g GE Energy Services	**Functional Testing Specification**
Inspection & Repair Services ***Louisville, KY***	**LOU–GED—193X726xx-B**

Test Procedure for a 193X726 Driver Coordination Card

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	John Madden	11-15-02
B	Added updates to Setup and Applicable documents sections	John Madden	4-14-04
C			

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
John Madden			Robert Duvall
DATE	**DATE**	**DATE**	**DATE**
11-15-02			11/20/02

Functional test procedure for a 193X726 Driver Coordination **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 Test Procedure 224X294AC (included in this test)**
- **3.1.2 Printed circuit diagram 36C759334EE (Not included in this test)**
- **3.1.3 Engineering Specification 224X250BC (Not included in this test)**

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	H188505	Fluke 5500a Calibrator
1		Sine wave generator or function generator
2		Tenma dual output DC power supplies
1		Oscilloscope, isolated
1		Pin out/Breakout box for Thick 193X cards, the one with the red jacks

6. TESTING PROCESS

6.1 Setup

6.1.1 See Listed GE Procedure, 224X294AC & section 2 of 224X250BC.

6.1.2 Connect a 1.5K ohm resistor between tab 5 and common, and another between tab 9 and common (found in section 2 of 224X250BC).

Note: There are some notes listed after the procedure that will clarify certain steps in the process. Refer to them and document 224X250BC before proceeding with test.

6.2 Testing Procedure

6.3 ***TEST COMPLETE ***

7. NOTES

7.1.1 Set both pots full CW

7.1.2 For step 2, input ref. voltage into tab 25 using calibrator to get output at tabs 5 or 9

7.1.3 For step 6, do not input any signal on tab 25.

7.1.4 For step 7, when it calls for a result of zero output from pins 5 or 9 after reversing polarity at pin 25, you may only see it go to 300 to 350 mV. This is OK.

7.1.5 For step 8A and 8B, signal required on tab 26 with be approximately +/- 10Vdc.

7.1.6 During step 9, once you have initiated an IOC switching operation, after you have removed the signal to tab 27 and/or 28, you can reset the card by momentarily grounding tab 11.

GENERAL ELECTRIC

224X294AC
CONT ON SHEET 2 SH NO. 1

REV NO. 0 | 224X294AC | CONT ON SHEET 2 SH NO. 1

TITLE DRIVER COORDINATION TEST INSTRUCTIONS

FIRST MADE FOR 193X726AHG01

REVISIONS

1.0 SCOPE

These procedures cover the suggested minimum requirements for production testing of the subject card. The operating conditions are stated in Section 3. For engineering specifications refer to 224X250BB.

2.0 INSTRUCTIONS

1. Card should be adjusted as per 224X250BB, Part 2.
2. For an output of 6 volts at tab 5 or tab 9, the error voltage at tab 30 (all with respect to common) should be .15 to .30 volts. The difference between positive and negative error voltage at tab 30, to produce equal 6 volt outputs at tabs 5 and 9, should not exceed .10 volts.
3. The lockout circuitry should prevent one output (either tab 5 or tab 9) from being positive with respect to common more than .5 volt if the other output is greater than .5 volt.
4. Connect a sine wave oscillator between reference input at tab 25 and common, with the oscillator set at 10 hertz and 4 volts peak to peak. The lockout outputs at tabs 10 and 18 should alternately switch from -0.4 volts (±0.2 volts) to +3 volts (±0.5 volts), with a 10 millisecond (±2 millisecond) overlap time between each switching where both lockout tabs 10 and 18 are at the -0.4 volt level (See Figure 1). Tabs 10 and 18 should never both be at the +3 volt level.
5. With the same oscillator input as in part 4, the voltages at output tabs 5 and 9 should alternately turn on, as shown in Figure 1. The first 10 milliseconds of each output pulse should have its slope limited, as shown in the figure, indicating that the error lockout is working properly.
6. With tab 11 connected to common, both tabs 10 and 18 should be at the -0.4 volt level. Disconnecting tab 11 from common should result in either tab 10 or tab 18 (but never both) to return to the +3 volt level.
7. With a positive input to tab 25, tab 5 should have a positive output while tab 9 remains at zero. The forward lockout, tab 10, should be at the +3 volt level and the reverse lockout, tab 18, should be at the -0.4 volt level. Applying a positive 0.75 volt signal to tab 28 should not effect any of these outputs. Changing the input to tab 25 from positive to negative should cause the output at tab 5 to go to zero but will not effect the lockout levels at tabs 10 and 18. Also the output at tab 9 will remain at zero. Removing the input signal to tab 28 should cause (1) tab 9 to have a positive output; (2) tab 10 to change from +3 to -0.4 volts and (3) tab 18 to change from -0.4 to +3 volts. Applying a positive 0.75 volt signal to tab 27 should not effect any of their outputs. Changing the input to tab 25 from negative to positive should cause the output at tab 9 to go to zero but will not effect the lockout levels at tabs 10 and 18. Also the output at tab 5 will remain at zero. Removing the input signal to tab 27 should cause (1) tab 5 to have a positive output; (2) tab 10 to change from -0.4 to +3 volts and (3) tab 18 to change from +3 to -0.4 volts.

5D (BW)
5E (BW)
5K (BW)
5L (BW)
5P (BW)
5QC (2BW)
5R (BW)
PRINTS TO

MADE BY H.O.Loberg 5-3-72 | APPROVALS | SPEED VARIATOR DIV OR DEPT. | 224X294AC
ISSUED [signature] 5-4-72 | | ERIE, PA. LOCATION | CONT ON SHEET 2 SH NO. 1

FF6803-WF (6-68) PRINTED IN U.S.A.

CODE IDENT NO.

GENERAL ELECTRIC

224X294AC
CONT ON SHEET 3 SH NO. 2

REV NO. 0

224X294AC
CONT ON SHEET 3 SH NO. 2

TITLE
DRIVER COORDINATION
TEST INSTRUCTIONS

FIRST MADE FOR 193X726AHG01

REVISIONS

8. The voltage limit circuitry should operate as follows:

   A. Turn voltage limit potentiometer (P737) to its full clockwise (minimum resistance) position. Apply a positive 10 volt signal to tab 25. Apply a negative signal of sufficient magnitude to tab 26 to reduce the output voltage at tab 5 to 5 volts. Turning the voltage limit potentiometer (P737) fully counterclockwise should reduce the output at tab 5 to no more than 1.5 volts.

   B. Turn voltage limit potentiometer (P737) to its full clockwise (minimum resistance) position. Apply a negative 10 volt signal to tab 25. Apply a positive signal of sufficient magnitude to tab 26 to reduce the output voltage at tab 9 to 5 volts. Turning the voltage limit potentiometer (P737) fully counterclockwise should reduce the output at tab 9 to no more than 1.5 volts.

9. The positive input signal to either tab 27 or tab 28 to cause a static IOC operation should not vary from a value of 16.5 volts by more than ±.75 volts. The positive signal applied simultaneously to both tab 27 and tab 28 to cause a static IOC operation should be 10.0 ±.5 volts. Following an IOC operation the lockout voltage on tab 10 and tab 18 should not both be at the -.4 volt level until the input signal is removed. Both lockout voltages should remain at -.4 volts if the input is reapplied. The voltage at tab 14 should be between 1.5 and 3 volts (positive to common) when an IOC switching operation occurs.

10. The peak point reference voltage output between tab 8 and common should be 8.9 volts ±.1 volt with 2.2K connected between tab 8 and tab 3.

3.0 CONDITIONS

The above tests and adjustments should be made at room temperature with DC supply voltage at 20 ±.1 volts. A warm-up time of about two seconds should be allowed before testing begins.

4.0 REQUALIFICATION

The subject card should be requalified by Quality Control every six months or after every 500 production cards, whichever comes first. In addition, one per cent of all production cards should be tested as per above instructions except at an ambient temperature of 65°C.

5D(BW)
5E(BW)
5K(BW)
5L(BW)
5P(BW)
5QC(2BW)
5R(BW)
PRINTS TO

MADE BY H. O. Loberg 5-3-72
ISSUED J. Shepard 5-4-72
APPROVALS
SPEED VARIATOR DIV OR DEPT.
ERIE, PA. LOCATION
224X294AC
CONT ON SHEET 3 SH NO. 2
CODE IDENT NO.

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GENERAL ELECTRIC

224X294AC
CONT ON SHEET FL SH NO. 3

REV NO. 0

224X294AC
CONT ON SHEET FL SH NO. 3

TITLE
DRIVER COORDINATION
TEST INSTRUCTIONS

FIRST MADE FOR 193X726AHG01

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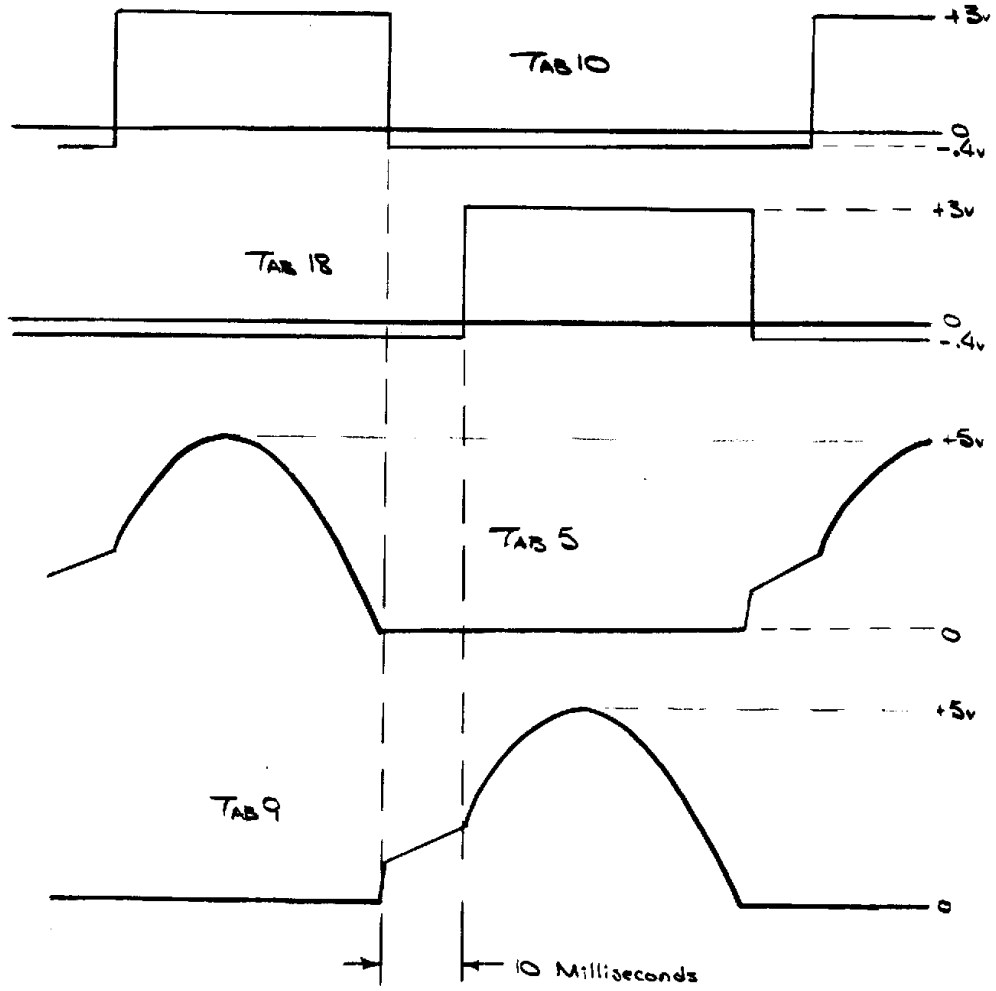
FIGURE 1



5D (BW)
5E (BW)
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PRINTS TO

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