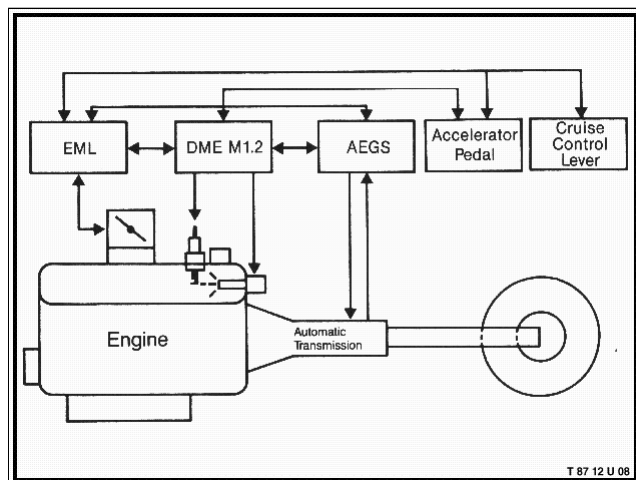


SUBJECT: Electrical Motor Load Regulation (EML)

MODEL: 750iL

Electronic Motor Load regulation (EML) provides simplified and concise throttle management for an ever increasing variety of engine operating needs. The EML system assures reliable rpm stability regardless of temperature or load variations, without the need of idle control systems, throttle cables, auxiliary air valves, cruise control servos, etc.

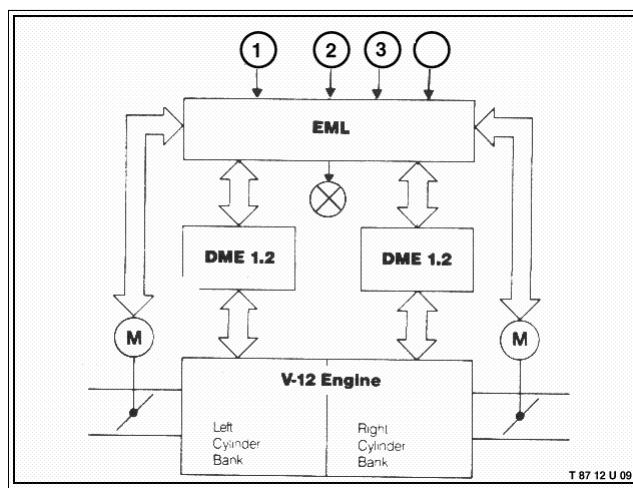


The BMW EML/M1.2 engine management system maintains control unit intercommunication between the EML, DME and the AEGS systems. This "dialogue" enables the EML system to uniquely tailor the throttle response to a wider variety of changing parameters, which would not be possible with existing mechanical and auxiliary controls.

For example, new benefits such as cruise control operation and a reduced cold engine RPM limit are now provided electronically by EML. Another example of system flexibility is AEGS program matching. The throttle opening progression curve is now matched to specific AEGS programs which will enhance fuel economy ("E" Program) or maximize power development ("S" Program).

The EML System

The dual DME M1.2 control units, while part of the fuel injection system, should also be considered as part of the EML system. For complete M1.2 information, see TRI 12 01 87 (2083).



System Components

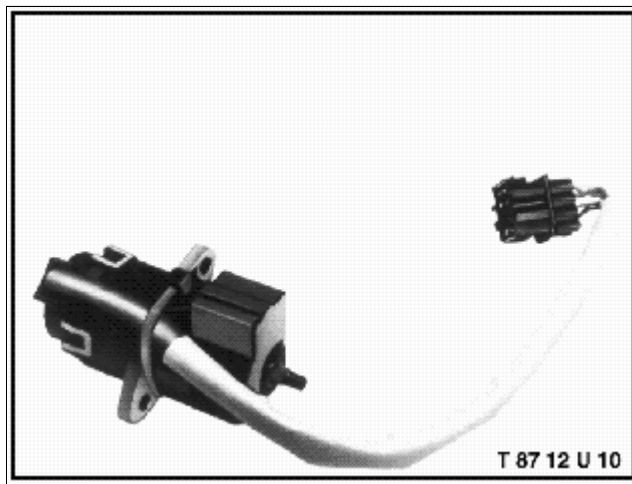
- Dual main power relays
- EML control unit
- Dual DME M1.2 control units
- Accelerator pedal assembly
- AEGS program switch
- Cruise control lever
- Dual electric throttle valves
- Fault indicator lamp

General Operation

Throttle valve control is managed electronically without the use of mechanical linkage. Accelerator pedal position now represents the "driver's desired throttle position". Switch contacts and a potentiometer attached to the accelerator pedal transmit the desired throttle position to the EML control unit. This electrical input as well as all other pertinent operating parameters are processed and the ideal throttle position is selected and maintained by EML. Throttle response is controlled with twin electric throttle valves which are operated by fastacting gear drive D.C. motors. In this way, optimum throttle response and compensation are provided for a wide variety of conditions including:

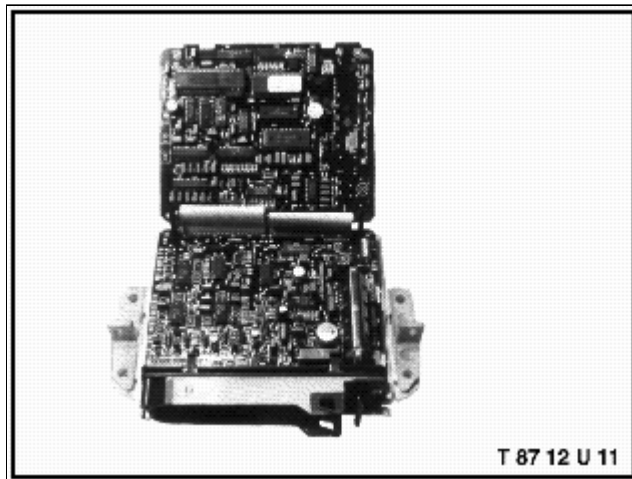
- Start-up throttle positioning
- Idle speed maintenance
- Cold engine frictional losses
- Air conditioning load fluctuation
- Gear engagement/disengagement
- Cylinder bank synchronization
- AEGS program matching
- Cruise control operation
- Maximum rpm limit
- Maximum vehicle speed limit
- Emergency operating programs

Accelerator Pedal Assembly



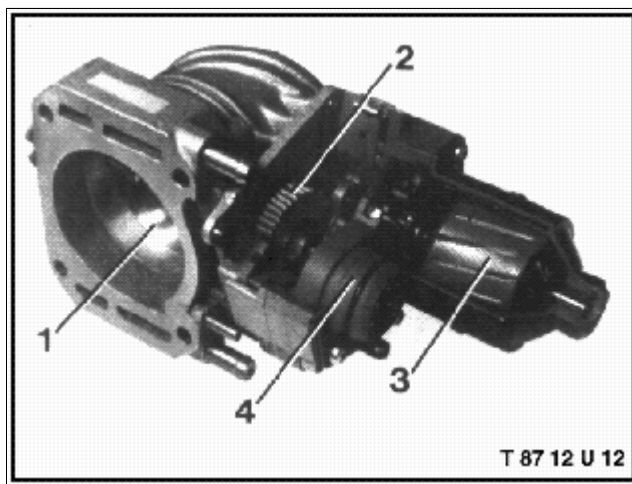
The EML accelerator pedal assembly contains a potentiometer (which generates a low voltage analog signal) that represents desired throttle position. Accelerator pedal released/depressed positioning is confirmed and verified by switch contacts known as the "90 switch". As accelerator travel crosses the 90 point, a high/low signal is monitored by the EML control unit. A safety switch completes a dedicated diagnostic circuit whenever the accelerator pedal is released. The diagnostic circuit is an independent hard wire "failsafe" which can, if necessary, initiate fuel shut off during brake application. Pedal travel and effort remain unchanged with the use of dual return springs which provide positive accelerator pedal release and pedal "feel".

EML Control Unit



The advanced EML control unit converts the accelerator pedal position values into responsive digital signals. Once processed, with consideration to other parameters and presets, the throttle valves are positioned accordingly.

Throttle Valve Assembly



1. Throttle plate
2. Gear drive
3. Electric motor drive
4. Electrical connector

The throttle valve assembly is a unitized, maintenance-free component. In addition to the internal subcomponents listed on page 3, the throttle valve assembly also contains electrical signalling devices and a positive closure return spring. The M70 employs two such throttle valves, one for each plenum, and they are operated and synchronized by the EML control unit. Precise cylinder bank balance is achieved by using the individual DME injector final stages as a reference. The EML control unit monitors physical throttle plate position from a feedback potentiometer and further verifies throttle movement via special contacts called the "170 switch". Throttle plate movement is sure and responsive, driven by D.C. electric motors via a gear drive.

EML Self-Diagnostics

EML self-testing and fault monitoring capability, combined with comprehensive safety circuitry and stored emergency programs, offer predictable system responses in the unlikely event of component malfunction. From the initial start-up all aspects of the system are tested, cross-checked and monitored for proper operation.

Many self-checks and failsafe features within and without the EML Control Unit employ redundancy for added reliability. The accelerator pedal/throttle valve relationship is monitored via the respective potentiometer signals and then confirmed by the 9° /17° switch positions. The 9° and 17° switches cannot be opened or closed simultaneously. The high/low signals produced by accelerator pedal/throttle valve travel are constantly monitored via a "switch window" arrangement within the EML control unit. EML fault lamp integrity is assured with the use of twin light bulbs.

Associated functions which are relied upon for failsafe operation are monitored in much the same way as the EML system. Such is the case with deceleration fuel shut off. Ordinarily, a fuel saving function, decel fuel shut off is also used by the EML system to provide rapid power reduction. Should the DME fail to engage decel cutoff reliably, EML will recognize a fault and reduce power.

In addition to normal EML System fault monitoring, all parameters and functions are continuously compared to programmed safety logic values. Comparison of actual operating values to programmed presets determines whether the relationship of all EML System components is

logical and plausible. For example:

- A constant accelerator pedal signal ordinarily would denote steady control by the driver. However, it could also be a stuck or blocked accelerator pedal. A "brakes applied" signal with a constant accelerator pedal signal represents conflicting values and would be deemed not plausible, causing an immediate reduction of power.

System fault detection receives immediate classification. In most cases, especially those which might affect engine RPM, the EML fault lamp is illuminated and power is reduced immediately. Depending on the fault detected, the throttle opening may be reduced to a 20° angle or to a typical idle speed position. Should the throttle valve(s) fail to move, the DME on cue will reduce the millisecond injector time or discontinue injection thus providing a substantial power reduction.

EML system troubleshooting and fault memory access is provided in the standard way, using the BMW diagnostic module.

Additionally, the hard wire diagnostic circuit which transmits the brakes applied signal via the accelerator pedal safety switch can be checked with BMW special tool P/N 88 88 6 127 010.

For full testing information, refer to Service Information Bulletin 12 06 87 (1502) and repair manual page 12 - 365 (dated 11/87).