

g

GE Energy

Functional Testing Specification*Parts & Repair Services
Louisville, KY***LOU-GED-IS215UCVE****Test Procedure for a Universal Controller Assy, UCVE****DOCUMENT REVISION STATUS:** Determined by the last entry in the "REV" and "DATE" column

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	John Madden	06-03-08
B	Additional information, step (6.2.4) Roger test.	John Madden	09-16-08
C	Added comment about replacing 3V battery, (6.1.1) and added section (6.2.9) on leaving battery jumpers in on cards.	C. Wade	2/17/2009
D	Changed Section (6.2.9) on leaving battery jumpers disabled when shipping cards back to customers, per PSB 25136	C. Wade	4/15/2010
E	Added step (6.2.2) on testing current draw on batteries.	R. Johnson	4/27/2010
F	Added M05 NOTES: with special instructions for testing the IS215UCVEM05A cards	M Starling	6/30/2010
G	Added TMR system test instructions and corrected some procedure mistakes.	M. Starling	7/30/2010
H	Page 4, note on use of RTV.	C. Wade	8/27/2010
I	Added Step 6.2.2 about soldering new batteries in and Step 6.2.13.28 about burn-in change and battery voltage check.	C. Wade	1/19/2011
J	Modified Step 6.2.13.28 about burn-in change for battery replacements only to be at least 12 hours.	C. Wade	3/29/2011
K	Added special note to 6.1.2 about compact flash replacement,	C. Wade	3/8/2012
L	Added 6.3 thru 6.3.2.2.16, VMI/VME-7614 test procedure "UCVE tester"	Dan Waddy	9/13/2013

© COPYRIGHT GENERAL ELECTRIC COMPANY

Hard copies are uncontrolled and are for reference only.

PROPRIETARY INFORMATION – THIS DOCUMENT CONTAINS PROPRIETARY INFORMATION OF GENERAL ELECTRIC COMPANY AND MAY NOT BE USED OR DISCLOSED TO OTHERS, EXCEPT WITH THE WRITTEN PERMISSION OF GENERAL ELECTRIC COMPANY.

PREPARED BY John Madden	REVIEWED BY Frank Howard	REVIEWED BY M. Starling	QUALITY APPROVAL <i>Charlie Wade</i>
DATE September 16, 2008	DATE 2/19/2010	DATE 7/30/2010	DATE 9/18/2008

LOU-GED-IS215UCVE REV. L	g GE Energy <i>Parts & Repair Services</i> <i>Louisville, KY</i>	Page 2 of 12
-----------------------------	--	--------------

1. SCOPE

1.1 This is a functional testing procedure for a Mark VI Universal Controller Assy.

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 N:\Design Folders\IS2\IS215\UCVE

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, cracked, or loosely connected

4.2.1.2 Terminal strips / connectors - broken or cracked

4.2.1.3 Components - visually damaged

4.2.1.4 Capacitors - bloated or leaking

4.2.1.5 Solder joints - damaged or cold

4.2.1.6 Circuit board - burned or de-laminated

4.2.1.7 Printed wire runs / Traces - 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		Fluke 87 DMM (or Equivalent)
1		Chip ID pc (for the "Roger" test)
1	H188790	Mark VI test rack Sim31
1	H188886	Mark VI TMR system
1	H190123	VMI/VME-7614 (UCVE tester)

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 3 of 12</p>
-------------------------------------	--	---------------------

6. TESTING PROCESS

6.1 Setup

6.1.1 Setup is called out in each step.

6.1.2 For **IS215UCVEM05A** units follow any special **M05 NOTES**: while going through the procedure. Best practice would be to remove the expansion cards (you will need to so you can replace the batteries anyway) and first test the unit as a standard **IS215UCVE** card. Then install the expansion card and retest the unit following the special notes.



Note: This test currently covers only IS215UCVE. We no longer repair DS215UCVA or UCVB, nor do we repair IS215UCVC due to lack of parts availability. There is a separate test for UCVD assemblies, because of the number of differences involved in testing.

Replace both 3V Lithium batteries with new before testing board. Disable battery jumpers before replacing batteries. Be sure to check battery connections after soldering for breaks/opens.



Note: Areas of this test are marked with the words *TMR:* or *Simplex:* before the section description. These areas are specific to the TMR or Simplex racks only. Areas that do not state *TMR:* or *Simplex:* prior to the description are relevant for both rack systems.



Note: STEC Compact Flash Part# SLCF128MM1U and SLCF128MM1UI-F GE Part# 336A5196AAP8 should be replaced with the Delkin Device brand compact flash. See Product Service Bulletin PSB25232 for more information.

6.2 Testing Procedure

6.2.1 Initial Inspection:

6.2.1.1 Look the card over very closely. Physical damage & corrosion have been found on these units, along with missing hardware.

6.2.1.2 If you can get to the battery(s), check the voltage. It should be greater than 2.8Vdc.

6.2.2 Battery Replacement

6.2.2.1 When replacing batteries, limit the time the soldering iron is in contact with the battery to 3 sec per contact. (The heat from the iron will drain the battery). Use either solder with a flux core or no-clean solder with additional flux to solder these contacts. Do not use no clean solder without flux.



Note: Pictures of RTV on batteries. Customer complained about picture one; use of black RTV and using an excessive amount. Use white RTV and limit the amount as in pictures 2 and 3.



Picture 1
Excessive



Picture 2
Correct



Picture 3
Correct

6.2.3 Typical current draw: After new batteries have been replaced.

6.2.3.1 (B2) After battery jumper is removed/disabled, connect a current meter to J10 Pin-1 to Pin-2. Current should read between **3uA to 5uA draw, typical**. If unit is 6uA or higher, the RTC circuit is overdrawing and battery will not last for the advertised rated period. This RTC circuit goes to a BGA (U35). If this circuit is incorrect we will have to send the card out for repair, because we lack the ability to change out BGA devices.

6.2.3.2 (B2) Next connect the current meter to E8 Pin-7 to Pin-8. Current should read **.1uA draw, typical**. If unit is .2uA or higher, U62 may require replacement to lower current draw.

6.2.4 Compact Flash:

- 6.2.4.1 There should be a compact flash card mounted into a slide holder/socket that needs to be flashed. This flash that needs to be performed is the default that, after you have finished testing later on, will once again be reloaded at the end of this test.
- 6.2.4.2 Remove the compact flash card from the unit, and install it into the socket located behind the keyboard on the bench right below the Sim70 rack.
- 6.2.4.3 Call up the compact flash program on your desktop. Select the file that most closely matches the one labeled on the card. I say most closely because the one in the computer may be a slightly newer revision than what's in the card. For example, your card may end with *BWP3, but *BWP4 is what's on the menu. Select *BWP4 and remember to print a new label to place over top of the old one on the card.
- 6.2.4.4 When you select the file you want, the next window that pops up has a button on the upper right that says, "**Write**". Click on it, and then once again select the file from the next menu. It'll be the same one. You should get a progress bar next, followed by another one, and then it is finished. After the next few steps, at the end of this test, you'll be prompted to repeat this step in order to send the unit out with the default settings, so the customer can set it up for their needs.

6.3 UCVE tester

6.3.1 Setup:

- 6.3.1.1 Before testing can begin you must verify that the latest BIOS version (currently version 1.1) is loaded. This can be accomplished by simply verifying the BIOS version listed on boot up. You must also clear the CMOS. To do so just install a jumper at E4; power up the unit; turn off the power and remove the jumper from E4. When power is applied to the unit, the CMOS is cleared and needs to be set up.
- 6.3.1.2 Before installing the card into the test rack set the jumpers for testing (**see table 1**) install a jumper at E8 pins 2-4. There is also a PMC-5565 card which needs to be installed onto the UCVE card on the connectors directly above P2. Once the card is installed into the test rack, connect your VGA, mouse/keyboard (ps2), and the Ethernet cables.

TABLE 1 - Jumper Settings

Jumper E7 Not Used
 Jumper E9 Programming Header
 Jumper E12 Not used

Password Clear (User Configurable) – Jumper (E4)

Jumper Pos.	Select
OUT	Normal
In	Clear CMOS/ Password

Watchdog Timer Interrupt Settings – Jumper (E5)

Jumper Pos.	CPU Option
*3-4,7-8 IN	Celeron 300 MHz
Out	Celeron 366 MHz

Timers Enable/Disable – Jumper (E8)

Jumper Location	TEST Default Pos.	GE Default Pos.	Select
Watchdog Timer			
2-4	OUT	OUT	Reset
4-6	OUT	OUT	NMI
Programmable Timer Clock Selection			
1-3	IN	IN	1MHz
3-5	OUT	OUT	2MHz
NVRAM Battery Power			
7-8	IN	OUT	NVRAM Battery

CMOS Battery Enable – Jumper (E10)

Jumper Location	TEST Default Pos.	GE Default Pos.	Select
E-10	IN		CMOS Battery Enabled
E-10		OUT	CMOS Battery Disabled

BIOS Mode Option – Jumper (E15)

Jumper Pos.	Select
*1-2	Normal
2-3	Programming

Default settings in **BOLD Italic** type

6.3.2 Testing

6.3.2.1 CMOS settings

- 6.3.2.1.1 Install the card into slot 9 of the test rack.
- 6.3.2.1.2 During boot up hit the F2 key to enter CMOS setup.
- 6.3.2.1.3 In the BIOS setup utility screen adjust the system date and time fields.
- 6.3.2.1.4 Press F9 to load defaults.
- 6.3.2.1.5 Enter F10 to save CMOS settings and exit the BIOS menu.
- 6.3.2.1.6 On reboot hit F2 and enter the BIOS menu again. Verify that the time and date are correct. If necessary, set the correct time and date. Navigate to the advanced menu options. Select **RESET CONFIGURATION DATA** and change it to YES, then hit F10 to save and exit. After exiting the BIOS menu power down the rack.

6.3.2.2 Initial testing

- 6.3.2.2.1 Apply power to the rack. The system will give you the option to boot into DOS, Windows NT, or Windows NT (vga mode). Select MS-DOS. You will then be prompted to select which card you would like to test. Select 1–7614. Testing procedures are divided into 3 batch files, each batch file must be executed and pass before moving on to the next batch file. Select file 1. You will be asked if you want to flash the BIOS, select no. **DO NOT FLASH THE BIOS!!!**
- 6.3.2.2.2 Enter “13” at the board options? Prompt.
- 6.3.2.2.3 Verify that the correct items loaded by PASSED indication. The ram should read 32Mb and processor speed 300MHz.
- 6.3.2.2.4 The test will then provide instructions for performing the floppy test.
- 6.3.2.2.5 To test the PMC site type 100 at the “Enter Data Block Length” prompt. The test will begin running a read/write test, after 100,000 successful cycles hit space bar to terminate this execution and continue with the test.
- 6.3.2.2.6 Proceed to the NVRAM test and verify that each pattern passes. From there proceed to the WD timer test. If the card is functioning properly after 100 seconds the UUT will reboot.
- 6.3.2.2.7 Boot into DOS again and select 1 for the 7614 card and then 2 for batch test 2.
- 6.3.2.2.8 Verify that the NVRAM data (**all F's**) was retained and that the data was cleared out by a PASSED indication for both.

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 8 of 12</p>
--	--	----------------------------

- 6.3.2.2.9** The test will prompt you to the VME test. The test will automatically run 3 loops, verify that all 3 pass.
- 6.3.2.2.10** Power down the rack. Remove the UCVE card and move the jumper on E8 to position 4-6.
- 6.3.2.2.11** Reinstall the card, apply power to the rack, boot to the DOS menu, select 1 for the 7614 card, then select 3 for batch test 3.
- 6.3.2.2.12** The test will perform the NMI Timeout test.
- 6.3.2.2.13** From there the test will prompt you to prepare to boot into Windows NT workstation ver. 4.0 for Ethernet and com port testing.
- 6.3.2.2.14** Once Windows has loaded double click the “shortcut to serial” icon and follow instructions for the test. Verify that the card has passed testing then close this program.
- 6.3.2.2.15** Then double click the “Test Ping.bat” icon and verify that the card is pinging.
- 6.3.2.2.16** Once the ping test has been verified to pass, testing on the UCVE tester is complete. Shut down windows, power down the rack, remove the UCVE card, and return all jumpers to default settings.

6.3.3 “Roger” Test:

- 6.3.3.1** The Chip ID reader PC also contains the test programs for the UCV series controllers, written by an engineer at Salem by the name of Roger Thompson, hence the name “Roger” tests. Whenever you hear another tech refer to the Roger Test, you’ll know what they’re talking about. This test consists of the MK VI Sim31 rack, which sits just to the right of the Sim70 rack used for testing all the IS200Vxxx series cards.
- 6.3.3.2** There should be a VCMI card already in the rack, in the first slot. There may also be a VCRC in Slot 6, but sometimes this card is used in the Sim70 rack so it may not always be there. You will eventually need it in another step of this test, so go ahead and locate it, but don’t slide it in yet. Make sure the VCMI is not slid in, either.
- 6.3.3.3** Connect the Roger test serial cable, which is the one with red electrical tape on it, to COM1 of the unit under test, you’ll most likely need to use the adapter cable for compact d-shell connectors. There is a loopback cable that plugs into COM2 that has one end closed off with certain pins shorted together. This needs to be in place, too.

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 9 of 12</p>
--	--	----------------------------

6.3.3.4 Connect the Ethernet cable from the pc directly to the UUT. This cable must be a crossover cable. The crossover cable is the purple cable with black boots on the connector ends and appears as if pair of wires is spiraling under the purple jacket. Now, on the main menu of the Roger Test PC you'll see the option for testing the different UCV's. Select the one you need and follow the instructions closely. Another thing you'll run across is that it may say the time on the unit's clock is wrong, just click OK and let it reprogram the clock. Make sure the batteries are good on the unit before performing this test.

6.3.3.5 M05 NOTE: If you are testing a IS215UCVEM05A, you will also need to use the VersaMax unit for testing the ProfiBus. Follow the instructions in the Roger test.

6.3.3.6 After Roger test is complete with a pass, skip to

6.3.3.7 Simplex: GE Control Systems Solutions Toolbox, compact flash Core and TCP/IP Switch the serial cable over from the red one of the Roger test pc, to the yellow taped on of the Sim31 and Sim70 pc. Remove the compact flash from the board, and set it up in the card reader you had it in for 6.2.2. With Sim31 file of Toolbox opened up, select Device in the left of the upper toolbar, then Download, and Compact Flash. This sets up the TCP/IP address and core load for the next test step.

6.4 Simplex: GE Control Systems Solutions Toolbox, card testing:

- 6.4.1** This test is performed when the unit is plugged into the rack, and includes the VCRC Graphic Test, which is performed simply as an exercise to get the UCVE to perform a task that might be asked of it in the field.
- 6.4.2** With rack power OFF, slide in both the VCMI and the VCRC Power up the rack, and wait for it to finish booting up. Make sure the first word on the left-most menu, SIMPLEX, is highlighted.
- 6.4.3** Once it boots up, click on Device, then Download, and Product Code. When it's done, it will prompt you for a reboot.
- 6.4.4** Click NO and then cycle power to the rack. Once unit has finished booting up again, click on the button in the upper toolbar that has a checkmark on it. The window below should ultimately reflect "Validation complete with 0 errors & 0 warnings".
- 6.4.5** Next, click on the Build button, which has a hammer and ruler on it, and the lower window should display "xx records with 0 errors-SUCCESS" (xx records can be any number).

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 10 of 12</p>
--	--	-----------------------------

- 6.4.6** Go online by clicking the button on the upper right of the toolbar with two mating yellow plugs. You should see two small windows on the lower right side of the screen, one with UNKN and the other with NO CODE.
- 6.4.7** Now go to the Download button, the one with the red arrow pointing downward, click OK, then look for Download Complete.
- 6.4.8** Go Offline with the same button you went online with, cycle power to the unit, and wait for the reboot.
- 6.4.9** Once rebooted, look for the two windows in the lower right to now be Green and showing Control and Equal. NOTE: If by chance you end up with a red FAIL and green EQUAL lit up, try downloading the configurations to the VCMI and VCRC and rebooting.

6.5 TMR: GE Control Systems Solutions Toolbox, card testing:

- 6.5.1** Please follow the following steps to install the UCVE into the TMR system. The idea is to install the replacement card in such a way as to emulate a field swap, while the turbine is still running. NOTE: A Check and Build does not need to be performed and is not needed to replace the processor on an operating system. Doing so will result in a Minor or Major difference causing a downloading puzzle that is difficult to solve without causing a trip or rebooting the system. Again, the idea is to emulate a field swap without causing a trip or needing to reboot the system.
- 6.5.2** Remove compact flash from UCVE or later and insert into the flash Reader/writer on host computer.
- 6.5.3** Using toolbox select the dropdown menu Device/Download/Compact flash.
- 6.5.4** Select the processor that the UCVE or later is going to replace R, S or T. Then download core for that Rack that is being replaced.
- 6.5.5** Install compact flash back into the replacement UCVE or later.
- 6.5.6** Install battery jumpers.
- 6.5.7** Install card into the rack ensure all cables are connected.
- 6.5.8** Turn off power to the VPRO module for the rack that is being replaced.
- 6.5.9** Apply power to the UCVx rack that the replacement card is installed into.
- 6.5.10** Allow card time to boot, the run LED's and I/O cards will start to flash.
- 6.5.11** Using toolbox select from the drop down menu Device/Download/Product code (Runtime).
- 6.5.12** Select the processor that is being replaced.
- 6.5.13** When asked, would you like to reboot? Select "YES".

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 11 of 12</p>
--	--	-----------------------------

- 6.5.14** Allow time for unit to reboot, Go Offline then back online, select the processor that is being replaced.
- 6.5.15** When unit is ready for application codes at the bottom of toolbox the three windows will say Undef, UNKN, Nocode.
- 6.5.16** Click on the red down arrow select the correct processor and download application code.
- 6.5.17** When the download is complete cycle power on the rack.
- 6.5.18** Apply power to the VPRO module for this rack.
- 6.5.19** Allow time to boot go back online with the Designated processor.
- 6.5.20** When the newly replaced card is in the control state verify the NTP time is synced with the UTC. To view from the drop down menu select Device/Download/View/Set time. If the NTP is enabled the time should auto sync.
- 6.5.21** If NTP is not enabled press Set time select the processor that was newly replaced.
- 6.5.22** Verify time is synced.
- 6.5.23** Simplex: GE Control Systems Solutions Toolbox, VCRC graphic:
- 6.5.24** Now open up the VCRC graphic under the Sim31 directory, making sure to first check that it's not in Read-only status.
- 6.5.25** Once it's up, click on Automatic and see to it that it runs the VCRC and TRLY cards properly. If so, then burn it in as long as you need.
- 6.5.26** TMR: GE Control Systems Solutions Toolbox, VAIC, VAOC cards and VCRC graphic:
- 6.5.27** Now open up the VCRC graphic under the SIM035_MK6_TMR directory, making sure to first check that it's not in Read-only status.
- 6.5.28** Once it's up, click on Automatic and see to it that it runs the VCRC and TRLY cards properly.
- 6.5.29** The VAIC and VAOC cards are also setup to run with simulated I/O. Clear any diagnostic and monitor status periodically during burn in, to make sure they remain clear. **All UCVE card repairs shall be burned in for 24 hours, battery replacements only shall be burned in for at least 12 hours.** Power system up and down a couple times to see if card will still boot system. Had a couple of complaints that cards would not work; replaced batteries again and everything worked fine.
- 6.5.30** After burn-in, cards will be removed and battery voltage checked per step 6.2.3. Cards must pass this step.

<p>LOU-GED-IS215UCVE REV. L</p>	<p>g</p> <p>GE Energy Parts & Repair Services Louisville, KY</p>	<p>Page 12 of 12</p>
-------------------------------------	--	----------------------

6.6 Reset Compact Flash to Default:

6.6.1 This is very important. The unit **MUST** be reset to factory default flash settings to prevent conflicts in the field, or possible corruption when the customer goes to set the unit up for their needs. Return to step 6.2.2 for this procedure.

6.7 Jumpers for Batteries:

6.7.1 Per Service Bulletin PSB25136, board jumpers shall be disabled for shipment. Estimated storage life can also be found in this bulletin.

6.8 ***TEST COMPLETE***

7. NOTES

7.1 None at this time.

8. ATTACHMENTS

8.1 None at this time.