TEST INSTRUCTIONS

0621L0501 GALL
60 Hertz Field application Card
Date: November 9, 2007

Location: Book or file

PURPOSE: To test the 60 Hertz Field application Card card.

ELEMENTARY:

S&C Data Book 5764 sec. 501 Dwg. 0266A9655

EQUIPMENT:

A) Multimeter HP 34401A TL # 00321 or equivalent.
B) Oscilloscope Tektronix 2440 TL # 00145 or equivalent.
C) Pulse Generator HP 8111A TL # 00138 or equivalent.
D) Quad 50V 1A power supply TL # 00199 or equivalent.
E) Amplifier Card 0471L0301 TL # 00443 or equivalent C<8
F) Component terminal block TL # 00621 or equivalent A<5
G) 24 VDC. Relay 0177A1922 P007 TL # 00199 or equivalent.

SET UP:

A) Connect

1) P50 VDC. To TJ24 of the 0471L0301 card.
2) N50 VDC. To TJ30 of the 0471L0301 card.
3) COMM. To TJ50, TJ51 of the 0471L0301 card.
4) P15 VDC. To 1TB18 of the 0621L0501 card.
5) N15 VDC. To 1TB15 of the 0621L0501 card.
6) COMM. To 1TB16 of the 0621L0501 card. Connect all com's together.
7) the function generator to NO contact of the 24 VDC. Relay.
8) the common contact of the 24 VDC. Relay to TJ44 of the 0471L0301 card. Place a jumper between the NO contact to the common contact. This jumper will be removed at a later step.
9) the TJ48 of the 0471L0301 card to 1TB08 of the 0621L0501 card.
10) the TJ50 of the 0471L0301 to 1TB07 of the 0621L0501 card.
11) the positive terminal of the relay to 1T06 of the 0621L0501 card.
12) the negative terminal of the relay to 1TB05 of the 0621L0501 card.

B) Set

1) number one power supply to P15 VDC.
2) number two power supply to N15 VDC.
3) number three power supply to P20 VDC.
4) number four power supply to N20 VDC.
5) amplitude of the function generator to give a 30v P-P square wave signal at the output of the TL#0443 card.

PROCEDURES: Install .1uF 50V Between 9 & 12
" 68KΩ " 10 & 11

(Static):

A) P10 VDC. Power supply circuit

1) Apply the DC power to the card under test and adjust R8 until cp34 or 1TB14 is P10.0 VDC. ± 100 mV.

B) Voltage sensor circuit

1) Set function generator for 60 HZ.
2) Observe the square wave (slightly ramps up and down) signal on cp02.

C) Reset circuit

1) Observe a positive going pulse @ cp03 of ~100 ms when PB1 is pressed, held, and then released.
2) Observe a positive going pulse @ cp03 of ~100 ms when 1TB03 is connected to 1TB14.
3) Observe LED03 illuminates. Disconnect 1TB3 from 1TB14.

D) Field Application timer circuit

1) Adjust the 30 volt square wave signal for 3.5 HZ.
2) Set R1 CW.
3) Depress PB1 until flip flop OAFR (cp06) switches to a logic "1".
4) Now adjust R1 until flip flop OAFR (cp06) switches to a logic "0".
5) Momentarily depress PB1 and note that flip flop resets (logic 1) and returns to the set state (logic 0).

Circuit will work somewhere
Between 2.9 & 4.1 HZ

E) Field Application Logic circuit

1) Remove cp01 from cp02 and cp28 from cp29.
2) Connect cp02 to COMM and momentarily depress PB1.
3) Observe that cp06-cp08 are a logic "1".
4) Connect 1TB03 to 1TB14.
5) Observe that cp08 switches to a logic "0".
6) Connect 1TB04 to 1TB14.
7) Observe that cp08 switches to a logic "1".
8) Leave 1TB03 connected to 1TB14 but remove the jumper to 1TB04.
9) Remove cp02 from COMM. And reconnect cp01 to cp02.
10) Increase function generator to 20 Hz.
11) Observe the time delay of 10 msec. Between cp08 and 1TB01.
12) Also observe the time delay of 10 msec. Between cp08 and 1TB02.
13) Note that each time 1TB01 is a logic "1" LED04 illuminates.
14) Connect cp28 to cp29.

F) Slip frequency detector circuit

1) Adjust R2-R5 CW.
2) Set the function generator signal to 48 HZ.
3) Momentarily depress PB1 to reset cp13 to a logic "0".
4) Slowly turn R2 CCW. Until cp13 switches to a logic "1".
5) Set the function generator signal to 36 HZ.
6) Slowly turn R3 CCW. Until cp14 switches to a logic "1".
7) Set the function generator signal to 24 HZ.
8) Slowly turn R4 CCW. Until cp15 switches to a logic "1".
9) Set the function generator signal to 12 HZ.
10) Slowly turn R5 CCW. Until cp16 switches to a logic "1".

G) Slip internal timing circuit

1) Set function generator to 60 HZ.
2) Connect 1TB03 to 1TB14.
3) Momentarily depress PB1.
4) Observe the signal on cp20. Low to high.
5) Reduce the frequency to 48 HZ.
6) Momentarily depress PB1.
7) Observe the signal on cp21 go from high to low and back to high.
8) Reduce the frequency to 36 HZ.

9) Momentarily depress PB1.
10) Observe the signal on cp22. Same as 7.
11) Reduce the frequency to 24 HZ.
12) Momentarily depress PB1.
13) Observe the signal on cp23. Same as 7.
14) Reduce the frequency to 12 HZ.
15) Momentarily depress PB1.
16) Observe the signal on cp24. Same as 7.

H) Thermal discharge rate circuit

1) Jumper cp17 to cp18.
2) With R6 CW. Measure -< 1250 mV at CP19.
3) With R6 CCW. Measure -< 250 mV at CP19.
4) Leave R6 CW.

I) Slip timing circuit R7 CCW

1) Open the jumper between 1TB03 and 1TB14.
2) Turn all R7's CCW and toggle power.
3) Measure P175 mVDC. @ cp25A-E
4) Measure N500 mVDC. @ cp26A-E
5) Adjust signal generator for 52 HZ.
6) Switch DC power off. Place Ch1 of scope on cp19 and ch2 on cp25 of circuit A. You will see a 0 volt to –1 volt transition on cp19 and a 0 volt to –10 volt transition on cp25 once power is turned on.
7) Switch DC power back on and connect 1TB03 to 1TB14.
8) Observe that S-IND tries to go to black (if you can see it) within 500 msec. And LED01 of circuit one illuminates. only half flash
9) After 500 msec. LED02 of circuit one illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
10) Observe that S-IND goes to red.
11) Adjust signal generator for 40 HZ.
12) Switch DC power off. Remove jumper at 1TB03. Move Ch2 to circuit B cp25 and observe the same.
13) Switch DC power back on and reconnect jumper at 1TB03.
14) Observe that S-IND tries to go to black within 500 msec. And LED01 of circuit two illuminates.
15) After 500 msec. LED02 of circuit two illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
16) Observe that S-IND goes to red.

17) Adjust signal generator for 30 HZ.
18) Switch DC power off. Remove jumper at 1TB03. Move CH2 to circuit 'C' cp25 and observe the same.
19) Switch DC power back on and reconnect jumper at 1TB03.
20) Observe that S-IND tries to go to black within 500 ms and LED01 of circuit three illuminates.
21) After 500 msec. LED02 of circuit three illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
22) Observe that S-IND goes to red.
23) Adjust signal generator for 20 HZ.
24) Switch DC power off. Remove jumper at 1TB03. Move Ch2 to circuit D cp25 and observe the same.
25) Switch DC power back on and reconnect jumper at 1TB03.
26) Observe that S-IND tries to go to black within 500 msec. And LED01 of circuit four illuminates.
27) After 500 msec. LED02 of circuit four illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
28) Observe that S-IND goes to red.
29) Adjust signal generator for 8 HZ.
30) Switch DC power off. Remove jumper at 1TB03.Move Ch2 to circuit E cp25 and observe the same.
31) Switch DC power back on and reconnect jumper at 1TB03.
32) Observe that S-IND tries to go to black within 500 msec. And LED01 of circuit five illuminates.
33) After 500 msec. LED02 of circuit five illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
34) Observe that S-IND goes to red.

J) Slip timing circuit R7 CW

1) Remove the jumper between 1TB03 and 1TB14 and jumper between the NO and COM contacts of the relay.
2) Turn all R7's CW.
3) Adjust signal generator for 52 HZ.
4) Switch DC power off.
5) Switch DC power back on. Push reset button so S-IND is black. Turn power off to 501 card only and add the jumper between 1TB03 and 1TB14.
6) Turn on power to 501 card. LED01 of circuit one illuminates.
7) After 40 sec. LED02 of circuit one illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
8) Observe that S-IND goes to red.

9) Adjust signal generator for 40 HZ.
10) Switch DC power off and remove jumper between 1TB03 and 1TB14
11) Switch DC power back on. Push reset button so S-IND is black. Turn power off to 501 card only and add the jumper between 1TB03 and 1TB14.
12) Turn on power to 501 card. LED01 of circuit two illuminates.
13) After 40 sec. LED02 of circuit two illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
14) Observe that S-IND goes to red.
15) Adjust signal generator for 30 HZ.
16) Switch DC power off and remove jumper between 1TB03 and 1TB14.
17) Switch DC power back on. Push reset button so S-IND is black. Turn power off to 501 card only and add the jumper between 1TB03 and 1TB14.
18) Turn on power to 501 card. LED01 of circuit three illuminates.
19) After 40 sec. LED02 of circuit three illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
20) Observe that S-IND goes to red.
21) Adjust signal generator for 20 HZ.
22) Switch DC power off and remove jumper between 1TB03 and 1TB14.
23) Switch DC power back on. Push reset button so S-IND is black. Turn power off to 501 card only and add the jumper between 1TB03 and 1TB14.
24) Turn on power to 501 card. LED01 of circuit four illuminates.
25) After 40 sec. LED02 of circuit four illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
26) Observe that S-IND goes to red.
27) Adjust signal generator for 8 HZ.
28) Switch DC power off and remove jumper between 1TB03 and 1TB14.
29) Switch DC power back on. Push reset button so S-IND is black. Turn power off to 501 card only and add the jumper between 1TB03 and 1TB14.
30) Turn on power to 501 card. LED01 of circuit five illuminates.
31) After 40 sec. LED02 of circuit five illuminates and voltage between 1TB05 and 1TB06 drops the relay out.
32) Observe that S-IND goes to red.

K) Sealing of Potentiometers

Seal R2-R5 and R8

END.

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Upgrades

1) Remove and discard resistors R21, R22, R25, R26. Replace with 4 jumpers.
2) Remove trace to 1TB7 and 1TB8.
3) Retrieve four new resistors 0177A1032 P023.
4) Drill six - .042 diameter holes, maintaining a minimum .25 clearance to run on component side. Use diagram as an aid.
5) Connect tops of resistors R26 and R21 to 1TB7 and 1TB8 respectively.
6) Solder bottom leads of R26 and R25 together and bottom leads of R21 and R22 together.
7) Solder lead of R25 to trace that connects to jumper at R26.
8) Solder lead of R22 to trace that connects to jumper at R21.
9) Remark component side with ML621L501 G002 and 199B8510 REV. 2.
10) Remark solder side with 166C7725 REV. 5.