GV3000® Version 4
Regulator Board Installation Instructions

Regulator Board P/N 0-56921-4xx
Regulator Upgrade Kit P/N K-690-AU

Regulator Board P/N 413338-5AU
Regulator Upgrade Kit P/N K-690-AV

Instruction Manual D2-3333

RELIANCE ELECTRIC

The information in this manual is subject to change without notice.

DANGER

ONLY QUALIFIED ELECTRICAL PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS MANUAL AND OTHER APPLICABLE MANUALS IN THEIR ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE USER IS RESPONSIBLE FOR CONFORMING WITH ALL APPLICABLE LOCAL, NATIONAL, AND INTERNATIONAL CODES. WIRING PRACTICES, GROUNDING, DISCONNECTS, AND OVERCURRENT PROTECTION ARE OF PARTICULAR IMPORTANCE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

D-C BUS CAPACITORS RETAIN HAZARDOUS VOLTAGES AFTER INPUT POWER HAS BEEN DISCONNECTED. AFTER DISCONNECTING INPUT POWER, WAIT FIVE(5) MINUTES FOR THE D-C BUS CAPACITORS TO DISCHARGE AND THEN CHECK THE VOLTAGE WITH A VOLTMETER TO ENSURE THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

CAUTION: The Power Module Identification procedure enabled in parameter P998 will clear the contents of parameter P999. Only qualified electrical personnel who understand the potential hazards involved should make modifications to parameters P998 and P999. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

CAUTION: Entering incorrect values into parameter P999 will configure the Regulator board incorrectly for the connected Power Module. This parameter must be set by a qualified person who understands the significance of setting it correctly. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

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PREFACE

The products described in this manual are manufactured or distributed by Reliance Electric Industrial Company.

This manual provides instructions for replacing the Regulator board in your installation with a GV3000® Version 4 Regulator board. It is intended for qualified electrical personnel. The Regulator board is sold individually as P/N 056921-4xx or 413338-5AU and as part of Upgrade Kit P/N K-690-AU or K-690-AV.

You will need to refer to the following instruction manuals as you perform the installation procedure. These manuals are shipped with the new Regulator board.

- D2-3323 GV3000 A-C General Purpose (Volts/Hertz) and Vector Duty Drive Software Start-Up and Reference Manual
- D2-3324 GV3000 A-C Power Modules Hardware Reference, Installation, and Troubleshooting

The installation procedure consists of replacing the Regulator board, identifying the Power Module to the Regulator board, and restoring your configuration. Perform the instructions in the order in which they are presented in this manual. The board replacement procedure differs depending on drive type. Use the following table to locate the appropriate installation procedure in this manual.

If your drive's model number is not listed below, the regulator software may not be compatible for your drive. Contact Reliance Renewal Parts for a compatible Regulator board.

	For Drive Model Number...	Replace the Regulator Board with Part Number...	Using the Procedure Beginning in Section...
1 - 5 HP	1V41x0 1V44x0	0-56921-4xx	1.0
	2V41x0 2V44x0	0-56921-4xx	1.0
	3V41x0 3V44x0	0-56921-4xx	1.0
	5V41x0 5V44x0	0-56921-4xx	1.0
7.5 - 10 HP	7V41x0 7V42x0	0-56921-4xx	1.0
	10V41x0 10V42x0	0-56921-4xx	1.0
15 - 25 HP	15V41x0 15V42x0	0-56921-4xx	2.0
	20V41x0 20V42x0	0-56921-4xx	2.0
	25G41x0 25G42x0	0-56921-4xx	2.0
25 - 50 HP	30R41x0	413338-5AU	3.0
40 - 100 HP	50R41x0	413338-5AU	Contact Reliance
	75R41x0	413338-5AU	
100 - 150 HP	125R41x0	413338-5AU	4.0

NOTE: *If you are replacing the Regulator board in order to upgrade your system to Version 4, and you have purchased the Configuration Executive (CE3000) software, save your configuration to a personal computer before you begin the installation procedure if you have not done this previously. Refer to the CE3000 instruction manual (D2-3303) for this procedure.*

Getting Assistance from Reliance Electric

If you have any questions or problems with the products described in this instruction manual, contact your local Reliance Electric sales office. If the product is still under warranty, you can also call the Customer Response Center (CRC) at 1-800-726-8112. This is a toll-free call.

If the product is no longer under warranty, you have two options. You can call 1-900-230-6600. This is a toll call for which you will be billed by the minute (the first two minutes are free). Alternately, you can call 1-900-346-3400. Calls to this number will be billed at a flat rate per call. If you think your problem will take longer than 25 minutes to resolve, it will be more economical to contact Reliance at the second number.

1.0 INSTALLING REGULATOR BOARD P/N 0-56921-4XX IN 1-5 HP AND 7.5-10 HP DRIVES

DANGER

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS INSTRUCTION MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE DRIVE IS AT LINE VOLTAGE WHEN CONNECTED TO INCOMING A-C POWER. DISCONNECT, TAG, AND LOCKOUT ALL INCOMING POWER TO THE DRIVE BEFORE PERFORMING THE FOLLOWING PROCEDURE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

D-C BUS CAPACITORS RETAIN HAZARDOUS VOLTAGES AFTER INPUT POWER HAS BEEN DISCONNECTED. AFTER DISCONNECTING INPUT POWER, WAIT FIVE (5) MINUTES FOR THE D-C BUS CAPACITORS TO DISCHARGE AND THEN CHECK THE VOLTAGE WITH A VOLTMETER TO ENSURE THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

Use the following procedure to replace the Regulator board (P/N 0-56921-4xx, individually, or as part of Upgrade Kit P/N K 690 AU) in 1 to 5 HP and 7.5 to 10 HP GV3000 drives. Refer to figure 2.3 (1 to 5 HP) or figure 2.4 (7.5 to 10 HP) in instruction manual D2-3324 as you perform the procedure. Note that if the Power Module has been panel-mounted, this procedure will be easier to perform if the Power Module is removed from the panel.

Remove the Keypad Support Bracket from the Drive

Step 1. Disconnect, tag, and lockout power to the drive.

Step 2. Wait five (5) minutes for the D-C bus capacitors to discharge.

Step 3. Remove the cover by loosening the four (4) cover retaining screws.

Step 4. Using a voltmeter, verify that there is no voltage at the drive's A-C input power terminals (R/L1, S/L2, T/L3).

Step 5. Check the D-C bus potential (+, − terminals) with a voltmeter as described in section 9.3 of D2-3324 to ensure that the D-C bus capacitors are discharged.

Caution: The drive contains printed circuit boards that are static-sensitive. An anti-static wrist band should be worn by any person who touches the drive's components, connectors, or leads. Failure to observe this precaution may result in erratic machine operation and damage to, or destruction of, equipment.

Step 6. Note the cable lead connections to the Regulator board terminal strip. If these connections are not documented elsewhere, record them now. Then disconnect these cable leads from the Regulator board terminal strip.

If the drive has an option board, such as the AutoMax® Network Communication option board, installed below the Regulator board, continue to step 7. Otherwise, proceed to step 8.

Step 7. (Drives with option boards only) Note the cable connections to the option board terminals. If these connections are not documented elsewhere, record them now. Then disconnect these leads from the option board terminal strip.

Step 8. Disconnect the green-striped keypad ribbon cable from the Regulator board. The cable is located on the right-hand side of the drive. The cable connector is held in place by a small retaining clip at its center. Insert a small screwdriver inside the cable loop, and press in on the retaining clip while pulling out the connector.

Step 9. Remove the three (3) M4 x 10 screws that fasten the bottom of the support bracket to the drive's heat sink.

Step 10. Disconnect the 26-conductor Regulator board ribbon cable from the Current Feedback board located on the right-hand side below the keypad. The connector is held in place by retaining clips at its edges. Spread these clips apart to release the connector.

Step 11. Move the support bracket aside and carefully pull out the Current Feedback board to expose the internal fan assembly connector plug. Use a small pair of pliers to pinch the center retaining clip that holds the Current Feedback board in place.

Step 12. Unplug the internal fan assembly power connector from the drive.

For 7.5 to 10 HP drives, continue to step 13.

For 1 to 5 HP drives containing an option board, proceed to step 14.

For 1 to 5 HP drives with no option board, proceed to step 16.

Remove the Regulator Board from the Keypad Support Bracket

Step 13. (7.5 to 10 HP drives only) Loosen the thumb screw on the left side of the keypad support bracket to release the top of the bracket from the bottom. Grasp the bracket on the left-hand side and lift it up and to the left to separate the top bracket from the bottom.

If the drive has an option board, continue to step 14. If there is no option board, proceed to step 16.

Step 14. (Drives with option boards only) Remove the option board from the support bracket. The option board is held in place by two metal screws with lock washers and two plastic rivets. To remove a plastic rivet, pull the post from the rivet body and then remove the body of the rivet. Use a small pair of wire cutters or a similar tool to pry these pieces loose. NOTE: *Do not cut the rivets.*

Set the plastic rivets, metal screws, and lock washers aside for later use.

Step 15. (Drives with option boards only) Remove the Regulator board ribbon connector from the option board. The connector is held in place by retaining clips at its ends. Spread these clips apart to release the connector. Set the option board aside.

Step 16. Remove the old Regulator board from the support bracket. The Regulator board is held in place by two metal screws with lock washers and two plastic rivets. To remove a plastic rivet, pull the post from the rivet body and then remove the body of the rivet. Use a small pair of wire cutters or a similar tool to pry these pieces loose. NOTE: *Do not cut the rivets.*

Set the plastic rivets, metal screws, and lock washers aside for later use. Then slide the old Regulator board out of the bracket.

Step 17. Note the settings of jumpers J4 and J17 on the old Regulator board. These jumpers are located along side the center of the terminal strip. Figure 2.9 in D2-3324 shows the location of these jumpers.

Install the New Regulator Board in the Keypad Support Bracket

Step 18. Remove the new Regulator board from its anti-static wrapper and verify that the jumper settings on the new Regulator board are identical to those on the old board. Slide the new board into the keypad support bracket. Position the board so that the seven-segment displays appear in the display window in the keypad.

Step 19. Connect the new Regulator board to the support bracket using the fasteners removed in step 16. Observe that two corners of the board have metal-plated grounding pads. In order to properly ground the Regulator board, use the metal screws and lock washers to mount the corners that have the grounding pads. Mount the other two corners of the board by inserting the plastic rivet bodies into the mounting holes and then pressing the posts into the rivet bodies. NOTE: *Improper grounding of the Regulator board may result in erratic operation of the drive.*

If the drive has an option board, continue to step 20.

For 7.5 to 10 HP drives without an option board, proceed to step 22.

For 1 to 5 HP drives without an option board, proceed to step 23.

Step 20. (Drives with option boards only) Align the key on the Regulator board's 34-conductor ribbon cable connector with the slot in the option board's connector and press the ribbon cable connector in until it locks into position.

Step 21. (Drives with option boards only) Reconnect the option board to the support bracket using the fasteners removed in step 14. Observe that two of the corners of the board have metal-plated grounding pads. In order to properly ground the option board, use the metal screws and lock washers to mount the corners that have the grounding pads. Mount the other two corners of the board by inserting the plastic rivet bodies into the mounting holes and then pressing the posts into the rivet bodies. NOTE: *Improper grounding of the option board may result in erratic operation of the drive.*

For 7.5 to 10 HP drives, continue to step 22.

For 1 to 5 HP drives, proceed to step 23.

Step 22. (7.5 to 10 HP drives only) Reconnect the top of the keypad support bracket to the bottom by inserting the mounting tabs into the slots in the bottom of the bracket and tightening the thumbscrew.

Reinstall the Support Bracket in the Drive

Step 23. Reconnect the internal fan assembly power connector to the drive. Align the key on the connector with the slot in the receptacle, and press the connector into position.

WARNING

PROPER ALIGNMENT OF THE CURRENT FEEDBACK BOARD DURING INSTALLATION IS CRITICAL. VERIFY THAT THE CONNECTOR PINS ON THE CURRENT FEEDBACK BOARD ARE CORRECTLY ALIGNED WITH THEIR CORRESPONDING CONNECTOR BLOCKS ON THE DRIVE. FAILURE TO OBSERVE THIS PRECAUTION MAY RESULT IN BODILY INJURY.

Step 24. Reinstall the Current Feedback board. Carefully align the two sets of connector pins on the Current Feedback board with their matching connector blocks on the drive. Then gently press the board into place. The board should go in easily. If any resistance is met, it may be due to a bent or misaligned pin. After inserting the board, inspect the installation thoroughly with a light source for bent or misaligned pins.

Step 25. Align the support bracket with the mounting holes in the drive heat sink. Fasten the bracket with the three (3) M4 x 10 screws removed in step 9.

Step 26. Connect the green-striped keypad ribbon cable to the new Regulator board. Align the ribbon cable connector with the Regulator board connector and carefully push the keyboard cable connector in until it snaps into place. Verify that it is locked into position by gently tugging on the cable.

Step 27. Align the Regulator board's 26-conductor ribbon cable connector (located on the right-hand side below the keypad) with the Current Feedback board's connector and press it in until it locks into position.

If an option board has been installed, continue to step 28. Otherwise, proceed to step 29.

Step 28. (Drives with option boards only) Connect the option board cable leads to the appropriate option board terminals. Route the wire through the left-hand wire-routing hole at the bottom of the drive. Refer to the terminal connections documented in step 7 or to the appropriate instruction manual for the option board that is being used.

Step 29. Connect all Regulator board cable leads to the appropriate terminals on the Regulator board terminal strip. Route the wire through the left-hand wire-routing hole at the bottom of the drive. Refer to the terminal connections documented in step 6 or to the appropriate instruction manual for the speed feedback device that is being used.

Step 30. Reinstall the cover. Align all cover screws into the heat sink before tightening any of them. (For NEMA 4X/12 covers, refer to section 8.2 in D2-3324.)

Step 31. Remove the lockout and tag, and apply power to the drive. SELF will be displayed while the drive performs power-up diagnostics. After the diagnostics are complete, the alarm code PUn will be displayed.

This completes the hardware installation portion of the Regulator board replacement procedure. Go to Chapter 5 for the procedure to clear the PUn alarm code.

2.0 INSTALLING REGULATOR BOARD P/N 0-56921-4XX IN 15-25 HP DRIVES

DANGER

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS INSTRUCTION MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE DRIVE IS AT LINE VOLTAGE WHEN CONNECTED TO INCOMING A-C POWER. DISCONNECT, TAG, AND LOCKOUT ALL INCOMING POWER TO THE DRIVE BEFORE PERFORMING THE FOLLOWING PROCEDURE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

D-C BUS CAPACITORS RETAIN HAZARDOUS VOLTAGES AFTER INPUT POWER HAS BEEN DISCONNECTED. AFTER DISCONNECTING INPUT POWER, WAIT FIVE (5) MINUTES FOR THE D-C BUS CAPACITORS TO DISCHARGE AND THEN CHECK THE VOLTAGE WITH A VOLTMETER TO ENSURE THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

Use the following procedure to replace the Regulator board (P/N 0-56921-4xx, individually, or as part of Upgrade Kit P/N K-690-AU) in 15 to 25 HP GV3000 drives. Refer to figure 2.5 in instruction manual D2-3324 as you perform the procedure. Note that if the Power Module has been panel-mounted, the procedure will be easier to perform if the Power Module is removed from the panel.

Remove the Keypad Support Bracket from the Drive

Step 1. Disconnect, tag, and lockout power to the drive.

Step 2. Wait five (5) minutes for the D-C bus capacitors to discharge.

Step 3. Remove the cover by loosening the four (4) cover retaining screws.

Step 4. Using a voltmeter, verify that there is no voltage at the drive's A-C input power terminals (R/L1, S/L2, T/L3).

Step 5. Check the D-C bus potential (+, – terminals) with a voltmeter as described in section 9.3 of D2-3324 to ensure that the D-C bus capacitors are discharged.

Caution: The drive contains printed circuit boards that are static-sensitive. An anti-static wrist band should be worn by any person who touches the drive's components, connectors, or leads. Failure to observe this precaution may result in erratic machine operation and damage to, or destruction of, equipment.

Step 6. Note the cable lead connections to the Regulator board terminal strip. If these connections are not documented elsewhere, record them now. Then disconnect these cable leads from the Regulator board terminal strip.

If the drive has an option board, such as the AutoMax® Network Communication Option board, installed below the Regulator board, continue to step 7. Otherwise, proceed to step 8.

Step 7. (Drives with option boards only) Note the cable connections to the option board terminals. If these connections are not documented elsewhere, record them now. Then disconnect these leads from the option board terminal strip.

Step 8. Disconnect the green-striped keypad ribbon cable from the Regulator board. The cable is located on the right-hand side of the drive. The cable connector is held in place by a small retaining clip at its center. Insert a small screwdriver inside the cable loop, and press in on the retaining clip while pulling out the connector.

Step 9. Loosen the thumb screw on the left side of the keypad support bracket to release it from the bottom support bracket. Grasp the keypad support bracket on the left-hand side and lift it up and to the left to separate it from the bottom bracket.

Step 10. Disconnect the 26-conductor Regulator board ribbon cable from right-hand side of the Power Supply board. The connector can be seen through a small slot on the right side of the support bracket. It is held in place by retaining clips at its edges. Spread these clips apart to release the connector.

If the drive has an option board, continue to step 11. If there is no option board, proceed to step 13.

Remove the Regulator Board from the Keypad Support Bracket

Step 11. (Drives with option boards only) Remove the option board from the support bracket. The option board is held in place by two metal screws with lock washers and two plastic rivets. To remove a plastic rivet, pull the post from the rivet body and then remove the body of the rivet. Use a small pair of wire cutters or a similar tool to pry these pieces loose. NOTE: *Do not cut the rivets.*

Set the plastic rivets, metal screws, and lock washers aside for later use.

Step 12. (Drives with option boards only) Remove the Regulator board ribbon connector from the option board. The connector is held in place by retaining clips at its ends. Spread these clips apart to release the connector. Set the option board aside.

Step 13. Remove the old Regulator board from the support bracket. The Regulator board is held in place by two metal screws with lock washers and two plastic rivets. To remove a plastic rivet, pull the post from the rivet body and then remove the body of the rivet. Use a small pair of wire cutters or a similar tool to pry these pieces loose. NOTE: *Do not cut the rivets.*

Set the plastic rivets, metal screws, and lock washers aside for later use. Then slide the old Regulator board out of the bracket.

Step 14. Note the settings of jumpers J4 and J17 on the old Regulator board. These jumpers are located alongside the center of the terminal strip. Figure 2.9 in D2-3324 shows the location of these jumpers.

Install the New Regulator Board in the Keypad Support Bracket

Step 15. Remove the new Regulator board from its anti-static wrapper and verify that the jumper settings on the new Regulator board are identical to those on the old board. Slide the new board into the keypad support bracket. Position the board so that the seven-segment displays appear in the display window in the keypad.

Step 16. Connect the new Regulator board to the support bracket using the fasteners removed in step 13. Observe that two corners of the board have metal-plated grounding pads. In order to properly ground the Regulator board, use the metal screws and lock washers to mount the corners that have the grounding pads. Mount the other two corners of the board by inserting the plastic rivet bodies into the mounting holes and then pressing the posts into the rivet bodies. NOTE: *Improper grounding of the Regulator board may result in erratic operation of the drive.*

If the drive has an option board, continue to step 17. If there is no option board, proceed to step 19.

Step 17. (Drives with option boards only) Align the key on the Regulator board's 34-conductor ribbon cable connector with the slot in the option board's connector and press the ribbon cable connector in until it locks into position.

Step 18. (Drives with option boards only) Reconnect the option board to the support bracket using the fasteners removed in step 14. Observe that two of the corners of the board have metal-plated grounding pads. In order to properly ground the option board, use the metal screws and lock washers to mount the corners that have the grounding pads. Mount the other two corners of the board by inserting the plastic rivet bodies into the mounting holes and then pressing the posts into the rivet bodies. NOTE: *Improper grounding of the option board may result in erratic operation of the drive.*

Step 19. Align the Regulator board's 26-conductor ribbon cable connector (located on the right-hand side below the keypad) with the Power Supply board's connector (accessed through a small slot on the right side of the support bracket). To facilitate insertion, first fold the connector against the ribbon cable so that it is parallel to it. Then carefully press the ribbon cable connector into the power supply connector until it locks into position.

Reinstall the Support Bracket in the Drive

Step 20. Reconnect the keypad support bracket to the bottom bracket by inserting the mounting tabs into the slots in the bottom bracket and tightening the thumbscrew.

Step 21. Connect the green-striped keypad ribbon cable to the new Regulator board. Align the ribbon cable connector with the Regulator board connector and carefully push the keyboard cable connector in until it snaps into place. Verify that it is locked into position by gently tugging on the cable.

If an option board has been installed, continue to step 22. Otherwise, proceed to step 23.

Step 22. (Drives with option boards only) Connect the option board cable leads to the appropriate option board terminals. Route the wire through the left-hand wire-routing hole at the bottom of the drive. Refer to the terminal connections documented in step 7 or to the appropriate instruction manual for the option board that is being used.

Step 23. Connect all Regulator board cable leads to the appropriate terminals on the Regulator board terminal strip. Route the wire through the left-hand wire-routing hole at the bottom of the drive. Refer to the terminal connections documented in step 6 or to the appropriate instruction manual for the speed feedback device that is being used.

Step 24. Reinstall the cover. Align all cover screws into the heat sink before tightening any of them. (For NEMA 4X/12 covers, refer to section 8.2 in D2-3324.)

Step 25. Remove the lockout and tag, and apply power to the drive. SELF will be displayed while the drive performs power up diagnostics. After the diagnostics are complete, the alarm code PUn will be displayed.

This completes the hardware installation portion of the Regulator board replacement procedure. Go to Chapter 5 for the procedure to clear the PUn alarm code.

3.0 INSTALLING REGULATOR BOARD P/N 413338-5AU IN 25-50 HP DRIVES

DANGER

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS INSTRUCTION MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE DRIVE IS AT LINE VOLTAGE WHEN CONNECTED TO INCOMING A-C POWER. DISCONNECT, TAG, AND LOCKOUT ALL INCOMING POWER TO THE DRIVE BEFORE PERFORMING THE FOLLOWING PROCEDURE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

D-C BUS CAPACITORS RETAIN HAZARDOUS VOLTAGES AFTER INPUT POWER HAS BEEN DISCONNECTED. AFTER DISCONNECTING INPUT POWER, WAIT FIVE (5) MINUTES FOR THE D-C BUS CAPACITORS TO DISCHARGE AND THEN CHECK THE VOLTAGE WITH A VOLTMETER TO ENSURE THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

Use the following procedure to replace the Regulator board (P/N 413338-5AU, individually, or as part of Upgrade Kit P/N K-690-AV) in 25 to 50 HP GV3000 drives. Refer to figure 2.6 in instruction manual D2-3324 as you perform the procedure.

Remove the Keypad Support Bracket from the Drive

Step 1. Disconnect, tag, and lockout power to the drive.

Step 2. Wait five (5) minutes for the D-C bus capacitors to discharge.

Step 3. Remove the cover from the drive by loosening the six (6) cover retaining screws.

Step 4. Using a voltmeter, verify that there is no voltage at the drive's A-C input power terminals (1L1, 1L2, 1L3).

Step 5. Remove the two (2) screws from the top of the hinged panel on which the keypad support bracket is mounted. Then tilt the mounting panel forward out of the drive chassis.

Step 6. Check the D-C bus potential (+, – terminals) with a voltmeter as described in section 9.3 of D2-3324 to ensure that the D-C bus capacitors are discharged.

Caution: The drive contains printed circuit boards that are static-sensitive. An anti-static wrist band should be worn by any person who touches the drive's components, connectors, or leads. Failure to observe this precaution may result in erratic machine operation and damage to, or destruction of, equipment.

Step 7. Swing the hinged mounting panel back into position in the drive chassis. Note the cable connections to the Regulator board terminal strip, directly below the keypad. If these connections are not documented elsewhere, record them now. Then disconnect the cable leads from the Regulator board terminal strip.

If the drive has an option board installed, such as the AutoMax® Network Communication Option board, continue to step 8. Otherwise, proceed to step 9.

Step 8. (Drives with option boards only) Note the cable connections to the option board terminal strip, below the Regulator board. If these connections are not documented elsewhere, record them now. Then disconnect the cable leads from the option board terminal strip.

Step 9. Disconnect the green-striped keypad ribbon cable from the Regulator board. The cable is located on the right-hand side of the keypad. The cable connector is held in place by a small retaining clip at its center. Insert a small screwdriver inside the cable loop, and press in on the retaining clip while pulling out the connector.

Step 10. Disconnect the Regulator board's 60-conductor ribbon cable from the Power Unit Interface board. The ribbon cable runs from the top of the Regulator board through a slot in the hinged mounting panel to the Power board on the other side. The connector on the Power board is held in place by retaining clips at its edges. Spread these clips apart to release the connector. Then slip the ribbon cable out of the slot to free it from the mounting panel.

Step 11. Remove the four (4) screws and lock washers that fasten the keypad support bracket to the hinged mounting panel. Set aside the screws and lock washers for later use.

If the drive has an option board, continue to step 12. If there is no option board, proceed to step 14.

Remove the Regulator Board from the Keypad Support Bracket

Step 12. (Drives with option boards only) Disconnect the 34-conductor Regulator board ribbon cable from the left side of the option board. The connector is held in place by retaining clips at its ends. Spread these clips apart to release the connector.

Step 13. (Drives with option boards only) Remove the option board from the keypad support bracket by removing the four (4) metal mounting screws. Then set the option board and the screws aside.

Step 14. Remove the Regulator board from the keypad support bracket by removing the four (4) screws and hex nuts. Slide the old Regulator board out of the bracket and set the screws aside.

Step 15. Note the settings of the jumpers on the old Regulator board. The jumpers are located alongside the Regulator board terminal strip. Figure 2.10 in D2-3324 shows the location of the jumpers.

Install the New Regulator Board in the Keypad Support Bracket

Step 16. Remove the new Regulator board from its anti-static wrapper and verify that the jumper settings on the new Regulator board are identical to those on the old board.

Step 17. Slide the new Regulator board into the keypad support bracket. Position the board so that the seven-segment displays appear in the display window in the keypad. Mount the new Regulator board to the support bracket using the fasteners removed in step 14.

If the drive has an option board, continue to step 18. If there is no option board, proceed to step 20.

Step 18. (Drives with option boards only) Align the key on the Regulator board's 34-conductor ribbon cable connector with the slot in the option board's connector and press the ribbon cable connector in until it locks into position.

Step 19. (Drives with option boards only) Remount the option board to the support bracket using the four screws removed in step 13.

Step 20. Route the new Regulator board's 60-conductor ribbon cable through the slot in the hinged mounting panel to the connector on the Power Unit Interface board. Align the two connectors. Placing your thumb beneath the Power Unit board for support, carefully press the ribbon cable connector in until it locks into position.

Reinstall the Support Bracket in the Drive

Step 21. Reattach the keypad support bracket to the hinged mounting panel using the four (4) screws and lock washers removed in step 11.

Step 22. Reconnect the green-striped keypad ribbon cable to the new Regulator board. Align the ribbon cable connector with the Regulator board connector and carefully push the keyboard cable connector in until it snaps into place. Verify that it is locked into position by gently tugging on the cable.

Step 23. Swing the hinged mounting panel back up into position. Make certain that the keypad ribbon connector is tucked into the cabinet and not pinched by the panel. Re-fasten the two (2) screws to the top of the panel.

If an option board has been installed, continue to step 24. Otherwise, proceed to step 25.

Step 24. (Drives with option boards only) Reconnect all option board cable leads to the appropriate option board terminals. Refer to the terminal connections documented in step 7 or to the appropriate instruction manuals for the options being used. Route the cables through the right-hand wire-routing hole at the bottom of the drive, away from the A-C lines.

Step 25. Connect all Regulator board cable leads to the appropriate terminals on the new Regulator board. Refer to the terminal connections documented in step 6 or to the appropriate instruction manuals for the devices being used. Route the cables through the right-hand wire-routing hole at the bottom of the drive, away from the A-C lines.

Step 26. Reinstall the drive cover. Align all cover screws into the heat sink before tightening any of them. Make certain that no wires or cables are being pinched by the cover. (For NEMA 4X/12 covers, refer to section 8.2 in D2-3324.)

Step 27. Remove the lockout and tag, and apply power to the drive. SELF will be displayed while the drive performs power-up diagnostics. After the diagnostics are complete, the alarm code PUn will be displayed.

This completes the hardware installation portion of the Regulator board replacement procedure. Go to Chapter 5 for the procedure to clear the PUn alarm code.

4.0 INSTALLING REGULATOR BOARD P/N 413338-5AU IN 100-150 HP DRIVES

DANGER

ONLY QUALIFIED PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF THIS EQUIPMENT AND THE HAZARDS INVOLVED SHOULD INSTALL, ADJUST, OPERATE, AND/OR SERVICE THIS EQUIPMENT. READ AND UNDERSTAND THIS INSTRUCTION MANUAL IN ITS ENTIRETY BEFORE PROCEEDING. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

THE DRIVE IS AT LINE VOLTAGE WHEN CONNECTED TO INCOMING A-C POWER. DISCONNECT, TAG, AND LOCKOUT ALL INCOMING POWER TO THE DRIVE BEFORE PERFORMING THE FOLLOWING PROCEDURE. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

DANGER

D-C BUS CAPACITORS RETAIN HAZARDOUS VOLTAGES AFTER INPUT POWER HAS BEEN DISCONNECTED. AFTER DISCONNECTING INPUT POWER, WAIT FIVE (5) MINUTES FOR THE D-C BUS CAPACITORS TO DISCHARGE AND THEN CHECK THE VOLTAGE WITH A VOLTMETER TO ENSURE THE D-C BUS CAPACITORS ARE DISCHARGED BEFORE TOUCHING ANY INTERNAL COMPONENTS. FAILURE TO OBSERVE THIS PRECAUTION COULD RESULT IN SEVERE BODILY INJURY OR LOSS OF LIFE.

Use the following procedure to replace the Regulator board (P/N 413338-5AU, individually, or as part of Upgrade Kit K-690-AV) in 100 to 150 HP GV3000 drives. Refer to figure 2.8 in instruction manual D2-3324 as you perform the procedure.

Remove the Keypad Support Bracket from the Drive

Step 1. Disconnect, tag, and lockout power to the drive.

Step 2. Wait five (5) minutes for the D-C bus capacitors to discharge.

Step 3. Remove the cover from the drive by loosening the six cover retaining screws.

Step 4. Using a voltmeter, verify that there is no voltage at the drive's A-C input power terminals (1L1, 1L2, 1L3).

Step 5. Loosen the two screws from the top of the hinged panel on which the keypad support bracket is mounted. Then tilt the mounting panel forward out of the drive chassis.

Step 6. Check the D-C bus potential on the fuses on the Power Unit Interface board with a voltmeter to ensure that the D-C bus capacitors are discharged. (Refer to section 9.3 of D2-3324 and figure 9.4.)

Caution: The drive contains printed circuit boards that are static-sensitive. An anti-static wrist band should be worn by any person who touches the drive's components, connectors, or leads. Failure to observe this precaution may result in erratic machine operation and damage to, or destruction of, equipment.

Step 7. Swing the hinged mounting panel back into position in the drive chassis. Note the cable connections to the Regulator board terminal strip, directly below the keypad. If these connections are not documented elsewhere, record them now. Then disconnect the cable leads from the Regulator board terminal strip.

If the drive has an option board installed, such as the AutoMax® Network Communication option board, continue to step 8. Otherwise, proceed to step 9.

Step 8. (Drives with option boards only) Note the cable connections to the option board terminal strip, below the Regulator board. If these connections are not documented elsewhere, record them now. Then disconnect the cable leads from the option board terminal strip.

Step 9. Disconnect the green-striped keypad ribbon cable from the Regulator board. The cable is located on the right-hand side of the keypad. The cable connector is held in place by a small retaining clip at its center. Insert a small screwdriver inside the cable loop, and press in on the retaining clip while pulling out the connector.

Step 10. Tilt the mounting panel forward out of the drive chassis. Disconnect the Regulator board's 60-conductor ribbon cable from the Power Unit Interface board. The ribbon cable runs from the top of the Regulator board through a slot in the hinged mounting panel to the Power board on the other side. The connector is held in place by retaining clips at its edges. Spread these clips apart to release the connector. Then slip the ribbon cable out of the slot to free it from the mounting panel.

Step 11. Remove the Power Unit Interface board from the back of the hinged mounting panel. The board is held in place by eight (8) plastic standoffs. Pinch the top of each standoff with a pair of needle nose pliers and carefully pop the board off the standoff. Note for later reinstallation that two of the standoffs have metal grounding contacts.

Step 12. Tie the Power Unit Interface board temporarily out of the way with a tie wrap or small piece of wire. Pass the wire or tie wrap through one of the mounting holes in the board and around a convenient fastening point, such as a wire harness.

Step 13. Remove the four screws and lock washers that fasten the keypad support bracket to the hinged mounting panel. Be sure to hold the keypad support bracket as you remove the screws. Set the screws and lock washers aside for later use.

If the drive has an option board, continue to step 14. If there is no option board, proceed to step 16.

Remove the Regulator Board from the Keypad Support Bracket

Step 14. (Drives with option boards only) Detach the option board from the keypad support bracket by removing the four metal mounting screws. Set the screws aside.

Step 15. (Drives with option boards only) Disconnect the 34-conductor Regulator board ribbon cable from the right side of the option board. The connector is held in place by retaining clips at its ends. Spread these clips apart to release the connector. Then slide the option board out of the bracket and set it aside.

Step 16. Remove the Regulator board from the keypad support bracket by removing the four screws and hex nuts. Slide the Regulator board out of the bracket and set the screws and hex nuts aside aside.

Step 17. Note the settings of the jumpers on the old Regulator board. The jumpers are located alongside the Regulator board terminal strip. Figure 2.10 in D2-3324 shows the location of the jumpers.

Install the New Regulator Board in the Keypad Support Bracket

Step 18. Remove the new Regulator board from its anti-static wrapper and verify that the jumper settings on the new Regulator board are identical to those on the old board.

Step 19. Slide the new Regulator board into the keypad support bracket. Position the board so that the seven-segment displays appear in the display window in the keypad. Mount the new Regulator board to the support bracket using the screws and hex nuts removed in step 16.

If the drive has an option board, continue to step 20. If there is no option board, proceed to step 22.

Step 20. (Drives with option boards only) Align the key on the Regulator board's 34-conductor ribbon cable connector with the slot in the option board's connector and press the ribbon cable connector in until it locks into position.

Step 21. (Drives with option boards only) Remount the option board to the support bracket using the four screws removed in step 14.

Reinstall the Support Bracket in the Drive

Step 22. Remount the keypad support bracket to the hinged mounting panel using the four (4) screws removed in step 13.

Step 23. Remove the tie that was fastened to the Power Unit Interface board in step 12. Align the Power Unit Interface board on the eight plastic standoffs on the back of the hinged mounting panel, and carefully press it into place. Check to make sure that good contact has been made with the two grounding standoffs.

Step 24. Route the new Regulator board's 60-conductor ribbon cable through the slot in the hinged mounting panel to the connector on the Power Unit Interface board. Align the two connectors. Placing your thumb beneath the Power Unit PC board for support, carefully press the ribbon cable connector in until it locks into position.

Step 25. Reconnect the green-striped keypad ribbon cable to the new Regulator board. Align the ribbon cable connector with the Regulator board connector and carefully push the keyboard cable connector in until it snaps into place. Verify that it is locked into position by gently tugging on the cable.

Step 26. Swing the hinged mounting panel back up into position. Make certain that no wires or cables are pinched by the panel. Then re-fasten the two screws at the top of the panel.

If an option board has been installed, continue to step 27. Otherwise, proceed to step 28.

Step 27. (Drives with option boards only) Reconnect all option board cable leads to the appropriate option board terminals. Refer to the terminal connections documented in step 8 or to the appropriate instruction manuals for the options being used. Route the cables through the right-hand wire-routing hole at the bottom of the drive, away from the A-C lines.

Step 28. Connect all Regulator board cable leads to the appropriate terminals on the new Regulator board. Refer to the terminal connections documented in step 7 or to the appropriate instruction manuals for the devices being used. Route the cables through the right-hand wire-routing hole at the bottom of the drive, away from the A-C lines.

Step 29. Reinstall the drive cover with the six mounting screws removed in step 3. Make certain that no wires or cables are being pinched by the cover. (For NEMA 4X/12 covers, refer to section 8.2 in D2 3324.)

Step 30. Remove the lockout and tag, and apply power to the drive. SELF will be displayed while the drive performs power-up diagnostics. After the diagnostics are complete, the alarm code PUn will be displayed.

This completes the hardware installation portion of the Regulator board replacement procedure. Go to Chapter 5 for the procedure to clear the PUn alarm code.

5.0 CLEARING THE PUn ALARM CODE AND IDENTIFYING THE POWER MODULE

CAUTION: The Power Module identification procedure enabled in parameter P.998 will clear the contents of parameter P.999. Only qualified electrical personnel who understand the potential hazards involved may make modifications to parameters P.998 and P.999. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

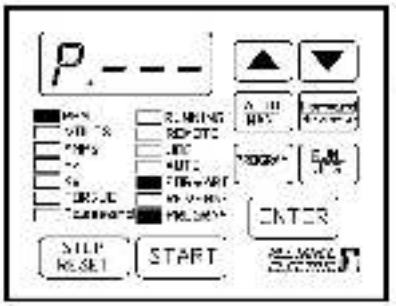
CAUTION: Entering incorrect values into parameter P.999 will configure the Regulator board incorrectly for the connected Power Module. This parameter must be set by a qualified person who understands the significance of setting it correctly. Failure to observe this precaution could result in damage to, or destruction of, the equipment.

After the Regulator board is replaced and power is applied to the Power Module, PUn will be displayed. This alarm code indicates that the Power Module has not been identified to the Regulator board. The drive cannot start until this alarm code is cleared.

To clear this alarm code, you must perform a Power Module identification procedure. The values entered during this procedure configure the Regulator board for the connected Power Module so that appropriate control calculations are made by the system. Note that equipment damage may result if incorrect values are entered during this procedure.

You must be familiar with the keypad/display in order to perform the following procedure. If you are not familiar with the keypad/display, refer to chapter 3 in instruction manual D2-3323.

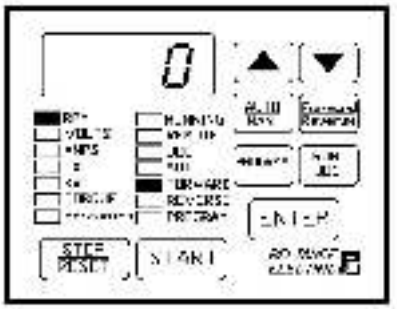
Use the following procedure to identify the Power Module to the Regulator board:

Step		Display	Description
Step 1.	Press the PROGRAM key.		The PROGRAM LED is on, and the First Menu General (P) parameters can be accessed.
Step 2.	Press the ENTER key to access the First Menu General (P) parameters.	P.000	
Step 3.	Press the ↑ key until P.006, Second Menu Password, is displayed.	P.006	
Step 4.	Press the ENTER key.	0	Zero is displayed.

Clearing the PUn Alarm Code and Identifying the Power Module *(Continued)*

Step	Display	Description
Step 5. Press the ↑ key until the password number 75 is displayed.	75	This password enables access to Power Module identification parameters P.998 and P.999.
CAUTION: It is the user's responsibility to determine how to distribute this password within his organization. Reliance Electric is not responsible for unauthorized access violations within the user's organization. Failure to observe this precaution could result in damage to, or destruction of, the equipment.		
Step 6. Press the ENTER key to save the password.	P.998	P.998 is displayed. This parameter is used to enable the Power Module identification procedure.
Step 7. Press the ENTER key to access parameter P.998.	OFF	The default setting for P.998 is displayed.
Step 8. Press the ↑ key to enable the Power Module identification procedure.	On	On is displayed.
Step 9. Press the ENTER key.	PUCH The Power Module has been automatically identified by the regulator. Go to Step 13. OR P.998 Go to Step 10.	Depending on the Power Module model number, pressing the ENTER key will cause one of the following to occur: • An automatic identification procedure will be initiated. OR • You will be advanced to parameter P.999. Parameter P.999 is used to manually enter the Power Module identification values (voltage and horsepower).
Step 10. Press the ENTER key to access parameter P.999.	UnSL	UnSL is displayed indicating that the Power Module voltage and horsepower values have not been selected.

***Clearing the PUn Alarm Code and Identifying the Power Module** (Continued)*

Step	Display	Description
Step 11. Press the ↑ key until the appropriate Power Module voltage and horsepower is displayed.	4.20	The Power Module values are displayed in the format Vnnn where V represents the drive's panel rating, and nnn represents horsepower. This information is contained in the drive model number. Refer to Section 2.1 in D2-3324, for assistance in identifying the drive. The sample display shows the appropriate selection for a 460V, 20 HP Power Module.
Step 12. Press the ENTER key to save the selected value.	PUCH	PUCH is displayed for a few seconds to indicate that the Power Module identification values have been changed.
Step 13. Go to section 6.0 in this manual, Restoring the Drive Configuration.		After the new values are accepted, the drive enters monitor mode, and the RPM LED turns on. The displayed value is zero RPM.

NOTE: *The value entered into parameter P999 is displayed in Second Menu General parameter P099 (Power Unit Type).*

6.0 RESTORING THE DRIVE CONFIGURATION

After the Regulator board has been replaced, the drive powers up with the parameters set to their factory-default values. If you changed any of the parameters from their default values prior to replacing the board, you must change them again after you have completed the Power Module identification procedure described in Chapter 5.

Use one of the following procedures to restore your configuration:

- If you have purchased the Configuration Executive 3000 (CE3000) software and saved your configuration to your personal computer prior to replacing the Regulator board, you can use the CE3000 software to load the configuration to the new Regulator board. Refer to the CE3000 instruction manual (D2-3303) for this procedure.
- If you are using the keypad to configure the drive and you have a record of the changes made to the parameter settings, you will need to change only those parameters affected. Refer to instruction manual D2-3323 for parameter descriptions.
- If you are using the keypad to configure the drive and you have no record of changes made to the parameters, you will need to perform the appropriate start-up procedure in instruction manual D2-3323.

7.0 TROUBLESHOOTING THE INSTALLATION

The following table describes possible installation problems and their corrective actions. Chapter 9 in instruction manual D2-3324 also contains guidelines for troubleshooting the drive.

Description of Problem	Corrective Action
Replacement board is too big/too small.	Check the part number on the replacement board. Use the table in the Preface of this manual to verify you have the appropriate board for your installation.
CHS appears on the display after the Regulator board is replaced and power is applied.	Contact Reliance.
Fault or alarm code other than PUn appears on the display.	Refer to chapter 5 in instruction manual D2-3323 for a description of the codes and the corresponding corrective actions.

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