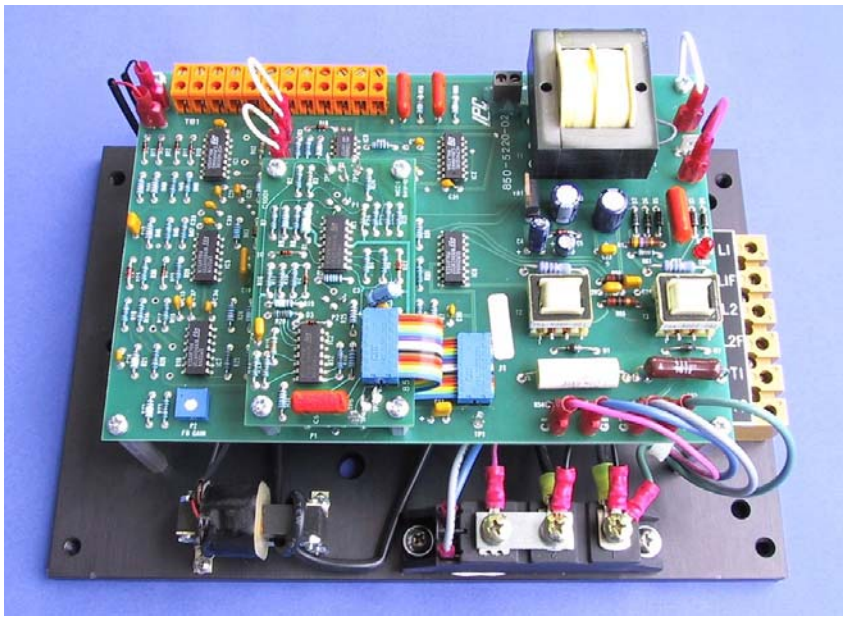
INSTALLING, OPERATING, AND MAINTAINING

MODEL D1000

SINGLE PHASE TRIGGER



REVISED: FEBRUARY 2008

INSTRUCTION MANUAL #910-5252-021

THE MODEL D1000 SINGLE PHASE TRIGGER

DESCRIPTION:

The D1000 is a digital trigger and power controller developed for single phase applications. The digital firing circuits eliminate many of the problems commonly found with analog controls – susceptibility to line distortions, control circuitry noise and drift. The D1000 can be used as a trigger board or a complete power controller with current output capabilities of 30 Amps as standard.

FEATURES:

- Digital Firing
- Current Limiting and Over current Trip Detection
- Open Loop (no external feedback) or Closed Loop Operation
- Regulation of 1% or better
- Fast Response – 16 milliseconds, Open loop
- On/Off Control Switch
- User Trip Input allows an external source to shut down the control.

OPTIONS:

- 4 to 20 milliamp Current Input Control with Gain and Bias Adjustment
- RMS Feedback
- Lower or Higher Output Current Ratings Available

SPECIFICATIONS:

- CONTROL VOLTAGE: 110 OR 220 Volts AC Single Phase
- INPUT VOLTAGE: zero to 10 Volts DC, four to 20 ma optional
- OUTPUT VOLTAGE: zero to 110/220 Volts AC
- CURRENT RATING: 30 Amperes Continuous, 90 Amps peak
- CURRENT LIMIT: User adjustable from 50 to 100%
- OVERCURRENT TRIP: User adjustable from 125 to 250%

DIMENSIONS:

- LENGTH: 10.50 inches
- WIDTH: 7.00 inches
- HEIGHT: 4.25 inches

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LIST OF FIGURES
D1000 HOOK-UP NOTES

SECTION 1
GENERAL INFORMATION

1.1 Introduction:

This manual provides the necessary information to install and operate the **Model 1000 Single Phase Trigger**. It should be read and understood completely before trying to work with the Model D1000. Please feel free to call IPC Automation with any questions you may have **BEFORE** performing installation or start-up.

1.2 Safety:

There are certain fundamental warnings which must be kept in mind at all times. These include:

WARNING:
THE D1000 SINGLE PHASE TRIGGER SHOULD BE INSTALLED, ADJUSTED, AND SERVICED BY QUALIFIED ELECTRICAL MAINTENANCE PERSONNEL FAMILIAR WITH THE CONSTRUCTION AND OPERATION OF ALL EQUIPMENT IN THE SYSTEM: PERSONAL INJURY AND/OR EQUIPMENT DAMAGE MAY OCCUR IF INDIVIDUALS ARE NOT FAMILIAR WITH THE HAZARDS RESULTING FROM IMPROPER OPERATION.

WARNING:
THE USER IS RESPONSIBLE FOR CONFORMING WITH THE NATIONAL ELECTRICAL CODE WITH RESPECT TO MOTOR, CONTROLLER, AND OPERATOR DEVICE INSTALLATION, WIRING AND START-UP. THE USER IS ALSO RESPONSIBLE FOR UNDERSTANDING AND APPLYING ALL OTHER APPLICABLE LOCAL CODES WHICH GOVERN SUCH PRACTICES AS WIRING PROTECTION, GROUNDING, DISCONNECTS, AND OVERCURRENT PROTECTION.

1.3 Warranty:

Standard conditions of sale for the Company include a Statement of Warranty which covers the control equipment. This Statement of Warranty covers all new equipment.

1.4 Q.A. Testing:

Each unit is carefully tested at the factory prior to shipment. The control must pass both Static and Dynamic performance checks as well as Final Inspection for quality of workmanship. A unit is allowed to ship only after acceptance of all aspects of Q.A. Testing and Inspection.

1.5 Storage:

If it should become necessary to store the control for any length of time, the following precautions should be taken:

- Store the control in a clean, dry (non-corrosive location that is protected from sudden temperature changes, high levels of moisture, shock, and vibration.
- Ambient temperature should be maintained between 0 degrees C and 65 degrees C.
- The control should be covered to protect from dust and dirt contamination. (Utilize original shipment packaging if available).

SECTION 2
GENERAL DESCRIPTION

2.1 Introduction:

The IPC Automation Model D1000 Single Phase Trigger uses a combination of analog and digital circuitry to provide a simple yet reliable source of power. The trigger is designed to hard fire a back-to-back SCR configuration producing a variable AC output voltage source.

2.2 Control Specification:

2.2.1 Input: 120/240 VAC Single Phase

2.2.2 Output: 0 to 120/240 VAC Single Phase
30 Amp continuous
90 Amp peak

2.2.3 Control Reference Input:

A. MANUAL INPUT REFERENCE -- An external resistor and potentiometer provides 0 to 10 volts referenced from the internal power supply; or

B. CURRENT INPUT -- Optional current input 0 to 20 MA with gain and bias adjustments located on the C1001 option board.

2.2.4 Feedback:

A. OPEN LOOP -- The control can be operated open loop by installing a jumper on the trigger control board; or

B. DC FEEDBACK – Provides closed loop control and accuracy of the output voltage with adjustable gain. This signal should be a maximum 10 VDC; or

C. AC RMS FEEDBACK – Also provides closed loop control and accuracy of the output voltage with adjustable gain. This signal should be a maximum 12 VAC.

2.2.5 Current Limiting:

This point is adjustable by the use of an external resistor.

2.2.6 Over Current Trip:

Disable the output firing for overload conditions. The trip point is set between 100% and 200% by the OCT potentiometer and an LED indicator is provided for trip indication.

2.2.7 General Specifications:

- Fully isolated;
- Linear firing of output SCR's with relationship to the applied input command;
- Digital firing logic to provide full 180 degree firing range of the output SCR's;
- Picket fence hard-firing of output SCR's.

SECTION 3
INSTALLATION AND START UP

3.1 Introduction:

The following section contains hook-up notes and drawings for the D1000 Single Phase Trigger and C1001 option board.

WARNING:
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3.2 Hook-Up Notes:

3.2.1 Input Line and Output Voltage:

A. L1 and L2 are the input lines to the power section 120/240 VAC;

B. L1F and L2F should be fused input lines to protect the control board (see Figure 1);

C. The AC output is 0 to 120/240 VAC single phase, 30 amp continuous, 90 amp peak.

3.2.2 Input Reference Signal:

The Input Reference signal can either be:

A. Manual Input Reference; or
B. Current Input Option

Each are described as follows:

A. **MANUAL INPUT REFERENCE: (Reference Figure #1):**

1. Attach the “ON/OFF” switch to TB1 terminal 1 and TB1 terminal 2 (see Figure #1)

2. Attach a 5K OHM resistor in series with the low end of a 10K OIHM potentiometer and connect as follows:

TB1 Terminal	Connect
1	Other End 5K resistor
4	Potentiometer wiper
5	High end of potentiometer

3. Monitor the voltage at TB1 terminal 4 with a voltmeter referenced to common (TB1-5 or TB1- 7);

4. With power applied and the on switch closed; check that the range of the potentiometer is from 0-10 VDC at TB1-4.

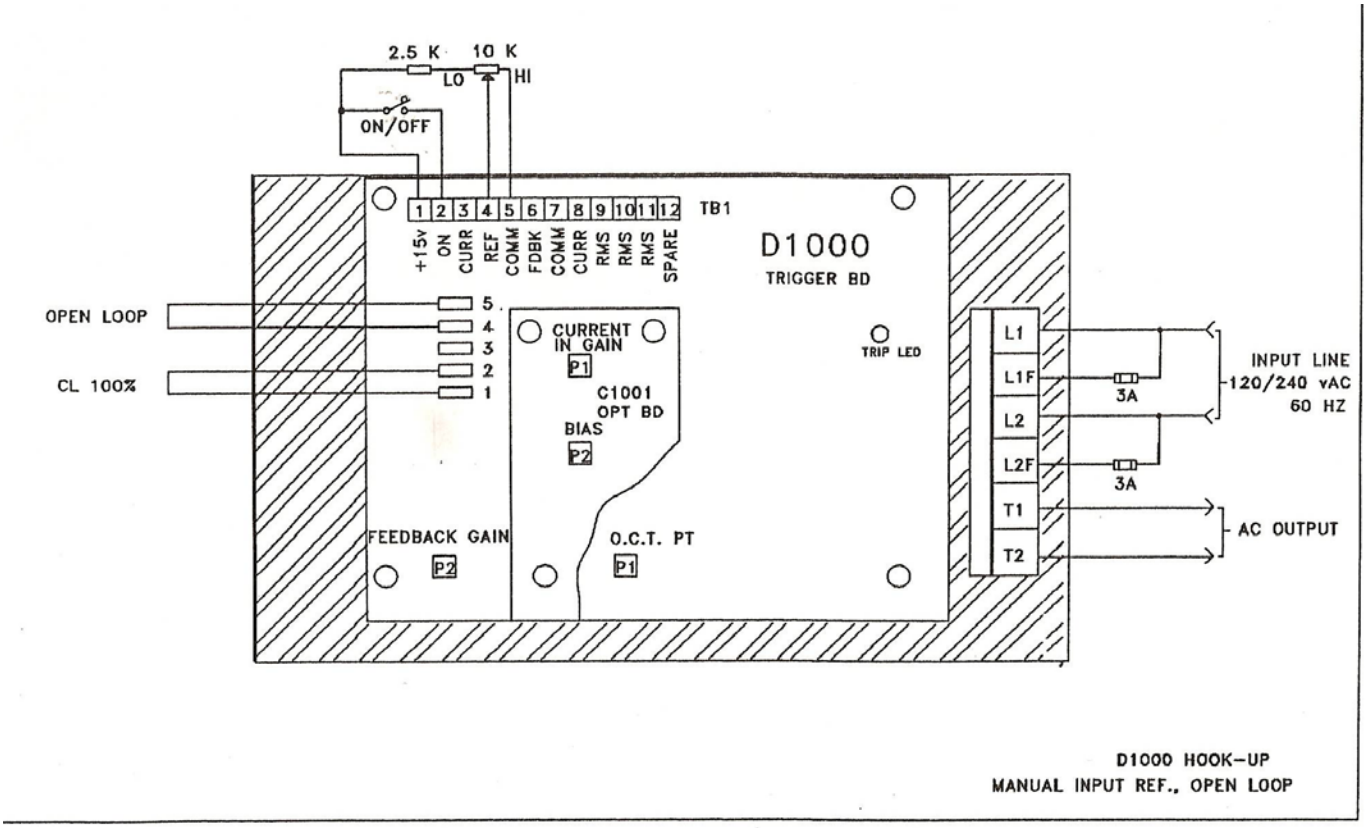


FIG. 1

B. **CURRENT INPUT OPTION (Reference Figures 2, 2.1, and 3)**

STANDARD = 0 – 20 MA

OFFSET MODIFICATION = 4 – 20 MA operation when 750k ohm resistor is present on the bottom of the C1001 Option Board.

1. Attach “ON OFF/RESET” switch as seen in Figure 3 to TB1 terminal 2;

2. When using the current input option the external reference potentiometer **WILL NOT** be used;

3. Turn the bias potentiometer (P2 on the C1001 option board) fully counter-clockwise;

4. Apply maximum current input to TB1 terminal 8;

5. Monitor the voltage at TB1 terminal 3 with a voltmeter;

6. Adjust the input gain potentiometer (P1 on the C1001 option board) for +10V at TB1 terminal 3. This will set the maximum input reference to the control, given the maximum input current;

7. When this point is set at +10V, place a jumper across TB1 terminal 3 and TB1 terminal 4. This will connect the reference signal to the control board. This jumper should be installed **after** the maximum reference point is set;

8. The Bias potentiometer (P2 on the C1001 option Board) can now be adjusted. Continue to monitor the voltage at TB1 Terminal 3 with a voltmeter. With an input signal of 0 MA (4 MA for offset modification) at TB1 terminal 8, adjust the bias for the desired output level (see figure 2, 2.1);

9. The range of the bias potentiometer is as follows:

P2 on option board – Full clockwise = 5V
P2 on option board – Full counter-clockwise = 0V

CURRENT INPUT OPTION

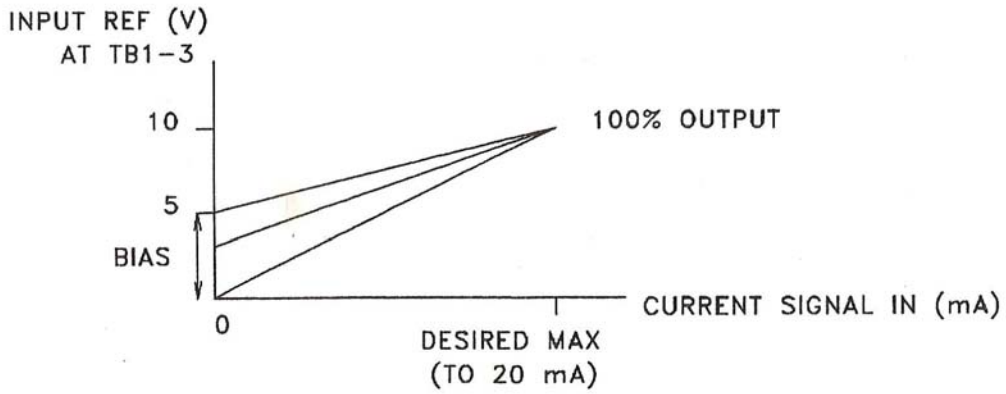
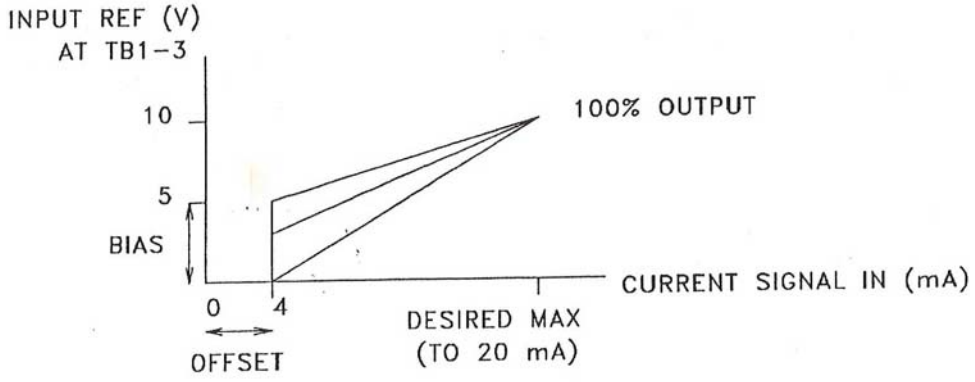


FIG. 2

CURRENT INPUT OPTION

WITH 4 – 20 mA OFFSET MODIFICATION



NOTE: A 750 K OHM RESISTOR ADDED TO THE BOTTOM OF THE C1001 BD INDICATES A 4 mA OFFSET MODIFICATION

FIG. 2.1

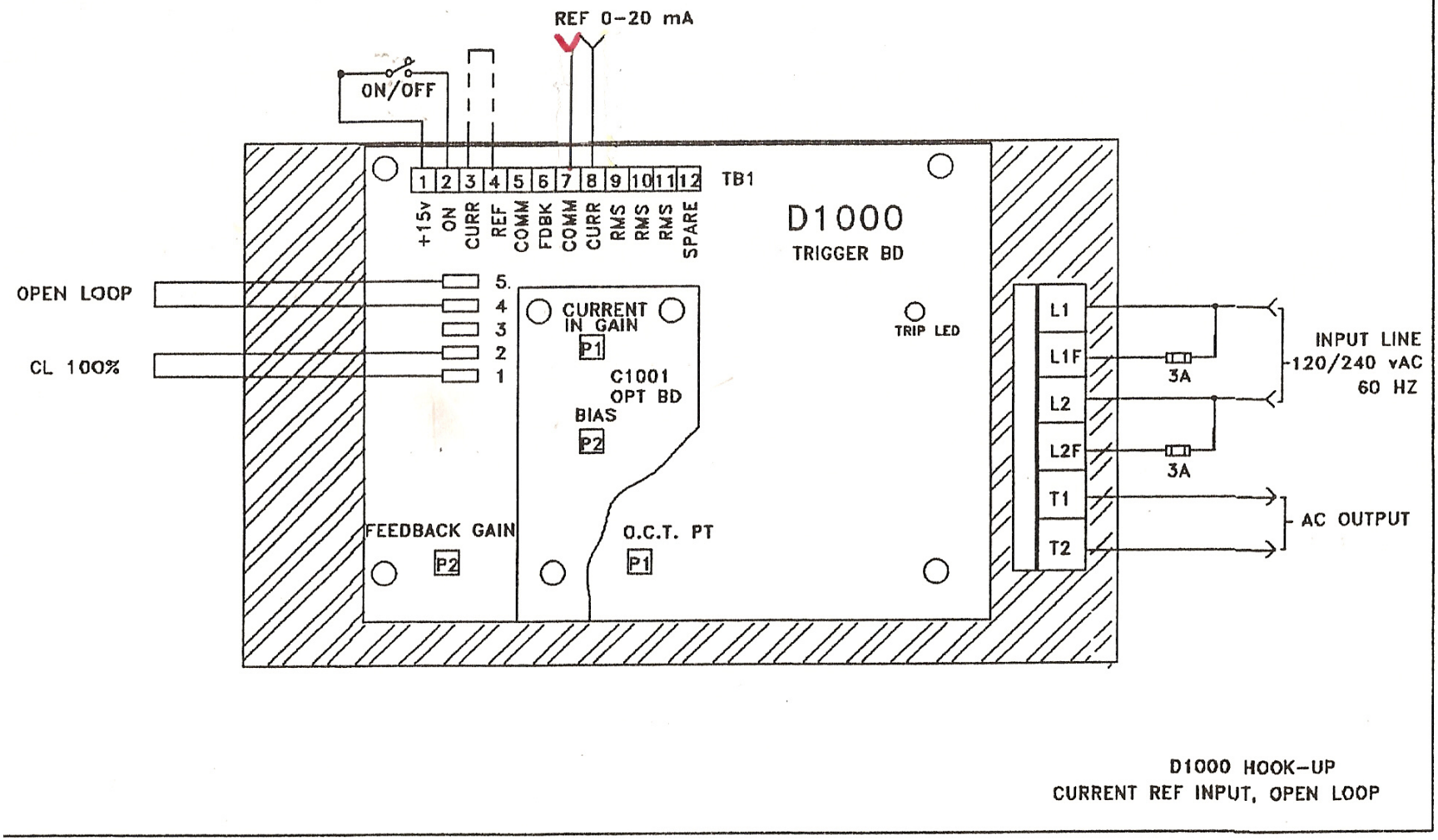

REF 0-20 mA
ON/OFF
1 2 3 4 5 6 7 8 9 10 11 12
TB1
+15v
ON
CURR
REF
COMM
FDBK
COMM
CURR
RMS
RMS
RMS
SPARE
D1000
TRIGGER BD
OPEN LOOP
CL 100%
5
4
3
2
1
CURRENT
IN GAIN
P1
C1001
OPT BD
BIAS
P2
TRIP LED
L1
L1F
L2
L2F
T1
T2
3A
3A
INPUT LINE
120/240 vAC
60 HZ
AC OUTPUT
FEEDBACK GAIN
P2
O.C.T. PT
P1
D1000 HOOK-UP
CURRENT REF INPUT, OPEN LOOP

FIG 3

3.2.3 Feedback:

The Feedback signal can be either:

A. Open Loop; or
B. Closed Loop DC; or
C. Closed Loop AC RMS.

Each are described as follows:

A. **OPEN LOOP (Reference Figure #1)**

1. Place a jumper between quick disconnect terminal stubs #4 and #5 (see Figure 1 or 3) to establish open loop operation;

2. In the open loop mode, the control will regulate on the reference signal only. There should be no signal applied at the feedback point TB1 Terminal 6.

B. **STANDARD DC FEEDBACK (Reference figure #4)**

1. Apply full feedback voltage 1 VDC to 10VDC at TB1 Terminal 6 (see Figure 4);

2. Monitor quick disconnect terminal stub #3 referenced to common (TB1-5 or TB1-7);

3. Apply power, close the “ON/OFF” switch, apply full reference signal (TB1-4 = +10 VDC) and adjust the “Feedback Gain” potentiometer P2 on the D1000 Trigger board for -10 VDC at quick disconnect terminal stub #3;

   WARNING: THE FEEDBACK SIGNAL AT QUICK DISCONNECT TERMINAL STUB #3 SHOULD BE AS CLOSE AS POSSIBLE TO -10 VDC WITHOUT EXCEEDING IT WHEN THE FULL ON REFERENCE SIGNAL IS +10 VDC AT TB1-4.

4. The DC feedback signal is typically high impedance (Z = 10K ohms).

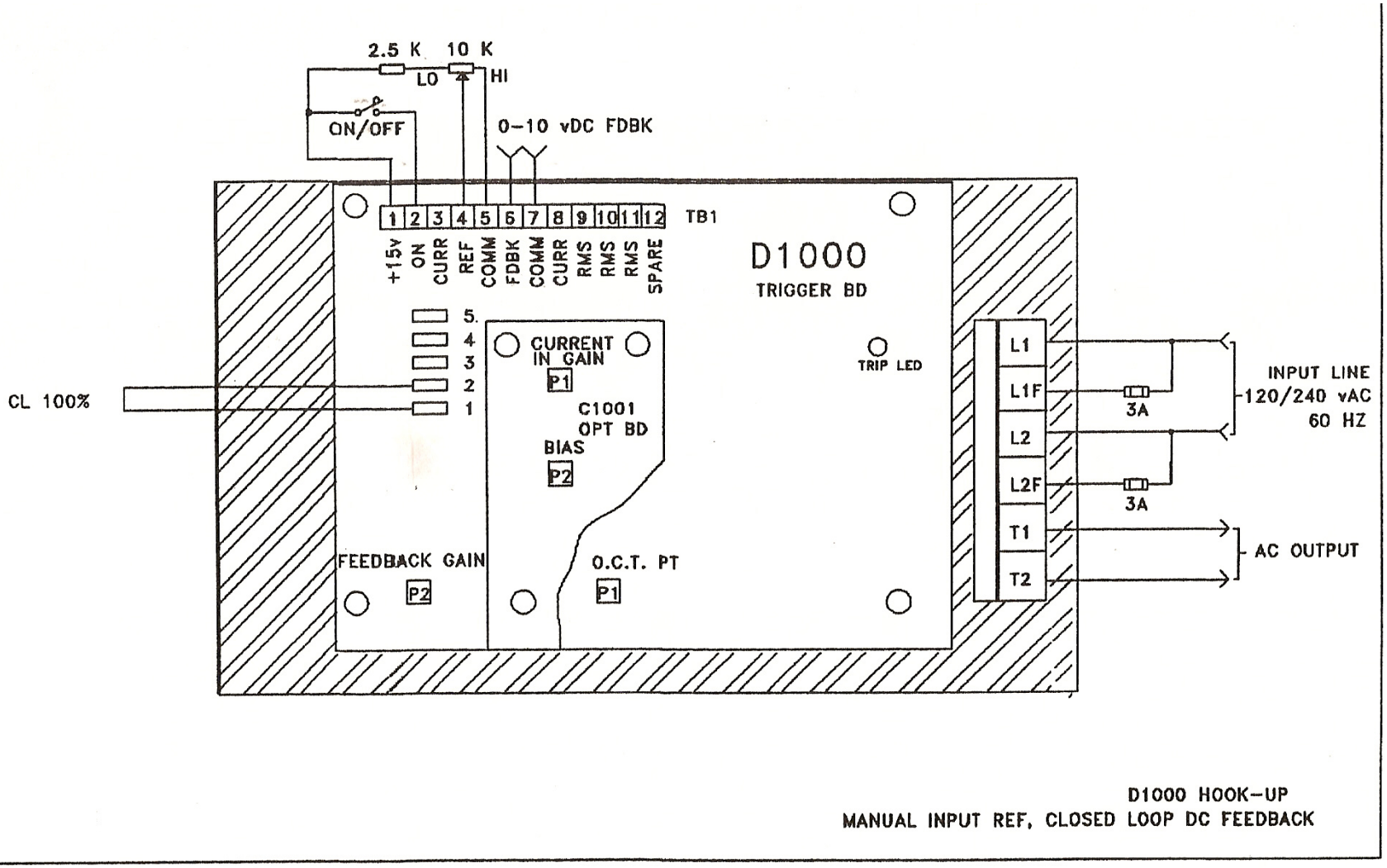

2.5 K
10 K
LO
HI
ON/OFF
0–10 vDC FDBK
1 2 3 4 5 6 7 8 9 10 11 12
TB1
+15v
ON
CURR
REF
COMM
FDBK
COMM
CURR
RMS
RMS
RMS
SPARE
D1000
TRIGGER BD
5
4
3
2
1
CL 100%
CURRENT
IN GAIN
P1
C1001
OPT BD
BIAS
P2
TRIP LED
FEEDBACK GAIN
P2
O.C.T. PT
P1
L1
L1F
L2
L2F
T1
T2
3A
3A
INPUT LINE
120/240 vAC
60 HZ
AC OUTPUT
D1000 HOOK–UP
MANUAL INPUT REF, CLOSED LOOP DC FEEDBACK

FIG. 4

C. **RMS FEEDBACK (Reference Figure 5)**

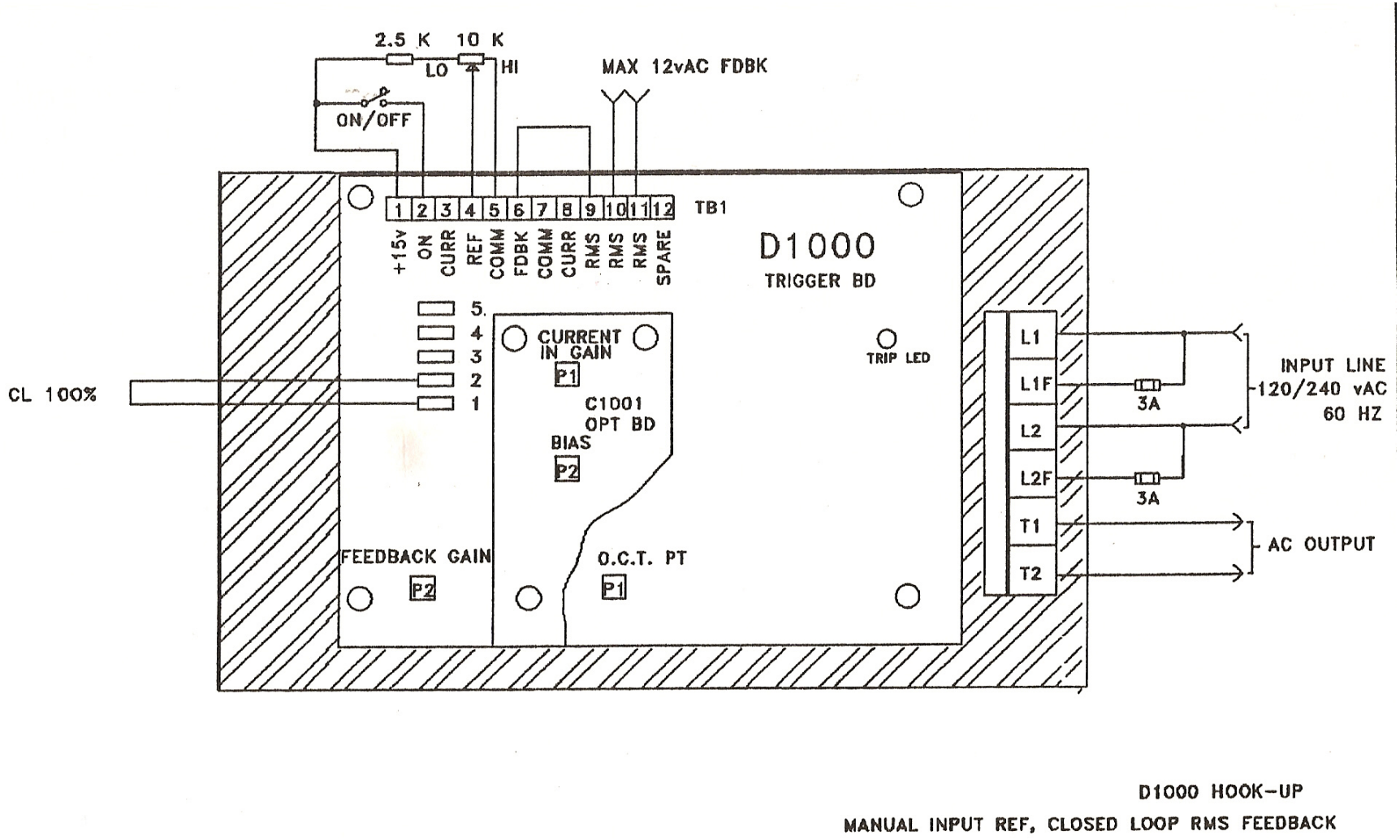
1. Connect a jumper from TB1 Terminal 9 to TB1 Terminal 6 to establish AC RMS feedback operation (see Figure 5);

2. Apply a feedback signal no greater than 12 VAC to TB1 Terminal 10 and TB1 Terminal 11.

3. Monitor quick disconnect terminal stub #3 referenced to common (TB1-5 or TB1-7);

4. Apply power, close the “ON/OFF” switch, apply full reference signal (TB1-4 = +10 VDC) and adjust the “Feedback Gain” potentiometer P2 on the D1000 Trigger board for -10 VDC at quick disconnect terminal stub #3;

   <u>WARNING</u>: THE FEEDBACK SIGNAL AT QUICK DISCONNECT TERMINAL STUB #3 SHOULD BE AS CLOSE AS POSSIBLE TO -10VDC WITHOUT EXCEEDING IT WHEN THE FULL ON REFERENCE SIGNAL IS +10 VDC AT TB1-4.



D1000 HOOK-UP

MANUAL INPUT REF, CLOSED LOOP RMS FEEDBACK

FIG. 5

3.2.4 Current Limit Point:

A. The current limit point is set by placing a resistance between quick disconnect terminals #1 and #2 (see Figure #1);

B. The following chart should be used to set the current limit point:

Resistor	Current Limit Point
0K ohms	100%
20K ohms	75%
40K ohms	50%

3.2.5 Over-Current Trip Point:

A. Potentiometer P1 on the D1000 Trigger board adjusts the point which the control will over current trip;

B. A red LED on the right side of the Trigger board indicates a trip when illuminated;

C. The range of the over current trip potentiometer is as follows:

P1 on Trigger board -- Full Clockwise = 250% of full load

P1 on Trigger board – Full Counter-clockwise = 125% of full load