g GE Industrial Systems *Renewal Services* *Louisville,KY*	**Functional Testing Specification** **LOU–GED-IC3650MISC**

Test Procedure for Miscellaneous IC3650 cards

DOCUMENT REVISION STATUS: Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	D.Laemmle	9/18/02
B			
C			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
D. Laemmle			Robert Dwall
DATE	**DATE**	**DATE**	**DATE**
09/18/02			10/16/02

Functional test procedure for a Card

1. SCOPE

1.1 This is a functional testing procedure for a Card.

2. STANDARDS OF QUALITY

2.1 Refer to the current revision of the IPC-A-610 standard for workmanship standards.

3. APPLICABLE DOCUMENTS

3.1 The following document(s) shall form part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue shall apply.
- **3.1.1 259A2101 – Test Instruction for IC3655A117**
- **3.1.2 PGEI-1430 – LodTrak Calibration Instructions**

4. ENGINEERING REQUIREMENTS

4.1 Equipment Cleaning
- **4.1.1** Equipment should be clean and free of debris prior to applying power unless performing an initial check. Refer to the local documented procedures for cleaning guidelines.

4.2 Equipment Inspection
- **4.2.1** Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:
  - **4.2.1.1** Wires broken or cracked
  - **4.2.1.2** Terminal strips / connectors broken or cracked
  - **4.2.1.3** Loose wires
  - **4.2.1.4** Components visually damaged
  - **4.2.1.5** Capacitors leaking
  - **4.2.1.6** Solder joints damaged or cold
  - **4.2.1.7** Circuit board burned or de-laminated
  - **4.2.1.8** Printed wire runs burned or damaged

5. EQUIPMENT REQUIRED

5.1 The following equipment is required to perform the process requirements. Equipment may be substituted provided that all accuracy's and test ratios are equivalent or better.

Qty	Reference #	Description
1		Fluke 85 DMM (or Equivalent)
1		LodTrak Calibration Box

6. TESTING PROCESS

6.1 Setup

6.1.1

Note:

6.2 IC3650SODB

6.2.1 .

6.3 IC3650SODC

6.3.1

6.4 IC3650SPUA

6.4.1

6.5 IC3650SRDG

6.5.1

6.6 IC3655A117

6.6.1

6.7 IC3655A137

6.7.1

6.8 ***TEST COMPLETE ***

7. NOTES

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PGEI-1430

TITLE
Instructions for LodTrak Card Calibration Using the Portable Calibration Box

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GENERAL OPERATING PROCEDURE

The portable calibration box is intended for calibrating the Overload, Overload/ Overtemperature, Unbalance and Ground Fault functions of a LodTrak motor protection relay. A circuit card containing electronic components is installed in the box and should remain there permanently. On no account should any of the sealed trim potentiometers of this card be adjusted. Space is provided for a relay driver card and a function card, to be provided by the LodTrak relay under test. Cards are withdrawn from the relay and also from the calibration box using the card puller provided. IT IS IMPORTANT THAT POWER BE REMOVED FROM THE RELAY BEFORE CARDS ARE REMOVED. A SWITCH MARKED "CARD POWER" IS PROVIDED ON THE CALIBRATION BOX. THIS SWITCH SHOULD ALWAYS BE IN THE OFF POSITION WHEN CARDS ARE EITHER BEING INSERTED OR WITHDRAWN.

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Prior to using the calibration box it should be connected to a standard 115V 60Hz supply, the main power switch turned on and the equipment allowed to warm up for approximately 10 minutes.

Operation of the equipment for calibrating individual card functions is described in the following pages. After individual card calibration all cards should be replaced in the CORRECT relay base, care being taken to ensure that they are properly seated. A functional test should be done on the complete relay as follows.

Push the test button of each function card in turn and check that the trip and alarm relays pick up and that all latching relays latch after the button has been released. Check also that the appropriate annunciator lamps light and

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that the trip lamps latch. (Note there is some delay in operation of the test functic of the unbalance card, the trip signal produced by other cards should be immediate.)

A. Overload Card (IC3650SODB1)

1. Set controls as follows

"UNBALANCE" switch - "F.L. AMPS"

"UNBALANCE" potentiometer - CCW

"CURRENT INPUT" - Both CCW

"OVERLOAD OVERTEMPERATURE" - "F.L. AMPS"

"FUNCTION" - "OVERLOAD"

~~Turn both trim potentiometers of overload card, R36 and R37, fully counterclock-~~ (Service Factor)
~~wise (CCW) (about 15 turns)~~. Turn "TRIP LEVEL" adjustment on card to 100%.

Clip orange jumper lead to C13 lead nearest to card front (first scrape off transparent varnish to ensure good contact). Now insert both overload and relay driver cards in their appropriate slots, using sufficient force to ensure good contact in the sockets. Insert jumper lead plug into socket marked "JUMPER". Turn both trim pots of overload card, R36 & R37 fully CCW (about 15 turns)
Turn card power switch to "ON".

2. Adjust "CURRENT INPUT" controls until digital meter displays the desired ~~trip~~ ultimate trip ~~current~~ 3.0 current (Between 2.0 and 5.0 amps). Turn "OVERLOAD/OVERTEMPERATURE" switch to "ADJUST F.L." then push "FAST CAL" button on card and hold while turning "RUN" trim potentiometer clockwise. When a trip is indicated, back off R37 CCW until relay released then very slowly turn CW again until relay just trips. (Further rotation than is necessary to just cause the relay to trip will result in the relay being set at too low a value)

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3. Turn "OVERLOAD/OVERTEMPERATURE" switch to "L.R. AMPS" and adjust "CURRENT INPUT" controls until digital meter displays the desired locked rotor current. (Between 12 and 18 30 amps if locked rotor current is six times full load current) Turn "OVERLOAD/OVERTEMPERATURE" switch to "ADJUST L.R." then adjust "STALL" trimpot CW until the digital display reads the value given by table 1, below, for the desired maximum stall time. (This operation will approximately set the desired stall time).

TABLE 1 1.8 sec @ 30 Amps maximum Adjustment { 3.75 ultimate TRIP / 10 sec @ 15 Amps }

TIME (sec)	METER READING	TIME (sec)	METER READING	TIME (sec)	METER READING
5	~~113~~ 226	10	~~058~~ 116	20	~~031~~ 062
5.5	~~103~~ 206	11	~~053~~ 106	21	~~029~~ 058
6	~~095~~ 190	12	~~049~~ 098	22	~~028~~ 056
6.5	~~088~~ 176	13	~~045~~ 090 087	23	~~027~~ 054
7	~~082~~ 164	14	~~042~~ 084	24	~~026~~ 052
7.5	~~076~~ 152	15	~~040~~ 080	25	~~025~~ 050
8	~~072~~ 144	16	~~037~~ 074	26	~~024~~ 048
8.5	~~068~~ 136	17	~~035~~ 070	28	~~023~~ 046
9	~~064~~ 128	18	~~034~~ 068	30	~~021~~ 042
9.5	~~061~~ 122	19	~~032~~ 064	49.8	019

4. Turn "OVERLOAD/OVERTEMPERATURE" switch to "TIME". Press and hold down the yellow "TIME" button. Card will now experience a simulated locked rotor and after trip will display the time taken to trip. Releasing the button resets

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the circuit and, after a wait of ten seconds, the button may be depressed again to repeat the test. If the time taken to trip is too long turn R36 CW a little and repeat the test. If the time is too short turn R36 CCW. Repeat until the time to trip is within acceptable limits.

5. Turn card power switch to "OFF". Remove cards and jumper from Overload card.

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Instructions for Logitrak Card Calibration Using the Portable Calibration Box

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Meter 20 to 1 ScDC1 0°C 9.04Ω set for 0 130°C 14.05 set to 6.5V

TP 7-18
2-34
1-22
6-27 CHECK WIRES TEST JACKS TO PINS

B. OVERLOAD/OVERTEMPERATURE CARD (IC3650SODC)

1. Set controls as follows

"UNBALANCE" switch - "F.L. AMPS"

"UNBALANCE" potentiometer - CCW

"CURRENT INPUT" - Both CCW

"OVERLOAD/OVERTEMPERATURE" - "F.L. AMPS"

"FUNCTION" - "OVERLOAD/OVERTEMPERATURE"

Pencil Inserts Nominal Settings

Insert both Overload/Overtemperature and relay driver cards in their appropriate slots and apply sufficient force to ensure good contact in their sockets.

Rotate "ALARM", "TRIP", "RUN" and "STALL" trimpots fully CW (approximately 15 turns). TURN CARD POWER SWITCH TO "ON". Check meter at 40° & 150°

ScDC1 RTD-10.6 1K?

2. (OMIT IF NO ALARM FUNCTION IS REQUIRED). Check wiring to test jacks

Set "RTD RESISTANCE" decade switch the resistance equivalent to the desired Alarm temperature.

Example: E.g. ~~120°C~~

	R.T.D. Resistance Switch Setting
SODC1 - 10 Ω Copper	013.7 219.3 ?
SODC2 - 120 Ω Nickel (GE or Edison #7)	~~219.9~~
SODC3 - 100 Ω Platinum	~~146.3~~ 4.1 on p.16 of GEH-4049

For other types or temperatures refer to published resistance tables. Turn "ALARM" pot CCW until alarm lamp lights. Turn CW until lamp goes out then slowly CCW again until lamp just lights again.

3. Set "RTD RESISTANCE" decade switch for the resistance equivalent to the desired trip temperature

These cal. should be to customers order request

If new not it calibrated

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Instructions for Logitrak Card Calibration Using the Portable Calibration Box

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135 = 14.25

Example: E.g. 130°C

	Switch Setting
SODC1 - 10 Ω Copper	014.0 ~~228.9~~
SODC2 - 120 Ω Nickel (GE or Edison #7)	~~225.1~~
SODC3 - 100 Ω Platinum	~~150.1~~ 150.2

For other types or temperatures refer to the published resistance tables

Turn "TRIP" pot CCW until trip lamp lights. Turn CW until lamp goes out then slowly CCW again until lamp just lights up again.

4. Set "RTD RESISTANCE" decade switch for the resistance equivalent to 40°C

	Switch Setting
SODC1 - 10 Ω Copper	010.6
SODC2 - 120 Ω Nickel	~~150.0~~ 152.3
SODC3 - 100 Ω Platinum	~~115.0~~ 115.4

Adjust "CURRENT INPUT" controls until digital meter displays the desired full load current, (between 2.0 and 5.0 amps). 3.5 Turn "OVERLOAD/OVERTEMPERATURE" switch to "ADJUST F.L." and rotate "RUN" trim potentiometer on card until display reads 05.0. whatever customer request For F.L. current

5. Turn "OVERLOAD/OVERTEMPERATURE" switch to "L.R. AMPS". Adjust "CURRENT INPUT" controls until digital meter displays the desired locked rotor current 21 (between 12 and 30 amps if locked rotor current is six times full load current) 6x3.5 or whatever F.L.

Turn "OVERLOAD/OVERTEMPERATURE" switch to "ADJUST L.R." and turn "STALL" pot on card until meter displays the number from the chart below for the desired maximum stall time. (This operation will approximately set the desired stall-time). 15sec ← on calib req. + see Time chart next page next page The number shown is for 10Ω Cu RTD. It will vary from these values for the Ni & Pt RTD's.

13.7 - 14.1

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Instructions for LodTrak Card Calibration Using the Portable Calibration Box

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RTD TRIP TEMP 130°C	RTD TRIP TEMP 155°C	TIME (sec)	RTD TRIP TEMP 130°C	RTD TRIP TEMP 155°C	TIME (sec)	RTD TRIP TEMP 130°C	RTD TRIP TEMP 155°C
999	1247	10	522	651	20	284	355
913	1138	11	479	597	21	273	340
840	1048	12	443	552	22	263	328
779	972	13	412	514	23	253	316
727	906	14	386	481	24	245	305
681	849	15	363	453	25	237	296
641	800	16	343	428	26	230	287
606	756	17	326	407	27	223	278
575	717	18	311	387	28	217	271
547	682	19	297	370	30	206	257

6. Turn "OVERLOAD/OVERTEMPERATURE" switch to time. Wait ten seconds then push and hold yellow "TIME" button. Card will experience a simulated locked rotor and after the trip the meter will display the time taken to trip. Releasing the button resets the circuit card and timer and, after a wait of ten seconds, the button may be depressed again to repeat the test. If the time taken is too short then rotate the stall pot CW a little and repeat the test. If the time is too long rotate the pot CCW. Repeat until the time to trip is within acceptable limits.

7. Turn card power switch to "OFF". Remove cards.

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Make sure the RTD setting is 40°C for timing calibration. Too low setting causes an increase in time. Too high setting causes a decrease in time.

	Pin
TP4	1
TP1	2
TP2	34
TP3	18

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Portable Calibration Box

FIRST MADE FOR P7 Nameplate.

C. PHASE UNBALANCE CARD (IC3650SPUA 2

1. Set controls as follows

"UNBALANCE" switch - "UNBAL"

"UNBALANCE" potentiometer - CCW

"CURRENT INPUT" - Both CCW

"OVERLOAD/OVERTEMPERATURE" - "F.L. AMPS"

"FUNCTION" - "UNBALANCE"

Remove jumper T3-T4 from unbalance card, set "TRIP LEV" adjustment on card to desired trip level (scale is marked 10%, 20% and 30%, pot is infinitely adjustable within this range). Now insert both unbalance and relay driver cards in their appropriate slots and apply sufficient force to ensure good contact in their sockets. Rotate both trimpots fully CW (approximately 15 turns). Turn card power switch to "ON".

2. Adjust "CURRENT INPUT" controls until digital meter displays the desired full load current. Check that "UNBALANCE" potentiometer is indeed fully CCW then rotate CW until digital meter displays the reduced value of current equivalent to the unbalance level required for ultimate trip of the relay. (e.g. if full load current = 5 amps. and unbalance to trip = 10% then meter should read 90% of 5 amps = 4.5 amps)

Now rotate the trim pot (R85) on unbalance card (the trimpot on the left) CCW till trip lamp lights. Turn CW until lamp goes out then slowly CCW again until lamp just lights. Note that if the "UNBALANCE" potentiometer is now ~~cked~~ off fully CCW then slowly CW again, the alarm lamp will light first at

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3% of the trip value if
the alarm function is included) then the trip lamp will light at the level of unbalance just calibrated. Now turn the "UNBALANCE" potentiometer fully CCW. *nominal* OCW *2.031*

ADD Jumper T3 to T4 Ck. for Time Delay.

1. Turn "UNBALANCE" switch to "1.5 *5.6* x F.L." then adjust "CURRENT INPUT" controls until digital meter reads a value 1.5 times the full load current. *5.25 NOV.* [redacted] rotate clamp trimpot (R82, the trimpot on the right) slowly CCW until the reading on the digital meter just starts to reduce. *Meter will be inclined to "bounce" some. Look for a steady decrease as R82 is turned and then come back to where it just begins.*

Turn card power switch to "OFF". Remove cards and replace T3-T4 jumper on unbalance card.

Turn power off. Put jumper back in timing

After setting R82

Go back Check trip set unbalance switch to unbalance

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GROUND FAULT CARD (IC3650SGDB1/2)

Set controls as follows

"UNBALANCE" switch	-	"F.L. AMPS"
"UNBALANCE" potentiometer	-	CCW
"CURRENT INPUT"	-	Both CCW
"OVERLOAD/OVERTEMPERATURE	-	"F.L. AMPS"
"FUNCTION"	-	"GROUND"

Toggle sw To 1 IF Trip is over .1 Turn POT CW. Then set DIGITAL Read out For ? with current input controls. Then Turn POT CW UNTIL Trip goes OUT Then CCW TILL ON. Then Turn CURRENT INPUT CCW + Then CW ALARM Should come ON AT 67% OF Trip reading + Trip should come ON AT whATever digiTAL WAS SET AT For Trip Push TEST Trip bUTTON TO see IF bOTH Lights come on.

.5AMP

et the range switch) for the desired ground trip level range and turn the round fault level potentiometer fully CW. Insert the ground and relay driver ards in their appropriate slots using sufficient force to ensure good contact n the card sockets. Turn card power switch to "ON".

. Adjust "CURRENT INPUT" controls until digital meter displays the desired .5AMP round fault current to trip. Now turn the trip level adjustment on the card lowly CCW until the trip lamp lights. Back off the "CURRENT INPUT" control ully CCW then slowly increase again. Firstly the alarm lamp will light at .33AMP bout 67% of the current required to trip (if the alarm function is included), hen the trip lamp will light at the level for which the card was calibrated. .5AMP

. Turn card power switch to "OFF". Remove cards.

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TABLE 1 (Cont'd)
STALL SETTINGS USE FOR 3φ OVERLOAD CARD

9	064	18	034	30	021
9.5	061	19	032		

TABLE 2
STANDARD RTD'S USED WITH LODTRAK
(Resistance in Ohms)

Super

TEMPERATURE °C	10 OHM COPPER	100 OHM PLATINUM	CGE 100 OHM NICKEL	CGE OR EDISON 120 OHM NICKEL
0	9.04	100.00	100.00	120.00
10	9.42	103.96	105.97	127.17
20	9.81	107.92	112.10	134.52
30	10.19	111.86	118.38	142.06
40	10.58	115.78	124.83	149.79
50	10.97	119.70	131.45	157.74
60	11.35	123.60	138.25	165.90
70	11.74	127.50	145.21	174.25
80	12.12	131.38	152.37	182.84
90	12.51	135.25	159.67	191.64
100	12.90	139.11	167.20	200.64
110	13.28	142.95	174.87	209.85
120	13.67	146.79	182.74	219.29
130	14.06	150.61	190.80	228.96
140	14.44	154.42	199.04	238.85
150	14.83	158.22	207.46	248.95
160	15.22	162.01	216.08	259.30
170	15.61	165.79	224.92	269.91
180	16.00	169.55	233.97	280.77
190	16.39	173.30		291.96
200	16.78	177.04		303.46

8. <u>Oscilloscope Verification Examples:</u>

Fig. 1

Fig. 2