Line Codes Generator for Learning Purposes

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Abstract – **line codes generator used for learning of students of radio and communication engineering majors was described in this article.**

Keywords – **line code, energy spectrum, spectral density of signal, RZ, RZI, NRZ, NRZI, AMI, 2BQ3, MANCHESTER, MANCHESTER II**

Digital encoding is widely used in modern communication systems for information transmitting. Code should satisfy the following requirements to be selected for mentioned tasks:

- minimal spectrum width for defined bitrate [bps];
- absence of DC component in spectrum;
- absence of high frequency components behind transmission line bandwidth;
- self synchronizing properties, which permit the proper framing of transmitted code words provided that no uncorrected errors occur in the symbol stream;
- error-correction properties which could be achieved by using noise combating code

Investigation of energy spectrums of Cyrillic letters, encoded by different line codes (RZ, Manchester II, etc.) was made in previous works [1, 2]. Continuation of those works result to building generator of common line codes – RZ, RZI, NRZ, NRZI, AMI, 2BQ3, MANCHESTER, MANCHESTER II, etc. Generator was built on typical Intel 8051 processor kit and use original software, written by authors. Overall view of generator is shown at figure 1. Shape of an encoded signal is shown at figure 2 as well as it's binary representation - at figure 3.

Fig.1. Overall view of generator's PCB

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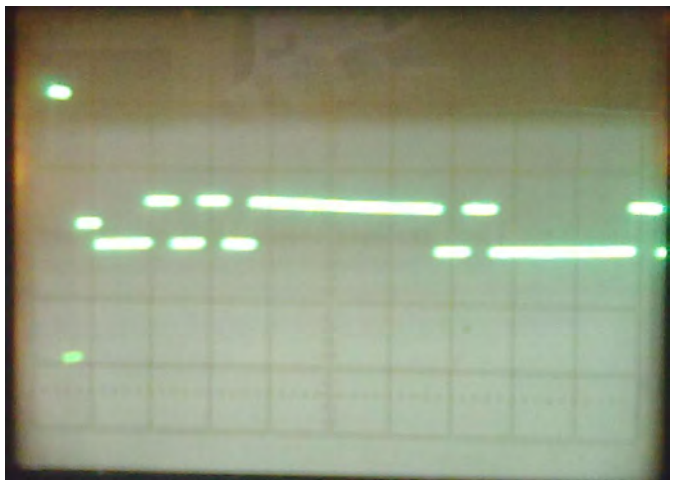

Fig.2. Oscilloscope view of signal shape, generated by line codes generator

Fig.3. Digital representation of generated signal on generator's LCD

It allow to encode 16bits length sequences and it is useful during learning signal theory, investigation of spectrum of different digital signals and properties of transmission lines. Currently generator is used during laboratory and practical lessons for students of "Radioengineering" and "Telecommunications" majors.

References

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