

# APEX Feature Overview

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## Drive

- **START SPEED**  
1=Slow 12= Fast  
Initial start-up speed as the trigger first begins to move the car
  - **PUNCH**  
Clockwise = More Punch
  - **TOP SPEED**  
1= most reduced 12= Maximum  
Top speed limiter, bypassed using the BOOST button on the handle.
  - **TORQUE**  
Almost like adjustable valve timing or exhaust pipe tuning on real cars.
  - **ACCELERATE**  
1= Slow 12 = Fast  
Rate of power increase after trigger is squeezed to give more speed.
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## Brake

- **BRAKES**  
1= Minimum 12= Maximum  
Maximum level of braking after APPLY RATE time has passed.
  - **APPLY RATE**  
Clockwise = Fast  
Rate at which the Brakes will be applied up to the level set on BRAKES.
  - **HOLD**  
1= Minimum 12=Maximum  
Speed to which the car slows to before brakes are released.
  - **RELEASE DELAY**  
Clockwise = longer Delay  
Rate at which the Brakes are released from HOLD
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## Handle Controls

- **END SPEED**
- **CURVE**
- **CURVE MODE SWITCH**
- **COAST BRAKE**
- **BOOST**
- **THROW**

# APEX Features and User Guide

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## Main Control Box Settings

### Drive:

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**START SPEED:** Initial starting speed as the trigger is first squeezed.

1-12 slow – fast (high ohms to low ohms)

- This adjustment is similar to controllers with a sensitivity or 'Ohms' adjustment and enables all cars to respond to the trigger movement over a useful range. Seamless integration with the Curve, Punch, Top Speed, Acceleration and Torque controls.
  - Once the start speed is decided, the rest of the power delivery is divided into 26 steps across the controller element. For a fast start speed then, the change in power between each of the segments will be small, while for a slower start speed it will be greater.
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**TOP SPEED:** Maximum speed limiter.

1-12 slower – maximum

- Ideal where a track has a long straight with tight, twisty, difficult sections. Limiting the maximum speed enables the motor to be tamed for those twisty parts and banked or sweeping corners on the track, to allow more confident trigger action without the car flying off the track.

**BOOST:** (Button on the controller handle)

When you come around to the long straight, you just squeeze the trigger to maximum as normal, but at the same time press the BOOST button on the back of the handle to give full speed again. When released the speed returns to the limited setting you chose. The extra power feeds in at the rate set by the ACCELERATION control so there are not sudden surges in speed. If you have released the trigger, then the Boost button has not effect.

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**PUNCH:** Trigger position output overshoot.

Turn clockwise for more punch.

- This is most effective with the TORQUE dial turned up a bit. (Lower operating frequency)
- For high punch settings, the controller delivers up to 20% more power for a given trigger position, until the motor has reached the speed expected for that trigger setting. (It cannot provide more power than the track power supply will provide)
- As the motor speed increases, that extra power is proportionally removed to exactly match the natural acceleration of that particular motor, so that the final motor speed matches the trigger position automatically.
- If you have a sluggish motor, then increasing the PUNCH will liven it up to improve performance.

If the motor is a lively one anyway, the effect is less noticeable and may cause jerky car response.

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**FREQUENCY / TORQUE:** General motor aggressivity.

Turn clockwise for higher frequency.

- This changes the internal operating frequency of the PWM drive and enables you to fine tune the frequency to match the particular motor being used.  
An analogy might be tuning an exhaust pipe length for performance at certain RPM.
  - Because we're using 3 pole brushed motors, there is a frequency of commutator rotation at any given RPM that can be matched by the PWM frequency adjustment. It's quite a subtle adjustment, but is noticeable mostly in twisty section of technical tracks where suddenly the ease of getting through the section is mastered with a combination of the frequency, punch, start speed and acceleration controls.
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**ACCELERATION:** Rate at which power is delivered to the motor.

1-12 Slow - Fast

- If the trigger is squeezed rapidly from a slow speed up to full throttle, then this control helps to keep the front of the car from lifting the guide out of the slot.
  - It helps to reduce the need for a front mounted weight to hold the nose down, so allowing a lighter car overall.
  - Helps with loss of traction out of the corners and losing time down a straight due to snaking or shuddering.
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## Brake:

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**BRAKE:** Amount of braking force applied when the trigger is released.

1-12 Gentle - Maximum.

- Applies a load to the motor during braking to change the rate the motor slows down.
  - Works in conjunction with the Apply Rate control (described below)
  - Allows better corner entry speed so control is smoother when the power is re-applied.
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**APPLY RATE:** Rate at which the Brakes are applied up to the setting on BRAKE

1-12 Slow – Fast

- With a real car one applies pressure to the brake pedal rather than stamping on it, so this control provides that function for slot cars.
  - The brake will be applied at the chosen rate up to the level set on the Brake dial.
  - Brakes will remain applied until the HOLD function takes effect. (Described below).
  - This provides a smooth transition from braking ready for when you re-apply power.
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**HOLD:** Time for which the brakes are applied before they release.

1= Minimum 12=Maximum

- The HOLD measures the speed of the car under braking and at the preset level will release the brakes to allow the car to coast.
  - The delay time to gradually release the brakes is set using the RELEASE DELAY below.
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**RELEASE DELAY:** Rate at which the Brakes are released from HOLD

Clockwise = longer Delay

- The braking strength begins to reduce once the car speed matches the HOLD level.
- The Release Delay determines the rate at which the brakes release.

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Graphical representations of the DRIVE and BRAKE features are at the end of the text descriptions.

## Handle Controls

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### **CURVE:**

Anti-clockwise bends the curve downwards.

Clockwise bends the curve upwards.

- This sets the element feel by adjusting the shape of the throttle response curve. (See the graphical images that represent this curve change)
  - The setting should be thought of as a sensitivity control since it directly affects the amount of power over the middle section of the trigger wiper element.
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### **CURVE Mode Switch:**

- In the + position, the Mode Switch turns on the positive, upward bend, to the CURVE control pot. (Centre position on the pot is Linear)
  - In the – position, the Mode switch supplies only a negative, downward bend, to the CURVE control pot. (Fully clockwise on the pot is Linear)
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### **END SPEED:**

Anti-clockwise = Low END SPEED with a larger jump in speed at full throttle

Clockwise = higher END SPEED with a smaller jump in speed at full throttle.

- This sets the size of the jump in speed from the second last to the final segment on the wiper element. As you squeeze the trigger the motor speed changes gradually as set by the CURVE and START SPEED controls until it reaches the second last segment where the END STEP control sets the size of the final jump up to full speed as set via the TOP SPEED adjustment.
  - Turning the control clockwise, the smaller the jump in speed, so more power is fed to the rest of the element. Turning the control counter-clockwise sets a larger jump in speed so less power is fed to rest of the element. The idea is to give more control for difficult tracks and particularly those with a high voltage power supplies. While you are running around the difficult sections the top power is held back until the very last segment when you are ready for full speed when you pull the trigger all the way.
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### **COAST BRAKE:**

Clockwise max Brakes.

- In COAST mode this control becomes a Brake Simulation adjustment suitable for those cars that stop almost immediately even with no brakes applied.
  - The idea is that though the trigger has been released, the power fed to the motor decreases at a steady rate set by this control. Once the controller is no longer feeding power, the normal brakes will be applied at the rate you have set under BRAKE CONTROL as above. (For these cars the BRAKE will usually have be set to minimum)
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### **SPRING TENSION AND THROW ADJUSTMENTS:**

Spring Tension Adjustment:

- Under the trigger is a small screw that pushes on a tension cam arm to pull on the return spring.
- Turn clockwise to increase the spring tension.

(You will see the cam moving as you turn the screw)

Trigger Throw Adjustment: (Not currently being fitted since almost no one uses these)

- Accessed through the rear fascia panel under the BOOST button. It changes the Brake stop position of the trigger when released. This shortens the throw of the trigger. For endurance racing the shorter travel reduces hand fatigue due to the smaller motions that the fingers need to make to go from braking to maximum speed again.
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#### **POWER and BRAKE LEDs:**

- When full power is applied the Blue Power LED extinguishes, but remains illuminated at all other times.
- When using the TOP SPEED limit settings and the trigger is at full throttle, pressing the BOOST button will extinguish the Power LED confirming that the switch is OK and the feature is working correctly.
- The Brake LED will illuminate while the brakes are active. The level of illumination is a function of the settings for brake strength and delays in application and release.

#### **FUSE Illumination:**

- The fuse is a standard automotive blade style, which have differently coloured plastic housings according to the fuse current rating.
  - If the fuse blows it is illuminated from inside and light shines through the fuse plastic casing to be visible through the small hole in the right hand side of the control box. The colour of the light seen depends on the colour of the fuse plastic casing.
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#### **Maintenance:**

- Once you feel a scratchy operation or can hear squeaking then it is advisable to apply a small amount of switch cleaner/lubricant (such as Servisol Super 10) to the wiper element board. This will keep it smooth, with a light trigger action, while maintaining good conductivity.
- The plug-in cable can be removed each time it is packed away, but is not essential. If you have trouble with the cable then a replacement can be bought from the web site under 'spares/cable'

