

Lower Capacity Means Quieter Pictures

A TV Camera Tube is essentially a noise-free device; therefore, the signal-to-noise ratio of a Plumbicon[®] camera tube is determined by its signal amplifier, with most of the contribution of noise coming from the input stage.

The signal amplifier contains a number of noise sources, both voltage and current. The two main contributors are the voltage and current noise in the FET amplifier, and the noise generated in the input circuit consisting of a load resistance and total capacitance shunting the current source, the Plumbicon[®] tube.

The total capacitance has been addressed in developing these new tubes. The total capacitance is made up of the capacity of the tube, the input of the FET and from the associated stray capacity. If the generation of a signal current producing a signal voltage is examined, it can be shown that in order to have a low noise voltage, one must maximize the impedance of the circuit. This can be accomplished by increasing the total resistance or decreasing the total capacitance.

The Plumbicon[®] capacitance has always been low compared to the input capacitance of the FET, with the FET contributing as much as two-thirds of the total input capacity. New developments in FET technology have produced FETs with much lower capaci-

tance. When these new devices are used in preamps, they introduce a much lower capacitance in parallel with the tube; therefore, any reduction in tube capacity is significant in reducing the overall input capacity of the input circuit. With low capacity tubes, the signal-to-noise improvement can present itself in two apparent ways:

- **IMPROVED SENSITIVITY**

This is true because noise is a component of the picture. When under a subjective evaluation, noise is the criteria by which a user determines whether or not a picture is usable.

- **IMPROVED RESOLUTION**

Noise is generally frequency dependent, and worse at higher frequencies. A limitation of the amount of aperture correction or enhancement to improve system resolution has been the added noise that this high frequency gain produces. A signal-to-noise improvement allows more room for high frequency correction for a specified camera signal-to-noise ratio.

Low capacity tubes are not new to Amperex. This technology was first introduced in the manufacturing of the XQ1080 in 1969 and then used in the design of the 45XQ. Now Amperex is planning to incorporate low capacitance technology into all sizes of Plumbicon[®] tubes.