Engine Governing System

ICM200 Series Ignition Control Module

Governors America Corp.®

- Configurable Coil Current and Self-Calculating Dwell Times
- 12 and 24VDC Compatible
- Inductive Spark Coils
- Two Configurable Variable Timing Maps Based on Engine Speed and Load
- In-Field Timing Trim Adjustment with LED Indication
- Individual Cylinder Timing Trim
- Easy Configuration and Customization Using GAC SmartVU Software
- High Reliability

INTRODUCTION

The Ignition Control Module (ICM) 200-series is an intelligent electronic control module which is part of GAC's distributor-less ignition system. The ICM triggers an inductive coil by charging the coil with the appropriate amount of energy for high voltage induction into the engines' spark plugs.

The ICM200 uses either a camshaft position sensor or crankshaft position sensor to determine correct ignition timing. Using this engine position reference along with the Manifold Absolute Pressure (MAP) sensor to determine engine load, the ICM200 can accurately control spark timing for gaseous- fueled engines. The ICM200 also has the ability to automatically detect the dwell time for each coil and adjust the spark timing accordingly.

GAC's configuration software, SmartVU, available on *www.governors-america.com*, allows the user to set the overspeed limits, the number of cylinders, whether the system is a sequential or wasted-spark ignition type, and set up the various triggering arrangements with ease and repeatability.

In addition to these features, the ICM200 is ruggedly designed with a cast aluminum sealed case (rated to IP-67) to fit in a variety of engine environments. The ICM200 is designed to be highly reliable and includes protection against reverse battery voltage, transient voltages, short circuits and a loss of engine position input or battery supply.

DESCRIPTION

The ICM200 is designed for both 12 and 24 VDC applications and will operate ranging from 6.5 to 33 VDC. The ICM200 includes a low-side driver output capable of supporting up to 2A of continuous current which is used to control the ignition coil power relay. In the event of an overspeed condition, the ICM200 will remove power to this relay in order to shutdown the engine.

Since the ICM200 controls the inductive spark coils based on current, dwell time changes due to battery voltage levels are automatically compensated for. Although this compensation is provided, low voltage can occur during cranking

which may cause misfire. The ICM includes the ability to limit the maximum dwell time per coil as a safety precaution using GAC's SmartVU software.

The ICM200 engine position and speed reference come from either a camshaft position sensor which is reading a timing triggering wheel or a crankshaft position sensor and flywheel. These sensors can be of either the Hall Effect or variable reluctance variety. Depending on the triggering method desired and which sensor inputs are available, the ICM has the ability to support both sequential and wasted-spark ignition arrangements.

Wasted-spark ignitions fire each of the spark plugs twice per cycle; one on the compression stroke and the second is 'wasted' because it occurs during the exhaust cycle. Wasted spark ignitions have the advantage of simplifying triggering arrangements and are used with dual output coils which fire two cylinders simultaneously. Sequential spark ignitions fire each of the spark plugs once per cycle using single output coils.

If the wasted spark ignition configuration is desired, a crank shaft position signal is the only input required. For sequential ignitions, a camshaft position signal is required to give the 1st cylinder reference which can be the cylinder number + 1 type. Alternate triggering wheel configurations are available; contact GAC for assistance.

Governors America Corp., 720 Silver Street Agawam, MA 01001
phone: 413.786.5600 fax: 413.789.7736
www.governors-america.com
info@governors-america.com

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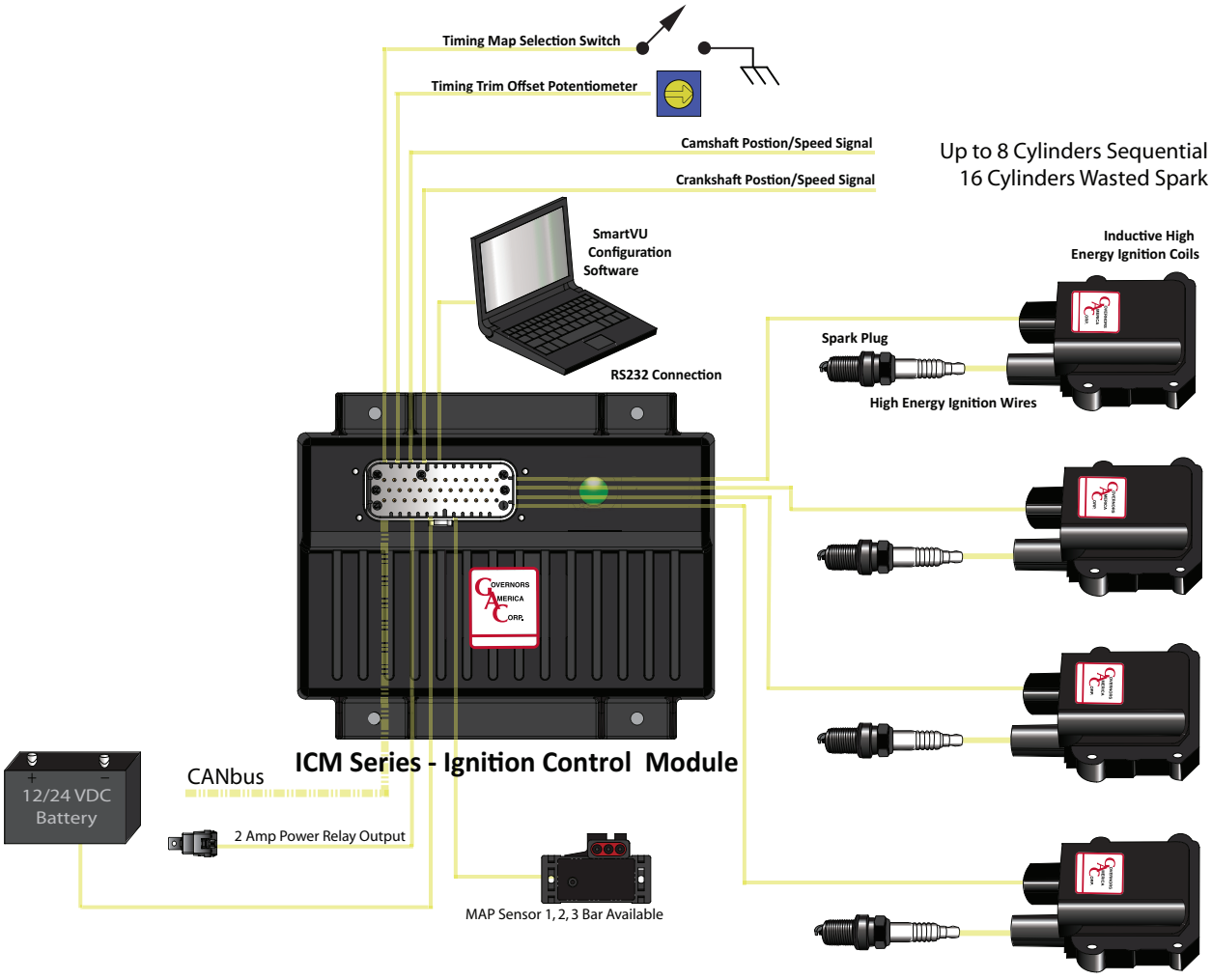
The ICM200 has standard fixed timing and offset angle parameters but also offers the ability of altering the timing infield after initial setup using a potentiometer. The adjustment globally advances or retards the timing for the engine to account for changing fuel qualities or other factors. SmartVU is used to enable the feature as well as define the timing trim window which has a maximum range of 10 degrees of either timing advance or retard. The current trim angle offset is indicated to the user by flashing the LED on the ICM. The LED will blink GREEN the number of degrees of advance, blink RED the number of degrees of retard, or remain a steady GREEN for a zero trim angle or if the trim function is disabled. If the overspeed limit is reached the LED will blink YELLOW.

The ICM also features the capability of offsetting the timing on individual cylinders, if needed. The variable timing maps provide ignition timing based on real-time engine load and speed conditions. The ICM can store two separate timing maps which are set up using GAC's SmartVU software. These maps are fully configurable for engine speed and manifold absolute pressure (which is an indication of engine load). The maps are selectable through a discrete input into the ICM. Applying ground to this input will select the 2nd timing map. If a global timing advance or retard is needed; the user can set the 2nd timing map identically to the 1st map with the desired offset angle.

DIAGRAM 1 SYSTEM WIRING / OUTLINE



SELECTION TABLE

	Maximum Number of Cylinders	
Model	Sequential	Wasted-Spark
ICM200-4	4	8
ICM200-6	6	12
ICM200-8	8	16

SPECIFICATIONS

PERFORMANCE

Steady State Accuracy…..…… ± 1° Crankshaft Angle

ENVIRONMENTAL

Temperature Range..... -40° to 125°C (-40° to +257°F)
Relative Humidity…….....……up to 95%

INPUT POWER

Power….....12-24 VDC Battery Systems (6.5 to 33 VDC) Nominal
Polarity.....Negative Ground (case isolated)
Reverse Voltage Protection.....Up to 600 VDC
Power Consumption.....100 mA max Continuous
Plus Ignition Coil Current
Engine Position Sensor Input.....Hall Effect or Variable Reluctance
Ignition Coil Current.....15 Amps Peak
Manifold Absolute Pressure/Timing Trim Pot. Input.....0-5 VDC

RELIABILITY

Vibration……10G@20-2000Hz
Functional Test (Full Verification).....100%

PARAMETERS

Offset Angle……..0-360° Crankshaft Angle
Timing Angle…….....……...0-360°
Number of Ignition Coils...……..……1-8 sequential, 2-16 wasted-spark
Maximum Dwell Time.....1-100 ms
Ignition Coil Current.....0-15 Amps
Overspeed.....0-5000 RPM
Timing Trim Adjustment.....-10° to 10°
Crank Trigger Wheel Setup.....40-1 & 60-2
Cam Trigger Wheel Setup.....#Cyl + 1, 24-1, or Single Tooth