PERFORMANCE ELECTRONICS

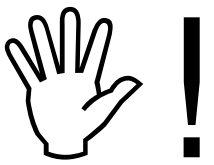
INSTALLATION INSTRUCTIONS FOR:

EMS P/N 30-2905-0 & 30-2905-96

EMS-4

PROGRAMMABLE ENGINE MANAGEMENT SYSTEM WIRE HARNESSES

WARNING:



This installation is not for the tuning novice nor the PC illiterate! Use this system with <u>EXTREME</u> caution! The EMS-4 allows for total flexibility in engine tuning. Misuse of this product WILL destroy your engine!

Installation of the EMS-4 must be performed by a qualified EFI technician familiar with EFI sensors, actuators and wiring.

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

General Information

READ AND UNDERSTAND THESE INSTRUCTIONS BEFORE ATTEMPTING TO INSTALL THIS PRODUCT.

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.

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.

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.

EMS-4 Basic Specifications

EMS-4 Specifications

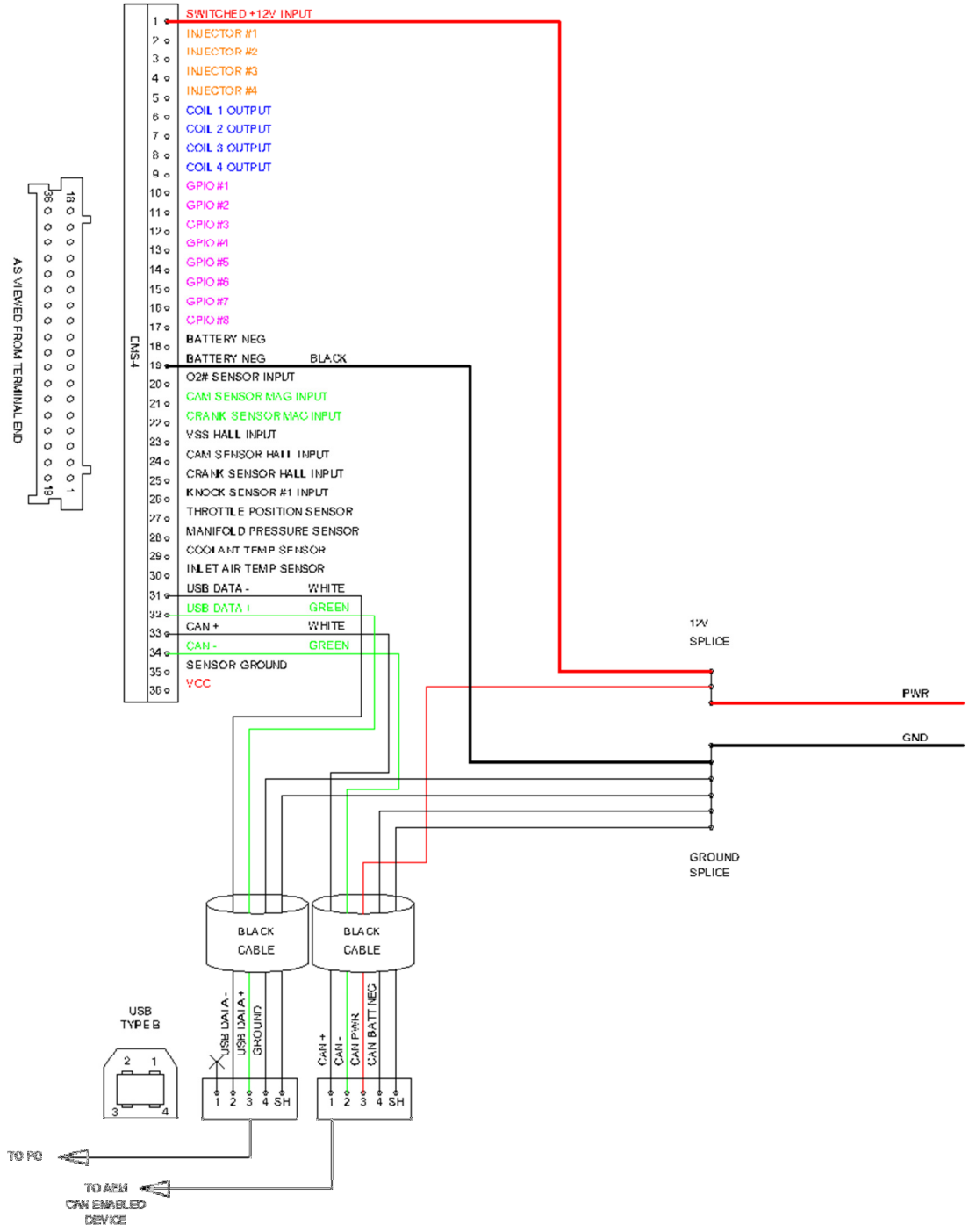
CPU Core:	16 bit / 40 MHz
Injector Drivers:	4 x Saturated (8 ohm minimum, ***High Impedance Only***)
Coil Drivers:	4 x 0-5V Falling Edge Fire (**do not connect directly to coil primary**)
GPIO Pins:	4 x 1.5A Low Side Output / 0-5V Analog Input / Switch Input
	4 x 1.5A Low Side Output / 0-5V Analog Input / PWM output
O2 Sensor Input:	1 x 0-5V analog
Timing Sensor Inputs:	1 x VR (mag) Cam Input
	1 x VR (mag) Crank Input
	1 x Hall VSS Input
	1 x Hall Crank Input
	1 x Hall Cam Input
Knock Sensor Input	1x Programmable
Throttle Position Input	1 x 0-5V
Manifold Pressure Sensor	1 x 0-5V
Coolant Temperature Sensor	1 x analog
Inlet Air Temperature Sensor	1 x analog
USB	1 x EMS / PC Communication
CAN	1 x Programmable Send / Receive
Sensor Ground	1 x
5 Volt Reference	1 x

Wire Harness Options

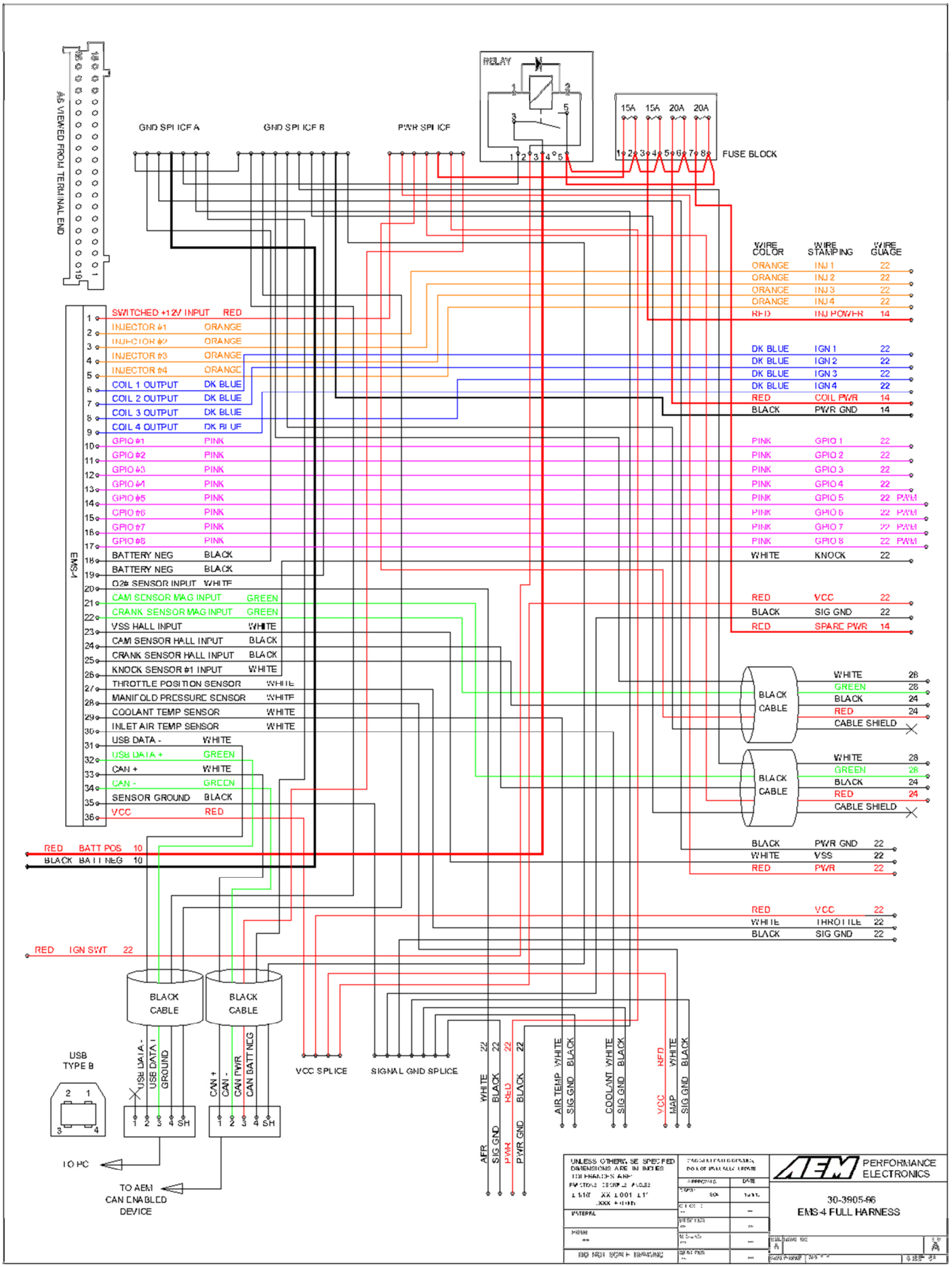
EMS-4 with 30-2905-96 Full Harness

EMS-4 with 30-2905-0 Mini Harness

AEM 30-2905-0
HARNESS



UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ARE: FRACTIONS DECIMALS ANGLES ± 1/16" .XX ± 0.01 ± 1° .XXX ± 0.005	CAD GENERATED DRAWING. DO NOT MANUALLY UPDATE	PERFORMANCE ELECTRONICS
MATERIAL	APPROVALS / DATE	30-3905-0 EMS-4 MINI HARNESS
FINISH --	DRAWN GA 12/1/10; CHECKED --; RESP ENG --; MFG ENG --; QUAL ENG --	SIZE A; DWG. NO.; REV. A
DO NOT SCALE DRAWING		SCALE: NONE; CAD FILE:; SHEET 1 OF 1


AS VIEWED FROM TERMINAL END
GND SPLICE A
GND SPLICE B
PWR SPLICE
RELAY
15A 15A 20A 20A
FUSE BLOCK
EMS-4
1 SWITCHED +12V INPUT RED
2 INJECTOR #1 ORANGE
3 INJECTOR #2 ORANGE
4 INJECTOR #3 ORANGE
5 INJECTOR #4 ORANGE
6 COIL 1 OUTPUT DK BLUE
7 COIL 2 OUTPUT DK BLUE
8 COIL 3 OUTPUT DK BLUE
9 COIL 4 OUTPUT DK BLUE
10 GPIO #1 PINK
11 GPIO #2 PINK
12 GPIO #3 PINK
13 GPIO #4 PINK
14 GPIO #5 PINK
15 GPIO #6 PINK
16 GPIO #7 PINK
17 GPIO #8 PINK
18 BATTERY NEG BLACK
19 BATTERY NEG BLACK
20 O2# SENSOR INPUT WHITE
21 CAM SENSOR MAG INPUT GREEN
22 CRANK SENSOR MAG INPUT GREEN
23 VSS HALL INPUT WHITE
24 CAM SENSOR HALL INPUT BLACK
25 CRANK SENSOR HALL INPUT BLACK
26 KNOCK SENSOR #1 INPUT WHITE
27 THROTTLE POSITION SENSOR WHITE
28 MANIFOLD PRESSURE SENSOR WHITE
29 COOLANT TEMP SENSOR WHITE
30 INLET AIR TEMP SENSOR WHITE
31 USB DATA - WHITE
32 USB DATA + GREEN
33 CAN + WHITE
34 CAN - GREEN
35 SENSOR GROUND BLACK
36 VCC RED
WIRE COLOR / WIRE STAMPING / WIRE GUAGE
ORANGE INJ 1 22
ORANGE INJ 2 22
ORANGE INJ 3 22
ORANGE INJ 4 22
RED INJ POWER 14
DK BLUE IGN 1 22
DK BLUE IGN 2 22
DK BLUE IGN 3 22
DK BLUE IGN 4 22
RED COIL PWR 14
BLACK PWR GND 14
PINK GPIO 1 22
PINK GPIO 2 22
PINK GPIO 3 22
PINK GPIO 4 22
PINK GPIO 5 22 PWM
PINK GPIO 6 22 PWM
PINK GPIO 7 22 PWM
PINK GPIO 8 22 PWM
WHITE KNOCK 22
RED VCC 22
BLACK SIG GND 22
RED SPARE PWR 14
BLACK CABLE
WHITE 28
GREEN 28
BLACK 24
RED 24
CABLE SHIELD
BLACK CABLE
WHITE 28
GREEN 28
BLACK 24
RED 24
CABLE SHIELD
BLACK PWR GND 22
WHITE VSS 22
RED PWR 22
RED VCC 22
WHITE THROTTLE 22
BLACK SIG GND 22
RED BATT POS 10
BLACK BATT NEG 10
RED IGN SWT 22
BLACK CABLE
BLACK CABLE
USB TYPE B
USB DATA -
USB DATA +
GROUND
CAN +
CAN -
CAN PWR
CAN BATT NEG
TO PC
TO AEM CAN ENABLED DEVICE
VCC SPLICE
SIGNAL GND SPLICE
AFR WHITE 22
SIG GND BLACK 22
PWR GND BLACK 22
AIR TEMP WHITE
SIG GND BLACK
COOLANT WHITE
SIG GND BLACK
VCC RED
MAP WHITE
SIG GND BLACK
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
PERFORMANCE ELECTRONICS
30-3905-96
EMS-4 FULL HARNESS

Two partially assembled harness options are available for the EMS-4:

1. P/N 30-2905-96 EMS-4 Full Harness
2. P/N 30-2905-0 EMS-4 Mini Harness

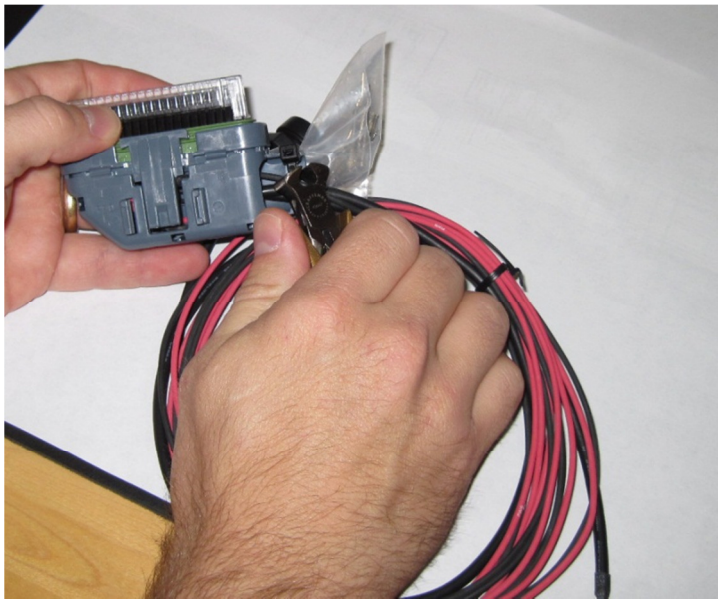
Photographs and schematics for each are shown above. The Full Harness option is best suited to applications where no factory harness exists or where modifications are so extensive, it is easier to build a custom harness. This harness includes a fused power distribution center with main relay. All circuits are pre-terminated at the ECU connector. All sensor input and actuator output leads are grouped and clearly labeled. All power and ground splices are pre-configured. All sensitive communications and CAN data stream circuits are pre-configured.

The Mini Harness option is best suited to applications where the factory harness is suitable as a starting point for modifications. Like the fully populated harness, the mini version includes pre-terminated CAN data stream and communications circuits. It also includes primary power and ground inputs. This is the minimum required for powering up the EMS and enabling communications. All other harness terminations are the responsibility of the installer. A bag of Delphi/Packard female terminals is included for terminating all circuits at the main ECU connector.

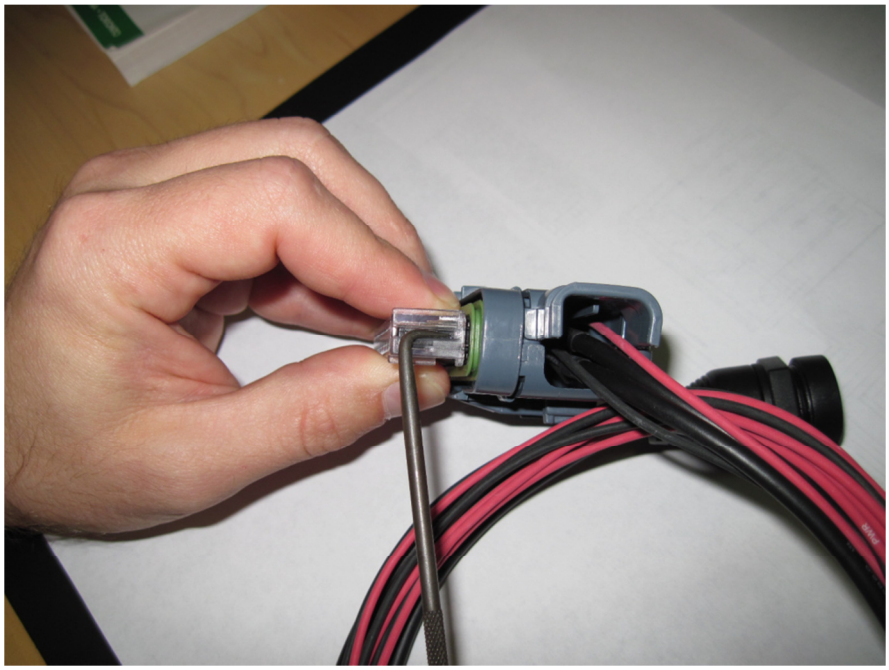
Installers choosing the Mini Harness option should refer to the Full Harness schematic above and the EMS-4 System Diagram that shows an example of a complete system design. The EMS-4 System Diagram is included with the software installation for AEM Kit P/N 30-6905, EMS-4 Programmable Engine Management System.

ECU Terminations with Mini Harness, P/N 30-2905-0

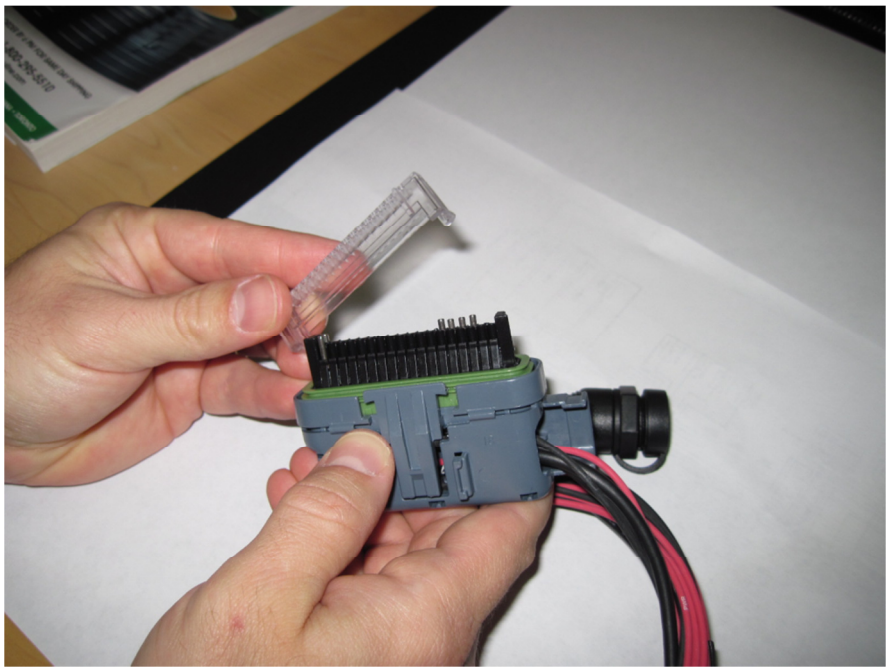
To following steps illustrate how to open the ECU connector backshell so additional circuits can be added.



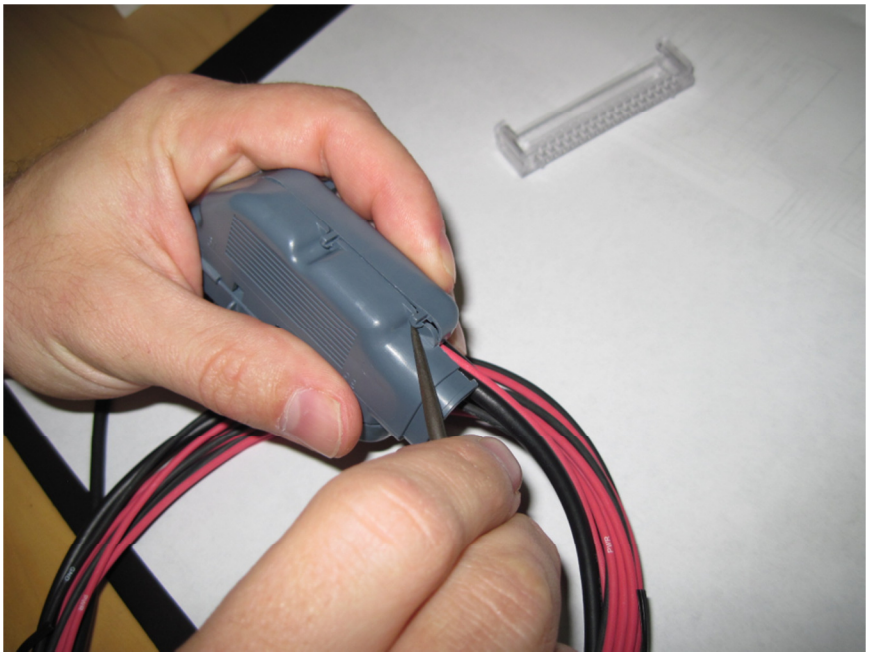
Begin by cutting the strain relief tie wrap holding the terminal bag as shown.



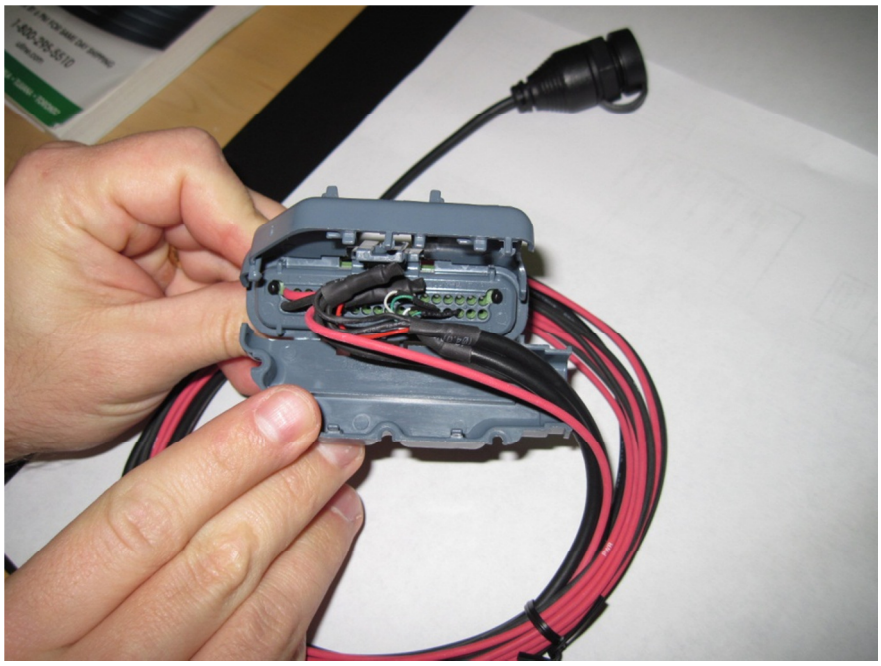
Using a sharp pick or probe, push in on the locking tabs holding the outer retainer.



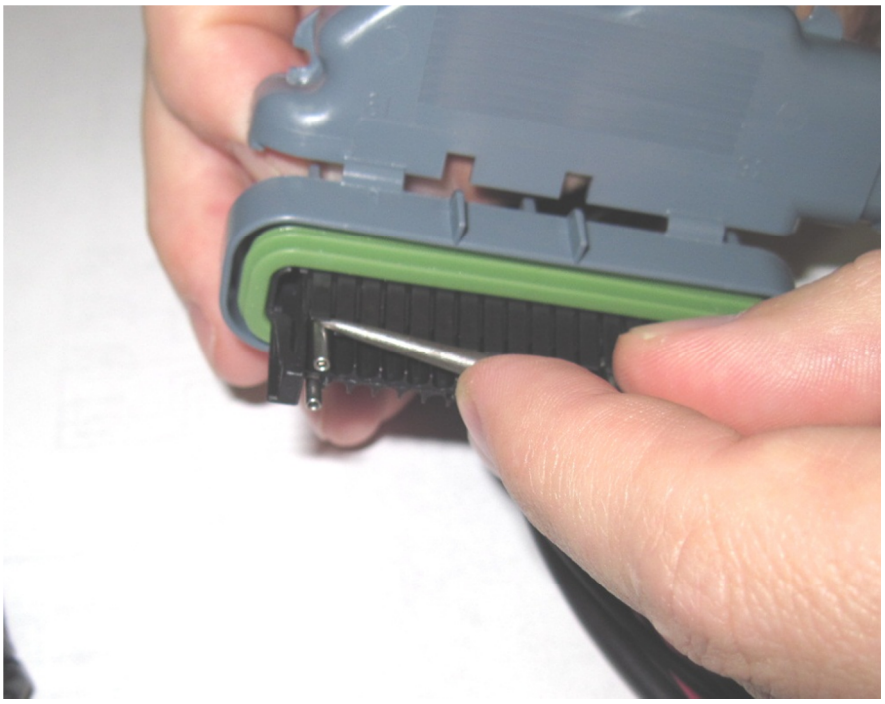
Remove the retainer.



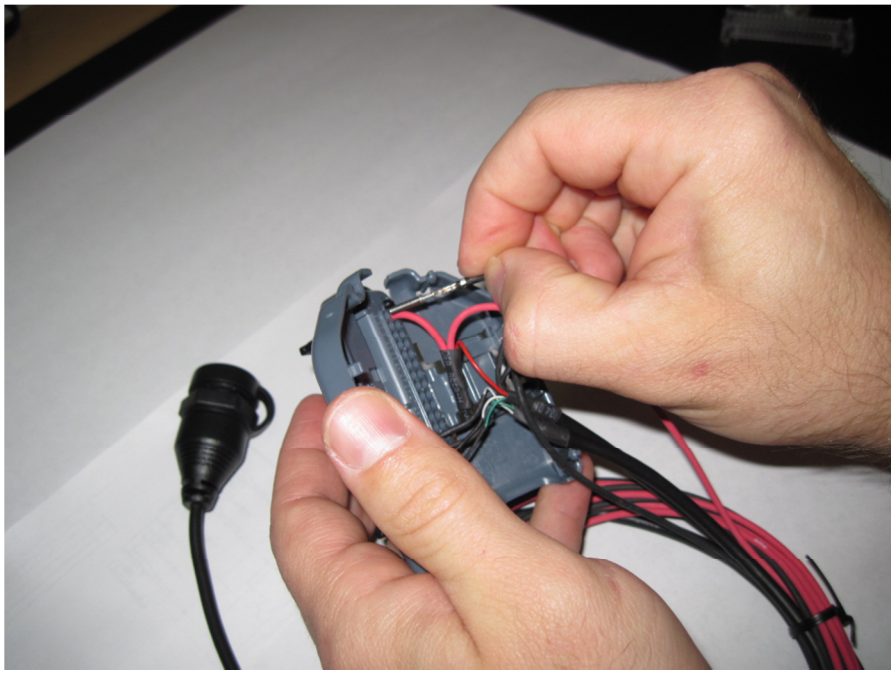
Use pick to pry open the retaining tabs holding the backshell halves together.



Open the shell to expose the cavities.



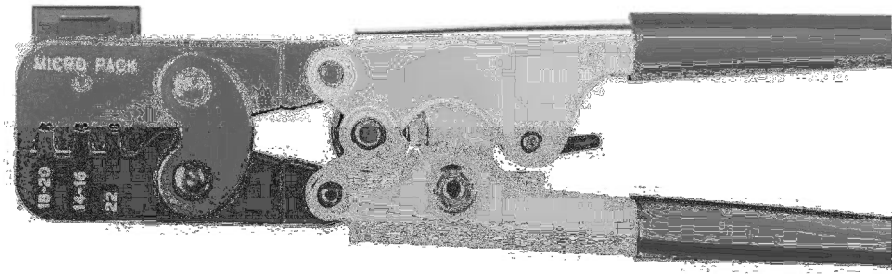
To remove a terminal, carefully pry up on the retaining clip. Be careful as the clips can break if bent too far.



To add a new circuit, insert the terminal from the back as shown until it clicks into place.

Showing terminal fully seated.

Following is the proper tool for use with the Delphi Micro Pack terminals used in the ECU main connector.



Delphi Part No: 12070948

Application: Unsealed Micro-Pack 100, Female only

Core and Insulation

Cable Range (mm2): 2.0-0.35

Image shows a properly crimped terminal. Top View.

Side View. After crimping, be sure to do a pull test to make sure the terminal is properly installed.

General note on wire terminations

A proper wiring job includes proper termination of the wire at the sensor. The wire terminal end must be moisture tight where it plugs into the sensor and it must have strong, electrically sound terminals. The preferred method of securing a wire to a terminal is to use a crimp terminal with NO solder. It is important to use the proper crimping tool for sound terminal construction. Plastic terminal plugs must have moisture tight seals. Inspect each plug to make sure the seals are in place. Also, before the plug is installed on the sensor, apply a dab of di-electric grease in the terminal slots to further aid in corrosion resistance.

If a splice into a wire must be made and no solder-less terminals are available, then you must properly solder the splice.