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GE Energy

Functional Testing Specification*Parts & Repair Services
Louisville, KY***LOU-GED-DS200XDSAGxAC****Test Procedure for a LM Fuel/Pressure Measuring Card****DOCUMENT REVISION STATUS:** Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Scott Cash	4-12-07
B	Page 3 Note to Technician	C. Wade	10/10/2008
C	Removed TB designations from test steps	J. Hardin	9/1/2009
D	Revised test	J. Hardin	7/8/2011
E	Removed comment about placing acceptance stamp on card when testing has been completed, stamp has been replaced with job tag.	C. Wade	1/2/2014

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PREPARED BY Scott Cash	REVIEWED BY J. Hardin	REVIEWED BY	QUALITY APPROVAL <i>Charlie Wade</i>
DATE 4/12/2007	DATE 9/1/2009	DATE	DATE 5/2/2007

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1. SCOPE

1.1 This is a functional testing procedure for a LM Fuel/Pressure Measuring 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 Check board's electronic folder for more information

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 site specific SRA's 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, cracked, or loosely connected

4.2.1.2 Terminal strips / connectors - broken or cracked

4.2.1.3 Components - visually damaged

4.2.1.4 Capacitors - bloated or leaking

4.2.1.5 Solder joints - damaged or cold


4.2.1.6 Circuit board - burned or de-laminated

4.2.1.7 Printed wire runs / Traces - 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 87 DMM (or Equivalent)
1		Dual trace Oscilloscope
1		Function Generator

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6. TESTING PROCESS

Note to Technician: GEAC has been experiencing intermittent problems with some of these cards, for the present time change out all six transmitter chips (DS16F95) before testing. C. Wade

6.1 Setup

- 6.1.1 Verify that no solder shorts exist between adjacent pins.
- 6.1.2 Using the material list, verify that all parts shown on the silk-screen are present, and are assembled per the silk-screen. Capacitors are mounted with plus lead as indicated on card
- 6.1.3 Verify that all leads are properly soldered and clipped.
- 6.1.4 Verify that U1, U2, U3, and U4 are **7805BT**.
- 6.1.5 Verify that U5, U6, U9, U10, U11 and U12 are **DS16F95**.
- 6.1.6 Verify that U7 and U8 are **MAX703MJA**.
- 6.1.7 Verify that U13 and U14 are **54LS05**.
- 6.1.8 Verify fastons E7 and E8 are present.
- 6.1.9 Verify JP1 and JP2 pos. "IN"; JP3, JP4, JP5 and JP6 pos. "0".
- 6.1.10 Using the DVM as an Ohmmeter, verify mounting hole below faston E7 is connected to faston E7.
- 6.1.11 Using the DVM as an Ohmmeter, verify mounting hole below faston E8 is connected to faston E8.

6.2 POWER TESTS

6.2.1 Regulators U1 & U2

- 6.2.1.1 Remove top half of TB1 connector and replace with special green connector cable.
- 6.2.1.2 Connect Power Supply (set for 12 +/- 0.05VDC output), plus lead to TB1-1 and minus lead to TB1-2. Connect XDSA fixture cables to P1, P2, P3 and P4 connectors.
- 6.2.1.3 Connect DVM (+) to P1-2, DVM (-) to P1-3. DVM measures 12 +/- 0.05 VDC.
- 6.2.1.4 Move DVM (+) to P2-2. DVM measures 12 +/- 0.05 VDC.

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6.2.1.5 Move DVM (+) to P1-6. DVM measures 4.8 to 5.2 VDC.

6.2.1.6 Move DVM (+) to P2-6. DVM measures 4.8 to 5.2 VDC.

6.2.2 Default Address 0

6.2.2.1 Move DVM (+) to P1-11. DVM measures 0.0 +/- 0.05 VDC.

6.2.2.2 Move DVM (+) to P1-12. DVM measures 0.0 +/- 0.05 VDC.

6.2.2.3 Move DVM (+) to P1-13. DVM measures 0.0 +/- 0.05 VDC.

6.2.2.4 Move JP3 to Pos. "1". DVM measures 4.8 to 5.2 VDC.

6.2.2.5 Move DVM (+) to P1-14. DVM measures 0.0 +/- 0.05 VDC.

6.2.2.6 Move JP4 to Pos. "1". DVM measures 4.8 to 5.2 VDC.

6.2.3 Default Address 1

6.2.3.1 Move DVM (+) to P2-11. DVM measures 4.8 to 5.2 VDC.

6.2.3.2 Move DVM (+) to P2-12. DVM measures 0.0 +/- 0.05 VDC.

6.2.3.3 Move DVM (+) to P2-13. DVM measures 4.8 to 5.2 VDC.

6.2.3.4 Move JP3 to Pos. "0". DVM measures 0.0 +/- 0.05 VDC.

6.2.3.5 Move DVM (+) to P2-14. DVM measures 4.8 to 5.2 VDC.

6.2.3.6 Move JP4 to Pos. "0". DVM measures 0.0 +/- 0.05 VDC.

6.2.4 Transmit-Receive Circuit #1

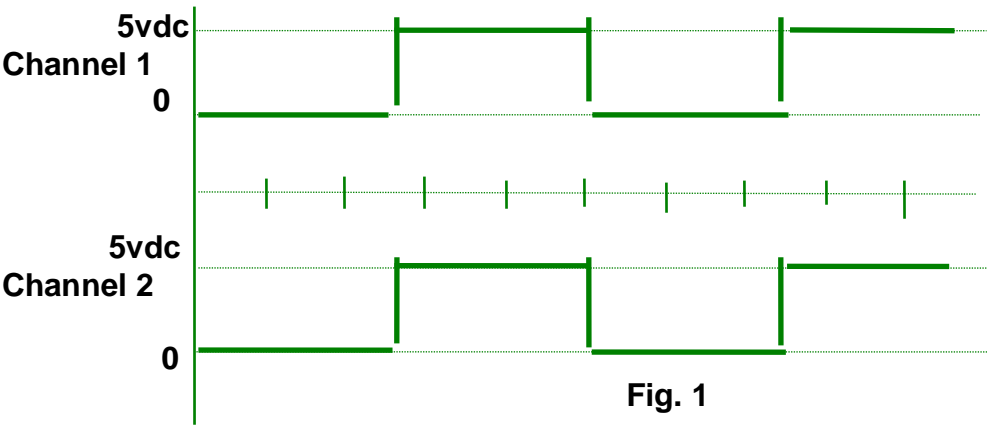
6.2.4.1 Connect Function Generator to plus lead to P1-16 and the minus lead to P1-5. Make connection from TTL/CMOS on Function Generator.

6.2.4.2 Connect the Oscilloscope minus to P2-5; ch.1 to P2-16, ch.2 to P2-18.

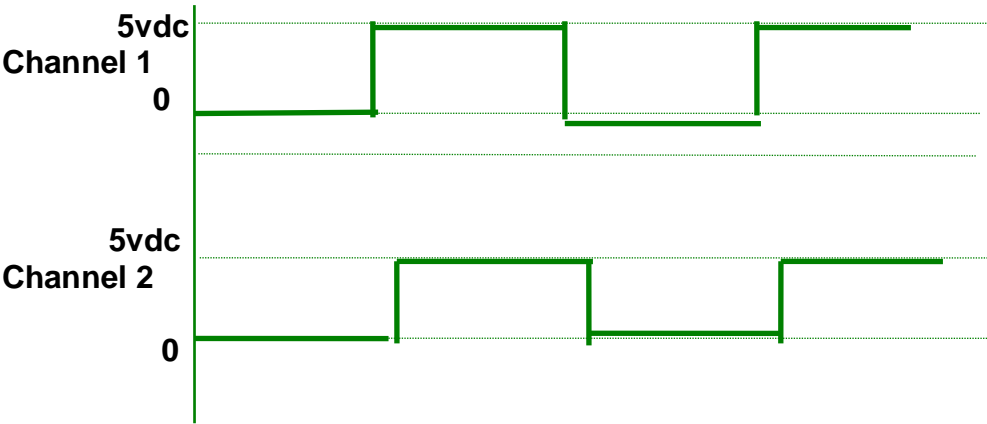
6.2.4.3 Adjust the Function Generator for a 5-volt, 375 KiloHertz, Continuous Square Wave pulse.

6.2.4.4 Adjust the Oscilloscope ch.1 and ch.2 traces for 5 VDC/Div.; 500 Nanosec/Div.

6.2.4.5 Turn on 12 VDC power supply. Verify waveforms below per Fig. 1.



6.2.5 Move Scope ch. 2 to TBP1-18. Verify the waveforms below.



6.3 Misc. Tests:

- 6.3.1 Move DVM (+) to P1-8. DVM measures 4.8 to 5.2 VDC.
- 6.3.2 Move DVM (+) to P2-8. DVM measures 4.8 to 5.2 VDC.
- 6.3.3 Move DVM (+) to P1-9. DVM measures 4.8 to 5.2 VDC.
- 6.3.4 Move DVM (+) to P2-9. DVM measures 4.8 to 5.2 VDC.
- 6.3.5 Move DVM (+) to P1-10. DVM measures 4.8 to 5.2 VDC.
- 6.3.6 Move DVM (+) to P2-10. DVM measures 4.8 to 5.2 VDC.
- 6.3.7 Move DVM (+) to P1-15. DVM measures 4.8 to 5.2 VDC.
- 6.3.8 Move DVM (+) to P2-15. DVM measures 4.8 to 5.2 VDC.
- 6.3.9 Move Function Generator plus lead to TB1-7 and minus lead to P1-3.

- 6.3.10 Verify waveforms per Fig. 3. Channel 1 rise-time is caused by fixture wiring.

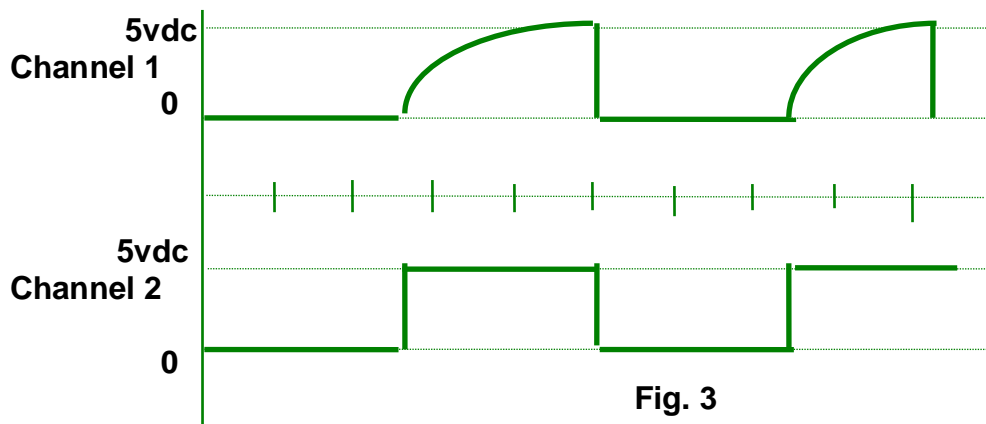


Fig. 3

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6.4 Regulators U3 & U4

- 6.4.1 Connect DVM (+) to P3-2, DVM (-) to P3-3. DVM measures 12 +/- 0.05 VDC.
- 6.4.2 Move DVM (+) to P4-2. DVM measures 12 +/- 0.05 VDC.
- 6.4.3 Move DVM (+) to P3-6. DVM measures 4.8 to 5.2 VDC.
- 6.4.4 Move DVM (+) to P4-6. DVM measures 4.8 to 5.2 VDC.

6.5 Default Address 2

- 6.5.1 Move DVM (+) to P3-11. DVM measures 0.0 +/- 0.05 VDC.
- 6.5.2 Move DVM (+) to P3-12. DVM measures 4.8 to 5.2 VDC.
- 6.5.3 Move DVM (+) to P3-13. DVM measures 0.0 +/- 0.05 VDC.
- 6.5.4 Move JP5 to pos. "1". DVM measures 4.8 to 5.2 VDC.
- 6.5.5 Move DVM (+) to P3-14. DVM measures 0.0 +/- 0.05 VDC.
- 6.5.6 Move JP6 to pos. "1". DVM measures 4.8 to 5.2 VDC.

6.6 Default Address 3

- 6.6.1 Move DVM (+) to P4-11. DVM measures 4.8 to 5.2 VDC.
- 6.6.2 Move DVM (+) to P4-12. DVM measures 4.8 to 5.2 VDC.
- 6.6.3 Move DVM (+) to P4-13. DVM measures 4.8 to 5.2 VDC.
- 6.6.4 Move JP5 to pos. "0". DVM measures 0.0 +/- 0.05 VDC.
- 6.6.5 Move DVM (+) to P4-14. DVM measures 4.8 to 5.2 VDC.
- 6.6.6 Move JP6 to pos. "0". DVM measures 0.0 +/- 0.05 VDC.

6.7 Transmit-Receive Circuit #2

- 6.7.1 Move the Function Generator plus lead to P3-16 and the minus lead to P3-5.
- 6.7.2 Connect the Oscilloscope minus to P4-5; ch. 1 to P4-16; ch.2 to P4-18.
- 6.7.3 Adjust the Function Generator for a 5-volt, 375 Kilohertz, Continuous Square Wave pulse.
- 6.7.4 Adjust the Oscilloscope ch. 1 and ch. 2 traces for 5 VDC/Div. 500 Nanosec/Div.
- 6.7.5 Verify waveforms per Fig. 4.

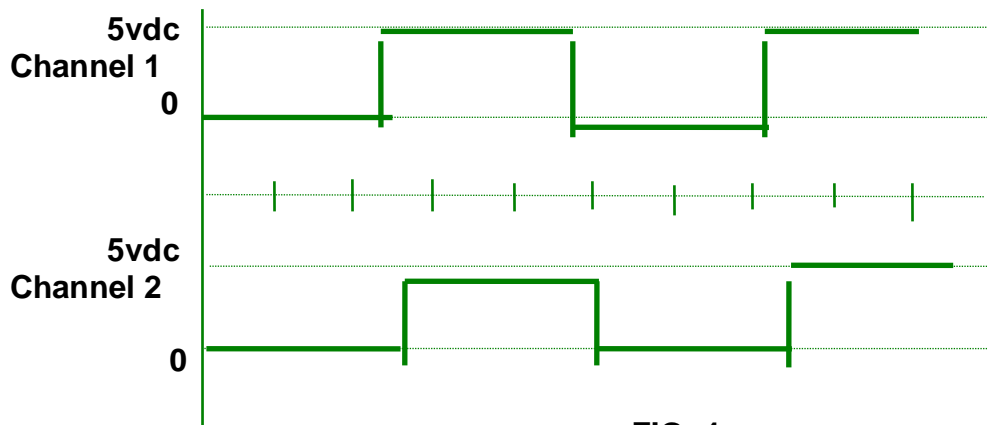
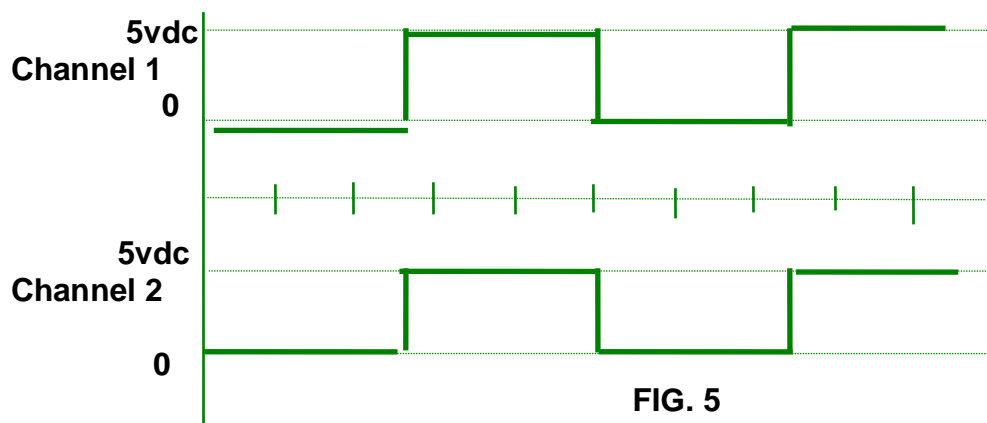


FIG. 4

6.7.6 Move Scope ch. 2 to P3-18. Verify the waveforms per Fig. 5.



6.8 Additional Misc. Tests:

- 6.8.1** Move DVM (+) to P3-8. DVM measures 4.8 to 5.2 VDC.
- 6.8.2** Move DVM (+) to P4-8. DVM measures 4.8 to 5.2 VDC.
- 6.8.3** Move DVM (+) to P3-9. DVM measures 4.8 to 5.2 VDC.
- 6.8.4** Move DVM (+) to P4-9. DVM measures 4.8 to 5.2 VDC.
- 6.8.5** Move DVM (+) to P3-10. DVM measures 4.8 to 5.2 VDC.
- 6.8.6** Move DVM (+) to P4-10. DVM measures 4.8 to 5.2 VDC.
- 6.8.7** Move DVM (+) to P3-15. DVM measures 4.8 to 5.2 VDC.
- 6.8.8** Move Function Generator plus lead to TB1-15 and minus lead to P3-3.
- 6.8.9** Verify Waveform per Fig. 6 on next page. Channel 1 rise-time is caused by fixture wiring.

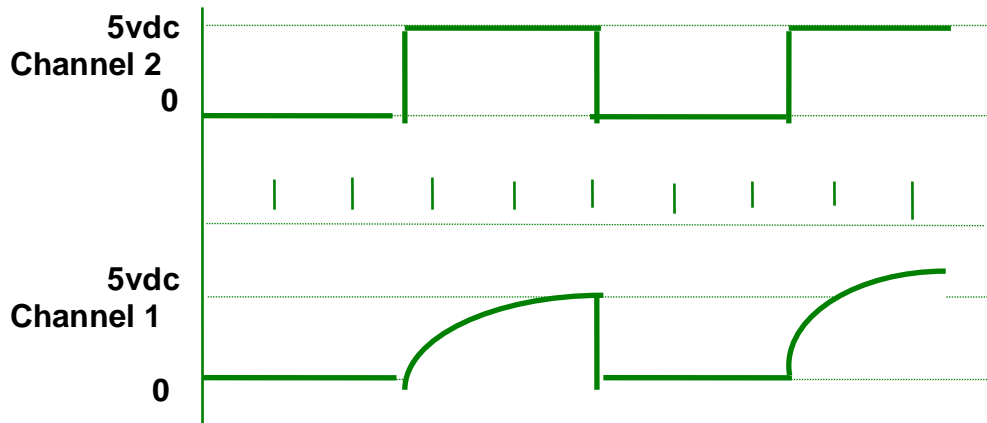


FIG. 6

6.8.10 Move DVM (+) to P4-15. DVM measures 4.8 to 5.2 VDC.

6.8.11 Move DVM (+) to cathode of D17 (located to the left of JP5). DVM measures 7.3 to 9.1 VDC.

6.8.12 Move DVM (+) to cathode of D18 (located to the right of JP17). DVM measures 7.3 to 9.1 VDC.

6.8.13 Disconnect special orange connector cable from TB1 and replace with top of orange connector removed earlier. Disconnect fixture cable from P1, P2, P3 and P4 connectors.

6.9 *TEST COMPLETE *****