Installation Instructions for:
EMS P/N 30-1401
1994-95 Ford Mustang 5.0L

WARNING:

This installation is not for the tuning novice nor the PC illiterate! Use this system with <u>EXTREME</u> 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.

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Instruction Part Number: 10-1401

Congratulations! You have just purchased the finest Engine Management system for your car at any price!

The AEM Engine Management System (EMS) is the result of extensive development on a wide variety of cars. Each system is engineered for the particular application. The AEM EMS differs from all others in several ways. The EMS is an all new stand alone system, which completely replaces the factory ECU and features unique Plug and Play Technology, which means that each system is configured especially for your make and model of car. There is no need to modify your factory wiring harness and in most cases your car may be returned to stock in a matter of minutes. The AEMPro software is configured to work with the factory sensors and equipment, so that there is no need for expensive or hard to find sensors, making replacement and repairs as simple as with an unmodified car. For stock and some slightly modified cars, the AEMPro software will be preprogrammed with a set of base parameters, providing a starting point for individual tuning. For more heavily modified cars, the EMS has many spare inputs and outputs allowing the elimination of separate rev-limiters, boost controllers, nitrous controllers, and fuel computers. It will also allow programmable control over all automatic transmission functions, and includes a configurable onboard data logger capable of recording 512kb of information. Every EMS comes with all functions installed and activated, and there are no expensive options or upgrades to be performed.

The installation of the AEM ECU on the 1994-1995 Ford Mustang 5.0L uses the stock sensors and actuators. The base map is automatically installed in the base calibrations directory in the AEMPro directory on your computer. They are named:

1401_AEM2bar_19 pph inj.V1.19.cal
1401_Stock MAF_19pph inj.V1.19.cal

Full details of the test vehicle used to generate this map can be found in the files notes section. However, while the base map is a good starting point and may save you considerable time and money, it will not replace the need to tune your specific application. It is not intended to be driven aggressively. Ignoring this can and will damage your engine.

Please visit the AEM EMS Tech Forum at http://www.aempower.com/bbs and register your EMS before you start to use it. Make sure you enter your EMS serial number when you register as doing this grants access to the calibration files. We always post the most current strategy release, PC Software and base calibrations online. On the forum, you will find many helpful hints/tips to make your EMS perform it's best. Also, we may make available EMS maps for engines running speed density, larger turbo, etc…

Read and understand these instructions <u>BEFORE</u> attempting to install this product.

<u>Vehicle Ground Circuits</u>

Be sure to inspect all vehicle ground circuits prior to installing the AEM EMS. Faulty ground circuits will cause many vehicle problems including misfires and incorrect sensor data. Over the years, corrosion can build up between the vehicle's chassis and the

circular ground terminal lugs commonly used in factory wiring harnesses. Use sandpaper, scotchbrite pads or equivalent to ensure clean metal to metal contact at all ground connections. High power CDI type ignition systems also can cause ignition misfires if not grounded properly. CDI ignition systems should be grounded directly to the vehicle's battery isolated from the ECU ground circuits.

1) **Removing the Stock Engine Control Unit**
   a) Access the stock Engine Control Unit (ECU). The location of the ECU on the Ford Mustang is behind the passenger side kick panel.
   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 ECU's 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 it aside. Do not destroy or discard the factory ECU, as it can be reinstalled easily for street use and troubleshooting.
2) **Install the AEM Engine Management System.**
   a) Plug the factory wiring harness into the AEM ECU, and position it so that the wires are not pulled tight or stressed. Secure it with the provided Velcro fasteners.
   b) Plug the comms cable into the EMS and into your PC.
   c) Turn your ignition on but do not attempt to start the engine.
   d) Upload the base calibration file (.cal) that most closely matches your vehicle's configuration. (These files can be found in the AEMPro/Base Calibrations/Ford folder on your computer's hard drive)
   e) Set the throttle range: Select the *Configure* drop down menu, then *ECU Setup* | *Set Throttle Range* and then follow the direction given on the screen.
   f) Verify the ignition timing by selecting the *Configure* drop down menu, then *ECU Setup* | *Set Ignition*. Use a timing light and compare the physical timing numbers to the Parameter *Ignition Timing* displayed. Use the *Advance/Retard* buttons to make the timing number match.
3) **You are now ready to begin tuning your vehicle.**
   a) Note: This calibration needs to be properly tuned and is not recommended for street use. **NEVER TUNE YOUR VEHICLE WHILE DRIVING.**

Application Notes for EMS P/N 30-1401
1994-95 Ford Mustang 5.0L

Make:	Ford
Model:	Mustang
Years Covered:	1994 – 1995
Engine Displacement:	5.0L
Engine Configuration:	V8
Firing Order:	1-3-7-2-6-5-4-8
N/A, S/C or T/C:	N/A
Load Sensor Type:	MAF
Ignition System:	TFI Remote Mount
# Coils:	1 (Stock)
Ignition driver type:	0-12v Logic
How to hook up MSD:	Install between TFI and Coil
# Injectors:	8 (J1-8)
Injector Flow Rate:	19 lb/hr
Injector Resistance:	11-18 Ω
Injection Mode:	Sequential
Knock Sensors used:	None
Lambda Sensors used:	1 & 2
Idle Motor Type:	PWM
Main Relay Control:	No
Crank Pickup Type:	Hall Effect
Crank Teeth/Cycle:	8
Cam Pickup Type:	---
Cam Teeth/Cycle:	---
Transmissions Offered:	M/T, A/T
Trans Supported:	All
Drive Options:	RWD
Spare 0 – 5V MAP	MAP, Pin 65
Spare CAM Input	CAM, Pin 66
Spare Knock Input	Knock 1, Pin 71
Spare Knock Input	Knock 2, Pin 72

Supplied Connectors:	AMP 12 Pin Mating
Spare Injector Drivers:	Inj 9, Pin 17
Spare Injector Drivers:	Inj 10, Pin 18
Spare Injector Drivers:	---
Spare Injector Drivers:	---
Spare Injector Drivers:	---
Spare Injector Drivers:	---
Spare Coil Drivers:	Coil 1, Pin 48
Spare Coil Drivers:	Coil 2, Pin 23
Spare Coil Drivers:	Coil 3, Pin 24
Spare Coil Drivers:	Coil 4, Pin 28
Boost Solenoid:	PW2, Pin 4
EGT 1 Location:	Pin 61
EGT 2 Location:	Pin 62
EGT 3 Location:	Pin 63
EGT 4 Location:	Pin 64
Spare 0-5V Channels:	---
Spare 0-5V Channels:	---
Spare 0-5V Channels:	---
Spare LS Driver:	---
Spare LS Driver:	---
Spare LS Driver:	---
Spare LS Driver:	---
Check Engine Light:	---
Spare Switch Input:	SWITCH #2, Pin 8
Spare Switch Input:	SWITCH #5, Pin 19
Spare Switch Input:	SWITCH #6, Pin 42
Spare Switch Input:	---
A/C Switch Input:	SWITCH #4
Available Stepper Motor Control	Pins 67, 68, 69, 70 Idle1, Idle2, Idle3, Idle4

Notes:

1. Air Injection control connected but disabled in base map

Connection Diagram for EMS P/N 30-1401
1994-95 Ford Mustang 5.0L

PnP	The Plug and Play system comes with this configured for proper operation of this device. Is still available for reassignment by the end user.
Available	The function is not currently allocated and is available for use
Dedicated	The location is fixed and can not be changed

Pin #	94-95 Mustang 5.0L	AEM PEMS P/N 30-1401	I/O	Availability
1	Keep Alive Power	PERM	Input	Dedicated
2	Brake On/Off	SWITCH #3	Input	PnP for Brake On/Off Switch
3	(+) VSS	T3	Input	PnP for Vehicle Speed
4	Ignition Diagnostic Monitor	PW2	Output	Available PWM Output
5	Trans. Speed Sensor	T4	Input	PnP for Transmission Speed
6	(-) VSS	GND	Input	Dedicated
7	Engine Coolant Temperature	COOLANT	Input	PnP for Engine Coolant Temp
8	Fuel Pump Monitor	SWITCH #2	Input	Available Switch Input
9	Mass Air Flow Return	AGND	Input	Dedicated
10	A/C Clutch Request	SWITCH #4	Input	PnP for A/C Request
11	Canister Purge Solenoid	LS1	Output	PnP for Canister Purge Solenoid
12	Fuel Injector 6	INJECTOR 6	Output	PnP for Injector 6
13	Fuel Injector 7	INJECTOR 7	Output	PnP for Injector 7
14	Fuel Injector 8	INJECTOR 8	Output	PnP for Injector 8
15	Fuel Injector 5	INJECTOR 5	Output	PnP for Injector 5
16	Ignition Ground	GND	Input	Dedicated
17	Self Test Output	INJECTOR 9	Output	Available Injector or Switched Ground 1.5A max
18	Data (+)	INJECTOR 10	Output	Available Injector or Switched Ground 1.5A max
19	Data (-)	SWITCH #5	Input	Available Switch Input
20	Case Ground	GND	Input	Dedicated
21	Idle Speed Control	PW1	Output	PnP for Idle Speed Control
22	Fuel Pump Relay	LS11	Output	PnP for Fuel Pump Relay Control
23	Not Used	COIL2	Output	Available Coil or 1.5A Switched Output
24	Not Used	COIL3	Output	Available Coil or 1.5A Switched Output
25	Intake Air Temperature	AIT	Input	PnP for Intake Air Temperature
26	Reference Voltage	5V0	Output	Dedicated
27	EGR Valve Position Sensor	ADCR11	Input	PnP for EGR Valve Position
28	Not Used	COIL4	Output	Available Coil or 1.5A Switched Output
29	Not Used	FM	Output	Available +/- 5 Volt Output 5mA max
30	Trans Range Sensor	GEAR	Input	PnP for Transmission Gear Position
31	Sec. Air Inj. Bypass Sol	LS2	Output	PnP for Air Injection Bypass Solenoid
32	High Fan Control	LS3	Output	PnP for High Speed Fan Control
33	EGR Vacuum Regulator	LS8	Output	PnP for EGR Vacuum Regulator Solenoid
34	Sec. Air Inj. Diverter Sol	LS4	Output	PnP for Air Injection Diverter Solenoid
35	Fuel Injector 4	INJECTOR 4	Output	PnP for Injector 4
36	Spark Out	SPOUT	Output	Dedicated
37	Vehicle Power	PWR	Input	Dedicated
38	Electronic Pressure Control	LS12	Output	PnP for Transmission Line Pressure Control Solenoid

39	Fuel Injector 3	INJECTOR 3	Output	PnP for Injector 3
40	Power Ground	GND	Input	Dedicated
41	TransCntrl Sw.	SWITCH #1	Input	PnP for Transmission Control Switch
42	A/C Pressure Switch	SWITCH #6	Input	Available Switch Input
43	EGO Sensor - Left	O2#2	Input	PnP for Left EGO
44	EGO Sensor - Right	O2#1	Input	PnP for Right EGO
45	Not Used	T4	Input	Same as Pin 5, Available Speed or Switch Input
46	Signal Return	AGND	Input	Dedicated
47	Throttle Position Sensor	TPS	Input	PnP for Throttle Position Sensor
48	Self Test Input	COIL1	Output	Available Coil or 1.5A Switched Output
49	Trans. Fluid Temp. Sensor	ADCR14	Input	PnP for Transmission Fluid Temperature
50	Mass Air Flow	MAF	Input	PnP for Mass Air Flow Sensor
51	Shift Solenoid 1	LS6	Output	PnP for Shift Solenoid 1
52	Shift Solenoid 2	LS7	Output	PnP for Shift Solenoid 2
53	TC Clutch	LS10	Output	PnP for Torque Converter Clutch Solenoid
54	WOT A/C Cut Off	LS9	Output	PnP for Wide Open Throttle A/C Cut Off
55	Low Fan Control	LS5	Output	PnP for Low Speed Fan Control
56	Profile Ignition Pickup	CRANK	Input	Dedicated
57	Vehicle Power	PWR	Input	Dedicated
58	Fuel Injector 1	INJECTOR1	Output	PnP for Injector 1
59	Fuel Injector 2	INJECTOR2	Output	PnP for Injector 2
60	Power Ground	GND	Input	Dedicated
61	Not Used	EGT 1	Input	Available RTD Type EGT Input
62	Not Used	EGT 2	Input	Available RTD Type EGT Input
63	Not Used	EGT 3	Input	Available RTD Type EGT Input
64	Not Used	EGT 4	Input	Available RTD Type EGT Input
65	Not Used	MAP	Input	Available MAP Sensor Input for Speed Density
66	Not Used	CAM	Input	Available Cam Position / Timing Sensor Input
67	Not Used	IDLE 1	Output	Available Stepper Motor Control or 12 Volt 1.2A output
68	Not Used	IDLE 2	Output	Available Stepper Motor Control or 12 Volt 1.2A output
69	Not Used	IDLE 3	Output	Available Stepper Motor Control or 12 Volt 1.2A output
70	Not Used	IDLE 4	Output	Available Stepper Motor Control or 12 Volt 1.2A output
71	Not Used	KNOCK 1	Input	Available Knock Sensor Input
72	Not Used	KNOCK 2	Input	Available Knock Sensor Input