METHOD DETERMINATION OF THE SENSORS CONTROL OF CONDITION TRACK SECTION WITH AN ADAPTIVE RECEIVER

Aliev R.M., Aliev M.M.
Department «Information systems and technologies»
Tashkent State Transport University, RUz

Abstract. The article presents one of the most promising methods for detecting a moving unit by a sensor for monitoring the condition of track sections, namely, rail circuits with an adaptive receiver. The scheme for realizing control sections using a computer is presented.

Key words: automation, telemechanic, rail circuits, insulating joint, control zone

Mainly, main railway lines are equipped with track circuits with insulating joints, which are widely used to monitor the condition of railway track sections and transfer information to rolling stock [1, 4]. Most of the track circuits in service are limited, that is, with insulating joints and basically all of them use one type of receiver - a receiver with a fixed threshold [6].

One of the promising directions for improving sensors for controlling the condition of track sections [8] is the development of controlling sensors that are less dependent on changes in ballast resistance, longitudinal asymmetry [9] and the standard value of shunt sensitivity, such an area is the development of adaptive track circuits [3, 5]. The article proposes a sensor control with an adaptive receiver, the principle of operation of which is that monitoring the state of the track section depends on the parameters of adjacent track circuits [4] included in the common controlled area CA figure 1.

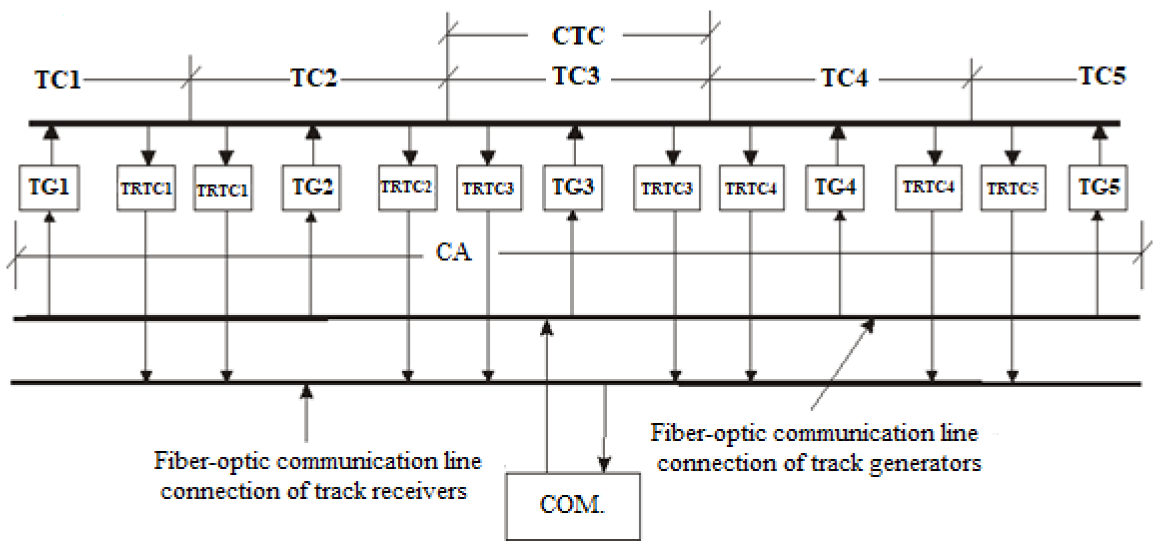

Figure 1. Block diagram of connecting devices to rail lines of a control sensor with an adaptive receiver

In the scheme shown in Fig. 1, track generators TG1 - TG5 are connected in the middle of the track circuits by analogy with the structure of the CAB devices [2, 9]. Track generators send signals of different frequencies to the track lines, alternating in each track circuit, for example, track generators TG1, TG3 and TG5 send a frequency of 420 Hz to the track circuits, and track generators TG2 and TG4 send a frequency of 480 Hz [6-8]. At each end of the track circuit, track receivers $TRTC_1$ - $TRTC_5$ are connected, consisting of filters tuned to the frequency of the track generator connected to the track circuit, an analog-to-digital converter and a microprocessor receiver, from the output of which the signal is fed via a fiber-optic cable to a computer for further processing.

The computer receives the voltage values from all receiving ends of the rail lines, and the states of the rail lines are fixed according to the following algorithm. The occupation of the rail line i will be fixed if the voltage of the receiving end of this rail line is lower than the voltage of the receiving end of the rail line i + 1 by a short-circuit time, and the release of the considered rail line i is fixed provided that the ratio of the voltage at the input of the receiver of the considered i-rail line to the voltage of the same name at the input of the receiver behind the lying rail line i-1 is equal to or greater than the release coefficient of the KO, while the two behind the lying rail lines i-1 and i-2 are free, and the one in front is i + 1 is busy.

Methods for monitoring the state of a rail line, based on a comparison of voltages, do not require switching devices at the ends of the rail circuit, which significantly increases the reliability of the devices, and, accordingly, traffic safety.

Comparison methods of current and reference voltages will allow monitoring the state of rail lines even with an intensive decrease in insulation resistance, which significantly increases the reliability of monitoring the state of track sections.

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