

Shuttle TV: Is What We See What NASA Gets?

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Within hours of reaching orbit, STS-103 began beaming familiar video scenes of space back to Earth and into the homes of thousands of space enthusiasts with access to the "NASA TV" program.

But for televised pictures as clear as these, some observers have cast a lot of lingering doubt over whether NASA is cutting off transmissions of specific aspects of space flight that "the government doesn't want us to see."

On the shuttle's first pass across Florida, the shuttle transmitted scenes of the payload bay doors opening that clearly showed a few flickering dots drifting up and out of the payload bay.

Two orbits later, crossing Mexico by night, the shuttle used its low-light B&W camera to send images of city lights, lightning bursts and stars rising from behind Earth.

"We don't censor anything," insisted Rob Navias at the Johnson Space Center in Houston.

Navias, who bears the title "Associate Director for Public Affairs for Mission Operations and Television," knows by heart the 1958 NASA charter which requires real-time release into the public domain, "for the full and open dissemination of the conduct of human spaceflight."

Where are the cuts?

Just how these transmissions reach the public is a fascinating story all in itself. Let's follow the signal and see where along the way there might be opportunities to delay it, mask it or cut it off, and who would have to be involved.

Although the shuttle can send TV images directly to two ground sites (one at Cape Canaveral and the other at Goldstone, California), the vast majority of video transmissions are bounced from relay satellites in 24-hour orbits (the "Tracking and Data Relay Satellite System", or TDRSS) down to the main NASA receiving site

at White Sands, New Mexico.

The raw signal is then relayed to the NASA Johnson Space Center in Houston for processing and release.

That relay, currently via transponder 5 of the GE2 commercial satellite, can indeed be scrambled to prevent public viewing.

That used to be done for all Defense Department missions, but there haven't been any for years. It is still done for private medical conferences and for relaying proprietary science data (NASA grants exclusive use of raw results to the 'Principal Investigators' for one year).

Breaking the encryption

But apparently it's not always encoded.

"I've been watching transponder 5 for at least the last six or seven shuttle missions," space artist Rick Sternbach told **space.com**. However, there's a trick to it: the view is often "muxed" (multiplexed) with alternating frames of engineering data which makes the raw video feed look bizarre.

"It's an every-other-frame deal", Sternbach explained, "so you can freeze the image on any good VCR and study parts of the shuttle and launch complex you probably haven't ever seen before." He was particularly amused by one pre-launch survey of the shuttle where the camera stopped on a dark spot on an SRB, zoomed in and focused on "a roly-poly bug" for about ten minutes.

No fingers on the button

How about the issue of a "tape delay", often suggested as a means of reviewing and censoring undesirable scenes of sudden disaster ... or naked frolics ... or even flying saucers out the window?

Radio call-in talk shows routinely implement a 10-12 second delay so the moderator can punch a button to stop unexpected profanity from being broadcast. Does NASA do the same?

James Hartsfield is a public affairs officer at the Johnson Space Center who regularly takes his turn manning the PAO console in Mission Control.

"There's no delay -- it's immediate," he told **space.com**.

You can even test this at home, as I did on a space station docking mission last spring. Get an accurate timepiece near the TV and watch the television transmissions for particular discrete events, such as docking or undocking.

Log the time the event appeared to occur, and then later compare it

to the officially announced time. When I did this check with the shuttle docking, the televised time was within a few seconds -- I couldn't estimate any more accurately -- of the actual event. There was no measurable lag at all.

The images are cooked!

Calvin Avery is a television specialist who used to work in the control room in Houston that processed the incoming pictures, and he agreed they were practically instantaneous. But, he revealed to **space.com**, the images are manipulated by specialists there.

"Flight crews used to review our recorded video and told us the scenes were not as vivid as seen in space," Avery told **space.com**. "So in the control room we'd push up the blue, push up the red to greater levels than in the downlink."

He described how these color adjustments were made to ensure that white objects -- the shuttle skin, or a space-walking astronaut's suit -- were truly white, and that the images as released were as realistic as possible.

Both officials and workers agreed that "what NASA gets is what the public sees."

Ray Castillo, the executive producer of NASA TV at NASA Headquarters in Washington, DC, agrees: "For our purpose, which is news dissemination, there is absolutely no reason why we'd want to hold it up in any way."

Avery, who now directs a video operations center at Rice University, agrees that there is no censorship of shuttle video (as he pointed out to **space.com**, the television workers are contract employees with no security clearances).

"Their button would have been in my control room," he told me. "There is no such button."