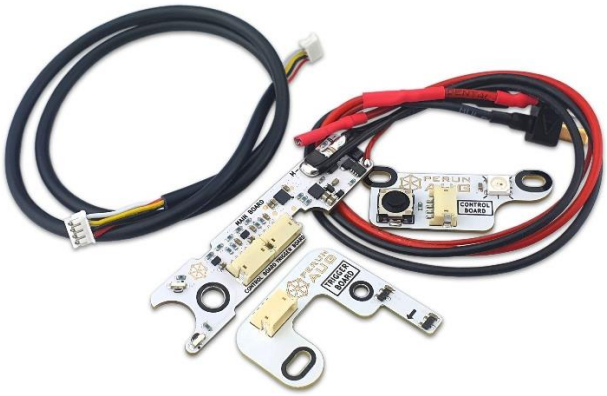
Perun for AUG

User and installation manual



Perun for AUG replaces mechanical contacts in your Steyr AUG replica and provides lots of useful features. Optical and magnetic sensors allow to eliminate many moving parts, which are prone to damage, thus increasing the reliability. The elasticity of this unit gives you certainty, that even a replica made from parts made by different manufacturers will not have any incompatibility issues. Adaptive trigger control allows switching from a very short trigger travel to a long one even out in the field, as well as fast firing in semiautomatic mode.

Reading this manual will help you fully exploit this unit's potential and in case of encountering any problems, you can look for solutions to them here.

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1. Technical data

Recommended power sources

Perun for AUG works with any power source that provides a voltage between 7 and 17 volts and can deliver enough current to ensure smooth cycling of the replica. Li-Po and Li-Ion batteries with a nominal voltage of 7.4, 11.1 or 14.8 volts are recommended. It is also advised to use batteries with possibly high „C" parameter and capacity. This is safer for the battery, as it should not be working on the edge of its capability. In this video, we are showing why:
https://www.youtube.com/watch?v=s8RKcIy810A

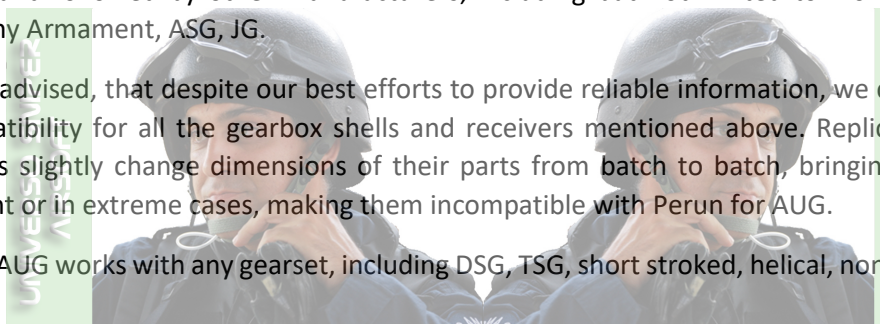
Capacity and the „C" parameter also influence the rate of fire of the replica:
https://www.youtube.com/watch?v=5hO25aPvHcU

Compatibility with high-ROF and high-power builds

Perun for AUG can work with any replicas, including highly tuned.

Compatible gearboxes, gears, and triggers

Perun for AUG works in AUG airsoft replicas made according to standard set out by Tokyo Marui company and followed by other manufacturers, including but not limited to: Tokyo Marui, Classic Army, Army Armament, ASG, JG.



Please be advised, that despite our best efforts to provide reliable information, we cannot guarantee full compatibility for all the gearbox shells and receivers mentioned above. Replica manufacturers sometimes slightly change dimensions of their parts from batch to batch, bringing need for some adjustment or in extreme cases, making them incompatible with Perun for AUG.

Perun for AUG works with any gearset, including DSG, TSG, short stroked, helical, non-helical, and with any ratio.

Electronic fuse

Perun for AUG has an integrated electronic fuse, which will automatically cut the power off in case of a short circuit or when a gearbox jam is detected. The fuse does not wear out when it is activated.

Battery connector type

Perun for AUG comes with an already soldered T-Plug connector (T-Deans).

Stand-by current consumption

Whenever the battery is connected, unit consumes 2 mA of current. While unnoticeable during normal play, it may deplete your battery completely and damage it, if you store the replica with battery connect for a week or more. Therefore, always remember to disconnect the battery after use.

Brushless motors

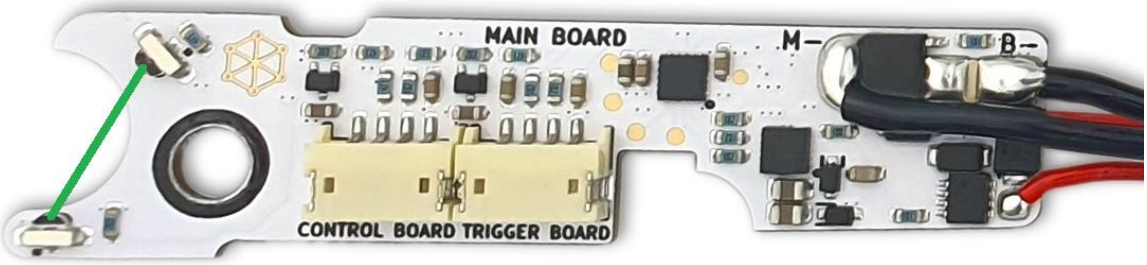
Perun for AUG works with BLDC motors like Option No. 1 or Warhead.

⚠ *RoF reduction feature must not be activated when these motors are used!*

2. How does it work?

Perun for AUG uses optical and magnetic sensors for the detection of sector gear and trigger. That provides great reliability and brings many useful features.

Sector gear detection



Sector gear phototransistor (sensor) and IR LED diode work in pair as a barrier switch. When sensor and diode cannot "see" each other, it means that the sector gear cut-off cam is between them. Perun AUG is using information whether the cam can be seen or not, to determine which gearbox cycle phase is currently taking place. Photo below shows the line between the sensor and the diode.

Trigger

Perun for AUG is provided with an additional external circuit board (trigger board) that is installed near the trigger and connected with a cable to the main board fastened to the gearbox. Hall-effect sensors on the trigger board are monitoring the magnetic field generated by the magnet in the magnet holder installed on the trigger. These readings are then conveyed to the microcontroller of the unit, which depending on the sensitivity setting and trigger position, may trigger a shot. The magnetic sensors are also able to detect, whether an external magnetic object is present near to the replica and in such case, will activate external magnetic field alarm to prevent an unintended shot.

The trigger bar that in stock AUG replicas is used to transmit the trigger movement to the gearbox is no longer needed.

Safety switch

Safety switch position is not directly detected by the mosfet. Safe mode is provided by the safety switch mechanically blocking the trigger.

Firing modes

AUG has no selector. Different firing modes are accessible by short or long trigger pulls, like in the original. Modes available under each kind of pull can be changed in the programming mode (more details in "Features and programming" section of the manual).

3. Installation

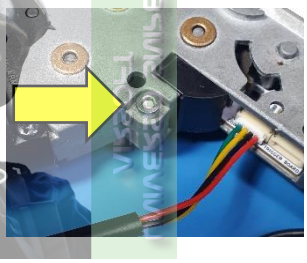
1. Remove the upper receiver, gearbox (temporarily), and the trigger bar (completely; shown on the photo below). The trigger bar is the link between the trigger and the gearbox shown on the photo below. To remove the trigger bar, the trigger assembly must be unscrewed and removed from the receiver. While doing that and disassembling the trigger, watch out for the spring-loaded plungers inside the trigger assembly, which can jump out and get lost.

2. Install the trigger board as shown on the photo to the right.
3. Install the magnet holder. Fasten it using the fastening screws, **but do not drive them too far, only enough to make the holder sit still on the trigger part**. Make sure, that the arrow on the magnet holder points exactly to the corresponding arrow on the trigger board.

⚠ *It is strongly recommended to not only rely on the screws, but also use cyanoacrylate glue to strengthen the connection between trigger part and the magnet holder, to make sure that it will not fall off due to vibration.*

4. Connect the longer signal wire to the trigger board and route it down to the gearbox compartment, as shown on the photo below.

5. Remove mechanical contacts with wiring from the gearbox.
6. Open the gearbox and main board in place. Make sure that it is held firmly by the screw and **does not wobble**. Do not worry about the PCB, as in the screw area there are no electronic paths, and you do not need to use any gaskets. Do not use excessive force, though. Assemble the gearbox and use 14 mm hex screw (included) instead of the original longer screw in place shown on the photo to the right.



7. Connect the motor. If your AUG has wires soldered directly to the motor, cut Perun's connectors out (leaving as much wire as possible) and solder wires directly to the motor.
8. Disconnect the main trigger board and leave the cable connected to the gearbox. Put the gearbox in the body, making sure that the wires are going towards the front.
9. Connect the cable to the control board.
10. Install the back plate and fasten the control board to it (as shown on the photo on the right). If stock screws are too short to reach to the thread due to the presence of the control board, use additional 12 mm hex screws that are included in the package.

11. Assemble the replica and make sure everything works correctly.

4. Trigger calibration

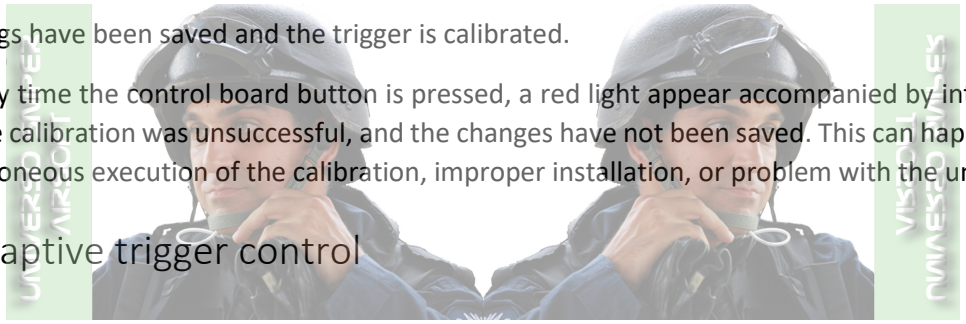
Trigger calibration is mandatory because it ensures proper functioning of the "SAFE" mode. However, if done successfully, it will also ensure that first and second trigger stages can only be accessed according to current selector position. This means, that no shots can be taken with the selector on "SAFE" and that second stage is not available with selector on "SEMI", regardless of current sensitivity settings for each trigger stage.

Trigger calibration is performed the following way:

1. Enter the programming mode.
2. Go to “Trigger calibration” feature (LED blinking violet and blue alternatively).
3. Pull and hold the trigger for a few seconds to start trigger calibration. The LED should be emitting white, blinking light now.
4. Switch the selector to “SAFE”.
5. Pull the trigger **very hard and hold it**. It is necessary, because it tells the unit how far the trigger can travel when the selector is on “SAFE”. Should the trigger ever be accidentally pulled when on “SAFE”, the unit will take the slack in the safety mechanism into consideration and will not allow a shot to be fired on “SAFE”.
6. **While still holding the trigger and applying force to it**, press the button on the control board. There should be a beep and the LED color should change to blue.
7. Release the trigger.
8. Switch the selector to “FIRE”.
9. Pull the trigger and stop on the second stage trigger break. Hold the trigger there.
10. Press the button on the control board. There should be a beep and the LED color should change to red.
11. Release the trigger.
12. Pull the trigger all the way and hold it.
13. Press the button on the control board.
14. Then there should be a long beep and the LED should shine green for a couple of seconds.

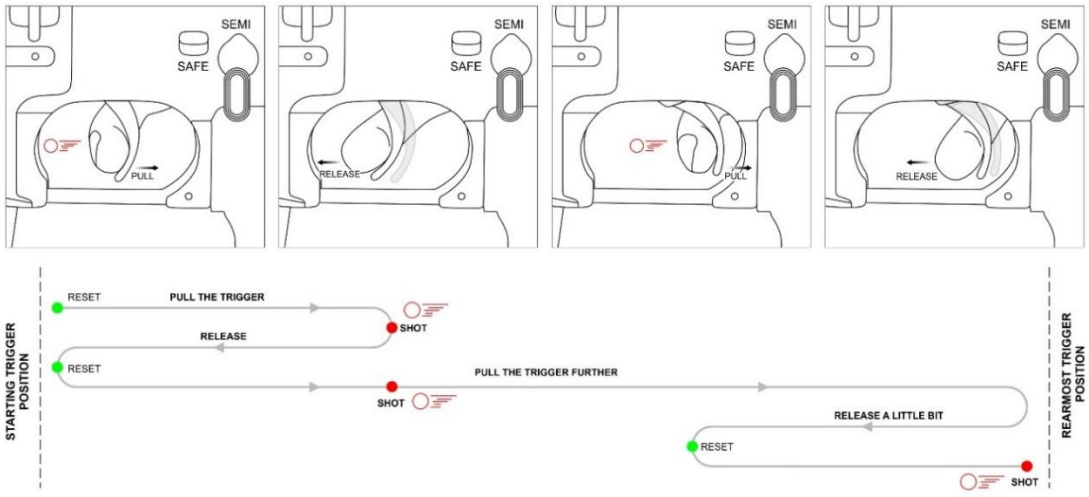
The settings have been saved and the trigger is calibrated.

Should any time the control board button is pressed, a red light appear accompanied by intermittent beeps, the calibration was unsuccessful, and the changes have not been saved. This can happen either due to erroneous execution of the calibration, improper installation, or problem with the unit itself.



5. Adaptive trigger control

Each time the battery is connected, Perun senses the trigger resting position and uses it as a reference (therefore, make sure to never pull the trigger during startup). Depending on the current trigger sensitivity setting, Perun will automatically fire after the trigger has traveled a long enough distance. This allows very short trigger pulls with no trigger modification needed whatsoever and the trigger sensitivity changes possible even in the field. When in semi-only mode, Perun for AUG uses a progressive trigger activation method. This means that the trigger threshold and reset points are mobile and move together with the trigger, as shown on the sketch below:



6. Features and programming

To enter the programming mode, press the button on the control board 2 times. First push activates the button, which is signaled by LED starting to glow green. Quick second push shortly after the first leads to the programming mode. Successful entry into the programming mode will be confirmed by a sound signal and LED glowing green.

Pressing the button will switch the modes, while pulling the trigger allows to enable, disable, or set levels for the modes.

Full feature description

<table>
<tr><th>Function and LED color</th><th>Description</th></tr>
<tr><td>Firing mode
Green</td><td>Choose firing mode combinations: semi, binary, semi-auto, semi-burst and burst-auto. 1st stage is the firing mode activated after a short trigger pull. 2nd stage can be reached by pulling the trigger further and that should only be possible with selector set to “AUTO”.

<table>
<tr><th>Mode</th><th>1st stage</th><th>2nd stage</th><th>Signal</th></tr>
<tr><td>Semi</td><td>Semi</td><td>-</td><td>1 short single signal and blink</td></tr>
<tr><td>Binary</td><td>Binary</td><td>-</td><td>2 long signals and blinks</td></tr>
<tr><td>Semi-auto</td><td>Semi</td><td>Auto</td><td>1 short and 1 long signals and blinks</td></tr>
<tr><td>Semi-burst</td><td>Semi</td><td>Burst</td><td>1 short and later 3 short signals and blinks</td></tr>
<tr><td>Burst-auto</td><td>Burst</td><td>Auto</td><td>3 short and later 1 long signal and blink</td></tr>
</table></td></tr>
<tr><td>Burst count
Green and white blinking alternately</td><td>Define number of shots in a burst.

2-5 short signals and blinks – 2-5 round burst</td></tr>
<tr><td>AB
Blue</td><td>Active brake (AB) stops the motor after the shot, preventing the spring from remaining in a compressed state and eliminates double shots on semi in replicas with high rate of fire (“overspin”). 5 levels of braking strength are available – from 1 (weakest braking) to 5 (the strongest). Braking can be also completely disabled. It is advised not to use braking or use it on the lowest level, if stronger braking is not necessary, as it negatively impacts the service life of motor brushes and causes increased heating.
Tip: Switch to semi, fire a single shot, and hold the trigger after the shot. This will cause a second single shot with strongest AB setting to be fired after 3 seconds, making sure the spring remains uncompressed. It is advised to do that when you finish shooting.

⚠ While precocking is on, the AB setting becomes irrelevant. However, any programmed AB setting will be stored in memory and will become effective as soon as precocking is disabled.

No sound signal while LED glows blue means, that the active brake is disabled. 1 to 5 signals indicate braking levels from 1 (the weakest) to 5 (the strongest).</td></tr>
</table>

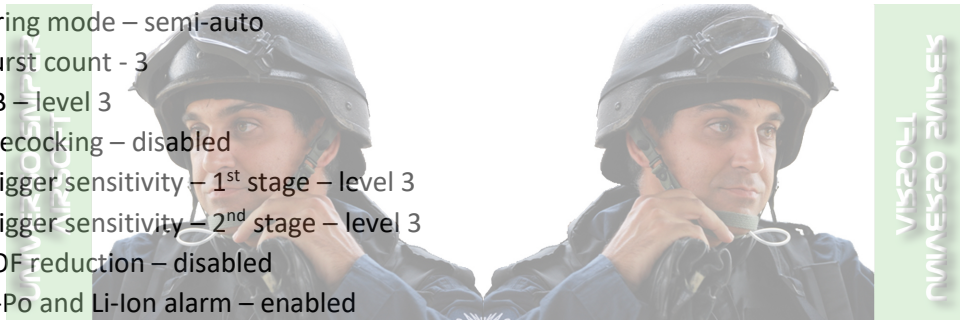
Function and LED color	Description
Precocking Yellow	When shooting on semi, precocking keeps the piston in the rear position, ready for the shot. This decreases the time between pulling the trigger and the actual shot, increasing realism, and giving advantage in CQB fights. Correct precocking level must be set individually to each replica and according to user preferences. Precocking power is automatically adjusted to battery voltage and semi or automatic shots. ***Tip:*** *To release the spring after using precocking, switch to semi, fire a single shot, and hold the trigger after the shot. This will cause a second single shot with the strongest active brake setting to be fired after 3 seconds, making sure the spring remains uncompressed. It is advised to do that when you finish shooting.* No sound signal while LED glows yellow means, that the precocking is disabled. 1 to 8 signals indicate precocking levels from 1 (the weakest) to 8 (the strongest).
Trigger sensitivity – 1st stage Violet and yellow blinking alternately	This parameter decides how sensitive is the 1st stage of the trigger. For instance, when semi-auto firing mode combination is enabled, this parameter decides how much trigger travel is needed to fire on semi. 5 sensitivity levels are available. ⚠ ***Since Perun for AUG depends on the mechanical trigger lock, make sure that when using highest sensitivity settings, pulling the trigger with selector on "SAFE" will not result in a shot! If it does, trigger calibration must be performed.*** 1 to 5 signals while the LED blinks violet and yellow alternately indicate sensitivity levels from 1 (the lowest) to 5 (the highest).
Trigger sensitivity – 2nd stage Violet and red blinking alternately	This parameter decides how sensitive is the 2nd stage of the trigger. For instance, when semi-auto firing mode combination is enabled, this parameter decides how much trigger travel is needed to fire on auto. 5 sensitivity levels are available. ***Tip:*** *Choose such trigger sensitivity for the 2nd stage, so that it can only be activated when the selector is set to "AUTO".* 1 to 5 signals while the LED blinks violet and yellow alternately indicate sensitivity levels from 1 (the lowest) to 5 (the highest).
ROF reduction White	This function allows to lower the rate of automatic fire. 5 reduction levels are available: 1 – 6% 2 – 12% 3 – 18% 4 – 24% 5 – 30% ⚠ *Those are approximate values and may vary depending on replica configuration.* ⚠ *Semi-automatic shots and the first shot in burst are always fired without any power reduction to retain good trigger response.* No sound signal while LED glows white means, that the ROF reduction is disabled. 1 to 5 signals indicate reduction levels from 1 (the smallest) to 5 (the greatest).
Li-Po and Li-Ion alarm Teal	Li-Po and Li-Ion alarm informs the user that battery voltage has fallen below 3.7 V per cell, at which the battery should not be further used and must be recharged. Unit automatically detects number of cells in the battery and determines safe voltage range. The need for battery replacement is signaled by short sound signals every 30s. Disable this function if you are using batteries other than Li-Po or Li-Ion. No sound signal while the LED glows white means, that the alarm is disabled. 1 signal indicates activation of the alarm.

Function and LED color	Description
DSG Green and blue blinking alternately	This function can be enabled when dual sector gear is used, to provide better precocking control. No sound signal while LED glows green and blue alternately means, that DSG is disabled. 1 signal indicates activation of the DSG mode.
Trigger calibration Violet and blue blinking alternately	More details in section 4. of the manual - “Trigger calibration”.
Master reset Red	Master reset returns the unit to the factory settings. To reset, pull and hold the trigger for 2 seconds or simply wait 10 seconds while the LED glows red and until the reset takes place without using the trigger. A long sound signal confirms return to factory settings.

7. Factory settings

New units and units where master reset was activated will have modes set in a following way:

- Firing mode – semi-auto
- Burst count - 3
- AB – level 3
- Precocking – disabled
- Trigger sensitivity – 1st stage – level 3
- Trigger sensitivity – 2nd stage – level 3
- ROF reduction – disabled
- Li-Po and Li-Ion alarm – enabled
- DSG - disabled



8. Diagnostic system

Perun for AUG has a diagnostic system that will help you find the source, should you encounter a problem. After the battery is connected, the unit undergoes a start-up check, to make sure replica is ready to work. Successful completion of this check is indicated by a short green blink of the LED.

Problem and LED color	Description
Disconnected motor/Diagnostic mode Yellow, blinking	This not only provides information about the disconnection of the motor, but it is also a diagnostic mode for the trigger and sector gear sensors, as well as button on the control board. With the motor disconnected, engaging the switches will cause the LED to glow purple (trigger), green (sector gear), or white (button) for a moment. This can be used for troubleshooting problems with the switchboard in the gearbox. Reconnecting the motor will restore normal function. ⚠ *Motor check only takes place at start-up. A disconnection after the start-up will not be signaled!*

Problem and LED color	Description
Fuse activation Red, continuous, or blinking	Activation of the fuse with a distinction between a short circuit (continuous red) and gearbox jam (blinking red). In some situations, this distinction may not be correct, for instance, a gearbox jam may be incorrectly read as a short circuit and vice versa. Electronic fuse might as well be activated by parts combination, which draws too much current (e.g., high speed motor and gears). The unit will start functioning normally after the battery is reconnected unless there still is a short circuit that will be detected at the next start-up.
Gearbox cycle detection failure Yellow and green blinking alternately	The unit did not receive information about cycle end from the sector gear switch and stopped firing only after safety time limit was exceeded. Check whether the gears or the sensors are not damaged and whether the sensors are properly engaged by the gears.
Unit temperature is too high Yellow and white blinking alternately	Too high temperature of the unit (main board) was detected. It will not function again until it cools down, after which it will operate normally.
Battery with too low voltage is connected Yellow and teal blinking alternately	Battery with voltage below 7 V is connected. Change the battery to one with voltage between 7 V and 17 V.
Battery with too high voltage is connected Red and teal blinking alternately	⚠ **Battery with voltage over 17 V is connected. The battery must be immediately disconnected, as it can cause permanent damage!** Change the battery to one with voltage between 7 V and 17 V.
An external magnetic field was detected Red and violet blinking alternately	External magnetic field (originating not from the trigger magnet) was detected by the trigger sensors. The unit will be blocked until the source of the magnetic field is not removed.
Main transistor or driver damage Red and yellow blinking alternately	The main transistor or driver is damaged. The unit needs to be sent back for repair.
Battery voltage sensing malfunction Red and white blinking alternately	The battery detection system is malfunctioning. The unit needs to be sent back for repair.

Other known problems:

Problem	Cause	Solution
Replica fires a 2-round burst in semi-auto mode.	Motor and battery are too strong for the main spring, which causes an overspin.	Enable AB or precocking.
	Too high precocking level	Set precocking to a lower level.
	Trigger mechanism malfunction.	Check the cut-off lever and contacts, replace if needed.
Replica does not shoot; the unit does not emit any light or sound.	Incompatible T-Deans battery connector.	T-deans plugs and sockets from various manufacturers may sometimes not work together reliably. Although the plug may seem to fit the socket nicely, the conductive surfaces may not contact each other, cutting the power off. In that case try with another battery, most preferably with a T-deans socket made by different manufacturer.
Battery and/or the motor heat up very much.	The battery has too low capacity (mAh) and/or "C" parameter.	Use a battery with higher capacity and/or "C" parameter.
	The motor is too weak.	Use a stronger motor, possibly with neodymium magnets.
	Increased motor load caused by an excessive friction, for example caused by: - improper shimming, - motor positioned askew in the pistol grip.	Remove the cause of the friction.
	The motor/gear ratio/spring combination draws too much current (for instance – high speed motor, high speed gears and M120 spring).	Change the replica configuration by using a softer spring, gears with higher ratio (lower speed, higher torque) or motor with higher TPA number (or lower revolution speed).
When trying to shoot, replica remains silent or shortly vibrates, after which green LED appears and one beep is heard	A gearbox jam or a short-circuit is present but because of low battery power or bad connection with the battery, the unit resets due to voltage drop instead of the electronic fuse properly activating.	Remove the reason of the gearbox jam or short-circuit.
	The build is too power demanding for the battery use and the unit resets due to voltage drop.	Use a higher-powered battery.
External magnetic field error appears, despite no external magnet being close to the replica	Trigger was being held at startup.	Reconnect the battery and do not hold the trigger during the startup.
	The trigger has too much slack and can move sideways, which can activate the error.	Shim the trigger so that it cannot move sideways, only back on forth.
	The triggers movement is obstructed and when it is released, it may end up in slightly different positions. If at some moment the trigger will move further back than it was at startup, this can activate the error.	Make sure the trigger can move freely and completely unobstructed.
		Use stronger trigger spring.

When RoF reduction is enabled, electronic fuse activates, or the replica just does not shoot	The RoF reduction is too great, and the motor is not able to cycle the gearbox.	Reduce RoF reduction or disable it completely.
Motor beeps from time to time	Li-Po alarm has activated.	Replace the battery (if you are not using a Li-Po or Li-Ion, disable the Li-Po alarm).

In case of any technical questions, please contact us at: info@perunairsoft.pl

9. Sensor check

You can easily check the sensor readings by disconnecting the motor. When Perun for AUG is connected to the battery, but disconnected from the motor, it informs about this by yellow, flashing light. If during that flashing a properly working and connected switch will be closed, the unit will signal that by changing the LED color for a moment.

⚠ *To enter this mode, the motor must be disconnected first, only then connect the battery!*
⚠ *After you enter the sensor check mode, it will be active for 5 minutes, after which the unit will shut down. To restart it, simply reconnect the battery.*

LED color	Switch
Disconnected motor / Sensor check Yellow, blinking	None of the sensors detects any change at this moment.
Button on the control board White	This should happen after button on the control board is pressed.
Trigger Violet	Trigger pull detected.
Sector gear Green	Sector gear movement detected.

Checking the trigger sensor can be done by simply pulling the trigger. To check the sector gear sensor, it is best to open the gearbox and remove everything out of it, except for the sector gear. Then spin the sector gear by hand and see, whether the color of the light changes to green.