Design Note on a Serrated Choke*

The serrated choke described by Dr. Kiyo Tomiyasu and J. J. Bolus[1] is a very effective device to employ whenever long cuts or gaps are present on the walls of rectangular waveguide. This communication is concerned with the application of a serrated choke to an X-band waveguide ring switch,[2] wherein the waveguide was split longitudinally at opposite corners to form a rotor section and a stator section.

The final choke design arrived at is shown in Fig. 1. It consists of 0.050×0.050-inch square pins of 0.330-inch length spaced 0.040 inch apart, with a gap of 0.015 inch between the pins and the adjacent choke surface. The reason for using such a small gap was to obtain as low an impedance as possible from the quarter-wavelength open-ended two-wire line stubs formed by the pins and the adjacent choke surface. The mechanical configuration involved was chosen so as to permit the choke to be easily and accurately cut by standard machining methods into the same piece of metal which forms the walls of the half-waveguide section, thus eliminating the need for any tedious soldering or adjustment of individual pins. Another advantage of this design is that the metallic surfaces are continuous (no cracks) at all points of high current density, thus permitting higher RF power capacity. The point of attachment of a choke cover and the gap necessary to permit relative movement of the two half-waveguide sections both occur in the low current density region of the choke. Fig. 2 shows aluminum X-band experimental test sections which were constructed for the purpose of evaluating the machined serrated choke. RF tests conducted upon such a section 37 inches in length showed a loss of only 0.1 db per foot, a power handling capacity in excess of 200 kw peak, and no main-guide interference from choke channel propagation over the frequency band of 8200 to 10,000 mc.

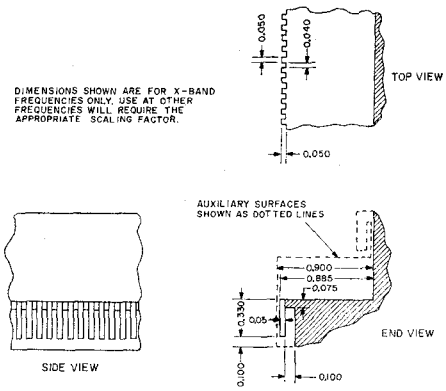

Fig. 1—X-Band serrated choke design.

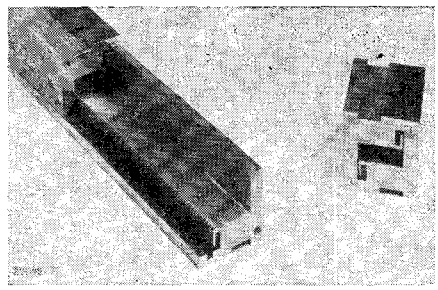

Fig. 2—Experimental test sections of serrated choke machined from aluminum castings.

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* Received by the IRE, July 15, 1959.

[1] K. Tomiyasu and J. J. Bolus, "Characteristics of a new serrated choke," IRE TRANS. ON MICROWAVE THEORY AND TECHNIQUES, vol. MTT-4, pp. 33–36; January, 1956.

[2] W. F. Gabriel, G. D. Peeler, H. P. Coleman, and D. H. Archer, "Volumetric Scanning GCA Antenna Design," Naval Res. Lab., Washington, D. C., Rept. No. 5019, pp. 34–48; November, 1957.

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