

## COMMUNICATIONS

# Fast Data Communication

► THE FASTEST transmissions of data ever reported over both telephone line and television channel were demonstrated in Yorktown, N. Y.

In both of the transmissions by engineers of International Business Machines Corporation, the high reliability required for computer communications was attained with relatively simple experimental equipment.

Computer data was flashed over a high-quality television channel at a rate of 20 million bits of information per second (33 million words per minute). This transmission went over an experimental link from the IBM Advanced Systems Development Division Laboratory to the American Telephone and Telegraph Company Microwave Repeater Station at Harriman, N. Y., and back, a total distance of about 40 miles.

Computer engineers said following this test that common carrier television channels may become one of the most important media for fast and economical worldwide business communications, particularly in view of recent successes in television transmission by space satellites. Speeds over longer distances would be slower than have been achieved, depending upon the number of relay stations used.

Television channels and other broadband facilities have been used up to now only in a small number of data transmission systems, generally at speeds of 100,000 to 500,000 bits per second. Most "long distance" communication of data in business systems today is by common carrier telegraph (up

to 75 bits per second) and telephone lines (up to 2400 bits per second).

Dr. Emil Hopner, computer communications manager of the IBM Advanced Systems Development Division, explained that the TV channel offers possibilities for higher speed computer communications not only because it is far broader in bandwidth than the telephone line but also because it is designed for transmission of pulses that are similar to the binary signals of computer language. Consequently simple equipment can be used to translate signals between computers and television channels.

Telephone channels are designed primarily to carry speech signals that are quite different from data signals and are intended for the human ear. "Delay" distortion affecting computer signals, but not noticeable to the human ear, and the great variety of lines encountered, are the main factors that have up to now limited the speed of data communication over voice lines.

A solution to this problem was also demonstrated by another IBM system operating at the highest rate of transmission reported to date over telephone lines. In this test, data was transmitted over an experimental high quality telephone channel at 8000 bits per second between the IBM laboratory in Yorktown, N.Y., and the American Telephone and Telegraph Company Station at Harriman, N.Y. It was pointed out that these speeds could be achieved only over carrier quality lines.

This system can be made to compensate

for telephone line distortion by adapting itself automatically to each telephone line used. This is done at the beginning of transmission by sending a sample signal over the line to determine its specific waveform distortion. This information then is sent back to the transmitting end in digital form so that the transmitter can produce automatically a pre-distorted wave form that will compensate for the phase and amplitude distortion of the line.

Besides automatic compensation for line distortion, another factor responsible for higher transmission rate is the use of a simple and efficient vestigial sideband phase modulation system that almost doubles the capacity of the voice channel. A further increase in transmission rate is made possible by carrying the information in both the polarity (positive or negative to ground) and amplitude (two possible values) of the data signal.

• Science News Letter, 83:5 January 5, 1963

## TECHNOLOGY

## Electronic Computer for Newspaper Typesetting

► A SYSTEM of using an electronic computer in newspaper text typesetting will be used at the Palm Beach, Fla., Post-Times, in January. It is expected to make possible a minimum savings of 40 per cent in newspaper text typesetting. Under present systems, perforated tape to be fed into typesetting machines is justified by the perforator operator to exactly the width of the column. Two of the major obstacles to speedy production of the justified tape are hyphenation and word letter spacing. Under the new composition system, unjustified tape is prepared by perforator operators on standard multi-face or other types of punching machines, then fed into the RCA 301 data processing unit which hyphenates words according to standard dictionaries, justifies the lines, and prepares justified tape, which is used to activate linecasting devices.

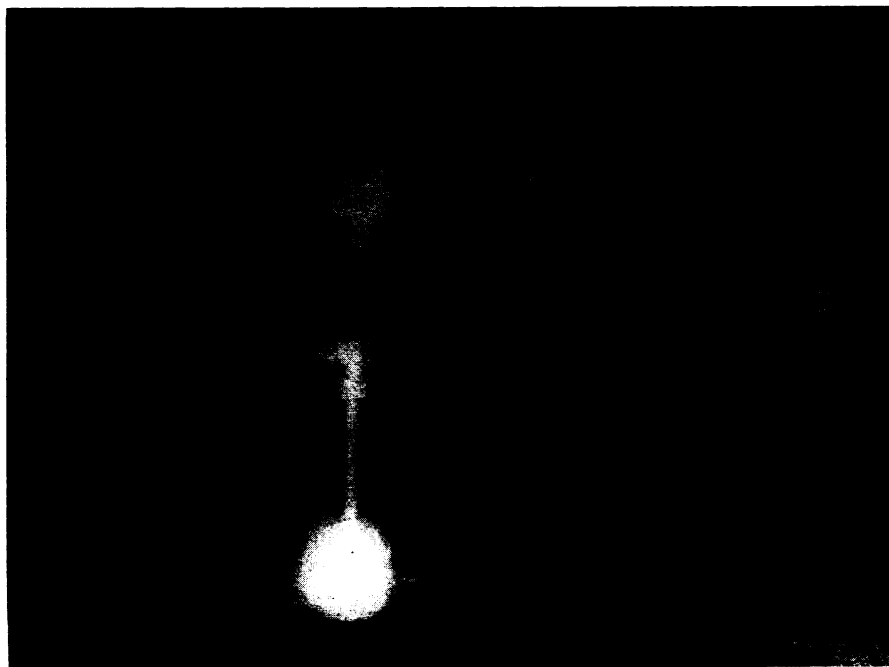
• Science News Letter, 83:5 January 5, 1963

## TECHNOLOGY

## Electron Beam Cuts Hardest Substances

► ELECTRON BEAMS can cut through earth's hardest substances, including tungsten, difficult or impossible to work by ordinary methods. General Electric, Schenectady, N.Y., reports it is now possible to generate and control electron beams without need of high temperature or high vacuum and at the same time to maintain a constant focus over a wide voltage range. The new "cold cathode" electron gun can be operated at moderate temperatures (approximately 100 to 1,000 degrees Centigrade) and in any gas under a partial vacuum. Conventional electron guns require a high vacuum of half a micron or less and temperatures between 2,000 and 2,500 degrees Centigrade. It has been used to fuse dissimilar materials, including joining porcelain to tantalum, as well as to melt titanium, quartz, molybdenum and other refractory substances.

• Science News Letter, 83:5 January 5, 1963



General Electric

**ELECTRON GUN**—Dr. L. H. Stauffer of General Electric Company is shown operating a self-focusing electron gun. It can function effectively at low temperature and low pressure while maintaining constant focus over a wide voltage range.