Installation Instructions for:
EMS P/N 30-1040 and 30-1040U
1992-1995 Civic / Del Sol / Integra
90-95 Accord / Prelude (2.1L Only)

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.

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 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 options or upgrades to be purchased.

Please visit the AEM EMS Forum at http://www.aempower.com to register the system before beginning. Make sure to enter the serial number found on the back of the EMS as doing this grants access to the calibration files. AEM always posts the most current software and base maps online. The forum also has many helpful hints/tips to make the EMS perform its best.

While the base map may be a good starting point and will save considerable time and money, it will not replace the need to tune the specific application. AEM start-up maps are tuned conservatively and are not intended to be driven aggressively. Ignoring this can and will damage your engine.

If the 30-1040U EMS was purchased, the stock O2 #1 sensor will not be used and should be replaced with the supplied AEM sensor. The 30-1040U furnishes the user with real time, accurate and repeatable air/fuel ratios. The system consists of an internal air fuel ratio (AFR) controller, wiring harness, wide band oxygen sensor and a sensor bung.

The heart of the AEM wideband controller is the Bosch LSU4.2 Universal Exhaust Gas Oxygen (UEGO) sensor. This type of sensor is commonly referred to as "laboratory grade" and works on a different principle than the normal oxygen sensor found in most vehicles. Its unique design makes precision AFR measurements possible over the entire operating range. UEGO type sensors use a "current pump" within the sensor itself to determine the actual oxygen concentration within the sensing element or, lacking any oxygen, it determines the amount of oxygen required to regain stoichiometric operation. The output is in the form of a very small current, which varies depending on the air-fuel ratio. This is completely different from normal oxygen sensors (1, 2, and 4 wire types), which directly output a voltage.

Each AEM UEGO sensor is individually calibrated using a laser trimmed resistor integral found on the connector body. This process replaces the traditional "free air" calibration procedure when changing sensors and implements a sensor specific calibration for unparalleled accuracy.

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

1) **Removing the Stock Engine Control Unit**
   a) Access the stock Engine Control Unit (ECU). The location of the ECU on the OBD1 Hondas 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 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 and Routing the UEGO Sensor (30-1040U Only)**
   a) Remove the forward most O2 sensor and replace it with the supplied UEGO sensor.
   b) Connect the sensor and route the wire through the firewall to the EMS being careful in staying away from heat and the suspension.

3) **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 Mitsubishi-DSM folder located in: *"My Computer | Local Disk (C:) | Program Files | AEM | AEMPro | Startup Calibrations"*
   f) Set the throttle range: Select the "*Configure*" drop down menu, then "*ECU Setup | Set Throttle Range*" and then follow the instructions given on the screen.
   g) Verify the ignition timing: Select the "*Configure*" drop down menu, then "*ECU Setup | Set Ignition*". Use a timing light and compare the physical engine timing to the parameter "*Ignition Timing*" displayed. Use the "*Advance/Retard*" buttons to make the timing number match.
   h) Calibrate the lambda sensor channel: With the ignition "on" and the sensor unplugged, change the *"O2 #1 Gain" ("Setup | Sensors | Oxygen Sensor | Oxygen Sensor #1 | Options - O2 Sensor #1")* until the *"O2 #1 Volts"* parameter displays 3.94 Volts (+/- 0.02 Volts). This should yield an "*O2 #1 Gain*" near 1.3. If using the non-UEGO 30-1040, the "*O2 #1 Gain*" should be near 1.28.
   i) Set the appropriate UEGO calibration (30-1040U Only): Enter the calibration on page 8 of this manual into *Setup | Sensors | Oxygen Sensors | Oxygen Sensor #1 | O2 Sensor #1 Cal Table*. Note, this is different than that used for the external AEM UEGO sensor.

4) **Ready to begin tuning the vehicle.**
   a) Note: This calibration needs to be properly tuned and is not recommended for street use. <u>**NEVER TUNE THE VEHICLE WHILE DRIVING.**</u>

Application Notes for EMS P/N 30-1040 & 1040U

Make:	Acura/Honda
Model:	Integra/Civic/Prelude/Accord
Years Covered:	1990-1995
Engine Displacement:	1.5-2.2L
Engine Configuration:	Inline 4
Firing Order:	1-3-4-2
N/A, S/C or T/C:	N/A
Load Sensor Type:	MAP
Map Min:	0.32V @ -13.9 PSI
Map Max:	4.84V @ 10.94 PSI
# Coils:	1
Ignition driver type:	0-5V Low Switch High
How to hook up MSD:	Wire after Igniter
# Injectors:	4 (Inj 1-4)
Factory Injectors:	190-240cc Saturated
Factory Inj Resistors:	No
Injection Mode:	Sequential
Knock Sensors used:	1
Lambda Sensors used:	1
Idle Motor Type:	PW
Main Relay Control:	No
Crank Pickup Type:	Mag
Crank Teeth/Cycle:	24
Cam Pickup Type:	Mag
Cam Teeth/Cycle:	1
Transmissions Offered:	M/T, A/T
Trans Supported:	M/T Only
Drive Options:	FWD
Supplied Connectors:	Plug C with Connectors

Spare Injector Drivers:	Inj #5, Pin A8
Spare Injector Drivers:	Inj #6, Pin A6
Spare Injector Drivers:	Inj #7, Pin A16
Spare Injector Drivers:	Inj #8, Pin A14
Spare Injector Drivers:	Inj #10, Pin A11
Spare Injector Drivers:	---
Spare Coil Drivers:	Coil #2, Pin B6
Spare Coil Drivers:	Coil #3, Pin B3
Spare Coil Drivers:	Coil #5, Pin B4
Spare Coil Drivers:	---
Boost Solenoid:	PW #2, Pin C10
EGT #1 Location:	Pin D5
EGT #2 Location:	Pin D2
EGT #3 Location:	Pin D9
EGT #4 Location:	Pin D10
Spare 0-5V Channels:	ADR13, Pin B7
Spare 0-5V Channels:	ADR03, Pin D8
Spare 0-5V Channels:	ADR11, Pin D12
Spare Low Side Driver:	Low Side #1, Pin C6
Spare Low Side Driver:	Low Side #2, Pin A10
Spare Low Side Driver:	Low Side #7, Pin C3
Spare Low Side Driver:	Low Side #8, Pin A18
Spare Low Side Driver:	Low Side #9, Pin C4
Spare Low Side Driver:	** Idle #2, Pin A17
Spare Low Side Driver:	Idle #4, Pin A19
Spare Low Side Driver:	
Spare Low Side Driver:	
Check Engine Light:	Low Side #10, Pin A13
Spare High Side Driver:	High Side #2, Pin C11
Spare Switch Input:	Switch #2, Pin C12
Spare Switch Input:	Switch #6, Pin C5
Spare Switch Input:	Switch #1, Pin C7
A/C Switch Input:	Switch #3, Pin B5

Notes:

** Does not apply to vehicles equipped with an intake air bypass (IAB) solenoid for the intake manifold.

Connection Diagram for EMS P/N 30-1040 and 1040U

Pin #	OBD1 Honda / Acura	30-1040 & 1040U	I/O	Availability
A1	Injector 1	Injector #1	Output	PnP for Injector 1
A2	Injector 4	Injector #4	Output	PnP for Injector 4
A3	Injector 2	Injector #2	Output	PnP for Injector 2
A4	VTEC Solenoid Valve	High Side Driver #1	Output	PnP for VTEC Solenoid
A5	Injector 3	Injector #3	Output	PnP for Injector 3
A6	Primary 02 Heater Control	Injector #6	Output	PnP for 02 Sensor Heater (1040 Only)
A7	Fuel Pump Relay	Low Side Driver #11	Output	PnP for Fuel Pump Relay
A8	Fuel Pump Relay (Accord/Prelude Only)	Injector #5	Output	Avail, Injector Gnd, 1.5A max
A9	Idle Air Control Valve	PW #1	Output	PnP for Idle Air Control Valve
A10	---	Low Side Driver #2	Output	Avail, Switched Gnd, 1.5A max
A11	EGR Solenoid (Accord/Prelude Only)	Injector #10	Output	Avail, Injector Gnd, 1.5A max
A12	Radiator Fan Control (Except Prelude)	Low Side Driver #12	Output	PnP for Radiator Fan
A13	Malfunction Indicator Light	Low Side Driver #10	Output	Avail, Switched Gnd, 1.5A max
A14	---	Injector #8	Output	Avail, Injector Gnd, 1.5A max
A15	A/C Clutch Relay	Low Side Driver #6	Output	PnP for A/C Clutch Relay
A16	Alternator Control (Except Accord/Prelude)	Injector #7	Output	Avail, Injector Gnd, 1.5A max
A17	IAB Control Solenoid (Accord/Integra Only)	Idle #2	Output	Avail, Ground / +12V, 1.5A max
A18	---	Low Side Driver #8	Output	Avail, Switched Gnd, 1.5A max
A19	---	Idle #4	Output	Avail, Ground / +12V, 1.5A max
A20	EVAP Purge Control Solenoid	Low Side Driver #4	Output	Avail, Switched Gnd, 1.5A max
A21	Ignition Control Module	Coil #1	Output	PnP for Ignition Control Module
A22	Ignition Control Module	---	---	---
A23	Power Ground 1	Power Ground	Input	Dedicated
A24	Power Ground 2	Power Ground	Input	Dedicated
A25	Power Source 1	+12 Volt Switched	Input	Dedicated
A26	Logic Ground 1	Sensor Ground	Output	Dedicated

Pin #	OBD1 Honda / Acura	30-1040 & 1040U	I/O	Availability
B1	Power Source 2	+12 Volt Switched	Input	Dedicated
B2	Logic Ground 2	Sensor Ground	Output	Dedicated
B3	---	Coil #3	Output	Avail, Falling Edge Trigger Coil Out
B4	---	Coil #5	Output	Avail, Falling Edge Trigger Coil Out
B5	A/C Switch Signal	Switch #3	Input	PnP for A/C Switch Signal
B6	---	Coil #2	Output	Avail, Falling Edge Trigger Coil Out
B7	---	ACDR13	Input	Avail, 0-5 Volt Input, 100k pull up
B8	Power Steering Pressure Switch	Switch #5	Output	Avail, Switched Input
B9	Starter Switch Signal	12V When Cranking	Input	Dedicated
B10	Vehicle Speed Sensor	Vehicle Speed	Input	PnP for Vehicle Speed Sensor
B11	CYP +	Cam Sensor	Input	PnP for Cam Speed Sensor
B12	CYP -	Timing Ground	Output	Dedicated
B13	TDC +	Spare Speed	Input	Avail, Magnetic Speed Sensor
B14	TDC -	Timing Ground	Output	Dedicated

B15	CKP +	Crank Sensor	Input	PnP for Crank Speed Sensor
B16	CKP-	Timing Ground	Output	Dedicated

C1	---	+12 Volt Switched	Input	Dedicated
C2	---	---	---	---
C3	---	Tach Output (LS7)	Output	Avail, Switched Gnd, 1.5A max
C4	---	Low Side Driver #9	Output	Avail, Switched Gnd, 1.5A max
C5	---	Switch #6	Input	Avail, Switched Input
C6	---	Low Side Driver #1	Output	Avail, Switched Gnd, 1.5A max
C7	---	Switch #1	Input	Avail, Switched Input
C8	---	IDLE #3	Output	Avail, Ground / +12V, 1.5A max
C9	---	ADCR14	Input	Avail, 0-5 Volt Input, 100k pull up
C10	---	PW #2	Output	Avail, Boost Control Solenoid
C11	---	High Side Driver #2	Output	Avail, +12V, 1.5A max
C12	---	Switch #2	Input	Avail, Switched Input

D1	Voltage Back Up	Permanent +12V	Input	Dedicated
D2	Brake Switch (Except Prelude)	EGT #2	Input	Avail, RTD Temp
D3	Knock 1	Knock #1	Input	PnP for Knock Sensor
D4	Service Check Connector	Knock #2	Input	Avail, Knock Input
D5	---	EGT #1	Input	Avail, RTD Temp
D6	VTEC Pressure Switch	Switch #4	Input	Avail, Switched Input
D7	Data Link Connector	High Side Driver #1	Output	Avail, same as pin A4
D8	---	MAF	Input	Avail, 0-5 Volt Input, 100k pull up
D9	Alternator FR Signal	EGT #3	Input	Avail, RTD Temp
D10	Electronic Load Detector	EGT #4	Input	Avail, RTD Temp
D11	Throttle Position Sensor	TPS	Input	Dedicated
D12	EGR Valve Lift Sensor (Accord/Prelude Only)	ADCR11	Input	Avail, 0-5 Volt Input, 100k pull up
D13	Engine Coolant Sensor	Coolant	Input	Dedicated
D14	Primary 02 Sensor	<Lambda #1>	<Input>	PnP for O2 Sensor <Not Avail On 30-1040U>
D15	Inlet Air Temp Sensor	AIT	Input	Dedicated
D16	Secondary 02 Sensor	Lambda #2	Input	Avail, Lambda Input
D17	Map Sensor	MAP	Input	Dedicated
D18	Shift Up Indicator Light (D15 only)	IDLE #1	Output	Avail, Ground / +12V, 1.5A max
D19	Sensor Voltage 1	+V5 Sensor	Output	Dedicated
D20	Sensor Voltage 2	+V5 Sensor	Output	Dedicated
D21	Sensor Ground 1	Sensor Ground	Output	Dedicated
D22	Sensor Ground 2	Sensor Ground	Output	Dedicated

A1	A3	A5	A7	A9	A11	A13	A15	A17	A19	A21	A23	A25
A2	A4	A6	A8	A10	A12	A14	A16	A18	A20	A22	A24	A26

B1	B3	B5	B7	B9	B11	B13	B15
B2	B4	B6	B8	B10	B12	B14	B16

C1	C3	C5	C7	C9	C11
C2	C4	C6	C8	C10	C12

| D1	D3	D5	D7	D9	D11	D13	D15	D17	D19	D21
D2	D4	D6	D8	D10	D12	D14	D16	D18	D20	D22

Connector A   Connector B Connector C   Connector D

Oxygen Sensor #1 Calibrations (UEGO EMS ONLY)

O2 (V)	AFR (GAS)	LAMBDA
0.000	9.950	0.679
0.156	10.070	0.687
0.312	10.180	0.695
0.468	10.350	0.706
0.624	10.520	0.718
0.780	10.690	0.730
0.936	10.810	0.738
1.092	10.920	0.745
1.248	11.090	0.757
1.404	11.270	0.769
1.560	11.380	0.777
1.716	11.550	0.788
1.872	11.720	0.800
2.028	11.900	0.812
2.184	12.070	0.824
2.340	12.240	0.835
2.496	12.410	0.847
2.652	12.640	0.863
2.808	12.810	0.874
2.964	13.040	0.890
3.120	13.210	0.902
3.276	13.440	0.917
3.432	13.670	0.933
3.588	13.950	0.952
3.744	14.240	0.972
3.900	14.580	0.995
4.056	14.980	1.023
4.212	15.440	1.054
4.368	16.010	1.093
4.524	16.580	1.132
4.680	17.210	1.175
4.836	17.840	1.218
4.992	18.470	1.261
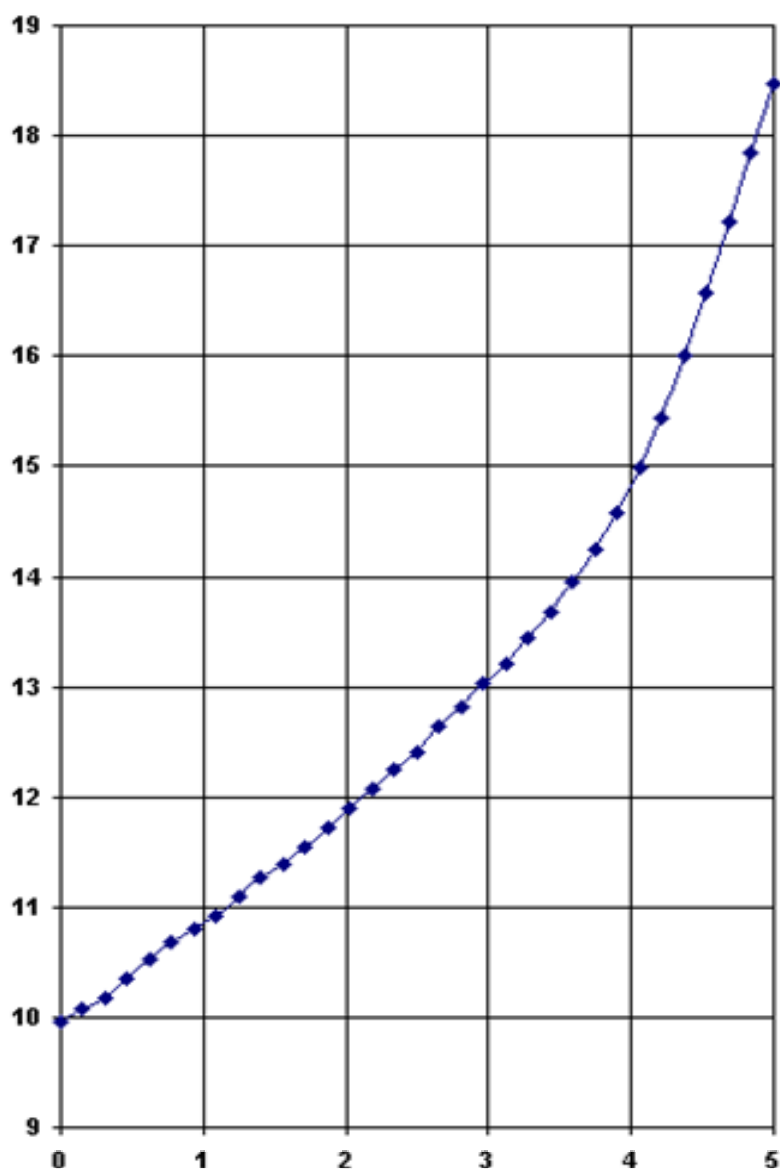
Calculating the Air Fuel Ratio of common fuels from the Lambda value

Gasoline AFR = Lambda * 14.65
Methanol AFR = Lambda * 6.47
Diesel AFR = Lambda * 14.5
Propane AFR = Lambda * 15.7
Ethanol AFR = Lambda * 9.00
CNG AFR = Lambda * 14.5

UEGO Controller/Sensor Specifications (30-1040U Only)

Supply Voltage (nominal):	9 to 18 Volts
Measuring range:	0.75 to 1.22 Lambda
Type:	Bosch UEGO LSU4.2
Accuracy:	+/- 1%
Temperature Limit:	930C
Initial Warm-up Time:	Less than 20 seconds
Weight:	80 grams
Heater Current:	1.1A at 12.0V
Mounting:	M18 X 1.5 thread, Torque to 30 ft-lbs
Nominal Service Life:	100,000 km for Unleaded Fuel
	60,000 km for Leaded Fuel 0.15g Pb/l
	30,000 km for Leaded Fuel 0.40g Pb/l
	20,000 km for Leaded Fuel 0.60g Pb/l

Notes:

The sensor should not be subject to mechanical or thermal shock or it may be damaged.
The sensor is not designed for operation on leaded fuels, doing so will dramatically shorten sensor life.
Long term running in the rich region (Lambda < 0.95) will shorten sensor life.
High exhaust temperatures (over 850C) will shorten sensor life.
Engine oil usage at a rate greater than 1 quart per 1,000 miles will shorten sensor life.
Do not run the engine with the UEGO sensor installed without power applied to the controller and the sensor plugged in.

Replacement Oxygen Sensor Components (30-1040U Only)

    30-2001   Replacement UEGO Sensor
    35-4005   O2 Sensor Bung, mild steel, welding required
    35-4001   O2 Sensor Plug, mild steel