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Congratulations on your new digital fire control computer! This unit will change the way you use and look at your electric gun. With this short document, you will know all you need to install and use your new **Trigger Master Mark II** (MkII) unit!

*You should have basic soldering skills and feel comfortable with the idea of disassembling and re-wiring your gun before you start this. If you do not, get your local Airsoft gun mechanic to install this for you.*

## Feature List

- 100% electronic control
- Active Braking
- Battery monitoring
- Low-battery warning
- Motor soft-start for reduced wear
- Adjustable motor speed
- Overtemperature and Overcurrent protection and monitoring
- Easier installation and FREE motor connectors with heat shrink!
- Advanced configuration functions (now even easier to use!)
- Fully programmable

Improved functions include:

- x *Semi-auto*
- x *Full-auto*
- x *3-round burst*
- x *Burst-only operation*
- x *Semi-only operation*
- x *Semi-only with shot delay (for Sniper/DM guns)*

*All bursts complete even if trigger is released early!*

## Firing Modes Available

Normal (Safe-Semi-Full)	Fire selector works like a normal gun.
Burst Mode (Safe-Semi-Burst/Full)	When on "FULL", a 3-shot burst is fired. If the trigger is kept down, the gun begins full-auto.
Semi-only (Safe-Semi-Semi)	The gun will only fire semi-auto, regardless of selector switch setting.
Burst only (Safe-Semi-Burst)	When on "FULL", a 3-shot burst is fired. No full auto follows the burst.
Sniper/DM mode	Like Semi-only, but with a 1-second shot delay between each shot to simulate the delay from recoil and careful aim.  (This mode can be useful to allow electric Sniper/DM guns higher FPS limits, when semi-only is not enough of a handicap.)
<i>Semi-Locked (special order)</i>	Semi-only and <u>cannot be changed</u> . Special order only.

## What You Will Do

You will do the following to install and use the **Trigger Master MkII**:

1. Disassemble your gun
2. Install the Trigger Master Mk II (Consult the packing label for an illustrated guide to the kit contents)
3. Power it up for the first time, and train the Trigger Master for your gun's gears and timing
4. Test the operation
5. (Optional) Change any advanced configuration options if you wish

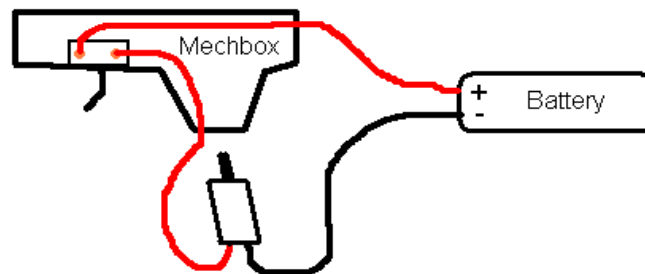
## Installing the Trigger Master MkII

The Trigger Master is small enough to be placed in almost any spot inside an AEG. It can even sit in the same space as a normal fuse holder (replacing the stock fuse) if space is tight.

To install your **Trigger Master MkII** unit, you will need to know how to take apart your AEG and how to modify some wiring.

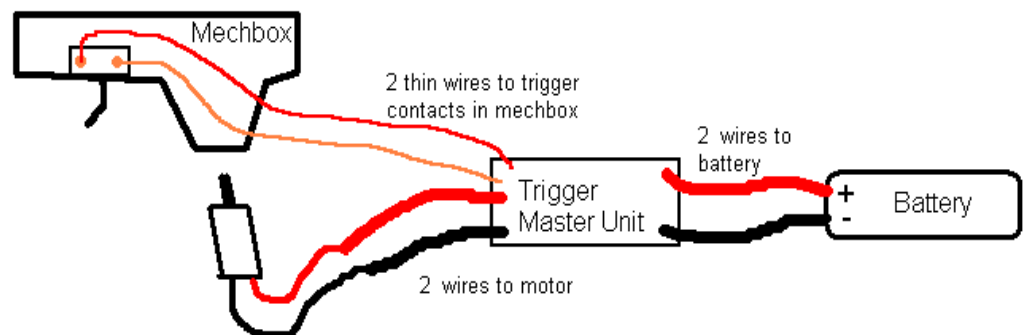
The **Trigger Master MkII** has wires coming out of it. One pair goes to the battery, one pair goes to the motor, and one pair is for the trigger contacts. These wires need to be attached to the battery, motor, and trigger contacts of your gun as shown on the next page:

The diagram to the right shows how a normal AEG is wired.



The trigger switch contacts are wired to connect power directly to the motor when pulled.

This diagram shows how the **Trigger Master** must be wired.



## Wiring Details and Notes

The wires to and from the **Trigger Master MkII** are already *twisted* in pairs. (Diagrams do not show the wires twisted to make it easier to see what wires go where.)

Try to leave as much of the *twist* in the wires as possible when you install, especially closest to the **Trigger Master MkII** itself. The more twist is left in the wires, the better! (Twisting helps prevent electrical noise and voltage spikes due to the large currents used by the motor.)

All of the wires on the **Trigger Master MkII** unit are more than long enough to accommodate any wiring layout you desire, and any custom battery wiring you may have.

*Heat-shrink tubing is included in the **Trigger Master MkII** package for your use in making any wiring modifications to*

your AEG.

**Wiring the Trigger:** Attach the trigger wires from the Trigger Master to the contacts for the trigger in the gearbox - it doesn't matter which wire goes to which side. Depending on the gearbox version, you may be able to use some of the existing wiring in the gearbox.

**Wiring the Motor:** There are two options open to you for the motor wiring. Either use the existing wiring of the gun, or replace the gun's existing wiring with the Trigger Master's "To Motor" wires.

Using the gun's existing motor wiring: A gun's existing wires are pre-fitted and have special connectors for the motor terminals already attached to them. You can splice into the "To Motor" wires from the Trigger Master Unit to take advantage of this. Use the included heat shrink tubing to insulate and protect the splice.

Replacing the gun's motor wiring: Two sets of motor connectors (one pair of angle connectors, and one pair of straight connectors) are included with your Trigger Master MkII. If you choose to replace the motor wiring with the "To Motor" wires from the Trigger Master, cut the wires to the exact length, choose the motor connectors that match your gun and motor, and install them onto the ends of the "To Motor" wires. The connectors can be crimped on or soldered. Heat shrink tubing has been included so you can insulate the resulting connection.

**The Battery:** The "To Battery" wires should be connected to a battery connector. Be sure to match the "+" and "-" wires appropriately. Battery packs used should be rated at least 8.4V and never more than 14.4V.

Low-quality or low-capacity packs can result in unstable power that impairs performance. *Mini sized 8.4V packs will work, but expect them to run down quickly - their low capacity causes unstable power that impairs performance.* The Trigger Master works best with high quality, higher capacity battery packs.

As for the fuse - whether to leave the AEG's fuse in place, or take it out to make room for the Trigger Master unit is up to you. If you need the space to make things fit you can safely remove it - the Trigger Master will automatically provide its own over-current protection by shutting down the motor if it detects a serious problem such as a short.

## Powering Up for the First Time, and Testing

**YOU MUST TRAIN YOUR GUN WHEN POWERING UP FOR THE FIRST TIME.**

1. After connecting a battery, hold the grip of the gun (where the motor is) and in a few seconds you will feel a short vibration, then a longer one. This means that the computer's self-check is complete and you can go to step two. If you do **not** feel the pulses as described, disconnect the battery and check your wiring.
2. Now **train your gun by putting the selector on SEMI and shooting 5 single shots**, one after another. The gun is now timed properly for your battery, gears, and motor.

You should also do this every time you power up your gun to keep the training "topped up". Each time you power up your gun, fire 5 shots with the selector in "SEMI".

3. You can now fire in the following modes. Test each one.  
**Semi-auto** (selector on "Semi")  
**3-Round Burst** (selector on "Auto")  
**Full Auto** (hold trigger down after a burst to start full-auto)
4. If all is well, fire away! You are done!

## Care and Maintenance

- Disconnect the battery when the gun is in storage. (The Trigger Master operates while the battery is connected and will slowly drain the battery if left connected for a long period of time.)
- Leave your finger off the trigger while connecting the battery, or the Trigger Master will be confused and report an error. (To fix this, disconnect then reconnect the battery.)
- For best results, use the highest-quality battery packs you can. The Trigger Master is optimized to get the most out of high-quality battery packs.
- Try to use the same battery packs with the same gun. The Trigger Master uses a highly accurate method of timing for the 3-round bursts, but switching to a much higher or lower voltage/capacity battery can cause timing errors to occur. (To reset the Trigger Master and teach it a new battery pack, do a TOTAL RESET as described in the support section below.)
- 99% of problems can be traced to low batteries! Having strange problems? Charge your batteries with a good quality charger and give it another go!

## Advanced Configuration and Other Technical Info

Many people are perfectly happy with the default SAFE/SEMI/BURST-FULL operation of the Trigger Master MkII.

But if you are one of those people who would like to explore the different options and firing modes available (and you probably are), then here is how to do it!

Remember that you can ALWAYS return your Trigger Master to factory defaults (a total reset), so don't be afraid to play around!

### Advanced Configuration Reference

The following options are available to be programmed into the Trigger Master via a system of trigger pulls and motor grip-pulses for feedback. For advanced users only. Anything you set here will be remembered even if you disconnect the battery.

To enter advanced option programming mode, pull the trigger ONCE after the first short pulse when the battery is first connected to the gun.

You will feel 1 pulse. This means you are in MODE selection.

Pulling the trigger one or more times within the next two seconds will set the gun's function: **(Mode cannot be changed if you have a semi-locked model.)**

*1 Trigger pull = Normal Mode (SAFE-SEMI-FULL)*

*2 Trigger pulls = Burst Mode (SAFE-SEMI-BURST/FULL)*

*3 Trigger pulls = Semi Only (SAFE-SEMI-SEMI)*

*4 Trigger pulls = Burst Only (No full-auto after a burst)*

*5 Trigger pulls = Sniper/DM Mode (Semi only with forced 1 second delay between shots)*

*Note: The first 5 "training" shots in Sniper/DM mode will not have the shot delay.*

If you do not wish to change this parameter, do nothing.

You will now feel 2 pulses. You are in BURST TIME REDUCTION mode.

Pulling the trigger one or more times within the next two seconds will shorten the length of time of a burst. This is useful if the gun happens to be shooting more than 3 shots for a burst, or if you want to manually tweak it to get 2-shot bursts.

*Each trigger pull = 4% shorter burst timing*

**NOTE**

For SEMI-LOCKED Trigger Masters installed on fullauto-only guns (meaning gearboxes that have no semi-auto, e.g. M249) the "Burst Time Reduction" manually *decreases* the length of a single firing cycle. (A semi-locked full-auto gun is technically firing "bursts" that are only one shot long.)

If you do not wish to change this parameter, do nothing.

You will now feel 3 pulses. You are in BURST TIME INCREASE mode.

Pulling the trigger one or more times within the next two seconds will lengthen the length of time of a burst. This is useful if the gun happens to be shooting less than 3 shots for a burst for some reason.

*Each trigger pull = 2% longer burst timing*

**NOTE**

For SEMI-LOCKED Trigger Masters installed on fullauto-only guns (meaning gearboxes that have no semi-auto, e.g. M249) the "Burst Time Increase" manually *increases* the length of a single firing cycle. (A semi-locked full-auto gun is technically firing "bursts" that are only one shot long.)

If you do not wish to change this parameter, do nothing.

You will now feel 4 pulses. You are in MOTOR SPEED REDUCTION mode.

Pulling the trigger one or more times within the next two seconds will reduce the speed of the motor, effectively reducing the rate of fire.

*Each trigger pull = 10% slower motor speed*

If you do not wish to change this parameter, do nothing.

You will now feel 5 pulses. You are in MOTOR SPEED INCREASE mode.

Pulling the trigger one or more times within the next two seconds will increase the speed of the motor, effectively increasing the rate of fire.

*Each trigger pull = 10% faster motor speed*

If you do not wish to change this parameter, do nothing. Factory default is 100%.

You will now feel 6 pulses. You are in ACTIVE BRAKING ENABLE/DISABLE mode.

*Pull the trigger once to enable Active Braking.  
Pull the trigger twice to disable Active Braking.*

To leave this parameter unchanged, do nothing. Active Braking is ON by default.

You will now feel 7 pulses. You are in TOTAL RESET mode.

*If you do not wish to enforce a factory reset, do nothing.*

*Otherwise, pull the trigger and hold it down until you feel a long vibration. This will completely reset the gun's programming and set it back to factory defaults. Disconnect, then reconnect the battery to complete the reset and start the **Trigger Master** fresh.*

Remember, when powering up the gun for the first time after a reset you **must** fire the gun 5 times in semi-auto mode to train it.

You will feel a long pulse when the Advanced Configuration mode is ended. **You must now disconnect and reconnect the battery** to use the new settings.

## Startup Codes Reference

After connecting power, the Trigger Master does a power-up self-check which lasts a few seconds. After the check, the results are communicated by vibrating the motor.

One Pulse	All systems go (normal).
Two Pulses	Battery voltage is less than 7.0 volts. (Battery is really dead!)
Three Pulses	Battery voltage is more than 17.0 volts (too high!)
Four Pulses	Trigger is down during startup. Keep your finger off the trigger, disconnect and re-connect battery. If your finger is <i>not</i> on the trigger, check the trigger wiring for a short.

If the gun did not shut down as a result of an error, a **long** pulse will now signal the user that the gun is ready to fire.

## Post-Firing Codes Reference

After shooting and releasing the trigger, if any of the following conditions were met the user will be signaled by vibrations from the motor:

One pulse	Battery is Low. (Technically, battery has dropped below 85%.) This is a single pulse felt immediately after shooting. If the battery drops much further, the gun will stop firing.
Two pulses	Overcurrent detected. Peak current was over 250 Amps. Motor is stopped immediately and the gun will not fire. (Motor will "click" when trigger is pulled, due to motor startup then immediate shutdown.) Check for shorts or other wiring or motor problem.
Three pulses	Overheating detected (>75 degrees celsius at CPU). Lay off the trigger, disconnect the power, and inspect your gun for faults (or fire).

## Support and Technical Info

Your **Trigger Master MkII** is covered by a 30-day warranty against manufacturing defects. This warranty does not extend to damage caused by improper installations.

If you need technical support or have a warranty concern, please go to <http://unconventional-airsoft.com> or email [store@unconventional-airsoft.com](mailto:store@unconventional-airsoft.com).

## About the Trigger Master

The **Trigger Master** is based on the excellent SW-COMPUTER and SW-EVOLUTION by Terry Fritz, and available from <http://extreme-fire.com>.

The hardware and software used is **open source**. You can obtain copies of the hardware design and source code at <http://unconventional-airsoft.com>. You are absolutely free to make and modify your own as long as you keep the hardware and software design free.

*For additional help and the latest documentation, you can always go to <http://unconventional-airsoft.com/store/> or email [store@unconventional-airsoft.com](mailto:store@unconventional-airsoft.com).*



## Advanced Configuration Quick Reference *(To cut out and keep with you)*

Disconnect and re-connect battery. Pull trigger once after the first pulse (but before the second long one.)		
One pulse (Firing Mode)	1. Normal (Safe-Semi-Full) 2. Burst (Safe-Semi-Burst/Full) 3. Semi-only	4. Burst only (no full auto) 5. Sniper/DM (semi-only with forced shot delay)
Two pulses (Shorter bursts)	4% shorter burst time for each trigger pull.	
Three pulses (Longer bursts)	2% longer burst time for each trigger pull.	
Four pulses (Motor speed down)	10% slower motor speed (and therefore lower rate-of-fire) per trigger pull.	
Five pulses (Motor speed up)	10% faster motor speed per trigger pull. (Default is 100%)	
Six pulses (Active Braking)	1. Active Braking is ON (default) 2. Active Braking is OFF	
Seven pulses (Factory Reset)	<b>Pull and hold</b> trigger until long pulse is felt to return unit to factory defaults.	
Long pulse	End of advanced configuration. Disconnect and re-connect battery to use new settings. Remember to fire 5 shots in semi-auto after connecting power to your gun for training the timing.	

## Firing Modes Quick Reference

Name	Selector Switch Function	Description
Normal	SAFE - SEMI - FULL	Selector works like on a normal gun.
Burst	SAFE - SEMI - BURST/FULL	When selector is on FULL, a 3-round burst is fired. If the trigger remains held down after the burst, full-auto begins after 0.5 seconds.
Semi-Only	SAFE - SEMI - SEMI	Only one shot per trigger pull regardless of selector setting.
Burst Only	SAFE - SEMI - BURST	When selector is on FULL, the gun fires a 3-round burst. The burst does <u>not</u> become full-auto if the trigger is held down.
Sniper/DM	SAFE - SEMI - SEMI	Only one shot per trigger pull. 1 second of "dead time" is forced between each shot. <i>(Note: The first 5 training shots after powering up the gun do not have a shot delay)</i>

## Tips and Reminders

1. After connecting a battery, there is a short pulse then a long one. The gun is now ready.
2. Always shoot 5 shots with the selector in "SEMI" after powering up the gun. This is to train the Trigger Master on your gun's timing to make sure it is up-to-date.
3. The Trigger Master uses a small amount of power when plugged in. To prevent a dead battery, unplug battery when not in use.
4. One short vibration felt immediately after a shot is fired is the Low Battery Warning.