GE Industrial Systems

IGCT Exciter Bridge Interface Board IS200EXIBG_A_ _

Safety Symbol Legend

Warning

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

Caution

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

Note Indicates an essential or important procedure or statement.

These instructions do not purport to cover all details or variations in equipment, nor to provide every possible contingency to be met during installation, operation, and maintenance. If further information is desired or if particular problems arise that are not covered sufficiently for the purchaser's purpose, the matter should be referred to GE Industrial Systems.

Section **Page**

Functional Description

The IS200EXIB Exciter Bridge Interface Board (EXIB) provides most of interface functions between the Innovation Series™ Medium Voltage - SP Drive's exciter bridge and the IS200EXIC Exciter Control Interface Board (EXIC). The only exception is the input from the bridge ambient temperature thermistor that connects directly to the EXIC board. EXIB board functions include ac and dc voltage feedback, current feedback, metal oxide varistor (MOV) fuse loss detection, and SCR gating (including overvoltage gating). The EXIB board is mounted on the backside of the hinged panel that the EXIC board is mounted on. The board is used in both the 3300 V and 6600 V versions of the drive.

Innovation Series is a trademark of General Electric Company, USA

Voltage Feedbacks

Five discrete wired ac and dc inputs are connected to vertical stab connectors. Ac inputs VA, VB and VC are V line-to-line signals that range from 240 – 600 V rms (nominal), 50/60 Hz. Dc inputs VP and VN maximum voltage level is determined by the potential of VA, VB, and VC.

Five identical voltage feedback signal conditioning circuits are provided for the five voltage feedback inputs. The circuits consist of resistive voltage divider networks with each network referenced to chassis ground. The five analog voltage feedback output signals (proportional to ac and dc bridge voltages) are sent to the EXIC board through a multi-conductor cable, J1.

Current Feedback

Exciter field current feedback is fed to the EXIB board through a discrete-wired connector, J2. This input signal is generated by a dc current shunt connected in series with the positive dc output terminal of the exciter bridge. The shunt signal is conditioned by a noise filter, voltage amplifier, and voltage-frequency converter.

Shunt Scaling

The shunt output is 100 mV when the shunt current magnitude = 100% of its rating. (Current flows through the shunt in one direction only.)

Feedback Signal Description

Voltage-to-frequency converters are used to produce two logic level feedback signals, current feedback and timed overcurrent model feedback, whose frequencies are proportional to the shunt current of the SCR bridge. These signals are connected to the EXIC board through a multi-conductor cable, J1.

The current feedback signal provides feedback to the field current regulator and has a range of approximately 2.5 PU = 2 MHz.

The timed overcurrent model feedback signal has twice the range of the current feedback signal, or approximately 5.0 PU = 2 MHz.

MOV Fuse Loss Detection

Three metal oxide varistors (MOV) are located in the SCR bridge and connected across the 3-phase ac line. These MOVs have protective fuses in their input lines to detect the failure of any of these fuses. Three signals from the load side of the three fuses are sent as discrete inputs to the EXIB board through vertical stab connectors.

Ac inputs VMA, VMB and VMC are line-to-line voltage signals that range from 240 – 600 V rms (nominal), 50/60 Hz. If any one of the three fuses should fail, a fuse loss detection circuit on the EXIB board causes a logic signal to the EXIC board to change state thus indicating the fuse loss. This logic signal is sent through a multi-conductor cable, J1.

SCR Gate Power

Six SCR gate firing commands from the EXIC Board (TTL logic signals, GATE1C – GATE6C) are connected to the EXIB board through a multi-conductor cable, J1. Six isolated SCR gate pulse amplifier circuits are provided. Each circuit has a 12 Ω load line with 24 volts peak open circuit and 2.0 amps peak short circuit.

Six SCR gate power output signals, GATE1 – GATE6, are connected the SCRs through six individual 3-pin connectors, J3 – J8.

Overvoltage Protection

Passive overvoltage protection is provided for one phase of the bridge (consisting of one positive and one negative SCR). If an SCR's forward voltage reaches 1400 V peak, gate current is applied to that SCR. Energy for this gate current is derived from the bridge ac input voltage and does not require the control power input be energized.

Power Supply Inputs and Outputs

One single-phase step-down control power transformer (CPT) per exciter is mounted externally to provide isolated power to both the EXIB and EXIC boards. The CPT secondary is center-tapped and its secondary voltage is rectified into unregulated ± 24 volts dc. This unregulated ±24 V dc input to the EXIB board is through a 4 -pin connector, J12.

The EXIB board provides the following control power outputs to the EXIC board through a discrete-wired connector, J15:

- +5.0 V dc (±0.1 V) @ 2 amps
- +24.0 V dc (±0.25 V) @ 0.11 amps
- –24.0 V dc (±0.25 V) @ 0.11 amps

Application Data

The EXIB board has no fuses or adjustable hardware. The board has LED indicators, test rings, and testpoints for power supply and signal diagnostic purposes.

Thirty-five testpoints provide signal access to connector J1 I/O signals, gate current amplifier signals, and isolated shunt amplifier input signals for diagnostic purposes. Twelve additional test rings provide access to power supply signals.

Nine LED indicators provide visual indication of power supply status, isolated power supply status, SCR gate pulses, and MOV fuse loss.

The EXIB board also has ten plug connectors and nine stab-on connectors for signal interfacing. One vertical stab-on connector, E9, provides grounding to chassis. See Figure 1 for the locations of these devices. Refer to the following tables for device descriptions: (Individual testpoints and test rings are not shown on Figure 1.)

Table	Description
1	LED Indicators
2	Testpoints and Test Rings
3	Stab-on Connectors
4	J1 EXIC Board Interface Connector
5	J2 Dc Shunt Input Connector
6	J3 – J8 Gate Power Output Connectors
7	J12 Power Supply Input Connector
8	J15 Power Connector (to EXIC board)

Table 1. EXIB Board LED Indicator Descriptions

LED	Color	Mnemonic	Description
DS31	Yellow	G1	SCR1 gate pulse indicator - ON when SCR gate power on
DS32	Yellow	G2	SCR2 gate pulse indicator - ON when SCR gate power on
DS33	Yellow	G3	SCR3 gate pulse indicator - ON when SCR gate power on
DS34	Yellow	G4	SCR4 gate pulse indicator - ON when SCR gate power on
DS35	Yellow	G5	SCR5 gate pulse indicator - ON when SCR gate power on
DS36	Yellow	G6	SCR6 gate pulse indicator - ON when SCR gate power on
DS41	Red	MNOK	MOV fuse failure indicator - ON when fuse has failed
DS42	Green	MOK	MOV fuse OK indicator - ON when fuse is OK
DS43	------	------	Surge arrestor - May flash occasionally in normal operation
DS44	Green	PSOK	Power supply indicator - ON when OK
DS71	Green	PSHOK	Isolated power supply indicator - ON when OK

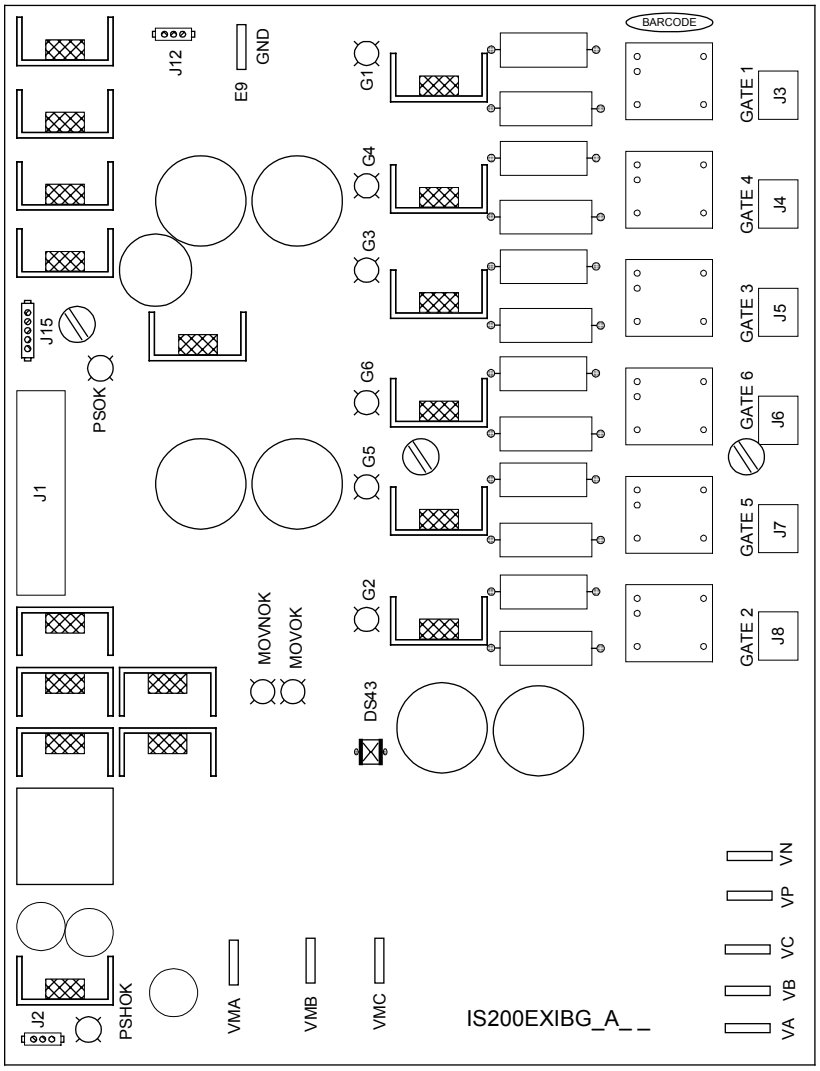


Figure 1. EXIB Board Layout Diagram

Warning

All testpoints with an H suffix (marked with an * in Table 2) are floating at high potential above ground. Do not ground these testpoints.

Table 2. EXIB Board Testpoint and Test Ring Descriptions

Testpoint	Mnemonic	Description
TP21	4MHZH*	Isolated current feedback clock
TP22	SHNH*	Negative current shunt input
TP23	SHPH*	Positive current shunt input
TP24	SHX20H*	Current feedback (mv) x 20
TP25	FIFBH*	Frequency-converted current feedback
TP26	FTOCH*	Frequency-converted timed overcurrent feedback
TP41	VMA5	MOV fuse loss phase A feedback
TP42	VMB5	MOV fuse loss phase B feedback
TP43	VMC5	MOV fuse loss phase C feedback
TP44	OAOK	MOV fuse loss, phase A – phase B
TP45	OBOK	MOV fuse loss, phase B – phase C
TP46	OMOVOK	MOV fuse failure
TP52	VA1R	Voltage feedback phase A return
TP53	VB1R	Voltage feedback phase B return
TP54	VC1R	Voltage feedback phase C return
TP55	VP1R	Voltage feedback positive bus return
TP56	VN1R	Voltage feedback negative bus return
TP71	P12	Positive 12 V dc power supply (test ring)
TP72	P12H*	Positive 12 V dc power supply for isolated shunt input amplifier
TP73	COMH*	Isolated shunt input amplifier power supply common
TP74	N12H*	Negative 12 V dc power supply for isolated shunt input amplifier
TP75	P5H*	Positive 5 V dc power supply for isolated shunt input amplifier
TP101	VBOC	Development test use only - *Do not measure* (test ring)
TP102	VBONC	Development test use only - *Do not measure* (test ring)
TP103	VBOG5G	Development test use only - *Do not measure* (test ring)
TP104	VBON	Development test use only - *Do not measure* (test ring)
TP105	VBONB	Development test use only - *Do not measure* (test ring)
TP106	VBOG2G	Development test use only - *Do not measure* (test ring)
TP502	VA1	Voltage feedback output, phase A
TP503	VB1	Voltage feedback output, phase A
TP504	VC1	Voltage feedback output, phase A
TP505	VP1	Voltage feedback output, positive
TP506	VN1	Voltage feedback output, negative

Table 2. EXIB Board Testpoint and Test Ring Descriptions — continued

Testpoint	Mnemonic	Description
TP507	DCOM	Digital common
TP508	MOV	MOV fuse status (low = fuse OK)
TP509	IFB	Current feedback output
TP510	ITOC	Timed overcurrent feedback output
TP511	PSOK	Power supply OK
TP512	G1C	Gate command input, SCR1
TP513	G2C	Gate command input, SCR2
TP514	G3C	Gate command input, SCR3
TP515	G4C	Gate command input, SCR4
TP516	G5C	Gate command input, SCR5
TP517	G6C	Gate command input, SCR6
TP601	AC1	20 V ac power input 1 (test ring)
TP602	PCOM	20 V ac power input common (test ring)
TP603	AC2	20 V ac power input 2 (test ring)
TP604	P24	Positive 24 V dc power supply (test ring)
TP605	N24	Negative 24 V dc power supply (test ring)
TP611	P5VSW	Positive 5 V dc switching regulator output
TP612	P5	Positive 5 V dc power supply (test ring)
TP613	DCOM	Digital common (test ring)

Table 3. EXIB Board Stab-on Connector Descriptions

Stab-on	Nomenclature	Description
E1	VA	Phase A voltage feedback from SCR bridge, 240–600 V, 50/60 Hz
E2	VB	Phase B voltage feedback from SCR bridge, 240–600 V, 50/60 Hz
E3	VC	Phase C voltage feedback from SCR bridge, 240–600 V, 50/60 Hz
E4	VP	Positive dc voltage feedback from SCR bridge
E5	VN	Negative dc voltage feedback from SCR bridge
E6	VMA	Phase A voltage feedback from MOV fuses, 240–600 V, 50/60 Hz
E7	VMB	Phase B voltage feedback from MOV fuses, 240–600 V, 50/60 Hz
E8	VMC	Phase C voltage feedback from MOV fuses, 240–600 V, 50/60 Hz
E9	GND	Chassis ground

Table 4. EXIB Board J1 Connector Pin Descriptions (EXIC Board Interface)

Pin No.	Nomenclature	Description
1	VA1	Phase A voltage feedback (= VA/250)
2	VA1RTN	VA1 return
3	VB1	Phase B voltage feedback (= VB/250)
4	VB1RTN	VB1 return
5	VC1	Phase C voltage feedback (= VC/250)
6	VC1RTN	VC1 return
7	VP1	Positive bus voltage feedback (= VP/250)
8	VP1RTN	VP1 return
9	VN1	Negative bus voltage feedback (= VN/250)
10	VN1RTN	VN1 return
11	OMOVFOK	MOV fuse status (low = MOV fuses OK)
12	DCOM	Digital common
13	VCO_5	Current regulator feedback
14	DCOM	Digital common
15	VCO_6	Timed overcurrent feedback
16	DCOM	Digital common
17	PSOK	Power supply status (high = power supply OK)
18	DCOM	Digital common
19	DFM1	1/2 differential signal for SCR#1 control
20	DFM1C	1/2 differential signal for SCR#1 control
21	DFM2	1/2 differential signal for SCR#2 control
22	DFM2C	1/2 differential signal for SCR#2 control
23	DFM3	1/2 differential signal for SCR#3 control
24	DFM3C	1/2 differential signal for SCR#3 control
25	DFM4	1/2 differential signal for SCR#4 control
26	DFM4C	1/2 differential signal for SCR#4 control
27	DFM5	1/2 differential signal for SCR#5 control
28	DFM5C	1/2 differential signal for SCR#5 control
29	DFM6	1/2 differential signal for SCR#6 control
30	DFM6C	1/2 differential signal for SCR#6 control
31	SP52	Spare - not used
32	SP52A	Spare - not used
33	SP53	Spare - not used
34	SP53A	Spare - not used

Table 4. EXIB Board J1 Connector Pin Descriptions (EXIC Board Interface) — continued

Pin No.	Nomenclature	Description
35	SP54	Spare - not used
36	SP55	Spare - not used
37	SP55	Spare - not used
38	SP56	Spare - not used
39	SP56	Spare - not used
40	SP57	Spare - not used
41	ENGT	Gating enable
42	OGATE	J1 connection status (low = J1 connection OK)
43	BRD_IDB	EXIB board identification
44	DCOM	Digital common
45	CHASSIS	Screw terminal chassis ground
46	CHASSIS	Screw terminal chassis ground

Warning

All testpoints with an H suffix (marked with an * in Table 5) are floating at high potential above ground. Do not ground these testpoints.

Table 5. EXIB Board J2 Dc Shunt Input Connector Pin Descriptions

Pin	Nomenclature	Description
1	SHNH*	Shunt negative input
2	SHPH*	Shunt positive input
3	COMH*	Isolated shunt common

Table 6. EXIB Board J3–J8 Gate Power Output Connector Pin Descriptions

Pin	Nomenclature	Description
1	G_G	SCR_ gate connection
2	NC	Not connected
3	G_K	SCR_ cathode connection

Table 7. EXIB Board J12 Power Supply Input Connector Pin Descriptions

Pin	Nomenclature	Description
1	AC1	20 V rms ac input 1
2	PCOM	Power common
3	AC2	20 V rms ac input 2

Table 8. EXIB Board J15 Connector Pin Descriptions (Power Input Connector to EXIC Board)

Pin No.	Nomenclature	Description
1	P24	Positive 24 V dc input (+24 V dc)
2	PCOM	Power common
3	N24	Negative 24 V dc input (–24 V dc)
4	P5	Positive 5 V dc input (+5 V dc)
5	DCOM	Digital common

Renewal/Warranty Replacement

How to Order a Board

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

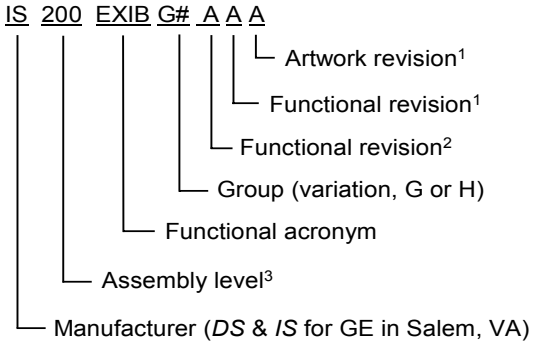
- How to accurately identify the part
- If the part is under warranty
- How to place the order

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, is normally based on the **board description**, or name. For example, the EXIB board is described as the Exciter Bridge Interface board.



[1]Backward compatible
[2]Not backward compatible
[3]*200* indicates a base-level board; *215* indicates a higher-level assembly or added components (such as PROM)

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:

("+" indicates the international access code required when calling from outside of the USA.)

GE Industrial Systems
Product Service Engineering
1501 Roanoke Blvd.
Salem, VA 24153-6492 USA

Phone: + 1 800 533 5885 (United States, Canada, Mexico)
+ 1 540 378 3280 (International)

Fax: + 1 540 387 8606 (All)

Renewals (spares or those not under warranty) should be ordered by contacting the nearest GE Sales or Service Office.

Be sure to **include the following** when ordering any warranty or renewal parts:

- 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 replacement boards based on availability and design enhancements. However, GE Industrial Systems ensures backward compatibility of replacement boards.

Handling Precautions

Caution

To prevent component damage caused by static electricity, treat all boards with static sensitive handling techniques. Wear a wrist grounding strap when handling boards or components, but only after boards or components have been removed from potentially energized equipment and are at a normally grounded workstation.

Printed wiring boards may contain static-sensitive components. Therefore, GE ships all replacement boards in antistatic bags.

Use the following guidelines when handling boards:

- Store boards in antistatic bags or boxes.
- Use a grounding strap when handling boards or board components (per previous *Caution* criteria).

Replacement Procedures

Warning

To prevent electric shock, turn off power to the drive, 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.

➢ To replace the EXIB board

1. Make sure that the drive in which the board resides has been de-energized. (Refer to the appropriate *User's Guide, GEH-6419,* for complete de-energizing procedures and follow all local practices of lock-out/tag-out.)
2. Open the bridge control cabinet door, and using equipment designed for high voltages, test any electrical circuits **before touching them** to ensure that power is off.
3. Locate the hinged panel with the EXIC board mounted to it and access the EXIB board as follows:
   a. Remove the two screws at the uppermost and lowermost locations on the hinged panel and set them aside until reassembly.
   b. Swing the panel open (hinged on left side) being careful not to damage any connector cables.
4. Carefully disconnect all cables from the EXIB board as follows:
   - Verify all cables are labeled with the correct connector name (as marked on the board) to simplify reconnection.
   - Grasp each side of the stab-on connector that joins with the board's stab terminal and gently pull the stab-on connector loose.
   - For cables with pull-tabs, carefully pull the tab.

Caution

Avoid dropping any mounting hardware into the equipment as this could cause damage when power is reapplied.

5. Remove the nine screws that hold the EXIB board to the insulating standoffs, and remove the board.
6. Orient the new EXIB board in the same position as the one removed and install it onto the standoffs with the nine screws removed in step 5.
7. Reconnect all cables to EXIB board as labeled and ensure that cables are properly seated at both ends.
8. Close the hinged panel, being careful not damage any connector cables, and reinstall and tighten the two screws removed in step 3.
9. Close the bridge control cabinet door.

Notes

GE Industrial Systems

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