g GE Energy Services	**Functional Testing Specification**
Inspection and Repair Services ***Louisville,KY***	**LOU–Woodward-5421146**

Test Procedure for a Woodward Governor 5421-146-B

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Paul Kelley			Robert Dwall
DATE	**DATE**	**DATE**	**DATE**
3/16/2004			3/17/04

Functional test procedure for a 5421-146-B

1. SCOPE

1.1 This is a functional testing procedure for a Blade Driver Amplifier 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

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
4		Fluke 85 DMM (or Equivalent)
1		+ and – 30 V DC Supply
2		0 to 15 V DC Supply

6. TESTING PROCESS

6.1 Setup

6.1.1 Hook up as shown in the diagram below in Fig.1 . You can use 3 meters as the diagram shows or use 1 meter and switch the meter common to the proper point as indicated.

6.2 Testing Procedure

6.2.1 With PS1 and PS2 at 0 V apply + - 15 V power to the board.

6.2.2 With meter 1 verify +12 V on TP24.

6.2.3 With meter 1 verify – 12 V on TP10.

6.2.4 Turn R1, R3, R5, R7 fully CW.

6.2.5 Turn R9, R13, R14, R15 fully CCW.

6.2.6 With meter 1 verify 0 V on TP6.

6.2.7 Short TP6 to ground.

6.2.8 Short pin 48 (TP1) to ground.

6.2.9 With meter 1 adjust R2 to obtain 0 V on TP2.

6.2.10 Remove short from TP6.

6.2.11 With meter 1 adjust R5 for 6.13 V on TP6.

6.2.12 With meter 2 adjust R1 for 0.00 V on TP2.

6.2.13 With meter 3 verify .80 V + - .02 V across 200 ohm resistor (between pins 71 and 72).

6.2.14 Remove short on pin 48 (TP1).

6.2.15 With PS 1 input –10.00 V to pin 48 (TP1).

6.2.16 With meter 2 verify 10 V + - .1 V on TP2.

6.2.17 With meter 2 adjust R1 for 10.00 V on TP2.

6.2.18 With meter 3 verify 4 V + - .03 V across 200 ohm resistor (between pins 71 and 72).

6.2.19 Remove PS1 volts applied to pin 48 (TP1).

6.2.20 Connect pin 48 (TP1) to PS1 ground.

6.2.21 With meter 1 adjust R6 for 0.00 V on TP7.

6.2.22 Connect TP7 to PS1 ground.

6.2.23 With meter 1 adjust R4 for 0.00 V on TP5.

6.2.24 Connect TP20 and TP16 to PS1 ground.

6.2.25 Connect TP11 to TP25.

6.2.26 Adjust R11 for 0.000 V on TP25.

6.2.27 Remove TP20 and TP16 from ground.

6.2.28 Remove pin 48 (TP1) from ground.

6.2.29 With PS1 input –5.0 V to pin 48 (TP1).

6.2.30 With meter 1 adjust R3 for 3.60 V on TP5.

6.2.31 Remove TP7 from ground.

6.2.32 With meter 1 adjust R6 for 5.00 V on TP7.

6.2.33 With meter 1 verify -3.4 V on TP5.

6.2.34 With meter 4 verify +16.9 V + - .3 V on pin 21 and –16.9 V + - .3 V on pin 24.

6.2.35 Set PS2 to 1.00 V.

6.2.36 With meter 1 verify 8.23 V + - .1 V on TP15.

6.2.37 With meter 4 verify +16.9 V + - .3 V on pin 5 and –16.9 V + - .3 V on pin 8.

6.2.38 With meter 1 verify .98 V + - .02 V on TP20.

6.2.39 With meter 4 verify +16.9 V + - .3 V on pin 13 and –16.9 V + - .3 V on pin 16.

6.2.40 With meter 1 verify 8.23 V + - .1 V on TP16.

6.2.41 Remove the PS1 1.00 V applied to pins 11 (TP9), 3 (TP19) and 19 (TP3) and connect these 3 pins to ground.

6.2.42 With meter 1 adjust R10 for 0.00 V on TP12.

6.2.43 Connect TP12 to PS1 ground.

6.2.44 With meter 1 verify 0 V on TP16.

6.2.45 Connect TP16 to PS1 ground.

6.2.46 With meter 1 adjust R8 for 0.00 v on TP23.

6.2.47 Remove grounds from TP12 and TP16 from ground.

6.2.48 With meter 1 adjust R10 for 8.23 V on TP12.

6.2.49 With meter 2 adjust R7 for 0.00 V on TP23.

6.2.50 With meter 3 verify .80 V across the 200 ohm resistor (between pins 67 and 68).

6.2.51 Remove ground from pins 11 (TP9), 3 (TP19) and 19 (TP3) and connect back to PS2.

6.2.52 Set PS2 voltage (approx - .83 V) to get 10.0 V on TP23 with meter 2.

6.2.53 With meter 3 verify 4 volts across 200 ohm resistor (between pins 67 and 68).

6.2.54 Using meter 1 verify 10.13 V + - .2 V on TP25.

6.2.55 Using meter 1 verify 10.13 V + - .2 V on TP21.

6.2.56 Verify good contact closure between pins 42 and 41.

6.2.57 Connect pin 43 to PS1 ground

6.2.58 Verify good contact closure between pins 41 and 40.

6.2.59 With meter 1 verify 13.46 V + - .2 V on TP21.

6.2.60 Remove the pin 43 to ground connection.

6.2.61 With meter 1 adjust R6 for 0.00 V on TP21.

6.2.62 With meter 1 adjust R15 for 0.80 V on TP21.

6.2.63 With meter 1 adjust R14 for 1.50 V on TP21.

6.2.64 With scope 1 adjust R13 for a 4 V PtoP signal on TP26.

6.2.65 Adjust R12 for 9.0 HZ on TP26.

6.2.66 Replace the jumper between TP25 and TP11 with a 100K resistor.

6.2.67 With meter 1 adjust R6 for –6.06 volts on TP7.

6.2.68 With a scope 1 adjust R6 for a centered signal on TP21.

6.2.69 Verify the signal is approx 6 V PtoP.

6.2.70 Verify a good contact closure between pins 35 and 36.

6.2.71 Verify a good contact closure between pins 33 and 32.

6.2.72 Connect pin 37 to pin 39.

6.2.73 Verify a good contact closure between pins 35 and 34

6.2.74 Verify a good contact closure between pins 33 and the junction of C20-R37.

6.2.75 Remove the pin 37 to 39 connection.

6.2.76 With meter 1 verify + 15 V on pin 38.

6.2.77 Verify a < .5 ohm connection between pins 29 and 27.

6.2.78 Verify a < .5 ohm connection between pins 27 and 44, 46, 52, 61, 62, 63, 64.

6.2.79 Verify a < .5 ohm connection between pins 17 and 18.

6.2.80 Verify a < .5 ohm connection between pins 69 and 70.

6.2.81 Verify a < .5 ohm connection between pins 55 and 56.

6.2.82 Verify a < .5 ohm connection between pins 1 and 2.

6.2.83 Verify a < .5 ohm connection between pins 9 and 10.

6.2.84 Verify a < .5 ohm connection between pins 30 and 31.

6.2.85 Verify a < .5 ohm connection between pins 65 and 66.

6.2.86 With meter 1 verify + 15 V on pin 45, 55, 56.

6.2.87 With meter 1 verify + 12 V on pin 47.

6.2.88 With meter 1 verify – 12 V on pin 49.

6.2.89 With meter 1 verify – 15 V on pin 50.

6.3 ****TEST COMPLETE ****

7. Drawings:

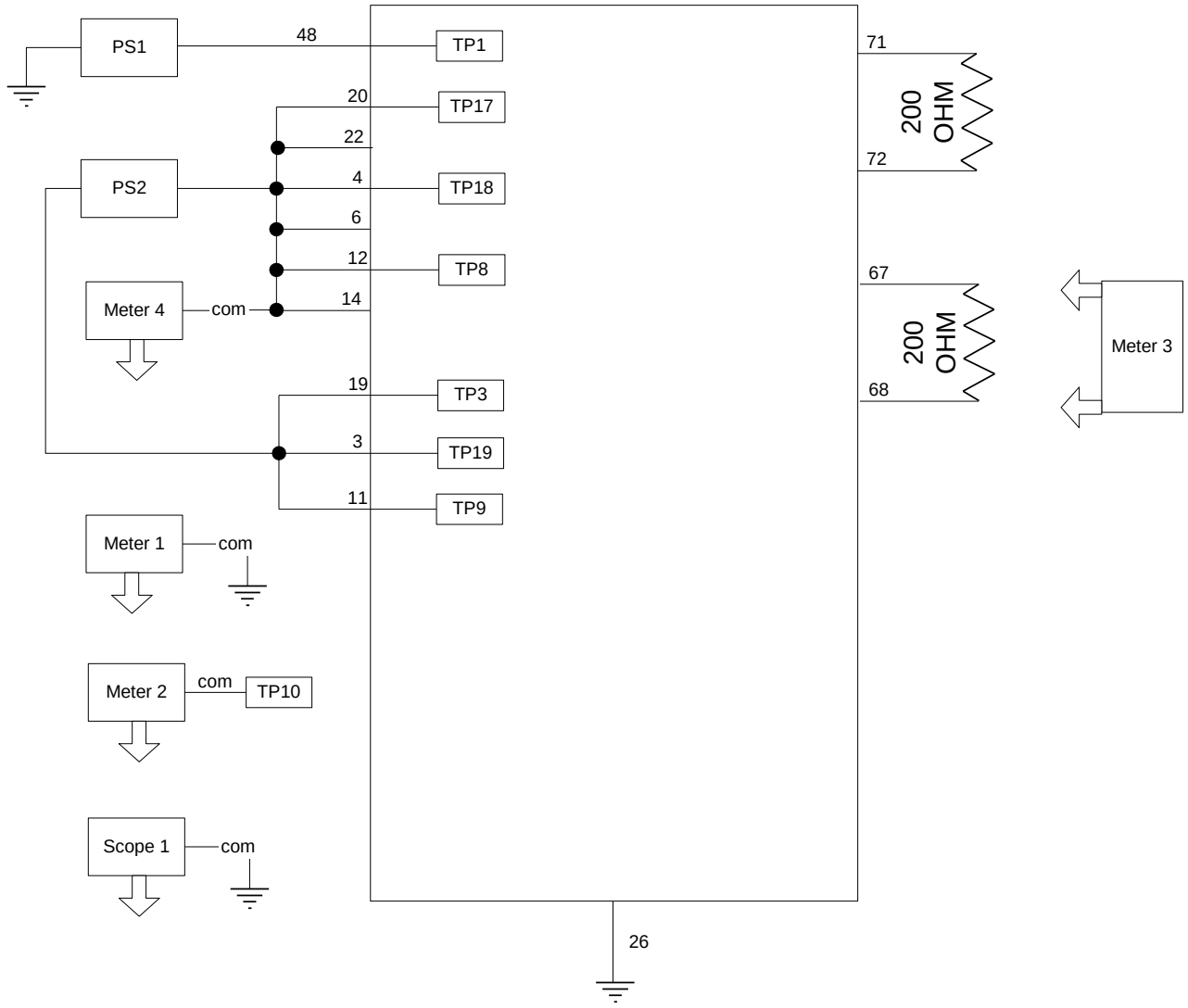

Fig. 1