g	GE Energy	**Functional Testing Specification**
	Inspection & Repair Services *Louisville, KY*	**LOU–GEF** **CMC-0000-1-B**

Test Procedure for a CMC-0000-1-B Master Amplifier

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PREPARED BY C. Wade	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL Charlie Wade
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Test Procedure for a CMC-0000-1-B Amplifier

1. **SCOPE**

   1.1 This is a functional testing procedure for CMC-0000-1-B Amplifier.

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

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	CMC-2070-1-B	Slave Drive
1	CMC-0000-1-B	Master Drive
1	15vdc PS	Power Supply
1	Cable Set	Master/Slave cable set
1	Motor	Motor with encoder
1	Variac	110vac variac

6. TESTING PROCESS

6.1 Connection Setup

    6.1.1 Before hooking up controller/amplifier, be sure each to open up each unit and look them over for any electrical damage prior to powering them up. On CMC-000 controllers, remove any EPROMs located in slots U33 & U34. These are specific to the customer and will not be needed during testing. They should be reinstalled at the end of testing, if you can verify their status, do so.

    6.1.2 Be sure to ohm check the dipswitches.

6.2. Testing Procedure

    6.2.1. CMC-0000 Setup

    6.2.2. Set all dipswitches (SW1 & SW2) on controller to left except for (SW2) 5,7, & 8 they go to the right. This sets up the address to "0" and sets up communications.

    6.2.3. Hookup the CMC communication cable to P3. Cable is not reversible, be sure to connect proper end to amp and to the PC

    6.2.4. This unit is 110VAC model, be sure to hook up power cable to autotransformer. Hook up power and encoder cable to controller's P2 connector; leave P1 off at this time.

    6.2.5. CMC-2070 Setup for Encoder feedback

    6.2.6. Hook up extended cable to the X-Axis, both connectors P1 & P2. Be sure cable is wired correctly for each profile, no tachometer needed at this time.

    6.2.7. Set all dipswitches (SW1 & SW2) on controller to left except SW1-5, 9, & 10, they go right. Use +12V power supply to feed voltage to the switch box. Red lead to Black Jack on Switch Box, Black Lead to Red Jack on Switch Box.

    6.2.8. Power up computer and amplifiers. The fault LED on the amps should be on "RED". If over temp light on drive is on shut down and trouble shoot problem.

    6.2.9. Access CCS and go to the Terminal Mode. Enter the address of the amplifier, should be (0). Controller communication LED will blink when the enter key is pressed, if you are communicating. If communication has been established you should see an echo from the drive every time you hit enter on the PC. Download CMC0000 from computer to amplifier, this will allow you to operate the slave unit later in the test.

    6.2.10. Plug encoder into encoder cable. The XMIT LED will blink every time screen updates/transmits. Flip switches SW10, SW11, & SW12 down on switch box.

    6.2.11. Type in 0GT1. Motor should start turning in about 4 to 5 seconds and continue to spin reversing directions every 6 to 8 seconds with a slight delay of 3 seconds between runs.

    6.2.12. This is some of the program that was programmed in to drive.

i.	0CB	Cold Boot Resets all parameters to default settings
ii.	0GNX50	Sets gain to 50
iii.	0IBX255	Sets Integration Band to 255
iv.	0ZRX180	Sets Controller Zero to 180
v.	0WB	Warm Boot does not effect the parameter settings
vi.	0DE*	Define the Profile (* denotes the profile number)
vii.	0ACX75000	Sets the Acceleration
viii.	0VX75000	Sets the Velocity
ix.	0RX150000	Load Radius for XY move Clockwise Direction
x.	0IMX150000	Incremental Move
xi.	0WTT4	Wait 1 second
xii.	0RIX	Run Incremental Command X Axis
xiii.	0RX-150000	Load Radius for XY move Counter Clockwise Direction
xiv.	0IMX-150000	Incremental Move

xv.	0WTT4	Wait 1 second
xvi.	0RIX	Run Incremental Command X Axis
xvii.	0RM0	Repeat Profile (0=Infinite)
xviii.	0ED	End of Profile
xix.	0GT*	Executes Profile (* denotes the profile number, same number as

in line 6 above) try 0GT3.

6.2.13. The Green LED will be on when motor spins in a clockwise direction.

6.2.14. The Amber LED will be on when motor spins in a counterclockwise direction.

6.2.15. To stop the motor, use either the 0HT or 0ST commands.

6.2.16. Testing the Inputs

6.2.17. Enter command RSX at 200 milliseconds in the query mode (F7). You should see the following when switch is flipped. Switches 9, 10, 11, & 12 flipped up. This tests the last 4 four inputs switches.

xx.	0011 0011 0000 0101	All switches flipped up.
xxi.	0000 0000 0000 0101	Switch 12 down.
xxii.	0000 0001 0000 0101	Switch 11 down.
xxiii.	0000 0000 0000 0101	Switch 10 down.
xxiv.	0000 0000 0010 0101	Switch 9 down.

6.2.18. Disable drive. The next test checks the first eight inputs. Enter Diagnostics 0DG1 and the screen should display the results of any switch 1 through 8 which is toggled. If not, you may have to enter 0PE=1 to enable profiles. Check all switches. You may find drive will display switch status only when SW6, SW7, or SW8 are toggled. Slave should be ran for at least four hours with motor. End of test for CMC-2070.

6.2.19. CMC-0000 Setup

6.2.20. Power Down and connect CMC-0000 cable.

6.2.21. Be sure cable is wired correctly for each profile, no tachometer needed at this time. Be sure connector is wired correctly. Connector P1-1 should be +12V and inputs are P1-2 through P1-13, ground connections are P1-14 & P1-19.

6.2.22. Testing the Inputs

6.2.23. Enter RDI in query mode so that screen shows switch settings. Once connector is hooked up correctly and voltage applied to inputs; as you flip SW1 through SW12 on the switch box you should see the response on the PC screen.

	SW12		*SW1*
xxv. 1000	*0*000	0000	000*0*

6.2.24. With encoder plugged in P2 connector, as you turn encoder clockwise the Green LED will light. Counterclockwise the Amber LED will light.

6.2.25. Testing Analog Inputs – Change Cables.

6.2.26. Use HP6826 Power Supply. Drive will need to be enabled and you should go to terminal mode and query the inputs (F7). Enter RA1, RA2, RA3, & RA4.

6.2.27. The following values were taken from the first unit tested. Use as a comparison for further units. The more exact you are to the actual voltage, the closer you should get to the actual numerical value.

Voltage Input	Number Value	Voltage Input	Number Value
0V	0-10	0V	0-10
1V	205	-1V	205
2V	411	-2V	410
3V	615	-3V	615
4V	821	-4V	825
5V	1029	-5V	1030
6V	1239	-6V	1235
7V	1440	-7V	1440

Seven volts should be high enough to verify or register any problems. The unit is supposed to take up to ten volts, but I would rather not go that high at this point.

6.3. ***TEST COMPLETE ***

7. NOTES

8. REFERENCES

Configuration and Test procedures for XMC-2-B

1. Use test WETS5402 to calibrate XMC-2 power bd. amped version and WETS5403 to calibrate the ampless version.
2. To change power bd. for 220VAC operation, move JP5 to A & B.
3. To convert unit from sink to source, change EPROM (U29), set JP1 to A & B and E & F, then remove R76 and put it in R25 spot.
4. E-proms are as follows:

IMC-20X0	31450053 (SINK)
IMC-20X1	31450044 (SOURCE)
CMC-20X0	31450029 (SINK)
CMC-20X1	31450034 (SOURCE)

5. To convert from IMC to CMC, use applicable EPROM, remove U9 and jumper pins 9 & 11, then remove U8 and replace with 31320090.
6. Now mate the power and logic boards together with a shield board between them.
7. Connect AC power cable to power board and turn on power. Connect voltmeter positive side to U6 pin 25 and ground to U29 pin 14. Turn R35 pot until meter reads 0volts. Now turn off power and seal pot.
8. Go to final test bench and run WETS5429 test procedure.
9. After successful completion of testing, forward to assembly.

Repairs and what to look for on XMC-2 units

1. If the unit is returned for repair, be sure the board is not burned. If it looks repairable, more than likely have to replace R33-R36, C32, C36, C38 and D16,18-21. If C20 is shorted replace C20. Need to replace C12-C15 only if any one of R33-R36 is open.
2. In some cases, the logic power and motor power supply sections have been burned. You may just want to replace the power board because there are a lot of parts to replace and it just may not be worth your time.
3. To upgrade logic boards, replace U15 with 70004444 bd., replace CR13 with zero ohm resistor, upgrade EPROM to latest revision. Cut out CR10&11 and Q3. Run jumper wire from U29 pin 28 to U30 pin 28. Run more jumper wire fromU15 pin 7 to U14 pin 14 and U15 pin 14 to U14 pin 7. Finally, replace U30 ram with battery-backed version 31430050 for IMC's only.
4. If troubleshooting new power boards, power OK but will not run correctly, be sure no transistors are shorted to the T-bar. Always be on the look out for shorts and missing parts.

Common components to replace on power supply card.

330uf 35VDC	C32, C36, C38
27K 2 Watt	R35
30K 2 Watt	R34
560uf 250VDC	C13, C14
2200uf	C33, C34