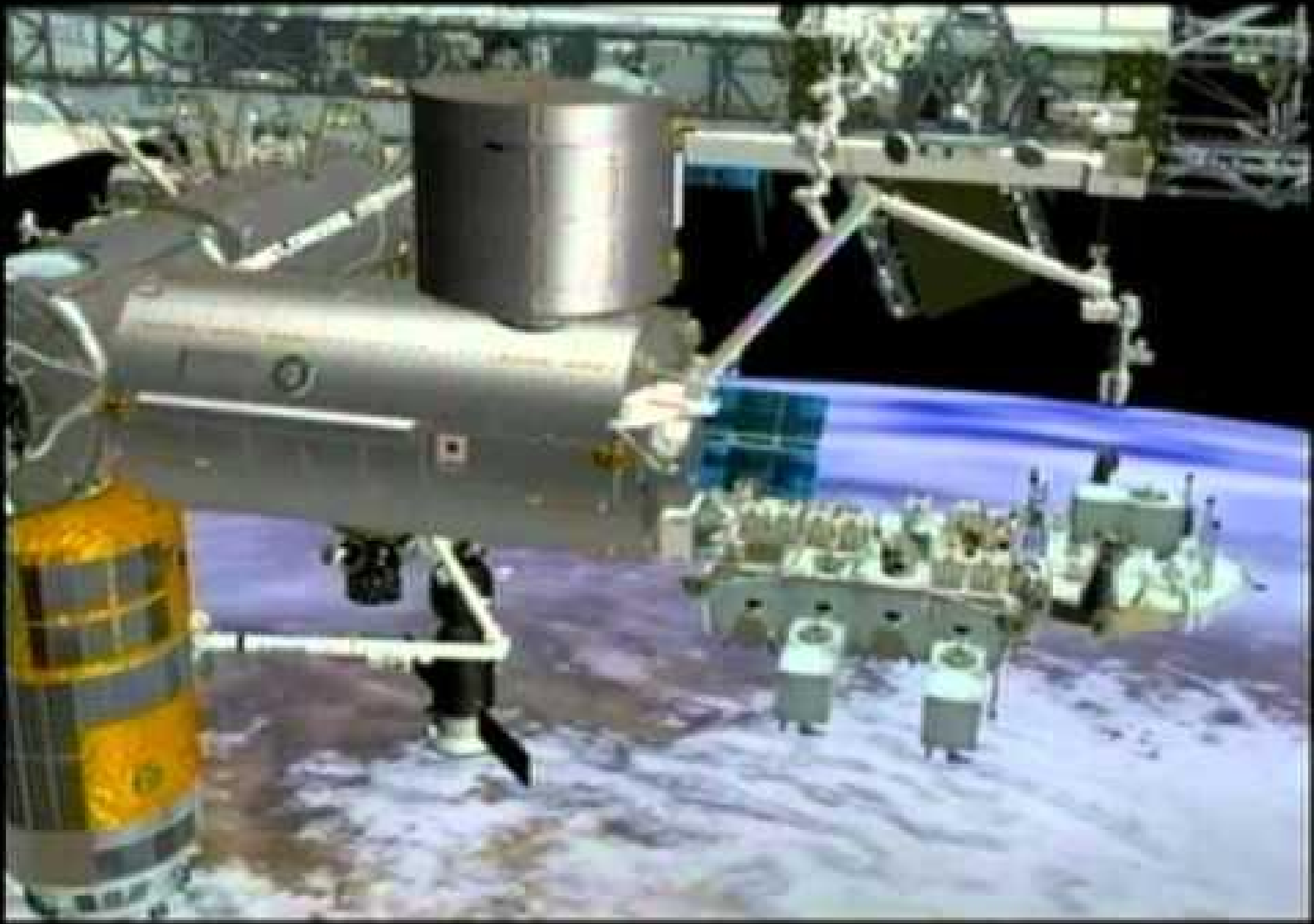

1
00:00:00,970 --> 00:00:08,850
\h GEORGE DILLER: Like the International Space Station itself, the STS-124 mission represents the spirit

2
00:00:08,850 --> 00:00:13,650
\h Commanded by Mark Kelly, and joined by JAXA astronaut Aki Hoshide.

3
00:00:13,650 --> 00:00:19,450
\h The crew of Discovery will build on the
success of STS-123 by adding a large

4
00:00:19,450 --> 00:00:23,370
\h pressurized module and a versatile robot arm.

5
00:00:23,370 --> 00:00:30,130
\h STS-124 is the second in this series of flights. Discovery will be in place on

6
00:00:30,130 --> 00:00:35,690
\h Launch Pad 39A and the countdown clock is already ticking toward liftoff.

7
00:00:35,690 --> 00:00:40,750
\h Live from NASA's Kennedy Space Center, this is L minus-one.

8
00:00:40,750 --> 00:00:47,870
\h (Crew recording) Close and lock your visors, initiate O2 flow, it's time to fly.

9
00:00:47,870 --> 00:00:50,850
\h ALLARD BEUTEL: Thanks for joining us here for our prelaunch show, L-minus-one.

10
00:00:50,850 --> 00:00:54,570
\h I'm your host Allard Beutel, news chief here at NASA's Kennedy Space Center.

11
00:00:54,570 --> 00:00:58,880
\h L-minus-one is also NASA-talk for the day before lift off and we are almost exactly

12
00:00:58,880 --> 00:01:02,590
\h 24-hours away from the launch of space shuttle Discovery. And we can feel the

13

00:01:02,590 --> 00:01:06,120
\h pace picking up here at the launch center as the clock is counting down.

14
00:01:06,120 --> 00:01:09,850
\h We've got a great show lined up for you today. We have veteran astronaut Mike Foale

15
00:01:09,850 --> 00:01:16,100
\h who will take us inside the STS-124 mission that will dramatically increase the science potential of the I

16
00:01:16,100 --> 00:01:20,790
\h But first let me set the stage for you. This very studio is located inside the Kennedy News Center

17
00:01:20,790 --> 00:01:26,650
\h and media from around the world have been pouring in the last couple of days to cover tomorrow's laun

18
00:01:26,650 --> 00:01:30,760
\h The hub of this activity is right across the
street from here, in the launch control

19
00:01:30,760 --> 00:01:35,170
\h center, or as we call it the LCC, which is really the "brain" of the shuttle launch complex.

20
00:01:35,170 --> 00:01:39,080
\h Every mission launched at Launch Complex 39 from the Apollo missions straight through

21
00:01:39,080 --> 00:01:43,480
\h to the shuttle program have been controlled from the firing rooms inside the launch control center.

22
00:01:43,480 --> 00:01:49,150
\h Right now there are controllers on duty, round the clock, monitoring the health of Discovery from Firing

23
00:01:49,150 --> 00:01:52,950
\h It's a very exciting time to be here and it's a very good time for us to introduce Dr. Michael Foale, thank

24
00:01:52,950 --> 00:01:55,910
\h MICHAEL FOALE: It's a pleasure to be with you.

25
00:01:55,910 --> 00:02:00,480

\h BEUTEL: When I call you "veteran," that's no lie -- six flights and including one on

26
00:02:00,480 --> 00:02:03,410
\h the long duration flight on the International Space Station and long duration flight on the

27
00:02:03,410 --> 00:02:08,060
\h Russian Space Station Mir. You've gone through a few countdowns yourself.

28
00:02:08,060 --> 00:02:09,440
\h FOALE: Yes, I have. BEUTEL: What's it like?

29
00:02:09,440 --> 00:02:16,000
\h 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
\h 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
\h you're part of a team, and you're aware of this team, building you up getting you ready,

32
00:02:25,700 --> 00:02:31,900
\h making sure you get out to the launch pad on time. They don't want anyone lost in the toilet or anything

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

34
00:02:38,920 --> 00:02:44,270
\h 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
\h because other days you've seen workers out there at the launch pad,

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

37
00:02:52,390 --> 00:02:56,560
\h 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 --> 00:03:01,200
\h and that's because it's a really dangerous place. And you're going out there and it makes you think, ah,

39
00:03:01,200 --> 00:03:05,770
\h 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
\h Once you get into the vehicle you kind of settle down and it's more familiar to you again.

41
00:03:11,360 --> 00:03:15,760
\h It's stuff you trained in the simulator many, many times. The countdown progresses

42
00:03:15,760 --> 00:03:25,510
\h in a very steady way over two hours to that magic moment -- 3, 2, 1, 0 and then the solid rocket booster

43
00:03:25,510 --> 00:03:28,030
\h BEUTEL: And really, is it like the training? I mean do you kick back into your

44
00:03:28,030 --> 00:03:34,230
\h training mode or really does feel extra special -- that this is real, not simulated?

45
00:03:34,230 --> 00:03:42,010
\h FOALE: The other big difference, about actually driving out in the Astrovan, to the launch pad is the, of

46
00:03:42,010 --> 00:03:46,790
\h you're not going to a simulator; you're going to the real thing. And so simulators, no matter how good the

47
00:03:46,790 --> 00:03:55,290
\h graphics and our graphics in our simulators back in Houston are not as good as even the best games ar

48
00:03:55,290 --> 00:04:00,230
\h So when you actually get in the vehicle and you see the sky through the windows

49
00:04:00,230 --> 00:04:05,510
\h and you see blue sky and you're on your back. And the smell of the vehicle is a little different

50
00:04:05,510 --> 00:04:10,890

\h from the simulator and it's newer looking. And all that tells you, this is different.

51
00:04:10,890 --> 00:04:18,000
\h And so however, nonetheless, everything that you do is familiar to you because you've done it before.

52
00:04:18,000 --> 00:04:24,510
\h BEUTEL: Right. Well actually for this particular crew on Discovery, two of them are veterans and two of

53
00:04:24,510 --> 00:04:30,080
\h them are actually experiencing a countdown for the very first time. So let's take a look at the STS-124 cr

54
00:04:30,080 --> 00:04:34,290
\h DILLER: Two-time shuttle pilot Mark Kelly
takes the reins as commander of space

55
00:04:34,290 --> 00:04:39,420
\h shuttle Discovery on the 26th mission to the International Space Station.

56
00:04:39,420 --> 00:04:48,090
\h It's the first shuttle mission for crew members Ken Ham, Karen Nyberg and Ron Garan, and the second

57
00:04:48,090 --> 00:04:54,760
\h Aki Hoshide represents the Japan Aerospace Exploration Agency on his first space flight.

58
00:04:54,760 --> 00:05:00,270
\h Expedition 17 Flight Engineer Greg Chamitoff will join the crew aboard the station,

59
00:05:00,270 --> 00:05:05,340
\h replacing Garrett Reisman, who will return to Earth after his stay in orbit.

60
00:05:05,340 --> 00:05:08,250
\h BEUTEL: Well, let's get to the part where we have the thing in the back

61
00:05:08,250 --> 00:05:10,380
\h of Discovery, in the cargo bay, the payload, as we call it.

62
00:05:10,380 --> 00:05:14,320
\h This is Japan's major contribution to International Space Station and overall

63
00:05:14,320 --> 00:05:17,610
\h the laboratory's called the Japanese Experiment Module, or JEM or --

64
00:05:17,610 --> 00:05:21,070
\h FOALE: Kibo, yes -- BEUTEL: or Kibo. FOALE: I think hope, is that right?

65
00:05:21,070 --> 00:05:25,710
\h BEUTEL: That -- you're absolutely -- And we're taking up the Pressurized Module, the main, \

66
00:05:25,710 --> 00:05:29,280
\h the biggest lab on the space, it will be the biggest lab on the space station and the biggest module we've

67
00:05:29,280 --> 00:05:34,680
\h Right now we really have all the, really all the major scientific elements up on the station, or will be after

68
00:05:34,680 --> 00:05:40,610
\h FOALE: Just about, yes. This mission is key, it really I think psychologically for the partners it will

69
00:05:40,610 --> 00:05:45,380
\h be the accomplishment of all the dreams of building an international space

70
00:05:45,380 --> 00:05:49,310
\h station…an international experiment facility and laboratory.

71
00:05:49,310 --> 00:05:57,590
\h And Kibo lab is the "end piece," it's not the final piece, but I think psychologically it is.

72
00:05:57,590 --> 00:06:01,470
\h BEUTEL: And there have been people here at the Kennedy Space Center from Japan who have worked

73
00:06:01,470 --> 00:06:07,160
\h since the pressurized module arrived. You yourself, obviously not only flown on the original space statio

74
00:06:07,160 --> 00:06:12,260
\h but on Mir, had to train and live in Russia for some time yourself. So what's it like having to immerse

75

00:06:12,260 --> 00:06:14,790
\h yourself into a different country and work with their space program?

76
00:06:14,790 --> 00:06:16,750
\h FOALE: Well, that's the neat thing about being an astronaut today.

77
00:06:16,750 --> 00:06:22,190
\h At least a government astronaut in the United States is you get to meet all these other partner

78
00:06:22,190 --> 00:06:26,060
\h nations and their astronauts and their engineers and support people.

79
00:06:26,060 --> 00:06:31,830
\h It's a little tough for me as a scientist and physicist who wasn't very good at languages initially in

80
00:06:31,830 --> 00:06:38,990
\h school to have to learn Russian for example and I speak Russian really well now, fluently as a result of

81
00:06:38,990 --> 00:06:42,430
\h many years in Russian and flying on the International Space Station.

82
00:06:42,430 --> 00:06:48,740
\h But that, that, all those new friends, that new experience is extraordinarily valuable to me personally,

83
00:06:48,740 --> 00:06:56,890
\h and I welcome the day when -- I met Souichi outside just now, when I can start learning some Japanese

84
00:06:56,890 --> 00:07:05,070
\h I'd like to be assigned to a space station mission in the future where I get to travel to Japan,

85
00:07:05,070 --> 00:07:07,600
\h you know, and learn about the experiments they're going to do in their laboratory Kibo.

86
00:07:07,600 --> 00:07:13,560
\h BEUTEL: Hint, hint, to management. Actually Kibo is an extensive and complex addition to the Internati

87
00:07:13,560 --> 00:07:18,020
\h Let's take a closer look, with NASA Payload Mission Manager Scott Higginbotham.

88
00:07:18,020 --> 00:07:22,080
\h SCOTT HIGGINBOTHAM: The Japanese Experiment Module is named Kibo -- meaning "hope."

89
00:07:22,080 --> 00:07:25,160
\h Kibo is actually made up of five major segments delivered to the

90
00:07:25,160 --> 00:07:30,110
\h International Space Station over the course of three space shuttle missions.

91
00:07:30,110 --> 00:07:36,040
\h The diverse elements making up Kibo will allow the space station crew to conduct experiments both insi

92
00:07:36,040 --> 00:07:39,780
\h -- and outside in the direct exposure to space.

93
00:07:39,780 --> 00:07:44,390
\h The larger of the two pressurized modules will serve as the working laboratory.

94
00:07:44,390 --> 00:07:51,930
\h A smaller pressurized logistics module that sits atop the laboratory will be used primarily for storage of t

95
00:07:51,930 --> 00:07:58,400
\h On the outside are two more segments -- the exposed facility to hold experiments -- and a logistics platf

96
00:07:58,400 --> 00:08:02,620
\h The final piece is a robotic arm attached to the laboratory.

97
00:08:02,620 --> 00:08:07,670
\h The arm will allow astronauts inside the lab to access the external facilities and experiments.

98
00:08:07,670 --> 00:08:18,260
\h Attached to the space station's Harmony module, the arrival of Kibo greatly expands the scientific work

99
00:08:18,260 --> 00:08:21,910
\h BEUTEL: As luck would have it we happen to have a model of Kibo.

100

00:08:21,910 --> 00:08:26,260
\h Let's kind of go through in general what's up there now and what's not.

101
00:08:26,260 --> 00:08:31,660
\h FOALE: Well the only thing that's up there right now is the logistics module which was launched on the l

102
00:08:31,660 --> 00:08:36,860
\h To set the scene here, the space station is flying this way and the space shuttle is

103
00:08:36,860 --> 00:08:40,860
\h docked here and this module is attached to the Harmony Node,

104
00:08:40,860 --> 00:08:44,460
\h Node 2 on the zenith, on the opposite side of the station.

105
00:08:44,460 --> 00:08:50,670
\h 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

106
00:08:50,670 --> 00:08:56,970
\h then they'll move this logistics module from the top of Harmony and stick it on top of Kibo.

107
00:08:56,970 --> 00:09:04,190
\h This piece will come out later on, next year, I think it is and represent external experiments that

108
00:09:04,190 --> 00:09:09,740
\h will be done using the vacuum of space. It's a pretty harsh vacuum but very, very good for material scien

109
00:09:09,740 --> 00:09:12,960
\h and for studying the properties of new and modern materials.

110
00:09:12,960 --> 00:09:19,350
\h There's an arm mounted on the Kibo that's going up on the shuttle, on Discovery, and it's 30 foot long.

111
00:09:19,350 --> 00:09:23,930
\h It will be used to manipulate the experiments that are out here on this pallet.

112
00:09:23,930 --> 00:09:31,290

\h In addition, there's a scientific airlock in the middle there and it's not an airlock that lets humans in space

113
00:09:31,290 --> 00:09:36,420
\h It's an airlock that allows experiments here to be passed out and put on the pallet

114
00:09:36,420 --> 00:09:43,320
\h using the arm or brought back in through the airlock to be used and studied by the astronauts that are in

115
00:09:43,320 --> 00:09:47,240
\h BEUTEL: And just for clarification's sake people will wonder, we are taking up the main part of the robot

116
00:09:47,240 --> 00:09:51,170
\h A six-foot extension to it will be added on another flight.

117
00:09:51,170 --> 00:09:54,560
\h FOALE: And that's called a "fine arm." And it's much more dexterous,

118
00:09:54,560 --> 00:10:00,490
\h it's more detailed work that it can do and it's carried at the end of this 32-foot arm.

119
00:10:00,490 --> 00:10:03,520
\h BEUTEL: Let's see this is actually a very good time for to go to questions that people have submitted

120
00:10:03,520 --> 00:10:07,690
\h on our question board at NASA.gov so I'll jump right into it and say, the first one

121
00:10:07,690 --> 00:10:11,060
\h Robert from Ontario asks: How many hours of EVA training are required for

122
00:10:11,060 --> 00:10:14,370
\h every hour spent outside the station on an actual spacewalk?

123
00:10:14,370 --> 00:10:22,730
\h FOALE: Roughly about seven to one or ten to one. So if you're going to do one EVA on a space shuttle

124
00:10:22,730 --> 00:10:27,120
\h to build something, do some of the space station assembly or get an experiment out there,

125
00:10:27,120 --> 00:10:34,160
\h it would take roughly ten times the six hours of EVA, about 60 hours or so, 70 hours of training.

126
00:10:34,160 --> 00:10:38,350
\h BEUTEL: And you're training in big pools.

127
00:10:38,350 --> 00:10:43,900
\h FOALE: Yes, of course that training, we don't, we forgot to mention that that's in a big water tank,

128
00:10:43,900 --> 00:10:48,890
\h a huge water tank, where a large part of the space station is submerged full-scale

129
00:10:48,890 --> 00:10:54,530
\h and then we work in that water in spacesuits as if it was weightless. But of course it's not,

130
00:10:54,530 --> 00:11:00,040
\h we can feel weight inside the suit. But our bodies basically move as if they were in space.

131
00:11:00,040 --> 00:11:02,080
\h BEUTEL: Let's go to the next question. Bill from Ann Arbor asks:

132
00:11:02,080 --> 00:11:05,840
\h Are there any plans to lengthen crew stays on the International Space Station so we'll better understanc

133
00:11:05,840 --> 00:11:09,820
\h what astronauts will experience on a future journey to Mars?

134
00:11:09,820 --> 00:11:14,630
\h FOALE: Six months is what we do on the space station. I've lived on the space station six months and

135
00:11:14,630 --> 00:11:21,030
\h that is good enough to get to Mars and get back from Mars using chemical rockets.

136
00:11:21,030 --> 00:11:25,830
\h It's possible that we might go slower, but I think it's unlikely. And in that case,

137
00:11:25,830 --> 00:11:32,350

\h yes there would be value in extending the missions on the International Space Station. But right now, no

138
00:11:32,350 --> 00:11:36,070
\h BEUTEL: Well, let's see, we've actually been getting a lot of other questions that

139
00:11:36,070 --> 00:11:39,170
\h for something that really is not part of the original cargo for Discovery.

140
00:11:39,170 --> 00:11:43,340
\h But we added some, some, some pieces for the International Space Station this week.

141
00:11:43,340 --> 00:11:48,180
\h People have heard about. We have a broken -- a partially working toilet on the space station.

142
00:11:48,180 --> 00:11:51,910
\h We added some parts that we'll be taking up including a pump to help that.

143
00:11:51,910 --> 00:11:55,580
\h The fact is you, my man, have actually (laughter) used the facilities there,

144
00:11:55,580 --> 00:12:00,100
\h so just briefly, how again, we get asked this all the time.

145
00:12:00,100 --> 00:12:08,330
\h FOALE: A toilet is really, really a key part of the space station. It's terrible if the toilet breaks because it n

146
00:12:08,330 --> 00:12:12,900
\h The big issue, the great advantage of being in space, of course, is that it's weightless.

147
00:12:12,900 --> 00:12:15,900
\h You can do experiments with that environment that you can't do on Earth.

148
00:12:15,900 --> 00:12:23,360
\h But it has its complications and especially for the toilet. And the key is that urine in this case is a liquid,

149
00:12:23,360 --> 00:12:27,980
\h it forms a nice yellow ball if you put it out in the open -- and it shouldn't be.

150
00:12:27,980 --> 00:12:31,190
\h It'll wobble and stick together through its surface tension.

151
00:12:31,190 --> 00:12:37,020
\h 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.

152
00:12:37,020 --> 00:12:42,650
\h And so the toilet specifically has a vacuum cleaner type of arrangement where it blows air through

153
00:12:42,650 --> 00:12:48,310
\h tubes and tries to get that liquid air mixture to go in towards the tank.

154
00:12:48,310 --> 00:12:52,350
\h Well, how you get the liquid to go into the tank and the air to separate?

155
00:12:52,350 --> 00:12:56,490
\h And that's what's called a liquid-air separator it's like a centrifuge in a way,

156
00:12:56,490 --> 00:13:01,940
\h and peels off the liquid in one direction and the air in the other. And that's what failed and that's what's

157
00:13:01,940 --> 00:13:08,780
\h being delivered now on this shuttle, Discovery, to help the crew that are onboard the station right now.

158
00:13:08,780 --> 00:13:13,420
\h BEUTEL: I guess if you had to have this happen it's not bad to have it right before a shuttle flight to brin

159
00:13:13,420 --> 00:13:19,490
\h FOALE: That's true, yeah, otherwise you could be doing a lot of maintenance. In fact, we should say rig

160
00:13:19,490 --> 00:13:25,040
\h they can go to the bathroom, it's just using a lot more water than they normally do and it's a lot more co

161
00:13:25,040 --> 00:13:28,050
\h they're having to do extra flushing basically to keep the urine in the right place.

162
00:13:28,050 --> 00:13:30,540

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

163
00:13:30,540 --> 00:13:36,680
\h FOALE: Absolutely! Living, working in space you're learning all kinds of stuff about how the pumps work

164
00:13:36,680 --> 00:13:41,160
\h You're learning about how to make machinery and equipment work that

165
00:13:41,160 --> 00:13:45,910
\h would allow us to do colonies in space, for example -- live for a long time, not just six months.

166
00:13:45,910 --> 00:13:51,020
\h Same technology will be used going to Mars and the same technology, or similar technologies

167
00:13:51,020 --> 00:13:55,160
\h will be used on the Moon and then Mars when we have colonies there.

168
00:13:55,160 --> 00:14:00,100
\h BEUTEL: Well, alright, that's interesting way to leave us. And I do appreciate you joining us and thanks

169
00:14:00,100 --> 00:14:01,430
\h FOALE: Thank you, it was a pleasure.

170
00:14:01,430 --> 00:14:05,690
\h BEUTEL: And tonight at about 8:30 p.m. Eastern time, the rotating service structure

171
00:14:05,690 --> 00:14:09,820
\h -- the protective covering for the shuttle at the pad -- will be rolled away from shuttle Discovery.

172
00:14:09,820 --> 00:14:15,720
\h And liquid oxygen and liquid hydrogen are set to begin flowing into that external fuel tank a little after 7:4

173
00:14:15,720 --> 00:14:19,290
\h Right now the weather forecast calls for about an 80 percent chance of good

174
00:14:19,290 --> 00:14:22,370
\h weather so our fingers are crossed and we'll be looking towards the sky.

175
00:14:22,370 --> 00:14:30,240
\h To follow the launch countdown, tune in live to NASA television, or click your way over to www.nasa.gov

176
00:14:30,240 --> 00:14:34,510
\h to find NASA's launch blog for online play-by-play of the action leading up to the