
PAO

1
00:00:00,746 --> 00:00:03,406
>> Pat Ryan: Welcome to
Mission Control in Houston.

2
00:00:03,746 --> 00:00:06,456
My name is Pat Ryan, I'm
the Public Affairs Officer

3
00:00:06,456 --> 00:00:09,156
on the Orbit 2 Shift here
in Mission Control today,

4
00:00:09,156 --> 00:00:12,166
and we've just finished
up our live update

5
00:00:12,166 --> 00:00:14,796
on the activities onboard the
International Space Station

6
00:00:15,266 --> 00:00:18,946
and happy to join you and get
to tell you more about NASA

7
00:00:18,946 --> 00:00:20,866
and about the Space
Station, what's going on.

8
00:00:21,216 --> 00:00:23,746
I've invited along another
one of our flight controllers

9
00:00:23,746 --> 00:00:27,336
who works here, Ken Neiss
is a CRONUS Specialist,

10
00:00:27,336 --> 00:00:30,756
and we're going to find out
what that is after we first find

11
00:00:30,756 --> 00:00:33,876
out about you, what is it,
you're professional background?

12
00:00:33,876 --> 00:00:34,846
How did you end up at NASA?

13
00:00:35,216 --> 00:00:35,496
>> Ken Neiss: Okay.

14
00:00:36,116 --> 00:00:38,026
Well, I grew up in
the Philadelphia area,

15
00:00:38,386 --> 00:00:39,896
Philadelphia Pennsylvania
suburbs.

16
00:00:39,896 --> 00:00:43,666
I was always proficient
at taking things apart,

17
00:00:43,696 --> 00:00:48,056
to my parents dismay, they
labeled that breaking things,

18
00:00:48,356 --> 00:00:50,836
but I always wanted to
see how things work,

19
00:00:51,286 --> 00:00:55,956
and along the way I had, I was
very good at math and sciences,

20
00:00:56,336 --> 00:00:58,886
so I pursued the
field of engineering,

21
00:00:58,886 --> 00:01:01,816

when I went into college, I
went to Penn State University,

22
00:01:02,456 --> 00:01:05,776
got my Graduate, Undergraduate
and my Graduate degree

23
00:01:06,036 --> 00:01:11,026
at Penn State, and at that
point, I got recruited by NASA

24
00:01:11,176 --> 00:01:13,416
at one of the college
fairs, career fairs

25
00:01:13,836 --> 00:01:16,326
and I've been working
here every since.

26
00:01:17,716 --> 00:01:20,206
>> Pat: Let's find out, as
I said, we're going to find

27
00:01:20,206 --> 00:01:22,486
out what a CRONUS does, because
I imagine that that's one

28
00:01:22,486 --> 00:01:23,926
of the first questions
that we're going to hear.

29
00:01:23,926 --> 00:01:26,406
We're ready to hear what the
kids in Little Rock have to say.

30
00:01:28,116 --> 00:01:31,176
>> Daniel Ray: Good morning,
my name is Daniel Ray and I'm

31
00:01:31,176 --> 00:01:36,696

in the eighth grade, and
I have a question for you.

32
00:01:36,696 --> 00:01:41,386
Could you name one
or two conditions

33
00:01:41,386 --> 00:01:44,566
that could negatively
affect operations

34
00:01:44,566 --> 00:01:47,596
for the flight control team?

35
00:01:48,346 --> 00:01:49,826
>> Ken: That is a
really good question.

36
00:01:49,826 --> 00:01:51,666
There are a couple of things

37
00:01:52,196 --> 00:01:54,576
that could negatively
affect us down here.

38
00:01:54,996 --> 00:01:58,106
The first is loss
of communications.

39
00:01:58,676 --> 00:02:03,856
One of our main ways to figure
out how things are going on,

40
00:02:03,856 --> 00:02:08,766
on the Space Station is via
the telemetry of data received

41
00:02:08,766 --> 00:02:11,466
on the ground, and by
actually talking to the crew.

42
00:02:11,926 --> 00:02:18,446
If we don't have those links,
then we don't have a way to talk

43
00:02:18,626 --> 00:02:22,696
to the crew, to figure out
what's going on, or to interact,

44
00:02:22,696 --> 00:02:25,506
intervene from the
ground to fix anything,

45
00:02:25,826 --> 00:02:29,036
so it's really important
for us to try

46
00:02:29,036 --> 00:02:33,746
to utilize our communication
timeframes, as best as we can.

47
00:02:34,276 --> 00:02:38,026
Another thing that could
negatively affect us is

48
00:02:38,626 --> 00:02:39,426
a malfunction.

49
00:02:39,826 --> 00:02:43,706
If something does go wrong,
everything that's scheduled

50
00:02:43,846 --> 00:02:46,376
for the day, depending on
how big the malfunction is,

51
00:02:47,396 --> 00:02:50,456
the whole day could be wiped
out, so it really depends

52
00:02:50,456 --> 00:02:55,646
on what the malfunction is, but
those are some of the big things

53
00:02:55,646 --> 00:02:59,756
that can really affect
the ground controllers,

54
00:02:59,756 --> 00:03:02,076
us here on the ground, the
flight controller team.

55
00:03:02,456 --> 00:03:05,786
>> Pat: And, particularly,
for you, for a CRONUS officer,

56
00:03:05,916 --> 00:03:09,906
explain what it is, what
systems you guys are charged

57
00:03:09,906 --> 00:03:10,746
with maintaining?

58
00:03:10,876 --> 00:03:12,636
>> Ken: As a CRONUS
we are in charge

59
00:03:12,636 --> 00:03:16,416
of those communication
pathways, so the voice

60
00:03:17,376 --> 00:03:21,166
that commands the data, we
get from the Space Station,

61
00:03:21,616 --> 00:03:25,466
the video that we get down
from the Space Station,

62

00:03:25,566 --> 00:03:28,646
all the status, health
and status of our system,

63
00:03:29,016 --> 00:03:31,796
of our payload data,
our science data,

64
00:03:31,796 --> 00:03:34,166
comes down through the
systems that I manage,

65
00:03:35,066 --> 00:03:39,576
so that's what we're in control
of and it's a really fun job.

66
00:03:40,826 --> 00:03:41,416
>> Pat: Next question.

67
00:03:43,046 --> 00:03:44,796
>> Kyle Holmes: My
name is Kyle Holmes

68
00:03:44,796 --> 00:03:46,176
and I'm in the eighth grade.

69
00:03:47,056 --> 00:03:51,346
About when will the flight
controller downlinking the

70
00:03:51,346 --> 00:03:56,866
command history logs; daily,
weekly, monthly, or when?

71
00:03:57,586 --> 00:03:58,266
>> Ken: That's another.

72
00:03:58,266 --> 00:03:59,126
>> Pat: Very specific.

73
00:03:59,126 --> 00:04:01,096
>> Ken: Yeah, it's a
very good question.

74
00:04:01,846 --> 00:04:05,006
Part of discipline, we're
responsible for the computers

75
00:04:05,006 --> 00:04:08,776
and downlinking those longs,
like you talked about.

76
00:04:09,166 --> 00:04:13,766
We downlink detailed data
from the main computer

77
00:04:13,766 --> 00:04:15,616
about once a week, on
a Sunday afternoon.

78
00:04:16,946 --> 00:04:20,446
We get more detailed data from
the crews personal computers,

79
00:04:20,446 --> 00:04:23,416
personal computers they use
to command and receive data

80
00:04:23,416 --> 00:04:26,756
from the systems, we down-link
that about once every month.

81
00:04:27,276 --> 00:04:29,636
Behind me, in the background,

82
00:04:29,636 --> 00:04:33,846
we do get real-time
command history data,

83

00:04:34,216 --> 00:04:36,466
basically all the commands
that we send from the ground.

84
00:04:36,906 --> 00:04:41,506
We get a log of that, and we
are constantly saving that,

85
00:04:41,766 --> 00:04:45,836
so for historical purposes
and to see what has happened.

86
00:04:46,896 --> 00:04:47,106
>> Pat: Good.

87
00:04:48,336 --> 00:04:48,876
Who's next?

88
00:04:49,426 --> 00:04:50,006
>> Thank you.

89
00:04:53,096 --> 00:04:55,246
>> Jonathan Jordan: Hi, my
name is Jonathan Jordan,

90
00:04:55,676 --> 00:04:57,396
and I'm currently
in the eighth grade.

91
00:04:58,146 --> 00:05:00,116
I have two questions I
would like to ask you.

92
00:05:00,396 --> 00:05:05,086
The first one, where exactly
are the multiplexer computers

93
00:05:05,086 --> 00:05:09,536
located on the International
Spaceship, or also known as ISS.

94
00:05:10,616 --> 00:05:10,896
>> Ken: Okay.

95
00:05:12,246 --> 00:05:16,166
The
multiplexer/de-multiplexer's,

96
00:05:16,166 --> 00:05:19,456
it's a hard word, basically our
main computers are located all

97
00:05:19,456 --> 00:05:20,216
throughout the space station.

98
00:05:20,216 --> 00:05:21,626
>> Pat: Because there
are very many of them.

99
00:05:21,736 --> 00:05:26,356
>> Ken: There are, there are 40
of them, so we have three tiers

100
00:05:26,356 --> 00:05:32,296
of these main computers, and
some of them are located inside,

101
00:05:32,296 --> 00:05:34,526
some are outside, some
are inside the lab module

102
00:05:34,526 --> 00:05:39,546
in various racks, some are in
end cones, some in, like I said,

103
00:05:39,546 --> 00:05:43,476
the lab, node 2, node
3, airlock, the PMM,

104

00:05:43,476 --> 00:05:46,076
and then there's a
whole bunch outside,

105
00:05:46,236 --> 00:05:48,956
on the external trusses,
so they're everywhere,

106
00:05:49,106 --> 00:05:51,896
and they need to be
everywhere to do all the job

107
00:05:51,946 --> 00:05:53,316
that they're responsible for.

108
00:05:53,446 --> 00:05:55,536
>> Pat: And the
multiplexer/de-multiplexer

109
00:05:55,536 --> 00:05:58,986
computers, is there a way
to characterize the level

110
00:05:59,016 --> 00:06:01,556
where they are, they're not
just the standard laptops

111
00:06:02,256 --> 00:06:04,006
that the crew interact
with all the time?

112
00:06:04,076 --> 00:06:06,596
>> Ken: No, these are
the computers that range

113
00:06:06,596 --> 00:06:11,216
from directing the traffic,
from the sensors and effectors

114
00:06:11,776 --> 00:06:15,046

for the data we're trying
to gather to passing it up

115
00:06:15,046 --> 00:06:18,896
and interfacing with other
modules are other international

116
00:06:18,896 --> 00:06:21,786
partners, all the way up
to our prime computer,

117
00:06:21,786 --> 00:06:24,006
which is responsible for
putting together all the data,

118
00:06:24,296 --> 00:06:26,656
being the crews interface
and shipping that data

119
00:06:26,656 --> 00:06:29,636
where it needs to be, such as
the ground or the crews laptops.

120
00:06:30,036 --> 00:06:30,176
>> Pat: Okay.

121
00:06:31,586 --> 00:06:31,986
Next one.

122
00:06:33,756 --> 00:06:35,206
>> Jonathan: And my
second question is,

123
00:06:35,666 --> 00:06:37,186
how many channels
does the [Inaudible],

124
00:06:37,186 --> 00:06:39,756
communication systems have?

125
00:06:40,556 --> 00:06:43,406
>> Ken: The KUN link
event system, right now,

126
00:06:43,406 --> 00:06:46,056
we're able to get six
downlink channels,

127
00:06:46,056 --> 00:06:51,506
six downlink video either
HD or standard definition,

128
00:06:51,856 --> 00:06:55,986
in addition to ability
to talk via IP phone,

129
00:06:55,986 --> 00:06:57,956
internet protocol
phone, to the crew.

130
00:06:58,366 --> 00:07:01,376
We can even send email through
it, we can ship live video

131
00:07:01,526 --> 00:07:06,086
for the crew to use and also
bring down payload science data

132
00:07:06,226 --> 00:07:08,066
through that KUN link.

133
00:07:08,306 --> 00:07:11,906
>> Pat: And the six channels
is a fairly new development.

134
00:07:11,906 --> 00:07:15,106
>> Ken: It is, over the
past less than a year,

135

00:07:15,716 --> 00:07:18,546
early this year, I should
say, March/April timeframe;

136
00:07:18,866 --> 00:07:20,156
we expanded our capabilities

137
00:07:20,156 --> 00:07:22,026
from four standard
definition downlinks

138
00:07:22,026 --> 00:07:25,646
to six combination high def
or standard definition video.

139
00:07:26,076 --> 00:07:28,306
>> Jonathan: thank you.

140
00:07:28,506 --> 00:07:29,796
>> Ken: You're welcome.

141
00:07:31,036 --> 00:07:31,876
>> Hi, my name is [Inaudible],

142
00:07:31,876 --> 00:07:35,066
and I want to ask
you how many tracking

143
00:07:35,316 --> 00:07:39,936
and data relay satellites
does the US have?

144
00:07:40,546 --> 00:07:42,736
>> Ken: So the US
has, I believe,

145
00:07:42,736 --> 00:07:45,416
eight of these satellites
that we can use.

146
00:07:45,996 --> 00:07:49,026
What the International
Space Station uses

147
00:07:49,026 --> 00:07:53,006
for communications is only five
of them, so we have the options

148
00:07:53,006 --> 00:07:56,516
to use five, which are
located in various parts,

149
00:07:56,646 --> 00:07:57,746
in relation to the Earth.

150
00:07:58,436 --> 00:07:59,926
So, five of eight we use.

151
00:08:01,536 --> 00:08:02,056
>> Thank you.

152
00:08:06,466 --> 00:08:09,096
>> Hi, my name is
[Inaudible] and my question is,

153
00:08:09,796 --> 00:08:11,766
why does the antennae have
to move to collect data?

154
00:08:13,556 --> 00:08:14,826
>> Ken: Good question.

155
00:08:15,106 --> 00:08:17,226
>> Pat: They studied up for you.

156
00:08:17,226 --> 00:08:21,026
>> Ken: Yeah they did,
they're trying to stump me.

157
00:08:21,496 --> 00:08:24,746
The antennae has to move
because of the design

158
00:08:24,746 --> 00:08:25,886
of the systems, basically.

159
00:08:26,606 --> 00:08:30,196
We need to get a high
rate of information,

160
00:08:30,196 --> 00:08:35,136
high amount of information
down, and the easiest to explain

161
00:08:35,136 --> 00:08:37,166
that is, the higher
the information,

162
00:08:37,396 --> 00:08:39,686
the smaller the beam width,

163
00:08:39,756 --> 00:08:44,256
the antennae can radiate
in a given direction.

164
00:08:44,316 --> 00:08:47,286
So, if we have a small
beam width, a small area

165
00:08:47,286 --> 00:08:52,246
where you can actually see or
transmit the data, then you have

166
00:08:52,286 --> 00:08:56,356
to be able to move that small
distance to track the satellite.

167
00:08:57,166 --> 00:09:01,796

If we don't need as big, or
if we don't need a high amount

168
00:09:01,796 --> 00:09:05,856
of traffic, we don't need as
big of a beam width, or so,

169
00:09:05,856 --> 00:09:09,876
we can have a bigger
beam width and not have

170
00:09:10,016 --> 00:09:12,666
to move the gimbals
for our antennae's.

171
00:09:13,156 --> 00:09:15,046
>> Pat: And, I believe
part of the reason

172
00:09:15,046 --> 00:09:16,256
that the antennae's move too,

173
00:09:16,256 --> 00:09:18,506
has to do with the tetra
satellites, because you have

174
00:09:18,506 --> 00:09:20,626
to point the antennae
at the satellite.

175
00:09:20,896 --> 00:09:21,366
>> Ken: Exactly.

176
00:09:21,366 --> 00:09:23,076
>> Pat: And the station
is moving,

177
00:09:23,196 --> 00:09:25,716
but the satellites are
not, relative to the Earth.

178
00:09:26,046 --> 00:09:26,676
>> Ken: Exactly.

179
00:09:26,676 --> 00:09:30,816
As the Tetris is moving, the
station is moving and it all has

180
00:09:30,816 --> 00:09:33,686
to be in sync to lock
up to each other.

181
00:09:33,966 --> 00:09:37,336
We do have some parts of
antennae's that we can fail

182
00:09:37,336 --> 00:09:42,366
over to, they're considered
low rate that don't move,

183
00:09:42,636 --> 00:09:46,196
they're like omni directional,
almost omni directional,

184
00:09:46,456 --> 00:09:50,396
and it gets part of the
sky, but other than that,

185
00:09:50,506 --> 00:09:52,906
if you want to transmit a higher
amount of data, you're going

186
00:09:52,906 --> 00:09:55,056
to have to track the satellites.

187
00:09:55,956 --> 00:09:57,146
>> Thank you.

188
00:09:58,576 --> 00:10:01,826

>> Hi, my name is [Inaudible],
I have a question for you.

189
00:10:02,926 --> 00:10:06,376
How do know when asteroids
are coming to the ISS?

190
00:10:06,916 --> 00:10:11,206
>> Ken: Wow, the
asteroids are a tough one.

191
00:10:11,406 --> 00:10:14,126
We have a specific
flight controller

192
00:10:14,126 --> 00:10:18,046
in the room called TOPO, they're
in charge of all the monitoring

193
00:10:18,046 --> 00:10:22,126
and the trajectories of any
types of debris or objects

194
00:10:22,126 --> 00:10:26,256
that could impact the space
station and they talk to one

195
00:10:26,256 --> 00:10:28,846
of their counterparts
called STRATCOM,

196
00:10:29,166 --> 00:10:33,496
and those two positions
monitor all the time,

197
00:10:33,496 --> 00:10:35,116
whatever is available to see.

198
00:10:35,456 --> 00:10:37,186
They've got lots of

radar and satellites

199
00:10:37,186 --> 00:10:39,116
that they can monitor
this information,

200
00:10:39,686 --> 00:10:41,166
and hopefully alert us

201
00:10:41,516 --> 00:10:44,136
if we have any potential
asteroids coming.

202
00:10:44,456 --> 00:10:47,576
Now the smaller the asteroids,
the harder it is to monitor

203
00:10:47,576 --> 00:10:48,996
and the less notice we get.

204
00:10:49,076 --> 00:10:50,036
>> Pat: They're harder to see.

205
00:10:50,036 --> 00:10:50,866
>> Ken: They're harder to see.

206
00:10:51,246 --> 00:10:53,656
The bigger they are,
hopefully we get enough notice

207
00:10:53,716 --> 00:10:54,606
to watch out.

208
00:10:55,186 --> 00:10:56,886
>> Pat: And they're watching
not just for asteroids,

209
00:10:56,886 --> 00:11:01,126
but they're keeping track of

all of the junk that's in space.

210
00:11:01,126 --> 00:11:04,356
There's, over the course
of the 50 years or more,

211
00:11:04,626 --> 00:11:07,796
as people have flown in space
and they have left garbage

212
00:11:07,796 --> 00:11:10,706
up there, there's more
things that are up there,

213
00:11:10,706 --> 00:11:13,866
so we have to keep track
of even small objects,

214
00:11:13,866 --> 00:11:16,026
because if they were to
collide with the station,

215
00:11:16,246 --> 00:11:17,346
they could cause some damage.

216
00:11:17,596 --> 00:11:19,306
>> Ken: Yeah, you've
got to understand that.

217
00:11:19,486 --> 00:11:21,846
All those objects have
a trajectory and a speed

218
00:11:21,846 --> 00:11:26,256
and velocity, so if we're
going in a different direction

219
00:11:26,256 --> 00:11:28,106
than that, it could
have a real dire effect,

220
00:11:28,106 --> 00:11:29,956
and we're traveling really fast.

221
00:11:31,136 --> 00:11:32,086
>> Pat: Okay, next question.

222
00:11:32,326 --> 00:11:36,026
>> Raquel: Hi, my name
is Raquel [Inaudible],

223
00:11:36,086 --> 00:11:37,606
I'm in the seventh grade.

224
00:11:41,896 --> 00:11:44,626
Have you ever sent
a video to space?

225
00:11:45,616 --> 00:11:48,036
>> Ken: Have I ever
sent a video to space?

226
00:11:48,726 --> 00:11:52,006
I can't say that I have
sent a video to space.

227
00:11:52,446 --> 00:11:57,856
We ship the astronauts video
all the time, me personally no.

228
00:11:58,106 --> 00:12:01,706
We are probably shipping them
video as we speak right now,

229
00:12:02,306 --> 00:12:05,426
during the crew off duty day
we can ship them live TV,

230
00:12:05,706 --> 00:12:07,856

as long as we have that
link that we talked

231
00:12:07,856 --> 00:12:12,476
about between the satellite
and the space station, but no,

232
00:12:12,476 --> 00:12:15,286
I have never sent video,
the closest I've gotten

233
00:12:15,286 --> 00:12:18,416
to sending video is sending a
picture up to the astronauts,

234
00:12:18,836 --> 00:12:20,856
when my daughter was
born in December,

235
00:12:21,346 --> 00:12:23,696
and they were pretty
stoked about seeing that,

236
00:12:23,696 --> 00:12:25,856
and they gave some
congratulations.

237
00:12:26,596 --> 00:12:28,626
>> Pat: But we do send
video to the crew,

238
00:12:28,666 --> 00:12:29,966
all the time, as Ken says.

239
00:12:29,966 --> 00:12:30,526
>> Ken: All the time.

240
00:12:30,526 --> 00:12:33,406
>> Pat: They get video
that is training video,

241
00:12:33,406 --> 00:12:36,036
that helps teach them
how to do things.

242
00:12:36,576 --> 00:12:40,256
They get video, live
video from their families,

243
00:12:40,256 --> 00:12:43,476
they get a chance to have
weekly video conferences

244
00:12:43,476 --> 00:12:46,686
with their families, that,
usually on the weekends.

245
00:12:46,686 --> 00:12:50,266
They can get video from
in this room, sometimes,

246
00:12:50,266 --> 00:12:52,596
of events that happen in
this room that gets sent

247
00:12:52,596 --> 00:12:55,406
up to them, so it happens a lot.

248
00:12:55,876 --> 00:12:56,506
>> Ken: Yes it does.

249
00:12:59,736 --> 00:13:00,466
>> Thank you.

250
00:13:01,856 --> 00:13:03,526
>> Cedric Williams: Hello,
my name is Cedric Williams,

251
00:13:03,526 --> 00:13:06,976

and the question I have for
you today is, what would happen

252
00:13:06,976 --> 00:13:12,706
if there was a malfunction
in the IA, IAS,

253
00:13:12,706 --> 00:13:18,176
internal audio system,
during an emergency?

254
00:13:18,286 --> 00:13:21,036
>> Ken: And you said during
the internal audio system

255
00:13:21,036 --> 00:13:21,856
during emergency.

256
00:13:23,336 --> 00:13:23,616
>> Cedric: Yeah.

257
00:13:24,256 --> 00:13:25,546
>> Ken: Interesting question.

258
00:13:26,086 --> 00:13:30,436
So, what would happen during
an emergency, it would depend

259
00:13:30,436 --> 00:13:32,216
on the malfunction
of the audio system.

260
00:13:32,616 --> 00:13:36,486
Normally during an
emergency, we alert the crew

261
00:13:36,486 --> 00:13:38,386
that there is an emergency,
if they weren't the ones

262
00:13:38,386 --> 00:13:41,736
that detected, via the
tones that are produced

263
00:13:41,736 --> 00:13:45,966
by the audio system to let them
know, hey, there's an emergency,

264
00:13:45,966 --> 00:13:47,156
you need to take some actions.

265
00:13:47,806 --> 00:13:51,786
If there's an emergency
and they know about it,

266
00:13:51,786 --> 00:13:54,616
and there's an audio
malfunction, they're trained

267
00:13:54,616 --> 00:13:57,036
on the [inaudible] responses,
it's almost ingrained.

268
00:13:57,136 --> 00:14:02,746
We train emergency response
very hard, and very often,

269
00:14:03,006 --> 00:14:05,666
so they'll just go
on muscle memory,

270
00:14:05,666 --> 00:14:06,986
they'll go to their procedures,

271
00:14:06,986 --> 00:14:08,836
and they'll just go
perform the actions.

272
00:14:09,516 --> 00:14:12,076

If we don't have a link, if we
don't have audio with the crew,

273
00:14:12,806 --> 00:14:17,196
hopefully the failure would be
one where we still have audio

274
00:14:17,196 --> 00:14:22,016
with the crew and audio tones,
but it would impact the ability

275
00:14:22,016 --> 00:14:25,456
for the team on the ground,
to be able to follow the crew

276
00:14:25,456 --> 00:14:27,746
and for the crew to be alerted

277
00:14:27,746 --> 00:14:29,366
with all their normal
signatures.

278
00:14:29,466 --> 00:14:30,266
[Inaudible] question.

279
00:14:30,266 --> 00:14:33,356
>> Pat: We have to rely on the
data that's still coming down

280
00:14:33,356 --> 00:14:35,286
but without the ability
to talk to them.

281
00:14:35,286 --> 00:14:35,796
>> Ken: Exactly.

282
00:14:37,376 --> 00:14:37,606
>> Pat: Okay.

283

00:14:39,296 --> 00:14:39,666
>> Cedric: Thank you.

284
00:14:40,186 --> 00:14:40,816
>> Ken: No problem.

285
00:14:43,306 --> 00:14:45,836
>> My name is [Inaudible] Perry,
and I'm in the seventh grade.

286
00:14:46,846 --> 00:14:49,526
We know that NASA suffered
budget cuts in the past,

287
00:14:49,906 --> 00:14:52,016
will CRONUS be affected
by those budget cuts?

288
00:14:53,396 --> 00:14:55,926
>> Ken: Will CRONUS be
affected by the budget cuts?

289
00:14:57,526 --> 00:14:58,996
Probably in some ways.

290
00:14:59,396 --> 00:15:02,826
We have already merged
with some,

291
00:15:03,226 --> 00:15:08,506
we originally were communication
system and for one discipline,

292
00:15:08,506 --> 00:15:11,406
and computer data systems
is another discipline,

293
00:15:11,866 --> 00:15:14,056
we have since merged into
CRONUS to combine that.

294
00:15:14,496 --> 00:15:18,356
I don't foresee any additional
impacts, the budget cuts,

295
00:15:18,426 --> 00:15:19,886
but it's too early to tell.

296
00:15:20,296 --> 00:15:22,016
I think, I think
we're pretty stable.

297
00:15:23,336 --> 00:15:24,356
>>Pat: Okay, next question.

298
00:15:25,056 --> 00:15:34,096
>> Hello, my name is Gabrianna
and my question for you is,

299
00:15:34,356 --> 00:15:39,446
what is the, what is the
machinery you use to send,

300
00:15:39,446 --> 00:15:43,986
if you want information to ISS?

301
00:15:44,096 --> 00:15:46,006
>> Ken: You said the
machinery used to point,

302
00:15:46,096 --> 00:15:47,846
to transmit information to ISS.

303
00:15:47,846 --> 00:15:49,576
>> Pat: I'm not sure, can
you repeat the question?

304
00:15:49,576 --> 00:15:51,396
>> [Inaudible]

305
00:15:51,396 --> 00:15:58,516
>> Gabrianna: What is the
machinery you use to send,

306
00:15:58,786 --> 00:16:02,406
to point information to ISS?

307
00:16:03,096 --> 00:16:03,306
>> Pat: To [inaudible].

308
00:16:03,376 --> 00:16:05,176
>> Ken: To transmit and
receive information,

309
00:16:05,176 --> 00:16:06,336
that's a good question.

310
00:16:06,626 --> 00:16:09,386
We use various pieces of
equipment on the ground.

311
00:16:09,386 --> 00:16:11,496
Our main interface, as
a flight controller,

312
00:16:11,496 --> 00:16:13,326
is our LINYX workstations.

313
00:16:13,666 --> 00:16:15,476
You can, kind of, see one
in the background here,

314
00:16:15,846 --> 00:16:19,926
it has command interfaces
and data interfaces,

315
00:16:20,316 --> 00:16:22,616
and it interfaces with

the ground systems,

316
00:16:22,876 --> 00:16:27,246
so it puts together what we
want to do, it sends it off,

317
00:16:27,666 --> 00:16:31,286
it puts it into the data
stream and the command stream,

318
00:16:31,326 --> 00:16:35,126
and at some point, it adds
the audio information,

319
00:16:35,126 --> 00:16:37,336
from the voice channels
that we talk to the crew,

320
00:16:37,926 --> 00:16:42,456
and then it gets encrypted,
combined and shipped

321
00:16:42,456 --> 00:16:45,556
up to the satellite, shipped
over to the space station

322
00:16:45,986 --> 00:16:50,026
and it receives, it's
received by a satellite dish

323
00:16:50,026 --> 00:16:57,076
on our space station called the
radio frequency gimbal, RFG, so,

324
00:16:57,496 --> 00:17:02,266
at that point, it brings in the
S-band system, gets pulled into,

325
00:17:03,156 --> 00:17:06,026
it gets decrypted first,

and then gets pulled

326
00:17:06,026 --> 00:17:08,576
out into audio data,
which goes to audio system

327
00:17:08,626 --> 00:17:13,656
and the systems data,
the command data,

328
00:17:13,656 --> 00:17:15,096
that goes into the
main computer,

329
00:17:15,366 --> 00:17:19,936
the main computer will then
ship it wherever it needs to go.

330
00:17:20,276 --> 00:17:21,506
>> Pat: Simple as that.

331
00:17:21,506 --> 00:17:22,686
>> Ken: Simple as that.

332
00:17:22,686 --> 00:17:23,346
>> Thank you.

333
00:17:24,166 --> 00:17:32,666
>> My name is Christina and my
question is, how are commands

334
00:17:32,666 --> 00:17:36,436
and data sent between
MCC and ISS?

335
00:17:36,756 --> 00:17:38,926
>> Ken: How are commands
routed between MCC and ISS?

336

00:17:39,446 --> 00:17:41,856
We talked a little bit
on the previous question,

337
00:17:41,856 --> 00:17:45,716
but the commands are, we
have a set list of commands

338
00:17:45,716 --> 00:17:48,166
that we can choose
from, that we've tested

339
00:17:48,166 --> 00:17:52,406
in various settings, and we can
chose on our LINYX workstations,

340
00:17:52,406 --> 00:17:55,126
our LINYX workstations has an
application that interfaces

341
00:17:55,126 --> 00:17:59,016
with the command system,
we chose a command, we hit,

342
00:17:59,016 --> 00:18:02,566
you know, basically hit, want
to send it, it gets added

343
00:18:02,646 --> 00:18:07,096
to the stream, it gets
combined with the audio system,

344
00:18:07,626 --> 00:18:11,866
it gets encrypted, so, you know,
only the command that we want

345
00:18:11,966 --> 00:18:15,536
to send, get onto
the space station.

346

00:18:15,536 --> 00:18:19,896
It gets added to, a radio
frequency signal gets embedded

347
00:18:19,896 --> 00:18:23,016
into that and it gets
shipped out via White Sands

348
00:18:23,416 --> 00:18:27,306
to a satellite, the satellite
will then relay the command,

349
00:18:27,306 --> 00:18:31,276
the entire stream over to the
S-band system, and it will get,

350
00:18:31,276 --> 00:18:34,646
you know, pulled out from there,
and shipped along where it needs

351
00:18:34,646 --> 00:18:36,816
to go, the main computer
will detect whether

352
00:18:36,816 --> 00:18:40,126
or not the command
is valid and send it

353
00:18:40,126 --> 00:18:43,006
to where its destination is,
which is part of the header

354
00:18:43,126 --> 00:18:45,676
in the command field, and
it will go from there.

355
00:18:45,676 --> 00:18:46,996
We can ship commands

356
00:18:46,996 --> 00:18:48,676

to all different parts
of the space station.

357
00:18:49,046 --> 00:18:52,256
We can even ship
information between modules,

358
00:18:52,256 --> 00:18:54,086
between segments and so forth.

359
00:18:54,796 --> 00:18:58,316
>> Pat: And despite the
tearing those commands apart

360
00:18:58,316 --> 00:19:00,636
into the pieces, so you know
they go where they need to ,

361
00:19:00,636 --> 00:19:03,046
I think it's interesting to
note too is, as you said,

362
00:19:03,046 --> 00:19:06,056
that the path that information
takes to get from here

363
00:19:06,056 --> 00:19:07,586
to the station is
not a straight line.

364
00:19:07,586 --> 00:19:08,476
>> Ken: No, it's
not a straight line.

365
00:19:08,476 --> 00:19:10,626
>> Pat: It goes from
here to New Mexico

366
00:19:10,986 --> 00:19:14,056
to the satellite to the station.

367
00:19:15,496 --> 00:19:17,116
>> Ken: That's correct.

368
00:19:17,286 --> 00:19:19,586
>> Hello, my name is
[Inaudible] and we know

369
00:19:19,586 --> 00:19:24,106
that there are several countries
working together with the ISS,

370
00:19:24,236 --> 00:19:27,256
we want to know how
do they work together?

371
00:19:27,256 --> 00:19:28,656
>> Ken: How do we work together?

372
00:19:29,386 --> 00:19:30,976
There are a lot of countries

373
00:19:31,046 --> 00:19:33,756
that we're working with,
with ISS right now.

374
00:19:34,156 --> 00:19:38,236
How we work together is, we
have lots of meetings, lots of,

375
00:19:38,836 --> 00:19:42,316
a lot of get togethers
with our partners.

376
00:19:42,686 --> 00:19:45,796
Sometimes we talk to them over
the phone, sometimes we talk

377
00:19:45,796 --> 00:19:50,906

over in Mission Control, to
them, via telephones systems,

378
00:19:51,226 --> 00:19:55,826
what's called device behind us,
we can listen to dozens of loops

379
00:19:55,826 --> 00:20:00,106
at any given time, and these
are patched into Moscow,

380
00:20:00,106 --> 00:20:02,696
they're patched into Japan,
they're patched into Europe,

381
00:20:03,246 --> 00:20:06,986
patched into Alabama, it can
be patched almost anywhere.

382
00:20:07,616 --> 00:20:10,866
So, we can talk to them
real time, by those methods,

383
00:20:11,556 --> 00:20:13,536
and we have a pretty
good relationship

384
00:20:13,536 --> 00:20:14,576
with all our partners.

385
00:20:15,296 --> 00:20:20,046
Some partners, the Russians,
require extra translation,

386
00:20:20,506 --> 00:20:24,126
because we speak English,
they speak Russian.

387
00:20:24,406 --> 00:20:24,686
>> Pat: Right.

388
00:20:24,726 --> 00:20:28,066
>> Ken: So, it requires
an extra person involved,

389
00:20:28,226 --> 00:20:31,076
and both teams have sets of
translators that assist us,

390
00:20:31,436 --> 00:20:34,336
so we make sure we communicate
the correct information

391
00:20:34,386 --> 00:20:36,956
to both sides and the
other side receives the

392
00:20:36,956 --> 00:20:38,236
correct information.

393
00:20:38,976 --> 00:20:41,956
But, we have a pretty good
symbiotic relationship

394
00:20:41,956 --> 00:20:43,576
between all the countries
working together.

395
00:20:43,866 --> 00:20:47,016
>> Pat: And that's, as you say,
its 16 different countries now

396
00:20:47,016 --> 00:20:52,076
that are involved and the
device that you talked about,

397
00:20:52,076 --> 00:20:54,136
I know you can't see it
too well on television,

398
00:20:54,136 --> 00:20:57,076
but from this panel right
here, we can punch buttons

399
00:20:57,076 --> 00:20:59,806
and through the headsets that
we're wearing, we can talk to,

400
00:20:59,806 --> 00:21:02,596
not only everybody else in
this room, but other people

401
00:21:02,596 --> 00:21:08,246
in this building, and in Russia
and in Germany and in Japan.

402
00:21:08,286 --> 00:21:09,426
>> Ken: And this
is the same system

403
00:21:09,426 --> 00:21:12,146
that certain people can
talk to the astronauts

404
00:21:12,146 --> 00:21:13,006
up in space right now.

405
00:21:13,006 --> 00:21:13,176
>> Pat: Right.

406
00:21:13,586 --> 00:21:15,536
Next question.

407
00:21:19,216 --> 00:21:22,446
>> Okay, did, did
we have some more,

408
00:21:22,446 --> 00:21:24,646
I know some of you

had two questions,

409
00:21:25,656 --> 00:21:29,896
did any of you have any
additional questions to ask?

410
00:21:30,866 --> 00:21:33,786
All right, if I may, I'd
like to ask a question,

411
00:21:34,296 --> 00:21:38,496
and that is what different
career fields are in that,

412
00:21:38,496 --> 00:21:39,976
everyone thinks of
NASA they think

413
00:21:39,976 --> 00:21:41,626
of astronauts and
things like that.

414
00:21:41,976 --> 00:21:45,346
What are some of the different
career fields available at NASA?

415
00:21:46,096 --> 00:21:47,486
>> Ken: Well, I'm glad
you asked that question,

416
00:21:47,486 --> 00:21:49,396
I forgot to tell
you my back-story.

417
00:21:49,656 --> 00:21:53,046
I'm actually, I alluded
to it, but I'm an engineer

418
00:21:53,046 --> 00:21:55,576
and I actually worked in the

field, I studied in the field

419
00:21:55,576 --> 00:21:57,766
of electrical engineering
communication systems.

420
00:21:57,796 --> 00:22:01,946
There are a lot of engineers
here, a lot of engineers,

421
00:22:01,946 --> 00:22:03,286
a lot of electrical engineers

422
00:22:03,286 --> 00:22:05,306
or aerospace engineers
that work here.

423
00:22:05,746 --> 00:22:10,776
Some, some people that work
here are pure scientists,

424
00:22:10,866 --> 00:22:13,276
so pure sciences,
either research

425
00:22:13,896 --> 00:22:20,756
or research payload
type science.

426
00:22:21,546 --> 00:22:25,546
Other fields are medical
fields, there's a lot

427
00:22:25,546 --> 00:22:28,846
of medicinal doctor
requirements, doctors.

428
00:22:28,846 --> 00:22:32,936
>> Pat: [Inaudible]
doctors, there are writers,

429
00:22:32,966 --> 00:22:35,346
there are people who know

430
00:22:35,346 --> 00:22:39,246
about business operations
and insurance.

431
00:22:39,246 --> 00:22:39,866
>> Ken: Finances.

432
00:22:39,866 --> 00:22:41,776
>> Pat: There are people
who run the buildings.

433
00:22:41,776 --> 00:22:45,516
There are all kind
of occupations

434
00:22:45,516 --> 00:22:47,456
who are needed working at NASA.

435
00:22:47,886 --> 00:22:49,966
>> Ken: Yeah, it really
takes a whole plethora

436
00:22:49,966 --> 00:22:53,836
of different types and different
fields to work at NASA,

437
00:22:53,836 --> 00:22:57,736
even Johnson Space Center, and
it's really diverse background.

438
00:22:58,196 --> 00:23:00,346
>> Pat: Okay, we have time
for one more question,

439
00:23:00,346 --> 00:23:04,706

if you've got it there?

440
00:23:05,146 --> 00:23:08,386
>> Okay, looks like we
have a few shy folks.

441
00:23:08,516 --> 00:23:10,306
One question, all
right, [inaudible],

442
00:23:10,356 --> 00:23:11,406
come on up [inaudible].

443
00:23:12,376 --> 00:23:13,936
Hurry up, we've got, we
haven't, hurry along.

444
00:23:14,516 --> 00:23:22,546
[Silence]

445
00:23:23,046 --> 00:23:26,526
>> My question is, who
designed ISS and why?

446
00:23:27,166 --> 00:23:28,546
>> Ken: Who designed
ISS and why?

447
00:23:28,866 --> 00:23:30,666
Another good back-story
question,

448
00:23:30,946 --> 00:23:31,956
please correct me if I'm wrong.

449
00:23:31,956 --> 00:23:32,866
>> Pat: And the short version.

450
00:23:33,196 --> 00:23:34,136

>> Ken: The short version is,

451
00:23:34,136 --> 00:23:37,256
is that we were building a space
station called Space Station

452
00:23:37,256 --> 00:23:40,796
Freedom, we , sorry, we were
planning on one, and Moscow,

453
00:23:40,796 --> 00:23:44,186
I'm sorry Russia had partially
built Space Station Mere Two,

454
00:23:44,656 --> 00:23:47,896
and Europe had purposed a
certain module Columbus,

455
00:23:48,246 --> 00:23:50,476
and we all, kind of,
decided to pull our resources

456
00:23:50,476 --> 00:23:53,266
and create an International
Space Station.

457
00:23:53,666 --> 00:23:55,396
>> Pat: But, yeah, a lot
of people were working

458
00:23:55,396 --> 00:23:58,086
on different things and it
started to come together

459
00:23:58,086 --> 00:24:00,156
as a group back in the 1990's.

460
00:24:00,506 --> 00:24:00,726
>> Ken: Yeah.

461
00:24:00,946 --> 00:24:02,686
>> Pat: And I think that's
about the time we have.

462
00:24:02,686 --> 00:24:05,606
Ken, I want to thank you
for, for joining us here and,

463
00:24:05,666 --> 00:24:08,506
for some interesting answers
and learning about what's going

464
00:24:08,506 --> 00:24:11,406
on here, and we'll send
it back to the DLN.

465
00:24:11,666 --> 00:24:12,496
>> Ken: Thank you everybody.