



## **CYCLONE DUAL-SECTOR GEAR SYSTEM INSTALLATION GUIDE**

(Version 2.2)

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## **I. Introduction**

A traditional sector gear retracts the piston assembly once per sector gear cycle. However, not all airsoft electric guns (AEGs), specifically shorter barreled ones, require the full cylinder air volume for BB propulsion. The ported and tapered cylinder units were conceived to improve the energy efficiency in such systems.

The Cyclone Dual-Sector Gear System takes the concept another leap forward by significantly shortening the piston stroke distance and implementing an additional sector on the sector gear. The evolutionary design provides two piston strokes per sector gear cycle. This allows short barreled AEGs, with barrels up to 363mm long, to gain improved energy efficiency, quicker trigger response, and higher rate-of-fire at the same time.

Due to the shorter piston stroke of the design, the energy stored and released from the spring is decreased in the process. As such, a higher rate spring has to be used with the system to achieve similar muzzle energies as that of the traditional full piston stroke design. Optional piston spacers or spring guide spacer may be used along with the system for increased pre-compression of the spring for higher energy output as well.

A properly implemented Cyclone Dual-Sector Gear System provides unprecedented performance and energy efficiency compared to the traditional designs. Extremely high voltage battery packs are no longer the necessities for attaining lightning trigger response and high rate-of-fire. This also opens up more performance headroom for AEGs with limited battery storage space.

## **II. Requirements**

Proficient knowledge and skills of AEG mechbox disassembly, assembly, and operation are required.

### **Components**

1. Battery pack: 30-Amp continuous discharge rate or better.
2. Gears: Steel standard or high speed ratio spur cut step and bevel gears when pairing with stand-alone Cyclone Dual-Sector Gear (DSG).
3. Inner barrel: 363mm or shorter.
4. Mechbox: Tokyo Marui or specification compliant mechbox.
5. Piston: Rack gear with steel 8<sup>th</sup> tooth (8T DSG), 9<sup>th</sup> tooth (9T DSG), or with full steel teeth.  
Half-width rack gear required for GS-B-C2 (2021), GS-TP-C2, GS-B-SR-C2, & GS-T-SR-C2.

### **III. Compatible Parts**

#### **1. Bearings/Bushings**

- Hardened steel or alloy bushings with proper high temperature high viscosity grease applied to the bushing bores
- Large diameter (8mm or greater) unshielded ball bearings with proper high temperature high viscosity grease applied to the balls, raceways, and bearing bores

#### **2. MOSFET devices**

- Must be capable of handling 400+ Amps of startup current and 45+ Amps of sustained current

#### **3. Motors**

- Neodymium or samarium-cobalt permanent magnet equipped motors

#### **4. Pistons**

- Hardened full steel rack gear recommended

### **IV. Incompatible Parts**

#### **1. Bearings/Bushings**

- Small diameter ball bearings (7mm or smaller)
- Non-hardened bushings
- Plastic bushings
- Inadequately lubricated bores

#### **2. Mechbox**

- Non-TM-specification-compliant mechboxes

#### **3. Motor**

- Ferrite or low strength magnet equipped motors

#### **4. Pistons**

- Aluminum teethed pistons

## **V. Installation Procedures**

### **1. Tappet Plate**

The tappet plate and the piston both require modifications.

Normal tappet plates do not function correctly when paired with Cyclone Dual-Sector Gears. The design of the Dual-Sector Gear system simply prevents the original tappet plates from providing the attached nozzles sufficient time to stay sealed with the inner barrels for complete air transfer.



As such, tappet plate modification is necessary. Simply measure and mark off a distance of 11mm from the base of the tappet plate. Then snip off the excess portion as shown below.



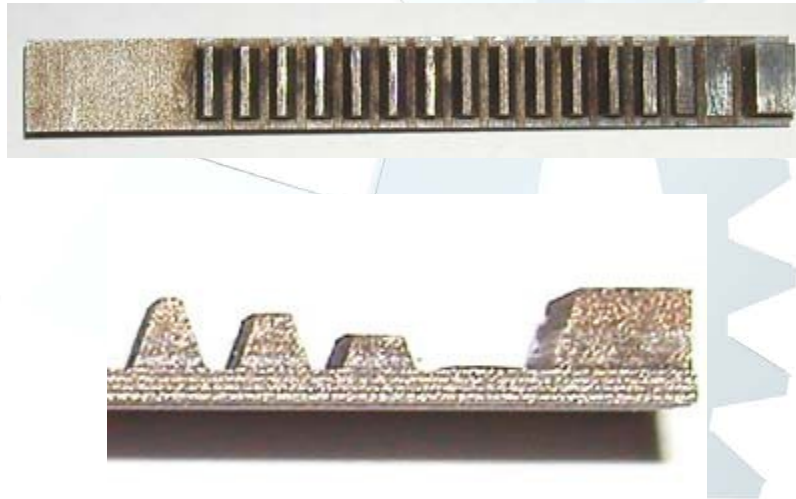
The modified tappet plate would then be able to function properly with the Dual-Sector Gear.





## 2. Piston

The piston, on the other hand, requires teeth removal from the large catch tooth side to decrease the chance of sector gear engagement errors from the higher cyclic rate. A piston with full steel rack gear is highly recommended due to the less difficult modifications involved. At the bare minimum, the second tooth has to be removed, as shown.



For more reliable operations, calibrating the sector gear to piston rack gear's angle of engagement (AoE) is highly recommended as well. The AoE may be adjusted either by shimming between the piston head and the piston, or by increasing the thickness of the buffer material (rubber or foam padding) on the cylinder head. Partial or full removal of the third and fourth teeth may be necessary to avoid sector gear interference.

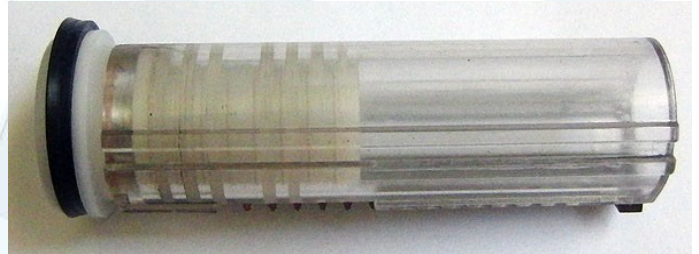


It is also vital to keep the piston assembly mass as light as possible for better performance and reliability. As such, piston weight blocks should be avoided whenever possible. For more adventurous tuners, the piston body may be ported to further decrease the piston assembly mass.

### 3. Piston Spacers

For those who purchased the optional piston spacers, please insert the spacers into the piston. It may take a little effort to push each spacer into the piston base, as the spacers are designed to be friction fit to the piston for better durability. When using the 9-tooth version of the Cyclone Dual-Sector Gear, please insert only 7 spacers into piston instead of the 8 spacers used for the 8-tooth version.

The piston spacers may be used in traditional short stroked systems as well. Please install only 1 spacer for each tooth removed from the sector gear. Installing more spacers than the number of teeth short stroked should be avoided to prevent component failures.



Please also do not use the piston spacers in combination with the spring guide spacer. Doing so will lead to severe damages to the mechbox components.

### 4. Spring Guide Spacer

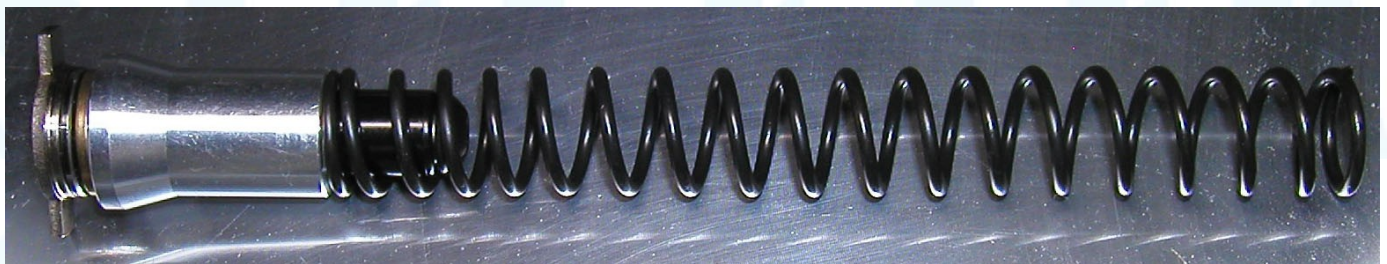
For those who purchased the optional spring guide spacer, simply slip the spacer down the guide rod on the spring guide as shown. This would pre-compress the spring to produce higher energy output when installed. Please ensure that the wider end of the spacer caps over the spring guide's thrust bearing while the narrower end engages the spring. Installing the spacer in reverse will jam the system and cause component failures.

Please do not use the spring guide spacer in combination with the piston spacers. Please also do not utilize the spring guide spacer in traditional full stroke systems. Doing so will lead to severe damages to the mechbox components.



### 5. Cyclone Specific Spring (Discontinued)

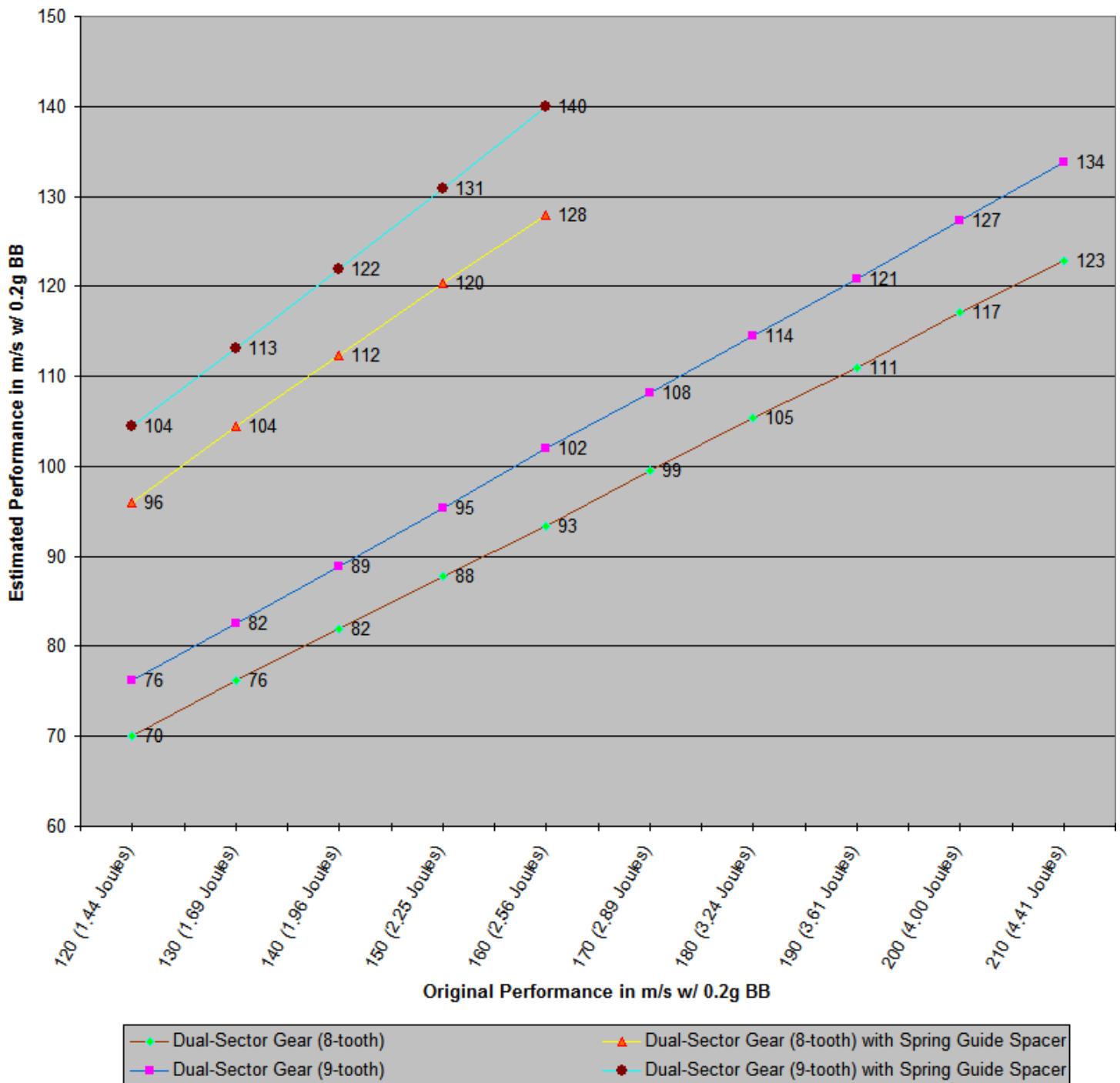
The optional Cyclone specific short spring requires the use of either the piston spacers or the spring guide spacer. Please install the spring with the tighter wound coil end facing the spring guide, as shown below:



Please do not install the Cyclone specific spring without either of the spacers nor use it in full stroke systems. Due to the short length of the spring, doing so may cause severe piston assembly bounce and lead to component damages.



## Spring Performance Chart



Actual performance may vary due to the variety of components used. In a Cyclone Dual-Sector Gear System without the spring guide spacer, the spring can produce anywhere from 30% to 50% of the energy producible in a traditional full stroke setup. When the spring guide spacer is used, 60% to 70% of the spring's energy can be achieved. *Please also note that the original performance figures listed are actual spring performance and are not indicative of the manufacturers' spring ratings.*

## **VII. Troubleshooting, Support, & Warranty**

Please refer to the Gear Set Installation Notes document (<http://www.siegetek.com/instructions/notes.pdf>) for known potential issues.

For general troubleshooting and support, please contact [support@siegetek.com](mailto:support@siegetek.com).

Due to the mechanical wear and tear nature of gears and our lack of control over user installation quality, all sales are final. A conditional 1-year repair or replacement warranty from the date of product receipt is offered to cover manufacturing defects. No other warranty of any kind is provided. Manufacturing defects include only unused condition traits, such as cracks and fractures, which prevent proper operation of the gears. Please note that machine marks, assembly marks, and other cosmetic blemishes are not considered as defects since they do not hinder product performance. Furthermore, damages due to incorrect installation, configuration, and usage are not covered under the warranty.

For warranty service, the original buyer must contact [support@siegetek.com](mailto:support@siegetek.com) to arrange the return of the defective gear. Replacement will be shipped out as soon as the defective gear is received. International customers are responsible for the return shipping as well. A 30-day repair or replacement warranty (or the remainder of unit warranty, whichever is longer) applies to the replacement.