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USER'S GUIDE UG-5230

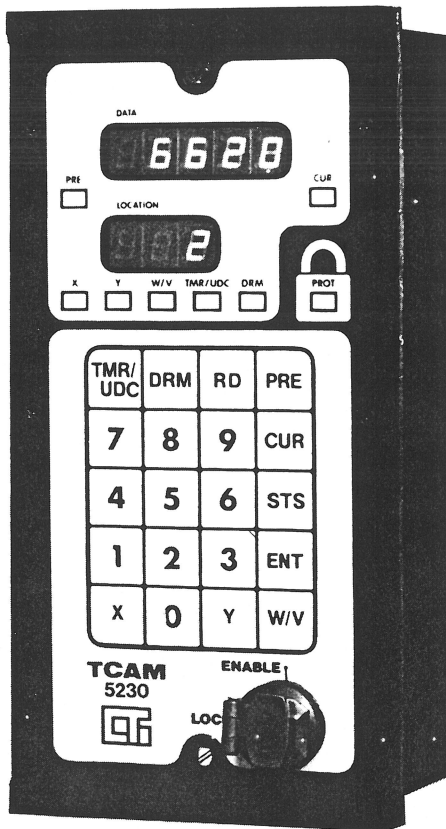
ABSTRACT

The TCAM-5230 has been designed for the operator or engineer that needs a convenient panel mounted method to display and adjust timers, counters, drums, and variable (V) memory locations without a VPU. The easy use and flexibility of the TCAM-5230 makes it a natural for a variety of applications such as process monitoring, recipe changes, drum sequencing, and time controlled operations.

INTRODUCTION

The TCAM-5230 is an operator interface unit designed specifically for the Texas Instruments programmable controller models 530, 520, and 510 **. This convenient panel mounted unit allows the user to easily monitor and adjust any given timer, counter, or drum location. In addition the operator can display and change variable (V) memory location values, and examine software protected locations, discrete I/O states, and word (W) X/Y memory.

**NOTE: The T.I. model 510 must have the VIM interface installed.



OPERATOR INTERFACE UNIT
FOR
T.I. PROGRAMMABLE CONTROLLER

The series 500 is a Model Trademark of Texas Instruments Incorporated.

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TCAM-5230 Timer Counter Access Module

1.0 PRODUCT CONFIGURATION

1.1 FRONT PANEL (figure 1)

For description purposes, the front panel area is sub-divided into 3 sections, see figure 1.

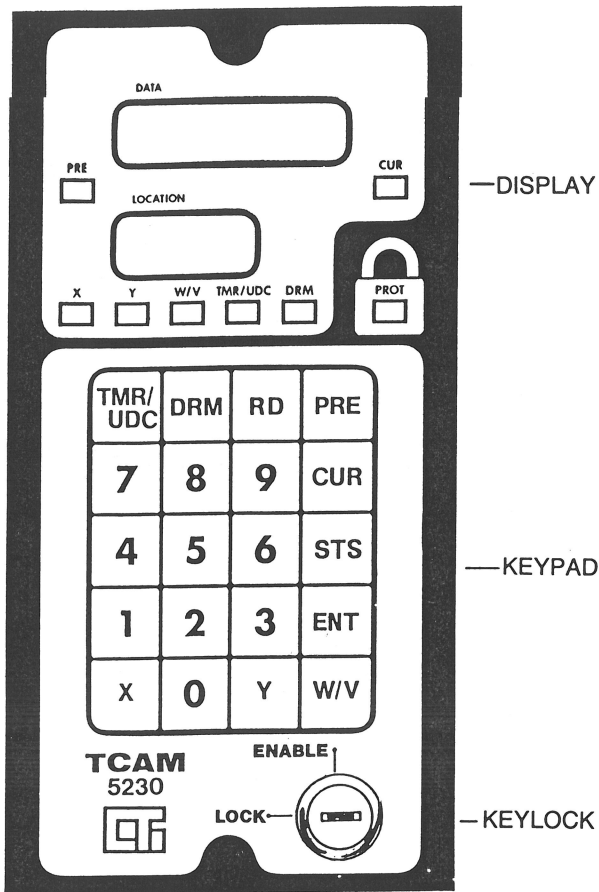


figure 1

1.1A KEYLOCK (figure 2)

Keylock is a two position key switch which provides the ability to prevent unauthorized changing of any timer, counter, drum, or V memory value. Even when the key switch is in the LOCK position all monitoring functions of the TCAM-5230 are still available. See note 14.

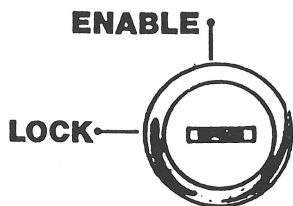


figure 2

1.1B KEYPAD (figure 3)

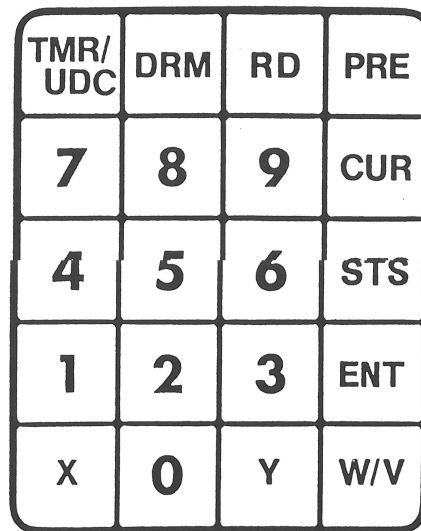







figure 3


TMR/UDC  — (Timer up/down Counter) Used to select a timer or counter.

DRM  — (Drum) Used to select a drum.

PRE  — (Preset) Causes the display of preset values. Used with the TMR/UDC and DRM keys.

CUR  — (Current) Causes the display of current values. Used with the TMR/UDC and DRM keys.

X  — Used to select discrete inputs (X).


Y  — Used to select discrete outputs (Y).


W/V  — Dual Function Key.


V — Used to select variable (V) memory locations.

W — Used with the X and Y keys.

When pressed immediately after the X or Y key then word X (WX) or word Y (WY) is selected for display.

RD  — (Read) Used to command the display of WX, WY, or V memory values.

STS  — (Status) Used to command the display of discrete input (X) or output (Y) status. Also used to display the current count of the current step in the drum mode.

ENT  — (Enter) To enter changes for timers, counters, drums, or V memory values. The KEYLOCK must be in the ENABLE position for this key to operate.

FUNCTION KEYS — The following keys are designated as function keys; TMR/UDC, DRM, X, Y, and W/V.

ACTION REQUEST KEYS — The following keys are designated as action request keys; RD, PRE, CUR, STS, and ENT.

1.1C DISPLAY (see figure 4)

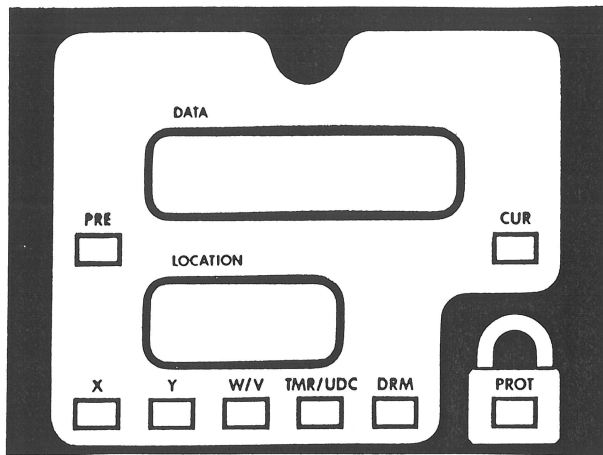
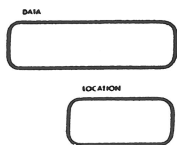


figure 4



DATA — Five (5) LEDs for display of the information stored.

LOCATION — Three (3) LEDs for display of the location requested, (i.e. timer, counter, drum, X, Y, WX, WY, or V location).

PROT — Illuminates when the present value being displayed by the TCAM cannot be revised (is protected). See note 14.



CUR — Illuminates when displaying the current value of a timer, counter, or drum.



PRE — Illuminates when displaying the preset value of a timer, counter, or drum.



X — Illuminates when displaying a discrete input (X) value.



Y — Illuminates when displaying a discrete output (Y) value.



W/V — Dual Function Indicator

V — Illuminates when displaying V memory.

W — Illuminates in conjunction with X or Y to indicate Word X (WX) and Word Y (WY) values.



TMR/UDC — Illuminates when displaying timer or counter values.



DRM — Illuminates when displaying drum values.

1.2 REAR PANEL (figure 5)

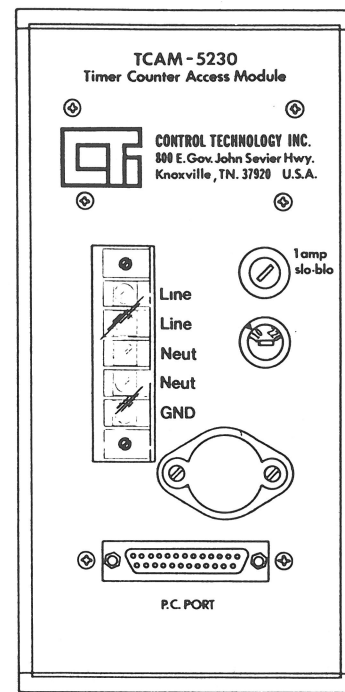


figure 5

PC PORT — The TCAM cable plugs into this location. The other end of this cable will plug into the serial communications port of the programmable controller.

POWER

TERMINAL — Supply power is connected to the unit as is labeled on the back of the unit. See figure 5.

FUSE — 1 amp slo blo fuse for overload protection.

LINE VOLTAGE

SELECTOR SWITCH — Provides the flexibility to use 110 volts (North American) or 220 volts (European) single phase supply.

2.0 MOUNTING (figure 6)

2.1 Recommended mounting and cut-out dimensions are shown below.

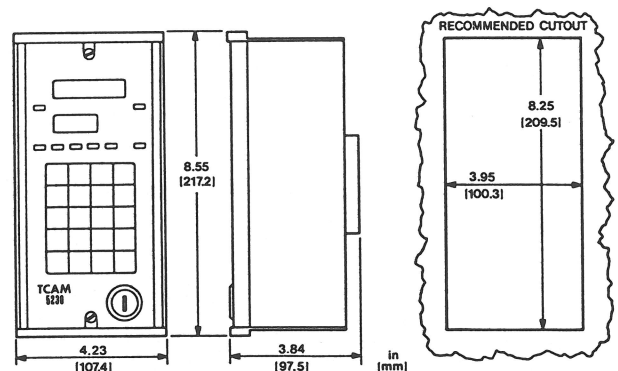


figure 6

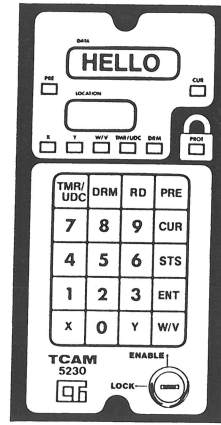
3.0 OPERATION GUIDE

3.1 HOW TO ?

POWER UP

How to power up the TCAM-5230?

Apply the supply voltage to the proper terminals points. See figure 5 for the terminal connections. The TCAM-5230 will respond with **HELLO** in the location display area. After approximately 10 seconds the display area will go blank and the TMR/UDC LED will light. The TCAM-5230 is then ready to use.



STEP	TIMER	DISPLAY
<p>How to read a preset timer value?</p>		
1.	Press the TMR/UDC key.	TMR/UDC LOCATION
2.	Enter the digits for the timer desired.	LOCATION <input type="text" value="1"/>
3.	Press the PRE key. The preset value for the timer will then be displayed. See notes 1 & 2.	PRE DATA <input type="text" value="450"/>
<p>How to read a current timer value?</p>		
1.	Press the TMR/UDC key.	TMR/UDC LOCATION
2.	Enter digits for the location desired.	LOCATION <input type="text" value="1"/>
3.	Press the CUR key. The current value for the timer will then be displayed. See notes 1 & 3.	CUR DATA <input type="text" value="320"/>
<p>COUNTER</p>		
<p>How to read a preset counter value?</p>		
1.	Press the TMR/UDC key.	TMR/UDC LOCATION
2.	Enter the number for the counter desired.	LOCATION <input type="text" value="2"/>
3.	Press the PRE key. The preset value for the counter will then be displayed. See notes 2 & 6.	PRE DATA <input type="text" value="4"/>

STEP	TIMER	DISPLAY
<p>How to modify a preset timer value?</p>		
1.	Press the TMR/UDC key.	TMR/UDC LOCATION
2.	Enter the digits for the timer desired.	LOCATION <input type="text" value="1"/>
3.	Press the PRE key.	PRE DATA <input type="text" value="450"/>
4.	Place the KEYLOCK in the ENABLE position.	
5.	Enter the digits for the new timer value.	DATA <input type="text" value="500"/>
6.	Press the ENT key. The new value is now stored and displayed. See notes 4, 5, & 15.	
<p>How to modify a current timer value?</p>		
1.	Press the TMR/UDC key.	TMR/UDC LOCATION
2.	Enter the digits for the timer desired.	LOCATION <input type="text" value="1"/>
3.	Press the CUR key.	CUR DATA <input type="text" value="320"/>
4.	Place the KEYLOCK in the ENABLE position.	
5.	Enter the digits for the new timer value.	DATA <input type="text" value="400"/>
6.	Press the ENT key. The new value is now stored. See notes 4, 5, & 15.	
<p>COUNTER</p>		
<p>How to modify a preset counter value?</p>		
1.	Press the TRM/UDC key.	TMR/UDC LOCATION
2.	Enter the number for the counter desired.	LOCATION <input type="text" value="2"/>
3.	Press the PRE key.	PRE DATA <input type="text" value="4"/>
4.	Place the KEYLOCK in the ENABLE position.	
5.	Enter the new value for the counter.	DATA <input type="text" value="3"/>
6.	Press the ENT key. The new value is now stored and displayed. See notes 2, 3, & 15.	

STEP COUNTER	DISPLAY
<p>How to read a current counter value?</p> <ol style="list-style-type: none"> 1. Press the TMR/UDC key. <input type="checkbox"/> 2. Enter the number for the counter desired. <input type="text" value="2"/> 3. Press the CUR key. <input type="checkbox"/> The current value for the counter will then be displayed. 	<p>TMR/UDC <input type="checkbox"/></p> <p>LOCATION <input type="text" value="2"/></p> <p>CUR <input type="checkbox"/></p> <p>DATA <input type="text" value="3"/></p>
DRUM	
<p>How to read a preset step of a drum?</p> <ol style="list-style-type: none"> 1. Press the DRM key. <input type="checkbox"/> 2. Enter the number for the drum desired. <input type="text" value="1"/> 3. Press the PRE key. <input type="checkbox"/> The preset step of the drum will then be displayed. See note 2. 	<p>DRM <input type="checkbox"/></p> <p>LOCATION <input type="text" value="1"/></p> <p>PRE <input type="checkbox"/></p> <p>DATA <input type="text" value="1"/></p>
<p>How to read a current step of a drum?</p> <ol style="list-style-type: none"> 1. Press the DRM key. <input type="checkbox"/> 2. Enter the number for the drum desired. <input type="text" value="1"/> 3. Press the CUR key. <input type="checkbox"/> The current step of the drum will then be displayed. See notes 3. 	<p>DRM <input type="checkbox"/></p> <p>LOCATION <input type="text" value="1"/></p> <p>CUR <input type="checkbox"/></p> <p>DATA <input type="text" value="3"/></p>
<p>How to read the current count of a current step of a drum?</p> <ol style="list-style-type: none"> 1. Press the DRM key. <input type="checkbox"/> 2. Enter the number for the drum desired. <input type="text" value="1"/> 3. Press either the PRE or CUR key. <input type="checkbox"/> 4. Press the STS key. <input type="checkbox"/> The current count of the current step will be displayed until the count reaches 0 then the current step will be displayed. 	<p>DRM <input type="checkbox"/></p> <p>LOCATION <input type="text" value="1"/></p> <p>CUR <input type="checkbox"/></p> <p>DATA <input type="text" value="7"/></p> <p>DATA <input type="text" value="32"/></p> <p>DATA <input type="text" value="8"/></p>

STEP COUNTER	DISPLAY
<p>How to modify a current counter value?</p> <ol style="list-style-type: none"> 1. Press the TMR/UDC key. <input type="checkbox"/> 2. Enter the number for the counter desired. <input type="text" value="2"/> 3. Press the CUR key. <input type="checkbox"/> 4. Place the KEYLOCK in the ENABLE position. 5. Enter the new value for the counter. <input type="text" value="1"/> 6. Press the ENT key. <input type="checkbox"/> The new value is now stored. See notes 2, 3, & 15. 	<p>TMR/UDC <input type="checkbox"/></p> <p>LOCATION <input type="text" value="2"/></p> <p>CUR <input type="checkbox"/></p> <p>DATA <input type="text" value="3"/></p> <p>DATA <input type="text" value="1"/></p>
DRUM	
<p>How to modify a preset step of a drum?</p> <ol style="list-style-type: none"> 1. Press the DRM key. <input type="checkbox"/> 2. Enter the number for the drum desired. <input type="text" value="1"/> 3. Press the PRE key. <input type="checkbox"/> 4. Place the KEYLOCK in the ENABLE position. 5. Enter in the numeric value for the new preset value of the drum. <input type="text" value="2"/> 6. Press the ENT key. <input type="checkbox"/> The new preset step is now stored and displayed. See notes 1 & 15. 	<p>DRM <input type="checkbox"/></p> <p>LOCATION <input type="text" value="1"/></p> <p>PRE <input type="checkbox"/></p> <p>DATA <input type="text" value="1"/></p> <p>DATA <input type="text" value="2"/></p>
<p>How to modify a current step of the drum?</p> <ol style="list-style-type: none"> 1. Press the DRM key. <input type="checkbox"/> 2. Enter in the number for the drum desired. <input type="text" value="1"/> 3. Press the CUR key. <input type="checkbox"/> 4. Place the KEYLOCK in the ENABLE position. 5. Enter the new current value. <input type="text" value="7"/> 6. Press the ENT key. <input type="checkbox"/> The new current step is now stored. See note 15. 	<p>DRM <input type="checkbox"/></p> <p>LOCATION <input type="text" value="1"/></p> <p>CUR <input type="checkbox"/></p> <p>DATA <input type="text" value="3"/></p> <p>DATA <input type="text" value="7"/></p>

STEP	DISCRETE POINT	DISPLAY
<p>How to read a discrete input (X) status?</p>		
1.	Press the X key. <input type="checkbox"/> X	X <input type="checkbox"/>
2.	Enter in the number for the discrete input. <input type="text" value="5"/> <input type="text" value="0"/>	LOCATION <input type="text" value="50"/>
3.	Press the STS key. <input type="checkbox"/> STS	DATA <input type="text" value="1"/>
	The status of that discrete input will then be displayed. It will either be a 1 (ON) or a 0 (OFF). See notes 7, 8, & 9.	

<p>How to read a discrete output (Y) status?</p>		
1.	Press the Y key. <input type="checkbox"/> Y	Y <input type="checkbox"/>
2.	Enter the number for the discrete output. <input type="text" value="2"/> <input type="text" value="5"/>	LOCATION <input type="text" value="25"/>
3.	Press the STS key. <input type="checkbox"/> STS	DATA <input type="text" value="0"/>
	The status of that discrete output will then be displayed. It will be either a 1 (ON) or a 0 (OFF). See notes 7, 8, & 9.	

WORD MEMORY

<p>How to read a WX value?</p>		
1.	Press the X key. <input type="checkbox"/> X	X <input type="checkbox"/>
2.	Press the W/V key. <input type="checkbox"/> W/V	W/V <input type="checkbox"/>
3.	Enter in the location number. <input type="text" value="3"/> <input type="text" value="8"/>	LOCATION <input type="text" value="38"/>
4.	Press the RD key. <input type="checkbox"/> RD	DATA <input type="text" value="14320"/>
	The value for the location will then be displayed. See notes 10 & 11	

STEP	WORD MEMORY	DISPLAY
<p>How to read a WY value?</p>		
1.	Press the Y key. <input type="checkbox"/> Y	Y <input type="checkbox"/>
2.	Press the W/V key. <input type="checkbox"/> W/V	W/V <input type="checkbox"/>
3.	Enter the location number. <input type="text" value="8"/>	LOCATION <input type="text" value="8"/>
4.	Press the RD key. <input type="checkbox"/> RD	DATA <input type="text" value="2341"/>
	The value for the location will then be displayed. See notes 10 & 11.	

<p>How to read a V memory location?</p>		
1.	Press the W/V key. <input type="checkbox"/> W/V	W/V <input type="checkbox"/>
2.	Enter the location number. <input type="text" value="5"/>	LOCATION <input type="text" value="5"/>
3.	Press the RD key. <input type="checkbox"/> RD	DATA <input type="text" value="35"/>
	The value of the V memory will then be displayed. See notes 11 & 12.	

<p>How to modify a V memory location?</p>		
1.	Press the W/V key. <input type="checkbox"/> W/V	W/V <input type="checkbox"/>
2.	Enter the location number. <input type="text" value="5"/>	LOCATION <input type="text" value="5"/>
3.	Press the RD key. <input type="checkbox"/> RD	DATA <input type="text" value="35"/>
4.	Place the KEYLOCK in the ENABLE position.	
5.	Enter in the new value. <input type="text" value="4"/> <input type="text" value="7"/> <input type="text" value="0"/>	DATA <input type="text" value="470"/>
6.	Press the ENT key. <input type="checkbox"/> ENT	
	The new value for V is now stored and displayed. See notes 4, 13, & 16.	

3.2 USER NOTES

Note 1: If the timer/counter that the TCAM is displaying is protected, the PROT light will be illuminated and you will not be able to revise that timer/counter. Also see note 14.

Note 2: To change the display from the preset value to the current value, press the CUR key.

Note 3: To change the display from the current value to the preset value, press the PRE key.

Note 4: For this change to take place, the keylock must be in the ENABLE position.

Note 5: If the timer/counter location to be revised is already being displayed use these following steps. Enter the digits for the value desired. Press the ENT key.

Note 6: The TI models 530, 520, and 510 programmable controllers share the same memory location designators for both timers and counters. Therefore the procedure for accessing a counter is exactly like the timer accessing procedure.

Note 7: If the location entry is larger than 999, the decimal point in the left LED will light to indicate that the location exceeds a three digit number.

Note 8: Discrete inputs (X) and outputs (Y) cannot be modified from the TCAM-5230.

Note 9: Discrete inputs (X) and outputs (Y) are continually updated from the PC.

Note 10: WX and WY values can not be modified from the TCAM-5230.

Note 11: The values displayed by the TCAM-5230 are in integer format.

Note 12: Any V memory location that is a result of a multiplication will have a 32 bit word. The TCAM-5230 will only read and display a 16 bit word. Conversion to this format must be done in the PC program.

Note 13: Information is entered in integer format, (whole numbers only).

Note 14: In anticipation of Texas Instruments' software release for the models 530, 520, and 510 which supplies a task code for protected timers and counters, the TCAM-5230 has been developed to support this enhancement. With any software release prior to REL 2.0 the KEYLOCK must be in the LOCK position to protect timers and counters. There will be no indication in the PROT indicator for protected timers and counters without software release REL 2.0 or later installed in the models 530, 520, or 510 programmable controllers.

Note 15: All timer, counter, and drum modifications made by the TCAM-5230 are stored in the appropriate TCP, DCP, TCC, and DCC memory locations. When the

PC goes through a power up cycle it will be necessary to re-enter any previous modifications. Permanent changes for timers, counters, and drums must be performed via the VPU.

Note 16: Variable (V) memory modifications made by the TCAM-5230 are stored in the appropriate V memory location.

3.3 ERROR MESSAGES

EO — An incorrect key was pressed when the TCAM-5230 was initially powered up. A function key (i.e. TMR/UDC, DRM, X, Y, and W/V key) must be the first key pressed.

To correct error (EO) enter a valid function key.

E1 — A numeric entry was not made before the action request key was pressed. A function key (i.e. TMR/UDC, DRM, X, Y, and V/W keys) was pressed. Then an action request key (i.e. PRE, CUR, STS, ENT, and RD keys) was pressed.

To correct error (E1) press the function key and enter a numeric value. Then press the correct action request key.

E2 — Invalid action request key was pressed for the function selected. Review the HOW TO? section for the desired function.

To correct error (E2) press the function key followed by the numeric entry then the correct action request key.

E3 — Software communications error. This indicates a communications problem between the TCAM-5230 and the PC.

To correct error (E3) re-enter the last entry. If this error continues, technical assistance should be requested.

E4 — Hardware communications error. This indicates a transmitter or receiver problem.

To correct error (E4) insure the cable between the TCAM-5230 and the PC is installed properly. If this error continues, technical assistance should be requested.

E5 — Invalid data received. This indicates the PC has received or transmitted invalid information. The TCAM-5230 will display the E5 error for approximately 2 seconds then clear the display.

To correct error (E5) re-enter the last requested transaction after the TCAM-5230 has reset. If this error continues, technical assistance should be requested.

E6 — Check sum error. This indicates a ROM failure in the TCAM-5230.

To correct error (E6) re-set power to the TCAM-5230. If this error continues, technical assistance should be requested.

4.0 SPECIFICATIONS

4.1 CONNECTION

The TCAM-5230 plugs directly into the serial port of the Texas Instruments programmable controller. For this connection a separate cable is required. As an option Control Technology Inc. offers a 15 foot cable (part number TCAM-CL-15), or other lengths upon request. The cable length can not exceed 50 feet.

4.2 ADAPTABILITY

When powered up the TCAM-5230 will perform a hand shaking routine with the programmable controller to determine the number of location selections (i.e. drums, timers, counters, V, X, Y, WX, & WY) and the total number will be available to the operator through the TCAM-5230.

NOTE: The Texas Instruments programmable controller model 510 must have the VIM interface connected.

4.3 COMMUNICATIONS

EIA RS 423 A Serial Data Transfer
Data Rate 9600 Baud
Maximum Cable Length 50 Feet

4.4 POWER REQUIREMENTS

Voltage 110 VAC @ 60 HZ. or 220 VAC @ 50 HZ. (European) Switch Selectable

Power 5 Watts

4.5 ENVIRONMENT

Temperature
Storage -40° to 85° C
Normal Operation 0° to 60° C
Humidity Up to 85% R.H. Non-condensing
Seal ... NEMA 12 on the front cover and keylock

4.6 SPECIAL APPLICATION

The TCAM-5230 is another addition to the series of products, which operates in conjunction with our



CONTROL TECHNOLOGY INC.

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5.0 PRODUCT POLICIES

5.1 WARRANTY

Control Technology Inc. (hereafter referred to as CTI) warrants the TCAM-5230 (hereafter referred to as the Product) for a period of one year from the date of shipment unless otherwise agreed in writing. CTI will repair or replace (at its option) any product found to be defective during this warranty period. If the Product is determined not to be defective within the terms of this warranty all expenses (including freight) incurred in performing the repair or replacement will be borne by the customer at the current published CTI maintenance rate. All shipments will be F.O.B. shipping point.

This warranty is contingent on the proper use of the Product and does not apply to damage caused by misuse, negligence, alteration, or tampering; or to damage incurred in shipment or to any loss or damage whose proximate cause was faulty installation done by the customer.

THE WARRANTY SET FORTH ABOVE IN THIS ARTICLE IS THE ONLY WARRANTY CTI GRANTS AND IT IS IN LIEU OF ANY OTHER IMPLIED OR EXPRESSED GUARANTY OR WARRANTY ON CTI PRODUCTS, INCLUDING WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE AND IS IN LIEU OF ALL OBLIGATIONS OF LIABILITY OF CTI FOR DAMAGES IN CONNECTION WITH LOSS, DELIVERY, USE OF PERFORMANCE OF CTI PRODUCTS OR INTERRUPTION OF BUSINESS, LOSS OF USE, REVENUE OR PROFIT. IN NO EVENT WILL CTI BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

5.2 REPAIR POLICY

In the unlikely event that the Product should fail during or after the warranty period, a Return Material Authorization number (RMA) can be requested verbally or in writing from CTI main offices. Whether this equipment is in or out of warranty a Purchase Order number provided to CTI when requesting the RMA number will aid in expediting the repair process. The RMA number that is issued, and your Purchase Order number should be referenced on the returning equipment's shipping documentation.

Repair rates are 15% of the current recommended user price of the unit. Emergency module swaps can be accomplished within 24 hours (contingent on availability) at 30% of the current recommended user price of the unit, plus freight. Typical turnaround for repairs is 2 weeks after receipt of the unit by CTI.

5.3 SCOPE

Control Technology Inc. reserves the right to make changes to the product in order to improve reliability, function, or design in the pursuit of providing the best possible product. Since CTI does not possess full access to data concerning all of the uses and applications of customer's product, CTI assumes no responsibility for indirect or consequential damages resulting from the improper use or application of this equipment. It is assumed in this documentation that the user is familiar with the Texas Instruments Programmable Controller models 530, 520, and 510 and the terms associated with their use.