well good afternoon or good morning I

guess for us here in Houston and I guess

for you folks up in New York it's

afternoon welcome to Mission Control

Houston you're looking at the

International Space Station flight

control room and we are very pleased to

have with us here Jason Barber he is a

aerospace engineer so he's very very

smart he works he works right in front

here on one of the other consoles he's

supports the environmental control and

life support system on the station

monitors all of that activity as part of
the environmental and thermal operating system of the station so Jason's agreed to join us and help answer some questions for you guys so we're really happy to have you guys here good morning it's good to talk from my home state yes I would I'm the teacher I'll briefly say hello I went to swing Binghamton so I know your further north on mood 84 81 okay we got it on now sorry about that now we hear you loud and clear welcome welcome we understand you're a New Yorker I went to school at Binghamton new one Brooke so southern
tier and we have a couple of students

with questions we learned this year

because of our work that two of the

family

worked with NASA the things you learn

illegal work with you people

so we have will have one of the students

tell you what grandpa did and we have

lovely questions tell us when you'd like

us to ask our questions we're ready

we're really happy to have you guys here

we're gonna try because my grandpa who

did sadarski was a real time programmer

for IBM that recorded to NASA for 1960
to 1966 so I was wondering what kind of

44 00:02:14,479 --> 00:02:17,509 information you got from the
spacecraft's radar during the Gemini

45 00:02:15,919 --> 00:02:21,619 missions that helped you with these

46 00:02:17,509 --> 00:02:25,609 current missions right I'll answer that

47 00:02:21,620 --> 00:02:26,930 as best I can

48 00:02:25,610 --> 00:02:30,769 but the main thing was how the vehicle

49 00:02:26,930 --> 00:02:34,760 work in space orbiting the planet how

50 00:02:30,769 --> 00:02:35,840 the life-support equipment was

51 00:02:34,759 --> 00:02:38,388 interfacing with the crew and taking

52 00:02:35,840 --> 00:02:42,289 that and expanding it to making it to

53 00:02:38,389 --> 00:02:45,290 moon I'm sorry yeah Mars making it all

54 00:02:42,289 --> 00:02:47,138 the way to the moon and back and

55 00:02:45,289 --> 00:02:49,099 basically making sure all of that

56 00:02:47,139 --> 00:02:51,379 Hardware worked the way it was supposed

57 00:02:49,099 --> 00:02:54,680
to for long durations the other thing it
figured out was doing edited maneuvers
while the vehicle is in space and being
able to align the vehicle to leave
Earth's atmosphere and go to the moon
itself so is testing all that those
capabilities so that way we could land
on the moon in Apollo like we did so I
guess that Julia can be a legacy and
maybe one day work right here where her
grandpa did that'll be a bit pretty
exciting and that's not unheard of we've
actually in the flight director office
we've had father-son flight directors
before so it's not unheard of for families to follow each other into NASA right

and my question what do members of the Michigan to Mel do to be careful about

and the most recent one I have two and I beat that can you get control have to do

to prepare for this one this most recent

mission when it was going up what was

your role in my particular role in that

well my consoles role was to basically determine that we had all the consumables that we needed to be able to support the crew while they're on orbit
and by that we have plenty of water
plenty of food we have the necessary
equipment to be able to process their
bathroom facilities into drinking water
the next day and basically making sure
all that is ready for them to get there
let me this is Patricia if the students
could come closer to the microphone that
way we can hear them better that would
be great thank you come on Roger that
now a weary trade where is your best way
into training but in order to become a
sighs okay
the I'll just give it a general overview
the I'll just give it a general overview
of my path the first thing is get your

101 00:05:31,709 --> 00:05:39,089
for error for your engineering degree

102 00:05:33,560 --> 00:05:43,348
and that can be aerospace mechanical or

103 00:05:39,089 --> 00:05:44,819
anyone of that type and then you once

104 00:05:43,348 --> 00:05:47,939
you get there done with that you get

105 00:05:44,819 --> 00:05:49,560
hired by NASA and you'll go through a

106 00:05:47,939 --> 00:05:51,959
series of training my training took me

107 00:05:49,560 --> 00:05:53,908
about two and a half years to get the

108 00:05:51,959 --> 00:05:55,418
current cert I have together to work on

109 00:05:53,908 --> 00:05:58,300
life support

110 00:05:55,418 --> 00:06:01,658
and basically NASA teaches you to become

111 00:06:01,658 --> 00:06:04,199
a flight controller and that's through a

112 00:06:04,199 --> 00:06:08,408
series of simulations book reading

113 00:06:08,408 --> 00:06:12,180
testing to take on the job that I have

114 00:06:14,860
and then there's after that once I do a
year or so of working console that's

when I get assigned to be a mission lead

for various missions like for me it was

shuttle missions and increment leads

with the crew that's on orbit now and

various other system leads that pop up

for different hardware's and stuff that

launch so that's the general path to the

training and that's essentially

the path that a lot of the people you

see in this room take as Jason said

there's different engineering

backgrounds and and depending on what

position you're sitting at in this room
you oversee a specific area of that Space Station to make sure that it's safe and operating for the crew that's on board well three of the items that my console is specific specifically involved in is emergencies so any one of those emergencies can be a rapid depress a hole in the shell of the vehicle a fighter on board the vehicle or some sort of toxic fluid gets spilled on ISS and my console is constantly revamping procedures and making making improvements so that way if any of those emergencies work to occur we could
respond as needed what type of

technology is

commonly use that we would understand

from Mission Control well I probably

computers everything that we do is all

on computers all of our telemetry we get

from the vehicle is we view on computers

and all that is processed on the ground

and then sent to our particular consoles

where our computers are at and we can

view all the telemetry that we have yeah

there's my producer Karin showing

Jason's console right there so you guys

can see that's where he he normally sits

00:08:30,670 --> 00:08:36,370
if he's on duty of course he's doing

158
00:08:34,000 --> 00:08:40,418
helping me today talk to you guys but

159
00:08:36,370 --> 00:08:44,529
that is a live view just about what 15

160
00:08:40,418 --> 00:08:46,419
or 20 feet away and and the back side of

161
00:08:44,529 --> 00:08:49,179
that console which you don't see is all

162
00:08:46,419 --> 00:08:51,159
of their computer screens that that

163
00:08:49,179 --> 00:08:54,069
stream the data that Jason's talking to

164
00:08:51,159 --> 00:08:56,919
you about so they can maintain a real

165
00:08:54,070 --> 00:08:58,600
good watch over all of the things that

166
00:08:56,919 --> 00:09:00,969
are going on with their systems aboard

167
00:08:58,600 --> 00:09:02,320
the International Space Station in fact

168
00:09:00,970 --> 00:09:04,060
if you look behind us we have computers

169
00:09:02,320 --> 00:09:06,100
right here that are similar to what all

170
00:09:04,059 --> 00:09:08,469
the other consoles have it's that way

171
00:09:06,100 --> 00:09:10,600
you can get an idea of what it is we're
looking at right most consoles have about five monitors that we're using to look at our data the creatures that you have and what you learn from them thank you I'll answer that the best I can that's at taffy and I'm gonna answer it just based on based on my views from the video that we got downlink it looked like the spenger waves were more perfectly formed so where they didn't have gravity pulling them down it looked like a more pure shape as far as the exact details of what we learned from that I can get more information for you
and pass it on to you guys if you like

as off top my head I don't know yeah I think that some of them did for the most part that they did we have one method

right now you know we had the Space Shuttle program that brought was able to bring cargo down from this station and now we have other partners that are providing cargo capability one of which can provide a return capability so so yes when we do have insect or animal type experiments on the station they do they are able to be brought back home I tried to get an answer to that question
most flight directors are flight controllers from one discipline or another generally that's the path you take if you want to be a flight director as you become a flight controller there's a few exceptions here and there but I'd say probably 95% of the flight directors for flight controllers and I think almost every one of them worked their way through just like Jason's doing you know training to to be a specialist in one specific area the flight director obviously is the person that oversees everything that goes on on
that shift as you know a flight director

00:11:30,710 --> 00:11:35,800
is in this room 24 hours a day

00:11:33,409 --> 00:11:39,439
around-the-clock on three shifts and so

00:11:35,799 --> 00:11:42,019
so we have flight directors that have to

00:11:39,440 --> 00:11:43,610
know everything about all of the systems

00:11:42,019 --> 00:11:45,889
on the station but they do rely heavily

00:11:43,610 --> 00:11:49,940
on Jason and the rest of the flight

00:11:45,889 --> 00:11:51,949
controllers to provide the very quickly

00:11:49,940 --> 00:11:54,080
information to him to help make

00:11:51,950 --> 00:11:56,360
decisions especially in the case where

00:11:54,080 --> 00:11:59,330
there may be a problem yes that you have

00:11:56,360 --> 00:12:03,080
to work so flight director is a critical

00:11:59,330 --> 00:12:05,270
position in the room and and and the and

00:12:03,080 --> 00:12:07,639
as Jason said that almost all of them

00:12:05,269 --> 00:12:13,600
have come from the background that Jason
has and in flight control good question

other do you have planned fish more

spiders more spiders fairies more beads

and what are some of the changes that

have occurred to that when they return

I'm not sure I can find out for you if

you'd like

and actually I wouldn't have to do that

I'm gonna have to find out free I'm

sorry yeah we've had we've had all

different types of some insects and some

and we've had the fish experiments on

board as well we have investigators on

the ground that planned those
experiments the crew checks on those types of living animal or insect experiments throughout the flight and then and then when they're brought back the investigators look at those to see what changes occurred we don't hear the direct feedback from those you know here in the room but you know learning about animals and insects will it sounds strange but it will help in the long term when we try to send humans further out into space as well because anything that happens to insects over short periods of times or small animals could
happen to human beings and so we need to learn all of that before we send humans further than the altitude that the space station is at right now which is you know about only only 250 miles away from us but if we go further out into space obviously we need to be able to protect a crew for those long periods of time and give you an example of an experiment that will have direct impact to people on the ground it's not necessarily using insects but it's a lung experiment that I'll be launching the next year so and then I'll give us more insight on asthma
and help us to be able to come up with

00:14:09,519 --> 00:14:15,720
better treatments for people with asthma

00:14:11,490 --> 00:14:15,720
so that'll be launching the next year

00:14:17,029 --> 00:14:21,980
hi my name is Brendan and my question is

00:14:19,580 --> 00:14:24,590
what does the students all have to do

00:14:21,980 --> 00:14:27,110
when there's a problem to be solved such

00:14:24,590 --> 00:14:30,080
as the ammonia leak on the International

00:14:27,110 --> 00:14:32,659
Space Station great question

00:14:30,080 --> 00:14:34,160
well actually it was Mission Control

00:14:32,659 --> 00:14:37,449
that found the leak in the first place

00:14:34,159 --> 00:14:40,939
through monitoring our data and

00:14:37,450 --> 00:14:45,200
basically once we observed that we had

00:14:40,940 --> 00:14:47,150
the leak we at that stage pulled the

00:14:45,200 --> 00:14:48,740
team together and figured out okay is

00:14:47,149 --> 00:14:50,360
this something we can solve from
commanding on the ground are we gonna
have to send the crew out EBA which is
what we ended up doing so once we made
that decision to go EBA the ground here
in Mission Control figured out okay what
do we need to do during the CVA do
replace the poem do we do tests along
the way or what do we need to do so it
was the team here working together to
figure out how to solve that problem
like it that's a perfect example of
teamwork because you know Mission
Control is critical to what happens on
the space station in terms of seeing all
the data and being able to you know tell

the crew what's going on and not only
tell the crew what's going on but have
the crew help if there is a
troubleshooting procedure like what we
ended up having to do with what you just
mentioned you know with that with that
ammonia leak we ended up sending a crew
out to to track it down and actually fix
it physically and we obviously couldn't
do that from here but it was a great
example of teamwork and and teamwork
that occurred over a very short period
of time to make that happen and and keep
the vehicle and the crew safe great

another example of the team working
together we had a this is about three years ago now but our co2 removal device

it suffered a software failure the hardware itself was fine but the software wasn't working properly so we ended up having to do manual commanding from the ground to basically manipulate it to do everything it needed to do that software would normally do for us so the ground basically that's an example the ground
doing for the crew what the crew didn't

329
00:16:28,700 --> 00:16:33,350
have to do so we did all the commanding

330
00:16:31,370 --> 00:16:35,529
everything from the ground to make that

331
00:16:33,350 --> 00:16:35,529
happen

332
00:16:35,620 --> 00:16:50,299
Wow that's really something

333
00:16:37,820 --> 00:16:52,370
thank you answer my question for

334
00:16:50,299 --> 00:16:54,289
something and an issue on the

335
00:16:52,370 --> 00:16:56,690
International Space Station do you have

336
00:16:54,289 --> 00:16:59,779
a specific procedure and who is in

337
00:16:56,690 --> 00:17:02,720
charge thank you

338
00:16:59,779 --> 00:17:05,200
I didn't quite get all that anyway

339
00:17:02,720 --> 00:17:07,539
actually you may have to repeat that

340
00:17:05,200 --> 00:17:11,029
okay

341
00:17:07,539 --> 00:17:12,920
what is the album boys an algorithm for

342
00:17:11,029 --> 00:17:14,930
solving an issue on the International
Space Station do you have a specific procedure and who's in charge

ultimately the flight directors in charge for approving our troubleshooting methods but typically what happens is

say like with the Sidra example or excuse me the co2 example that was used earlier when the failure occurs my team was looking at okay how do we keep co2 removal going and not impact the mission so we sat down figured out okay how do we make this work once we had the plan we presented that to the flight director and they said yep sounds good go ahead
do what you need to do we documented

that in a procedure flight approved it

and then we started implementing it

thank you

and where my phone signal day-use except

what cell phones a little radio or

what's a primary text we do have to use

satellites to talk to the space station

there is no direct line of sight

communication we use two types of

signals to talk to the space station one

is called s band which is similar to

what you would think of as a cell phone

which gives us our telemetry that we
look at for all of our troubleshooting

or day-to-day monitoring and our voice

communication with the crew the second

set is kayuu band which think of that

like the Internet that's what gives us

game off all of our payload information that we

game off all of our video that we see

coming from space so just to add to that

the communications that we get from the

station they have a big dish on the

station just like a satellite dish and

and that can communicate directly with

communication satellites and then that

transmission is bounced to the ground

transmission is bounced to the ground
and bounced here to Mission Control so

we can stay in pretty constant contact

with the crew we have short periods of

time here and there where we lose the

signal right and yeah and that and but

for the most part we can stay in pretty

close contact with them now way way back

in the Gemini days you know we were

talking about Gemini earlier that we

didn't have the communication satellite

capability so we did have ground

stations and the spacecraft could talk

directly to the ground but only during

short periods of time yes so the the

ability to talk to the space station has
changed so dramatically over the last 4050 years and that allows us and not
only do we can communicate on one channel but we actually have four
different voice channels now right so
the crews can actually be talking on
different channels about different experiments just like we would on the
ground in in offices to get work done
it's that's a great question
article and we were watching the live
replay of the Soyuz spacecraft and I'm
wondering why were there stuffed animals
well it gave us something entertaining
to watch didn't it it that varies from crew to crew some crew like having stuffed animals to play with on orbit and it gave you a pretty good view of okay how much rocking is the Soyuz going through is on its way up but generally the stuff animals that's a crew preference item yeah it's it's it's interesting it's it is it is a scientific approach like Jason says it shows the crew when they actually you know they can obviously feel the gravity building up on them or the g-forces excuse me building up on them as they
climb into space once I get into space

and the engines shut down it's like it's instant and now you see a view inside

the vehicle for the launch the other day

but it actually when that engine shuts off it's instant microgravity or zero-g

and the commander of the Soyuz spacecraft that you saw there his children actually picked this small toy that take and each crew member is each flight is different but that's that's what that's all about and it's obviously a sentimental item but it also has a scientific purpose as well
the main thing is basically the crew

00:22:17,839 --> 00:22:25,158
themselves the experiments on them as we

00:22:22,130 --> 00:22:27,020
determine how is space affecting them so

00:22:25,159 --> 00:22:30,350
that helps us determine more data for

00:22:27,019 --> 00:22:32,990
when we've got a Moon and Mars how has

00:22:30,349 --> 00:22:35,469
long-term exposure to space going to

00:22:32,990 --> 00:22:35,470
affect them

00:22:48,130 --> 00:23:02,090
what was my favorite mission yes there's

00:22:56,900 --> 00:23:06,440
been so many I'd have to say my favorite

00:23:02,089 --> 00:23:08,419
mission was my when I did the Columbus

00:23:06,440 --> 00:23:11,660
mission I was late for that when we

00:23:08,420 --> 00:23:13,130
launched the Columbus module it was fun

00:23:11,660 --> 00:23:16,190
working with the international partners

00:23:13,130 --> 00:23:18,230
and attaching a brand-new modules of the

00:23:16,190 --> 00:23:20,029
space station so I have to say that was
probably holds a special place in my heart

what was the contribute a shoe to the ISS other than the Canada notice Canada

became number one from a Canadian point obviously and it's it's and it is a very important component of the International Space Station for sure

Jason's gonna say Columbus again because he worked a shuttle flight that delivered the European laboratory right

but well you know Canada holds a special place in my heart since I grew up on the border but I'd say the Canadian crew
probably is probably the next best thing
to the arm in that the Canadian crew
that goes up there like Chris Hadfield
that was just there he did a lot of good
interaction with the a lot of children
on the ground and bringing them more
closer to the experience of space
to each other anything's in hazzard a
did you say the emission controls for
all around the world we all we all are
connected to each other and that's
through basically to the internet that
we have interfaces so that we can talk
to each other share telemetry share
experimental information but all that is
all connected through the internet well
that was a great great bunch of
questions we if we had time we'd sit
here with you guys all day but y'all
have schoolwork probably to get back to
and and Jason's got to get back to work
as well but we really enjoyed y'all
coming inside Mission Control with us
and and talking with us today and we
loved all the questions we really
appreciate it
do I have time to say yeah the one thing
I wanted to say to you guys is if you
can dream it you can do it

don't let yourself be put into a box of

what you can and can't do follow your dreams work hard get that education and just follow your hearts and you'll do anything that you want to do great advice you guys have a great day and we really enjoyed it today I'd love to see you empty on Mission Control so that you can see with us we thank you for that I'm happy to be here very fun talking to you guys thanks a lot guys have a good day