

Description:

The TMC1 Timing Map Controller provides the ability to precisely control ignition timing retard vs. both intake manifold pressure and RPM. It is especially useful for engines that have been converted to forced induction through the addition of either a turbocharger or supercharger. The TMC1 makes it possible to boost the manifold pressure without inducing harmful detonation (engine knock).

The versatile controls of the TMC1 allow the user to fine tune the amount of timing retard over the entire operating range of the engine. These adjustments can be made from the driver's seat making it possible to adjust timing retard on-the-fly to compensate for varying fuel conditions.

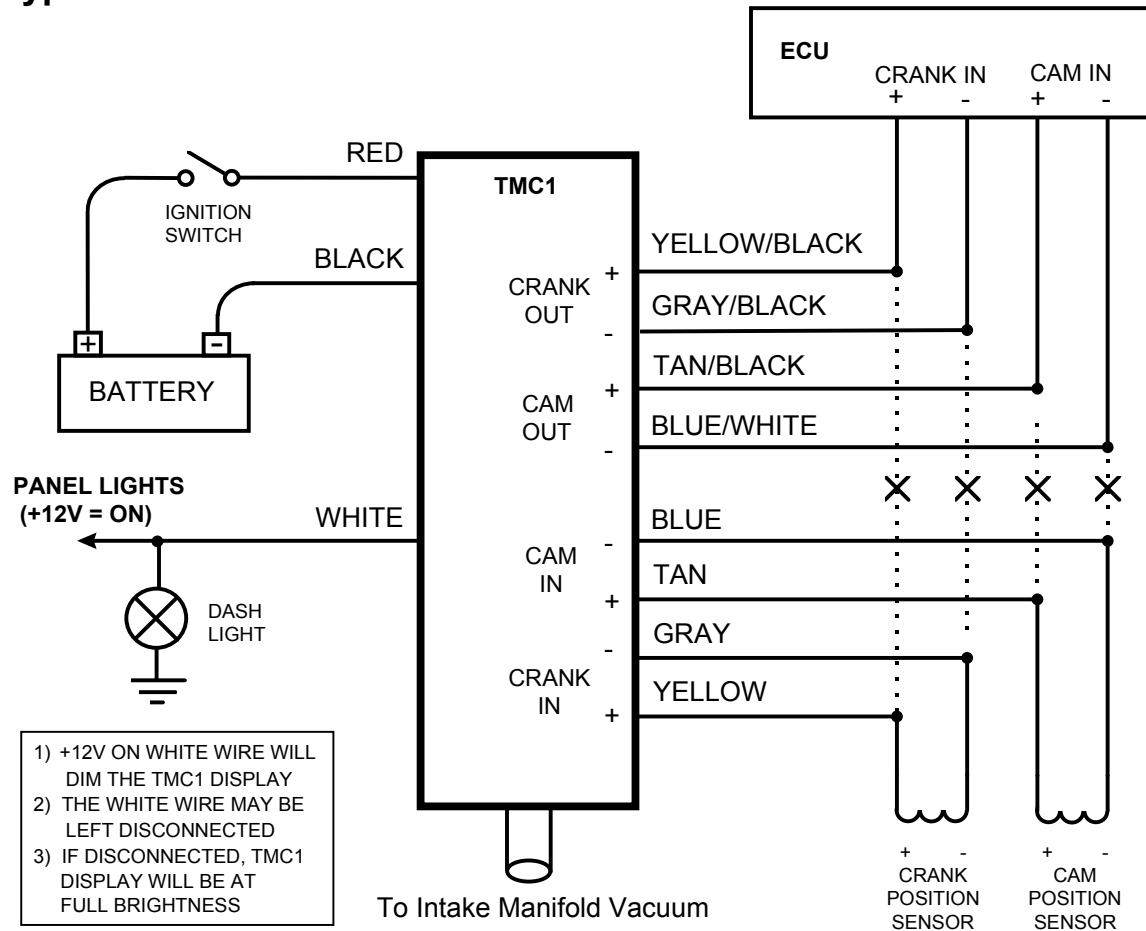
The RPM LOW and RPM HIGH controls adjust how much timing retard is applied over the RPM range. The THRESHOLD control sets the manifold pressure at which timing retard will start to occur. It may be adjusted over a wide range of manifold vacuum and pressure. The RETARD control sets the sensitivity of timing retard to change in manifold pressure.

The TMC1 is compatible with modern engines with individual ignition coils and will not interfere with the protection and self diagnostic features of the ignition system. Several versions of the TMC1 are available which serve a variety of engine makes and models. It can also be ordered with fixed calibration settings and in a wide temperature range version that is suitable for installation in the engine compartment.

Features:

- 3D mapping of timing retard over RPM and intake pressure
- Adjustable from the driver's seat
- Compatible with modern OBDII engines that have individual coils
- Transient surge and battery reversal protection
- Automatic panel illumination dimming at night

Typical Connections:



Note: In some applications, some of these wires are not used. Wire colors may be different for specific versions. Check the installation instructions for model specific wiring information.

Wire Assignments:

WIRE COLOR	CONNECT TO	LABEL
Red	Switched battery positive (+12V)	BATT+
Black	Battery negative (chassis ground)	BATT-
Yellow	Positive side of crank position sensor	CRI+
Gray	Negative side of crank position sensor	CRI-
Tan	Positive side of cam position sensor	CMI+
Blue	Negative side of cam position sensor	CMI-
Yellow/Black	Positive side of crank sensor input to the ECU	CRO+
Gray/Black	Negative side of crank sensor input to the ECU	CRO-
Tan/Black	Positive side of cam sensor input to the ECU	CMO+
Blue/White	Negative side of cam sensor input to the ECU	CMO-
White	Switched +12V to dash lights (+12V=ON)	LIGHT

Theory Of Operation:

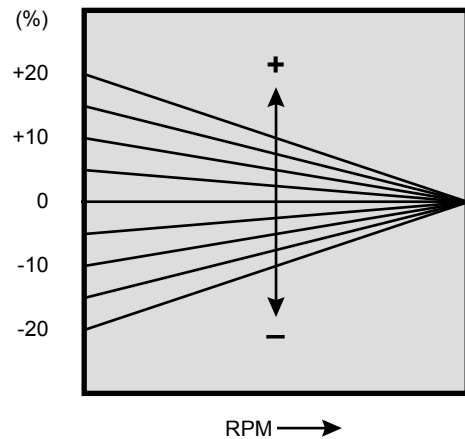
The TMC1 provides a variable amount of ignition timing retard as a function of intake manifold pressure and RPM. As intake manifold pressure increases past the level set by the THRESHOLD control, the timing will be retarded at a rate defined by the RETARD control. If the RETARD control is set at zero, the timing stays at the stock programmed settings over the entire manifold pressure range.

The TMC1 will never advance the timing. In the course of describing the RPM controls of the TMC1, reference is made to advance and retard of timing. Note that this refers to the ability of the RPM controls to scale the amount of retard set by the THRESHOLD and RETARD controls. The RPM Low and RPM HIGH controls can alter the amount of timing retard by up to $\pm 20\%$. For example, if the settings of the THRESHOLD and RETARD controls resulted in a timing retard of 10 degrees at a given manifold pressure, the RPM HIGH control can vary the timing retard from 8 to 12 degrees.

Front Panel Adjustments:

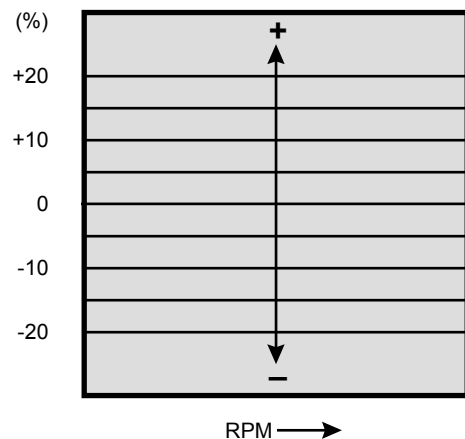
RPM LOW

The RPM LOW control alters the amount of timing retard that is applied at low PRM. It can vary the retard at idle by up to $\pm 20\%$. Adjustment of the RPM LOW control will affect the entire RPM range, but its effect diminishes as RPM increases. This control modifies the amount of retard set by the THRESHOLD and RETARD controls.



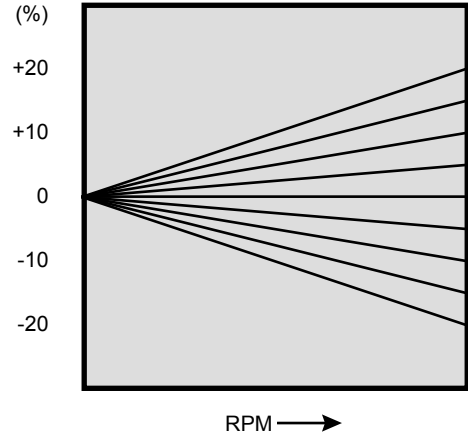
RPM HIGH

The RPM HIGH control effects the timing retard by the same percentage over the entire RPM range. It can vary the retard by up to $\pm 20\%$. As with the RPM LOW control, the RPM HIGH control modifies the amount of retard set by the THRESHOLD and RETARD controls.



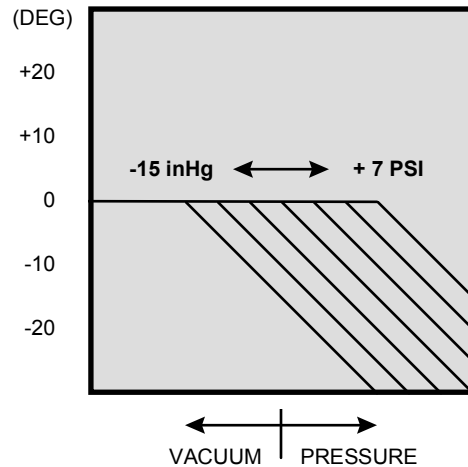
RPM LOW and HIGH TOGETHER

The RPM LOW and RPM HIGH controls interact to make more complex functions. This graph shows that it is possible to use the controls together to hold the timing retard at idle at the nominal level and modify it by up to $\pm 20\%$ at high RPM. The top line is realized by setting RPM LOW to -20% and RPM HIGH to $+20\%$.



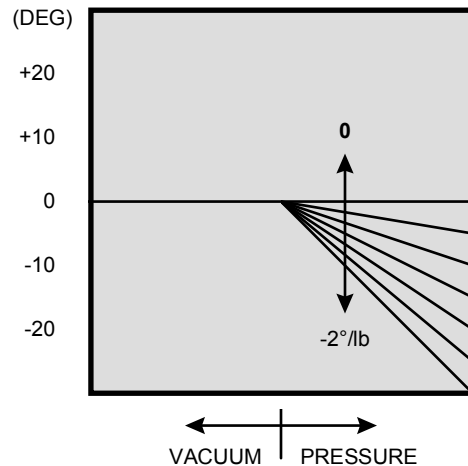
THRESHOLD

The THRESHOLD control adjusts the threshold level of intake manifold pressure at which the TMC1 will begin to retard timing. Before this threshold, no timing retard will occur. The zero point of the THRESHOLD control is set at atmospheric pressure. The range of adjustment is from -15 inHg of vacuum to $+7$ PSI of manifold pressure.



RETARD

The RETARD control adjusts the sensitivity of timing retard to increase in manifold pressure. It may be set over the range of zero to $-2^\circ/\text{lb}$ of boost in $0.1^\circ/\text{lb}$ increments. Timing retard begins at the manifold pressure set by the THRESHOLD control, while the amount of timing retard is set by the RETARD control.



Adjustment Procedure:

Begin with all the controls at their zero position. RPM LOW, RPM HIGH and THRESHOLD are at zero when pointing to the twelve o'clock position. The RETARD control is at zero when rotated fully counterclockwise. At this setting, the ignition timing of the engine is close to stock over the entire operating range. The maximum inherent retard due to the action of the TMC1 is 1.5°.

If detonation is detected, the ignition timing may be retarded by increasing the setting of the RETARD knob. As the intake manifold transitions from the vacuum region to the positive pressure region, the TMC1 will begin to retard the ignition timing. The amount of timing is dependent on the position of the RETARD control. Each click in the positive direction takes out an additional 0.1 degree of timing per pound of boost. The maximum setting available is 2 degree per pound of boost. The RETARD control is usually set in the lowest possible position where detonation does not occur.

The THRESHOLD knob is adjusted when it is necessary to vary the threshold where boost retard begins to occur. If detonation is detected in the vacuum region of manifold pressure, the THRESHOLD knob may be rotated to the left which will result in sooner onset of timing retard as the engine transitions from high vacuum towards atmospheric pressure. The onset of timing retard is adjustable over the range of -15 inHg to +7 PSI.

The THRESHOLD and RETARD settings interact and can result in greater timing retard than read from the RETARD knob setting. For example, if the THRESHOLD knob is set to zero and RETARD is set to -2°/lb, at 5 PSI of manifold pressure, the timing retard will be 10°. If the BOOST knob is now rotated counterclockwise into the vacuum region, at 5 PSI, the timing retard will now be greater than 10°.

The RPM LOW and RPM HIGH controls introduce the ability to alter the amount of retard added to or removed from the timing over the RPM range. If additional timing retard is desired at low RPM but not high RPM, the RPM LOW control may be rotated clockwise into the minus region. If more timing retard is needed at high RPM compared to low RPM, the RPM HIGH knob may be rotated clockwise into the minus region. When rotated in the counterclockwise (+) direction, the RPM LOW and RPM HIGH controls result in less timing retard action at low and high engine RPM respectively.

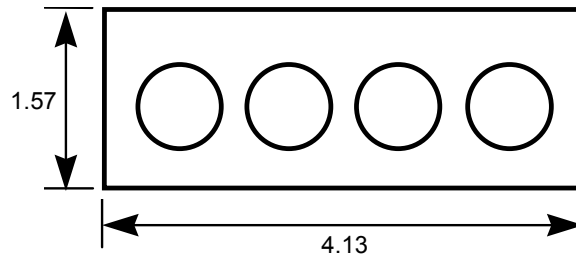
All four controls on the TMC1 interact and together provide the means to control a three dimension map where ignition timing can be retarded according to both RPM and intake manifold pressure.

Electrical Characteristics:

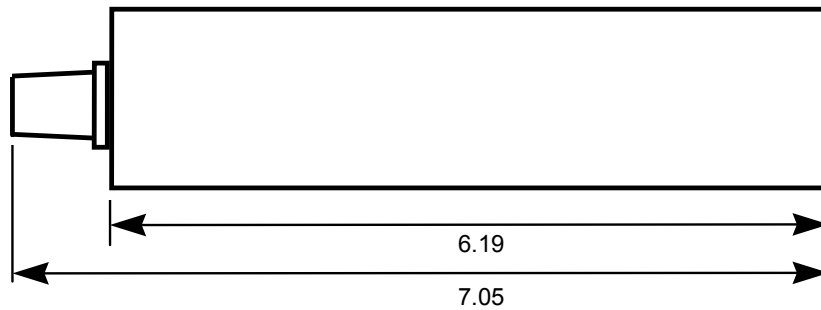
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
RPM LOW Range	% adjust of idle value	-20		20	%
RPM HIGH Range	% adjust of full scale value	-20		20	%
THRESHOLD Range	intake manifold pressure	-15		7	inHg/PSI
RETARD Range	other controls at zero	0		2	°/lb
Supply Voltage	BATT+ to BATT-	12	13.5	16	V
Dimming Voltage	LIGHT to BATT-	2	13.5	16	V
Supply Current	BATT+ terminal (day)		110		mA
Supply Current	BATT+ terminal (night)		55		mA

Mechanical Characteristics:

Front View



Side View



(dimensions in inches)



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