SPACE TECHNOLOGY LABORATORIES, INC.
PUBLIC RELATIONS · OSBORNE 5-4677 · EXT 2665
5500 EL SEGUNDO BLVD., EL SEGUNDO, CALIF. · (P.O. BOX 95001, LOS ANGELES 45, CALIF.)

INTERPLANETARY COMMUNICATIONS

Communications over an interplanetary distance of 50,000,000 miles may be achieved for the first time in the history of space exploration as the Pioneer V space planetoid approaches the orbital path of Venus.

By combining the phenomenal digital electronic brain, "telebit," with a powerful 150-watt transmitter, scientists at Space Technology Laboratories, Inc., payload designers, hope to collect a variety of data in areas of previously unexplored space.

Pioneer V's tiny, intricate electronic brain "telebit," is the first true space data "traffic controller,"---a miniature memory unit that will store and calculate scientific information on the orbital path of Venus before sending it back to earth via radio. The 150-watt transmitter is the most powerful radio ever flown in a Western deep-space probe.

Developed by Robert E. Gottfried and John Taber, Research and Development Division of STL, the thoughtful "telebit" system was first tested on the Explorer VI satellite and was part of the instrumentation contained in the Atlas-Able IV payload.

A first cousin to giant, earthbound electronic computers, it is the initial member of the digital computer clan to enter space. In Explorer VI it confirmed the many suspected advantages of a true digital space communications system.

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The unit is responsible for gathering and relaying data on cosmic radiation, magnetic fields, radiowave propagation, solar radiation density, ionization, micrometeorite flux and momentum, and other basic elements of astrophysics.

Earlier telemetric systems in satellite or space payloads had to relay information continuously. This seriously limited the system to single, one-at-a-time responses and continuous heavy drainage of the batteries on which the transmitters depended.

With its transmitter turned off, "telebit" collects, stores, and tallies data collected by the deep-space planetoid's fact-finding instrumentation all at the same time. On command from the ground, "telebit" transmits the information it collects through the large transmitter to earth.

For example, when a small micrometeorite particle strikes a diaphragm mounted on the exterior of the payload, the impact registers as an electrical pulse. The pulse is fed through an amplifier into a shaper, then carried to "telebit" to be recorded in numerical form. Each additional meteorite hitting the diaphragm creates another pulse, which is added to the total being stored in the unit.

Upon completion of a preset cycle, the summed-up data is dispatched to earth via the planetoid's radio signals.

Received at the ground stations, the coded "telebit" data is demodulated and punched into teletype tape. The tape provides an exact representation of the data recorded by the scientific instruments in the space-journeying payload.

The teletype data tapes are fed into a central digital computer which processes the tapes and then prints out the solar system data in chart or graph form for detailed study and evaluation by STL scientists.

In spite of the complexity and greatly extended capability of this advanced, unprecedented telemetric system, the size of "telebit" and its interplanetary radio transmitter is surprisingly small. This was accomplished by miniaturization and modular construction, resulting in light-weight, and a high density packing factor.

Development of "telebit" and the interplanetary transmitter is a major and significant advance in the increasingly important art of deep-space communication. The unit in Pioneer V is supplying data impossible to obtain with earlier systems. As the forerunner of systems to come, "telebit" is setting standards for the staggering astronomical requirements of the space probes still in the future.

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