g GE Energy	**Functional Testing Specification**
Parts & Repair Operations ***Louisville, KY***	**LOU-GEF-AXS0x**

Test Procedure for MC2000 AXS02 & AXS03 MC2000 Axis Boards

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Rick Diercks	8/27/2007
B	Added Resolver test.	Rick Diercks	12/9/2008
C	Added Velocity test	Rick Diercks	7/30/2014

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DATE	**DATE**	**DATE**	**DATE**
8/27/2007	7/30/2014		8/27/2007

Functional test procedure for AXS02 & AXS03 Printed Circuit Boards

1. SCOPE

1.1 This is a functional test procedure for testing the MC2000 AXS02 and AXS03 printed circuit boards.

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 44C719636 AXS02 Elementary

3.1.2 44C719666 AXS03 Elementary

4. ENGINEERING REQUIREMENTS

4.1 Description

4.1.1 The purpose of the axis cards are to interface between the MC2000 control and the axis drive modules with feedback signals and velocity commands.

4.2 Equipment Cleaning

4.2.1 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.

4.3 Equipment Inspection

4.3.1 Equipment should be visually inspected for any defects prior to applying power. This inspection should include the following as a minimum:

4.3.1.1 Wires broken or cracked
4.3.1.2 Terminal strips / connectors broken or cracked
4.3.1.3 Loose wires
4.3.1.4 Components visually damaged
4.3.1.5 Capacitors leaking
4.3.1.6 Solder joints damaged or cold
4.3.1.7 Circuit board burned or de-laminated
4.3.1.8 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	MC2000 Control	Test Control with Axis cart
1	HP 3478A	Multimeter
1	MC2000 TP Board	PL Cable Pin Test Points

6. TESTING PROCESS

6.1 Pre Test Procedure

6.1.1 Inspect board for revision.

6.1.2 Inspect board for EPROM and microprocessor revisions.

6.1.3 Ensure jumper is in place at JPL 1 to 2

6.2 Test Axis Resolver Test

6.2.1 Ensure power is OFF by depressing the “Red Off” push button on the NCCS and that the motion cart inhibit switch in “On”.

6.2.2 Remove known good board (KGB) and insert the board under test (BUT). Make the following connections.

6.2.2.1 Plug 1PL from RLV01 into Axis 1PL

6.2.2.2 Plug resolver cable into RLV01 3PL, 4PL, 5PL, & 6PL.

6.2.3 Turn MC2000 Control on by depressing “Green On” push button on the NCCS

6.2.4 A “Power Up Diagnostics” should be displayed on the NCCS, then “System Loading” will be displayed, next “Mark Century 2000 Service Diagnostics Initialization” will appear.

NOTE: All LEDs on the boards in the logic rack should be on. If any LED fails to come on, turn power off and then back on. If any LED still fails to come on at the end of this time, turn power off and remove BUT. Check logic rack with KGB. If system works with KGB then BUT is bad.

6.2.5 At this time “Polling for DNC Control or NCCS Keyboard Entry for Manual Mode” will be displayed.

6.2.6 Depress any key to continue.

6.3 “Factory Test Diagnostics” menu page will be displayed.

6.3.1 Select “Axis Processor Test” using the cursor control and push “Enter” key. The “Axis Processor Service Diagnostics” screen will be displayed.

6.3.2 Select “Position Tracking Test”

6.3.3 Select Axis board number to test.

6.3.4 Manually turn each axis in the “+” (positive) and “-“(negative) directions to insure a linier count in each direction.

NOTE: If count is not linier or if there is no counter movement then the BUT may be bad.

6.3.5 Depress “Enter” when complete.

6.4 Select "Axis Bus Broadcast System Test"

6.4.1 Enter number of repetitions and press "Enter".

6.4.2 Press any key when test is complete.

NOTE: If test fails then the BUT may be bad.

6.5 Select "Single Board Axis Test"

6.5.1.1 Enter "1" for number of repetitions.

6.5.1.2 Enter board number to be tested "1".

6.5.1.3 Turn off axis cart inhibit switch.

6.5.1.4 Set counters on motion cart to zero (when prompted) and depress any key.

6.5.1.5 Watch motors on motion cart. All motors should turn at the same speed and at the same time. Motors should run smoothly.

6.5.1.6 Count on counters should be +- 1 count at end of test.

6.5.1.7 Re Select Single board test and enter 50-100 for number of repetitions.

6.5.1.8 Enter board number to be tested "1".

6.5.1.9 Press enter, Watch motors on motion cart Motors should run smoothly

NOTE: If BUT does not meet specifications, BUT is bad.

6.5.1.10 Turn inhibit "On".

6.5.1.11 If test passed, then continue to next test.

6.6 Tested Axis Encoder Test

6.6.1 Shut down Control, remove Resolver cables and RLV Board, and then connect Plug in encoder cables into AXIS 3PL, 4PL, 5PL, & 6PL.

6.6.2 Turn Control On, "Factory Test Diagnostics" menu page will be displayed.

6.6.3 Select "Axis Processor Test" using the cursor control and push "Enter" key.

6.6.4 Select "Single Board Axis Test"

6.6.5 Enter "1" for number of repetitions.

6.6.6 Enter board number to be tested.

6.6.7 Turn off axis cart inhibit switch.

6.6.8 Set counters on motion cart to zero (when prompted) and depress any key.

6.6.9 Watch motors on motion cart. All motors should turn at the same speed and at the same time. Motors should run smoothly.

6.6.10 Count on counters should be +- 1 count at end of test.

6.6.11 **TURN OFF AXIS CART!**

6.7 Calibration of Velocity Output.

6.7.1 Make sure AXIS CART IS OFF

6.7.2 Remove 6PL and plug in Test TP Board

6.7.3 Select Maximum Output Test

6.7.4 Remove 6PL and plug in Test TP Board

6.7.5 Balance VELCMD-1 Connect Meter Com. to TP2 and +V to TP3 adjust P2 for .0000V.

6.7.6 Balance VELCMD-2 connect meter lead Com to TP8 and +V to TP9 adjust P4 for .0000V.

6.7.7 Balance VELCMD-3 connect meter lead Com to TP11 and +V to TP12 adjust P6 for .0000V.

6.7.8 Now press ENTER" Maximum output will be flashing

6.7.9 VELCMD-3 Adjust P5 for 10.000V

6.7.10 VELCMD-2 connect Meter lead com to TP8 and +V to TP9 Adjust P3 for 10.000V.

6.7.11 VELCMD-1 connect meter lead com to TP2 and +V to TP3 adjust P1 for 10.000V.

6.7.12 Press enter to stop test and remove Test TP Board and plug 6PL in.

6.7.12.1 Select "Single Board Axis Test"

6.7.12.2 Enter "50- 100" for number of repetitions.

6.7.12.3 Enter board number to be tested "1".

6.7.12.4 Turn on Axis Cart press enter Motors should.

6.7.12.5 When Completed turn off Axis Cart.

6.8 Part Program Test

6.8.1 Depress Cancel and turn CPU Switch to center position then depress Cancel "do you want to reboot (y/n) depress "y" push button on no keyboard, MB3 Program should load.

6.8.2 Once control is up and on line with the 7.59MC application, select "INDEX" on the white keys at the top of the keyboard. This should cause the control to display two or three part programs, select "MCLOOP Program" with the gray buttons, and then press POSN, one of the white keys. This should take you back to the position page.

6.8.3 Turn on axis cart and enable drives.

6.8.4 Press Control On again, this will lock in drives from control.

6.8.5 Press “Auto” and then “Cycle Start” and drive should begin to move and will continue until they are interrupted by pressing “Cancel or Clear” or removing power. Run Part Program Test for 4 to 6 hours.

6.8.6 When complete power down control.

6.9 TEST COMPLETE

7. NOTES

7.1 Card can be run in either MC2000 Test Controls