engineering sciences

ELECTRONICS

High capacity transmission link

Drawing on a research effort temporarily shelved in the 1950's, Marconi Co. Ltd. Research Div. will build a test transmission link using a 50-millimeter circular waveguide to carry an enormous number of voice, data or video channels for the British Post Office. A millimeter-wave circuit will be established along a 30-kilometer distance between Martlesham Heath and Mendlesham, Suffolk, England. The link will be tested using two main bands: 32 to 50 and 50 to 90 gigahertz.

Marconi engineers claim the waveguide will permit the simultaneous transmission of up to 300,000 telephone conversations or up to 200 color-TV channels because of the very broad bandwidths available. For example, in the lower band the link will provide 16 high-speed digital channels, each capable of a data rate of 500 million bits a second. The Post Office is supporting such research as a means of handling the steadily increasing traffic in computer data, future requirements for Viewphones, and needs of the TV industry.

Bell Telephone Laboratories in the United States is developing a similar system for use by 1980 using the frequency range of 40 to 110 gigahertz.

HEAT EXCHANGE

Navy studies a heat pipe

In a continuing effort to improve cooling of its ships and aircraft, the Navy is concentrating one research team on making practical use of a heat pipe—a device that could efficiently transfer heat without the need for external pumping or supporting mechanisms.

The device is a pipe closed at each end and lined with a porous material. The material, impregnated with a fluid, acts as a kind of wick. On exposure to heat at one end, the fluid vaporizes and flows to the other end due to the difference in pressures. At the cool end, the fluid condenses and thus emits heat. Through capillary action, the fluid returns and the cycle is repeated.

The problem, the Navy says, is to improve performance and reduce heat losses between the two ends of the pipe. Another difficulty is that working fluids vary with the heat-exchange need and naturally the Navy would like to use water. Under a Naval Research Laboratory contract, the University of New Mexico is working on an improved design using water-saturated wicks, a technique about which little is now known. Studies are now pointed toward tests of different liner materials and wick geometries.

GEODESY

Final U.S.-Canadian survey begun

A two-year geodetic survey which started last month will complete a highly accurate network between Alaska, Canada and the conterminous United States—a project that began in 1964. The teams employ satellite triangulation, in which a spacecraft with an accurately known ephemeris is photographed against a star background. More than 1,700 photographs will be required. Computer processing will not be completed until mid-1975.

The finished network will provide geodetic control points from which surveyors and engineers can begin their surveys and obtain an accuracy of 1 foot in 1 million. The best today is 1:200,000. The network will include 13 United States and 8 Canadian stations, 600 to 800 miles apart.

STRUCTURAL GLASS

Sea immersion strengthens glass

Four and a half years of testing by the Naval Ordnance Laboratory have shown that extended saltwater immersion actually makes glass stronger, even when the test material is subjected to continuous stress.

Commercially available, surface-compression strengthened glass, carrying a mechanical load, was submerged for three years in a simulated seawater environment and for 18 months in the ocean. The result: Bending strengths of all test articles increased from 5 to 15 percent. Marine fouling of specimens after removal from the ocean was heavy, researchers said, but after cleaning no surface deterioration was found.

The Navy's interest in glass results from the need to find a material not subject to stress-corrosion cracking. Except for the glass used in the test, no material has been found that does not weaken in the biomarine environment.

LASERS

Lighthouse in Australia

The Australian Government will build the world's first laser-illuminated lighthouse this year. The developer, Laser Electronics Pty. Ltd., Queensland, expects to sell more to the Department of Shipping and Transport and to other countries, but it won't give any details on the design or construction of the unit. All that has been revealed is that the instrument is 5 feet long, 12 inches in diameter, weighs about 100 pounds and operates on low power—two 12-volt auto batteries will drive it.

The laser light will be installed atop a 60-foot memorial to Capt. James Cook, the early South Pacific explorer, at Point Danger, a headland separating Queensland from New South Wales. Recent tests, the Government disclosed, have shown that the laser beam will penetrate nearly any weather except the densest of fogs. Operating life, without service is claimed to be five years.

VIBRATION CONTROL

Seat takes shake out of flying

Testing has begun on an advanced aircraft-pilot seat, designed to minimize the dangerous effects of vibration resulting from air turbulence. Barry Controls of Watertown, Mass., will evaluate the performance of commercial jet transport pilots for the National Aeronautics and Space Administration using the active vibration-isolation system.

The concern is the frequency range of 1 to 20 cycles per second. Such vibrations can severely limit the pilot's control response at a time when he must take rapid corrective actions. Laboratory tests to date have shown that the experimental seat provides better than 95 percent isolation efficiency at about five cycles a second.