

How an Electric Brain Works

Part VI—Although no genius himself, Simon now helps us to understand how an electric brain is put together

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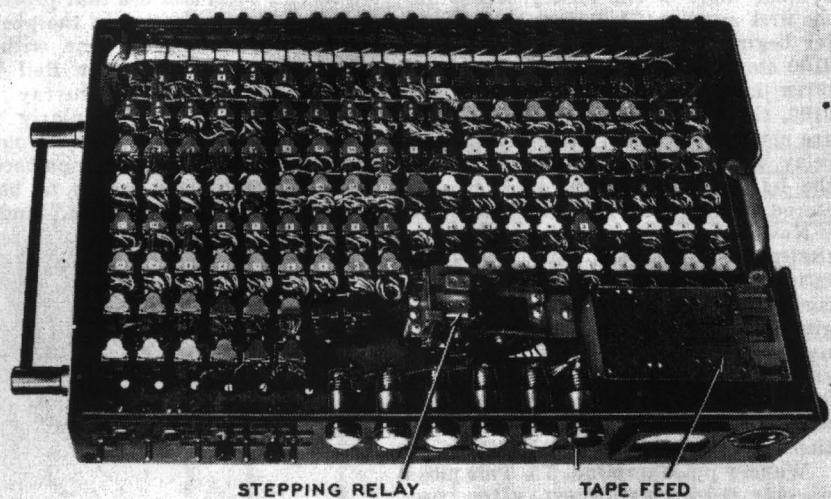


Fig. 1—A photo of Simon with his top cover off. He has 120 relays that make up his gray matter, as well as a few spares for development in the future.

MOST of the operations that are essential for an electric brain have now been explained and illustrated. In previous articles, we have covered relay circuits for: storing and transferring information; performing arithmetical operations; arranging automatic control.

* Author: *Giant Brains*, John Wiley & Sons, Inc.

Now, how do we put all these operations together, so that we actually succeed in making a complete electric brain that will work successfully?

As usual in this discussion, we shall keep to a simple example and leave out the more complicated sides of questions, so that principles may be made clear. But instead of having to talk about

hypothetical examples, this time we can talk about an actually existing example—the baby mechanical brain Simon that we have described previously.

The machine Simon was pictured in the October, 1950, issue of *RADIO-ELECTRONICS*, and some more pictures of it are given here. A top view is shown in Fig. 1, and a bottom view in Fig. 2. Because Simon does not have covers in these pictures, some idea of what the machine is really like may be gained from them.

From the top view we can see that Simon has:

- a front panel, with lights, buttons, switches, and a meter;
 - a tape feed, for feeding 5-hole paper tape;
 - a stepping switch, for timing the machine; and—
 - some 120 active relays, for operations.
- The bottom view shows:
- some banks of small rectifiers;
 - some capacitors, for spark suppression; and
 - a lot of wiring.

When finished in May 1950 Simon knew only the numbers 0, 1, 2, and 3. As a result of changes of his circuits made in August 1950, however, Simon now can take in numbers from 0 to 15 and can report numbers from 0 to 31. With some more changes, Simon could handle bigger numbers still.

Earlier we said there were five parts to every mechanical brain: input, output, storage, computer, and control. Where are these various parts in Simon located?

Input

The *input* of Simon consists of 5-hole paper tape, the tape-feeding mechanism (see Fig. 1), and switches and buttons (see Fig. 3). These are all the ways in which you can give information to Simon so that he will know exactly what to do and in what order to do it.

Ordinarily, when you want to run a problem on Simon, you write out the commands (with 1's and 0's, using binary notation) cycle by cycle on a piece of paper. This is called the *coding* for the problem. Then you punch this coding onto a piece of tape, put the tape into the tape feed, and turn on the power. The tape runs, and Simon clicks away, "thinking," as he works out the answers to his problems.

You may, if you wish, give Simon general instructions applying to any one or more numbers, and then put the numbers into the machine by hand from

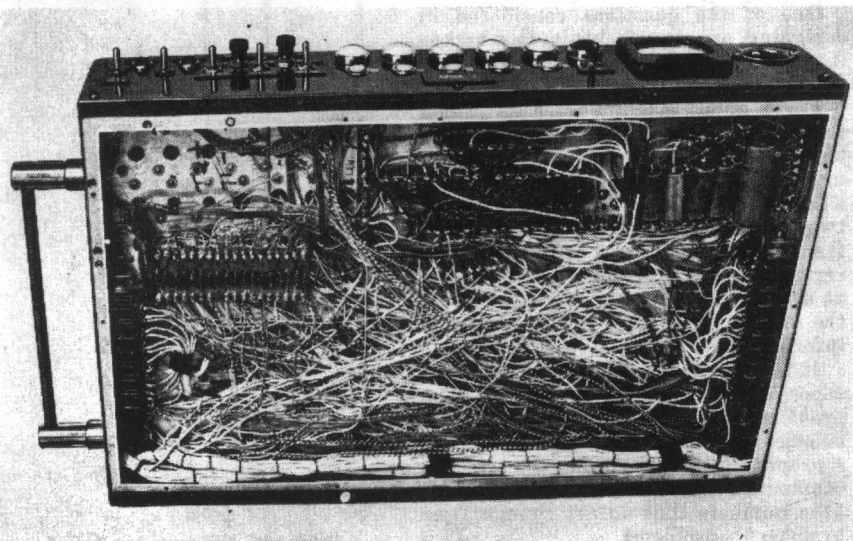


Fig. 2—Simon's underside is mostly a lot of wiring. He also has some small selenium rectifiers and some capacitors that are used for spark suppression.