

## Operation and Testing of late model Ford & Marelli Voltage Regulators

Various late model Ford and Marelli voltage regulators are computer controlled by the vehicle PCM (Powertrain Control Module). They contain many advanced features that require special diagnostics and testing.

Ford regulator XW4U-10C359-AB ([Transpo F601](#)) is found in late model



Ford 6G alternators GL425, GL426, GL436; Lester 7788, 8253, 8255, etc., used on Ford Windstar, Focus and other applications.



Ford regulator YF1U-10C359-AA ([Transpo F797](#)) is found in late model Ford 4G alternators GL523, GL526, Lester 8269, 8323, etc., used on Ford Crown Victoria, Taurus and

other applications.

Magneti-Marelli regulators 85562541, 85582601 ([Transpo IX131](#)) are found in late model alternators 63321678, 63321679, 63321711, etc., used



on 1998-up Ford Focus 1.4L, 1.6L and other applications

These regulators function quite similarly. Their connections and functions are as follows..

1. **RC / Regulator Control:** This regulator input pin receives a vehicle PCM signal that is a 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.)

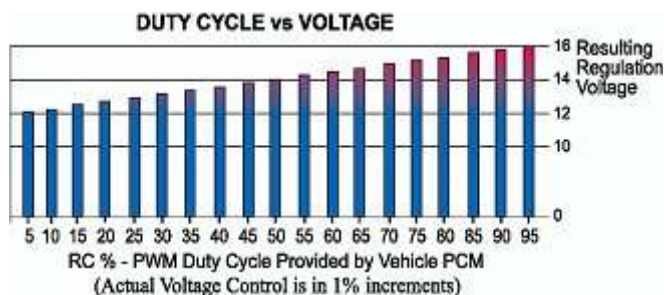
2. **LI / Load Indicator:** This regulator output pin provides a PWM feed-back signal from the regulator circuit to the PCM. This feed-back signal indicates how hard the alternator is working to maintain the required voltage set point. This PWM signal has amplitude of 14 volts and a frequency of 125 Hz. It represents the Field current signal, but it is inverted. It should be noted that the LI has no direct control over

current FET power device. The PWM field current duration is such that it satisfies the voltage level required by the PCM signaled set point to within 0.1V.

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..

**Basic Operation:** The vehicle PCM monitors the PWM signal from the regulator LI pin and controls the regulation set-point voltage via a specific PWM signal to the regulator RC pin. When a sudden load is applied to the charging system, the computer senses the load and effectively lowers the regulation set-point voltage for a few seconds. It should be noted that the PCM also monitors other peripheral loads, i.e., AC, transmission, etc., and changes the PWM signal applied to regulator RC, accordingly. This type of regulator control provides a charging system that responds very smoothly and limits the effect of the alternator load on vehicle performance. A similar effect is accomplished in Delco CS-series regulators with long delay LRC functions..



### Basic Regulator Testing using the Transpo [VRC101 Tester](#).

1. Connect the regulator B+, regulator Field, and regulator Ground to the appropriate VRC101 tester connections..

2. Connect the regulator AS pin to the VRC101 tester B+ connection. At this point the regulator should still be off (no regulation voltage indicated)..

3. Connect the regulator RC pin to the VRC101 tester Ground (B-) connection. The regulator should regulate at approximately 13.8V, its primary set voltage. Removing the AS connection should provide a secondary voltage reading (approximately 14.0V to

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. connection..

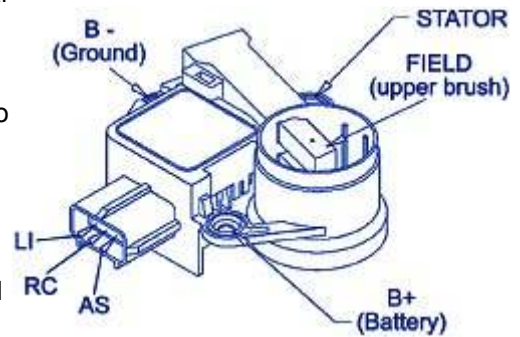
4. **B+ / Voltage Supply:** This regulator input connection receives battery current for regulator circuit operation..

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 .

14.2V)..

4. A full range regulator test requires an appropriate PWM signal applied to the RC pin connection.

The Transpo VRC101-31 test box (soon to be released) will provide varied PWM signals..



**Thank You For Your Business!**