GE Power Generation Engineering

Materials and Processes Engineering
Schenectady, NY 12345

PROCESS SPECIFICATION

P3K-AL-0598-A01

TEST INSTRUCTIONS FOR CONTROL VALVE POSITION CONTROL 1F1-B4 CIRCUIT BOARD ASSEMBLY 142D7274 G1

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: --

DT-3C

TITLE
TEST INSTRUCTIONS FOR CONTROL VALVE POSITION CONTROL
1F1-B4 CIRCUIT BOARD ASSEMBLY 142D7274 G1

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A. BOARD CONTENTS

1. 2 each regulated power supplies.
2. Feedback amplifier (IC1)
3. Summing amplifier (IC2)
4. Meter amplifier (IC3)

B. POWER SUPPLIES

1. V_{TP1} = 15.7 ± 1 VDC
2. V_{TP2} = -15.7 ± 1 VDC
3. I Pin 37 = 63 ± 15 ma DC
4. I Pin 41 = 62 ± 15 ma DC

C. FEEDBACK AMPLIFIER (IC1)

With TP6 grounded, assure that VR56 runs VTP5 thru zero.

-7.98 < VTP5/VTP6 < -6.59 (VR8 CW)

-1.24 < VTP5/VTP6 < -1.18 (VR8 CCW)

D. METER AMPLIFIER (IC3)

1. V_{TP53} = -22 VDC, (VR10 CW)

   -6.85 < V_{TP53} < -5.8 VDC (VR10 CCW)

2. Attach milliammeter from pin 24 to ground.
   Ground TP5 and null IC3.
   Insure that VR50 runs V_{TP4} through zero.

3. V_{TP4}/V_{TP5} = 1.00 ($-10 \leq V_{TP5} \leq 0$ VDC)

4. Apply -10 VDC to TP5. THEN:

   1.5 < I_{meter} < 1.6 ma DC (VR5 CW)

   0.82< I_{meter} <0.92 ma DC (VR5 CCW)

273-5
273-314
~~273-2~~
273-12
273-71
273-13
~~273-22~~
~~273-22~~

PRINTS TO

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E. SUMMING AMPLIFIER (IC2) - STEADY STATE

1. Voltage Ranges

a. V_{TP60} = 0 VDC, (VR4 CCW)

$-6.0 < V_{TP60} < -5.0$ VDC, (VR4 CW)

b. V_{TP55} = 0 VDC, (VR7 CCW)
$-14.1 < V_{TP55} < -12.0$ VDC, (VR7 CW) } (VR53 CCW)

c. $4.7 < V_{TP61} < 4.9$ VDC, (VR1 CCW)
$17.2 < V_{TP61} < 17.8$ VDC, (VR1 CW) } (VR2 CW)

d. V_{TP64} = 0 VDC, (VR3 CCW)

$-14.1 < V_{TP64} < -12.0$ VDC, (VR3 CCW) (VR54 CW)

2. Null

Ground TP61, TP62, TP67, TP56, TP66, TP63
Assure that VR55 drives V_{TP3} thru zero.

3. Amplifier Gains

a. - VR1 CW
- VR7 CCW
- TP7, TP54, TP5, TP65 grounded
- TP57-TP52 shorted
- TP58-TP59 shorted

THEN:

$-1.05 < V_{TP3}/V_{TP61} < -1.00$ (VR2 CW)
$-1.01 < V_{TP3}/V_{TP61} < 0.96$ (VR2 CCW) } ($V_{TP61} \approx +1.0$ VDC)

b. - TP7, TP54, TP61, TP65 grounded
- TP58-TP59 shorted

THEN:

$-1.02 < V_{TP3}/V_{TP56} < -0.98$ (VR6 CCW)
($0 < V_{TP56} < 1.5$ VDC)

PRINTS TO

E. SUMMING AMPLIFIER (IC2) - STEADY STATE (Continued)

2. (continued)

b. $-23.3 < V_{TP3}/V_{TP56} < -18.8$ (VR6 CW)
($0 < V_{TP56} < 0.3$ VDC)

c. Series Gains

- TP57 - TP52 shorted
- TP66, TP63, TP61 grounded
- Set $-10 < V_{TP55} < 0$ VDC
- Apply necessary $V_{TP56} > 0$ to keep amplifier from limiting

THEN when IC2 not limiting:

(1) VR51 CCW, VR53 CCW

$-2.55 < V_{TP3}/V_{TP7} < -2.44$ ($V_{TP7} > V_{TP55}$)

$-3.57 < V_{TP3}/V_{TP7} < -3.42$ ($V_{TP7} < V_{TP55}$)

(2) VR51 CCW, VR53 CW

$-2.55 < V_{TP3}/V_{TP7} < -2.44$ ($V_{TP7} > V_{TP55}$)

$-2.77 < V_{TP3}/V_{TP7} < -2.62$ ($V_{TP7} < V_{TP55}$)

(3) VR51 CW, VR53 CW

$-.055 < V_{TP3}/V_{TP7} < -.044$ ($V_{TP7} > V_{TP55}$)

$-.275 < V_{TP3}/V_{TP7} < -.227$ ($V_{TP7} < V_{TP55}$)

(4) VR51 CW, VR53 CCW

$-.055 < V_{TP3}/V_{TP7} < -.044$ ($V_{TP7} > V_{TP55}$)

$-1.08 < V_{TP3}/V_{TP7} < -1.02$ ($V_{TP7} < V_{TP55}$)

d. Feedback Gains

- TP57 - TP52 shorted
- TP7, TP54, TP61 grounded
- Apply necessary $V_{TP56} > 0$ to keep amplifier from limiting

THEN with IC2 not limiting:

E. SUMMING AMPLIFIER (IC2) - STEADY STATE (continued)

2. (continued)

d. (1) VR52 CCW, VR54 CCW

$-.1073 < V_{TP3}/V_{TP5} < -.086 \qquad (V_{TP5} > V_{TP64})$

$-.135 < V_{TP3}/V_{TP5} < -.108 \qquad (V_{TP5} < V_{TP64})$

(2) VR52 CCW, VR54 CW

$-.1073 < V_{TP3}/V_{TP5} < -.086 \qquad (V_{TP5} > V_{TP64})$

$-1.13 < V_{TP3}/V_{TP5} < -1.06 \qquad (V_{TP5} < V_{TP64})$

(3) VR52 CW, VR54 CW

$-2.55 < V_{TP3}/V_{TP5} < -2.44 \qquad (V_{TP5} > V_{TP64})$

$-3.57 < V_{TP3}/V_{TP5} < -3.42 \qquad (V_{TP5} < V_{TP64})$

(4) VR52 CW, VR54 CCW

$-2.55 < V_{TP3}/V_{TP5} < -2.44 \qquad (V_{TP5} > V_{TP64})$

$-2.57 < V_{TP3}/V_{TP5} < -2.46 \qquad (V_{TP5} < V_{TP64})$

3. Limit Circuit

a. TP58 - TP59 shorted

$V_{TP3} = \pm 2.5 \pm 0.5$ VDC (soft limit)

b. Short removed:

$V_{TP3} = 0.3 \pm 0.1$ VDC (hard limit)

4. Saturation Protection (CR10, CR11)

$|$ V Pin 2 IC2 - V Pin 3 IC2 $| \leq 0.6$ VDC

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F. SUMMING AMPLIFIER - TRANSIENT STATE

1. Feedback

VR6 CCW
TP61, TP7, TP54 grounded

a) Ground TP66 and adjust VR52 so that $V_{TP3}/V_{TP5} = -1.25$

b) Remove TP66 ground and:
Ground TP63 and adjust VR54 so that $V_{TP3}/V_{TP65} = -0.50$

THEN:

(1) With TP63 grounded:

Apply V_{TP65} = +2.5 VDC step and observe V_{TP3}.

(2) Remove TP63 ground and ground TP66

Apply V_{TP5} = +1.0 VDC step and observe V_{TP3}.

See Figure 2.

2. Series

VR6 CCW
TP61, TP5, TP65 grounded

a) Ground TP67 and adjust VR51 so that $V_{TP3}/V_{TP7} = -1.25$

b) Remove TP67 ground and:
Ground TP62 and adjust VR53 so that $V_{TP3}/V_{TP54} = -0.50$

THEN:

(1) With TP62 grounded:

Apply V_{TP54} = +2.5 VDC step and observe V_{TP3}.

(2) Remove TP62 ground and ground TP67

Apply V_{TP7} = +1.0V step and observe V_{TP3}.

See Figure 2.

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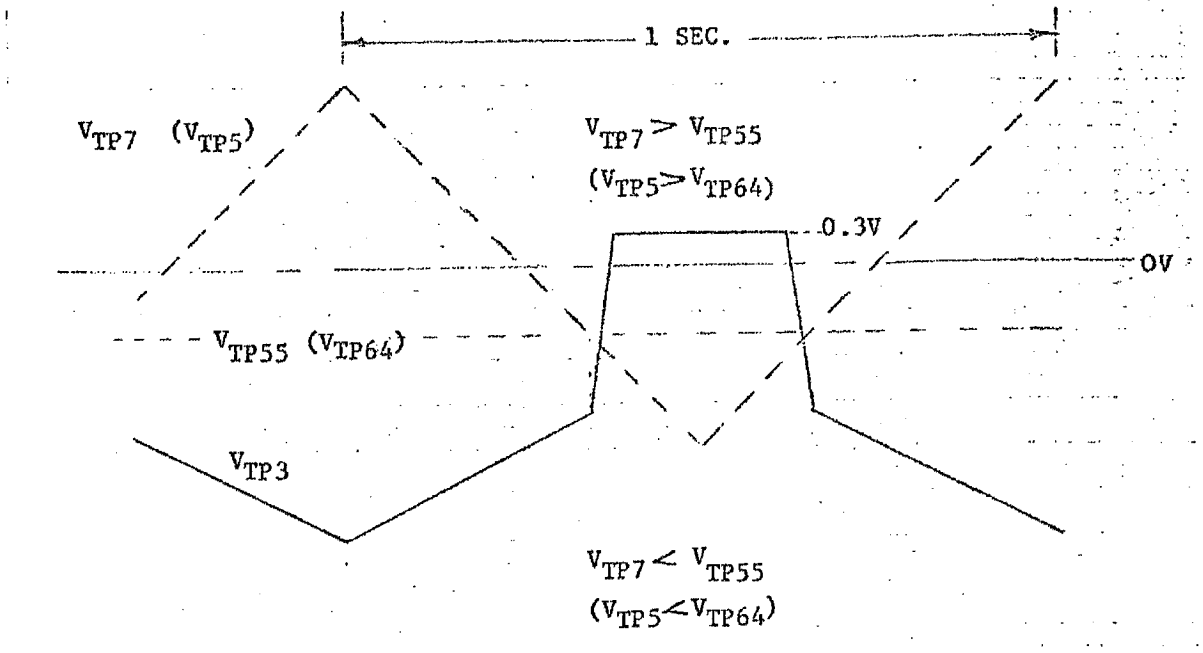

FIGURE 1: Using a 1 HZ triangle signal to check V_{TP3}/V_{TP7} (V_{TP3}/V_{TP5}) Section E.2.c. (d).

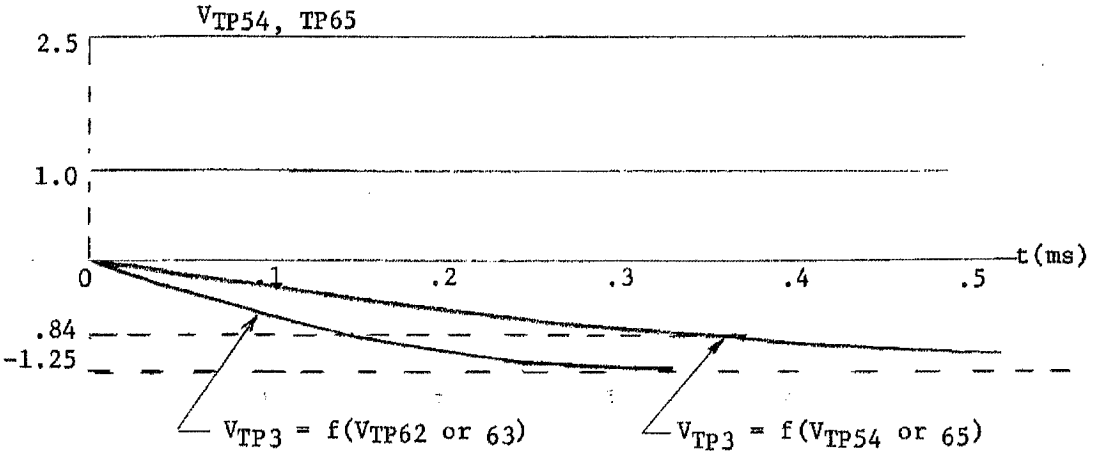

FIGURE 2: Nominal step response to F.1. and F.2.

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REV NO. A	TITLE	CONT ON SHEET —	SH NO. 7
P3K-AL-0598-A01	TEST INSTRUCTION FOR CONTROL VALVE POSITION CONTROL 1F1-B4 CIRCUIT BOARD ASSEMBLY 142D7274 G1		
CONT ON SHEET — SH NO. 8	FIRST MADE FOR		

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PREPARED BY: S S Abelson DATE 2/17/78

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REVIEWED BY: R L Olson DATE 2/17/78

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PRINTS TO

MADE BY	APPROVALS		
J. Polacek Feb. 22, 1978		Steam Turbine DIV OR DEPT.	P3K-AL-0598-A01
ISSUED FEB 23 1978		Schenectady, N.Y. LOCATION	CONT ON SHEET — SH NO. 8

FF-803-WA (8-77)
PRINTED IN U.S.A.

CODE IDENT NO.