

TECHTIP

Operation and Testing of Late Model Ford Regulators



Various late model Ford voltage regulators are now computer controlled by the vehicle PCM (Powertrain Control Module). The PCM controls the alternators performance and contains alternator diagnostic abilities. These alternators are now found in some Ford Focus and Ford BF Falcon applications.

1 RC / Regulator Control

This regulator input pin receives a signal from the vehicles PCM, that can be up to 125 Hz, PWM (Pulse Width Modulated) square wave. The PCM signal communicates a desired voltage set point by providing a specific PWM duty cycle. Each duty cycle rate (5% through 95%) represents a specific, discrete voltage setting. (See 'Table A' below)

2 LI / Load Indicator

This regulator output pin provides a PWM feed-back signal from the regulator circuit to the PCM. This feed-back signal indicates how hard the alternator is working to maintain the required voltage set point. This PWM signal has amplitude of 14 volts and a frequency of 125 Hz. It represents the field current signal, but it is inverted. It should be noted that the LI has no direct control over lamp function. Indicator lamp function would be solely controlled by the vehicle PCM.

3 AS / External Voltage Sense

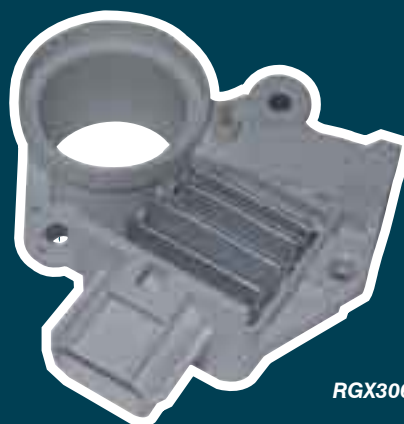
This regulator input pin provides charging system reference voltage to the regulator. The regulator reacts to this by functioning in its primary voltage set point mode.

4 B+ / Voltage Supply

This regulator input connection receives battery current for regulator circuit operation.

5 FLD / Field

This regulator output connection provides current to the rotor field coil. The regulator provides a 125 Hz PWM output. The field current duration is controlled by means of switching a high current FET power device. The PWM field current duration is such that it satisfies the voltage level required by the PCM signalled set point to within 0.1V.



RGX3060

6 GND / Ground

This is the regulator ground connection.

7 STA / Stator

This regulator input connection detects alternator stator pulses that are counted by the regulator. When stator pulses disappear, the regulator informs the PCM of a fault, via the regulator LI circuit. Voltage regulation continues with no interruption.

During alternator operation, the vehicles PCM monitors an output signal from the regulators "LI" pin and then provides a specific input signal to the regulator "RC" pin to control the regulation set point voltage. When sudden load is applied to the charge system, the PCM senses the load and effectively lowers the regulation set point voltage for a few seconds and then adjusts the signal to satisfy the demand of the vehicle electrical system. Note should be made that the PCM also monitors other vehicle peripheral loads including air conditioning and transmission, and alters the PWM signal applied to regulator "RC" pin accordingly.

This type of regulator control provides a charging system that responds very smoothly and limits the effect of the alternator load on performance.

Information courtesy of Transpo.

Duty Cycle vs. Voltage

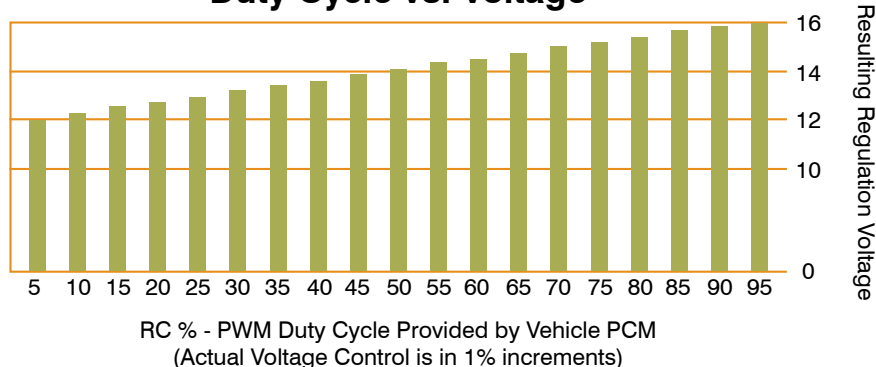


Table A

