

Design Note on a Serrated Choke*

The serrated choke described by Dr. Kiyo Tomiyasu and J. J. Bolus¹ 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

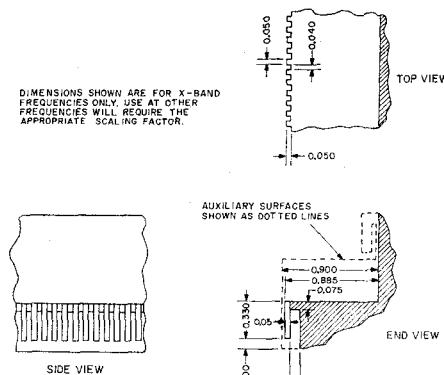


Fig. 1—X-Band serrated choke design.

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

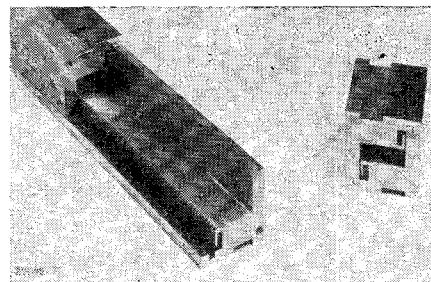


Fig. 2—Experimental test sections of serrated choke machined from aluminum castings.

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.

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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.

Contributors

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A. F. HARVEY

A. F. Harvey was born in Monmouthshire, England, on March 21, 1910. He received the B.Sc. degree in electrical engineering from the University College of Wales, Cardiff, in 1930, and the D.Phil. degree from Oxford University, Oxford, Eng., in 1940.

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Dr. Harvey was for several years chairman of the R.C.R.D. and R.C.S.C. waveguide committees and also of the NATO working group on waveguides. He is a member of the IEE.

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In 1951, he was employed at the Wheeler Laboratories, New York, where he was engaged in microwave radar system development. After receiving the M.E.E. degree, he joined the staff of the Microwave Research Institute of the Polytechnic Institute of Brooklyn, N. Y., where he is presently studying general diffraction theory and propagation in multimode waveguides.

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While at Stanford, he was a research assistant in the Electronics Research Laboratory where he did research on network synthesis. In 1951, he joined the faculty of the Division of Electrical Engineering of the University of California at Berkeley, where he was an assistant professor. He continued research on network synthesis and supervised graduate student research in that field. From 1955 to 1958 he was a member of the technical staff of the Ramo-Wooldridge Corporation, Los Angeles, Calif., and was engaged in system analysis and research on microwave components. In September, 1958, he joined the staff of Stanford Research Institute, Menlo Park, Calif., where he is presently a senior research engineer in the electromagnetics laboratory. His work is concerned with research on microwave components.

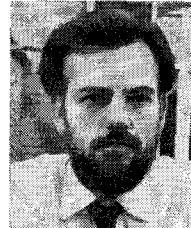
Dr. Matthaei is a member of Sigma Xi, Tau Beta Pi, and the Tensor Club of Great Britain.

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Kenneth G. Patterson was born in London, England, on February 22, 1925. He studied radio techniques and physics at Queen Mary College, London, from 1944 to 1946.

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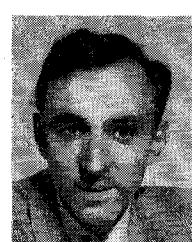


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Joseph H. Vogelman (M'46-SM'49-F'59) was born in New York City, N. Y., on August 18, 1920. He received the B.S. degree



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