

Special features of exploitation are difficult exhaust ducts construction and possibility of installation only after straight piping.

Thanks to low price of transport costs, joining-up and maintainability in rooms with strict sanitary requirements and low air motion are important factor. Textile ventilating ducts have pride of place amongst innovative ventilation equipment.

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MODULATION AND DEMODULATION OF OPTICAL RADIATION WITH USAGE OF THE SUBCARRIER OF FREQUENCY

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Methods of modulation-demodulation of optical radiation with usage of a subcarrier of frequency for transmission and reception of video signals are considered. Influence of a subcarrier of frequency on relations between a signal/noise and level of non-linearity distortions of video signals is researched.

There are different methods of obtaining the modulated optical radiation:

1. Direct modulation is the type of modulation in which radiation LD(Laser diodes) or the light-emitting diode is reached by the change of a current of pump;
2. Exterior modulation or modulation of radiation of an unmodulated light source;
3. Internal modulation which is carried out by modulator introduction in the laser resonator.

The modulator is a system in which there is an interaction of light to substance. Control of a refraction index is based on electrooptical effect (changing electric field), or on magneto-optical effect (changing a magnetic field), or on piezooptic effect (piezoelectric change of density). Electrooptical modulators are used more often. Materials with the expressed magneto-optical effect are opaque to light. Piezooptic's modulators are difficult.

Two methods of reception can be used during the demodulation:

1. Immediate reception by the photo detector (incoherent reception)
2. The coherent reception (hetero- or homodyne)

In our research the method of usage of a subcarrier of frequency on purpose improving of the relation a signal/noise and reduction of non-linearity distortions of video signals has been studied.

In picture 1 the fiber-optical system of transmission (FOST) with usage of a subcarrier of frequency is presented [2].

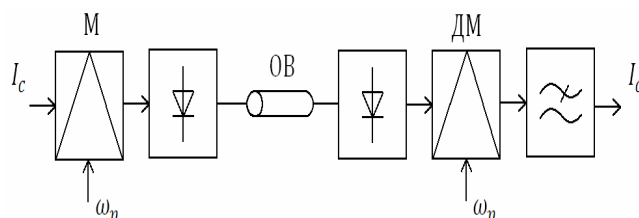


Fig. 1. FOST with usage of a subcarrier of frequency:
M – the modulator; DM – the demodulator; ω_n – frequency of a subcarrier

Double modulation is used for the analysed method. The information electrical signal is transferred to the modulator where the first operation takes place: modulation of a subcarrier of frequency either on amplitude, or on frequency or a phase, and then modulated ω_n , arrives on an optical radiator where there is a second operation:

modulation of intensity of optical radiation. On the receiving side demodulation happens upside-down. The method of the usage of a subcarrier increases the relation a signal/noise and reduces non-linearity distortions under condition of good linearity of characteristics of the modulator and the demodulator.

$$(S/N)_{\text{subcarrier}} = \left[6 \cdot \beta^2 \cdot \frac{B_{\text{subcarrier}}}{B_{\text{signal}}} \right] \cdot (S/N)$$

I.e. the relation can be reduced a signal/noise;
 β – an index of the frequency modulation

$$\beta = \frac{\Delta f}{2 \cdot \pi \cdot B_{\text{Signal}}}$$

B_{signal} - a signal band;

$B_{\text{subcarrier}}$ - a subcarrier band ($V_p=2 \cdot (\beta + 1) \cdot B_{\text{signal}}$).

The frequency modulation is most effective, because during AM in the relation the signal/noise makes a scoring about 2 times. The frequency modulation of a subcarrier found its application by video signal transmission to cable TV.[1]

The skeleton diagram analog FOST for video signal transmission:

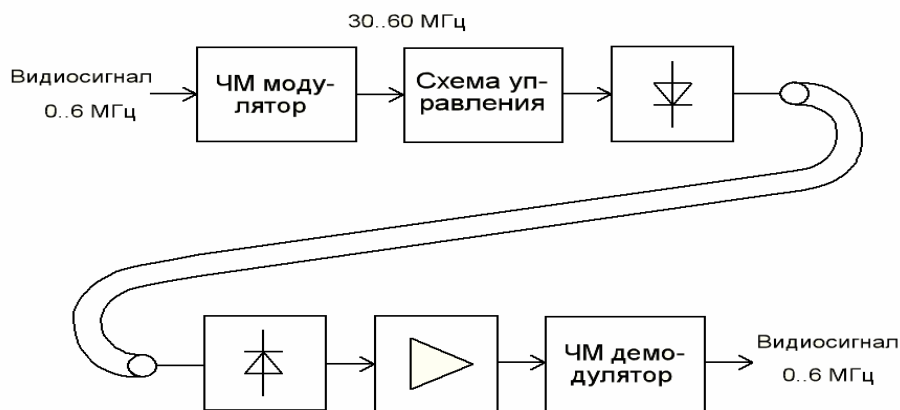


Fig. 2. The Skeleton diagram analog FOST for video signal transmission

The research has been made in a range of carrying frequency $f_0=30-60$ MHz, at values MHz modulating frequency $F=0-8$.

Research FM of the modulator has been conducted in software package Multisim12 in a picture 3.

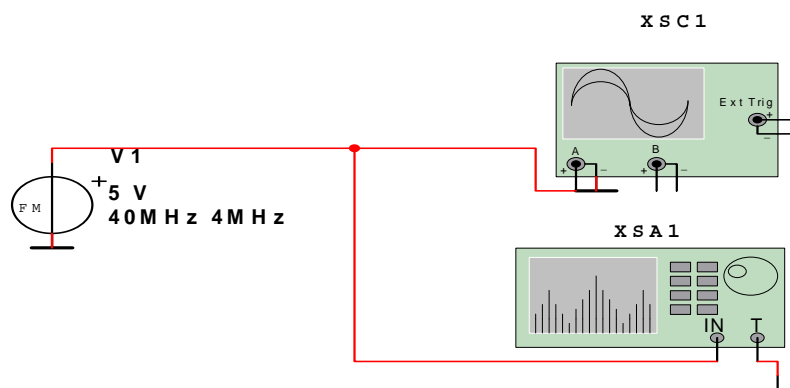


Fig. 3. The Skeleton diagram for research FM of the modulator
 V1=FM The modulator, XSC1= Oscilloscope, XSA1= Spectrum analyzer

The research has been made in a range of carrying frequency $f_0=30-60$ MHz, at values MHz modulating frequency $F=0-8$.

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In picture 4 the oscillogram of frequency the modulated signal at the following data: $f_0=40$ MHz, $F=4$ MHz is resulted.

In picture 5 the spectrum specified above a signal is resulted.

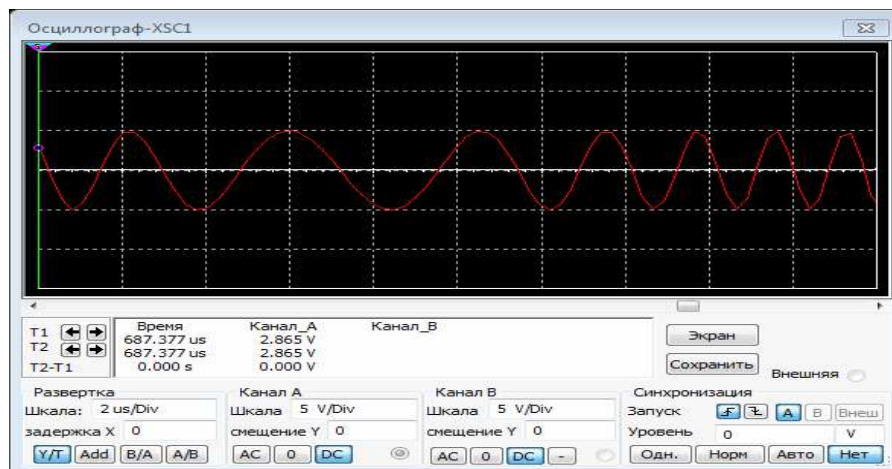


Fig. 4. The oscillogram of FM of a signal

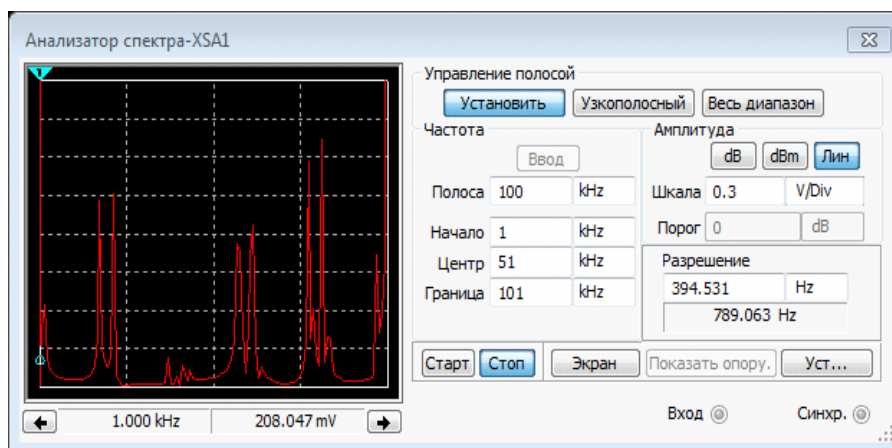


Fig. 5. Spectrum video signal

To sum up we should underline that the research of the frequency modulation allows to improve the noise refines security of the channel of transmission of video signals. Comprehensible level of non-linearity distortions of signals is thus provided. Analysed method can be used for transmission of video signals to a cable television.

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RECENT TRENDS OF INDUSTRIAL USE OF THE HEAT PUMP TECHNOLOGIES

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Describes technical and energy conditions for the generic use of the heat pump technologies in Housing and Public Utilities, heat-recycling systems and at industrial plants, which are utilizing water-retaining cooling systems for process equipment. An example of the low potential heat flows' evaluation at the refinery, as well as