Test Procedure for a IMC-4230-1-B Amplifier

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	C. Wade	06/09/2005
B	Added asset number to cables and motor	J. Francis	5/29/2009
C			

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DATE 06/09/2005	DATE 5/29/2009	DATE 5/29/2009	DATE 6/9/2005

Test Procedure for an IMC-4230-1-B Amplifier

1. **SCOPE**

   1.1 This is a functional testing procedure for IMC-4230-1-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 Pub 14, CMC Series User Manual

   3.1.2 Pub 29, User Manual for Stepper Controllers

   3.1.3 Pub 52, User's manual Addendum for Two-Axis Stepper Controller

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	IMC-4230-1-B	Dual Axis Stepper Drive (UUT)
1	15vdc PS	Power Supply
1	H188786	Whedco Computer w/Keyboard
1	H188777	Motor with encoder
1	H188776	Motor with encoder
1	H188778	Whedco Switch Box
1	H188785	Variable Autotransformer-Whedco
1	H188779	Whedco Axis Jumper Switch
1	H188780	Whedco Axis Jumper Switch
1	H188783	Whedco Serial Communication Cable
1	H188782	Whedco 4230 Encoder Cable
1	H188781	Whedco 4230 Parallel I/O Cable
1	H188787	Whedco 4230 Motor/Power Connector Cable

6. TESTING PROCESS

6.1 Connection Setup

6.1.1 Before hooking up amplifier ohm check the dipswitches.

6.2. Testing Procedure

6.1.2 IMC-4230 Switch Setup: Orientation for switch settings are as follows – Heatsink down on bench with switches and connectors facing towards you.

6.1.3 SW1 Settings 5 & 7 switched down, all others switched up.

6.1.4 SW2 Settings 3, 4, & 5 switched down, all others switched up.

6.1.5 Hook up IMC-4230 Motor/Power cable, H188787.

6.1.6 Hook up two DB-25 switches, fixture numbers H188779 and H188780, one to axis 1 and the other to axis 2. This will allow you to enable each axis separately. Connect a stepper motor, H18777 and H188776, to each end of the 9 pin connector cable, H188787, should be two, not important at this time if

the motor has an encoder or not because we are not looking for feedback at this time.

6.1.7 Hookup the IMC-4230 communication cable, H188783, to P3. Cable is not reversible, be sure to connect proper end to UUT and to the PC.

6.1.8 This unit is 110VAC model, be sure to hook up power cable to autotransformer, H188785. Use +12V power supply to feed the switch box. Red lead to Red Lead on Switch Box, H188778, Black Lead to Black Lead on Switch Box.

6.1.9 Power up UUT. Bottom LED 5 should be on and continue to stay lit until unit is enabled by flipping one of the DB-25 enable switches for each Axis.

6.1.10 If over temp light on drive is on shut down and trouble shoot problem.

6.1.11 Access CCS main menu to verify that communication has been established; go to Online Communications, option 2 on main screen. Type in "0" then "enter". On the computer screen, H188786, you should see the response " Invalid Command" displayed on the screen. This lets you know Axis 0 is communicating. Type in "1" then "enter". On the computer screen, H188786, you should see the response " Invalid Command" displayed on the screen. This lets you know Axis 1 is communicating. Note: Controller communication LED for each Axis will light until the "enter" key is pressed. Use the ESC key to return to main menu screen on the computer.

6.1.12 Press 6 for the Application Program Management Screen. Press "F1" and type "0" when prompted. This selects Axis 0's address you wish to download to. Press F5 to download a file, then press "Y" to clear memory when prompted, then type in the filename IMC4230 when prompted. Computer will download program into Axis 0.

6.1.13 Press "F1" and type "1" when prompted. This selects Axis 1's address you wish to download to. Press F5 to download a file, then press "Y" to clear memory when prompted, then type in the filename IMC4230 when prompted. Computer will download program into Axis 1.

6.1.14 Make sure to have IMC-4230 program downloaded to both axis controllers, Axis 0 and Axis 1, as it has an exercise program that will be used later in this procedure. After downloading is complete for both Axis, cycle power to let unit load new programs. Press "ESC" key, then press "2" to go into "online Communications" mode.

6.1.15 Flip individual axis switch to enable axis, fault light should go out when active.

This program should already be programmed into unit.

0WB	(Warm Boot)
0SP1000	(Speed of Motor)
0AC5000	(Load Acceleration Rate)
0ER4096	(No Encoder) Tells drive there is no encoder feedback
0SFN	(Slew Forward) Forward Direction

6.1.16 Enter 0SFN & 1SFN both motors should be turning same direction. Type in 0SRN & 1SRN, motors will have reverse directions and should still be spinning. No fault light should be on during this process.

6.1.17 Enter "0ST" and "1 S T" to stop both motors.

6.2 Stepper Motor Test with encoder and Profile Tests

6.2.1 Power down controller and set switches SW1 the following way;

6.2.2 SW1 1,3,4 down, leaving 5,7 down.

6.2.3 Disconnect both I/O plugs with switches.

6.2.4 Connect I/O cable, H188781, and encoder feedback cable, H188782, to axis 0.

6.2.5 Flip all test box switches up.

6.2.6 Power up +12V and 110VAC power supplies. If you physically turn stepper motor shaft you will see feedback LED light up depending on direction turned. This will let you know if you have the correct motor/encoder/axis configuration.

6.2.7 Go to on-line communications, option 2 from main menu, and type "0ER26214" and "1ER26214". This let the drive know you have encoder feedback and will act accordingly. Cycle 110 VAC power to UUT. You can poll the memory within each axis by entering specific information, for example (0ER?) will give me what ER information is in Axis 0 and (1ER?) will give what ER information is in Axis 1

6.2.8 Now Flip SW10, SW11, & SW12 switches down, should see LED 5 go off.

6.2.9 Enter "0DG1". Flip switch 1 and stepper should begin to move and display the switch status on the computer display. Once stepper stops flip switches 2 through 7, motor will move again and display switch status on computer display., SW3, SW4, SW5, SW6, and SW7. When switch 8 is flipped the motor will reverse direction, give switch status on computer display, and go back to where the program began.

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6.2.10 To check switch 9, type in "0PFH" then "enter". Flipping switch 9 will display switch status on computer display.

6.2.11 Type "0SFN" to spin motor forward. Motor should be turning clockwise direction with the forward command. Green LED should steadily be ON, Yellow LED might be blinking, depends on speed of motor While motor is spinning forward, flip switch 10. Motor should stop, this checks the forward limit switch.

6.2.12 Type "0SRN" to spin motor in reverse direction. Motor should be turning counterclockwise direction with the forward command. Yellow LED should steadily be ON, Green LED might be blinking, depends on motor speed. While motor is spinning, flip switch 11. Motor should stop, this checks the reverse limit switch.

6.2.13 Power down UUT.

6.2.14 Move the I/O cable, H188781, and the encoder cable, H188782, to Axis 1. Also, move the encoder cable, H188782, from motor/encoder on Axis 0 to motor/encoder on Axis 1.

6.2.15 Power up unit.

6.2.16 Now Flip SW10, SW11, & SW12 switches down, should see LED 5 go off.

6.2.17 Enter "1DG1". Flip switch 1 and stepper should begin to move and display the switch status computer display. Once stepper stops flip switches 2 through 7, motor will move again and display switch status on computer display., SW3, SW4, SW5, SW6, and SW7. When switch 8 is flipped the motor will reverse direction, give switch status on computer display, and go back to where the program began.

6.2.18 To check switch 9, type in "1PFH" then "enter". Flipping switch 9 will display switch status on computer display.

6.2.19 Type "1SFN" to spin motor forward. Motor should be turning clockwise direction with the forward command. Green LED should steadily be ON, Yellow LED might be blinking, depends on speed of motor While motor is spinning forward, flip switch 10. Motor should stop, this checks the forward limit switch.

6.2.20 Type "1SRN" to spin motor in reverse direction. Motor should be turning counterclockwise direction with the forward command. Yellow LED should steadily be ON, Green LED might be blinking, depends on motor speed. While motor is spinning, flip switch 11. Motor should stop, this checks the reverse limit switch.

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6.2.21 After both Axis have been checked and passed, type "0ER4096" then press "enter" and type "1ER4096" and press "enter".

6.2.22 Power down UUT and set switches SW1 1,3,4 in the up position on both Axis boards. This tells the UUT we will not be using the encoder on the motor and not to look for it.

6.2.23 Remove the I/O cable, H188781, and the encoder cable, H188782, from UUT and motor/encoder. Install Axis Jumper switches, H188779 and H188780, on both Axis.

6.2.24 Power up UUT. Enable both Axis.

6.2.25 Type "0EX9" for Axis 0 and "1EX9" for Axis 1. Both motors should be spinning. Run both axis for at least four hours and be sure you use a fan to keep motors cool. Let run for 2 – 4 hours. Type 0ST or 1 S T command to stop each axis.

6.2.26 Power down UUT 110VAC and +12VDC.

6.2.27 End of Test

6.3. ***TEST COMPLETE ***

7. **NOTES**

7.1.1 None at this time

8. REFERENCES

Switch 1 No Encoder

Axis 1		Axis 2
L	1	L
L	2	L
L	3	L
L	4	L
R	5	R
L	6	L
R	7	R
L	8	L

Switch 1 With Encoder

Axis 1		Axis 2
R	1	R
L	2	L
R	3	R
R	4	R
R	5	R
L	6	L
R	7	R
L	8	L

Switch 2

Axis 1		Axis 2		
L	1	L	Axis 1 Address = 1
L	2	L	Axis 2 Address = 0
R	3	R	Echo
R	4	R	9600 Baud
R	5	R	RS-232
L	6	L	Non-encoded
L	7	L	Pulse Multiplier x 1
L	8	L	Pulse Multiplier x 1

Configuration and Test procedures for XMC-4-B

1. Use test WETS5406 to calibrate XMC-4 power bd. Must have logic boards connected to test power bd.
2. To change power bd. for 220VAC operation, make a cut across foil between holes at JP1 after burn in and before final test.
3. To convert unit from sink to source, change EPROM (U19), set JP1 to A & B and E & F, then remove R1 and put it in R2 spot.
4. E-proms are as follows:

For	IMC-4230	31450011 (SINK)
	IMC-4231	31450012 (SOURCE)
	CMC-4230	31450028 (SINK)
	CMC-4231	31450045 (SOURCE)

5. To convert from IMC to CMC, use applicable EPROM, remove 12 and jumper pins 9 & 11, then remove U11 and replace with 31320090.
6. Now mate the power and logic boards together with a shield board between them.
   a. **POWER LED PCB- CABLE TO J1**
   b. SERIAL PORT PCB- CABLE TO J3
   c. SHIELD BOARD
   d. POWER BOARD PCB
7. Run WETS5428 test procedure at Jeff's old bench.
8. After successful completion of testing, forward to assembly.

CMC-4230	IMC-4230
U11=74LS90	U11=74LS93
	U12=74LS592

Repairs and what to look for on XMC-4 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 R2 & R3, C5, C6, C36, C38, and C46-C48. C5 & C6 have to be replaced only if R2 or 3 is open.
2. Be sure the driver boards. 70004140 are the latest revision. If not, they need to be replaced.
3. Check the logic supply. If R60 & RC61 are open, logic supply is blown and needs many parts including the following: R60 & R61, 58, U8, D9, Q7, 8, 9, 1, and C28. May have to replace U1&2 also. Piggyback R13 with same value and be sure R5 is 7.5K and R10 is 20K.
4. These power boards can be difficult to troubleshoot at times. Disable motor bridge by lifting R30 & R40 at times to help in troubleshooting procedures.
5. **Be sure to leave logic boards connected to power board when applying power for troubleshooting or other problems <u>will</u> arise!**
6. To upgrade logic boards, replace U30 with 70004444 bd., replace D6 with zero ohm resistor, upgrade EPROM to latest revision. Run jumper wire from U19 pin 28 to U20 pin 28. Run more jumper wire from U30 pin 7 to U15 pin 14 and U30 pin 14 to U15 pin 7.
7. If you turn on the power to the unit and the bottom 3 lights are on, the clock is probably not working. Check for a clock signal to the EPROM and look for the INT pulse at pin 16 of the CPU. If not there, suspect bad CPU. Have been getting a few of them lately.
8. Communication problems can be on the logic bd. U31, U32, or U34. Have to troubleshoot with computer in terminal mode hooked up to the unit using techniques with the scope. Hopefully this narrows it down some. If having real difficulty, sometimes can be as simple as SW2 not functioning. Test SW2 with ohmmeter.
9. If a lot of weird things are going on as well as intermittent, you may want to replace J1 ribbon connector.
10. If the over-current lights are illuminated on the logic bd. turn the power off and check to see if the + or – 12V lines are shorted to ground. If so, pull off the logic bd. and see if the short is still there. If so, could be a .1ufd capacitor that is bad. Many times you can see a little burn spot on one of them that is the culprit.
11. Had a couple of Power Supply boards failed due to bad PROM U6, could not get 50V at C16 of 70003980.
12. If no 50vdc, could be bad U8, U9, & U1.
13. When comm. Cable connected & no response, change Q7 & Q8.