



# HEIDENHAIN



Operating Instructions

## ND 1200 T TOOL-CHEK

(TC 200)

English (en)  
9/2013



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**Tool-Chek® 200**

**User's Guide**

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## **Safety and Maintenance Considerations**

General safety precautions must be followed when operating the system. Failure to observe these precautions could result in damage to the equipment, or injury to personnel. It is understood that safety rules within individual companies vary. If a conflict exists between the material contained in this guide and the rules of a company using this system, the more stringent rules should take precedence.

Although Metronics strongly recommends that you read all parts of this guide, it is essential for reliable and safe operation to read the first portions up to and including Chapter 2: Operation, prior to operating the TC200.

## **Location and Mounting**

The TC200 must be placed or mounted on a stable, reliable surface. If the TC200 should fall, it could become seriously damaged and more importantly could cause injuries to the user.

## **Cleaning**

Use only a cloth dampened with water and a mild detergent for cleaning the exterior surfaces. Never use abrasive cleaners, and never use strong detergents or solvents. Only dampen the cloth, do not use a cleaning cloth that is dripping wet.

## **Electrical**

Do not allow the power cord to be located such that it can be

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walked on or create a tripping hazard.

**WARNING**

**Unplug the TC200 from the electrical outlet before cleaning.**



**WARNING!**



**WARNING!**

**WARNING**

**The TC200 is equipped with a 3-prong power plug that includes a separate ground connection. Always connect the power plug to a 3-prong grounded outlet. The use of 2-prong power plug adapters or any other connection accessories that remove the third grounded connection create a safety hazard and should not be permitted. If a 3-prong grounded outlet is not available, ask your electrician to provide one.**

## **General maintenance**

Unplug the TC200 from the wall outlet and seek the assistance of a qualified service technician if:

- The power cord is frayed or damaged or the power plug is damaged
- Liquid is spilled or splashed onto the enclosure
- The TC200 has been dropped or the exterior has been damaged
- The TC200 exhibits degraded performance or indicates a need for service some other way

## **Backup battery charging**

The TC200 utilizes an internal battery to maintain system configuration settings during power interruptions. A battery circuit charges this backup battery during periods of normal operation.

When the TC200 is used on a daily basis, the backup battery will be adequately charged to maintain configuration settings during power outages. However, over extended periods of nonuse, the battery might lose the charge necessary to maintain configuration settings. To keep the backup battery charged over extended periods of nonuse, apply power to the TC200 and leave it turned on for a minimum of 2 days each month.

## **FCC compliance statement**

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FCC Rule NP15R Rev. 23, June, 1989

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions in this guide, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Shielded cables must be used with this unit to ensure compliance with Class A FCC limits. The connection of a non-shielded equipment interface cable to this equipment will invalidate the FCC Certification of this device and may cause interference levels which exceed the limits established by the FCC for this equipment. It is the responsibility of the user to obtain and use a shielded equipment interface cable with this device. Do not leave cables connected to unused interfaces. Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

**For Canadian Users:**

This Class "A" digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe "A" respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

**Declaration of  
Conformity (EU)**

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This product conforms to the following product standards:  
EN61010-1 Safety  
EN61326:1998 EMC

The product therefore conforms with the requirements of the European Directives on Low Voltage 73/23/EEC and EMC 89/336/EEC.

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# Introduction

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## About this manual

The material in this guide is divided into 4 chapters ranging from introductory material to advanced topics. If you are an advanced user of tool presetter readouts, feel free to skim the material contained in this guide, but do not begin to operate the readout unless you're confident that you understand the essential information contained in these chapters. Observe all precautions and safety rules while using this equipment.

After an initial review, this guide will become an invaluable reference source that can be used routinely to answer questions and ensure smooth continued operation of the Tool-Chek. The comprehensive table of contents and index facilitate rapid access to specific information contained within the guide.

## Who should read this guide

This user's guide is intended for operators, technicians, supervisors and dealer representatives.

## What this guide covers

### Chapter 1: Overview

An overview of TC200 system including specifications.

### Chapter 2: Operation

Demonstration of TC200 operation for getting started with a minimum of details.

### Chapter 3: Setup

Contains an explanation of the various menu functions found on the TC200.

### Chapter 4: Communications

Serial (RS232) and parallel communication with printers and IBM-compatible personal computers.

## Introduction

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### Conventions and Basic terms

The terms Tool-Chek 200, TC200 and system used in this guide refer to the Tool-Chek 200 tool presetter readout.

A program is simply a series or sequence of key-presses used to perform measurements and stored by the system to be repeated automatically later. The stored sequence (program) can be repeated later simply by pressing one user-defined key.

### Measurement polarity

It is assumed in all discussions of measurements that:

- Moving crosshairs to the right causes measure counts to increase in a positive direction; 1 to 2 to 3 and so on.
- Moving crosshairs up causes measure counts to increase in a positive direction; 1 to 2 to 3 and so on.
- Rotating crosshairs counterclockwise causes measure counts to increase in a positive direction; 1 degree to 2 degrees to 3 degrees and so on.
- This count direction can easily be reversed if necessary.

Reversing the count direction is discussed later in Chapter 6: Orthogonal axis calibration.

### Measurement resolution in the guide

In most cases the display resolution shown on screens in this guide will be one ten-thousandths of an inch (0.0001) or two microns metric (0.002). The display resolutions shown in this manual are not meant to suggest resolutions that should be set on your system, they are only examples.

## Icons



**WARNING!**



**CAUTION!**



**NOTE!**

This guide uses the following icons to highlight information:

The raised hand icon indicates a warning regarding a situation or condition that could lead to personal injury or death. You should not proceed until you read and thoroughly understand the warning message. Warning messages are shown in bold type.

The exclamation point icon indicates a caution regarding a situation or condition that could lead to equipment malfunction or damage. You should not proceed until you read and fully understand the caution message. Caution messages are shown in bold type.

The note icon indicates additional or supplementary information about an activity or concept. Notes are shown in bold type.

## Type styles

Warnings, cautions, notes and the titles of front panel keys or system commands and menus shown in instructions are shown in bold type.

## Accuracy and precision

The TC200 is capable of great accuracy and precision and may surpass the measurement-accuracy capability of the human operator. The system is also capable of displaying higher resolution and more significant figures than is often needed. These facts may be important in your interpretation and use of the measurement data provided by the system.

### System configuration and setup

Metronics, Incorporated assumes that all TC200 systems will be configured and setup for the end-user by dealer representatives or OEMs. This setup includes calibration according to the user's tool presetter if needed.

When the end-user installs a new tool presetter, it will probably be necessary to perform configuration and setup again. In that case, contact their dealer representatives for assistance.



**WARNING!**

#### **WARNING**

**There is never any reason to open the TC200 enclosure. There are no user-serviceable components or assemblies inside. As with any electronic instrument, there is a danger of electrical shock and damage to the instrument if the enclosure is opened. Refer all maintenance requirements to your original dealer, or failing that to Metronics Incorporated.**

# Chapter 1

## Overview

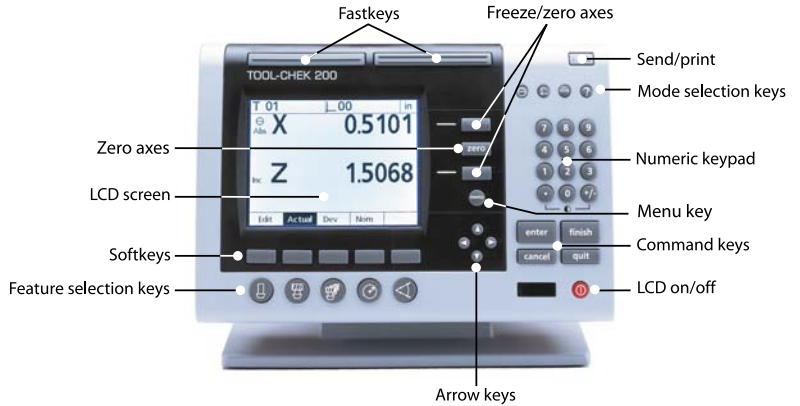
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The Tool-Chek 200 is an advanced tool presetter readout system that allows the user to establish datums using a setting gage and measure tool offset relative to nominal dimensions. Using the TC200 you can create a tool sequence to perform a series of commonly repeated tool measurements. Measurement results can be viewed on the TC200's LCD display, sent to a printer, or downloaded to a computer. The TC200 supports a variety of reporting formats for the user to select.

The intuitive interface will be familiar to users of the Tool-Chek and other Metronics products. Operators will find the TC200 easy to understand and use thanks to a large LCD display and front panel keys clearly marked with familiar function and mode symbols.



The LCD displays alphanumeric information that enables the user to perform simple offset measurements or more complex tool pre-setting and sequencing functions. Its size allows pertinent information to be clearly displayed and eliminates the need to page or scroll for information.



Many of the features and symbols from previous Tool-Chek version are retained in the TC200. The feature selection keys and the features they activate will be familiar to most Tool-Chek users.

Additional 'softkeys' expand the functionality of the TC200 and make the interface more user-friendly. Softkeys are used to access additional groups of related functions. To access softkey functions simply press the softkey beneath the desired group.

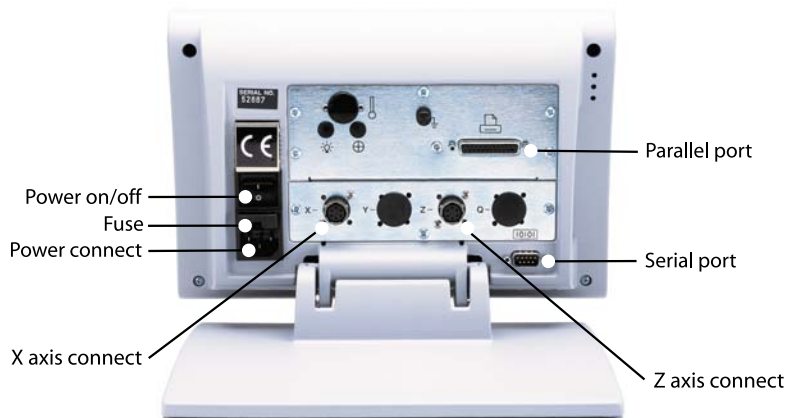
User's can navigate through lists using the arrow keys and enter numeric information via the numeric keypad.

Commonly executed tasks can be programmed into the TC200 and activated via one of the two Fast keys at the top of the read-out.

All front panel keys provide tactile sensory feedback, and many keypress operations can be configured by supervisors or dealer representatives to generate an audible sound.

Speaker and external speaker jack outputs are provided that can be adjusted for quiet or noisy environments. Earphones can be plugged into the external speaker jack to facilitate silent operation in quiet environments.

The compact ergonomic design and adjustable-tilt front panel of the TC200 allows users to locate and mount the instrument in a wide variety of environments. The tilt front panel can be adjusted and secured in any convenient position. Rubber feet on the bottom prevent slipping when the is not permanently bolted to a work surface. Bolt holes are provided in the mounting stand that match the pattern of the TC2000.



Measurements viewed on the front panel LCD can be transmitted to an IBM-compatible personal computer over a standard parallel port connection, or to a printer over a parallel or serial port. Sequences of keypresses used to perform measurements can be recorded and stored as programs. These programs can be replayed later to perform complete measurement sequences. Sequences can be as simple as measuring a line, or can be expanded to include skew adjustment, the measurement of multiple features and printing reports of measurement results.

An optional foot switch and remote keypad are available for feature-point and numeric data entry when the user is not close to the front panel.





## Specifications

**Input voltage range:**

85 VAC to 264 VAC. 100 W maximum (Auto switchable)

**Fuse:**

1.6 Amp 250V Type T

**CAUTION**

**Fuses provide protection against fire and other damage. Replacement fuses MUST match the specified voltage and current ratings.**

**Input Frequency:**

47Hz to 63Hz

**Environmental Conditions:**

Temperature: 0C to 45C (32F to 113F) non-condensing

Humidity: 90%rh

Altitude: 2000 meters

Pollution degree: 2

Installation category: II

**Dimensions:**

Enclosure: (WxHxD): 11.5" X 7.5" X 2.75"

Base (WxHxD): 10" X 2" X 7.8"

Enclosure weight: 3.5 lbs.

Base weight: 7lbs.

**LCD:**

Size/color: 6" black and white

Display digit size: 0.5"

**Resolution:**

0.000004" or 0.0001mm

**ENC tests:**

**EN61326:1998**

EMC for electrical equipment for measurement, control, and laboratory use

**EN61010**

Safety requirements for electrical equipment for measurement, control, and laboratory use



**WARNING!**

**WARNING:**

**To reduce the risk of electrical shock, never remove the cover or open the enclosure. There are no user-serviceable parts inside. Refer all service requirements to qualified service personnel.**

# Chapter 2

## Operation

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This chapter demonstrates the operation of the Tool-Chek 200. This demonstration is provided to allow experienced operators to start using the TC200 immediately. The demonstration will be most helpful if you perform the indicated steps on your TC200 while reading this material.



### NOTE

**Illustrations are included in this manual to indicate the basic types or displays found while operating the TC200. Specific data (i.e. measurements) will vary according to user selections. It is not necessary to match actual measurements to those presented here.**

The demonstration will include:

- Getting ready to operate the TC200
- Applying power
- Initial system settings
- Measuring and storing a setting gage
- Measuring and entering a tool
- Creating a tool sequence
- Measuring a circle
- Measuring an angle

The contents of LCD screens used in this demonstration will reflect a system using X and Z axis encoders configured with factory default settings.

### Getting ready to operate the TC200

This demonstration assumes a basic familiarity with the process of measuring features, TC200 controls and indicators, and the types of information presented on LCD screens.



### **NOTE**

It is assumed that operators have a basic understanding of tool fixturing and the geometric probing techniques required for their tool presetting devices.

### **Location and mounting**

Verify that the TC200 is mounted on a stable reliable surface. If it should fall, it could become seriously damaged or cause injuries to the user.

### **Power cord and plug**

The power cord should not be located where it can be walked on or create a tripping hazard. Always connect the 3-prong power plug to a 3-prong grounded outlet. Use of a 2-prong power plug adapter or any other connection accessory that removes the third grounded connection creates a safety hazard and should not be permitted.

### **Power surge suppressor**

A high-quality power surge suppressor should be used to limit the amplitude of potentially damaging power line transients caused by the operation of heavy electrical machinery or lightning.

### **Liquids**

Do not spill or splash liquids on the TC200 enclosure.

### **Configuration and system setup**

System configuration and setup should be performed only by technically qualified supervisors or dealer representatives. Operators should not attempt to alter the configuration of the TC200

### **Checking connections**

Perform a routine inspection of all connections to the tool preset readout system. Connections should be clean and tight. Cables should be located away from moving objects and should not create tripping hazards.

Cables connected to the parallel and serial (RS232) output ports should be shielded and should be terminated and firmly connected on both ends.

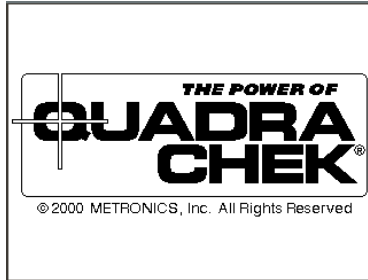


**CAUTION**

Never connect electrical cables to the system when the power is on. Optical edge detector cables may be connected or disconnected with the power on.

**Applying power**

To apply power, press the power switch located at the back of the enclosure to ON (1). The system will initialize and display the power-up screen.



Press any key on the front panel to complete the system initialization. The DRO screen will be displayed showing the current positions of encoders on each axis.

| T        |          | 00            | in |
|----------|----------|---------------|----|
| ⊖<br>Abs | <b>X</b> | <b>0.0000</b> |    |
|          | <b>Z</b> | <b>0.0000</b> |    |
|          |          |               |    |



**NOTE**

If the encoders used with your system include reference marks, you may be instructed to cross the reference marks on each axis before the DRO screen is displayed.

### Initial system settings

The first steps in any measurement session will include adjusting the LCD viewing angle, contrast and measurement or display settings.

#### Adjusting LCD tilt

The tilt angle of the TC200 enclosure can usually be adjusted for optimum viewing by simply swiveling the enclosure on its base to the desired position. If the enclosure angle is locked in position, loosen the two Allen screws at the base of the enclosure, move the enclosure to the desired angle and tighten the Allen screws so that the enclosure is held firmly in position but can be adjusted again without loosening the Allen screws.

#### Adjusting LCD brightness

The LCD contrast can be adjusted for optimum viewing from the DRO screen. Press the decimal point of the numeric keypad to decrease contrast or the +/- key to increase contrast.

#### Setting measurement and display parameters

The measure and display parameters that you establish prior to a measurement session will depend on the measurement that you are making and the way you would like to have data and graphics displayed on the LCD screen and on reports.



#### Diameter/Radius

Select diameter or radius measurement by pressing the Diameter/Radius mode key. This selection can be changed at any time.



#### NOTE

**When the user changes the mode from diameter or radius the value entered remains the same. Be certain to adjust the value entered to obtain accurate presets.**



#### Absolute/Incremental

Select absolute or incremental modes for the X and Z axis by pressing the Absolute/Incremental mode key. When the Absolute/Incremental mode key is pressed the user is prompted to select the axis to be changed to incremental mode. To select either the X or Z axis press the axis key. To switch both axes to incremental press

the zero key. Pressing the Absolute/Incremental mode key a second time will return both axes to absolute. Both axes can be changed to incremental by simply pressing the zero button and following the on-screen instructions.

**Unit of measure (Linear)**

Features can be displayed in mm or inches. Select the desired unit of measure if necessary by pressing the mm/inch mode key. The unit of measure will be displayed at the upper right corner of the LCD. This selection can be changed at any time.

**Help**

Displays help text on the screen explaining the current function or LCD screen.

### Feature selection keys

The feature selection keys initiate TC200 functions that measure and calculate setting gage and tool dimensions, store tool sequencing programs, and initiate other automated features.



#### Setting gage

Setting gages are used to establish a datum on the tool presetter. Pressing this key brings up the Select Setting Gage screen. The user can input new, edit existing, and delete unneeded setting gages with softkey functions on this screen. All tool presetting operations require at least one setting gage.



#### Tool

Allows the user to input nominal information for a tool. Pressing this key brings up the New Tool screen. The user can input information to store a new tool on this screen. New tools can be saved by pressing the save softkey. Existing tools can be selected by pressing the select softkey.



#### Tool Sequence

Allows the user to program a series of tool measurements required for a specific part. Pressing this key brings up the recording screen. The TC200 will record all keypresses and user selections and store them for later use. Users can retrieve a tool sequence using this key as well.



#### Circle

Circles can be measured by targeting between 3 and 100 points around the circumference. Generally, accuracy of the feature is increased as more points are targeted and the targeted points are



distributed at more or less equal arc distances around the circle. When more than 3 points are targeted, a best-fit algorithm will be used to create the circle feature and an F (Form) value will be included in the circle feature data.

**Angle**

Angles can be measured by targeting between 2 and 100 points on each of the vertices of the angle. Generally, accuracy of the feature is increased as more points are targeted and the targeted points are distributed at more or less equal distances along the line.

## Basic operating procedures

### To measure and store a setting gage

#### Step 1

From the feature selection keys press setting gage. The LCD displays the select setting gage screen.

| Select Setting Gage |              | in      |
|---------------------|--------------|---------|
| <b>00</b>           | Name         | 00      |
|                     | Nominal X    | 0.00000 |
|                     | Nominal Z    | 0.00000 |
|                     | Label Format | Current |
|                     | Swap Axes    | No      |
|                     | Reverse X    | No      |
|                     | Reverse Z    | No      |
|                     | R/D Axis     | X       |
|                     | Cal Date     |         |
| New                 | Edit         | Delete  |

#### Step 2

Press the new softkey. The LCD displays the new setting gage screen.

| New Setting Gage |                      | in  |
|------------------|----------------------|-----|
| Name             |                      |     |
| Nominal X        | <input type="text"/> | Dia |
| Nominal Z        | <input type="text"/> |     |
| Label Format     | <u>Current</u>       |     |
| Swap Axes        | No                   |     |
| Reverse X        | No                   |     |
| Reverse Z        | No                   |     |
| R/D Axis         | X                    |     |
| Cal Date         |                      |     |
|                  |                      | Cal |

#### Step 3

Use the numerical keypad to enter a name for the setting gage and then press enter.

| New Setting Gage |                      | in  |
|------------------|----------------------|-----|
| Name             | <b>01</b>            |     |
| Nominal X        | <input type="text"/> | Dia |
| Nominal Z        | <input type="text"/> |     |
| Label Format     | <u>Current</u>       |     |
| Swap Axes        | No                   |     |
| Reverse X        | No                   |     |
| Reverse Z        | No                   |     |
| R/D Axis         | X                    |     |
| Cal Date         |                      |     |
|                  |                      | Cal |

Step 4

Enter the value for Nominal X. Nominal X is the diameter or radius of the setting gage. Press enter.

| New Setting Gage |         | in  |
|------------------|---------|-----|
| Name             | 01      |     |
| Nominal X        | 0.01250 | Dia |
| Nominal Z        |         |     |
| Label Format     | Current |     |
| Swap Axes        | No      |     |
| Reverse X        | No      |     |
| Reverse Z        | No      |     |
| R/D Axis         | X       |     |
| Cal Date         |         |     |
|                  |         | Cal |



**NOTE**

The TC200 displays either 'Dia' or 'Rad' next to input field for Nominal X to indicate whether the value is a diameter or radius. This indication can be changed by pressing the Diameter/Radius mode selection key.



**NOTE**

When the user changes the mode from diameter or radius the value entered remains the same. Be certain to adjust the value entered to obtain accurate presets.



**NOTE**

Be certain to use the correct units of measurement to avoid errors. The units of measure are displayed at the top right corner of the screen. To change the units of measure press the mm/inches mode selection key.

Step 5

Enter the value for Nominal Z. Nominal Z via the distance from the datum to the tip of the setting gage. Press enter.

| New Setting Gage |         | in  |
|------------------|---------|-----|
| Name             | 01      |     |
| Nominal X        | 0.01250 | Dia |
| Nominal Z        | 2       |     |
| Label Format     | Current |     |
| Swap Axes        | No      |     |
| Reverse X        | No      |     |
| Reverse Z        | No      |     |
| R/D Axis         | X       |     |
| Cal Date         |         |     |
|                  |         | Cal |

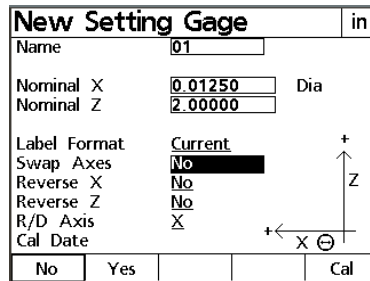
**Step 6**

Press the list softkey and use the up or down arrow keys to choose label formats and press enter.



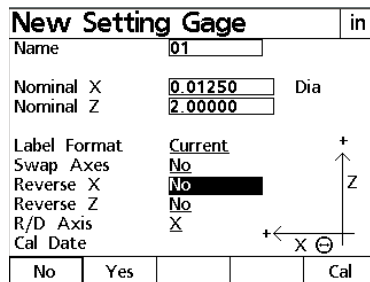
**Step 7**

The swap axes feature allows the user to swap the X and Z axis. Use the softkeys to select yes or no and press enter.



**Step 8**

The reverse X feature allows the user to reverse the positive and negative ends of the X axis. Use the softkeys to select yes or no and press enter.





**NOTE**

It may be necessary to reverse axes when presetting lathe tools to achieve positive offset values.

Step 9

The reverse Z feature allows the user to reverse the positive and negative ends of the Z axis. Use the softkeys to select yes or no and press enter.

| New Setting Gage |         | in  |
|------------------|---------|-----|
| Name             | 01      |     |
| Nominal X        | 0.01250 | Dia |
| Nominal Z        | 2.00000 |     |
| Label Format     | Current |     |
| Swap Axes        | No      |     |
| Reverse X        | No      |     |
| Reverse Z        | No      |     |
| R/D Axis         | X       |     |
| Cal Date         |         |     |
| No               | Yes     | Cal |



**NOTE**

It may be necessary to swap axes when presetting lathe tools to achieve positive offset values.

Step 10

The R/D Axis feature allows the user to designate the X or Z axis as the diameter/radius of the setting gage. Use the softkeys to select X or Z and press finish.

| New Setting Gage |         | in  |
|------------------|---------|-----|
| Name             | 01      |     |
| Nominal X        | 0.01250 | Dia |
| Nominal Z        | 2.00000 |     |
| Label Format     | Current |     |
| Swap Axes        | No      |     |
| Reverse X        | No      |     |
| Reverse Z        | No      |     |
| R/D Axis         | X       |     |
| Cal Date         |         |     |
| X                | Z       | Cal |

Step 11

Align the setting gage with the crosshairs on the tool presetter and press enter. The TC200 will store the setting gage in its memory.

| New Setting Gage                              |    | in  |
|-----------------------------------------------|----|-----|
| Name                                          | 01 |     |
| Press ENTER when the setting gage is aligned. |    |     |
| Reverse X                                     | No | Z   |
| Reverse Z                                     | No |     |
| R/D Axis                                      | X  | X ⊖ |
| Cal Date                                      |    |     |
|                                               |    |     |

To measure and store a tool

Step 1

From the feature selection keys press tool. The LCD displays the New Tool screen.

| New Tool     |         | in  |
|--------------|---------|-----|
| Tool         |         |     |
| POT          | 1       |     |
| Nominal X    | 0.00000 | Dia |
| Nominal Z    | 0.00000 |     |
| Setting Gage | 01      |     |
| Location     |         |     |
| Radius       |         |     |
| Angle        |         |     |
| Save         |         |     |

Step 2

Use the numeric keypad to enter a number for the tool and press enter.

Step 3

Position of tool (POT) refers to a tools location in a tool changer mechanism. Use the numeric keypad to enter a value between 1 and 99 then press enter.

Step 4

Nominal X is the diameter or radius of the tool. Use the numeric keypad to enter a value for nominal X and press enter.



**NOTE**

The TC200 displays either 'Dia' or 'Rad' next to input field for Nominal X to indicate whether the value is a diameter or radius. This indication can be changed by pressing the Diameter/Radius mode selection key.



**NOTE**

Be certain to use the correct units of measurement to avoid errors. The units of measure are displayed at the top right corner of the screen. To change the units of measure press the mm/inches mode selection key.

Step 5

Nominal Z is the length of the tool. Use the numeric keypad to enter a value for nominal Z and press enter.

Step 6

Enter the name of the setting gage to be used with this tool. The setting gage name may be entered with the numeric keypad or by pressing the list softkey. When using the list softkey, use the up or down arrow keys to scroll through the list. Highlight the setting gage to be used and press enter. If the setting gage has not been entered the user will be unable to save the tool data.

| New Tool     |         | in  |
|--------------|---------|-----|
| Tool         | 001     |     |
| POT          | 1       |     |
| Nominal X    | 0.01250 | Dia |
| Nominal Z    | 2.00000 |     |
| Setting Gage | 01      |     |
| Location     |         |     |
| Radius       |         |     |
| Angle        |         |     |
| Save         | List    |     |

| New Tool     |      | in  |
|--------------|------|-----|
| Tool         | 00   |     |
| POT          | 01   |     |
| Nominal X    |      | Dia |
| Nominal Z    |      |     |
| Setting Gage |      |     |
| Location     |      |     |
| Radius       |      |     |
| Angle        |      |     |
| Save         | List |     |

Step 7

The TC200 allows the user to store the location of tools in the location field. Location refers to the physical storage location of the tool and not the position of the tool (POT) in the automated tool changer. Entries in this field are optional. Use the numerical keypad to enter the tool location and press enter. To continue without entering a location simply press enter.

### Step 8

The TC200 includes additional inputs for radius and angle for specialized cutting tools. For conventional milling procedures these fields are left blank.

### Step 9

Press the save softkey to save the tool. The TC200 displays the tool just created.

## Creating a tool sequence

The TC200 records user input and store it as a tool sequence. Tool sequences can be saved for repeated use or modified for slightly different tasks. For more on modifying tool sequences see Chapter 3: operation.



### NOTE

**While recording a tool sequence, use the cancel key to return to a previously recorded tool. Pressing cancel once brings up the previous tool; to go back three tools press cancel three times, and so forth. Tools can also be re-measured after recording by pressing the tool sequence key then using the up or down arrow keys to select the desired tool and pressing finish.**

### Step 1

Press the tool sequence feature selection key. The LCD displays the Recording Temp screen.

| Recording Temp |      |        |       | in    |
|----------------|------|--------|-------|-------|
| Tool           | SG   | POT    | Z-Act | X     |
|                |      |        |       |       |
| Pause          | Save | Select |       | Clear |



Step 2

Press the save softkey. Use the numerical keypad to enter a tool sequence name and press OK. The DRO screen is displayed.

|                       |    |     |       |    |
|-----------------------|----|-----|-------|----|
| <b>Recording Temp</b> |    |     |       | in |
| Tool                  | SG | POT | Z-Act | X  |
| Enter sequence name:  |    |     |       |    |
| 01                    |    |     |       |    |
| Cancel                | OK |     |       |    |



**NOTE**

In the running temp or running sequence screen, use the left and right arrow keys to view the entire tool report.

|                       |      |        |       |       |
|-----------------------|------|--------|-------|-------|
| <b>Recording Temp</b> |      |        |       | in    |
| Tool                  | SG   | POT    | Z-Act | X     |
|                       |      |        |       |       |
| Pause                 | Save | Select |       | Clear |

|                       |       |        |  |       |
|-----------------------|-------|--------|--|-------|
| <b>Recording Temp</b> |       |        |  | in    |
| Z-Act                 | X-Act | Z-Norm |  | X     |
|                       |       |        |  |       |
| Pause                 | Save  | Select |  | Clear |

|                       |        |        |  |       |
|-----------------------|--------|--------|--|-------|
| <b>Recording Temp</b> |        |        |  | in    |
| Z-Norm                | X-Norm | Z-Dev  |  | X     |
|                       |        |        |  |       |
| Pause                 | Save   | Select |  | Clear |

|                       |       |          |  |       |
|-----------------------|-------|----------|--|-------|
| <b>Recording Temp</b> |       |          |  | in    |
| Z-Dev                 | X-Dev | R/D I/MM |  | X     |
|                       |       |          |  |       |
| Pause                 | Save  | Select   |  | Clear |

### Running a tool sequence

#### Step 1

Press the tool sequence feature selection key. Press the select softkey and use the cursor keys to highlight the desired sequence. Press the enter key.

| Select Sequence |          |     | in |
|-----------------|----------|-----|----|
| Temp            | Sequence | 1   |    |
| <b>1</b>        | Tool     | POT |    |
|                 | 001      | 1   |    |
|                 | 002      | 2   |    |
| Delete          |          | Run |    |

#### Step 2

Press the run softkey. The name of the first tool in the sequence appears in the upper left corner of the screen.

| Select Sequence |          |     | mm |
|-----------------|----------|-----|----|
| √Temp           | Sequence | 001 |    |
| <b>001</b>      | Tool     | POT |    |
|                 | 001      | 1   |    |
|                 | 02       | 2   |    |
| Delete          | Copy     | Run |    |

| T 001 |               | 01             | in  |
|-------|---------------|----------------|-----|
| ⊖     | <b>X</b>      | <b>-0.0426</b> |     |
| Abs   |               |                |     |
|       | <b>Z</b>      | <b>2.0020</b>  |     |
| Abs   |               |                |     |
| Edit  | <b>Actual</b> | Dev            | Nom |

**Step 3**

Align the tool on the tool presetter. When the tool is aligned press finish. The next tool in the sequence is displayed in the upper left corner of the screen. Repeat this process for each of the tools in the sequence.

|          |               |                |     |    |  |
|----------|---------------|----------------|-----|----|--|
| T 002    |               | L 01           |     | in |  |
| ⊖<br>Abs | <b>X</b>      | <b>-0.0426</b> |     |    |  |
| Abs      | <b>Z</b>      | <b>2.0020</b>  |     |    |  |
| Edit     | <b>Actual</b> | Dev            | Nom |    |  |

### Step 4

After the last tool in the sequence press finish. The TC200 prompts 'Print tool sequence report?'

|       |                                     |        |
|-------|-------------------------------------|--------|
| T 002 | L 01                                | in     |
| ⊖ X   | -0.0426                             |        |
| Abs   | Sequence is complete. Print Report? |        |
| Abs   | Z                                   | Z.0020 |
| No    | Yes                                 |        |

Press the yes softkey to print a report, otherwise press the no softkey. The tool sequence has been successfully completed.

## Measuring a circle

Circles can be measured by targeting between 3 and 100 points around the circumference. Generally, accuracy of the feature is increased as more points are targeted and the targeted points are distributed at more or less equal arc distances around the circle. When more than 3 points are targeted, a best-fit algorithm will be used to create the circle feature and an F (Form) value will be included in the circle feature data.



### NOTE

The procedure below assumes that circle data is required for a saved tool. If circle data is required for simple verification or other purposes, press the circle feature selection key and proceed from step 3.

### To measure a circle

#### Step 1

Press the Circle feature selection key. Be certain there is not a tool selected. If a tool name appears at the top of the screen press the Quit command key followed by Circle feature selection key. The Probe Circle screen will be displayed.

|     |   |        |    |
|-----|---|--------|----|
| T   |   | 00     | in |
| ⊖   | X | 0.0000 |    |
| Inc | Z | 0.0000 |    |
|     |   |        |    |

|              |       |        |    |
|--------------|-------|--------|----|
| Probe Circle |       |        | in |
| ⊖            | X     | 0.0000 |    |
| Inc          | Z     | 0.0000 |    |
|              | Pts=0 |        |    |
|              |       |        |    |

### Step 2

Align the tool with the crosshairs on the tool presetter and press enter. The location of the targeted point will be shown on the Probe Circle screen and the number of points indicated on the lower left part of the display will increase.

| Probe Circle |          | in             |
|--------------|----------|----------------|
| ⊖<br>Inc     | <b>X</b> | <b>-0.0197</b> |
| Inc          | <b>Z</b> | <b>-0.0004</b> |
| <b>Pts=1</b> |          |                |
|              |          |                |

| Probe Circle |          | in             |
|--------------|----------|----------------|
| ⊖<br>Inc     | <b>X</b> | <b>0.0205</b>  |
| Inc          | <b>Z</b> | <b>-0.0031</b> |
| <b>Pts=2</b> |          |                |
|              |          |                |

### Step 3

Align the tool with the crosshairs on the tool presetter on the second point and press enter. The new location will be shown and the number of points will increase again. The Tool-Chek requires a minimum of 3 points to measure a circle.

| Probe Circle |          | in             |
|--------------|----------|----------------|
| ⊖<br>Inc     | <b>X</b> | <b>0.0173</b>  |
| Inc          | <b>Z</b> | <b>-0.0012</b> |
| <b>Pts=3</b> |          |                |
|              |          |                |

**Step 4**

Continue this process until all of the points have been targeted and entered. When all of the required points on the perimeter of the circle have been entered, press the Finish key.

|        |          |                |        |
|--------|----------|----------------|--------|
| T      |          | L 00           | in     |
| ⊖      | <b>X</b> | <b>0.0206</b>  |        |
| Max    |          |                |        |
|        | <b>Z</b> | <b>-0.0009</b> |        |
| Max    |          |                |        |
| r      | 0.0030   | F              | 0.0000 |
| Actual | Center   | <b>C Max</b>   |        |

**Step 5**

Press the Tool feature selection key. Enter the tool information and press the save softkey.

|                 |         |     |
|-----------------|---------|-----|
| <b>New Tool</b> |         | in  |
| Tool            |         |     |
| POT             | 1       |     |
| Nominal X       | 0.00080 | Dia |
| Nominal Z       | 0.00000 |     |
| Setting Gage    | 00      |     |
| Location        |         |     |
| Radius          | 0.00010 |     |
| Angle           |         |     |
| Save            |         |     |

|                 |         |     |
|-----------------|---------|-----|
| <b>New Tool</b> |         | in  |
| Tool            | 001     |     |
| POT             | 1       |     |
| Nominal X       | 0.05000 | Dia |
| Nominal Z       | 1.00000 |     |
| Setting Gage    | 01      |     |
| Location        |         |     |
| Radius          | 0.00050 |     |
| Angle           |         |     |
| Save            |         |     |

## Measuring an angle

Angles can be measured by targeting between 2 and 100 points on each of the vertices of the angle. Generally, accuracy of the feature is increased as more points are targeted and the targeted points are distributed at more or less equal distances along the line.



### NOTE

The procedure below assumes that angle data is required for a saved tool. If angle data is required for simple verification or other purposes, press the angle feature selection key and proceed from step 2.

### To measure an angle

#### Step 1

Press the Angle feature selection key. Be certain there is not a tool selected. If a tool name appears at the top of the screen press the Quit command key followed by Angle feature selection key. The Probe Line 1 screen will be displayed.

|     |   |        |    |
|-----|---|--------|----|
| T   |   | 00     | in |
| ⊖   | X | 0.0000 |    |
| Inc |   |        |    |
|     | Z | 0.0000 |    |
| Inc |   |        |    |
|     |   |        |    |

|              |   |        |    |
|--------------|---|--------|----|
| Probe Line 1 |   |        | in |
| ⊖            | X | 0.0882 |    |
| Abs          |   |        |    |
|              | Z | 0.0500 |    |
| Abs          |   |        |    |
| Pts=0        |   |        |    |
|              |   |        |    |



**Step 2**

Align the first line of the angle with the crosshairs on the tool presetter and press enter. The location of the targeted point will be shown on the Probe Line 1 screen and the number of points indicated on the lower left part of the display will increase. A minimum of 2 points is needed for a line. When all points are entered press the Finish command key.

| Probe Line 1 |          | in            |
|--------------|----------|---------------|
| ⊖<br>Abs     | <b>X</b> | <b>0.1677</b> |
| Abs          | <b>Z</b> | <b>0.0610</b> |
| <b>Pts=1</b> |          |               |
|              |          |               |

| Probe Line 1 |          | in            |
|--------------|----------|---------------|
| ⊖<br>Abs     | <b>X</b> | <b>0.1677</b> |
| Abs          | <b>Z</b> | <b>0.0610</b> |
| <b>Pts=2</b> |          |               |
|              |          |               |

**Step 3**

Align the second line of the angle with the crosshairs on the tool presetter and press enter. The location of the targeted point will be shown on the Probe Line 2 screen and the number of points indicated on the lower left part of the display will increase. A minimum of 2 points is needed for a line. When all points are entered press the Finish command key.

| Probe Line 2 |          | in            |
|--------------|----------|---------------|
| ⊖<br>Abs     | <b>X</b> | <b>0.1677</b> |
| Abs          | <b>Z</b> | <b>0.0610</b> |
| <b>Pts=0</b> |          |               |
|              |          |               |

| Probe Line 2 |          | in            |
|--------------|----------|---------------|
| ⊖<br>Abs     | <b>X</b> | <b>0.0071</b> |
| Abs          | <b>Z</b> | <b>0.0559</b> |
| <b>Pts=1</b> |          |               |
|              |          |               |

| Probe Line 2 |          | in            |
|--------------|----------|---------------|
| ⊖            | <b>X</b> | <b>0.0118</b> |
| Abs          |          |               |
|              | <b>Z</b> | <b>0.0327</b> |
| Abs          |          |               |
| <b>Pts=2</b> |          |               |
|              |          |               |
|              |          |               |

| New Tool     |           | in  |
|--------------|-----------|-----|
| Tool         |           |     |
| POT          | 1         |     |
| Nominal X    | 0.00060   | Dia |
| Nominal Z    | 0.00050   |     |
| Setting Gage | 00        |     |
| Location     |           |     |
| Radius       |           |     |
| Angle        | 64°00'59" |     |
| Save         |           |     |

Step 4

Press the Tool feature selection key. Enter the tool information and press the save softkey.

| New Tool     |           | in  |
|--------------|-----------|-----|
| Tool         |           |     |
| POT          | 1         |     |
| Nominal X    | 0.00060   | Dia |
| Nominal Z    | 0.00050   |     |
| Setting Gage | 00        |     |
| Location     |           |     |
| Radius       |           |     |
| Angle        | 64°00'59" |     |
| Save         |           |     |

| New Tool     |           | in  |
|--------------|-----------|-----|
| Tool         | 002       |     |
| POT          | 2         |     |
| Nominal X    | 0.25000   | Dia |
| Nominal Z    | 2.00000   |     |
| Setting Gage | 01        |     |
| Location     |           |     |
| Radius       |           |     |
| Angle        | 64°00'59" |     |
| Save         |           |     |

### Zeroing Axes

Press the zero key to zero one or both axes on the TC200. The TC200 will prompt: press axis to zero, or press zero again to zero both axes.

| T                                                          | L 01     | in            |
|------------------------------------------------------------|----------|---------------|
| ⊖<br>Inc                                                   | <b>X</b> | <b>0.0205</b> |
| Press axis to zero, or press Zero again to zero both axes. |          |               |
| Inc                                                        | <b>Z</b> | <b>0.0018</b> |
|                                                            |          |               |

| T        | L 01     | in            |
|----------|----------|---------------|
| ⊖<br>Inc | <b>X</b> | <b>0.0000</b> |
| Inc      | <b>Z</b> | <b>0.0018</b> |
|          |          |               |

### Freezing Axes

Occasionally a tool is too large to fit entirely on the tool presetter. When this happens it is sometimes necessary to measure one axis at a time. The TC200 allows users to freeze axes in order to measure along only one axis at a time.

To freeze an axis, press the freeze/zero axis key adjacent the axis to be froze. In this example the X axis is frozen. When an axis is frozen it appears in a hollow font.

| T        | L 01     | in            |
|----------|----------|---------------|
| ⊖<br>Inc | <b>X</b> | <b>0.0000</b> |
| Inc      | <b>Z</b> | <b>0.0018</b> |
|          |          |               |



# Chapter 3

## Setup

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### Configuring the TC200

Configure the TC200 prior to using it the first time and when tool measurement, reporting, or data communication requirements change. System configurations are entered using the arrow keys, command keys, softkeys, and numeric keypad. The setup menu structure allows easy navigation and quick setup of the TC200.

### Basic setup terms

The following is a list of terms used in this chapter and their definitions.

**Data entry field:** Any item within a setup screen that requires numeric input from the user. The MM Disp Res field on the Display setup screen is a data entry field.

**Highlight:** Placing the cursor block on a particular item in a list or data entry field.

**Option selection field:** Any item within a setup screen that can be changed by selecting options using the softkeys. The English field on the About setup screen is an option selection field.

**Scroll:** Using the up or down arrow keys to move the cursor block (highlight) through a list.

**Setup screen:** Any screen accessed via the setup softkey. The About setup screen is the first screen displayed after pressing the Setup softkey. Additional setup screens can be accessed by scrolling through the list with the up or down arrow keys.

### The Setup Menu

All operating parameters of the TC200 can be configured using functions in the Setup menu. These parameters include:

- Language shown on the LCD display
- Display format of tool data
- Encoder configuration
- Print configuration for reports and labels
- Ports configuration for serial and parallel
- Supervisor password
- Squareness angle
- LEC (Linear Error Correction)
- SLEC (Segmented Linear Error Correction) configuration
- Scale factor
- Misc (Miscellaneous) parameters
- Clock date and time settings

Setup configurations are retained by the TC200 until changed by the user.

### Accessing the Setup menu

The Setup menu is accessed by pressing the Menu key and then pressing the Setup softkey. Setup menu procedures are divided into user level procedures and supervisor level procedures. Supervisor level procedures require the input of the supervisor password in the Supervisor setup screen. If the supervisor password has not been entered, all supervisor level procedures are inaccessible. The supervisor password is not retained through power cycles; it must be re-entered each time the unit is turned off and on.

The Setup menu contents are displayed on the left side of the screen with the About setup screen highlighted.

## Using the Setup menu

To select from the Setup menu scroll through the list using the up or down arrow keys and highlight the desired setup screen. When a setup screen is highlighted, associated data entry fields and option selection fields appear on the right portion of the screen and can be configured or changed using arrow keys, softkeys, command keys, and numeric keypad.

## Setup Instructions

Selecting and configuring system parameters are explained in the Using the Setup menu section of this chapter. Configure the TC200 prior to using it the first time and when tool measurement, reporting, or data communication requirements change.



To access the setup menu, press the menu key and then press the setup softkey.

### Command Keys

The enter, finish, cancel and quit keys have slightly different functions during setup activities.



#### **Enter Key**

Press the enter key to store the highlighted value or selection and advance to the next setup parameter. Pressing enter at the bottom of a list advances to the top of the list.



#### **Finish Key**

Press the finish key to store all parameters for the current setup activity and return to the setup menu.



#### **Cancel Key**

Press the cancel key to erase the last digit in a highlighted data field.



#### **Quit Key**

Pressing the quit key to store all parameters for the current setup activity and return to the setup menu.



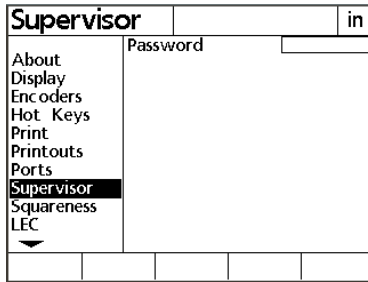
## Supervisor Password

Most setup functions are password protected. Users with supervisor access have unrestricted access to setup screen activities. Only users with extensive tool presetter and TC200 experience should perform supervisor level setup procedures. The supervisor password is contained in the TC200 packing materials and is clearly labeled.

### To enter the password

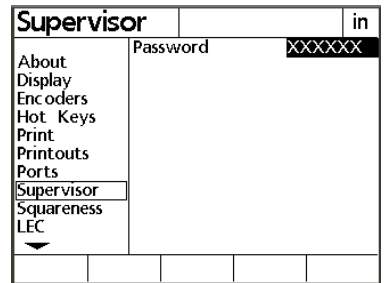
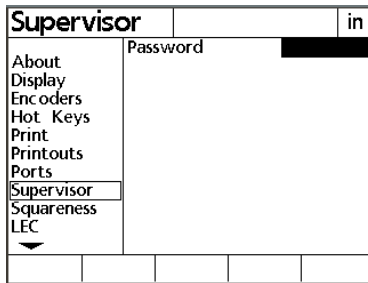
#### Step 1

Scroll through the setup menu until Supervisor is highlighted.



#### Step 2

Press the left cursor arrow to highlight the password data entry field. Use the numeric keypad to enter the password, then press enter.



Press the left arrow key to return to the setup menu.

## About

The About setup screen allows the user to change the default display language. Users may choose English, French, German, Spanish, or Italian. This screen also contains software version information. All procedures on this screen are user level.

Scroll through the setup menu using the up or down arrow keys until About is highlighted.

| About      |                | in  |
|------------|----------------|-----|
| About      | English        | Yes |
| Display    | French         | No  |
| Encoders   | German         | No  |
| Print      | Spanish        | No  |
| Ports      | Italian        | No  |
| Supervisor | Portuguese     | No  |
| Squareness | Version 0.99z9 |     |
| LEC        | XZ             |     |
| SLEC       |                |     |
| Misc.      |                |     |
| ▼          |                |     |

Press the right arrow key to highlight items in the right portion of the screen. Press the up or down arrow key or enter to scroll through the languages. Highlight the desired language and press the yes softkey. Press the left arrow key or finish to save the language selection and return to the setup menu.

## Display

The display setup screen contains 4 user level procedures and 4 supervisor level procedures. Users can change the startup units of linear and angular measurement, select decimal or comma radices, and designate angular measurement format. Supervisors can input display resolutions for millimeters, inches, decimal degrees; and degrees, minutes, and seconds in addition to the above user level procedures.

| Display    |                 | in      |
|------------|-----------------|---------|
| About      | MM Disp Res     | 0.0001  |
| Display    | Inch Disp Res   | 0.0001  |
| Encoders   | DMS Disp Res    | 0.00.01 |
| Print      | DD Disp Res     | 0.001   |
| Ports      | Startup Linear  | Inch    |
| Supervisor | Startup Angular | DMS     |
| Squareness | Radix           | Decimal |
| LEC        | Current Angular | DMS     |
| SLEC       |                 |         |
| Misc.      |                 |         |
| ▼          |                 |         |

Display resolution determines the number of decimal places the TC200 will display. For example, if the millimeter display resolution is set to .1, the TC200 will display a measurement of 1.2311 millimeters as 1.2. Any value up to the resolution of the encoder can be entered for display resolution. Values in excess of the encoder resolution result in accurate display information.

**NOTE**

**When inputting resolution remember that .0001mm is a higher resolution than .0002mm. Therefore, any entry less than .0002mm exceeds the resolution of an encoder with .0002mm resolution.**

Scroll through the setup menu until Display is highlighted.

The following data entry fields are displayed, MM Disp Res (millimeter display resolution), Inch Disp Res (inch display resolution), DMS Disp Res (degrees, minutes, seconds display resolution), DD Disp Res (decimal degrees display resolution). Each of these fields are supervisor level procedures and require the supervisor password to be entered prior to changing.

The following option selection fields are displayed, Startup Linear, Startup Angular, Radix, and Current Angular. Each of these fields are user level procedures and can be changed without entering the supervisor password.

Press the right cursor key to select items in the right portion of the screen.

### MM Disp Res

Defines the measurement resolution displayed on the TC200 for linear information in mm (metric) mode. Any resolution at or below the resolution of the encoder is a valid entry for this field. Do not enter a resolution higher than the encoder resolution. Consult the encoder product information to determine its resolution. This data entry field requires the supervisor password prior to access.

| Display    |                 | in      |
|------------|-----------------|---------|
| About      | MM Disp Res     | 0.0001  |
| Display    | Inch Disp Res   | 0.0001  |
| Encoders   | DMS Disp Res    | 0.00.01 |
| Print      | DD Disp Res     | 0.001   |
| Ports      | Startup Linear  | Inch    |
| Supervisor | Startup Angular | DMS     |
| Squareness | Radix           | Decimal |
| LEC        | Current Angular | DMS     |
| SLEC       |                 |         |
| Misc.      |                 |         |
| ▼          |                 |         |



### NOTE

When inputting resolution remember that .0001mm is a higher resolution than .0002mm. Therefore, any entry less than .0002mm exceeds the resolution of an encoder with .0002mm resolution.

### Inch Disp Res

Defines the measurement resolution displayed on the TC200 for linear information in inch (English) mode. Any resolution at or below the resolution of the encoder is a valid entry for this field. Do not enter a resolution higher than the encoder resolution. Consult the encoder product information to determine its resolution. This data entry field requires the supervisor password prior to access.

| Display    |                 | in      |
|------------|-----------------|---------|
| About      | MM Disp Res     | 0.0001  |
| Display    | Inch Disp Res   | 0.0001  |
| Encoders   | DMS Disp Res    | 0.00.01 |
| Print      | DD Disp Res     | 0.001   |
| Ports      | Startup Linear  | Inch    |
| Supervisor | Startup Angular | DMS     |
| Squareness | Radix           | Decimal |
| LEC        | Current Angular | DMS     |
| SLEC       |                 |         |
| Misc.      |                 |         |
| ▼          |                 |         |



**NOTE**

When inputting resolution remember that .0001in is a higher resolution than .0002in. Therefore, any entry less than .0002in exceeds the resolution of an encoder with .0002in resolution.

**DMS Disp Res**

Defines the measurement resolution displayed on the TC200 for angular information in degree, minute, and second format. Any resolution at or below the resolution of the encoder is a valid entry for this field. Do not enter a resolution higher than the encoder resolution. Consult the encoder product information to determine its resolution. This data entry field requires the supervisor password prior to access.

| Display    |                 | in      |
|------------|-----------------|---------|
| About      | MM Disp Res     | 0.0001  |
| Display    | Inch Disp Res   | 0.0001  |
| Encoders   | DMS Disp Res    | 0.00.01 |
| Print      | DD Disp Res     | 0.001   |
| Ports      | Startup Linear  | Inch    |
| Supervisor | Startup Angular | DMS     |
| Squareness | Radix           | Decimal |
| LEC        | Current Angular | DMS     |
| Misc.      |                 |         |
| ▼          |                 |         |



**NOTE**

When inputting resolution remember that .0001mm is a higher resolution than .0002mm. Therefore, any entry less than .0002mm exceeds the resolution of an encoder with .0002mm resolution.

### DD Disp Res

Defines the measurement resolution displayed on the TC200 for angular information in decimal degree format. Any resolution at or below the resolution of the encoder is a valid entry for this field. Do not enter a resolution higher than the encoder resolution. Consult the encoder product information to determine its resolution. This data entry field requires the supervisor password prior to access.

| Display    |                 |         |  | in |
|------------|-----------------|---------|--|----|
| About      | MM Disp Res     | 0.0001  |  |    |
| Display    | Inch Disp Res   | 0.0001  |  |    |
| Encoders   | DMS Disp Res    | 0.00.01 |  |    |
| Print      | DD Disp Res     | 0.001   |  |    |
| Ports      | Startup Linear  | Inch    |  |    |
| Supervisor | Startup Angular | DMS     |  |    |
| Squareness | Radix           | Decimal |  |    |
| LEC        | Current Angular | DMS     |  |    |
| SLEC       |                 |         |  |    |
| Misc.      |                 |         |  |    |
| ▼          |                 |         |  |    |
|            |                 |         |  |    |



### NOTE

When inputting resolution remember that .0001mm is a higher resolution than .0002mm. Therefore, any entry less than .0002mm exceeds the resolution of an encoder with .0002mm resolution.

### Startup Linear

Defines the default display of linear measurements. Options for this field include MM (metric/millimeters), Inch (English/decimal inches), and Last. The Last option will retain the last selection made via the mm mode selection key through power cycles. For example, if inches was the last unit selected with the mm key prior to shutdown, the TC200 will startup in inches for its next use. Selections for this field are made using softkeys.

| Display    |                 |         |  | in |
|------------|-----------------|---------|--|----|
| About      | MM Disp Res     | 0.0001  |  |    |
| Display    | Inch Disp Res   | 0.0001  |  |    |
| Encoders   | DMS Disp Res    | 0.00.01 |  |    |
| Hot Keys   | DD Disp Res     | 0.001   |  |    |
| Print      | Startup Linear  | MM      |  |    |
| Printouts  | Startup Angular | DMS     |  |    |
| Ports      | Radix           | Decimal |  |    |
| Supervisor | Current Angular | DMS     |  |    |
| Squareness |                 |         |  |    |
| LEC        |                 |         |  |    |
| ▼          |                 |         |  |    |
| MM         | Inch            | Last    |  |    |

| Display    |                 |         |  | in |
|------------|-----------------|---------|--|----|
| About      | MM Disp Res     | 0.0001  |  |    |
| Display    | Inch Disp Res   | 0.0001  |  |    |
| Encoders   | DMS Disp Res    | 0.00.01 |  |    |
| Hot Keys   | DD Disp Res     | 0.001   |  |    |
| Print      | Startup Linear  | Inch    |  |    |
| Printouts  | Startup Angular | DMS     |  |    |
| Ports      | Radix           | Decimal |  |    |
| Supervisor | Current Angular | DMS     |  |    |
| Squareness |                 |         |  |    |
| LEC        |                 |         |  |    |
| ▼          |                 |         |  |    |
| MM         | Inch            | Last    |  |    |

### Startup Angular

Defines the default display of angular measurements. Options for this field include DD (decimal degrees), DMS (degrees, minutes, and seconds), and Last. The Last option will retain the last selection through power cycles. For example, if decimal degrees was the last unit selected prior to shutdown, the TC200 will startup in decimal degrees for its next use. Selections for this field are made using softkeys.

|                |                 |      |         |    |
|----------------|-----------------|------|---------|----|
| <b>Display</b> |                 |      |         | in |
| About          | MM Disp Res     |      | 0.0001  |    |
| Display        | Inch Disp Res   |      | 0.0001  |    |
| Encoders       | DMS Disp Res    |      | 0.00.01 |    |
| Print          | DD Disp Res     |      | 0.001   |    |
| Ports          | Startup Linear  |      | Inch    |    |
| Supervisor     | Startup Angular |      | DMS     |    |
| Squareness     | Radix           |      | Decimal |    |
| LEC            | Current Angular |      | DMS     |    |
| SLEC           |                 |      |         |    |
| Misc.          |                 |      |         |    |
| ▼              |                 |      |         |    |
| DD             | DMS             | Last |         |    |

### Radix

Radix settings are available for English (dot: 1.000) or European (comma: 1,000) presentations. Selections for this field are made using softkeys.

|                |                 |  |         |    |
|----------------|-----------------|--|---------|----|
| <b>Display</b> |                 |  |         | in |
| About          | MM Disp Res     |  | 0.0001  |    |
| Display        | Inch Disp Res   |  | 0.0001  |    |
| Encoders       | DMS Disp Res    |  | 0.00.01 |    |
| Hot Keys       | DD Disp Res     |  | 0.001   |    |
| Print          | Startup Linear  |  | Inch    |    |
| Printouts      | Startup Angular |  | DMS     |    |
| Ports          | Radix           |  | Decimal |    |
| Supervisor     | Current Angular |  | DMS     |    |
| Squareness     |                 |  |         |    |
| LEC            |                 |  |         |    |
| ▼              |                 |  |         |    |
| Decimal        | Comma           |  |         |    |

### Current Angular

Defines the default display of measured angles until the TC200 is shutdown. At the next startup, the Startup Angular setting defines the default display of measured angles. Options for this field include DD (decimal degrees) and DMS (degrees, minutes, and seconds). Selections for this field are made using softkeys.

|                                                                                     |                 |         |     |  |  |  |
|-------------------------------------------------------------------------------------|-----------------|---------|-----|--|--|--|
| <b>Display</b>                                                                      |                 | in      |     |  |  |  |
| About                                                                               | MM Disp Res     | 0.0001  |     |  |  |  |
| Display                                                                             | Inch Disp Res   | 0.0001  |     |  |  |  |
| Encoders                                                                            | DMS Disp Res    | 0.00.01 |     |  |  |  |
| Hot Keys                                                                            | DD Disp Res     | 0.001   |     |  |  |  |
| Print                                                                               | Startup Linear  | Inch    |     |  |  |  |
| Printouts                                                                           | Startup Angular | DMS     |     |  |  |  |
| Ports                                                                               | Radix           | Decimal |     |  |  |  |
| Supervisor                                                                          | Current Angular | DMS     |     |  |  |  |
| Squareness                                                                          |                 |         |     |  |  |  |
| LEC                                                                                 |                 |         |     |  |  |  |
| <table border="1"> <tr> <td>DD</td> <td>DMS</td> <td></td> <td></td> </tr> </table> |                 | DD      | DMS |  |  |  |
| DD                                                                                  | DMS             |         |     |  |  |  |

Press the left arrow key or finish to return to the setup menu. Use the up or down arrow keys to scroll through the setup menu and highlight Encoders.

### Encoders

The encoder setup screen contains 1 user level procedures and 7 supervisor level procedures. Users can observe the encoder setup for the X and Z axes. Supervisors can input encoder resolution, define encoder type, select reference marks, obtain machine zero, reverse axis direction, enter interpolation values, and select units of measure.

Press the right arrow key to select items in the right portion of the screen.



### Axis

Users can toggle between the X and Z axes using softkeys to observe encoder settings. Supervisors can use the softkeys to select an axis to configure.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
| ▼          |               |            |
| X          | Z             |            |

### Resolution (Res)

Enter the encoder resolution using the numeric keypad. Consult the encoder product information to determine its resolution. Entries in this field must precisely match the encoder resolution. This data entry field requires the supervisor password prior to access.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
| ▼          |               |            |
|            |               |            |

### Type

Use the softkeys to select the encoder type. The following encoder types are supported on the TC200: TTL, analog, and serial. Consult the encoder product information to determine its type. This option selection field requires the supervisor password prior to access.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
|            | TTL           | Analog     |
|            | Serial        |            |

### Reference Marks

Encoder reference marks are used for Segmented Linear Error Correction (SLEC). Use the softkeys to select from the following options: none, ref, abs AC (absolute Acu-Rite), abs HH (absolute Heidenhain), and manual. The TC200 prompts the user to move each axis encoder across a reference mark prior to measurement activities when reference marks are used. This option selection field requires the supervisor password prior to access.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
|            | None          | Ref        |
|            | Abs AC        | Abs HH     |
|            | Manual        |            |

### MZ Cnts

Allows the user to define the machine zero position of an encoder by moving it to the desired position.

Entering a zero in this field causes the TC200 to automatically record the current position of the encoder as the machine zero at the next startup. Subsequent startups will not change the machine zero unless this field is reset to zero first. This data entry field requires the supervisor password prior to access.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
|            |               |            |

### Reversed

The normal convention for the display of the polarity of measurements is:

- Motion to the right is positive (X axis)
- Motion up is positive (Z axis)

The settings for any axis can be reversed to accommodate the encoder mounting requirements of the system used. Press the No softkey to retain the positive polarity for the selected axis, or press the Yes softkey to achieve the correct polarity for different encoder mounting. Press the down cursor arrow or Enter key to advance the display and highlight Interpolation. This option selection field requires the supervisor password prior to access.

| Encoders   |               | in         |
|------------|---------------|------------|
| About      | Axis          | X          |
| Display    | Res           | 0.00100000 |
| Encoders   | Type          | TTL        |
| Hot Keys   | Ref Marks     | None       |
| Print      | M.Z. Cnts     | 0          |
| Printouts  | Reversed      | No         |
| Ports      | Interpolation | X1         |
| Supervisor | Units         | MM         |
| Squareness |               |            |
| LEC        |               |            |
|            |               |            |
| No         | Yes           |            |



**NOTE**

When presetting lathe tools this option selection field can be used to compensate for tools with a down and/or left-hand cutting direction. For example when presetting a lath tool with a cut direction of down and left, reverse both the X and Z axes to obtain positive numbers during presetting.

**Interpolation**

Press the softkey interpolation value required for the encoder being used on the selected axis and press the down cursor arrow or Enter key to advance the display and highlight Units. This option selection field requires the supervisor password prior to access.

|                 |               |            |        |
|-----------------|---------------|------------|--------|
| <b>Encoders</b> |               |            | in     |
| About           | Axis          | X          |        |
| Display         | Res           | 0.00100000 |        |
| Encoders        | Type          | TTL        |        |
| Hot Keys        | Ref Marks     | None       |        |
| Print           | M.Z. Cnts     | 0          |        |
| Printouts       | Reversed      | No         |        |
| Ports           | Interpolation | X1         |        |
| Supervisor      | Units         | MM         |        |
| Squareness      |               |            |        |
| LEC             |               |            |        |
|                 | X1            | X2         | X5 X10 |

**Units**

Enter the encoder units using the softkeys. Users can select In (inches), MM (millimeters), and Deg (degrees). Consult the encoder product information to determine the proper unit. Entries in this field must precisely match the encoder unit. This option selection field requires the supervisor password prior to access.

|                 |               |            |     |
|-----------------|---------------|------------|-----|
| <b>Encoders</b> |               |            | in  |
| About           | Axis          | X          |     |
| Display         | Res           | 0.00100000 |     |
| Encoders        | Type          | TTL        |     |
| Hot Keys        | Ref Marks     | None       |     |
| Print           | M.Z. Cnts     | 0          |     |
| Printouts       | Reversed      | No         |     |
| Ports           | Interpolation | X1         |     |
| Supervisor      | Units         | MM         |     |
| Squareness      |               |            |     |
| LEC             |               |            |     |
|                 | In            | MM         | Deg |

Press the left arrow key or finish to return to the setup menu. Scroll through the Setup menu until the Print selection is highlighted.

## Print

The print setup screen contains 4 user level procedures and 8 supervisor level procedures.

Users can insert ASCII control character for pre line, post line, pre form, and post form operations. Typically these character insertions are for line feeds or carriage returns. A chart of common ASCII characters can be found in Chapter 3: Communications and at the end of this section.

Supervisor can set reports and labels to print, set tool location and position of tool to print, define number of lines per label, set number of skipped lines, and set label indents.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |
|              |              |            |  |    |

Press the right cursor arrow to select items in the right portion of the screen.

### Auto Label

When yes is selected in this field labels automatically print after the finish key is pressed on the new tool or edit tool screens. This option selection field requires the supervisor password to be entered prior to access.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |
| No           | Yes          |            |  |    |

### Auto Report

When yes is selected in this field tool sequence reports are automatically printed at the end of a tool sequence run. If no is selected the TC200 will prompt the user 'Print tool sequence report?' This option selection field requires the supervisor password to be entered prior to access.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| Print        | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |
| No           | Yes          |            |  |    |

### Label Format

Press the list softkey to access the format list. Use the up or down arrow keys to select a report format. Press finish to return to the label format setup screen. This option selection field requires the supervisor password to be entered prior to access.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| Print        | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |
| List         |              |            |  |    |

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| Print        | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |
| List         |              |            |  |    |

### Pre Line

To add an output control character before a line is printed use the numeric keypad to enter an ASCII control character in this field.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     | [REDACTED] |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     | [REDACTED] |  |    |
| Squareness   | Post Form    | [REDACTED] |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |

### Post Line

To add an output control character after a line is printed use the numeric keypad to enter an ASCII control character in this field.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     | [REDACTED] |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     | [REDACTED] |  |    |
| Squareness   | Post Form    | [REDACTED] |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |

### Pre Form

To add an output control character before a form is printed use the numeric keypad to enter an ASCII control character in this field.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     | [REDACTED] |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     | [REDACTED] |  |    |
| Squareness   | Post Form    | [REDACTED] |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |

### Post Form

To add an output control character after a form is printed use the numeric keypad to enter an ASCII control character in this field.

|              |              |  |  |            |
|--------------|--------------|--|--|------------|
| <b>Print</b> |              |  |  | in         |
| About        | Auto Label   |  |  | No         |
| Display      | Auto Report  |  |  | No         |
| Encoders     | Label Format |  |  | Metronics1 |
| <b>Print</b> | Pre Line     |  |  |            |
| Ports        | Post Line    |  |  | 10 13      |
| Supervisor   | Pre Form     |  |  |            |
| Squareness   | Post Form    |  |  |            |
| LEC          | Label Lines  |  |  | 5          |
| SLEC         | Skip Lines   |  |  | 0          |
| Misc.        | Label Indent |  |  | 0          |
| ▼            |              |  |  |            |
|              |              |  |  |            |

### Print Report

Enables or disables tool sequence report print function. Use the softkeys to select yes or no. This option selection field requires the supervisor password prior to access.

|                  |                  |  |  |          |
|------------------|------------------|--|--|----------|
| <b>Printouts</b> |                  |  |  | in       |
| About            | Print Report     |  |  | No       |
| Display          | Print Labels     |  |  | No       |
| Encoders         | Wide Form        |  |  | Yes      |
| Hot Keys         | Print Loc        |  |  | No       |
| <b>Print</b>     | Print POT        |  |  | No       |
| Printouts        | Num Label Lines  |  |  | 5        |
| Ports            | Num Skip Lines   |  |  | 0        |
| Supervisor       | Amt Label Indent |  |  | 0        |
| Squareness       | Format           |  |  | Standard |
| LEC              |                  |  |  |          |
| ▼                |                  |  |  |          |
| No               | Yes              |  |  |          |

### Label Lines

Use the numeric keypad to enter the desired number of lines for labels. This data entry field requires the supervisor password prior to access.

|              |              |  |  |            |
|--------------|--------------|--|--|------------|
| <b>Print</b> |              |  |  | in         |
| About        | Auto Label   |  |  | No         |
| Display      | Auto Report  |  |  | No         |
| Encoders     | Label Format |  |  | Metronics1 |
| <b>Print</b> | Pre Line     |  |  |            |
| Ports        | Post Line    |  |  | 10 13      |
| Supervisor   | Pre Form     |  |  |            |
| Squareness   | Post Form    |  |  |            |
| LEC          | Label Lines  |  |  | 5          |
| SLEC         | Skip Lines   |  |  | 0          |
| Misc.        | Label Indent |  |  | 0          |
| ▼            |              |  |  |            |
|              |              |  |  |            |



### Skip Lines

Use the numeric keypad to enter the number of lines skipped between printed lines. This data entry field requires the supervisor password prior to access.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |

### Label Indent

Use the numeric keypad to enter the number of indent spaces for labels. This data entry field requires the supervisor password prior to access.

|              |              |            |  |    |
|--------------|--------------|------------|--|----|
| <b>Print</b> |              |            |  | in |
| About        | Auto Label   | No         |  |    |
| Display      | Auto Report  | No         |  |    |
| Encoders     | Label Format | Metronics1 |  |    |
| <b>Print</b> | Pre Line     |            |  |    |
| Ports        | Post Line    | 10 13      |  |    |
| Supervisor   | Pre Form     |            |  |    |
| Squareness   | Post Form    |            |  |    |
| LEC          | Label Lines  | 5          |  |    |
| SLEC         | Skip Lines   | 0          |  |    |
| Misc.        | Label Indent | 0          |  |    |
| ▼            |              |            |  |    |

### ASCII Codes

|    |                 |    |   |     |   |
|----|-----------------|----|---|-----|---|
| 8  | backspace       | 46 | . | 84  | T |
| 9  | horizontal tab  | 47 | / | 85  | U |
| 10 | line feed       | 48 | 0 | 86  | V |
| 11 | vertical tab    | 49 | 1 | 87  | W |
| 12 | form feed       | 50 | 2 | 88  | X |
| 13 | carriage return | 51 | 3 | 89  | Y |
| 14 | so              | 52 | 4 | 90  | Z |
| 15 | si              | 53 | 5 | 91  | [ |
| 16 | dle             | 54 | 6 | 92  | \ |
| 17 | dcl             | 55 | 7 | 93  | ] |
| 18 | dc2             | 56 | 8 | 94  | ^ |
| 19 | dc3             | 57 | 9 | 95  | ~ |
| 20 | dc4             | 58 | : | 96  |   |
| 21 | nak             | 59 | ; | 97  | a |
| 22 | syn             | 60 | < | 98  | b |
| 23 | etb             | 61 | = | 99  | c |
| 24 | can             | 62 | > | 100 | d |
| 25 | em              | 63 | ? | 101 | e |
| 26 | sub             | 64 | @ | 102 | f |
| 27 | esc             | 65 | A | 103 | g |
| 28 | fs              | 66 | B | 104 | h |
| 29 | gs              | 67 | C | 105 | i |
| 30 | rs              | 68 | D | 106 | j |
| 31 | us              | 69 | E | 107 | k |
| 32 | space           | 70 | F | 108 | l |
| 33 | !               | 71 | G | 109 | m |
| 34 | "               | 72 | H | 110 | n |
| 35 | #               | 73 | I | 111 | o |
| 36 | \$              | 74 | J | 112 | p |
| 37 | %               | 75 | K | 113 | q |
| 38 | &               | 76 | L | 114 | r |
| 39 | '               | 77 | M | 115 | s |
| 40 | (               | 78 | N | 116 | t |
| 41 | )               | 79 | O | 117 | u |
| 42 | *               | 80 | P | 118 | v |
| 43 | +               | 81 | Q | 119 | w |
| 44 | ,               | 82 | R | 120 | x |
| 45 | -               | 83 | S | 121 | y |
|    |                 |    |   | 122 | z |

Scroll through the setup menu to highlight Ports.

## Ports

Serial (RS232) communications are configured on this screen. Parallel port protocols are standard and require no end-user setup. In order to connect the TC200 to a serial printer setting on this page must match the corresponding parameter of the printer. Consult the printer information for its operating parameters.



### NOTE

**Metronics attempts to support the widest variety of printers available. Still, not every serial printer is compatible with the TC200. Carefully check the ports setup for accuracy if the printer fails to work. If all settings appear correct the printer may not be compatible.**

The print setup screen contains 9 supervisor level procedures. There are no user level procedures on this setup screen. All fields require the supervisor password prior to access.

| Ports      |                 |       |  | in |
|------------|-----------------|-------|--|----|
| About      | RS232           |       |  |    |
| Display    | Baud            | 38400 |  |    |
| Encoders   | Word Len        | 8     |  |    |
| Print      | Stop Bits       | 1     |  |    |
| Ports      | Parity          | Odd   |  |    |
| Supervisor | Handshake       | Hard  |  |    |
| Squareness | Data            | None  |  |    |
| LEC        | RS232 EOC Delay | 330   |  |    |
| SLEC       | RS232 EOL Delay | 0     |  |    |
| Misc.      | Parallel        |       |  |    |
|            | Data            | Label |  |    |

Supervisors can set baud rate (Baud), word length (Word Len), stop bits, parity, handshake, data, parallel data protocols, end of character delay (EOC Delay), and end of line delay (EOL Delay).

### Baud

The RS232 baud rate can be increased or decreased by pressing the Dec or Inc softkeys. The available baud rates are 1200; 2400; 4800; 9600; 19,200; 38,400; 57,600; and 115,200. This option selection field requires the supervisor password prior to access.

| Ports      |       |                 |       | in |
|------------|-------|-----------------|-------|----|
| About      | RS232 | Baud            | 38400 |    |
| Display    |       | Word Len        | 8     |    |
| Encoders   |       | Stop Bits       | 1     |    |
| Print      |       | Parity          | Odd   |    |
| Ports      |       | Handshake       | Hard  |    |
| Supervisor |       | Data            | None  |    |
| Squareness |       | RS232 EOC Delay | 330   |    |
| LEC        |       | RS232 EOL Delay | 0     |    |
| SLEC       |       | Parallel        |       |    |
| Misc.      |       | Data            | Label |    |
| Dec        | Inc   |                 |       |    |

### Word Len (word length)

Press the softkeys to select 7 or 8 bit word length. This option selection field requires the supervisor password prior to access.

| Ports      |       |                 |       | in |
|------------|-------|-----------------|-------|----|
| About      | RS232 | Baud            | 38400 |    |
| Display    |       | Word Len        | 8     |    |
| Encoders   |       | Stop Bits       | 1     |    |
| Print      |       | Parity          | Odd   |    |
| Ports      |       | Handshake       | Hard  |    |
| Supervisor |       | Data            | None  |    |
| Squareness |       | RS232 EOC Delay | 330   |    |
| LEC        |       | RS232 EOL Delay | 0     |    |
| SLEC       |       | Parallel        |       |    |
| Misc.      |       | Data            | Label |    |
| 7          | 8     |                 |       |    |

### Stop Bits

Press the softkeys to select 1 or 2 stop bits. This option selection field requires the supervisor password prior to access.

| Ports      |       |                 |       | in |
|------------|-------|-----------------|-------|----|
| About      | RS232 | Baud            | 38400 |    |
| Display    |       | Word Len        | 8     |    |
| Encoders   |       | Stop Bits       | 1     |    |
| Print      |       | Parity          | Odd   |    |
| Ports      |       | Handshake       | Hard  |    |
| Supervisor |       | Data            | None  |    |
| Squareness |       | RS232 EOC Delay | 330   |    |
| LEC        |       | RS232 EOL Delay | 0     |    |
| SLEC       |       | Parallel        |       |    |
| Misc.      |       | Data            | Label |    |
| 1          | 2     |                 |       |    |

### Parity

Press the softkeys to select none, odd, or even parity. This option selection field requires the supervisor password prior to access.

|              |                 |              |
|--------------|-----------------|--------------|
| <b>Ports</b> |                 | in           |
| About        | RS232           |              |
| Display      | Baud            | <u>38400</u> |
| Encoders     | Word Len        | <u>8</u>     |
| Print        | Stop Bits       | <u>1</u>     |
| Ports        | Parity          | <u>Odd</u>   |
| Supervisor   | Handshake       | <u>Hard.</u> |
| Squareness   | Data            | <u>None</u>  |
| LEC          | RS232 EOC Delay | <u>330</u>   |
| SLEC         | RS232 EOL Delay | <u>0</u>     |
| Misc.        | Parallel        |              |
| ▼            | Data            | <u>Label</u> |
| None         | Odd             | Even         |

### Handshake

Press the softkeys to select the proper handshake protocol. This option selection field requires the supervisor password prior to access.

|              |                 |              |
|--------------|-----------------|--------------|
| <b>Ports</b> |                 | in           |
| About        | RS232           |              |
| Display      | Baud            | <u>38400</u> |
| Encoders     | Word Len        | <u>8</u>     |
| Print        | Stop Bits       | <u>1</u>     |
| Ports        | Parity          | <u>Odd</u>   |
| Supervisor   | Handshake       | <u>Hard.</u> |
| Squareness   | Data            | <u>None</u>  |
| LEC          | RS232 EOC Delay | <u>330</u>   |
| SLEC         | RS232 EOL Delay | <u>0</u>     |
| Misc.        | Parallel        |              |
| ▼            | Data            | <u>Label</u> |
| XOnOff       | Hard.           |              |

### Data/ Parallel Data

Reports of measurement data can be sent to the serial or parallel port for printing. There are four softkey options for this field: none, display, report, and both. Press the none softkey if no printed reports are required. Press the display softkey to view reports on the LCD display. Press the report softkey to print all reports. Press the both softkey to display reports on the LCD and print. This option selection field requires the supervisor password prior to access. This option selection field requires the supervisor password prior to access.

| Ports      |          |           |       | in     |
|------------|----------|-----------|-------|--------|
| About      | RS232    | Baud      | 38400 |        |
| Display    |          | Word Len  | 8     |        |
| Encoders   |          | Stop Bits | 1     |        |
| Print      |          | Parity    | Odd   |        |
| Ports      |          | Handshake | Hard  |        |
| Supervisor |          | Data      | None  |        |
| Squareness | RS232    | EOC Delay | 330   |        |
| LEC        | RS232    | EOL Delay | 0     |        |
| SLEC       | Parallel |           |       |        |
| Misc.      | Data     |           | Label |        |
|            |          | None      | Label | Report |
|            |          |           | Both  |        |

| Ports      |          |           |       | in     |
|------------|----------|-----------|-------|--------|
| About      | RS232    | Baud      | 38400 |        |
| Display    |          | Word Len  | 8     |        |
| Encoders   |          | Stop Bits | 1     |        |
| Print      |          | Parity    | Odd   |        |
| Ports      |          | Handshake | Hard  |        |
| Supervisor |          | Data      | None  |        |
| Squareness | RS232    | EOC Delay | 330   |        |
| LEC        | RS232    | EOL Delay | 0     |        |
| SLEC       | Parallel |           |       |        |
| Misc.      | Data     |           | Label |        |
|            |          | None      | Label | Report |
|            |          |           | Both  |        |

### EOC Delay (end of character delay)

Use the numeric keypad to enter values up to 10,000 (1 second). This setting determines the printer delay between printed characters. This data entry field requires the supervisor password prior to access.

| Ports      |          |           |       | in |
|------------|----------|-----------|-------|----|
| About      | RS232    | Baud      | 38400 |    |
| Display    |          | Word Len  | 8     |    |
| Encoders   |          | Stop Bits | 1     |    |
| Print      |          | Parity    | Odd   |    |
| Ports      |          | Handshake | Hard  |    |
| Supervisor |          | Data      | None  |    |
| Squareness | RS232    | EOC Delay | 330   |    |
| LEC        | RS232    | EOL Delay | 0     |    |
| SLEC       | Parallel |           |       |    |
| Misc.      | Data     |           | Label |    |
|            |          |           |       |    |
|            |          |           |       |    |

### EOL Delay (end of line delay)

Use the numeric keypad to enter values up to 1,000,000 (1 minute). This setting determines the printer delay between printed lines. This data entry field requires the supervisor password prior to access.

| Ports      |                 | in    |
|------------|-----------------|-------|
| About      | RS232           |       |
| Display    | Baud            | 38400 |
| Encoders   | Word Len        | 8     |
| Print      | Stop Bits       | 1     |
| Ports      | Parity          | Odd   |
| Supervisor | Handshake       | Hard  |
| Squareness | Data            | None  |
| LEC        | RS232 EOC Delay | 330   |
| SLEC       | RS232 EOL Delay | 0     |
| Misc.      | Parallel        |       |
|            | Data            | Label |



### NOTE

Occasionally the data exchange rate between the TC200 and a printer can exceed the printer's capabilities. If printing problems occur after printing has begun, set the EOC delay and EOL delay to the maximum values. If this eliminates the problem, experiment with lower settings to find the fastest working settings. Remember, the maximum EOC and EOL delay insert a 1 second delay after each character and a 1 minute delay after each line.

| Ports      |                 | in    |
|------------|-----------------|-------|
| About      | RS232           |       |
| Display    | Baud            | 38400 |
| Encoders   | Word Len        | 8     |
| Print      | Stop Bits       | 1     |
| Ports      | Parity          | Odd   |
| Supervisor | Handshake       | Hard  |
| Squareness | Data            | None  |
| LEC        | RS232 EOC Delay | 10000 |
| SLEC       | RS232 EOL Delay | 0     |
| Misc.      | Parallel        |       |
|            | Data            | Label |

| Ports      |                 | in      |
|------------|-----------------|---------|
| About      | RS232           |         |
| Display    | Baud            | 38400   |
| Encoders   | Word Len        | 8       |
| Print      | Stop Bits       | 1       |
| Ports      | Parity          | Odd     |
| Supervisor | Handshake       | Hard    |
| Squareness | Data            | None    |
| LEC        | RS232 EOC Delay | 10000   |
| SLEC       | RS232 EOL Delay | 1000000 |
| Misc.      | Parallel        |         |
|            | Data            | Label   |

Scroll through the Setup menu to highlight Squareness.

## Squareness

The squareness correction coefficient is used to compensate for small machine errors that can exist between the X and Z measurement axes.

| Squareness |        |      | in        |
|------------|--------|------|-----------|
| About      | Angle  |      | 90°00'00" |
| Display    | Master | Axis | X         |
| Encoders   |        |      |           |
| Hot Keys   |        |      |           |
| Print      |        |      |           |
| Printouts  |        |      |           |
| Ports      |        |      |           |
| Supervisor |        |      |           |
| Squareness |        |      |           |
| LEC        |        |      |           |
| ▼          |        |      |           |
|            |        |      |           |

| Squareness |        |      | in        |
|------------|--------|------|-----------|
| About      | Angle  |      | 90°00'00" |
| Display    | Master | Axis | X         |
| Encoders   |        |      |           |
| Hot Keys   |        |      |           |
| Print      |        |      |           |
| Printouts  |        |      |           |
| Ports      |        |      |           |
| Supervisor |        |      |           |
| Squareness |        |      |           |
| LEC        |        |      |           |
| ▼          |        |      |           |
| Teach      |        |      |           |

### Angle

Press the teach softkey. Measure a line along the master axis. Press enter to input a point. Lines require at least two points. Press finish. This data entry field requires the supervisor password prior to access.

| Squareness |                                                               |      | in        |
|------------|---------------------------------------------------------------|------|-----------|
| About      | Angle                                                         |      | 90°00'00" |
| Display    | Master                                                        | Axis | X         |
| Encoders   | Measure a line along the master axis. Press FINISH when done. |      |           |
| Hot Keys   |                                                               |      |           |
| Print      |                                                               |      |           |
| Printouts  | Pts 0                                                         |      |           |
| Ports      |                                                               |      |           |
| Supervisor |                                                               |      |           |
| Squareness |                                                               |      |           |
| LEC        |                                                               |      |           |
| ▼          |                                                               |      |           |
|            |                                                               |      |           |

| Squareness |                                                               |      | in        |
|------------|---------------------------------------------------------------|------|-----------|
| About      | Angle                                                         |      | 90°00'00" |
| Display    | Master                                                        | Axis | X         |
| Encoders   | Measure a line along the master axis. Press FINISH when done. |      |           |
| Hot Keys   |                                                               |      |           |
| Print      |                                                               |      |           |
| Printouts  | Pts 3                                                         |      |           |
| Ports      |                                                               |      |           |
| Supervisor |                                                               |      |           |
| Squareness |                                                               |      |           |
| LEC        |                                                               |      |           |
| ▼          |                                                               |      |           |
|            |                                                               |      |           |

| Squareness |        |      | in        |
|------------|--------|------|-----------|
| About      | Angle  |      | 89°01'26" |
| Display    | Master | Axis | X         |
| Encoders   |        |      |           |
| Hot Keys   |        |      |           |
| Print      |        |      |           |
| Printouts  |        |      |           |
| Ports      |        |      |           |
| Supervisor |        |      |           |
| Squareness |        |      |           |
| LEC        |        |      |           |
| ▼          |        |      |           |
| Teach      |        |      |           |



### Master Axis

Press the X or Z softkey to designate the master axis. This option selection field requires the supervisor password prior to access.

|                   |   |           |  |    |
|-------------------|---|-----------|--|----|
| <b>Squareness</b> |   |           |  | in |
| Angle             |   | 89°01'26" |  |    |
| Master Axis       |   | X         |  |    |
| About             |   |           |  |    |
| Display           |   |           |  |    |
| Encoders          |   |           |  |    |
| Hot Keys          |   |           |  |    |
| Print             |   |           |  |    |
| Printouts         |   |           |  |    |
| Ports             |   |           |  |    |
| Supervisor        |   |           |  |    |
| Squareness        |   |           |  |    |
| LEC               |   |           |  |    |
| ▼                 |   |           |  |    |
| X                 | Z |           |  |    |

Press the left arrow key or finish to return to the setup menu.

### Error Correction

Linear, segmented linear and non-linear error correction methods can be used with the TC200. Linear and segmented linear error corrections are provided with every TC200. system and non-linear error correction is provided as an option. Each method compensates for encoder and machine travel variations using error correction coefficients developed by comparing actual measurements of a standard to the standard's nominal values.

Linear error correction (LEC) uses one correction coefficient for each axis to compensate for variations along the axis. For example, a linear error correction coefficient of 0.0002 "/inch applied to a 6" measurement along the X axis would produce a measurement result of 6.0012".

Segmented linear error correction (SLEC) divides each axis into up to 7 segments. Each segment uses one error correction coefficient to compensate for variations within the segment. Each axis also includes a machine zero offset to refer the position of the standard's datum to the machine zero reference. The standard's nominal and measured segment values must be specified during the setup process. The machine zero offset for each axis must also be specified. When SLEC is used, the stage must be moved to cross a reference mark/hard-stop on each axis upon system startup to initialize SLEC.

Non-linear error correction (NLEC) uses a standard that divides the entire measurement area into a grid of up to 30 X 30 cells. Each cell uses error correction coefficient for each axis to compensate for variations within a cell. The standard's nominal and measured X and Y values must be specified for the positions of each cell during the setup process. The machine zero offset to the grid datum must also be specified. When NLEC is used, the stage must have a repeatable machine zero defined on startup to initialize NLEC.



#### **NOTE**

**You must set the machine zero by crossing reference marks on the X and Y encoders before calibrating the SLEC and NLEC error corrections.**

## Linear Error Correction (LEC)

Scroll through the Setup menu to highlight Linear Error Correction (LEC). Linear error correction coefficients are used to compensate for overall encoder and machine travel variations. A standard is measured, and the measured value is compared to the known value of the standard to generate the correction coefficient. Correction coefficients are generated for each axis and used in subsequent measurements to provide linear compensation for encoder variations.

| LEC        |            |              |            | in      |
|------------|------------|--------------|------------|---------|
| About      | X Standard | Linear Error | Correction |         |
| Display    | X Observed |              |            | 0.03940 |
| Encoders   | Z Standard |              |            | 0.03940 |
| Print      | Z Observed |              |            | 0.03940 |
| Ports      |            |              |            |         |
| Supervisor |            |              |            |         |
| Squareness |            |              |            |         |
| LEC        |            |              |            |         |
| SLEC       |            |              |            |         |
| Misc.      |            |              |            |         |
| ▼          |            |              |            |         |

Press the right arrow key to select items in the right portion of the screen.

Enter the nominal value of the standard for each axis into the appropriate Standard data field using the numeric keypad on the front panel. Use the down cursor arrow to scroll to the desired data field.

| LEC        |            |              |            | in      |
|------------|------------|--------------|------------|---------|
| About      | X Standard | Linear Error | Correction |         |
| Display    | X Observed |              |            | 0.03940 |
| Encoders   | Z Standard |              |            | 0.03940 |
| Print      | Z Observed |              |            | 0.03940 |
| Ports      |            |              |            |         |
| Supervisor |            |              |            |         |
| Squareness |            |              |            |         |
| LEC        |            |              |            |         |
| SLEC       |            |              |            |         |
| Misc.      |            |              |            |         |
| ▼          |            |              |            |         |

| LEC        |            |              |            | in      |
|------------|------------|--------------|------------|---------|
| About      | X Standard | Linear Error | Correction |         |
| Display    | X Observed |              |            | 0.03940 |
| Encoders   | Z Standard |              |            | 0.03940 |
| Print      | Z Observed |              |            | 0.03940 |
| Ports      |            |              |            |         |
| Supervisor |            |              |            |         |
| Squareness |            |              |            |         |
| LEC        |            |              |            |         |
| SLEC       |            |              |            |         |
| Misc.      |            |              |            |         |
| ▼          |            |              |            |         |

| LEC        |            |         | in |
|------------|------------|---------|----|
| About      | X Standard | 0.03940 |    |
| Display    | X Observed | 0.03940 |    |
| Encoders   | Z Standard | 0.03940 |    |
| Print      | Z Observed | 0.03940 |    |
| Ports      |            |         |    |
| Supervisor |            |         |    |
| Squareness |            |         |    |
| LEC        |            |         |    |
| SLEC       |            |         |    |
| Misc.      |            |         |    |
| ▼          |            |         |    |

| LEC        |            |         | in |
|------------|------------|---------|----|
| About      | X Standard | 0.03940 |    |
| Display    | X Observed | 0.03940 |    |
| Encoders   | Z Standard | 0.03940 |    |
| Print      | Z Observed | 0.03940 |    |
| Ports      |            |         |    |
| Supervisor |            |         |    |
| Squareness |            |         |    |
| LEC        |            |         |    |
| SLEC       |            |         |    |
| Misc.      |            |         |    |
| ▼          |            |         |    |

Measure the standard on each axis and enter the measured value into the appropriate Observed data field using the numeric keypad on the front panel. Use the down cursor arrow to scroll to the desired data field.

When all the nominal and observed data is entered, press the left cursor arrow or Finish button to return to the Setup menu.

## Segmented Linear Error Correction (SLEC)

Scroll through the Setup menu to highlight Segmented Linear Error Correction (SLEC). Linear error correction coefficients are applied to segments of each axis to compensate for encoder and machine travel variations. The standard is measured on each axis, and the measured values are compared to the nominal values to generate correction coefficients. Correction coefficients are generated for each segment that deviates from the nominal value. The correction coefficients are then used to provide linear compensation for only the segments requiring it.

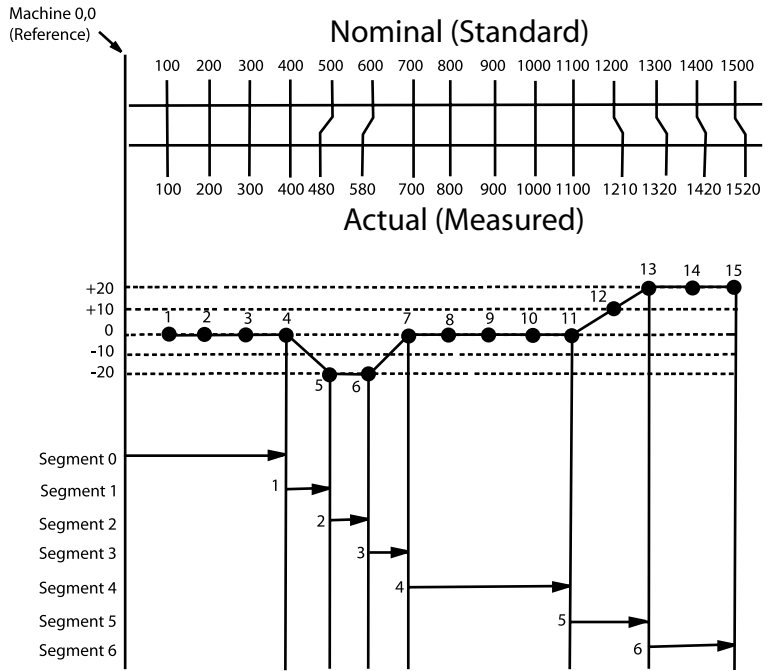
| SLEC        |           | in      |
|-------------|-----------|---------|
| Display     | SLEC Axis | X       |
| Encoders    | Enabled   | Off     |
| Hot Keys    | Segment   | 0       |
| Print       | Standard  |         |
| Printouts   | Observed  |         |
| Ports       |           |         |
| Supervisor  | MZ Offset | 0.00000 |
| Squareness  |           |         |
| LEC         |           |         |
| <b>SLEC</b> |           |         |
|             |           |         |

Mount the standard on the stage and zero axes on the datum of the standard. Measure and graph the nominal and actual segment values as shown below. A segment is any group of points that combine to form a straight line.



### NOTE

The numbers used in this example are only meant to illustrate the process and are not intended to suggest actual values.



Select the desired axis and enter the nominal and actual end points of each segment into the SLEC Standard and Observed data fields as shown below. A maximum of 30 segments (0-29) can be entered (7 are shown in this example).

Enter the offset from the Machine zero to the standard's datum for the current axis into the MZ Offset data field.

Press the ON softkey to use SLEC compensation for the selected axis.

When all the data are entered for all axes, press the left cursor arrow or Finish button to return to the Setup menu.

---

## Misc. (miscellaneous)

The miscellaneous setup screen contains 1 supervisor level function and 1 user level function. The two data entry fields contained on this screen are: key delay and volume.

### Key Delay

This data entry field allows supervisor level users to set the interval an arrow key must be depressed prior to executing its function a second time. Use this field to adjust the keys for rapid or slow scrolling through TC200 lists and to account for operator dexterity. This data entry field requires the supervisor password to be entered prior to access.

### Volume

This data entry field allows users to increase or decrease the volume of the TC200 sounds. 1 through 10 are valid inputs in this field (the TC200 does not go to 11).

## Libraries

The libraries setup screen contains 5 supervisor level functions. The five option selection fields on this screen are as follows: use locations, tool button, SG 00 master, SG edit lock, and SG cal loc. All fields require the supervisor password to be entered prior to access.

|                  |                |            |    |
|------------------|----------------|------------|----|
| <b>Libraries</b> |                |            | in |
| Display          | Tools          |            |    |
| Encoders         | Use Locations  | <u>Yes</u> |    |
| Print            | Tool Button    | <u>New</u> |    |
| Ports            | Setting Gages  |            |    |
| Supervisor       | SG 00 master   | <u>No</u>  |    |
| Squareness       | Edit Lock      | <u>No</u>  |    |
| LEC              | Cal Lock       | <u>No</u>  |    |
| SLEC             | Tool Sequences |            |    |
| Misc.            | Edit Lock      | <u>No</u>  |    |
| <b>Libraries</b> |                |            |    |
|                  |                |            |    |

### Use Locations

This option selection field enables the Tool Loc field found on the tool setup screen. Press the yes softkey to enable this function or the no softkey to disable it. This option selection field requires the supervisor password to be entered prior to access.

|                  |                |            |    |
|------------------|----------------|------------|----|
| <b>Libraries</b> |                |            | in |
| Display          | Tools          |            |    |
| Encoders         | Use Locations  | <u>Yes</u> |    |
| Print            | Tool Button    | <u>New</u> |    |
| Ports            | Setting Gages  |            |    |
| Supervisor       | SG 00 master   | <u>No</u>  |    |
| Squareness       | Edit Lock      | <u>No</u>  |    |
| LEC              | Cal Lock       | <u>No</u>  |    |
| SLEC             | Tool Sequences |            |    |
| Misc.            | Edit Lock      | <u>No</u>  |    |
| <b>Libraries</b> |                |            |    |
| No               | Yes            |            |    |

### Tool Button

This option selection field determines the navigation result when the tool key is pressed. Press the new softkey to bring up the new Tool setup screen when the tool key is pressed. Press the select softkey to bring up the select tool screen when the tool key is pressed. This option selection field requires the supervisor password to be entered prior to access.



|                                                                                                                  |        |                                                                                                                                                                                              |  |    |
|------------------------------------------------------------------------------------------------------------------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|
| <b>Libraries</b>                                                                                                 |        |                                                                                                                                                                                              |  | in |
| ↑<br>Display<br>Encoders<br>Print<br>Ports<br>Supervisor<br>Squareness<br>LEC<br>SLEC<br>Misc.<br>Libraries<br>↓ |        | Tools<br>Use Locations <u>Yes</u><br>Tool Button <u>New</u><br>Setting Gages<br>SG 00 master <u>No</u><br>Edit Lock <u>No</u><br>Cal Lock <u>No</u><br>Tool Sequences<br>Edit Lock <u>No</u> |  |    |
| New                                                                                                              | Select |                                                                                                                                                                                              |  |    |

### SG 00 master

The options selection field assigns all calibrations relative to a master setting gage rather than absolute or machine zero. Press the yes softkey to enable this function. Press the no softkey to calibrate each setting individually against absolute/machine zero. This option selection field requires the supervisor password to be entered prior to access.

|                                                                                                                  |     |                                                                                                                                                                                              |  |    |
|------------------------------------------------------------------------------------------------------------------|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|----|
| <b>Libraries</b>                                                                                                 |     |                                                                                                                                                                                              |  | in |
| ↑<br>Display<br>Encoders<br>Print<br>Ports<br>Supervisor<br>Squareness<br>LEC<br>SLEC<br>Misc.<br>Libraries<br>↓ |     | Tools<br>Use Locations <u>Yes</u><br>Tool Button <u>New</u><br>Setting Gages<br>SG 00 master <u>No</u><br>Edit Lock <u>No</u><br>Cal Lock <u>No</u><br>Tool Sequences<br>Edit Lock <u>No</u> |  |    |
| No                                                                                                               | Yes |                                                                                                                                                                                              |  |    |

### SG Edit Lock

The options selection field allows setting gage edit options to be enabled or disabled. Press the yes softkey to allow edits to setting gages. Press the no softkey to prevent edits to setting gages. This option selection field requires the supervisor password to be entered prior to access.

| Libraries  |                |               |     | in |
|------------|----------------|---------------|-----|----|
| Display    | Tools          | Use Locations | Yes |    |
| Encoders   |                | Tool Button   | New |    |
| Print      | Setting Gages  |               |     |    |
| Ports      | SG 00 master   |               | No  |    |
| Supervisor | Edit Lock      |               | No  |    |
| Squareness | Cal Lock       |               | No  |    |
| LEC        | Tool Sequences |               |     |    |
| SLEC       | Edit Lock      |               | No  |    |
| Misc.      |                |               |     |    |
| Libraries  |                |               |     |    |
| No         | Yes            |               |     |    |

### SG Cal Lock

The options selection field allows setting gage calibration to be a supervisor level function. This will prevent users from inadvertently altering calibrations. Press the yes softkey to allow this function. Press the no softkey to disable it. This option selection field requires the supervisor password to be entered prior to access.

| Libraries  |                |               |     | in |
|------------|----------------|---------------|-----|----|
| Display    | Tools          | Use Locations | Yes |    |
| Encoders   |                | Tool Button   | New |    |
| Print      | Setting Gages  |               |     |    |
| Ports      | SG 00 master   |               | No  |    |
| Supervisor | Edit Lock      |               | No  |    |
| Squareness | Cal Lock       |               | No  |    |
| LEC        | Tool Sequences |               |     |    |
| SLEC       | Edit Lock      |               | No  |    |
| Misc.      |                |               |     |    |
| Libraries  |                |               |     |    |
| No         | Yes            |               |     |    |

### Tool Sequence Edit Lock

This option selection field allows supervisor level users to make tool sequence editing a supervisor level or user level function. Press the yes softkey to make tool sequence editing a supervisor level function or the no softkey to make it a user level function. This option selection field requires the supervisor password prior to access.

| Libraries  |                | in         |
|------------|----------------|------------|
| Display    | Tools          |            |
| Encoders   | Use Locations  | <u>Yes</u> |
| Print      | Tool Button    | <u>New</u> |
| Ports      | Setting Gages  |            |
| Supervisor | SG 00 master   | <u>No</u>  |
| Squareness | Edit Lock      | <u>No</u>  |
| LEC        | Cal Lock       | <u>No</u>  |
| SLEC       | Tool Sequences |            |
| Misc.      | Edit Lock      | <u>No</u>  |
| Libraries  |                |            |
| No         | Yes            |            |

## Clock

The clock setup screen contains 8 supervisor level functions. The 6 data entry fields and 2 option selection fields are as follows: year, month, day, hours, minutes, seconds, date format, time format. All fields require the supervisor password to be entered prior to access.

| Clock      |             | in           |
|------------|-------------|--------------|
| Encoders   | Year        | <u>2000</u>  |
| Print      | Month       | <u>0</u>     |
| Ports      | Day         | <u>0</u>     |
| Supervisor | Hours       | <u>0</u>     |
| Squareness | Minutes     | <u>0</u>     |
| LEC        | Seconds     | <u>0</u>     |
| SLEC       | Date Format | <u>M/D/Y</u> |
| Misc.      | Time Format | <u>12</u>    |
| Libraries  |             |              |
| Clock      |             |              |

### Year

Enter the current year in this data entry field by using the numeric keypad. This data entry field requires the supervisor password to be entered prior to access.

|              |             |       |
|--------------|-------------|-------|
| <b>Clock</b> |             | in    |
| ↑            | Year        | 2000  |
| Encoders     | Month       | 0     |
| Print        | Day         | 0     |
| Ports        | Hours       | 0     |
| Supervisor   | Minutes     | 0     |
| Squareness   | Seconds     | 0     |
| LEC          | Date Format | M/D/Y |
| SLEC         | Time Format | 12    |
| Misc.        |             |       |
| Libraries    |             |       |
| Clock        |             |       |
|              |             |       |

### Month

Enter the current month in this data entry field by using the numeric keypad. This data entry field requires the supervisor password to be entered prior to access.

|              |             |       |
|--------------|-------------|-------|
| <b>Clock</b> |             | in    |
| ↑            | Year        | 2000  |
| Encoders     | Month       | 12    |
| Print        | Day         | 0     |
| Ports        | Hours       | 0     |
| Supervisor   | Minutes     | 0     |
| Squareness   | Seconds     | 0     |
| LEC          | Date Format | M/D/Y |
| SLEC         | Time Format | 12    |
| Misc.        |             |       |
| Libraries    |             |       |
| Clock        |             |       |
|              |             |       |

### Day

Enter the current day in this data entry field by using the numeric keypad. This data entry field requires the supervisor password to be entered prior to access.

|              |             |       |
|--------------|-------------|-------|
| <b>Clock</b> |             | in    |
| ↑            | Year        | 2000  |
| Encoders     | Month       | 12    |
| Print        | Day         | 12    |
| Ports        | Hours       | 0     |
| Supervisor   | Minutes     | 0     |
| Squareness   | Seconds     | 0     |
| LEC          | Date Format | M/D/Y |
| SLEC         | Time Format | 12    |
| Misc.        |             |       |
| Libraries    |             |       |
| Clock        |             |       |
|              |             |       |

### Hours

Enter the current hour using the numeric keypad. This data entry field requires the supervisor password to be entered prior to access.

|              |             |       |    |
|--------------|-------------|-------|----|
| <b>Clock</b> |             |       | in |
| ▲            | Year        | 2000  |    |
| Encoders     | Month       | 12    |    |
| Print        | Day         | 12    |    |
| Ports        | Hours       | 24    |    |
| Supervisor   | Minutes     | 0     |    |
| Squareness   | Seconds     | 0     |    |
| LEC          | Date Format | M/D/Y |    |
| SLEC         | Time Format | 12    |    |
| Misc.        |             |       |    |
| Libraries    |             |       |    |
| Clock        |             |       |    |
|              |             |       |    |

### Minutes

Enter the current minute using the numeric keypad . This data entry field requires the supervisor password to be entered prior to access.

|              |             |       |    |
|--------------|-------------|-------|----|
| <b>Clock</b> |             |       | in |
| ▲            | Year        | 2000  |    |
| Encoders     | Month       | 12    |    |
| Print        | Day         | 12    |    |
| Ports        | Hours       | 24    |    |
| Supervisor   | Minutes     | 59    |    |
| Squareness   | Seconds     | 0     |    |
| LEC          | Date Format | M/D/Y |    |
| SLEC         | Time Format | 12    |    |
| Misc.        |             |       |    |
| Libraries    |             |       |    |
| Clock        |             |       |    |
|              |             |       |    |

### Seconds

Enter the current second using the numeric keypad. This data entry field requires the supervisor password prior to access.

|              |             |       |    |
|--------------|-------------|-------|----|
| <b>Clock</b> |             |       | in |
| ▲            | Year        | 2000  |    |
| Encoders     | Month       | 12    |    |
| Print        | Day         | 12    |    |
| Ports        | Hours       | 24    |    |
| Supervisor   | Minutes     | 59    |    |
| Squareness   | Seconds     | 59    |    |
| LEC          | Date Format | M/D/Y |    |
| SLEC         | Time Format | 12    |    |
| Misc.        |             |       |    |
| Libraries    |             |       |    |
| Clock        |             |       |    |
|              |             |       |    |

### Date Format

Use the softkeys to select month/day/year or day/month/year format. This option selection field requires the supervisor password to be entered prior to access.

|              |             |       |    |
|--------------|-------------|-------|----|
| <b>Clock</b> |             |       | in |
| ↑            | Year        | 2000  |    |
| Encoders     | Month       | 12    |    |
| Print        | Day         | 12    |    |
| Ports        | Hours       | 24    |    |
| Supervisor   | Minutes     | 59    |    |
| Squareness   | Seconds     | 59    |    |
| LEC          | Date Format | M/D/Y |    |
| SLEC         | Time Format | 12    |    |
| Misc.        |             |       |    |
| Libraries    |             |       |    |
| (Clock)      |             |       |    |
| M/D/Y        | D/M/Y       |       |    |

### Time Format

Use the softkeys to select a 12 hour clock or a 24 hour clock. This option selection field requires the supervisor password to be entered prior to access.

|              |             |       |    |
|--------------|-------------|-------|----|
| <b>Clock</b> |             |       | in |
| ↑            | Year        | 2000  |    |
| Encoders     | Month       | 12    |    |
| Print        | Day         | 12    |    |
| Ports        | Hours       | 24    |    |
| Supervisor   | Minutes     | 59    |    |
| Squareness   | Seconds     | 59    |    |
| LEC          | Date Format | M/D/Y |    |
| SLEC         | Time Format | 12    |    |
| Misc.        |             |       |    |
| Libraries    |             |       |    |
| (Clock)      |             |       |    |
| 12           | 24          |       |    |

# Chapter 4

## Communications

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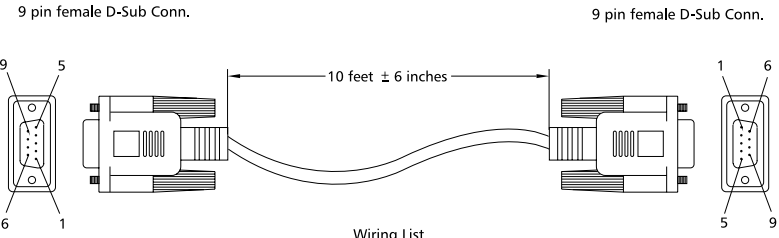
This chapter explains how to establish the interface between a printer or computer and the TC200. There are many manufacturers of printers, and unfortunately not all printers are compatible. It would be impossible to support all of them. Parallel printers must support the Text Only mode.

**NOTE**  
**It is the users responsibility to check printer compatibility, cabling and system configuration accordingly.**

### RS232 port

The RS232 port must be configured to communicate with your printer or computer.

Serial Cable 9 Pin Female to 9 Pin Female



Wiring List

| 9 pin dsub (F) | cable  | 9 pin dsub (F) |
|----------------|--------|----------------|
| 2              |        | 2              |
| 3              |        | 3              |
| 4              |        | 4              |
| 5              |        | 5              |
| 7              |        | 7              |
| 8              |        | 8              |
| case           | shield | case           |

### Default settings

#### Ports section of Setup menu:

The following is a list of factory default settings.

- Baud Rate: 38400
- Word Length: 8
- Stop Bits: 1
- Parity: Odd
- Handshake: Hard
- Data Bits: None
- Parallel Data: Display

#### Print section of Setup menu:

- Pre Line: Enter ASCII control character (string) for printer control before printing a line.
- Post Line: Enter ASCII control character (string) for printer control after printing a line.
- Pre Form: Enter ASCII control character (string) for printer control before printing a form.
- Post Form: Enter ASCII control character (string) for printer control after printing a form.



ASCII Codes

|    |                 |    |   |     |   |
|----|-----------------|----|---|-----|---|
| 8  | backspace       | 46 | . | 84  | T |
| 9  | horizontal tab  | 47 | / | 85  | U |
| 10 | line feed       | 48 | 0 | 86  | V |
| 11 | vertical tab    | 49 | 1 | 87  | W |
| 12 | form feed       | 50 | 2 | 88  | X |
| 13 | carriage return | 51 | 3 | 89  | Y |
| 14 | so              | 52 | 4 | 90  | Z |
| 15 | si              | 53 | 5 | 91  | [ |
| 16 | dle             | 54 | 6 | 92  | \ |
| 17 | dcl             | 55 | 7 | 93  | ] |
| 18 | dc2             | 56 | 8 | 94  | ^ |
| 19 | dc3             | 57 | 9 | 95  | ~ |
| 20 | dc4             | 58 | : | 96  |   |
| 21 | nak             | 59 | ; | 97  | a |
| 22 | syn             | 60 | < | 98  | b |
| 23 | etb             | 61 | = | 99  | c |
| 24 | can             | 62 | > | 100 | d |
| 25 | em              | 63 | ? | 101 | e |
| 26 | sub             | 64 | @ | 102 | f |
| 27 | esc             | 65 | A | 103 | g |
| 28 | fs              | 66 | B | 104 | h |
| 29 | gs              | 67 | C | 105 | i |
| 30 | rs              | 68 | D | 106 | j |
| 31 | us              | 69 | E | 107 | k |
| 32 | space           | 70 | F | 108 | l |
| 33 | !               | 71 | G | 109 | m |
| 34 | "               | 72 | H | 110 | n |
| 35 | #               | 73 | I | 111 | o |
| 36 | \$              | 74 | J | 112 | p |
| 37 | %               | 75 | K | 113 | q |
| 38 | &               | 76 | L | 114 | r |
| 39 | '               | 77 | M | 115 | s |
| 40 | (               | 78 | N | 116 | t |
| 41 | )               | 79 | O | 117 | u |
| 42 | *               | 80 | P | 118 | v |
| 43 | +               | 81 | Q | 119 | w |
| 44 | ,               | 82 | R | 120 | x |
| 45 | -               | 83 | S | 121 | y |
|    |                 |    |   | 122 | z |

## Feature print formats

In the following, the "v" means to ignore the character it is substituted for i.e., X, Y, Z, r, d, <, T, R, A, etc.

- "d" means digit
- "-" is the negative sign
- "s" means space
- "c" means carriage return

For positive outputs, the space character will be substituted for the negative sign "-". The leading digits may be spaces.

When a TC200 is shipped from the factory, each output line is terminated by a carriage return (ASCII 13).

### Feature Formats

The TC200 is able to print features in formats specified in the Print section of the Setup menu. These include:

- Pre line formats
- Pre form formats
- Post line formats
- Post form formats

### Print Setup

The print setup screen contains 4 user level procedures and 8 supervisor level procedures.

Users can insert ASCII control character for pre line, post line, pre form, and post form operations. Typically these character insertions are for line feeds or carriage returns. A chart of common ASCII characters can be found in Chapter 3: Communications and at the end of this section.

Supervisor can set reports and labels to print, set tool location and position of tool to print, define number of lines per label, set number of skipped lines, and set label indents.

| Print        |           | in    |
|--------------|-----------|-------|
| About        | Pre Line  |       |
| Display      | Post Line | 10 13 |
| Encoders     | Pre Form  |       |
| Hot Keys     | Post Form |       |
| <b>Print</b> |           |       |
| Printouts    |           |       |
| Ports        |           |       |
| Supervisor   |           |       |
| Squareness   |           |       |
| LEC          |           |       |
| ▼            |           |       |
|              |           |       |

Press the right cursor arrow to select items in the right portion of the screen.

**Pre Line**

To add an output control character before a line is printed use the numeric keypad to enter an ASCII control character in this field.

**Post Line**

To add an output control character after a line is printed use the numeric keypad to enter an ASCII control character in this field.

|              |           |    |    |    |
|--------------|-----------|----|----|----|
| <b>Print</b> |           |    |    | in |
| About        | Pre Line  |    |    |    |
| Display      | Post Line | 10 | 13 |    |
| Encoders     | Pre Form  |    |    |    |
| Hot Keys     | Post Form |    |    |    |
| Print        |           |    |    |    |
| Printouts    |           |    |    |    |
| Ports        |           |    |    |    |
| Supervisor   |           |    |    |    |
| Squareness   |           |    |    |    |
| LEC          |           |    |    |    |
| ▼            |           |    |    |    |
|              |           |    |    |    |

**Pre Form**

To add an output control character before a form is printed use the numeric keypad to enter an ASCII control character in this field.

**Post Form**

To add an output control character after a form is printed use the numeric keypad to enter an ASCII control character in this field.

**Print Report**

Enables or disables tool sequence report print function. Use the softkeys to select yes or no. This option selection field requires the supervisor password prior to access.

|                  |                  |          |  |    |
|------------------|------------------|----------|--|----|
| <b>Printouts</b> |                  |          |  | in |
| About            | Print Report     | No       |  |    |
| Display          | Print Labels     | No       |  |    |
| Encoders         | Wide Form        | Yes      |  |    |
| Hot Keys         | Print Loc        | No       |  |    |
| Print            | Print POT        | No       |  |    |
| Printouts        | Num Label Lines  | 5        |  |    |
| Ports            | Num Skip Lines   | 0        |  |    |
| Supervisor       | Amt Label Indent | 0        |  |    |
| Squareness       | Format           | Standard |  |    |
| LEC              |                  |          |  |    |
| ▼                |                  |          |  |    |
| No               | Yes              |          |  |    |

### **Print Labels**

Enables or disables tool label print function. Use the softkeys to select yes or no. This option selection field requires the supervisor password prior to access.

### **Print POT**

Press the yes softkey to include the POT (position of tool within tool changer) on the printed label. Press the no softkey to exclude the POT. This option selection field requires the supervisor password prior to access.

### **Num Label Lines**

Use the numeric keypad to enter the desired number of lines for labels. This data entry field requires the supervisor password prior to access.

### **Num Skip Lines**

Use the numeric keypad to enter the number of lines skipped between printed lines. This data entry field requires the supervisor password prior to access.

### **Amt Label Indent**

Use the numeric keypad to enter the number of indent spaces for labels. This data entry field requires the supervisor password prior to access.

## **Glossary**

- Post Form: The purpose of a "Postform Character" is to output a control character such as, Line Feed, Carriage Return or any other ASCII Code control character, after each page is printed.
- Post Line: The purpose of a "Postline Character" is to output a control character such as, Line Feed, Carriage Return or any other ASCII Code control character, after a line is printed.
- Pre Form: The purpose of a "Preform Character" is to output a control character such as, Line Feed, Carriage Return or any other ASCII Code control character, before each page is printed.

Pre Line: The purpose of a "Preline Character" is to output a control character such as, Line Feed, Carriage Return or any other ASCII Code control character before a line is printed.



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