AGT ENGINEERING

CANBUS Emulator Mini V1.x

Overview - Installation and Operating Instructions

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Overview

The AGT Engineering “Canbus Emulator Mini” enables the use of late model Subaru engines (that are Canbus equipped) into vehicles or applications that do not have Canbus.

Late model Subaru’s use Canbus technology for the Engine Computer, Body Computer, ABS, Traction Control, Airbag, EPS, HVAC and Gearbox modules to talk to one another. If some of these Canbus modules are absent in an engine conversion using the standard engine computer (ECU), the engine will not run properly and the “check engine light” will illuminate.

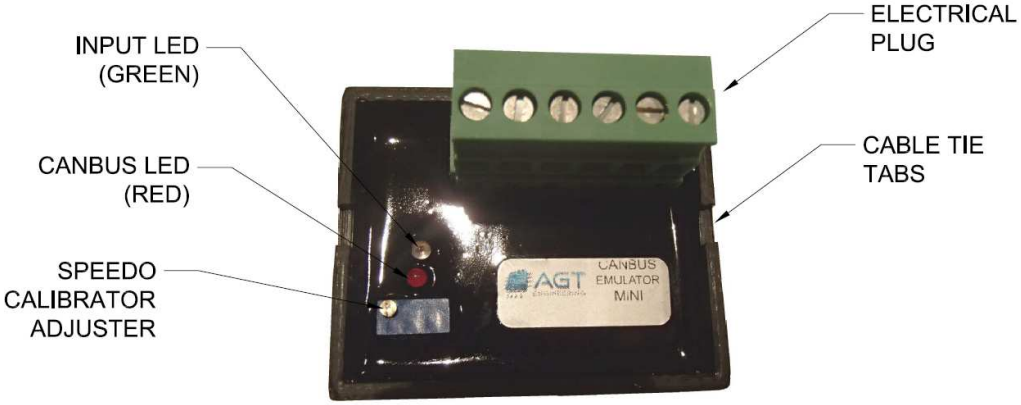
The Canbus emulator fixes this problem, by emulating (copying) the signals from the Canbus modules that are not used in an engine conversion. This keeps the engine computer happy, and stops it from going into a fault (limp) mode.

The Canbus Emulator can also perform a few extra functions to assist in your engine conversion, including the following:

Speedometer calibrator – Used with the Subaru gearbox speed sensor or another 4-5 pulse sensor, the Canbus Emulator can adjust the signal to account for different wheel/tyre combinations and differential ratios so the electronic speedometer can be calibrated to read correctly. Adjustment range is from 25% to 250% of the input signal and can be set using a screwdriver by turning the potentiometer on the circuit board. This signal is then transmitted over Canbus for the engine computer and FA/FB instrument cluster.

> Note: The Canbus emulator MINI, does not include a calibrated speed pulse wire for earlier model EJ model Canbus systems. If the instrument cluster is needed for a calibrated speedometer display, the Subatronics Canbus Emulator should be used, or a 3rd party digital speedo calibrator, such as the “SpeedoHealer” used in conjunction with the Canbus Emulator Mini.

The Canbus Emulator is housed in a robust, water resistant plastic case complete with recessed tabs to enable it to be secured to the wiring harness using cable ties. A 6 way “Phoenix” style screw termination plug is used for the electrical connections, and can be wired direct to the existing wiring loom. It needs just 4 mandatory wires, two for power, and two for Canbus. The 5th and 6th wires are for the speedometer input (if used) and the reverse switch (for FA/FB systems that were CVT Automatic and the Subaru reversing camera is being used in the conversion.



Installation

Basic Install

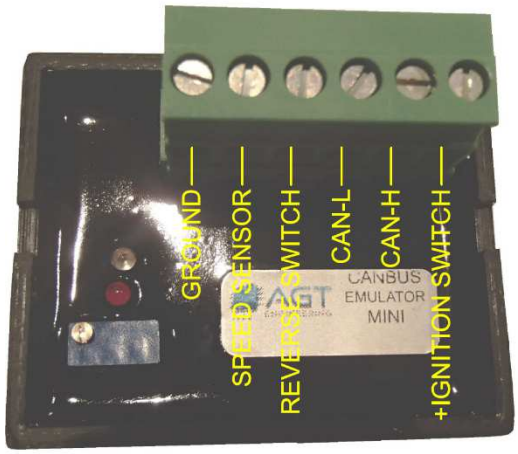
The Canbus emulator is contained within a robust plastic enclosure with recessed tabs allowing it to be secured to the wiring loom using cable ties.

A 6 way “Phoenix” style screw termination plug is used for the electrical connections, and can be wired direct to the existing wiring loom. Depending on what options are installed on the Canbus emulator will depend on how many wires are provided on the wiring harness.

The primary function of the Canbus Emulator is to provide the missing Canbus messages when the engine is placed in a non Canbus environment. For this basic setup, only 4 Wires are needed as shown below.

PIN	Common Loom colours		NAME
1	BLACK	Input	GROUND
2			
3			
4	BLUE	HS CAN	HS-CAN-L
5	RED	HS CAN	HS-CAN-H
6	Green/Yellow	INPUT	+12V IGNITION

These connections can be wired into the steering wheel angle sensor wiring (if equipped) once the angle sensor wiring is removed from the steering wheel (it is only required for ABS). Alternatively, it can be spliced into the wires anywhere along the existing circuit.



Connection diagram

With optional speed sensor input and reverse signal input

The Canbus Emulator Mini can be used as a speedometer calibrator for calibrating the speedometer for different ratio differentials and tyres. It does this by sensing the speed on the speed input wire and changing the frequency between %25 to %250 of the input frequency, adjusted by the user. It sends the speed data via Canbus communications to the engine computer and FA/FB speedometers.

The Canbus Emulator Mini also emulates the CVT Gearbox ECU in FA/FB systems. The reverse signal in CVT systems goes to the CVT Gearbox ECU and is transmitted to the Multi-function Display screen over Canbus. It will also display "R" on the instrument cluster when reverse gear is selected. The Canbus Emulator transmits this reverse signal over Canbus if required.

Note: Conversions from manual donor vehicles have the reverse signal connected to the Body Computer (BIU), in this case, the reverse signal is not needed to be wired into the Emulator.

PIN	Common Loom colours		NAME
1	BLACK	Input	GROUND
2	Pink/Green	Input [1]	Speed input
3	Brown/Yellow	Input [2]	Reverse Input
4	BLUE	HS CAN	HS-CAN-L
5	RED	HS CAN	HS-CAN-H
6	Green/Yellow	INPUT	+12V IGNITION

[1] Speed input is a 0-5V or 0-12V digital pulse of approximately 4-5 pulses per wheel revolution. The wire is pulled "high" by the emulator, and suits a negatively switched output speed sensor (most speed sensors, including Subaru is this type).

[2] Reverse input is a 0 to 12V input. 12V when in Reverse

Operation

Speed sensor Calibration

The Canbus Emulator Mini, once wired up, should work straight away once the ignition is turned on. There is a multi-turn potentiometer on the board used to calibrate the speedometer. It is factory set at roughly 100%, meaning no adjustment to the input speed. This can be adjusted to 250% by turning the screw with a small flat blade screwdriver in a clockwise rotation. There are approximately 10 turns from the midpoint (factory 100% setting) to 250%. The adjustment can also be set down to a minimum of 25% by turning the screw in an anti-clockwise rotation. There are approximately 10 turns anticlockwise from the midpoint (factory 100% setting). The unit can be adjusted below 25% makes the emulator transmit a constant 38km/h speed over Canbus. This prevents the ECU from going into a fail-safe “limp” mode if the speed input is not used.

Indication Lights

There are two indication LEDs on the Canbus Emulator to display its status and for fault finding.

The RED LED

RED LED	SOLID – Indicate Power ON but no Canbus signal has been detected from the engine ECU FLASHING – Indicates it is communicating to the Engine ECU
Green LED	Changes state every time the speed input is pulses, or the reverse switch is engaged/disengaged. It will therefore flash slowly at slow speeds, and rapidly at fast speeds.

Troubleshooting

Symptom	Solution
No LEDS	Check power connections
No Canbus communication (P0600 ECU Faults, many warning lights on instrument cluster)	Check Canbus Wiring. Check Polarity of High and Low Canbus wires (try swapping them over)
No Speedometer	Older EJ Canbus systems have a hard wired Speedometer input (not via Canbus), so the speed sensor needs to be wired to the speedometer as well as the emulator (See speedometer section above).
Erratic Speedometer	Incorrect or noisy speed signal.

Important Details on using late model Subaru Canbus motors for conversions

The late model Canbus motors are an ideal choice for engine conversions as they are newer, generally have lower km's, and more economical than older models. The Canbus wiring and control is a little more complex than the older non-Canbus engines, however in most cases there will actually be less wires between components!

A few things to note before attempting a Canbus Subaru conversion:

The engine immobiliser uses the Engine Computer (ECU), Body Computer (BIU), Instrument Cluster, the ignition barrel, and of course the key with the transponder chip. All of these components need to be matching, otherwise the engine will only run for 2 seconds, if at all. Preferably, these components, along with the wiring harness, should be removed from the same donor car as the engine. Subaru can reprogram the security codes of the components and keys, however this can be difficult without the components being in a working car.

The Instrument cluster is part of the immobiliser system, however if you do not wish to use the Subaru instrument cluster, the security function may be able to be copied and replaced with a dash emulator. For the instrument cluster to be copied, it must be sent to **AGT Engineering** to allow the security codes to be extracted from it. If an instrument cluster is not available, the rest of the components must be reprogrammed by Subaru to match an existing dash emulator that can be copied.

The list below details the parts required from a donor Subaru for a Subaru conversion:

Engine

Wiring loom (including wiring between Engine and Engine Computer (ECU), Body Computer (BIU), Instrument Cluster, accelerator pedal sensor, engine fuse and relay block (holds engine, fuel pump fuses and relays).

Engine Computer (ECU)

Body Computer (BIU)

Key and Key antenna (on the ignition barrel)

Instrument Cluster (dash)

Accelerator Pedal (Canbus motors are drive by wire with no throttle cable)

Ignition Switch Barrel and Key (including the key transponder pickup coil)

Fuel Pump Controller (some models only, mainly turbo or H6)

Fuel Pump (Or a suitable alternative)

Steering Wheel (Optional – However useful for the cruise control buttons if equipped. Note: cruise control will also need the Subaru switches added to the Brake and Clutch pedals)