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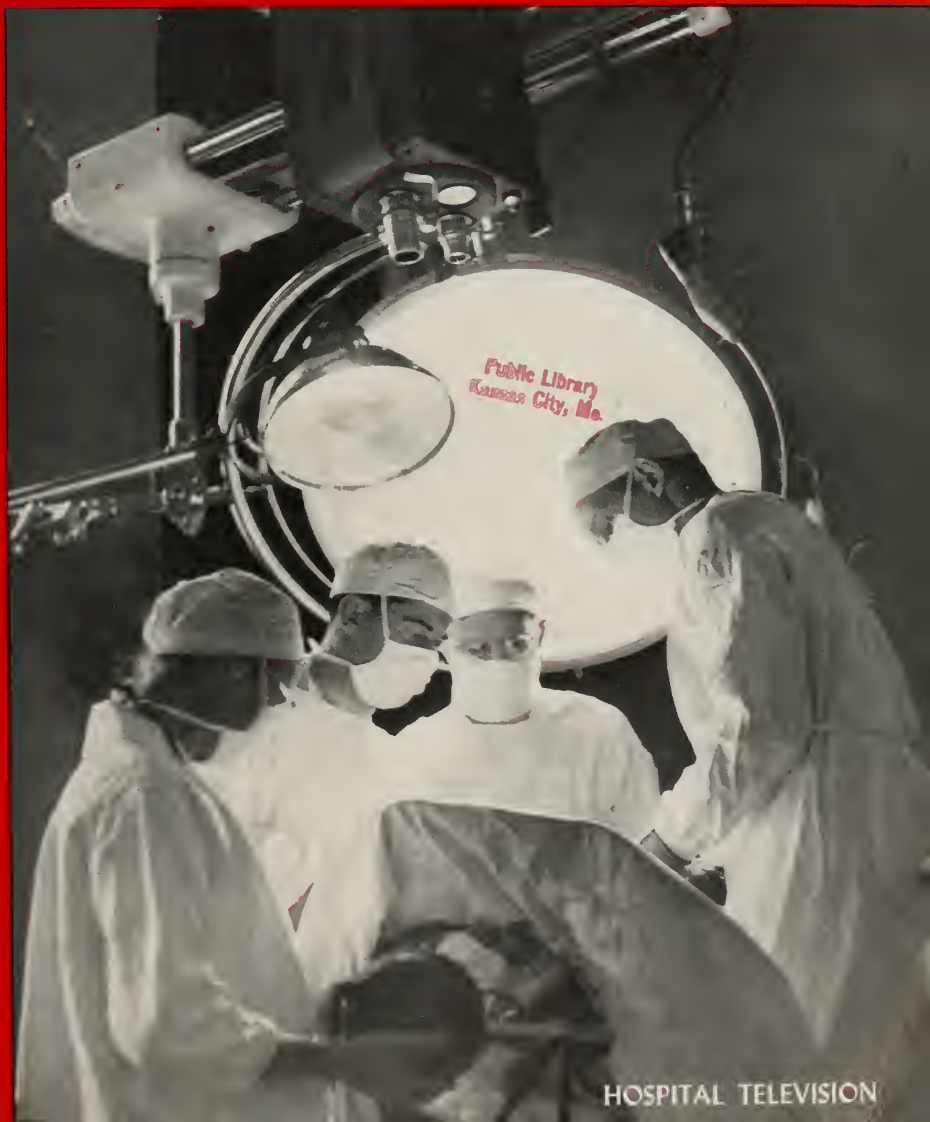

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RCA

APRIL

1947

NEW TUBE HAS "MEMORY"

"Selectron", Under Development at RCA Laboratories, Helps to Solve Complex Mathematical Problems With Lightning Speed.

DEVELOPMENT of a new electron tube with uncanny powers of "memory" was disclosed by Dr. Jan Rajchman, of RCA Laboratories, Princeton, N. J., in a paper presented March 4, to the 1947 National Convention of the Institute of Radio Engineers, at the Hotel Commodore, New York.

This unusual tube—known as the "Selectron"—has been designed for use in electronic calculating machines through which, according to Dr. Rajchman, it is possible to complete the multiplication of two numbers of as many as twelve digits (one thousand billions) in about a hundred-millionth of a second.

Calculations with this lightning-like speed are imperative, it was explained, in solving mathematical problems relating to supersonic air flow, atomic physics, weather predictions, and other scientific or technical equations in which ultra-rapid solution is a factor.

Dr. Rajchman emphasized that work on the Selectron is still in the laboratory stage and tubes of this type are not yet available commercially. He revealed, however, that RCA scientists contemplate using tubes of the Selectron type in an electronic computing machine being built in Princeton in cooperation with the Institute for Advanced Study.

One of the principal requirements of electronic computing machines, Dr. Rajchman reported, is that of "inner memory" such as that being achieved by the RCA Selectron tube. He said that this requirement arises from the fact that in solving equations fast registry and delivery must be made for long sequences of computations in order that the results of one operation become the data for a subsequent operation without the use of mechanical gadgets or humanly limited equipment.

Through its ability to retain data originally fed into the calculating machine and data subsequently accumulated in the process of computation, for arbitrarily long or short storing times, the Selectron makes it possible to compute the long sequences.

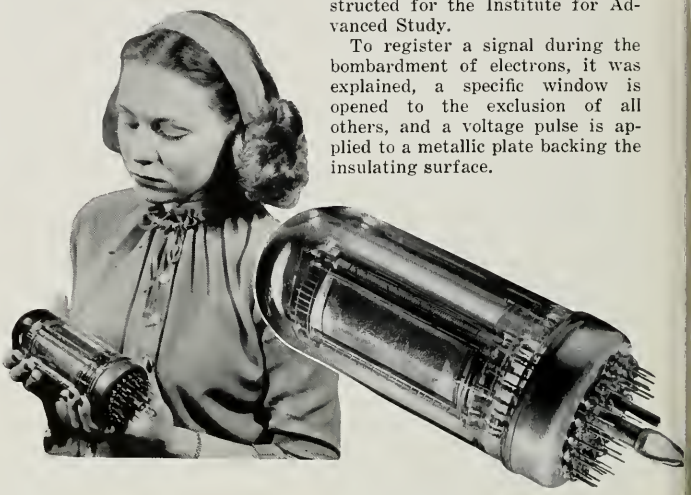
Each of multiple "on-off" signals, representing factors of the mathematical operation, is stored in terms of electrostatic charges on the surface of an insulator. This is called "writing". Two sets of tiny metallic wires at right angles to each other are located between the source of electrons and the insulating surface. These two sets create a checkerboard of windows which can be closed or opened to the passage of electrons at will.

The tiny metallic bars of the "windows" are internally connected in such a way that by applying "on-off" voltages to a relatively small number of sealed-in leads, the flow of electrons can be blocked from all except one selected window. This selection is part of the process accounting for the "memory" characteristics of the tube. During so-called storing periods, electrons pass through all the windows and forcefully maintain the potential of subdivided areas on the insulator.

In the experimental Selectron tubes under development at RCA Laboratories, Dr. Rajchman said, the source of electrons is an axial cathode. The Selectron has a capacity of 4,096—equal to 64 times 64—"on-off" signals. Dr. Rajchman disclosed that forty such tubes with a capacity of 163,840 "on-off" signals will be used in the electronic computing machine being constructed for the Institute for Advanced Study.

To register a signal during the bombardment of electrons, it was explained, a specific window is opened to the exclusion of all others, and a voltage pulse is applied to a metallic plate backing the insulating surface.

This pulse is negative or positive depending on the polarity of the signal and overpowers the local electronic locking mechanism. Immediately following this registration, all windows are opened again, and the previously registered potentials are locked in. For reading any signal, once more the proper window is opened at the exclusion of all others and a signal is obtained from the backing plate. The "writing" requires no previous erasing and takes only a few millionths of a second. The reading, which requires no scanning of undesired elements, follows the reading call by a few millionths of a second and can be repeated indefinitely.



SMALL SIZE OF THE "SELECTRON" TUBE BELIES ITS UNUSUAL POWERS OF "MEMORY" IN HELPING TO SOLVE COMPLEX MATHEMATICAL PROBLEMS.