g	GE Energy	**Functional Testing Specification**
	Inspection & Repair Services *Louisville, KY*	**LOU-GEF-IMC-31CE-2-MOD**

Test Procedure for a IMC-31CE-2-MOD RDN Amplifier

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	Charlie Wade	9/10/2007
B	On demand mode 6.2.14. Lengthen test time to thirty minutes.	C. Wade	12/4/2008
C			

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DATE 9/10/2007	DATE	DATE	DATE 9/11/2007

Test Procedure for a IMC-31CE-2-MOD RDN Amplifier

1. **SCOPE**

   1.1 This is a functional testing procedure for IMC-31CE-2-MOD 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.
      Check RDN 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 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	15vdc PS	Power Supply
1	Motor	Large Motor with Resolver
1	Variac	110vac variac
1	220vac	Transformer
2	Cables	Motor Power & Feedback Cable & test plug

6. TESTING PROCESS

6.1 Setup

6.1.1 Set all dipswitches on Amp to left except for #6, it goes to the right. This sets up the address to "0". Baud rate is set for 9600.

6.1.2 Hook up communications cable. Cable is not reversible, be sure to connect proper end to amp and to the PC. If communication has been established you should see an echo from the drive every time you hit enter on the PC.

6.1.3 Hookup 230VAC, both motor cables, terminal bar connections to amplifier

6.1.4 Power up computer and amplifier. The top LED on the amp should be on "RED".

6.1.5 Access the CCS for Windows. Press return again to remove advertisement.

6.1.6 Go to the Terminal drop down arrow and select the "0" terminal. This should bring you to the amp communication screen.

6.1.7 Type "klall" , press return, you should *.

6.1.8 Type "clm", press return, answer yes (Y) to clear memory.

6.1.9 Go to the "TOOLS" on the menu bar and select "SEND FILE".

6.1.10 Send file "scut6d54.txt" located in the CCSWIN directory to the amplifier. Should be the only file that comes up.

6.1.11 When the computer is finished downloading save to flash memory.

6.1.12 Type "AUTORET" press return, you should see *.

6.1.13 Type "SAVE" press return, you should see saving user memory. Follow by user memory saved.

6.1.14 Power down amplifier then power amp back up.

6.2 Testing

6.2.1 Test MODE 1

6.2.2 Type "VI01=1" press return. This puts you in mode 1.

6.2.3 Type "VF15=10" press return.

6.2.4 Type "VB01=1, before you hit enter need to be spinning the resolver in the correct direction and be ready to press the home push button shortly after press return on the computer. Once return has been press on the PC the motor should begin to move, pressing the home PB will cause the motor to come-in-position, which will now allow you to operate the motor. If this does not happen you will not be able to run the motor. As long as the resolver is spinning the motor should spin. Note: If you spin the resolver too fast it might cause a trip to occur.

6.2.5 Once the resolver has come to a stop, the motor should stop shortly thereafter.

6.2.6 Test MODE 2

6.2.7 Motor should still be enabled from step 18. Type "VI01=2" press return.

6.2.8 Type "VF23=.25" press return. This sets up the motor to turn four revolutions per second. Example: if you enter a "VF23=1" you should see one revolution per second.

6.2.9 Type "VB01=1" press return. This is the controlled start command to begin motor operation.

6.2.10 Type "VB01=0" press return. This is the controlled stop command for the motor.

6.2.11 Test MODE 3 (On Demand Mode)

6.2.12 Motor should still be enabled from step 18. Type "VI01=3" press return.

6.2.13 Type "VB01=1" press return.

6.2.14 Every time you press the external cut mode push button the motor should spin one revolution. Leave motor engaged for at least thirty minutes and periodically press the push button throughout this time to see if the unit is still responding.

6.2.15 To deactivate this type "VB01=0" press return.

6.2.16 Test MODE 4

6.2.17 Motor should still be enabled from step 18. Type "VI01=4" press return.

6.2.18 Type "VB01=1" press return. The motor should be running continuously at about 750 to 1000 RPM. This is the controlled start command to begin motor operation.

6.2.19 Type "VB01=0" press return. This is the controlled stop command for the motor.

6.2.20 Once all modes have been tested and function properly, go back to MODE 2 and run this test for four hours.

6.2.21 End of test

6.3 ******TEST COMPLETE ******

7. NOTES

7.1 Special Note: If you plug in Amp and turn unit on and it starts sending garbage to the computer, switch to 38400 baud and load firmware into amp.

8. REFERENCES

Here are some miscellaneous commands for interrogation of servo amplifiers.

FCQ Displays fault code register. With our computer interface enabled, and FCQ command is executed, the fault code register value will be given as an integer number. If no fault occurred, the message given is "Controller functional".

Bit message

Bit	message		Bit	message
0	Power Failure		16	Invalid Motion
1	Reserved		17	Reserved
2	Software Fault		18	Reserved
3	Lost Enable		19	Network Power Failure
4	Digital Out Fault		20	Duplicate Network Address
5	Invalid Command in String		21	Excessive Following Error
6	Transmit Buffer Overflow		22	Excessive Command Increment
7	Resource not Available		23	Position Register Overflow
8	Invalid Variable Pointer		24	Resolver Feedback Lost
9	Mathematical Overflow		25	Motor Power Over-Voltage
10	Mathematical Data Error		26	Motor Power Clamp Excessive Duty Cycle
11	Value Out of Range		27	Motor Power Clamp Over-Current Fault
12	String Too Long		28	Motor Over-Current Fault
13	Nonexistent Label		29	Motor Over-Temperature
14	Gosub Stack Underflow		30	Control Over-Temperature
15	Gosub Stack Overflow		31	Network Communications Error

FIQ   Displays fault input register. The register displays what fault is currently active.

IOQ When querying the general IO register I got the following message when the amplifier was running. See Appendix A: Page A-57 for more information.

> Enable input active
> Auxiliary index input active
> Auxiliary channel B input active
> Auxiliary channel A input active

AIQ Display analog input voltage (minimum is –10.00V maximum +10.00V). To set an analog out, example AO=1.5, sets analog output equal to 1.5 volts.

AOQ   Displays analog output voltage (minimum is –10.00V maximum +10.00V)

INPUTS

DIQ Displays status of input states. **DI5Q** will display the value of digital input 5. The screen will display the inputs in the following fashion. Below are the results of DIQ on a small Whedco drive. By adding 12 volts to any of the unused inputs and then querying the amplifier I saw a change in status to its input.

12 _{MSD}	11	10	9	8	7	6	5	4	3	2	1 _{LSD}
0	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**1**	**1**	**1**	**1**

OUTPUTS
DOQ   Display status of output states. **DO7Q** will display digital output 7. To set an output, example **DO12**=1, should set digital high out to 12. Could only get 11 & 12 to work on the Whedco unit. I am sure the software and wiring disabled me in performing this function on the other outputs.
The screen will display the outputs in the following fashion. Below are the results of DOQ on a small Whedco drive.

12 MSD	11	10	9	8	7	6	5	4	3	2	1 LSD
0	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**

PROGRAM   edits program
X   Steps through program/motion blocks
!   Exits editor