GE Canada
Electronic Products Repair

Test Instructions for

0621L0461 G002
Device Number

Reversing Armature Interface Card
Description of Device

Originated By: Maher Albasel
Typed Name

Date: January 31, 2006
mm/dd/yy

Approved By: Dennis Ladd
Signature

Approval Date: February 1, 2006
mm/dd/yy

TEST INSTRUCTIONS
PREVIOUS REVISION SHEET

0621L0461 G002
Device Number
Reversing Armature Interface Card
Description of Device

Originated By	Date mm/dd/yy	Description of change
Omar Zawistowski	05/19/87	Created new instruction for Armature Interface 0621L0431 G001.
Tim Papez	12/30/94	Incorporated original to be used for the new Armature Interface Card0621L0461 G002, improved some instructions.
Rogerio Cordeiro	April 15, 1999	Improved some instructions
Rogerio Cordeiro	April 15, 2004	Corrected minor typos.
Rogerio Cordeiro	February 15, 2005	Added upgrade information
Rogerio Cordeiro	April 1, 2005	Added upgrade use on similar type cards
Maher Albasel	January 31, 2006	Updated test instructions and equipment needed

TEST INSTRUCTIONS

Location: Book or file File

Device Name Reversing Armature Interface Card
Device Number 0621L0461 G002
Date: January 31, 2006

1. PURPOSE:

   a. To test and repair the Reversing Armature Interface Card 0621L0461 G002

2. ELEMENTARY:

   a.

3. EQUIPMENT:

   a. Digital Multimeter
   b. Anatek Dual Regulated Power Supply
   c. Power supplies (+/-15VDC, +5VDC, +65VDC)
   d. Tektronix Oscilloscope
   e. 51 Pin Universal Test Jig
   f. 50 Pin Flat Ribbon Cable to 51 Pin Jig Converter Jig
   g. Variac
   h. Sencore Capacitor Tester
   i. Isolation Transformer TL #847 TM002 or equivalent
   j. 115VAC Isolated (2 phases of 3 phase connected to bench is O.K.)
   k. 3 Phase 115VAC
   l. 1 - Semi-Pack SCR or a 100Ω, 5%, ½Watt resistor resister for "loading"
   m. 1 – 20kΩ, 1%, ½W resistor 0177A1032 P022
   n. 1 – 200Ω, 5%, 5W resistor 0177A1029 P021
   o. 3 – 1kΩ, 1%, ½W resistor 0177A1024 P026

4. SET UP:

   a. Measure 20Ω with a DMM across R260 through R265
   b. Measure 0.5μF with a DMM or a capacitor tester across C120 through C125
   c. Connect 51 Pin Universal test Jig to bench power supplies, insert 50 Pin Flat Ribbon to 51 Pin Jig converter Jig in any slot and connect to JA on the card.
   d. Connect +15VDC on JA25 and JA1
   e. Connect –15VDC on JA37
   f. Connect GND on JA31

5. PROCEDURE: – Goto page 11.

   a. Power up ±15 VDC
   b. Measure +5VDC on C76
   C. **SCR FIRING CIRCUITS:**

TEST INSTRUCTIONS

Location: Book or file File

Device Name Reversing Armature Interface Card
Device Number 0621L0461 G002
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i. Measure 0Ω between 115VA, J115V-1, J115V-3, J115V-5, J115V-7, J115V-9
ii. Measure 0Ω between 115VB, J115V-2, J115V-4, J115V-6, J115V-8, J115V-10
iii. Apply 115V to 115VA and 115VB
iv. Measure ≈26VDC across the positive and negative of the bridge rectifier for each circuit.
v. Measure ≈8.2VDC across the zener for each circuit
vi. Load each circuit one at a time and pull the corresponding JA pin to GND.
vii. Observe that the LED for that circuit is on.
viii. Measure ≈1.6VDC across the gate and cathode of the SCR.
ix. Measure ≈12VDC across the positive and negative of the bridge rectifier for each circuit.
x. Measure ≈6.5VDC across the zener for each circuit
xi. Disconnect AC at 115A and 115B before proceeding to next step.

Circuit	I/P	AC I/P	G	K	ZA	XFMR	LED
P1F	JA2	J115V-1/J115V-2	1	2	Z1	T1	LED1
N1F	JA 4	J115V-1/J115V-2	1	2	Z3	T3	LED3
P2F	JA 6	J115V-1/J115V-2	1	2	Z5	T5	LED5
N2F	JA 8	J115V-1/J115V-2	1	2	Z7	T7	LED7
P3F	JA10	J115V-1/J115V-2	1	2	Z9	T8	LED9
N3F	JA12	J115V-1/J115V-2	1	2	Z11	T11	LED11
P1R	JA14	J115V-1/J115V-2	1	2	Z4	T4	LED4
N1R	JA16	J115V-1/J115V-2	1	2	Z2	T2	LED2
P2R	JA18	J115V-1/J115V-2	1	2	Z8	T8	LED8
N2R	JA20	J115V-1/J115V-2	1	2	Z6	T6	LED6
P3R	JA22	J115V-1/J115V-2	1	2	Z12	T12	LED12
N3R	JA24	J115V-1/J115V-2	1	2	Z10	T10	LED10

Goto page 11 - Section 5
+ page 12

Goto page 12 Step D

d. **CONDUCTION STATE SENSORS:**

i. Using the DMM, measure the comparator thresholds by measuring across C80 and C81 should read +0.54 and -0.54 respectively +/- 2%. Monitor the outputs as stated with respect to COM, with the following inputs as according to this chart. NOTE: Output Values are +/-5% and jumpers are removed.

INPUT VOLTAGE POINTS			INPUT VOLTAGE		OUPUT VOLTAGE		SENSOR
High	***Med***	***Low***	***STATE1***	***STATE2***	***STATE1***	***STATE2***	***TP***
CP49			0V	61.18-67.62V	5V	-0.61V	1,2,3
	CP50		0V	41.8-46.2V	5V	-0.61V	1,2,3
		CP51	0V	25.65-28.35V	5V	-0.61V	1,2,3
CP52			0V	61.18-67.62V	5V	-0.61V	1,4
	CP53		0V	41.8-46.2V	5V	-0.61V	1,4
		CP54	0V	25.65-28.35V	5V	-0.61V	1,4
CP55			0V	61.18-67.62V	5V	-0.61V	2,5
	CP56		0V	41.8-46.2V	5V	-0.61V	2,5
		CP57	0V	25.65-28.35V	5V	-0.61V	2,5
CP58			0V	61.18-67.62V	5V	-0.61V	3,6
	CP59		0V	41.8-46.2V	5V	-0.61V	3,6
		CP60	0V	25.65-28.35V	5V	-0.61V	3,6
CP61			0V	61.18-67.62V	5V	-0.61V	4,5,6
	CP62		0V	41.8-46.2V	5V	-0.61V	4,5,6
		CP63	0V	25.65-28.35V	5V	-0.61V	4,5,6

e. **MOTOR VOLTAGE FEEDBACK:**

i. Apply +50.00VDC to CP66, with Digital multimeter, read U8 pin 1, should read -.984 VDC +/- 2%. Install the 20kΩ resistor between SC5 and SC6 and again apply +50.00VDC to CP66, measure JA41 with digital multimeter, and observe +1.968VDC +/-2%. Measure the same voltage again at TP15, JA42 and JA49. Now apply the +50.00VDC input to CP69. Observe the same voltages as above but with the opposite polarity except for TP15 and JA42. The voltage at TP15 and JA42 should always be positive because of the absolute value circuit.

f. **BRIDGE VOLTAGE FEEDBACK:**

i. Apply +50.00VDC to CP51 and COM to CP63. Observe -.984 VDC on U12 pin7 with digital multimeter. Install the 20kΩ resistor between SC1 and SC2 and again apply the +50.00VDC to CP51 as before. Observe +1.968VDC +/- 2% at the following points: SC2, TP14, JA40 and CP92. Now move the +50.00VDC to CP63 and COM to CP51 and observe the same as above but with opposite polarity.

g. **LINE VOLTAGE FEEDBACK:**

i. Attach 3θ 115VAC to circuit card as follows: Line 1 to CP54, Line 2 to CP57 and Line 3 to CP60. Apply power and observe that NL1 and NL2 are illuminated. Observe TP8 and TP9 with oscilloscope and observe the following waveform (FIGURE 1). TP9 may be slightly higher; both have the same amplitude of approximately 6.8Vp-p to 6.9Vp-p. Also observe the same waveforms on JA45 and JA46.

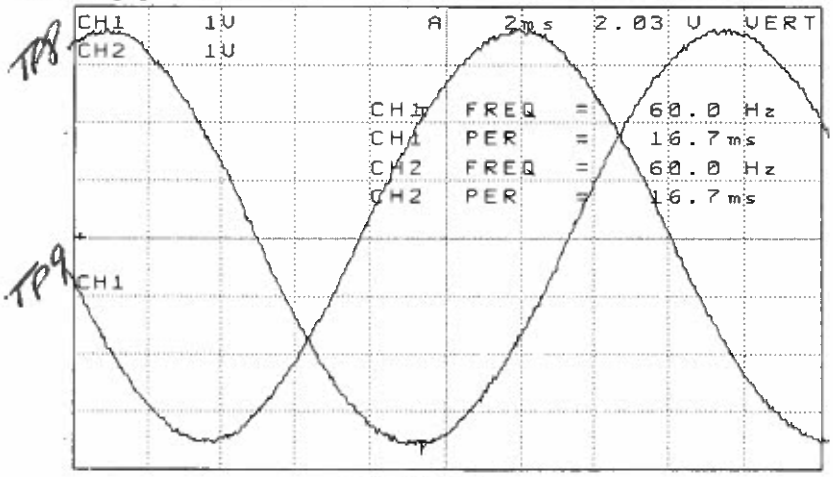

Figure 1.

H. CONDUCTION STATE SENSORS PART II:

i. With 3θ still connected apply power and observe TP1 with channel 1 and TP2 with channel 2 of the oscilloscope and observe the waveforms in FIGURE 2. The waveform present on TP1 will also be on TP4 and the waveform on TP2 will also be on TP5. Now move Channel 2 from TP2 and place on TP3, observe the waveforms of FIGURE 3. The waveform present on TP3 will also be present on TP6.

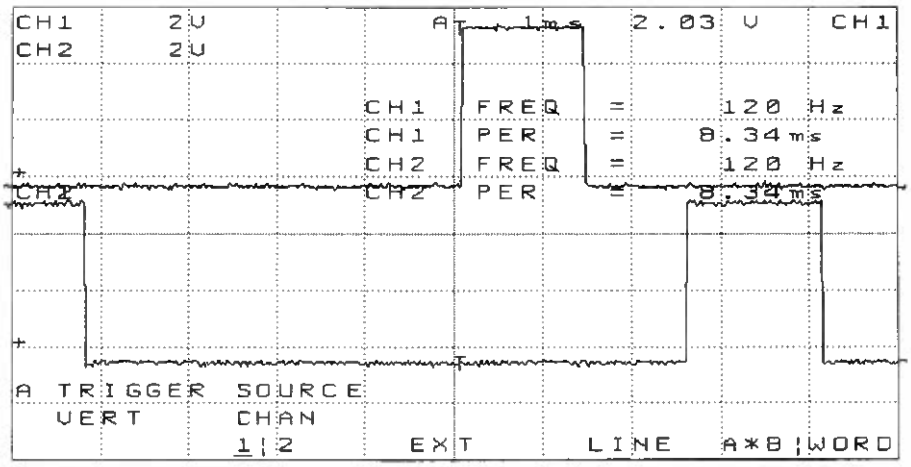

Figure 2.

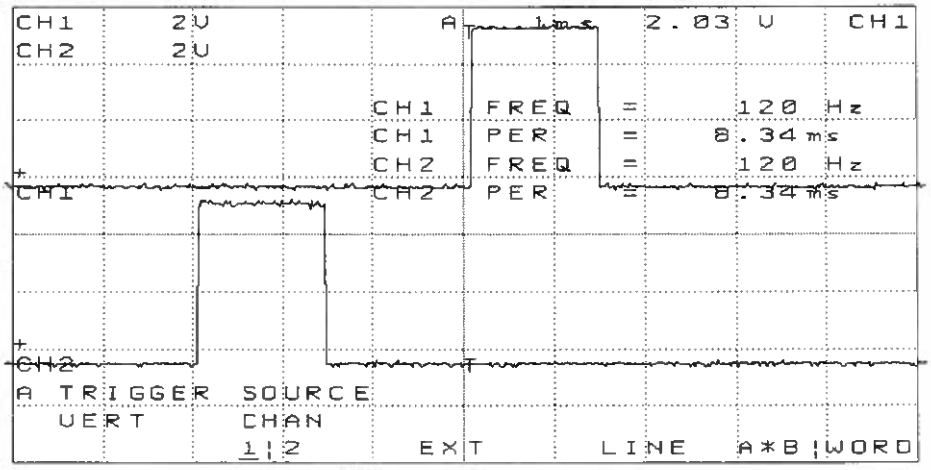

Figure 3.

i. **PHASE LOCKED LOOP INPUT FILTER:**

i. With 3 phase still connected apply power and observe TP12 with channel 1, TP13 with channel 2 and observe the waveforms in FIGURE 4. The square wave on TP13 should be from -0.6 VDC and +5.0VDC, this waveform will also be present on JA38.

See note page 12 - Step I

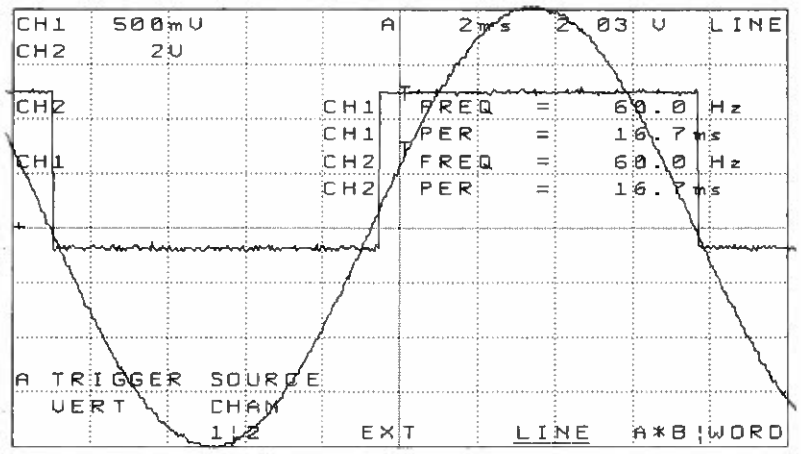

Figure 4.

j. **SPARE METER DRIVER:**

i. Using the Diode Test function on the digital multimeter, observe 0.740 when forward biased and infinity when reverse biased across Z13 and Z14. Check for continuity between CP89 and SC11; CP90 and SC12; and CP91 and COM.

k. **TEMPERATURE SENSORS:**

i. Using the 1kΩ resistors connect one resistor between JTEMPS1 and JTEMPS2, one resistor between JTEMPS3 and JTEMPS4, and one resistor between JTEMPS5 and JTEMPS6 make sure none of the leads are touching one another. Observe TP7 with digital multimeter, should read +1.9VDC +/- 5%. Attach JTEMPS2, with resistor still connected to +5VDC and TP7 should go to +5VDC as well. Repeat this for JTEMPS4 and then JTEMPS6 with the same results.

See note page 12 Step K.

l. **MOTOR CURRENT FEEDBACK:**

I. With CP76 jumpered to CP77 (COM), observe that CP88, TP11, JA47 and JA48 are at 0VDC with digital multimeter. Remove jumper and apply 10VACp-p (3.5VAC on DVM) to CP76 with respect to COM with variac and isolation transformer. Observe JA47 and CP88 with oscilloscope, should see the input waveform on these points. Observe JA48 and TP11 with oscilloscope, should see a 5Vp, fully rectified waveform. Replace factory jumper CP76 - CP77 after test.

m. **BRIDGE CURRENT FEEDBACK:**

i. Connect variac to isolation transformer and set so that the secondary of the isolation transformer is 35V P-P (12.36VAC on DVM). Connect the secondary leads to JACCT1 and JACCT2. Install the 200Ω, 5W resistor between SC7 and SC8. Apply power and observe 15V peak full wave rectification at SC7 and observe squared off rectification at TP16 with channel 1 and channel 2 respectively of oscilloscope (see FIGURE 5.). Observe TP16 waveform at CP93, now touch JA50 to COM and observe that the waveform at CP93 inverts. Repeat the above for the secondary leads connected to JACCT3 & JACCT4 and then again for JACCT5 & JACCT6. Check for continuity between CP80 & SC10 and CP81 & COM.

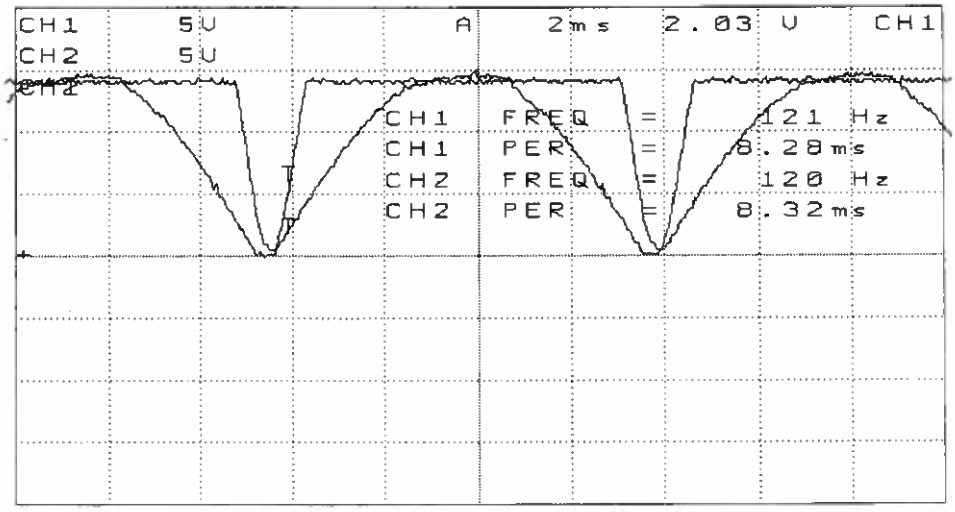

Figure 5.

6. UPGRADES:

   a. Rev0 to Rev1
      a. Add a jumper from CP90 to CP95.

   b. Rev1 to Rev2
      a. Replace R260 to R265 with 0177A1504P083. **(Do not do will change again).**

   c. Rev2 to Rev3
      a. Add 0177A1127P037 for TP17 and TP18. qty change from 59 to 61.
      b. Add 0177A1235P002 R282.

   d. Rev3 to Rev4
      a. Change R80-R91 to 0177A1001P049
      b. Change C62 to 0177A1283P009(0.01μF 50V).
      c. Change R145 to 0177A1460P385(475kΩ±1% 1/8W).
      d. Remount C62 at U4-pin4 (Acom) to C62 mounting hole at U4-pin6. **(Do not do will change again).**

   e. Rev4 to Rev5
      a. Add 0186B6379DLP002 insulator.
      b. Add 0186B6379DLP001 metal shield.
      c. Remount C62-pin1 to U4-pin6, and C62-pin2 to R34-pin2 (Acom).

   f. G1 Rev5 to G2 Rev0
      a. Remove R260 to R265.
      b. Remount per 0233B3975
      c. Using 0293A1816P001
      d. Change R260 to ~~R264~~ R265 to 0177A1504P053.

7. END.

Amended sections of tests for **0621L0461G002.** 7/9/2012

Section 5, Page 4, Entire Sheet

1.) Measure short between the following points 115VA, J115V-1, J115-3, J115-5, J115-7, J115-9
2.) Measure short between the following points 115VB, J115V-2, J115-4, J115-6, J115-8, J115-10
3.) Apply 115VAC to 115VA and 115VB
4.) Connect 2 pos. connector with 100 ohm load to P1F
5.) Connect JA2 to Com
6.) Verify LED1 is illuminated
7.) Verify 12VDC across load
8.) Remove connection at JA2
9.) Move load to N1F
10.) Connect JA4 to Com
11.) Verify LED3 is illuminated
12.) Verify 12VDC across load
13.) Remove connection at JA4
14.) Move load to P2F
15.) Connect JA6 to Com
16.) Verify LED5 is illuminated
17.) Verify 12VDC across load
18.) Remove connection at JA6
19.) Move load to N2F
20.) Connect JA8 to Com
21.) Verify LED7 is illuminated
22.) Verify 12VDC across load
23.) Remove connection at JA8
24.) Move load to P3F
25.) Connect JA10 to Com
26.) Verify LED9 is illuminated
27.) Verify 12VDC across load
28.) Remove connection at JA10
29.) Move load to N3F
30.) Connect JA12 to Com
31.) Verify LED11 is illuminated
32.) Verify 12VDC across load
33.) Remove connection at JA12
34.) Move load to P1R
35.) Connect JA14 to Com
36.) Verify LED4 is illuminated
37.) Verify 12VDC across load
38.) Remove connection at JA14
39.) Move load to N1R
40.) Connect JA16 to Com
41.) Verify LED2 is illuminated
42.) Verify 12VDC across load
43.) Remove connection at JA16
44.) Move load to P2R
45.) Connect JA18 to Com
46.) Verify LED8 is illuminated
47.) Verify 12VDC across load
48.) Remove connection at JA18
49.) Move load to N2R
50.) Connect JA20 to Com

51.) Verify LED6 is illuminated
52.) Verify 12VDC across load
53.) Remove connection at JA18
54.) Move load to P3R
55.) Connect JA22 to Com
56.) Verify LED12 is illuminated
57.) Verify 12VDC across load
58.) Remove connection at JA22
59.) Move load to N3R
60.) Connect JA24 to Com
61.) Verify LED10 is illuminated
62.) Verify 12VDC across load
63.) Remove connection at JA24
64.) Remove Load

Section 5, Page 5, Step D: Test as follows

1.) Measure across C80 and C81 for .54VDC and -.54VDC +/-2%
2.) Measure TP1, TP2, and TP3 for 5VDC
3.) Apply 67VDC to CP49 with respect to COM
4.) Verify CP50 = 41.8VDC to 46.2VDC
5.) Verify CP51 = 25.65VDC to 28.35VDC
6.) Verify TP1, TP2 and TP3 = -0.061VDC
7.) Remove voltage from CP49
8.) Verify TP1, TP2, and TP3 = 5VDC
9.) Apply 67VDC to CP52 with respect to COM
10.) Verify CP53 = 41.8VDC to 46.2VDC
11.) Verify CP54 = 25.65VDC to 28.35VDC
12.) Verify TP1 and TP4 = -0.061VDC
13.) Remove voltage from CP52
14.) Verify TP1 and TP4 = 5VDC
15.) Apply 67VDC to CP55 with respect to COM
16.) Verify CP56 = 41.8VDC to 46.2VDC
17.) Verify CP57 = 25.65VDC to 28.35VDC
18.) Verify TP2 and TP5 = -0.061VDC
19.) Remove voltage from CP55
20.) Verify TP2 and TP5 = 5VDC
21.) Apply 67VDC to CP58 with respect to COM
22.) Verify CP59 = 41.8VDC to 46.2VDC
23.) Verify CP60 = 25.65VDC to 28.35VDC
24.) Verify TP3 and TP6 = -0.061VDC
25.) Remove voltage from CP58
26.) Verify TP3 and TP6 = 5VDC
27.) Apply 67VDC to CP61 with respect to COM
28.) Verify CP62 = 41.8VDC to 46.2VDC
29.) Verify CP63 = 25.65VDC to 28.35VDC
30.) Verify TP4, TP5 and TP6 = -0.061VDC
31.) Remove voltage from CP49
32.) Verify TP4, TP5, and TP6 = 5VDC

Section 5, Page 8, Step i: **NOTE;** be sure scope has a good ground connection

Section 5, Page 8, Step K: **NOTE;** Special connector made for this step