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***Installation Instructions for:
EMS P/N 30-1602 and 30-1602U
96-99 Nissan 180SX SR20DET
97-98 Nissan Silvia S14 SR20DET
93-98 Nissan Silvia S14 SR20DET (Europe)
99-02 Nissan Silvia S15 SR20DET (Japan)***

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.

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Instruction Part Number: 10-1602

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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 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.

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 many helpful hints/tips to make your EMS perform it's 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 base maps are tuned conservatively and are not intended to be driven aggressively. Ignoring this can and will damage your engine.

If the UEGO EMS was purchased, the stock O2 #1 sensor should be removed and replaced with the AEM sensor supplied with the EMS. The UEGO EMS furnishes the user with real time, accurate and repeatable air/fuel ratio values. The system consists of an internal air fuel ratio (AFR) controller, wiring harness, and a wide band oxygen sensor with a weld-in 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 BEFORE attempting to install this product.

More installation manuals at: www.thmotorsports.net

1) Removing the Stock Engine Control Unit

- a) Access the stock Engine Control Unit (ECU). The stock ECU is found 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 (UEGO EMS 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 Nissan 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 (UEGO Only): 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 1.28. If using the non-UEGO EMS, keep the "*O2 #1 Gain*" at 1.0.

4) 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 30-1602 and 30-1602U

Make:	Nissan
Model:	180SX and Silvia
Years Covered:	1993-2002
Engine Displacement:	2.0L
Engine Configuration:	Inline 4
Firing Order:	1-3-4-2
N/A, S/C or T/C:	T/C
Load Sensor Type:	MAF
MAP Min:	---
MAP Max:	---
MAF Min:	0.47 Volts
MAF Max:	4.98 Volts
# Coils:	4
Ignition driver type:	0-5V High Switch Low
* How to hook up a CDI:	Wire in after Igniter
# Injectors:	4 (Inj 1-4)
Factory Injectors:	370cc-480cc Saturated
Factory Inj Resistors:	No
Injection Mode:	Sequential
Knock Sensors used:	1
Lambda Sensors used:	1
Idle Motor Type:	Pulse Width
Main Relay Control:	No (hardware controlled)
Crank Pickup Type:	Optical
Crank Teeth/Cycle:	360
Cam Pickup Type:	Optical
** Cam Teeth/Cycle:	* 4 different wavelengths
Transmissions Offered:	Manual/Automatic
Trans Supported:	Manual
Drive Options:	RWD
Supplied Connectors:	N/A

Spare Injector Drivers:	Inj #5, Pin 23
Spare Injector Drivers:	Inj #6, Pin 105
Spare Injector Drivers:	Inj #7, Pin 14
Spare Injector Drivers:	Inj #8, Pin 114 (15 for Mod A)
Spare Coil Drivers:	---
Spare Coil Drivers:	---
Spare Coil Drivers:	---
Boost Solenoid:	PW2, Pin 102 (111 for Mod A)
EGT #1 Location:	Pin 8
EGT #2 Location:	Pin 15 (Pin 114 for Mod A)
EGT #3 Location:	Pin 44
EGT #4 Location:	Pin 115
Spare 0-5V Channels:	MAP, Pin 35
Spare 0-5V Channels:	PR Press, Pin 33
Spare 0-5V Channels:	---
Spare 0-5V Channels:	---
Spare Low Side Driver:	Low Side #2, Pin 45
Spare Low Side Driver:	LS#4, Pin 111 (102 for Mod A)
Spare Low Side Driver:	Low Side #8, Pin 12
Spare Low Side Driver:	---
Spare Low Side Driver:	---
Check Engine Light:	Low Side #10, Pin 24
Spare High Side Driver:	High Side #1, Pin 28
Spare High Side Driver:	---
Spare High Side Driver:	---
Spare Switch Input:	Switch #1, Pin 42
Spare Switch Input:	Switch #2, Pin 43
Spare Switch Input:	---
Spare Switch Input:	---
Spare Switch Input:	---
A/C Switch Input:	Switch #6, Pin 41

* Because the S15 Coils have built-in ignitors, a Capacitive Discharge Ignition is not optional without replacing them with non-ignitor coils.

** Nissan manufactures many different optical-type cam and crank sensors. These discs have different teeth patterns that, for the most part, are physically interchangeable with one another and can easily be installed upside down. If the vehicle has the stock cam/crank arrangement, the appropriate base map will work and there are no adjustments needed. However, if the engine has been tampered with at some point and is not starting with the AEM EMS, check the parameter "Stat Sync'd". If this parameter turns ON while cranking the engine, the cam/crank disc is correct and the starting problem lies elsewhere. If "Stat Sync'd" stay OFF while cranking, log the parameter "S Tooth". Find a unique number here to synchronize from. In other words, there should be at least one value displayed in the "S Tooth" parameter that only happens once per engine cycle (1 camshaft revolution). This value should be entered in the option "MX Sync Test". Note: Some Nissan cam/crank sensors will have multiple unique values to sync from. If a change was necessary, be sure to confirm the ignition timing using the "Ignition Sync" option.

*Included in this kit is a alternative trigger wheel that can replace the factory wheel inside the CAS(cam angle sensor). Please visit our forum at www.aempower.com for more information and calibration settings.

PnP	The Plug & Play system comes with this configured for proper operation of this device. It 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

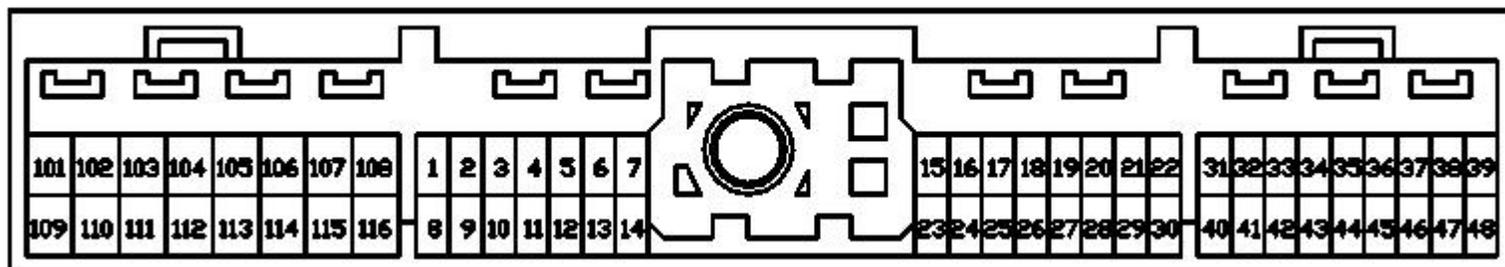
Pin	1996-1999 Nissan 180SX SR20DET 1997-1998 Nissan Silvia S14 SR20DET 1993-1998 Nissan Silvia S14 SR20DET (Europe) 1999-2002 Nissan Silvia S15 SR20DET	P/N 30-1602(U)	I/O	Availability
1	Coil 1 Output	Coil #1	Output	PnP for Coil 1
2	Tachometer Signal	Tachometer	Output	PnP for Tachometer
3	Coil 2 Output	Coil #2	Output	PnP for Coil 2
4	ECCS Self-Shutoff Relay	Main Relay	Output	Dedicated
5	Coil 3 Output	Coil #3	Output	PnP for Coil 3
6	ECCS Ground	Power Ground	Input	Dedicated
7	Data Link Connector	Coil #2	Output	Dedicated, same as Pin 3
8	NATS Immobilizer (Except S13)	EGT #1	Input	Avail, RTD Temp
9	Cooling Fan Low Speed (Except S13)	Low Side Driver #3	Output	PnP for Cooling Fan
10	Cooling Fan High Speed (Except S13)	Low Side Driver #5	Output	PnP for Cooling Fan
11	Air Conditioner Relay (Except S13)	Low Side Driver #6	Output	PnP for A/C Compressor
12	A/T Signal No. 3	Low Side Driver #8	Output	Avail, Switched Gnd, 1.5A Max
13	ECCS Ground	Power Ground	Input	Dedicated
14	Diagnostics Clock	Injector #7	Output	Avail, Switched Gnd, 1.5A Max
15	Data Link Connector	EGT #2	Input	Was Inj #8 for 30-1602 Mod A EMS
16	Mass Air Flow Sensor	MAF	Input	PnP for MAF Sensor
17	Mass Air Flow Ground	Power Ground	Input	Dedicated
18	Engine Coolant Temperature Sensor	Coolant	Input	Dedicated
19	Oxygen Sensor	<Lambda #1>	<Input>	<O2 #1 Input N/A for 30-1603U>
20	Throttle Position Sensor	TPS	Input	Dedicated
21	Sensor Ground	Sensor Ground	Output	Dedicated
22	Crankshaft Reference Signal (Except S15)	Cam	Input	Dedicated
23	Data Link Connector	Injector #5	Output	Avail, Switched Gnd, 1.5A Max
24	Malfunction Indicator Light	Low Side Driver #10	Output	Avail, Switched Gnd, 1.5A Max
25	Coil 4 Output	Coil #4	Output	PnP for Coil 4
26	Exhaust Temperature Sensor (S13) NATS Immobilizer (S14)	AIT	Input	Avail, AIT Sensor Input
27	Knock Sensor	Knock #1	Input	PnP for Knock Sensor
28	Throttle Position Sensor Signal Output	High Side Driver #1	Output	Avail, +12V, 1.5A Max
29	Sensor Ground	Sensor Ground	Output	Dedicated
30	Crankshaft Reference Signal	Cam	Input	Dedicated
31	Crankshaft Position Signal	Crank	Input	Dedicated
32	Vehicle Speed	Vehicle Speed	Input	PnP for Vehicle Speed Sensor
33	Electrical Load Signal	PR Pressure	Input	Avail, 0-5 Volt Input
34	Start Signal	Cranking	Input	Dedicated
35	Neutral Position Switch	MAP	Input	Avail, Speed Density
36	Ignition Switch	Ignition Switch	Input	Dedicated
37	Throttle Position Sensor Power Supply	+5V Sensor	Output	Dedicated
38	Power Supply for ECM	+12V Switched	Input	Dedicated
39	ECCS Ground	Power Ground	Input	Dedicated
40	Crankshaft Position Signal (Except S15)	Crank	Input	Dedicated

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41	Air Conditioner Switch	Switch #6	Input	PnP for A/C Switch
42	A/T Signal No. 1	Switch #1	Input	Avail, Switched Input
43	Power Steering Oil Pressure Switch	Switch #2	Input	Avail, Switched Input
44	A/T Signal No. 2	EGT #3	Input	Avail, RTD Temp
45	A/T Signal No. 1 (Except S13)	Low Side Driver #2	Output	Avail, Switched Gnd, 1.5A Max
46	Back-Up Power Supply	Permanent +12V	Input	Dedicated
47	Power Supply for ECM	+12V Switched	Input	Dedicated
48	ECCS Ground	Power Ground	Input	Dedicated

101	Injector No.1	Injector #1	Output	PnP for Injector 1
102	Wastegate Control Solenoid (Except S15)	PW #2	Output	Was LS#4 for 30-1602 Mod A EMS
103	Injector No.3	Injector #3	Output	PnP for Injector 3
104	Fuel Pump Relay	Low Side Driver #11	Input	PnP for Fuel Pump
105	Fuel Pressure Control (S13)/EGR Valve (S14)/VTC Solenoid (S15)	Injector #6	Output	Avail, Switched Gnd, 1.5A Max
106	Air Conditioner relay (S13)/Fuel Pump Relay (S14 & S15)	Low Side Driver #9	Output	PnP for Fuel Pump
107	ECCS Ground	Power Ground	Input	Dedicated
108	ECCS Ground	Power Ground	Input	Dedicated
109	Reverse Electrical Flow Return Circuit	Permanent +12V	Input	Dedicated
110	Injector No.2	Injector #2	Output	PnP for Injector 2
111	EAI Control Solenoid (S13)/Front O2 Sensor Heater (S14 & S15)	Low Side Driver #4	Output	Was PW#2 for 30-1602 Mod A EMS
112	Injector No.4	Injector #4	Output	PnP for Injector 4
113	Idle Auxiliary Air Control Valve	PW #1	Output	PnP for Idle Air Control
114	VTC Solenoid Valve (S14 Only)	Injector #8	Output	Was EGT#2 for 30-1602 Mod A EMS
115	Air Injection Solenoid (S13)/Wastegate Solenoid (S15 Only)	EGT #4	Input	Avail, RTD Temp
116	ECCS Ground	Power Ground	Input	Dedicated

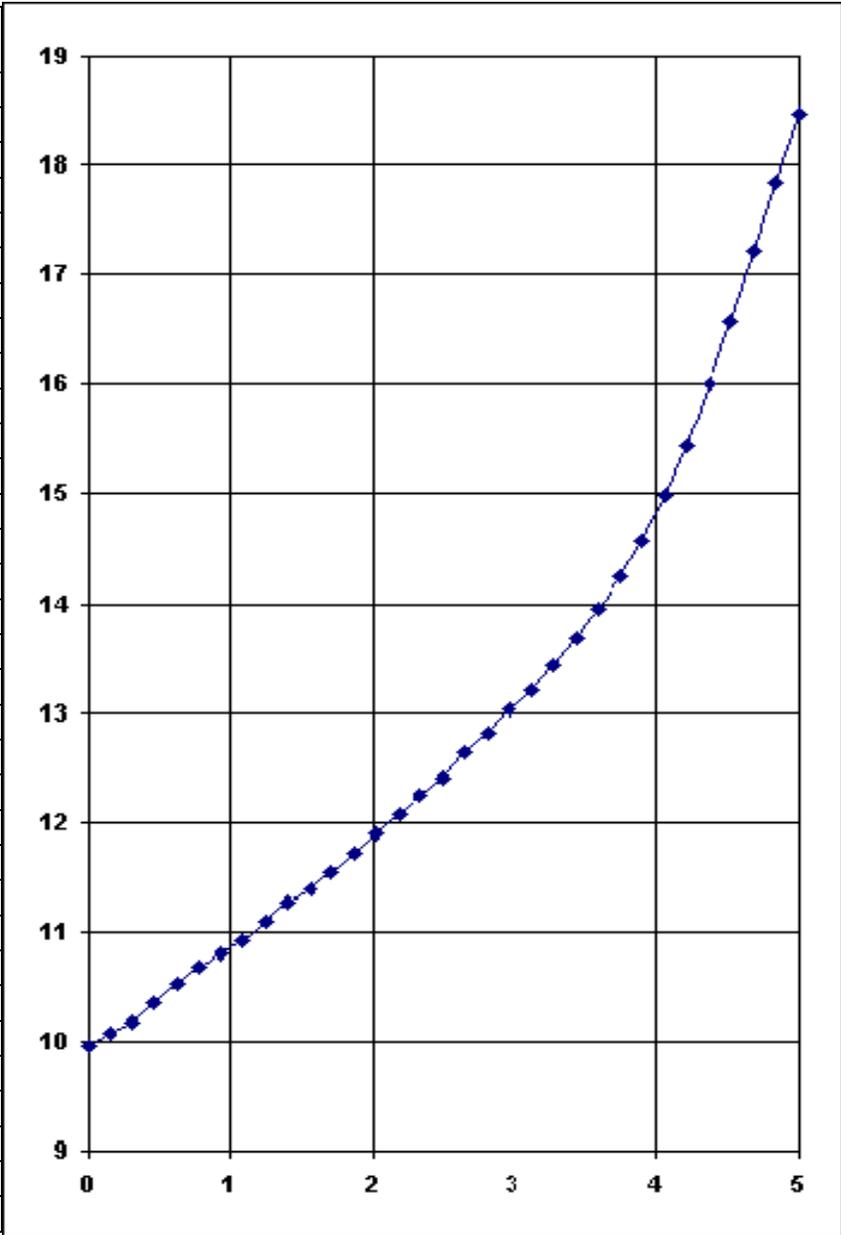
Wire View of AEM EMS



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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

$$\text{CNG AFR} = \text{Lambda} * 14.5$$

UEGO Controller/Sensor Specifications (UEGO EMS Only)

Supply Voltage (nominal):	9 to 18 Volts
Measuring range:	0.68 to 1.26 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 consumption 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 (UEGO EMS Only)

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

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.