

Gould Couplers Soar in Space Shuttle Experiment

The Space Shuttle Discovery launched on October 29 carrying more than 80 experiments, among them the Hubble Space Telescope Orbital Systems Test (HOST) platform (see figure 1). The HOST Platform was one of the primary payloads aboard the Discovery. Along with other tests, the HOST platform contained the Fiber Optics Flight Experiment (FOFE), designed to determine if fiber optic communication would work in harsh space environments. In this experiment, telemetry data was transmitted via both standard copper lines and fiber optic lines the length of the shuttle. The fiber optic data was processed through an on-board laptop computer. Both types of data were downlinked to Earth for comparative analysis and evaluation.

Gould multimode couplers used by Boeing engineers in a Coupler Card design flew in the Shuttle's laptop Payload General Support System (PGSC). The primary purpose of the coupler Card was to provide attenuation and signal splitting between the HOST payload (a NASA Goddard experiment), and the Shuttle's PGSC computer.

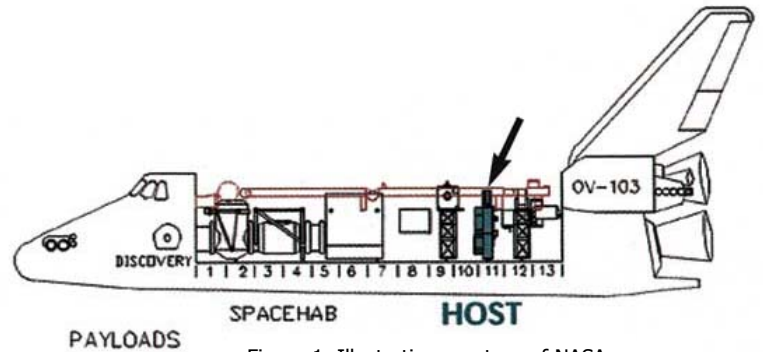


Figure 1. Illustration courtesy of NASA.

The PGSC housed both the Coupler Card and a fiber optic transceiver card. The design provided an in-line means to monitor/troubleshoot the FOFE system without disconnecting cables/harnesses (see figure 2).

During the transmission, the Shuttle purposely flew through the South Atlantic Anomaly, part of the Van Allen radiation belt, to test the effects of high levels of radiation and electromagnetic interference on data transmission. Boeing performed data comparisons during "on-orbit"

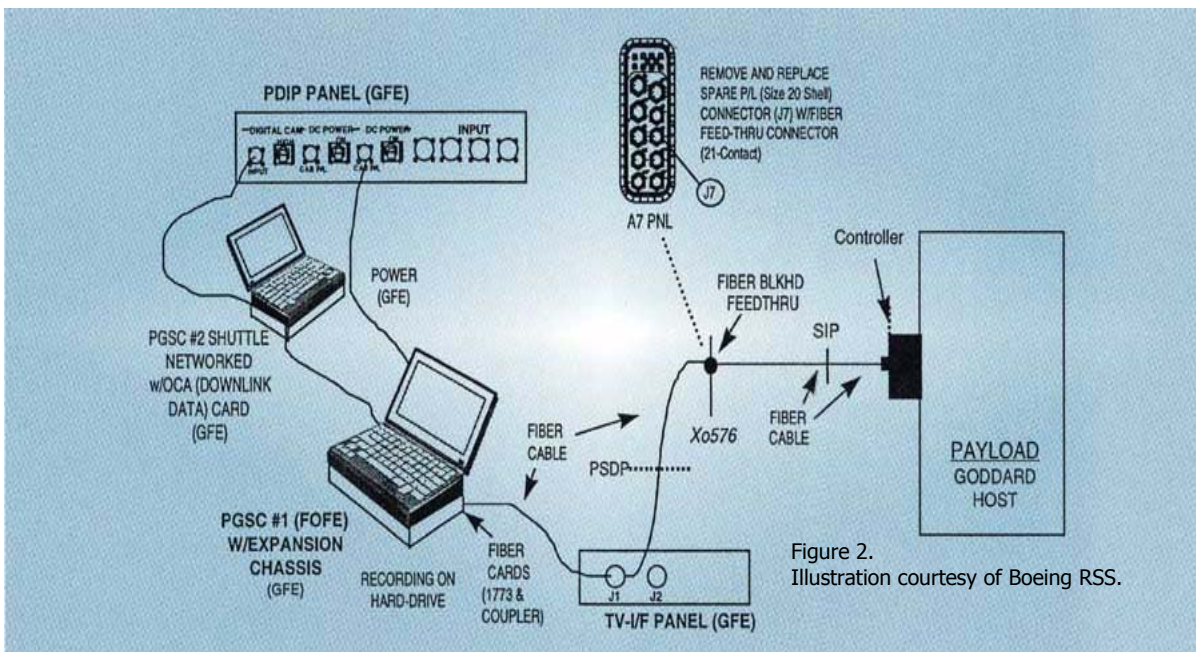


Figure 2. Illustration courtesy of Boeing RSS.

transmissions and found no discrepancies between signals originating from fiber and from copper, proving fiber optic communication systems can work in space applications. According to Chuck Garcera, FOFE Project Engineer, Boeing Reusable Space Systems (RSS), "The fiber optic cards performed flawlessly; information was sent down everyday and the cards performed as expected. "Further analysis will be done on the data transmitted from FOFE to see if there is any difference in the quality of signal received from copper versus that received from fiber. As of this writing all of the analysis is not complete.

This collaborative effort was a first-of-its-kind fiber optic experiment, developed by Boeing, NASA and USA. Boeing, Reusable Space Systems-Downey California, was the primary design center for the FOFE experiment. Mel Weiss, Assistant Avionics Lab Manager for Boeing RSS, selected the Gould couplers " because of their performance in miniature packaging and Gould's ability to connectorize the components to fit onto a laptop computer card." The FOFE used Gould's 1 x 2 and 2 x 2 multimode couplers with special Lucent ST™ connectors. The specifications for connectorization were very stringent. Gould used an interferometer to inspect and verify the connectors. (Parameters such as the undercut, the radius of curvature and the apex offset of connectors are measured via an interferometer.

From the procurement standpoint, according to Frank Maggoire, Senoir Subcontract Administrator, Boeing RSS, "Gould really supported this project. In fact, on one particular occasion Anthony Abdilla, Gould Sales Engineer, gave up his evening so that he could be available to support NASA Goddard engineers and Boeing engineers with additional hardware that the program required during critical pre-test phase. Anthony's reply to me was. 'It's no problem; NASA Goddard is just down the road. It's on my way home and I want to support the program with any help I can provide, even if it means working around the clock."

In future Shuttle upgrades, fiber optic communication lines may be used in order to reduce weight and increase internal communication capability. Fiber optic communication lines will simplify data and communication interfaces and allow for more efficient payload processing and testing on the ground. Additionally, fiber optics are not susceptible to electromagnetic fields such as those encountered in the Van Allen radiation belt.

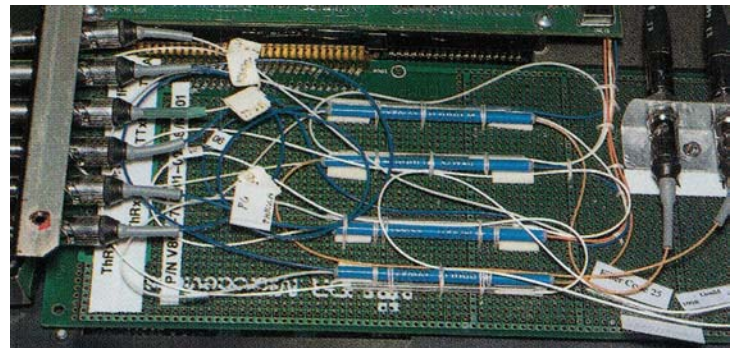


Photo courtesy of Boeing RSS

Close up of the fiber optic card used in the Fiber Optics Flight Equipment (FOFE) aboard the Space Shuttle Discovery. Gould multimode couplers with special connectors were used for attenuation and split the light between the payload HOST and an on-board laptop computer.

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