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The #1 Choice in Performance Boating!™

ENGINE KNOCK METER MANUAL
Model # GIEK & LMEK

The Engine Knock Meter is a valuable tool which provides information for the tuning and protection of your engine. The Knock Meter listens to your engine with an acoustic SENSOR that electrically transmits the engine sound to an ELECTRONIC CONTROL. The electronics then analyze the sounds, distinguishing engine knock from other engine sounds such as valve train, blower, accessory drives and exhaust system. The result is a Knock Meter reading when engine knock occurs.

Everything you need to know about using your Knock Meter is presented in this manual. For maximum performance from your unit, please read carefully.

INSTALLATION

The unit has three major components, the SENSOR, the ELECTRONIC CONTROL, and the METER. The installation of each follows.

SENSOR

The acoustic sensor supplied with your Knock Meter sends electrical signals that represent normal engine sounds and engine knock to the electronic control. Since these sounds vary in intensity at different locations on the engine, SENSOR placement will have some effect. For maximum Knock Meter performance, we recommend that the sensor be mounted on the engine as shown below.

SENSOR LOCATION

715 E. Center St. * Grayslake, IL 60030 * Office: 847-548-5900 * Fax: 847-548-5903
Website: www.livorsi.com * email: info@livorsi.com

	MOUNTING LOCATIONS		
APPLICATION	#1 CHOICE	#2 CHOICE	#3 CHOICE
Motor Vehicles (less than 300 HP)	Block	Head	Intake
High Performance Street Cars	Block	Head	Intake
Competition Race Cars	Intake	Head	Block
Boats	Intake	Head	Block
Engines on Dynamometer	Intake	Head	Block

Handy Mounting Tips

The sensor has a 1/4 NPT thread and may be mounted directly to the engine or with the use of the bracket supplied in the kit. It may be mounted in any position and requires a light torque of 15-20 ft.-lbs.

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Engine Block - Mount the sensor under the cylinder head preferably in the middle of the engine. Many engines have pipe plugs in the block which may be removed and the port used for direct mounting.

The sensor bracket may be mounted together with other brackets, but it must be bolted DIRECTLY to the block. Allow at least one inch clearance from the exhaust for both the sensor and routing of the sensor wire. Should the sensor wire touch the exhaust system, it WILL burn.

Intake Manifold - The sensor may be mounted directly to any of the pipe ports in the manifold. The bracket provided may be attached to the thermostat housing hold down bolts or manifold hold down bolts.

For supercharged engines the sensor fits conveniently in the back of the intake manifold under the supercharger.

Cylinder Head - In most applications, only the front or the rear of the cylinder head is accessible. Should pipe ports be available, the sensor may be mounted directly.

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The Electronic Control processes the electrical signals from the sensor. When engine knock is present, the control identifies it from other engine sounds and sends a signal to the meter.

This electronic control is designed to be resistant to vibration and moisture. However, high temperature areas such as near the exhaust system MUST be avoided. A good rule, for any electronic unit, is to install it in the coolest possible area to assure long life and proper operation. In most applications, installation near the instrument panel is the best. **Note: The sensor cable from the electronic unit to the sensor cannot be lengthened or shortened because of the special connectors and the shielded cable.** Be sure to take this into account when choosing a mounting location. Cables of any other length are available if required.

Electrical Hook-Up

Knock Meter - A schematic of the basic wiring is shown in Figure one. The RED wire should be attached to the ignition or a power switch to assure operation when the engine is running. The GREEN wire is to be attached to the "S" terminal on the gauge. The BLACK wire is to be attached to an ENGINE ground. If you have any doubt about the ground, attach this wire directly to the engine.

Alarm and Control Switch - A switching ground (yellow wire) is provided and may be used to turn on any 12 volt DC electrical device with a maximum power rating of 12 Watts or a maximum current draw of 1 AMP. Loads greater than 1 amp, such as a car horn (4-6 amps) may be switched with the use of a relay. A 12 volt DC car horn relay works well for these applications and is available at most auto parts stores. This switch is activated when the Knock Meter approaches the yellow band or about 1/4 scale. Uses for this circuit include warning lights, audible alarms and solenoid valves.

Instrumentation Output - This unit is equipped with a special 0-5 VDC output for recording engine knock on electrical data acquisition systems such as race computers and dynamometer installations. This voltage CANNOT be used as a power source for any electrical devices.

Knock Meter

This meter registers the signals from the electronic control and displays engine knock and its severity.

Meter Wiring

The Knock Meter wiring schematic is shown in Figure 2. For most applications, it will be easiest to wire this meter to other existing gauges and panel lights.

Note: For dynamometer installations it will be necessary to isolate the meter bracket from the console ground if they are different.

CHECKOUT AND CALIBRATION

Check Out

Turn power to the unit on. The Knock Meter should read at the start of the GREEN band. Any other reading indicates a wiring error and the installation should be rechecked.

With the power on, tap directly on the top of the sensor adjacent to the connector. Verify a resulting reading on the meter. This test verifies the installation is wired correctly and the unit is operational.

Operation verified, start the engine. It is normal to see a meter reading when the engine is cranking on the starter motor. The meter reading will be in the low GREEN at all engine operating conditions where engine knock is not present.

Control Calibration

A one time calibration of your Knock Meter is required to match your engine and sensor location.

On the back of the electronic unit you will find a switch with ten numbers located on its face and four small lights to the side. ONLY number 1 thru 4 are operational and the switch has only 4 positions.

Start your engine and raise the engine speed to between 2000 and 2500 RPM in neutral. Observe the number of lights that are lit with the engine operating out of gear at 2000 to 25000 RPM. Turn the engine off. With a small screwdriver set the arrow on the switch to point to the number on the face of the switch representing the number of lights you observed lit. For example, if two lights were on when the engine was at 2000 to 2500 RPM and no load, you will set the switch pointer at #2.

If you don't have a tachometer, raise the engine to just above a fast idle. As a guide, remember fast idle for a cold engine is approximately 1500 RPM and you want to be a little higher between 2000 and 2500 RPM. The exact speed is not required. As a guide, the table below indicates normal settings for most applications. Ninety percent of all applications will be on setting number 2 or 3.

CONTROL CALIBRATION SWITCH SETTINGS

APPLICATION	NORMAL SWITCH SETTING
Motor Vehicles (less than 300 HP)	#1 or #2
High Performance Street Cars	#2 or #3
Competition Race Cars	#2 or #3
Boats, all engines	#2 or #3
Engines on Dynomometer	#2, #3 or #4
Engines with very high Manifold Pressures or Compression Ratios	#3 or #4

The test is only valid with the engine out of gear at 2000 to 2500 RPM. At higher RPM and/or with the engine under load, all the lights will eventually turn on. These lights are only to be used while calibrating the Control for initial installation and have NO other purpose.

READING THE KNOCKMETER

The Knock Meter indicates the presence of engine knock when it occurs. The meter is divided into three colors that represent the following:

- GREEN - Readings in the green range indicate light engine knock or pinging. Engine operation in this range is not advised but is acceptable in most engines for short periods of time.

- YELLOW - Yellow readings indicate medium engine knock. Operation at this level for any length of time could result in engine damage. In most applications, prolonged meter readings in this range will increase to severe engine knock.

- RED - A full red reading represents severe engine knock and can result in immediate engine damage.

The Knock Meter will not read on an engine that is properly tuned. Under these conditions, the meter will stay at the start of the green and move ONLY when some form of engine knock is present.

CAUTION:
Remember, any time the meter is reading, some form of engine knock is present. The meter cannot tell you what engine knock levels are safe. In fact, damage may occur in some engines even if operated at green levels for prolonged periods of time.

TROUBLE SHOOTING GUIDE

PROBLEM	SOLUTIONS
Meter doesn't come up to green with power on	Check installation for proper wiring. Verify supply voltage is 11.2 volts
Meter does not respond to tapping or check out.	Verify sensor is in place. Verify sensor case is grounded to engine. Verify **NO** continuity exists between terminals E & F at the connector on the wiring harness with the same sensor connected.
Meter does not indicate engine knock.	Tap on sensor to verify unit is operational. Repeat control calibration sequence. Turn switch to next lowest number (Ex: If switch is set at #2 turn back to #1.) Check sensor location chart and try second location. Recalibrate control.
Meter reads at a constant value at various power settings	Repeat control calibration. Turn switch to the next highest number. (Ex: If switch is set at #2 advance to #3.) Check sensor location chart and try second location. Recalibrate control.

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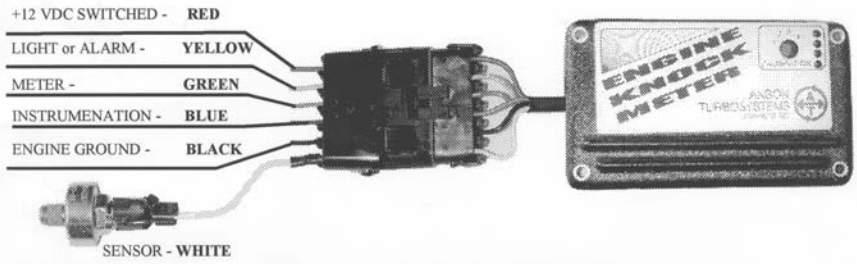
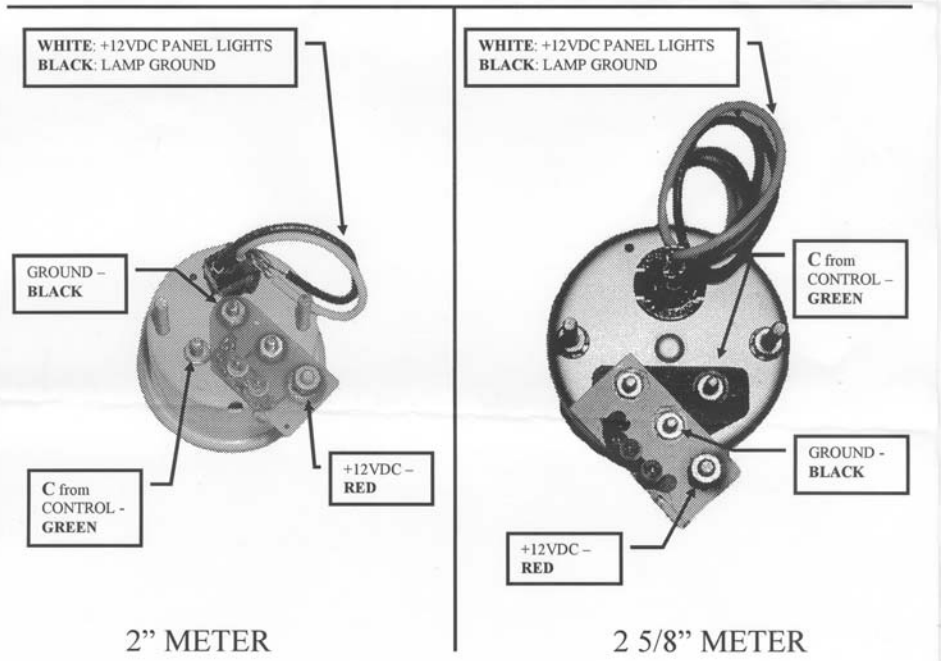
LIVORSI
CONTROL WIRING INSTALLATION





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