XIV. MICROWAVE COMPONENTS

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A. FERRITES AT MICROWAVE FREQUENCIES

This work will be presented in Technical Report No. 284.

ERRATUM. In the Quarterly Progress Report of January 15, 1954, page 53, second line from end, C = 1.4 should read C = 1.04.

A. D. Berk

B. T-RIDGE WAVEGUIDES

Some further results are given concerning the T-ridge waveguides that were described in a previous report (1). Figure XIV-1 is a plot of the cutoff wavelengths of the dominant mode ($\lambda'_{c1}$) and of the next mode ($\lambda'_{c3}$) that can be excited by a symmetric electric probe, as a function of the normalized ridge gap $g$; the symbols used are defined in Fig. XIV-2. Both curves were obtained experimentally with a standard S-band rectangular waveguide in which $L/H = 2.12$, with a ridge having 2/3 of the guide width. The single-mode transmission bandwidth ratio $\lambda'_{c1}/\lambda'_{c3}$ is plotted in Fig. XIV-3. For large values of $g$, the curve falls somewhat below the value 3 corresponding to the TE$_{10}$ and TE$_{30}$ modes of a rectangular guide, but for small gaps it increases rapidly to very large values.

![Cross section of T-ridge waveguide.](image)

![Cutoff wavelengths of lowest symmetric modes in a T-ridge waveguide.](image)
Fig. XIV-3

Ratio of the cutoff wavelengths of the first and second symmetric modes.

Fig. XIV-4

Power handling capacity.

Fig. XIV-5

Coaxial cable to the T-ridge guide broadband junction.

Fig. XIV-6

Photograph of junction shown in Fig. XIV-5.

Fig. XIV-7

Test curve of the broadband junction.
The computed maximum power transmissible for a maximum allowable electric field is plotted on Fig. XIV-4; $P_\infty^{(0)}$ corresponds to the rectangular guide without a ridge. It can be observed that the wider the single-mode band is, the smaller the transmissible power becomes.

Figures XIV-5 and XIV-6 show a junction designed to feed a T-ridge waveguide having a characteristic impedance equal to that of a 50-ohm coaxial cable. The low impedance of the guide eliminates the necessity of impedance-matching devices and allows operation over a large frequency band with low standing-wave ratios; the back section to the left of the junction operates as an open circuit over the whole range. Figure XIV-7 is an experimental plot of the voltage standing-wave ratio in the ridge guide when a lossy cable is connected to the coaxial output; the high-frequency limit of the range of operation is determined by the neighborhood of the next cutoff.

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References