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GENERAL ELECTRIC

REV NO. 1	TITLE	P3K-AL-1103-A01 SH NO.1
P3K-AL-1103-A01 SH NO.1	TEST INSTRUCTION FOR THE TRUST BEARING WEAR DETECTOR (TBWD) TEST CIRCUIT BOARD 1TM2-S102	
	FIRST MADE FOR	

SH	REV	SH	REV	SH	REV
1	1				
2	1				
3	1				
4	1				
5	1				
6	1				
7	1				
8	1				
9	1				
10	1				
11	1				
12	1				

REVISIONS

REV	DESCRIPTION	DATE	APPROVED
1	AUG 2 0 1990 Page 11, Step 7; Corrected pin numbers at which to check for contact closure. Redrawn, Retraced.	7/26/90	

273-5
273-12
273-314
PRINTS TO

MADE BY	APPROVALS	DIV OR DEPT.	
T. LAKE 7/12/90	MRM	TURBINE	P3K-AL-1103-A01 SH NO.1
ISSUED AUG 2 0 1990		SCHENECTADY LOCATION	

RE

I. SCOPE:

This instruction outlines the test procedure for the MK 2 TBWD TEST (NOT MK 2A):

TBWD TEST circuit board Assem.	155D8110 G1
TBWD TEST Schematic	155D8111
1TM2-S102	

The THRUST BEARING WEAR DETECTOR (TBWD) TEST Logic board (1TM2-S102) is used to replace the MK2 board which used Simpson Meter Relays in the TBWD TEST and Annunciation circuit. It also replaces previous TBWD Logic Boards (shown below).

155D8110 G1 REPLACES:

TBWD TEST circuit board Assem	145D4749 G1 & G3
TBWD TEST Schematic	145D4746
1TM2-S101	

TBWD TEST circuit board Assem	145D2290 G1
TBWD TEST Schematic	145D2292
1TM2-S102	

TBWD TEST circuit board Assem.	155D6600 G1
TBWD TEST Schematic	155D6601
1TM2-S102	

NONE OF ABOVE REPLACES Mk 2A TBWD TEST Logic Board:

Mk 2A TBWD TEST circuit board Assem	186C8150 G1
Mk 2A TBWD TEST Schematic	148D2479
Refer to Trip & Monitoring Schematic.	
Mk 2A TBWD TEST = 1TM2-S201	

II. CIRCUIT DESCRIPTION

The THRUST BEARING WEAR DETECTOR (TBWD) TEST Logic board (1TM2-S102) is used to replace the MK2 board which used Simpson Meter Relays in the TBWD TEST and Annunciation circuit. It also replaces previous TBWD Logic Boards (shown on Sh 2).

This circuit board (155D8110 G1) improves on the previous model (155D6600 G1) by adding a Wraparound feature. This feature differentiates between a test trip and an actual trip. An actual trip causes K2 to Pick Up (PU) but does not effect K3 or K4.

For a test trip, the Test Push Button is engaged to PU K3 and K4 (K4 PU keeps the trip bus open during testing). TBWD trip then occurs causing K2 to PU.

Old Circuit (155D6600 G1):

If test button is released and the TBWD test trip fails to reset, the trip bus closes back in 3 seconds later and an unwanted turbine trip occurs.

New Circuit (155D8110 G1):

If test button is released and the TBWD test trip fails to reset, the Wraparound feature keeps K4 PU and prevents the turbine from tripping. K4 remains PU and keeps TBWD trip bus open for as long as the trip remains. Once trip is cleared, K4 will Drop Out (DO) 3 sec later and close TBWD trip bus.

III CIRCUIT BOARD TEST

A. Power Supply Check

1. Apply +24V to pin 38 & 24V Common to pin 40.

2. Check +5v Regulator output @ pin 35 & TP50 = +5.00 ± 0.25 VDC.

3. Observe that Green LED DS1 (Grn) is On, signaling +5V present.

4. Observe that 4 Red LEDs are Off.

5. Observe Power Supply Requirements (Approx values):

* All relays Off & all Red LEDs off;	24V supply draws 0.07 A
* Four crystal can relays energized; (K1, K2, K5, K6, are energized)	24V supply draws 0.23 A 125V supply draws 0.10 A
* Four 10 Amp relays Pick Up (PU) & 4 LEDs On; (K3, K4, K7, K8, energized) (DS2, DS3, DS4, DS5 all On)	24V supply draws 0.50 A No 125V applied
* All 8 relays energized & 4 LEDs On; (K1, K2, K5, K6, energized) (K3, K4, K7, K8, energized) (DS2, DS3, DS4, DS5 all On)	24V supply draws 0.64 A 125V supply draws 0.10 A

III CIRCUIT BOARD TEST Cont'd

B. Relay Operation Check (K1 thru K4)

Connect 24V supply to pin 38 & 24V Common to pin 40.

Connect 125V Common to pin 36.

1. Check K1;
   Apply +125V to pin 12, K1 should Pick Up (PU). Note that No red LEDs are On. Check for contact closure at pin 16 to 17.
   Remove 125V from pin 12 & observe K1 Drop Out (DO).

2. Check K2;
   Apply +125V to pin 10, K2 should PU (No red LEDs On).
   Check for contact closure at pin 17 to 22.
   Remove 125V from pin 10 & observe K2 DO.

3. Check K3;
   Apply +24V to pin 13, K3 should PU, & LED DS2 should go On. Check for contact closures at pin 32 to 33 & 19 to 31.
   Remove 24V from pin 13 & observe K3 DO & LED DS2 go Off.

4. Check K4;
   Apply +24V to pin 13; Observe K3 PU, & LED DS2 go On
   (Check for contact closures at pin 32 to 33 & 19 to 31),
   and observe K4 PU & LED DS3 go On immediately;
   Check for contact closures at pin 29 to 30 & 23 to 24.

5. Check 555 Timer (IC9);
   Remove 24V from pin 13 & observe K3 DO & LED DS2 go Off immediately, but K4 remains PU & LED DS3 remains On for approx 3 sec.
   Both LEDs DS2 & DS3 should now be Off.

6. Repeat steps 4 & 5 several times to insure that timer is repeating.

III CIRCUIT BOARD TEST Cont'd

C. Relay Operation Check (K5 thru K8):

Connect 24V supply to pin 38 & 24V Common to pin 40.

Connect 125V Common to pin 36.

1. Check K5;
   Apply +125V to pin 9, K5 should PU (No red LEDs On).
   Check for contact closure at pin 27 to 28.
   Remove 125V from pin 9 & observe K5 DO.

2. Check K6;
   Apply +125V to pin 11, K6 should PU (No red LEDs On).
   Check for contact closure at pin 28 to 26.
   Remove 125V from pin 11 & observe ~~K2~~ K6 DO.

3. Check K7;
   Apply +24V to pin 18, K7 should PU, & LED DS4 should go On. Check for contact closures at pin 20 to 21 & 2 to 15.
   Remove 24V from pin 18 & observe K7 DO & LED DS4 go Off.

4. Check K8;
   Apply +24V to pin 18, and observe K7 PU, & LED DS4 go On;
   Check for contact closures at pin 20 to 21 & 2 to 15.
   Observe K8 PU & LED DS5 go On immediately;
   Check for contact closures at pin 29 to 30 & 23 to 24.

5. Check 555 Timer (IC17);
   Remove 24V from pin 18 & observe K7 DO & LED DS4 go Off immediately, but K8 remains PU & LED DS5 remains On for approx 3 sec.
   Both LEDs DS4 & DS5 should now be Off.

6. Repeat steps ~~3~~ 4 & 5 & ~~6~~ several times to insure that timer is repeating.

III CIRCUIT BOARD TEST Cont'd

D. Testing Lower TBWD Logic

Connect 24V supply to pin 38 & 24V Common to pin 40.

Connect 125V Common to pin 36.

1. Apply +24V to pin 13; K3 & K4 should Pick Up (PU) and LEDs DS2 & DS3 should go On immediately. Check for contact closure of K3 (pin 19 to 31, & 32 to 33) and K4 (pin 23 to 24, & 29 to 30). K2 should remain Dropped Out.

2. Remove 24V from pin 13; Observe K3 Drop Out (DO) and LED DS2 turn off immediately. Observe K4 DO and LED DS3 turn off 3 seconds later.

3. Apply 125V to pin 10 and observe K2 PU immediately. Check for contact closure at pin 17 to 22. K3 and K4 should remain DO.

4. Remove 125V from pin 10; Observe K2 DO immediately (K2, K3, & K4 are all DO).

5. Repeat above steps several times, and observe LEDs to determine proper operation.

III CIRCUIT BOARD TEST Cont'd

E. Checking Wraparound Feature (IC7)

1. Apply 24V to pin 13; K3 & K4 should PU and LEDs DS2 & DS3 should go On immediately. Check for contact closure of K3 (pin 19 to 31, & 32 to 33) and K4 (pin 23 to 24, & 29 to 30). K2 should remain DO.

2 Apply 125V to pin 10; K2 should PU immediately. Check for contact closure at pin 17 to 22.

3 Remove 24V from pin 13; Observe K3 DO and LED DS2 turn off immediately. K2 and K4 should remain PU.

17-22 23-24

4 Wait for over 1 minute; Remove 125V from pin 10 and observe K2 DO immediately. Observe that after approx. 3 seconds K4 Drops Out and LED DS3 turns off.

5 Apply 125V to pin 10; K2 should PU immediately (No red LEDs On). Check for contact closure at pin 17 to 22. K3 and K4 should remain DO.

6 Remove 125V from pin 10 and observe K2 DO.

7 Apply 125V to pin 10; K2 should PU (No red LEDs On). Check for contact closure at pin 17 to 22. K3 and K4 should remain DO.

8 Momentarily apply 24V to pin 13; Observe that K3 Picks Up and Drops Out (LED DS2 turns on and off) immediately. Observe that K4 Picks Up immediately and Seals In (LED DS3 turns on). K4 should remain Picked Up as long as 125V is applied to pin 10.

9 Remove 125V from pin 10; Observe K2 DO immediately, check contacts 17 to 22. K4 should DO (DS3 turn off) 3 sec. later.

III CIRCUIT BOARD TEST Cont'd

F. Check That 555 Timer (IC9) Cannot Be Retriggered During 3 Sec. Timing Period

1 Apply 24V to pin 13; Observe K3 & K4 PU and LEDs DS2 & DS3 turn on immediately. Check for contact closure of K3 (pin 19 to 31, & 32 to 33) and K4 (pin 23 to 24, & 29 to 30).

2 Remove 24V from pin 13; Observe K3 DO and DS2 turn off immediately. K4 should remain PU (DS3 remain lit).

3 Momentarily re-apply 24V to pin 13 before K4 Drops Out (within 3 sec).

4 Observe that K4 Drops Out 3 seconds after initial removal of 24V from pin 13 and is not influenced by the second trigger.

III CIRCUIT BOARD TEST Cont'd

G. Testing Upper TBWD Logic

Connect 24V supply to pin 38 & 24V Common to pin 40.

Connect 125V Common to pin 36.

1. Apply +24V to pin 18; K7 & K8 should Pick Up (PU) and LEDs DS4 & DS5 should go On immediately. Check for contact closure of K7 (pin 2 to 15, & 20 to 21) and K8 (pin 23 to 24, & 29 to 30). K6 should remain Dropped Out.

2. Remove 24V from pin 18; Observe K7 Drop Out (DO) and LED DS4 turn off immediately. Observe K8 DO and LED DS5 turn off 3 seconds later.

3. Apply 125V to pin 11 and observe K6 PU immediately. Check for contact closure at pin 26 to 28. K7 and K8 should remain DO.

4. Remove 125V from pin 11; Observe K6 DO immediately (K6, K7, & K8 are all DO).

5. Repeat above steps several times, and observe LEDs to determine proper operation.

III CIRCUIT BOARD TEST Cont'd

H. Checking Wraparound Feature (IC15)

1. Apply 24V to pin 18; K7 & K8 should PU and LEDs DS4 & DS5 should go On immediately. Check for contact closure of K7 (pin 2 to 15, & 20 to 21) and K8 (pin 23 to 24, & 29 to 30). K6 should remain DO.

2 Apply 125V to pin 11; K6 should PU immediately. Check for contact closure at pin 26 to 28.

3 Remove 24V from pin 18; Observe K7 DO and LED DS4 turn off immediately. K6 and K8 should remain PU.

4 Wait for over 1 minute; Remove 125V from pin 11 and observe K6 DO immediately. Observe that after approx. 3 seconds K8 Drops Out and LED DS5 turns off.

5 Apply 125V to pin 11; K6 should PU (No red LEDs On) immediately. Check for contact closure at pin 26 to 28. K7 and K8 should remain DO.

6 Remove 125V from pin 11 and observe K6 DO immediately.

7 Apply 125V to pin 11; K6 should PU immediately (No red LEDs On). Check for contact closure at pin 26 to 28. K7 and K8 should remain DO.

8 Momentarily apply 24V to pin 18; Observe that K7 Picks Up and Drops Out (LED DS4 turns on and off) immediately. Observe that K8 Picks Up immediately and Seals In (LED DS5 turns on). K8 should remain Picked Up as long as 125V is applied to pin 11.

9 Remove 125V from pin 11; Observe K6 DO immediately, check contacts 26 to 28. K8 should DO (DS5 turn off) 3 sec. later.

III CIRCUIT BOARD TEST Cont'd

I. Check That 555 Timer (IC17) Cannot Be Retriggered During 3 Sec. Timing Period

1 Apply 24V to pin 18; Observe K7 & K8 PU and LEDs DS4 & DS5 turn on immediately. Check for contact closure of K7 (pin 2 to 15, & 20 to 21) and K4 (pin 23 to 24, & 29 to 30).

2 Remove 24V from pin 18; Observe K7 DO and DS4 turn off immediately. K8 should remain PU (DS5 remain lit).

3 Momentarily re-apply 24V to pin 18 before K8 Drops Out (within 3 sec).

4 Observe that K8 Drops Out 3 seconds after initial removal of 24V from pin 18 and is not influenced by the second trigger.

TEST IS NOW COMPLETE.