



TDA

Thermocouple DIN Alarm
USER'S MANUAL

April 1990

No. 190-709-00B

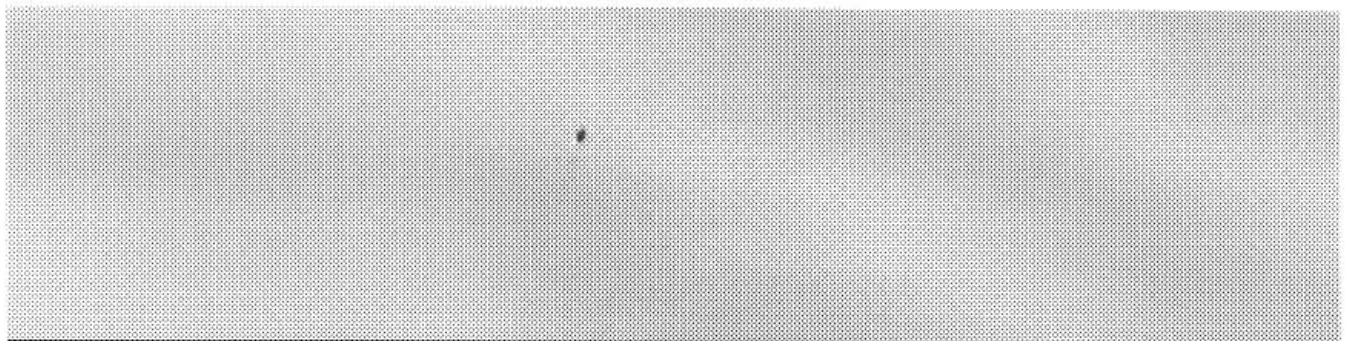


Table of Contents

Introduction	1
Description	1
Calibration	4
Installation	11
Operation	14
Theory of Operation	15
Maintenance	16
Troubleshooting	16

48^{HR.} DELIVERY



United States/Canada

TOLL FREE
1-800-999-2900

16650 Schoenborn Street
Sepulveda, California 91343, U.S.A.
Tel: (818) 894-7111 • Tlx: 65-1322
FAX: (818) 891-3297
CONNECT (MacNet): MIISEPULVEDA

United Kingdom

FREE PHONE
0800 525107

18 Royce Road, Crawley
W. Sussex RH10-2NX, United Kingdom
Tel: 0293 514488 • Tlx: 87667
FAX: 0293 36852

Australia

TOLL FREE
008 251928

3/18 Resolution Drive, Carlingbah
New South Wales 2229, Australia
Tel: (02) 525-9177 • Tlx: 790-75914
FAX: (02) 525-7296

Ask for the STAR Center

Moore Industries' STAR* Center has a wide variety of quality instrumentation in stock and ready to ship.

- Signal Transmitters
- Temperature Transmitters
- P/I and I/P Converters
- Isolators and Converters
- Indicators and Displays
- Alarm Trips
- Integrators and Totalizers
- Power Transducers
- Instrument Power Supplies
- Racks, Rails and Enclosures

Most instruments can be customized to meet your needs. Even then, you'll never have to wait more than a few days.

Moore Industries

STAR
CENTER

* Support, Technical Assistance, and Repair (our Quick-Ship Facility)

Introduction

This manual contains descriptive, calibration, and maintenance information on Thermocouple Alarm, model TDA. The TDA accepts all standard ISA thermocouple types and produces a signal that operates an alarm system. The TDA may be configured as a single alarm with one relay or as a dual alarm with two relays (operating from one signal).

There is an LED indicator, in series with each relay coil, to indicate when a relay is energized. The unit normally operates in failsafe mode; the relay is energized in the normal condition and is de-energized under alarm conditions or power loss.

Description

The TDA is a 4-wire alarm unit in DIN-style housing. The unit features an LCD display in 0.25-inch black numerals over a reflective background. There are 3-1/2 active digits with a decimal point and minus sign to show ranges -5.0 percent to 105.0 percent. The display shows the trip point value and input value as a percent of span. These values are switch-selectable by a rotary switch on the front panel of the unit.

Jumpers on a printed circuit board allow each channel to be set to a high or a low alarm and allow selection of upscale or downscale drive on open input. Trip point controls allow the alarm to be set to trip at any point over the input range. Trip point potentiometers are provided to set the point at which each of the alarm relays changes state. With a failsafe high alarm, the relay is de-energized when the input signal is above the trip point. The relay is de-energized when the input signal is below the trip point for a failsafe low alarm. See figure 1.

The TDA can have relay outputs or opto-isolated outputs. The opto-isolated outputs are open-collector transistor switches. These switches may be used to control solid-state relays which in turn may control heaters, pumps, and other power equipment. The standard outputs for single alarm units are double-throw relays; dual alarm units have single-pole, double-throw relays.

The TDA has an optional built-in intrinsic safety circuit. The circuit allows inputs to be accepted directly from primary elements in hazardous locations without the need for external barriers in the process loop.

Standard features provided with the TDA include: (1) complete isolation of the input, output, and power terminals to prevent false signals due to ground loop currents; (2) inherent RFI protection; and (3) reduced power supply requirements over industry-standard alarm modules.

A complete set of specifications for the TDA is shown in table 1. This specification contains complete information on input, controls, and performance.

Serial Number. A complete history is kept on every Moore Industries unit. This information is keyed to the serial number. Whenever service data is required on a unit, it is necessary to provide the factory with the serial number. This information is located on the same label as the model number, which is explained in the paragraph which follows.

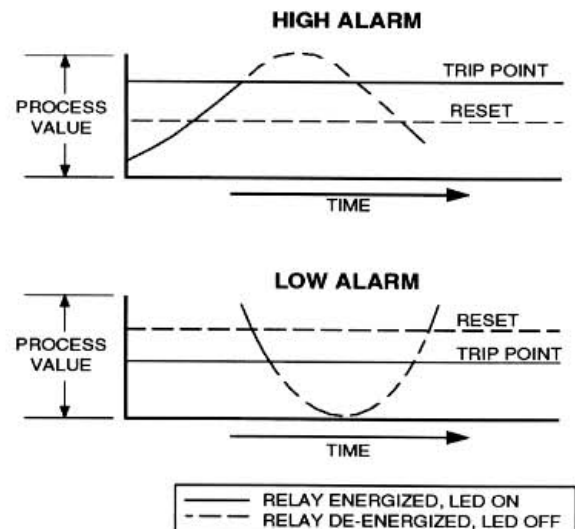


Figure 1. Normal Failsafe High and Low Alarm Configuration

Table 1. TDA Specifications

Characteristic	Specifications
Input	Specify type of thermocouple and input span in millivolts change and/or specify range in degrees C or F. Ranges (in ISA thermocouple types B , E , J , K , R , S , and T and BS type N): 5MV 5 millivolt change 10MV 10 millivolt change 25MV 25 millivolt change 50MV 50 millivolt change 75MV 75 millivolt change
Output	The standard output is a DPDT relay for single alarms and two SPDT relays for dual alarms Relay Contact Ratings: Relay contacts are rated 5A @ 117Vac or 28Vdc; or 2A @ 240Vac (all non-inductive loads, 50/60 Hz)
Power Requirements	24DC: Accepts 18-30Vdc (1.0 -1.5 watts, nominal)
Performance	Repeatability: Trip point repeats within $\pm 0.1\%$ of input span Deadband: 1% of input span standard Alarm Response: 50 milliseconds standard. (Input signal must be beyond trip point continuously for 50 milliseconds before an alarm state is output.) Signal Response: -3dB @ 5Hz typical (low pass) Line Voltage Effect: $\pm 0.005\%$ / 1% line change Burnout Protection: Upscale/downscale drive jumper-selectable; configured for upscale drive at factory standard (downscale drive with -DD option). 100nA (nanoamps) maximum bias current, including break detection
Isolation	500Vac, input to output to power
RFI/EMI Effect	With field strengths of 10 volts per meter, at frequencies of 20-500MHz, unit will not go into alarm status unless process variable is within $\pm 1.0\%$ of trip point
Controls (Front Panel)	Trip Points: Multi-turn front panel potentiometers adjust over a range of -5% to 105% of span, typical Input/Trip Point Viewing: Rotary switch allows selection of viewing input, Trip A or Trip B on front panel LCD
Adjustments (Internal)	Deadband: Adjustable deadband 1-20% of span, nominal (-AD option) Zero: Adjustable to $\pm 20\%$ of span Span: With full-scale input, output is adjustable to 100% $\pm 20\%$

NOTE: Refer to the Installation Section for outline dimensions.

Table 1. TDA Specifications (continued)

Characteristic	Specifications
Indicators	<p>Display: 3-1/2 digit LCD displays either input, Trip A, or Trip B as determined by rotary switch. Display indicates from -5.0% to 105% of input span and is linear with respect to the input signal</p> <p>Trip Point: LED on front panel indicates alarm status for each trip point ("ON" LED indicates energized relay)</p> <p>Display Accuracy: $\pm 0.1\%$ of input span ± 1 count to include repeatability, hysteresis, and adjustment resolution</p> <p>Relay Status: LEDs light when relays are energized</p> <p>Alarm Status: Jumper-selectable for high/low status</p>
Ambient Temperature	<p>Range: 0° to 150°F (-18° to 65°C)</p> <p>Effect on Amplifier: 0.018% of span /°C</p> <p>Reference Junction Compensation: For ISA thermocouple types B, E, J, K, R, S, and T and BS type N -- $\pm 1^\circ\text{C}$, maximum error per 50° C ambient change</p>

Model Number. Moore Industries' model numbers identify the type of instrument, functional characteristics, operating parameters, any options ordered, and housing. If all accompanying documentation of a unit is missing, the model number can be used to obtain technical information. The model number for the TDA is located on a label on the rear of the housing.

Each field in a model number has important significance. The fields are as follows:

Unit / Input / Output / Power / Options [Housing]

Unit -- In this field, the designation for your unit is specified. For this unit, the designation is **TDA**. Other units use other designations (RDA, MDA, etc.)

Input -- In this field, the thermocouple type and millivolts of change are specified. For example, if your TDA is a type K, 25-millivolt unit, this field will be identified as **K-25MV**. Note that the bolded designation corresponds to the specifications in table 1.

Output -- In this field, the type of alarm output in your TDA is specified. For example, if your TDA is a dual with failsafe alarms, 1 high, 1 low, this field will be identified as **DH1L1**. Note that the bolded designation corresponds to the specifications in table 1.

Power -- In this field, the power requirement for your TDA is specified. This field is simply identified as **24DC**, although the unit is capable of receiving 18-30Vdc. Note that the bolded designation corresponds to the specifications in table 1.

Options -- In this field, all of the options contained in your TDA are specified. This field can be quite lengthy, depending on how many options you have. For example, if your TDA has double-pole, single-throw normally open relays and a 5-millivolt elevated zero, this field will be identified as **-DPSTNO -EZ5**.

[Housing] -- In this field, the type of housing in which your TDA is enclosed is specified. The housing type used is a DIN, which is specified by **DIN**.

Here is an example of what your model number would appear as if your TDA contained all the specifications described in the foregoing paragraphs:

TDA/K-25MV/DH1L1/24DC/-DPSTNO -EZ5 [DIN]

TDA

Calibration

This section contains information necessary to adjust and calibrate the unit. Each unit is adjusted and checked at the factory for proper performance before shipment.

After the TDA is unpacked, general operation level checks of the individual unit are recommended. Generally these checks, which are specified in the Calibration Procedures paragraph, require little or no adjustment.

Adjustments

The following adjustments consist of a multi-turn potentiometer that is adjustable with a slotted screwdriver. The type of potentiometer used with these adjustments requires fifteen turns of the shaft to move the wiper from one end of its range to the other.

All potentiometers are equipped with a slip clutch at each end to prevent damage if the adjustment is turned beyond the wiper stop. Usually a slight change can be felt when the clutch is at the end of a range (i.e., slipping). However, if this change is not felt, either end can be reached by turning the shaft fifteen turns in the desired direction.

Trip Point. The TDA has trip point potentiometers located on the front panel of the unit. For single alarm units, the potentiometer is labeled "TRIP A"; for dual alarm units, the potentiometers are labeled "TRIP A" and "TRIP B." A trip point value is displayed in percent of span when the selector switch is in the trip position.

Selector Switch. A rotary switch on the front panel selects input or trip point values shown on the LCD.

Zero and Span. The Zero (R540) and Span (R507) potentiometers adjust the input range to zero percent and 100 percent. They are located inside the unit.

To adjust these potentiometers, partial disassembly of the unit is required. To access the potentiometers, use a screwdriver to release the tabs on both sides of the unit and pull the front panel straight out. Attached to the inside of the front panel are five printed circuit (PC) boards. The Zero and Span potentiometers are located on PC5, one of the side PC boards. See figure 2.

Deadband. For units with the -AD (adjustable deadband) option, adjustment potentiometers are provided inside the unit. R424 is for single alarm units, and R424 and R425 are for dual alarm units. To adjust these potentiometers, partial disassembly of the unit is required. To access the potentiometers, use a screwdriver to release the tabs on both sides of the unit and pull the front panel straight out. Attached to the inside of the front panel are five PC boards. The deadband potentiometers are located on PC4, the rear printed circuit board. See figures 2 and 3.

Reference Junction Compensation. The Cal (R539) potentiometer, located inside the unit, is factory set for compensation of ambient temperature variations. Contact the factory for details about this adjustment.

Refer to the Calibration Procedures paragraph for step-by-step instructions to adjust the potentiometers.

Indicators

LEDs associated with each output relay are included on the front panel of the unit as a standard feature. These LEDs inform the User when a relay is energized (see figure 1). LEDs are labeled "A" and "B" on dual alarm units, and "A" on single alarm units.

NOTE

Failsafe considerations are such that the relay energizes in the normal condition and de-energizes either upon alarm or power loss to the unit. LEDs illuminate when relays are energized.

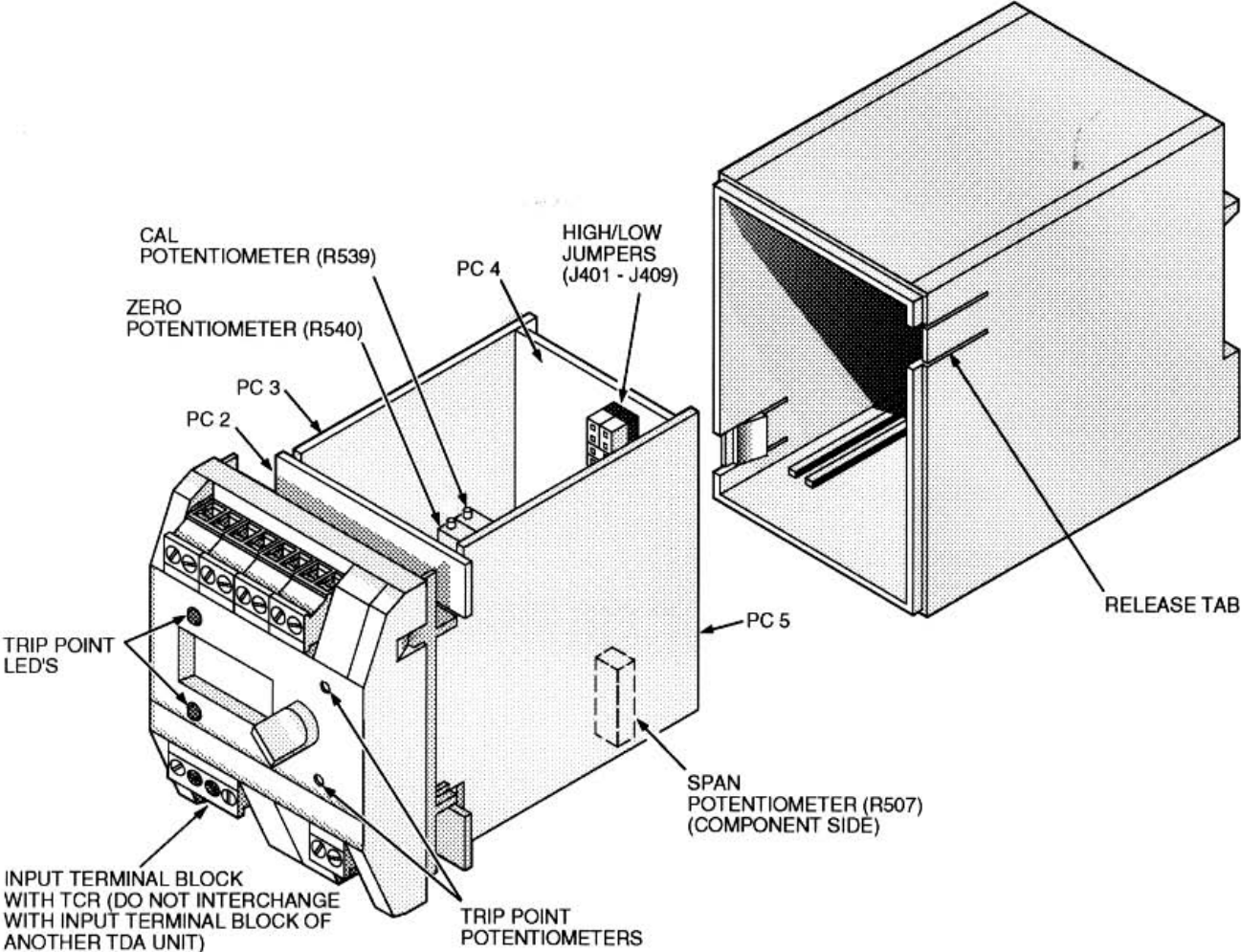


Figure 2. Disassembly Diagram

TDA

Jumpers

Solderless jumpers are used to set high or low alarms and upscale or downscale open input drive. To verify or change jumper settings in the field, partial disassembly of the unit is required. To access the jumpers, use a screwdriver to release the tabs on the sides of the housing and slide the front panel out. Attached to the inside of the front panel are five PC boards. The alarm status jumpers are located on the rear printed circuit board, PC4, and the upscale/downscale drive jumpers are located adjacent to the Span potentiometer on PC5. See figures 2 and 3 and refer to table 2.

Table 2. Alarm Status

Status	Install Jumpers
A Low	J402, J404
A High	J401, J403
B Low	J407, J409
B High	J406, J408

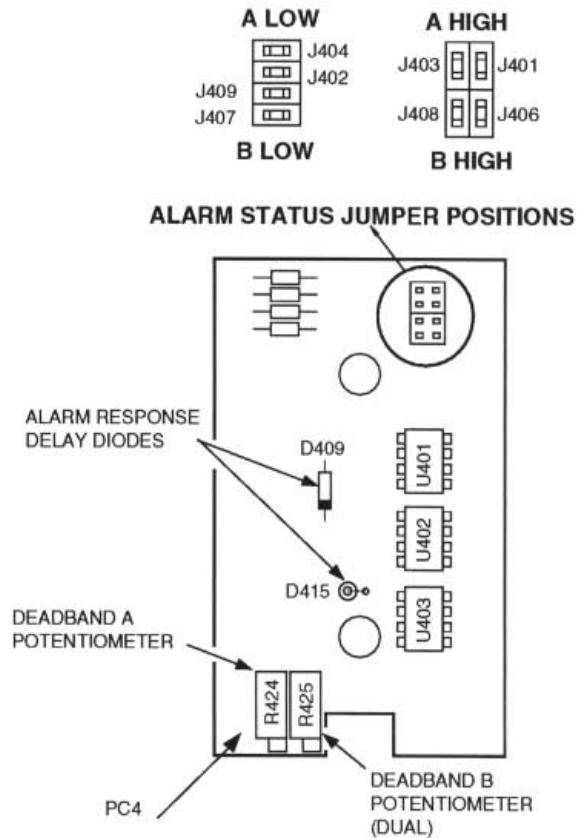
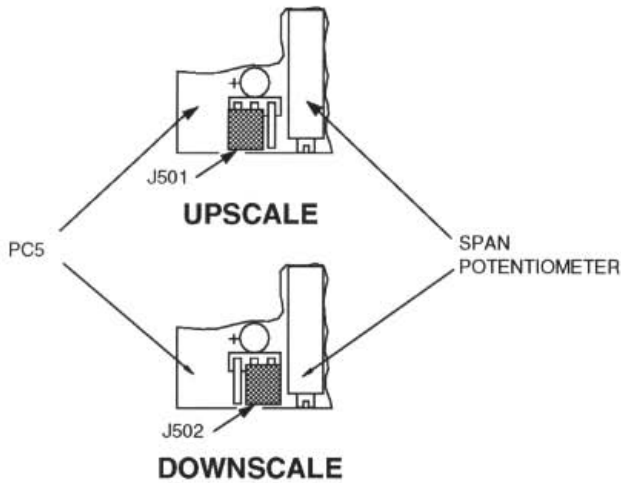


Figure 3. Jumper and Component Location Diagram

Equipment

Calibration equipment is listed in table 3. This equipment is not supplied with the unit and must be provided by the User.

There are two options shown in the calibration setup diagrams. If the unit has relay outputs, an ohmmeter is used to monitor output states. If the unit has opto-isolated transistor switch outputs, a dc voltmeter and load resistor are used.

Setup

Off-line calibration for all TDA units generally requires the same test equipment setup. Separate configurations are shown for clarity. The calibration setups for single alarm units are shown in figures 4 and 5. The calibration setups for dual alarm units are shown in figures 6 and 7.

When connecting this equipment to the TDA, a slotted screwdriver of the appropriate size should be used. Wire terminations are clearly marked on the TDA.

Table 3. Calibration Equipment

Equipment	Description
Screwdriver (slotted)	Head width no greater than 0.1 inch (2.54mm)
Adjustable Thermocouple Simulator	Must be capable of simulating specified thermocouple and input range
Ohmmeter (optional)	Accurate to within 1%
Power Supply	24Vdc @ 1A

TDA

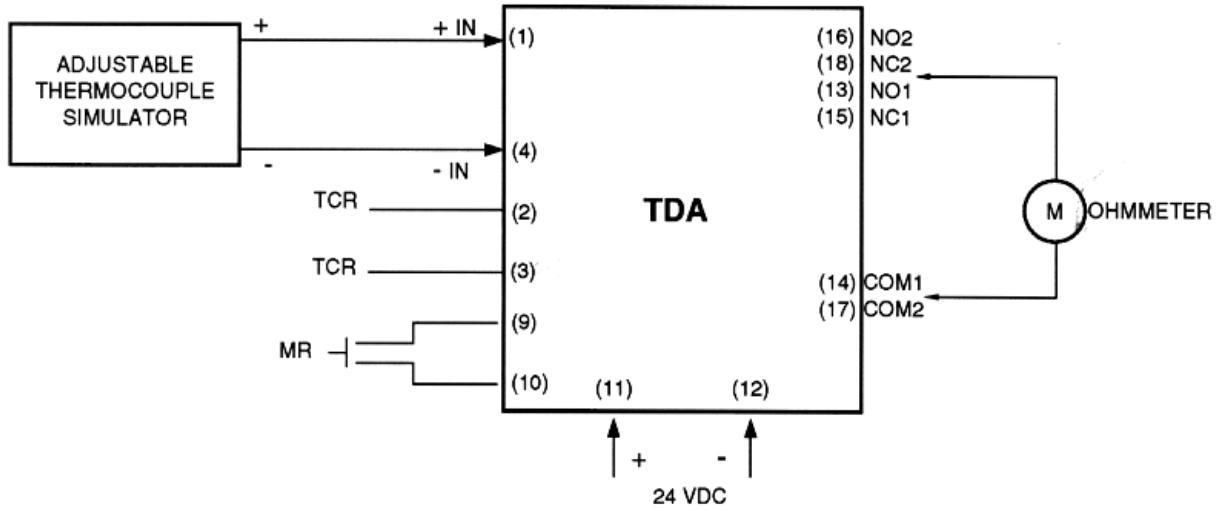


Figure 4. Calibration Setup for Single Alarm Units with Relay Outputs

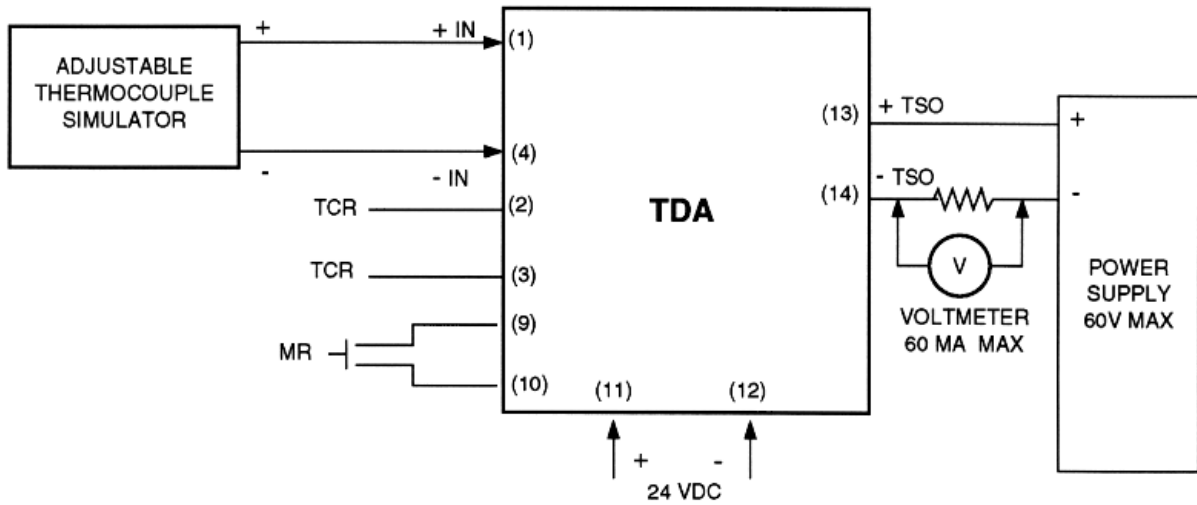


Figure 5. Calibration Setup for Single Alarm Units with Opto-isolated Outputs

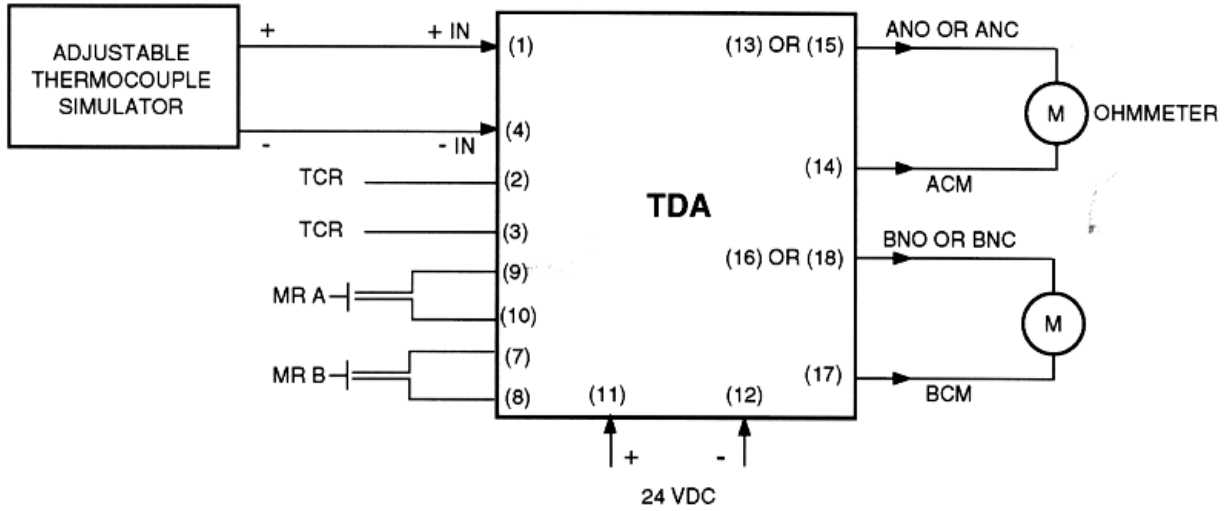


Figure 6. Calibration Setup for Dual Alarm Units with Relay Outputs (SPDT)

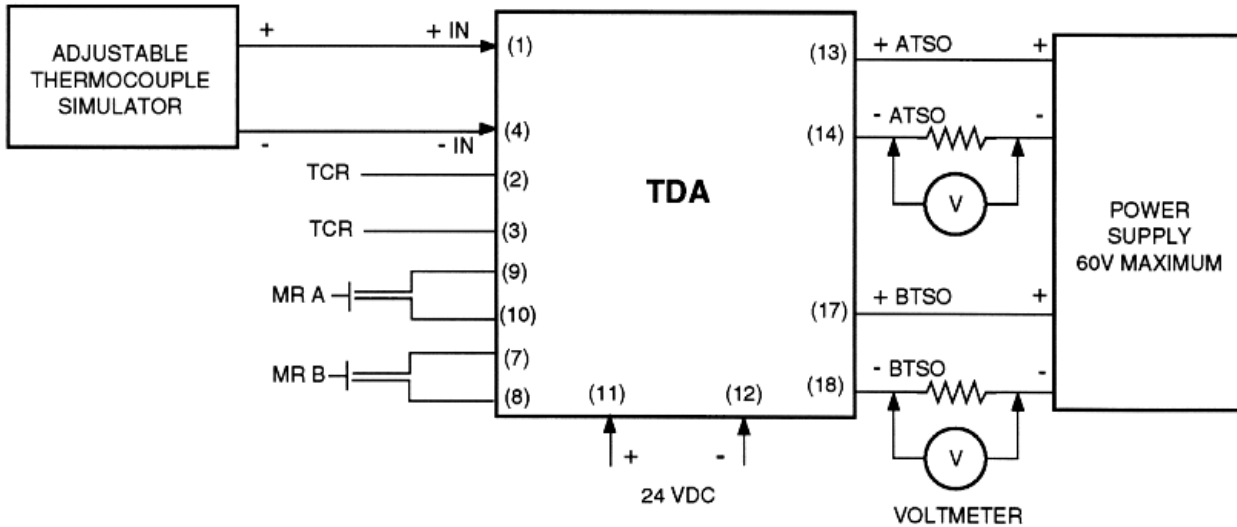


Figure 7. Calibration Setup for Dual Alarm Units with Opto-isolated Outputs

TDA

Calibration Procedures

Calibration consists of simulating an input signal to the TDA, monitoring the input value on the LCD, and adjusting the controls to obtain the desired value. Trip point settings are also set and verified. The TDA has an LCD, which shows the trip point value and input value as a percent of span.

To calibrate a TDA, the unit must be partially disassembled. Refer to the Adjustments paragraph and see figures 2 and 3.

WARNING

*A temperature compensating resistor (TCR) is mounted on the input terminal block for reference junction compensation. The unit has been calibrated at the factory for the TCR shipped with the unit. Do **NOT** interchange the input terminal block with that of another TDA unit.*

1. Verify that jumpers J401 through J409, located on PC4, are set for a high or low alarm, as required. Refer to table 2 and see figure 3.
2. Using the correct type of thermocouple extension wire, connect a thermocouple simulator to the input of the TDA. Connect an 18-30Vdc power source. See figures 4 through 7.
3. Turn the selector switch to the INPUT position.
4. Apply power to the unit and apply the thermocouple simulator input equal to zero percent of the input range.
5. The display should read 00.0 percent.
6. If the display does not read 00.0 percent, adjust the Zero potentiometer (R540) located on PC5 for 00.0 percent. See figure 2.

CAUTION

To avoid damaging the potentiometers, use a screwdriver with a head no wider than 0.1 inch (2.54mm) to adjust the Zero and Span potentiometers.

7. Adjust the thermocouple simulator to 100 percent of the input range.

8. The display should read 100.0 percent.
9. If the display does not read 100.0 percent, adjust the Span potentiometer (R507) located on PC5 for 100.0 percent. See figure 2.
10. Repeat steps 4 through 6 to verify a zero percent reading.
11. Apply 0, 25, 50, and 75 percent of the millivolt input range.
12. Observe the LCD at each setting in step 11 and verify the input is linear for the range selected.
13. Turn the selector switch on the front panel to TRIP A.
14. Set the TRIP A potentiometer on the front panel to the desired trip point value in percent of span.

NOTE

The LCD display shows readings in percent and tenths of percent so trip settings are very accurate.

15. For dual alarm units, repeat steps 13 and 14 for TRIP B potentiometer.
16. Open the input and verify that the display reading goes upscale or downscale with the DD option. See figure 3 for the jumper position to configure upscale or downscale drive.

Calibrating a Unit with the AD Option

The Adjustable Deadband (AD) option provides an adjustable 1-20 percent deadband from the trip point (available to 100 percent). When the controlled variable is within this range, no control action takes place.

1. Turn Deadband A Potentiometer (R424) fully clockwise. See figure 3.
2. Turn TRIP A potentiometer to mid-range.
3. Apply power to the unit.

4. Apply an input signal equal to the value of TRIP A (in percent).
5. Slowly turn TRIP A potentiometer until the unit alarms.
6. Increase or decrease the input level by an amount equal to the percent of desired deadband. Slowly turn Deadband A potentiometer counter-clockwise until the alarm resets.
7. Re-check the trip and reset action of the alarm.
8. For dual alarm units, repeat steps 1 through 7 for TRIP B potentiometer and Deadband B potentiometer (R425).

Calibrating a Unit with the AR Option

The Alarm Response Delay (AR) option introduces a time delay in the unit. This makes calibration difficult because the user must wait for the delay time to see if the trip points have been tripped. The delay may be defeated by short-circuiting diodes D409 and/or D415. See figure 3. Take extreme care in shorting diodes, as damage may occur if diodes are accidentally shorted to other parts.

Calibrating a Unit with the MR Option

If the Manual Reset (MR) option is present on your unit, the deadband circuit is not available. Verify that the unit latches upon alarm. Verify that the unit resets by changing the input signal to a non-alarm level and then shorting the MR terminals together with an external, normally open (NO) momentary switch.

Installation

This section contains physical mounting dimensions, installation procedures, and electrical connections.

The units are designed to operate in free air at a high ambient temperature. However, it is recommended that if a large number of units are mounted together on a rail or in a cabinet, attention should be given to providing adequate access to the screwdriver slot underneath the unit, which permits releasing the unit from the rail (see figure 8). In addition, input and output values should be checked, on-site, before the unit is placed into service.

Mounting

The TDA is enclosed in a thermoplastic, DIN-style rail-mount housing with removable terminal blocks; this housing allows for high density control-room or field-mount installation. Approximately 1.25 inches of clearance should be maintained above and below the unit for ease of installation and removal. Figure 8 contains the mounting dimensions of the unit.

To mount or remove the housing from the top hat-rail, insert a slotted screwdriver into the space provided underneath the unit as shown in figure 8. Use a lever-type action to release the catch.

Electrical Connections

All electrical connections to the TDA are made to the terminals on the front of the unit; the terminals are clearly marked; refer to table 4. Special wire or cable is not required for signal connections to the unit (the terminals are designed for 16 AWG, maximum).

Figure 9 illustrates a typical hookup diagram for a unit with relay outputs. Figure 10 shows a typical hookup diagram for a unit with opto-isolated outputs and a load resistor. Figure 11 shows a typical hookup diagram for a unit with opto-isolated outputs and a relay coil. Note that a diode must be put in parallel with the relay coil as shown in figure 11 to prevent damaging the transistor. The diode "clamps" the applicable voltage in the event of a coil-induced switching transient.

The TDA operates from an 18 to 30 volt dc power source.

TDA

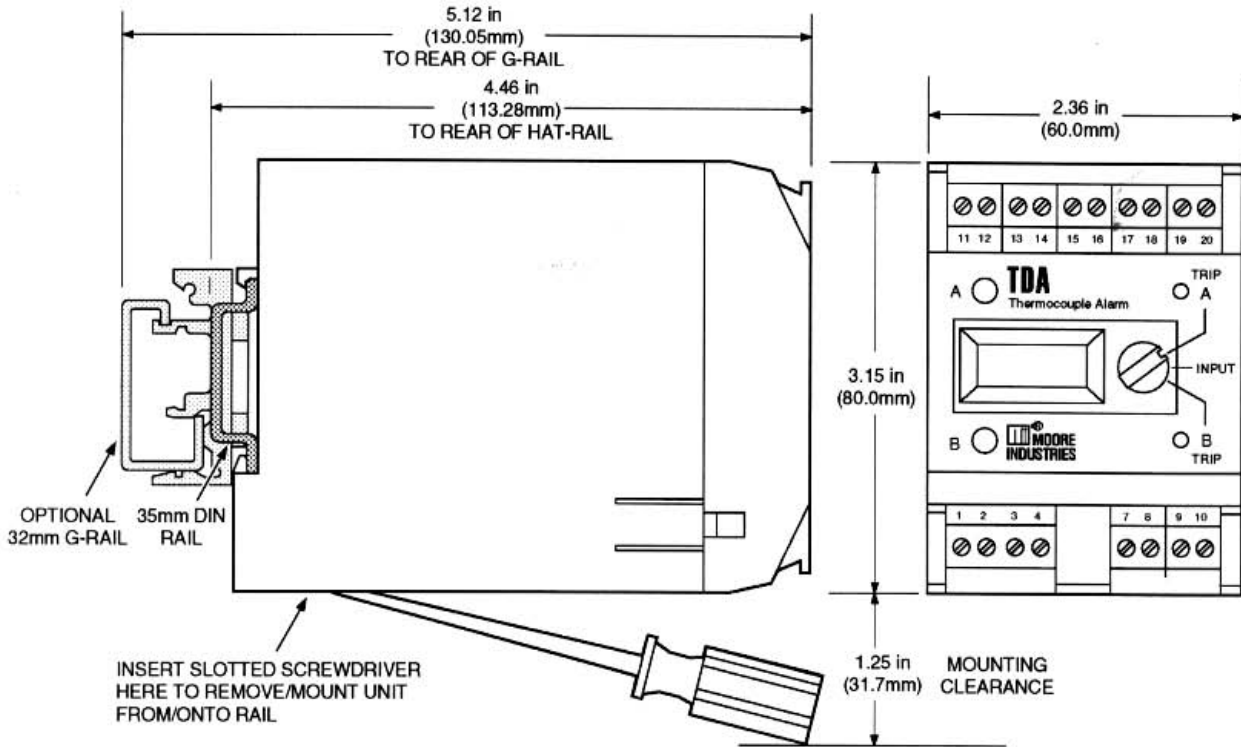


Figure 8. Mounting Dimensions

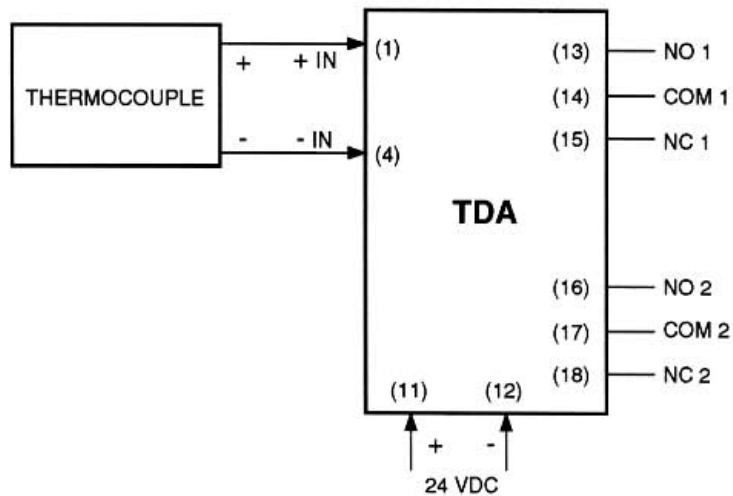


Figure 9. Hookup Diagram for Relay Outputs

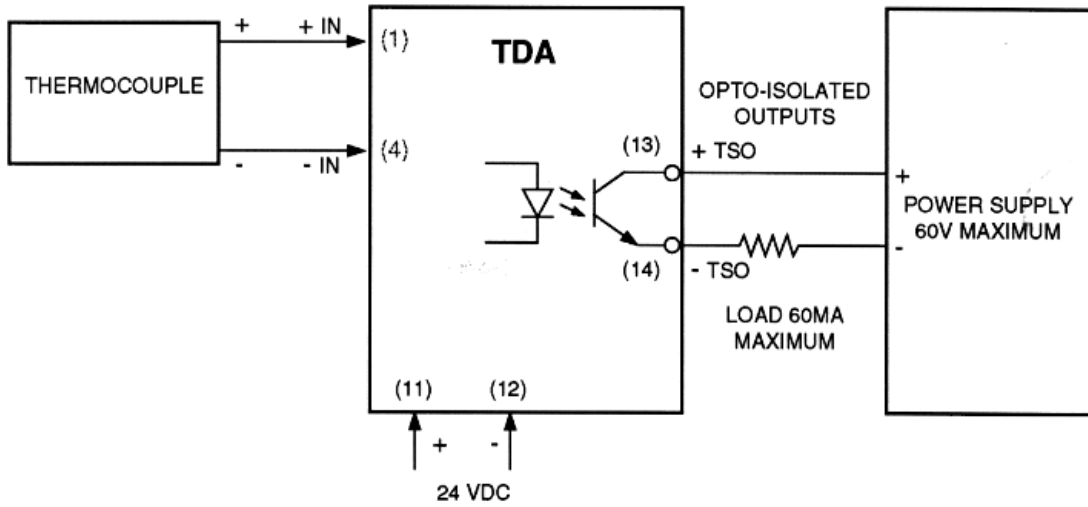


Figure 10. Hookup Diagram for Opto-isolated Outputs and Load Resistor

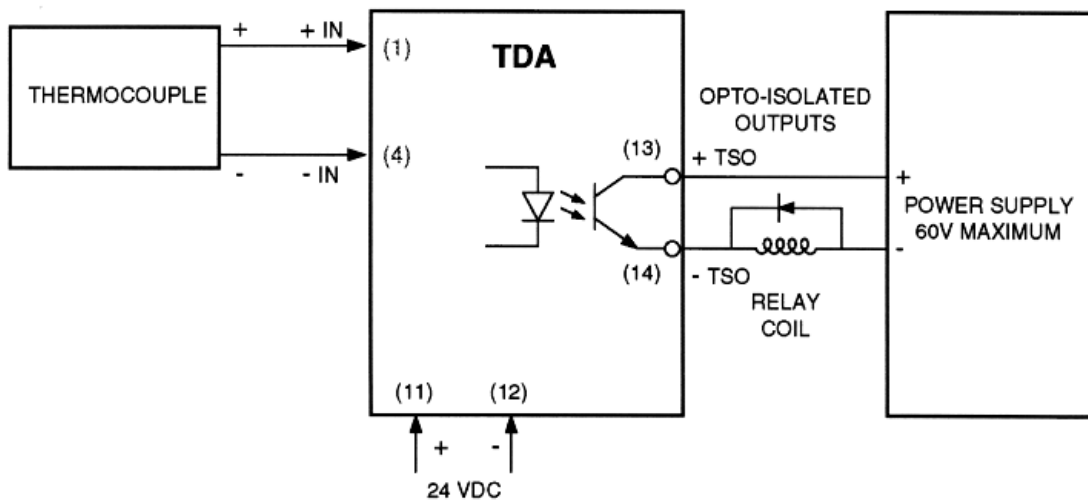


Figure 11. Hookup Diagram for Opto-isolated Outputs and Relay Coil

Table 4. Terminal Designations

Configuration	Terminals																		
	1	2 /3	4	5/6	7*	8*	9*	10*	11	12	13	14	15	16	17	18	19	20	
Single/DPDT	+IN	TCR	-IN	NOT USED			MR	MR	DC	DCC	NO1	CM1	NC1	NO2	CM2	NC2			
Single/Switch Out	+IN	TCR	-IN	NOT USED			MR	MR	DC	DCC	+TSO	-TSO							
Dual/SPDT	+IN	TCR	-IN	NOT USED	BMR	BMR	AMR	AMR	DC	DCC	ANO	ACM	ANC	BNO	BCM	BNC			
Dual/Switch Out	+IN	TCR	-IN	NOT USED	BMR	BMR	AMR	AMR	DC	DCC	+ATSO	-ATSO			+BTSO	-BTSO			
Dual/DPST/NO	+IN	TCR	-IN	NOT USED	BMR	BMR	AMR	AMR	DC	DCC	ANO1	ACM1	ANO2	ACM2	BNO1	BCM1	BNO2	BCM2	
Dual/DPST/NC	+IN	TCR	-IN	NOT USED	BMR	BMR	AMR	AMR	DC	DCC	ANC1	ACM1	ANC2	ACM2	BNC1	BCM1	BNC2	BCM2	
Dual/DPST/NONC	+IN	TCR	-IN	NOT USED	BMR	BMR	AMR	AMR	DC	DCC	ANO1	ACM1	ANC2	ACM2	BNO1	BCM1	BNC2	BCM2	

*Special wiring rules apply for I.S.

Key:	1 (suffix)	Relay 1	IN	Input signal
	2 (suffix)	Relay 2	MR	Manual reset
	A (prefix)	Channel 1, dual alarm	NC	Relay contact, normally closed
	B (prefix)	Channel 2, dual alarm	NO	Relay contact, normally open
	CM	Common	TCR	Temperature compensating resistor
	DC	+DC power input	TSO	Transistor switch output
	DCC	-DC power input		

Operation

Once the TDA has been calibrated and installed, it may be left unattended. The only controls for the unit are the trip point potentiometers, which after initial adjustment require no further attention. The LEDs on the front of the unit indicate when a relay is energized. Because the circuit uses highly reliable solid-state components with no moving parts, the TDA operates maintenance-free for extended periods.

The TDA may become warm during operation, especially when a large number of units are mounted together on a rail or in a cabinet, and the ambient temperature is above normal. This is perfectly acceptable and should not be cause for concern, unless a malfunction is also observed.

A periodic check of terminal connections is recommended every six months to ensure continued dependability of service.

Theory of Operation

This section briefly describes how the TDA operates. A simplified block diagram is shown in figure 12, to help in understanding the circuit description.

Input to the alarm is applied through a dual flying capacitor/analog switch circuit operating at approximately 500Hz. During one phase of the clock, a voltage proportional to the input signal is applied to an AC-coupled amplifier; during the alternate phase, a reference voltage from an internal zero/offset network is applied. The resulting signal is a square wave whose amplitude is proportional to the difference between the input signal and the reference voltage.

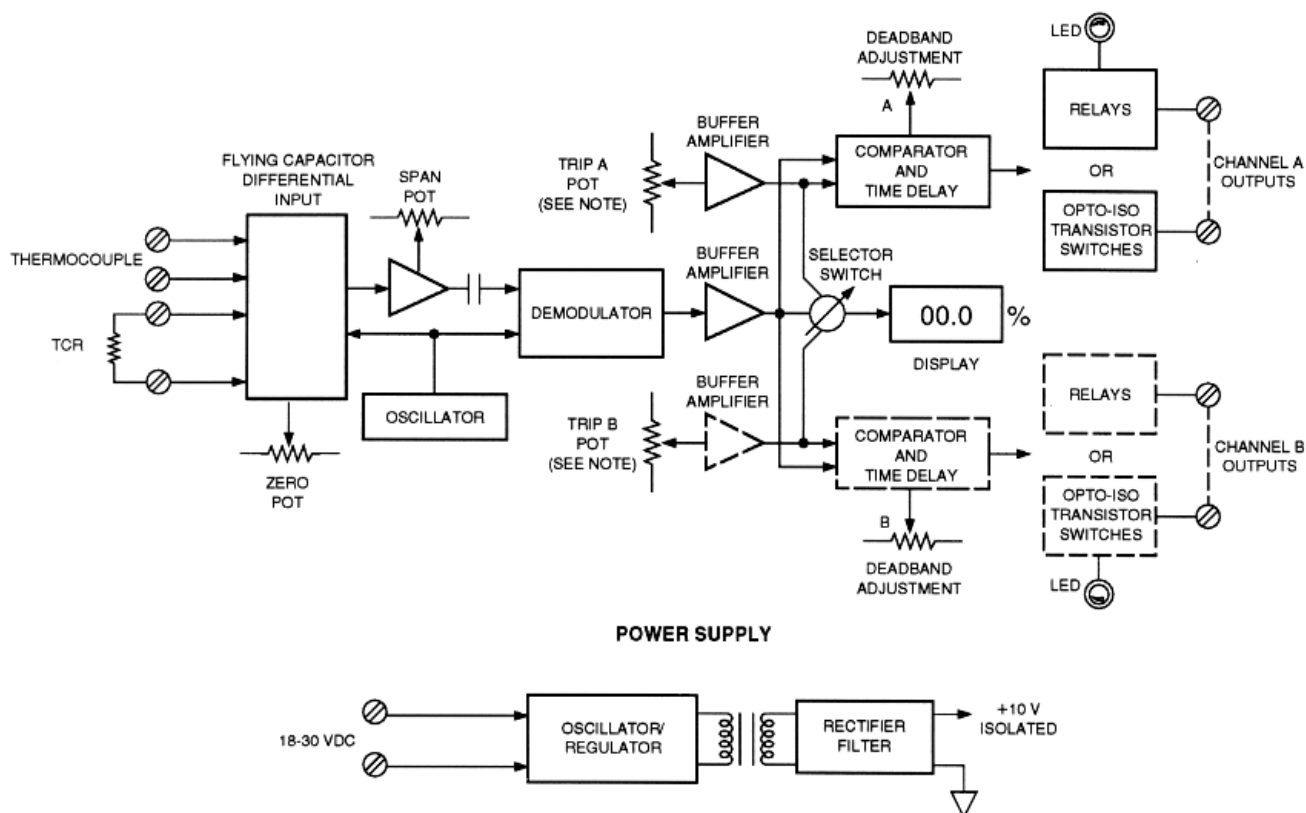
This square wave is amplified, demodulated, buffered, and applied to the comparator inputs. Trip point potentiometers are buffered and their set voltages applied to the comparator reference inputs. High- or

low-going alarm performance is achieved by selecting the comparator input phasing via pluggable jumpers. Either of the trip point settings or the input signal value may be viewed on the front panel LCD using the three-position selector switch.

A controlled positive feedback around each comparator provides the desired deadband, and a time-delay circuit sets the duration for which a comparator input signal must exceed its reference threshold before an alarm state is output.

Output circuits drive either relays or optically isolated transistor switches; these are configured at the factory via soldered jumpers for either failsafe or non-failsafe operation.

Isolated, regulated power is provided by an oscillator/transformer/rectifier circuit that accepts 18 to 30 Vdc input power.



NOTE: TRIP A AND B POTENTIOMETERS ARE LOCATED ON THE FRONT PANEL OF UNIT.

Figure 12. TDA Simplified Block Diagram

TDA

Maintenance

Maintenance of the TDA is limited to keeping the terminals clean and tight, and ensuring there is adequate ventilation or heat dissipation for the unit. It is recommended that the User check the terminals every six months.

Troubleshooting

Troubleshooting the TDA involves determining whether the unit is functioning abnormally. The calibration equipment listed in table 3 can be used to verify that the TDA outputs are within specified limits. Refer to specifications, table 1. It is recommended that any unit found performing below specifications be returned to the factory for service, in accordance with the instructions on the back cover of this manual.

If a problem is suspected with the TDA, it is suggested that the following check list be reviewed as a preliminary step:

1. Verify that all electrical connections are clean and tight.
2. Verify that the measuring instrument used for input voltage or current is of the proper range and accuracy.
3. Verify that the output circuit is electrically isolated from the input circuit.

For additional technical assistance, contact Moore Industries' Customer Service Department by calling toll free 1-800-999-2900.

RETURN PROCEDURES

To return equipment to Moore Industries for repair, follow these four steps:

1. Call Moore Industries and request a Returned Material Authorization (RMA) number.

Warranty Repair –

If you are unsure if your unit is still under warranty, we can use the unit's serial number to verify the warranty status for you over the phone. Be sure to include the RMA number on all documentation.

Non-Warranty Repair –

If your unit is out of warranty, be prepared to give us a Purchase Order number when you call. In most cases, we will be able to quote you the repair costs at that time. The repair price you are quoted will be a "Not To Exceed" price, which means that the actual repair costs may be less than the quote. Be sure to include the RMA number on all documentation.

2. Provide us with the following documentation:
 - a) A note listing the symptoms that indicate the unit needs repair
 - b) Complete shipping information for return of the equipment after repair
 - c) The name and phone number of the person to contact if questions arise at the factory
3. Use sufficient packing material and carefully pack the equipment in a sturdy shipping container.
4. Ship the equipment to the Moore Industries location nearest you.

The returned equipment will be inspected and tested at the factory. A Moore Industries representative will contact the person designated on your documentation if more information is needed. The repaired equipment, or its replacement, will be returned to you in accordance with the shipping instructions furnished in your documentation.

WARRANTY DISCLAIMER

THE COMPANY MAKES NO EXPRESS, IMPLIED OR STATUTORY WARRANTIES (INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE) WITH RESPECT TO ANY GOODS OR SERVICES SOLD BY THE COMPANY. THE COMPANY DISCLAIMS ALL WARRANTIES ARISING FROM ANY COURSE OF DEALING OR TRADE USAGE, AND ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY ACKNOWLEDGES THAT THERE ARE NO WARRANTIES IMPLIED BY CUSTOM OR USAGE IN THE TRADE OF THE BUYER AND OF THE COMPANY, AND THAT ANY PRIOR DEALINGS OF THE BUYER WITH THE COMPANY DO NOT IMPLY THAT THE COMPANY WARRANTS THE GOODS OR SERVICES IN ANY WAY.

ANY BUYER OF GOODS OR SERVICES FROM THE COMPANY AGREES WITH THE COMPANY THAT THE SOLE AND EXCLUSIVE REMEDIES FOR BREACH OF ANY WARRANTY CONCERNING THE GOODS OR SERVICES SHALL BE FOR THE COMPANY, AT ITS OPTION, TO REPAIR OR REPLACE THE GOODS OR SERVICES OR REFUND THE PURCHASE PRICE. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES EVEN IF THE COMPANY FAILS IN ANY ATTEMPT TO REMEDY DEFECTS IN THE GOODS OR SERVICES. BUT IN SUCH CASE THE BUYER SHALL BE ENTITLED TO NO MORE THAN A REFUND OF ALL MONIES PAID TO THE COMPANY BY THE BUYER FOR PURCHASE OF THE GOODS OR SERVICES.

ANY CAUSE OF ACTION FOR BREACH OF ANY WARRANTY BY THE COMPANY SHALL BE BARRED UNLESS THE COMPANY RECEIVES FROM THE BUYER A WRITTEN NOTICE OF THE ALLEGED DEFECT OR BREACH WITHIN TEN DAYS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH, AND NO ACTION FOR THE BREACH OF ANY WARRANTY SHALL BE COMMENCED BY THE BUYER ANY LATER THAN TWELVE MONTHS FROM THE EARLIEST DATE ON WHICH THE BUYER COULD REASONABLY HAVE DISCOVERED THE ALLEGED DEFECT OR BREACH.

RETURN POLICY

For a period of thirty-six (36) months from the date of shipment, and under normal conditions of use and service, Moore Industries ("The Company") will at its option replace, repair or refund the purchase price for any of its manufactured products found, upon return to the Company (transportation charges prepaid and otherwise in accordance with the return procedures established by The Company), to be defective in material or workmanship. This policy extends to the original Buyer only and not to Buyer's customers or the users of Buyer's products, unless Buyer is an engineering contractor in which case the policy shall extend to Buyer's immediate customer only. This policy shall not apply if the product has been subject to alteration, misuse, accident, neglect or improper application, installation, or operation. THE COMPANY SHALL IN NO EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.



WORLDWIDE • www.miinet.com

United States • info@miinet.com Tel: (818) 894-7111 • FAX: (818) 891-2816	Belgium • info@mooreind.be Tel: 03/448.10.18 • FAX: 03/440.17.97	China • sales@mooreind.sh.cn Tel: 86-21-62491499 • FAX: 86-21-62490635
Australia • sales@mooreind.com.au Tel: (02) 8536-7200 • FAX: (02) 9525-7296	The Netherlands • sales@mooreind.nl Tel: (0)344-617971 • FAX: (0)344-615920	United Kingdom • sales@mooreind.com Tel: 01293 514488 • FAX: 01293 536852