ENGINEERING

Pint-Sized "Memory" Unit

By reducing the physical size of this mercury unit developed for high-speed electronic computers, it has been made practical for use in commercial equipment.

➤ A THOUSAND numbers can be stored in a pint of mercury, "memory" unit developed for high-speed electronic computers, Isaac L. Auerbach told members of the Institute of Radio Engineers, meeting in New York.

Five million pulse signals per second can be sent into the mercury memory perfected by Mr. Auerbach, J. Presper Eckert, Jr., C. Bradford Sheppard and Robert F. Shaw of the Eckert-Mauchly Corporation of Philadelphia.

The device, details of which are revealed for the first time, is based on a radar development. It is said to be ten times as fast as former methods. Recent developments have made it possible to reduce the physical size of the delay memory unit so that now it is practical for use in commercial equipment.

Large business and mail order companies, as well as banks and statistical groups, are expected to benefit by this new development. A computing system using the new mercury memory can operate so fast and thus handle such a tremendous volume of data that it promises great economies in routine work.

Sound waves traveling through a column of mercury are the means used for storing numerical data and operating instructions. Quartz crystals resonant at frequencies between ten and fifteen million cycles per second are used.

Two little crystals are placed at opposite ends of the mercury column. One acts as a loud speaker, transmitting supersonic code pulses like Morse Code when pulsed with electrical signals. These pulses, representing the numbers to be remembered, travel down the column of mercury to another crystal. This acts as a microphone and changes the pulses back to electrical signals.

The sonic code pulses, Mr. Auerbach explained, travel only one-millionth as fast in the mercury column as do electrical signals on a wire. The first pulse transmitted is not received by the second crystal until thousands of pulses have entered the column from the transmitter.

The code pulses are effectively "remembered" during the interval that they are traveling down the column. If the numbers must be remembered for a longer period than it takes them to pass through the mercury column, the code signals are returned electrically to the transmitting crystal and again pass through the mercury column. By repeating this process, data can be stored as long as desired.

The electrical signals in the model are compressed into a column of mercury only one-fourth as long as in early designs. To do this, all parts of the circuit were made to operate four times as fast as before. A second achievement of the new model is that most of the accurate machine work, which has made other designs costly, is eliminated.

A mercury "memory" slightly larger than the one reported here is used in the UNIVAC (Universal Automatic Computer) described at the meeting by Dr. John W. Mauchly, president of the company. This can hold as many as 1,000 twelve-digit numbers. Data and instructions placed in this built-in memory are immediately accessible to the machine for use in its computations.

Science News Letter, April 3, 1948

MERCURY MEMORY UNIT—The mercury tube shown here being held by Isaac L. Auerbach, one of the men who perfected it, is the core of the new memory system in which a thousand numbers can be stored. Just revealed, it is said to be ten times as fast as former methods.

RADIO

Television at a Distance

➤ THE popular belief that television reception is restricted to line of sight, that a person at the receiving antenna should be able to see the transmitting antenna on a clear day, is not true, the Institute of Radio Engineers, meeting in New York, was told by T. T. Goldsmith, Jr., and R. P. Wakeman of Allen B. DuMont Laboratories, Passaic, N. J.

Actually the signal strength simply decreases quite rapidly beyond the horizon of the transmitting antenna, they declared. That there is sufficient signal to produce satisfactory television pictures far beyond the horizon, even 125 miles from the transmitter, is shown by a survey they recently made.

The survey covered a six-months period in which 1,500 measurements were made and 500 photographs taken within a 50-mile radius of New York City. In addition to the ground survey, measurements were taken from an airplane which flew 2,000 miles within a radius of 200 miles of the city.

Great variations in signal strength beyond the horizon were observed with changes in the atmosphere, they said. These may occur very rapidly, or the variation may be a very slow change throughout the day or season.

The survey indicates the desirability of locating a transmitting antenna well above any structures in the vicinity. This eliminates the possibility of ghosts which originate in the vicinity of the transmitter and which can not be removed by anything done at the receiver or receiving antenna. Higher power at the transmitter will increase the signal-to-noise ratio at receivers. These two changes at the transmitter would permit a cleaner, more stable picture, they concluded. At the receiver location, the antenna should be installed as high up and as far away from noise sources as practicable.

Science News Letter, April 3, 1948