

Sun-Earth Day Audio Voyage #1 (Shuttle Mockup)

[Opening sound clip]

Sounds and descriptions can capture a person, place, event, or feeling so clearly that you can “see” in your mind’s eye whatever it is that is being described.

[Energetic background music continues behind the narrator]

My name is Troy Cline and you are listening to the first stop on our ‘Audio Voyage’ for Sun-Earth Day 2007: Living in the Atmosphere of the Sun.

As a result of your feedback, we have decided to complement our normal Sun-Earth Day podcasts with a new series of descriptive audio reports from different NASA locations.

During each stop of this Voyage, we will be recording as much of the natural and ambient sound as possible. Your job is to pay close attention to everything you hear in the background. My job is to describe everything I see. Together, we should be able to paint quite a vivid picture in your minds eye.

In future podcasts we will explore how astronauts protect themselves from our Sun’s stormy effects and how they plan to protect themselves during extended missions to the moon, Mars and beyond.

Join me today as I climb into the mid deck of a real Space Shuttle Mockup at NASAs Johnson Space Flight Center in Houston Texas. Accompanying us is Adam Flagan, a member of the technical staff, maintenance, mechanical and crew systems. Adam is also an instructor in the Space Shuttle program. For the next 18 minutes Adam will walk us through a hi-fidelity mockup of the Shuttle’s Crew Compartment Chamber; and will give us a quick peak into how today’s astronauts are able to take care of their most basic ‘human’ needs in space: Food, clothing and Shelter.

If you are currently connected to the internet, you can visit the podcast page of Sunearthday.nasa.gov and follow along with a series of shuttle diagrams.

Troy: So what I see in front of me right now, is a staircase that has about 20 steps to get all the way up into the open hatch. And we're looking at the.. What side is this?

Adam: The left side, or the Port side.

Troy: Shall we get started?

Adam: Yes, we're going to climb up what we call the platform.

Troy: [Laughing] Just so I don't trip and fall on my way up. [footsteps] Ahh, I see the hatch. Now this hatch that I'm looking at is enormous. And it looks quite heavy as well.

Adam: Oh yes, It's quite heavy. We say it's about 300 pounds.

Troy: 300 pounds. And it's about 4 feet wide?

Adam: Yes, about 30 something inches or so. Not quite. The actual opening you can see, if you look closely, has some layers to it. The outer layer has the TPS, or the thermal protective system, ceramic tiles. The inner layers are the actual pressure vessel where the crew members inhabit. So that is why it makes the hatch so big. It has to be able to seal up the crew module and provide thermal protection.

Troy: Now this hatch is circular and instead of it opening to the side, left, or right, like I would expect in an airplane or a door, this hatch actually comes forward and lays down on the ground in front of us, horizontally. And we have to step up onto the hatch to get into the shuttle.

Adam: That is correct. This is in a post landing config as if the shuttle was at the end of a mission lying on the runway. However for pre-launch this thing would be in the vertical configuration; so the hatch would then be on the left side in the vertical. And this mechanism here would be its hinge just like on a door. Normally it would swing open and close just like a door we have in our home.

Troy: Now is this where the astronauts would enter the shuttle?

Adam: That's correct. This is the primary means of ingressing and egressing the shuttle.

Troy: Well let's jump in and see how this works.

Adam: OK! Just be careful, there are lots of things in here that you can bump your head on and snag your nice clothes on. Just go nice and slow. And if you hit your head on anything you owe me a dollar.

Troy: [Laughing] You'll be a rich man when we're finished. Okay, right now I'm actually crawling through the hatch. I believe you can hear the sound difference [audio quality gets better] in my voice and the echo. There I have just stepped through the hatch. Where I'm standing now is amazing. I can look straight up above me and there's a separate portal with a ladder that has about 8 or 9 rungs on the ladder that looks like it goes right up to the cockpit.

Adam: That's right It's called the flight deck.

Troy: The flight deck. [laughing] with about 13 million buttons; it looks like one of those Bugs Bunny cartoons I used to watch when I was a child.

Adam: [laughing] yeah the numbers are around twelve hundred switches.

Troy: 1200, wow. And I can also see straight up through some windows in the top. If I were the pilot I could see straight out into space.

Adam: We call those the overhead windows.

Troy: Incredible. Now what I'm noticing all around me as I step on this metal flooring is that there are hatches on the ceiling, floors and walls. Can you explain what we're looking at?

Adam: Yes. First off, normally when we come into this mock up I let the visitors look around and take it all in and look around. Then to put together a plan of attack I start at the port side here and work my way around, forward to the starboard side and talk about all the little things we see. Then I end up on the aft side here and we'll go up that ladder we saw that leads to the flight deck and go out the same hatch we came in. So if you like we can follow that plan and if you have any questions at all please let me know and I'll go into more detail.

Troy: I will certainly do that. First of all I would like to mention that the room we are standing in is how many feet wide? It looks like it's about 10 feet wide.

Adam: Maybe even more, we have a lot of things in here that makes it hard to gauge. But if I spread my arms they are 6 feet. So it's roughly two arms length, about 12 feet. And the height I would say is about 8 feet.

Troy: The height is nice because I don't have to duck, I can stand comfortably. Which wouldn't matter if we were in micro-gravity, we could just float around. [laughing] can you turn that feature on?

Adam: [laughing] Yeah, I'll just turn on the zero gravity. Right here on the port side you can see two large objects. The first one on the aft, closest to the side hatch that we just came in is called the MAR or Mid Deck Accommodations rack. It is essentially a large closet. It's a mission specific stowage volume. It doesn't necessarily fly on every mission; but when it does it contains these items: A centerline camera and a back up centerline camera. And that's actually the camera that missions going to the space station use for docking. It's such a critical piece of hardware we actually fly two of them. We call it Crit One. It's so critical that it's A-number-One important. So here's primary and here's backup. In between those, we store typically laptop computers. We call them PGSCs or Payload General Support Computers. Typically a mission now-a-days flies about

7 or 10 computers. So this MAR is a nice place to put that and right below that you can see we have a color printer.

Troy: Nice. Now this entire cabinet is really about twice the size of a highschool locker.

Adam: Yes, it's quite big.

Troy: And of course everything in here is white blue and chrome so it really makes me feel like I'm in space.

Adam: Sure. This MAR was designed to handle a space suit. So if we had a damaged space suit, we could put it inside the MAR so that will give you an idea of how big that is.

Troy: I'm also noticing, everywhere in the chamber we are standing in there are pieces of Velcro. What are they used for?

Adam: If you noticed they are about 2 to 3 inches apart. And they aren't very big, 1 inch by 2 inch. We call them pyle. It's one half the mating portion of Velcro. All the loose equipment the astronauts would pull out would have the hook portion. So lets say you have a camera, you could temporarily stow it where ever you would like, anywhere throughout the vehicle. It's our primary means of temporary stowing all the loose equipment in orbit.

Troy: So it makes sense that everywhere I can lay my eyes I see a piece of that Velcro.

Adam: Yes. And we have to maintain that spacing, the pattern you notice, to prevent a fire. If we had a fire it wouldn't spread much past the size of the Velcro.

Troy: Now just to the right of the MAR, what are we seeing?

Adam: This is what we call the galley, or the astronaut kitchen. It's a big white object with three sections to it. The top third is called the rehydration station or the RHS. Most of the food we fly is dehydrated and sealed in a vacuum packed bag for weight and stowage savings. So when they want to prepare their food they come over here, slide this mechanism out and clamp the food or drink item in. Then slide the mechanism into the needle. I don't know if you can see that.

Troy: I see the needle there just behind it. And this whole mechanism is chrome color and is about 6 inches wide and circular. You just place your food or drink item inside and then puncture it with the needle. Just like I'm doing now.

Adam: You then calibrate the amount of water you want in it with this dial. It goes in half ounce increments all the way up to 8 ounces. You can hear the detenses.

Troy: When the needle punctures the food, what happens then? I mean, we don't want food floating all through the air. So how do the astronauts actually get the food?

Adam: on the food packages there is something called a septum, which is a one-way rubber check valve and the needle lines right up with it. As soon as you pull the needle out of the bag it self-seals again so food can't escape and float around.

Troy: [laughing] That would be a mess.

Adam: Mealtime is one of the most enjoyable times for the astronauts. You'll see a lot of photos of them "playing with their food" and relaxing. It's also a time where the whole crew of 7 can all convene here on the mid-deck and talk about what they have experienced during the day. As soon as they are done with meals they go right back to work. And the food, I have heard, is very tasty.

Troy: It's a full time job.

Adam: I'm sorry I don't have a sample of the food for you here today. But this is a fully functional galley and I can turn it on for you and demonstrate it. It's quite noisy. The bottom third has several controls, one being Oven. This switch turns on the whole unit. Now you can hear the pumps as it calibrates itself and turns on some heaters to heat and cool the water. It takes roughly a half an hour for it to go through its calibration process. And then if we wanted to we could grab some food and use the hot or cold water.

Troy: It would be neat to say I've had my meal aboard the shuttle.

Adam: Definitely. Above that is the oven. It's not necessarily used to cook things. This one is used to keep food hot or to reheat it. Then you'll see another switch for the fan, and it's quite loud [VERY LOUD FAN NOISE]. And if you close the door [Door shuts, fan gets quieter], it will attenuate the sound a bit.

Troy: It certainly does. This small oven is only about half the size of a normal microwave. But in this case it's not a microwave.

Adam: yes, a very small microwave... Any questions so far about the gallery?

Troy: No, I don't, but if I had some food I would certainly would try it out.

Adam: Oh, here is something we almost missed. This thing right here says Oxport, and it's a QD and right below it there is a knob that says "Hot to Ambient". Can you guess what that is for?

Troy: I'm at a loss, I'll make a guess that it's to warm my food up to a particular temperature.

Adam: [Lockers banging as hatches open]. This is called the post insertion locker. And what I was looking for is this hose. It interfaces with the QD and then on the other end is a nozzle. And this hose is the Astronaut's shower.

Troy: No way!

Adam: It's about an 8 foot long hose. They would take a washcloth with soap and then wash each body part one at a time.

Troy: So where we are right now is also the shower room.

Adam: You got it. So you're right here in the middle of the mid-deck and taking a shower here is quite a hassle. There is water floating everywhere and they have to be very careful. So most astronauts don't shower their whole mission.

Troy: Oh wow. I'll bet most of them are very happy to get home after their mission.

Adam: It's like a rough camping trip. Interesting huh?

Troy: I believe we have about 5 more minutes of time. So let's move to the right.

Adam: Okay. Here is a bank of lockers. There are a total of 44 mid-deck lockers. Pretty much everything we fly is located in one. And if you want to try open on just lift up on these safety latches, and rotate until you see the red arrows. Then just pop the locker open. Once open each locker has a tray with clothing food, written procedures, experiments, medical supplies or other hardware they need to meet their objectives of the mission.

Troy: And above these lockers I see one named FRED. So does someone named FRED stuck up there? [laughing]

Adam: It actually stands for Foot Restraint Equipment Device. It's a long duration device that they install on the flight deck for robotic operations. And my guess is that the person who designed it was named Fred. [laughing]

Adam: Continuing over here on the starboard side you'll notice these blue bags that are attached to the starboard wall. Each crewmember gets their own sleeping bag and are launched in this location and they return in this location.

Troy: So they really do look like super sleeping bags that are just latched by harnesses to the wall.

Adam: You got it. They take them down and install them wherever they would like to sleep. Two people could sleep on this wall, or by these lockers, or on the ceiling. Pretty much anywhere they want to. The sleeping bag provides warmth, and this is a nomex material with a cotton weave and it acts as a mattress. Since you're floating around in space this kind of mimics a mattress. And the way it works is this strap puts tension or force on your body and give you the sensation of being on a mattress.

Troy: And when I rub my fingers across it, it feels just like canvas [rubbing sound on canvas]

Adam: The Nomex is here to prevent fires.

Adam: Attached to that you'll see a green liner that is used just like a mummy bag with a place for the arms and head to come out. And for the head there is a place for a pillow. And to use it like a pillow you have to use this strap again and go over your forehead, like so.

Troy: I see, so there is a pillow that goes to the back of your head and then the strap that keeps the pillow attached to your head.

Adam: And some crew members use the strap to cover their eyes to attenuate the light as well.

Troy: That is what they should add to all our flights on airplanes.

Adam: Alright, we're back in the aft area, and here are some addition lockers identical to the ones we saw. Continuing around here we have the Airlock. This is the depress repressed chamber for a spacewalk. They put on their spacesuits or EMU's, close this hatch and depress it down to vacuum and then go out the hatch into the payload bay.

Troy: So I'm looking at 3 concentric circles. You go through the first hatch, then the second hatch which is 4 feet wide in diameter, and into the room where they would prepare to go on into space.

Adam: Yes, and it's a pretty small room. And you can see two suits on the wall and that is pretty much all the room you have. And that's all the room you would need for a space walk.

Troy: It's funny, but it's so much harder to get around in here with Gravity and I'm imagining what it's like without gravity, you would just float through the hatches effortlessly.

Adam: A lot of the things in here have been designed for microgravity.

Troy: Okay, we've gone full circle and we are now exiting back onto the deck [background sounds change]. I hope to return back here real soon and check out something else.

Adam: Absolutely, thanks for coming.

[Music interlude]

Well that wraps up the first stop of our Voyage. For her kind assistance and support, I would like to thank Debbie Nguyen, the education representative in Johnson Space Flight Center's public affairs office.

Sun-Earth Day invites you to participate in two upcoming web casts. One on February 22nd and the other on March 20th. For details about these events and more, visit our website at sunearthday.nasa.gov.

While there, don't forget to register in order to receive your free Sun-Earth Day educational [kit](#) filled with NASA materials rich in science content!

7) If you have questions or comments about the Sun-Earth Day podcasts, send an email to sunearthdaypodcast@mail630.gsfc.nasa.gov.

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