g GE Energy	**Functional Testing Specification**
Parts & Repair Services ***Louisville, KY***	**LOU-GED-DS200SIOB**

Test Procedure for a DS200SIOBH1ABA and lower cards

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1. SCOPE

1.1 This is a functional testing procedure for a DS200SIOB 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.
5.2

Qty	Reference #	Description
1		Fluke 87 DMM (or Equivalent)
1	H190113	SIOB Simulator Box
2		Cables connected to H190113 simulator box

6. Modifications/Upgrades

6.1 This test procedure does not cover the upcoming ACA revision cards. It is only for the ABA and earlier cards. Information regarding this upgrade and test instructions will be added to this procedure as soon as available.

7. Testing Process

7.1 Setup

7.1.1 The SIOB is tested in the Mark VI Simplex rack.

7.1.2 Slots 1 and 2 are used for the IS215UCVD Processor Card. The UUT is placed in slot 3 for testing.

7.1.3 TCP IP address assigned to the UCVD is 192.168.101.160.

7.1.4 The Toolbox file for card test are located at N:\SIMULATORS\SIM106_SIOB

7.1.4.1 SIOB1_Low.ucb

7.1.4.2 SIOB1_High.ucb

7.1.4.3 SIOB_Test.grw

7.1.5 Prior to inserting SIOB UUT into rack. Do the following:

7.1.5.1 SW1, SW2 and SW3. Set all DIP switches to “L” Low.

7.1.5.2 SW4. Set DIP switches 1-7 to Closed. Set 8 to Open.

7.1.5.3 Set jumpers JP1-JP6 and JP18-JP20 to “15”.

7.1.5.4 Set jumpers JP7-JP14 to “V”.

7.1.5.5 Remove jumpers JP15-JP17. Check the resistance on these three locations between center pin and pin marked “60”. Measurement should be 150 ohms +/- 1%. If resistance is not within tolerance, correct problem before continuing.

7.1.5.6 Reinstall jumpers JP15-JP17 in the “V” position.

7.1.5.7 On the SIOB Simulator Box (Simulator) set all Pulse Tach Phase Control switches in the Forward position. Set Frequency switch to “LO”. Set Frequency Select rotary dial to the first position 1 KHz / 62.5 KHz. The Amplitude switch should be in the “HI” position.

✍ **Note:** Actual frequency output that is read on the SIOB Toolbox screen and within the test graphic screen will be ½ that indicated by the Frequency Select rotary dial. This is due to the SIOB Simulators internal counters dividing the encoders input signal by 2.

7.2 Testing Procedure

7.2.1 Insert the UUT SIOB into slot 3 of the Mark VI rack.

7.2.2 Connect the 25 pin and 37 pin connectors from the SIOB Simulator Box to their respective positions on the front of the UUT SIOB.

7.2.3 Turn on the power switch, on the SIOB Simulator Box.

7.2.4 Open Toolbox and open the following Toolbox files:

7.2.4.1 N:\Simulators\SIM160_SIOB\SIOB1_Low.ucb

7.2.4.2 N:\Simulators\SIM160_SIOB\SIOB_Test.grw

7.2.5 Turn on Mark VI rack power and allow the processor card to boot.

7.2.6 Once booted, go online.

7.2.7 Check, build and download application code.

7.2.8 After application code download you should have the green Control an Equal at the bottom right of the screen.

7.2.9 To view SIOB I/O in Toolbox, open Hardware and I/O Definitions. Then VMEI: VME Interface and click SIOB. You should now see the SIOB I/O in the right window.

7.2.10 At the top of the screen, click Windows and then click SIOB_Test.grw. This will open the SIOB Graphics test screen. NOTE: You can toggle back and forth between these two screens doing this.

7.2.11 On graphics screen left side you will first see 5 virtual rocker switches. Below these switches are 4 analog outs, whose voltages can be selected via the virtual switches.

7.2.12 To the right of these analog outputs are 8 analog in readouts. Each of the analog outs, control 2 of the analog inputs. For example Analog Out 1 controls Analog In 1 & 2. Analog Out 2 controls Analog In 3 & 4 and so forth. Each of the Analog Inputs should follow their respective Analog Output.

7.2.13 The red indicators to the left of the analog inputs will illuminate if there is a variance of more than 0.02 Volts between the respective analog output and input. This indicates that there is a problem within that circuit. This is true on AUTO or individual voltage select.

7.2.14 Selecting AUTO will ramp Analog Output voltages from -10 to 0 to +10 Volts in a continuous cycle. This is especially useful for burn in and latency checks. Individual voltage selects are useful for checking stability and troubleshooting.

7.2.15 Next on the graphics screen you will see the Test Cal and Reset Cal buttons. Clicking the Test Cal button will simply change the logic state of the 8 Cal circuits from logic "0" to logic "1" and will be indicated by the green virtual LEDs. Clicking Reset Cal will reset the Cal circuits to logic "0". These results may also be viewed on the SIOB I/O Toolbox screen. If any of the Cal bits do not toggle there is a problem in that circuit.

7.2.16 Clicking the Force Stall button will cause the STALL indicator to illuminate red and set the stall bit to logic "1". On the graphics screen FREQ1, 2 and 3 will change to 0 Hz. Clicking Stall Reset will return the Stall logic bit to "0" and FREQ1, 2 and 3 will again display encoder frequency. This result may also be viewed on the SIOB I/O Toolbox screen. NOTE: In this instance FREQ1, 2 and 3 dropping to 0 Hz when Force Stall is active is only a function of the graphics screen.

7.2.17 Click the Dither Enable button. This will set the Dither bits from logic "0" to logic "1". The 1 Enabled, 2 Enabled and 3 Enabled should illuminate green. If one or more of these do not illuminate there is a problem in their respective circuit. Click the Dither Off to return Dither bits to "0". These results may also be viewed on the SIOB I/O Toolbox screen.

7.2.18 The Generate Alarm functions just as the Dither Enable. Click the Generate Alarm and the Alarm 1, 2 and 3 should illuminate red. Reset Alarm returns logic to normal state. If one or more of these do not illuminate there is a problem in their respective circuit. These results may also be viewed on the SIOB I/O Toolbox screen.

7.2.19 FREQ 1, FREQ 2, FREQ 3 and COUNT 1, COUNT 2 and COUNT 3. The SIOB Simulator Box contains internal circuits which emulate the signal output of a rotating encoder. A single square wave signal with and amplitude of either 5 Volts or 15 Volts and a frequency of 1 KHz to 2 MHz in 12 steps, is buffered and input into 3 counters which convert the signal into Grey Code. The SIOB understands this Grey Code as an encoder and forward and reverse is understood by an ascending or descending grey code count. 00,01,11,10 = Forward. 10,11,01,00 = Reverse. These 3 signals are routed to the SIOBs front connector and into SW1, SW2 and SW3. The encoders speed selection is made at these DIP switches. Low speed "L" routes the signals through opto-couplers and is rated for frequencies to 100 KHz. High speed "H" routes the signals through RS-485 receivers, and is rated for frequencies to 1 MHz. On the SIOB Simulator Box, 12 frequencies can be selected via the Frequency dial; this is a 2 deck 6 position rotary switch. Selection between decks is made with the frequency "HI / LO" switch. Frequencies are labeled for each position, ie. (1 KHz / 62.5 KHz) Low / High settings for

that position of the dial. NOTE: The frequency read on the graphic display and on the SIOB I/O screen in Toolbox will be ½ the selected frequency. This is due to the counters that convert the incoming signal to Grey Code dividing the signal by 2. COUNT 1, 2 and 3 as they appear on the graphics screen are modified readouts of CNT_1, 2 and 3 on the SIOB I/O screen, which are actually a continuous count of 10 digits counts each encoder pulse that returns to 0 and starts over after reaching 9999999999. This number is basically a blur when displayed. So the readout on the graphics screen was modified to count from 0 to 255 and to divide the counted pulses by 1000. The 0 to 255 display will increment 1 count per 1000 pulses. This makes it much easier to see that the CNT_1, 2 and 3 are indeed counting.

7.2.20 With the Frequency switch on the SIOB Simulator Box in the LO position, and all Pulse Tach Phase Control (PTPC) switches in the Forward position, move the Frequency Select rotary dial through the six positions. The FREQ 1, FREQ 2 and FREQ 3 readouts on the graphics screen should follow the frequency selection. NOTE: On some frequencies readout will have a tendency to hunt by about 30 Hz. This is due to the Toolbox sampling rate.

7.2.21 Change all the PTPC switches to the reverse position. Move the Frequency Select rotary dial through the six positions. The FREQ 1, FREQ 2 and FREQ 3 readouts on the graphics screen should follow the frequency selection, but will be (-) xxxx.xx Hz.

7.2.22 Move the rotary dial back to the first position. Place the Frequency switch in the “HI”. Again move the rotary dial through the first 3 positions. Check in Forward and Reverse. The FREQ 1, FREQ 2 and FREQ 3 readouts on the graphics screen should follow the frequency selection and polarity. If FREQ 1, FREQ 2 and FREQ 3 readouts do not track the proper frequency and direction, there is a problem in that circuit. NOTE: If you move the rotary dial to the 4th position with Frequency switch “HI” in this step, you will see that the FREQ 1, FREQ 2 and FREQ 3 readouts, will drop to 0 Hz. This is because the frequency is beyond the 100 KHz limit with the SIOB SW1, 2 and 3 speed DIPs set to low.

7.2.23 Take Toolbox offline. Turn off rack power and close Toolbox. Don’t save.

7.2.24 Change switches SW1, 2 and 3 on the SIOB UUT to the High “H” position. Re-open Toolbox and open the following files.

7.2.24.1 N:\Simulators\SIM160_SIOB\SIOB1_High.ucb

7.2.24.2 N:\Simulators\SIM160_SIOB\SIOB_Test.grw

7.2.25 Turn on Mark VI rack power and allow the processor card to boot.

7.2.26 Once booted, go online.

7.2.27 Check, build and download application code.

7.2.28 After application code download you should have the green Control an Equal at the bottom right of the screen.

7.2.29 To view SIOB I/O in Toolbox, open Hardware and I/O Definitions. Then VMEI: VME Interface and click SIOB. You should now see the SIOB I/O in the right window.

7.2.30 At the top of the screen, click Windows and then click SIOB_Test.grw. This will open the SIOB Graphics test screen. NOTE: You can toggle back and forth between these two screens doing this.

7.2.31 Place the frequency switch on the SIOB Simulator to the HI position and place the frequency dial in the 7.8 KHz / 500 kHz position.

7.2.32 Note: Sometimes it takes a bit for the frequencies to sync, but once they do they will track perfectly. If you flip the frequency switch from HI to LO a couple of times, this seems to speed up the process.

7.2.33 Move the selector switch through the following position and observe output on screen. Check in both Forward and Reverse.

7.2.33.1 7.8 KHz / 500 kHz = 250 KHz

7.2.33.2 15.6 KHz / 1 MHz = 500 KHz

7.2.33.3 31.3 KHz / 2 MHz = 1 MHz

7.2.34 If one or more of these do not track properly, there is a problem in that circuit. Check to make sure switches SW1-SW3 are properly set. Sometimes these switches do not snap in when toggled, this will cause a failure.

7.2.35 Post Test Burn-in **Required** **_X_ Yes** **___ No**

7.3 ***TEST COMPLETE ***

8. Notes

8.1 Common problems found thus far in the High Speed circuit are as follows.

8.1.1 Defective U12

8.1.2 Defective U30, U31 and/or U32

8.1.3 Defective switch SW1-SW3

9. Attachments

9.1 None at this time.