

### FET INSTALLATION:

- 1) Open the gearbox and remove the stock wiring harness and cutoff lever.
- 2) Install the Spectre FET into the gearbox and screw it down tightly.
- 3) Route the power and motor wires through the gearbox as shown in the above diagram. Note that the motor wires coming out of the gearbox are now REVERSED so the motor in the grip will need to be reversed too.
- 4) For proper cycle detection, shim the sector gear as close as possible to the cycle detection switch underneath it, but NOT close enough for the gear to come in contact with the switch's solder joints. **Be sure to shim BOTH sides of the sector gear otherwise it might slide away from the switch and cause misreads.**
- 5) Apply grease to the sector gear's cutoff cam to prevent wear on the cycle detection switch.
- 6) The installation is complete and the gearbox can now be closed.

### OPTIONAL:

- The anti-reversal latch can be removed, but may require the motor braking setting to be enabled to prevent gear reversal noises. Also precocking will no longer be possible and therefore need to be kept disabled.
- To convert the FET from rear-wired to front-wired, simply route the wires for the battery out the front of the gearbox. This will result in the battery red and black wires becoming uneven but can be ignored or trimmed.

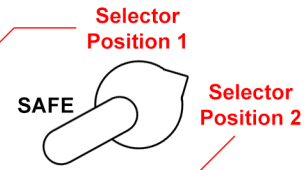
# Programming Mode

## Entering programming mode:

- 1) Disconnect the battery.
- 2) Set fire selector to **SEMI** or **AUTO**.
- 3) Hold the down the trigger while reconnecting the battery.
- 4) The motor will buzz **4 times** to indicate programming mode active.

## Select Function

1	LiPoly Monitoring
2	Digital Fuse
3	Motor Braking
4	Fire Mode
5	RoF Control
6	Precocking
7	Fire Mode
8	RoF Control
9	Precocking



After input, wait 3s until motor buzzes **2 times**

Settings saved, disconnect battery if finished

After input, wait 3s until motor buzzes **4 times**

## Select Settings

### LiPoly Monitoring

1	Disabled
2	2-cell LiPoly or 3-cell LiFePO
3	3-cell Lipoly or 4-cell LiFePO
4	4-cell Lipoly

### Digital Fuse

1	Disabled
2	20 Amps
3	30 Amps
4	40 Amps
5	50 Amps
6	60 Amps

### Motor Braking

1	Disabled
2	Light Braking
3	Medium Braking
4	Max Braking

### Fire Mode

Selector Postion 1 or 2

1	Semi
2	Auto
3	2rnd Burst
4	3rnd Burst
5	4rnd Burst
6	5rnd Burst
7	Semi w/ Ramping
8	Burst-Auto Hybrid

### RoF Control

Selector Postion 1 or 2

1	Disabled
2	10ms delay between shots
3	20ms
4	30ms
5	40ms
6	50ms
7	60ms
8	70ms

### Precocking

Selector Postion 1 or 2

1	Disabled
2	10ms precock after shots
3	20ms
4	30ms
5	40ms
6	50ms
7	60ms
8	70ms

Note: Pressing the trigger more times then the number of options will return the trigger press counter back to 1 and emit a longer motor buzz.

## PROGRAMMING EXAMPLE:

### Setting fire selector to SAFE - 2 BURST - 3 BURST

- 1) Connect battery while holding down the trigger.
- 2) Press trigger **4 times** to select "Selector Position 1 - Fire Mode". Wait 3s until the motor buzzes 2 times.
- 3) Press trigger **3 times** to select "2rnd Burst". Wait 3s until the motor buzzes 4 times.
- 4) Press trigger **7 times** to select "Selector Position 2 - Fire Mode". Wait 3s until the motor buzzes 2 times.
- 5) Press trigger **4 times** to select "3rnd Burst". Wait 3s until the motor buzzes 4 times.
- 6) Disconnect the battery to exit programming mode.

## FACTORY RESET:

To reset all settings back to factory defaults (blue settings), enter programming mode **but do not release the trigger**, keep it pressed for 5 more seconds. The motor will emit a very long buzz when the factory reset is successful and will proceed to programming mode (disconnect battery if finished).

### Factory default settings

Lipoly monitoring, motoring braking, RoF control, precocking = DISABLED  
 Digital fuse = 60A  
 Fire mode configuration = SAFE - SEMI - AUTO

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## Reliability Functions

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### MOSFET Trigger

Higher voltage batteries can wear down an AEG's trigger switch contacts due to electrical arcing. This damage gradually reduces the conductive surface area of the contacts over time, which decreases the AEG's RoF.

The MOSFET circuit prevents this electrical arcing by routing 99.9% of the current away from the AEG's trigger switch.

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### Cycle Completion

In most AEGs the motor stops as soon as the trigger is released. This means releasing the trigger mid-cycle will leave the piston and spring in a compressed state, increasing stress on the gearbox components.

Cycle complete prevents this by always completing the last firing cycle regardless of when the trigger is released. This ensures the piston will be properly reset after each cycle (assuming precocking is DISABLED and no "overspin" is present).

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### Motor Braking

On certain setups the motor does not stop immediately when turned off, instead it continues spinning for a few more rotations due to inertia. This is known as "overspin" and will leave the piston and spring in a compressed state (even with the cycle complete function), increasing stress on the gearbox components.

Motor braking forces the motor to come to an immediate stop by use of "dynamic braking". Sparks can be seen from the bottom of the motor when the brake kicks in. This is normal and lets you know the brakes are functioning properly.

NOTE: Braking will increase motor heat so avoid using a higher setting than needed!

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## Fire Control Functions

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### Fire Modes

Burst Fire (2-5 rounds) - Fires a predetermined number of rounds with each trigger pull.

Semi w/ Ramping - Semi fire. Tap the trigger at least 5 times per second for full auto (adjustable via RoF control).

Burst-Auto Hybrid - Tap the trigger for 3 round burst. Continue holding down the trigger for full auto.

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### Rate of Fire Control

Reduces the AEG's RoF by adding a delay between each shot cycle. Increase the delay value until the desired RoF is achieved.

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### Precocking Control

After each cycle the motor continues spinning for a set amount of time so the piston stops in a compressed/precocked position. This allows the next shot to be near instantaneous. Useful for AEGs with a low cycle rate or sniper builds.

NOTE: Before putting away an AEG please fire at least one non-precocked shot in order to reset a precocked piston and reduce stress on the gearbox. Therefore it is recommended to keep at least one fire select position with precocking disabled for this very task.

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## Electrical Monitoring Functions

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### LiPo / LiFePo Monitoring

Monitors a LiPo or LiFePo battery's voltage level to prevent it from going below the "overdischarged" threshold (typically 3.2V per cell). Will shut down the motor and emit a low voltage warning when this threshold is reached.

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### Digital Fuse

Programmable software-based "fuse" that monitors the current level to prevent it from going above a user defined threshold. Will shut down the motor and emit an overcurrent warning when this threshold is reached. Useful for protecting low output batteries from damage.

## Troubleshooting

Problem	Checklist
No response on trigger pull AND no motor buzz.	<p><b>Battery may be completely drained.</b></p> <ul style="list-style-type: none"> <li>Try recharging or replacing the battery.</li> </ul> <p><b>Possible short circuit in the wiring.</b></p> <ul style="list-style-type: none"> <li>Try running the motor with the FET and wiring entirely outside the gearbox. Do this by simply tapping the trigger switch. If the motor now runs then check for any tears in the wiring and insulate any that are found.</li> </ul> <p><b>Empty mag detection switch is engaged.</b></p> <ul style="list-style-type: none"> <li>Make sure the inserted magazine is not empty.</li> <li>Check if the empty mag detection switch or the levers that engage it are stuck.</li> </ul>
Only fires full auto AND continues firing for 0.5s after trigger is released.	<p><b>Sector gear not engaging the cycle detection switch.</b></p> <ul style="list-style-type: none"> <li>Shim the sector gear closer to the switch. Make sure to shim both sides of the sector gear so it does not slide away from the switch.</li> </ul>
Wrong firing mode on one or more selector positions.	<p><b>Wrong fire modes selected in programming mode.</b></p> <ul style="list-style-type: none"> <li>Reselect the settings in programming mode or perform a factory reset.</li> </ul> <p><b>Selector plate not fully pressing down the fire select switch.</b></p> <ul style="list-style-type: none"> <li>Try manually holding down the switch (release for SEMI, hold down for AUTO) and pull the trigger. If the fire modes are correct then the selector plate is likely off-spec. If the AEG is a clone, try replacing the selector plate with an official Tokyo Marui selector plate.</li> </ul>
Semi fire always cycles twice.	<p><b>If precock is ON: precock timing is set too high for your setup.</b></p> <ul style="list-style-type: none"> <li>Lower the timing setting in programming mode.</li> </ul> <p><b>If precock is OFF: the motor is taking too long to fully stop.</b></p> <ul style="list-style-type: none"> <li>Try enabling or increasing the motor braking setting in programming mode.</li> </ul> <p><b>If braking is already ON: the motor is in need of maintenance or replacement.</b></p> <ul style="list-style-type: none"> <li>Clean the motor's internals and replace the motor brushes if they are worn down. Replacing the motor with a more powerful one will also improve the braking function.</li> </ul>
Stops firing and motor begins to buzz repeatedly.	<p><b>1 buzz per second: low voltage / gearbox jam / torn wiring / poor wire connection</b></p> <ul style="list-style-type: none"> <li>Try recharging the battery and make sure voltage monitoring is not set too high.</li> <li>Make sure the gearbox is not jammed and has sufficient torque to cycle the gearbox.</li> <li>Check wires for any torn insulation that might be shorting against the gearbox shell.</li> <li>Check battery and motor connectors for any broken solder joints.</li> </ul> <p><b>2 quick buzzes per second: digital fuse tripped by high current draw (not due to short circuit)</b></p> <ul style="list-style-type: none"> <li>Make sure the gears are not shimmed too tightly and motor height is not set too high, otherwise the increased load on the motor would also increase current draw.</li> <li>Increase digital fuse setting or use a higher torque gearset or motor.</li> </ul>

## Limited Warranty

BlackTalon Concepts warrants for 3 years after purchase that its products will be free from defects in material and workmanship. BTC will repair or replace any product which is found to be defective under normal use and service, without charge. BTC's obligation to repair or replace shall be the purchaser's sole and exclusive remedy under this warranty.