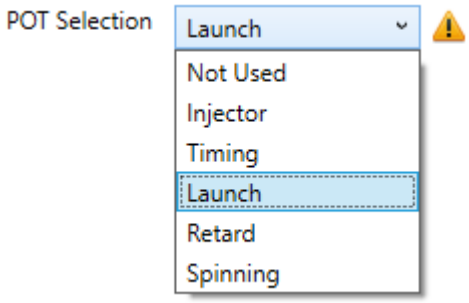
Spitronics - ECU - POT Sensor - Guide

1. Overview

The POT (Potentiometer) sensor is a universal input that allows the user to select and adjust different features.



⚠ All selections use the same input and can only be used one at a time.

If Android capability is available, this setting can be changed from a mobile device to allow multiple features to be used when required.

👉 This is a critical setting and may influence wiring connections on some products

👉 If this input is not used, select **Not Used** to free up processor resources

Some features (such as Injector, Timing, and Retard) also require a value setting. The POT value is used for this purpose.

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2. Available Features

- Injector
- Timing
- Launch
- Retard
- Spinning

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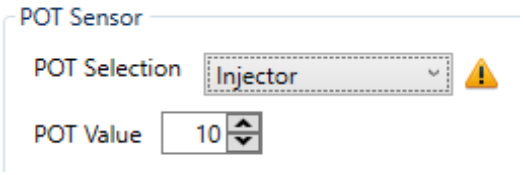
3. Injector

The Injector setting adjusts fuel delivery by adding or subtracting a percentage.

👉 The POT must be centred to have no effect

This is useful in race vehicles where the driver monitors AFR and makes live adjustments.

Example:



If the POT value is set to 10:

- Clockwise → +10% fuel
- Counterclockwise → −10% fuel

⚠ This is a tuning tool only and should not be used permanently.

Unintended adjustments can damage the engine.

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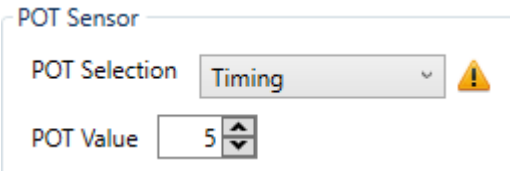
4. Timing

The Timing setting allows ignition timing to be advanced or retarded.

👉 The POT must be centred to have no effect

Used for real-time tuning, especially in racing applications.

Example:



If the POT value is set to 5:

- Clockwise → +5° advance
- Counterclockwise → −5° retard

⚠ A knock detection system is required to prevent engine damage

⚠ This is a tuning tool only and should not be used permanently

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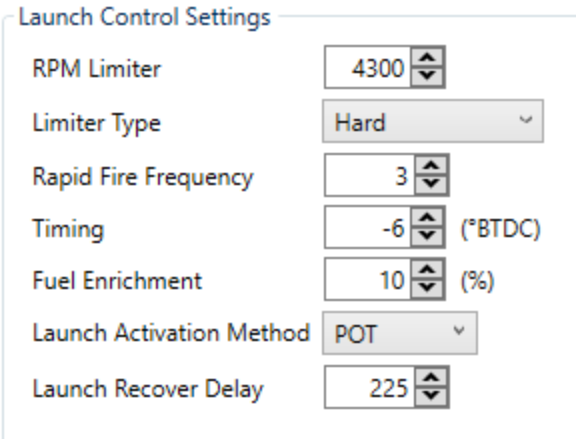
5. Launch Control

Launch Control allows the engine to build boost while stationary.



This is achieved by:

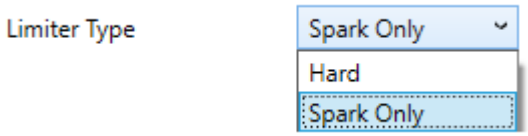
- RPM limiting
- Fuel enrichment
- Timing retard

👉 Timing and fuel are applied 500 RPM before the limiter

If RPM exceeds the limiter:

- Spark is cut

Limiter Types



Hard Limiter

- Cuts fuel and spark completely
- Resumes when RPM drops

⚠ May cause lean conditions with split sequential injection

Spark Only Limiter

- Cuts spark only
- Fuel remains active

👉 Provides more consistent mixture

5.2 Additional Launch Settings

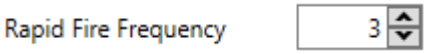
Timing

- Range: +30° BTDC to −30° ATDC
- Retard increases exhaust energy for turbo spool

Fuel Enrichment

- Adds fuel for exhaust flame and turbo response

RapidFire



- Produces random spark events above limiter
- Creates machine-gun exhaust effect
- Prevents plug fouling

👉 Higher values reduce engine power

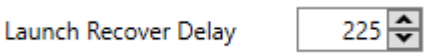
RapidFire Notes

- Value 1 → spark every 2 revolutions
- Value 2 → spark every 4 revolutions
- Up to value 10
- Sparks alternate between cylinders

⚠ Exhaust system must be modified to handle this

⚠ Always use the lowest value that achieves the effect

Launch Recover Delay



Gradually increases RPM limit after launch.

- Adjustable in 100 ms steps
- Improves traction

Example:
Value 30 → 3 seconds to increase 2000 RPM

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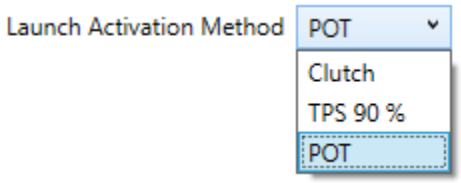
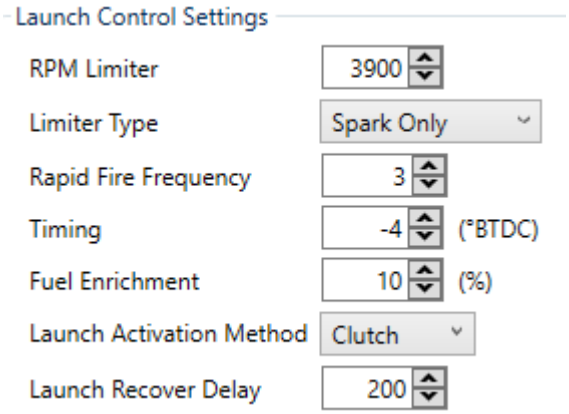
6. Launch Activation Methods

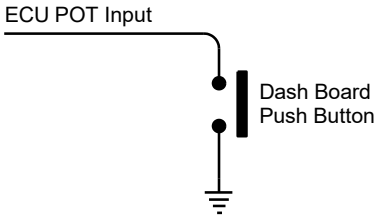


6.1 Clutch Method

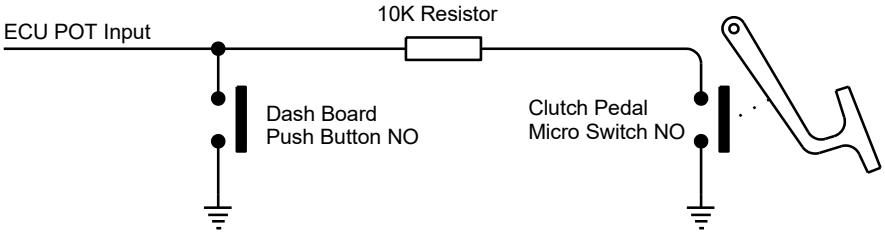


Most common method.

- Button press → activate
- Release → deactivate



Can be combined with clutch switch and resistor.



If you have wired the dashboard switch and the clutch pedal switch with a resistor combination, press the clutch to activate the clutch pedal switch, then press the dashboard switch once to activate launch.

There is no need to keep the dashboard switch pressed.

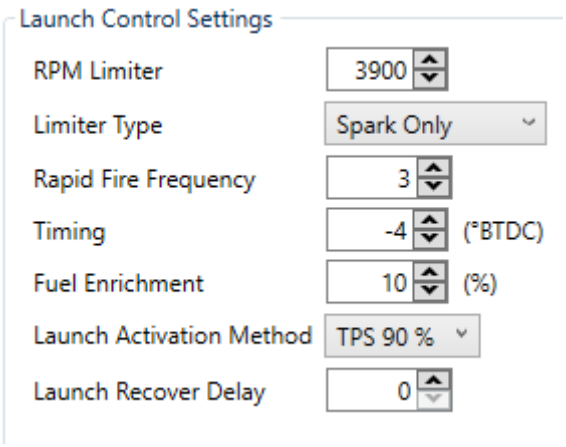
Press the accelerator, and the launch parameters will activate. When the clutch is released, the launch switch will disengage, deactivating launch.

To activate this feature again, repeat the procedure.

This setup allows the driver to focus on the launch while keeping their hands free for other tasks.

👉 Allows hands-free operation after activation

6.2 TPS 90% Method



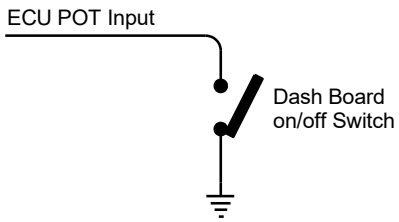
With this method, there is no need for a clutch pedal switch. However, you must install either the dashboard On/Off switch or the Tuning POT.

The driver must avoid pressing the accelerator pedal beyond 90% during launch activation, as pressing it further will deactivate launch and revert to normal settings. Practising this technique may be necessary.

Additionally, a GP output can be used to switch on a light at 80% TPS to help the driver avoid pressing too deeply.

In both methods, the engine must drop below 3000 RPM before the launch feature can be activated again. This prevents the feature from engaging during gear shifts.

This method can be used with Hard Cut and Spark Only Cut, with or without RapidFire. However, Launch Recover Delay does not work with this method.



Activation Procedure

- Turn the switch to the **On** position
- Press the accelerator to no more than 90% to activate launch and allow the turbo to spool
- When releasing the clutch, press the accelerator to 100% to deactivate launch

👉 To reactivate the feature, the engine speed must drop below 3000 RPM.

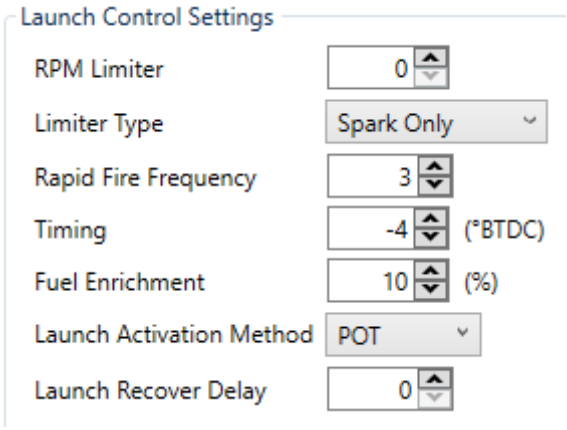
Deactivation
To disable this feature, turn the switch off.

👉 No clutch switch required

⚠ Requires driver practice

👉 Engine must drop below 3000 RPM before reactivation

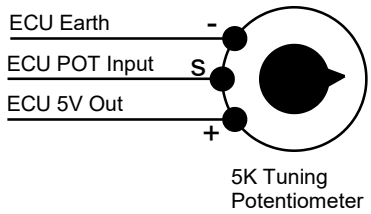
6.3 POT Method



This feature is useful because different race tracks offer varying levels of traction, allowing for higher launch RPMs.

The launch RPM limit is set to the engine RPM limit plus 1000 RPM. This provides room for the POT to be turned clockwise beyond the engine limiter to disable it.

This feature can only be deactivated using the TPS-above-90% method, as it does not have a dashboard switch.



Activation Procedure

1. Press the clutch
2. Apply the accelerator to just below 90%
3. Turn the tuning POT counterclockwise until the desired RPM is shown on the rev counter

When the clutch is released, press the accelerator to 100% to deactivate launch.

👉 The feature will automatically reactivate once the engine speed drops below 3000 RPM, preventing activation during gear shifts.

Deactivation

To cancel this feature, turn the POT fully clockwise.
Mark the tuning POT in increments to calibrate it to the engine RPM.

Notes

- The RPM Limiter and Launch Recover Delay have no effect in this mode.

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7. Retard

Used for automatic transmissions.

- Retards timing during shifts
- Reduces drivetrain shock

Example:
POT value 15 → 15° BTDC during shifts

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8. Spinning Mode

Spinning mode was developed to use both the Engine Limiter and the Launch Limiter within a single map, switching quickly between them using the TuneBox, POT, and RapidFire switch. This is especially useful for The Badger, which has only one map. There is no need to switch maps to enable spinning.

For spinning applications, performance, sound effects, and engine protection are important. Spinning Mode does not retard timing before the launch limiter is reached, unlike standard launch control. This ensures maximum noise and performance while spinning.
However, retarded timing and fuel enrichment can be applied separately in the Launch Limiter settings to enhance exhaust flames.

Engine Limiter Operation

When the POT is turned fully clockwise (100%), the Engine Limiter is activated.

In this mode:

- Timing and fuel are not altered

The driver can:

1. Use the POT to adjust the engine limiter RPM as an audible limiter
2. Press the RapidFire switch when POT is fully clockwise during engine limiting to change the frequency with each press

⚠ The driver cannot adjust RPM and press the RapidFire switch at the same time, as this will activate the Launch Limiter

👉 Error Code: 9 – Information: RPM Limiter Reached

Launch Limiter Operation

When the POT is set below 95% and the RapidFire switch is pressed, the Launch Limiter is activated.

In this mode:

- Timing is retarded
- Fuel is enriched (as per Launch Limiter settings)

The driver can:

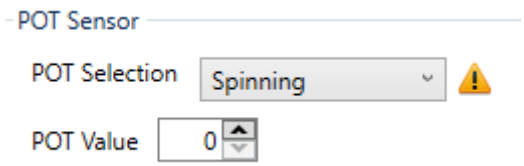
1. Use the POT to adjust the Launch Limiter RPM (must remain below 95%)
2. Press the RapidFire switch to change the frequency with each press

⚠ The POT must not exceed 90%, as this will activate the Engine Limiter

👉 Error Code: 12 – Information: Launch Limiter Reached

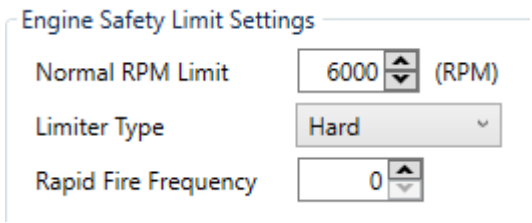
Engine Limiter adjustment

1. Set the POT selection to **Spinning**



👉 The POT value does not affect this selection

2. Go to **Engine Safety Limits Settings**



3. Set the **Normal RPM Limit** (maximum value)
4. Select the **Limiter Type**

Limiter Type Options

- **Hard Cut**
- **Spark Only** (can be combined with RapidFire)
- **RapidFire**

👉 Spark Only produces louder, erratic bangs

👉 RapidFire produces a constant machine-gun effect

Increasing the RapidFire count reduces spark frequency, resulting in louder bangs.

⚠ No timing or fuel adjustments are applied in this mode, so the engine operates at peak performance before the limiter

⚠ Soft limiter is not recommended, as it reduces power and increases exhaust temperature without producing the desired sound

Adjustment

- Turning the POT counterclockwise lowers the engine limiter RPM
- Turning it clockwise restores the maximum limiter

👉 The limiter type and RapidFire settings remain unchanged

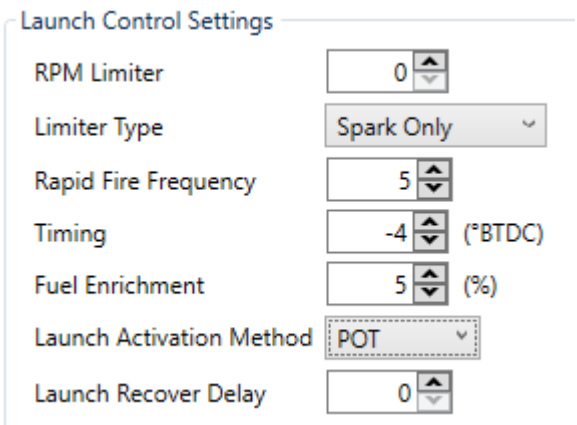
👉 The adjustable limiter will always be lower than the Normal RPM Limit

Launch Limiter Adjustment (Spinning Mode)

The Launch Limiter acts as the second limiter in spinning mode.

👉 The following settings have no effect in this mode:
- RPM Limiter
- Launch Activation Method
- Launch Recover Delay

Setup Procedure



1. Select the limiter type
   👉 Typically **Spark Only with RapidFire**
2. Set the **RapidFire value**
   - Each button press reduces the frequency by one
   - When it reaches 0, it resets to 5

- Increasing frequency creates a faster machine-gun effect

3. Set the **Timing value**
   - This value is forced when the limiter is active
   - Set to 30 to disable timing modulation
4. Set **Fuel Enrichment (%)**
   - Adds fuel for louder exhaust bangs
   - Set to 0% to disable

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5. Deactivation

To disable the Launch Limiter and return to the adjustable Engine Limiter:

👉 Turn the POT fully clockwise

The system will revert to the previous Engine Limiter settings.

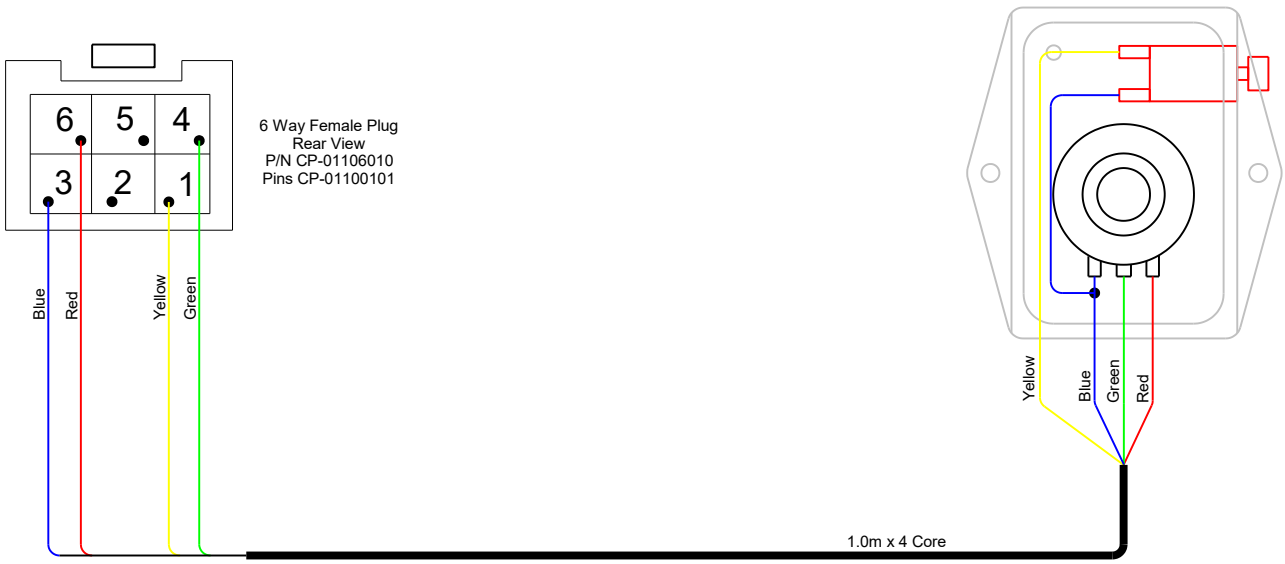
💡 Notes

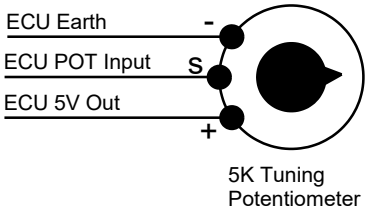
- Spinning mode allows two limiter behaviours within a single map
- Incorrect use may affect engine safety and performance
- Always test settings before full operation

Tune Box

File Name: Tune Box

Last Changed: 31/05/2017





5K Tuning
Potentiometer