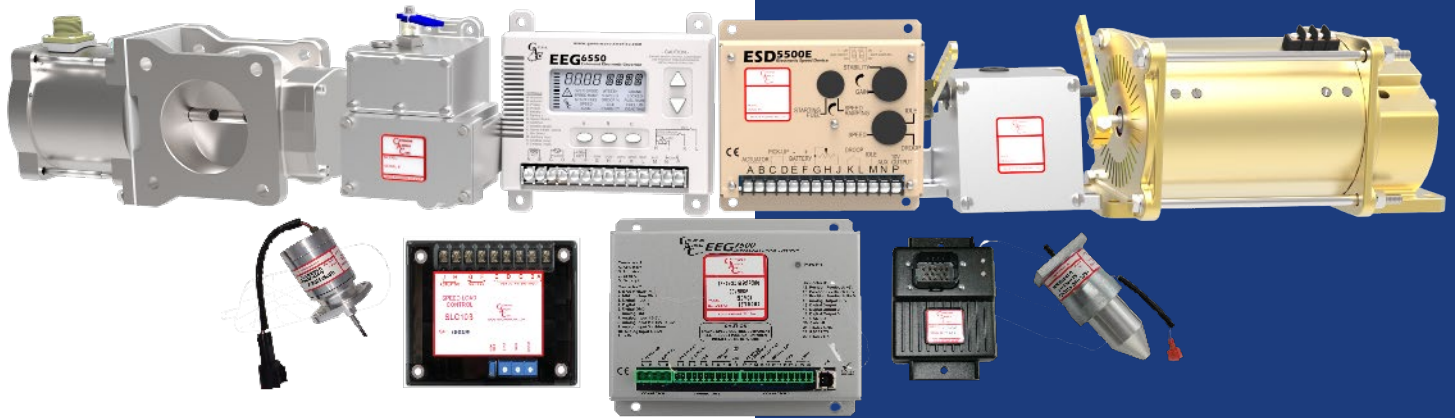


# GAC PRODUCT APPLICATION GUIDE



Governors America Corp.  
720 Silver Street, Agawam, MA 01001

(P) 413-233-1888 • (F) 413-789-7736  
governors-america.com  
GAC@governors-america.com

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## OVERVIEW

### ABOUT THIS GUIDE

This guide is divided by engine manufacturer and then engine and include simple descriptions of solutions GAC has provided. The back of this guide details the cross-reference list of GAC products that either directly replace or can be used to replace original manufacturer equipment or other similar equipment.

### ABOUT INLINE DIESEL FUEL INJECTION PUMPS

The basic types of mechanical governors used are min-max or variable speed controllers.

**Min-Max Governors** have mechanical limits and only govern the maximum speed and low idle speed.

**Variable Speed Controllers** control the engine speed at all times. (All speed controllers)

These mechanical governors are replaced with electro-magnetic proportional pump-mounted GAC Actuator.

GAC Actuator	Recommended GAC Speed Controller
175 Series	ESD5500E, 5500-II, 5511, 5550, or 2401
275 Series	ESD2210, 5500E, 5500-II, 5111, or 5550
295 Series	ESD5330, 5340, or 5500E

### Rotary Fuel Pumps

#### *Stanadyne Fuel Pumps*

Three types of mechanical governors are used with Stanadyne fuel pumps, 3 to 5% droop Speed Controller for generator set application and all-speed governors on agricultural / industrial engines. Min-max Speed Controller are used on automotive applications.

The 100 Series GAC Actuator mounts directly onto the Stanadyne D Series Pump, no external mounting brackets or linkage is required.

GAC Actuator	Recommended GAC Governor
100 Series	ECC328, ESD2402, 5520, 5120, 5500-II, 5570, 2244-12/24

Note: The 100 Series GAC Actuator include Packard connectors.

#### *Delphi DPG Fuel Pump*

Delphi DPG fuel pumps have all speed mechanical governors. These are replaced by electric 103 Series GAC Actuator. The 103 Series are mounted directly onto the fuel pumps.

GAC Actuator	Recommended GAC Speed Controller
103 Series	ECC328, ESD2402, 5520, 5120, 5500-II, 5570, 2244-12/24

### Engine Mounted Fuel Pumps

GAC engine mounted Actuator are designed for high temperature applications.

GAC Actuator	Recommended GAC Speed Controller
110 Series *	ECC328, ESD2244, 2402, 5120, 5520, 5570, 5500-II
180 Series**	ESD5500E, 5111, 5500-II, 5550
ALR Series	ECC328, ESD2402, 5520, 5120, 5500-II, 5570, 2244 &...

\* Deutz 1011

\*\* Deutz 1012/1013 & 2012, and Volvo 520/720

## GAC GOVERNOR BASIC TERMS

Number of Teeth: Used to determine RPM and/or control frequency through the magnetic speed sensor (MSP) on Flywheel Ring Gear Teeth.

$$\text{Frequency} * 60 / \# \text{ of teeth} = \text{RPM}$$

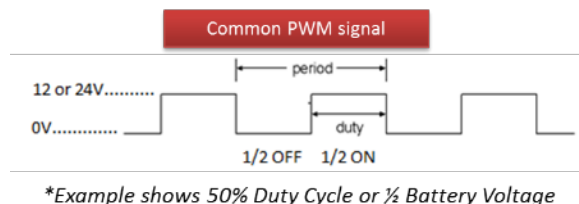
Rated Speed: The operating speed of the engine.

Variable Speed: Applications that operate over a range of speeds. RPM can be set externally with

either a resistive (potentiometer) or voltage input.

**Crank Termination RPM:** The speed at which the Speed Controller begins to regulate speed.

**Pulse-Width Modulation (PWM):** Equates to a percentage of battery output supplied to the actuator.



**Overspeed:** Safety parameter to turn off fuel to the engine if it reaches the defined over-speed setting.

**Light Force:** Speed Controller specifically designed for low current, less than 2.5 amps, fast responding, small Actuator. These governors are designed with a specific PID range, so the Actuator are precisely tuned under all speed and load conditions.

**Reverse Acting:** Reverse acting governors react the opposite of traditional governors by reducing actuator duty cycle to increase engine speed and increase duty cycle to bring the engine to minimum fuel.

**Electronic Fuel Control (EFC):** Cummins PT fuel system where actuator/valve assemblies have been optimized to work with the existing Cummins fuel system.

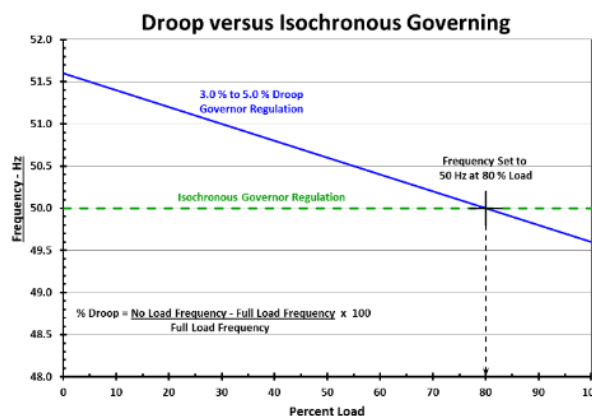
## GAC GOVERNOR FEATURES

**Fuel Ramp:** The fuel ramp rate between the start fuel parameter and the rated speed.

**Isochronous:** Fixed speed control not load dependent.

**Droop:** governs with a decrease in speed as load increases. Without droop, the engine could be unstable. GAC governors have the option to simulate droop with dedicated input and adjustment.

- **Droop %:** This sets the speed decrease based on a percentage of rated speed at full engine load.
- **Droop Switch:** External Droop enable switch is on or off.



**PID:** Control loop with Proportional (P), Integral (I), and Derivative (D) terms. Measures and minimizes the error between the desired and actual speed.

**Gain (P):** Initial response of the control to changes in load or speed.

**Stability (I):** Response of the control to reach steady state also used to avoid periodic variations in speed.

**Dead Time (D):** Changes the transient response of the engine and affects the stability during transient load changes.

**Starting Fuel:** Starting fuel position sets the needed amount of fuel to start the engine easily without black exhaust smoke.

**Speed Ramp:** An adjustment to optimize the rate of acceleration and avoid RPM overshoot.

**Idle:** Speed the engine will run at if the idle select input is activated.

AUX Input: A 0-10 V reverse polarity signal used for load sharing and synchronizing multiple generators.

Speed Trim Control: The ability to use a potentiometer to vary the engine speed remotely.

Speed Switches: Relay contacts that are set to switch state at a set speed. Typically come in single, dual and/or triple element speed switches.

Soft Coupling: Averages out the engine noise/instabilities and gives better steady-state performance using a steady speed reference for the PID routine. Activating the soft coupling feature eliminates the effects of drive train resonance.

Lead Circuit: Speed anticipation which enables the Speed Controller to be more responsive and allows higher gain. This provides more active control and improves the performance of slower engines.

Dual Gain: Independent gain adjustments for idle and rated speeds.

Dead Time Compensation (DTC): GAC Speed Controllers have the ability to set various levels of DTC. Digital Speed Controller have the ability to set a full range of dead-time values based on engine speed and load.

Multi PID: Feature for digital Speed Controller allowing independent PID values to be set throughout the speed and load range.

Fuel Limit: Limit the actuator position based on speed or load.

Dither: Speed Controller commands a small variation to the actuator output to keep it constantly moving back and forth to overcome

mechanical friction points at fuel systems or throttle body butterfly.

Temperature Compensated: Internal component to eliminate drift due to extreme temperature swings.

Foot Petal: Foot pedal input controls mobile equipment engine over a wide range of operating speeds, used with ESD2300 Series controllers.



# ARROW

ENGINE MODEL	ACTUATOR	SPEED CONTROLLER	MSP	ACCESSORIES
A32 and A42	<a href="#">ATB T2 45</a>	<a href="#">ESD2401</a>		
A54	<a href="#">ATB T2 45</a>	<a href="#">ESD2401</a>		
A90	<a href="#">ATB T2 45</a>	ESD5131		

GAC APPLICATION NOTE

**A-32, A-42, and A-62 GENERATOR**

<b>Customer / OEM:</b>	<b>Arrow Engine Company</b>
<b>Application(s):</b>	Generator
<b>Engine Make / Model:</b>	A-32 3.2L A-42 4.2L A-62 6.2 L
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	A-32 1000-1200 RPM; 3 cylinder A-42 1000-1800 RPM; 4 cylinder A-62 1000-1800 RPM; 6 cylinder
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ATB T2 Series Integral Throttle Body Actuator with optional position feedback sensor.</li><li>• Speed Controller: ESD2401</li></ul>

**Summary** Arrow engines, building natural gas engine solutions, have used GAC products for over 30 years to control the flow of fuel, working in tandem with the carburetor. GAC ESD2401 speed control unit, located in an enclosed box on the side of the flywheel housing, makes it easy to update if required.

**ARROW A-42 ENGINE WITH ATB T2**





## GAC APPLICATION NOTE

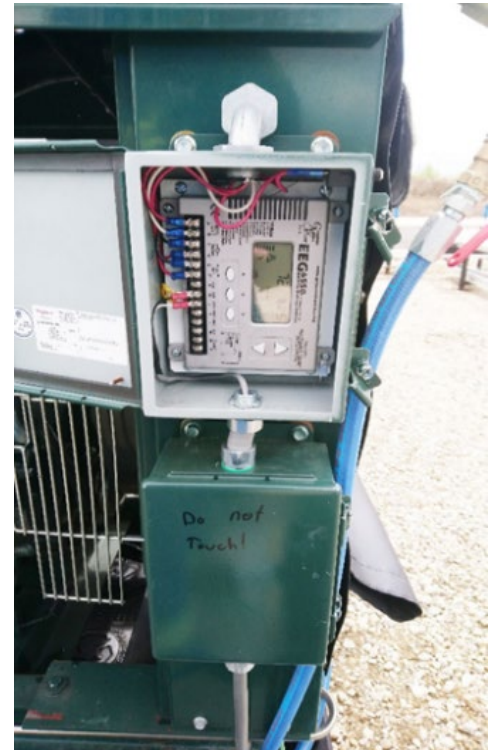
### **A-54 GENERATOR ENGINE**

<b>Customer / OEM:</b>	<b>The Governor Shop</b>
<b>Application(s):</b>	Generator
<b>Engine Make</b>	Arrow A-54
<b>Equipment Make / Model:</b>	Oil Field
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	A-54 1000-1800 RPM; 6 cylinder
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ATB T2 Series Integral Throttle Body Actuator 45 mm with optional position feedback sensor.</li> <li>• Speed Controller: EEG6550</li> </ul>
<b>Summary</b>	The Governor Shop in Canada modified an Arrow A54 to a gaseous generator using a GAC ATB T2 in an oil field. The engines use a process input (4-20 mA) from a Lufkin panel controlled by a GAC EEG6550.

### **COMPLETED PUMP WITH ATB T2**



### **EEG6550**





GAC APPLICATION NOTE

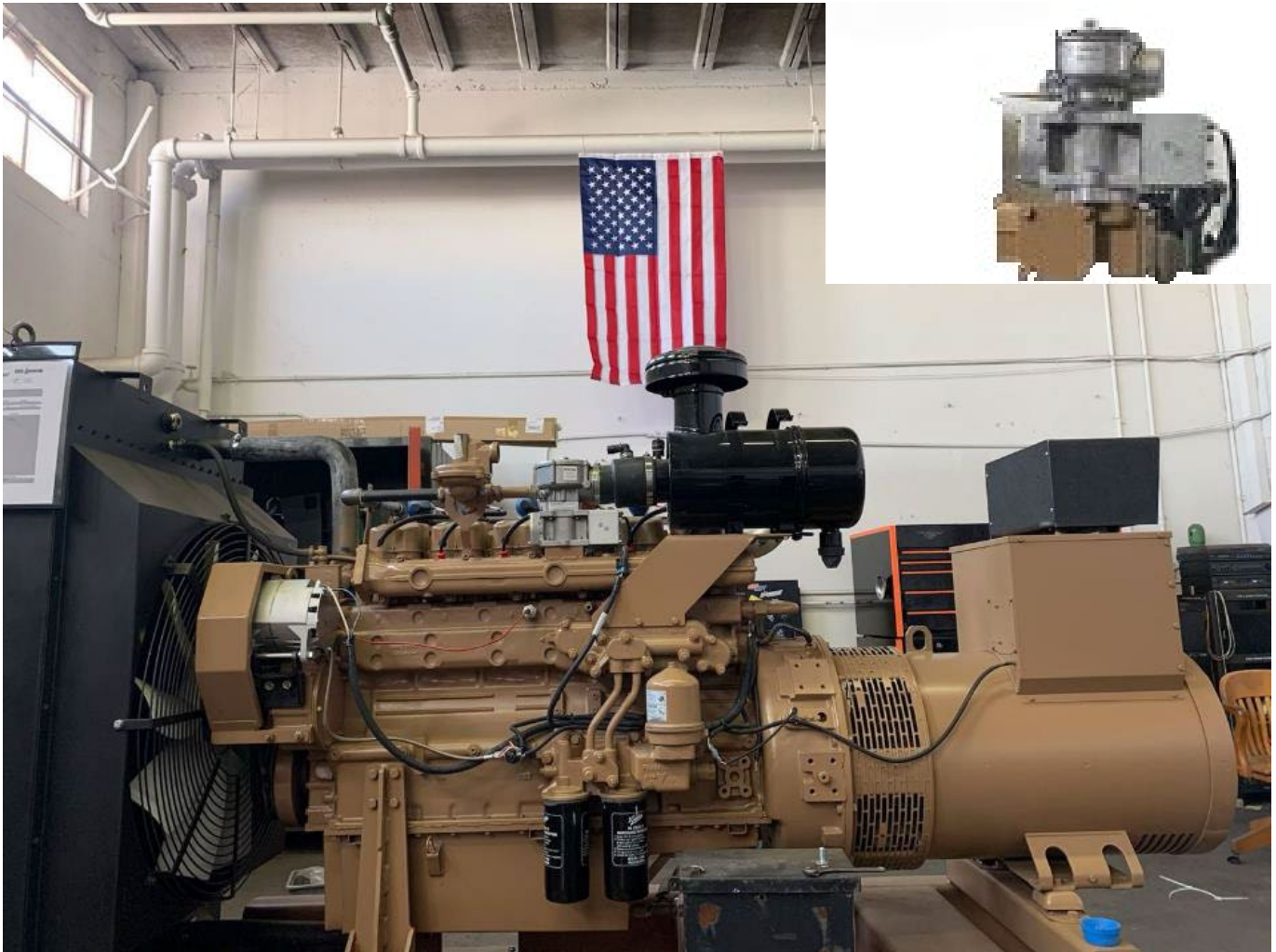
**A-90 GENERATOR ENGINES**

**Customer / OEM:** SES ARROW  
**Application(s):** Custom Generators  
**Engine Make / Model :** Arrow A-90 1000-1800 RPM; 6 cylinder  
**Equipment Make / Model:** 25KW  
**Fuel System Type & Make / Model:** Natural Gas  
**Battery Voltage:** 12 or 24 V DC  
**Installed Products:**

- Actuator: ATB T2 Series Integral Throttle Body Actuator (45 mm)
- Speed Controller: ESD5131

**Summary** SES Arrow Generator builds custom generators for Oil and Gas. This 25KW unit uses a GAC throttle body controlled with the GAC ESD5131 speed controller.

**ARROW A-90 WITH ATB**



## BEML

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
BSA6D170	<a href="#">ACE275K</a>	ESD5403		

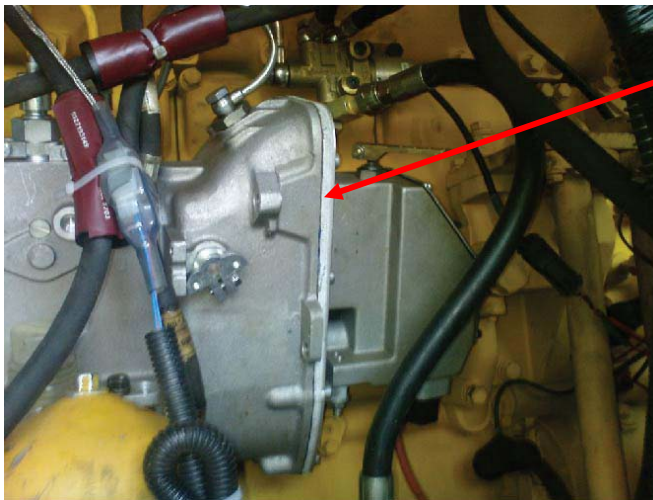
## GAC APPLICATION NOTE

### **BSA6D170 INDUSTRIAL ENGINE**

<b>Customer / OEM:</b>	BEML Limited
<b>Application(s):</b>	50 Ton Dump Truck
<b>Engine Make / Model:</b>	BSA6D170, 6 cylinder, 23.1L (Komatsu License)
<b>Equipment Make / Model:</b>	50-Ton Dumper Truck
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, ZEXEL Inline Fuel Pump
<b>Operating Speed(s):</b>	535 kW, 2100 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACE275K</li> <li>• Speed Controller: ESD5403</li> <li>• Magnetic Speed Pickup</li> </ul>

**Summary:** Conversion from mechanical to an electronic control system was performed by BEML under direction from The Indian Ministry of Defense to save fuel, improve drivability and performance. The ACE275K was selected for its heavy-duty bearings and position feedback sensor that work with the ESD5403 to achieve fuel limiting for mobile equipment.

### **50-TON DUMPER TRUCK**



**ACE275K**

## CATERPILLAR

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
3054	<a href="#">ADC100-24</a>	<a href="#">ESD5111</a> or <a href="#">ECC328-24</a>		
<a href="#">3304 and 3306</a>	<a href="#">ADD225GSC-24</a>	<a href="#">ESD5500E</a>		
3406	<a href="#">ADD225GSC-24</a>	<a href="#">ESD5500E</a>		<a href="#">KT230</a>
3406	<a href="#">ATB652T2N</a>	<a href="#">ESD5526</a>		EAM121
3408	<a href="#">ACB2001</a>			
<a href="#">3408 with Natural Gas</a>		<a href="#">ESD5330</a>		<a href="#">ICM200-4</a> <a href="#">CL602</a> <a href="#">SPW100</a>
3412		<a href="#">ESD5111</a> <a href="#">ESD5500E</a> <a href="#">ESD5550</a>		
3512 and 3516	<a href="#">ACB2001</a>	<a href="#">ESD5330</a>		
CAT engines with Delphi DPA/DPD	<a href="#">ADD103B-12/24</a>			
<a href="#">3516 Tugboat</a>	<a href="#">ABC2001</a>	<a href="#">ESD5330</a>		
CATERPILLAR 3408	ADB225	ESD2244		

GAC APPLICATION NOTE (all of the components specified are sold separately)

## C2.2 ENGINE

**Customer / OEM:**

**Applications:**

**Engine Make, Model:**

**Fuel System:**

**Operating Speed(S):**

**Battery Voltage:**

**Installed or Recommended**

**Products:**

**Caterpillar**

Water Pump Drives, Power Generation

Caterpillar C2.2 Engine

2.2L, 41.6 – 66.1 BHP

Indirect fuel injection, Bosch PF Pump

Idle to 3200 rpm

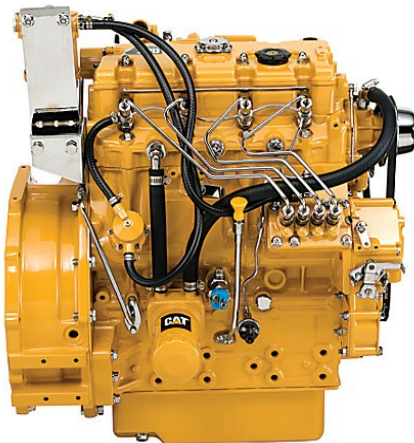
12 or 24 V DC

- Actuator: ALR190-P04-12 / 24 (pull type)
- Speed Controller: EEG6550
- Magnetic Speed Pickups (2): MSP6741

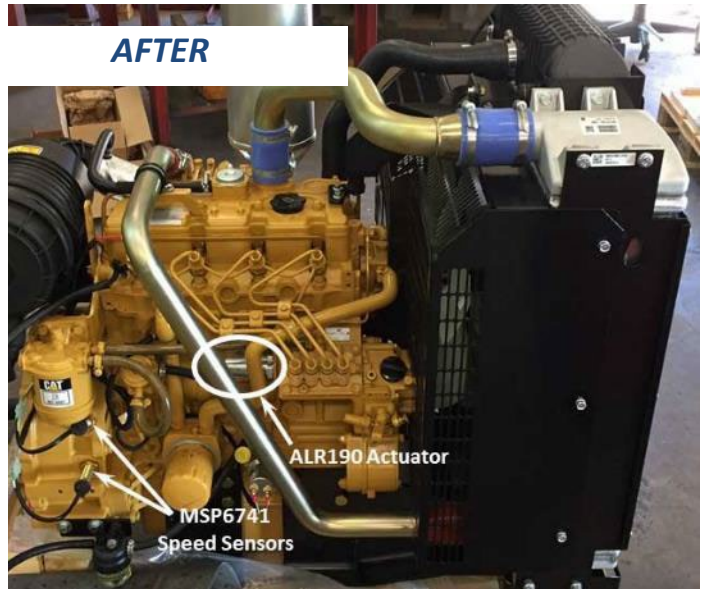
**Summary:** ALR190 Series Actuator and EEG6550 Speed Control provides a complete Electronic Governing System for a Caterpillar C2.2 engine. The EEG6550 digital governor was selected for having the most applicable combination of features. The speed ramping control significantly reduces visible exhaust smoke as the engine is accelerated under load. The Light Force governor feature scales the PID governor range of adjustment for these small, low current, actuators providing the best resolution for ease of tuning these governor response parameters.

### CATERPILLAR C2.2 ENGINE BEFORE AND AFTER GAC ELECTRONIC GOVERNING SYSTEM

**BEFORE**



**AFTER**





## GAC APPLICATION NOTE

### **C0.5 ENGINE**

**Customer / OEM:**

**Applications:**

**Engine Make, Model:**

**Fuel System:**

**Operating Speed(S):**

**Installed Products:**

**Remote Energy**

Power Generation for Battery Top Off

Caterpillar C0.5

11-13.7 HP

U.S. EPA Tier 4 Final, EU Stage V

Indirect Fuel Injection

Naturally Aspirated

22 lb-ft @ 2600 rpm

- Speed Controller: EEG7000

**Summary:** The HPE Mining Series is a 4kw 48V DC generator used for precision lithium battery charging. “We convert the mechanical control of the engine to electronic utilizing the EEG7000 controller and a custom-built actuator to manage the speed of the engine which includes a warm up phase before load is applied then to main RPM, which controls voltage to charge the batteries. We maintain voltage to 0.1 volts which is very precise.”

### **CATERPILLAR C0.5 AS HPE MINING SERIES BATTERY GENERATION SUPPORT**



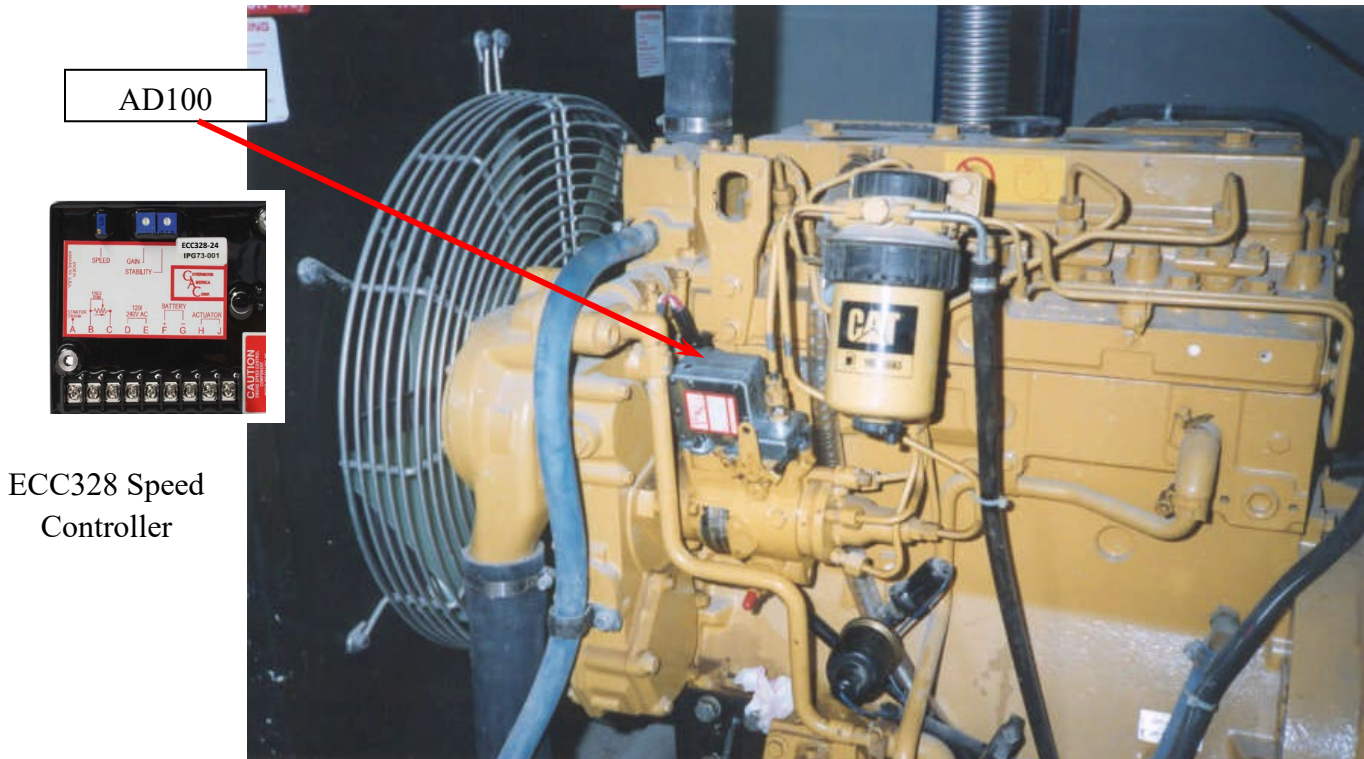
## GAC APPLICATION NOTE

### **3054 GEN SET ENGINE**

<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(s):</b>	Gen-Set
<b>Engine Make / Model:</b>	3054, 4.4L Naturally Aspirated Inline 4 Cylinder
<b>Fuel System Type &amp; Make / Model:</b>	Stanadyne Rotary Pump, Diesel
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC100</li> <li>• Speed Controller: ECC328</li> <li>• Magnetic Speed Pickup: No MSP required</li> </ul>

**Summary:** GAC Actuator ADC100–12/24 is designed to replace the pump’s governor cover and acts directly on the mechanical governor linkage arm. There are several light force speed control options available: the ECC328 Speed Controller with the input from the gen-set’s electrical frequency, a magnetic pickup is not required with this controller.

### **ADC100-24 INSTALLED ON CATERPILLAR 3054 GEN-SET ENGINE**

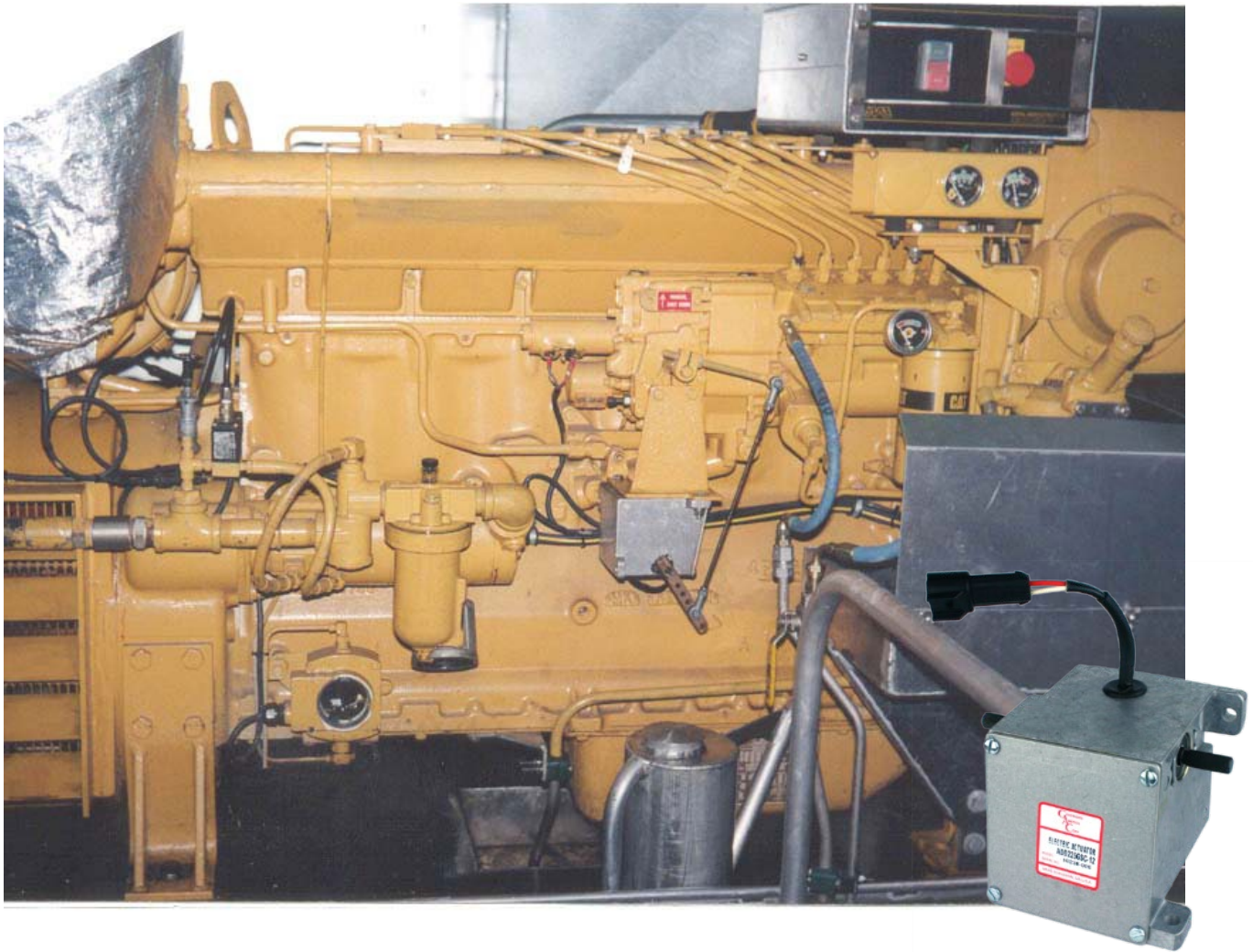


GAC APPLICATION NOTE

## 3304 and 3306 INDUSTRIAL ENGINES

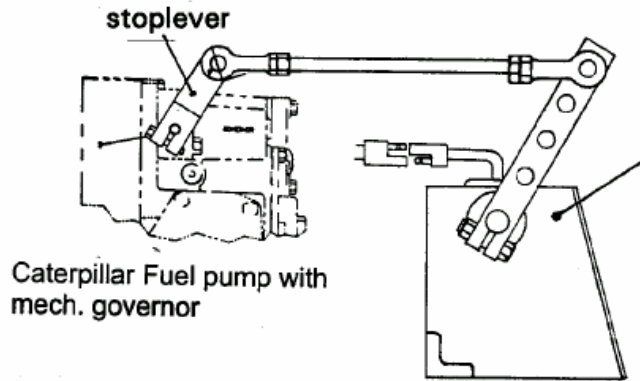
<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	3304, 3306 Engines
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	218 HP @ 2000 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed / Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225GSC-24 w/ Packard Connector, or ADC225GS-24 w/ Commercial Connector</li><li>• Controller: ESD5500E</li></ul>

### COMPLETED INSTALLATION



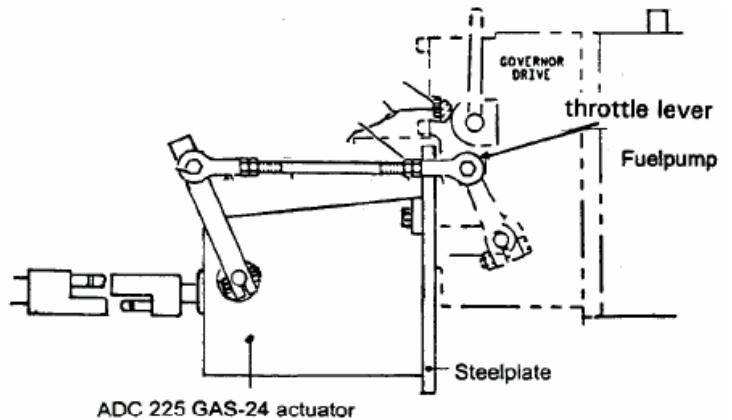


## ENGINES WITH CATERPILLARS OWN MECHANICAL GOVERNOR



GAC actuator ADD225GSC-24 is installed on a solid bracket near the mechanical governor and linked to the stop lever. The throttle lever must be blocked in a forward position, resulting in a speed that is 200 - 300 RPM **above** the nominal operating speed.

## ENGINES WITH EXTERNALLY FITTED WOODWARD PSG HYDRAULIC GOVERNOR



The PSG hydraulic governor must be removed. A steel plate must cover up the PSG drive hole. The GAC ADD225GSC-24 actuator lever is linked to the throttle lever.

GAC APPLICATION NOTE (all of the components specified are sold separately)

## **G3406 NATURAL GAS ENGINE UPGRADE**

<b>Customer / OEM:</b>	Caterpillar
<b>Application(s):</b>	Industrial Natural Gas Engine
<b>Engine Make / Model:</b>	14.64L, 6 cylinder
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	Idle to 3600 rpm
<b>Battery Voltage:</b>	12/24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ATB652T2N-24</li> <li>• Speed Control: ESD5526</li> <li>• Interface Module: EAM121</li> </ul>

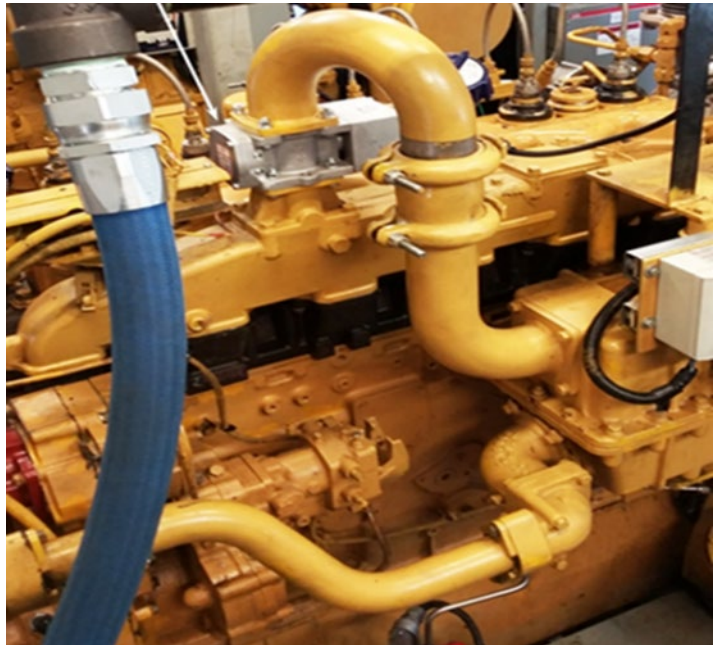
**Summary:** The Governor Shop of Canada upgraded a 14.64L, 6-cylinder Caterpillar G3406 engine to a GAC control system, noting its ease of installation and superior performance. The EAM121 allows transparent compatibility with the existing controller.

### **BEFORE AND AFTER NATURAL GAS CONVERSION OF G3406 ENGINE**

**BEFORE**



**AFTER**



ESD5526E with ANTI-WINDUP  
SPECIFICALLY DESIGNED FOR GASEOUS  
FUEL ENGINE CONTROL



ATB652T2N-24



EAM211 INTERFACE MODULE

GAC APPLICATION NOTE (all of the components specified are sold separately)

## 3406 INDUSTRIAL ENGINE

<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(S):</b>	Industrial, Generator
<b>Engine Make, Model:</b>	Caterpillar 3406, Inline 6 cylinder, 14.64 L
<b>Fuel System Type &amp; Make, Model:</b>	Diesel
<b>Operating Speed(S):</b>	472 HP @ 2100 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: 225 Series: ADC225GS-24</li><li>• Speed Controller: ESD5111, ESD5500E, or EEG6500</li><li>• Magnetic Speed Pickup: MSP6720</li><li>• Installation Kit: KT230</li><li>• 5K Potentiometer (optional): TP501</li></ul>
<b>Summary:</b>	Complete electronic governor replacement of an existing Caterpillar governor without removing the fuel pump. The KT230 provides the necessary bracket and hardware to install the GAC 225 series actuator. The ESD5111, ESD5500E, or EEG6500 speed control units provide precise control adjustments. <a href="#">Complete instructions are available on the GAC website.</a>

### GAC 225 SERIES ON CAT 3406





GAC APPLICATION NOTE

**3408 NATURAL GAS GENERATOR**

<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(s):</b>	Generator
<b>Engine Make / Model ::</b>	CAT 3408, 18 L, V-8, 136 flywheel teeth
<b>Fuel System Type:</b>	Natural Gas
<b>Operating Speed(s):</b>	1500 RPM, 1800 RPM, or variable
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB2001</li><li>• Speed Controller : ESD5330</li><li>• Ignition Control Module: ICM200-4</li><li>• Ignition Coils: CL600 for 24 V DC or CL601 for wasted spark</li><li>• Spark Plug Wires: SPW100</li><li>• Spark Plugs: SPG100-002 (Iridium Tip, Turbo Applications)</li></ul>

**Summary:** Application with GAC Ignition System running in wasted spark i.e. crankshaft triggering.

**CAT 3408 WITH GAC IGNITION SYSTEM AND ACB2001**



GAC APPLICATION NOTE (all of the components specified are sold separately)

## 3408 GOVERNOR REPLACEMENT

**Customer / OEM:** Fishing Vessel  
**Application(s):** Marine  
**Engine Make / Model:** CAT3408  
**Battery Voltage:** 12 or 24V  
**Recommended Products:**

- Actuator: ADB225
- Speed Controller: ESD2244-24
- Magnetic Speed Pickup: MSP6723C

**Summary:** A fishing vessel needed a cost-effective replacement to their aging Woodward PSG but a one-for-one replacement was expensive and installation time consuming. Instead they chose GAC's external mount ADB225 and the ESD2244-24, saving both downtime and money.

**ESD2244-24**



**ADB225**

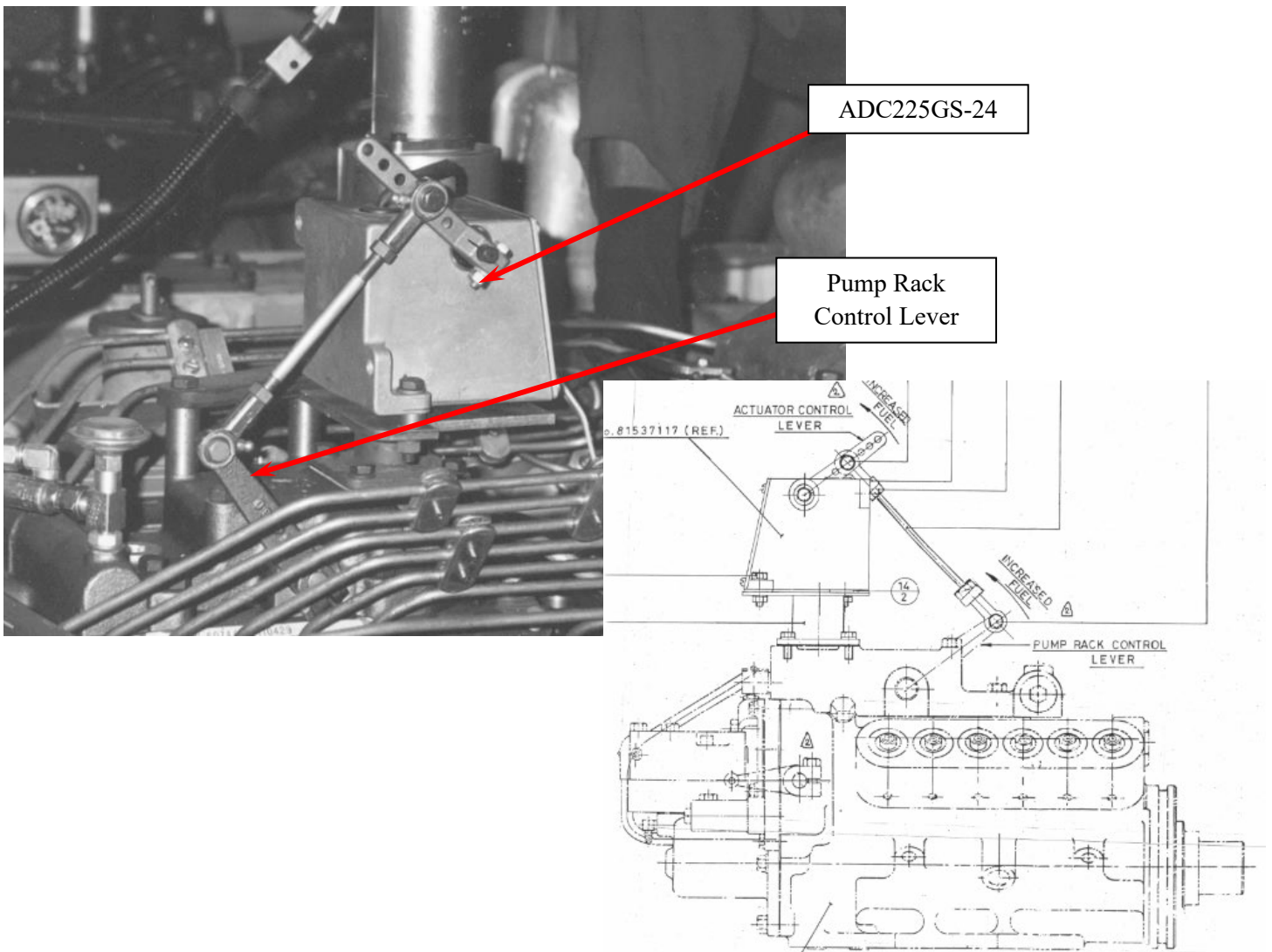


## GAC APPLICATION NOTE

### **3412 ENGINE**

<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model:</b>	Caterpillar 3412, 27.02 L, V12
<b>Fuel System Type &amp; Make / Model:</b>	Caterpillar Mechanical Governor, Diesel
<b>Operating Speed(s):</b>	1500/1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC225GS-24 (with lesser rate return spring)</li> <li>• Speed Controller: ESD5111, ESD5500E w/ start fuel and speed ramping adjustments, or ESD5550 w/ over-speed switch</li> </ul>
<b>Summary:</b>	This solution replaces a PSG governor assembly only. The pump rack control lever is required for this solution. The mechanical Caterpillar Governor is not replaced.

### **ADC225GS-24 INSTALLED ON CATERPILLAR 3412 ENGINE**



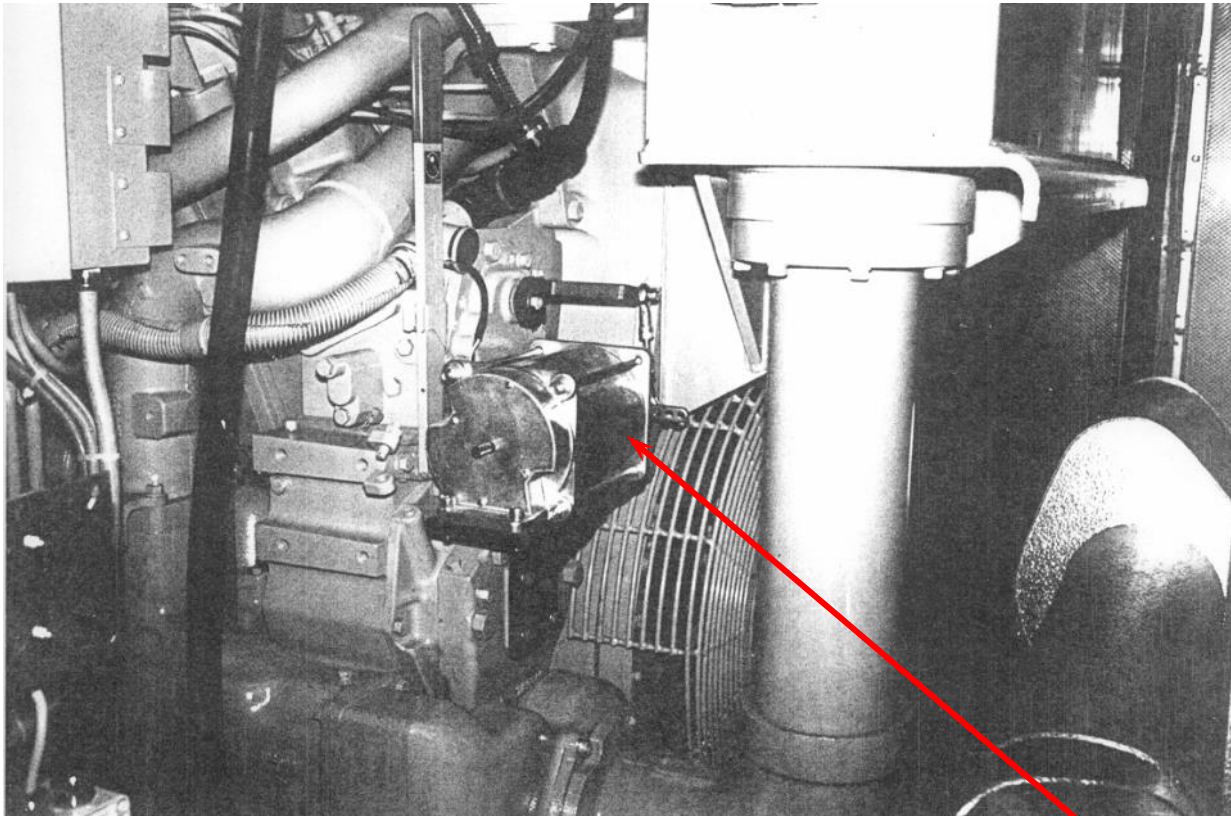


GAC APPLICATION NOTE

**3512 and 3516 ENGINES**

<b>Customer / OEM:</b>	CATERPILLAR
<b>Application(s):</b>	Industrial
<b>Engine Make / Model:</b>	Caterpillar 3512, 51.8L V-12, and 3516, 69L V-16 Engines
<b>Fuel System Type &amp; Make / Model:</b>	Caterpillar Mechanical Governor, Diesel
<b>Operating Speed(s):</b>	Multiple
<b>Battery Voltage:</b>	24 V
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB2001</li><li>• Speed Controller: ESD5330</li></ul>

**ACB2001 ACTUATOR ON CAT 3512 ENGINE**



**Note:** Installed on a bracket near flywheel housing

ACB2001

## GAC APPLICATION NOTE

### **DPA-DPD DELPHI DPG PUMP**

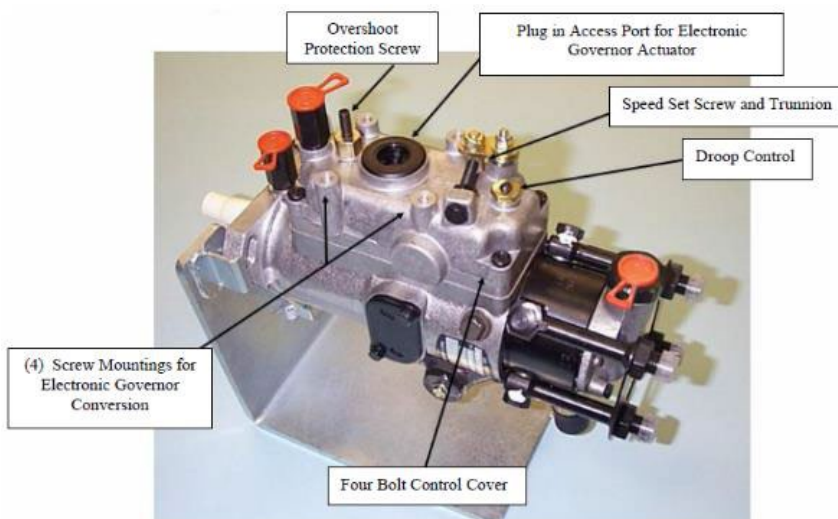
<b>Customer / OEM:</b>	CATERPILLAR (PERKINS)
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	Various
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Delphi DPA/DPD Pump
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V
<b>Installed Products:</b>	<b>Actuator:</b> ADD103B-12/24

**Summary:** The 103 Series Integral Actuator is designed to mount directly to the Delphi DPA/DPD (fixed speed-versions). No external linkage or brackets are required to install this actuator. By internally moving the fuel metering valve to the no fuel position, when de-energized, the 103 Series electric actuator provides the function of fuel shutoff solenoid.

Installing the 103 Series actuator does not defeat the engine's mechanical governor operation. During the installation process, the mechanical governor is set to a higher speed than the electric governor's operating speed. In this configuration the mechanical governor acts as a speed limiter. The electromechanical design used in the 103 Series is field proven and provides a proportional actuator movement based on the actuator coil current.

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.](#)

### **ADD103B SERIES ACTUATOR ON DELPHI PUMP**





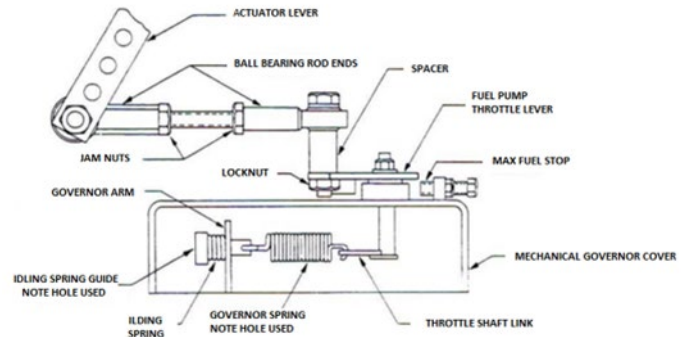
## GAC APPLICATION NOTE

### **DPA-DPD – DP210 ROTARY EXTERNAL PUMP REPLACEMENT**

<b>Application(s):</b>	Agricultural, Industrial and Power Generation Equipment
<b>Engine Make / Model / Displacement / Rating:</b>	Multiple rating, with 3-, 4-, and 6-cylinder off road engines
<b>Fuel System Type &amp; Make / Model:</b>	Delphi DP210, DPA, DPS, DPD
<b>Operating Speed(s):</b>	600-3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ALN050</li> <li>• Speed Controller: ESD2402, ESD5120, EEG6500</li> <li>• Magnetic Speed Pickup: MSP675</li> <li>• Mounting Kit: BK266</li> </ul>

**Summary:** Perkins, Caterpillar and other 3-, 4-, and 6-cylinder engines in off-highway applications with the DP210, DPA, or DPD pumps are mechanically governed.

They can be replaced with the GAC ALN050 or 120 Series universal actuator by mounting them to the pump's throttle lever.



#### **DP210 AND DPA ROTARY PUMP**



#### **ALN050 MOUNTED WITH BRACKET ON PUMP**



## GAC APPLICATION NOTE

### **3516 69L V16 MARINE**

<b>Customer / OEM:</b>	ICELAND
<b>Application(s):</b>	Tugboat propulsion control
<b>Engine Make / Model:</b>	Caterpillar 3516, 69L V16
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB2001 (2)</li><li>• ESD5330 (2)</li></ul>

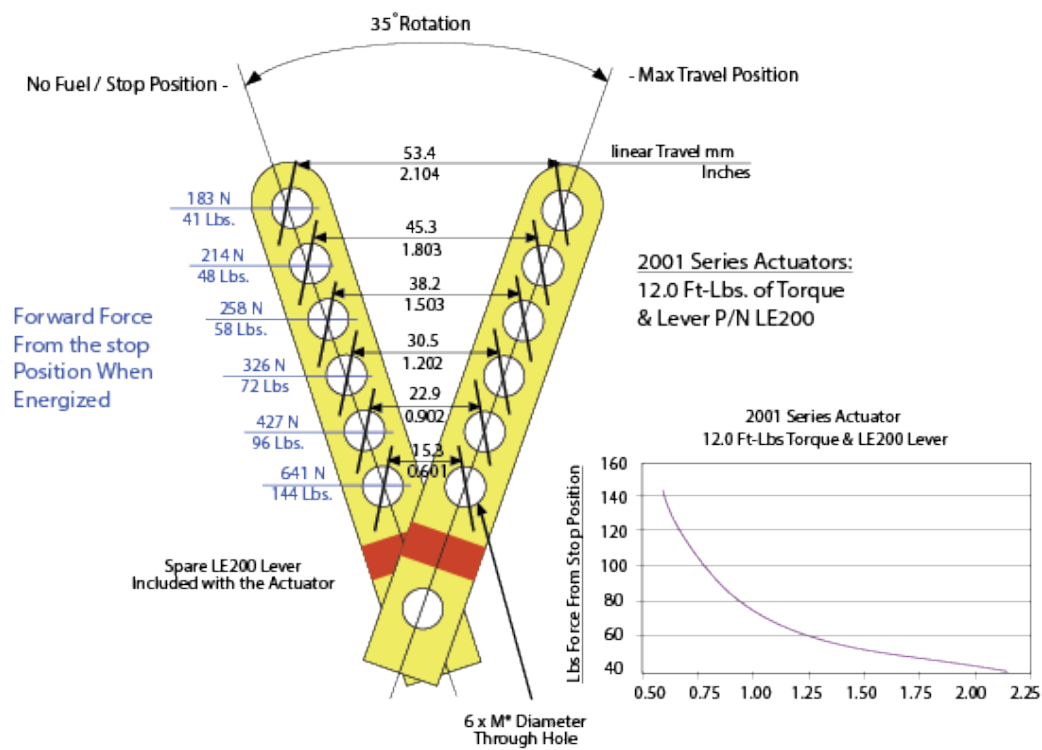
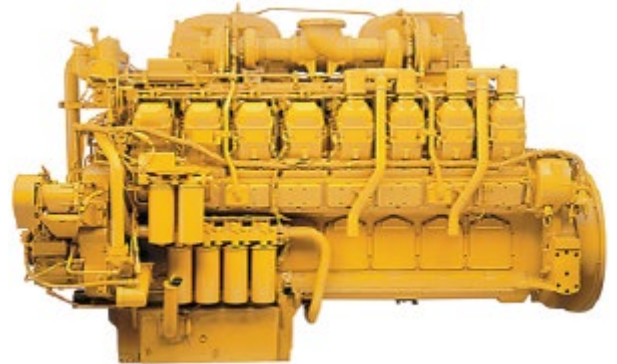
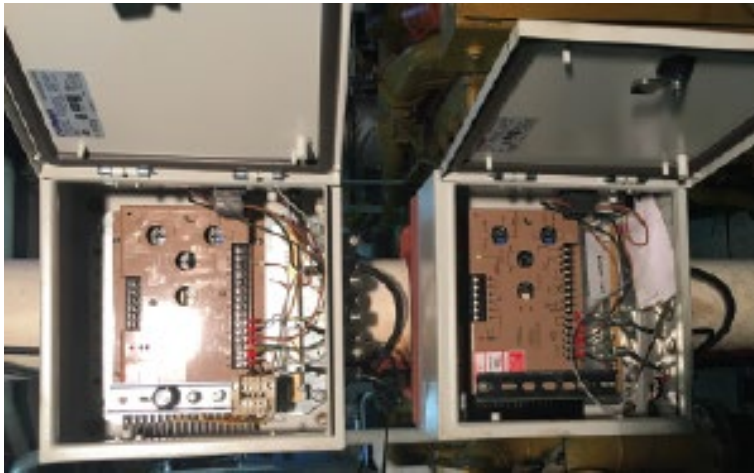
**Summary:** A Tugboat in Iceland replaced the main propulsion control system for its two Caterpillar 3516, 69L V16 engines, balanced the output of both engines connected to a single drive train, and controlled with a single potentiometer. The solution uses two GAC ACB2001 actuators and two ESD5330 controllers connected with a harness that was specifically designed for the application with potentiometers to adjust and balance the engines individually and a single potentiometer to control the speed of both engines at once.

The connection to the fuel control racks were modified and each engine fitted with an ACB2001 actuator. Each of these actuators provide 12.0 Ft-Lbs. (16.3 Nm) of torque over 35° of shaft rotation.

All sea trials were successfully completed after the GAC control system was installed. The Tugboat was returned to service and continues to perform without incident and the captain reported the fastest cruising speed ever.



## 3516 69L V16 MARINE



## CHEVROLET

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
350 natural gas or propane	<a href="#">ATB452T2N</a> -12 or 24	<a href="#">ESD5159</a> <a href="#">ESD5526</a> <a href="#">ESD5500</a> <a href="#">EEG6500</a>		<a href="#">TP501</a> KT1932 <a href="#">KT41761</a> EC1300
<a href="#">454 natural gas or propane</a>	<a href="#">ATBT252</a>	<a href="#">ESD5159</a> <a href="#">ESD5526</a> <a href="#">ESD5500</a> <a href="#">EEG6500</a>	<a href="#">MSP6729</a>	<a href="#">KT41761</a> <a href="#">KT425-T2</a>
Combined heat and power solution using 8.1L	<a href="#">ATB552T2F14-12/24</a>	<a href="#">EEG6500</a>	<a href="#">MSP6732</a>	

GAC APPLICATION NOTE (all of the components specified are sold separately)

## 350 IN<sup>3</sup> ENGINE, NATURAL GAS OR PROPANE

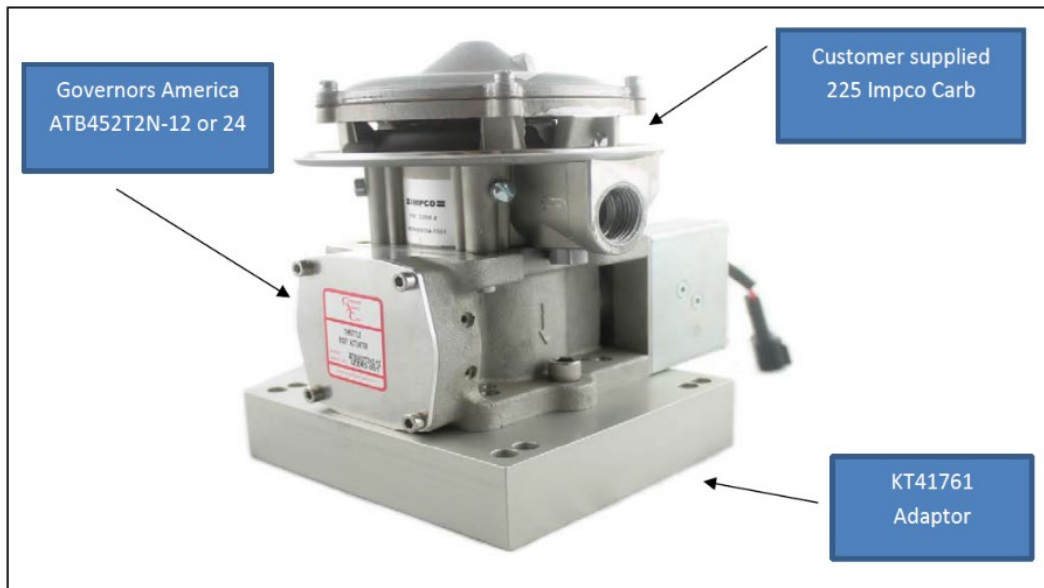
ELECTRONIC GOVERNOR SOLUTION WITH GAC ATB (REF. KT350ATB)

<b>Application(s):</b>	Power Generation, Water Pump, Forklift, others
<b>Engine Make, Model:</b>	Chevrolet 350 in <sup>3</sup> (5.7 L), 8 cylinders
<b>Fuel System Type &amp; Make, Model:</b>	Impco 225 gas carburetor mixer (customer supplied)
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500</li> <li>• Throttle Body: ATB452T2N-12 or 24 V DC</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Installation Kit: KT41761</li> <li>• Mating Connector: EC1300</li> <li>• 5K Potentiometer (optional): TP501</li> <li>• Adapter for spread bore intake manifold (if necessary): KT1932</li> </ul>

**Summary:** This a complete Electronic Governing system for the natural gas or propane fueled Chevrolet 350 in<sup>3</sup> engine using a Governors America Throttle Body with a Customer supplied Impco 225 carburetor- mixer.

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE](#)

## COMPLETE ELECTRONIC GOVERNING SYSTEM FOR CHEVROLET 350 IN<sup>3</sup> NATURAL GAS OR PROPANE ENGINE







GAC APPLICATION NOTE (all of the components specified are sold separately)

## 454 IN<sup>3</sup> ENGINE, NATURAL GAS or PROPANE

ELECTRONIC GOVERNOR SOLUTION WITH GAC ATB (REF. KT454ATB)

<b>Application(s):</b>	Power Generation, Water Pump, Forklift, others
<b>Engine Make, Model:</b>	Chevrolet 454 in <sup>3</sup> (7.4 L), 8 cylinders
<b>Fuel System Type &amp; Make, Model:</b>	Impco 425 gas carburetor mixer (customer supplied)
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 v
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500</li> <li>• Throttle Body: ATB552T2N-12 or 24 (volts)</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Installation Kit: KT41761</li> <li>• Installation Kit: KT425-T2</li> <li>• 5K Potentiometer (optional): TP501</li> <li>• Adapter for spread bore intake manifold (if necessary): KT1932</li> </ul>
<b>Summary:</b>	This a complete Electronic Governing system for the natural gas or propane fueled Chevrolet 454 in <sup>3</sup> engine using a Governors America Throttle Body with a Customer supplied Impco 425 carburetor- mixer.

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE](#)

## COMPLETE ELECTRONIC GOVERNING SYSTEM FOR CHEVROLET 454 IN<sup>3</sup> NATURAL GAS OR PROPANE ENGINE



## GAC APPLICATION NOTE

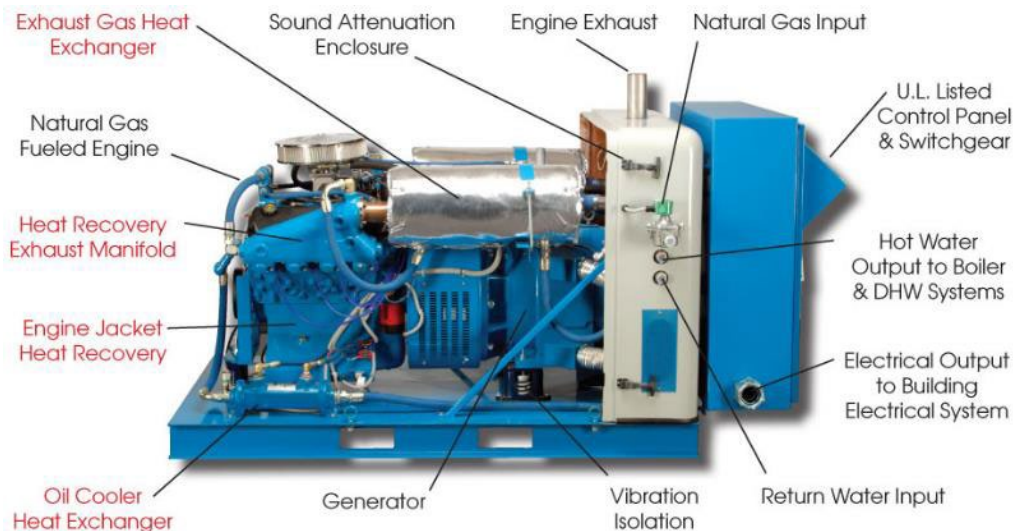
### **8.1L COMBINED HEAT AND POWER**

<b>Customer / OEM:</b>	<b>Aegis Energy Systems</b>
<b>Application(s):</b>	Combined Heat and Power (CHP)
<b>Engine Make / Model:</b>	Chevrolet 8.1L
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: <a href="#">EDG6000</a> , <a href="#">EEG6500</a>, and <a href="#">ESD5111</a></li> <li>• Actuator: <a href="#">ATB552T2F14</a>-12/24</li> <li>• Magnetic Speed Pickup: <a href="#">MSP6732</a></li> </ul>

**Summary:** Aegis Energy Services provides turnkey installation of modular combined heat and power systems. Each cogeneration module includes a natural gas-fueled Chevrolet 8.1 L engine, induction generator, microprocessor control panel, protective switchgear, and heat recovery equipment. Each module is enclosed in a sound attenuated cover and can be installed indoors or outdoors.

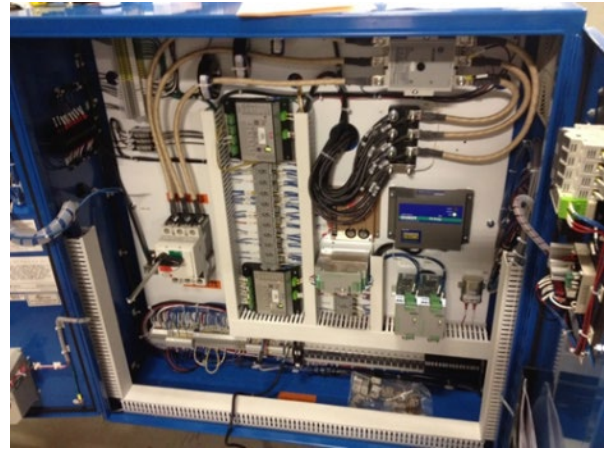
The solution features the GAC an EEG6500 (Digital, Multiple PID, SmartVu, Environmentally Sealed, & Tamper Resistant) EDG6000, or ESD5111 (Analog, Isochronous, Variable, & Droop) controller and an ATB552T2F14 55 mm throttle body to provide strict performance and reliability requirements needed. The ATB552T2F14 features a position feedback sensor used by the air-fuel ratio system to determine the actual throttle position for precise control. Each module is also equipped with an MSP6723 for speed reference

### **COMPLETE CHP UNIT**





## CONTROL PANELS WITH EEG6500 AND ESD5111



## TOP VIEW WITH ATB552T2



## CUMMINS

A cross reference to direct replacements with Cummins part numbers to GAC part numbers is located at the end of this guide [here](#).

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / OTHER
<a href="#">QST30G GOVERNING SYSTEM WITH BOSCH IN-LINE FUEL INJECTION PUMP</a>	<a href="#">ADD175F</a>	ESD5111or <a href="#">ESD5221</a>	<a href="#">DDM101</a> KT197
NT, KT WITH EFC SYSTEM WITH PT PUMP	<a href="#">ADB120E4</a>	<a href="#">ESD5522E</a>	<a href="#">MSP6724, MSP6728C</a>
NT, K19, K28, K38, K50 WITH EFC SYSTEM (PT-PUMP)		<a href="#">ESD5522E</a>	<a href="#">MSP6724, MSP6728C</a> <a href="#">EAM100</a>
<a href="#">C WITH BOSCH INLINE AND RSV (STOP LEVER)</a>	<a href="#">ADC225S</a> <a href="#">ADC120, ADD175A</a>	<a href="#">ESD2210</a> , ESD5500E <a href="#">ESD5111</a>	<a href="#">MSP6724, MSP6728C</a>
CUMMINS B WITH CAV DPA (REAR MOUNT)/BOSCH VE STOP LEVER	<a href="#">ADC225S</a>	ESD2210, <a href="#">ESD5111</a> ESD5500E	<a href="#">MSP6724, MSP6728C</a>
<a href="#">6BT 5.9-G1 UP TO 6 CYL WITH BOSCH INLINE</a>	<a href="#">ADD175A</a>	<a href="#">ESD5111</a> , <a href="#">ESD2210</a> ESD5500E	<a href="#">MSP6724</a>
4A2.0, 4A2.3, 4AT2.3	<a href="#">120 Series</a>		
3A1.4 & 3A1.7	<a href="#">120 Series</a>		
KTA38 37.8L	ACB2001-24	ESD5330	
<a href="#">4B 3.3-G1 WITH ZEXEL A</a>	<a href="#">ADD175A</a>	<a href="#">ESD2210, ESD5111</a>	<a href="#">MSP6728C</a>
4B 3.9, 4B 3.9-G1(2), & 6BT 5.95-G1 WITH STANADYNE PUMP	<a href="#">ADC100</a> -12/24	ESD5120, <a href="#">ESD5522E</a>	<a href="#">MSP6724, MSP6728C</a>
8.3L and GTA855	ATB T4	ESD5526e, RSC671	
<a href="#">VT1710 IRRIGATION</a>	ATB652T2F14-24	<a href="#">ESD5111</a> DDM101	<a href="#">STE101</a>
KTA-50L4	<a href="#">ADB120E4</a>	<a href="#">ESC63-17, -7, -23</a> <a href="#">SSW676, SSW675</a>	MSP677, MSP678 ITM050, ITM051
855 NA	<a href="#">ATB652T2N-12 or 24</a>	<a href="#">ESD5526E</a>	5/8-18 UNF-2A
QSM111			LSM201N

GAC APPLICATION NOTE (all of the components specified are sold separately)

## **NT / KT with PT PUMP and EFC FUEL SYSTEM or PT PUMP WITH MECHANICAL GOVERNOR**

<b>Customer / OEM:</b>	<b>CUMMINS</b>
<b>Applications:</b>	Diesel Engine Generators, Compressors, Marine, others
<b>Engine Make, Model:</b>	Cummins NT and KT Series engines with EFC system with a PT pump or mechanical governor.
<b>Fuel System:</b>	PT Pump (normally closed or normally open integrated actuators or mechanical governor).
<b>Operating Speed(S):</b>	Full RPM range
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADB120E4-GAC (EFC system) or ADC225JS-12/24 (mechanical governor). <ul style="list-style-type: none"> <li>○ Optional Mounting Bracket for ADB120E4-GAC: BK114</li> <li>○ Optional Mounting Bracket for ADC225JS-12/24</li> </ul> </li> <li>• Speed Control Options: <ul style="list-style-type: none"> <li>○ EFC (normally closed): EEG6500, ESD5522E, ESD5120</li> <li>○ EFC (normally open): ESD5119, ESD5160</li> </ul> </li> <li>• Speed Controller- EEG6500, EDG6000, ESD2210, ESD5111, ESD5500E, ESD5500-II, ESD5550</li> <li>• Optional EAM Module: EAM100 (interface module for Cummins EFC to GAC load sharing / synchronizing modules).</li> <li>• Optional Load Sharing Modules: LSM100, 201 and 672</li> <li>• Optional Auto Synchronizers: SYC6714</li> <li>• Optional Throttle Linkage components: <ul style="list-style-type: none"> <li>○ Bearing Rod Ends: BR200 (1/4"-28 thread), BR300 (M5 thread), BR400 (M6 thread).</li> <li>○ Threaded Rod: RD102- Zinc coated 1/4"-28 thread precut to 1.0 ft. (0.3 m). RD233- Zinc coated M6 thread precut to 8.75 in. (222 mm)</li> </ul> </li> </ul>

**SUMMARY:** The ADB120E4-GAC and 225 Series for Cummins NT and KT engines provide an electromechanical actuator used for engine fuel control positioning.

The Cummins P.T. fuel system is controlled with either a mechanical governor or Normally Open or Normally Closed Electronic Fuel Control (EFC) system with its actuator integrated in the P.T. pump. GAC has actuator / governor solutions for each control system offering Isochronous, Droop and Variable Speed operation.



[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.](#)

GAC APPLICATION NOTE (all of the components specified are sold separately)

## **QSM11 as DUEL GENERATOR SET**

**CUSTOMER / OEM:**

**CUMMINS**

**APPLICATIONS:**

Diesel Engine Generators, Compressors, Marine, others

**ENGINE MAKE, MODEL:**

Cummins QSM11 .

**OPERATING SPEED(S):**

Full RPM range

**BATTERY VOLTAGE:**

12 or 24 V DC

**INSTALLED PRODUCTS:**

- LSM201N

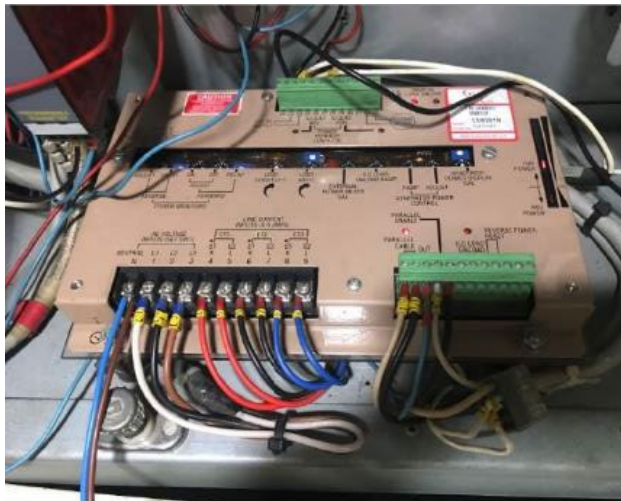
**SUMMARY:** This deep water operations vessel had a question about a new piece of GAC equipment, the LSM201N load sharing module, recently added to a pair of auxiliary generators using QSM11 Cummins engines with the ISM Engine Control Module (ECM).



Balancing power distribution between engines is the primary function of the LSM. It can also provide power control through ramping and monitoring, accurately measuring true engine power.

When one of the two QSM11-DM engines reversed power it was easy to determine the cause. Out of the box the LSM201N interpreted the ECM increased voltage to be a request to decrease power. But the ECM translated increased voltage as a need to increase power. The LSM was built to allow a hardware solution of adding a jumper to change polarity, but like both GACs EEG7000 and the EEG7500 controllers, the ECM was also able to use software to match the LSMs polarity. The issue was easily resolved, and the boat was soon back in service.

**LSM201N**



**CUMMINS QSM11**





GAC APPLICATION NOTE (all of the components specified are sold separately)

## **QST30G GOVERNING SYSTEM CONVERSION with BOSCH IN-LINE FUEL INJECTION PUMP**

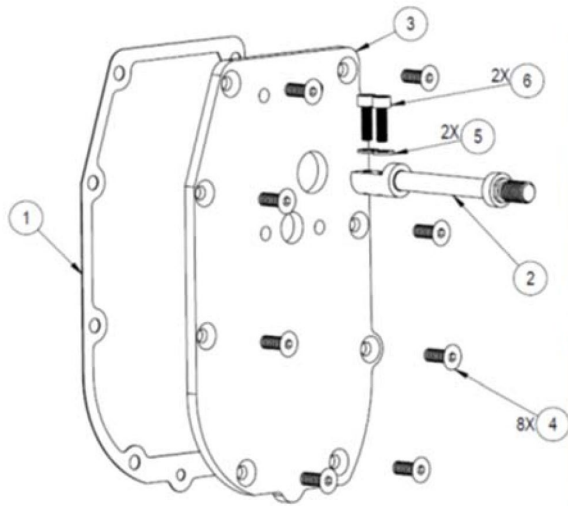
<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	Various
<b>Engine Make / Model / Displacement / Rating:</b>	Cummins QST30G / 30.5L, V121 / 760 to 1500 HP / 567 to 1119 kW
<b>Fuel System Type &amp; Make / Model:</b>	Bosch in-line pump with EDC governor
<b>Operating Speed(s):</b>	1500, 1800 and 2100 RPM
<b>Battery Voltage:</b>	24 V
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator (2 required): ADD175F</li> <li>• Speed Controller (1 required): ESD5111 or ESD5221 (overspeed option)</li> <li>• Dual Driver Module: DDM101</li> <li>• Magnetic Speed Pickup: 5/8", 18 thread</li> <li>• Magnetic Speed Pickup Harness: CH1204</li> <li>• Bosch EDC Governor Adaptor Kit (2 required): KT197</li> <li>• K-Type Thermocouples (2 required): STE101</li> <li>• Feedback Sensor Mating Harness (2 required): CH1243</li> <li>• Actuator Harness (2 required): CH1215</li> </ul>

**Summary:** This is a GAC complete electronic governing system conversion kit for Cummins PC controller and Bosch injection pump mounted governor. The GAC parts listed are not compatible with the Cummins PCC controller or the Bosch injection pump mounted actuators. This system acts as a standalone complete dual pump governor system that does not require interaction with the Cummins controller.

Converting to the GAC system includes the installation of an ADD175F actuator on each pump with a KT197 adapter kit, installing a K-Type thermocouple in the exhaust stream of each bank and connecting the actuators, position feedback sensors and thermocouples to the DDM101 module and ESD5111 or ESD5221 governor controller. The DDM101 uses the input from the two thermocouples and two position sensors to balance and maintain an equal output from both banks of the engine while being controlled by a single governor.

**The complete conversion installation instructions are in [GAC DOCUMENT CUMMINS QST30 GAC CONVERSION INSTALLATION INSTRUCTIONS PIB5119](#).**

## KT197 – ADAPTS 175 SERIES ACTUATORS TO BOSCH EDC GOVERNOR HOUSING



## ADD175F ACTUATOR MOUNTED ON A QST30 FUEL INJECTION PUMP WITH KT197 INSTALLATION KIT



## GAC APPLICATION NOTE

### **B4.5T ENGINES**

<b>Customer / OEM:</b>	Taylor Machine Works
<b>Application(s):</b>	Forklift
<b>Engine Make / Model:</b>	CUMMINS B4.5T-C99, 275 in <sup>3</sup> Displacement, 99 HP / 2200 RPM, 10 Ton Taylor Machine Works Forklift
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	800 RPM idle, variable range from 800 to 2200 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller : ESD2349-12</li> <li>• Electronic Foot Pedal: FP100</li> </ul>

**Summary:** The ESD2300 series electronic speed controller provides superior speed regulation over a variable RPM range and an immediate, precise response to transient load changes. The electronic foot pedal interface provides the load signal while a ring gear mounted magnetic Pickup provides the speed input.

- **ESD2349-12V** is specifically for off-road variable speed applications. It includes adjustable PID governor control and is compatible with foot pedal, GAC part number FP100.
- **ESD2351-12V** includes integral over-speed contacts, adjustable PID Speed Controller and is compatible with either a Williams vertically mounted foot pedal, GAC part number FP201, or horizontally mounted foot pedal GAC part number FP202.
- **ESD2352-12V** includes integral over-speed contacts, adjustable PID Speed Controller and is compatible with a Morse foot pedal.

## **10 TON TAYLOR MACHINE WORKS FORKLIFT**



### **ESD2352-12 Variable Speed Controller**



**FP201 Vertically  
Mounted Foot  
Pedal**



**FP202 Horizontally  
Mounted Foot Pedal**



GAC APPLICATION NOTE

**GTA 8.8L and 855 ENGINES**

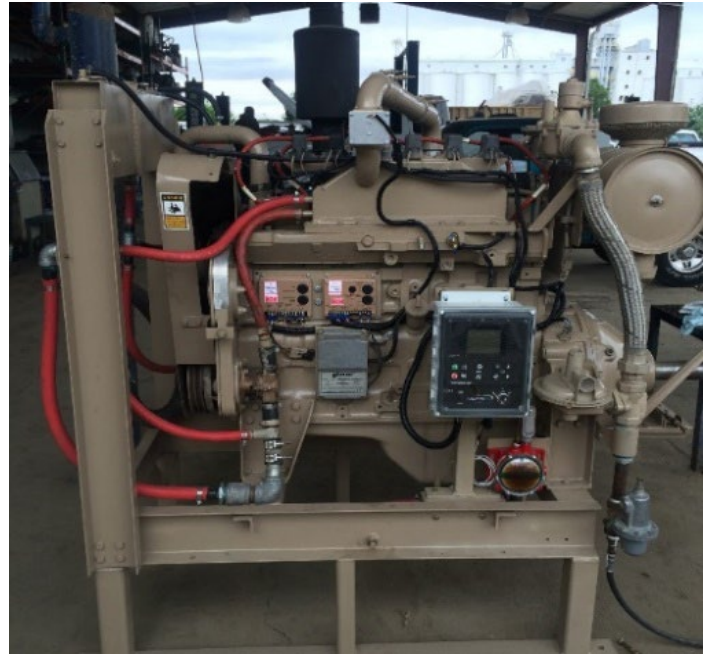
<b>Customer / OEM:</b>	PSS Governor Services
<b>Application(s):</b>	Irrigation
<b>Engine Make / Model :</b>	Cummins GTA 8.3L and GTA855
<b>Fuel System Type &amp; Make / Model:</b>	Cummins PT Fuel System, Natural Gas
<b>Operating Speed(s):</b>	2100 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: Two ATB T2</li><li>• Speed Controller: Two ESD5221</li><li>• Speed Ramping Controller: Two RSC671's</li></ul>

**SUMMARY** PSS Governor Services (PSS) updated Cummins irrigation pump drives on 2 systems. These after market natural gas engines are now controlled by GAC integrated actuator/throttle body assemblies ATB throttle body actuators, RSC671 programmable ramp generators, and ESD5526e governor speed controllers.

**GTA 8.3L**



**GTA855**



GAC APPLICATION NOTE

**KT38 ENGINES**

<b>Customer / OEM:</b>	Private
<b>Application(s):</b>	Tug Boat
<b>Engine Make / Model:</b>	Two - Cummins KT38 Engines: V12, 38L (2300 in <sup>3</sup> ) Turbocharged / After-cooled
<b>Fuel System Type &amp; Make / Model:</b>	Cummins PT Fuel System
<b>Operating Speed(s):</b>	2100 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: Two ADB120E4 (Designed for Cummins PT fuel system)</li><li>• Speed Controller : Two ESD5221</li><li>• Speed Ramping Controller: Two RSC671's</li></ul>

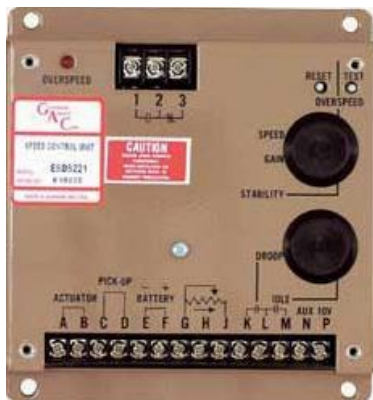
**TUG BOAT "GLACIER WIND" IN COOK INLET, ALASKA**



## GAC EQUIPMENT ON CUMMINS KT38 ENGINES



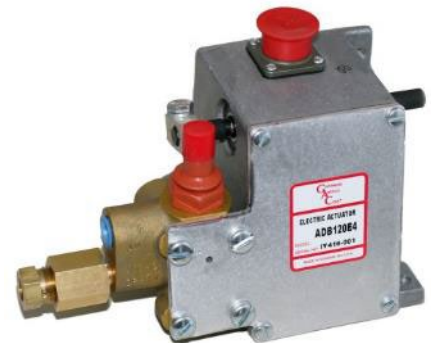
**ESD5221 SPEED CONTROLLER**



**RSC671 RAMPING SPEED**



**ADB120E4 ACTUATOR**



GAC APPLICATION NOTE (all of the components specified are sold separately)

## 37.8L NATURAL GAS GEN SET 500KW

**Customer / OEM**

Camda

**Applications:**

Generator

**Engine Make, Model:**

Cummins

**Fuel System:**

Natural Gas

**Operating Speed(S):**

**Battery Voltage:**

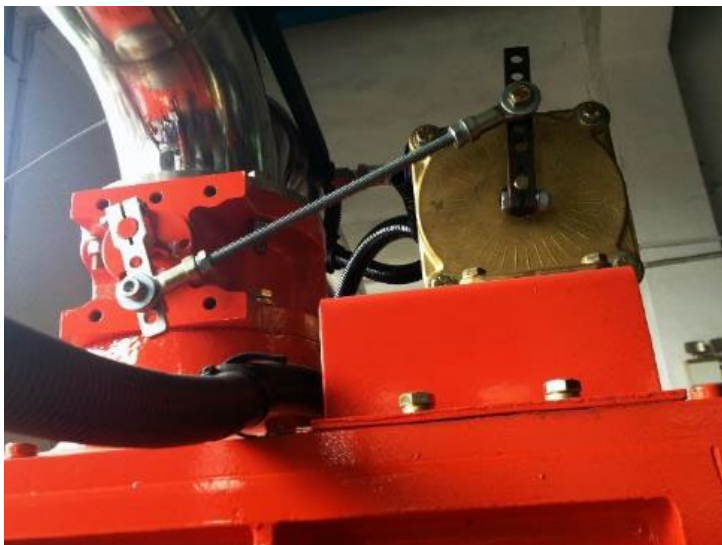
12 or 24 V DC

**Installed Products:**

- **Actuator:** ACB2001-24
- **Speed Controller:** ESD5330

### SUMMARY

Camda New Energy Equipment Co. Ltd., a generator manufacturer, 500 kW gaseous gen-set built on the Cummins Kt38 37.8L engine uses the GAC ACB2001 controlled by the GAC ESD5330, specifically designed to run the ACB2001, ensures stability and smooth results.

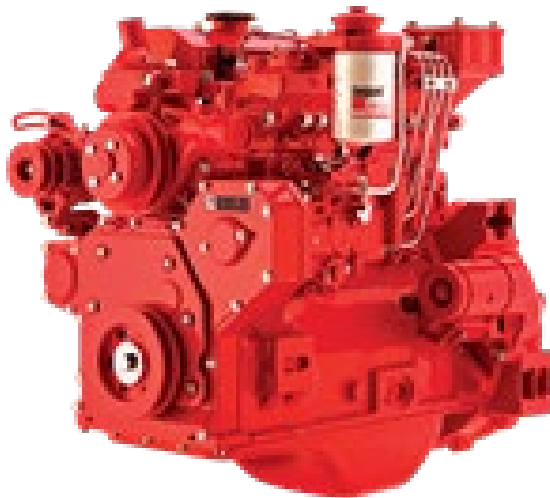


## GAC APPLICATION NOTE

### **B ENGINE with CAV DPA**

<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	Cummins B with CAV DPA
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	173 HP @ 2500 RPM, B5.9 99 HP @ 2500 RPM, B4.5 124 HP @ 2200 RPM, B3.9
<b>Battery Voltage:</b>	12, 24, or 32 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC120</li> <li>• Speed Controller: ESD2210, ESD5111, or ESD5500E</li> <li>• Magnetic Speed Pickup: MSP6724 or MSP6728C</li> </ul>

### **CUMMINS B SERIES ENGINE**



### **ACTUATOR ADC120**



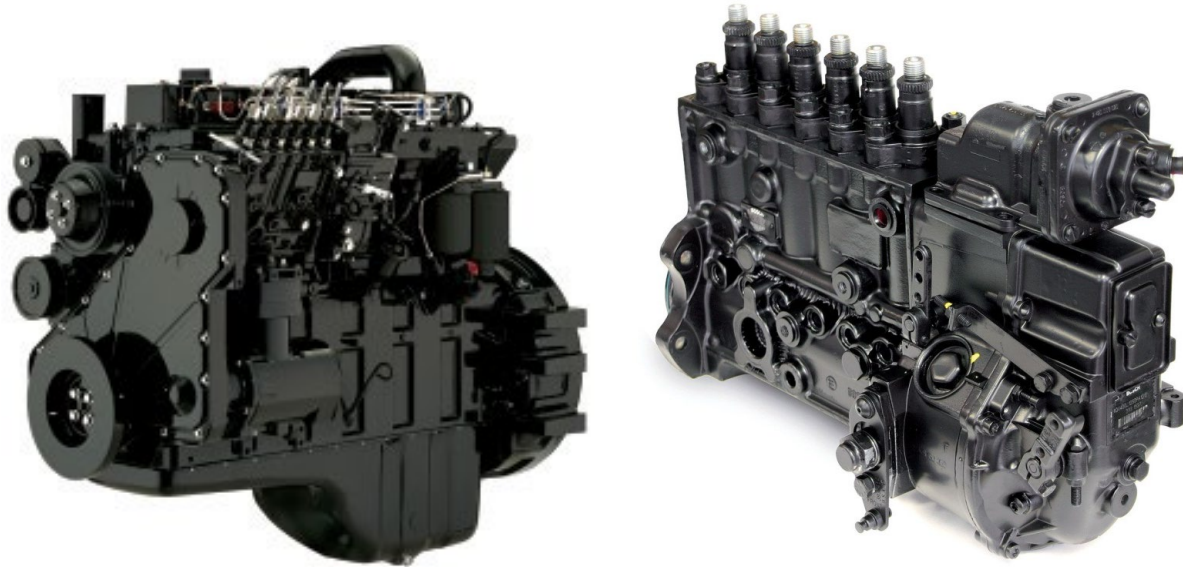


GAC APPLICATION NOTE

**C ENGINE WITH BOSCH INLINE AND RSV**

<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	Cummins C with Bosch inline and RSV
<b>Fuel System Type &amp; Make / Model:</b>	Bosch P-Series Inline Pump, Diesel
<b>Operating Speed(s):</b>	260 HP @ 2200 RPM
<b>Battery Voltage:</b>	12, 24, or 32 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225S, ADC120, or ADD175A</li><li>• Speed Controller: ESD2210, ESD5111, or ESD5500E</li><li>• Magnetic Speed Pickup: MSP6724 or MSP6728C</li><li>• Kits / Connectors: EC1300, KT102J, KT175-A-R, KT275 (aka KT275-3000)</li></ul>

**CUMMINS C ENGINE AND BOSCH INLINE PUMP**



## GAC APPLICATION NOTE

### **B ENGINE with CAV DPA and BOSCH VE STOP LEVER**

**Customer / OEM:**

CUMMINS

**Application(s):**

Agricultural and Industrial Equipment (various)

**Engine Make / Model:**

Cummins 4B (T) and 6B (T) Engines

**Fuel System Type & Make / Model:**

CAV/DPA Rotary Pumps

**Operating Speed(s):**

173 HP @ 2500 RPM, B5.9

99 HP @ 2500 RPM, B4.5

124 HP @ 2200 RPM, B3.9

**Battery Voltage:**

12 or 24 V DC

**Recommended Products:**

- Actuator: 120 Series
- Speed Controller: ESD2210, ESD5111, ESD5500E or EEG6500 (Digital)
- Magnetic Speed Pickup: MSP6724, MSP6728C

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.](#)

#### **CUMMINS B SERIES ENGINE**



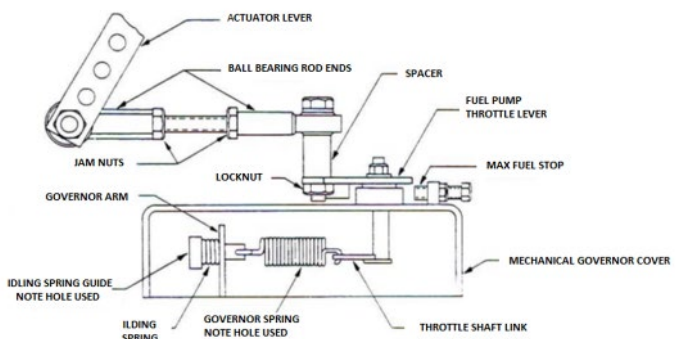
#### **GAC 120 SERIES ACTUATOR**



#### **CAV DPA ROTARY PUMP**



#### **LINKAGE**

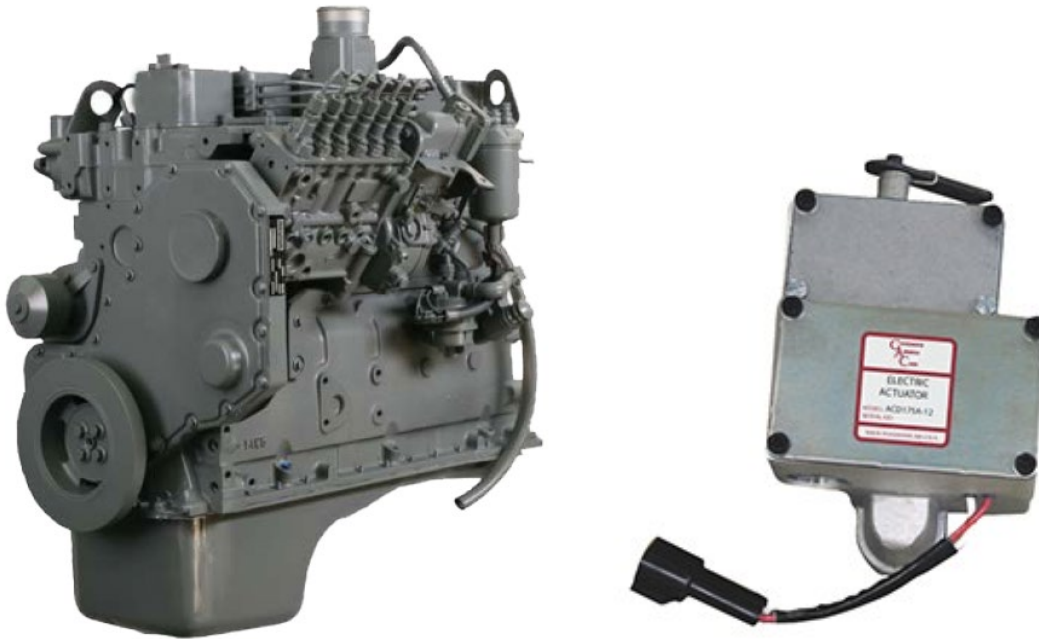


## GAC APPLICATION NOTE

## 6BT ENGINE with BOSCH INLINE

<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	Various
<b>Engine Make / Model :</b>	6BT 5.9
<b>Fuel System Type &amp; Make / Model:</b>	Bosch Inline Pump, Diesel
<b>Operating Speed(s):</b>	173 HP @ 2500 RPM, B5.9
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC175A</li><li>• Speed Controller : ESD2210, ESD5111, or ESD5500E</li><li>• Magnetic Speed Pickup: MSP6724</li><li>• Kits: EC1300, KT175-A-R or KT275</li></ul>

## CUMMINS 6B/5.9L ENGINE WITH ADD175A ACTUATOR

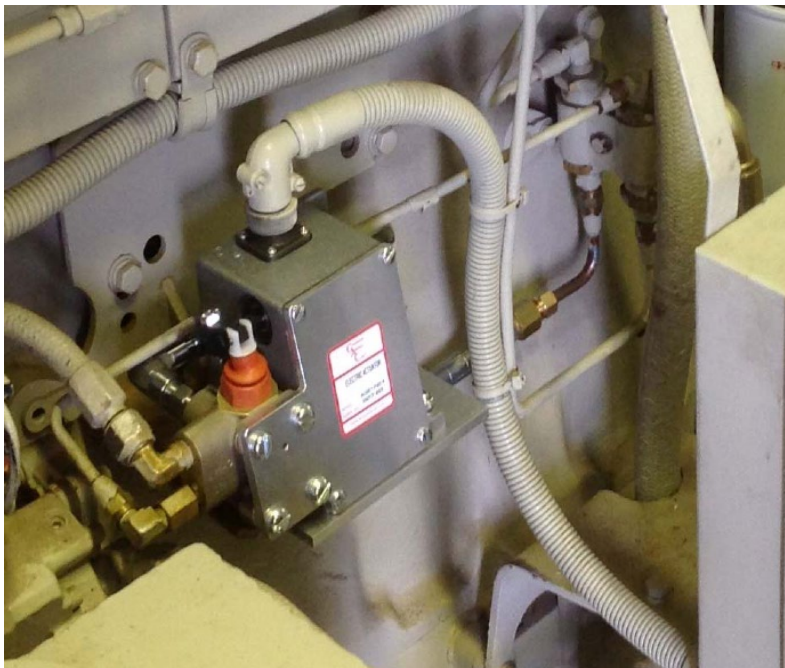


GAC APPLICATION NOTE

**NT AND KT ENGINES**

<b>Customer / OEM:</b>	Cummins
<b>Application(s):</b>	Various
<b>Engine Make / Model / Displacement / Rating:</b>	Cummins NT and KT engines with mechanical or EFC Systems
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Cummins PT Fuel System
<b>Operating Speed(s):</b>	1800 RPM
<b>Battery Voltage:</b>	12, 24, or 32V
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADB120E4 with BK115</li><li>• Speed Controller : ESD5522E</li><li>• Magnetic Speed Pickup: MSP6724 or MSP6728C</li></ul>

**CUMMINS NT855 WITH ADD120E4**





## GAC APPLICATION NOTE

### **NT, K19, K28, K38, K50 with EFC SYSTEM (PT PUMP)**

<b>Customer / OEM:</b>	Cummins
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	Cummins NT, K19, K28, K38, K50 with EFC System (PT pump)
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Cummins PT Fuel System
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Speed Controller : ESD5522E</li> <li>Interface Module: EAM100</li> </ul>

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.](#)

### **CUMMINS K19, K38, AND K50 ENGINES**



### **ESD5522E**



### **EAM100**



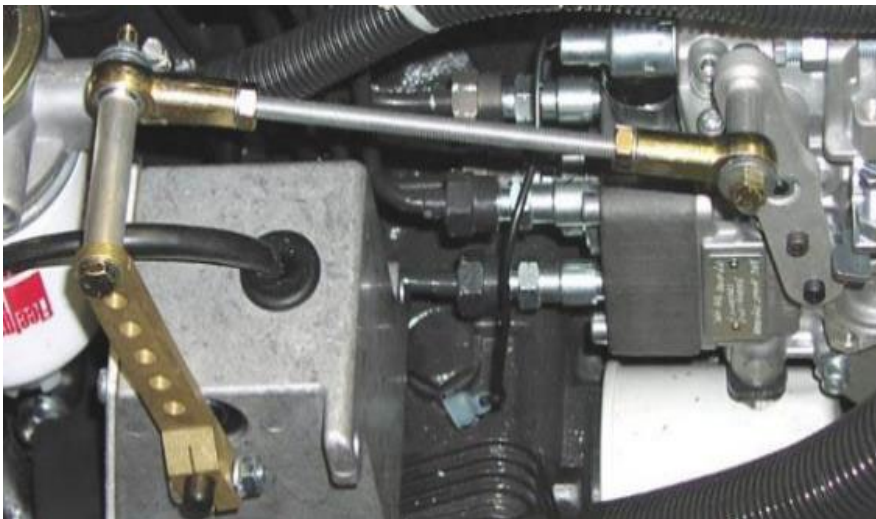


GAC APPLICATION NOTE (all of the components specified are sold separately)

## 4A2.0, 4A2.3 AND 4AT2.3 4 CYLINDER ENGINES

<b>Applications:</b>	Generators, Compressors, Marine, others
<b>Engine Make, Model:</b>	Cummins 4A2.0 (122 in <sup>3</sup> ), 28.6 HP, 4A2.3 (140.3 in <sup>3</sup> ), 33 HP and 4AT2.3 (140.3 in <sup>3</sup> ) 4 cylinder in line engines
<b>Fuel System:</b>	Indirect fuel injection
<b>Operating Speed(S):</b>	Idle to 2800 rpm
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• <b>Actuator:</b> 120 Series-12/24 V Dc: Purchased Separately (Includes Lever Les1501)</li> <li>• <b>Bracket BK234:</b> purchased separately</li> <li>• <b>Hardware kit KT234:</b> purchased separately</li> <li>• <b>Linkage LKS234:</b> purchased separately</li> </ul>
<b>Summary:</b>	<a href="#">DETAILED INSTALLATION INSTRUCTIONS</a> are available on the GAC website for the 120 Series Installation Instructions and Parts List for Cummins 4A2.0, 4A2.3 and 4AT2.3 provide an electromechanical actuator used for engine fuel control positioning.

### FINISHED INSTALLATION



### GAC 120 SERIES



### KIT

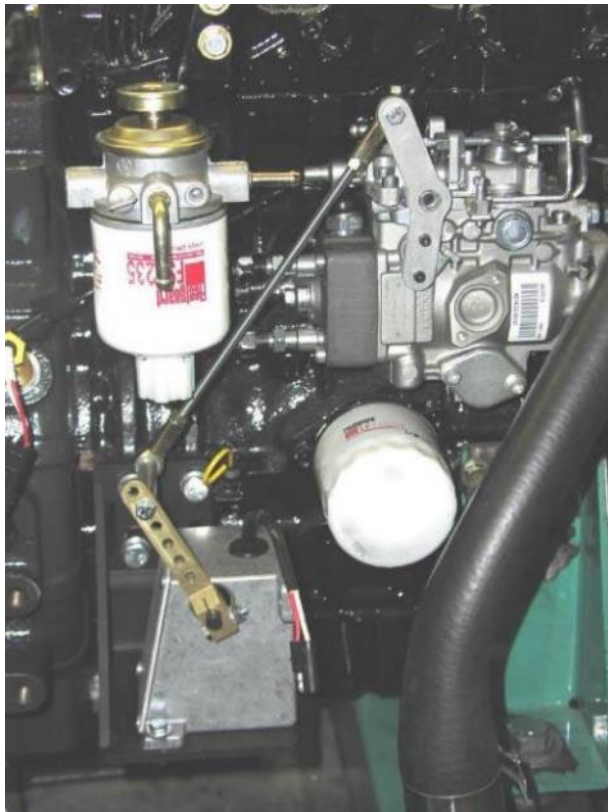


GAC APPLICATION NOTE (all of the components specified are sold separately)

## 3A1.4 & 3A1.7 3 CYLINDER ENGINES

<b>Applications:</b>	Generators, Compressors, Marine, others
<b>Engine Make, Model, Displacement:</b>	Cummins 3A1.4 (85.4 in <sup>3</sup> ), 19.3 HP and 3A1.7 (103.7 in <sup>3</sup> ), 41 HP, 3 cylinder in line engines
<b>Fuel System:</b>	Indirect fuel injection
<b>Operating Speed(S):</b>	Idle to 2800 rpm
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: 120 Series-12/24 V Dc</li> <li>• Bracket BK233: purchased separately</li> <li>• Hardware KT233: purchased separately</li> <li>• Linkage LKS233: purchased separately</li> </ul>
<b>Summary:</b>	<a href="#">DETAILED INSTALLATION INSTRUCTIONS</a> are available on the GAC website FOR THE 120 Series Installation Instructions and Parts List for Cummins 3A1.4 and 3A1.7 provide an electromechanical actuator used for engine fuel control positioning.

### FINISHED INSTALLATION



### GAC120 WITH LEVER



### BRACKET BK233, KIT KT233, LINKAGE

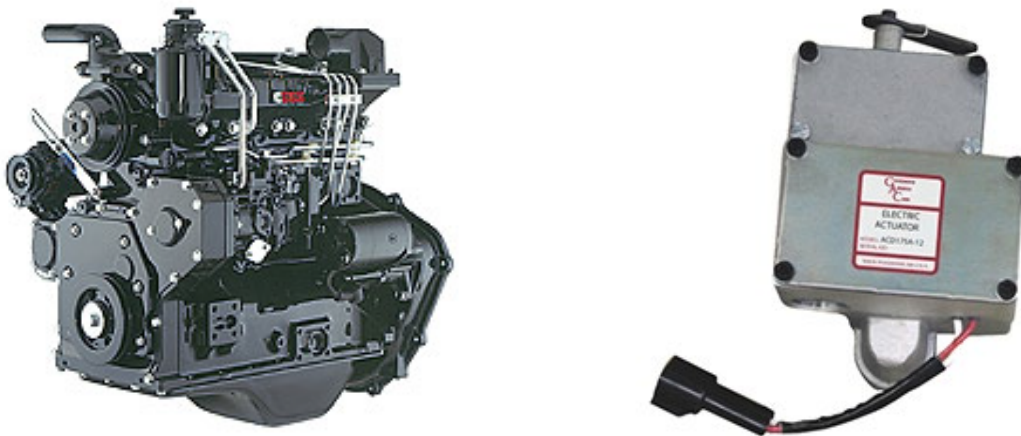


## GAC APPLICATION NOTE

### **4B ENGINE with ZEXEL A**

<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	4B 3.3-G1 with Zexel A
<b>Fuel System Type &amp; Make / Model:</b>	Inline Diesel Pump
<b>Operating Speed(s):</b>	85 HP @ 2600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC175A with EC1300, KT175-RS-R-Zexel</li> <li>• Speed Controller: ESD2210 or ESD5111</li> <li>• Magnetic Speed Pickup: MSP6728C</li> </ul>

### **CUMMINS B3.3 ENGINE WITH ADC175A ACTUATOR**



### **KT175-RS-R-ZEXEL INSTALLATION KIT**





GAC APPLICATION NOTE (all of the components specified are sold separately)

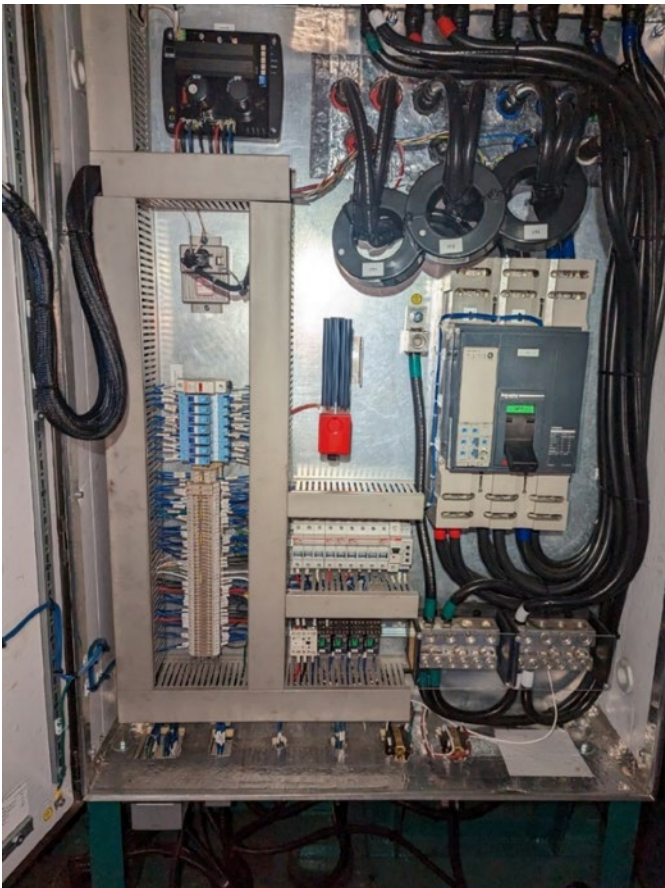
## KTA19

**Application(s):** Container Crane, Generators  
**Engine Make, Model, Displacement** Cummins KTA19  
**Fuel System Type & Make, Model:** Diesel  
**Installed Products:** • Speed Controller: EEG7000

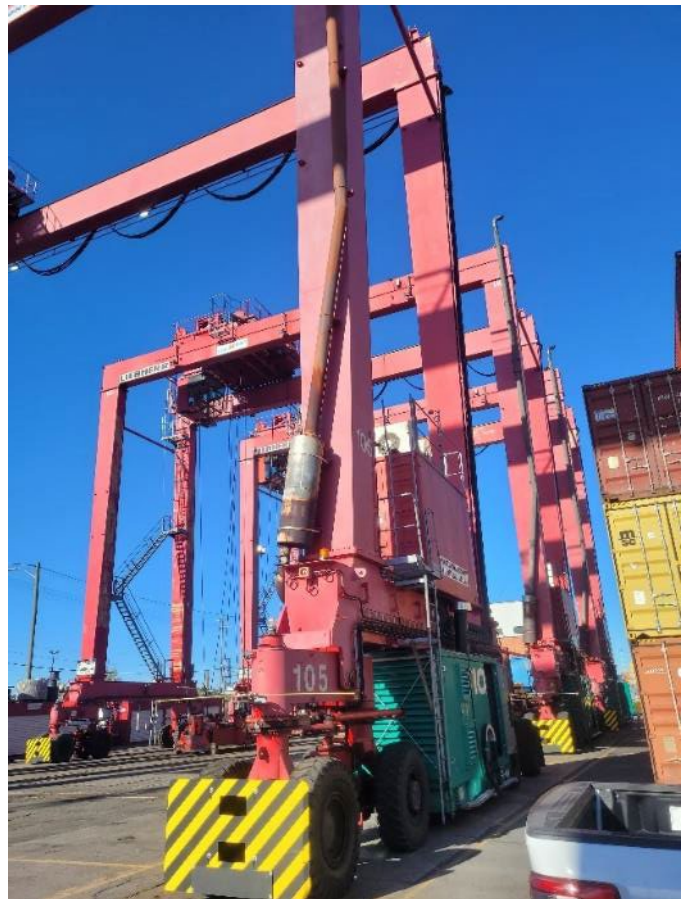
**Summary:** A container crane at a Canadian port asked for help fine tuning its new EEG7000. Communicating with Deep Sea DSE 7410-04 controller, the support personnel were very satisfied with the reliability and precision provided by the GAC unit.

The customer chose the EEG7000 speed controller because it allows the end user to modify or reinstall the original settings without updating the load bank; they just upload GACs free software and upload the saved configuration file and done. The EEG7000 replaced a Cummins (Onan) PCC3100 with integrated speed and voltage controller.

**EEG7000**



**GANTRY CRANE WITH KTA19**



## GAC APPLICATION NOTE

### **KTA50-G9**

<b>Customer / OEM:</b>	Steel Mill
<b>Application(s):</b>	Emergency Cooling System
<b>Engine Make / Model:</b>	KTA50-G9 engine with a PT fuel system and EFC actuator 50.3 litre (3067 in. <sup>3</sup> ) 16 cylinder 2 pump / 2 loop Cooler
<b>Fuel System Type &amp; Make / Model:</b>	Cummins PT™ direct injection
<b>Operating Speed(s):</b>	85 HP @ 2600 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Speed Controller: ESD5500E</li></ul>

#### **Summary:**

DCML, a Cummins Distributor in Brazil, installed and maintains an emergency cooling water system using a KTA50-G9 engine with a PT fuel system and EFC actuator, controlled by an ESD5500E series speed control, to drive a water pump to displace 3600m<sup>3</sup> of water per hour (over 951,000 gallons per hour). The pump runs on an automated system and comes on-line with a power failure or other interruption.

#### **CUMMINS KTA50-G9 WITH ESD5500E**





## GAC APPLICATION NOTE

### **NA855**

<b>Customer / OEM:</b>	Johnson Irrigation
<b>Application(s):</b>	Generator
<b>Engine Make / Model:</b>	CUMMINS NA855
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ATB</li> <li>• Speed Controller: EDG5500</li> </ul>

**Summary** GAC worked with Johnson Irrigation, a third-generation full service engine and generator support house, to determine the optimal natural gas control system for their irrigation engines. The combination of GAC's throttle body and EDG5500 speed controller provided a smooth result.

### **CUMMINS 855 WITH ATB ACTUATOR**



**ATB652T2N-24**



**EDG5500**



## GAC APPLICATION NOTE

### **855**

**Customer / OEM:** PSS Governor Services  
**Application(s):** Irrigation Pump  
**Engine Make / Model:** CUMMINS 855  
**Fuel System Type & Make / Model:** Natural Gas  
**Operating Speed(s):**  
**Battery Voltage:** 12 or 24 V DC  
**Installed Products:**

- Actuator: ATB65 T2
- Speed Controller: ESD5500

**Summary** PSS Governor Services typically works with marine governors, but helped a local neighbor with an irrigation engine issue. The combination of GAC's throttle body and ESD5500E speed controller was a quick improvement.

### **CUMMINS 855 WITH ATB ACTUATOR**



**ATB652T2N-24**



**ESD5500E**

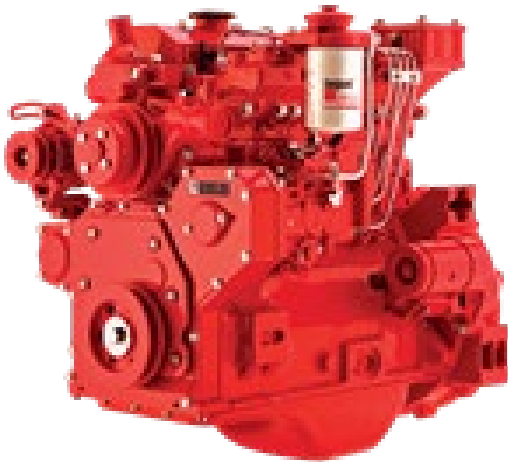


GAC APPLICATION NOTE

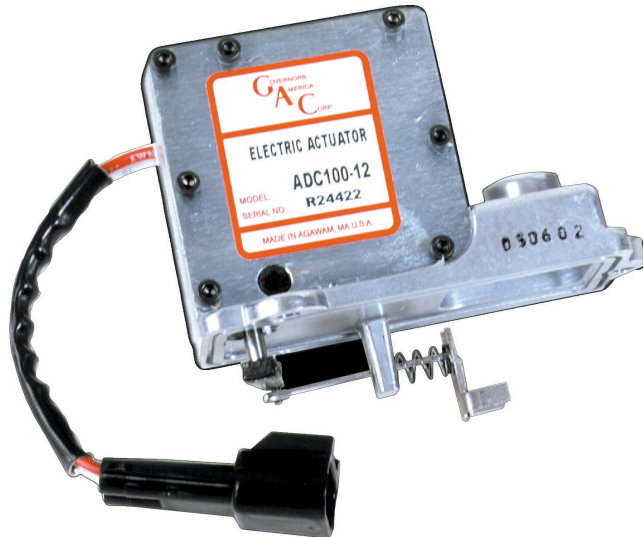
**4B AND 6BT ENGINES with STANADYNE ROTARY PUMP**

<b>Customer / OEM:</b>	CUMMINS
<b>Application(s):</b>	
<b>Engine Make / Model / Displacement / Rating:</b>	4B 3.9, 4B 3.9-G1(2), and 6BT 5.95-G1 with Stanadyne
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Stanadyne Rotary Pump, Diesel
<b>Operating Speed(s):</b>	173 HP @ 2500 RPM, B5.9 124 HP @ 2200 RPM, B3.9
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC100-12/24</li><li>• Speed Controller: ESD5120 or ESD5522E</li><li>• Magnetic Speed Pickup: MSP6724 or MSP6728C</li></ul>

**CUMMINS B SERIES ENGINES**



**ACTUATOR ADC100**





## GAC APPLICATION NOTE

### **VT1710 ENGINE**

<b>Customer / OEM:</b>	JIES Johnson Irrigation Engine Service
<b>Application(s):</b>	Irrigation
<b>Engine Make / Model:</b>	VT1710
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	685 HP @ 2100 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: Dual ATB652T2F14-24</li><li>• Speed Controller: ESD5111</li><li>• Dual Driver Module: DDM101-PIB4134</li><li>• Thermocouples: STE101</li></ul>

**Summary:** The Cummins VT1710 Engine requires two gaseous throttle body Actuator, each receiving equal fuel levels. The Dual Driver Module (DDM101) is used to regulate the fuel in each cylinder using its fuel and exhaust temperature balance. Using the DDM101, none, one, or two actuators can have droop. Two [thermocouples](#) measure, track, and therefore trim the balance based on exhaust temperatures.

### **CUMMINS VT1710 ENGINE**



## GAC APPLICATION NOTE

### **KTТА50L DIESEL ELECTRIC LOCOMOTIVE**

<b>Customer / OEM:</b>	CUMMINS INDIA LTD.
<b>Application(s):</b>	Locomotive
<b>Engine Make / Model:</b>	Cummins KTTA50L4, 50L, 16 Cylinder, Equipped with Twin Turbo Chargers / Charge Air Cooled
<b>Fuel System Type &amp; Make / Model:</b>	Cummins PT Fuel System, Diesel
<b>Operating Speed(s):</b>	Rated at 2000BHP @ 1900 RPM
<b>Battery Voltage:</b>	12, 24, or 32 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADB120E4</li> <li>• Speed Controller: LCC107B</li> </ul>
<b>Summary:</b>	The LCC107B Closed Loop PID Speed Control Features Overspeed Sensing, Start Fuel Adjustments, Speed Selects and Excitation Control. 16 Cylinder, 2000 BHP/1900 RPM C.I.L. Engine Installation. Twin Turbo Chargers / Charge Air Cooled

#### **ACTUATOR - ADB120E4**



ADB120E4

#### **C.I.L. KTTA-50-L4 ENGINE INSTALLATION**





## LCC107B MODULE MOUNTED IN CONTROLS CABINET



## DIESEL-ELECTRIC LOCOMOTIVE



GAC APPLICATION NOTE (all of the components specified are sold separately)

## 855 NATURALLY ASPIRATED NATURAL GAS

<b>Application(s):</b>	Generators, Compressors, Others
<b>Engine Make, Model, Displacement</b>	Cummins 855 NA (14L)
<b>Equipment Make, Model:</b>	
<b>Fuel System Type &amp; Make, Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	650 to 2400 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5526E</li> <li>• Actuator: ATB652T2N-12 or 24</li> <li>• Magnetic Speed Pickup: 5/8-18 UNF-2A</li> <li>• Adaptor Plates: KT425, KT855</li> </ul>
<b>Summary:</b>	Complete Electronic Governor using GAC ATB throttle body, Speed Controller, and Customer supplied IMPCO 425 carburetor.



## DETROIT ENGINES

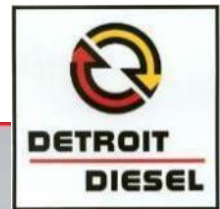
ENGINE MODEL	ACTUATOR	SPEED CONTROLLER	MSP	ACCESSORIES
<a href="#"><u>3-71, 4-71 &amp; V8-71</u></a>	<a href="#"><u>ADD225</u></a> <a href="#"><u>ADB225</u></a> <a href="#"><u>ADC225</u></a>	<a href="#"><u>ESD5111</u></a> <a href="#"><u>ESD5500E</u></a>	<a href="#"><u>MSP6728C</u></a> <a href="#"><u>MSP679</u></a>	<a href="#"><u>KT170</u></a>
<b>V12-71, V8-92 &amp; V12-92</b>	<a href="#"><u>ADB225</u></a> <a href="#"><u>ADC225</u></a>	<a href="#"><u>ESD5111</u></a> <a href="#"><u>ESD5500E</u></a>	<a href="#"><u>MSP6728C</u></a> <a href="#"><u>MSP679</u></a>	
<b>V16-71, V24-71, V16-92, V12-149 &amp; V16-149</b>	<a href="#"><u>ACB2001</u></a> <a href="#"><u>ADC225</u></a>	<a href="#"><u>ESD5330</u></a>	<a href="#"><u>MSP6728C</u></a> <a href="#"><u>MSP679</u></a>	<a href="#"><u>EAM104</u></a>
<a href="#"><u>DDEC Engines</u></a>		<a href="#"><u>EAM104</u></a>		

## GAC APPLICATION NOTE

### **3-71, 4-71, 6-71, and V8-71 ENGINES**

<b>Customer / OEM:</b>	DETROIT DIESEL
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	3-71, 4-71, 6-71 and V8-71
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	84 kW, 113 HP @ 2100 RPM, 3-71 116 kW, 155 HP @ 2100 RPM, 4-71 177 kW, 238 HP @ 2100 RPM, 6-71 237 kW, 318 HP @ 2100 RPM, V8-71
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADD225, ADB225, or ADC225 with kit KT170</li> <li>• Speed Controller: ESD5111 or ESD5500E</li> <li>• Magnetic Speed Pickup: MSP6728C or MSP679</li> </ul>

### **DETROIT 3-71, 4-71, 6-71 AND V8-71 ENGINES**





GAC APPLICATION NOTE

**V12-71, V8-92, and V12-92 ENGINES**

<b>Customer / OEM:</b>	DETROIT ENGINES
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	V12-71, V8-92, V12-92
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	355 kW, 553 HP @ 2100 RPM, V12-71 321 kW, 430 HP @ 2100 RPM, V8-92 522 kW, 700 HP @ 2100 RPM, V12-92
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225 or ADB225</li><li>• Speed Controller: ESD5111 or ESD5500E</li><li>• Magnetic Speed Pickup: MSP6728C or MSP679</li></ul>

**DETROIT V12-71, V8-92, AND V12-92 ENGINES**





## GAC APPLICATION NOTE

### **V16-71, V24-71, V16-92, V12-149, and V16-149 ENGINES**

<b>Customer / OEM:</b>	Detroit Engines
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	V16-71, V24-71, V16-92, V12-149, V16-149
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	540 kW, 724 HP @ 2100 RPM, V16-71 716 kW, 960 HP @ 2100 RPM, V16-92 1007 kW, 1350 HP @ 1900 RPM, V12-149 1343 kW, 1800 HP @ 1900 RPM, V16-149
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACB2001 or ADC225</li> <li>• Speed Control: ESD5330</li> <li>• Magnetic Speed Pickup: MSP6728C or MSP679</li> </ul>

#### **DETROIT V16-71, V16-92, V12-149 AND V16-149 ENGINES**



#### **ACTUATOR ACB2001**



#### **ESD5330**



#### **MAGNETIC SPEED PICKUPS MSP6728C AND MSP679**



## GAC APPLICATION NOTE

### **DDEC ENGINES**

<b>Customer / OEM:</b>	Detroit Engines
<b>Application(s):</b>	Various
<b>Engine Make / Model :</b>	DDEC Engines
<b>Fuel System Type &amp; Make / Model:</b>	Various
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Interface Module: EAM104</li> </ul>

**Summary:** The GAC interface module EAM104 provides for isochronous parallel operation with GAC auto synchronizer and precision load sharing.

### **EAM104 INTERFACE MODULE**



## DEUTZ

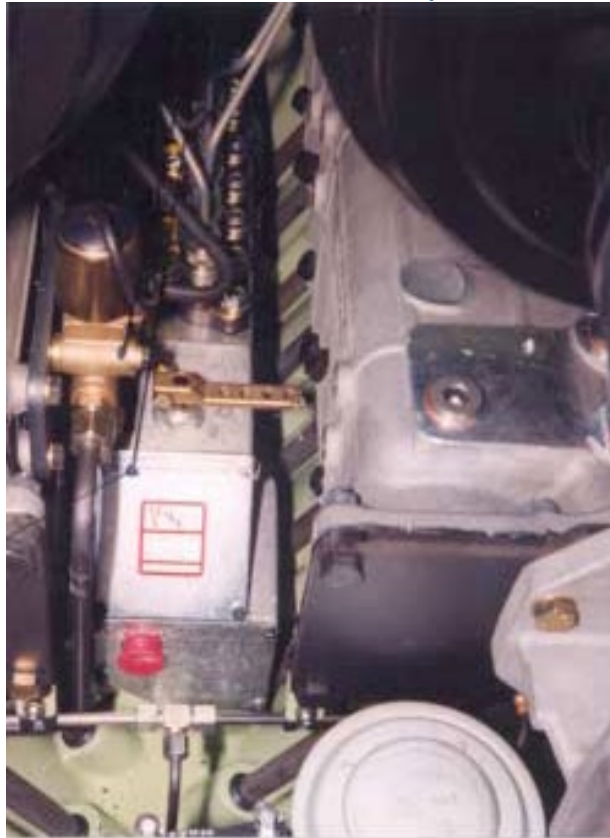
DEUTZ ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
616 Series	<a href="#">ACB275H-S1</a>			
620	<a href="#">ACE295-24</a>			
912 & 913	<a href="#">ADE176AA</a>			
1011 & 2011	<a href="#">ACD110-12</a> / 24			
1012, 1013 & 2012	<a href="#">ADD180G-12/24</a>	<a href="#">ESD5111</a> <a href="#">ESD5500E</a>		KT188
<a href="#">1015 FIMS</a>	<a href="#">ATB552T2N-12</a>	<a href="#">AFR210</a> <a href="#">ICM200-6</a>		MX60-STM SCI100, SCI103 RPR104 CL602, BK601 SPM200-1B STE101 SOX102, SPO100 STC101 GR104, 303082
1015/2015	<a href="#">ACE275J-24</a> <a href="#">ADD175A</a>	<a href="#">ESD5500E</a>		KT275
2008 Delphi Pump	<a href="#">ADD103B-12/24</a>			
TWIN 12L513	<a href="#">ACE275K-24</a>	ESD5221		RSC671
INTERFACE MODULE FOR EMR	<a href="#">ATB552T2F4-12</a> <a href="#">ATB401T1F4</a>	EAM114 <a href="#">ESD2210-12/24</a> <a href="#">ESD5550</a>	MSP6728C	MX60-STM SCI100, SCI103 RPR104 ICM200-6 CL602 BK601, BK604 SPM200-1B STE101, SOX102 SPO100, STC101 GR104, 303082 FIMS1500, SPM100 KT207, KT276 CH1220-L6, CH1208-L6 G 4 24V, G 4 12V CH1220, CH1230

GAC APPLICATION NOTE

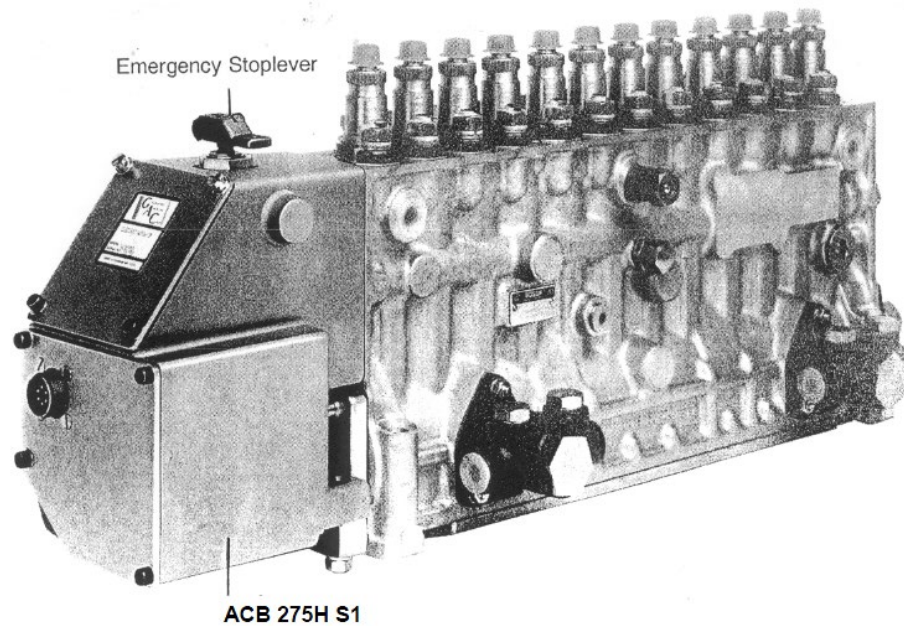
**MWM 616 SERIES**

<b>Customer / OEM:</b>	DEUTZ MWM
<b>Application(s):</b>	Genset
<b>Engine Make / Model :</b>	616 Series Engines- TBD 616 V8/V12
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Inline Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB275H S1 and ACB275G4-24</li></ul>

**275 SERIES ACTUATOR ON DEUTZ MWM TBD 616 V8/V12**



## ACB275H S1 INTEGRAL ACTUATOR ON DEUTZ 616 SERIES ENGINE





GAC APPLICATION NOTE

**MWM 620 with BOSCH P9/ P10 PUMP**

<b>Customer / OEM:</b>	DEUTZ
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	620 Engine
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch P9 and P10 Inline Pump
<b>Operating Speed(s):</b>	1500-1860 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• <b>Actuator:</b> ACE295-24</li></ul>

**ACE295-24 ACTUATOR**



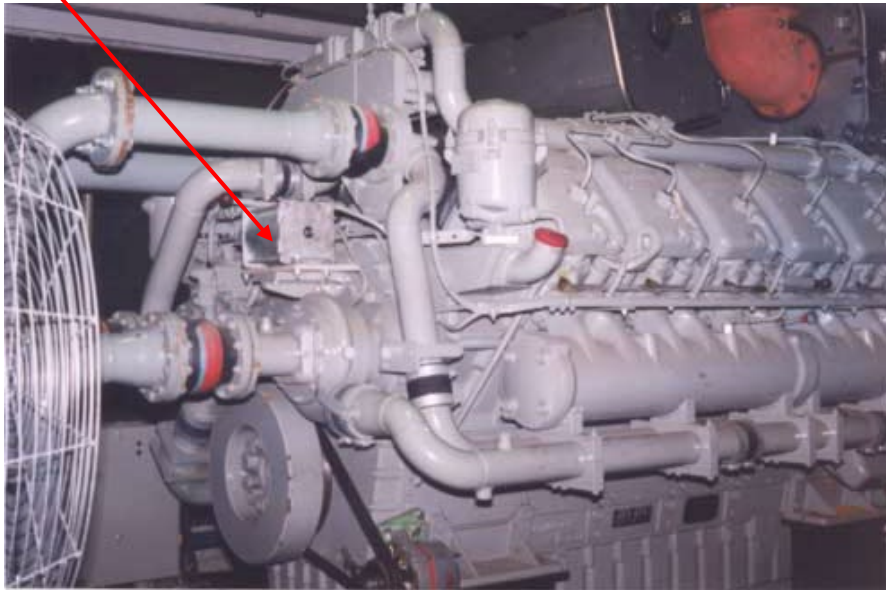
GAC APPLICATION NOTE

**MWM 620 V12 with BOSCH PE12/10/150/100LS54**

<b>Customer / OEM:</b>	DEUTZ MWM
<b>Application(s):</b>	Industrial
<b>Engine Make / Model:</b>	Deutz MWM 620, V-12, 53.2 L
<b>Fuel System Type &amp; Make / Model:</b>	Pump Bosch PE12/10/150/100LS54
<b>Operating Speed(s):</b>	Multiple
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Speed Controller: ESD5330</li><li>• Actuator: ACB2001</li></ul>

**INSTALLED ACB2001**

ACB2001



GAC APPLICATION NOTE

**912/913 ENGINES**

<b>Customer / OEM:</b>	DEUTZ
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	912 and 913 Engine
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch A Inline Pump
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	Actuator: ADE176AA Series <ul style="list-style-type: none"><li>○ 04233541-12V</li><li>○ 04233463-24V</li></ul>

**DEUTZ 912 ENGINE**



## GAC APPLICATION NOTE

### **1011 and 2011 SERIES GEN-SETS**

<b>Customer / OEM:</b>	DEUTZ
<b>Application(s):</b>	50 and 60 Hz Gen Drive Engines
<b>Engine Make / Model / Displacement / Rating:</b>	1011 and 2011 Series 2-, 3- and 4-Cylinder Engines. 0.73L/Cylinder, 1500, 1800 or 3000 RPM Applications
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Bosch Unit Pump, Diesel, Engine Mounted Pump
<b>Operating Speed(s):</b>	1500, 1800 and 3000 RPM
<b>Battery Voltage:</b>	12 or 24 VDC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Actuator: ACD110-12/24</li> </ul>

**Summary:** The ACD110 actuator mounts directly on the engine in place of the electric stop solenoid.

### **DEUTZ BF4L 1011 ENGINE**



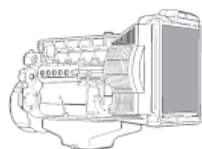
### **GAC EQUIPMENT ON DEUTZ 1011 SERIES ENGINES**

GAC ACD110-12 = Deutz part number 0428 1525 KV-12

GAC ACD110-24 = Deutz part number 0428 1524 KV-24







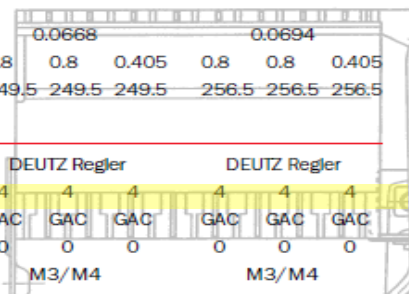
## 1011. Der Gen Motor.

18-60 kVA at 1500/1800/3000 min<sup>-1</sup>



### ► Technical data

Engine type		F2L 1011 F				F3L 1011 F				F4L 1011 F			BF4L 1011 F		
Speed	min <sup>-1</sup>	3000	1500	1800	3000	1500	1800	3000	1500	1800	3000	1500	1800	3000	1500
Frequency	Hz	50	50	60	50	50	60	50	50	60	50	50	60	50	50
<b>Engine/genset ratings<sup>1)</sup></b>															
Continuous power, ICN (COP) <sup>2)</sup>	kW	20.0	16.0	20.5	30.0	21.5	27.5	40.0	28.5	36.0	48.0	28.5	36.0	48.0	28.5
Prime power, ICN (PRP) <sup>3)</sup>	kW	21.0	17.0	22.0	31.0	22.5	29.0	42.0	30.5	38.0	50.0	30.5	38.0	50.0	30.5
Limited-time running power, IFN (LTP) <sup>4)</sup>	kW	22.0	18.0	23.0	33.0	24.0	30.5	44.0	32.0	40.0	53.0	32.0	40.0	53.0	32.0
Typical generator power output (COP) <sup>5)</sup>	kVA	23.0	18.0	23.0	34.0	24.0	31.0	45.0	32.0	41.0	54.0	32.0	41.0	54.0	32.0
Typical generator power output (PRP) <sup>5)</sup>	kVA	24.0	19.0	25.0	35.0	25.0	33.0	47.0	34.0	43.0	56.0	34.0	43.0	56.0	34.0
Typical generator power output (LTP) <sup>5)</sup>	kVA	25.0	20.0	26.0	37.0	27.0	34.0	50.0	36.0	45.0	60.0	36.0	45.0	60.0	36.0
<b>Basic engine data</b>															
Inertia moment J															
- Engine without flywheel	kg/m <sup>2</sup>	0.059			0.0678				0.0668				0.0694		
- Flywheel	kg/m <sup>2</sup>	0.499	0.8	0.8	0.499	0.8	0.8	0.405	0.8	0.8	0.405	0.8	0.8	0.405	0.8
Weight, engine with radiator	kg	167	208	208	208	249.5	249.5	249.5	256.5	256.5	256.5	256.5	256.5	256.5	256.5
<b>Governing</b>															
Governor mechanical		DEUTZ Regler	DEUTZ Regler			DEUTZ Regler			DEUTZ Regler			DEUTZ Regler			
- Speed droop (static)	%	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Governor electronic		GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC	GAC
- Speed droop (static, option)	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Control quality <sup>6)</sup>		M3/M4	M3/M4			M3/M4			M3/M4			M3/M4			



GAC APPLICATION NOTE

## 1012 and 1013 ENGINES

**Customer / OEM:**

**Application(s):**

**Engine Make / Model:**

DEUTZ / VOLVO

Engine

**Deutz:**

- BF4M1012, Inline 3.19L 4 cylinder
- BF6M1012, Inline 4.79L 6 cylinder
- BF4M1013, Inline 4.76L 4 cylinder
- BF6M1013, Inline 7.12L 6 cylinder
- 2012 Engine

**Volvo:**

- 520 Inline 7.76L 4 cylinder
- 720 Inline 7.15L 6 cylinder

**Fuel System Type & Make / Model:**

**Operating Speed(s):**

**Battery Voltage:**

**Installed Products:**

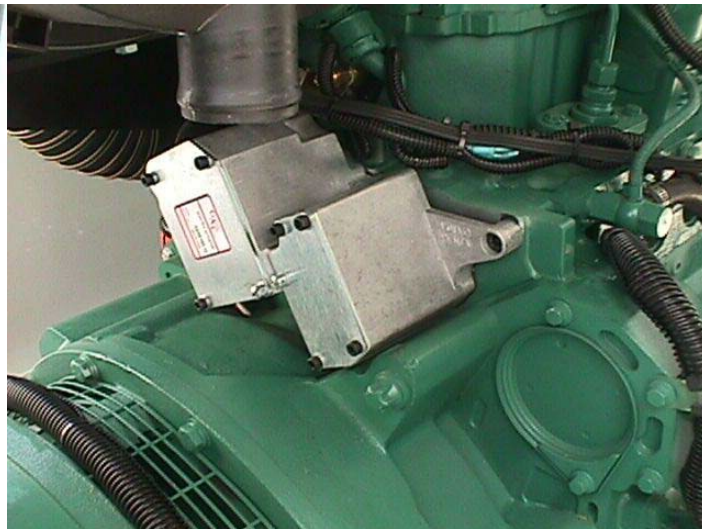
Diesel, Engine Mounted Pump

1500 / 1800 RPM

12 or 24 V DC

- Actuator: ADD180G with KT188
- Speed Controller: ESD5111 or ESD5500E

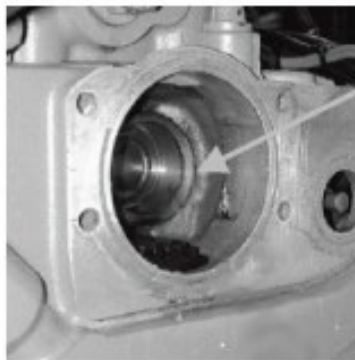
### ENGINE MOUNTED ADD180G-12 OR -24 ACTUATOR



## ADD180G



### FREEZE PLUG INSTALLATION



**Figure 1** - Inner Bore to be Cleaned. Apply Loctite here.



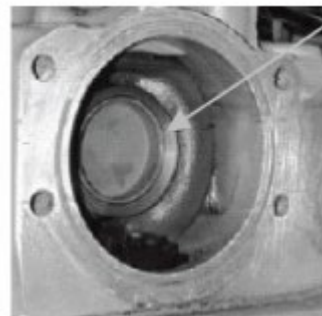
**Figure 2** - Freeze Plug. Make sure this surface is clean and free of nicks or burrs. Use Loctite on outer surface.

### FREEZE PLUG INSTALLATION

### FREEZE PLUG INSTALLATION



**Figure 3 (left) & 4 (below)** - Use a length of 38mm diameter steel pipe to drive the Freeze Plug into the engine's inner bore.



**Figure 5** - Align the Freeze Plug to this edge.

## GAC APPLICATION NOTE

### **BF6M1015GCP- FIMS**

<b>Customer / OEM:</b>	DEUTZ 1015 Series Engines
<b>Application(s):</b>	LNG / CNG / Biogas Fueled Generator Set
<b>Engine Make / Model:</b>	Deutz V6, 11.9L, Model #BF6M1015GCP Turbo Charged / Intercooled
<b>Fuel System / Battery Voltage:</b>	Continuous Rating: 300 kW at 1500 RPM, 295 kW at 1800 RPM
<b>Operating Speed(s):</b>	Natural gas / 12 V DC 300 kW @ 1500 RPM, 295 kW @ 1800 RPM

<b>Products:</b>	<ul style="list-style-type: none"> <li>• ATB552T2N-12 55 mm Throttle Body Actuator</li> <li>• AFR210 Integrated Venturi Mixer Control / Engine Speed Controller</li> <li>• MX60-STM 60 mm Mixer with Stepper Motor</li> <li>• SCI100 Variable Reluctance Speed Sensor</li> <li>• RPR104 Zero Pressure Gas Regulator</li> <li>• ICM200-6 Ignition Control Module</li> <li>• CL602 Ignition Coil</li> <li>• BK601 Coil Bracket, 6 Cylinder</li> <li>• SPG100-002 Spark Plugs &amp; Wires</li> <li>• SPM200-1B 1 Bar MAP Sensor</li> <li>• STE101 Exhaust Gas Temperature Sensor</li> <li>• SOX102 O2 Sensor</li> <li>• SPO100 Oil Pressure Sensor</li> <li>• STC101 Coolant Temperature Sensor</li> <li>• GR104 24-1, 68mm Trigger Wheel</li> <li>• SCI103 Hall Effect Sensor / 90° Connector</li> </ul>
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**Summary:** Variations of the Deutz 6 cylinder 1015 LNG / CNG / Biogas fueled engines with GAC Fuel and Ignition Management System components are used in gen-sets, industrial and agricultural applications with wide range of power ratings.

### **GAC FIMS SYSTEM ON DEUTZ 6 CYLINDER 1015 LNG / CNG / BIOGAS FUELED ENGINE**





## GAC APPLICATION NOTE

### **1015 ENGINES**

<b>Customer / OEM:</b>	DEUTZ
<b>Application(s):</b>	Industrial, Mobile Equipment, Construction, Power Generation
<b>Engine Make / Model:</b>	Deutz 1015, V-8 15.87 L, or V-6 11.9L, Water Cooled, Turbocharged
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch Inline 6 or 8-cylinder, P3000 Series Pump
<b>Operating Speed(s):</b>	1500, 1800 RPM – Generator; Min idle 550 RPM, maximum nominal speed 2100 RPM: mobile machinery
<b>Battery Voltage:</b>	24 V
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACE275H-24 (standard unit) or ACE275J-24 (with oil drain fitting and high-torque return fitting – contact GAC for selection)</li> <li>• Speed Controller: ESD5500E</li> <li>• Mounting Kit: KT275 (P3000 Series Camshaft Bearing Retainer Kit)</li> <li>• With EDC pump use ADD175A with KT197</li> </ul>

### **ACE275H-24 ON V8 ENGINE**



ACE275H-24

## ACE275J-24 ON V6 ENGINE



ACE275J-24

Note: Oil drain on top cover

GAC APPLICATION NOTE

**2008 ENGINE with DELPHI PUMP**

<b>Customer / OEM:</b>	DEUTZ
<b>Application(s):</b>	
<b>Engine Make / Model:</b>	2008 Engine, Delphi Pump
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Delphi DPG pump
<b>Operating Speed(s):</b>	36 HP @ 3000 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD103B</li></ul>

**ADD103 SERIES ACTUATOR**



## GAC APPLICATION NOTE

### **12L513 ENGINES**

<b>Customer / OEM:</b>	Alaska Runner Generators
<b>Application(s):</b>	Hovercraft
<b>Engine Make / Model:</b>	DEUTZ 12L513, V-12, 19.14 L
<b>Equipment Make / Model:</b>	Alaskan AP188 Hovercraft Main Propellers
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Inline Pump
<b>Operating Speed(s):</b>	252-543 HP
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACE275</li><li>• Speed Controller: ESD5221</li><li>• Speed Ramping Controller: RSC671</li><li>•</li></ul>

**Summary:** The Alaskan AP188 Hovercraft uses two RCS671 controllers in conjunction with two ESD5221 controllers driving two ACE275 Actuator installed on the main propulsion engines, Deutz 12L513's, powering two 9 foot propellers.

### **ALASKAN AP188 HOVERCRAFT**





## GAC APPLICATION NOTE

# DEUTZ ENGINES with EMR INTERFACE MODULE

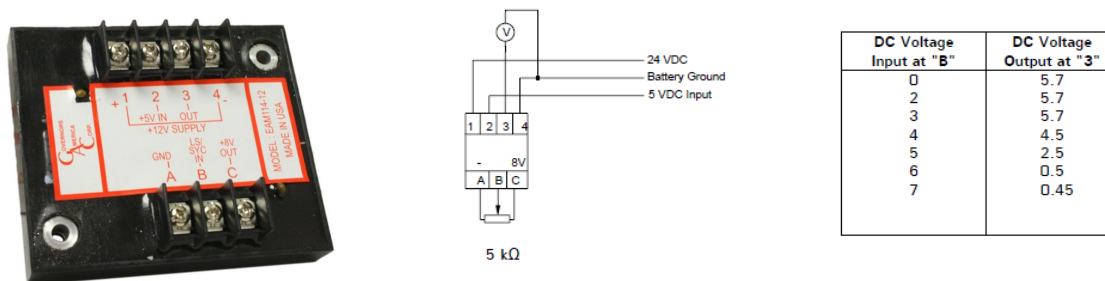
<b>Application(s):</b>	Engine Control System
<b>Engine Make / Model:</b>	DEUTZ EMR
<b>Fuel System Type &amp; Make / Model:</b>	
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Interface Module: EAM114</li> </ul>

**Summary:** The EAM114 is an electronic interface module that provides signal conditioning to operate the DEUTZ EMR engine control system. It is typically used with a GAC auto synchronizing and load sharing system is connected to the DEUTZ EMR engine control system.

The DC supply for the interface comes from the common battery source for the Speed Controller and the accessory controls. The input to the module (Terminal B) is typically at 5.0 V DC, which represents the auto-sync and load sharing outputs analog signals. The output of the EAM114 to the EMR engine control is 2.5 V DC with the EMR 5.0 V DC reference connected to Terminal 2.

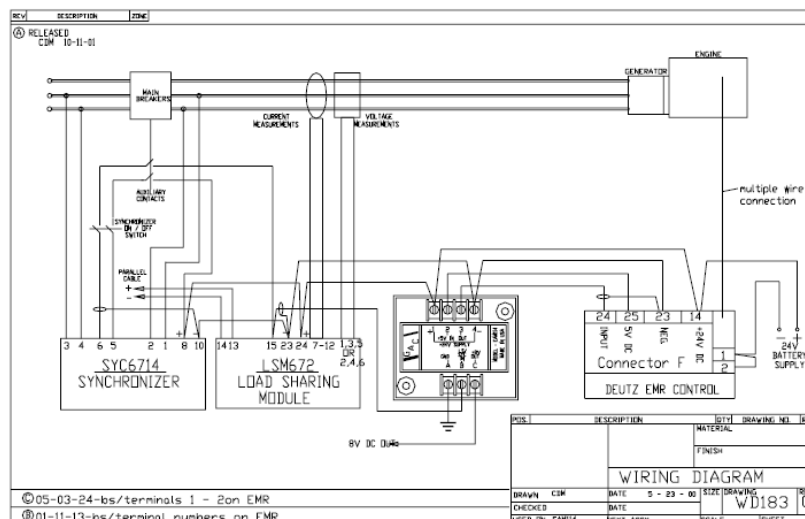
## EAM114

## TESTING EAM114



DC Voltage Input at "B"	DC Voltage Output at "3"
0	5.7
2	5.7
3	5.7
4	4.5
5	2.5
6	0.5
7	0.45

## WIRING DIAGRAM WD183C



## DOOSAN

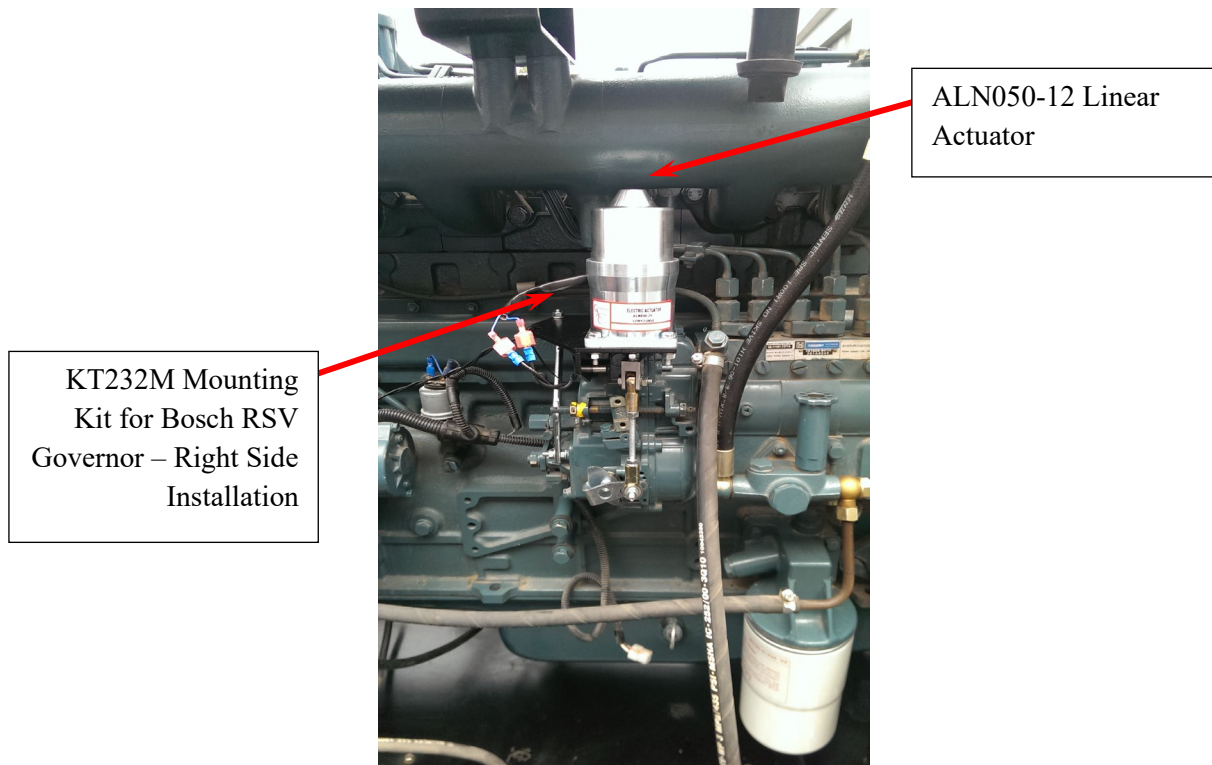
ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
D1146T	<a href="#">ALN050</a>	<a href="#">ESD5500E</a> <a href="#">ESD5550</a> <a href="#">ESD5550M</a>	<a href="#">MSP675</a>	<a href="#">KT232R/231L</a> <a href="#">JDR050</a>

## GAC APPLICATION NOTE

### **D1146T ENGINE**

<b>Customer / OEM:</b>	Infracore
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model / Displacement / Rating:</b>	DOOSAN D1146T 8.1L 6 Cylinder 1800 RPM 113 kW Continuous Power, 138 kW Standby 1500 RPM 97 kW Continuous Power, 118 kW Standby
<b>Equipment Make / Model:</b>	G-Drive
<b>Fuel System Type &amp; Make / Model:</b>	Zexel In-Line “AD” Pump with RSV All Speed Governor
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ALN050</li> <li>• Speed Controller: ESD5500E</li> <li>• Magnetic Speed Pickup: MSP675</li> <li>• Mounting Kit: KT232 mounts an ALN050 to onto a Bosch RSV governor (right side) run/stop lever. Kit KT231 is for left-side governor.</li> </ul>
<b>Summary:</b>	Doosan Infracore engines for power generation are built for maximum power output and durability and are installed in prime and standby generators worldwide.

### **DOOSAN D1146T ENGINE WITH GAC ALN050 ACTUATOR AND KT232**



## FORD

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
300 natural gas or propane	<a href="#">ATB401T1N</a> -12 or 24	<a href="#">ESD5159</a> <a href="#">ESD5526</a> <a href="#">ESD5500</a> <a href="#">EEG6500</a>		EC1300 <a href="#">TP501</a> <a href="#">KT425-T2</a>
460	<a href="#">ATB552T2N-12, 24</a>	<a href="#">ESD5159</a> <a href="#">ESD5526</a> ESD5500-II <a href="#">EEG6500</a>	<a href="#">MSP6729</a>	KT41761 KT425-T2 TP501
460	<a href="#">ADC225GS -12</a> or 24	<a href="#">ESD5500E</a> <a href="#">EEG6500</a>	<a href="#">MSP6729</a>	KT121M TP501

GAC APPLICATION NOTE (all of the components specified are sold separately)

## 460 IN<sup>3</sup> ENGINE, NATURAL GAS

<b>Customer / OEM:</b>	The Governor Shop
<b>Application(s):</b>	Generator, Power Generation,
<b>Engine Make, Model, Displacement</b>	FORD 460 in <sup>3</sup> with Woodward L-Series 8404-2009
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: EEG6500</li> <li>• Throttle Body: ATB401T1N-12 or 24 V DC</li> <li>• Magnetic Speed Pickup: MSP6729</li> </ul>
<b>Summary:</b>	The Governor Shop in Edmonton, Canada updated this turbocharged Ford 460 engine with a Woodward L-Series 8404-2009 to respond to load changes. It stalled for any appreciable load change. With the GAC ATB and EEG6500 installed, the engine had no trouble with turbo lag, the delay it had been experiencing during load transients caused by air-fuel ratio change needs.

### FORD 460



### ATB AND ESD6500 INSTALLATION





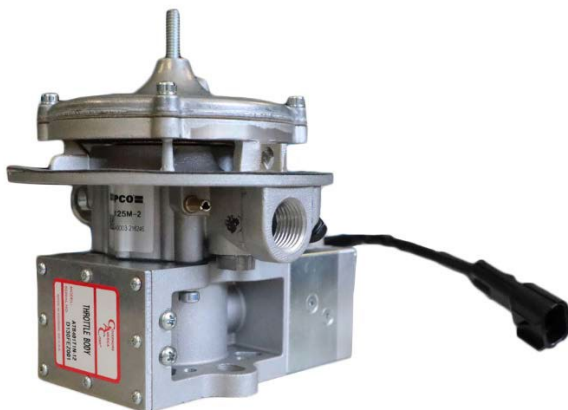
GAC APPLICATION NOTE (all of the components specified are sold separately)

## 300 IN<sup>3</sup> ENGINE, NATURAL GAS or PROPANE

<b>Customer / OEM:</b>	Electronic Governor Solution with GAC ATB (ref. KT300ATB)
<b>Application(s):</b>	Power Generation, Water Pump, Forklift, others
<b>Engine Make, Model, Displacement</b>	FORD 300 in <sup>3</sup> (4.9 L), 6 cylinders
<b>Equipment Make / Model:</b>	Various
<b>Fuel System Type &amp; Make, Model:</b>	Impco 125 gas carburetor mixer (GAC part no. MX125M-2)
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500</li> <li>• Throttle Body: ATB401T1N-12 or 24 V DC</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Mating Connector: EC1300</li> <li>• 5K Potentiometer: TP501</li> <li>• Air Filter (optional): AIR1-1</li> </ul>
<b>Summary:</b>	<p>This a complete Electronic Governing system for the natural gas or propane fueled Ford 300 in<sup>3</sup> engine using a Governors America Throttle Body with either a Customer or GAC supplied Impco 125 carburetor- mixer. <a href="#">COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.</a></p>

### MOUNTING MIXER-CARBURETOR ON ATB

The Impco 125 mixer carburetor can be purchased from GAC (MX125M-2) or customer supplied. Use the gaskets included with the carburetor to mount to the ATB.



### OPTIONAL AIR FILTER

The optional air filter is recommended but not required.



GAC APPLICATION NOTE (all of the components specified are sold separately)

## 460 IN<sup>3</sup> ENGINE, NATURAL GAS OR PROPANE

<b>Customer / OEM:</b>	Electronic Governor Solution with GAC ATB (ref. KT460ATB)
<b>Application(s):</b>	Power Generation, Water Pump, Forklift, others
<b>Engine Make, Model:</b>	FORD 460 in <sup>3</sup> (7.5 L), 8 cylinders
<b>Fuel System Type &amp; Make, Model:</b>	Impco 425 gas carburetor mixer (customer supplied)
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5159, ESD5526, ESD5500-II or EEG6500</li> <li>• Throttle Body: ATB552T2N-12 or 24 V DC</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Installation Kits: <ul style="list-style-type: none"> <li>• KT41761 (intake manifold to throttle body-open square Holley Pattern)</li> <li>• KT425-T2</li> </ul> </li> <li>• 5K Potentiometer (optional): TP501</li> </ul>

**Summary:** This a complete Electronic Governing system for the natural gas or propane fueled Ford 460 in<sup>3</sup> engine using a Governors America Throttle Body with a Customer supplied Impco 425 carburetor- mixer. [COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.](#)

## ELECTRONIC GOVERNING SYSTEM FOR FORD 460 IN<sup>3</sup> NATURAL GAS OR PROPANE ENGINE

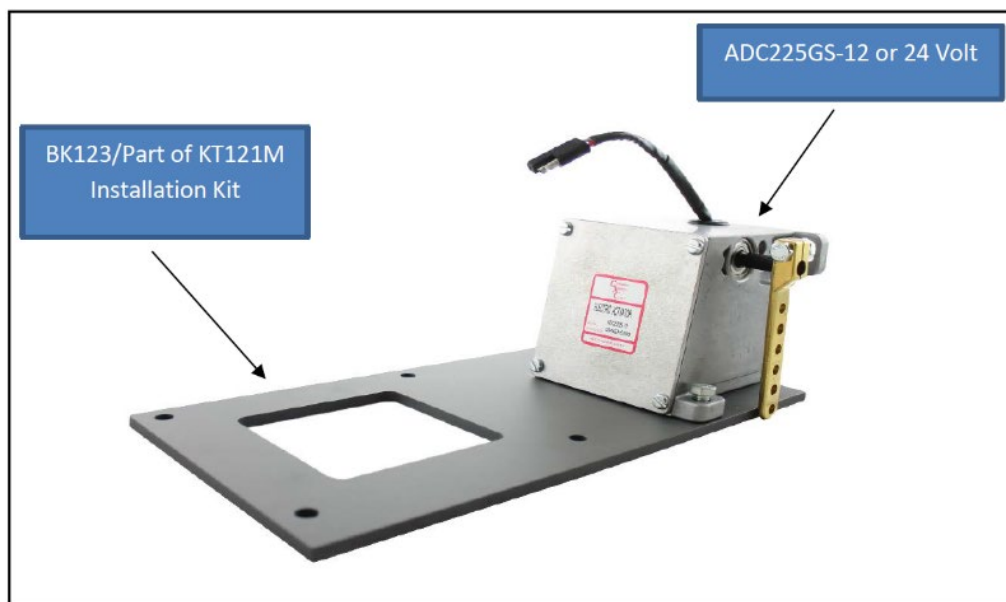


GAC APPLICATION NOTE (all of the components specified are sold separately)

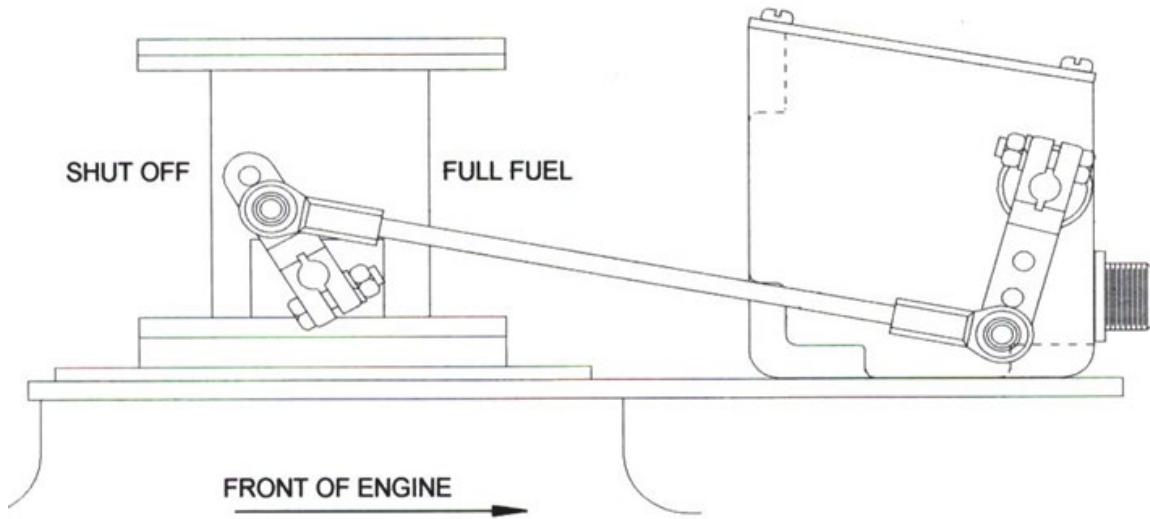
## 460 IN<sup>3</sup> NA or TURBOCHARGED ENGINE

<b>Customer / OEM:</b>	Electronic Governor Solution with GAC 225 Series Actuator (KT460A)
<b>Application(s):</b>	Power Generation, Water Pump, Forklift, others
<b>Engine Make, Model, Displacement</b>	FORD 460 in <sup>3</sup> (7.5 L), 8 cylinders
<b>Equipment Make, Model:</b>	Various
<b>Fuel System Type &amp; Make, Model:</b>	Carbureted or Throttle Body
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5500E or EEG6500</li> <li>• Actuator: ADC225GS -12 or 24 V DC</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Installation Kit : KT121M</li> <li>• 5K Potentiometer (optional): TP501</li> </ul>
<b>Summary:</b>	This a complete Electronic Governing system for a carbureted or throttle body equipped Ford 460 in <sup>3</sup> naturally aspirated (NA) or turbocharged engine using a Governors America 225 Series Actuator. <a href="#">COMPLETE INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE.</a>

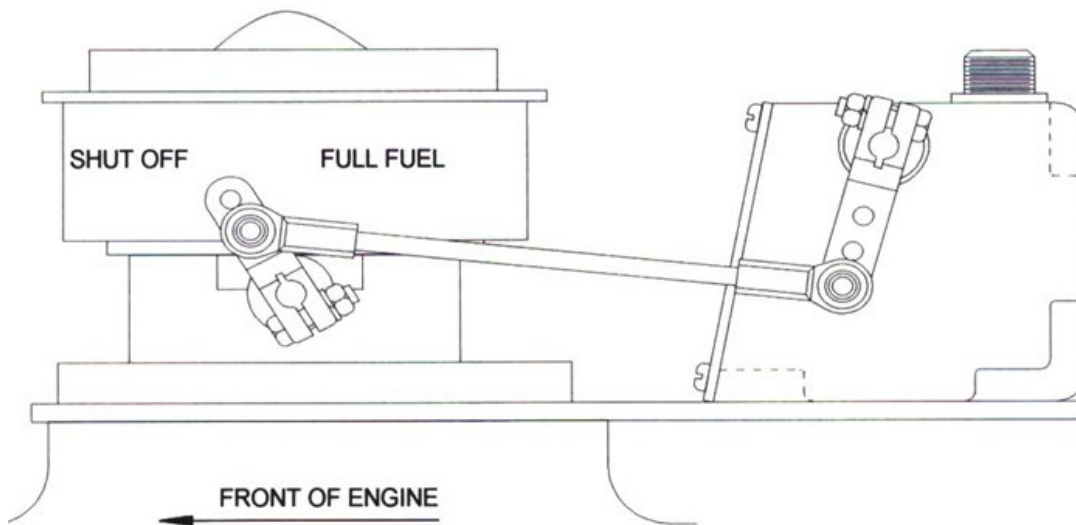
### COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A FORD 460 IN<sup>3</sup> ENGINE



## TURBOCHARGED



## NATURALLY ASPIRATED



## HATZ

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
1B Series	ADD107L01B-12/24			
35W Series	ADD107L35W-12/24		MSP6730	



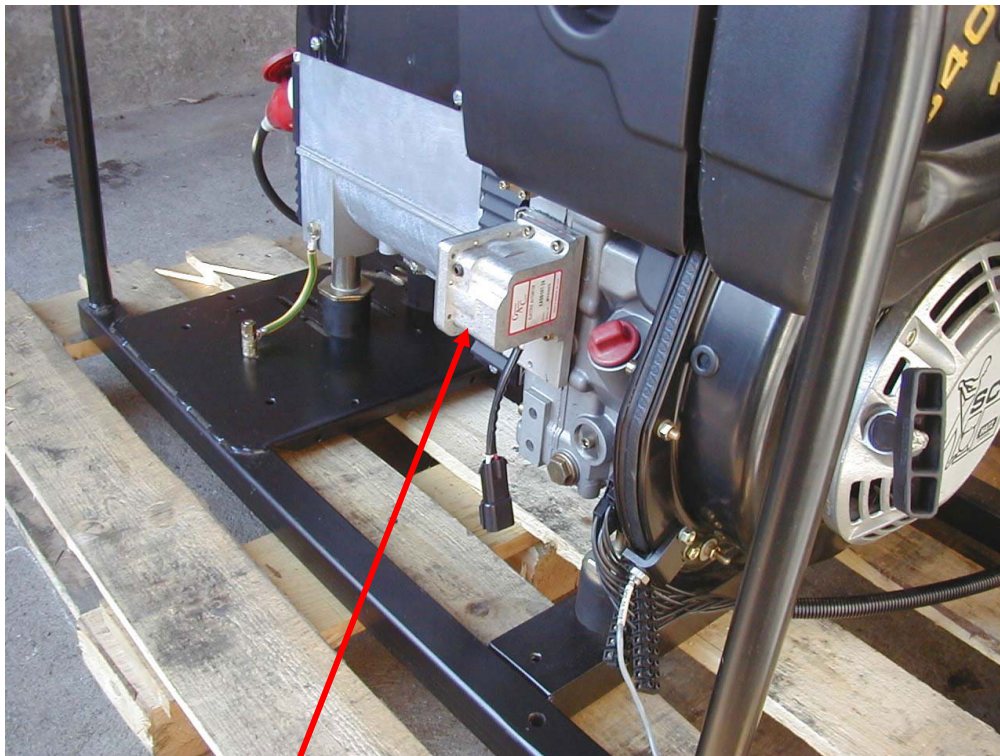
## GAC APPLICATION NOTE

### **1B SERIES ENGINES**

<b>Customer / OEM:</b>	Hatz
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	1B
<b>Equipment Make / Model:</b>	HATZ 1B Series Engines
<b>Fuel System Type &amp; Make / Model:</b>	Various
<b>Operating Speed(s):</b>	1.5 to 8 kW at max speed of 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD107L01B-12/24</li></ul>

**Summary:** Factory mounted, tested, and released system. (retrofit not recommended)  
Isochronous and Droop operation  
Works with SDG, IGC and ESD control-units

### **INTEGRAL ADD107 ACTUATOR ON HATZ 1B SERIES ENGINE**



ADD107L01B-12/24

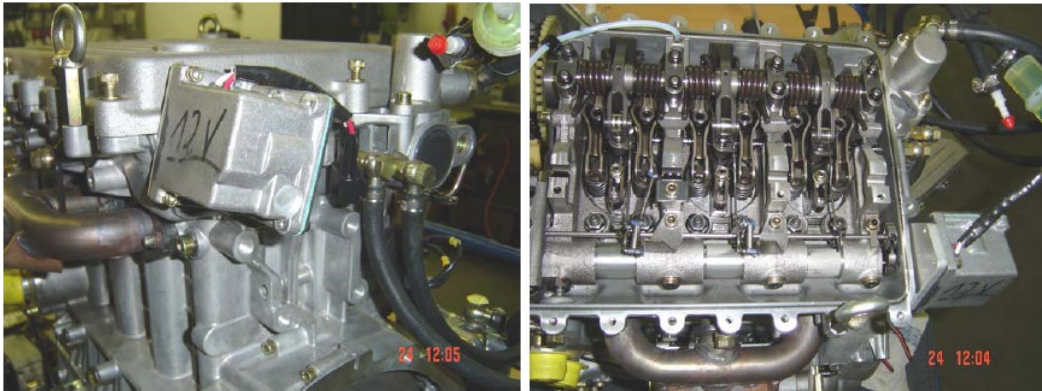
## GAC APPLICATION NOTE

### **35W SERIES ENGINES**

<b>Customer / OEM:</b>	Hatz
<b>Application(s):</b>	Various
<b>Engine Make / Model :</b>	35W
<b>Equipment Make / Model:</b>	HATZ 35W Series Engines
<b>Fuel System Type:</b>	
<b>Battery Voltage:</b>	12 or 24 V
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD107L35W-12/24</li><li>• Magnetic Speed Pickup: MSP6730</li></ul>

**Summary:** Factory mounted, tested, and released system. (retrofit not recommended)  
Isochronous and Droop operation  
Works with SDG, IGC, EDG and ESD control-units  
Direct Link to the fuel rack

### **INTEGRAL ADD107 ACTUATOR ON HATZ 35W SERIES ENGINE**



### **MSP6730 ON HATZ 35W SERIES ENGINE**



## JOHN DEERE

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
IRRIGATION PUMP	<a href="#">ADC120S</a> -12/24	IGC745-02-04		
3029, 4045, 6068, with Stanadyne D- pump	ADC100	ECC328 (no mag pickup required) ESD22444, ESD2402 ESD5120, ESD5520 ESD5500-II	MSP 6728C	



## GAC APPLICATION NOTE

### **JOHN DEERE DIESEL ENGINE with CAV-DPA ROTARY PUMP**

**Customer / OEM:**

**Application(s):**

Irrigation Pump

**Engine Make / Model :**

2040, others

**Equipment Make / Model:**

JOHN DEERE

**Fuel System Type & Make / Model:**

Diesel, CAV-DPA Rotary Pump

**Operating Speed(s):**

**Battery Voltage:**

12 or 24 V DC

**Installed Products:**

- Actuator : ADC120S – 12/24
- Integrated Governor: IGC745-02-04

#### **IRRIGATION PUMP**



#### **IGC ON IRRIGATION PUMP**



#### **ADC120S ACTUATOR ON IRRIGATION PUMP**

IGC745-02-04



ADC120S  
Actuator



## BACK OF INTEGRATED GOVERNOR



Back View

IGC745-02-04

## VALVES



## Digital Governors



### IGC700 Series

- Integrated engine governor & protection control
- 3 Contacts (starter motor, fuel valve or solenoid output, alarm or preheat)
- SMARTTOUCH® 16 character keypad for easy set-up and troubleshooting
- Password protected for greater security
- LED bar graph for set-up and troubleshooting
- Non-volatile E<sup>2</sup> memory
- Fixed speeds, plus variable speed range
- Configurable fuel limit control

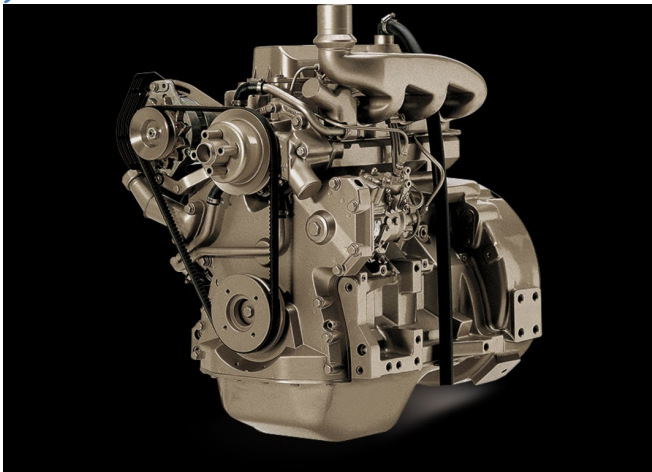


## GAC APPLICATION NOTE

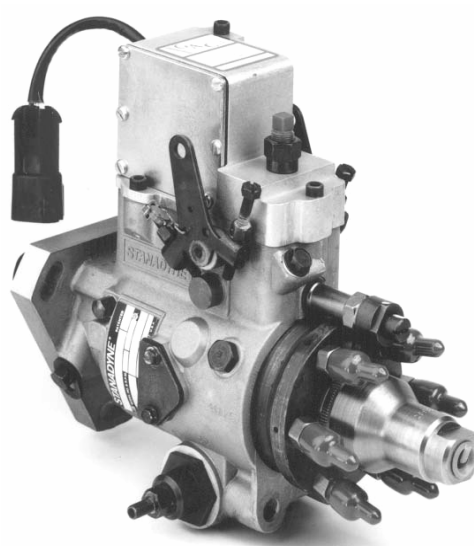
### **3029 / 4045 / 6068 WITH STANADYNE PUMPS**

<b>Customer / OEM:</b>	John Deere and Stanadyne
<b>Application(s):</b>	Engine
<b>Engine Make / Model / Displacement / Rating:</b>	JOHN DEERE 3029, Inline 3 cylinder, 2.9 L / 4045, Inline 4 cylinder, 4.4 L / 6068, Inline 6 cylinder, 6.8 L
<b>Fuel System Type &amp; Make / Model:</b>	Stanadyne D-series fuel injection pump
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<p>Governor – light force</p> <ul style="list-style-type: none"> <li>• ECC328 (no mag pickup required)</li> <li>• ESD2244 (basic isochronous)</li> <li>• ESD2402 (basic isochronous with idle and anti-windup)</li> <li>• ESD5120 (isochronous, variable, and drip with no start fuel / speed ramping)</li> <li>• ESD5520 (same as 5120 with start fuel and speed ramp control)</li> <li>• ESD5526 (same as 5520 with anti-windup for gaseous applications)</li> <li>• ESD5570 (same as 5520 with speed switch contacts)</li> <li>• ESD5500-II (fusion series – all features of 5500 series)</li> <li>• Actuator: ADC100-VV</li> <li>• Magnetic Speed Pickup: MSP 6728C</li> </ul>

**JOHN DEERE 3029**



**ADC100 ON PUMP**



## IVECO

A cross reference a GAC replacement with an Iveco part numbers see the cross reference at the end of this guide [here](#).

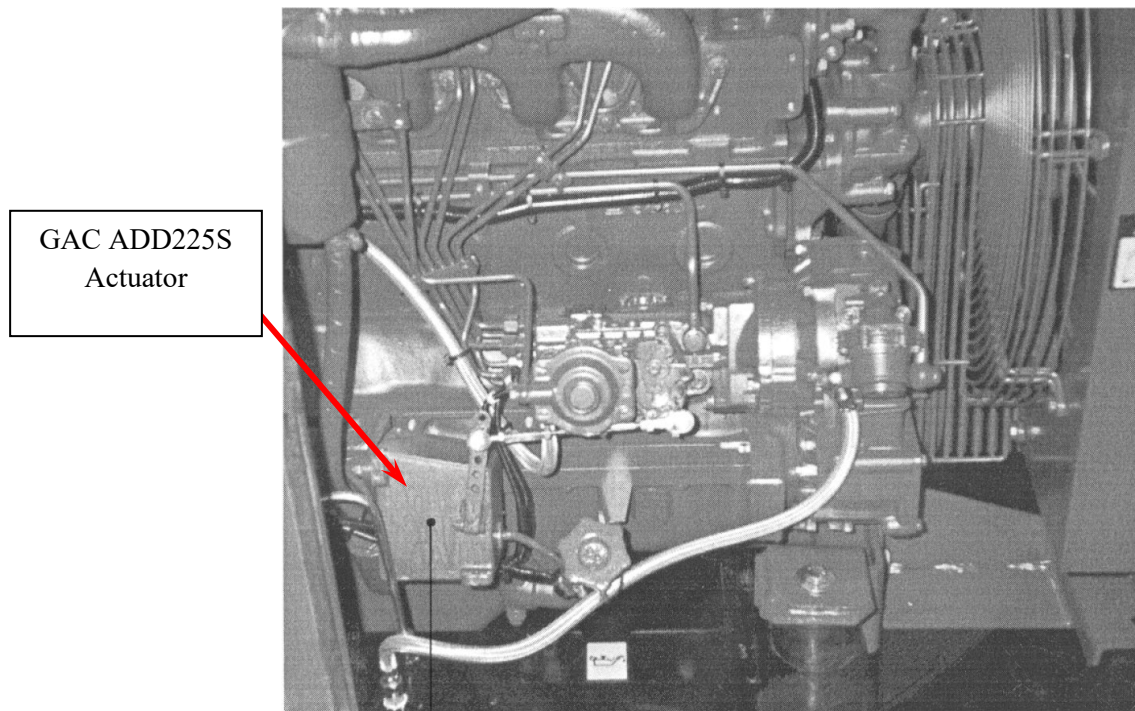
ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
7450, 7675, 8031 & 8061	<a href="#">ADD225S-12</a>	<a href="#">ESD5111</a>	<a href="#">MSP6721C</a>	<a href="#">KT276</a>
	ADD225S-24	<a href="#">ESD5500E</a>	<a href="#">MSP6728C</a>	<a href="#">KT275</a>
	<a href="#">ADB225F</a>	<a href="#">ESD5330</a>	<a href="#">MSP6732</a>	
	<a href="#">ACB2001</a>	EGS1013		
	<a href="#">ACD275H</a>	<a href="#">ESD5330</a>		
	<a href="#">ADD225SC</a> -12, -24	SDG721		
	<a href="#">ADD175A</a> -24	<a href="#">SDG725</a>		
	<a href="#">ADC100</a> -12, -24			

GAC APPLICATION NOTE

**7450, 7675, 8031, and 8061 ENGINES**

<b>Customer / OEM:</b>	IVECO
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model:</b>	IVECO 7450 Inline 4 cylinder, 5.0 L / 7675, Inline 6 cylinder, 7.5 L / 8031, Inline 3 cylinder, 2.9 L / 8061, Inline 6 cylinder, 5.9 L
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch VE Pump
<b>Operating Speed(s):</b>	1500 RPM
<b>Battery Voltage:</b>	12 or 24 V
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225S-12/24 or ADC225S-12/24</li><li>• Speed Controller: ESD5111 or ESD5500E</li></ul>

**ADD225S ACTUATOR ON IVECO 7450, 7675, 8031 AND 8061 ENGINES**



## KIRLOSKAR

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
6SL8800TA	ADC225D1S	<a href="#">ESD5160</a>		
DV8, DV10 & DV12	<a href="#">ADD175SA</a> -24	<a href="#">ESD5550</a>		

## GAC APPLICATION NOTE

### **6SL8800TA ENGINE with INLINE PUMP**

<b>Customer / OEM:</b>	KIRLOSKAR Oil Engines Ltd. – Pune, India
<b>Application(s):</b>	Fire Pump
<b>Engine Make / Model:</b>	Kirloskar 6SL8800TA
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Inline pump
<b>Operating Speed(s):</b>	355 HP @ 2100 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC225D1S</li> <li>• Speed Controller: ESD5160</li> </ul>

**Summary:** The **ESD5160** speed control is specifically designed for fire pump applications. It is CE certified, reverse acting and has an extended speed range. It has adjustable PID for either isochronous, variable or droop governing.  
The **ADC225D1S** actuator has an extended universal through shaft and internal dual return springs for fail-safe operation.

## **KIRLOSKAR FIRE PUMPS**

**Fire Fighting Pump-sets Powered By Kirloskar 6SL8800TA Engines**  
**Rated at 355 HP / 2100 RPM**





## GAC EQUIPMENT ON KOEL FIRE PUMP APPLICATION

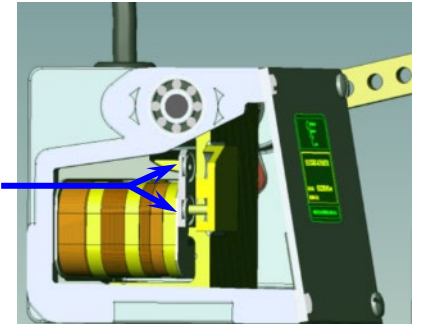


**ESD5160** Speed Controller Designed for Fire-pump Applications CE Certified, Reverse Acting with Extended Speed Range, Isochronous, Variable and Droop Operation.

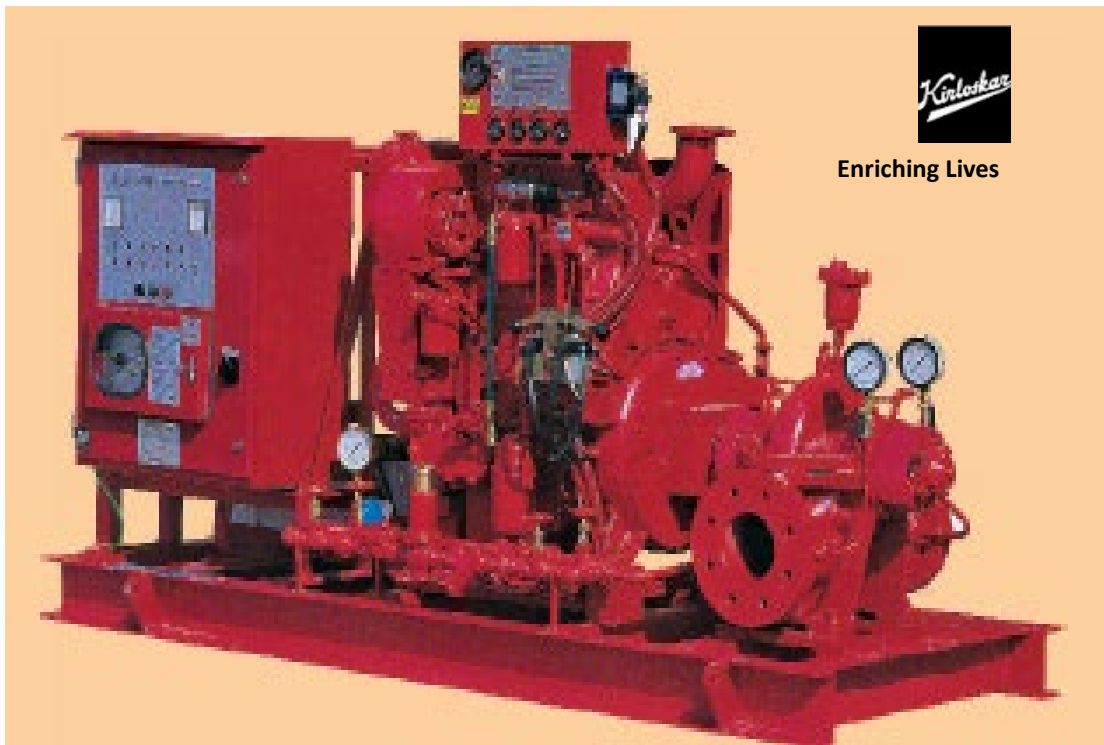


**ADC225D1S** Actuator with Dual Springs and Extended Travel

Dual Actuator Return Spring Installation



## KOEL FIRE PUMP



## GAC APPLICATION NOTE

### **DV SERIES ENGINES**

**Customer / OEM:**

**Application(s):**

**Engine Make / Model:**

**Fuel System Type & Make / Model:**

**Operating Speed(s):**

**Battery Voltage:**

**Recommended Products:**

**Summary:**

KIRLOSKAR Oil Engines Ltd – Pune, India

Power Generation, Fire Pumps, Hydraulic Drives

KOEL DV8: 15.9L, 346 kW/490 HP at 1500 RPM

KOEL DV10: 19.9L, 448 kW/608 HP at 1500 RPM

KOEL DV12: 23.9L, 552 kW/750 HP at 1500 RPM

Diesel, Bosch inline P-Pump

1500 RPM operating / 800 RPM idle

24 V DC

- Actuator: ADD175SA-24

- Speed Controller: ESD5550

The ADD175SA is designed to mount directly to fuel injection Bosch-style “P” pumps to achieve an integrated proportional fuel control package. Its control arm assembly connects directly to the fuel rack in place of a mechanical governor. The actuator includes a manual shut-off lever.

### **DV10 ENGINE / GEN-SET DRIVE**



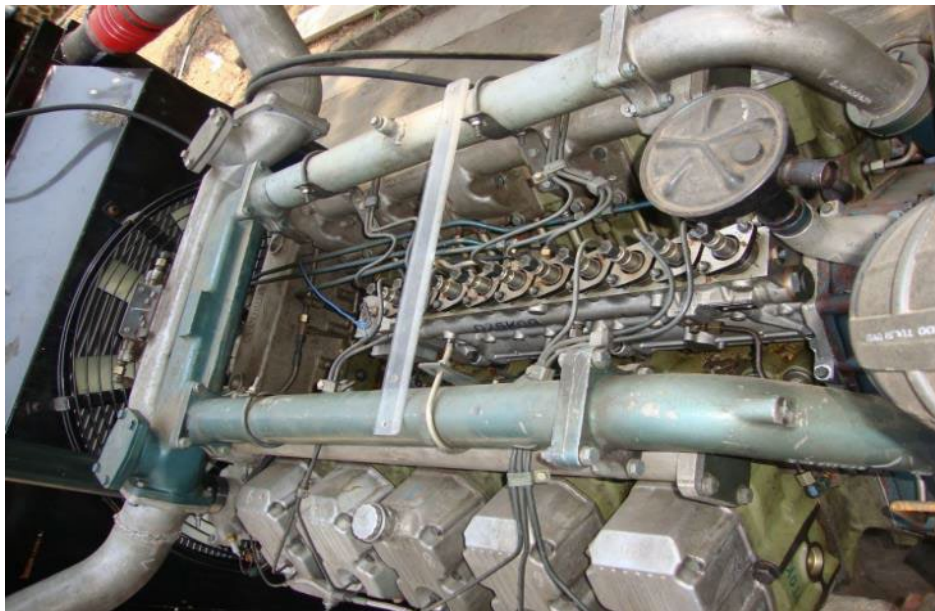
## TEST STAND MOUNTED “P” PUMP WITH GAC ACTUATOR

### ADD175SA-24 ACTUATOR ON DV10 “P” PUMP



## “P” PUMP / ADD175SA-24 ACTUATOR ON DV10 ENGINE

### DV10 ENGINE INSTALLATION



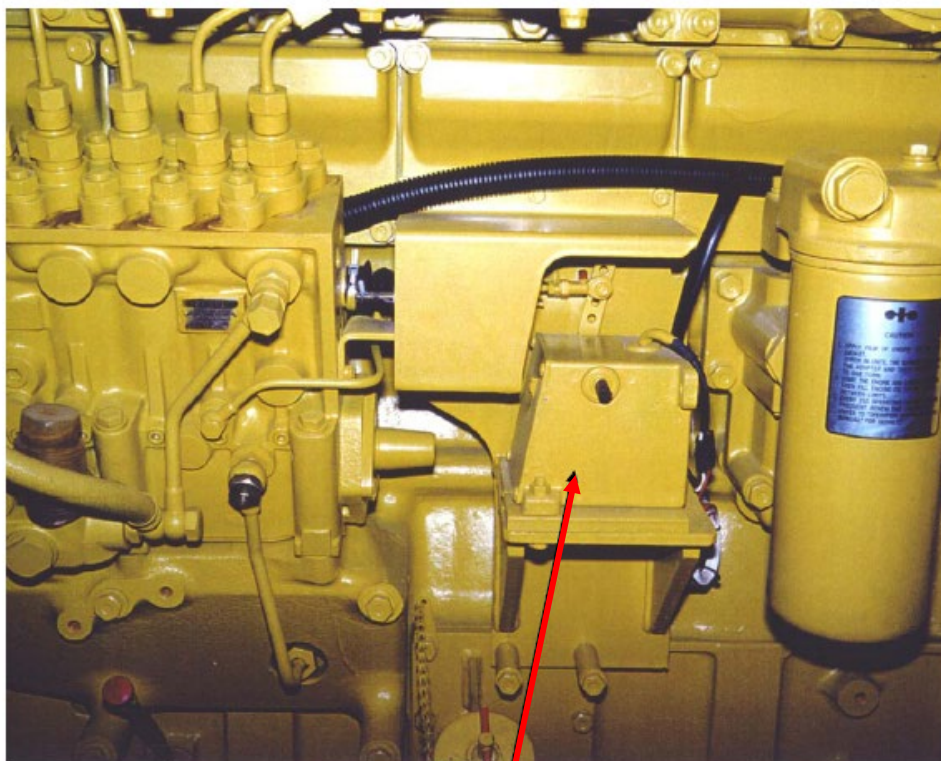
## KOMATSU

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
SAA 170-G3	<a href="#">ADC225S-24</a>			
GEN. SET	<a href="#">ADC225GAS-24</a>			

GAC APPLICATION NOTE

**SAA 170-G3 ENGINES**

<b>Customer / OEM:</b>	KOMATSU
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	SAA 170-G3
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225S-24</li></ul>



ADC225S-24 Actuator



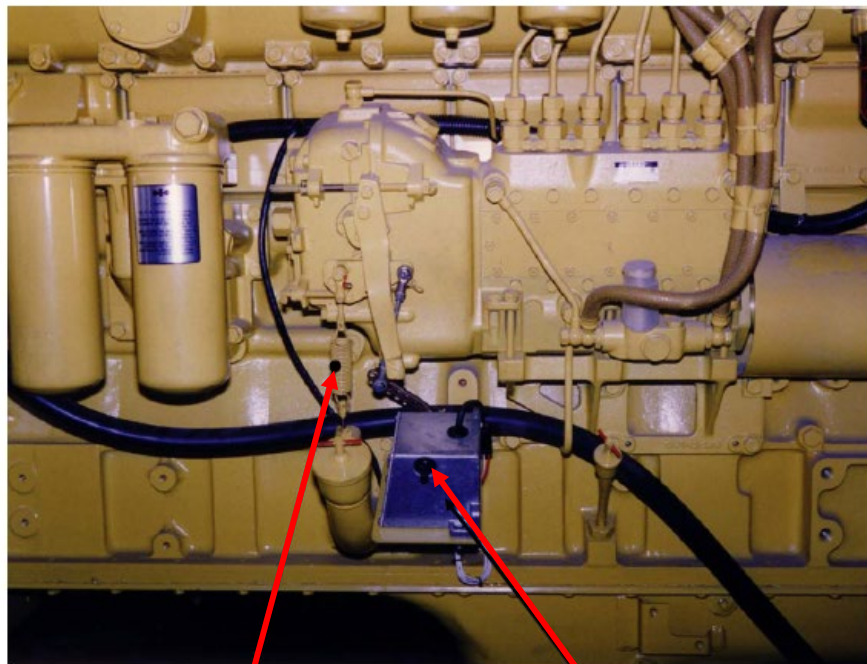
## GAC APPLICATION NOTE

### **KOMATSU GEN SET**

<b>Customer / OEM:</b>	KOMATSU
<b>Application(s):</b>	Gen.Set
<b>Engine Make / Model:</b>	Komatsu
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225GAS-24</li></ul>

**Summary:** The GAS model has a lighter spring (G), additional travel (A) and serrated shaft (S).

### **KOMATSU GEN SET FINISHED INSTALLATION**



Light spring pulling  
stoplever completely in  
Stop position

ADC225GAS-24 Actuator

## KUBOTA

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
D905, D1005, D1105, D1105T, V1305, V1505 & V1505-T	<a href="#">ALR190-K04-12/24</a>		<a href="#">MSP6729</a>	
D1503M, D1703M, D1803M, V2003M & V2403M	<a href="#">ALR190</a> -KM04-12/24			
<a href="#">D722</a>	<a href="#">ADD120S-12</a> <a href="#">ALN025-12</a>	<a href="#">EEG7000</a>		<a href="#">BK265</a>
V2203	<a href="#">ADD120S-12</a>			
V3300 & V3800	<a href="#">ALR190-K04-12/24</a>		<a href="#">MSP6729</a>	
Z482	<a href="#">ALN025-12</a>	ECC328-12 ESD2402 ESD5500-II		KT130 BK265

## GAC APPLICATION NOTE

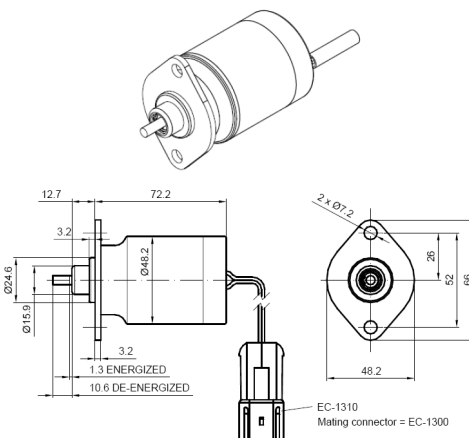
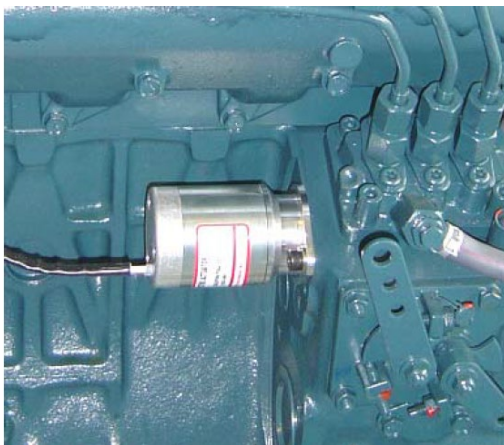
### **VARIOUS DIESEL ENGINES**

<b>Customer / OEM:</b>	KUBOTA, Shibaura, Mitsubishi, Isuzu, Yanmar and Perkins
<b>Application(s):</b>	Power Generation, Agricultural, Construction, Industrial, Stationary Power
<b>Engine Make / Model:</b>	See Application Chart
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Inline and Unit Pumps
<b>Operating Speed(s):</b>	1500 / 1800 RPM operating, 600 RPM idle, variable range from 1000-2400 RPM etc...
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ALR190 Series</li> <li>• Speed Controller(Light Force): ECC328, ESD2402, ESD5520E, ESD5120, ESD5500-II, ESD5570E, ESD2244-12/24 depending on features needed.</li> <li>• Magnetic Speed Pickup: Various</li> </ul>

**Summary:** The ALR190 Series Integral Actuator is designed to mount directly onto various injection Pumps on small engines. No external linkage or brackets are required for its installation. When de-energized the ALR190 Series actuator provides the function of a fuel shutoff solenoid. This is accomplished by an internal spring loading the fuel-rack to the no fuel position. Installing the ALR190 Series actuator does not defeat the engine's mechanical governor operation. During the installation process, the mechanical governor is set 200-300 RPM higher than the electric Speed Controller operating speed and acts as over-speed protection and engine-power limiter within the engine manufacturers specifications.

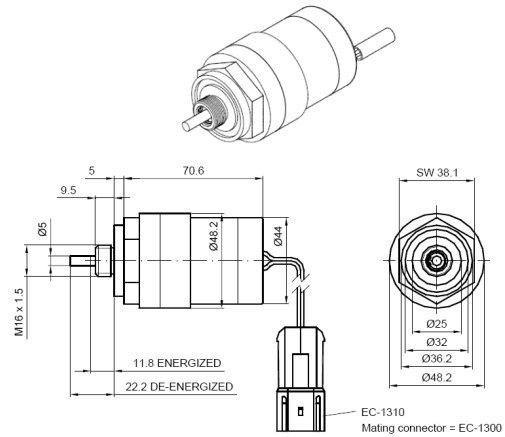
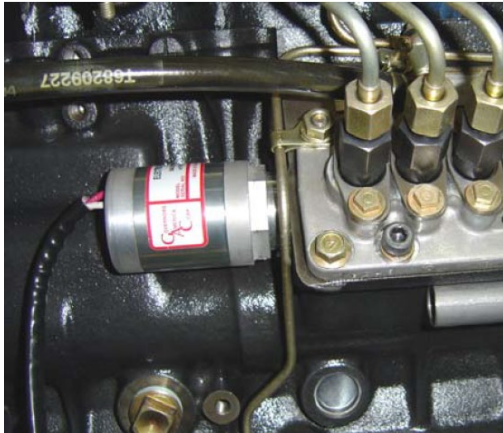
The electromechanical design used in the ALR190 Series is field proven and provides a proportional actuator movement based on the actuator coil current.

#### **KUBOTA: ALR190-K04-XX**

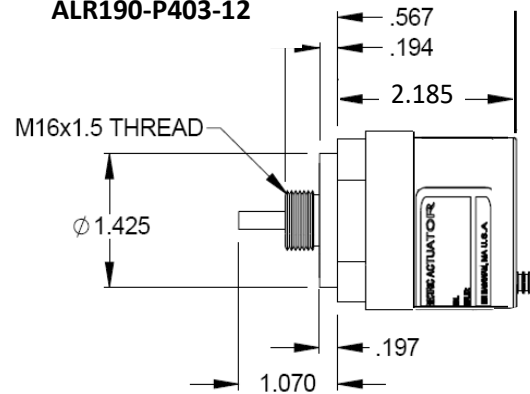
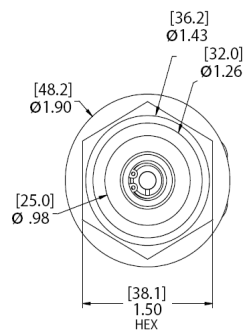




## PERKINS 404 AND 403 SERIES ENGINES: ALR190-P04-XX



### ALR190-P403-12

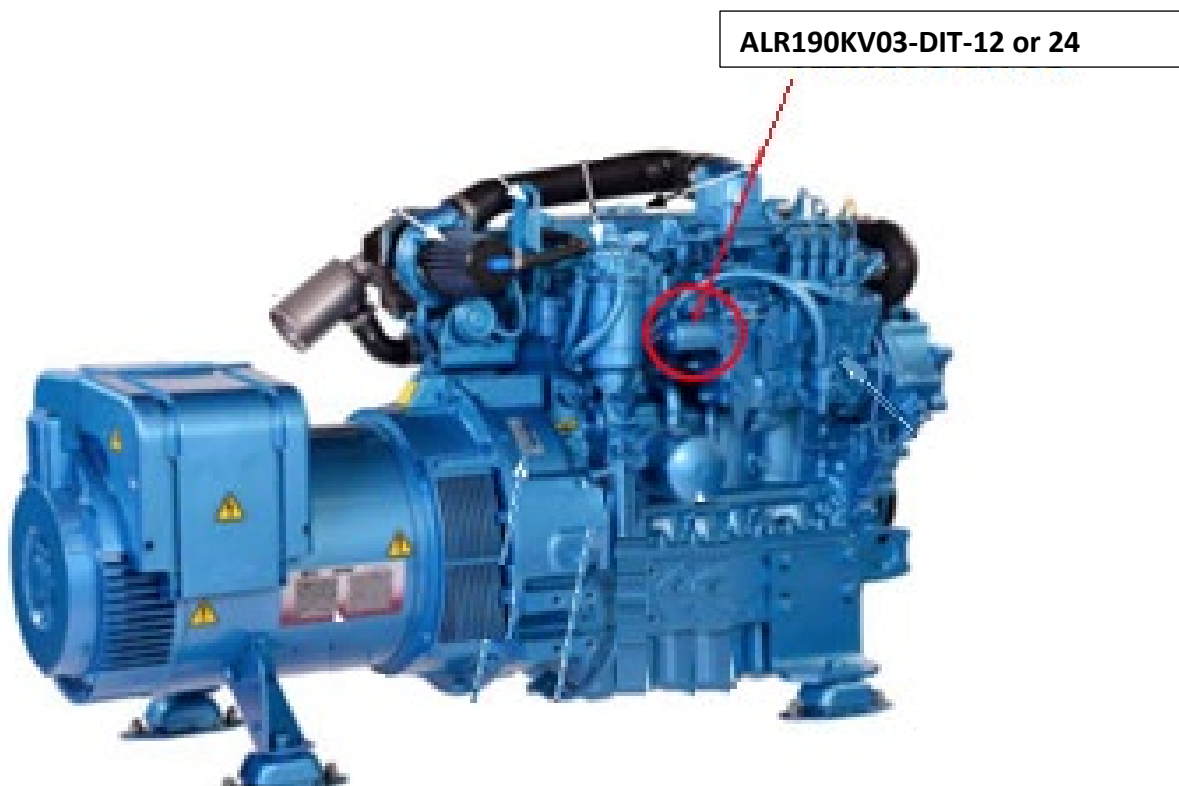




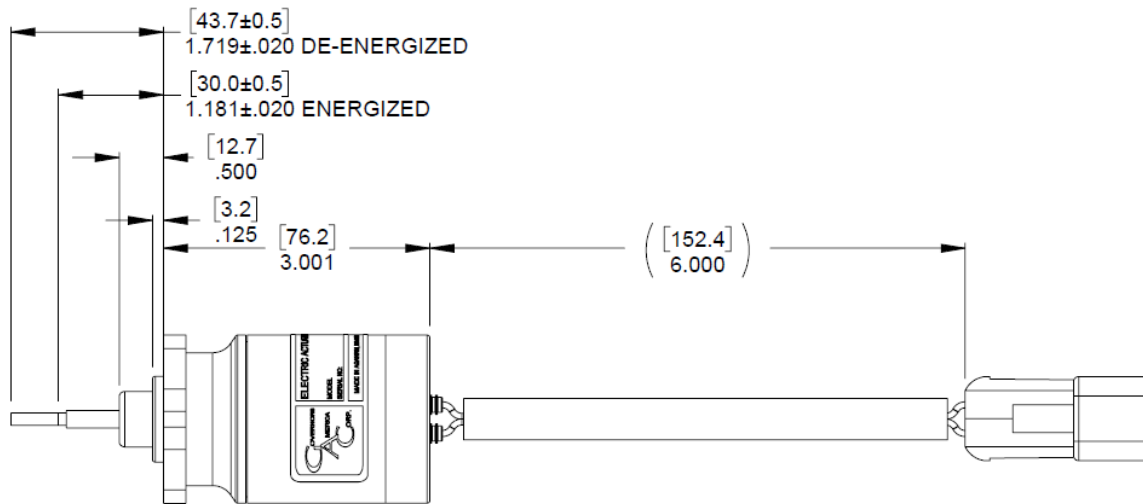
GAC APPLICATION NOTE

**V3800D-IT V3800 ENGINES**

<b>Customer / OEM:</b>	<b>KUBOTA</b>
<b>Application(s):</b>	Various
<b>Engine Make, Model, Displacement</b>	Kubota V3800 DI-T, 4 Cylinder, 3.8L
<b>Equipment Make, Model:</b>	Various
<b>Fuel System Type &amp; Make, Model:</b>	In Line
<b>Operating Speed(s):</b>	Idle to 2400 rpm
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed and Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controllers: <ul style="list-style-type: none"> <li>○ Digital: <a href="#">EEG6000</a>, <a href="#">EEG6500</a>, <a href="#">EEG7000</a>, <a href="#">EEG7500</a></li> <li>○ Analog: <a href="#">ESD5120</a>, <a href="#">ESD5520E</a>, <a href="#">ESD5500E</a></li> </ul> </li> <li>• Actuator: <a href="#">ALR190</a>-KV03DIT</li> </ul>
<b>Summary:</b>	An ALR190 actuator specifically designed for the Kubota V3800 D-IT engine.




## HOW TO IDENTIFY THE ALR190-KV03DIT-12/24 ACTUATOR



## APPLICATIONS CHART – ALL MODELS

**NOTE** Check engine dimensions before selecting or installing an ALR as alterations made to factory engines may impact ALR fit.

ENGINE FAMILY	ENGINE MODEL	ACTUATOR MODEL	ENGINE FAMILY	ENGINE MODEL	ACTUATOR MODEL	ENGINE FAMILY	ENGINE MODEL	ACTUATOR MODEL		
CATERPILLAR			ISUZU			MITSUBISHI				
C Series	C2.2T	ALR190-P04 -12 or -24	C-Series	2CA	ALR190-Y04 -12 or -24	L-Series	L2E	ALR190-M04 -12		
	C3.4			L3E						
	C1.5	ALR160-S04 -12 or -24				S3L				
	C1.7	ALR190-P403 -12 or -24	L-Series	3LB1	ALR190-I03 -12 or -24	S3L2				
				3LD1		S4L				
				3LD2		S4L2				
PERKINS						YANMAR				
Perkins	404D-15 404D-22	ALR190-P04 -12 or -24 or ALR160-S04 -12 or -24	Super 5 Series	D905	ALR190-K04 -12 or -24	TNV- and TNE- Series	2TNV70	ALR190-Y04 -12 or -24		
	403D-15 403D-15T	ALR190-P403 -12 or -24		D1005			3TNV70			
				D1105			3TNV76			
				D1105-T			3TNV82A			
				V1305			3TNV84 3TNV84T			
				V1505, -T			3TNV88			
SHIBAURA (PERKINS)			V3 Series	V3300 V3600 V3600T V3800	ALR190-KV03 -12 or -24		4TNV84			
Shibaura (Perkins)	N843-C, N844L-C, N844LT-C	ALR160-S04 -12 or -24 ALR190-P04 -12 or -24		03 Series			V2003 V2203* V2403		4TNV94L	
							07 Series		V2607 V3007 V3307	4TNV88
									ALR190-KV07 -12 or -24	4TNV98 4TNV98T
			DI-T	V3800DI-T	ALR190- KV03DIT -12 or -24				2TNE	
		3TNE								
							4TNE			





\* IDI model only

## COMPATIBLE SPEED CONTROLLER MODELS

MODEL NUMBER	FEATURES
<b>ECC328-12 or -24</b>	Isochronous Operation / No Mag Pickup Needed Uses Genset Frequency 40-80 Hz
<b>ESD2244-12 or -24</b>	Isochronous Operation / Adjustable PID Functions / Speed Trim Input / Hard Potted
<b>ESD2402-12 or -24</b>	Isochronous Operation / Hard Potted / Idle Control / Adjustable PID Functions / Speed Trim Input /
<b>ESD5120</b>	Isochronous, Droop & Variable Operation / Idle Control / Speed Trim Input / Auxiliary Accessory Input & +10V Supply
<b>ESD5520E</b>	Isochronous, Droop & Variable Operation / Idle Control / Speed Trim Capability / Starting Fuel and Speed Ramping Adjust / Auxiliary Accessory Input & +10V Supply / Soft Coupling / Lead Circuit
<b>ESD5500-II</b>	Isochronous, Droop & Variable Governing / Idle Control / Aux Input & +10V Supply / Starting Fuel and Speed Ramping Adjust / Soft Coupling / Lead Circuit / Selectable Light-Force / Dither / LED Indicators
<b>All digital speed controls are also compatible:</b> <b>EEG6500, EEG6550, EEG7000, EEG7500, EDG6000, SDG, etc.</b>	

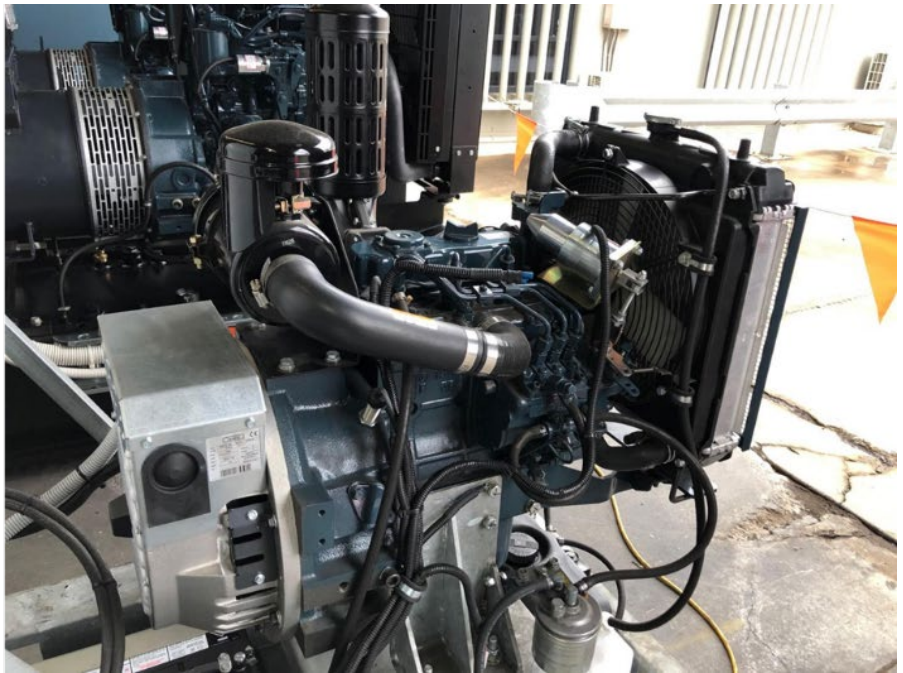
GAC APPLICATION NOTE

**D722 VARIABLE SPEED ENGINE**

<b>Customer / OEM:</b>	KUBOTA
<b>Application(s):</b>	Mecc Alte Generator Drive, Variable DC
<b>Engine Make / Model:</b>	Kubota D722 Diesel 0.719 L, 3 Cylinder, 14.9 kW (20.0 HP) at 3600 RPM, 12V
<b>Fuel System:</b>	Diesel
<b>Operating Speed(s):</b>	14.9 kW @ 3600 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• <b>Alternator</b> (MECC ALTE) : PM5G 48VDC</li><li>• <b>Actuator</b> (GAC): ALN025 with BK265 and KT130 clevis kit</li><li>• <b>Speed Controller</b> (GAC): EEG7000</li></ul>

**Summary:** By pairing Mecc Alte's Permanent Magnet Generator (PMG) with a GAC actuator and speed controller, the team developed a variable speed generator solution that varies a generator's engine speed based on load. This solution, based on a Kubota D722 Diesel 3-cyl engine, can optimize and match the output power with demand and reduce fuel consumption by at least 25%. The result allowed the customer to charge a battery bank while maintaining voltage and maximizing the battery life..

**ACTUATOR ALN025-12 AND EEG7000**



## D722 VARIABLE SPEED ENGINE

### EEG7000 ENHANCED ELECTRONIC DIGITAL SPEED CONTROLLER



#### EEG7000 ACCESSORIES

##### GAC PART NUMBER

EC1502

CH1520

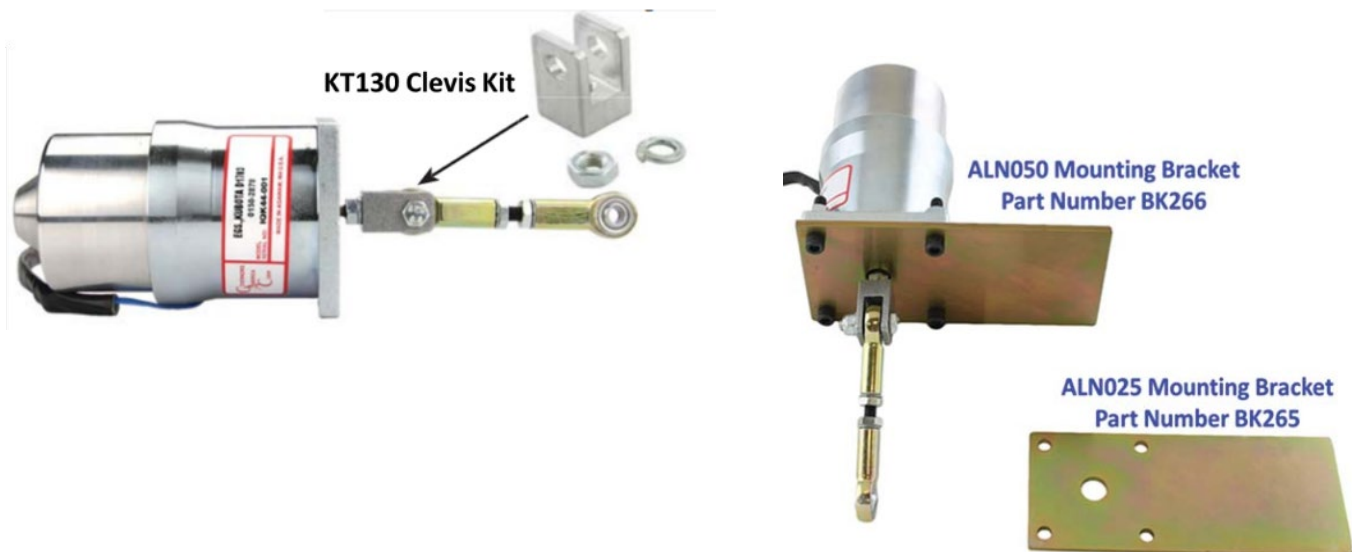
##### DESCRIPTION

EEG7000 14 Pin AMPSEAL mating connector

EEG7000 Cable Harness Assembly

- Mini-ECU, J1939 TSC1 Control Capable with Diagnostic Messages (DM).
- Isochronous, Variable, or Customizable Droop Governing.
- 3 Fixed Speeds or Variable Speed with Direct 0-5V, 5k $\Omega$ , or 4-20mA Input.
- Built-in USB Port for Easy Configuration with Free Software.
- Black-Smoke Reduction, Speed Ramp Control, Load Sharing / Synchronizing Option, and Cummins EFC Capable.
- Built-in Speed Switch Output for Crank or Overspeed.
- Engine Hour Meter and Service Timer.
- Fully Sealed, IP-67.

### ALN025 / ALN050 ACTUATOR AND ACCESSORIES



GAC's ALN linear actuators provide highly accurate precise positioning for closed-loop control with a minimum number of moving parts, prolonging the life of the actuator. With no sliding parts and sealed, reliability is outstanding, and no maintenance is necessary.

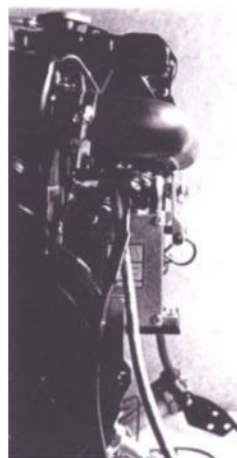
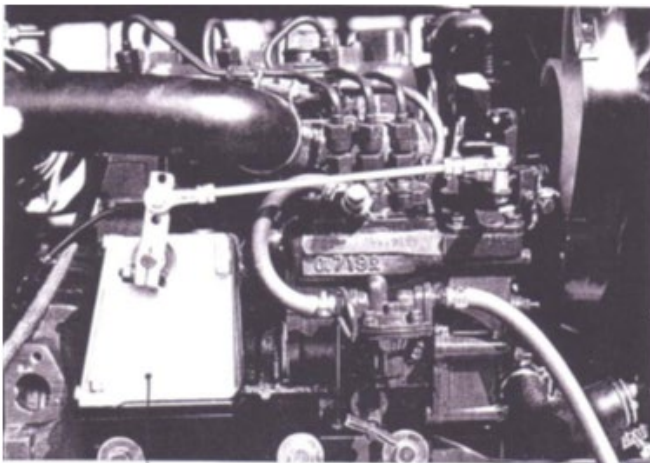
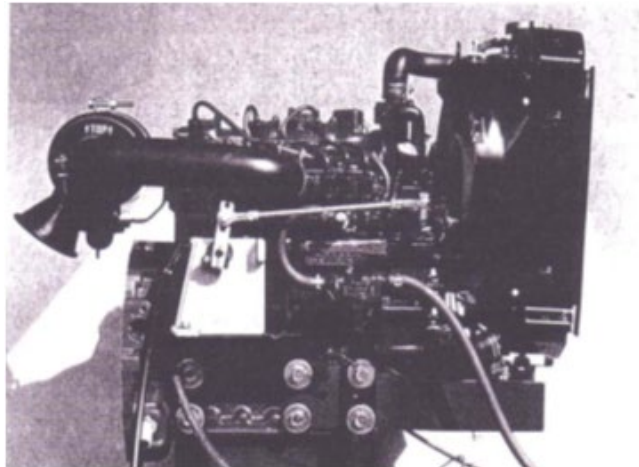


## GAC APPLICATION NOTE

### **D722 DIESEL ENGINES**

<b>Customer / OEM:</b>	KUBOTA
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	D722
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	14.9 kW @ 3600 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADD120S-12 or ADC120S-12</li> </ul>

### **ACTUATOR ADD120S-12 AND ADC120S-12**

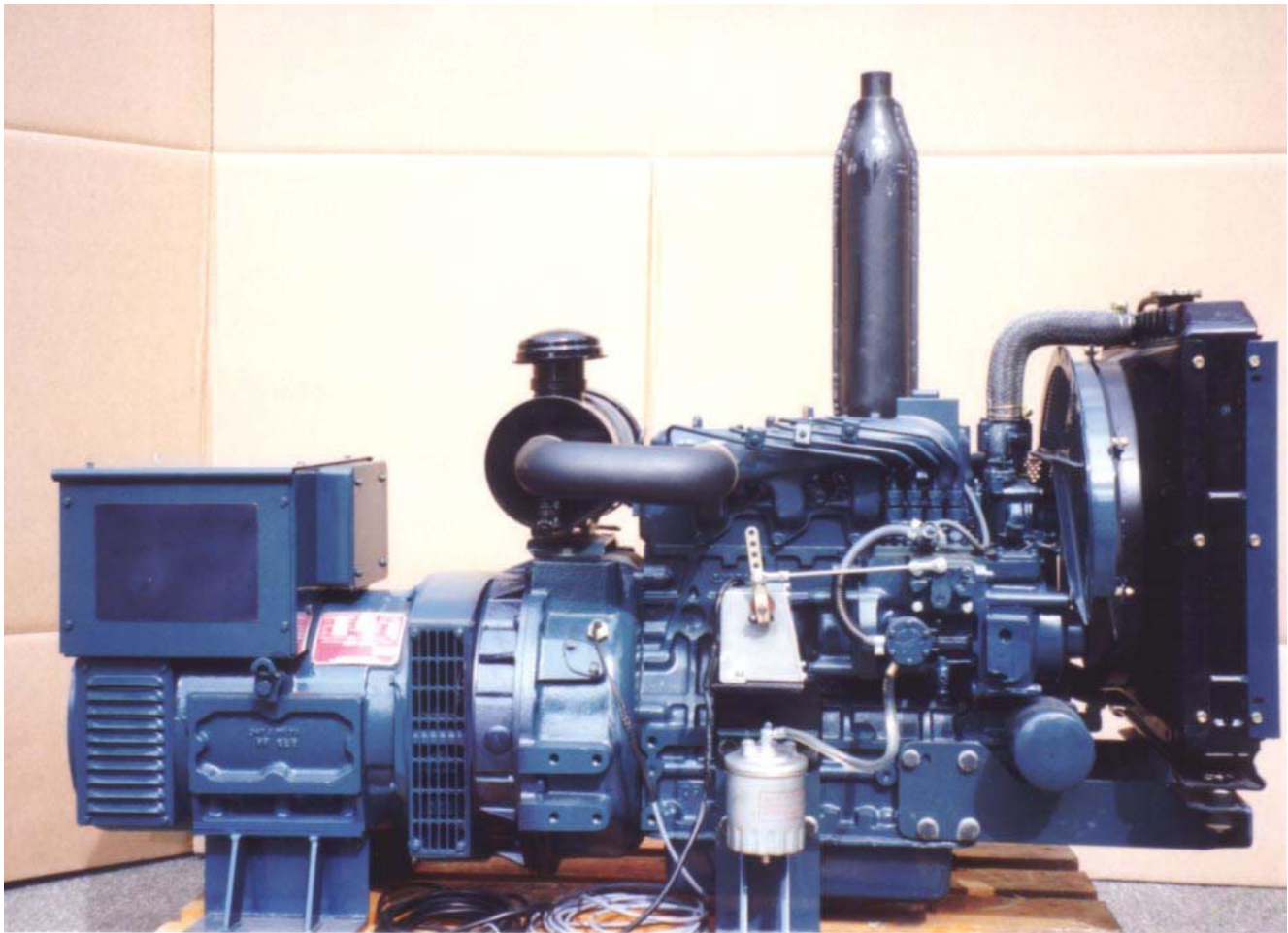


GAC APPLICATION NOTE

**V2203 ENGINES**

<b>Customer / OEM:</b>	KUBOTA
<b>Application(s):</b>	Various
<b>Engine Make / Model / Displacement / Rating:</b>	V2203 Engine
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	35.9 kW @ 2800 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Recommended Products:</b>	Actuator: ADD120S-12

**ADD120S-12 ACTUATOR ON KUBOTA V2203**



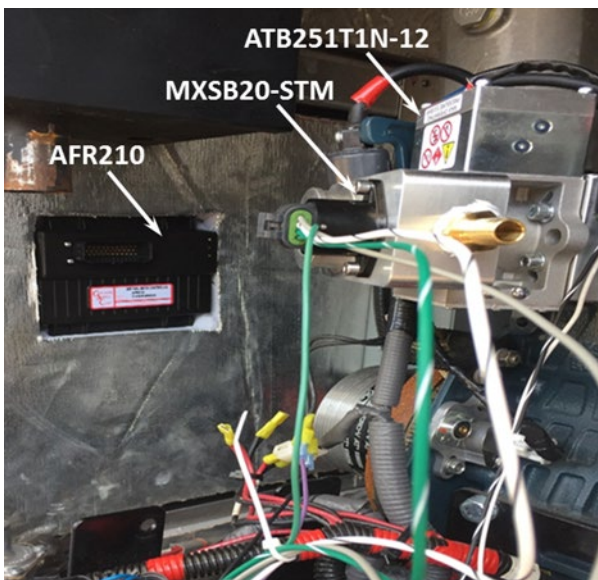
GAC APPLICATION NOTE

**WG752 3-CYLINDER, 0.74L ENGINE**

<b>Customer / OEM:</b>	KUBOTA
<b>Application(s):</b>	Various
<b>Engine Make / Model</b>	WG752
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	35.9 kW @ 2800 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Products Used:</b>	AFR210 ATB251T1N1-12 MSP6827C MXB20-STM

**SUMMARY** GAC's AFR210 offers an 'Anti-Wind-Up' PID feature that minimizes RPM over-shoot and/or under-shoot to support this combined heat and power (CHP) solution.

**GASEOUS CO-GEN CHP POWER**



GAC APPLICATION NOTE (all of the components specified are sold separately)

## **Z482 ENGINE USING ALN025 SERIES ACTUATOR AND SPEED CONTROLLER OPTIONS**

<b>Customer / OEM:</b>	Multiple
<b>Application(s):</b>	Universal small engine
<b>Engine Make / Model / Displacement / Rating:</b>	KUBOTA Z482 / 479cc / 10.9 HP
<b>Equipment Make / Model:</b>	Multiple
<b>Fuel System Type &amp; Make / Model:</b>	Bosch MD Type mini pump
<b>Operating Speed(s):</b>	2400 – 3200 RPM operating, 3600 RPM Max Speed
<b>Battery Voltage:</b>	12 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ALN025-12</li> <li>• Speed Controller Options (Analog): <ul style="list-style-type: none"> <li>○ ECC328-12 No speed sensor – Uses generator frequency, Fixed Speed, No Idle (Only for AC Generator Application). No speed sensor necessary.</li> <li>○ ESD2402-12 Idle function, fixed speed</li> <li>○ ESD5120 Idle function, fixed or variable speed, load share/sync</li> <li>○ ESD5500-II Idle function, fixed or variable speed, load share/sync, starting fuel, speed ramping</li> </ul> </li> <li>• Speed Controller Options (Digital): <ul style="list-style-type: none"> <li>○ EEG6500, EEG7000 or EEG7500</li> </ul> </li> <li>• Optional Starter Mounting Bracket: BK265</li> <li>• Optional Clevis Kit: KT130</li> <li>• Optional Threaded Rod: RD102 (1/4"-28) or RD233 (M6 x 1.5mm)</li> </ul>

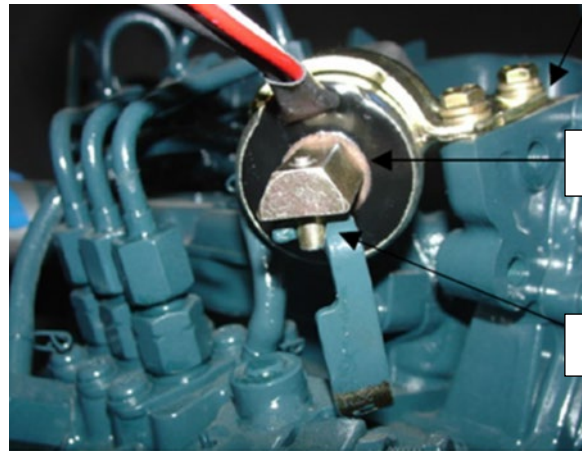
**Summary:** ALN025-12 actuator is to be mounted in place of the original fuel shut-off solenoid. The ALN025-12 serves as both the actuator and a fail-safe fuel shut-off.

### **ALN025-12**





## ORIGINAL STOP SOLENOID MOUNTED ON KUBOTA Z482



OEM Kubota Stop Solenoid

Stop Lever

## FINISHED INSTALLATION: ALN025-12 MOUNTED ON KUBOTA Z482



Starter Mounting Bracket BK265

Clevis Kit and Threaded Rod



## LIMMAT

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
12 CYLINDER	<a href="#">ADB225</a>	<a href="#">ESD5500E</a>	<a href="#">RSC671</a>	<a href="#">SSW675</a>

GAC APPLICATION NOTE

## 12 CYLINDER MARINE ENGINE

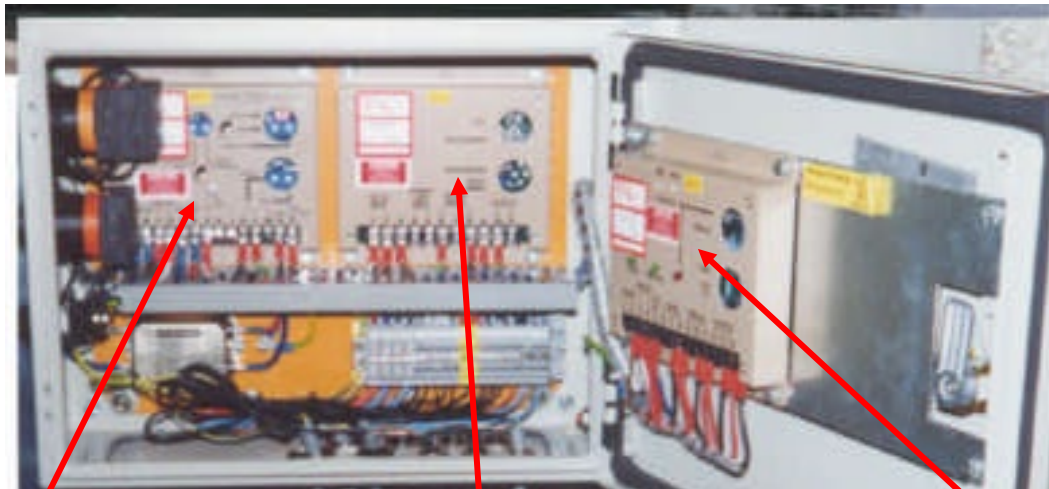
<b>Customer / OEM:</b>	Lake Boat
<b>Application(s):</b>	Marine Control
<b>Engine Make / Model:</b>	LINMAT 12 Cylinder
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Mechanical Governor, Inline Pump
<b>Operating Speed(s):</b>	Variable
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADB225</li><li>• Speed Controller: ESD5500E</li><li>• Speed Ramping Controller: RSC671</li><li>• Accessories: SSW675</li></ul>

**Summary:** The ESD5500E works in harmony with the RSC671 for precise acceleration / deceleration control. The SSW675 provides crank / over speed switching capability.

## PASSENGER BOAT WITH VARIABLE PITCH PROPELLER



## MARINE CONTROLS

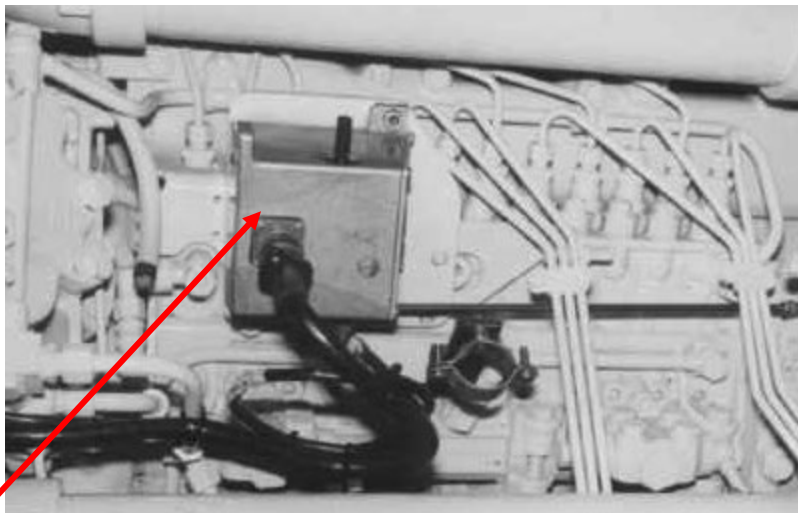


ESD5500E

RSC671

SSW675

## ADB225 ACTUATOR



ADB225

## LOMBARDINI

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
KDW1003	<a href="#">ADC120</a>	<a href="#">ESD5500E</a> , <a href="#">EEG6500</a> or <a href="#">EEG7000</a>	<a href="#">MSP6729</a>	<a href="#">KT130</a>
LDW 2004	<a href="#">ADC120S-12</a>			

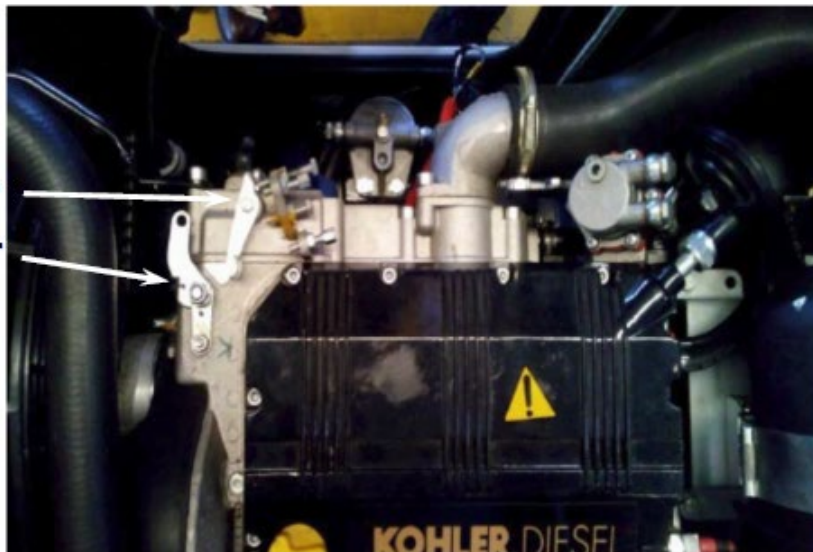
GAC APPLICATION NOTE (all of the components specified are sold separately)

## **KOHLER (LOMBARDINI) KDW1003 DIESEL ENGINE**

<b>Customer / OEM:</b>	Electronic Governor Solution with GAC ALN025: 12 or 24 V DC Linear Actuator or 120 Series: 12 or 24 V DC Actuator
<b>Application(s):</b>	Refrigeration Groups, Excavators, Tractors, Compressors, others
<b>Engine Make, Model, Displacement</b>	KOHLER KDW1003, 62.7 in <sup>3</sup> (17.5 kW), 3 cylinders
<b>Equipment Make, Model:</b>	Various
<b>Fuel System Type &amp; Make, Model:</b>	Indirect injection
<b>Operating Speed(s):</b>	Idle to 3600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5500E, EEG6500 or EEG7000</li> <li>• Actuator: ALN025 -12/24 (V DC) or 120 Series-12/24 (V DC)</li> <li>• Magnetic Speed Pickup: MSP6729</li> <li>• Hardware for ALN025 installation only: <ul style="list-style-type: none"> <li>○ Clevis Kit: KT130</li> <li>○ Bearing Rod Ends: BR200 (¼"-24), BR300 (M5), BR400 (M6) or BR500 (M8)</li> <li>○ Threaded Rods : RD102 (¼"-28) or RD233 (M6)</li> <li>○ Mounting Plate (starter): BK265</li> </ul> </li> </ul>
<b>Summary:</b>	This a complete Electronic Governing system for a Kohler (Lombardini) KDW1003 3 Cylinder Diesel Engine

### **BASIC FUEL PUMP AND GOVERNOR SETUP ON KDW3000 ENGINE**

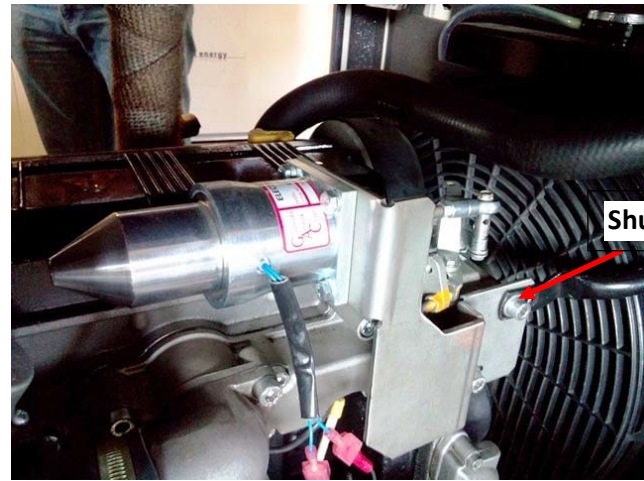
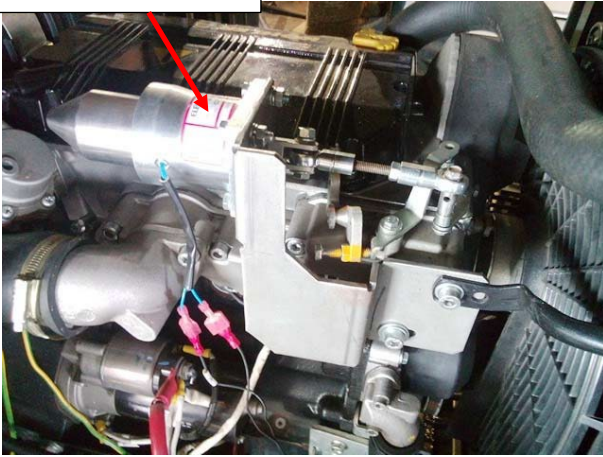
**KDW1003**  
**Throttle Lever**  
**Shut-Off Lever**





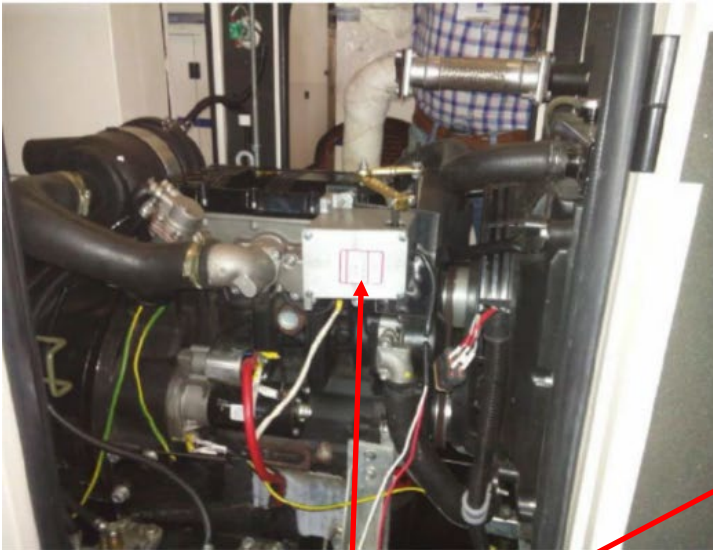
## COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A KOHLER (LOMBARDINI) ENGINE ALN025 CONFIGURATION

**ALN025 Linear Actuator**

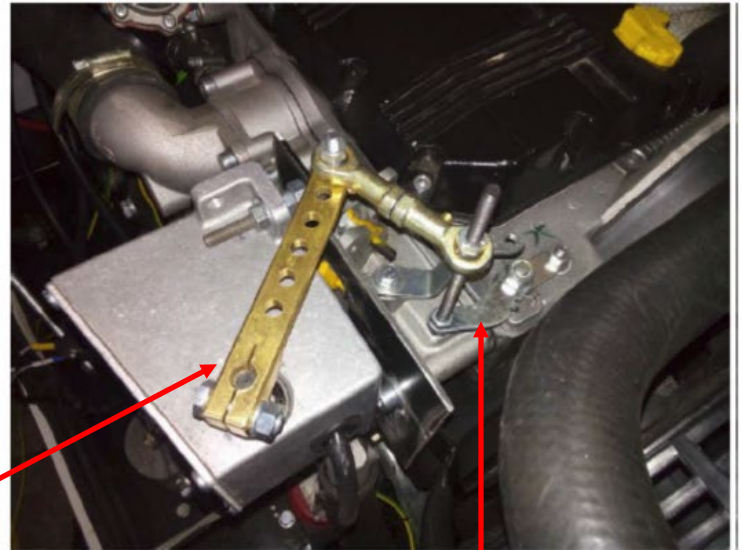


**Shut Off Lever**

## COMPLETE ELECTRONIC GOVERNING SYSTEM FOR A KOHLER (LOMBARDINI) ENGINE 120 SERIES CONFIGURATION



**ADC120 SERIES ACTUATOR (INCLUDES LE1400-2LEVER)**



**Shut Off Lever**

## ALN025 ACTUATOR AND RELATED PARTS

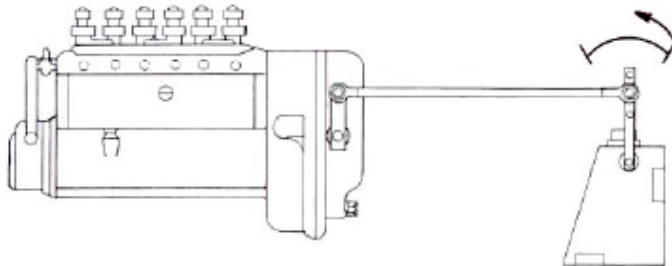


## ADC120 ACTUATOR WITH LEVER

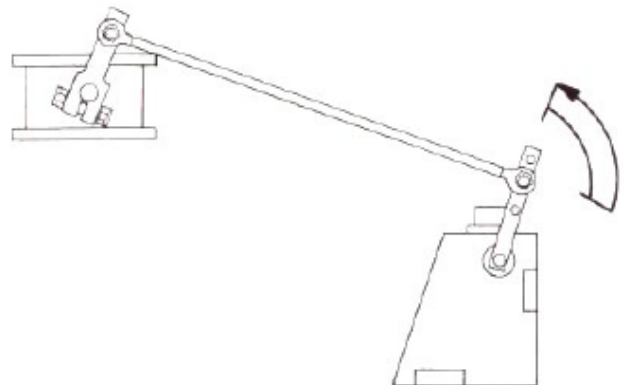


**FOR DETAILED INSTALLATION INSTRUCTIONS SEE EACH PRODUCTS INSTALLATION MANUAL**

**FUEL LEVER AT MID FUEL POSITION DIAGRAM**



**FUEL LEVER AT FULL FUEL POSITION DIAGRAM**



## GAC APPLICATION NOTE

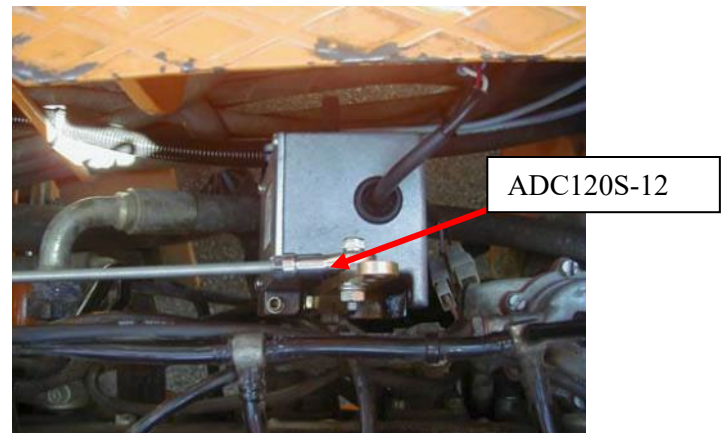
### **LDW 2004 ENGINE**

<b>Customer / OEM:</b>	Witschi
<b>Application(s):</b>	CMT Mobile Loader
<b>Engine Make / Model:</b>	LOMBARDINI LDW 2004, 4 cylinder, 2.1L
<b>Equipment Make / Model:</b>	Witschi CMT Loader
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	35kW @ 3000 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC120S-12</li> </ul>

### **CMT LOADER**



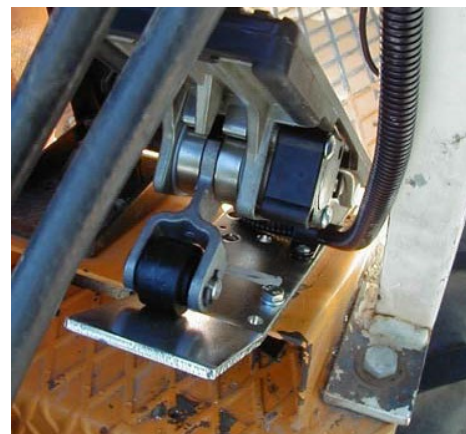
### **ADC120S-12**



### **LOADER DASHBOARD**



### **LOADER ELECTRIC FOOT PEDAL**



## LOVOL

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
1003, 1004, 1006, 1106	<a href="#">ADD175A</a> -12/24	<a href="#">ESD5500E</a>		



## GAC APPLICATION NOTE

### **LOVOL DIESEL GEN SET ENGINES**

<b>Customer / OEM:</b>	Foton Lovol International Heavy Industry Co., Ltd.
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model:</b>	Lovol 1003 series, 2.99L, NA/Turbo, 26 / 38 kW Lovol 1004 series, 3.99L, NA/Turbo, 40 / 60 kW Lovol 1006 series, 5.98L, Turbo/Water-cooled, 90 / 110 kW Lovol 1106 series, 5.98L, Turbo Air-cooled, 130-158.4 kW (1500RPM)
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Asimco-Tianwei (BYC), PB Pump (1003, 1004, 1006), P7100 (1106)
<b>Operating Speed(s):</b>	1500 / 1800 RPM rated
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: ESD5500E (Lovol T63201004)</li> <li>• Actuator: ADD175A-12/24 (Lovol T73201202 for 12V, T73201203 for 24V)</li> </ul>

**Summary:** The ESD5500E controller was selected for its ruggedness, reliability and ease of operation, as well as its many essential features, perfect for the China gen set market. It is also a good choice for exporting Chinese-made engines because GAC has world-wide recognition. The ADD175A-12 is a perfect fit for BYC's PB and P7100 pumps as it was designed specifically to fit Bosch and BYC pumps.

### **LOVOL 1006TAG**





## MAN

A cross reference to MAN part numbers to GAC part numbers is at the end of this guide [here](#).

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
D2842	<a href="#">ACE275HD-24</a>	<a href="#">ESD5330</a> <a href="#">RSC671</a>		
0824 & 0826	<a href="#">ADD120S-24</a>			
2876	<a href="#">ATB652T2F14-24</a>	<a href="#">SDG</a>	<a href="#">MSP6723C</a>	
E3268	<a href="#">ADB335-24</a> <a href="#">ADC225-24</a>	<a href="#">EEG6550</a>	MSP6723C	

GAC APPLICATION NOTE

**D2842LE201 with ACE275HD-24 ACTUATOR**

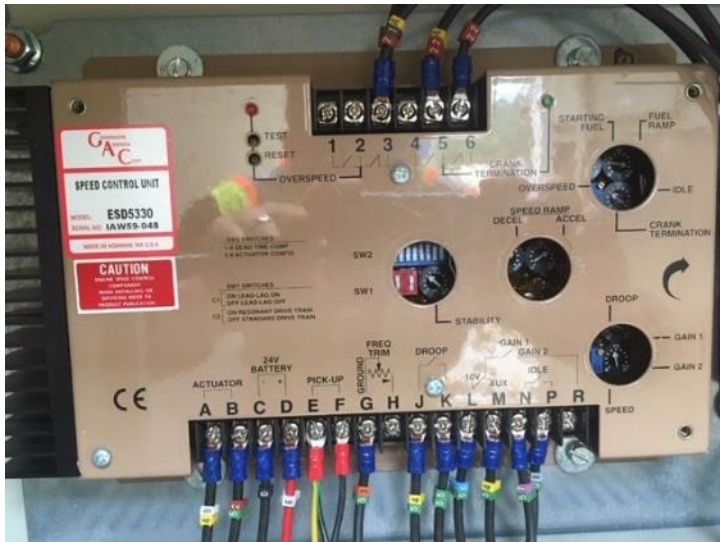
<b>Customer / OEM:</b>	MAN Engines /Trevicos Corp.
<b>Application:</b>	High Pressure Soil Pump – Pile Driver (Model 7T800)
<b>Engine Make / Model</b>	MAN D2842 LE 201 / 610KW / V12
<b>Equipment Make / Model:</b>	Soilmec 7T800
<b>Fuel System :</b>	Diesel, Inline Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM, 750bar 614 liters-per-minute
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACE275HD-24</li><li>• Speed Controller: ESD5330</li><li>• Controller: RSC671</li></ul>

**Summary** This Soilmec 7T800 pump uses a 21.93L diesel MAN D2842 LE 201 engine to power this 614 liter/min workhorse. The engine is equipped with a GAC ACE275HD actuator (MAN PN 51.11610.6028) with heavy duty bearings to provide the strength and durability this application needs. The GAC ESD5330 works with our RSC671 controller to ensure precise control.

**COMPLETED PROJECT**



## ESD5330 WITH RSC671



## ACE275HD-24 MOUNTED ON DIESEL PUMP



## MAN 12 CYLINDER ENGINE M/N D2842LE 201





## GAC APPLICATION NOTE

### **2876 COMBINED HEAT AND POWER AMERIGEN 150**

**Customer / OEM:** Co Energy America  
**Application(s):** Combined Heat and Power (CHP)  
**Engine Make / Model /** 150 MAN 2876  
**Fuel System Type & Make / Model:** Natural Gas  
**Products in Solution:** **Actuator:** Throttle Body, 65 mm Bore, Feedback HT Sealed  
**Speed Controller:** GAC Smart Digital Governors  
**Other:** Magnetic Speed Pickup

**Summary:** Co Energy America has included GAC ATBs in their 150K W Amerigen 1150 CHP solution for over 20 years. Although the engines originally include a control, they needed more precise consistent results, and chose GAC ATBs for that reason.

Co Energy America has placed the Amerigen 150 across New England including Gillette Stadium, Whole Foods, Mass College of Pharmacy, and various Health care facilities.

### **COMPLETED CHP UNIT**



#### **SDG514**



#### **ATB652T2F14-24**

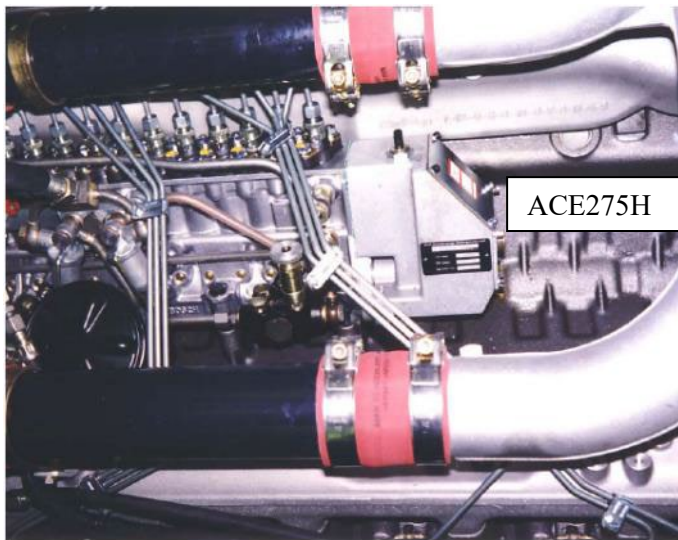


GAC APPLICATION NOTE

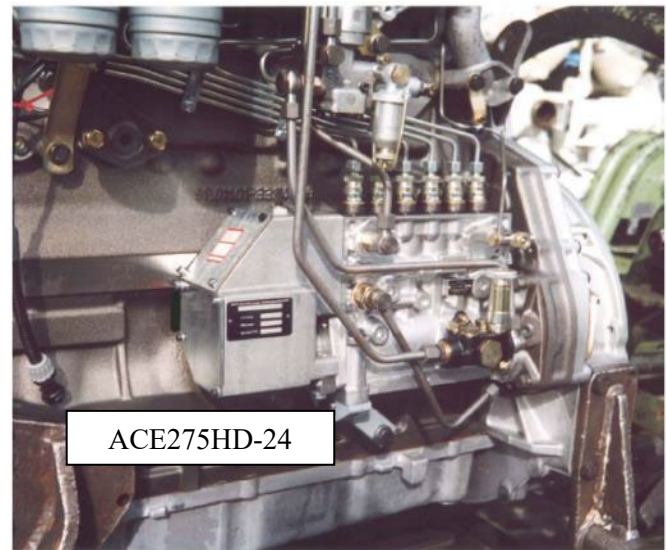
**2842 AND 2866 ENGINES**

<b>Customer / OEM:</b>	MAN
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	MAN 2842, 2866 and 2876 Engines
<b>Fuel System Type :</b>	Diesel, Inline Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACE275HD-24</li></ul>
<b>Summary:</b>	HD Version includes heavy duty bearings received by MAN for durability.

**ACE275HD-24 ACTUATOR ON MAN 2842**



**ACE275HD-24 ACTUATOR ON MAN 2866**





GAC APPLICATION NOTE

**MAN E3268 COMBINED HEAT AND POWER**

<b>Customer / OEM:</b>	<b>HATRACO</b>
<b>Application(s):</b>	Combined Heat and Power
<b>Engine Make / Model:</b>	E3268 LE212 and MAN E2876 LE302
<b>Equipment Make / Model:</b>	V8
<b>Fuel System Type &amp; Make / Model:</b>	Gasoline
<b>Operating Speed(s):</b>	350 kW
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225-24 or ADB335-24</li><li>• Speed Controller: EEG6550</li><li>• Other: MSP6723C</li></ul>

**Summary** CHP based on the gas engine MAN E2876 LE302 with GAC ADC225-24 or ADB335-24, controlled with EEG6500 and MSP6723C.

**FINISHED CHP**



**ENGINE WITH GAC ADC225-24**



**ENGINE WITH GAC ADB335-24**



## GAC APPLICATION NOTE

### **MAN 9L20 MARINE GEN SET**

<b>Customer / OEM:</b>	<b>Research Vessel</b>
<b>Application(s):</b>	Marine Gen Set
<b>Engine Make / Model:</b>	MAN 9L20
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	900 kW
<b>Battery Voltage:</b>	24 V DC

**Summary** The ARA PUERTO DESEADO oceanographic research vessel needed an overhaul before it returned to work studying the continental shelf as far south as Antarctica. Powered by 2 MAN 9L20 / 27 900 KW diesel engines and 2 ABB 380V, 120 kW AC electric motors for auxiliary propulsion the EEG6500 was used to update speed control of its power plant, replacing the original system

### **RESEARCH VESSEL**



### **EEG6500 INSTALLATION**



### **ENGINE ROOM**



## MILITARY

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
John Deere 40457F151 & 6068TF151	ADC101-24	ESD5551	MSP6735 MSP6728	AVR100, AVR400 LSS100, LSS400 TCM100, TCM102 TCM400 PCI102 CH113, CH114

## GAC APPLICATION NOTE

### **JOHN DEERE 40457F151 and 6068TF151 GENERATOR**

<b>Customer / OEM:</b>	Army Mobile Electrical Power		
<b>Application(s):</b>	Power Generation		
<b>Engine Make / Model :</b>	30 kW: JOHN DEERE 40457F151, 4 cycle, 4 cylinder, 3.9 L 60 kW: JOHN DEERE 6068TF151, 4 cycle, 6 cylinder, 5.9 L		
<b>Equipment Make / Model:</b>	L-3 Westwood / Cherokee Nation Generator		
	<b>MEP Part Number</b>	<b>NSN</b>	<b>Description</b>
	806B	6115-01-462-0291	60 kW; 50/60 Hz
	816B	6115-01-462-0292	60 kW; 400 Hz
	805B	6115-01-461-9335	30 kW; 50/60 Hz
	815B	6115-01-462-0290	30 kW; 400 Hz
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Engine Mounted Pump, JP-8		
<b>Operating Speed(s):</b>	400 Hz – 2000 RPM 50/60 Hz – 1800 RPM		
<b>Battery Voltage:</b>	24 V DC Input		
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller ESD5551</li> <li>• Actuator, D-Series ADC101-24 (96-23538)</li> <li>• Voltage Regulator (50/60 Hz) AVR100</li> <li>• Voltage Regulator (400 Hz) AVR400</li> <li>• Load Sharing (50/60 Hz) LSS100</li> <li>• Load Sharing (400 Hz) LSS400</li> <li>• I/O Interface (50/60 Hz) TCM100</li> <li>• Main Backplane Interconnect TCM102</li> <li>• I/O Interface (400 Hz) TCM400</li> <li>• Power Supply PCI102</li> <li>• Magnetic Speed Pickup MSP6735, MSP6728</li> <li>• Cable Harness CH113 (96-23665) CH114 (96-23664)</li> </ul>		

**Summary:** The 60 kW is called MEP 806B for 50/60 Hz applications and MEP 816B for 400 Hz applications. The 30 kW model is called MEP 805B for 50/60 Hz applications and MEP 815B for 400 Hz applications. Skid and trailer mount configurations are available.

30 kW 50/60 Hz: The 30kW TQG Generator Set, MEP-805B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 VDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

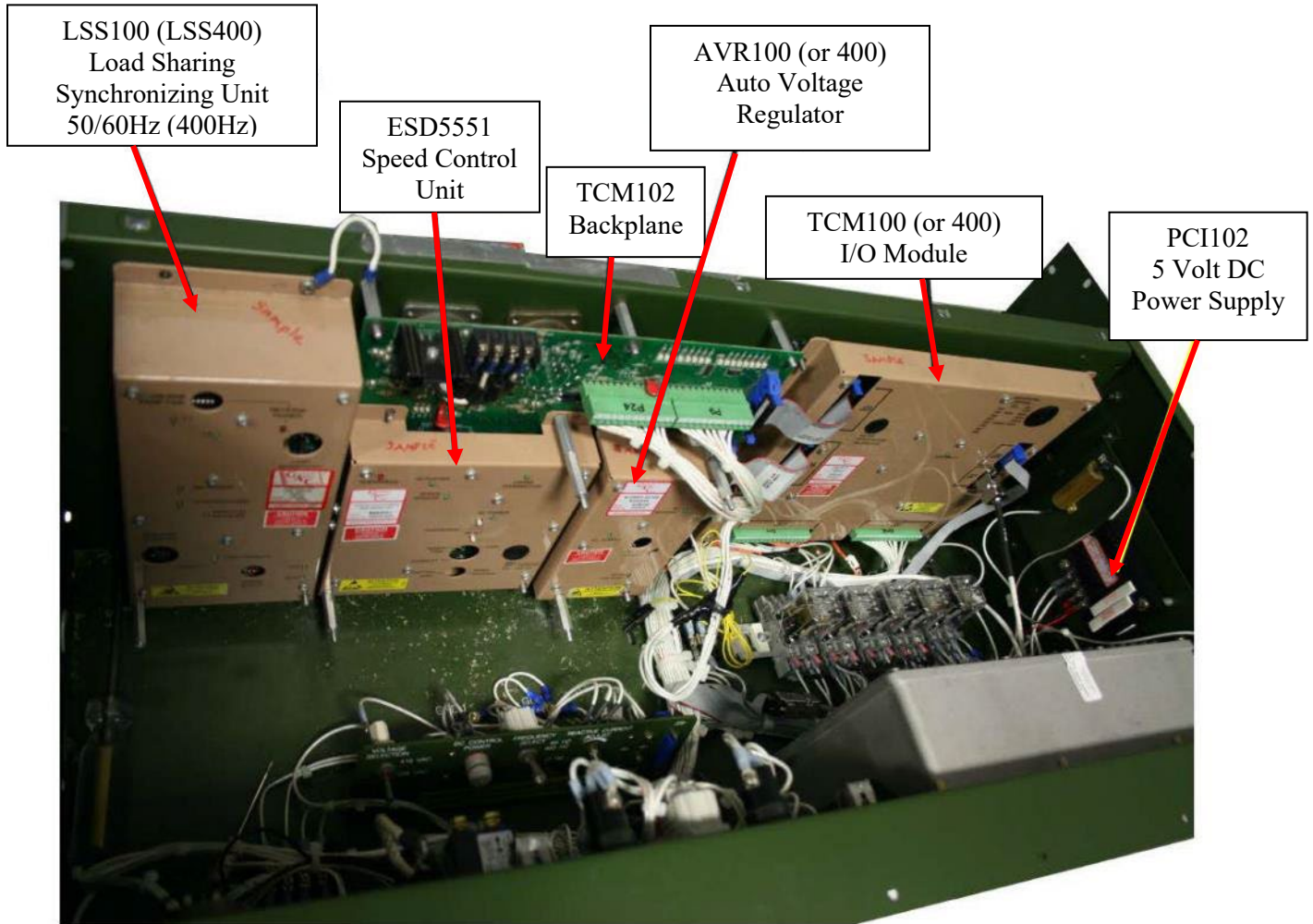
30 kW 400 Hz: The 30kW TQG Generator Set, MEP-815B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, and 24 V DCDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

60 kW 50/60 Hz: The 60kW TQG Generator Set, MEP-806B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 VDC starting system DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.

60 kW 400 Hz: The 60kW TQG Generator Set, MEP-816B, is a fully enclosed, self-contained, skid-mounted, portable unit. It is equipped with controls, instruments, and accessories necessary for operation as a single unit or in parallel with another unit of the same class and mode. The generator set includes a diesel engine, brushless generator, cooling system, excitation system, governing system, fuel system, 24 V DCDC starting system, DCS, and fault system. The generator set is designed to be used with any piece of equipment requiring a medium source of AC power and operates in a “Hot and Basic” climatic condition range of -25°F to +120°F. This generator set is mobile and requires forklift support.



## GAC PRODUCTS IN GENERATOR CONTROL CABINET



## END PRODUCT



## 30 KW, 50/60 HZ GENERATOR EXAMPLE



## 30 KW, 400 HZ GENERATOR EXAMPLE



## 60 KW, 50/60 HZ GENERATOR EXAMPLE



## 30 KW 50/60 HZ SPECS

### Technical Description

#### Generator Set

Manufacturer: MCII  
Model: MEP-805B  
Voltage (Volts): 120/208/240/416  
Frequency (Hz): 50/60  
Speed (RPM): 1800  
Phase: 3

#### Engine

Manufacturer: John Deere  
Model: 4045TF151  
Type: 4 Cycle  
Cylinders: 4  
Displacement: 239 in<sup>3</sup> (3.9L)

#### Fuel

Fuel Capacity (Gal): 23  
Fuel Consumption (GPH): 2.60  
Fuel Requirement: Diesel/JP-8

#### Dimensions

Length (in): 79.7  
Width (in): 35.7  
Height (in): 55  
Weight (lbs):  
Dry: 2732  
Wet (coolant & POLs): 2931  
Volume (ft<sup>3</sup>): 90.56

#### Aural Signature

Audio Rating: 70dBA @ 7 meters

#### Replaced Items

MEP-005A, MEP-805A.

#### Transportability

All variants of the USMC M353 trailer.

## 30 KW 400 HZ SPECS

Technical Description			
<b><u>Generator Set</u></b>		<b><u>Fuel</u></b>	
Manufacturer:	MCII	Fuel Capacity (Gal):	23
Model:	MEP-815B	Fuel Consumption (GPH):	2.75
Voltage (Volts):	120/208/240/416	Fuel Requirement:	Diesel/JP-8
Frequency (Hz):	400	<b><u>Dimensions</u></b>	
Speed (RPM):	2000	Length (in):	79.7
Phase:	3	Width (in):	35.7
<b><u>Engine</u></b>		Height (in):	55
Manufacturer:	John Deere	Weight (lbs):	
Model:	4045TF151	Dry:	2732
Type:	4 Cycle	Wet (coolant & POLs):	2931
Cylinders:	4	Volume (ft <sup>3</sup> ):	90.56
Displacement:	239 in <sup>3</sup> (3.9L)	<b><u>Aural Signature</u></b>	
		Audio Rating:	71dBA @ 7 meters
<b><u>Replaced Items</u></b>		MEP-114A, MEP-815A.	
<b><u>Transportability</u></b>		All variants of the USMC M353 trailer.	

## 60 KW 50/60 HZ SPECS

Technical Description			
<b><u>Generator Set</u></b>		<b><u>Fuel</u></b>	
Manufacturer:	MCII	Fuel Capacity (Gal):	43
Model:	MEP-806B	Fuel Consumption (GPH):	5.06
Voltage (Volts):	120/208/240/416	Fuel Requirement:	Diesel/JP-8
Frequency (Hz):	50/60	<b><u>Dimensions</u></b>	
Speed (RPM):	1800	Length (in):	87
Phase:	3	Width (in):	35.7
<b><u>Engine</u></b>		Height (in):	59
Manufacturer:	John Deere	Weight (lbs):	
Model:	6068TF151	Dry:	3556
Type:	4 Cycle	Wet (coolant & POLs):	3992
Cylinders:	6	Volume (ft <sup>3</sup> ):	106
Displacement:	359 in <sup>3</sup> (5.9L)	<b><u>Aural Signature</u></b>	
		Audio Rating:	70dBA @ 7 meters
<b><u>Replaced Items</u></b>		MEP-006A, MEP-806A.	
<b><u>Transportability</u></b>		All variants of the USMC M353 trailer.	

## 60 KW 400 HZ SPECS

Technical Description			
<b><u>Generator Set</u></b>		<b><u>Fuel</u></b>	
Manufacturer:	MCII	Fuel Capacity (Gal):	43
Model:	MEP-816B	Fuel Consumption (GPH):	5.37
Voltage (Volts):	120/208/240/416	Fuel Requirement:	Diesel/JP-8
Frequency (Hz):	400		
Speed (RPM):	2000	<b><u>Dimensions</u></b>	
Phase:	3	Length (in):	87
		Width (in):	35.7
		Height (in):	59
<b><u>Engine</u></b>		Weight (lbs):	
Manufacturer:	John Deere	Dry:	3603
Model:	6068TF151	Wet (coolant & POLs):	4042
Type:	4 Cycle	Volume (ft <sup>3</sup> ):	103
Cylinders:	6		
Displacement:	359 in <sup>3</sup> (5.9L)		
		<b><u>Aural Signature</u></b>	
		Audio Rating:	72dBA @ 7 meters
<b><u>Replaced Items</u></b>	MEP-115A, MEP-816A.		
<b><u>Transportability</u></b>	All variants of the USMC M353 trailer.		



## MITSUBISHI

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Mitsubishi part numbers that cross reference to GAC part numbers are referenced in the [MITSUBISHI cross-reference table](#) at the end of this guide.

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
L3E-V363JGH		<a href="#">EDG6000</a>		<a href="#">EAM208</a>
S4L2	<a href="#">ALR190-M04-12</a>	<a href="#">SDG514-02-02</a>	MSP6738	

## GAC APPLICATION NOTE

### L3E ENGINE

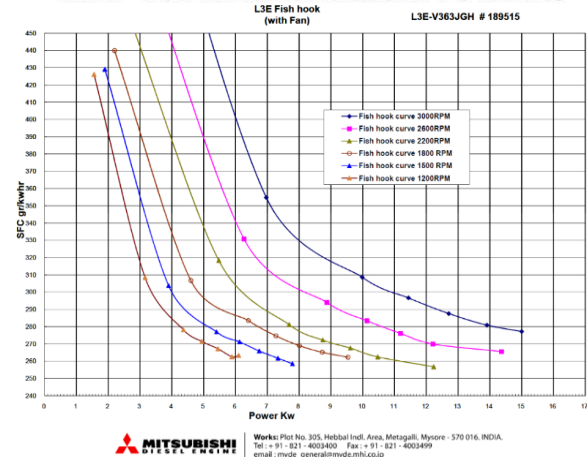
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model :</b>	MITSUBISHI L3E-V363JGH
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	Variable Range from 1200-3000 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Speed Controller: EDG6000</li> <li>• Interface Module: EAM208</li> </ul>
<b>Summary:</b>	The <b>EAM208</b> accessory module provides an output proportional to power based on the current input from the variable speed DC generator. The <b>EDG6000</b> is a digital Speed Controller designed for industrial engine applications from generator sets, and mechanical drives, to pumps or compressors.

#### MITSUBISHI L3E GEN-DRIVE ENGINE

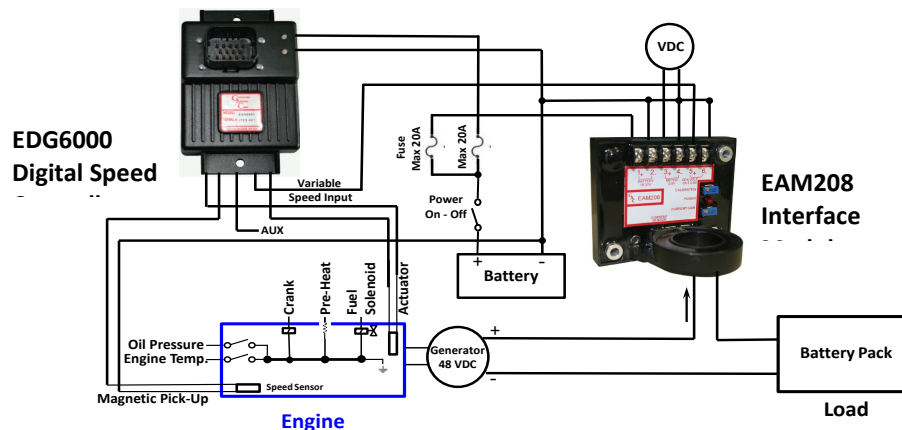


#### MITSUBISHI L3E: SFC -G/KW-HR

##### MHI - VST DIESEL ENGINES PVT. LTD.



#### EXAMPLE: VARIABLE SPEED DC GENERATOR SCHEMATIC



## GAC APPLICATION NOTE

### **S4L2 POWERING MILLER WELDER**

<b>Customer / OEM:</b>	Miller Electric Manufacturing Company
<b>Application(s):</b>	Diesel Welder
<b>Engine Make / Model :</b>	MITSUBISHI S4L2, 1.8L, 4-cylinder In-line, Water-cooled
<b>Equipment Make / Model:</b>	Miller Big Blue Series
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch-type inline
<b>Operating Speed(s):</b>	1800 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ALR190-M05-12</li><li>• Speed Controller: SDG514-02-02</li><li>• Magnetic Speed Pickup: MSP6738</li></ul>

**Summary:** The SDG514-02-02 digital speed control is used with the ALR190-M05-12 integrated linear actuator mounted on a Mitsubishi S4L2 engine with Bosch-type pump along with an MSP6738 for speed reference. These are used in a series of compact diesel welders to precisely control engine speed in all load conditions. The ALR190-M05-12 (reverse acting, pull actuator) connects directly to the fuel pump in place of the stop solenoid for seamless integration and incredible transient response. The SDG514-02-02 is a powerful, compact, and tamper-proof Speed Controller with a customer-specific calibration so that every engine off the line performs the same. These generators are used by construction contractors, independent rig owners and fleet managers.

### **COMPLETED WELDER**



## ALR CLOSE-UP VIEW



ALR190-M05-12

## SIDE VIEW OF WELDER



## SDG INSTALLED



## MITSUBISHI HEAVY INDUSTRY

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Mitsubishi part numbers that cross reference to GAC part numbers are referenced in the [MITSUBISHI cross-reference table](#) at the end of this guide.

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
MHI S6R2 Series	<a href="#">ADC225S-24</a>	<a href="#">ESD5500E</a>	<a href="#">MSP6728C</a>	KT193
S4S & S6S	<a href="#">ADD225S-12/24</a> <a href="#">ADD175A-12/24</a>	<a href="#">ESD5111</a> <a href="#">ESD5221</a> <a href="#">ESD5550</a>	MSP6722C <a href="#">MSP6728C</a>	<a href="#">KT175-AR</a> <a href="#">KT175-RS-R</a> <a href="#">KT289</a>
S4S Injection Pump	<a href="#">ADD175A</a>	<a href="#">ESD5221</a>		<a href="#">KT175-RS-R</a> <a href="#">KT289</a>
S12A2, S12R & S16R	<a href="#">ACB2001</a>	<a href="#">ESD5330</a> ESD5340	<a href="#">MSP6728C</a>	
L Series & K Series	<a href="#">ADD225S-12/24</a>	<a href="#">ESD2210-12/24</a>	<a href="#">MSP6728C</a>	
S6A3, S6B3, S6R	<a href="#">ADD225S-12/24</a>	<a href="#">ESD5500E</a>	<a href="#">MSP6728C</a>	



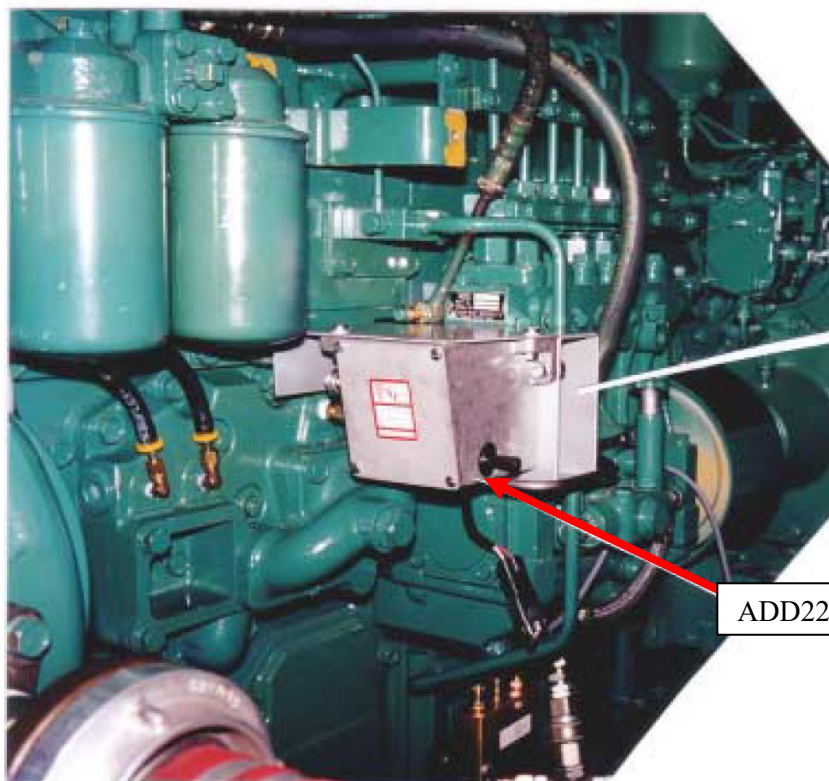
## GAC APPLICATION NOTE

### **MHI S6R2 (VOLVO D30) ENGINES**

<b>Customer / OEM:</b>	Volvo Penta
<b>Application(s):</b>	Marine Propulsion / Generator Drive
<b>Engine Make / Model:</b>	MITSUBISHI S6R2, 24.5L In-Line 6 Cylinder Power Ratings Range from 480 to 759 kW at 1500 RPM
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, In-line
<b>Operating Speed(s):</b>	1500 / 1800 RPM and Variable Speed
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC225S-24 (Volvo Part Number 3838271)</li> <li>• Speed Controller: ESD5500E (Volvo Part Number 3817999)</li> <li>• Magnetic Speed Sensor: MSP6827C</li> </ul>

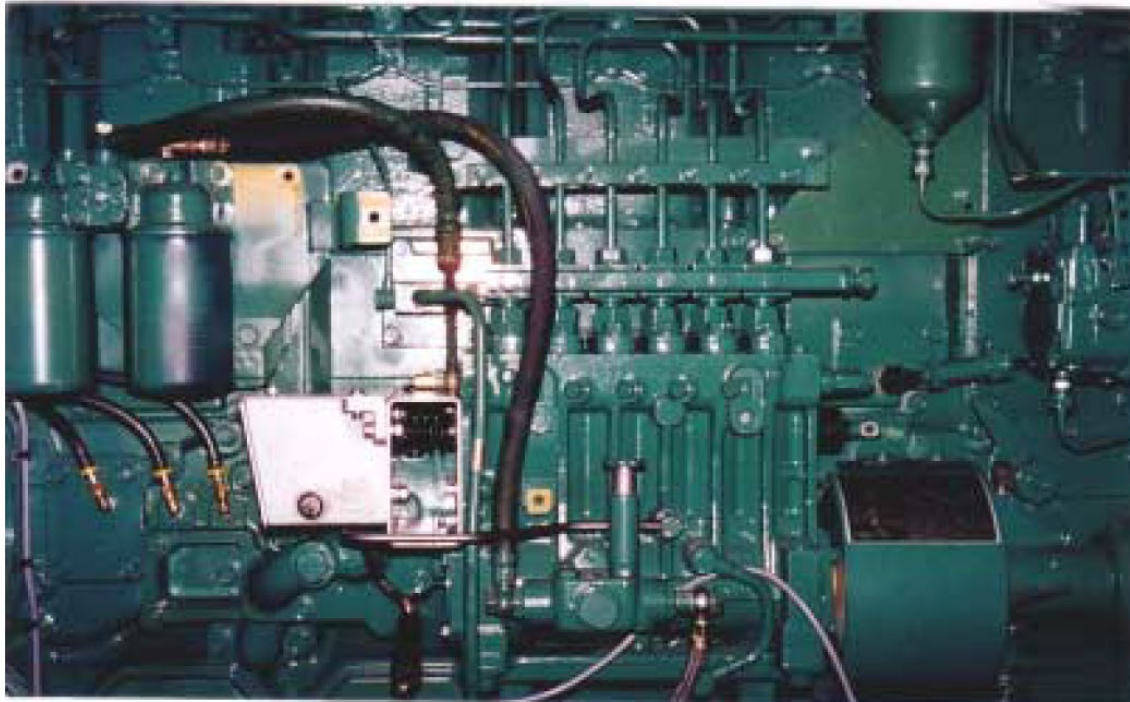
**Summary:** The MHI S6R2 engine series fit with a GAC electronic governor systems for superior speed control serves in gen-sets and marine propulsion applications.

### **VOLVO D30 (MHI S6R2) ENGINE WITH GAC GOVERNOR SYSTEM ON PS6-48 270 PUMP**



ADD225S-24 Actuator

## VOLVO D30 (MHI S6R2) ENGINE WITH GAC GOVERNOR SYSTEM ON PS6-48 270 PUMP



## GAC GOVERNOR SYSTEMS ON VOLVO-MHI ENGINES FOR RETROFIT APPLICATIONS

ENGINE	ACTUATOR	SPEED CONTROLLER	MSP
D25A	ADD225S-24	ESD5500E	MSP6728C
D30A	ADD225S-24	ESD5500E	MSP6728C
D34A	ACB2001	ESD5330	MSP6728C
D49A	ACB2001	ESD5330	MSP6728C
D65A	ACB2001	ESD5330	MSP6728C

GAC APPLICATION NOTE

**S4S and S6S MHI ENGINES**

<b>Customer / OEM:</b>	MITSUBISHI Heavy Ind.
<b>Application(s):</b>	50 Hz Gen. Set 42 HP at 1500 RPM
<b>Engine Make / Model :</b>	S4S 4 cyl. 3.31L and S6S
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Zexel Inline Injection Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225, or ADD175A-12/24</li><li>• Speed Controller: ESD5111, ESD5221 or ESD5550</li><li>• Magnetic Speed Pickup: MSP6722C or MSP6728C</li><li>• Mounting Kit; KT175-RS-R, or KT289 (included with actuator)</li></ul>

**S4S ENGINE**



GAC APPLICATION NOTE

## MHI S4S INJECTION PUMP INSTALLATION

<b>Customer / OEM:</b>	MITSUBISHI Heavy Ind.
<b>Application(s):</b>	50 Hz Gen. Set 42 HP at 1500 RPM
<b>Engine Make / Model:</b>	S4S 4 cyl. 3.31L
<b>Fuel System Type &amp; Make / Model:</b>	Zexel In-Line Injection Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD175A</li><li>• Mounting Kits: KT175-RS-R and KT289</li></ul>

**Summary:** Pump replacement.

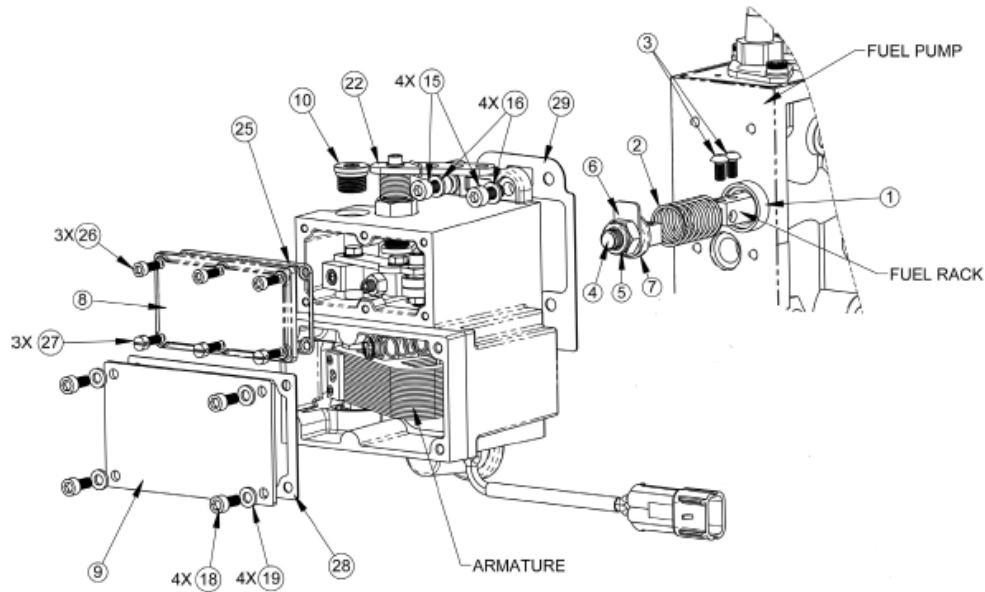
### MOUNTING KIT KT175-RS-R



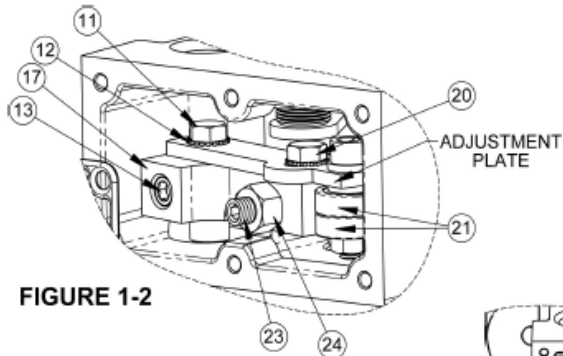
Connect the link rack to the fuel rack. The gasket and adaptor plate are then screwed into the mechanical governor housing.

[INSTALLATION INSTRUCTIONS ARE AVAILABLE ON THE GAC WEBSITE](#)

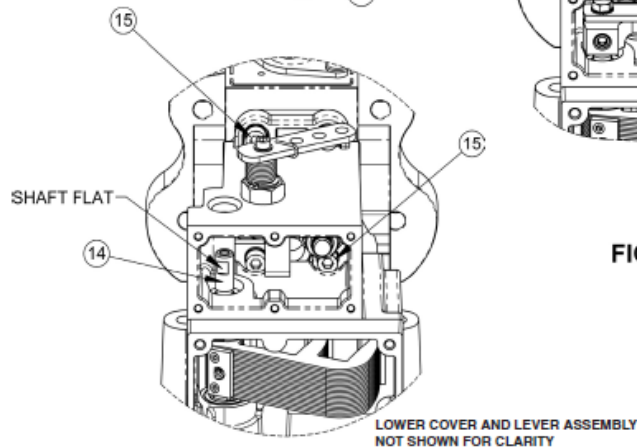




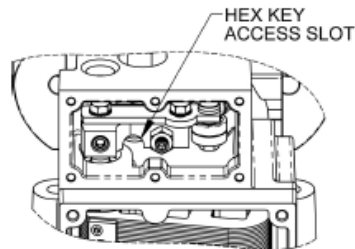
**FIGURE 1-1**



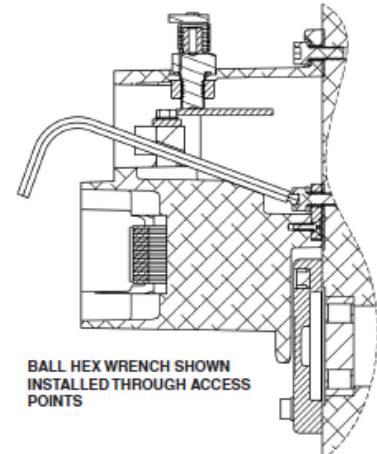
**FIGURE 1-2**



**FIGURE 1-3**



**FIGURE 1-5**



**BALL HEX WRENCH SHOWN  
INSTALLED THROUGH ACCESS  
POINTS**



## GAC APPLICATION NOTE

### **S12A2, S12R, and S16R MHI ENGINES**

<b>Customer / OEM:</b>	MITSUBISHI Heavy Ind.
<b>Application(s):</b>	Gen-Set, Industrial and Marine
<b>Engine Make / Model / Displacement / Rating:</b>	S12R 2992 in <sup>3</sup> / 49L V12 S16R 3989 in <sup>3</sup> / 65.37L V16
<b>Equipment Make / Model:</b>	
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, In-Line
<b>Operating Speed(s):</b>	1500 RPM, 1800 RPM. 2200 RPM Over-speed
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACB2001</li> <li>• Speed Controller: ESD5340</li> <li>• Magnetic Speed Pickup: MSP6728C</li> </ul>

**Summary:** The ESD5340 Speed Controller offers superior full fuel control from rated operating speed to low idle due to its unique combination of features like dual gain adjustment, one for idle and one for operating speed, with independently adjustable acceleration and deceleration speed ramping controls. The ESD5340 also includes:

- A Two Element Speed Switch
- Dual Speed Ramping from Idle to Operating Speed, with Acceleration and Deceleration Adjustments
- Wide Range Speed Control Compatible
- Start Fuel Control for Lower Exhaust Emissions
- Enhanced Start Circuit for Large Bore Engines
- Variable Speed Governing
- Accessory Inputs for Load Sharing
- High Current Controlled Output, Designed for the ACB2001
- Dual Gain, One at Idle & One at Operating Speed
- Adjustable Chop Frequency for Added Stability

#### **ESD5340**



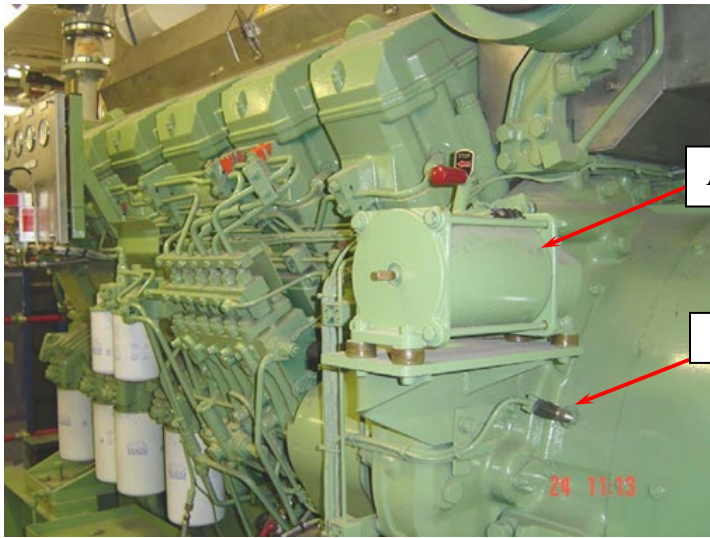
#### **ACB2001 ACTUATOR**



#### **SPEED SENSOR**

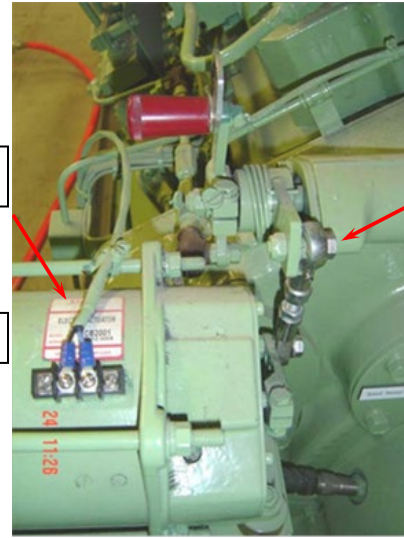


## ACB2001 ACTUATOR ON MHI S12R V12 ENGINE (VOLVO PENTA D49)



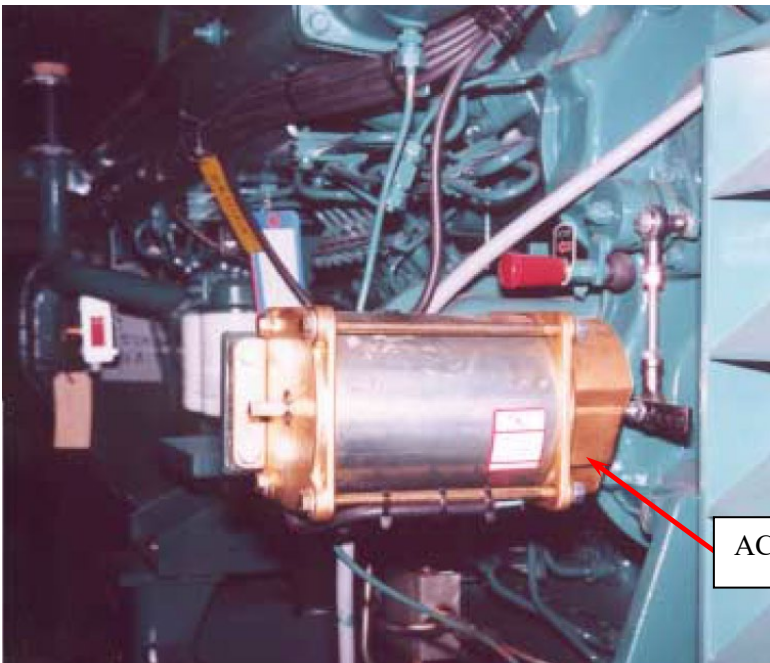
ACB2001

MSP6728

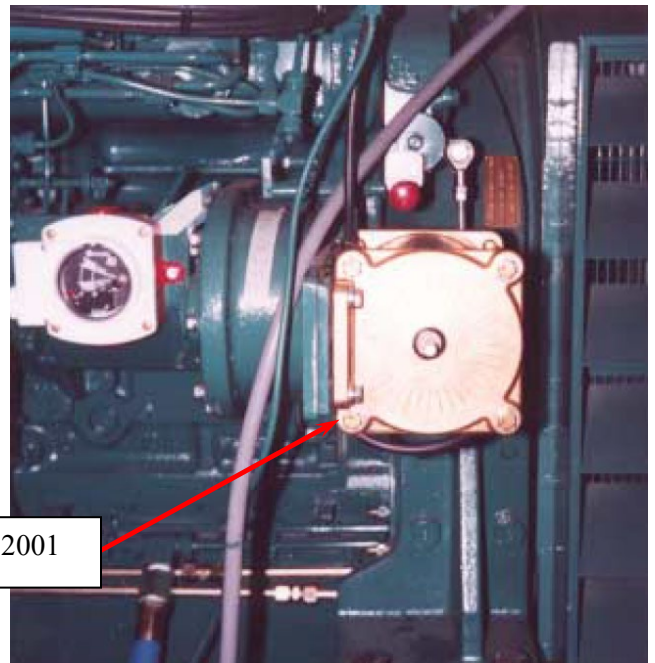


Linkage w/ 2  
BR200 Bearing  
Rod Ends

## ACB2001 ACTUATOR ON MHI S12A2 V12 ENGINE (VOLVO PENTA D34)



ACB2001



## MHI - S12R: 2,992 CUBIC INCH / 49L DISPLACEMENT V12



## MHI S16R-PTA; 3,989 CUBIC INCH / 65.37L DISPLACEMENT V16



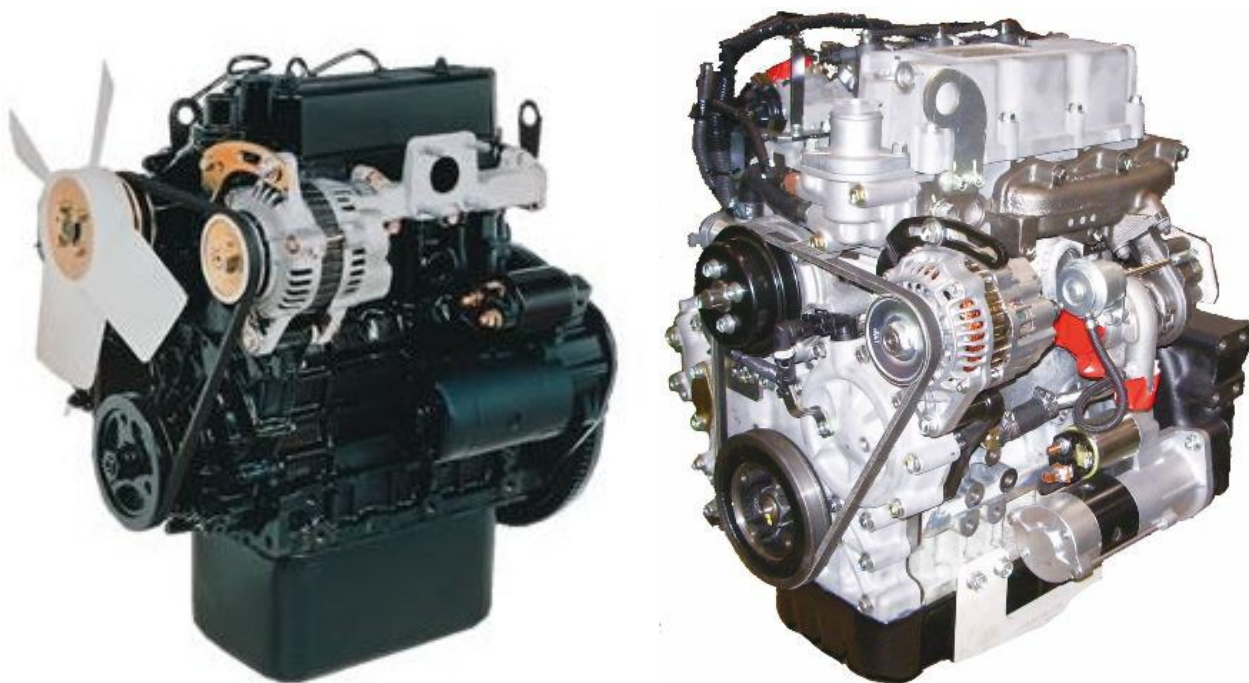


GAC APPLICATION NOTE

**L-SERIES and K-SERIES ENGINES**

<b>Customer / OEM:</b>	MITSUBISHI Heavy Ind.
<b>Application(s):</b>	Various
<b>Engine Make / Model :</b>	L-Series and K-Series
<b>Equipment Make / Model:</b>	
<b>Fuel System Type:</b>	Diesel
<b>Operating Speed(s):</b>	5.4 to 20.4 HP, 1500 – 3600 RPM, L- Series
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225S-12/24</li><li>• Speed Controller: ESD2210-12/24</li><li>• Magnetic Speed Pickup: MSP6728C</li></ul>

**MITSUBISHI L AND K SERIES ENGINES**



GAC APPLICATION NOTE

**S6A3, S6B3, and S6R MHI ENGINES**

<b>Customer / OEM:</b>	MITSUBISHI Heavy Ind.
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	S6A3, S6B3, and S6R
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	583 HP @ 1960 RPM, S6A3 429 HP @ 2000 RPM, S6B3 835 HP prime power @ 1800 RPM, S6R
<b>Battery Voltage:</b>	24 V DC
<b>Installed and Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225S-24</li><li>• Speed Controller: ESD5500E</li><li>• Magnetic Speed Pickup: MSP6728C</li></ul>

**S6A3, S6B3, AND S6R ENGINES**





## MTU

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

MTU part numbers that cross reference to GAC part numbers are referenced in the [MTU cross-reference table at the end of this guide](#).

MTU ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
183 Locomotive	<a href="#">ACB275C</a>		<a href="#">RSC671</a>	LCC109B
447 & 440 HP	ADC225S-24 <a href="#">ACB275C</a>	<a href="#">ESD5221</a> <a href="#">ESD5550</a> <a href="#">LSM201</a>	<a href="#">MSP677</a>	<a href="#">KT276, KT275</a> PCA157, PCA155 PCA162, PCA156 MRM100 KT6731
183 Generator Marine	<a href="#">ACE275H</a>	EGS104B <a href="#">SYC6714</a>		

GAC APPLICATION NOTE

## MTU 183 DIESEL-ELECTRIC LOCOMOTIVE

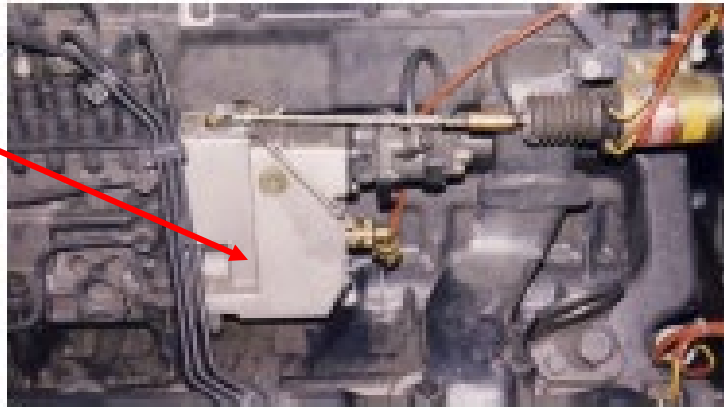
<b>Customer / OEM:</b>	Zermatt-Bahn Cog Railway
<b>Application(s):</b>	Locomotive
<b>Engine Make / Model:</b>	MTU 183, V-12, 21.93 L
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Inline Pump
<b>Operating Speed(s):</b>	Variable
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB275H</li><li>• Speed Switch: SSW675</li><li>• Accessories: LCC109B</li></ul>

### LOCOMOTIVE



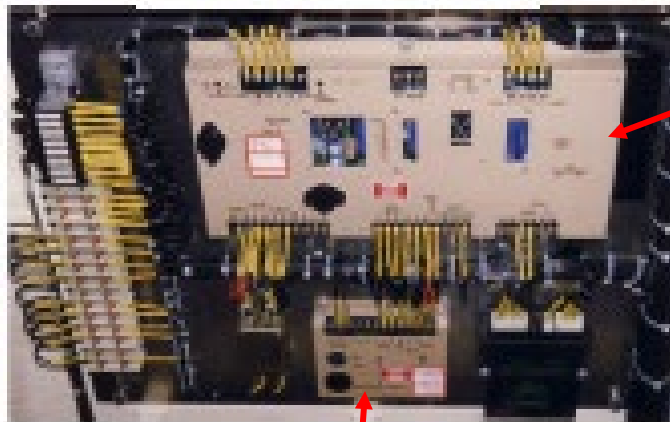
## ACB275H

ACB275



## LCC109B AND SSW675

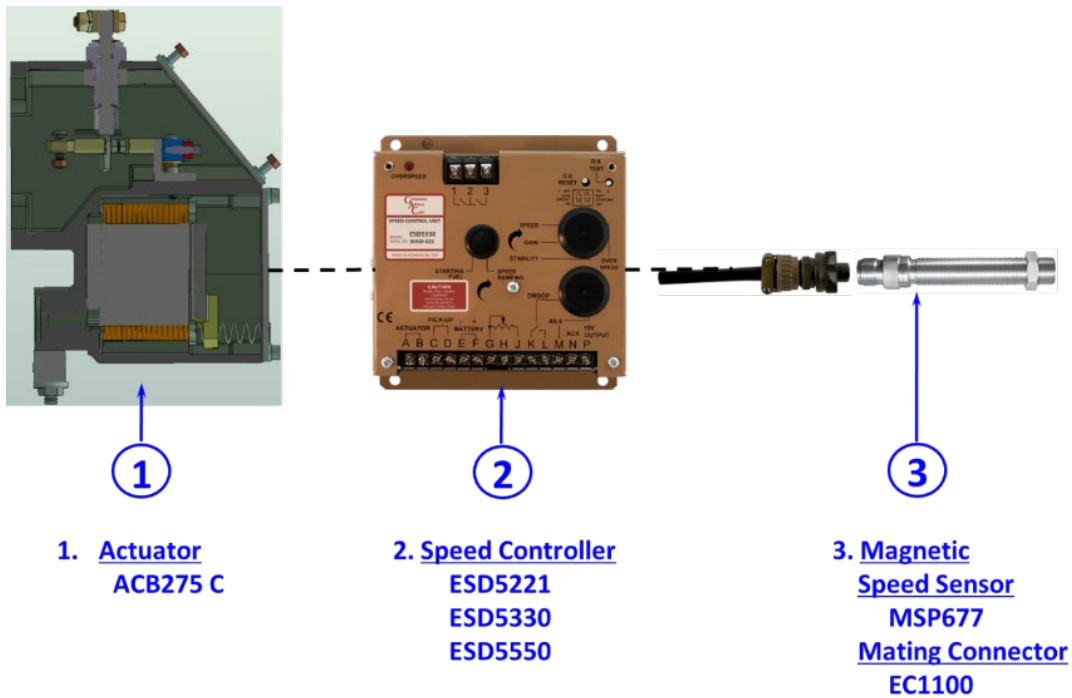
LCC109B



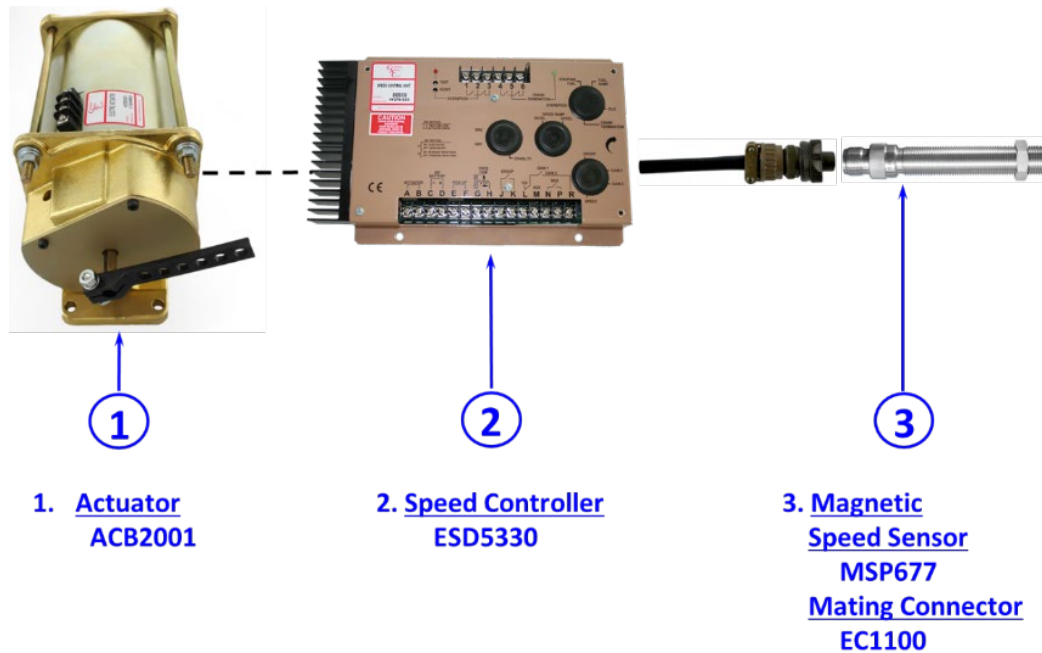
SSW675

## GAC ELECTRONIC GOVERNOR SOLUTIONS FOR MTU ENGINES

### MTU 183 SERIES ENGINES WITH INTEGRAL ACTUATOR



### MTU 396 SERIES ENGINES WITH EXTERNAL ACTUATOR



GAC APPLICATION NOTE

**MTU 447 WOOD CHIPPER**

<b>Customer / OEM:</b>	LiPPEL: Brazil
<b>Application(s):</b>	Wood Chipper
<b>Engine Make / Model :</b>	MTU 447, 440HP
<b>Equipment Make / Model:</b>	Forestry Drum Wood Chipper PTML 350/550 x 800
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch Inline Fuel Pump
<b>Operating Speed(s):</b>	1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC225S-24</li><li>• Speed Controller: EDG5500</li></ul>

**COMPLETE WOOD CHIPPER**





## EDG5500

EDG5500



## ADC225S-24, FUEL PUMP SIDE VIEW

ADC225S-24



GAC APPLICATION NOTE

**MTU 183 MARINE PROPULSION / GENERATOR DRIVE**

<b>Customer / OEM:</b>	SES Yacht
<b>Application(s):</b>	Marine
<b>Engine Make:</b>	2 MTU 183, 150KW each, Diesel
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Speed Controller: EGS104B</li><li>• Supporting Modules: 2 LSM201 load share modules</li><li>• Supporting Modules: 2 SYC6714 synchronizers</li><li>• Actuator: ACE275H</li></ul>

**Summary:** The EGS104B speed controller uses the actuators and synchronizers on each engine to share information and provide a smooth transition between the engines.



## NOELL

NOELL ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
6 CYL.	<a href="#">ADD175</a>	<a href="#">ESD5550</a>	<a href="#">RSC671</a>	

## GAC APPLICATION NOTE

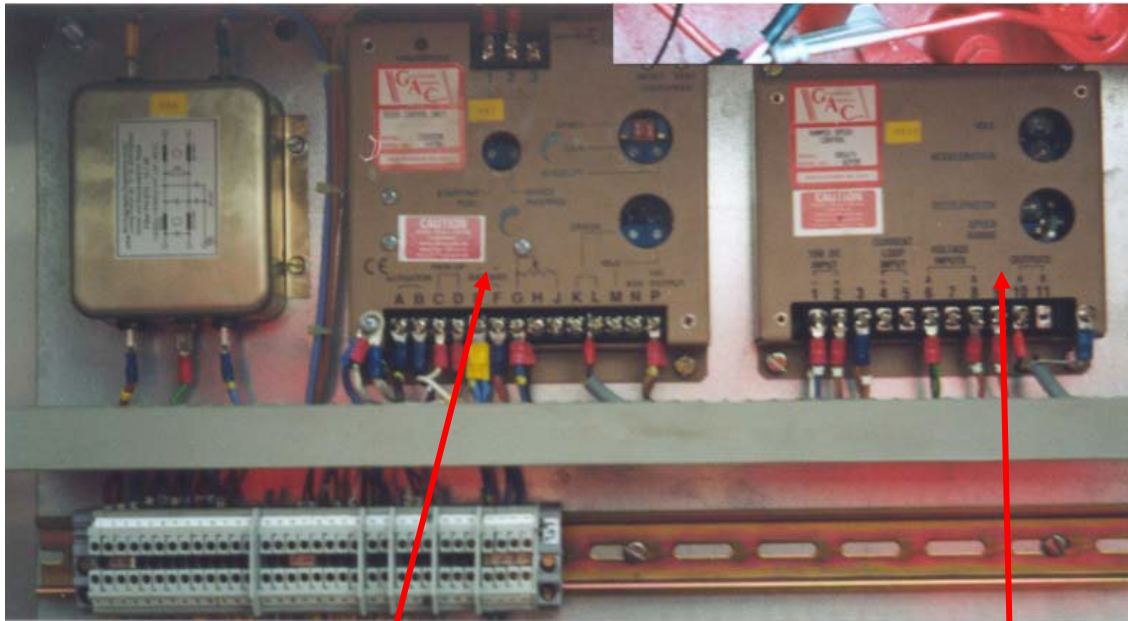
### **6 CYLINDER CRANE**

<b>Customer / OEM:</b>	NOELL Crane Systems
<b>Application(s):</b>	Crane
<b>Engine Make / Model:</b>	6 Cylinder Scania
<b>Equipment Make / Model:</b>	Container Crane
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch Inline Pump
<b>Operating Speed(s):</b>	12 or 24 V DC
<b>Battery Voltage:</b>	
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD175-24</li><li>• Speed Controller: ESD5550</li><li>• Speed Ramping Module: RSC671</li></ul>

### **CONTAINER CRANE**



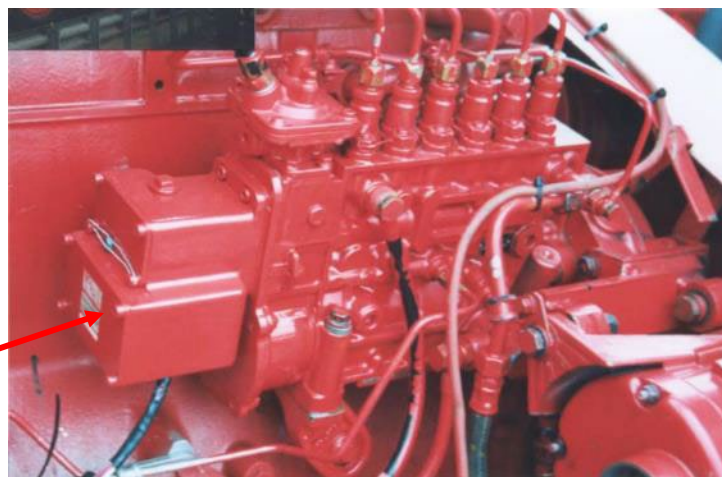
## GAC CONTROLS



ESD5550

RSC671

## ACTUATOR on PUMP



ADD175A



## PERKINS

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

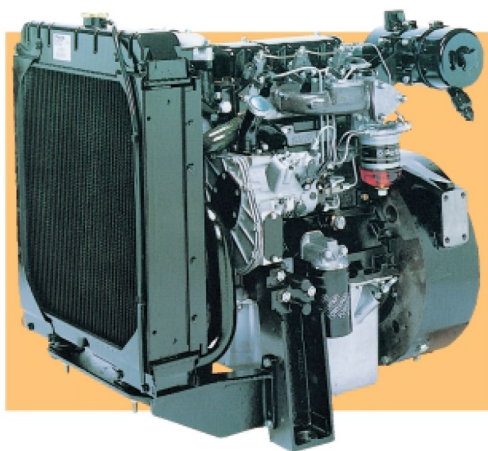
PERKINS ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
<a href="#">3.1524</a>	<a href="#">ADC100</a>	<a href="#">ESD2244</a> <a href="#">ESD5120</a> <a href="#">ESD5522E, ESD5570</a>	<a href="#">MSP6728C</a>	EC1350
<b>4.236</b>	<a href="#">ADC100</a> <a href="#">ADD120S</a>	<a href="#">ESD2244</a> <a href="#">ESD5120</a> <a href="#">ESD5522E, ESD5570</a>	<a href="#">MSP6728C</a>	KT190 EC1350
403D	ALR190	EEG6500		
<a href="#">1004-4</a>	<a href="#">ADC100</a>	<a href="#">ESD2244, ESD5120</a> <a href="#">ESD5522E, ESD5570</a>	<a href="#">MSP6723C,</a> <a href="#">MSP6728C</a>	EC1350
<b>1006-6</b>	<a href="#">ADC100</a>	<a href="#">ESD2244, ESD5120</a> <a href="#">ESD5522E, ESD5570</a>	<a href="#">MSP6723C</a> <a href="#">MSP6728C</a>	KT190 EC1350
<b>1300 SERIES</b>				<a href="#">EAM115</a>
<b>1306 (TAG)</b>	<a href="#">ADD175A</a>		<a href="#">MSP6724</a>	<a href="#">KT275</a>
<a href="#">2006</a>	<a href="#">ACE275HD-24</a>		<a href="#">MSP6728C</a>	<a href="#">KT275</a>
<b>2800 SERIES</b>				<a href="#">EAM113</a>
<b>3008 (TA)</b>	<a href="#">ACE275HD-24</a> <a href="#">ADD175A</a>			<a href="#">KT275</a>
<a href="#">3012 SERIES</a>	<a href="#">ADD225S</a>		<a href="#">MSP6728C</a>	
<b>4006, 4008 &amp; 4016</b>	<a href="#">ATB552T2N2-24</a> <a href="#">ATB652T2N2-24</a> <a href="#">ATB753T3N14-24</a>	<a href="#">AFR210</a>		<a href="#">RPR102</a> MXSB44-STM <a href="#">ICM200-6/8</a> <a href="#">STE101</a> <a href="#">SOX103</a> CL600, <a href="#">GR104</a> <a href="#">SPW100</a> <a href="#">SCI101</a>
<b>4006 TAG2 ENGINE</b>	<a href="#">ACB2001</a>	<a href="#">ESD5330, ESD5340</a>		
<b>Vista A</b>	<a href="#">ADD103B-12/24</a>			

## GAC APPLICATION NOTE

### **3.1524 ENGINE with STANADYNE**

<b>Customer / OEM:</b>	PERKINS
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	3.1524 (T) with Stanadyne 3 cylinder, 2.5 liter
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Stanadyne Rotary Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC100</li> <li>• Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570</li> <li>• Magnetic Speed Pickup: MSP6728C and EC1350</li> </ul>
<b>Summary:</b>	Mounted directly on the rotary pump

### **PERKINS 3.1524 ENGINE WITH STANADYNE ROTARY PUMP**



#### **1- PERKINS 3.1524 ENGINE RATINGS**

Engine Speed rev/min	Type of Operation	Typical Generator Output (Net)		Engine Power			
		kVA	kWe	Gross		Net	
				kWm	bhp	kWm	bhp
1500	Prime power	27.5	22.0	25.0	33.5	24.5	33.0
	Standby power	30.0	24.0	27.5	37.0	27.0	36.0
1800	Prime power	30.5	24.5	28.0	37.5	27.5	37.0
	Standby power	34.0	27.0	31.0	42.0	30.5	41.0

## GAC APPLICATION NOTE

### **4.236 ENGINE with STANADYNE CAV**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	4.236 (T) with Stanadyne CAV
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Stanadyne Rotary Pump
<b>Operating Speed(s):</b>	84 HP @ 2800 RPM
<b>Battery Voltage:</b>	12, 24 or 32 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC100 or ADD120S</li> <li>• Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570</li> <li>• Magnetic Speed Pickup: MSP6728C and EC1350</li> <li>• Mounting Kit: KT190</li> </ul>

### **PERKINS 4.236 ENGINE**



### **GAC ACTUATOR ON STANADYNE ROTARY PUMP**

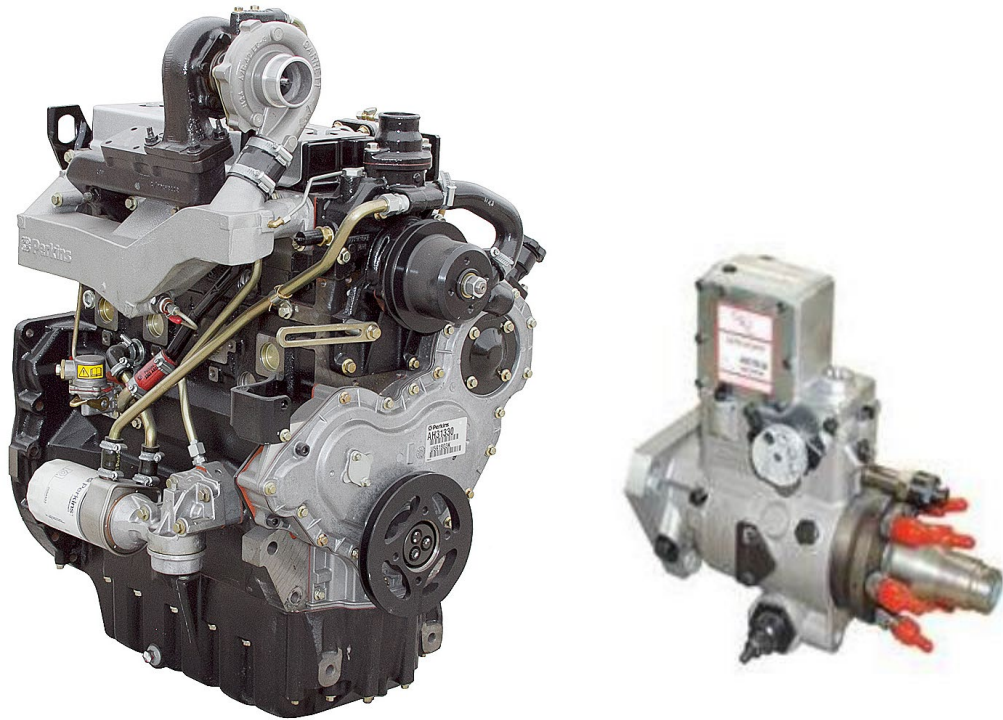


GAC APPLICATION NOTE

**1004 ENGINE with STANADYNE ROTARY PUMP**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	1004-4 (TW) with Stanadyne
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Stanadyne Rotary Pump
<b>Operating Speed(s):</b>	85.5 BHP @ 2600 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADC100</li><li>• Speed Controller: ESD2244, ESD5120, ESD5522E, or ESD5570</li><li>• Magnetic Speed Pickup: MSP6728C, EC1350, or MSP6723C with M16x1.5 thread</li></ul>
<b>Summary:</b>	Mounted directly on pump

**PERKINS 1004-4 ENGINE WITH STANADYNE ROTARY PUMP AND ADC100 ACTUATOR**





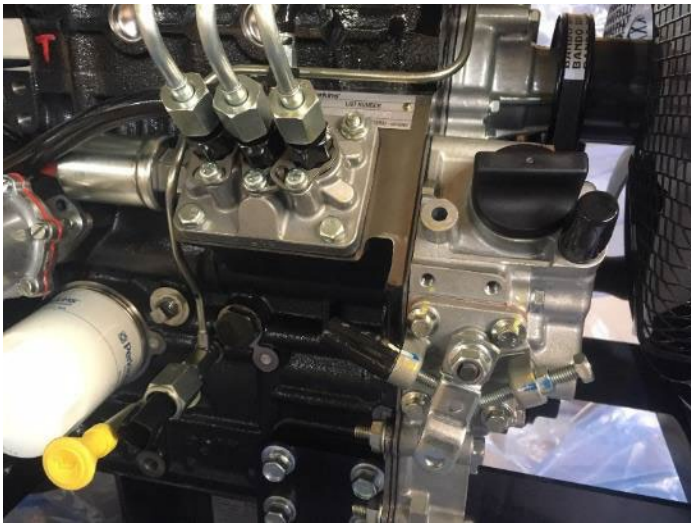
GAC APPLICATION NOTE (all of the components specified are sold separately)

## **CATERPILLAR C1.7 and PERKINS 403D ENGINES**

<b>Customer / OEM:</b>	Perkins / Caterpillar
<b>Application(s):</b>	Industrial Diesel Engines
<b>Engine Make / Model:</b>	403D-07 / 3 cyl / .76L/9-15.3 kW / 2800-3600 rpm 403D-15 / 18.4-25.1 kW / 2200-3000 rpm 403D-15T / 23.1-30 kW / 2200-3000 rpm CAT C1.7 / 23.6 & 26.1 kW / 2400-2600 rpm
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	2200 to 3600 RPM
<b>Battery Voltage:</b>	12/24 VDC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: <a href="#">ALR190-P403-12/24</a></li> <li>• Speed Controls: EEG6500 (digital), ESD5111 or ESD5500E (analog)</li> </ul>

**Summary:** ALR actuator easily replaces the Electronic Fuel Stop Solenoid in the Perkins and Caterpillar engines.

### **BEFORE AND AFTER INSTALLATION OF THE ALR190-P403-12/24 ACTUATOR**





## GAC APPLICATION NOTE

### **1006 ENGINE with STANADYNE CAV**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Various
<b>Engine Make / Model :</b>	1006-6 (TW) with Stanadyne CAV 6 cylinder in-line
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Stanadyne Rotary Pump
<b>Operating Speed(s):</b>	182.5 BHP @ 2600 RPM
<b>Battery Voltage:</b>	12, 24, or 32 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC100 or ADD120S</li> <li>• Speed Controllers: ESD2244, ESD5120, ESD5522E, or ESD5570</li> <li>• Magnetic Speed Pickup: MSP6728C, EC1350, or MSP6723C with M16x1.5 thread</li> <li>• Mounting Kit: KT190</li> </ul>
<b>Summary:</b>	Mounted directly on pump

### **PERKINS 1006-6 ENGINE AND STANADYNE PUMP WITH ADC100 ACTUATOR**



## **ENGINE RATINGS**

Performance Data	Gross Intermittent*	Speed rev/min	Net Intermittent	Speed rev/min
Power Output (kW)	119	2600	107	2600
Power Output (bhp)	159	2600	143.5	2600
Peak Torque (Nm)	577	1600	516	1600
Peak Torque (lbf ft)	425	1600	380	1600

Power output for a run-in engine after 60 hours.

\*Rating Standard ISO (TR) 14396

## GAC APPLICATION NOTE

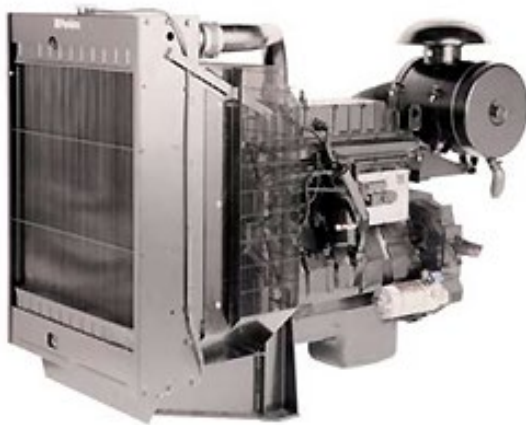
### **1300 SERIES with INTERFACE MODULE**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Engine Control System
<b>Engine Make / Model:</b>	1300 series
<b>Fuel System Type &amp; Make / Model:</b>	
<b>Operating Speed(s):</b>	174-350 BHP
<b>Battery Voltage:</b>	12 or 24 V
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Interface Module: EAM115</li> </ul>

**Summary:** The EAM115 is an interface module that provides conditioned electrical signals for Perkins1300 Series engine/genset applications (Edi 6e gen set). A typical application is where a GAC load sharing/ synchronization system is to be connected to such a Perkins engine control system.

The DC supply for the interface comes from the common battery source for the engine control and the accessory controls. The input to the module (Terminal D) is typically 5.0 V DC, which represents the load sharing, and synchronization signals. The output of the EAM115 to the Perkins control is a 2.5 V DC signal based on the Perkins 5.0 V DC reference signal.

#### **PERKINS 1300 SERIES ENGINE**



#### **EAM115 INTERFACE MODULE**



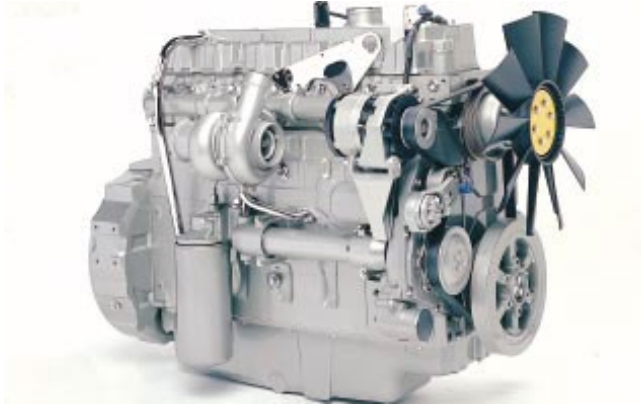
GAC APPLICATION NOTE

**1306 ENGINE with BOSCH “P” PUMP**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Gen. Set
<b>Engine Make / Model:</b>	1306 (TAG)
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch “P” Inline Pump
<b>Operating Speed(s):</b>	246 kW, 330 HP @ 1500 RPM 261 kW, 350 HP @ 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator : ADD175A</li> <li>• Magnetic Speed Pickup: MSP6724 with ¾-16 UNF</li> <li>• Mounting Kit: KT275</li> </ul>

**PERKINS 1306 ENGINE**

**MSP6724**



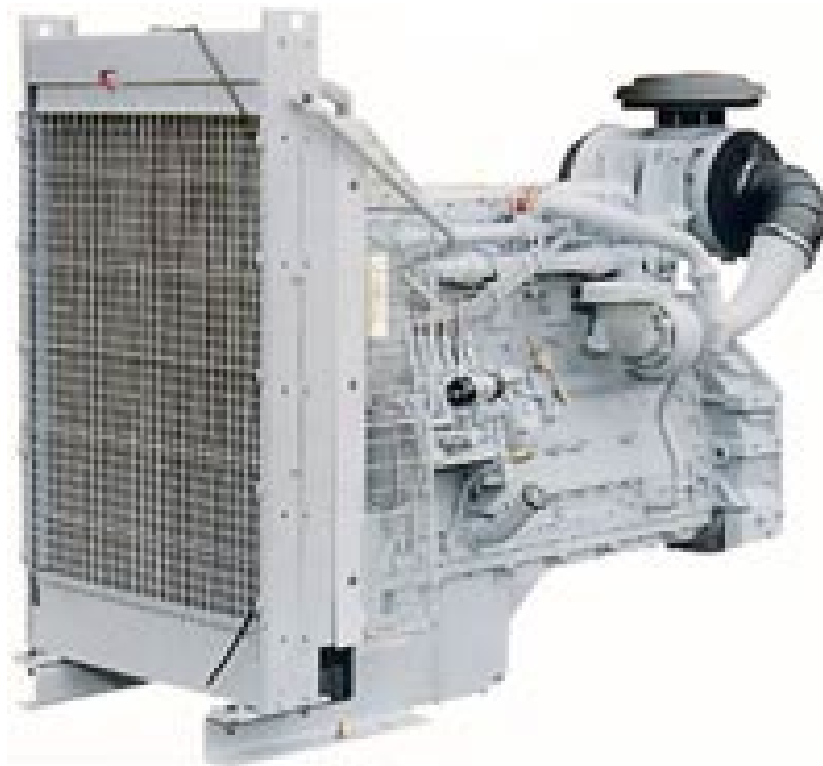
1300 Series EDi Gen Set Power		
	Gross Engine Output kWm (hp)	
	@1500 rev/min	@1800 rev/min
1306-E87T	149.0 (200)	171.5 (230)
	160.0 (215)	--
1306-E87TA	186.5 (250)	201.5 (270)
	205.0 (270)	227.5 (305)
	223.0 (300)	242.5 (325)
	231.0 (310)	--
	246.0 (330)	261.0 (350)

GAC APPLICATION NOTE

**2006 ENGINE with BOSCH “P” PUMP**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Gen. Set
<b>Engine Make / Model:</b>	2006 (TA)
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch “P” Inline Pump
<b>Operating Speed(s):</b>	364 kW @ 1500 RPM 368 kW @ 1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACE275HD-24</li><li>• Magnetic Speed Pickup: MSP6728 with 5/8-18 UNF</li><li>• Mounting Kit: KT275</li></ul>

**PERKINS 2006 ENGINE AND BOSCH “P” PUMP**



## GAC APPLICATION NOTE

### **2800 SERIES ENGINE**

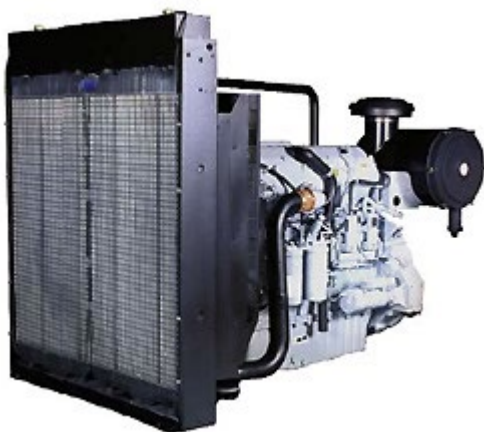
<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Engine Control System
<b>Engine Make / Model :</b>	2800 Series
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	514-652 kW
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>Interface Module: EAM113</li> </ul>

**Summary:** The EAM113 interface module is designed to be used between the PERKINS 2800 series engine control and an external control such as a variable speed input or a Load sharing and Synchronizing system. The output of the EAM113 is a current sinking PWM signal that controls the PERKINS engine control.

The EAM113 has two inputs, a 4-20 mA input as well as a 5.0V DC input. The 4-20 mA input serves to provide a wide range of PWM for maximum changes at the PERKINS control. The 5.0 V DC input is a limited range PWM output around 50% duty cycle for trimming of the speed for such usages as GAC load sharing and synchronizing.

A single potentiometer adjustment allows the range of the input signal's effect on the PERKINS control to be limited from maximum to minimum PWM duty cycle. The PWM frequency is fixed at 500 Hz. Supply voltage for the interface is the same 24 V DC battery that supplies the PERKINS system.

### **PERKINS 2800 SERIES ENGINE**



### **EAM113 INTERFACE MODULE**





## GAC APPLICATION NOTE

### **3008 ENGINE with BOSCH “P” PUMP**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Various
<b>Engine Make / Model / Displacement / Rating:</b>	3008 (TA) with Bosch “P”
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch “P” Inline Pump
<b>Operating Speed(s):</b>	468 kW, 628 BHP @ 1500 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACE275HD-24 or ADD175A-24</li> <li>• Mounting Kit: KT275</li> </ul>

### **PERKINS 3008 ENGINE AND BOSCH “P” PUMP**



### **ENGINE RATINGS**

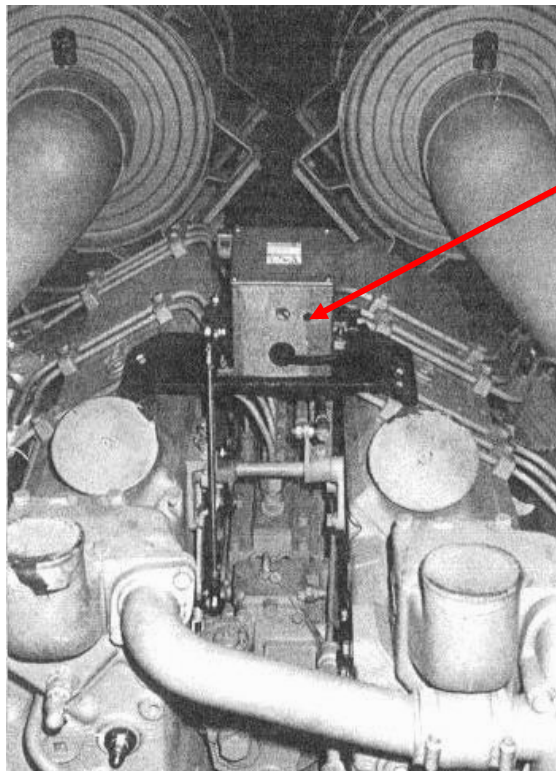
Engine Speed rev/min	Type of Operation	Typical Generator Output (Net)		Engine Power			
		kVA	kWe	Gross kW	Gross bhp	Net kW	Net bhp
1500	Continuous Baseload	–	–	–	–	–	–
	Prime Power	500	400	438	587	426	571
	Standby (Maximum)	550	440	480	644	468	628
1800	Continuous Baseload	–	–	–	–	–	–
	Prime Power	–	–	–	–	–	–
	Standby (Maximum)	–	–	–	–	–	–

GAC APPLICATION NOTE

**3012 SERIES ENGINES**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model:</b>	3012 26.1L V-12
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, CAV Maximec
<b>Operating Speed(s):</b>	550 kW, 738 BHP @ 1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225S-24</li><li>• Magnetic Speed Sensor: MSP6728C</li></ul>
<b>Summary:</b>	Engine with CAV Maximec fuel pump (to stop lever)

**ACTUATOR AND INSTALLATION KIT**



ADD225

GAC APPLICATION NOTE

**4000 SERIES METHANE POWER GENERATION**

<b>Customer / OEM:</b>	Mayphil – Gas Centre of Excellence for Perkins 4000 Series Engines
<b>Application(s):</b>	Power Generation, mining
<b>Engine Make / Model / Displacement / Rating:</b>	Perkins 22.9L (1398 in <sup>3</sup> ) 4006 in-line 6 cylinder series Perkins 30.6L (1865 in <sup>3</sup> ) 4008 in-line 8 cylinder series Perkins 61.1L (3729 in <sup>3</sup> ) 4016 V-16 cylinder series gas engines
<b>Fuel System Type &amp; Make / Model:</b>	Air/Fuel mixer with zero pressure regulator and mixture adjustment Actuator throttle body, Ignition system with individual cylinder ignition coils, spark plugs and electronic engine Governor -
<b>Operating Speed(s):</b>	1500 / 1800 RPM 384 kW @ 1200 RPM, 415 kW @ 1500 RPM, 4008 inline 912 kW @ 1500 RPM, 4016 V-16
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Zero pressure gas regulator GAC RPR102</li> <li>• Venturi mixer and fuel control valve assembly GAC MXSB44-STM</li> <li>• Actuator throttle body GAC ATB552T2N2-24, ATB652T2N2-24 and ATB753T3N214-24</li> <li>• Venturi mixer-control / engine speed controller GAC AFR210</li> <li>• Oxygen Sensor GAC SOX103</li> <li>• Exhaust gas temperature sensor GAC STE101</li> <li>• Ignition Control Module GAC ICM200-6/8</li> <li>• Ignition Coils GAC CL600</li> <li>• Spark Plug Wires GAC SPW100</li> <li>• Camshaft trigger wheel GAC GR104</li> <li>• Camshaft sensor GAC SCI101</li> </ul>
<b>Summary:</b>	From their UK headquarters in South Wales, Mayphil and their regional facilities have been appointed Perkins 4000 Series Centre of Excellence for engines capable of operating on a wide range of methane based gases: landfill gas, digester gas biogas and coal bed mine gas.

**MAYPHIL / PERKINS 4000 SERIES GAS ENGINES**



**4006 SERIES**



**4008 SERIES**



**4016 SERIES**

## GAC ESD5500 SERIES AND ACTUATOR THROTTLE BODY

On Mayphil / Perkins 4006 Engine prepared for shipment



## GAC APPLICATION NOTE

### **N844 4 CYLINDER ENGINE**

<b>Customer / OEM:</b>	Private
<b>Application(s):</b>	Power Generation
<b>Engine Make / Model:</b>	N844
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Battery Voltage:</b>	
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: <a href="#">ALR160-S04</a></li><li>• Speed Controller: <a href="#">SDG725</a></li></ul>

**Summary:** The Puma Ocean Racing Team installed a Perkins N844 four-cylinder engine to adjust the keel on one of their sailboats. GACs ALR160-S04 actuator and SDG725 Smart Digital Governor supports the application which required a fast, compact, flexible variable speed system that can be controlled from above or below deck. The ALR160 actuator replaced the shut off solenoid in the PF pump housing, acting directly on the fuel control rack.

### **FINISHED INSTALLATION**



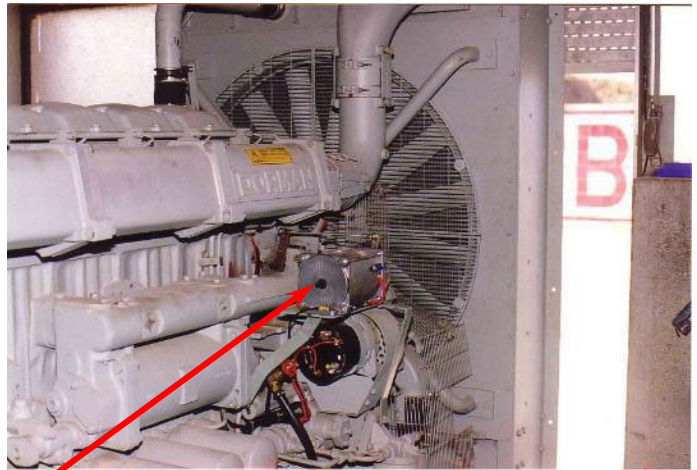
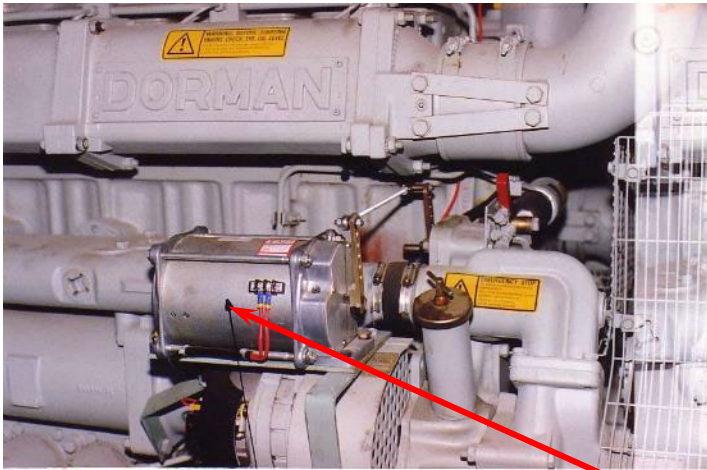


GAC APPLICATION NOTE

**DORMAN 6 SETCA 2 / PERKINS 4006 TAG2 ENGINE**

<b>Customer / OEM:</b>	Perkins / Dorman
<b>Application(s):</b>	Industrial, Gen-set Engine
<b>Engine Make / Model :</b>	4006 TAG2 6 Cylinder 22.9L, 587 kW at 1500 RPM
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	1500 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ACB2001</li><li>• Speed Controllers: ESD5330 (Standard) or ESD5340 (Full Fuel at Start-up)</li></ul>
<b>Summary:</b>	The Perkins Engine Company Limited acquired Dorman Diesels of Stafford; they incorporated the SE engines into the Perkins system as the 4000 Series.

**DORMAN 6 SETCA 2 / PERKINS 4006 TAG2 ENGINE**

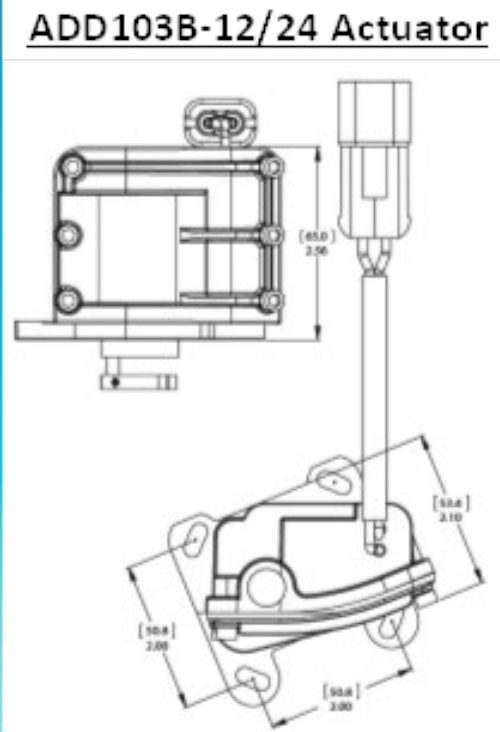


GAC - ACB2001  
Actuator

GAC APPLICATION NOTE

**VISTA A with DELPHI DPA**

<b>Customer / OEM:</b>	Perkins
<b>Application(s):</b>	Various
<b>Engine Make / Model:</b>	Vista A 1453
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Delphi DPG Pump
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>Actuator: ADD103B-12/24</li> </ul>
<b>Summary:</b>	3230F570T Perkins Vista A 30 KVA Delphi DPA Fuel Pump



## SCANIA

SCANIA ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
<a href="#">D9, D11, DSC 14 &amp; DSI 14</a>	<a href="#">ADC225S-24</a>	<a href="#">ESD5131</a> <a href="#">ESD5500E</a>	<a href="#">MSP675</a>	
Scania DSC 1000	<a href="#">ACE275K-24</a>			DSC1004
Scania 12L	ATB652T2N1-24V			
Scania S6				<a href="#">EAM127</a>
Sanfirden SGI-12-ST	ATB652T2N1-24 <a href="#">ACB275H</a>	<a href="#">ESD5526E</a> <a href="#">RSC671</a>	<a href="#">MSP677</a>	EC1100 CH1204-L3 CH1206-S PCI105 <a href="#">KT276</a> CH1203-B CH1206A-L6 CH1208-6 DSC1002 DSC1002C

## GAC APPLICATION NOTE

### **DC13 072A ENGINES**

<b>Customer / OEM:</b>	Scania
<b>Application(s):</b>	Generator
<b>Engine Make / Model:</b>	DC13 072A
<b>Equipment Make / Model:</b>	6 Cylinder, 12.7L
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	326-406 kW
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ATB752T2N-24</li><li>• Speed Controller: AFR201</li><li>• MLXB75</li></ul>

**Summary:** Two Scania DC13 072A engines and GAC AFR solution supports three water pumps in a Brazilian town. The GAC ATB driven by an AFR keeps the engine running for this town. Running in a lean mixture the AFR allows for updates using the free GAC configuration software.

### **DUAL SCANIA DC13 FOR PUMP SUPPORT**



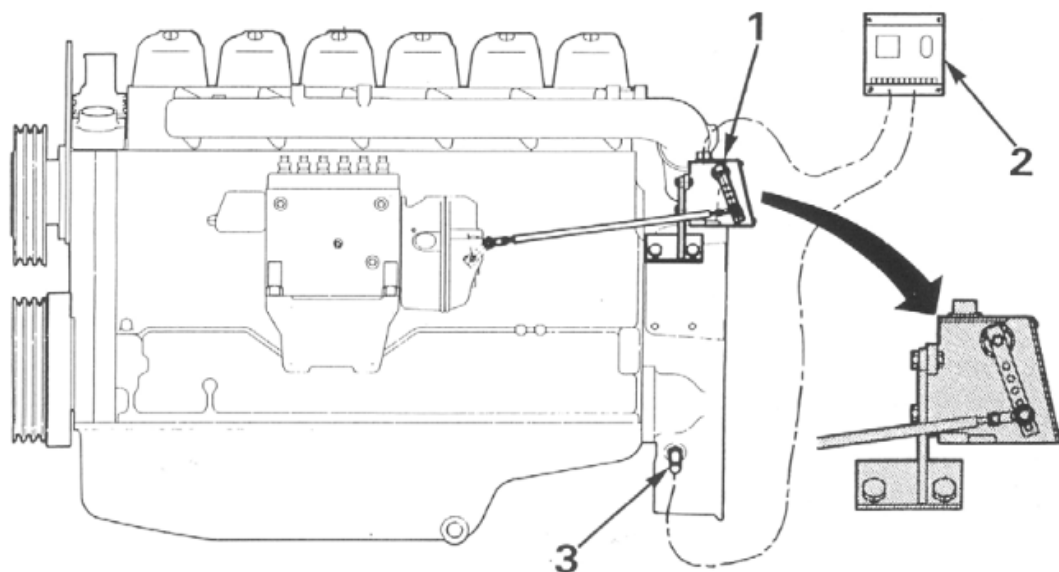
GAC APPLICATION NOTE

**D9, D11, DSC 14, and DSI 14 ENGINES**

<b>Customer / OEM:</b>	Scania
<b>Application(s):</b>	Various
<b>Engine Make / Model / Displacement / Rating:</b>	D9, D11, DSC 14, DSI 14
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	700 RPM low idle, variable range from 700-2200 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADC225S-24</li> <li>• Speed Controllers: ESD5131 or ESD5500E</li> <li>• Magnetic Speed Pickup: MSP675</li> </ul>

**SCANIA D9**

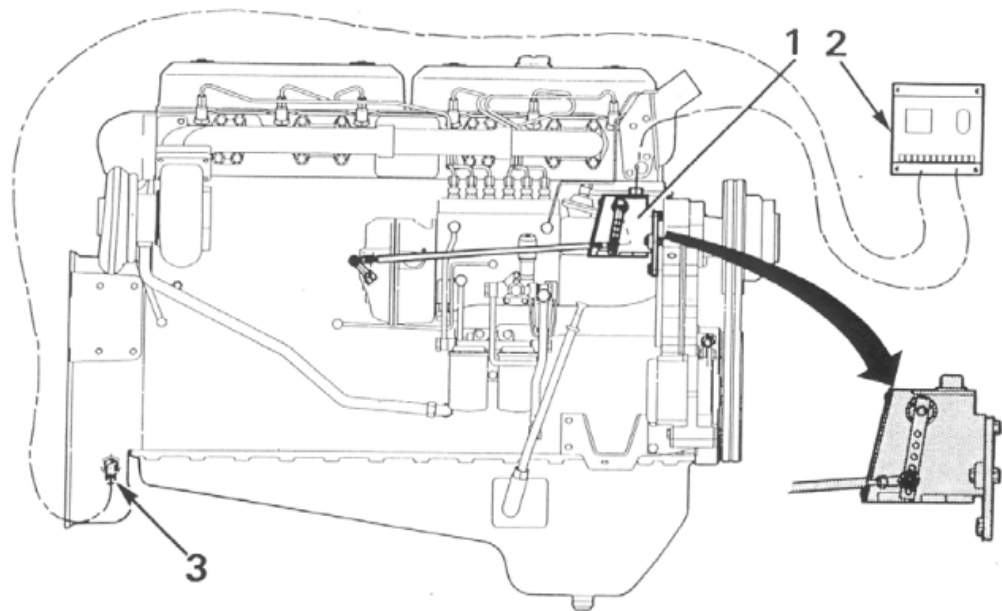
- |                |
|----------------|
| 1 Actuator     |
| ADC225S-24     |
| 2 Control Unit |
| ESD5131 or     |
| ESD5500E       |
| 3 Speed Sensor |
| MSP675         |





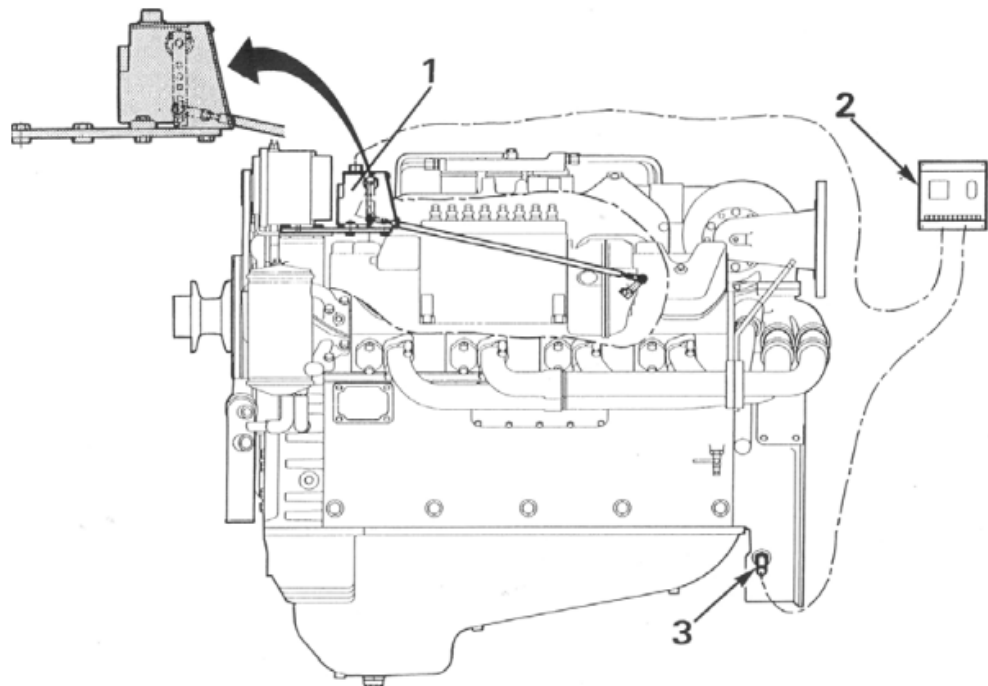
## SCANIA D11

- 1 Actuator  
ADC225S-24
- 2 Control Unit  
ESD5131 or  
ESD5500E
- 3 Speed Sensor  
MSP675



## SCANIA DSC 14

- 1 Actuator  
ADC225S-24
- 2 Control Unit  
ESD5131
- 3 Speed Sensor  
MSP675



## SCANIA DSI 14

1 Actuator

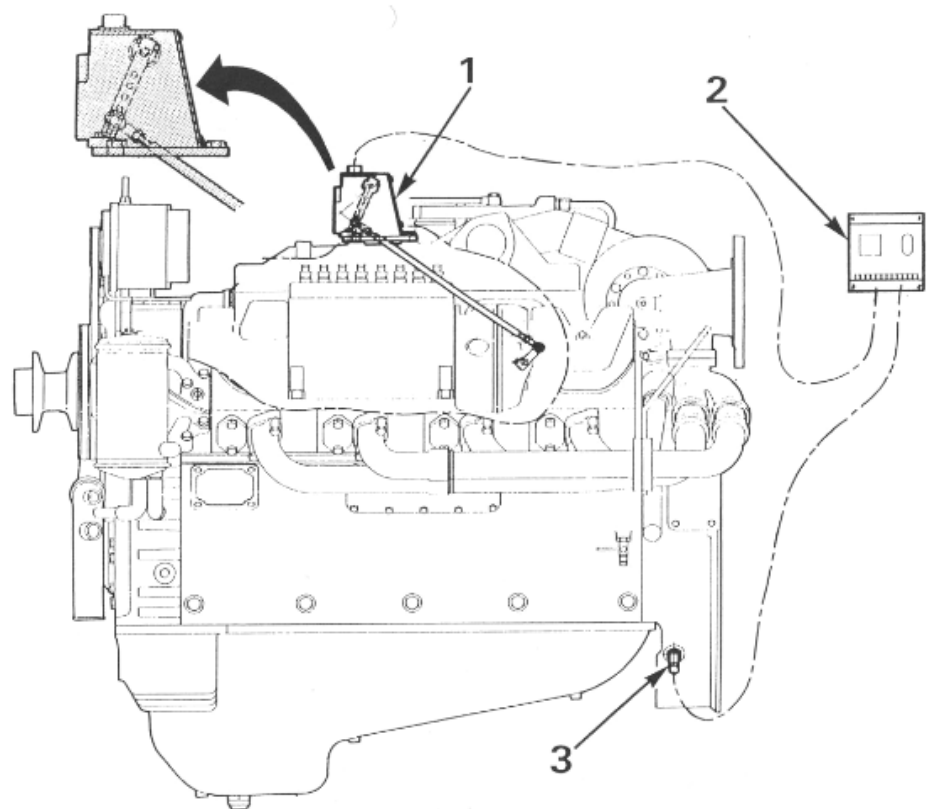
ADC225S-24

2 Control Unit

ESD5131

3 Speed Sensor

MSP675



GAC APPLICATION NOTE

**DSC1000 SERIES ENGINE CONTROL SYSTEM**

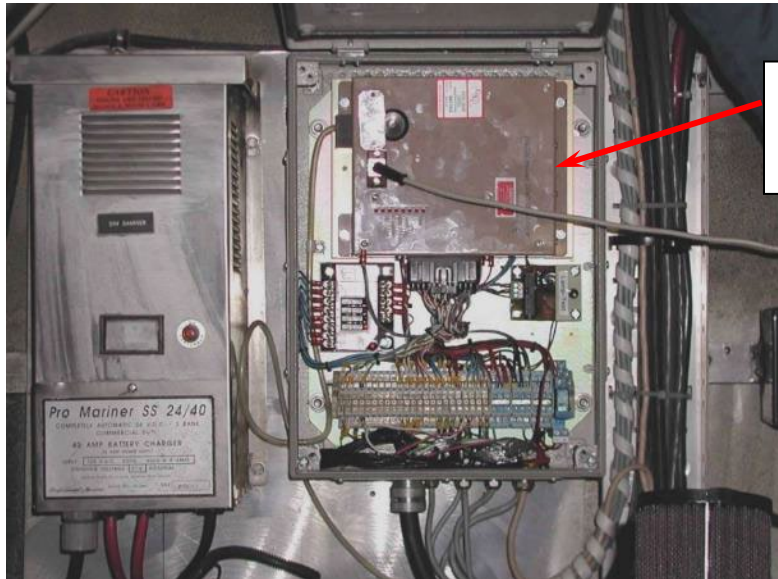
<b>Customer / OEM:</b>	Scania, Deutz, MWM, BEML...
<b>Application(s):</b>	Marine, Power Generation, Off Road Mobile Equipment
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Bosch Inline P-Pump
<b>Operating Speed(s):</b>	800 RPM idle, variable range from 1000-2400 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	Actuator: <b>ACE275K-24</b> <ul style="list-style-type: none"><li>• Position Feedback Sensor</li><li>• Heavy Duty Bearings</li><li>• Manual Shut-Off</li></ul> Speed Controller: <b>DSC1004</b> <ul style="list-style-type: none"><li>• Cranking Fuel and Crank Termination Adjustments</li><li>• Speed Ramping</li><li>• Fully Programmable – GDS Software</li><li>• Fuel Mapping Based On RPM and Boost Pressure / Boost Limits</li><li>• Temperature Dependent Start Fuel</li><li>• Temperature dependent Torque Curve (De-Rated Temp. Control)</li><li>• Fault Codes / Fault Logging / MIL w/ Flash Codes</li><li>• Load Sharing / Synchronizer Input</li><li>• Droop or Isochronous Selection</li><li>• Oil, Air and Exhaust Temp. Measurement w/ Adjustable Thresholds</li></ul>

**Summary:** Marine Installation on water taxi.

**THE MONMOUTH OUT OF WEEHAKEN, N.J.**



## DSC1004 CONTROLLER PANEL INSTALLATION



DSC1004  
Controller

## ACE275K ACTUATOR MOUNTED ON BOSCH "P" PUMP



ACE275K  
Actuator

GAC APPLICATION NOTE

## 12 LITER GAS ENGINE

<b>Customer / OEM:</b>	Scania
<b>Application(s):</b>	Various Gen Set
<b>Engine Make / Model:</b>	12L Gas Engine
<b>Fuel System Type &amp; Make / Model:</b>	Natural Gas
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	24V
<b>Recommended Products:</b>	Actuator: ATB652T3N1-24

**Summary:** SCANIA 12-liter gas engine with GAC electronic governor using an ATB652T3N1-24 V DC Integral electric throttle





## GAC APPLICATION NOTE

### **S6 ENGINE**

<b>Customer / OEM:</b>	SCANIA
<b>Application(s):</b>	Engine Control
<b>Engine Make / Model:</b>	S6
<b>Operating Speed(s):</b>	
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Interface Module: EAM127</li></ul>

**Summary:** The [EAM127](#) is an electronic interface module designed for use with the SCANIA S6 engine control system. The module accepts a nominal 5 VDC input signal and converts this signal to a 1.589 V DC analog signal for the S6 control across a galvanic isolated barrier. Typical usage is as a signal conditioner between a GAC auto-synchronizer / load sharing system and the S6 engine control. The power to operate the interface comes from the 24 V DC on the COO module.

### **EAM127 INTERFACE MODULE**



## GAC APPLICATION NOTE

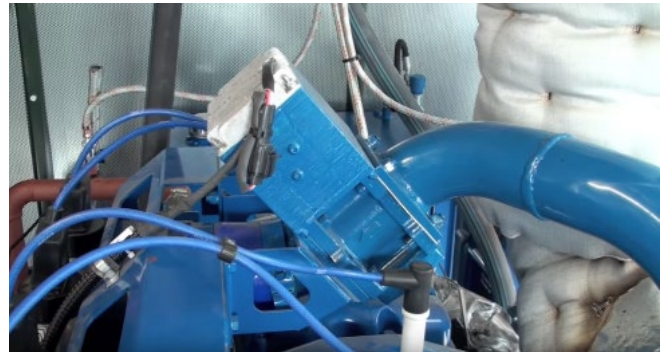
### **SANFIRDEN BIO GAS ENGINE - SCANIA SGI-12-ST**

<b>Customer / OEM:</b>	SANFIRDEN / SCANIA
<b>Application(s):</b>	Gen-Set
<b>Engine Make / Model :</b>	Scania 12L SGI-12-ST / 205 kW at 50 Hz and 220 kW at 60 Hz
<b>Fuel System Type &amp; Make / Model:</b>	LNG, CNG, LBG, Natural Gas. 45% to 60% Methane
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ATB T2 - 65mm Bore Diameter, High Temperature / Sealed with optional positions feedback sensor</li> <li>• Speed Controller: ESD5526E <ul style="list-style-type: none"> <li>• Anti-Wind-Up Circuit (for use with ATB gas applications)</li> <li>• Switchable Droop Control, Start Fuel Control</li> <li>• Speed Ramping, Soft Coupling, Over-speed Control Switch</li> </ul> </li> </ul>
<b>Summary:</b>	See <a href="http://www.youtube.com/watch?v=sszuUNz5ltU">http://www.youtube.com/watch?v=sszuUNz5ltU</a> for a live demonstration.

### **COMPLETED SCANIA SGI-12-ST BIO-GAS FUELED ENGINE**



### **GAC ESD5526 AND ATBT2 ACTUATOR**



## VOLVO

The following engine application solutions are described in this section. Links to details on the products are located in this table. Links to details of many of the installation steps described are in the corresponding application note.

Volvo part numbers that cross reference to GAC part numbers are referenced in the [VOLVO cross-reference table](#) at the end of this guide.

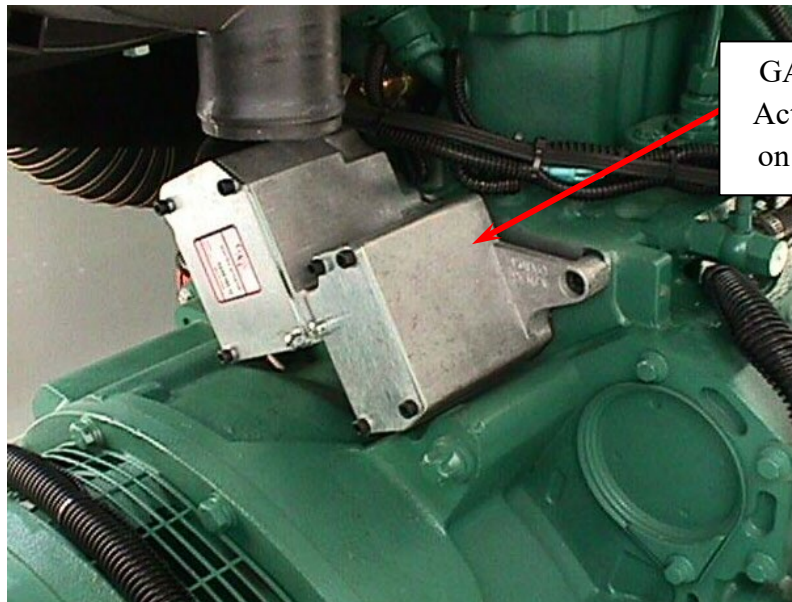
VOLVO ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
<a href="#">D5A, D7A, TD 420, TAD 420, TAD 520, TAD 531, TAD 720 &amp; TAD 731</a>	<a href="#">ADD180G-12/24</a>	<a href="#">ESD5500E</a> <a href="#">ESD5111</a> <a href="#">ESD5500-II</a> <a href="#">ESD5550</a>		
D25A & D30A	<a href="#">ADD225S-24</a>		<a href="#">MSP6728C</a>	
D34A, D49A & D65A	<a href="#">ACB2001</a>	<a href="#">ESD5330</a>	<a href="#">MSP6728C</a>	
TD610, TWD610, TD710, TWD710, TAD721, TAD730, TD740, TD741, TD1010, TAD1030, TAD1031, TAD1032, TWD1211, TAD1230, TAD1231 & TAD1233	<a href="#">ACB275H-24</a> <a href="#">ADD175A-24</a>	<a href="#">ESD5500E</a>	<a href="#">MSP6728C</a>	<a href="#">KT275</a> <a href="#">KT276</a>
TAD 520 & TAD 720	<a href="#">ADD225S-24</a>	<a href="#">ESD5500E</a>		

GAC APPLICATION NOTE

**TD 420, TAD 420, TAD 520, TAD 531, TAD 720 AND TAD 731 ENGINES**

<b>Customer / OEM:</b>	VOLVO / DEUTZ
<b>Application(s):</b>	Marine Gen-set and Industrial Applications
<b>Engine Make / Model:</b>	Volvo Industrial: 4.76L 4 Cylinder and 7.15L 6 Cylinder TD 420, TAD 420, TAD 520, TAD 531, TAD 720 and TAD 731 Volvo Marine Gen-Set: D5A and D7A Deutz: 1012, 1013 and 2012
<b>Equipment Make / Model:</b>	Marine Gen-set and Industrial Applications
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, Engine Mounted Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM
<b>Battery Voltage:</b>	12 or 24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD180G-12/24</li><li>• Speed Controller: ESD5500E, ESD5111, ESD5500-II, or ESD5550</li></ul>
<b>Summary:</b>	The 180 SERIES Integral Actuator is designed to mount directly to Deutz 1013/2012 and Volvo 520/720 engines. The existing mechanical governor is removed from the engine and the 180 SERIES integral actuator is mounted in its place.

**ADD180G INSTALLED ON A VOLVO ENGINE**



GAC ADD180G  
Actuator installed  
on Volvo 720GE

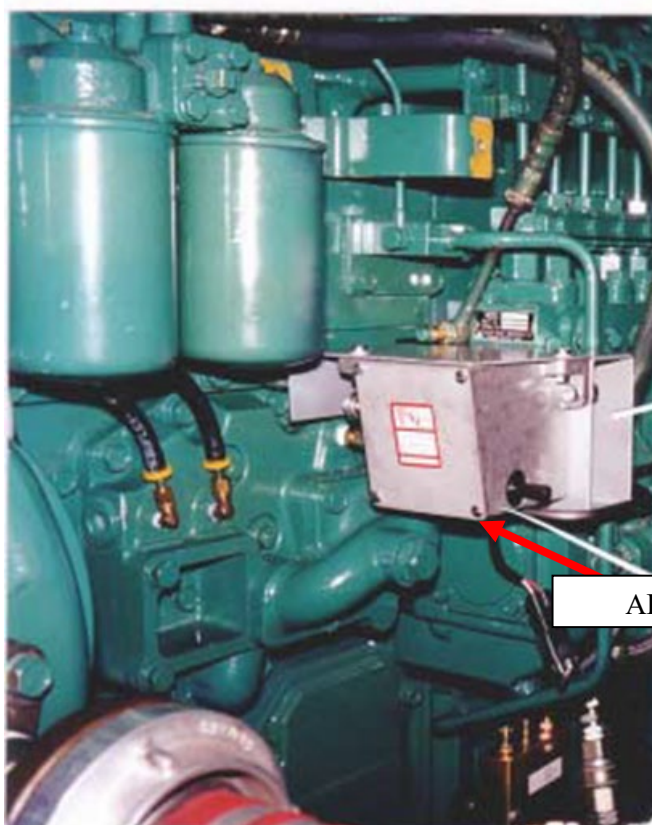
GAC APPLICATION NOTE

**VOLVO D30 (MHI S6R2) ENGINES**

<b>Customer / OEM:</b>	VOLVO PENTA
<b>Application(s):</b>	Marine Propulsion / Generator Drive
<b>Engine Make / Model:</b>	Mitsubishi S6R2, 24.5L In-Line 6 Cylinder Power Ratings Range from 480 to 759 kW at 1500 RPM
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	1500 / 1800 RPM and Variable Speed
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator : ADC225S-24 (Volvo Part Number 3838271)</li><li>• Speed Controllers: ESD5500E (Volvo Part Number 3817999)</li><li>• Magnetic Speed Pickup: MSP6827C</li></ul>

**Summary:** The MHI S6R2 engine series fit with a GAC electronic governor systems for superior speed control serves in gen-sets and marine propulsion applications.

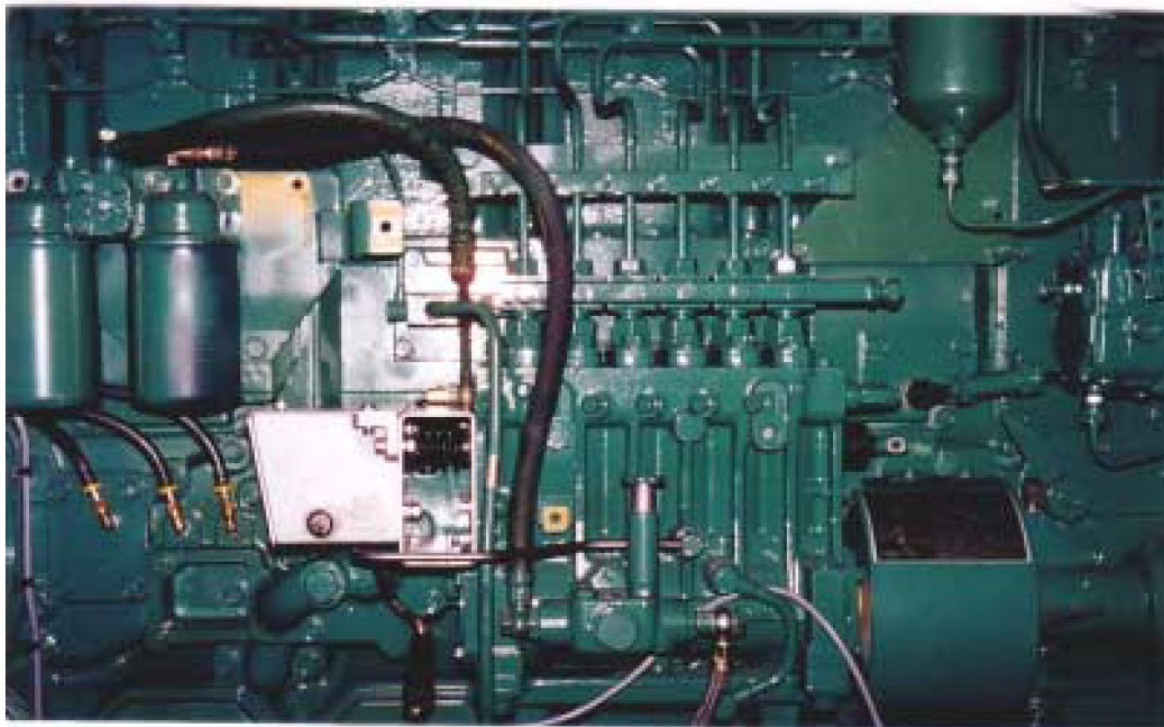
**VOLVO D30 (MHI S6R2) ENGINE WITH GAC SPEED CONTROLLER AND ACTUATOR ON PS6-48 270 PUMP**



ADD225S-24



## VOLVO D30 (MHI S6R2) ENGINE WITH GAC SPEED CONTROLLER AND ACTUATOR ON PS6-48 270 PUMP



## GAC GOVERNOR SOLUTIONS ON VOLVO-MHI ENGINES FOR RETROFIT APPLICATIONS

Engine	Actuator	Speed Controller	MSP
D25A	ADD225S-24	ESD5500E	MSP6728C
D30A	ADD225S-24	ESD5500E	MSP6728C
D34A	ACB2001	ESD5330	MSP6728C
D49A	ACB2001	ESD5330	MSP6728C
D65A	ACB2001	ESD5330	MSP6728C

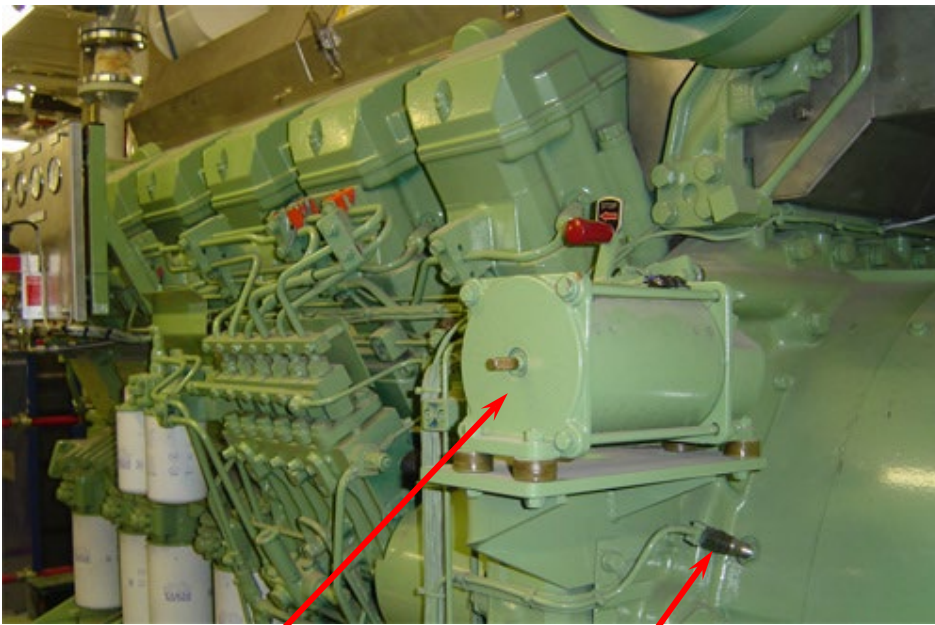
## GAC APPLICATION NOTE

### **D34A, D49A, and D65A ENGINES for MARINE APPLICATIONS**

<b>Customer / OEM:</b>	VOLVO
<b>Application(s):</b>	Marine Main Propulsion and Generator Drive
<b>Engine Make / Model :</b>	D34A – V12, 33.9L, 964 HP at 1500 RPM and 1126 HP at 1800 RPM D49A – V12, 49L, 1319 HP at 1650 RPM D65A – V16, 65.4L, 2190 HP at 1800RPM
<b>Equipment Make / Model:</b>	Multiple Vessel Manufacturers
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, In-line Injection Pump
<b>Operating Speed(s):</b>	1500 / 1800 RPM operating, variable range from 900-1800 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ACB2001</li> <li>• Speed Controller: ESD5330</li> <li>• Magnetic Speed Pickup: MSP6728C</li> </ul>

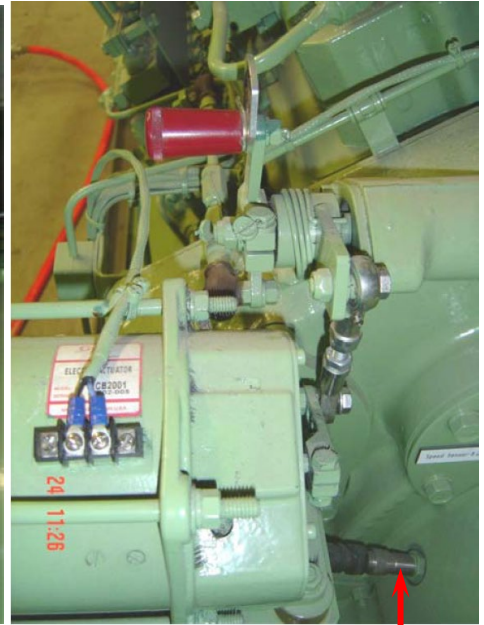
**Summary** The actuator is mounted on stiff rubber elements (shore 60) and connected to the original MHI linkage with 2-SF8 ball-links, with a manual stop lever.

#### **ACB2001 ON VOLVO PENTA D49 V12 MHI S12R-MPTK ENGINE**



ACB2001  
Actuator

GAC MSP6728C  
Magnetic Speed Sensor



Magnetic Speed  
Sensor

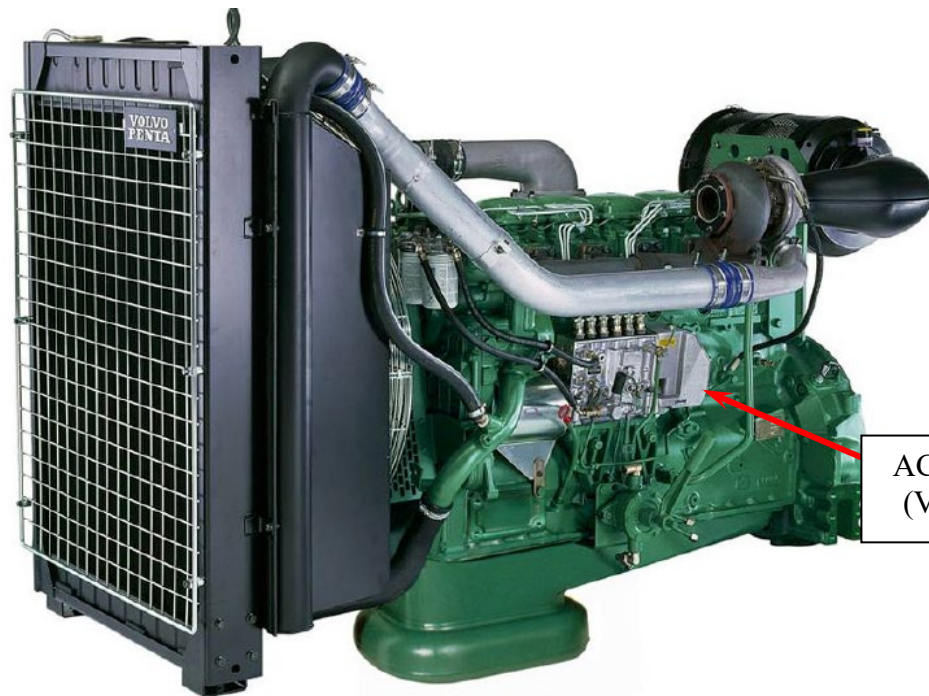
GAC APPLICATION NOTE

**TD/TWD610, TD/TWD710, TAD721, 730, 740, TD1010, and TD1030 ENGINES**

<b>Customer / OEM:</b>	VOLVO
<b>Application(s):</b>	Industrial, Gen-Set, Marine
<b>Engine Make / Model:</b>	TD/TWD610-5.5L 6 Cylinder TD/TWD710- 6.7L 6 Cylinder TAD721, 730 and 740-7.3L 6 Cylinder TD1010, 1030, 1031 and 1032-9.6L 6 Cylinder
<b>Equipment Make / Model:</b>	Multiple applications
<b>Fuel System Type &amp; Make / Model:</b>	Diesel, MW Pump, Bosch P3000 and P7000 Inline Pumps
<b>Operating Speed(s):</b>	1500 / 1800 RPM operating, 600 RPM idle, variable range from 1000-2400 RPM
<b>Battery Voltage:</b>	24 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ADD175A-24 or ACB275H-24</li> <li>• Speed Controller: ESD5500E</li> <li>• Magnetic Speed Pickup: MSP6728C</li> <li>• Mounting Kit: KT275 or KT276</li> </ul>

**VOLVO TAD1032 ENGINE: 397 HP AT 1500 RPM / 390 HP AT 1800 RPM**

**VOLVO PENTA GENSET ENGINE**



ACB275H-24 Actuator  
(Volvo P/N 3827082)

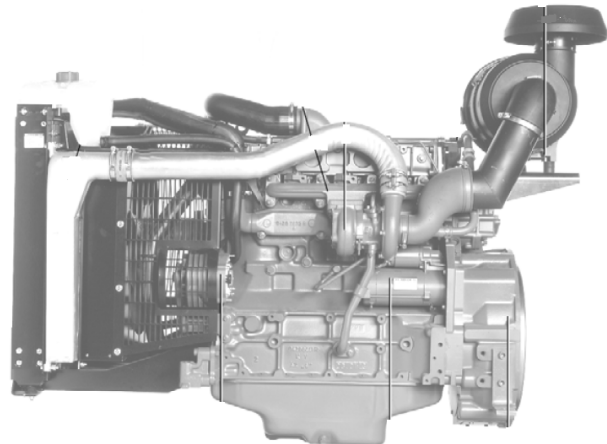


GAC APPLICATION NOTE

**TAD 520/720 ENGINES**

<b>Customer / OEM:</b>	DEUTZ / VOLVO
<b>Application(s):</b>	Engine
<b>Engine Make / Model:</b>	Volvo TAD 520/720
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	102 kW, 139 HP @ 1500 RPM, 110 kW, 150 HP @ 1800 RPM, TAD520 153 kW, 209 HP @ 1500 RPM, 163 kW, 222 HP @ 1800 RPM, TAD720
<b>Battery Voltage:</b>	24 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"><li>• Actuator: ADD225</li></ul>

**VOLVO TAD 520 AND TAD 720 ENGINES**





# WANCO

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
Wanco				TCM050



## GAC APPLICATION NOTE

### **WANCO LIGHT TOWER**

<b>Customer / OEM:</b>	WANCO
<b>Application(s):</b>	Light Towers
<b>Engine Make / Model ::</b>	Multiple Engines
<b>Fuel System Type &amp; Make / Model:</b>	Diesel
<b>Operating Speed(s):</b>	1800 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>EAM / Other: TCM050</li> </ul>

**Summary:** Wanco purchased the TCM050, which is produced and programmed at GAC, and enclosed it in their own rugged exterior for use on their light towers. Features include:

- Fully integrated display and configuration, non-volatile memory for fast recording and real-time clock.
- Relays – starter, pre-heat, fuel, fault
- Warnings - start, ready-to-load, load energized, crank, fault, and LEDs
- I/O Low fuel warning, auxiliary shutdown, remote start, magnetic speed pickup

### **WANCO LIGHT TOWER**



### **INSTALLATION LOCATION**



## TCM050



## TCM050 IN CASE



## WISCONSIN MOTORS

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
TM27	<a href="#">ATB401T1N-12</a>	<a href="#">AFR201</a> <a href="#">JDR100</a>	<a href="#">MSP6729</a>	SDU1100 or SDU1101 <a href="#">ICM200-4</a> CL602 <a href="#">MXSB26-STM</a> RPR102 <a href="#">SOX102</a> SPM201-2B SPW100

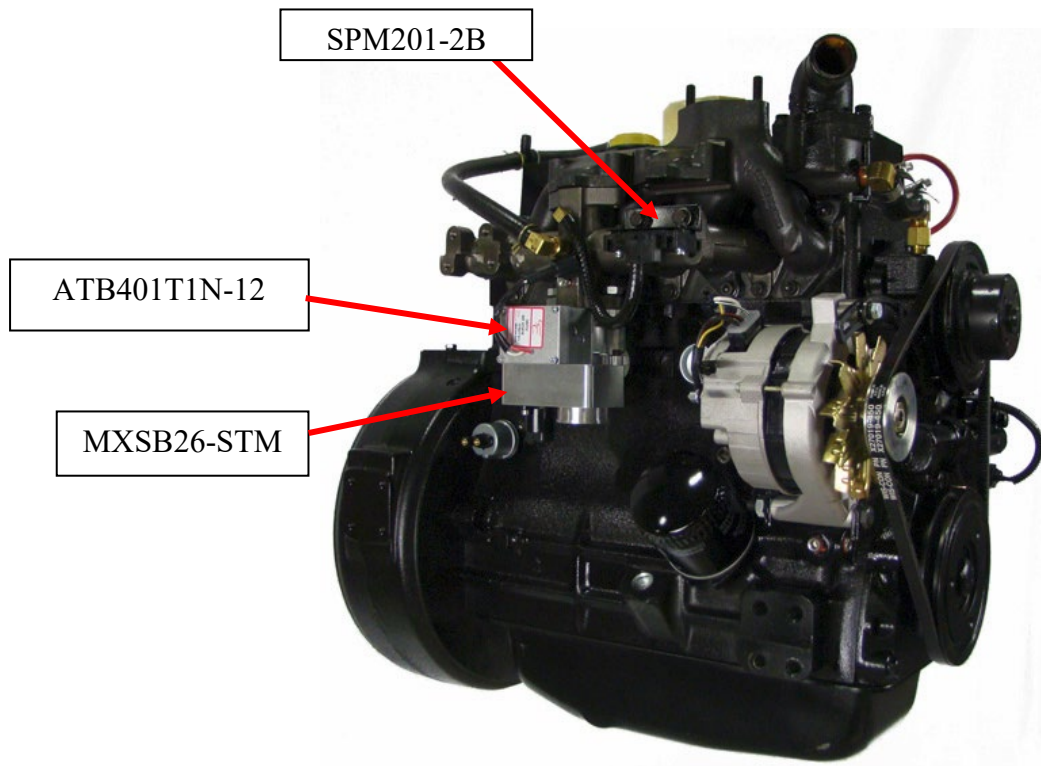
## GAC APPLICATION NOTE

### **TM27 ENGINES**

<b>Customer / OEM:</b>	WISCONSIN Motors
<b>Application(s):</b>	Power Generation, Compression
<b>Engine Make / Model :</b>	Wisconsin Motors TM27, 4-cylinder, 2.7 L
<b>Fuel System Type &amp; Make / Model:</b>	LP or Natural Gas
<b>Operating Speed(s):</b>	52 HP, 1500, 1800, 2000-2400 RPM
<b>Battery Voltage:</b>	12 V DC
<b>Recommended Products:</b>	<ul style="list-style-type: none"> <li>• Actuator: ATB401T1N-12</li> <li>• Magnetic Speed Pickup: MSP 6729</li> <li>• FIMS: AFR201, ICM200-4, CL602, MXS B26-STM, RPR102, SOX102, SPM201-2B, SPW100, JDR100 (Part of panel SDU1100 or SDU1101)</li> </ul>

**Summary:** GAC's FIMS500 fuel management system led the engine to be EPA certified to run up to 60% methane content in the fuel.

### **NATURAL GAS CONFIGURATION – VARIABLE SPEED**

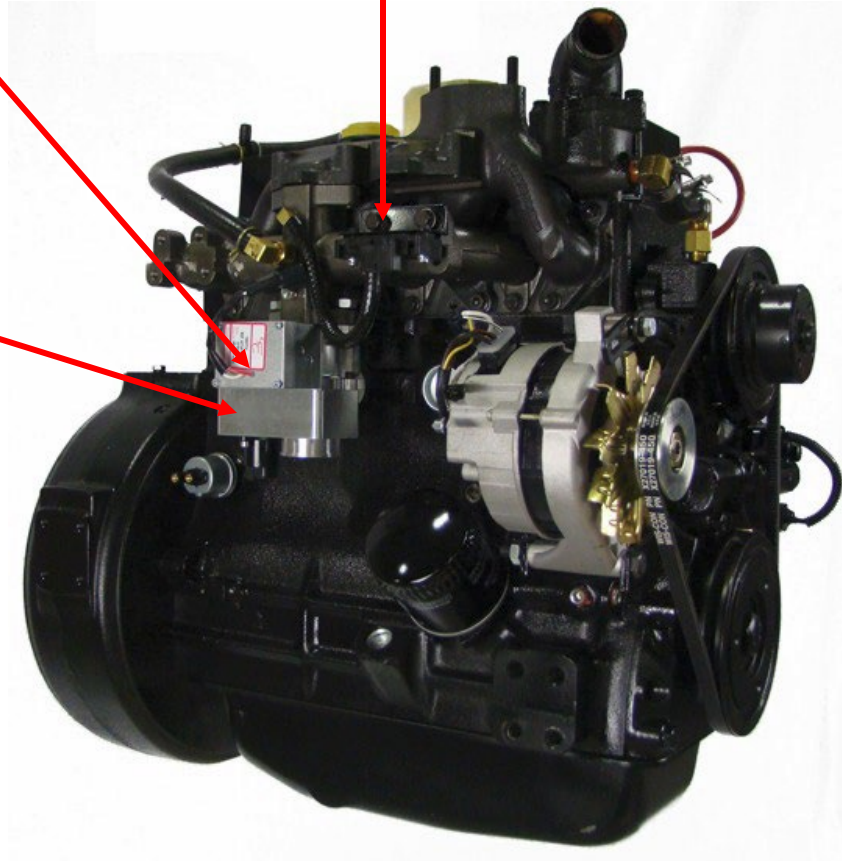


## CONSTANT SPEED ENGINE

SPM201-2B

ATB401T1N-12

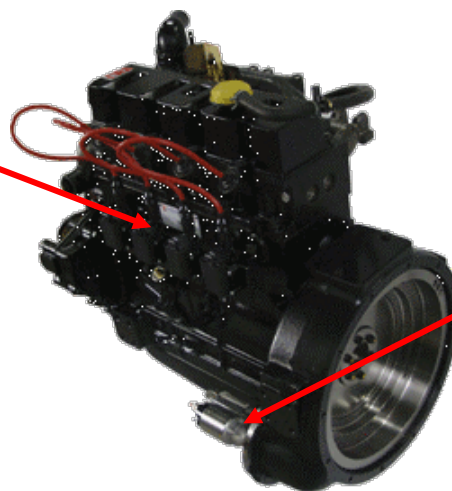
MXSB26-STM



## INSTALLED IGNITION SYSTEM

CL602 x4  
SPW100 x4  
SPG100-002 x4

ICM200-4









## WISCONSIN MOTORS

*Your Heavy-Duty Power Source*

### CONTINENTAL ADVANTAGE

EPA and CARB Certified  
for stationary applications

Four Cylinder OHV

Liquid-Cooled

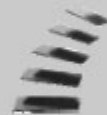
Stellite exhaust valves

Drive-by-wire throttle control

On-Board electronic  
Engine management and  
Diagnostics

Precise engine speed control

Optional control center is  
available



Leading the way in  
industrial engine  
innovation

### Continental TM27

52 HP Natural Gas Configuration



### Your Heavy-Duty Power Source

#### WORLDWIDE PARTS AND SERVICE

We back our engines with a world wide service network. Experienced Continental representatives are always ready to meet your needs.

## Industrial by Design

EPA and CARB certified engines



## WISCONSIN MOTORS

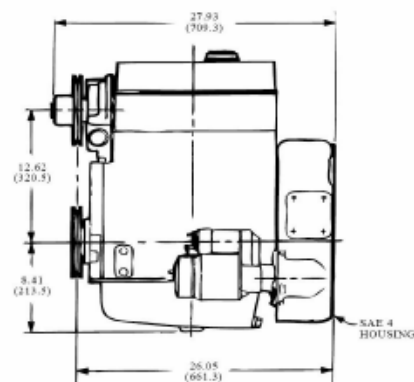
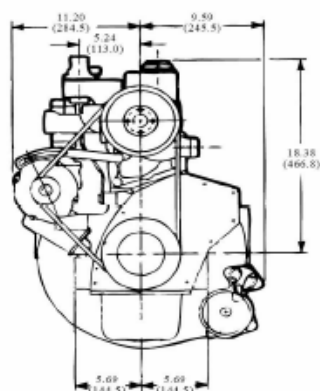
*Your Heavy-Duty Power Source*

### Continental **TM27**

### Performance Specifications

#### Standard Features

- Four cylinder OHV
- Liquid-cooled
- Heavy-duty cast iron block & cylinder head
- Five main bearings
- Stellite exhaust valves
- Closed-loop air/fuel ratio control
- Precise engine speed control
- On-board electronic engine management and diagnostics
- Post-catalyst O<sub>2</sub> sensor based diagnostics
- Low oil pressure & high coolant temp. shutdown protection
- SAE #4 flywheel housing (Standard)
- High volume oil pump
- Full-flow oil filter
- 63 amp. alternator with internal regulator



#### Power Output : Natural Gas

Power			Torque	
RP M	HP	KW	Ft.lbs	Kg-M
2200	44.8	33.4	117.6	16.3
2400	51.7	38.5	113.0	15.6

Bore — 3.58 in. (91 mm)  
Stroke — 4.06 in. (103.2 mm)  
Piston Displacement—164.7 cu. in.

#### POWER OUTPUT

Maximum dynamometer gross brake horsepower of the basic engine corrected to a pressure reading of 29.3 in. Hg (99 kPa) dry barometer and temperature of 77°F (25°C) when tested in accordance with SAE Test Code J1995 (June 95). Engine output can be demonstrated within 5% at the factory under standard rating conditions. Power will decrease 3% for each 1,000 ft. (305 m) above 500 feet (152.4 m) and 1% for each 10°F (12.2°C) above standard temperature of 77°F (25°C). For continuous operation, applications should be limited to 80% of power shown.

#### **EPA and CARB certified**



The Continental TM27 is EPA and CARB certified. Wisconsin Motors is committed to a cleaner tomorrow beginning today.

Wisconsin Motors, LLC  
2021 MacArthur Road  
Waukesha, WI 53188  
1-800-932-2858

[www.wisconsinmotors.com](http://www.wisconsinmotors.com)

WM10323

## XINCHAI

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
YANXU-FORKLIFT				<a href="#">DPG100</a> -VS FP201

## GAC APPLICATION NOTE

### **VARIABLE SPEED FORKLIFT with DPG100-VS**

<b>Customer / OEM:</b>	XINCHAI
<b>Application(s):</b>	Forklift
<b>Engine Make / Model:</b>	45kW / 2500 RPM
<b>Fuel System Type &amp; Make / Model:</b>	Shandong Kangda BQ Diesel Fuel Injection System
<b>Operating Speed(s):</b>	600 RPM to 2500 RPM
<b>Battery Voltage:</b>	
<b>Installed Products:</b>	<ul style="list-style-type: none"> <li>• Pump Mounted, integrated actuator/digital governor: DPG100-VS</li> <li>• Other: Dual trace electric foot pedal FP201</li> </ul>

**Summary:** The DPG mounts directly onto the Kangda BQ injection pump and offers superior speed regulation over a variable RPM range. The controller includes torque limiting flexibility and a fully programmable speed/load matrix for customized throttle response / throttle progressions. Its electronic foot pedal interface provides the load signal while a ring gear mounted magnetic pickup provides speed signal. The DPG's actuator mechanism includes a rack position feedback sensor for precise, closed-loop control of the fuel system.

### **XINCHAI - PUMP / DPG AND FOOT PEDAL INSTALLATION**



**DUAL TRACE ELECTRIC  
FOOT PEDAL KT-FP201**



**DPG100-VS ON  
KANGDA BQ INJECTION PUMP**

DPG100  
Installed on a  
Kangda BQ Fuel  
Injection System



## XICHAI FORKLIFT



## DPG100-VS PUMP MOUNTED, INTEGRATED VARIABLE SPEED DIGITAL GOVERNOR / ACTUATOR ASSEMBLY



## YANMAR

ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
6CXBM	<a href="#">ACB2001</a>			

## GAC APPLICATION NOTE

### **6CXBM MARINE PROPULSION / GEN SET**

**Customer / OEM:** New Zealand Coast Guard

**Application(s):** Marine

**Engine Make:** 2 - YANMAR 500 HP 6CXBM, Diesel

**Battery Voltage:** 24 V DC

**Installed Products:**

- Actuators: 2 - [ACB2001](#)

**SUMMARY:** This NZ Coast Guard vessel needed reliable throttle control with high torque during tight maneuvers. By combining two GAC ACB2001 actuators with an AXIOMATIC AX100310 Unidirectional Digital Control one of Coastguard Bluff's rescue vessel's has a reliable solution to a throttle speed control issue.

### **THROTTLE CONTROL SOLUTION**



## VARIOUS

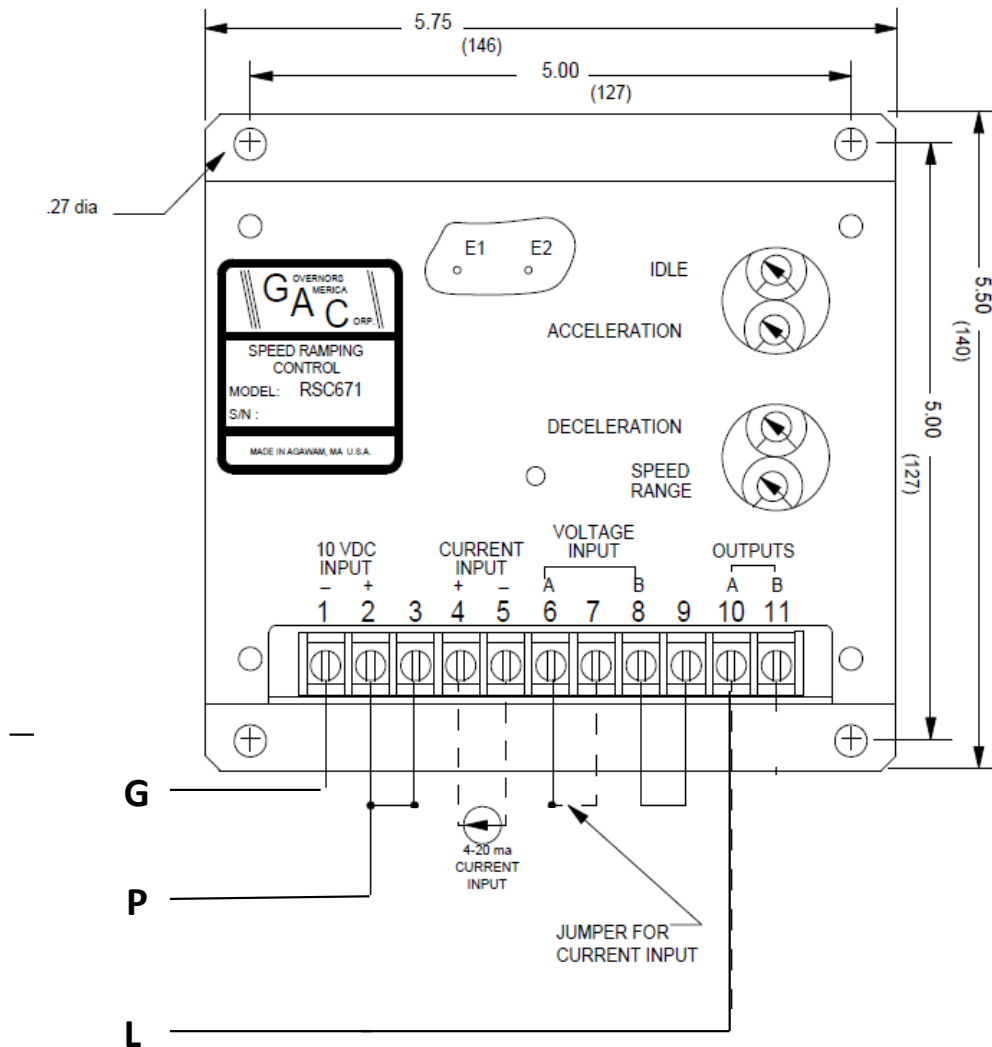
ENGINE MODEL	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP	GAC ACCESSORIES
<b>VARIABLE SPEED</b> <a href="#">RSC671</a>	GAC ACTUATOR	<a href="#">ESD5100</a> ESD5200 <a href="#">ESD5500E</a>	<a href="#">RSC671</a>	
<b>175 Series Actuator</b>	<a href="#">175 Series Actuator</a>			<a href="#">KT175-RS-R-Zexel</a>





## WIRING FOR CURRENT INPUT ONLY

### Wiring For Current Input Only



### Wiring:

- Connect terminals K and N on ESD if DROOP is required
- Connect terminals 2 and 3 on RSC if **voltage** input is used.
- Connect terminals 2 and 3, also 6 and 7 on RSC if **current** input is used.
- **Important:** Ground potential of current input (terminal 5 on RSC671) must be equal to terminal E on the ESD (battery -)

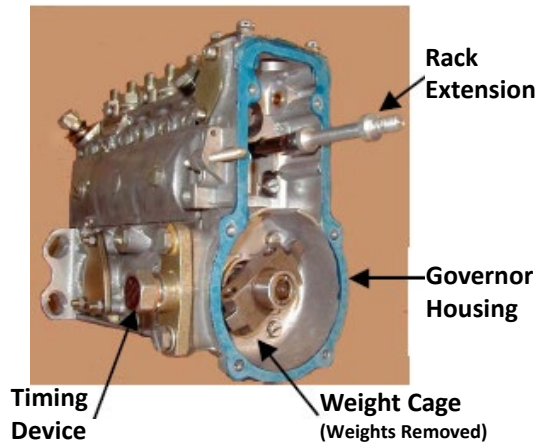
## GAC APPLICATION NOTE

### **GAC 175 SERIES ACTUATOR INSTALLATION ON DENSO / BOSCH PUMP**

<b>Customer / OEM:</b>	Denso / ZEXEL / Bosch
<b>Application(s):</b>	Gen-Set, Agricultural, Industrial, Marine
<b>Engine Make / Model :</b>	Various
<b>Fuel System Type &amp; Make / Model:</b>	In-Line 'P' type pump, constant or variable speed
<b>Operating Speed(s):</b>	Specific to Individual Engine Application
<b>Battery Voltage:</b>	12 or 24 VDC
<b>Installed or Recommended Products:</b>	<ul style="list-style-type: none"> <li>Mounting Kit: KT175RS-R-ZEXEL</li> </ul>
<b>Summary:</b>	<ul style="list-style-type: none"> <li>175 Series Actuator Mounted on RSV Governor housing</li> </ul>

### **GAC 175 SERIES ACTUATOR ON DENSO / ZEXEL / BOSCH PUMP**

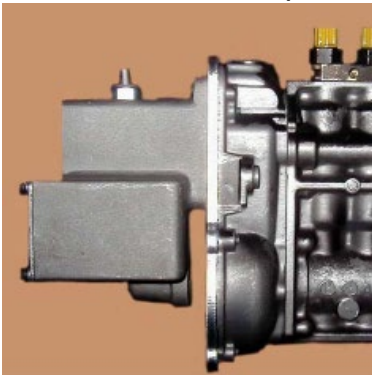
**Pump with Existing Governor Housing.  
Rack Extension Installed**



**Adapter Plate From KT 175 RS-R ZEXEL  
Installation Kit Installed on Governor Housing**



**175 Series Actuator Installed on  
'A' Size Pump with RSV Governor  
w/ KT 175 RS-R ZEXEL Adapter Kit**



**KT175-WRS-R-ZEXEL Installation Kit**



## CROSS REFERENCES and GAC REPLACEMENTS

### VARIOUS MANUFACTURERS

ENGINE MANUFACTURER	GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	MFR PART NUMBER
AGREKKO		<a href="#">ESD5520E</a>		311025A
DAEWOO		<a href="#">ESD5550</a>		65.11220-7009
DENYO			<a href="#">JDR050</a>	Y0602120691
HOBART	<a href="#">ACB120</a> <a href="#">ACB225</a> <a href="#">ACB225</a>  <a href="#">ADC120</a>	<a href="#">ESC61C-7</a> <a href="#">ESC63C-7</a>		404113-0 404113-1 482335 404112-0 404112-1 M20577-2
LINCOLN		<a href="#">SDG</a>	MSP6722 MSP Bushing	M20577-1 M20577-3 M20577-6
LOVOL	<a href="#">ADD175A-12</a> <a href="#">ADD175A-24</a>	<a href="#">ESD5500E</a>	EC1300	T73201202 T73201203 T63201004 T63274315
MACK BORING	<a href="#">ALN050-12</a>			010-MACK1340
REGAL BELOIT			CVR63-4R	761594-01 761684-01

## AMBAC CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	AMBAC PART NUMBER	NOTES
ACE120			AGB130D	
			5	
ACB225			AGB200A1	
			AGB200A2	Rotary, .2 Joule, 12-32V w.7.1" Lever
ACB225			AGB200A3	
			AGB200A4	Rotary, .2 Joule, 12-32V w.7.1" Lever
ACB225			AGB200A5	
ACB225			AGB200A6	
ACB275H			AGB270A1	
ACB275H			AGB270B1	
ACB275H			AGB280A1	
ACB275H			AGB280B1	
ADB120E4			AGD130E4	
ADB120E4			AGD130E5	
ADB120E4			AGD200E6	
			AGK1600A1	
ACB2001			AGK2200A1	
			AGK505A4	
			AGK505A5	
			AGK525A4	
			AGK525A5	
			AGL101A1	Linear, Nippondenso PFR Pump Mounted, 12V (Perkins 100 Series)
			AGL120A1	Linear, Actuator, .05 Joules, Pedestal Mount, 12V DC
			AGL121A1	Linear, Nippondenso PFR Pump Mounted, 24 V DC (Perkins 100 Series)
			AGL202A1	Lucas (CAV) DPA/DPS Pumps with Fixed Timing 12V
			AGL202A2	Lucas (CAV) DPA/DPS Pumps with Fixed Timing 12V
			AGL222A1	Lucas (CAV) DPA/DPS Pumps with Fixed Timing 24 V DC
ADC100-12			AGS50A1	
ADC100-12			AGS50A4	
ADC100-24			AGS50A2	
ADC100-24			AGS52A4	
			AL3000-12	Linear, 4 LB. Pull, .8" Stroke, 12V (Supersedes AGL301)
			AL3000-24	Linear, 4 LB. Pull, .8" Stroke, 24 V DC (Supersedes AGL321)
			AL3001-12	Linear, 4 LB. Pull , 12v
			AL3001-24	Linear, 4 LB. Pull , 24 V DC
ADC100-12			AR3100-12	

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	AMBAC PART NUMBER	NOTES
ADC100-24			AR3100-24	
ACB275H			AR3200	
	ESC61C-17		CU671C-17	
	ESC61C-7		CU671C-7	
	ESC63C-23		CU673C-23	
			CU673C-26	Replaced by CW673C-30U
			CW673C-17	Replaced by CW673C-30U
			CW673C-7	Replaced by CW673C-30U
			CW673C-30U	Replaced by CW673C-30U
				High Current Output for AGK1600/2200 Actuator, High Resolution
			EC50	Remote Speed Trim, integral Idle/Run Feature Terminal Strip, 12-32V
			EC50F-1	Superseded by EC5100
			EC5000	Superseded by EC5100 (but available while supplies last)
				For All Actuator (Cummins, AMBAC, etc.), Switchable Current
			EC501	Levels, Fuel Limiting, Speed Ramping, ISO/Droop, Idle/Run, 12-32V
			EC5010	Superseded by EC5010
				Fuel Limiting, Speed Ramping, ISO/Droop, Idle/Run, 12-32V
			EC51E1	(Supersedes EC501)
			EC5100	Superseded by EC5100 (but available while supplies last)
			EC5111	ISO/Droop, Remote Speed, 12V-32V (Supersedes EC50 & EC51.)
			EC60A-3	ISO/Droop, Load Sharing, Run/Idle, 12-32V (Supersedes ECD67-5111)
			EC60A4	12V, 50/60 Hz Unit
			EC60B-3	24V, 50/60 Hz Unit
			EC60B-4	12V, 400 Hz Unit
	ESD2110		ECD67-2110	24V, 400 Hz Unit
	ESD2110		ECD67-2112	
	ESD5111		ECD67-5111	
	ESD5221		ECD67-5221	
			ECD67-7000	Speed Control Unit - P.C. Plug In
			KT67-5221	Speed Control Unit - P.C. Plug In
				EC-5111B With Adj. Single Set Point
				Speed Switch, SWA674 12-32V
		LS671	LS671A	
		LSM672N	LS672A	
		LSM675	LS7010	Superseded By LS7010
			LS7000	



GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	AMBAC PART NUMBER	NOTES
			CU6714D	Load Share Unit, Load Ramping, Power Monitors, Compatible With Barber-Colman and Cummins Speed Controls
		SYC6714	SY6000	Superseded by SY6000 Supersedes CU6714D
			SYN671(A) SYN401415	Auto-Synchronizer with Master/Slave Feature (Order As New Part Number SYN401415)
		RSC671	RGC671	Auto-Synchronizer with Master/Slave Feature
			BP401397	
		SSW674	SWA674A SWA675A-1	Adjustable Speed Switch
		SSW675	SWA675A-2	2 Element Speed Switch-Latching (Superseded to SWA675D1)
		SSW675	SWA675D1	
		SSW676	SWA676B	
			MP414045	
			MP6710A	4.5 Inch Body Length, Bendix Connector MS3106A
			MP6712	5 Inch Body Length, MIL Connector, With Mating Connector
		MSP675	MP675	3 Inch Body Length, 72 Inch Leads
		MSP676	MP676	
		MSP677	MP677	
		MSP6721C	MP6775	
		MSP678	MP678	
		MSP679	MP679A	
			MP6750	
		MSP6723C	MP6716	2-3/8 Inch Body Length, 8 Inch Leads
		TP502	TP671A	
		TP503	TP672A	description based I think that is right
		TP501	CU6710A	
			CU6711A	
			CU6721A	1 Turn, 50K OHMS, With Knob, Switch 10 Turn, 5K OHMS, Remote Droop Pot
			KT410046	
			KT410632	Converts AGD130 to AGD200
			KT410633	Installation Kit; AGB Actuator, Includes 6 Pin Connector Rod End Bearings, Threaded Rod, Actuator Lever and Magnetic Pickup
		KT275	KT413882	Installation Kit; AGK Actuator, Includes Rod End Bearings, Threaded Rad, Actuator Lever and Magnetic Pickup

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	AMBAC PART NUMBER	NOTES
		KT276	KT413883	
			KT6722	
			KT6723	Idle/Run Module (CU Controllers)
			KT6724	AGD130E Service Kit
			KT6737	AGD130E Plunger Assembly
			KT6738	AGB270A1 and GAB270B1 Bearing Cover Kit
				AGB280A1 and GAB280B1 Bearing Cover Kit
		FU411368		Fuse and Holder, 10 A Fast Acting (Most 12V Systems)
		FU411369		Fuse and Holder, 15 A Fast Acting (Most 24 V Systems)
		CH1203	CB6712A	
		CH1204	CB401428	
			(CB6715A)	
			EC1248-3	Connector (all AGJ Type Actuator)
				Connector (all AGJ Type Actuator)
			LE6713A	
		LE1400-1	LE673-1A	Lever AGD Type Actuator
		LE1400-2	LE673-2A	
			LE673-3A	
			BG403040	7.1 Inch Length With 3/16 Inch Diameter Holes
		BR200	BG671	Rod End Bearing, Male 3/16 Inch ID, 10-32 Thread AGB250
			BG672	Rod End Bearing, female 3 /16 Inch ID, 10-32 Thread
		BR100	BG403039	(Order As New Part Number BG403039)
		EC1200	EC1248-6	
		EC1000	EC1249-2	
		EC1100	EC1267-1	
		EC1010	EC412902	
			BK410043	
		BK114	BK6726	Mounting Bracket for AGK505/525, AR3500 Series

## BARBER COLMAN CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	BARBER COLMAN PART NUMBER	NOTES
ATB301T1N-12			PF31-12	
ATB401T1N-12			PF38-12	
ATB402T2N-12			PF42-12	
ATB452T2N-12			PF50-12	
ATB552T2N-12			PF60-12	
ALN025-12/24			DYNC-10202-12/24	
ALN050-12/24			DYNC-10502-12/24	
ADB225F-12/24			DYNC-11000-XXX-X-XX	
ADC225GS-12/24			DYNC-11020-12/24	
ADC225S-24			DYNC-12000-24	
			DYNC-14000-XXX-X-XX	
ACB2001			DYNC-12000-24	
ADC100-12			DYNC-70025-12	
	ESD2402-12/24		DPG2100	
	ESD1100 or ESD2210 or ESD2402		DPG-2101-001	
	ESD2210-12/24		DPG-2102	
	ESD2402-12/24		DPG-2103	
	ESD5120		DPG-2104	
	ESD2402-12/24		DPG-2105	
			DPG-2145-55	NO DIRECT REPLACEMENT
	ESD2410-24 or ESD1000-24		DYNC-10744	
	SDG700/800		DPG-2201	
	SDG700/800		DPG-2223	
	SDG700/800		DPG-2401	
	SDG700/800		DPG-2300	
			DYN10024/25/26/31/10502/503504/506/10652/53/54/56	NO DIRECT REPLACEMENT
	ESD5330		DPG-2201	
	ESD5500E		DPG-2201	
	ESD5330		DPG-2201	
	ESD2401-12/24		DYN1 10701-000-0-12/24	
	ESD5131			
	ESD5520E		DYNA1 10752-000-0-12/24	
		EAM103	DYNA1 10753,4,6	
	ESD2402-12/24		DYN1 10784-000-0-12/24	
	ESD5520			
	ESD5120		DYN1 10794-000-0-12/24	
	ESD2402-12/24			

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	BARBER COLMAN PART NUMBER	NOTES
	ESD2244-12/24			
	SSW675	LAM100	DYN2 500004	
			DYNZ 60010, 60013	
		MSP674 to 6732C	DYNT-10100 to 10600	
		MSP6724 to 6744	DYNT-13200 to 13300	
		MSP6714 to 6723C	DYNT-11100 to 11600	
			DYNS 10000, -1	

## CUMMINS CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	CUMMINS PART NUMBER	NOTES
ADB120E4			3019635	
			3001817	
ACD120			3019635/3001817	
	ESD5111		3020987	Replacement for
	ESD5119 (reversing action)		3052504	Normally open
			3052505	
			3052506	
			3052507	
			3052508	
			3052509	
			3037359	
			3032733	
	ESD5120		3063504	Normally closed
			3063505	
			3044189	
			3044196	
	EEG6500		3081313	
	ESC63-17		3005810	
	ESC63-7		3014107	
	ESC63-23		3014195	
	SSW676		3039571	
	SSW675		8836	Not a direct replacement
		MSP677	213272	
		CH1205	213273	
		MSP678	3003916	
		CH1203B	3005811	
		LCC200	3008316	
		TP503	3015105	
		MSP676	3017418	
		MSP678	3628381	
		ITM050	ITM050	
		ITM051	ITM051	



## DEUTZ CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	DEUTZ PART NUMBER
ACB275H-S1			1231 4175
ACB275CF			1231 4288
ACE295-24			1230 7878
ADE176AA-12			0423 3541, 04233456
ADE176AA-24			0423 3463
ACD110-12			0428 1525 KV-12
ACD110-24			0428 1524 KV-24
ADD180G-12			02113598
ADD180G-24			0421 26060
ATB552T2N-12 (Rev H)			301622
ATB552T2F4-12			302990
ATB401T1F-12			302991
ACE275H-24			0422 3844
ACE275CF-24			1231 6257
ACE275J-24			0422 6301
ACD176A-24			0423 3140 replaced by 0423 3463
ACD176A-12, ADE176A-12			0423 3456
ADD176AA-24			0423 3463
ADE176AA-24			0423 3464
ADE176AA-12			0423 3541
AXX110-24			0427 1898
ACB2001			1230 5436
ACB2000CF			1230 4578
	DSC1004B-KPL		1502 2476
	DSC1004		1232 0916
	PCI105		1509 8057
	EAM125		1509 6247
	ESD5550		1232 0621
	RSC671		1509 6246
	ESD2210-12		0427 1795
	ESD5550		0419 1545
	ESD2210-24		0427 1897
	ESD5221		0422 3457
	ESD5500E		0422 3846
		KT207	303089
		KT276	0422 3959
		KT209	302979
		KT214	302981
		KT275	1231 4423
		KT278	1231 6259

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	DEUTZ PART NUMBER
		KT 1611	1231 6113
		MX60-STM	302972
		MX30-STM	302987
		FIMS1500 6 Cyl	302583
		FIMS1500 4 Cyl	302997
		FIMS1500 6 Cyl. Turbo	302938
		SOX100	302977
		SOX102	302978
		CL601	302664
		ECM64A	302969
		SPG100-001	302973
		SPG100-002	303082
		SPM100	30301
		SPM101	302974
		SAI100	302976
		STE100	302982
		CH1220-L03	0423 3576
		CH1230-L03	0424 3577
		CH1240 CE-L02	0427 1793
		CH1231	302983
		CH1232	302984
		CH1234	302985
		CH1204-L6	1232 0622
		CH1203A-L6	1232 0623
		CH1225L03	04233807
		CH1301-L10	1232 0914
		CH1220-L6	0422 4032
		CH1208-L6	0422 4035
		CH1208AM-L6	0422 4956
		CH1208AM-L2	0427 1801
		CH1203A-L10	1509 8058
		CH1204A-L10	1509 8059
		CH1220-L10	1232 3417
		CH1204-L15	1232 3419
		MSP6728C	0423 3161
		MSP6714	1232 0620
		MSP6732	0419 1541
		DSC1004B-KPL	1232 2066
		DC 22321	1203 6768
		MTC6C-4320 LC	1215 3968
		EC1110	1215 3968
		EC1110	1215 7759
		GA 270	1221 3833
		GA 7000	1221 3883

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	DEUTZ PART NUMBER
		GA 277	1221 3885
		G4-24V	1231 4176, was 04323142
		FN670-10/06	1232 0983
		BK601	302970
		BK604	302994

## DOOSAN / GHANA CONTROLS CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	DOOSAN / GHANA PART NUMBER
	ESD5550		65.11220-7009
	ESD5550M		65.11220-7008 / DWC-2000
			65.11220-7011 / DGC-2007
			300611-00633A / DGC-2013
			GNSA-2002
ACE275H-24			65.11101-8008B
			65.11501-7006
			DWA-2000
			65.11501.7008
			65.11501.7009
		MSP675	46492583

## HEINZMANN CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	HEINZMANN PART NUMBER
	ESD5400		KG1/2
	ESD5221		KG6/10
	ESD5221		KG16/30/40
	ESD5330		KG64/90
	ESD5221		KG2000
	ESD5400		AC3
	EDG5500 or ESD5500E		DC2 / DC6
	EDG6000		DC8
	SDG500 / SDG700		DC8
	EDG5500 or ESD5500E		DC9
	EDG6000		DC12
	SDG500 / SDG700		DC12
ADC100			StG 4002
ADD175A			StG 2005 DP
ADD176A			StG 2005 DP
ACE275H			StG 2005 DP
ACE295			StG 2040 DP
ACB120			StG 1/ StG 2
ADB335			StG 6-01 (Gears)
ADB445			StG 6-02V (Gears)
ACB2001			StG 10 (Gears)
ACB2001			StG 16 (Gears) / StG 2080
ACB120			StG 2005
ACB225			StG 2010
ADB445			StG 2040
ACB120			StG 3005 / StG 3010
ALN025			LA 25 / LA 30
ALN050			LA 35



## IVECO CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	IVECO PART NUMBER
ADD225S-12			8018971
ADD225S-24			8021744
ADB225F			8015587
ACB2001			8018556
ACB275H			8018674
ACE275H-24			8029133
ADD225S-12			8078971
ADD225S-24			8021744
ADD175A-24			8037141
ADC100-12			8045581
ADC100-24			8045582
ALN025-12			5802139004
ADD103B-12			5801383709
ADD103B-24			5801407573
	ESD5111		8017472
	ESD5500E		8018675
	ESD5330		8018557
	EGS1013		8023045
	ESD5330		8030357
	SDG721 or 725		87974507
	ESD5111		8017472
	ESD5500E		8018675
	ECC328-12		5802139002
		MSP6721C	8014335
		MSP6728C	8018673
		MSP6732	8030061
		KT276	8018343
		KT275	8018386

## MAN CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	MSP / ACCESSORIES	MAN PART NUMBER
ADD120S-12			51.11610-6026
ADD120S-24			51.11610-6025
ACE275HD-24			51.11610-6028
	ESD2210		51.11610-7131
	ESD2335		51.11610-7159
	ESD5131		51.11610-7132
	ESD5221		51.11610-7133
	ESD5305		51.11610-7134
	ESD5550		51.11610-7135
	SDG		51.11610-1023
		MSP6723C	51.27120-7032
		LE1400	99.25413-6117
		EC1000	51.25435-7007
		EC1300	51.25435-6010
		EC1310	51.25435-6011
		KT278-1	E 51.11610-6029
		LE1400-4	E 51.11605-0199
		LK275	E 51.11610-6017
		SP202	E 51.97601-0286

## MITSUBISHI / MITSUBISHI HEAVY IND CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	MITSUBISHI PART NUMBER
ALR190-M04-12			242538
ALR160-S03-12			3838271
ADC225S-24			242295
	SDG514-02-02		3817999
	ESD5500E		242537
		MSP6738	

## MTU CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	MTU PART NUMBER	NOTES
ACB275C			001-061-23-00	
	ESD5221A		000-538-32-60	
	EGS104B		000-538-55-60	Caseless
	EGS104B		000-538-56-60	
	PCA156		001-530-16-12	
	PCA157		000-532-01-10	
	PCA155		000-532-50-64	
	PCA162		000-533-29-88	Filter Board for EGS104B
		KT275	001-061-09-03	
		KT275	001-061-10-03	
		KT276	000-061-10-03	
		MSP677	000-535-62-33	
		MRM100	000-538-57-60	
		MRM100A	003-531-86-18	
		DP3	003-531-76-18	
		MPP 4102 G2S	003-531-84-18	

## SCANIA CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC / MSP ACCESSORIES	SCANIA PART NUMBER
ADC225S-24			1349 380
ACB275H			1359 295
	RSC671		1359 400
	ESD5131		1349 569
	ESD5500E		1373 879
		MSP675	1373 881
		MSP677	1300 298
		CH1204-L3	1300 300
		CH1206-S	1349 570
		PCI105	1359 216
		KT276	1359 296
		CH1203-B	1359 299
		CH1206A-L6	1359 403
		CH1208-6	1359 404
		DSC1002	1412 222
		DSC1002C	1412 223
		DSC1002	1423 086
		DSC1002	1432 252
		DSC1002	1432 254
		DSC1002C	1480 890
		DSC1002	1480 891
		DSC1002C	1534601
		DSC1002C	1534603



## SDMO CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	SDMO PART NUMBER
ADD175A-12			30604011001
ADD175A-24			30604011201
ADC100-12			30604020701
	ESD2210-12		30604020901
	ESD5111		30604015401
	ESD5131		30604007101
		KT175-RS-R	30604012201
		KT276	30604021001
		MSP6724C	30604020801
		MSP6728C	30604005401
		MSP6729	31101043101
		EC1350	31613096301
		EGS276-12	30604020011NE

## VOLVO CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	VOLVO PART NUMBER
ADD180G-12/24			358 9408
ADD225S-24			383 8271
ADD175-24			382 7267
ADD175A-24			383 4900
ACB225			863 616
ACB275D			866 167
ACB275H			383 7082
ACE275K-24			358 6281
ACE275H-24			382 5454
	EGS222-12		881 676
	EGS222-24		881 677
	ESD5500E		881 616 (873 979, 873 738, 873 747)
	ESD5330		881 665
	ESD5131		865 414 (Also 873738)
	ESD5111		863 617
	LSM672N		873 796
	LSM201N		873 797
	SYC6714		873 798
		KT166	382 6107
		KT286 with Gasket	383 9296
		KT276	865 233
		KT275	866 169
		KT278	382 5233
		MSP6732C	358 9140
		MSP679	863 618
		MSP6728C	382 5810
		LE1400-2	862 207
		LE160	866 812
		LE161	382 5151
		TP502	874 370
		EC1310	358 6975
		EC1301	358 6282
		MPP4102-G2-24V	358 6789
		EC1300	383 4933

## WOODWARD CROSS REFERENCES & REPLACEMENTS

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	WOODWARD PART NUMBER
	ESD5526E		8290-051, -052
	ESD5131		8290-061, -054, -038, -060
	ESD5131		8290-067, -071, -046, -075
	ESD5500E		8290-140, -186
	ESD5500E		8290-175, -138, -184, -172
	ESD5500E		8290-069, -073, -044, -077
	ESD5500E		8290-184, -189, -190
	ESD5526E		8290-064, -041, -059
	ESD5526E		8290-057, -058, -039
	ESD5526E		8290-068, -072, -047, -076,
	ESD5526E		8290-070, -074, -045, -078
	ESD5526E		8290-045, -185, -187
	ESD5526E		8256-022, -017
	ESD5528E		8290-141, -187
	ESD5528E		8290-174, -139, -185
	ESD5330		8290-158, 8256-022, -017
	ESD5330		8290-142, -021, -016
	ESD5530		8290-118, 8256-021, -016
	EDG5500 or ESD5500E		2301A
	EDG5500 or ESD5500E		DPG2100
	EDG6000		DPG2200
	EDG5500 or ESD5500E		EPG512/EPG524
	EDG5500 or ESD5500E		EPG1712/EPG1714
ADD104-12			DYNC 70000-001-0-12 (CW)
ADC100			Dyna 70025
ADD175A (12 or 24 )			Kit: A459 8
ADD176A (12 or 24)			Actuator SA-4506-24 (24VDC)
ACE275H-24 (24)			Actuator SA-4506-24 (24VDC)
ADC225 (12 or 24 )			Dyna8000, Models DC11020-000-012 Through DC11028-300-024
ADB335-24 (24VDC Only)			Dyna8200, Models DC12000-000-012 Through DC12003-000-024
ADB335F-24			8405-089
ADB445-24 (24VDC Only)			DynaPlus4
ACB2001-24 (24VDC Only)			DynaPlus8, UG8 – UG40
ALN025			ProAct Model I
ALN050			ProAct Model II
		LSM100	LSM
ATB T1 Series			L-Series ITB
ATB T2 Series			F-Series ITB

GAC ACTUATOR	GAC SPEED CONTROLLER	GAC MSP / ACCESSORIES	WOODWARD PART NUMBER
ATB T3 Series			Flo-Tech ITB
ATB T4 Series			ProAct ITB – Large Bores