GE Industrial Control Systems

# Expander Diode Source Board IS200GGXDG_A_ _



## Safety Symbol Legend

**WARNING** Indicates a procedure, practice, condition, or statement that, if not strictly observed, could result in personal injury or death.

**CAUTION** Indicates a procedure, practice, condition, or statement that, if not strictly observed, could result in damage to or destruction of equipment.

***Note*** Indicates an essential or important procedure, practice, condition, or statement.

## Contents



## Functional Description

The IS200GGXDG_A Expander Diode Source Board (GGXD) provides the fiber-optic and analog feedback hardware needed between the drive's Bridge Interface Control Board (BICI) and a diode source/dynamic braking (DB) circuit. This board is located in the control cabinet.

RS-422 transceivers are used to interface the gating commands and status signals between the BICI board and GGXD board. Fiber-Optic signal interfacing is used between the GGXD board and up to four DB Integrated Gate Commutated Thyristors (IGCTs). The GGXD board receives a high frequency voltage input from the Gate Driver Power Assembly Board (GDPA). Onboard positive 5 (P5) and 12 (P12) V dc power supplies provide power for the RS-422 transceivers, fiber-optic communications, and some monitoring circuits. Seven isolated stab-on type connectors are provided for selective grounding.

The following signals are sent to the Bridge Interface Control board (BICI) from the GGXD board:

- Three current feedback signals from the source current transformers
- An opto-coupled GDPA board power supply OK signal
- An opto-coupled circuit continuity checking signal to ensure that the associated Voltage Feedback Attenuator Board (NATO) is plugged in
  - This signal is not available for an unpowered GGXD board in a non-DB application.

- An opto-coupled onboard P5 OK signal
  - This circuit is not functional in non-DB applications.
- An opto-coupled 115 V OK signal
  - The 115 V control power feeding the GDPA board is monitored.
  - This circuit is not functional in non-DB applications.

## Application Data

The GGXD board includes LED indicators, testpoints, plug connectors, stab-on connectors for wire jumpers, fiber-optic connectors, and adjustable hardware. There are no fuses on the GGXD board.

### Indicators

Three LED indicators display status of the GGXD board as follows: (See Figure 1 for locations.)

- DS1 - ON for P5 OK signal
- DS2 - ON for GDPA OK signal
- DS4 - ON for 115V OK signal

### Testpoints

The GGXD board includes fifteen testpoints for signal monitoring. Most of these can be accessed from the board front. See Figure 1 for locations and Table 3 for descriptions.

### Connectors

The GGXD board contains six 3-terminal connectors for current transformer inputs:

- Phase A Primary TB1, TB2, TB3; See Figure 1 and Table 4.
- Phase A Secondary TB4, TB5, TB6; See Figure 1 and Table 5.
- Phase B Primary TB7, TB8, TB9; See Figure 1 and Table 6.
- Phase B Secondary TB10, TB11, TB12; See Figure 1 and Table 7.
- Phase C Primary TB13, TB14, TB15; See Figure 1 and Table 8.
- Phase C Secondary TB16, TB17, TB18; See Figure 1 and Table 9.

The GGXD board contains three 2-terminal connectors for CT burden resistor inputs (user):

- TB19, TB20 - Phase A CT burden resistor inputs, See Figure 1 and Table 10.
- TB21, TB22 - Phase B CT burden resistor inputs, See Figure 1 and Table 11.
- TB23, TB24 - Phase C CT burden resistor inputs, See Figure 1 and Table 12.

The following connectors are also included on the GGXD board:

- Connector J1 (20 pin) is the input connector from the Voltage Feedback Attenuator Board (NATO). See Figure 1 and Table 13.
- Connector J2 (6 pin) is the input connector for power from the Gate Driver Power Assembly Board (GDPA). It also receives the GDPA OK signal that is displayed by DS2. See Figure 1 and Table 14.
- Connector J3 (2 pin) is the input connector for monitoring the 115 V ac control power feeding the GDPA boards. See Figure 1 and Table 15.
- Connector PSRC (50 pin) is an input/output (I/O) connector with the Bridge Interface Controller Board (BICI). See Figure 1 and Table 16.

Four duplex receive/transmit fiber-optic connectors (DB1, DB2, DB3, DB4) are included on the GGXD board for firing commands/ status feedback of the DB IGCTs. Receiver connectors are blue and the transmit connectors are gray. See Figure 1 and Table 17.

### Adjustable Hardware

Berg and wire jumpers are used on the GGXD board.

Berg jumpers JP1, JP2, and JP3 are 2 pin jumpers used for burden resistor selection for the current transformers (CT). See Figure 1 for jumper location and Table 1 for the setting descriptions.

*Table 1. Berg Jumpers*

| Jumper | Jumper Position | |
|---|---|---|
| JP1 | Jumper In:<br>Jumper Out: | 100 Ω CT A burden<br>User burden selection for CT A |
| JP2 | Jumper In:<br>Jumper Out: | 100 Ω CT B burden<br>User burden selection for CT B |
| JP3 | Jumper In:<br>Jumper Out: | 100 Ω CT C burden<br>User burden selection for CT C |

Wire jumpers are used on the isolated ground stabs, E1 through E7. These stabs provide selective grounding. See Table 2 for identification and description. The jumper settings are typically as follows:

- In normal operation E1 and E4 are jumpered together.
- E2 and E5 are jumpered together.
- Typically, E3 and E6 are not jumpered together.
- E7 is always tied to chassis.

*Table 2. Wire Jumpers (Ground)*

| Stab # | Nomenclature | Description |
|---|---|---|
| E1 | DCOM | Digital common |
| E2 | LCOM | Local analog common |
| E3 | DCOM | Digital common |
| E4 | CHAS | Chassis |
| E5 | CHAS | Chassis |
| E6 | DCOMX | DCOM from control rack |
| E7 | CHAS | Chassis |

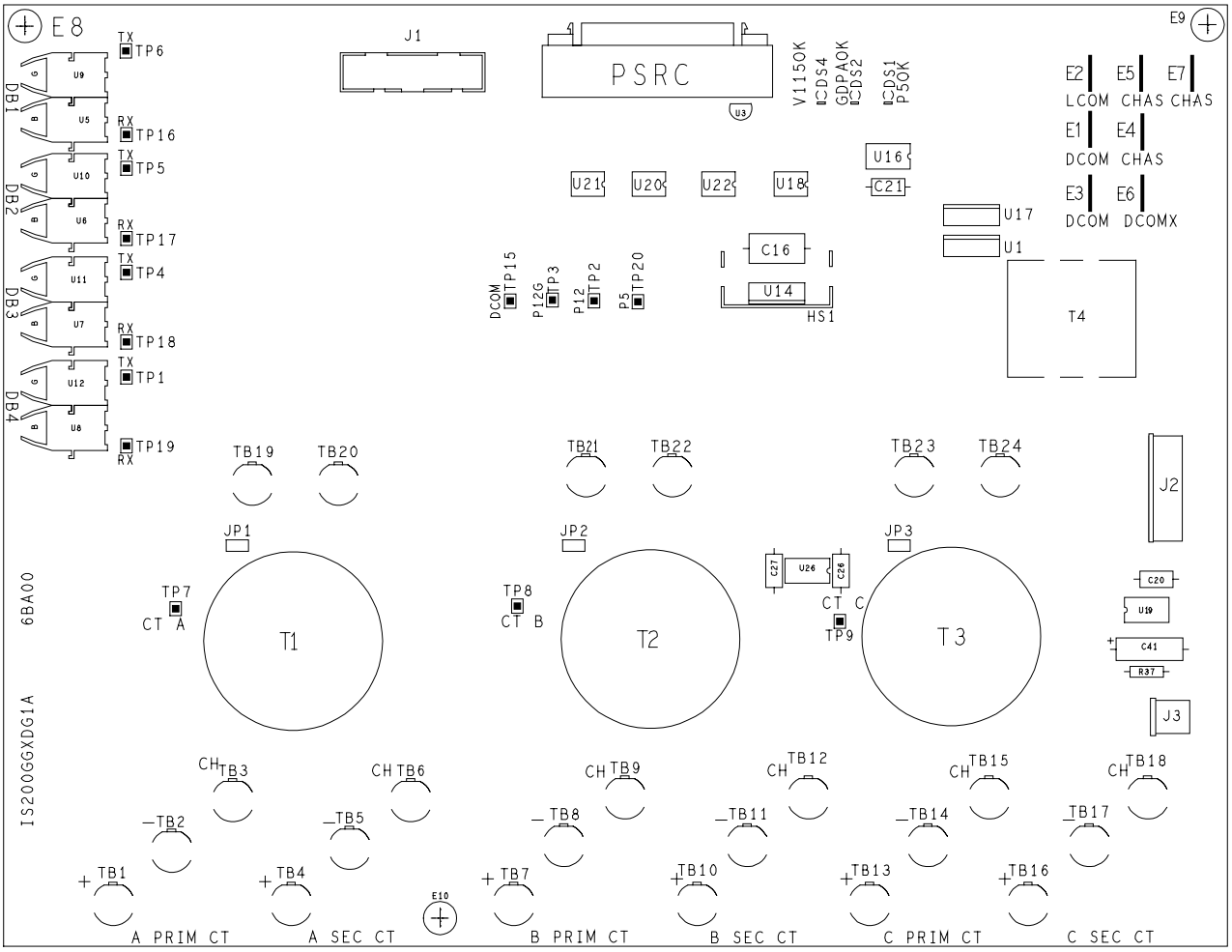


*Figure 1. GGXD Board Layout*

*Table 3. Testpoints*

| Name | Nomenclature | Description |
|---|---|---|
| TP1 | DB4-TX | DB4 Gating Command (Dynamic Brake IGCT) |
| TP2 | P12 | 12 V dc |
| TP3 | P12G | 12 V dc for gating circuits (switched) |
| TP4 | DB3-TX | DB3 gating command (Dynamic Brake IGCT) |
| TP5 | DB2-TX | DB2 gating command (Dynamic Brake IGCT) |
| TP6 | DB1-TX | DB1 gating command (Dynamic Brake IGCT) |
| TP7 | CT A | Current difference between Phase A CT primary and secondary |
| TP8 | CT B | Current difference between Phase B CT primary and secondary |
| TP9 | CT C | Current difference between Phase C CT primary and secondary |
| TP15 | DCOM | Signal common |
| TP16 | DB1-RX | DB1 Status Feedback (Dynamic Brake IGCT) |
| TP19 | DB2-RX | DB2 Status Feedback (Dynamic Brake IGCT) |
| TP18 | DB3-RX | DB3 Status Feedback (Dynamic Brake IGCT) |
| TP19 | DB4-RX | DB4 Status Feedback (Dynamic Brake IGCT) |
| TP20 | P5 | Positive 5 V dc |

*Table 4. GGXD Board Input To Phase A Current Transformer Primary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB1 | A PRI CT (+) | Phase A primary side CT positive terminal connection |
| TB2 | A PRI CT (–) | Phase A primary side CT negative terminal connection |
| TB3 | CHAS | Chassis ground |

*Table 5. GGXD Board Input To Phase A Current Transformer Secondary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB4 | A SEC CT (+) | Phase A secondary side CT positive terminal connection |
| TB5 | A SEC CT (–) | Phase A secondary side CT negative terminal connection |
| TB6 | CHAS | Chassis ground |

*Table 6. GGXD Board Input To Phase B Current Transformer Primary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB7 | B PRI CT (+) | Phase B primary side CT positive terminal connection |
| TB8 | B PRI CT (–) | Phase B primary side CT negative terminal connection |
| TB9 | CHAS | Chassis ground |

*Table 7. GGXD Board Input To Phase B Current Transformer Secondary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB10 | B SEC CT (+) | Phase B secondary side CT positive terminal connection |
| TB11 | B SEC CT (–) | Phase B secondary side CT negative terminal connection |
| TB12 | CHAS | Chassis ground |

*Table 8. GGXD Board Input To Phase C Current Transformer Primary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB13 | C PRI CT (+) | Phase C primary side CT positive terminal connection |
| TB14 | C PRI CT (–) | Phase C primary side CT negative terminal connection |
| TB15 | CHAS | Chassis ground |

*Table 9. GGXD Board Input To Phase C Current Transformer Secondary Circuit*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| TB16 | C SEC CT (+) | Phase C secondary side CT positive terminal connection |
| TB17 | C SEC CT (–) | Phase C secondary side CT negative terminal connection |
| TB18 | CHAS | Chassis ground |

*Table 10. GGXD Board User Burden Resistor Input To Phase A Current Transformer*

| Pin No. | Definition |
|---|---|
| TB19 | User burden resistor input for phase A CT |
| TB20 | User burden resistor input for phase A CT |

*Table 11. GGXD Board User Burden Resistor Input To Phase B Current Transformer*

| Pin No. | Definition |
|---|---|
| TB21 | User burden resistor input for phase B CT |
| TB22 | User burden resistor input for phase B CT |

*Table 12. GGXD Board User Burden Resistor Input To Phase C Current Transformer*

| Pin No. | Definition |
|---|---|
| TB23 | User burden resistor input for phase C CT |
| TB24 | User burden resistor input for phase C CT |

*Table 13. Connector J1, GGXD Board Input From Voltage Feedback Scaling Board (NATO)*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| 1 | LCOM | Signal common |
| 2 | NC | No connect |
| 3 | LCOM | Signal common |
| 4 | SRCVAS | Phase A voltage from attenuator |
| 5 | LCOM | Signal common |
| 6 | SRCVBS | Phase B voltage from attenuator |
| 7 | LCOM | Signal common |
| 8 | SRCVCS | Phase C voltage from attenuator |
| 9 | LCOM | Signal common |
| 10 | VDBR1S | Dynamic brake resistor positive voltage from attenuator |
| 11 | LCOM | Signal common |
| 12 | VDBR2S | Dynamic brake resistor negative voltage from attenuator |
| 13 | LCOM | Signal common |
| 14 | NATO CBL CHK | NATO board cable-in-place indication |
| 15 | LCOM | Shield |
| 16 | LCOM | Shield |
| 17 | LCOM | Shield |
| 18 | LCOM | Shield |
| 19 | LCOM | Signal common |
| 20 | NC | No connect |

*Table 14. Connector J2, GGXD Board Input From Gate Driver Power Assembly Board (GDPA)*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| 1 | GDPA1 0K P | Ok signal from GDPA board (positive) |
| 2 | GDPA1 0K N | Ok signal from GDPA board (negative) |
| 3 | NC | No connect |
| 4 | HF1-1 | Input power to GGXD board, 48 V ac, 27 kHz |
| 5 | NC | No connect |
| 6 | HF2-1 | Input power to GGXD board, 48 V ac, 27 kHz |

*Table 15. Connector J3, GGXD I/O to Gate Driver Power Assembly*

| Pin No. | Nomenclature | Definition |
|---|---|---|
| 1 | V115V | Senses input voltage to GDPA board |
| 2 | V115R | Senses input voltage to GDPA board |

*Table 16. Connector PSRC, GGXD I/O With Bridge Interface Controller Board (BIC_)*

| Pin No. | I/O | Nomenclature | Description |
|---|---|---|---|
| 1 | Output | NATOCHKS | NATO board cable-in-place signal send indication, 0 = OK |
| 2 | Output | ACTP | Phase A current inbalance between CT primary and secondary |
| 3 | Output | BCTP | Phase B current inbalance between CT primary and secondary |
| 4 | Output | CCTP | Phase C current inbalance between CT primary and secondary |
| 5 | Output | SRCVAS | Phase A voltage from attenuator |
| 6 | Output | SRCVBS | Phase B voltage from attenuator |
| 7 | Output | SRCVCS | Phase C voltage from attenuator |
| 8 | Output | VDBR1S | Dynamic brake resistor positive voltage from attenuator |
| 9 | Output | VDBR2S | Dynamic brake resistor negative voltage from attenuator |
| 10 | ------ | SPR1P | Spare pin |
| 11 | ------ | SPR2P | Spare pin |
| 12 | Input | DB1GP | Dynamic brake (DB) IGCT #1 gate signal |
| 13 | Input | DB2GP | Dynamic brake (DB) IGCT #2 gate signal |
| 14 | Input | DB3GP | Dynamic brake (DB) IGCT #3 gate signal |
| 15 | Input | DB4GP | Dynamic brake (DB) IGCT #4 gate signal |
| 16 | Output | DB1SP | Positive RS-422TX Dynamic brake (DB) IGCT #1 gate status |
| 17 | Output | DB2SP | Positive RS-422TX Dynamic brake (DB) IGCT #2 gate status |
| 18 | Output | DB3SP | Positive RS-422TX Dynamic brake (DB) IGCT #3 gate status |
| 19 | Output | DB4SP | Positive RS-422TX Dynamic brake (DB) IGCT #4 gate status |
| 20 | Input | DCOMX | DCOM from BICI board |
| 21 | Input | DCOMX | DCOM from BICI board |
| 22 | Output | GDPA OK | GDPA power supply board OK |
| 23 | Output | CPOKS | 115 V status 0 = OK |
| 24 | Output | P5 CHK | 5 V power supply monitor |
| 25 | Input | BRDIDS | GGXD board identification |
| 26 | Output | NATOCHKR | NATO board cable-in-place signal receive indication, 0 = OK |
| 27 | Output | ACTN | Return for ACTP |
| 28 | Output | BCTN | Return for BCTP |
| 29 | Output | CCTN | Return for CCTP |
| 30 | Input | DCOMY | DCOM from BICI board |
| 31 | Input | DCOMY | DCOM from BICI board |
| 32 | Input | DCOMY | DCOM from BICI board |
| 33 | Input | DCOMY | DCOM from BICI board |
| 34 | Input | DCOMY | DCOM from BICI board |
| 35 | ------ | SPR1N | Spare pin |
| 36 | ------ | SPR2N | Spare pin |

*Table 16. Connector PSRC, GGXD I/O With Bridge Interface Controller Board (BIC_) – Continued*

| Pin No. | I/O | Nomenclature | Description |
|---|---|---|---|
| 37 | Input | DB1GN | Return for DB1GP |
| 38 | Input | DB2GN | Return for DB2GP |
| 39 | Input | DB3GN | Return for DB3GP |
| 40 | Input | DB4GN | Return for DB4GP |
| 41 | Output | DB1SN | Return for DB1SP |
| 42 | Output | DB2SN | Return for DB2SP |
| 43 | Output | DB3SN | Return for DB3SP |
| 44 | Output | DB4SN | Return for DB4SP |
| 45 | Input | DCOMX | DCOM from BIC_ board |
| 46 | Input | DCOMX | DCOM from BIC_ board |
| 47 | Output | GDPA OK R | GDPA board OK |
| 48 | Output | CPOK R | Return for CPOKS |
| 49 | Output | P5 CHK R | Return for P5 checks |
| 50 | Input | BRDID R | Return for BRDIDS (GGXD board identification) |
| 51 | ------ | NC | No connect |
| 52 | ------ | NC | No connect |

*Table 17. Fiber-Optic Connectors, GGXD I/O With Dynamic Braking IGCTs*

| Connector | I/O | Description |
|---|---|---|
| DB1-TX | Output | Gating command to DB1 IGCT, Light = Fire cell |
| DB1-RX | Input | Status feedback from DB1 IGCT, Light = IGCT OK |
| DB2-TX | Output | Gating command to DB2 IGCT, Light = Fire cell |
| DB2-RX | Input | Status feedback from DB2 IGCT, Light = IGCT OK |
| DB3-TX | Output | Gating command to DB3 IGCT, Light = Fire cell |
| DB3-RX | Input | Status feedback from DB3 IGCT, Light = IGCT OK |
| DB4-TX | Output | Gating command to DB4 IGCT, Light = Fire cell |
| DB4-RX | Input | Status feedback from DB4 IGCT, Light = IGCT OK |

# Renewal/Warranty Replacement

## How to Order a Board

When ordering a replacement board for a GE drive, you need to know:

- How to accurately identify the part
- If the part is under warranty
- How to place the order

This information helps ensure that GE can process the order accurately and as soon as possible.

### Board Identification

A printed wiring board is identified by an alphanumeric **part (catalog) number** located near its edge. Figure 2 explains the structure of the part number.

The board's functional acronym, shown in Figure 2, normally is based on the **board description**, or name. For example, the *GGXD* board is described as the *Expander Diode Source* board.

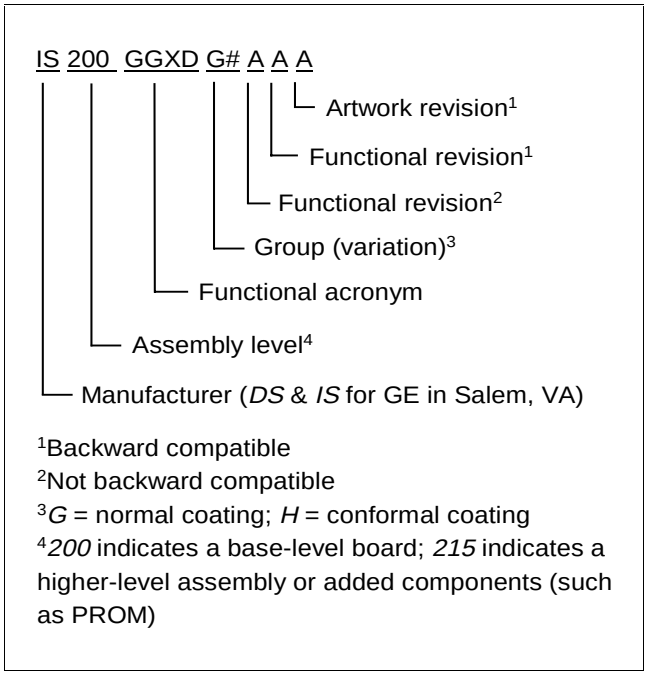


*Figure 2. Board Part Number Conventions*

### Warranty Terms

The GE *Terms and Conditions* brochure details product warranty information, including **warranty period** and **parts and service coverage**. The brochure is included with customer documentation. It may be obtained separately from the nearest GE Sales Office or authorized GE Sales Representative.

### Placing the Order

Parts still under **warranty** may be obtained directly from the factory:

GE Industrial Control Systems
Product Service Engineering
1501 Roanoke Blvd.
Salem, VA 24153-6492 USA
Phone: + 1 540 387 7595
Fax: + 1 540 387 8606
*("+" indicates the international access code required when calling from outside of the USA.)*

**Renewals** (spares or those not under warranty) should be ordered by contacting the nearest GE Sales or Service Office. Be sure to include:

- Complete part number and description
- Drive serial number
- Drive Material List (ML) number

### Note

**All digits are important when ordering or replacing any board.**

**The factory may substitute later versions of boards based on availability and design enhancements. However, GE Industrial Control Systems ensures backward compatibility of replacement boards.**

## How to Replace the Board

### Handling Precautions

**CAUTION**

**To prevent component damage caused by static electricity, treat all boards with static sensitive handling techniques.**

Printed wiring boards may contain static-sensitive components. Therefore, GE ships all replacement boards in antistatic bags. Use the following guidelines when handling boards:

1. Store boards in antistatic bags or boxes.
2. Use a grounding strap when handling boards or board components.

### Replacement Procedures

**WARNING**

**To prevent electric shock, turn off power to the board, then test to verify that no power exists in the board before touching it or any connected circuits.**

**CAUTION**

**To prevent equipment damage, do not remove, insert, or adjust board connections while power is applied to the equipment.**

Remove the board as follows:

1. Make sure that the drive in which the board resides has been de-energized.
2. Open the drive's cabinet door. Using equipment designed for high voltages, test any electrical circuits **before touching them** to ensure that power is off.
3. Carefully disconnect all cables from the GGXD board as follows:
   - Verify cables are labeled with the correct connector name (as marked on the board) to simplify reconnection.
   - For ribbon cables, grasp each side of the cable connector that mates with the board connector and gently pull the cable connector loose.
   - For cables with pull tabs, carefully pull the tab.
   - For screw terminal connections, loosen the screw and remove the wire.
4. Carefully remove the board, as follows:
   a. Take note of all the hardware settings and the orientation of the board.
   b. Remove the 11 mounting screws.
      – Be careful with the eight plastic standoffs and the three metal standoffs with star washers.
      – As the screws are removed, catch the standoffs and star washers.
      – Remember that the star washers are paired with the metal standoffs

**CAUTION**

**Avoid dropping any hardware into the unit. Loose material within the unit could potentially cause damage.**

Install the new (replacement) board as follows:

1. Check that the hardware settings on the new board are the same as on the removed board. Adjust hardware settings if necessary.
2. Orient the new GGXD board in the same position as the removed board.

3. Install the GGXD board with 11 mounting screws on eight plastic standoffs and the three metal standoffs.
   - The star washers are to be used with the three metal standoffs.
   - Tighten the screws to hold the board securely in place.

**CAUTION**

**Be sure the star washers are seated against the metal surface with the metal standoffs, not with the plastic standoffs. The metal standoffs and star washers make a protective circuit shunting accidental high voltage to ground.**

4. Reconnect all electrical connections.

*Notes:*

***GE Industrial Control Systems***

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