TEXMATE INC

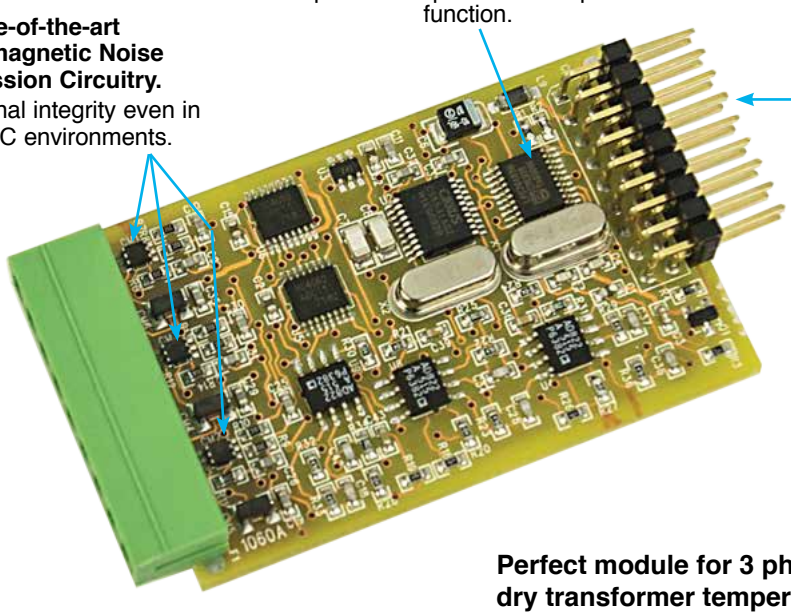
SMART INPUT MODULE

Triple RTD

Triple RTD

On-board Digital Signal Processor.
Linearization RTDs 20 Hz averaged outputs 16-bit precision comparator function.

State-of-the-art Electromagnetic Noise Suppression Circuitry.
Ensures signal integrity even in harsh EMC environments.



Interface to Tiger Meter.

Perfect module for 3 phase dry transformer temperature measurement.

0.01° accuracy on three channels.

IST7 and IST8 are smart input modules that can monitor temperature. Both modules can accept triple 2/3/4-wire RTD sensors. Applied in multiple-point temperature measurement.

Input Module Order Code Suffix

IST7 (50 Hz Rejection)
IST8 (60 Hz Rejection)

Hardware Module Specifications	
RTD	
Triple-input RTD	2/3/4-wire RTD configuration. Choice of Pt385 or Pt392.
Excitation Current	160 mA DC constant current source, ratiometric
	referenced to ATD.
Resolution & Range	0.01 °C, –200 °C to +850 °C.
Analog-to-digital	Dual channel sigma delta ATD convertor.
	16-bit resolution.
	Shield drive +2.5 V.

Software Module Specifications	
Line Frequency Rejection	50/60 Hz software selectable.
RTD Type	Pt385 / Pt392 sofware selectable.
RTD Linearization	On-board linearization tables for RTD.
2-point Calibration	Simple 2-point calibration of RTD
	using Tiger 320 Series software.
Sampling Speed	800 / 960 Hz each channel, 20 Hz averaged outputs.

Fits Tiger 320 Series

INPUTS

TEMPERATURE

Component Layout

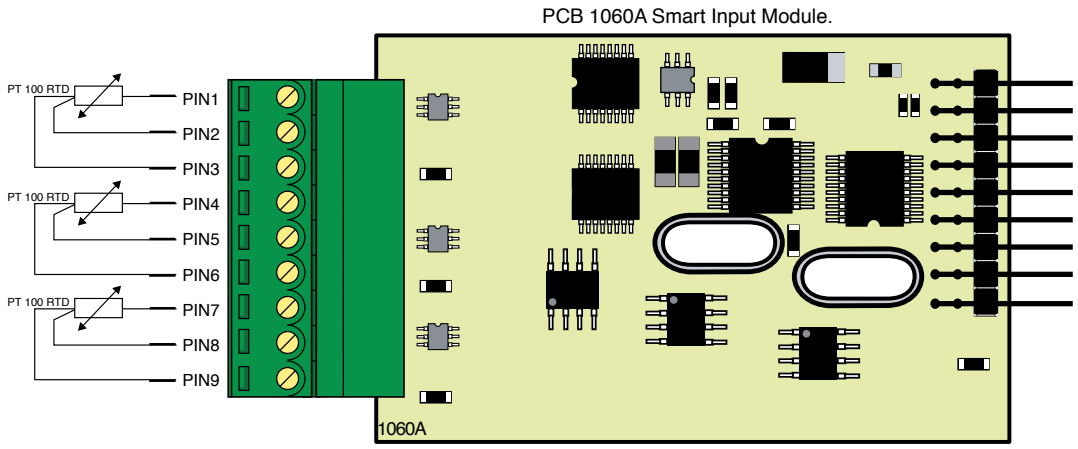


Figure 1 – IST7/IST8 Triple RTD Input Module

Connector Pinouts

Input Module Pin Numbers	Function	Description
1	RTD1	Current Drive
2	RTD1	Current Return
3	RTD1	Sense
4	RTD2	Current Drive
5	RTD2	Current Return
6	RTD2	Sense
7	RTD3	Current Drive
8	RTD3	Current Return
9	RTD3	Sense

Function Schematic Diagram

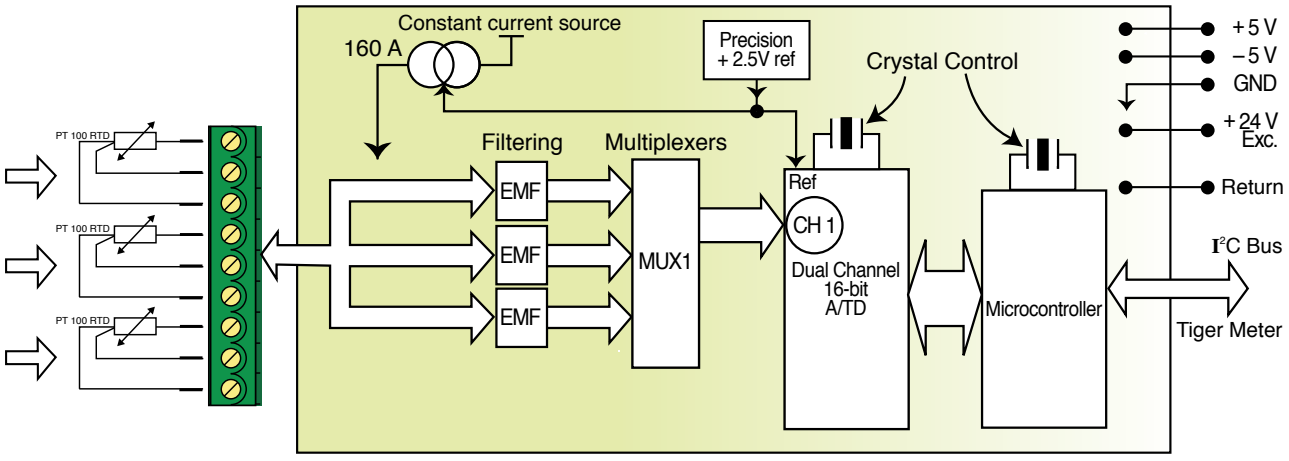


Figure 2 – Input Module IST7/IST8 Functional Schematic Diagram

Smart Setup Registers

The Tiger controller uses three smart setup registers to configure all smart input modules. Line frequency rejection (50 / 60 Hz) and RTD type are configured in **smart register 1** (SMT1). See Figure 3.

Smart register 1 allows you to select the following settings:

- Line frequency rejection of 50 or 60 Hz for all three RTD inputs.
- RTD type: Pt385 or Pt392 for all RTD types.

A standard sampling rate of 800 / 960 Hz (50 / 60 Hz) is applied to all inputs.

The module produces three output registers (3 RTD), each being the 20 Hz averaged result of the input sensors. One of these registers can be transferred to CH1 via Code 2, the same or another register transferred to CH2 via Code 4, the same or another register transferred to CH3 via Code 5, and the same or another register transferred to CH4 via Code 6.

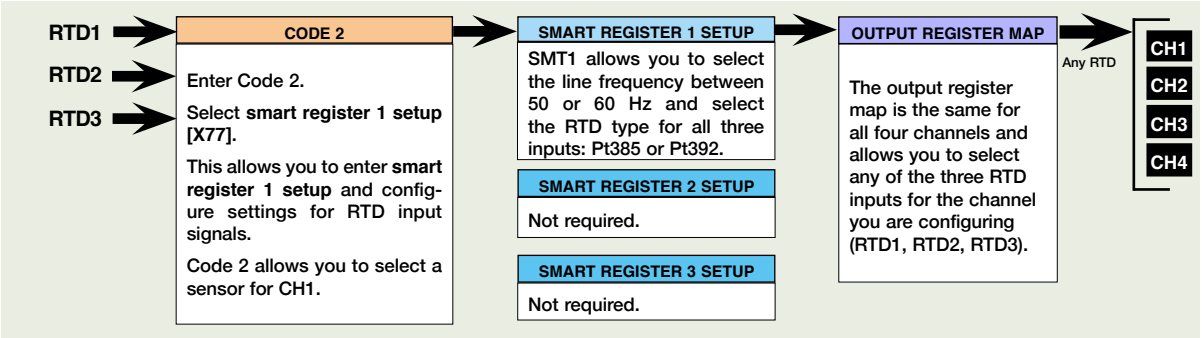


Figure 3 – IST7/IST8 Smart Setup Registers Operational Flow Diagram

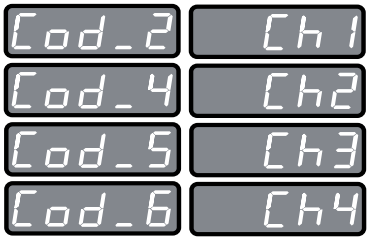
Programming Procedures

The input module requires the following individual inputs to be programmed through the configuration menus in the controller:

1 Select Line Frequency Rejection & RTD Type

This menu allows you to select the input signal line frequency rejection for all input signals (50 or 60 Hz) and the RTD type for all RTD inputs (Pt385 or Pt392) using Smart Register 1 (SMT1).

2 Select a Channel for the RTDs



In the code for the required channel, select the relevant RTD from the output register map.

Select RTD Type

Enter Code 2 and select the RTD type and input signal line frequency rejection setting for all inputs

1. Press the P and ⬆ buttons at the same time to enter the main programming mode.

2. Press the P button three times to enter Code 2. Set Code 2 to [X77].
   The 1st digit setting is not relevant to this procedure and can remain at zero (0).

This setting enters the **smart register 1** code setup menu.

FIRST DIGIT
TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100 Hz

SECOND DIGIT
MEASUREMENT TASK
0 Voltage, Current
1 TC (3rd digit selects type of TC)
2 RTD 3-wire (3rd digit selects type of RTD)
3 RTD 2- or 4-wire (3rd digit selects type of RTD)
4 Frequency
5 Period
6 Counter
7 Smart Input Module

THIRD DIGIT
OUTPUT REGISTER MAP
0 Averaged RTD1
1 Averaged RTD2
2 Averaged RTD3
3 Averaged Process 1
4 Averaged Process 1
5 -
6 -
7 Smart input module register 1 code setup

Note: The output registers in the 3rd digit are specific to the IST7/IST8 input module. These registers vary for each different smart input module.

Note: The 20 Hz averaged signal is output for all five inputs.

3. Press the P button.

This menu provides settings unique to **smart register 1** of input module IST7/IST8.

FIRST DIGIT
FREQUENCY SELECT
0 60 Hz rejection
1 -
2 50 Hz rejection
3 -

SECOND DIGIT
NOT USED
0 -
1 -
2 -
3 -
4 -
5 -
6 -
7 -

THIRD DIGIT
RTD TYPE
0 Pt385 100 Ω
1 Pt392 100 Ω
2 -
3 -
4 -
5 -
6 -
7 -

4. Using the ⬆⬇ buttons, select either **50 or 60 Hz line frequency rejection** (**2** for areas with 50 Hz power supplies and **0** for areas with 60 Hz power supplies) in the 1st digit and the **RTD type** in the 3rd digit.
   2nd digit settings are not relevant and should be left at zero (0).

5. Press the P and ⬆ buttons at the same time to return to the operational display.

Select a Channel

Select a channel for the RTD.

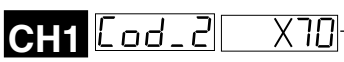
Channel 1 = RTD1

To select an RTD1 for CH1:

6. Press the P and ⬆ buttons at the same time again to re-enter the main programming mode, then press the P button three times to enter Code 2.

7. Set Code 2 to [X70]. Select the required processing rate for all input sensors in the 1st digit and RTD1 in the 3rd digit.

Note: The output register map is different for each smart input module type.



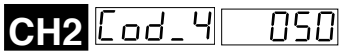
FIRST DIGIT
TIGER PROCESSING RATE
0 10 Hz
1 10 Hz
2 100 Hz
3 100Hz

SECOND DIGIT
MEASUREMENT TASK
0 Voltage, Current
1 TC (3rd digit selects type of TC)
2 RTD 3-wire (3rd digit selects type of RTD)
3 RTD 2- or 4-wire (3rd digit selects type of RTD)
4 Frequency
5 Period
6 Counter
7 Smart Input Module

THIRD DIGIT
OUTPUT REGISTER MAP
0 Averaged RTD1
1 Averaged RTD2
2 Averaged RTD3
3 Averaged Process 1
4 Averaged Process 2
5 -
6 -
7 Smart input module register 1 code setup

Channel 2 = RTD2

8 Enter Code 4 and set to [050]. Select the RTD2 for **CH2** in the 2nd digit. See **Note* in 2nd digit below.



FIRST DIGIT
MEASUREMENT TASK
0 Voltage, Current
1 TC (type as per 2nd digit)
2 RTD (type as per 2nd digit)
3 Second Digital Input Channel (type as per 2nd digit)

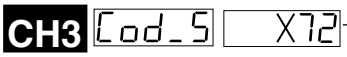
SECOND DIGIT	
FOR VOLTAGE & CURRENT	
0 Channel 2 Disabled	
1 Direct (no post processing)	
2 Square Root of Channel 2	
3 Inverse of Channel 2	
4 Output Register 1 (smart module)*	
5 Output Register 2 (smart module)*	
6 Output Register 3 (smart module)*	
7 Output Register 4 (smart module)*	

**Note:*
The logic for CH2 is not the same as CH1, CH3, or CH4. The 1st and 3rd digits must both be set to 0. Selecting 040 to 070 in the 2nd digit of Code 4 directly selects one of the following settings in the output register map (3rd digit):

2nd Digit	Output Register Map
4 selects	**0 Averaged RTD1**
5 selects	1 Averaged RTD2
6 selects	2 Averaged RTD3
7 selects	3 Averaged Process 1

Channel 3 = RTD3

9 Enter Code 5 and sert to [X72]. Select RTD3 for **CH3** in the 3rd digit.



FIRST DIGIT
CH3 POST PROCESSING
0 Direct Display of Input (no processing)
1 Square Root of Channel 3
2 Inverse of Channel 3
3 Meters with 4 kB memory
NO Linearization
Meters with 32 kB memory
32-point Linearization of CH3 using Table 3

Note:
All linearization tables are set up in the Calibration Mode [24X].

THIRD DIGIT
OUTPUT REGISTER MAP
0 Averaged RTD1
1 Averaged RTD2
2 Averaged RTD3
3 Averaged Process 1
4 Averaged Process 2
5 -
6 -
7 Smart input module register 1 code setup

Note: The output register map is different for each smart input module type.

RTD Full Scale Calibration Procedures

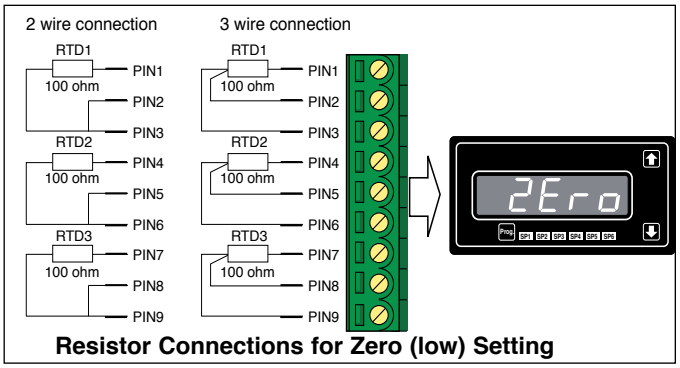
The RTDs can be calibrated in °F or °C. Using a calibration source to calibrate a zero and full scale setting is the easiest method to use. If a calibration source is not available, the known resistance values for the temperatures can be used.

The following table lists the equivelant resistances for both Pt385 and Pt392 type 100 Ω RTDs over a temperature range of 0 to 100 °C.

RTD Type	Temperature	Equivelant Resistance
Type Pt385 / 392	0 °C	100 Ω
Type Pt385	100 °C	138.5 Ω
Type Pt392	100 °C	139.3 Ω

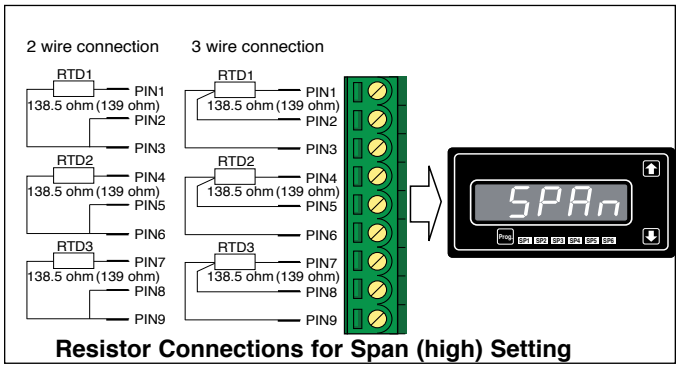
If a calibration source is not available make up a set of calibration plugs with the resistors shown in the diagrams opposite.

Plug the 0 °C calibration plug into the module and program the [ZEro] setting for the first channel required.



Resistor Connections for Zero (low) Setting

Unplug the 0 °C plug and plug the 100 °C calibration plug into the module and program the [SPAn] setting for the same channel.



Resistor Connections for Span (high) Setting

Example 2-point Calibration Procedure

The example 2-point calibration procedure on Page 7 can be used with a calibration source or with the calibration plug method. Enter the calibration mode and carry out the 2-point calibration procedure on the first channel required for RTD input.

Repeat this procedure for any other channels requiring an RTD input.

Tiger Macro Development System (TDS)

Tiger 320 Macro Overview

The Tiger 320 Series of programmable meter controllers have been designed to incorporate the analog and digital functionality of an intelligent controller with the logic of a PLC.

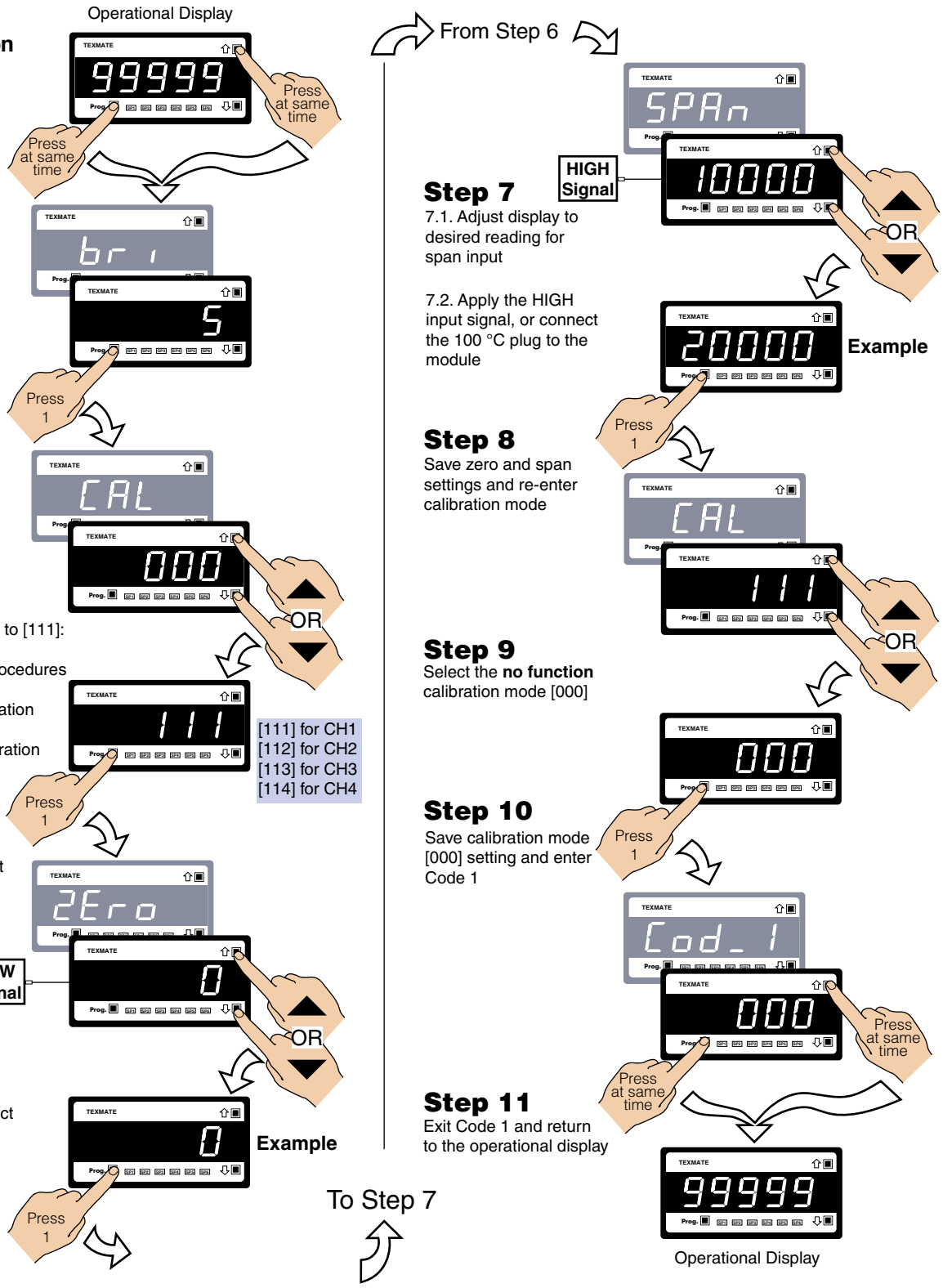
Traditionally, the PLC approach is to build a working application entirely in some form of programming language. The approach used in the Tiger 320 Series of controllers is to build an application by selecting the pre-programmed functions of the controller and then adding small amounts of programmability and logic where needed.

The operating system of the Tiger 320 controller controls all the pre-programmed functions, handling the input, averaging, scaling, linearization, totalization and much more, as well as driving the display, timers, relays, analog and serial outputs. Once configured, these functions are executed by the operating system and form the basis of a control system.

To form an advanced automation and control system you only need to write a small program that adds the extra logic required. We call this program a macro. A macro can be written specifically for your application and is used to initiate a sequence, reconfigure, or disable some of the controller functions. With Texmate's 22 I/O plug-in module installed, a macro further expands the Tiger 320 operating system with additional digital status inputs and digital switched outputs.

START HERE

2-point Calibration Mode Example



Macro control is ideal for many OEM applications that require analog, digital, and timer functions with sophisticated mathematical and enhanced logic operations. The macro concept has major cost advantages for large or small sophisticated applications that require some degree of programmable logic control with display and front panel control.

Custom Macro Programming

Texmate's Tiger Development System (TDS) enables a macro to be written and compiled in BASIC, utilizing any combination of the hundreds of functions and thousands of registers embedded in the Tiger 320 Operating System. When your BASIC program is compiled into Tiger 320 Macro-language it is error checked and optimized.

Macros are useful when implementing a specialized control system that cannot be achieved by the standard configuration capability of the Tiger 320 Operating System. Using the TDS software, functions can be altered or added in a standard controller to perform the required job. This may typically include logic sequencing functions and mathematical functions.

Developing a Macro is much easier and quicker than programming a PLC, because the basic code required to customize the Tiger meter is considerably less than the ladder logic programming required for PLCs. This is due to the hundreds of functions built into the Tiger controller that can be manipulated or invoked by a macro to fulfill the requirements of almost any application.

Scrolling display messages can be programmed to appear with any setpoint activation, selected event, or logic input. Easy to read, plain text prompts can be programmed to replace the manual programming codes and provide a user-friendly interface for any custom application.

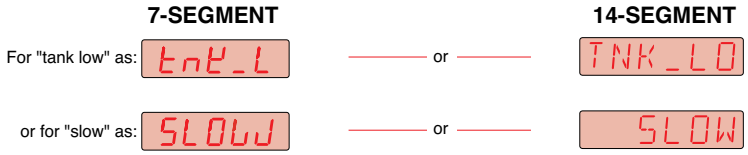
Scrolling Text Messaging

Scrolling text messaging is another bonus from running a macro. Any number of messages for detailed operator instructions, of up to 100 characters each, can be written into the macro during compilation for detailed operator instructions, alarm and control applications.

A scrolling text message can be written for OEMs and sensor manufacturers providing informative instructions for setup and calibration procedures.

Alphanumeric Displays

14-segment alphanumeric displays are Texmate's display choice for easy to read display text and scrolling text messaging.



Customer Configuration Settings:

		1st Digit	2nd Digit	3rd Digit
	SMt 1			
CH1	Cod_2			
CH2	Cod_4	0		0
CH3	Cod_5		7	

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