g GE Energy	**Functional Testing Specification**
Inspection & Repair Services ***Louisville, KY***	**LOU-GEF-CPU02-14** MC2000 CPU Board

Test Procedure for CPU02 CPU03, CPU04, & CPU14 CPU Cards

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Functional test procedure for CPU02 CPU3, CPU04 and CPU14 Processor cards

1. SCOPE

1.1 This specification provides the Engineering Requirements for testing CPU03, CPU04, and CPU14 cards. The process applies only to control cards model number 44A719307-101, 44A719307-102, 44A719307-103, and 44A719307-104

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	**GEK-25382**	Maintenance & Troubleshooting
3.1.2	**GEK-25381**	Startup & Adjustments
3.1.3	**GEK-25391**	System Diagrams
3.1.4	**44C719633**	**CPU02, 03**
	44C719655	**CPU04**
	44C719658	**CPU14** Board Schematics
3.1.5	**GIT-200**	**TAB12** Diagnostic Software

4. ENGINEERING REQUIREMENTS

4.1 Description

4.1.1 The CPU is an 8086/8087 microprocessor- based board, which provides the numeric processing and control for the MC2000 system functions. It is contained on a single “J” sized board (8” x 11”) and interfaces to the system bus through dual 60-pin card edge connectors. Addition logic on board handles interrupts, arbitrates for a multiprocessor system bus, generates a system bus clock and performs on-board and subsystem-level diagnostics,

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	GE MC2000 Control	2000 Control with axis cart
1	Factory Service Diagnostics	Resides on Bubble Board MB1:
1	7.59MC Software	Resides on Bubble Board MB3:

6. TESTING PROCESS

6.1 Pre Test Requirement

6.1.1 Insure control is off.
6.1.2 Set address jumpers: 1st board JP1=1-2 JP2=1-2
6.1.3 System Timer: J3= 1-2, J4= 2-3, J5= 2-3, J6= 1-2
6.1.4 Board Select: JP7= 1-2, J8=1-2
6.1.5 **Control LOGIC Rack Test Boards**
Testing CPU02 **IOC02 board must be in Rack**
Testing CPU03-04 **IOC03 board must be in Rack**
Testing CPU14 **Any IOC board**
Note DRM clock Jumper must be set for IOC
5Mhz for IOC02-IOC04
7. 37Mhz for IOC12

6.1.6 Turn control on by depressing green "Control On" push button on the NCS Station. If the LED on the CPU does not come on, stop the testing and begin your troubleshooting.
6.1.7 "Power Up Diagnostics" should be displayed on screen, followed by "System Loading", which will be followed by "Mark Century 2000 Service Diagnostics Initialization" & "Make any Keyboard entry for manual/menu mode".
6.1.8 Press any key and Factory Diagnostic Screen will be displayed.
6.1.9 To select a heading on the menu page, use the cursor control up or down arrow key.

6.1.10 Go to manual testing of the CPU by selecting Central Processor Test and pressing enter or return. You need to go through the following tests.

6.1.10.1 "1. PUU 8087 Processor Test.
6.1.10.2 "2. CPU Local Ram Test.
6.1.10.3 "3. CPU Interrupt Controller Test.
6.1.10.4 "4. LRAM Memory Retention Test.
*****Note Input Write Test First then Read Test.**
6.1.10.5 CPU Switch Test.

6.1.11 This should help determine what area has failed on the DRM card. Only after board has passed all tests should you continue on.
6.1.12 Go to diagnostic page and select "Execute Automatic Test Cycle", Push Enter.
6.1.13 Enter test name "CPU", Push Enter.
6.1.14 Enter number of test cycles as 1 to 99, Push Enter. Usually we choose 25 to 50 cycles depending on the board problem. Takes a little over a minute to run 1 cycle.

6.2 The following headings will appear on the CRT and "Working" will appear under the headings:
6.2.1 "CPU TEST 8087"
6.2.2 "CPU TEST LRAM"
6.2.3 "CPU TEST PIC"
6.2.4 If all the tests pass, control will come back to "Factory Test Diagnostics" page. Skip next section and go to section 5.4.

6.3 If test fails, then "Failure in Error Log" will be displayed.
6.3.1 Depress any key to continue to main menu.
6.3.2 Select "Error Log Options", press enter.
6.3.3 Select "Display Error Log", press enter.
6.3.4 Scroll through Error Log with the Down key until "fail" appears in log.
6.3.5 Record test name for all failures present in Error Log.
6.3.6 When all failures are recorded, depress Cancel.
6.3.7 Select "Erase Error Log", and push enter.
6.3.8 Press "Cancel" to return to main menu. Shut down control and troubleshoot card.

6.4 MB3 Test.

6.4.1 Before turning on control be sure proper boards have been inserted into the logic rack and CPU switch is in the middle position.
6.4.2 If everything is ready turn on control, pressing “ON”.
6.4.3 It will take a minute or so for control to boot up. Once done the CRT should display a banner page for 7.59MC control. All LEDs should be lit on all board.

6.5 Part Program Test

6.5.1 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.
6.5.1.1 Turn on axis cart and enable drives.
6.5.1.2 Press Control On again, this will lock in drives from control.
6.5.1.3 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.
6.5.1.4 When complete power down control.

6.6 ******TEST COMPLETE ******