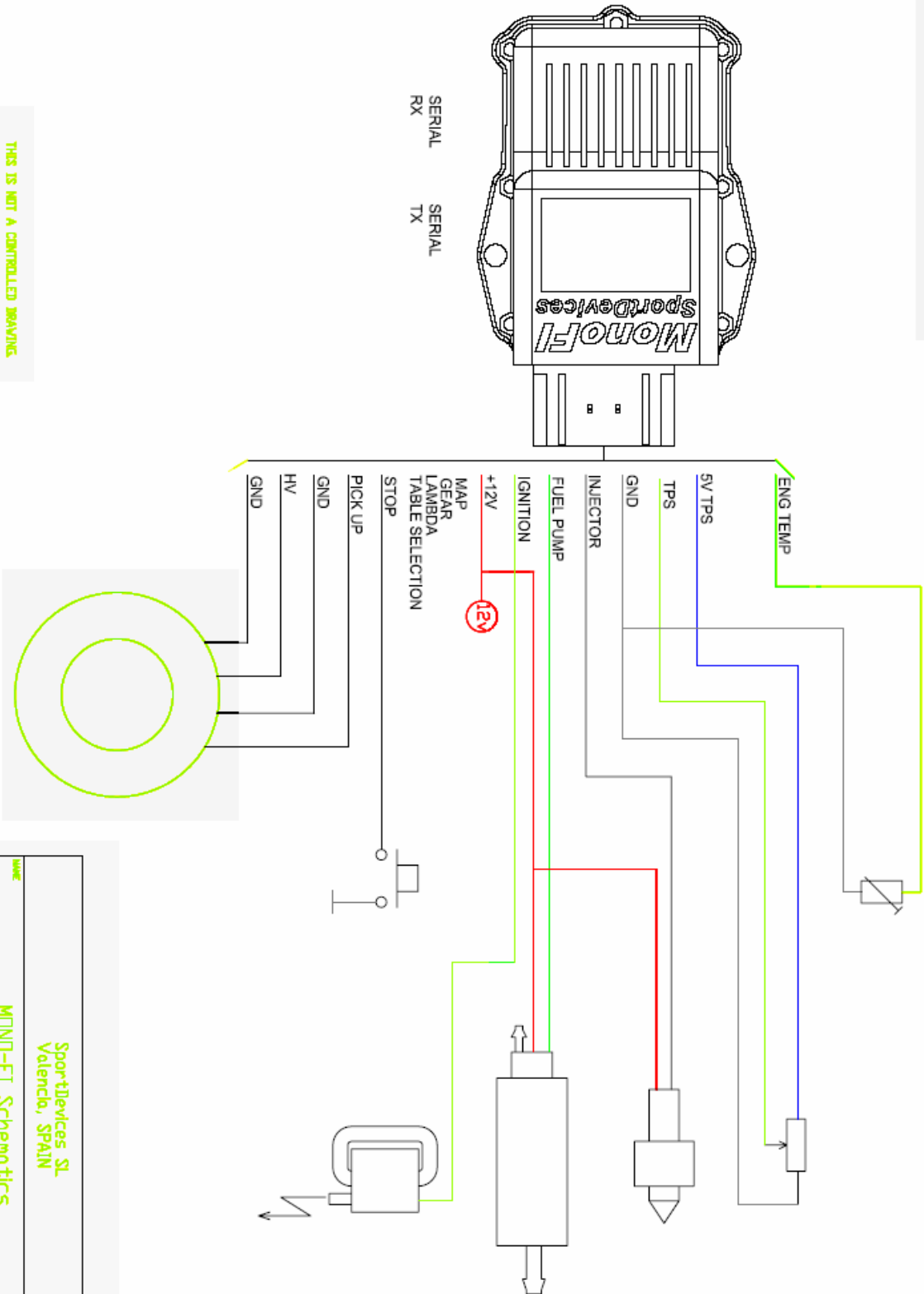


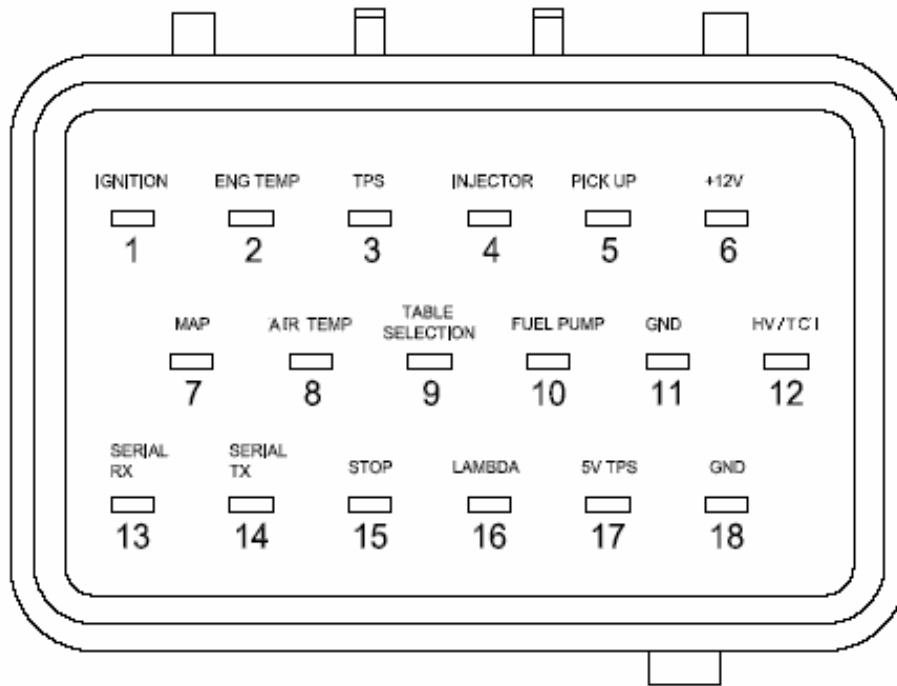
MonoFI Installation

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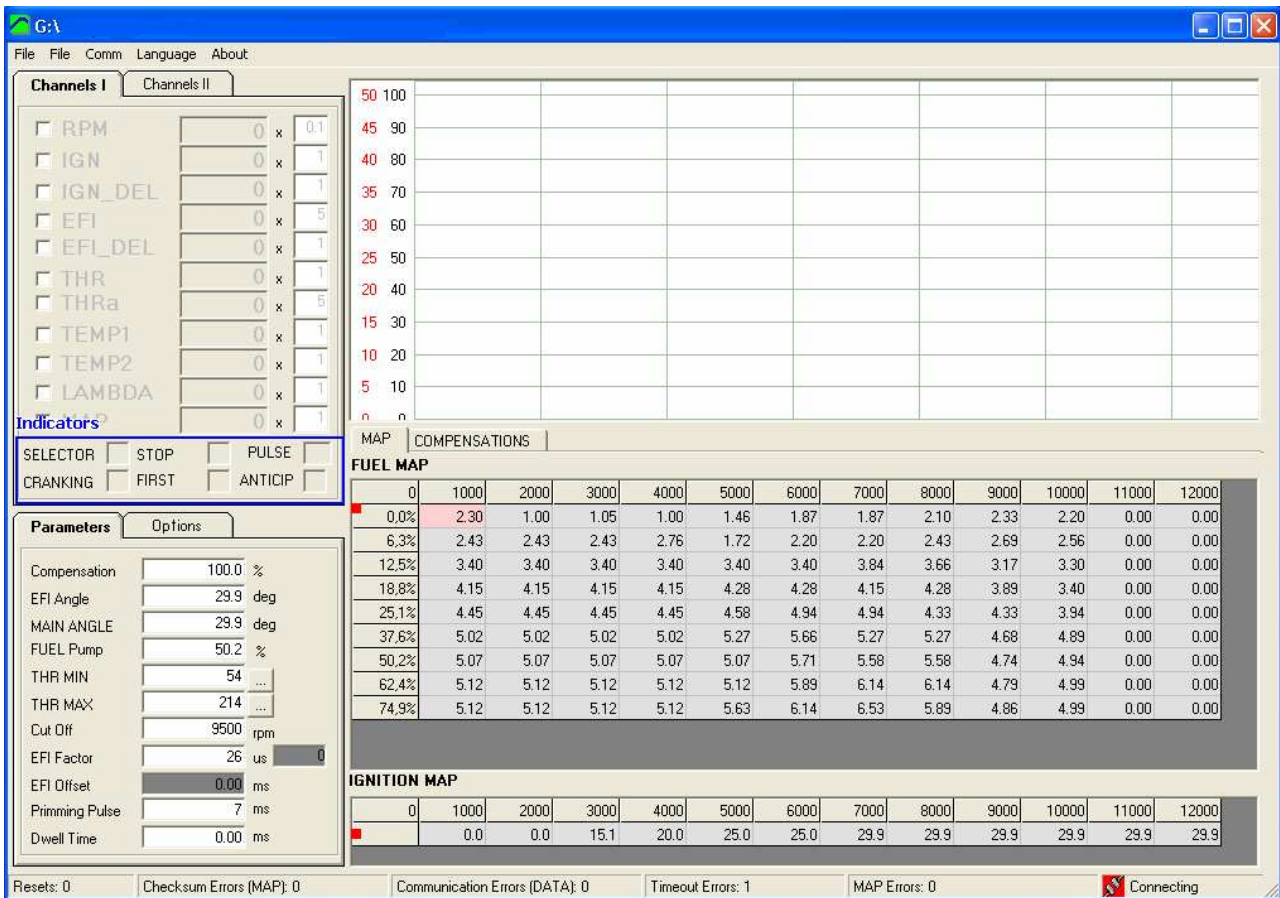
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MONO-FI Schematics			
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1. **Ignition (O)**, **only for CDI version**, ignition High Voltage **output**. It connects to the high voltage coil (ground ended).
2. **Engine temp (I)**, this **input** can be connected to a NTC temperature sensor (ground ended). Two 2K5 pull-up resistors must be installed on the board. A compensation table exists in the FW to use this input.
3. **TPS, Throttle Position Sensor (I)**, this **input** (0 to 5 volt) is used for the TPS axis of the fuel map. Currently it is not used for the ignition.
4. **Injector (O)**, this is an open-drain **output**. It connects to ground the injector to be activated. Injector must be 12 volt ended.
Warning: injector output is not short-circuit protected.
5. **Pickup (I)**, this **input** must be connected to the pickup signal (ground ended). Minimum starting voltage is about 2 volt. Positive and negative pulses are acquired. Default order is: positive pulse at maximum advance (for example 40 BTDC), and negative pulse at minimum advance (for example 10 BTDC)
6. **+12 Volt (I)**, 12 volt from battery after main Switch. **ECU is NOT reverse polarity protected.**
7. **MAP (I)**, this 0-to-5-volt **input** is a provision. It is acquired and shown in the program but it is not used at all in the current FW version.
8. **Air temp (I)**, this **input** can be connected to a NTC temperature sensor (ground ended). Two 2K5 pull-up resistors must be installed on the board. A compensation table exists in the FW to use this input.
9. **Map/Table Selector (I)**, this digital (0/1) **input** is a provision. It is acquired and shown in the program but it is not used at all in the current FW version. It activates when connected to ground.
10. **Fuel Pump (O)**, this is an open-drain **output**. It connects to ground the fuel pump to be activated. Fuel Pump must be 12 volt ended.
Warning: Fuel Pump output is not short-circuit protected.
11. **GND (I)**, battery ground.
12. **HV alternator (I/O) / TCI (O)**, **in CDI version**, this **input** is connected to High Volt alternator (200-300 volt). **In TCI version**, this **output** is the 12-volt coil output, the coil must be 12-volt ended.
13. **RX (I)**, RS232 RX line.
14. **TX (O)**, RS232 TX line.
15. **Stop (I)**, this digital (0/1) **input** stops the engine when connected to ground. It disconnects all functions: injection, ignition and fuel pump.

16. **Lambda**, this 0 to 5 volt **input** is a provision. It is acquired and shown in the program but it is not used at all in the current FW version.
17. **5V TPS**, 5 volt output for TPS sensor. It must not be used to power any other device.
18. **GND**, battery ground.

MonoFI Monitor 0.53



Channels

The checkbox at the left of each channel name enables or disables the visualization of the channel on the graph. The value at the right of the channel is the scale used to paint the graph. It can be changed to fit the signal on the graph.

- **RPM**, engine rpm. By default it is used the positive pulse from the pickup, but it can be changed on the hardware.
- **IGN**, current ignition advance (degrees or raw units)
- **IGN_DEL**, current ignition delay in time from reference pulse
- **EFI**, current injection value (degrees or raw units)
- **EFI_DEL**, current ignition delay in time to the point when the injection starts
- **THR**, throttle value: percentage after MIN and MAX calculation or raw value (0 to 255).
- **THRa**, throttle acceleration. It is used for the fuel enrichment, if the option is enabled.
- **TEMP1**, engine or air temperature (to be defined). Used in compensations (if enabled)
- **TEMP2**, engine or air temperature (to be defined). Used in compensations (if enabled)
- **LAMBDA**, lambda reading (raw or AFR), used ONLY for monitoring
- **MAP**, MAP sensor reading (raw or AFR), used ONLY for monitoring
- **Prescaler**, it is an internal value, used for diagnostics
- **COMP**, compensation from TEMP1 (if enabled)
- **COMP2**, compensation from TEMP2 (if enabled)

- **VOL1**, extra analog channel (voltage or raw) used only for monitoring
- **VOL2**, extra analog channel (voltage or raw) used only for monitoring

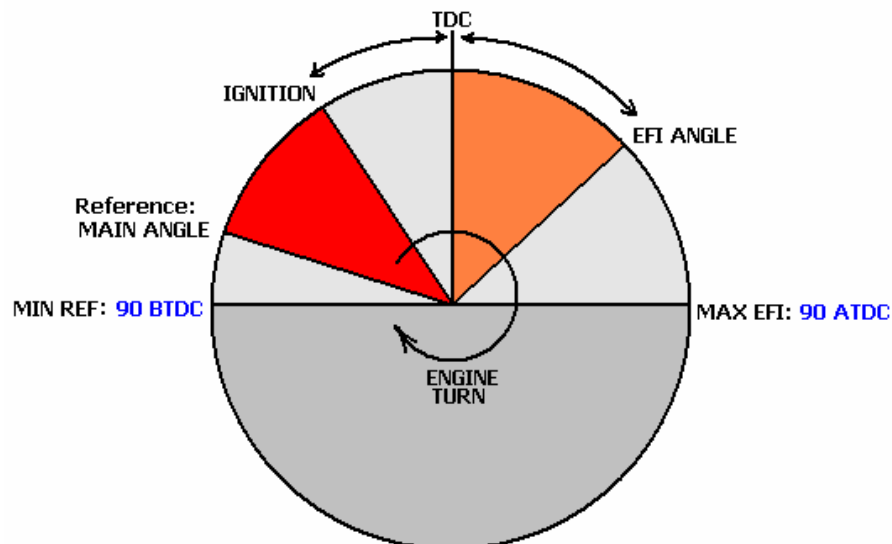
Indicators

- **SELECTOR**, there is an input line that could be used to select between two maps (not implemented), this indicator shows the state of the line
- **CRANKING**, (internal) shows when the ECU is in cranking mode
- **STOP**, (internal) shows when the ECU is in stop mode
- **FIRST**, (internal) shows when the ECU receives the first pulse after STOP mode. Certain internal calculations are different for the first pulse.
- **PULSE**, (internal) shows the pulse order "High then Low" (typical) or "Low then High" to know if the pickup pulses are being received as expected
- **ANTICIP**, (internal) for high RPM the ECU has an algorithm that modifies the order of calculations in order to prepare the events (injection and ignition) as fastest as possible. At high RPM it uses the calculations from the previous revolution and then performs the calculation for the next revolution (ANTICIP=on), for low rpm it performs the calculations on the normal order.

Parameters

These are the numeric values that setup the main operation of ECU

- **Compensation**: it modifies the overall FUEL map; its default value is 100%. Range is from 0 to 199%
- **EFI Angle**: it defines the angle position where the injection is performed. In the current implementation it always should be greater than 0 TDC. Default value is 30 ATDC.
- **MAIN ANGLE**: it defines the position where the reference pulse from the pickup is received. This value is used for all ECU timing, so it must be as accurate as possible. Allowed range is from 89.6 BTDC to 0



Both ignition and injection happens every turn,
 Regardless cycle (compression/combustion or exhaust/intake)

- **FUEL Pump**: it is the percentage of power applied to fuel pump. As fuel pumps usually have more power than needed for single cylinder applications the user can waste less power by decreasing this value. Allowed range is from 0 to 100%
- **THR MIN**: it is the starting value for throttle closed (idle). It is important to translate the THR axis of fuel map to the throttle body. By

pressing the (...) button the program will use the current value of throttle channel as the minimum (throttle should be closed at that moment)

- **THR MAX:** it is the maximum value for throttle opened. By pressing the (...) button the program will use the current value of throttle channel as the maximum (throttle should be opened at that moment)
- **Cut Off:** it is ignition cut off value. For rpm higher than this value, both ignition and injection stops. It is useful to prevent breaking the engine (when it is able to reach dangerous rpm values, not all engines can do it)
- **EFI Factor:** It is an internal value used to translate the absolute units (0 to 255) inside the ECU into milliseconds. It is important to find a suitable factor at the beginning of the fuel mapping, because changing that value will alter the entire resulting fuel map. An excessive low EFI factor will cause to reach the maximum absolute value and not be able to inject more fuel, and an excessive high EFI factor will cause low accuracy on resulting values.
- **EFI Offset:** not used at the moment.
- **Priming Pulse:** it is the number of milliseconds to inject fuel when the power is turned on, before start cranking. It is done once.
- **Dwell Time:** **ONLY FOR TCI** ignition, it is the number of milliseconds that the coil need to charge (typical values are from 1 to 5 ms)

Options

- **EFI interpolation:** it may be useful to disable the interpolations between adjacent cells during fuel mapping. In this way, only one cell from the fuel map is used to calculate the injection timing, what can be useful to ease to know which cell to modify. It **must be enabled** during normal usage.
- **IGN interpolation:** the same behaviour as EFI interpolation but with ignition map.
- **ACCEL enrichment:** when throttle is opened, the acceleration channel is used to increase temporary the fuel applied (similar to fuel pumps on carburetors)
- **Engine TEMP comp:** it enables/disables the compensation using the "engine temp" table
- **Negative pulse start:** two pulses are got from the pickup, usually the first one is the positive pulse that is used as reference for all ECU calculations (for example at 40 BTDC), and usually the second pulse, the negative one is used for cranking (for example at 10 BTDC). This is the usual default option.
- **Positive pulse start:** this option is used when pulses are received opposite as usual.
- **Voltage Boost:** certain ignitions have very low voltage at cranking, and by using additional hardware and enabling this option, this voltage can be increased at low rpm. **It needs some extra hardware**, otherwise it has no effect.
- **AIR temp comp,** same as "engine TEMP comp" but with "air comp" table
- **EFI on PUMP,** this is an experimental option to inject directly from the fuel pump to the engine. The fuel map affects directly to pump's power.
- **TCI Ignition,** this option is used to change the timing when using TCI ignition. **ECU version MUST BE adapted for TCI ignition.**