1
00:00:05,349 --> 00:00:02,790
good day i'm kelly humphries and with me

2
00:00:07,590 --> 00:00:05,359
today in mission control houston is tim

3
00:00:10,310 --> 00:00:07,600
braithwaite he's the manager of the

4
00:00:11,749 --> 00:00:10,320
canadian space agency liaison office

5
00:00:14,230 --> 00:00:11,759
here at the johnson space center in

6
00:00:17,269 --> 00:00:14,240
houston uh tim's pretty excited because

7
00:00:18,870 --> 00:00:17,279
uh canadian astronaut chris hadfield is

8
00:00:21,189 --> 00:00:18,880
getting ready to arrive at the

9
00:00:22,870 --> 00:00:21,199
international space station on friday

10
00:00:24,870 --> 00:00:22,880
welcome tim

11
00:00:27,109 --> 00:00:24,880
thank you kelly it's good to be here hey

12
00:00:29,429 --> 00:00:27,119
uh tell us a little bit about yourself

13
00:00:32,389 --> 00:00:29,439

first off uh how you came to be here in

14
00:00:35,510 --> 00:00:32,399
houston and where you're from in canada

15
00:00:37,990 --> 00:00:35,520
and what your area of expertise is

16
00:00:39,270 --> 00:00:38,000
well um i'm canadian i'm from toronto in

17
00:00:40,709 --> 00:00:39,280
ontario

18
00:00:42,790 --> 00:00:40,719
and i'm

19
00:00:44,310 --> 00:00:42,800
i'm an engineer i

20
00:00:46,709 --> 00:00:44,320
started out working at what was then

21
00:00:49,029 --> 00:00:46,719
called spar aerospace in toronto

22
00:00:51,350 --> 00:00:49,039
and had the good fortune to be an

23
00:00:53,110 --> 00:00:51,360
engineer working on the design of

24
00:00:55,510 --> 00:00:53,120
the mobile servicing system canada's

25
00:00:57,350 --> 00:00:55,520
contribution to the space station

26
00:00:59,189 --> 00:00:57,360
and at the time we were doing detailed

27
00:01:00,790 --> 00:00:59,199
design work on the

28
00:01:03,110 --> 00:01:00,800
canadarm2 as we call it the space

29
00:01:05,670 --> 00:01:03,120
station remote manipulator also called

30
00:01:07,830 --> 00:01:05,680
sometimes the big arm

31
00:01:09,109 --> 00:01:07,840
and i was there living working in

32
00:01:12,870 --> 00:01:09,119
toronto

33
00:01:14,870 --> 00:01:12,880
and in 1995 canadian space agency

34
00:01:17,590 --> 00:01:14,880
started looking for people who were

35
00:01:19,830 --> 00:01:17,600
going to be flight controllers down here

36
00:01:23,429 --> 00:01:19,840
and also in montreal

37
00:01:25,429 --> 00:01:23,439
to flight control the robots

38
00:01:27,030 --> 00:01:25,439

from mission control and i thought that

39
00:01:29,510 --> 00:01:27,040
sounded like a pretty cool thing so i

40
00:01:31,109 --> 00:01:29,520
applied and ended up moving down here

41
00:01:32,870 --> 00:01:31,119
working for the canadian space agency

42
00:01:34,630 --> 00:01:32,880
then at the end of 95. i've been here

43
00:01:36,069 --> 00:01:34,640
ever since

44
00:01:37,990 --> 00:01:36,079
you know you and i have worked a lot of

45
00:01:39,350 --> 00:01:38,000
shifts together on mission control and

46
00:01:42,069 --> 00:01:39,360
you've always been a pleasure to work

47
00:01:44,389 --> 00:01:42,079
with and and your robotic background has

48
00:01:46,630 --> 00:01:44,399
uh led you to rise up the ranks a little

49
00:01:49,030 --> 00:01:46,640
bit uh at csa and we're happy to have

50
00:01:51,270 --> 00:01:49,040
you as a liaison uh tell us about your

51
00:01:52,870 --> 00:01:51,280
role now in working with canadian

52
00:01:54,469 --> 00:01:52,880
astronauts and

53
00:01:56,069 --> 00:01:54,479
the overall

54
00:01:57,749 --> 00:01:56,079
canadian international partnership

55
00:02:00,469 --> 00:01:57,759
contributions to the international space

56
00:02:02,709 --> 00:02:00,479
station right well um we have a canada

57
00:02:05,429 --> 00:02:02,719
has a small liaison office here

58
00:02:08,150 --> 00:02:05,439
and i left the mission operations world

59
00:02:09,350 --> 00:02:08,160
in 2005 and moved up into the liaison

60
00:02:13,110 --> 00:02:09,360
office and i've been managing that

61
00:02:16,790 --> 00:02:15,670
we support the program the space station

62
00:02:18,390 --> 00:02:16,800
program

63
00:02:21,190 --> 00:02:18,400

go to a lot of meetings a lot of what we

64
00:02:22,790 --> 00:02:21,200
do in liaison work is communications

65
00:02:24,070 --> 00:02:22,800
putting the right people in touch so

66
00:02:25,670 --> 00:02:24,080
that they can solve the problems that we

67
00:02:28,229 --> 00:02:25,680
work on every day

68
00:02:30,229 --> 00:02:28,239
and mostly space station work

69
00:02:32,150 --> 00:02:30,239
and as you say we've got chris hadfield

70
00:02:33,509 --> 00:02:32,160
in orbit right now he's on his way to

71
00:02:34,630 --> 00:02:33,519
the space station going to dock tomorrow

72
00:02:37,030 --> 00:02:34,640
morning

73
00:02:39,509 --> 00:02:37,040
and we've been working on this mission

74
00:02:42,309 --> 00:02:39,519
uh the whole canadian space agency team

75
00:02:44,229 --> 00:02:42,319
for several years now uh getting ready

76
00:02:45,910 --> 00:02:44,239
to uh to have chris there and to do some

77
00:02:48,470 --> 00:02:45,920
really great things

78
00:02:50,869 --> 00:02:48,480
um i had the the privilege of doing part

79
00:02:53,589 --> 00:02:50,879
of that prep work got to work on some

80
00:02:58,309 --> 00:02:53,599
contingency planning also working with

81
00:03:02,390 --> 00:03:00,229
video files and

82
00:03:04,390 --> 00:03:02,400
stuff downlinked from him when he's

83
00:03:06,149 --> 00:03:04,400
working on station and be able to

84
00:03:08,070 --> 00:03:06,159
distribute that out to the folks who

85
00:03:09,670 --> 00:03:08,080
need it um you may know chris is a bit

86
00:03:10,790 --> 00:03:09,680
of a musician actually that's an

87
00:03:12,710 --> 00:03:10,800
understatement he's quite an

88
00:03:14,710 --> 00:03:12,720

accomplished musician and we've got some

89
00:03:16,470 --> 00:03:14,720
neat musical projects projects that he's

90
00:03:19,110 --> 00:03:16,480
going to be working on

91
00:03:21,270 --> 00:03:19,120
all right so and you guys are especially

92
00:03:23,990 --> 00:03:21,280
excited about this particular flight of

93
00:03:26,149 --> 00:03:24,000
canadian to the space station why well

94
00:03:27,430 --> 00:03:26,159
that's right because um although this is

95
00:03:29,670 --> 00:03:27,440
our second

96
00:03:31,270 --> 00:03:29,680
long duration expedition to the iss bob

97
00:03:33,190 --> 00:03:31,280
thirsk was our first long duration crew

98
00:03:35,350 --> 00:03:33,200
member back and that just three years

99
00:03:36,949 --> 00:03:35,360
ago now i think

100
00:03:39,670 --> 00:03:36,959
chris is going to be the commander of

101
00:03:41,030 --> 00:03:39,680
the iss with the departure of kevin ford

102
00:03:41,910 --> 00:03:41,040
next march

103
00:03:43,990 --> 00:03:41,920
so

104
00:03:45,990 --> 00:03:44,000
chris will be the first first commander

105
00:03:47,030 --> 00:03:46,000
and we are real excited about that and i

106
00:03:48,710 --> 00:03:47,040
think there's going to be a lot of

107
00:03:49,830 --> 00:03:48,720
excitement all across canada when that

108
00:03:51,910 --> 00:03:49,840
happens

109
00:03:53,509 --> 00:03:51,920
are you seeing signs of that excitement

110
00:03:54,949 --> 00:03:53,519
already back home

111
00:03:56,630 --> 00:03:54,959
yeah i think a little bit there's been

112
00:03:58,470 --> 00:03:56,640
quite a bit of attention to this it's

113
00:04:00,630 --> 00:03:58,480

always exciting when we fly astronauts

114
00:04:02,309 --> 00:04:00,640
in space but i think knowing that chris

115
00:04:03,830 --> 00:04:02,319
is going to be the commander get uh

116
00:04:05,350 --> 00:04:03,840
inspires the imagination just a little

117
00:04:07,350 --> 00:04:05,360
bit more

118
00:04:09,190 --> 00:04:07,360
now you know one of the key hallmarks of

119
00:04:11,750 --> 00:04:09,200
what we're doing up there is research

120
00:04:13,750 --> 00:04:11,760
and i know that canada is no stranger to

121
00:04:15,110 --> 00:04:13,760
performing research on the space station

122
00:04:17,189 --> 00:04:15,120
do you have some special plans for

123
00:04:19,110 --> 00:04:17,199
research for chris and the team while

124
00:04:20,469 --> 00:04:19,120
he's up there well we have we have a

125
00:04:22,469 --> 00:04:20,479
number of

126
00:04:25,670 --> 00:04:22,479
the whole suite of payload experiments

127
00:04:26,390 --> 00:04:25,680
going on and a few of those are

128
00:04:28,710 --> 00:04:26,400
our

129
00:04:30,870 --> 00:04:28,720
canadian with canadian pis that chris is

130
00:04:32,230 --> 00:04:30,880
going to be working on yeah and pi is a

131
00:04:33,830 --> 00:04:32,240
principle of professional investigators

132
00:04:35,430 --> 00:04:33,840
sorry that's right

133
00:04:36,950 --> 00:04:35,440
and i should have brought the whole

134
00:04:38,230 --> 00:04:36,960
detailed list so i could smell them all

135
00:04:40,390 --> 00:04:38,240
out because if i name a few i'll know

136
00:04:42,629 --> 00:04:40,400
i'll leave some out but i know what

137
00:04:44,390 --> 00:04:42,639
there's radian 2 is one of those he's

138
00:04:45,990 --> 00:04:44,400

going to be working on and

139
00:04:47,670 --> 00:04:46,000
the other names escape me just at the

140
00:04:49,749 --> 00:04:47,680
moment okay

141
00:04:51,350 --> 00:04:49,759
now one experiment that i know is near

142
00:04:53,990 --> 00:04:51,360
and dear to you is one that is a

143
00:04:56,310 --> 00:04:54,000
combined joint experiment between nasa

144
00:04:57,189 --> 00:04:56,320
and the canadian space agency and that's

145
00:04:59,510 --> 00:04:57,199
the

146
00:05:01,430 --> 00:04:59,520
refueling capability

147
00:05:04,310 --> 00:05:01,440
there is a special experiment up there

148
00:05:07,029 --> 00:05:04,320
that uses the dextrous

149
00:05:09,830 --> 00:05:07,039
manipulator system which is basically an

150
00:05:12,150 --> 00:05:09,840
extra pair arms and fine-tuned hands for

151
00:05:13,189 --> 00:05:12,160
the robotic arm can you tell us a little

152
00:05:14,629 --> 00:05:13,199
bit about that it looks like we're going

153
00:05:16,790 --> 00:05:14,639
to be doing some of that early in the

154
00:05:18,150 --> 00:05:16,800
spring next year well that's right we've

155
00:05:20,150 --> 00:05:18,160
been working

156
00:05:22,790 --> 00:05:20,160
on the robotic refueling mission as it's

157
00:05:24,870 --> 00:05:22,800
called for several years now

158
00:05:26,469 --> 00:05:24,880
and we have another on-orbit session

159
00:05:29,029 --> 00:05:26,479
coming up i believe it's now scheduled

160
00:05:31,270 --> 00:05:29,039
to start around mid-january

161
00:05:34,150 --> 00:05:31,280
and the special purpose texas

162
00:05:36,790 --> 00:05:34,160
manipulator which we also called dexter

163
00:05:39,350 --> 00:05:36,800

is you know the most recent part of our

164
00:05:41,909 --> 00:05:39,360
mobile servicing system and it's a big

165
00:05:44,230 --> 00:05:41,919
it's really quite large two-armed robot

166
00:05:47,350 --> 00:05:44,240
but despite its size it's capable of

167
00:05:49,510 --> 00:05:47,360
really refined dextrous tasks and can

168
00:05:51,990 --> 00:05:49,520
align

169
00:05:54,150 --> 00:05:52,000
objects to be inserted and withdrawn and

170
00:05:56,150 --> 00:05:54,160
fastened up can align objects with

171
00:05:56,950 --> 00:05:56,160
really remarkable precision

172
00:05:59,110 --> 00:05:56,960
so

173
00:06:00,710 --> 00:05:59,120
this next set of operations is the

174
00:06:02,950 --> 00:06:00,720
latest phase of that

175
00:06:03,830 --> 00:06:02,960
and they're actually going to exercise

176
00:06:08,469 --> 00:06:03,840
the

177
00:06:10,070 --> 00:06:08,479
simulated fuel i think it's blue ethanol

178
00:06:12,469 --> 00:06:10,080
and they're actually going to pump fluid

179
00:06:13,909 --> 00:06:12,479
this time from you know one compartment

180
00:06:16,150 --> 00:06:13,919
into another using the tools that have

181
00:06:18,710 --> 00:06:16,160
been prepared for dexter use

182
00:06:20,870 --> 00:06:18,720
so that's actually quite a significant

183
00:06:23,270 --> 00:06:20,880
you know a really exciting news

184
00:06:24,309 --> 00:06:23,280
capability a new step for robotics in

185
00:06:26,070 --> 00:06:24,319
space

186
00:06:28,950 --> 00:06:26,080
and of course those operations the

187
00:06:31,189 --> 00:06:28,960
dexterous operations are actually all

188
00:06:33,990 --> 00:06:31,199

controlled from here on the ground

189
00:06:36,550 --> 00:06:34,000
um the those operations tend to be very

190
00:06:37,830 --> 00:06:36,560
slow and deliberate this is a polite way

191
00:06:40,710 --> 00:06:37,840
to put that

192
00:06:42,950 --> 00:06:40,720
but in general those ops take days

193
00:06:45,029 --> 00:06:42,960
so we have teams of flight controllers

194
00:06:47,590 --> 00:06:45,039
here on the ground and we've got a

195
00:06:50,070 --> 00:06:47,600
relatively recent capability to control

196
00:06:52,230 --> 00:06:50,080
and actually move these robots from the

197
00:06:53,830 --> 00:06:52,240
ground and the flight control team here

198
00:06:56,230 --> 00:06:53,840
and also in our control room up at

199
00:06:58,230 --> 00:06:56,240
saint-jeber near montreal will be

200
00:06:58,950 --> 00:06:58,240
executing those ops

201
00:07:01,589 --> 00:06:58,960
and

202
00:07:03,510 --> 00:07:01,599
just to get to the end result of that or

203
00:07:05,909 --> 00:07:03,520
the end goal there there are a lot of

204
00:07:08,629 --> 00:07:05,919
satellites in orbit and we currently

205
00:07:09,589 --> 00:07:08,639
don't have a way to refuel them and

206
00:07:11,430 --> 00:07:09,599
there are a lot of satellites that

207
00:07:13,189 --> 00:07:11,440
weren't even designed to be refueled in

208
00:07:14,710 --> 00:07:13,199
orbit and this experiment is going to

209
00:07:17,029 --> 00:07:14,720
take a look at

210
00:07:18,629 --> 00:07:17,039
whether we can actually do that in orbit

211
00:07:20,870 --> 00:07:18,639
is that right well that's right this is

212
00:07:22,790 --> 00:07:20,880
a technology demonstration

213
00:07:26,150 --> 00:07:22,800

and you know we have already seen in the

214
00:07:28,390 --> 00:07:26,160
previous on-orbit phases of this uh

215
00:07:31,029 --> 00:07:28,400
of these ops we've seen you know lock

216
00:07:32,629 --> 00:07:31,039
wires being cut you know often when you

217
00:07:35,350 --> 00:07:32,639
know when it's not as you said it's not

218
00:07:37,110 --> 00:07:35,360
designed to be done robotically so they

219
00:07:38,790 --> 00:07:37,120
closed off the plugs the way they always

220
00:07:41,029 --> 00:07:38,800
did and they would screw fasteners on

221
00:07:42,469 --> 00:07:41,039
and they would lock wire them in place

222
00:07:44,390 --> 00:07:42,479
so we have already demonstrated the

223
00:07:47,270 --> 00:07:44,400
capability with dexter and the tools

224
00:07:49,670 --> 00:07:47,280
that we have to actually sneak in ever

225
00:07:52,070 --> 00:07:49,680
so close almost like a crochet hook and

226
00:07:53,430 --> 00:07:52,080
to get the wire out and to cut it and to

227
00:07:57,189 --> 00:07:53,440
demonstrate that we can open up those

228
00:07:58,869 --> 00:07:57,199
plugs to go connect and pump fluid

229
00:08:00,309 --> 00:07:58,879
so it's you're right this is a

230
00:08:02,550 --> 00:08:00,319
technology demonstration we're going to

231
00:08:04,550 --> 00:08:02,560
grow this capability and

232
00:08:06,710 --> 00:08:04,560
eventually future robots will be sent up

233
00:08:08,070 --> 00:08:06,720
and i'm sure in the high orbit and to go

234
00:08:09,029 --> 00:08:08,080
resurrect satellites that were out of

235
00:08:11,189 --> 00:08:09,039
gas

236
00:08:13,990 --> 00:08:11,199
great well and i know it's going to be

237
00:08:16,309 --> 00:08:14,000
really exciting for chris to be on orbit

238
00:08:17,749 --> 00:08:16,319

when that is going on with a significant

239
00:08:19,189 --> 00:08:17,759
contribution of the canadian space

240
00:08:20,710 --> 00:08:19,199
agency to the international space

241
00:08:22,629 --> 00:08:20,720
station and of course the station could

242
00:08:24,070 --> 00:08:22,639
have been built without the canadian

243
00:08:26,230 --> 00:08:24,080
space agency's contribution with the

244
00:08:28,469 --> 00:08:26,240
robotic arm that did so much of the work

245
00:08:31,029 --> 00:08:28,479
to help put modules in place and is

246
00:08:33,190 --> 00:08:31,039
continuing to be a workhorse so that we

247
00:08:35,350 --> 00:08:33,200
can get things done on orbit when we

248
00:08:37,750 --> 00:08:35,360
have spacewalks that we need to replace

249
00:08:39,990 --> 00:08:37,760
parts or bring new

250
00:08:42,389 --> 00:08:40,000
components up so it's great to have you

251
00:08:43,990 --> 00:08:42,399
here and and i hear that chris actually

252
00:08:45,750 --> 00:08:44,000
since this is kind of a holiday mission

253
00:08:47,110 --> 00:08:45,760
arrival that he may be doing some

254
00:08:49,110 --> 00:08:47,120
special things is he giving you any

255
00:08:51,350 --> 00:08:49,120
sneak information about what he's

256
00:08:53,030 --> 00:08:51,360
planning with his crewmates

257
00:08:54,550 --> 00:08:53,040
you know we're we're going to enjoy

258
00:08:56,230 --> 00:08:54,560
those christmas surprises together but

259
00:08:57,990 --> 00:08:56,240
i'll be i expect i'll be in here quite a

260
00:09:00,389 --> 00:08:58,000
few days over the holidays to uh to see

261
00:09:02,870 --> 00:09:00,399
what's going on and to get those files

262
00:09:04,470 --> 00:09:02,880
out where they need to go okay well tim

263
00:09:06,150 --> 00:09:04,480

braithwaite thank you so much for being

264
00:09:07,590 --> 00:09:06,160
here today and talking with us about

265
00:09:09,910 --> 00:09:07,600
canada's contributions to the

266
00:09:13,030 --> 00:09:09,920
international space station one of the

267
00:09:15,350 --> 00:09:13,040
key five partners in this multinational

268
00:09:17,110 --> 00:09:15,360
effort to do research on orbit on the