How an Electric Brain Works

Part VII—Analysis of Simon as a complete working unit. How the various sections are made to work together

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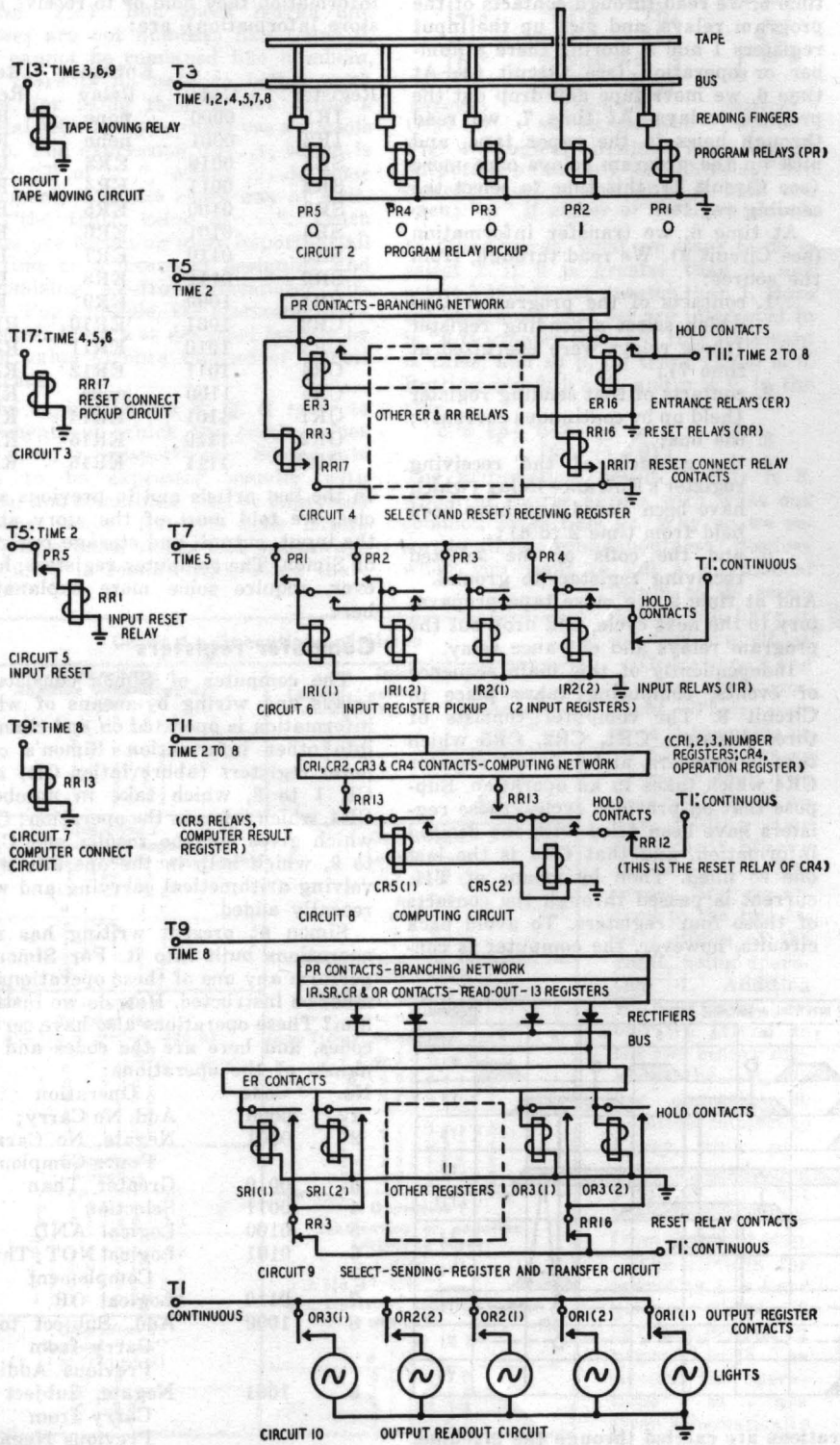

Fig. 1—Simon's 10 essential circuits, showing operational sequence and connections to stepping switch terminals.

IN THE last article, we began to talk about Simon, a complete baby electric brain, made of relays, a stepping switch, and a paper-tape feed. We anchored down the terms "input," "output," "computer," "storage," and "control," each into a particular set of relays that actually perform that function.

Now, what is the general scheme, and the circuit wiring, whereby this equipment works as a complete electric brain?

This may be seen in Fig. 1, which shows, sketchily and schematically, the 10 essential circuits of Simon, beginning with moving the tape, and ending with putting informaton out in the output lights.

To explain these circuits, we should start with their timing. Each of the terminals shown, T1, T3, etc., is energized at a certain time or times by means of the stepping switch as the calculation proceeds.

For Simon or any electric brain to operate, things have to happen precisely in succession, in sequence, one after another. This is the heart of automatic control. In Simon the timing is done by the stepping switch. The Clare Relay Co. stepping switch that we bought on the war surplus market when we were constructing Simon, had 20 timing points and 6 levels, but we found that it stepped too fast. The easiest change to make was to wire the points together in pairs, thus effectively giving the stepper 10 timing points. Also, we replaced the stepper's nonbridging wipers (which broke current between each point and the next) with bridging wipers, so that we would have uninterrupted current for holding up relays when desired. The switch was modified by installing a coil to operate on 24 volts d.c., the standard operating voltage for Simon.

As we worked out the circuits of the machine, the points were wired together to give seven terminals that were numbered T3, T5, T7, T9, T11, T13, and T17 (see Fig. 2), carrying currents at different times. The odd numbers were used to indicate that the current was of the same sign, positive, as the source,