# *ME221 Engine Management System*


# RENAULT CLIO 172/182

## *Hardware Installation Manual*

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# 1 Introduction

**Thank you for using our system in your pursuit of power! The Motorsport Electronics core system stems from over 15 years of electronics design and engineering, from a small, active development team. With tuners all across the world, and an ever expanding network of users, the ME experience is more than just a PCB - we are here to help and we actively encourage and welcome feedback, both via our normal support system as well as community support via our "ME Users" facebook group. Get involved - if you have an idea for a feature, there's no reason it can't be implemented!**

This guide covers the physical installation of the ME221 Plug-In Engine Management System for the Renault Clio. The ME221 is the core control system as used by many of our Plug'n'Play ECUs - so this guide applies to some of them also.

Visiting a rolling road and an experienced mapper will sometimes be the best option for most users (the ones who just want their car to perform how they want, without much interest in as to how to get it to) - for others, the experience of doing it themselves is what matters, and with the ME221 being so flexible, and so many rolling roads and tuners supporting the ME221, as well as a user friendly tuning system, plus a growing support network, both styles of approach are equally accessible.

This guide does not cover the basics of using the MEITE tuning software (i.e the menus, keys etc) - that is covered in the MEITE guide here.

## 1.1 Safety First!

It must be said first and foremost that tuning an engine can be an exciting experience, as well as a risky one. If you really don't know what you're doing, or even where to start, read all the manuals until you do, and if you're still lost - seek professional advice from one of our world-wide installation agents. **Failure to do so may damage your engine, and even yourself!**

**If you have no experience of engine management - follow the manual closely, ask for support if you get stuck, and aim only to get the basic physical install done - leave the rest to a reputable tuner to avoid engine damage or personal injury. NEVER tune your ME221 on the public highway!**

## 1.2 Connectivity & Disclaimer

While we develop the connectivity, products and basemaps on REAL cars in house, that doesn't mean to say there isn't some weird and wonderful cross-over that moved a certain connection - we detail any of these "special" cases in the appendix if applicable. It is however always the installers obligation to check the compatibility of the ECU with the OEM harness - Motorsport Electronics Limited cannot be held liable for any costs incurred through incorrect installation of use of the product. DRIVE-BY-WIRE SHOULD NOT BE USED ON PUBLIC HIGHWAYS DO SO AT YOUR OWN RISK.

## 1.3 Getting Help & Support

There are various avenues for support - the first being the online manuals and documentation. Almost all support can be answered with a simple "it's on this page" - but in those rare cases, you can either raise a support ticket via our website, or call us Mon-Fri 9am-5pm GMT on +44 (0) 1373 710610 where one of our support engineers will be happy to guide you through any queries. Please bare in mind while we will try and offer some tuning support, in most cases a visit to your nearest ME approved agent will be the best advice for tuning. Our basemaps are

provided “as-is” and should be used at your own risk. Note they are from REAL cars, tuned on the rolling road at our headquarters and validated by our agents across the globe - but just like wiring ‘oddities’ this is no guarantee of their suitability for your specific modifications - using a basemap for more than startup testing prior to calibration is not advised!

There is also a vast and vibrant user community online that can offer helpful insight - check Facebook for “ME Users”, and feel free to get involved!

# 2 Initial Board Setup

Before you install the new ME221 PnP into your vehicle, varius checks must be carried out. Note the ME221 supports the factory CAN-bus stream so the OEM dashboard can be kept.

## 2.1 Board Switch/Jumper Settings

Please note that some ME221 PnP ECUs require jumper settings to facilitate different models or functionality.

### Clio 182

There are no jumper settings to be carried out when installing on the DBW Clio 182. Remember that incorrect safety settings can make a DBW controlled car a danger to yourself and other road users. For that reason DBW based systems should be used off-road only. Motorsport Electronics Limited accepts no liability if you choose to enable DBW control.

### Clio 172

To use the ME221 Clio PnP on a mechanical throttle Ph1 172 loomed car, some pin swaps are required to be made to the ECU harness. These are detailed below:

| ***Move From*** | ***Move To*** |
|---|---|
| 10 | 39 |
| 12 | 38 |
| 13 | 46 |
| 19 | 67 |
| 20 | 12 |
| 38 | 69 |
| 39 | 10 |
| 41 | 61 |
| 49 | 18 |
| 53 | 77 |
| 63 | 65 |
| 64 | 37 |
| 70 | 5 |
| 72 | 62 |
| 74 | 71 |
| 75 | 87 |
| 77 | 84 |
| 79 | 72 |

## 2.2 Connected Hardware & Basemaps

The ME221 (and specifically its supplied basemaps) is designed to drive stock hardware & utilise OEM sensors - it is also designed to run only High-Impedance injectors (Low impedance can be used with ballast resistors however.). If you have changed your sensors/coils etc, you will need to configure them using the MEITE tuning studio.

# 3 ECU Installation

This section provides information on the physical install of the ME221 Engine Management System.

## 3.1 ECU Handling

You should always handle both the stock ECU (and its internals) as well as the ME221 PCB with due care and attention, protecting them from anti-static discharge. Use a grounded wrist-strap where possible as damage can occur. Also be wary of physical damage to the ECUs which can be caused by applying force or subjecting them to contamination from oil/dirt. A workshop environment is NOT a safe environment for working with electronics!


1. Carry out the install on a conductive, and earthed metal workspace.
2. Wear a grounded to earth wrist-strap when working with electronics.
3. Avoid contact with any of the components, contacts or metal work of the PCBs.

## 3.2 Fitting of the ECU

The ECU is designed to fit into the OEM placement

The below outlines a simple guide for all models of the ME221 Plug-In range. Specific models are detailed (where available) on our youtube channel.

1. Ensure the ignition is off, and disconnect the negative terminal of the battery. Note saved stereo settings etc may be lost.
2. Locate the factory ECU, which in most cases is in the left hand casing of the engine bay.
3. Remove any security bolts to allow removal and disconnection of the factory ECU.
4. Install the new ME221 ECU - See above section if you need to carry out any pin-swaps.
5. Ideally, install a tuning cable, modifying the OEM casing to allow the cable to run through.
6. Reconnect the battery, but do not attempt to start - follow the manual through entirely first.

# 4 Additional Sensors & Inputs/Outputs

The ME221 offers more connectivity than the factory ECU, allowing upgrades such as MAF-Less fuelling (utilising an IAT & MAP sensor), or spare control lines for nitrous, boost control etc.

## 4.1 Clio Sensors

The Clio version of the ME221 relies on the factory MAP sensor. This can of course be upgraded to any 5V MAP sensor (for turbo/supercharged applications). You can also add a MAP sensor one of the spare analog connections.

Be sure to calibrate the MAP Sensors 'HRT' table in the MEITE tuning software if you change from the OEM one.

The stock IAT sensor is also retained for fuelling calculations. You should always measure the temperature of the air AFTER any turbo charging or intercooling stages, ideally just in front of the throttle body - take care to avoid heat soak where possible.

## 4.2 Additional Inputs/Outputs

There are some unused pins of the OEM ECU plug is used for additional IO - this is detailed in the Connectivity table in later sections. You can set the function of these additional IOs using the IO Settings tab of the MEITE.

# 5 Connecting for Tuning

## 5.1 MEITE Tuning Software

ME221/ME442 ECUs utilise the Motorsport Electronics Integrated Tuning Environment (MEITE for short) for carrying out diagnostics, calibration and setup. You can download the latest copy of MEITE from the www.motorsport-electronics.co.uk website. After downloading, install, and if prompted to auto-update, be sure to, to bring the PC tuning software to the most current version. MEITE supports Windows x32 and x64 versions 7/8/10 and above.

## 5.2 Serial/USB Connectivity

If using an ME221 based PnP, you will likely be using a serial connection to connect to the laptop/PC, and we advise the use of a genuine FTDI Serial->USB adapter if your laptop does not feature a serial connection. Always ensure you download the latest drivers from the FTDI website - which are also listed under support on our website.

## 5.3 Initial Connection

Once you have installed MEITE, and the USB->Serial Drivers, connect the ECU to the laptop, and turn the ignition to position 2 - also, be sure to disable any immobiliser so the dashboard Check Engine Light is illuminated.

Open MEITE. If MEITE is already running, press 'Connect' under the 'File' menu. A green bar will progress across the screen as the ECU data is downloaded to the laptop. If this does not happen, check that the correct comm-port is selected in the lower right section of the MEITE window. Refer to the MEITE guide for further help with getting connected.

# 6 Pre-Start Setup

Be sure to follow this section carefully. Firmware updates, basic sensor checks and calibrations need to be carried out, as well as loading of a default calibration to allow successful operation of the ECU.

## 6.1 Firmware Update

Because we offer free feature updates and additions through firmware updates, it is always best to check the current firmware version and the version available from the www.motorsport-electronics.co.uk website. You can check which version you have currently by going to Help>About when connected to the ECU. The ECU FW Version is the number to take of. If you have a version that is older than the current latest firmware, then follow the firmware update procedure in the MEITE Guide to update your ECU to the latest version. Note if you car has been tuned, major FW changes can make the map unuseable - only update if you are aware of changes that could happen.

## 6.2 Basemaps and Startup

We provide a number of basemaps on our calibrations server which can be accessed from the ME website (Under support). We offer various startup files, one of which will be always provided based on (and calibrated on) an OEM, low mileage car utilizing OEM sensors and hardware. This should only be used as a guide - professional tuning/advice should still be sought.

Ensure you're connected to the ME221, then go to ***Calibrations>Load Calibration*** to load on a chosen calibration. Try to use a calibration that closely matches you're specification. If none are available, or not yet released, start with the OEM basemap for your model. Be sure to load "Tuning data only". A green bar will progress to show the calibration being loaded. Power cycle the ignition after downloading an entire calibration.

## 6.3 Sensors and Sense Check

Using the 'Sensor Cals' tab of MEITE, check all sensors read sane values. IAT, Coolant, MAP (which should be around 99KpA at sea level, with the engine not running), Throttle (moving from 0-100% with throttle actuation). If they do not, refer ME221 Software guide to tune the HRT tables to suit your sensors.

If you have changed any sensors, such as MAP, or IAT sensors, then you will need to calibrate them using the MEITE. Refer to ME221 Software guide - which details specifics of the ME221s functions, for details on this.

## 6.4 Injectors

If you have changed your injectors to ones that have a different flow rate, be sure to senter their cc/min into the ***System>Injection Driver*** settings window available on the 'START' tab in MEITE.

## 6.5 Calibrating Base-Offset/Trigger Offset

If all of the above has been carried out successfully, and everything is reading correctly, it is time to attempt a first-start. The base-maps contain trigger offset numbers for the crank/cam sensors that relate to OEM cars. You should still confirm that the ECU's commanded advance (shown under ***Ignition>Ignition Advance***) matches the actual advance angle seen when using a timing light (while cranking).

If it does not, adjust it by modifying the Trigger Offset number under the ***System>Engine Driver*** window.

You can turn the fuel supply off to stop wetting of plugs during this stage by going to the ***System>Injection Driver*** and turning Fuelling Mode to “OFF”. Remember to reset this to its original setting (usually ‘Fully Seq’) when trying to finally run the engine.

Once you have the engine running and idling, reconfirm the offset as low RPMs can prove difficult to time truly accurately.

# 7 First Time Startup

If you have made it this far, a base-map suitable for your engine has been loaded, the engine ignition is timed and all sensors are reading sane values. You're now ready to start the engine!

Follow the below process as a final checklist and startup procedure:

1. With the ignition on, and MEITE connected, check the following from the "MAPPING" tab:
    a. MAP sensor reads around 98-100KPa (at sea level).
    b. Battery voltage reads around 12+ volts.
    c. Engine Coolant and Intake Air Temp values read sanely.
    d. The TPS/Throttle percent number moves from 0-100% as you sweep the throttle.
2. Rectify any issues with the above checklist - there is no point progressing further if the basics above are incorrect!
3. Turn the ignition OFF then back ON - listen for the fuel pump priming for around 2 seconds (if ECU controlled)
4. Crank the engine - you may need some throttle to help it. While cranking you should see an RPM reading of around 200-300rpm on most engines with charged batteries. The engine may be running excessively rich/lean - adjust the "Engine Size" under the System>Engine Driver to richen/enlean the mixture - note this is a "get you running" hack and it should only need to be changed by around 20% maximum either way - the Engine Size should be reset to the actual size when starting tuning.
5. If you do not get a stable RPM, use the diagnostics tab in MEITE to confirm CRANK and CAM IRQs (pulses from the sensors) - also check for "Lost Sync Count" increasing while cranking as this can indicate failing sensors or electrical noise. Resolve these issues before continuing. If you have attempted multiple starts, check to ensure spark plugs are not wet - ideally replace as opposed attempt drying them.
6. Once the engine is running, allow it to warm, and then adjust the engine size number to get as good a running as possible.
7. Adjust the idle control in "Manual Mode" under the IDLE tab to help maintain a steady idle without throttle use. (Refer to the ME221 Tuning Manual for more on idle tuning).

Remember that ultimately an engine is a simple mechanical system - it needs, air, fuel, compression and a spark (at the right time, usually around 10* BTDC at idle for most common engines). Check for these basics and you can narrow down the issue. If still in doubt, give us call, e-mail and we will help you out - if you can have an internet connection available we can remote connect and check things enabling

## **Congratulations**!

You now have a running engine that is ready for full calibration under load. Please visit our website for a list of approved tuning agents, or, contact us about your tuner of choice and we can get in touch to offer training or assistance where needed. That being said, the ME221/ME442, although advanced in areas of knock and boost control etc, is similar to most modern performance ECUs in that it is a VE based engine management system and any competent tuning professional should find it very easy to use.

# Appendix A | Connectivity

Extra Connections available:

| *Pin #* | *Function* | *Notes* |
|---|---|---|
| 2 | COIL C | IGBT Coil Driver (10A) |
| 4 | Relay 8 | Low Side 500mA Relay Driver |
| 5 | TACHO | 0-12v Tachometer signal |
| 31 | COIL D | IGBT Coil Driver (10A) |
| 34 | Relay 7 | Low Side 500mA Relay Driver |
| 35 | Relay 6 | Low Side 500mA Relay Driver |
| 45 | SWT3 | Ground Triggered Switched Input |
| 50 | SWT4 | Ground Triggered Switched Input |

**Full Pinout (DBW 182 Version)**

| PIN | Thickness | Marking | Function / ECU Internal Naming |
|---|---|---|---|
| 1 | 1 | 3CW | 2 & 3 IGNITION COIL / COIL B |
| 3 | 1.4 | M | EARTH |
| 6 | 0.35 | 3LR | + LOAD POTENTIOMETER 1 / 5V REF |
| 7 | 0.6 | 3MN | MOTORISED THROTTLE POTENTIOMETER / 5V REF |
| 8 | 0.6 | 3BB | CANISTER BLEED SOLENOID VALVE / LS 3 |
| 9 | 0.35 | 3AC | FUEL PUMP RELAY COIL - CONTROL / DVSLS 5 |
| 10 | 0.35 | 3AA | INJECTION LOCKING RELAY COIL - CONTROL / DVSLS 1 |
| 11 | 0.35 | 3JN | FAN 1 RELAY - CONTROL / DVSLS 2 |
| 12 | 0.5 | 3S | KNOCK PINKING SENSOR 1 + SIGNAL > FRONT / KNOCK 1 |
| 13 | 0.6 | 3MQ | MOTORISED THROTTLE POTENTIOMETER 2 SIGNAL / ANA SPARE 2 |
| 14 | 0.35 | 3LS | LOAD POTENTIOMETER 1 + SIGNAL / TPS RAW |
| 15 | 0.6 | 3GN | MANIFOLD PRESSURE SENSOR EARTH / GROUND |
| 16 | 0.6 | 3F | ATMOSPHERIC PRESSURE SENSOR SIGNAL / MAP RAW |
| 17 | 0.6 | 3MP | MOTORISED THROTTLE POTENTIOMETER 1 SIGNAL / DBW ADC PTE0 |
| 18 | 0.6 | 3B | AIR TEMPERATURE SENSOR + SIGNAL / IAT RAW |

| | | | |
|---|---|---|---|
| 21 | 1 | 38Z | PWM IDLE / LS 2 |
| 23 | 0.35 | 3FX | CRUISE CONTROL ON>OFF - CONTROL / |
| 24 | 0.6 | 3BL | ENGINE SPEED > TDC SENSOR - SIGNAL / CRANK VR |
| 27 | 0.35 | 133B | INSTRUMENT PANEL CAN H SIGNAL > COMPUTER / CAN H |
| 28 | 1.4 | M | EARTH |
| 29 | 0.35 | AP29 | PROTECTED + AFTER IGNITION ENGINE FUNCTION FUSE / 12V POWER |
| 30 | 0.6 | BP37 | PROTECTED + BATTERY FEED > INJECTOR MEMORY > LOCKING / NC |
| 32 | 1 | 3CV | 1 & 4 IGNITION COIL - CONTROL / COIL A |
| 33 | 1.4 | M | EARTH |
| 37 | 1 | 3PC | CAMSHAFT SHIFTER CONTROL / LS 1 |
| 39 | 0.35 | 38K | AIR CONDITIONING CUT-OFF CONTROL > PETROL-DIESEL COMPUTER |
| 43 | 0.35 | 3LW | LOAD POTENTIOMETER 2 + SIGNAL /SPARE ADC |
| 44 | 0.6 | 3GL | DOWNSTREAM OXYGEN SENSOR SIGNAL / O2 RAW |
| 45 | 0.6 | 3GK | -- |
| 46 | 0.6 | 3C | COOLANT TEMPERATURE SENSOR + SIGNAL / COOLANT RAW |
| 52 | 0.35 | 5A | BRAKE PEDAL SWITCH + SIGNAL / |
| 53 | 0.35 | 65A | BRAKE LIGHTS + CONTROL |
| 54 | 0.6 | 3BG | ENGINE SPEED SIGNAL > TDC SENSOR |
| 57 | 0.35 | 133C | CAN LOW |
| 58 | 0.35 | 86G | CRUISE CONTROL PROGRAMMING CONTROL |
| 59 | 0.6 | 3CR | INJECTOR 1 - CONTROL |
| 60 | 0.6 | 3CT | INJECTOR 3 - CONTROL |
| 61 | 1 | 3AJB | THROTTLE MOTOR + CONTROL/ DBW A |
| 62 | 1 | 3AJC | THROTTLE MOTOR - CONTROL / DBW B |
| 67 | 1.4 | M | EARTH |

| | | | |
|---|---|---|---|
| 68 | 1 | 3GG | EARTH |
| 69 | 0.35 | 3JP | FAN 2 RELAY - CONTROL / DVSLS 2 |
| 71 | 0.35 | 3LU | + LOAD POTENTIOMETER 2 |
| 72 | 0.5 | 3DQ | PINKING SENSOR / KNOCK -VE |
| 73 | 0.6 | 3JK | COOLANT TEMPERATURE - GROUND |
| 75 | 0.35 | 3LT | - LOAD POTENTIOMETER 1 - GROUND |
| 76 | 0.6 | 3GJ | DOWNSTREAM OXYGEN SENSOR EARTH |
| 77 | 0.35 | 86M | CRUISE CONTROL PROGRAMMING RETURN SIGNAL |
| 78 | 0.6 | 3LG | ATMOSPHERIC PRESSURE SENSOR + / 5V REF |
| 79 | 0.6 | 38U | RHEOSTAT CURSOR |
| 80 | 0.6 | 3GH | UPSTREAM OXYGEN SENSOR EARTH |
| 82 | 0.6 | 3MO | MOTORISED THROTTLE POTENTIOMETER SENSOR - |
| 83 | 0.6 | 38Y | REFRIGERANT GAS PRESSURE SENSOR + |
| 84 | 0.6 | 3JQ | AIR TEMPERATURE -GROUND |
| 85 | 0.6 | 3AW | POWER STEERING PRESSOSTAT |
| 87 | 0.35 | 3LV | - LOAD POTENTIOMETER 2 |
| 89 | 0.6 | 3CU | INJECTOR 4 - CONTROL |
| 90 | 0.6 | 3CS | INJECTOR 2 - CONTROL |

# Appendix B | Known Issues / Model Specifics

If you plan to use a clutch switch, move the wire in Pin 48 to Pin 50. The input will be on DIG IN 4.