The Formative Years: 1955-1960

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Recent Progress in Solid State Technology

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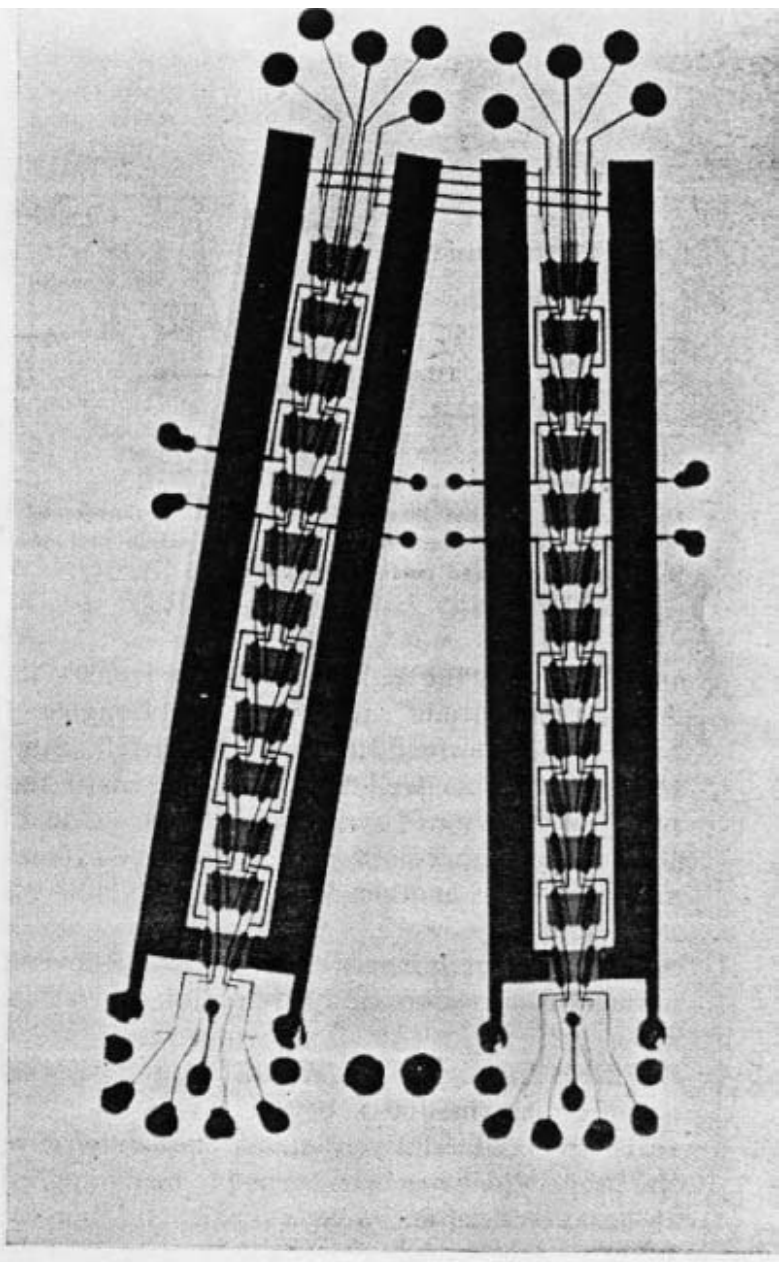

Thirteen-stage evaporated-film cryotron shift register. Exploded view, Fig. 6, shows details

Growing complexity of systems is intensifying demands for size reduction, better reliability and lower cost. Concentrated development work on solid-state devices and circuits is bringing system microminiaturization closer

A WELL-ACCEPTED feeling among solid-state engineers is that electronics is entering a new phase and that the problems now being confronted are radically different from those of lumped-parameter days.

At the 1960 Solid-State Circuits Conference in Philadelphia, there was much discussion about the emerging solid-state discipline, and about the place of tunnel diodes, thin magnetic films and cryogenic devices in future systems. There was also lively dispute on the aims of microminiaturization, a field which some observers feel has been overly publicized.

Leaders in the solid-state field are quick to assert that aims have not essentially changed—greater reliability, greater capacity, greater speed and, especially, smaller total cost (including throw-away cost) in electronic systems—and it is likely that in order to achieve these aims in highly-complex systems we are obliged to go to microminiaturization.

The ranging pro- and con arguments on microminiaturization, many of which were well-put, are important, however, for they are symptomatic of the problems and confusions besetting engineers working in the micro-domain. As various devices are scaled down, their behavior varies in often unpredictable fashion, and the electronics designer and applications engineer finds that his old intuition will no longer serve him reliably.

Charting a course for the developing of the new

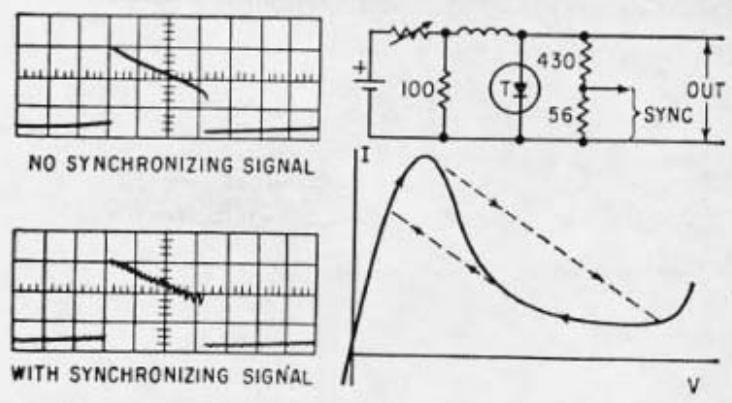

FIG. 1—In this tunnel-diode frequency divider, a relaxation oscillator is synchronized by a weak signal at a higher frequency. Rapid switching occurs when the tunnel-diode operating point moves slightly into the negative-resistance region

1960 Conference Coverage in Electronics Magazine