**Just Like Home**

Sometimes, little things help you feel closer to home, even when you're far far away. Astronauts feel happier when they have reminders of home with them on the International Space Station (ISS) or the Space Shuttle.

*Image to left: Astronaut Frank L. Culbertson, Jr. takes time out from a busy day to play his trumpet on the International Space Station (ISS).*

*Credit: NASA*

Maybe it's a picture drawn by their child or a favorite snack, but those extra touches mean a lot. Psychological support scientists, part of Wyle Laboratory's Behavioral Health and Performance section at NASA's Johnson Space Center, work to help the astronauts feel more connected to the ground, but there are some surprising restrictions on what space travelers can take into orbit.

Once or twice during a typical six-month ISS mission, a resupply ship brings materials to the astronauts aboard the ISS. In that delivery, there is a package that astronauts eagerly await: crew care packages. These care packages are sent from home or from the support staff. The purpose is to make life in space a bit more homey and familiar. The crew care packages are about half the size of cargo transfer bags (CTB) -- the white, fabric duffle bags often seen in photos from the ISS. The CTB used for crew care packages is approximately 23 centimeters by 42 centimeters (9 inches by 16 inches), and the weight limit is 5 kilograms (about 11 pounds) per crew member, so the amount of goodies sent into space is limited.

*Image to right: Crew care packages contain items specially selected for the astronauts.*

*Credit: NASA*

The bag is also restricted by content. Food is allowed. But, anything with significant crumbs -- such as potato chips and peanuts, depending on the packaging -- that can stray into the air, causing problems with computers and the ventilation, can't go. Homemade treats like cookies -- besides the crumb factor -- can't go, because they're perishable and their quality can't be monitored. Products containing alcohol -- not just alcohol to drink, but alcohol in perfume, aftershave, and mouthwash -- can't go into space, and neither can cans under pressure -- like shaving cream. Clothing can go, as long as it's 100 percent cotton. Certain electronics, like handheld video games, aren't allowed either, due to concerns about batteries (they have sparking potential) and off-gassing problems.

What is off-gassing? It's a serious concern in space. Many objects give off smells or emit odorless gases. On Earth, when odors are strong, we can open a window, go outside or turn on a fan. In space, astronauts have no way of escaping a smell, and that can be dangerous. In both atmospheres -- Earth and space -- there are also undetectable gases, such as radon and carbon monoxide, which can cause serious health problems if unchecked. The climate of the ISS and Space Shuttle are delicately balanced, so it's important to restrict substances that will significantly alter that balance.

"Off-gassing is a primary concern," said Gabrielle Avina, psychological support scientist. "You'd be surprised at the things that must be off-gas tested before they can go into space. One astronaut wanted to take a keyboard to play on the International Space Station. No electronics can go into space unless they're flight certified, so we turned it over to engineers, who contacted the manufacturer for configuration details, and then it was tested for off-gassing. DVDs had to be tested as well. It's not just the DVD itself, but the ink used for making the labels on the disk."

*Image to left: Astronauts on the International Space Station have a Nomex® Christmas tree.*

*Credit: NASA*

Sometimes, family members are surprised that certain things can't go into space -- stuffed animals also have off-gassing issues due to the polyester filling, Avina said. But, families cooperate because they know it's in their family members' best interest. Once approved, items are packed in flight-certified zipper plastic bags and put into the crew care packages. Some of the most-requested items are chocolate (a must), movies and reading materials. Some astronauts prefer to read traditional books made of paper, some like audio books (which help pass the time while exercising on the treadmill), while others request e-books -- electronically published works that are viewed on the computer.
For special events, the psychological support scientists try to maintain customs and traditions. A Christmas tree and stockings have been sent to the ISS, but they weren't ones seen on Earth. This tree was made out of Nomex®, a fire-resistant and flame retardant fabric that comes in many colors -- including green. "It was a lot of fun for the astronauts to celebrate Christmas in space," Avina said. "The stockings and Christmas tree were a big part of it."

Even more popular, perhaps, than the crew care packages are the weekly family conferences. Astronauts can send e-mail and make telephone calls with an Internet Protocol (IP) phone -- routed through computers and Ku-band satellites -- to call friends and family anytime they like. Once a week, though, there is a video conference scheduled so that the families can chat and catch up on the happenings of the week. Until recently, this involved bringing all family members to NASA's Johnson Space Center and using the studio facilities to arrange the two-way conversation. Now, ever since Expedition 5 of the ISS, video conferences originate from the family home. "It's a more relaxed setting and doesn't involve bringing everyone out to the center," Avina said. "It's nice to know that by pushing a few buttons, the astronauts can feel like they're home with their family, talking in the living room. It helps them feel connected to the ground in a very important way."

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