DEH-4568A

EntelliGuard® Digital Test Kit

User's Guide

imagination at work

WARNINGS, CAUTIONS, AND NOTES AS USED IN THIS PUBLICATION

WARNINGS
Warning notices are used in this publication to emphasize that hazardous voltage, 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.

1-1 Description

EntelliGuard® TU Test Kit is a lightweight, portable test instrument designed for field-testing of EntelliGuard TU Trip Units. The Test Kit includes the following features:

- Operation from a 100-240VAC 50/60 Hz Universal plug supply or two 9-volt alkaline batteries (batteries not supplied).
- Provides power to the trip unit for viewing and setting set-points with less than 15% load on the breaker or if the replaceable Trip Unit Battery needs replacing.
- Verification of metering (phase simulation)
- Ground Fault Testing with Ground Fault Trip Indication
- Trip test
- Temporarily disable the Ground Fault feature during single phase breaker testing

1-2 Summary of Operation

The functions of the various switches and LEDs are as follows:

Power Switch
Pressing this button will power-up the trip unit. The green Power LED will indicate that power has been provided to the trip unit. A red Battery Low LED indicates that the batteries in the test kit should be replaced.

Trip Breaker Switch
Pressing this button will cause the breaker to trip. The switch has an associated red LED that indicates the state of the switch. If the LED is illuminated, then switch is ON and firing the flux shifter to trip the breaker.

Disable Ground Fault
Pressing this button will cause the trip unit GF protection to be temporarily disabled. To enable the GF, the switch and associated red LED must be turned off. The GF switch has an associated red LED that indicates the state of the switch (GF disabled when red LED illuminated).

WARNING: When using EntelliGuard Digital Test Kit to defeat Ground Fault function of EntelliGuard Trip Units, the ground fault protection of the trip unit will not be active. Power to the breaker should be removed prior to using this feature. Before applying load to the breaker, ensure that the Disable GF LED is OFF or the Test Kit is disconnected from the trip unit.

Failure to follow this procedure can result in deactivation of the Trip Unit GF protection.

1.2 Summary of Operations, Continued

Ground Fault & Overload

Pressing this button will cause a trip either on the Ground Fault or Overload protection. The switch has a red LED that is ON when the switch is pressed. This feature will store the trip event in the Event log and operate the bell alarm, if available.

CAUTION: With the Phase Current enabled, the EntelliGuard trip unit will not provide correct protection to the system, which may result in a trip below desired levels. Power should be disconnected from the circuit breaker prior to entering Phase Current Mode.
Ensure that the Phase Current LED is OFF when in normal operation. Failure to follow this procedure can result in improper operation of the system.

Phase Current

By pressing this switch, the EntelliGuard trip unit will display approximately 100A on each current phase. This can be viewed on the trip unit LCD under METER menu. The switch has a red LED that indicates the state of the switch (LED On when Switch is ON).

See Figure 1.0

1.3 Specifications

The EntelliGuard Digital Test Kit Catalog Number is GTUTK20. It includes the following components:

- Test kit box
- 24VDC power supply – CUI Inc., Part Number EMS 240075- P5P-SZ or equivalent.
- Voltage polarity is as follows:

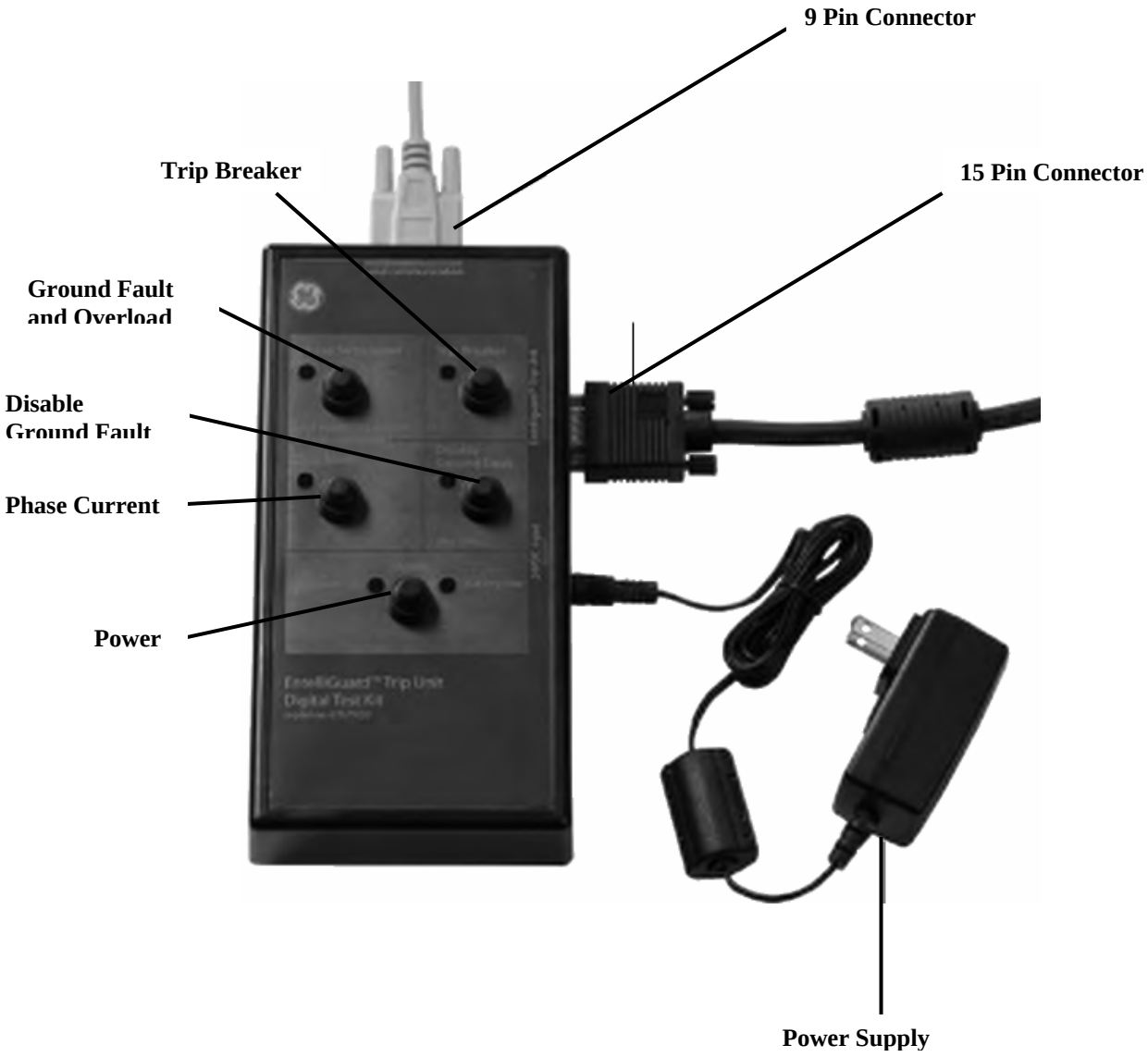
- Serial Communication Test Kit cable (6 ft DB9 (male)/DB9 (female) cable). This cable connects the Test Kit to a PC to be used to download Waveforms and set-up the trip unit via set-up software. Part number 45-0314 from GC Electronics or equivalent. Below is the connection diagram between the test kit and PC.

Test Kit DB-9		PC Comm port DB-9
2	----------	2
3	----------	3
5	----------	5

- EntelliGuard Trip Unit cable (6-ft. SVGA/VGA Monitor Extension Cable HD15M to HD15F). This cable connects the Test Kit to the EntelliGuard Trip Unit. Part Number SPC20050 from SPC Technology or equivalent. Below is the connection diagram between the Test Kit and Trip Unit

Test Kit HD15F		Trip Unit HD15M
1	----------	1
2	----------	2
3	----------	3
6	----------	6
7	----------	7
8	----------	8
9	----------	9
10	----------	10
11	----------	11

Figure 1.0 EntelliGuard Test Kit: GTUTK20



1.4 Detailed Operation

Cables: The Test Kit is provided with a 15-pin trip unit cable that connects to the side (EntelliGuard trip unit port) of the test kit and to the front of the trip unit. This cable allows the test kit to power the trip unit and to apply signals for the test functions provided below. Note: In some cases removal of the screws from the 15 pin connector on the trip unit side are required.

In addition, the test kit is provided with a 9-pin cable that connects to the top (serial communication port) of the test kit to support Modbus communication. Modbus communication requires a computer, Modbus software and configuration to be used. See the EntelliGuard Trip Unit Manual (DEH-4567) for Modbus register information. Contact your GE Account Manager for availability of software specifically for use with the EntelliGuard TU.

Powering the trip unit: The test kit can be used to power the trip unit as follows:

- Connect the EntelliGuard Trip Unit cable to the trip unit.
- Press the Power button to power-on the trip unit.

The power ON LED will be lit. The trip unit can also be powered by external 24V that is wired to the secondary disconnect of the circuit breaker and is powered when sufficient current is flowing through the circuit breaker. The test kit can be used to power the trip unit in cases where current is flowing through the circuit breaker but the current is insufficient to power the trip unit. Applying power to the trip unit from the test kit while the trip unit is powered from another source will not damage the trip unit. When Power is supplied to the trip unit, the bright backlight LCD screen will be lit.

Trip Breaker Test: Pressing the Trip Breaker button signals the trip unit to trip the breaker by firing the flux shifter. This can be used to verify that the flux shifter is connected and installed properly and that the flux shifter trips the breaker mechanism. This test is performed by having the test kit connected and the breaker closed and then pushing the Trip Breaker button. The breaker will then open. No events will be stored in the event log and no bell alarm will operate.

If trip unit fails to trip the breaker in this test, remove the breaker from service and refer the trip unit and breaker to an authorized GE service representative.

Ground Fault & Overload Operation: In order to perform the Ground Fault test, Short Time and Instantaneous pickup must be set to 5X or greater. Record all settings prior to making changes. To perform an overload test the Ground Fault needs to be disabled through the test kit. See the following page for detailed instructions on test set-up.

Ground Fault Disable: This feature should only be used when testing the breaker with the breaker disconnected from the source (upstream breaker or switch open or breaker racked out). This test is used when performing primary injection testing of overcurrent or short circuit protection features on 1 phase of the circuit breaker. This single-phase current will appear as a ground fault to the trip unit due to the phase unbalance (only 1 phase current applied). The ground fault disable feature will allow this testing to occur without the unit tripping on ground fault. Pressing the Disable Ground Fault button signals the trip unit to temporarily disable the GF protection.

WARNING: When using the EntelliGuard Digital Test Kit to defeat the Ground Fault function of EntelliGuard Trip Units the ground fault protection of the trip unit will not be active. Power to the breaker should be removed prior to using this feature. Before applying load to the breaker, ensure that the Disable GF LED is OFF or the Test Kit is disconnected from the trip unit.

Failure to follow this procedure can result in deactivation of the Trip Unit GF protection.

Phase Current: This feature should only be used when testing the breaker with the breaker disconnected from the source (upstream breaker or switch open or breaker racked out). The phase current button is used to apply a fixed voltage to the sensing circuitry for each phase. This will test the measurement circuitry of the trip unit. If the unit is working properly then 100A ± 10A will appear for each phase on the trip unit METER display. If your trip unit reads lower than 90A or greater than 110A, please contact your local GE Field Sales Office.

CAUTION: With the Phase Current enabled, the EntelliGuard trip unit will not provide correct protection to the system, which may result in a trip below desired levels. Power should be off from the circuit breaker prior to entering Phase Current mode. Ensure that the Phase Current LED is OFF when in normal operation. Failure to follow this procedure can result in improper operation of the system.

1.4 Detailed Instructions, Continued

RECORD ALL TRIP UNIT SETTINGS PRIOR TO TESTING

EntelliGuard TU trip unit test procedure

Initial trip unit set-up

Set Long Time Pick-Up to 50% (allows test signal to cause O/L trip without extremely long time delay)
Set Long Time Delay to any of the lower bands
Set Short Time Pick-Up to 9X (set above expected test current)
Set Short Time Delay to any of the intermediate bands or set to OFF
Set Instantaneous Pick-Up > 5X (to prevent instantaneous trip with test kit input)
Set Ground Fault Pick-Up to 0.20
Set Ground Fault Delay to any of the upper delay bands

Clear all events in the Event Log

Scroll to EVENT tab on main screen
Press UP and DOWN arrows simultaneously
Verify Event 0 is blank

Metering Test

Scroll to METER tab on the main screen. Press right arrow to view phase currents
Press PHASE CURRENT button. LED turns ON
Verify ~100A current on Phase A, B, C
Press PHASE CURRENT button again to turn off phase current input. LED turns OFF
Verify 0A current on Phase A, B, C

Breaker Trip Test

Charge and Close Breaker
Press TRIP BREAKER button
Breaker trips
No bell alarm operation and no event reported in Event Log

Ground Fault Test

Charge and Close Breaker
Press OVERLOAD / GROUND FAULT button
Breaker trips
Bell alarm operates, if available
Event log (Event 0) registers ground fault trip with magnitude of approx 1.5 times the sensor

Overload (Long Time) Test

Reset Bell Alarm
Charge and Close Breaker
Press DISABLE GROUND FAULT button - verify LED is ON
Press and hold OVERLOAD / GROUND FAULT button - may take several seconds depending on LT Delay setting. To accelerate time to trip, adjust the Long Time Pick-up to 50%.
Breaker trips
Bell alarm operates, if available
Event log (Event 0) registers long time trip with magnitude of approx 1.5 times the sensor

RESTORE ALL TRIP UNIT SETTINGS AFTER TESTING IS COMPLETE AND REPLACE RATING PLUG WITH ORIGINAL

Trip Unit set-up for Testing RELT – Reduced Energy Let Through and Short Time

Change rating plug to a value approximately 50-60% of the breaker sensor, see Table 1.0 on the following page

Set Long Time Pick-Up to 50% (allows test signal to cause O/L trip without extremely long time delay)

Set Long Time Delay to any of the lower bands

Set Short Time Pick-Up to 9X (set above expected test current)

Set Short Time Delay to any of the intermediate bands or set to OFF

Set Instantaneous Pick-Up > 5X (to prevent instantaneous trip with test kit input)

Set RELT Pick-Up for 1.5X

Set Ground Fault Pick-Up to 0.20

Set Ground Fault Delay to any of the upper delay bands

RECORD ALL TRIP UNIT SETTINGS PRIOR TO TESTING

RELT Test

Reset Bell Alarm

Charge and Close Breaker

Turn RELT ON via local or remote RELT switch. Verify RELT light on instrument panel is ON

Press DISABLE GROUND FAULT button - verify LED is ON

Press OVERLOAD / GROUND FAULT button

Breaker trips

Bell alarm operates, if available

Event log (Event 0) registers instantaneous trip with magnitude of approx the RELT pick-up value

Short Time Test

To test Short Time function, set Short Time Pick-Up to 4X or less, set Instantaneous Pick-Up to >6X or OFF

Reset Bell Alarm

Charge and Close Breaker

Press DISABLE GROUND FAULT button - verify LED is ON

Turn RELT switch OFF. Verify RELT light on instrument panel is OFF

Press OVERLOAD / GROUND FAULT button

Breaker trips

Bell alarm operates, if available

Event log (Event 0) registers short time trip with magnitude of approx 1.5 times the sensor

RESTORE ALL TRIP UNIT SETTINGS AFTER TESTING IS COMPLETE AND REPLACE RATING PLUG WITH ORIGINAL

Table 1.0 Rating Plug selection for RELT and Short Time Test

Rating plug selection for testing RELT and Short Time with GTUTK20 test kit

							Test current multiple for overcurrent tests **			
Current Sensor (amps)	50% Rating Plug (amps)	60% Rating Plug (amps)	**Use Rating Plug (amps)**	Sensor Range (amps)	% Sensor	Equivalent test current signal from test kit (amps)	RELT & Instantaneous multiple[1] with Test Rating Plug	LT multiple[2] when LT pick-up = 0.5	ST multiple[3] when LT pick-up = 0.5	GF multiple[4] when GF pick-up = 0.2
400	200	240	**200**	200-400	50	600	3	6	6	7.5
800	400	480	**400**	400-1000	50	1200	3	6	6	7.5
1600	800	960	**1000**	1000-2500	63	2400	2.4	4.8	4.8	7.5
2000	1000	1200	**1000**	1000-2500	50	3000	3	6	6	7.5
2500	1250	1500	**1500**	1600-4000	60	3750	2.5	5	5	7.5
3000	1500	1800	**1500**	1600-4000	50	4500	3	6	6	7.5
3200	1600	1920	**1500**	1600-4000	47	4800	3.2	6.4	6.4	7.5
4000	2000	2400	**2000**	2000-5000	50	6000	3	6	6	7.5
5000	2500	3000	**2500**	2500-6400	50	7500	3	6	6	7.5

**** Test kit provides a signal that is equivalent to 1.5x the current sensor value for a test current**

[1] Instantaneous pick-up is a multiple of the Rating Plug

[2] Long time pick-up is a multiple of the Rating Plug

[3] Short time pick-up is a multiple of Rating Plug * LT Pick-Up

[4] Ground Fault is a multiple of the Current Sensor

RESTORE ALL TRIP UNIT SETTINGS AFTER TESTING IS COMPLETE AND REPLACE RATING PLUG WITH ORIGINAL

GE
41 Woodford Avenue, Plainville, CT 06062
www.geelectrical.com