T-55 tank integrated crew simulator

The main characteristics

- The structural and functional adequacy of crew members' workplaces
- The adequacy of the motion and shooting model
- High-quality visualization
- 3-D models of a firing range, tank driving range, and a tactical field
- 3DOF motion platform
- The full scope of exercises of the Driving and Firing Courses
- The wide range of training conditions
- Unbiased assessment of trainees' actions
- Results documentation

Specifications of the T-55 tank integrated crew simulator

No	Nomenclature	Unit	Value
1	Quantity of simultaneously trained people	---	3 (commander, driver-mechanic, gunner)
2	Minimum area required	m^2	30
3	Type of a room	---	Indoor
4	Readiness upon turning-on	min	5
5	Duration of daily continuous work	hours	12
6	Power supply: voltage	V	220±10%
	frequency	Hz	50±1
7	Maximum power consumed	kW	30
8	Mean power consumed	kW	14
9	The range of working temperatures	°C	from +5 to +40
10	Diagnostics system	---	Integrated semi-automatic
11	Dimensions 3D terrain model for driving exercises	km	2x4
12	Dimensions 3-D terrain models for shooting exercises	km	2x4
13	Dimensions 3-D terrain models for tactical exercises	km	4x4
14	The types of terrain	---	3 (plain, desert, mountain)
15	Assessment of trainees' actions	---	automated, in accordance with indices and criteria of Driving Course and Firing Course
16	The training conditions	---	Day, night, winter, summer, mist, various range of optical visibility, temperature range from -20°C up to +50 °C.
17	The ability to input tank equipment faults and failures	---	Enter of failures and faults of tank equipment is implemented from the workplace of class manager
18	Error-free running time	hours	Minimum 1000
19	Expected life	years	Minimum 10
20	Warranty period	years	2

The simulator structure

1. The tank driving compartment mock-up mounted on the motion platform

2. The tank fighting compartment mock-up mounted on the motion platform

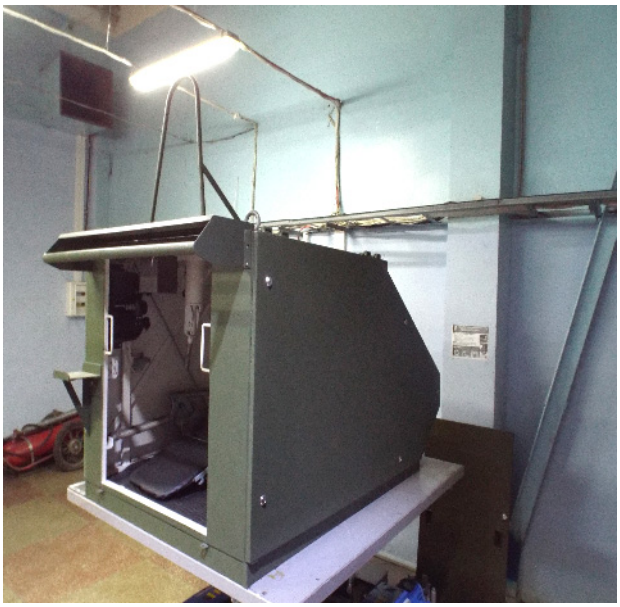
3. Instructor's workstation

The tank driving compartment mock-up

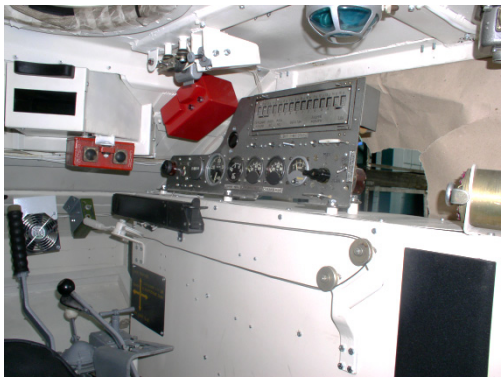
► The placement of simulator controls (and loads on them) and indication means to ensure full compliance with the real T-55 tank driving compartment

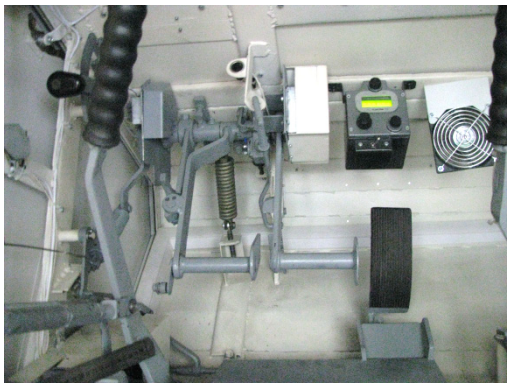
► The motion platform ensures simulation of tilts and acceleration loads corresponding to the dynamics of a moving tank in various conditions of terrain conditions

► The structure of a driving compartment mockup ensures embarking of trainees through the hatch of driver-mechanic and the rear opening



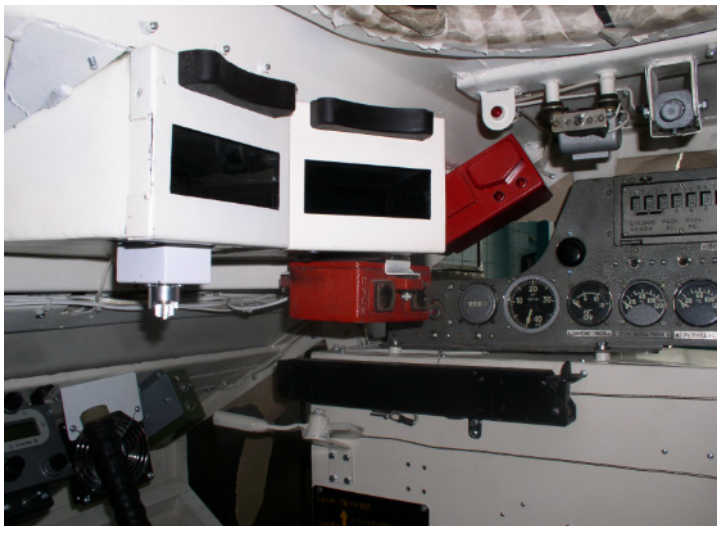
The driving compartment mockup is equipped with the full package of controls, observation devices, instruments, illumination, and an alarm means





The composition of the T-55 tank driving compartment mockup

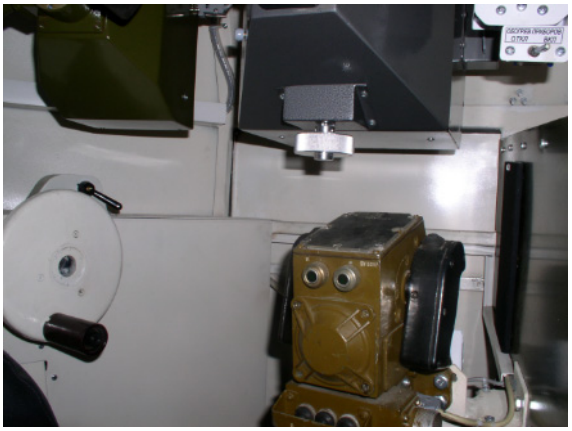
No	Nomenclature	Number
1	**Controls' and equipment mockups, set, including**	1
	BMO-190V observation device	2
	TVNO-2B night vision device	1
	The driver's instruments panel	1
	Battery switch	1
	KUB-3 fan control box	1
	Air cylinders	2
	Heater shield	1
	GPK-59 directional gyro	1
	Pressure gauge	1
	TVNO-2B power supply unit	1
	Air start valve	1
	Gun position indicator lamps	2
	Interphone control box	1
	Fuel tank selection tap	1
2	**Equipment, set, including**	1
	Hatch with opening and locking device, and electric actuator blocking	1
	Planetary steering mechanism control levers	2
	Fuel supply pedal	1
	Clutch pedal	1
	Brake pedal, stopping brake drive handle	1
	Speed change lever, lockout mechanism of transmission selector gate	1
	Inlet shutters gate drive lever	1
	RNM-1 handle of fuel supply pump (fuel manual supply handle)	1
	Headset	1
	Driver’s seat	1
	Folding lamp, devices interior lamp	2
	Fan	1



T-55 tank fighting compartment mockup

► The compartment to accommodate a commander and gunner workplaces equipped with mockups of devices and equipment
► The motion platform

The gunner workplace

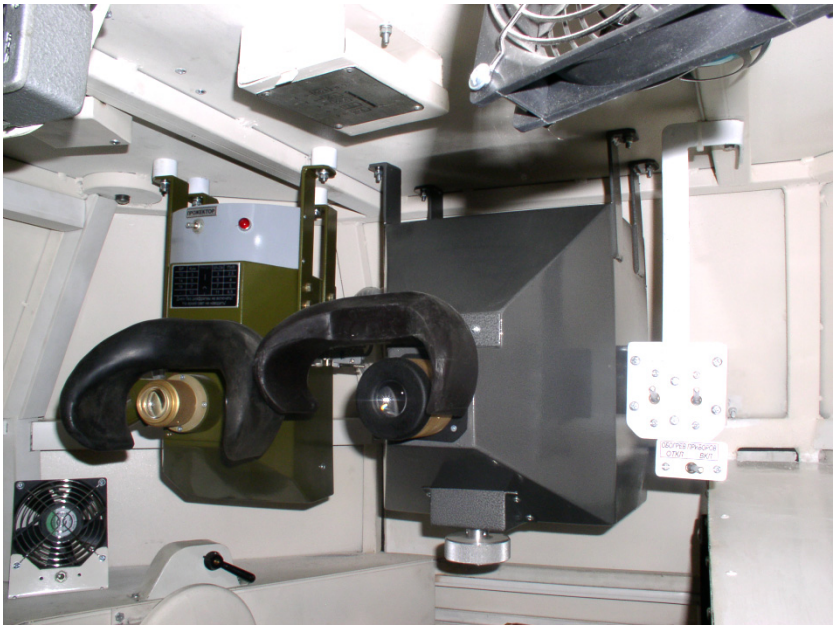


The fighting compartment mockup

The tank commander workplace

The structure of T-55 tank fighting compartment mockup

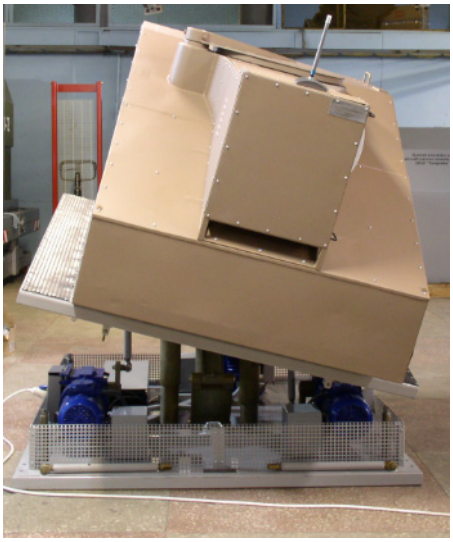
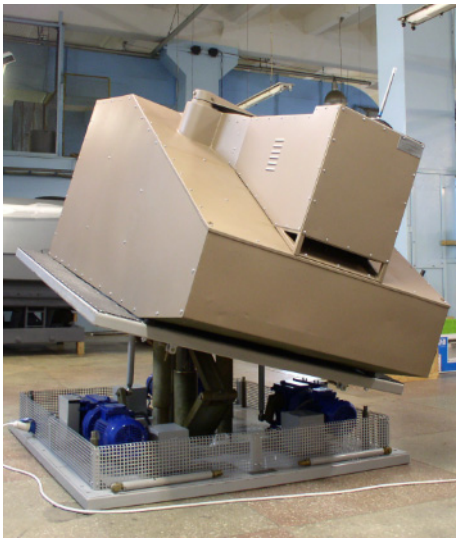
No	Nomenclature	Number
1	**The controls' and equipment mockup, set, including**	1
	TKN-1S device	1
	Commander's cupola locking mechanism	1
	TSh-2B-32 telescope sight	1
	TNP-1-22-11 night sight	1
	Breech end of gun with bridge block wedge handle	1
	Control panel of the 902B system (smoke grenade launch)	1
	Hand gear of gun rise with worm-pair disconnecting handle	1
	Turret traversing hand gear	1
	Turret lock	1
	Azimuth indicator	1
	R-123 (full-scale mock-up) radio station	1
	Stabilizer control panel	1
	PKT receiver	1
2	**Equipment, set, including**	1
	"Headlight" toggle-switch	1
	"Heating device" toggle-switch	1
	OU-3 searchlight activation lamp	1
	Gunner's seat	1
	Commander's seat	1
	Headset	2
	Interior lamp	2
	Fan	2
	Intercommunication devices	2



The motion platform

The motion platform ensures a tank hull tilts simulation during motion as per the terrain relief, during the gun firing, as well as acceleration effects during starting, acceleration, deceleration, turning off the tank

3-degree motion platform


The main characteristics of the motion platform

Index	Values
Type of drive motors	Asynchronous with short-circuited rotor
Drive motor control	Frequency as per the velocity and the position
Pitch angle	+/- 20 degrees
Roll angle	+/- 20 degrees
Yaw angle	+/- 20 degrees
Angular velocity of axis motion	0-20 degrees/sec
Accuracy of control signals	0,2 degrees as per the angles
	10 mm as per the position
Consumed power (mean)	12 kW
Value of transverse displacement	6 kW

The Instructor's workstation

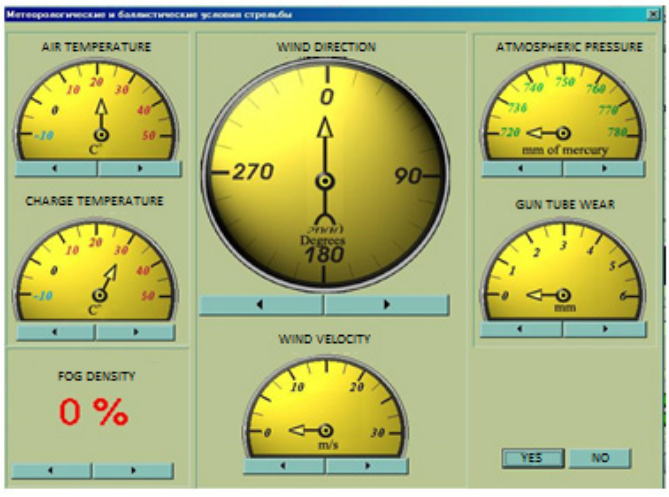
The functional capabilities of the instructor's workstation

- Activating/deactivating of a simulator, including emergency cut-off
- Prompt help to the instructor
- Activating "reset", "record", "reiteration" modes
- Selection of an exercise of the required level of complexity from the library
- Selection of training conditions
- Selection of the terrain type
- Development of an exercise by the Instructor
- Enter of faults and failures of simulated equipment
- Control of trainees' actions during training
- Two-way communication

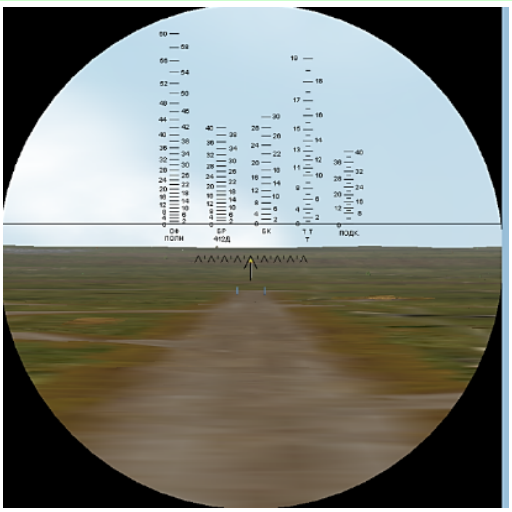
The main menu

The monitor of controls and instruments status in a driving compartment

Weather conditions input menu

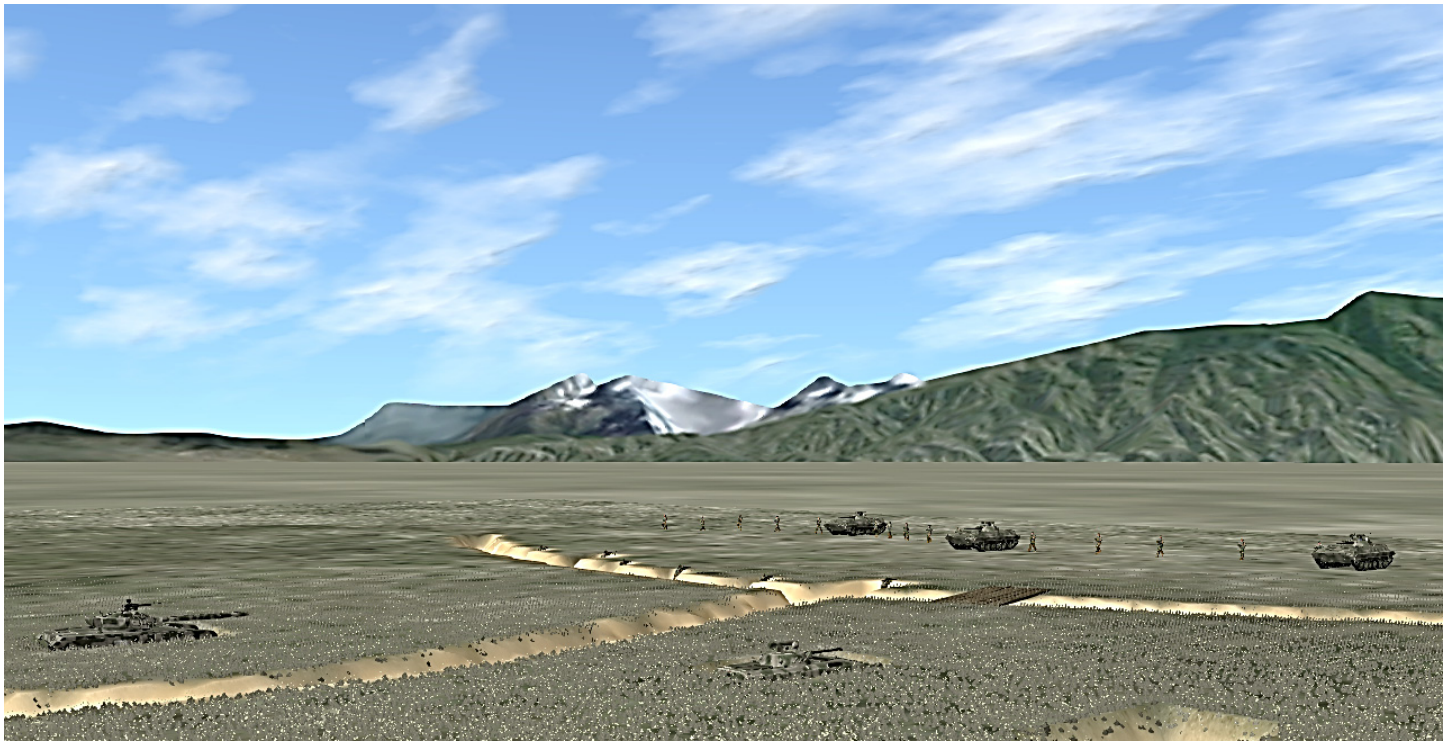


Monitor of the field of view of sighting device TSh-2B-32 on instructor's workstation



Off-turret visual scenes examples

The view from the external controlled camera of the instructor’s workstation on a tactical field



The view of a simulated T-55 tank from the external camera on the 3D driving range model

The simulator training features

The Simulator instructional and training capabilities:
- Individual training of tank driver-mechanicals
- Individual fire training of tank gunners
- Collective fire and tactical training of tank crews (including an enemy return fire)

The simulator capabilities to form training conditions:
- The size of 3D terrain model – 4x4 km
- The types of terrain – mid-rugged, mountain, desert (subject to a Customer's requirements any terrain sector with dimensions 8x8 km can be developed)
- Types of road pavement – subsoil, hard surface, off-the-road
- Time of a day – day, twilight, night
- Weather conditions – sunny, cloudy, rain, wind of different velocity and direction
- season – summer, winter (subject to a Customer's requirements as per the conditions of the geographical region)

The simulator's capabilities for driver mechanicals instruction and training:
- Performance of a full list of the Driving Course exercises with an unbiased assessment of trainees' actions
- Driving under various road and off-the-road conditions in the course of fire and tactical tasks accomplishment

The simulator's capabilities for education and training of tank commanders and gunners :
- Conducting of a full list of the Gunnery Course exercises with an unbiased assessment of trainees' actions
- Accomplishment of fire and tactical tasks

The capabilities to manage trainees' actions:
- as per the current status of controls and instruments, commander's and gunner's (on control monitor) controls
- as per the duplicated field of view of observation devices of driver mechanical
- as per the duplicated field of view of TSh-2B-32P, TNP-1-22-11, TKN-1S sight
- as per the tank state from the external controlled camera
- as per the position of the tank on the tank driving range, firing range or a tactical field
- as per the protocol of driving, fire and tactical exercises execution
- as per the reports of the trainees via communication means

The capabilities to assess trainees' actions:
- automatic assessment of a driver-mechanic's actions during an execution of standard exercises as per criteria of the Driving Course
- automatic assessment of commander's and gunner's actions during an execution of standard exercises as per criteria of the Gunnery Course
- an unbiased assessment of trainees' actions as per the results of the analysis by the entire (or random) means of control

The capabilities to generate training conditions:
- Selection of weather conditions for firing
- Selection of standard and development of improvised firing and tactical exercises
- Selection of terrain type, time of a day and season
- Selection of the enemy return firing status
- Reiteration (multiple if required) of an exercise scenarios
- Simulation of a tank equipment failures and faults

The capabilities for processing and storing the results of exercises
- e-documenting of training results (printout)
- archiving the results per day and for a specified period