
NASA
SPACESTATION
LIVE

1
00:00:09,190 --> 00:00:07,190
one part of the mission of the

2
00:00:11,270 --> 00:00:09,200
international space station is to get

3
00:00:13,990 --> 00:00:11,280
human beings ready for the future of

4
00:00:16,790 --> 00:00:14,000
exploration for missions to destinations

5
00:00:18,710 --> 00:00:16,800
beyond low earth orbit the work on the

6
00:00:21,349 --> 00:00:18,720
vehicle that will carry those future

7
00:00:23,509 --> 00:00:21,359
astronauts the orion multipurpose crew

8
00:00:25,750 --> 00:00:23,519
vehicle is continuing at several

9
00:00:27,670 --> 00:00:25,760
locations around the country and this

10
00:00:29,910 --> 00:00:27,680
morning we're going to get an update on

11
00:00:32,389 --> 00:00:29,920
it from john mccullough the orion

12
00:00:33,990 --> 00:00:32,399
vehicle integration manager good morning

13
00:00:35,510 --> 00:00:34,000

it's nice to have you good morning it's

14
00:00:37,670 --> 00:00:35,520
good to be here it's like coming home

15
00:00:40,150 --> 00:00:37,680
been back in the control center

16
00:00:42,310 --> 00:00:40,160
2015 was a very busy year for orion tell

17
00:00:43,510 --> 00:00:42,320
me about some of the highlights that you

18
00:00:45,430 --> 00:00:43,520
guys saw

19
00:00:47,110 --> 00:00:45,440
it really was it is another busy year

20
00:00:48,150 --> 00:00:47,120
for ryan we seem to have a lot of them

21
00:00:50,549 --> 00:00:48,160
but

22
00:00:52,470 --> 00:00:50,559
we started off obviously uh learning and

23
00:00:54,709 --> 00:00:52,480
applying the lessons learned from eft

24
00:00:56,310 --> 00:00:54,719
one very successful test flight got a

25
00:00:58,549 --> 00:00:56,320
lot of data out of that rolling that

26
00:01:01,110 --> 00:00:58,559
into our designs and updates

27
00:01:03,430 --> 00:01:01,120
to allow us to conduct a very successful

28
00:01:04,469 --> 00:01:03,440
critical design review which we did last

29
00:01:06,149 --> 00:01:04,479
year

30
00:01:07,990 --> 00:01:06,159
along with our

31
00:01:09,030 --> 00:01:08,000
partners in exploration

32
00:01:11,030 --> 00:01:09,040
sls

33
00:01:13,030 --> 00:01:11,040
at marshall and ground systems at

34
00:01:15,270 --> 00:01:13,040
kennedy we all conducted our critical

35
00:01:17,350 --> 00:01:15,280
design reviews and so that was a very

36
00:01:19,910 --> 00:01:17,360
busy time for the team a large community

37
00:01:21,270 --> 00:01:19,920
review of all our products and and uh

38
00:01:24,710 --> 00:01:21,280

milestone

39
00:01:26,390 --> 00:01:24,720
achievements uh moving through there um

40
00:01:28,230 --> 00:01:26,400
we had the uh

41
00:01:30,230 --> 00:01:28,240
european structural test article

42
00:01:32,390 --> 00:01:30,240
delivered to plumbrook i think we have

43
00:01:34,230 --> 00:01:32,400
some pictures of that um

44
00:01:36,390 --> 00:01:34,240
those uh that was a very big milestone

45
00:01:38,469 --> 00:01:36,400
obviously our european partners uh have

46
00:01:40,630 --> 00:01:38,479
done a great deal in in building up the

47
00:01:42,789 --> 00:01:40,640
uh the

48
00:01:44,469 --> 00:01:42,799
service module portion of the spacecraft

49
00:01:46,389 --> 00:01:44,479
and so this test article is going to be

50
00:01:49,190 --> 00:01:46,399
used for uh

51
00:01:51,270 --> 00:01:49,200
extensive amount of test

52
00:01:52,389 --> 00:01:51,280
integration and mechanism deploys and

53
00:01:55,109 --> 00:01:52,399
and

54
00:01:58,149 --> 00:01:55,119
environmental uh testing at plum brook

55
00:01:59,749 --> 00:01:58,159
uh it'll then get also uh uh spend time

56
00:02:01,030 --> 00:01:59,759
at the kennedy space center so uh we're

57
00:02:02,709 --> 00:02:01,040
looking forward to that testing picking

58
00:02:04,709 --> 00:02:02,719
up right now they're in the process of

59
00:02:06,950 --> 00:02:04,719
outfitting it to the the rest of the

60
00:02:08,869 --> 00:02:06,960
vehicle uh test articles that are out

61
00:02:10,309 --> 00:02:08,879
there at plumbrook and you'll be seeing

62
00:02:14,869 --> 00:02:10,319
that testing as we come into the next

63
00:02:17,750 --> 00:02:14,879

year uh we've also had a huge uh

64
00:02:20,070 --> 00:02:17,760
milestone in at the michoud uh facility

65
00:02:22,630 --> 00:02:20,080
where we uh completed welding and you'll

66
00:02:25,750 --> 00:02:22,640
see those pictures there of the uh the

67
00:02:28,390 --> 00:02:25,760
em-1 mission uh flight vehicle so the

68
00:02:31,509 --> 00:02:28,400
pressure uh vessel for that uh

69
00:02:33,509 --> 00:02:31,519
that vehicle uh had uh seven critical

70
00:02:36,470 --> 00:02:33,519
welds uh the stir friction weld process

71
00:02:39,190 --> 00:02:36,480
is a very unique and amazing large

72
00:02:40,869 --> 00:02:39,200
mechanism uh process that uh

73
00:02:42,790 --> 00:02:40,879
if you've seen it it's it's quite an

74
00:02:45,430 --> 00:02:42,800
impressive thing to see and observe but

75
00:02:46,949 --> 00:02:45,440
uh all that welding uh occurred um and

76
00:02:48,630 --> 00:02:46,959
just actually finished up this last

77
00:02:51,110 --> 00:02:48,640
weekend so we'll talk about next year uh

78
00:02:53,350 --> 00:02:51,120
sure this year shortly

79
00:02:54,790 --> 00:02:53,360
moving on we also uh

80
00:02:57,750 --> 00:02:54,800
did a lot of

81
00:03:02,070 --> 00:02:57,760
drop testing uh that we're leading the

82
00:03:05,270 --> 00:03:02,080
uh the technology and the uh the

83
00:03:07,110 --> 00:03:05,280
workplace in terms of large parachute

84
00:03:08,710 --> 00:03:07,120
spacecraft return

85
00:03:09,509 --> 00:03:08,720
science and so

86
00:03:12,309 --> 00:03:09,519
that

87
00:03:14,390 --> 00:03:12,319
development sequence continued over the

88
00:03:16,309 --> 00:03:14,400

last year we also

89
00:03:17,990 --> 00:03:16,319
as you see here did a lot of human in

90
00:03:19,190 --> 00:03:18,000
the loop testing at the johnson space

91
00:03:22,710 --> 00:03:19,200
center and so this is the neutral

92
00:03:24,630 --> 00:03:22,720
buoyancy facility where we

93
00:03:25,750 --> 00:03:24,640
practice the ingress and egress of the

94
00:03:27,110 --> 00:03:25,760
the crew

95
00:03:28,949 --> 00:03:27,120
and different techniques and different

96
00:03:31,509 --> 00:03:28,959
approaches in different environments

97
00:03:33,670 --> 00:03:31,519
a lot of good testing there we also used

98
00:03:36,070 --> 00:03:33,680
the mock-ups in uh in building nine here

99
00:03:38,710 --> 00:03:36,080
at jsc to do other uh human in the lube

100
00:03:40,229 --> 00:03:38,720
testing and uh simulations and that's

101
00:03:42,630 --> 00:03:40,239
all just very

102
00:03:44,869 --> 00:03:42,640
very busy here yeah so very busy here

103
00:03:47,030 --> 00:03:44,879
tell me about some of the the milestones

104
00:03:49,190 --> 00:03:47,040
that are on the agenda for 2016. you've

105
00:03:51,750 --> 00:03:49,200
got a lot of in fact there was

106
00:03:54,070 --> 00:03:51,760
just an airdrop test last week

107
00:03:56,390 --> 00:03:54,080
that's correct yes so uh we did 17

108
00:03:57,990 --> 00:03:56,400
different uh drop tests to test the

109
00:03:59,990 --> 00:03:58,000
parachutes with different configurations

110
00:04:01,830 --> 00:04:00,000
different failures different

111
00:04:02,949 --> 00:04:01,840
techniques and

112
00:04:05,110 --> 00:04:02,959
different

113
00:04:06,789 --> 00:04:05,120

changes to the shoot design a little bit

114
00:04:08,869 --> 00:04:06,799
that was our developmental phase and

115
00:04:11,190 --> 00:04:08,879
that just completed over the last week a

116
00:04:12,869 --> 00:04:11,200
very successful final drop for that

117
00:04:16,229 --> 00:04:12,879
from there we have eight more drops this

118
00:04:18,150 --> 00:04:16,239
year and and and leading on to em1 where

119
00:04:19,590 --> 00:04:18,160
uh that's the that actually transitions

120
00:04:21,270 --> 00:04:19,600
into qualification testing so we

121
00:04:23,590 --> 00:04:21,280
actually are verifying and qualifying

122
00:04:25,670 --> 00:04:23,600
the design uh that we finished with the

123
00:04:27,510 --> 00:04:25,680
developmental phase so a team out there

124
00:04:29,030 --> 00:04:27,520
does a lot of great work and

125
00:04:30,710 --> 00:04:29,040
really pulls the whole whole process

126
00:04:32,390 --> 00:04:30,720
together again if you've been out there

127
00:04:33,990 --> 00:04:32,400
i had a chance to fly in the the

128
00:04:35,350 --> 00:04:34,000
helicopter for one of the drop tests and

129
00:04:37,270 --> 00:04:35,360
help with the recovery of some of the

130
00:04:39,670 --> 00:04:37,280
components and it's an amazing

131
00:04:41,990 --> 00:04:39,680
integrated process with a huge community

132
00:04:44,150 --> 00:04:42,000
that really pulls together

133
00:04:46,629 --> 00:04:44,160
all aspects of space flight it's very

134
00:04:49,430 --> 00:04:46,639
exciting so a lot goes on there

135
00:04:51,110 --> 00:04:49,440
so yeah that yuma drop test was very

136
00:04:53,830 --> 00:04:51,120
successful

137
00:04:59,830 --> 00:04:56,550
just finished this weekend the weld ford

138
00:05:02,390 --> 00:04:59,840

edm1 uh vehicle so

139
00:05:04,950 --> 00:05:02,400
all so the uh pressure vessel for the

140
00:05:07,830 --> 00:05:04,960
em1 flight is complete

141
00:05:09,430 --> 00:05:07,840
uh in terms of the assembly and so uh

142
00:05:11,270 --> 00:05:09,440
february beginning of february that's

143
00:05:13,590 --> 00:05:11,280
going to be shipping via the guppy to

144
00:05:14,950 --> 00:05:13,600
ksc for integration

145
00:05:16,870 --> 00:05:14,960
the ksc

146
00:05:19,029 --> 00:05:16,880
tell me the e-m1 we're talking about is

147
00:05:21,749 --> 00:05:19,039
the next flight test the exploration

148
00:05:23,909 --> 00:05:21,759
mission one and the vehicle is going to

149
00:05:25,990 --> 00:05:23,919
the kennedy space center soon and what

150
00:05:28,230 --> 00:05:26,000
happens to it once it gets there yeah so

151
00:05:31,430 --> 00:05:28,240
it's it's quite an extensive process so

152
00:05:34,150 --> 00:05:31,440
uh our experience with the eft one um

153
00:05:35,670 --> 00:05:34,160
really helped us uh improve and baseline

154
00:05:37,350 --> 00:05:35,680
and understand those processes so that

155
00:05:39,270 --> 00:05:37,360
we can be even more effective and

156
00:05:41,830 --> 00:05:39,280
efficient the the second time uh but

157
00:05:43,670 --> 00:05:41,840
once it gets to to uh the kennedy space

158
00:05:45,830 --> 00:05:43,680
center we're going to do a proof test uh

159
00:05:47,670 --> 00:05:45,840
pressure test where we'll pressurize the

160
00:05:49,590 --> 00:05:47,680
vehicle make sure that there's no leaks

161
00:05:53,110 --> 00:05:49,600
and no no issues with the with the

162
00:05:54,550 --> 00:05:53,120
pressure vessel itself and then the

163
00:05:55,749 --> 00:05:54,560

heat shield structure not the heat

164
00:05:58,469 --> 00:05:55,759
shield tiles but the heat shield

165
00:06:01,110 --> 00:05:58,479
structure will arrive and be assembled

166
00:06:03,189 --> 00:06:01,120
to the to the pressure vessel and then

167
00:06:04,629 --> 00:06:03,199
they'll spend the rest of the year uh 30

168
00:06:05,990 --> 00:06:04,639
different subsystems will be delivered

169
00:06:08,309 --> 00:06:06,000
to the to kennedy space center for

170
00:06:09,909 --> 00:06:08,319
integration they'll be uh very busy with

171
00:06:11,350 --> 00:06:09,919
harness

172
00:06:12,790 --> 00:06:11,360
incorporation into the vehicle they'll

173
00:06:14,469 --> 00:06:12,800
be very busy with

174
00:06:16,790 --> 00:06:14,479
a lot of the the tubing that's required

175
00:06:19,430 --> 00:06:16,800
for the prop system all gets routed in

176
00:06:21,189 --> 00:06:19,440
and hand installed uh to the vehicle and

177
00:06:23,350 --> 00:06:21,199
so that's largely what they'll be doing

178
00:06:26,309 --> 00:06:23,360
as they work towards the 2018 flight uh

179
00:06:27,670 --> 00:06:26,319
2017 is a large uh period of of uh

180
00:06:28,629 --> 00:06:27,680
integrated testing of the vehicle and

181
00:06:30,150 --> 00:06:28,639
all the different components after

182
00:06:31,430 --> 00:06:30,160
they've been assembled so

183
00:06:33,110 --> 00:06:31,440
a huge amount of work is going to be

184
00:06:34,550 --> 00:06:33,120
going on at the kennedy space center and

185
00:06:36,550 --> 00:06:34,560
that's as you say still a couple of

186
00:06:38,469 --> 00:06:36,560
years away before that that flight that

187
00:06:40,469 --> 00:06:38,479
that test flight but what happens during

188
00:06:43,110 --> 00:06:40,479

that test flight so that test flight is

189
00:06:45,110 --> 00:06:43,120
going to be a a huge milestone uh for

190
00:06:47,029 --> 00:06:45,120
the agency uh there's a little bit of

191
00:06:48,150 --> 00:06:47,039
video here i think as well

192
00:06:50,309 --> 00:06:48,160
we are actually going to take the

193
00:06:53,350 --> 00:06:50,319
vehicle and and exercise all the key

194
00:06:56,309 --> 00:06:53,360
systems many of the key systems required

195
00:06:58,150 --> 00:06:56,319
uh for future missions it's a 26 day

196
00:06:59,270 --> 00:06:58,160
flight it's going to go

197
00:07:02,070 --> 00:06:59,280
a very exciting part of it it's going to

198
00:07:04,469 --> 00:07:02,080
go 70 000 kilometers past the moon so

199
00:07:06,469 --> 00:07:04,479
farther than any other uh human rated

200
00:07:08,550 --> 00:07:06,479
spacecraft will have gone we're going to

201
00:07:11,270 --> 00:07:08,560
be delving into the proving ground which

202
00:07:13,350 --> 00:07:11,280
is a huge piece of of nasa's

203
00:07:14,390 --> 00:07:13,360
goals to get to mars so this is the

204
00:07:17,110 --> 00:07:14,400
environment where you're really going to

205
00:07:19,589 --> 00:07:17,120
test deep space systems understand

206
00:07:21,270 --> 00:07:19,599
our hardened systems work and and the

207
00:07:22,309 --> 00:07:21,280
environment the radiation environment

208
00:07:24,390 --> 00:07:22,319
and then the

209
00:07:27,029 --> 00:07:24,400
the ability to work in and navigate in

210
00:07:28,550 --> 00:07:27,039
that type of space is is very unique

211
00:07:29,990 --> 00:07:28,560
uh for

212
00:07:31,189 --> 00:07:30,000
for space flight so we're looking

213
00:07:33,430 --> 00:07:31,199

forward to that that's going to be a

214
00:07:35,670 --> 00:07:33,440
huge exercise of the vehicle 26 days in

215
00:07:37,189 --> 00:07:35,680
deep space great john thanks for

216
00:07:38,710 --> 00:07:37,199
bringing us up to speed we'll be keeping

217
00:07:40,230 --> 00:07:38,720
an eye on it very good appreciate it

218
00:07:42,790 --> 00:07:40,240
thanks for having me john mccullough is