



#asknasa



1  
00:00:10,230 --> 00:00:08,230  
well good evening and good morning for

2  
00:00:12,390 --> 00:00:10,240  
the folks on the east coast my name is

3  
00:00:14,230 --> 00:00:12,400  
dwayne brown with nasa's office of

4  
00:00:15,509 --> 00:00:14,240  
communications

5  
00:00:17,269 --> 00:00:15,519  
you are

6  
00:00:18,470 --> 00:00:17,279  
here where

7  
00:00:21,109 --> 00:00:18,480  
nasa's

8  
00:00:22,950 --> 00:00:21,119  
mars maven spacecraft has successfully

9  
00:00:24,470 --> 00:00:22,960  
been placed in orbit

10  
00:00:26,790 --> 00:00:24,480  
we're here at the lockheed martin

11  
00:00:28,070 --> 00:00:26,800  
facility in littleton colorado where you

12  
00:00:31,189 --> 00:00:28,080  
will hear

13  
00:00:34,069 --> 00:00:31,199

how it was done and the next steps

14

00:00:35,430 --> 00:00:34,079

this is truly a happy ending to a new

15

00:00:37,910 --> 00:00:35,440

beginning

16

00:00:39,670 --> 00:00:37,920

we have brief remarks from

17

00:00:41,830 --> 00:00:39,680

our participants and then we'll open up

18

00:00:43,590 --> 00:00:41,840

for questions and these folks have a lot

19

00:00:45,670 --> 00:00:43,600

to do so we're going to try to keep this

20

00:00:47,750 --> 00:00:45,680

short to about 30 minutes so we'll ask

21

00:00:49,590 --> 00:00:47,760

you to limit your questions to one

22

00:00:52,389 --> 00:00:49,600

you can bring your questions or ask your

23

00:00:54,150 --> 00:00:52,399

questions on hashtag ask nasa and we'll

24

00:00:56,630 --> 00:00:54,160

start with questions here

25

00:00:59,029 --> 00:00:56,640

and then we'll wrap it up

26  
00:01:00,549 --> 00:00:59,039  
so before we hear the remarks let me

27  
00:01:03,270 --> 00:01:00,559  
introduce you to the

28  
00:01:05,030 --> 00:01:03,280  
the folks here first up

29  
00:01:06,149 --> 00:01:05,040  
john grunsfeld

30  
00:01:08,070 --> 00:01:06,159  
astronaut

31  
00:01:10,710 --> 00:01:08,080  
associate administrator

32  
00:01:18,630 --> 00:01:10,720  
the nasa science mission directorate

33  
00:01:18,640 --> 00:01:21,429  
david mitchell

34  
00:01:21,439 --> 00:01:25,270  
maven project manager

35  
00:01:27,590 --> 00:01:25,590  
got nasa's

36  
00:01:36,870 --> 00:01:27,600  
space flight center

37  
00:01:42,230 --> 00:01:40,149  
guy buttercheese

38  
00:01:44,789 --> 00:01:42,240

lockheed martin maven program manager

39

00:01:52,389 --> 00:01:44,799

lockheed martin space systems company

40

00:01:56,389 --> 00:01:54,310

and a very very happy gentleman at the

41

00:01:57,270 --> 00:01:56,399

end

42

00:01:59,190 --> 00:01:57,280

bruce

43

00:02:01,030 --> 00:01:59,200

jokowski the maven principal

44

00:02:03,270 --> 00:02:01,040

investigator from the laboratory for

45

00:02:05,190 --> 00:02:03,280

atmospheric and space physics

46

00:02:08,070 --> 00:02:05,200

university of colorado and boulder and

47

00:02:09,910 --> 00:02:08,080

with that john your thoughts well i'm

48

00:02:11,830 --> 00:02:09,920

just really excited to be able to talk

49

00:02:14,309 --> 00:02:11,840

to you this evening

50

00:02:16,470 --> 00:02:14,319

with a very happy group of people

51  
00:02:18,470 --> 00:02:16,480  
having put the maven spacecraft into

52  
00:02:20,309 --> 00:02:18,480  
mars orbit

53  
00:02:21,830 --> 00:02:20,319  
stepping back just a little bit though

54  
00:02:24,150 --> 00:02:21,840  
and thinking about you know what an

55  
00:02:27,190 --> 00:02:24,160  
amazing accomplishment this is

56  
00:02:29,910 --> 00:02:27,200  
we often talk about how mars is hard

57  
00:02:31,270 --> 00:02:29,920  
and once again you know this team made

58  
00:02:32,949 --> 00:02:31,280  
it look easy

59  
00:02:36,470 --> 00:02:32,959  
but it certainly wasn't it represents

60  
00:02:38,150 --> 00:02:36,480  
years of work you know very complex work

61  
00:02:39,750 --> 00:02:38,160  
and it's just incredible to me that

62  
00:02:42,150 --> 00:02:39,760  
we're able to accomplish these things

63  
00:02:43,589 --> 00:02:42,160

and that maven has joined a fleet of

64

00:02:46,710 --> 00:02:43,599

spacecraft including the mars

65

00:02:48,309 --> 00:02:46,720

reconnaissance orbiter odyssey curiosity

66

00:02:51,350 --> 00:02:48,319

and opportunity

67

00:02:53,670 --> 00:02:51,360

at mars and reflects this incredible

68

00:02:57,030 --> 00:02:53,680

quest to unravel the mysteries of the

69

00:02:58,790 --> 00:02:57,040

universe and to try and understand mars

70

00:03:01,509 --> 00:02:58,800

this really is a quest of humanity it's

71

00:03:02,470 --> 00:03:01,519

an international quest and it was a team

72

00:03:04,869 --> 00:03:02,480

effort

73

00:03:07,270 --> 00:03:04,879

to get maven into mars orbit it

74

00:03:08,309 --> 00:03:07,280

represents the start of the maven

75

00:03:12,630 --> 00:03:08,319

mission

76

00:03:14,070 --> 00:03:12,640

this effort was made and bruce will talk

77

00:03:15,509 --> 00:03:14,080

more about that

78

00:03:17,509 --> 00:03:15,519

i just want to thank all the team

79

00:03:18,550 --> 00:03:17,519

members and in particular the family

80

00:03:21,270 --> 00:03:18,560

members

81

00:03:22,869 --> 00:03:21,280

that had to suffer while all these folks

82

00:03:24,070 --> 00:03:22,879

were working you know weekends and

83

00:03:25,589 --> 00:03:24,080

nights

84

00:03:27,670 --> 00:03:25,599

and i also want to thank the family

85

00:03:29,110 --> 00:03:27,680

members for all the weekends and nights

86

00:03:30,630 --> 00:03:29,120

that the science team is going to be

87

00:03:32,229 --> 00:03:30,640

working

88

00:03:34,229 --> 00:03:32,239

while the maven mission is doing its

89

00:03:35,830 --> 00:03:34,239

incredible incredible work

90

00:03:37,430 --> 00:03:35,840

so with that

91

00:03:40,229 --> 00:03:37,440

david hand it over

92

00:03:42,390 --> 00:03:40,239

wow what a night um you know you get one

93

00:03:43,990 --> 00:03:42,400

shot with mars orbit insertion and maven

94

00:03:45,910 --> 00:03:44,000

nailed it tonight so

95

00:03:47,509 --> 00:03:45,920

um we've got a really happy crew in the

96

00:03:49,270 --> 00:03:47,519

building here and and

97

00:03:51,670 --> 00:03:49,280

across the country and literally around

98

00:03:53,830 --> 00:03:51,680

the world so i'm just really excited for

99

00:03:56,390 --> 00:03:53,840

the crew and their families as as john

100

00:03:58,470 --> 00:03:56,400

just mentioned so um thanks to everybody

101  
00:04:00,869 --> 00:03:58,480  
for for the hard work to get this point

102  
00:04:03,350 --> 00:04:00,879  
many years and and so we look forward to

103  
00:04:05,589 --> 00:04:03,360  
the years ahead and and uh so i'm simply

104  
00:04:07,509 --> 00:04:05,599  
going to talk a couple minutes about uh

105  
00:04:09,830 --> 00:04:07,519  
where we are in the orbit and then guy

106  
00:04:11,670 --> 00:04:09,840  
will talk about spacecraft health but um

107  
00:04:13,990 --> 00:04:11,680  
really things look really great with the

108  
00:04:16,069 --> 00:04:14,000  
the orbit at this point

109  
00:04:17,909 --> 00:04:16,079  
navigation navigation solutions were

110  
00:04:20,229 --> 00:04:17,919  
very stable before mri and showed a

111  
00:04:24,150 --> 00:04:20,239  
nominal approach direction with arrival

112  
00:04:26,790 --> 00:04:24,160  
at altitude at a good safe distance

113  
00:04:28,390 --> 00:04:26,800

moi was successfully executed the

114

00:04:30,070 --> 00:04:28,400

duration of the burn

115

00:04:32,230 --> 00:04:30,080

and these are all preliminary numbers

116

00:04:33,270 --> 00:04:32,240

but as it stands right now the duration

117

00:04:36,870 --> 00:04:33,280

is uh

118

00:04:39,270 --> 00:04:36,880

34 minutes 26 second burn

119

00:04:41,990 --> 00:04:39,280

that was about 11 seconds longer than

120

00:04:43,990 --> 00:04:42,000

the nominal which really means we nailed

121

00:04:46,469 --> 00:04:44,000

it i mean maven nailed it it was right

122

00:04:49,110 --> 00:04:46,479

on the money so really happy about that

123

00:04:50,870 --> 00:04:49,120

all the observed navigation data is

124

00:04:54,310 --> 00:04:50,880

within nominal range

125

00:04:56,469 --> 00:04:54,320

um post moi orbit assessment and it's

126

00:04:57,990 --> 00:04:56,479

active right now it's going on as we

127

00:05:00,550 --> 00:04:58,000

speak and we'll be meeting later about

128

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

that tonight but tracking data indicates

129

00:05:05,350 --> 00:05:02,479

we're in a stable capture orbit the

130

00:05:07,990 --> 00:05:05,360

orbit period is near the target of 35

131

00:05:10,870 --> 00:05:08,000

hours so this is the the first initial

132

00:05:13,029 --> 00:05:10,880

orbit and then our first

133

00:05:15,029 --> 00:05:13,039

pass back into periops our lowest

134

00:05:17,510 --> 00:05:15,039

portion of the orbit that'll come the

135

00:05:20,070 --> 00:05:17,520

next time around past mars is is

136

00:05:22,070 --> 00:05:20,080

calculated to be near 380 kilometers

137

00:05:23,590 --> 00:05:22,080

above the surface and that really is

138

00:05:25,670 --> 00:05:23,600

right on the money on that one that was

139

00:05:27,590 --> 00:05:25,680

what we had planned for

140

00:05:29,510 --> 00:05:27,600

so and they um in the next couple of

141

00:05:32,469 --> 00:05:29,520

days we'll do our second burn we have a

142

00:05:34,310 --> 00:05:32,479

total of five burns coming up to to walk

143

00:05:36,070 --> 00:05:34,320

it down from the 35 hour orbit to the

144

00:05:37,590 --> 00:05:36,080

four and a half hour orbit that we'll

145

00:05:39,670 --> 00:05:37,600

have our science in

146

00:05:41,590 --> 00:05:39,680

so we'll do what's called our peri-ops

147

00:05:44,070 --> 00:05:41,600

lowering maneuver number one

148

00:05:46,950 --> 00:05:44,080

in two days and look forward to that and

149

00:05:48,710 --> 00:05:46,960

uh but again so far so good really happy

150

00:05:49,830 --> 00:05:48,720

team out here and i'll turn it over to

151  
00:05:51,749 --> 00:05:49,840

guy

152  
00:05:53,590 --> 00:05:51,759

all right i'm gonna just uh kind of walk

153  
00:05:54,950 --> 00:05:53,600

you back through what we did on the

154  
00:05:57,029 --> 00:05:54,960

spacecraft side

155  
00:05:58,710 --> 00:05:57,039

we started right before the maneuver

156  
00:06:01,029 --> 00:05:58,720

doing what we call a pressurization

157  
00:06:03,350 --> 00:06:01,039

event we have a tank of helium high

158  
00:06:05,189 --> 00:06:03,360

pressure helium on board that's isolated

159  
00:06:07,430 --> 00:06:05,199

behind these valves that are

160  
00:06:09,670 --> 00:06:07,440

pyrotechnically activated so it's

161  
00:06:11,590 --> 00:06:09,680

isolated all the way through crews and

162  
00:06:14,070 --> 00:06:11,600

we fire those valves to allow the helium

163  
00:06:16,390 --> 00:06:14,080

to flow through a regulator to our

164

00:06:18,550 --> 00:06:16,400

propellant tank and the reason for that

165

00:06:20,070 --> 00:06:18,560

is that maintains a high pressure during

166

00:06:21,590 --> 00:06:20,080

the burn to allow the burn to be

167

00:06:24,070 --> 00:06:21,600

efficient

168

00:06:25,749 --> 00:06:24,080

so that went uh went well that's uh that

169

00:06:27,909 --> 00:06:25,759

was one of the stressful points for the

170

00:06:29,350 --> 00:06:27,919

engineers because that's one thing these

171

00:06:31,350 --> 00:06:29,360

are pyrotechnic valves which means you

172

00:06:33,350 --> 00:06:31,360

can only fire them once so

173

00:06:34,390 --> 00:06:33,360

you can't really test them because if

174

00:06:36,870 --> 00:06:34,400

you fire them you got to take them out

175

00:06:38,230 --> 00:06:36,880

and put in a new one so uh that was one

176

00:06:39,990 --> 00:06:38,240

of the uh the

177

00:06:42,070 --> 00:06:40,000

events we were watching very closely but

178

00:06:43,909 --> 00:06:42,080

it worked flawlessly

179

00:06:45,909 --> 00:06:43,919

at that point we

180

00:06:47,189 --> 00:06:45,919

slewed the spacecraft it had been flying

181

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

with its high gain antenna pointed

182

00:06:50,469 --> 00:06:49,120

towards the earth but we needed to slew

183

00:06:51,909 --> 00:06:50,479

so that the

184

00:06:53,430 --> 00:06:51,919

main engines would be pointed in the

185

00:06:55,270 --> 00:06:53,440

proper direction and that takes our high

186

00:06:57,110 --> 00:06:55,280

gain antenna off of the earth so we

187

00:06:59,830 --> 00:06:57,120

switch to low gain antennas that have a

188

00:07:01,749 --> 00:06:59,840

much wider field of view

189

00:07:03,589 --> 00:07:01,759

the down point is that we we had to drop

190

00:07:05,510 --> 00:07:03,599

to 40 bits per second so we had a little

191

00:07:07,189 --> 00:07:05,520

lower telemetry rate

192

00:07:09,430 --> 00:07:07,199

so it made a little more nervous

193

00:07:11,189 --> 00:07:09,440

watching that uh watching the burn but

194

00:07:13,589 --> 00:07:11,199

the slew went well

195

00:07:16,070 --> 00:07:13,599

we started right on time as dave said we

196

00:07:18,309 --> 00:07:16,080

have accelerometers on board and we use

197

00:07:20,550 --> 00:07:18,319

those accelerometers to basically

198

00:07:22,390 --> 00:07:20,560

measure the change in velocity as the

199

00:07:24,230 --> 00:07:22,400

engines are burning

200

00:07:26,870 --> 00:07:24,240

that allows us to get a very precise

201  
00:07:33,909 --> 00:07:27,830  
cut off

202  
00:07:36,790 --> 00:07:33,919  
230.5 meters per second uh which

203  
00:07:37,830 --> 00:07:36,800  
corresponds to about 2 753 miles per

204  
00:07:40,550 --> 00:07:37,840  
hour

205  
00:07:43,189 --> 00:07:40,560  
uh we used up this preliminary estimate

206  
00:07:44,550 --> 00:07:43,199  
but approximately about 260 gallons of

207  
00:07:46,869 --> 00:07:44,560  
rocket fuel

208  
00:07:49,189 --> 00:07:46,879  
uh we then slewed back to earthpoint to

209  
00:07:50,950 --> 00:07:49,199  
get the high gain antenna back uh

210  
00:07:53,990 --> 00:07:50,960  
pointed at the earth and that allowed us

211  
00:07:55,990 --> 00:07:54,000  
to to bump up the downlink rate to 285

212  
00:07:57,510 --> 00:07:56,000  
kilobits per second and that's where the

213  
00:07:58,950 --> 00:07:57,520

team is right now so we're getting the

214

00:08:00,710 --> 00:07:58,960

data down

215

00:08:02,550 --> 00:08:00,720

and we're analyzing all that data the

216

00:08:04,869 --> 00:08:02,560

kind of the preliminary look is that all

217

00:08:07,110 --> 00:08:04,879

systems seem to be healthy we don't see

218

00:08:09,670 --> 00:08:07,120

anything that is in uh

219

00:08:11,510 --> 00:08:09,680

that shows a problem but again we're

220

00:08:13,990 --> 00:08:11,520

downlinking all this high rate data and

221

00:08:15,270 --> 00:08:14,000

the data we recorded during the burn so

222

00:08:17,270 --> 00:08:15,280

that we can do some more in-depth

223

00:08:20,710 --> 00:08:17,280

analysis and make sure that

224

00:08:21,909 --> 00:08:20,720

that that everything is as expected

225

00:08:25,350 --> 00:08:21,919

so

226

00:08:27,830 --> 00:08:25,360

you know i i would like to to say

227

00:08:30,390 --> 00:08:27,840

that kind of echoing would what john and

228

00:08:32,469 --> 00:08:30,400

dave said

229

00:08:34,149 --> 00:08:32,479

you don't realize you know people won't

230

00:08:34,949 --> 00:08:34,159

realize how much hard work went into

231

00:08:37,670 --> 00:08:34,959

this

232

00:08:40,310 --> 00:08:37,680

how much behind the scenes stuff went on

233

00:08:42,870 --> 00:08:40,320

during the design phase how much testing

234

00:08:44,870 --> 00:08:42,880

the team did how many contingencies that

235

00:08:47,269 --> 00:08:44,880

we went through what if scenarios what

236

00:08:49,670 --> 00:08:47,279

if this happened what if that went wrong

237

00:08:52,389 --> 00:08:49,680

it really is an amazing amount of work

238

00:08:55,829 --> 00:08:52,399

that the team did to make it look so

239

00:08:57,590 --> 00:08:55,839

smooth uh tonight um it's kind of cliché

240

00:08:59,750 --> 00:08:57,600

people walk around going it's not rocket

241

00:09:02,710 --> 00:08:59,760

science well sometimes it is rocket

242

00:09:04,070 --> 00:09:02,720

science so and uh i'm very proud to be

243

00:09:06,230 --> 00:09:04,080

part of this team

244

00:09:07,990 --> 00:09:06,240

and i just want to thank them uh for all

245

00:09:09,110 --> 00:09:08,000

the hard work they've done so now i'm

246

00:09:11,829 --> 00:09:09,120

gonna turn it over to bruce tell us

247

00:09:12,870 --> 00:09:11,839

about the great science room

248

00:09:14,550 --> 00:09:12,880

thank you

249

00:09:16,310 --> 00:09:14,560

i think my heart's about ready to start

250

00:09:17,750 --> 00:09:16,320

again

251  
00:09:20,630 --> 00:09:17,760  
we've been

252  
00:09:23,350 --> 00:09:20,640  
developing this mission for 11 years now

253  
00:09:25,110 --> 00:09:23,360  
from the the original concept that we

254  
00:09:26,150 --> 00:09:25,120  
wanted to propose

255  
00:09:28,389 --> 00:09:26,160  
and

256  
00:09:30,470 --> 00:09:28,399  
i can't tell you how many

257  
00:09:33,430 --> 00:09:30,480  
requirements reviews

258  
00:09:35,269 --> 00:09:33,440  
powerpoint proposals how much paper we

259  
00:09:38,550 --> 00:09:35,279  
push to get there

260  
00:09:41,350 --> 00:09:38,560  
how many reviews along the way

261  
00:09:43,430 --> 00:09:41,360  
how much effort the team put into

262  
00:09:45,590 --> 00:09:43,440  
the the design

263  
00:09:47,190 --> 00:09:45,600

the development building testing the

264

00:09:48,389 --> 00:09:47,200

spacecraft

265

00:09:50,710 --> 00:09:48,399

launching it

266

00:09:53,670 --> 00:09:50,720

then we had a 10 months cruise

267

00:09:54,790 --> 00:09:53,680

and an absolutely flawless performance

268

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

tonight

269

00:09:59,350 --> 00:09:57,600

it just amazes me that we're able to do

270

00:10:02,069 --> 00:09:59,360

this and

271

00:10:05,590 --> 00:10:02,079

as they've said to do it and appear so

272

00:10:07,829 --> 00:10:05,600

so appear for it to be so effortless

273

00:10:10,630 --> 00:10:07,839

it's a real testament to the team

274

00:10:13,110 --> 00:10:10,640

i think i want to send my thanks and my

275

00:10:15,750 --> 00:10:13,120

congratulations to the team we've had

276  
00:10:18,150 --> 00:10:15,760  
over 600 people working on maven at

277  
00:10:19,030 --> 00:10:18,160  
different times throughout its lifetime

278  
00:10:20,470 --> 00:10:19,040  
and

279  
00:10:23,030 --> 00:10:20,480  
we've gotten here because of the

280  
00:10:25,509 --> 00:10:23,040  
incredible commitment and dedication of

281  
00:10:27,829 --> 00:10:25,519  
each one i've come to realize that every

282  
00:10:29,829 --> 00:10:27,839  
single person wearing one of these maven

283  
00:10:31,750 --> 00:10:29,839  
shirts tonight thinks that they are

284  
00:10:33,030 --> 00:10:31,760  
doing absolutely the coolest thing they

285  
00:10:36,150 --> 00:10:33,040  
can be doing

286  
00:10:38,069 --> 00:10:36,160  
and they have put their heart and soul

287  
00:10:39,750 --> 00:10:38,079  
into each job that they're doing to get

288  
00:10:42,470 --> 00:10:39,760

us here and i think that's why we've

289

00:10:43,990 --> 00:10:42,480

been successful at getting here and

290

00:10:48,949 --> 00:10:44,000

making it look so effort because of the

291

00:10:54,630 --> 00:10:52,870

i want to echo guys and dave and john's

292

00:10:56,870 --> 00:10:54,640

thanks to our families

293

00:10:58,630 --> 00:10:56,880

they put up with an awful lot

294

00:11:01,190 --> 00:10:58,640

you don't realize

295

00:11:03,829 --> 00:11:01,200

until you go through this what it takes

296

00:11:05,990 --> 00:11:03,839

to do this and what the families

297

00:11:08,470 --> 00:11:06,000

especially have to put up with in terms

298

00:11:09,990 --> 00:11:08,480

of lost weekends

299

00:11:14,630 --> 00:11:10,000

travel

300

00:11:18,870 --> 00:11:17,110

i also want to

301  
00:11:21,430 --> 00:11:18,880  
take a step back we've had a

302  
00:11:23,670 --> 00:11:21,440  
tremendously successful night tonight

303  
00:11:27,030 --> 00:11:23,680  
we are anxiously awaiting

304  
00:11:29,430 --> 00:11:27,040  
the arrival in two days of the india mom

305  
00:11:31,670 --> 00:11:29,440  
mission and we're hoping for their

306  
00:11:34,069 --> 00:11:31,680  
success we're sending them the best

307  
00:11:35,910 --> 00:11:34,079  
wishes from the entire maven team

308  
00:11:36,949 --> 00:11:35,920  
for a successful orbit insertion and

309  
00:11:39,910 --> 00:11:36,959  
mission

310  
00:11:42,550 --> 00:11:39,920  
all i can say at this point is we're in

311  
00:11:43,829 --> 00:11:42,560  
orbit at mars guys

312  
00:11:48,150 --> 00:11:43,839  
and

313  
00:11:50,150 --> 00:11:48,160

we get to do the science that we've been

314

00:11:51,190 --> 00:11:50,160

planning for all this time

315

00:11:52,870 --> 00:11:51,200

so

316

00:11:53,590 --> 00:11:52,880

dwane i'll throw it back to you thank

317

00:11:54,389 --> 00:11:53,600

you

318

00:11:57,030 --> 00:11:54,399

well

319

00:11:59,030 --> 00:11:57,040

folks before we open up for questions uh

320

00:12:06,150 --> 00:11:59,040

let's give this incredible team a round

321

00:12:10,470 --> 00:12:08,389

okay just a reminder that you can send

322

00:12:11,350 --> 00:12:10,480

your questions in to

323

00:12:14,230 --> 00:12:11,360

ask

324

00:12:15,990 --> 00:12:14,240

nasa and again these folks their work is

325

00:12:18,389 --> 00:12:16,000

just beginning we're going to keep this

326

00:12:19,910 --> 00:12:18,399

short to about 30 minutes so if you can

327

00:12:21,110 --> 00:12:19,920

keep your questions to one if we have

328

00:12:23,030 --> 00:12:21,120

some time

329

00:12:24,710 --> 00:12:23,040

maybe a follow-up and then we'll see if

330

00:12:27,030 --> 00:12:24,720

any of the social media folks have a

331

00:12:28,870 --> 00:12:27,040

question if we're wearing good on time

332

00:12:31,670 --> 00:12:28,880

uh so if you can

333

00:12:33,030 --> 00:12:31,680

raise your hand here again uh hashtag

334

00:12:34,629 --> 00:12:33,040

ask nasa

335

00:12:37,110 --> 00:12:34,639

if you're looking at this

336

00:12:39,910 --> 00:12:37,120

from around the country and name and

337

00:12:43,910 --> 00:12:42,389

yes we have a mic on the way we do have

338

00:12:45,590 --> 00:12:43,920

a mic

339

00:12:47,829 --> 00:12:45,600

and so while we're waiting for mike one

340

00:12:48,710 --> 00:12:47,839

more plug for the hashtag

341

00:12:51,509 --> 00:12:48,720

ask

342

00:12:53,670 --> 00:12:51,519

nasa for the folks who are watching this

343

00:12:55,990 --> 00:12:53,680

name affiliation great thanks this is

344

00:12:57,190 --> 00:12:56,000

alex whitsey from nature um for bruce

345

00:12:58,629 --> 00:12:57,200

can you talk about what's going to

346

00:13:00,310 --> 00:12:58,639

unfold with the science instruments

347

00:13:02,069 --> 00:13:00,320

which ones get switched on in which

348

00:13:03,910 --> 00:13:02,079

order and when we start to get data back

349

00:13:06,629 --> 00:13:03,920

from the various instruments

350

00:13:08,389 --> 00:13:06,639

let me let me start from when we start

351

00:13:10,310 --> 00:13:08,399

the science mission over the next six

352

00:13:13,269 --> 00:13:10,320

weeks we have to do commissioning of the

353

00:13:15,829 --> 00:13:13,279

spacecraft that requires us to do

354

00:13:17,670 --> 00:13:15,839

maneuvers as dave said to get into our

355

00:13:20,870 --> 00:13:17,680

final mapping orbit we have to deploy

356

00:13:23,110 --> 00:13:20,880

the booms we have four booms to deploy

357

00:13:24,870 --> 00:13:23,120

with instruments at the end uh one of

358

00:13:26,949 --> 00:13:24,880

the instruments the engines instrument

359

00:13:29,350 --> 00:13:26,959

has a cap that has to be deployed off of

360

00:13:31,829 --> 00:13:29,360

it called a break-off cap we have to

361

00:13:34,389 --> 00:13:31,839

turn on the instruments test them

362

00:13:36,470 --> 00:13:34,399

do some calibration of the pointing

363

00:13:38,870 --> 00:13:36,480

do an end-to-end relay test using our

364

00:13:41,110 --> 00:13:38,880

electric communications relay

365

00:13:43,670 --> 00:13:41,120

to to send data to and from the

366

00:13:45,350 --> 00:13:43,680

curiosity rover all of this is going to

367

00:13:47,509 --> 00:13:45,360

take about six weeks before we're

368

00:13:49,189 --> 00:13:47,519

actually ready to do science so we're

369

00:13:51,189 --> 00:13:49,199

looking at early november as the

370

00:13:52,389 --> 00:13:51,199

official start of science

371

00:13:54,069 --> 00:13:52,399

on the way

372

00:13:56,069 --> 00:13:54,079

we have

373

00:13:58,870 --> 00:13:56,079

what i'll call a bonus opportunity with

374

00:14:00,710 --> 00:13:58,880

comet siding spring that is a comet

375

00:14:01,670 --> 00:14:00,720

discovered last year that has a close

376

00:14:02,949 --> 00:14:01,680

approach

377

00:14:05,990 --> 00:14:02,959

to mars

378

00:14:09,750 --> 00:14:06,000

in on october 19th it's going to miss by

379

00:14:11,269 --> 00:14:09,760

only 132 000 kilometers which is is

380

00:14:13,110 --> 00:14:11,279

almost nothing

381

00:14:14,310 --> 00:14:13,120

we're going to take five days out of our

382

00:14:16,629 --> 00:14:14,320

commissioning

383

00:14:18,150 --> 00:14:16,639

in order to make observations of the

384

00:14:20,790 --> 00:14:18,160

comet itself

385

00:14:23,350 --> 00:14:20,800

and of the mars upper atmosphere and

386

00:14:24,629 --> 00:14:23,360

solar wind environment both before the

387

00:14:26,870 --> 00:14:24,639

comet approach

388

00:14:28,629 --> 00:14:26,880

and immediately following so we can get

389

00:14:31,110 --> 00:14:28,639

a before and after look at the upper

390

00:14:31,910 --> 00:14:31,120

atmosphere so that's five days centered

391

00:14:33,829 --> 00:14:31,920

on

392

00:14:35,509 --> 00:14:33,839

october 19th

393

00:14:37,750 --> 00:14:35,519

if we have the opportunity we'll be

394

00:14:39,509 --> 00:14:37,760

turning instruments on sooner and

395

00:14:41,430 --> 00:14:39,519

getting some additional early science

396

00:14:44,790 --> 00:14:41,440

but that depends on how the

397

00:14:45,990 --> 00:14:44,800

the next hours and days unfold

398

00:14:48,710 --> 00:14:46,000

so we're going to leonard and then we're

399

00:14:51,829 --> 00:14:48,720

going to go to the ask nasa questions

400

00:14:53,350 --> 00:14:51,839

yeah leonardo space.com i maybe i think

401  
00:14:54,230 --> 00:14:53,360  
it was dave that talked about the walk

402  
00:14:56,150 --> 00:14:54,240  
down

403  
00:14:58,629 --> 00:14:56,160  
maneuvers and can you just describe

404  
00:15:00,629 --> 00:14:58,639  
maybe the first one and are they all

405  
00:15:04,230 --> 00:15:00,639  
different the fives there's different

406  
00:15:05,350 --> 00:15:04,240  
durations and uh so the um

407  
00:15:07,189 --> 00:15:05,360  
uh

408  
00:15:10,150 --> 00:15:07,199  
i'm trying to think of the exact times

409  
00:15:11,350 --> 00:15:10,160  
but um basically the the second one of

410  
00:15:13,990 --> 00:15:11,360  
those the

411  
00:15:16,470 --> 00:15:14,000  
period reduction maneuver

412  
00:15:18,069 --> 00:15:16,480  
that's got the longest burn it's it's

413  
00:15:20,069 --> 00:15:18,079

actually i don't have the numbers right

414

00:15:22,710 --> 00:15:20,079

in front of me but um it's not as

415

00:15:25,110 --> 00:15:22,720

significant as the moi burn we just went

416

00:15:27,750 --> 00:15:25,120

through but i want to say about a third

417

00:15:29,590 --> 00:15:27,760

of that amount of a burn so it's um that

418

00:15:31,189 --> 00:15:29,600

that's a big one and they're all they're

419

00:15:33,509 --> 00:15:31,199

all designed to um

420

00:15:36,230 --> 00:15:33,519

you know we wanted to carefully get into

421

00:15:38,550 --> 00:15:36,240

a larger orbit before we

422

00:15:41,590 --> 00:15:38,560

dialed it in so to speak and so

423

00:15:43,269 --> 00:15:41,600

um it'll the again the first one happens

424

00:15:46,150 --> 00:15:43,279

in a couple of days and the last one

425

00:15:49,269 --> 00:15:46,160

will happen i want to say about um

426

00:15:51,670 --> 00:15:49,279

uh 10 days out on that order in early

427

00:15:53,269 --> 00:15:51,680

october uh we'll we'll do the last one

428

00:15:55,590 --> 00:15:53,279

and then we'll be in our final four and

429

00:15:56,550 --> 00:15:55,600

a half hour orbit and and that'll get us

430

00:16:00,870 --> 00:15:56,560

uh

431

00:16:04,949 --> 00:16:00,880

surface

432

00:16:09,350 --> 00:16:07,509

okay let's uh go to my colleague jason

433

00:16:11,110 --> 00:16:09,360

townsend who is monitoring the questions

434

00:16:13,829 --> 00:16:11,120

coming in from hashtag

435

00:16:17,509 --> 00:16:13,839

ask nasa and jason what do we have on

436

00:16:21,189 --> 00:16:19,030

hi so we've got our first question

437

00:16:23,509 --> 00:16:21,199

coming in from twitter user freelance

438

00:16:25,910 --> 00:16:23,519

filos asking where can the community get

439

00:16:28,550 --> 00:16:25,920  
data from maven

440

00:16:31,030 --> 00:16:28,560  
let me take that one

441

00:16:32,550 --> 00:16:31,040  
once we start to collect data we'll be

442

00:16:34,389 --> 00:16:32,560  
releasing

443

00:16:35,430 --> 00:16:34,399  
some of the early results as quickly as

444

00:16:38,949 --> 00:16:35,440  
possible

445

00:16:41,509 --> 00:16:38,959  
and the data will be available on

446

00:16:43,829 --> 00:16:41,519  
our various websites we've got one at

447

00:16:47,829 --> 00:16:43,839  
last.colorado.edu

448

00:16:50,949 --> 00:16:47,839  
maven and of course nasa.gov maven

449

00:16:53,189 --> 00:16:50,959  
we were anticipating that we'll really

450

00:16:55,990 --> 00:16:53,199  
begin to understand the data and start

451  
00:16:59,030 --> 00:16:56,000  
to get preliminary conclusions for the

452  
00:17:00,949 --> 00:16:59,040  
goals of the mission after about three

453  
00:17:03,590 --> 00:17:00,959  
months so we're looking at early in the

454  
00:17:05,909 --> 00:17:03,600  
calendar year to really be getting our

455  
00:17:08,870 --> 00:17:05,919  
results out

456  
00:17:10,949 --> 00:17:08,880  
another question jason

457  
00:17:12,470 --> 00:17:10,959  
twitter user jonathan asks is there

458  
00:17:14,549 --> 00:17:12,480  
anything specific that you're looking

459  
00:17:17,189 --> 00:17:14,559  
for and or expecting to find in mars

460  
00:17:21,510 --> 00:17:20,230  
what we're trying to do is to

461  
00:17:23,750 --> 00:17:21,520  
respond

462  
00:17:25,590 --> 00:17:23,760  
with this mission to observations that

463  
00:17:27,909 --> 00:17:25,600

tell us that the climate has changed on

464

00:17:29,909 --> 00:17:27,919

Mars significantly over the past few

465

00:17:31,590 --> 00:17:29,919

billion years we're trying to understand

466

00:17:32,549 --> 00:17:31,600

what the cause of that climate change

467

00:17:33,990 --> 00:17:32,559

has been

468

00:17:36,950 --> 00:17:34,000

and we're looking at the role that

469

00:17:38,870 --> 00:17:36,960

escape to space may have played in

470

00:17:41,270 --> 00:17:38,880

removing the atmosphere and changing the

471

00:17:43,669 --> 00:17:41,280

atmosphere so we're looking at what

472

00:17:46,150 --> 00:17:43,679

happens at the top of the atmosphere how

473

00:17:48,710 --> 00:17:46,160

the processes involving the sun and the

474

00:17:50,390 --> 00:17:48,720

solar wind affect the gas at the top of

475

00:17:52,950 --> 00:17:50,400

the atmosphere and strip it away to

476

00:17:55,029 --> 00:17:52,960

space so in essence that's our goal to

477

00:17:59,350 --> 00:17:55,039

answer the question where did the water

478

00:18:03,750 --> 00:18:01,350

okay uh do we have

479

00:18:05,190 --> 00:18:03,760

any more questions here and then we have

480

00:18:09,430 --> 00:18:05,200

here

481

00:18:11,590 --> 00:18:09,440

can you wait for the mic

482

00:18:13,830 --> 00:18:11,600

name and affiliation hello i'm laura

483

00:18:15,190 --> 00:18:13,840

keaney with the denver post um tim

484

00:18:17,029 --> 00:18:15,200

preiser came down earlier and he was

485

00:18:18,390 --> 00:18:17,039

talking to us about the fuel

486

00:18:21,270 --> 00:18:18,400

and i understand that you were expecting

487

00:18:23,029 --> 00:18:21,280

to use 25 gallons to get out there but

488

00:18:24,390 --> 00:18:23,039

it only used five and i put that on

489

00:18:25,350 --> 00:18:24,400

twitter and a lot of people have been

490

00:18:27,669 --> 00:18:25,360

asking

491

00:18:29,909 --> 00:18:27,679

why and what what impact is that going

492

00:18:32,870 --> 00:18:29,919

to have on the mission

493

00:18:34,070 --> 00:18:32,880

yeah i'll take that yeah um

494

00:18:36,950 --> 00:18:34,080

we budget

495

00:18:38,549 --> 00:18:36,960

you know uh our fuel during the design

496

00:18:40,870 --> 00:18:38,559

phase to make sure that we can

497

00:18:41,990 --> 00:18:40,880

accommodate all kinds of scenarios so

498

00:18:43,510 --> 00:18:42,000

there's all you know there's

499

00:18:45,510 --> 00:18:43,520

uncertainties in performance for

500

00:18:47,750 --> 00:18:45,520

instance on the launch vehicle

501  
00:18:49,430 --> 00:18:47,760  
but the launch vehicle came gave us a

502  
00:18:51,430 --> 00:18:49,440  
fantastic ride and put us right where we

503  
00:18:53,990 --> 00:18:51,440  
needed to be so we had budgeted extra

504  
00:18:57,750 --> 00:18:54,000  
fuel in case the launch vehicle left us

505  
00:18:59,430 --> 00:18:57,760  
off slightly off of of the target so

506  
00:19:01,190 --> 00:18:59,440  
so that went well so we didn't have to

507  
00:19:03,430 --> 00:19:01,200  
use quite as much fuel there we had

508  
00:19:05,909 --> 00:19:03,440  
planned for what we call trajectory

509  
00:19:07,750 --> 00:19:05,919  
correction maneuvers or tcms these are

510  
00:19:10,230 --> 00:19:07,760  
maneuvers where we we changed the

511  
00:19:11,270 --> 00:19:10,240  
trajectory we we planned for four of

512  
00:19:13,830 --> 00:19:11,280  
them

513  
00:19:15,350 --> 00:19:13,840

but the first two went so well

514

00:19:16,870 --> 00:19:15,360

due to a combination of the great

515

00:19:19,270 --> 00:19:16,880

navigation work out of the jet

516

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

propulsion laboratory and how well the

517

00:19:22,789 --> 00:19:21,120

spacecraft behaved

518

00:19:25,590 --> 00:19:22,799

so when we did those maneuvers the

519

00:19:27,350 --> 00:19:25,600

spacecraft executed those burns exactly

520

00:19:28,549 --> 00:19:27,360

right where the navigators wanted us to

521

00:19:30,310 --> 00:19:28,559

do them

522

00:19:32,070 --> 00:19:30,320

so we had uncertainties budgeted for

523

00:19:33,990 --> 00:19:32,080

thruster performance uncertainties in

524

00:19:35,590 --> 00:19:34,000

terms of our attitude control

525

00:19:37,510 --> 00:19:35,600

all of that

526  
00:19:39,830 --> 00:19:37,520  
really came right down the middle and

527  
00:19:41,590 --> 00:19:39,840  
then the kind of the third piece of that

528  
00:19:44,470 --> 00:19:41,600  
was we work very closely with the

529  
00:19:46,549 --> 00:19:44,480  
navigation team to help them model

530  
00:19:48,950 --> 00:19:46,559  
any kind of delta v that comes from the

531  
00:19:51,510 --> 00:19:48,960  
spacecraft so that they can put that

532  
00:19:53,590 --> 00:19:51,520  
into their navigation solutions

533  
00:19:55,669 --> 00:19:53,600  
the better you model it the better they

534  
00:19:57,029 --> 00:19:55,679  
can you know design those first two

535  
00:19:59,430 --> 00:19:57,039  
maneuvers

536  
00:20:01,029 --> 00:19:59,440  
and then uh because it was so well

537  
00:20:03,270 --> 00:20:01,039  
modeled and the spacecraft was so well

538  
00:20:06,070 --> 00:20:03,280

behaved we actually got to cancel the

539

00:20:07,750 --> 00:20:06,080

third one and the fourth one

540

00:20:09,590 --> 00:20:07,760

which is you know

541

00:20:11,270 --> 00:20:09,600

a testament to all the hard work of both

542

00:20:13,830 --> 00:20:11,280

the engineering team on the spacecraft

543

00:20:16,310 --> 00:20:13,840

and the navigation team so it really was

544

00:20:17,990 --> 00:20:16,320

when when when you budget for problems

545

00:20:19,909 --> 00:20:18,000

and then the problems don't occur and

546

00:20:22,230 --> 00:20:19,919

your design behaves exactly as you

547

00:20:24,549 --> 00:20:22,240

designed it good things happen like a

548

00:20:27,029 --> 00:20:24,559

lot lower fuel use than you'd planned

549

00:20:28,870 --> 00:20:27,039

does that mean the mission can go longer

550

00:20:30,950 --> 00:20:28,880

the more fuel we have the more we can

551  
00:20:33,270 --> 00:20:30,960  
give it to bruce for uh for getting more

552  
00:20:34,390 --> 00:20:33,280  
science and extending the mission so yes

553  
00:20:36,310 --> 00:20:34,400  
okay we're going to take one more

554  
00:20:37,430 --> 00:20:36,320  
question here a couple more from ass

555  
00:20:39,830 --> 00:20:37,440  
nasa and then we're going to wrap up

556  
00:20:42,549 --> 00:20:39,840  
good job uh aj smith with audible

557  
00:20:44,390 --> 00:20:42,559  
designs um i was wondering

558  
00:20:45,190 --> 00:20:44,400  
what do we learn on the laddie mission

559  
00:20:46,870 --> 00:20:45,200  
that

560  
00:20:49,270 --> 00:20:46,880  
makes this uh

561  
00:20:51,029 --> 00:20:49,280  
different or better than um

562  
00:20:53,909 --> 00:20:51,039  
the maven

563  
00:20:55,110 --> 00:20:53,919

well the the lady mission was a mission

564

00:20:56,870 --> 00:20:55,120

to the moon

565

00:20:58,710 --> 00:20:56,880

and we're at mars so i'm not quite sure

566

00:21:01,510 --> 00:20:58,720

i understand your question well they

567

00:21:02,950 --> 00:21:01,520

were both to um sample the atmosphere to

568

00:21:05,510 --> 00:21:02,960

see what was in them before it was

569

00:21:06,710 --> 00:21:05,520

polluted so well the moon

570

00:21:08,230 --> 00:21:06,720

you know most people think it doesn't

571

00:21:10,870 --> 00:21:08,240

have an atmosphere but in fact it has a

572

00:21:11,909 --> 00:21:10,880

very thin and tenuous atmosphere

573

00:21:14,789 --> 00:21:11,919

and it's

574

00:21:16,549 --> 00:21:14,799

a combination of volatiles and and other

575

00:21:18,870 --> 00:21:16,559

elemental abundance that's coming from

576

00:21:21,029 --> 00:21:18,880

the moon in an exosphere

577

00:21:23,669 --> 00:21:21,039

and in particular studying the fact that

578

00:21:25,029 --> 00:21:23,679

the moon is almost a complete vacuum

579

00:21:27,270 --> 00:21:25,039

you know that questions about

580

00:21:28,549 --> 00:21:27,280

electrostatic elevation of dust and

581

00:21:30,630 --> 00:21:28,559

things like that

582

00:21:32,470 --> 00:21:30,640

but it is very different from mars mars

583

00:21:33,990 --> 00:21:32,480

has you know a relatively thick

584

00:21:35,830 --> 00:21:34,000

atmosphere compared to the moon a very

585

00:21:38,149 --> 00:21:35,840

thick atmosphere compared to the moon

586

00:21:40,549 --> 00:21:38,159

the more interesting comparison is that

587

00:21:42,310 --> 00:21:40,559

we have you know a fleet of earth

588

00:21:44,149 --> 00:21:42,320

science and weather satellites around

589

00:21:46,630 --> 00:21:44,159

the earth for us to understand the

590

00:21:48,870 --> 00:21:46,640

earth's atmosphere and the mars

591

00:21:50,230 --> 00:21:48,880

atmosphere being something like the

592

00:21:52,310 --> 00:21:50,240

earth's

593

00:21:55,830 --> 00:21:52,320

maven is more akin to our earth

594

00:21:57,830 --> 00:21:55,840

observing satellites but somehow mars

595

00:21:59,510 --> 00:21:57,840

changed billions of years ago from a

596

00:22:01,190 --> 00:21:59,520

thick atmosphere like earth to the very

597

00:22:02,950 --> 00:22:01,200

thin one today and that's the big

598

00:22:05,830 --> 00:22:02,960

mystery that bruce and his team with

599

00:22:07,350 --> 00:22:05,840

maven are trying to solve

600

00:22:09,110 --> 00:22:07,360

jason

601  
00:22:11,990 --> 00:22:09,120  
wonderful this next question comes from

602  
00:22:13,750 --> 00:22:12,000  
twitter user ideosh who asks is the

603  
00:22:17,590 --> 00:22:13,760  
riskiest part of the maven mission

604  
00:22:21,029 --> 00:22:20,230  
sure um

605  
00:22:22,310 --> 00:22:21,039  
okay

606  
00:22:23,190 --> 00:22:22,320  
so there's there's

607  
00:22:25,270 --> 00:22:23,200  
um

608  
00:22:26,870 --> 00:22:25,280  
there's gates along the way so launch is

609  
00:22:28,870 --> 00:22:26,880  
a big deal

610  
00:22:30,630 --> 00:22:28,880  
mars urban insertion is certainly a big

611  
00:22:32,149 --> 00:22:30,640  
deal

612  
00:22:33,830 --> 00:22:32,159  
and we have a series of deployments that

613  
00:22:36,470 --> 00:22:33,840

bruce already described that are coming

614

00:22:38,390 --> 00:22:36,480

up in october so every one of these

615

00:22:39,590 --> 00:22:38,400

steps we we breathe another sigh of

616

00:22:41,590 --> 00:22:39,600

relief

617

00:22:43,190 --> 00:22:41,600

and it is because as guys said because

618

00:22:44,950 --> 00:22:43,200

of the testing and all the work that's

619

00:22:47,990 --> 00:22:44,960

been done but nonetheless they're big

620

00:22:49,750 --> 00:22:48,000

events that have to work and so we

621

00:22:52,070 --> 00:22:49,760

you know i i don't want to say what risk

622

00:22:54,549 --> 00:22:52,080

is is the highest but everyone has to

623

00:22:56,549 --> 00:22:54,559

work along the way i personally

624

00:22:57,990 --> 00:22:56,559

will breathe a lot easier november 8th

625

00:22:59,590 --> 00:22:58,000

when the science starts that means all

626

00:23:03,350 --> 00:22:59,600

the deployments have worked all the

627

00:23:05,430 --> 00:23:03,360

checkouts have been finalized so um but

628

00:23:07,990 --> 00:23:05,440

space is hard you know the space flight

629

00:23:10,230 --> 00:23:08,000

is hard and um but it's it's great to

630

00:23:11,909 --> 00:23:10,240

knock off one of the the big risks

631

00:23:13,270 --> 00:23:11,919

tonight that we had with mars orbit

632

00:23:14,710 --> 00:23:13,280

insertion

633

00:23:17,430 --> 00:23:14,720

i'll breathe a sigh of relief after the

634

00:23:19,110 --> 00:23:17,440

one earth year video

635

00:23:27,190 --> 00:23:19,120

the primary science is done then i'll

636

00:23:27,200 --> 00:23:31,510

we've gotten a whole solar cycle

637

00:23:34,149 --> 00:23:33,190

jason let's take one last one before we

638

00:23:35,669 --> 00:23:34,159

wrap up

639

00:23:38,789 --> 00:23:35,679

sure this question comes from twitter

640

00:23:41,110 --> 00:23:38,799

user okay now run who asks are there any

641

00:23:43,590 --> 00:23:41,120

superstitions observed by the maven team

642

00:23:45,510 --> 00:23:43,600

before or after maven's mars orbital

643

00:23:48,149 --> 00:23:45,520

insertion

644

00:23:50,549 --> 00:23:48,159

yeah i'll throw one out uh it's a common

645

00:23:52,549 --> 00:23:50,559

tradition to bring peanuts to both

646

00:23:55,029 --> 00:23:52,559

launch events and orbit insertion events

647

00:23:57,029 --> 00:23:55,039

peanuts are considered good luck

648

00:23:59,269 --> 00:23:57,039

and then we also our fall protection

649

00:24:00,870 --> 00:23:59,279

engineer brought in mars bars so i think

650

00:24:04,310 --> 00:24:00,880

that's going to become

651  
00:24:05,830 --> 00:24:04,320  
become a new tradition as well

652  
00:24:07,350 --> 00:24:05,840  
okay that's going to do it i want to

653  
00:24:09,190 --> 00:24:07,360  
thank you all for

654  
00:24:10,789 --> 00:24:09,200  
letting us uh stay within the time limit

655  
00:24:12,710 --> 00:24:10,799  
we're actually going to in a little

656  
00:24:14,870 --> 00:24:12,720  
earlier these folks uh their work is

657  
00:24:16,549 --> 00:24:14,880  
just beginning and if you're just

658  
00:24:18,710 --> 00:24:16,559  
joining us

659  
00:24:20,549 --> 00:24:18,720  
here the lockheed man facility in

660  
00:24:22,070 --> 00:24:20,559  
littleton colorado

661  
00:24:23,669 --> 00:24:22,080  
the mars atmosphere and volatile

662  
00:24:26,630 --> 00:24:23,679  
evolution of maven spacecraft has

663  
00:24:27,830 --> 00:24:26,640

successfully entered martian

664

00:24:30,149 --> 00:24:27,840

orbit

665

00:24:34,230 --> 00:24:30,159

the work is beginning uh you can get

666

00:24:38,230 --> 00:24:35,269

maven

667

00:24:39,669 --> 00:24:38,240

join the conversation a lot of talk

668

00:24:40,710 --> 00:24:39,679

on facebook

669

00:24:42,149 --> 00:24:40,720

twitter

670

00:24:44,390 --> 00:24:42,159

keep those questions coming in at

671

00:24:46,230 --> 00:24:44,400

hashtag asknasa and we'll have

672

00:24:48,230 --> 00:24:46,240

scientists available to answer those

673

00:24:49,990 --> 00:24:48,240

questions so just keep them coming in

674

00:24:51,029 --> 00:24:50,000

and again congratulations to the maven