



USER'S GUIDE

**GROUND FAULT TESTER 2, (GFT 2)
A81010 -01, -02**

NOVEMBER 2015

**DOCUMENT NO. SIG-00-15-06
VERSION A**

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The equipment covered in this manual has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

DOCUMENT HISTORY

Version	Release Date	Sections Changed	Details of Change
A	NOV 2015		Initial Release

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NOTES, CAUTIONS, AND WARNINGS

Throughout this manual, notes, cautions, and warnings are frequently used to direct the reader's attention to specific information. Use of the three terms is defined as follows:

WARNING

WARNING
INDICATES A POTENTIALLY HAZARDOUS SITUATION WHICH, IF NOT AVOIDED, COULD RESULT IN DEATH OR SERIOUS INJURY. WARNINGS ALWAYS TAKE PRECEDENCE OVER NOTES, CAUTIONS, AND ALL OTHER INFORMATION.

CAUTION

CAUTION
REFERS TO PROPER PROCEDURES OR PRACTICES WHICH IF NOT STRICTLY OBSERVED, COULD RESULT IN A POTENTIALLY HAZARDOUS SITUATION AND/OR POSSIBLE DAMAGE TO EQUIPMENT. CAUTIONS TAKE PRECEDENCE OVER NOTES AND ALL OTHER INFORMATION, EXCEPT WARNINGS.

NOTE

NOTE
Generally used to highlight certain information relating to the topic under discussion.

If there are any questions, contact Siemens Industry, Inc. Application Engineering.

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

Static electricity can damage electronic circuitry, particularly low voltage components such as the integrated circuits commonly used throughout the electronics industry. Therefore, procedures have been adopted industry-wide which make it possible to avoid the sometimes invisible damage caused by electrostatic discharge (ESD) during the handling, shipping, and storage of electronic modules and components. Siemens Industry, Inc. has instituted these practices at its manufacturing facility and encourages its customers to adopt them as well to lessen the likelihood of equipment damage in the field due to ESD. Some of the basic protective practices include the following:

- Ground yourself before touching card cages, assemblies, modules, or components.
- Remove power from card cages and assemblies before removing or installing modules.
- Remove circuit boards (modules) from card cages by the ejector lever only. If an ejector lever is not provided, grasp the edge of the circuit board but avoid touching circuit traces or components.
- Handle circuit boards by the edges only.
- Never physically touch circuit board or connector contact fingers or allow these fingers to come in contact with an insulator (e.g., plastic, rubber, etc.).
- When not in use, place circuit boards in approved static-shielding bags, contact fingers first. Remove circuit boards from static-shielding bags by grasping the ejector lever or the edge of the board only. Each bag should include a caution label on the outside indicating static-sensitive contents.
- Cover workbench surfaces used for repair of electronic equipment with static dissipative workbench matting.
- Use integrated circuit extractor/insertion tools designed to remove and install electrostatic-sensitive integrated circuit devices such as PROM's (OK Industries, Inc., Model EX-2 Extractor and Model MOS-40 Inserter (or equivalent) are highly recommended).
- Utilize only anti-static cushioning material in equipment shipping and storage containers.

For information concerning ESD material applications, please contact the Technical Support Staff at 1-800-793-7233. ESD Awareness Classes and additional ESD product information are also available through the Technical Support Staff.

SECTION 1 - INTRODUCTION

1.0 INTRODUCTION

NOTE**NOTE**

Periodic independent ground fault testing should be performed during routine maintenance of the system.

The A81010 Ground Fault Tester 2 is a user configurable device used to monitor the leakage resistance between battery terminals and earth ground. The unit can be operated in a stand-alone mode, with a SEAR II device or with any 3rd party equipment that can be configured to accept dry contact relay inputs.

The GFT 2 has 8 leakage current mode detection settings; a 4 bit DIP switch on the front panel that is used to select 1 to 4.5mA leakage current detection modes in steps of 0.5mA. 3 bits (SEL0:SEL2) configure the current setting while the fourth bit SEL3 is used to set the odd parity

The 81010 Ground Fault Tester 2 (GFT 2) can operate in two modes. In normal mode, the GFT 2 constantly monitors up to two batteries for ground faults and indicates battery fault status to the monitoring equipment, if connected. Information is provided to the SEAR II as a pulsed data signal via any unused SEAR II digital input. The GFT 2 also provides two dry relay contacts; each contact indicating the battery fault channel to any 3rd party equipment.

The unit can also be placed in test mode where a simulated ground fault of 1 mA is placed internally on an isolated battery input to verify that the unit is properly detecting faults.

A separate internal circuit is used to verify the GFT 2's health, as indicated by the status of the GFT FAIL LED on the front panel. The GFT 2 can be powered by a 9-30 VDC (12 VDC nominal) operating battery independently from the batteries being monitored.

The GFT 2 has an internal debounce circuit that monitors the channel faults for 10+/- 1 sec from the instant the GFT 2 detects the presence or removal of the fault before confirming the status of the fault visually via LED indicators on the front panel and via a serial interface to the SEARII and via dry relay contacts to 3rd party equipment

The GFT 2 is available in two hardware configurations, A81010-01 and A81010-02. The -01 configuration is used with 9 to 16 volt batteries. The -02 configuration is used with 24 to 30 volt batteries. See Figure 1-1 and Figure 1-2.

The GFT 2 has been designed using fail-safe design principles to ensure that in the event of a failure, no more than a 0.8 mA ground can be placed on the battery being monitored.

Figure 1-1 and Figure 1-2 show the two hardware configurations, A81010-01 and A81010-02 of the GFT 2.

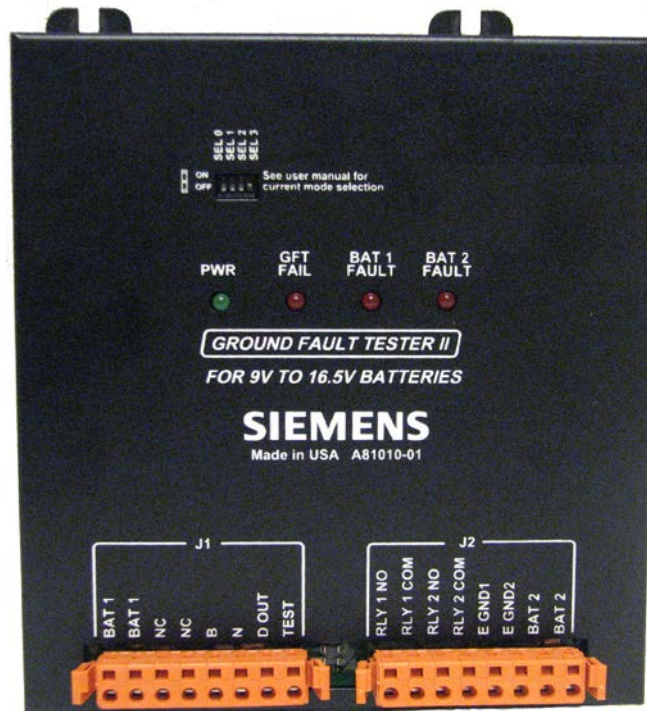


Figure 1-1 Ground Fault Tester 2 (GFT 2) A81010-01 (9 – 16.5 Volts)

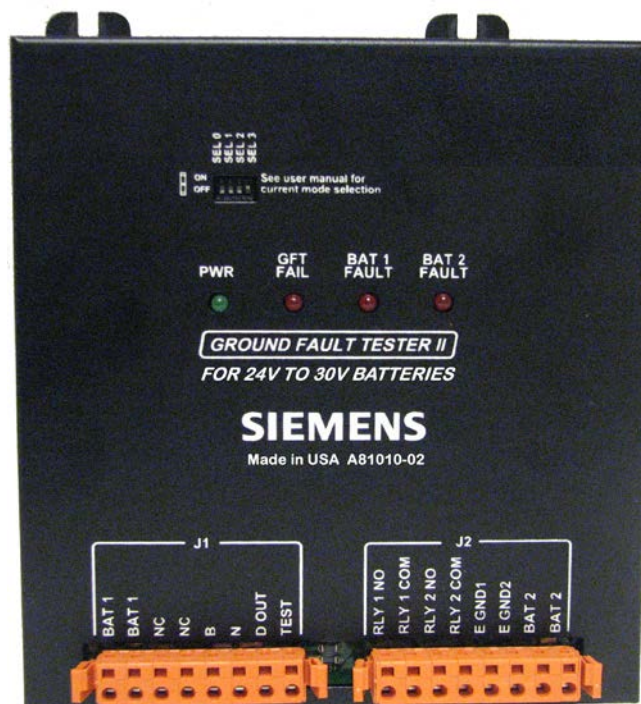


Figure 1-2 Ground Fault Tester 2 (GFT 2) A81010-02 (24 – 30 Volts)

**WARNING**

THE GROUND FAULT TESTER 2 (GFT 2) SHOULD ONLY BE USED IN APPLICATIONS DESCRIBED IN THIS MANUAL.

AN INTERNAL FAILURE OF THE GFT 2 MAY RESULT IN A GROUND OF UP TO 0.8 mA ON THE BATTERY BEING MONITORED. THEREFORE, THE GFT 2 SHOULD NOT BE USED IN SAFETY CRITICAL APPLICATIONS THAT COULD BE ADVERSELY AFFECTED BY A GROUND OF UP TO 0.8 mA.

THE GFT 2 CANNOT BE GUARANTEED TO CORRECTLY DETECT AND/OR REPORT GROUND FAULTS UNDER ALL FAILURE CONDITIONS.

1.1 ORDERING INFORMATION

The following is the ordering information for the A81010 GFT 2.

8000-81010-0X

T

1 – 9 to 16.5 VDC

2 – 24 to 30 VDC

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SECTION 2 – GFT 2 HARDWARE DESCRIPTION

2.0 GFT 2 HARDWARE DESCRIPTION

Connector J1 and J2 on the GFT 2 front panel has two terminals labeled **BAT 1** and two terminals labeled **BAT 2** respectively to provide non-polarized connection to the external batteries being monitored. The GFT 2 will detect ground referenced leakage resistance from either or both battery terminals to earth ground. If this leakage exceeds the set value or configured value via the DIP switch settings (from 1 mA to 4.5 mA), see Table 2-3, the unit will set an active alarm as indicated by the BAT 1 and BAT 2 FAULT LEDs on the front panel (see Table 2-1). Under normal monitoring conditions (no fault detected) the BAT 1 and/or BAT 2 FAULT LED will be lit steady. When an external ground fault is detected the corresponding FAULT LED on the GFT 2 front panel will be set to a blinking condition. When the unit is in internal self-test mode both FAULT LEDs will blink continuously (see Table 2-1).

The unit constantly monitors itself for internal failure via its onboard health check circuit. If the master oscillator circuit output level is too high or too low a GFT 2 failure condition is set. The GFT FAIL LED on the front panel will change from a steady lit condition indicating normal operation, to blinking, indicating an active alarm state (see Table 2-1).

The GFT 2 can be used as a stand-alone device providing only visual indications of monitored battery status via its front panel LEDs, or connected to a SEAR II to receive and record any battery fault alarms. Data from the GFT 2 is present on J1, Pin 7 (labeled D OUT) of connector J1. The GFT 2 also communicates the monitored battery status to 3rd party equipment via Relay 1 (RLY1 NO, RLY1COM) on pin1 and pin2 of connector J2 for BAT 1 and via Relay 2 (RLY2 NO, RLY2COM) on Pin 3 and Pin 4 of connector J2 for BAT 2. A normally open condition indicates no fault and a closed condition indicates the presence of a fault.

Table 2-1 GFT 2 Front Panel Indicators

LABEL	LED COLOR	INDICATION
PWR	Green	Illuminated constantly when internal 5V power is Present.
GFT FAIL	Red	Illuminated constantly when normal. Flashes when an internal master oscillator failure occurs.
BAT 1 FAULT	Red	Illuminated constantly when normal. Flashes when an external ground fault exceeding the predefined set value is detected on monitored battery 1, or when in Test Mode.
BAT 2 FAULT	Red	Illuminated constantly when normal. Flashes when an external ground fault exceeding the predefined set value is detected on monitored battery 2, or when in Test Mode.

Table 2-2 below shows the user configurable DIP switch settings for the Current Mode Detection of the GFT 2

Table 2-2 GFT 2 Leakage Current Mode Detection Settings

SEL3	SEL2	SEL1	SEL0	Mode
DOWN	UP	UP	UP	1 mA
UP	UP	UP	DOWN	1.5 mA
UP	UP	DOWN	UP	2 mA
DOWN	UP	DOWN	DOWN	2.5 mA
UP	DOWN	UP	UP	3 mA
DOWN	DOWN	UP	DOWN	3.5 mA
DOWN	DOWN	DOWN	UP	4 mA
UP	DOWN	DOWN	DOWN	4.5 mA

For all the above settings, an **UP** indicates an **OFF** Position and a **DOWN** indicates an **ON** position.

Table 2-3 GFT 2 Trigger Current versus Voltage

Setting (mA) for GFT 2 -01	Trigger Current @ 16.5 VDC in mA	Trigger Current @ 9.0 VDC in mA	Setting (mA) for GFT 2 -02	Trigger Current @ 30 VDC in mA	Trigger Current @ 24 VDC in mA
1	1.06	0.58	1	0.97	0.77
1.5	1.59	0.87	1.5	1.45	1.16
2	2.13	1.16	2	1.93	1.55
2.5	2.66	1.45	2.5	2.42	1.93
3	3.19	1.74	3	2.9	2.32
3.5	3.72	2.03	3.5	3.38	2.71
4	4.25	2.32	4	3.87	3.09
4.5	4.78	2.61	4.5	4.35	3.48

Table 2-4 GFT 2 Connector Pin Assignments A81010-01 and -02

J1 TERMINAL	LABEL	I/O	SIGNAL DESCRIPTION
J1-1	BAT 1	IN	A resistance to earth ground from this terminal exceeding the calibrated set point will activate a BAT 1 FAULT .
J1-2	BAT 1	IN	A resistance to earth ground from this terminal exceeding the calibrated set point will activate a BAT 1 FAULT .
J1-3	NC		No Connect
J1-4	NC		No Connect
J1-5	B	IN	9-30 VDC, 12 VDC nominal input for the unit.
J1-6	N	IN	
J1-7	D OUT	OUT	Data output to SEAR II; referenced to the GFT 2 N terminal.
J1-8	TEST	IN	Nominal +12V level activates internal Test Mode; +12V must be referenced to the GFT 2 battery N terminal.
J2-1	RLY1NO		Relay 1 Normal Open Contact
J2-2	RLY1COM		Relay 1 Common Contact
J2-3	RLY2NO		Relay 2 Normal Open Contact
J2-4	RLY2COM	IN	Relay2 Common Contact
J2-5	EGND1	IN	Earth ground reference terminals required for detection of battery ground faults. Do not jumper these terminals to each other. Each must be connected to a different point on the chassis ground of the bungalow. Allows the GFT 2 to detect if a ground wire disconnects from the unit.
J2-6	EGND2		
J2-7	BAT 2	IN	A resistance to earth ground from this terminal exceeding the calibrated set point will activate a BAT 2 FAULT .
J2-8	BAT 2	IN	A resistance to earth ground from this terminal exceeding the calibrated set point will activate a BAT 2 FAULT .

The maintainer may disconnect the GFT 2 from battery being monitored and apply an equivalent test load corresponding to the leakage current setting on any one of the battery terminals being monitored. The Table below displays resistance values for each of the GFT 2 current settings.

Table 2-5 Equivalent Test Load Resistance Values

GFT2 Current Setting (in mA)	Decade Box Resistance Values in ohms (-01)	Decade Box Resistance Values in ohms (-02)
1	15,520	31,040
1.5	10,345	20,690
2	7,760	15,520
2.5	6,208	12,410
3	5,173	10,350
3.5	4,434	8,870
4	3,880	7,760
4.5	3,448	6,890

SECTION 3 – GFT 2 INSTALLATION

3.0 GFT 2 INSTALLATION

Physical installation of the GFT 2 involves mounting the unit on a wall, shelf, or rack (19-inch standard using mounting rails, using relay rack spacing); making wiring connections; applying power and performing initial setup and checks before the system is put into operation.

3.1 MOUNTING DIMENSIONS

Figure 3-1 shows the GFT 2 mounting dimensions.

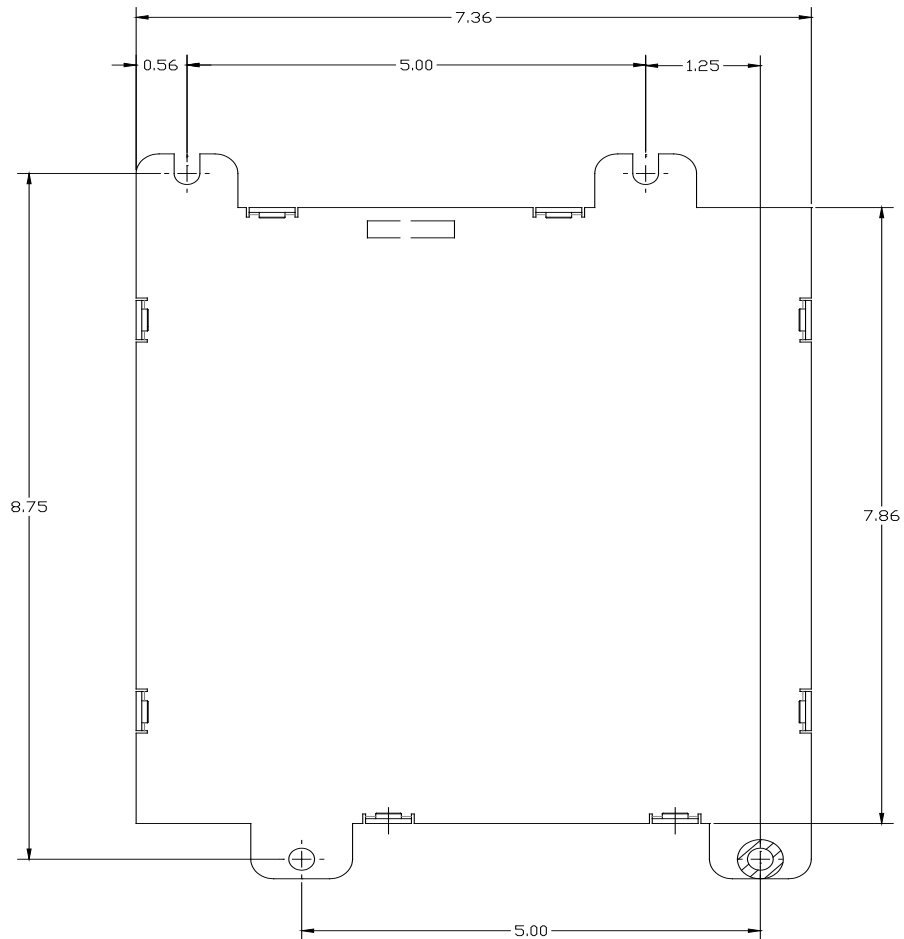


Figure 3-1 GFT 2 Mounting Dimensions

3.2 ELECTRICAL CONNECTIONS

Female mating connectors are provided with the GFT 2 for connector J1 and J2 on the unit's front panel. Make all wiring attachments to this connector before plugging it into J1 and J2. Pin assignments are marked on the GFT 2 front panel immediately above J1 and J2. Refer to figure 2 and figure 3 and attach connector wires as follows:

Stand-alone connections: (Visual indications only)

- Connect operating battery power to GFT 2 J1 pins 5 and 6 (labeled B and N respectively).
- Connect GFT 2 J1 pins 1 and 2 (labeled BAT 1) to the terminals on monitored battery 1.
- Connect GFT 2 J2 pins 7 and 8 (labeled BAT 2) to the terminals on monitored battery 2.
- Connect GFT 2 J2 pins 5 and 6 to an approved earth ground. Do not jumper J2 pins 5 and 6 together. Wire each pin to a separate earth ground point in the bungalow.

Additional SEAR II connections for monitoring/recording:

- Connect GFT 2 J1 pin6 (labeled N) to (-) pin on SEAR II spare Digital Input channel.
- Connect GFT 2 J1 pin 7 (labeled D OUT) to (+) pin of same SEAR II Digital Input channel.

Additional SEAR II and or 3rd party equipment connections for remote test:

- Connect GFT 2 J1 pin 5 (labeled B) to one pin of a SEAR II Relay Output channel.
- Connect GFT 2 J1 pin 8 (labeled TEST) to other pin of the same SEAR II Relay Output channel.

Additional 3rd party connections for monitoring/recording:

- Connect GFT 2 J2 pin1 and pin2 (labeled RLY1 NO and RLY1 COM to an input channel that accepts dry relay contacts)
- Connect GFT 2 J2 pin3 and pin4 (labeled RLY2 NO and RLY2 COM to an input channel that accepts dry relay contacts)

3.3 GFT 2 TO SEAR CONNECTIONS

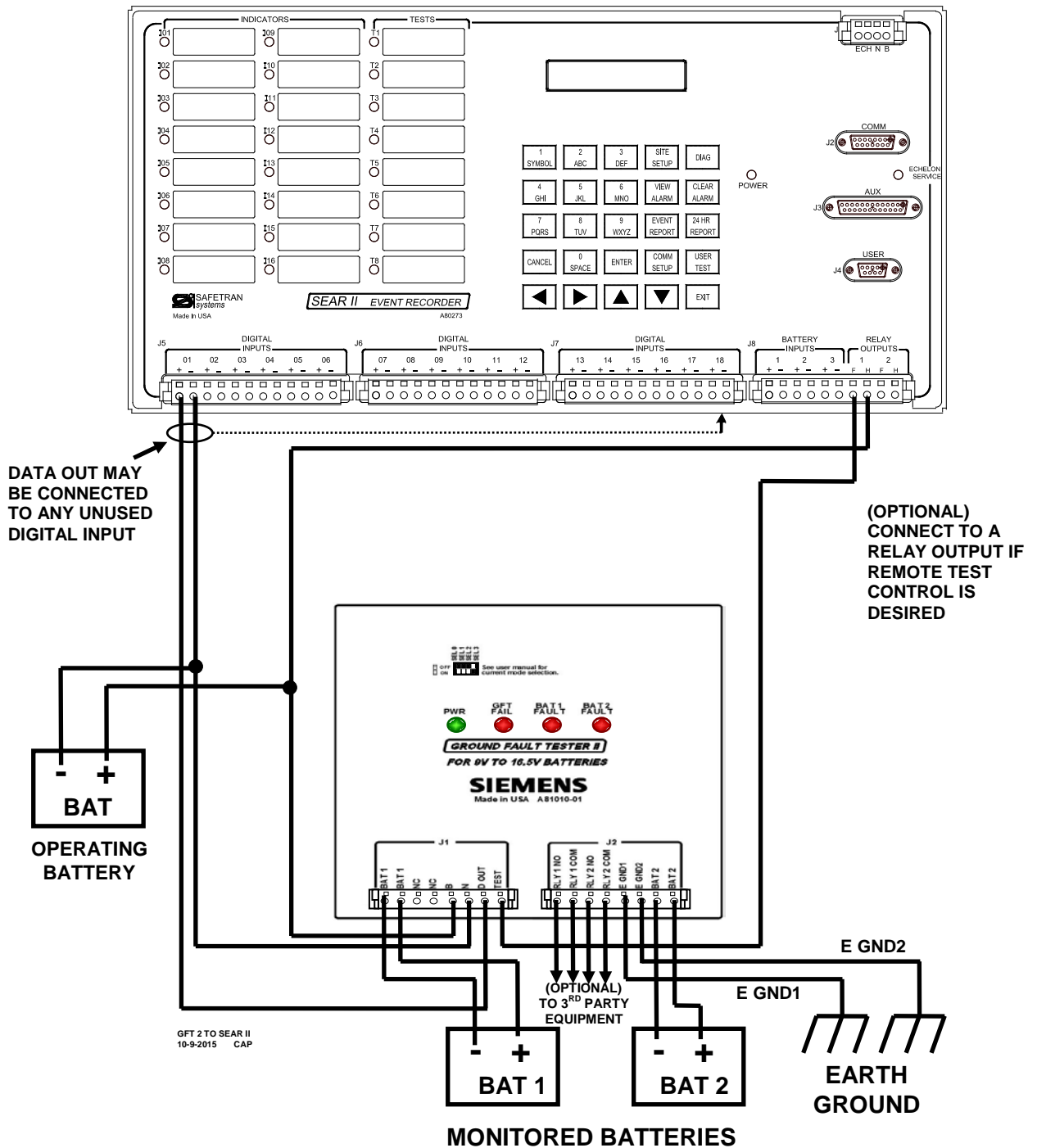


Figure 3-2 A81010 GFT 2 to SEAR II Interconnection

NOTE

NOTE
The negative (-) input terminal on the selected SEAR II Digital Input must be connected to the negative side of the battery that powers the GFT2 (See Figure 3-2).

3.4 GFT 2/SEAR II SOFTWARE CONFIGURATION SETUP

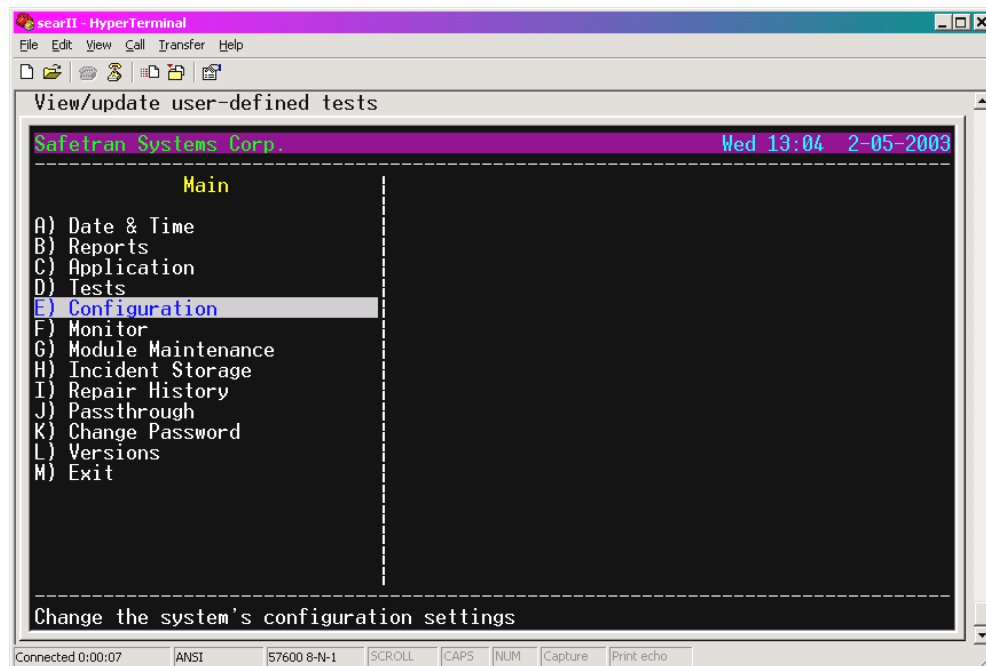
A spare Digital Input channel on the SEAR II is used to communicate with the GFT 2 unit. To select and configure a Digital Input channel on the SEAR II, follow the steps below.

- Step 1. Connect an RS232 serial cable between a Laptop computer or PC and the **USER** port (J4) on the SEAR II. Run **HyperTerminal** on the computer and adjust the port settings to communicate with the SEAR II as necessary. (The SEAR II is normally set for **19200-8-N-1** – baud rate, data bits, parity, and stop bits).

NOTE**NOTE**

The computer and SEAR II must be set to the same communication protocols in order to communicate. To verify the settings of the SEAR II USER port, use the SEAR II keypad and display. Press the COMM SETUP key on the keypad, then continue pressing the ENTER key to scroll through the various displayed settings until the settings for the USER port are shown. Press the EXIT key when done.

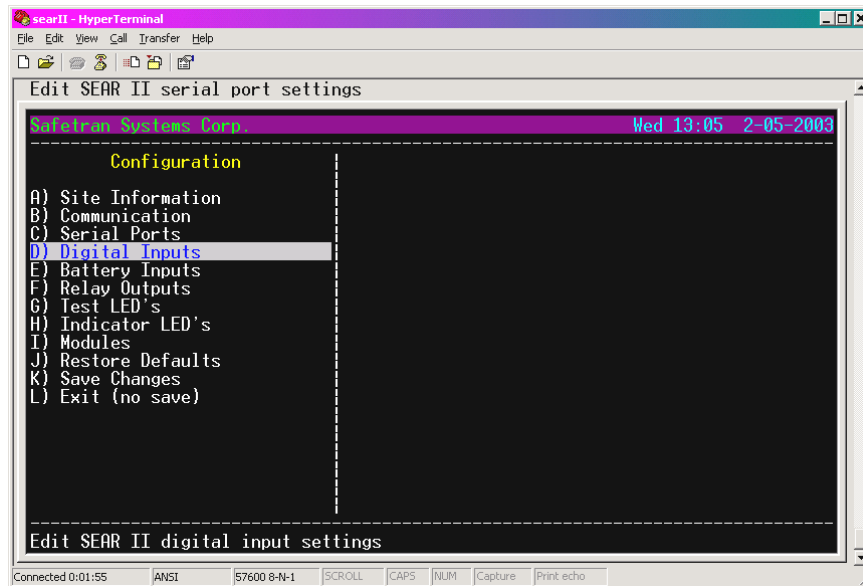
- Step 2. After communication has been established with the SEAR II, press “[**Ctrl**]+[**L**]” on the computer keyboard to access the SEAR II **Main** menu.
- Step 3. The **Main** menu should be displayed on the Laptop/PC. Using the keyboard **down arrow** (↓), scroll down the menu options and highlight **Configuration** as shown in the example screen below. Press the keyboard **Enter** key to proceed to the Configuration menu as shown in step 4.



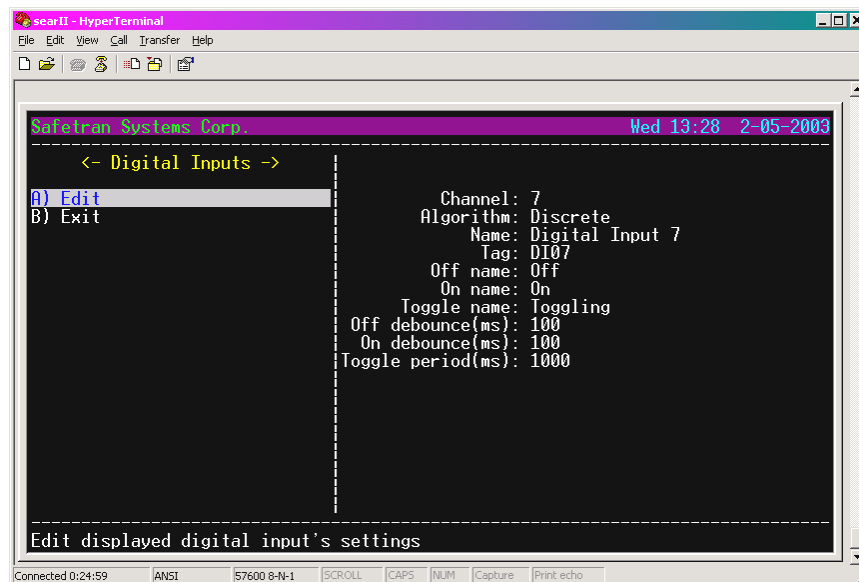
NOTE**NOTE**

The application screens shown on these pages are for example purposes only. Actual screens may vary depending on the SEAR II software version in use.

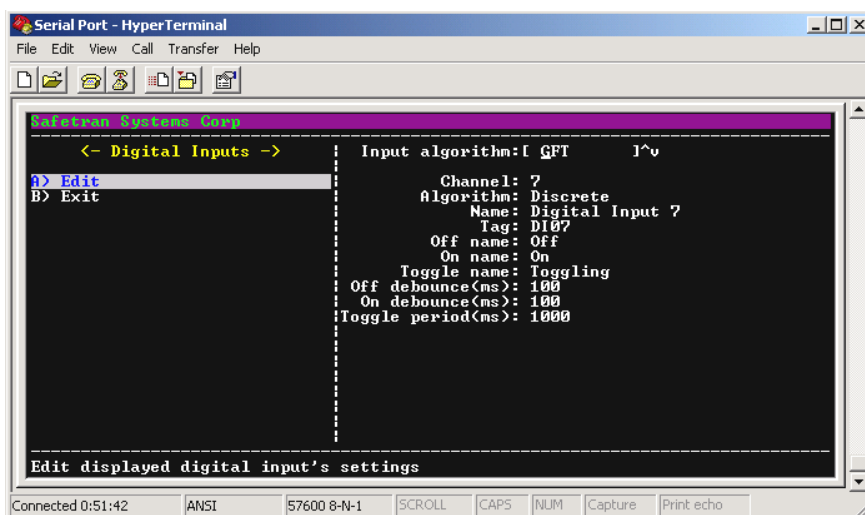
- Step 4. In the **Configuration** menu, scroll down and select **Digital Inputs**, as shown below. Press the **Enter** key to proceed to the <-Digital Inputs-> menu, shown in step 5.



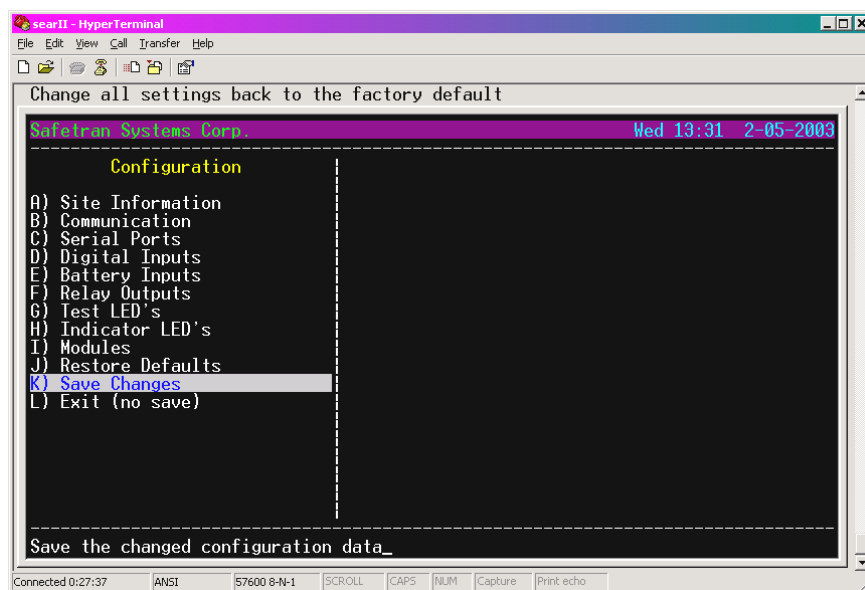
- Step 5. In the <-Digital Inputs-> menu, use the keyboard **right arrow** key (→) to select a spare input channel on the SEAR II. In the example below, Channel 7 is selected.



- Step 6. With the **Edit** option highlighted, press **Enter**. Use the keyboard **down arrow** and select **GFT**. A screen similar to the one below is displayed. The next prompt allows you to accept the default names for the GFT 2 batteries, or you can manually change them by selecting **Manual Entry** and editing the displayed names. Verify the information, then scroll to **Exit** and press **Enter** to return to the Configuration menu.



- Step 7. In the **Configuration** menu, scroll down to selection **Save Changes** as shown below. Press the **Enter** key to save the current setup and exit to the Main menu.



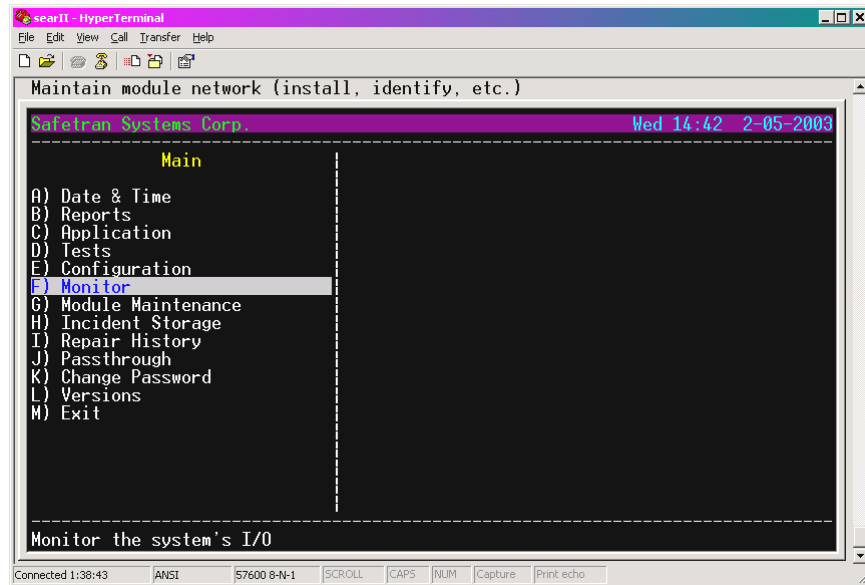
- Step 8. This concludes the GFT 2/SEAR II setup configuration.

NOTE**NOTE**

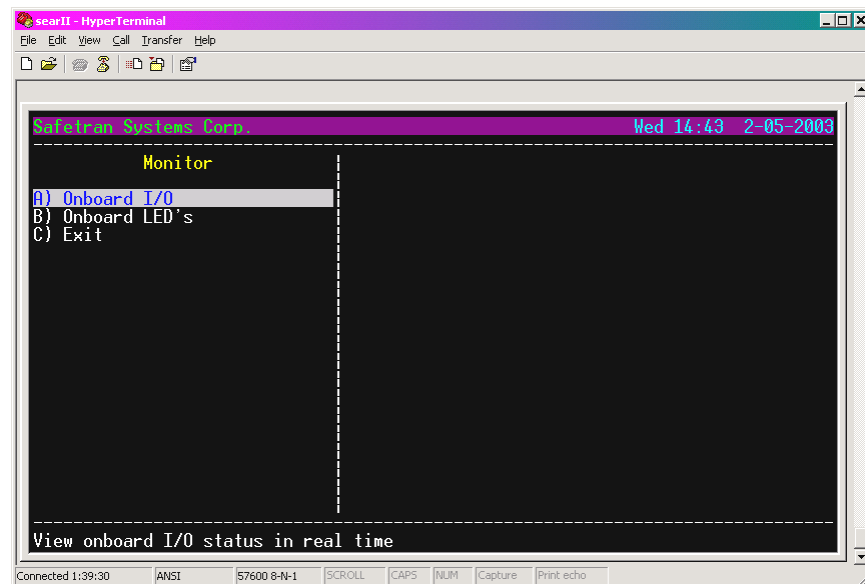
To monitor the inputs in real time, follow the steps outlined in Section 3.5.

3.5 REAL TIME MONITORING OF GFT 2 INPUTS

- Step 1. After configuring a Digital Input channel for the GFT 2 on the SEAR II, go to the **Main** menu and scroll down to selection **Monitor**, as shown below. Press the **Enter** key.



- Step 2. In the **Monitor** menu, scroll to selection **Onboard I/O** as shown. Press **Enter**.



- Step 3. The channel selected in the configuration setup will be displayed similar to the screen shown below. Refer to Table 3-1 for descriptions of the abbreviations appearing on the channel display. If a problem occurs with the GFT 2 input, "STUCK LOW" or "STUCK HIGH" may be shown on the display. Both errors indicate a problem with the wiring to the input.

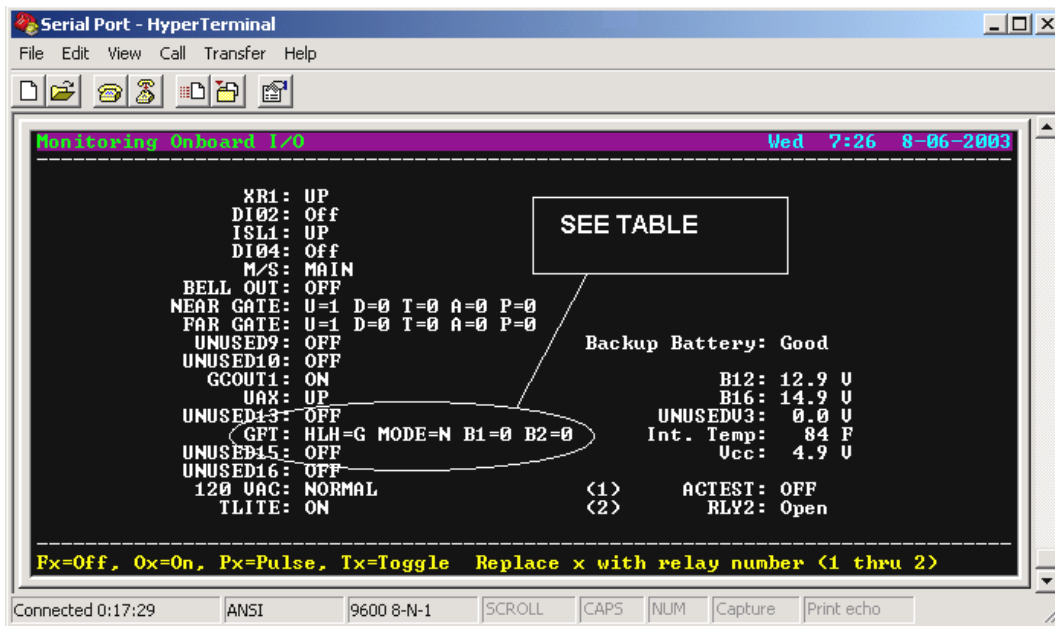


Table 3-1 Sensor Monitoring Legend

DESIGNATION	MONITORING	GFT 2 SCREEN INDICATIONS
HLH	GFT 2 Health	G = Good Health, B = Bad Health
MODE	GFT 2 Mode	N = Normal, T = Test
B1	Battery 1 Fault	Ø = No fault, 1 = Fault
B2	Battery 2 Fault	Ø = No fault, 1 = Fault

Step 4. To return to the previous menu, press **Escape** on the PC keyboard.

NOTE

NOTE

GFT 2 indications are listed in the SEAR II History Log using the label as entered in the configuration.

3.6 INSTALLATION VERIFICATION

At completion of the GFT 2 installation, a configuration verification should be performed to ensure the integrity of GFT 2 standalone operation, GFT 2/SEAR II operation and GFT 2 / 3rd party equipment operation . The following steps should be performed depending on the physical configuration you employ (see paragraph 3.2). Refer to paragraph 5.1 for additional details on using the GFT 2's Test Mode feature.

3.6.1 GFT 2 Stand Alone Configuration

If the GFT 2 is configured for “stand alone” mode (visual indication only), temporarily apply +12 VDC to the TEST pin on GFT 2 connector J1 and ensure BAT 1 and BAT 2 FAULT LEDs on the GFT 2 front panel begin blinking, and remain blinking as long as Test Mode is enabled.

NOTE

NOTE

For simplified testing, a momentary-contact pushbutton switch may be installed between the test voltage source, and connector J2 pin 4 (TEST) on the GFT 2. With this additional hardware, a “quick test” can be performed by simply pressing the pushbutton switch, verifying the BAT FAULT LEDs are blinking, then releasing the switch.

3.6.2 SEAR II Monitoring/Recording Configuration – Manual Test

If the GFT 2 is configured to allow a SEAR II to monitor and record GFT 2 status, run HyperTerminal and enter GFT 2 Real Time Monitor Mode as previously explained in paragraph 3.5. At this point all GFT 2 indications should display as normal (HLH = G, MODE = N, B1 = Ø, B2 = Ø).

Initiate test mode MANUALLY by applying +12 VDC to J1 connector pin 8 (TEST) of GFT 2 . Ensure the GFT 2 front panel BAT 1 and BAT 2 FAULT LEDs begin blinking and the SEAR II Monitor screen reflects the changes in GFT 2 operating status (HLH = G, MODE = T, B1 = 1, B2 = 1). Be sure to remove the test voltage when done.

3.6.3 SEAR II Monitoring/Recording Configuration – Remote Test

If the GFT 2 is configured to allow a SEAR II to monitor and record GFT 2 status and execute remote testing via Relay Output 1 or 2, run HyperTerminal and enter GFT 2 Real Time Monitor Mode as previously explained in paragraph 3.5. At this point all GFT 2 indications should display as normal (HLH = G, MODE = N, B1 = Ø, B2 = Ø).

Initiate test mode REMOTELY by temporarily configuring the SEAR II to toggle RELAY OUTPUT 1 or 2, as applicable (refer to *SEAR II Installation & Operation Manual #SIG-00-02-07*). After the GFT 2 is remotely set to Test Mode ensure the GFT 2 front panel BAT 1 and BAT 2 FAULT LEDs begin blinking, then return to Real Time Monitor Mode and ensure the SEAR II Monitor screen reflects the changes in GFT 2 operating status (HLH = G, MODE = T, B1 = 1, B2 = 1). Be sure to remove the test voltage by toggling the applicable SEAR II Relay Output when done.

3.6.4 3rd Party Monitoring/Recording Configuration

If the GFT 2 is configured to allow a 3rd part equipment to monitor GFT 2 status, initiate test mode MANUALLY OR Programmatically by applying +12 VDC to J1 connector pin 8 (TEST) of GFT 2 . Ensure the GFT 2 front panel BAT 1 and BAT 2 FAULT LEDs begin blinking.

Also note that the Relay1 and Relay2 remain energized as long as the GFT 2 is in SELF TEST Mode (i.e., as long as the 12V DC signal is applied to the TEST Signal.)

Relays 1 and 2 will de-energize upon removal of the SELF TEST Signal.

NOTE

NOTE

When a SELF-TEST fault is applied, allow at least 20 seconds for the GFT 2 to detect and report as fault, This ensures the GFT 2 debounces the circuit, validates the fault and reports the fault. Similarly when a SELF TEST is removed, allow for at least 20 seconds for the GFT 2 to report the removal of the fault from the instant the SELF TEST is disabled

SECTION 4 – SPECIFICATIONS

4.0 SPECIFICATIONS

Alarm Threshold	Configurable 1 to 4.5 mA
Power Supply Input Range:	9 – 30 VDC
Isolation:	2000 Vrms, 60 Hz, 60 Seconds
Power Consumption	0.3 A @ 13.2 VDC 0.5 A @ 9.0 VDC 0.3 A @ 16.5 VDC
Environmental Temperature:	-40° F to + 160° F (-40° C to + 71° C)
Humidity:	95% Non-condensing
Dimensions Cover:	8.00 inches H x 7.50 inches W x 2.25 inches D (20.32 cm H x 19.05 cm W x 5.715 cm D)
Base Plate:	9.25 inches H x 7.50 inches W x 0.25 inches D (23.495 cm H x 19.05 cm W x 0.635 cm D)
Weight:	4.0 Lbs. (1.81437 Kg)

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SECTION 5 – MAINTENANCE

5.0 MAINTENANCE

NOTE

NOTE

Periodic independent ground fault testing should be performed during routine maintenance of the system.

It is encouraged to perform a periodic check on the GFT 2 to verify the unit is healthy and reporting faults as is configured. The maintainer may disconnect the GFT 2 from battery being monitored and apply an equivalent test load corresponding to the leakage current setting on any one of the battery terminals being monitored. The Table below displays resistance values for each of the GFT 2 current settings.

Table 5-1 Equivalent Test Load Resistance Values

GFT2 Current Setting (in mA)	Decade Box Resistance Values in ohms (-01)	Decade Box Resistance Values in ohms (-02)
1	15,520	31,040
1.5	10,345	20,690
2	7,760	15,520
2.5	6,208	12,410
3	5,173	10,350
3.5	4,434	8,870
4	3,880	7,760
4.5	3,448	6,890

The 1mA Test Mode was designed to facilitate periodic verification of the GFT 2's continued ability to detect ground faults. Siemens Rail Automation recommends the use of this feature be incorporated in the regular site maintenance program.

The Test Mode feature allows you to test the internal circuitry of both battery monitor inputs for proper operation. Test Mode may be performed with or without batteries actually being monitored.

To activate Test Mode, temporarily apply +12 VDC to the TEST input pin on GFT 2 connector J1, with negative reference to J1 pin N. This voltage places internal resistors between each monitor input and earth ground to internally test the monitoring circuits. The test voltage must be applied from the operating battery or other power source connected to GFT 2 J2 pins B and N. For GFT 2 A81010-02 and -01, the internal resistors will be properly referenced to earth ground only if both pins J2 pin5 and J2 pin 6 are correctly wired to separate points on the same external earth grounds.

Test Mode effectively tests the unit for normal operation of all components, including those connected to the battery input terminals. When the GFT 2 is in Test Mode and all internal circuits are functioning normally, both BAT FAULT LEDs will blink continuously. At the same time, battery fault data is transmitted to the SEAR II via the D OUT pin on GFT 2 connector J1, if connected (see Figure 3-2).

Test Mode may be remotely activated by connecting the GFT 2 J1 TEST pin to a SEAR II Relay Output and configuring the SEAR II to toggle the corresponding relay. Refer to Figure 3-2 for wiring interconnections, and the *SEAR II Installation & Operation Manual #SIG-00-02-07* for information on configuring SEAR II Relay Outputs.

SECTION 6 – TROUBLESHOOTING

6.0 TROUBLESHOOTING

6.1 GENERAL

It is not possible to cover every combination of problems that may occur in the system. Therefore, the methods described in Table 6-1 have been prepared to isolate the most probable system failures.

Table 6-1 Troubleshooting Chart

PROBLEM	POSSIBLE CAUSES	CHECK OR TRY
Green PWR LED not illuminated	No power to GFT 2 or failed LED	Verify battery power is present at GFT 2 connector J1, pins 5 (B+) and 6 (N-).
Red GFT FAIL LED not illuminated	No power to LED or failed LED	Verify that battery power is present. NOTE: <ul style="list-style-type: none"> LED should be lit steady when normal condition exists. LED should blink if an internal hardware failure occurs.
Red BAT 1 FAULT LED not illuminated	No power to LED or failed LED	Check that battery power is present. NOTE: <ul style="list-style-type: none"> LED should be lit steady when normal condition exists. LED should blink when an external ground fault is detected, or when set in Test Mode.
Red BAT 2 FAULT LED not illuminated	No power to LED or failed LED	Verify that battery power is present. NOTE: <ul style="list-style-type: none"> LED should be lit steady when normal condition exists. LED should blink when an external ground fault is detected, or when set in Test Mode.
BAT FAULT LEDs not blinking during Self-Test	Improper earth ground reference	Verify both earth ground reference terminals (E GND 1 and E GND 2) are securely connected to separate earth ground connection points. If both earth ground are properly connected, and LEDs Do not blink, then an internal failure exists on the GFT 2. Return to factory for further trouble shooting

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