INSTALLATION MANUAL

FOR TOKYO MARUI NGRS

Leviathan - NGRS parameters

- It is processor controlled mosfet with wireless communication.
- Device parameters is changed with smartphone via application (Android and iOS).
- Device is fully integrated inside the gearbox instead of the original trigger contacts.
- It can be fitted into these Tokyo Marui Next Generation guns: M4, SCAR, HK416, HK417.
- It has wires to stock (loose end), mini 40A fuse and deanT to solder after gun assembly.
- It adds new shooting modes, controls RoF, pre-cocking, active braking, virtual magazine, input and output ports, electronic fuse, low battery indication, statistics...
- Usable for battery with max. 17 volts (max. lipol 4S 14,8V).

Safety warning

- Installation of this device into the gearbox requires advanced technician skills!
- Please read these informations before installing your device to prevent any damage.
- Short circuit or incorrectly connected battery will cause immediate damage to the device which is not covered by the warranty. It can lead to fire or even battery explosion.
- Disconnect battery, when you aren't using the gun! Otherwise you will fully discharge the battery. Because the device drains small amount of current from it all the time.
- Don't connect battery when gun pointing towards you, another person or an animal.
- Don't modify, repair, put into any kind of liquids or thermal shock the Leviathan.

Package contents

- Leviathan-NGRS drop-in module with wiring
- 2x screw and pads to secure it in the gearbox
- 2x Foams to keep device in the place
- Sheet with selector plate stikers
- 40A fuse, 2x faston, T-Plug, red wire, heat-shrinks to finish wiring at the battery end
- Leviathan black 40mm round sticker
   - Installation manual

Device overview
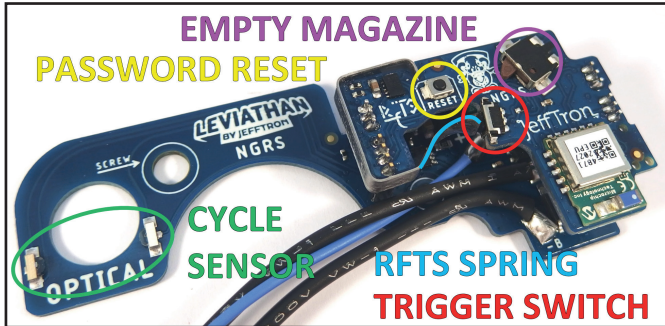
- Tactile trigger micro switch is in the red circle, button travel is only 0.13mm.
- RFTS = Real Feel Trigger System was made by professional gunsmith for more realistic feel from shooting. This spring simulates trigger resistance. You can bend its end to change resistance.
- Pink micro switch detects empty magazine.
- Optical sensor for the sector gear is in the green circle, it detects gear cam movement.
- Yellow reset button hold for 2s, password is reset to **1234** after vibration from motor (settings are reset too).
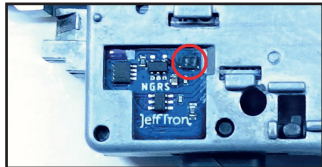

Optical sensor is for detection SAFE, SEMI and AUTO position. It is shown in the red circle. For its function is neccessary to place sticker on the selector plate.

External ports
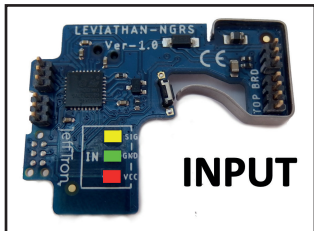
Input terminal

- Leviathan has 3 pads for connecting external button, virtual reload or sensor.
- **3,1V** is in the **red area** (for sensor only).
- **Signal** is in the **yellow area**.
- **Negative** pole is in the **green area**.
- External button connects on SIG and GND pad (doesn't matter on polarity).
- In the app use interface „External input" to activate desired function.
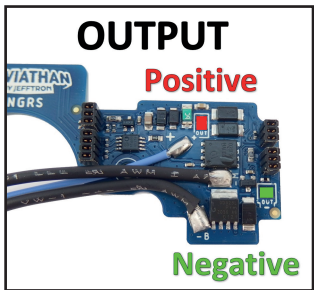

Output terminal

- Leviathan has 2 pads on the board for powering hop-up LED illumination, flashlight, laser, magazine motor etc.
- On the **Positive** pad is battery voltage (in the **red area**).
- **Negative** pad from the motor is in the **green area**, the power is fully driven throuht the Leviathan microprocessor.
- In the app use interface „External output" to activate desired function.
- Some input functions activates output terminal even on OFF status.

> **WARNING**: Installation requires advanced soldering skills! Wires can't touch other pads and components on the board. Damage to the Leviathan will void the warranty!

Insertion procedure of Leviathan-NGRS into the gearbox

1. Remove and open the gearbox according to the normal gun disassembly procedure.
2. Take out all the internals from the gearbox and clean the vaseline, oils after them.
3. Check the gearbox for edges. Grind for smooth surface to prevent Leviathan damage.
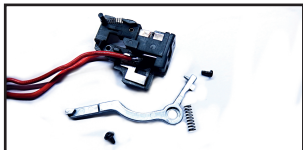
**4.** Take out these parts out of the gearbox (not used with the Leviathan).
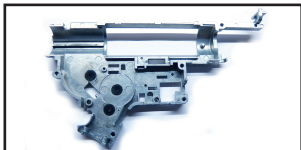
**5.** Remove other internals from gearbox. Prepaired gearbox for installation.

Gearbox shell modification

Stock gearbox modificaion is necessary to fit Leviathan wiring without damaging them - see pictures 6 and 7.

Please **skip this part**, if you already bought **CNC gearbox from Retroarms**, because it has enough room for the wiring.
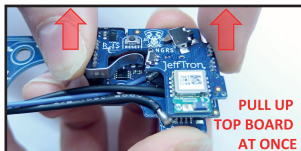

GRIND 2 PINS
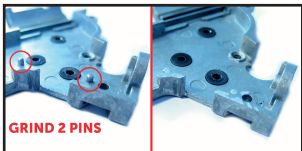
6. Grind these 2 pins to flat, it is necessary to fit wiring inside the gearbox.

GRIND THIS AREA
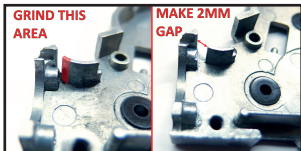
MAKE 2MM GAP

7. Make 2mm gap into the red area to insert wiring through this gap.

4

7. Keep in place transparent foil, it prevents from short circuit through gearbox.
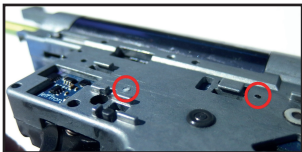

8. Unplug Leviathan top board from the bottom - all jumpers at one time.

9. Insert the Leviathan-NGRS instead of the original contacts:
- Check if the Leviathan-NGRS is laid flat on the gearbox shell.
- Adjust the Leviathan position to the same distance from sector gear bearing (red circle).
    - Use screws with washers from package and screw device to gearbox (white circles).
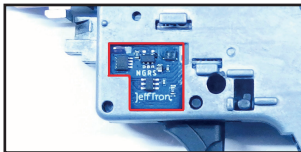
10. Make sure the screws doesn't stick outside of the gearbox. If yes grind it.

KEEP CLEAR

12. Place wires in order: blue, -battery, -motor. Keep clear green hole for pin.

14. Overall view to the wiring in gearbox.

11. Check if there are any parts contact with the gearbox around the red area.

STICK WIRES ON THE WALL
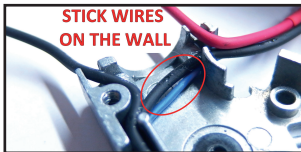
13. Wires under motor have to stick on the wall. You can use hot glue to fix their position in the gearbox.

15. Stick 2 foams to the right gearbox shell according this image (foams are included in the package).
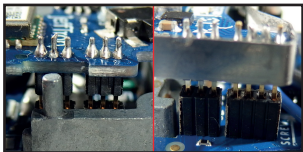
16. Carefully plug top board into the bottom. Watch for right jumpers position otherwise Leviathan could be damaged.
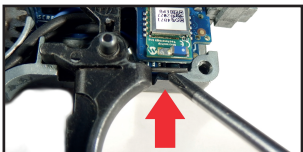

17. Carefully insert the trigger into the gearbox. Trigger spring has to be outside the gearbox.

18. Push the trigger spring into the gearbox by screwdriver or pliers.
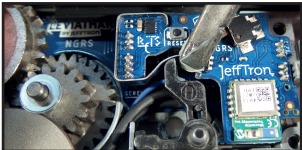
19. Lube the top part of the trigger by small amount of vaseline (for RFTS).

Gear cam
Screw
Sector gear washers
Optical sensor detection

20. Check sector gear height, it can't touch the optical sensor or screw.

21. Insert the remaining parts into the gearbox. Put together the gearbox shell. Check if it fits perfectly together.

22. Assemble empty magazine detection system and check its right interaction with micro switch.

23. Take out one of 12 stickers by pliers.
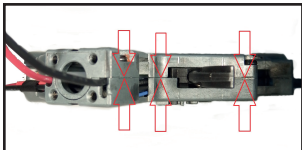**Do not touch the sticker by hand!**

Selector plate stickers
Leviathan - NGRS optical

LEVIATHAN
BY JEFFTRON
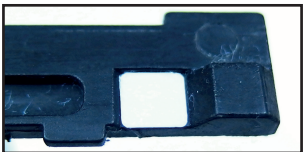
24. Clean selector plate by degreaser and place sticker the to the white area.

TRIGGER
MECHANICAL
LOCKING REMOVAL

25. If you want functions on SAFE position, cut the selector plate in red area.
Mechanical locking will be disabled.
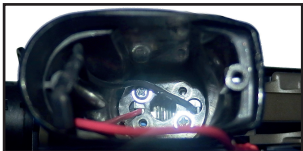
26. Black wire bends back at the bottom and lead both wires back.
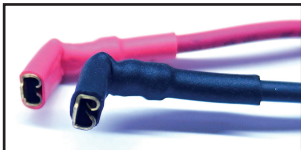
27. Bend both motor connectors exactly like on the picture.
Do not bend it to the other site!
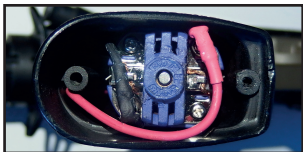
28. Connect the black wire first. Keep in mind right motor polarity.
Motor has opposite position now.
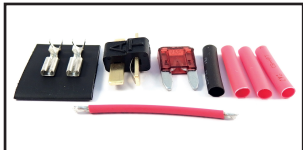
30. Also you can use this Leviathan set for T-plug connector.

32. Use lighter or hot air gun to shrink tube around the spade connectors and connect both of them to the fuse.

29. If you want to use original battery connector, cut wires in this place and solder them to the connector.
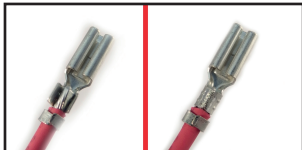
31. Squeeze faston connector around red wires with pliers and solder them.

33. Shrink large tube around the fuse and wires. Solder black and red wire to the T-Plug connector.

Sensors configuration and testing

1. Install „**Leviathan by JeffTron**" app from App store (iOS) or Google play (Android) into your smartphone.
Or use link **https://www.jefftron.net/application** (QR code).

| 🔫 | **Leviathan**
04:91:62:A9:6D:0F | **Connect** |

2. Connect the battery to the Leviathan and pair it with your smartphone.

Gun password

password
1234   👁

4/4

☐ Remember password

Cancel   **OK**

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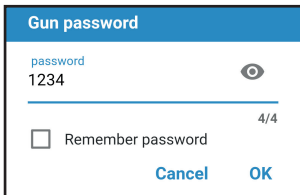
3. Use default password „**1234**".
You can save it by checking the box "Remember password.

Change device password

Do you want to change default gun password now?

No   **Yes**

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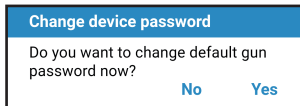
4. Change password to your own 4 digit.

Change device password

Old password   👁̸

0/4

New password   👁̸

0/4

Confirm new password   👁̸

0/4

Cancel   **Save**

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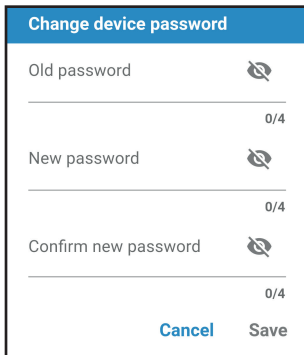
5. Set 2x new password and push SAVE.
Don't tell the password to anybody!

If you **forgot your password**, restore it by holding RESET button for 2s - see page 2. Battery has to be connected.

Optical selector calibration
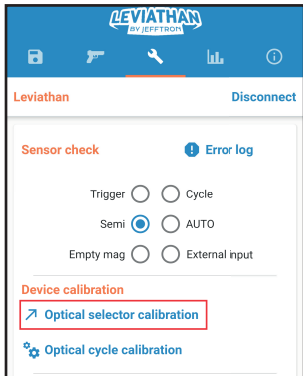
6. Tap on „Optical selector calibration".

Move selector to Auto and press finish.	
Selector on SAFE:	21%
Selector on SEMI:	61%
Selector on AUTO:	91%

8. At the end every selector position has to end in the green color. **If not, go to the page 13 to solve the problem.**

Optical calibration process is for setting your selector on gun (safe, semi, auto).
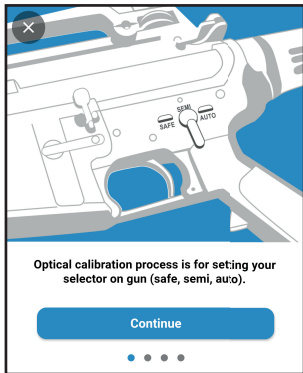
Continue

7. Follow instructions in the calibration. Move the selector plate to Safe, its value should be in range 6% - 30% and press continue.
Move selector to Semi (range 40%-70%) and press continue.
Move selector to Auto (range 80%-99%) and press finish.
Try right Semi and Auto responses in the „Sensor check" function. Blue is ON. SAFE is when Semi and Auto is inactive.

Optical cycle calibration
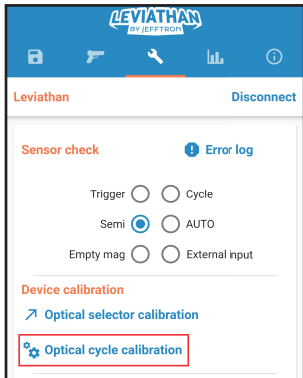
9. Tap on „Optical cycle calibration".

Optical calibration process is for setting your gun cycle detection. For that you have to make shot to spin cycle gear.

1 Unload and check your gun and point it to the safe area.

2 Pull the trigger to make shot to continue calibration process.

10. Follow instructions in the calibration. **Make sure no BBs are in the gun!**
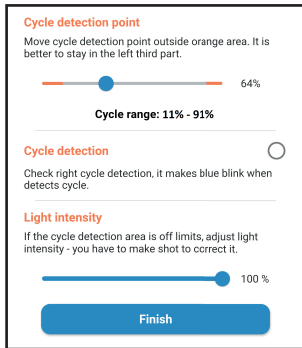
11. After the shot, this page appears.

Cycle detection point determines when it detects cycle. Higher value detects cycle little bit sooner.

Cycle range shows optical sensor reading for spinning sector gear. Ideal range is 10% - 90%. It perfectly works even with range difference only 20%.

Cycle detection blinks when sensor detects sector gear complete cycle.

Light intensity will lower cycle range if is too high. Then shoot again.

Sensor troubleshooting

Move selector to Auto and press finish.	
Selector on SAFE:	6%
Selector on SEMI:	58%
Selector on AUTO:	60%

12. If cycle range has **too high values**, move sensor slightly higher to be closer to the sector gear.

If cycle range has **too low values**, move sensor slightly lower to be further from the sector gear or clean the sensor.

For that operates with screw in red circle.

13. If any selector position ends in the red color, its value is too close to another one, so the position won't be set right.

This could be caused by wrong sticker position or dirt on selector plate or sensor.

It is also possible you didn't change selector position during calibration process.

First time shooting

1. Connect battery, after 1s you will feel a short vibration - power-up self-test is complete.

2. Put the gun into SAFE-nothing happen on trigger pull (if was done selector plate mode).

3. Put the gun into SEMI and it will fire once.

4. Put the gun into AUTO and pull the trigger shortly. Gun should fire a burst of 3 rounds. If you held down the trigger longer the gun will go to auto fire.

5. If everything works as described, congratulations for the correct installation the Leviathan. If not, check what is written in the error log and the **20-22 pages in this manual**

6. Pair phone with Leviathan and update firmware to the newest version.

Keep your app and firmware always up to date!

> **WARNING:** Disconnect the battery, when the gun is not in use! Leviathan drains small amount of current from the battery all the time so it will overdischarge the battery.

Change parameters page 1/3

Orange stripe = not paired, **green stripe** = paired
Paired = loads parameters from Leviathan.

Change parameter -> shows „**writting...**„ in the green stripe. **Text dissapear ->** parameter is saved

Fire modes with **Selector on safe/semi/auto**:
- **SAFE**: no responding to the trigger pull.
- **Semi**: it fires single shot per trigger pull.
- **Semi/BurstX**: short trigger pull fires single shot, long trigger pull fires burst.
- **Binary trigger**: fire semi when trigger is pulled and semi again when it is released in less than 3s.
- **BurstX**: gun shoot burst per trigger pull.
- **BurstX+BurstY**: short trigger pull fire burstX, long trigger pull fire burstX plus burstY bullets.
- **BurstX/Full**: short trigger press fires burstX, long trigger press makes auto fire.
- **Full**: gun makes auto fire until trigger is released.
- **Virtual reload:** pull trigger to reload virtual mag.

Burst functions:
It enables you to shoot a set number of BBs on one trigger pull. It will always complete the burst. Every selector has its own burst settings.

Rate of fire:
It is useful for solving problems with too high gun RoF. This function makes breaks between shots to reduce RoF. It gives you fast trigger response even with very low rate of fire, just like in a real gun.

Active Brake:
It uses the excess energy from the motor to stop it. Spring is fully released, parts in gearbox aren't under strain. Higher braking is for weapons with high RoF. Braking effect is more powerful with torque motor.
Note: Lower braking intensity spares the motor coils.

Pre-cocking:
The piston is partly compressed after SEMI fire. There isn't almost any delay between trigger pull and shot. Recommended compression is about 65%. Holding the trigger for 3 seconds, gun shots again with de-cocked piston - use it for storing the gun after game.
WARNING: it increases wear and tear on the gearbox.

Delay between shots:
It is for simulation the delay from gun reload or recoil. During delay gun can't shoot. After dealy gun vibrates shortly to notify the gun is ready for shooting.

Electronic fuse:
Set sensitivity for high current detection to avoid any damage if something goes wrong. We recommend to set 10A above average auto current reading from the statistics.

Low Battery Indication:
It is used for only Li-xx batteries. Choose right battery type or it will not work properly.
When is the low battery voltage detected, gun vibrates after each shot. Now it is good time to replace the battery at the nearest opportunity.
When the battery is discharged the gun vibrates instead of firing for battery protection.
WARNING: Leviathan drains small amount of current from the battery all the time!
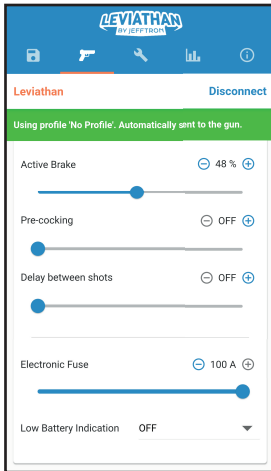
Change parameters page 3/3

External input - *see manual at page 3:*

- OFF: Every signal to Input terminal is ignored.

- External trigger: gun trigger is disabled and replaced by micro switch connected to Input (SIG and GND)

- Burst-3 trigger: switch on SIG and GND makes 3 burst fire when it is pressed. Gun trigger is functional.

- AUG trigger: selector plate detection is disabled. Gun trigger is set to selector on semi. Micro switch connected to Input (SIG, GND) is set to selector on auto.

- Empty mag (NO): Micro switch activates empty magazine detection, when is connected SIG with GND.

- Empty mag (NC): Micro switch activates empty magazine detection, when is disconnected SIG with GND.

- Virtual reload: Micro switch activates virtual magazine reload, when is connected SIG with GND.

External output - *see manual at page 3:*

- OFF: it works only if the Input terminal activates it.

- Motor: it is ON with gun motor + with IN activation.

- Motor + Xs: it is ON with gun motor with time delay after gun motor is deactivated + with IN activation.

- Always on: the output is constantly activated.

Virtual magazine:
Value sets number of shots (70bb here). Gun will stop shooting when virtual mag. reach 0.

Near empty magazine - makes 2 short beeps after each shot before virtual mag. is empty.

Reload delay - is time when gun can't shoot after empty mag. or it is triggered by „Virtual reload" (through *input port* - set as fire mode or *change selector position* - there and back)

Save or Save as: You can save these parameters under custom name into your app.

FACTORY RESET: It restores parameters to factory state (password is unchanged).

Error log: shows errors made during the device life. Total shot counter value is saved when error happen. Error expansion shows possible solution.
Bin at top corner will reset all errors.
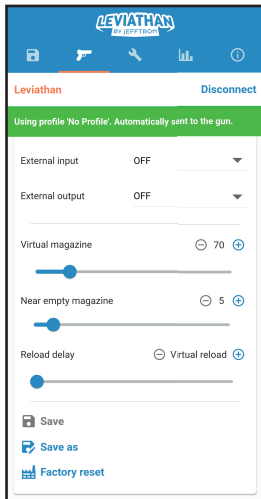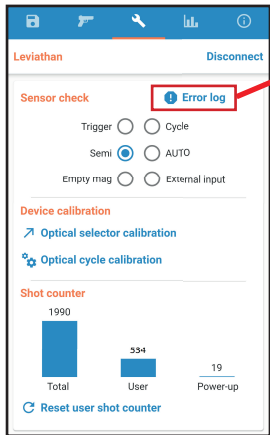
Sensor check:
Shows how the sensors respond. Grey color is OFF, blue is ON. Sensors are displayed on page 2. With selector on Safe are Semi and Auto detected as OFF.

Shot counter: records full gear spin
Total - count every shot during lifetime
User - can be reset by user anytime
    Power-up - battery connection reset it

Profiles: At this page are saved profiles. „Select" will upload settings to device.

Statistics

Rate of fire (sec): gun rate of fire per second.

Rate of fire (min): gun rate of fire per minute.
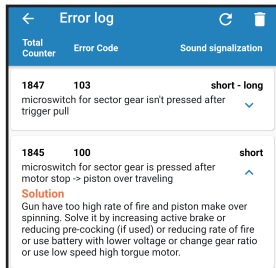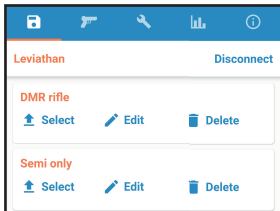
Last trigger pull shots: the number of BBs fired at the last trigger pull.

Pre-cocking time: time to move piston to compressed position (it will reduce Semi cycle time).

Semi cycle time: time between motor start and piston release.

Auto cycle time: time between shots in a burst where the RoF has already reached its maximum value.

Motor start current: peak current when motor starts spinning.

Average semi current: current during first shot.

Average auto current: current during burst fire.

Mosfet temperature: actual mosfet temperature, the cut-off temperature is 75 °C.

Processor temperature: actual processor temperature, the cut-off temperature is 75 °C.

Signal strength: shows the signal strength, the smaller the dBm drop, the stronger the signal.

Battery voltage: It shows actual voltage value. **Red color** line indicates when gun won't shoot. In **yellow** it will shoot with warning vibration. In **green** is everything OK and **grey** is discharge from 100% charge.

Power up time: how long is the battery connected.
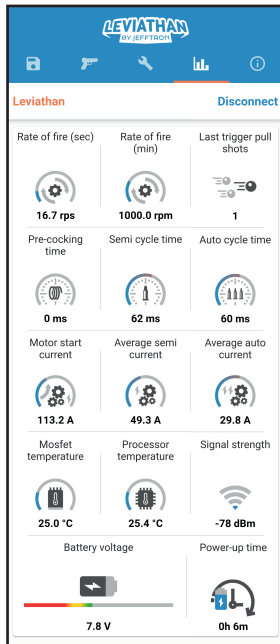
Settings

Language: text translation in the app to different language. Tacticool language is made up for your fun.

Dark theme: choose white or black application interface

Temperature: change mosfet and processor temperature unit from °C to °F.

Remember password: set automatic login to Leviathan.

Turn off connection by fire selector: if it is ON, then wireless connection will be turned OFF/ON by fast change selector from Semi to Auto and back. It is good for gun security. It always turns ON when the battery is plug-in. When this function is disabled you can always connect.

Overspin detection (Error 100): will turn off the beep at error 100 (over spinning - double shot).

Sound signalization: allow/deny sounds when magazine is empty, delay between shots and virtual reload.

Full auto limit: is safety feature. It cut off power after 100 bb continuous burst on the FULL auto fire.

Information: info about app and firmware version. Bootloader and Hardware version is constant.

Device name: is visible on the list with devices (max. 12 characters). It disconnects from phone after saved name.

Device password: write to the first row old password and to other two new password (4 digits) and push SAVE.

Device update: fixes bugs and adds new features. It takes cca 30s to finish = successful message + vibration.

Installation manual: link to the latest manual in .pdf.

Support: if you have any questions or problems, please contact us at email: support@jefftron.cz.
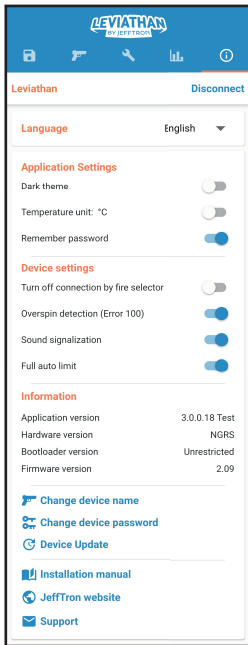
Startup codes

After connecting battery the Leviathan does a power up self check, which lasts a 1s.
It results the motor vibration or error beeps with the error log record:
1 short vibration - All systems are OK. This vibration is about half second long.
1 short beep - Trigger is pressed during battery connection (102)
2 short beeps - High current flow the mosfet (106)
3 short beeps - High temperature on the mosfet (104)
1 long beep - Battery voltage is less than 5.5 volts (107)
2 long beeps - Battery voltage is more than 17.0 volts (105)
3 long beeps - High processor temperature (108)
short-long-short beep - Motor is disconnected (109)
long-short-long beep - Nonfunctional application (200)

Post firing codes

If any problem occurs during firing, it will be signaled by beeps with the error log record:
1 short beep - Sector gear sensor is pressed after motor stop -> piston over traveling (100)
short-long beep - Sector gear sensor isn't pressed after trigger pull (103)
2 short and long beep - Selector plate has moved during shooting (101)
2 short beeps - High current flow the mosfet (106)
3 short beeps - High temperature on the mosfet (104)
1 long beep - Battery voltage is less than 5.5 volts (107)
3 long beeps - High processor temperature (108)

1 vibration after shot - Battery voltage is low. If the battery drops much further, the gun will vibrate instead firing. Now it is a good time to change your battery for new one.
1 vibration instead of fire - Battery is discharged. The gun vibrates on every trigger pull. change your battery for new one. **WARNING:** the battery is still slowly discharging.
1 vibration after some time - When is delay between shot activated, it vibrates after the time ends. It is as notification the gun is ready for shooting (sound signalization disables it)
Decreasing melody = Wireless conn. OFF, **Increasing melody =** Wireless conn. ON

Troubleshooting

ISSUE: Weapon doesn't react at all after battery connection.

SOLUTION: Check if the battery is properly connected and charged. Also check motor contacts and motor functionality. Check if the safety fuse hasn't been blown.

ISSUE: Weapon doesn't make shots after trigger pull (start-up vibration was made).

SOLUTION: Damaged or misplaced micro switch for trigger, check it's proper function.

ISSUE: Selector is set to semi but act like on SAFE or AUTO (or any other combination).

SOLUTION: Check the right sticker position on the selector plate or clear dirt on this sensor, check its proper function through „Sensor check" in the app and use „Optical selector calibration" to set it again.

ISSUE: Sector gear sensor is pressed after motor stop -> piston over traveling (Error 100).

SOLUTION: Gun have too high rate of fire and piston make over spinning. Solve it by increasing active brake or reducing pre-cocking (if used) or reducing rate of fire or use battery with lower voltage or change gear ratio or use low speed high torque motor.

ISSUE: Selector plate has moved during shooting (Error 101).

SOLUTION: You have changed by mistake fire selector during shooting or it was changed by vibrations from shooting. Check and change if necessary the right sticker position on the selector plate, and use „Optical selector calibration" to set it again.

ISSUE: Trigger is pressed during battery connection (Error 102).

SOLUTION: Release the trigger and try again. Check for right trigger microswitch function.

ISSUE: The gun always shoots BURST with short-long beep after fire (Error 103).

SOLUTION: Cycle sensor doesn't detect sector gear motion. Clean the sensor from dirt. check its right position in the gearbox to detect the gear cam and use „Optical cycle calibration" to set it again.

ISSUE: High temperature on the mosfet (Error 104).

SOLUTION: Wait until temperature will be dropped down. If it repeats, mosfet is overloaded by too high Amps. Change gearbox internals to drain less amperage.

Troubleshooting

ISSUE: Battery voltage is too high (Error 105).
SOLUTION: Change battery with less voltage than 17.0 volts.

ISSUE: High current flow the mosfet (Error 106).
SOLUTION: Check if motor or gears is damaged or jammed. Check wires to motor for short circuits or exposed connections. Could be problem of unballanced gun upgrade.

ISSUE: Battery voltage is too low (Error 107).
SOLUTION: Change or charge battery to have more voltage than 5.5 volts.

ISSUE: High temperature on the processor (Error 108).
SOLUTION: check for short circuits on leviathan through the gearbox or damaged parts.

ISSUE: Motor is disconnected (Error 109).
SOLUTION: Check motor and contacts for it, if they aren't damaged or disconnected.

ISSUE: Nonfunctional application (Error 200).
SOLUTION: Program error in the Leviathan. Make update firmware to the newest version.

ISSUE: Gun suddenly stopped firing.
SOLUTION: Protection could be activated - check error log. Check battery charge. Check motor contacts and motor functionality. Check if the safety fuse hasn't been blown.

ISSUE: The Leviathan is not visible in the device list in the application.
SOLUTION: Click to refresh button in the app. Check if battery is charged and connected into the Leviathan. Enable wireless and location in your phone. Restart mobile app.

ISSUE: You programmed the Leviathan, now it doesn't do what you wanted.
SOLUTION: Best way is to do **FACTORY RESET** and start again.

ISSUE: The gun does something strange or nothing.
SOLUTION: STOP! Release trigger, disconnect battery and search for the problem before-something will be irreversibly damaged! Contact us at email **support@jefftron.cz**.

MANUFACTURER

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VERSION 4.21

2 WARRANTY YEARS

Warranty does not cover: water immersion, defects or damage from accident, misuse, opposite battery polarity, abuse, damaged wires, wrong installation, bad handling, any modification by user, unusual physical, electrical or electromechanical stress.

Exclusion of liability: Manufacturer Ing. Filip Němec is not liable for any damages, injuries or accidents of any kind resulting from the use of this product in the airsoft gun.

WARNING!
ELECTROSTATIC
SENSITIVE DEVICE

For technical support or reclamation use email:
support@jefftron.cz

CE ✓RoHS