

# **Laser tag kit for home use**

**User's manual**

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Laser tag is a type of active recreation that doubles as a sport and has become increasingly popular for families.

Participation in laser tag does not require any special skills or physical training, making it an activity that is open to anyone from the age of five and up.

It can also be a great team-building act, helping to foster communication and collaboration skills amongst participants. Whether it's a family outing or a corporate team-building event.

Laser tag is not just a game, it's an opportunity for children to develop physically and intellectually.

Laser tag helps children to develop qualities such as coordination, concentration, and quick decision-making.

The task of the player's team is to complete the mission (depending on the scenario) earlier than the opponent's team, while getting the tager's beam into the sensors of the players of the opposite team and not letting them hit themselves.

## 1 Game kit

The main components of the equipment:

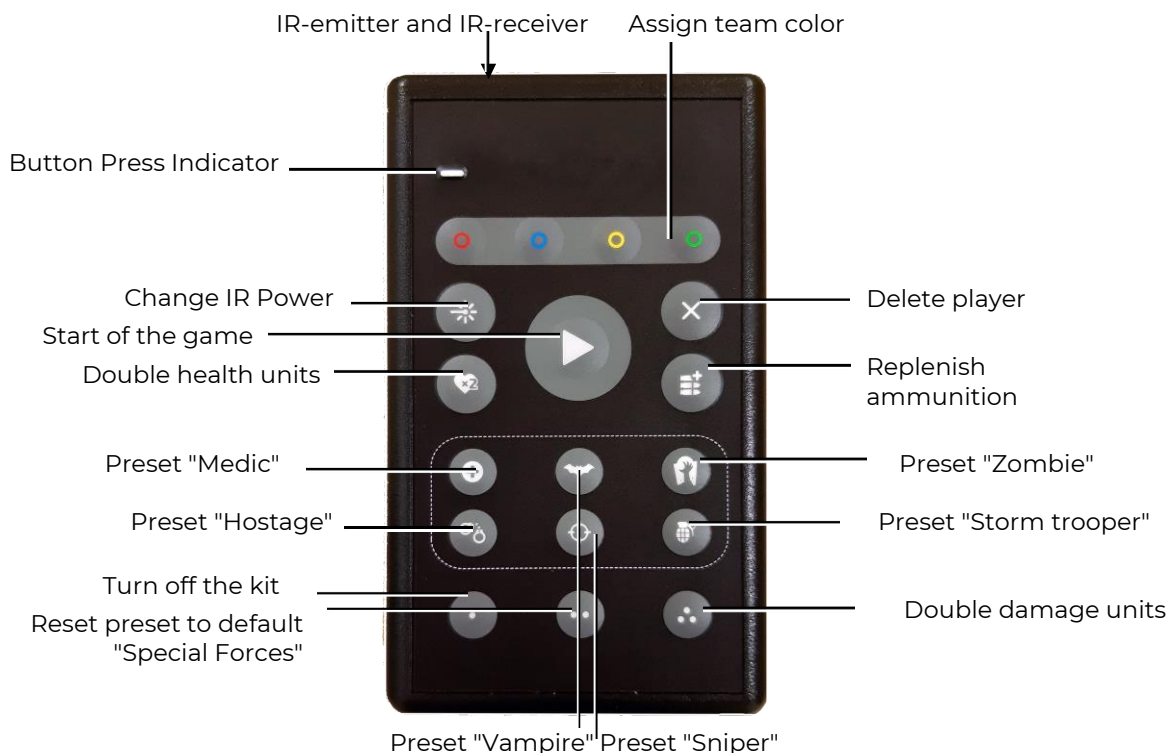
- Remote Control – 1 pcs.;
- Tager – from 2 to 10 pcs.
- A device for fixing a hit (headband) – from 2 to 10 pcs.
- Wi-Fi router – 1 pcs.

### 1.1 Remote Control

The smart remote control (Remote Control) is designed to change the parameters of the tager and control the laser tag game.

Power: 2 batteries for 1,5 V of the AAA type.

On the external panel of the remote control there are 18 buttons, graphically divided into 4 zones: assigning the color of the teams, game control, presets (scenario settings of the Game kits) and functional buttons. The front side panel of the remote control is made of a material transparent to IR-radiation, that allows you to send and receive game commands.









**External elements of the remote control**

### 1.1.1 Access point selection

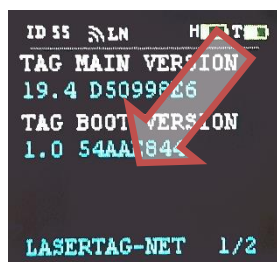
In case of simultaneous use of game kits at two or more playgrounds, and with several access points configured for different names, it is necessary to configure the kits for the corresponding names. To do this you need to:

1. Switch on the blaster in service mode (pushing the trigger) and turn on the headband).
2. Directing the emitter of the remote control at the headband or infrared receiver of the blaster, press one of the preset buttons corresponding to the name of the access point:

 - LASERTAG (LT),  - LASERTAG-NET (LN),  - MGO (MG),  
 - Test mode (TM),  - OTK (OT),  - TechSupport (TS);

LEDs on the headband respond by double blinking with the color of the team, and you will also hear the sound effect of a passing bullet. The full name of the access point will be displayed on the tager screen.












3. Turn the kit off and turn it on again in standby mode.  
Two letters of the abbreviated name of the access point should appear in the top line of the tager screen, next to the Wi-Fi connection icon.




Tager screen when selecting an access point

## 1.1.2 Configuring game kits


To change the settings of the kit, the tager, the headband (hit capture device) must be located within the direct line of sight from the remote control, optimally no further than 5 meters:


1. Switch on the tager and the headband in standby mode. If the kit is correctly attached, the headband will blink in the previously selected team color and you will hear a system sound.
2. Point the IR emitter of the remote control at any of sensors on the headband or tager.
3. The color of the team can be changed using 4 buttons "Assign team colors"    . By pressing the button with the selected color, the color of the RGB indicators of the headband and the power indicator of the blaster change, accompanied by a short sound signal from the speaker of the tager.
4. To change the power of the beam emitted by the infrared diode on the blaster, you must push the "IR beam power" button . This parameter varies depending on the conditions of the game: in open areas, in sunny weather, the beam power must be increased, in the evening, indoors to decrease the rebound effect, it must be reduced. The remote control allows you to switch two gradations of power (maximum or minimum), which will change each time the button is pressed. The factory settings of maximum power correspond to 90 conventional units, and minimum - 40. In the first case, the tager speaker reproduces the sound of a shot from a space blaster, with reduced power - the standard sound of a shot. At the same time, the range of the shot and the brightness of the glow of the optical LED will change. Setting the maximum or minimum power of the infrared beam with an accuracy of 1% can be done using the program installed on a phone (tablet).
5. To increase the number of player's health units in this round of the game, you must click the "Double health units" button . And each press will double the previous value, up to 255 units. In this case, the blaster will play sound signals resembling Morse code.
6. The button on the remote control  allows you to replenish ammunition, and the tager's magazine is refilled, i.e. if at that moment there were 29 rounds left in the magazine, then only 1 round would be added (with the settings of 30 rounds in the magazine).
7. There are 6 preset buttons that allow you to quickly change the settings of kits depending on the scenario. Each preset is a pack of settings that allows you to give the kit specific, different from standard abilities. The remote control allows you to assign such presets as Doctor , Vampire , Zombie , Hostage , Sniper

 and Stormtrooper . To reset to the standard settings of the kit ("Special Forces"), press the button with two dots .

The remote assigns presets with pre-configured parameters (a chart with the basic settings of presets is given in chapter 1.2.1. Part 1 of this manual), but starting from the version 2.02 of Lasertag Operator (for Android), it is possible to edit presets. However, custom settings are applied only when connecting kits to the server. Therefore, if the kit is online, when the preset is sent with the remote control, the parameters set in the program are assigned, if the game is played without a server, the default settings are used.



8. Buttons with dots are functional, i.e. the user can assign commands to them (as to any other button). But in the factory settings there are also default commands installed for these buttons.

So, a button with one dot  allows you to turn off the kit. To do this, direct the emitter of the remote control at the infrared sensor of the tager or hit capture device, and then press this button.

"Reset to the default preset" command is installed on the a button with two dots .

Pressing a button with three dots  doubles the damage caused by shot.






You can change the power of the shot, the number of lives, the color of the team, double the damage of the kit, and you can inflict 2 damage during the game round. You can also turn off the kit during the game.

9. To change the volume level of the blaster speaker, put it in service mode (by holding down the trigger). Directing the remote control at the IR receivers of the kit, and pressing the buttons Change IR Power  (increase) and Double Health Units  (decrease) you can set the required level.

### 1.1.3 Managing the autonomous operation of a headband

Starting with firmware version 19.2, the headband can function autonomously, without a blaster. Because there is no Wi-Fi module in the control board of the hit capture device, and there is no way to connect to the network, configuration and control are carried out only by using the Remote Control.

To activate an autonomous mode, it is enough to turn on the headband, direct the transmitter emitter at the sensors and press one of the preset buttons.

At the moment, 5 battery life modes are implemented: Activator (button ) , Medic (  ), Zombie Player (  ), Frontier, (  ) and Hostage (  ).


To start the modes, you must click the Start Game button .

The description of the autonomous operation modes of the hit capture device is described in Chapter 1.3.6 of this manual.

### 1.1.4 Controlling the game using the remote control


The use of the equipment manufactured by the company implies the use of a Wi-Fi network. In this case, the functionality of both game kits will be fully disclosed. But games can be held using only the remote control.


After setting up the game kits (team color, preset, IR beam power, additional health units - see Chapter 1.1.2. Of this manual), you can start the round. To do this, you need to point the IR

emitter of the remote control at the sensors of the headbands of the players (in direct visibility up to 5 meters) and press the Start the game button .

At the same time, all the headbands respond with a short flash of the team color, and the speakers of the taggers reproduce the sound "Go, go, go!" or "Start!".

The teams go back to the bases and wait for the start sound signal.

During the game the referee can remove the player, for example, who violated the rules using the remote control, to do this, you must direct the IR emitter of the remote control at the headband of this player and press the Delete Player button .

With the Start the game button , the referee can restore the player in the game, without his returning to the base.

### 1.1.5 Setting the button commands

By default, the remote control is already programmed to execute all the necessary commands, but any button can be reprogrammed to your own desires and needs of the game. There are two ways to do this - copying and self-programming.

To copy, you need a similar remote control, the commands of which can be duplicated.



The procedure is as follows:

1. Place the remote control with the front translucent panel in the direction of the emitter of the copied remote control (face to face).
2. Press the button you want to reprogram on the remote control until the button indicator flashes rapidly.
3. While holding this button down, press the necessary button on the remote control that is being copied. Successful receipt of the pack will be displayed by increasing the flashing frequency of the indicator of the remote control that is being programmed.
4. Wait until the indicator goes off and release the button.
5. Check the correctness of the change.
6. Repeat the procedure for other buttons if necessary.

In addition, the remote control can "self-adjust". Using the buttons as a keyboard and typing the command code, you can program each of them (except for the button Change color to red) without additional devices.

The programming procedure is as follows:

1. Simultaneously press the Change color to red button and the button that needs to be reprogrammed.
2. Wait until the flashing green LED first increases the frequency, and then stops (should constantly glow).
3. While holding the Change color to red button, release the button that is being programmed.
4. Without releasing the Change color to red button, dial a 4-digit code, according to the code chart and the attached scheme of buttons and symbols.
5. When the button is pressed correctly, the LED should temporarily turn off.
6. The green LED will turn off as a confirmation of a successful code entry.
7. Check the correctness of the change.
8. Repeat the procedure for other buttons if necessary.

If necessary, return to the default settings, just hold the buttons of the Hostage  and Stormtrooper  presets for 5 seconds. You should wait until the frequent blinking of the green LED stops and turns off, this action restores the factory settings.



### Codes table

Remote Button	Symbol	Command	Code	Set
		Change the team color to red	A900	
	0	Change the team color to blue	A901	
	1	Change the team color to yellow	A902	
	2	Change the team color to green	A903	
	3	Change IR Power	830E	
	4	New game	8305	
	5	Delete the player	8300	
	6	Double health units	8310	
	7	Add ammo to the magazine	811E	
	8	Medic preset	A806	
	9	Vampire preset	A807	
	A	Zombie preset	A803	
	B	Hostage preset	A801	
	C	Sniper preset	A805	
	D	Stormtrooper preset	A800	
	E	Turn off the kit	E0E0	
	F	"Special Forces" preset (default)	A804	
	Shift	Double damage inflicted by kit	8312	
		Change the team color	8309	
		Add 1 point of health	8B01	
		Respawn	8304	
		Radiation	A001	
		Domination box captured	8311	
		Radiation only for red	BE01	
		Radiation only for blue	BF01	
		Radiation only for yellow	C001	
		Radiation only for green	C101	

## 1.2 Tager

A tager is a device that emits directional focused pulses of harmless infrared light. The coding of the signal is carried out at a carrier frequency of 56 kHz and a wavelength of 940 nm.

As emitters, OSRAM SFH 4545. IR diodes are used.

To increase realism, the IR-beam is duplicated by a beam of visible light during a pulse.

The purpose of the tager is to get with a focused infrared ray into any of the hit sensors on the HFD - hit fixation device (headband) of the opponent team player. In this case, the hit indicator is triggered, which is shown by the flashing of the RGB-indicators of the HFD, vibration, and a sound notification of the player's "injury" or "defeat". If one lacks health units, his tager is disabled, and the kit cannot participate in the round until it is "restored" by any device (depending on the scenario).

Also in firmware starting from version 19.1 there is an option to play without a headband - only using a tager. In this case, hit sensors built into the housing act as HFDs. This option will be convenient for hot weather, when wearing a headband is quite uncomfortable. Or when the headband is used in standalone mode (see Chapter [1.3.6](#)).

The communication of the tager and the HFD is wireless and is carried out over the air with a working frequency of 868 MHz. To configure, manage and remove statistics using a server and computer programs, a Wi-Fi channel is used.

The tager, depending on the order, can be equipped with an IPS (color) screen, , hit sensors, a second-hand sensor and front shot illumination in the color of the team.

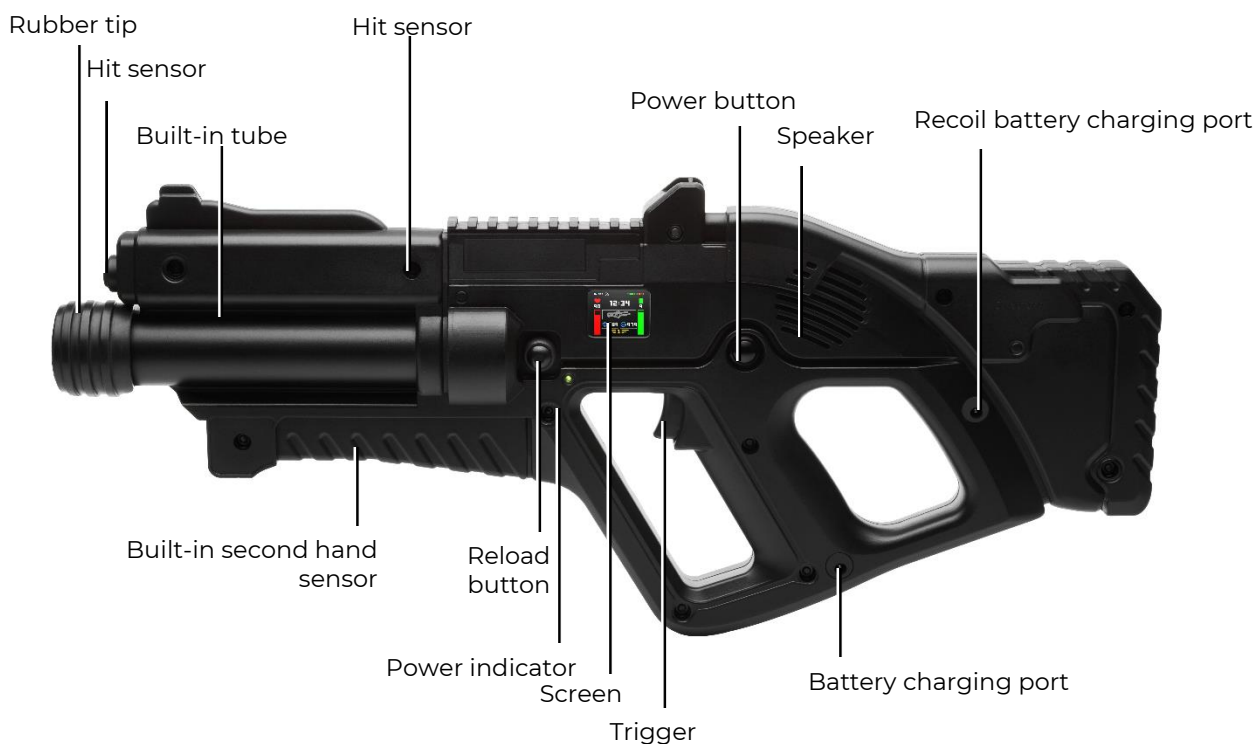
Tagers are manufactured in the following complete sets: Standard, Premium.

Set	Rubber tip	Screen	Second hand sensor	Hit sensors	Impulse recoil
Standard	✓	✓		✓	
Premium	✓	✓	✓	✓	✓

The FALCON F1 tager is a medium-sized gun (length – 54 cm), suitable for players of all ages; it supports the game without a headband and has 10 types of weapons in one.

In the FALCON F1 tagers, impulse recoil is implemented, thanks to which pulses mimicking the real recoil of the weapon pass along the body when shot.

Guns are made of shockproof black ABS plastic, which is resistant to shocks and scratches. The screen displays health units, active weapons, and other game statistics.



### The main elements of the tager FALCON F1 (equipped with Premium)

The tager can operate in three modes - "service", "standby" and "game".

#### 1.2.1 Service mode

You can go to service mode by turning on the device with the trigger held down. In service mode, the screen displays the identification number of the kit, the status of the connection to the server, the battery charge of the tager and HFD, the version numbers of the firmware, and the name of the hotspot to the server.

The information is displayed on two main screens - the firmware versions of the tager are shown on the first screen, and the information about the firmware versions of the headband is shown on the second screen. Double click on the power button to switch between the screens. The information can be displayed in two different methods. The first one shows hexadecimal designation of the firmware version, and the second one shows the date and time of its updating. Double click on the tager reload button to switch between the display methods.



Two options for displaying the tager's firmware



Display of headband and shock-band firmware

In this mode you can:

- change the identification number (ID) of the tager;
- assign a tager ID to any headband (bind any headband to the tager);
- change some settings using the Remote Control.

### 1.2.1.1 Change tager ID

Upon delivery, all kits have different numbers, but inside the kit, both the tager and the headband with their identification numbers (ID) must correspond to each other.

In service mode, it is possible to change the tager ID. For that, you need to:

1. at the same time hold the trigger and reload button for 8-9 seconds;
2. after the sound signal, release the trigger and button - the kit ID will be reset to the 1st number;
3. briefly pressing the reload button to set the desired number (the change in the number will be accompanied by a sound signal);
4. turn off the tager by holding the power button.







After changing the identification number of the tager, it is necessary to "tie" a headband to it, i.e. assign the same number (see Ch. 1.3.4).






### 1.2.1.2 Changing settings using the Remote Control

Starting with the tager firmware version 17.0.60, in service mode, the ability to change some settings of the kit using the Remote Control has been added.

To do this, you need to direct the transmitter emitter to any of the sensors that hit the kit and press the corresponding button. The following settings are possible:

1. select hotspot:

Button	Hotspot name
	LASERTAG
	LASERTAG-NET
	MGO
	Test mode
	OTK
	TechSupport

2. set the sound volume level (  – increases,  – decreases);
3. change the HFD display mode (press the button ). Each press will produce a different sound: system sound for normal mode and ricochet sound for inverse indication;
4. enable auto-reload – press the button , disable – .

### 1.2.2 Standby mode

The kit is turned on by pressing the power button of the tager and the control unit of the HFD (headband) and shock-band for 3 seconds, and goes into standby mode.

Since hitters are installed on tagers of all configurations, in this mode the tager is ready to receive commands for changing settings and launching the game. But in order to conduct the game without HFD, it is necessary to check the corresponding item in the program in the settings of the kits. If this is not done, then when the tager is turned on after 5 seconds, a message on the operation of the cheat detector (CD) will be displayed on the screen. A similar reaction will occur if the player independently turns off the headband during the game.

**! Most of the scripts built into the program have the "Game without a headband" mode turned on by default.**

If, after their turning on, the individual numbers of the individual components of the kit coincide, the sensors on the headband begin to blink smoothly in the color of the team, and the control unit of the shock-band plays a sound signal. Images of the batteries of the devices connected to it will appear in the top line of the tager screen. (T – tager, H - headband).

If there is no connection to the server, the Wi-Fi icon or 2 letters of the abbreviated network name (with 4 devices) glows gray, when connected to the network it glows green.

In standby mode, the instructor through the computer program or using the remote control has the ability to change the color of the team, add ammunition, increase the number of health units, set a scenario preset, etc., and also start the game round.

#### 1.2.2.1 Setting presets using the remote control

It is possible to set a preset (role) for the kit with the help of the Remote Control, using special buttons. At the initial start, by default, the "Special Forces" preset is installed on the kit. The player has 100 health units, only one type of weapon is a assault rifle (damage 25, ammunition 100 magazines of 30 rounds).

Starting with firmware version 19.2, presets can be edited in programs for Windows and Android, and when playing a game with the server, the preset parameters configured in the program (custom) are applied. They are sent to the kit via wi-fi channel.

If the game is played without a server, then when you turn on the kit for the first time, the settings that the kit had before turning it off, including custom ones, are used. If during the game one direct the remote control at the player's sensors and press any preset button, these settings are reset and the kit get the settings programmed by default.

The main parameters of presets by default are given in the table:

Preset	Medic		Vampire	Zombie	Hostage	Sniper		Storm trooper		Special Forces (default)
Remote Control Button										
Number of health points	100		250	200	300	100		100		100
Invulnerability time, sec	1		1	2	3	1		1		1
Shock time, sec	1,2		1	1		1,2		1,2		1,2
Auto-regeneration time, sec	0		0	0	0	0		0		0
Friendly fire*	no		no	yes	yes	yes		no		no
Inverse indication	no		no	yes	no	no		no		no
Weapon	1. Medkit	2. Gun	Bite	Claw	no	1. Sniper rifle	2. Gun	1. Assault rifle	2. Underbarrel grenade launcher	Assault rifle
Damage, health units	25	25	10	h/2**		100	25	25	100	25
Rapidity of fire, shots per minute	300	180	300	200		30	180	545	100	545
Shooting mode										
Shooting mode change	no	yes	no	no		no	yes	yes	no	yes
Quantity of spare clips, pcs	0	2	0	20		4	2	10	3	100
Amount of cartridges in a clip, pcs	10	10	999	30		10	10	30	1	30
Shots in the burst, pcs	1	3	1	1		1	3	3	1	3
Reload time, sec	1	1	1	1		4	1	3	6	3
IR-beam power, %	50	50	60	20		100	50	60	30	60

\*Friendly fire in an individual setting means that the kit can be hit not only by the players of the opposing team, but also by the players of own team.

\*\* h/2 - When a zombie hits a player, it takes away half his health units



Single shots



Burst mode



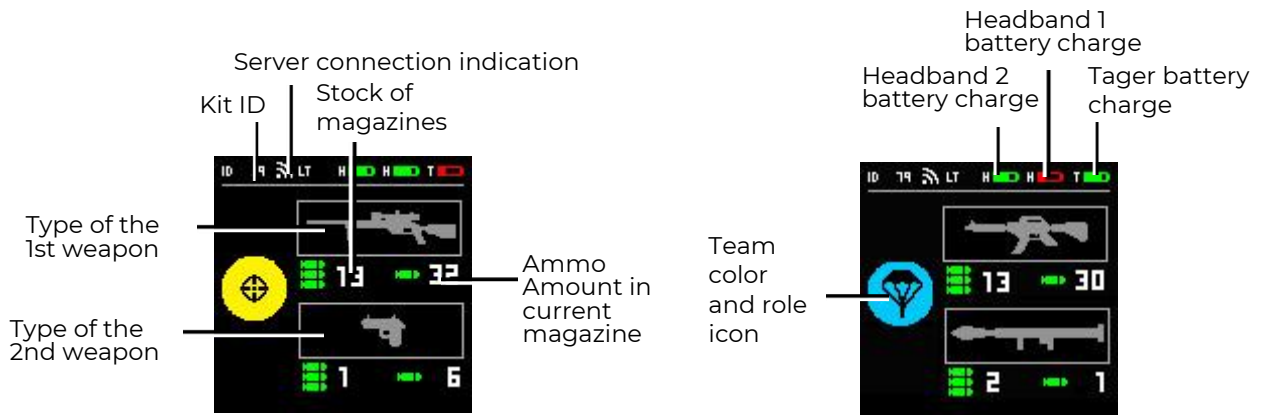
Burst duration until empty

Each preset has its own characteristics. So, a kit in the role of a Vampire loses 1 unit of health every 5 seconds (the so-called "thirst"). Also, on him and on Zombies, the Medkit and Radiation produce the opposite effect - the first takes health units, and the second replenishes. A zombie turns an affected opponent into a zombie, and when Vampire hits a player, he not

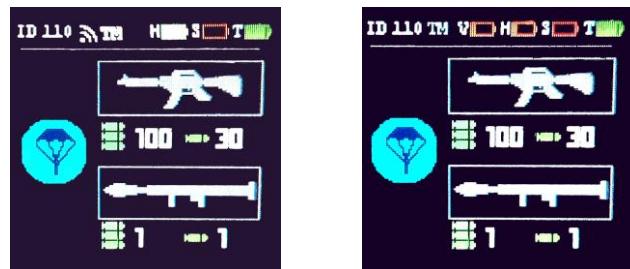
only reduces his number of health units, but also attaches them to himself. Read more about presets in part 3 of this manual.

When assigning presets from the Remote Control, the parameters recorded in the firmware of the kit are used, but they can be corrected by increasing the number of health units and changing the power of the IR beam by pressing the corresponding buttons of the Remote Control.

Presets can be edited in the Android program and when playing with the server, the preset parameters configured in the program (custom) are applied. They are sent to the kit via wi-fi channel.



IPS screen when selecting kit configuration



IPS screen with two / three connected HFDs

### 1.2.3 Game mode

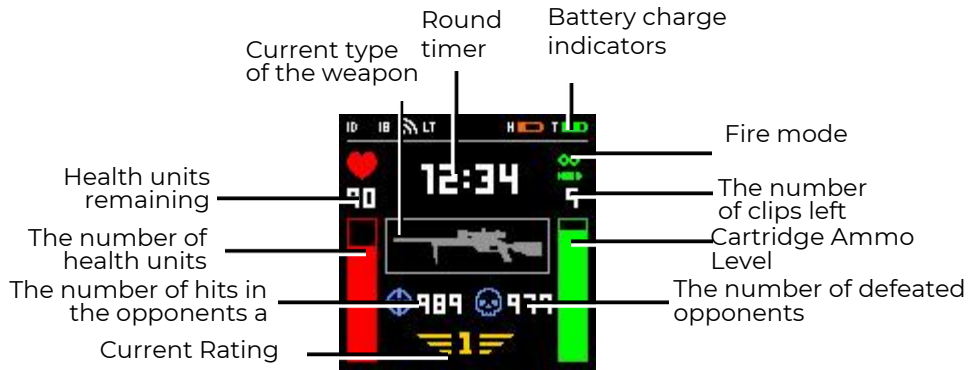
You can control game kits using both the remote control and the programs installed on a computer or smartphone (tablet).

In order to start the game using the Remote Control, the kit must be activated:

1. Turn on the kit and make sure that the tager, HFD and shock-band are “tied” to each other (headband indicators blink smoothly in the color of the team, the shock-band mode LEDs go out, and the battery icons of the connected devices appears on the tager screen).
2. If necessary, select one of the presets - point the emitter of the remote control to any of the HFD sensors and press the corresponding button on the remote control.
3. To start the round, click the "Start Game" button.
4. Upon successful activation, the sound message “Go, go, go!” or “Start” is played, the RGB-indicators of the HFD once light up with the color of the player’s team and go out. The shock-band reacts to the start of the game with a short vibration signal.
5. During the game round, a player can hit opponents with the infrared beam of his tager and be hit by opponents in the sensors located on his kit (headband or tager).

Setting up and managing game kits from computer programs are described in part 2 of this manual.

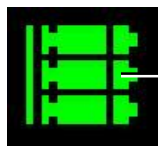
If an IPS screen is installed in the tager, during the game it displays information about the kit parameters, current individual statistics and the round timer:



Screen menu during the game



Single shots



Burst mode



Burst duration until empty

Pictograms keys of firing modes

During the game, the screen displays almost all the events occurring with the kit:



Health units doubled



Two-hand absence sensor tripped



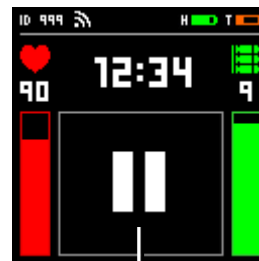
The player was affected by Med KIT



The player was affected by Radiation



Zombie damage received



Game paused

Also briefly it shows the individual number of the opponent which the player hit, and the ID of the player who hit him.





The player hit an opponent with ID 125



The player defeated an opponent with ID 125



The player was hit by opponent with ID 2



The player was defeated by opponent with ID 125

### Decoding characters on the screen during the game

During the game, it is monitored whether external hit fixation devices are turned on. And if this is not provided for by the kit's settings, when the player arbitrarily turns them off, the message about "cheating" is displayed in the computer program and on the tager screen:



Cheat detector alarm

At the end of the game round, brief statistics are displayed on the screen.



The number of hits in the opponents

The number of defeats from the opponent

Place in rating

The number of defeated opponents

The number of points gained

IPS screen at the end of the game

Turning off the tager - hold down the power button for 7-8 sec in standby mode and for 12-13 sec in game mode.

#### 1.2.4 Reload button

The reload button located on the tager body, in addition to directly simulating a store change, also allows you to change the shooting mode and current weapon (if allowed in the kit settings).

As a rule, for each new game, the tager is equipped with limited ammunition (clips with cartridges). After a player shoots a clip, when pressing the trigger, he hears sounds imitating a misfire.

To resume firing, briefly press the reload button. At the same time, the characteristic shutter sound is played, and the tager is again ready for game. Reloading can be done before emptying the clip.

To change the shooting mode (with single "shots", a fixed burst, usually 3 rounds each, and an endless burst until the magazine is empty), you need to press the reload button twice with an interval of less than 1 second. If the mode change is successful, a beep will sound. When changing weapons, the shooting mode is maintained.

Starting from the tager firmware version 17.0.60, it is possible to assign roles to kits, among which there are those that have two types of weapons in their arsenal. So, the Medic has a Medkit and an assault rifle, the Storm trooper has an assault rifle and an underbarrel grenade launcher, the sniper has a rifle and a gun.

To change weapons, you must hold down the reload button for about 3 seconds until the sound signal starts to play.

All parameters of the tager (the number of clips, cartridges in them, reload time, rate of fire, interval of the player's invulnerability, etc.) are programmed using programs installed on a PC, tablet or phone.

#### 1.2.5 Charging batteries of the tager

Depending on the delivery set, the tager can be equipped with one or two (for guns with impulse output) sets of batteries. Each of them has a separate charger connector.

The charging cycle for fully discharged batteries is 5-6 hours when using charging with an output current of 1 A, or 2 hours when using charging with an output current of 2 A for a tager (capacity 2400 mA/h).

### 1.3 Headband

A headband is included with each player and are devices for fixing and indicating a hit. It consists of a textile base, a control unit and 4 sensors.

#### 1.3.1 Headband textile base

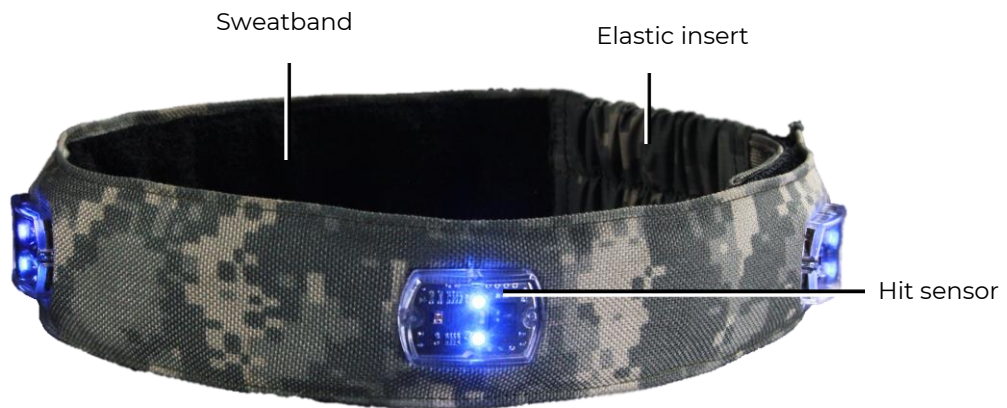
The base of the headband consists of 2 layers. External - from durable wear-resistant cordura fabric. Velcro-style textile fasteners are sewn on the inside for attaching a sweatband and a moisture-proof zipper. The headband design allows, if necessary, to extract electronic components and wash the textile base.

**! Due to the fact that the headband is used in high humidity conditions, it is recommended to check periodically (once every two weeks) the functionality of the fastener by opening and closing. If it is difficult to slide the slider, lightly rub the prongs along the entire length of the zipper with a household paraffin candle or dry soap.**

The headband is completed with a sweatband, which is used when playing without a headdress. The band is made using a volume mesh "air-mesh", which provides air circulation between the headband and the player's body. The band, if necessary, can be easily detached for sanitization.

**! Before washing, it is recommended to fold the band so that the spiky segments of the textile fastener (hooks) are connected to each other.**

To change the size of the headband it is necessary to use a textile fastener, which is set in the desired range. To fix on the player's head, the headband has an elastic insert.



**The appearance of the headband**

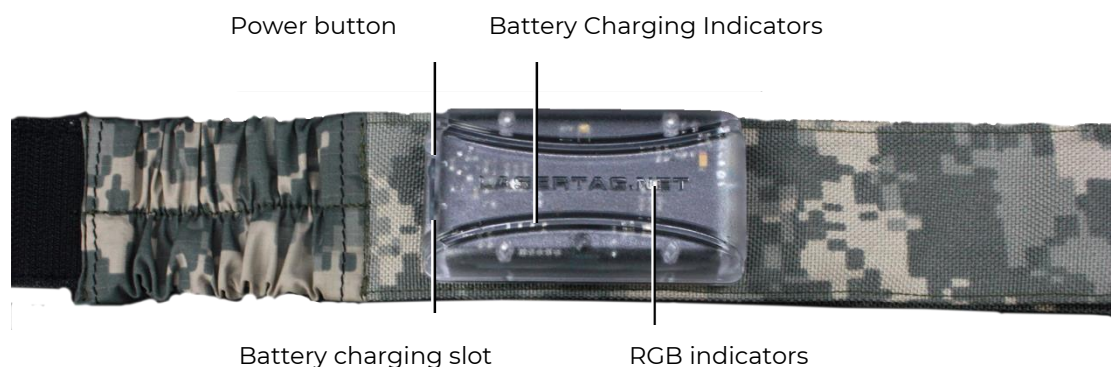
### 1.3.2 The electronic components of the headband

The headband has 4 hit sensors (3 around the perimeter of the headband and one in the control unit).

Inside the control unit there is an electronic board on which one of the hit sensors, a vibration device, and a battery that is charged by the charger through a special connector, are installed. The connector, as well as the power button located on the case, is closed from contamination by a silicone plug.

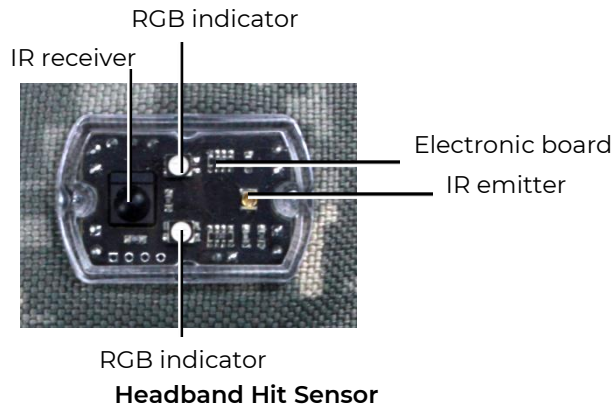
The board has 4 LEDs (3 green and one red), which show the dynamics of turning the device on and off. In addition, when the device is turned on, when you press the power button briefly, they show the battery level: 100 % - all LEDs are on, 75 % - two green and one red, 50 % - green and red, 25 % - only red, from 25 to 12 % - the red LED blinks 2 times per second, less than 12 % - blinks 4 times per second.

In addition to the IR-receiver, an IR-emitter is installed on the control unit board, which is used in some HFD operation modes.



**Control unit**

The hit sensor is an electronic board on which an IR-receiver (Vishay TSOP 4856), an IR-emitter, 2 RGB-indicators and other auxiliary elements are placed in a transparent case.



An IR-receiver detects an infrared ray from an opponent's tager.

RGB-indicators depending on the task can glow in 6 colors: red, green, blue, yellow, violet and white. They can show the color of the player's team, signal about the hit of the opponent's beam, react to their inclusion, binding to the tager, etc.

Also, an IR-emitter is installed on the hit sensor board, which is used in the autonomous mode of operation of the HFD to simulate a through wound, etc.

### 1.3.3 Headband activation

The connection between the headband with the sensors and the tager is carried out wirelessly. The operating radio frequency of the game kit is 868 MHz.

The headband is turned on by pressing 3-4 buttons on the control unit. After turning on, the device goes into the search mode for a tager with an identical ID, if it is absent, the sensors glow with an overflow of 3 colors and an intermittent buzzer signal is played. The procedure for linking the HFD to a tager is given in Chapter 1.3.4.

When a "related" tager is detected, the display sensors blink with the color of the player's team with a frequency of 1 second.

In game mode, the electronics of the headband constantly monitor the availability of weapons. If at this moment you turn off the tager with the identical ID or place it at a distance of more than 3 meters, the indicators will also light up with an overflow of 3 colors and the buzzer will signal.

The control unit is turned off by a long press (about 3 seconds) on the power button.

### 1.3.4 Binding a headband to a tager

1. Turn on the HFD (headband) that needs to be tied - the indicators will glow with overflow of different colors.
2. Turn on the tager in service mode (hold the trigger and the power button) and fire a shot at any of the HFD sensors. To exclude accidental attachment to devices nearby, the power of the emitting IR-beam in the service mode is 1 %, so the shot must be fired at close range.
3. If the binding is successful, the RGB-indicators of the headband flash once in white, and the HFD receives the ID of the tager.
4. Turn off the kit by holding the power button on the tager and pressing the HFD power button.

### 1.3.5 Game mode

During the start of the round of the game after a command from the server or the remote control ("Start the game" button), the RGB-indicators respond with a short flash of the team color and turn off. In the inverse mode, they continue to glow.

The kit reacts to the opponent team or additional device ("Radiation") beam from the tager beam as follows:

- If the player still has health units, the LEDs of the sensor into which the opponent's beam hit, often blink white for several seconds, and the LEDs of the other sensors - the color of the team. Through the speaker of the tager, it is reported that the player is injured ("I am wounded" or "Last life"). Moreover, a certain time, which is set by a computer program, the kit is invulnerable. This option is made so that the player does not "get out" of the burst of shots.
- A headband reacts to a player who has a "last life" hitting into the sensor by frequent flashing white and a long vibration signal. The speaker of the tager reports: "The player is lost - we are returning to the base", the tager stops emitting impulses and the player should be sent to the base for recovery. The headband indicators flash alternately in white until rebirth.
- In the firmware version from 19.1 for HFD in the program mode the option "Through wound" can be turned on. This means that when it hits one of the sensors, the shot goes "through" as if - the IR-emitter of the headband hits the player standing behind.

### 1.3.6 Standalone mode for headband

Since the firmware version 19.2, the headband can function autonomously, without a tager, this function allows not only to diversify the scenarios, but also to increase the number of players involved in the gameplay with a limited number of kits.

Since there is no Wi-Fi module in the control board, and there is no way to connect to the network, the adjustment and control is carried out only with the help of the Remote Control (RC).


There are 5 modes of autonomous operation of the headband:

- "Activator";
- "Medic";
- "Zombie Walker";
- "Frontier";
- "Hostage".


To activate the modes:

1. Turn on the hit fixation device;
2. Direct the emitter of the Remote Control to the sensors of the headband;
3. Press the corresponding button.

The color of the team is assigned by the buttons of the Remote Control "Assigning the color of the team".

Each of the modes is disabled by the "Delete player"  button.

It is impossible to increase the number of health units from the Remote Control to any of the modes.

The "Activator" mode is activated by the "Stormtrooper"  Preset button on the Remote Control – the sensor LEDs light up in red.

At the beginning of the round, a player in the "Activator" mode has 100 health units.

Weapon damage during the operation of the headband in the "Activator" mode is 25 health units, i.e. to defeat the player, it is necessary to hit them 4 times.


To enable the mode, press the "Start game" button.

The hit fixation device once every 10 seconds will respawn the players of its team who have a headband in the "Activator" mode.

If the player in the team has any other mode of headband ("Medic", "Zombie Walker", "Frontier" or "Hostage"), then in the default settings the respawn command does not apply to that player.

In the "Activator" mode, there is no auto-respawn, after its deactivation, the round will be lost.

To resume the game after deactivation, click on the "Start game" button on the Remote Control.

The "Medic" mode is activated by the Preset "Medic"  button on the Remote Control – after activation, the LEDs light up in yellow.


After the start, a player with a headband will distribute 25 health units to all players on the site every 5 seconds, regardless of the color of the team and the mode of the headband within a radius of about 3 meters, except for those in the "Zombie Walker" mode.

Players in the "Zombie Walker" mode will distribute 25 damage units every 5 seconds.

At the beginning of the round, a player in the "Medic" mode has 100 health units.

In the "Medic" mode, there is no auto-respawn, after its deactivation, the round will be lost.


To resume the game after deactivation, click on the "Start game" button on the Remote Control.

The "Zombie Walker" mode is activated by the Preset "Zombie"  button – after turning on the mode, the LEDs of the sensors of the hit fixation device begin to blink in blue, and after starting with the "Start" button, they flash in the same color every 10 seconds.

After the start, the player in the "Zombie Walker" mode will distribute 100 damage units to all players on the site once per second, regardless of the color of the team.

The number of health units taken away doesn't depend on the distance, in the range of the headband life will be taken equally, both near and at a distance of three meters.


"Zombie Walker" mode has an advanced setting – by changing the power of the IR beam, you can adjust the range of its action.

To do this, after activating the mode, direct the Remote Control to the headband and press the "Change IR beam power"  button. You can select 4 modes: 1, 2, 5 and 10 m – each press of the button changes the range values in a circle. To determine the value, you need to press the button until the low sound of the headband buzzer appears. This corresponds to 1 m. The next press assigns a range of 2 m, etc.

At the beginning of the round, the player in the "Zombie Walker" mode has 100 health units.

In the "Zombie Walker" mode, there is no auto-respawn, after its deactivation, the round will be lost.

To resume the game after deactivation, click on the "Start game" button on the Remote Control.

The "Frontier" mode is better suited to the headband. The mode is enabled by the Preset "Sniper"  button – the LEDs light up in red.

The mode is designed to pass the route against the clock with the defeat of several headbands. To make it impossible, to approach the headband or pass by, it "distributes" radiation (every second 25 health units are taken from each player, regardless of the color of the team and the mode).

Activating the mode with the "Start of the game" button on the Remote Control – the headband begins to blink once per second.

In this mode, it is not necessary for all headbands to be worn on players, you can place activated headbands at a certain distance from each other anywhere on the site.


At the beginning of the round, a player in the "Frontier" mode has 100 health units.

The number of shots to hit the device is regulated by weapon damage. Sensors respond to hit with a white flash.

After deactivation, the headband often blinks green for 8 seconds, indicating that the passage is allowed, and then goes out and after another 20 seconds it becomes active again.

In this mode, the sequence of damaging of the headbands is not provided, i.e. there is no need to deactivate the first headband so that it is possible to deactivate the second one.

In the "Frontier" mode, auto-respawn is provided, it occurs automatically 20 seconds after the player is deactivated.

"Hostage" mode  is the simplest offline mode that is used in a scenario where the player needs to be held on a certain route, not allowing the opponent to hit him.

It is activated by the button of the Preset "Hostage" on the Remote Control. The LEDs light up in purple and then you need to choose the color of the hostage team – click the desired button "Assigning the color of the teams".

At the beginning of the round, a player in the "Frontier" mode has 100 health units.

In the "Hostage" mode, there is no auto-respawn, after its deactivation, the round will be lost (if this condition is agreed in the game).

To resume the game after deactivation, click on the "Start game" button on the Remote Control.

#### **1.4 Wi-Fi router**

As a Wi-Fi router in the set of laser tag equipment, the company supplies the Tp-link Archer C80 AC1900 device.

The router is based on a 1.2 GHz MediaTek network processor, which has a single core capable of performing two threads.

In the 2.4 GHz range, there is a processor that provides 802.11n protocols, supports MU MIMO 3×3 and has a maximum connection speed of 600 Mbps.

For 5 GHz and 802.11ac is the processor, also working with MU-MIMO 3×3, and the maximum connection speed it is 1300 Mbps.



### The appearance of the router Tp-link Archer C80 AC1900

The router is equipped with an external power supply (12 V, 1 A (EU Version) or 12 V, 1.5 A (US Version)) and RJ45 Ethernet cable.

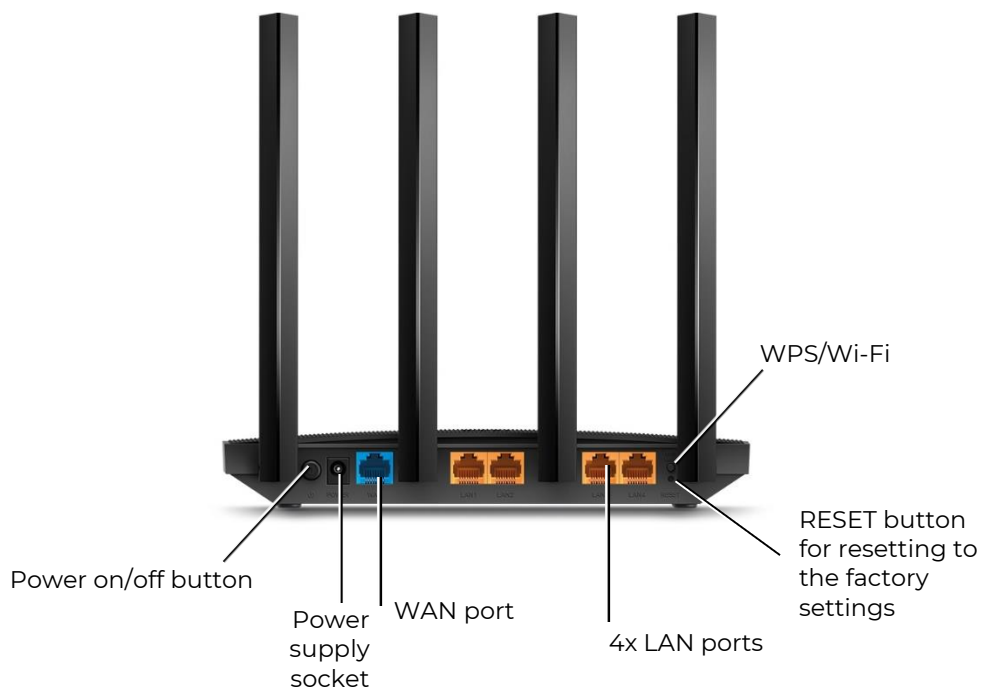
**!** **Caution! When using a portable power supply (Power Bank) for the operation of the router, it is necessary that the output voltage on it corresponds to the nominal supply voltage of the router – 12 V.**

On the mounting side of the router, the following objects are located:

- power on/off button;
- power connector;
- WAN – port for connecting the provider's cable;
- LAN1...LAN4 – four ports for connecting to the router of other devices, without indicators;
- WPS/Wi-Fi button – for simplified connection/disconnection of devices to the Wi-Fi network of the router;
- RESET button – reset the router settings to the factory settings.

**!** **The device is delivered fully configured for use with software and laser tag equipment produced by the company and does not require any additional changes.**





### The appearance of the router from the mounting side

#### 1.4.1 Self-configuration of the router in case of accidental resetting

If the settings of the router for any reason were violated (for example, you accidentally pressed the RESET button or made changes to the settings that led to incorrect operation of the router), you should configure the router yourself using a personal computer. To do this, you should:

1. Position the antennas vertically;
2. Connect the computer directly to the router via any of the 4 LAN connectors using an Ethernet cable (included in the delivery set);
3. Turn on the power of the router and wait for it to load;
4. In any browser installed on the computer (Opera, Google Chrome, Internet Explorer), enter the address <https://192.168.0.1> in the URL input line;

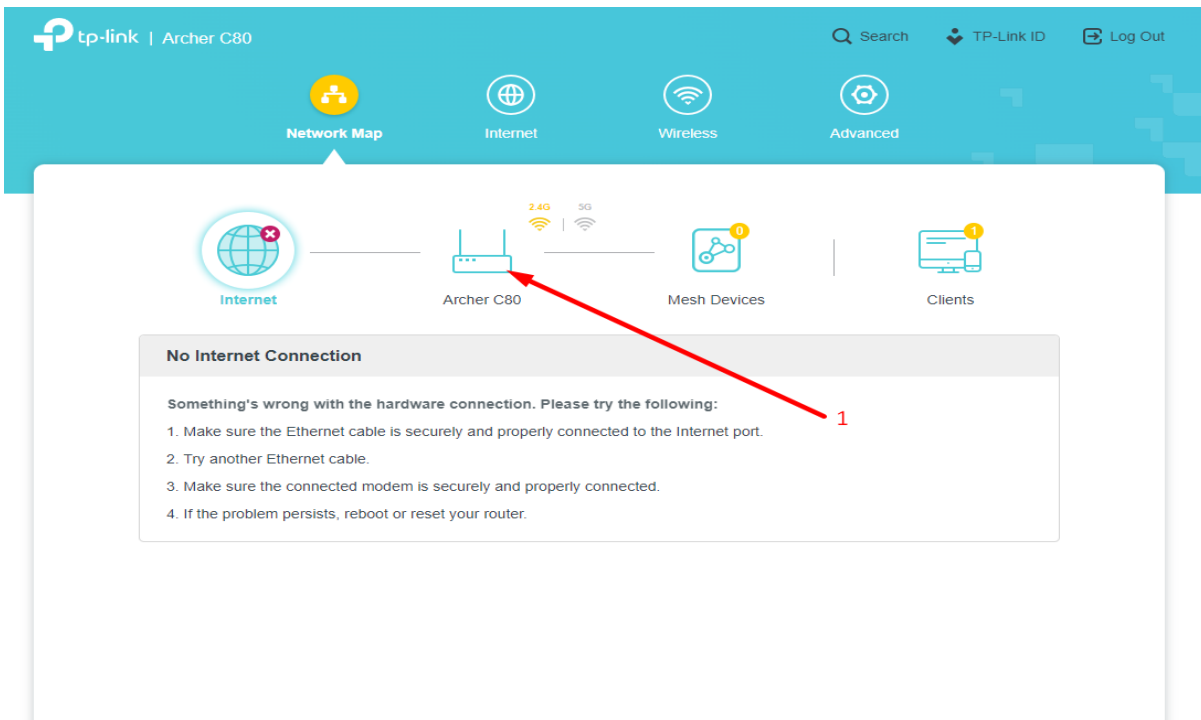
If the router settings page does not open, you should reset the router to the factory settings – on the mounting side of the router, hold down the RESET button and wait for the indicators to turn off for a moment, then release the button.

Reopen the router settings page.

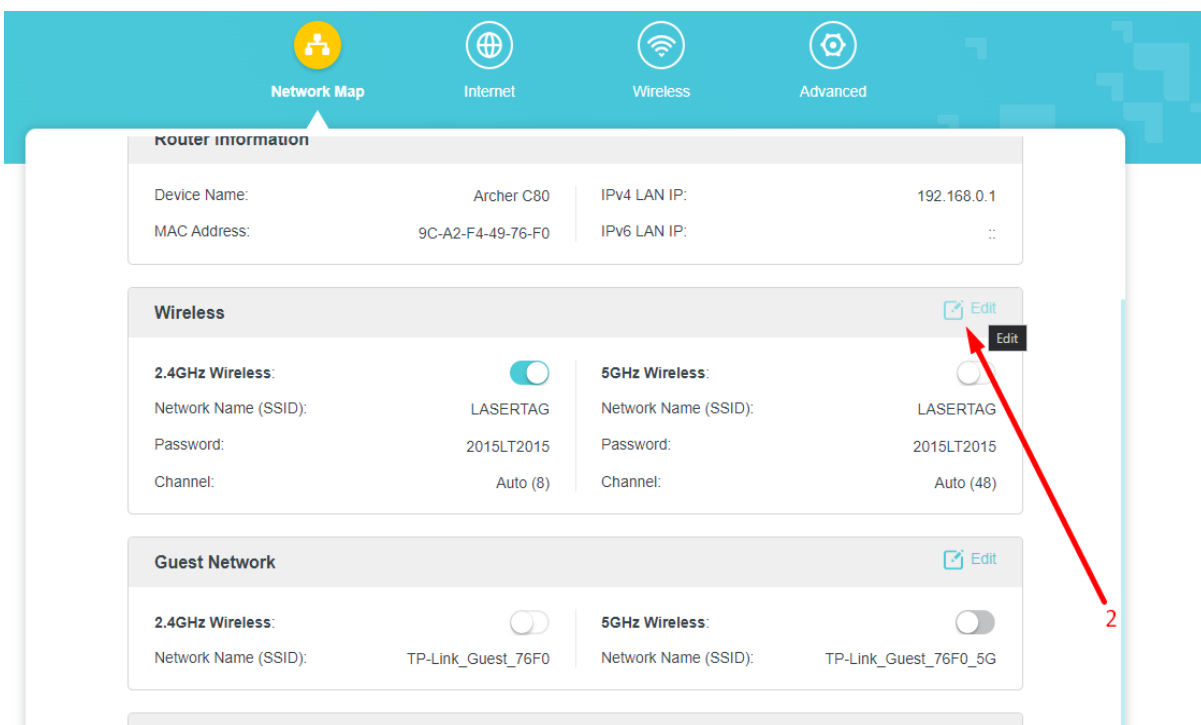
5. On the back panel of the router, read the login and password from the sticker tapped by the company's QCD and enter the settings menu.

To do this, in the window that opens, enter the username and password in the appropriate fields;

6. In the window that appears, click on the name of the Archer C80 router:



7. Next, in the Wireless menu, click Edit.



8. In the window that appears, enter the LASERTAG network name in the Network Name (SSID) field, and enter the 2015LT2015 password in the Password field.

Check that the remaining fields are filled in according to the picture.

**Wireless Settings**  
Personalize wireless settings as you need.

**Smart Connect:**  Enable [?](#)  
When enabled, the 2.4GHz and 5GHz networks share the same network name and password (only one SSID will be displayed), and your wireless device will automatically switch connection to the Wi-Fi band that provides the fastest speed.

**2.4GHz:**  Enable [Sharing Network](#)

Network Name (SSID):   Hide SSID **3**

Security:

Version:

Encryption:

Password:  **4**

Transmit Power:

Channel Width:

Channel:

Mode:

**5GHz:**  Enable [Sharing Network](#)

The router is ready to operate.

## 2 Setting up and controlling equipment using the Lasertag Operator program

The program is designed to set up the equipment, control the game and record statistics using devices supporting the Android operating system (smartphones, tablets). The program interface language is automatically selected depending on the device settings.

Minimum device requirements:

- Snapdragon 450 chipset
- RAM 4 GB
- ROM 16 GB
- Android operating system version 7.0

The connection of the Android device with the laser tag equipment is carried out via a router.

This manual is a description of the logic of the Lasertag Operator program starting from version 2.3.431 - with a modified interface and extended functionality. Below there are the minimum firmware numbers for hardware microcontrollers compatible with this program:

- Tager - 19.4.9257
- Headband- 5.2

### 2.1 Connecting Android device

1. Download and install the Lasertag Operator program on the device - available at: <https://play.google.com/store/apps/details?id=net.lasertag.operator>

2. Install the program.

3. Turn on a router configured for a specific hotspot. At factory settings, the hotspot name is LASERTAG, the password is 2015LT2015.

Note: the system supports 5 more names:

LASERTAG-NET, password - 2018LTN2018

MGO, password - 2018MGO2018

Test mode, password - 2018TM2018

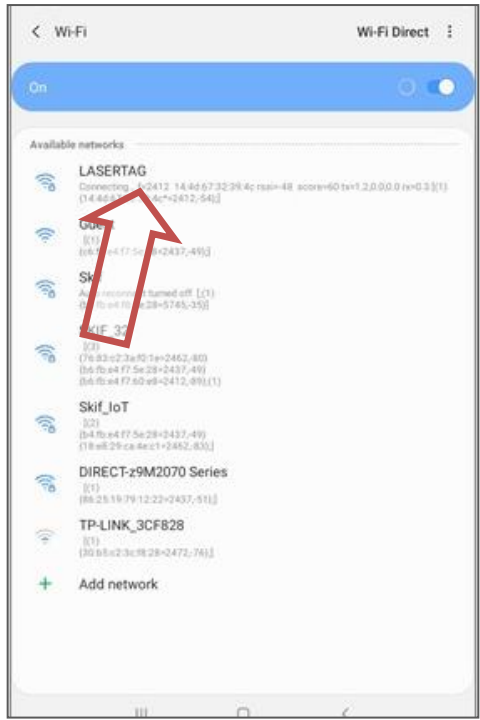
OTK, password - 2018OTK2018

TechSupport, password - 2018TS2018



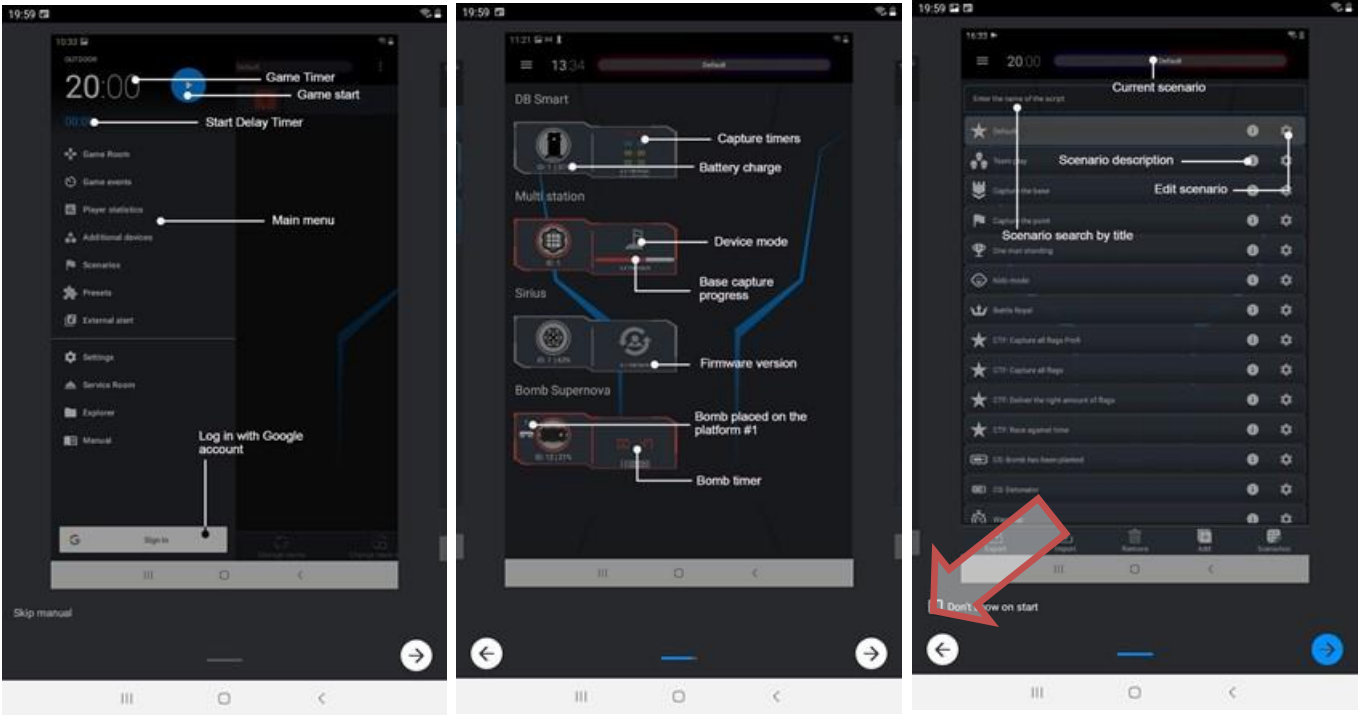
In these cases, the hotspot, as well as all the laser tag equipment used at one site, should be configured in accordance with the selected name and password.

4. On your Android-device, turn on the Wi-Fi network connection mode (Settings/ Connections/ Wi-Fi) and search for the Hotspot. (The setup procedure may differ depending on the version of the operating system and device model).
5. After finding the LASERTAG Hotspot, select it and enter the password 2015LT2015 in the window that appears.
6. Touch the CONNECT button. A connection entry should appear under the LASERTAG inscription, marked NO INTERNET ACCESS.



7. Launch Lasertag Operator program. The first time you open the app, the quick user start guide is shown.

If desired, you can select the SKIP TRAINING item. On the last slide of the displayed instruction, you can check the DO NOT SHOW AT START option. If you want it to be shown again, in the settings click ALLOW TRAINING.

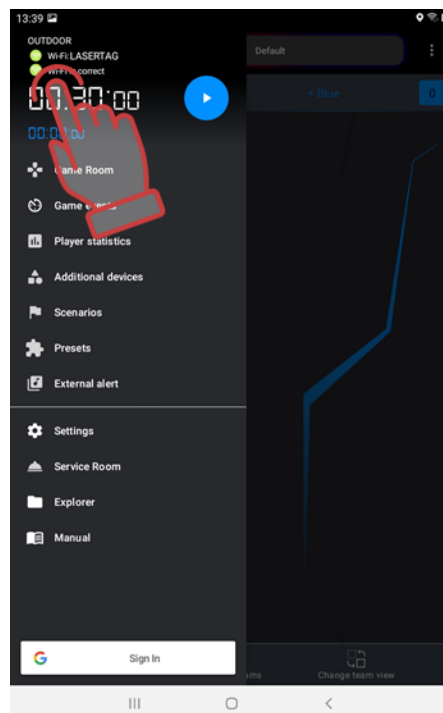



8. First of all, the application will request access to the device's location, files, and so on. It should be noted that access to location data is needed to control Wi-Fi network

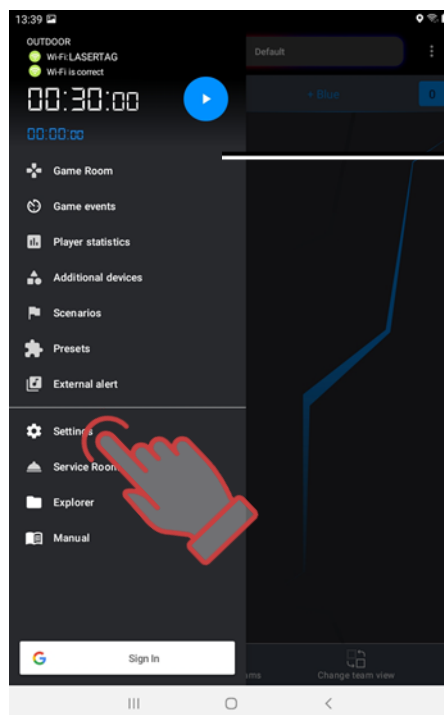
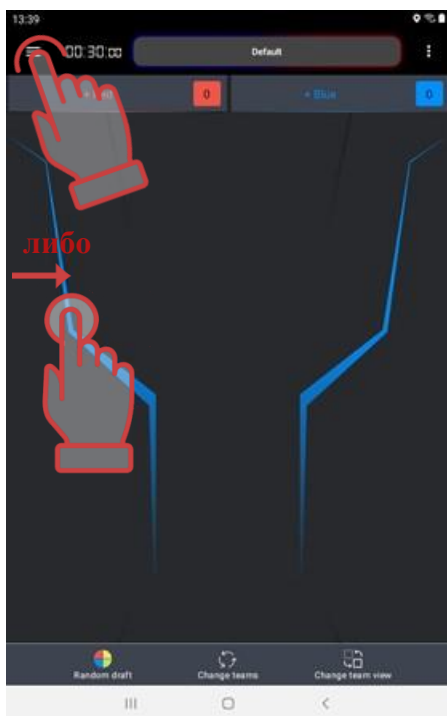
data and correctly display the game network, which will be indicated in the corresponding pop-up notification.



9. After that you need to make sure that the device is connected to the correct network. At the top of the main menu screen, you should see two stylized green Wi-Fi icons, the name of the network, and a message that the network is correct. If one of the icons is red, the device is connected to an Internet Wi-Fi network, and not to one of the local networks intended for laser tag games. In this case, you need to reconnect to one of these networks - Lasertag, Lasertag.net, etc.



10. In the start window press the MAIN MENU button , or swipe to the right and go to the main menu screen.
11. On the main menu screen, click on SETTINGS.



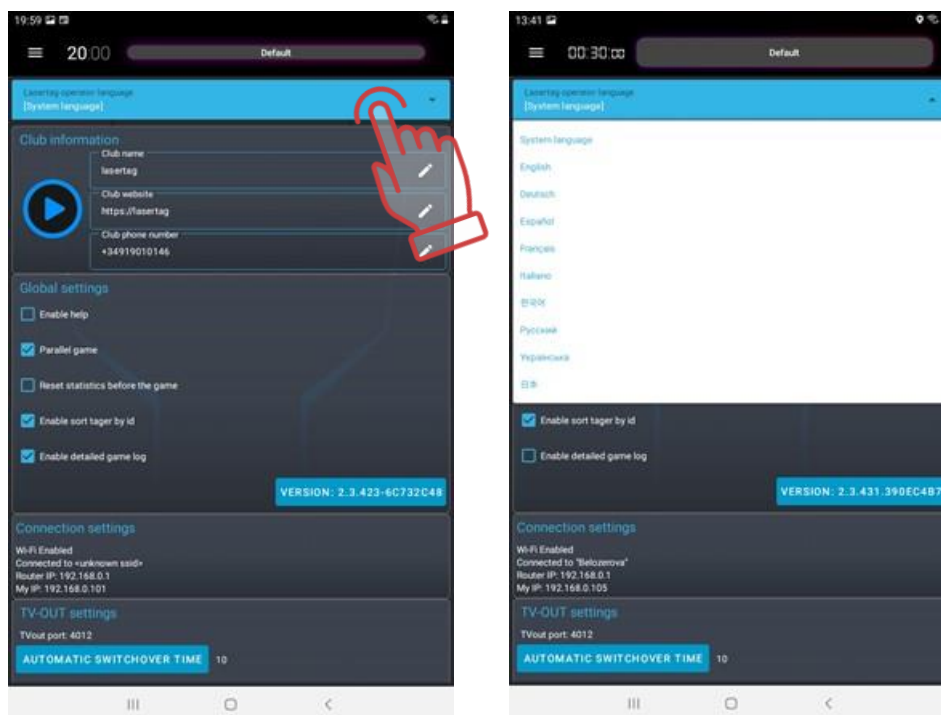
Main menu

## 2.2 Settings menu

Before starting the gameplay, you need to go to the SETTINGS menu.

The window is divided into six sections.

The top section contains the choice of application language. Clicking on the checkbox will bring up a list of available languages. By default, the application opens in the same language that the operating system is currently running in. When you change the language, the application restarts.



Below section contains the information about the club. These data will be shown on the forms for printing statistics.

To enter up-to-date information on the club, you must touch the corresponding line and, using the keyboard that appears, enter the name, website address and phone number of the club. To hide the keyboard after editing - click on the checkmark button at the bottom of the screen.

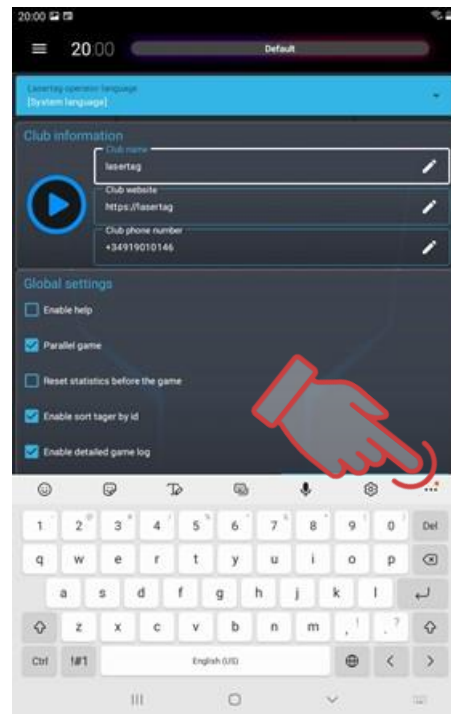
In the same way, you can change the image of the club logo - click on the current logo and select the desired image in the opened window of the file system of the tablet or phone. The recommended logo size is 200x200 pixels. When uploading a larger image, the image will be automatically adjusted to the specified size. It is not recommended to load a smaller logo, because the picture is stretched and the image will be of poor quality.

The GLOBAL SETTINGS section has five items: ALLOW TRAINING, PARALLEL GAME, RESET STATISTICS BEFORE THE GAME and TURN ON SORTING OF TAGERS BY ID, TURN ON DETAILED GAME LOGGING.

If the ALLOW TRAINING checkbox is checked, training slides are shown when the application starts. If the item is not checked, the tutorial is not shown.

The PARALLEL GAME item is necessary when games are played simultaneously on several playgrounds, bounded by each other, for example, only by nets. In this case, a player participating in the game on another ground may be hit from a tager.





Control over the observance of the parallelism of games is possible only when the settings and management of games are performed from different servers. In this case, the PARALLEL GAME item (Main menu/Settings) must be checked on the control tablets. The algorithm for conducting parallel games is as follows:

1. When the game starts, the server resets the identified numbers of the kits participating in the round to the tagers.
2. After the IR-signal of the opponent's tager hits the player's kit sensor, the ID number is compared with the list of numbers participating in the game on this site.
3. If the number is on the list, the hit counts. If not, it is ignored.

It is possible that the kits on one of the parallel games are not connected to the server, but are controlled with the Remote Control. In this case, these kits cannot hit kits connected to a server at another ground. This is due to the fact that the IDs of the kits controlled from the Remote Control will not be included in the list of kits that take part in the game with the server, reset at the start. At the same time, kits controlled from the Remote Control can be affected by kits connected to the server, so they are not told about the numbers that should be ignored.

The marked item RESET STATISTICS BEFORE THE GAME allows you to automatically reset game statistics before each round.

If you check the box ENABLE SORTING OF TAGERS BY ID, then in the Game room window the tiles of the players will be arranged in order - numbers in ascending order from top to bottom. Otherwise, the tiles will be arranged in random order.

The marked menu item TURN ON DETAILED GAME LOGGING allows user to display the maximum number of game events. If the item is not checked, in the sub-item of the main menu "Game events" during the game, only the main events in the game are displayed - the start and end of the game, the base capture, the capture of the Domination Box, etc. If the item is checked, this submenu displays all game events, including all hits and defeats of players against each other.

The next section is CONNECTIONS SETTINGS. Here you should check the availability of a Wi-Fi connection, the correctness of the selected network name (LASERTAG), the IP of the router (192.168.0.1) and the device (My IP).

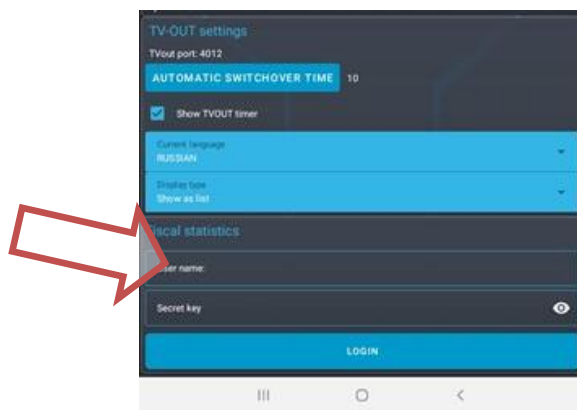
Next is the TV OUT SETTINGS section. The parameter of the TV OUT port is indicated here - this number, like IP devices, is required to configure the display of statistics on an external screen.

During a game round, statistics can be displayed both in the form of player tiles and in the form of a table. In the next section, you can select DISPLAY TYPE. In a tiled view, it may turn out that all of the players' tiles cannot fit on the screen. In this case, the program splits the display into pages and the frequency of page turning in seconds is set by the TIME OF AUTOMATIC PLAYER CHANGE parameter.

User can select the display language as one more item - the language in which the information is displayed on the external screen. Currently there are 5 languages available - Russian, English, Spanish, French and German. To select a language, shortly click on the selected current language and, if necessary, select another one from the drop-down list.

Also in this section you can select the interface language of the statistics display program and show/hide the game timer on the screen.


The last section of the "Settings" menu is FISCAL STATISTICS. It has two fields for entering a username and a secret key. If the data is entered correctly and the LOGIN button is pressed, the club administrator gets access to the statistics of the games played to the server. Detailed – see ch. 2.12.



## 2.3 SCENARIOS Menu

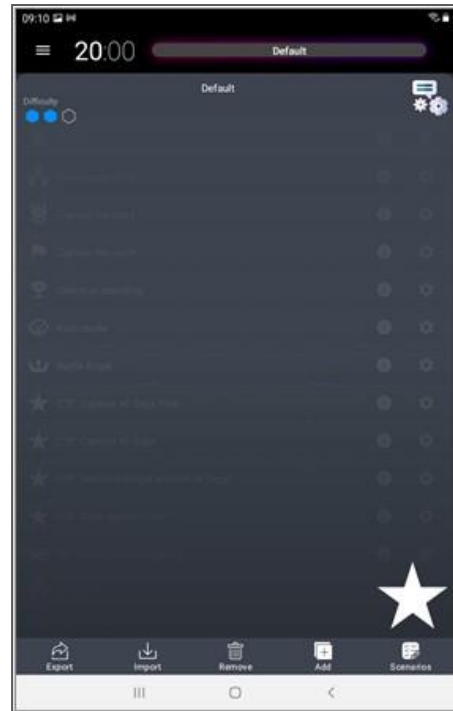
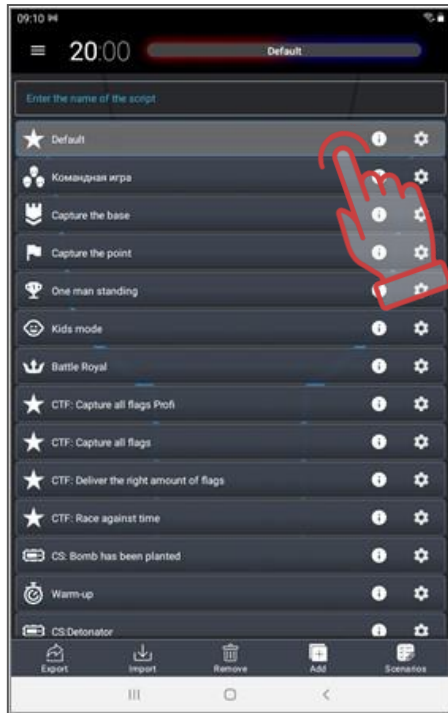
A number of ready-made scenarios are built into the Lasertag Operator program (see chapter 2.3.1). All of them have been tested in real conditions, but, as a rule, depending on the size and configuration of the site, the number and composition of players, they require adjustment. The program has such an opportunity, as well as the ability to create your own original scenarios.

Clicking in the main menu on the inscription SCENARIOS opens the list of scenarios in the form of tiles.

Clicking on the icon  on the scenario tile opens information with data on the difficulty level of the scenario and its brief description.


To speed up the search for the desired scenario, you can click on the line ENTER THE NAME OF THE SCENARIO and type the first letters of the name on the keyboard that appears. Scenarios starting with these letters will appear. Now you need to click on the required tile - it will take the top position in the list.

In order for the game to use the selected scenario, you need to press on the tile.

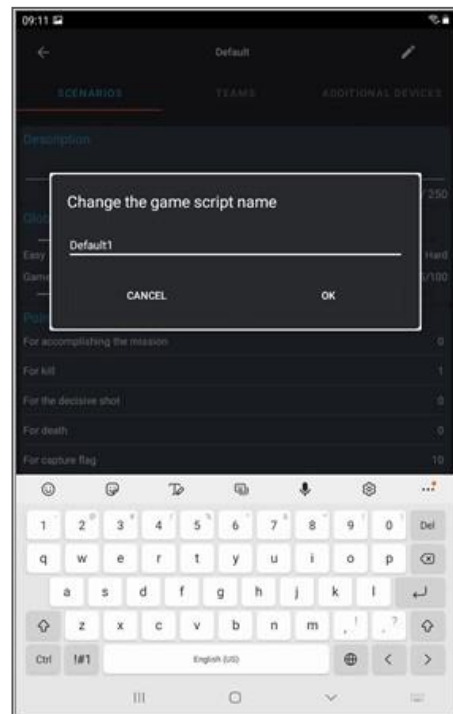


The scenarios tab can also be called directly from the Game Room tab - when you click on the display of the name of the current scenario, a window with scenario tiles will open.

Built-in scenarios can be edited, but not deleted.

The scenario editor is called by clicking on the button with an image of a gear .

First of all, the editor window allows you to change the name of the scenario - for this, you need to click on the button in the form of a pencil to the right of the name.



The window has tabs: SCENARIOS, TEAMS.

### 2.3.1 Scenarios tab

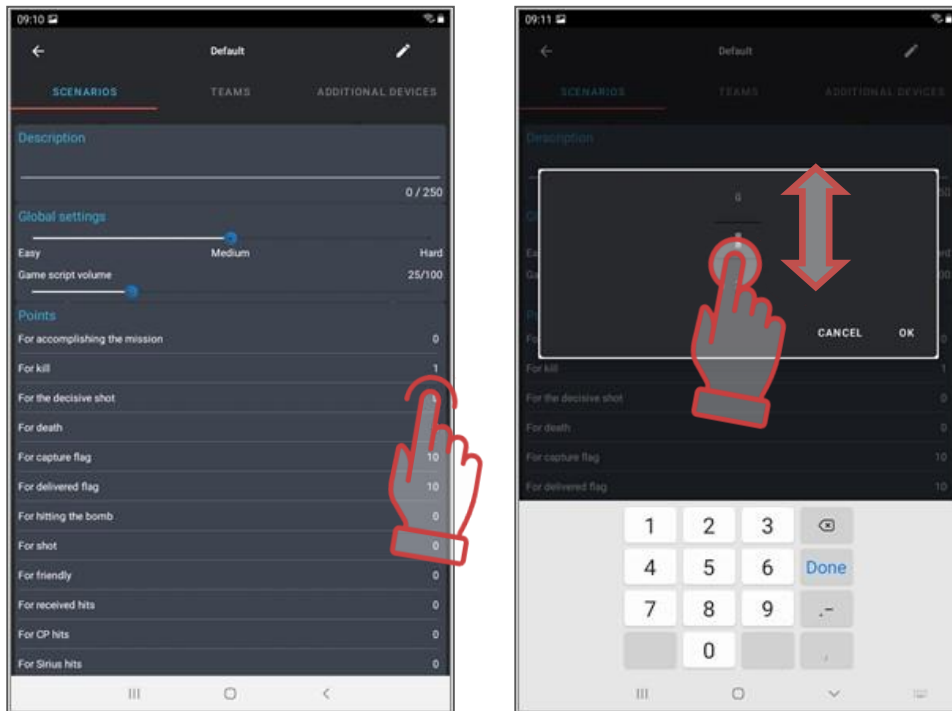
The tab is divided into 5 sections.

The DESCRIPTION section contains textual information that helps to identify the scenario by specific features. The length of the text is up to 250 characters.

In the GLOBAL SETTINGS section, the difficulty level of the scenario and the volume of the sound reproduced by the tager's speaker are set.

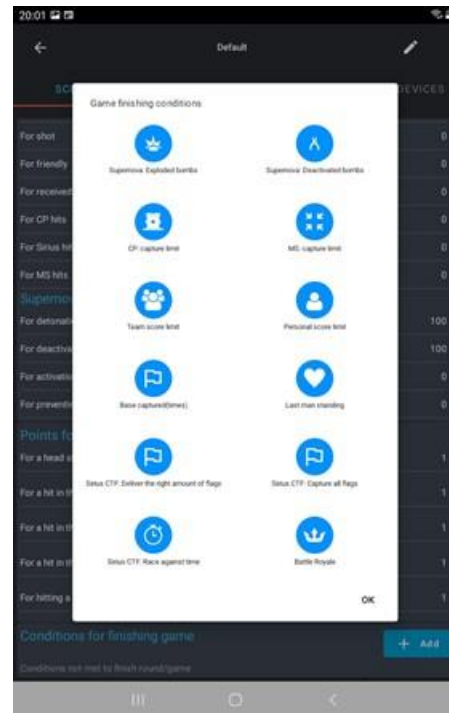
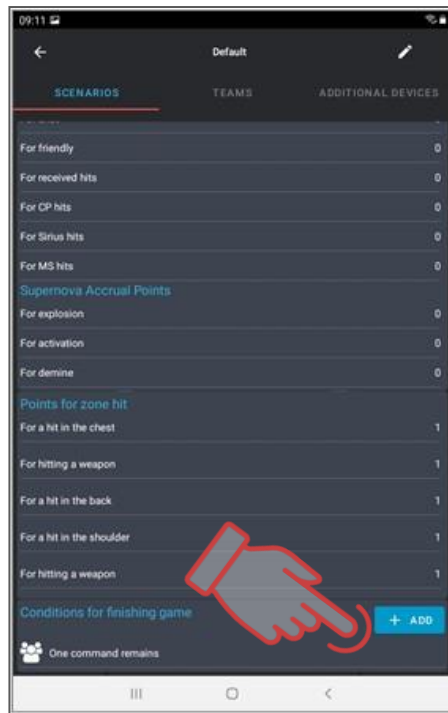
Next comes the POINTS section. It displays the number of points awarded or deducted for various events in the game - for a victory, deactivation of an opponent, a flag delivered, capture of a Domination Box, etc.

To change the numerical value, you must click on the parameter line and in the window that appears, scrolling vertically or using the numeric keyboard (appears if you tap on a number) set the desired value. Some parameters, for example, FOR HITTING A TEAM-MATE or FOR A SHOT, can have negative values - that is, points for these actions are deducted, not added.



If the design and equipment of the kit allows it, you can set differential damage, i.e. the number of points for hitting different zones of the kit - in the back, in the arm, head or chest. The setting is made in the section POINTS FOR THE DEFEAT OF THE ZONE.

The last section is GAME END CONDITIONS. When you click on the + ADD button, a window appears in which you can select the condition for early (not by timer) completion of the game round.




To add a condition, you need to click on the icon above the name. You can select several conditions at once - then the game will end if any of the given ones are fulfilled. To confirm, click on the inscription OK.

The selected conditions will be displayed at the bottom line of the section.


Some of the conditions have their own parameters, the numerical values of which are displayed on the right side of the condition line. To edit a number, click on it and change the value in the window that appears.

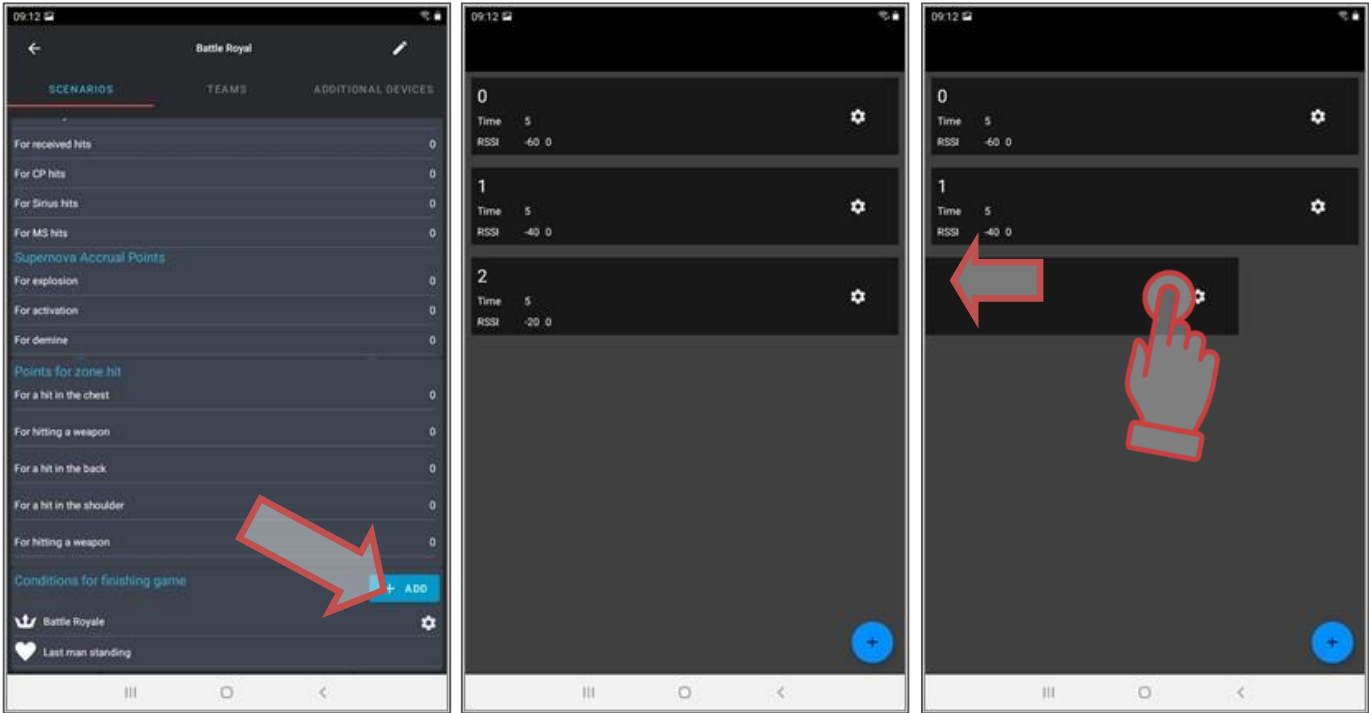
The ROYALE BATTLE condition has an advanced setting. This is due to the principles of the game, borrowed from the genre of the same name of computer games: the players are minimally armed and the safe zone in which the players can be is constantly decreasing during the round. The last survivor wins.

The principle of zone narrowing is implemented using RSSI control (the level of the received Wi-Fi signal from the router). At determined intervals, a player, whose game kit has RSSI less than the value defined in the scenario, starts with "bleeding" - a constant decrease in health units. To stop the bleeding, the player needs to approach the router.

Entering the setting mode for this round completion condition is the button  on the right side of the line. A window opens in which you can add the desired number of zones - click on the blue plus button in the lower right corner of the screen.

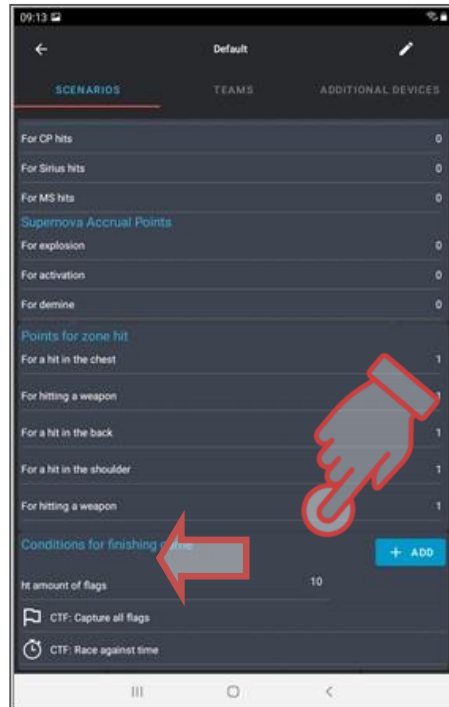
If it is necessary to delete a zone, its line must be shifted from the screen to the left.

The button  in the zone parameters field opens a window in which you can set the RSSI level, the time of a safe stay within the zone and the time of delay in bleeding after a message about the need to move to the next zone.



Three conditions for ending the game relate to a series of CAPTURE THE FLAG (CTF) scenarios: CTF: DELIVER THE RIGHT AMOUNT OF FLAGS, CTF: CAPTURE ALL FLAGS, and CTF: RACE AGAINST THE CLOCK.

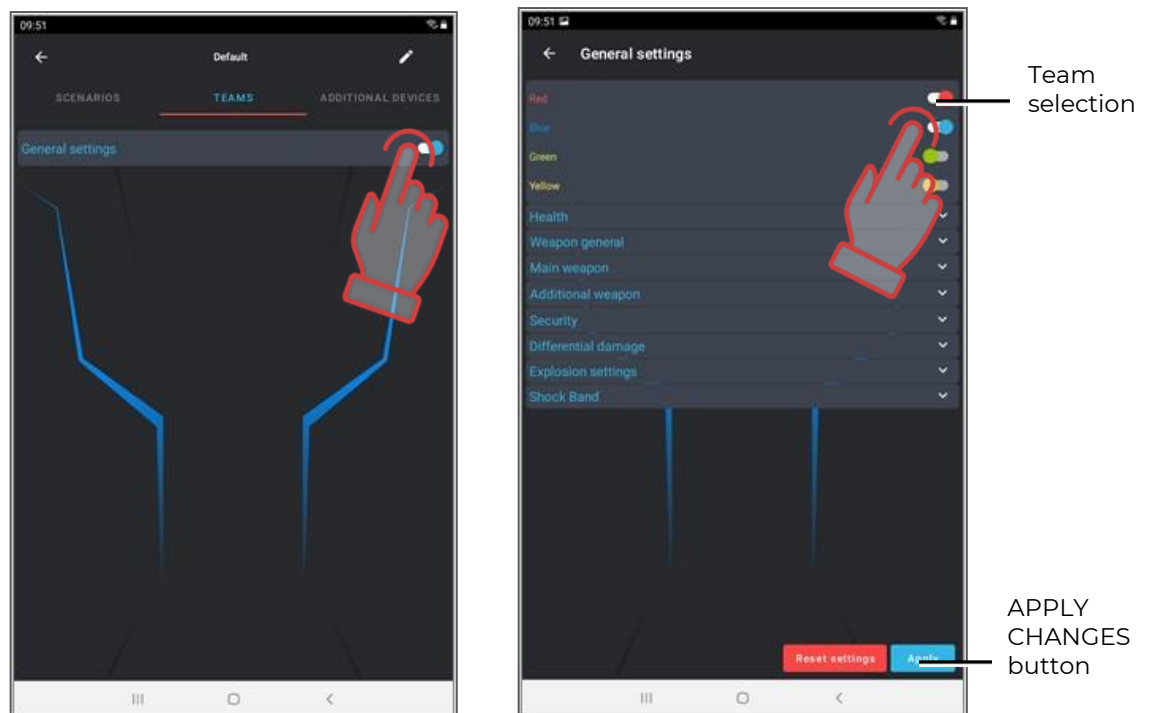
To remove the game end condition from the scenario, the line with the name must be moved to the left to the end of the screen



### 2.3.2 Teams tab

In a scenario, kit of players from different teams can have either the same settings or different ones. Common settings for all teams are called by touching the line GENERAL SETTINGS.

On the tab, by moving the slider to the right or simply tapping on it, you can select the number and colors of the teams involved in the scenario.



By scrolling down the window, you can configure more than 40 kit parameters. All of them are divided into groups: HEALTH, GENERAL WEAPON, MAIN WEAPON, SECONDARY WEAPON, DIFFERENTIAL DAMAGE, EXPLOSION SETTINGS, SHOCK BAND. Each tab expands into sub-items when you click on a line or on the white checkmark opposite its title.

The table of configurable parameters is almost the same for general settings as well as for team or individual settings.

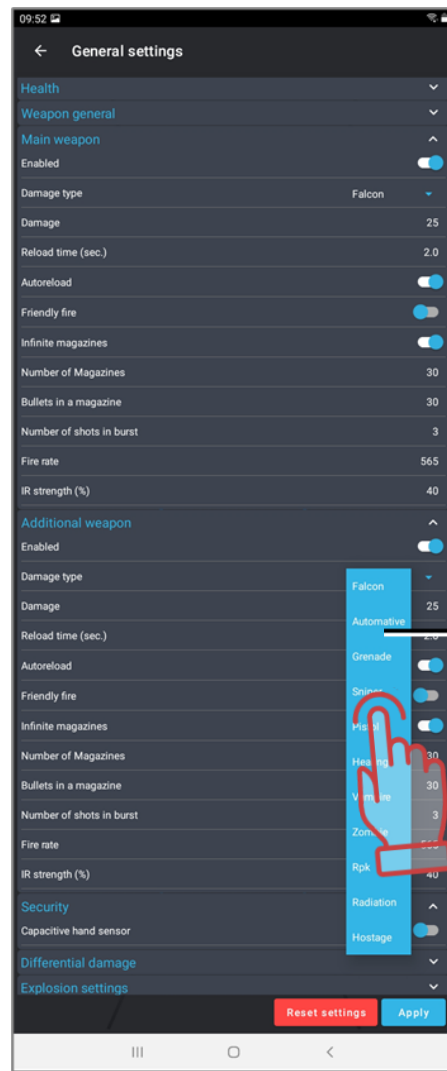
To change each specific parameter inside the tabs, you must click on its title - a corresponding window will appear, with the help of which either the change is made, or the switch changes its state.

To confirm changes, click on the blue checkmark at the bottom of the screen.

To return to the factory settings, click on the RESET SETTINGS inscription at the very end of the parameter list.

To collapse a group, click on the title line of the group, or on an inverted white checkmark in the same line.

To exit the window, click on an arrow in the upper left corner of the window.



Choose the type of damage

Below is a description of the parameters.

#### Section HEALTH:

- Health units - the starting amount of health units (0-999 units).
- Invulnerability time - the period during which the player cannot be damaged after being hit (0-25.4 sec, in increments of 0.1). In this case, the player is prevented from being deactivated by one burst of shots.
- Shock time - the period of inactivity of the weapon after the opponent's beam hits the kit (0-25.4 sec, in increments of 0.1).
- Auto-respawn - the time after which the deactivated player automatically re-enters the game (0-254 sec, 0 - off).
- Respawn invulnerability - the time during which the kit cannot be hit after the respawn (0-100 sec). The parameter was introduced to prevent players from being "pinched" on their bases.
- Bleeding period - the frequency with which health units are taken away after exposure to the kit of the opponent's tager's beam (0-255 sec, 0-disabled).
- Bleeding damage is the number of health units taken during the bleeding period (1-100 units). I.e. with a bleeding period of 5 seconds and damage of 10, after being included in the kit, the player's health will worsen by 10 units every 5 seconds.



Bleeding can be stopped only after exposure to an accessory operating in the MEDKIT mode.

- Regeneration interval - the frequency of automatic addition of health units (0-100 sec, 0-disabled).
- Regeneration - the number of health units restored during the regeneration period (1-100 units).
- Regeneration delay - delay time before the start of regeneration (0-100 sec). Thus, setting, for example, an interval of 2 seconds, a regeneration of 5 points and a delay of 10 seconds, we get the following game situation: a player, having received damage, can hide behind a shelter and after 10 seconds, 5 health units will be automatically added to him every 2 seconds.

#### Section GENERAL WEAPONS:

- Recoil - permission to use impulse recoil on the tager (yes/no).
- Side lighting - turn on/turn off side lighting on the tager (yes/no). The setting is relevant only when using the Falcon LUX tager.
- Game without headband - permission to play without a headband if hit sensors are installed on the tager (yes/no).
- Auto turn off - the period after which the kit will automatically shut down in the absence of any game actions (0-720 min).
- Through shot - permission to activate the function of through wound, when, when hitting a headband, the sensors of these devices hit standing players behind with their IR emitters (yes/no).
- Shots before overheating - the number of shots in a continuous burst, after which the BARREL OVERHEATING mode is activated for the tager and it stops shooting (0-255, 0 - off).
- Weapon cooling time - the time after which the tager resumes firing after the barrel overheats (0-255 sec).
- Inverse mode - turning on the inverse mode of the headband indication, when the indicators are constantly lit, and when they are hit, they stop glowing (yes/no). The mode is used when playing games in the dark, or in darkened indoor areas (arenas).
- Headband vibration - permission to enable the function of vibration of the headband sensors when the opponent's tager beam hits them. The function is turned off, as a rule, for young children.
- Change weapon mode - permission to change the firing mode of a weapon from a single shot to a fixed or endless burst and back (yes/no). The mode change is carried out by double pressing the tager recharge button with an interval of less than 1 second.
- Defeat in weapon - selection of the kit's reaction to the hit of the opponent's beam on the sensors of the player's tager hit (Damage/Ignore/Deactivate). When you select the DAMAGE parameter, the damage is counted in the same way as hitting the sensors of a headband. If you select IGNORE, then hitting the tager is not counted. The selected parameter DEACTIVATE disables the weapon for the time set in the next parameter - DEACTIVATE WEAPON.
- Weapon deactivation - the time of inactivity of the weapon after the opponent's beam hits it with the selected parameter DEFEAT WEAPON - Deactivate (0-100 sec).

## Section MAIN WEAPON:

- Turned on - permission to use the main weapon in the kit (yes/no).
- Damage type - the type of virtual weapon that is selected when configuring the player's kit presets. (Falcon/ Assault rifle/ Grenade/ Sniper/ Gun/ Heal/ Vampire/ Zombie/ RPK/ Radiation/ Hostage). When choosing a type of damage, the following parameters are automatically set by default for this particular type of weapon. But each of them can be changed later. Only the icon on the tager screen and the sound reproduced by the tager speaker when fired remain unchanged.

FALCON, ASSAULT RIFLE, SNIPER, GUN and RPK actually differ only in the amount of damage, rate of fire, power of the IR-beam and ammunition.

The GRENADE type (underbarrel grenade launcher) allows you to "explode the player" when, after hitting the player, the sensors of his kit, with their emitters, affect the nearby players of their team.

The type HEAL (Medkit) does not take away, but adds units of health when it hits the player. However, this does not apply to players with the ZOMBIE and VAMPIRE presets - the opposite effect is performed on them.

Damage VAMPIRE (Bite) not only takes away health units from the opposing player, but also adds them to itself. The damage can only be selected for the basic Vampire preset.

When a ray with damage ZOMBIE (Claw) hits the player, the kit loses half of the health units available at that moment, besides, even if the player is defeated, the player also becomes a zombie.

The specificity of the damage RADIATION is that it takes away units of health from all players, and heals players in the roles of Zombies and Vampires.

HOSTAGE damage has not yet been implemented in current hardware firmware versions.

### **! To change weapons, you must hold down the reload button for about 3 seconds until the sound signal starts to play.**

- Damage - the number of health units that are taken away from the opponent's kit when the player's tager ray hits it (1-100 units).
- Reload time - a pause during which the weapon cannot fire after pressing the reload button on the tager (0.1-25.4 sec, in 0.1 increments). As a rule, the value is set close to the reload time of real samples of small arms.
- Auto-reload - permission to automatically reload the weapon magazine without pressing the corresponding tager button (yes/no). A useful feature for children's scenarios.
- Friendly fire - permission to turn on the mode when the kit can be hit by the players of their team (yes/no). The parameter is turned on in the games of the "DEATH MATCH" series, as well as for adding spice to the gameplay of any scenario.
- Infinite magazines - a parameter that removes the limitation in the starting number of magazines with cartridges (yes/no). Most often used in games with young children who have difficulty using the recharge button.
- Number of magazines - the numerical value of the number of magazines given to the player (1-254).
- The number of cartridges in the clip is the value of the magazine capacity at the start or after reloading (1-254). May correspond to the number of cartridges in the magazine of real weapon.

- Shots in a burst - the number of shots fired by the tager after the trigger is pressed in the FIXED BURST mode (1-254).
- Rate of fire - the frequency of rounds per minute, with which the tager shoots when the trigger is pressed, if the weapon provides for and automatic firing is allowed (1-999). The optimal value for small arms is 565 rounds per minute.
- IR-beam power - the percentage of IR-radiation power when the tager shoots (1-100%). The range of the shot and the active spot depend on the power. It also affects the ricochet from walls and obstacles on the playground. In sunny weather, in an open area, it is recommended to set the power of the IR-beam to a high level, when using kits in arenas, 20-40% is enough.

#### Section ADDITIONAL WEAPONS:

The parameters are the same as in the MAIN WEAPON section. To activate it, you also need to allow it to be used in the ENABLED parameter.

#### SECURITY section

- Capacitive hand sensor - permission to use an induction sensor that reacts to the player's wrist grip on the tager's forearm (yes/no). Activating the parameter is necessary to prevent waving weapons and shooting from behind shelter if hit sensors on the tager are absent.

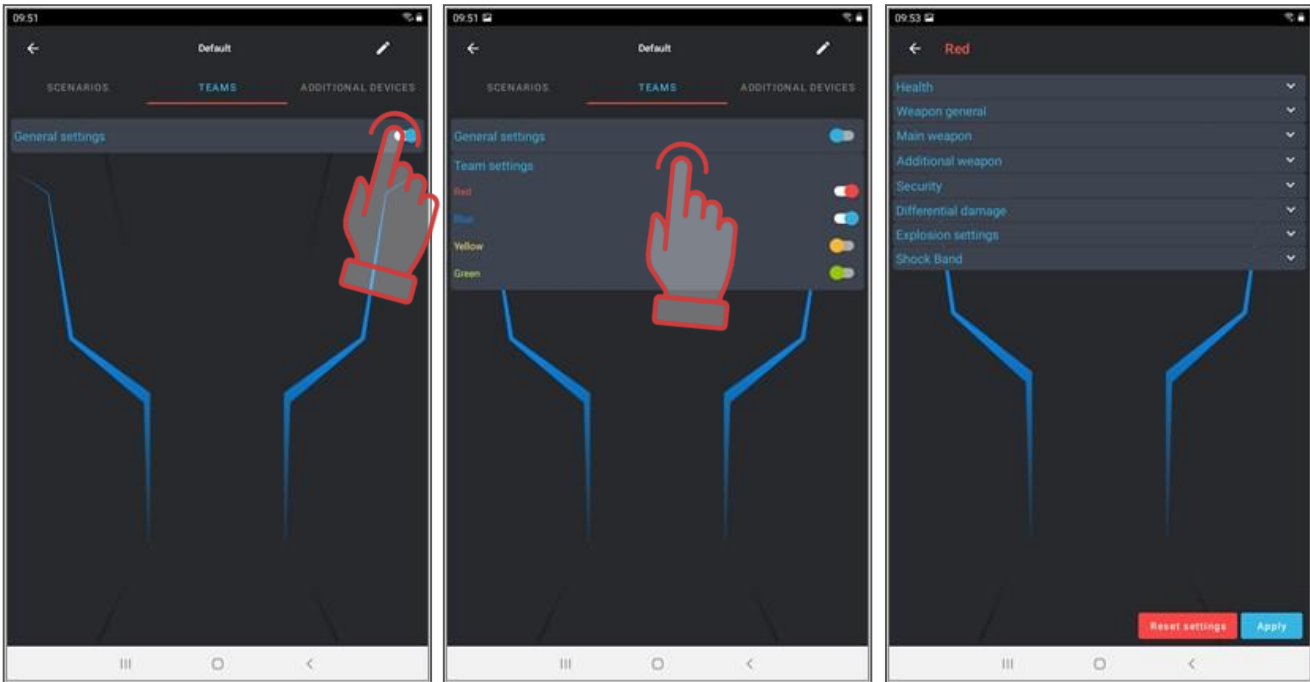
#### Section DIFFERENTIAL DAMAGE:

- Head (0-300%, 0 - the parameter is disabled).
- Chest (0-300%, 0 - the parameter is disabled).
- Back (0-300%, 0 - the parameter is disabled).
- Shoulder (0-300%, 0 - the parameter is disabled).
- Weapon (0-300%, 0 - the parameter is disabled) - coefficients by which the received damage in a certain zone is multiplied. For example, if the selected value of differential damage is 50% in the back and the beam hits this zone with 90 units of damage, the actual damage will be 45. But at 300% the same hit will deal damage of 270 health units.

The presence of differentiated damage depends on the composition and type of equipment included in the player's kit. The maximum kit is a headband and a tager with hit sensors.

If the game assumes different settings for teams (this may be due to different missions or compensation for a different number or composition of teams), in the TEAMS tab, move the switch to the left on the GENERAL SETTINGS line. After that, the team settings will become active.

By switches, you can select teams, which will participate in the scenario. When you click on the line with the team name, a window for team settings of the kits opens, which is similar in content to the general ones.



### 2.3.3 Description of built-in scenarios

Any of the scenarios built into the program can be corrected, and it is also possible to return to the factory settings. To do this, in the scenario editor in the team settings, click on the RESET item - it is located at the very bottom of the table.

The tables below show the standard parameters for general/team settings and scoring for a particular game action.

**Scenario default settings table (Teams tab)**

Specification	Units of measurement	Quantity/ Indication
Health units	Health units	100
Invulnerability time	Sec	1
Shock duration	Sec	1
Respawn invulnerability	Sec	2
Bleeding damage		No
Regeneration		No
Recoil		Yes
Side lighting (Falcon Lux only)		
Game without headband		Yes
Through wound		No
Weapon cooling time	Sec	0
Inverse mode		No
Headband vibration		Yes
Change weapon mode		No
Defeat in weapon		Damage
Enabled Main weapon / Additional weapon		Yes/No
Damage type		Falcon
Damage	Health units	25
Recharging time	Sec	0,4

Specification	Units of measurement	Quantity/ Indication
Autoreload		Yes
Friendly fire		No
Endless magazines		Yes
Number of magazines	pcs	30
Amount of cartridges in a clip	pcs	30
Shots in a burst	pcs	3
Rate of fire	shots/min.	565
IR-beam power	%	40
Capacitive hand sensor		No
Differential damage: Head	%	100
Chest	%	100
Back	%	100
Shoulder	%	100
Weapon	%	100

#### Scoring table (Scenarios tab)

Action	Points
For deactivating an opponent	1
For capture the flag	10
For the fetched flag	10
For the headshot	1
For the shot in the chest	1
For the shot in the back	1
For the shot in the shoulder	1
For hitting a weapon	1

These settings are basic and are loaded by default when scenarios are created based on the default.

The current version of Lasertag Operator comes with 14 ready-made scenarios:

- The default scenario is based on basic settings. The default settings for this scenario are good for beginners or for starting warm-up - there are two teams playing in it, there is no condition for completing the scenario. The deactivated player is restored after 5 seconds.  
Points are awarded (one at a time) for hitting a player or for deactivating him after 4 hits.  
The game ends on timer and the team with the biggest amount of points wins.
- Team play primarily involves confrontation between several teams. There are also no additional devices, but a condition for the completion of the scenario - ONE TEAM LEFT has been added. Players have 100 health units, for each hit of the opponent, 25 units are removed, and there is no possibility of respawn. I.e. to deactivate a player, you need to hit him 4 times. By default, in this scenario, 1 point is awarded for hitting and deactivating an opponent.  
The goal of the game is to hit as many opponents of the opposing team as possible. The team with at least one player left wins.  
If not, the game is stopped by the timer and the winner is determined by points. The points gained are taken into account, firstly, at the end of the game by the timer (if the end of the game is not met), secondly, for assigning nominations to the players at the end of the round, and thirdly, for accounting in multi-round games.

To complicate and accordingly lengthen the scenario, you can enable respawn for players (Teams/Team settings/Health). With the set regeneration interval equal to 1 (i.e. every second), the regeneration in 2 health units, and the regeneration delay in 5 seconds, the player has the opportunity, hiding behind a shelter, to fully restore his health units in a certain time.

One of the options for the development of this scenario is to enable friendly fire (Teams/Team settings/Main weapons) - this is when the player can be hit by allies. This change makes the player more responsible for each trigger pull of the tager.

- The tactics in this game correspond to the name of the scenario: Death match. All players on the same team are red. "Friendly fire" enabled - so players of the same team can hit each other. Each player has 200 health units, after each hit, 25 is taken away. In the conditions of completion - ONLY ONE REMAINS, that is, the last survivor wins. For each hit, the player receives one point, and this indicator will be taken into account in the distribution of nominations at the end of the game.

This scenario is well suited for warm-up, for beginners - it will allow you to get acquainted with the ground, learn how to handle the game weapon, hide behind shelters, etc. This scenario is also suitable for a small number of players. In addition, this scenario is recommended for young children who may not always appreciate the need for team tactics.

As a development of this scenario, you can use the following option: disable the condition for completing the scenario ONLY ONE REMAINS, but enable the condition PERSONAL POINTS LIMIT with the current limit for this ground and the given number of players (up to 400). Then the player with the maximum number of points will receive the victory - the game will end either by the timer or when it reaches the specified value. For a change, you can conditionally recruit players to different teams, but include "Friendly fire", because team statistics will not be counted.

- Kids mode is designed for children and beginners. Here, by default, auto-respawn is enabled, which is triggered 5 seconds after deactivation, as well as auto-reload and endless magazines. Headband vibration is disabled, hitting the weapon is also not counted. The rest of the parameters are configured by default, including 100 health and damage 25. This scenario is easy for both the players and the instructor. The game is downloaded on a timer and at the end of the game, players can receive printed sheets with comic nominations depending on the points scored or the actions performed in the game.

It is necessary to adjust the scenario depending on the game situation. For example, if a round turns into a pointless firefight, you can increase the auto-respawn time or enable such a parameter as weapon damage - DEACTIVATE. In the latter case, it is necessary to set the period during which the weapon will be inactive after the opponent's beam hits it (0-100 sec).

- The Battle royale scenario involves playing in an ever-shrinking zone over time. The principle of zone narrowing is implemented using RSSI control (the level of the received Wi-Fi signal from the router). At set intervals, a player, whose game kit has RSSI less than the value defined in the scenario, "bleeding" starts - a constant decrease in health units. To stop this process, the player needs to get closer to the router by going to the next zone.

The last survivor wins. As a result, the players during the game need not only to try to hit the opponents, but also to monitor the virtual change in the playground configuration.

Conventionally, the zones are circles of various diameters with a router in the center. But it must be taken into account that the Wi-Fi signal coverage can be heterogeneous and largely depend on the geometry of the playground, the presence of natural or artificial obstacles.

For each zone in the program, its own RSSI level is selected (from 0 - to 100 dbm) and the time spent inside the zone when it is safe to be there. When the time spent

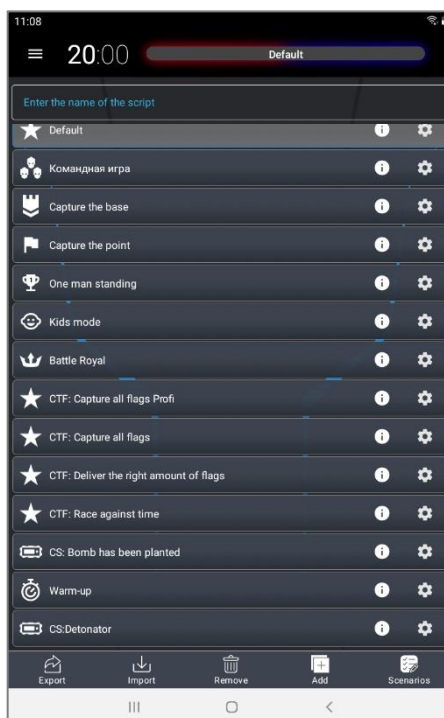
inside a certain zone is running short, the kits give an audible signal that it is time to move on to the next zone. The player is given time (10 seconds set) to move to an area with a higher signal level from the router.

There are three zones in the firmware - Zone 0 with an RSSI limit of -60, zone 1 with a range of 0...-40 and zone 2 with values 0...-20. The time spent in each of the zones is 5 minutes. The third zone is located very close to the router, and it has no time limit - all players in this zone will have "bleeding", and if several players remain on the playground, the winner will be the one who runs out of health units later than others. By default, friendly fire is turned on (players, regardless of the color of the kit, hit each other), the player has 100 health units, damage is 25%, autorespawn is disabled. Ammunition is limited - 10 clips of 30 rounds.

The scenario can be greatly complicated and varied. For example, you can make it for a team, i.e. set the condition ONE TEAM LEFT. This option is more suitable for a game with quite large number of players - divide it, for example, into 4 small teams. In this case, players will be able to work out team interaction.

By configuring the devices for the Arsenal mode, placing them at the edges of the playing area and making the minimal starting ammo for players, you can radically change the tactics of players. Now, in addition to everything else, they will have to "get cartridges" in order to deactivate their opponents later.

Depending on the size and configuration of the site, it may be necessary to adjust the parameters of the zones. You can do it in the setting for the end condition of the Battle Royale game, which has an advanced setting.

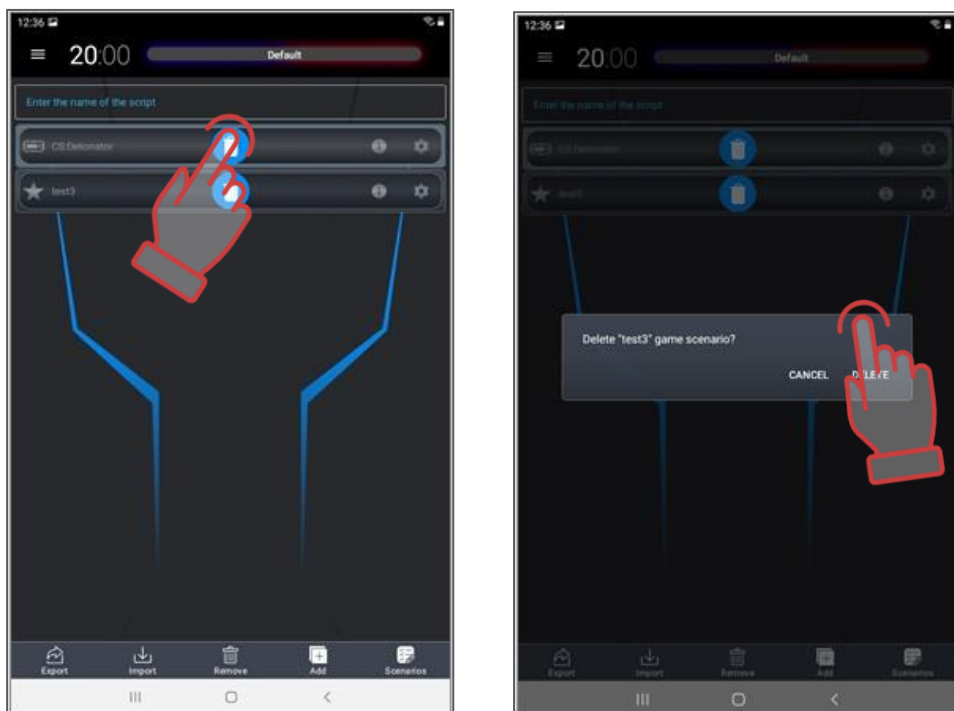
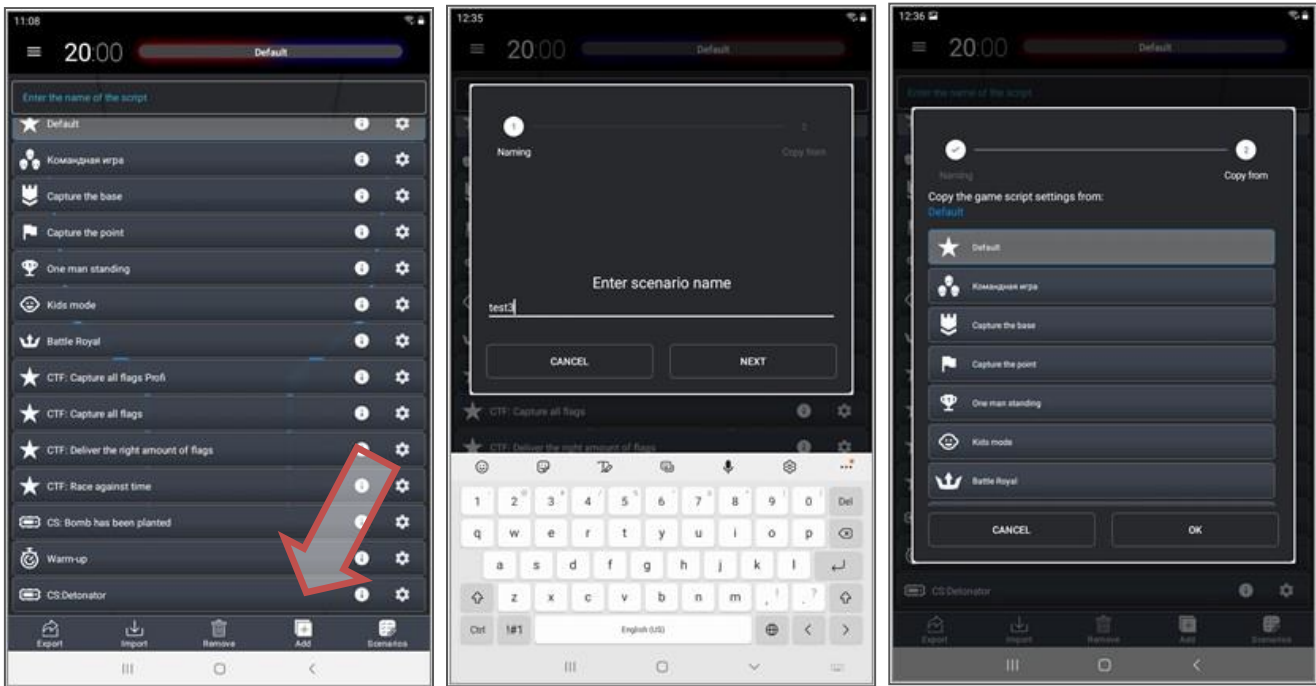


- The Warm Up scenario is another lite version of game for younger players and beginners. The game includes auto-respawn of players for 5 seconds, auto-reloading and endless magazines. The second hand sensor is turned off. The kit settings are standard, they are the same for both teams. There is no scenario termination condition. The game ends on a timer. The team that scores the highest number of rating points wins.

### 2.3.4 Creating custom scenario

To create your own scenario, you need to click on the ADD button in the bottom of the screen. At the first step, the program offers to enter the name of the new scenario, at the second step it offers to select a template based on which a new scenario will be created, i.e. copy settings from existing scenarios in the program. After confirmation by clicking on the OK button, the scenario editor window opens. Here you can give a short description of the scenario and set the necessary parameters of the equipment and the scenario itself.

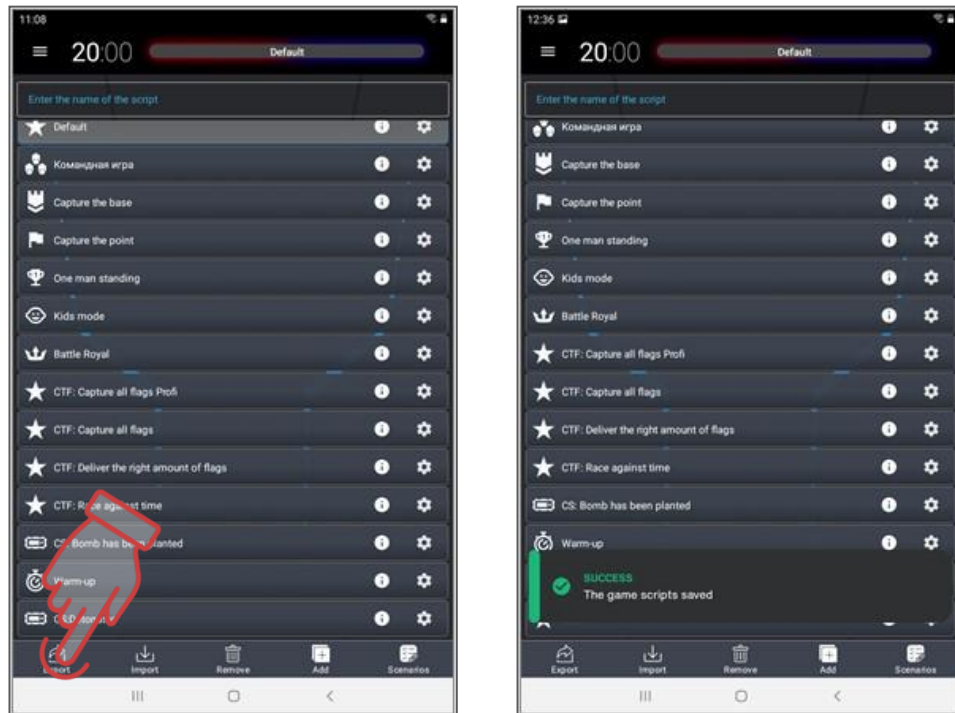
Unlike built-in scenarios, custom scenarios can be deleted - click on the menu item - delete (the delete icon will appear on all custom scenarios), then select the scenario that requires deletion, confirm the deletion.





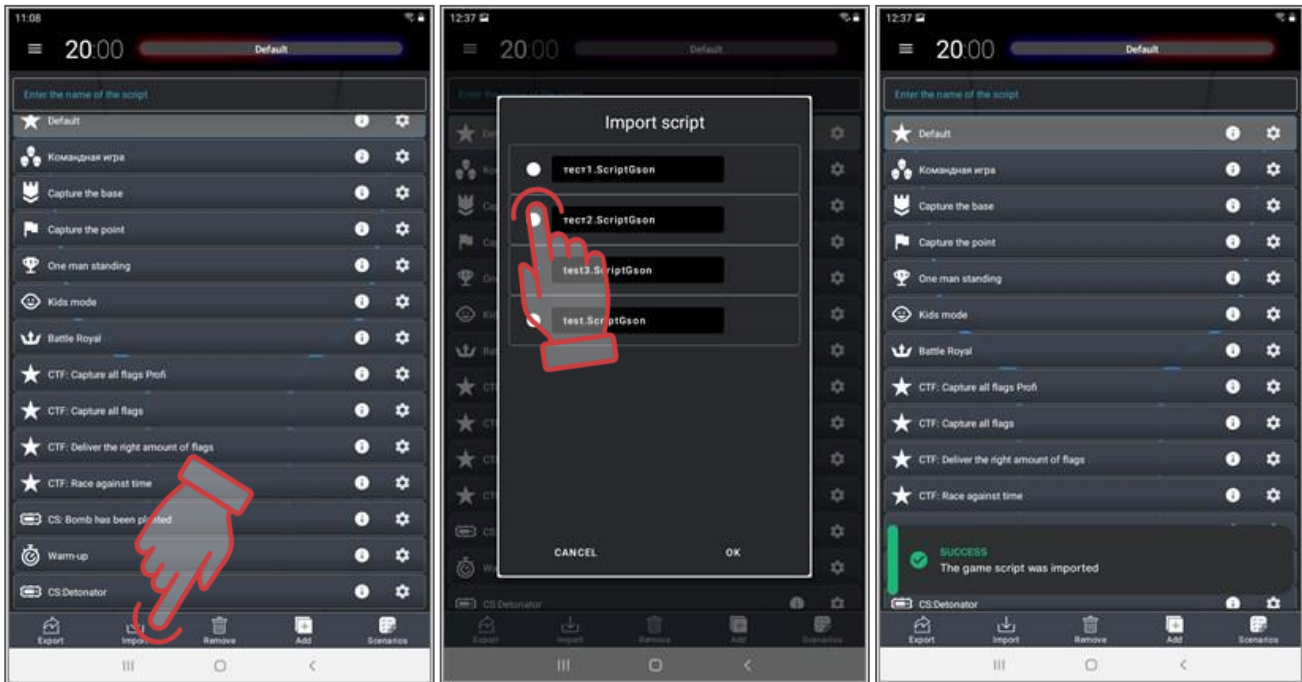
In order to immediately return to the scenarios window after deleting a scenario, you must click on the SCENARIOS button in the lower right corner of the screen.

To back up the scenario, the program has the ability to export and import them. It concerns only scenarios generated by user. To export in the scenario editor (Main menu/Scenario), press the "Export" button. The program saves the scenario to the device memory.




When you click on the "Import" button, a window with the names of the saved or imported scenarios opens. You should also click on the white circle to the left of the scenario name, which should turn into a checkmark. Press the OK button.

To find files of saved scenarios on the device, click on the "Explorer" main menu item, and then selecting the "Scenarios" tab. Scenarios files will have a .ScriptGson extension.

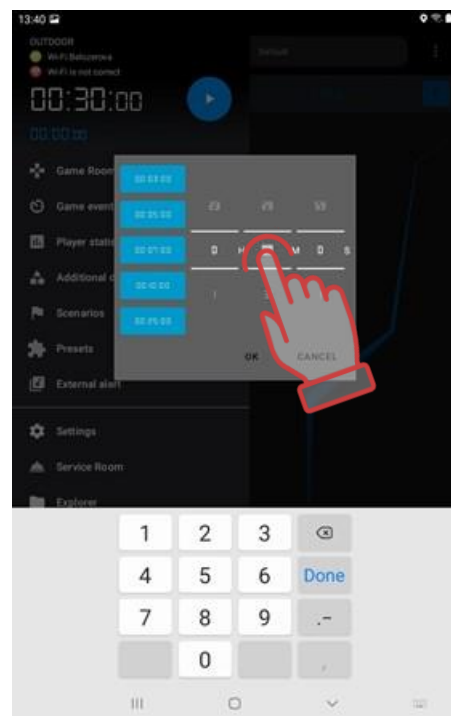
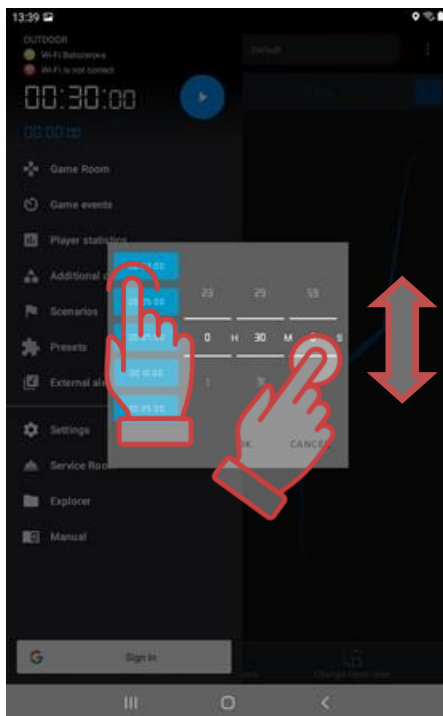
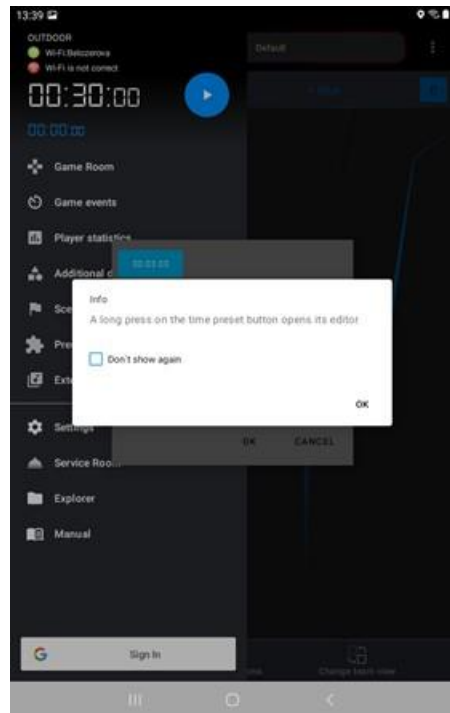
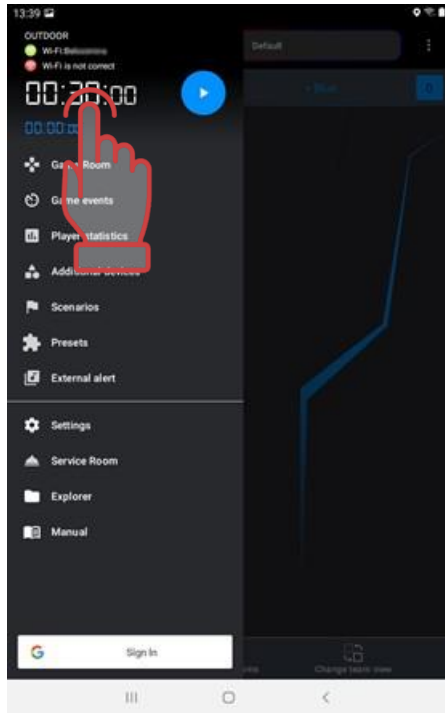


### 2.3.4.1 Setting the round time

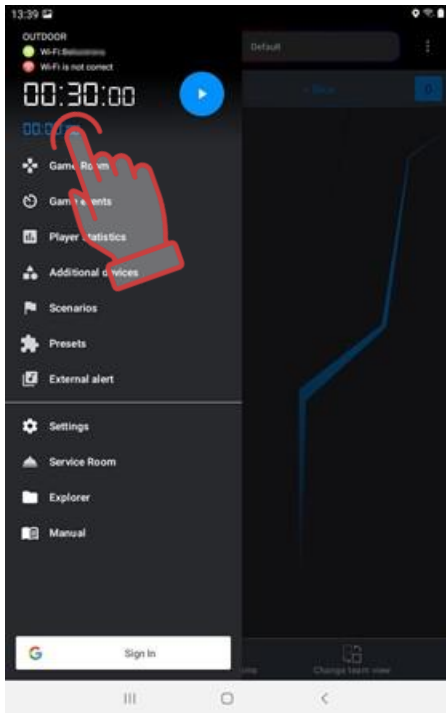
The duration of the round is chosen depending on the scenario and the availability of conditions for the end of the game. If the goal of the game is specific, for example, to knock out all the players of the opposing team, the maximum time can be set (99 minutes).

To set the scenario time, you need to go to the main menu (swipe to the right or press the button ):

1. Tap on the big white numbers at the top of the menu. The window that appears allows you to set the time of the game round.
2. There are three ways to choose the game time. The first way is to choose one of the preset options (presets) of the round time in the leftmost column - 3, 5, 7, 10, 25 minutes. Time presets can be edited after a long press on the tiles..
3. The second method involves manually selecting the time in the corresponding hours (0-23 h), minutes (0-59 min) and seconds (0-59 s) by shifting the numbers vertically.
4. The third way - setting the time can be done using the numeric keypad, which appears when you click on the number that needs to be corrected.
5. Confirm changes - click on the inscription OK, if you refuse to change - click on the inscription CANCEL.



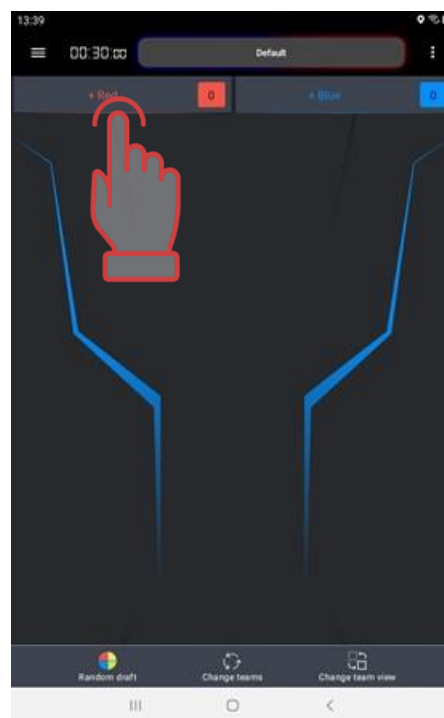
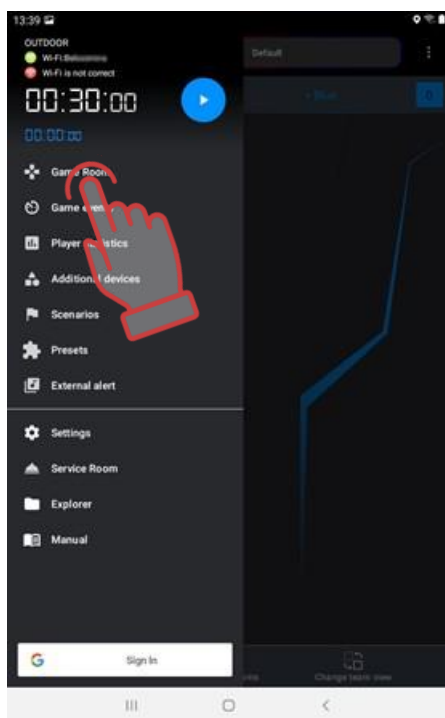
- The start delay is set in the same way. The delay timer is displayed in small blue numbers under the main timer. When you click on them, the time setting window is also called. The only difference is that the preset time options are given here in seconds - 5, 10, 15, 20, 30 seconds, respectively.



## 2.4 Forming teams

After choosing and configuring the scenario, you need to divide the players into teams. Even if the scenario is carried out according to the principle "death match", it is recommended to assign different colors to the kits to improve the visibility of statistics and add color to the game. The sequence is as follows:

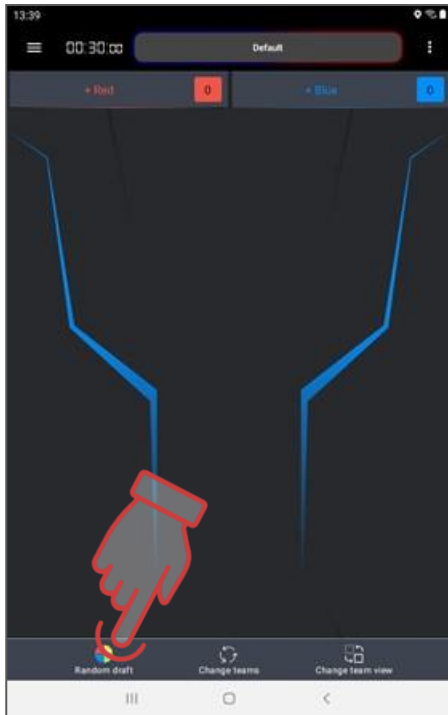
1. Turn on all the kits that will participate in the game.
2. In the main menu, click on "Game Room".
3. In the screen that appears, click on the button with the name of the team color.



4. If the device is on an incorrect Wi-Fi network, the program will prompt you to check the access point or network connection, if necessary, change it. Only after that it will allow you to enter the kit distribution menu.
5. In the player selection window, mark the cards of the kits connected to the server for the selected team or tick the box in the upper right corner to select all. Confirm your selection by clicking on the OK button.
6. Click on the button with the name of the team of another color. Mark cards of the remaining players. Check the equipment for teams.

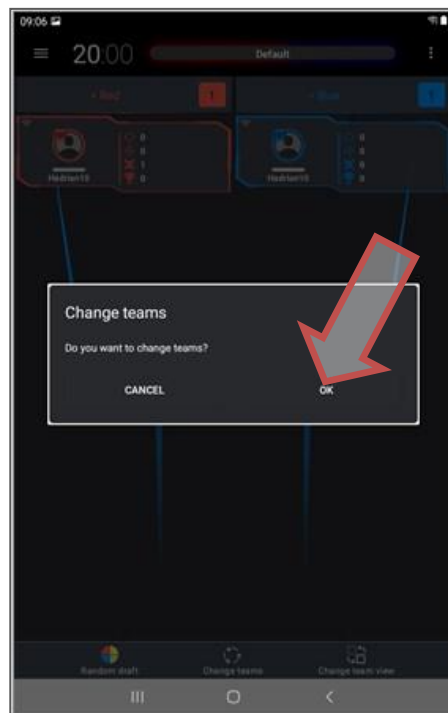


If necessary, players can be assigned to teams automatically. To do this, in an empty game room, click on the "Auto-distribution" item at the bottom of the screen - a window appears with all the kits connected to the server.

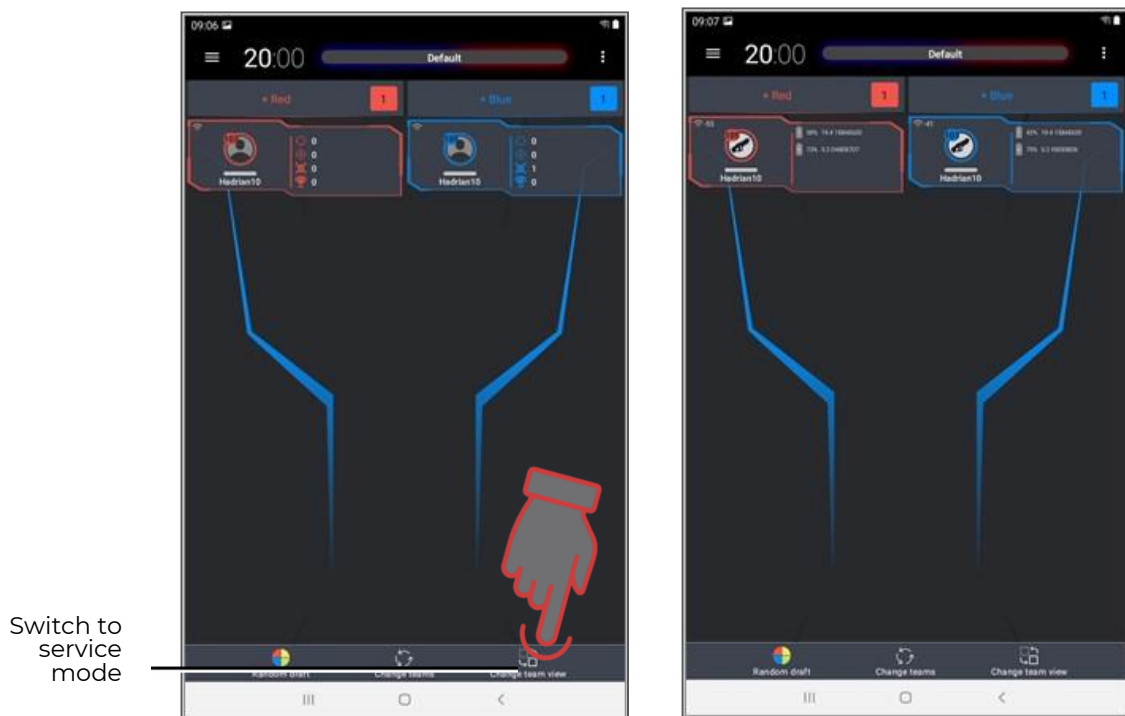


When you click on the Auto-distribution button in the menu, players are automatically assigned to teams within a few seconds. The process is graphically displayed by scrolling a multi-colored circle consisting of four segments in the center of the screen. To refuse auto-distribution, click on the Cancel button.

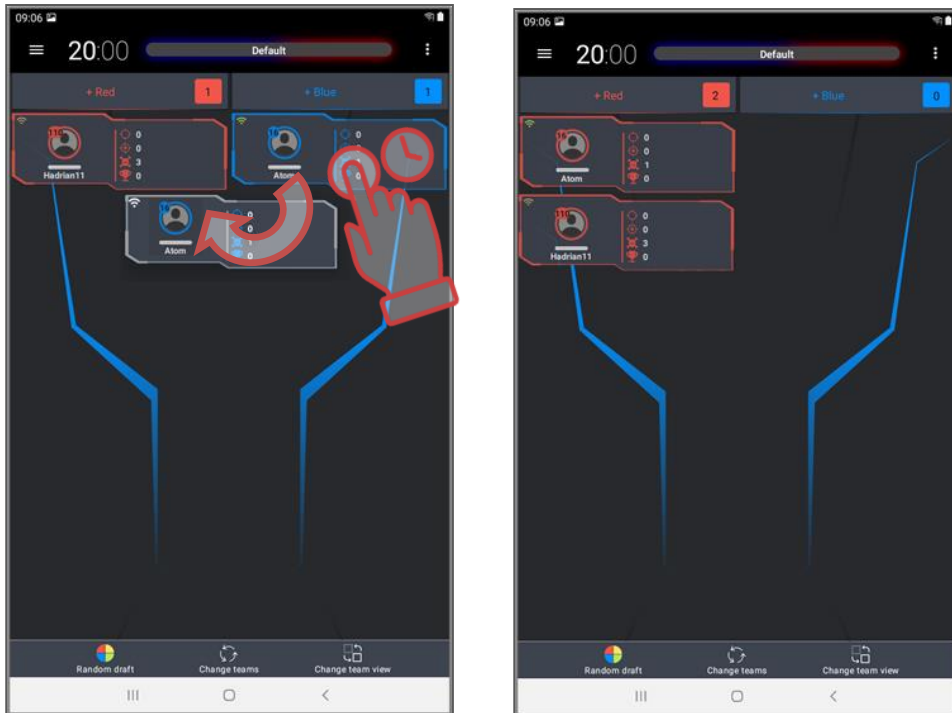
The program provides one more opportunity for editing the distribution by teams - pressing the Change teams button changes the color of the teams - if there are more than two teams, the color change is performed "circle wise".



- The program has two types of displaying the player card. In the main view (STATISTICS), the ID of the kit, the name of the player or kit, the number of hits, kills and defeats, efficiency are displayed.
- In an additional form (SERVICE), in addition to the ID and the name of the kit, the screen displays the state of charge of the headband and tager batteries, the firmware version of the HFD (tager, headband), the level of the Wi-Fi signal received from the router.
- The color of the frame and icons in both views matches the color of the team.
- Switching between modes is done by clicking on the CHANGE DISPLAY TYPE button at the bottom of the screen.



7. You can edit the distribution if necessary. To do this, select the card with a long press and, without releasing your finger, move it to the field of another team.

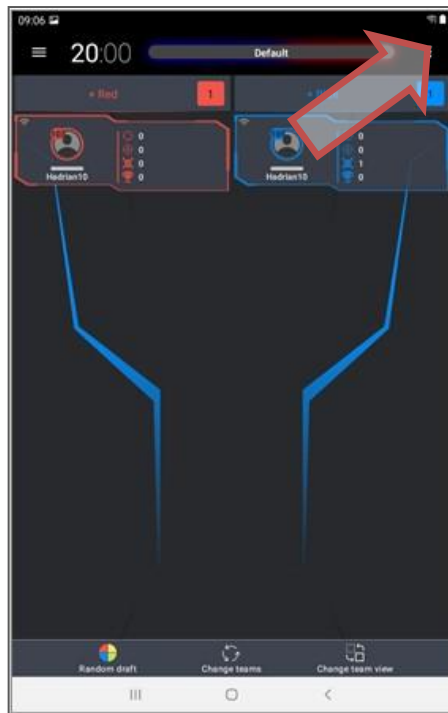


8. The program provides one more opportunity for editing the distribution by teams - pressing the CHANGE TEAMS button changes the color of the commands. If there are more than two teams, the color change is performed circle wise.

Pressing the button  in the upper right corner of the game window brings up a window with five items: SOUND VOLUME, REMOVE ALL, TURN OFF ALL DEVICES, SEND LOGS, RESET PLAYER NAMES.

- By clicking on the item SOUND VOLUME, you can set the sound volume level of the speakers of all the tagers participating in the game. In the window that appears, move the slider with your finger to increase the volume to the right, to decrease it to the left. Save changes - click the OK button. Listen to the system sound, change the volume if necessary.
- The item REMOVE ALL clears the team fields from all cards.
- The TURN OFF ALL DEVICES item allows you to remotely turn off the kits.
- The SEND LOGS item sends all existing program error messages to the company's technical support address (after connecting the device to the Internet).
- The item RESET PLAYER NAMES allows you to reset the player names to standard ones.





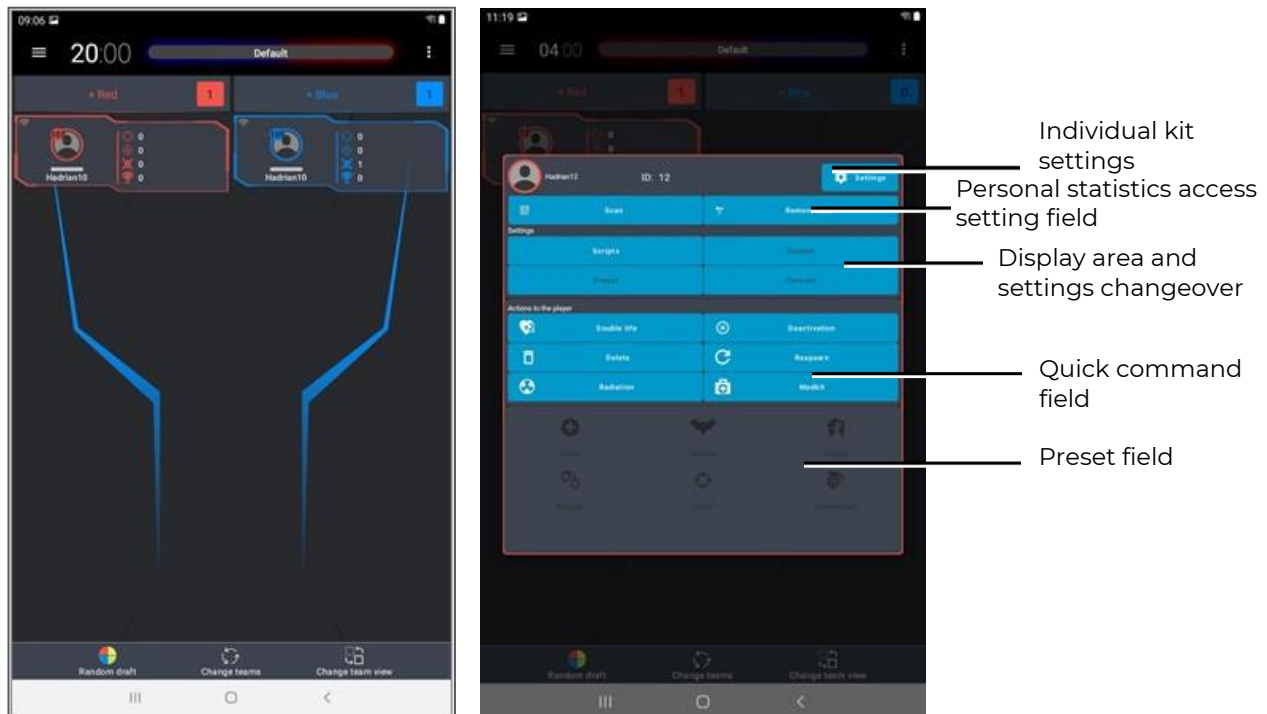
## 2.5 Individual kits settings

As a rule, in the scenario, the kits of players are assigned either general settings that are the same for everyone, or team settings that are different for different teams, but the same within the team. But there is a need to single out individual players, endowing them with specific abilities and capabilities. It can be both the birthday person and the animator participating in the game. It is useful to designate some players as medics or snipers.

In the program, in addition to using scenario settings, there are three options for assigning specific abilities to a player - individual settings, presets (pre-formed preset settings) or settings from the remote control.

Individual kit settings are called only after the kits are connected to the server, and they will be selected in one of the teams:

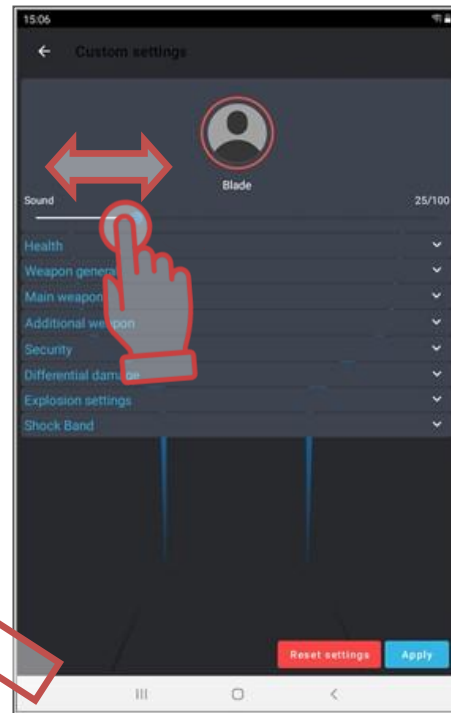
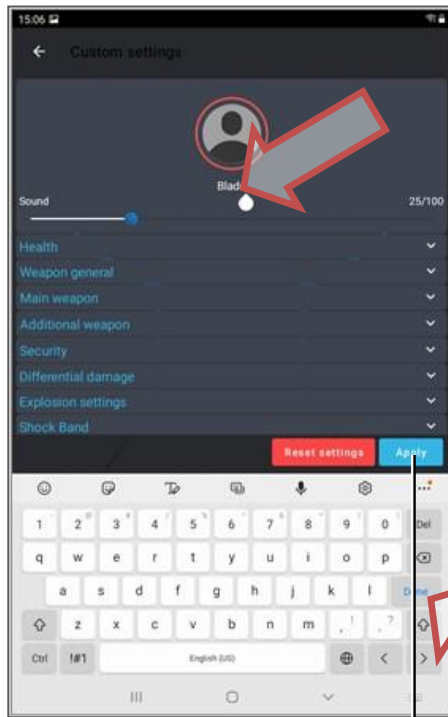
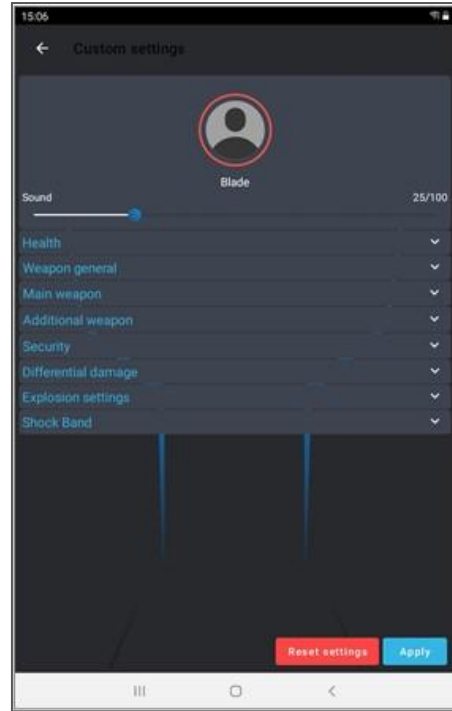
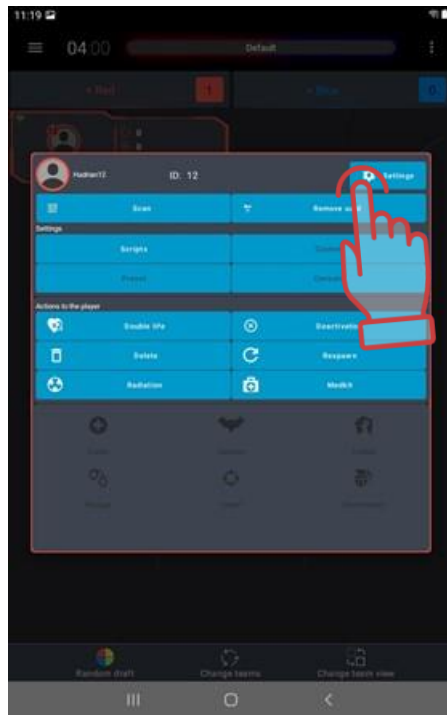
In the "Game room", when you click on a player's card, a window for quick commands and kit settings opens.



If you click on the ID number, the window for changing the identification number of the kit is called up.

Clicking on the SETTINGS icon opens the kit settings window. In this window, touching the name activates the keyboard, with which you can edit the player's name (up to 10 characters are allowed, except for #, ! and a tab character). The change must be confirmed by clicking on the SAVE CHANGES button. Exit from the name editor - press the OK button on the keyboard.

In the window it is possible to adjust the volume of sounds reproduced by the tager speaker. Holding the blue circle on the slider and moving it to the right increases the volume, moving to the left decreases it.

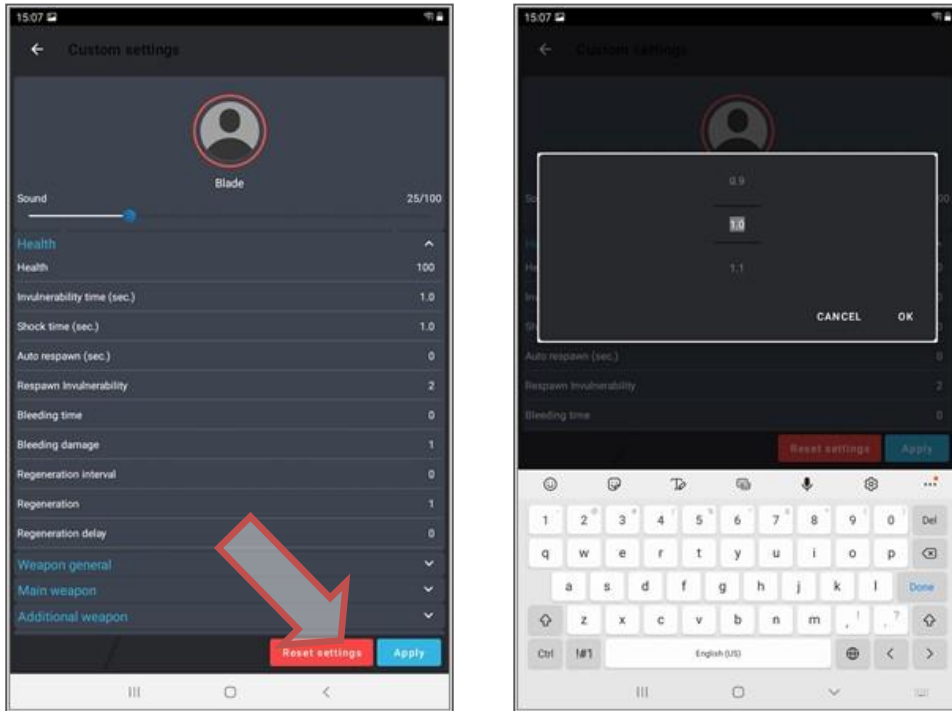


Save changes button

There is the kit settings table below the slider. It is possible to change about 40 parameters, such as the number of health units, rate of fire, shock time, enabling/disabling "friendly fire" (when players of the same team can hit each other), etc. The parameters, just like in the scenario editor, are organized by groups.

To change any of the parameters, you must click on its name - a window will appear with which the setting is made. Changes are confirmed by clicking on the APPLY button.

When you click on the bottom line in the table - "Reset settings", the factory settings are returned. To exit the window, click on an arrow in the upper left corner of the window.



The field for setting access to personal statistics allows the instructor to synchronize the kit with the player's personal UUID registered in the personal statistics display application for the duration of the game:

1. On the player's smartphone, open the previously installed and configured program for displaying personal statistics.
2. Open individual QR code of the player.
3. In the Lasertag Operator program, in the field for setting access to personal statistics, press the "Scan" button and the tablet camera turns on.
4. Scan the player's QR code.
5. Now the player's UUID is synchronized with their kit ID, and a QR code icon appears on the player's card in the upper left corner.



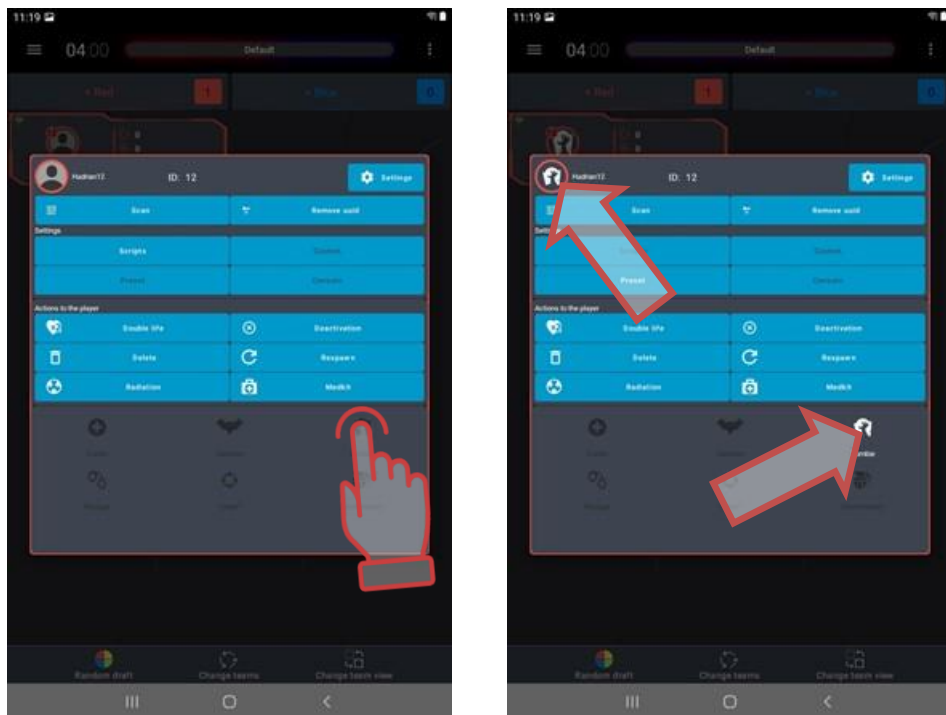
The field of quick commands allows you to send a protocol command to the selected kit directly from the server. By clicking on the corresponding button, you can send the following commands: DOUBLE LIVES (double the number of health units), DEACTIVATION (deactivate the player, but keep in the game), DELETE (remove the player from the game), RESPAWN (return to the player starting kit settings), MEDKIT and RADIATION (add or subtract health units).

## 2.5.1 Presets




In fact, presets are pre-prepared individual kit settings that can be quickly assigned to individual player kits after they are connected to the server.

In the lower part of the individual kit settings window, there are six preset icons - kit settings that give the kit its specific abilities. By clicking on the corresponding icon, the player can get one of the roles: MEDIC, VAMPIRE, ZOMBIE, HOSTAGE, SNIPER or STORMTROOPER. In this case, the selected icon becomes brighter, and its image will appear in the icon and on the player's card. After swiping on the second page of the individual card, the user presets will open - if any.

Return to the default role (SPECIAL FORCES) - click on the item SCENARIO SETTINGS or CUSTOM SETTINGS (if the set was configured individually) in the field of indication and switching of settings.



There are the factory preset parameters below:

-  **Doctor.** Number of health units - 100. It has two weapons - a Medkit, which, when only its own team hits a player, replenishes him 25 health units, and an assault rifle (damage 25 units).
-  **Vampire.** Number of health units - 250. It has one weapon - a bite, which not only takes 10 health units from the opponent player, but also attaches them to itself. The peculiarity of this preset is that during the game the kit loses 1 unit of health every 5 seconds (the so-called "thirst"), as well as the fact that radiation adds units of health to it, and the Medkit takes away.
-  **Zombie.** Number of health units - 200. Has one weapon - a claw. Double hitting the opponent turns the latter into a zombie too, i.e. "repaints" in its own color (unless configured otherwise). It has an inverse glow of the kit - the headband is constantly glowing. Doesn't respawn. Doesn't hit zombies. Just like a vampire, radiation adds health units, and a Medkit takes away. In firmware version 19.4 and higher zombies have the ability to kill zombies in

the opponent team. However, the damage done and received in the statistics may not be displayed correctly.



**Hostage.** Number of health units - 300. The weapon is a recorder, with which the hostage is marked upon reaching the final point of the route. The glow color of the kit is purple. Can be hit and healed (with kits as a Medic) by players of any team.



**Sniper.** Number of health units - 100. Has two weapons - a sniper rifle (damage 100 units) and a gun (damage 25 units). Strikes players of any team, including own one.




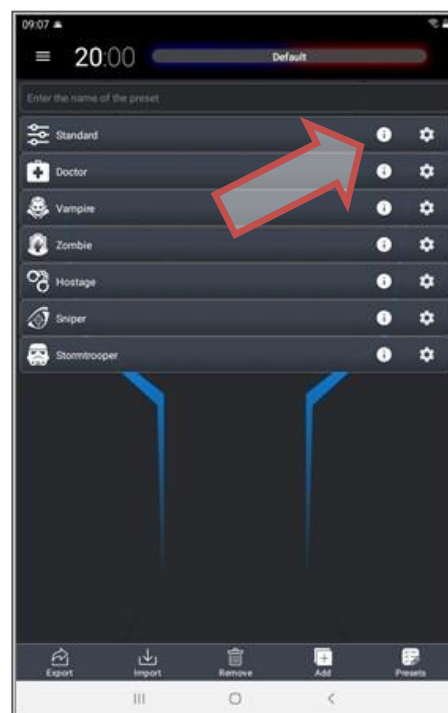
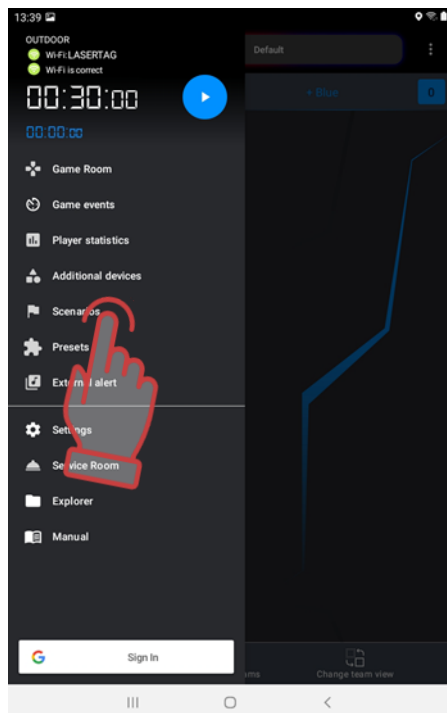
**Stormtrooper.** Number of health units - 100. Only affects players of other teams. Has two weapons - an assault rifle (damage 25 units), which shoots in bursts, and an under-barrel grenade launcher, which has 6 sec. of recharge, but damage is 100 units.

If the game is controlled from a PC, the kits connected to the server receive the settings set in the Lasertag Operator program. By default, the factory settings are also used, but the program has the ability to edit and create your own presets. Moreover, it is possible to do this without kits connected to the server.

**!** If a preset is assigned to a kit from the remote control, the “Remote control” icon becomes active in the field of indication and switching settings. To play with preset settings from the program, you must restart the game and select one of the presets in the program.

## 2.5.2 Editing built-in presets

For editing, in the Main menu you need to tap on the PRESETS section. A window with tiles of presets installed in the program will appear. The tile contains the preset logo and its name. On the side, there is an icon with a gear  that opens the preset editor.



More than 50 different parameters can be configured in the editor window.

The top line is a brief description of the preset.

The settings table is similar to the individual settings table.

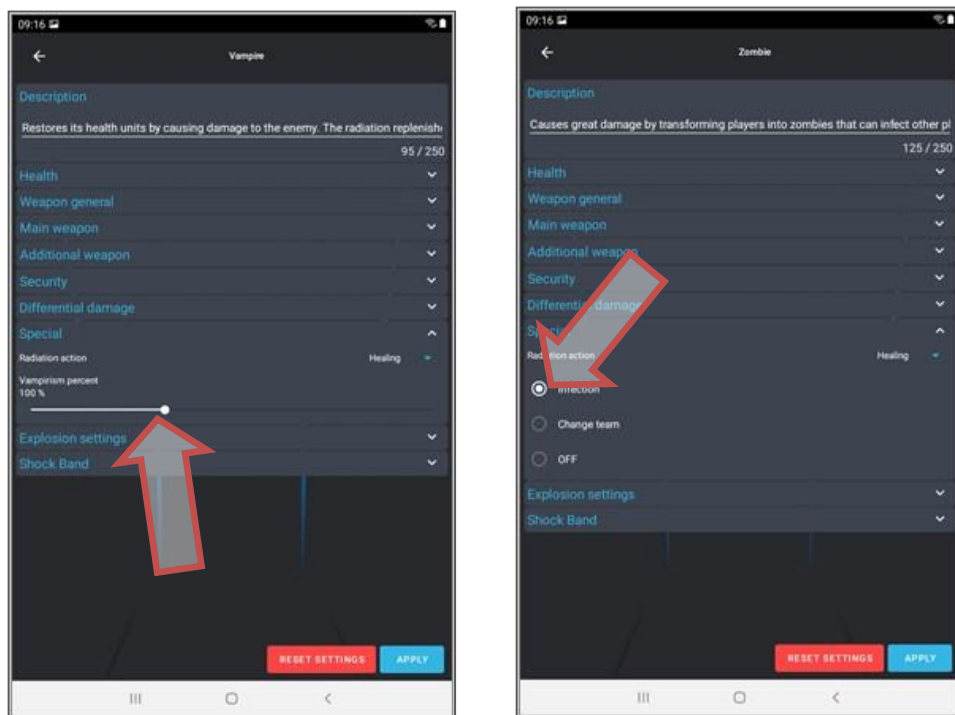
The only difference is that the "Special" section has been added.

For all presets, it displays the item "Effect of radiation" (None/Healing/Damage).

For the "Vampire" role, you can set the Percentage of Vampirism - the percentage of health units relative to your own damage settings, which the player attaches to himself after hitting the opponent's kit (0-300%). For example, the opponent currently has 75 health units. Vampire weapon damage (bite) - 25 units. The percentage of vampirism is set to 50%. When the opponent enters the kit, 25 units are taken away from him (50 remains), and only 12 units join the Vampire (rounding down). At the same time, the total number of health units of the Vampire cannot exceed the starting value. This parameter was introduced to equalize the gaming capabilities of players with different roles.

For "Zombies" in the "Special" section, you can select one of the following options:

- Change team - permission for a player to change a team after receiving a ZOMBIE protocol command (yes/no). After changing the team color, the player's preset remains the same as it was.
- Infection - permission for the player to change the role from the starting role to the Zombie after receiving the protocol command ZOMBIE (yes/no). In this case, the player also goes to the zombie team.
- Turn off - in fact, only the sound of a shot (growling) remains from the properties of a zombie.

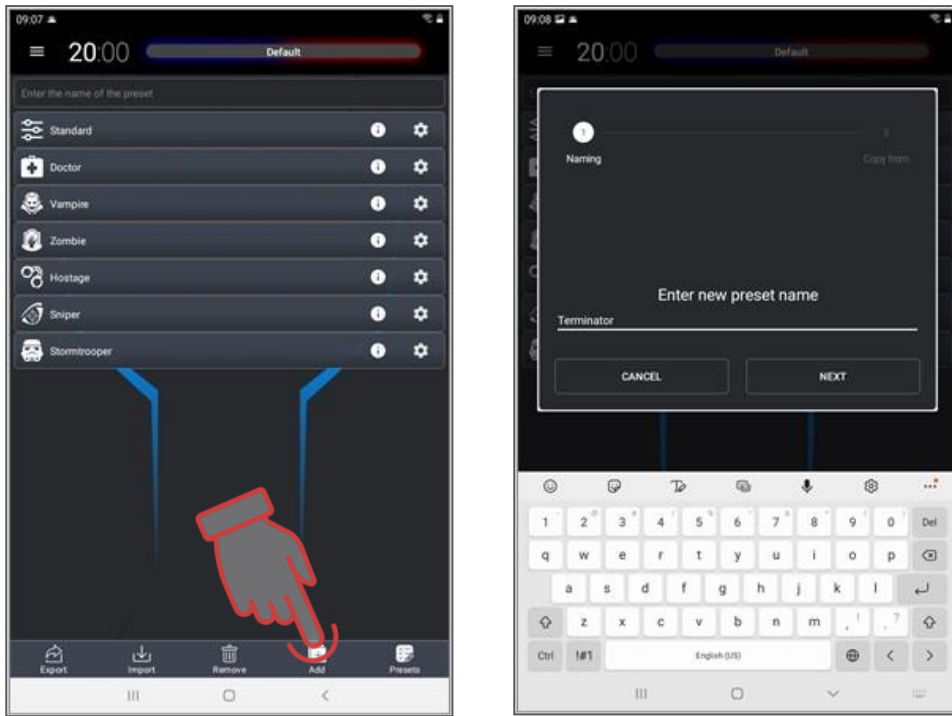


### 2.5.3 Creating custom presets

In addition to the fact that the settings of each built-in preset can be edited, the program provides the ability to create custom presets.

To do this, in the preset editor window, click on the ADD button at the bottom of the window. A window opens asking you to specify a name for the new preset.

After entering the name, click the "Next" button and copy the preset settings from the existing ones, click "OK". The kit settings window opens, similar to the pre-installed preset settings window.



The SHOOTER role is the main one, on the basis of which you can create presets of field players.

The fundamental difference between the basic settings of VAMPIRE and ZOMBIE is that for them, by default, the opposite effect of the protocol commands MEDKIT and RADIATION is set. Also, the Vampire has "thirst" enabled for the entire game period (after certain intervals he automatically loses health units). If the damage type is set not to "Vampire", but to another for this preset, then the player has so-called "thirst", but the units of life taken from the opponent will not be added to the player. Zombie has the ability to "repaint" the opponent in his own color.

The basic HOSTAGE setting does not imply any damage.

Each preset can be assigned 2 virtual weapons.





**!** If a player has two types of weapons in the preset, to switch them, you need to hold down the reload button of the tager for 3 seconds until the sound signal plays.

In fact, the types of weapons differ in their impact (take away or add health units, “repaint”, etc.) and the sounds accompanying the shot. Other parameters can be set at the desire.

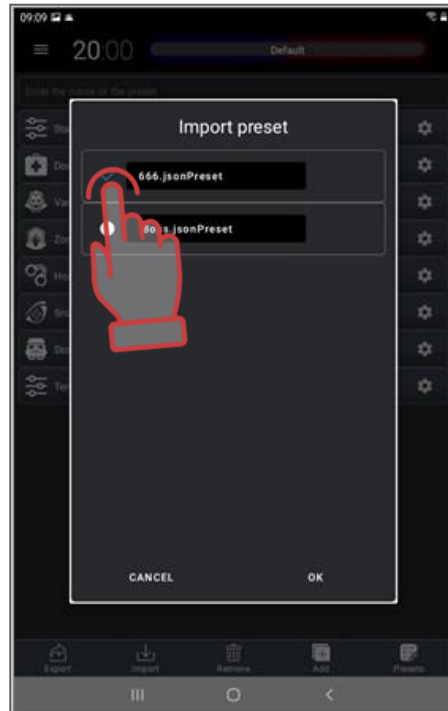
The following settings are recommended for different types of weapons:

Damage type/Parameter	Damage, health units	Auto-reload	Recharging time, sec	Friendly fire	Endless magazines	Number of magazines, pcs.	Number of cartridges in magazine, pcs.	Shots in the burst, pcs.	Speed of fire, shots/min	IR-beam power, %
Falcon	25	-	2,0	-	-	10	30	3	565	40
Assault rifle	25	-	3.0	-	-	10	30	3	565	40
Grenade	100	-	6.0	-	-	3	1	1	100	30
Sniper	100	-	4.0	-	-	5	10	1	30	100
Gun	25	-	2.0	-	-	3	15	1	180	50
Healing	25	-	2.0	-	-	10	30	1	300	40
Vampire	25	-	2.0	-	-	10	30	1	300	40
Zombie	25	-	2.0	-	☐	10	30	1	300	40
RPK	50	-	3.0	-	-	10	45	3	565	40
Radiation	25	☐	2.0	-	☐	10	30	1	300	40
Hostage	0	☐	2.0	☐	☐	100	100	3	565	2

To save the settings, click on the checkmark button. After that, the tile with the new preset will appear on the second page of the individual kit settings window. To open the second page (or the next, if there are several of these pages), you need to swipe to the left of the presets section.



Opening the next page of presets



Export, import and deletion of presets is carried out by analogy with scenarios, using the corresponding buttons.

To find files of saved scenarios on the device, click on the "Explorer" main menu item, and then select the Scenarios tab. Preset files will have a .jsonPreset extension.

Switching between options of individual settings is possible using special buttons in the window of quick commands and kit settings.

If the custom settings were changed before starting the game, the corresponding button will become active. When you click on it, the inscription CUSTOM SETTINGS becomes bright, thereby indicating that these settings have been applied.

If you click on one of the preset icons, including custom ones, the inscription on the PRESET SETTINGS button will become bright, indicating that the kits have received a setting using a preset.

The inscription "Remote" becomes active if any parameters of the kit were changed not through the program, but from the remote control.

Pressing the SCENARIO SETTINGS button returns the settings assigned by the scenario for all or for a specific team of the player.

Settings can be selected both before the round and changed during the running game. If the scenario does not change between rounds, then the individual settings are saved for the next game.



## 2.6 External alert

The equipment produced by the company uses two types of sound effects that are reproduced:

- tager's speakers;
- external acoustic system.

The tager speakers reproduce the sound of a weapon being used (a shot, radiation, a medkit, a zombie growl, etc.), a misfire, a ricochet sound, as well as some system signals (weapon breakage, barrel overheating, etc.).

You can change the sound scheme of the kit only during the flashing of the microcontrollers of the devices using a special program.

**! For advice on updating the firmware of device microprocessors, contact the company's technical support service!**

The external acoustic system of the playground plays background music, as well as more than 50 voice messages that automatically sound in accordance with emerging situations in the game.

An external speaker system is connected to the device used as a server either via an audio joint or via Bluetooth.

Lasertag Operator program allows you to listen to voice messages and, if necessary, play them in manual mode.

To do this, in the main menu, you need to click on the EXTERNAL ALERT item and in the "Events table" tab move the ON/OFF switcher to the ON position.

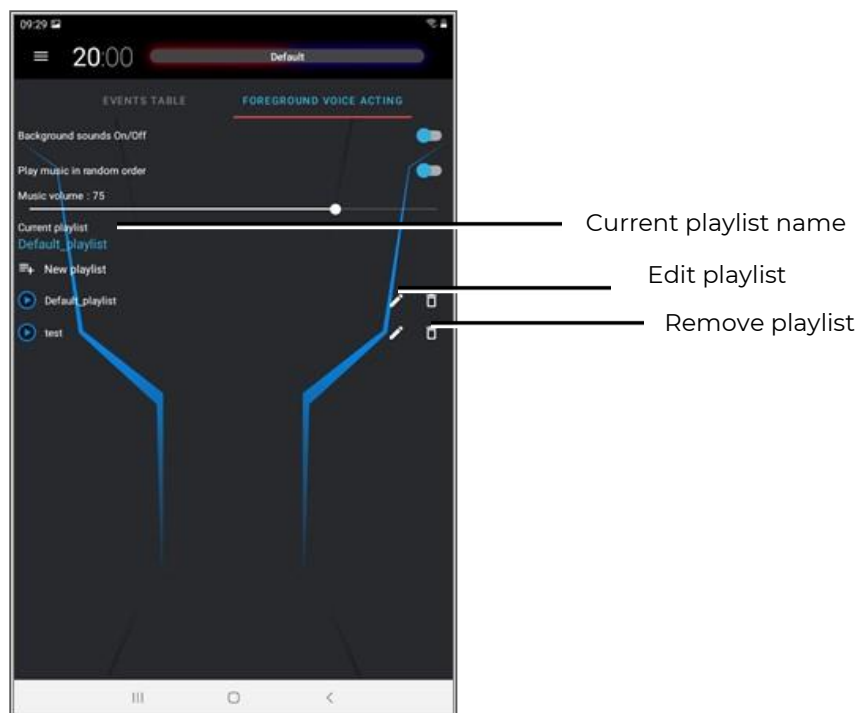
Below you can select the playback language. In this version of the application, English, Russian, Spanish, and French languages are available.


Next there is the volume control for music playback - by default it is set to the maximum - 100%. If necessary, the volume can be quickly adjusted.

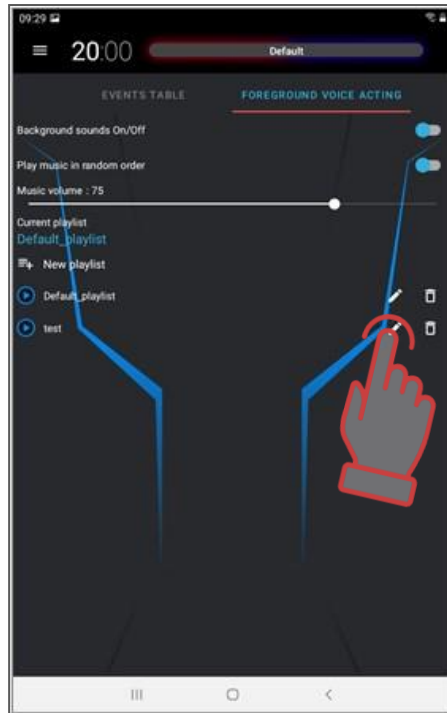
When you click on the selected line of the message, the sound is played in parallel by the speakers of the tablet and the external acoustic device.





In the BACKGROUND VOICE ACTION tab you can control the music that plays on the playground during a round. The program allows you to turn on/off music playback, Shuffle on/off, adjust volume, as well as select a pre-formed playlist (a list of played music) - for this you need to lick on the selected line.




When delivered, the program already has a built-in collection of musical compositions that may be suitable for scoring laser tag games. When clicking on the pencil  icon, an editable list opens.




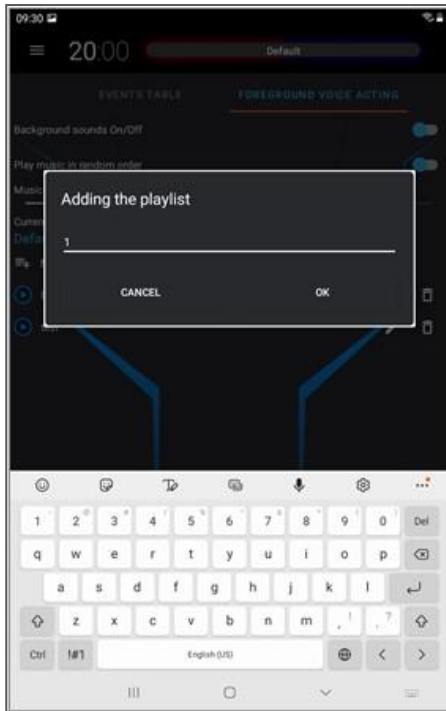
To change the order of playing melodies, you need to click on the song line, hold it and move it to the selected place. A short press on the song line plays it, a second press stops it.



If necessary, you can rename (  button) or delete the selected song (  button).

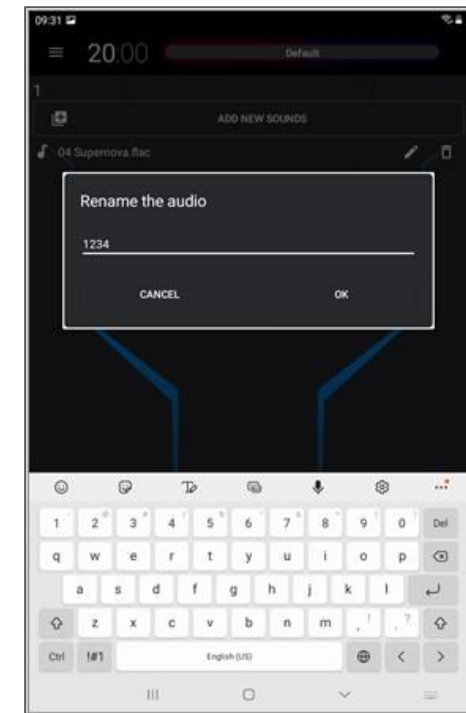
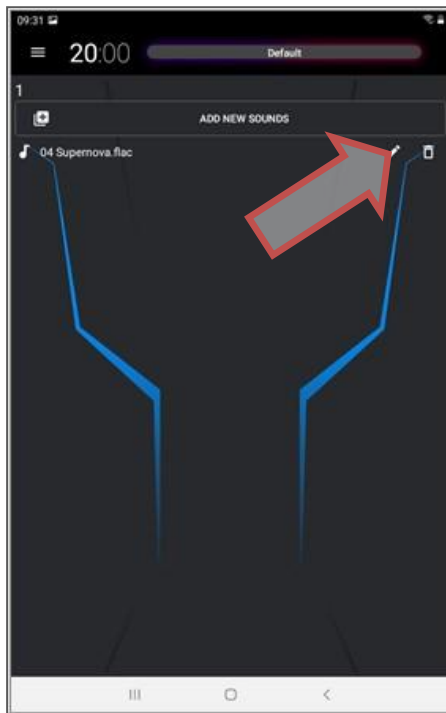
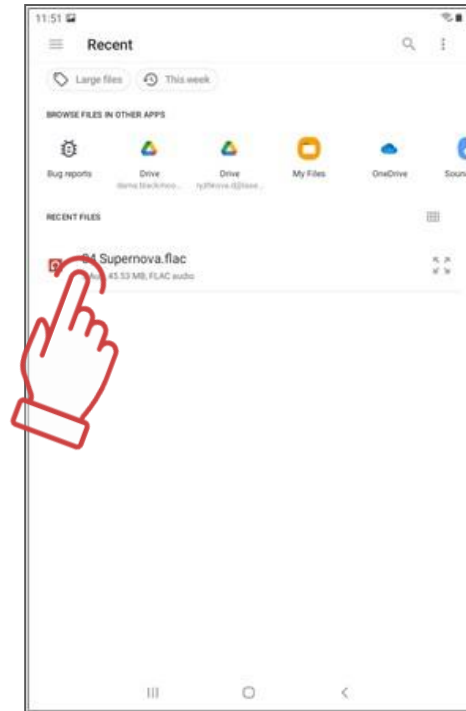
To create a new playlist, click on the NEW PLAYLIST button  . The program first suggests you to name the playlist. The name can be connected with a specific scenario, the theme of the game, an event (for instance, birthday) or a category of players.

After confirmation with the OK button, the playlist name will appear in the general list. Now the playlist needs to be created:

1. Click on the button with the pencil image  .



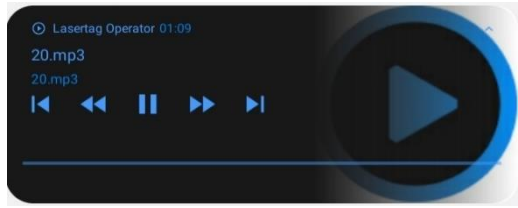
2. In the window that opens, click on the line ADD NEW SOUNDS. The device file system window will open.
3. Select the required music compositions (files with the .wav and .mp3 extensions are supported). The file search order depends on the version of the tablet or smartphone operating system.
4. The file names appear in the song list. If desired, you can rename them - click on the button with a pencil .
5. The list can be supplemented (repeat the procedure for inclusion in the playlist) or shortened by clicking on the button with the trash can  image to the right of the file name.



The playlist itself is deleted in the same way.

Now, when the switch ON/OFF BACKGROUND SOUND is turned on during the game, the melodies will be played depending on the selected playlist and in the order as they are located in the list. The playlist is controlled from the standard player of the operating system. Volume control - by controlling the volume of the device and speaker system.

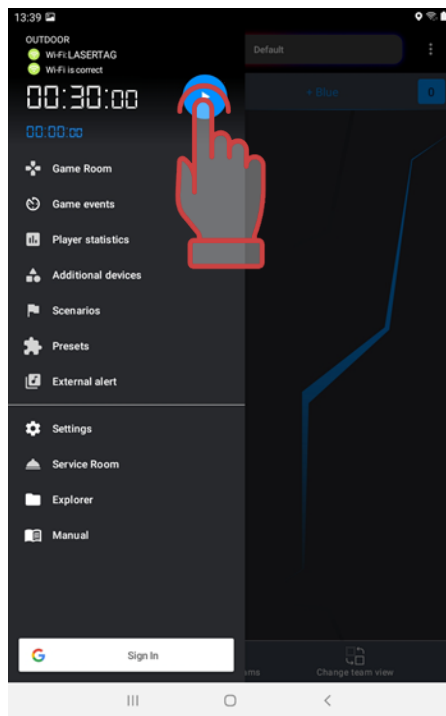
The playlist is controlled from the standard player of the operating system. Volume control - by controlling the volume of the device and speaker system.



## 2.7 Game control and monitoring

After choosing a scenario, if you need to customize the kits, soundtrack and round time, you can start playing the game directly.

To start, you must use the control button in the main menu.



After the start of the game, the timer in the main menu starts counting down (after a delay, if it was set).

The status bar on the player cards will show a green bar proportional to the remaining health points.

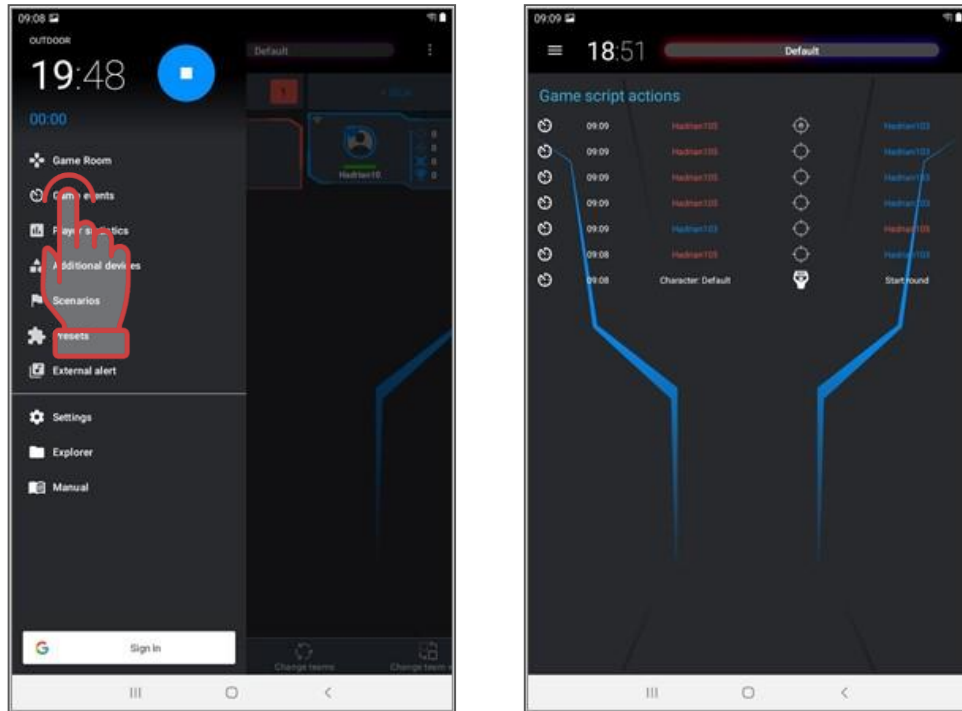
	<p>Kit in the game, 100% health</p>		<p>Kit in the game, 50% health</p>
	<p>Kit in the game, 25% health</p>		<p>The player suffers a defeat</p>
	<p>Player pending start or removed from game</p>		



During the game, one can see a log on the screen - a report on the main events taking place on the playground. Moreover, the log can be viewed both in expanded and short display - just check/uncheck the "Turn on detailed game logging" item in the "Settings" menu.

In the expanded display, you can see all the events taking place in the game, including every hit of an opponent by all players. In the short display, you can see only key events, such as the beginning and end of a round, capture of a Domination Box, etc.

In order to show the log on the screen, you need to go to the main menu item "Game events" during the game.



Also, as in standby mode, during the game you can change players between teams - by long pressing on the card, first activate it, and then move it to the field of another team. However, keep in mind that statistics in this case may be displayed incorrectly.

## 2.8 Game statistics

Pressing the button GAME STATISTICS of the main menu (swap to the right) displays the corresponding window. There are 3 tabs in it, which are called by clicking on their name.

The TABLE tab in real time and at the end of the game shows for each kit participating in the game, the number of frags, shots fired, captures of Domination Boxes, points scored, damage done and received. The table also displays the number of captured, lost and fetched flags, bomb shots and differential damage.

ID	Name	Points	Kills	Deaths	Shots	Damage applied	Damage received	DB is captures	Flags delivered	Flags dropped
103	Hadrian103	1	0	1	2	25	100	0	0	0
105	Hadrian105	1	1	1	15	100	25	0	0	0

Flags taken	Bomb hits	Total	Shoulders	Head	Chest	Back	Weapon
0	0	1	0	1	0	0	0
0	0	4	0	0	0	0	4

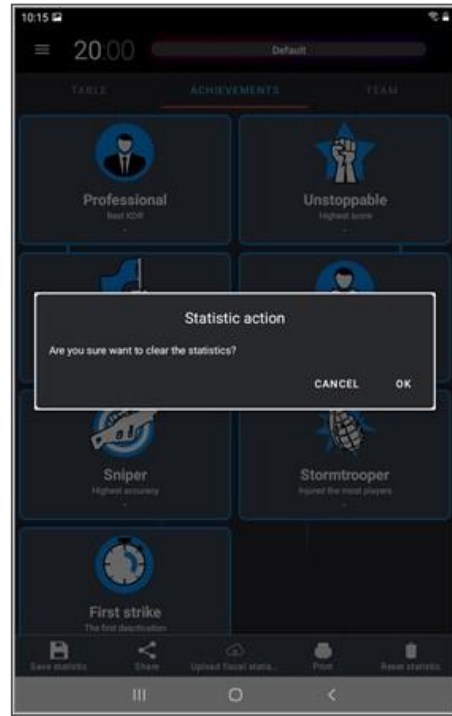
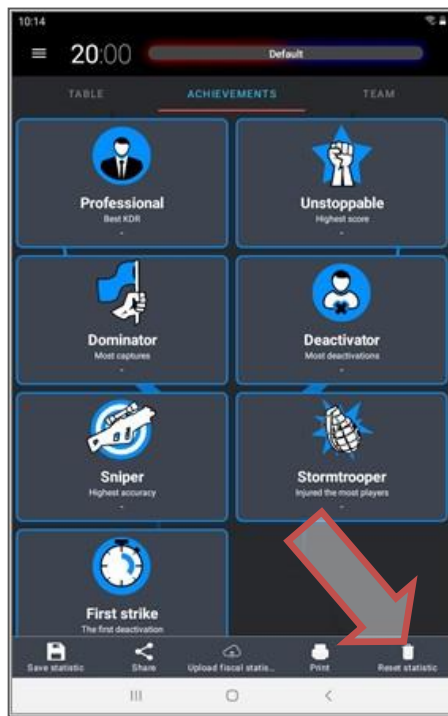
The ACHIVEMENTS tab displays the current comic nominations depending on game indicators - accuracy, number of hits, number of points scored, etc.

The TEAMS tab displays team statistics.



Game statistics can be viewed not only at the end of the round, but also during the game.

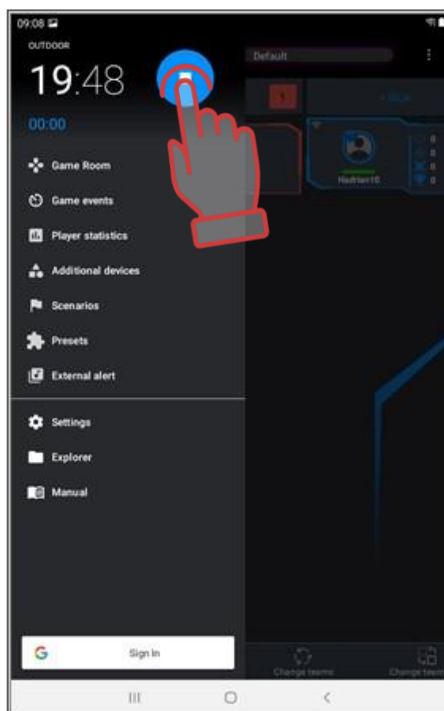
When the RESET STATISTICS BEFORE THE GAME option is enabled (Main menu/Settings/Global settings), all numerical indicators are reset before the start of the round. Otherwise, statistics will be accumulated until you turn off the RESET STATISTICS BEFORE GAME option. It is possible to forcibly reset statistics by clicking on the RESET STATISTICS button.



## 2.9 Finishing the game

The term GAME means a gameplay in which the same teams play a certain number of rounds. It can be either one or several rounds. ROUND is a gameplay with a certain scenario, limited either by time frames, or ending when a condition specified in the scenario occurs (capture of DB, reaching a specified level of points, etc.).

The round can also end forcibly - by pressing the STOP button in the main menu, which appears in place of the START button.



At the end of a round or game, the program has the ability to process statistics. So, in the GAME STATISTICS window after clicking the SAVE STATISTICS button, the program resets the current results to the device memory at the address: My files/Documents/pdf/ (the address may be different depending on the version of the operating system). At the same time, three graphic files of general statistics are saved: Game\_statistic\_XX: XX.pdf, Cross\_statistic\_XX: XX.pdf and Honor\_desk\_\_XX: XX.pdf, where XX: XX is the file saving time.

Individual statistics of all players who participated in the game are also saved there - files Player\_statistic\_XX: XX Nickname.pdf, where Nickname is the name or nickname of the player.

## 2.10 Explorer

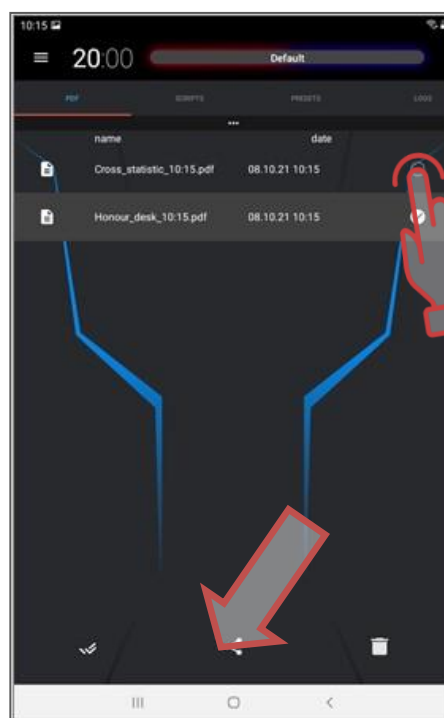
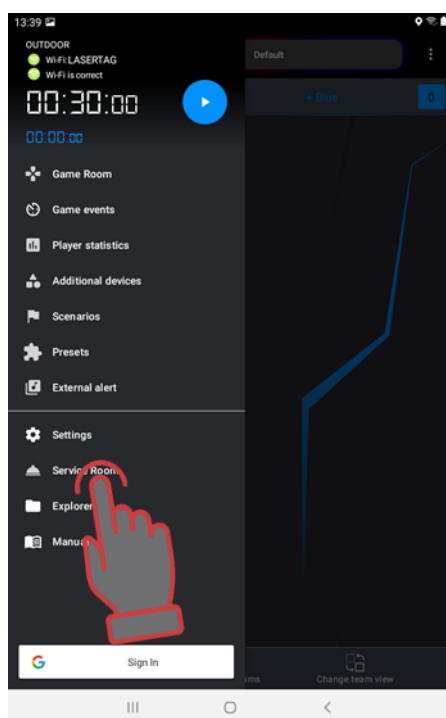
Statistics files, as well as files of game logs, saved scenarios, presets and instructions can be seen by going to the "Explorer" sub-item of the main menu. By selecting the "Pdf" tab (first from the left), you can open files by date, select all, delete all or specific files, print on a printer, share via mail or social networks.

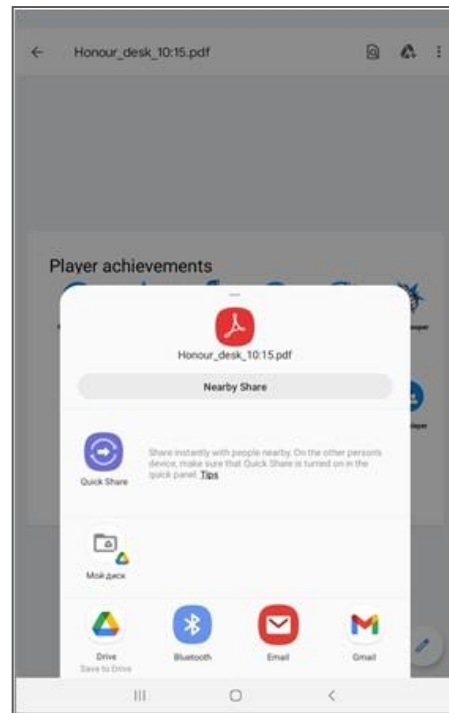
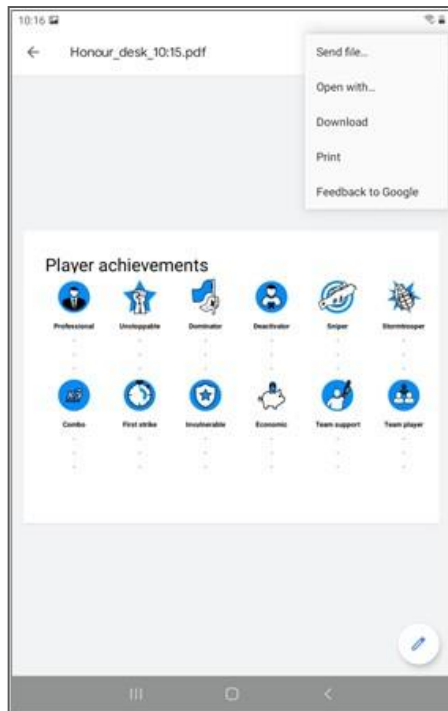
The SHARE button opens a window in which the user is prompted to publish graphical statistics files via mail, Google Drive or social networks, depending on the programs installed on the device.

**! You can share the result of the game after connecting the device to the Internet.**

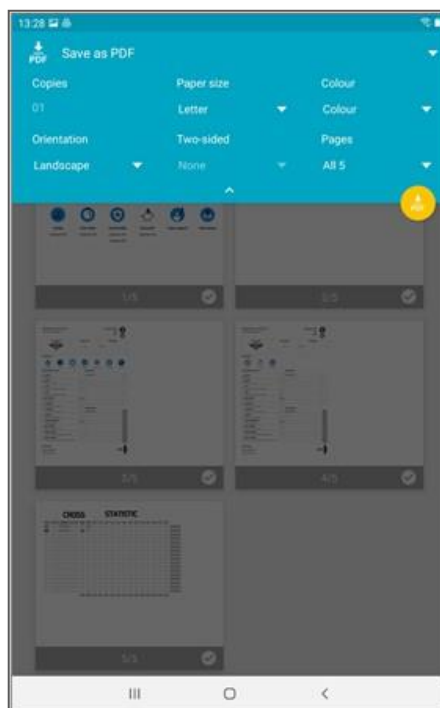
The "Scenarios" and "Presets" tabs also allow you to share saved custom presets or delete them.

The Logs tab stores messages about events in the program, and the Instructions tab contains pdf versions of the instructions downloaded from the company's website (by clicking the Instructions main menu item).



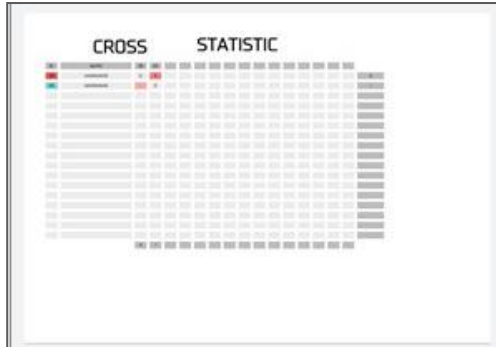


When you click on the PRINT button, a dialog box appears in which you can choose to save the report as pdf files specially prepared for printing.



If you select a printer connected via Wi-Fi to the device in the dialog box, report forms can be printed immediately. It is also possible to customize printing. The printing preferences dialog box depends on the version of the operating system installed on the device.

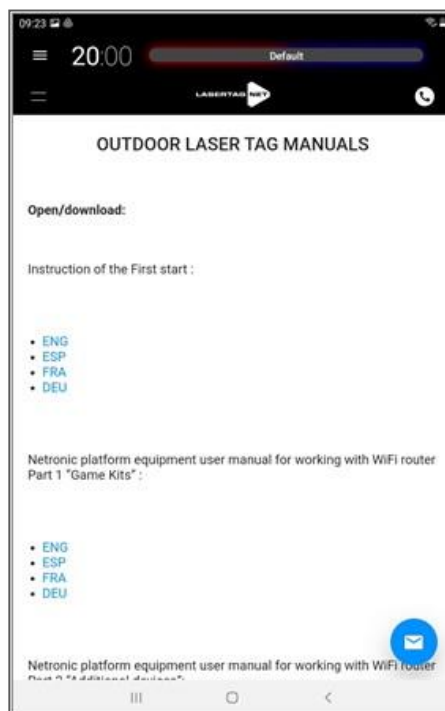
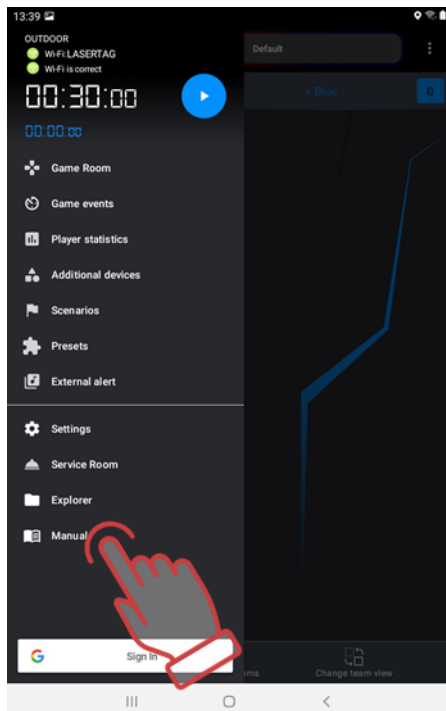
**!** The printer must be connected to the same network as the tablet or smartphone



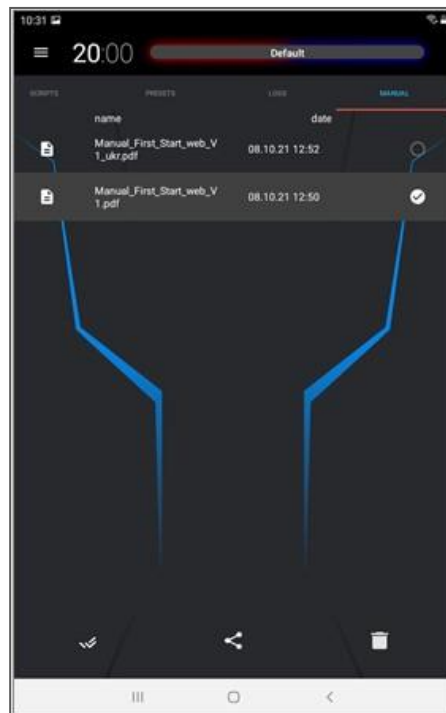
## 2.11 Manuals

The program provides an opportunity to download the Operating Instructions for laser tag equipment (including the current version of this one) directly from the company's website. To do this, in the Main Menu, select the "Instructions" item, in the window that appears, select the necessary instructions and click on the "Download" inscription.

**!** In this case, the device must have access to the Internet.



The saved instructions can be found in the "Instructions" tab of the "Explorer" item of the Main Menu (on the right side).

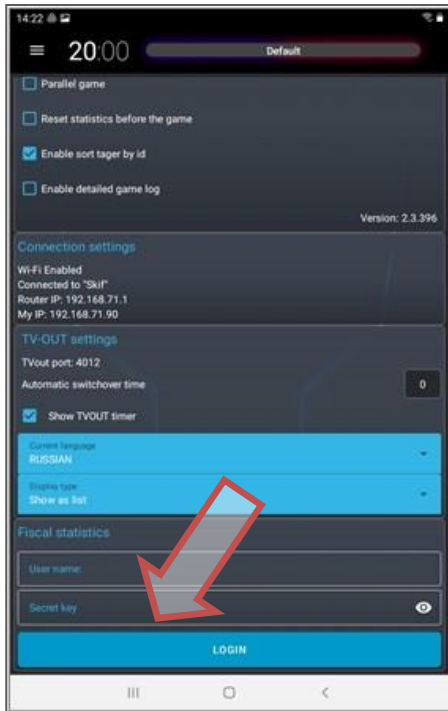


## 2.12 Fiscal statistics

The program allows you to keep server statistics, which allows the owner of the club to control the number of games played on the playground.

When sending the kits, the owner is given the address, login and password from the server, where he gets access to the statistics of his club. There he creates accounts for administrators, and reports the details of them to administrators.

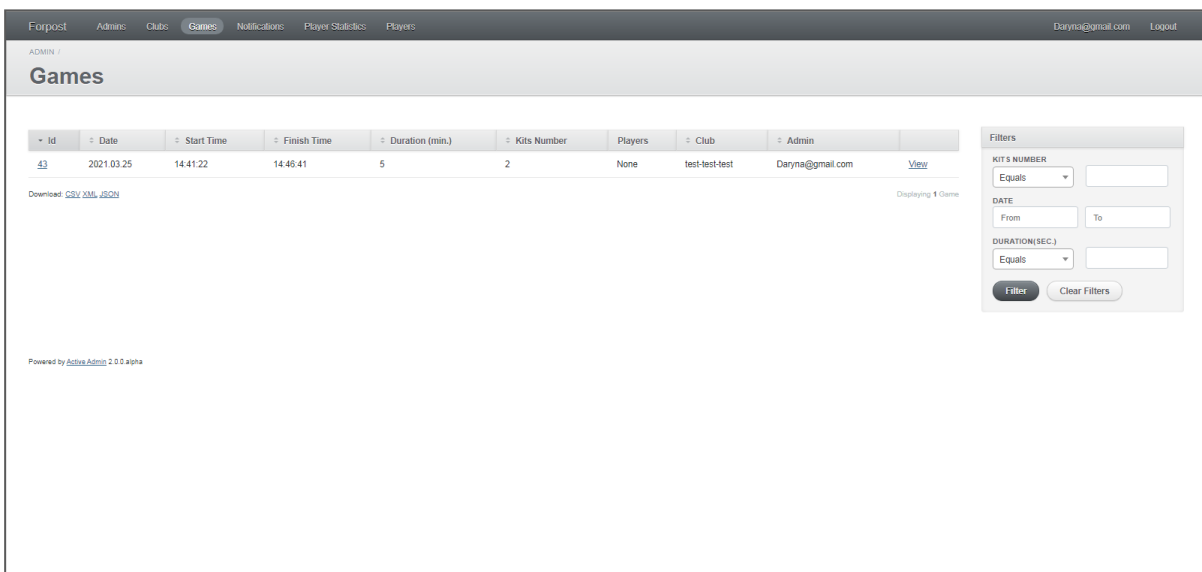
The username and password that the club owner provided to the user (administrator or instructor) must be entered in the FISCAL STATISTICS section (Main menu/Settings).



During all working hours, statistics will be accumulated in the background on the device until the button SEND FISCAL STATISTICS is pressed. The user (this can be both the administrator and the owner of the club, who logged in with his own name and password), after connecting the tablet or smartphone to the Internet, dumps statistics to the server. This clears the statistics on the device.

**!** **Uploading statistics to the server takes place for games from 3 minutes, so that short test and verification games are not taken into account.**

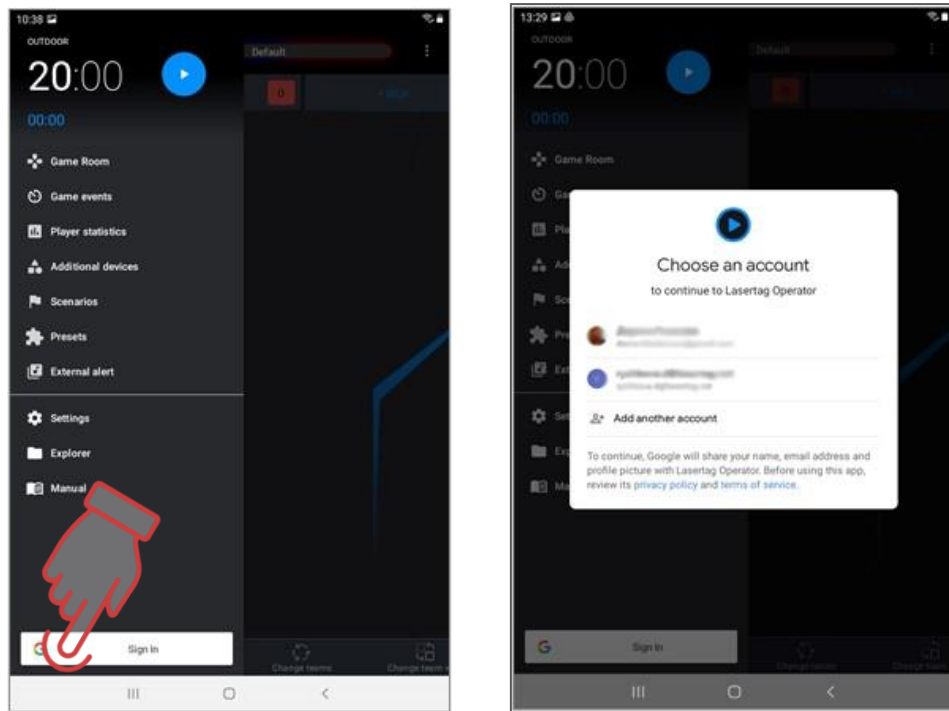
Now information about the games played (date, time of the start of the game and the end, duration and number of sets participating in the game) will be stored on the server and will be available only to the owner of the club.





### 2.13 Log in with Google account

The current version of the program now has an option for authorizing the program via Google account. To log in, click on the button with the Google icon "Login" in the main menu at the bottom of the screen, select an account and log in.



After successful authorization, the developer can receive authorized error notifications and backlog. And in the future (now this option is being developed) you will be able to receive notifications about updates in the program on your device, as well as join the customer loyalty program.