GE Industrial Systems

Voltage Attenuator Feedback Board
IS200VATFG_A_ _

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.

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 IS200VATF Voltage Attenuator Feedback Board (VATF) provides attenuation of the ac or dc bridge voltages for Innovation Series™ drives. The VATF board also generates voltage controlled oscillator (VCO) feedbacks via a duplex fiber-optic feedback link. The board contains identical, series-connected strings of precision resistors with provisions for input connections at different points along each series string, so a range of voltages may be accommodated. The maximum attenuator input is 7000 V peak.

Control power for the VATF board is derived from the distributed high frequency ac power source. The isolation rating with respect to control power is 2100 V peak. The dielectric isolation between the VATF high voltage ground plane and control power input is 8000 V rms.

There are two versions (groups) of the VATF board, G1 and G2.

- G1 boards do not have a 2% frequency bias (1 MHz = 0 volts); frequency offset is 1000 kHz.
- G2 boards have an additional resistor (R20) to create a 2% frequency bias; frequency offset is 1020 kHz.

Description of Operation

The VATF board accepts a 3-phase ac input voltage. Phases two and three of the ac input are applied to two identical strings of precision resistors in order to reduce the high voltages to signal electronic levels (relative to phase one). Phase one is directly connected to the VATF high voltage ground plane.

Note

Alternatively, the VATF board can be used to measure the two dc rail voltages relative to the dc link midpoint or neutral.

A low voltage feedback circuit is referenced to the high voltage ground plane (phase one). Two synchronous VCOs generate two voltage feedback pulse trains, V21 and V31 (maximum of 2 MHz). The two feedback pulse trains are transmitted to the bridge interface board over a duplex fiber-optic cable. A single high frequency gate driver power transformer referenced to phase one generates the control power supply.

Each attenuator string contains five 1.245 MΩ resistors connected in series. Stab connectors allow the user the option of connecting five, three, two, or one of the resistors at any given time. The output of each resistor string is connected to a resistor and bias network to create a 0.5 milliamp full-scale input signal for the VCOs.

VCO Feedbacks

Two synchronous VCOs configured for bipolar inputs are used to create the feedback pulse trains. A 4 MHz oscillator clocks the VCOs, yielding a full-scale frequency range of 0 – 2 MHz. The VCO is biased such that 0 V input = 1 MHz (G1 boards). An additional 2% bias is present on G2 boards.

Power Supplies

Floating control power is derived from the distributed 50 V ac, 27 kHz supply via an onboard 8 kV isolation transformer. Control power is referenced to the phase-one input on the secondary side of the isolation transformer. The isolation transformer has a full-wave, rectified, center-tapped secondary and generates unregulated ±15 V dc power.

A 5 V dc linear regulator (powered from the +15 V dc supply) provides onboard logic power. Input and output power supply connectors are provided to facilitate a daisy-chain power distribution scheme within the high voltage enclosure. Shield continuity must be maintained throughout the power distribution cables.

Application Data

The VATF board has no fuses or user adjustable hardware. The board has two plug connectors, two fiber-optic transmitter connectors, eight stab-on connectors, and five testpoints. It also has one LED indicator for power supply OK (DS1, PSOK). See Figure 1 for a board layout diagram, which shows the location of these components and the following tables for descriptions:

Table	Description
1	Testpoints
2	J1 and J2 plug connectors
3	V21 and V31 fiber-optic connectors
4	Stab-on connectors

Warning

Testpoints TP1 – TP5 are for bench or factory testing only (see Table 1). Use of these test points for any other purpose is not recommended due to the high voltages present during normal operation. When the drive is operating, these test points can float several thousand volts above ground.

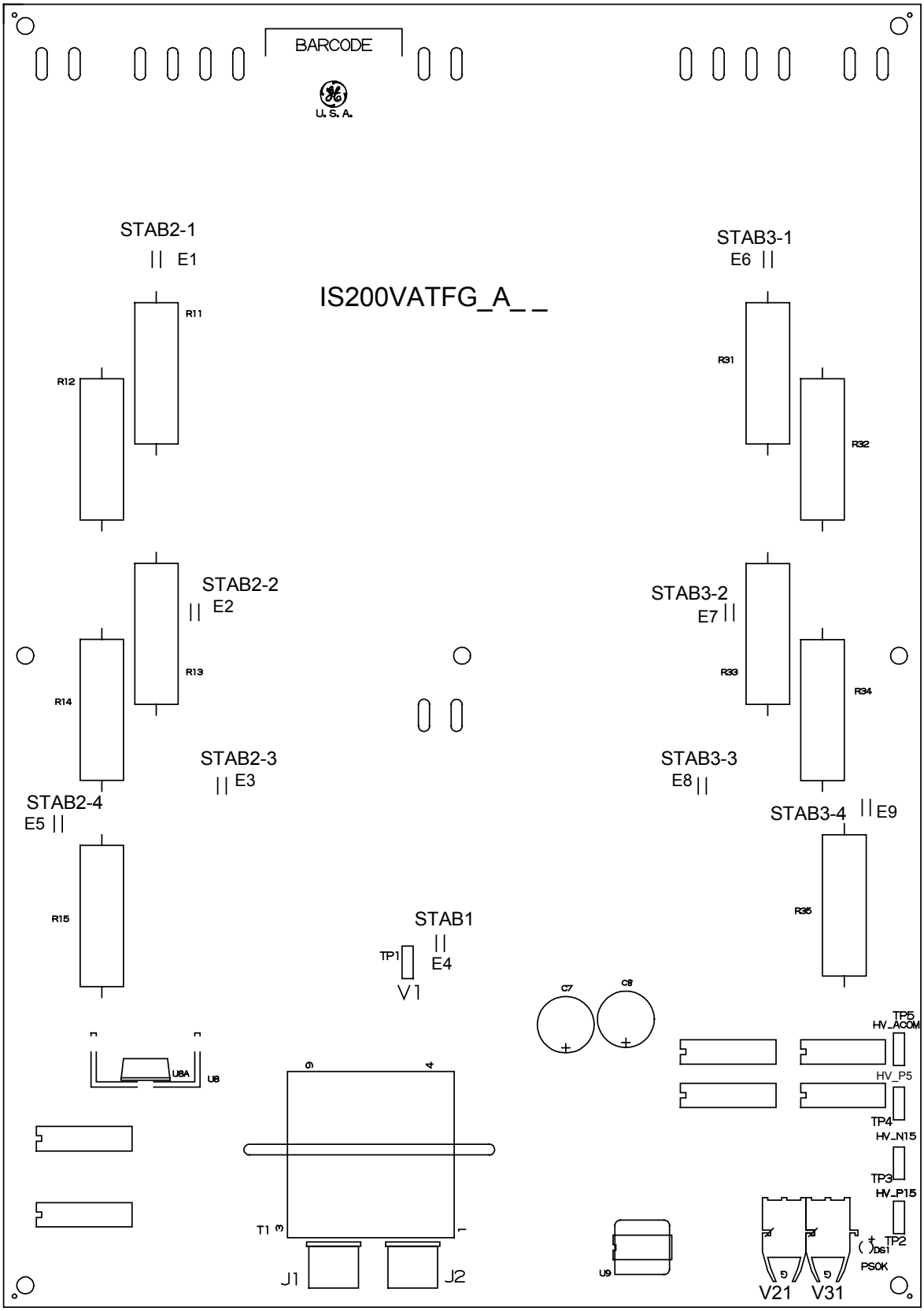


Figure 1. VATF Board Layout Diagram

Table 1. VATF Board Testpoints TP1 – TP5 Signal Descriptions

Testpoint	Nomenclature	Description
TP1	V1	High voltage common
TP2	HV_P15	Positive 15 V dc
TP3	HV_N15	Negative 15 V dc
TP4	HV_P5	Positive 5 V dc
TP5	HV_ACOM	High voltage analog common

Table 2. VATF Board Connectors J1 and J2 (J1/2) Pin Signal Descriptions

Pin #	Nomenclature	Description
J1/2-1	HF1	High Frequency (50 V ac, 27 kHz) Power Supply Input
J1/2-2	HFSH	High Frequency (50 V ac, 27 kHz) Power Supply Shield
J1/2-3	HF2	High Frequency (50 V ac, 27 kHz) Power Supply Return

Table 3. VATF Board Fiber-Optic Transmitter Signal Descriptions

Transmitter	Color	Description
V21	Gray	Phase 2 Voltage Feedback Pulse Train to the Bridge Interface Board (referenced to phase 1)
V31	Gray	Phase 3 Voltage Feedback Pulse Train to the Bridge Interface Board (referenced to phase 1)

Table 4. VATF Board Stab-On Connector Voltage Selections

Input Connections	Phase 2 and Phase 3 RMS Voltage Rating*	Phase 2 and Phase 3 Peak Voltage Rating (V_{PK})*
STAB2-1 or STAB3-1 to STAB1	4160 V rms	8163
STAB2-2 or STAB3-2 to STAB1	2300 V rms	4900
STAB2-3 or STAB3-3 to STAB1	1750 V dc	3268
STAB2-4 or STAB3-4 to STAB1	860 V rms	1637

*With respect to phase 1.

Renewal/Warranty Replacement

How to Order a Board

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

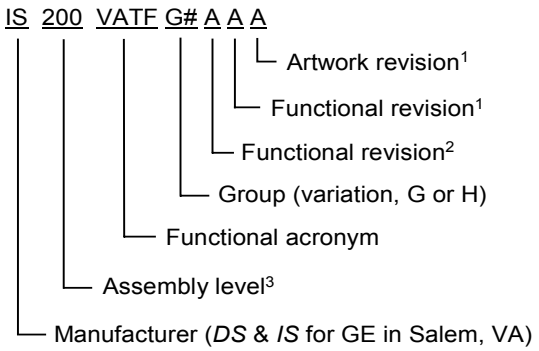
- How to accurately identify the part
- If the part is under warranty
- How to place the order

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 VATF board is described as the Voltage Attenuator Feedback 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:

GE Industrial Systems
Product Service Engineering
1501 Roanoke Blvd.
Salem, VA 24153-6492 USA
Phone: +1 540 387 7595
Fax: +1 540 387 8606
(Replace + with the international access code.)

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 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. 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

Bridge cabinet doors should not be opened when drive power is ON.

Warning

To prevent electric shock, turn off power to the board, and 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 VATF board as follows:

1. Make sure that the drive in which the board resides has been de-energized and follow all local safety practices of Lock-Out/Tag-Out.
2. Open the bridge cabinet doors and verify that the neon lamps on the IS200CVMB Capacitor Voltage Monitoring Board have gone out, indicating that voltage is below 50 V dc.
3. Install safety grounds (see Figure 3) and, using equipment designed for high voltages, test any electrical circuits **before touching them** to ensure that power is OFF and has dissipated.
4. Carefully disconnect all cables from the VATF board to be replaced 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 fiber-optic cables, depress the latch on the mating connector and remove the fiber-optic cable.

Caution

Avoid dropping mounting hardware into the unit, which could cause damage.

5. Carefully cut any plastic wire ties that, for strain relief, secure cables to the VATF board.
6. Compress (inward) each of the six plastic snaps that hold the board in place to release the board.

Install the new (replacement) VATF board as follows:

1. Orient the board in the same position as the board that was removed.
2. Press the VATF board onto the four plastic stand-offs, ensuring that all holders snap into position to secure the board in place.
3. Reconnect all electrical connections that were disconnected in step 4 of *removing the board*.
4. Verify that all the stab-on connection settings on the new board are set the same as on the board that was removed and that all connectors are fully seated.
5. Replace any wire ties that secured cables to the VATF board, which were removed in step 5 of *removing the board*.
6. Remove the safety grounds that were installed in step 3 of *removing the board*, then close the bridge cabinet doors.

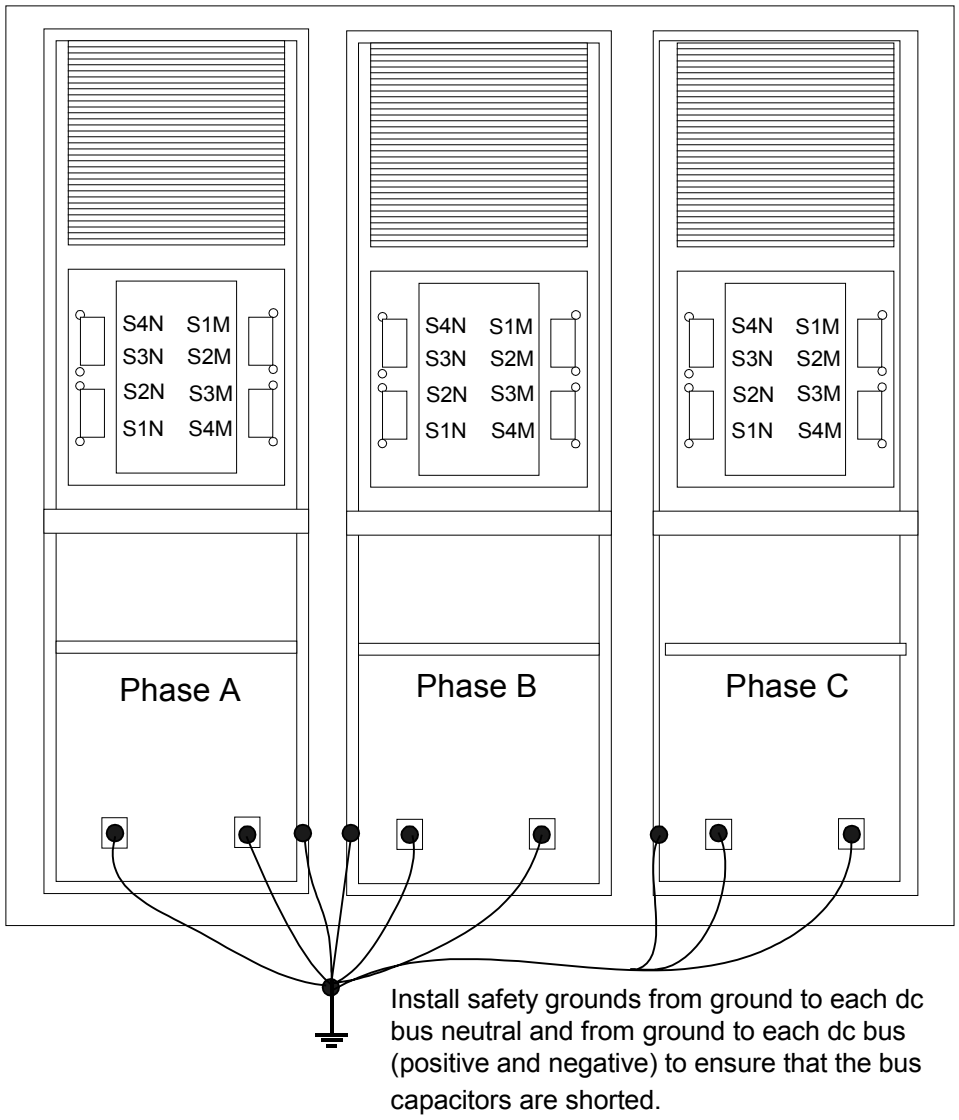


Figure 3. Dc Bus Safety Grounding

Notes:

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Issue date: 1999-03-29

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