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. Trupp	DEC 0 2 1991

INACTIVE FOR NEW DESIGN

AS OF 12/02/91

PREPARED BY: P.R. BUDKA

ORIG. ISSUE DATE: --

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%
(Miliammeter 0 ÷ 1 ma connected between pins 35 and 36)

273-5
273-314
273-2
273-12
273-138
273-221
273-227
273-71

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II. CIRCUIT SPECIFICATIONS (continued)

C. Output Loads: (continued)

2. Load 2: 40 Ohms ± 1%
(Miliammeter 0 ÷ 1 ma connected between pins 33 and 34)

3. Load 3: 40 Ohms ± 1%
(Miliammeter 0 ÷ 1 ma connected between pins 31 and 32)

4. Load 4: 40 Ohms ± 1%
(Miliammeter 0 ÷ 1 ma connected between pins 29 and 30)

D. Individual Stage Performance Specifications

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

a. TP1: +15.7 ± 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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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)

VR1 POSITION	VOLTAGE AT TP7
CW	0.000 VDC
CCW	5.356 ± 0.374 VDC

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II. CIRCUIT SPECIFICATIONS (continued)

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

VR2 POSITION	VOLTAGE AT TP8
CW	0.000 VDC
CCW	5.356 ± 0.374 VDC

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

VR3 POSITION	VOLTAGE AT TP9
CW	0.000 VDC
CCW	5.356 ± 0.374 VDC

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

VR4 POSITION	VOLTAGE AT TP10
CW	0.000 VDC
CCW	5.356 ± 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 ± 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 ± 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 ± 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 ± 0.110 VDC

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

VR8 POSITION	RESISTANCE BETWEEN TP15-PIN35
CW	1 Ohm (maximum)
CCW	20K Ohms ± 10%

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II. CIRCUIT SPECIFICATIONS (continued)

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

VR7 POSITION	RESISTANCE BETWEEN TP14-PIN33
CW	1 Ohm (maximum)
CCW	20K Ohms ±10%

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

VR6 POSITION	RESISTANCE BETWEEN TP13-PIN31
CW	1 Ohm (maximum)
CCW	20K Ohms ±10%

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

VR5 POSITION	RESISTANCE BETWEEN TP12-PIN29
CW	1 Ohm (maximum)
CCW	20K Ohms ±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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REVISIONS

PREPARED BY D. Economou DATE 8/14/73

D. Economou
EHC DESIGN ENGINEERING

APPROVED BY P C Callan DATE 2-7-77

P.C. Callan - MANAGER
EHC DESIGN ENGINEERING

TEST PROCEDURE REVIEWED BY C R Bugg DATE 11/27/73

C. Bugg
EHC TEST ENGINEER

PRINTS TO

MADE BY D.Mone Feb. 9, 1977

ISSUED FEB 10 1977

APPROVALS

Steam Turbine DIV OR DEPT.

Schenectady, N.Y. LOCATION

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