GENERAL ⒼⒺ ELECTRIC

P3K-AL-0022

| REV NO. | 0 | | TITLE | | CONT ON SHEET | 2 | SH NO | 1 |

P3K-AL-0022

CONT ON SHEET 2   SH NO. 1

CV PREAMP. BD. CIRCUIT BOARD TEST

FIRST MADE FOR PL 994D153 (Schem. 994D189)

REVIS

I)   GENERAL DESCRIPTION

This board provides the closure of the V.C. position loop. This board has an input E_{SL}, valve stem lift demand signal, from the DFG BD. and an input E_F', valve position feedback, from the SADI board.

The forward loop contains:

1) OP-AMP as a preamplifier.
    R36 - loop gain adjustment.

2) Hard limit on opening rate.
    R37 - opening rate adjustment.

3) Valve test closing bias.
    R38 - closing (test) rate adjustment.

The feedback loop contains:

1) OP-AMP to prevent loading the feedback signal from the SADI.
    R46 provides 0-5V range for E_F.

2) BIAS ADJUSTMENT R40 to overcome linear transducer offset and 5% mechanical bias in the servovalve.

3) ADJ. R42 to provide a unity feedback loop.

DATA SHEETS

A valve position unit data sheet is prepared for each turbine. The data sheet provides numerical values, for a specific turbine, to be used with this turbine. (See Fig. 1)

273-7
273-2
273-1
273-1
273-1
273-1
R.
PRINTS

MADE BY	APPROVALS		DIV OR DEPT.	
T.B. White Sept. 25, '69		Steam Turbine		P3K-AL-0022
ISSUED Oct. 10 1969		Schenectady, N. Y. LOCATION	CONT ON SHEET 2 SH NO. 1

FF-803-WA (2-60)
PRINTED IN U.S.A.

CODE IDENT

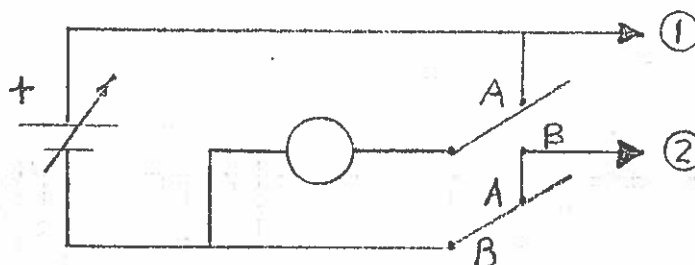| REV NO. 0	TITLE		
P3K-AL-0022	CV PREAMP. BD. CIRCUIT BOARD TEST		
CONT ON SHEET 3 SH NO. 2	FIRST MADE FOR PL 994D153 (Schem. 994D189)		

REVISI

II) INITIAL ADJ. - OP-AMP FDB. & LOOP FDB. (PERFORM WITH B10, R9, and R14 OPEN)

A) Test Set Up

Note: Make sure DVM reads zero when input terminals are shorted. If not, adjust DVM

During this adjustment the circuit board has to be disconnected. Note that the PLUS-side of the variable power supply is connected to the 1 terminal.

B) OP-AMP FDB

1) Set SW to POS. A.
2) Connect terminal 1 with TP2 (RD).
3) Connect terminal 2 with B4.
4) Adjust variable voltage source until DVM reads V_4.
5) Set SW to POS. B.
6) Adjust R36 until the ammeter reads current I_4.

C) Loop FDB

1) Set SW to POS. A.
2) Connect terminal 1 with TP4.
3) Connect terminal 2 with B4.
4) Adjust variable voltage source until DVM reads V_5.
5) Set SW to POS. B.
6) Adjust R42 until the ammeter reads current I_5.

Note: It may be necessary to open circuit one end of R9 to obtain correct resistance.

MADE BY T.B. White Sept. 25, '69	APPROVALS	Steam Turbine DIV OR DEPT.	P3K-AL-0022
ISSUED Oct 10 1969		Schenectady, N. Y. LOCATION	CONT ON SHEET 3 SH NO. 2

FF-803-WA (2-69) PRINTED IN U.S.A.

CODE IDEN

GENERAL ⊛ ELECTRIC

P3K-AL-0022

CONT ON SHEET 4   SH NO. 3

REV NO. 0

P3K-AL-0022

CONT ON SHEET 4   SH NO. 3

TITLE

CV PREAMP. BD. CIRCUIT BOARD TEST

FIRST MADE FOR PL 994D153 (Schem. 994D189)

III) FINAL TEST

A) Connect -22V to pin 21.
Connect +30V to pin 17.
Connect signal ground pin 19.
Insert B10, R9, and R14.

Do not connect Figure 2 until step E15

B) FDB. Loop OP-AMP

1) Set R46 at 11 turns from either end.
2) Measure E_F at TP4 with DVM.
3) Adjust R47 to bring E_F as close to zero as possible.

C) Adj. of Opening Rate Limit

1) Turn R40 fully CCW.
2) Apply +5V on pin 36.
3) Adjust R37 until the voltage E_{SA} (TP2) reads $V_{OP. LIMIT}$.

D) Adj. of Vlv. Test Closing Bias

1) Connect pin 5 with pin 7.
2) Remove +5V from pin 36.
3) Adjust R38 until the voltage E_{SA} (TP2) reads $V_{CL LIMIT}$.
4) Remove lead which connects pins 5 and 7.

E) Gain and Bias Adj.

1) Turn pot 9 fully CCW (Fig. 2).
2) Apply E_F = -5V at pin 39.
3) Adjust R46 to give E_F = -5V at TP4.
4) Turn R40 fully CCW.
5) Apply 50K in parallel with R5 + R36.
6) Apply +5V at pin 36.
7) E_{SA} (TP2) should be 0.0V. If not, adjust R42 until E_{SA} is 0.0V.
8) Apply +5V at pin 39.
9) E_F (TP4) should read +5V. If not, adjust R46 until E_F = +5V.
10) Connect pin 36 to signal ground, pin 19.
11) Change resistance in parallel with R5 + R36 to 5K.
12) Adjust R40 for E_{SA} = -0.25 at TP2.
13) Check OP. AMP. FDB. resistor setting: ~~Leaving~~ *Returning* all other voltage and resistor settings as they are at end of step (9); apply V_6 volts at pin 36. E_{SA} (TP2) should read V_7 volts. If not, adjust R36 until E_{SA} = V_7, within ± 25%.

(Note: The V value given must be less than $V_{OP LIMIT}$ to be correct.)

GENERAL ⊛ ELECTRIC

P3K-AL-0022

| REV NO. 0 | TITLE | CONT ON SHEET 5 | SH NO. 4 |

P3K-AL-0022

CONT ON SHEET 5   SH NO. 4

CV PREAMP. BD. CIRCUIT BOARD TEST

FIRST MADE FOR PL 994D153   (Schem. 994D189)

REVIS

III) <u>FINAL TEST</u> (Continued)

    E) <u>Gain and Bias Adj.</u> (Continued) ‾OPEN

        14) Use power supply to vary E_{SL} (pin 36).

        15) Switch S17 to Pos. B. ~~Close~~ S10.

        16) Apply $E_{SL} = 1.0V$ and E_F (TP4) should go to 4.0V.

        17) Apply $E_{SL} = 2.0V$ and E_F should go to 3.0V.

        18) Apply $E_{SL} = 3.0V$ and E_F should go to 2.0V.

        19) Apply $E_{SL} = 4.0V$ and E_F should go to 1.0V.

        20) <u>If steps 16 through 19 do not check</u>, use pot 9 to set $E_F = 5V$ when E_{SL} is 0V and then repeat steps 16 through 19.

        Put red glyptol on R42 and R36.

| MADE BY T.B. White Sept. 25, '69 | APPROVALS | Steam Turbine DIV OR DEPT. | P3K-AL-0022 |
| ISSUED Oct. 10, 1969 | | Schenectady, N. Y. LOCATION | CONT ON SHEET 5   SH NO. 4 |

FF-803-WA (2-69)
PRINTED IN U.S.A.

1270   CODE IDE

273-
273-
273-
273-
273-

R
PRINT

TITLE	TURBINE:
VPU SETTING DATA	VALVE:
3 SLOPE DFG.	TEST INSTR: P24B-AL-4945, P24B-AL-4
FIRST MADE FOR	P24B-AL-4948

OP. AMP.
FEEDBACK: $V_4 =$ volts $I_4 =$ uamp $R_f = V_4/I_4 =$ KOHM

$V_6 =$ volts $V_7 = \dfrac{R_f}{R_1} V_6 =$

RATE LIMITS: $V_{OPLIMIT} =$ volt $V_{CLLIMIT} =$ volt

LVDT SIZE = _____ in

FIGURE 1

273-
273-
273-
273-
273-

GENERAL ⊛ ELECTRIC

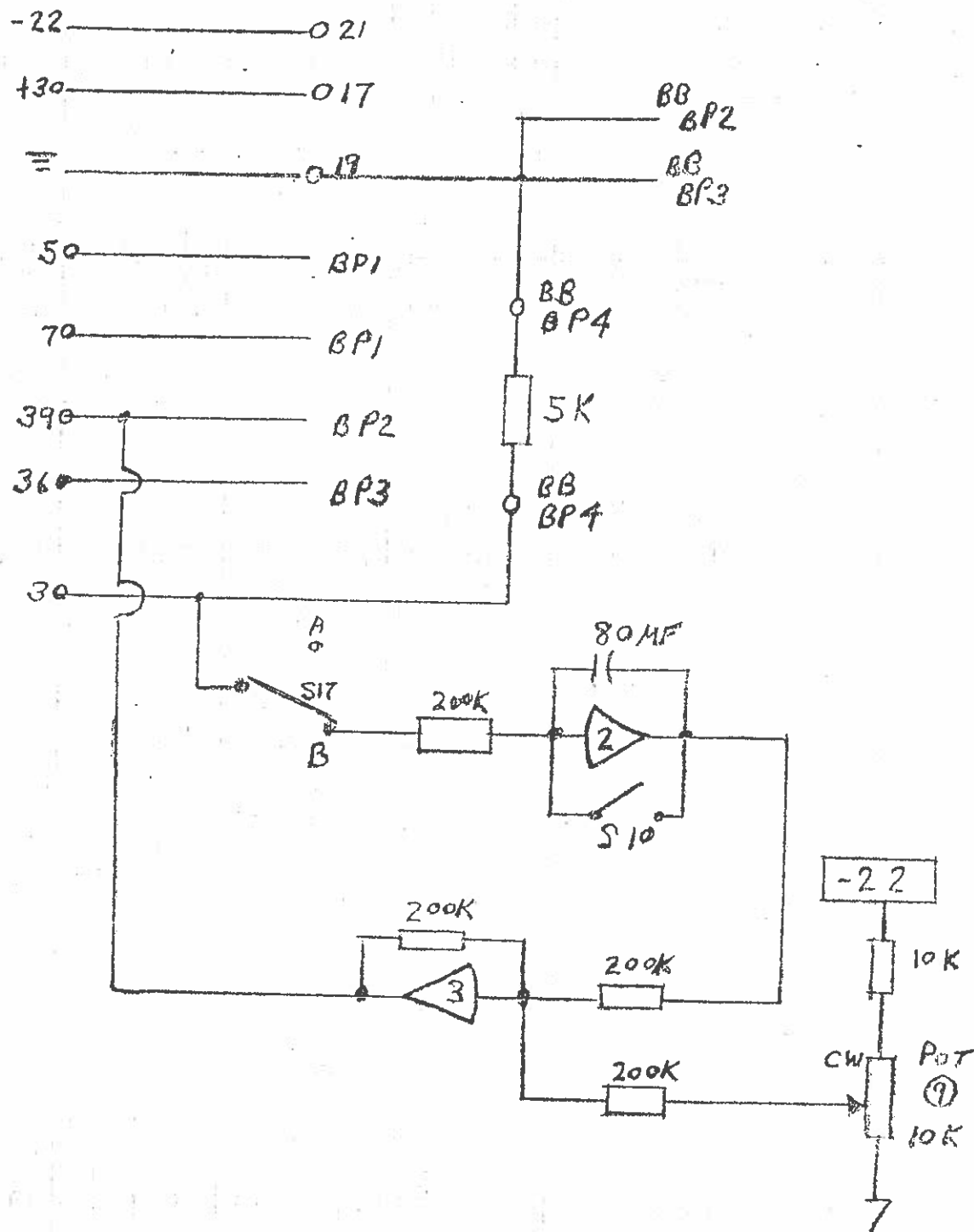| REV NO. 0		P3K-AL-0022
P3K-AL-0022	TITLE	CONT ON SHEET 7 SH NO. 6
CONT ON SHEET 7 SH NO. 6	CV PREAMP. BD. CIRCUIT BOARD TEST	

FIRST MADE FOR   PL 994D153   (Schem. 994D189)

REVIS

TEST SCHEMATIC
FIGURE 2

MADE BY T.B. White Sept. 25, '69	APPROVALS	Steam Turbine DIV OR DEPT.	P3K-AL-0022
ISSUED Oct. 10, 1969		Schenectady, N. Y. LOCATION	CONT ON SHEET 7 SH NO. 6

FF-803-WA (2-69)
PRINTED IN U.S.A.

PRINTS

CODE IDENT

REV NO. 0	TITLE

P3K-AL-0022

CONT ON SHEET --   SH NO. 7

CV PREAMP. BD. CIRCUIT BOARD TEST

FIRST MADE FOR   PL 994D153   (Schem. 994D189)

REVIS

PREPARED BY: _T.B. White_   DATE _10/10/69_
T. B. White
Turbine Control Design Engineering

APPROVED BY: _P. C. Callan_   DATE _10/10/69_
P. C. Callan, Manager
Turbine Control Design Engineering

REVIEWED BY: _____   DATE _____
R. J. Dellorfano
EHC Test Engineer

ET-2

273-7

273-2

273-1

273-1

273-1

R

PRINTS

MADE BY	APPROVALS		DIV OR DEPT.	
T.B. White, Sept. 25, '69		Steam Turbine		P3K-AL-0022
ISSUED Oct. 10, 1969		Schenectady, N. Y.	LOCATION	CONT ON SHEET -- SH NO. 7

FF-803-WA (2-69)
PRINTED IN U.S.A.

12T0

CODE IDENT

Data Sheet

Job # _____				Burn-in Start _____			
Serial # _____							
Date _____				Burn-in Stop _____			
Data Sheet for ____994D153G0008/G0013/G0019_____							
Test Procedure ___P3K-AL-0022_____				Technician _____			

Test Procedure Step	Nominal	Lower Limit	Pre-Burn in Results	Post Burn in Results	Upper Limit	Pot Values If applicable		Pass/Fail
						CW	CCW	
C-3 - R37 - TP2	-3.357V	Vop limit						
D-3 - R38 - TP2	+2.857V	Vcl limit						
E7 - TP2	0.0V	0.0V						
E9 - TP4	+5.0V	+5.0V			+5.0V			
E13 - TP2	+3.0V	+2.25V			+3.75V			
E16 - TP4	4.0V	+3.91V			+4.09V			
E17 - TP4	3.0V	+2.91V			+3.09V			
E18 - TP4	2.0V	+1.91V			+2.09V			
E19 - TP4	1.0V	+0.91V			+1.09V			
Brunswick Test								
3 - R47 @ Pin-18								
4	0.0V							
5 - R36								
6-7 - R46								
8-9-10 - R37	-3.357V							
11 - R42 @ TP2								
13 -R40 @ TP2								
15-16-17 - R38	+2.857V							
20	+5.00V							
22	+2.50V							
24	0.00V							

3/19/2012
cw