

Varga J., Kupriyenko D., Mironau D. Conceptual Design of Personnel Training System in the Sphere of Border Management

Expansion of the integrated border management practices are also stipulated by higher demands to the employees of the subjects of border security system. The human factor is the most influential one regarding its impact upon the possibility to realize the IBM potential. Therefore the subjects of IBM are obliged to pay considerable attention to recruitment, training and motivation of personnel. However, the results of the conducted analysis revealed high probability of inharmonicity in the personnel training (learning) system in the sphere for IBM. In its turn, this creates high risks of insufficient implementation of national and international border interests.

The purpose of the article is conceptual design of personnel training system in the sphere of border management the results of which permit to find the answer to the question: How can we achieve well-timed, common design and sufficient formation of personnel competence in the sphere of IBM?

The article proposes the solving of the problem by means of conceptual design of personnel training system in the sphere of IBM. To achieve this on the basis of competency building and system approaches we enunciated the desired image of the training system (in terms of goals set and four requirements) and presented the methodology of its achievement. In its turn, the methodology consists of organizational stage, as well as the formative stages of its content, provision, implementation and sustention. As part of the methodology we worked out the organizational model of personnel training system in the sphere of IBM, the structure of national differentiated academic programme on IBM mastering, the model of the generalized matrix of the personnel competences in the sphere of IBM.

The practical implementation of the offered approach will allow to achieve adequacy (in time, concept and content) of the whole personnel training in the sphere of IBM, and, subsequently – significant increase of the border security system effectiveness.

IBM National Coordination Centre can be considered as the most appropriate body of activity organization concerning formation and sustention of the national differentiated academic programme on IBM.

The stage of the training system working design can present the lines of further researches in this direction covering: a) systematizing of specific tasks solved in the sphere of IBM, and necessary personnel competences for their implementation; b) systematizing of personnel categories involved into the sphere of IBM, specifying educational/training institutions/centres which would provide the training, retraining and follow-on training; substantiating of the mechanism of their interaction with personnel employers; c) working out of IBM national

differentiated academic programme web-resource, defining the order of its maintenance and access to it.

Keywords: *integrated border management, personnel training, conceptual design, competency building and system approaches, national differentiated academic programme.*

Vinohrad O.V., Dvornichena I.M. Perspectives of using of canine teams of the State Fiscal Service of Ukraine in fighting against illicit wildlife trafficking

The Main provisions of the CITES Convention, key flows of wildlife trafficking products and their derivatives are described in the article. The Global experience of detection of wildlife trafficking products and their derivatives, which are inscribed under CITES, with the help of sniffer dogs is analysed.

The core ways of illegal trafficking of CITES objects are considered and problematic issues related to trafficking derivatives of endangered wild animals and plants are noted. A brief excursus into the history of using of sniffer dogs for the search for and identify CITES specimens was made. The advanced experience and existing programs in the area of sniffer dogs training for identifying CITES objects are analysed and its similarity to the programmes and methods through which sniffer dogs are trained in other areas, including training for the search for narcotic drugs, psychotropic substances, weapons, ammunition, tobacco products, currency, etc.

The perspectives of using of canine teams in the system of the State Fiscal Service of Ukraine in fighting against illicit wildlife trafficking are investigated. The main features and conditions of canine teams training for the search for CITES objects are defined.

Based on the research carried out it was determined that for further practical implementstion of CITES Convention in Ukraine it is essential to harmonize national legislation in accordance with the requirements of the CITES Convention; to enhance control over fulfillment of the CITES requirements; to establish coordinated and systematic cooperation between supervisory authorities on implementation of the CITES Convention in Ukraine; to increase the overall level of professional knowledge of officials of the State Fiscal Service of Ukraine and other executive authorities through various scientific events, including those with engagement of representatives of the CITES Secretariat; to provide officials of the State Fiscal Service of Ukraine with consulting through the creation of specialized colored manuals and guides regarding domestic specificities, which will contain the description given to CITES specimens, their names in Latin and Ukrainian and basic ways of illegal movement across the customs border; to raise awareness among media, authorities and public about the issues of illegal trade in specimens CITES in Ukraine; to cooperate and exchange of information on the fight against illicit trafficking of CITES specimens between neighbouring customs administrations; to increase the potential for canine services of customs offices of the State Fiscal Service of Ukraine.

Keywords: CITES Convention, CITES specimens, sniffer dogs.

Kurashkevich A. P. **Justification criterion of efficiency of the special measures to find the offenders (sabotage and reconnaissance groups of the enemy) in the area of responsibility of border units**

The situation in the zone of the antiterrorist operation in the east of Ukraine shows a significant intensity of use of the enemy in the areas of responsibility of border departments sabotage and reconnaissance groups, which are sent by special operations forces and illegal armed groups. In addition, the increase in the number of offenses relating to the law of Ukraine on border issues.

Despite this, the State Border Guard Service of Ukraine started to carry out military tasks that were inherent in it after the reform with the Border Troops of Ukraine.

Said necessitates a critical rethinking of the existing provisions of the legal framework and scientific-methodological developments based on the analysis of contemporary domestic and international experience of armed confrontation, cease internal conflicts in order to determine the role and place of border units in these processes.

There is a need in the processing of a number of theoretical propositions on military and operational art, the development of the border agency, the determination of optimal forms and methods of implementation of tasks in modern conditions, training of border units operational, operational and technical, operational and combat fighting.

In the article the criterion for the effective implementation of special measures to find the offenders in the area of responsibility of border units.

The effectiveness of border management units is inextricably linked with the degree of realization of their potential when performing tasks in the actual conditions of the situation. Each unit, which performs tasks in the area of responsibility, has some potential operational service (service and combat) capabilities with respect to the predicted activity offenses (to counter the enemy force). This potential can be realized in full, in part or at all unrealized. The direct impact on the course and result of operative-service (service and combat) action is only the part of the potential to be realized, that is skillfully used in the specific conditions of the situation for the task. So, as a result of these problems, other things being equal, the decisive role played by the ability of management to effectively exploit the potential divisions.

Thus, the effective management units has a dependency on complex solution of all problems of management and efficiency indicators values, resistance, secrecy, at a minimum cost of heterogeneous resources.

On the basis of the main tasks of border units, the choice of a rational variant of the use of existing forces in the implementation of the special measures related to the definition of a number of factors that characterize: the purpose of implementation of the place, the offender (the opponent), the start time, the group conditions of use groups (groups) counter, and also assess the effectiveness of the system of special events.

In turn, the purpose of objectifying account of these factors in management decisions need to have the appropriate formal apparatus, which version of the

materials presented in this article.

Keywords: special events, border units, operational service (service and combat) actions, performance criteria.

Nazarenko V. O. The technique of military team shakeup of units of the State Border Guard Service of Ukraine in special conditions

Based on the experience of training of border guard units for participation in armed conflict in the east of Ukraine the article analyzes the improvement of courseware for formation of military shakeup of new border units in order to carry out service duties successfully. The author offered the technique that allows to ensure achievement, support and improvement of proper level of military professional training of border units personnel, their physical endurance, crew shakeup, coordination of units and headquarters in order to carry out operational and military tasks.

It has been found that the main principle of military team shakeup is the following rule – “from simple to complicated”. It should be realized on the basis of three directions: structural, organizational and methodical. Structural direction concerns design of military crew shakeup from a soldier, or, in other words, the first stage is individual training. Afterwards shakeup of crews and units is formed gradually. Then it is necessary to coordinate the service with command and control center. Organizational direction concerns accurate division of functions of chiefs and border guard organs of different levels that organize and manage military coordination. Methodical direction means gradual formation of trainees’ knowledge and skills.

The experience of training of border guard units shows that the forms of military teams shakeup are the following: tactical combatant lessons, tactical lessons and tactical training.

Tactical combatant lesson is one of the forms of training of soldiers and units. They are designated to learn techniques of operational and military actions of border protection and defense, initial shakeup of crews, teams and units in order to get ready to tactical lessons and training. Besides, they should be used to train crews, teams, units, border posts, command and control center during contemporary combat.

Tactical lesson as the main form of training, is between tactical and combatant lessons and tactical training. Its designation is to coordinate border posts and units, improvement of chiefs’ skills of organization of operational and military action and management of units, preparing to tactical training. The topics of tactical lessons are determined on the basis of programs, plant and schedule of lessons with instructions of senior chief.

Tactical training is the main form of field training of border guard units and their preparation to carry out operational and military tasks of border protection.

Keywords: *military team shakeup, tactical and combatant lessons, tactical lessons, tactical training*

Trotsky R.S., Reshetnik S.N. Peculiarities of performing official-combat mission of Ukrainian National Guard militaries in the antiterrorist operation

The article examines the results of the internal contradictions, facts of separatism and terrorism in the state. The Armed Forces units, police and the National Guard of Ukraine (hereinafter NSU) play an important role in combating external threats.

The Ukrainian National Guard militaries involve in antiterrorist operation in the Eastern Ukraine. They acquired considerable combat experience and demonstrate effective results in clashes with Russian militants.

The aim of the article is determining the characteristics of tactics of NSU militaries during their service at checkpoints in antiterrorist operation.

There are some experts' points of view in the article. In spite that Russia refused the allegations in presenting its troops on Ukrainian territory, some experts convinced that it is wrong. De-facto, Russians have a lot of weapons, necessary military experience and combat together with separatists against Ukrainians.

The article discusses recent researches of such scientists as: P. Aleksieiev, D. Boldin, T. Vasiliev, V. Verbytskyi, I. Herasymov, F. Demidchyk, V. Kuvaldin, V. Makarov, P. Mironenko and Yu. Pereverzin etc.

The author strengths that the service on combat checkpoints is permanent. The military observation posts have to change according to the schedule. There is some tactics of taking necessary measures to repel the attack.

The author identifies the reasons of losses among NGU militaries, main of them are lack of proper artificial barriers near positions and fortifications in the reference point, the fire system unpreparedness, lack of secure channels and reserve funds communication, negotiations on a cell phone, low combat readiness of militaries on checkpoint, absence of interaction with artillery and aviation. As a result, rebels could destroy important checkpoints, military equipment (armored vehicles, ammunition depots and radio stations) and individual firing points.

In conclusion, the main task of Ukrainian troops is to block and isolate areas of illegal armed groups and terrorists in the antiterrorist operation. It is necessary to ensure full or partial blocking entry (exit) in certain areas, preventing the import (export) them weapons, ammunition and other restrictive means which could be used for illegal activities, demonstration of military presence, surveillance and gathering information from the local population.

Keywords: Tactics, military, checkpoints, engineering barriers, fortifications, operational environment, the organization of service, security zone, allegations, isolate, military units, National Guard of Ukraine, antiterrorist operation, troops, weapon, combat.

Khimich V. V. Improvement of organizational management of State border service of Ukraine for the provision of state border

According to the Law of Ukraine "On the State Border Service of Ukraine" the State Border Guard Service of Ukraine is a special law enforcement body that has a system of management structures of the state border, their units and marine

protection.

Activities of the border agency management structures (regional departments, departments of border units and departments of the State Border Guard Service) provide certain functions, including organizational ones. The dynamic operational environment in areas of responsibility form the main goal of management structures - maintaining high availability subordinate units to perform scheduled and suddenly emerging challenges and ensure their full operational performance.

The organizational activities of all administrative units of the State Border Guard Service management can be divided into two components:

- work command (Commanders) concerning operational performance;
- work command (commanders, chiefs) to guide the the State Border Guard Service of Ukraine.

Organizational work of Command (commanders, chiefs) to guide the Border Guard Service can be presented in a logical sequence of events:

- planning of the management structure of domestic work in the administration;
- the organization of the planned activities, work plans bring to the attention of subordinate bodies and performers;
- monitoring and assisting administrative structures and subordinate units in border areas;
- assessment of the situation, debriefing, preparation of reports.

Today, more attention needs an element of management, leadership as service activity unit. The main goal of the governing bodies of subordinate units is practical assistance, which is not only point to the weaknesses and work of officers and higher authorities to improve the situation on the spot, if possible, eliminate shortcomings with the command unit, a complex of measures improving operational performance, increasing the professional level of personnel.

Management experience shows that the state of operational performance only is at the appropriate level in the divisions where the groups arrived for work are oriented towards improvment of border protection, manual operational activity, carrying out of educational activities with staff and others. So, the basic principle of each officer during departure should be the final result - increasing operational performance.

Thus, we can conclude that one of the main areas of organizational management structures of the State Border Guard Service of Ukraine to ensure reliable protection of state borders is the creation and functioning of the trips management structures (regional management, frontier) in subordinated governments and departments to provide practical help on the ground.

Keywords: organizational activities, regional management, governance, controls, operational activity, commander, chief.

Androshchuk O., Melenchuk V. **The model of risk assessment of projects and programs of implementation of logistics systems of automatic technical maintenance of military units and law enforcement agencies**

This article reveals the matter of implementation of the logistics management of material resources and relevant information flows in automatic technical maintenance of troops with the development and support of certain projects and programs; new principles for driving automobile transportation and task solving for improving the efficiency of capital investment and decreasing the costs for rational organization of automatic technical maintenance. There is an analysis of the properties of the logistics system and the situation on the market of transport services, and the forefront aspects are revealed to be related with the increase of the transport costs efficiency that continuously grow alongside the increase of vehicle fleet in military units. The research puts the goal of risk analysis, providing the leadership of military units and law enforcement agencies by information which is necessary for making a decision about the feasibility of the logistics project application, and also for developing the measures that will help to prevent possible losses. For risk assessment of the project, a mathematical model is proposed for implementation of logistics systems of automatic technical maintenance, which is the evaluation of nonlinear object with the set and one output variable. The authors propose to apply the fuzzy logic output for risk evaluation of logistics systems projects, which can be implemented in automatic technical maintenance, according to the setting of the mathematical problem. The identified methodological approaches of risks assessment of projects and programs in logistic support of transportation units of the military units and law enforcement agencies might be used when developing the method for evaluating the risks of projects and programs of logistic support.

Keywords: automatic technical maintenance, logistics system, project, military units, law enforcement agencies, risk, model.

Babii Yu. O., Fonar L. S., Kudetskyi O. V. **Synthesis of digital filters in dynamic state**

The article is devoted to the study of improvement of methods and techniques of synthesis of digital filters in dynamic state that means that their parameters are constantly changing. Also the article summarizes the methods of frequency and time analysis of digital filters and determines the appropriateness of usage of the method of dynamic transfer coefficient.

We have admitted that the traditional methods of analysis of signal passage through linear circles and response determination are based on the usage of time or frequency characteristics of signals and circles. The time methods include the method of interdifferential equations and Duamel integral. The frequency methods embrace the spectral and operator methods. As a result of calculations with the use of these methods we can find out immediate values of response.

To develop methods and techniques of analysis of nonstationary processes is very important task for modern radio systems and devices operating in real scales of time with parameters with constantly changing input signals. At the

contemporary level of development of equipment we have to meet enhanced requirements of speed of operation and efficiency of conducted measurements when parameters of circles and signals are changing. Nonstationarity is found at all changes of parameters of circles and signals. Dynamic regimes limit speed of systems operation and can become a reason as far as they are received (in real time).

The analysis we have conducted testifies to the fact that despite of the importance of vivid directions of analysis of nonstationary signals and corrections of dynamic damages, the methods of analysis of dynamic regimes of analog and digital filters have not been developed appropriately and we have not offered the techniques of physical realization of such methods.

Moreover the article analyses the method of dynamic transfer coefficient which generalizes space and time method. It gives the possibility to determine characteristics of circles in frequency and time spheres which determine characteristics of circles in stationary and dynamic regimes. The greatest attention has been drawn towards dynamic transfer coefficient as time function as in this case it gives direct complex rounding amplitude at the output of circle. Dynamic transfer coefficient differs from static one in the fact that it considers not only values of immediate frequency but values of indirect frequencies and amplitudes in time.

We have come to the conclusion that the analysis of operation of digital filters in dynamic state requires the further development of methods of correction of dynamic damages and determination of frequency and time characteristics of digital filters.

Keywords: dynamic state of filters, digital filters, frequency and time characteristics, transient process, methods and techniques of design of digital filters.

Babenko B.I., Myronov O.V., Korniiichuk O.O. **Evolution of Video Surveillance Systems and Video Monitoring in the Context of the State Customs Affairs**

The article investigates the evolution of video control and video surveillance systems. The authors identify three historical stages of development of such systems: first stage - 1942 -1994 based on analog TV; second stage - 1995 - 1997 based on digital recorders; third stage - from 1997 till today based on video surveillance network technologies. On the basis of the analysis of scientific literature of characteristics and capabilities of structural components of modern video surveillance systems the authors proposed a logical variant of structural scheme of video control system, which can be used as a basis for establishing a video surveillance system in the automobile checkpoints.

Keywords: video surveillance, video control, television camera, video monitor, recording devices.

Vodianyh A., Budareckii Y., Diakov A., Budareckii S. Experimental study of immunity integration of GPS-INS navigation system

Problem statement.

Modern navigation and topogeodesic bindings must provide accurate determination of the coordinates of the start and fire positions and the location of objects of armored vehicles in a natural and organized by means of electronic countermeasures enemy jamming.

Therefore, the development, production and experimental studies on high-precision weapons and antijamming navigation and topographic and geodetic binding sites of missile troops and artillery as well as armored vehicles are vital scientific and technical problem.

The aim of the article is the conduct at experimental studies of noise immunity developed algorithms aggregation of satellite navigation systems and inertial navigation systems.

Statement of the basic material of research.

To study the operation of the developed algorithms has been proposed experimental setup based simulator navigation signals CH-3803 production of the State Enterprise "Orizon-Navigation".

In solving problems of live simulation plays important role the problem of obtaining reliable information about the values of the phase coordinates the movement of the object (and other associated parameters) in real driving dynamics of terrestrial moving objects. The main source of such information is material specific trajectory measurements, in which the components of the state vector are recorded by on-board means of objective control or specialized flight recorders using standard sensors. Analysis of the dynamics of of cross-country movement showed that studied trajectory belongs to a class of limited maneuverability and can be characterized by the following parameters:

- Maximum acceleration - $25 \text{ m} / \text{s}^2$;
- The maximum jerk (rate of acceleration change) - $7.5 \text{ m} / \text{s}^3$.

The experimental results of work tracking gauges consumer navigation equipment of satellite navigation systems and their networking at its complexing with an inertial navigation system using a tightly integrated processing algorithm based on extended Kalman filter have been presented.

The analysis of the experimental results leads to the conclusion that the use of digital phase-locked loop with astatism of 2nd order when integrated with an inertial navigation system provides the final increase in noise immunity by 8-9 dB. The use of the developed software and hardware of digital phase-locked loop does not lead to a deterioration of accuracy in assessing the performance of the receiver position and velocity.

Conclusions and suggestions. In the proposed structure and circuit implementations of consumer navigation equipment, inertial navigation system midrange accuracy and a tightly integrated processing algorithm using the extended Kalman filter can be provided at the level of noise immunity (52 ... 54)dB.

Areas for further research involve feasibility study of interconnecting satellite radio navigation system and an inertial navigation system with Doppler radar navigation system.

Keywords: *immunity, satellite navigation system, inertial navigation system.*

Volokh A.P. Features of technical support and performance engineering problems with Combat Support Forces in contemporary armed conflicts and counterterrorism operations.

The requirements and the guidelines of the implementation of technical support software engineering problems are somewhat outdated and have to be looked over, due to the flaws in cooperation between the necessary level of combat readiness unit engineers and the for the implementation of this software.

The main reasons for this is the change of tactics in modern warfare, the damaging effect of modern weapons and the role of logistics, which only confirms the relevance of the raised issues and articles as a whole.

Analysis of the technical support activities in local wars and armed conflicts of the last decade reveals a number of shortcomings in the organization that significantly effect combat missions as a whole.

The main reasons are:

low maintenance of weapon systems and preparing them for combat use;

lack of interaction between the rear forces plus arms and ammunition in the combat zones.

Mismatching sparepartkits for repair of the vehicles of the armed forces.

lack of practical skills of personnel, training and maintenance of weapon systems, troubleshooting in the field, plus the maintenance of training facilities for the intended use.

Given the experience of Russian troops fighting in Chechnya, the troops on the eastern borders of Ukraine and the Russian troops engaged in the eastern part of Ukraine and the logistics of the armies of NATO a number of problems have been revealed such as the implementation of the technical support in contemporary armed conflicts and counterterrorism operations as a whole:

the need to provide reliable protection and support of the army units means improving the mobility of the ranks of support and the transportation of material and facilities or the evacuation of weapons and military equipment.

the need to deploy and assembly damaged cars outside the area of armed conflict as a result of damage caused by the conflict, defense and safety regulations for the personnel when repairing these vehicles.

The establishment of complex repair and recovery of groups for simultaneous tasks of technical intelligence. The restoration and repair of damaged weapons and equipment for tactical teams and groups;

the need for a single order the troops of various departmental affiliation ammunition at their joint actions;

the need to ensure high autonomy of the troops by creating additional ammunition stocks and increasing the effectiveness of the reserves (1.5 - 2 times);

need for a kits of spare part for each and every unit and reserve components and assemblies for immediate response to damaged equipment dealing with the limited time they have to restore it.

Keywords: *anti-terrorist operation, technical support, software engineering problems fighting troops.*

Golovnya S.B. Model of reliability assessment for transport-induced failures of a particular vehicle of border detachment automobile park

Timely response to situation changes at the state border sector is ensured by providing units with vehicles of the specified level of reliability. The adequate level of reliability is provided by effective operation of maintenance unit of the frontier post resulting in damage repair and automobile maintenance.

To identify an appropriate level of engineering reliability it is necessary to develop a model. Such model enables to keep the serviceability at the appropriate level and assess the performance of maintenance unit of the border detachment.

There are many publications on study of engineering reliability. Thus without claiming to give a full analysis we consider some of them. The mentioned studies are focused on approaches to assessment of reliability level considering statistics of transport-induced failures, in such case data processing is time consuming and requires much workload. Still there are no methods to estimate transport-induced failures with minimal time loss and resources. Given that further research is relevant.

The findings of the research consist in the developed model, which enables to define the level of reliability for a definite vehicle of the border detachment allowing for its mileage. The model enables to define reliability standard (transport-induced failures) for different types of vehicles and then to assess the performance of maintenance unit and adjust the level of technical readiness of the border detachment vehicles. The gained results are aimed at further usage in evaluation procedure as for operational performance of serviceability and maintenance system of border detachment.

To verify the suggested model under operating conditions of a specific border detachment its ion is recommended. Development of software for making calculations is required.

Keywords: reliability vehicle, availability factor, repair unit.

Kaydalov R. O., Nikorchuk A. I. Using of combined method of wheeled vehicles turning movement for increasing its maneuvering capability

Usage of wheeled vehicles in ATO area conduction shows that one of disadvantages of wheeled vehicles during conduction of military operation is low maneuvering capability, especially when wheeled vehicles move in a column. In case of attack on a column, there can be conditions of limited space for turning movement, because of damaged vehicles stop, both ahead and behind undamaged wheeled vehicles. In this case undamaged wheeled vehicle must secure fast maneuvering capability – turning movement (turnback) for implementation of further movement in safe direction.

In the present article is grounded the possibility of increasing of wheeled vehicles maneuvering capability during moving in a column and at restricted road area, which lies in the fact that it is necessary to use combined method of turning control, which helps to increase the efficiency of automotive vehicles usage of National Guard subdivisions, Armed Forces and State Border Guard Service of Ukraine combat conditions.

For increasing maneuvering capability of transport vehicle, during moving in a column and at restricted road area, when it is necessary to implement the turning at a place, simultaneously with the beginning of directive wheels turning to shutdown pressure source of working fluid brake gear of directive wheels and wheels of outer face trailing dolly. Stopping of outer face trailing dolly wheels, which is followed by fuel supply increasing into transport vehicle motor, secures its turning around outer face trailing dolly wheels with smaller radius of turning movement and overall passage corridor. After the transport vehicle turning movement ends, outer face trailing dolly wheels stops and brake gear of directive wheels and wheels of outer face trailing dolly connect to pressure source of working fluid.

Order of conducting and experimental investigations results with defining of wheeled vehicle turning radius using combined method of turning control are given, in particular:

- decreasing of vehicle turning movement radius of ZIL-131 comprised 7,54 m, that is less for 2,36 m (23%) than while using kinematics method;
- decreasing of turning movement radius is the result of additional action of the moment, that occurs while difference between torsion torque of trailing dolly outside and inside wheels increases, that leads to turning radius decreasing;
- was established, that wheel tread of trailing dolly practically coincided with front axle wheel thread, as a result of which, vehicle overall corridor was decreased.

Usage of turning movement control combined method allows to decrease vehicle turning radius with wheel arrangement 6X6 to 23% and to improve maneuvering capability, that can be used during completion of a maneuver of vehicle in a column and at restricted road areas.

As the direction of further experimental investigations was defined impact assessment of vehicle wheel arrangement, its speed and type of road pavement at turning radius value while using of turning control combined method.

Keywords: *maneuvering capability, combined method of facing movement control, turning movement radius, and wheeled vehicle.*

Katenchuk I. S., Yevdokhovych B. V. The technique of choosing the variant of the thermal imager complexes application on the state border sector

During the application of the thermal imagers (TIs) it is important to solve some topical problems concerning the place and the number of observation means of thermal imagers, which would provide the effective control over the state border.

The aim of this research is the development of technique for realization of the following tasks:

- 1) definition of area of control with the use of a separate thermal imager at site;
- 2) definition of sites for location of stationary (places for application of mobile) thermal imagers;
- 3) definition of specific sectors, types and quantities of TIs using which "covering" of the whole sector of border protection will be provided with the minimum quantity of TIs based on the results of comparison of control areas of separate TIs on certain sectors of their application.

The SRTM technology (Shuttle Radar Topographic Mission) is applied in the technique to acquire the data of digital model of a land relief; the wave algorithm – for search of a set of final points of visibility at site utilizing the thermal imagers and creation of a contour of a visibility range; the methods of discrete geometry – for calculation of the area of irregular polygons which correspond to visibility ranges of thermal imagers at site; models of Arcgis and Arcview Spatial Analyst program modules – for processing of multichannel raster data, such as aerial photographs, satellite images, and receiving of raster layers of a site in a digital format.

The algorithm of the technique includes several stages:

1. Preparation of basic data.
2. Preparation of the map of a site and determination of initial values for calculations.
3. Determination of values of characteristics for application of thermal imagers on certain sectors (points): control zones; areas of control; length of a sector of the state border which is controlled by thermal imagers; average range of control.
4. A rational variant is chosen according to the values of characteristics for application of thermal imagers on certain sectors (points).

Using this technique it will be possible to define all possible sites for effective application of thermal imagers. By application of the received results it is possible to solve such problems:

- 1) to evaluate the area and the sector of the state border which is controlled by TIs from each separate point;
- 2) to define the necessary quantity of TIs with which the control of certain areas of control and sectors of the border will be provided;
- 3) to choose the best variant using the defined characteristics for application of thermal imagers on each specific sector.

Keywords: substantiation, of thermal imaging technology, decision making, state border protection, border sector.

Prokopenko Y. V., Bigyk A. V. Cryptographic methods to ensure privacy of information

The experience of the counterterrorist operation on the eastern border of Ukraine underlines the importance of providing timely and reliable exchange of

information in the management system. This achievement of the objective of fighting depends on the speed and secrecy of evidence making. The main, and often the only way to organize communication is radio communication. Applying by enemy a means of electronic warfare and radio interception, encourages the introduction of modern methods and countermeasures. And that cryptographic methods of protection techniques could satisfy the requirement to ensure the confidentiality of information during the proof of orders and instructions in the tactical control link.

The initial task of cryptography is developing methods aimed at concealing the content transmitted or stored information. Although today the scope of cryptographic mechanisms has expanded, the basic idea can be illustrated by the example is privacy information. Obviously, the privacy feature is achieved when converted from plaintext, namely cryptograms, no one can learn about the content of the text, and unauthorized users can not make the inverse conversion from cryptograms in plaintext. In the article the classic cryptographic system, which is used in the formation of radio - code substitution.

It is noted that today cryptographic mechanisms are so closely related to modern technologies, ways and methods of information exchange of information, along with increased requirements for automation control systems necessary to increase the requirements for information security. From the above it follows that the computational stability of cryptosystems must constantly explore, always taking into account the development of modern information technology trends and developing efficient computational algorithms.

Prospects for further research in this area aimed at establishing a modern communications and management and provides a transition to integrate information processes main battlefield in uniform multifunctional terminals for both telecommunications organizations and for remote control of weapon. Also, a significant increase in the requirements for providing covert control radio communication tactical management level. Creating of a multi-level information security and convergence of different networks by nature and telecommunication services at uniform digital channels through the introduction of new information technologies.

Keywords: *cryptanalysis, key, substitution cipher, transposition cipher, radio communications, encryption.*

Sivak V. A. The Concept of safe operation of vehicles under the conditions of the state border protection

A sufficient number of regular modern vehicles is used in the course of performing the operational tasks of the departments and agencies of the State border service of Ukraine. Safety of their operation became a topical issue which has not been conceptually justified yet.

The aim of the article is to outline the conceptual approaches, to formalize and develop the concept of safe operation of the vehicles under the conditions of protection of the state border of Ukraine.

The article reveals the structure and specificity of the developed and proposed concepts for safe operation of vehicles under the conditions of state border protection, the essence of which lies in implementing an integrated approach in order to improve the existing level of vehicle safety in major modes of their operation under the conditions of execution of service and operational tasks of the state border protection.

The proposed Concept of ensuring safe operation of vehicles under the conditions of protection of the state border is based on the systematic principle, which allows us to represent the solution to the problem of vehicle safety operation in three main aspects: theoretical, methodological (scientific) and practical, as well as to allocate and justify the main solutions to this problem.

Implementation of the main provisions of the Concept of ensuring safe operation of vehicles under the conditions of the state border protection will enable to determine the optimal amount of complex measures ensuring their operational safety during the execution of operational and service tasks for the state border protection.

Keywords: concept, safe operation, vehicles, the state border protection.

Subotin V. Ananin O. Work with a local population in the zone of realization of Anti-terror operation on the southeast of Ukraine

In the conditions of realization of Anti-terror operation on the southeast of Ukraine of border line subdivisions must be oriented not only on the soldiery methods of fight but also on providing of support from the side of local population, creation of favourable social climate and terms for the confidence-building of the Ukrainian citizens to state power and power structures.

The aim of the article is determination of work assignments from providing of the proper level of trust from the side of local population to border subdivisions in the places of their distribution in the zone of realization of Anti-terror operation.

In relation to providing of trust from the side of local population it is possible work assignments to define: organization of measures on informing of population of the pre-arranged programs of development and intermediate results of their realization on territory, state power; expansion of collaboration is with local volunteer organizations; observance of discipline and regulation order by the personnel of frontier subdivisions in the places of execution of service; study of public opinion in relation to the level of trust from the side of locals to the border guards in the districts of location of border subdivisions.

The study of public opinion in relation to the level of trust of locals to the border guards can become the effective method of estimation of job with a local population and present social climate performances in certain locality. To carry out the study of public opinion maybe by sociological researches by means of the use of the specially worked out sociological questionnaires. The results of sociological researches in the zone of realization of Anti-terror operation confirmed a capacity earlier the worked out methodology from the estimation of public opinion. The level of trust from the side of local population to the Ukrainian border guards laid down 40%. Trust of citizens to other law-enforcement

structures and laid down local-authority: militia - 22,4%; SBU - 29,4 %; to local-authority - 34,9%. It researches were conducted by Center of Razumkova in March, 2015. The study of level of trust from the side of local population by means of the special questionnaires witnessed about a presence, as to the positive so some problem questions in organization of service of frontier subdivisions. This fact specifies on expediency of the use of such forms of social researches as questionnaire of persons. Also the results of study of public opinion can be drawn on as a criterion for the estimation of socio-political situation in the districts of distribution of border subdivisions.

Taking into account the social-psychological features of considerable part of local population that lives on territories, where an anti-terror operation is conducted, it is possible to mark that sociological researches are able to help the exposure of risks in the system of guard of state boundary, and also can become an operative information that it is expedient to apply during planning of official activity of border subdivisions generator.

Keywords: *anti-terror operation, to the border subdivisions, local population, public opinion, sociological researches.*

Shynkaruk O. M., Fedorchenko A. V. Analysis of the experience of creation and use of integrated telecommunication systems "GART" within the State Border Guard Service of Ukraine

The article deals with the analysis of experience of developed integrated information and telecommunication system "GART", which is a combination of functioning information and telecommunication subsystems processing information on all types of operational and service, and combat activity of organs of the State Border Guard Service of Ukraine. By means of the deployment of this system, software and hardware subsystems are created in the state border guard units to ensure the exchange of information between them and the central data repository of central subsystem, organization of remote access to information for officials of border guards units and also the personnel of border details.

Telecommunications network "GART" is constructed in such way that digital streams are arranged directly from the Administration of the State Border Guard Service of Ukraine to border guard units and provide simultaneous exchange of data, voice and video information based on IP-protocol, and supports the remote control function of the network and monitoring its condition.

The purpose and peculiarities of twenty major subsystems of GART are briefly revealed. The reasons of necessity of creation of the subsystem "GART-ITS" based on the positive experience of existing integrated telecommunications subsystems "GART" are described.

Keywords: *information telecommunication subsystem, state border protection*

Shport N. N. Definition of the main approaches to the software realization of the construction of the rational routes in solving problems of operational performance of the SBGS

The increase the volume of processing of the information in telecommunication systems of the State Border Service of Ukraine with geographic "binding" causes increase in the using of the geoinformation systems. The rational construction of the routes is necessary in solving a number of problems of operational performance of the SBGS. The separate class of such problems are the problems to minimizing travel time on the route, considering weather conditions, terrain, vehicles, and other factors that are important for operational performance.

The aim of the article is definition of the software implementation rational search routes using GIS SBGS ArcGIS.

Conclusion. We can use two approaches for automation solving a number of problems of operational performance of the SBGS that provide rational construction of routes. The first approach involves a better use of GIS of the SBGS. GIS at the same time is used as on the stage of construction masks areas and for routing (used module Spatial Analyst). However, its usage provides greater financial costs and significant resource requirements of computer technology workstations.

Another approach involves the using of GIS of the SBGS only at the stage of constructing masks areas. After their construction to determine rational routes used separate program. The disadvantage of this approach is the requirement of the previous calculation for individual border regions of Ukraine masks areas. However, regardless of the approach to implementing sustainable route fuzzy search, the important step in this task is the method of forming the mask area.