ABB EPIS	Functional Testing Specification
Parts & Repair Services *Louisville, KY*	LOU-GED-44C331894

Test Procedure for a GENERREX AC Ref & AC/V 44C331894-G01 card.

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

REV.	DESCRIPTION	SIGNATURE	REV. DATE
A	Initial release	J. Francis	07/26/2018

PREPARED BY	REVIEWED BY	REVIEWED BY	QUALITY APPROVAL
J. Francis			L. Groves
DATE	**DATE**	**DATE**	**DATE**
07/26/2018			7/26/2018

1. SCOPE

1.1 This is a functional testing procedure for a GENERREX AC Ref & AC/V 44C331894-G01 card.

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 Check board's electronic folder for more 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 site specific SRA's 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
2	*	Fluke 87 DMM (or Equivalent)
2	*	Tenma Dual Power Supplies
1	*	Oscilloscope
1	*	Function Generator
1	*	GENERREX 44C Patch board

6. TESTING PROCESS

6.1 Testing Procedure

6.1.1 Static connection checks

From:	To:	Results:
Pin 23	Pin 28	95 K to 105 K Ohms
Pin 23	2TP	9.5 K to 10>5 K Ohms
Pin 25	4TP	104.5 K to 115.5 K Ohms
Pin 16	3TP	104.5 K to 115.5 K Ohms
Pin 15	5TP	104.5 K to 115.5 K Ohms

6.1.2 Visually check the following Resistors for correct values

6.1.2.1 3R 3.3 K Ohms

6.1.2.2 9R 2.7 K Ohms

6.1.2.3 21r 2.7 K Ohms

6.1.3 Setup – Do not apply power at this time.

6.1.3.1 Refer to Block Diagram for setup reference (see attachment 8.1).

6.1.3.2 Install Unit Under Test (UUT) into GENERREX 44C card patch board.

6.1.3.3 Connect DMM positive lead to **2TP** (“2” Red Jack on Face Plate of UUT) and negative to **1TP** (“1” Black Jack on Face Plate of UUT). This will be considered the “OUT” or “**BJ-10**”.

6.1.3.4 Connect +15 -/+ 0.15 VDC positive to Pin 1 and return to Pin 3.

6.1.3.5 Connect -15 -/+ 0.15 VDC output to Pin 5 and return to Pin 3.

6.1.3.6 Connect + 24 -/+ 0.5 VDC positive to Pin 7 and return to Pin 9.

6.1.3.7 Connect Function Generator positive output to Pin 14 and return to Pin 9. Set generator for a 4 Hz square wave 8 Vpp output.

6.1.3.8 Connect 2 external LEDs (24 volt/10 mA setup), one to Pin 11, and one to Pin 12, with returns (positive lead for both) connected to Pin 8.

6.1.3.9 Set Pots 1P (MIN) fully CW and Pot 2P fully CCW.

6.1.4 Testing

6.1.4.1 Apply Power – apply -/+15 VDC and +24 VDC to UUT. AC light on UUT should be lit along with L11 (Pin 11) LED.

6.1.4.2 Output at BJ-10 should be +3.74 -/+ 0.3 VDC.

6.1.4.3 Input -15 -/+ 0.05 VDC into Pin 17. Output at BJ-10 should go to +3 -/+0.3 VDC.

6.1.4.4 Remove input from Pin 17 of UUT.

6.1.4.5 Adjust 1P (MIN) pot fully CCW. Output at BJ-10 should be +4.99 -/+ 0.3 VDC.

6.1.4.6 Adjust 1P (MIN) pot fully CW. Output at BJ-10 should be +3.74 -/+ 0.3 VDC.

6.1.4.7 Set 1P (MIN) pot to +4.5 -/+ 0.005 VDC at BJ-10.

6.1.4.8 Input +10 VDC into Pin 26 with return to Pin 3.

6.1.4.9 Adjust 2P (SPAN) pot fully CCW. Output at BJ-10 should be approximately +5.7 VDC.

6.1.4.10 Adjust 2P (SPAN) pot fully CW. Output at BJ-10 should be +4.68 -/+ 0.12 VDC.

6.1.4.11 Set 2p (SPAN) pot to +5.5 -/+ 0.005 VDC at BJ-10.

6.1.4.12 Remove input from Pin 26.

6.1.4.13 Input -4.4 -/+ 0.06 VDC into Pin 21 and return to Pin 3. Wait for approx. 1 minute for AC light and L11 (Pin11) LED to go out and V/HZ light to come on and L12 (Pin 12) to start flashing at 4 Hz, which is the signal input on Pin 14.

6.1.4.14 Increase input into Pin 21 to -4.56 VDC. V/HZ light and L12 (Pin 12) LED goes out and AC light and L11 (Pin 11) LED come on. Wait approx. 1 minute for lights to transition.

6.1.4.15 Reduce input on Pin 21 back to -4.4 VDC. AC light and L11 (Pin 11) go out and V/HZ light comes on and L12 (Pin 12) LED to start flashing at 4 Hz. Wait approx. 1 minute for lights to transition.

6.1.4.16 Connect O-Scope positive input to **3TP** (“3” Red Jack on Face Plate of UUT) and return of O-Scope to **4TP** (“4” Red Jack on Face Plate of UUT).

6.1.4.17 Press and hold “**TEST**” button on Face Plate of UUT. 3TP and 4TP should start pulsing on O-Scope.

6.1.4.18 Increase input on Pin 21 to -6.2 -/+ 0.2 VDC. Pulses on 3TP and 4TP O-Scope should stop.

6.1.4.19 Decrease input on Pin 21 to -4.4 -/+ 0.06 VDC. Wait for approx. 1 minute for AC light and L11 (Pin11) LED to go out and V/HZ light to come on and L12 (Pin 12) to start flashing at 4 Hz.

6.1.4.20 Remove Function Generator input from Pin 14.

6.1.4.21 Jumper Pin 14 to Pin 8. V/HZ light and L12 (Pin 12) LED should go out. AC light and L11 (Pin 11) LED should also be out.

6.1.4.22 Remove jumper from Pin 14 to Pin 8.

6.1.4.23 Remove O-Scope from 3TP and 4TP.

6.1.4.24 Connect O-Scope positive input to Pin 13 and return to Pin 9.

6.1.4.25 With O-Scope set to “TRIGGER” on negative pulse, using the input on Pin 21, change input to -7 VDC. Wait approx. 1 minute for transition. When unit transitions, the O-Scope should “TRIGGER” on a negative pulse, going down then back to normal in approx. 8 mSec.

6.1.4.26 Using the input on Pin 21, change input to -3 VDC. Wait approx. 1 minute for transition. When unit transitions, the O-Scope should “TRIGGER” on a negative pulse, going down then back to normal in approx. 8 mSec.

6.1.4.27 Move O-Scope positive input from Pin 13 to Pin 29.

6.1.4.28 With O-Scope set to “TRIGGER” on positive pulse, using the input on Pin 21, change input to -7 VDC. Wait approx. 1 minute for transition. When unit transitions, the O-Scope should “TRIGGER” on a positive pulse, going up then back to normal in approx. 30 mSec.

6.1.4.29 Using the input on Pin 21, change input to -3 VDC. Wait approx. 1 minute for transition. When unit transitions, the O-Scope should “TRIGGER” on a positive pulse, going up then back to normal in approx. 30 mSec.

6.1.4.30 Remove all power and connections.

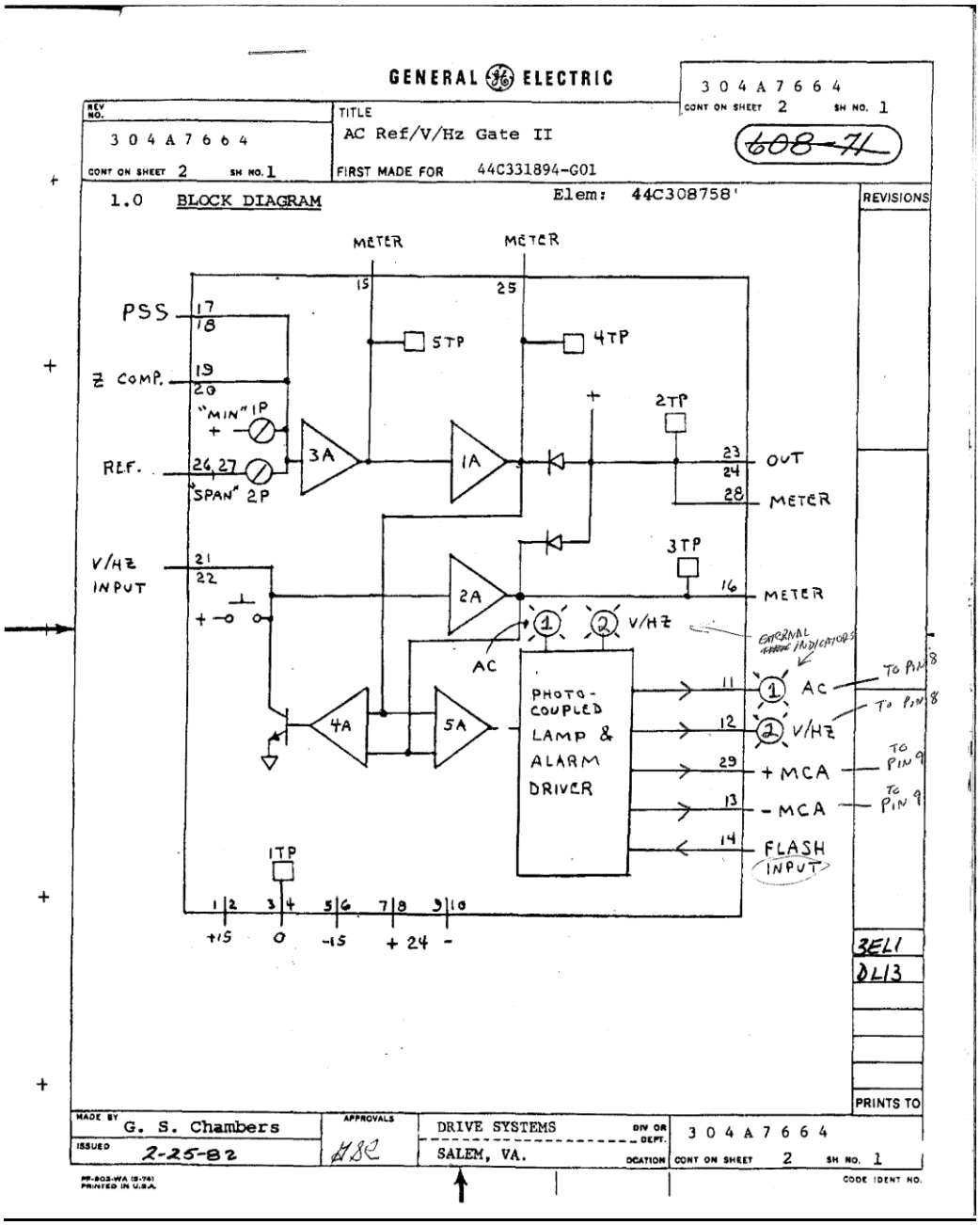
6.2 ***TEST COMPLETE ***

7. NOTES

7.1 Block Diagram 8.1 for setup reference.

7.2 Original test in 8.2 for testing reference.

8. ATTACHMENTS



8.1

8.2

GENERAL ELECTRIC

277A3909 CONT ON SHEET 2 SH NO. 1

REV NO. | TITLE

277A3909 CONT ON SHEET 2 SH NO. 1

TEST SPECIFICATIONS

FIRST MADE FOR 44C331894-G01

REVISIONS

STANDING INSTRUCTIONS

FOR

AC REF. and AC/V/HZ GATE II

PRINTED CIRCUIT BOARD

FOR

GENERREX SYSTEM

44C331894-G01

Distribution:

1 QC Engr.
1 Engr.
1 Test Area

3EL1
4QA1
1RA2
4EK1
DL13

PRINTS TO

MADE BY R. K. Gerlitz 790212

ISSUED 2/21/79

APPROVALS

Drive Systems DIV OR DEPT.

Salem, VA USA LOCATION

277A3909 CONT ON SHEET 2 SH NO. 1 CODE IDENT NO.

FF-803 WF (11-77) PRINTED IN U.S.A.

GENERAL ELECTRIC

277A3909
CONT ON SHEET 3 SH NO. 2

REV NO. | TITLE

277A3909
CONT ON SHEET 3 SH NO. 2

TEST SPECIFICATIONS

FIRST MADE FOR 44C331894-G01

REVISIONS

I. Test Equipment Required

A. Printed Circuit Board test setup - 44C931365.

B. Adaptor - Amp. Mod. II 30 pin.

C. Patchboard PB1.

D. Drawings

44C308758	Elementary Rev. 1	0
44C331874	Assembly	
44C931365	Elementary of Universal Power Supply	

II. Connection

A. Connect the Amp. Mod. II adaptor cable to "PL1" on the Universal Tester (UT).

B. Connect the power supply cable to "PL3" on the UT and to power supplies per lead markings.

C. Insert Patchboard PB1 in carrier of Universal Tester and close.

D. Connect DC voltmeter to "BJ-1" red (+) and black (-).

E. Install LED ~~5ma~~ 10ma lights in "L11" and "L12" sockets.

III. Wire Check

Pin	To	Test Point	to	Pin	Resistance (Ohms)
23				28	95K to 105K
23		2TP			9.5 to 10.5K
25		4TP			104.5K to 115.5K
16		3TP			104.5K to 115.5K
15		5TP			104.5K to 115.5K

Visually Check 3R 3.3K
9R 2.7K
21R 2.7K

3EL1
4QA1
1RA2
4EK1
DL13

PRINTS TO

MADE BY R. K. Gerlitz 790212
ISSUED 2/21/79

APPROVALS S R Pierce 2-20-79

Drive Systems DIV OR DEPT.
Salem, VA USA LOCATION

277A3909
CONT ON SHEET 3 SH NO. 2
CODE IDENT NO.

FF-803 WF (11-77)
PRINTED IN U.S.A.

GENERAL ELECTRIC

2 7 7 A 3 9 0 9 CONT ON SHEET 4 SH NO. 3

REV NO. 2 7 7 A 3 9 0 9 CONT ON SHEET 4 SH NO. 3

TITLE TEST SPECIFICATIONS

FIRST MADE FOR 44C331894-G01

REVISIONS

IV. Setup

A. Turn all switches to OFF or Normal on both the UT and UPS.

B. Turn all power supplies to zero on the UT and all variacs to zero on the UPS.

C. Apply power to test stand.

D. Install board under test to adaptor.

E. Connect a DC digital voltmeter to BJ-1 red (+) and black (-).

F. Connect a DC digital voltmeter to BJ-10 red (+) and black (-).

V. Electrical Test

A. Adjust 1P on the PC board completely ~~CW~~ CCW and 2P on the PC board completely ~~CW~~ CCW. (1)

B. Close "SW-1" and "SW-34", depress "LPB1" and set PS-1 to 24 ± 0.5 VDC at BJ-1. NOTE: Should it become necessary to remove all DC power from the PCB, open "SW-1".

C. (1) Depress ~~Depress~~ "LPB-2" and adjust PS-2 to 15 ± 0.15 VDC.

D. Depress "LPB-3" and adjust PS-3 to 15 ± 0.15 VDC.

E. Place "SW-31" down.
Close "SW-2".

F. Place "SW-11" down, "SW-12" down.
AC mode and "L11" shall be energized.
Place "RS-1" to position 6.

G. Depress LPB-9. Adjust PS5 from 0 to -15 ± 0.05 VDC at "BJ-1".
The voltage at "BJ-10" will go from 3.74 ± 0.3 to ~~3.74~~ (1) 3.00 ± 0.3 VDC.

H. Adjust PS5 for zero volts at "BJ-1". Open "SW-31".

Adjust 1P (on PCB)	"BJ-10"
~~CW~~ CW (1)	3.74 ± 0.3
~~CW~~ CCW	4.99 ± 0.3
Set	4.5 ± 0.005

3EL1
4QA1
1RA2
4EK1
DL13

PRINTS TO

MADE BY R. K. Gerlitz 790212 ISSUED 2/21/79

APPROVALS

Drive Systems DIV OR DEPT.
Salem, VA USA LOCATION

2 7 7 A 3 9 0 9 CONT ON SHEET 4 SH NO. 3 CODE IDENT NO.

FF-803 WF (11-77) PRINTED IN U.S.A.

GENERAL ELECTRIC

277A3909 CONT ON SHEET FNL SH NO. 4

REV NO.	TITLE
277A3909 CONT ON SHEET FNL SH NO. 4	TEST SPECIFICATIONS
	FIRST MADE FOR 44C331894-G01

REVISIONS

I. Place "SW-29" down.
Depress "LPB-4"
Adjust "PS-4" to 10 ± 0.01 VDC
Depress and Hold "PB-7"

J. Adjust 2P "BJ-10"
CW 4.68 ± ~~0.06~~ 0.12 (2)
CCW 6.24 ± ~~0.06~~ 0.12
Set 5.5 ± 0.005
Release "PB-7".

K. Return PS4 to Zero.
Open "SW-29"

L. Place "SW-6" down
"BJ-10" shall go from 4.5 ± 0.06 VDC to .75 ± 0.1 VDC
Open "SW-6"
"BJ-10" shall return to 4.5 ± 0.06 VDC
Place "SW-19" down

M. Depress "LPB-7". Increase PS-4 to -4.4 ± 0.06 volts DC at "BJ-1". "L12" and V/HZ lights shall be energized. Increase PS-4 until "L12" and the volts/hertz light deenergizes and "L11" and AC light energizes. This shall occur at -4.5 ± 0.06 VDC at "BJ-1". Lower PS-4 voltage to -4.4 ± 0.01 VDC the volts/hertz light and "L12" will energize and AC reg. light and "L11" deenergize.

N. Set PS-4 to -6 ± 0.06 volts and depress and hold TEST Pushbutton on (2) PCB. The control mode should oscillate. (3TP to 4TP shall oscillate) 2TP to 1TP shall not change more than 0.1 VDC.

O. Increase PS4 until 3TP ceases to oscillate. This shall occur at ~~7.0 ± 0.1~~ 6.2 ± 0.2 VDC. Release TEST PB, "L11" and AC shall be energized. (2)

P. Lower PS4 to 4.4 ± .01 VDC. "L12" and V/HZ lights are now energized.

Q. Close SW-14. "L12" shall deenergize. Open SW-14 and "L12" shall energize.

R. Connect an oscilloscope pin 13 to pin 9 and note that a negative pulse (20 to 24 volts and approximately 8 ms.) appears each time the system transfers from one mode to another. (Use PS-4 or "SW-19").
NOTE: If noise pickup occurs (scope display) connect temporarily a 100K 1/4 watt resistor pins 9 to 13. Remove after test.

S. Open "SW-1". Return all switches to OFF. ~~Open 1SW/6A/PCB/~~ Remove LED lights from "L11" and "L12". (2)

3EL1
4QA1
1RA2
4EK1
DL13

PRINTS TO

MADE BY	APPROVALS	DIV OR DEPT.	277A3909
R. K. Gerlitz 790212	S R Rumm	Drive Systems	
ISSUED 2/21/79	2-22-79	LOCATION Salem, VA USA	CONT ON SHEET FNL SH NO. 4
			CODE IDENT NO.

FF-803 WF (11-77)
PRINTED IN U.S.A.