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P3K-AL-0447-A01	TEST INSTRUCTION FOR STANDBY VOLTAGE COMPARATOR	2	1
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42-3			
I. SCOPE			
This instruction outlines the test specifications for Circuit Board Assembly 125D4322 (Schematic 125D3270).			
II. CIRCUIT DESCRIPTION			
This circuit board consists of two identical voltage comparators which perform the voltage matching function which allows entry into or exit from the Standby Mode of operation. The circuit basically looks at two independent voltages and picks up a relay as long as the difference between them is less than some preselected limit. If the two voltages differ from each other by more than the set limit then the relay drops out.			
The circuit operation is as follows: The LM741 (IC1) takes the difference between V_C and V_D and multiplies it by a gain of 5 i.e. $R_F = \frac{100K}{R_{IN}} = \frac{100K}{20K}$			
Provisions are made for nulling the LM741 output when $V_C = V_D$. The output of IC1 is used to drive IC2 which is a 711 dual comparator. Two voltage limits are set at pins IC2-3 and IC2-6 of the 711. As long as the input voltage at pins IC2-4 and IC2-7 is within the band of voltage between pins IC2-3 and IC2-6, the output of the 711 will be ground or low state and the relay K1 will be picked up. If the input at pins IC2-4 and IC2-7 exceeds the positive limit at IC2-3 or the negative limit at IC2-6, then the output of the 711 will be approximately +4.5V or high state and the relay will be dropped out.			
The two zener diodes (IN746A) on the output of the LM741 (IC1) are used to limit the voltage into the 711 to $\pm 3.9V$. The maximum input voltage to the 711 must be less than $\pm 7V$.			
The relay contacts available per voltage comparator are two single pole double throw dry circuit contacts with 3.0 amp capacity at 28 VDC and resistive load. For this special application these relays are wired together with jumpers B1, B2 in the way they will be used in the Standby logic.			
As an example, if it is desired to detect when V_C and V_D are within 0.1V of each other and the 741 gain is 5, then the positive voltage divider pin IC2-3 must be set to +0.5 V and the negative voltage divider pin IC2-6 must be set to -0.5V. With the present values of end resistors and potentiometers, the voltage limits can be set between approximately 0.2 VDC and 2 VDC. This allows detection of $(V_C - V_D)$ between 0.04 V and 0.4 V.			
PRINTS TO			
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REV NO.	TITLE	CONT ON SHEET	3	SH NO.	2
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III. <u>CIRCUIT SPECIFICATIONS</u>					REVISIONS
A. Power Supply Requirements					
1. Power Supply 1: $+22.000 \pm 0.002$ VDC (Pin 37) at 225 ma					
2. Power Supply 2: -22.000 ± 0.002 VDC (Pin 41) at 100 ma					
B. Input Signal Levels					
1. VC1					
a. C Input (Pin 18) ± 12 VDC max.					
b. D Input (Pin 17) ± 12 VDC max.					
2. VC2					
a. C Input (Pin 27) ± 12 VDC max.					
b. D Input (Pin 26) ± 12 VDC max.					
C. Outputs					
1. Main On-Board Power					
a. (+) Supply (TP1): $+15.7 \pm 1.0$ VDC					
b. (-) Supply (TP2): -15.7 ± 1.0 VDC					
2. VC1					
a. On-board (+) supply. Measured at the cathode of CR7: $\pm CR11$ $+12$ VDC with tolerance $\pm 5\%$. 12 ± 0.6 V					
b. On-board (-) supply. Measured at the anode of CR8: $\pm CR12$ -6.2 VDC with tolerance $\pm 5\%$. -6.2 ± 0.3 V					
c. (+) Reference voltage (TP3) adjustable, by changing VR1, over the range 0.22 VDC to 1.97 VDC.					
d. (-) Reference voltage (TP4) adjustable, by changing VR2, over the range -0.22 VDC to -1.97 VDC.					
e. Relay K1 contacts					
1. K1-1 Pin 14 Common Pin 16 Normally closed Pin 15 Normally open					
2. K1-2 Pin 13 Common Pin 11 Normally closed Pin 12 Normally open					
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III. <u>CIRCUIT SPECIFICATIONS</u> (continued)			REVISION	
C. Outputs (continued)				
3. <u>VC2</u>				
a. On-board (+) supply. Measured at the cathode of CR11: +12 VDC with tolerance $\pm 5\%$.				
b. On-board (-) supply. Measured at the anode of CR12: -6.2 VDC with tolerance $\pm 5\%$.				
c. (+) Reference voltage (TP6) adjustable, by changing VR3, over the range 0.22 VDC to 1.97 VDC.				
d. (-) Reference voltage (TP7) adjustable, by changing VR4, over the range -0.22 VDC to -1.97 VDC.				
e. Relay K2 contacts				
1. K2-1 Pin 22 Common Pin 20 Normally closed Pin 21 Normally open				
2. K2-2 Pin 23 Common Pin 25 Normally closed Pin 24 Normally open				
D. Performance Specifications				
1. Main On-Board Power				
a. Measure the DC voltage at TP1 with a digital voltmeter. It should be +15.7 ± 1.0 VDC.				
b. Measure the DC voltage at TP2 with a digital voltmeter. It should be -15.7 ± 1.0 VDC.				
2. VC1				
a. Measure the DC voltage at the cathode of CR7 with a digital voltmeter. It should be +12 VDC $\pm 5\%$.				
b. Measure the DC voltage at the anode of CR8 with a digital voltmeter. It should be -6.2 VDC $\pm 5\%$.				
c. Monitor TP3 with a digital voltmeter. Adjust VR1 over the entire range and verify that the voltage output changes from 0.22 VDC to 1.97 VDC.				
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III. <u>CIRCUIT SPECIFICATIONS</u> (continued)							
D. Performance Specifications (continued)							
2. VC1 (continued)							
d. Monitor TP4 with digital voltmeter. Adjust VR2 over its entire range and verify that the voltage output changes from -.22 VDC to -1.97 VDC.							
e. Check and set null for IC1							
1. Set up the following conditions:							
C Input (Pin 18) to ground, D Input (Pin 17) to ground. Monitor TP50 with a digital voltmeter.							
2. Adjust VR50 for a null at TP50. This should be 0.0 ± 1 MV DC.							
f. Check Pick Up Point (+) and (-)							
1. Set up the following conditions:							
Set (+) Reference voltage TP3 to 0.5 VDC. Set (-) Reference voltage TP4 to -0.5 VDC.							
Connect D Input (Pin 17) to some external voltage between 0 and +10 VDC.							
Connect C Input (Pin 18) to an adjustable external voltage. Monitor K1 relay contacts (Pin 13) and (Pin 12) for continuity. Monitor the external voltage (Pin 18) with a digital voltmeter.							
2. Slowly increase the voltage on (Pin 18) from some value below the voltage on (Pin 17). Note the voltage on Pin 18 where relay K1 picks up. This voltage should be lower than the voltage on Pin 17 by 0.1 ± .010 VDC.							
3. Slowly decrease the voltage on Pin 18 from some value above the voltage on pin 17. Note the voltage on pin 18 where relay K1 picks up. This voltage should be higher than the voltage on pin 17 by 0.1 ± 0.010 VDC.							
4. Repeat steps 1, 2, and 3 with the voltage on Pin 17 set to some value between 0 and -10 VDC.							
This instruction is ok, as typed.							
PRINTS							
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	EHC MARK II				
III. <u>CIRCUIT SPECIFICATIONS</u> (continued)					REVISIONS
D. Performance Specifications (continued)					
2. VC1 (continued)					
g. Check Zener Limiters ICL					
1. This test can be performed at the same time as III.D.2.f. above with the same set up.					
2. Monitor TP50 with a digital voltmeter.					
3. Set the voltage at Pin 18 to be less than that at Pin 17 by 1.0 V. The voltage at TP50 should be no greater than 4.37 VDC and no less than 3.43 VDC.					
4. Set the voltage at Pin 18 to be greater than that at Pin 17 by 1.0 V. The voltage at TP50 should be no less than -4.37 VDC and no greater than -3.43 VDC.					
h. Check Relay Contacts					
1. Set up conditions for Step III. D. 2. f. above.					
2. Monitor K1-1 and K1-2 relay contacts for continuity.					
3. Pick up and drop out relay K1 and verify that all contacts will open and close.					
3. VC2					
Repeat procedure outlined in step III. D. 2. for VC2 noting appropriate changes for pin numbers, test point numbers and potentiometer numbers.					
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