
PAO

1
00:00:05,030 --> 00:00:03,429
here inside the international space

2
00:00:07,749 --> 00:00:05,040
station flight control room right now

3
00:00:10,070 --> 00:00:07,759
the teams are continuing to track and uh

4
00:00:11,990 --> 00:00:10,080
monitor the cooling loop issue on board

5
00:00:13,669 --> 00:00:12,000
the international space station and to

6
00:00:15,669 --> 00:00:13,679
kick off our show today joining me on

7
00:00:17,910 --> 00:00:15,679
console is the expedition 38 lead flight

8
00:00:19,750 --> 00:00:17,920
director judd freiling judd first off

9
00:00:21,349 --> 00:00:19,760
thanks so much for joining me here today

10
00:00:22,790 --> 00:00:21,359
and we've been following along with this

11
00:00:24,310 --> 00:00:22,800
issue and i know you and the team have

12
00:00:25,830 --> 00:00:24,320
been doing a lot of really creative

13
00:00:27,830 --> 00:00:25,840

stuff to try and get this loop back up

14
00:00:29,029 --> 00:00:27,840
to its nominal settings what are just

15
00:00:31,349 --> 00:00:29,039
some of the things you guys have been

16
00:00:32,150 --> 00:00:31,359
doing over the last couple of days

17
00:00:35,350 --> 00:00:32,160
sure

18
00:00:37,750 --> 00:00:35,360
as as you're aware of dan uh it's uh

19
00:00:40,709 --> 00:00:37,760
we're we're in a spot now with uh our

20
00:00:42,389 --> 00:00:40,719
external curling loop bravo uh that it's

21
00:00:43,830 --> 00:00:42,399
rejecting all the heat of the station

22
00:00:45,590 --> 00:00:43,840
and we're trying to get this

23
00:00:47,270 --> 00:00:45,600
loop alpha

24
00:00:49,830 --> 00:00:47,280
into a state where we can reject some of

25
00:00:53,750 --> 00:00:49,840
the heat of the internal loads so just

26
00:00:59,750 --> 00:00:56,709
usually we we operate with the loop loop

27
00:01:01,670 --> 00:00:59,760
alpha in a closed loop control mode so

28
00:01:02,950 --> 00:01:01,680
we're uh we're we're unable to do that

29
00:01:04,710 --> 00:01:02,960
now so

30
00:01:07,350 --> 00:01:04,720
sort of the uh the the efforts we're

31
00:01:10,149 --> 00:01:07,360
trying to do is is kind of learn how to

32
00:01:11,990 --> 00:01:10,159
operate this uh this this loop in a in a

33
00:01:13,429 --> 00:01:12,000
kind of an open loop mode where we're

34
00:01:14,390 --> 00:01:13,439
we're using the controllers here on the

35
00:01:17,749 --> 00:01:14,400
ground

36
00:01:20,950 --> 00:01:17,759
to uh to to to to be the closed loop

37
00:01:22,310 --> 00:01:20,960
so and so real quick just what was the

38
00:01:23,910 --> 00:01:22,320

failure

39
00:01:25,670 --> 00:01:23,920
you know it was with one of the the

40
00:01:28,390 --> 00:01:25,680
valves actually inside the loop correct

41
00:01:30,230 --> 00:01:28,400
right right so so we have a pump module

42
00:01:32,310 --> 00:01:30,240
package assembly that's that's outside

43
00:01:34,469 --> 00:01:32,320
that that's the pump that flows all the

44
00:01:35,910 --> 00:01:34,479
ammonia throughout the the external

45
00:01:37,109 --> 00:01:35,920
loops

46
00:01:41,270 --> 00:01:37,119
and um

47
00:01:44,389 --> 00:01:41,280
on that that loop alpha and uh what what

48
00:01:47,670 --> 00:01:44,399
what failed was the regulation of of of

49
00:01:49,510 --> 00:01:47,680
of where the the hot in the and the warm

50
00:01:51,109 --> 00:01:49,520
ammonia go right so we call that the

51
00:01:55,590 --> 00:01:51,119
flow control valve

52
00:01:56,789 --> 00:01:55,600
as such where we're only getting a lot

53
00:01:58,950 --> 00:01:56,799
of cold

54
00:02:00,709 --> 00:01:58,960
cold ammonia into the system right so

55
00:02:03,030 --> 00:02:00,719
that means that

56
00:02:05,670 --> 00:02:03,040
we've got an interface between

57
00:02:07,429 --> 00:02:05,680
the the external ammonia system and the

58
00:02:09,270 --> 00:02:07,439
the internal cooling system which is an

59
00:02:10,949 --> 00:02:09,280
internal water loops

60
00:02:12,550 --> 00:02:10,959
that are cooled by water

61
00:02:14,470 --> 00:02:12,560
uh through what's called an interface

62
00:02:17,030 --> 00:02:14,480
heat exchanger okay

63
00:02:19,030 --> 00:02:17,040

if uh if we get the uh the ammonia

64
00:02:21,510 --> 00:02:19,040
outside too cold

65
00:02:23,589 --> 00:02:21,520
uh we we are unable to integrate these

66
00:02:25,750 --> 00:02:23,599
interfaith interface heat exchangers uh

67
00:02:27,430 --> 00:02:25,760
with with the internal loops because

68
00:02:29,910 --> 00:02:27,440
uh there's a risk of freezing the

69
00:02:31,910 --> 00:02:29,920
internal water loops and and uh if we

70
00:02:33,350 --> 00:02:31,920
freeze the internal water loops that's a

71
00:02:35,350 --> 00:02:33,360
that's a bad thing sounds like a much

72
00:02:37,430 --> 00:02:35,360
bigger problem right it's

73
00:02:39,190 --> 00:02:37,440
what ends up happening is those those

74
00:02:40,229 --> 00:02:39,200
interface heat exchangers have a really

75
00:02:41,990 --> 00:02:40,239
small

76
00:02:44,229 --> 00:02:42,000
uh if you can think of a radiator on

77
00:02:45,990 --> 00:02:44,239
your car real small fins and and in

78
00:02:47,750 --> 00:02:46,000
places where

79
00:02:51,350 --> 00:02:47,760
they connect and and and if we freeze

80
00:02:53,509 --> 00:02:51,360
this the water expands excuse me expands

81
00:02:55,110 --> 00:02:53,519
and uh

82
00:02:57,509 --> 00:02:55,120
would allow ammonia to come to the

83
00:02:58,630 --> 00:02:57,519
internal uh part of station and that's

84
00:03:01,110 --> 00:02:58,640
that's a really bad thing for them

85
00:03:02,229 --> 00:03:01,120
definitely astronauts avoid and so what

86
00:03:04,149 --> 00:03:02,239
what have the teams here in mission

87
00:03:06,309 --> 00:03:04,159
control been doing to try and you know

88
00:03:07,589 --> 00:03:06,319

get around this issue get the loops back

89
00:03:10,149 --> 00:03:07,599
up to functioning to where they should

90
00:03:12,949 --> 00:03:10,159
be sure so so the external loop we're

91
00:03:15,110 --> 00:03:12,959
still uh like i said uh trying to use uh

92
00:03:16,390 --> 00:03:15,120
uh the the team on the ground is kind of

93
00:03:19,430 --> 00:03:16,400
a closed loop

94
00:03:21,430 --> 00:03:19,440
control uh by commanding manually so we

95
00:03:24,309 --> 00:03:21,440
we've tried to command manually the the

96
00:03:27,190 --> 00:03:24,319
loops we we we see the the heat goes up

97
00:03:28,710 --> 00:03:27,200
and we command a little adjustments on a

98
00:03:30,630 --> 00:03:28,720
different valve not this flow control

99
00:03:33,190 --> 00:03:30,640
valve but a different valve

100
00:03:35,350 --> 00:03:33,200
that is regulating the cold

101
00:03:37,190 --> 00:03:35,360
ammonia that goes into the pump

102
00:03:38,070 --> 00:03:37,200
so so we kind of pinch off that valve a

103
00:03:39,830 --> 00:03:38,080
little bit

104
00:03:42,229 --> 00:03:39,840
and uh

105
00:03:44,149 --> 00:03:42,239
that that allows the loop to warm up and

106
00:03:46,710 --> 00:03:44,159
then we open it up a little bit and

107
00:03:48,229 --> 00:03:46,720
allows the loop to cool down a bit and

108
00:03:50,070 --> 00:03:48,239
it's my understanding that this is a

109
00:03:51,509 --> 00:03:50,080
loop that you know before you guys

110
00:03:53,270 --> 00:03:51,519
targeted it it was one that was just

111
00:03:55,350 --> 00:03:53,280
open or closed i mean this is something

112
00:03:57,190 --> 00:03:55,360
that loop wasn't necessarily designed to

113
00:04:00,149 --> 00:03:57,200

do right so this this valve that we're

114
00:04:03,110 --> 00:04:00,159
manipulating uh is is called a radiator

115
00:04:05,110 --> 00:04:03,120
a return isolation valve so as the name

116
00:04:06,869 --> 00:04:05,120
implies it's it's an isolation valve and

117
00:04:09,750 --> 00:04:06,879
so normally it would just be open or

118
00:04:12,149 --> 00:04:09,760
closed so so we're using this particular

119
00:04:13,830 --> 00:04:12,159
isolation valve in a in a manner that it

120
00:04:15,589 --> 00:04:13,840
wasn't originally designed to be used

121
00:04:17,590 --> 00:04:15,599
and so there's there's a lot of finesse

122
00:04:20,390 --> 00:04:17,600
and basically what we do is

123
00:04:22,469 --> 00:04:20,400
as we start it at a known position

124
00:04:23,670 --> 00:04:22,479
we tell it to drive

125
00:04:25,990 --> 00:04:23,680
and then

126
00:04:28,070 --> 00:04:26,000
a number of seconds after it drives we

127
00:04:30,469 --> 00:04:28,080
pull the power from the valve so that

128
00:04:32,790 --> 00:04:30,479
fixes it in a certain spot and can you

129
00:04:34,950 --> 00:04:32,800
give us just a general sense of how that

130
00:04:36,469 --> 00:04:34,960
fix has been working so far and or what

131
00:04:38,070 --> 00:04:36,479
you're looking at or if you're going to

132
00:04:39,590 --> 00:04:38,080
continue doing that or are you looking

133
00:04:40,629 --> 00:04:39,600
at other things you know in the coming

134
00:04:43,110 --> 00:04:40,639
days

135
00:04:45,670 --> 00:04:43,120
sure the uh the the fidelity that we

136
00:04:47,510 --> 00:04:45,680
have here on the ground to uh to to

137
00:04:49,110 --> 00:04:47,520
precisely control

138
00:04:51,189 --> 00:04:49,120

when that valve

139
00:04:54,230 --> 00:04:51,199
you know starts moving in stops

140
00:04:55,110 --> 00:04:54,240
is uh on the order of um

141
00:04:56,469 --> 00:04:55,120
about

142
00:05:00,150 --> 00:04:56,479
point

143
00:05:02,230 --> 00:05:00,160
somewhere in that range

144
00:05:03,749 --> 00:05:02,240
um we really need the fidelity to be

145
00:05:06,950 --> 00:05:03,759
much finer than that we need it to be on

146
00:05:10,150 --> 00:05:06,960
the order of point one seconds okay okay

147
00:05:11,990 --> 00:05:10,160
so uh the way we can rely be reliably

148
00:05:13,590 --> 00:05:12,000
produce that is

149
00:05:15,830 --> 00:05:13,600
by

150
00:05:17,430 --> 00:05:15,840
putting some software on the computers

151
00:05:18,950 --> 00:05:17,440
on board

152
00:05:21,189 --> 00:05:18,960
that that

153
00:05:23,510 --> 00:05:21,199
basically allows us to get that finer

154
00:05:25,590 --> 00:05:23,520
control and so so so engineers and

155
00:05:27,270 --> 00:05:25,600
coders overnight have been working on uh

156
00:05:28,710 --> 00:05:27,280
kind of a software we call it a patch a

157
00:05:31,029 --> 00:05:28,720
software fix

158
00:05:33,029 --> 00:05:31,039
to one of the computers that controls

159
00:05:34,710 --> 00:05:33,039
controls that valve movement

160
00:05:38,070 --> 00:05:34,720
and

161
00:05:40,710 --> 00:05:38,080
we we have we've identified the the code

162
00:05:43,110 --> 00:05:40,720
fix we're testing it out right now and

163
00:05:45,670 --> 00:05:43,120

uh hopefully by this afternoon uh we'll

164
00:05:48,390 --> 00:05:45,680
be able to uplink it to the vehicle and

165
00:05:51,189 --> 00:05:48,400
uh and then uh start to again re-learn

166
00:05:54,310 --> 00:05:51,199
how to how to manipulate that isolation

167
00:05:56,550 --> 00:05:54,320
valve such that we can control the the

168
00:05:59,189 --> 00:05:56,560
temperatures of the external loop pretty

169
00:06:01,350 --> 00:05:59,199
reliably okay well thanks again judd

170
00:06:03,350 --> 00:06:01,360
again the teams here in mission control

171
00:06:04,469 --> 00:06:03,360
flying a ship for over 10 years now and

172
00:06:05,830 --> 00:06:04,479
they're still learning how to do new

173
00:06:08,390 --> 00:06:05,840
things with it

174
00:06:10,070 --> 00:06:08,400
so continue to follow along as you guys

175
00:06:11,830 --> 00:06:10,080
try and get that loop back into its

176
00:06:13,189 --> 00:06:11,840
nominal configuration really appreciate

177
00:06:15,029 --> 00:06:13,199
you coming on and giving us a quick