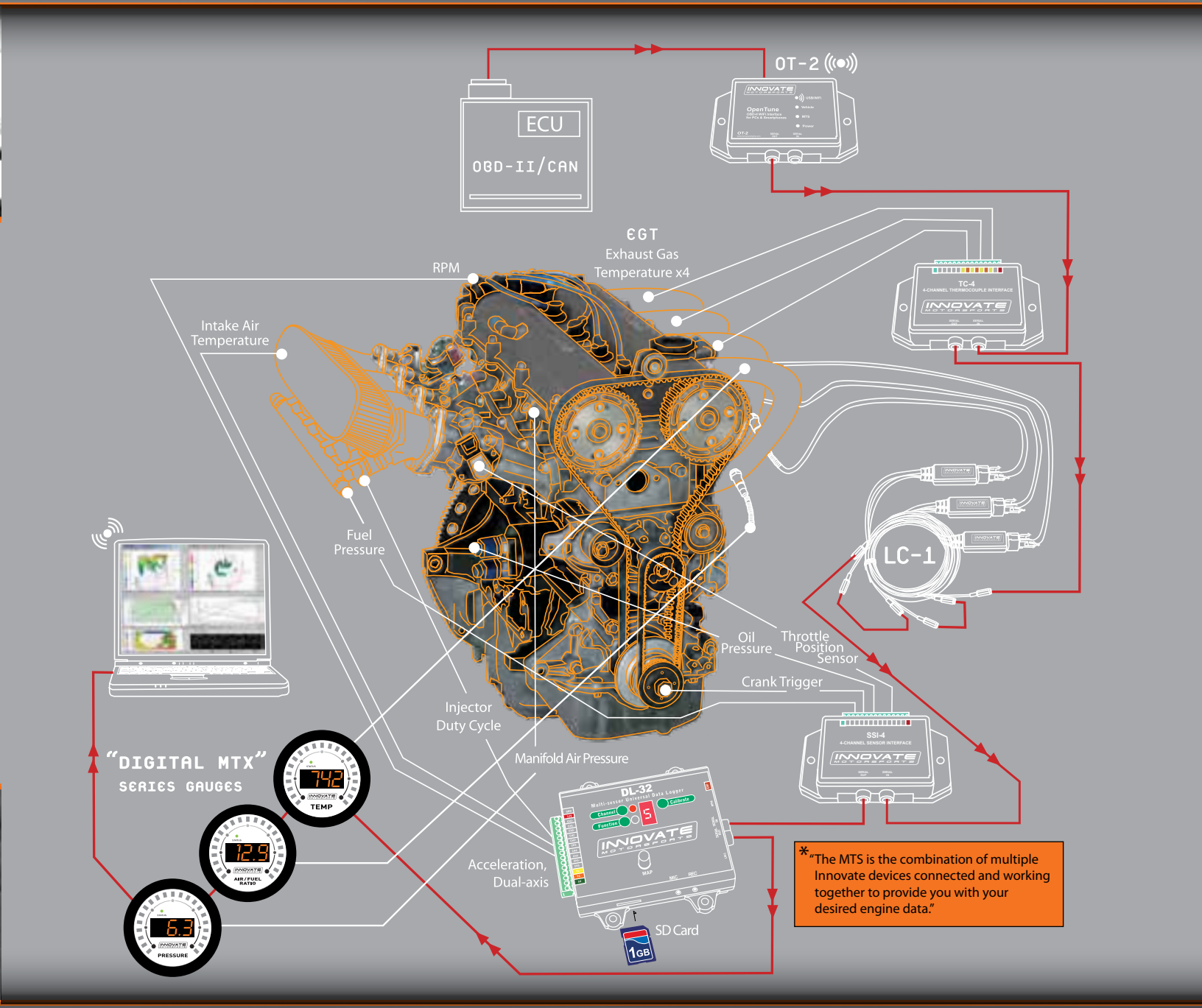
INNOVATE MOTORSPORTS



*"The MTS is the combination of multiple Innovate devices connected and working together to provide you with your desired engine data."

NOW YOU'RE TUNING!

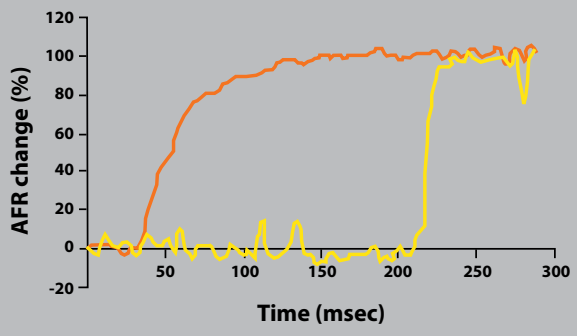
At the track, on the street, on the dyno, drag, rally, sprint, kart, drift, autocross, or any other form of motor sport, you need accurate tuning tools. Domestic or import, EFI, MFI or carbureted, land, water, or snow – the need for precise, cost-effective, and easy-to-use tuning tools is greater now than ever. Innovate Motorsports develops, manufactures, and markets professional-grade digital tuning tools, wideband, data loggers, and gauges at grassroots prices. Regardless of your setup, you'll win with Innovate.

LOGWORKS 3.0

Shipped with every Innovate product and available online for free, LogWorks delivers a complete 32 channel tuning workshop for your PC. LogWorks can calculate and graph horsepower, allowing direct mapping and comparison of HP vs. RPM vs. AFR. This enables users to gather performance data with a number of different fuel maps (or jetting changes), then use LogWorks to directly determine peak efficiency at any RPM or load. In other words, LogWorks can tell you not only what your AFRs are, but also what they should be.

THE DIRECT DIGITAL™ DIFFERENCE

All Innovate wideband products feature patented DirectDigital™ measurement technology. DirectDigital™ applies advanced digital signal processing (DSP) algorithms to zirconia sensing elements, delivering superior response times, self-calibration to compensate for sensor drift, and advanced diagnostics. DirectDigital™ – enabling the next generation of high-performance, high-efficiency engines.



Direct Digital™ — Competitors "UEGO" Analog O2 Sensor Control

"If you're not using Direct Digital™ technology, you're ignoring critical engine data!"

LM-2 DIGITAL AIR/FUEL RATIO METER

The LM-2 combines an air/fuel ratio meter, a full-function 32-channel datalogger, and powerful software to deliver a complete tuning workshop for less than the cost of one dyno day. Whether you have a piggy-back fuel controller, race carb, aftermarket ECU, ODB-II tuning software, or a flash/chip programmer, an LM-2 is the measurement tool you need to dial in maximum HP. The meter's digital signal processing technology provides data on exactly how rich or lean an engine is running at any load. The LM-2's self-calibrating circuitry also compensates for changes in temperature, altitude, and sensor condition.

- Use Patented Direct Digital™ Wideband Technology
- Single or Dual Channel A/F Version Available
- OBD-II Scan Tool – Read/Clear DTCs, and log up to 16 channels of OBD-II / CAN Data
- Log up to 32 channels directly to SD memory card (included)
- Wideband O2 compatible with ALL fuel types
- Built-in RPM converter (direct frequency or with optional inductive clamp)
- 4 fully-differential analog inputs and 2 configurable analog outputs
- Large, high contrast graphics LCD
- Innovate MTS serial IN and OUT
- USB connection to your PC
- Playback log data on screen or with LogWorks software
- 16v DC Compatible – NEW!

Direct™ Digital

P/N: 3806

3806	LM-2 Kit: Single Wideband O2 sensor
3807	LM-2 Dual Kit: Dual Wideband O2 sensors
3837	LM-2 Basic Kit: Single Wideband O2 sensor

P/N: 3806 & 3807 LM-2 Complete Kits include the LM-2 meter, Bosch wide-band oxygen sensor (x2 for Dual Channel Kit), 8 ft sensor cable (x2 for Dual Channel Kit), cigarette-lighter power adapter, analog in/out cable, ODB-II/CAN interface cable, SD memory card, USB cable for PC connection, weld-in bung and plug, LogWorks software CD, and quick-start guide. Carrying Case also included.

P/N: 3837 LM-2 "Basic" Kit (Single Wideband O2) includes the LM-2 meter, Bosch wide-band oxygen sensor, 8 ft sensor cable, cigarette-lighter power adapter, USB cable for PC connection, weld-in bung and plug, LogWorks software CD, and quick-start guide.

MTX DIGITAL SERIES

The Innovate Motorsports MTX digital & analog air/fuel gauges utilize the only 100% digital wideband control technology on the market. The patented Direct Digital™ technology utilized is faster and more accurate than the typical "UEGO" gauge offerings. In addition, the gauges feature a water resistant casing, and 2 fully programmable linear analog outputs for use with aftermarket engine management systems and dataloggers.

- The only 100% digital wideband air/fuel ratio technology!
- Water Resistant 52mm (2 1/16") round dash-mountable casing is perfect for automotive, powersports, marine, and demanding racing applications
- Built-in Direct Digital™ Wideband Controller reduces wiring and simplifies installation
- Wideband O2 Sensor is compatible with all fuel types (Leaded, Unleaded, Diesel, Methanol, E85, etc)
- Ability to calibrate O2 sensor for increased accuracy
- (2) 0-5v fully programmable linear analog outputs for use with engine management systems "closed-loop" and external dataloggers
- Datalog using LogWorks on your PC
- Serial IN and OUT ports allows for easy connection with other Innovate MTS and other devices

MTX-L Display Range

Fuel Type	Low	High
Gasoline	7.35	22.4
Lambda	0.50	1.52
Diesel	7.3	99.9
Methanol	3.2	9.95
E85	4.9	14.93
LPG (Propane)	7.85	23.91

Direct Digital™

3844	MTX-L: Air/Fuel Ratio Gauge Kit, Includes 8ft. Harness, O2 Sensor & Bung
3845	MTX-L: Air/Fuel Ratio Gauge Kit, Powersports applications, 3ft. Harness
3851	MTX-D: Digital, Vacuum / Boost & Shift Light Gauge Kit
3852	MTX-D: Digital, Oil Temperature & Pressure Gauge Kit
3853	MTX-D: Digital, Water Temperature & Battery Voltage Gauge Kit
3854	MTX-D: Digital, Exhaust Gas Temperature (EGT) Gauge Kit

Dual Function

VACUUM / BOOST & SHIFT LIGHT

OIL TEMPERATURE & PRESSURE

WATER TEMPERATURE & BATTERY VOLTAGE

EXHAUST GAS TEMPERATURE (SINGLE FUNCTION)

MTX ANALOG SERIES

WATER RESISTANT

DIGITAL GAUGE FEATURES

- Interchangeable faceplates and bezels: Black and silver bezel, black and white faceplates included
- Large digital readout and programmable "Digital Needle" provides the functionality of a needle style gauge with the pinpoint accuracy of a digital display

P/N: 3844 / 3845 MTX "Digital" Air/Fuel Ratio Gauge Kit includes the gauge (standard color configuration Black faceplate & Black bezel), Bosch wideband oxygen sensor, sensor cable, mild steel weld-on bung, white faceplate, silver bezel, serial cable for PC connection, software CD containing LogWorks 3.0, and quick-start guide.

MTX-AL

ANALOG GAUGE FEATURES

- Interchangeable bezels: Black and silver bezel included (Faceplate color black or white, not interchangeable. See part description.)
- High Performance, High Torque, 270° Stepper Motor
- Superior needle holding force for high shock and high vibration applications
- Microprocessor driven!
- Programmable warning indicator and User selectable background lighting

P/N: 3855 / 3856 MTX "Analog" Air/Fuel Ratio Gauge Kit includes the gauge (Faceplate color black or white, not interchangeable. See part description), Bosch wideband oxygen sensor, sensor cable, mild steel weld-on bung, black & silver bezel, serial cable for PC connection, software CD containing LogWorks 3.0, and quick-start guide.

AIR / FUEL RATIO

Black Face	White Face	
3855	3856	MTX-AL: Analog, Air/Fuel Ratio Gauge Kit, Includes Harness, O2 Sensor & Bung
3857	3858	MTX-A: Analog, Vacuum / Boost Gauge Kit
3859	3860	MTX-A: Analog, Oil Pressure Gauge Kit
3861	3862	MTX-A: Analog, Water OR Oil Temperature Gauge Kit
3863	3864	MTX-A: Analog, Fuel Pressure Gauge Kit
3865	3866	MTX-A: Analog, Exhaust Gas Temperature Gauge Kit

VACUUM / BOOST

OIL PRESSURE

OIL OR WATER TEMPERATURE

FUEL PRESSURE

EXHAUST GAS TEMPERATURE (EGT)

NEW & IMPROVED! LC-2 STANDALONE WIDEBAND CONTROLLER "LAMBDA CABLE"

The LC-1 is a complete wideband controller built into a sealed cable. It features the same award-winning patented digital measurement principal found in the LM-2, and includes a digital input, output, and 2 programmable linear analog outputs. The LC-1 can interface directly with most dynos, ECUs, and data recorders on the market via two configurable 0 to 5v analog outputs. The LC-1 can also log directly into LogWorks via the Innovate MTS data bus. This enables laptop or PC-based logging directly from one or more LC-1 controllers. Since the LC-1 can be daisy-chained, users can now affordably tune individual cylinders for precision power balancing.

Direct Digital™

3877	LC-2: Wideband Controller Cable (w/ Bosch Sensor) & Bung

G2 SERIES GAUGES

The Innovate G2 Air/Fuel Ratio gauge (52mm, 2 1/16") features a high-speed stepper motor, through-dial backlighting, silver face and bezel and an illuminated pointer.

	3801	G2 Gauge Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-1 & Sensor
	3803	G2 Gauge: Silver/Silver (Gauge Only) Accessory for LC-1, LM-1 or LM-2
	3815	G2 Vacuum/Boost Gauge Kit (Mechanical)
	3817	G2 Water Temperature Gauge Kit (Electronic)
	3819	G2 Oil Pressure Gauge Kit (Electronic)

G3 SERIES GAUGES

The Innovate G3 Air/Fuel Ratio gauge (52mm, 2 1/16") features a high-speed stepper motor, through-dial backlighting, and an illuminated pointer which is blacked out when powered off, and illuminated when powered on.

3802	G3 Gauge Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-2 & Sensor
3804	G3: Silver/Black (Gauge Only) Accessory for LC-1, LM-1 or LM-2
3816	G3 Vacuum/Boost Gauge Kit (Mechanical)
3818	G3 Water Temperature Gauge Kit (Electronic)
3820	G3 Oil Pressure Gauge Kit (Electronic)

G4 GAUGE

The Innovate G4 Air/Fuel Ratio gauge (White face/Chrome bezel, 52mm, 2 1/16") features a high-speed stepper motor, through-dial backlighting, and an illuminated pointer.

3821	G4 Gauge Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-2 & Sensor
3823	G4 Gauge: White Face/Chrome Bezel (Gauge Only) Accessory for LC-1, LM-1, or LM-2

G5 GAUGE

The Innovate G5 Air/Fuel Ratio gauge (Black face/Chrome bezel, 52mm, 2 1/16") features a high-speed stepper motor, through-dial backlighting, and an illuminated pointer.

3822	G5 Gauge Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-2 & Sensor
3824	G5 Gauge: Black Face/Chrome Bezel (Gauge Only) Accessory for LC-1, LM-1, or LM-2

DB GAUGES

The Innovate DB Air/Fuel Ratio gauge (52mm, 2 1/16") features a bright LED (available in blue or red) and is blacked out when powered off.

3793	DB Gauge Blue, Accessory for LC-1, LM-1 or LM-2
3794	DB Gauge Red, Accessory for LC-1, LM-1 or LM-2
3795	DB Gauge Blue Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-2 & Sensor
3796	DB Gauge Red Kit: Complete Air/Fuel Ratio Gauge Kit, Incl. LC-2 & Sensor

AUTO TIMER & WIDEBAND AIR/FUEL RATIO DISPLAY

Designed to prolong the life of your turbocharger and/or oil. The Innovate Motorsports Auto Timer will allow a vehicle to idle the engine for a timed period, with the ignition key removed. This conveniently allows the engine oil and turbo center cartridge to cool down properly and prolong turbo and oil life. This can be done by two programmable count down presets, or you can use its three auto timer modes (Low-Normal-High). A Manual Timer, Volt-Meter, and *Wideband Air/Fuel Ratio Display are also standard features. Using the Auto Timer to display your Wideband Air/Fuel Ratio requires one of the following Innovate Motorsports wideband controllers: LC-1, LM-1, or LM-2 (*Not included in base Auto Timer kit, P/N: 3830). The Auto Timer Air/Fuel Ratio display range is 7.4 to 22.4, with a 0-5 volt linear input. The safety option for the parking brake can be used to disengage operation if vehicle is attempted to be moved without the key.

3830	Auto Timer
3833	Auto Timer: Complete Air/Fuel Ratio Display kit, Incl. LC-2 & Sensor

OT-2

ALL-IN-ONE WIRELESS METER FOR iPHONE™ / iPOD TOUCH™ / iPAD™

The OT-2 is a simple device that wirelessly connects your iPhone, iPod Touch or iPad, to your vehicle. When used with the free Logworks Mobile app, the OT-2 transforms your device into a wireless Gauge, Dyno, OBD-II Scan Tool, Efficiency Meter and Datalogger! The OT-2 combines thousands of dollars in expensive equipment into a single, affordable device! OT-2 features:

3831	OT-2: "OpenTune" OBD-II/CAN Wireless (WiFi) Interface

GAUGE

The OT-2 Gauge allows you to view and record your choice of critical engine information such as RPM, TPS, MAP, IAT, and timing advance and more! Share your data by emailing your logs instantly to friends, tuner or anyone else.

DYNO

The OT-2 Dyno function allows you to measure the performance of your vehicle quickly and accurately. This includes 0-60 acceleration, HP calculation, Acceleration G's, 1/8th and ¼ mile times and more! Find out how much power your performance modifications add without the cost of renting a dyno. *Share your results by emailing your dyno test or upload to facebook!*

OBD-II SCAN TOOL

Does your check engine light come on regularly? The OT-2 device is a powerful OBDII scan tool. Wirelessly scan your vehicle for Diagnostic Trouble Codes (DTCs), view and clear in seconds! Quickly diagnose simple problems and save money on costly diagnosis and repairs. The OT-2 also performs "Emission Tests Status" checks to let you know if you're vehicle is ready to get smog tested.

EFFICIENCY METER

Learn to drive more efficiently! The OT-2 features a built-in efficiency meter that trains you to use less fuel by keeping the tree green. Automatically calculate, track and graph your fuel economy and expenses over time. Simply input your cost at each fill-up and watch your spending and carbon footprint shrink!

POWERED BY *LOGWORKS MOBILE*. FREE APP!

Available on the App Store

OT-2 WIDEBAND BUNDLE

Turn your iPhone, iPod Touch or iPad, into a wireless air/fuel ratio gauge! This kit combines the powerful OT-2 WiFi device and the Innovate Motorsports LC-1 to enable you to monitor and log your air/fuel ratio wirelessly. Simply plug in the LC-1 into the serial port of the OT-2 and you're ready to monitor your air/fuel ratio. In addition, you can utilize all the other wireless logging and monitoring features of the OT-2 including dyno, efficiency meter, OBD-II Scan Tool and multi-function gauge!

3832	OT-2: "OpenTune" Interface with LC-2 Wideband Controller & O2 Sensor

DL-32 DATALOGGER AND SENSOR CONTROLLER

The DL-32 is a complete vehicle-mounted data-logging system for advanced engine tuning. The system includes acceleration (dual-axis) sensors for RPM, MAP, temperature, duty cycle, and analog inputs. The DL-32 unit features the following:

- Up to 32 channels of data recording, 12 samples per second
- 17 minutes of recording per MB of SD card capacity
- 1-bar to 3-bar pressure sensor (MAP, Vacuum, Boost, etc.)
- Thermocouple amplifier (EGT, CHT, etc.)
- Duty cycle (dwell) sensor (or frequency)
- 2-axis accelerometer (acceleration Gs, braking Gs, and cornering Gs)
- RPM converter
- 5v power supply for external sensors

3782	DL-32 Datalogger and Sensor Controller

LMA-3 "AUXBOX" MULTI-SENSOR DEVICE

The LMA-3 (AuxBox) is a multi-sensor interface for the MTS. The LMA-3 has the same 5 built-in sensors as the DL-32 datalogger. The AuxBox also includes 5 external inputs for connecting external sensors in lieu of the internal sensors.

3742	LMA-3: "AuxBox" Multi-Sensor Device

SSI-4 SIMPLE SENSOR INTERFACE

The SSI-4 is a 4-channel simple sensor interface for the MTS. It can digitize tach/inductive signals for RPM, frequency, duty cycle, and analog 0-5v inputs.

3783	SSI-4: Simple Sensor Interface

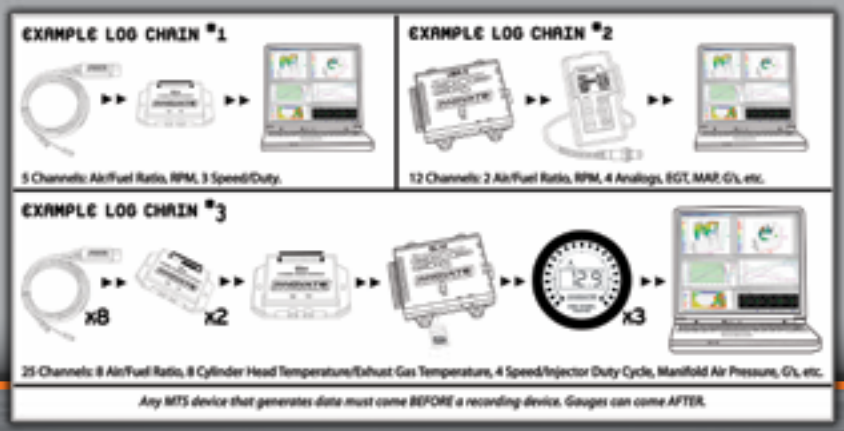
TC-4 THERMOCOUPLE AMPLIFIER

The TC-4 is a 4-channel (K-Type) thermocouple amplifier with two temperature ranges for exhaust gas temperature (EGT) or cylinder head temperature (CHT). K-Type thermocouple probes not included.

3784	TC-4: Thermocouple Amplifier

EXAMPLE LOG CHAINS & MODULAR TUNING SYSTEM (MTS*)

Unique in the industry is Innovate's concept of the modular logging chain. The Modular Tuning System (MTS™) includes meters, sensors, gauges, and recorders designed to work together. The MTS is scalable, and all components share a common communications protocol. At its simplest, the MTS is a basic LM-2 kit. At its most complex, a 32-channel data-acquisition system, with an LC-1 on every cylinder and sensors for every critical engine parameter.



ACCESSORIES & REPLACEMENT PARTS

EXHAUST CLAMP
Patented, Venturi-effect, tapped exhaust clamp for obtaining accurate air-fuel ratio measurements without welding a bung in the system.

Perfect for dyno applications or temporary installation.

3728	Exhaust Clamp

3814	LM-2 Window Mount

3835	12mm to 18mm Motorcycle Bung Adaptor

3834	Inductive Clamp (for use with LMA-3, DL-32 & LM-2

3729	HBX-1 (Heat-Sink Bung Extender) High Heat Applications

Exhaust Bung & Plug Kits (1 inch)	
3764	Mild Steel
3838	Stainless Steel
3842	Titanium

3737	Wideband O2 Sensor (Bosch LSU 4.2)

Sensor Cables for LM-2, LC-2 & MTX-L	
3843	3 Foot
3810	8 Foot
3828	18 Foot

3733	USB-to-Serial Adapter
3811	LM-2 Analog Cable
3812	LM-2 Serial Patch Cable (MT5)
3760	Serial Patch Cable: 4 ft., m2.5 to m2.5
3787	2 GB SD Card, LM-2, DL-32
3789	Serial Patch Cable: 6 inch, 2.5 to 2.5

3808	Power Cable: LM-2
3809	OBD-II Cable: LM-2
3813	USB Cable: LM-2
3836	Carrying Case: LM-2
3850	Thermocouple Probe, Type K, EGT

"WHY DO I NEED TO CALIBRATE THE O2 SENSOR WITH INNOVATE PRODUCTS?" THE ANSWER IS SIMPLE.... ACCURACY!

Innovate Motorsports is the only wideband O2 device manufacturer on the market that allows the user to field calibrate the O2 sensor. Our patented sensor calibration allows compensation for the two main causes of inaccurate air/fuel ratio data; **sensor wear and altitude**. The alternative to calibrating your sensor in the field is to rely on the sensor's Bosch factory calibration. The Bosch factory sensor calibration is done using a fixed atmospheric pressure value that may be incorrect for your location from the start!

SENSOR WEAR

Most popular wideband systems, including Innovate, utilize the Bosch LSU 4.2 wideband O2 sensor. This sensor has an integrated calibration resistor located in the connector on the plug end. Like all sensors in a vehicle, O2 sensors wear over time and being able to recalibrate the sensor is the only way to ensure continued accuracy. Innovate Motorsports is the ONLY wideband controller manufacturer that makes it possible for the sensor to be recalibrated because we do not rely on or utilize the Bosch calibration resistor. Without the ability to calibrate, your wideband will continue to rely on the Bosch factory pre-calibrated resistor settings as your sensor wears. The results of doing so have been **published by Bosch** in a technical document referenced below:

LSU test bench at constant 20 degC gas temp and constant 14.7 PSI ambient.

	New	After 500hr test bench run	After 2000hr test bench run
Calibrated measurement gas for **24.99** AFR	24.99 ± .73 AFR	24.99 ± 1.47 AFR	24.99 ± 2.20 AFR
Calibrated measurement gas for **11.76** AFR	11.76 ± .15 AFR	11.76 ± .29 AFR	11.76 ± .59 AFR

Source: Bosch Y 258 K01 005-000e technical document.

According to the Bosch spec the sensor leaves the factory with a ± margin of error of .15 AFR. In **IDEAL** lab conditions sensor wear will cause the sensor to drift to an accuracy of ± .29 AFR after approximately 500 hours and ± .59 AFR after approximately 2000 hours. In aftermarket performance applications where engines typically see richer conditions with higher exhaust gas temperatures, the sensor will degrade at a greatly accelerated rate compared to the Bosch spec. Other factors such as detergents, additives in the fuel, sensor placement and lead will also accelerate sensor wear even further. The Innovate Motorsports patented digital wideband sensor controller technology eliminates any and all inaccuracies caused by sensor wear. The simple and quick free air calibration process will ensure that you have measurements accurate to ± .1 AFR for the life of the sensor.

ALTITUDE COMPENSATION

Changes in altitude will also affect the accuracy of the measurements. It is important to note the Bosch spec tests the accuracy of the sensor at 14.7 PSI atmospheric pressure (sea level). In the same way that the pre-calibrated resistor can not compensate for sensor wear, it can not compensate for changes in altitude. To illustrate how important a difference in altitude we can look at the difference between Innovate Motorsports' office in Huntington Beach, CA which is at sea level, and Willow Springs Raceway in Rosamond, CA. The difference in altitude is approximately 2400 ft. between the two locations; this will make a difference in your measurements by as much as .2 AFR. If you do not have the ability to calibrate your sensor, and you happen to live in Denver (5280 ft. above sea level), your readings will be incorrect right from the start and will progressively get worse as the sensor degrades.

Innovate Motorsports' recommended calibration schedule:

Normally aspirated daily driver	Calibrate before installation of the new sensor. Calibrate the sensor again after 3 months of use. Thereafter calibrate once a year or every 20,000 miles, whichever comes first.
Turbo car, daily driver (tuned rich)	Calibrate before installation of the new sensor. Calibrate the sensor again after 3 months of use. Thereafter calibrate twice a year or every 10,000 miles, whichever comes first.
Race car (running leaded race fuel)	Calibrate before the new sensor. Calibrate once per race weekend.
Dyno use	Calibrate the new sensor. Calibrate every 2-3 days, or more frequently, depending on usage.

CONCLUSION

The purpose of installing a wideband O2 system in a high performance engine is to accurately monitor the engine's operating air/fuel ratio to ensure maximum performance and safety. If you are using a wideband system that does not allow the sensor to be recalibrated, you are putting your engine at risk. Whether you only perform the simple calibration once when you first install a sensor, or at the recommended intervals; Innovate Motorsports' patented digital wideband O2 sensor controller technology will ensure that you have the **fastest** and most **accurate** wideband instrument available at any price.

The difference between a wideband that does not require calibration and an Innovate Motorsports wideband is ACCURACY.