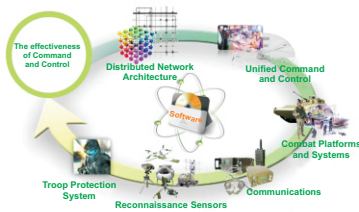


# AUTOMATED CONTROL SYSTEMS FOR LAND FORCES





## PROCESSES AND TASKS OF ARMY AND WEAPONS CONTROL IMPLEMENTED IN C2 OF THE ARMY

C2 systems for the Army have been built on the basis of the integrated distributed network architecture combining the forces, reconnaissance facilities, control authorities, combat systems and force protection systems into the integrated combat control contour, the multiple use of which significantly increases the efficiency of command and control by means of:

- Providing all the control units with the overall picture of combat situational awareness;
- Control process operability, reasonability of taken decisions and quality of combat activity planning;
- Prediction of enemy's behavior while making assessment of the combat situation, decision making, Army notification about the missions and activities.

Collection, processing, creation and provision of the concluding and summarizing informational documents to the higher quarters regarding the place of deployment, state and supportability of the army, level of their combat and mobilization readiness, results of the operational and combat preparation, state of the military discipline and tasks to solve.

Reception (input) of the combat executive documents, commands and combat control signals from higher-level of military management and their transmission to the subordinate troops with further monitoring of their execution.

Transition management of large units, military bases and units to the highest degree of combat readiness including control over the troop's transition from peace-time to war-time mode.

Generation of the reference database on performance characteristics of weapons and military equipment and operational-tactical standards of friendly troops and foreign country troops combat use in different forms of troops (forces) usage.

### Combat tasks assignment to subordinate large units, military bases and units

- Generation of text and graphic combat documents and their transmission to subordinate command units
- Reception and display of the information on the air situation in the large unit responsibility zone.

### Tasks on generation, storage and display of situational data

Collection, processing, storage, display and issue of the information on subordinate troops (forces) (effective combat strength, full strength, combat readiness, state, deployment, nature of action, losses, logistics).

Collection, processing, storage, display and issue of the information on infrastructure objects in the zone of responsibility.

Collection, processing, storage, display and issue of the information on effective combat strength, combat readiness, deployment, combat capabilities and possible actions nature of enemy troops.

### Decision-making on the operation (battle) execution and planning of troops (forces) combat operations

Military strength and quantity estimation of friendly troops (forces) and enemy troops.

Combat capabilities estimation of friendly troops (forces) and enemy troops.

Military strength ratio estimation of the involved parties forces all over the troops action zone and lines of operations.

Estimations on advance (movement start), deployment, transfer and maneuver of troops (forces) in the operation (battle).



## PURPOSE

Armored Reconnaissance Vehicle 4B (hereinafter referred to as ARV-4B) is designed for reconnaissance in various types of battle, at any time of day and in any weather conditions including limited visibility conditions (rain, snow, fog, smoke screen, extraneous light etc.), at a considerable distance (up to 300 km) from friendly forces as part of various intelligence agencies.

## FUNCTIONAL CAPABILITIES

### RECONNAISSANCE

Deployment of two observation (reconnaissance) posts: vehicle-based and remote ones.

Reconnaissance from the vehicle-based observation post:

- optoelectronic (infrared and television) ground reconnaissance to a range of up to 7.0 km;

- radioelectronic (radar) reconnaissance to a range of up to 18.0 km;

- radioelectronic (radar) reconnaissance of VHF and UHF radio equipment to a range of up to 30.0 km;

- radioelectronic (seismic) reconnaissance to a range of up to 50.0 km;

- optoelectronic (infrared and television) air reconnaissance to a depth of up to 90.0 km;

Optoelectronic (infrared and television) ground reconnaissance from the remote observation post to a range of up to 4.5 km.

Automated mode identification in any environment:

- tank - up to 10.0 km
- vehicle - up to 8.0 km
- human - up to 7.0 km
- UAV - up to 3.0 km

Automated mode identification of detected targets coordinates (within the accuracy of 15 m) with the display on a digital terrain map.

Monitoring of VHF and UHF radio equipment (VHF radios, various types of radar stations, tropospheric communications stations, mobile phones) to a range of up to 30.0 km.

### AUTOMATION OF CONTROL, DATA TRANSMISSION AND NAVIGATION

Providing of automated collection, processing of reconnaissance information (from both posts) and report generation to a higher authority. Providing of reports transmission (reception) in automated mode (in graphic and text documents) at a distance up to 300.0 km.

Providing of stable radio communication at a distance: when moving up to 100.0 km; static up to 300.0 km.

Determination of its location coordinates either with a satellite (GLONASS/GPS) or autonomous navigation systems.

### PROVIDING OF COMBAT UNIT SURVIVABILITY

Providing protection for combat unit against bullets of 7.62 mm caliber.

Defuse of radio-controlled explosive devices.

Laying aerosol (smoke) screen.

Neutralize the enemy with a machine-gun.

Ensuring that the tasks are performed in radiological, chemical and biological contaminated area and at an ambient temperature of 400 C.

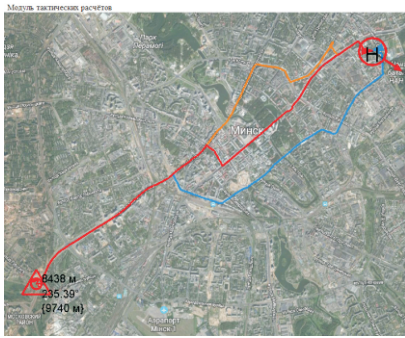
## COMPOSITION

ARV-4B consists of five units and systems:

- mobility unit
- reconnaissance unit;
- command and data system;
- communications, data transmission and navigation system;
- special equipment unit.

Main feature of the multi-functional reconnaissance module is that the high level of informational contents of ARV-4B

reconnaissance elements ensures prompt receipt of reliable information about the enemy within the shortest possible time with minimal efforts and transmission of fused information at the distance up to 300 km.



### PURPOSE

Integrated with decision-making assist software, the system is designed for comprehensive control of subordinate troops and assets, organization of collaboration and interaction with other units, and preparation of possible solutions based on enhanced situational awareness in the area of responsibility (AOR).

It will ratchet up the volume and delivery rate of messages and reports, decision-making speed, pave the way for informational superiority and provide a tactical edge.

The system transmits data via wires, HF/VHF radio channels, LTE (4G) individual high-speed communications equipment, satellites and local mobile operators.



### THE TZU PROVIDES:

- Telephone and videotelephone multimediaservices,
- Conference communications via secure channels and Ethernet compatibility,
- A single digital terrain map for all levels,
- Reception of video from electro-optical systems, based on a digital networking protocol.

Given that the system is integrated with decision-making assist software, it provides:

- Modeling of situations and preparation of solutions based on the situation,
- Tactical calculations,
- Preparation of 3D digital images of the terrain and buildings,
- Implementation of AI-powered software.

The automatic control system is the only multi-functional network, combining all personnel, combat and C2 vehicles, as well as CP at the tactical level. Besides, it has everything there is to be integrated with higher HQs, utilizing similar technologies.

The TZU comes in stationary and mobile configurations to meet mission needs of various units.

The former is suitable for deployment in buildings, tents and shelters.

The other option includes collective and individual modules.

While the collective equipment is deployed on vehicles, IFVs, APCs, etc., the individual package is carried by individuals.



## PURPOS

Automated control of preparation and combat operations of the artillery battery (rocket artillery battery, mortar battery).



## THE SYSTEM ENSURES

- collection, processing and storage of data about the location, state and supply status of operations platoon and gun platoons;
- automation of collection, processing and storage processes and target data transmission process;
- reconnaissance and target positioning;
- automated tasking solutions on:
  - meteorological and ballistic preparation for fire;
  - deliberate and rapid preparation of fire and fire transfer from target reference points;
  - planning of battery fire and settings calculation for fire at mobile and static targets;
  - planning of route march, approach march, deployment and movement during training and conducting of combat operations;
- automated support of trial fire and destruction fire adjustment;
- automated data transmission from Battery Commander to the Senior Officer of the battery and to the gun commanders and back;
- automated interaction via radio and wire communication channels with automated control systems of higher level units and all-arms units, etc.



The automated and non-automated control of combat means of rocket-artillery units equipped with heavy caliber MLRS both during planning and combat activities (planning of the march movement, deployment and maneuver, survey and weather data support, reconnaissance, preparation and control of fire).

### SOLVED TASKS

#### Automation of control processes:

Collection, processing, display and storage of information received from set of communication means and data transmission equipment, survey means, means of reconnaissance, observation and weather data support;  
Solving of control tasks during the preparation and combat actions (during march movement, change of position, maneuver and fire control of the battalion (battery));  
Generation, reception and processing of reports, commands and orders;  
Protection against unauthorized access to the information and functional check of all hardware means of the System.

#### Calculations:

Solving a set of tasks on survey and determining of bearings to aiming points;  
Solving a set of tasks on weather data support to perform launches (determining of weather data, calculation of corrections with respect to the fire deflections if compared to the tabular values);  
Calculation of corrections of ballistic and geophysical firing conditions if compared to the tabular values;  
Calculation of the parameters values for fire at the target (targets) determining target aiming points for each combat vehicle;  
Determining the consumption of rocket-type missiles for conducting a fire by a battery or a combat vehicle;  
Generation and transmission of commands to get prepared for launches and conducting of launch.



## PURPOSE

Automation of the main control processes over regiment forces and facilities when executing combat (combat practice) tasks at the deployment position.

Training of combat crew's officers in the training mode.

Ground objects defense from air surveillance facilities and protection against the aimed fire engagement.

## TASKS TO BE SOLVED

### Information tasks module:

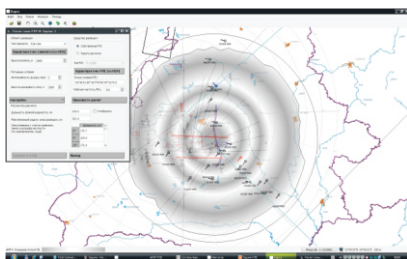
- Collection, processing, storage, display of information from subordinate command posts, radars, electronic reconnaissance unit and radio interference station;
- Reception, processing, storage, display of information from the higher command post;
- Information transmission to the higher command post;
- Information exchange with interacting command posts.

### Control tasks module:

- Reception, processing and storage of combat orders and instructions;
- Generation and transmission of combat reports;
- Transmitting of commands and combat control signals to subordinate command posts;
- Control over subordinate sources of radar and radio-technical information;
- Monitoring of assigned tasks execution

### Calculation tasks module:

- Air objects identification in accordance with the information received from electronic reconnaissance unit, radio interference station, higher (interacting) command post or subordinate radar;
- Estimation of electronic countermeasure zones for aircraft on-board radars taking into account terrain features;
- Estimation of regiment combat performance zones and boundaries;
- Estimation of resources for suppression of on-board radar and VHF radio communication;
- Effectiveness assessment of EW regiment forces and facilities usage;
- Estimation of sectors for signals intelligence (electronic countermeasures) conduct and detection zones of on-board radars taking into account terrain features;
- Estimation of signals intelligence and electronic countermeasures zones of radio interference station VHF aviation radio communication;
- Estimation of the regiment (subunit) route march.





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