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Axle Metering Devices and Their Use on the Railway Automation and Telemechanics

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ABSTRACT. The use of rail tracks in railway automation and telemechanics and the application of equipment for the axle bulkhead require a different approach. Determines the possibility of adequate improvement of the parameters of automatic signaling when using the cross-section of the measuring devices. This is expressed by reducing the time spent on carriages standing at the crossings. Investigations in this area, as well as the introduction of production and equipment, will shorten the time of the cut-off. One of the problems in ensuring train efficiency at the station and the hauls is relatively small relative to the chain rails. This ensures automatic locomotive signalization. As one of the ways to increase reliability in railroad automation and telemechanics, the use of axle metering devices requires more control.

KEYWORDS: railway automation and telemechanics, rail chains, axle metering devices, crossroad signaling system, automated information systems, diagnostic system.

I. INTRODUCTION

At present, the transmitter and signal connector are replaced with electronic equipment, including microelectronics, pulse microprocessors. However, there are no similar modifications and modernization processes in the rail of chains industry. Currently, the tonal rail of chains equipment is being developed, which provides low power consumption and broad functionality, allowing for improved performance.

The results of the analysis of flaws and chains of axle metering devices in the country and overseas have revealed that they are based on scientific research and on the basis of the use of railroad automation and telemechanical axle measuring devices.

II. ANALYSIS OF MODERN CONDITION AND DEVELOPMENT OF RAILWAY AUTOMATION AND TELEMECHANICS SYSTEMS

Devices for measuring the readings are the alternative chains to the chain rails and are sufficiently processed. Acting systems using the principle of readings appeared almost 50 years ago. They were mechanical devices and did not differ with sufficient levels. The appearance of integrated circuits has led to significant growth in the development of axle counting systems. This has led to the fact that the axis counting system can not provide high reliability and safety at work with hardware chains, with more complex and functional discrete electronics, with hardware and circuitry. Railway automation and telemechanics (RAT) devices have been used for the calculation of the readings. With the introduction of a large IMS, the integration potential could increase the most potential and functional capabilities of the axles to improve the performance of the device.

The readings are not limited to the use of devices on railways. The similarity of the principle of train movement regulation and traffic safety are also covered by the axle metering devices in the field of industrial transport. At the same time, the service culture of automation and telemechanics (AT) devices is considerably lower, which leads to certain difficulties in maintenance and operation. Experience has shown that the traditional RAT devices do not have the capability to operate at railways in industrial enterprises, and they are unable to function as long as they do not eliminate the damage, and are the only alternative to axle metering devices.

Axle metering devices (DAM) can also be used as a means to improve the reliability and cost-effectiveness of RAT equipment. The paths can be seen in the example of a very complicated waybill station. If the intensity of train movement varies widely on the route of the station, it can be equipped with encoded rail chains, with head and

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Vol. 6, Issue 5 , May 2019

passenger train receiving and dispatch routes, DAM devices. Better use of cheaper DAM devices to control remaining spaces.

Determining the principal different approach to the sale of DAM hardware when using rail tracks in the RAT devices and when using the axle bulk method. In contrast, in the autogroup and semi-automatic blocking systems, at the station and block-sections, the connection between the hardware and the service of the operation of the state of operation and the function of the SCB distant function requires a totally different approach. There are various options for implementing these functions in practice.

Detecting the ability to improve the automatic signaling performance when using DAM devices at the crossroads. This is expressed by reducing the time spent on carriages standing at the crossings. Investigations in this area, as well as the introduction of production and equipment, will shorten the time of the cut-off [1].

AUTOMATION AND TELEMECHANICS FUNCTIONALITY OF THE NEW HARDWARE

Existing reports will be reviewed by the DAM and ALSR systems (implemented on hardware, Uzbekistan railways and industrial transport).

The scheme of practically feasible and prospective functional capabilities of new equipment is shown in Figure 1. Scientific and technical developments and the results of practice have shown that the creation of DAM hardware will have enhanced functional capabilities in relation to devices that solve the problem of rail chain replacement and to calculate known axes.

Tracking of traffic jams is a traditional issue, and this issue is solved with bullets counters, including DAM. A number of regulatory documents have been published, which set out the principles and standards set out to comply with the technical requirements of DAM hardware.

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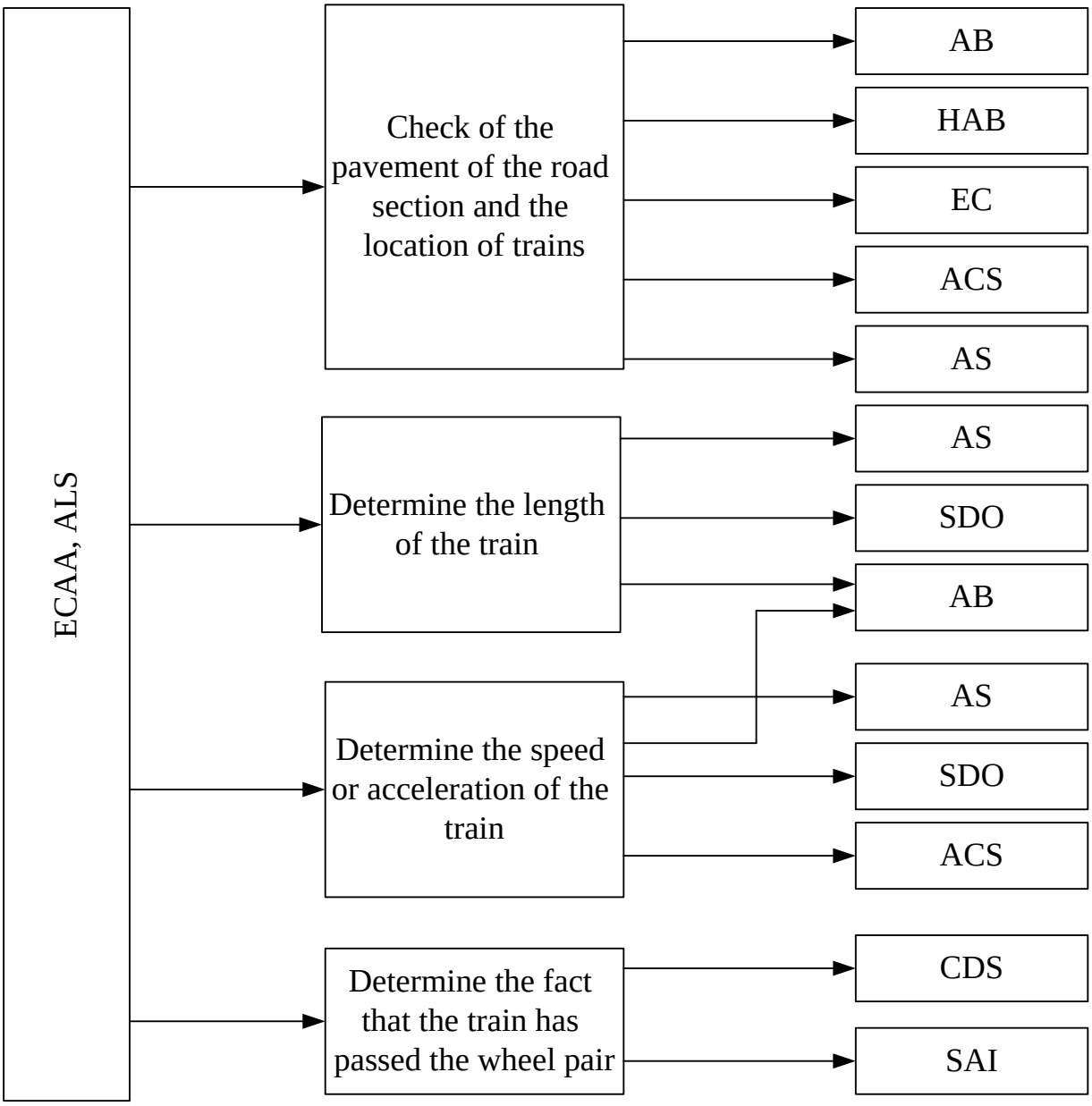

Fig.1. Structural scheme of functional capabilities of equipment

AB – automatic blocking; HAB – half automatic blocking; EC - electric centralization; ACS – automatic crossover signalization; AS - automatic switching; SDO – station duty officer; CDS – a complex of diagnostic system; SAI – automated information systems.

Self-adjustment, unification (universalization), universality, and functional blocks of the DAM hardware unit allow the RAT to operate without any changes in all the rotating devices. This reduces design and construction costs and reduces the cost of operating.

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Vol. 6, Issue 5 , May 2019

The speed of the train at DAM is easily detected. The most commonly used circular circuits on automatic switching (AS) are the most sophisticated speedometers. DAM devices used for this purpose extend the scope of its application and reduce the range of devices used in SCB distances.

The speed of data transmitted from the signaling point is especially useful when there are significant differences in the permissible or real-speed trains, especially in temporary limitation or overhaul of the road. Station duty officer (SDO) will be able to interact with hauling capacity [2].

III. DEVELOPING TECHNICAL SOLUTIONS FOR DESIGNING POINTERS AT THE STATION

The principle of combining data transmission channels enables the number of cable connections to be reduced when the number of CEMs in the powered central station is large. For the design of DAM devices with standard technical solutions, it is envisaged to install separate dual-wire cable pairs from each CEM to the devices on the post (EM). Here is an example of a simplified cable plan in the sternail (Figure 2).

Thus, the principle of joining the power supply and data transmission channel between the USE and the CEM and the RS allows the use of a variety of variants of the wired network and data exchange structure. The choice of one or another of these options is determined by the current technical and economic requirements, which are promoted in the production of SCBs using DAM.

The structure of the electronic hardware of the counting system. At present time, the railway track control, the electronic system of axle counting, is replaced by chain rails at the station, and such exchanges have been widely implemented in semi-automatic blocking sites, allowing them to connect to dispatcher centering.

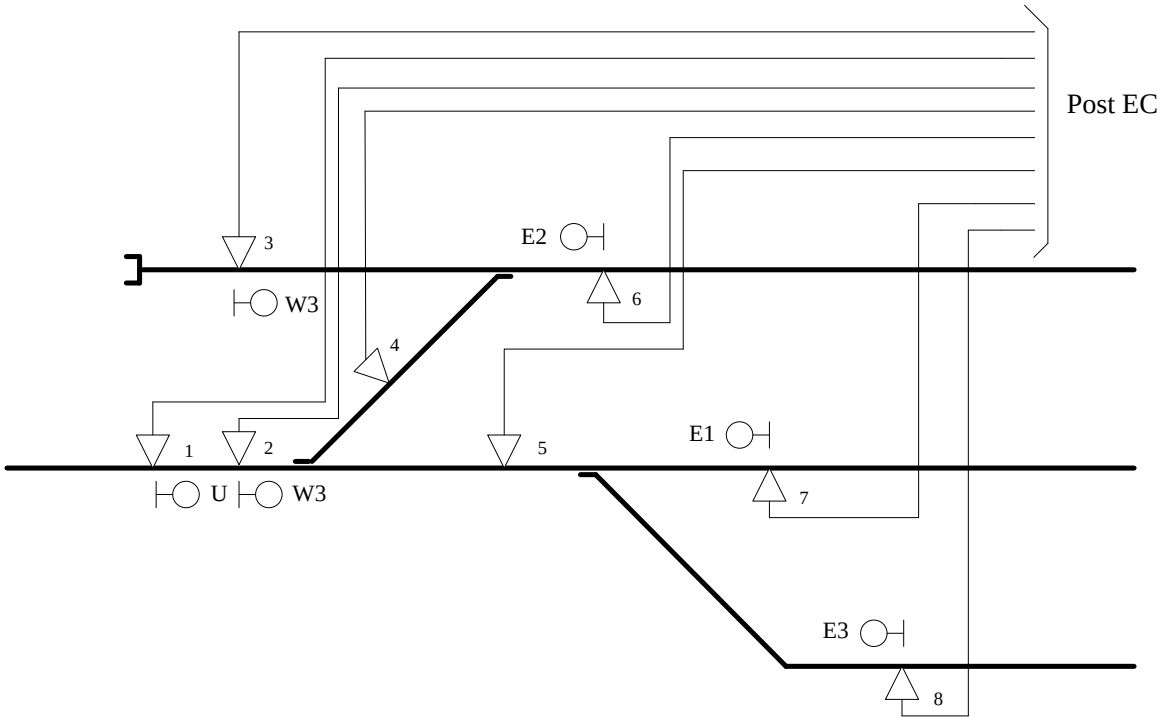

Fig.2. Model cable plan on the station

It is not required to install isolated cables and drossel-transformers at the stations. In the case of an autonomous switch, the connectors on the connector and the point switch on the switch points will not be installed. In the event of an electric shock, there is a need to maintain the circuit breaker and rails in order to reduce the resistance of the opposite grid.

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Vol. 6, Issue 5 , May 2019

Figure 3 illustrates trunk lines in the cable layout and the EM connections with EM lines. It is possible to connect the CEMs to the ring to increase the reliability of DAM devices at the station, and this is illustrated by dashed lines in Figure 3. This DAM provides the ability to work when the NEM cable line breaks somewhere.

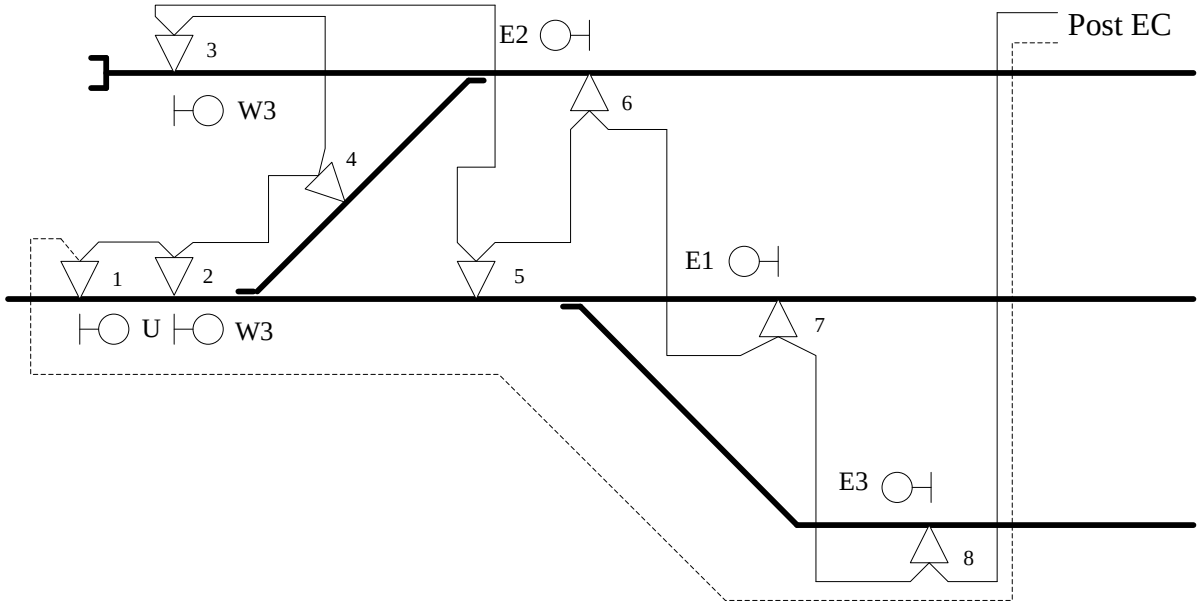

Fig.3. A cable plan shortened to the station

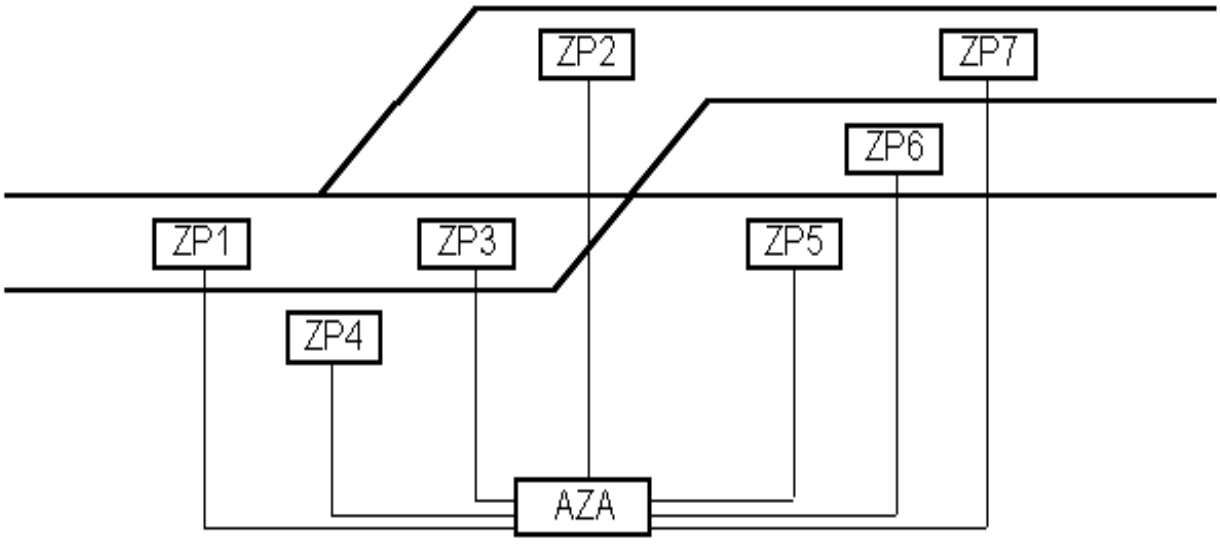

Fig.4. Structural scheme of control over the road sections at the station by means of counting of axles.

The SIEMENS company's AzL 90-M-2 axles counting system, the structural scheme for the free or busy road sections of the station (Figure 4).

The AzL 90-M-2 axles counting system has been producing series since 1993. It is intended for operation in the station and includes a centralized calculation of the AZA device and can connect to 16 ZP terminals.

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Vol. 6, Issue 5 , May 2019

IV. STRUCTURAL SCHEME OF CONTROL OVER THE ROAD SECTIONS AT THE STATION BY MEANS OF CALCULATION OF AXLES

V.

The AZA Central Device is based on the "Two of Two" scheme, which is based on a high-

performance two processor calculator. The centrifugal device and all counting points are made according to the standard tire connection between the ZP.

Each metering station is equipped with two duplicating equipments, which are not interconnected, receive data from the rails sensor and transmit it to the central device via the electronic processing unit.

Each central device can operate with a limited number of metering points, and if the number of tracks is large (at the station and the pickup hill), the axles counting system connects several AZAs, which are combined by standard mounting hardware [3].

VI. AXLE METERING DEVICES ON THE CROSSROAD SIGNALLING SYSTEM

One of the most hazardous sections is the crossroads of highways along one of the highways. That is why high requirements for reliable operation of automatic suspension systems of trains are provided. In the early stages of the development of the stopping device, these requirements are mainly restricted to the safety of traffic on all types of transport, which has significantly affected the economic factor lately: on such a cross-section such devices have been required to ensure maximum mobility of the vehicle and allowing you to reduce the time. This is due to an increase in the speed of train movement, the passage of railway tracks, and the increased traffic intensity.

The switch can be divided into two categories for the carriage of vehicles by the method of closing the train. The first one includes the calculation of lengths, and the second one, which uses the approximate approximation of the train to which the train moves. There are two types of point-and-shoot detectors that can be used to record the train entry on the notification area.

Connection to or disconnection of devices used on railways, in railway vehicle exemplary solutions, is carried out as a result of the influence of the train on the road sensors.

VII. AN ECONOMICAL BENEFIT ANALYSIS OF AXLE METERING DEVICES

The use of DAM will depend on the methodology for analyzing economic performance and the results that can be obtained, the features that will implement the apparatus, and the reasons for using the DAM. The functions of the DAM can be divided into two groups, which are widely used: the hauls equipment, on the crossroad signaling system, and the stationary devices, as well as the hinge systems.

VIII. CONCLUSION

The dissertation has developed questions on the use of arrows in the signaling systems on stations and overhead transmission lines. The following scientific results were obtained.

The analysis of the current state of the devices for measuring the readings: the analysis of the current condition and functional capabilities of the new equipment of automation and telemechanics, comparing the RATs on rails chains and axle counting devices, and the accuracy of the high-speed movement based on axle meters.

Development of technical solutions for investigating and designing optical profiles for axles counting devices for stations: study of the operation of communication channels between post devices and CEM, optimal modes and reliability of signaling exchanges between post devices and CEM, technical for designing pointers at stations solutions have been developed.

Application of readings in the systems of electric centralization and crossing signalization: the structure and determination of the device for calculation of axles of the station systems, the analysis of the cost effectiveness of the calculation axles counters of the firm "SIMENS" for station automation devices.

The analysis of the current state of the device for measuring the readings, the determination and application of the devices, and the development of technical solutions for the optimal regimens for the devices for measuring axles at the station are important in designing and deploying axles at the station. The results of the study - recommended for the stationary and haul equipment for haulage at the existing railway stations, as well as for their newly constructed types.

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