

Wire-In Engine Management System



ME221 / ME360 / ME442 GEN 2 90 Way Wire-In

Quick-Start 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 circuit board - 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 Tips & Tricks" 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 new Generation 2 90-way Wire In range offered by us. The ME221, ME360 and ME442 GEN2 all share the same pinout, only some features are only available to the higher numbered ranges. For simplicity, the ME221 is catered to four-cylinders (or simpler engines) while the ME360 is catered to six-cylinder and complex four cylinders (such as requiring Drive-by-Wire) and the ME442 is the fully featured 8-cyl system.

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 ME ECU being so flexible, and so many rolling roads and tuners supporting the ME product range, 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](#).

Please note a complete systems manual detailing all of the ECUs featureset can be found online at www.motorsport-electronics.co.uk/support.

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, the ECU, or 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 ECU 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 ECU Tuning & Tips", and feel free to get involved!

2 ECU Mounting

The ME442 is IP67 sealed against dust and water ingress, and as a result, it is safe to install in the engine compartment. Do not install near extreme temperatures such as the exhaust manifold or turbocharger. The metal casing does not need to be earthed, but it does not harm it to do so. The FCI 90 way connector is also fully waterproof when correctly assembled with rubber boots etc.

For crimping connections, the FCI tool used by our looming factory to crimp the cables is over £2,000, so may not be viable for most small workshop installs - to that end a normal Mini-Timer type crimp tool can be used such as the Durite 0-703-53. Crimps for the main header are part number: 211CC2S1160P

The four 6mm mounting holes are rectangularly arranged with centers at 85×194mm. The case does not need to be earthed and it does not harm it in doing so.



3 Powers & Grounds

Power Grounds

The ECU features multiple 'power ground' pins.

They should be earthed directly to the chassis. These allow current from the injectors, coils, DBW system and low-side switches to flow back to ground (battery negative).

Sensor Ground

All sensors should return to Pin 52 as a protected sensor ground.

Ignition 12V

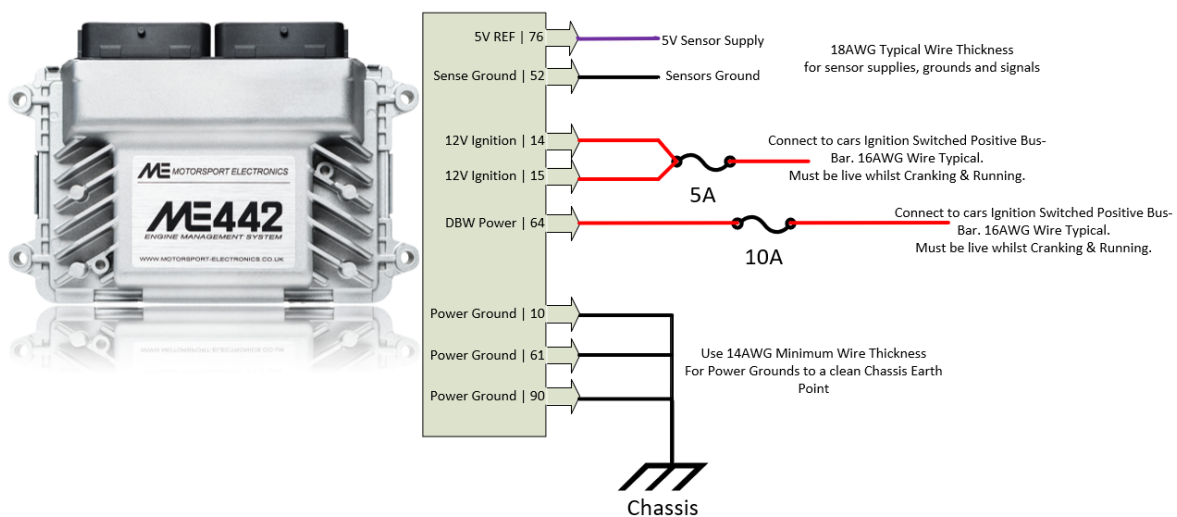
Ignition 12V lines should be connected to a 12V (Ignition Live) line that becomes active on ignition only. Typically this would be fused as part of the EFI fusing at around 10-20A (dependant on amount of coils, outputs etc). No ECU settings will be lost during ECU power off/storage. Note you will NOT be able to connect to the ECU with MEITE without it being powered.

Be sure this supply line stays powered during cranking, as some ignition barrels do not! Always check for 12V when cranking if you seem to have issues starting.

Internal Battery

The ME360/442 houses an internal CR2032 battery (good for over 7 years) to keep the real-time-clock running even when the power is removed. This is used primarily for the engine log-book and datalogging time-stamp. Motorsport Electronics offers a replacement service for this battery.

ME442 Power/Ground Connections

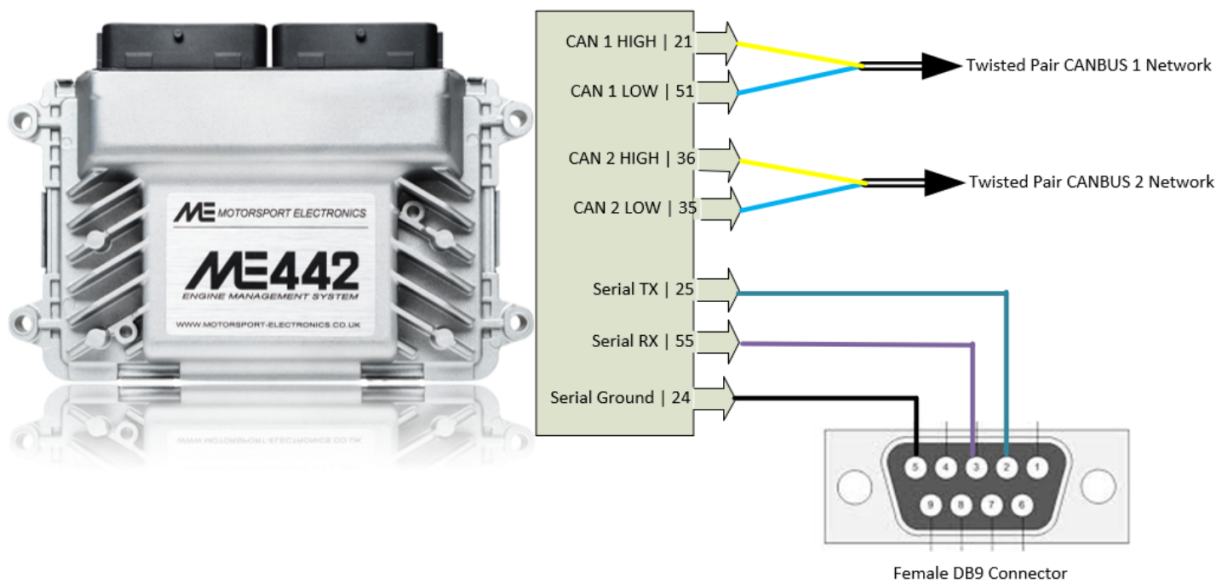


4 Communications

4.1 Serial Data Communication for Tuning

The serial connection is rated at 115kbps and 230kbps with auto switching based on bandwidth requirement and SNR. A good quality serial lead should be used for connection to the tuning laptop/PC, as well as a genuine FTDI Serial → USB Cable.

If you are using a semi or fully terminated wiring loom, then a female DB9 connection will already be provided at the main connector. If you have opted for a plug/pins system, then you will need to make up the connections as follows. Use a female DB9 connection to allow a PC/Laptop to connect via a straight through extension cable and then a genuine FTDI Serial → USB adaptor can be used.



Pin 5 | SERIAL GROUND | Connect to ECU Pin 24

Pin 2 | SERIAL DATA | Connect to ECU Pin 25

Pin 3 | SERIAL DATA | Connect to ECU Pin 55

Note CAN2 is only available on the ME442.

Note that some older laptops with in-built serial ports may not work with the ME221/ME442 due to not supporting the higher speed. You should always use an FTDI Serial → USB adaptor where possible. Prolific and CH304 Chinese clones are NOT supported.

Always be sure to install the latest FTDI Serial/USB drivers which can be downloaded from the support section of our website.

4.2 CAN-Bus Communications

The ECU houses a 2.0b compliant CAN transceiver. Note that the line is not terminated inside the ECU, so a termination resistor will be required if the ECU is at the end of the bus. Several OEM dash CAN-streams are available, as well as a general purpose CAN stream for after-market dashboards. The CAN DBC files are available on the ME website, as well as detailed in the appendix. Use twisted pair cable for CANbus wiring.

CAN1-Low is Pin 51

CAN1-High is Pin 21

4.3 MEITE Tuning Software

ME Plug-In ECUs utilize 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..

4.4 Initial Connection

Once you have installed MEITE, and the Serial FTDI drivers (all available from our website), connect the ECU to the laptop, and turn the ignition/12V supply on - 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 help (Help menu) for further help with getting connected. If it does not, be sure to try the Auto-Detect under the ECU menu to establish the correct COMM port for the laptop to use.

5 Inputs/Outputs/Sensors etc

The full manual (at www.motorsport-electronics.co.uk/support) contains more details on the connections to different types of engine hardware, however, as a brief run-down, items labeled in the Pin Out Table in the appendix have typically the below use.

Connection Type	Function
12V Ignition	Connect to your switched ignition supply
Power Ground	Connect to chassis/engine earth.
5V REF	A 5v Reference/supply voltage for sensors like the MAP sensor or Throttle Position.
Sensor/Signal Ground	The ground for all of your sensors.
Injector X	The GROUND SWITCH to each injector. (The other wire on each injector goes to your 12V supply.)
COIL X	The Coil Pin. Software allows you to set this either to a 5V trigger for COPs and other smart coils (such as VAG Coil-On-Plugs), or a High Current Low Side (IGBT) for passive coils (such as a traditional Ford Coil Pack).
PWM Low Side	4A capable Low Side (switched Ground) outputs that can be driven at high frequency/pulse-width modulated for things like VVT, Boost Control, Idle Valves etc.
Relay Low Side	Low current (<400mA per channel), non PWM-able outputs that are used for relays such as Coolant Fan, Fuel Pump, AC Clutch etc.
Analog Temp.	This is a temperature sensor connection. It has an internal 2k7 5V pullup. The other wire of the sensor goes to Sensor Ground.
Analog Volt.	A 0-5V sensor input (for things like the Throttle Sensor or MAP Sensor).
Crank/Cam VR+/-	The two wires from a VR type Crank/Cam sensor would connect here. (See full manual for help with HALL type sensors.)
Digin X	A digital input pin. Internally pulled up to 5V. Connect the wire via a switch (such as clutch switch) to Sensor Ground to enable the specified function as set in the Input Settings.

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 your car has been tuned, major FW changes can make the map unusable - 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 ECU, 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 100 KPa at sea level, with the engine not running), Throttle (moving from 0-100% with throttle actuation). If they do not, refer to the ME 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 ME Software guide - which details the specifics of the ECUs 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 enter 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 to 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 [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 a call or email and we will help you out - if you can have an internet connection available we can remote connect and check things are enabled correctly.

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 | 90 Way Header Connectivity

Below is the full pinout. Note some features are not available on certain models. An “x” denotes it is available.

Pin	Function	<i>ME221 GEN2</i>	<i>ME360 GEN2</i>	<i>ME442 GEN2</i>
1	COIL 4	x	x	EVERYTHING
2	COIL 3	x	x	
3	INJECTOR 4	x	x	
4	INJECTOR 2	x	x	
5	DIG_IN 4			
6	DIG_IN 1	x	x	
7	DIG_IN 2	x	x	
8	DIG_IN 3		x	
9	LOW SIDE RELAY 18		x	
10	GROUND CHASSIS	x	x	
11	EGT 1		x	
12	LOW SIDE PWM 2	x	x	
13	LOW SIDE RELAY 15			
14	VBAT IGNITION	x	x	
15	VBAT IGNITION	x	x	
16	LSU HEATER -VE	x	x	
17	ANA VOLT 3	x	x	
18	ANA VOLT 4		x	
19	LSU UN	x	x	

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20	LSU VM	X	X	
21	CAN 1 HIGH	X	X	
22	CAM A VR+	X	X	
23	CAM A VR-	X	X	
24	SERIAL 1 GROUND	X	X	
25	SERIAL 1 TX	X	X	
26	ANA VOLT 1	X	X	
28	INJECTOR 5		X	
31	COIL 2	X	X	
32	COIL 1	X	X	
33	INJECTOR 3	X	X	
34	DIG_IN 6		X	
37	LOW SIDE RELAY 11	X	X	
39	LOW SIDE PWM 6		X	
40	LOW SIDE RELAY 17			
42	LOW SIDE RELAY 12			
43	LOW SIDE RELAY 14			
44	LOW SIDE PWM 4	X	X	
45	5V REF	X	X	
46	5V REF	X	X	
47	ANA TEMP 4		X	
48	ANA VOLT 7		X	
49	LSU IA	X	X	

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50	LSU IP	X	X	
51	CAN 1 LOW	X	X	
52	SENSORS GROUND	X	X	
53	KNOCK 1 SIGNAL	X	X	
54	KNOCK 2 SIGNAL			
55	SERIAL 1 RX	X	X	
56	ANA VOLT 2	X	X	
57	ANA TEMP 2	X	X	
58	INJECTOR 6		X	
59	COIL 5		X	
60	COIL 6		X	
61	GROUND (INJECTORS 1/2/3/4)	X	X	
62	DIG_IN 5		X	
63	INJECTOR 1	X	X	
64	VBAT (H-BRIDGE SUPPLY)	X	X	
65	H-BRIDGE A OUT 1 (DBW +)		X	
66	H-BRIDGE A OUT 2 (DBW -)		X	
67	Stepper 1 / A1		X	
68	Stepper 2 / A2		X	
69	LOW SIDE PWM 5	X	X	
70	Stepper 3 / B1		X	
71	Stepper 4 / B2		X	
72	LOW SIDE RELAY 13			

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73	LOW SIDE PWM 1	X	X	
74	LOW SIDE PWM 3	X	X	
75	LOW SIDE RELAY 16			
76	5V REF	X	X	
77	ANA TEMP 3	--	X	
78	ANA VOLT 6			
79	TACHOMETER (12V Square Wave)	X	X	
80	CRANK VR-	X	X	
81	CRANK VR+	X	X	
82	CAM B VR-		X	
83	CAM B VR+		X	
86	ANA TEMP 1	X	X	
87	ANA VOLT 5	--	--	
89	POWER GROUND	X	X	
90	GROUND (INJECTORS 5/6	X	X	