SCP-3

Electronic Controller

OXIGEN SLOT.IT DIGITAL Ready 2.4GHz

wireless software updates



Reprogramming Procedures for SCP-3 and SCP-2 Controllers

The manual is applicable to the SCP-1 1.1 (not 1.0) as well

Understanding trigger calibration

Unlike traditional slot car controllers, the **SCP series continuously measures the trigger position** instead of relying on mechanical contacts or end-of-travel switches.

Inside the trigger is a small permanent magnet. As the trigger moves, the magnetic field generated by this magnet is measured by a **Hall-effect sensor**, whose output is read by the controller's microprocessor.

Because there are no sliding electrical contacts between the trigger and the controller electronics, there is no contact wear, no dust generated by friction, and no change in electrical characteristics over time. This contactless design contributes to the long-term reliability and consistency of the SCP controllers.

The SCP firmware continuously monitors the Hall sensor and automatically detects the fully released (**Rest**) and fully pressed (**Full**) trigger positions. Every controller is factory calibrated and requires no adjustment under normal conditions.

The Base Trigger Map
The Hall sensor does not measure trigger angle directly. Instead, it measures the strength of the magnetic field produced by the trigger magnet. The controller must therefore translate each sensor reading into a trigger position before it can calculate the power to be delivered to the car.
You can think of this process as a series of translations:

```
Trigger movement
        ↓
Magnetic field
        ↓
Hall sensor reading
        ↓
Base trigger map
        ↓
Trigger position
        ↓
Controller power curve
        ↓
Power delivered to the car
```

The **Base Trigger Map** is the relationship between the Hall sensor reading and the logical trigger position. This mapping forms the foundation upon which every SCP operating mode and power curve is built.

A small change to this base mapping can noticeably alter how the controller feels, even though none of the controller's curves or driving modes have been modified. For this reason, these settings are intended for experienced users only.

The factory calibration establishes this base map for the specific magnet installed in each controller. Whenever the trigger magnet is replaced, the base mapping must be recalibrated.

Since firmware version **1.1** (November 2010), the SCP also allows advanced users to modify this mapping manually. Rather than changing the trigger magnet itself, this function lets the controller behave **as if a different magnet were installed**, allowing the trigger response and power delivery to be fine-tuned to suit individual driving preferences.

Understanding the Trigger Curve

The Base Trigger Map is defined by four reference points:

- **Rest** – sensor reading with the trigger fully released.
- **15°** – intermediate calibration point.
- **25°** – intermediate calibration point.
- **Full** – sensor reading with the trigger fully pressed.

The **Rest** and **Full** values are determined automatically during calibration and depend on the physical trigger and magnet. They cannot be edited.

The **15°** and **25°** points are user-adjustable and determine how the controller interprets the trigger movement.

For example, assume the trigger produces the following Hall sensor readings:

```
Released                        Fully pressed

Rest ----- 15° ----- 25° ----- Full
 30         80        140       220
```

These numbers are not motor power values; they are simply reference readings from the Hall sensor.

If the **15°** value is reduced from **80** to **60**, the controller reaches that reference point earlier during the trigger pull. Consequently, more power is delivered with less trigger movement, making the controller feel more responsive.

Conversely, increasing the value means the trigger must travel farther before reaching the same logical position, producing a smoother and more progressive response.

Although this may appear counterintuitive at first, the controller is not changing the motor power itself. It is changing **how the Hall sensor readings are interpreted as trigger position**.

The values must always remain in ascending order:

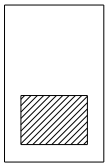
```
Rest < 15° < 25° < Full
```

This ensures that trigger position increases smoothly throughout the trigger travel.

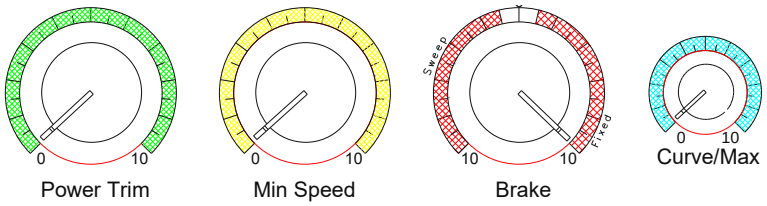
Finally, the **Rest Area** and **Full Area** settings define the tolerance around the fully released and fully pressed trigger positions. Increasing these values makes the controller more tolerant of small fluctuations in the Hall sensor reading, while reducing them provides more precise trigger detection.

Setting up the SCP for programming mode

1. Ensure that the SCP controller is powered off
2. Locate the LIN/CRV switch and set it to 'CRV' (Curve mode).



3. Adjust the knob settings as per the following image:



Note: *The primary adjustment is the small blue* ***Curve/Max*** *knob. This control sets the width of the* ***Rest*** *and* ***Full*** *detection areas (also referred to as the dead bands), expressed in* ***bits****. These are the ranges around the fully released and fully pressed trigger positions within which the controller considers the trigger to be at* ***Rest*** *or* ***Full****, turning on the corresponding red or green LED.*

Turning the knob clockwise increases the width of these detection areas, making the controller more tolerant of small variations in the Hall sensor readings. Turning it counter-clockwise reduces the width, providing more precise trigger detection.

For normal operation, a setting corresponding to 1 or 2 bits is recommended, as it offers the best compromise between stability and precision.

Unless you have a specific reason to modify this parameter and fully understand its effect, it is recommended to leave the **Curve/Max** knob at its default position (0, fully clockwise), corresponding to a bandwidth of 2 bit. Advanced racers may want to set it to 1.

Enter programming mode

1. **Preparation:**
   - Ensure the controller is unplugged.
   - Ensure the track has power.
2. **Button Press Sequence:**
   - Press and hold the three buttons (arrow up, arrow down, round button) on the controller simultaneously.
   - While keeping these buttons pressed, pull the trigger to its maximum position.
3. **Entering Programming Mode:**
   - While continuing to hold the buttons and keeping the trigger pulled, plug the controller back into its socket.
   - Once the controller is plugged in, verify the power to the track is on.
4. **LED Confirmation:**
   - If the SCP controller is successfully in programming mode, all the LEDs on the controller should now be illuminated: green LED on the left and bi-color (red and green, appearing as orange) LED on the right.

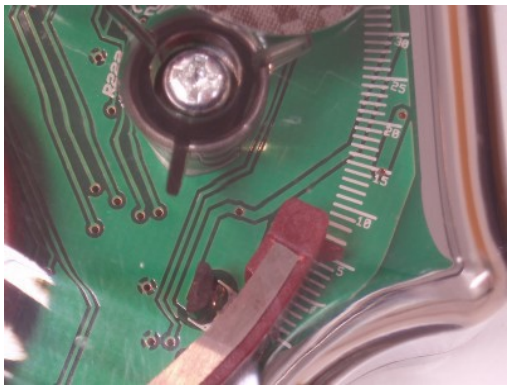


   - If the LEDs do not light up as described, unplug the controller, release the buttons and trigger, and repeat steps 2 to 4 until the LEDs display correctly indicating that the controller is in 'programming' mode.
5. **Note:**
   - The reference points can only be recorded when the controller is in 'programming' mode, indicated by all LEDs being ON as described.

This is the first of four points that need to be entered to complete the reprogramming process.

Recording the 0° (rest) point

1. **Preparation:**
   - Ensure the SCP controller is in 'programming' mode following the previous procedure.



2. **Setting the Zero Point:**
   - The 'zero' (rest) point is identified when the trigger is in the fully released position, typically representing the braking state.
   - Completely release the trigger to position it at the 'zero' (min) point.
   - Press and release the round button.

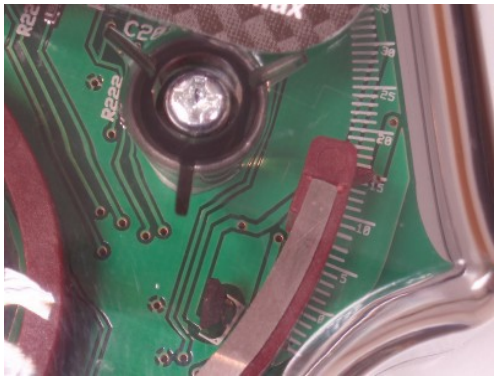
3. **LED Confirmation:**
   - Upon executing the above step, the left green LED should remain illuminated, the green light on the bi-color LED should turn off, and the red light on the bi-color LED should stay on. This LED state—left LED green, right LED red—confirms the successful recording of the 'zero' point.



4. **Note:**
   - It's imperative to keep the trigger fully released when recording the 'zero' point. Any deviation from the 0° position can result in inaccurate mapping.
   - However, you have the flexibility to adjust the width of the 'zero' area by using the small blue knob labeled Curve/Max. This adjustment affects both the Min and Max areas—the zones where the controller interprets the need to brake or deliver maximum power.
   - The blue knob setting impacts the width of these areas:
     - A setting lower than '2' may cause the controller to malfunction.
     - A setting of '2' could work well, though '3' is the standard setting (default when blue knob is set to zero).
     - Settings greater than '3' can be experimented with based on driving style, but it's advised not to exceed a setting of '4'.
   - If these adjustments seem complex, or you are unsure of the process, it's advisable to set the blue knob to zero (default) to avoid potential controller malfunctions.

Recording the 15° point

1. **Preparation:**
   - Ensure the SCP controller remains in 'programming' mode from the prior procedure.
2. **Setting the 15° Point:**
   - Press the trigger until the small plastic arrow indicating the angular position reaches the mark '15' on the white scale.
   - While maintaining the trigger in this position, press and release the round button.



3. **LED Confirmation:**
   - Following the above step, the left green LED should remain illuminated, the green light on the bi-color LED should turn on, and the red light on the bi-color LED should turn off. This LED state confirms the successful recording of the 15° point.



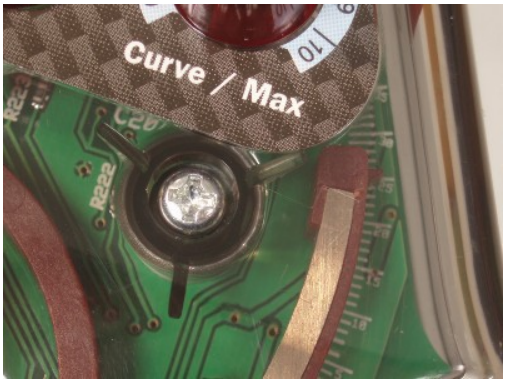
4. **Note:**
   - There is an option to vary the 15° point mapping by positioning the small plastic arrow at a value other than 15° during this step.
     - A higher value (e.g., 16°, 17°) will result in a softer response in the initial part of the trigger's range.
     - Conversely, a lower value (e.g., 14°, 13°—not recommended to go lower than 13°) will yield a sharper response.
   - Adjusting this point allows for some customization in the trigger response, catering to personal driving style and preferences.

By following the above procedure, you can successfully record the 15° point on your SCP controller and make adjustments to suit your driving preferences.

This is the second of four points that need to be entered to complete the reprogramming process.

Recording the 25° point

1. **Preparation:**
   - Ensure the SCP controller remains in 'programming' mode from the prior procedures.



2. **Setting the 25° Point:**
   - Press the trigger until the small plastic arrow, indicating the angular position, reaches the mark '25' on the white scale.
   - While maintaining the trigger in this position, press and release the round button.

3. **LED Confirmation:**
   - Following the above step, the left green LED should turn off, while the green light on the bi-color LED should remain on. This LED state confirms the successful recording of the 25° point.



4. **Note:**
   - There is an option to vary the 25° point mapping by positioning the small plastic arrow at a value other than 25° during this step.
     - A higher value (e.g., 26°, 27°) will result in a softer response in the middle part of the trigger's range.
     - Conversely, a lower value (e.g., 24°, 23°) will yield a sharper response.
   - Adjusting this point allows for further customization in the trigger response, catering to personal driving style and preferences.

This is the third of four points that need to be entered to complete the reprogramming process.

Recording the Max ('Full') point

1. **Preparation:**
   - Ensure the SCP controller remains in 'programming' mode from the prior procedures.



2. **Setting the 'Max' Point:**
   - Press the trigger fully to reach the 'full throttle' position.
   - While maintaining the trigger in this position, press and release the round button.
3.
4. **LED Confirmation:**
   - Following the step above, the right red LED will illuminate for 1 second.
   - Subsequently, the green LEDs will start blinking, indicating that the programming is finished.





... LEDs start blinking green

5. **Completion:**
   - With the blinking green LEDs, programming is now complete. The controller can be switched off at this point.

Additional Notes:
This reprogramming procedure can be repeated to readjust the base mapping, and **must** be performed if the trigger magnet is replaced.

Once familiar with this reprogramming technique, adjustments to the SCP controller can be made as necessary to better suit personal preferences or to adapt to new hardware configurations.

For the bleeding edge users looking to further customize the trigger's run, modifications such as inserting spacers or filing away plastic to create a shorter run trigger can be done. However, reprogramming the controller is essential once these modifications are made.

Before attempting any advanced modifications that might void your trigger's warranty, ensure a thorough understanding of this document and a level of proficiency with the controllers' programming is achieved.

In any case....



press the large and friendly orange button and contact



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