

NASA Facts

National Aeronautics and
Space Administration

John F. Kennedy Space Center
Kennedy Space Center, Florida 32899
AC 321-867-2468



March 2002

FS-2002-03-003-KSC

Receiving Space Shuttle Astronaut Voice Communications (Air to Ground)

Space Shuttle air-to-ground communication is transmitted on one of two designated S-band frequencies. Because the S-Band voice is digitized, it is unintelligible. When the orbiter is above the horizon, air-to-ground voice on the UHF band can be heard either on 259.7 MHz or 296.8 MHz. However these frequencies are primarily used only during launch and landing. It will, of course, be necessary to know if and when the Space Shuttle will be above the horizon at your location. Unless you are near a NASA tracking station, you will hear only the “downlink,” or one side of the conversation, which will be the astronauts talking to ground controllers.

On some missions, the Space Shuttle’s orbital inclination is 28.45 degrees, meaning the orbiter travels no farther north in the U.S. than the latitude of Cape Canaveral, the Canary Islands in the Atlantic Ocean region or Midway Island in the Pacific, which limits geographical voice coverage. However, flights that rendezvous with the International Space Station and many scientific Space Shuttle missions have higher inclinations, ranging between 39 degrees and 57 degrees. At these inclinations, voice may be heard as far north as the Gulf of Alaska, Hudson Bay in Canada, and the Hebrides in Scotland.

During all Space Shuttle flights, air-to-ground voice (both uplink and downlink) and video from the orbiter are transmitted on NASA Television, which is a C-band satellite transmission on GE-2, Transponder 9C, (3880.0 MHz). This is a geostationary satellite with an orbital location of 85 de-



grees West. Audio only is also available on 6.8 MHz. GE-2 can be received in all 50 states and much of Canada, Mexico and the Caribbean. While the Space Shuttle is in orbit, this system is always broadcasting. The signal is not encoded, or scrambled, and may be picked up with a home satellite receiver.

Some cable television companies carry the signal, at least on a time-shared basis. However, NASA Television is available on a continuous basis on a commercial satellite-to-home broadcast system, the Dish Network, Channel 213.

The Space Shuttle and International Space Station on-orbit communications, through the Tracking and Data Relay Satellite (TDRS) system, use S-band and K-band. This is encoded and also transmitted digitally, so it is not possible for a home satellite system to receive air-to-ground voice or television from TDRS.

The Amateur Radio Club at the Goddard Space Flight Center in Greenbelt, Md., WA3NAN, retrans-

mits the air-to-ground communications during Space Shuttle missions on short-wave frequencies: 3.860 MHz, 7.185 MHz, 14.295 MHz, 21.395 MHz, 28.650 MHz

The best reception on each frequency will vary based on the time of day.

During Space Shuttle missions, some amateur radio organizations retransmit the audio from NASA Television or the air-to-ground communications. As examples, an amateur radio FM transmitter, located on Merritt Island near Gate 2 at the Kennedy Space Center, retransmits the audio on 146.940 MHz; the amateur radio club at the Goddard Space Flight Center in Greenbelt, Md., retransmits on frequency 147.450 MHz; and the club at the Johnson Space Center in Houston retransmits on 146.640 MHz. The signals can be received for about 25 miles.

An amateur television transmitter (ATV) in Cocoa, Fla., retransmits NASA Television during Space Shuttle missions on 421.250 MHz. This can be received with a normal cable-ready television set using an external antenna and tuning to Channel 57. The signal can be received for about 20 miles.

Transmitters of various power on other frequencies are provided by local amateur radio organizations in cities around the country. A list of amateur

retransmissions of audio or video/audio from NASA TV is available on the Worldwide Web at <http://amsat.org/amsat/sarex/shutfreq.html>.

Some Space Shuttle missions also carry amateur radio transmitters called SAREX (Shuttle Amateur Radio Experiment). As the schedule permits, amateur radio operators can have their call sign confirmed directly by an astronaut. When the flight crew is busy, a “computer packet module” will automatically transmit a computer message.

For further information on the SAREX program frequencies, contact the American Radio Relay League, 225 Main Street, Newington, CT 06111, (860) 594-0200. A SAREX Worldwide Web Page from the NASA Goddard Space Flight Center may be found at http://www.nasa.gov/sarex/sarex_mainpage.html.

An amateur radio system is also on the International Space Station and is occasionally used by the astronauts. It broadcasts on 145.800 MHz. When the astronauts are not transmitting, a packet module serves as a relay for the computer messages of amateur operators on the ground. An associated web site maintained by the International Space Station partners may be found at <http://ariss.gsfc.nasa.gov/>.



This is the satellite antenna for NASA TV, used to provide air-to-ground voice and television communications.