

Spitronics ECU - Prime and Accel - Guide

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Overview

The **Prime & Accel** feature controls additional fuel required during starting and rapid throttle changes.

Open:

Features → Prime & Accel

The Cosmos page contains:

- Adjustment.
- Pre Start Prime Pulse.
- Post Start Enrichment.
- Accelerator Pump selection.
- TPS Enrichment.
- TPS Sensitivity.
- TPS Max RPM.
- TPS Strokes.
- MAP Enrichment.
- MAP Sensitivity.
- MAP Max RPM.
- MAP Strokes.

On RacePack firmware, selected fuel-compensation values can also be controlled by **Temperature Graphs**.

Features
Prime & Accel

Fuel Compensation Settings or Graphs

* Adjustment
Temperature Graphs

Pre Start Prime Pulse
27
(ms)
*

Post Start Enrichment
3.8
(ms)
*

Accelerator Pump

MAP & TPS

TPS

Enrichment
2.5
(ms)
*

Sensitivity
1

Max RPM
2800

Strokes
6

MAP

Enrichment
3.5
(ms)
*

Sensitivity
3

Max RPM
2200

Strokes
6

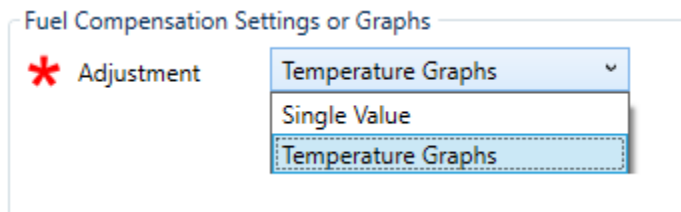
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Adjustment

Adjustment determines whether the applicable fuel-compensation settings use fixed values or temperature-based Graphs.

This software version provides:

- Single Value.
- Temperature Graphs.



Single Value

Select **Single Value** for normal applications where one fixed setting is sufficient.

The values shown on the Prime & Accel page are used directly.

Temperature Graphs

Select **Temperature Graphs** when the compensation must vary according to engine temperature.

This option is available only on supported **RacePack** firmware.

It was introduced particularly for applications such as **methanol-fuelled engines**, where starting and acceleration fuel requirements can change substantially with engine temperature.

When Temperature Graphs are selected, the settings marked with the red asterisk are controlled from:

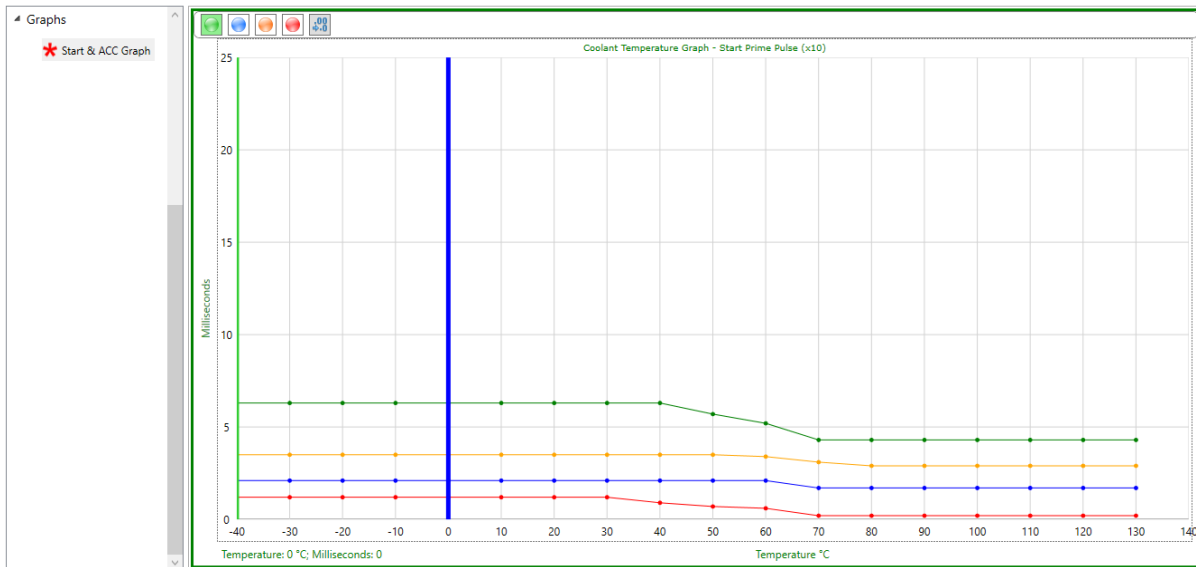
Graphs → Start & ACC Graph

The software page then acts as the configuration entry point, while the actual values are defined by the temperature Graphs.

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Start & ACC Graph

The **Start & ACC Graph** contains the temperature-dependent values used by Prime & Accel.



The Graph colour convention is:

Graph	Function
Green	Pre Start Prime Pulse
Blue	TPS Accelerator Enrichment
Orange	MAP Accelerator Enrichment
Red	Post Start Enrichment

The horizontal axis represents **Coolant Temperature**.

This allows the required extra fuel to be adjusted individually as the engine warms.

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Pre Start Prime Pulse

Pre Start Prime Pulse provides an initial amount of fuel before or during the beginning of cranking to assist the engine in firing.

A cold engine normally requires more initial fuel than a warm engine.

With **Single Value** selected, one fixed value is used.

With **Temperature Graphs**, the value is taken from the green Prime Pulse Graph according to Coolant Temperature.

Prime Pulse Graph Scaling

The green Prime Pulse Graph is displayed as:

Start Prime Pulse (x10)

The graph value must therefore be multiplied by **10** to obtain the actual prime-pulse time.

Example:

Graph value:

6.0

Actual Prime Pulse:

60 ms

This scaling allows a useful adjustment range while maintaining practical graph resolution.

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Post Start Enrichment

Post Start Enrichment provides additional fuel immediately after the engine starts.

The purpose is to help the engine stabilise during the first running period after cranking.

A cold engine normally requires more Post Start Enrichment than a fully warm engine.

With **Single Value**, one fixed value is used.

With **Temperature Graphs**, the value is taken from the **red** Start Enrichment Graph according to Coolant Temperature.

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Accelerator Pump

The Accelerator Pump adds temporary fuel when engine load changes rapidly.

Its purpose is similar to the accelerator pump in a carburettor.

When the throttle is opened quickly, airflow can increase faster than the normal fuel calculation responds. The temporary enrichment helps prevent:

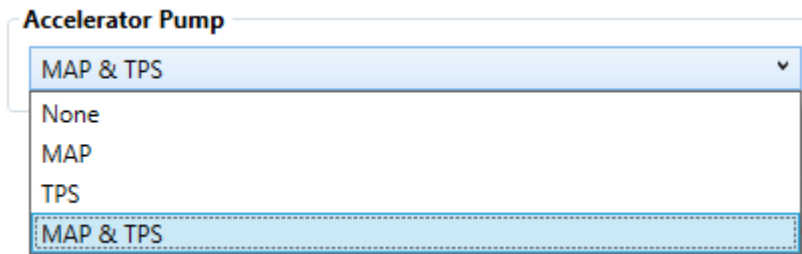
- Flat spots.
- Hesitation.
- Lean stumble.
- Poor throttle response.

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Accelerator Pump Selection

The current selections are:

- None.
- MAP.
- TPS.
- MAP & TPS.



None

Disables Accelerator Pump enrichment.

MAP

Uses rapid changes in manifold pressure to trigger enrichment.

TPS

Uses rapid throttle-position changes to trigger enrichment.

MAP & TPS

Enables both methods.

Each method has its own:

- Enrichment.
- Sensitivity.
- Max RPM.
- Strokes.

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TPS Accelerator Pump

The **TPS Accelerator Pump** reacts to rapid movement of the throttle.

TPS generally provides a fast and clean indication of driver demand.

The TPS section contains:

- Enrichment.
- Sensitivity.
- Max RPM.
- Strokes.

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TPS Enrichment

TPS Enrichment determines the amount of additional injector time added when the TPS Accelerator Pump is triggered.

The setting is in:

milliseconds

Example:

2.5 ms

Higher values provide more temporary fuel.

Lower values provide less.

With **Temperature Graphs** selected, TPS Enrichment is taken from the **blue** Graph according to Coolant Temperature.

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TPS Sensitivity

TPS Sensitivity determines how easily throttle movement triggers the Accelerator Pump.

Range:

1 to 10

The important direction is:

1 = Most Sensitive

10 = Least Sensitive

Lower numbers make the Accelerator Pump more sensitive.

Do not automatically use maximum sensitivity.

If the setting is too sensitive, normal small TPS movement or signal noise may repeatedly activate enrichment and cause unnecessary over-fuelling.

TPS can normally tolerate a more sensitive setting than MAP because the signal is generally faster and more stable.

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TPS Max RPM

TPS Max RPM determines the maximum engine speed at which TPS Accelerator Pump enrichment may be activated.

Example:

2800 RPM

Above this RPM, new TPS Accelerator Pump events are not initiated.

A practical starting range for TPS Max RPM is approximately 1500-3000 RPM.

1500 to 3000 RPM

for TPS acceleration enrichment.

This is a starting guideline rather than a fixed requirement.

If an enrichment event has already started before Max RPM is reached, the existing decay sequence may continue.

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TPS Strokes

TPS Strokes determines how long the temporary enrichment is applied and over how many engine firing events it decays.

A larger Strokes value makes the enrichment last longer.

A smaller value makes it disappear more quickly.

The enrichment is progressively reduced during the selected number of strokes rather than simply switching off suddenly.

For example, with 10 Strokes selected, the enrichment is reduced progressively by roughly one tenth per cycle until it reaches zero.

Use the lowest Strokes value that removes the acceleration flat spot without leaving unnecessary enrichment afterward.

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MAP Accelerator Pump

The **MAP Accelerator Pump** reacts to rapid changes in manifold pressure.

It can be particularly useful where TPS movement alone does not fully represent the engine load change.

The MAP section contains:

- Enrichment.
- Sensitivity.
- Max RPM.
- Strokes.

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MAP Enrichment

MAP Enrichment determines the amount of additional injector time added when the MAP Accelerator Pump is triggered.

The setting is in:

milliseconds

Example:

3.5 ms

With **Temperature Graphs** selected, MAP Enrichment is taken from the **orange** Graph according to Coolant Temperature.

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MAP Sensitivity

MAP Sensitivity controls how easily a manifold-pressure change triggers MAP enrichment.

Range:

1 to 10

Again:

1 = Most Sensitive

10 = Least Sensitive

MAP is normally a more pulsating signal than TPS, so the MAP Sensitivity value may need to be less aggressive.

If the setting is too sensitive, engine vacuum pulsation or normal load changes may repeatedly activate the Accelerator Pump and cause over-fuelling.

TPS can normally be set more sensitively than MAP because the TPS signal is generally faster and cleaner.

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MAP Max RPM

MAP Max RPM determines the maximum engine speed at which MAP Accelerator Pump enrichment can be initiated.

Example:

2200 RPM

1500 to 2200 RPM

as a normal starting range for MAP enrichment.

Actual settings depend on the engine and intake system.

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MAP Strokes

MAP Strokes determines how long the MAP enrichment lasts and how gradually it is reduced.

A larger number:

- Extends enrichment for longer.
- Produces a slower decay.

A smaller number:

- Produces a shorter enrichment event.
- Returns to normal fuelling sooner.

Tune for the lowest value that eliminates the flat spot.

How Enrichment Decays

Accelerator enrichment does not remain at the full Enrichment value for the entire event.

Instead, the enrichment starts at the selected value and is progressively reduced over the selected number of Strokes.

Conceptually:

Initial Enrichment → Reduced Each Stroke → Zero

This provides a smoother transition back to the normal Fuel Tune.

For example, with:

Enrichment = 5 ms

and:

Strokes = 5

the ECU progressively reduces the additional fuel until the acceleration enrichment reaches zero.

The exact internal implementation may vary with firmware, so tune the practical result rather than manually calculating every intermediate pulse.

TPS vs MAP Accelerator Pump

TPS and MAP detect acceleration differently.

TPS

TPS responds directly to throttle movement.

Advantages:

- Fast response.
- Stable signal.
- Good indication of driver demand.

MAP

MAP responds to the resulting manifold-pressure change.

Advantages:

- Represents actual engine load response.
- Can supplement TPS on some applications.

Using **MAP & TPS** allows both effects to contribute where required.

Do not assume that using both automatically gives better results.

Use only as much enrichment as the engine requires.

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Temperature Compensation

Cold engines often require more transient enrichment than warm engines.

With RacePack Temperature Graphs, the amount of:

- Prime fuel.
- Start Enrichment.
- TPS Accelerator Enrichment.
- MAP Accelerator Enrichment.

can all be adjusted according to Coolant Temperature.

This is particularly valuable on fuels and applications where temperature has a large influence on fuel behaviour.

Methanol applications were one of the main reasons the temperature-dependent Graph system was introduced.

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Graph Colours

For quick reference:

Green - Pre Start Prime Pulse

Blue - TPS Enrichment

Orange - MAP Enrichment

Red - Post Start Enrichment

Remember:

Green Prime Pulse is x10.

This colour relationship should remain consistent anywhere the Start & ACC Graph is documented.

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Basic Accelerator Pump Tuning

Before tuning Accelerator Pump:

- Warm the engine unless specifically calibrating cold operation.
- Complete the main Fuel Tune first.
- Make sure TPS is calibrated.
- Make sure MAP is stable.
- Confirm normal Lambda operation.
- Do not use Accelerator Pump to hide a poor base Tune.

Start with conservative enrichment.

Perform a quick throttle transition and observe:

- Engine response.
- Lambda.
- RPM recovery.
- Whether the engine hesitates.
- Whether it becomes excessively rich.

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Lean Flat Spot

If the engine hesitates and Lambda shows a temporary lean condition:

Try:

- Increasing Enrichment slightly.
- Increasing sensitivity if the pump activates too late.
- Increasing Strokes if enrichment disappears too quickly.

Make one change at a time.

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Rich Hesitation

If the engine responds poorly and Lambda immediately becomes excessively rich:

Try:

- Reducing Enrichment.
- Reducing sensitivity.
- Reducing Strokes.

Remember that a lower Sensitivity number means **more sensitive**, so reducing sensitivity means moving toward a **higher numerical value**.

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Pump Activates Randomly

If enrichment is being triggered during normal steady driving:

- Increase the Sensitivity number.
- Check TPS signal stability.
- Check MAP signal stability.
- Check sensor wiring and Grounding.

Random enrichment can make the engine appear generally too rich even if the base Tune is correct.

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Accelerator Pump Active Too High in RPM

If the engine receives unnecessary transient enrichment at higher engine speed:

Reduce:

Max RPM

At higher RPM, the normal Fuel Tune and engine airflow may respond quickly enough that Accelerator Pump enrichment is no longer required.

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Enrichment Lasts Too Long

If Lambda remains rich after the throttle transition is complete:

Reduce:

Strokes

If the initial response is correct but the mixture remains rich afterward, the problem is more likely duration than initial Enrichment.

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Enrichment is Too Short

If the engine responds correctly at first but then develops a secondary lean spot:

Increase:

Strokes

This extends the decay period without necessarily increasing the initial enrichment amount.

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Tuning Order

A practical tuning sequence is:

1. Complete the normal Fuel Tune.
2. Disable or minimise Accelerator Pump while checking the base Tune.
3. Select TPS, MAP or MAP & TPS.
4. Set Sensitivity so genuine acceleration is detected without random triggering.
5. Adjust Enrichment to remove the initial lean flat spot.
6. Adjust Strokes for the required enrichment duration.
7. Set Max RPM so the feature operates only where necessary.
8. Repeat at different engine temperatures where Temperature Graphs are used.
9. Verify normal driving does not cause unnecessary enrichment.

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RacePack Temperature Graph Setup

Where **Temperature Graphs** are available:

1. Select **Temperature Graphs** under Adjustment.
2. Open **Graphs** → **Start & ACC Graph**.
3. Set the green Pre Start Prime Pulse Graph.
4. Set the red Post Start Enrichment Graph.
5. Set the blue TPS Enrichment Graph.
6. Set the orange MAP Enrichment Graph.
7. Test at different Coolant Temperatures.
8. Smooth the Graph so that enrichment changes progressively with temperature.

Do not create unnecessary sharp steps between neighbouring temperature points unless testing proves that they are required.

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Common Problems

Symptom	Possible Cause	Check
Engine hesitates on throttle opening	Too little enrichment	Increase Enrichment
Initial response good, then lean	Enrichment duration too short	Increase Strokes

Symptom	Possible Cause	Check
Engine bogs rich	Too much enrichment	Reduce Enrichment
Remains rich after acceleration	Strokes too high	Reduce Strokes
Pump activates randomly	Sensitivity too high	Increase Sensitivity number
MAP enrichment triggers excessively	MAP signal pulsation	Reduce MAP sensitivity
No enrichment at higher RPM	Max RPM reached	Check Max RPM
Cold engine needs much more fuel	Fixed value inadequate	Use Temperature Graphs where available
Prime Pulse incorrect by large amount	x10 scaling misunderstood	Check Prime Graph scaling
Warm Tune good but methanol cold response poor	Temperature compensation insufficient	Adjust RacePack Graphs

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Setup Check

- [] Adjustment mode selected correctly.
- [] Pre Start Prime Pulse configured.
- [] Post Start Enrichment configured.
- [] Accelerator Pump method selected.
- [] TPS Enrichment configured where used.
- [] TPS Sensitivity configured.
- [] TPS Max RPM configured.
- [] TPS Strokes configured.
- [] MAP Enrichment configured where used.
- [] MAP Sensitivity configured.
- [] MAP Max RPM configured.
- [] MAP Strokes configured.
- [] Temperature Graphs configured where RacePack is used.
- [] Green Prime Pulse x10 scaling understood.
- [] Accelerator Pump does not activate during steady driving.
- [] Base Fuel Tune is correct before final Accelerator Pump tuning.

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