

# The Metcom Klystron Line

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Metcom, Inc. has been active in the klystron field since its very beginning in 1959. Over the four year span, more than 65 different tubes have been developed primarily in X and Ku band. There are, however, a few types in C and K band.



Standard Metcom Klystron

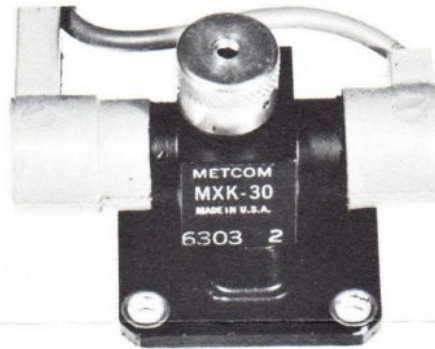
Four distinct categories or classes may be noted among the Metcom types. They are (1) grid tuned reflex tubes, (2) external cavity tuned reflex tubes, (3) dielectrically tuned reflex tubes, and (4) stable fixed tuned two cavity power tubes.

The grid tuned reflex tubes vary in power output between 20 and 500 mw. depending upon the specified beam voltage and current and upon the mode of operation. All of the tubes in the Metcom line are waveguide coupled and utilize either mica or ceramic as a waveguide window element. Tuning is accomplished by varying the grid capacity in the capacity loaded klystron cavity. By utilizing various modes and the utmost in grid capacity variation, tuning capability in excess of 40% is possible with some types. On these types (i.e. MXK-26) micrometers are utilized so that a rough calibration of frequency vs. micrometer reading may be provided. Electronic tuning (accomplished by varying the repeller voltage) is of the order of 30 to 40 megacycles.

The second class of tubes, namely the external cavity tuned types utilize fixed grid positions. No distortion of the grid gaps occurs in the tuning operation. Instead tuning is accomplished by varying the frequency of a very closely coupled high Q cavity, which is a part of the basic tube assembly but not a part of the vacuum tube envelope. Typical of this family of tubes is the 6975/MXK-21. Most of these tubes

are in the low power end of the power spectrum and find their principal usefulness in local oscillator and test equipment service. The external coupled cavity acts as a frequency stabilizing element in addition to providing the tuning capability.

The third class of tubes or dielectrically tuned tubes are the result of a proprietary development of Metcom and sponsored by its own funds. Tuning is accomplished by varying the position of a dielectric rod with respect to the capacitive gap. Tuning ranges as great as 12% are conveniently accomplished in those tubes incorporating welded bellows. Tuning life in these types is several million cycles. Other tubes utilize convoluted bellows configurations and provide roughly 5% tuning range with proportionately lesser bellows life. The tubes are reasonably rugged and find their principal usefulness as parametric pump tubes. Power outputs of 0.5 to 1.0 watt are typical. One "off-



MXK-30

New Dielectrically tuned Klystron

shoot" of this general class of dielectrically tuned tubes is one incorporating very low input power (less than 4 watts). Principal application for this class is for space satellite local oscillator use, where power input is at a premium. Typical output power is of the order of 10 milliwatts. Of the 4 watts of input power required, roughly 1/2 is consumed in the heater and the rest is in the beam.

The fourth and final class of tubes is the two cavity medium power oscillator tubes. The tubes are fixed tuned within a tolerance of less than 0.001%. They feature very low noise output, low heater ripple noise, in-

sensitivity to magnetic effects and excellent frequency temperature stability.

The tubes are extremely rugged and are both convection cooled and liquid cooled, depending upon the power dissipated in the cavity block. Power outputs of 1 to 15 watts are available with beam voltages varying from 1500 to 3000 volts. Principal use of the tube is in CW Doppler systems for helicopters.