

***Installation Instructions for:
EMS P/N 30-1820
2004 Subaru Impreza WRX STI
and
EMS P/N 30-1821
2005-06 Subaru Impreza WRX STI***

WARNING:



This installation is not for the tuning novice nor the PC illiterate! Use this system with **EXTREME** caution! The AEM EMS System allows for total flexibility in engine tuning. Misuse of this product can destroy your engine! If you are not well versed in engine dynamics and the tuning of management systems or are not PC literate, please do not attempt the installation. Refer the installation to a AEM trained tuning shop or call 800-423-0046 for technical assistance. You should also visit the AEM EMS Tech Forum at <http://www.aempower.com>

NOTE: AEM holds no responsibility for any engine damage that results from the misuse of this product!

This product is legal in California for racing vehicles only and should never be used on public highways.

ADVANCED ENGINE MANAGEMENT INC.
2205 126th Street Unit A Hawthorne, CA. 90250
Phone: (310) 484-2322 Fax: (310) 484-0152
<http://www.aempower.com>
Instruction Part Number: 10-1820

© 2008 Advanced Engine Management, Inc.

Congratulations! You have just purchased the finest Engine Management System for your vehicle at any price.

The AEM Engine Management System (EMS) is the result of extensive development on a wide variety of vehicles. Each system is engineered for a particular application. The AEM EMS differs from all others in several ways. The EMS is a “stand-alone”, which completely replaces the factory ECU and features unique plug and play technology. There is no need to modify the factory wiring harness and in most cases the vehicle may be returned to stock in a matter of minutes. The AEMPro software is configured to work with the factory sensors and equipment, so there is no need for expensive or hard to find sensors, making replacements and repairs as simple as with any stock vehicle. For stock and slightly modified vehicles, the AEMPro software can be programmed with base parameters, providing a solid starting point for beginner tuning. For more heavily modified cars, the EMS has many spare inputs and outputs allowing the elimination of add-on rev-limiters, boost controllers, nitrous controllers, fuel computers, etc. It also includes a configurable onboard data logger that can record any 16 EMS parameters at up to 250 samples per second. Every EMS comes with all functions installed and activated; there is no need to purchase options or upgrades to unlock the full potential of your unit.

Please visit the AEM EMS Tech Forum at <http://www.aempower.com> and register. We always post the most current strategy release, PC Software and base calibrations online. On the forum, you will find and share many helpful hints/tips to make your EMS perform its best.

TUNING NOTES AND WARNING:

While the supplied startup calibration may be a good starting point and can save considerable time and money, it will not replace the need to tune the EMS for your specific application. AEM startup calibrations are not intended to be driven aggressively before tuning. We strongly recommend that every EMS be tuned by someone who is already familiar with the AEM software and has successfully tuned vehicles using an AEM EMS. Most people make mistakes as part of the learning process; be warned that using your vehicle as a learning platform can damage your engine, your vehicle, and your EMS.

Please read and understand these instructions **BEFORE** attempting to install your EMS.

1) Removing the Stock Engine Control Unit

- a) Access the stock Engine Control Unit (ECU). The location of the ECU on the WRX is underneath the right side floorboard. A 10mm socket is required to remove the kick panel that covers the stock ECU.
- b) Carefully disconnect the wiring harness from the ECU. Avoid excessive stress or pulling on the wires, as this may damage the wiring harness. Some factory ECUs use a bolt to retain the factory connectors, and it must be removed before the harness can be disconnected. There may be more than one connector, and they must all be removed without damage to work properly with the AEM ECU. Do not cut any of the wires in the factory wiring harness to remove them.
- c) Remove the fasteners securing the ECU to the car body, and set them aside. Do not destroy or discard the factory ECU, as it can be reinstalled easily for street use and troubleshooting.

2) Installing the AEM Engine Management System.

- a) Plug the factory wiring harness into the AEM EMS and position it so the wires are not pulled tight or stressed in any manner. Secure the EMS with the provided Velcro fasteners.
- b) Plug the comms cable into the EMS and into the PC (not supplied).
- c) Install the supplied AEM CD and open the AEMPro software.
- d) Turn the ignition "on" but do not attempt to start the engine.
- e) Go to: "*ECU | Send New Calibration*". Upload the base calibration file (.cal) that most closely matches the vehicle's configuration to be tuned. Full details of the test vehicle used to generate each map can be found in the "*Notes*" section in the "*Setup*" window of the AEMPro software. The base maps can be found in the Subaru folder located in: "*My Computer | Local Disk (C:) | Program Files | AEM | AEMPro | Startup Calibrations*"
- f) Calibrate the Electronic Throttle Control system by following the ETC Calibration procedure - see page 8-9
- g) Synchronize the ignition timing: Select the "*Configure*" drop down menu, then "*ECU Setup | Set Ignition*". Use a timing light and compare the physical engine timing on cylinder #1 (front right cylinder on the STI) to the parameter "*Ignition Timing*" displayed. Use the "*Advance/Retard*" buttons until the timing at the engine matches the timing parameter displayed in the EMS.

3) Ready to begin tuning the vehicle.

- a) Note: This calibration needs to be properly tuned and is not recommended for street use. **NEVER TUNE THE VEHICLE WHILE DRIVING.**

Application Notes for EMS P/N 30-1820 / 30-1821

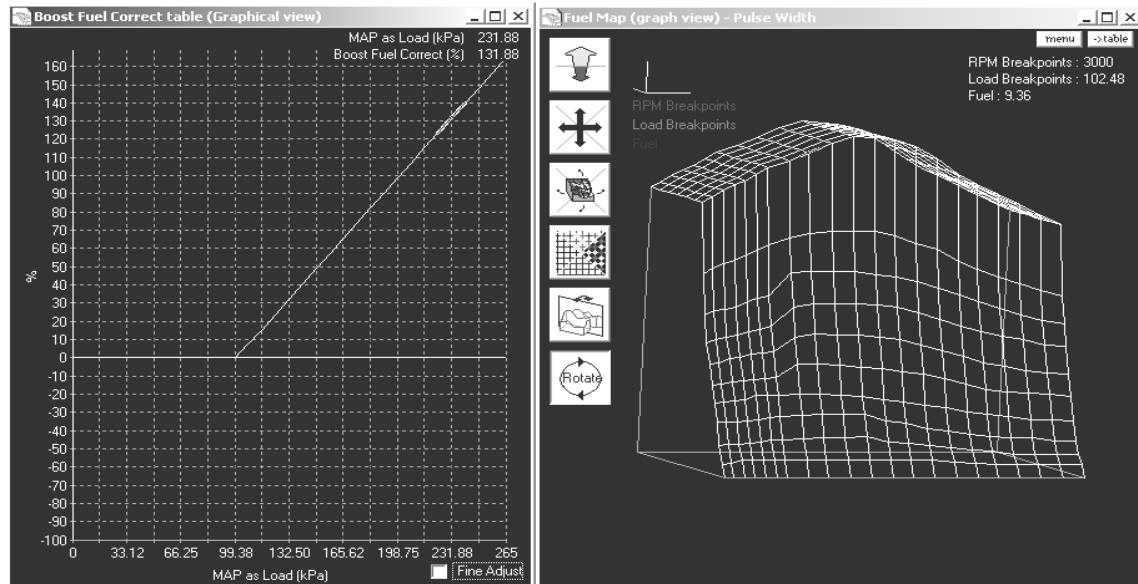
Make:	Subaru	Transmissions Offered:	Manual
Model:	Impreza WRX STI	Trans Supported:	Manual
Years Covered:	2004 (30-1820 EMS) 2005-2006 (30-1821)	Drive Options:	AWD
Engine Displacement:	2.5L	Supplied Connectors:	---
Engine Configuration:	Flat 4	Spare Injector Drivers:	Inj #5, pin A2
Firing Order:	1-3-2-4	Spare Injector Drivers:	Inj #6, pin A3
N/A, S/C or T/C:	Turbocharged	Spare Injector Drivers:	Inj #7, pin A6
Load Sensor Type:	MAP or MAF	Spare Injector Drivers:	Inj #8, pin A7
MAP Min:	0.8V @ -14.7 PSIG	Spare Coil Drivers:	---
MAP Max:	4.59V @ 23.8 PSIG	Boost Solenoid:	PW #2, pin A32
MAF Min:	0.70V @ 0.0 Grams/Sec	EGT #1 Location:	Pin C12
MAF Max:	4.84V @ 308 Grams/Sec	EGT #2 Location:	Pin D20
# Coils:	4, with internal igniters	EGT #3 Location:	Pin D24
Ignition driver type:	0-5V Logic	EGT #4 Location:	Pin D29
How to hook up a CDI:	Remove OEM coils	Spare 0-5V Channels:	---
# Injectors:	4 (Inj 1-4)	Spare Low Side Driver:	Low Side #2, pin A13
Factory Injectors:	500 cc/min Saturated	Spare Low Side Driver:	Low Side #3, pin A12
Factory Inj Resistors:	No	Spare Low Side Driver:	Low Side #4, pin A14
Injection Mode:	Sequential	Spare Low Side Driver:	Low Side #11, pin A24
Knock Sensors used:	1	Check Engine Light:	Low Side #10, pin A17
Lambda Sensors used:	2 (OEM O2 sensors not used by EMS)	Spare High Side Driver:	High Side #2, pin A33
Idle Motor Type:	None (Electronic Throttle)	Spare Switch Input:	Switch #2, pin C9
Main Relay Control:	Yes	Spare Switch Input:	Switch #3, pin A1
Crank Pickup Type:	Magnetic	Spare Switch Input:	Switch #4, pin D11
Crank Teeth/Cycle:	36-2-2-2	Spare Switch Input:	Switch #5, pin D13
Cam Pickup Type:	Hall Effect	A/C Switch Input:	Switch #6, pin D16 / D17
Cam Teeth/Cycle:	3		

Subaru 2004 / 2005-2006 Model Year Differences

Although there are very few differences between the 2004 and 2005-2006 models, the ECUs are not interchangeable. The 30-1820 EMS must be used in a 2004 vehicle, and the 30-1821 EMS must be used in 2005-2006 vehicles. Consult the pinout chart for further information.

EMS Fuel Map, Boost Fuel Correct Table

The 30-1820/1821 maps provided utilize the “*Boost Fuel Correct Table*” to provide a 1:1 fuel compensation above atmospheric pressure. In the startup calibration, the “*Boost Fuel Correct Table*” is configured to provide twice as much fuel when the manifold pressure is twice as high; this should help simplify the tuning process for different boost levels. Notice the values in the main “*Fuel Map*” do not change above 100 kPa (0 psi boost), the fuel correction is being made by the “*Boost Fuel Correct Table*.” Note: the “*Boost Fuel Correct Table*” must be adjusted if a different map sensor is installed (this is because the load breakpoints change). The Boost Fuel Correct value should be 0 at 100 kPa, +100 at 200 kPa, +200 at 300 kPa, etc...



Subaru MAF sensor, Intake Air Temp sensor

The MAF (mass air flow) sensor can be removed to help decrease intake air restriction as the base map uses the factory MAP sensor to determine engine load. Please be aware that the IAT (intake air temperature) sensor is integrated into the factory MAF sensor. If the factory MAF / IAT sensor is removed, you may wish to install an AEM IAT Sensor Kit (P/N 30-2010), which includes a sensor, wire connector, and aluminum weld-in bung. While the factory MAF sensor locates the IAT sensor upstream of the turbocharger inlet, it may be preferable to install an IAT sensor downstream of the intercooler to accurately measure charge temperatures.

EMS DC Stepper Motor control (Subaru Tumble Generator Valves)

There are two sets of Tumble Generator Valves (TGV) found on the intake manifold of the STI. Each set of valves is driven by a DC stepper motor and has a 0-5V feedback signal to monitor valve position. The Motor #1 and Motor #2 Target tables are used to set the position of the valves; valve position can be controlled based on various parameters such as throttle position, vehicle speed, engine RPM, or engine load. The parameters “*PR Press Voltage*” and “*Spare Temp Voltage*” display the current position of the valves. When these parameters are near 0 Volts, the valves are open and will allow maximum air flow. When these parameters are near 5 Volts, the valves are closed creating turbulence in the intake stream and restricting air flow. The valves are always open in the AEM-supplied startup calibrations.

WARNING: the EMS can be configured to control the left and right bank independently. The engine will run very poorly if one set of TGVs is fully open while the other set is fully closed, so please be sure that the Motor #1 and Motor #2 Target tables are both the same.

EMS Variable Valve Control (Subaru AVCS)

The Variable Valve Control table in the EMS can be used to control the STI's AVCS system, which is used to change the airflow characteristics of the engine by advancing the timing of the intake camshafts. When adjusting the Valve #1 and Valve #2 map, please be aware that 55 represents minimum camshaft advance and 0 represents maximum camshaft advance. The VVC settings provided in the AEM startup calibration are the results of hours of dyno testing on a stock 2004 STI and should be a good starting point. Other setups may respond differently, so the startup calibration may not contain the ideal VVC settings for vehicles that have been modified.

WARNING: The Subaru engine has a right and left camshaft, and the EMS is able to control each of them independently. It is very important that the VVC#1 and VVC#2 tables, options and error control settings are set to the same value for every load and RPM point. If the left and right camshaft targets or control schemes are not the same, the resulting oil pressure fluctuation to the AVCS solenoids may make it difficult to accurately control camshaft angle and the engine may run poorly.

Initial VVC Calibration:

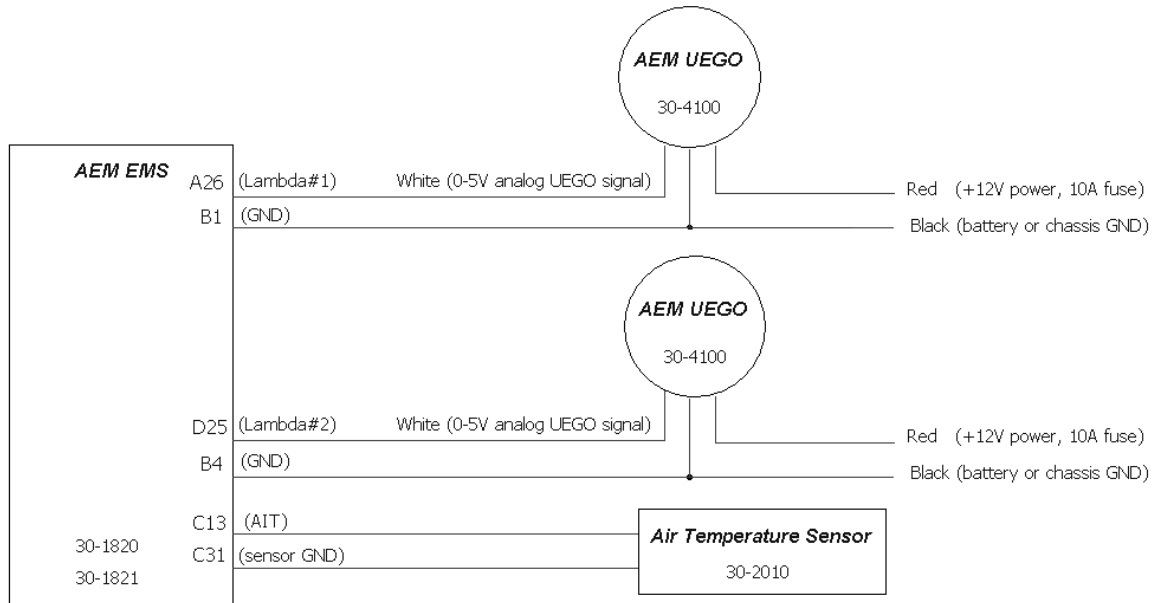
The Cam#1 Start and Cam#2 Start options may be different from each other, and may not be the same for every vehicle. VVC calibration should be performed once the EMS has been tuned well enough that the engine idles smoothly and can safely be taken to redline in neutral.

- With the engine idling, open the Valve #1 map, select the entire map, right-click with the mouse and choose "Copy" to save the table values to the clipboard.
- Highlight the columns from 2500 RPM up to 5000 RPM, press the [M] key to open the right-click menu, and then press the [S] key for "set value."
- In the dialog box that appears, type "40" and press [Enter]. Open the Valve #2 map and repeat this process, setting the map to "40" from 2500-5000 RPM.
- Open the VVC#1 Template (Setup >> Advanced Setup >> Variable Valve Control >> VVC#1) and hold the engine around 3500 RPM. Monitor the *Cam#1 ADV* parameter, it should be the same as the *VVC#1 Target* parameter (40 degrees), and the *VVC#1 Error* should be very small (+/- 1 max). If the *VVC#1 Error* is greater than +1 or -1, adjust the *Cam#1 Start* option to decrease this error.
- Repeat this process for the VVC#2 Template, adjust the Cam#2 Start option as needed.
- Select the entire Valve #2 table, right-click and Paste the original values back into the table. Copy and paste these values into the Valve #1 table also.

Wiring accessories to the EMS

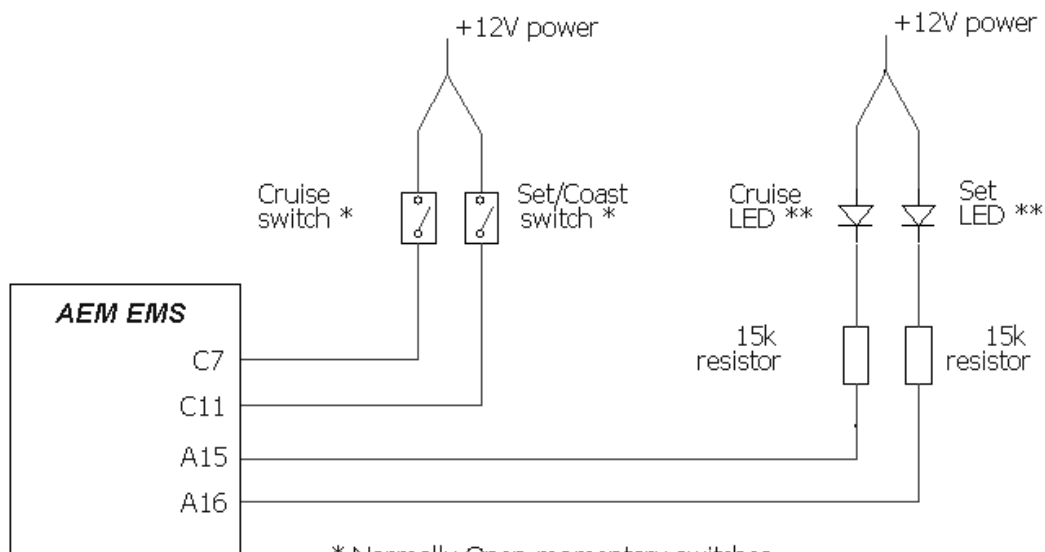
Please follow this suggested wiring diagram when adding accessories such as UEGO gauges or Air Temperature Sensors to the EMS.

Note that the AEM UEGO gauge's black wire should be tapped to the battery or chassis ground; connecting the UEGO to the EMS ground pins without also wiring it to the battery or chassis may cause the UEGO and/or EMS to malfunction.



Subaru Cruise Control switches and indicator lights

The OEM cruise control switches and lights are used to perform the initial calibration of the Electronic Throttle Control unit. If the OEM steering wheel and/or gauge cluster have been removed, please temporarily re-install them to calibrate the ETC unit, or add switches and lights to the vehicle as shown:



* Normally Open momentary switches

** LEDs should be rated for at least 10 mA current

AEM Electronic Throttle Control System (ETC)

The 30-1820 EMS incorporates an ETC system which controls the OEM electronic throttle body. All components of this system, unmodified and as delivered from the manufacturer, are required for optimum and safe functionality of this system. These components include, but are not limited to, wiring, ETC relay, accelerator pedal assembly, and throttle body.

The EMS ETC control system incorporates multiple failsafe strategies such that in the event of a component failure, the system will shut down the ETC system and, if necessary, the engine in a graceful manner. It still remains the user's responsibility to ensure that all vehicle, component, and wiring systems are maintained to a level of workmanship consistent with industry standards.

Note: As the EMS is intended for use on vehicles that are to be operated off-road only, the factory cruise control system will be non-operational after installation of the EMS.

Installation Information

The 30-1820 AEM EMS was designed to work with the vehicle, its components, and wiring as delivered from the manufacturer. If any of the components or wiring have been changed or if the drive-line from the original vehicle has been placed in another vehicle such in a custom race application then the user should take heed of the following notes.

- A mechanical Wide Open Throttle/"WOT" accelerator pedal travel stop is installed in the floor and/or carpet of the vehicle as delivered from the manufacturer. If this stop is removed for any reason, such as removing the carpet for use in a race vehicle, the user must ensure that a stop of some sort is fabricated and installed. This stop must be fabricated such that there is a minimum clearance of 0.250 inches between the accelerator pedal mounting bracket and the accelerator pedal actuating rod when the pedal is at WOT. See *Figure 1*.

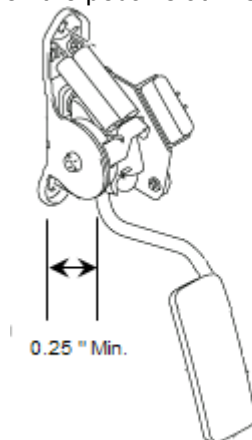


Figure 1 - Minimum Pedal to Bracket Clearance

- The ETC system incorporates several safety/failsafe strategies and components that rely on the system to be installed as delivered from the manufacturer to operate properly. These components include, but are not limited to, wiring, ETC relay, accelerator pedal assembly, and throttle body. All the original components must be installed and functional to ensure optimum and safe performance of the ETC system.
- The **CRUISE** and **SET/COAST** buttons, and the **CRUISE** and **SET** dashboard indicator lights are an integral part of the ETC system calibration and diagnostic functions. It is, therefore, not recommended that these buttons and lights be completely removed from the vehicle such as could be the case with a purpose-built race vehicle.

Electronic Throttle Control System Calibration Procedure

The 30-1820 / 30-1821 EMS, as delivered, requires a specific calibration procedure to be performed prior to use. Before beginning this procedure, please be familiar with the location and function of the **CRUISE** and **SET/COAST** buttons on the Cruise Control Steering Column Stalk as depicted in *Figure 2*. Also be aware of the (green) **CRUISE** and **SET** indicator lights on the dashboard, *Figure 3*. **This procedure should be repeated any time any part of the ETC system has been serviced, removed, or replaced.**

Note: Do not attempt to start or run the engine during the calibration procedure. The EMS will disable engine start/running whilst in calibration mode.

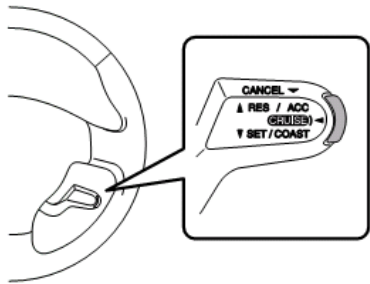


Figure 2 - "CRUISE" and "SET/COAST" buttons

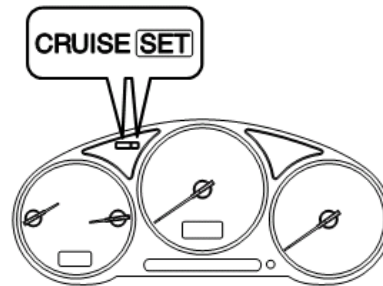


Figure 3 - "CRUISE" and "SET" indicator lights

1. Initial Calibration Procedure

- a. Turn the ignition key to the ON position. The **CRUISE** and **SET** indicator lights will begin flashing in unison at a medium rate.
- b. Press and hold the **CRUISE** button (See *Figure 4*) for approximately three (3) seconds until the indicator lights stop flashing.
- c. There will be a brief delay after which the **CRUISE** light will flash once.
- d. Ensure the accelerator pedal is not being depressed and is in the full "UP" position.
- e. The **SET** indicator light will flash rapidly for a few seconds as the EMS calibrates this position.
- f. There will be a brief delay after which the **CRUISE** light will flash twice.
- g. Depress and hold the accelerator pedal to the floor and ensure it is in the full Wide Open Throttle/"WOT" position.
- h. The **SET** indicator light will flash rapidly for a few seconds as the EMS calibrates this position.
- i. There will be a brief delay after which the **CRUISE** light will flash three times.
- j. The **SET** indicator light will flash rapidly for several seconds as the EMS calibrates the ETC throttle body.
- k. If the calibration procedure was successful and all the ETC sensors and actuators are found to be within tolerance then the **CRUISE** and **SET** indicator lights will flash in unison at a medium rate.
- l. If the calibration procedure fails, indicated by the **CRUISE** and **SET** indicator lights flashing in an alternating pattern, please reference the sections entitled **ETC Diagnostics and Calibration Troubleshooting** elsewhere in this document.
- m. Turn the ignition key to the OFF position.
- n. The ETC system is now calibrated and ready for use.

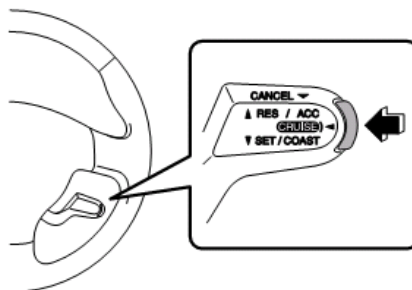


Figure 4 – Pressing the "CRUISE" button

2. EMS Calibration

- Connect to the EMS using AEM Pro. Reference the AEM Pro user manual if you need help connecting.
- Edit the *Idle% vs. Target* table, as in *Figure 5*, such that all breakpoints are at zero (0) percent.
- Edit *Idle A/C Load Comp* and/or *Idle Extra <12 Volt Options*, as in *Figure 6*, to zero (0) percent.
- Verify that the EMS parameter Idle Position parameter is zero (0) percent.
- Perform the “Throttle Setup” procedure as described in the AEM Pro user manual.
- Restore the above Options to their original values to ensure proper idle control functionality.

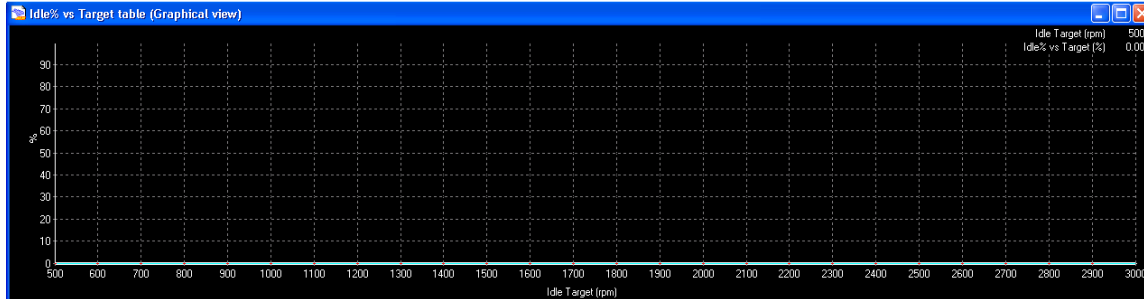


Figure 5 – Temporarily set the *Idle% vs. Target* table to zero

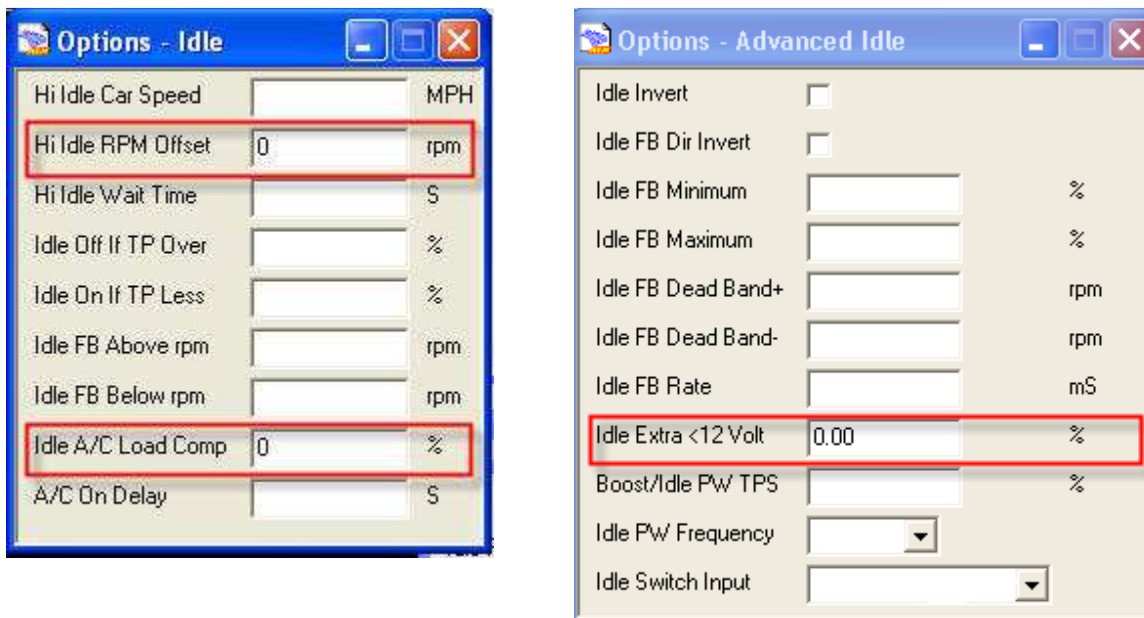


Figure 6 – Temporarily set *Idle A/C Load Comp*, *Hi Idle RPM Offset*, and *Idle Extra < 12 Volt* to zero

Re-calibrating the Electronic Throttle Control System (ETC) Calibration

Once the ETC system calibration procedure has been performed, it should not need to be re-calibrated unless one or more of the following is true:

- The APP sensor, TPS, or throttle body have been removed, replaced, or adjusted.
- The EMS has been removed and installed in a different vehicle.
- AEM Technical Support has requested it to be performed.

The following procedure describes the steps to re-activate calibration mode on a system that has already been calibrated.

Activate Calibration Mode

- a. Ensure the ignition key is in the OFF position.
- b. Press and HOLD both the **CRUISE** and **SET/COAST** buttons. Please note that the **CRUISE** button is activated by pressing the end of the Cruise Control Steering Column Stalk and the **SET/COAST** button is activated by pulling the entire stalk downward as depicted in *Figure 7*. Both buttons must be depressed and held prior to moving on to the next step.

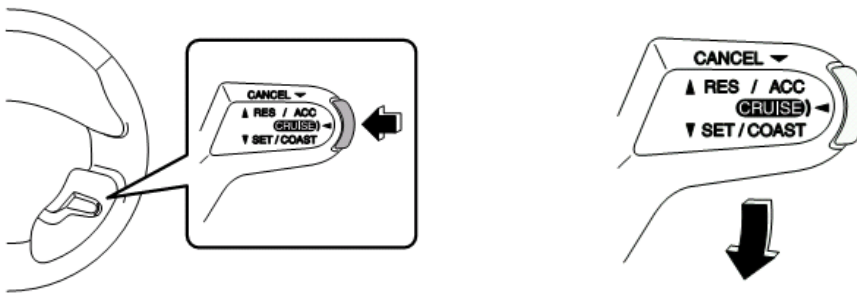


Figure 7 - Pressing the "SET/COAST" and "CRUISE" buttons

- c. Turn the ignition key to the ON position.
- d. Keep holding both the **CRUISE** and **SET/COAST** buttons for approximately ten (10) seconds until the **CRUISE** and **SET** indicator lights (*Figure 3*) begin flashing in unison at a medium rate.
- e. Release the **CRUISE** and **SET/COAST** buttons.
- f. Calibration mode has now been activated. Follow the steps in **Electronic Throttle Control System Calibration Procedure – Initial Calibration Procedure** to complete the process.

EMS Idle Control Calibration

The ETC idle control can be configured and calibrated via AEM Pro similarly to more traditional systems that use an idle air bypass valve. There are a few calibration options that are set specifically to allow proper ETC idle control and must not be changed from the values set forth in the 30-1820 startup calibration. The options highlighted in red, in *Figure 8*, must remain set as depicted for predictable ETC idle control. The other options that are not highlighted have been set up for stable idle control in the 30-1820 startup calibration but are, however, available for adjustment as the calibrator sees fit.

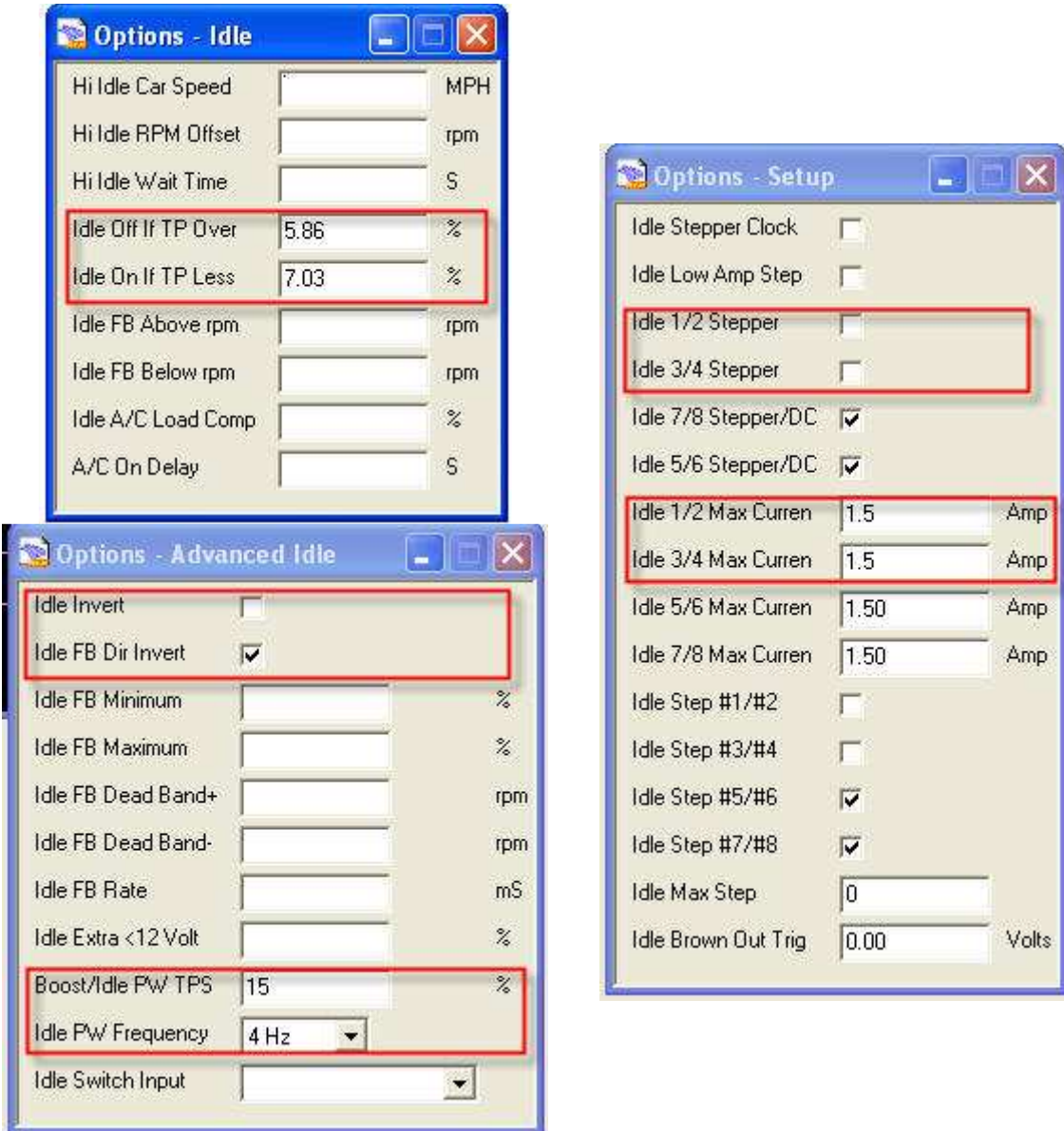


Figure 8 - Parameters highlighted in red must be set as depicted for predictable ETC Idle Control

ETC Fault Management

The ETC system continuously monitors itself for proper operation. If a fault is detected then the system will be placed in a failsafe mode and power to the electronic throttle body will be turned off. This will allow the engine to start and idle at approximately 1500-2000 rpm as a “limp-home” mode but the throttle body will not respond to accelerator pedal inputs.

The system will continue to monitor itself and assume that the throttle blade will be in its rest position while in this un-powered failsafe mode. If it is detected that this is not the case then the system will enter a second failsafe stage whereby the crank signal to the EMS is interrupted. The tachometer will drop to zero and the EMS will not fire fuel injectors or ignition coils. If the engine is running, it will coast to a stop. If the engine is not running, it will not start.

ETC Diagnostics

The AEM EMS ETC system uses the **CRUISE** and **SET** indicator lights on the dashboard to display diagnostic information to the user. The indicator lights flash in different ways for different purposes as described in the following sections.

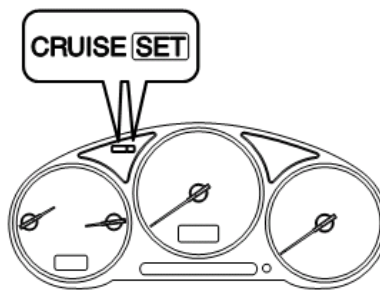


Figure 9 - CRUISE and SET Indicator Lights as diagnostic outputs

Boot-Up

When the ignition key is turned on and the EMS is powered up, both of the **CRUISE** and **SET** indicator lights will flash briefly to signify the ETC system has booted up and that the indicator lights are functioning properly.

Fault Detected

When the ETC system detects a fault, the **CRUISE** and **SET** indicator lights will flash in an alternating fashion to alert the user a fault has been detected. This will happen in one of two situations:

1. Calibration Fault – A failed calibration will be detected if one of the sensors is found to be out of the expected range during the calibration procedure. The indicator lights will flash in an alternating pattern to alert the user of this fault for a period of approximately twenty (20) seconds. After this time period, the **CRUISE** light will remain off and the **SET** indicator light will flash a fault code. Please reference *Table 1* for a description of the fault codes. The system will flash the code repeatedly until the ignition is turned off.

Calibration Fault	
1	APP Minimum
2	APP Maximum
3	TPS Minimum
4	TPS Maximum
5	RP / Relay

Table 1 – System Fault Code

2. Operational Fault – When the system detects a fault during normal operation (e.g. driving, idling, etc), the indicator lights will repeatedly flash in an alternating pattern to alert the user of this fault until the ignition key is turned off. Note that the ETC system will

not be functional and the EMS may disable engine operation during this mode depending on the severity of the fault.

Once the ignition has been turned off and then on again the indicator lights will flash the fault code for the affected system. The affected ETC system code will be first flashed on the **CRUISE** light after which the failure type will be flashed on the **SET** light. These codes are listed in *Table 2* and *Table 3*. The ETC system will remain un-activated until the following boot-up cycle, i.e. key-off then key-on.

System	
1	APP
2	TPSA
3	TPSB
4	Target
5	System Voltage
6	Motor Driver
7	WDR
8	EEPROM
9	N/A

Table 2 – System Fault Code

Failure Type	
1	Out of Range
2	Noise
3	Disagreement
4	General
5	F2
6	N/A
7	N/A
8	N/A
9	N/A

Table 3 – Failure Type Fault Code

Troubleshooting Calibration Faults

A calibration fault will be reported if the Accelerator Pedal Position (APP) or Throttle Position Sensor (TPS) sensors are found to be outside of the specification limits. *Table 4* details the electrical limits for these sensors.

Sensor	Mechanical Position	Voltage Limit (VDC)
APP1 (Main)	Minimum (Idle)	1.00 ± 0.35
	Maximum (WOT)	4.00 ± 0.45
APP2 (Sub)	Minimum (Idle)	1.00 ± 0.35
	Maximum (WOT)	4.00 ± 0.45
TPS1 (Main)	Minimum (Idle)	0.70 ± 0.30
	Maximum (WOT)	4.10 ± 0.45
TPS2 (Sub)	Minimum (Idle)	1.45 ± 0.30
	Maximum (WOT)	4.10 ± 0.45

Table 4 – Sensor Electrical Calibration Limits

A fault code of “5 - RP / Relay” may be caused by a fouled throttle bore, a malfunctioning or missing ETC relay, or if the throttle body has mechanically failed.

Troubleshooting Operational Faults

Should an operational fault be detected, please read and follow the following suggestions for each system.

APP

- Ensure the accelerator pedal position sensor is in good condition and plugged in.
- Double-check that APP sensor is wired per OEM specifications.
- Check all wiring for shorts or intermittent connections.

TPSA/TPSB

- Ensure the throttle position sensor is in good condition and plugged in.
- Double-check that throttle body/TPS sensor is wired per OEM specifications.
- Check all wiring for shorts or intermittent connections.

Target

- Ensure throttle body bore is clean and free from obstruction.
- Ensure vehicle battery is in good condition and properly charged.

System Voltage

- Ensure vehicle battery is in good condition and properly charged.
- Check all wiring for shorts or intermittent connections.

Motor Driver

- Double-check that throttle body/TPS sensor is wired per OEM specifications.
- Check throttle body wiring for shorts or intermittent connections.
- Ensure EMS has not been installed in an area of extreme heat (> 120°C)

WDR

- Contact AEM EMS Technical Support

EEPROM

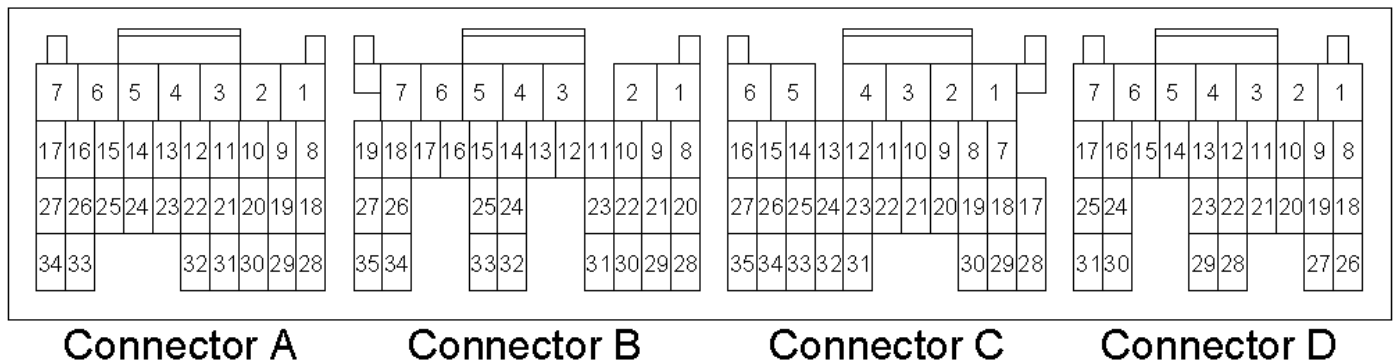
- Perform ETC system calibration
- Restore ETC system factory calibration
- Contact AEM EMS Technical Support

Pinout Chart: AEM 30-1820 / 30-1821 EMS

PnP	These pins are used in the AEM-supplied startup calibration. They can be reconfigured by the end user.
Available	Not used by the startup calibration. Modifications to the OEM wiring may be required before use
Dedicated	The location of these pins is fixed and must not be changed

Pin #	2004 STI 2.5L / 2005-2006 STI 2.5L	AEM EMS 30-1820 / 30-1821	I/O	Availability / Notes
A1	Clutch Switch	Switch #3	In	Available, switch should connect to +12V when closed
A2	Front Oxygen Sensor Heater (Signal 2)	Injector #5	Out	Available, can be used for additional injectors (1.5A max)
A3	Front Oxygen Sensor Heater (Signal 1)	Injector #6	Out	Available, can be used for additional injectors (1.5A max)
A4	---	---		Not Used
A5	---	---		Not Used
A6	GND (Front Oxygen A/F Heater 2)	Injector #7	Out	Available, can be used for additional injectors (1.5A max)
A7	GND (Front Oxygen A/F Heater 1)	Injector #8	Out	Available, can be used for additional injectors (1.5A max)
A8	Tumble Generator Valve RH (close)	Idle #6	Out	PnP for TGV
A9	Tumble Generator Valve RH (open)	Idle #5	Out	PnP for TGV
A10	Tumble Generator Valve LH (close)	Idle #8	Out	PnP for TGV
A11	Tumble Generator Valve LH (open)	Idle #7	Out	PnP for TGV
A12	Pressure control solenoid valve (fuel tank)	Low Side Driver #3	Out	Available, can be used for Switched Ground (1.5A max)
A13	Drain Valve	Low Side Driver #2	Out	Available, can be used for Switched Ground (1.5A max)
A14	Purge Control solenoid valve	Low Side Driver #4	Out	Available, can be used for Switched Ground (1.5A max)
A15	Main light ("Cruise" lamp on dash)	Cruise light	Out	Dedicated, ETC system output
A16	Cruise Set light ("Set" lamp on dash)	Set light	Out	Dedicated, ETC system output
A17	Malfunction Indicator Lamp	Low Side Driver #10	Out	PnP for MIL
A18	Oil flow control solenoid (RH) Signal (+)	+12V Switched Ignition Power	Out	Dedicated
A19	Oil flow control solenoid (LH) Signal (+)	+12V Switched Ignition Power	Out	Dedicated
A20	---	---		Not Used
A21	---	---		Not Used
A22	Alternator	Low Side Driver #1	Out	Available, can be used for Switched Ground (1.5A max)
A23	Engine Speed Output (to OEM tachometer)	Tach Output (LS7)	Out	PnP for Tachometer
A24	Fuel Tank sensor control valve	Low Side Driver #11	Out	Available, can be used for Switched Ground (1.5A max)
A25	Front Oxygen sensor shield	---		Not Used
A26	Front Oxygen sensor signal (-)	Lambda #1	In	PnP for O2 #1 signal
A27	---	---		Not Used
A28	Oil flow control solenoid (RH) Signal (-)	Injector #9	Out	PnP for VVC #1 (Active Valve Control Solenoid)
A29	Oil flow control solenoid (LH) Signal (-)	Injector #10	Out	PnP for VVC #2 (Active Valve Control Solenoid)
A30	---	---		Not Used
A31	---	---		Not Used
A32	Wastegate Control solenoid valve	PW #2	Out	PnP for Boost Control Solenoid
A33	Front Oxygen sensor signal (+)	High Side Driver #2	Out	Available, can be used for Switched +12V (1.5A max)
A34	Engine Ground	Power Ground	In	Dedicated

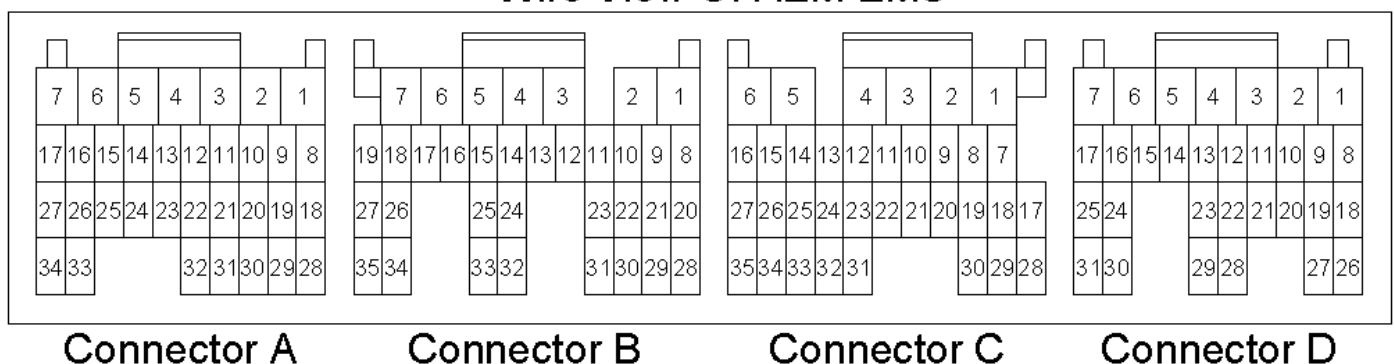
Wire View Of AEM EMS



Pin #	2004 STI 2.5L / 2005-2006 STI 2.5L	AEM EMS 30-1820 / 30-1821	I/O	Availability / Notes
B1	GND (Power Supply)	Power Ground	In	Dedicated
B2	Rear Oxygen Sensor heater signal	---		Not Used
B3	---	---		Not Used
B4	GND (Power Supply)	Power Ground	In	Dedicated
B5	Control Unit Power Supply	+12V Switched Ignition Power	In	Dedicated
B6	Control Unit Power Supply	+12V Switched Ignition Power	In	Dedicated
B7	---	---		Not Used
B8	Camshaft position sensor (LH)	Vehicle Speed	In	PnP for Cam sensor (LH)
B9	Camshaft position sensor (RH)	Cam	In	PnP for Cam sensor (RH)
B10	Crankshaft position sensor Signal (+)	Crank	In	Dedicated
B11	---	---		Not Used
B12	GND (Ignition System)	Power Ground	In	Dedicated
B13	---	---		Not Used
B14	---	---		Not Used
B15	Ignition Control #4	Coil #5	Out	PnP for Coil #5
B16	Ignition Control #3	Coil #3	Out	PnP for Coil #3
B17	Ignition Control #2	Coil #2	Out	PnP for Coil #2
B18	Ignition Control #1	Coil #1	Out	PnP for Coil #1
B19	Back-up Power Supply	Permanent +12V	In	Dedicated
B20	---	---		Not Used
B21	---	---		Not Used
B22	Crankshaft position sensor Signal (-)	Timing Ground	Out	Dedicated
B23	---	---		Not Used
B24	Radiator Fan relay 2 control	Low Side Driver #9	Out	PnP for A/C Fan
B25	Radiator Fan relay 1 control	Low Side Driver #8	Out	PnP for Radiator Fan
B26*	Fuel Pump control unit Signal 1 / Vehicle Speed*	FPCU circuit (Idle#2) / Spare Speed*	Out*	Dedicated, 0-5V signal to Fuel Pump Control Unit
B27*	Vehicle Speed / Fuel Pump control unit sig 1*	Spare Speed / FPCU circuit (Idle#2)*	In*	PnP for wheel speed input, shared with speedometer
B28	---	---		Not Used
B29	---	---		Not Used
B30	---	---		Not Used
B31	Crankshaft Position sensor Shield	Power Ground	Out	Dedicated
B32	---	---		Not Used
B33	A/C relay control	Low Side Driver #6	Out	PnP for A/C compressor clutch
B34	---	---		Not Used
B35	Electronic Throttle control motor relay	ETC relay control	Out	Dedicated

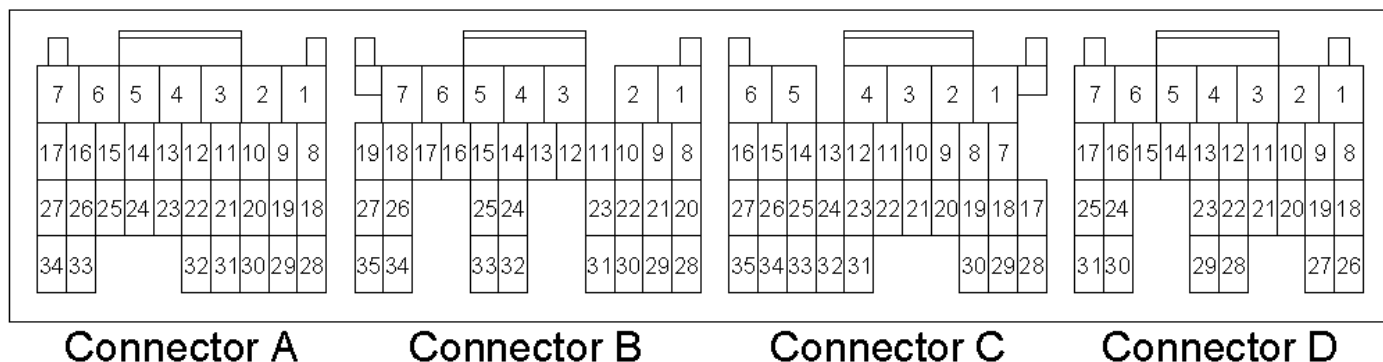
* Pin function is different between 2004 / 2005-2006 models

Wire View Of AEM EMS



Pin #	2004 STI 2.5L / 2005-2006 STI 2.5L	AEM EMS 30-1820 / 30-1821	I/O	Availability / Notes
C1	---	---		Not Used
C2	---	---		Not Used
C3	Fuel Injector #4	Injector #4	Out	PnP for Injector #4
C4	Fuel Injector #3	Injector #3	Out	PnP for Injector #3
C5	Fuel Injector #2	Injector #2	Out	PnP for Injector #2
C6	Fuel Injector #1	Injector #1	Out	PnP for Injector #1
C7	Main switch	Main Switch	In	Dedicated, ETC system input
C8	Brake Switch 2	---		Not Used
C9	Brake Switch 1	Switch #2	In	Available, switch should connect to GND when closed
C10	Resume / Accel switch	---		Not Used
C11	Set / Coast switch	Set Switch	In	Dedicated, ETC system input
C12	Fuel Temperature Sensor signal	EGT #1	In	Available, RTD type thermistor
C13	Intake Air Temperature sensor signal	AIT	In	PnP for Air Intake Temp sensor, RTD type thermistor
C14	Engine Coolant Temperature sensor	Coolant	In	PnP for Coolant Temp sensor, RTD type thermistor
C15	Accelerator Pedal Position sensor Power	Accelerator Pedal +5V reference	Out	Dedicated, reference power to accelerator pedal
C16	Electronic Throttle control Power Supply	+5V Sensor reference	Out	Dedicated, sensor reference power
C17	Accelerator Pedal Position sensor Main	Accelerator Pedal signal 1	In	Dedicated, main 0-5V signal from accelerator pedal
C18	Electronic Throttle control Main	TPS / Electronic Throttle signal 1	In	Dedicated, main 0-5V signal from throttle motor
C19	---	---		Not Used
C20	Fuel Level Sensor	---		Not Used
C21	Fuel Tank Pressure Sensor signal	---		Not Used
C22	Manifold Absolute Pressure sensor signal	MAP	In	PnP for Manifold Pressure sensor
C23	Mass Air Flow sensor Signal	MAF	In	Available, 0-5V MAF input signal
C24	--	--		Not Used
C25	Knock Sensor Signal	Knock #1	In	Dedicated
C26	Tumble Generator Valve position sensor LH	Spare Temp (ADCR14)	In	PnP for TGV
C27	Tumble Generator Valve position sensor RH	PR Pressure (ADCR11)	In	PnP for TGV
C28	Accelerator Pedal Position sensor Sub	Accelerator Pedal signal 2	In	Dedicated, secondary 0-5V signal from accelerator pedal
C29	Electronic Throttle control Sub	Electronic Throttle signal 2	Out	Dedicated, secondary 0-5V signal from throttle motor
C30	---	---		Not Used
C31	Mass Air Flow sensor GND	Sensor Ground	Out	Dedicated
C32	Mass Air Flow sensor Shield	Power Ground	Out	Dedicated
C33	Knock Sensor Shield	Power Ground	Out	Dedicated
C34	Accelerator Pedal Position sensor GND	Accelerator Pedal Ground	Out	Dedicated, ground to accelerator pedal
C35	GND (sensor)	Sensor Ground	Out	Dedicated

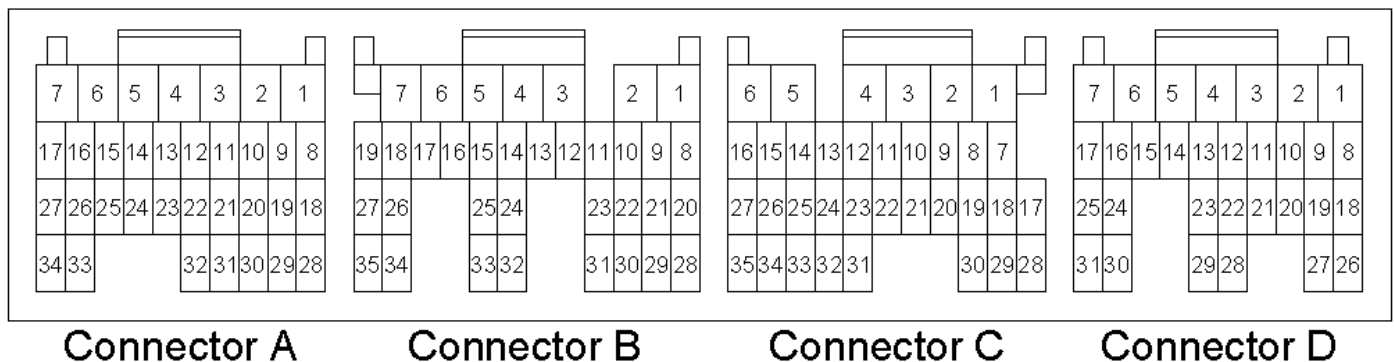
Wire View Of AEM EMS



Pin #	2004 STI 2.5L / 2005-2006 STI 2.5L	AEM EMS 30-1820 / 30-1821	I/O	Availability / Notes
D1	GND (control systems)	Power Ground	In	Dedicated
D2	GND (control systems)	Power Ground	In	Dedicated
D3	Electronic Throttle control GND (sensor)	Electronic Throttle Ground	Out	Dedicated
D4	Electronic Throttle control motor (-)	Electronic Throttle Motor -	Out	Dedicated, ETC system output
D5	Electronic Throttle control motor (+)	Electronic Throttle Motor +	Out	Dedicated, ETC system output
D6	Electronic Throttle control Motor Power	Electronic Throttle Power	In	Dedicated, ETC power
D7	GND (Injectors)	Power Ground	In	Dedicated
D8	Starter switch	Main Relay circuit (Switch #1)	In	Dedicated
D9	Neutral Position switch	---		Not Used
D10	Power Steering oil pressure switch	---		Not Used
D11	Rear Defogger switch	Switch #4	In	Available, switch should connect to GND when closed
D12	(not used by stock ECU)	---		Not Used
D13	Blower Fan switch	Switch #5	In	Available, switch should connect to GND when closed
D14*	Test Mode Connector / Ignition Switch*	--- / Main Relay circuit (Switch#1)*	*	Not Used
D15*	Ignition Switch / Test Mode Connector*	Main Relay circuit (Switch #1) / --- *	In*	Dedicated
D16*	AC Switch / Main Relay control*	Switch #6 / Main Relay circuit (FM) *	In*	PnP for A/C request switch
D17*	Main Relay control / AC Switch*	Main Relay circuit (FM) / Switch #6 *	Out*	Dedicated, activates main relay with switched GND
D18	---	---		Not Used
D19	---	---		Not Used
D20	SSM / GST communication line	EGT #2	In	Available, RTD type thermistor
D21	---	---		Not Used
D22	---	---		Not Used
D23	---	---		Not Used
D24	Blow-by Leak diagnosis signal	EGT #3	In	Available, RTD type thermistor
D25	Rear Oxygen sensor Signal	Lambda #2	In	Available, O2 #2 signal
D26	---	---		Not Used
D27	---	---		Not Used
D28	Fuel Pump control unit Signal 2	Low Side Driver #5	Out	Available, can be used for Switched Ground (1.5A max)
D29	--	EGT #4	In	Available, RTD type thermistor
D30	---	---		Not Used
D31	Rear Oxygen sensor Shield	Power Ground	Out	Dedicated

* Pin function is different between 2004 / 2005-2006 models

Wire View Of AEM EMS



AEM Electronics Warranty

Advanced Engine Management Inc. warrants to the consumer that all AEM Electronics products will be free from defects in material and workmanship for a period of twelve months from date of the original purchase. Products that fail within this 12-month warranty period will be repaired or replaced when determined by AEM that the product failed due to defects in material or workmanship. This warranty is limited to the repair or replacement of the AEM part. In no event shall this warranty exceed the original purchase price of the AEM part nor shall AEM be responsible for special, incidental or consequential damages or cost incurred due to the failure of this product. Warranty claims to AEM must be transportation prepaid and accompanied with dated proof of purchase. This warranty applies only to the original purchaser of product and is non-transferable. All implied warranties shall be limited in duration to the said 12-month warranty period. Improper use or installation, accident, abuse, unauthorized repairs or alterations voids this warranty. AEM disclaims any liability for consequential damages due to breach of any written or implied warranty on all products manufactured by AEM. Warranty returns will only be accepted by AEM when accompanied by a valid Return Merchandise Authorization (RMA) number. Product must be received by AEM within 30 days of the date the RMA is issued.

Please note that before AEM can issue an RMA for any electronic product, it is first necessary for the installer or end user to contact the tech line at 1-800-423-0046 to discuss the problem. Most issues can be resolved over the phone. Under no circumstances should a system be returned or a RMA requested before the above process transpires.

AEM will not be responsible for electronic products that are installed incorrectly, installed in a non approved application, misused, or tampered with.

Any AEM electronics product can be returned for repair if it is out of the warranty period. There is a minimum charge of \$50.00 for inspection and diagnosis of AEM electronic parts. Parts used in the repair of AEM electronic components will be extra. AEM will provide an estimate of repairs and receive written or electronic authorization before repairs are made to the product.