INSTALLATION INSTRUCTIONS

Original Issue Date: **8/04**
Model: **20–2000 kW Generator Sets**
Market: **Industrial**
Subject: **Decision-Maker® 340 Controller Circuit Board Service Kits GM37440, GM37441, and GM94042**

Introduction

The controller circuit board service kits replace the circuit boards shown in Figure 1. See Figure 2 for identification of the controller and Figure 3 for location and descriptions of the controller circuit boards.

Items Required

The following equipment is required to calibrate the generator set after a new circuit board is installed.

- Resistive load bank rated for the generator set standby rating
- RMS voltmeter and ammeter (some load banks may include metering)
- TP-5829 or MP-5829 controller operation manual
- An approved grounding wrist strap (see Safety Precaution notice)

Read the entire installation procedure and compare the kit parts with the parts list in this publication before beginning installation. Perform the steps in the order shown.

Always observe applicable local and national electrical codes.

Service Kit Part Number	Circuit Board Part Number	Circuit Board Description
GM37440	A–352166	Input conditioner/aux.
GM37441	A–352160	Interconnection
GM94042	A–352162	Main logic

Figure 1 Circuit Board Service Kits

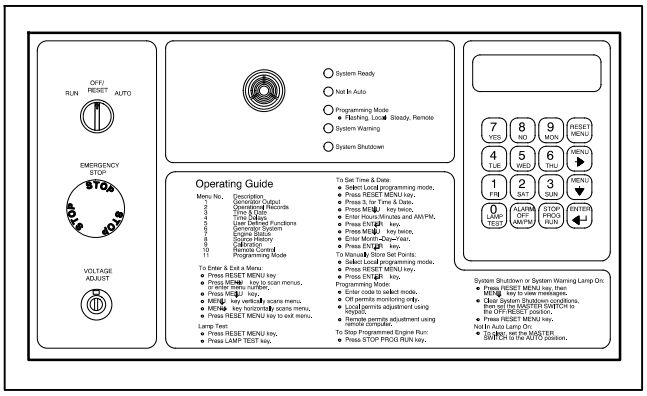
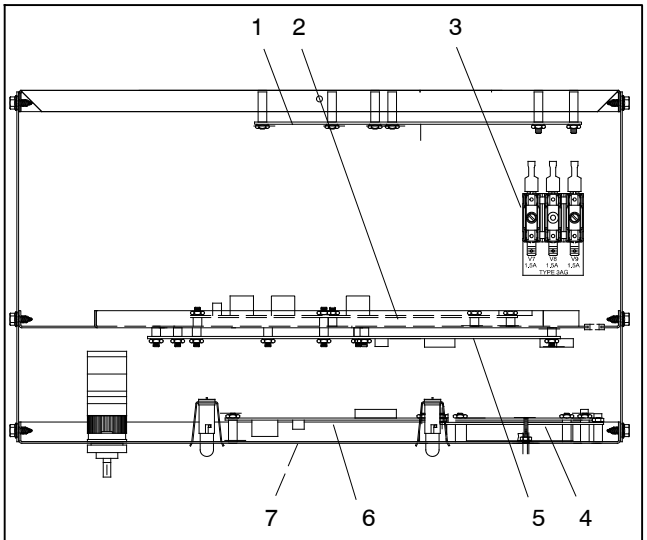


Figure 2 340 Controller Front View



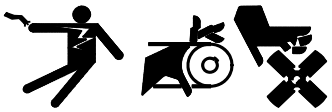
1. **Interconnection circuit board** (TB1, TB2, TB3, and TB4 terminal strips)
2. **Input conditioner/aux. circuit board**
3. AC fuse block
4. Keypad and digital display circuit boards
5. **Main logic (microprocessor) circuit board** with F1, F2, and F3 fuses
6. Indicator circuit board (LED and alarm horn)
7. Optional communication circuit board (below indicator board)

Figure 3 Controller Circuit Boards and Fuses, Controller Top View

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.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocution is possible whenever electricity is present. Open the main circuit breakers of all power sources before servicing the equipment. Configure the installation to electrically ground the generator set and related equipment and electrical circuits to comply with applicable codes and standards. Never contact electrical leads or appliances when standing in water or on wet ground because these conditions increase the risk of electrocution.

Connecting the battery and the battery charger. Hazardous voltage can cause severe injury or death. Reconnect the battery correctly, positive to positive and negative to negative, to avoid electrical shock and damage to the battery charger and battery(ies). Have a qualified electrician install the battery(ies).

Short circuits. Hazardous voltage/current can cause severe injury or death. Short circuits can cause bodily injury and/or equipment damage**.** Do not contact electrical connections with tools or jewelry while making adjustments or repairs. Remove all jewelry before servicing the equipment.

NOTICE

Electrostatic discharge damage. Electrostatic discharge (ESD) damages electronic circuit boards. Prevent electrostatic discharge damage by wearing an approved grounding wrist strap when handling electronic circuit boards or integrated circuits. An approved grounding wrist strap provides a high resistance (about 1 megohm), *not a direct short*, to ground.

Installation Procedure

1. Acquire the display data from Menu 6, Generator System.

When possible, make note of the data from the existing controller for entry with the new circuit board(s).

If the existing controller is not functional, the installer **must** determine and document this information for entry later in this procedure.

See the appendix for the controller User-Defined Settings form for default settings.

1.1 Press the Reset Menu key on controller keypad.

1.2 Go to Menu 6, Generator System and press the down arrow key to System Voltage. See Figure 4. Record all data from each display.

2. Remove the generator set from service.

2.1 Place the generator set master switch in the OFF position.

2.2 Disconnect the power to the battery charger, if equipped.

2.3 Disconnect the generator set engine starting battery(ies), negative (-) lead first.

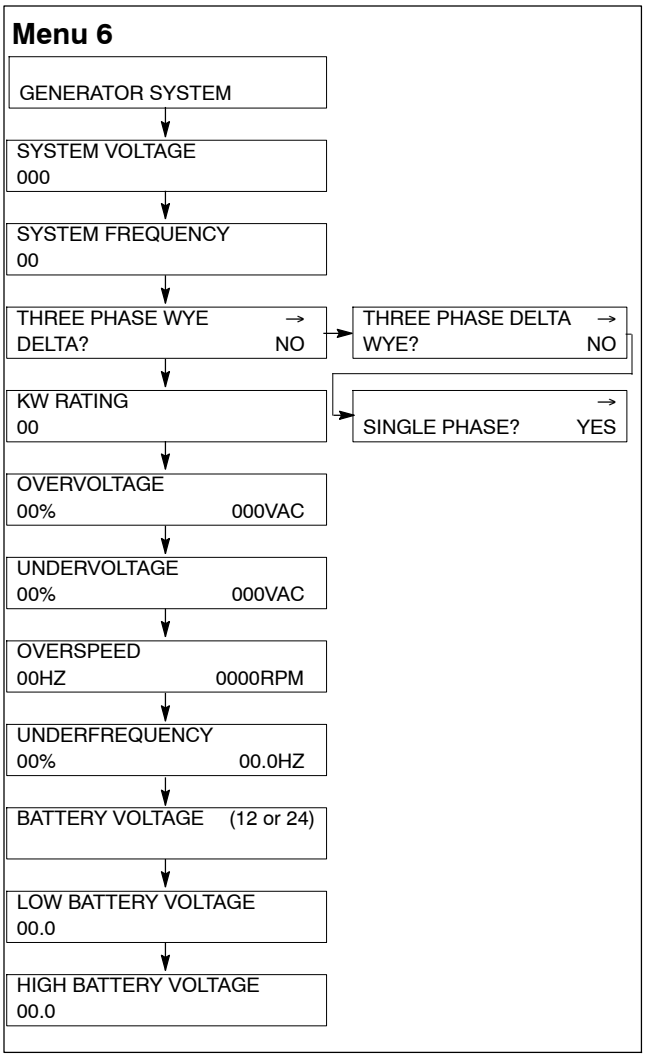


Figure 4 Menu 6, Generator System

3. Open the controller.

3.1 Remove the controller cover and hardware.

3.2 Partially disassemble the controller box. Remove the two controller panel top screws and center bottom screw and then loosen the bottom screw on each side to swing the controller panel down.

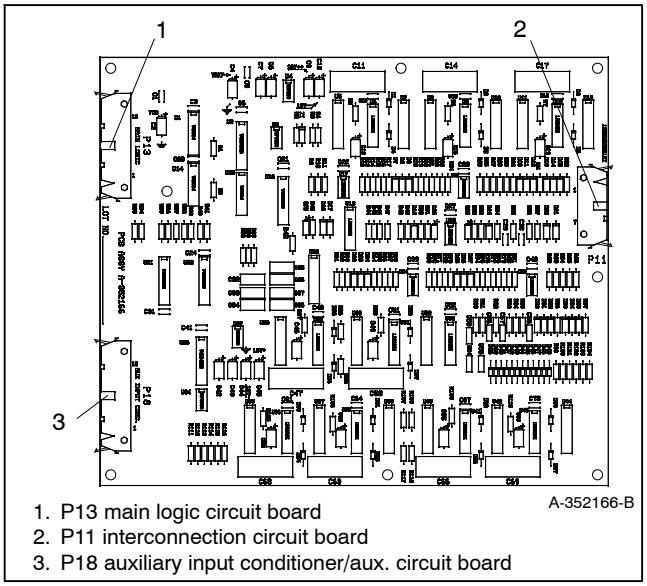
4. Remove the controller circuit board external electrical connections.

Remove items mentioned in step 4.1 input conditioner/aux. circuit board A-351166, 4.2 interconnection circuit board A-352160, and/or 4.3 main circuit board A-352160 as needed.

Note: Clearly mark all disconnected leads from the 340 controller with tape to simplify reconnection.

4.1 Input conditioner/aux. circuit board A-352166. See Figure 5.

- P11 interconnection circuit board 14-pin connector
- P13 main logic circuit board 24-pin connector
- P18 input conditioner/aux. circuit board 26-pin connector

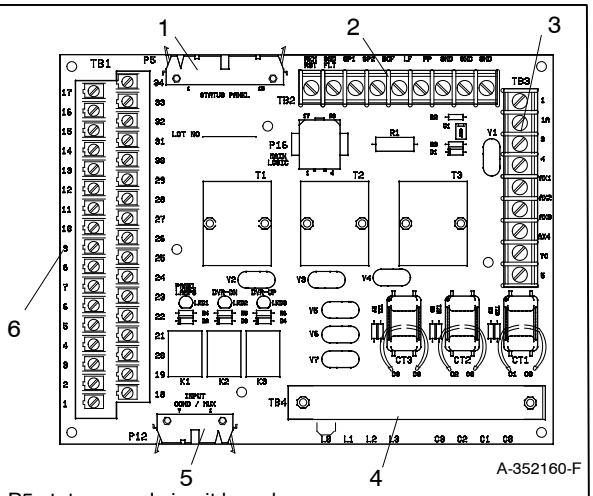


1. P13 main logic circuit board
2. P11 interconnection circuit board
3. P18 auxiliary input conditioner/aux. circuit board

Figure 5 Input Conditioner Circuit Board A-352166

4.2 Interconnection circuit board A-352160. See Figure 6.

- P5 status panel circuit board 30-pin connector
- P12 input conditioner/aux. circuit board 14-pin connector
- TB1 terminal strip connections
- TB2 terminal strip connections
- TB3 terminal strip connections
- TB4 terminal strip connections

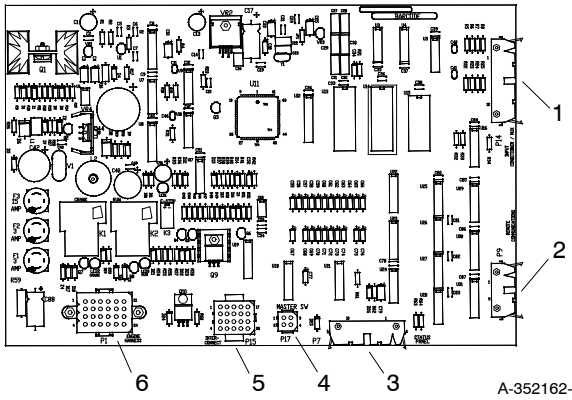


1. P5 status panel circuit board
2. TB2 terminal strip connections
3. TB3 terminal strip connections
4. TB4 terminal strip connections
5. P12 input conditioner/aux. circuit board
6. TB1 terminal strip connections

Figure 6 Interconnection Circuit Board A-352160

4.3 Main logic circuit board A–352162. See Figure 7.

- P1 engine harness connection
- P7 status panel connection
- P9 remote communications connection
- P14 input conditioner/aux. connection
- P15 interconnection connection
- P17 master switch connection



1. P14 input conditioner/aux. connection
2. P9 remote communications connection
3. P7 status panel connection
4. P17 master switch connection
5. P15 interconnect connection
6. P1 engine harness connection

Figure 7 Main Logic Circuit Board A-352162

5. Remove/replace the circuit board(s) from the controller.

5.1 Observe proper circuit board grounding practices. See NOTICE in safety precautions section.

5.2 Remove the mounting hardware.

5.3 Remove the defective circuit board(s).

5.4 Install the new circuit board(s) in the same position as that of the old circuit board(s).

5.5 Secure the new circuit board(s) using the existing hardware.

6. Attach the controller circuit board(s) external electrical connections.

Reconnect the items mentioned in step 6.1 input conditioner/aux. circuit board A-351166, 6.2 interconnection circuit board A-352160, and/or 6.3 main logic circuit board A-352162 as needed.

6.1 Input conditioner/aux. circuit board A-352166. See Figure 5.

- P11 interconnection circuit board 14-pin connector
- P13 main logic circuit board 24-pin connector
- P18 input conditioner/aux. circuit board 26-pin connector

6.2 Interconnection circuit board A-352160. See Figure 6.

- P5 status panel circuit board 30-pin connector
- P12 input conditioner/aux. circuit board 14-pin connector
- TB1 terminal strip connections
- TB2 terminal strip connections
- TB3 terminal strip connections
- TB4 terminal strip connections

6.3 Main logic circuit board A-352162. See Figure 7.

- P1 engine harness connection
- P7 status panel connection
- P9 remote communications connection
- P14 input conditioner/aux. connection
- P15 interconnection connection
- P17 master switch connection

7. Assemble the controller.

7.1 Swing the front controller panel up and replace and tighten the screws, as necessary.

7.2 Replace the controller cover and hardware. Tighten all controller screws.

8. Restore power to the generator set.

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

8.2 Reconnect the generator set engine starting battery, negative (–) lead last.

8.3 Reconnect power to the battery charger, if equipped.

9. Initialize the EEPROM (Menu 20).

Note: Refer to the controller operation manual TP-5829 or MP-5829 as needed.

9.1 Press the Reset Menu key, enter 20, and press the Down Arrow key to go to Menu 20, Setup. See Figure 8.

9.2 Press the Down Arrow key until Version No. #.## appears.

9.3 Press the Right Arrow key and the screen displays *INITIALIZE EEPROM*.

9.4 Press the Enter key and the display will flash *STORE SET-POINTS* and will then go back to showing *VERSION NO. #.##*.

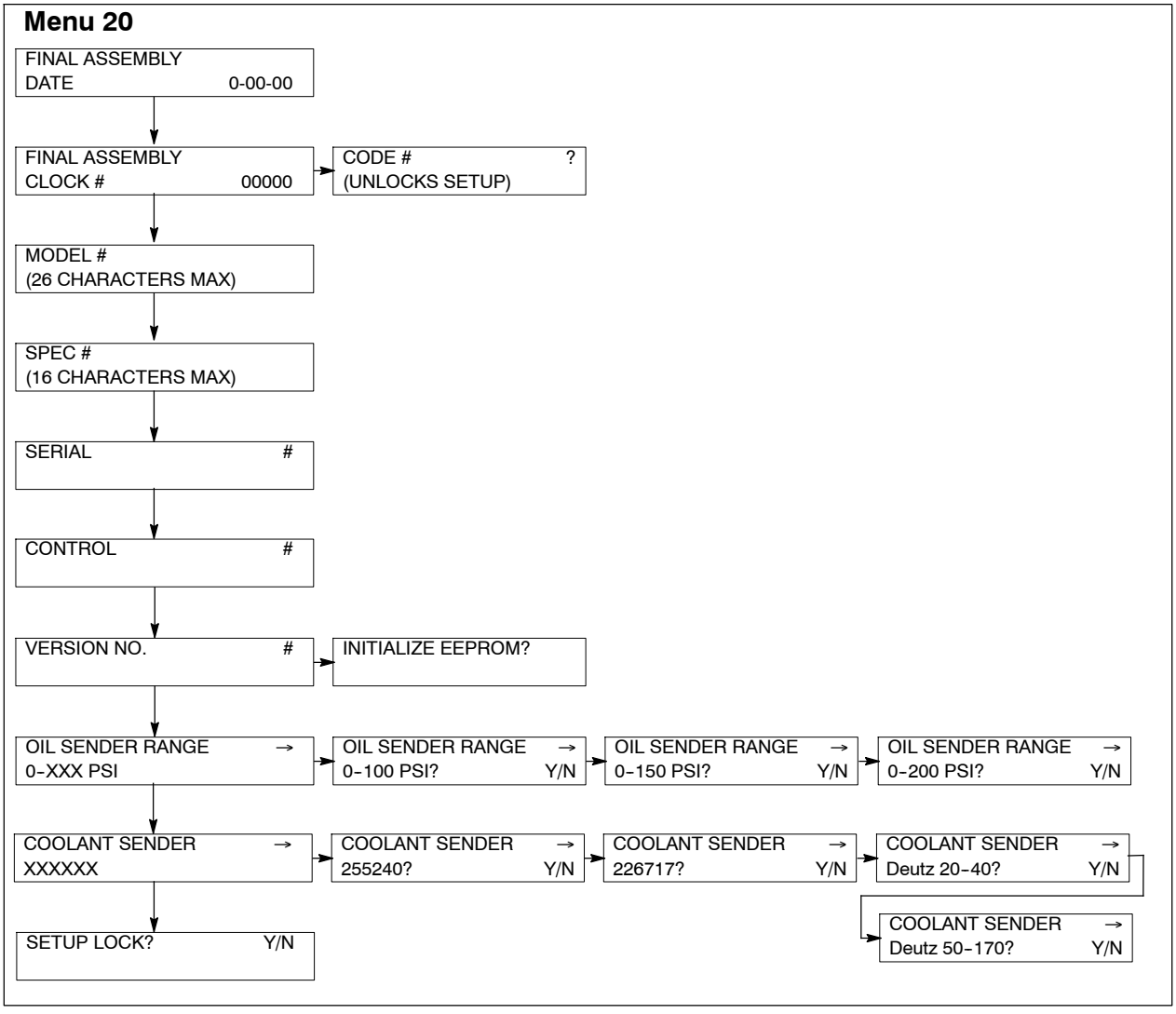


Figure 8 Menu 20 Setup

10. Set the programming mode (Menu 11).

Note: Refer to the controller operation manual TP-5829 or MP-5829 as needed.

10.1 Press the Reset Menu key, enter 11, and press the Enter key to go to Menu 11, Programming Mode. See Figure 9.

10.2 Press the Down Arrow key to Programming Mode.

If Programming Mode—Local is shown, go to step 11.

If Programming Mode—Local is NOT shown, press the Right Arrow key to select Local. Press YES and the Enter key.

10.3 Enter the access code. The factory default access code is the number 0. Press the Enter key.

11. Verify the generator set system values.

Note: Refer to the controller operation manual TP-5829 or MP-5829 as needed.

11.1 Press the Reset Menu key, enter 6, and press the Enter key to go to Menu 6, Generator System.

11.2 Press the Down Arrow key to System Voltage.

11.3 Use the numeric and/or YES/NO keys and then press the Enter key to add the data to each corresponding display shown in Figure 4. Press the Down Arrow key to access the next display. Use the Right Arrow key for the three-phase/ single-phase entry.

Note: During Step 1 the user should have recorded the values for Menu 6. The user must define these values for purposes of calibrating the controller.

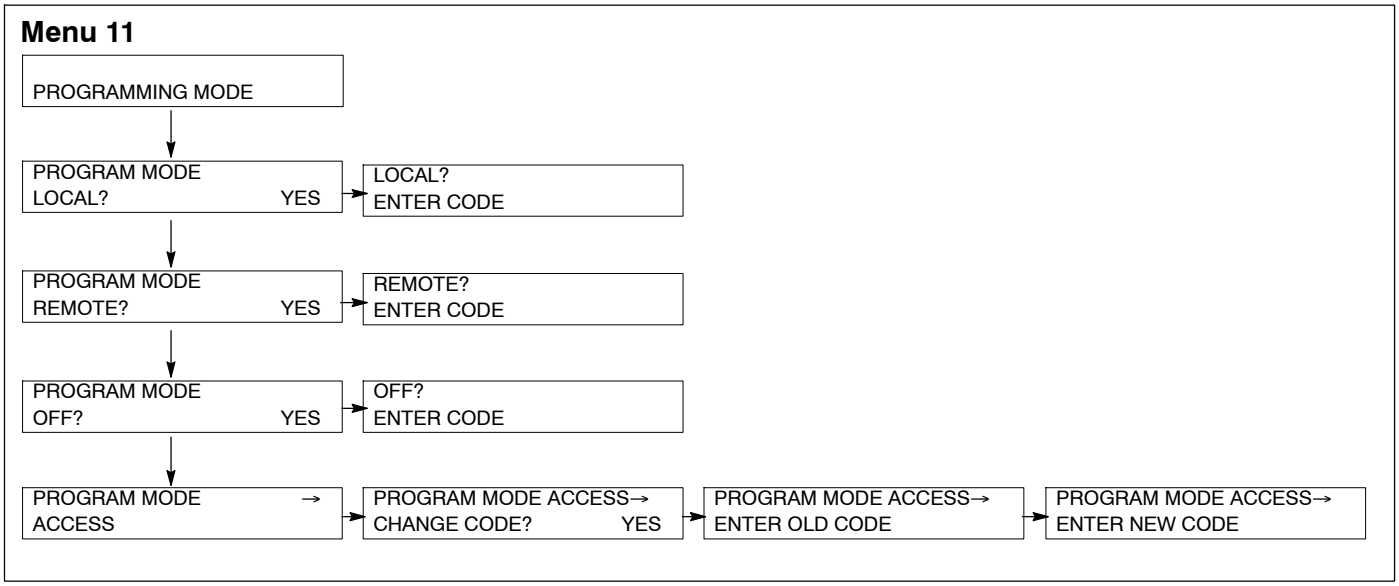


Figure 9 Menu 11, Programming Mode

12. Calibration procedure.

Note: Refer to the controller operation manual TP-5829 or MP-5829 as needed for generator set starting and stopping procedures.

12.1 Verify that the controller master switch is in the OFF position.

12.2 Press the Reset Menu key, enter 9, and press the Enter key to go to Menu 9, Calibration. See Figure 10.

12.3 Press the Down Arrow key to the *AUTO-ZERO?* display.

12.4 Press YES and the Enter key.

12.5 Connect a resistive load bank to the generator set output leads. The load bank must be rated for the generator set standby nameplate rating.

If the resistive load bank does not have metering, connect an RMS voltmeter and ammeter to each corresponding generator set output lead connection under calibration.

12.6 Place the controller master switch to the RUN position to start the generator set. Allow the generator set to run for 5–10 minutes to reach operating temperature.

12.7 Record the L1–L2 voltage from the resistive load bank or connect an RMS voltmeter to L1–L2 output leads if the resistive load bank is not meter equipped.

12.8 Press the Down Arrow key to L1–L2 Volts. Use the numeric keys to enter the user measured value. Press the Enter key.

12.9 Record the voltage on the resistive load bank or connect an RMS voltmeter to each of the remaining voltage connections shown in Figure 10. Use the numeric keys to enter the user measured value of each of the corresponding voltage displays. Press the Enter key. Press the Down Arrow key to access the next display.

12.10 Record the amps from the resistive load bank or connect an RMS ammeter to each of the amperage connections shown in Figure 10. Use the numeric keys to enter the user measured value of each of the corresponding amp. displays. Press the Enter key. Press the Down Arrow key to access the next display.

12.11 Press the Down Arrow key to access the *RESISTIVE LOAD?* display.

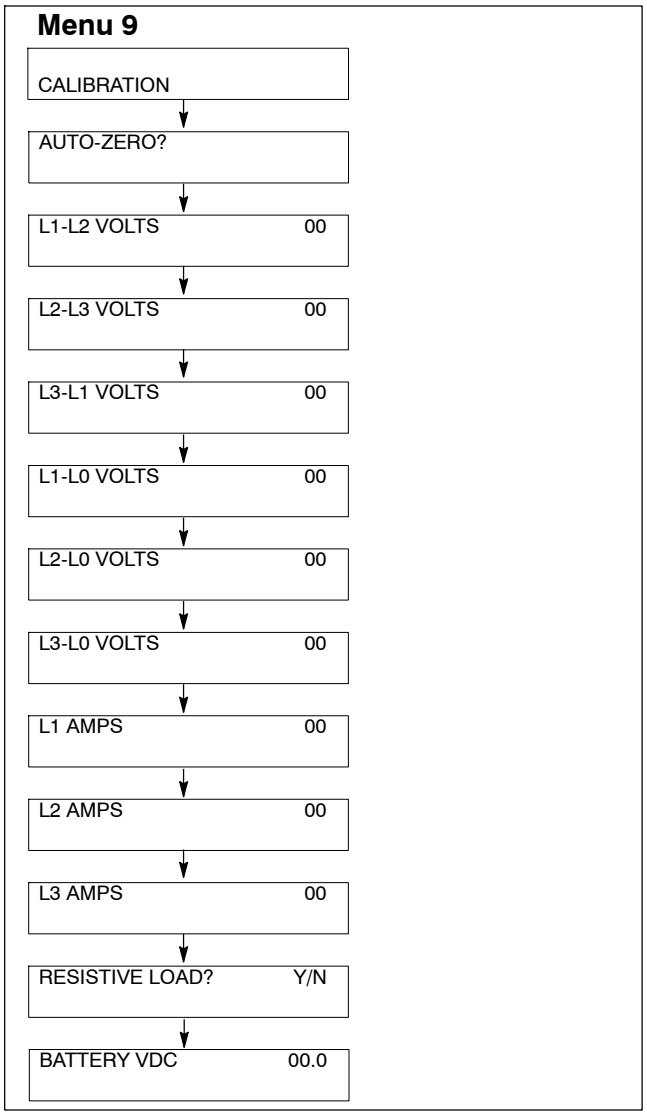


Figure 10 Menu 9, Calibration

12.12 Press Yes and the Enter key.

Note: Enter only a Yes response and apply only a purely resistive load. Failure to comply with this request will cause incorrect kW load and power factor values.

12.13 Press the Down Arrow key to access the *BATTERY VDC* display.

12.14 Use the numeric keys to enter the measured engine electrical system voltage. Press the Enter key.

12.15 Press the Reset Menu key.

12.16 Press the Enter key. The display indicates *STORE SET POINTS*. Wait until display changes to *ENTER MENU 1-14*.

12.17 Place the controller master switch to the OFF position to stop the generator set.

13. Enter the Menu 3, Time and Date, settings.

13.1 Press the Reset Menu key, enter 3, and press the Enter key to go to Menu 3, Time and Date. See Figure 11.

13.2 Use the information from the controller operation manual as necessary to set the time and date.

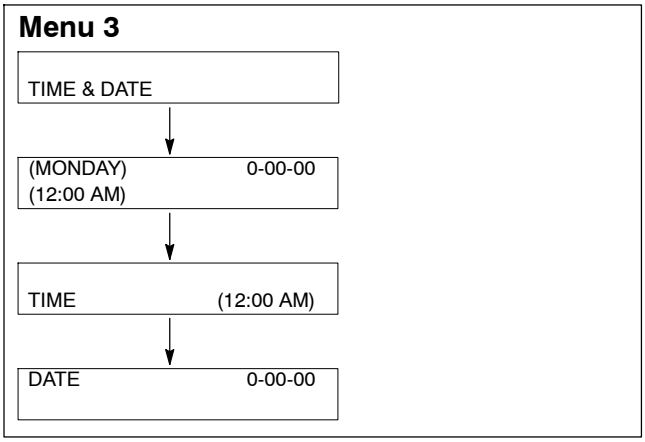


Figure 11 Menu 3, Time and Date

14. Restore the generator set to service.

14.1 Perform the Menu 10, Remote Control entries.

14.1.1 Press the Reset Menu key, enter 10, and press the Enter key to go to Menu 10, Remote Control.

14.1.2 With the information previously recorded from Step 1, complete the communication entries as necessary for the application. Use the information from the controller operation manual as necessary.

14.2 Perform the Menu 11, Programming Mode entries.

14.2.1 Press the Reset Menu key, enter 11, and press the Enter key to go to Menu 11, Programming Mode.

14.2.2 Change the entries for the application as necessary.

14.3 The generator set system is now ready to function.

14.4 Move the generator set master switch to AUTO for startup by remote transfer switch or remote start/stop switch.

Parts List

Controller Circuit Board Service Kits

Kit: GM37440		
Qty.	**Description**	**Part Number**
1	Input conditioner/aux. circuit board	A-352166
1	Installation Instructions	TT-1391
Kit: GM37441		
Qty.	**Description**	**Part Number**
1	Interconnection circuit board	A-352160
1	Installation Instructions	TT-1391
Kit: GM94042		
Qty.	**Description**	**Part Number**
1	Main logic circuit board	A-352162
1	Installation Instructions	TT-1391

Appendix A User-Defined Settings

Use the table below to record user-defined settings during the generator set controller setup and calibration. The controller default settings and ranges provide guidelines. The table contains all faults with ranges and time delays including items that do not have adjustments.

Status or Fault	Refer to Menu	Digital Display	Relay Driver Output (RDO)	Range Setting	Default Selection	Inhibit Time Delay* (sec.)	Time Delay (sec.)	User-Defined Settings
Access Code (Password)	11				0 (zero)			
Cyclic Cranking	4			1–6 crank cycles 1–60 sec. crank 1–60 sec. pause	3 15 sec. 15 sec.			
Coolant Temperature Signal Loss	5	No Temp Gauge Signal	User Defined			30		
Customer Auxiliary 1–4 Shutdown or Warning	4, 5	Auxiliary 1–4	User Defined		30 sec. inhibit, 5 sec. delay	0–60	0–60	Not adjustable
Emergency Power System Supplying Load	5	EPS Supplying Load	RDO—8		5% of line current			
High Battery Voltage	5, 6	High Battery Voltage	RDO—10	14.5–16.5 (12V) 29–33 (24V)	16 (12V) 32 (24V)		10	
High Coolant Temperature Shutdown	5	High Coolant Temperature	Std.			30	5	Not adjustable
High Coolant Temperature Warning	5	High Coolant Temperature Warning	Std.			30		Not adjustable
High Oil Temperature Shutdown	5	High Oil Temperature	User Defined			30	5	Not adjustable
kW Overload (Load Shed)								
Load Shed	5	Load Shed KW Overload	User Defined		100% of kW Rating		5	
		Load Shed Underfrequency	User Defined		59, (60 Hz) 49, (50 Hz)		5	
Low AC Output	5	Low AC Output	User Defined			10		
Low Battery Voltage	5, 6	Low Battery Voltage	Std.	10–12.5 (12V) 20–25 (24V)	12 (12V) 24 (24V)		10	
Low Coolant Level Shutdown	5	Low Coolant Level	RDO—7			30	5	Not adjustable
Low Oil Pressure Shutdown	5	Low Oil Pressure	Std.			30	5	Not adjustable
Low Oil Pressure Warning	5	Low Oil Pressure Warning	Std.			30		Not adjustable
Overcrank Shutdown	5	Overcrank	Std.					
Overcurrent	5	Overcurrent	User Defined		110%		10	
Overfrequency Shutdown	5, 6	Overfrequency	User Defined	102%–140%	140% Std. 103% FAA		10	

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Status or Fault	Refer to Menu	Digital Display	Relay Driver Output (RDO)	Range Setting	Default Selection	Inhibit Time Delay* (sec.)	Time Delay (sec.)	User-Defined Settings
Overspeed Shutdown	5, 6	Overspeed	Std.	65–70 (60 Hz) 55–70 (50 Hz)	70 (60 Hz) 70 (50 Hz)		0.25	
Oil Pressure Signal Loss	5	No Oil Gauge Signal	User Defined			30		Not adjustable
Overvoltage Shutdown	5, 6	Overvoltage	RDO—6	105%–135%	115% 2-sec time delay		2–10	
Password (Access Code)					0 (zero)			
Starting Aid Function	4, 5		User Defined	0–10 sec.				
Time Delay Engine Cooldown (TDEC)	4		RDO—4	00:00–10:00 min:sec	5:00			
Time Delay Engine Start (TDES)	4		User Defined	00:00–5:00 min:sec	00:01			
Underfrequency Shutdown	5, 6	Underfrequency	User Defined	80%–95%	90%		10	
Undervoltage Shutdown	5, 6	Undervoltage	User Defined	70%–95%	85% 10-sec time delay		5–30	
Weak Battery	5	Weak Battery	User Defined		60%		2	

* Inhibited time delay is the time delay period after crank disconnect.

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.