



**SPACESTATION
LIVE**

1
00:00:09,430 --> 00:00:07,190
while the international space station

2
00:00:11,190 --> 00:00:09,440
continues to fly on with its mission

3
00:00:14,150 --> 00:00:11,200
nasa is also moving ahead with some

4
00:00:16,790 --> 00:00:14,160
testing on its next human spacecraft

5
00:00:19,029 --> 00:00:16,800
that is the orion vehicle after a

6
00:00:21,670 --> 00:00:19,039
successful flight test of an uncrewed

7
00:00:23,509 --> 00:00:21,680
spacecraft late last year the program is

8
00:00:25,189 --> 00:00:23,519
planning another important parachute

9
00:00:27,109 --> 00:00:25,199
test next week

10
00:00:29,109 --> 00:00:27,119
this one will include some planned

11
00:00:30,950 --> 00:00:29,119
failures of a couple of parachutes in

12
00:00:33,190 --> 00:00:30,960
the system this morning we're going to

13
00:00:35,350 --> 00:00:33,200

learn more about that plan i'm joined by

14

00:00:37,430 --> 00:00:35,360

chris johnson who is the orion capsule

15

00:00:39,910 --> 00:00:37,440

parachute assembly system project

16

00:00:41,350 --> 00:00:39,920

manager good morning welcome thanks for

17

00:00:43,030 --> 00:00:41,360

taking the time with us this morning

18

00:00:45,430 --> 00:00:43,040

thanks for having me what is it that you

19

00:00:47,830 --> 00:00:45,440

will be testing in these these tests in

20

00:00:49,830 --> 00:00:47,840

arizona next week yeah so we'll be doing

21

00:00:51,670 --> 00:00:49,840

an air drop test

22

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

that tests the full scale orion

23

00:00:55,590 --> 00:00:53,840

parachute system which includes forward

24

00:00:57,910 --> 00:00:55,600

recovery parachutes

25

00:01:01,110 --> 00:00:57,920

drug parachutes pilot parachutes and

26

00:01:04,469 --> 00:01:01,120

main parachutes and we use a

27

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

representative full-scale orion capsule

28

00:01:08,310 --> 00:01:06,159

to perform the test it has a critical

29

00:01:10,550 --> 00:01:08,320

interface to the parachute system as

30

00:01:11,750 --> 00:01:10,560

well as it generates a representative

31

00:01:14,469 --> 00:01:11,760

wake

32

00:01:16,149 --> 00:01:14,479

to be a more accurate environment

33

00:01:18,469 --> 00:01:16,159

to the parachutes

34

00:01:20,070 --> 00:01:18,479

so to do this test actually to get to

35

00:01:22,550 --> 00:01:20,080

the test point that's half the battle

36

00:01:24,469 --> 00:01:22,560

when we go out and do our tests in yuma

37

00:01:25,910 --> 00:01:24,479

so we use a test technique that we've

38

00:01:28,710 --> 00:01:25,920

developed

39

00:01:30,789 --> 00:01:28,720

we use a c-17 to take the test vehicle

40

00:01:34,710 --> 00:01:30,799

which includes the ptv up to an altitude

41

00:01:36,870 --> 00:01:34,720

of either 25 000 feet or 35 000 feet and

42

00:01:39,749 --> 00:01:36,880

depending on the test objectives we

43

00:01:42,310 --> 00:01:39,759

extract that vehicle from the c-17

44

00:01:44,789 --> 00:01:42,320

we separate the ptv from the platform or

45

00:01:46,950 --> 00:01:44,799

cradle that carries it up there and then

46

00:01:50,149 --> 00:01:46,960

we deploy programmer parachutes behind

47

00:01:53,350 --> 00:01:50,159

the ptv and that's used to get the orion

48

00:01:55,670 --> 00:01:53,360

parachute system to its test point

49

00:01:57,910 --> 00:01:55,680

so it's a very complicated test

50

00:01:59,510 --> 00:01:57,920

technique we use up to nine other

51
00:02:00,870 --> 00:01:59,520
parachutes other than the orion

52
00:02:02,870 --> 00:02:00,880
parachute system

53
00:02:04,389 --> 00:02:02,880
to perform an air drop test and that is

54
00:02:06,469 --> 00:02:04,399
one of the big engineering challenges we

55
00:02:08,389 --> 00:02:06,479
have when we do an air drop test and we

56
00:02:10,309 --> 00:02:08,399
were just showing folks uh one of the

57
00:02:12,309 --> 00:02:10,319
recent tests there how is what you're

58
00:02:14,869 --> 00:02:12,319
going to be doing this time different

59
00:02:16,229 --> 00:02:14,879
than than what you've done so far so

60
00:02:19,430 --> 00:02:16,239
this coming week we're doing what we

61
00:02:21,830 --> 00:02:19,440
call a minimum system uh test uh our

62
00:02:25,030 --> 00:02:21,840
system is designed so that one of the

63
00:02:26,869 --> 00:02:25,040

drug two drug parachutes can fail and

64

00:02:28,070 --> 00:02:26,879

one of the three main parachutes can

65

00:02:30,710 --> 00:02:28,080

fail

66

00:02:32,229 --> 00:02:30,720

and still safely land the vehicle so

67

00:02:34,470 --> 00:02:32,239

what we're doing this coming week is

68

00:02:36,710 --> 00:02:34,480

testing those failures one drug out and

69

00:02:38,630 --> 00:02:36,720

one main out in a sequence

70

00:02:40,630 --> 00:02:38,640

which is kind of an extreme condition

71

00:02:43,430 --> 00:02:40,640

for flight

72

00:02:45,589 --> 00:02:43,440

it also is good in terms of we're trying

73

00:02:47,910 --> 00:02:45,599

to understand more of the vehicle

74

00:02:49,830 --> 00:02:47,920

stability under those conditions

75

00:02:51,670 --> 00:02:49,840

underneath the parachutes and so

76

00:02:53,509 --> 00:02:51,680

obtaining the data on that will help

77

00:02:55,589 --> 00:02:53,519

engineers evaluate and predict the

78

00:02:58,470 --> 00:02:55,599

performance of the vehicle and the

79

00:03:00,710 --> 00:02:58,480

parachutes as a larger integrated system

80

00:03:04,070 --> 00:03:00,720

so you're taking the opportunity to find

81

00:03:06,390 --> 00:03:04,080

out how it's really worked not just what

82

00:03:09,030 --> 00:03:06,400

we thought on the design board yes

83

00:03:11,190 --> 00:03:09,040

exactly we use these tests to to go to

84

00:03:13,430 --> 00:03:11,200

the extremes and put the parachutes you

85

00:03:15,830 --> 00:03:13,440

know through a lot of work um

86

00:03:17,350 --> 00:03:15,840

in the in the extreme envelopes of the

87

00:03:19,509 --> 00:03:17,360

of the design

88

00:03:21,750 --> 00:03:19,519

to ensure that we have a safe system for

89

00:03:23,910 --> 00:03:21,760

the vehicle

90

00:03:25,509 --> 00:03:23,920

this sounds like a

91

00:03:26,710 --> 00:03:25,519

dumb question they say there are no dumb

92

00:03:29,190 --> 00:03:26,720

questions but

93

00:03:30,550 --> 00:03:29,200

why are parachutes for this vehicle so

94

00:03:33,030 --> 00:03:30,560

important

95

00:03:35,110 --> 00:03:33,040

well obviously the parachutes are very

96

00:03:38,149 --> 00:03:35,120

critical in the final phase of the

97

00:03:39,350 --> 00:03:38,159

descent of uh and landing a safe landing

98

00:03:41,430 --> 00:03:39,360

of a vehicle

99

00:03:42,710 --> 00:03:41,440

uh so you know the vehicle after

100

00:03:44,550 --> 00:03:42,720

re-entry it's going through the

101
00:03:47,030 --> 00:03:44,560
atmosphere once it gets into the thicker

102
00:03:49,190 --> 00:03:47,040
part of the atmosphere the rcs thrusters

103
00:03:50,710 --> 00:03:49,200
become less effective

104
00:03:53,030 --> 00:03:50,720
as well as we need to slow the vehicle

105
00:03:55,750 --> 00:03:53,040
down for a landing so we deploy the

106
00:03:57,030 --> 00:03:55,760
drogue parachutes around 310 miles per

107
00:03:58,630 --> 00:03:57,040
hour

108
00:03:59,830 --> 00:03:58,640
and that helps also stabilize the

109
00:04:04,149 --> 00:03:59,840
vehicle

110
00:04:06,229 --> 00:04:04,159
miles an hour and that's when we then

111
00:04:07,750 --> 00:04:06,239
deploy the main parachutes by using the

112
00:04:09,910 --> 00:04:07,760
pilot parachutes

113
00:04:12,070 --> 00:04:09,920

and so the main parachutes then slow the

114

00:04:14,949 --> 00:04:12,080

vehicle down to their final splashdown

115

00:04:17,349 --> 00:04:14,959

velocity of 17 miles an hour

116

00:04:18,870 --> 00:04:17,359

and that has a safe landing

117

00:04:20,710 --> 00:04:18,880

in the ocean

118

00:04:23,270 --> 00:04:20,720

is there any steering involved or is it

119

00:04:26,550 --> 00:04:23,280

just braking uh it's mostly braking now

120

00:04:28,310 --> 00:04:26,560

that said we have we do use roll control

121

00:04:30,469 --> 00:04:28,320

underneath the parachute so the rcs

122

00:04:31,590 --> 00:04:30,479

thrusters still are used to orient the

123

00:04:34,390 --> 00:04:31,600

vehicle

124

00:04:36,390 --> 00:04:34,400

on the final landing if there are winds

125

00:04:37,590 --> 00:04:36,400

such that we're moving in a horizontal

126
00:04:39,270 --> 00:04:37,600
velocity

127
00:04:40,710 --> 00:04:39,280
so we're trying to keep the toe of the

128
00:04:42,390 --> 00:04:40,720
vehicle

129
00:04:44,230 --> 00:04:42,400
pointing forward and landing in the

130
00:04:46,550 --> 00:04:44,240
ocean first now i understand there's

131
00:04:48,950 --> 00:04:46,560
still one more test after this one we've

132
00:04:51,830 --> 00:04:48,960
been discussing in the eva engineering

133
00:04:53,990 --> 00:04:51,840
evaluation series and then you move on

134
00:04:56,390 --> 00:04:54,000
to what's called qualifying this the

135
00:04:59,270 --> 00:04:56,400
whole system for flight so what what

136
00:05:01,510 --> 00:04:59,280
does that set testing series look like

137
00:05:03,510 --> 00:05:01,520
yeah so our qualification testing is a

138
00:05:05,590 --> 00:05:03,520

series of eight full system uh

139

00:05:07,990 --> 00:05:05,600

full-scale tests

140

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

that really put the final design which

141

00:05:13,270 --> 00:05:10,880

we're going to define in less than a

142

00:05:15,270 --> 00:05:13,280

month at our critical design review

143

00:05:17,590 --> 00:05:15,280

it'll put those those parachutes through

144

00:05:19,590 --> 00:05:17,600

the extreme conditions and environments

145

00:05:21,590 --> 00:05:19,600

that we want to expose them to to ensure

146

00:05:24,550 --> 00:05:21,600

that we have a safe system

147

00:05:27,270 --> 00:05:24,560

for final human certification for orion

148

00:05:29,990 --> 00:05:27,280

i mentioned that there was a successful

149

00:05:32,390 --> 00:05:30,000

uh flight test last year uh what did you

150

00:05:34,310 --> 00:05:32,400

learn about the parachutes at the end of

151

00:05:35,430 --> 00:05:34,320

that test back in december

152

00:05:38,150 --> 00:05:35,440

yeah so

153

00:05:40,230 --> 00:05:38,160

now while we do if for airdrop testing

154

00:05:42,230 --> 00:05:40,240

we we're able to heavily instrument and

155

00:05:44,150 --> 00:05:42,240

place cameras on the test vehicle that

156

00:05:46,790 --> 00:05:44,160

give us a lot of valuable engineering

157

00:05:48,230 --> 00:05:46,800

data and is the there's the bulk of what

158

00:05:50,230 --> 00:05:48,240

we use to

159

00:05:52,710 --> 00:05:50,240

predict the performance of the of the

160

00:05:55,189 --> 00:05:52,720

parachute system but they're they're

161

00:05:57,029 --> 00:05:55,199

when you have a reentry of a spacecraft

162

00:05:59,830 --> 00:05:57,039

you can learn some additional things

163

00:06:02,309 --> 00:05:59,840

that are just hard to represent uh even

164

00:06:03,990 --> 00:06:02,319

uh even doing air drop testing um an

165

00:06:06,390 --> 00:06:04,000

example is one of the things we learned

166

00:06:08,230 --> 00:06:06,400

is that the capsule wake or the weight

167

00:06:10,230 --> 00:06:08,240

that's generated behind the capsule is a

168

00:06:11,430 --> 00:06:10,240

little bit different than what we can

169

00:06:12,550 --> 00:06:11,440

test to

170

00:06:14,070 --> 00:06:12,560

and so we learned a little bit more

171

00:06:15,590 --> 00:06:14,080

insight about the drag performance over

172

00:06:17,670 --> 00:06:15,600

drag parachutes

173

00:06:19,590 --> 00:06:17,680

so we use that to tweak the models but

174

00:06:21,510 --> 00:06:19,600

in general the eft one flight that we

175

00:06:23,830 --> 00:06:21,520

had back in december was a very nominal

176
00:06:25,430 --> 00:06:23,840
flight and very consistent to the

177
00:06:27,830 --> 00:06:25,440
performance that we see when we do an

178
00:06:29,830 --> 00:06:27,840
air drop test in yume arizona which is i

179
00:06:32,550 --> 00:06:29,840
i take it a good thing if it's actually

180
00:06:34,150 --> 00:06:32,560
behaving the way you expected it to yes

181
00:06:36,230 --> 00:06:34,160
that's what we like to see we like to

182
00:06:38,070 --> 00:06:36,240
learn about the vehicle about the

183
00:06:39,830 --> 00:06:38,080
parachute system and what to change when

184
00:06:41,830 --> 00:06:39,840
we're doing these air drop tests which

185
00:06:44,150 --> 00:06:41,840
is the whole purpose of them so that

186
00:06:46,790 --> 00:06:44,160
when we have an actual uh spacecraft

187
00:06:48,550 --> 00:06:46,800
flight we have a safe system be eager to

188
00:06:50,309 --> 00:06:48,560

see what happens next week in arizona

189

00:06:52,550 --> 00:06:50,319

chris thanks very much you're welcome

190

00:06:54,629 --> 00:06:52,560

chris johnson is the orion capsule