



GE Power Generation Engineering

Materials and Processes Engineering
Schenectady, NY 12345

PROCESS SPECIFICATION

P3K-AL-0376-A01

TEST INSTRUCTIONS FOR MOTOR POSITION INDICATOR CIRCUIT BOARD

DOCUMENT REVISION STATUS: DETERMINED BY THE LAST ENTRY IN THE "REV" AND "DATE" COLUMN

REV.	AN NO.	DESCRIPTION	SIGNATURE	REV. DATE
A	YA00096	SPECIFICATION LISTED IN STEAM TURBINE/GENERATOR INDEX AS "INACTIVE" HAS BEEN FORMALLY REVISED AS "INACTIVE FOR NEW DESIGN". (PR BUDKA)	C.R. Trippi	DEC 02 1991
<div>INACTIVE FOR NEW DESIGN AS OF 12/02/91</div>				

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PREPARED BY: P.R. BUDKA

ORIG. ISSUE DATE: --

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REVISIONS

I. CIRCUIT DESCRIPTION

This circuit board provides an electrical signal for turbine control panel indication of the position of up to four motor drives positioning Load Control Unit potentiometers.

The board contains four MPI Circuits; each MPI Circuit derives its position signal from a 2 kilohm potentiometer mounted in tandem with the functional potentiometers on the LCU motor drives. A fixed reference supply voltage is provided by the circuit board to this potentiometer. The range of the potentiometer slider voltage is 0 to about -10 volts. The potentiometer spans 340° of which the first 25° and the last 25° lie beyond the electrical limits of the motor drive position. Thus the useful range of the potentiometer slider voltage is from about -.8 volts to about -9.3 volts. This input signal is summed with an opposing adjustable bias to establish a signal voltage proportional to the motor drive position. This opposing bias is the zero adjust.

The summing operation is accomplished with an operational amplifier connected as a unity gain amplifier. This provides an adjustable signal for a turbine control panel indicating meter.

II. CIRCUIT SPECIFICATIONS

A. Power Supply Requirements:

1. Power Supply 1: (Pin 37): +22.000 ± 0.002 VDC at 30 MA(Approx).
2. Power Supply 2: (Pin 41): -22.000 ± 0.002 VDC at 60 MA (approx).

B. Operating Signal Levels:

1. Input 1 (Pin 11): 0 to -10V (Approx.)
(controlled by 2K Ohms pot connected between pins 10 and 12).
2. Input 2 (Pin 15): 0 to -10V (Approx.)
(controlled by 2K Ohms pot connected between pins 16 and 14).
3. Input 3 (Pin 19): 0 to -10V (Approx.)
(controlled by 2K Ohms pot connected between pins 20 and 18).
4. Input 4 (Pin 23): 0 to -10V (Approx.)
(connected between pins 24 and 22).

C. Output Loads:

1. Load 1: 40 Ohms ± 1%
(Milliammeter 0 ÷ 1 ma connected between pins 35 and 36)

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TEST INSTRUCTIONS FOR MOTOR POSITION
INDICATOR CIRCUIT BOARD 1L1-K001
(ASS'Y DRAWING 115D2236 G-1)
FIRST MADE FOR EHC MARK II

REVISIONS

II. CIRCUIT SPECIFICATIONS (continued)

C. Output Loads: (continued)

2. Load 2: 40 Ohms \pm 1%
(Milliammeter 0 \div 1 ma connected between pins 33 and 34)
3. Load 3: 40 Ohms \pm 1%
(Milliammeter 0 \div 1 ma connected between pins 31 and 32)
4. Load 4: 40 Ohms \pm 1%
(Milliammeter 0 \div 1 ma connected between pins 29 and 30)

D. Individual Stage Performance Specifications

1. Power Supply (CR1, 2, 3, & 4):

- a. TP1: $+15.7 \pm 1.0$ VDC
- b. TP2: -15.7 ± 1.0 VDC

2. Meter Amplifier 1 (IC1):

- a. Acceptable Offset at TP15
(Zero input): ± 30 mV
- b. Transfer Function for Input Signal (R4, R8):
 $\frac{TP15}{TP3} = -G1$

Where Gain (G1) = 1.000 ± 0.020 volts/volt

- c. Transfer Function for Bias (R6, R8):
 $\frac{TP15}{TP7} = -G2$

Where Gain (G2) = 1.000 ± 0.020 volts/volt

- d. Saturation Limits (TP15): ± 12 VDC (minimum)

3. Meter Amplifier 2 (IC2):

- a. Acceptable Offset at TP14
(zero input): ± 30 mV
- b. Transfer Function for Input Signal
(R10, R14):
 $\frac{TP14}{TP4} = -G3$

Where Gain (G3) = 1.000 ± 0.020 volts/volt

- c. Transfer Function for Bias (R12, R14):
 $\frac{TP14}{TP8} = -G4$

Where Gain (G4) = 1.000 ± 0.020 volts/volt

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DIV OR DEPT.

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II. CIRCUIT SPECIFICATIONS (continued)

3. Meter Amplifier 2 (IC2) (continued)

d. Saturation Limits (TP14): ± 12 VDC (minimum)

4. Meter Amplifier 3 (IC3):

a. Acceptable offset at TP13 (zero input): ± 30 mV

b. Transfer Function for Input Signal (R16, R20):

$$\frac{TP13}{TP5} = -G5$$

Where Gain (G5) = 1.000 ± 0.020 volts/volt

c. Transfer Function for Bias (R18, R20):

$$\frac{TP13}{TP9} = -G6$$

Where Gain (G6) = 1.000 ± 0.020 volts/volt

d. Saturation Limits (TP13): ± 12 VDC (minimum)

5. Meter Amplifier 4 (IC4):

a. Acceptable Offset at TP12
(zero input): ± 30 mV

b. Transfer Function for Input Signal (R22, R26):

$$\frac{TP12}{TP6} = -G7$$

Where Gain (G7) = 1.000 ± 0.020 volts/volt

c. Transfer Function for Bias (R24, R26):

$$\frac{TP12}{TP10} = -G8$$

Where Gain (G8) = 1.000 ± 0.020 volts/volt

e. Saturation Limits (TP12): ± 12 VDC (minimum)

6. Voltage divider network for IC1 bias (R5, R6, VR1)

<u>VR1 POSITION</u>	<u>VOLTAGE AT TP7</u>
CW	0.000 VDC
CCW	5.356 ± 0.374 VDC

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(ASS'Y DRAWING 115D2236 G-1)

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II. CIRCUIT SPECIFICATIONS (continued)

7. Voltage divider network for IC2 bias (R11, R12, VR2)

VR2 POSITIONVOLTAGE AT TP8

CW

0.000 VDC

CCW

5.356 \pm 0.374 VDC

8. Voltage Divider network for IC3 bias (R17, R18, VR3)

VR3 POSITIONVOLTAGE AT TP9

CW

0.000 VDC

CCW

5.356 \pm 0.374 VDC

9. Voltage divider network for IC4 bias (R23, R24, VR4)

VR4 POSITIONVOLTAGE AT TP10

CW

0.000 VDC

CCW

5.356 \pm 0.379 VDC

10. Voltage divider network for IC1 input signal.
-
- (2K 1% resistor connected between pins 10 and 12):
-
- Voltage at pin 10: -10.602
- \pm
- 0.110 VDC

11. Voltage divider network for IC2 input signal
-
- (2K 1% resistor connected between pins 16 and 14):
-
- Voltage at pin 16: -10.602
- \pm
- 0.110 VDC

12. Voltage divider network for IC3 input signal
-
- (2K 1% resistor connected between pins 20 and 18):
-
- Voltage at pin 20: -10.602
- \pm
- 0.110 VDC

13. Voltage divider network for IC4 input signal
-
- (2K 1% resistor connected between pins 24 and 22):
-
- Voltage at Pin 24: -10.602
- \pm
- 0.110 VDC

14. Range adjustment pot for IC1 output (VR8):

VR8 POSITIONRESISTANCE BETWEEN TP15-PIN35

CW

1 Ohm (maximum)

CCW

20K Ohms \pm 10%

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D.Mone Feb. 9, 1977

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TEST INSTRUCTIONS FOR MOTOR POSITION
INDICATOR CIRCUIT BOARD 1L1-K001
(ASS'Y DRAWING 115D2236 G-1)
FIRST MADE FOR ENG-MARK II

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II. CIRCUIT SPECIFICATIONS (continued)

15. Range adjustment pot for IC2 output (VR7):

VR7 POSITION

RESISTANCE BETWEEN TP14-PIN33

CW
CCW

1 Ohm (maximum)
20K Ohms $\pm 10\%$

16. Range adjustment pot for IC3 output (VR6):

VR6 POSITION

RESISTANCE BETWEEN TP13-PIN31

CW
CCW

1 Ohm (maximum)
20K Ohms $\pm 10\%$

17. Range adjustment pot for IC4 output (VR5):

VR5 POSITION

RESISTANCE BETWEEN TP12-PIN29

CW
CCW

1 Ohm (maximum)
20K Ohms $\pm 10\%$

III. SETPOINTS

A. Zero Adjustments:

Potentiometers VR1, VR2, VR3, and VR4 should be set fully CCW. (During line-up they are used to adjust the meters to full scale deflection when the LCU motor drives are in their minimum position).

B. Range Adjustment Potentiometers

Potentiometers VR8, 7, 6, and 5 shall be set fully CCW. (During line-up they are used to adjust the meters to full scale deflection when the LCU motor drives are in their maximum position).

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 INDICATOR CIRCUIT BOARD 1L1-K001
 (ASS'Y DRAWING 115D2236 G-1)
 FIRST MADE FOR EHC MARK II

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REVISIONS

PREPARED BY

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DATE

8/14/73

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APPROVED BY

P.C. Callan

DATE

2-7-77

P.C. Callan - MANAGER
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TEST PROCEDURE
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DATE

11/27/73

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