GEORGE DILLER: Like the International Space Station itself, the STS-124 mission represents the spirit of global teamwork.

Commanded by Mark Kelly, and joined by JAXA astronaut Aki Hoshide.

The crew of Discovery will build on the success of STS-123 by adding a large pressurized module and a versatile robot arm.

STS-124 is the second in this series of flights. Discovery will be in place on Launch Pad 39A and the countdown clock is already ticking toward liftoff.

Live from NASA's Kennedy Space Center, this is L minus-one.

(Crew recording) Close and lock your visors, initiate O2 flow, it's time to fly.

ALLARD BEUTEL: Thanks for joining us here for our prelaunch show, L-minus-one.

I'm your host Allard Beutel, news chief here at NASA's Kennedy Space Center.

L-minus-one is also NASA-talk for the day before lift off and we are almost exactly 24-hours away from the launch of space shuttle Discovery. And we can feel the pace picking up here at the launch center as the clock is counting down.
We've got a great show lined up for you today. We have veteran astronaut Mike Foale who will take us inside the STS-124 mission that will dramatically increase the science potential of the International Space Station.

But first let me set the stage for you. This very studio is located inside the Kennedy News Center and media from around the world have been pouring in the last couple of days to cover tomorrow's launch for a global audience.

The hub of this activity is right across the street from here, in the launch control center, or as we call it the LCC, which is really the "brain" of the shuttle launch complex.

Every mission launched at Launch Complex 39 from the Apollo missions straight through to the shuttle program have been controlled from the firing rooms inside the launch control center.

Right now there are controllers on duty, round the clock, monitoring the health of Discovery from Firing Room 4.

It's a very exciting time to be here and it's a very good time for us to introduce Dr. Michael Foale, thank you for joining us.

MICHAEL FOALE: It's a pleasure to be with you.

BEUTEL: When I call you "veteran," that's no lie -- six flights and including one on the long duration flight on the International Space Station and long duration flight on the...
Russian Space Station Mir. You've gone through a few countdowns yourself.

28
00:02:08,060 --> 00:02:09,439
FOALE: Yes, I have. BEUTEL: What's it like?

29
00:02:09,439 --> 00:02:16,000
FOALE: Why, it's nerve racking. I was surprised I was able to sleep before each countdown –

30
00:02:16,000 --> 00:02:22,110
the night before I got sleep. But once you get out there, once you get up you have your breakfast,

31
00:02:22,110 --> 00:02:25,700
you're part of a team, and you're aware of this team, building you up getting you ready,

32
00:02:25,699 --> 00:02:31,899
making sure you get out to the launch pad on time. They don't want anyone lost in the toilet or
anything like that back home.

33
00:02:31,900 --> 00:02:38,920
And you feel some tension with your crewmates. As the Astrovan, the silver van takes you out

34
00:02:38,919 --> 00:02:44,269
to the launch pad, you're aware that this day is very, very different from other days,

35
00:02:44,270 --> 00:02:48,400
because other days you've seen workers out there at the launch pad,

36
00:02:48,400 --> 00:02:52,390
just regular things are going on the guard checks happen, the badges are checked.

37
00:02:52,389 --> 00:02:56,559
But this day, no one is out there. In fact, if there are any vehicles, they're all leaving the launch pad,

38
00:02:56,560 --> 00:03:01,199
and that's because it's a really dangerous place. And you're going out there and it makes you think,

ah,

39
00:03:01,199 --> 00:03:05,769
this is the most dangerous place in the whole area and you're driving out towards it.

40
00:03:05,770 --> 00:03:11,360
Once you get into the vehicle you kind of settle down and it's more familiar to you again.
It's stuff you trained in the simulator many, many times. The countdown progresses in a very steady way over two hours to that magic moment -- 3, 2, 1, 0 and then the solid rocket boosters kick off.

BEUTEL: And really, is it like the training? I mean do you kick back into your training mode or really does feel extra special -- that this is real, not simulated?

FOALE: The other big difference, about actually driving out in the Astrovan, to the launch pad is the, of course,

you're not going to a simulator; you're going to the real thing. And so simulators, no matter how good the graphics and our graphics in our simulators back in Houston are not as good as even the best games around these days.

So when you actually get in the vehicle and you see the sky through the windows and you see blue sky and you're on your back. And the smell of the vehicle is a little different from the simulator and it's newer looking. And all that tells you, this is different.

And so however, nonetheless, everything that you do is familiar to you because you've done it before.

BEUTEL: Right. Well actually for this particular crew on Discovery, two of them are veterans and two of them are actually experiencing a countdown for the very first time. So let's take a look at the STS-124 crew.
DILLER: Two-time shuttle pilot Mark Kelly

takes the reins as commander of space shuttle Discovery on the 26th mission to the International Space Station.

It's the first shuttle mission for crew members Ken Ham, Karen Nyberg and Ron Garan, and the second for Mike Fossum.

Aki Hoshide represents the Japan Aerospace Exploration Agency on his first space flight.

Expedition 17 Flight Engineer Greg Chamitoff will join the crew aboard the station,

replacing Garrett Reisman, who will return to Earth after his stay in orbit.

BEUTEL: Well, let's get to the part where we have the thing in the back of Discovery, in the cargo bay, the payload, as we call it.

This is Japan's major contribution to International Space Station and overall

the laboratory's called the Japanese Experiment Module, or JEM or --

FOALE: Kibo, yes -- BEUTEL: or Kibo. FOALE: I think hope, is that right?

BEUTEL: That -- you're absolutely -- And we're taking up the Pressurized Module, the main,

the biggest lab on the space, it will be the biggest lab on the space station and the biggest module we've ever taken up.
Right now we really have all the, really all the major scientific elements up on the station, or will be after this flight.

FOALE: Just about, yes. This mission is key, it really I think psychologically for the partners it will be the accomplishment of all the dreams of building an international space station...an international experiment facility and laboratory.

And Kibo lab is the "end piece," it's not the final piece, but I think psychologically it is.

BEUTEL: And there have been people here at the Kennedy Space Center from Japan who have worked here since the pressurized module arrived. You yourself, obviously not only flown on the original space station,

but on Mir, had to train and live in Russia for some time yourself. So what's it like having to immerse yourself into a different country and work with their space program?

FOALE: Well, that's the neat thing about being an astronaut today.

At least a government astronaut in the United States is you get to meet all these other partner nations and their astronauts and their engineers and support people.

It's a little tough for me as a scientist and physicist who wasn't very good at languages initially in school to have to learn Russian for example and I speak Russian really well now, fluently as a result of living many,
many years in Russian and flying on the International Space Station.

But that, that, all those new friends, that new experience is extraordinarily valuable to me personally,

and I welcome the day when -- I met Souichi outside just now, when I can start learning some Japanese.

I’d like to be assigned to a space station mission in the future where I get to travel to Japan,

you know, and learn about the experiments they're going to do in their laboratory Kibo.

BEUTEL: Hint, hint, to management. Actually Kibo is an extensive and complex addition to the International Space Station.

Let's take a closer look, with NASA Payload Mission Manager Scott Higginbotham.

SCOTT HIGGINBOTHAM: The Japanese Experiment Module is named Kibo -- meaning "hope."

Kibo is actually made up of five major segments delivered to the

International Space Station over the course of three space shuttle missions.

The diverse elements making up Kibo will allow the space station crew to conduct experiments both inside in microgravity

-- and outside in the direct exposure to space.

The larger of the two pressurized modules will serve as the working laboratory.
A smaller pressurized logistics module that sits atop the laboratory will be used primarily for storage of tools and supplies.

On the outside are two more segments -- the exposed facility to hold experiments -- and a logistics platform.

The final piece is a robotic arm attached to the laboratory.

The arm will allow astronauts inside the lab to access the external facilities and experiments.

Attached to the space station's Harmony module, the arrival of Kibo greatly expands the scientific work of the orbiting outpost.

BEUTEL: As luck would have it we happen to have a model of Kibo.

Let's kind of go through in general what's up there now and what's not.

FOALE: Well the only thing that's up there right now is the logistics module which was launched on the last mission.

To set the scene here, the space station is flying this way and the space shuttle is docked here and this module is attached to the Harmony Node.

Node 2 on the zenith, on the opposite side of the station.

Once Kibo is pulled out of the space shuttle's payload bay it'll be attached to the port side of the space station traveling this way and then they'll move this logistics module from the top of Harmony and stick it on top of Kibo.
This piece will come out later on, next year, I think it is and represent external experiments that will be done using the vacuum of space. It's a pretty harsh vacuum but very, very good for material science.

There's an arm mounted on the Kibo that's going up on the shuttle, on Discovery, and it's 30 foot long.

It will be used to manipulate the experiments that are out here on this pallet.

In addition, there's a scientific airlock in the middle there and it's not an airlock that lets humans in spacesuits do EVAs. It's an airlock that allows experiments here to be passed out and put on the pallet using the arm or brought back in through the airlock to be used and studied by the astronauts that are inside.

And just for clarification's sake people will wonder, we are taking up the main part of the robotic arm?

A six-foot extension to it will be added on another flight.

FOALE: And that's called a "fine arm." And it's much more dexterous,

it's more detailed work that it can do and it's carried at the end of this 32-foot arm.

Let's see this is actually a very good time for to go to questions that people have submitted
on our question board at NASA.gov so I'll jump right into it and say, the first one

Robert from Ontario asks: How many hours of EVA training are required for every hour spent outside the station on an actual spacewalk?

FOALE: Roughly about seven to one or ten to one. So if you're going to do one EVA on a space shuttle mission, it would take roughly ten times the six hours of EVA, about 60 hours or so, 70 hours of training.

BEUTEL: And you're training in big pools.

FOALE: Yes, of course that training, we don't, we forgot to mention that that's in a big water tank, a huge water tank, where a large part of the space station is submerged full-scale and then we work in that water in spacesuits as if it was weightless. But of course it's not, we can feel weight inside the suit. But our bodies basically move as if they were in space.

BEUTEL: Let's go to the next question. Bill from Ann Arbor asks:

Are there any plans to lengthen crew stays on the International Space Station so we'll better understand what astronauts will experience on a future journey to Mars?
FOALE: Six months is what we do on the space station. I've lived on the space station six months and that is good enough to get to Mars and get back from Mars using chemical rockets.

It's possible that we might go slower, but I think it's unlikely. And in that case, yes there would be value in extending the missions on the International Space Station. But right now, no plans to do that.

BEUTEL: Well, let's see, we've actually been getting a lot of other questions that for something that really is not part of the original cargo for Discovery.

But we added some, some, some pieces for the International Space Station this week.

People have heard about. We have a broken -- a partially working toilet on the space station.

We added some parts that we'll be taking up including a pump to help that.

The fact is you, my man, have actually (laughter) used the facilities there,

so just briefly, how again, we get asked this all the time.

FOALE: A toilet is really, really a key part of the space station. It's terrible if the toilet breaks because it makes life very difficult.

The big issue, the great advantage of being in space, of course, is that it's weightless.

You can do experiments with that environment that you can't do on Earth.
But it has its complications and especially for the toilet. And the key is that urine in this case is a liquid,

it forms a nice yellow ball if you put it out in the open -- and it shouldn't be.

It'll wobble and stick together through its surface tension.

But if you try to get it into a bag or into a tank it won't go. It's going to stick to walls -- and it won't move.

And so the toilet specifically has a vacuum cleaner type of arrangement where it blows air through

tubes and tries to get that liquid air mixture to go in towards the tank.

Well, how you get the liquid to go into the tank and the air to separate?

And that's what's called a liquid-air separator it's like a centrifuge in a way,

and peels off the liquid in one direction and the air in the other. And that's what failed and that's
what's

being delivered now on this shuttle, Discovery, to help the crew that are onboard the station right now.

BEUTEL: I guess if you had to have this happen it's not bad to have it right before a shuttle flight to bring parts up.

FOALE: That's true, yeah, otherwise you could be doing a lot of maintenance. In fact, we should say right away,
they can go to the bathroom, it's just using a lot more water than they normally do and it's a lot more complicated,

00:13:25,039 --> 00:13:28,049
they're having to do extra flushing basically to keep the urine in the right place.

BEUTEL: But these are the kind of things that we have to develop on the fly.

FOALE: Absolutely! Living, working in space you're learning all kinds of stuff about how the pumps work, how they don't work.

You're learning about how to make machinery and equipment work that would allow us to do colonies in space, for example -- live for a long time, not just six months.

Same technology will be used going to Mars and the same technology, or similar technologies will be used on the Moon and then Mars when we have colonies there.

BEUTEL: Well, alright, that's interesting way to leave us. And I do appreciate you joining us and thanks for stopping by Mike.

FOALE: Thank you, it was a pleasure.

BEUTEL: And tonight at about 8:30 p.m. Eastern time, the rotating service structure -- the protective covering for the shuttle at the pad -- will be rolled away from shuttle Discovery.

And liquid oxygen and liquid hydrogen are set to begin flowing into that external fuel tank a little after 7:45 a.m. tomorrow.

Right now the weather forecast calls for about an 80 percent chance of good
weather so our fingers are crossed and we'll be looking towards the sky.

To follow the launch countdown, tune in live to NASA television, or click your way over to www.nasa.gov/shuttle

to find NASA's launch blog for online play-by-play of the action leading up to the liftoff of space shuttle Discovery and the start of the STS-124 mission.

I'm Allard Beutel -- thanks for watching. At T-minus 11 hours and holding, this is L-minus-one.