# Abstracts

## A Submillimeter Measurement System Using a Harmonic Mixing Superheterodyne Receiver

*J.M. Cotton. "A Submillimeter Measurement System Using a Harmonic Mixing Superheterodyne Receiver." 1963 Transactions on Microwave Theory and Techniques 11.5 (Sep. 1963 [T-MTT]): 385-389.*

A measurement system for use in the submillimeter wavelength region has been assembled and evaluated. This system utilizes two 70-Gc klystron sources and operates as high as the sixth harmonic. One of these sources provides the fundamental input power for a crystal harmonic generator which serves as the transmitter. The other klystron serves as a fundamental local oscillator for the harmonic mixing receiver. Incorporation of harmonic mixing techniques provides identification and selection of individual harmonics and simultaneously affords improved sensitivity over crystal video detection. The dynamic range of the measurement system is here defined as the difference (in db) between the maximum signal level at a specified harmonic, and that level for which the signal-to-noise ratio is unity. Dynamic ranges were measured to be 61 db at 210 Gc, 46 db at 280 Gc, 32 db at 350 Gc, and 29 db at 420 Gc, selection of any of these frequencies is accomplished by inserting an appropriate filter in the receiver's IF amplifier. Techniques are described which can be used to improve substantially the dynamic range at the above-mentioned frequencies. The system is suitable for many types of measurements in the short millimeter and the submillimeter region, and has good possibilities for frequency extension by increasing the frequency of the fundamental signal. Some data are included on measured transmission losses of dominant mode, and oversized, overmoded waveguide. The latter type is seen to offer advantages of reasonably low loss and simple construction when transmission over moderate path lengths is needed.

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