TECHNOLOGY

Talking Through Tubes?

A new two-inch tube with far greater capacity than coaxial cable can carry telephone conversations and television programs. It uses frequencies never before found practical.

See Front Cover

➤ HUNDREDS OF thousands of simultaneous telephone conversations may soon be crammed into a single two-inch pipe and transmitted for long distances on wave frequencies higher than have ever been used in communications.

The capacity of the new copper pipe, called a circular waveguide, exceeds that of the most modern eight-tube coaxial cable which can handle only 7,400 two-way conversations at a time.

The pipe, shown on the front cover of this week's SCIENCE NEWS LETTER, could also carry cross-country television programs. Ordinarily, one TV channel takes up the space of about 600 telephone contacts.

The frequency of the microwaves used in the tube ranges from 35,000 to 75,000 megacycles, up to seven times higher than had been found practical before.

In addition, the number of different frequencies that this tubing can carry is so huge that all conventional transmission wavelengths of all media could fit in its spread with ease.

But the seemingly limitless capacity of the tube is reduced greatly since each individual conversation or television channel must be widely separated to eliminate interference.

Stewart E. Miller, assistant director of radio research for Bell Telephone Laboratories at Holmdel, N. J., who developed the device, told SCIENCE SERVICE that his team's experiments with 500 feet of the tubing was the first demonstration that a circular waveguide is practical for long distance communication. He said he thought the tubes may be put into actual use in five to ten years.

Up to this time waveguides have only been used to transmit lower frequency signals for short distances, such as from the ground to the top of a radio tower. The most commonly used form is the rectangular waveguide, a box-like tube.

Great care, Mr. Miller pointed out, must be taken when bends are introduced into these tubes. Interfering echoes are set up when they are turned around a corner, but he offered two solutions to this problem. One would be to build insulated copper rings into the pipe at turns, which would be very expensive. The other would be to make the tube of fine coiled wire wrapped by a flexible outer coating.

Such tubes, which have been developed, could negotiate the bends without great losses, he said, and may eventually be the sort employed for long distance transmission.

The solid pipe used in the experiments presents other problems too. It must be perfectly straight. Even small dents cause considerable losses. Tiny factors, such as which way the tube is polished, circularly or lengthwise, also affect transmission.

The problem of turns does not arise in coaxial cables, which such tubing might supplement or replace.

Tiny super-high frequency waves that move through the new pipe have been almost entirely useless up until now. They are even too small for radar, since they bounce off dust particles and water droplets in the air.

Mr. Miller and his associates found, however, that the higher the frequency generated in the tube, the more efficient it becomes. Such super-high frequency waves were reflected back and forth inside a 500-foot-long pipe in the experiments. Tests showed that the loss in energy was so small that boosters would only be necessary every 25 miles.

After analyzing an impulse that had traveled a total of 40 miles back and forth inside the experimental tube, the Bell Laboratories engineers noted:

"The pulse shape was essentially the same as that of the transmitted pulse, although background noise became clearly visible. We certainly can conclude from this that circular electric wave transmission over great distances is possible."

The background noise, Mr. Miller said, can be easily eliminated.

These results were based on the work of Drs. S. A. Schelkunoff and G. C. Southworth, Bell scientists who discovered the method. (See SNL, May 9, 1936, p. 302.)

Science News Letter, February 12, 1955

VERTICAL JET TAKE-OFF—Two turbojet engines with their thrusts directed downward raise this experimental airplane from the landing field. When the plane is airborne, the jets can be switched to horizontal position, and it can fly like a conventional plane. The revolutionary craft, developed by Bell Aircraft Corp., was successfully flown recently in tests.

MARINE BIOLOGY

Imported Oyster May Start New Industry

➤ A COMMON European oyster may bring a new and prosperous shellfish industry to the northern coastal states of the United States and possibly to Canada.

The imported oyster is now living and reproducing experimentally in some areas along the shoreline of Maine and in some well-protected bays and harbors of the Pacific coast states. It was introduced into this country because scientists thought that it could be raised commercially in water that is normally too cold for native oysters.

Results of five years of experimentation with the immigrant oyster were reported by Dr. Victor L. Loosanoff, aquatic biologist of the U. S. Fish and Wildlife Service at Milford, Conn., in *Science* (Jan. 28).

The European oyster, known scientifically as *Ostrea edulis,* was originally received as a shipment of 9,000 individuals in 1949 from the Netherlands.

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