

INSTALLATION INSTRUCTIONS

Original Issue Date: 4/02

Model: **Model K and Model S Programmable Transfer Switches and Bypass-Isolation Transfer Switches**

Market: **Transfer Switches**

Subject: **Programmable Input/Output (I/O) Module Kits GM21359-KP1 and Input/Output (I/O) Module Mounting Assembly Kits GM21360-KP1**

Introduction

This document provides assembly instructions for the programmable I/O module kit and installation instructions for the I/O module mounting assembly kit.

Note: A personal computer running the Setup Program is required to configure the I/O circuit board. Refer to the Setup Program Operation Manual to set up the I/O circuit board communications and to define the I/O circuit board inputs and outputs.

Programmable I/O module kit includes one I/O circuit board and the circuit board mounting components. See Figure 1. The I/O circuit board provides *two programmable inputs* and *six programmable outputs*. The programmable outputs are normally open and normally closed contacts in a form C configuration and rated 2 amps @ 30 VDC or 250 VAC. Up to four programmable I/O module kits can be installed on the transfer switch DIN mounting rail.

I/O module mounting assembly kit includes mounting pan, DIN rail, module cover, and interface harness for mounting the programmable I/O module kit. See Figure 2. The I/O module mounting assembly kit allows mounting for up to four I/O modules.

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

Tools Required

- Phillips screwdriver, No. 2
- Large slotted screwdriver (as needed)
- Small slotted screwdriver (as needed)
- Nutdriver or socket wrench, 7/16 in.
- Nutdriver or socket wrench, 3/8 in.

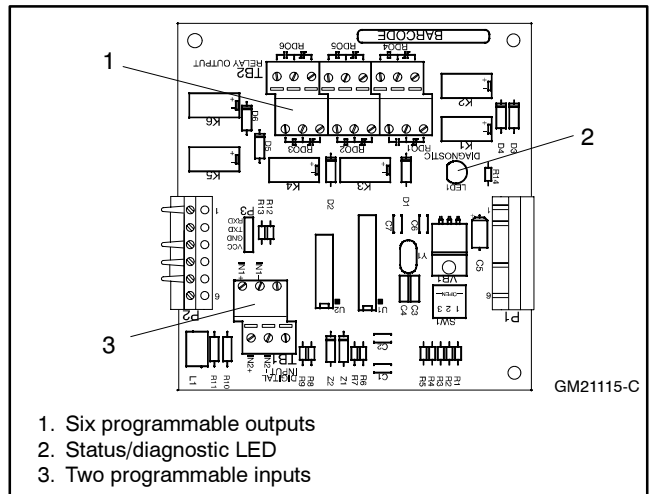


Figure 1 Programmable I/O Circuit Board

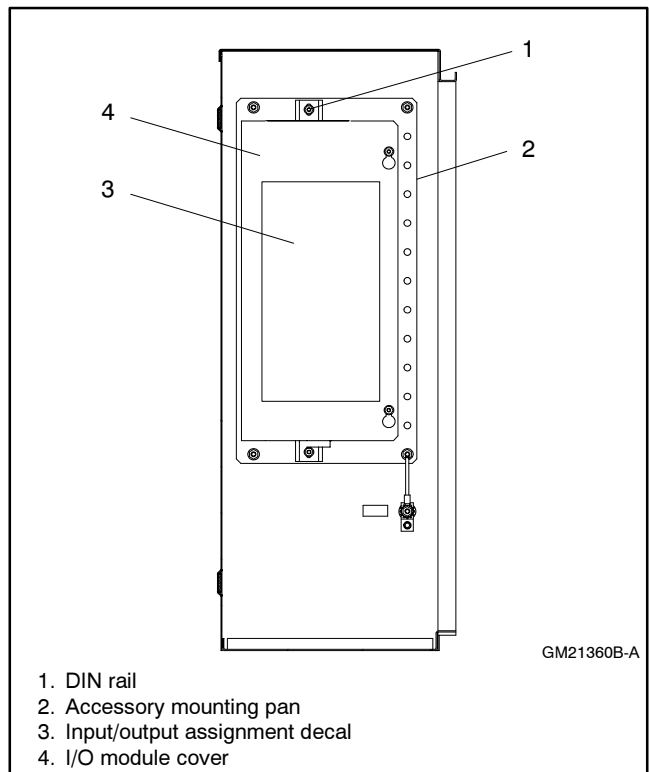
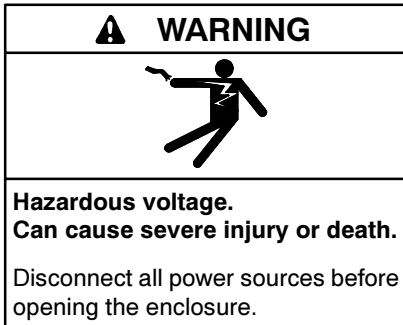


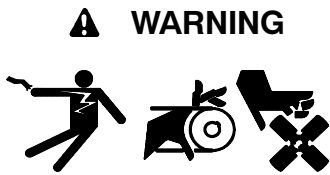
Figure 2 I/O Module Mounting Assembly Kit, Typical

Safety Precautions

Observe the following safety precautions during installation.



(600 volts and under)



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.

Grounding electrical equipment. Hazardous voltage can cause severe injury or death. Electrocutation 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, transfer switch, 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.

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.

Circuit Board Handling

Improper removal, installation, transportation, storage, or service can damage sensitive electronic components. Observe the following guidelines to prevent damage when working with circuit boards or electronic components.

Circuit Board and Electronic Component Handling

- Keep circuit boards or electronic components inside the antistatic, cushioned factory packaging until installation.
- Store circuit boards or electronic components in a clean environment away from moisture, vibration, static electricity, corrosive chemicals, and solvents.
- Disconnect all power sources before removing or installing circuit boards or electronic components.
- Wear an approved, grounded, antistatic wrist strap when handling circuit boards or electronic components.
- Carefully hold the circuit board by its edges and not by any of its components or electrical contacts.
- Do not drop the circuit board or electronic components.
- Do not bend the circuit board, electronic components, or electronic component leads.
- Do not strike the circuit board or electronic components using or against a hard object.
- Clean dusty or dirty circuit boards with a vacuum cleaner or soft, dry brush.
- Never attempt circuit board repairs, adjustments, or modifications other than replacing plug-in service parts or performing manufacturer-approved installation or service procedures.

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Installation Procedure

1. Remove the generator set and transfer switch from service

- 1.1 Place all generator set master switches in the OFF position.
- 1.2 Disconnect the power to all battery chargers, if equipped.
- 1.3 Disconnect all generator set engine starting battery(ies), negative (-) leads first.
- 1.4 Disconnect all power sources to transfer switches and power monitors.
- 1.5 Turn off and disconnect the power to all devices in the system.
- 1.6 Open the transfer switch enclosure.

2. Assemble the programmable I/O module kit GM21359-KP1

- 2.1 Place the 3 PC mounting modules (GM21332) side-by-side. Position all modules with the back mounting clips the same way. See Figure 3.
- 2.2 Install 4 PC mounting pins (GM21333) in one side of the first PC mounting module.
- 2.3 Align the PC mounting pins with the second PC mounting module and push together. The PC mounting modules also have small plastic locking pins that lock together.
- 2.4 Repeat steps 2.2 and 2.3 for the third PC mounting module.
- 2.5 Carefully install the I/O circuit board (GM21115) in the PC mounting module grooves as shown in Figure 3.
- 2.6 Align the I/O circuit board edge flush with the PC mounting module. Place the two screws (X-67-143) thru the I/O circuit board holes and thread into the PC mounting modules. See Figure 4.
- 2.7 Repeat step 2 for any additional programmable I/O module kits.

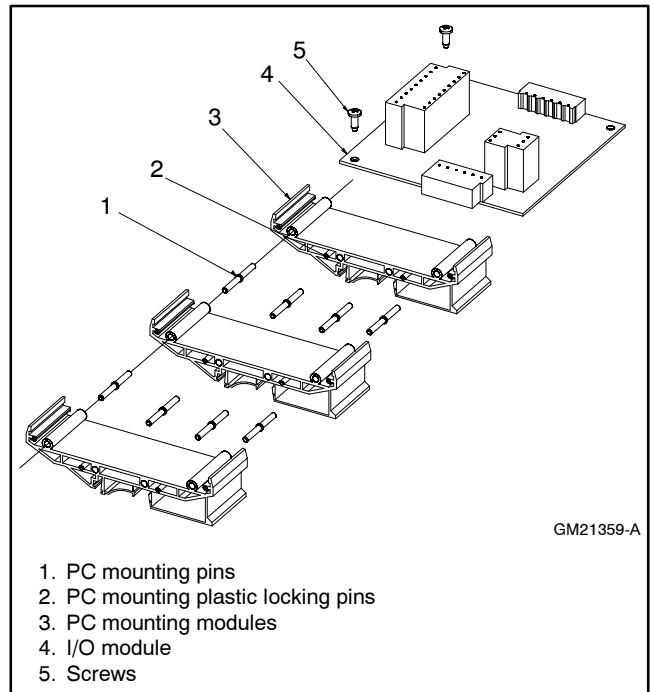


Figure 3 Assembling the I/O Module Kit

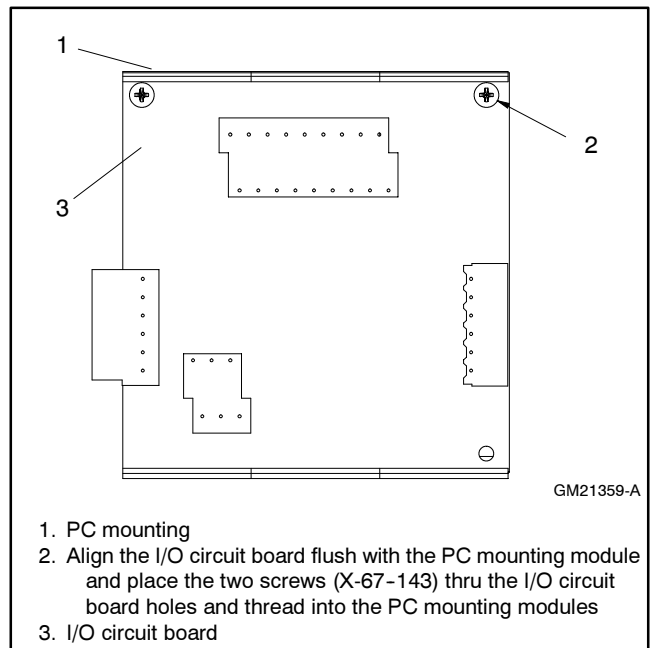


Figure 4 Installing the I/O Circuit Board to the PC Mounting Modules

3. Install the I/O module mounting assembly kit GM21360-KP1

- 3.1 See Figure 7 and determine the recommended mounting location. Location and position of the kit vary by transfer switch model.
- 3.2 Mount the accessory mounting pan (GM21330) to the transfer switch enclosure using four 1/4-20 nuts (X-6210-2). Position the accessory mounting pan as shown in Figure 7. Do not tighten nuts at this time.
- 3.3 Locate the studs positioned in the center of the accessory mounting pan. See Figure 5. Place the DIN rail (GM21328) with the slotted hole surface against the accessory mounting pan and secure with two 10-32 nuts (X-6210-1).

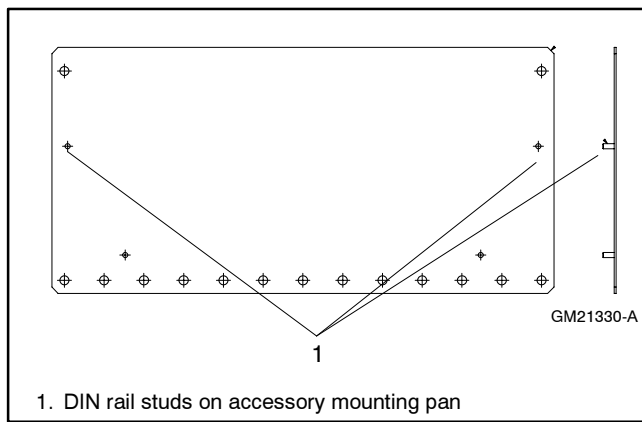


Figure 5 Installing Accessory Mounting Pan and DIN Rail

- 3.4 Install Programmable I/O Module No. 1 to the DIN rail in the position shown in Figure 6. Attach by tilting the I/O module slightly back and aligning the first index slot and then pushing the other side of the I/O module toward the DIN rail. See Figure 8.

Note: To remove the I/O module from the DIN rail, place a large slotted screwdriver in the groove of the I/O module as shown in Figure 9 and apply outward pressure to release the I/O module. Repeat for each PC mounting module.

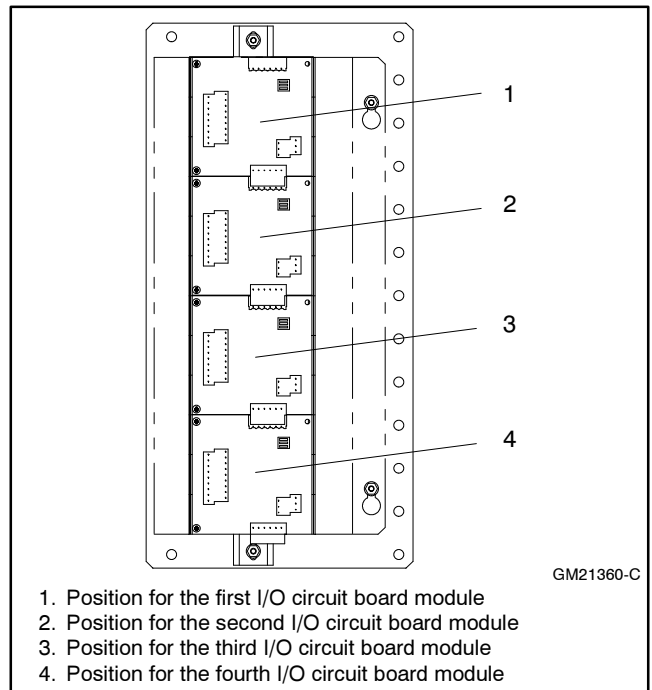


Figure 6 Mounting Position of I/O Circuit Board Module on DIN Rail

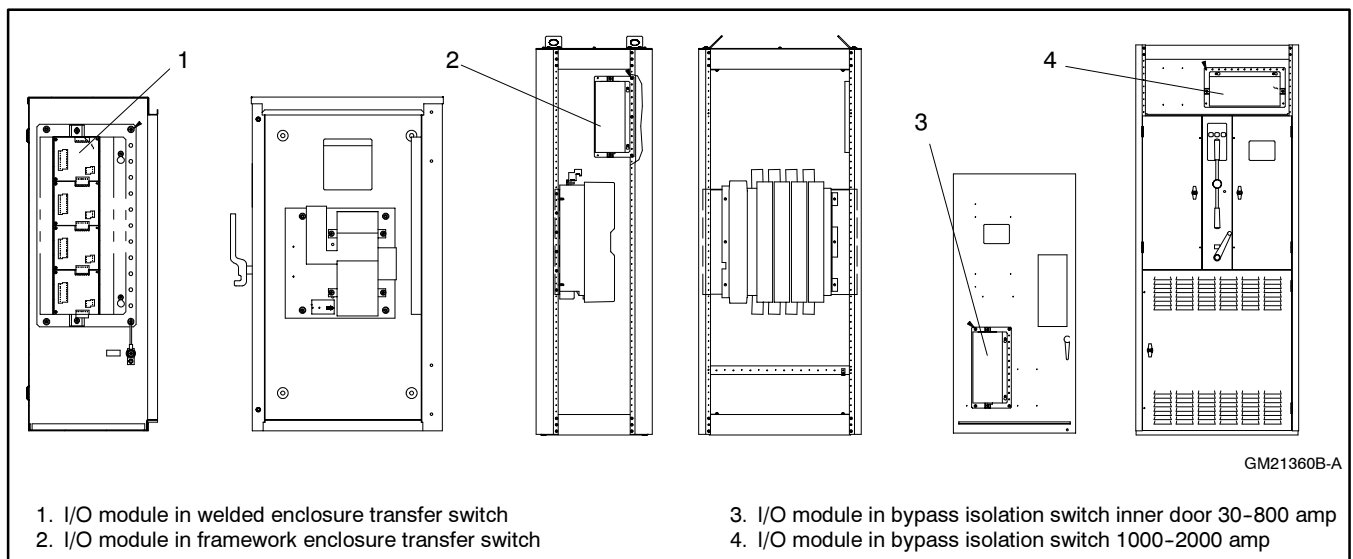


Figure 7 Accessory Mounting Pan Location and Position

- 3.5 Repeat step 3.4 for any additional Programmable I/O Module Kits. Refer to Figure 6 for positioning I/O modules Nos. 2-4.

After installing each of the remaining I/O modules on the DIN rail, slide each I/O module toward I/O module No. 1 to engage the mating electrical connectors.

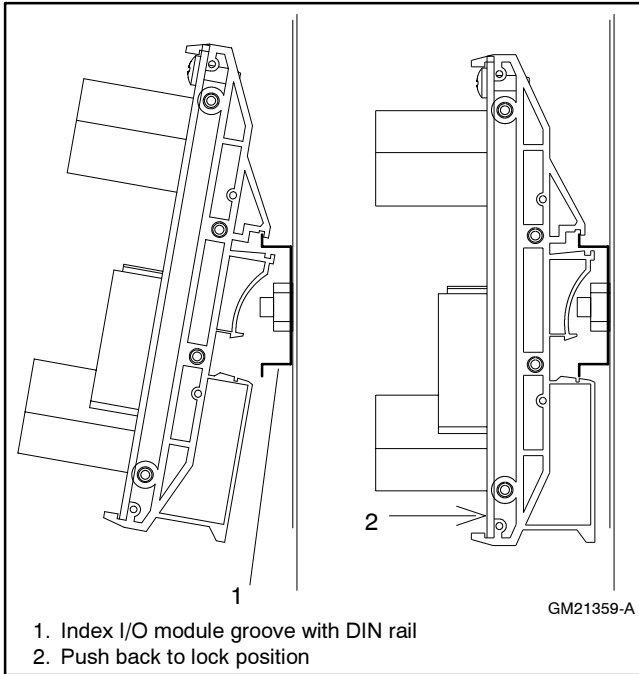


Figure 8 Installing I/O Circuit Board Module on DIN Rail

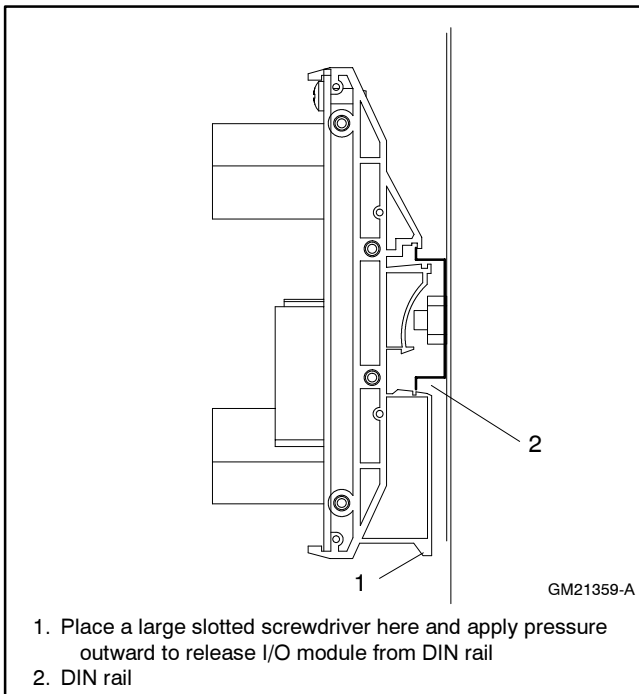


Figure 9 Removing the I/O Module from the DIN Rail

Note: To disengage the I/O modules mating connectors, carefully place a small slotted screwdriver between the plastic locking tabs and slide the I/O modules apart. See Figure 10.

4. Install the I/O module harness

- 4.1 Locate I/O module No. 1 and install the mating connector of I/O module harness (GM21341-2). See Figure 11.

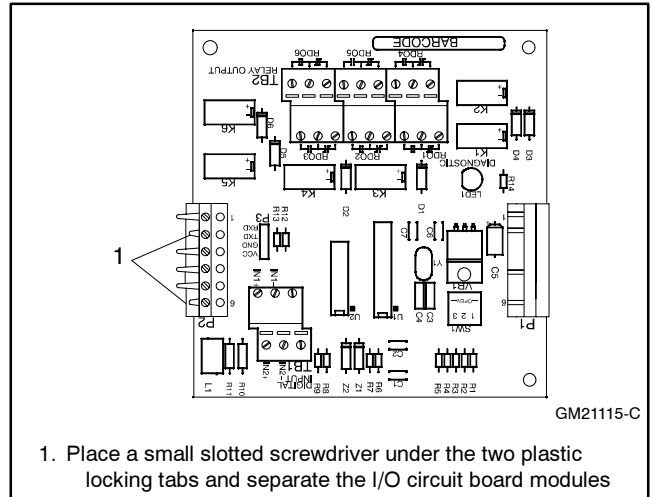


Figure 10 Separating the Circuit Board Modules at the Electrical Connectors

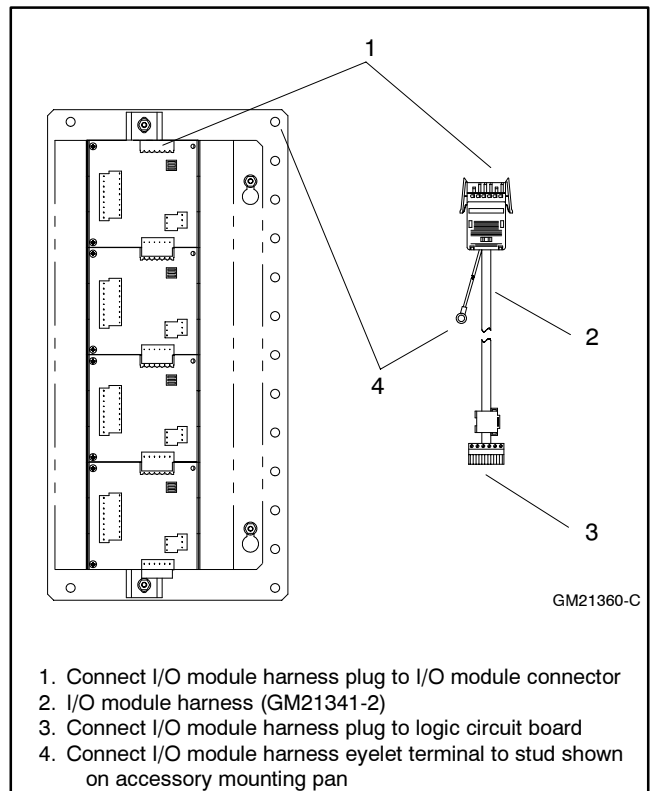


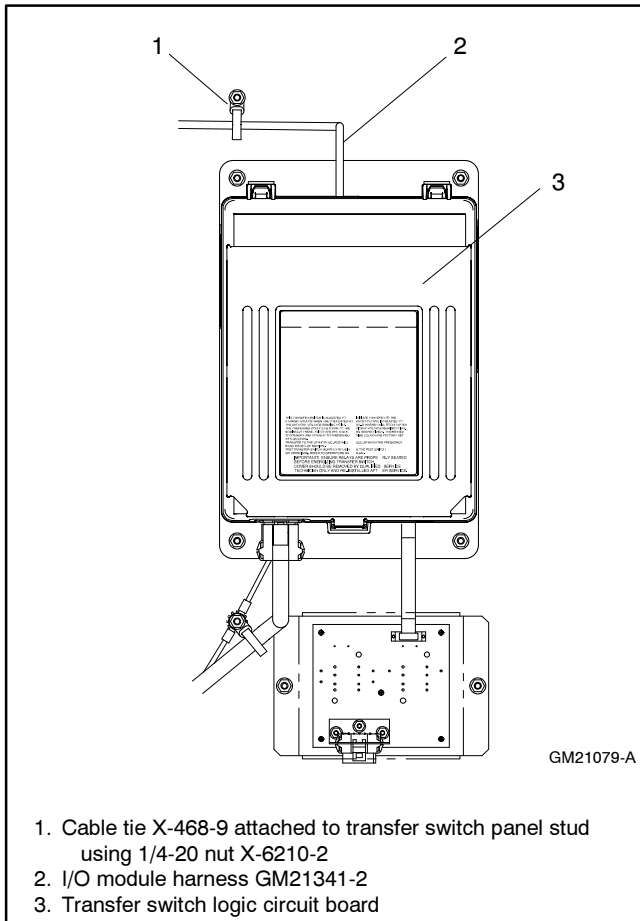
Figure 11 I/O Circuit Board Module Harness Connector and Ground Connection

- 4.2 Remove the nut from the accessory mounting pan stud as shown in Figure 11. Install the 1/4 in. int./ext. tooth lock washer (X-22-12), eyelet terminal from I/O module harness, 1/4 in. plain washer (X-25-40), and nut. Final tighten all four accessory mounting pan nuts.
- 4.3 Route and connect the other end of the I/O module harness to the transfer switch logic circuit board. See Figure 12.
- 4.4 Attach the cable tie (X-468-9) to I/O module harness and secure to the transfer switch panel stud using a 1/4-20 nut (X-6210-2).

5. Assign base addresses to the I/O circuit board modules

Each I/O module must have a unique base address in order to establish controller communication. Refer to Figure 6 for I/O module numbers based on position.

- 5.1 Set the DIP switches on I/O circuit board module No. 1 to base address No. 1 as shown in Figure 14 and Figure 15.



- 1. Cable tie X-468-9 attached to transfer switch panel stud using 1/4-20 nut X-6210-2
- 2. I/O module harness GM21341-2
- 3. Transfer switch logic circuit board

Figure 12 Connecting I/O Circuit Board Module Harness to Transfer Switch Logic Circuit Board

- 5.2 Repeat step 5.1 for the remaining I/O circuit board modules.

6. Select the respective programmable inputs and outputs

The I/O circuit board provides *two programmable inputs* and *six programmable outputs*.

Refer to the Setup Program Operation Manual to set up the I/O circuit board communications and to define the I/O circuit board inputs and outputs.

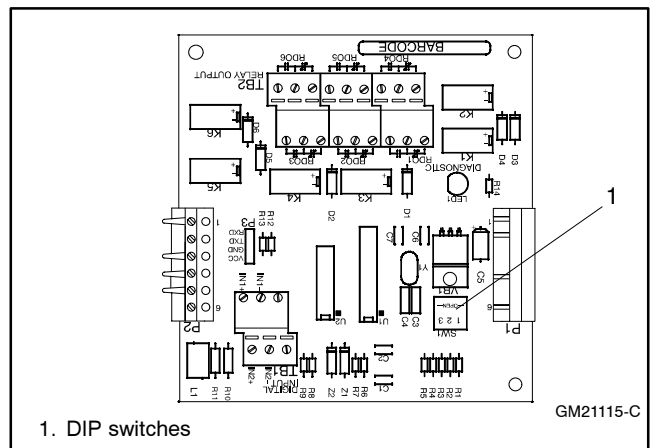
Refer to the wiring diagram provided with the transfer switch for input and output connections.

The programmable inputs require a 16 mA @ 12 VDC signal voltage. Use 18 gauge wire for the input wiring.

The programmable outputs are normally open and normally closed contacts in a form C configuration and rated 2 amps @ 30 VDC or 250 VAC. See Figure 13 for I/O circuit board module wire and terminal recommendations.

Component Connections	Number of Wires	Wire Size Range	Tightening Torque
Controller connection strip I/O terminals	1	#12-24 AWG	0.5 Nm (4.4 in. lbs.)
I/O circuit board terminals	1	#14-26 AWG	

Figure 13 Input/Output Connection Specifications



- 1. DIP switches

Figure 14 I/O Module DIP Switch Location

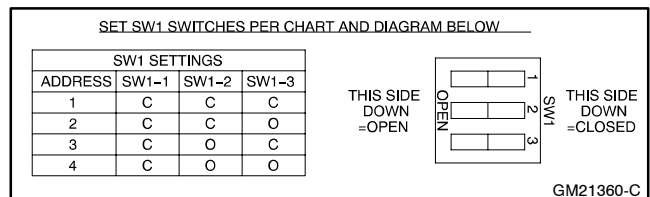


Figure 15 Assigning I/O Circuit Board Module Base Address on DIP Switches

6.1 Document the programmable input and output information on the decal (GM23621) for each I/O circuit board module address. See Figure 16.

Note: The decal may be shipped already attached to the I/O module cover.

7. Install I/O module cover

7.1 Use cable ties as necessary to secure and protect all input and output I/O module wiring.

7.2 Install the I/O module cover (GM21334) using two 10-32 nuts (X-6210-1). See Figure 17.

7.3 With surfaces clean and dry, attach the decal to the I/O module cover.

Note: The decal may be shipped already attached to the I/O module cover.

8. Restore the generator set and transfer switch to service

8.1 Close and secure the transfer switch enclosure.

8.2 Check that all generator set master switches are in the OFF position.

8.3 Reconnect the generator set engine starting battery(ies), negative (-) leads last.

8.4 Reconnect power to the battery charger, if equipped.

8.5 Reconnect all power sources to the transfer switches and power monitors.

8.6 Reconnect power to all devices in the system.

8.7 Place all generator set master switches to the AUTO position.

INPUT/OUTPUT MODULE ASSIGNMENTS

ADDRESS 1
 INPUT 1 (TB1-IN1) _____
 INPUT 2 (TB1-IN2) _____
 OUTPUT 1 (TB2-RD01) _____
 OUTPUT 2 (TB2-RD02) _____
 OUTPUT 3 (TB2-RD03) _____
 OUTPUT 4 (TB2-RD04) _____
 OUTPUT 5 (TB2-RD05) _____
 OUTPUT 6 (TB2-RD06) _____

ADDRESS 2
 INPUT 1 (TB1-IN1) _____
 INPUT 2 (TB1-IN2) _____
 OUTPUT 1 (TB2-RD01) _____
 OUTPUT 2 (TB2-RD02) _____
 OUTPUT 3 (TB2-RD03) _____
 OUTPUT 4 (TB2-RD04) _____
 OUTPUT 5 (TB2-RD05) _____
 OUTPUT 6 (TB2-RD06) _____

ADDRESS 3
 INPUT 1 (TB1-IN1) _____
 INPUT 2 (TB1-IN2) _____
 OUTPUT 1 (TB2-RD01) _____
 OUTPUT 2 (TB2-RD02) _____
 OUTPUT 3 (TB2-RD03) _____
 OUTPUT 4 (TB2-RD04) _____
 OUTPUT 5 (TB2-RD05) _____
 OUTPUT 6 (TB2-RD06) _____

ADDRESS 4
 INPUT 1 (TB1-IN1) _____
 INPUT 2 (TB1-IN2) _____
 OUTPUT 1 (TB2-RD01) _____
 OUTPUT 2 (TB2-RD02) _____
 OUTPUT 3 (TB2-RD03) _____
 OUTPUT 4 (TB2-RD04) _____
 OUTPUT 5 (TB2-RD05) _____
 OUTPUT 6 (TB2-RD06) _____

SW1 SETTINGS			
ADDRESS	SW1-1	SW1-2	SW1-3
1	C	C	C
2	C	C	O
3	C	O	C
4	C	O	O

GM23621-
GM23621-

Figure 16 Decal for Input and Output Assignments

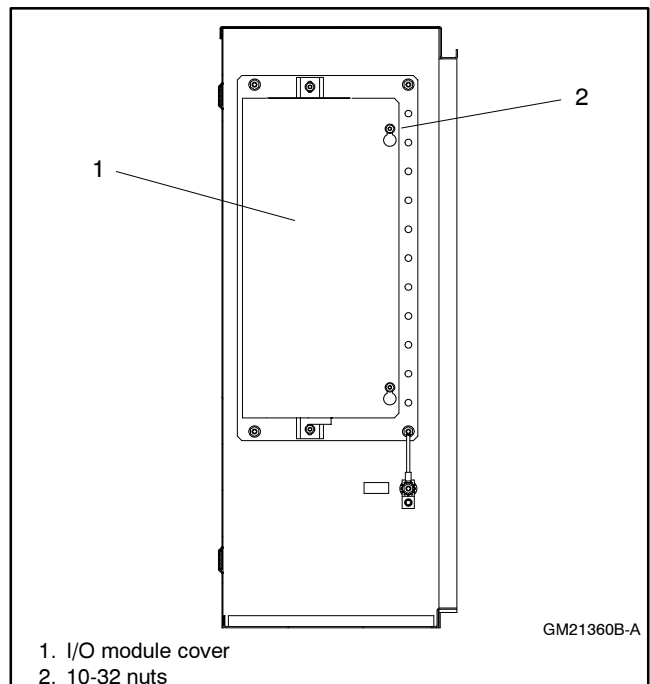


Figure 17 Installing I/O Module Cover

Test the I/O Module Circuit Board

Verify the programmable I/O module kit function by using the following information after installation and during troubleshooting.

When power is applied to the system, the controller attempts to initiate communication with each connected I/O board. The following faults may occur on powerup if the I/O modules are not correctly installed, addressed, or configured in the setup software. Check the LED on each I/O module for diagnostic information in the case of a fault.

Diagnostic LED. Each I/O module has a diagnostic LED that lights or flashes to indicate the I/O board status as described in the table in Figure 18.

I/O board Status	Diagnostic LED
Unpowered	Off
Operating correctly	On, Steady
Power but no communication with control board	Quick Flash (2 Hz)
No defined program at I/O module address	Slow Flash (0.5 Hz)

Figure 18 I/O Module Status/Diagnostic LED

I/O Module Not Found. If the system does not detect an I/O module at an expected address, the Service Required LED flashes and the software logs the message, “I/O Module Not Found”. Check that the number of I/O modules installed matches the number expected by the setup program. Check that the I/O modules are connected and the address DIP switches are set correctly. Check the diagnostic LED to verify that the module is receiving power and communicating with the controller.

I/O Module Not Installed. If the software detects an I/O module that is connected but not expected by the setup program, the Service Required LED flashes and the

software logs the message, “I/O Module Not Installed.” The system ignores the board if it does not find the setup definition. Check that the number of I/O modules expected in the Setup Program matches the number of modules installed on the transfer switch. Check that the I/O module address DIP switches are set correctly. Check the diagnostic LED.

I/O Module Communications Lost. If communication to an I/O module that was previously installed and working is lost, the Service Required LED flashes and the software logs the message “I/O Module Communications Lost.” Check the I/O module connections and diagnostic LED.

Parts List

Programmable I/O Module Kit

Kit: GM21359-KP1		
Qty.	Description	Part Number
1	I/O circuit board	GM21115
3	Module, PC mounting	GM21332
8	Pin, PC mounting	GM21333
2	Screw, sheet metal	X-67-143

I/O Module Mounting Assembly Kit

Kit: GM21360-KP1		
Qty.	Description	Part Number
1	Pan, accessory mounting	GM21330
1	Rail, DIN	GM21328
1	Cover, I/O module	GM21334
1	Harness, I/O module	GM21341-2
1	Tie, cable with mounting	X-468-9
4	Nut, 10-32	X-6210-1
5	Nut, 1/4-20	X-6210-2
1	Decal	GM23621
1	Washer, 1/4 in. int./ext. tooth lock	X-22-12
1	Washer, 1/4 in. plain	X-25-40