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MARK I INTELLIGENT ENGINE SIMULATOR

The Mark I is an engine simulator for use in powertrain controller development. It supplies all the necessary input and output functions, including the CAN network messaging, to allow an Electronic Control Unit (ECU) to operate without the vehicle. It allows development engineers to exercise new Engine Controller hardware and software before testing it on a real vehicle.

SYSTEM ARCHITECTURE

The Mark I contains a real time, VME-based I/O subsystem and a PCbased interface. The VME I/O subsystem handles all real time control functions related to the physical I/O of the system. The 20-slot VME rack contains digital and analog I/O cards that can be selected to meet the needs of a particular system. Two auxiliary racks provide signal conditioning for the raw incoming signals.

The Windows-based PC provides the user with an intuitive interface to view the simulation experiment as it happens. The GUI allows the user to adjust variables and set conditions on the fly. The entire process of running an experiment can be recorded. Every keystroke, button push and encoder adjustment can be recorded and played back later.

Adjustments to settings may be made via either the PC interface or the supplied I/O box that provides switches, encoders, LEDs, and a four- line vacuum fluorescent display. All of the I/O box functions are "soft" and may be reassigned to any variable.

The system has several bays for customized load trays meeting the I/O requirements of various ECUs. These trays are easily removed and mate to a system interconnect board. The interconnect board provides a convenient routing mechanism for the large number of interconnection points for various higher pin count ECUs.

The breakout panel provides convenient access to I/O signals. Each signal may be individually disconnected, interrupted, or probed by the user. In addition to an LCD monitor, information is available on two LED wings located on either side of the monitor. There are also software assignable LEDs on the I/O box.

FEATURES

The Mark I Engine Simulator has powerful real time data acquisition and measurement capabilities. All functions are under computer control and are accessible via the graphical user interface.

Actual engine loads are provided:

- Ignition Coils
- Injectors
- Electronic Throttle Body
- Alternator
- Oxygen Sensor Heaters
- Fuel Pump Relay
- Auto Shut Down Relay
- Exhaust Gas Recirculation Solenoid (EGR)
- Cylinder De-Activation Solenoids
- Variable Valve Timing Solenoids

Scripting support in the Mark I software allows the user to create test scripts to control every parameter in the controller environment. Tests may be designed before the physical ECU is available.

Scripts may be easily modified, altering the test sequence to further investigate hardware or software issues.