Fig. 1—Ceramic-glass configuration, 0.36 inch diameter.

Fig. 2—Ceramic configuration, 0.36 inch diameter.

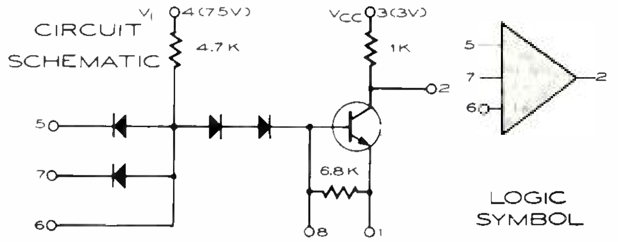

Fig. 3 — Typical microcircuit; the DMC-100 nand gate.

The semiconductor devices used in digital microcircuits are listed in Table I; all are silicon planar-epitaxial type. Resistors are Cermet (*ceramic-metal*), platinum-gold metallized at each end. These rods, 0.04 inch diameter and 0.03 inch long, have initial tolerances of ±2, ±5, or ±10% over a range from 50 to 100,000 ohms and a temperature coefficient of 300 ppm/°C.

The design approach used for digital microcircuits is extremely flexible; variations in sample lots and small production runs require no retooling. Eventually, as circuit designs become fixed and volume increases, several microcircuits can be combined in a single unit to form fully integrated devices.

Special Devices Service Available From RCA Labs

by Dr. J. T. Wallmark,
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As a service to RCA groups active in circuit and equipment development, a *Special Devices* activity was established at RCA Laboratories in 1961 to supply experimental electronic devices not available commercially or otherwise. The intention is to facilitate advances in circuitry and product applications earlier than would normally be possible. Such devices may originate in research projects at RCA Laboratories, or in product divisions when shortcomings of existing devices are overcome or novel device features are innovated. Speed of delivery is usually considered more important then reproducible data, life test experience, or uniformity of the product.

While it is not the purpose of this activity to undertake research on new devices, it has access both to research results at RCA Laboratories and to the most advanced technology both there and in electronic-component product divisions of RCA. To disseminate information about new devices the activity distributes a *Special Devices Bulletin* to interested engineers in charge of circuit research or development projects in RCA.

An example of new devices distributed by the activity are the non-linear stabilizing resistors for tunnel-diode oscillators. The DC power losses of these devices are lower, by a factor of 3 to 6, than those of conventional resistors. The conventional method of stabilizing tunnel diode oscillators is with a resistance in parallel with the tunnel diode (Fig. 1). For stabilization, this resistance must be at least as low as the negative resistance of the tunnel diode. On the other hand, a low value of resistance gives large DC power loss in the resistor. Thus, adequate stabilization and low power consumption are in conflict. An effective compromise is obtained by the use of nonlinear stabilizing resistors, rather than conventional linear resistors. Such nonlinear resistors may be fabricated from semiconductors in the form of reverse-biased, heavily doped junctions operating in the tunneling region.

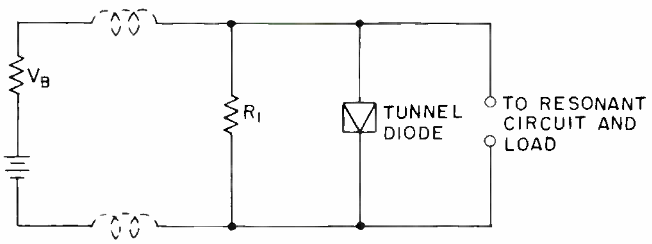

Fig. 1—Tunnel diode oscillator circuit.

For a GaAs tunnel diode with 50-ma peak current, the improvement in DC power loss by the use of this nonlinear resistor is approximately a factor of 6. For germanium tunnel diodes, which operate at a lower voltage, the improvement is approximately a factor of 3. In addition to the DC power saving, there is a reduced AC power loss which makes the location of the resistor less critical, so that it need not be exactly at an AC voltage node.

Lowpass-to-Bandpass Transformation by Switching Techniques



by A. Acampora, B. Rabinovici, C. A. Renton, *Systems Laboratory, Surface Communications Division, DEP, New York 13, New York*

The translation of a network function $H(\omega)$ in the frequency spectrum has been analytically treated.[1-3] By using a sequential sampling system,[4] a network can be translated in the frequency domain by multiples of the sampling frequency and will retain its exact normalized amplitude and phase response; that is:

$$H(\omega) \rightarrow H'(\omega - n\omega_o) + H'(\omega + n\omega_o).$$

Since lowpass filters can more easily be made to have desired skirt selectivities and time delay equalization, the technique of synthesizing bandpass filters by sequentially sampling identical lowpass filters can be very useful in SSB transmission. This *Note* describes a symmetrical bandpass filter centered about the switching frequency f_o by symmetrically sampling at f_o rate three identical channels, each containing a lowpass filter.

Fig. 1a — Lowpass filter. B is a coarse bandpass filter. L_1, L_2 and L_3 are identical lowpass filters. S are switches.

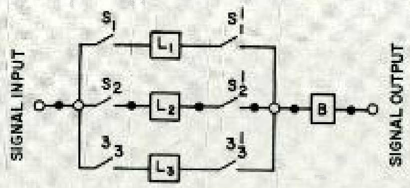

Fig. 1b — Timing sequence of switches at input and output of lowpass filters.