

ENGINE GOVERNING SYSTEM

EDG5500 Electronic Digital Governor

With Quikset™ Display



- A Near Drop in Replacement of the ESD5500E
- Identical Mounting Hole Pattern to ESD5500E
- Simple LCD User Interface
- Fast Setup with 5 Push Buttons, no Potentiometers
- Lockable Display to Prevent Unauthorized Access
- 2 Fixed Speeds (Rated / Idle) and Variable Speed

- Selectable Isochronous or Droop Governing
- Adjustable Starting Fuel Strategy (Black Smoke Reduction)
- Speed Ramping (Idle to Rated, or, any Speed Setting Change)
- Overspeed Sensing
- Magnetic Pickup Speed Input
- Includes Standard GAC AUX Input for Synchronizing and Load Sharing

INTRODUCTION

GAC's EDG5500 digital governor is designed to regulate engine speed on diesel and gas reciprocating engines. The EDG system is a suitable replacement for any mechanical governor system that needs flexibility, precision, or control of governed speed. The EDG is an integral part of a closed loop speed control system. When connected to an electric actuator and supplied with a speed sensor signal, the governor will direct the fuel system to the desired engine speed setting. The EDG is designed for industrial engine applications from generator sets, mechanical drives to pumps, or compressors.

DESCRIPTION

The EDG uses an advanced microprocessor to support an enhanced PID control loop, user interface, and an optional J1939 CAN Bus interface. Being digital, the EDG governor is not subject to analog drift.

The EDG5500 is designed to be a compatible replacement for GAC's venerable ESD5500E. The EDG's terminal connections are virtually identical to the ESD. The mounting hole pattern and footprint is the same.

Just like the ESD5500, the EDG5500 is rugged enough to be placed in a control cabinet or engine mounted enclosure with other dedicated control equipment. If water, mist, or condensation may come in contact with the controller, it should be mounted vertically to avoid water damage.

The EDG5500 has a built in user interface (no configuration software required). The EDG5500 has three configuration menus; QuikSet, Special, and Advanced configuration menu. Parameters are displayed on an LCD. There are five buttons – 3 COLUMN select buttons, 1 UP ARROW, 1 DOWN ARROW.

The EDG5500 is designed to have the most frequently adjusted parameters on the main display. Selecting and modifying these parameters is performed using the patented Quikset method.

All of the Quikset parameters are on the LCD display in five rows with three parameters in each row. The active row is



indicated by the parameters in the row being displayed. To select next row, tap any COLUMN button. Continuously tapping a COLUMN button cycles through all the rows.

To view the value of a parameter in the current row, press and hold the COLUMN button under the parameter. To change the value of the parameter, while still holding the COLUMN button, tap the UP ARROW to increase the value, or tap the DOWN ARROW to decrease the value. Release the COLUMN button to return to the normal display. Holding down the UP or DOWN ARROW, while changing the value of a parameter, will scroll through the values.

The Special Menu is used to view and change lesser used parameters. These parameters include Variable Speed / Trim select, Soft Coupling (on / off), Lead (on / off), and Dither percent. This menu is entered and exited by simultaneously pressing and holding all three column keys. The values are changed by using the up and down arrows. The next parameter is selected by pressing any one of the column buttons.

While governing, the EDG5500 will display the current RPM and the percent of the throttle being applied. By default the



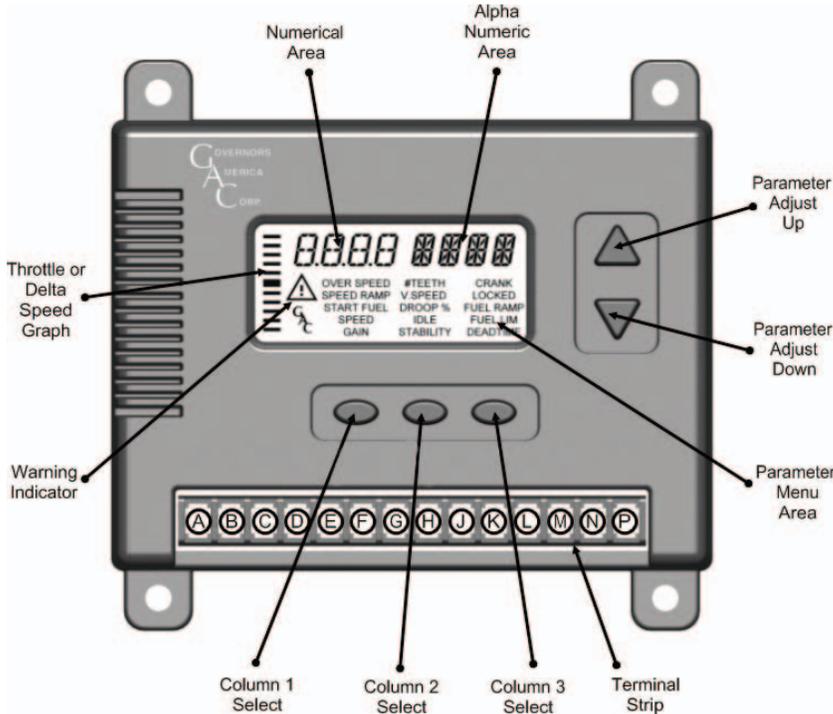
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RPM is displayed in the alpha numeric area, and the % throttle is on the bar graph. By pressing either the UP arrow or DOWN arrow, the user can change the alpha numeric area to display the numerical percent of throttle; the bar graph will then represent the difference between the actual RPM and the desired RPM. The EDG5500 provides switch inputs for Droop and Idle and a standard GAC accessory input for connecting to load shar-

ing / synchronizing controls, The EDG also has an analog input. With a 5K potentiometer, this input can be configured as a trim (percentage of speed) or as a variable speed input (speed range).

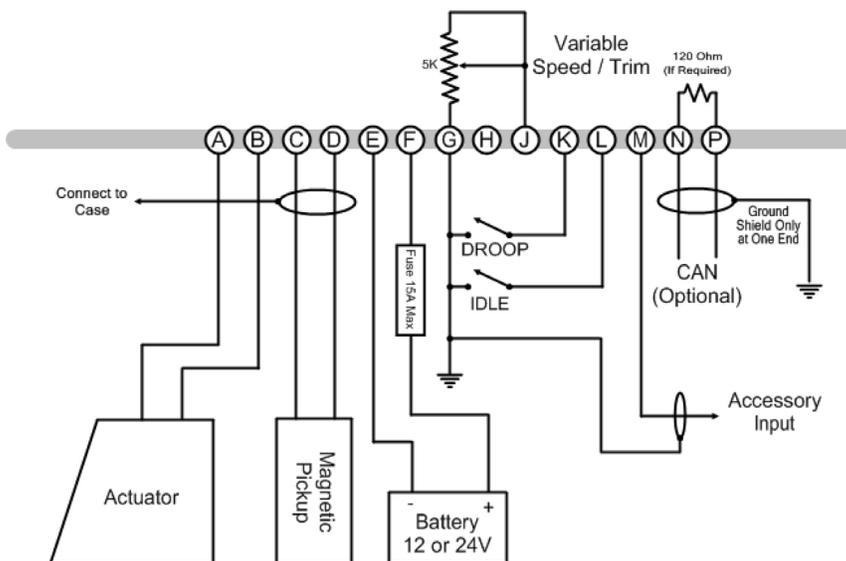
DIAGRAM 1 USER INTERFACE



Using the Keypad and LCD:

- The numerical area displays the value of a selected parameter or live running parameter. The alpha numeric area displays the units for the parameter (e.g., 1800 RPM).
- When running, the EDG will by default display the engine RPM in the alpha numeric area and the bar graph will represent throttle position. The EDG can alternatively display the throttle position, and show the difference between commanded RPM and actual RPM on the bar graph.
- To alternate between RPM and throttle position on display and bar graph, press either UP or DOWN.
- If the EDG display is locked, it can be unlocked by simultaneously pressing and holding the UP and DOWN buttons for 10 seconds. The LOCKED indicator will the turn off.

DIAGRAM 2 SYSTEM WIRING / OUTLINE



Terminal	Definition
A & B	Actuator (+ / -)
C & D	Magnetic Pickup (D is ground)
E & F	Battery Power (+ / +)
G	Ground Signal
H	Not Used
J	Variable Speed Input
K	Droop Select (closed to ground)
L	Idle Select (closed to ground)
M	Aux Input (load sharing/synchronizing, 5V nominal)
N & P	(Optional: CAN L & H)

CONFIGURABLE PARAMETERS for QUIKSET

Name	Definition	Valid Range & Default
OVERSPEED Over Speed: RPM at which to automatically shutoff the actuator Range: 500 RPM - 9999 Default: 2250	#TEETH Number of teeth on flywheel Range: 50-255 Default: 120	CRANK Crank termination: RPM at which EDG switches from starting to governing Range: 0-9999 RPM Default: 400
SPEED RAMP Speed Ramp: Rate throttle at which is ramped open during start Range: 0-9999 Default: 150	V.SPEED (See Note1) Variable Speed Control - Maximum speed change allowed from trim input 0 to 9999 RPM Default: 5	LOCKED Lock Configuration: Indicates whether EDG is to be locked when not in use Range: OFF, ON Default: OFF
START FUEL Starting Fuel: Percent of power to apply to actuator when crank starts Range: 0-100% Default: 65%	DROOP% Droop Percent: Droop to apply under maximum load (based on duty cycle of the actuator) Range: 0-25.0 (increments of 0.1) Default: 5.0	FUEL RAMP Percent per second to apply fuel as engine starts Range: 0-100% Default: 10%
SPEED (See Note1) Fixed speed of engine, expressed in RPM Range: 0-9999 Default: 1800	IDLE Speed (in RPM) of engine when IDLE input is closed Range: 0-9999 Default: 1000	FUEL LIM Fuel Limit: Maximum actuator percentage allowed Range: 0-100% Default: 99%
GAIN Proportional (P) set point of the PID control Range: 0-100, 100=Max Gain Default: 30	STABILITY Integral (I) set point of the PID control Range: 0-100, 100= Fastest Response Default: 25	DEADTIME Derivative (D) set point of the PID control Range: 0-100 Default: 5

Note 1: In Trim Mode, V.SPEED represents the RPM TRIM of the SPEED parameter dictated by the limits of the potentiometer input. For example, if VSPD is OFF, with SPEED set to 1500 RPM and V.SPEED set to 5 RPM, then the lower end of the pot will set the requested speed to 1495 RPM and the upper end will set it to 1505 RPM. (Based on a 5k potentiometer).

In Variable Speed Mode, V.SPEED represents the maximum speed and SPEED parameter represents the minimum speed. For example, VSPD is ON, and SPEED is set to 1000 and V.SPEED set to 2000, then the lower end of the pot is set to 1000 and the upper end is set to 2000. The center of the pot is 1500 (assuming linear taper).

SPECIFICATIONS

PERFORMANCE

Isochronous Operation.....±0.25%
 Speed Range/ Governor.....400- 10 KHz
 (200-500RPM w/ 120 tooth flywheel) continuous*
 Idle Adjust.....Full Range
 Droop Range.....1 - 5% regulation**
 Speed Trim.....Programmable 0-100%, (default = 5%)

ENVIRONMENTAL

Ambient Temperature.....-40° to 85°C (-40 to +180°F)
 Relative Humidity.....up to 95%
 All Surface Finishes.....Fungus Proof and Corrosion Resistant
 CE Rated.....EN55011, EN50081-2, EN50082-2

COMPLIANCE / STANDARDS

Agency.....CE and RoHS Requirements
 Communications.....SAE J1939 (Option)

INPUT/OUTPUT

Supply.....12-24 VDC Battery Systems (6.5 to 33 VDC)***
 Polarity.....Negative Ground (Case Isolated)
 Power Consumption.....70mA max. continuous plus actuator current
 Speed Sensor Signal.....0.5-120 VRMS
 Actuator Current @ 77°F (25°C).....10 Amps Continuous****
 Load Share / Synchronizer Input...0-10VDC (5V nominal, reversed, 100Hz/V)
 Reverse Power Protection.....Yes
 Transient Voltage Protection.....60V

RELIABILITY

Vibration.....7G, 20-100 Hz
 Shock.....20G Peak
 Testing.....100% Functional Testing

PHYSICAL

Dimension.....See Outline (DIAGRAM 2)
 Weight.....1.8 lbs. (820 grams)
 Mounting.....Any position, Vertical Preferred

*Though governing speeds are entered into the EDG in RPM, it is operating range is specified in flywheel frequency. This is because RPM is dependent on the number of teeth specified on the flywheel (# TEETH parameter). For example, iso-chronous governing at 1,800 RPM with # TEETH set to 150, the EDG will govern at 4,500 Hz. If variable speed operation is used and the desired operating range is 1,000 to 2,000 RPM, and # TEETH is set to 150, the EDG will govern between 2,500-5,000 Hz.

**Droop is based on a speed sensor frequency of 4000 Hz, and an actuator current change no load to full load. Applications with more actuator current change will experience higher percentages of droop. See droop description for specific details on operation of droop ranges. When used with the ADC100 actuator the droop percentage will be less due to the actuators low current consumption.

***Protected against reverse voltage by a series diode. A 15 amp fuse must be installed in the positive battery lead.

****Protected against short circuit to actuator (shuts off current to actuator), unit must have a power down reset to resume operation after the short is cleared.

This document is subject to change without notice.

Caution: None of GAC products are flight certified controls including this item.