
PAO

1
00:00:04,870 --> 00:00:02,790
hi welcome to the international space

2
00:00:07,590 --> 00:00:04,880
station flight controller flight control

3
00:00:09,270 --> 00:00:07,600
room we have here today uh anthony

4
00:00:10,390 --> 00:00:09,280
barria who is a spartan flight

5
00:00:13,270 --> 00:00:10,400
controller and he's going to give us an

6
00:00:15,270 --> 00:00:13,280
update on the uh ammonia link that we

7
00:00:17,430 --> 00:00:15,280
had the space walk over the weekend to

8
00:00:19,189 --> 00:00:17,440
repair thanks so much for joining us

9
00:00:20,710 --> 00:00:19,199
anthony good morning glad to be here

10
00:00:22,150 --> 00:00:20,720
okay why don't we start with uh real

11
00:00:23,990 --> 00:00:22,160
quick explaining what a spartan is

12
00:00:25,189 --> 00:00:24,000
because okay that background spartan's

13
00:00:27,830 --> 00:00:25,199

in charge of the electrical and the

14
00:00:30,070 --> 00:00:27,840
thermal systems onboard station so uh

15
00:00:32,150 --> 00:00:30,080
all the ammonia power all the ammonia

16
00:00:33,430 --> 00:00:32,160
cooling systems on the external uh on

17
00:00:35,750 --> 00:00:33,440
the external part of the station that

18
00:00:38,229 --> 00:00:35,760
takes away the heat from the modules and

19
00:00:40,069 --> 00:00:38,239
the in this case the eva was done on the

20
00:00:41,910 --> 00:00:40,079
uh the cooling system that cools the

21
00:00:44,150 --> 00:00:41,920
batteries you know just like a cellu

22
00:00:45,590 --> 00:00:44,160
cellular phone

23
00:00:47,670 --> 00:00:45,600
batteries get hot when they are

24
00:00:49,510 --> 00:00:47,680
discharging and so we have to have an

25
00:00:51,590 --> 00:00:49,520
ammonia cooling system to radiate that

26
00:00:53,750 --> 00:00:51,600
heat away via radiator so we've got a

27
00:00:56,229 --> 00:00:53,760
pump runs it through the the batteries

28
00:00:57,670 --> 00:00:56,239
underneath the batteries and then uh

29
00:00:59,990 --> 00:00:57,680
releases that heat into space by our

30
00:01:02,630 --> 00:01:00,000
radiator so that's uh that's where we

31
00:01:04,310 --> 00:01:02,640
had the uh the the leak this past week

32
00:01:05,830 --> 00:01:04,320
and we have a graphic here of uh what

33
00:01:07,429 --> 00:01:05,840
that area looks like exactly so that's

34
00:01:09,510 --> 00:01:07,439
out on the p6 truss we're talking the

35
00:01:11,590 --> 00:01:09,520
far port side of the of the space

36
00:01:13,510 --> 00:01:11,600
station now p6 truss was actually even

37
00:01:15,350 --> 00:01:13,520
though it's way out on the end uh that

38
00:01:17,350 --> 00:01:15,360

piece of truss has been on orbit since

39
00:01:18,950 --> 00:01:17,360
gosh 2000 or something something in that

40
00:01:20,710 --> 00:01:18,960
time frame right

41
00:01:22,390 --> 00:01:20,720
and uh that was back when the station

42
00:01:24,630 --> 00:01:22,400
was much smaller so as we built out the

43
00:01:26,710 --> 00:01:24,640
truss we've been able to finally put in

44
00:01:29,830 --> 00:01:26,720
its final spot which you see here on the

45
00:01:31,910 --> 00:01:29,840
far port side of the vehicle so uh

46
00:01:33,670 --> 00:01:31,920
you know these cooling systems that

47
00:01:35,429 --> 00:01:33,680
spartan is in charge of along with the

48
00:01:36,870 --> 00:01:35,439
electrical systems are what

49
00:01:38,870 --> 00:01:36,880
keep the lights on and keep everything

50
00:01:40,149 --> 00:01:38,880
running on station very important

51
00:01:41,830 --> 00:01:40,159
absolutely and we want to make sure that

52
00:01:43,109 --> 00:01:41,840
they're running okay so that's what

53
00:01:45,030 --> 00:01:43,119
normally the spartan officer is in

54
00:01:46,630 --> 00:01:45,040
charge of making sure that the all the

55
00:01:47,990 --> 00:01:46,640
lights and pumps and fans and everything

56
00:01:49,270 --> 00:01:48,000
are working right so we can get you know

57
00:01:51,030 --> 00:01:49,280
good science down on the station and

58
00:01:53,190 --> 00:01:51,040
keep the keep the crew members safe and

59
00:01:55,270 --> 00:01:53,200
so last week we noticed that there was a

60
00:01:57,749 --> 00:01:55,280
a leak in the ammonia system that cools

61
00:01:59,190 --> 00:01:57,759
that uh area on the p6 truss right

62
00:02:00,870 --> 00:01:59,200
that's correct so we sent

63
00:02:02,709 --> 00:02:00,880

chris cassidy and tom marshburn out to

64
00:02:04,950 --> 00:02:02,719
do a spacewalk and take a look at it and

65
00:02:06,389 --> 00:02:04,960
get it prepared and and changed out is

66
00:02:08,070 --> 00:02:06,399
that right that's correct and that was

67
00:02:09,990 --> 00:02:08,080
done in record time you know we've we've

68
00:02:11,990 --> 00:02:10,000
actually known that we've had a leak on

69
00:02:14,949 --> 00:02:12,000
the system for several years a very

70
00:02:17,030 --> 00:02:14,959
small leak starting back in 2006 about a

71
00:02:19,270 --> 00:02:17,040
pound and a half per year so out of a

72
00:02:21,670 --> 00:02:19,280
you know a system that's several dozen

73
00:02:23,670 --> 00:02:21,680
pounds you know 100 maybe 100 pounds

74
00:02:25,589 --> 00:02:23,680
that's not that big of a deal so the

75
00:02:27,589 --> 00:02:25,599
first thing we did was we decided we'll

76
00:02:30,150 --> 00:02:27,599
just feed the leak and so that was done

77
00:02:32,630 --> 00:02:30,160
on ulf6 back in 2011

78
00:02:35,030 --> 00:02:32,640
mike fink and uh and drew feustel went

79
00:02:36,470 --> 00:02:35,040
out to the p6 worksite and refilled that

80
00:02:37,830 --> 00:02:36,480
with ammonia from one of the other

81
00:02:39,110 --> 00:02:37,840
ammonia systems

82
00:02:41,030 --> 00:02:39,120
so we thought we were doing pretty good

83
00:02:42,869 --> 00:02:41,040
then and then the leak rate picked up

84
00:02:46,309 --> 00:02:42,879
last year middle of last year and that's

85
00:02:48,550 --> 00:02:46,319
when sunny and aki went out in eba 20 in

86
00:02:50,150 --> 00:02:48,560
early november of 2012 and that was to

87
00:02:52,229 --> 00:02:50,160
try and isolate the radiator because the

88
00:02:54,630 --> 00:02:52,239

leak had gotten a lot worse

89
00:02:56,309 --> 00:02:54,640
well we had a 50 50 chance on whether or

90
00:02:58,229 --> 00:02:56,319
not the leak was in the radiator or in

91
00:02:59,589 --> 00:02:58,239
the pump those are the two parts that

92
00:03:02,229 --> 00:02:59,599
you can replace

93
00:03:04,309 --> 00:03:02,239
and as we learned after eva 20 which

94
00:03:05,910 --> 00:03:04,319
sunny naki did in november wasn't in the

95
00:03:07,430 --> 00:03:05,920
radiator so

96
00:03:10,229 --> 00:03:07,440
we kept an eye on it we were watching

97
00:03:11,190 --> 00:03:10,239
the leak and sure enough on thursday

98
00:03:13,110 --> 00:03:11,200
morning

99
00:03:15,190 --> 00:03:13,120
the crew called down seeing ammonia

100
00:03:17,190 --> 00:03:15,200
flakes let me show what that looks like

101
00:03:18,550 --> 00:03:17,200
here good video of it here yeah that's

102
00:03:20,149 --> 00:03:18,560
usually that should be liquid

103
00:03:22,790 --> 00:03:20,159
pressurized ammonia but when it's in the

104
00:03:24,309 --> 00:03:22,800
vacuum of space it will uh turn into

105
00:03:25,030 --> 00:03:24,319
these small flakes here which you can

106
00:03:27,990 --> 00:03:25,040
see

107
00:03:29,750 --> 00:03:28,000
and so our leak rate which in mid 2012

108
00:03:31,670 --> 00:03:29,760
was a five pound per year leak rate

109
00:03:34,149 --> 00:03:31,680
turned into maybe a five pound per day

110
00:03:35,910 --> 00:03:34,159
leak rate we couldn't operate yeah we

111
00:03:37,910 --> 00:03:35,920
couldn't operate for very long with that

112
00:03:40,149 --> 00:03:37,920
so that's what led to the quickest

113
00:03:41,990 --> 00:03:40,159

turnaround stage eva that i think we've

114
00:03:43,750 --> 00:03:42,000
ever done here well and despite the

115
00:03:46,309 --> 00:03:43,760
quick turnaround it was very successful

116
00:03:49,110 --> 00:03:46,319
right they got in and out and uh the

117
00:03:51,030 --> 00:03:49,120
right amount of time on saturday and and

118
00:03:53,110 --> 00:03:51,040
it looks like they've got it fixed well

119
00:03:55,110 --> 00:03:53,120
well yeah right amount of time well they

120
00:03:57,030 --> 00:03:55,120
they raced through i think when i was

121
00:03:58,949 --> 00:03:57,040
putting in my console log that the crew

122
00:04:00,390 --> 00:03:58,959
was exiting the airlock as i was typing

123
00:04:03,190 --> 00:04:00,400
the sentence the crew reported from the

124
00:04:05,270 --> 00:04:03,200
far end of p6 so certainly got the the

125
00:04:07,429 --> 00:04:05,280
right crew members up there to to scurry

126
00:04:09,429 --> 00:04:07,439
around and do this pretty fast and as

127
00:04:12,229 --> 00:04:09,439
you said yeah we're feeling pretty good

128
00:04:13,750 --> 00:04:12,239
about where we are um the big leak you

129
00:04:15,990 --> 00:04:13,760
know the gusher that we were that the

130
00:04:18,310 --> 00:04:16,000
crew called down seeing the flakes from

131
00:04:20,150 --> 00:04:18,320
we think we've got that isolated to the

132
00:04:22,550 --> 00:04:20,160
pump that we have taken out of the

133
00:04:24,469 --> 00:04:22,560
system we call we've referred to that uh

134
00:04:27,830 --> 00:04:24,479
the nomenclature of that pump is now mr

135
00:04:30,710 --> 00:04:27,840
leaky uh and mr leaky is we still have

136
00:04:32,469 --> 00:04:30,720
uh telemetry insight on that pump and we

137
00:04:34,150 --> 00:04:32,479
can watch it right now you know the

138
00:04:35,510 --> 00:04:34,160

spartan officer matt gilson sitting over

139
00:04:36,950 --> 00:04:35,520
there right now is what just showed me

140
00:04:39,189 --> 00:04:36,960
the plot

141
00:04:41,590 --> 00:04:39,199
the accumulator in that pump is going

142
00:04:43,510 --> 00:04:41,600
down and that pump we know that that is

143
00:04:46,230 --> 00:04:43,520
got a big leak in it so that's a good

144
00:04:47,590 --> 00:04:46,240
sign whether or not the small leak we

145
00:04:49,909 --> 00:04:47,600
were seeing or small air leak we were

146
00:04:51,510 --> 00:04:49,919
seeing last year is also in that pump

147
00:04:53,270 --> 00:04:51,520
well we'll have to check that over time

148
00:04:54,790 --> 00:04:53,280
but right now we're feeling pretty good

149
00:04:56,629 --> 00:04:54,800
we definitely got the big leak and we're

150
00:04:58,390 --> 00:04:56,639
definitely able to run the system right

151
00:05:00,230 --> 00:04:58,400
now which is uh if you would have asked

152
00:05:01,510 --> 00:05:00,240
me last thursday if we were being this

153
00:05:03,590 --> 00:05:01,520
position right now i'd have said

154
00:05:05,909 --> 00:05:03,600
absolutely not so we're doing we're

155
00:05:07,670 --> 00:05:05,919
doing very well right now great so um

156
00:05:09,749 --> 00:05:07,680
how long will it take for you to know

157
00:05:11,189 --> 00:05:09,759
whether or not the small leak is gone if

158
00:05:12,790 --> 00:05:11,199
you fix that with with this change out

159
00:05:14,629 --> 00:05:12,800
as well so we have you know we have

160
00:05:16,070 --> 00:05:14,639
teams of engineers as well as those of

161
00:05:18,310 --> 00:05:16,080
us spartans who watch the data very

162
00:05:20,469 --> 00:05:18,320
closely and it'll probably take a couple

163
00:05:22,710 --> 00:05:20,479

of months at least to be able to say you

164
00:05:25,510 --> 00:05:22,720
know what we think the uh what we think

165
00:05:27,749 --> 00:05:25,520
this system is doing and it'll take

166
00:05:29,510 --> 00:05:27,759
longer if it's leaking less or leaking

167
00:05:31,510 --> 00:05:29,520
not at all so as we've told our

168
00:05:33,430 --> 00:05:31,520
management we want to uh if they don't

169
00:05:35,590 --> 00:05:33,440
hear from us it's a good thing probably

170
00:05:36,710 --> 00:05:35,600
so we'll keep an eye on the data and

171
00:05:37,749 --> 00:05:36,720
we'll look at it over the next couple of

172
00:05:40,070 --> 00:05:37,759
months and make sure the system's

173
00:05:42,469 --> 00:05:40,080
running healthy but we've got actually

174
00:05:43,830 --> 00:05:42,479
we you know when we first saw the leak

175
00:05:45,909 --> 00:05:43,840
the first thing we did was we stopped

176
00:05:47,510 --> 00:05:45,919
the pump and when we did that we slowed

177
00:05:49,189 --> 00:05:47,520
down the leak rate so we've managed to

178
00:05:50,790 --> 00:05:49,199
hold on to enough ammonia that we can

179
00:05:53,110 --> 00:05:50,800
run the system and we still have a

180
00:05:54,230 --> 00:05:53,120
little bit of margin to with which that

181
00:05:56,309 --> 00:05:54,240
you know as

182
00:05:57,749 --> 00:05:56,319
fluids cool down they contract so they

183
00:05:59,990 --> 00:05:57,759
have a little bit less

184
00:06:02,070 --> 00:06:00,000
fluid in the system we can survive those

185
00:06:03,909 --> 00:06:02,080
sort of orbital variations and and be

186
00:06:06,870 --> 00:06:03,919
okay so we're looking pretty good right

187
00:06:08,629 --> 00:06:06,880
now okay well um i know after i guess

188
00:06:09,510 --> 00:06:08,639

after they discovered the leak and knew

189
00:06:11,189 --> 00:06:09,520
we were

190
00:06:12,629 --> 00:06:11,199
planning to lose that loop of the

191
00:06:14,309 --> 00:06:12,639
electrical system they moved everything

192
00:06:16,070 --> 00:06:14,319
over to the other loop so that we

193
00:06:18,550 --> 00:06:16,080
wouldn't turn off you know anything

194
00:06:20,390 --> 00:06:18,560
unnecessarily has that all been re-moved

195
00:06:21,830 --> 00:06:20,400
back to that's a good question so the

196
00:06:24,550 --> 00:06:21,840
electrical power system of the station

197
00:06:26,469 --> 00:06:24,560
is designed very well uh we have a lot

198
00:06:29,189 --> 00:06:26,479
of redundancy and the ability to cross

199
00:06:31,510 --> 00:06:29,199
strap different power channels so that

200
00:06:33,110 --> 00:06:31,520
maybe one solar array feeds what another

201
00:06:35,590 --> 00:06:33,120
solar array should have that's all done

202
00:06:37,830 --> 00:06:35,600
at the mbsu main bus switching unit

203
00:06:39,749 --> 00:06:37,840
which you may remember from evas 18 and

204
00:06:42,070 --> 00:06:39,759
19 that sunny aki

205
00:06:43,990 --> 00:06:42,080
replaced one of those last year so this

206
00:06:45,670 --> 00:06:44,000
is the we're talking about the two bravo

207
00:06:47,510 --> 00:06:45,680
channel that's actually our winds up

208
00:06:49,749 --> 00:06:47,520
being our most important channel so when

209
00:06:52,230 --> 00:06:49,759
we saw that leaking we

210
00:06:54,230 --> 00:06:52,240
handed over its loads to the two alpha

211
00:06:56,469 --> 00:06:54,240
channels so two alpha is now supporting

212
00:06:58,629 --> 00:06:56,479
all the twos the two and the two b

213
00:07:00,870 --> 00:06:58,639

and since then we haven't been actually

214
00:07:02,710 --> 00:07:00,880
pulling any power from the two bravo

215
00:07:04,309 --> 00:07:02,720
channel the one with which had the leak

216
00:07:05,990 --> 00:07:04,319
on it we're just waiting on some

217
00:07:07,589 --> 00:07:06,000
software updates to account for the new

218
00:07:10,150 --> 00:07:07,599
pump and then early next week we should

219
00:07:12,230 --> 00:07:10,160
be able to produce a happy healthy two

220
00:07:13,510 --> 00:07:12,240
bravo channel supporting its own loads

221
00:07:14,710 --> 00:07:13,520
okay and after that would you say that

222
00:07:16,230 --> 00:07:14,720
everything would be kind of back to

223
00:07:18,070 --> 00:07:16,240
normal

224
00:07:19,270 --> 00:07:18,080
as far as the as far as crew and

225
00:07:20,629 --> 00:07:19,280
everybody else would be concerned to be

226
00:07:22,550 --> 00:07:20,639
back to normal as far as the spartan

227
00:07:24,230 --> 00:07:22,560
console uh is concerned there's we

228
00:07:26,629 --> 00:07:24,240
haven't been in a normal for quite a

229
00:07:28,070 --> 00:07:26,639
long time but uh but it'll be manageable

230
00:07:29,350 --> 00:07:28,080
we'll call it manageable all right well

231
00:07:30,950 --> 00:07:29,360
thanks so much for talking with us i