

DESCRIPTION

Waukesha's Custom Engine Control® (CEC) Ignition Module (IM) provides accurate and reliable ignition timing for optimum stationary engine operation. Specifically designed to enhance the performance and cost-effectiveness of Waukesha engines, the IM offers improved starting, smoother operation, and increased spark plug life. The IM is an electronic, microcircuit-based digital ignition system that is standard on ATGL®, VHP®, and VGF® engines.

When the IM is integrated with the CEC Detonation Sensing Module (DSM) system, the ignition system protects the engine from detonation and costly downtime, and maximizes power availability under adverse conditions. Together the IM and DSM form a protection system to extend engine life, optimize engine performance, and protect against engine detonation.

FEATURES AND BENEFITS

Optimum Performance - Accurate ignition timing is critical as horsepower demands increase and engine applications become more diversified. The IM provides better cycle-to-cycle and cylinder-to-cylinder accuracy for more consistent emissions, higher power availability and greater engine stability. Timing is controlled within 1/4 degree of the desired setting. With more consistent firing of each cylinder, the engine is optimized for power, performance, and emissions.

No Scheduled Maintenance - The CEC IM offers no scheduled maintenance operation. Since the IM is electronically controlled, there are no moving parts to wear out. The circuit boards controlling engine timing are mounted inside the IM housing.

High Energy - The CEC IM operates on a capacitor discharge principle. This consistently provides high energy for maximum ignition spark, allowing greater spark plug life and engine performance.

Diagnostics - Three on-board diagnostic LEDs provide visual troubleshooting. These LEDs give operators confirmation on 1) incoming power, 2) Hall-effect pickup signal, and 3) proper application settings.

Expandable - Waukesha's CEC IM is expandable to incorporate the CEC DSM. A 14-pin expansion port on the IM allows for connection to the DSM. The DSM makes it possible for the IM to individually time engine cylinders. This allows maximum advance of timing providing better fuel consumption and optimum performance.

Application Flexibility - The IM is capable of providing timing for more than one fuel or load point. With two 16 position rotary timing switches, the engine can be set up to operate on two different fuels. This eliminates the need to manually make timing adjustments and provides application flexibility. Timing can also be selected to minimize emissions or maximize efficiency.

COMPONENTS

Waukesha's CEC IM system consists of an electronic module, Hall-effect pickup (two for AT27GL), timing disc or gear, wiring harnesses, and one ignition coil for each cylinder. Use of a Hall-effect sensor(s) provides simple, reliable installation and operation.

RETROFIT CAPABILITY

Retrofit kits are available for VGF®, VHP®, and ATGL® engines.

Ignition Module



Custom Engine Control IM

- CSA Certification, Class I, Division 2, Group D
- Optimizes performance
- Built-in diagnostics/status LEDs
- Dual fuel capabilities
- PLC interface capability

SPECIFICATIONS

Module Size	Voltage Output to Coils
3.70" H	130 - 180 VDC
8.85" L	Ground
7.12" W	Negative
Mounting Centers	Timing Accuracy
7.75" L	± 1/4°
6.25" W	
Number of Cylinders	
6, 8, 12, and 16	



Waukesha CUSTOM[®] ENGINE CONTROL

IGNITION MODULE

The CEC Ignition Module (IM) is a microcircuit-based, digital ignition system. With no scheduled maintenance, and built in diagnostics, the IM is designed to enhance the reliability and performance of your Waukesha Engine while maximizing engine up-time.

DETONATION SENSING MODULE

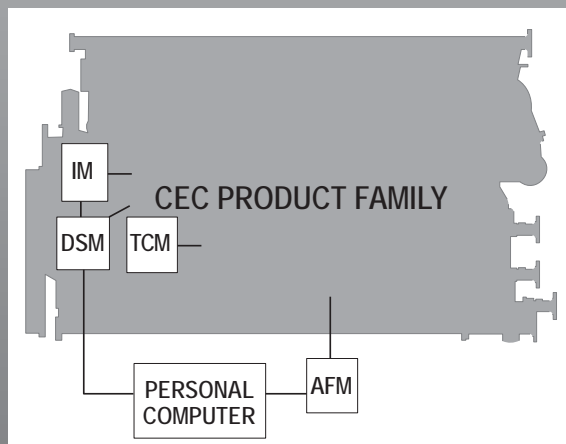
The CEC Detonation Sensing Module (DSM) works in conjunction with the ignition module to protect Waukesha spark ignited gas engines from damage due to detonation as well as maintain fuel economy and power output during adverse operating conditions.

AIR/FUEL MODULE

The CEC Air/Fuel Module (AFM) optimizes fuel consumption and emissions even when fuel composition and ambient conditions change dramatically.

TURBOCHARGER CONTROL MODULE

The CEC Turbocharger Control Module (TCM) improves turbocharger efficiency and enhances engine performance by precisely matching turbocharger output to engine needs under all operating conditions.



CEC Product Family

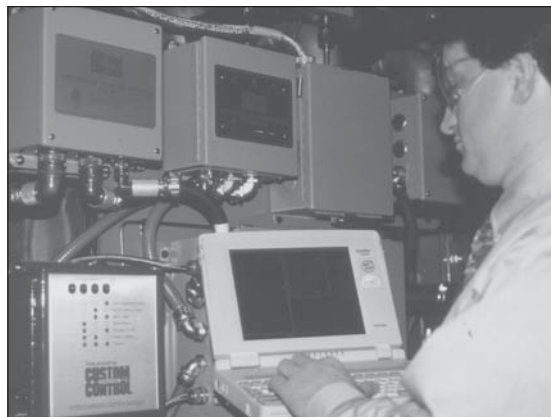
The CEC family consists of an Ignition Module (IM), Detonation Sensing Module (DSM), Air/Fuel Module (AFM), and, on ATGL engines, the Turbocharger Control Module (TCM). Together they form a comprehensive engine management system that optimizes engine performance. Even when large changes in operating conditions occur, there is no discernible difference in engine performance.



The Custom Engine Control Family includes (left to right) the Air/Fuel Module, Detonation Sensing Module, Turbocharger Control Module, and Ignition Module. Together, they form a comprehensive engine management system that optimizes engine performance.

Programming Tailored To Your Needs

The AFM, DSM and TCM programs can be tailored to meet your performance needs. Thus emissions, fuel consumption and engine response can all be optimized for a given application. The AFM has dual programming schedules to accommodate dual fuel applications. Performance can be tailored on each fuel. There is no need

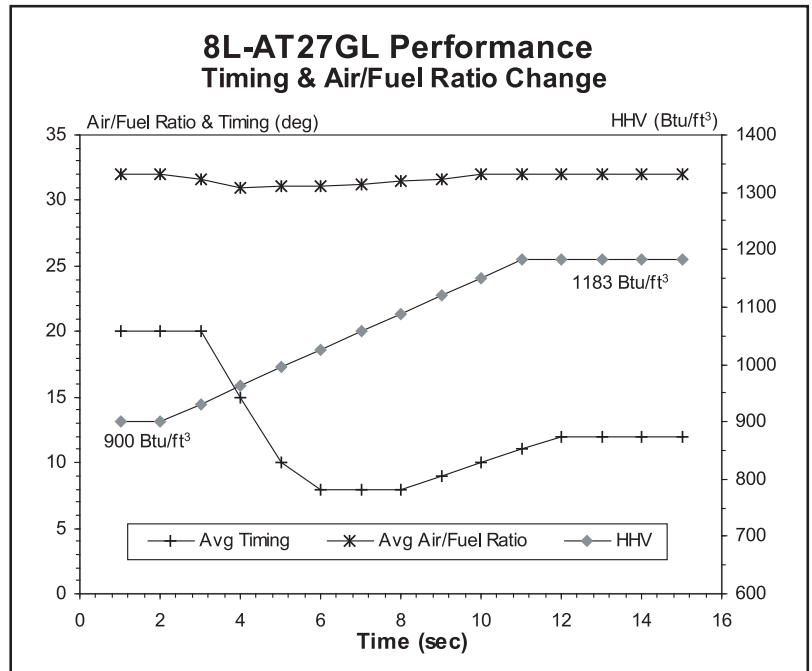


to compromise performance on one fuel due to operating limitations that might be imposed by the other. Similarly, the DSM has dual timing schedules which permit operation in two different timing ranges. This might be required in dual fuel or other applications where optimum performance

cannot be achieved with a single timing range. The operation of the TCM can be tailored to facilitate maximum engine response, maximum turndown capability, or maximum fuel efficiency whichever is most appropriate for the application.

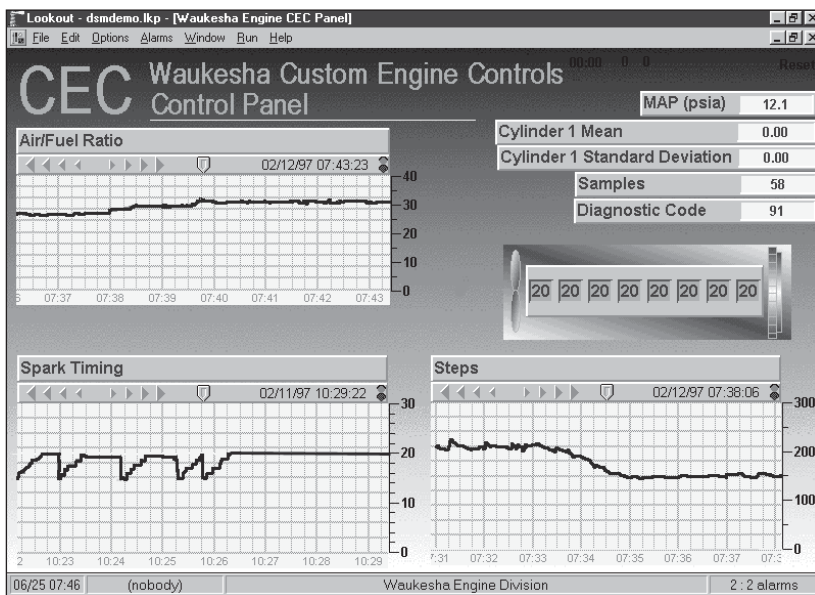
CEC PRODUCT PERFORMANCE

An example of system operation during significant changes in fuel composition is shown in the figure. In this severe test, the CEC family of products maintained peak engine performance under extreme conditions. Fuel composition was changed from a mixture with 900 Btu/ft³ and a Waukesha Knock Index™ (WKI™) value of approximately 94, to nearly 1200 Btu/ft³ with a WKI value of about 52 within 9 seconds. The CEC engine management system simultaneously adjusted all control parameters as required to keep the engine running smoothly, at rated power and the best fuel economy emissions possible. The AFM system kept the engine from becoming too rich. Only a slight change in air/fuel ratio occurred during the transition in fuel composition. Thus, emissions were maintained and the tendency for detonating was reduced (refer to the average air/fuel ratio curve in the figure at the right). At the same time the AFM was adjusting air/fuel ratio, the DSM system was monitoring the combustion process to see if a change in ignition timing was required. In this test, even with proper air/fuel ratio control, the huge change in WKI necessitated a change in ignition timing. The DSM system retarded and advanced engine timing, via the CEC Ignition Module, to the optimum level. Power was maximized while maintaining detonation free combustion (see the average timing curve in the figure above). This is just one example of how the CEC family of products can enhance engine performance under even the most difficult operating conditions.



ABOVE: An example of system operation during significant changes in fuel consumption. In this test, the CEC family of products maintained peak engine performance under extreme conditions.

The CEC family forms a comprehensive engine management system that optimizes engine performance.

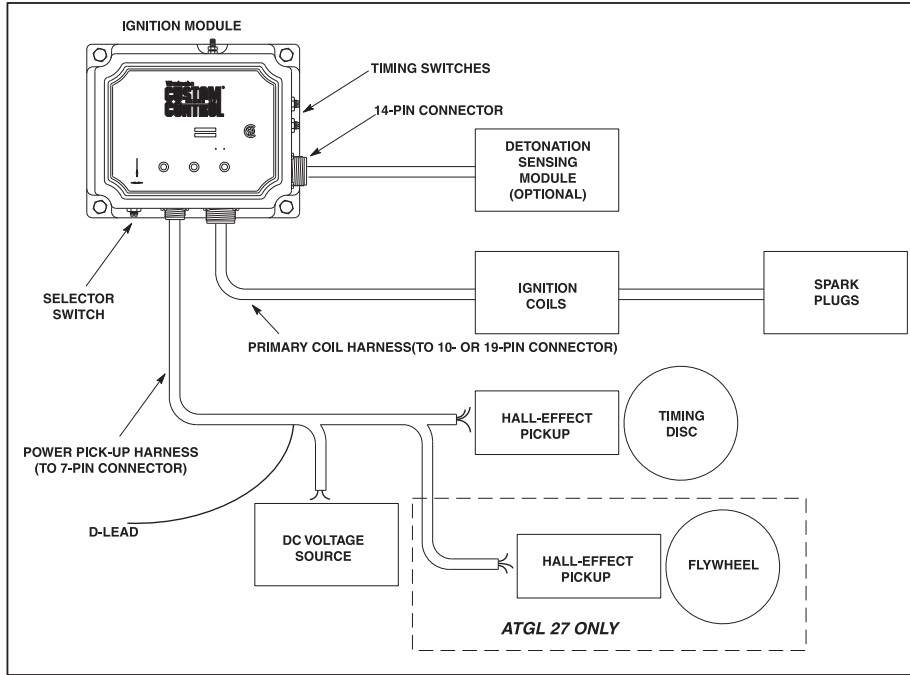


ABOVE: An example of a screen developed with data acquisition software which is used to display information and trend data on engine performance.

Data Acquisition Monitoring Capability

It is possible to acquire continuous streams of data about your engine's performance from the CEC product family using data acquisition software (provided by customer). The CEC data streams provide information such as knock sensor status, diagnostic codes, air/fuel ratio operating point, and individual cylinder timing. Through the use of a PC this information can be logged and used for system trending and analysis. The figure to the left is an example of a screen developed with data acquisition software which is used to display information and trend data on engine performance. The information format of the serial streams is available from Dresser Waukesha Application Engineering.

IGNITION MODULE (IM) SYSTEM LAYOUT



IGNITION MODULE MODEL ENGINE APPLICATIONS

Model 811	Model 1211	Model 1611
VHP 6 Cyl. Engines	VHP 12 Cyl. Engines	VHP 16 Cyl. Engines
VGf 6 and 8 Cyl. Engines	VGf 12 Cyl. Engines	VGf 16 Cyl. Engines
ATGL 8 Cyl. Engines	ATGL 12 Cyl. Engines	ATGL 16 Cyl. Engines

IGNITION MODULE SELECTOR SWITCH SETTINGS

Selector Switch Setting	Model 811 for 6 and 8 Cyl. Engines	Model 1211 for all 12 Cyl. Engines	Model 1611 for all 16 Cyl. Engines
A	VHP/VGf 6 Cyl. Engines	VHP/VGf 12 Cyl. Engines	VHP/VGf 16 Cyl. Engines
B	No Application	No Application	No Application
C	VHP/ATGL 8 Cyl. Engines	ATGL 12 Cyl. Engines	ATGL 16 Cyl. Engines

IGNITION MODULE SYSTEM POWER REQUIREMENTS

- Voltage.....24 VDC nominal
- Operating Range 10 - 32 VDC
- Ripple Peak-to-Peak.....less than 2 VAC
- Steady State Operation Current 2 amps average (up to 30 amp pulses)

OPERATOR INTERFACE

- Front Panel LED display.....(Power, Pickup, Application)

ENVIRONMENTAL

- Ambient Air Temp. Range -40° F (-40° C) to 150° F (66° C)
- Enclosure.....NEMA Type 4X Design
- Meets CSA Class I, Division 2, Group D, hazardous location requirements
- The use of a power supply with a battery will eliminate the possibility of engine shutdown if main utility power is lost

Consult your local Waukesha Distributor for system application assistance. The manufacturer reserves the right to change or modify without notice, the design or equipment specifications as herein set forth without incurring any obligation either with respect to equipment previously sold or in the process of construction except where otherwise specifically guaranteed by the manufacturer.

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