INSTALLATION INSTRUCTIONS

Original Issue Date: **5/16**
Model: **Automatic Transfer Switches**
Market: **ATS**
Subject: **Decision-Maker® MPAC 1500 Controller Conversion Kits GM99440-KP1 and GM99440-S1 for FAA**

Introduction

Use conversion kit GM99440-KP1 or GM99440-S1 to replace the transfer switch controller with a Decision-Maker® MPAC 1500 controller shown in Figure 1.

See Figure 2 for an illustration of the installed kit. The controller in this kit has been designed with a separate current sensing terminal block mounted to one side as shown for this application.

Applicable Models

This kit can be used to install the Kohler Decision-Maker® MPAC 1500 transfer switch controller onto an ASCO 962 automatic transfer switch.

Tools Required

- Phillips® screwdriver
- Small flat tip screwdriver
- Wire cutter
- 7/16 nut driver
- 11/32 nut driver
- 5/16 nut driver
- Gray (ANSI 49) touch-up paint (included)
- Masking tape or painter's tape

Read the entire installation procedure and compare the kit parts with the parts list in this publication before beginning installation. Refer to the wiring diagrams at the end of this publication as needed during the installation. Perform the steps in the order shown.

Note: Do not discard these instructions after kit installation. Keep this document with the transfer switch documentation for future reference.

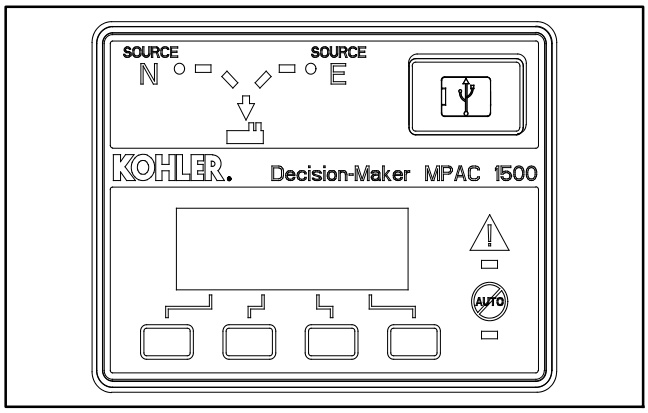
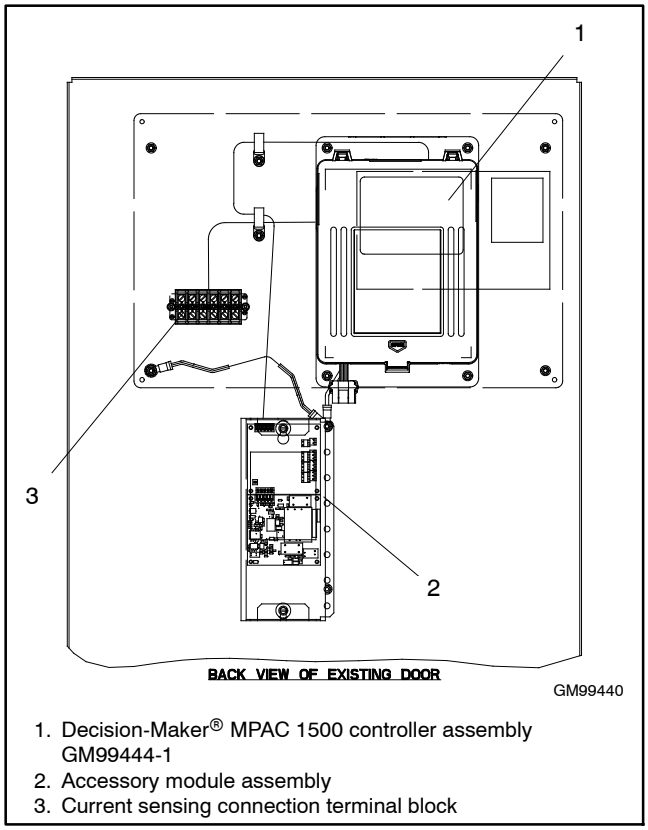


Figure 1 Decision-Maker® MPAC 1500 Controller



1. Decision-Maker® MPAC 1500 controller assembly GM99444-1
2. Accessory module assembly
3. Current sensing connection terminal block

Figure 2 Decision-Maker® MPAC 1500 Controller Conversion Kit, Installed

Accessory Modules (Option Boards)

The conversion kit includes the following accessory modules and hardware:

- Standard input/output (I/O) module
- External Battery Supply Module (EBSM or BOB)
- Module mounting bracket
- Cover
- Harness
- Decal

Note: All accessory modules may not be required for each application.

Controller Functions

Many functions are integrated into the Decision-Maker® MPAC 1500 operation. For example, an active time delay can be ended by pressing a button on the controller. Separate time delay override switches are not required. See Figure 3 for selected controller function information.

	MPAC™ 1500
Time Delays	Integrated
Test Switch	Integrated
Override Switches	Integrated
Current Meter (amps)	Current sensing kit required (see Figure 4)
Plant Exerciser	Integrated
Voltage/Frequency Meters	Integrated
Load Shed Contact	Integrated load control function (one output connection required)
Phase Rotation Protection	Integrated
In-Phase Monitor	Integrated
Audible Alarm	Alarm module required

Figure 3 Examples of Controller Functions

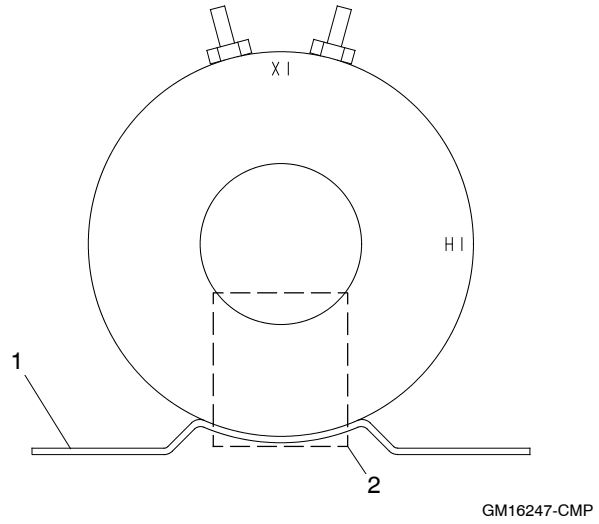
Current Transformers

The controller conversion kit includes the current transformers, terminal block, and wiring harness required for current sensing.

If the transfer switch is equipped with current transformers (CTs), they MUST be replaced with new current transformers for use with the Decision-Maker® MPAC 1500 controller. The standard kit includes three 400 amp current transformers, GM47789. See Figure 4 for a full list of current transformer part numbers and Figure 5 for an illustration of the CT.

Amps	CT Part Number	Quantity	
		3 ph	1 ph
200	GM47788	3	2
400	GM47789	3	2
1000	GM47790	3	3
1200	GM47791	3	2
2000	GM47792	3	—
3000	GM47793	3	—

Figure 4 Current Transformer Part Numbers



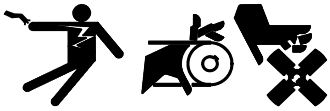
1. Bracket. Remove if the CT is not mounted to the enclosure wall.
2. Cut and remove any tape or wire ties to remove the bracket.

Figure 5 Current Transformer

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 equipment connected to the set, 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.

⚠ DANGER

Hazardous voltage.
Will cause severe injury or death.

Disconnect all power sources before opening the enclosure.

Servicing the transfer switch. Hazardous voltage can cause severe injury or death. Deenergize all power sources before servicing. Turn off the main circuit breakers of all transfer switch power sources and disable all generator sets as follows: (1) Move all generator set master controller switches to the OFF position. (2) Disconnect power to all battery chargers. (3) Disconnect all battery cables, negative (-) leads first. Reconnect negative (-) leads last when reconnecting the battery cables after servicing. Follow these precautions to prevent the starting of generator sets by an automatic transfer switch, remote start/stop switch, or engine start command from a remote computer. Before servicing any components inside the enclosure: (1) Remove all jewelry. (2) Stand on a dry, approved electrically insulated mat. (3) Test circuits with a voltmeter to verify that they are deenergized.

NOTICE

Foreign material contamination. Cover the transfer switch during installation to keep dirt, grit, metal drill chips, and other debris out of the components. Cover the solenoid mechanism during installation. After installation, use the manual operating handle to cycle the contactor to verify that it operates freely. Do not use a screwdriver to force the contactor mechanism.

Installation Procedure

Note: The photos and diagrams shown in this procedure represent a typical transfer switch. They may not be an exact match for your ATS model.

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. Disconnect power from the transfer switch on both sources, Normal and Emergency.
5. Open the ATS enclosure door. See Figure 6.
6. If the transfer switch is equipped with current transformers (CTs), remove all CTs from the power lines of the ATS.

   Note: Old CTs **MUST** be removed and replaced with the new CTs. **Using the old CTs will damage the new controller.**

7. Disconnect and remove any optional switches.
8. If the transfer switch is equipped with meters, disconnect and remove all meters.

   Separate meters are not required with the Decision-Maker® MPAC 1500 controller. Voltage, frequency, and current (amps) are shown on the controller display.

9. Disconnect any other accessories mounted on the inner panel.
10. Disconnect the contactor harness from the transfer switch controller.
11. Remove the mounting screws to remove the controller from the enclosure door.

Figure 6 Transfer Switch before Controller Replacement

12. Modify the existing enclosure door as described below.

    a. Remove the door from the enclosure, if possible. Place the door on a bench or other work surface. If the door cannot be removed, cover the transfer switch mechanism to protect it from debris.

    b. Tape drill template GM100182 (provided with the kit) to the door, aligning the controller cutout to the upper right corner of the existing opening. Verify that the template is level. See Figure 7.

    c. Drill twelve (12) 10 mm (0.39 inch) diameter holes in the door at the locations shown on the drill template. The template can be discarded after use.

    d. Remove any burrs and use ANSI 49 gray touch-up paint (provided, GM19492) on any bare metal surfaces to prevent rust.

    e. If the door was removed from the enclosure, reinstall it now.

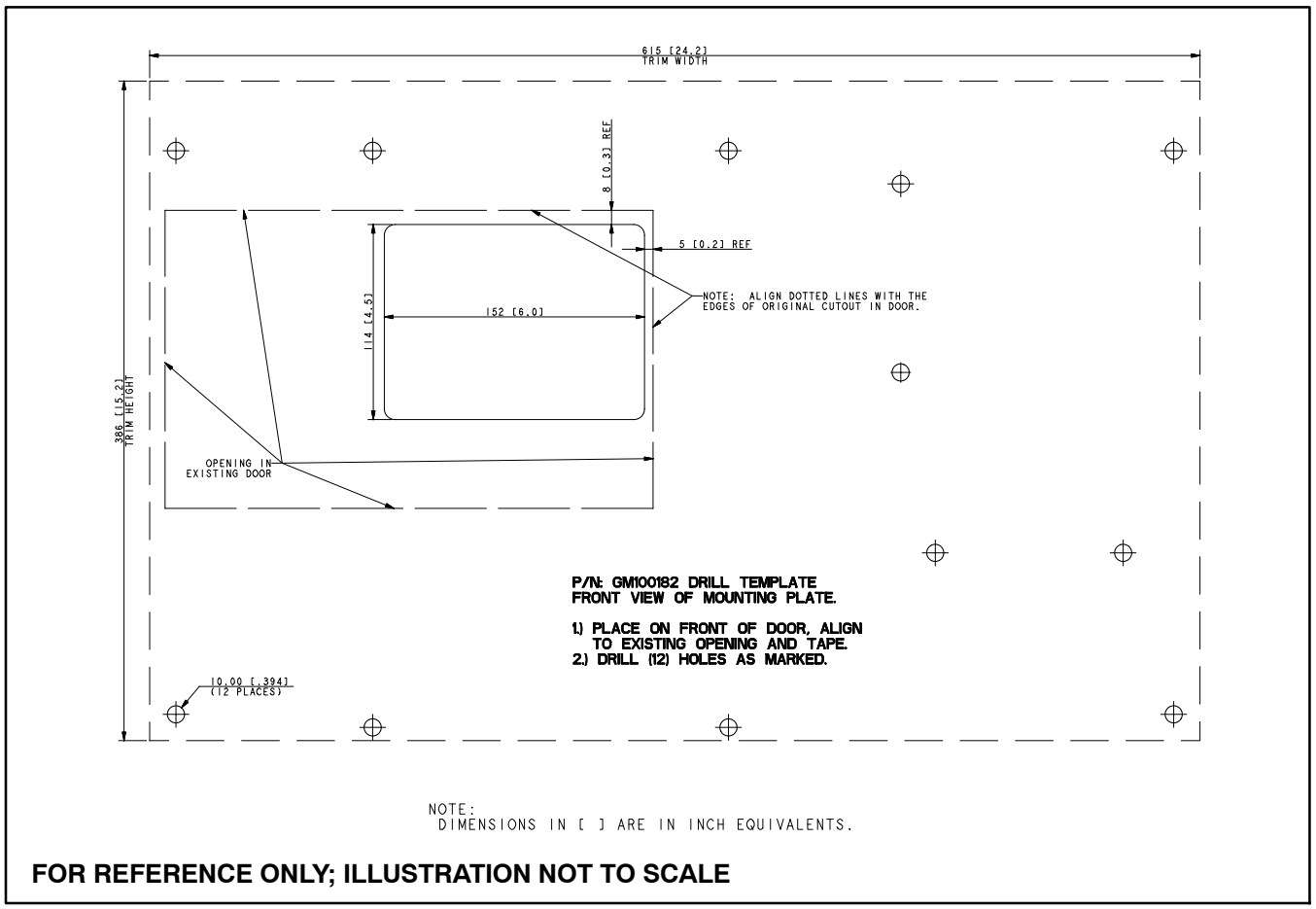


Figure 7 Drill Template GM100182 (for reference only; illustration not to scale)

Note: Refer to Figure 10 during kit installation.

13. Install the conversion kit mounting plate (GM99439). Use four Spiralock flange nuts (X-6210-2) to secure the mounting plate to the four corner studs as shown in Figure 10.

14. Install the Decision-Maker® MPAC 1500 controller assembly (GM99444-1) onto the conversion kit mounting plate using four nuts X-6210-2. See Figure 10.

15. Install new current transformers (CTs). Three 400 amp CTs (GM47789) are included with the kit; also see Figure 4 for CT part numbers.

    Note: Do not use any old CTs that were installed on the original transfer switch. They will cause damage to the new MPAC controller.

    a. If the new CTs are not attached to the enclosure wall, remove the metal brackets from the CTs. See Figure 5. Cut away any tape and/or cable ties holding the bracket, and pull the bracket off.

    b. Install the CTs with the Hi side pointing toward the power source. For CTs on the load leads, the Hi side should face the contactor.

16. Install the current sensing terminal block (X-6126-27) and harness (GM89029).

    a. Install the terminal block onto the door using two nuts (X-6210-4) as shown in Figure 10. Also see Figure 8.

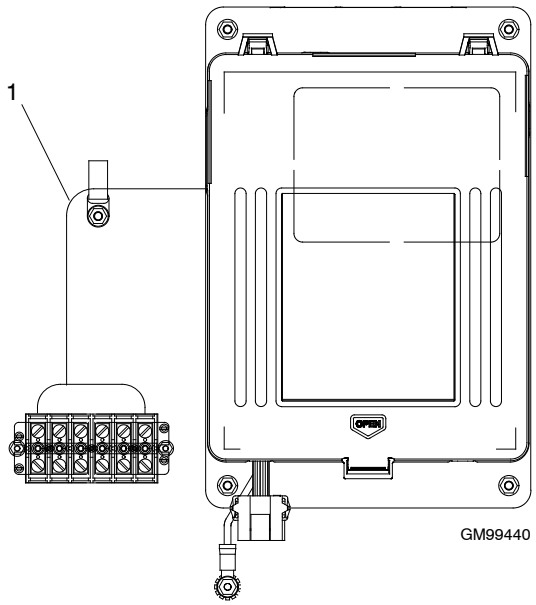
    b. Connect wire harness GM89029 to the terminal block as shown in Figure 11. See Figure 9 for an illustration of harness GM89029.

    Note: Figure 11 does not show the correct location of the terminal block Refer to Figure 11 for electrical connections only.

    c. Connect the 6-pin plug P1 of terminal block wiring harness (GM89029) to the controller at P3.

    d. Connect the current transformers to the terminal block using harness GM40560 as shown in Figure 11. See Figure 4 for current transformer part numbers.

    e. Remove two small screws from the terminal block and save them to secure the insulation. Place terminal block insulation (GM47797) over the terminal block and secure with the two screws.



NOTES:

HI SIDE OF CT'S MUST ALWAYS FACE THE POWER SOURCE.
Route CT harness neatly to controller with controller/contactor harness. Use cable ties as necessary.
See wiring diagram GM47803 (Figure 11).

1. Harness GM89029. See Figure 11 for electrical connections.

Figure 8 Current Sensing Terminal Block Connection

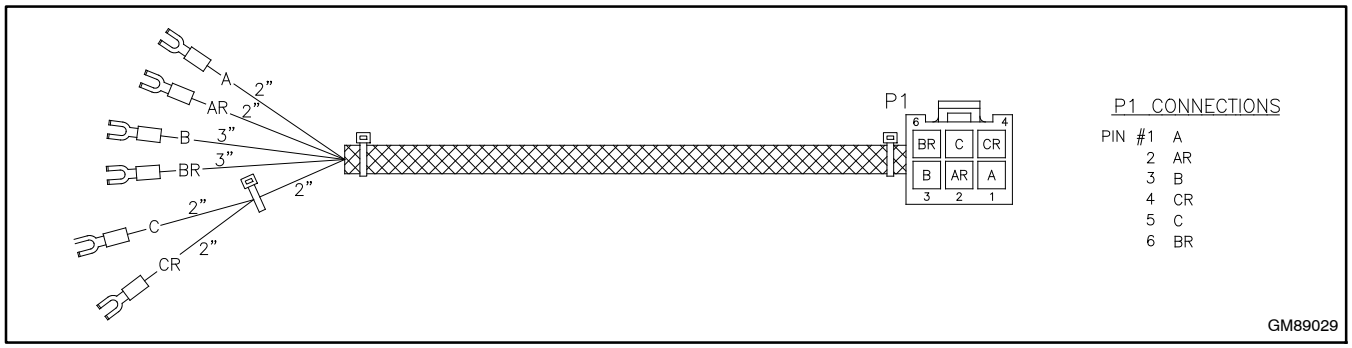


Figure 9 Current Sensing Harness GM89029

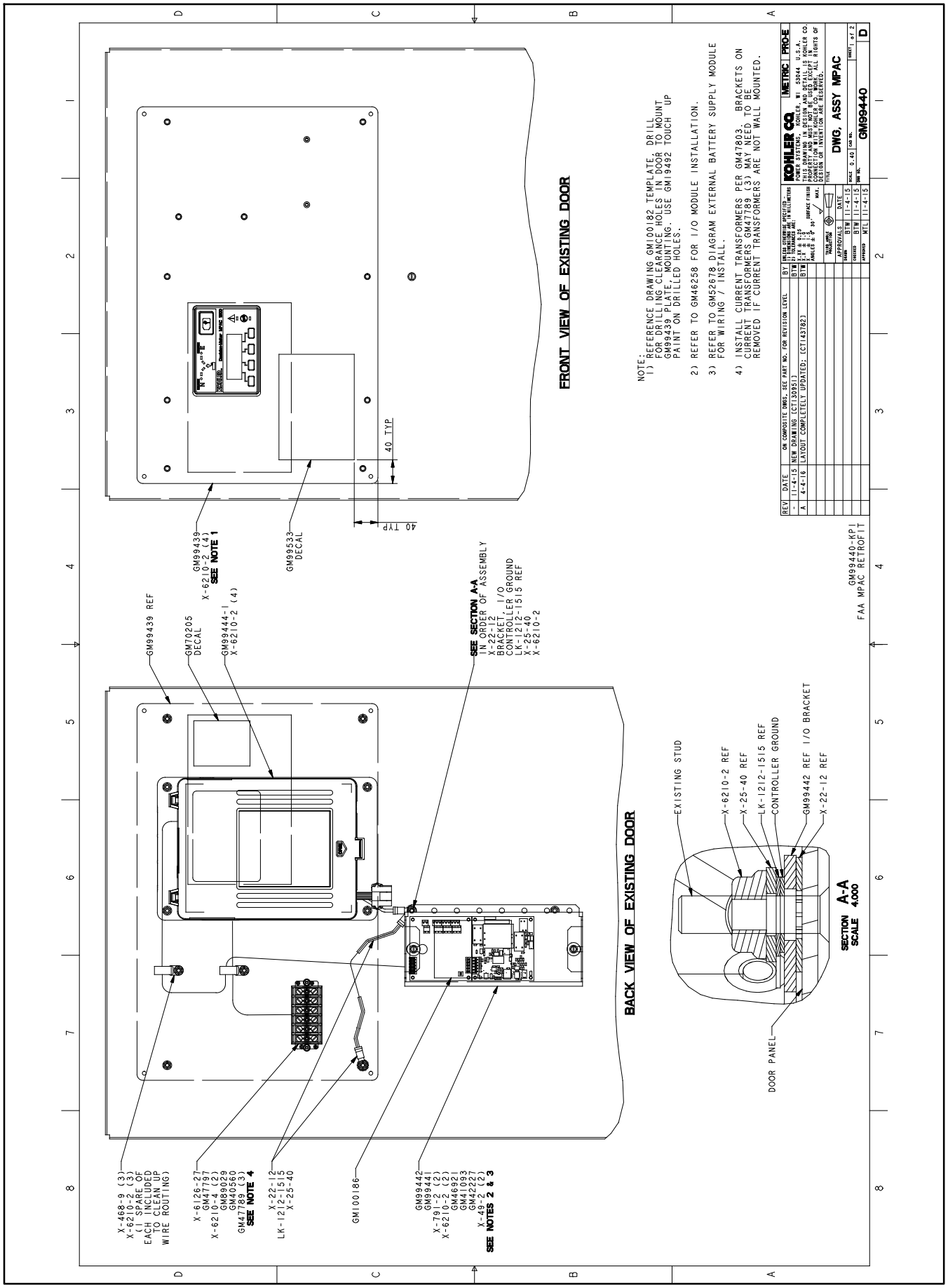


Figure 10 Conversion Kit Assembly Drawing GM99440

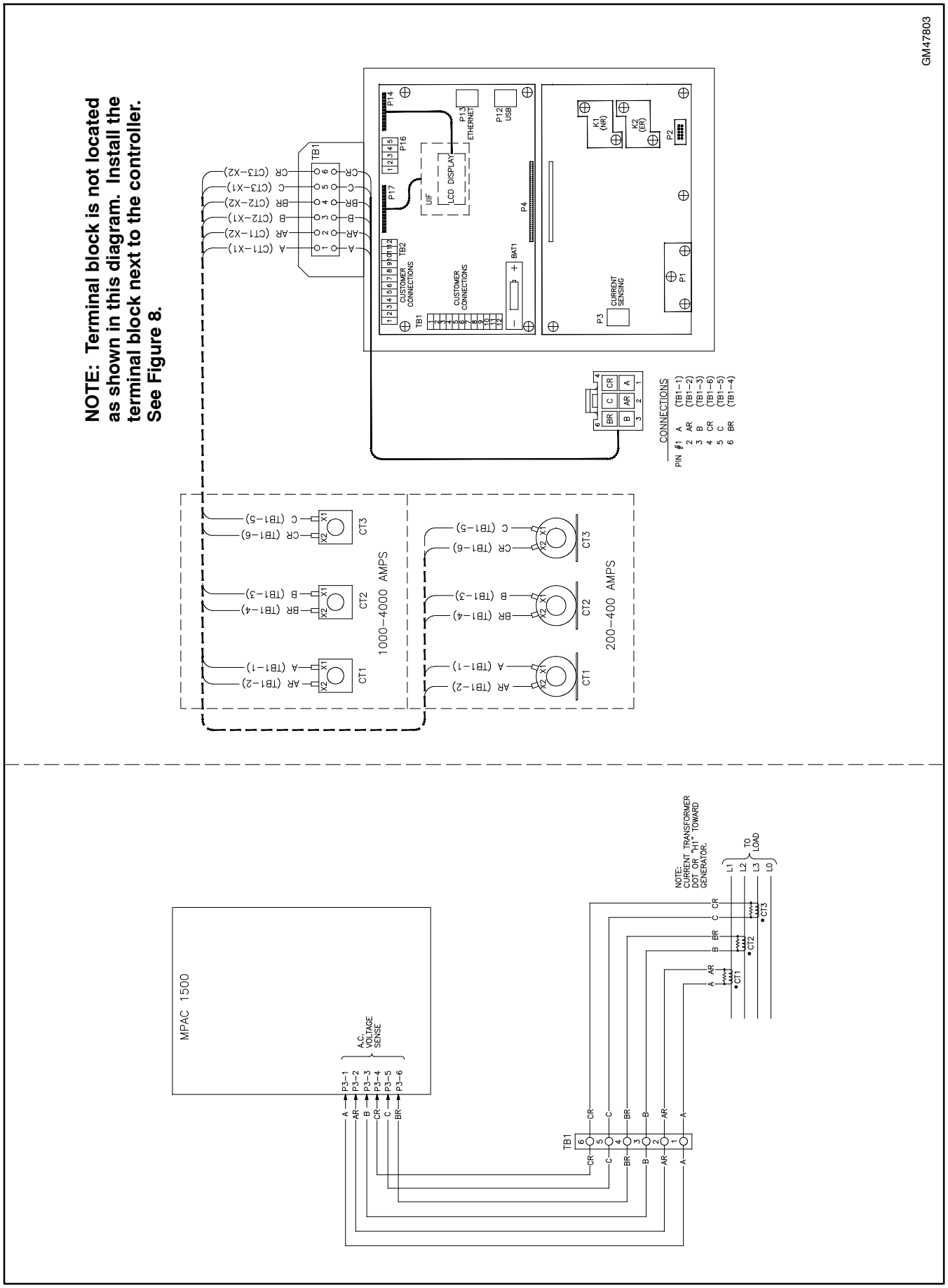


Figure 11 Wiring Diagram GM47803, Current Transformers and Terminal Block

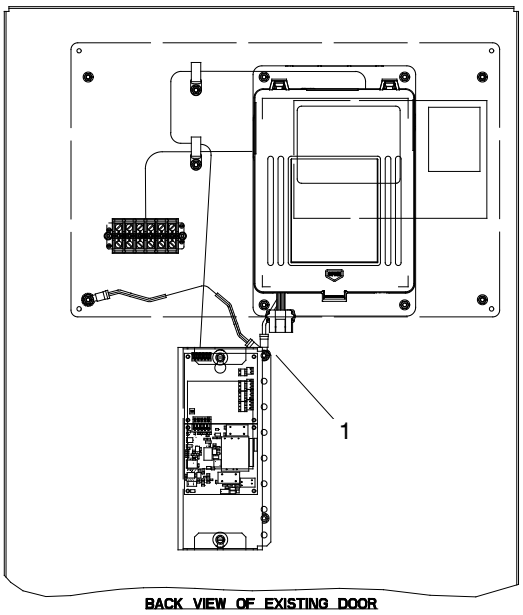
17. Install the input/output module mounting bracket (GM99442) onto the door using two Spiralock flange nuts (X-6210-2) as shown in Figure 10.

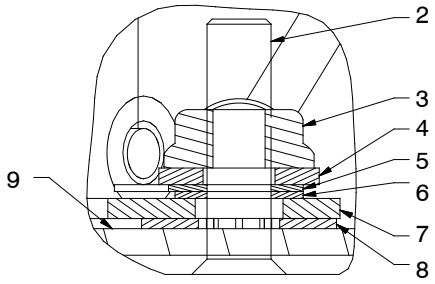
18. Connect the ground leads. See Figure 12.

    a. Connect one end of the green grounding lead (LK-1212-1515) to the ground lug on the door using one screw (X-791-2) and one Spiralock flange nut (X-6210-2). Attach the other end to the stud below controller, along with the controller ground lead. Assemble the ground leads and hardware as shown in Figure 12.

    b. Verify that the factory ground lead between the cabinet and the door is connected.

    c. Secure the ground leads with cable ties (X-468-1) as needed.





CONNECTION DETAIL

GM99440

1. Ground connection (see connection detail)
2. Stud (existing)
3. Nut, 1/4-20, X-6210-2
4. Washer, X-25-40
5. Ground lead, LK-1212-1515
6. Controller ground lead
7. I/O bracket, GM99442
8. Lock washer, X-22-12
9. Door panel

Figure 12 Ground Lead Connection

19. Install and connect the accessory modules. See Figure 18 and Figure 19 for accessory module connection details.

    Note: The external battery supply module (EBSM or BOB) must be installed in the last position as described below. Do not reverse the order of the modules.

    a. Install I/O module (GM41093) into the top position on the I/O module mounting bracket. Press the circuit board firmly onto the four standoffs on the mounting plate.

    b. Align the P20 connector on the EBSM (GM42227) with the P21 connector of the installed board. Push the board so that the connectors are joined and the four mounting holes align with the standoffs. Press the board firmly until the lower standoffs snap into the holes. Use two #6-32 screws (X-49-2) provided to secure the module to the top two standoffs.

    c. Bring harness GM46921 through the opening in the top of the I/O module mounting bracket and connect to the I/O module.

    d. Connect the other end of the harness to P16 on the controller.

    e. Set the DIP switches SW10 and SW11 on the modules as shown in Figure 13.

    f. Install I/O assembly cover GM99441 and secure with two 1/4-20 screws X-791-2.

    g. Use wire tie X-468-9 and nut X-6210-2 to route and strain relieve the I/O harness and current sensing harness. See Figure 10.

    h. Record the I/O assignments on decal GM100186 and attach the decal to the assembly cover.

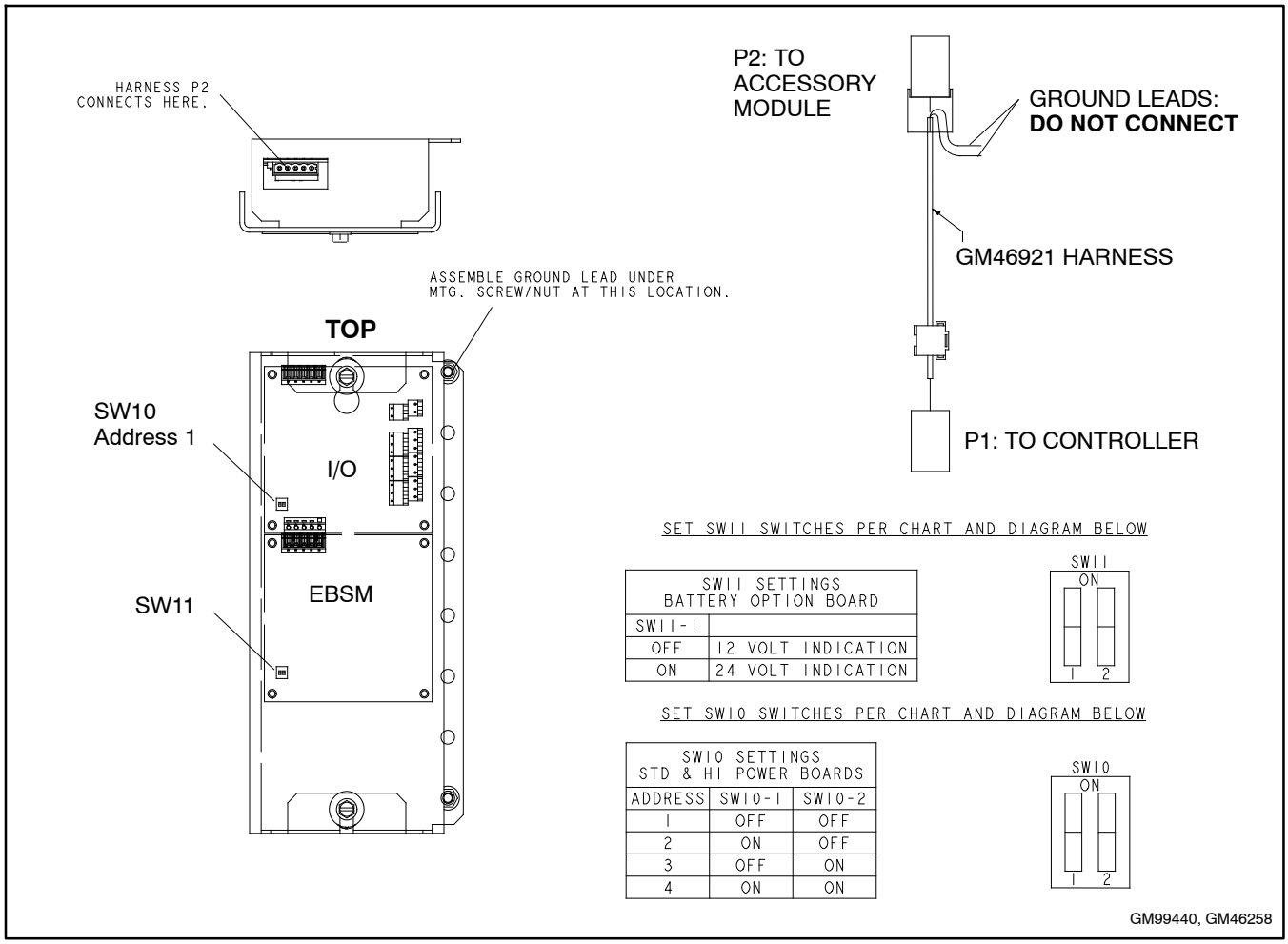
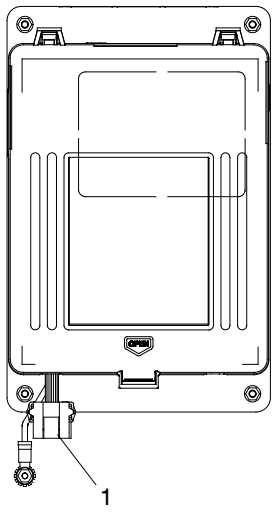


Figure 13 I/O Module Assembly (GM46258)

20. Connect the existing contactor harness to the controller. See Figure 14.



1. Contactor harness connection GM99440

Figure 14 Controller Connection

21. With the surfaces clean and dry, affix conversion kit decal GM99533 on the outside of the mounting plate. See Figure 10 and Figure 15.

OPERATING INSTRUCTIONS

NORMAL MODE: BYPASS CONTACTS OPEN.
ISOLATION CONTACTS CLOSED.

AUTOMATIC TO TEST POSITION
1. TURN BYPASS HANDLE TO THE SOURCE FEEDING THE LOAD.
2. TURN ISOLATION HANDLE TO THE TEST POSITION.

NOTE: WITH A.T.S. IN THE TEST OR ISOLATION POSITION THE BYPASS SWITCH CAN BE OPERATED AS A MANUAL TRANSFER SWITCH TO EITHER AVAILABLE SOURCE.

TEST TO ISOLATION POSITION
1. PULL ISOLATION HANDLE OUT AND TURN TO OPEN POSITION.
2. REFER TO OPERATOR'S MANUAL FOR REMOVAL AND RE-INSTALLATION OF A.T.S.

ISOLATION TO TEST POSITION
1. PULL ISOLATION HANDLE OUT AND TURN TO TEST POSITION.

TEST TO AUTOMATIC POSITION
1. A.T.S. MUST BE CONNECTED TO THE SAME SOURCE AS THE BYPASS SWITCH.
2. OPERATE TRANSFER TEST SWITCH FOR TRANSFER TO EMERGENCY OR RESET TO NORMAL SWITCH FOR RE-TRANSFER TO NORMAL.
3. TURN ISOLATION HANDLE TO CLOSED POSITION.
4. TURN BYPASS HANDLE TO OPEN POSITION.

GM99533

Figure 15 Conversion Decal GM99533

22. Record the required information on decal GM70205. See Figure 16. See Figure 4 for the current sensing kit (CT part number).

23. Verify that the surface is clean and dry, and place decal GM70205 on the mounting plate as shown in Figure 10.

KOHLER.
POWER SYSTEMS
MPAC 1500 TM
MODIFICATION KIT
PART NO. _____
INSTALLATION DATE _____
USE WIRING
DIAGRAM _____
CURRENT SENSING
KIT _____
GM70205

GM70205

Figure 16 Decal GM70205

24. Reconnect power to the transfer switch.

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

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

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

28. On the Decision-Maker MPAC 1500 controller, program the system parameters shown in Figure 17. Refer to the transfer switch nameplate for the ATS ratings. Also check time delays and and other settings that affect the ATS operation. See TP-6883, Operation Manual, for instructions.

System Parameter	Factory Setting
Standard or programmed transition	Set these parameters to match the transfer switch. See the ATS nameplate.
Single/three phase	
Operating voltage	
Operating frequency (50 or 60 Hz)	
Rated current	
Phase rotation	ABC
Commit to transfer (yes or no)	No
Operating mode: Generator-to-Generator, Utility-to-Generator, or Utility-to-Utility	Utility-to-Generator
In-phase monitor	Disabled
In-phase monitor transfer angle	5°

Figure 17 System Parameters

29. Run the operation tests outlined in Operation Manual TP-6883 to verify system operation.

30. Keep these installation instructions and wiring diagrams with the transfer switch documentation for future reference.

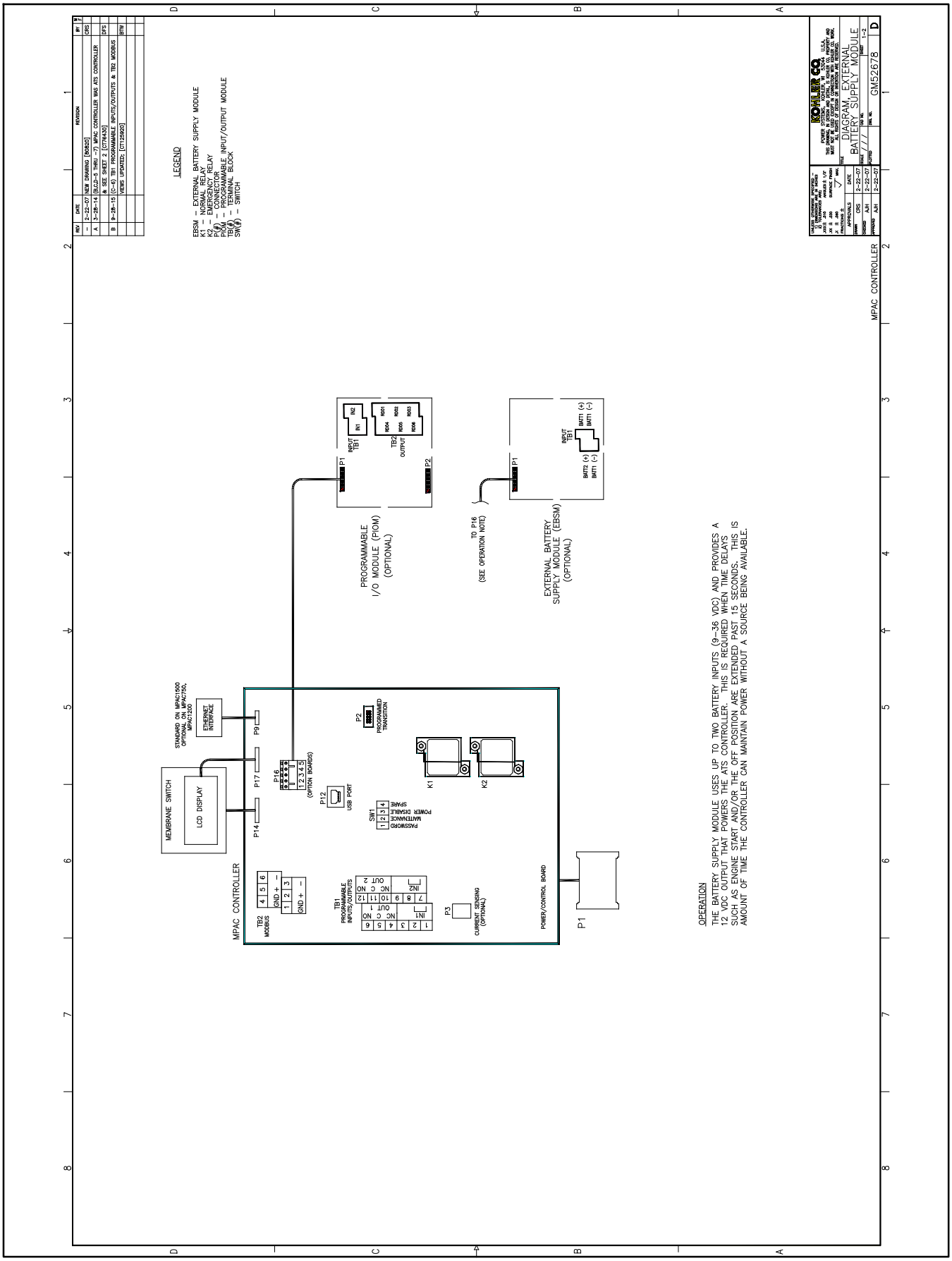


Figure 18 External Battery Supply Module (EBSM or BOB) Wiring Diagram GM52678, Sheet 1

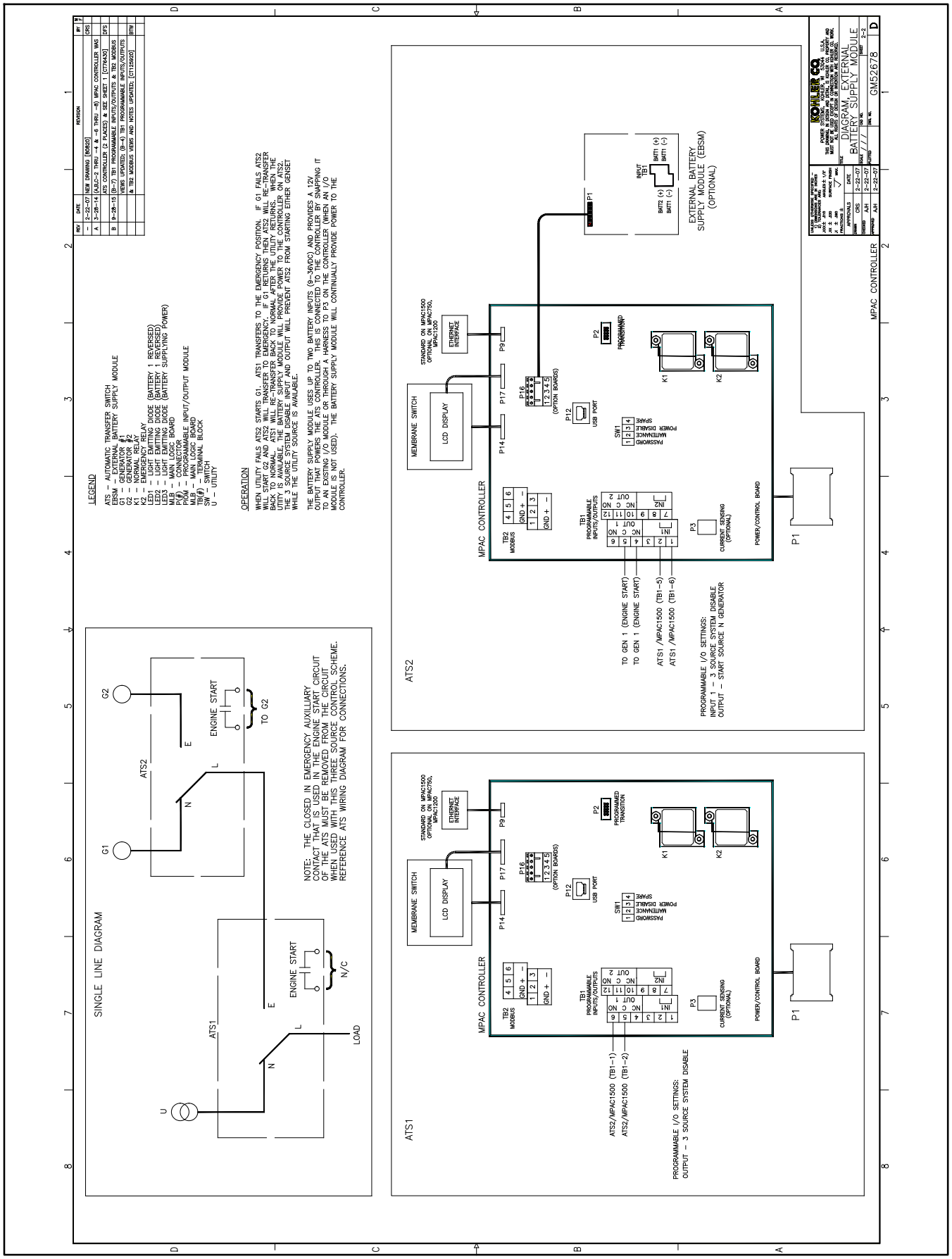


Figure 19 External Battery Supply Module (EBSM or BOB) Wiring Diagram GM52678, Sheet 2, Three-Source System Connections

Notes

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Parts Lists

Controller Conversion Kit

Kit: GM99440-KP1/GM99440-S1		
Qty.	**Description**	**Part Number**
1	Bracket, I/O	GM99442
3	Cable tie	X-468-1
3	Cable tie	X-468-9
1	Cover, I/O Assembly	GM99441
1	Decal, I/O Assignments	GM100186
1	Decal, Kohler Power Systems MPAC-1500	GM70205
1	Decal, Retrofit MPAC	GM99533
1	Drill, Template	GM100182
1	Harness, CT	GM89029
1	Harness, Current 6 Ft.	GM40560
1	Harness, Wiring	GM46921
1	Instructions, Accessory Modules	TT-1449
1	Instructions, Conversion ASCO 962 to MPAC1500 for FAA	TT-1688
1	Insulation, Terminal Block	GM47797
1	Lead	LK-1212-1515
1	MPAC Logic Assy - FAA Retrofit	GM99444-1
14	Nut, flange Spiralock, 1/4-20	X-6210-2
2	Nut, flange whiz, 8-32	X-6210-4
1	O/M MPAC 1500, ATS	TP-6883
1	Paint, ANSI Grey 49	GM19492
1	PCB, Assy External Battery Module	GM42227
1	PCB, Standard I/O Module, MPAC1500	GM41093
1	Plate, Mounting	GM99439
2	Screw, Machine	X-49-2
2	Screw, slotted hex washer head,mach	X-791-2
1	Terminal block	X-6126-27
3	Transformer, Current	GM47789
2	Washer, lock .262 ID x.743 in. OD	X-22-12
2	Washer, plain, .281 ID x .625 in. OD	X-25-40

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.