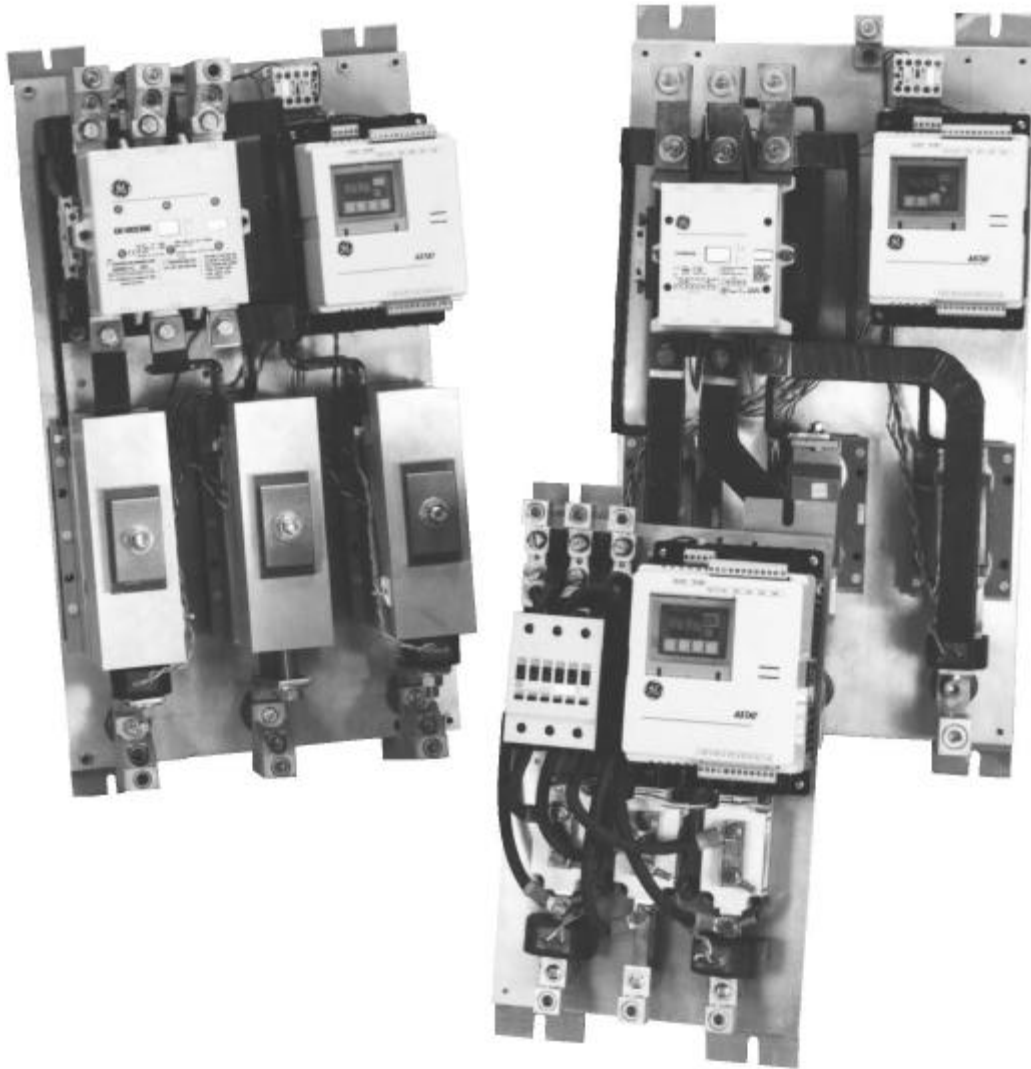


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DEH-40417

# ASTAT<sup>®</sup> -IBP Plus Solid State Starters

## Service Instructions





## DEH-40417

### ***WARNINGS, CAUTIONS, AND NOTES AS USED IN THIS PUBLICATION***

#### ***WARNINGS***

Warning notices are used in this publication to emphasize that hazardous voltages, currents, or other conditions that could cause personal injury are present in this equipment or may be associated with its use.

Warning notices are also used for situations in which inattention or lack of equipment knowledge could cause either personal injury or damage to equipment.

#### ***CAUTIONS***

Caution notices are used for situations in which equipment might be damaged if care is not taken.

#### ***NOTES***

Notes call attention to information that is especially significant to understanding and operating the equipment.

This document is based on information available at the time of its publication. While efforts have been made to ensure accuracy, the information contained herein does not cover all details or variations in hardware and software, nor does it provide for every possible contingency in connection with installation, operation, and maintenance. Features may be described herein that are not present in all hardware and software systems. GE Electrical Distribution & Control assumes no obligation of notice to holders of this document with respect to changes subsequently made.

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**WARNING:** Power must be removed from the ASTAT-IBP before any servicing operation.

**AVERTISSEMENT:** Le courant doit être enlevé du ASTAT-IBP avant de procéder à toute opération de service.

## Cover Removal and Replacement

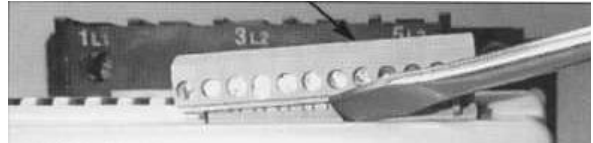
1. Remove the two 12-point terminal connectors by inserting a flat-head screwdriver between the terminal connector and the ASTAT-IBP cover, as illustrated in Figure 1.

**Do not remove the wiring from the terminal connectors.**

Carefully release the terminal connector from the pins. Carefully pull the terminal connectors, with the wiring, straight off the ASTAT-IBP starter.

2. Remove the plastic cover by pressing and releasing the plastic tab on each side of the cover with a flat-head screwdriver, as illustrated in Figure 2.
3. To reattach the cover, lower it over the circuit boards. Carefully push down on the cover until the two tabs snap into place. It may be necessary to push in slightly on the outside of the lower plastic housing.
4. Replace the terminal connectors through the plastic cover onto the connector strips. Ensure that the terminal connectors snap into place.

Terminal Connector



Cover

Figure 1. Removing the terminal connectors.

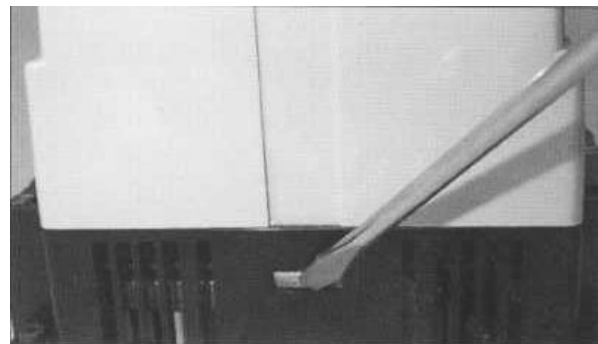


Figure 2. Removing the cover.

## Logic Board Replacement

**CAUTION:** Always handle circuit boards by their edges and do not distort the parts on the circuit boards.

**ATTENTION:** Il faut toujours manipuler les plaques de circuits par leurs côtés et ne pas déformer les pièces sur les plaques de circuits.

1. Remove the ASTAT-IBP cover as described in steps 1–2 of *Cover Removal and Replacement*.
2. Unplug the two ribbon cables from the Logic Board, as shown in Figure 3.
3. Remove the four corner screws holding the Logic Board to the stand-offs below the Logic Board. Lift the Logic Board straight up to remove it, as illustrated in Figure 4.
4. Reassemble the Logic Board to the starter. With the display on the Logic Board at the upper left corner, place the board on the stand-offs. Reattach the four screws holding the Logic Board to the stand-offs.
5. Reattach the two ribbon cables. Ensure that the ribbon cable at the bottom of the ASTAT-IBP is fully seated on both circuit boards and that the ribbon cable does not interfere with or touch the cover.
6. Reinstall the plastic cover and the terminal connectors as described in steps 3–4 of *Cover Removal and Replacement*.

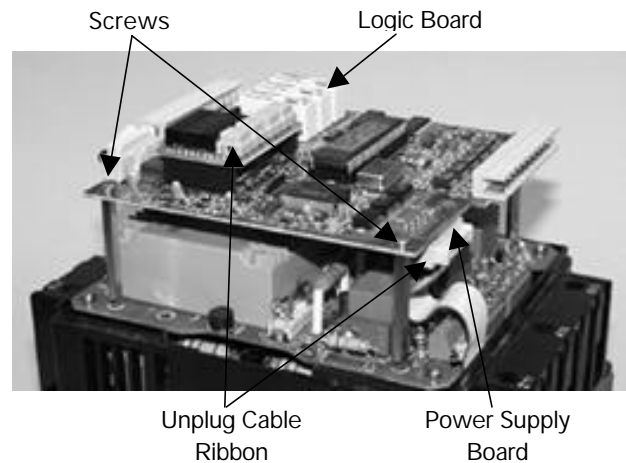


Figure 3. Logic board and part locations.

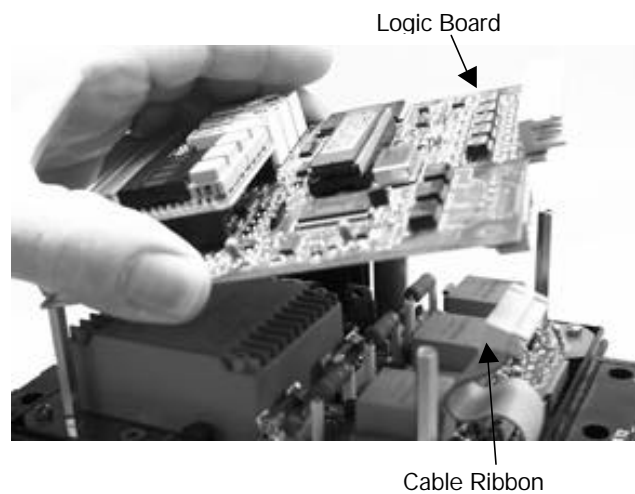


Figure 4. Removing the Logic Board.

## Power Supply Board Replacement

The Power Supply Board is located as shown in Figure 5. It contains gray and orange transformers visible from the sides.

1. Remove the following components:
  - a. The cover, as described in steps 1–2 of *Cover Removal and Replacement*.
  - b. The Logic Board, as described in steps 2–3 of *Logic Board Replacement*.
2. Remove the four screws holding the Power Supply Board to the black plastic housing, as shown in Figure 6.
3. If a yellow-green wire is connected to the bottom of the Power Supply Board, it must be disconnected. Lower the top of the Power Supply Board to view the red and white gate leads to the SCRs, as shown in Figure 7.

**NOTE:** Check the red and white gate wires for a marked number before removing these wires. Each gate wire must have a number corresponding to the terminal numbers (1–12) on the Power Supply Board to facilitate reassembly.

**NOTE:** Vérifier les chiffres sur les fils de porte avant d'enlever ceux-ci. Chaque fil de porte doit avoir un chiffre correspondant aux chiffres de la borne (1–12) sur la plaque de la boîte d'alimentation pour faciliter le réassemblage.

4. With a small screwdriver, remove the red and white gate wires from the small four-point gate Terminal Boards, one on the component side and two on the solder side of the Power Supply Board.

These wires must be reconnected to the new Power Supply Board at the proper number terminals for proper operation of the starter.

5. Lift off the Power Supply Board. Remove and save the hex stand-offs, nuts, and washers from the Power Supply Board for use on the replacement board.
6. Attach the stand-offs to the new Power Supply Board. Place the new Board in position in the ASTAT-IBP.

Power Supply Board      Ribbon Cable

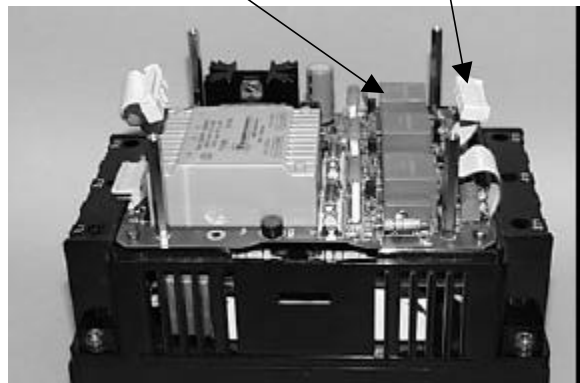


Figure 5. Location of the Power Supply Board.

Screw

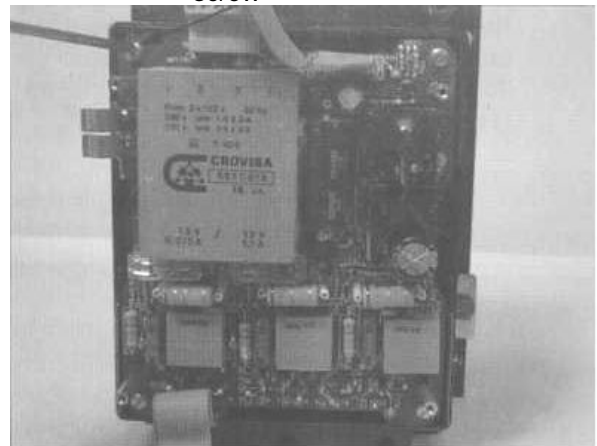
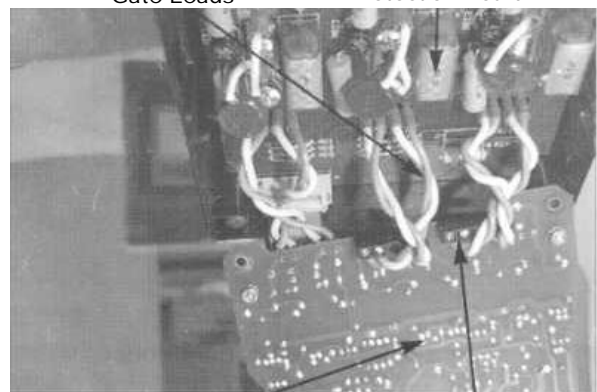


Figure 6. Removing the screws holding the Power Supply Board to the housing.

Gate Leads      Protection Board



Bottom of Power Supply Board      Gate Terminal Board

Figure 7. Gate leads, Power Supply Board, and Protection Board.

# ASTAT® -IBP Plus Service Instructions

7. Reconnect the red and white gate wires to the four-point Terminal Boards, one on the component side and two on the solder side of the Power Supply Board, as illustrated in Figures 8, 9, and 10.
8. Secure the Power Supply Board with the four screws removed earlier.
9. Reinstall the following components:
  - a. The Logic Board, as described in steps 4–5 of *Logic Board Replacement*.
  - d. The cover, as described in steps 3–4 of *Cover Removal and Replacement*.

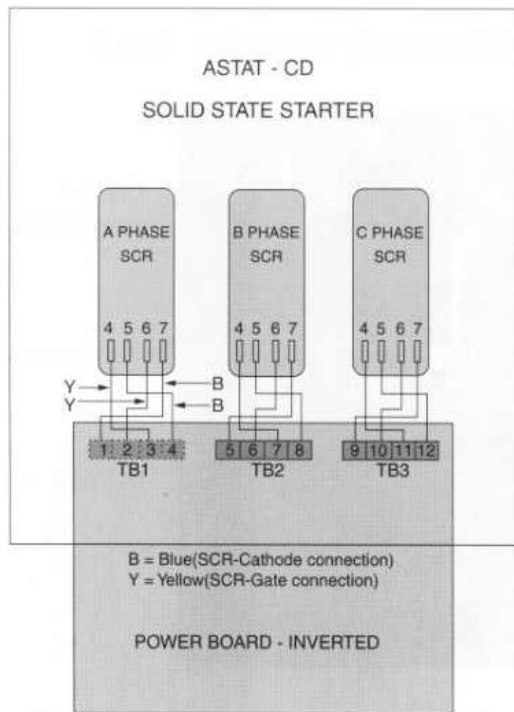


Figure 8. Gate lead connections for sizes K, L, and Y.

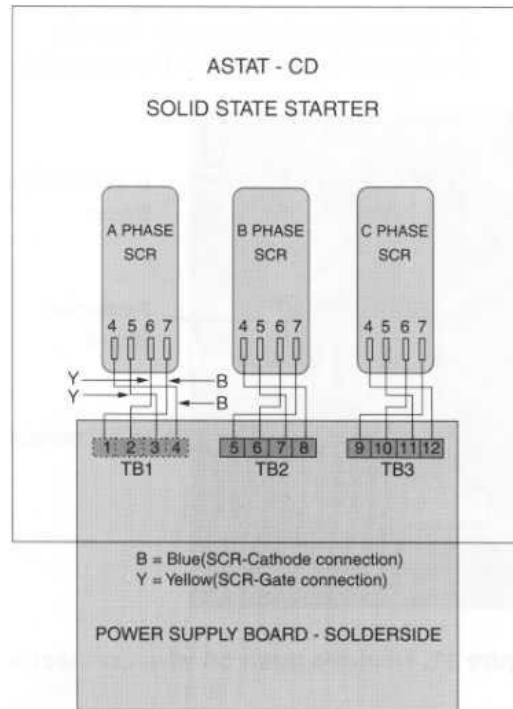


Figure 9. Gate lead connections for sizes M, Z, and N.

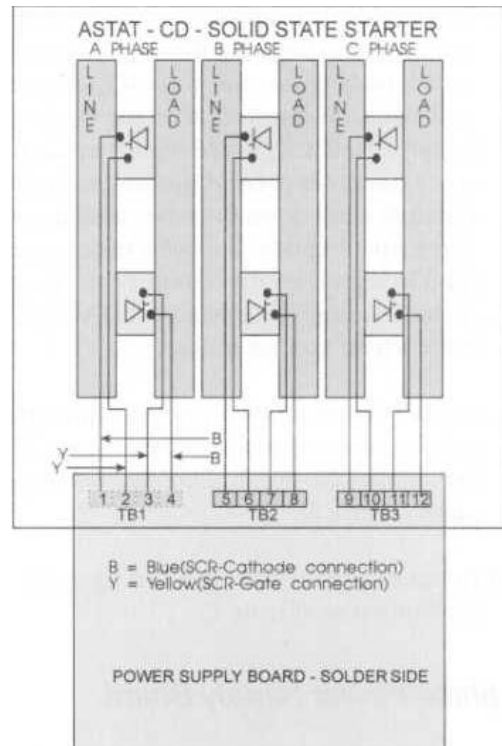


Figure 10. Gate lead connections for sizes P, Q, R, and S.



## Protection Board Replacement

1. Remove the following components:
  - a. The cover, as described in steps 1–2 of *Cover Removal and Replacement*.
  - b. The Logic Board, as described in steps 2–3 of *Logic Board Replacement*.
  - c. The Power Supply Board, as described in steps 2–5 of *Power Supply Board Replacement*.
2. Remove the six wire connectors from the Protection Board, as shown in Figure 11. Note the locations of these terminals for reassembly.
3. Disconnect the four leads from the two current transformers and the two leads from the thermostat connecting to the six-point Terminal Board, located at the top-right edge of the Protection Board. Label these leads to ensure that they are connected to the same terminals on the new Protection Board.
4. Loosen the four screws holding the Protection Board to the housing. Remove the Protection Board from the ASTAT-IBP.
5. Place the new Protection Board in position in the ASTAT-IBP and secure it with the four mounting screws to the housing.
6. Attach the four current transformer leads and the two thermostat leads to the six-point Terminal Board.
7. Attach the six push-on wire connectors to the Protection Board.
8. Reinstall the following components:
  - a. The Power Supply Board, as described in steps 6–9 of *Power Supply Board Replacement*.
  - b. The Logic Board, as described in steps 4–5 of *Logic Board Replacement*.
  - c. The cover, as described in steps 3–4 of *Cover Removal and Replacement*.

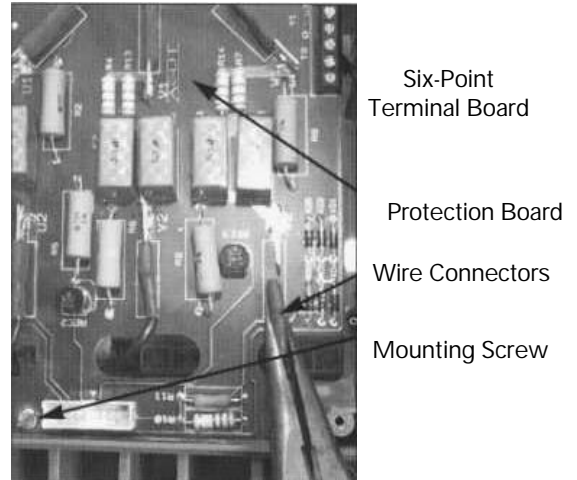


Figure 11. Removing the wire connectors from the Protection Board.

### SCR Module Replacement (Sizes K, L, and Y)

This procedure requires the following tools and materials:

- #2 Phillips-head screwdriver, 3/16" Allen wrench, torque wrench
- Scotchbrite or equivalent abrasive
- Mild solvent to clean mounting surfaces
- Electrolube 2GX or equivalent thermal grease

1. Loosen the screws holding the MOVs and bus bars to the SCR Module to be replaced, as illustrated in Figure 12, and remove the MOVs and bus bars.
2. Remove the mounting screws at each end of the SCR Module, as shown in Figure 13, then lift out the Module. Retain all the parts and hardware removed from the SCR Module for reassembly with the replacement Module.
3. Clean the heat sink surface of the replacement Module with a fine abrasive, such as Scotchbrite. Remove all particles from the heat sink surface and wipe the SCR mounting surface with a mild solvent. Apply a light coat of thermal grease, such as Electrolube 2GX to both the SCR and heat sink surfaces.
4. Place the contact face of the SCR Module on the mating heat sink surface. Move the Module back and forth several times to distribute the thermal grease evenly over the contact surfaces.
5. Attach the SCR Module to the heat sink with the screws removed earlier. Tighten the screws to 44 in-lb.
6. Reattach the bus bars and MOVs to the SCR Module with the screws removed earlier. Tighten the screws to 26 in-lb.

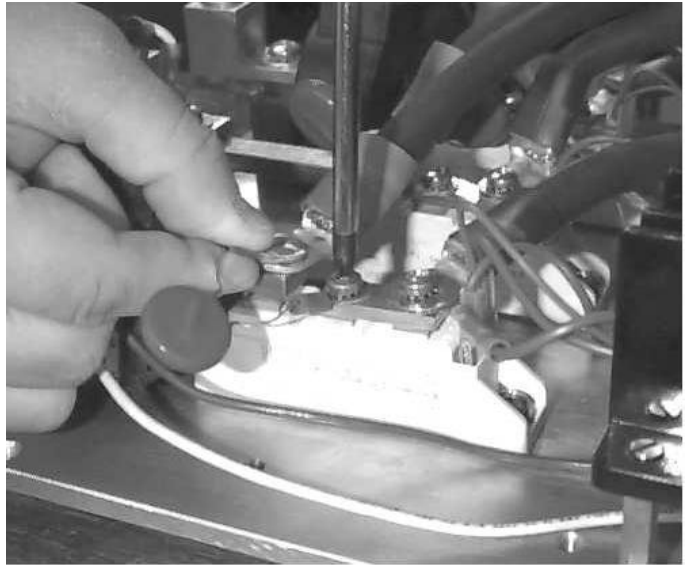


Figure 12. Removing the MOVs and bus bars from an SCR to be replaced.

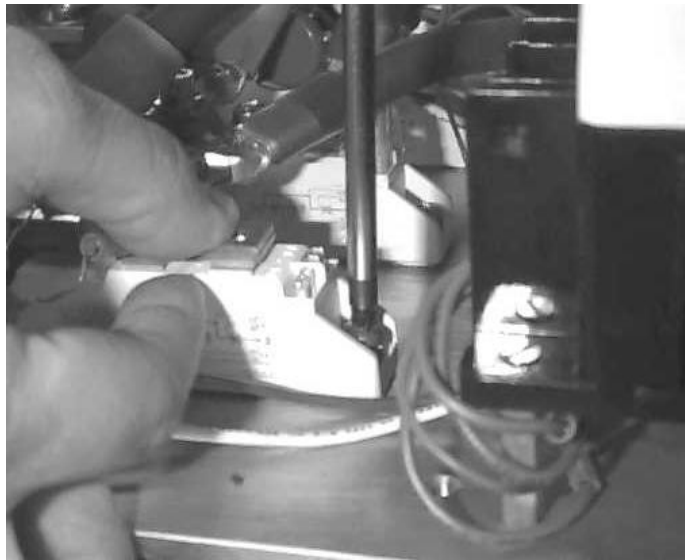


Figure 13. Removing the SCR module.

## SCR Module Replacement (Sizes M, Z, and N)

This procedure requires the following tools and materials:

- #2 Phillips-head screwdriver,  $\frac{3}{16}$ " Allen wrench, torque wrench
  - Scotchbrite or equivalent abrasive
  - Mild solvent to clean mounting surfaces
  - Electrolube 2GX or equivalent thermal grease
1. Loosen the screws holding the MOVs and bus bars to the SCR Module to be replaced, shown in Figure 14, and remove the MOVs and bus bars.
  2. Remove the mounting screws at each end of the SCR Module, then lift out the Module. Retain all parts and hardware removed from the SCR Module for reassembly with the replacement Module.
  3. Clean the heat sink surface of the replacement Module with a fine abrasive, such as Scotchbrite. Remove all particles from the heat sink surface and wipe the SCR mounting surface with a mild solvent. Apply a light coat of thermal grease, such as Electrolube 2GX to both the SCR and heat sink surfaces.
  4. Place the contact face of the SCR Module on the mating heat sink surface. Move the Module back and forth several times to distribute the thermal grease evenly over the contact surfaces.
  5. Attach the SCR Module to the heat sink with the screws removed earlier. Tighten the screws to 44 in-lb.
  6. Reattach the bus bars and MOVs to the SCR Module with the screws removed earlier. Tighten the screws to 80 in-lb.



Figure 14. Location of SCRs on size M, Z, N ASTAT-IBP.

### SCR Module Replacement (Sizes P, Q, and R)

This procedure requires the following tools and materials:

- 1/2" wrench, 3/16" Allen wrench, torque wrench
- Scotchbrite or equivalent abrasive
- Mild solvent to clean mounting surfaces
- Electrolube 2GX or equivalent thermal grease

1. Disconnect the control wiring harness for the SCRs to be replaced. If necessary, disconnect the wiring harness of the CTs.
2. Remove the bolt holding the busbar to the line side of the SCR Module.
3. Remove the bolt holding the CT, spacer, and load-side busbar to the SCR Module, as shown in Figure 15.
4. Remove the four screws holding the SCR Module to the mounting plate, as shown in Figure 16.
5. Lift out the SCR Module, as shown in Figure 17. Retain all parts and hardware for reassembly with the replacement Module.
6. Remove the MOV by disconnecting it at the spade connectors. Attach the MOV to the replacement SCR Module in the same manner.
7. Clean the heat sink surface of the replacement Module with a fine abrasive, such as Scotchbrite. Remove all particles from the heat sink surface and wipe the SCR mounting surface with a mild solvent. Apply a light coat of thermal grease, such as Electrolube 2GX to both the SCR and heat sink surfaces.
8. Place the new SCR Module in the proper position on the mounting surface. Move the Module back and forth several times to evenly distribute the grease on the plate.
9. Secure the SCR Module to the mounting plate with the screws removed earlier. Tighten the screws to 44 in-lb torque.
10. Reattach the busbars, CT, and spacer to the SCR Module with the bolts removed earlier. Tighten the bolts to 150 in-lbs torque.
11. Attach the wiring harness of the new SCR Module to its mating piece. Attach the wiring harness of the CTs, if necessary.



Figure 15. Disconnecting the SCR load side..

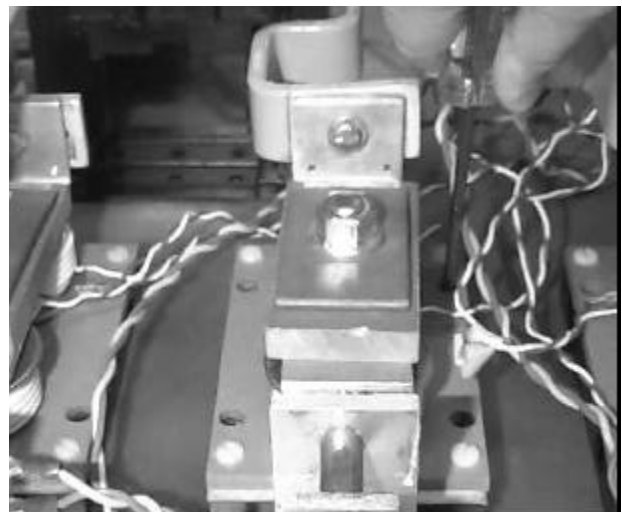


Figure 16. Removing the SCR mounting screws.

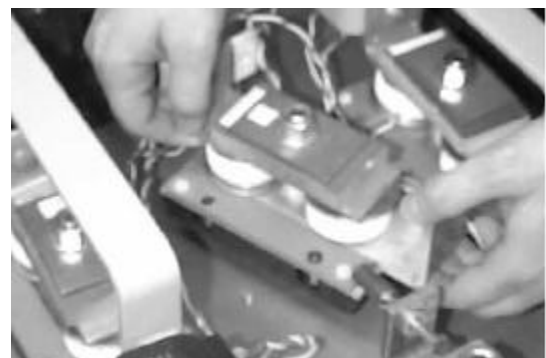


Figure 17. Removing an SCR Module.

## SCR Module Replacement (Size S)

This procedure requires the following tools and materials:

- 9/16" wrench, 11/16" wrench, 3/16" Allen wrench, torque wrench
  - Scotchbrite or equivalent abrasive
  - Mild solvent to clean mounting surfaces
  - Electrolube 2GX or equivalent thermal grease
1. Disconnect the control wiring harness for the SCRs to be replaced. If necessary, disconnect the wiring harness of the CTs.
  2. Remove the bolt holding the busbars connected to the blocks on the load and line sides of the SCR Module, as shown in Figure 18.
  3. Remove the bolt holding the CT, the threaded stud, and the load-side busbar from the Module.
  4. Remove the bolts holding the load-side lug in place. Remove the lug.
  5. Remove the L-shaped busbar and CT, if applicable, from the assembly, as shown in Figure 19.
  6. Remove the four screws holding the SCR Module to the mounting plate, as shown in Figure 20.

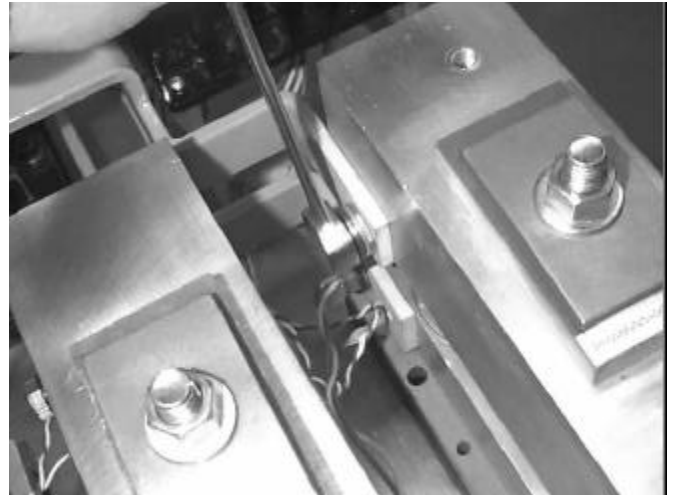


Figure 18. Removing the busbar mounting bolt.

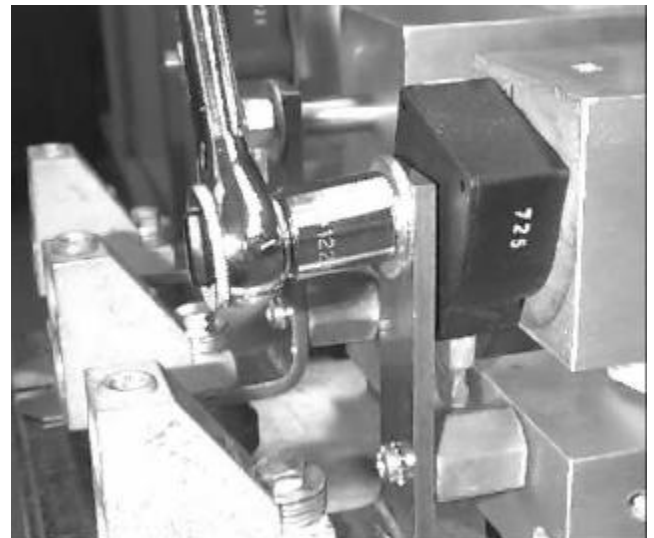


Figure 19. Removing the L-shaped busbar.

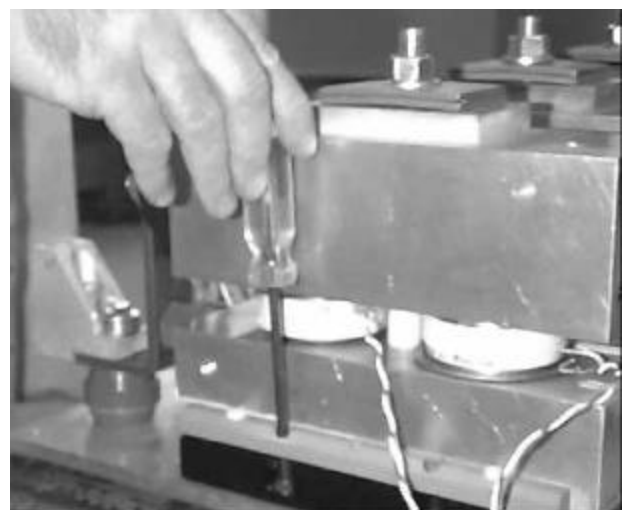


Figure 20. Removing the SCR mounting screws.

7. Lift out the SCR Module, as shown in Figure 21. Retain all parts and hardware for reassembly with the replacement Module.
8. Remove the threaded stud from the SCR Module and attach it to the new Module. Tighten to 200 in-lb torque.
9. Clean the heat sink surface of the replacement Module with a fine abrasive, such as Scotchbrite. Remove all particles from the heat sink surface and wipe the SCR mounting surface with a mild solvent. Apply a light coat of thermal grease, such as Electrolube 2GX to both the SCR and heat sink surfaces.
10. Place the new SCR Module in the proper position on the mounting surface. Move the Module back and forth several times to evenly distribute the grease on the plate.
11. Secure the SCR Module to the mounting plate with the screws removed earlier. Tighten the screws to 44 in-lb torque.
12. Reattach the load-side lug, L-shaped busbar, and CT, if applicable. Tighten the mounting bolts to 200 in-lb torque.
13. Reattach the busbars to the SCR Module. Tighten the mounting bolts to 150 in-lb torque.
14. Attach the wiring harness of the new SCR Module to its mating piece. Attach the harness of the CTs, if necessary.



Figure 21. Removing the SCR Module from the mounting plate..

## Troubleshooting Guide

This guide is provided for troubleshooting and isolating common problems. It does not cover every possible situation. Contact the Customer Support Center at 800-843-3742 if any problem is not resolved by these procedures.

| <b>Symptom or Error &amp; (Error Code)</b>              | <b>Possible Cause</b>   | <b>Measures to Be Taken</b>   |
|---|---|---|
| Display OFF   | No control voltage.<br>Main breaker tripped or fuse blown                                       | Check wire harness and control voltage  |
|   | F1 fuse blown on power supply PCB   | Check and change.   |
|   | Bad connection of flat ribbon wire joining power supply PCB to control PCB                      | Verify connectors.<br>Check power supply board and logic board for 5VDC. Use a DC voltmeter on the power supply board, (-) lead of voltmeter on the top lead of C6 (located next to the black heatsink on the right edge of the power supply board) and the (+) lead of voltmeter on top lead of Diode AD21 or R25 (located on the upper right corner of the power supply board.) |
| Equipment does not respond to STOP / START controls     | F2 fuse blown on power supply PCB   | Check and change.   |
| Frequency error (admits<br>45Hz ≤ f main ≤ 65Hz) (Ex10) | No <b>1L1</b> phase or frequency is out of range  | Check <b>1L1</b> phase and/or mains frequency   |
| Overload trip (Ex11)                                    | Excessive load or excessive current during starting   | Verify overload conditions during starting time and steady state. Check settings in parameters "Nxxx", "Lxxx", and "oxxx"   |
| Synchronism loss (Ex13)                                 | Phase <b>1L1</b> lost   | Check <b>1L1</b> phase  |
| Phase A, B, C thyristor (Ex14)<br>(Ex15)<br>(Ex16)      | Short circuited thyristor   | Check thyristor module.<br>Check ground connections and voltage to ground.<br>Poor ribbon cable connection  |
|   | No output phases  | Check <b>2T1, 4T2</b> and <b>6T3</b> phases   |
| Heatsink thermostat (Ex17)                              | Heatsink thermostat tripped by overheating or defective   | Check for adequate ventilation.<br>Check thermostat and wiring  |
| Motor thermistor(Ex18)                                  | Motor thermistor tripped by overheating or defective  | Check thermistor and wiring, if no thermistor terminal 5 and 6 must be jumpered   |
| Phase A, B, C loss (Ex19)<br>(Ex20)<br>(Ex21)           | No input / output phases  | Check power wire harness for <b>1L1, 3L2, 5L3, 2T1, 4T2</b> and <b>6T3</b>  |
|   | Defective thyristor or ribbon wire harness loose or defective                                   | Verify gate and cathode wire harness.<br>Verify thyristors  |
| Stalled rotor (Ex22)                                    | Equipment detected stalled motor rotor  | Restart equipment and check for an appreciable loss in motor speed at any time  |
| Internal error (Ex23)                                   | Micro-controller malfunction  | Check IC1 and IC8 are correctly inserted in their sockets.<br>Check for noise on control voltage power or line  |
| Long start time (Ex25)                                  | Current limit condition present more than 2 x ta sec. or 240 sec. (ta = acceleration ramp time) | Increase current limit and / or acceleration ramp time  |
| Lock-out (Ex27)   | The time between startings is less than the adjusted in parameter "LKxx"                        | Check if settings are correct.<br>This protection may be disabled   |
| Undervoltage (Ex28)                                     | The line voltage exceeds of limit set in parameters "UVxx" or "OVxx"                            | Check if settings are correct.<br>This protection may be disabled   |
| Overtoltage (Ex29)                                      |   |   |
| Undercurrent (Ex30)                                     | The motor current exceeds of limit set in parameters "UCxx" or "OCxx"                           | Check if settings are correct.  |
| Overcurrent (Ex31)                                      |   | This protection may be disabled   |

**Renewal Parts List**

The following parts and assemblies are available as replacement parts for ASTAT-IBP Solid State Starters. Renewal parts as furnished may not be identical to the original parts since design changes may have been made in the interim. The parts supplied will, however, be interchangeable with the original parts.

| Description   | Where Used     | Catalog Number |           |           | Req. Qty. | List Price, GO-11G |
|---|----------------|----------------|-----------|-----------|-----------|--------------------|
|   |                | Phase 1        | Phase 2   | Phase 3   |           |                    |
| SCR Module  | QI3KDP         | QIX000111      |           |           | 1/phase   | \$117.00           |
|   | QI3LDP         | QIX000112      |           |           | 1/phase   | 117.00             |
|   | QI3YDP         | QIX000113      |           |           | 1/phase   | 117.00             |
|   | QI3MDP         | QIX000114      | QIX000115 | QIX000116 | 1/phase   | 430.00             |
|   | QI3ZDP         | QIX000117      | QIX000118 | QIX000119 | 1/phase   | 430.00             |
|   | QI3NDP         | QIX000120      | QIX000121 | QIX000122 | 1/phase   | 430.00             |
|   | QI3PDP         | QIX000123      | QIX000124 | QIX000125 | 1/phase   | 945.00             |
|   | QI3QDP         | QIX000126      | QIX000127 | QIX000128 | 1/phase   | 945.00             |
|   | QI3RDP         | QIX000129      | QIX000130 | QIX000131 | 1/phase   | 945.00             |
|   | QI3SDP         | QIX000132      | QIX000133 | QIX000134 | 1/phase   | 1,512.00           |
| Bypass Contactor  | QI3(K,L)DP     | QIX000135      |           |           | 1         | 295.00①            |
|   | QI3(Y,M)DP     | QIX000136      |           |           | 1         | 475.00①            |
|   | QI3(Z,N)DP     | QIX000137      |           |           | 1         | 945.00①            |
|   | QI3(P,Q,R)DP   | QIX000138      |           |           | 1         | 1800.00①           |
|   | QI3SDP         | QIX000139      |           |           | 1         | 2700.00            |
| Protection Circuit Board                                | QI3KDP         | QIX000140      |           |           | 1         | 140.00             |
|   | QI3LDP         | QIX000141      |           |           | 1         | 140.00             |
|   | QI3YDP         | QIX000142      |           |           | 1         | 140.00             |
|   | QI3MDP         | QIX000143      |           |           | 1         | 140.00             |
|   | QI3ZDP         | QIX000144      |           |           | 1         | 140.00             |
|   | QI3NDP         | QIX000145      |           |           | 1         | 140.00             |
|   | QI3PDP         | QIX000146      |           |           | 1         | 140.00             |
|   | QI3QDP         | QIX000147      |           |           | 1         | 140.00             |
|   | QI3RDP         | QIX000148      |           |           | 1         | 140.00             |
|   | QI3SDP         | QIX000149      |           |           | 1         | 140.00             |
| Logic Printed Circuit Board with EPROM                  | ALL            | QIX000150      |           |           | 1         | 650.00             |
| Power Supply PCB  | ALL            | QIX000151      |           |           | 1         | 360.00             |
| Current Transformer                                     | QI3KDP         | QIX000154      |           |           | 1/phase   | 40.00              |
|   | ALL Others     | QIX000155      |           |           | 1/phase   | 120.00             |
| MOV (with terminals and insulators)                     | QI3(K,L,Y)DP   | QIX000156      |           |           | 2/phase   | 35.00              |
|   | QI3(M,Z,N)DP   | QIX000157      |           |           | 2/phase   | 35.00              |
|   | QI3(P,Q,R,S)DP | QIX000158      |           |           | 2/phase   | 35.00              |
| Terminal Strip (Logic P.C.B.)                           | All, 12-point  | QIX000159      |           |           | 1         | 16.00              |
| Terminal Strip (Control Power Input to ASTAT)           | All, 5-point   | QIX000160      |           |           | 1         | 10.00              |
| Fuses on Power Supply Board (Bussman Type GMC, 250 Vac) | F2, ALL, 500mA | QIX000161      |           |           | 1         | 3.00               |
|   | F1, ALL, 2A    | QIX000162      |           |           | 1         | 3.00               |
| Ribbon Cable, Top-Logic Board to Power Supply Board     | ALL            | QIX000163      |           |           | 1         | 5.00               |
| Ribbon Cable, Bottom-Logic Board to Protection Board    | ALL            | QIX000164      |           |           | 1         | 6.00               |
| Thermostat  | QC2K,L,M       | QIX000165      |           |           | 1         | 10.00              |
| Plastic Cover-ASTAT-IBP Plus                            | ALL            | QIX000166      |           |           | 1         | 30.00              |

① List Price, GO-10C2.





These instructions do not cover all details or variations in equipment nor do they provide for every possible contingency that may be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise that are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GE Company.

**g**

**GE Industrial Systems**

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*General Electric Company*  
41 Woodford Ave., Plainville, CT 06062

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