
KyBak

1
00:00:13,190 --> 00:00:11,120
hello once again this is our third and

2
00:00:15,530 --> 00:00:13,200
final briefing of the afternoon on the

3
00:00:18,859 --> 00:00:15,540
Alana mission and here to talk about

4
00:00:21,380 --> 00:00:18,869
Alana is Jason cruising the Alana

5
00:00:25,609 --> 00:00:21,390
program executive from NASA headquarters

6
00:00:28,130 --> 00:00:25,619
in Washington Garrett scroll bought the

7
00:00:32,089 --> 00:00:28,140
Alana mission manager from the NASA law

8
00:00:34,639 --> 00:00:32,099
services program at Kennedy David club

9
00:00:37,819 --> 00:00:34,649
are the director of the space science

10
00:00:39,740 --> 00:00:37,829
and an engineering laboratory for

11
00:00:41,959 --> 00:00:39,750
Montana State University and the

12
00:00:46,940 --> 00:00:41,969
Explorer 1 prime pense principal

13
00:00:49,790 --> 00:00:46,950

investigator James lump the director of

14
00:00:52,400 --> 00:00:49,800
the space systems laboratory and the KY

15
00:00:56,750 --> 00:00:52,410
SAT one principal investigator from the

16
00:00:58,819 --> 00:00:56,760
University of Kentucky and Brian Sanders

17
00:01:01,790 --> 00:00:58,829
the research coordinator for the

18
00:01:03,619 --> 00:01:01,800
Colorado Space Grant consortium and he

19
00:01:05,270 --> 00:01:03,629
is the Hermes principal investigator

20
00:01:08,210 --> 00:01:05,280
from the university of colorado at

21
00:01:11,420 --> 00:01:08,220
boulder and we'll begin first with Jason

22
00:01:13,969 --> 00:01:11,430
cruising thank you George I wanted to

23
00:01:16,190 --> 00:01:13,979
thank you very got everything off here

24
00:01:17,630 --> 00:01:16,200
to take the time with us today talk

25
00:01:20,140 --> 00:01:17,640
about a few details of a new initiative

26
00:01:22,810 --> 00:01:20,150
and NASA specifically the Alana

27
00:01:25,280 --> 00:01:22,820
education launching of a nano satellites

28
00:01:26,780 --> 00:01:25,290
mission this is the first element of an

29
00:01:29,179 --> 00:01:26,790
overall new initiative called our keep

30
00:01:30,050 --> 00:01:29,189
set launch initiative and NASA and I

31
00:01:32,690 --> 00:01:30,060
wanted to give you a little background

32
00:01:34,670 --> 00:01:32,700
why we're even pursuing the CubeSat

33
00:01:37,399 --> 00:01:34,680
launch initiative so nASA has many

34
00:01:38,899 --> 00:01:37,409
programs that fund universities those

35
00:01:41,149 --> 00:01:38,909
come from everything from scientific

36
00:01:43,880 --> 00:01:41,159
grants to educational research grants

37
00:01:46,100 --> 00:01:43,890
and a training grants such as our NASA

38
00:01:49,249 --> 00:01:46,110

Space Grant consortium funding and like

39
00:01:52,219 --> 00:01:49,259
likewise the the universities use these

40
00:01:53,569 --> 00:01:52,229
various funds to develop obviously to

41
00:01:54,859 --> 00:01:53,579
meet their scientific goals of their

42
00:01:58,039 --> 00:01:54,869
grants but also to develop educational

43
00:02:00,230 --> 00:01:58,049
training opportunities for students and

44
00:02:02,090 --> 00:02:00,240
a lot of these universities what they've

45
00:02:04,100 --> 00:02:02,100
chosen to do is actually develop small

46
00:02:05,690 --> 00:02:04,110
satellite programs to achieve those

47
00:02:08,180 --> 00:02:05,700
overall education objectives that they

48
00:02:10,309 --> 00:02:08,190
have these small satellite programs

49
00:02:11,809 --> 00:02:10,319
allow students actually experience the

50
00:02:12,780 --> 00:02:11,819
entire mission lifecycle of a spacecraft

51
00:02:15,679 --> 00:02:12,790
every

52
00:02:17,759 --> 00:02:15,689
from instrument design to operations to

53
00:02:21,000 --> 00:02:17,769
actually hands on building of the

54
00:02:22,949 --> 00:02:21,010
instrument themselves one of the

55
00:02:24,240 --> 00:02:22,959
important missing elements though for

56
00:02:25,860 --> 00:02:24,250
many of these programs is actually the

57
00:02:28,979 --> 00:02:25,870
ability to launch and actually see their

58
00:02:30,479 --> 00:02:28,989
project through the end launch to a lot

59
00:02:31,649 --> 00:02:30,489
of folks and the operations and

60
00:02:32,849 --> 00:02:31,659
achieving their and getting their

61
00:02:34,649 --> 00:02:32,859
scientific results is really the

62
00:02:37,229 --> 00:02:34,659
capstone of any kind of mission that

63
00:02:38,339 --> 00:02:37,239

there that you can be part of and this

64
00:02:41,369 --> 00:02:38,349
has been missing from a lot of these

65
00:02:42,990 --> 00:02:41,379
educational opportunities so this flight

66
00:02:44,339 --> 00:02:43,000
allows this team to actually see the

67
00:02:45,629 --> 00:02:44,349
outcome of the results both

68
00:02:46,860 --> 00:02:45,639
scientifically and the technical

69
00:02:50,069 --> 00:02:46,870
developments that they've been trying to

70
00:02:51,569 --> 00:02:50,079
achieve those are very important to see

71
00:02:53,159 --> 00:02:51,579
the design choice and see how they play

72
00:02:56,009 --> 00:02:53,169
out actually in an operational system

73
00:02:57,119 --> 00:02:56,019
the second aspect is of our cube set

74
00:02:58,349 --> 00:02:57,129
launch initiative is actually to

75
00:03:00,899 --> 00:02:58,359
demonstrate that students can lead

76
00:03:02,879 --> 00:03:00,909
missions that bring significant results

77
00:03:05,610 --> 00:03:02,889
be they scientific or technology

78
00:03:07,890 --> 00:03:05,620
developments and these these results are

79
00:03:10,319 --> 00:03:07,900
actually go way beyond just education

80
00:03:13,860 --> 00:03:10,329
outputs but actually real mission values

81
00:03:15,929 --> 00:03:13,870
that we get back as an agency and what

82
00:03:17,729 --> 00:03:15,939
better way to actually conduct education

83
00:03:18,960 --> 00:03:17,739
by giving but by giving the next

84
00:03:21,420 --> 00:03:18,970
generation workforce hands-on

85
00:03:23,550 --> 00:03:21,430
opportunities not just classroom based

86
00:03:25,140 --> 00:03:23,560
or lab-based case studies but real

87
00:03:26,939 --> 00:03:25,150
missions that they get to work on today

88
00:03:29,430 --> 00:03:26,949

and actually see them all the way

89
00:03:31,289 --> 00:03:29,440
through flight and with that today

90
00:03:33,719 --> 00:03:31,299
you'll hear about our overall along

91
00:03:35,759 --> 00:03:33,729
emission from my colleagues here and

92
00:03:38,339 --> 00:03:35,769
then our individual satellites as well

93
00:03:40,110 --> 00:03:38,349
thank you alright thank you Jason and

94
00:03:42,059 --> 00:03:40,120
we'll go down to Garrett's crow bought

95
00:03:44,099 --> 00:03:42,069
the Alana mission manager from the NASA

96
00:03:46,649 --> 00:03:44,109
launch services program at Kennedy

97
00:03:48,300 --> 00:03:46,659
Garrett thank you George good afternoon

98
00:03:51,089 --> 00:03:48,310
everyone and thank you for being here

99
00:03:53,250 --> 00:03:51,099
this afternoon to listen about the Alana

100
00:03:56,189 --> 00:03:53,260
briefing and what the NASA initiative

101
00:03:57,569 --> 00:03:56,199
for cube sets will be one of NASA's

102
00:03:59,599 --> 00:03:57,579
missions is to attract and retain

103
00:04:01,890 --> 00:03:59,609
students and the sciences technology

104
00:04:03,960 --> 00:04:01,900
engineering and mathematics or we call

105
00:04:07,129 --> 00:04:03,970
STEM disciplines creating missions of

106
00:04:10,439 --> 00:04:07,139
programs to achieve the important goal

107
00:04:12,420 --> 00:04:10,449
helps train since NASA's net nation's

108
00:04:14,039 --> 00:04:12,430
future workforce as well as engage and

109
00:04:16,860 --> 00:04:14,049
inspire Americans in the rest of the

110
00:04:18,300 --> 00:04:16,870
world in the last three years an attempt

111
00:04:20,430 --> 00:04:18,310
to bring back educational space flight

112
00:04:22,350 --> 00:04:20,440
NASA generated a new and exciting

113
00:04:24,089 --> 00:04:22,360

initiative the initiative is a NASA

114
00:04:27,140 --> 00:04:24,099
educational launch of nanosatellite

115
00:04:28,890 --> 00:04:27,150
orellana which is now in folsom

116
00:04:30,420 --> 00:04:28,900
alanna missions are the first

117
00:04:32,580 --> 00:04:30,430
educational packages to be carried on

118
00:04:34,980 --> 00:04:32,590
expendable launch vehicles for NASA's

119
00:04:36,689 --> 00:04:34,990
launch services program these missions

120
00:04:39,330 --> 00:04:36,699
contain small auxiliary satellite

121
00:04:41,279 --> 00:04:39,340
payloads we call cube sets these cube

122
00:04:43,409 --> 00:04:41,289
sets are built by students throughout

123
00:04:46,469 --> 00:04:43,419
America from high schools through

124
00:04:48,360 --> 00:04:46,479
graduate level when Glory's t9 mission

125
00:04:50,100 --> 00:04:48,370
lights it's motors the first line

126
00:04:52,950 --> 00:04:50,110
emission will begin its journey as an

127
00:04:54,960 --> 00:04:52,960
auxiliary payload once in orbit hundreds

128
00:04:56,129 --> 00:04:54,970
of students from around the country will

129
00:04:58,350 --> 00:04:56,139
be able to experience the feeling of

130
00:05:02,600 --> 00:04:58,360
accomplishment we are truly launching

131
00:05:05,279 --> 00:05:02,610
education in the space on my next image

132
00:05:07,650 --> 00:05:05,289
to give a little bit of detail on the

133
00:05:11,040 --> 00:05:07,660
first mission here villano it comprises

134
00:05:12,420 --> 00:05:11,050
of what we call 31 you cube sets the

135
00:05:15,749 --> 00:05:12,430
bill built by Montana State University

136
00:05:18,320 --> 00:05:15,759
implore one explore one prime the

137
00:05:22,890 --> 00:05:18,330
University of Colorado Boulder hermes in

138
00:05:25,670 --> 00:05:22,900

Kentucky Space consortium KY SAP the 3

139
00:05:28,379 --> 00:05:25,680
cube sets what could be contained

140
00:05:30,270 --> 00:05:28,389
through flight and california and

141
00:05:33,749 --> 00:05:30,280
polytechnic state university or we call

142
00:05:35,430 --> 00:05:33,759
Cal Poly at Sandy bisko's poly Pico

143
00:05:38,339 --> 00:05:35,440
satellite orbital deployer what we call

144
00:05:40,260 --> 00:05:38,349
the pea pod these three cubes these cube

145
00:05:42,959 --> 00:05:40,270
SATs are designed and built by students

146
00:05:45,990 --> 00:05:42,969
the pea pod is built by students and

147
00:05:47,490 --> 00:05:46,000
once separated from the pea pod the cube

148
00:05:51,659 --> 00:05:47,500
sets will be tracked by students around

149
00:05:55,649 --> 00:05:51,669
the world in tracking stations next

150
00:05:59,100 --> 00:05:55,659
slide please this image here represents

151
00:06:02,399 --> 00:05:59,110
the integration of the flight pea pod

152
00:06:03,570 --> 00:06:02,409
and cube sets back in November but one

153
00:06:05,010 --> 00:06:03,580
of the things that three cubes had to

154
00:06:07,200 --> 00:06:05,020
complete what we call the mission ready

155
00:06:09,390 --> 00:06:07,210
to review each one of these tubes went

156
00:06:11,640 --> 00:06:09,400
through a review process just like a

157
00:06:13,140 --> 00:06:11,650
primary spacecraft would do the students

158
00:06:17,790 --> 00:06:13,150
had to get up in front of a NASA team

159
00:06:18,930 --> 00:06:17,800
and a Cal Poly team and present their

160
00:06:23,180 --> 00:06:18,940
basis of meeting all the requirements

161
00:06:27,120 --> 00:06:23,190
for flight the image on the Left shows

162
00:06:29,459 --> 00:06:27,130
Hermes on the far left their tools KY

163
00:06:33,120 --> 00:06:29,469

sat in the middle and it's 41 prime on

164
00:06:35,250 --> 00:06:33,130
the far right the other two images are

165
00:06:36,629 --> 00:06:35,260
Cal Poly's students actually doing the

166
00:06:39,269 --> 00:06:36,639
integration of the flight systems

167
00:06:40,790 --> 00:06:39,279
preparing it for flight and final

168
00:06:43,020 --> 00:06:40,800
testing

169
00:06:45,870 --> 00:06:43,030
each one of these cube SATs weighs about

170
00:06:47,309 --> 00:06:45,880
one kilogram or 2.2 pounds and the

171
00:06:50,309 --> 00:06:47,319
complete integrated system weighs about

172
00:06:52,890 --> 00:06:50,319
six kilograms the cube sets are 10

173
00:06:58,650 --> 00:06:52,900
centimeter cubes or just over under 4

174
00:07:00,779 --> 00:06:58,660
inches cubed next image now where these

175
00:07:02,550 --> 00:07:00,789
Don cubes be located with the pea pod

176
00:07:05,490 --> 00:07:02,560
it's going to forward in the vehicle we

177
00:07:09,240 --> 00:07:05,500
call on the third stage it's a patch to

178
00:07:12,450 --> 00:07:09,250
the F ring on the apt enter the tourists

179
00:07:15,059 --> 00:07:12,460
third stage with a mounting bracket that

180
00:07:19,529 --> 00:07:15,069
was provided by orbital to attach it to

181
00:07:22,399 --> 00:07:19,539
the launch vehicle on the next slide our

182
00:07:25,589 --> 00:07:22,409
next image here is a orbital technician

183
00:07:28,050 --> 00:07:25,599
installing the Alana pea pod on februari

184
00:07:31,620 --> 00:07:28,060
6 this is a big day of accomplishment

185
00:07:32,790 --> 00:07:31,630
for a lot of us and we really took a big

186
00:07:35,700 --> 00:07:32,800
sigh of relief will neither had to

187
00:07:39,930 --> 00:07:35,710
happen and was all bolted up the next

188
00:07:42,360 --> 00:07:39,940

image shows the sequence of timing and

189
00:07:45,839 --> 00:07:42,370
when the actual separation of the cubes

190
00:07:47,999 --> 00:07:45,849
will be glory will separate about 13

191
00:07:50,430 --> 00:07:48,009
minutes into flight in 10 seconds later

192
00:07:52,709 --> 00:07:50,440
the three cubes will eject from the pea

193
00:07:55,499 --> 00:07:52,719
pod in the direction opposite of that of

194
00:07:57,209 --> 00:07:55,509
glory they may ask why we were going on

195
00:07:59,279 --> 00:07:57,219
the opposite direction well our analysis

196
00:08:02,189 --> 00:07:59,289
showed that by going in the opposite

197
00:08:04,649 --> 00:08:02,199
direction we help and do no recontact to

198
00:08:08,189 --> 00:08:04,659
the primary the whole mission is to

199
00:08:10,559 --> 00:08:08,199
basically had no risk to the mission the

200
00:08:13,200 --> 00:08:10,569
engineering team at KSC did a fantastic

201
00:08:15,330 --> 00:08:13,210
job the Cal Poly teen did a fantastic

202
00:08:17,129 --> 00:08:15,340
job each one and keeps that team did an

203
00:08:20,430 --> 00:08:17,139
unreal job on meeting all the

204
00:08:22,260 --> 00:08:20,440
requirements that we proposed to them so

205
00:08:23,820 --> 00:08:22,270
with that I like to say thank you to the

206
00:08:27,689 --> 00:08:23,830
glory project for allowing us to ride

207
00:08:29,100 --> 00:08:27,699
along your mission to all the lot of

208
00:08:30,809 --> 00:08:29,110
team members that did all the extraneous

209
00:08:33,329 --> 00:08:30,819
hard work overlap at the past three

210
00:08:35,430 --> 00:08:33,339
years and to the senior management team

211
00:08:38,819 --> 00:08:35,440
for believing in the Alana mission thank

212
00:08:41,219 --> 00:08:38,829
you okay thank you Gary we'll go now to

213
00:08:43,019 --> 00:08:41,229

David club are you use the Explorer 1

214
00:08:47,040 --> 00:08:43,029
prime principal investigator from

215
00:08:50,130 --> 00:08:47,050
Montana State University David thank you

216
00:08:51,930 --> 00:08:50,140
George I'm pleased to be here today as

217
00:08:54,030 --> 00:08:51,940
the representative of a lot of folks

218
00:08:57,720 --> 00:08:54,040
who've made this moment

219
00:09:00,090 --> 00:08:57,730
possible for us we could have the first

220
00:09:02,220 --> 00:09:00,100
slide I represent Montana State

221
00:09:04,350 --> 00:09:02,230
University the Montana Space Grant

222
00:09:07,350 --> 00:09:04,360
consortium and the space science and

223
00:09:10,550 --> 00:09:07,360
engineering laboratory at MSU I also

224
00:09:13,769 --> 00:09:10,560
represent more than 400 college students

225
00:09:17,660 --> 00:09:13,779
who have been touched by our program

226
00:09:21,960 --> 00:09:17,670
over the 11 years since its founding the

227
00:09:23,819 --> 00:09:21,970
next slide more than 125 students have

228
00:09:26,910 --> 00:09:23,829
worked on the Explorer 1 mission alone

229
00:09:29,730 --> 00:09:26,920
since 2006 that's five years in the

230
00:09:33,420 --> 00:09:29,740
process here the photo you're looking at

231
00:09:37,800 --> 00:09:33,430
is a group photo of the SS al team taken

232
00:09:40,800 --> 00:09:37,810
recently of the 400 or more students

233
00:09:43,999 --> 00:09:40,810
who've been touched I very proudly

234
00:09:46,650 --> 00:09:44,009
represent the many who have found

235
00:09:50,129 --> 00:09:46,660
founded successful careers in the

236
00:09:53,870 --> 00:09:50,139
aerospace industry and at NASA centers

237
00:09:56,550 --> 00:09:53,880
and other government laboratories I

238
00:09:59,400 --> 00:09:56,560

represent our made our many partners and

239
00:10:01,110 --> 00:09:59,410
collaborators without them this program

240
00:10:02,730 --> 00:10:01,120
and the Explorer 1 prime mission would

241
00:10:05,460 --> 00:10:02,740
not have been would not be taking place

242
00:10:08,069 --> 00:10:05,470
the space dynamics laboratory in Logan

243
00:10:10,920 --> 00:10:08,079
Utah and the Lockheed Martin enterprise

244
00:10:12,990 --> 00:10:10,930
integration group now known as the SI

245
00:10:18,150 --> 00:10:13,000
organization provided substantial

246
00:10:21,210 --> 00:10:18,160
assistance e 1 p as we fondly refer to

247
00:10:24,769 --> 00:10:21,220
it however receives major support from

248
00:10:28,350 --> 00:10:24,779
NASA's Montana Space Grant consortium

249
00:10:31,829 --> 00:10:28,360
msg sees founding director dr. William a

250
00:10:35,639 --> 00:10:31,839
his was our fervent supporter until

251
00:10:38,939 --> 00:10:35,649
his recent passing Billy I know you're

252
00:10:42,090 --> 00:10:38,949
watching this week to all I'm extremely

253
00:10:44,429 --> 00:10:42,100
grateful without the tenacity and

254
00:10:46,769 --> 00:10:44,439
perseverance of Garrett's robot on my

255
00:10:49,679 --> 00:10:46,779
right and Larry and Bill his colleagues

256
00:10:52,319 --> 00:10:49,689
at NASA launch services program Alana

257
00:10:54,420 --> 00:10:52,329
certainly would not exist so I thank you

258
00:10:57,210 --> 00:10:54,430
NASA and I think you Garrett for making

259
00:10:59,629 --> 00:10:57,220
it possible for us to be here today and

260
00:11:01,829 --> 00:10:59,639
of course without the glory mission

261
00:11:04,139 --> 00:11:01,839
allowing us to hitch a ride on their

262
00:11:04,540 --> 00:11:04,149
rocket we also wouldn't have been here

263
00:11:06,550 --> 00:11:04,550

today

264
00:11:09,960 --> 00:11:06,560
now let me say a few words about our

265
00:11:14,850 --> 00:11:09,970
program and our Explorer 1 prime mission

266
00:11:18,790 --> 00:11:14,860
I'm holding in the palm of my hand a

267
00:11:23,800 --> 00:11:18,800
cubesat this is this is not a scale

268
00:11:26,019 --> 00:11:23,810
model this is full size it's identical

269
00:11:28,810 --> 00:11:26,029
in size to the 3 cube SATs mounted on

270
00:11:31,360 --> 00:11:28,820
the top of the Taurus XL each of these

271
00:11:34,569 --> 00:11:31,370
10 centimeter by 10 centimeter by 10

272
00:11:36,970 --> 00:11:34,579
centimeter cubes has all of the

273
00:11:40,180 --> 00:11:36,980
fundamental subsystems that any

274
00:11:43,480 --> 00:11:40,190
scientific spacecraft requires as a

275
00:11:46,150 --> 00:11:43,490
power system it has communication system

276
00:11:49,800 --> 00:11:46,160
these are the antennas it has an

277
00:11:55,470 --> 00:11:49,810
attitude determination system control

278
00:11:59,350 --> 00:11:55,480
telemetry ground ground contact and

279
00:12:03,280 --> 00:11:59,360
command and data Hamlet all that's

280
00:12:06,699 --> 00:12:03,290
packed into one kilogram of material in

281
00:12:09,579 --> 00:12:06,709
silicon more than 60 cube sets have been

282
00:12:12,460 --> 00:12:09,589
launched in the past eight years and

283
00:12:14,319 --> 00:12:12,470
they at work they all were are they many

284
00:12:16,630 --> 00:12:14,329
of most of them work and they're

285
00:12:19,350 --> 00:12:16,640
definitely not toys I won't say they all

286
00:12:22,510 --> 00:12:19,360
work considering that they're built to

287
00:12:25,000 --> 00:12:22,520
widely spaced universities well one

288
00:12:28,840 --> 00:12:25,010

might ask how could such a small package

289
00:12:32,170 --> 00:12:28,850
do anything useful I'd like to share

290
00:12:33,940 --> 00:12:32,180
with you my my vision and it's a vision

291
00:12:37,540 --> 00:12:33,950
shared by many of my space science

292
00:12:40,210 --> 00:12:37,550
colleagues I'll ask you not to think of

293
00:12:44,110 --> 00:12:40,220
the power of just one or two or maybe

294
00:12:46,030 --> 00:12:44,120
three of these diminutive satellites but

295
00:12:49,449 --> 00:12:46,040
I'll ask you to think instead of the

296
00:12:53,040 --> 00:12:49,459
potential power of 10 or 20 or 30 or

297
00:12:56,920 --> 00:12:53,050
maybe even 50 or 100 nano satellites

298
00:12:58,920 --> 00:12:56,930
distributed as a constellation working

299
00:13:04,329 --> 00:12:58,930
synergistically toward a common goal

300
00:13:07,509 --> 00:13:04,339
that's our big vision the next slide I'd

301
00:13:10,139 --> 00:13:07,519
like to talk about our students for

302
00:13:12,340 --> 00:13:10,149
glory and virtually all other NASA

303
00:13:14,260 --> 00:13:12,350
scientific flight programs the launch

304
00:13:16,540 --> 00:13:14,270
represents the beginning the data

305
00:13:19,900 --> 00:13:16,550
flowing from the from

306
00:13:22,960 --> 00:13:19,910
mission orbit after orbit day after day

307
00:13:25,420 --> 00:13:22,970
month after month and the scientific

308
00:13:29,740 --> 00:13:25,430
interpretation of that data represent

309
00:13:32,680 --> 00:13:29,750
the true and goal in contrast for our

310
00:13:36,009 --> 00:13:32,690
program student hands-on training is

311
00:13:38,380 --> 00:13:36,019
that is really the prime goal by

312
00:13:41,380 --> 00:13:38,390
delivering an in-house design build and

313
00:13:44,560 --> 00:13:41,390

tested satellite that's fully qualified

314
00:13:47,500 --> 00:13:44,570
for spaceflight we've basically achieved

315
00:13:52,509 --> 00:13:47,510
in excess of ninety five percent of our

316
00:13:54,280 --> 00:13:52,519
goal working on space in space of course

317
00:13:57,490 --> 00:13:54,290
is the frosting on the cake and that's

318
00:13:59,470 --> 00:13:57,500
why we're all here today next slide many

319
00:14:01,660 --> 00:13:59,480
dozens of students know intimately

320
00:14:03,550 --> 00:14:01,670
though through direct first-hand

321
00:14:05,639 --> 00:14:03,560
experience as Garrett has pointed out

322
00:14:10,269 --> 00:14:05,649
what is needed now to produce

323
00:14:12,850 --> 00:14:10,279
spaceflight hardware next slide let me

324
00:14:15,670 --> 00:14:12,860
repeat that it really is this hands-on

325
00:14:17,850 --> 00:14:15,680
student training process getting to the

326
00:14:20,319 --> 00:14:17,860
eve of the launch with a fully qualified

327
00:14:23,740 --> 00:14:20,329
Space Flight qualified satellite that's

328
00:14:26,319 --> 00:14:23,750
our primary goal now to be sure our

329
00:14:29,079 --> 00:14:26,329
mission is scientific and technical

330
00:14:32,829 --> 00:14:29,089
element and and a historical

331
00:14:34,690 --> 00:14:32,839
significance as well just like glory

332
00:14:37,449 --> 00:14:34,700
will will operate in space return

333
00:14:39,519 --> 00:14:37,459
scientific data interpret and publish

334
00:14:42,030 --> 00:14:39,529
the data if we could go to the next

335
00:14:44,920 --> 00:14:42,040
slide I'll talk just very briefly about

336
00:14:48,130 --> 00:14:44,930
our mission the satellite is named

337
00:14:51,130 --> 00:14:48,140
Explorer 1 prime because of its close

338
00:14:54,210 --> 00:14:51,140

relationship to the original Explorer

339
00:14:56,710 --> 00:14:54,220
one that carried a Geiger counter

340
00:14:59,490 --> 00:14:56,720
experiment produced by Professor James

341
00:15:02,980 --> 00:14:59,500
Van Allen at the University of Iowa that

342
00:15:05,800 --> 00:15:02,990
experiment on explorer 1 led to the

343
00:15:09,639 --> 00:15:05,810
discovery of what are now known as the

344
00:15:11,800 --> 00:15:09,649
Van Allen radiation belts depicted in

345
00:15:15,100 --> 00:15:11,810
the upper left and the and the right

346
00:15:18,790 --> 00:15:15,110
hand side of this visual our Explorer 1

347
00:15:21,639 --> 00:15:18,800
prime is carrying an authentic Van Allen

348
00:15:24,510 --> 00:15:21,649
Geiger tube Geiger counter supplied to

349
00:15:26,480 --> 00:15:24,520
us by Van just before he passed away in

350
00:15:32,620 --> 00:15:26,490
2006

351
00:15:35,570 --> 00:15:32,630
so as the slide shows our orbit will

352
00:15:38,230 --> 00:15:35,580
pass through the horns of the radiation

353
00:15:41,300 --> 00:15:38,240
belts about four times per orbit our

354
00:15:43,490 --> 00:15:41,310
experiment will report back variations

355
00:15:46,100 --> 00:15:43,500
in the intensity and location of the

356
00:15:47,810 --> 00:15:46,110
radiation belts these variations are

357
00:15:50,600 --> 00:15:47,820
driven by disturbances on the Sun that

358
00:15:53,030 --> 00:15:50,610
propagate to earth and jostle the

359
00:15:55,100 --> 00:15:53,040
magnetic field that controls the motion

360
00:15:56,870 --> 00:15:55,110
of the very energetic electrons and

361
00:16:01,210 --> 00:15:56,880
protons that are trapped in the

362
00:16:05,420 --> 00:16:01,220
radiation belts the next visual shows

363
00:16:09,769 --> 00:16:05,430

the radiation belts as seen by the no

364
00:16:12,260 --> 00:16:09,779
oppose instruments depicted on a map of

365
00:16:15,380 --> 00:16:12,270
the of the earth and the yellow bands

366
00:16:18,410 --> 00:16:15,390
that represent the the horns of the

367
00:16:22,190 --> 00:16:18,420
radiation belts where we will obtain our

368
00:16:25,370 --> 00:16:22,200
primary data so I'll go to the last

369
00:16:27,170 --> 00:16:25,380
visual just to conclude with this

370
00:16:30,079 --> 00:16:27,180
photograph of our baby that's now

371
00:16:32,300 --> 00:16:30,089
sitting out there on the Pat as it

372
00:16:35,329 --> 00:16:32,310
looked just before delivery we're

373
00:16:40,040 --> 00:16:35,339
thrilled to be here and we look forward

374
00:16:44,269 --> 00:16:40,050
with enthusiasm to the on-orbit phase of

375
00:16:48,590 --> 00:16:44,279
our mission all right thank you David

376
00:16:50,329 --> 00:16:48,600
and now to James lump use the KY set one

377
00:16:53,600 --> 00:16:50,339
principal investigator from the

378
00:16:57,319 --> 00:16:53,610
University of Kentucky James thank you

379
00:16:58,670 --> 00:16:57,329
George good afternoon I am really happy

380
00:17:00,860 --> 00:16:58,680
to be here I'm really happy to be at

381
00:17:02,300 --> 00:17:00,870
this point where our spacecraft is up on

382
00:17:05,030 --> 00:17:02,310
top of that beautiful rocket down by the

383
00:17:06,829 --> 00:17:05,040
coast happy to talk to you today a

384
00:17:09,110 --> 00:17:06,839
little bit about our satellite and our

385
00:17:11,929 --> 00:17:09,120
team and really proud to represent our

386
00:17:13,549 --> 00:17:11,939
team back in Kentucky which includes

387
00:17:16,250 --> 00:17:13,559
many dedicated people who spent a lot of

388
00:17:20,030 --> 00:17:16,260

hard work and time bringing this to

389
00:17:21,679 --> 00:17:20,040
reality the team that built KY is that

390
00:17:23,480 --> 00:17:21,689
one is is somewhat unique in that it

391
00:17:26,470 --> 00:17:23,490
consists of students from a consortium

392
00:17:29,810 --> 00:17:26,480
of public universities across the state

393
00:17:31,460 --> 00:17:29,820
that we call Kentucky space the

394
00:17:33,280 --> 00:17:31,470
consortium includes University of

395
00:17:36,080 --> 00:17:33,290
Kentucky Morehead State University

396
00:17:38,030 --> 00:17:36,090
Western Kentucky University the

397
00:17:39,380 --> 00:17:38,040
University of Louisville murray state

398
00:17:40,700 --> 00:17:39,390
university and the

399
00:17:45,710 --> 00:17:40,710
kentucky community and technical college

400
00:17:47,810 --> 00:17:45,720
system as Dave mentioned hands-on

401
00:17:50,150 --> 00:17:47,820
experiences like building a satellite

402
00:17:52,550 --> 00:17:50,160
are invaluable to engineering technology

403
00:17:55,310 --> 00:17:52,560
and science students and really a

404
00:17:57,830 --> 00:17:55,320
hands-on educational experience was the

405
00:18:01,190 --> 00:17:57,840
focus of our effort throughout that that

406
00:18:03,590 --> 00:18:01,200
kind of set up the way we organize the

407
00:18:05,660 --> 00:18:03,600
team that we built the subsystems and

408
00:18:07,430 --> 00:18:05,670
even made its way into the concept of

409
00:18:10,100 --> 00:18:07,440
operations for the satellite itself

410
00:18:12,980 --> 00:18:10,110
which includes a substantial outreach

411
00:18:14,750 --> 00:18:12,990
component for K through 12 education to

412
00:18:18,290 --> 00:18:14,760
engage K through 12 students in stem

413
00:18:20,000 --> 00:18:18,300

fields I'll talk a little bit about that

414
00:18:21,980 --> 00:18:20,010
more later but let me go ahead and and

415
00:18:26,780 --> 00:18:21,990
bring up the first graphic and introduce

416
00:18:27,920 --> 00:18:26,790
kya one the first image shows the

417
00:18:29,450 --> 00:18:27,930
picture of the final launch

418
00:18:31,070 --> 00:18:29,460
configuration of the satellite as it's

419
00:18:34,040 --> 00:18:31,080
currently integrated inside the pea pod

420
00:18:37,520 --> 00:18:34,050
on the Taurus XL it's a 1u cubesat the

421
00:18:39,950 --> 00:18:37,530
triangular solar cells on all six faces

422
00:18:42,010 --> 00:18:39,960
provide power the golden bands wrapped

423
00:18:44,450 --> 00:18:42,020
around the satellite are in fact the

424
00:18:45,800 --> 00:18:44,460
communications antennas and there's a

425
00:18:47,870 --> 00:18:45,810
black circle on the top face there

426
00:18:50,870 --> 00:18:47,880
that's the lens of our digital camera

427
00:18:53,270 --> 00:18:50,880
the second image shows the satellite

428
00:18:56,330 --> 00:18:53,280
with the solar cells and the frame

429
00:18:59,030 --> 00:18:56,340
removed you can see the stack there and

430
00:19:00,530 --> 00:18:59,040
in this testing there are black whip

431
00:19:02,270 --> 00:19:00,540
antennas in place of the flight antennas

432
00:19:05,030 --> 00:19:02,280
the camera module is visible in the

433
00:19:07,070 --> 00:19:05,040
foreground KY set one serves as a

434
00:19:09,830 --> 00:19:07,080
testbed for several satellite bus

435
00:19:11,600 --> 00:19:09,840
technologies that we're developing to

436
00:19:13,970 --> 00:19:11,610
support a variety of orbital and

437
00:19:15,200 --> 00:19:13,980
suborbital missions the bus includes a

438
00:19:18,760 --> 00:19:15,210

flexible command and data handling

439
00:19:21,800 --> 00:19:18,770
system generic payload interface and

440
00:19:23,450 --> 00:19:21,810
extensive health and status monitoring

441
00:19:25,630 --> 00:19:23,460
throughout the satellite that can be

442
00:19:28,340 --> 00:19:25,640
programmed in various telemetry modes

443
00:19:30,530 --> 00:19:28,350
the third image shows the satellite in

444
00:19:32,570 --> 00:19:30,540
its flight configuration with the intent

445
00:19:34,730 --> 00:19:32,580
is deployed you can see that there's

446
00:19:37,970 --> 00:19:34,740
three antennas in the picture the longer

447
00:19:40,370 --> 00:19:37,980
to support a UHF VHF radio system the

448
00:19:45,500 --> 00:19:40,380
short one at the top there supports an

449
00:19:48,440 --> 00:19:45,510
s-band high-bandwidth radio system the

450
00:19:50,510 --> 00:19:48,450
UHF VHF radio is the primary support for

451
00:19:51,769 --> 00:19:50,520
our educational outreach and provides

452
00:19:53,810 --> 00:19:51,779
beacons and login

453
00:19:57,399 --> 00:19:53,820
beacons for the satellite and then the

454
00:19:59,869 --> 00:19:57,409
s-band provides much higher bandwidth

455
00:20:01,509 --> 00:19:59,879
communications for uploading audio files

456
00:20:04,940 --> 00:20:01,519
for the radio and downloading images

457
00:20:08,570 --> 00:20:04,950
larger data sets the fourth image shows

458
00:20:10,129 --> 00:20:08,580
on the left the 21 meter parabolic dish

459
00:20:11,749 --> 00:20:10,139
at morehead state that we'll use to

460
00:20:14,169 --> 00:20:11,759
communicate with the s-pen radio and

461
00:20:17,029 --> 00:20:14,179
then sort of in contrast on the right is

462
00:20:19,039 --> 00:20:17,039
an example of a handheld station that

463
00:20:22,789 --> 00:20:19,049

can also be used to communicate with Kos

464
00:20:24,109 --> 00:20:22,799
at one these images sort of represent

465
00:20:26,509 --> 00:20:24,119
the extremes of the ground stations that

466
00:20:28,219 --> 00:20:26,519
can contact the satellite our UHF

467
00:20:31,039 --> 00:20:28,229
downlink radio is is powerful enough

468
00:20:33,589 --> 00:20:31,049
that a modest handheld transceiver like

469
00:20:35,239 --> 00:20:33,599
the one in the picture can can receive

470
00:20:38,060 --> 00:20:35,249
signals from the satellite and a

471
00:20:40,489 --> 00:20:38,070
handheld radio can even command the

472
00:20:43,369 --> 00:20:40,499
satellite using DTMF touch tones to

473
00:20:45,829 --> 00:20:43,379
request beacons and do things such as a

474
00:20:48,289 --> 00:20:45,839
request photographs to be taken we're

475
00:20:50,200 --> 00:20:48,299
working with a network of K through 12

476
00:20:52,219 --> 00:20:50,210
schools throughout Kentucky to make

477
00:20:54,049 --> 00:20:52,229
handheld ground stations like the one in

478
00:20:55,129 --> 00:20:54,059
the picture available to students to go

479
00:20:58,009 --> 00:20:55,139
right in their own backyard known

480
00:21:01,489 --> 00:20:58,019
playground at school and command KY set

481
00:21:06,919 --> 00:21:01,499
one the first video I have here is a

482
00:21:10,399 --> 00:21:06,929
sequence of images of the team and shows

483
00:21:12,680 --> 00:21:10,409
the the team and some of the operations

484
00:21:14,389 --> 00:21:12,690
you know ky7 provided a unique workforce

485
00:21:16,909 --> 00:21:14,399
development opportunity to train future

486
00:21:18,200 --> 00:21:16,919
aerospace engineers over the course of

487
00:21:20,539 --> 00:21:18,210
the project many students have worked on

488
00:21:21,950 --> 00:21:20,549

the program and our graduated and

489
00:21:24,560 --> 00:21:21,960
working in the aerospace industry across

490
00:21:26,359 --> 00:21:24,570
the country to support the KY set one

491
00:21:28,459 --> 00:21:26,369
mission we developed infrastructure in

492
00:21:30,799 --> 00:21:28,469
Kentucky space schools including thermal

493
00:21:34,159 --> 00:21:30,809
vacuum facilities vibration facilities

494
00:21:36,440 --> 00:21:34,169
clean room facilities VHF uhf and has

495
00:21:38,899 --> 00:21:36,450
been testing and communications ground

496
00:21:40,789 --> 00:21:38,909
stations the team also carried out a

497
00:21:44,379 --> 00:21:40,799
series of high-altitude balloon missions

498
00:21:46,459 --> 00:21:44,389
suborbital rocket flights and

499
00:21:48,919 --> 00:21:46,469
experiments to test subsystems of the

500
00:21:51,739 --> 00:21:48,929
satellite we even have the opportunity

501
00:21:53,899 --> 00:21:51,749
to test our antenna actuation system on

502
00:21:58,389 --> 00:21:53,909
a NASA sounding rocket in March 2010 in

503
00:22:03,950 --> 00:22:01,669
the project has had a big impact and I'm

504
00:22:07,519 --> 00:22:03,960
going to go ahead and put the second

505
00:22:10,009 --> 00:22:07,529
video queue up and well that's queuing

506
00:22:11,480 --> 00:22:10,019
up i'd like to go ahead and thank some

507
00:22:14,899 --> 00:22:11,490
of the pan like to thank Jason and his

508
00:22:18,799 --> 00:22:14,909
team for making Alana possible I'd like

509
00:22:21,200 --> 00:22:18,809
to thank Garrett scro bot and Larry and

510
00:22:26,480 --> 00:22:21,210
the team at LSP for all their support

511
00:22:31,249 --> 00:22:26,490
and their expertise the once the second

512
00:22:33,799 --> 00:22:31,259
video starts well I guess let me also

513
00:22:38,629 --> 00:22:33,809

thank the Cal Poly team and their

514
00:22:40,220 --> 00:22:38,639
support ok I'll do the thank yous at the

515
00:22:43,340 --> 00:22:40,230
end sorry about that the second video

516
00:22:44,539 --> 00:22:43,350
shows KY set one orbit the white image

517
00:22:46,009 --> 00:22:44,549
there shows the focal plane of the

518
00:22:48,440 --> 00:22:46,019
camera and you can see when a six

519
00:22:49,730 --> 00:22:48,450
hundred kilometer orbit satellite is

520
00:22:51,710 --> 00:22:49,740
tracking the magnetic field of the earth

521
00:22:53,720 --> 00:22:51,720
which does extend into low-earth orbit

522
00:22:55,129 --> 00:22:53,730
so the sped up image kind of shows the

523
00:22:59,180 --> 00:22:55,139
satellite nodding as it tracks that

524
00:23:02,090 --> 00:22:59,190
magnetic field you'll see in the

525
00:23:03,830 --> 00:23:02,100
animation that will have a ground

526
00:23:05,240 --> 00:23:03,840
contact coming up here the yellow shows

527
00:23:07,039 --> 00:23:05,250
a ground contact from our station in

528
00:23:09,560 --> 00:23:07,049
Kentucky this is the six orbit of the

529
00:23:11,090 --> 00:23:09,570
satellite and is the first pass over the

530
00:23:12,590 --> 00:23:11,100
middle of the US would be the first

531
00:23:15,619 --> 00:23:12,600
chance for students at our ground

532
00:23:17,810 --> 00:23:15,629
stations to interrogate the details of

533
00:23:21,980 --> 00:23:17,820
health of the status health and status

534
00:23:24,619 --> 00:23:21,990
of the satellite so the video can play

535
00:23:26,779 --> 00:23:24,629
out so I did want to thank Garrett in

536
00:23:28,330 --> 00:23:26,789
his team thank the group at Cal Poly for

537
00:23:31,310 --> 00:23:28,340
their support we owe a debt of gratitude

538
00:23:33,049 --> 00:23:31,320

back to in Kentucky to the Kentucky

539
00:23:35,060 --> 00:23:33,059
science and technology corporation for

540
00:23:37,820 --> 00:23:35,070
sort of spearheading the establishment

541
00:23:39,139 --> 00:23:37,830
of Kentucky space NASA Kentucky space

542
00:23:43,070 --> 00:23:39,149
grant consortium for their support

543
00:23:46,190 --> 00:23:43,080
throughout the years in closing since

544
00:23:48,320 --> 00:23:46,200
the KY set one effort started it has

545
00:23:50,210 --> 00:23:48,330
really served as a catalyst for several

546
00:23:52,669 --> 00:23:50,220
activities that are going on throughout

547
00:23:55,519 --> 00:23:52,679
the state today students at Kentucky

548
00:23:57,619 --> 00:23:55,529
Space consortium schools are are working

549
00:23:59,509 --> 00:23:57,629
on a series of small satellite missions

550
00:24:01,850 --> 00:23:59,519
we're operating payloads aboard the

551
00:24:03,950 --> 00:24:01,860
International Space Station and students

552
00:24:06,169 --> 00:24:03,960
are dreaming up many new initiatives all

553
00:24:07,010 --> 00:24:06,179
that stem directly from the experience

554
00:24:10,370 --> 00:24:07,020
of working on KY

555
00:24:12,620 --> 00:24:10,380
that one the excitement created by the

556
00:24:14,090 --> 00:24:12,630
Ilana launch and the outreach activities

557
00:24:16,460 --> 00:24:14,100
that we've established with Kos at one

558
00:24:18,140 --> 00:24:16,470
have introduced a whole generation of K

559
00:24:21,050 --> 00:24:18,150
through 12 students and college students

560
00:24:22,340 --> 00:24:21,060
to opportunities in space and we look

561
00:24:23,660 --> 00:24:22,350
forward to sharing the satellite with

562
00:24:26,330 --> 00:24:23,670
the rest of the world as it launches

563
00:24:29,540 --> 00:24:26,340

later this week thanks George all right

564
00:24:32,450 --> 00:24:29,550
thank you James and dr. Brian Sanders

565
00:24:34,310 --> 00:24:32,460
the Hermes principal investigator from

566
00:24:37,700 --> 00:24:34,320
the university of colorado at boulder

567
00:24:38,990 --> 00:24:37,710
brian thank you George thank you

568
00:24:40,370 --> 00:24:39,000
everyone for coming out today and

569
00:24:42,380 --> 00:24:40,380
hearing a little bit about our Ilana

570
00:24:43,610 --> 00:24:42,390
mission I'm representing the students

571
00:24:45,260 --> 00:24:43,620
from the University of Colorado at

572
00:24:47,660 --> 00:24:45,270
Boulder the color of space grant

573
00:24:49,550 --> 00:24:47,670
consortium and the hard work that they

574
00:24:53,000 --> 00:24:49,560
put forth over the past almost five

575
00:24:54,830 --> 00:24:53,010
years five years ago we said we want to

576
00:24:56,270 --> 00:24:54,840
build a CubeSat and we let the students

577
00:24:58,250 --> 00:24:56,280
figure out what it is that they wanted

578
00:24:59,720 --> 00:24:58,260
to do they took a look at the community

579
00:25:01,640 --> 00:24:59,730
and figure it out what are some of the

580
00:25:04,370 --> 00:25:01,650
main areas that at least at that point

581
00:25:05,800 --> 00:25:04,380
needed some more development they want

582
00:25:07,940 --> 00:25:05,810
to take a look at an extensible bus

583
00:25:11,030 --> 00:25:07,950
develop some subsystems that could be

584
00:25:12,950 --> 00:25:11,040
used in future cubesat missions they

585
00:25:15,650 --> 00:25:12,960
wanted to take a look at the environment

586
00:25:17,360 --> 00:25:15,660
up there as well take a look and see how

587
00:25:21,140 --> 00:25:17,370
their attitude system would perform with

588
00:25:23,420 --> 00:25:21,150

a passive attitude system and one of the

589
00:25:25,790 --> 00:25:23,430
tall poles quite frankly and CubeSat

590
00:25:27,230 --> 00:25:25,800
missions especially data-hungry deep

591
00:25:30,110 --> 00:25:27,240
scientific missions is that

592
00:25:32,450 --> 00:25:30,120
communications question so we wanted to

593
00:25:35,300 --> 00:25:32,460
develop a high rate data s-band

594
00:25:37,100 --> 00:25:35,310
communication system and most

595
00:25:39,710 --> 00:25:37,110
importantly is what you've heard already

596
00:25:41,510 --> 00:25:39,720
from the panel it's really the student

597
00:25:45,920 --> 00:25:41,520
impact if we go to the first image

598
00:25:48,440 --> 00:25:45,930
please students have developed every

599
00:25:50,300 --> 00:25:48,450
major component within the cubesat

600
00:25:52,940 --> 00:25:50,310
develop developing the printed circuit

601
00:25:54,650 --> 00:25:52,950
boards populating the parts going

602
00:25:57,560 --> 00:25:54,660
through the entire life cycle of the

603
00:26:00,890 --> 00:25:57,570
project and hardware development and the

604
00:26:04,900 --> 00:26:00,900
next image please this is Hermes on the

605
00:26:07,550 --> 00:26:04,910
bench in Colorado a little bit before

606
00:26:08,840 --> 00:26:07,560
summer time when they were developing

607
00:26:10,220 --> 00:26:08,850
all the boards getting them together

608
00:26:12,830 --> 00:26:10,230
into the final check out and going

609
00:26:14,450 --> 00:26:12,840
through the final iterations the

610
00:26:16,880 --> 00:26:14,460
students are really the ones behind this

611
00:26:18,080 --> 00:26:16,890
entirely there's program managers that

612
00:26:20,540 --> 00:26:18,090
are responsible for budgets and

613
00:26:21,830 --> 00:26:20,550

personnel it's really a microcosm for

614
00:26:23,120 --> 00:26:21,840
what these students will be doing in

615
00:26:26,960 --> 00:26:23,130
just a few short years when they get out

616
00:26:30,530 --> 00:26:26,970
into the NASA and Industry the next

617
00:26:32,480 --> 00:26:30,540
picture please they go through the

618
00:26:33,860 --> 00:26:32,490
entire development lifecycle they

619
00:26:35,240 --> 00:26:33,870
develop the hardware and in fact we've

620
00:26:36,470 --> 00:26:35,250
taken a lot of lessons learn from this

621
00:26:38,060 --> 00:26:36,480
mission and applied it to our upcoming

622
00:26:40,430 --> 00:26:38,070
missions that we're really excited about

623
00:26:44,240 --> 00:26:40,440
as well that our CubeSat and other small

624
00:26:47,560 --> 00:26:44,250
satellite based missions in the next

625
00:26:50,600 --> 00:26:47,570
slide please they really do get a

626
00:26:52,130 --> 00:26:50,610
fantastic into end perspective so again

627
00:26:53,870 --> 00:26:52,140
some freshman might be working on

628
00:26:56,030 --> 00:26:53,880
soldering some boards together testing

629
00:27:00,560 --> 00:26:56,040
those out and as they go through their

630
00:27:01,910 --> 00:27:00,570
academic careers they get more skills

631
00:27:03,590 --> 00:27:01,920
through their classes that they can

632
00:27:06,200 --> 00:27:03,600
apply to the hands-on projects that they

633
00:27:08,150 --> 00:27:06,210
do and eventually end up as juniors or

634
00:27:11,060 --> 00:27:08,160
seniors working with hardware and a

635
00:27:14,540 --> 00:27:11,070
clean room facility in the next image

636
00:27:16,040 --> 00:27:14,550
please these are pictures these next

637
00:27:19,100 --> 00:27:16,050
three photos are over the past couple

638
00:27:21,290 --> 00:27:19,110

months really over the past year in

639
00:27:23,600 --> 00:27:21,300
Colorado were very fortunate to have

640
00:27:25,760 --> 00:27:23,610
some fantastic aerospace community

641
00:27:28,180 --> 00:27:25,770
support and they've really come through

642
00:27:30,380 --> 00:27:28,190
both in terms of technical mentorship

643
00:27:34,880 --> 00:27:30,390
debugging and some fantastic test

644
00:27:36,740 --> 00:27:34,890
facilities in the next photo this is our

645
00:27:39,500 --> 00:27:36,750
humble abode back at the University of

646
00:27:41,870 --> 00:27:39,510
Colorado with our bell jar I love this

647
00:27:44,390 --> 00:27:41,880
photo cubesat you can almost see right

648
00:27:46,070 --> 00:27:44,400
next to the pm's face but we have the

649
00:27:48,200 --> 00:27:46,080
the NASA meatball up there proudly

650
00:27:49,610 --> 00:27:48,210
displaying and this is really what helps

651
00:27:51,500 --> 00:27:49,620
to inspire a lot of the students is that

652
00:27:52,910 --> 00:27:51,510
correlation between NASA and actually

653
00:27:58,250 --> 00:27:52,920
launching something that they'd build

654
00:28:01,130 --> 00:27:58,260
into space in the next image again David

655
00:28:03,980 --> 00:28:01,140
had a fantastic human reference but this

656
00:28:06,110 --> 00:28:03,990
really helps to show what we're talking

657
00:28:07,730 --> 00:28:06,120
about the CubeSat is the very very small

658
00:28:10,730 --> 00:28:07,740
thing on the top of the vibration

659
00:28:13,490 --> 00:28:10,740
drumhead we were able to go down to a

660
00:28:16,760 --> 00:28:13,500
facility that tests huge huge huge

661
00:28:18,140 --> 00:28:16,770
satellites and we can say without a

662
00:28:21,530 --> 00:28:18,150
doubt that we've been we are the small

663
00:28:24,740 --> 00:28:21,540

satellite they've ever tested in the

664
00:28:26,360 --> 00:28:24,750
next image please and this is really

665
00:28:27,560 --> 00:28:26,370
representing something unique for us as

666
00:28:30,290 --> 00:28:27,570
well as we're going to the Mission

667
00:28:32,720 --> 00:28:30,300
Operations phases this is our s-band

668
00:28:33,830 --> 00:28:32,730
communication system just northeast of

669
00:28:35,330 --> 00:28:33,840
Boulder Colorado

670
00:28:36,769 --> 00:28:35,340
the students have put together the

671
00:28:39,680 --> 00:28:36,779
ground station have done a whole bunch

672
00:28:41,659 --> 00:28:39,690
of testing in addition to a UHF and VHF

673
00:28:44,180 --> 00:28:41,669
system on top of our building at the

674
00:28:46,820 --> 00:28:44,190
University of Colorado and in the final

675
00:28:48,680 --> 00:28:46,830
image this is our launch team this

676
00:28:50,960 --> 00:28:48,690
picture was only taken about two weeks

677
00:28:53,480 --> 00:28:50,970
ago these are all the mission operators

678
00:28:55,310 --> 00:28:53,490
some students are freshmen that have

679
00:28:56,630 --> 00:28:55,320
been under studies for folks who have

680
00:28:58,820 --> 00:28:56,640
been around a little bit longer but it's

681
00:29:01,730 --> 00:28:58,830
a fantastic way to get hands-on

682
00:29:03,529 --> 00:29:01,740
experience even at a very early age to

683
00:29:06,529 --> 00:29:03,539
then apply that as you go out into

684
00:29:07,820 --> 00:29:06,539
industry and I'd like to point out the

685
00:29:10,490 --> 00:29:07,830
picture at the very bottom you can see

686
00:29:14,240 --> 00:29:10,500
all the pizza boxes the Sun might be the

687
00:29:16,940 --> 00:29:14,250
the driver for the the solar activities

688
00:29:19,789 --> 00:29:16,950

around a lot of what glory studying

689
00:29:22,070 --> 00:29:19,799
pizza is really the the driver behind

690
00:29:24,529 --> 00:29:22,080
what students do and it's really topped

691
00:29:27,010 --> 00:29:24,539
off with the unforgettable experience of

692
00:29:30,350 --> 00:29:27,020
actually launching something into space

693
00:29:32,870 --> 00:29:30,360
thank you Brian key and we're ready now

694
00:29:34,399 --> 00:29:32,880
to take questions once again if you'll

695
00:29:36,409 --> 00:29:34,409
give your name and affiliation and we'll

696
00:29:38,029 --> 00:29:36,419
start with Nora where Wallace Santa

697
00:29:40,070 --> 00:29:38,039
Barbara news-press could you three

698
00:29:41,990 --> 00:29:40,080
gentlemen speak about how many people

699
00:29:44,720 --> 00:29:42,000
you brought with you this week and also

700
00:29:52,460 --> 00:29:44,730
financial commitment to create your

701
00:29:53,389 --> 00:29:52,470
experiment I'll start we have about 100

702
00:29:55,430 --> 00:29:53,399
students have been involved in the

703
00:29:57,110 --> 00:29:55,440
program over the past five years we have

704
00:29:59,539 --> 00:29:57,120
10 students that will be here physically

705
00:30:01,190 --> 00:29:59,549
in California for the launch and a

706
00:30:02,299 --> 00:30:01,200
couple three of our students the

707
00:30:05,000 --> 00:30:02,309
leadership of the team have been out

708
00:30:06,289 --> 00:30:05,010
here for a couple days one of the great

709
00:30:10,039 --> 00:30:06,299
things about cube SATs is they're

710
00:30:11,480 --> 00:30:10,049
relatively affordable the I'll use a lot

711
00:30:13,880 --> 00:30:11,490
of off-the-shelf parts figure out how to

712
00:30:16,279 --> 00:30:13,890
make them available for space so you're

713
00:30:18,830 --> 00:30:16,289

not in the billions or millions it's

714
00:30:24,380 --> 00:30:18,840
really quite affordable especially for

715
00:30:29,019 --> 00:30:24,390
university projects we have I believed

716
00:30:32,060 --> 00:30:29,029
seven students here for the launch and

717
00:30:33,799 --> 00:30:32,070
as Brian said you know you can spend

718
00:30:36,799 --> 00:30:33,809
tens of thousands of dollars on the

719
00:30:38,870 --> 00:30:36,809
materials and supplies for a cube set vs

720
00:30:41,010 --> 00:30:38,880
vs million so it sits on the orders of

721
00:30:43,440 --> 00:30:41,020
tens and

722
00:30:44,760 --> 00:30:43,450
we working on the arse for about five

723
00:30:46,530 --> 00:30:44,770
years as well and then probably about a

724
00:30:47,910 --> 00:30:46,540
hundred students have participated to

725
00:30:51,900 --> 00:30:47,920
the years on various aspects of the

726
00:30:54,650 --> 00:30:51,910
system so lots of impact the Montana

727
00:30:58,860 --> 00:30:54,660
State University official travel team

728
00:31:02,100 --> 00:30:58,870
here in California is is about 11 or 12

729
00:31:04,200 --> 00:31:02,110
people we have a number of students who

730
00:31:07,140 --> 00:31:04,210
are now in the industry a lot of them

731
00:31:09,270 --> 00:31:07,150
here in Southern California there it's

732
00:31:11,610 --> 00:31:09,280
an uncountable number i don't know how

733
00:31:13,470 --> 00:31:11,620
many are actually coming in i know that

734
00:31:16,770 --> 00:31:13,480
some students are flying in from halfway

735
00:31:19,470 --> 00:31:16,780
across the country former students I

736
00:31:23,840 --> 00:31:19,480
think we might number 20 people by the

737
00:31:27,150 --> 00:31:23,850
time tomorrow night's launch arrives the

738
00:31:30,720 --> 00:31:27,160

costs of building lease is is a little

739
00:31:33,990 --> 00:31:30,730
hard to quantify because we depend so

740
00:31:37,560 --> 00:31:34,000
much on on industry collaborators and

741
00:31:40,890 --> 00:31:37,570
partners to provide light kind support

742
00:31:43,260 --> 00:31:40,900
and and and and get get involved with us

743
00:31:47,100 --> 00:31:43,270
and our students it's good for them

744
00:31:49,400 --> 00:31:47,110
because they they get a chance to to vet

745
00:31:52,020 --> 00:31:49,410
students before they might hire them and

746
00:31:54,120 --> 00:31:52,030
and it's good for the students because

747
00:31:56,220 --> 00:31:54,130
they get to work with professionals and

748
00:32:02,190 --> 00:31:56,230
mentors and and have that industry

749
00:32:07,940 --> 00:32:02,200
contact that's so important so I'll just

750
00:32:13,560 --> 00:32:10,469
Janine Scully santa maria times lompoc

751
00:32:16,049 --> 00:32:13,570
record how valuable is this experience

752
00:32:18,330 --> 00:32:16,059
for the students to actually do this

753
00:32:21,509 --> 00:32:18,340
versus just reading books and writing

754
00:32:24,210 --> 00:32:21,519
papers oh I'd like to a little easier to

755
00:32:27,629 --> 00:32:24,220
answer yeah that now that we could talk

756
00:32:35,599 --> 00:32:27,639
about it it's it's it's incredibly

757
00:32:39,749 --> 00:32:35,609
valuable and I I it it so many instances

758
00:32:43,680 --> 00:32:39,759
will see a student who will design a

759
00:32:45,299 --> 00:32:43,690
system make a design in and just have so

760
00:32:46,320 --> 00:32:45,309
much confidence that it's that it's

761
00:32:48,060 --> 00:32:46,330
going to work that they won't even

762
00:32:50,519 --> 00:32:48,070
bother to build it you know all your

763
00:32:53,009 --> 00:32:50,529

launch isn't until a month from now look

764
00:32:54,779 --> 00:32:53,019
yeah but once you get my head and test

765
00:32:57,330 --> 00:32:54,789
your system out three years in advance

766
00:33:00,509 --> 00:32:57,340
and what they discover is it doesn't

767
00:33:02,669 --> 00:33:00,519
work and it's that interactive back and

768
00:33:04,200 --> 00:33:02,679
forth that's oh my gosh scratching the

769
00:33:06,839 --> 00:33:04,210
head and going back and trying to figure

770
00:33:08,539 --> 00:33:06,849
out why that's so important and the

771
00:33:11,279 --> 00:33:08,549
other thing that's very important is is

772
00:33:13,320 --> 00:33:11,289
the interdisciplinary nature of the

773
00:33:14,129 --> 00:33:13,330
project so you have a mechanical

774
00:33:16,649 --> 00:33:14,139
engineering student in electrical

775
00:33:18,330 --> 00:33:16,659
engineering a CS student they come

776
00:33:20,489 --> 00:33:18,340
together and they and they understand

777
00:33:22,409 --> 00:33:20,499
each others worlds a little better and

778
00:33:24,719 --> 00:33:22,419
they understand that they have to give

779
00:33:26,879 --> 00:33:24,729
and take in order to satisfy the entire

780
00:33:29,009 --> 00:33:26,889
mission systems engineering constraints

781
00:33:31,669 --> 00:33:29,019
so it's just huge it's just really huge

782
00:33:34,529 --> 00:33:31,679
and I could add one thing Dave on that

783
00:33:36,629 --> 00:33:34,539
working with NASA we took in this

784
00:33:38,700 --> 00:33:36,639
approach with the students as they have

785
00:33:40,859 --> 00:33:38,710
project managers and these project

786
00:33:43,320 --> 00:33:40,869
managers are required to manage the

787
00:33:44,609 --> 00:33:43,330
mission and report back to us and we put

788
00:33:48,239 --> 00:33:44,619

them through every one of the review

789
00:33:49,440 --> 00:33:48,249
cycles come launch night I have three

790
00:33:50,849 --> 00:33:49,450
slots for each one of the project

791
00:33:52,259 --> 00:33:50,859
manager on console so let me sit down

792
00:33:53,789 --> 00:33:52,269
console experiencing the whole effect

793
00:33:57,419 --> 00:33:53,799
now they don't know who might call them

794
00:33:59,999 --> 00:33:57,429
yet or not we may so but I think the

795
00:34:02,099 --> 00:34:00,009
experience they've experienced over the

796
00:34:04,469 --> 00:34:02,109
life of the mission the telecon the

797
00:34:07,680 --> 00:34:04,479
meetings has been a beneficial to them

798
00:34:12,659 --> 00:34:07,690
and it makes them a better manager or

799
00:34:22,149 --> 00:34:15,399
can you address the lifespan or is it

800
00:34:25,659 --> 00:34:22,159
the same as glorious at three years the

801
00:34:27,730 --> 00:34:25,669
hardware is built to last for a long

802
00:34:29,560 --> 00:34:27,740
long period of time for her me

803
00:34:31,359 --> 00:34:29,570
specifically were designed to last for

804
00:34:33,550 --> 00:34:31,369
at least six months if not a year in

805
00:34:36,460 --> 00:34:33,560
terms of primary and secondary mission

806
00:34:37,930 --> 00:34:36,470
objectives but there's no reason that I

807
00:34:42,070 --> 00:34:37,940
can't last for a long time operationally

808
00:34:43,149 --> 00:34:42,080
on orbit orbit life the over life for

809
00:34:46,180 --> 00:34:43,159
each of the satellites is probably on

810
00:34:47,800 --> 00:34:46,190
the order of 15 years but then for us

811
00:34:50,139 --> 00:34:47,810
it'll probably better better recycling

812
00:34:55,720 --> 00:34:50,149
time maybe 18 months two years would be

813
00:34:57,910 --> 00:34:55,730

a great goal for us I just add that most

814
00:35:00,730 --> 00:34:57,920
of these cubes none of the ones that are

815
00:35:04,210 --> 00:35:00,740
applying tomorrow night have any

816
00:35:05,980 --> 00:35:04,220
consumables so unlike glory where they

817
00:35:09,340 --> 00:35:05,990
have propellants and three years from

818
00:35:10,900 --> 00:35:09,350
now they may run out there's no reason

819
00:35:14,890 --> 00:35:10,910
to believe these satellites won't work

820
00:35:17,620 --> 00:35:14,900
for four years and years one of the

821
00:35:20,280 --> 00:35:17,630
technologies that does the program is

822
00:35:23,050 --> 00:35:20,290
set up to do is to try to utilize

823
00:35:26,109 --> 00:35:23,060
commercial off-the-shelf parts that you

824
00:35:29,380 --> 00:35:26,119
can just buy almost almost locally

825
00:35:31,690 --> 00:35:29,390
literally and we're trying to understand

826
00:35:34,060 --> 00:35:31,700
how those parts can survive in the space

827
00:35:36,570 --> 00:35:34,070
environment and we may have some early

828
00:35:40,750 --> 00:35:36,580
failures or we may understand that

829
00:35:42,160 --> 00:35:40,760
indeed low-cost commercial parts that

830
00:35:45,490 --> 00:35:42,170
are used in cell phones and everything

831
00:35:48,070 --> 00:35:45,500
else are just fine for satellites are

832
00:35:49,270 --> 00:35:48,080
real wessler KSBY TV I wondering from

833
00:35:51,700 --> 00:35:49,280
the three of you did you have to work

834
00:35:53,740 --> 00:35:51,710
with Cal Poly students to discuss the

835
00:35:59,230 --> 00:35:53,750
pea pod that was going to house your

836
00:36:01,870 --> 00:35:59,240
satellites we work very closely with

837
00:36:04,870 --> 00:36:01,880
with the team at Cal Poly excellent

838
00:36:06,970 --> 00:36:04,880

group of students and you know they are

839
00:36:09,370 --> 00:36:06,980
a real advocate for the cubesat form

840
00:36:12,880 --> 00:36:09,380
factor and work with schools throughout

841
00:36:14,770 --> 00:36:12,890
the country to to have them build cube

842
00:36:16,270 --> 00:36:14,780
sets and it was a great experience

843
00:36:19,820 --> 00:36:16,280
working with them work very closely with

844
00:36:27,780 --> 00:36:23,010
all right if we any follow-up questions

845
00:36:30,240 --> 00:36:27,790
here again in the front all right in

846
00:36:32,850 --> 00:36:30,250
that event that will look include our

847
00:36:36,030 --> 00:36:32,860
briefing a programming note about our

848
00:36:38,630 --> 00:36:36,040
NASA TV launch coverage it will begin at

849
00:36:40,680 --> 00:36:38,640
twelve-thirty a.m. pacific time on

850
00:36:43,560 --> 00:36:40,690
wednesday morning that's three thirty

851
00:36:48,450 --> 00:36:43,570
eastern time and it will conclude after

852
00:36:50,910 --> 00:36:48,460
we have deployed both glory and alana so