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Electronic Products Repair

Test Instructions for

0621L0460 G002
Device Number

SP3200 armature interface "B" non reversing
Description of Device

Originated By: Dennis Cully **Date:** June 14, 2006
Typed Name mm/dd/yy

Approved By: Lucio Carrescia **Approval Date:** June 14, 2006
Signature mm/dd/yy

TEST INSTRUCTIONS

PREVIOUS REVISION SHEET

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Device Number
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Description of Device

Originated By	**Date mm/dd/yy**	**Description of change**
Dennis Cully	June 14, 2006	Created test instructions for SP3200 armature interface "B" non reversing 0621L0460 G002
Dennis Cully	June 14, 2006	Created cover and revision sheet
Dennis Cully	June 14, 2006	Revised the document to the latest format and added the upgrade section

TEST INSTRUCTIONS

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Location: Book or file File

SP3200 armature interface "B" non reversing
0621L0460 G002
Date: June 14, 2006

1. PURPOSE:

   a. Static and dynamic test procedures for SP3200 armature interface "B" non reversing 0621L0460 G002

2. ELEMENTARY:

   a. S & C data book 1190 section 460 drawing number 0216B9831GA

3. EQUIPMENT:

   a. Digital multi meter
   b. ANATEK dual regulated power supply
   c. ±15VDC power supply
   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 (ratio not important)
   j. 115 VAC isolated (2 phases of 3 phase connected to bench is o.k.)
   k. 3 phase 115VAC
   l. 1 - semi-pack SCR or a 100 ohm, 5%, 1/2 Watt resistor for "loading
   m. 1 - 20K-okm 1%, 1/2 Watt resistor
   n. 1 - 75 ohm 5%, 5 Watt resistor
   o. 3 - 1K-ohm, 1%, 1/2 Watt resistor

4. SET UP:

   a. Identified in the procedure

5. PROCEDURE:

   a. Using digital multi meter, measure the values across R260 to R265 inclusive, value should read 20 ohms +/- 5%
   b. Using the SENCORE capacitor tester, measure across C120 to C125 inclusive, value should read .5µF +/- 10% and when leakage is measured with setting on "all other capacitors", display should read 0.00. If capacitors are questionable, heat capacitors to 50°C, and the above readings should be met
   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 to pin 25 and 1
   e. Connect -15VDC to pin 37

f. Connect COM to pin 31

g. Apply DC power and observe 5VDC at C76

h. Connect 115VAC isolated to 115VA and 115VB on the circuit card

i. Apply AC power and NL3 should illuminate

j. Looking at page 5 of the elementary, use a digital multi meter and measure 26.6 VDC ±5% between the plus and negative of each diode bridge with the corresponding leads of the multi meter. Probe ZA for each circuit (positive lead to cathode, negative lead to anode), observe 8.2 VDC ±5%

k. S.C.R. firing circuits:

   i. Load each circuit one at a time that is currently being tested (according to chart) with an actual SCR (Semi-Pack type) or a 100 ohms resistor between pin1 and 2 of the connector for that circuit (G & K respectively). Trigger this firing circuit by pulling the appropriate JA pin to COM (from chart). Observe that the LED for that circuit is lit, use a Digital Multi meter, place the positive lead on the gate and the negative lead on the cathode observe 1.58VDC ±5%. Now move the positive lead of the voltmeter to the cathode of the zener for that circuit and measure 12.7VDC ±5% (see note). Now move the negative lead of the voltmeter to the anode of the zener and observe 6.85 VDC ±5% (Note: Voltage will drop over a period of time as the circuit is left triggered, these voltages are initial values only, this is normal, the 1.5 VDC will remain constant). Repeat this for all circuits

l. Conduction state sensors:

   i. Using the digital multi meter, measure the comparator thresholds across C80 and C81 should read + .54 and -.54 respectively ±2%. Monitor the outputs as stated with respect to COM, with the following inputs as according to this chart. NOTE: Input and Output Values are ±5% and jumpers are removed

INPUT CP POINTS			INPUT VOLTAGE		OUTPUT VOLTAGE		TEST POINTS
HIGH	MED.	LOW	STATE 1	STATE 2	STATE 1	STATE 2	
49			0	63.6	5.0	-0.61	1,2 AND 3
	50		0	45.9	5.0	-0.61	1,2 AND 3
		51	0	27.6	5.0	-0.61	1,2 AND 3
52			0	63.6	5.0	-0.61	1 AND 4
	53		0	45.9	5.0	-0.61	1 AND 4
		54	0	27.6	5.0	-0.61	1 AND 4
55			0	63.6	5.0	-0.61	2 AND 5
	56		0	45.9	5.0	-0.61	2 AND 5
		57	0	27.6	5.0	-0.61	2 AND 5
58			0	63.6	5.0	-0.61	3 AND 6
	59		0	45.9	5.0	-0.61	3 AND 6
		60	0	27.6	5.0	-0.61	3 AND 6
61			0	63.6	5.0	-0.61	4 AND 6
	62		0	45.9	5.0	-0.61	4 AND 6
		63	0	27.6	5.0	-0.61	4 AND 6

m. Motor voltage feedback:

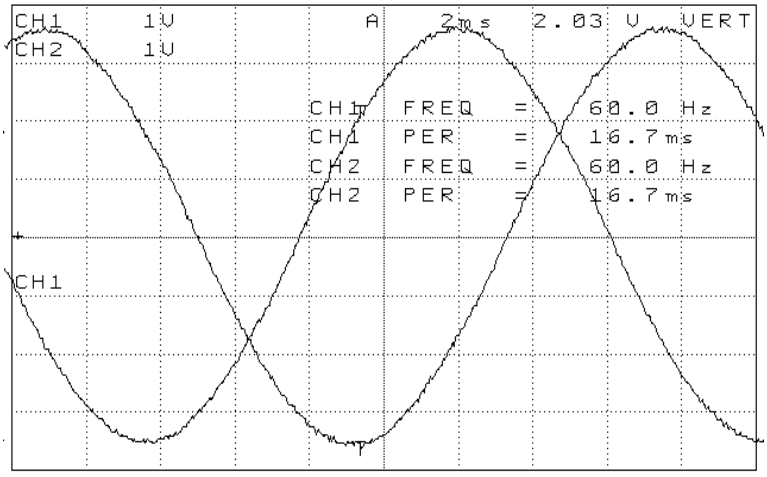
i. Apply +50.00 volts to CP66, with digital multi meter, read U8 pin 1, should read -.984 VDC ±2%. Install a 20 K-ohm resistor between SC5 and SC6 and again apply +50.00 volts to CP66, measure JA41 with digital multi meter, and observe +1.968 VDC ±2%. Measure the same voltage again at TP15, JA42 and JA49. Now apply the +50.00 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

n. Bridge voltage feedback:

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

o. Line voltage feedback:

i. Attach the 3-phase 115 VAC 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.)

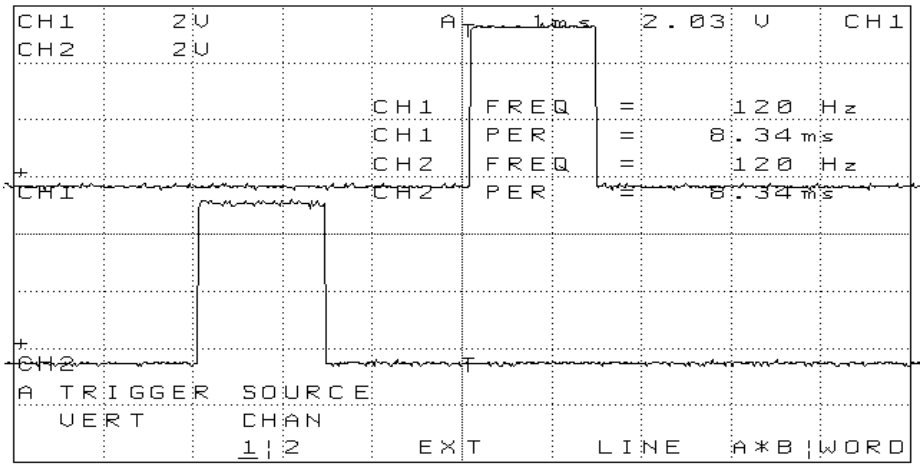


ii. Figure 1

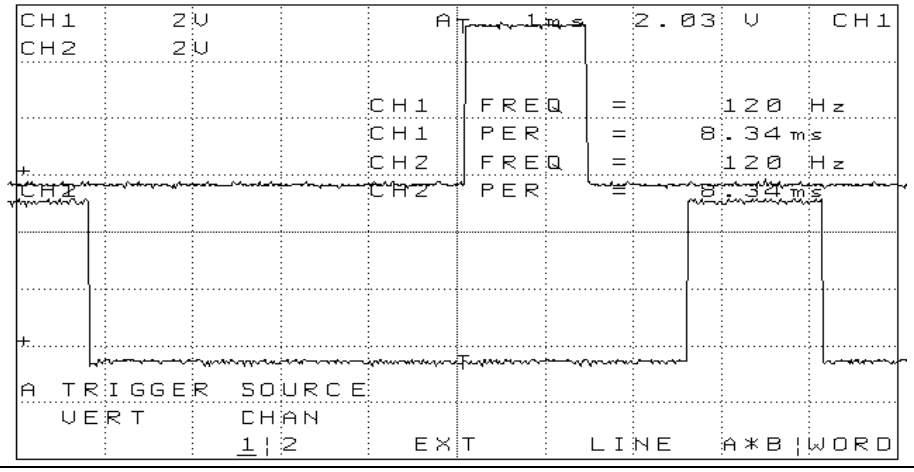
iii. TP9 may be slightly higher. Both have the same amplitude of approximately 6.8V p-p to 6.9V p-p. Also observe the same waveforms on JA45 and JA46

p. Conduction state sensors Part II:

i. With 3 phase still connected apply power and observe TP1 with channel 1 and TP2 with channel 2 of 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



ii. Figure 2



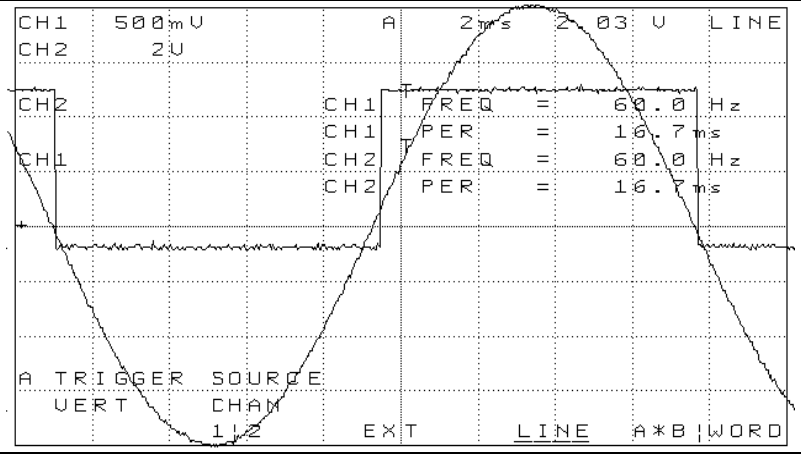
iii. Figure 3

q. 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 +5.0 VDC, this waveform will also be present on JA38

r. Spare meter driver:

i. Using the Diode Test function on the digital multi meter, observe 0.740 when forward biased and infinity when reverse biased across Z13 and Z14. Check for continuity between C89 and SC11; CP90 and SC12; and CP91 and COM



ii. Figure 4

s. Temperature sensors:

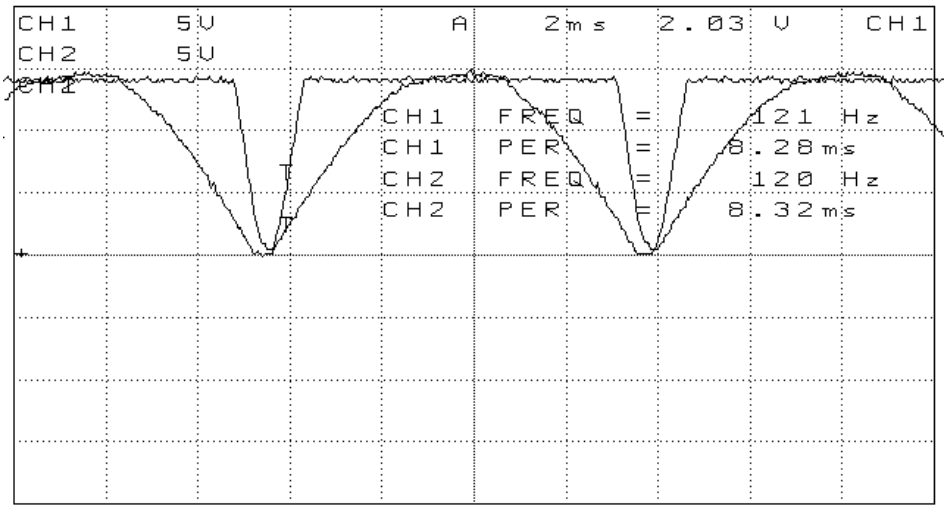
i. Using the 1 K-ohm resistors, connect one resistor between JT1 and JT2, one resistor between JT3 and JT4, and one resistor between JT5 and JT6 make sure none of the leads are touching one another. Observe TP7 with digital multi meter, should read +1.9 VDC ±5%. Attach JTEMPS2, with resistor still connected to +5 VDC and TP7 should go to +5 VDC as well. Repeat this for JTEMPS4 and then JTEMPS6 with the same results

t. Motor current feedback:

i. Jumper CP76 to CP77 (COM), observe that CP88, TP11, JA47 and JA48 are at 0 VDC with digital multi meter. Remove jumper and apply 10V p-p 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 5 V peak, fully rectified waveform. Replace factory jumper CP76 - CP77 after test

u. Bridge current feedback:

i. Connect the VARIAC to isolation transformer and set so that the secondary of the isolation transformer is 35VAC p-p (12.36VAC RMS on digital multi meter). Connect the secondary leads to JACCT1 and JACCT2. Install the 75 ohms 5 watt 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



ii. Figure 5

6. UPGRADES:

a. Rev0 to Rev1
   i. Add a jumper from CP90 to CP95
b. Rev1 to Rev2
   i. Replace R260 to R265 with 0177A1504P083. **(Do not do will change again)**
c. Rev2 to Rev3
   i. Add 0177A1127P037 for TP17 and TP18 qty change from 59 to 61
   ii. Add 0177A1235P002 R282
d. Rev3 to Rev4
   i. Change R80-R91 to 0177A1001P049
   ii. Change C62 to 0177A1283P009(0.01µF 50V)
   iii. Change R145 to 0177A1460P385(475K ±1% 1/8W)
   iv. Remount C62 at U4-pin4 (ACOM) to C62 mounting hole at U4-pin6. **(Do not do will change again)**
e. Rev4 to Rev5
   i. Add 0186B6379DLP002 insulator
   ii. Add 0186B6379DLP001 metal shield
   iii. Remount C62-pin1 to U4-pin6, and C62-pin2 to R34-pin2 (ACOM)
f. G1 Rev5 to G2 Rev0
   i. Remove R260 to R265
   ii. Remount per 0233B3975

iii. Using 0293A1816P001
iv. Change R260 to R264 to 0177A1504P053

7. END.