

REV NO. 0	TITLE	CONT ON SHEET 2	SH NO 1
P3K-AL-0178	CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST		
CONT ON SHEET 2	SH NO. 1	FIRST MADE FOR 170X463 - Philadelphia Electric	

GENERAL DESCRIPTION

The inputs to this board consist of the error signal from the low value gate, the load reference signal from the load reference amplifier. A valve opening bias network has been added to open the control valves during Chest/Shell warming. The board has one operational amplifier which sums the inputs with their corresponding gains (equal to the feedback resistance, divided by the resistance seen by the input in question). The output signal then goes to the valve position loops. A positive 5 volts calls for control valves wide open, 0 volts or less calls for the valves to close. A bias on the output acts to limit the voltage to +5 volts if a larger voltage is called for. The bias is supplied by +30 volts through a resistance network and contact KT102 (closed under normal operation) to -22 volts. This forward biases CR1 when the output is less than 5 volts (effectively tying the amplifier output to the card output). The output transistor circuit is used for current amplification to drive the external load. Its base to emitter drop may be neglected.

If an overspeed occurs during loading, the resultant speed error will act to close the valves. A 5% overspeed will cancel a 100% load reference signal to close the valves. For example, a 5% overspeed produces a 2.5 volt speed error, or 1.25 volts at pin 11. This contributes -5 volts at the output (gain of 4) which will cancel +5 volts from a 100% load signal to call for 0 volts (all control valves closed).

If the turbine is tripped on emergency overspeed, contact KT102 will open to lock out the +30 V supply. This causes the output to go negative which rapidly closes all control valves.

REVISION

ET-
273-
273-
273-
273-
273-
PRINT:

MADE BY D.Mone Jan. 17, 1973	APPROVALS	DIV OR DEPT. Stream Turbine	P3K-AL-0178
ISSUED JAN 18 1973		LOCATION Schenectady, N.Y.	CONT ON SHEET 2 SH NO 1



970

REV NO. 0

TITLE

CONT ON SHEET 3

SH NO 2

P3K-AL-0178

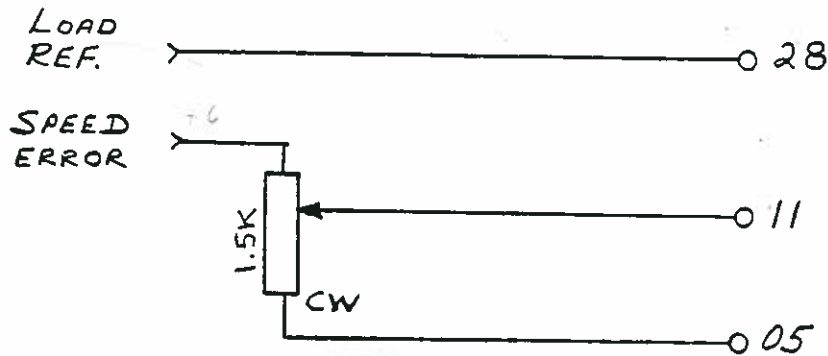
CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST

CONT ON SHEET 3

SH NO. 2

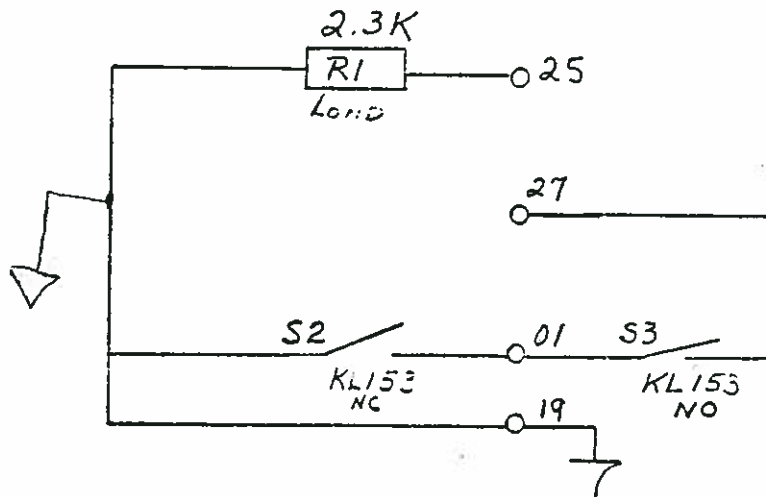
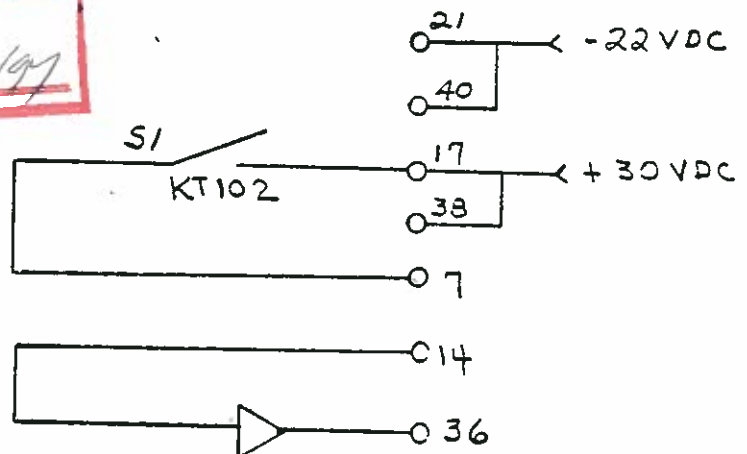
FIRST MADE FOR 170X463

TEST SETUP - BWR



ACTIVE FOR *Test*

BY *MC* DATE *2/10/97*



REVISI

ET-2

273-

273-

273-

273-

273-

PRINTS

MADE BY D.Mone Jan. 17, 1973

ISSUED JAN 18 1973

APPROVALS

Steam Turbine

Schenectady, N.Y.

DIV OR DEPT.

LOCATION

P3K-AL-0178

CONT ON SHEET 3

SH NO 2

970

REV. NO. 0	TITLE		CONT ON SHEET 4	SH NO. 3
P3K-AL-0178	CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST			
CONT ON SHEET 4	SH NO. 3	FIRST MADE FOR 170X463		

TEST PROCEDURE

Input voltages should be set to ± 10 MVDC.

Output voltages should be read with ± 100 MVDC of stated values, unless specified otherwise.

1. Hook up card as per test setup. Close S1, S2.
2. Set 0 volts speed error input and load reference input.
3. Check voltage at pin 1 for 0 VDC.
4. Set 1.5K pot max. CCW.
5. Set +6 VDC on speed error, adjust 1.5K pot for +3V at pin 11 or TP4.
6. Set 0 VDC on speed error. Set -6.0 VDC on load reference input.
- 7. Adjust R1 for +5 VDC at TP8. Output bias limits voltage to +5 VDC.
8. Decrease load reference to -5 VDC.
9. Set speed error to +2.5 VDC. = 1.25 V at pin 11
10. Check voltage at TP8. Should be +0.0 VDC.
11. Set speed error to 0 VDC. Voltage at TP8 should be +5.0 VDC.
12. Set load reference to 0 VDC. TP8 should be 0 VDC.
13. Open S2, close S3.
14. Adjust R5 for -10.1 volts at TP7. Sets CV opening bias during warming.
15. Voltage at TP8 should be +5.0 VDC. Trim R5 if necessary.
16. Set speed error to +2.50 VDC. TP8 should be 0 VDC. 1.28 V at pin 11
17. Close ^{S2} ~~S1~~, open ^{S3} ~~S2~~.
18. Voltage at TP8 should be -5.0 VDC.
19. Set speed error to 0 VDC.
20. Set load reference to -5 VDC. TP8 is +5.0 VDC.
21. Open S1. Voltage at TP8 should be -2.0 ± 1.0 VDC.
22. Remove all connections to the card and verify 4.02 meg Ω 10% between pins 26 + 14.

REVIS

PRINTS

MADE BY D. Mone Jan. 17, 1973	APPROVALS	DIV OR DEPT. Steam-Turbine	P3K-AL-0178
ISSUED JAN 18 1973		LOCATION Schenectady, N.Y.	CONT ON SHEET 4
			SH NO 3

REV
NO. 0

TITLE

CONT ON SHEET -

SH NO. 4

P3K-AL-0178

CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST

CONT ON SHEET - SH NO. 4

FIRST MADE FOR 170X463

REVISI

PREPARED BY:

J. Dombrosky
J. Dombrosky
EHC DESIGN ENGINEER

DATE:

1-10-73

APPROVED BY:

P.C. Callan
P.C. Callan - MANAGER
EHC DESIGN ENGINEERING

DATE:

1-16-73

APPROVED BY:

R.J. Dellorfano
R.J. Dellorfano
EHC TEST ENGINEER

DATE:

1-18-73

PRINTS

MADE BY

D.Mone Jan. 17, 1973

ISSUED

JAN 18 1973

APPROVALS

Steam Turbine

DIV OR
DEPT.

Schenectady, N.Y.

LOCATION

P3K-AL-0178

CONT ON SHEET -

SH NO. 4

Data Sheet

Job # _____						Burn-in Start _____ Burn-in Stop _____ Technician _____		
Serial # _____								
Date _____								
Data Sheet for __118D1516G003_____								
Test Procedure __P3K-AL-0178_____								
Test Procedure Step	Nominal	Lower Limit	Pre-Burn in Results	Post Burn in Results	Upper Limit	Pot Values If applicable CW CCW		Pass/Fail
3	0V	-.001V			+.001V			
5	+3VDC	+2.999V			+3.001V			
7	+5.000VDC	+4.990V			+5.010V			
10	0VDC	-.01V			+.01V			
11	+5VDC	+4.990V			+5.010V			
12	0VDC	-.01V			+.01V			
14	-10.1VDC	-10.099V			-10.101V			
15	+5VDC	+4.990V			+5.010V			
16	0VDC	-.01V			+.01V			
18	-5VDC	-4.90V			-5.10V			
20	+5VDC	+4.990V			+5.010V			
21	-2VDC	-1.9V			-2.1V			
R5 - TP7								
R1 - TP8								
Comments:	Tolerances tighten x 10 for Brunswick							
	Steps 7, 14, 15, & 16 are site specific (Brunswick)							