S BOX - 100

OPERATING INSTRUCTIONS

MFX

SHOT CONTROL SYSTEM

SHOT CONTROL SYSTEM

Abstract

This user manual describes the functional capabilities of the SBOX-100 device for operation with the Shot Control System software-hardware complex.

Detailed information is provided for configuring and setting up the device in Controller mode and Receiver mode, along with key guidelines and critical points.

This manual covers the essential aspects of address space organization for configuring the Shot Control System software-hardware complex using SBOX-100 devices.

Security measures and device power management recommendations, including maintenance procedures, are provided.

It is strongly recommended to thoroughly review this manual before system operation.

For any inquiries, please contact us:

① Email: support@mainfx.ru

② In any messaging platform:

https://mainfx.ru/

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Before operating this device, please read this manual in full and carefully save it for future reference.
This device is designed for use by qualified personnel who have undergone training in its operation.

SHOT CONTROL SYSTEM

1 Description of the Device

The SBOX-100 device is a software-hardware system for controlling external devices via the SHOT CONTROL protocol.

The SHOT CONTROL protocol, in combination with SBOX-100 devices and other protocol-compatible devices, enables the creation of multichannel and multi-zone networks for electronic device control using software logic algorithms.

End devices for SBOX-100 may include various pyrotechnic devices and other low-voltage loads.

SBOX series devices are used for programmable control of pyrotechnic and other specialized devices during pyrotechnic displays and concerts. Additionally, they are utilized in the film and video industry.

The SHOT CONTROL protocol enables a single controller to manage hundreds of diverse end devices.

The SBOX-100 device can operate in two modes: Controller mode and Receiver mode.

1.1 CONTROLLER MODE

In Controller mode, the SBOX-100 device can control any devices that support communication via the _SHOT CONTROL SYSTEM_ radio protocol. The device features one physical and eight logical control buttons. It includes an active Bluetooth module for connecting to a mobile application. When operating in Controller mode, the device displays the corresponding status and information specific to Controller mode on its display.

1.2 RECEIVER MODE

In Receiver mode, the device receives signals from the controller and can trigger pyrotechnic devices as well as manage other loads by applying a 20-volt voltage with controllable duration and delay. The device operates via the SHOT CONTROL radio protocol in Receiver mode.

Up to 10 external devices can be connected through 10 contact groups for direct pyrotechnic igniter connections, as well as up to 6 expansion boards (each with 15 channels) via 6 RJ45 ports. When 6 expansion boards are connected, the device can simultaneously trigger up to 100 pyrotechnic ignitors.

When operating in Receiver mode, the device displays the corresponding status and information specific to Receiver mode on its display.

1.3 DEVICE UPDATE

Device updates and configuration are performed through a dedicated software application. To configure and update the device, connect it to a mobile device (smartphone, iOS or Android tablet) via Bluetooth where the dedicated application is installed. (For details on device configuration using the dedicated application, see the separate instruction).

1.4 DEVICE PACKAGE

The SBOX-100 device is delivered in its standard packaging, which includes:

- SBOX-100 device

- Antenna

Figure 1: Standard antenna for SBOX-100

- RJ45 to USB-C charger adapter for connecting the charger to the RJ45 port on the top cover of the SBOX-100 device.

Figure 2: RJ45 – USB-C charger adapter

- User manual

1.5 DEVICE STORAGE

The SBOX-100 device is recommended to be stored in its standard packaging in a dry, well-ventilated area.

Storage conditions:

- Storage temperature: from -30C to $+50$C

- Relative humidity: from 10% to 80%

For prolonged storage, it is recommended to remove the battery from the device.

IMPORTANT!

The device must not be stored with flammable substances or items.

1.6 ADDITIONAL ACCESSORIES FOR SBOX-100

Additional accessories included with the device:

① RJ45 to USB-C charger adapter

② 15-channel expansion board: (up to 6 expansion boards can be connected to a single device without parallel connections)
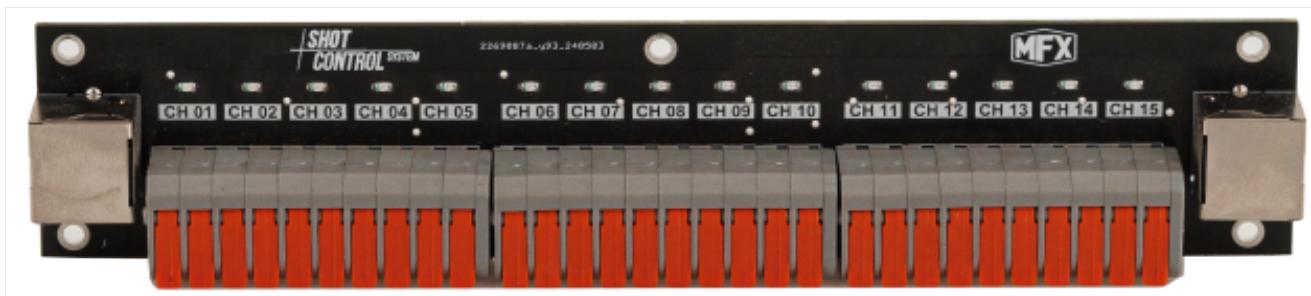
Figure 3: 15-channel expansion board

2   List of Definitions and Terms

Device — Equipment (device) that performs specific functions and is controlled via radio channel or DMX.

Controller, Shot Control — Hardware device configured through a mobile application on a mobile device and controls connected devices via radio channel and/or DMX.

Mobile Device — Smartphone or tablet (iOS, Android) on which the application is installed and from which the user configures the Controller and connected devices.

Application — Mobile software application installed on a mobile device used for configuring devices and Controllers. (See separate instruction for Application description.)

Program — A specific sequence of actions stored in a file for subsequent assignment to a button and transmission to the Controller. Represents a set of points structured in a time sequence.

Program Point — Individual entity within a program describing a specific action for a device. May have various entity types and parameter sets depending on the type.

User — Person who uses the system .

Button — Depending on context may mean:

- Button in the application interface
- Hardware button on the Controller and entity in the application to which a specific program (or sequence of programs) and a set of parameters regulating its operation can be assigned.

Channel — A channel is a physical contact on the SBOX-100 device (or other devices operating by protocol *SHOT CONTROL SYSTEM*) to which external devices are connected via wired connection for control: pyrotechnic igniter, electromagnet, other specialized devices.

Externally, a channel represents a terminal with two contacts (+ and -), to which voltage up to 2 as 20 V and current up to 5 A are applied with a specified time delay.

To control a channel from the Controller, a channel is assigned an address in the format: position number POSITION + ADDRESS (see section: 6.2.1 on page 22)

Note: The text contains comments.

⚠ **VERY IMPORTANT!**	We strongly recommend carefully reading and considering these comments. They are indeed very important!
⚠ **IMPORTANT!**	These comments are equally important, and we strongly recommend familiarizing yourself with them.
! **USEFULLY!**	Comments with this marker reflect useful tips and tricks.

3 | Precautions

Read this section carefully before using the SBOX-100 to ensure proper and safe operation of the device and extend its service life.

3.1 WARNINGS

⚠ Before operating the device, ensure it is charged and there are no visible damages.

⊘ Immediately stop using the device if it begins to smoke, overheat, or emits unusual odors or noises. These conditions may cause a fire. Immediately shut down the device and contact your dealer for a technical inspection.

⚠ The SBOX-100 must be charged using the manufacturer-recommended charger.

⚠ During operation, do not open or remove the device's casing secured with screws unless specifically instructed in the user manual.

⚠ Do not modify or alter any components of the SBOX-100. Modifications may cause the device to malfunction.

⚠ Use only the recommended battery types. Non-recommended batteries may damage the device or cause a fire.

⚠ Ensure batteries are installed with correct polarity. Improperly installed batteries may cause a fire and damage the device; this situation is not covered by warranty.

⊘ Using the device without a connected antenna may cause damage.

⚠ Using non-original antennas may damage the radio channel (not covered by warranty).

Do not store the device with flammable substances or items.

Installation and configuration of the SBOX-100 must be performed after thoroughly reading this manual.

4   Main Technical Specifications of the Controller

Table 1: Main Technical Specifications of the Controller

No.	Characteristic	Value
1	Weight:	684 grams
2	Overall dimensions:	154 mm × 140 mm × 48 mm
3	Output power supply voltage:	20 VDC
4	Maximum output current	5 A
5	Radio frequency range:	864-869MHz
6	Temperature	
6.1	Operating:	-20 to +40 Celsius
6.2	Storage:	-30 to +50 Celsius
7	Relative humidity (operating)	0-80%
8	Battery capacity and type:	removable Li-ion 2x18650
9	Battery life in active mode:	48 hours
10	Standby time in sleep mode	2 months
11	Housing material:	Anodized aluminum, black
12	Display type:	OLED
13	Ingress protection (IP) class:	IP 64
14	Number of radio channel (lines) positions:	1000
15	Number of channels in one radio channel position:	10,000
16	Number of «Receivers» connected to SBOX-100 in «Controller mode»	255
17	Maximum range in Controller mode (line-of-sight, ideal conditions)	up to 10 km
18	Service life:	5 years

SHOT CONTROL SYSTEM

5 Control Elements Description

5.1 FRONT PANEL OF THE DEVICE

The SBOX-100 device is made of a sturdy aluminum rectangular housing.
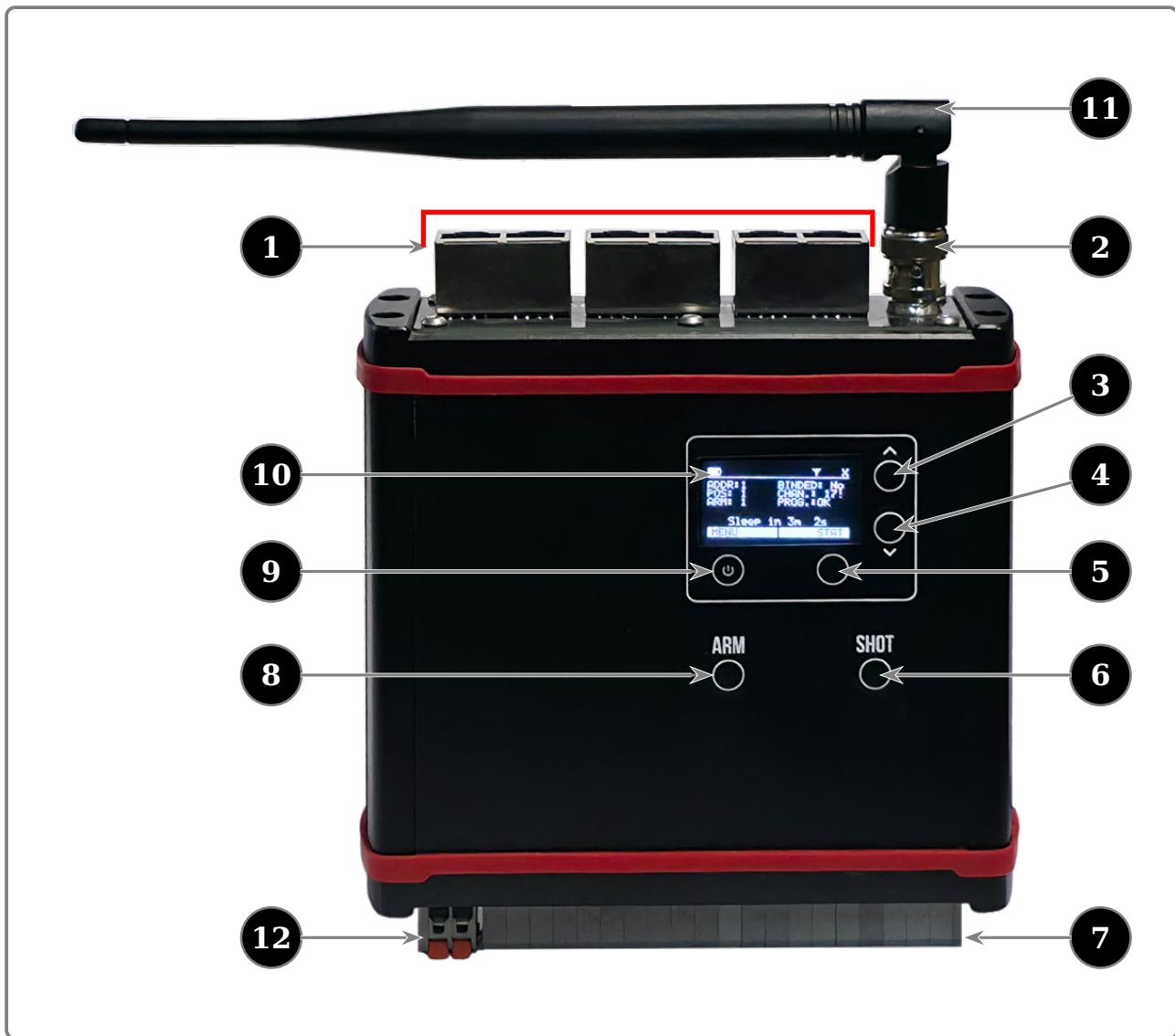
Figure 4: Front panel of the SBOX-100 device

1 External device connector [6xRJ45] for connecting expansion boards up to 90 channels.

2 Antenna connector [BNC]

3 Menu navigation button (up)

4 Menu navigation button (down)

5 Menu function button (right)

6 (Fire) button for controlling external devices in «Controller mode»

7 Terminal block for connecting external 10-channel devices

8 (ARM) button for controlling devices in «Controller mode»

9 Menu function button (left). Powers the device on. Powers the device off. Switches to «Sleep» mode.

10 Device display.

11 Device antenna

12 Device charging and power supply connector

5.2 TOP VIEW

The top view of the device is shown schematically and indicates the main elements:
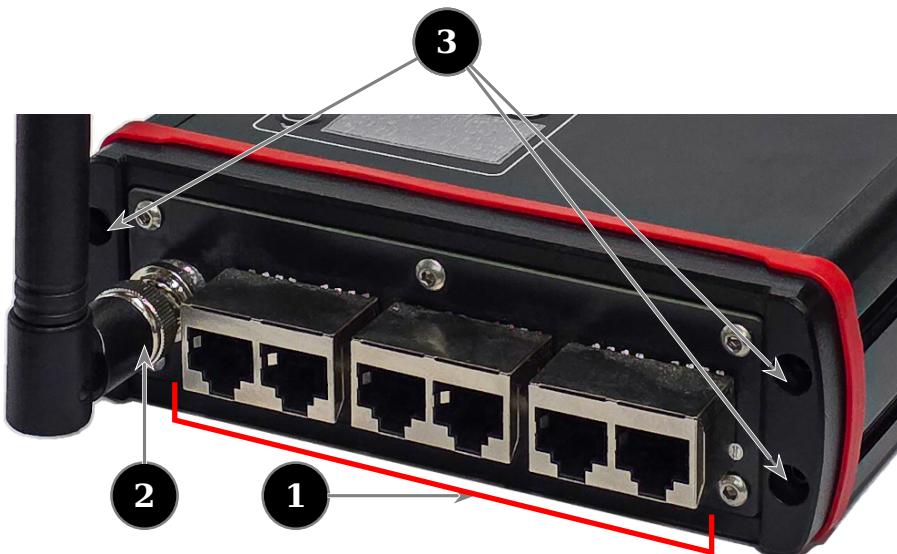
Figure 5: Top view of the SBOX-100 device

1 External device connector [6xRJ45] for channel scaling

2 Antenna connector

3   Fastening screws (4 pcs) in spe-   cial housing recesses

5.3   BOTTOM VIEW

The bottom view of the device is shown schematically and indicates the main elements:
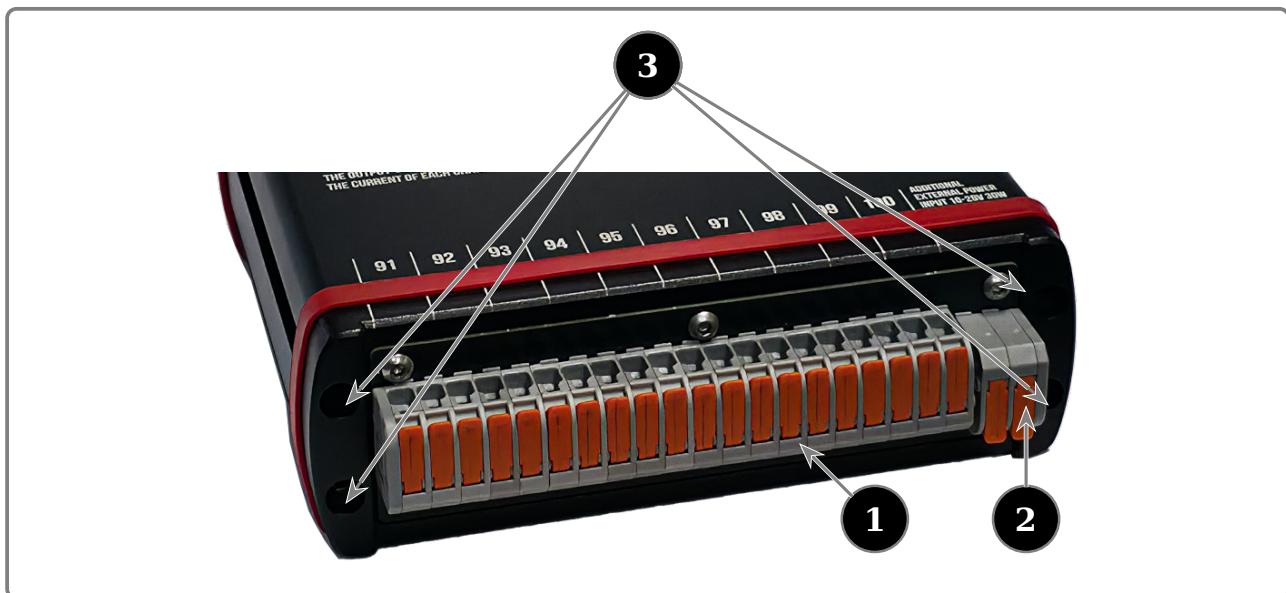
Figure 6: View of the SBOX-100 device from below

1   Connector for connecting external 10-channel devices. (Channel addresses on the device terminal block start with an offset of 90 relative to the address set on the device (for more details, see the Address Space section 6.2 on page 22))

2   Fastening screws (4 pcs) in special housing recesses

⚠ **USEFULLY!**   When disassembling the device, use a hex screwdriver or a 2mm wrench. For detailed disassembly instructions, see section 9.8 on page 87

5.4 CONNECTING A MOBILE DEVICE TO SBOX-100

> ⚠ **USEFULLY!**
>
> Pairing the SBOX-100 with a mobile device is only performed when the «Controller mode» is enabled (for more details, see section 7 on page 33)

.

To download programs and manage the network *SHOT CONTROL SYSTEM*, it is necessary to enable the Ⓖ BLUETOOTH function on the SBOX-100 device, see 7.6.1 on page 45, and pair it with a mobile device (phone or tablet Ⓗ) on which the special controller management application is installed.

When pairing is established, the SBOX-100 device becomes available in the special application on the mobile phone (or tablet), through which it is possible to download programs to the device and monitor the operation of the entire network *SHOT CONTROL SYSTEM*, see 7.

Figure 7: Controller mode

5.5   CONNECTING AN EXPANSION BOARD TO SBOX-100

It is possible to connect 6 expansion boards Ⓓ to the SBOX-100 receiver via a special connector Ⓑ and Ⓒ, see fig. 9 on the following page, increasing the external controllable channels from 10 to 100.

Connection is made using standard cables (patch cord RJ45) with straight-through twisted pair pinout.

Channel addressing is based on the number set in the SBOX-100 device settings and is distributed as follows:

> **1st RJ-45 connector** — from 1 to 15
>
> **2nd RJ-45 connector** — from 16 to 30
>
> **3rd RJ-45 connector** — from 31 to 45
>
> **4th RJ-45 connector** — from 46 to 60
>
> **5th RJ-45 connector** — from 61 to 75
>
> **6th RJ-45 connector** — from 76 to 90

The channels output on the device's own terminal block on the bottom, see fig. 9 on the next page Ⓔ, always start with an offset of 90 addresses relative to the configured address number in the device configuration and are distributed from address 91 to 100.

| ! | **USEFULLY!** | Expansion boards are not included with SBOX-100 devices and must be purchased separately. |
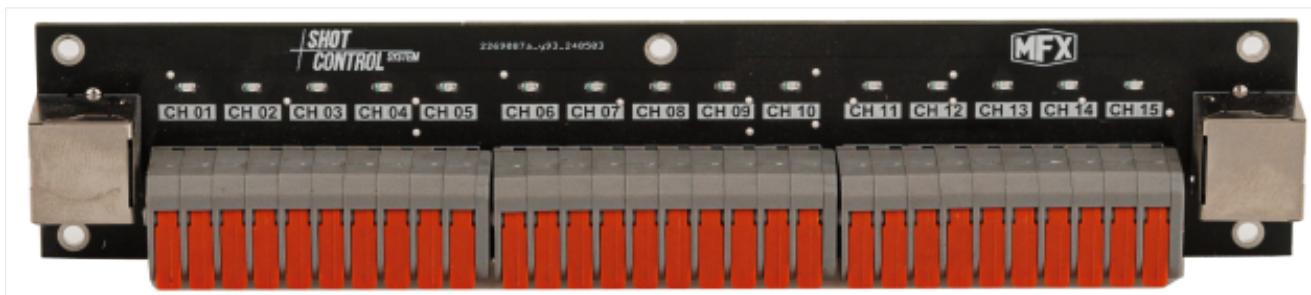
Figure 8: 15-channel expansion board for SBOX-100
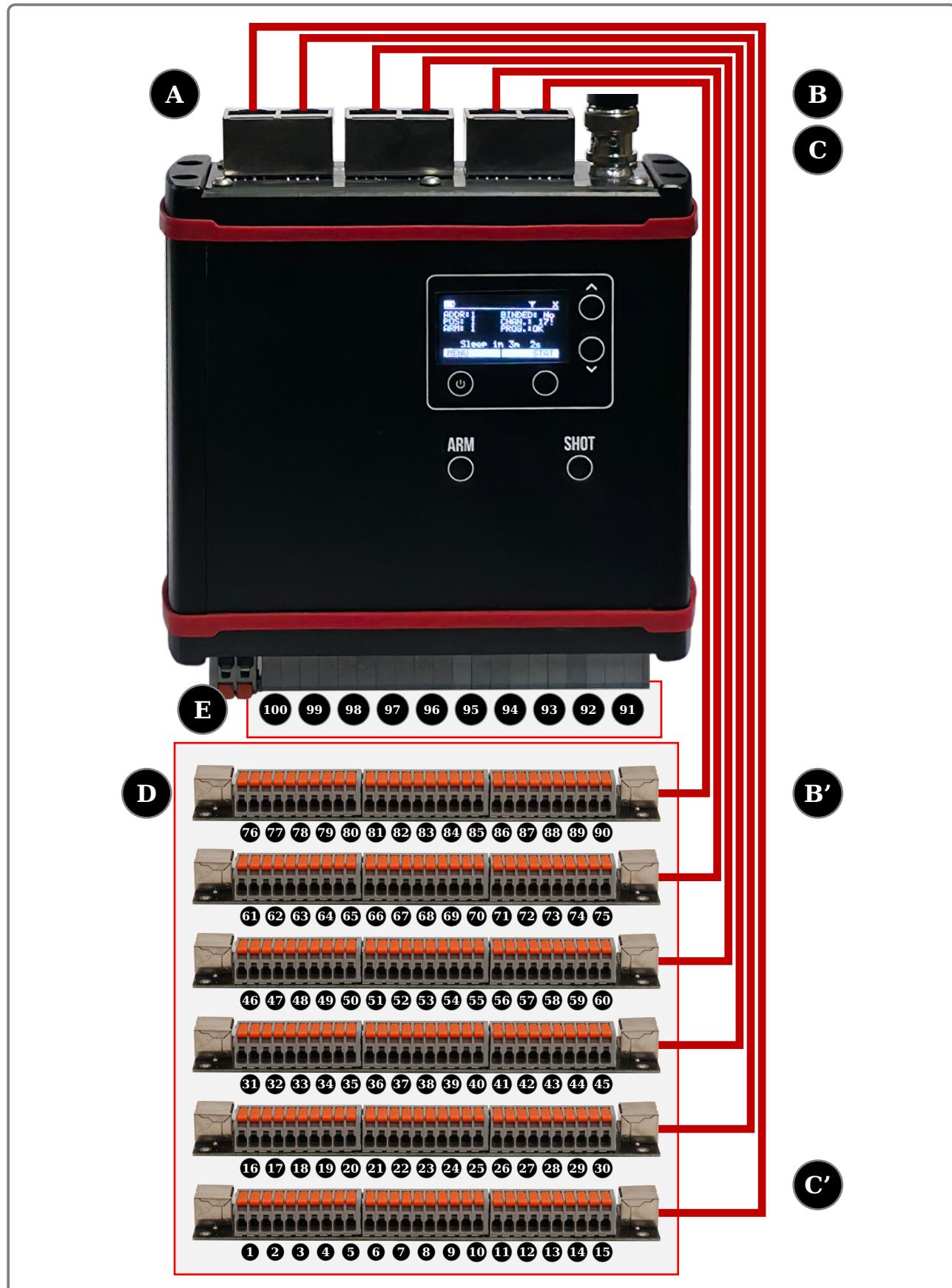
Figure 9: Receiver with expansion boards for up to 100 channels

6 SHOT CONTROL Protocol

The main theses of the SHOT CONTROL protocol covered in this chapter:

① The SBOX-100 device is a hardware-software complex for controlling external devices via the SHOT CONTROL protocol ⌐SHOT CONTROL SYSTEM .

② The ⌐SHOT CONTROL SYSTEM protocol allows creating an extensive radio network for automatic control of pyrotechnic devices and special effects equipment during various shows and performances.

③ Device control is performed via the radio network using a «Controller». (Several controller models are available under the MAINFX brand.)

④ The SBOX-100 device can operate in «Controller mode» and «Receiver mode».

⑤ The radio network is organized by establishing radio connections between devices operating on the ⌐SHOT CONTROL SYSTEM protocol.

⑥ Up to 255 «Receivers» can be connected simultaneously to one SBOX-100 device in «Controller mode».

⑦ One or more devices (depending on the receiver model) are connected to each «Receiver» via a wired channel (pyrotechnic igniters and special control equipment).

⑧ Network and device management is carried out through a special address space.

⑨ Multiple devices of the same type can be connected to one channel (Channel = position + address, for more details see section 6.2.1 on the following page).

⑩ The control scenario for external channels (with connected pyrotechnic and special devices) is programmed in a special mobile application or in a PC simulation program for subsequent transfer to a phone or tablet.

⑪ Control scenarios are saved as a special program and uploaded to the controller.

⑫ The program is started by pressing the «SHOT» button on the controller.

⑬ According to the program instructions, a signal is transmitted via the radio channel to an address in a position. All devices connected to this address are triggered simultaneously.

⑭ Control of external channels (with connected pyrotechnic devices) is possible in automatic and manual modes.

⑮ Examples of address space management using the SHOT CONTROL SYSTEM protocol

6.1 DEVICES OPERATING ON THE SHOT CONTROL PROTOCOL

The following devices[1] can be connected via radio channel to the SHOT CONTROL SYSTEM network controller:

S-box30,

S-box100,

Switch pack 4,

Crazy flame,

Direct flame,

Jump jet,

S-play

For a description of each device, see separate instructions.

6.2 SHOT CONTROL ADDRESS SPACE

The SHOT CONTROL SYSTEM protocol organizes a special address space. The address consists of two parts:

| 1 | 0 | 0 | 0 | : | 1 | 0 | 0 | 0 | 0 |
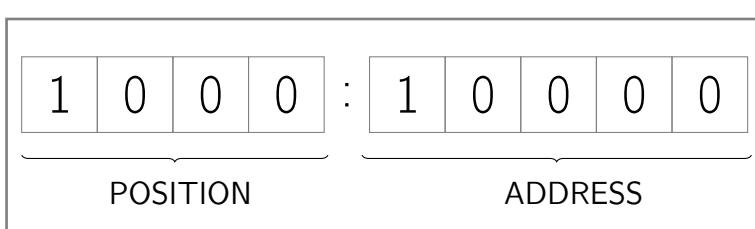
POSITION   ADDRESS

① from 1 to 1000 — position number POSITION

② from 1 to 10,000 — address number in the specified position ADDRESS

Figure 10: SHOT CONTROL address structure

When a program is launched from the controller, the program sequentially transmits signals to addresses. All devices in the SHOT CONTROL SYSTEM network are triggered upon receiving the SHOT signal at their address and position.

6.2.1 CHANNEL ADDRESS FORMAT

A channel is a physical contact on the SBOX-100 device (or other devices operating on the SHOT CONTROL SYSTEM protocol), to which external control devices are physi-

[1]The list of devices is updated as new models are released

cally connected via a wired connection: a pyrotechnic igniter, an electromagnet, or another special device.

Externally, a channel is a terminal block with two contacts (+ and -), to which a voltage of up to 20 volts and a current of up to 5A is applied upon command from the Controller, with a programmable delay and pulse duration.

Figure 11: Channel address space

Each channel has its own address, consisting of two parts: (A) — the position number (assigned to the «Receiver») and the contact number on this «Receiver» (B).

In the standard configuration (without an expansion board), the SBOX-100 device has 10 channels (see fig. 11), labeled in the figure from number **1** to **10** .

Each output channel in the SBOX-100 device is assigned its unique address starting from a base address with an offset of 90 addresses (i.e., when address number 1 is assigned to the device, the first physical channel will have the address 1+90=91 , see section. 8.4.1 on page 76) and then +90 for each subsequent channel. (For more details on address distribution on the device, see section 6.2.2 on the next page).

When the receiver's base address ADDRESS is changed in the settings, the channel numbers are automatically recalculated using the formula:

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> 90 + PHYSICAL CHANNEL NUMBER + BASE ADDRESS - 1 .

For example: if you set the POSITION number: 1 and the base address ADDRESS : 10 on a «Receiver», then all output channels on the bottom terminal block of the device will receive addresses: from 0001:000100 to 0001:00109, respectively. (see fig 11 on the preceding page)

6.2.2 CONFIGURING CHANNEL ADDRESSES ON THE RECEIVER

A range of addresses in the format can be assigned to each receiver:

> POSITION NUMBER:BASE ADDRESS — POSITION NUMBER:END ADDRESS

Where,

> END ADDRESS = BASE ADDRESS + Number of channels on SBOX-100

(10 channels without an expansion board).

When using the SBOX-100 model as a receiver without an expansion board, up to 10 pyrotechnic devices or special devices can be connected to its standard connector with five pairs of contacts (10 channels) (see 5.3 on page 17), accordingly, in this configuration, the SBOX-100 can control 10 addresses (from 00091 to 00100).
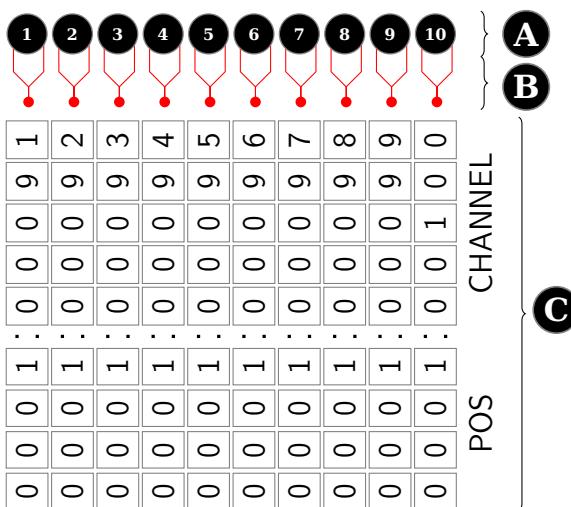
Figure 12: Address structure of the standard SBOX-100 device

For example: The **Receiver** is assigned the position number POSITION equal to 1 and a start address of 1. Then all output channels of this receiver on the lower terminal block will have addresses: from 0001:00091 to 0001:00100. See the figure.

When up to 6 expansion boards are connected to the receiver, see fig. 9 on page 20, the receiver's address space increases to 100 addresses.

Each «receiver», when connected to a controller (see section: 7.7.3 on page 57), is assigned a position number POSITION (for more details, see section: 8.4.2 on

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Figure 13: Address space of SBOX-100 with a start address of 16

(A) — physical numbers of the output channels on the SBOX-100 device

(B) — schematic representation of connecting external devices to the **Receiver** channels

(C) — correspondence between the addresses of the space *SHOT CONTROL SYSTEM* and the output contacts of SBOX-100

A	10	9	8	7	6	5	4	3	2	1
CHANNEL	5	4	3	2	1	0	9	8	7	6
POS	1	1	1	1	1	1	0	0	0	0
	1	1	1	1	1	1	1	1	1	1
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	...	...	...	...	...	...	...	...	...	...
	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0

page 77). This parameter is the first part of all addresses of devices connected to this «Receiver». Furthermore, the base address parameter is set on the receiver (see section: 8.4.1 on page 76)

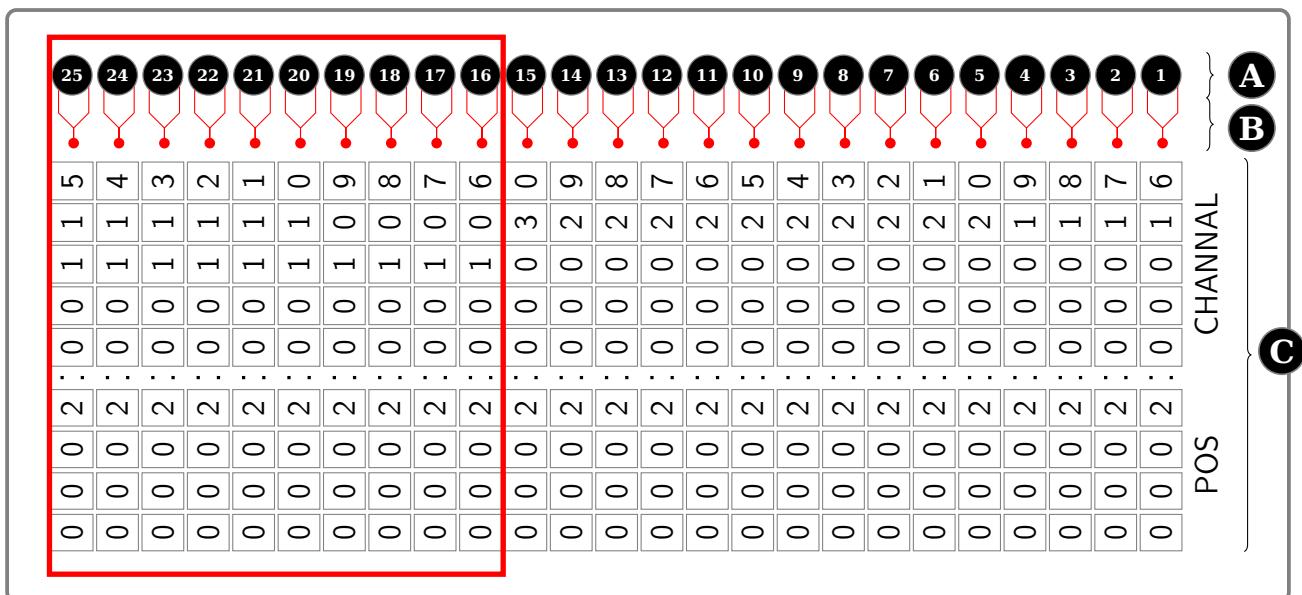| A	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
CHANNAL	5	4	3	2	1	0	9	8	7	6	0	9	8	7	6	5	4	3	2	1	0	9	8	7	6
POS	1	1	1	1	1	1	0	0	0	0	3	2	2	2	2	2	2	2	2	2	2	1	1	1	1
	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Figure 14: SBOX-100 address space with start address 16 and expansion board

For example: A 15-device expansion board is connected to a «Receiver», and the position number POSITION is set to 2 and the base address to 16, then all devices connected to this receiver will have addresses: from 0002:00016 to 0002:00030 on the expansion board and from 0002:00106 to 0002:00115 on the device's bottom terminal block. see the figure below.

Accordingly, when connecting 6 expansion boards and setting the base ad-

dress to 1 in the second position, the device will control 100 addresses from 0002:00001 to 0002:00100

⚠️ **IMPORTANT!**	When configuring the address space, it is recommended to assign a unique position number to each individual receiver for ease of network maintenance and management.
ⓘ **USEFULLY!**	To organize parallel launches of pyrotechnic items, set identical position numbers and base addresses in the settings of the «Receivers».

6.2.3 ADDRESS DISTRIBUTION ON RECEIVERS IN ONE POSITION

The procedure for configuring and distributing addresses in SBOX-100 «Receivers»:

When connecting several receivers to one controller and assigning the same position number `POSITION` to the receivers (for more details, see section: 8.4.2 on page 77), for sequential address distribution among end devices, it is necessary to set different base addresses on the receivers so that they do not overlap the address ranges on another device.

For example: If «Receiver» Ⓐ has the position number `POSITION:1` and the address number `ADDRESS:1` set, i.e., the SBOX-100 device has no expansion board, then this device will occupy addresses from 0001:00091 to 0001:00100 in the address grid. When connecting a second receiver Ⓑ to the «Controller» and setting `POSITION:1` on it, to avoid address overlap, the base address `ADDRESS:11` must be set on «Receiver» Ⓑ, and accordingly the second device will occupy the address range from 0001:00101 to 0001:00110.

Connect subsequent devices in position 1 by distributing them across the address space up to 10000 addresses, based on the physical number of output channels on the devices.

Accordingly, when connecting devices with a 15-channel expansion board, the device will occupy address space from the base address + 15 addresses and 10 addresses with an offset of 90 on the bottom terminal block of the SBOX-100 device. For example, a third device with one expansion board will occupy addresses from 0001:00201 to 0001:00300, but only addresses from 0001:00201 to 0001:00215 on the expansion board and from 0001:00291 to 0001:00300 on the bottom terminal block of the SBOX-100 device will be physically used.
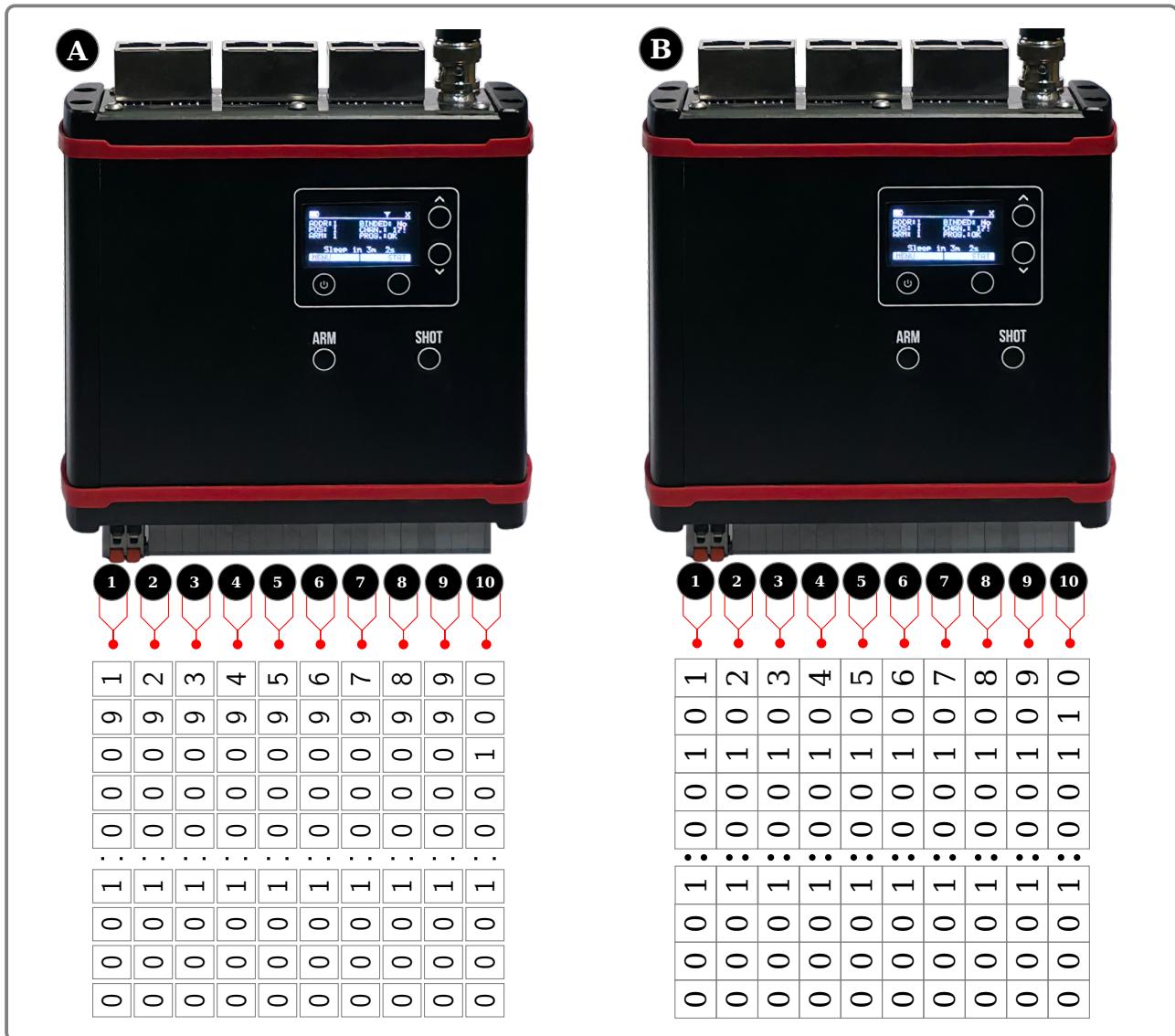
Figure 15: Address allocation when connecting in the first position

6.2.4 CONNECTING RECEIVERS IN DIFFERENT POSITIONS

The procedure for configuring and distributing addresses in SBOX-100 «Receivers» in different positions:

When connecting several receivers to one controller and assigning different position numbers `POSITION` to the receivers (for more details, see section: 8.4.2 on page 77), each receiver will have its own unique address space, even with identical `ADDR` values.

For example: If «Receiver» (A) has the position number `POSITION:1` and the address number `ADDRESS:1` set, i.e., the SBOX-100 device has no expansion board, then this device will occupy addresses from 0001:00091 to 0001:00100 in the address grid. When connecting a second receiver (B) to the «Controller» and
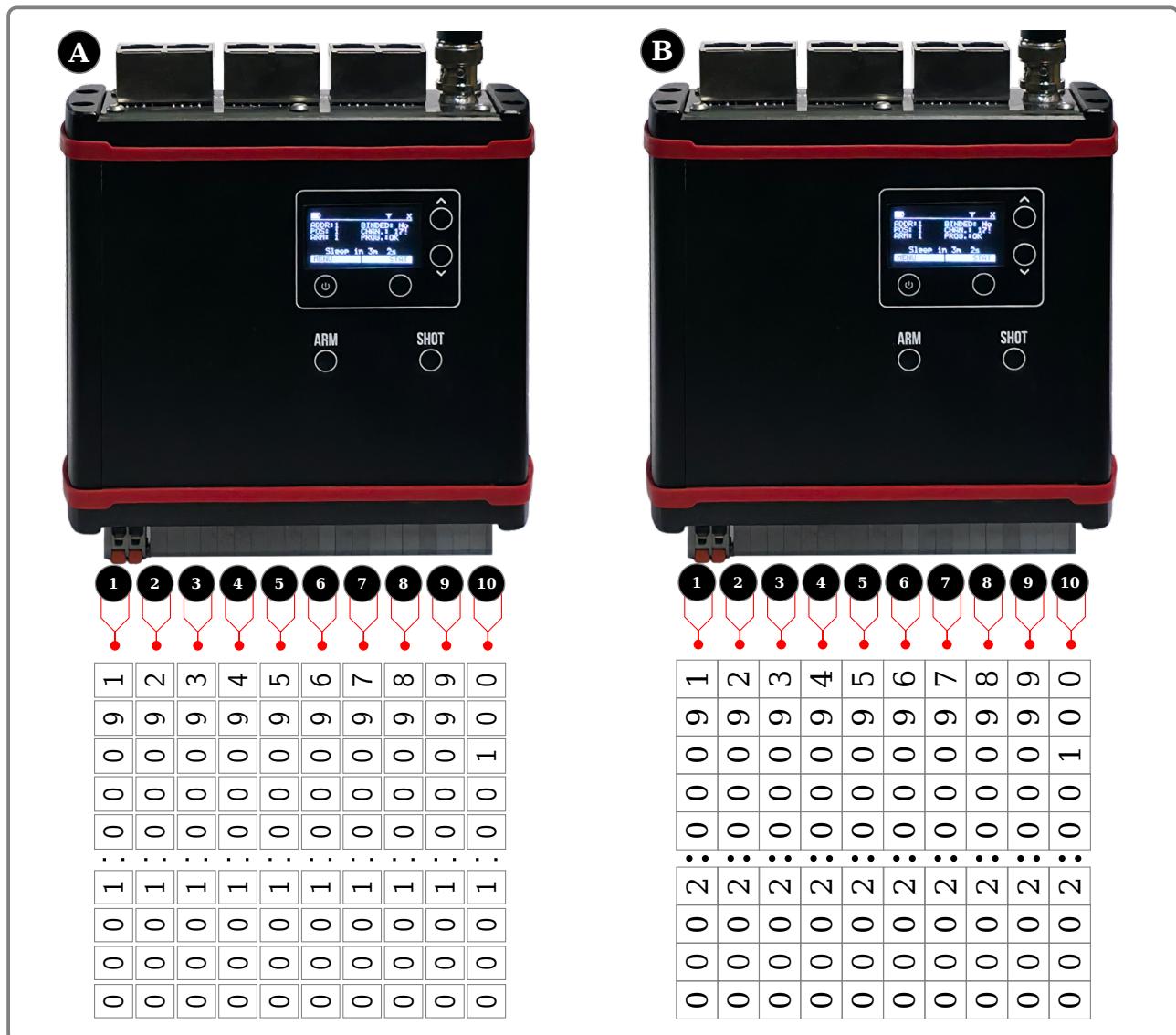
Figure 16: Address distribution when connecting in the 1st position and 2nd position

setting `POSITION:2` on it, the second receiver will have its own address space, and when assigning addresses `ADDRESS:1`, the second device will occupy the address range from 0002:00091 to 0002:00100, which will be unique addresses, different from the address space of «Receiver» (A).

Connecting subsequent devices with other position numbers will allow creating a unique address space on each channel of the «Receiver».

| ⚠ | **IMPORTANT!** | The full channel address consists of two values: the «Receiver» position number and the channel address number on the receiver `ADDRESS` |

6.2.5 CONNECTING RECEIVERS IN ONE POSITION WITH THE SAME BASE ADDRESS

The procedure for using addresses in SBOX-100 «Receivers» with identical settings:
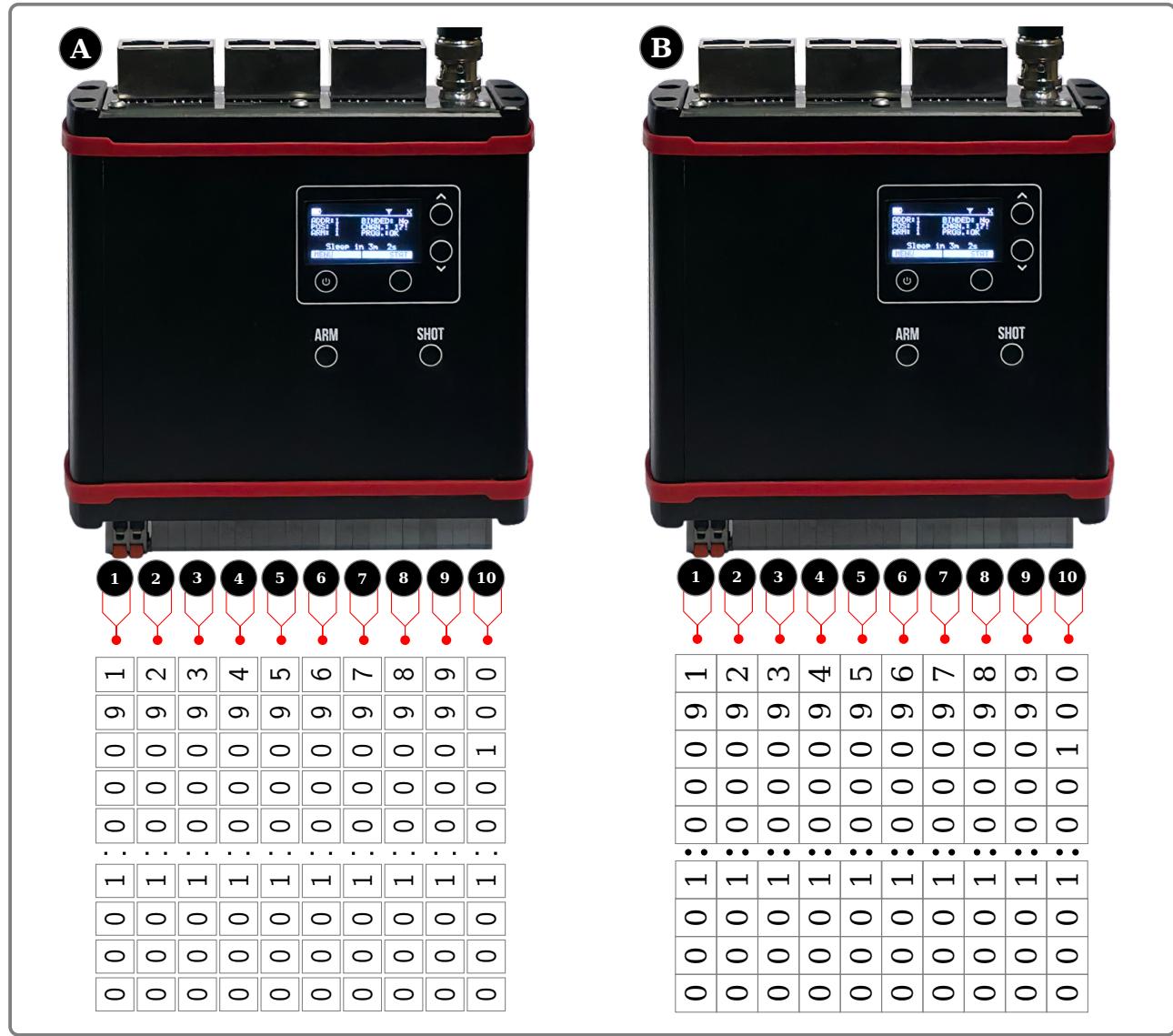

Figure 17: Address distribution when connecting in the first position with the same starting address

In scenarios for controlling pyrotechnic and special devices, parallel launching of identical devices is sometimes required.

For example: to ignite a pyrotechnic igniter simultaneously from four corners of the site, or shots must be fired in groups of several shots per volley, etc.

To organize such a scenario, it is necessary that parallel «Receivers» have the same POSITION and base address settings, and identical external devices

(e.g., pyrotechnic igniters) must be connected to the output channels.

For example: For parallel launching of 10 volleys with 2 shots per volley, it is necessary to configure 2 «Receivers» Ⓐ and Ⓑ and set the same position number `POSITION:1` and address number `ADDRESS:1` on them. Both devices will have an address space configuration from 0001:00091 to 0001:00100, and upon receiving a `SHOT` signal from the controller with the specified addresses, the shot will occur in parallel on both devices.

To increase the number of parallel shots, it is necessary to add the required number of SBOX-100 devices and connect pyrotechnic igniters to them. When connecting 10 SBOX-100 devices in parallel, the volley will accordingly consist of 10 shots simultaneously when accessing one channel.

To implement the same scenario, provided that these devices are on different positions, it would be necessary to write 10 steps into the program, one step for each channel.

6.3 ARM ZONE FOR RECEIVER MANAGEMENT

All settings for the connected equipment are performed before the start of the event.

For safety and to prevent emergency situations during the system's operation, it is recommended to divide receiver groups into ARM ZONEs.

The system supports up to 8 ARM ZONEs.

> **! USEFULLY!**
>
> ARM ZONE is a logical distribution of «Receivers» connected to the «Controller» into groups (up to 8 ARM ZONEs on one controller). Each ARM ZONE can be enabled and disabled during program execution without interrupting the program.

When an ARM ZONE with a specific number is disabled on the controller, the receivers in the disabled ARM ZONE switch to test mode and do not transmit incoming signals from the controller to the external channels. I.e., devices connected to this receiver are inactive.

When an ARM ZONE is enabled — the receiver switches to operational mode and continues to control the pyrotechnic igniters and devices connected to it.

For example: Two receivers are configured in the network, one receiver has ARM ZONE:1 set, and the other has ARM ZONE:2 set.

1. Initially, both ARM ZONEs are enabled, and the operator presses the SHOT button to start the program on the controller.

2. The program executes on both receivers.

3. An emergency situation occurs in the area of the 1st receiver.

4. The operator disables ARM ZONE:1

5. The program continues to execute, but launches only occur on the receiver in ARM ZONE:2.

6. After resolving the emergency situation in the ARM ZONE:1 area, the operator enables ARM ZONE:1 on the controller.

7. The program continues to execute in both ARM ZONEs from the current time, as if no disconnection occurred, but after the program finishes, the items that were not launched during the emergency resolution will remain unused.

⚠ **VERY IMPORTANT!**

> On the SBOX-100 device in «Controller mode», the signal is transmitted immediately to all 8 ARM ZONEs, and this setting does not affect the execution of the scenario.

For configuring ARM ZONE on the SBOX-100 device in «Receiver mode», see section 8.4.3 on page 77

RF-LOCK Mode   If an emergency situation occurs on a receiver during ARM mode, it is possible to individually disable receivers without disabling the entire ARM ZONE.

To do this, enable the RF-LOCK mode for the specific selected receiver (for more details, see section 7.7.6 on page 62).

When the RF-LOCK mode is enabled on the controller for a selected receiver, the receiver switches to test mode and does not transmit incoming signals from the controller to the external channels. I.e., devices connected to this receiver are inactive.

When the RF-LOCK mode is disabled — the receiver switches to operational mode and continues to control the pyrotechnic igniters and devices connected to it.
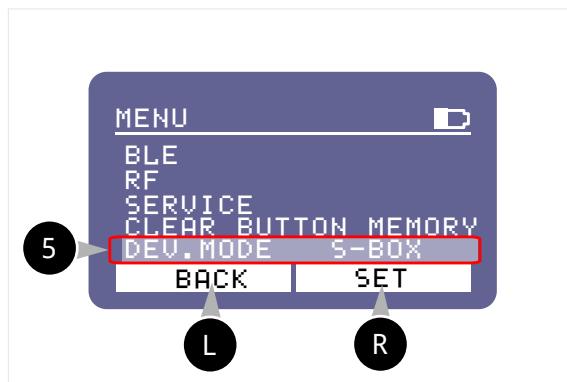
7   Controller Mode

In «Controller mode», the SBOX-100 device can control any instruments and launch special programs on them that support connectivity via the ⌐*SHOT CONTROL SYSTEM* radio protocol.

Up to 255 «Receivers» of various types supporting the ⌐*SHOT CONTROL SYSTEM* radio protocol can be connected simultaneously to the SBOX-100 device in «Controller mode».

In controller mode, this device has one physical and 8 logical control buttons.

It has an active Bluetooth module for connecting this device to a mobile application.

To enable the device in controller mode, navigate to the ⌐DEV.MODE⌐ menu and set the value to CONTROL (see section 7.6.5 on page 53):

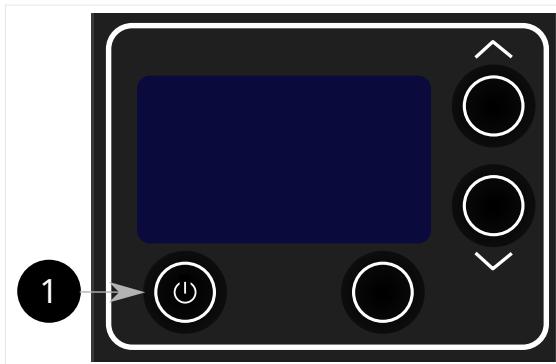
«CONTROLLER» To switch the device to «CONTROLLER» mode

1. Press the (R) ⌐EDIT⌐ button

2. Use the navigation buttons to select the value ⌐CONTROL⌐

3. Press the (R) ⌐SET⌐ button again to save the «CONTROLLER» mode

7.1 POWERING ON THE DEVICE.

⚠ VERY IMPORTANT!

To prevent burning out the radio path on the device! Power on the device ONLY with the ANTENNA CONNECTED!
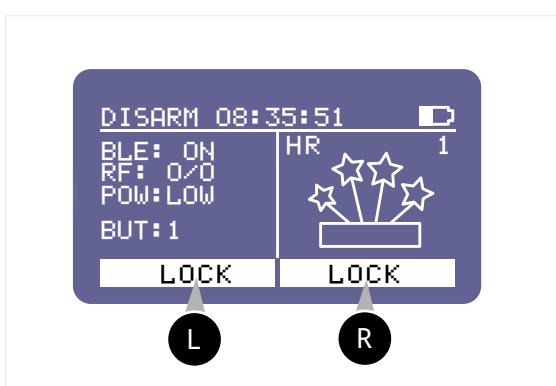

1 — To power on the device, press and hold button **1** for 1 second. The device will boot automatically and enter the current mode.

⚠ IMPORTANT!

When the device is powered on, the keyboard is initially locked, and the display shows the inscription LOCK   LOCK on the bottom line.


To unlock the device's keyboard, simultaneously press the **R** and **L** buttons.

Alternatively, to unlock the keyboard, press the **R** button and, without releasing it, press the **L** button. The device's keyboard will be unlocked, and the display will show the inscription MENU .

To lock the keyboard, perform a similar action: simultaneously press the **R** and **L** buttons; the keyboard will be locked, and the display will show information about the keyboard lock on the bottom line: LOCK   LOCK .

7.2 POWERING OFF THE DEVICE
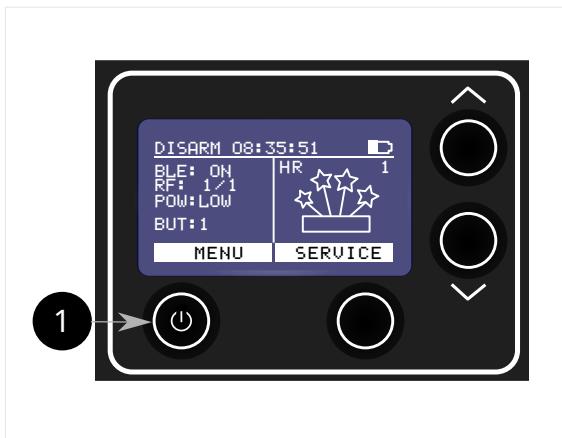
1 — To power off the device, press and hold button **1** for 2-3 seconds. The device will power off automatically and save all current settings.

Upon subsequent power-on, the device will boot into the mode of the current settings.

7.3 SWITCHING BETWEEN ARM AND DISARM MODES.

When operating in «Controller mode», the corresponding status is displayed on the top line of the device's display: ARM or DISARM , along with information corresponding to the «Controller mode».

The **8**   ARM button (Fig. 5.1 on page 15) is used to manage these modes. Pressing it toggles between the ARM and DISARM modes alternately.
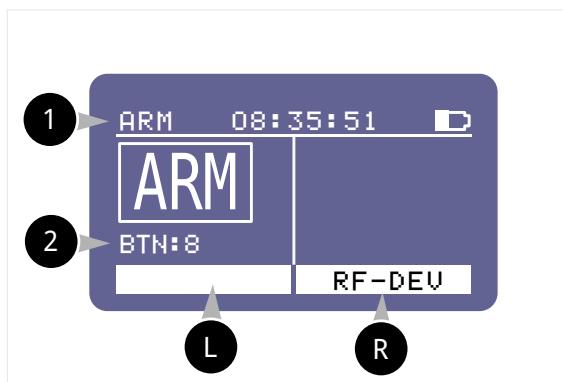
1 — ARM mode indication

2 — Indication of the currently active virtual button.

R — pressing the SHOT button activates the program loaded onto the selected button.

When the ARM mode is enabled, the ARM indication will be displayed on the screen.

To switch the controller to DISARM mode, press the ARM button again. In DISARM mode, the status line on the display will show DISARM.

In DISARM mode, the program execution buttons are not available for pressing on the controller. In this mode, the controller communicates with devices via the radio channel to transfer and update programs, configurations, and telemetry data.

⚠ VERY IMPORTANT!	After finishing work with the device, it must be switched back to DISARM mode.
⚠ IMPORTANT!	Before switching the controller to ARM mode, you must exit the menu to the main screen; otherwise, the controller will not enter ARM mode.
⚠ IMPORTANT!	If the controller is switched to the general DISARM mode during program playback, all programs will terminate.

7.4 OPERATING PROCEDURE IN «CONTROLLER» MODE

7.4.1 DEVICE PREPARATION FOR OPERATION

The SBOX-100 device in «Controller» mode can control up to 255 «Receivers» paired with it via the ⌁SHOT CONTROL SYSTEM protocol.

To prepare the SBOX-100 device for operation in «Controller» mode, perform the following steps:

① Power on the device (see section 7.1 on page 34)

② Enable «Controller» mode on the device (see section 7.6.5 on page 53)
    `DEV.MODE: CONTROL`

③ Switch the «Controller» to the `DISARM` state (see section 7.3 on the facing page)

④ Enable BLUETOOTH (see section 7.6.1 on page 45)

⑤ Launch the controller management application on the mobile device (phone/tablet)

⑥ Connect the «Controller» to the mobile phone via BLUETOOTH

⑦ Load programs from the application onto the controller.

⑧ Check for free frequency channels (see section 7.7.2 on page 56) and select a free channel in the settings 7.6.2 on page 48)

⑨ Perform pairing with receivers (see section 7.7.3 on page 57)

⑩ Configure the address space on the receivers (see section 7.7.5 on page 61)

⑪ Verify program loading and signal conductivity to the end devices (see section 7.7.4 on page 57)

7.4.2 MAIN OPERATIONS PERFORMED ON THE DEVICE

After completing the preliminary configuration of the ⌁SHOT CONTROL SYSTEM network devices, the following operations can be performed from the device in «Controller» mode:

Enabling ARM Mode   (see section 7.3 on page 36)

| ⚠ VERY IMPORTANT!	In ARM mode, all receivers switch to receive-only mode, and changing settings is impossible in this state.
⚠ VERY IMPORTANT!	For safety reasons, it is not recommended for people to be near the receivers in ARM mode. Injury may occur due to the activation of pyrotechnic devices.

In this mode, the entire *SHOT CONTROL SYSTEM* network is brought to readiness to execute the programs loaded onto the «Controller».

⚠ VERY IMPORTANT!	After enabling ARM mode on the controller, up to 3 seconds are required for all receivers to switch to active mode and for capacitors to charge. After 3 seconds, the system is ready for launch.

Selecting the Active Button for Program Launch: The device is equipped with 1 physical SHOT button ⑥ (see fig. 4 on page 15) and 8 logical ones.
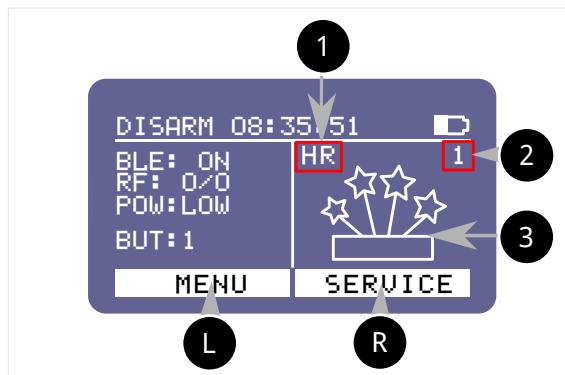
❶ — program settings (for more details, see section 7.4.2 on the next page **Program Settings Description**)

❷ — Before pressing the SHOT button, shows the number of programs on the current button (`BUT:1`).
In active mode (during program execution), shows the number of remaining program steps.

❸ — program icon (the program icon can be selected in the mobile application from the available catalog or drawn independently on the smartphone screen and uploaded to the program.)

Before pressing the physical SHOT button, it is necessary to establish its link with a logical button (see fig. 7.5 on page 44), i.e., select the logical button number through the main menu.

The display will show information about the program connected to the selected button.

| ⚠ IMPORTANT! | Pressing the SHOT button will execute the cycle of programs loaded onto one logical button of the device, selected at the current moment. |

To launch a program from another button, you need to make that button the current one (see fig. 7.5 on page 44) and press the physical SHOT button.

Launching the Program on the Current Button: Pressing the SHOT button launches the programs loaded onto the selected button.

After pressing the SHOT button, the progress of the program execution is displayed on the SBOX-100 device's display:
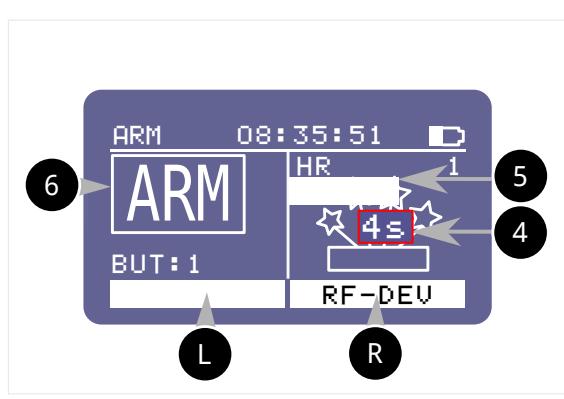
Progress bar. **5** — shows the remaining time until the transition to the next program point or the time until the completion of the last point. Appears below the top status line when the SHOT button is pressed. Disappears upon program completion.

4   — time in seconds until the program execution is complete.

6   — displays the indication of the enabled ARM mode.

After the program execution is complete, the SHOT button can be pressed again.

If the NO REPEAT mode is set for this program, the display will show the inscription FINISH , and to restart the program, you must perform the **CLEAR BUTTON MEMORY** function (removing the NO REPEAT mode, see section 7.6.4 on page 52) or select another logical button and launch it.

Pressing the button again is only possible after the entire cycle of programs loaded onto the selected button has been completed.

Program Settings Description   In the figure above, item **1**   indicates the settings of the program loaded onto the selected button:

H — the program is in HOLD mode, meaning the program will run for as long as the SHOT button is held down.

S — the program is in SHORT mode, meaning a single short press of the SHOT button is sufficient to launch the program.

R — means the program has repeat enabled (REPEAT ON). I.e., after the program execution is complete, pressing the SHOT button again will restart the program.

If the program was set to REPEAT OFF mode, then after completion, the display will show the indication FINISH .

The display indication may appear as: HR   SR   H   S .

② — Shows the number of remaining programs on the button. During program execution, it shows the total number of points in the program.

③ — Icon assigned when configuring the button in the mobile application. Used for convenience and visual understanding of which program is assigned to the button.

Locking/Unlocking Receivers (RF-LOCK Mode)   For safely resolving emergency situations during program execution, the controller has a receiver locking mode.

During program scenario execution and in case of an emergency with external devices, it is necessary to switch the «Receiver» to RF-LOCK mode from the «Controller» (for more details, see section 7.7.6 on page 62).

A «Receiver» in locked mode does not process signals from the controller to activate external devices connected to it. The «Receiver» display shows information that it is locked.

To unlock the «Receiver», the lock must be removed via the Main Menu of the «Controller» (for more details, see section 7.7.6 on page 62).

Enabling RF-LOCK in ARM Mode   In ARM mode, all receiver configuration menus are unavailable, but for resolving emergency situations, the **Ⓡ** button has the RF-DEV function. I.e., it allows accessing the list of receivers connected to the controller for locking them.
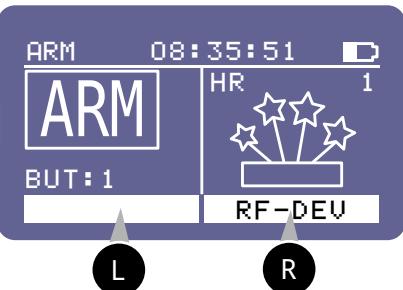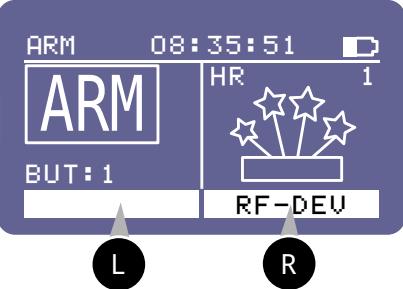
```
ARM      08:35:51   ▭
 ____     HR          1
|ARM|       ✦✦✦
|___|      ✦  ✦
BUT:1       ___
 _____  RF-DEV
        L        R
```

Press the **R**   RF-DEV button to go to the list of available devices connected to the controller.

```
1/1     ARM ADDR POS
SWTCH ▰◢ 1    1    2


   BACK     LOCK
        L        R
```
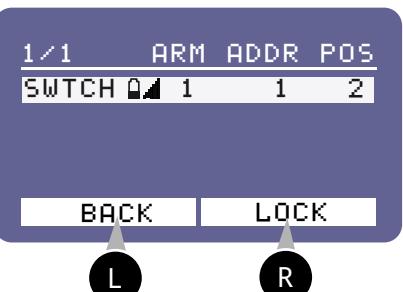
Only the LOCK mode is available on the right control button. Select the device to lock using the navigation buttons and press the **R**   LOCK button. The receiver will switch to RF-LOCK mode.

Disabling RF-LOCK in ARM Mode   To remove the lock in ARM mode, from the main screen, press the **R**   RF-DEV button. And go to the list of receivers connected to the controller to remove the lock.

```
ARM      08:35:51   ▭
 ____     HR          1
|ARM|       ✦✦✦
|___|      ✦  ✦
BUT:1       ___
 _____  RF-DEV
        L        R
```

Press the **R**   RF-DEV button to go to the list of available devices connected to the controller.

```
1/1     ARM ADDR POS
SWTCH ▰◢▰1    1    2


   BACK    UNLOCK
        L        R
```

When a locked device is selected, only the UNLOCK mode is available on the right control button. Select the device to unlock using the navigation buttons and press the **R**   UNLOCK button. The receiver will exit RF-LOCK mode, and the lock icon indicating the device is locked will no longer be displayed in the status line.

7.4.3 COMPLETING WORK WITH THE DEVICE/STORAGE

After finishing work in controller mode, it is necessary to:

① Switch the SBOX-100 device to DISARM mode (see section 7.3 on page 36)

② Power off the device (see section 7.1 on page 34)

③ Perform preventive maintenance

④ Store the device in its standard packaging

7.5   DEVICE MENU IN «CONTROLLER MODE»

In «Controller» mode, two menus are available for managing connected devices and configuring the instrument itself.
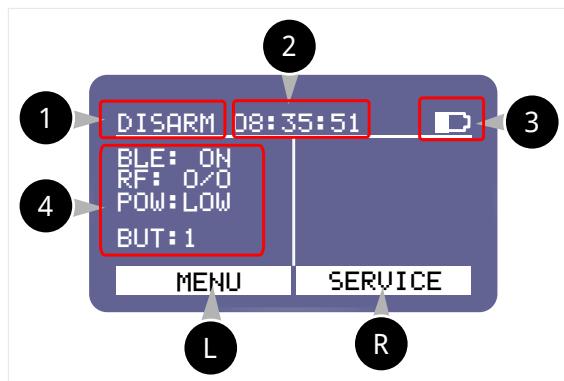
1 Displays the current device mode (in this case **DISARM**). Pressing the **8** ARM button (Fig. 5.1 on page 15) toggles between ARM and DISARM modes alternately.

2 Current time set on the device (synchronizes with the time set on the external Bluetooth device when it is connected to the controller).

3 Device charge level — visual: the filled area shows the remaining charge level:

— battery discharged   — battery fully charged

— half charged

The function buttons, labeled in figure 5.1 on page 15, control the instrument according to the indication in the white field on the very bottom line of the display:

Button **8** in Fig. 5.1 on page 15 performs the action indicated in the left white field of the display MENU : (hereinafter referred to in diagrams as: **L**).

Button **6** in Fig. 5.1 on page 15 performs the action indicated in the right white field of the display SERVICE : (hereinafter referred to in diagrams as: **R**).

4   — main display screen menu

BLE:ON — the display shows the status of the BLUETOOTH mode

BLE: ON — Bluetooth is enabled on the device

BLE: OFF — Bluetooth is disabled on the device

RF 0/2 — the display shows the RF mode

0 — number of bound and active external devices (receivers) — out of 2 devices bound to the controller, 0 are online.

2 — number of bound but inactive external devices (receivers) — total of 2 devices bound to the controller.

POW: LOW — device power level

LOW — low signal power level

MID — medium signal power level

HIGH — high signal power level

BUT: 1 — active connected button

• The instrument can manage 8 buttons, selected using the navigation buttons **3** and **4** in Fig. 5.1 on page 15.
• The buttons reflect the programs loaded onto the Controller.
• If no program is loaded onto a button, no information is displayed on the right side of the display when that button is selected.
• If a program is loaded onto a button, the icon of the loaded program is displayed on the right side of the display.

⚠ **VERY IMPORTANT!**

Configuration and loading of programs onto the controller is performed via the mobile application. To configure the Controller, connect it to the mobile application via bluetooth.
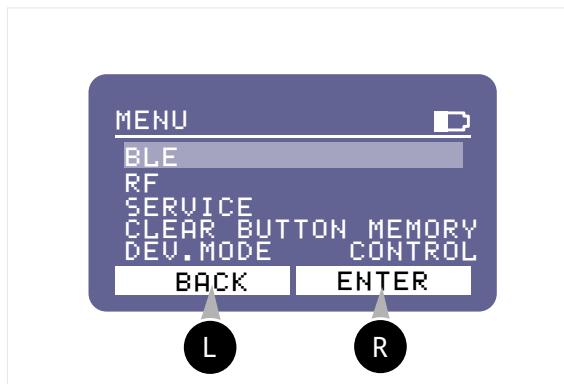
7.6 MAIN MENU

In «CONTROLLER» mode, there are two menus: the Main Menu   MENU   and the settings menu   SERVICE .

The Main Menu is displayed on the left side of the controller's screen.

To navigate to the «Main Menu», press the   **L**   button from the device's main menu (see Fig. 5.1 on page 15).

The «Main Menu» loads on the new screen, and the button assignments change.

**R** — To navigate to manage the selected item in the «Main Menu», press the   ENTER   button

L — To return to the previous menu level, press the   BACK   button

⚠ **USEFULLY!**

To move between menu lines on the display, use the controller buttons ③ (to move up) and ④ (to move down) Fig. 5.1 on page 15

7.6.1 BLUETOOTH MENU

The BLUETOOTH mode is designed for connecting to a mobile device to configure the controller via the application.
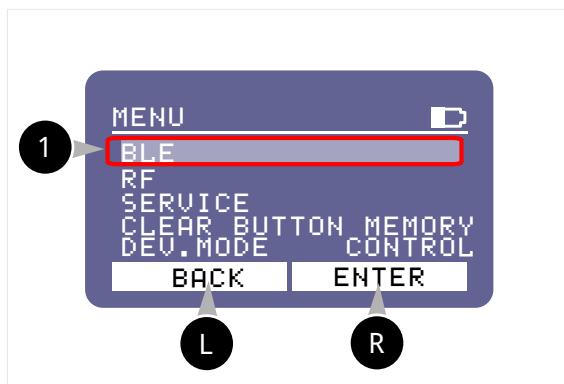
1 — **BLUETOOTH** configuration mode (Bluetooth - mode for wireless connection with external devices). In this menu mode, Bluetooth can be enabled and disabled.
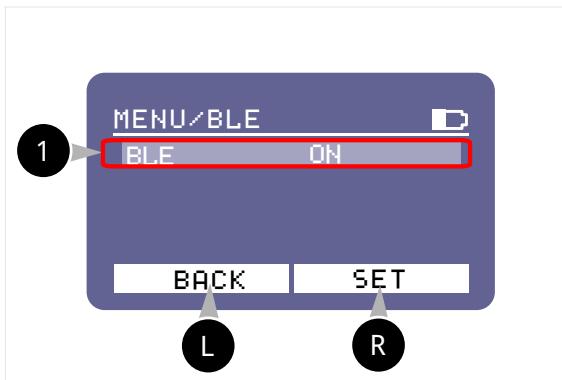
In this mode, the «Controller» connects to a special application on the mobile device to load programs onto the controller and manage it.

⚠️ **IMPORTANT!**   When BLUETOOTH mode is disabled, connection to the mobile application is unavailable, and program configuration management is impossible.

To proceed to editing the selected menu item, press the (R) button.

(R) — Enter edit mode EDIT .

Use the navigation buttons to select the Bluetooth ON/OFF value (Enable / Disable)

Press the (R) SET button again to save the result

(L) — return to the previous menu BACK

7.6.2 RF MENU

The RF mode is designed for managing devices connected to the controller via the radio channel.

In this mode, it is possible to establish pairing (remove pairing) with receivers and other devices operating on the *SHOT CONTROL SYSTEM* protocol.
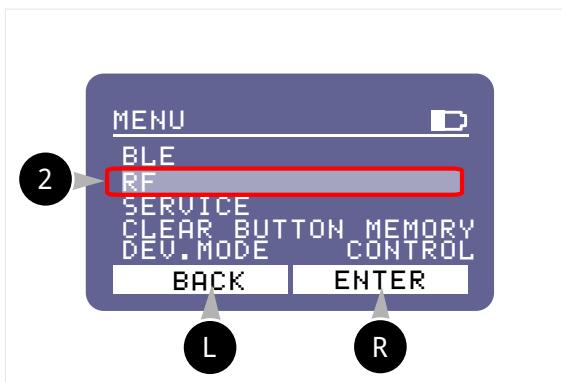
(2) — RF management mode.
The RF mode displays the status of external devices (receivers) connected to the controller. External devices can be active and inactive. Communication is established with active devices. With inactive devices, there is currently no communication with the controller.

To proceed to editing the selected menu item, press the (R) button.

In RF mode, the main management of the radio channel and external devices connected to the controller is performed.

When RF mode is enabled, all previously configured receivers on this controller will automatically wake from sleep mode and establish a connection with

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the controller.

When RF mode is disabled, all connected receivers will enter sleep mode within 5 minutes.

When managing the radio channel in RF mode, the channel power is configured, the operating channel frequency is selected, and the quality of communication with devices connected to the controller is tested.

Switching RF Mode To change RF settings, select the `RF ON/OFF` line using the navigation buttons and press the (R) button to change the setting.

⚠ **VERY IMPORTANT!** When the `RF` mode is disabled, the device does not operate in Controller mode and does not communicate with external devices.

Using the navigation buttons, select the desired value ON or OFF and press the `SET` button again to save the result or the `BACK` button to cancel changes.

(R) — Enable/Disable RF mode
`SET`

(L) — return to the previous menu
`BACK`

Managing Device Power Level The power level of the radio communication channel with external devices affects the battery life of the controller and the quality of the connection. When working over long distances and in areas with significant radio channel interference, it is necessary to set a higher transmitter power.

To change the device power settings, select the `POWER` line using the navigation buttons and press the (R) button to change the setting.

In `POWER` mode, the values cycle through:

`LOW` — low signal power level

`MID` — medium signal power level

`HIGH` — high signal power level

Select the required mode by pressing the UP and DOWN navigation buttons. After selecting the power mode, press the R   SET button to save the selected result to the device's memory.

⚠ **IMPORTANT!**

Under normal conditions, low power is intended for devices located within 100 meters, medium - up to 500 meters, high - over 500 meters. If the device is located close to the controller, high and medium signal power can overload its radio receiver, which will negatively affect the quality of the radio signal.

Selecting the Device's Operating Channel The device operates in the frequency range from 864 MHz to 869 MHz.

Various radio transmitting devices not supporting the SHOT CONTROL protocol can operate simultaneously in this area and have a negative impact on the controller's operation. To avoid negative consequences, it is necessary to diagnose the frequency spectrum occupancy and select a free channel.

To change the device's operating channel settings, select the CHANNEL line using the navigation buttons and press the R button to change the setting.

With the CHANNEL line active, press the navigation buttons to change the channel number value from 1 to 40. The UP navigation button — increases the channel number value, the DOWN navigation button — decreases the channel number value.

After selecting the channel number, press the R   SET button to save the selected result to the device's memory.

! **USEFULLY!**

To select a channel number, first check that this range is free: (see section 7.7.2 on page 56 SPECTRUM mode).

⚠ **IMPORTANT!**

The selected channel values correspond to the set operating frequency of the device: The frequency changes in steps of 0.2 MHz per channel. Channel 1 — 864.0 MHz, Channel 2 — 864.2 MHz, etc. Channel 40 — 868.8 MHz.

Setting the Channel Encryption Password   This mode provides a highly secure connection between the controller and the receiver and prevents unauthorized interference in managing devices connected to this controller.
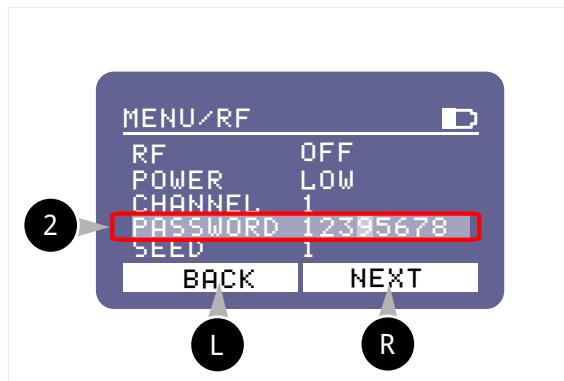
(R) — Moves the cursor to the right to select the current digit for changing the password `NEXT`

UP Navigation Button — increases the number in the selected digit

DOWN Navigation Button — decreases the number

(L) — return to the previous menu `BACK`

To change the password settings, select the `PASSWORD` line using the navigation buttons and press the **(R)** button to change the setting.

When selecting the password change mode, the designations on the function buttons change.

⚠ **VERY IMPORTANT!**

 Configuring channel encryption allows setting a special encryption mask on the signal transmitted from the device.

! **USEFULLY!**

To configure a more secure channel between the controller and receivers, try to set a password with random number combinations and avoid obvious patterns. For example: password `11111111` — is a bad password, while password `94500127` — is a good one.

Configuring Radio Protocol Speed   The radio protocol speed affects the quality of communication between devices and the delay between signals sent and received from the controller to the receiver.

To change the radio protocol speed settings, select the `SPEED` line using the navigation buttons and press the **(R)** button to change the setting.

MFX
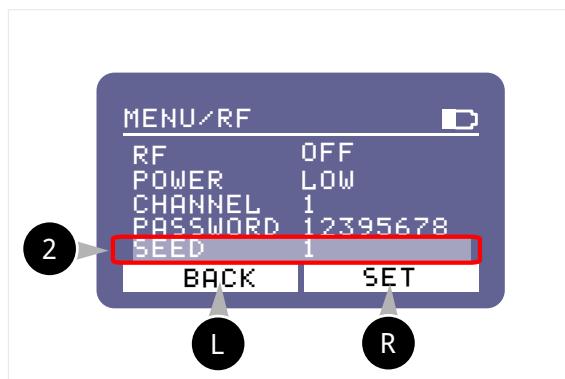
UP Navigation Button — increases the channel speed number

DOWN Navigation Button — decreases the channel speed number

Press the (R) **button** SET to save the selected result to the device's memory.

Press the navigation buttons to change the speed number value from 1 to 4. The UP navigation button — increases the speed number value, the DOWN navigation button — decreases the speed number value.

⚠ USEFULLY!	When selecting the transmission speed in the communication channel, the signal delay time changes. At speed 1 — the signal delay in the communication channel will be: 80-100ms.
⚠ IMPORTANT!	To maintain minimal delay in the communication channel and not lose the quality of the transmitted signal — operate at speed 4 and over short distances.
⚠ USEFULLY!	When working over long distances, it is advisable to set the speed to 1, which will provide stable communication and increase the signal delay to 100ms. When selecting speed 4 — the signal delay in the communication channel will be: 20ms.

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7.6.3 SERVICE MENU

The SERVICE mode is used to perform maintenance functions and restore factory settings.
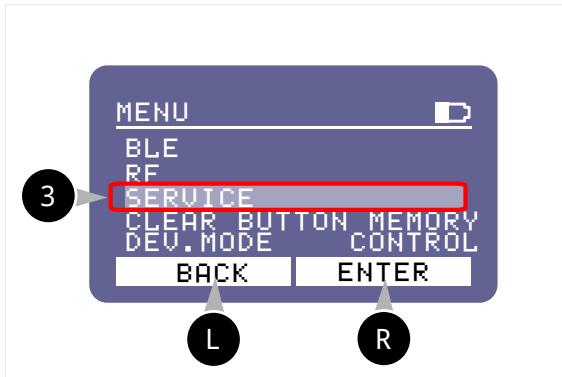
3 — SERVICE management mode.

The SERVICE mode allows performing necessary service procedures with the device. Currently, the function for full device initialization and reset to factory settings is available.

To proceed to editing the selected menu item, press the **R** button.

Formatting Device Settings In the opened menu, select the FORMAT mode using the navigation buttons.
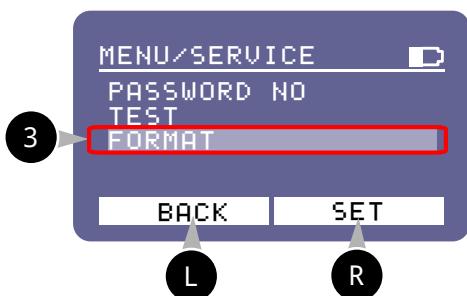
Press the **R** button and on the new screen, confirm formatting the device by also pressing the **R** button.

To cancel formatting, press the **L** button.

⚠ **VERY IMPORTANT!**

When selecting the FORMAT mode, all device settings are deleted and information about connected devices is erased.

A reset to factory settings is performed.

7.6.4 CLEAR BUTTON MEMORY MENU

When configuring programs loaded onto the controller, a program can be set to NO REPEAT mode. I.e., the program executes once and does not repeat.

To reset the NO REPEAT flag, it is necessary to execute the command in the CLEAR BUTTON MEMORY menu; the NO REPEAT flag for the program will be reset, and launching the program will become available again.

⚠ **IMPORTANT!**

A program can have the NO REPEAT flag set. I.e., after its single execution, it no longer runs, and pressing the SHOT button has no effect. To reset the NO REPEAT mode, the CLEAR BUTTON MEMORY function must be executed.

Press the navigation buttons to select the main menu item CLEAR BUTTON MEMORY .

The names of the function buttons on the screen change automatically.

Resetting the NO REPEAT Flag on One Button: Use the navigation buttons to select the current button and press **(R)** CLEAR to reset the NO REPEAT flag on the selected button.
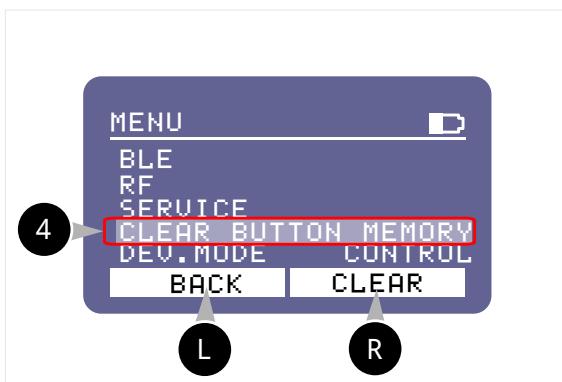
(4) — CLEAR BUTTON MEMORY management mode.
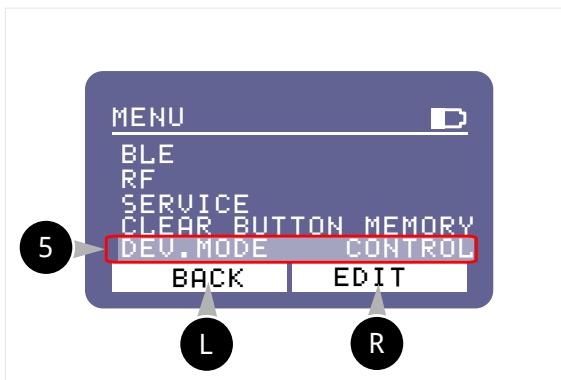
(R) — the function name CLEAR is displayed
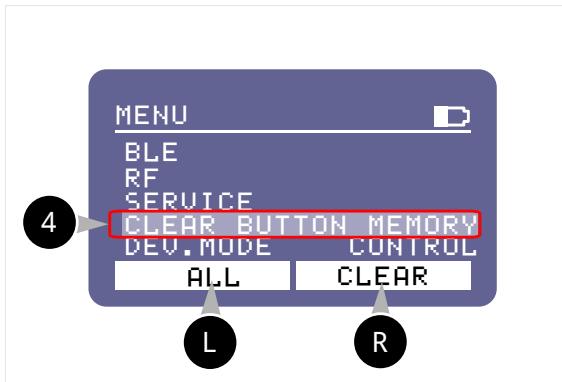
sequentially press the **(R)** CLEAR button and, without releasing it, press the **(L)** ALL button. (The left button will display the indication ALL — all buttons.) The NO REPEAT mode will be reset, and the SHOT function will become available again.

Resetting the NO REPEAT Flag on All Buttons Simultaneously: To execute the `CLEAR BUTTON MEMORY` function to reset the NO REPEAT flag on all buttons, it is necessary to:
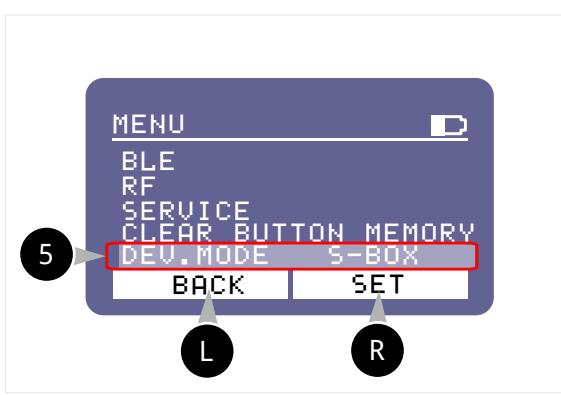
7.6.5 DEV.MODE MENU

The `DEV.MODE` menu is necessary for switching the device between «CONTROLLER» and «RECEIVER» modes.

Press the navigation buttons to select the main menu item `DEV.MODE` . The names of the function buttons on the screen change automatically.

4 — `DEV.MODE` management mode.

R — the function name `EDIT` is displayed

«RECEIVER» To switch the device to «RECEIVER» mode

1. Press the **R** `EDIT` button

2. Use the navigation buttons to select the value `S-BOX`

3. Press the **R** `SET` button again to save the «RECEIVER» mode

**«CONTROLLER»** To switch the device to «CONTROLLER» mode

1. Press the **R** `EDIT` button

2. Use the navigation buttons to select the value `CONTROL`

3. Press the **R** `SET` button again to save the «CONTROLLER» mode

Confirm the device reboot after changing the mode.

7.7 SERVICE MENU

To navigate to the «SERVICE» menu, press the ⓡ R button from the device's main menu (see Fig. 5.1 on page 15).

The «SERVICE» menu loads on the new screen, and the button assignments change.
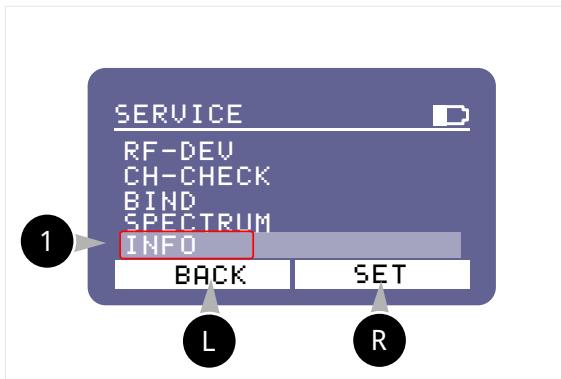
R — To navigate to manage the selected item in the «SERVICE» menu, press the `SET` button

L — To return to the previous menu level, press the `BACK` button

The `SERVICE` menu contains the following items:

RF-DEV — receiver configuration

CH-CHECK — testing electrical circuits of connected devices

BIND — pairing receivers

SPECTRUM — radio channel check

INFO — current device information

MAN.SHOT — manual ARM control

7.7.1 INFO MENU

To navigate to the `INFO` screen, in the previous menu, use the navigation buttons to place the cursor on the line labeled `INFO` **1** and press the **R** `SET` button. A screen with device information will open:

UID: — unique device identification number, consisting of two groups of characters 4:8, separated by a colon. The unique device number is duplicated on the back cover of the device and printed as a QR code.

BAT.SOC: — actual battery charge level of the device in %.

FW: — version of the Firmware installed on the device.

| ⚠ USEFULLY!	Firmware is a special microprogram loaded into the device's memory. Microprograms are periodically updated and available for download to the device.
⚠ **IMPORTANT!**	When updating the Firmware microprogram on the device, ensure that the program version is identical on all connected devices (controller and receivers). Operation of the system with connected instruments having different Firmware versions is not permitted.

HW: — HARDWARE code representation of the device version.

⚠ **IMPORTANT!**	Device identification, owner binding, device maintenance at the service center, and updates occur via the unique UID number.

7.7.2 SPECTRUM MENU

The `SPECTRUM` mode is designed for diagnosing radio frequencies in the air to select a stable frequency range on the device.
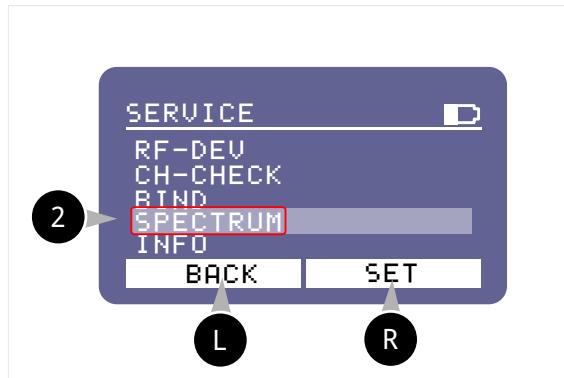
To navigate to the `SPECTRUM` screen, use the navigation buttons to place the cursor on the line labeled `SPECTRUM` **2** and press the **R** `SET` button. A screen for diagnosing frequencies in the air will open:

⚠ VERY IMPORTANT!

To work in SPECTRUM mode, the `RF` mode must be enabled (see section 7.6.2 on page 46). To avoid device damage and amplifier board burnout, always connect the standard antenna to the antenna connector before enabling the `RF` mode.

PANORAMA — Reflects the state of the air in the device's operating frequency range (from channel 1 to channel 40) from 864 MHz to 869 MHz.

PEAK@CH#9 — Indicates that there is interference on channel 9. This channel is not recommended for use.
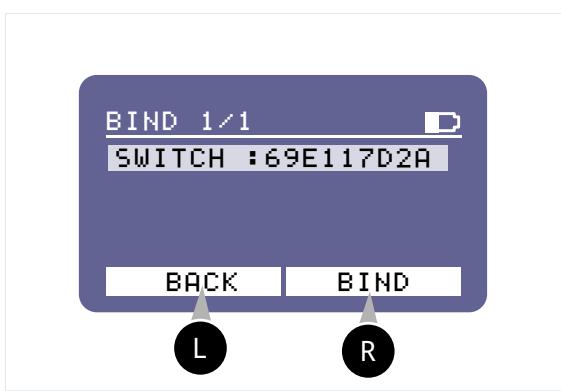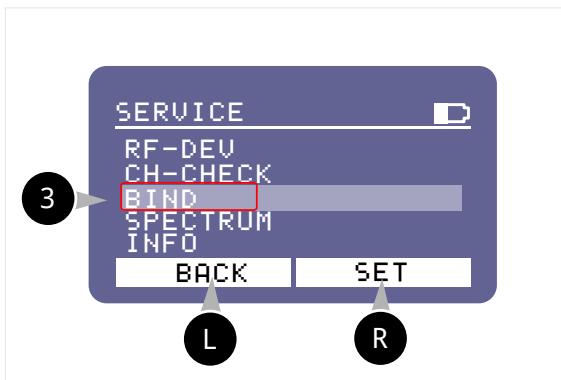
To return to the menu, press the **L** `BACK` button

! USEFULLY!

For selecting and configuring device channels (see section 7.6.2 on page 48).

7.7.3 BIND MENU

This mode is designed for binding external devices in the UNBIND state to the controller.

To navigate to the BIND screen, use the navigation buttons to place the cursor on the line labeled BIND **3** and press the **R** SET button. A screen for binding a new device will open:

Scanning — When the BIND screen opens, the controller scans all available *SHOT CONTROL SYSTEM* devices nearby that are in the UNBIND state (for more details, see section 8.4.4 on page 78).

Selection — use the navigation buttons to select the device to connect and press the **R** BIND button

The device is connected. To view active connected devices, see section 7.5 on page 43, subsection **RF Mode**).
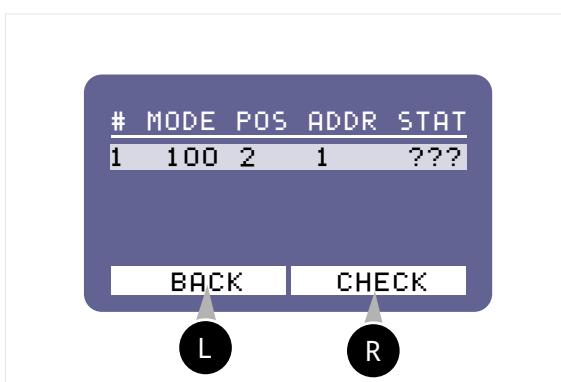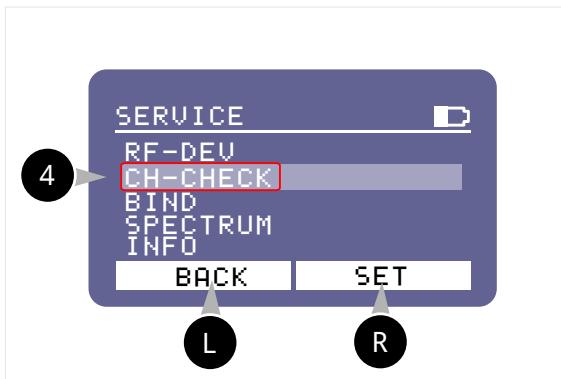
7.7.4 CH-CHECK MENU

⚠️ **VERY IMPORTANT!**

A very important mode for preliminary verification of all network settings. Sends commands to all receivers to "ring out" connections with external devices connected to the receivers.

This mode is designed for (ringing out) checking the communication channel with connected devices for configuration errors; it operates in low-current mode and should not trigger pyrotechnic items.

MFX

| ! | **USEFULLY!** |

In CH-CHECK mode, for ringing out connections from the SBOX-100 device, a voltage of 3.3 V and a current of 100 microamps is applied to the contacts.

```
SERVICE
RF-DEV
CH-CHECK
BIND
SPECTRUM
INFO
      BACK          SET
```
(4) L R

To navigate to the CH-CHECK screen, use the navigation buttons to place the cursor on the line labeled CH-CHECK (4) and press the (R) SET button. A screen for checking the connection with connected devices will open:

```
# MODE POS ADDR STAT
1  100 2   1     ???



     BACK        CHECK
```
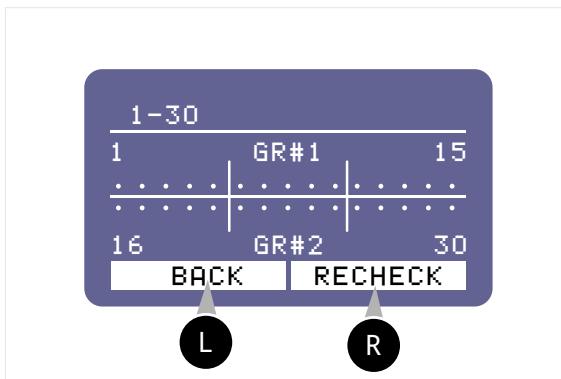L R

Scanning — When the CH-CHECK screen opens, the controller scans all configured external devices on the controller and displays them as a list.

> **#** — sequential number
> **MODE** — connection mode
> **POS** — device position

ADDR — device address within the controller

STAT — displays the status of the communication channel with the device

```
1-30
1           GR#1        15
. . . . . | . . . . | . . . . .
. . . . . | . . . . | . . . . .
16          GR#2        30
     BACK       RECHECK
```
L R

Selection — use the navigation buttons to select the device to check and press the (R) RECHECK button

Indication — the loaded window will display the status of each measured communication channel with the external device.

When the RECHECK button is pressed, the output channels are checked for the presence of a load. At this moment, a voltage of 3.3 volts with a current of 100 microamps is applied to the output channels. This current is insufficient to
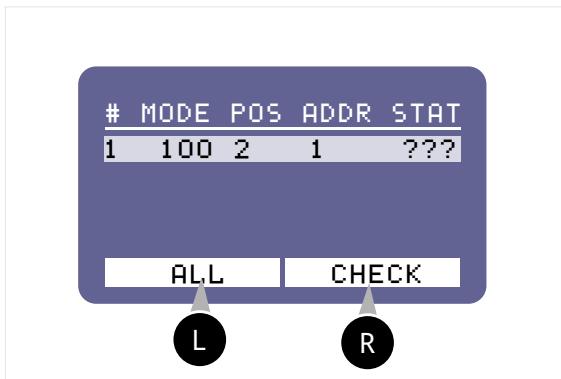
SHOT CONTROL SYSTEM

activate an electric igniter.

⚠ VERY IMPORTANT!   When performing the CH-CHECK procedure, always remain in a safe area away from hazardous devices and items connected to this receiver

Mode for checking all channels simultaneously — to activate this mode, perform the following actions:

to check the connection on all channels and devices simultaneously, press the **R** `CHECK` button and, without releasing the first, press the **L** `ALL` button. The controller will scan all channels and display the status of each device in the list.

Indication of channel test results on the screen uses the following conventional symbols to describe the state of the channels:
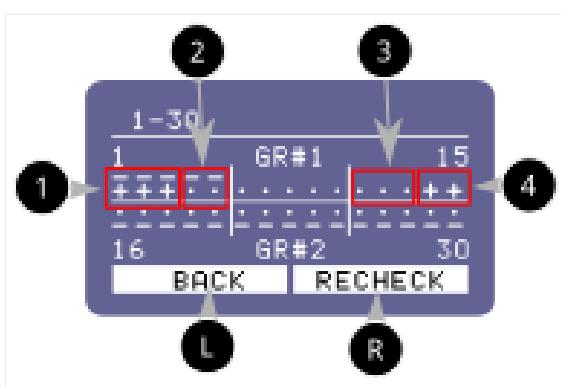
1 — on the screen, the channel is marked ⊞ — This channel is used in the program, there is a load in the channel, everything is working correctly.

2 — on the screen, the channel is marked ⊟ — This channel is used in the program, there is no load in the channel, the device is not connected.

3 — on the screen, the channel is marked · — program is not loaded, there is no load in the channel.

4 — on the screen, the channel is marked + — program is not loaded, there is a load in the channel, the device is connected incorrectly.

⚠ **IMPORTANT!**

After completing the diagnostics, be sure to re-connect the devices marked on the diagram with `+` and without the `-` sign above the plus. This device is connected to a channel where no programme is loaded.

After completing the CH-CHECK procedure, the screen will display the status of the performed channel checks.

! **USEFULLY!**

Channel Statuses:

`???` — channel not yet scanned;
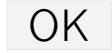
`OK` — all channels on the tested receiver are working correctly (i.e., the state on all checked channels corresponds to items ① and ③ — see fig. above);

`ERR` — errors were detected in the channels of the tested receiver, and additional verification is required (i.e., in some channel there is status ② and ④ — see fig. above).

7.7.5 RF-DEV MENU

This mode is intended for displaying complete information about all devices connected to the controller and for their configuration.
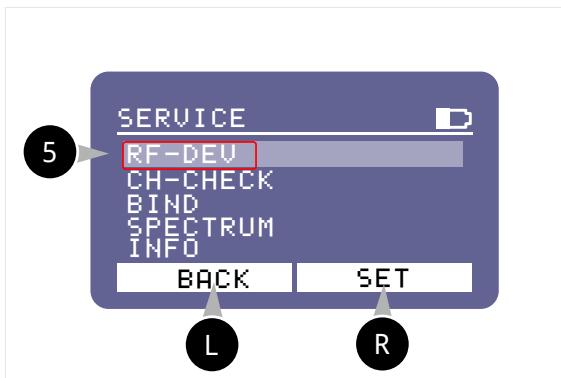
To navigate to the RF-DEV screen, use the navigation buttons to set the cursor on the line labeled RF-DEV   5   and press the R   SET button. The screen for viewing the list of connected devices will open.

List of devices connected to the controller:
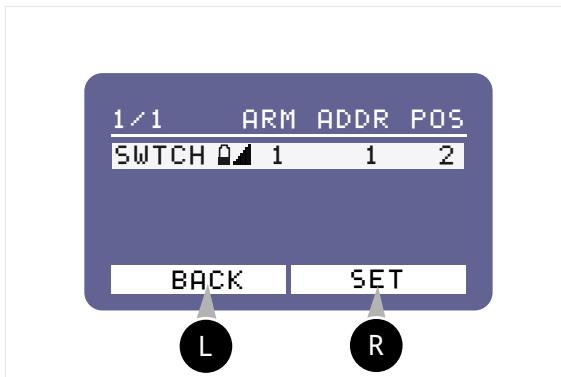
1/1 — number of active bound devices (receivers)/number of inactive bound devices. In this configuration, one receiver is bound to the controller and it is currently active (i.e., communication with it is established).

SWTCH — device name

🔋 — battery charge level of the external device

▰ — signal level with the external device

ARM — ARM zone in which the receiver operates

ADDR — start address of the selected receiver (for more details, see section 6.2 on page 22 describing the address space)

POS — receiver position number

To configure an external device, press the R button on the active line with the device name.

7.7.6 RECEIVER PARAMETERS MANAGEMENT MENU

To configure external devices («Receivers»), navigate to the RF-DEV menu (see section 7.7.5), select the device for configuration from the list, and press the R   SET button.

External device configuration parameters:
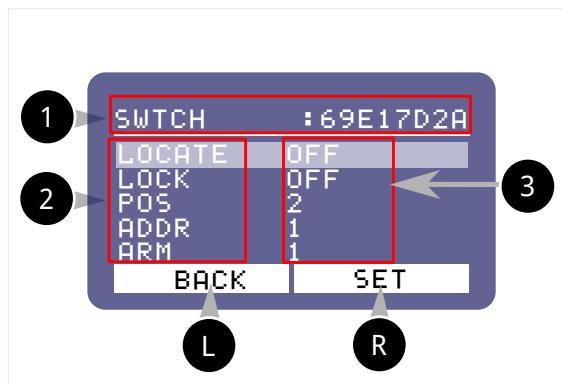
1 — external device name and its unique number

2 — names of external device parameters for configuration (The list of settings may vary depending on the type of connected device.)

3 — values of external device configuration parameters

⚠ USEFULLY!

To move between menu lines on the display, use the controller buttons ③ (to move up) and ④ (to move down) Fig. 5.1 on page 15
To switch to editing the selected position — press the (R) SET button

---

LOCATE Menu Item is intended for locating an external device.

To locate an external device, press the **R** SET button on the active position LOCATE OFF (see figure above). The value on the display will change to LOCATE ON , and the LOCATE indication in large letters will start blinking on the external device (see figure on the left).

LOCK Menu Item is intended for locking the device.

LOCK OFF — the device is available and operates fully

LOCK ON — the device is locked and does not receive signals in SHOT mode

To switch the LOCK mode, press the **R** SET button.

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When the device is locked, the inscription RF LOCK in large letters will be displayed on the receiver's screen (see figure on the left).

When the RF-LOCK mode is enabled on the controller for the selected receiver, the receiver switches to LOCK mode and does not transmit incoming signals from the controller to the external channels. I.e., devices connected to this receiver do not operate.

When the RF-LOCK mode is disabled, the receiver returns to the operating mode and continues to control the pyrotechnic igniters and devices connected to it.

Enabling the RF-LOCK mode is possible from three controller states:

① — DISARM mode is enabled on the controller

② — ARM mode is enabled on the controller and the program is not executing (the SHOT button is not pressed)

③ — ARM mode is enabled on the controller and the program is executing (the SHOT button is pressed)

**Enabling RF-LOCK from DISARM Mode**   allows locking the receiver in 2 ways:

Through the SERVICE menu:

**①** In Controller mode on the device, go to the SERVICE menu and select the RF-DEV item
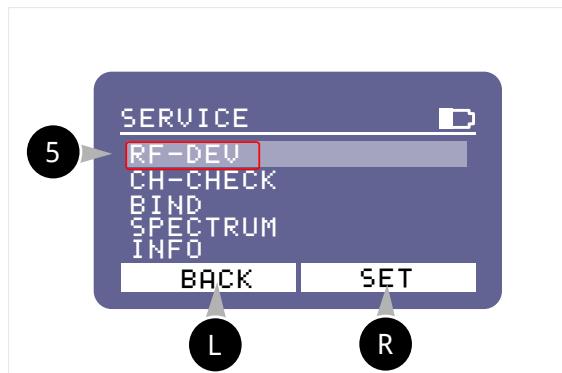
To navigate to the receiver management screen, use the navigation buttons to set the cursor on the line labeled RF-DEV **5** and press the **R** SET button. The screen for viewing the list of connected devices will open.

② On the display screen, select the device for locking:

```
1/1      ARM ADDR POS
SWTCH ▣◢ 1     1     2


      BACK        SET
```
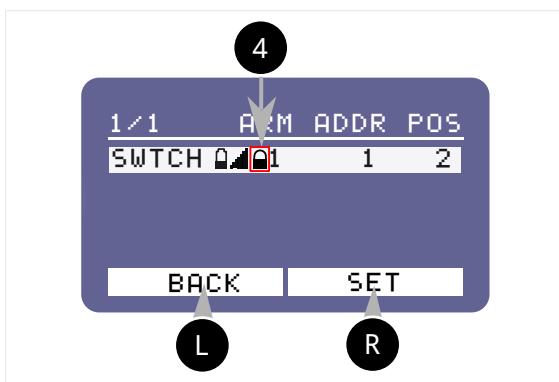L   R
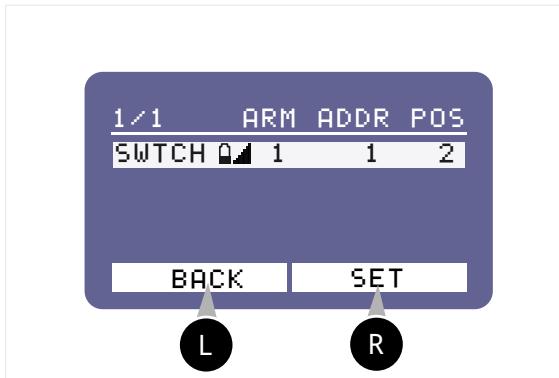
Press the **R** SET button to navigate to the device settings screen.

③ In the device settings window, use the navigation buttons to select the line LOCK:OFF

```
SWTCH       :69E17D2A
LOCATE    OFF
LOCK      OFF
POS       2
ADDR      1
ARM       1
      BACK        SET
```
3
L   R
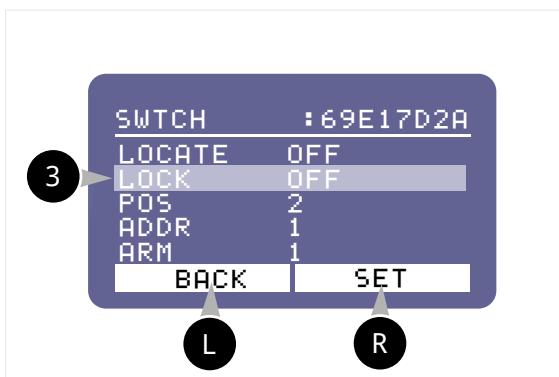
Use the navigation buttons to select the value ON and press the **R** SET button to save the changes.

4

```
1/1      ARM ADDR POS
SWTCH ▣◢🔒1     1     2


      BACK        SET
```
L   R

The selected receiver will switch to LOCK mode and a closed lock **4** will be displayed in the device status line.

Unlock by following the same sequence, setting the OFF value in the LOCK menu item.

Device locking mode by double-pressing the control buttons **R** **and** **L** .

Performed without entering the main receiver settings menu. It is sufficient to select the line with the name of the device to be locked and perform a double press of the **R** and **L** buttons as described below.

Perform all actions in the SERVICE menu described above up to item ② and

on the opened screen, select the line with the device for locking:
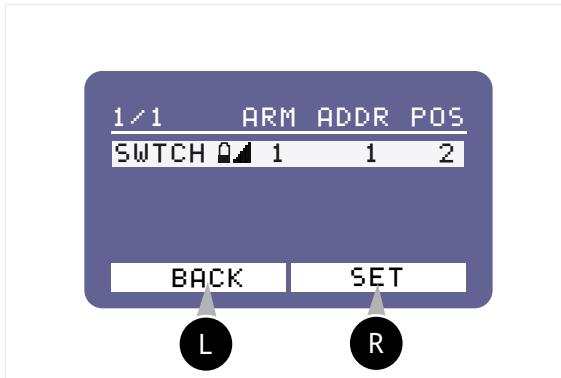
Press the (R) button and the left button will take the value LOCK , without releasing the buttons, press the (L) button.   The device will switch to lock mode and a lock will be displayed in the status line (see figure above).

To disable the lock, press the (R) button again and, without releasing it, press the (R) button. The lock in the device status line will not be displayed and the device will be unlocked.


USEFULLY!

The RF-LOCK lock/unlock mode can be switched multiple times:
press the (R) button and, without releasing it, press the (L) button; without releasing the (R) button, the next press of the (L) button will unlock the device.

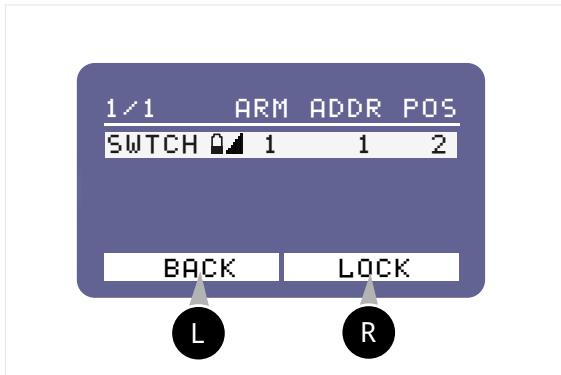**Enabling RF-LOCK in ARM Mode**   In ARM mode, all receiver configuration menus are unavailable, but for emergency situations, the (R) button has the RF-DEV function. I.e., it allows navigating to the list of receivers connected to the controller for locking them.
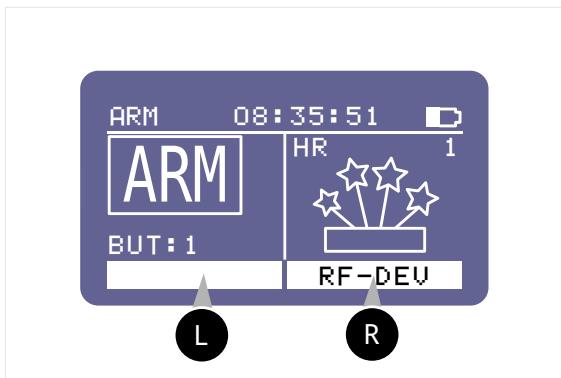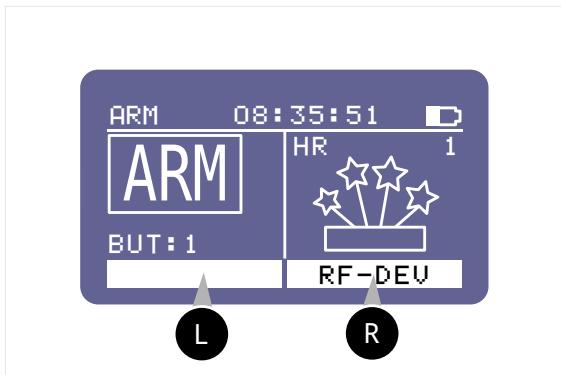

Press the (R) RF-DEV button to navigate to the list of available devices connected to the controller.

MFX

```
1/1     ARM ADDR POS
SWTCH ▫◪ 1      1     2


    BACK       LOCK
```
L   R

Only the LOCK mode is available on the right control button. Select the device for locking using the navigation buttons and press the **R** LOCK button. The receiver will switch to RF-LOCK mode.

Disabling RF-LOCK in ARM Mode   To remove the lock

```
ARM      08:35:51    ▭
 ARM    HR          1
         ☆☆☆
BUT:1    ▭▭▭▭
           RF-DEV
```
L   R

in ARM mode, from the main working screen, press the **R** RF-DEV button. And navigate to the list of receivers connected to the controller to remove the lock.

Press the **R** RF-DEV button to navigate to the list of available devices connected to the controller.

```
1/1     ARM ADDR POS
SWTCH ▫◪▣1      1     2


    BACK      UNLOCK
```
L   R

When selecting a locked device, only the UNLOCK mode is available on the right control button. Select the device for unlocking using the navigation buttons and press the **R** UNLOCK button.

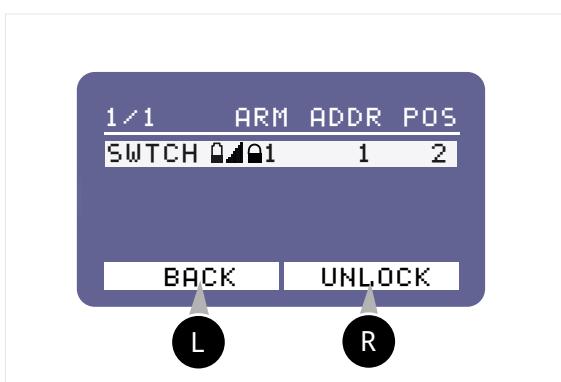The receiver will exit RF-LOCK mode and the lock indicating the device lock will no longer be displayed in the status line.

POS Menu Item   is intended for remote changing of the device position number.

To change the receiver's position number, use the navigation buttons to select the POS menu line, press the **R** SET button, and use the UP-DOWN navigation keys to set the required device position number. To save the result, press the **R** SET button again. (for more details, see section 6.2 on page 22 describing the address space)

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ADDR Menu Item   is intended for remote changing of the device start address number.

To change the receiver's start address number, use the navigation buttons to select the `ADDR` menu line, press the **R** `SET` button, and use the UP-DOWN navigation keys to set the required device address number. To save the result, press the **R** `SET` button again. (for more details, see section 6.2 on page 22 describing the address space)

ARM Menu Item   is intended for remote changing of the device's ARM ZONE number.

To change the external device's ARM ZONE number, use the navigation buttons to select the `ARM` menu line, press the **R** `SET` button, and use the UP-DOWN navigation keys to set the required ARM ZONE number for the device. To save the result, press the **R** `SET` button again. (for more details, see section 6.3 on page 31 describing the use of ARM ZONE)

UNBIND Menu Item   is intended for unbinding the selected device from the controller.

```
SWTCH        :69E17D2A
LOCK      OFF
POS       2
ADDR      1
ARM       1
UNBIND
    BACK        SET
     L           R
```
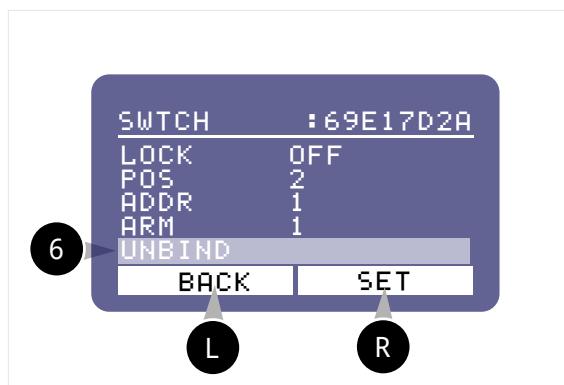
To unbind an external device from the controller, use the navigation buttons to select menu line **6** `UNBIND` , press the **R** `SET` button, and confirm the device unbinding in the message on the controller screen.

⚠ IMPORTANT!

A device can be unbound both from the device itself and from the controller.
If the device was unbound in its main menu, it is necessary to perform the unbinding procedure in the Controller menu.
Devices that have not been unbound will be displayed in the controller settings as passive and not connected.
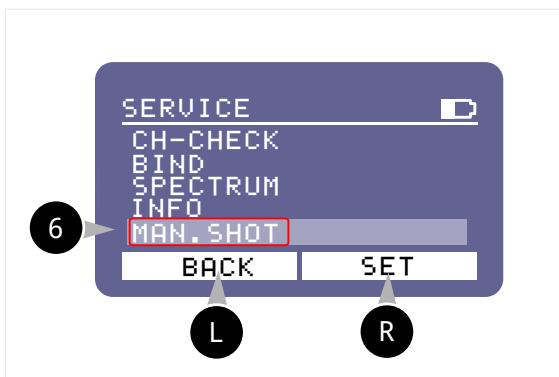
7.7.7 MAN.SHOT MENU

This mode is intended for activating the ARM mode without loading programs from the mobile application to the «Controller» and allows for manual control of pyrotechnic devices.

(!) USEFULLY! | This mode is convenient for quick setup and control of a small number of receivers and devices connected to them.

Selecting the MAN.SHOT mode:
To select the MAN/SHOT mode, use the navigation buttons in the SPECTRUM menu to select the line labeled MAN.SHOT **6** and press the **R** SET button.

In the opened menu, the parameters POSITION , CHANNAL , ACTION , and the automatic mode for changing the selected values A.NEXT are available for modification.

Navigation in the MAN.SHOT menu is performed by pressing the **R** NEXT button.

POS Menu — is the position number of the receivers to which the SHOT signal will be sent.
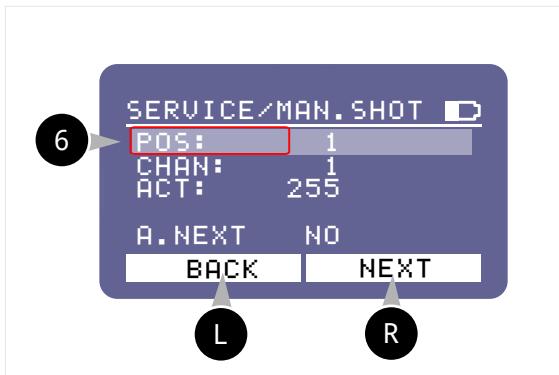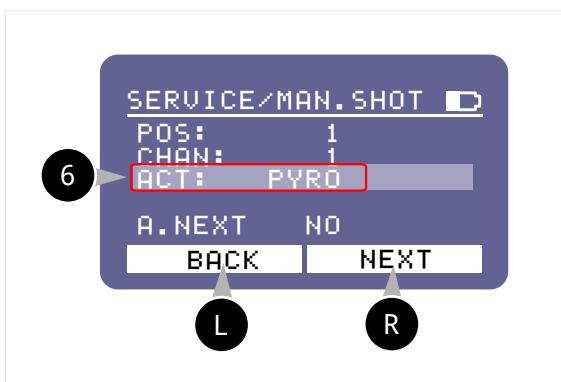
By pressing the **R** NEXT button, select the current line POS . In the active line, use the navigation buttons on the device (see fig. 4 on page 15) to select the required POS number value to which the SHOT signal will be sent (from 1 to 1000).

CHAN Menu — is the number of the active channel of the receivers to which the SHOT signal will be sent.
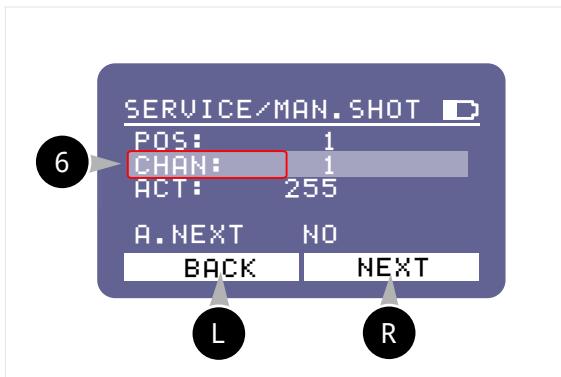
By pressing the `R` `NEXT` button, select the current line `CHAN` . In the active line, use the navigation buttons on the device (see fig. 4 on page 15) to select the required channel number value to which the SHOT signal will be sent (from 1 to 10000).

ACT Menu — is the action code (or command for the receiver) that will be sent to the selected address: POS+CHAN.

By pressing the `R` `NEXT` button, select the current line `ACT` . In the active line, use the navigation buttons on the device (see fig. 4 on page 15) to select the required action value:

- For generated receivers, set a value from 2 to 255, according to their command list.

- For pyrotechnic igniters, set the value `PYRO` . This value allows applying a firing current to the selected address for 100ms to activate the pyrotechnic igniter.

Operating Procedure in MAN.SHOT Mode   To start working in the active mode, press the `ARM` button.
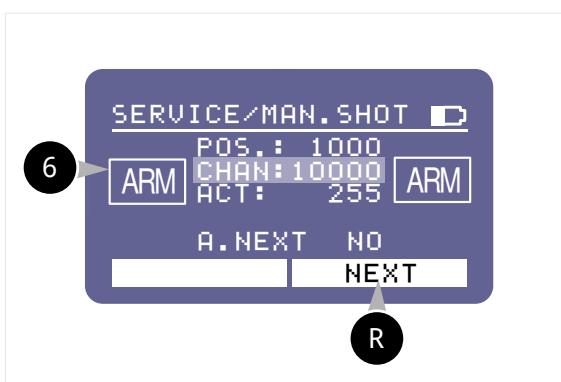
Press the `ARM` button on the «Controller». All receivers connected to the «Controller» will switch to ARM mode and will be ready to receive SHOT commands from the «Controller». The ARM mode indication will be displayed on the «Controller» and «Receiver» displays.

① Pressing the `NEXT` button in ARM mode moves the cursor through the menu lines: POS/CHAN/ACT.

② Pressing the UP and DOWN navigation keys in ARM mode changes the values in the current line.

③ Pressing the SHOT button will send a signal to the radio channel with the current set values of POS/CHAN/ACT.

④ To send a command to the same address again, press the SHOT button again without changing the POS/CHAN/ACT values and without turning off the ARM mode.

⑤ To send a command to a different address: set new values for POS/CHAN/ACT and press the SHOT button without turning off the ARM mode.

Automatic Value Change in MAN.SHOT Mode   For automatic changing of channel or position numbers, it is necessary:
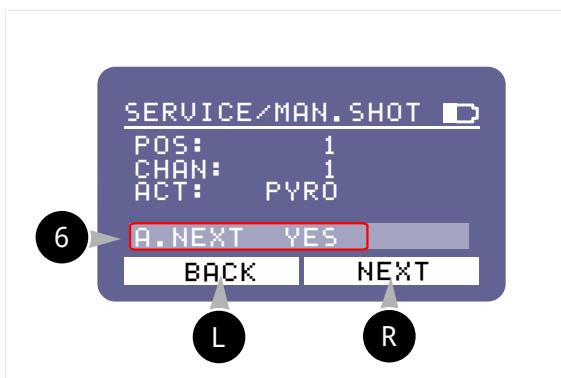
① Select the A.NEXT line and set its value to YES using the navigation buttons.

② Enable ARM mode

③ Use the NEXT button to select the current position for automatic value change (For example: CHAN — channels).

④ Use the UP and DOWN navigation buttons to set the starting value in the selected line.

⑤ Press the SHOT button to send a command to the selected address. (The address value will automatically increase by +1).

⑥ Subsequent presses of the button will automatically increase the address value and send the command without the need to manually change the address.
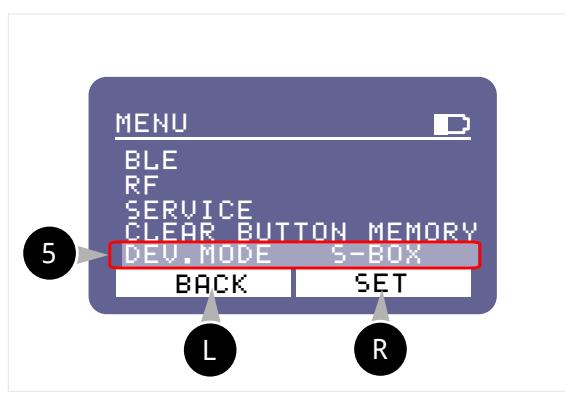
8 Receiver Mode

In «Receiver mode», the device receives signals from the control controller and supplies control current to external channels to initiate pyrotechnic devices or activate electromagnets or other special devices. This device in receiver mode is controlled via the SHOT CONTROL SYSTEM radio protocol.

In «Receiver mode», up to 10 (ten) external devices can be connected to the device through 10 contact groups (channels) for direct wired connection of pyrotechnic igniters, and also, through 6 RJ45 connectors, it is possible to connect 6 external expansion boards, with 15 channels each.

When 6 expansion boards are connected, the device can simultaneously send a signal to 100 pyrotechnic igniters.

When operating in «Receiver mode», the device display shows the corresponding status and information relevant to «Receiver mode».

To enable the device in receiver mode, navigate to the DEV.MODE menu and select the value S-BOX :

«RECEIVER» To switch the device to «RECEIVER» mode

1. Press the R EDIT button

2. Use the navigation buttons to select the value S-BOX

3. Press the R SET button again to save the «RECEIVER» mode

8.1 TURNING ON THE DEVICE.

⚠ **VERY IMPORTANT!**

To prevent burning out the radio path on the device! The device must only be turned on with the ANTENNA CONNECTED!

1 — To turn on the device, press and hold button **1** for 1 second. The device will boot automatically and switch to the current mode.

IMPORTANT!

When the device is turned on, the keyboard is initially locked and the inscription `LOCK` `LOCK` is displayed on the bottom line of the display.


To disable the keyboard lock on the device, simultaneously press the **R** and **L** buttons.
Alternatively, to disable the keyboard lock, press the **R** button and, without releasing it, press the **L** button. The device keyboard will be unlocked and the inscription `MENU` will be displayed on the display.

To lock the keyboard, perform an action similar to the previous one, simultaneously press the **R** and **L** buttons, the keyboard will be locked and information about the keyboard lock will be displayed on the bottom line `LOCK` `LOCK` .

8.2 TURNING OFF THE DEVICE
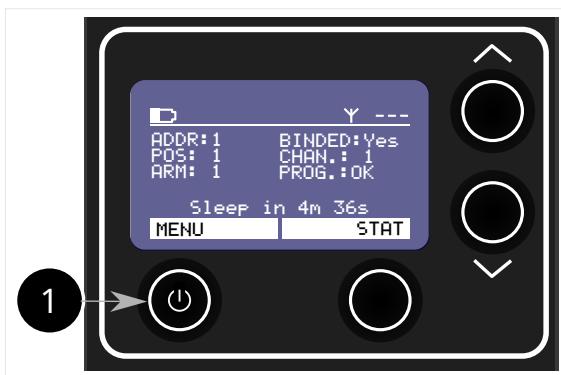
1 — To turn off the device, press and hold button **1** for 2-3 seconds. The device will turn off automatically and will remember all current settings.

Upon subsequent turning on, the device will boot into the mode of the current settings.

8.3 OPERATING PROCEDURE IN «RECEIVER» MODE

8.3.1 DEVICE PREPARATION FOR OPERATION

The SBOX-100 device in «Receiver mode» can receive signals from the «Controller» via the *SHOT CONTROL SYSTEM* protocol and control up to 100 external devices connected to it via wired communication.

To prepare the SBOX-100 device for operation in «Receiver mode», the following steps must be performed:

(1) Turn on the device (see section 8.1 on page 71)

(2) Enable «Receiver mode» on the device (see section 8.4.5 on page 79)
   DEV.MODE: S-BOX

(3) Perform pairing with the «Controller» (see section 8.4.4 on page 78)

(4) Configure the address space (see section 8.4.1 on page 76)

(5) Connect devices for control to the external channels

<table>
<tr>
<td>⚠ IMPORTANT!</td>
<td>Before starting work, ensure that the receiver is not in LOCK mode.

In LOCK mode, the receiver does not process signals from the «Controller» and does not respond to keyboard presses. (For more details on disabling LOCK mode, see section 7.7.6 on page 62)</td>
</tr>
</table>

8.3.2 MAIN OPERATIONS PERFORMED ON THE DEVICE

The SBOX-100 device in receiver mode, after configuration and pairing with the controller, operates automatically and does not require an operator's presence. Enabling and disabling the ARM mode is performed via the radio channel from the «Controller».

<table>
<tr>
<td>⚠ VERY IMPORTANT!</td>
<td>For safety reasons, it is not recommended for people to be near receivers in ARM mode. Injury is possible due to the activation of pyrotechnic devices.</td>
</tr>
<tr>
<td>⚠ VERY IMPORTANT!</td>
<td>After enabling ARM mode on the controller, up to 3 seconds are required for the receiver to switch to active mode and charge the capacitors. After 3 seconds, the complex is ready to execute programs.</td>
</tr>
</table>

8.3.3 COMPLETION OF WORK WITH THE DEVICE/STORAGE

After finishing work in receiver mode, it is necessary to:

① Turn off the power (see section 8.2 on the previous page)

② Disconnect devices from the external channels

③ Perform maintenance work

④ Place the device in its standard packaging

8.4 DEVICE MENU IN «RECEIVER» MODE
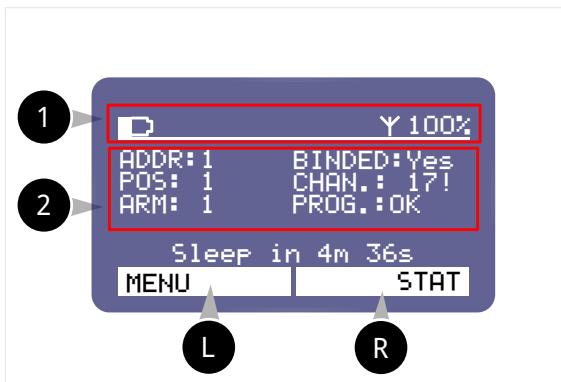
1 In the top line of the display in «Receiver» mode, the device's battery charge level and the link level with the controller are indicated. Y shows the signal level in %. If there is no signal from the controller, - - - is displayed.

2 Current device configuration parameters.

Device charge level — visually: the filled area shows the remaining charge level:

 — battery is discharged   — battery is fully charged

 — half charged

The function buttons, indicated in the figure, control the device according to the indication in the white field of the display:

Button **8** in Fig. 5.1 on page 15 performs the action indicated in the left white field of the display MENU : (hereinafter referred to in diagrams as: **L**).

Button **6** in Fig. 5.1 on page 15 performs the action indicated in the right white field of the display STAT : (hereinafter referred to in diagrams as: **R**).

2 — main display screen menu

ADDR:1 — the device's start address is indicated on the display

POS: 1 — the device's position number is indicated on the display

ARM: 1 — the ARM ZONE number in which the device operates is indicated on the display

BINDED:Yes — indication of an established binding to the controller:

Yes — link is established

No — is in controller search mode

CHAN.: 17! — the number of the device's working communication channel with the controller.

PROG.: OK — indication of a loaded program for the device's operation.

> **OK** — a program is loaded for this device, the device is ready for operation.
>
> **ERR** — a program is not loaded for this device, the device is not ready for operation.

⚠️ **IMPORTANT!**

For the correct operation of the device, a program for this device must be loaded from the controller, and the value   OK   must be set in the   PROG.:   line.

If the device status is   PROG: ERR , it is necessary to switch the controller to which this device is connected to   DISARM   mode and wait for the complete loading of the program onto the receiver and the establishment of the   PROG OK   status.

8.4.1 CTRL.ADDR MENU

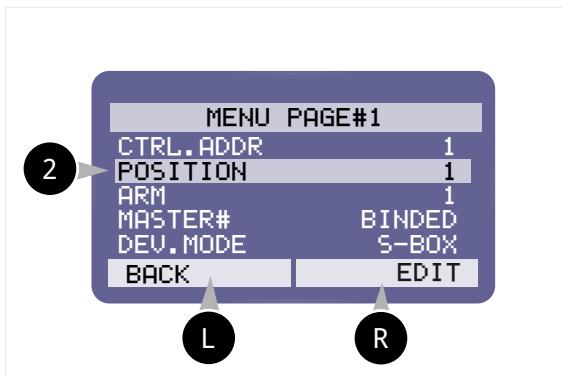This menu is intended for setting the device's start address.
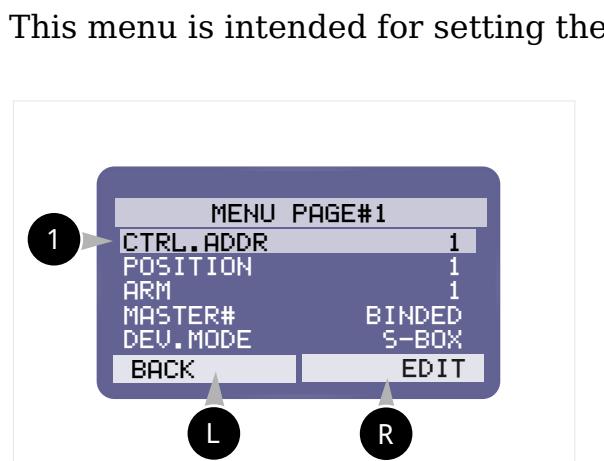
To proceed to editing the device address, use the navigation buttons to set the cursor on the line labeled   CTRL.ADDR   **1**   and press the   **R**   EDIT   button.

Use the UP-DOWN navigation buttons to set the required start address value and save the changes made by pressing the   **R**   ENTR   button.

To cancel the changes made, press the   **L**   BACK   button.

8.4.2 POSITION MENU

This menu is intended for setting the device's position number.

```
        MENU PAGE#1
CTRL.ADDR          1
POSITION           1
ARM                1
MASTER#       BINDED
DEV.MODE       S-BOX
  BACK          EDIT
```

To proceed to editing the device's position number, use the navigation buttons to set the cursor on the line labeled `POSITION` **2** and press the **R** `EDIT` button.

Use the UP-DOWN navigation buttons to set the required value

of the device's position and save the changes made by pressing the **R** `ENTR` button.

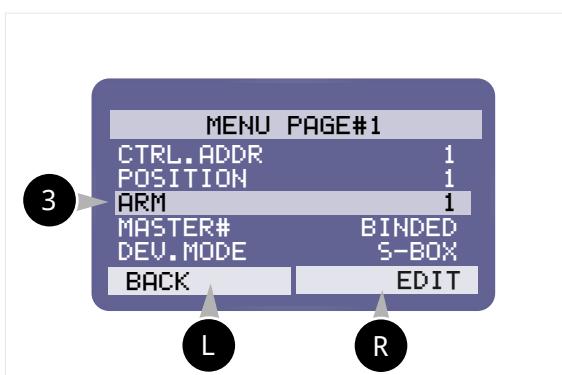To cancel the changes made, press the **L** `BACK` button.

⚠️ **IMPORTANT!**

When changing the position number in the device settings, all memory on the device will be erased and the position number will be changed.

8.4.3 ARM MENU

This menu is intended for changing the device's ARM ZONE number.

```
        MENU PAGE#1
CTRL.ADDR          1
POSITION           1
ARM                1
MASTER#       BINDED
DEV.MODE       S-BOX
  BACK          EDIT
```

To proceed to editing the device's ARM ZONE number, use the navigation buttons to set the cursor on the line labeled `ARM` **3** and press the **R** `EDIT` button.

Use the UP-DOWN navigation buttons to set the required value

of the device's ARM ZONE and save the changes made by pressing the **R** `ENTR` button.

To cancel the changes made, press the **L** `BACK` button.

MFX

⚠️ **IMPORTANT!**

When connecting SBOX-100 devices to each other as «CONTROLLER» and «RECEIVER», the ARM signal from the controller arrives immediately on all 8 ARM ZONES.
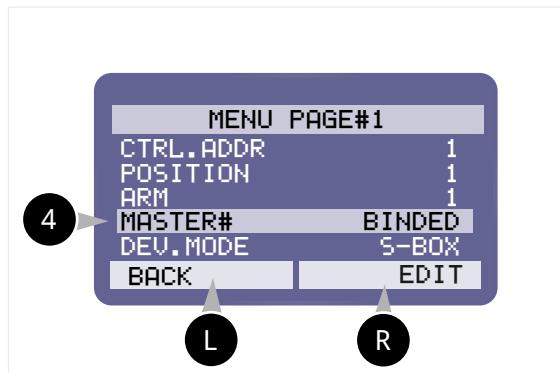
⚠️ **IMPORTANT!**

When connecting SBOX-100 devices in «RECEIVER» mode to a large controller, the ARM signal from the controller arrives only on the set ARM ZONES from 1 to 8.
During operation, be sure to check the ARM ZONE number settings on the devices.

8.4.4 MASTER MENU

This menu is intended for disconnecting the device from the controller.

Connecting a receiver to a controller is only possible from the menu in «Controller mode» (for more details, see section 7.7.3 on page 57).

```
        MENU PAGE#1
CTRL.ADDR           1
POSITION            1
ARM                 1
MASTER#        BINDED
DEV.MODE        S-BOX
  BACK          EDIT
```

To disconnect the device from the controller, use the navigation buttons to set the cursor on the line labeled MASTER **4** and press the **R**   EDIT button.
Use the UP-DOWN navigation buttons to set the value UNBIND

To save the changes made, press the **R**   ENTR button.

To cancel the changes made, press the **L**   BACK button.

(BINDED — link with the controller is established, UNBIND — link with the controller is not established and this receiver is available for connection by any controller that performs the device scanning procedure for connection; for more details, see section 7.7.3 on page 57.)

⚠️ **USEFULLY!**

For complete unbinding of the device from the controller, it is necessary to perform the unbinding procedure on the controller as well. (for more details, see section 7.7.3 on page 57)

SHOT CONTROL SYSTEM

8.4.5 DEV.MODE MENU

This menu is intended for setting the main mode of the device (CONTROLLER or RECEIVER)
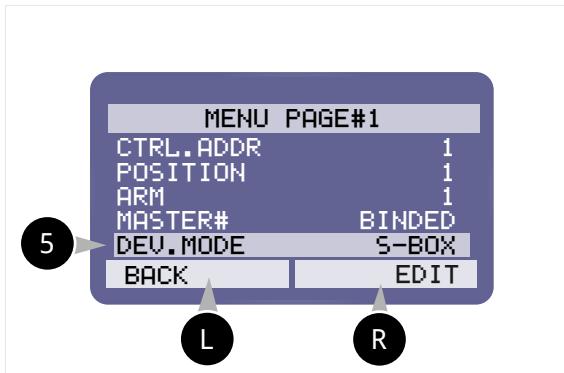
To switch the main operating mode of the device, use the navigation buttons to set the cursor on the line labeled DEV.MODE **5** and press the **R** EDIT button.
Use the UP-DOWN navigation buttons to set the required value

(CONTROL — to set «CONTROLLER» mode or S-BOX — to set «RECEIVER» mode) and save the changes made by pressing the **R** ENTR button. To cancel the changes made, press the **L** BACK button.

8.4.6 BUZZER MENU

This menu is intended for setting the audible signal on the device in ARM mode. ON — to enable or OFF — to disable.
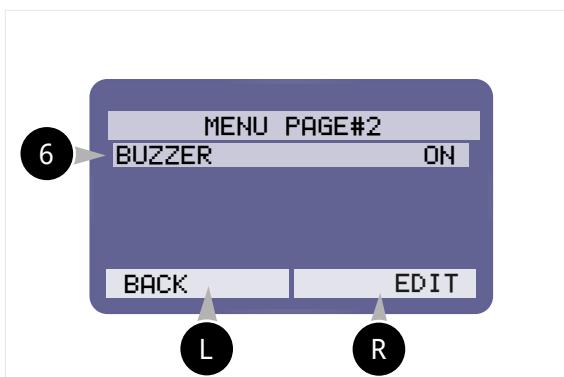
To set the audible signal mode on the device, set the cursor on the line labeled BUZZER **6** and press the **R** EDIT button.
Use the UP-DOWN navigation buttons to set ON/OFF. To cancel, press the **L** BACK button.

BUZZER ON — When ARM mode is enabled on the controller, the device will start emitting intermittent high-pitched sounds and the display will blink.

BUZZER OFF — When ARM mode is enabled on the controller, the device will only blink the display.

8.5 STATUS MENU

To navigate to the `STATUS` menu, on the main screen of the device in «Receiver» mode (see section 8.4 on page 75), press the **(R)** `STAT` button.

The device status will be displayed on the display.
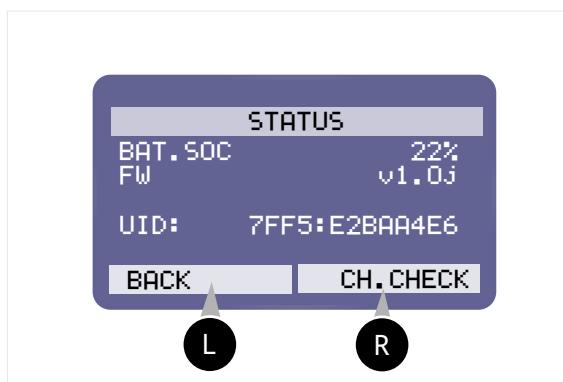
BAT.SOC — actual charge level of the device in %

FW — version of the Firmware installed on the device.

UID: — unique identification number of the device, consisting of two groups of characters 4:8, separated by a colon. The unique device number is duplicated on the back cover of the device and printed as a QR code.

⚠ **USEFULLY!**

Firmware is a special microprogram loaded into the device's memory.
Microprograms are periodically updated and available for download to the device.

⚠ **IMPORTANT!**

When updating the Firmware microprogram on the device, ensure that the program version on all connected devices (controller and receivers) is identical.
Operation of the complex with connected devices having different Firmware versions is not permitted.

8.5.1 CH-CHECK MENU

This mode is intended for (continuity) checking of wired contacts with connected external devices to the output channels (for more details on connecting external devices, see fig. 9 on page 20 directly to the standard connectors of the SBOX-100 device or through an expansion board up to 100 channels).
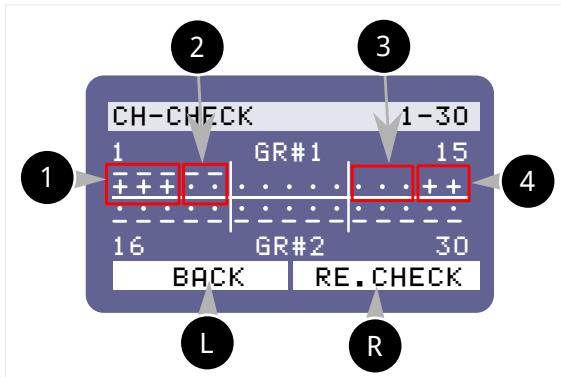
Start — **R** `RE.CHECK` the receiver scans all its channels and displays their status.

Indication — the loaded window will display the status of each measured channel connection with an external device.

Indication of Channel Testing Results on the screen uses the following conventional symbols to describe the channel states:

1 — on the screen, the channel is marked ⊞ — This channel is used in the program, there is a load in the channel, everything is working correctly.

2 — on the screen, the channel is marked ⊟ — This channel is used in the program, there is no load in the channel, the device is not connected.

3 — on the screen, the channel is marked ▫ — program is not loaded, there is no load in the channel.

4 — on the screen, the channel is marked ⊞ — program is not loaded, there is a load in the channel, the device is connected incorrectly.

⚠ **IMPORTANT!** After completing the diagnostics, be sure to reconnect the devices indicated on the diagram with ⊞ and without a ⊟ sign above the plus; this device is connected to a channel for which no program is loaded.

After completing the CH-CHECK procedure, the screen will display the status of the channel check performed.

USEFULLY!

Channel statuses based on test results:

??? — channel has not been scanned yet;

OK — all channels on the receiver are working correctly (i.e., on all checked channels, the state corresponds to items ① and ③ — see section above);

ERR — errors were detected in the channels of the tested receiver and additional checking is required (i.e., in some channel there is a state corresponding to items ② and ④ — see description above).

9 Device Power Management
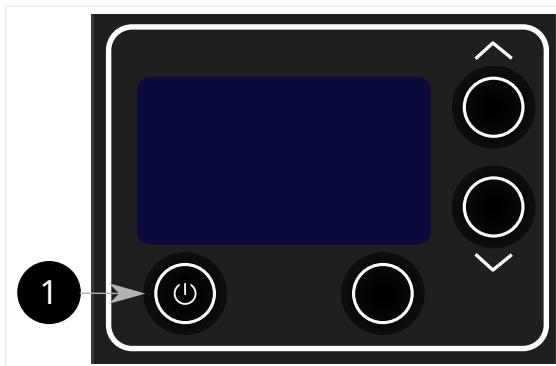
9.1 TURNING ON THE DEVICE

⚠ **VERY IMPORTANT!**

To prevent burning out the radio path on the device! The device must only be turned on with the ANTENNA CONNECTED!
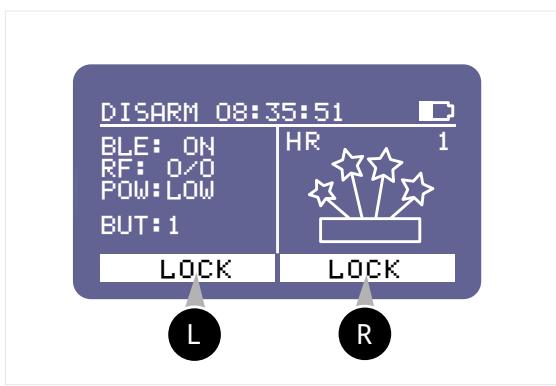
1 — To turn on the device, press and hold button **1** for 1 second. The device will boot automatically and switch to the current mode.

⚠ **IMPORTANT!**

When the device is turned on, the keyboard is initially locked and the inscription `LOCK` `LOCK` is displayed on the bottom line of the display.

```
DISARM 08:35:51    ▭
BLE: ON    HR       1
RF: O/O     ☆☆☆
POW:LOW    ☆☆☆☆
BUT:1        ▭
    LOCK      LOCK
      L         R
```

To disable the keyboard lock on the device, simultaneously press the **R** and **L** buttons.
Alternatively, to disable the keyboard lock, press the **R** button and, without releasing it, press the **L** button. The device keyboard will be unlocked and the inscription `MENU` will be displayed on the display.

To lock the keyboard, perform an action similar to the previous one, simultaneously press the **R** and **L** buttons, the keyboard will be locked and information about the keyboard lock will be displayed on the bottom line `LOCK` `LOCK`.

## 9.2 TURNING OFF THE DEVICE

1 — To turn off the device, press and hold button **1** for 2-3 seconds. The device will turn off automatically and will remember all current settings.

Upon subsequent turning on, the device will boot into the mode of the current settings.

9.3 AUTOMATIC SWITCHING TO SLEEP MODE

SLEEP mode (hibernation) is necessary for economical battery consumption on the device. In this mode, the device periodically checks for the restoration of the link with the controller, and upon link appearance, the device automatically resumes operation.
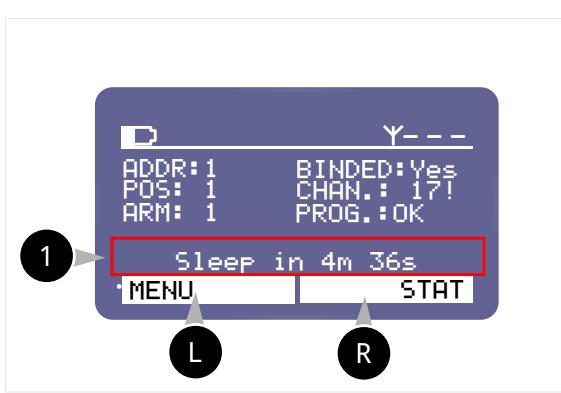
1 — Upon loss of link with the controller, a timer (5 minutes) is automatically started on the device to transition to SLEEP mode.

Restoration — Upon restoration of the link with the controller to which the device was bound, it will automatically wake up within 2 minutes.
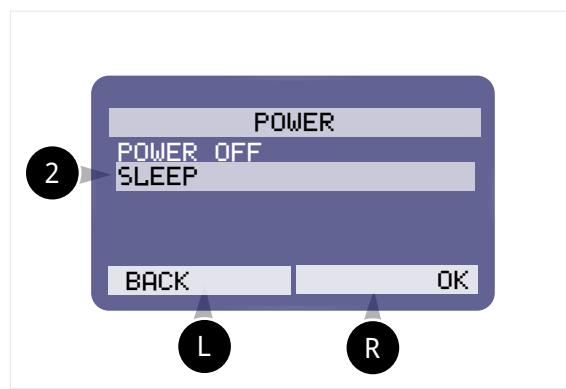
⚠ **VERY IMPORTANT!**

The device can remain in SLEEP mode for up to 2 months.

9.4 FORCED SWITCHING TO SLEEP MODE

To force the device into SLEEP mode, it is necessary to:

2 — Press and hold the **L** MENU button on the device for 2 seconds (no longer, to avoid triggering the POWER OFF mode — shutdown).

Select SLEEP — Use the navigation buttons to select the line labeled SLEEP.

R — Press the OK button.

9.5 FORCED WAKE-UP FROM SLEEP MODE

If the device is in SLEEP mode, a brief press of the «Power» button (see section 9.1 on page 83) will wake up the device and automatically connect it to the controller.

9.6 CONNECTING POWER TO THE DEVICE

The SBOX-100 device is equipped with a special connector for connecting an external power source for charging and providing stable power from an external source. (see fig. 4 on page 15 **12**).

A DC power source with a voltage of 20V and a power of at least 60W (this can be an external battery or another power source) is connected to this connector. When connecting an external power source, observe the polarity on the terminals.

9.7 CHARGING THE DEVICE

⚠ **VERY IMPORTANT!**

To prevent burning out the radio path on the device! The device must only be turned on with the ANTENNA CONNECTED!

or connect via the special connector for an external power source (see section 9.7 on the previous page).
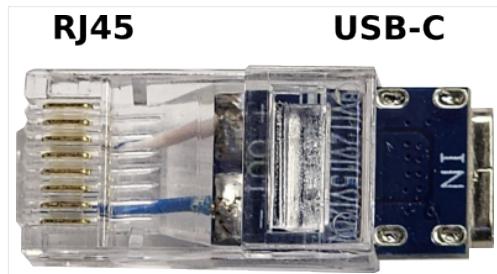
To charge the device, install the adapter [RJ45xUSB-C] (B) into the output connector of the device and connect a power supply unit with a power of at least 60W and a voltage of 20V with Power Delivery technology to the adapter. (A)

To charge one device, it is sufficient to connect the power supply via the [RJ45xUSB-C] adapter to any output RJ45 connector on the SBOX-100 device (see fig. 19).
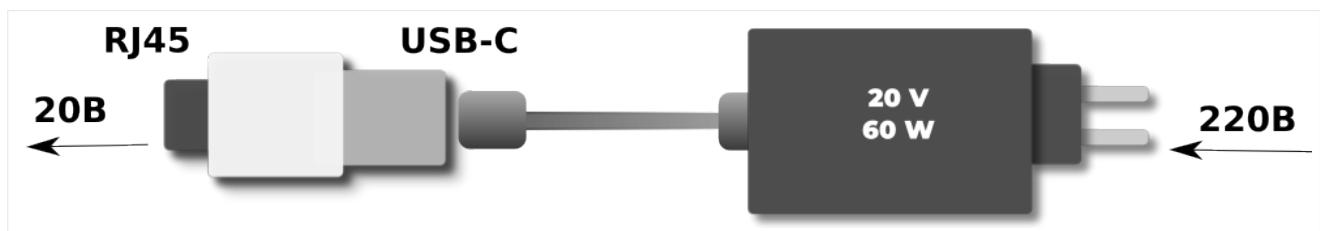

Figure 18: Charging the SBOX-100 device via the [RJ45xUSB-C] adapter

Figure 19: Charging 4 devices SBOX-100

⚠ **USEFULLY!**

Up to 4 SBOX-100 devices can be connected in series to one adapter for charging using (PATCH CORD RJ45) cables (C).

⚠️ **VERY IMPORTANT!**   Connecting more than four devices in series to a charger may lead to burnout of electronic components.

9.8 REMOVING THE BATTERY FROM THE DEVICE

For transporting the device on airplanes, removal of the battery is required. To remove the battery from the device, it is necessary to:

1   — unscrew the 4 screws located on the top end of the device housing in the housing recess using a 2mm hex key. (see fig. 20 on the next page)

2   — Carefully detach the top part of the housing from the central assembly.

3   — Carefully push the central assembly located in the slots out of the housing towards the bottom part of the housing with your finger.

4   — After removing the back cover, take the battery out of its standard place in the device. Carefully remove the battery without using metal objects.

Assemble the device in the reverse order, aligning the connectors of the top and bottom ends with the central assembly.
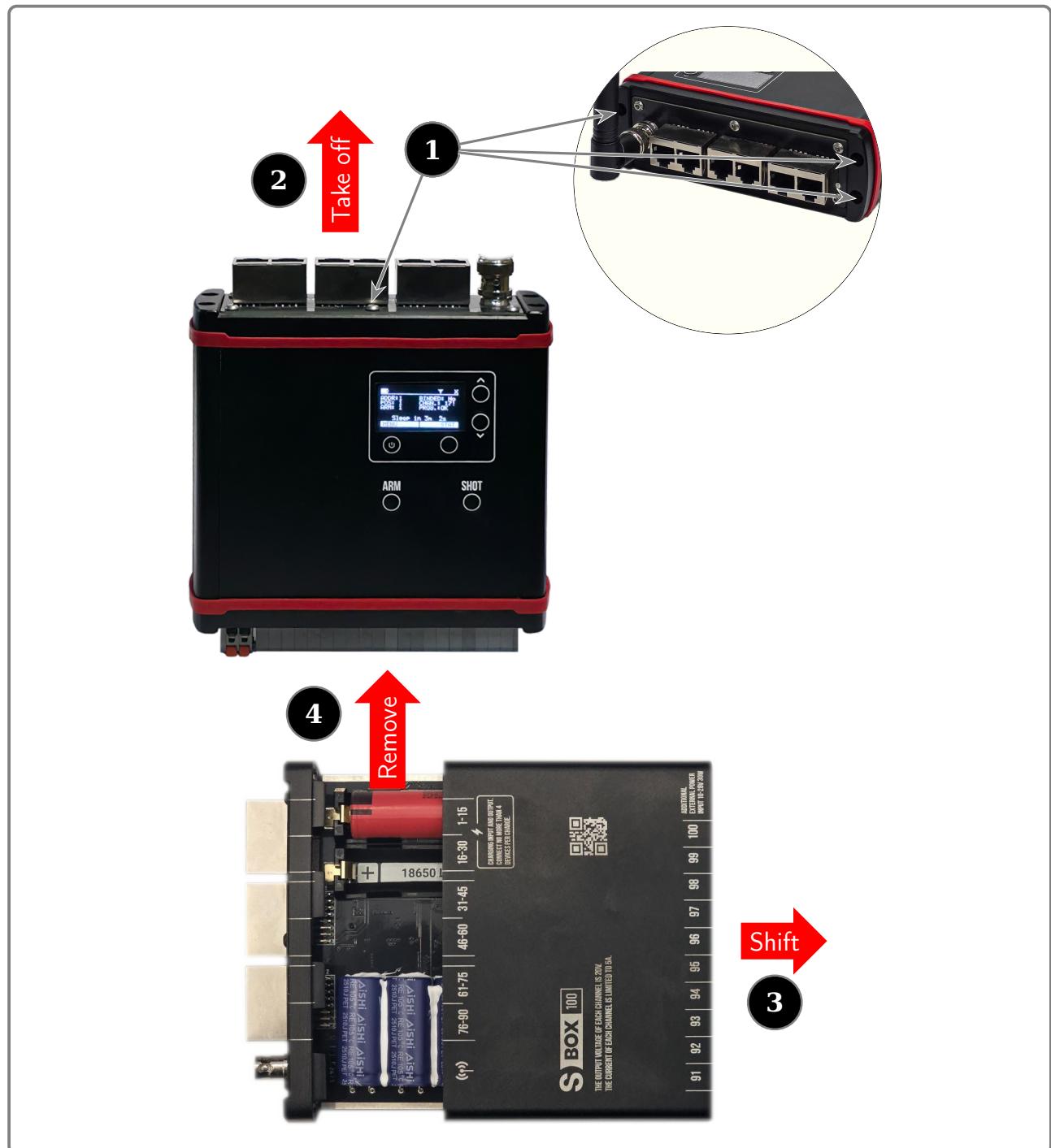
Figure 20: Removing the battery

10   Device Maintenance

10.1   DAILY CARE AND MAINTENANCE

After using the device and before placing it in its standard packaging, wipe the device with a dry cloth and remove any existing dirt.

Before packing, remove the antenna and disconnect cables and contact wires from the connectors.

Turn the device on and off by holding the power button to avoid the device being stored in SLEEP mode (sleep state).

Storing in sleep mode is not recommended to prevent battery discharge and premature failure.

10.2   BATTERY REPLACEMENT

When the battery's resource is depleted, its replacement is required. The replacement can be performed independently (see section 9.8 on page 87) or by contacting a service center.

10.3   SERVICE MAINTENANCE

The device does not require service maintenance except for software updates.

For software updates, it is recommended to contact a specialized service center.

The user can perform the update independently (It is necessary to first read the software update instructions).

> ⚠ **USEFULLY!**
>
> It is important to update the software on all devices simultaneously, as updates may introduce changes to the radio protocol, and devices with different firmware versions may become incompatible.

If a device malfunction occurs, contact the service center.

Transportation costs for shipping the device for repair and elimination of identified defects, as well as return delivery of the device to the customer, are borne by the customer (in both warranty and non-warranty cases).

11 Troubleshooting

If you encounter difficulties while operating this device, please review the table below. If the issue persists, turn off the device, disconnect the power cable, and seek assistance.

Table 2: Troubleshooting Table

Symptom	Possible Cause	Solution
The display does not light up when power is turned on.	The battery is discharged.	Connect the adapter and charge the device.
The device discharges quickly after a full charge.	The battery is faulty.	Replace the battery.
The device does not connect to the mobile application.	BLUETOOTH is disabled.	Enable BLUETOOTH and pair the device with the mobile application.
The device has stopped charging.	Faulty RJ45-USB-C adapter or incompatible power supply.	Change the adapter and try charging again.
The device has stopped charging.	Faulty ports or electronic board of the charging device.	Contact the service center.

12   Appendices

12.1 APPENDIX A (CHANNEL FREQUENCY TABLE)

Table 3: Device Channel Frequency Table

Channel No.	Frequency Mhz	Channel No.	Frequency Mhz
1	864.125	21	866.625
2	864.25	22	866.75
3	864.375	23	866.875
4	864.5	24	867
5	864.625	25	867.125
6	864.75	26	867.25
7	864.875	27	867.375
8	865	28	867.5
9	865.125	29	867.625
10	865.25	30	867.75
11	865.375	31	867.875
12	865.5	32	868
13	865.625	33	868.125
14	865.75	34	868.25
15	865.875	35	868.375
16	866	36	868.5
17	866.125	37	868.625
18	866.25	38	868.75
19	866.375	39	868.875
20	866.5	40	869

12.2 APPENDIX B (DEVICE MARKING)

Shot Control Management System

Model: SBOX-100
Output Power Voltage: 20 VDC
Radio Frequency Range: 864-869 MHz
Battery Capacity and Type: Li-Ion 2x18650 mAh
Dimensions: 154 mm × 140 mm × 48 mm
Country of Origin: Republic of Belarus
Manufacturer: Limited Liability Company "GlavEffect", 220049, Minsk, Volgogradskaya St., 13, office 213-61, Republic of Belarus.
Address of Product Manufacturing Activity: 223114, Minsk Region, Logoysky District, Alekshitsy village, Tsentralnaya St., 45, Republic of Belarus.
Date of Manufacture: 01.2025
Service Life: 5 years
Warranty Period: 2 years
Technical Specifications
TU BY 193792839.004-2025

13 Warranty Obligations

A warranty period of 24 (twenty-four) months from the date of purchase is provided for all products of the MainFX and SHOT CONTROL brands, purchased officially from the company (LLC "GlavEffect") LLC MainFX, in accordance with the terms outlined in this warranty.

The international MainFX warranty covers manufacturing defects existing at the time of purchase of the product.

The warranty becomes valid only if the warranty certificate is correctly and completely filled out, and if it bears the date and seal of an official MainFX dealer.

During the warranty period and upon presentation of a valid warranty certificate, you have the right to free-of-charge defect elimination (repair). If the restoration of the possibility to use your MainFX devices under normal conditions cannot be ensured through repair, MainFX guarantees their replacement with MainFX devices with similar or comparable characteristics.

Transportation costs for shipping the device for repair and elimination of identified defects, as well as return delivery, are borne by the customer (in both warranty and non-warranty cases).

The manufacturer's warranty does not cover:

• battery service life;

• natural wear and tear, aging (e.g., scratches on the glass/housing; color change);

• any damage to any parts of the products resulting from improper use, insufficient care, negligence, accident (impacts, dents, broken glass, etc.), incorrect use of the devices, and non-compliance with the operating instructions provided by MainFX.

14 Copyright and Privacy Policy

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The manual is supplied only as part of the documentation package upon purchase of the Shot Control System hardware and software complex.

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15 Technical Data Sheet of the Product

Hardware and software complex
for controlling external devices
via the SHOT CONTROL protocol

SBOX-100

15.1 GENERAL INFORMATION

Product Name: SBOX-100

Date of Manufacture:

Model: SBOX

Purpose: SBOX series devices are used for organizing programmable control of pyrotechnic and other special devices at pyrotechnic shows and concert programs. Also for use in the film and video industry.

Manufacturer: LLC "GlavEffect" (MainFX)

Official Website: https://mainfx.ru

Email: support@mainfx.ru

15.2 MAIN CHARACTERISTICS

No.	Characteristic	Value
1	Weight:	684 grams
2	Dimensions:	154 mm × 140 mm × 48 mm
3	Output Power Voltage:	20 VDC
4	Maximum Output Current	5 A
5	Radio Frequency Range:	864-869MHz
6	Temperature	
6.1	Operating:	-20 to +40 Celsius
6.2	Storage:	-30 to +50 Celsius

SHOT CONTROL SYSTEM

7	Relative Humidity (operating)	0-80%
8	Battery Capacity and Type:	Replaceable Li-ion 2x18650
9	Autonomous Operation Time in Active Mode:	48 hours
10	Standby Time in Sleep Mode	2 months
11	Housing Material:	Anodized Aluminum, black
12	Display Type:	OLED
13	Ingress Protection Rating:	IP64
14	Number of (Lines) Radio Channel Positions:	1000
15	Number of Channels in One Radio Channel Position:	10,000
16	Number of «Receivers» Connectable to SBOX-100 in «Controller» Mode	255
17	Maximum Range in Controller Mode (line of sight, ideal conditions)	up to 10 km
18	Service Life:	5 years

15.3 COMPONENTS

SBOX-100 Device – 1 pc

Antenna — 1 pc

RJ45-USB-C Adapter — 1 pc

User Manual – 1 copy

Product Data Sheet – 1 copy

Warranty Certificate – 1 copy

15.4 OPERATING CONDITIONS

Operation of the SBOX-100 product must be carried out in accordance with the following conditions:

Climatic Conditions: The device is intended for operation indoors or under a canopy at an ambient temperature from -20 °C to +40 °C and relative humidity up to 80

Power Supply: Only the standard charger recommended by the manufacturer, with output parameters of 20 VDC, should be used for operating the device. For autonomous operation, only batteries of the recommended type (replaceable Li-ion 2x18650) should be used, installed observing the correct polarity.

Radio Frequency Conditions: Operation of the device is permitted only with the connected proprietary antenna in the radio frequency range of 864-869 MHz. Using the device without an antenna or with antennas from other manufacturers is prohibited to avoid damage to the radio frequency path.

Physical Conditions: Operation of the device with visible mechanical damage to the housing, as well as disassembly or modification of the device, is prohibited. The device must be protected from dust and water splashes (protection class IP64). Storing and using the device near flammable substances is prohibited.

15.5 WARRANTY OBLIGATIONS

Warranty period – 24 months from the date of purchase. The warranty covers manufacturing defects provided that the rules of operation and storage are observed.

15.6 SERVICE RECORDS

Date	Type of Service	Performer	Signature

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info@mainfx.ru