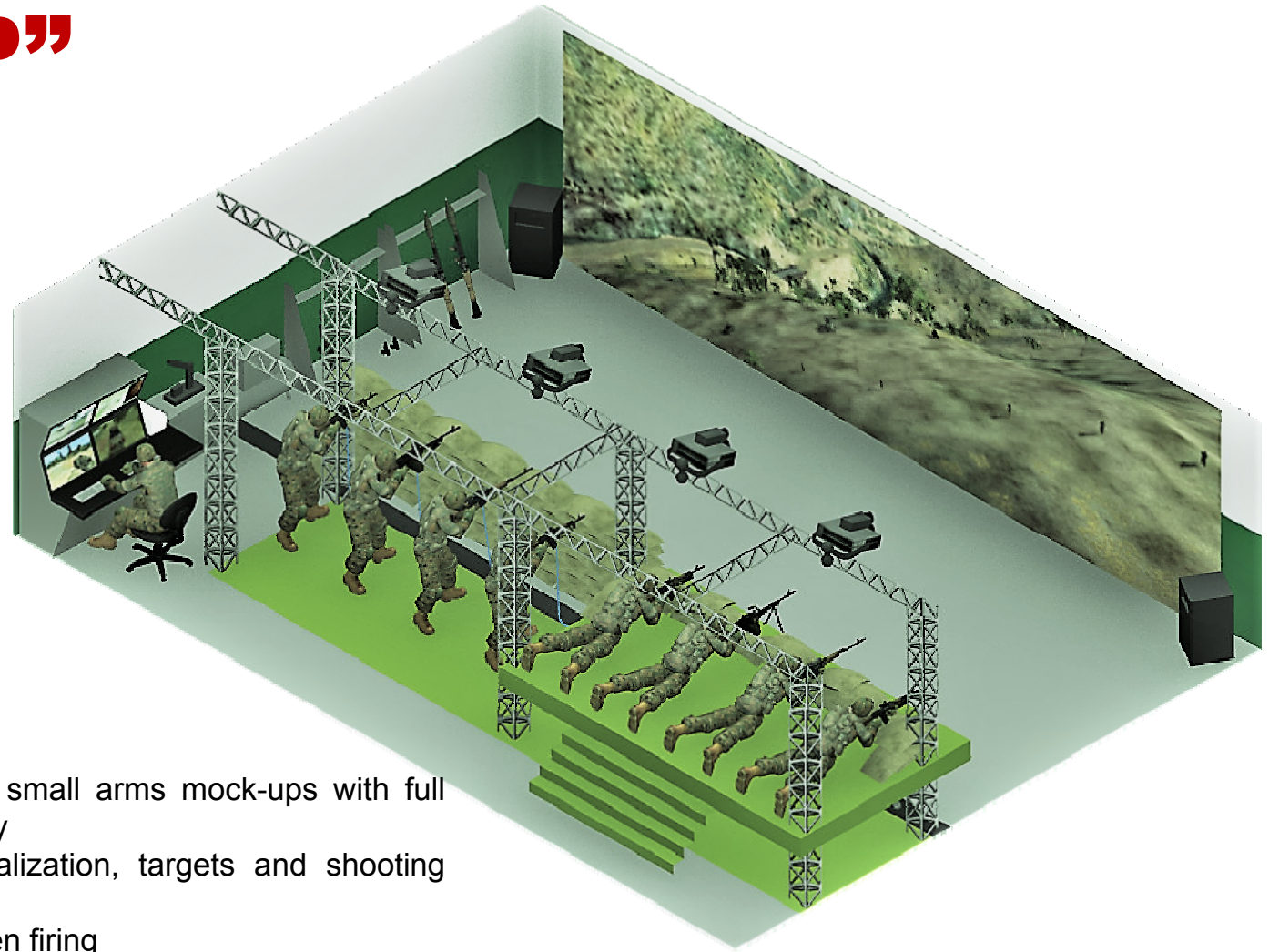


# Marksmanship training complex “Range-P”



## Characteristics

- The use of mass-dimensions small arms mock-ups with full adequacy of a trigger assembly
- The high quality of the visualization, targets and shooting effects
- Simulation of recoil effects when firing
- Wireless data transmitting channels
- Full package of Gunnery Course exercises
- A wide range of scenarios for exercises and training events
- Unbiased evaluation of trainees' actions, and training results documenting

## **The simulator purpose and capabilities**

The marksmanship training complex is designed with the use of modern technologies (replicas of weapons with the simulation of recoil effects when fired, electronics providing high accuracy of weapons positioning, non-contact sensors, high-speed wireless data transmission channels, advanced software operating in real-time, high-quality visualization of terrain and effects of combat, generating adequate audio effects of shooting) for effective individual and group fire training

### **Education and training capabilities**

- initial training of firers - to occupy the correct firing position, control breathing when aiming, producing a smooth trigger release, keeping the line of sight on the target
- the shaping of skills in assessing the results of firing and fire adjustment
- shaping the skills of targets detecting and identifying, determining the parameters of target movement, prioritizing targets for firing
- estimating a range to target reference points (TRP) and targets by eye as per their angular values and using the rangefinder scales of optical sights
- practice actions to prepare weapons for shooting, target selection, the firing of single shots and bursts under different visual conditions (day, night, or twilight, with the Sun in the face and behind), weather conditions, at night using lighting ammunition or night/thermal aiming devices, in various seasons
- training in aiming-off and firing when engaging moving targets as per the shooting conditions
- train high-speed shooting skills from various firing positions (prone, kneeling, standing) on several targets, set in different directions from the firing line

### **Capacity for learning and training squads (groups)**

- practising by the squad leader of fire control tasks during a battle: targets designation, target evaluation and prioritizing for engagement, choosing of firing mode and the moment to open fire, fire missions assignment and giving commands to open fire, observing the results of firing and fire adjustment, maneuvering by fire (concentration, separation, transfer, and ceasefire)
- practising of an entire scope of firing tasks by personnel of squad during an exercise, namely: observing a situation, receiving a firing mission from a commander, determining ranges to targets (TRPs), determination of an initial firing data and aiming point under various conditions, choosing a type of fire, firing, monitoring its results, reporting to a commander, correcting fire

# Marksmanship complex structure

**1 Instructor's workstation (chief instructor)**

**2 The range equipment**

**3 Multimedia virtual battlespace visualization means set, including**

**4 Motion system**

**1** The Instructor's workstation represents a unifying desk with in-built video monitors and computer towers



The instructor's workstation provides simplicity and ease of class management and full control over trainees' actions, including

- a) generating training scenarios of various difficulty
- b) selecting exercises from the simulator library, development of improvised exercises or an exercise with tactics elements using an instructors menu.
- c) selecting a section of terrain to perform the exercise
- d) editing and storing various variants of fire exercises in the simulator library
- e) generating of exercise terms and conditions - the time of a day, targets directions and speed, meteorological conditions;
- f) start, pause exercise conduct with its resumption
- g) exercise reiteration;
- h) displaying the fact of impact/miss and the parameters of the miss.
- i) training results documenting saving results for a certain training period with progress in training
- j) monitoring the progress of firing exercise from external video cameras
- k) moving a group of shooters to another firing position (s) in a virtual battlespace



## The types of full-scale weapon mock-up

2

The mass-dimensional small arms mock-ups fully correspond to real military weapons, ensure a regular operation of a trigger assembly, and simulation of the recoil effects when firing at least 80% of the real



### The recoil simulation system

The recoil simulation system works both from a centralized pneumatic system (tethered) and from compressed air accumulators (tetherless) built into standard weapon magazines



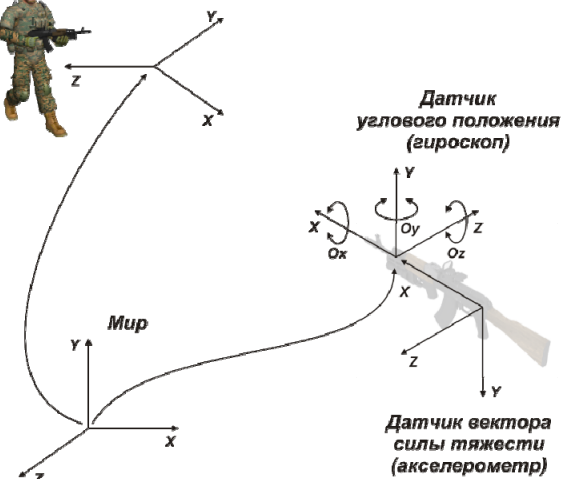
The magazine connected to the central pneumatic line

The rifle mock-up with recoil simulation means connected to the central pneumatic line



### The system of weapons positioning

Виртуальный объект



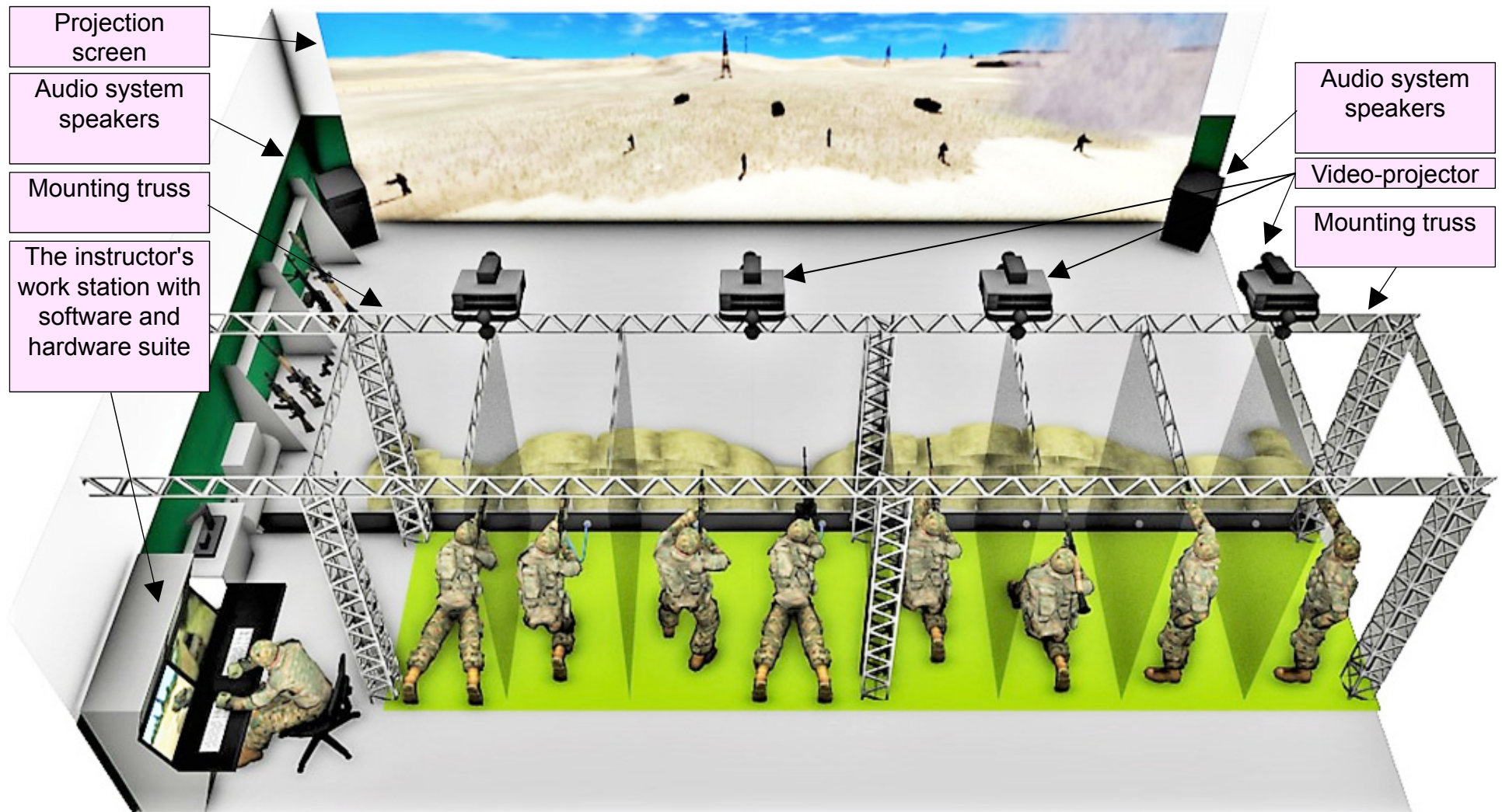
The weapon spatial positioning system is built upon angular position sensors, gravity vector sensors, and class I laser emitters and is connected to the server via a wireless high-speed channel

The positioning system calculates the pitch angles of the weapon (including cant angle), trigger control characteristic, a degree of pressing the butt-stock to a shoulder pocket, a position of a line of sight and aiming point, as well as a muzzle oscillation dynamics up to a moment a shot is fired

## Multimedia visualization means

3

The multimedia virtual battlespace visualization means are based on the modern visualization software and projecting system



The multimedia visualization tools provide the creation of high-quality static and dynamic scenes to a depth of 1000 m, generate sounds of shots of various types of weapons, as well as the sounds of combat (shells, grenades explosions, military equipment operating).

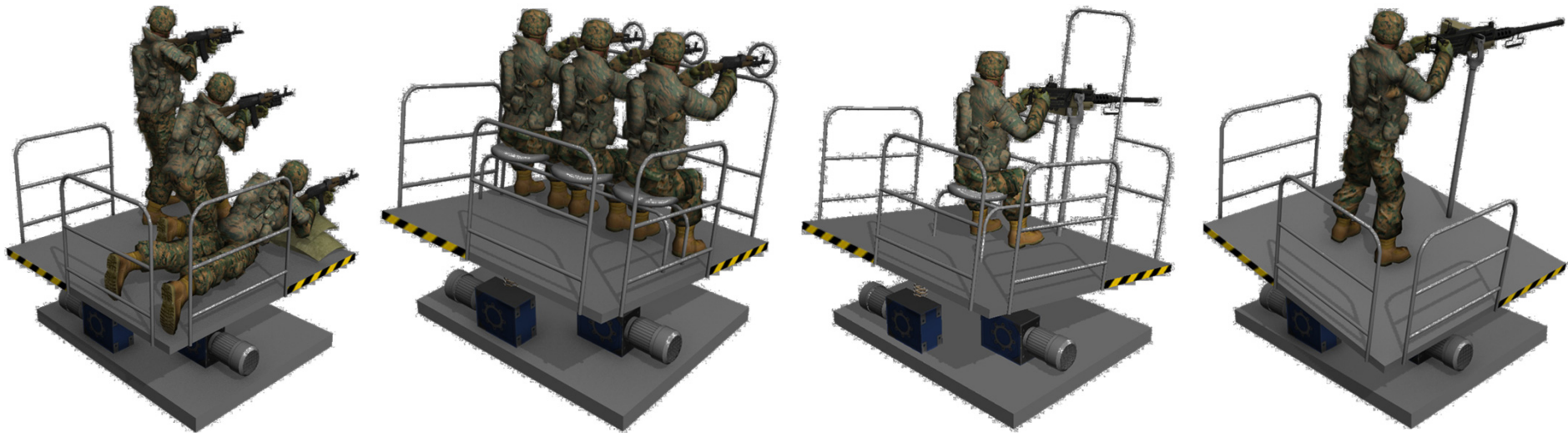
The screen dimensions and configuration are changed and modified as per the Customer's requirements.



## The motion system

3DOF motion platform delivers the following capabilities in the firers' training process:

- shooting at various targets from moving vehicles (cars, armored personnel carriers, combat vehicles, helicopters)
- shooting from firing positions with different target elevation angles
- shooting from firing positions with a various slope

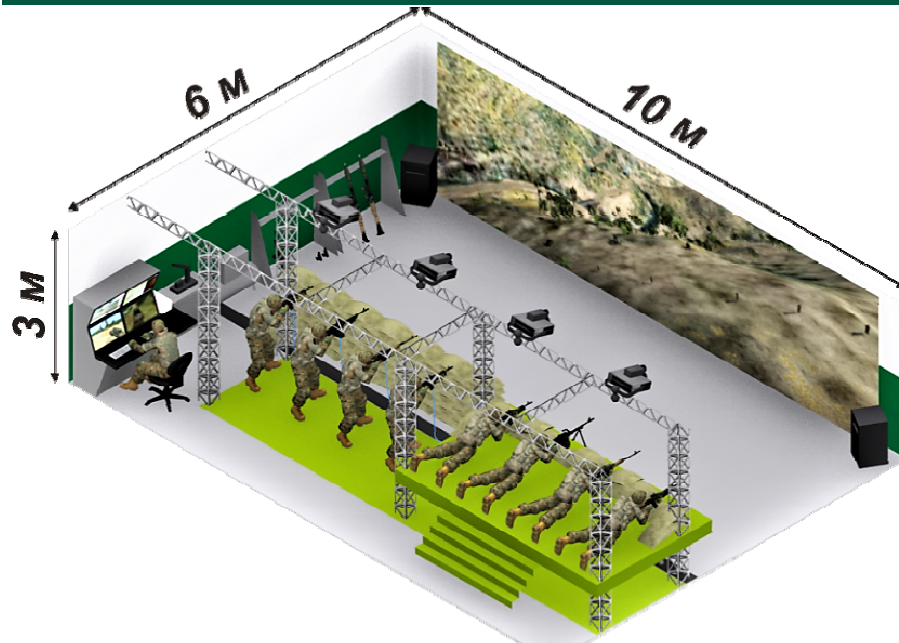


№	Characteristics		Value
1	The number of degrees of freedom		3
2	Pitch angle, degrees		+/-15
3	Roll angle, degrees		+/-15
4	Heave, mm		200
5	The load weight, kg		1200
6	Overall dimensions	Length, mm	1900
		Width, mm	1560
		An altitude in the lowest position	900
		An altitude in the highest position	700
7	Weight, kg		800
8	Electric power parameters	Voltage, V	220
		Frequency, Hz	50
9	Maximum consumed power, kW		6.6

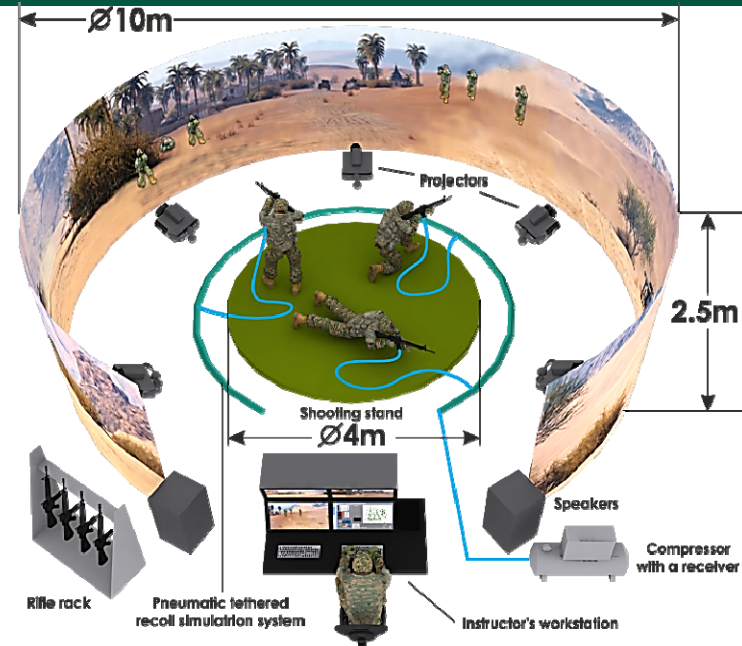
# The simulator configurations

By the type of projection screen

Plain screen



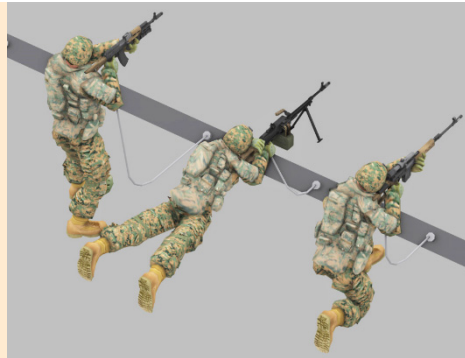
Circular screen



As per the the firers movement capacity during an exercise

Static firing positions

When performing firing exercises, each trainee fires within the assigned firing lane, which allows objectively and automatically evaluate trainees' actions and firing results. The recoil simulation system (both tethered and tetherless) allows firing from different firing positions (prone, kneeling, standing).



With the capability to maneuver

When performing exercises with elements of tactics, the recoil simulation system using compressed air accumulators allow firing subunit as a whole, moving in accordance with the prevailing situation and the commander's commands.



## Marksmanship complex completeness

Serial №	Names of components	Quantity,
<b>I</b>	<b>Instructor's workstation (chief instructor)</b>	<b>1</b>
1.1	Unified desk (including power on/off switch and protection panel, keyboard, optical manipulator, laser printer, 23,5" video monitors, uninterrupted power supply, audio system, cable harness)	1
1.2	Computer tower with general and special software	6
<b>II.</b>	<b>The range equipment</b>	<b>1</b>
2.1.	The mass-dimensional small arms mock-ups with recoil simulation equipment and spatial positioning means, set	8-20
2.2.	Mounting truss with video projectors' and cameras' brackets	1
2.3.	The piston-like and motor-operated supercharger, with a receiver	1
2.4.	The main air-pressure line	1
2.5	Air filling terminal	1
2.6	Compressed air accumulators, in-built into small arms magazines, set	1
2.7.	Functional day - and night - sights' mock-ups, set	1
2.8.	Arms locker	1
<b>III</b>	<b>Multimedia virtual battle space visualization means set, including</b>	<b>1</b>
3.1.	Visualization software suite (as part of the simulator software suite)	1
3.2.	Projection screen	1
3.3.	Video-projectors	4-6
3.4.	Audio system speaker	2-4
3.5.	camcorder	4-8
3.6.	The battery for powering electronic tools of spatial positioning of weapons, set	1
3.7.	Air filling terminal for compressed air accumulators	1
<b>IV</b>	<b>Motion system</b>	<b>1</b>
4.1.	The motion platform table with protective railing	1
4.2.	The motion platform base	1
4.3.	An electromechanical drive	3
4.4.	Electronic control box	1
4.5.	Frequency converter	3



## The simulator technical characteristics

Serial №	Characteristics		Parameter's value
1	Quantity of simultaneously trained persons		8 firers
2	The Quantity, of full-scale weapon mock-ups		8-20 (as per the Customer's requirements)
3	The type of projection screen		Plain
			Cylindric
			Circular
4	The projection screen dimensions, m	Plain	2,5 x 9 (3 x 10)
		Cylindric	3 x 10
		Circular	10 m diameter
5	The screen aperture (viewing angle from the central position), degrees	Plain	90-120
		Cylindric	100-130
		Circular	340-360
6	Quantity of projectors, pcs.		4-6
7	Distance from the line of fire to the projection screen, m		3-5
8	Air pressure in the central pneumatic line, atm		8-12
9	Air pressure in the compressed air accumulators, atm		45-50
10	Quantity of compressed air accumulators built into standard ammo magazines, pcs.		As per the ammunition combat load specified by the Customer
11	The simulator activation time (excluding the time of charging compressed air accumulators), min		15
12	The minimum area to place the shooting complex, m2		60

## PERFORMANCES

- Power supply - a single-phase AC 220 V, 50 Hz net
- Power consumption with the motion system - no more than 9 kW, without mobility platform - 5 kW
- Guaranteed continuous operating time - at least 12 hours
- Marksmanship training complex meets the following performance requirements:
  - increased working and limited temperature - up to + 40° C
  - reduced operating temperature up to + 5° C
  - relative humidity up to 80% at + 25° C.
- Recommended air temperature in a premise: +25° C

# Examples of exercises' scenarios visualization in the shooting complex

The tactical environment in a desert area



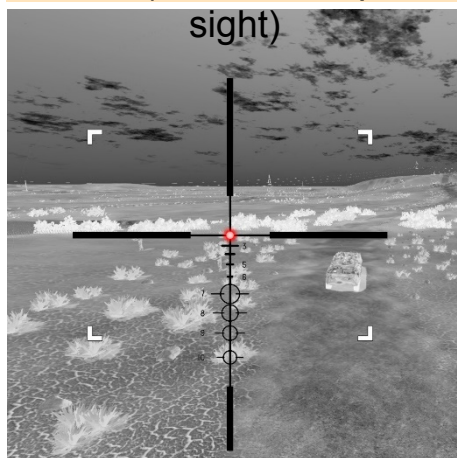
Foothill urban area

The sighting devices' fields of view

PSO-1 day channel



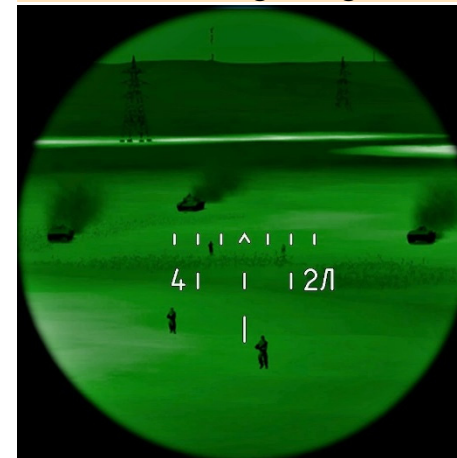
TWS (thermal weapon sight)



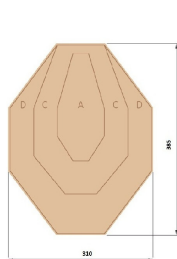
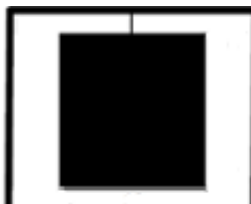
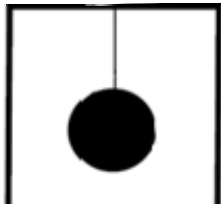
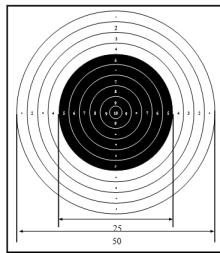
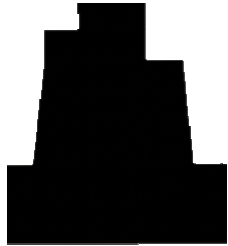
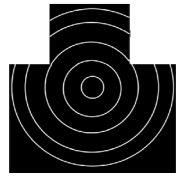
PSO-1 night channel



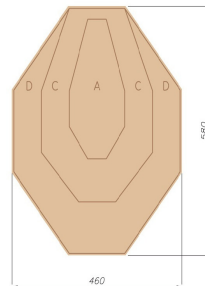
1PN58 night sight



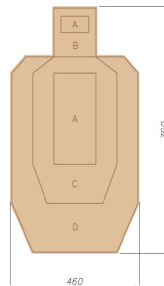
## Examples of 2D and 3D targets



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МИШЕН КЛАССИЧЕСКАЯ

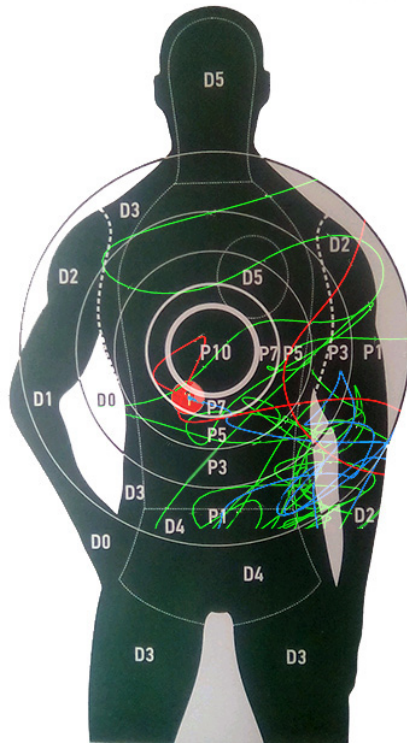


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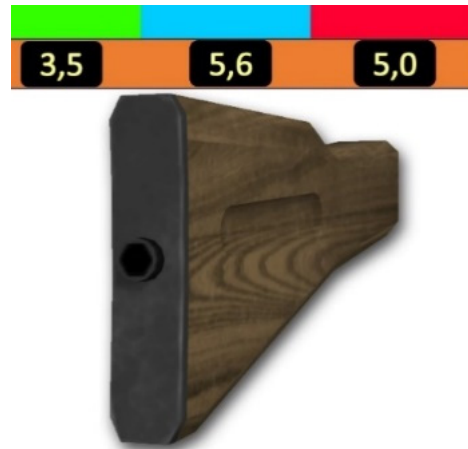




## The individual skills monitoring



The tracking of muzzle wobbling



The rifle cant and the level of butt-stock pressure in a shoulder pocket



The trigger control graph

The simulator software allows the instructor to set out each shot into three periods: aiming, firing off a shot, and post-firing weapon retention.

Those periods are displayed on the target with three lines of green, blue, and red, respectively. The muzzle wobbling during these periods characterizes the actions taken by the shooter to perform the recommended procedures for presenting the weapon, aiming and holding the sight picture, breathing, and trigger control, which are the basic principles of marksmanship.

The green line indicates the sameness of aiming, blue to the position of the weapon at the time of the shot (1 sec. to a sear release), and red for proper weapon retention when firing, and especially when the bursts are fired.

The same colors are used to show the effort the shooter applies the butt-stock to the shoulder and the graph of the effort with which he pulls the trigger, which together allows the instructor to correct mistakes made by the shooters during firing.



**Developer and manufacturer of the  
Marksmanship training complex “Range-P”  
LCC ‘ Research and Production Company ‘Energy 2000’  
Povitrophlotsky, 94-A, Kyiv, Ukraine  
[www.simulator.ua](http://www.simulator.ua)**

**Developer and manufacturer provide:**

- ☐ fabrication and delivery of the simulator equipment to the place of intended use
- ☐ assembly, adjusting, commissioning and acceptance tests
- ☐ training of user's technical personnel
- ☐ warranty service for 2 years
- ☐ post-warranted maintenance (subject to separate contract)