GENERAL ELECTRIC

P3K-AL-0137-A01
CONT ON SHEET 2 SH NO. 1

REV NO. 01

P3K-AL-0137-A01
CONT ON SHEET 2 SH NO. 1

TITLE
CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST per mark
FIRST MADE FOR X456 New England 115D3314 117D8553

REVISIONS

JUL 28 1972

GENERAL DESCRIPTION

* G1 and G2 for peaker
G3 and G4 for PWR

This turbine is a single admission type (no FA condition with starting and loading on the control valves). Provisions for chest and rotor warming have been included. A valve opening bias network has been added to open the control valves during pre-warming.

The inputs to this board consist of the speed error signal from the low value gate, the load reference signal from the load reference amplifier, and stage pressure feedback when selected. 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 reverse 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 va ves. 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).

Valve test can be initiated if the initial pressure is above 95% and the stage pressure signal is above 20% of rated value. When valve test is initiated KL412 KL413 and KL414 will open.

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ET-27
273-2
273-1
273-1
273-1
273-7
273-31

PRINTS TO

MADE BY	APPROVALS		
D.DeNora June 7, 1971		Steam Turbine — DIV OR DEPT.	P3K-AL-0137-A01
ISSUED JUN 8 1971		Schdy N.Y. — LOCATION	CONT ON SHEET 2 SH NO. 1

FF-893-WA 2-71
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~~970~~ 670 CODE IDENT NO

CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST

FIRST MADE FOR X456 115D3314

* G1 and G2 for peaker
G3 and G4 for PWR

If the unit is running at 60% load, the load reference will be -3 volts to contribute +12 volts (gain of 4) at the output. The stage pressure input will be +3 volts to contribute -9 volts (gain of 3) for a resultant of +3 volts at the output (which is the voltage for 60% load).

If the first stage pressure input drops to 2.5 volts the output will rise to 4.5 volts, calling for a 90% valve position. This will cause the stage pressure to build up to the desired level.

Since the gain of the speed error input is four times that of the load reference, its gain must be increased to 16 to maintain the 5% regulation on overspeed.

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

1 Q. Hyde JUL 28 1972.

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PRINTS TO

REV NO. 01

P3K-AL-0137-A01
CONT ON SHEET 4 SH NO. 3

TITLE

CONTROL VALVE AMPLIFIER CIRCUIT BOARD TEST

FIRST MADE FOR X456 115D3314

* G1 and G2 for peaker
G3 and G4 for PWR

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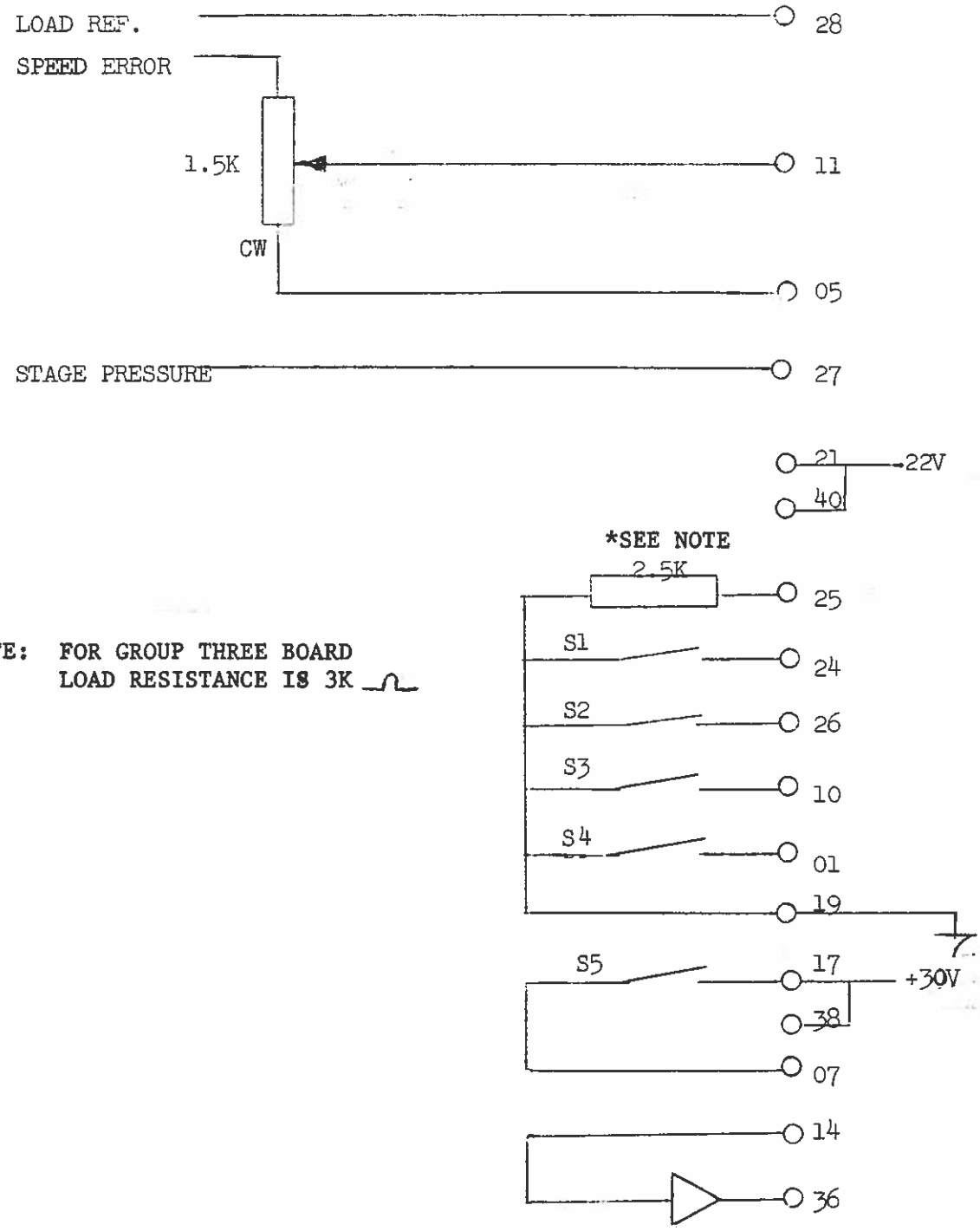
1 O. DeNora JUL 26 1972

TEST SET-UP



NOTE: FOR GROUP THREE BOARD
LOAD RESISTANCE IS 3K

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MADE BY D.DeNora June 7, 1971

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APPROVALS

Steam Turbine DIV OR DEPT.
Schenectady, N.Y. LOCATION

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CONT ON SHEET 4 SH NO. 3

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REVISIONS

1 D.Mone JUL 28 1972 Rel'd Released

TEST PROCEDURE:

G1 and G2 for peaker
G3 and G4 for PWR

Input voltages should be set to ± 10 MVDC.

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

1. Hook up card as per test set-up S1, S2, S3, S4, S5 should be closed.
2. Set 0 volts at speed error input, stage pressure input, and load reference input (pin 28).
3. Set 1.5K pot max. CCW.
4. Set +6V on speed error, adjust 1.5K pot for +3V at pin 11.
5. Set 0 volts on speed error. Set -6.0 VDC on load reference. 28
6. Adjust R1 for +5 volts at TP8.
7. Adjust R5 for +5.1 volts at TP7.
8. Set speed error to +2.5 volts.
9. Set pin 28 to -5 volts.
10. Check voltage at TP8. Should + 0.0 volts.
11. Set speed error to 0.0 volts. Voltage at TP8 should be +5.0 VDC.
12. Apply -3.0 volts at pin 28.
13. Set speed error to 0 volts. Voltage at TP8 should be +5.0 VDC.
14. Apply +3.0 volts to stage pressure input & turn the 77K pot & 19K pot fully CC.
15. Open S1, S2, and S3. The voltage at TP8 should remain at +3.0V.
16. Decrease voltage at the stage pressure input to +2.5 volts. Voltage at TP8 should be +4.5 volts.
17. Set pin 28 to -5.0 volts and the stage pressure input to 4.0 volts. Check TP8 should be at +5.0 volts.
18. Apply +1.0 volt to speed error. TP8 should be 0.0 volts.
19. Set stage pressure input to 0.0 volts. TP8 should be +5.0V.
20. Increase speed error to +2.5 volts. TP8 should be 0.0 volts.
21. Close S1, S2, S3, S5 and open S4.
22. Voltage at TP8 should be +5.0 VDC.
23. Open S5. Voltage at TP8 should vary between (-) 1.9 to -2.3 VDC when R1 is moved from max. counter-clockwise to max. clockwise.
24. For group #3 & #4 - Resistance check pin #3 to pin #13 for 5.1K ohms.

REJECTIONS: If voltages as stated are not obtainable, or if any adjustments cannot be reached, the board should be rejected and Control Engineering notified.

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* G1 and G2 for peaker
G3 and G4 for PWR

REVISION

1 D. DeNora JUL 28 1972

PREPARED BY M J Sindoni DATE 5/21/71

M.J. Sindoni
CONTROL DESIGN ENGINEERING

APPROVED BY B Dellorfano DATE 5/26/71

B. Dellorfano
EHC TEST ENGINEER

APPROVED BY P C Callan DATE 6-2-71

P.C. Callan - MANAGER
CONTROL DESIGN ENGINEERING

ET-27
273-2
273-1
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PRINTS T

MADE BY D.DeNora June 7, 1971

ISSUED JUN 8 1971

APPROVALS

Steam Turbine DIV OR DEPT.

Schenectady, N.Y. LOCATION

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CONT ON SHEET -- SH NO. 5

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