RAILROAD AUTOMATION AND TELEMECHANICS SYSTEMS

25 YEARS

RADIOAVIONICA
CORPORATION

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CORPORATION

RAILROAD AUTOMATION
AND TELEMECHANICS
SYSTEMS

POWER SUPPLY DEVICES FOR
RAILROAD AUTOMATION AND
TELEMECHANICS SYSTEMS

NON-DESTRACTIVE
TESTING
EQUIPMENT

C4ISR COMPLEX
«STRELETS»

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RADIOAVIONICA
CORPORATION

ESTABLISHMENT AND DEVELOPMENT OF RAILROAD AUTOMATION AND TELEMECHANICS DIRECTION


СИСТЕМА СЕРТИФИКАЦИИ РУССКОГО РЕГИСТРА

СЕРТИФИКАТ

СООТВЕТСТВИЯ СИСТЕМЫ МЕНЕДЖМЕНТА КАЧЕСТВА

Настоящим удостоверяется, что система менеджмента качества

Открытого акционерного общества "Радиоавионика"
Российская Федерация, Санкт-Петербург, Троицкий пр., 4, литер Б

была проверена и признана соответствующей требованиям стандарта

ИСО 9001:2015

в отношении проектирования, разработки, производства, технического обслуживания и ремонта систем железнодорожной автоматики и высокотехнологического оборудования специального назначения, приборов неразрушающего контроля, автоматизированных комплексов диагностики технических объектов инфраструктуры железнодорожного транспорта и промышленных предприятий

№: 16.0950.026
от 28 июня 2016 г.
Система менеджмента сертифицирована с 2010 года

Генеральный директор Ассоциации по сертификации "Русский Регистр"

Сертификат действителен до 28 июня 2019 г.

Уточнение области сертификации приведено в Приложении
Сертификат теряет силу в случае невыполнения условий сертификации
(http://www.rusregister.ru/doc/004.80-105.pdf)
Сертификат является собственностью Ассоциации по сертификации "Русский Регистр"

Ассоциация по сертификации "Русский Регистр"
Россия, 190121, Санкт-Петербург, пр. Римского-Корсакова, д. 101


Сертификат

выдан

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Russian Federation

Certification Association "Russian Register"

подтверждает, как одобренный IRIS орган по сертификации, что система менеджмента вышеназванной организации была проверена и признана соответствующей

International Railway Industry Standard (IRIS)
Версия 02, июнь 2009

в отношении видов деятельности: проектирование и разработка и техническое обслуживание и ремонт и производство
в областях сертификации: 3 (Система управления (тележки и ходовая часть)), 12 (Прокладка кабелей, шкафы управления), 19 (Инфраструктура)
для систем железнодорожной автоматики и высокотехнологичного оборудования специального назначения, приборов неразрушающего контроля, автоматизированных комплексов диагностики технических объектов инфраструктуры железнодорожного транспорта и промышленных предприятий

Действителен с 05/07/2016 — Действителен по 04/07/2019*

IRIS Certification

Текущая дата: 27/06/2016
Регистрационный номер сертификата: 16.0859.026

* При условии успешного прохождения последующих надзорных аудитов до истечения срока действия результатов предыдущего аудита.
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The important business area of our company is a development of failsafe systems of Railroad Automation and Telemechanics (RAT). Radiovionica JSC began this area in 1996. It was the time, when Russian Ministry of Railway decided to replace relay train control and monitoring systems and announce a tender for development of control computer system of microprocessor-based interlocking. The All-union Institute of electronic control computers (Moscow), Radioavionica JSC and others companies participated in this tender.

Having a great experience of high reliable and safe microprocessor system development, Radioavionica JSC has won the tender and started the development of Control Computer System (CCS RA) in 1997.

The microprocessor interlocking system EC-EM based on the CCS RA designed by specialists of Radioavionica JSC together with Giprotranssignalsvyaz was put in to pilot operation in 2000 at Noviy Petergof station of Oktyabrskaya railway. Integrated microprocessor automatic block signal system with tonal track circuits and central arrangement of equipment (ABTC-EM) was implemented in 2004 at rail section Ghiharevo-Naziya.

Nowadays, our microprocessor interlocking systems EC-EM/ABTC-EM operate at 145 railway stations (more than 4400 track switches) and 26 tracks (more than 600 km) across the Russian Federation and CIS. Radioavionica JSC, being one of the largest suppliers of microprocessor interlocking systems in Russia, carries out the mass production of CCS RA for compliance with the technical regulations of the Customs union TR TC 003/2011 "Infrastructure safety of rail transport". Our quality management systems meet the requirements of ISO 9001 and business management systems meet the requirements of international railway industry standard IRIS.

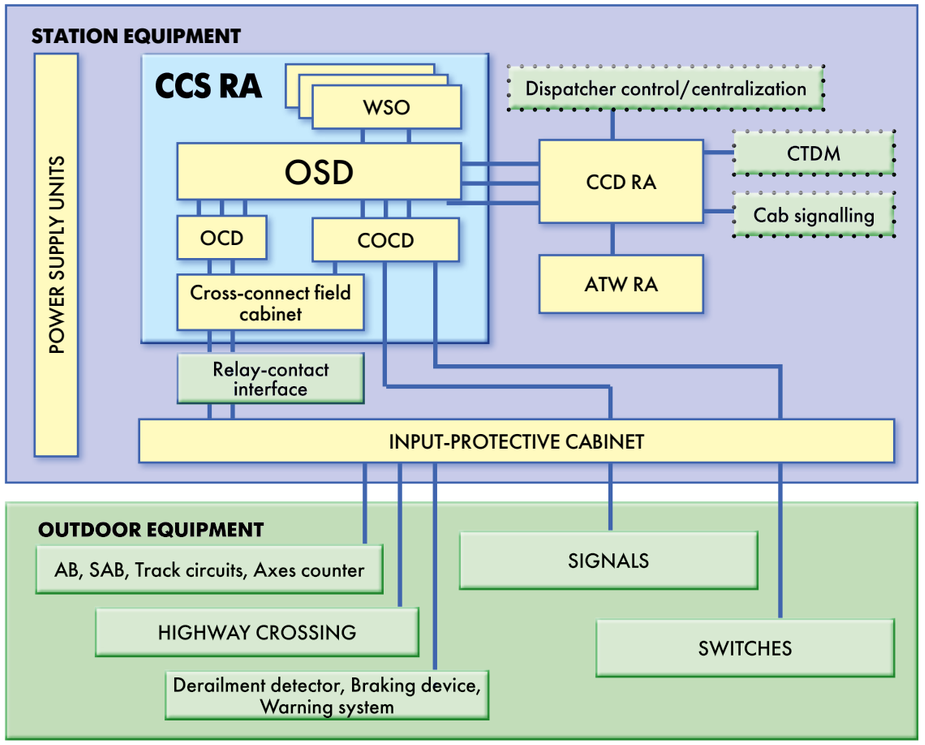
MICROPROCESSOR SYSTEM EC-EM

System EC-EM can be used in two variations:

- direct connection with outdoor equipment;
- connection with outdoor equipment through relay of the 1-st class reliability.

Each of these variations could be designed for different aims:

- partial modernization of relay systems on microprocessor interlocking system EC-EM;
- possibility of object remote control;
- using of digital coupling with adjacent systems Automatic block system (AB), Dispatcher centralization (DC), Cab signalling, Systems of technical diagnostic-and-monitoring (STDM), Automatic brake control system (ABS) and so on.



Structure of EC-EM with direct control of track switches and traffic signals

The best configuration of hardware-software and relay devices allows to choose more suitable version both in value and in the area of its premises. The implementation of Contactless Object Control Device (COCD) into microprocessor system EC-EM can decrease the quantity of relays on one track switch from 28 to 11 and increase operation characteristics of system. If relay schemes of outdoor equipment control (switches, traffic lights) is implemented into in the microprocessor system EC-EM, the relay stations for 20 track switches occupy will be no more than 4 modules, which is considerably less space than modern relay systems. Applying of connection with outdoor equipment without relay can reduce the number of transportable modules to three on such stations.

CONTROL COMPUTER SYSTEM (CCS RA)

CCS RA is a safe hardware-software complex of microprocessor interlocking system EC-EM/ABTC-EM. It provides the control of automation on small, medium and large railway stations and neighboring lines with aim to provide the high line traffic-capacity. CCS RA realized the control algorithms and central interlocking of switches and signals as well as devices ABTC-EM on lines during the operation.

Safety and fail-safety of CCS RA are based on following technical solutions:

- three channel instrumental backup of the equipment and links provide the safe function of system during failures of separate modules or single channel in generally;
- soft synchronization of channel operation with time shifting on fulfilment of the same name procedures in different channels can provide the normal function of system during failures in different channels;
- asymmetry of interface and channels failures by implementing of adaptive reconfigurable algorithms;
- continuous control, periodic testing, comparison of operation computer channels and transfer the failed equipment in safe non-reversing condition;
- possibility of hot-swap failed modules without interrupting system operation.

CCR RA consists of:

- **station operator workplace (WSO);**
- **central station device (CSD);**
- **object controller device (OCD, COCD).**

STATION OPERATOR WORKPLACE (WSO)

The control of microprocessor systems EC-EM/ABTC-EM is implemented from automated station operator workplace (WSO). The integration the information-service functions into microprocessor system EC-EM allowed to improve the working conditions of station operators and provide possibility to get the protocols of action and system operation.

Application of 2-4 sets WSO in microprocessor system EC-EM/ABTC-EM provides the monitor and control of large-scale stations with several control zones. The station Bologoe (207 track switches) was equipped with system EC-EM with two control zones in 2009.

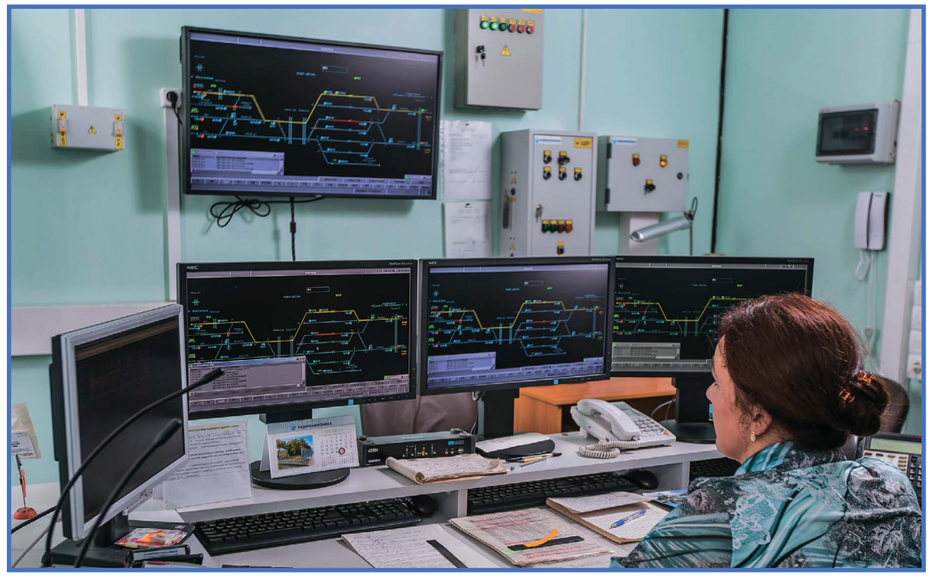
Using one set of WSO it is possible to control the one station or station group with centralized and decentralized arrangement of control elements. Also it is available to transfer the control of parks from WSO to local control.

WSO provides the achievement of requirements to relative graphic drawings according to RZD JSC standard CTO 1.19.005–2008:

- visual control of train location on station and neighboring lines using ABTC-EM;
- visual control of outdoor equipment condition;
- control of itineraries and separate outdoor equipment;
- generalized alarm about system failures.

The set WSO consists of three PC, one of them is in operating mode, second – in "hot" reservation and third – in "cold" reservation. The quantity of PC could be reduced according to customer requirements.

The set WSO can include up to 4 monitors for convenient display of train location on large-scale stations. Also additionally could be supplied the monitor of shared use where the increased track diagram is shown. Graphic station with shared use monitor is used for large-scale station. The connection between WSO and CSD is realized by four-wire cooper and fiber optic cables. If the station is divided on control zones each zone will be occupied by WSO.



WSO at railway station Vyritsa

CENTRAL STATION DEVICE (CSD)

Cabinet CSD consists of:

- unit of central station device (UCSD);
- interfaces converter unit Ethernet/RS-422 (ICU) or Ethernet switch-boards;
- switching processor unit (SPU).

UCSD provides program realization of control algorithms and central relations of track switches and signals of interlocking system EC-EM and also automatic blocks signaling ABTC-EM on lines with predetermined safety parameters.

Units ICU and SPU are used for connection with systems which have hardware architecture (2x2) and (2x2 V 2x2) and for increasing of necessary interfaces.

UCSD includes three computational channels, which are synchronized by software bring into step programmatic (the rule of the "soft" synchronization provides time shifting on fulfilment of the same name procedures in different channels). During CSD operation, a continuous monitoring of hardware-software condition is provided. This monitoring is based on periodic testing and comparison of working computational channels with the application of majority voters 2 and 3. It could provide necessary safety and fale-safety level of CSD.

Software of CSD works under control of hard real-time Operating System developed by Radioavionica JSC

Software of CSD provides:

- implementation of control algorithms and central relations;
- implementation of safety functions;
- monitoring and control of station facilities up to 400 centralized track switches;
- monitoring and control of station with several control zones;
- monitoring and control of facilities from basic station which are located at distance up to 120 km from CSD;
- organization of individual diagnostic data transmission channel.

Software of CSD consists of:

- **Technology software (TS)** implements the interlocking algorithms (EC-EM) and automatic block signalling (ABTC-EM);
- **System software (SS)** provides:
  - data exchange between CSD and OCD by three independent network channels;
  - interchannel comparison of Technology software databases, executable programs and continuous data;
  - a set of modules that provides connection with external systems (ABS, ABTC-M, digital module of track switches control, cab signaling).
- **Hard real time Operating System (OS RT)** AvRTOS-32 provides:
  - soft synchronization of computation channels and interchannel transfer (diagnostic period is less 1 sec.);
  - testing of equipment and network channels.

Technology software divides on two parts: first – for implementation of interlocking system EC-EM, second – for ABTC-EM. The both parts can be adjusted in one CSD. In this case, functions of movement control on station and lines are integrated (integrated interlocking system EC-EM/ ABTC-EM). Operating system and System software are not required the modification and always adjust in standard set.

OBJECT CONTROLLER DEVICE (OCD)

OCD has three channel architecture for monitoring and control of relay of the 1-st class reliability and operates by commands from CSD unit. The structure and quantity of cabinets OCD are determinated by specific project and depends on quantity of control facilities on station (the quantity of centralized tracks switches). Every OCD cabinet can provide the control of up to 384 relays and 560 contacts. The overall sizes (WxHxD) are 600x2000x800. Weight is about 250 kg.

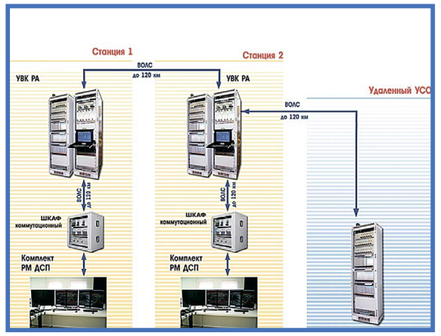
OCD consists of:

- 3 communication subunits (CS);
- data acquisition modules (DAM) which provide the capturing of discrete information about condition of control facility;
- output amplifier modules (OAM) which provide the organization of CCS output signals for relay control;
- safety control and switch off modules (SCSM) which exclude the dangerous failures by disconnection of OAM output cascades;
- 3 power supply modules (PSM);
- 3 media converters modules (MCM).

The connection of cabinets OCD to cabinet CSD could be implemented via cooper fourwire or fiberoptic cables which provide the facilities control that could be located at distance up to 120 km from CSD. For the first time the remote cabinet OCD is adjusted for control of ABTC-EM concentration station on line Vyazniki-Sen'kovo Gorkovskoy railway in 2009.

For conversion electrical signal into light signal are applied the media converter modules produced by Radioavionica JSC. MCM are used for interface RS-422/485 and Ethernet (10/100Mb/sec).

Modules MCM are designed for adjustment in cabinets CPD, OCD, COCD or special commutation cabinets.



Control of remote objects

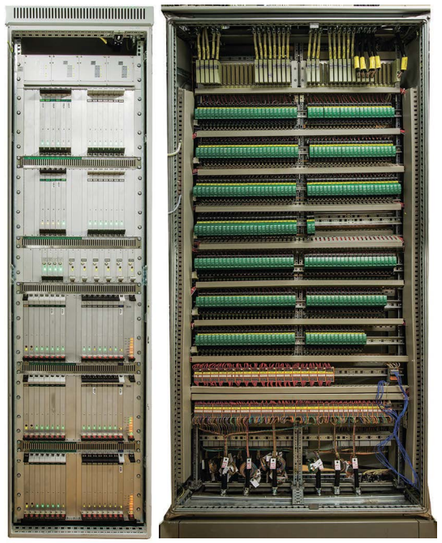
CONTACTLESS OBJECT CONTROLLER DEVICE (COCD)

COCD is applied for reducing the quantity of used relays in the system from 28 to 11 on the deemed centralized track switch.

The microprocessor system EC-EM with functions of COCD was put into pilot operation on station Molodezhnaya of juvenile railway (Oktabr'skaya railway) in June 2011 and transfer to full time operation in 2013.

In 2014 was put into operation station Viritsa with control of all switch motors and signals by COCD. Also on this station was implemented interface connection with digital modules of track circuits control and coding (DM TCC) of NPP "Stalenergo" which allowed to reduce the quantity of relay equipment in these circuits.

COCD consist of three channels in operation and logical parts, also power part with backup possibility.



The features of COCD are:

- Applying of contactless hardware components for monitoring and control of outdoor equipment.
- Reducing the amount of design and commissioning works.
- Resistance to atmospheric and commutation overvoltage, which is confirmed by test report in test center VITU.
- Depth diagnostic of outdoor equipment condition (control of temporary operation parameters, integrality of power circuits and insulation resistance, control of voltage fluctuations presence and so on).
- Depth diagnostic of COCD hardware with precision up to module and communication line.

Cabinet COCD can provide the monitoring and control of 32 single switch motors (with possibility of sequential control several motors) or 160 filament signals (traffic lights, LED, light-optical systems) without power backup. It is possible to combine the monitor and control of switch motors and signals in one cabinet COCD.

Constructively CSD, OCD and COCD are based on unified crates with fixed modules by height 3U, 6U and depth 220 mm, integrated in separate cabinets with overall sizes (WxDxH) 600x800x2000 mm. The switching of cabinets connections OCD and COCD with facilities (relay, outdoor equipment) is realized via cross and input-protective cabinets. Input-protective cabinet provides the protection of semiconductor devices from atmosphere overvoltage according to "RZD" JSC standard STO 08.024-2015.

CONTROL CONNECTION DEVICE (CCD RA)

CCD RA EC-EM/ABTC-EM is intended to execute of two main function groups:

- linking device functions, that provide the connection of the microprocessor system EC-EM/ABTC-EM with neighbor Railroad Automation and Telemechanics systems. Herewith CCD RA performs the information connection with devices of the microprocessor system EC-EM/ABTC-EM and devices of neighbor systems with support for a large set of formats and data exchange protocols;
- hub functions of diagnostic information of the microprocessor system EC-EM/ABTC-EM. Herewith CCD RA executes the collection, processing and storing of different types of diagnostic information about control facilities condition of the microprocessor system EC-EM/ABTC-EM and neighbor RAT systems.

During connection with neighbor RAT systems depending on the requirements the different versions of CCD RA are used:

- version for connection with RAT systems not security-related. This version is used for connection of the microprocessor system EC-EM/ABTC-EM with different Dispatcher control and Dispatcher centralization systems and others;
- version for connection with RAT systems security-related. This version is used for providing of integration the microprocessor system EC-EM/ABTC-EM and cab signaling. Herewith "safe" linking also supports the connection functions with Dispatcher control and Dispatcher centralization systems and so on.

Software of CCD RA works under control of operation system Linux. Information security and protection against unauthorized access is provided by functions installed into software and arrangements.

It is possible to manage the CCD RA network of several stations during equipping with the microprocessor system EC-EM/ABTC-EM. The access to the control-diagnostic information about microprocessor system EC-EM/ABTC-EM operation of the whole railway line is possible through the Automated technician's workstation (ATW) interface and provided after the connection to network.

AUTOMATED TECHNICIAN'S WORKSTATION OF THE MICROPROCESSOR INTERLOCKING EC-EM/ABTC-EM (ATW RA)

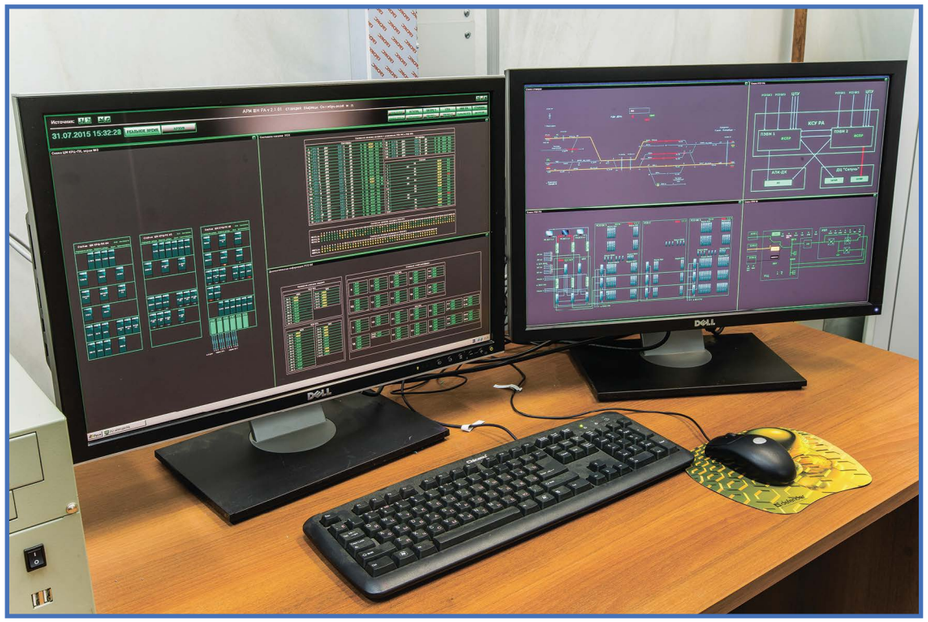
ATW RA is intended for providing the detailed control-diagnostic information about control facilities condition of the microprocessor system EC-EM/ABTC-EM to station maintenance staff, in particular:

- information about condition of the stations outdoor equipment and lines. When COCD is used as a part of the microprocessor system EC-EM/ABTC-EM on ATW displays detailed data about operation parameters, presence and factors of track switches and signals failures;
- information about condition of own hardware of the microprocessor system EC-EM/ABTC-EM;
- information about Combined Power Supply plant (CPSP, CPSP-M) condition including measurement figures of the power parameters;
- diagnostic data of the different external devices and RAT relating with the microprocessor system EC-EM/ABTC-EM..

ATW RA allows to out put the information in real-time as well as in display mode of the archival data in a user-friendly style (mnemonic diagrams, tables, lists of messages, schedules and so on).

ATW RA connects to Control Connection Device (CCD RA) of the microprocessor system EC-EM/ABTC-EM from which gets necessary data for processing and display.

It is possible to manage the CCD RA network of several stations during equipping with the microprocessor system EC-EM/ABTC-EM. It is allow to maintenance staff to get the control-diagnostic information about system EC-EM/ABTC-EM condition of the whole line from ATW RA of any station.



ATW RA Screen station Vyritsa

DESIGNING AND DEVELOPMENT OF MICROPROCESSOR INTERLOCKING SYSTEM EC-EM

Radioavionica JSC specialists use a complex approach to the development of technical facilities and designing RAT system, which is reflected in the project risks analysis reports.

Complex approach to unification is implemented by several main directions:

- unification of hardware-software devices;
- unification of embedding objects.

Unification of hardware-software devices is based on:

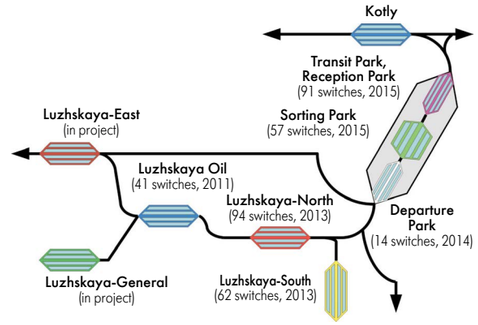
- on modularity of software;
- application of the standard interfaces and structure elements;
- application of the automated adaptation system of system software to real embedding object;
- proved by practices schematic and software solutions, that allow to increase the system functionality.

Unification of embedding objects differ by quantity of centralized track switches (EC-EM for small-scale, average-scale and large-scale railway station) is based on:

- scalability of the CCS and power supply devices structure;
- development of digital connections with neighbor microprocessor RAT systems;
- application of standard designing materials (SDM).

Our company has more than 15 years of experience in project development of EC-EM/ABTC-EM systems and their adjustments during operation.

The stage implementation of the system EC-EM on the objects of Ust'-Luzhskii hub



Standard designing materials (410417-ТМП) consist of categories on designing of the microprocessor system EC-EM, three valued and four valued of the automatic block signaling ABTC-EM and connection with automatic block systems and semi-automatic block systems, other EI systems, with Axle Counting System (ACS), Automatic brake control system, track switches cleaning, supports UTS 380, automatic switching systems and others. Using the Standard designing materials and new technical solutions, the development of EC-EM and automatic block signaling ABTC-EM could carry out a variety of design institutes.

The system development begins from getting of the input data from customer, followed by making and forecast estimation of the work volume, the list of supplied equipment and time schedule for the development of Control computer system CCS RA and power supply units.

For power supply of RAT systems located on the EI building are designed the combine power supply plants (CPSP) based on powerful uninterruptible supply units (USU) which provide stable and "clean" voltage with autonomy duration from 15 min (for possibility of switching on the diesel-generator) and up to several hours depending on customer requirements.

The microprocessor systems EC-EM and automatic block signaling ABTC-EM are designed on standard set of cabinets. The unification of CCS RA cabinet construction is based on the basic designing principle, in which allocated the same base for all of the cabinets and variable set of modules and subunits.

One of the distinctive features of our company is that Radioavionica JSC executes the full range of works from development of the system EC-EM/ ABTC-EM to commissioning «turnkey».

The procedure for ordering the EC-EM/ABTC-EM equipment, produced by Radioavionica JSC, begins after the approval of schemes plan of railway station and drafting interdependencies tables. For excluding design errors and planning of components order Radioavionica JSC recommends to design enterprises to adjust with us the list of supplied EC-EM/ABTC-EM equipment. For the development of cable network the requirements for location of WSO and CSD in one or different buildings, distance of control objects from interlocking building, presence of basic station and concentration post on the railway line must be taken into account. Optic fiber links and optic fiber converters are used:

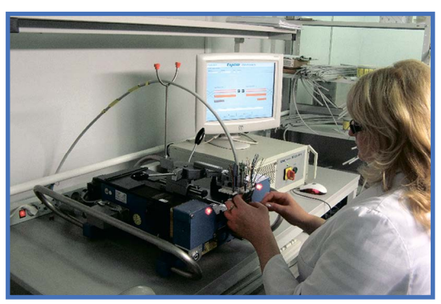
- for location of set (sets) WSO and CSD in different buildings;
- for location OCD and CSD in different buildings.

Using a connection via optic fiber provides the links immunity to the external EMC influences and excludes of applying amplifying points for link length up to 120 km.

PRODUCTION OF MICROPROCESSOR INTERLOCKING SYSTEM EC-EM

Radioavionica JSC has established the advanced high-tech manufacture which specializes on producing of Control computer systems CCS RA and Combined Power supply plants (CPSP). These systems are standard for Russian systems of control and traffic safety on railroads transports.

All components that are mounted on the board are subjected to acceptance computer testing, and after their assembling every board is checked for defects.



Radioavionica JSC developed, produced and certified a diagnostic stands for boards, modules and subunits. After all the necessary checks subunits and modules are covered by special protective coating protecting from humidity. The cable manufacturing is made on the certified workplaces with applying of high-tech equipment which reduces the failures during conductor stripping. Hardware-software complex for 100% quality control of cable connectors was created by Radioavionica JSC specialists. In modern condition of hard competition each producer aspires to provide the customer with products that meet the highest requirements in terms of reliability and fail-safety as well as is important to comply with reasonable pricing. For achieving these aims Radioavionica JSC uses the high-tech developments in producing their equipment. RAT systems of Radioavionica JSC consist of electronic units where only checked and advanced elements and components are used. For example, for producing of multilayer printed circuit boards for electronic modules and subunits the whole process is automated: beginning from selection of components for checking the quality of each element soldering on the board. All components for our systems are purchased from authorized and reliable distributors.

Due to increasing of orders quantity, Radioavionica JSC has extended its production space and facilities. This provided the possibility of applying new high-tech equipment, high-tech solutions and significantly improved the quality of manufactured products.

Technologic software of the microprocessor system EC-EM/ABTC-EM could be adapted according to development of railroad facilities, the quantity and type of outdoor equipment and with interdependencies for each individual railway station.

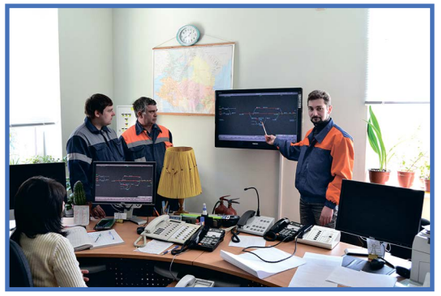
Since 2011 Radioavionica JSC has been using certified testing complex (TC) of the system EC-EM/ABTC-EM for checking of interdependencies for «idle» inspections during factory testing. The specialist's work at this complex allows to fix potential design failures quickly, including the software failures, and reduce duration of system testing reducing their commissioning time. Also TC is applied during the changes of railroad development of the station, which is in operation, or for a phased commissioning of railway facilities when the provided free time is limited. After the filling in the checking tables directly on the station is checked only connection of CCS RA to control objects.

Within the limits of in-line simulation methodology the part of hardware-software system and it environment is replaced by software models operating in accordance with strict time and logical regularities inherent to real devices.

MAINTENANCE WORK AND EDUCATION

The microprocessor systems EC-EM/ABTC-EM are not required high qualification of engineer and station operators maintaining these systems, because the system are designed and executed with using high-tech technical solutions on advanced elements base. Our specialists give lessons to engineer and station operators maintaining system on the exact station in the frame of the commissioning works. During 30 hours, operators are getting the enough scope of knowledge and experience for self-determined work taking into account the specifics of service equipment putting into operation.

We designed training stand allowing to simulate the failures of the EC-EM/ABTC-EM components for practical skill training of searching and failures correcting. This stand is situated in the education center Radioavionica JSC and can be used for periodical knowledge checking of specialist of Signalling.



In the beginning of 2010 thanks to Radioavionica JSC were supplied the equipment and educated the specialist of Moscow Railway Education center. In 2011 were equipped the educating classes for North-Caucus Railway. Nowadays the railway specialists are getting knowledge and upgrading skills in these centers.

In addition to training and education of railway specialists our company pays attention to guarantee and post-guarantee maintenance of the microprocessor systems EC-EM and separate supplied Power supply plants.

The maintenance of hardware performs by our service center, which has advanced material equipment and highly qualified staff. Nowadays our service teams work on Oktyabr'skaya, Moscow, North, South-East and North-Caucus railways.

Every service team is provided with everything necessary for maintenance and repair. Every our service car is equipped with all necessary tools and supplies to carry out the prophylactics, diagnostic, small and average repair directly on the object. The effective work of center is provided by the spare parts warehouse, fully stocked for maintenance, and available offices in Voronezh and Rostov-on-Don.

As a result, the customer receives the required level of support, which entails his savings of his time, intellectual resources, and the minimization of such an important parameter as equipment downtime that ultimately brings tangible material benefits.

COMPLEX EQUIPPING OF HIGH-SPEED LINE ADLER - ALPIKA-SERVICE (OLYMPIC RAILWAY LINE) AND POLTAVA-KRASNOGOROD (UKRAINE RAILWAY)

Our company carried out the building and implementation of the railroad automation facilities for Olimpic Games in 2014 within the reconstruction program of existing railroad automation facilities.

This project consisted of building combine motorway and railway road Adler – ski resort "Alpika-service" which has been not only the main Olympic traffic line, but also increased a region infrastructure The traffic capability of railway is achieved a 6 train couples per hour and provided with advanced microprocessor systems EC-EM/ABTC-EN, produced by Radioavionica JSC.

New challenges of JSC «Russian Railways» in front of our company required the development of technical solutions on joints of the system EC-EM/ABTC-EM with neighbor infrastructure, communication, onboard and movement control systems.

We have achieved the definitive results in this direction. A lot of technical solutions got approval on Olimpic direction – it is the pilot operation of interval regulation devices based on EC-EM/ABTC-EM, "Dispatcher Control-South" and radio block center of Italian company Ansaldo CTC, the automatic block signaling without intermediate signals system ABTC-EM. (cab signaling).

For the Ukraine railway had been carried out the modernization of line Poltava-Krasnograd, which is the part of new railway line Kiev-Donetsk connecting two city-hosts of European football championship in 2012. Poltava-Krasnkgrad line was equipped by the systems EC-EM/ABTC-EM and implemented according to customer requirement in the shortest possible time. Our system ensures uninterrupted operation of the line in terms of increased traffic intensity. For 6 months our specialist designed, supplied the equipment, tested it and put it into operation the system EC-EM/ABTC-EM including the CPSP sets with power supply units of stations: Seleshina, Karlovka, Lannaya, block-posts 8km, 43 km, Orchik, Kumi and concentration post Seleshina-Raz'ezd 43km.

For cost minimization of the line Poltava-Krasnograd the following solutions for control were implemented:

- Control computer systems CCS RA were implemented on base stations Seleshina, Karkovka, Lannaya.
- Remote Object Controller Devices OCD RA were implemented on block-posts and concentration post on the line Seleshina-Raz'ezd 43km. The control of Remote OCD is realized from based stations.
- For Remote OCD connection with CSD of based station two separated fiber optic links (main and reserved) were layed from both sides of railway with possibility of switching on reserved line when the main is failed. On this line also organized a Control connection device CCD RA network that provides the access from base stations Sleshina, Karlovka and EDCU of the line Lannayato to diagnostic information of CCS RA condition, Remote OCD and CPSP of the whole line, and also access to information about train situation on the line. The connection with Dispatcher control system "Kaskad" is implemented without relay schemes with transfer responsible commands of remote control via digital interface.

During system EC-EM/ABTC-EM operation on the Poltava-Krasnograd line was not found any failures which delay the movement of the train. Therefore we could make the decision that our system is more reliable and fail-safe in comparison with foreign microprocessor interlocking systems analogs.

25 YEARS

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