Installation Instructions for:
EMS P/N 30-1060

96-99 Acura Integra / 97 Acura 2.2CL / 96-97 Honda Accord / 96-98 Honda Civic / 96-97 Honda Del Sol / 96-01 Honda Prelude

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 30-1060U EMS was purchased, the stock O2 #1 sensor will not be used and should be replaced with the supplied AEM sensor. The 30-1060U 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 OBDII Hondas is behind the passenger side kick panel.
   b) Disconnect the wiring harness from the ECU. Avoid excessive stress or pulling on the wires, as this may damage the wiring harness. 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!
   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 (30-1060U Only)**
   a) Remove the forward 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 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. After this is complete, you MUST verify that the ignition timing matches across the entire RPM range. If it does not then you must STOP and call the EMS tech support line for further setup help. Do not run the engine until this problem is corrected.
   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 1.28. If using the non-UEGO 30-1060, the "*O2 #1 Gain*" should be near 1.0.
   i) Set the appropriate UEGO calibration (30-1060U 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 or the Gauge type UEGO controller.

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 30-1060 & 1060U
96-99 Integra, 97 2.2CL, 96-97 Accord. 96-98 Civic, 96-97 Del Sol, 96-01 Prelude

Make:	Acura/Honda
Model:	See Above
Years Covered:	See Above
Engine Displacement:	1.6-2.3L
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:	* 190-290cc Saturated
Factory Inj Resistors:	** No
Injection Mode:	Sequential
Knock Sensors used:	1
Lambda Sensors used:	2
Idle Motor Type:	PW (Rotary for D16Y7)
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 B with Connectors

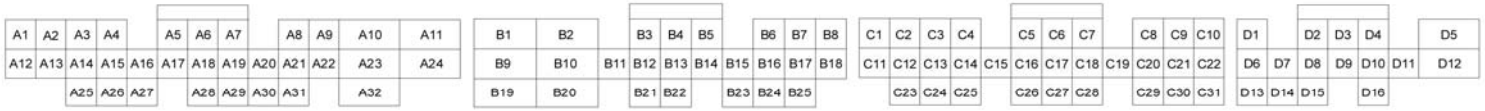| Spare Injector Drivers:	Inj #5, Pin C19
Spare Injector Drivers:	Inj #6, Pin B21
Spare Injector Drivers:	Inj #7, Pin A19/C9
Spare Injector Drivers:	Inj #9, Pin A32
Spare Injector Drivers:	Inj #10, Pin B6/C23
Spare Injector Drivers:	---
Spare Coil Drivers:	Coil #2, Pin B7
Spare Coil Drivers:	Coil #3, Pin B9
Spare Coil Drivers:	Coil #4, Pin B10
Spare Coil Drivers:	Coil #5, Pin B19
Boost Solenoid:	PW #2, Pin C31
EGT #1 Location:	Pin B25
EGT #2 Location:	Pin A31
EGT #3 Location:	Pin C17
EGT #4 Location:	Pin D16
Spare 0-5V Channels:	ADR03, Pin D15
Spare 0-5V Channels:	ADR11, Pin D9
Spare 0-5V Channels:	ADR13, Pin B8
Spare 0-5V Channels:	---
Spare Low Side Driver:	Low Side #7, Pin C26
Spare Low Side Driver:	Low Side #9, Pin B20
Spare Low Side Driver:	Idle #2, Pin B4
Spare Low Side Driver:	Idle #6, Pin B2
Spare Low Side Driver:	Idle #8, Pin B12
Spare Low Side Driver:	---
Spare Low Side Driver:	---
Check Engine Light:	Low Side #10, Pin A18
Spare High Side Driver:	Idle #5, Pin B1
Spare High Side Driver:	High Side #4, Pin B3
Spare Switch Input:	Switch #2, Pin B15
Spare Switch Input:	Switch #3, Pin B23
Spare Switch Input:	Switch #5, Pin C16
A/C Switch Input:	Switch #6, Pin C5

Notes:
* Honda Accord and Acura 2.2CL uses low impedance peak and hold injectors
** Honda Accord and Acura 2.2 CL uses an injector resistor box
*** Does not apply to vehicles equipped with an intake air bypass (IAB) solenoid for the intake manifold.

Connection Diagram for EMS P/N 30-1060, 1060U

Pin #	Factory ECU	AEM PEMS P/N 30-1060	I/O	Availability
A1	Injector 4	Injector #4	Output	PnP for Injector 4
A2	Injector 3	Injector #3	Output	PnP for Injector 3
A3	Injector 2	Injector #2	Output	PnP for Injector 2
A4	Injector 1	Injector #1	Output	PnP for Injector 1
A5	Secondary 02 Heater Control	Low Side Driver #12	Output	PnP for Secondary O2 Heater
A6	Primary 02 Heater Control	Low Side Driver #2	Output	PnP for Primary O2 Heater
A7	EGR Control Solenoid Valve	High Side Driver #2	Output	Avail, +12V, 1.5A max
A8	VTEC Solenoid Valve	High Side Driver #1	Output	PnP for VTEC Solenoid
A9	Power Ground	Power Ground	Output	Dedicated
A10	Power Ground	Power Ground	Output	Dedicated
A11	Power Source 1	+12V Switched	Input	Dedicated
A12	Idle Air Control Valve (IACV)	PW #1	Output	PnP for Idle Air Control
A13	IACV N (D16Y7 Only)	PW #1i	Output	PnP for Idle Air Control (Rotary Type)
A14	IACV P (D16Y7 Only)	PW #1	Output	PnP for Idle Air Control (Rotary Type)
A15	EVAP Purge Control Solenoid	Low Side Driver #4	Output	Avail, Switched Gnd, 1.5A Max
A16	Fuel Pump Relay	Low Side Driver #11	Output	Dedicated
A17	A/C Clutch Switch	Low Side Driver #6	Output	PnP for A/C Clutch Switch
A18	Malfunction Indicator Light	Low Side Driver #10	Output	Avail, Switched Gnd, 1.5A Max
A19	Alternator Control	---	---	---
A20	Ignition Control Module	Coil #1	Output	PnP for Ignition Control Module
A21	---	Knock #2	Input	Avail, Knock Input
A22	Power Ground	Power Ground	Output	Dedicated
A23	Power Ground 2	Power Ground	Input	Dedicated
A24	Power Source 2	+12V Switched	Input	Dedicated
A25	---	---	---	---
A26	Intake Air Bypass Solenoid	High Side Driver #3	Output	Avail, +12V, 1.5A max
A27	Radiator Fan Control	Low Side Driver #8	Output	PnP for Radiator Fan
A28	EVAP Bypass Solenoid Valve	Low Side Driver #3	Output	Avail, Switched Gnd, 1.5A Max
A29	EVAP Control Canister Vent Shut	Low Side Driver #5	Output	Avail, Switched Gnd, 1.5A Max
A30	Shift Up Indicator	Low Side Driver #1	Output	Avail, Switched Gnd, 1.5A Max
A31	---	EGT #2	Input	Avail, RTD Temp
A32	---	Injector #9	Output	Avail, Injector Gnd, 1.5A Max
B1	---	Idle #5	Output	Avail +12V, 1.5A max
B2	---	Idle #6	Output	Avail Switched Ground, 1.5A max
B3	---	High Side Driver #4	Output	Avail, +12V, 1.5A max
B4	---	Idle #2	Output	
B5	---	---	---	---
B6	---	Injector #10	Output	Avail, Injector Gnd, 1.5A Max
B7	---	Coil #2	Output	Avail, Switched Gnd, 1.5A Max
B8	---	ADCR 13	Input	Avail, 0-5 Volt Input, 100k Pull Up
B9	---	Coil #3	Output	Avail, Switched Gnd, 1.5A Max
B10	---	Coil #4	Output	Avail, Switched Gnd, 1.5A Max
B11	---	Idle #2	Output	Avail Switched Ground, 1.5A max
B12	---	Idle #8	Output	Avail Switched Ground, 1.5A max

B13	---	FM	Output	Avail, +/- 5V
B14	---	AGND	Output	Avail, Analog Ground
B15	---	Switch #2	Input	Avail, Switched Input
B16	---	Injector #7	Output	Avail, Injector Gnd, 1.5A Max
B17	---	Vcc (+5 volt)	Output	Avail, +5v Out for Sensor Reference
B18	---	---	---	---
B19	---	Coil #5	Output	Avail, Switched Gnd, 1.5A Max
B20	---	Low Side Driver #9	Output	Avail, Switched Gnd, 1.5A Max
B21	---	Injector #6	Output	Avail, Injector Gnd, 1.5A Max
B22	---	AGND	Output	Avail, Analog Ground
B23	---	Switch #3	Input	Avail, Switched Input
B24	---	Injector #8	Output	Avail, Injector Gnd, 1.5A Max
B25	---	EGT #1	Input	Avail, RTD Temp
C1	---	---	---	---
C2	CKP +	Crank Sensor	Input	Dedicated
C3	TDC +	Spare Speed	Input	Dedicated
C4	CYP +	Cam Sensor	Input	Dedicated
C5	A/C Switch Signal	Switch #6	Input	PnP for A/C Switch Signal
C6	Starter Switch Signal	+12V Switched	Input	Dedicated
C7	Service Check Connector	---	---	---
C8	K-Line	---	---	---
C9	Feedback at Signal	Injector #7	Output	Available
C10	Voltage Back Up	Permanent +12V	Input	Dedicated
C11	Crank Fluctuation Sensor -	Timing Ground	Output	Available, Speed Sensor Ground
C12	CKP -	Timing Ground	Output	Dedicated
C13	TDC -	Timing Ground	Output	Dedicated
C14	CYP -	Timing Ground	Output	Dedicated
C15	VTEC Pressure Switch	Switch #4	Input	Avail, Switched Input
C16	P/S Oil Pressure Switch	Switch #5	Input	Avail, Switched Input
C17	Alternator FR Signal	EGT #3	Output	Avail, RTD Temp
C18	Vehicle Speed Sensor	Vehicle Speed	Input	PnP Vehicle Speed Sensor
C19	---	Injector #5	Output	Avail, Injector Gnd, 1.5A Max
C20	EVAP Purge Flow Switch	ADR14	Input	Avail, 0-5 Volt Input, 100k Pull Up
C21	---	Idle #3	Output	---
C22	Immobilizer Code	Idle #7	Output	---
C23	---	Injector #10i	Output	Avail, same as pin B6
C24	---	Injector #9i	Output	Avail, same as pin A32
C25	---	Idle #1	Output	---
C26	---	Tacho Output (LS#7)	Output	---
C27	---	---	---	---
C28	---	---	---	---
C29	---	---	---	---
C30	ATTS Transmit (Prelude SH Only)	PW #2i	Output	Avail, Pulse Width Out, Inverted C31
C31	ATTS Receive (Prelude SH Only)	PW #2	Output	Avail, PW Out for Boost Solenoids
D1	Throttle Position Sensor	TPS	Input	Dedicated
D2	Engine Coolant Temp Sensor	Coolant	Input	Dedicated
D3	MAP Sensor	MAP	Input	Dedicated
D4	Sensor Voltage 1	+5V Sensor	Output	Dedicated
D5	Brake Switch	Switch #1	Input	Dedicated
D6	Knock Sensor	Knock #1	Input	PnP for Knock Sensor
D7	Primary 02 Sensor	Lambda #1	Input	PnP for Primary O2 Sensor

| D8	Intake Air Temp Sensor	AIT	Input	Dedicated
D9	EGR Valve Lift Sensor	ADR11	Input	Avail, 0-5 Volt Input, 100k Pull Up
D10	Sensor Voltage 2	+5V Sensor	Output	Dedicated
D11	Sensor Ground 2	Sensor Ground	Output	Dedicated
D12	Sensor Ground 1	Sensor Ground	Output	Dedicated
D13	Secondary 02 Sensor Ground	Sensor Ground	Output	Dedicated
D14	Secondary 02 Sensor	Lambda #2	Input	PnP for Secondary O2 Sensor
D15	Fuel Tank Pressure Sensor	ADR03	Input	Avail, 0-5 Volt Input, 100k Pull Up
D16	Electronic Load Detector	EGT #4	Input	Avail, RTD Temp

A1	A2	A3	A4		A5	A6	A7		A8	A9	A10	A11
A12	A13	A14	A15	A16	A17	A18	A19	A20	A21	A22	A23	A24
A25	A26	A27		A28	A29	A30	A31		A32			

Connector A

B1	B2		B3	B4	B5		B6	B7	B8
B9	B10	B11	B12	B13	B14	B15	B16	B17	B18
B19	B20	B21	B22		B23	B24	B25		

Connector B

C1	C2	C3	C4		C5	C6	C7		C8	C9	C10
C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22
C23	C24	C25		C26	C27	C28		C29	C30	C31	

Connector C

D1		D2	D3	D4		D5
D6	D7	D8	D9	D10	D11	D12
D13	D14	D15		D16		

Connector D

Oxygen Sensor #1 Calibrations (30-1060U 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
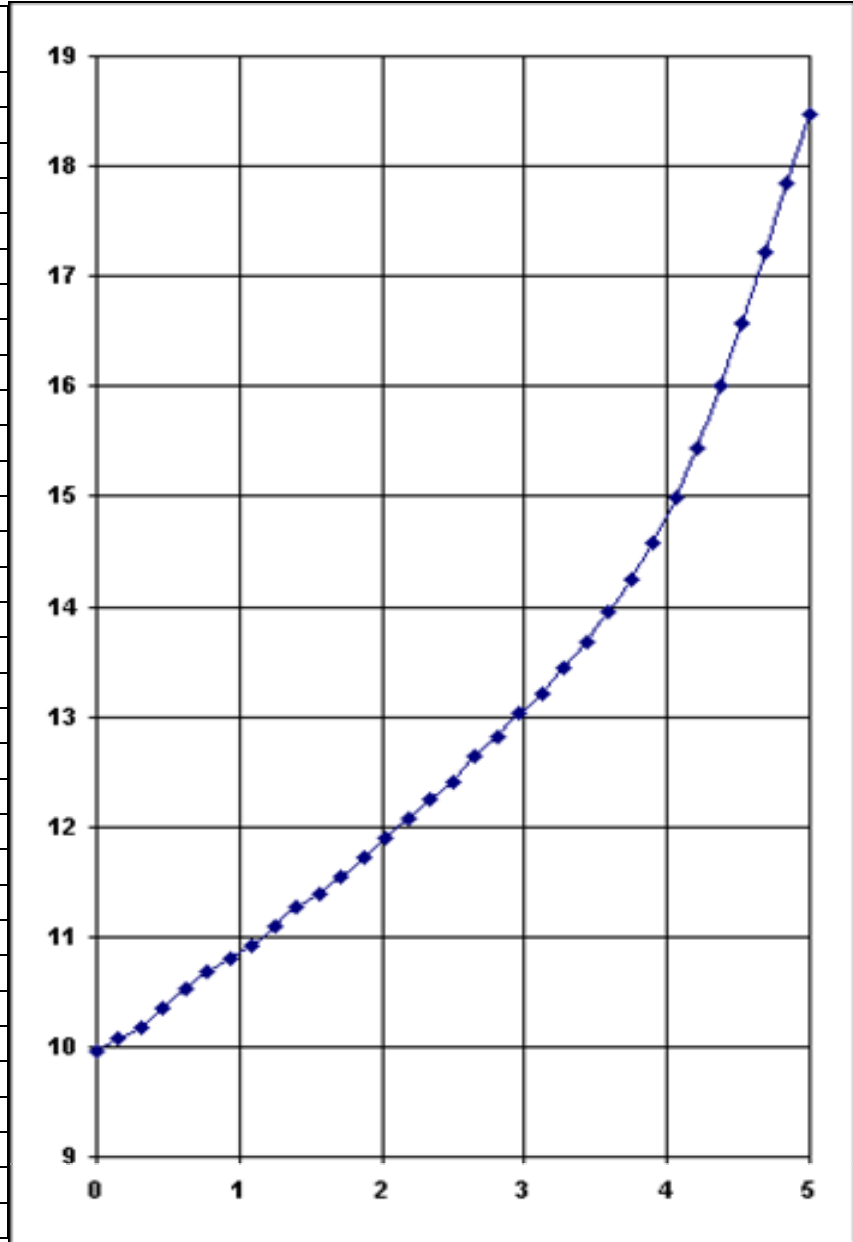
Calculating the Air Fuel Ratio of common fuels from the Lambda value

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 (30-1060U 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 (30-1050U Only)
- 30-2001 Replacement UEGO Sensor
- 35-4005 O2 Sensor Bung, mild steel, welding required
- 35-4001 O2 Sensor Plug, mild steel