

Hubble Facts

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771



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Hubble Space Telescope Servicing Mission 3A **SOLID STATE RECORDER**

To communicate with its operators on the ground, the Hubble Space Telescope uses a group of NASA satellites called the Tracking and Data Relay Satellite System (TDRSS). By way of TDRSS, Hubble sends the data from its science instruments and spacecraft systems to the Space Telescope Operations Control Center at NASA's Goddard Space Flight Center in Greenbelt, Md. When the TDRSS link is not available, Hubble stores its science and engineering data in onboard recorders for playback at a later time. Hubble records all of its science data to prevent any possible loss of unique information.

Prior to the Second Servicing Mission, Hubble used three 1970s-style, reel-to-reel tape recorders. In February 1997, Astronauts replaced one of these mechanical recorders with a digital Solid State Recorder. During Servicing Mission 3A Astronauts will remove a second mechanical tape recorder and install a second Solid State Recorder.

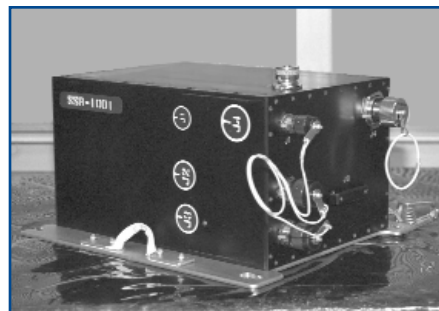
More Storage, No Moving Parts

Unlike the reel-to-reel recorder it replaces, the Solid State Recorder has no reels, no tape, and no moving parts to wear out and limit lifetime. Data is digitally stored in computer-like memory chips until Hubble's operators command its playback. Although the Solid State Recorder is about the same size and shape as the reel-to-reel recorder, it can hold approximately ten times as much data. It

stores 12 gigabits of data, while the tape recorder it replaces can hold only 1.2 gigabits. This ten times greater storage has proven essential in allowing Hubble's new, high-tech scientific instruments to be fully productive.

Flexibility and Multi-tasking

State-of-the-art electronics provide the Solid State Recorder with more capability and flexibility



Solid State Recorder

than a reel-to-reel recorder. This digital recorder is designed to perform the tasks of two separate mechanical

recorders. Unlike a mechanical recorder, the Solid State Recorder can record and play back data simultaneously.

Another advantage is its ability to record two data streams at the same time, allowing both the science and engineering data streams to be captured on a single recorder. Unlike the reel-to-reel recorders, data can be played back without having to rewind the tape, and information can be instantly accessed.

Resilient and Long-lasting

Reel-to-reel tape recorders can fall victim to single-point failures, such as a break in the tape or a mechanical defect. The Solid State Recorder does not have mechanically moving parts, and its memory modules have a very low failure rate. This digital recorder is designed to grow old gracefully, compensating for situations such as a bad chip or a bad module.

The recorder automatically detects, corrects and reports random errors in memory. If the failure is too difficult to correct, the affected area can be isolated and skipped over, leaving the rest of memory fully functional. The old, mechanical recorders also had to be sealed in a pressurized enclosure to protect the tape and the delicately lubricated moving parts from the hazards of a space vacuum. This special packaging is not necessary for the Solid State Recorder.

NASA successfully tested this Solid State Recorder during a 10-day Space Shuttle Mission (STS-95) in October 1998. Based on these results

and the on-orbit performance of the unit already aboard Hubble, NASA expects this new recorder to last the life of the Telescope. The Solid State Recorder was developed at Goddard.

SSR CHARACTERISTICS

Size	12 x 9 x 7 inches
Weight	25 pounds

FOR ADDITIONAL INFORMATION CONTACT

Nancy Neal
Goddard Space Flight Center
Office of Public Affairs
(301) 286-0039