:15:12,560

up to 120 000 feet

453

00:15:16,150 --> 00:15:14,800

from 120 000 feet we then drop the test

454

00:15:17,990 --> 00:15:16,160

vehicle just for a few tenths of a

455

00:15:19,509 --> 00:15:18,000

second and then it fires up a series of

456

00:15:20,949 --> 00:15:19,519

spin motors which get the vehicle spun

457

00:15:23,590 --> 00:15:20,959

up to lock in its attitude and then we

458

00:15:25,910 --> 00:15:23,600

fire a large star 48 motor to accelerate

459

00:15:27,990 --> 00:15:25,920

it from 120 000 feet altitude up to the

460

00:15:30,310 --> 00:15:28,000

top of the stratosphere at 180 000 feet

461

00:15:32,230 --> 00:15:30,320

and going about four times the speed of

462

00:15:33,670 --> 00:15:32,240

sound at about mach 4.

463

00:15:36,150 --> 00:15:33,680

at that point in the middle there during

464

00:15:37,749 --> 00:15:36,160

the test period we deploy the syad the

465

00:15:39,110 --> 00:15:37,759

six meter side that around the vehicle

466

00:15:41,110 --> 00:15:39,120

the inner two the dean talked about and

467

00:15:42,710 --> 00:15:41,120

see how that behaves in the environment

468

00:15:45,430 --> 00:15:42,720

and then once it slows down from mach

469

00:15:46,790 --> 00:15:45,440

3.8 where we deploy the syad down to two

470

00:15:49,189 --> 00:15:46,800

and a half times the speed of sound at

471

00:15:50,790 --> 00:15:49,199

mach 2.5 we deploy the large parachute

472

00:15:52,870 --> 00:15:50,800

and see that large parachute and how it

473

00:15:54,710 --> 00:15:52,880

behaves that large parachute also serves

474

00:15:56,389 --> 00:15:54,720

as the chute that descends the vehicle

475

00:15:57,829 --> 00:15:56,399

down to the surface of the ocean where

476

00:15:59,509 --> 00:15:57,839

it splashes down and we recover the

477

00:16:01,910 --> 00:15:59,519

vehicle from the ocean

478

00:16:03,829 --> 00:16:01,920

all right so if we can uh take a look at

479

00:16:05,189 --> 00:16:03,839

the at this vehicle right here this is

480

00:16:07,590 --> 00:16:05,199

our test vehicle

481

00:16:09,670 --> 00:16:07,600

it is actually 15 feet in diameter it

482

00:16:10,949 --> 00:16:09,680

flies in this direction with this heat

483

00:16:13,509 --> 00:16:10,959

shield forward

484

00:16:15,590 --> 00:16:13,519

it has a large star 48 rocket motor as i

485

00:16:17,110 --> 00:16:15,600

said to propel it in the vehicle around

486

00:16:19,509 --> 00:16:17,120

the side here in this gold area is where

487

00:16:21,509 --> 00:16:19,519

the cyad is stowed it is kept very

488

00:16:23,189 --> 00:16:21,519

tightly against the vehicle during its

489

00:16:25,030 --> 00:16:23,199

entry into mars and its flight here on

490

00:16:26,870 --> 00:16:25,040

earth and then when it deploys a cover

491

00:16:28,389 --> 00:16:26,880

comes off and it deploys out and this

492

00:16:30,310 --> 00:16:28,399

inner tube which increases the size of

493

00:16:31,269 --> 00:16:30,320

the vehicle to six meters from 4.7

494

00:16:32,949 --> 00:16:31,279

meters

495

00:16:34,230 --> 00:16:32,959

in here we also have this parachute can

496

00:16:36,069 --> 00:16:34,240

this is where the parachute shoots out

497

00:16:37,509 --> 00:16:36,079

of after the site has done its job and

498

00:16:39,350 --> 00:16:37,519

the vehicle has a tremendous amount of

499

00:16:40,629 --> 00:16:39,360

instrumentation to observe the flight to

500

00:16:42,550 --> 00:16:40,639

measure the characteristics we have a

501  
00:16:44,710 --> 00:16:42,560  
camera mast here to look at the side

502  
00:16:46,310 --> 00:16:44,720  
deploy to watch the parachute deploy we

503  
00:16:47,509 --> 00:16:46,320  
have many sensors to reconstruct the

504  
00:16:49,030 --> 00:16:47,519  
trajectory and to measure the

505  
00:16:51,829 --> 00:16:49,040  
characteristics of the inflation of the

506  
00:16:53,749 --> 00:16:51,839  
devices

507  
00:16:57,670 --> 00:16:53,759  
this vehicle has been named here in

508  
00:16:59,749 --> 00:16:57,680  
hawaii as keiki okahunua which is a boy

509  
00:17:01,350 --> 00:16:59,759  
from earth and so that's the vehicle

510  
00:17:03,590 --> 00:17:01,360  
we're going to be launching sometime in

511  
00:17:08,710 --> 00:17:03,600  
the next two weeks

512  
00:17:11,990 --> 00:17:10,549  
so here we see the balloon launching

513  
00:17:13,750 --> 00:17:12,000

this was a test flight that we had out

514

00:17:15,270 --> 00:17:13,760

of fort summer new mexico of our launch

515

00:17:16,549 --> 00:17:15,280

tower we have a special launch tower

516

00:17:19,669 --> 00:17:16,559

that we developed for this which also

517

00:17:22,390 --> 00:17:19,679

was named it's uh onika honua which is

518

00:17:23,990 --> 00:17:22,400

the mover of the earth and this is a

519

00:17:25,189 --> 00:17:24,000

large balloon most of the helium is kept

520

00:17:26,870 --> 00:17:25,199

up in the top of the boom when it's

521

00:17:28,950 --> 00:17:26,880

fully inflated at altitude the balloon

522

00:17:30,789 --> 00:17:28,960

would fill a large football stadium like

523

00:17:32,310 --> 00:17:30,799

the rose bowl it's an extremely large

524

00:17:34,710 --> 00:17:32,320

balloon and that's what carries the

525

00:17:36,549 --> 00:17:34,720

vehicle up to 120 thousand feet here you

526

00:17:38,950 --> 00:17:36,559

can see it departing and flying over the

527

00:17:40,710 --> 00:17:38,960

surface of new mexico it will deploy out

528

00:17:41,990 --> 00:17:40,720

from here from kauai and goes straight

529

00:17:43,830 --> 00:17:42,000

out over the ocean out into the middle

530

00:17:46,630 --> 00:17:43,840

of the ocean in the protected range that

531

00:17:48,390 --> 00:17:46,640

pmrf has provided us out there

532

00:17:50,310 --> 00:17:48,400

and next slide

533

00:17:51,590 --> 00:17:50,320

so once we get up to 120 000 feet we do

534

00:17:53,590 --> 00:17:51,600

what we call the drop there you see the

535

00:17:55,830 --> 00:17:53,600

vehicle dropping from the balloon firing

536

00:17:58,070 --> 00:17:55,840

its star 48 motor and it's pointed

537

00:18:00,230 --> 00:17:58,080

roughly up it goes up and then it turns

538

00:18:01,350 --> 00:18:00,240

over as the as the motor fires and it

539

00:18:03,270 --> 00:18:01,360

goes up higher and thinner in the

540

00:18:04,710 --> 00:18:03,280

atmosphere is now going roughly sideways

541

00:18:06,789 --> 00:18:04,720

it spins down

542

00:18:07,830 --> 00:18:06,799

and now in the video you'll see the syad

543

00:18:09,830 --> 00:18:07,840

deploy

544

00:18:11,190 --> 00:18:09,840

uh very rapidly around the vehicle and

545

00:18:12,470 --> 00:18:11,200

that provides the additional drag that

546

00:18:14,070 --> 00:18:12,480

we're going to need at mars to slow

547

00:18:15,909 --> 00:18:14,080

these vehicles down at high speeds so we

548

00:18:19,029 --> 00:18:15,919

can land larger payloads we go to the

549

00:18:21,750 --> 00:18:20,470

the next thing that happens at mach two

550

00:18:23,430 --> 00:18:21,760

and a half is we put out what's called a

551  
00:18:25,029 --> 00:18:23,440  
balut this is actually a 4.4 meter

552  
00:18:26,870 --> 00:18:25,039  
device that's used to pull the parachute

553  
00:18:28,630 --> 00:18:26,880  
out here we see the parachute being

554  
00:18:30,230 --> 00:18:28,640  
pulled out of its can out of the vehicle

555  
00:18:32,230 --> 00:18:30,240  
the bridles on the vehicle stand up

556  
00:18:33,830 --> 00:18:32,240  
which is what holds that parachute and

557  
00:18:34,870 --> 00:18:33,840  
then the parachute deploys and slows it

558  
00:18:35,990 --> 00:18:34,880  
down so that's what a view from the

559  
00:18:37,990 --> 00:18:36,000  
camera will look like that we're going

560  
00:18:39,909 --> 00:18:38,000  
to see of the parachute deploying into

561  
00:18:44,390 --> 00:18:39,919  
the high thin earth's atmosphere

562  
00:18:49,029 --> 00:18:46,950  
and so that's our flight we this is an

563  
00:18:50,549 --> 00:18:49,039

experimental flight we're testing now to

564

00:18:52,310 --> 00:18:50,559

see if we're able to do this we're able

565

00:18:53,669 --> 00:18:52,320

to get this vehicle up to mach 4 and the

566

00:18:55,510 --> 00:18:53,679

proper conditions to deploy these

567

00:18:56,789 --> 00:18:55,520

devices we're in the process of building

568

00:18:58,230 --> 00:18:56,799

two more vehicles that we're going to

569

00:18:59,990 --> 00:18:58,240

want to fly next year those will be our

570

00:19:01,270 --> 00:19:00,000

flights of record to actually measure

571

00:19:02,870 --> 00:19:01,280

the performance of the sides and the

572

00:19:05,029 --> 00:19:02,880

parachute and those two flights in the

573

00:19:07,190 --> 00:19:05,039

summer of 2015.

574

00:19:09,430 --> 00:19:07,200

and also i'd like to also again thank uh

575

00:19:10,870 --> 00:19:09,440

captain haye for hosting us here at pmrf

576

00:19:13,510 --> 00:19:10,880

this is a unique facility for our

577

00:19:14,950 --> 00:19:13,520

mission providing fantastic support for

578

00:19:16,870 --> 00:19:14,960

for being able to conduct this this

579

00:19:18,870 --> 00:19:16,880

flight

580

00:19:21,110 --> 00:19:18,880

so thank you i think we then dave open

581

00:19:23,029 --> 00:19:21,120

it up to questions okay thanks mark

582

00:19:26,390 --> 00:19:23,039

we will open it up for questions first

583

00:19:27,909 --> 00:19:26,400

here at pmrf and then over uh to

584

00:19:30,150 --> 00:19:27,919

reporters on the phone if you're on the

585

00:19:32,789 --> 00:19:30,160

phone and would like to ask a question

586

00:19:36,549 --> 00:19:32,799

please hit star one and you'll be added

587

00:19:38,470 --> 00:19:36,559

to the q a q for uh this briefing

588

00:19:39,990 --> 00:19:38,480

for folks here in the audience if you

589

00:19:41,510 --> 00:19:40,000

have a question

590

00:19:42,710 --> 00:19:41,520

please wait for the mic to get to you

591

00:19:51,669 --> 00:19:42,720

and if you want to raise your hands

592

00:19:56,310 --> 00:19:54,870

howdy andrew pereira with kitv um

593

00:19:57,750 --> 00:19:56,320

you're kind of opening yourselves up to

594

00:19:59,510 --> 00:19:57,760

all kinds of conspiracy theories with

595

00:20:02,470 --> 00:19:59,520

the saucer shape could you tell us a

596

00:20:04,470 --> 00:20:02,480

little bit about the saucer shape design

597

00:20:05,830 --> 00:20:04,480

well this is this was the the shape of

598

00:20:07,909 --> 00:20:05,840

actually our entry vehicles that we send

599

00:20:09,190 --> 00:20:07,919

to mars and so when we land something on

600

00:20:10,630 --> 00:20:09,200

mars it looks very much like this in

601  
00:20:12,390 --> 00:20:10,640  
fact it's the same size we had to make

602  
00:20:14,149 --> 00:20:12,400  
it to the same scale and i suppose it

603  
00:20:15,990 --> 00:20:14,159  
does have a little resemblance to a to a

604  
00:20:18,149 --> 00:20:16,000  
flying saucer though it doesn't fly like

605  
00:20:20,950 --> 00:20:18,159  
you see in the movies it flies this way

606  
00:20:23,590 --> 00:20:20,960  
um now when that uh that picture you saw

607  
00:20:26,470 --> 00:20:23,600  
of the flight that was in 42 years ago

608  
00:20:28,470 --> 00:20:26,480  
um in the summer of 1972 to practice for

609  
00:20:30,470 --> 00:20:28,480  
viking um that flight was actually out

610  
00:20:31,430 --> 00:20:30,480  
of roswell new mexico so you know you

611  
00:20:34,149 --> 00:20:31,440  
decide

612  
00:20:35,590 --> 00:20:34,159  
but to be clear right that aerodynamics

613  
00:20:37,909 --> 00:20:35,600

aerothorough dynamics determine the

614

00:20:40,710 --> 00:20:37,919

shape more and more than anything yeah

615

00:20:43,110 --> 00:20:40,720

it's physics

616

00:20:47,669 --> 00:20:43,120

okay do we have another question from

617

00:20:53,510 --> 00:20:50,230

if not we'll go ahead and take a

618

00:20:56,630 --> 00:20:53,520

question from our reporter on the phone

619

00:20:59,830 --> 00:20:56,640

uh the first one is from alan boyle of

620

00:21:02,070 --> 00:20:59,840

nbc news alan alan

621

00:21:04,870 --> 00:21:02,080

hi thank you for taking the question uh

622

00:21:06,789 --> 00:21:04,880

i wanted to ask what could go wrong and

623

00:21:08,630 --> 00:21:06,799

if it goes wrong what is it going to

624

00:21:09,430 --> 00:21:08,640

look like will you be able to recover

625

00:21:10,390 --> 00:21:09,440

the

626  
00:21:11,669 --> 00:21:10,400  
vehicle

627  
00:21:15,510 --> 00:21:11,679  
uh

628  
00:21:18,710 --> 00:21:15,520  
go through the worst case scenario

629  
00:21:19,830 --> 00:21:18,720  
okay so i i think i think

630  
00:21:21,590 --> 00:21:19,840  
could you repeat the question dave i

631  
00:21:25,110 --> 00:21:21,600  
think i heard it i think i heard it

632  
00:21:27,430 --> 00:21:26,630  
a little feedback there

633  
00:21:31,270 --> 00:21:27,440  
uh

634  
00:21:32,950 --> 00:21:31,280  
what would you do when would you be able

635  
00:21:34,950 --> 00:21:32,960  
to recover the vehicle

636  
00:21:37,190 --> 00:21:34,960  
okay so our objectives for this first

637  
00:21:38,310 --> 00:21:37,200  
flight are to launch it from here get

638  
00:21:40,149 --> 00:21:38,320

the balloon

639

00:21:41,430 --> 00:21:40,159

off and out over the water to get it up

640

00:21:42,950 --> 00:21:41,440

to altitude where we can drop the

641

00:21:45,029 --> 00:21:42,960

vehicle and to drop the vehicle and

642

00:21:46,549 --> 00:21:45,039

conduct this powered flight and get the

643

00:21:47,909 --> 00:21:46,559

data back from it to see how it works as

644

00:21:49,270 --> 00:21:47,919

i said this is an experimental test

645

00:21:51,270 --> 00:21:49,280

flight and so we want to get that data

646

00:21:52,470 --> 00:21:51,280

back and see how the vehicle flies make

647

00:21:54,230 --> 00:21:52,480

sure that it can get to the conditions

648

00:21:55,590 --> 00:21:54,240

that we want it to get to we also want

649

00:21:57,190 --> 00:21:55,600

to be able to recover the balloon

650

00:21:58,870 --> 00:21:57,200

envelope after that balloon has done its

651  
00:22:00,789 --> 00:21:58,880  
job the helium is let out of the balloon

652  
00:22:02,390 --> 00:22:00,799  
and it descends into the water

653  
00:22:03,750 --> 00:22:02,400  
naturally we always want to clean up our

654  
00:22:05,350 --> 00:22:03,760  
messes and so we go out there with a

655  
00:22:06,470 --> 00:22:05,360  
recovery boat and get that plastic out

656  
00:22:08,390 --> 00:22:06,480  
of the water and bring it back for

657  
00:22:10,149 --> 00:22:08,400  
disposal so those are the objectives now

658  
00:22:12,070 --> 00:22:10,159  
what can go wrong with that we could

659  
00:22:13,590 --> 00:22:12,080  
have a problem with the balloon on a

660  
00:22:14,710 --> 00:22:13,600  
scent the balloon the balloon could fail

661  
00:22:16,710 --> 00:22:14,720  
on ascent we could have a problem with

662  
00:22:17,909 --> 00:22:16,720  
getting the vehicle to operate um there

663  
00:22:19,430 --> 00:22:17,919

are several several different things

664

00:22:20,789 --> 00:22:19,440

that could happen there are what we want

665

00:22:22,230 --> 00:22:20,799

to really get though is the data we want

666

00:22:23,750 --> 00:22:22,240

to get that balloon to altitude drop it

667

00:22:25,430 --> 00:22:23,760

and fire that motor and if we fire that

668

00:22:27,110 --> 00:22:25,440

motor and we get data back from it that

669

00:22:28,710 --> 00:22:27,120

is a great day and that would that way

670

00:22:30,070 --> 00:22:28,720

we can learn exactly what happened and

671

00:22:32,870 --> 00:22:30,080

understand what to do for our next

672

00:22:37,590 --> 00:22:35,510

okay uh again if you have questions on

673

00:22:39,430 --> 00:22:37,600

the phone please hit star one and we'll

674

00:22:41,909 --> 00:22:39,440

add you to the queue

675

00:22:45,750 --> 00:22:41,919

uh we'll now take a question from tracy

676

00:22:48,549 --> 00:22:45,760

watson of usa today tracy

677

00:22:51,029 --> 00:22:48,559

yes thanks can you tell me from how far

678

00:22:52,789 --> 00:22:51,039

will this balloon be visible it's a

679

00:22:54,789 --> 00:22:52,799

pretty big thing

680

00:22:56,789 --> 00:22:54,799

and can you also talk a little bit about

681

00:22:59,270 --> 00:22:56,799

why the current technologies for getting

682

00:23:03,590 --> 00:22:59,280

things to mars are inadequate why not

683

00:23:08,870 --> 00:23:06,230

could you repeat the question or

684

00:23:09,990 --> 00:23:08,880

uh

685

00:23:19,750 --> 00:23:10,000

the

686

00:23:21,669 --> 00:23:19,760

inadequate for what you're trying to do

687

00:23:24,549 --> 00:23:21,679

you undo the first one and and how long

688

00:23:27,669 --> 00:23:24,559

will it be visible for from here at pmrf

689

00:23:30,789 --> 00:23:27,679

or to anyone in hawaii looking up

690

00:23:32,149 --> 00:23:30,799

how visible is the balloon the balloon

691

00:23:34,390 --> 00:23:32,159

and will you be able to see the test

692

00:23:37,110 --> 00:23:34,400

flight the uh the balloon itself will

693

00:23:38,470 --> 00:23:37,120

ascend the test vehicle to about 120 000

694

00:23:41,590 --> 00:23:38,480

feet altitude

695

00:23:43,990 --> 00:23:41,600

at that altitude the balloon expands

696

00:23:47,350 --> 00:23:44,000

and it's over 300 feet in diameter it's

697

00:23:48,630 --> 00:23:47,360

quite large in terms of visibility

698

00:23:49,430 --> 00:23:48,640

that's a good question i'm not really

699

00:23:51,830 --> 00:23:49,440

sure

700

00:23:53,990 --> 00:23:51,840

uh it's going to be you know sailing or

701  
00:23:55,590 --> 00:23:54,000  
floating west uh out over the pacific

702  
00:23:57,110 --> 00:23:55,600  
ocean i'm not sure from how far you'll

703  
00:23:58,950 --> 00:23:57,120  
be able to see it yeah it'll be it'll be

704  
00:24:00,630 --> 00:23:58,960  
out there about i'll actually a little

705  
00:24:02,230 --> 00:24:00,640  
bit be out there probably 50 or more

706  
00:24:03,830 --> 00:24:02,240  
nautical miles if we have i'm looking

707  
00:24:05,029 --> 00:24:03,840  
out there right now you can't see it but

708  
00:24:06,310 --> 00:24:05,039  
there are clouds out there if there are

709  
00:24:07,830 --> 00:24:06,320  
clouds out there like i see now you

710  
00:24:09,029 --> 00:24:07,840  
wouldn't be able to see it at all from

711  
00:24:10,710 --> 00:24:09,039  
distance we'll be able to see it launch

712  
00:24:12,950 --> 00:24:10,720  
from the base here and start to ascend

713  
00:24:14,230 --> 00:24:12,960

and leave and go out and turn into a dot

714

00:24:15,430 --> 00:24:14,240

and from there it's likely won't be able

715

00:24:17,269 --> 00:24:15,440

to see it directly but we do have

716

00:24:18,549 --> 00:24:17,279

cameras on the vehicle and so we're

717

00:24:19,830 --> 00:24:18,559

hoping to get telemetry back from the

718

00:24:21,510 --> 00:24:19,840

vehicle in real time and see the

719

00:24:22,789 --> 00:24:21,520

operation of the vehicle in flight

720

00:24:24,549 --> 00:24:22,799

through the radio even though the

721

00:24:26,630 --> 00:24:24,559

balloon is very even though the the

722

00:24:28,230 --> 00:24:26,640

balloon is very large uh it's at an

723

00:24:29,909 --> 00:24:28,240

altitude about four times higher than a

724

00:24:31,430 --> 00:24:29,919

typical airplane would fly

725

00:24:32,470 --> 00:24:31,440

so i'm not really sure how visible it

726  
00:24:34,630 --> 00:24:32,480  
would be

727  
00:24:36,070 --> 00:24:34,640  
the second question related to you know

728  
00:24:38,070 --> 00:24:36,080  
the technologies that we currently have

729  
00:24:39,830 --> 00:24:38,080  
for landing on mars

730  
00:24:41,269 --> 00:24:39,840  
landing on mars is an extremely

731  
00:24:43,669 --> 00:24:41,279  
challenging

732  
00:24:45,350 --> 00:24:43,679  
thing to do the atmosphere is extremely

733  
00:24:47,029 --> 00:24:45,360  
thin it's about one percent the density

734  
00:24:48,789 --> 00:24:47,039  
of the earth atmosphere

735  
00:24:50,789 --> 00:24:48,799  
that means that you need very large

736  
00:24:52,549 --> 00:24:50,799  
devices to react against the atmosphere

737  
00:24:54,149 --> 00:24:52,559  
to create the drag that we use to slow

738  
00:24:56,070 --> 00:24:54,159

the vehicles down

739

00:24:58,310 --> 00:24:56,080

as they enter the atmosphere

740

00:25:00,070 --> 00:24:58,320

the current technologies are the the

741

00:25:01,750 --> 00:25:00,080

ones that we've used to land things like

742

00:25:04,710 --> 00:25:01,760

the curiosity rover the mars science

743

00:25:06,470 --> 00:25:04,720

laboratory and the the limitations are

744

00:25:07,830 --> 00:25:06,480

largely associated with the the

745

00:25:09,190 --> 00:25:07,840

conditions that we can deploy those

746

00:25:10,710 --> 00:25:09,200

technologies like the supersonic

747

00:25:12,470 --> 00:25:10,720

parachute and the size of those

748

00:25:13,909 --> 00:25:12,480

technologies if you want to land things

749

00:25:16,149 --> 00:25:13,919

that are even heavier than the mars

750

00:25:17,750 --> 00:25:16,159

science laboratory if you want to land

751  
00:25:19,590 --> 00:25:17,760  
several tons

752  
00:25:20,870 --> 00:25:19,600  
and as you again cast your eyes to the

753  
00:25:23,269 --> 00:25:20,880  
horizon and you think about landing

754  
00:25:24,310 --> 00:25:23,279  
humans on the surface of mars emissions

755  
00:25:27,430 --> 00:25:24,320  
that will be

756  
00:25:28,950 --> 00:25:27,440  
10 to 15 tons 20 tons or more

757  
00:25:31,909 --> 00:25:28,960  
you're going to need extremely large

758  
00:25:34,149 --> 00:25:31,919  
drag devices to slow those vehicles down

759  
00:25:35,830 --> 00:25:34,159  
as they enter the martian atmosphere

760  
00:25:38,390 --> 00:25:35,840  
we don't have those currently and that's

761  
00:25:40,149 --> 00:25:38,400  
what ldsd is developing are the the

762  
00:25:41,909 --> 00:25:40,159  
technologies and the drag devices that

763  
00:25:44,070 --> 00:25:41,919

will allow us to slow those vehicles

764

00:25:45,909 --> 00:25:44,080

down safely to enable them to land on

765

00:25:47,990 --> 00:25:45,919

the surface of mars

766

00:25:49,669 --> 00:25:48,000

also i'll add one more thing there's a

767

00:25:52,070 --> 00:25:49,679

question about the sky crane

768

00:25:54,149 --> 00:25:52,080

the this technology is for what we call

769

00:25:55,909 --> 00:25:54,159

the descent phase of landing on mars we

770

00:25:57,909 --> 00:25:55,919

have entry we have descent and we have

771

00:25:59,990 --> 00:25:57,919

landing and so in fact this these

772

00:26:01,990 --> 00:26:00,000

technologies the side and the parachute

773

00:26:03,909 --> 00:26:02,000

would be decelerator stages two stages

774

00:26:05,350 --> 00:26:03,919

that would come before the last stage

775

00:26:07,110 --> 00:26:05,360

which is where we use rockets to slow

776

00:26:09,110 --> 00:26:07,120

the thing down to the ground and so very

777

00:26:11,909 --> 00:26:09,120

likely this technology would be followed

778

00:26:13,430 --> 00:26:11,919

by the sky crane that we used on msl but

779

00:26:14,950 --> 00:26:13,440

if we want to put down more mass the sky

780

00:26:16,950 --> 00:26:14,960

crane by itself can't do that we need

781

00:26:18,470 --> 00:26:16,960

these decelerators stages before the sky

782

00:26:19,830 --> 00:26:18,480

crane to slow it down enough so the sky

783

00:26:22,390 --> 00:26:19,840

crank can take over and then do its job

784

00:26:24,230 --> 00:26:22,400

at the very end

785

00:26:26,230 --> 00:26:24,240

okay thank you again if you have

786

00:26:28,789 --> 00:26:26,240

questions on the phone please hit star

787

00:26:30,630 --> 00:26:28,799

one and uh we'll take one more from the

788

00:26:38,149 --> 00:26:30,640

phone then we'll come back here

789

00:26:41,350 --> 00:26:39,510

oh

790

00:26:43,350 --> 00:26:41,360

yeah thanks guys for actually doing this

791

00:26:45,269 --> 00:26:43,360

i just had a quick question um there

792

00:26:45,990 --> 00:26:45,279

they're gonna be cameras on board right

793

00:26:50,630 --> 00:26:46,000

so

794

00:26:51,669 --> 00:26:50,640

that you're live and are we going to be

795

00:26:53,669 --> 00:26:51,679

able

796

00:26:55,909 --> 00:26:53,679

to see this happening could you give us

797

00:26:57,830 --> 00:26:55,919

give us a sense of

798

00:27:00,470 --> 00:26:57,840

what like what those of us watching here

799

00:27:01,909 --> 00:27:00,480

at at home will be able to see and also

800

00:27:04,310 --> 00:27:01,919

when is this going to happen when does

801  
00:27:07,430 --> 00:27:04,320  
the window kind of open up for or launch

802  
00:27:12,230 --> 00:27:09,430  
okay so we have several cameras on board

803  
00:27:13,590 --> 00:27:12,240  
the we have uh gopro cameras four gopro

804  
00:27:15,430 --> 00:27:13,600  
cameras which are used to give us

805  
00:27:18,310 --> 00:27:15,440  
real-time imagery for situational

806  
00:27:19,909 --> 00:27:18,320  
awareness those send data back in real

807  
00:27:21,750 --> 00:27:19,919  
time on the radio and so we'll hopefully

808  
00:27:23,190 --> 00:27:21,760  
be able to see those during the flight

809  
00:27:24,870 --> 00:27:23,200  
and see the flight conduct and the

810  
00:27:26,389 --> 00:27:24,880  
parachute deploy side deploy those sorts

811  
00:27:27,909 --> 00:27:26,399  
of things we also have several other

812  
00:27:29,430 --> 00:27:27,919  
cameras on board that are higher

813  
00:27:30,950 --> 00:27:29,440

resolution higher speed that will give

814

00:27:32,870 --> 00:27:30,960

us much more detailed data on the

815

00:27:34,470 --> 00:27:32,880

operation of the devices their data is

816

00:27:36,310 --> 00:27:34,480

recorded on board and so we will need to

817

00:27:37,669 --> 00:27:36,320

recover the flight image recorder which

818

00:27:40,230 --> 00:27:37,679

is part of the test vehicle in order to

819

00:27:42,470 --> 00:27:40,240

get that data back

820

00:27:43,750 --> 00:27:42,480

in terms of when we can go there there

821

00:27:47,190 --> 00:27:43,760

as i said there are opportunities over

822

00:27:49,430 --> 00:27:47,200

the next two weeks so on june 3rd 5th

823

00:27:51,590 --> 00:27:49,440

seventh ninth eleventh and fourteenth

824

00:27:52,950 --> 00:27:51,600

are six possible launch days and the

825

00:27:54,470 --> 00:27:52,960

next two weeks we are dependent on

826

00:27:56,230 --> 00:27:54,480

whether we need to have the proper winds

827

00:27:57,990 --> 00:27:56,240

to take the vehicle away from kauai and

828

00:27:59,350 --> 00:27:58,000

out over the ocean and so we're watching

829

00:28:01,190 --> 00:27:59,360

the weather every day very carefully and

830

00:28:02,789 --> 00:28:01,200

we'll pick a day that's the best day to

831

00:28:05,590 --> 00:28:02,799

try and launch this and get it out and

832

00:28:07,350 --> 00:28:05,600

conduct the mission

833

00:28:08,549 --> 00:28:07,360

in the webcast

834

00:28:09,669 --> 00:28:08,559

actually i know maybe dave you can

835

00:28:12,549 --> 00:28:09,679

answer on the way and i was going to say

836

00:28:15,190 --> 00:28:12,559

we will be webcasting live the tests uh

837

00:28:16,789 --> 00:28:15,200

whatever day and time it takes place

838

00:28:18,710 --> 00:28:16,799

we'll be streaming it live over the

839

00:28:21,909 --> 00:28:18,720

internet and carrying it as well on nasa

840

00:28:25,190 --> 00:28:24,149

we have a question from social media i

841

00:28:26,230 --> 00:28:25,200

think

842

00:28:29,669 --> 00:28:26,240

one

843

00:28:36,149 --> 00:28:29,679

please

844

00:28:39,269 --> 00:28:38,149

hi one of our followers has asked will

845

00:28:41,510 --> 00:28:39,279

you use a

846

00:28:44,630 --> 00:28:41,520

modified balloon for the actual mars

847

00:28:48,230 --> 00:28:47,430

use a modified balloon

848

00:28:50,389 --> 00:28:48,240

uh

849

00:28:52,870 --> 00:28:50,399

no the the balloon that we're using here

850

00:28:54,950 --> 00:28:52,880

is to to put our test vehicle at an

851

00:28:56,389 --> 00:28:54,960

altitude uh that will enable it to drop

852

00:28:57,990 --> 00:28:56,399

from the balloon and accelerate to

853

00:29:00,070 --> 00:28:58,000

several times the speed of sound what

854

00:29:01,590 --> 00:29:00,080

we're trying to do is replicate the

855

00:29:02,789 --> 00:29:01,600

environment in which these technologies

856

00:29:05,029 --> 00:29:02,799

would be used

857

00:29:07,510 --> 00:29:05,039

that means replicating the atmosphere in

858

00:29:10,070 --> 00:29:07,520

particular the density of the atmosphere

859

00:29:12,149 --> 00:29:10,080

which is again mars it's extremely thin

860

00:29:13,669 --> 00:29:12,159

and so to find that thinness of an

861

00:29:15,990 --> 00:29:13,679

atmosphere we have to go halfway to the

862

00:29:18,870 --> 00:29:16,000

edge of space or 50 kilometers

863

00:29:20,549 --> 00:29:18,880

about 180 000 feet here on earth

864

00:29:22,549 --> 00:29:20,559

to test these devices and we have to go

865

00:29:25,590 --> 00:29:22,559

several times the speed of sound

866

00:29:27,350 --> 00:29:25,600

we will not be using the balloon to land

867

00:29:30,950 --> 00:29:27,360

missions on mars

868

00:29:32,310 --> 00:29:30,960

the balloon is is more of a

869

00:29:36,230 --> 00:29:32,320

testism if you will it's something that

870

00:29:40,789 --> 00:29:38,710

okay thank you we'll take a question

871

00:29:42,630 --> 00:29:40,799

here in the back hi good morning

872

00:29:45,029 --> 00:29:42,640

gentlemen ramsey wharton i'm with hawaii

873

00:29:46,630 --> 00:29:45,039

news now uh my understanding if you're

874

00:29:48,870 --> 00:29:46,640

looking at the largest payload as you

875

00:29:49,830 --> 00:29:48,880

mentioned about 20 to 40 tons that's the

876

00:29:52,710 --> 00:29:49,840

big one

877

00:29:54,070 --> 00:29:52,720

but right now this inflatable device

878

00:29:56,070 --> 00:29:54,080

which i understand is more for the

879

00:29:58,549 --> 00:29:56,080

robotic missions what is the highest

880

00:30:01,510 --> 00:29:58,559

load that you're looking at to be able

881

00:30:03,269 --> 00:30:01,520

to bring down safely with the size of

882

00:30:05,669 --> 00:30:03,279

the technologies that we're testing here

883

00:30:07,110 --> 00:30:05,679

uh we think we could uh double the mass

884

00:30:08,230 --> 00:30:07,120

that we land on mars so we could go

885

00:30:10,149 --> 00:30:08,240

something from like the one ton

886

00:30:11,990 --> 00:30:10,159

curiosity rover to something twice that

887

00:30:13,669 --> 00:30:12,000

we could also land it more accurately

888

00:30:15,190 --> 00:30:13,679

and to higher elevations than we've been

889

00:30:17,350 --> 00:30:15,200

able to reach on mars

890

00:30:19,430 --> 00:30:17,360

but the technologies we also think are

891

00:30:22,149 --> 00:30:19,440

very extensible to those mass ranges

892

00:30:23,830 --> 00:30:22,159

that you discuss the 20 to 30 tons that

893

00:30:25,269 --> 00:30:23,840

is for example the parachute you know

894

00:30:27,029 --> 00:30:25,279

the way that we use parachutes here on

895

00:30:29,510 --> 00:30:27,039

earth when we return say the apollo

896

00:30:31,669 --> 00:30:29,520

command module the orion

897

00:30:33,269 --> 00:30:31,679

crew capsule is we use them in clusters

898

00:30:35,190 --> 00:30:33,279

we use several parachutes to drain even

899

00:30:37,669 --> 00:30:35,200

more drag even though we're only testing

900

00:30:38,950 --> 00:30:37,679

one parachute uh in the next few weeks

901  
00:30:41,110 --> 00:30:38,960  
uh we think that the parachute we're

902  
00:30:43,269 --> 00:30:41,120  
developing and testing is amenable to

903  
00:30:44,950 --> 00:30:43,279  
being used in clusters uh several

904  
00:30:47,269 --> 00:30:44,960  
parachutes at once to produce even more

905  
00:30:48,950 --> 00:30:47,279  
drag uh and those kinds of things are

906  
00:30:51,669 --> 00:30:48,960  
the the technologies that would enable

907  
00:30:55,430 --> 00:30:51,679  
the the 20 to 30 tons that we're talking

908  
00:30:59,350 --> 00:30:57,509  
before so that's why we want to be good

909  
00:31:00,630 --> 00:30:59,360  
guests with our hosts because we think

910  
00:31:02,470 --> 00:31:00,640  
we'll be back

911  
00:31:04,230 --> 00:31:02,480  
yeah and also just a quick uh if you

912  
00:31:05,750 --> 00:31:04,240  
have the mic here oh yeah a quick add-on

913  
00:31:06,789 --> 00:31:05,760

to that uh we

914

00:31:09,509 --> 00:31:06,799

um

915

00:31:10,950 --> 00:31:09,519

are we need to get to 20 to 40 tons with

916

00:31:12,710 --> 00:31:10,960

people on mars we can't do that in one

917

00:31:14,950 --> 00:31:12,720

step uh we have to take a kind of a step

918

00:31:16,389 --> 00:31:14,960

at a time and so we did one ton and

919

00:31:17,990 --> 00:31:16,399

we're going forward with the technology

920

00:31:19,190 --> 00:31:18,000

development to go up to twice that and

921

00:31:20,950 --> 00:31:19,200

we'll take a few more steps over the

922

00:31:22,230 --> 00:31:20,960

next decades to lead up to the ability

923

00:31:24,230 --> 00:31:22,240

to land people on mars and that's that's

924

00:31:25,669 --> 00:31:24,240

the great thing about having the space

925

00:31:27,110 --> 00:31:25,679

technology mission directorate is it can

926  
00:31:28,470 --> 00:31:27,120  
fund these things well in advance of the

927  
00:31:29,509 --> 00:31:28,480  
mission so we can reduce the risk of

928  
00:31:30,789 --> 00:31:29,519  
actually trying to do those missions

929  
00:31:32,230 --> 00:31:30,799  
when we have to go do them get

930  
00:31:33,430 --> 00:31:32,240  
confidence in the technologies know how

931  
00:31:34,870 --> 00:31:33,440  
we're going to do it what it's going to

932  
00:31:38,789 --> 00:31:34,880  
take to do it and then we can step in

933  
00:31:43,430 --> 00:31:41,590  
can you hear me there we go summertime

934  
00:31:46,389 --> 00:31:43,440  
if all goes well now you're looking at

935  
00:31:48,710 --> 00:31:46,399  
expanding that inflatable to the 26

936  
00:31:49,830 --> 00:31:48,720  
foot size diameter is that right this is

937  
00:31:51,990 --> 00:31:49,840  
the one

938  
00:31:53,909 --> 00:31:52,000

for the larger load the uh the first one

939

00:31:55,909 --> 00:31:53,919

we're testing is six meters in diameter

940

00:31:57,750 --> 00:31:55,919

uh it expands off the periphery of the

941

00:31:59,269 --> 00:31:57,760

vehicle that one's about 20 feet in

942

00:32:02,389 --> 00:31:59,279

diameter

943

00:32:03,830 --> 00:32:02,399

the we hope to come back next year uh in

944

00:32:06,710 --> 00:32:03,840

test one that's eight meters which is

945

00:32:08,470 --> 00:32:06,720

even larger uh and that would uh again

946

00:32:10,389 --> 00:32:08,480

enable even more mass to be landed on

947

00:32:13,110 --> 00:32:10,399

the surface of mars uh you can grow

948

00:32:14,710 --> 00:32:13,120

those even further uh we're not really

949

00:32:15,830 --> 00:32:14,720

sure what the limits are you know it's

950

00:32:18,630 --> 00:32:15,840

one of the reasons why we're doing some

951  
00:32:20,710 --> 00:32:18,640  
of this testing uh but the parachute uh

952  
00:32:23,029 --> 00:32:20,720  
you know the 30.5 meter or a hundred

953  
00:32:24,070 --> 00:32:23,039  
foot diameter parachute uh is also

954  
00:32:27,830 --> 00:32:24,080  
something that would be used in those

955  
00:32:32,470 --> 00:32:29,669  
okay and again if you have questions on

956  
00:32:34,710 --> 00:32:32,480  
the phone please hit star one we do have

957  
00:32:42,950 --> 00:32:34,720  
another question on the phone from sarah

958  
00:32:48,950 --> 00:32:46,149  
hi thanks um the eight meter model um

959  
00:32:50,870 --> 00:32:48,960  
will that be a different design or just

960  
00:32:54,310 --> 00:32:50,880  
a scaled up version of the six meter

961  
00:32:57,590 --> 00:32:55,830  
the eight meter side that we'd be

962  
00:33:00,149 --> 00:32:57,600  
testing is a very different design

963  
00:33:02,389 --> 00:33:00,159

actually um when we started thinking

964

00:33:04,389 --> 00:33:02,399

about what it meant to deploy inflatable

965

00:33:06,230 --> 00:33:04,399

decelerators uh

966

00:33:09,029 --> 00:33:06,240

the first steps that we started taking

967

00:33:10,710 --> 00:33:09,039

were were how do we

968

00:33:12,549 --> 00:33:10,720

how do we develop this technology and

969

00:33:14,230 --> 00:33:12,559

how do we develop in a way that we're

970

00:33:16,470 --> 00:33:14,240

familiar with how do we test it how do

971

00:33:18,389 --> 00:33:16,480

we know how it performs and one of the

972

00:33:20,149 --> 00:33:18,399

the key elements of that is is making

973

00:33:21,269 --> 00:33:20,159

device that acts as if it were a rigid

974

00:33:23,029 --> 00:33:21,279

device

975

00:33:24,789 --> 00:33:23,039

we fly rigid structures to mars

976

00:33:26,789 --> 00:33:24,799

routinely and we know how they perform

977

00:33:28,230 --> 00:33:26,799

we can scale them to very small sizes

978

00:33:30,070 --> 00:33:28,240

you know things that are that are even

979

00:33:31,350 --> 00:33:30,080

smaller than this and put them in a wind

980

00:33:32,710 --> 00:33:31,360

tunnel for example and test the

981

00:33:34,470 --> 00:33:32,720

aerodynamics and feel comfortable that

982

00:33:36,789 --> 00:33:34,480

the aerodynamics that we're seeing are

983

00:33:37,509 --> 00:33:36,799

going to be extensible or extractable uh

984

00:33:41,110 --> 00:33:37,519

to

985

00:33:42,789 --> 00:33:41,120

several times the size that we're

986

00:33:44,630 --> 00:33:42,799

testing uh

987

00:33:46,549 --> 00:33:44,640

we wanted to do a similar approach with

988

00:33:49,430 --> 00:33:46,559

the inflatable decelerators so the six

989

00:33:50,870 --> 00:33:49,440

meter is really designed to be uh

990

00:33:53,110 --> 00:33:50,880

something that acts as if it were a

991

00:33:55,269 --> 00:33:53,120

rigid structure

992

00:33:57,190 --> 00:33:55,279

the eight meter device is something very

993

00:33:58,950 --> 00:33:57,200

different uh as you start developing

994

00:34:00,710 --> 00:33:58,960

these inflatable decelerators you're

995

00:34:02,789 --> 00:34:00,720

gonna have to wrestle with what it means

996

00:34:04,710 --> 00:34:02,799

to have these very flexible structures

997

00:34:06,470 --> 00:34:04,720

uh that are attached you know directly

998

00:34:08,389 --> 00:34:06,480

to the the front of the vehicle

999

00:34:10,629 --> 00:34:08,399

uh and the eight meter starts moving us

1000

00:34:13,270 --> 00:34:10,639

in the direction instead of it being a

1001

00:34:15,190 --> 00:34:13,280

high higher pressure device uh it's

1002

00:34:17,750 --> 00:34:15,200

something that is much lower pressure

1003

00:34:20,470 --> 00:34:17,760

it's actually uh ram air inflated using

1004

00:34:22,950 --> 00:34:20,480

the oncoming supersonic flow to inflate

1005

00:34:24,869 --> 00:34:22,960

the device but it also has much more

1006

00:34:27,109 --> 00:34:24,879

flexibility associated with it the

1007

00:34:29,109 --> 00:34:27,119

aerodynamics of the device determine the

1008

00:34:31,510 --> 00:34:29,119

shape that it takes and vice versa and

1009

00:34:33,030 --> 00:34:31,520

the shape determines the aerodynamics

1010

00:34:35,109 --> 00:34:33,040

and so in that regard the eight meter

1011

00:34:37,109 --> 00:34:35,119

device is really our first foray into

1012

00:34:38,950 --> 00:34:37,119

understanding what it means to have very

1013

00:34:41,030 --> 00:34:38,960

large devices that are flexible that

1014

00:34:42,869 --> 00:34:41,040

will interact with the oncoming flow and

1015

00:34:44,470 --> 00:34:42,879

whose shape may not be determined a

1016

00:34:46,710 --> 00:34:44,480

priori

1017

00:34:48,550 --> 00:34:46,720

and it's that excitement that you know

1018

00:34:50,069 --> 00:34:48,560

means what is it how do we develop these

1019

00:34:51,829 --> 00:34:50,079

technologies and what are the behaviors

1020

00:34:52,950 --> 00:34:51,839

of them as we move to larger and larger

1021

00:34:56,869 --> 00:34:52,960

devices these are the questions that

1022

00:35:02,630 --> 00:34:59,430

okay thank you uh we'll take another

1023

00:35:08,710 --> 00:35:02,640

caller from on the phone uh tracy watson

1024

00:35:13,670 --> 00:35:11,670

can you talk about what the inflatable

1025

00:35:16,870 --> 00:35:13,680

portion is made out of

1026

00:35:19,030 --> 00:35:16,880

and how big it gets when it displays

1027

00:35:20,550 --> 00:35:19,040

compared to how big it is when it stowed

1028

00:35:23,990 --> 00:35:20,560

thank you

1029

00:35:25,990 --> 00:35:24,000

the uh the test vehicle is 4.7 meters in

1030

00:35:28,150 --> 00:35:26,000

diameter about 15 feet and it's

1031

00:35:29,990 --> 00:35:28,160

essentially a full scale

1032

00:35:32,230 --> 00:35:30,000

replica of what a mars entry vehicle

1033

00:35:33,670 --> 00:35:32,240

would look like when we inflate the the

1034

00:35:35,670 --> 00:35:33,680

side the first side that we're testing

1035

00:35:38,230 --> 00:35:35,680

is a six meter device uh so we go from

1036

00:35:40,630 --> 00:35:38,240

about a 4.7 meter to a six meter device

1037

00:35:42,550 --> 00:35:40,640

uh and that again would would enable us

1038

00:35:43,829 --> 00:35:42,560

to in conjunction with a parachute to

1039

00:35:45,910 --> 00:35:43,839

almost double the mass that we can land

1040

00:35:47,750 --> 00:35:45,920

on the surface of mars the materials

1041

00:35:50,069 --> 00:35:47,760

that the side are made out of

1042

00:35:52,150 --> 00:35:50,079

we actually use kevlar very similar to

1043

00:35:54,630 --> 00:35:52,160

the kevlar that's used to

1044

00:35:56,950 --> 00:35:54,640

build bulletproof vests

1045

00:35:58,310 --> 00:35:56,960

but we also apply some coatings to it to

1046

00:35:59,990 --> 00:35:58,320

allow it to withstand some of the

1047

00:36:01,990 --> 00:36:00,000

temperatures that you would see as this

1048

00:36:04,069 --> 00:36:02,000

thing is is inflated and deployed at

1049

00:36:05,990 --> 00:36:04,079

several times the speed of sound

1050

00:36:07,990 --> 00:36:06,000

so we're talking temperatures upwards of

1051  
00:36:10,390 --> 00:36:08,000  
600 degrees fahrenheit

1052  
00:36:12,390 --> 00:36:10,400  
to survive those not only do you have

1053  
00:36:13,829 --> 00:36:12,400  
the kevlar you also have some some

1054  
00:36:15,750 --> 00:36:13,839  
coating associated with it that will

1055  
00:36:17,030 --> 00:36:15,760  
allow it to absorb some of the heat and

1056  
00:36:21,670 --> 00:36:17,040  
the energy

1057  
00:36:25,589 --> 00:36:23,270  
okay again if you have any questions on

1058  
00:36:27,829 --> 00:36:25,599  
the phone please hit star one we'll come

1059  
00:36:34,870 --> 00:36:27,839  
back here and see if there are any more

1060  
00:36:39,270 --> 00:36:36,950  
having no takers here

1061  
00:36:41,430 --> 00:36:39,280  
oh wait we do have one sir andrew

1062  
00:36:43,430 --> 00:36:41,440  
pereira again with kitv4 news is there

1063  
00:36:46,230 --> 00:36:43,440

any uh earthbound uses for the

1064

00:36:48,310 --> 00:36:46,240

technology that you're testing today

1065

00:36:49,829 --> 00:36:48,320

uh absolutely uh aerodynamic

1066

00:36:50,870 --> 00:36:49,839

decelerators are devices that can be

1067

00:36:52,630 --> 00:36:50,880

used anywhere where there's an

1068

00:36:54,310 --> 00:36:52,640

atmosphere that can be earth that can be

1069

00:36:55,670 --> 00:36:54,320

mars it could be titan that can be you

1070

00:36:57,030 --> 00:36:55,680

know a number of bodies in the solar

1071

00:36:59,270 --> 00:36:57,040

system

1072

00:37:01,670 --> 00:36:59,280

the the earth atmosphere is is nice and

1073

00:37:03,270 --> 00:37:01,680

that it's very thick and so needing to

1074

00:37:04,710 --> 00:37:03,280

deploy these devices at supersonic

1075

00:37:07,109 --> 00:37:04,720

conditions

1076  
00:37:08,470 --> 00:37:07,119  
is not a problem that we routinely face

1077  
00:37:10,069 --> 00:37:08,480  
but certainly there's there's

1078  
00:37:18,150 --> 00:37:10,079  
applications where these devices would

1079  
00:37:26,230 --> 00:37:20,390  
okay any other questions from here in

1080  
00:37:29,190 --> 00:37:27,670  
all right

1081  
00:37:31,270 --> 00:37:29,200  
with no further questions we'll go ahead

1082  
00:37:33,349 --> 00:37:31,280  
and wrap up today's briefing thank you

1083  
00:37:35,030 --> 00:37:33,359  
all for joining us on nasa television

1084  
00:37:38,870 --> 00:37:35,040  
and here in person at the pacific

1085  
00:37:40,870 --> 00:37:38,880  
missile range facility on kauai hawaii

1086  
00:37:43,109 --> 00:37:40,880  
stay tuned we'll be updating the

1087  
00:37:46,230 --> 00:37:43,119  
potential for a launch tomorrow through

1088  
00:37:49,589 --> 00:37:46,240

our social media websites our mission

1089

00:37:51,910 --> 00:37:49,599

website as well as media advisories

1090

00:37:54,390 --> 00:37:51,920

you can follow along with us and find

1091

00:37:56,470 --> 00:37:54,400

out the latest on the launch date and

1092

00:37:59,349 --> 00:37:56,480

time by following

1093

00:38:01,829 --> 00:37:59,359

at nasa underscore technology

1094

00:38:04,390 --> 00:38:01,839

or at nasa

1095

00:38:06,790 --> 00:38:04,400

we'll also be posting updates to the

1096

00:38:09,589 --> 00:38:06,800

ldst mission page on the web which is