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1
00:00:00,706 --> 00:00:01,756
>> Good morning.

2
00:00:01,926 --> 00:00:04,286
I'm Pat Ryan with the Public Affairs office

3
00:00:04,286 --> 00:00:07,566
at NASA's Johnson Space Center,
and we're happy to join you.

4
00:00:07,826 --> 00:00:09,596
With me today is Angela Bauer.

5
00:00:09,836 --> 00:00:14,446
She is the lead of the Facilities
Operation Maintenance Group,

6
00:00:14,646 --> 00:00:17,606
which is part of the Mission
Operations Directorate.

7
00:00:17,946 --> 00:00:23,246
And they are the folks who are responsible for
taking care of everything in these buildings

8
00:00:23,246 --> 00:00:28,576
that is there to help support the people who
are supporting the folks who are on orbit.

9
00:00:29,146 --> 00:00:31,896
Which is sort of an inarticulate
way of describing what you do.

10
00:00:32,116 --> 00:00:33,796
But tell us how you got to that point.

11
00:00:33,796 --> 00:00:39,266
Tell me about what kind of background
does set somebody up to be in charge

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00:00:39,266 --> 00:00:41,646

of maintaining this kind of environment.

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00:00:42,316 --> 00:00:45,526

>> Well, I actually graduated with
a degree in mechanical engineering.

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00:00:45,946 --> 00:00:49,536

And after I graduated, I went to work for a
couple of years in the petrol chemical industry,

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00:00:49,636 --> 00:00:53,726

but I was always so attracted to NASA
and always looking for a way to get here.

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00:00:53,816 --> 00:00:58,176

And so, I did finally find a way to come
to work for NASA, and I was lucky enough

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00:00:58,206 --> 00:01:01,316

to be a shuttle electrical
power systems flight controller.

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00:01:01,816 --> 00:01:04,466

So we controlled all the
power systems on the shuttle.

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00:01:05,096 --> 00:01:09,336

But then, after a couple of years, I
was given the opportunity to come over

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00:01:09,376 --> 00:01:13,226

and manage a large project, replacing
workstations here in the control center.

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00:01:13,616 --> 00:01:16,816

And I jumped at that opportunity,
and I've been here ever since.

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00:01:17,396 --> 00:01:18,356

>> Sounds very exciting.

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00:01:18,716 --> 00:01:21,796

We'll find out more about it, and I think we're ready to take your questions.

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00:01:21,876 --> 00:01:22,346

So go ahead.

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00:01:22,546 --> 00:01:29,006

>> OK. Our first question says how much pressure is it to work in Mission Control?

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00:01:29,926 --> 00:01:31,026

>> Angela, how much pressure?

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00:01:31,266 --> 00:01:33,896

>> Well, it really depends on the moment.

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00:01:34,006 --> 00:01:37,786

Most of the time, working in Mission Control is something that you've been very well trained

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00:01:37,786 --> 00:01:42,376

to do, and you sit at your console and you watch your data do very predictable things,

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00:01:42,376 --> 00:01:47,396

and you do procedures that you've trained on extensively, and so it's all very easy.

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00:01:47,736 --> 00:01:49,546

The pressure comes when something goes wrong.

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00:01:49,916 --> 00:01:52,576

When something onboard breaks and all of a sudden,

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00:01:52,576 --> 00:01:54,706

you have to jump in and you have to fix it.

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00:01:55,096 --> 00:01:57,546

And we train our flight controllers
for that too.

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00:01:57,736 --> 00:01:59,016

We do extensive training.

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00:01:59,016 --> 00:02:02,536

We have a saying that we train like
we fly, and we fly like we train.

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00:02:03,246 --> 00:02:06,676

So we feel that our flight controllers
are all very capable of handling all this,

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00:02:06,676 --> 00:02:09,106

but it does make for some exciting
times here in Mission Control.

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00:02:09,906 --> 00:02:15,286

>> OK. The next one says, what is
the average education of someone

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00:02:15,286 --> 00:02:18,076

in Mission Control and an astronaut?

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00:02:18,986 --> 00:02:22,676

>> OK. Well, it's different for flight
controllers in Mission Control and astronauts.

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00:02:22,676 --> 00:02:23,636

Not that it has to be.

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00:02:24,136 --> 00:02:27,496

To be a flight controller, all you
have to have is a science degree.

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00:02:27,606 --> 00:02:31,066

So that would be either science, engineering, or math.

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00:02:31,386 --> 00:02:33,936

And most of our flight controllers have bachelor's degrees.

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00:02:34,226 --> 00:02:37,106

We do have some who have master's, and we have some who have Ph.D's.

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00:02:37,106 --> 00:02:40,086

It really depends on the person and the choice that they made in their schooling.

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00:02:40,086 --> 00:02:43,076

But all that you're required to have is a bachelor's degree in science and engineering.

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00:02:43,846 --> 00:02:46,566

>> Most of the astronauts do have advanced degrees, though.

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00:02:46,646 --> 00:02:48,996

Master's degrees, and a lot of them, doctorates as well.

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00:02:49,266 --> 00:02:54,336

Even the pilot astronauts who are in charge of driving the spacecraft, if you will --

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00:02:54,596 --> 00:02:57,076

a lot of them have advanced degrees in engineering as well.

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00:02:57,626 --> 00:03:05,316

>> OK. The next one says what is the additional training for someone working in Mission Control?

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00:03:06,206 --> 00:03:11,716
>> Well, when we bring our new flight controllers in, we actually have a set

55
00:03:11,716 --> 00:03:13,716
of classes that right now we're calling Boot Camp.

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00:03:13,716 --> 00:03:15,546
It's been called different names over the years.

57
00:03:15,546 --> 00:03:19,136
Where they spend several months going through intensive training on all

58
00:03:19,136 --> 00:03:21,746
of the different systems that are on the international space station.

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00:03:22,276 --> 00:03:25,466
And then, after they get through that, then they get put through a training flow

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00:03:25,466 --> 00:03:29,326
where we have smaller trainers that are not in this building --

61
00:03:29,326 --> 00:03:33,356
they're over in another building, where they can sit with just a couple of people and start

62
00:03:33,456 --> 00:03:34,946
to do troubleshooting on their systems.

63
00:03:34,946 --> 00:03:38,676
And then finally, after they've mastered some of those basics, then they come over here

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00:03:38,676 --> 00:03:44,086

and we do integrated simulations, where we have the entire flight control room participating,

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00:03:44,086 --> 00:03:49,176

we have computer models that pretend that they are the space station so we can mimic things

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00:03:49,176 --> 00:03:52,986

and conditions on the space station, and we have a whole group of instructors

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00:03:52,986 --> 00:03:55,426

where their whole job -- all they've been trained to do --

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00:03:55,426 --> 00:03:57,626

is to teach our flight controllers how to do their job.

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00:03:59,016 --> 00:04:03,286

>> If our space shuttle program is not operating,

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00:04:03,326 --> 00:04:06,706

how do we plan on getting astronauts to the ISS?

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00:04:06,706 --> 00:04:09,166

>> Well, you know, we actually knew for quite a few years

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00:04:09,166 --> 00:04:10,886

that the space station program was ending, or the

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00:04:10,966 --> 00:04:11,556

>> The shuttle program.

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00:04:11,556 --> 00:04:12,836

>> shuttle program was ending.

75
00:04:13,266 --> 00:04:15,936
And so we had a long, long time to plan for it.

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00:04:15,936 --> 00:04:19,306
So, what we do right now is
that we have the Russians send

77
00:04:19,306 --> 00:04:22,366
up our astronauts in their Soyuz spacecraft.

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00:04:22,366 --> 00:04:28,396
And so that's been well negotiated, and
they change out their crew every six months.

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00:04:28,456 --> 00:04:32,246
>> How much oxygen do they know
to bring and have on the ISS?

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00:04:33,216 --> 00:04:35,036
>> Well, since we've been doing
space flight for a long time,

81
00:04:35,036 --> 00:04:38,476
we know how much oxygen a
typical person needs in a day.

82
00:04:38,566 --> 00:04:42,626
And so, and say for space shuttle,
we actually had to take all

83
00:04:42,626 --> 00:04:44,596
of our oxygen and so we took it in big tanks.

84
00:04:44,596 --> 00:04:47,006
But for space station, they're
up there for such a long time

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00:04:47,006 --> 00:04:49,196

that we have many different ways of getting them oxygen.

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00:04:49,236 --> 00:04:53,076

So we have some equipment on board that can turn water into oxygen.

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00:04:53,406 --> 00:04:57,726

We have equipment that when activated, it's basically like a candle

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00:04:57,726 --> 00:04:59,986

that has a chemical reaction and releases oxygen.

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00:05:00,406 --> 00:05:03,376

And we also can send oxygen up in some of our resupply vehicles.

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00:05:03,636 --> 00:05:07,576

>> How long does it take to get to the ISS?

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00:05:08,456 --> 00:05:10,086

>> Well, that also depends on the vehicle.

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00:05:11,006 --> 00:05:13,486

Technically it doesn't take that long to get there.

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00:05:13,486 --> 00:05:15,306

You know, coming back, it takes about two hours.

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00:05:15,306 --> 00:05:19,386

But going there, it takes a lot longer, first of all because we have to launch --

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00:05:19,386 --> 00:05:21,136

it takes about you about eight minutes to get to orbit --

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00:05:21,176 --> 00:05:23,276

but then we have to catch
up with the space station.

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00:05:23,856 --> 00:05:27,286

You also have to make sure that your vehicle is
correctly orientated, and you have to make sure

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00:05:27,286 --> 00:05:32,216

that your crew has acclimated to space travel
so that they're able to do the docking.

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00:05:32,216 --> 00:05:35,746

So, normally for us, it takes
us between three and four days.

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00:05:36,366 --> 00:05:39,416

The Europeans sometimes take a
little bit longer, so it just depends

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00:05:39,416 --> 00:05:46,336

on the flight control team, and the astronauts,
and which country is operating the vehicle.

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00:05:47,836 --> 00:05:52,756

>> Do you see robotics as an important
part of the future of space travel?

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00:05:52,756 --> 00:05:54,306

>> Robotics is very important.

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00:05:54,566 --> 00:05:58,436

We can send robots to do things that
we wouldn't want to send humans to do,

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00:05:58,436 --> 00:05:59,976

or that we don't have enough humans to do.

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00:06:00,146 --> 00:06:03,376

So, we already use many robots in space travel.

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00:06:03,376 --> 00:06:05,866

We have a robotic arm on the space station.

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00:06:06,396 --> 00:06:10,116

We also have Dexter, which is on the space station that can do tasks.

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00:06:10,186 --> 00:06:12,776

And in addition to that, we also have things

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00:06:12,776 --> 00:06:15,146

like our Mars rovers that are robots that we operate.

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00:06:15,316 --> 00:06:16,686

So robotics is very important.

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00:06:17,926 --> 00:06:21,056

>> Discuss the funding for future space flight.

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00:06:21,056 --> 00:06:23,136

Do you think it will be more commercialized?

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00:06:24,596 --> 00:06:25,936

>> Well, OK, that's two questions.

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00:06:25,996 --> 00:06:30,726

First, for the funding, you know, we are a government agency and so our funding depends

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00:06:30,726 --> 00:06:33,566

on whatever Congress has money to do and how they allocate it.

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00:06:33,646 --> 00:06:36,846

So, we only know our funding from year to year, and we always hope

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00:06:36,846 --> 00:06:39,046

that they'll give us more, but we won't know.

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00:06:39,496 --> 00:06:42,206

For commercialization, we are actively striving

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00:06:42,206 --> 00:06:44,836

to increase the commercial
participation in space flight.

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00:06:45,976 --> 00:06:50,496

>> In fact, we're using some of the money
that we have in order to provide seed money

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00:06:50,496 --> 00:06:55,216

for private companies that are currently
working on developing both cargo ships,

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00:06:55,216 --> 00:06:59,506

to help supply the space station, and some
of them are also working on future vehicles

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00:06:59,506 --> 00:07:03,556

to bring crews to the space station,
and maybe to other destinations as well.

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00:07:03,556 --> 00:07:08,286

So, NASA is investing in that as a way
to get people to orbit in the future too.

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00:07:09,346 --> 00:07:13,826

>> Could you describe the
Ryan Multi-Purpose Vehicle?

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00:07:15,176 --> 00:07:16,646

>> Could I describe it?

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00:07:16,966 --> 00:07:21,876

Well, we're getting away from having the space shuttle type of vehicle.

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00:07:21,876 --> 00:07:25,946

The space shuttle, while it's really cool and very flexible in that it can go up

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00:07:25,946 --> 00:07:30,556

and down many times, is also very, very expensive to maintain and operate.

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00:07:30,946 --> 00:07:35,516

And so the Ryan capsule is more like what we had back in the Apollo days.

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00:07:36,026 --> 00:07:39,956

So it's a smaller capsule that is easier to launch

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00:07:39,956 --> 00:07:41,906

and it enters just like the Apollo capsule did.

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00:07:43,226 --> 00:07:45,776

>> Although, it's bigger than the Apollo capsule

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00:07:45,776 --> 00:07:46,066

>> That's right.

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00:07:46,066 --> 00:07:49,516

>> and it would be able to carry four or six astronauts,

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00:07:49,516 --> 00:07:51,426

where the Apollo could only carry three.

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00:07:51,606 --> 00:07:56,236

And it's being designed to be able to go a lot farther away from Earth into the future too.

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00:07:57,646 --> 00:07:57,796

>> Right.

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00:07:58,706 --> 00:08:06,366

>> Hold on just a second.

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00:08:06,706 --> 00:08:15,506

>> Are there any questions that you guys have that we haven't asked already?

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00:08:15,506 --> 00:08:18,496

If you have a question, come on up and just stand over here.

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00:08:18,496 --> 00:08:19,276

Please feel free.

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00:08:19,276 --> 00:08:23,616

This is your chance to talk to Mission Control.

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00:08:24,006 --> 00:08:31,596

It might be a once in a lifetime thing, so please think if you have a question.

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00:08:31,906 --> 00:08:36,636

>> Is there any possibility of getting to Mars soon, or in the future?

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00:08:36,636 --> 00:08:38,476

>> Well, that depends on your definition of soon.

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00:08:38,476 --> 00:08:38,696

>> Soon.

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00:08:38,986 --> 00:08:42,736

>> I definitely think we'll get to Mars sometime in your lifetime.

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00:08:42,806 --> 00:08:44,876
It's not going to be this decade.

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00:08:45,226 --> 00:08:49,756
Right now, we have got plans for the Orion capsule to launch and they're looking at going

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00:08:49,756 --> 00:08:53,396
to an astroid first, and then perhaps Mars, probably somewhere

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00:08:53,396 --> 00:08:56,516
out in 2030 would be the earliest.

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00:08:56,796 --> 00:08:58,526
>> I think it's definitely going to happen.

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00:08:58,526 --> 00:09:04,226
There are a lot of people who are working on developing, working out the issues

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00:09:04,226 --> 00:09:09,006
with propulsion that are necessary in order to get a space ship that far away.

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00:09:09,006 --> 00:09:13,946
They're also working up on the issues that are required to be able to sustain a crew.

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00:09:14,276 --> 00:09:16,336
I mean, we could shoot a rocket to Mars.

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00:09:16,336 --> 00:09:18,156
We do it all -- we do it now.

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00:09:18,576 --> 00:09:23,146
But we want to be able to have the crew members who are on board be able to be safe

161

00:09:23,146 --> 00:09:25,016
and to be healthy when they get there.

162
00:09:25,096 --> 00:09:28,406
Cause it's about a six month trip to get
there, and then there's the amount of time

163
00:09:28,406 --> 00:09:31,766
that you would be there to do
the work, to do the exploration,

164
00:09:31,766 --> 00:09:33,826
and then another six months to come back.

165
00:09:34,256 --> 00:09:39,186
So there are mechanical issues and there are
also human issues that still have to be worked

166
00:09:39,186 --> 00:09:45,146
out before we could do it and
with a relative degree of safety.

167
00:09:48,206 --> 00:09:54,976
>> What kind of problems do you face normally
when they're launching, if there are any?

168
00:09:56,056 --> 00:09:57,616
>> Are there any problems in launching?

169
00:09:57,616 --> 00:09:58,256
Yes, actually there are.

170
00:09:58,256 --> 00:10:00,006
>> There are occasionally problems in launching.

171
00:10:01,316 --> 00:10:06,436
Right now, all of our launches are done by
the Russians, and so they control all of that.

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00:10:06,476 --> 00:10:08,436

So I can tell you a little
bit about some of the problems

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00:10:08,436 --> 00:10:11,356

that we would have during the space shuttle
when we were in control of that launch.

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00:10:11,746 --> 00:10:13,926

And actually, problems were very rare.

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00:10:13,926 --> 00:10:17,536

We do so much testing that it's uncommon.

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00:10:18,416 --> 00:10:22,026

Most likely, probably if we looked
at the most common failure would be,

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00:10:22,026 --> 00:10:24,206

it would be that we lost a piece of telemetry.

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00:10:24,256 --> 00:10:26,056

Not that something actually happened onboard,

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00:10:26,346 --> 00:10:28,816

but for some reason, that
transducer stopped working.

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00:10:28,816 --> 00:10:30,986

>> And by telemetry, we're
talking about information.

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00:10:31,026 --> 00:10:31,956

Data that's coming down.

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00:10:31,996 --> 00:10:35,636

>> Right. A number that tells us how many
volts a certain piece of equipment has

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00:10:35,636 --> 00:10:41,816

or how fast a certain piece
of equipment is rotating.

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00:10:43,896 --> 00:10:48,916

>> So, since a rocket's basically a
controlled explosion, is there any chance

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00:10:48,916 --> 00:10:53,676

of using a nuclear blast to go
into deep space in the future?

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00:10:55,006 --> 00:10:57,936

>> Well, we're always looking
at advanced propulsion.

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00:10:57,936 --> 00:11:02,766

I haven't heard anything about using
a nuclear blast to get into space.

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00:11:02,826 --> 00:11:10,476

Actually, most of our efforts right now are
looking at using rockets that have less energy

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00:11:10,476 --> 00:11:14,936

but end up spitting it out at longer
times so that you would be able

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00:11:14,936 --> 00:11:17,146

to go a farther distance with less fuel.

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00:11:17,586 --> 00:11:23,286

>> There's a former NASA astronaut named
Franklin Chang-Diaz who is really in the lead

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00:11:23,286 --> 00:11:27,806

in developing this kind of engine where you
would carry enough fuel to be able to make a,

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00:11:28,096 --> 00:11:35,226

just a little thrust that would push
your vehicle along on a regular basis.

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00:11:35,516 --> 00:11:40,756

But because in orbit, and out beyond Earth
orbit, you don't have the resistance,

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00:11:41,136 --> 00:11:44,226

you don't need very much push
in order to get it going.

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00:11:44,536 --> 00:11:48,916

And you continue to build up the
momentum with every new impulse,

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00:11:48,916 --> 00:12:01,626

and you can go a great distance in a relatively
short period of time once you get started.

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00:12:03,746 --> 00:12:07,596

>> How do you choose the astronauts
that go up to the space stations?

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00:12:07,656 --> 00:12:13,496

>> That's really a question
for the astronaut office.

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00:12:13,496 --> 00:12:16,436

I know that they do a lot of
screening on their astronauts

201

00:12:16,436 --> 00:12:18,326

when they pick them to be
candidates in first place.

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00:12:18,326 --> 00:12:21,536

And then astronauts go through about two
years of training once they get selected.

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00:12:21,606 --> 00:12:24,866

So they go through one year where they do astronaut candidate training,

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00:12:24,866 --> 00:12:27,636

which is kind of generic training, and then they do they do about another year

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00:12:27,686 --> 00:12:30,986

of vehicle-specific and mission-specific training.

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00:12:31,396 --> 00:12:34,736

And so I would imagine that their choice of who they're going to pick depends

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00:12:34,736 --> 00:12:42,326

on how well those astronauts do in that training.

208

00:12:43,526 --> 00:12:46,846

>> Do you ever think we'll like officially like live in space?

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00:12:48,856 --> 00:12:51,106

>> Personally, I do think that we will live in space.

210

00:12:52,666 --> 00:12:57,486

NASA is always trying to put ourselves at the front of the space technology.

211

00:12:57,486 --> 00:13:00,416

We're trying to do the new things that nobody else has done before.

212

00:13:00,896 --> 00:13:05,726

And as we have figured out more and more ways to travel in space, then we end up giving

213

00:13:05,726 --> 00:13:10,886

that information over to other people, such as commercial partners, so that they can then use

214

00:13:10,886 --> 00:13:16,396

that information to make a commercial venture -- a company that can then capitalize on that

215

00:13:16,396 --> 00:13:20,146

and make space travel accessible for all people.

216

00:13:20,236 --> 00:13:24,496

So, I do believe that we'll get technology to the point that we can give it

217

00:13:24,496 --> 00:13:28,256

over to commercial partners and they can make space tourism a real option.

218

00:13:28,616 --> 00:13:31,666

>> And in the meantime, you know, there are people living in space right now.

219

00:13:31,896 --> 00:13:34,986

There are six people on board the International Space Station.

220

00:13:35,326 --> 00:13:38,946

Three of them have been living there since late November.

221

00:13:39,036 --> 00:13:42,066

The other three -- actually, today is the one hundredth day

222

00:13:42,406 --> 00:13:44,326

that the other three have been in space.

223

00:13:45,206 --> 00:13:50,876

There's one Russian cosmonaut who lived in space for over 430 days

224

00:13:51,066 --> 00:13:52,396
without coming back to the earth.

225

00:13:52,656 --> 00:13:54,436
So, we are living there now.

226

00:13:54,476 --> 00:14:00,846
We're not living there for as long
as we will in the future though.

227

00:14:00,846 --> 00:14:03,106
>> Is there any possibility
of going back to the moon?

228

00:14:04,386 --> 00:14:07,396
>> Well, there's always a
possibility of going back to the moon.

229

00:14:07,706 --> 00:14:11,906
When the president made the decision
to refocus the constellation efforts,

230

00:14:11,906 --> 00:14:16,776
we decided that we were going to, instead, focus
on going out to an astroid and then to Mars.

231

00:14:16,886 --> 00:14:21,046
So, we don't have any plans to
send people to the moon right now.

232

00:14:21,046 --> 00:14:24,796
We're always looking at what kinds of
rovers and robotics we could do at the moon.

233

00:14:25,146 --> 00:14:27,716
Actually, one of the activities that's operated

234

00:14:27,716 --> 00:14:32,836

out of this building is a program called Desert Rats, where we do a simulation

235

00:14:32,836 --> 00:14:35,486
of what it would be like on them
to go out to the desert in Arizona,

236

00:14:35,996 --> 00:14:41,076
and they test space suits and
rovers to see how they work.

237

00:14:41,676 --> 00:14:43,546
So we're constantly striving for that.

238

00:14:43,546 --> 00:14:48,186
>> And NASA has a pair of spacecraft
orbiting the moon right now.

239

00:14:48,186 --> 00:14:53,196
The Grail [phonetic] mission just sent
two spacecraft that are mapping the moon.

240

00:14:53,196 --> 00:14:58,396
So, we haven't sent people back just
yet, but we are still going to the moon.

241

00:14:59,226 --> 00:14:59,396
>> OK.

242

00:15:00,236 --> 00:15:03,946
>> Are you looking into fusion
reaction for energy?

243

00:15:05,746 --> 00:15:06,626
>> Fusion reaction.

244

00:15:07,106 --> 00:15:08,776
Are we looking into that for energy?

245

00:15:09,636 --> 00:15:10,636

>> Not that I, well.

246

00:15:10,816 --> 00:15:11,286

>> Not sure.

247

00:15:11,286 --> 00:15:12,686

I don't know that NASA is.

248

00:15:12,916 --> 00:15:13,096

>> Yeah.

249

00:15:13,096 --> 00:15:17,956

>> There are people who are, but that seems to be still quite a bit away.

250

00:15:18,476 --> 00:15:20,786

>> I know in Mission Control, we're not focusing on it right now.

251

00:15:20,786 --> 00:15:22,606

>> It's not in one of your buildings here.

252

00:15:22,806 --> 00:15:22,916

>> No.

253

00:15:25,996 --> 00:15:32,496

>> When Apollo 13 climbed the moon for the USA, is it possible that other countries,

254

00:15:32,706 --> 00:15:35,446

that we will be sharing the moon with other countries?

255

00:15:35,846 --> 00:15:37,346

>> I think that's entirely possible.

256

00:15:37,876 --> 00:15:41,246

For us, the moon was our goal back

in the '60s, and we achieved it,

257

00:15:41,626 --> 00:15:44,616

and I see no reason why other countries wouldn't want to have

258

00:15:44,616 --> 00:15:46,816

that same goal and achieve it just like we did.

259

00:15:47,056 --> 00:15:51,236

>> Yeah. When Apollo 11 was the first mission to land on the moon,

260

00:15:51,236 --> 00:15:55,806

and they planted an American flag, but they didn't really claim it for America.

261

00:15:55,806 --> 00:15:57,726

And you're remembering Apollo 13.

262

00:15:57,726 --> 00:16:04,736

That was the mission that circled the moon, but they didn't actually land there.

263

00:16:09,096 --> 00:16:11,486

>> How many missions have you helped get into space?

264

00:16:12,616 --> 00:16:14,326

>> We had 130

265

00:16:14,496 --> 00:16:17,846

>> 135 space shuttle missions that flew.

266

00:16:18,266 --> 00:16:20,216

>> Right. And then we also had all the Apollo missions.

267

00:16:20,536 --> 00:16:20,716

Gemini.

268

00:16:20,716 --> 00:16:22,796

>> Had all the Gemini and Mercury missions.

269

00:16:23,256 --> 00:16:23,606

>> Mercury.

270

00:16:23,606 --> 00:16:27,576

>> As well as all of the launches
to the International Space Station.

271

00:16:27,576 --> 00:16:30,496

The group that's onboard right
now is expedition number 30.

272

00:16:30,966 --> 00:16:38,536

And there are crews who aren't even going
to launch for another two and a half years

273

00:16:38,536 --> 00:16:41,246

who are already training for their flights.

274

00:16:43,556 --> 00:16:50,836

>> Are there any other questions?

275

00:16:50,836 --> 00:16:50,903

[Group discussion]

276

00:16:50,903 --> 00:16:54,036

>> Come on Gabby.

277

00:16:54,036 --> 00:16:56,486

>> Do you remember how many space
shuttle missions you worked?

278

00:16:56,486 --> 00:16:58,356

How many of those did you help put into space?

279

00:16:58,686 --> 00:17:00,446

>> You know, I didn't count.

280

00:17:01,416 --> 00:17:03,186

>> A dozen or so, probably.

281

00:17:03,186 --> 00:17:03,616

In those years.

282

00:17:03,616 --> 00:17:04,876

>> Yeah, it was a dozen or so.

283

00:17:04,876 --> 00:17:06,756

And my last was SCS 107.

284

00:17:07,236 --> 00:17:11,236

>> What kind of problems, not problems.

285

00:17:11,426 --> 00:17:16,716

What kind of things do you have to do to prepare to go up into space.

286

00:17:17,616 --> 00:17:18,916

>> You mean if you're an astronaut?

287

00:17:20,126 --> 00:17:21,606

>> No, like for Mission Control.

288

00:17:22,846 --> 00:17:28,396

>> Well, OK, so we start our flight controllers out with generic training where they do training

289

00:17:28,396 --> 00:17:32,606

on basic simulations and basic procedures that we go through.

290

00:17:33,096 --> 00:17:36,876

And then about six months out, we start

with, what we call, flight-specific training,

291

00:17:37,126 --> 00:17:41,736

where we actually rehearse every single major activity that's going to happen on orbit.

292

00:17:42,226 --> 00:17:46,596

And so we probably have about 15 to 20 of those types of activities

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00:17:46,596 --> 00:17:48,216

that involve the entire flight control team.

294

00:17:48,686 --> 00:17:59,556

And they increase the frequency as we get closer to the start of the increment.

295

00:17:59,556 --> 00:18:02,656

>> How many rockets have blown up during the launch?

296

00:18:03,496 --> 00:18:08,116

>> Well, OK, if you're going to talk about manned spaceflight,

297

00:18:08,556 --> 00:18:12,296

I only know of one that's blown up, and that was Challenger.

298

00:18:13,036 --> 00:18:17,196

We had another accident with an Apollo rocket, but that didn't blow up.

299

00:18:17,776 --> 00:18:18,616

It was on the pad.

300

00:18:18,616 --> 00:18:22,886

And if you're talking about the other rockets that get sent up, most of those are handled

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00:18:22,886 --> 00:18:28,806

by the Department of Defense or through another company, which is United Launch Alliance,

302

00:18:28,806 --> 00:18:33,026

which is a combination of Lockheed Martin and Boeing.

303

00:18:33,486 --> 00:18:36,416

And so I don't know how many they've had blow up, but they're the ones who do most

304

00:18:36,416 --> 00:18:40,136

of the actual rocket launches these days out of the Cape.

305

00:18:40,706 --> 00:18:47,936

>> What is NASA's ultimate goal as far as space travel?

306

00:18:48,756 --> 00:18:53,736

>> Well, NASA is always trying to explore, so our goal is to get as far away from this planet

307

00:18:53,736 --> 00:18:56,316

as possible, and to do so in a safe manner.

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00:18:56,316 --> 00:19:00,516

So, we're constantly striving to do new science that lets us figure

309

00:19:00,516 --> 00:19:05,846

out exactly how people are going to be affected by long time, long term space travel,

310

00:19:06,186 --> 00:19:11,016

how equipment's going to be affected, more effective ways to do things so that we can get

311

00:19:11,076 --> 00:19:14,666
to father places with less mass, less energy.

312
00:19:15,686 --> 00:19:19,516
So, I think NASA, long term, is going
to try and go as far as they can.

313
00:19:19,516 --> 00:19:23,596
Right now, they've set their
sights on Mars in 2030.

314
00:19:24,086 --> 00:19:26,966
>> How does NASA work with
Department of Defense?

315
00:19:27,736 --> 00:19:31,696
>> You know, we actually have some Department
of Defense folks who are on site with us.

316
00:19:31,796 --> 00:19:36,466
We used to do a lot more with them,
because back in the middle days of shuttle,

317
00:19:36,786 --> 00:19:39,706
there were actual Department of
Defense missions and so we had,

318
00:19:39,846 --> 00:19:44,056
one of the flight control rooms was
actually locked down and was very secret

319
00:19:44,056 --> 00:19:47,166
because it had Department
of Defense assets in it.

320
00:19:47,166 --> 00:19:51,566
These days, we do interface with them
some, but most of our involvement is

321
00:19:51,566 --> 00:19:56,226

with either universities or commercial companies that have payloads.

322

00:19:57,656 --> 00:20:01,766

>> But there are people from the branch, several branches of the service,

323

00:20:01,766 --> 00:20:04,136

who work here in a variety of places.

324

00:20:04,136 --> 00:20:10,236

Not only astronauts, but there are other people who are assigned by the Army or the Navy to come

325

00:20:10,236 --> 00:20:15,846

to NASA to work in flight control positions and in other places around here in Houston.

326

00:20:17,596 --> 00:20:19,506

>> Do you have a question?

327

00:20:20,936 --> 00:20:21,216

>> Yes.

328

00:20:21,216 --> 00:20:24,456

>> What's the furthest a robotic spacecraft has gotten away from the earth?

329

00:20:25,896 --> 00:20:26,766

>> Left the Solar System.

330

00:20:27,536 --> 00:20:27,886

Have we?

331

00:20:28,166 --> 00:20:28,316

>> Yeah.

332

00:20:28,396 --> 00:20:29,106

>> Voyager.

333

00:20:29,526 --> 00:20:34,806

I'm not sure if that's the farthest we've gone, or the furthest, whichever is correct.

334

00:20:34,806 --> 00:20:41,086

But early robotic spacecraft that were launched back in the '60's have left our Solar System.

335

00:20:42,566 --> 00:20:48,336

>> What is your favorite part about working for NASA?

336

00:20:49,576 --> 00:20:54,076

>> That's a hard question, because honestly, I love everything.

337

00:20:54,846 --> 00:20:59,546

Probably my favorite thing to do here at NASA is to do events like this and take people on tours,

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00:20:59,606 --> 00:21:02,396

because when you're doing your job, even though it's space,

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00:21:02,396 --> 00:21:07,016

it tends to still be processing paperwork to get monitors replaced and workstations replaced

340

00:21:07,016 --> 00:21:11,236

and update code, and when you get an opportunity to do something like this, or to bring people

341

00:21:11,236 --> 00:21:13,356

through Mission Control, it reminds you how cool it really is.

342

00:21:13,496 --> 00:21:15,836

>> Yeah. Working in this room is pretty cool.

343

00:21:15,836 --> 00:21:20,076

Getting to sit at one of these consoles
and listen to all of these people talk

344

00:21:20,076 --> 00:21:25,116

about what's going on on the space station, and
how we're making sure that we stay on the plan

345

00:21:25,116 --> 00:21:29,556

for what we want to do, or how we're going
to try to resolve some issue that's come up,

346

00:21:29,936 --> 00:21:39,176

and being right here in the middle
of it -- that's pretty good.

347

00:21:40,036 --> 00:21:43,146

>> Do you [phonetic] guys like
still send animals up into space?

348

00:21:43,426 --> 00:21:48,286

>> You know, I think there have
been some payloads recently

349

00:21:48,286 --> 00:21:50,246

that were sent up that did involve rats.

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00:21:50,346 --> 00:21:53,816

I know when I was working as a shuttle flight
controller, we had to account for the amount

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00:21:53,816 --> 00:21:55,386

of oxygen the rats would consume.

352

00:21:55,876 --> 00:22:01,016

But, we haven't sent primates
up in many, many years.

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00:22:01,016 --> 00:22:03,526

We did that in the beginning because we weren't sure what the effects would be

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00:22:03,526 --> 00:22:07,546

of human spaceflight on humans, and so we wanted to be very cautious, but these days,

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00:22:07,546 --> 00:22:14,136

the only animals that go up are going to be part of an experiment.

356

00:22:14,306 --> 00:22:17,246

>> What happens when an astronaut gets sick up in space?

357

00:22:18,656 --> 00:22:23,626

>> Well, we actually have a whole team down here called the flight surgeons who take care

358

00:22:23,626 --> 00:22:27,606

of astronaut health, and they carry a lot of medicine with them up in space.

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00:22:27,686 --> 00:22:32,526

And we have a capability for them to do private medical conferences, where they can call down

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00:22:32,526 --> 00:22:36,526

and talk to, or have a video teleconference, with the flight surgeons

361

00:22:36,566 --> 00:22:39,246

to discuss whatever ailment that they have.

362

00:22:39,246 --> 00:22:43,396

Our astronauts are also trained in many of the standard medical procedures

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00:22:43,396 --> 00:22:45,736

that you would expect from,

say, an ambulance crew.

364

00:22:45,876 --> 00:22:49,876

So if something critical were to happen, then they have the capability of responding to it,

365

00:22:49,876 --> 00:22:52,146

as long as it's something somewhat standard.

366

00:22:52,766 --> 00:23:02,746

>> I heard somewhere that, like, astronauts can, like, swell up in space.

367

00:23:02,876 --> 00:23:03,876

How does that happen?

368

00:23:04,896 --> 00:23:06,326

>> Well, in space, there's no gravity.

369

00:23:06,836 --> 00:23:10,586

So, on the earth, all of your fluids are pulled constantly towards your feet,

370

00:23:10,586 --> 00:23:12,456

and your body does account for that in some ways.

371

00:23:12,456 --> 00:23:15,856

I mean, by the end of the day, you are going to have more fluid at your feet than your head,

372

00:23:15,856 --> 00:23:17,786

but overall, it stays pretty constant.

373

00:23:18,136 --> 00:23:21,936

But when you're in space, there's no gravity, so the fluid just accumulates in your body

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00:23:21,936 --> 00:23:23,416

and it's not pulled down towards your feet.

375

00:23:23,536 --> 00:23:27,136

So, they do tend to have puffier faces when they are on orbit.

376

00:23:27,446 --> 00:23:28,706

That changes when they get back on the ground.

377

00:23:30,306 --> 00:23:34,286

>> Is there any other questions that we have not asked yet?

378

00:23:36,316 --> 00:23:38,996

>> I think you got, you've had some really good questions.

379

00:23:41,576 --> 00:23:42,876

>> Alright, wonderful.

380

00:23:42,876 --> 00:23:45,736

Dowell Middle School, this is Michael Hare [phonetic] again,

381

00:23:45,846 --> 00:23:47,466

from the Digital Learning Network.

382

00:23:47,726 --> 00:23:51,746

Did you want to say a final goodbye or thank you to Pat Ryan

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00:23:51,746 --> 00:23:54,466

and Angela Bauer for all their great answers?

384

00:23:54,836 --> 00:23:58,476

>> Thank you.

385

00:23:58,476 --> 00:23:59,816

>> You're welcome.

