U. S. flange ". . . there is little to compete with the Philips flange as an International Standard." Earlier he had stated: "The British also developed flanges for millimeter-wave work using the Union-type principle, but these found little favor in the U. S." Although nowhere specifically stated, it is strongly implied that this British flange is not being put forward as an international standard. In fact, the situation is that the British Union-type flange, or *C*-type, has been accepted as an international standard and is listed in document IEC publication 154. It is widely used in Great Britain both for millimeter wave sizes and, in large quantity, at *X*-band (WG16).

It is used extensively in airborne equipment, is an approved NATO design, and is fully specified in STANAG 4058 (3rd preliminary draft) document AC/67-D/65 of 6.9.63. for rectangular waveguide sizes WG15 to 26 inclusive.

The status of this flange in relation to Anderson's communication was discussed at a recent meeting of the United Kingdom Radio Component Research and Development Sub-Committee 16 (waveguide components), and members felt that it would be useful to put these points on record lest failure to do so might imply lack of use or interest in the Union-type flange.

It is, perhaps, unfortunate that some early samples of this flange were not made accurately to specification, or were heavily plated, with the result that some potential users were put off their design. As currently made, they have for a long time given adequate service and, as reported above, are in large scale use and are an internationally standardized item.

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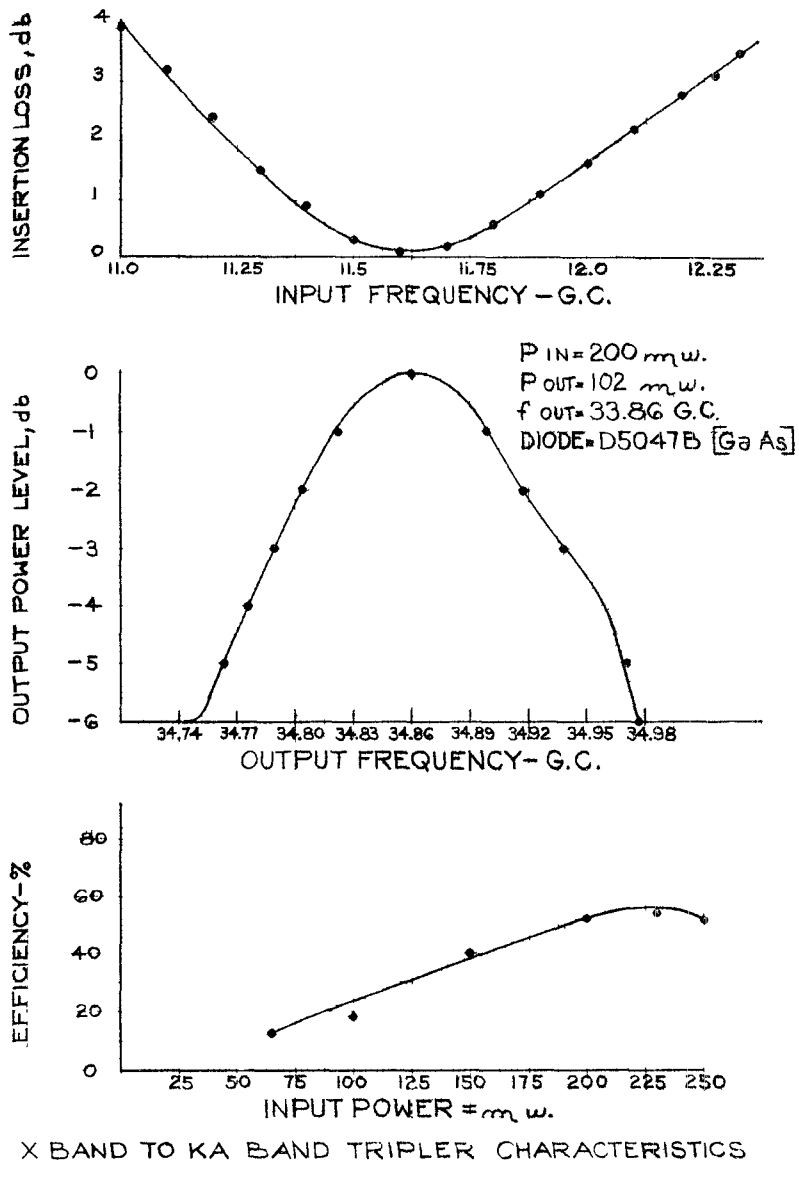

Fig. 1—x band to K_A band tripler characteristics.

K_A Band Klystron Replacement

We have successfully fabricated a harmonic tripler from 11,620 Mc to 34,860 Mc using a diffused junction gallium arsenide varactor (Sylvania D5047C) with an efficiency of approximately 50 per cent at an input power of 200 mw (Fig. 1).

This work was begun as a potential cost savings measure to eliminate the use of expensive short life K_A klystrons in test equipment. The present unit is being used in conjunction with an X-13 *X*-band klystron with a life expectancy far exceeding the original K_A band-tube source. The tripler itself is running unbiased with no dc return and should have near infinite life. To date, it has run for over 1900 hours with no indicated change in output.

The design is based on a half wave rectangular cavity with the diode mounted at the voltage maximum point. This arrangement tends to suppress the second harmonic and generate the odd harmonics. The cavity is essentially $\frac{3}{2}\lambda$ long at the desired third harmonic.

With an output power of +20 dbm, the second harmonic could not be detected and the total unwanted harmonic power above the third was approximately −30 dbm.

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Microwave Transmission Through a Plasma Sheath

Propagation of an electromagnetic wave of a given frequency in a plasma will occur only if the plasma density is less than a critical value.[1] When the density is expressed in terms of the plasma frequency $\omega_p^2 = ne^2/\epsilon_0 m$, propagation occurs if the plasma frequency is less than the frequency of the electromagnetic wave. When the plasma density is such that the plasma frequency is in excess of the signal frequency, the plasma acts like a conductor reflecting and severely attenuating the signal so that it cannot penetrate to any great depth into the plasma.

The interaction which takes place between the electromagnetic wave and the plasma at microwave frequencies is primarily that occurring between the electrons in the plasma and the electromagnetic field since at these frequencies the motion of the heavy positive ions is negligible compared with that of the electrons. If it is desired to pro-

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[1] M. P. Bachynski, "Plasmas and the Electromagnetic Field" McGraw-Hill Book Co., Inc., New York, N. Y.; 1962.