INSTALLATION INSTRUCTIONS

Original Issue Date: **5/04**
Model: **4–32 kW Generator Sets Equipped with the ADC 2100 Controller**
Market: **Marine, Mobile, and Residential/Commercial**
Subject: **ADC 2100 Controller Replacement Kits GM34969, GM46826, and GM48301**

Introduction

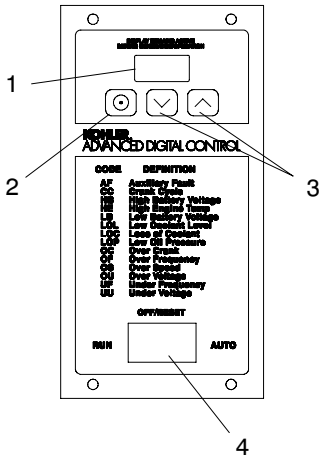
Use these instructions to replace, configure, and adjust the controller on generator sets originally equipped with the ADC 2100 controller. See Figure 1 for ADC 2100 Controller identification. Controller replacement, configuration, and adjustment must be performed by an authorized distributor/dealer or trained service technician.

Always check for loose connections, faulty wiring, blown fuses, a dead battery, or other simple problems before replacing parts. Check the SCR module (GM28483) connections, F1 fuse, and wiring before replacing the controller. Refer to the generator set service manual for troubleshooting and repair procedures.

Note: Replacement controllers must be configured for the generator set model and system voltage/frequency after installation. Be sure to read and follow the entire procedure to configure and adjust the new controller.

See Figure 2 for ADC 2100 controller replacement kit numbers.

Read the entire installation procedure before beginning installation. Perform the steps in the order shown.



1. LED display
2. Select button (use for setup and adjustment only)
3. Up and down arrow buttons (use for setup and adjustment only)
4. Generator set master switch

Figure 1 ADC 2100 Controller

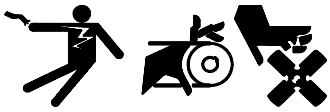
Generator Set Model	Controller Replacement Kit Number
Model 5/7.3ECD marine	GM48031
Model 20EORZD spec number GM38880-SA1	GM46826
All other models	GM34969

Figure 2 ADC 2100 Replacement Kit Numbers

Safety Precautions

Observe the following safety precautions while installing the kit.

⚠ WARNING



Accidental starting.
Can cause severe injury or death.

Disconnect the battery cables before working on the generator set. Remove the negative (-) lead first when disconnecting the battery. Reconnect the negative (-) lead last when reconnecting the battery.

Disabling the generator set. Accidental starting can cause severe injury or death. Before working on the generator set or connected equipment, disable the generator set as follows: (1) Move the generator set master switch to the OFF position. (2) Disconnect the power to the battery charger. (3) Remove the battery cables, negative (-) lead first. Reconnect the negative (-) lead last when reconnecting the battery. Follow these precautions to prevent starting of the generator set by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer.

⚠ WARNING

Hazardous voltage. Moving rotor.
Can cause severe injury or death.

Operate the generator set only when all guards and electrical enclosures are in place.

Servicing the generator set when it is operating. Exposed moving parts can cause severe injury or death. Keep hands, feet, hair, clothing, and test leads away from the belts and pulleys when the generator set is running. Replace guards, screens, and covers before operating the generator set.

Before Replacing the Controller

Read the information in this section before starting the controller replacement procedure.

Continuous Power Mode Jumper P7 Eliminated

Controllers manufactured after 7/18/2005 no longer include the continuous power mode jumper P7. These controllers use application program version numbers 1.18 and above.

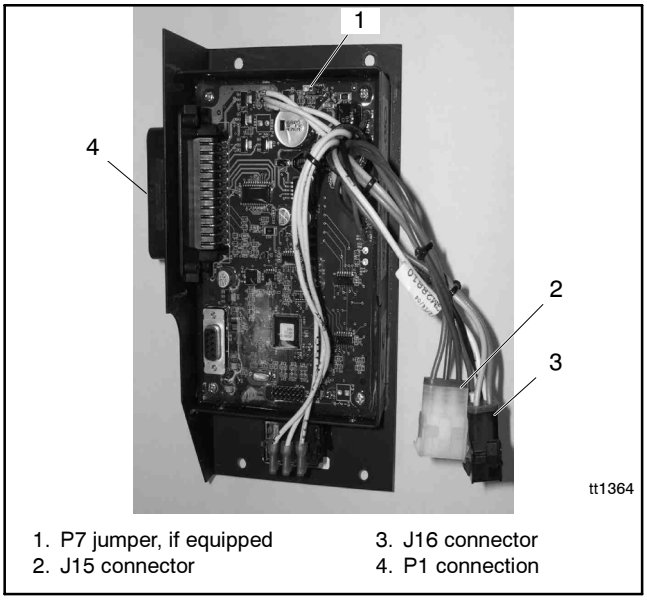
This upgrade allows the ADC 2100 to maintain CAN communications at all times when the master switch is in the AUTO position.

With the generator set master switch in the AUTO position:

- If the ADC 2100 is **not** configured for a CAN gauge *(communications parameter setting Cn00)*, the controller will power down after 48 hours of inactivity. If the generator set has been started, the controller will power down 48 hours after the generator set stops.
- If the ADC 2100 is configured for a CAN gauge *(communications parameter setting Cn01 or higher)*, the controller will not power down. The controller remains powered at all times to allow remote start commands from the CAN gauge.

Note: Do not load ADC application program version numbers below 1.18 onto the upgraded (P7 jumper eliminated) ADC 2100.

See Service Bulletin SB-652 for more information about the elimination of the continuous power mode jumper.



1. P7 jumper, if equipped
2. J15 connector
3. J16 connector
4. P1 connection

Figure 3 P7 Jumper Location, if equipped (controller back cover removed)

Controller Application Program

The controller's application program version number is shown on a label on the controller circuit board (under the back cover). The program version number is also displayed on the LED screen during the key sequence to enter the configuration mode. (The controller must be connected to the generator set.) Hold the Select button and move the generator set master switch to the RUN position. After about 5 seconds, the application program version number will be displayed on the controller display. For example, 01.18 will be displayed for program version 1.18.

- **Do not use application program version 2.XX on any models other than the Model 5/7.3ECD marine units.**
- Application program version 2.00 or later is required for the Model 5/7.3ECD marine units. Use the Program Loader Software and a personal computer to update the controller's application program after controller installation.
- If the Remote Digital Gauge is used, controller application program version 1.14 or later is required.
- Use controller application code version 1.18 or later on controllers that are not equipped with the P7 jumper. Do not load earlier code versions on controllers that do not have the P7 jumper.

Go to www.kohlernet.com, Tech Tools, Software, to find the latest software information and obtain application program software.

Use the Program Loader Software and a personal computer to update the controller's application program, when necessary. Obtain the latest version of the application program and the Program Loader software through Tech Tools or contact your generator set distributor. Refer to TT-1285, Program Loader Instructions, for instructions to load the application program onto the controller.

Controller Replacement

1. Place the generator set master switch in the OFF position.
2. Disconnect the power to the battery charger, if equipped.
3. Disconnect the generator set engine starting battery(ies), negative (-) lead first.
4. Open the junction box to gain access to the back of the ADC 2100. Disconnect the controller at P1, J15, and J16. See Figure 3.
5. Remove four controller mounting screws and remove the old controller.
6. Install the new controller and reconnect the P1, J15, and J16 connectors. Close the junction box.
7. **This step applies to models 10/13/15EG, 10/13/15ERG, 15/30RES, and 15/30RYG only. For all other models, proceed to step 8.**

   a. Check the generator set serial number and refer to Figure 4. On these generator set models with serial numbers before 2053692, it is necessary to cut the gray/orange lead in the wiring harness when an ADC 2100 controller with application code version 1.18 or later is installed.

   Generator sets with higher serial numbers use different wiring harnesses and do not require this procedure. **Proceed to step 8 for units with serial numbers above 2053692.**

Model	Market	Before Serial Number
10EG 13EG 15EG	Marine	**2053692**
10ERG 13ERG 15ERG	Commercial/ Recreational Mobile	
15RES 30RES 15RYG 30RYG	Residential/ Commercial	

Figure 4 Models Requiring Starting Circuit Procedure (for application code version 1.18 or higher)

b. Remove the cover on the ECM connector.

c. Locate pin #9. See the X mark in Figure 6.

d. Cut and remove a 1-inch section of the gray/orange lead entering pin #9 in the wiring harness at the ECM connector. This allows the ADC 2100 (and not the ECM) to control the starting circuit.

e. Replace the cover on the ECM connector.

8. Check that the generator set master switch is in the OFF position.

9. Reconnect the generator set engine starting battery, negative (-) lead last.

10. Reconnect power to the battery charger, if equipped.

11. Check the controller application software version number:

    a. Hold the Select button and move the generator set master switch to the RUN position. After about 5 seconds, the application software version number will be displayed on the controller display.

    b. Compare the software version number to Figure 5. For Model 5/7.3ECD units, use Kohler's Program Loader to load version 2.xx of the application code onto the controller. Go to www.kohlernet.com, Tech Tools, Software, or refer to TT-1285 for instructions to obtain and load the latest version of the controller application code, if necessary.

Model	Software version
Model 5/7.3ECD marine only	2.00 or higher versions 2.xx
All other models	1.18 or higher versions 1.xx

Figure 5 ADC 2100 Application Software Version Numbers

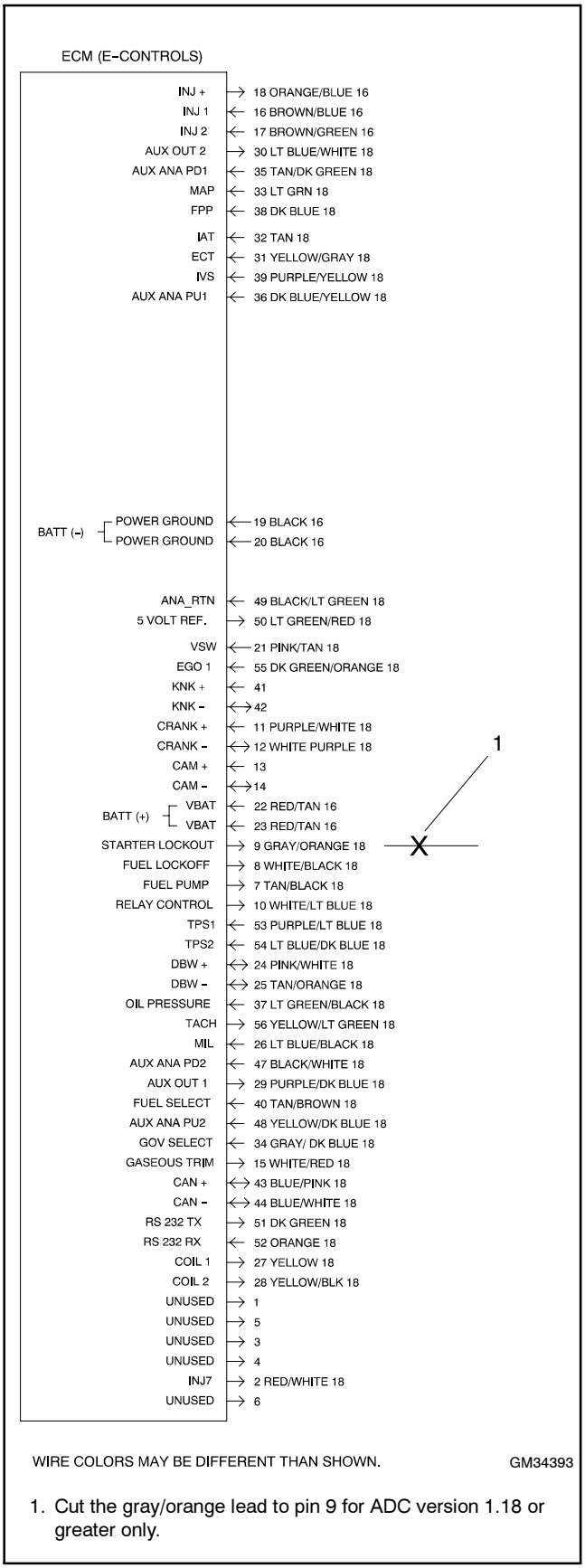


Figure 6 ECM Wiring for 10/13/15EG, 10/13/15ERG, 15/30RES, and 15/30RYG Models, S/N before 2053692

12. Follow the instructions in the Controller Configuration Section to change the new controller's configuration settings to match the generator set system voltage and frequency, unit configuration, engine type, engine data input types, battery voltage, and communications settings.

    Note: Be sure to save the new settings immediately as instructed before exiting the configuration mode. The changes will be lost if the controller times out before the settings are saved.

13. Use a multimeter to check the output voltage and frequency. Follow the instructions in the Voltage and Speed Adjustment Section to adjust the output voltage, speed, and stability settings on the ADC controller. Save the settings immediately after adjustment is complete.

    Note: Models with mechanical governors do not use the ADC controller's engine speed adjustment menus.

Controller Configuration

Replacement controllers are factory-set for the Model 8.5/12RES generator set. The installer must set the replacement controller to the appropriate configuration for the generator set model. See Figure 7 and Figure 8 to determine the appropriate settings for your generator set model.

Note: Setting the engine configuration parameter Ec automatically selects the corresponding Ed parameter for the standard data input types for that engine. You may need to change this parameter if optional senders are installed. See Figure 9.

After you have identified the appropriate settings for your generator set, follow the instructions in Figure 10 through Figure 12 to change the controller settings. Enter the configuration mode while the engine is not running and then step through the parameters. Use the up (∧) and down (∨) arrow buttons to select the appropriate setting for each parameter.

Configuration Mode Time Out

The controller will automatically exit the configuration mode without saving any changes after about 1 minute if no buttons are pressed. Start the configuration procedure over again from the beginning if the controller exits the configuration mode before the settings have been saved.

After setting the system configuration, use a multimeter to check the generator set output voltage and frequency. Use the controller to adjust the output if the voltage and/or frequency are not within the acceptable range for the application. Proceed to the Voltage and Speed Adjustment section and the diagrams in Figure 13 and Figure 14 for instructions.

Voltage and Speed Adjustment

The diagrams in Figure 13 and Figure 14 outline the procedures for voltage and speed adjustments. The generator set must be running during these adjustments. Use a multimeter to measure the generator set output voltage and frequency during adjustments.

The engine speed (frequency) adjustment menus are not accessible on models with mechanical governors.

Note: Save your settings after making adjustments. If the settings are not saved, the system returns to the previous settings after the generator set shuts down.

Parameter	Setting	Definition	Connect
Uu † Unit's system voltage and frequency	Uu00	Single phase, 2 Wire, 60 Hz, 100 VAC	1Ph, 2W
		Single phase, 3 Wire, 60 Hz, 100 VAC	1Ph, 3W
		Single phase, 2 Wire, 60 Hz, 120 VAC	1Ph, 2W
		Single phase, 3 Wire, 60 Hz, 120 VAC	1Ph, 3W
	Uu01*	Single phase, 3 Wire, 60 Hz, 120/240 VAC	1Ph, 3W
		Single phase, 3 Wire, 60 Hz, 120/240 VAC	Dogleg
	Uu02	Single phase, 2 Wire, 50 Hz, 230 VAC	1Ph, 2W
		Single phase, 3 Wire, 50 Hz, 115/230 VAC	1Ph, 3W
	Uu03	Three phase, 4 Wire, 50 Hz, 230/400 VAC	Wye
	Uu04	Three phase, 4 Wire, 60 Hz, 277/480 VAC	Wye
	Uu05	Single phase, 2 Wire, 50 Hz, 100 VAC	1Ph, 2W
		Single phase, 3 Wire, 50 Hz, 100 VAC	1Ph, 3W
		Single phase, 2 Wire, 50 Hz, 110 VAC	1Ph, 2W
		Single phase, 3 Wire, 50 Hz, 110 VAC	1Ph, 3W
		Single phase, 2 Wire, 50 Hz, 115 VAC	1Ph, 2W
	Uu06	Single phase, 3 Wire, 50 Hz, 115/230 VAC	1Ph, 3W
		Single phase, 3 Wire, 50 Hz, 115/230 VAC	Dogleg
	Uu07†	Single phase, 3 Wire, 50 Hz, 110/220 VAC	1Ph, 3W
		Single phase, 3 Wire, 50 Hz, 110/220 VAC	Dogleg
	Uu08†	Single phase, 3 Wire, 60 Hz, 100/200 VAC	1Ph, 3W
	Uu09†	Single phase, 3 Wire, 50 Hz, 100/200 VAC	1Ph, 3W
	Uu10†	Three phase, 4 Wire, 60 Hz, 120/240 VAC	Delta
		Three phase, 4 Wire, 60 Hz, 139/240 VAC	Wye
	Uu11†	Three phase, 4 Wire, 60 Hz, 120/208 VAC	Wye
	Uu12†	Single phase, 2 Wire, 50 Hz, 220 VAC	1Ph, 2W
	Uu13†	Single phase, 2 Wire, 50 Hz, 240 VAC	1Ph, 2W
	Uu14†	Three phase, 4 Wire, 50 Hz, 115/230 VAC	Delta
	Uu15†	Three phase, 4 Wire, 50 Hz, 110/220 VAC	Delta
	Uu16†	Three phase, 4 Wire, 60 Hz, 127/220 VAC	Wye
	Uu17†	Three phase, 4 Wire, 50 Hz, 110/190 VAC	Wye
	Uu18†	Three phase, 4 Wire, 50 Hz, 120/208 VAC	Wye
	Uu19†	Three phase, 4 Wire, 60 Hz, 220/380 VAC	Wye
	Uu20†	Three phase, 4 Wire, 60 Hz, 240/416 VAC	Wye
		Three phase, 4 Wire, 60 Hz, 230/400 VAC	Wye
	Uu21†	Three phase, 4 Wire, 50 Hz, 220/380 VAC	Wye
	Uu22†	Three phase, 4 Wire, 50 Hz, 240/416 VAC	Wye
	Uu23†	Three phase, 4 Wire, 50 Hz, 115/200 VAC	Wye

* Factory settings for replacement controllers.

† Check the generator set spec sheet for voltage configurations applicable to each model. Use voltage/frequency parameters Uu07–Uu23 only with ADC application program version 1.20 or higher.

Figure 7 Voltage/Frequency Parameter Uu Settings

Parameter	Setting	Definition
Uc Unit configuration	Uc00	Marine
	Uc01 *	Standby
	Uc02	Mobile
Ec Engine type	Ec00 *	8.5/12 RES
	Ec01	8-9EOZD/6.5-7EFOZD
	Ec02	10-20EOZD, 9-17.5EFOZD, 10/15/20EORD/EORZD, 10/15/20REOD/REOZD, 24EOZD/20EFOZD
	Ec03	10/13/15EG, 10/13/15ERG, 15RYG, 15RES
	Ec04	5/7.3ECD
	Ec05	Not assigned
	Ec06	30RYG, 30RES
	Ec07	28-32EOZD/23-27EFOZD (without pre-heater option)
	Ec08	12RESM1
	Ec09	23EOZD/20EFOZD with preheat option
	Ec10	13-15EGZ with PTO
Ed § Engine data input types	Ed00	10/13/15EG, 10/13/15ERG, 15/30RYG/RES
	Ed01	12RESM1, 13-15EGZ with PTO
	Ed03	5/7.3ECD, 8-9EOZD, 6.5-7.5EFOZD, 10-20EOZD, 9-17.5EFOZD, 10-20EORD/EFORD, 10-20REOD/REOZD, 24EOZD, 20EFOZD, 28-32EOZD, 23-27EFOZD
	Ed05 *	8.5/12 RES
Bt Battery Voltage	Bt12 *	Battery voltage 12 VDC
	Bt24	Battery voltage 24 VDC
Cn Communications	Cn00 *	No CAN communications
	Cn01	J1939 (use for Remote Digital Gauge)
	Cn02 ‡	Smartcraft® gauge for generator set #1
	Cn03 ‡	Smartcraft® gauge for generator set #2
	Cn04 ‡	Smartcraft® gauge for generator set #3
	Cn05 ‡	Smartcraft® gauge for generator set #4
	Cn06	Reserved for future development

* Factory settings for replacement controllers.

§ Setting the Ec parameter automatically selects the appropriate Ed parameter for the standard data input types for that engine. Change this parameter if optional senders are installed. See Figure 9.

‡ Smartcraft® settings for ADC code version 2.xx only, for models 5/7.3ECD and 4/6EFCD

Figure 8 Controller Parameters

Parameter	Low Coolant Level Sensor	Pressure Sensor	Temperature Sensor	Magnetic Pickup
Ed00	Digital	Digital	Digital	No
Ed01	Digital	Digital	Analog	No
Ed02	Digital	Analog	Digital	No
Ed03	Digital	Analog	Analog	No
Ed04	Digital	Digital	Digital	Yes
Ed05 *	Digital	Digital	Analog	Yes
Ed06	Digital	Analog	Digital	Yes
Ed07	Digital	Analog	Analog	Yes
Ed08	Analog	Digital	Digital	No
Ed09	Analog	Digital	Analog	No
Ed10	Analog	Analog	Digital	No
Ed11	Analog	Analog	Analog	No
Ed12	Analog	Digital	Digital	Yes
Ed13	Analog	Digital	Analog	Yes
Ed14	Analog	Analog	Digital	Yes
Ed15	Analog	Analog	Analog	Yes

* Factory setting for replacement controllers. See Figure 8 for the default settings for certain models. The installation of optional sender kits (available for some models) may require a different Ed setting.

Figure 9 Engine Data Input Types, Parameter Ed

Controller Configuration Mode

Hold the Select button:

Display:

Move the generator set master switch to the RUN position. (The generator set engine will not start.)

Display: . x x

Wait about 5 seconds until the display shows the program version number. (The number may be different than the one shown here.)

Display: U 1. 0 4

Press the down arrow key and then the up arrow key 3 times to enter the configuration mode. (This is the controller "password.")

Display: U u 0 *x*

Now release the Select button.

Press:

or

To set the voltage/frequency setting for 60 Hz or 50 Hz models. (See Figure 7.)

Display: U u 0 *x*

To step to the next parameter, unit configuration Uc.

or

To set the unit configuration setting, if necessary. (See Figure 8.)

Display: U c 0 *x*

To step to the next parameter, engine type Ec.

or

To set the engine type, if necessary. (See Figure 8.)

Display: E c 0 *x*

To step to the next parameter, advanced configuration mode or save mode selection.

Display: A d n c

Now either save your settings or enter the Advanced Configuration Mode to set the engine data inputs, battery voltage, and communications.

Press:

To enter advanced configuration mode. **Go to Figure 11.**

Display: E d 0 *x*

OR:

or

To proceed to the save mode without entering the advanced configuration mode. **Go to Figure 12.**

Display: S A V E

Note: Be sure to save your settings before exiting the configuration mode. The controller reverts to the last *saved* settings when the master switch is moved to the OFF/RESET position.

Note: Shaded boxes show which number in the controller display changes when the up or down arrow key is pressed. *x* denotes any number from 0 to 9.

Figure 10 Configuration Mode (system voltage/frequency, unit configuration, and engine type parameters)

Pressing the up arrow key at the Adnc display (See Figure 10) puts you into the Advanced Configuration Mode.

Press:

or To set the engine data input type. **E d 0 *x***

Note: Setting the Ec parameter automatically selects the appropriate Ed parameter for the standard senders for that engine. See Figure 9.

To enter battery voltage selection mode.

or To toggle between 12 and 24 VDC.

12-volt models **B t 1 2**

24-volt models **B t 2 4**

To enter communications selection mode.

or To set the communications parameter. (See Figure 8.) **C n 0 *x***

To enter SAVE mode. **Go to Figure 12.** **S A V E**

Note: Be sure to save your settings before exiting the configuration mode. The controller reverts to the last *saved* settings when the master switch is moved to the OFF/RESET position.

Note: Shaded boxes show which number in the controller display changes when the up or down arrow key is pressed. *x* denotes any number from 0 to 9.

Figure 11 Advanced Configuration Mode (engine data input types, battery voltage, and engine communications)

There are 3 options when the display says SAVE: **S A V E**

Press:

To return to the first parameter to check or change settings before saving. See Figure 10. **U u 0 *x***

or

To save changes. **Y E S**

or

To discard changes without saving. **n o**

"Yes"or "no" flashes when the up or down arrow is pressed and then the controller exits the configuration mode. The display returns to the runtime hours. ***x x x x***

Now move the master switch to OFF/RESET.

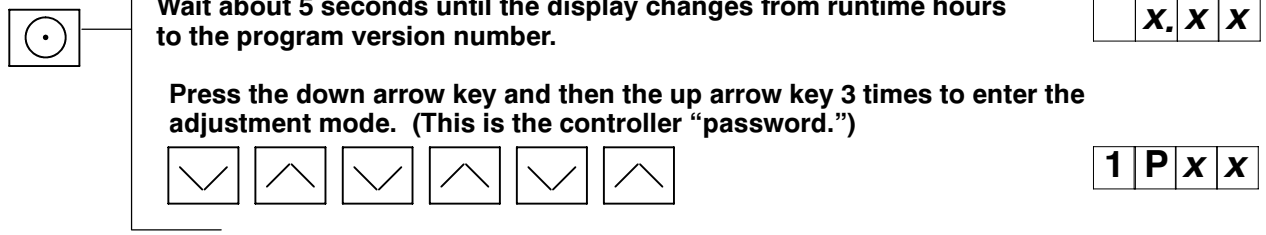
* *x* in the runtime hours display above denotes any number from 0 to 9.

Figure 12 Save Mode (after configuring generator set parameters)

Output Voltage and Frequency Adjustment Mode

Display :*

Move the generator set master switch to the RUN position. The generator set engine starts and the controller display shows the engine runtime hours.



The controller is now in the voltage coarse adjustment mode.

Press: **Display :***

▽ or △ To raise or lower the voltage in large increments (approximately 5–7 volts per step).	1 P x x
⊙ To enter fine voltage adjustment mode.	1 P x x
▽ or △ To raise or lower the voltage in smaller increments (approximately 0.5–0.7 volts per step).	
⊙ To enter coarse voltage stability (gain) adjustment mode.	2 P x x
▽ or △ To raise or lower the voltage stability (gain) in large increments.	

Continued on Figure 14.

* *x* in the examples above denotes any number from 0 to 9. The actual values may vary from model-to-model. Shaded boxes show which character in the controller display changes for each adjustment.

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Figure 13 Output Voltage and Frequency Adjustments

Continued from Figure 13:

Press:		Display : *
⊙	To enter fine voltage stability (gain) adjustment mode.	2 P *x* *x*
﹀ or ﹀	To raise or lower the voltage stability (gain) in smaller increments.	
⊙	To enter volts/Hz adjustment mode.	3 P 0 *x*
﹀ or ﹀	To raise or lower the volts/Hz: 00=low; 09= high	
⊙	To enter engine governor speed coarse adjustment mode.	4 P *x* *x*
﹀ or ﹀	To raise or lower the engine speed in large increments.	
⊙	To enter engine governor speed fine adjustment mode.	4 P *x* *x*
﹀ or ﹀	To raise or lower the engine speed in smaller increments.	
⊙	To enter engine governor stability (gain) coarse adjustment mode.	5 P *x* *x*
﹀ or ﹀	To raise or lower the engine governor stability (gain) in large increments.	
⊙	To enter engine governor stability (gain) fine adjustment mode.	5 P *x* *x*
﹀ or ﹀	To raise or lower the engine governor stability (gain) in smaller increments.	
⊙	To enter SAVE mode. **Go to Figure 12.**	S A V E

Note: Be sure to save your settings before exiting the adjustment mode. The controller reverts to the last *saved* settings when the master switch is moved to the OFF/RESET position.

***** Shaded boxes show which character in the controller display changes for each adjustment. *x* in the examples above denotes any number from 0 to 9. The actual values may vary from model-to-model.

Figure 14 Output Voltage and Frequency Adjustments, Continued

Parts Lists

Controller, ADC 2100 Service Replacement

Kit: GM34969		
Qty.	**Description**	**Part Number**
1	Controller Assy ADC 2100	GM28707
1	TT Program Loader Software	TT-1285
1	TT ADC 2100 Controller Replacement	TT-1364

Controller, ADC 2100 Service Replacement for Model 5/7.3ECD and 4/6EFCD

Kit: GM48031		
Qty.	**Description**	**Part Number**
1	Controller Assy ADC 2100	GM47982
1	TT Program Loader Software	TT-1285
1	TT ADC 2100 Controller Replacement	TT-1364

Controller, ADC 2100 Service Replacement for 20EORZD spec number GM38880-SA1

Kit: GM46826		
Qty.	**Description**	**Part Number**
1	Controller Assy ADC 2100	GM42037
1	TT Program Loader Software	TT-1285
1	TT ADC 2100 Controller Replacement	TT-1364

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