

Features of Formation of Video Signal in a Scanning Television Optical Microscope

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Abstract – Ways of construction of the amplitude-frequency characteristic of the video signal former to a scanning television optical microscope are considered. The method of indemnification of frequency distortions which are brought by the entrance cascade of the signal former is offered.

Key words – Scanning microscope, Video signal, Correction, Television mode, Low-frame-rate mode.

I. INTRODUCTION

In a scanning television optical microscope the scanning raster is formed by change of the sizes, frequency and resolution. It causes to expand a pass band of a path of formation of video signal as in a range top, and the bottom frequencies. Ways of expansion of a pass band and indemnification of frequency distortions are offered.

II. THE VIDEO SIGNAL FORMER

The block diagram of the video signal former which takes into account necessity of indemnification of frequency distortions of video signal for a range of the top frequencies, automatic control of amplification of the signal, independent regulation of contrast of the image in a range "white" and "black", mixing of the signals of synchronization and clearing, change of polarity of video signal, automatic control of amplification, a binding of a level "black" and restrictions of a level "white" is developed.

In work influence of some sources of noise on quality of the received image on the screen of the display information device is analyzed. The basic sources of noise in a scanning television optical microscope are the video signal former, the photoelectronic multiplier and a scanning electron beam tube.

As a result of researches dependences of a noise spectrum of electron beam tube on radius of a beam and speed of scanning, dependence root-mean-square values of noise from radius of a beam, dependence of the ratio signal / noise of the photoelectronic multiplier from factor of secondary emission (Fig.1), resistance of loading (Fig.2) and from a current of the photoelectronic multiplier are received. The method of definition of necessary brightness of a luminescence of a scanning tube for maintenance of the set quality of display of researched object is considered in view of influence of noise.

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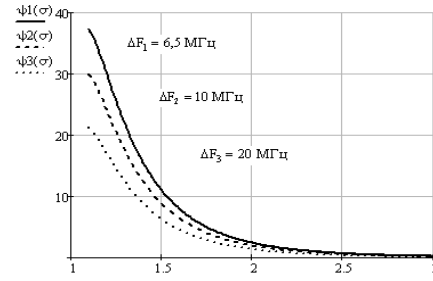


Fig.1. Dependence of the ratio signal / noise from factor of secondary emission of PEM at various pass bands of the video signal former

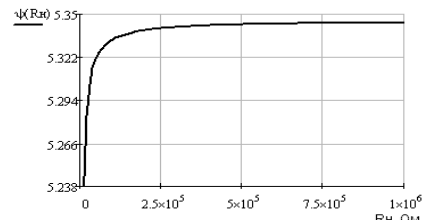


Fig.2. Dependence of the ratio signal / noise on output of PEM from resistance of loading of PEM

The opportunity of realization of the broadband amplifier with the top boundary frequency of 10 MHz and factor of amplification in a range of average frequencies 20 dB is considered. The received total amplitude-frequency characteristics of the entrance amplifier on an output of 1-st, 2-nd, 3-rd, 4-th and 5-th cascades in view of correction are submitted on Fig.3.

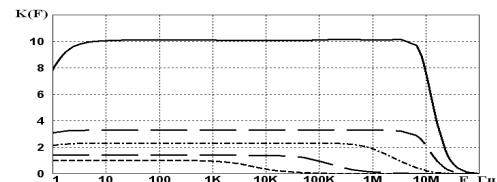


Fig.3. Total AFC on an output of 1-st, 2-nd, 3-rd, 4-th and 5-th cascades in view of correction

The opportunity of use in a scanning microscope of an electron beam tube with a ultra-violet range of a luminescence is considered. The opportunity of reception of the image in this case in a seen spectrum is shown. Characteristics of the photoelectronic multipliers, capable to work in a ultra-violet range are investigated.

III. CONCLUSIONS

The received results enable to define requirements to noise characteristics of the former of full video signal from the point of view of maintenance of the set image quality of researched microobject on the screen of the display information device concerning influence of noise handicaps, and also to simplify construction of sensitive broadband amplifiers with the uniform frequency characteristic.