# Connection of the turret components
## ElMod FusionX

This manual describes how to connect the different turret variants to FusionX. This manual will be extended with more variants and options like gun smoke generator.

ATTENTION! We do not guarantee the information listed here. The manufacturers of the models can make technical changes at any time. Above all, you cannot rely on the color of the individual wires. If you are unsure, contact the support of your dealer.

ATTENTION! For all conversions, make sure that no open contacts or cable ends are exposed. Insulate all open cable ends with heat shrink tubing or insulating tape. Uninsulated connections may be visible in the photos shown in this guide. This is for illustration purposes only and should not occur in the actual build. Short-circuits usually lead to damage or even destruction of the central unit and/or the components involved.
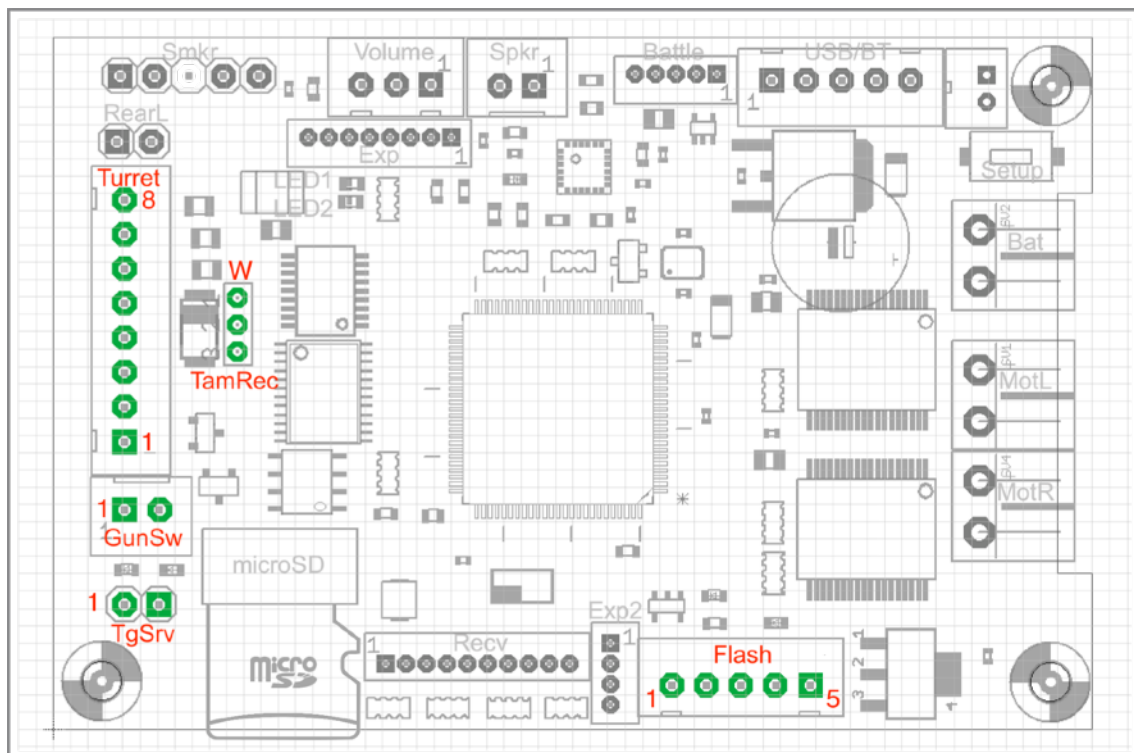
**Make sure that your ElMod FusionX has a current software version.**
**These instructions refer to firmware version 1.05 or newer.**

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# Connector position and pinout

The coloured connections are important for the turret connection:



- General turret components: "Turret" (8-pin)
- Recoil flash: "Flash" (5-pin)
- Gun position switch "GunSw" (2-polig)
- "TgSrv" (2-pin, female)
- Tamiya recoil "TamRec" (3-pin)

The assignment of the individual connectors is as follows:

| Turret top to bottom | Flash left to right | GunSw left to right | TgSrv left to right | TamRec top to bottom |
|---|---|---|---|---|
| 8. MG-LED - | 1. Battery + | 1. Ground | 1. Battery + | 1. Retraction signal |
| 7. Front light LED - | 2. Flash signal | 2. Gun position switch | 2. Ground | 2. Battery + |
| 6. Light common + | 3. Ground | | | 2. Extraction signal |
| 5. Elevation/shot motor common | 4. reserved | | | |
| 4. Shot motor | 5. Gun position switch | | | |
| 3. Elevation motor | | | | |
| 2. Turret rotation | | | | |
| 1. Turret rotation | | | | |

# Relevant parameters in the ElMod App

In the ElMod App, the following parameters must be considered:

**FusionX Rev.B**

- Tab "Weapons", parameter "Shot mode". Defines the behavior after pulling the trigger:
  - "Stop when trigger released": stops the shot as soon as the trigger is released.
  - "Gun returns to initial position": the gun automatically returns to the home position. This requires the use of a contact which is closed against ground in the innermost position of the gun. This contact is integrated in the turret mechanics of most tanks.
- Tab "Weapons", parameter "Flash and sound delay". Serves to fine-tune the movement of the barrel recoil and the muzzle flash or shot sound. In the case of motor-driven barrel recoil, the mechanism requires a certain amount of time before the barrel starts to move. If the shot sound and flash are triggered immediately, the entire process is not harmonious. This parameter delays the muzzle flash and the shot sound in steps of 100ms (corresponds to 0.1s). Normal values are between 0 (for servo motors) and between 2 (corresponding to 0.2s) and 5 (corresponding to 0.5s) for motor-driven barrel recoil. The value depends on the type of battery used (higher voltage causes the firing motor to rotate faster and the firing cycle is shorter).
- Tab "Weapons", parameter "Sensor delay". This parameter determines how long the shot motor should run after the shot sensor (switch/contact) has been closed by the gun barrel. The value must be selected in such a way that after the time has elapsed, the barrel returns to its initial position. This value is also given in 100ms (0.1s) steps. Usual values are 9-12 for HL barrel recoil or 4-6 for air gun mechanics. If the value is too small, the gun barrel remains retracted. If the value is too large, the barrel moves beyond the start position to endless firing. The value depends on the type of battery used (higher voltage causes the firing motor to rotate faster and the firing cycle is shorter).
- Tab "Turret", parameter "Elevation mode" has the following options:
  - "Both directions" allows the gun to move in either direction (up or down) at will.
  - "One direction (Taigen)" limits the direction of movement to one direction. Necessary because of internal turret switching on some Taigen tanks.
  - "One direction inverted (Taigen)" limits the direction of movement to one direction. Necessary because of internal turret circuit on some Taigen tanks.
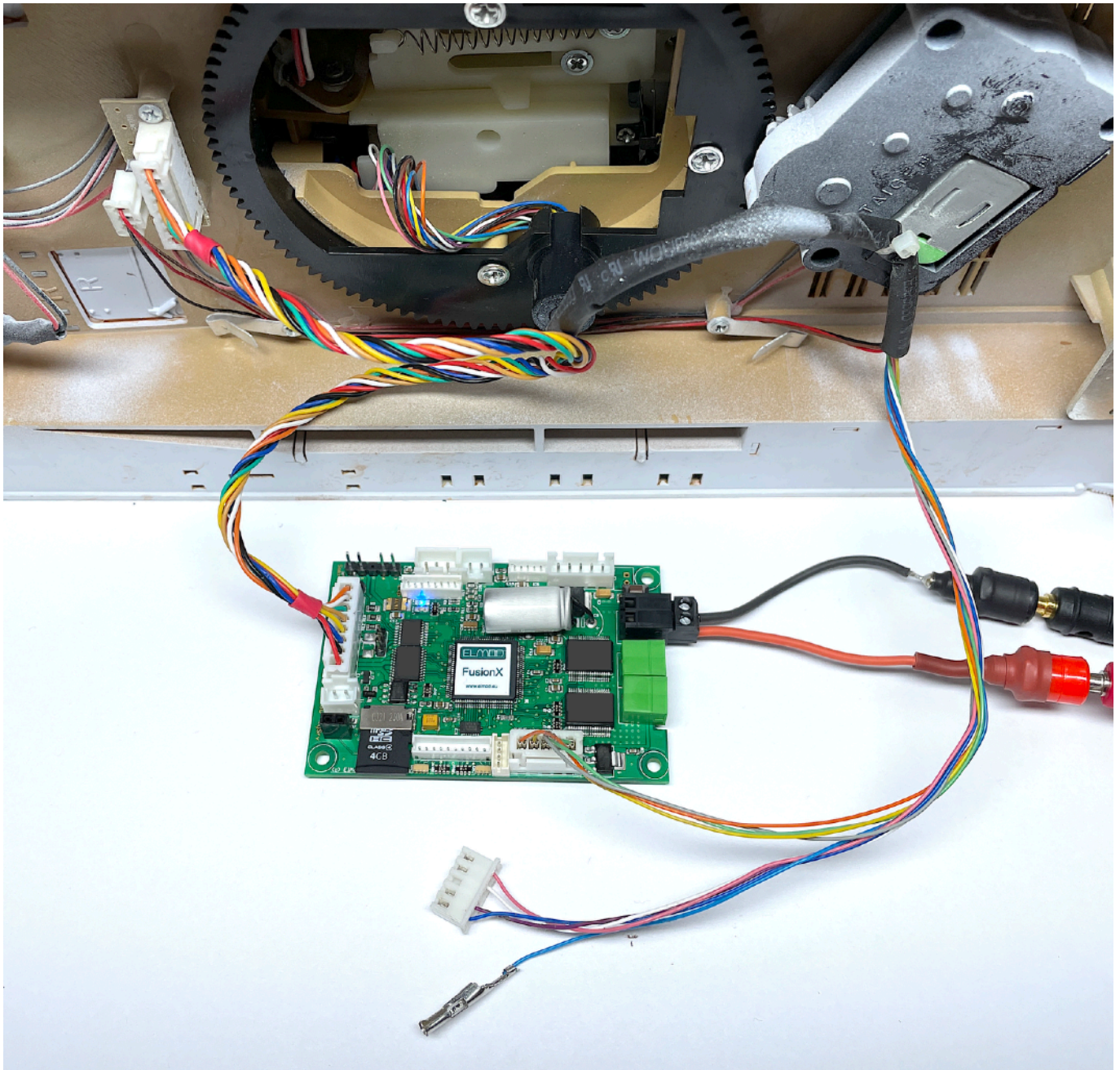
**FusionX Rev.C**

- Tab "Weapons", parameter "Air gun contact". Activates the evaluation of the contact which is closed against ground when a bullet is fired.
- Tab "Weapons", parameter "Flash and sound delay". Serves to fine-tune the movement of the barrel recoil and the muzzle flash or shot sound. In the case of motor-driven barrel recoil, the mechanism requires a certain amount of time before the barrel starts to move. If the shot sound and flash are triggered immediately, the entire process is not harmonious. This parameter delays the muzzle flash and the shot sound in steps of 100ms (corresponds to 0.1s). Normal values are between 0 (for servo motors) and between 2 (corresponding to 0.2s) and 5 (corresponding to 0.5s) for motor-driven barrel recoil. The value depends on the type of battery used (higher voltage causes the firing motor to rotate faster and the firing cycle is shorter).
- Tab "Turret", parameter "Elevation mode" has the following options:
  - "Both directions" allows the gun to move in either direction (up or down) at will.
  - "One direction (Taigen)" limits the direction of movement to one direction. Necessary because of internal turret switching on some Taigen tanks.
  - "One direction inverted (Taigen)" limits the direction of movement to one direction. Necessary because of internal turret circuit on some Taigen tanks.

# Standard turret mechanics

This is the factory setting. This type is suitable for testing the basic function of the turret components. It is also used by older HengLong and Taigen models. Furthermore, it is helpful for customized solutions. Finally, this setting should be selected when the barrel recoil is implemented using a servo and the FX Expander.

Connection:
- Attach 8-pin turret plug to "Turret" connector
- Optional: attach 5-pin muzzle flash plug to "Flash" connector
- Optional: Connect the ground cable from the turret to the battery minus (e.g. at the power plug).



All turret functions in past and current HengLong and Taigen tanks can be operated in this mode. Only in Taigen's servo turret solution, gun elevation will not work correctly because of the electronics in the turret.
The firing motor will run as long as the trigger is pulled. So you have to manually make sure that the gun returns in the home position after firing. However, this is not difficult due to the design of the barrel retraction mechanism.

Parameters in the ElMod App for ElMod Fusion Rev.B:

- Tab Weapons
  - Shot mode: Stop when trigger released *(Factory setting)*
  - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
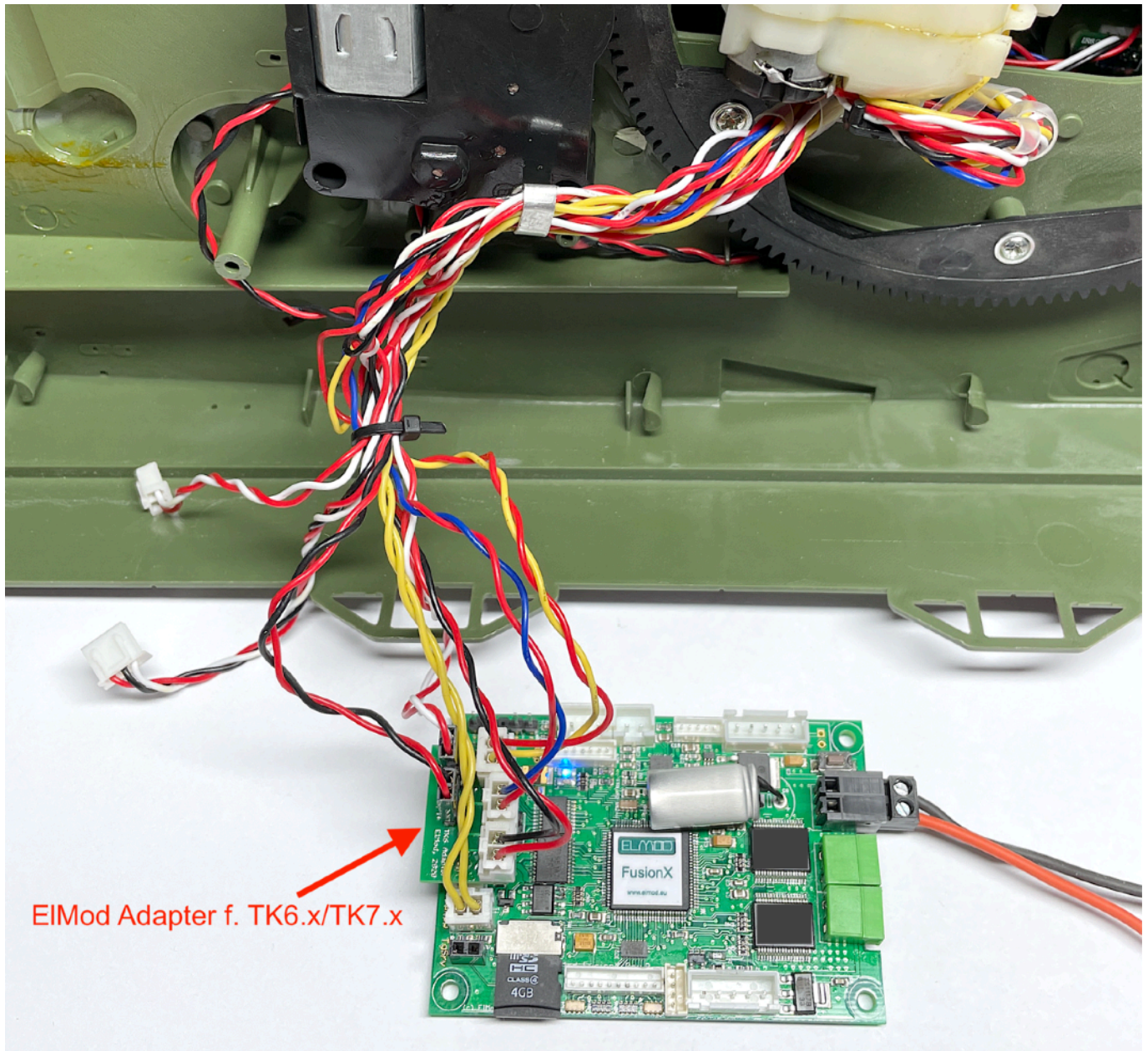  - Elevation mode: Both directions *(Factory setting)*


Parameters in the ElMod App for ElMod Fusion Rev.C:

- Tab Weapons
  - Air gun contact: disabled *(Factory setting)*
  - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
  - Elevation mode: Both directions *(Factory setting)*

# Heng Long

## TK6.x/7.x with air gun on Rev.B

For HengLong TK6.x and TK7.x an adapter is available from ElMod, which is plugged onto the turret connector. There the cables CN4 (turret rotation), CN5 (gun elevation), CN10 (shot) as well as the lighting LED4 (main light) and LED5 (MG flash) are plugged in. CN6 (gun position switch) is connected to the "GunSW" connector.
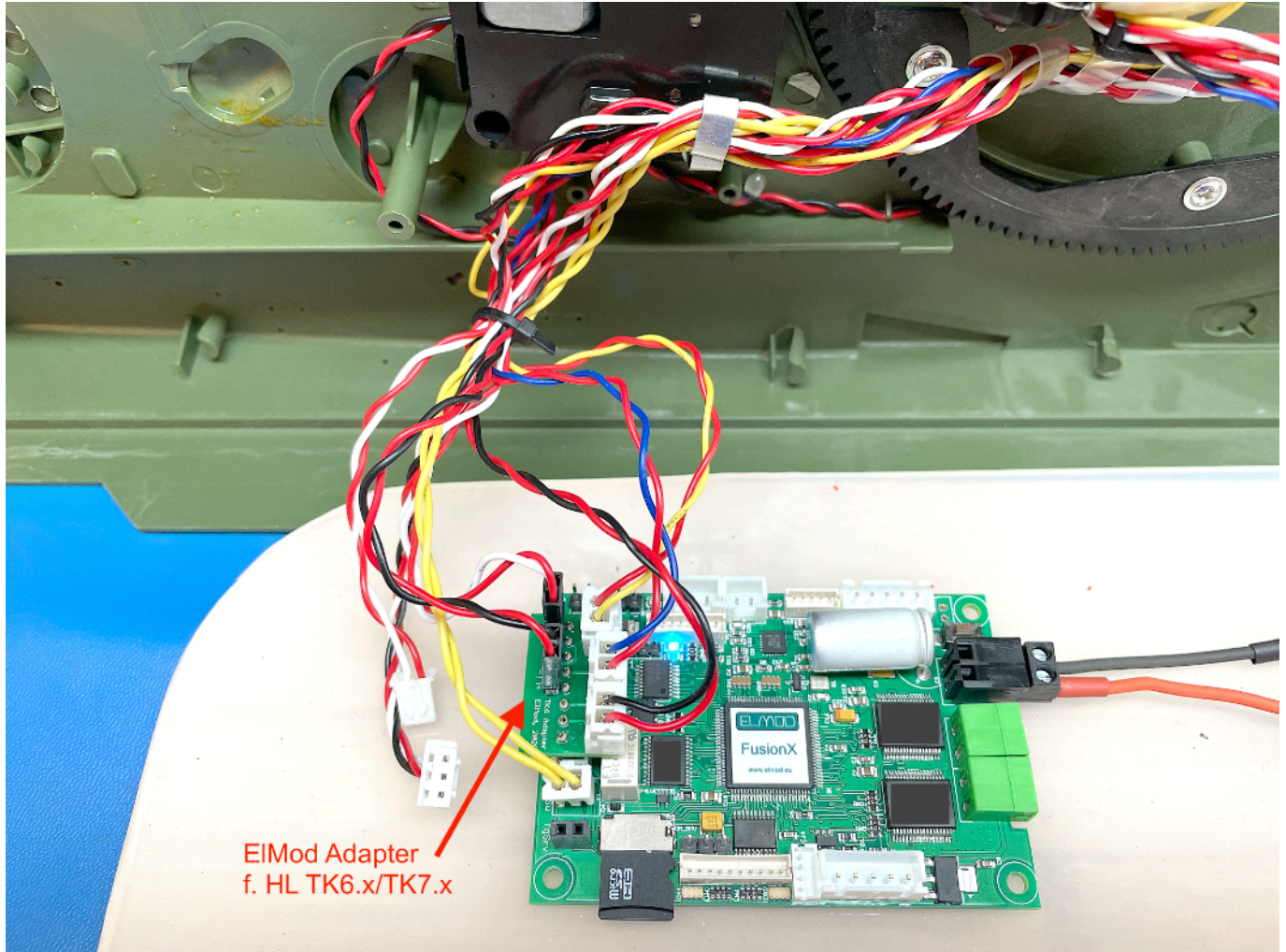


ElMod Adapter f. TK6.x/TK7.x

ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
    - Shot motor overrun
        - 2S-LiPo/6C-NiMh approx. 6 (0,6 sec)
        - 3S-LiPo approx. 2 (0,2 sec)
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## TK6.x/7.x with air gun on Rev.C

For HengLong TK6.x and TK7.x an adapter is available from ElMod, which is plugged onto the turret connector. There the cables CN4 (turret rotation), CN5 (gun elevation), CN10 (shot) as well as the lighting LED4 (main light) and LED5 (MG flash) are plugged in. CN6 (gun position switch) is connected to the "GunSW" connector.
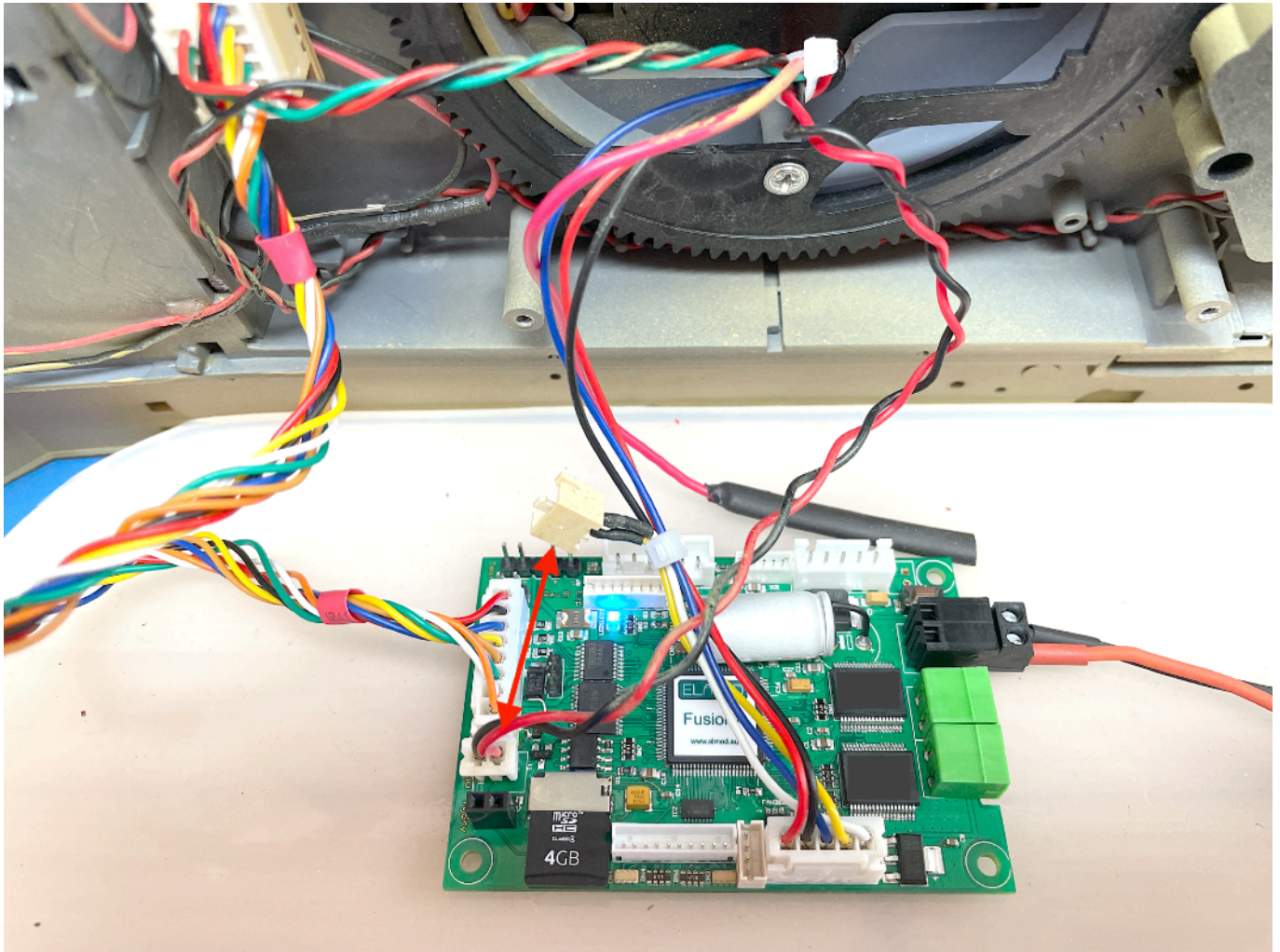


ElMod App parameters:

- Tab Weapons
  - Air gun contact: enabled
  - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
  - Elevation mode: Both directions *(Factory setting)*

# Taigen

## 320° turret, motor driven turret mechanics on Rev.B

- Attach 8-pin turret plug to "Turret" connector
- Attach 5-pin muzzle flash plug to "Flash" connector
- Disconnect the two-pin connector with black-red cable (recoil contact). If the cable is not long enough, there is usually about 10 cm (4") of this wire stowed in the turret.
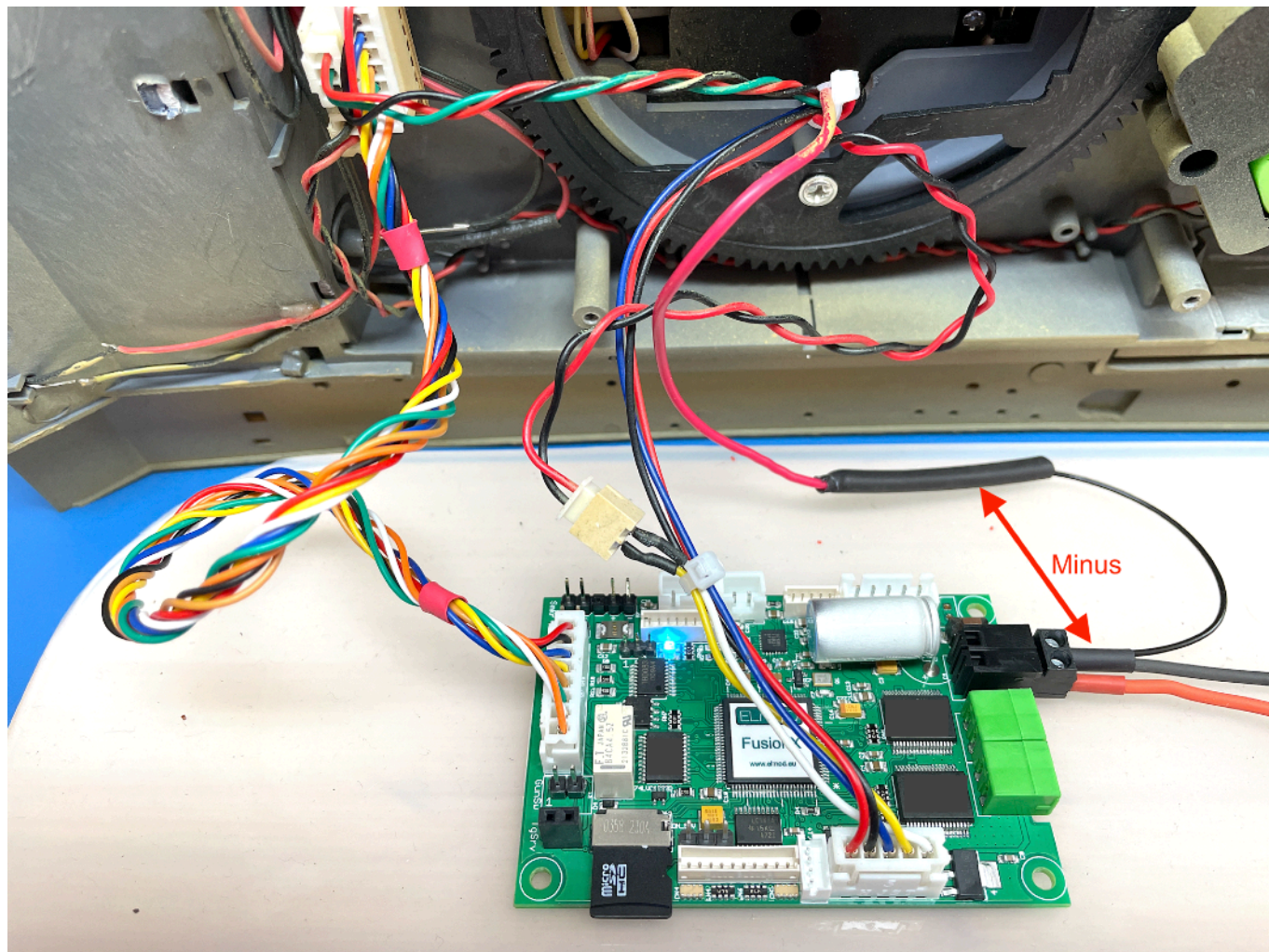


ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
    - Shot motor overrun
        - 2S-LiPo/6C-NiMh approx. 14 (1,4 sec)
        - 3S-LiPo approx. 8 (0,8 sec)
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## 320° turret, motor driven turret mechanics on Rev.C

- Attach 8-pin turret plug to "Turret" connector
- Attach 5-pin muzzle flash plug to "Flash" connector
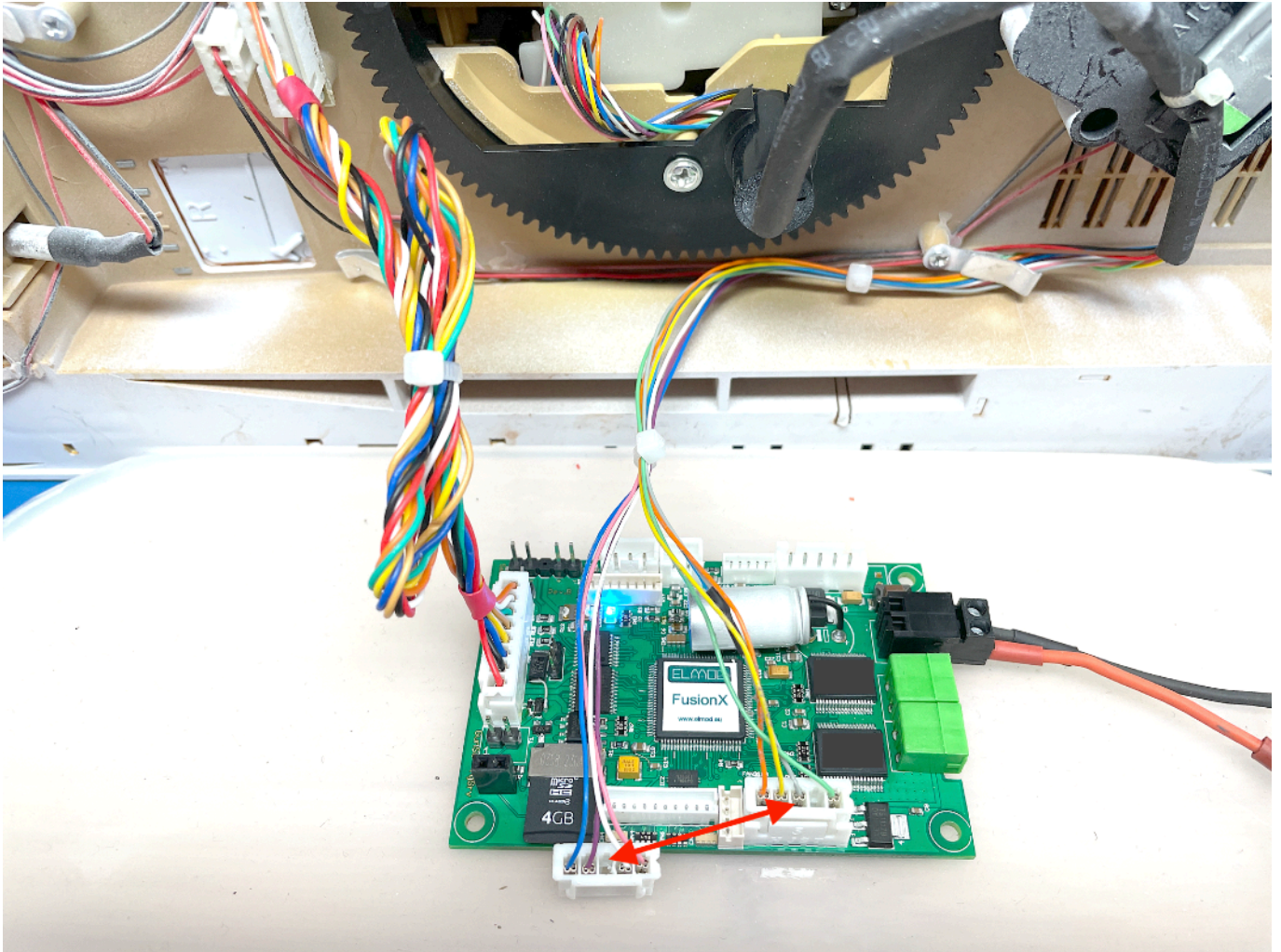- Connect the red ground cable from the tower to the battery negative (e.g. at the power plug).



ElMod App parameters:
- Tab Weapons
    - Air gun contact: enabled
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## 360° turret, motor driven turret mechanics on Rev.B

- Attach 8-pin turret plug to "Turret" connector
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.
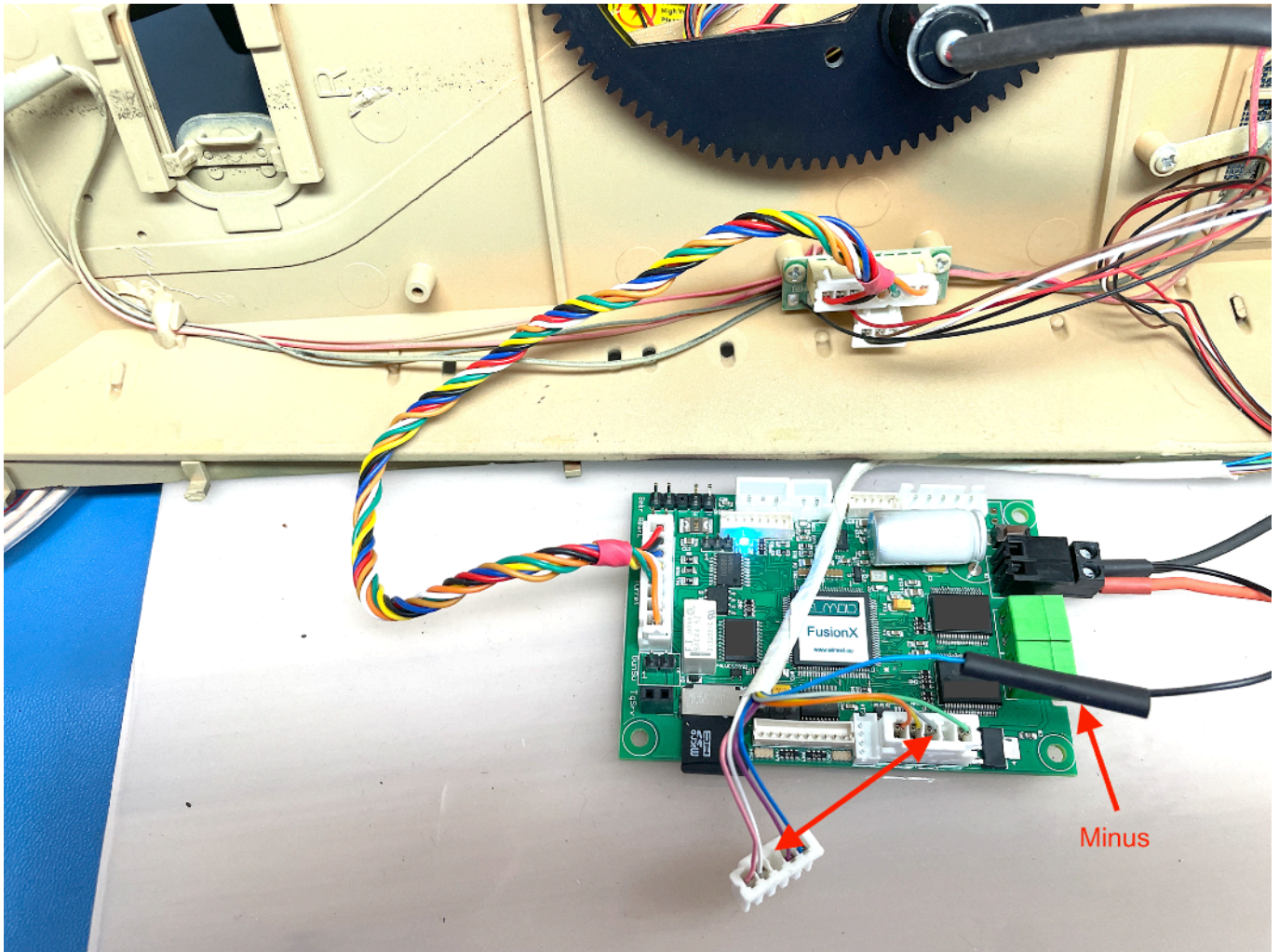- Attach 5-pin muzzle flash plug to "Flash" connector



ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
    - Shot motor overrun
        - 2S-LiPo/6C-NiMh approx. 14 (1,4 sec)
        - 3S-LiPo approx. 8 (0,8 sec)
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## 360° turret, motor driven turret mechanics on Rev.C

- Attach 8-pin turret plug to "Turret" connector
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.
- Attach 5-pin muzzle flash plug to "Flash" connector
- Some models have an additional separate ground cable from the turret. This is connected to the negative ground line (e.g. at the power connection).
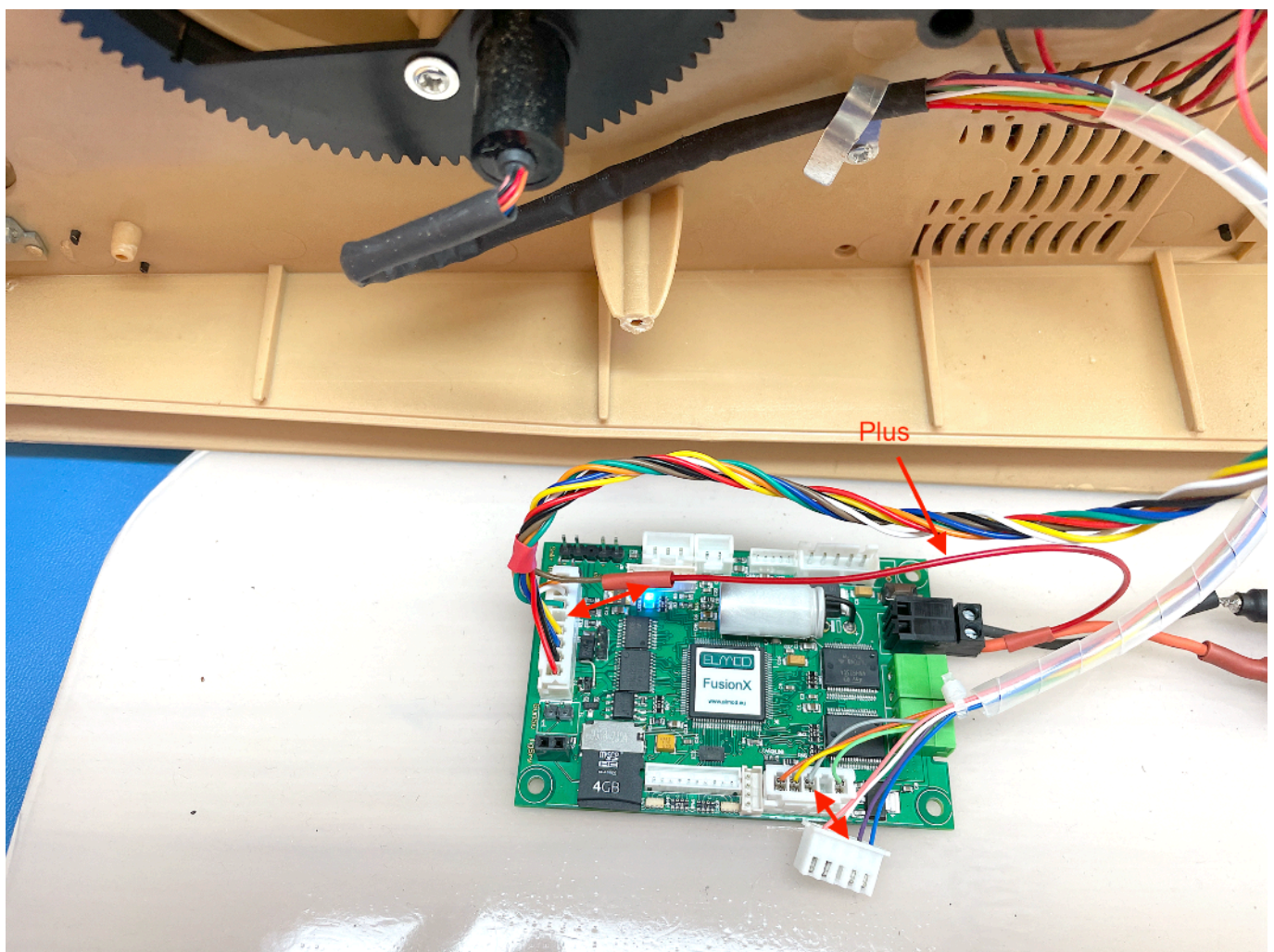


ElMod App parameters:
- Tab Weapons
    - Air gun contact: enabled
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## 360° turret with servo turret and gun smoke on Rev.B

In this version, there is an additional electronic system in the turret that controls two servos: one for the elevation of the gun and one for the barrel recoil. Elevation is limited to one direction and one speed. This means it is not possible to move the gun up or down selectively or to control the speed of the gun. The barrel recoil is equally as fast in both directions.

After the conversion, all functions are given. In addition, the speed of gun elevation is adjustable (however, the direction can still not be reversed).

- remove the 5th wire from the 8-pin turret connector (usually brown) and connect it to battery plus (for example at the battery connector).
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.



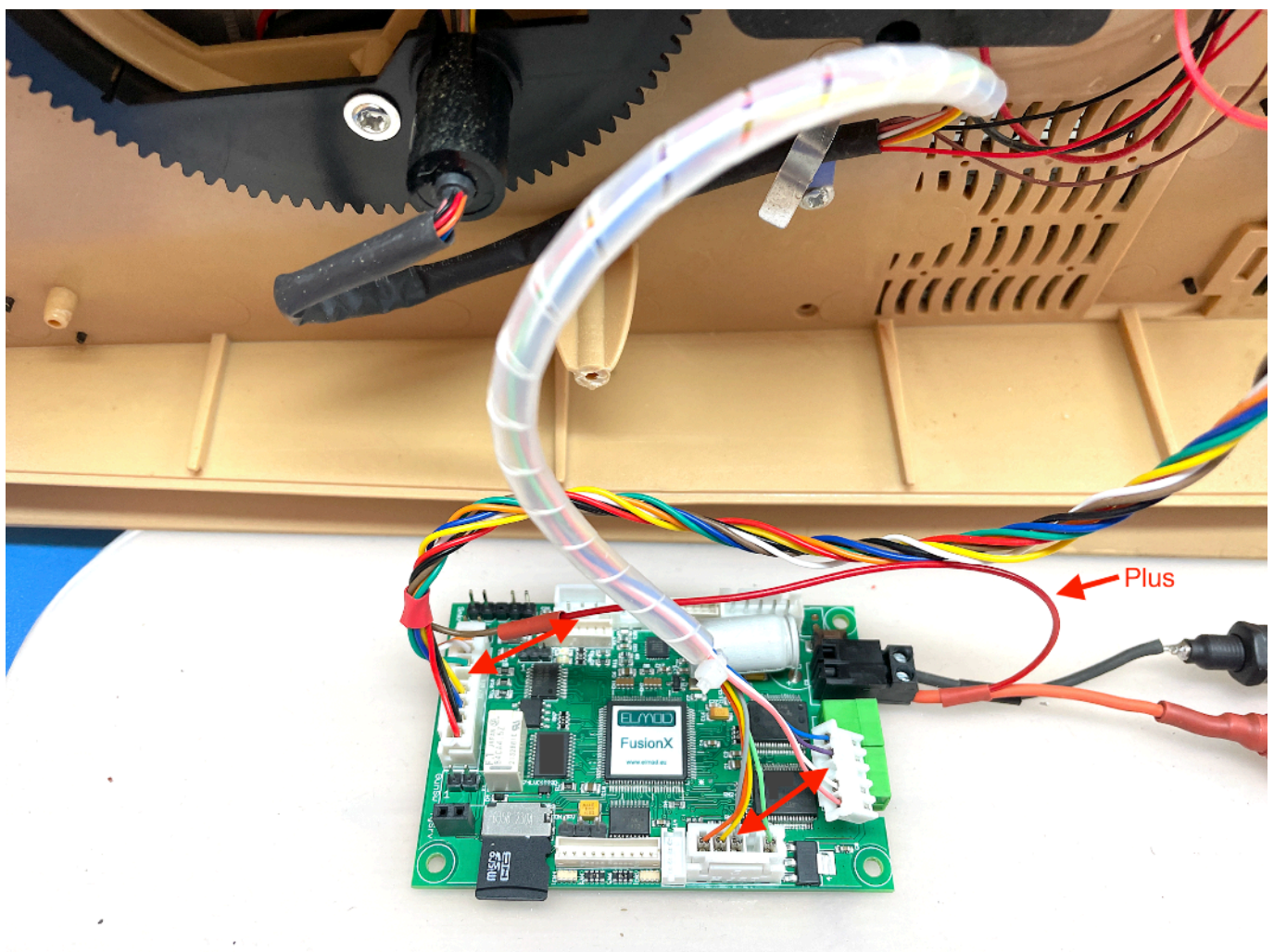ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: 0
    - Shot motor overrun: 0
- Tab Turret
    - Elevation mode: One direction inverted (Taigen)

## 360° turret with servo turret and gun smoke on Rev.C

In this version, there is an additional electronic system in the turret that controls two servos: one for the elevation of the gun and one for the barrel recoil. Elevation is limited to one direction and one speed. This means it is not possible to move the gun up or down selectively or to control the speed of the gun. The barrel recoil is equally as fast in both directions.

After the conversion, all functions are given. In addition, the speed of gun elevation is adjustable (however, the direction can still not be reversed).

- remove the 5th wire from the 8-pin turret connector (usually brown) and connect it to battery plus (for example at the battery connector).
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.
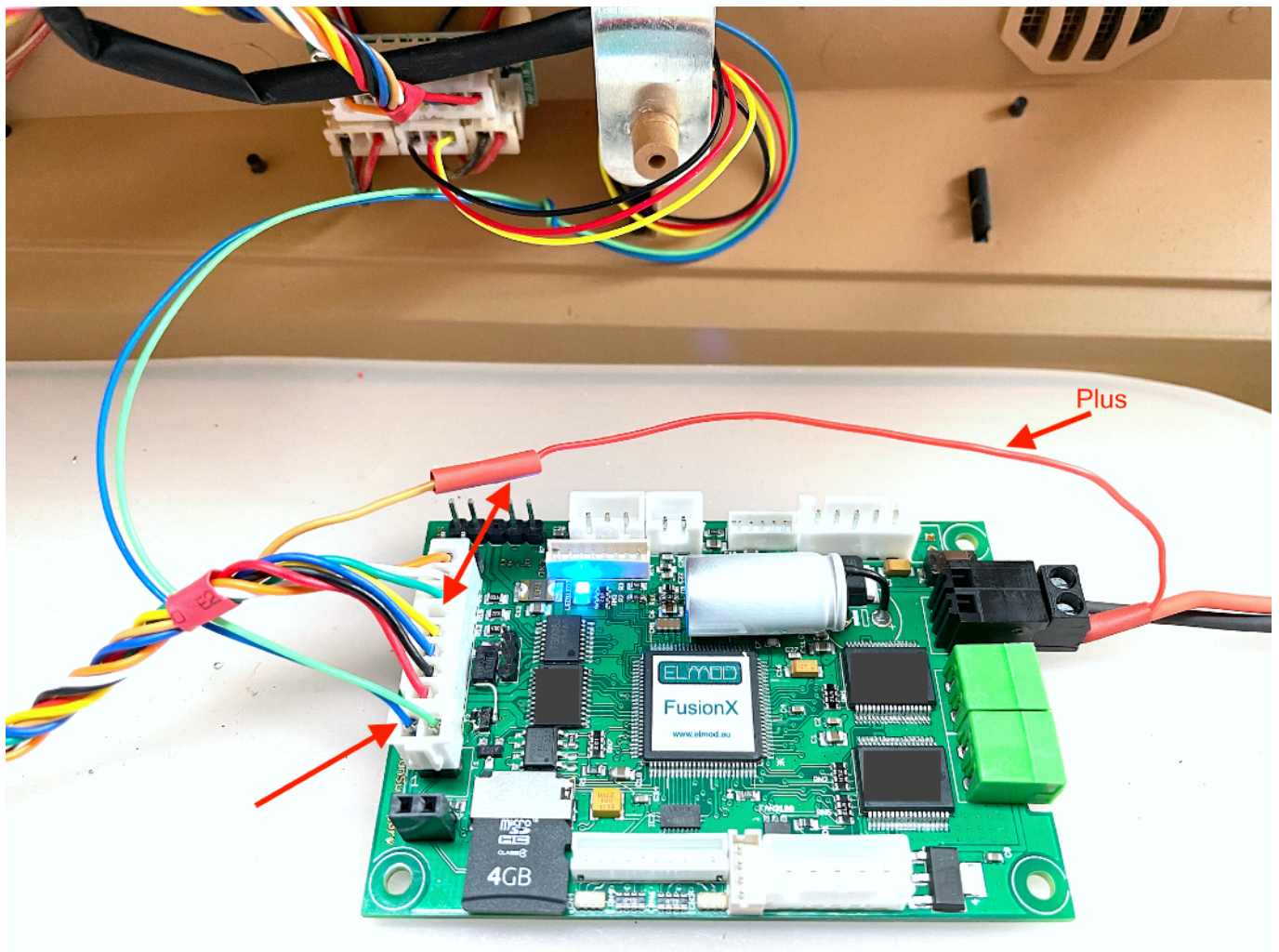


ElMod App parameters:
- Tab Weapons
  - Air gun contact: enabled
  - Flash and sound delay: 0
- Tab Turret
  - Elevation mode: One direction inverted (Taigen)

# 360° air gun turret with gun smoke on Rev.B

This version has additional electronics in the turret that control the Taigen gun smoke generator. Due to the circuitry of the smoke generator, it is not possible to move the gun up or down specifically.

After the conversion, the speed of raising/lowering the gun is adjustable, but the direction can still not be reversed.

- Remove the 5th wire from the 8-pin turret connector (usually brown) and connect it to battery plus (for example at the battery connector).
- Attach 8-pin turret plug to "Turret" connector
- Plug the 2-wire connector from the recoil contact to the "GunSw" position
    - Depending on the tank version, the orange or the blue line points to the left.
    - FusionX with a polarized plug at this location may need to swap the wires in the plug.
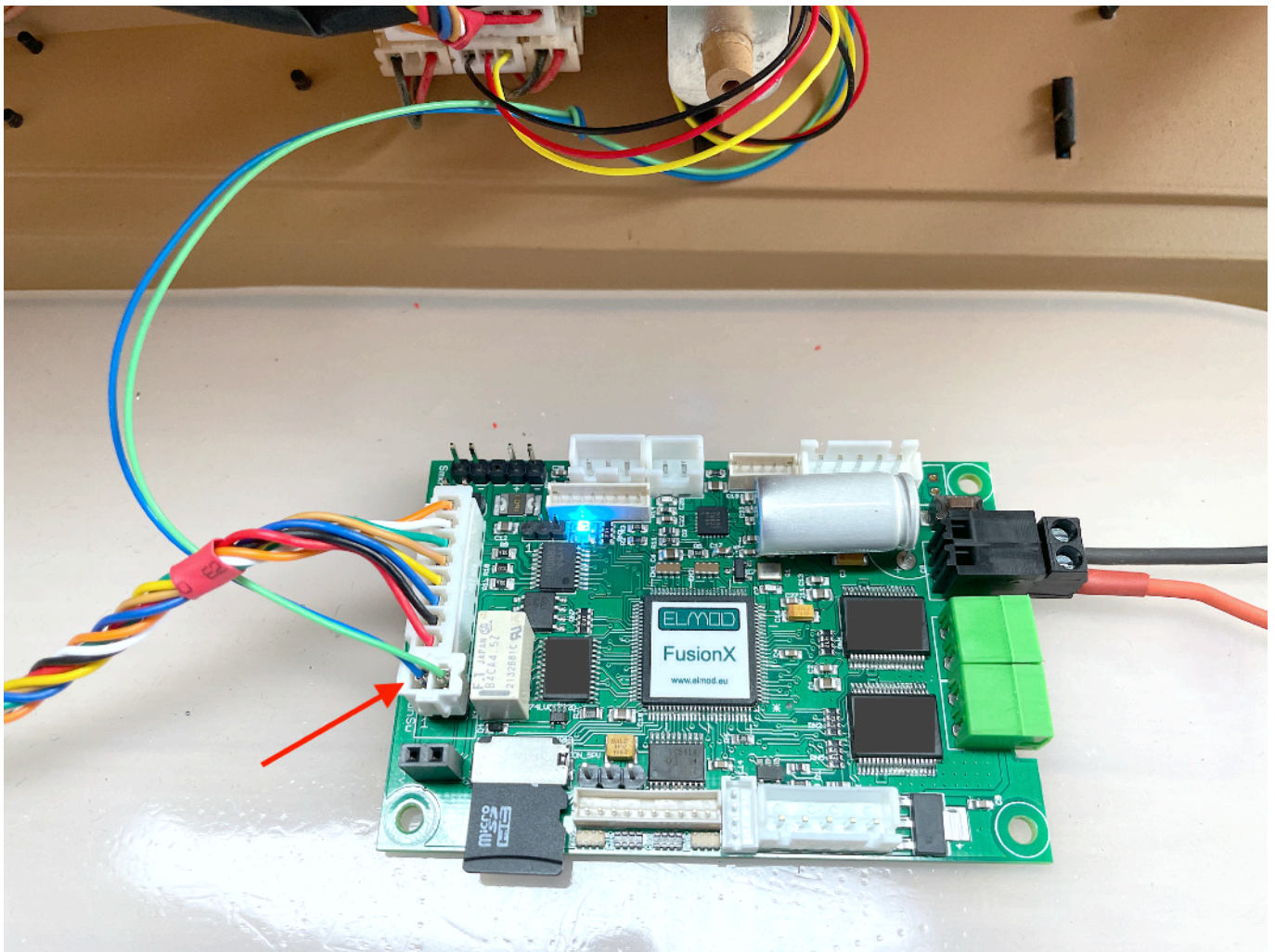


ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
    - Shot motor overrun
        - 2S-LiPo/6C-NiMh approx. 6 (0,6 sec)
        - 3S-LiPo approx. 2 (0,2 sec)
- Tab Turret
    - Elevation mode: One direction inverted (Taigen)

# 360° air gun turret with gun smoke on Rev.C

This version has additional electronics in the turret that control the Taigen gun smoke generator. Due to the circuitry of the smoke generator, it is not possible to move the gun up or down specifically.

After the conversion, the speed and direction of gun elevation is adjustable.

- remove the 5th wire from the 8-pin turret connector (usually yellow or brown) and connect it to battery plus (for example at the battery connector).
- Attach 8-pin turret plug to "Turret" connector
- Plug the 2-wire connector from the recoil contact to the "GunSw" position
    - Depending on the tank version, the orange or the blue line points to the left.
    - FusionX with a polarized plug at this location may need to swap the wires in the plug.
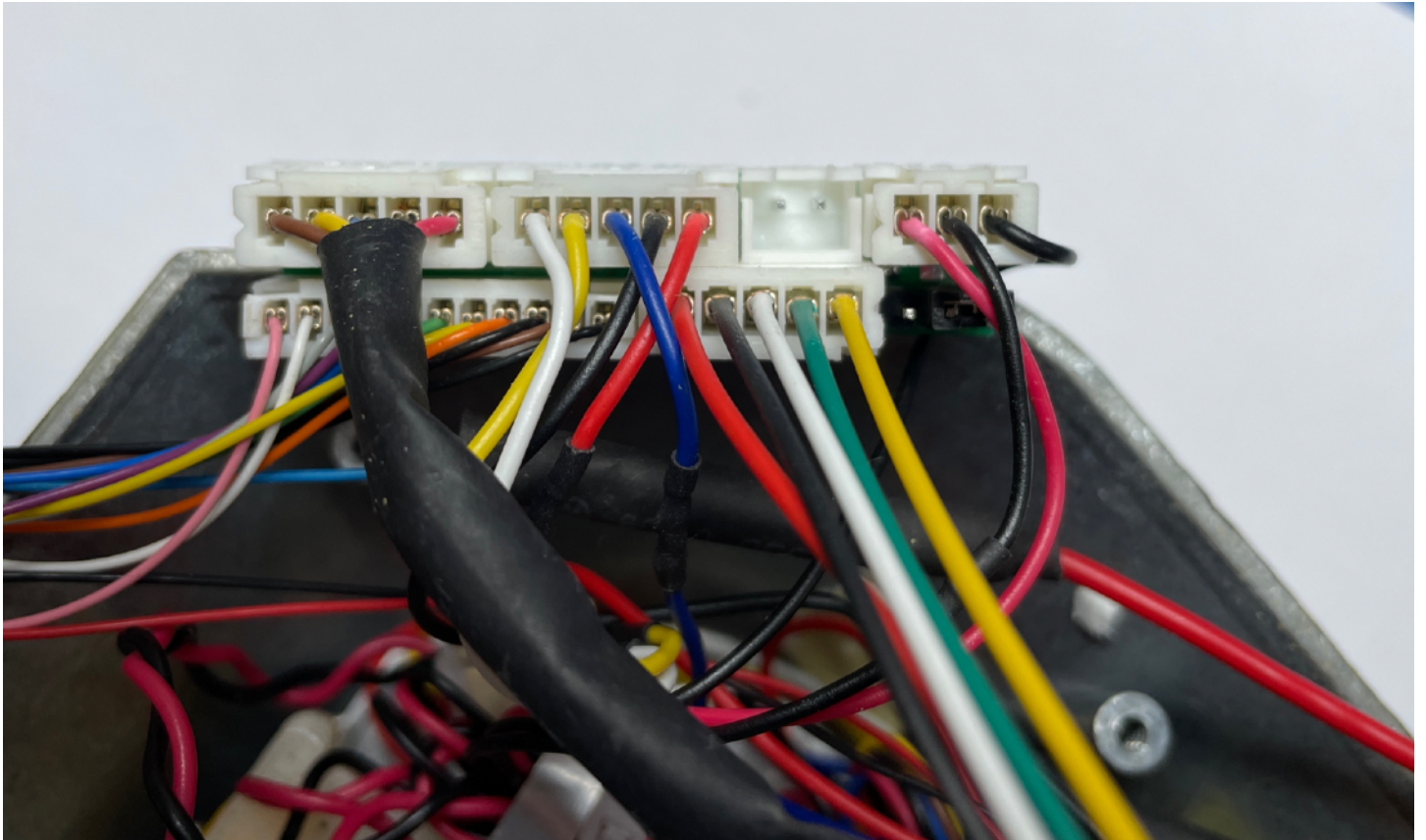


ElMod App parameters:
- Tab Weapons
    - Air gun contact: enabled
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

## 360° turret with motor driven turret mechanics and gun smoke on Rev.B

In this varian, barrel smoke has been added to the standard turret mechanics (elevation and recoil via motors). The control of the barrel smoke generator is part of the Taigen servo turret electronics. For this case the ElMod FX Taigen - Adapter (Art.No. 9840) is needed.
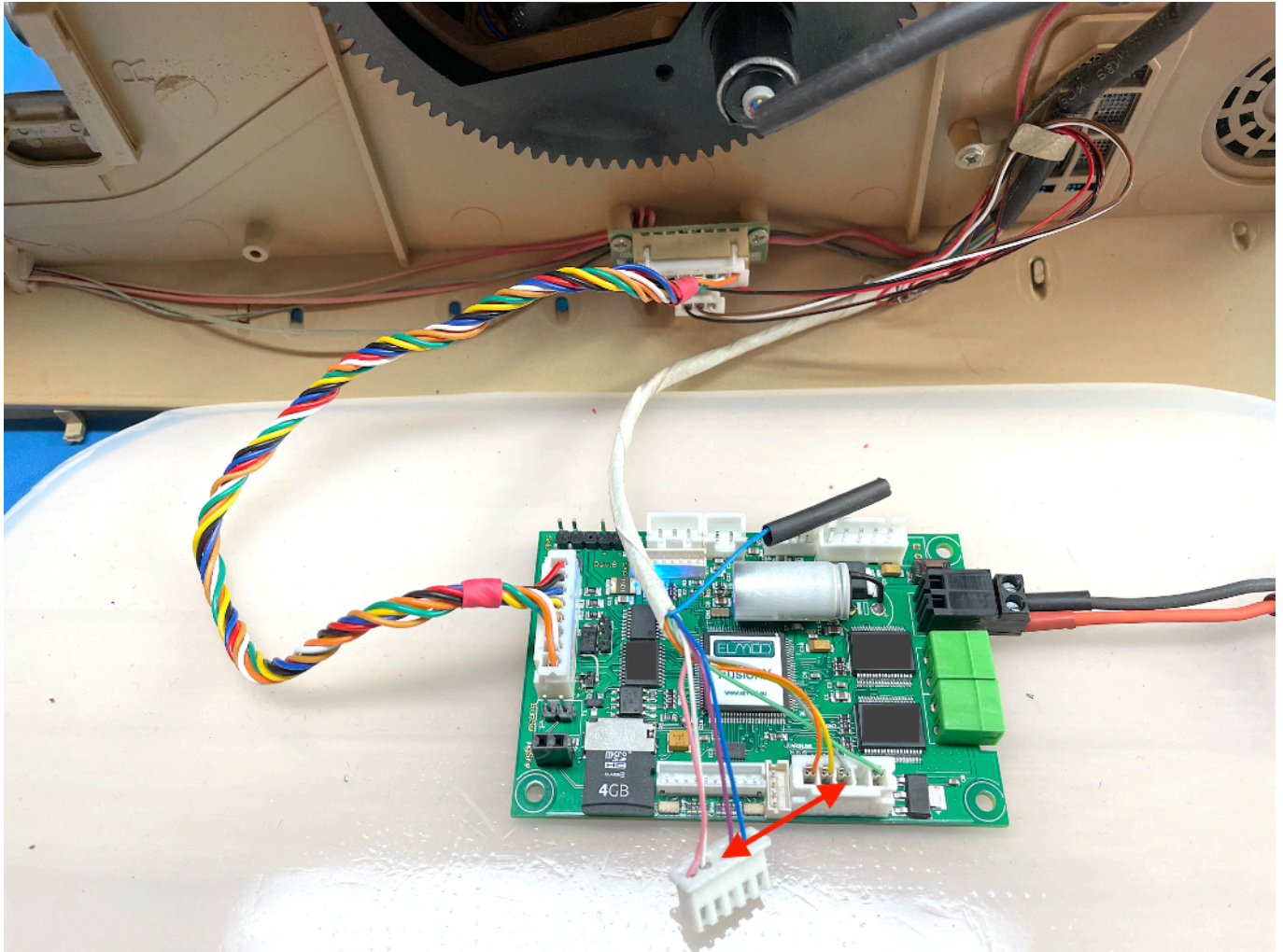

Turret connection:
- Reconnect all cables from the original Taigen header board in the turret to the ElMod FX Taigen adapter.
- The position of the connectors on the ElMod FX Taigen - Adapter corresponds to that of the original Taigen header board:
    - Top row from left to right: battle functions, muzzle flash, blank, turret motors (elevation + recoil)
    - Bottom row from left to right: connector to hull, Taigen servo and smoke board
    - Jumper is plugged in on the right (default setting)

Hull part:
- Attach 8-pin turret plug to "Turret" connector
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.
- Attach 5-pin muzzle flash plug to "Flash" connector
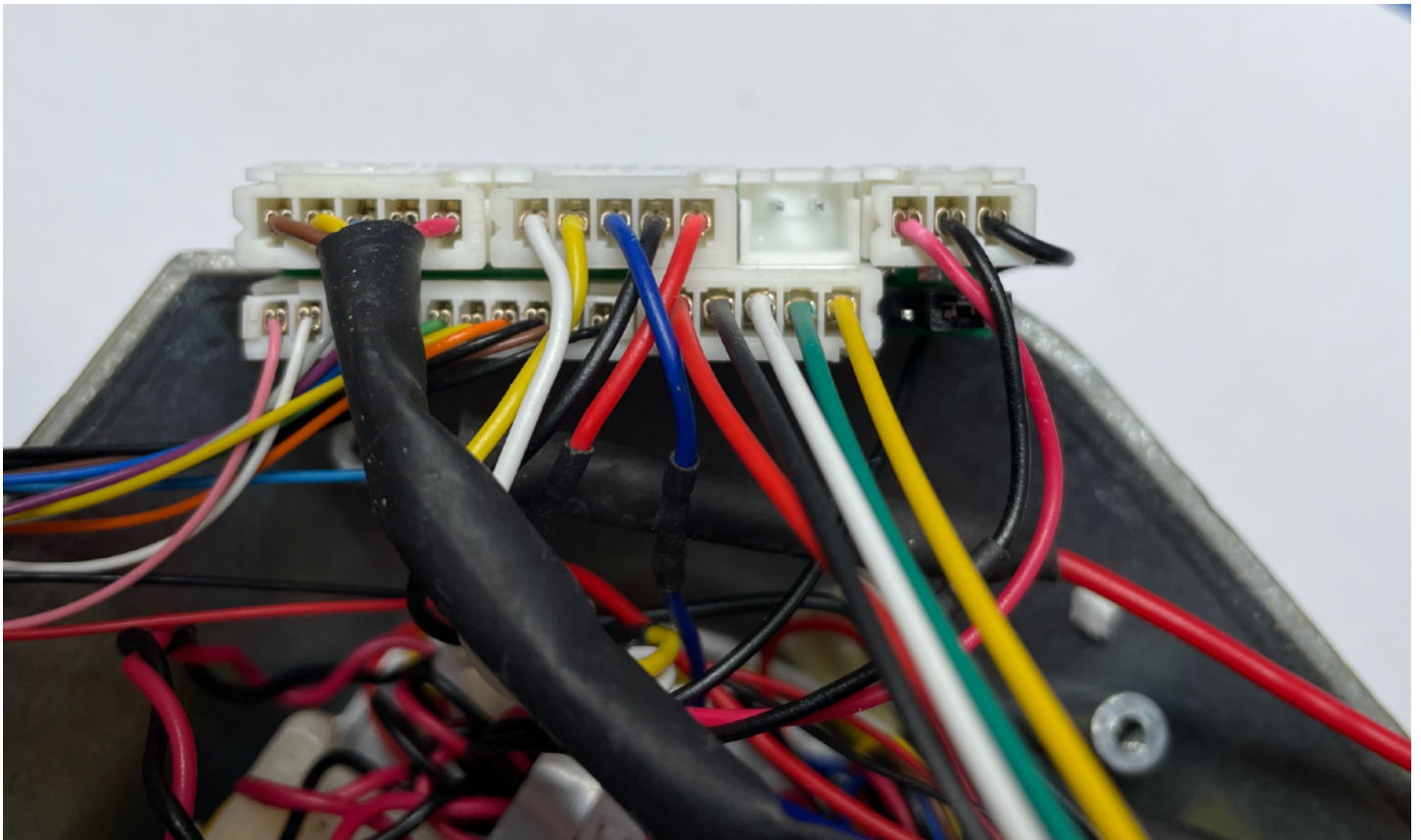


ElMod App parameters:
- Tab Weapons
    - Shot mode: Gun returns to initial position
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
    - Shot motor overrun
        - 2S-LiPo/6C-NiMh approx. 14 (1,4 sec)
        - 3S-LiPo approx. 8 (0,8 sec)
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

# 360° turret with motor driven turret mechanics and gun smoke on Rev.C

In this varian, barrel smoke has been added to the standard turret mechanics (elevation and recoil via motors). The control of the barrel smoke generator is part of the Taigen servo turret electronics. For this case the ElMod FX Taigen - Adapter (Art.No. 9840) is needed.
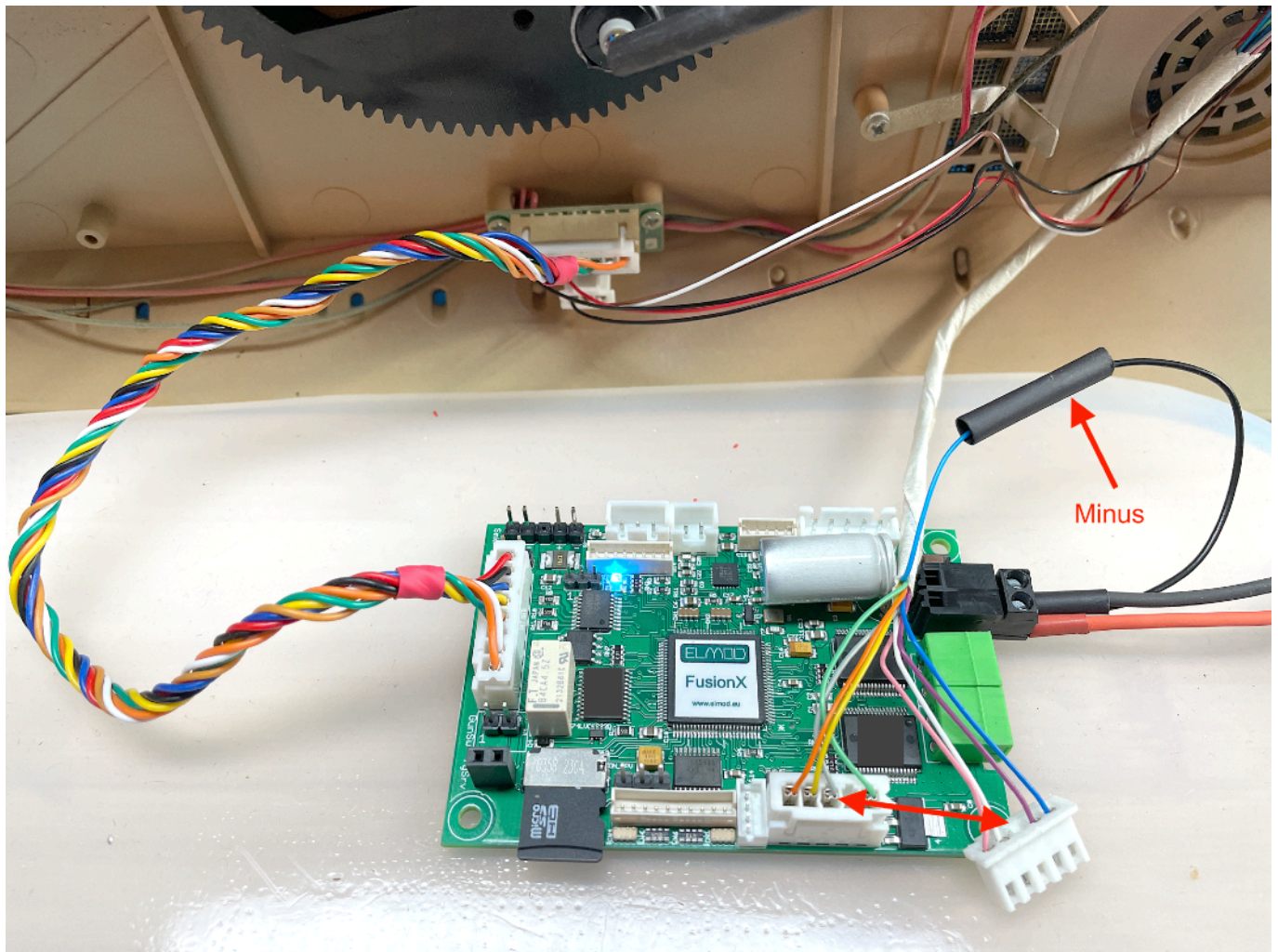
Turret connection:
- Reconnect all cables from the original Taigen header board in the turret to the ElMod FX Taigen adapter.
- The position of the connectors on the ElMod FX Taigen - Adapter corresponds to that of the original Taigen header board:
    - Top row from left to right: battle functions, muzzle flash, blank, turret motors (elevation + recoil)
    - Bottom row from left to right: connector to hull, Taigen servo and smoke board
    - Jumper is plugged in on the right (default setting)

## Hull part:
- Attach 8-pin turret plug to "Turret" connector
- remove the 3rd wire from the 5-pin battle connector (gray wire) and insert it into the 3rd position of the 5-pin lightning plug until it clicks into place.
- Attach 5-pin muzzle flash plug to "Flash" connector
- Some models have an additional separate ground cable from the turret. This is connected to the negative ground line (e.g. at the power connection).
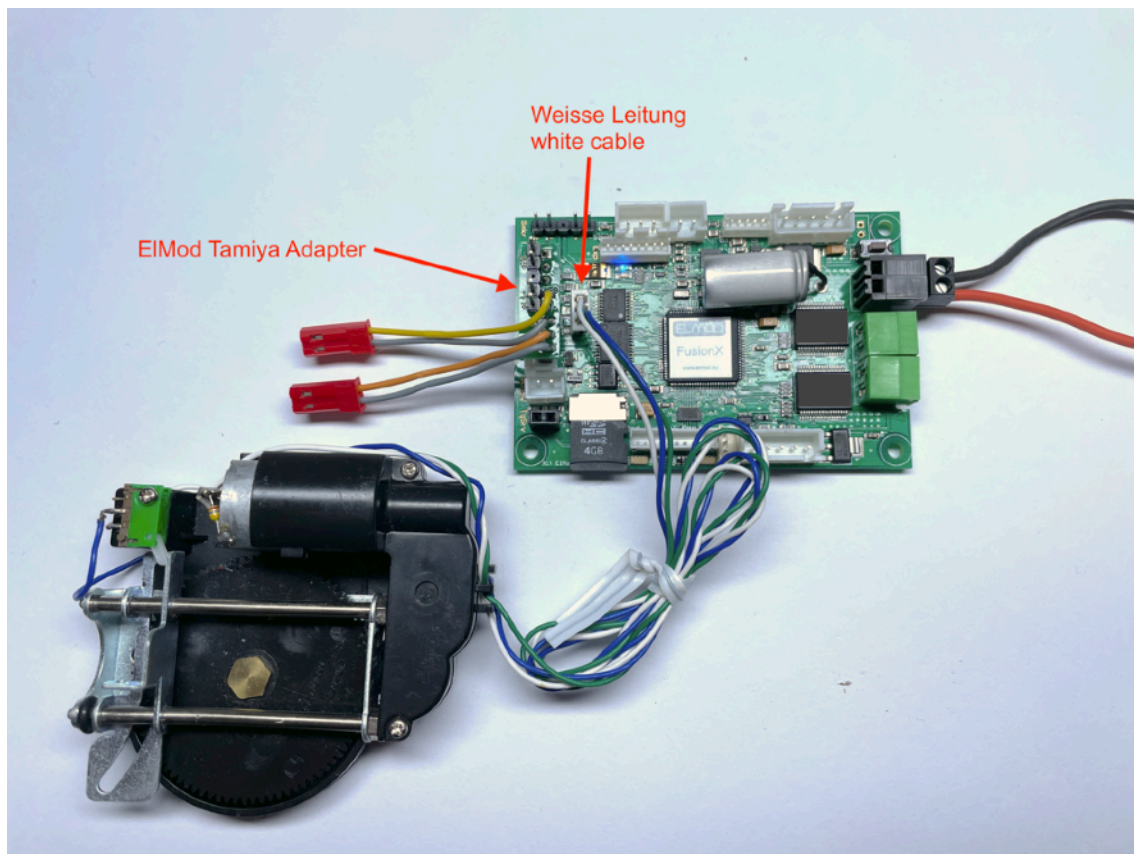


## ElMod App parameters:
- Tab Weapons
    - Air gun contact: enabled
    - Flash and sound delay: approx. 2 (0,2 sec) *(Factory setting)*
- Tab Turret
    - Elevation mode: Both directions *(Factory setting)*

# Tamiya

For Tamiya tanks, the ElMod Tamiya adapter is used. The turret motor (gray/orange), the gun elevation motor (gray/yellow) and the lighting (front light and MG muzzle flash) can be directly connected to it. The Tamiya xenon flash is not supported. Instead, an HL/Taigen flash can be connected to the "Flash" connector.

The Tamiya barrel retraction unit is connected to the matching 3-pin connector on FusionX. Here you have to take care that the white line points to the upper board edge (Rev.B) or to the right (Rev.C).  Otherwise the electronics can be damaged.

The barrel retraction mechanism stops automatically after the gun has returned to its initial position. No sensor or switch is evaluated by the electronics.



ElMod App parameters:
- Flash and sound delay: 0
- Sensor delay: no function
- Retraction time: 5
- Retraction speed: 100%
- Extraction speed: 50%

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