
PAO

1
00:00:04,630 --> 00:00:03,190
we're here again in the space station

2
00:00:06,390 --> 00:00:04,640
flight control room all the activities

3
00:00:08,549 --> 00:00:06,400
going well and as we've mentioned the

4
00:00:10,709 --> 00:00:08,559
focus has been continuing to be on the

5
00:00:12,470 --> 00:00:10,719
htv operations which

6
00:00:14,230 --> 00:00:12,480
continued throughout the weekend

7
00:00:16,470 --> 00:00:14,240
actually resulting in the off day for

8
00:00:18,470 --> 00:00:16,480
the crew members but it was done in

9
00:00:20,150 --> 00:00:18,480
large part due to a lot of different

10
00:00:21,429 --> 00:00:20,160
teams here on the

11
00:00:23,590 --> 00:00:21,439
on the ground team

12
00:00:25,429 --> 00:00:23,600
joining us here is megan levins who is

13
00:00:27,830 --> 00:00:25,439

the one of the robotics officers but

14
00:00:29,109 --> 00:00:27,840
specifically the lead for robot thanks

15
00:00:30,390 --> 00:00:29,119
for joining us

16
00:00:32,310 --> 00:00:30,400
why don't you start by can you explain

17
00:00:34,709 --> 00:00:32,320
to us what robot is

18
00:00:36,790 --> 00:00:34,719
robot is our robotics onboard trainer

19
00:00:38,310 --> 00:00:36,800
it's what our astronauts use in order to

20
00:00:41,350 --> 00:00:38,320
prepare for

21
00:00:42,869 --> 00:00:41,360
big robotic missions like htv4

22
00:00:44,229 --> 00:00:42,879
so they use it as it's kind of a

23
00:00:45,350 --> 00:00:44,239
simulation of what they'll actually be

24
00:00:47,670 --> 00:00:45,360
doing on the real day so they can

25
00:00:49,190 --> 00:00:47,680
practice in advance and this is a tool

26
00:00:50,709 --> 00:00:49,200
that they use

27
00:00:52,950 --> 00:00:50,719
from when they're assigned for the

28
00:00:54,709 --> 00:00:52,960
mission as well as on orbit yes it's the

29
00:00:55,990 --> 00:00:54,719
same simulation they use on the ground

30
00:00:57,510 --> 00:00:56,000
so they spend all their time on the

31
00:01:00,709 --> 00:00:57,520
ground preparing

32
00:01:03,029 --> 00:01:00,719
for like the hdb4 or a spacex mission or

33
00:01:04,789 --> 00:01:03,039
an eba using this same software so when

34
00:01:06,230 --> 00:01:04,799
they get on board they can use what

35
00:01:08,950 --> 00:01:06,240
they're very used to and familiar to

36
00:01:11,190 --> 00:01:08,960
them and is of a high quality

37
00:01:12,950 --> 00:01:11,200
nature to prepare on board

38
00:01:14,550 --> 00:01:12,960

can you tell us a little bit about the

39
00:01:17,109 --> 00:01:14,560
training curriculum for robot and

40
00:01:18,550 --> 00:01:17,119
robotics in general how does that once a

41
00:01:19,830 --> 00:01:18,560
individual is selected as an astronaut

42
00:01:21,429 --> 00:01:19,840
is that part of their astronaut

43
00:01:22,630 --> 00:01:21,439
candidate training is there a more

44
00:01:24,070 --> 00:01:22,640
advanced

45
00:01:26,550 --> 00:01:24,080
skill or training that only occurs once

46
00:01:27,990 --> 00:01:26,560
they're assigned to a mission they do a

47
00:01:29,350 --> 00:01:28,000
general training before they're assigned

48
00:01:30,789 --> 00:01:29,360
to a mission

49
00:01:32,950 --> 00:01:30,799
that they get qualified to use the

50
00:01:35,429 --> 00:01:32,960
robotic manipulator that can arm too and

51
00:01:37,030 --> 00:01:35,439
then once they are assigned they use

52
00:01:38,390 --> 00:01:37,040
simulations like robot to prepare

53
00:01:39,910 --> 00:01:38,400
specifically for the mission that they

54
00:01:42,950 --> 00:01:39,920
have assigned so our crews that are on

55
00:01:44,870 --> 00:01:42,960
board now used the cement to prepare for

56
00:01:46,389 --> 00:01:44,880
h2v4

57
00:01:47,830 --> 00:01:46,399
once they got in orbit about two weeks

58
00:01:49,510 --> 00:01:47,840
out since it may have been a long time

59
00:01:51,350 --> 00:01:49,520
since they've been on the ground they

60
00:01:52,789 --> 00:01:51,360
used robot as well as the can arm two to

61
00:01:54,950 --> 00:01:52,799
prepare

62
00:01:57,109 --> 00:01:54,960
kind of refresh their skills remind them

63
00:01:58,709 --> 00:01:57,119

of what's really involved with htv4 so

64
00:01:59,830 --> 00:01:58,719
that they're very prepared when the time

65
00:02:01,429 --> 00:01:59,840
comes

66
00:02:03,830 --> 00:02:01,439
and some of our viewers may have heard

67
00:02:05,510 --> 00:02:03,840
about doug in the past which is also

68
00:02:07,670 --> 00:02:05,520
another term that's frequently used when

69
00:02:10,229 --> 00:02:07,680
robotics comes up can you explain to us

70
00:02:11,990 --> 00:02:10,239
the distinction between doug and robot

71
00:02:13,589 --> 00:02:12,000
dug and robot are similar

72
00:02:16,309 --> 00:02:13,599
doug is used more for situational

73
00:02:18,229 --> 00:02:16,319
awareness it's more of a graphic

74
00:02:20,710 --> 00:02:18,239
tool it shows the crew members the space

75
00:02:22,949 --> 00:02:20,720
station they can put the can arm to an

76
00:02:24,550 --> 00:02:22,959
eva crew member the htv in places where

77
00:02:26,470 --> 00:02:24,560
they expect it to be and see what that

78
00:02:27,910 --> 00:02:26,480
looks like robot is a little more in

79
00:02:30,070 --> 00:02:27,920
depth in that it actually simulates the

80
00:02:31,990 --> 00:02:30,080
entire robotics workstation so they have

81
00:02:34,229 --> 00:02:32,000
hand controllers to actually fly they

82
00:02:35,430 --> 00:02:34,239
can arm two around go in for the capture

83
00:02:36,550 --> 00:02:35,440
press that trigger to get the good

84
00:02:37,509 --> 00:02:36,560
capture

85
00:02:39,350 --> 00:02:37,519
and then

86
00:02:41,190 --> 00:02:39,360
do you know whatever other operations

87
00:02:42,949 --> 00:02:41,200
they may have coming up

88
00:02:44,949 --> 00:02:42,959

how much proficiency training does a

89
00:02:46,550 --> 00:02:44,959
crew member usually need to prepare for

90
00:02:47,830 --> 00:02:46,560
these types of dynamic activities that

91
00:02:50,070 --> 00:02:47,840
we just had

92
00:02:52,630 --> 00:02:50,080
well in cases like htv4 our nominal plan

93
00:02:55,110 --> 00:02:52,640
they do about three robot sessions

94
00:02:57,270 --> 00:02:55,120
and then two sessions with canadarm2

95
00:02:58,150 --> 00:02:57,280
where they actually go over and grapple

96
00:02:59,509 --> 00:02:58,160
or

97
00:03:01,190 --> 00:02:59,519
at least go over the pin of a real

98
00:03:02,630 --> 00:03:01,200
grapple fixture flying from the cupola

99
00:03:04,470 --> 00:03:02,640
workstation itself

100
00:03:06,869 --> 00:03:04,480
and how long is the session

101
00:03:09,030 --> 00:03:06,879
about an hour depending on the session

102
00:03:10,550 --> 00:03:09,040
we'll do anything from watching the hdb

103
00:03:13,270 --> 00:03:10,560
approach so they can refresh on their

104
00:03:15,030 --> 00:03:13,280
htv specific

105
00:03:16,630 --> 00:03:15,040
telemetry and then we'll go through and

106
00:03:17,990 --> 00:03:16,640
actually fly the robotic manipulator a

107
00:03:19,509 --> 00:03:18,000
couple times so they can get

108
00:03:20,790 --> 00:03:19,519
re-familiarize themselves with that

109
00:03:22,070 --> 00:03:20,800
operation as well

110
00:03:23,030 --> 00:03:22,080
anywhere from an hour to an hour and a

111
00:03:25,430 --> 00:03:23,040
half

112
00:03:26,869 --> 00:03:25,440
so robot recently underwent some

113
00:03:28,550 --> 00:03:26,879

upgrades can you talk to us a little bit

114
00:03:29,990 --> 00:03:28,560
about that yes

115
00:03:31,589 --> 00:03:30,000
as you can imagine something that's so

116
00:03:32,789 --> 00:03:31,599
graphic intensive like robot it does

117
00:03:34,789 --> 00:03:32,799
take a really long time for the

118
00:03:35,990 --> 00:03:34,799
simulation to even start which is

119
00:03:38,229 --> 00:03:36,000
basically a person standing there

120
00:03:39,910 --> 00:03:38,239
watching a computer boot which is

121
00:03:41,830 --> 00:03:39,920
not quite entertaining

122
00:03:43,430 --> 00:03:41,840
now what we start with ht4 is we can

123
00:03:45,030 --> 00:03:43,440
actually do that part of the operation

124
00:03:46,789 --> 00:03:45,040
from the ground so as soon as the crew

125
00:03:47,990 --> 00:03:46,799
member is ready to start their operation

126
00:03:49,430 --> 00:03:48,000
they can walk right up to the robot

127
00:03:51,110 --> 00:03:49,440
workstation and it's all set up and

128
00:03:52,070 --> 00:03:51,120
ready to go for them

129
00:03:54,070 --> 00:03:52,080
and

130
00:03:55,110 --> 00:03:54,080
i'm curious it seems like this might

131
00:03:56,550 --> 00:03:55,120
have been something that could have been

132
00:03:58,869 --> 00:03:56,560
designed all along but this was actually

133
00:04:01,110 --> 00:03:58,879
an upgrade done to specifically preserve

134
00:04:02,869 --> 00:04:01,120
some more crew time yes this is we're

135
00:04:04,630 --> 00:04:02,879
paving the way so they can do more signs

136
00:04:06,229 --> 00:04:04,640
better prepare for htv get the space

137
00:04:07,509 --> 00:04:06,239
station ready do you have any sense of

138
00:04:09,429 --> 00:04:07,519

how much time that saves like how much

139
00:04:11,589 --> 00:04:09,439
did that boot up take basically in the

140
00:04:14,229 --> 00:04:11,599
two weeks leading up to a free flyer it

141
00:04:16,469 --> 00:04:14,239
saved over an hour and a half of time

142
00:04:17,990 --> 00:04:16,479
which is a lot of crew time

143
00:04:19,830 --> 00:04:18,000
and so this was the first time that

144
00:04:21,270 --> 00:04:19,840
they've been able to use that yes

145
00:04:22,550 --> 00:04:21,280
then we'll be rolling this plan out for

146
00:04:24,629 --> 00:04:22,560
all of the free flyers so we'll get this

147
00:04:26,830 --> 00:04:24,639
crew time savings every time

148
00:04:29,030 --> 00:04:26,840
sounds like a very valuable

149
00:04:30,629 --> 00:04:29,040
upgrade you're also explaining to me

150
00:04:32,310 --> 00:04:30,639
that you're also an instructor wizard

151
00:04:33,670 --> 00:04:32,320
which is kind of unusual for flight

152
00:04:36,230 --> 00:04:33,680
controllers

153
00:04:37,749 --> 00:04:36,240
uh yes it's just i started my background

154
00:04:39,430 --> 00:04:37,759
started with instruction which is how

155
00:04:41,189 --> 00:04:39,440
i'm so familiar with robots since it is

156
00:04:43,270 --> 00:04:41,199
a crew training tool as well as a flight

157
00:04:45,110 --> 00:04:43,280
control tool so it helps kind of segue

158
00:04:46,629 --> 00:04:45,120
into that nicely

159
00:04:48,390 --> 00:04:46,639
and can you tell us a little bit about

160
00:04:51,350 --> 00:04:48,400
your background that led you to nasa and

161
00:04:53,510 --> 00:04:51,360
being a robotics instructor

162
00:04:55,270 --> 00:04:53,520
i got my degree in physics from the

163
00:04:57,430 --> 00:04:55,280

university of nevada reno and i've

164
00:04:59,510 --> 00:04:57,440
always loved the space program i always

165
00:05:01,510 --> 00:04:59,520
knew i would end up here and robotics is

166
00:05:02,950 --> 00:05:01,520
a very interesting field so it was an

167
00:05:04,710 --> 00:05:02,960
easy transition

168
00:05:07,510 --> 00:05:04,720
started off as an instructor training

169
00:05:09,029 --> 00:05:07,520
the crew members all the way back with

170
00:05:10,710 --> 00:05:09,039
increment 19

171
00:05:12,870 --> 00:05:10,720
all the way up till now and then start

172
00:05:14,710 --> 00:05:12,880
on the flight control side with

173
00:05:16,390 --> 00:05:14,720
actually executing ops from the

174
00:05:18,950 --> 00:05:16,400
mission control i would think having

175
00:05:20,790 --> 00:05:18,960
that instructor perspective would really

176
00:05:22,230 --> 00:05:20,800
help from being as being a flight

177
00:05:24,070 --> 00:05:22,240
controller as well especially

178
00:05:25,430 --> 00:05:24,080
interfacing with the crew or knowing how

179
00:05:27,029 --> 00:05:25,440
they were trained and being able to kind

180
00:05:28,070 --> 00:05:27,039
of relate to them for real-time ops it

181
00:05:29,670 --> 00:05:28,080
does really help when the crew is

182
00:05:31,029 --> 00:05:29,680
involved to have a better understanding

183
00:05:32,390 --> 00:05:31,039
or at least a really good understanding

184
00:05:33,830 --> 00:05:32,400
of how they're thinking and especially

185
00:05:35,270 --> 00:05:33,840
if you've trained this particular crew

186
00:05:36,710 --> 00:05:35,280
you're very familiar with their habits

187
00:05:38,870 --> 00:05:36,720
and what they like to do and how they

188
00:05:40,950 --> 00:05:38,880

operate each person is different so it

189
00:05:43,350 --> 00:05:40,960
helps and there's an instructor assigned

190
00:05:45,350 --> 00:05:43,360
to each crew is that how it works

191
00:05:46,950 --> 00:05:45,360
i i would imagine or it seems like i've

192
00:05:48,710 --> 00:05:46,960
even heard a little bit robotics is some

193
00:05:50,629 --> 00:05:48,720
of the more challenging training that

194
00:05:51,990 --> 00:05:50,639
astronauts go through it is and

195
00:05:53,430 --> 00:05:52,000
especially since it's not something you

196
00:05:56,310 --> 00:05:53,440
deal with every day

197
00:05:58,070 --> 00:05:56,320
it has to come up periodically it's very

198
00:06:00,070 --> 00:05:58,080
it can be intense can you tell us a

199
00:06:01,990 --> 00:06:00,080
little bit about what kind of skills are

200
00:06:03,909 --> 00:06:02,000
required or what are what are the

201
00:06:07,110 --> 00:06:03,919
challenging aspects of it

202
00:06:08,870 --> 00:06:07,120
it's a lot of hand-eye coordination

203
00:06:10,309 --> 00:06:08,880
basically you have two at the robotics

204
00:06:11,510 --> 00:06:10,319
workstation we have two hand controllers

205
00:06:14,550 --> 00:06:11,520
and you have to operate these two hand

206
00:06:16,870 --> 00:06:14,560
controllers simultaneously to control a

207
00:06:18,309 --> 00:06:16,880
very large robotic arm out in free space

208
00:06:19,430 --> 00:06:18,319
and make sure you're watching all your

209
00:06:21,510 --> 00:06:19,440
clearances and looking at all your

210
00:06:23,189 --> 00:06:21,520
camera views and out your window it's

211
00:06:25,110 --> 00:06:23,199
it takes a lot of brain power

212
00:06:26,710 --> 00:06:25,120
yeah and doing two hand controllers

213
00:06:28,070 --> 00:06:26,720

simultaneously sounds like that would be

214
00:06:29,830 --> 00:06:28,080
hard i know it would be challenging for

215
00:06:32,790 --> 00:06:29,840
me yes and especially with things like

216
00:06:34,550 --> 00:06:32,800
http 4 you really do need both of them

217
00:06:35,990 --> 00:06:34,560
gotcha well thank you so much megan for

218
00:06:37,670 --> 00:06:36,000
joining us and explaining to us some of

219
00:06:39,350 --> 00:06:37,680
the behind the scenes upgrades that are

220
00:06:41,110 --> 00:06:39,360
going on that have helped the crew and

221
00:06:42,710 --> 00:06:41,120
the ground control team be successful