

Andrushko V. Z. The method of predicting the intensity of border crossing points with the use of neuro-fuzzy modeli

Organization of operational activity of the State Border Service includes forecasting the development of the situation at the state border. The main disadvantage of using classical approaches is the one-dimensionality of the original data, which significantly reduces the accuracy of the forecast. These shortcomings can be addressed through the implementation of a multi-dimensional projection.

The structure of the methodology based on the model of fuzzy artificial neural network. This method comprises the following stages: analysis and transformation of input data; Building Learning test samples; selection of the structure of an artificial neural network, etc. The main attention is paid to the choice of input parameters, which can be obtained automatically from external departmental databases, which enables

Bilorus A. M Collection system (mining) efficiency assesment methods and state border protection department processing conditions as a construction part in the area of border guards.

The analysis of the function build system (mining) and processing conditions on the border department responsibility area and determine main indicators are characterize the efficiency of obtaining information about the environment. It is possible to determine the components of methodological approaches to assess the overall effectiveness of its operation.

The article reveals the essence approaches and the procedure for determining the information provided cleaning (extraction) efficiency assesment and processing conditions as one of the most important and describing extent in the system of main tasks. The most important are the following: the proportion of extracted and share sales information, hidden stability system, flexibility and efficiency. Share information allows us to estimate the system capacity to collect and obtain information on conditions established in the state border protection unit responsibility area for a specified period of time. The share sales information characterizes the system efficiency in advance to provide the chief border guard units necessary information with regard to time for its realization.

These conditions implementation Completeness during Border Service department operational activity will be characterized by secrecy of action for getting to a given data environment object and share information available sources which extracted and transferred to the chief border guard units and an unknown element, illegal activities in the border area of the unit against that, it was carried out, to collect information. But it is always in the operation secrecy context which must take into account its ability to operate in any environment and at any specific time, in other words - the stability of the system or its ability to resist all external and internal influences. The next performance given system efficiency evaluation

is capable to in no time at all to give the chief border guard units required information, that speed and opportunity to work with various types of information - flexibility. These figures are connected as to obtain the most complete information about the phenomenon to be used by all available sources of information regardless of their type. These indicators are interrelated and must be considered together. The method for cleaning and processing conditions effectiveness evaluating allows the Chief of Border Service Department objectively assess its possibility to obtain necessary data for the situation responsibility area and, if necessary, makes timely adjustments to its work.

Keywords: information, gathering system (mining) and processing conditions, the efficiency of the operation, results.

Kupriyenko D. A. Using SWOT-analysis for determination of the threats of illegal migration in Ukraine.

The article deals with illegal migration as a threat to national and border security of Ukraine. In the context of current scientific and social researches illegal migration covers up as a kind of organized criminal activity. The analysis of the system of measures to combat illegal migration and classification of its measures has been conducted.

An important component of national security and its specific form is border security, which characterizes the degree of protection of the territorial integrity and sovereignty of the state in all spheres of social life and human activity, human rights and freedoms in the border area, which is achieved by early detection, prevention, neutralization real (potential) internal and external threats (real dangers) and ensuring sustainable development of border areas, the transparency of the state border to carry out cross-border activities and traveling people.

The modern trends of illegal migration according to an official statistics were discovered in the article. It shows that the external migration pressure has tendency to reduction however internal migration causes difficult socio-political situation in the state. It is the results of changes in structure channels of illegal migration and people smuggling through the territory of Ukraine.

According to the SWOT-analyze we cover up the positive and negative influence upon internal and external environment functioning of channels of illegal migration in Ukraine. The article shows up correlations with elements of the SWOT-analyze and its influence to the adoption of measures to counteract illegal migration in Ukraine. It was proposed a number of required measures to effective settlement migrations situation in Ukraine.

The world migration processes will be influenced by an economic and socio-political situation and its migration policy.

Keywords: *illegal migration, channels of illegal migration, threat, factors of illegal migration, analyze.*

Levchenko O. V. Social internet networks as important factor in forming of information security Ukraine

The rapid development of computer and telecommunication technologies in modern society has opened up entirely new opportunities for dissemination of information and communication between citizens. Active use of the Internet has allowed technologically developed countries to create a global information space, which is formed, stored, distributed, transmitted, received, transformed and destroyed information.

The basic format of communication on the Internet the most active segments of the population are social networks. The most common networks, which communicates the majority of the population, including Ukrainian, are Facebook, Twitter, Live Journal, You Tube, "VKontakte" and "Odnoklassniki".

Social networks have become not only a means of communication, but also one of the most dangerous tools of information-psychological influence and manipulation of mass consciousness.

Thus, the powerful information and expansionist campaign that was started by Russia during the illegal annexation of the Crimea and aggression in southeastern Ukraine, reached their specific purposes through active use of social Internet networks.

Therefore, it is vital to research advanced technologies and mechanisms of using social Internet networks with display positions as sources of threats to national security.

Social networking resources available social trust is currently successfully used to promote their own interests to enter into public circulation and openly biased harmful to public awareness information and for the organization and management of social unrest in other countries.

Today many governments have realized that uncontrolled use of social networks is a direct threat to national security and stability of the state, so the authorities take concrete measures to ensure the security of your information space.

Keywords: global computer network, information security, social internet networks, information and psychological influence.

Mysyk A. B., Stsiborovskyi O. A., Nechaiev O. O. **Principles of usage of operational-combat command and control center with in the system of border security**

The article concerns the findings on the problem usage of operational-combat command and control center within the system of border security.

The necessity to form operational-combat command and control centers emerged after aggravation of the military and political situation at Ukraine's borders. The provisions of the law "On the State Border Guard Service of Ukraine" on state border security, repelling enemy aggression and combating criminal armed groups have been changed significantly. The functions and tasks of operational-combat command and control centers have been formulated.

We substantiated the staff and organizational structure of command and control center and its combat efficiency. Also we developed the recommendations regarding deployment of military components and use of force.

Besides the article considers the conditions of carrying out military tasks on state border security. The guidelines on construction of defense of operational-combat command and control center have been developed. The typical battle order and variant for its elements location are described. Also the possibilities of operational-combat command and control center and requirements for creation of fire system have been examined.

In the article the most typical variant of sequence of use of force and fire means while carrying out combat missions according to enemy's activities have been offered.

Keywords: *state border protection, combat activities of border units, operational-combat command and control center.*

Mykhailenko O. V. Recommendations on the implementation of criminal analysis of illegal activity on the plot liability of body state border

Authors' model and methodology in the analysis of the criminal divisions of the State Border Service of Ukraine on the basis of fuzzy logic require improvement of methodical recommendations on the implementation of criminal analysis.

The organizational, legal and technical components of the implementation of criminal analysis.

According to the legislation, the investigators, operatives forensic experts can use the information and analytical systems and obtain information from various sources.

Formation of automated information systems operational and investigative activities carried out in accordance with the following principles: functionality, regulatory support, factuality data, feasibility of implementation and operation, capacity and development.

To successfully meet the challenges of building intelligent decision support system on criminal analysis is necessary and sufficient: 1) build quality, adequate to reality, but not overloaded mathematical model describing the decision-making in operational and investigative activities; 2) choose the most suitable mathematical apparatus using artificial intelligence techniques, decision theory, etc; 3) to develop an automated information system that solves the basic problem of criminal analysis, integrated with intelligent decision support.

A special role is played by the construction workstation Investigator (operative worker), which can be defined as the totality of the information and software and hardware tools that support decision making in the investigation of crimes that automate the information provision procedure activity.

The most important element of criminal analysis is the presence of a complete turn around, accurate information about the offense.

The stages of decision support tasks concerning criminal analysis based on fuzzy logic. The main ones are: the definition of linguistic variables; determination of the parameters (values) indicators; construction of the rule base (knowledge base); setting up a model of fuzzy inference.

Application of the developed recommendations in contrast to existing permits, the use of quality indicators; Accounting inaccurate approximate information about the values of attributes; use of the knowledge of experts - experts who are represented in the form of fuzzy inference rules; obtain better estimates of the object in the course of criminal analysis.

Keywords: recommendations, fuzzy inference, crime analysis, crime on the border.

Palamarchuk U. S. Decisions in operatively - investigative process

Decisions in operative search activity is a conclusion in limits prescribed by law authority officer in accordance with powers to the materials of the operational documentation for other materials, based on the totality of evidence, which pulls the installed operational and investigative law implications.

Decisions in operatively – investigative process is important, because without its adoption any of the operational and search activities cannot be done and, therefore, the operational activity carried itself.

The aim of this article is to study the decision in operative search proceedings. Each operational case is started, is carried on or is terminated on the basis of the decision on it. In addition, a number of legal decisions entail restriction of constitutional rights, and some of them lead to consolidation of confidential relationship.

The article examines the nature and content of the decision in operational and investigative process, the main types and forms of investigative solutions, is given structure solution of the decision, classification and basic indicators, certain features of the decision, the main stages of its development and guidelines for the formulation of a decision.

The main types of decisions in operative investigative activities are distinguished depending on the subject, which take them, the form and the level of that take, the region of spread, the truth and consequences.

Depending on the subjects there are decisions taken by official people of the search operations or of other officials in operatively-search activity.

In form, there are two types of decisions: oral and documented.

The level of adoption distinguished: operational decisions employee and the decision of the head of operative- investigative body.

In the area of distribution: to classify decisions that apply for indefinite circle of persons (both natural and legal) and which are valid only for employees of search operations (units).

Depending on the validity of a decision can be right and wrong; last - a false and deliberately made (in this case the fact of his presence entails bringing to responsibility officer, received him, close to criminal, in excess or abuse of office, and another person, such as agent - by intentionally providing false information. Finally, depending on the effects of the decision, they can be distinguished as those that are legally relevant consequences and those that are not.

Due to the fact that in operative investigative activity the constitutional rights of citizens may be limited, the special importance for the study a

consideration of the documented decision (usually) that causes legally relevant consequences (that is a solution based on two criteria - the form and the consequences of its decision). As a rule the decision that causes significant legal implications and its normative justification has to be documented.

The documented decision of operational activities is specified by the investigative law and regulations search operations of the kind of document. Thus the time of entry into force of the decision depends on the subject, what it takes. In this aspect the simple and complex subject has been distinguished.

For example, the entry into force of the decision about the creation of operational - investigation of the case is quite the written approval of the head of the operational and detective agency.

Quite different is the case with the entry into force of the decision, which entails the restriction of constitutional rights and civil rights. In this case the operational-search activities' resolution (e.g., monitoring of telephone calls, etc.) of the head of operational and investigative authority is not enough. In addition it is necessary to obtain the permission of a judge, which also must be designed as a reasoned decision.

Keywords: operational - search activity, operational investigative process, decisions in operational investigative process, the types of forms, key indicators, the order in operational - search activity.

Saliy A.Y. Contradictions in the scientific-methodological approaches to estimation of efficiency of radio electronic suppression of troops management and weapon

The analysis of factors which stipulate contradictions in the scientifically-methodical approach to evaluation of efficiency of radio electronic suppression of enemy troops management and weapon in modern armed conflicts (combat actions) is studied. Percentage estimation of radio electronic objects, destroyed by fire, suppressed by radio electronic warfare and amount of objects which remained undamaged, taking into account its effect on the degree of disorganization in compliance with the existing methods, was defied.

The analysis confirmed that commanding posts and radio electronic objects plays a significant role in the increase of the degree of disorganization. Such approach is inappropriate in the estimation of efficiency of radio electronic suppression of troops management and weapons.

The issue under consideration allows to set general scientific tasks that include a search of the ways to increase the efficiency of radio electronic suppression of enemy troops management and weapons, a determination of indexes and criteria of disorganization of enemy troops the management (by forces), and development of recommendations to methods and forms of combat application of joint forces and means of radio electronic warfare along with the fire facilities.

Keywords: *radio electronic suppression, control system, efficiency, fire damage, management disorganization.*

Sychevskiy Yu., Maltsev A. An expert evaluation of the factors influencing

a process of making border control management decisions by the officers in abnormal situations

The root of the matter and significance of uncertainty factors which influence the process of making border control management decisions by officers in abnormal situations is considered in the article. This is very important for modelling of management decisions taking. Also expert evaluation procedure for determining priority ranking of the factors is described, and higher priority factors which influence border control management decisions making in abnormal situations are defined in the article.

One of the main issues while solving the problem of management decisions effectiveness is defining the factors influencing decision making.

Among the major factors which severely influencing quality of management decision making are the following ones: information factor, time factor, border check point type and its design features factor (highway BCP, railway BCP, sea BCP or air BCP), organizational factors, disamenities and interrelation of decisions.

An expert evaluation was performed in order to define factors priority, and as a result it was defined that management decision making is severely influenced by information factor and time factor.

The defined factors help the border control officers to define priority areas of their activity, concerning making of border control management decisions in abnormal situations, in order to improve management decision making effectiveness and reduce decision making time.

Keywords: *uncertainty factor, influence factor, border control management, management decision, abnormal situation, border control, border control officer.*

Ananin O. Ways upgrading is qualities of functioning of the information telecommunications systems of the special setting.

From the point of view of the theory of automatic control analyzed the ways of realization of the application of technical solutions for improving the quality of functioning of the information and telecommunication systems, special purpose through the use of special algorithms of automatic control.

Modern information and telecommunication systems special purpose are hightech data transmission systems with high-speed networks subscriber access, for which the most complete characteristic is the quality of operation. It is believed that this characteristic reveals the property timeliness of information exchange. A quantitative measure that characterizes the property of timeliness of information exchange is an indicator of the probability of timely delivery of messages that determines the probability that the total waiting time in the queue, service packs, and other delays due to various failures, equipment failures, etc., will not exceed the allowable delivery time. Therefore, in modern conditions of intensive development of information and telecommunication systems based on networks with packet transmission, the acute need for overcoming such negative phenomena as congestion trunk sections with a large number of subscribers. As evidenced by recent domestic and foreign research, the most effective way to combat congestion

and thereby improve the quality of information and telecommunication systems that use the network, packet data is the use of algorithms for active queue management packages Active Queue Management. The main objective of these algorithms is to prevent overloading networks with packet transmission of data by minimizing the average queue length while maintaining high utilization of the channel, and the uniform distribution of buffer space between the different data streams.

The experimental results demonstrated that the use of fuzzy controllers in the active queue management gives the best effect in the process of managing packet queues in the network, compared to automatic control systems, where the regulators on fixed parameters. Fuzzy controllers provide higher performance and installation queue packets as close to the desired. Therefore, it is fuzzy controllers are useful for preventing overload on the network with packet transmission.

In the future, applied technical solutions to improve the quality of functioning of the information-telecommunication systems using network packet transmission can find application in the design and construction of special telecommunication systems in the process of implementation of the concept of intellectual boundaries.

Further research in this direction should focus on the development of the appropriate mathematical apparatus and programmes calculations for systems research active queue management (AQM systems) packages, which would permit to carry out a comparative evaluation of different control algorithms for systems of active queue management (AQM systems) subject to the conditions of uncertainty. Such mathematical apparatus and program payments would provide a comprehensive approach to the issues of the research of algorithms of automatic control by simulating real situational conditions in networks with packet data transmission in telecommunication systems, special purpose, which is still not given enough attention.

Keywords: *information telecommunications systems of the special setting, fuzzy controller, PI, PID, RED- controllers.*

Blinnikov G.P., Dacuk L.S. The ways of improvement of the environmental situation in the energy sector of Ukraine

In a prospect reduction of booty of oil and decline is 2020 to expected to 4-6% part of fuel oil in fuel balance of the thermo-energetic systems (TES). An of task of diminishing to the cost of fuel on TES of at providing of observance of ecological requirements at the production of energy is one of near - term, the decision of which requires present time. By of the basic way of reduction of consumption of gaseous masout fuel for TES, there is making from mine coal fuel with properties, sufficient for his use in gaseous masout caldrons, not reconstructing them. For of coal energy fundamentally important transition from direct incineration of coal in fire - box devices to preparation from coal of different quality (including from wastes of of вуглезбагачення) of water - coal fuel(WCF). Fuel of of of WCF of both on the stage of production, storage and transporting and on the stages of the use is fully ecologically a clean fuel. It of is stopped up in

bases of his preparation. In of connection with the features of process of his burning, this fuel burns without extrass with foods of combustion of monooxide of carbon, secondary hydrocarbons, soot and carcinogenic substances; thus sharply education and extrass of micronic hard parts (to 80-90 %), oxides of sulphur (to 70-85 %) and oxides of nitrogen (to 80-90 %) grow short.

The of level of harmful extrass of oxides of nitrogen with foods of combustion of of WCF, as a rule, does not exceed 0,08 - 0,1 gs/of of MJ, that folds 50 -60 % from maximum to the level. In of the realized compositions of of WCF of from not sulphureous coal the level of extrass of oxides of sulphur with foods of combustion, as a rule, does not exceed 0,05 - 0,1 gs / of of MJ, that folds 20 - 40 % from the possible level of these extrass.

Keywords: water-coal fuel, coal, fuel oil, gas, harmful substance, ecological index.

Borovyk O.V., Traskovetska L.M. Grounding of algorithm, structure and functional features of the functional dependence playing schedule for discrete sample

One rather important applied problems related to decision-making at various stages of the life cycle of products of new technology, there is the problem of functional dependencies for experimentally obtained discrete sampling. Its complexity stems from the fact that the initial formation of the concept and idea products can be known only incomplete, heterogeneous input information, which can serve as empirical evidence, expert assessments, a priori information about counterparts and prototypes, some information about the purpose and qualitative product, standard limitations and data describing the conditions of production and exploitation. These data can determine the arguments of the desired functional dependencies. Thus, on the basis of this information it is important to set up the target function. However, under these conditions, the choice of the number of objective functions and their analytical forms, study their meaning and purpose is formalized procedure that can be done only researcher.

In this context, as part of the disclosure of urgency is a conceptual vagueness problem playing functional dependencies for experimentally obtained discrete sampling. The peculiarity of the problem is that the required functions should not only be as close to the empirical data by certain criteria, but have extreme properties. The specificity of the extreme properties caused by the limited interval setting initial data lies in the fact that the perturbation to within the range significantly affect the properties of extremal functions. This feature is the principal structure and leads to more complex function approximation problems than interpolation. Another important feature is the need to choose a rational compromise between conflicting requirements: maximizing the reliability of procedures to identify the desired patterns, which leads to the need to increase the complexity class function approximation and minimization of complexity and the complexity of the procedure of forming the required dependencies, leading to facilitation function approximation.

Review of applications, which are reduced to solving the functional dependencies play and identify patterns on empirical data and appropriate methods presented in several papers. However, despite the serious theoretical justification for these methods, solving problems is studied quite problematic due to computational difficulties. Attention is devoted to this aspect in this paper.

In the work the algorithm structure, functional properties of software application for playback of functional dependencies discrete sampling were grounded and analysis of the results of operation of the application in solving relevant problems. Under the grounding algorithm implemented meaningful description of the studied problem and its formalization.

Keywords: *Chebyshev approximation discrepancy, vallepussenivskyy alternation, approximation, iteration.*

Borovyk O.V., Shynkaruk O. M., Darmoroz M. M. **Algorithmic realization of the creation of expert systems for the study of the operation of means of border protection**

Currently in various fields of human activity to produce recommendations are substantiated when deciding widespread usage of expert systems acquire. This is explained as follows: compared with human expert systems have great potential in solving extremely cumbersome problems; Expert systems have no preconceived notions, while the expert can use the knowledge side and easily exposed to external factors; expert systems do not make hasty conclusions, ignoring certain stages of finding solutions; Expert systems provide interactive mode and work with character variables; Expert systems provide correct operation of information that contains errors, by the use of probabilistic methods of research; allow simultaneous processing of alternatives; On-demand course explains the steps of the program; provide an opportunity to study and play solution towards its adoption.

However, along with the benefits there are also some drawbacks that limit the ability of expert systems. In particular, most expert systems are not well suited for widespread use; "skills " of the system is not always "grow" after the examination session, even when manifested new knowledge; problem is to bring the knowledge acquired from experts to the form that would ensure their efficient use; Expert systems usually can not acquire qualitatively new knowledge not provided during the development, and especially do not have common sense.

These shortcomings necessitated the development of expert systems that would be effective for use in a broad sense, as well as the development of appropriate environments for their creation. Despite the wide range of the latest, as of today remains a problem processing an integrated environment for the development of models for evaluating the effectiveness of complex systems in general, and of the operation of means of border protection in particular.

The paper analyzes the possibility of software-algorithmic implementation of creating expert systems for the analysis of the operation of means of border protection. The study concerned the analysis of the problems concerning the creation of expert systems, determining the structure of the information system, the establishment of the structure of modules, implementation of software applications.

Keywords: *expert system, means of border protection, the system operating software and algorithmic implementation, the system modules.*

Volokh A.P. Definition of frequency of regulated maintenance engineering technology based on cost indicator storage including availability of spare parts

Analytical expression is obtained for a cost index – middle specific charges on the leadthrough of prophylactic measures during storage of engineering technique, which allows to determine the optimum value of periodicity of it the regulated technical service taking into account readiness of spare parts of belonging.

Today, in conditions of significant resource constraints on the maintenance of the Armed Forces of Ukraine maintain equipment in an efficient state has become an urgent and important task. It is possible to ensure by guaranteeing quality and maintenance of equipment, timely replacement and upgrade of its components with a limited lifetime, rational distribution of equipment between the current use and content on the storage.

According to [1] engineering technology (it) the majority is in the regime of long-term storage, which provides a number of technical measures to maintain it in efficient condition, namely: verification of the technical condition (control and inspections), license maintenance, regulated, tested, peritonsillar and refreshment. The leading place in the system is regulated, which is conducted periodically regardless of the technical condition of the sample. The main activities regulated i.e. equipment test and forced replacing parts with a limited period of overlap (typically, this rubber goods).

Currently, in the absence of delivery of new models of it them the lion's share is in custody for more than 20 years, resulting in their moral and physical aging, a schedule of events do not correspond to the level of their reliability and require revision.

The purpose of this article is to validate the analytical expression of the cost of conducting activities RTO engineering equipment long-term storage, including availability of spare parts.

Keywords: *regulated maintenance, average unit costs, the availability of spare parts.*

Hashchuk M. P., Herasymiuk O. V., Honchar O. V. The direction of the system of formation of optimal composition of vehicle fleets of the state border guard units

The purpose of this article is to present the results of personal research of the authors regarding informed choice of the method of multi-criteria optimization of the composition of the vehicle fleet the border service units based on the use of specific additional information about the consequences of making preliminary decisions about the fleet and expert evaluation of these consequences. The protection of the state border is an essential feature of each sovereign state, a major challenge is the simultaneous desire the following two requirements: on the one

hand, the use of the state border as a means of ensuring the constitutional rights and freedoms, an effective instrument of international cooperation, economic, cultural and social development of their own country; on the other hand, the state border should be an insuperable barrier to terrorist groups, criminals, extremist, xenophobic, smugglers and illegal migrants, reliable means of countering threats to national security and encroachments on state sovereignty. It is on these requirements directed regulatory legal acts of Ukraine: Law of Ukraine “On the State Border Service of Ukraine”, Decree of President of Ukraine “On the concept of development of the State Border Service of Ukraine for the period till 2015”, target State law enforcement program “Development and reconstruction of the state border for the period up to 2015”, etc. But the existing methodological apparatus making decisions regarding specific aspects of border agency of Ukraine does not allow to fully perform the task. Thus, the imperfection of the methodological apparatus of making management decisions regarding the composition of fleet units of the border guard is one of the reasons that the transport capacity of the parks is implemented less than 30% for reasons of downtime working machines; that with sufficient funding program updates, some units of the border guard is not fully equipped separate types of vehicles. Methodological reason for these negative facts is imperfect level of consistency of the formation of managerial decisions. A significant advantage of the proposed method of multi-criteria optimization of the composition of the fleet units of the state border guard is that it allows you to make a decision based on the application of formal information on the results of previous actions and informal expert information, which reflects the subjective attitude of the experts to the importance of the criteria for the specific conditions of operation of units of the state border guard.

The supplementary information when solving multiobjective optimization problem of the composition of the fleet units of the state border guard is an implementation of a systematic approach to the solution of a set of contradictions in the subject area that is treated. The results of the study are the following: taking into account features of the subject area we considered available additional subjective and objective information, and it is appropriate to use the method of goal programming as a general method of solving scientific and applied tasks.

Keywords: vehicles, the composition of the vehicle fleet, border guard service, additional information, decision making.

Holovnia S.B. «Technique of estimation of technical efficiency of transport means of border detachment»

The author has developed the technique which allows us to determine the level of technical efficiency of transport means of border detachment. The article concerns the approach of determination of the particular reliability level of transport means of border detachment in order to find out indices of reliability of transport means. Also the author supposes that determination of reasons of possible decrease of technical efficiency level and he explains how to make appropriate management decisions for improvement of technical.

Operation and service activity of border detachment units is characterized by dynamics and fast changes of surrounding. Timeliness of reaction upon situation changes within the area of border detachment is ensured owing to supply of border units with reliable and highly mobile means of transport. Capabilities of transport means to stay in the state of permanent availability is realized by functioning of the system of technical maintenance of transport means.

The efficiency of technical maintenance of transport means is determined by its capability to maintain and restore vehicles and to ensure specified level of mechanical availability of transport means in the case of optimal time spending, labour expenditures and costs. It is necessary to have appropriate technique in the order to determine and correct the level of efficiency of the system of technical maintenance of transport means of border detachment. This technique will allow us to maintain mechanical availability of transport means at the specified level and to optimize costs of technical maintenance.

The offered technique establishes the connection between values of technical availability and expenses on maintenance of specified level of availability. Such connection will allow to determine conformity and expediency of financing of technical maintenance of border detachment. Obtained results can be used during the procedures of estimation of mechanical availability of transport means of border detachment and efficiency of functioning of the system of technical maintenance of transport means of border detachment. As a result of the research we offered the technique estimating efficiency of the system of technical maintenance of transport means of border detachment. The given technique allows to determine timeliness of supply with spare parts, quality of repairing works by service technicians, expediency of number of technicians regarding transport means being maintained, level of reliability of transport means, etc. Complex consideration of indices of technical maintenance system is possible as a result of using enhanced coefficient of technical application.

Keywords: *technique of evaluation of technical efficiency, efficiency coefficient, refusal index, transport means.*

Hunko A. V. Problems of maintenance of automatic transmission of vehicles

The article concerns the problems of exploitation and maintenance of vehicles with automatic gearbox. One of the main problems of technical maintenance of automatic transmission is regular substitution of automatic transmission fluid. There is a great number of researches concerning various methods of substitution of automatic transmission fluid. But in most cases scientists describe only succession of activities for a particular type of automatic transmission and they are oriented towards certain device for fluid substitution.

Complete substitution of automatic transmission fluid in this transmission aggregate requires expensive equipment and involvement of specialized service stations with highly-qualified personnel. Taking into consideration these studies we offer general technique of maintenance of most types of existing automatic transmissions using universal device. Offered device and methods allow us to

conduct this operation at any transport enterprise qualitatively. And it decreases the cost of technical maintenance while using vehicles with automatic transmission.

During planned maintenance we substitute used fluid with new one and do not mix. In turn it allows us to use fluids of different brands with different properties. Due to automatic support of line pressure corresponding with pressure of particular automatic transmission all elements do not fail.

Average cost of industrial devices for complete substitution of automatic transmission fluid suggested by current manufacturers is about 3000 \$. The author says that device price is rather low (about 400 UAH) and it is a reason that the device is so popular at service stations, technical maintenance units of the Armed Forces of Ukraine and border detachment units. One more reason – it does not require long training of personnel. Thus, we can say that all these facts will increase the level of technical efficiency of vehicles.

In future we can talk about complete or partial substitution of automatization of oil replacement in automatic gearbox using the offered device.

Keywords: automatic transmission, automatic transmission fluid, service station.

Ivanov A. V. An increase of cross-correlation properties of impulsive radiolocation signals taking into consideration amplitude-frequency fluctuations in complex by-pass

In the article the questions of increase of cross-correlation properties of radiolocation signals are investigated taking into consideration casual amplitude and angular modulating constituents.

Realization of impulsive methods of radio-location, envisages considerable limit nature in the indexes of quality and efficiency of functioning of the radiolocation systems. As the use of non-coherent methods of reception and treatment of radiolocation signals is envisaged, the informative indexes of the radiolocation system are determined exceptionally by energy and duration of sounding radio signals. However, by principal reason of subzero efficiency of impulsive methods of radio-location, there are applications of simple (without internal modulation) radiolocation signals, in that expansion of frequency spectrum results in considerably anymore power losses, than at application of difficult radiolocation signals, from impossibility of realization of the concerted algorithms of treatment and accordingly providing of effective "collection" of the up-diffused energy.

Many scientific studies are undertaken, in this direction, which showed that expansion of spectrum of impulsive radiolocation signals, by reduction of their duration, through disproportionate power losses, is inadvisable. Taking into account, that the impulsive radiolocation systems are hardly synchronized with the delimited times of radiation and reception of sounding signals, there is potential possibility of operative concordance of transceiver in every time. Thus, expansion of stripe of frequencies of sounding radiolocation signal can be realized by the corresponding concerted algorithm regardless of reason of appearance and his nature (artificial or fluctuation). In this case, cross-correlation properties of signal

even fully nondeterministic will determine efficiency of the radiolocation system, as a system will be realized on a coherent chart with corresponding possibilities.

For the estimation of the potential winning from realization of this approach, it is necessary to estimate how cross-correlation properties of radiolocation signal change, at taking into account of possible types and possible great number of parameters of nondeterministic changes of form complex by-pass of radiolocation signal.

We got analytical expressions of functions of vagueness of models of radiolocation signals, taking into account the determined modulation constituents of casual form in complex by-pass.

Research of these analytical expressions showed that at taking into account of fluctuation constituents during realization of the concerted treatment of signals gave an opportunity to get the considerable power winning and promote potential possibilities, in relation to distinction of signals of echo from group aims.

Keywords: *radiolocation systems, impulsive radio-location, coherent, concerted filtration, amplitude modulation, angular modulation, cross-correlation treatment.*

Kolos O.L. Determination of average unit costs on maintenance and repair the samples of engineering armament machines in models of intensive operation, considering the time-based redundancy

The reasoning of study method of calculating the average unit costs value that occur per unit of residence time of engineering armament machines in working condition when organizing their service after non-periodic maintenance strategy for technical condition, is proved in the article.

The research of dependence the condition monitoring values for different values of other parameters of equipment maintenance system is substantiated. An important feature of this research is the consideration of availability while operating engineering armament machines the organizational type of time-based redundancy, that is reserve in functionality restorind and during their maintenance, which can be used only in specifically listed daily intervals. Thus for the determination of average unit costs the semi-Markov random processes mathematical tools was applied. Total average costs are defined as the ratio of the average cost per stay of engineering armament machines in the subset conditions that include restore functionality, maintenance and control of technical condition to the stationary probability of being process in working condition.

The analytic correlations for calculating of average unit costs on servicing of engineering armament machines in the organization of maintenance system for ongoing maintenance strategy of technical condition using available time-based organizational reserve by means of semi-Markov processes theory were received in the article. Theoretical research of the analytical dependences by assessing the effect of the time reserve and options of maintenance strategies and repair on required amount of average unit costs.

It's been determined that due to the frequency control increase of a technical state of technology the value of the average unit costs of maintenance conduction

of the machines of engineering armament for all kinds of maintenance is increasing. Herewith unit costs of maintenance conduction of the machines of engineering armament, taking into account that real opportunities to use organizational machinery downtime in all cases are higher than those resulting in a classic calculation version considering the idealized (immediate) opportunities to use time reserve and value spendings in order to maintain the machines of engineering armament in working condition, are increasing considering the complication of specific operating conditions due to growing intensity of engineering technology failure.

It's been determined that the value of the average unit costs can be intentionally reduced by changing the basic settings of the maintenance system. The reliability of the results, obtained using, the proposed in the article, analytical estimated dependencies for the average unit costs of all kinds maintenance conduction, is also verified by the calculation proving a well-known fact of the maintenance conduction costs increase given the growing intensity of technology failure.

Keywords: *maintenance, technical use factor, the average unit cost, time-based reserving, semi-Markov processes, engineering armament machinery.*

Perig V.M. Some questions security electromagnetic leaks of elements telecommunication systems

In order to improve the efficiency of solving a wide range of problems of state border protection information-telecommunication systems are widely used. Their basis is a telecommunication systems. The use in the operational activities of the State Border Guard Service of Ukraine of modern information and communication technologies puts the task the protection of information in information and telecommunication systems. One of the main tasks you want to solve is a technical protection of information because of adverse electromagnetic radiation. The use in modern software and hardware complex modern network technologies, including Fast Ethernet, makes an important assessment of adverse electromagnetic radiation on the basis of certain parameters in the regulations. The need for such research networks, which are used in software and hardware complexes of State Border Guard Service of Ukraine increases the importance of this work.

The analysis of the structure of software and hardware complex of the State Border Guard Service of Ukraine was made. The most common network technology used in the construction of telecommunications component of software and hardware complex at the physical and data link layer is Fast Ethernet 100Base-TX. Signals in the cable networks are symmetric trapezoidal pulses. Pulse parameters are described in MLT-3 encoding.

This article describes the emission spectrum in using network technology. The spectrum of the signal strength was determined in using the autocorrelation function. Discrete harmonic having a non-zero amplitude in the frequency band are tightly connected. The form of signals in cable depends of the resulting emission spectrum.

It was determined that 99 percent of the energy in the signal cables are concentrated to 109 MHz. For a radiated signal 99 percent of the energy is concentrated in the 721 MHz. The use of the unshielded cable leads to the rise of the level of an electromagnetic radiation.

In order to reduce a harmful radiation signals they propose to use STP instead of UTP unshielded cable shielded cable.

Keywords: electromagnetic protection, leak, telecommunication system.

Sivak V.A. The Justification of the concept of protection from dangerous fault as operational characteristics of vehicles OODC

In the article “The Justification of the concept of protection from dangerous fault as operational characteristics of vehicles OODC” the problems of preventing failures and malfunctions of vehicles that lead to the occurrence of accidents and traffic accidents by staff of the state tax service of Ukraine have been identified.

The article reveals the concept of “dangerous faults” as those faults that affect the safe operation of vehicles and is a prerequisite for the occurrence of threat of injury or loss of life of the personnel of SBGS as a result of road traffic accidents.

The classification of hazardous faults with four main characteristics and details have been highlighted.

In addition, the concept of “protection from dangerous fault” as one of the operational characteristics of the vehicle has been described, explained and justified by the author. It has been proved that modern vehicles may not be fully protected from dangerous malfunction during the whole period of their operation.

These covered issues have been highlighted taking into account the terms and specifics of the technical operation of vehicles while performing operational tasks as for the protection of the state border.

In the conclusions and directions of further research of the topic, the ways to improve the protection of vehicles from hazardous malfunctions have been determined. The list of organizational and technical measures to reduce exposure to hazardous malfunctions and safe operation of vehicles used to provide operational tasks as for the protection of the state border have been recommended.

Keywords: dangerous malfunction, vehicle.

Slavin V., Gunko A., Holovnia S. Influence of ignition timing on the performance of the engine is equipped with modern system of fuel injection

One of the operational factors that affect the working process of combustion in spark-ignition engines is the ignition angle θ (deg). The optimum ignition timing is determined for each type of engine on the brake test stand, and it is known that the deviation angle from the optimum ignition timing leads to a shift of the indicator diagram relative to the upper dead point and increasing the heat losses. In laboratory tests the engines of the National Transport University carries out activities designed to reduce environmental pollution by toxic substances of exhaust gases and fuel consumption of petroleum origin wheeled vehicles. Between them, promising is the use of modern electronic system of fuel injection

and exhaust after treatment on cars in service with petrol engines. For comparative studies using common carburetor engine 4F7,6/6,6, which is equipped with modern electronic system of fuel injection distributed feedback type "LH-Motronic". Process the results of research in high-speed and load conditions of the engine 4F7,6/6,6 with different power systems from the values of angles ignition timing of the engine with carburetor system determines the value of new angles ignition engine equipped in conditions of modern electronic fuel injection. Conducting research performance engine 4F7,6/6,6 with different power systems and new angles ignition speed and load conditions.

Experimental research engine with various system of feed have shown that changing the base ignition timing angles in the program control engine fuel injection system contributed to decrease in of fuel consumption on characteristics of idling by 11%, the specific fuel consumption average and loading ($n=2000 \text{ min}^{-1}$) characterization of the injection system decreased by 5%. Engine power of the fuel injection system at full load increased by 6,6%.

Keywords: indicators of work the engine, angles of ignition timing, system of injection of petrol, carburetor system.

Tyagay S.V. Features perform basic tasks engineering in the antiterrorist operation.

Ukraine involved in artificially created armed conflict in its Eastern territory. Analysis of modern local wars and armed conflicts suggests that sabotage forces and illegal armed groups become mandatory and active participants. Purposeful activity and high efficiency of the actions of subversive groups causes the loss of the troops of the anti-terrorist operations, incapacitate important state and military facilities that significantly impact not only on the military but also the political and economic situation in Ukraine.

In modern conditions to ensure the persistence of important objects in the presence of an immediate threat from sabotage forces, illegal armed groups and terrorist groups is impossible without comprehensive security, moreover, without such important species as engineering.

Based on the above article covers recommendations for the implementation of the main tasks of engineering, such as: engineering exploration; fortification equipment positions and areas of troops, equipment of water points; engineering measures disguise; features and technical support during the conduct of anti-terrorist operations by the troops in the Eastern regions of Ukraine.

Keywords: software engineering, an anti-terrorist operation, the illegal armed groups.

Yurchenko K. M. Structural-logical scheme of building the effective computer systems for the professional training of employees of the civil protection service

The article discusses the elements of technology optimization of the logical circuit of training and assessment of the workers of Civil Protection Service. There were defined the aspects of information support of the process of their professional

training, set the drawbacks of automated systems for learning and knowledge control, indicated the necessity for multi-criteria assessment of knowledge and skills of specialists.

The definition of the effective computer system of professional training system, in which the training and control of knowledge occur during the minimum possible time, and their completeness is ensured, lack of information redundancy and information failure, as well as the maximum possible objectification of the results is given. The principles that determine the manufacturability of the design of such systems are formed. The graphical representation of the logic circuit of the control of knowledge as a hierarchical system, taking into account semantic relations between problems and units of educational material is proposed.

Depending on the method of studying of disciplines there was developed the adaptive control method of knowledge, which is based on the descending and ascending schemes of set questions. This method allows to minimize the time of control of knowledge and to structure the evaluation process.

Keywords: *logic scheme of the control of knowledge, automated systems of learning and knowledge control, adaptability, computer systems training.*

Yasko V.A. *Increasing the effectiveness of fortification equipment and obscurity of the positions and the basic areas of the units involved in the terrorist operation.*

The article considers the problem the question on increase of efficiency of fortification equipment and obscurity of the positions and the basic areas of the units involved in the terrorist operation. On this basis there are recommendations on equipping units to enhance the implementation of engineering protection measures. The proposed sequence for the equipment position in the branch, the use of Protistology coatings and visors, universal set of fortification of funds during the equipment of the positions. Also proposed the use of camouflage coating in combination with mesh or subtle barrier to improving the security of facilities, equipment, additional Y-like positions with the aim of increasing duty on positions of protection of objects, use of sources of illumination night sights for small arms of the enemy and tools disguise.

Keywords: *fortification equipment, the block-post, the base area, position, single trench.*

Jasko, VA, kirilchuk Ū.F. *Recommendations to enhance the implementation of the tasks of engineer support of combat actions of the troops.*

The aggravation of the political situation in Ukraine, the need to destroy created subversive groups and illegal armed groups in the South-Eastern territory of the country and the existence of a direct invasion of the Russian Federation, leads to the necessity of conducting large-scale warfare during the antiterrorist operation.

In these conditions, increasing problems of engineering and uskladnenia conditions of their execution. As a result, there are contradictions between their volume and capacity units to perform them.

The article provides recommendations for the implementation of the tasks of engineer support of combat operations of the troops, which will apodado the opportunity to reduce the degree of inconsistency between these tasks and the capabilities of the units and their autonomy to perform engineering tasks.

Keywords: *engineering, combat operations, survivability, mobility, Controlli.*

Yasko V.A., Neroba M.M. Types of alarms and recovery methods parts of assemblies military equipment

At the present stage of development of the Armed Forces of Ukraine staffing of troops, military equipment and its technical condition requires further development and maintenance of high technical level for effective combat branches of the armed forces.

Operation of military equipment will be organized correctly only when military experts have knowledge not only on its use for military purpose, but also know and understand the causes of machinery breakdown, and can arrange for maintenance and repair. All this will contribute to maintaining high combat readiness and life extension of military equipment.

The article discusses the types of alarms parts of assemblies of military equipment, a complex of measures on reduction of wear, and provides some recommendations on methods and ways to restore parts of assemblies of military equipment.

Keywords: details of sites, military equipment, operation, restoration.