# INSTALLATION INSTRUCTIONS

#### Original Issue Date: 2/17

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Model: 15-60REOZK with Decision-Maker® 3000 Controllers Only
Market: Industrial
Subject: Electronic Governor Kit GM90661-KP1
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Introduction

The electronic governor kit provides isochronous governing by using the signal over CAN to control the current input to the actuator. This kit is intended for use with units having the Decision-Maker<sup>®</sup> 3000 controller only.

**Note:** The electronic governors are shipped unprogrammed and have no manual adjustments. After installation, the governor requires downloading software and changes to the default settings.

The electronic governor kit includes an:

- Actuator (locate on top of injection pump).
- Electronic governor (locate inside the junction box). See Figure 1 for specifications.

Specs		
Supports	CAN/J1939 bus interface	
Operating Temperature	-40° to 85°C (-40° to 185°F)	
Power Input	9-30 VDC, Reverse polarity protected	
Output to Actuator	Pulse-width-modulated, 6 A max.	
Auxiliary Outputs	200 mA max.	

Figure 1 Governor Specifications

Read the entire procedure before beginning. Install the software onto a PC. Carefully follow these instructions and any additional instructions that appear on the screen during the download procedure. The instructions provided here assume you know how to operate a PC.

Loading incorrect or incomplete files may cause permanent damage to the governor controller's logic circuit board. Verify that the downloaded files contain the settings for your specific generator set and engine. Do not attempt to modify the data files.

## **Required Tools and Equipment**

Obtain the APECS Programming Interface Harness Kit GM100177-KP1. See Figure 2.





A PC with SiteTech<sup>™</sup> software is required to make the electronic governor functional. Use your SecurID to access Kohler Power Resource Center, click on the TechTools button, and follow the instructions to download the files. Refer to TP-6701 SiteTech<sup>™</sup> Software Operation Manual for more information.

A PC with Kohler ACT Tool software is also required to make the electronic governor functional. Use your SecurID to access Kohler Power Resource Center, click on the TechTools button, and follow the instructions to download the files.

Have **two 8 mm wrenches** available for adjusting the throttle arm, a **TP Torx Plus®** driver for removing the actuator cover, and a **flex joint/universal joint** for installing the actuator.

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**Disabling the generator set.** Accidental starting can cause severe injury or death. Before working on the generator set or equipment connected to the set, disable the generator set as follows: (1) Press the generator set off/reset button to shut down the generator set. (2) Disconnect the power to the battery charger, if equipped. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent the starting of the generator set by the remote start/stop switch.



Servicing the fuel system. A flash fire can cause severe injury or death. Do not smoke or permit flames or sparks near the fuel injection system, fuel line, fuel filter, fuel pump, or other potential sources of spilled fuels or fuel vapors. Catch fuels in an approved container when removing the fuel line or fuel system.

# **Installation Procedure**

- 1. Remove the generator set from service.
- 1.1 Press the generator set OFF/RESET button to shut down the generator set.
- 1.2 Disconnect the power to the battery charger, if equipped.

- 1.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.
- 1.4 If equipped with an enclosure, remove enclosure doors as needed to service the engine.

## 2. Install the actuator.

- 2.1 Before removing the mechanical governor head and replacing it with the actuator (324516), clean the surrounding area. Clean outside of the fuel injection pump with dry compressed air before removing the governor control cover. Place a suitable container underneath the fuel injection pump to catch any fuel that may spill when removing the governor control cover.
- Note: Dispose of all waste materials (engine oil, fuel, filter, etc.) in an environmentally safe manner and in accordance with all applicable laws.
- 2.2 Remove lead 70 from the existing mechanical governor and tape the end of the lead and tuck inside the plastic conduit.
- 2.3 Remove the fuel return line and the return line connector assembly from the governor cover using care not to allow dirt to enter the injection pump. Remove and discard the return line connector O-ring. Set aside the return line connector.
- 2.4 Loosen the three cover screws.
- **Note:** A universal joint or flex socket is needed to remove the rear-most screw.
- 2.5 Remove the governor control cover assembly (see the following NOTE). Save the screws for later use. See Figure 3.
- **Note:** When the actuator is fully loose, have rags handy as there will be fuel spilled from the reservoir. Figure 4 shows the fuel rack/metering assembly with the cover removed. The fork on the electronic governor cradles this arm and moves it to govern the speed. On a mechanical governor, the solenoid defaults to an extended position when not powered so that it pushes against the spring tension; this metering assembly turns off fuel. **Take great care when replacing the actuator**. If the linkage is missed, the engine may "runaway" as it would be in the full-fuel position. If you push on this arm with your finger, you'll see it actuate and feel the tension.



Figure 3 Actuator Screws (qty. 3)



Figure 4 Actuator

- **Note:** To prevent any damage, properly install the metering valve drive coupling to the governor linkage on the pump as described below.
- 2.6 Install the new cover seal (part of the actuator components) into the groove of the integrated actuator cover assembly.
- 2.7 Position the actuator head similar to Figure 5. Slightly lift the front portion of the actuator cover.
- 2.8 Carefully slide the integrated actuator cover toward the rear of the pump body until the mounting holes between the integrated actuator cover and pump body begin to align. Once in place, you'll see that the actuator is offset from the mounting holes and feel that there is spring tension pushing on the cover. If you push on the cover, you'll feel the tension which means that there is good contact with the linkage. See the slight offset in Figure 6.
- 2.9 Reuse the three cover mounting screws to assemble the integrated actuator cover to the pump body. Tighten the screws to 4–5 Nm (35–45 in. lb.).
- **Note:** A universal joint or flex socket is needed to install the rear-most screw.
- 2.10 Locate the 2 leads in the engine harness near the governor. These leads may be yellow and orange or blue and green (depending on the generator set model).



Figure 5 Actuator (Cover Design Similar)



Figure 6 Actuator (Cover Design Similar)

- 2.11 Connect the two leads to the two screws at the actuator. It doesn't matter which leads attach to which screws.
- 2.12 Install a new O-ring (part of the actuator components) on the return line connector assembly. Apply a light coating of all-purpose grease to the O-ring and install the connector. Tighten to 4.9–6 Nm (43–53 in. lb.).
- 2.13 Install the fuel return line to the return line connector.

#### 3. Remove the air cleaner assembly.

Removal of the air cleaner assembly is required as a means to shut down the engine should the actuator linkage be improperly installed in Step 2.

- **Note:** Controllers are factory adjusted to minimum RPM. However, for safety, the engine should be capable of being disabled if an overspeed condition should occur.
- **Note:** The best practice when replacing the actuator is to remove the air cleaner piping such that the junction box cover can be used to cut off air supply to the engine in the event of a runaway due to improper governor installation.

- 3.1 Remove the air cleaner cover.
- 3.2 Remove the air cleaner element.
- 3.3 Remove the air cleaner base.

#### 4. Install the governor kit.

4.1 Remove the junction box cover and mount the electronic governor (GM90652) in the junction box

using 2 each screws (M933-06030-60, plain washers (M125A-06-80), and nuts (M6923-06-80. See Figure 7 (15-30REOZK) or Figure 8 (40-60REOZK).

4.2 Connect governor harness GM90770 to terminal strip TB12 in the junction box using Figure 9. Do not plug the governor harness connector to the electronic governor at this time.







Figure 8 Installed Electronic Governor Kit, 40–60REOZK



Figure 9 Electronic Governor Wiring Diagram and Wiring Harness GM90770, Typical

- 4.3 Connect the grey male connector on the interface harness to the grey receptacle on the electronic governor. See Figure 10.
- 4.4 Connect the grey female connector on the interface harness to the grey connector on the existing harness inside the junction box. See Figure 10.
- 4.5 Connect the 7N terminal on the interface harness to 7N on the TB12 terminal strip. TB12 terminal strip is located inside of the junction box. See Figure 10.
- 4.6 Connect the P terminal on the interface harness to P on the TB12 terminal strip. See Figure 10.
- 4.7 Connect the USB connector on the interface harness to the personal computer. See Figure 10.
- 4.8 Use a USB cable to connect the personal computer to the generator set controller. The USB cable must have a male USB type-A connector on the PC side and a male mini-B connector on the device side. See Figure 11.
- **Note:** Be sure that the cable has a mini-B connector. Micro-B connectors will not connect to the device.



Figure 10 Interface Harness



Figure 11 USB Cable

4.9 Use SiteTech<sup>™</sup> version 4.3.xx or newer and under the **Genset Personality Profile** parameter, change the **ECM Model** to **Woodward APECS ECM**. See Figure 12.

Add Device Remove Device	ee Start Engine % Update Firmware svice Stop Engine A Change Password * Reset Faults Notification Setup Device	Reset to Defaults Calibrate Set Mpac Password	Manage Device		
DEMO-1	Parameter	DEMO-1			
0.0 KW	🕑 Identity	(*) Identity			
Engine Temp: 140.0 °F	<ul> <li>Engine Metering</li> </ul>	Engine Metering			
Oil Pressure: 0.0 PSI Fuel Level: 0 %	Generator Metering				
Battery: 12.0 V	Genset Info				
Eng Hours: 0.0 h	🖉 😸 Genset Run Time				
	A Genset Personality Profile				
	ECM Model	Woodward Apecs I			
	Maximum Alternator Current	Not Selected			
	Engine Number Of Flywheel Teeth	No ECM			
	Engine Warmed Up Temperature	Deere FCM			
	Engine Cooled Down Temperature	Volvo ECM			
	Engine Crank Disconnect Speed	Scania ECM			
	Engine Idle Speed	Lombardini			
	Engine Run Speed	Deeran			
	Engine Coolant Temperature Protectives Enab	Moto Tron ECM			
	Engine Coolant Temperature Sensor	Woodward Apecs ECM			
	Engine High Coolant Temperature Inhibit Dela	Impco ECM			
	Engine Low Coolant Temperature Warning De	Adec ECM			
	Engine High Coolant Temperature Warning De	VECM	1		

Figure 12 Genset Personality Profile Parameter

- 4.10 Turn the toggle switch (on the interface harness) to ON (1). See Figure 10.
- 4.11 Start the Kohler ACT Tool on the personal computer and accept the license agreement. See Figure 13.

License Agreement
SOFTWARE LICENSE AGREEMENT CAREFULLY READ THE FOLLOWING LICENSE AGREEMENT. BY OPENING THE PACKAGE OR LICKING ON THE "YES" BUTTON, YOU ("THE LICENSEE") ARE CONSENTING TO BE BOUND BY AND ARE BECOMING A PARTY TO THIS AGREEMENT. IF YOU DO NOT AGREE TO ALL OF THE TERMS OF THIS AGREEMENT, CLICK THE "NO" BUTTON, AND, IF APPLICABLE, RETURN THIS PRODUCT TO THE PLACE OF PURCHASE FOR A FULL REFUND. 1. GRANT OF LICENSE. The publisher grants to you the right to use one copy of the enclosed Woodward software program where applicable, (the "SOFTWARE") on a single terminal connected to a single computer (i.e. with a single CPU). You may not network the SOFTWARE or otherwise use it on more than one computer or computer terminal at the same time. 2. CDPYRIGHT. The SOFTWARE is owned by Woodward Governor Company or its suppliers and is protected by United States copyright laws and international tready provisions. Therefore, you must text the SOFTWARE like any other copyrighted material (e.g. a book or musical recording) except that you may either (a) make one copy of the SOFTWARE code/ use Company or its suppliers and is protected by United States copyright laws and international tready provisions. Therefore, you must text the SOFTWARE like any other copyrighted material (e.g. a book or musical recording) except that you may either (a) make one copy of the SOFTWARE coley for backup puppose. (b) lamafer
Cancel

Figure 13 License Agreement Screen

- 4.12 Find the COM port that the USB is plugged into See Figure 14. Then select "OK".
- 4.13 The KOHLER main screen appears. Select "Download KACT Calibration" See Figure 15.

C Com 1	Cancel
C Com 2	
Custom com7	
Note: enter the full name of the serial port, usually: CDMx (without space), where x is the serial port number	

Figure 14 KACT Communications Configuration

10 JACC 2003 Tay Monte Configure Host Anthetic Disarderd RACT Calibrated RACT Calibrated RACT Calibrated		
	KOHLER	
Redy		(com) 1.55F

Figure 15 Main Screen

4.14 Select the appropriate calibration file for your particular model and select "OPEN".

The appropriate file is dependent on your generator set model. For example *Dec3000\_15REOZK\_60\_12\_S*, the file naming structure contains the following information:

- Controller (Dec 3000)
- Model (15REOZK etc.)
- Hz (60 or 50)
- Battery volts (12)
- Application (P for Prime or S for Standby)
- 4.15 When the calibration file was downloaded successfully, select "OK". See Figure 16.

ACT	
A	The calibration file was downloaded successfully.
	ОК

Figure 16 Downloaded Successfully Screen

- 4.16 Start the generator set.
- 4.17 After the generator set is running, select "Actuator Throttle Arm" from the main screen. See Figure 17.



Figure 17 Main Screen

- 4.18 The following screen appears. See Figure 18. While the engine is running, select "START".
  - **Note:** Selecting the "START" button, turns the actuator on FULL. The values shown in Figure 18 are not adjustable.

120.0	ON Time	Idle
900.0	OFF Time	Engine RPM 0.0
0.95	PWM Value	
ABORT		START

Figure 18 Actuator Throttle Arm Screen

4.19 Using two 8 mm wrenches, loosen the jam nuts and adjust the throttle position screws (see Figure 19) until the Actuator Throttle Arm screen (shown in Figure 18) shows the following for Engine RPM:

For 60 Hz units

Engine RPM 1890

4.20 Tighten the jam nuts and select "ABORT" on the Actuator Throttle Arm screen (shown in Figure 18).

Note: The engine returns to normal rated speed (1800 rpm for 60 Hz units.)

4.21 Close the Actuator Throttle Arm window, then close the Kohler ACT Tool program on the personal computer.



Figure 19 Throttle position screws and jam nuts

4.22 To shut down the generator set:

- 4.22.1 Turn the toggle switch on the interface harness to OFF ( O ). See Figure 10.
  - Note: The generator set will continue to run if the toggle switch is not turned OFF.
- 4.22.2 Select the OFF/RESET button on the Decision-Maker® 3000 controller.
- 4.23 Disconnect the 7N and P terminals from the TB12 terminal strip.
- 4.24 Unplug the interface harness from the electronic governor inside the junction box.
- 4.25 Unplug the grey female connector from the existing harness inside the junction box.
- 4.26 Take the grey connector from the existing harness inside the junction box and plug it into the grey connector on the electronic governor.

## 5. Install the air cleaner assembly.

- 5.1 Replace the air cleaner base and hardware.
- 5.2 Replace the air cleaner element.
- 5.3 Replace the air cleaner cover.

## 6. Restore the generator set to service.

- 6.1 Replace the junction box cover and any sound shield door(s) and roof.
- 6.2 It is recommended that the battery be disconnected for 5 minutes after completing these steps and then, reconnected.
- 6.3 Check that the generator set is OFF.
- 6.4 Reconnect the generator set engine starting battery, negative (-) lead last.
- 6.5 Reconnect power to the battery charger, if equipped.

# Parts List

#### **Electronic Governor Kit**

Kit:	GM90661-KP1	
Qty.	Description	Part Number
1	Governor, electronic	GM90652
1	Actuator, governor	324516
2	Washer, plain (#6 screw size)	M125A-06-80
2	Nut, hex (6 mm)	M6923-06-80
2	Screw, hex cap (M6 x 30 mm)	M933-06030-60
1	Harness, governor	GM90770
1	Seal, cover	included with actuator
1	O-ring	included with actuator

# Troubleshooting

- 1. Remove the generator set from service.
- 1.1 Press the generator set OFF/RESET button to shut down the generator set.
- 1.2 Disconnect the power to the battery charger, if equipped.
- 1.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.
- 1.4 If equipped with an enclosure, remove enclosure doors as needed to service the engine.

#### 2. Testing the Actuator.

If the electronic governor system fails to operate and the actuator is suspected to be the problem, perform the following tests.

- Measure coil resistance (at room temperature):
   2.05 ±0.25 ohms (12 VDC actuator).
- 2.2 Measure coil isolation to case: >3 Megohm.
- 2.3 Remove the actuator. Manually move the actuator through its range of motion. No binding or sticking should occur.
- 2.4 Install a diode Kohler part no. 294254 (Motorola MUR810 or equivalent) across the actuator terminals.
- 2.5 Apply a 12 VDC power supply to the actuator where the pos. (+) connects to the cathode of the diode.
- 2.6 The actuator should move to the full fuel position and operate smoothly throughout its entire stroke without any interruption in motion.
- 2.7 If the actuator passes these tests the problem is likely in the governor and/or fuel system.

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