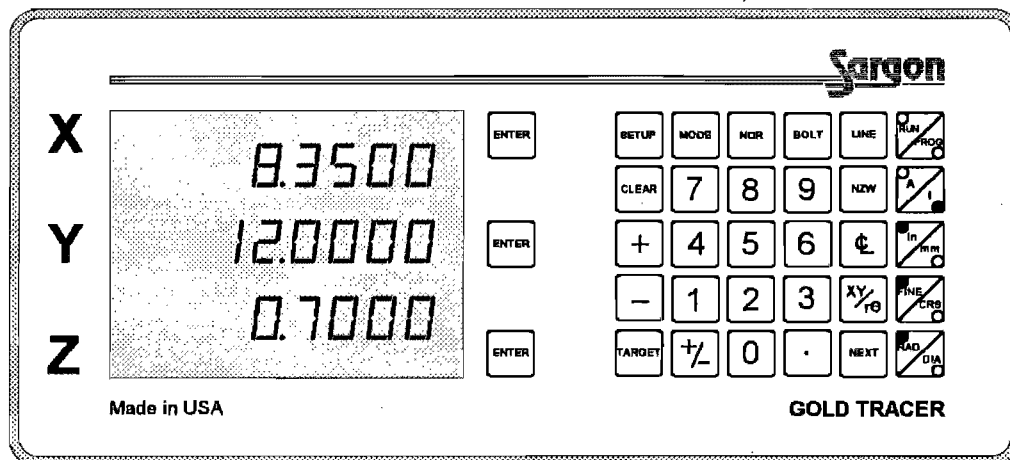


# GOLD TRACER DIGITAL READOUT




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**OPERATOR'S MANUAL**

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# 1

## Features and Capabilities

Press to select the appropriate axis.

Press a second time after numerical data has been keyed in.

Clearing All Memory: Press and hold while Gold Tracer is flashing 8.8.8.8.8.8.8. and then press any ENTER key to clear all memory.

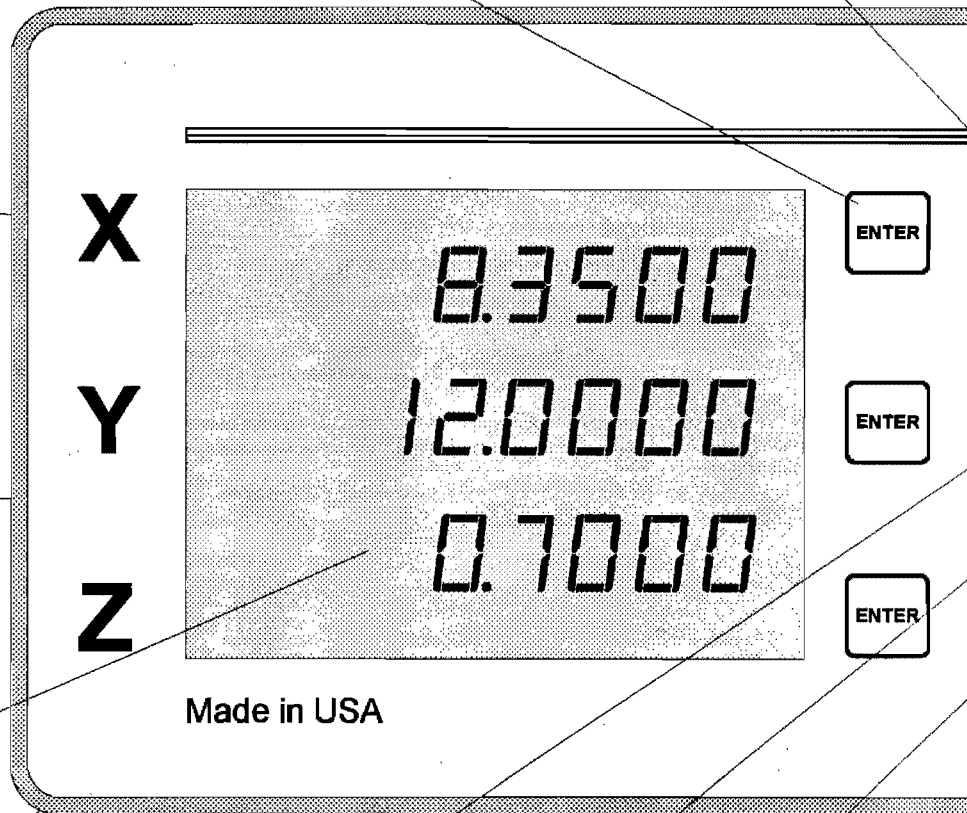
MEC switch at rear of Gold Tracer is used to set Machine Error Compensation (Scale Factors)

Internal Nonvolatile Memory maintains data when Gold Tracer is off

Bright, efficient LED display with wide viewing angle

Power input module at rear of Gold Tracer has:

- ◆ On/Off switch
- ◆ Fuse protection
- ◆ EMI filter for noise protection



Clear a dimension

Subtract from a dimension

Add to a dimension

Enter a target dimension

Setup Screens: Press and hold while Gold Tracer is flashing 8.8.8.8.8.8.8. to set the following:

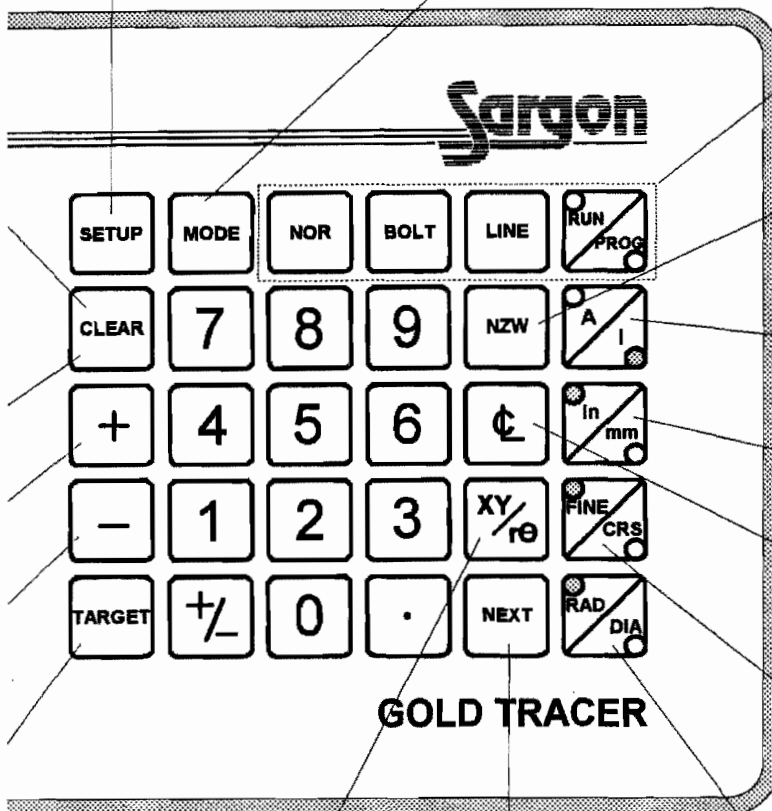
- ◆ Scale Resolutions
- ◆ Scale Directions
- ◆ Radius/Diameter enable

Display which of the following modes the Gold Tracer is currently in:

- ◆ Normal
- ◆ Program Bolt Hole pattern
- ◆ Run Bolt Hole pattern
- ◆ Program Line Hole pattern
- ◆ Run Line Hole pattern

Select one of the following modes:

- ◆ Normal
- ◆ Program Bolt Hole pattern
- ◆ Run Bolt Hole pattern
- ◆ Program Line Hole pattern
- ◆ Run Line Hole pattern



Near Zero Warning indicator: Press and hold while Gold Tracer is flashing 8.8.8.8.8.8.8. to set the Near Zero Warning window. During operation, press to enable or disable the Near Zero Warning indicator.

Absolute or Incremental display mode

Inch or millimeter display mode

Center a dimension. Divide the position display by 2.

Fine or Coarse resolution: In Fine, maximum scale resolution is displayed. In Coarse, less resolution is displayed.

Cartesian or polar coordinate display mode

Sequence through steps in Bolt or Line mode

Radius or Diameter: In Radius, the actual scale movement is displayed. In Diameter, double the scale movement will be displayed.

# 2

## Preparation For Use

---

### Unpacking

- ◆ **Inspect Shipping Containers.** Inspect for obvious damage that would indicate mishandling during shipment. Make note of any indicators, such as: dented corners or torn sides.
- ◆ **Save Packing Material.** The shipping box and packing material should be opened carefully to permit reuse in case it is necessary to return any portion of the equipment.
- ◆ **Notify Carrier In Case of Damage.** If the display or other items show any external damage, or if parts have vibrated or broken loose, the carrier should be notified within ten days of receipt of shipment.
- ◆ **Check Packing List.** Any discrepancy between the items received and the items listed on the shipment packing list should be reported immediately to the Sargon distributor.

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### General Installation Notes

## **WARNING**

**HAZARDOUS VOLTAGES.  
USE EXTREME CAUTION.**

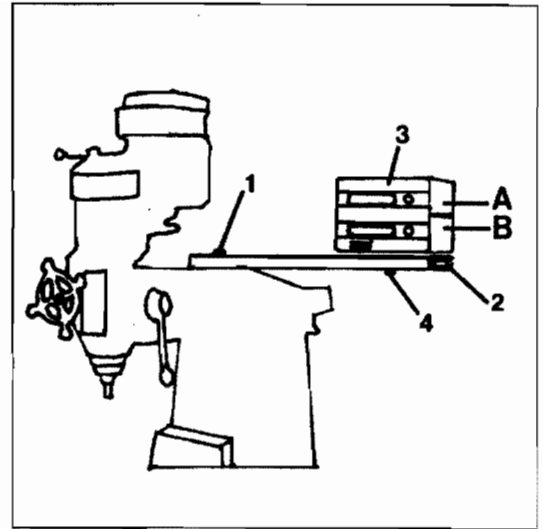
- ◆ All required electrical work should be performed by a qualified electrician.
- ◆ Mount the Gold Tracer a minimum of 6 inches away from any motors. The Gold Tracer may be mounted to the arm provided, or to a custom machined arm, mount, or stand.
- ◆ Refer to the applicable manual for scale installation.



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## Typical Display Installation

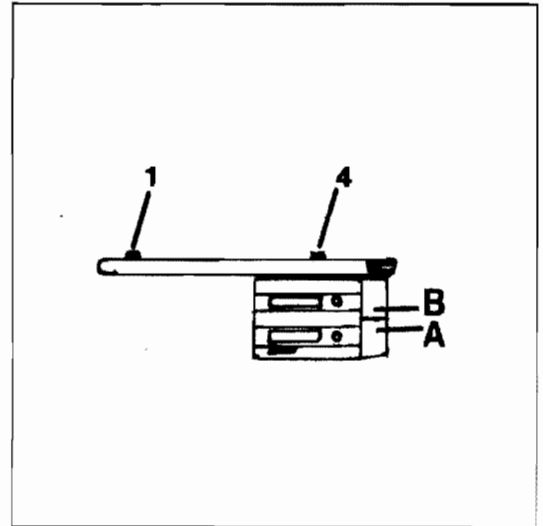
1. Remove the large eye bolt located on top of the milling machine column (Index 1).
2. Mount the arm (Index 2) as shown.
3. Bolt the Gold Tracer to the mounting arm with the 5/16-18 bolt (Index 4) provided in the hardware kit.



---

## Installation Under Mounting Arm

1. Remove screws at both sides of the Gold Tracer case extrusion.
2. Remove the top and bottom halves of the case extrusion.
3. Mount the bottom half of the case (Index B) on the top side of the Gold Tracer.
4. Mount the top half of the case (Index A) on the bottom side of the Gold Tracer. The top half should now have the mounting hole in its center.
5. Mount the Gold Tracer as shown.



## 2: Preparation For Use (Continued)

---

### Grounding

- ◆ The AC outlet should be a three prong grounded outlet (per article 250 of the US National Electrical Code). If it is not, use a grounded adapter and verify that the adapter is grounded.
- ◆ Verify that the machine is grounded. If it is not, a ground must be installed.
- ◆ Install a 14 AWG stranded wire (customer provided) from the ground lug located on the back of the Gold Tracer to the machine power ground connection. If this is not possible, drill/tap at an alternate location on the machine. Secure the ground wire using star or split washers to ensure adequate connection. Use an approved anti-oxidation compound at the connection where the paint is scraped.

---

### AC Power

- ◆ Do not use machine power lines for the Gold Tracer. Use a separate 120 or 240 VAC outlet. If an outlet is not available, one should be installed near the Gold Tracer mounting location.
- ◆ The AC power outlet should be of the same voltage as that indicated on the identification/serial number label on the back of the Gold Tracer.
- ◆ Use the power cord supplied. Do not modify the power cord in any way.

---

### Routing Scale Cables

- ◆ Connect and secure the scale connectors to the Gold Tracer. Using tie-wraps, secure the scale cables and dress any excess slack. Do not wrap any AC power lines with the scale cables. Maintain a minimum of 6 inch spacing from AC lines and cross at right angles.

# 3

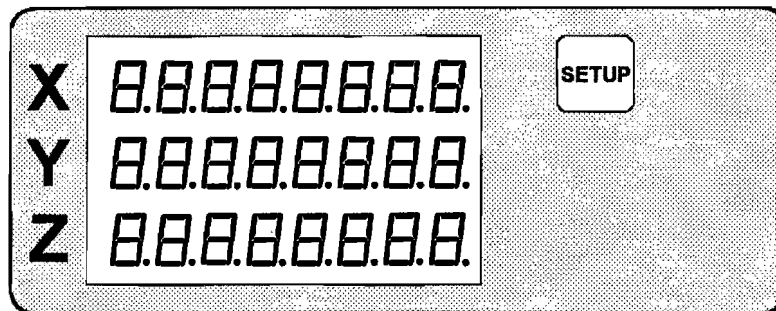
## Setup Screens: Setting Scale Resolutions, Scale Directions and Radius/Diameter Enable

### Setup Screens Description

Instead of using internal switches, scale resolutions, scale directions and radius/diameter button enable are programmed from the Gold Tracer's front panel.

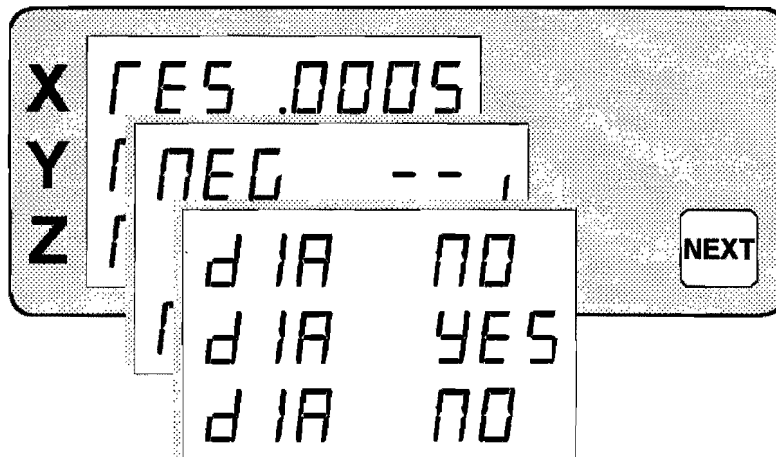
Scale resolutions, scale directions and radius/diameter enable are stored in the Gold Tracer's nonvolatile memory. Once set, the Gold Tracer may be powered down. When powered up at a later time the settings will still be intact.

### Entering the Setup Screens



After power up and while the display is still flashing **8.8.8.8.8.8.8.8.** press and hold **SETUP** until one of the setup screens is displayed.

### Selecting the Desired Setup Screen



Press **NEXT** as required until the desired setup screen is displayed.

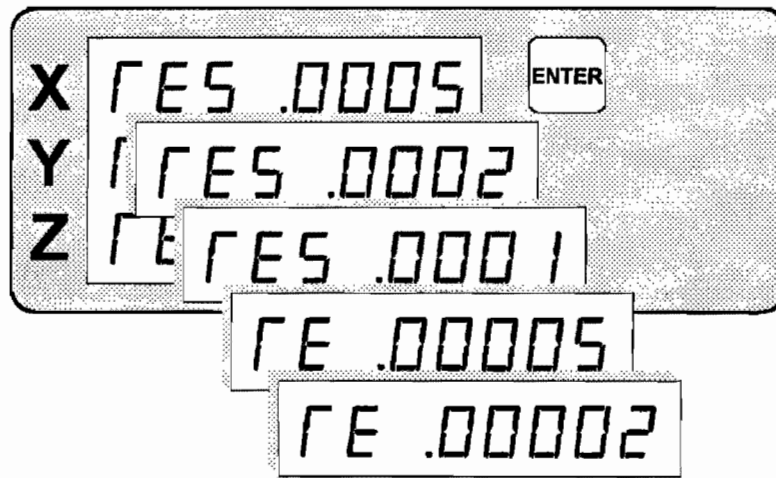
## 5: Setup Screens (Continued)

### Scale Resolutions Description

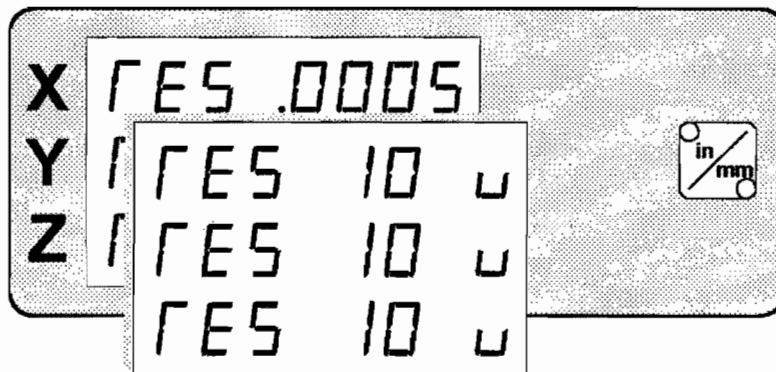
Each axis on the Gold Tracer must be set to the resolution which matches the scale being used for that axis. Resolutions available on the Gold Tracer are shown to the right. The scales must be metric. When inch mode is selected, the metric scale inputs are converted by the Gold Tracer to display in inches.

MICRON	INCH
10.0	0.0005
5.0	0.0002
2.0	0.0001
1.0	0.00005
0.5	0.00002

### Setting Scale Resolutions



Press **ENTER** for the desired axis to go through the available resolutions.



Press **inch/mm** to change between inch and metric displays. In mm mode the resolutions are displayed in microns (0.001 mm).

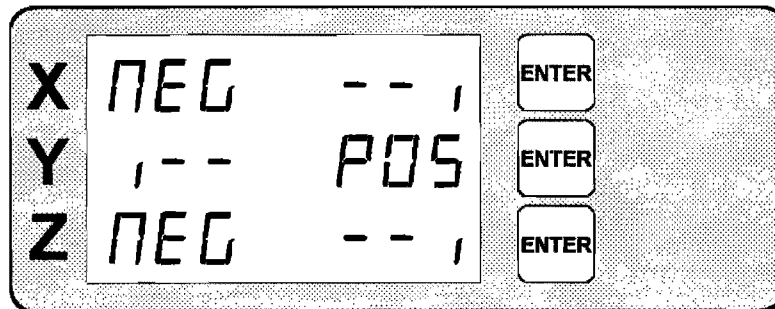
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**Scale Directions  
Description**

Scale movement is displayed as either positive or negative, depending on the direction of machine movement. Scale direction can be set, in the Gold Tracer, for each axis, so that movements are properly displayed for the machine being used.

---

**Setting Scale  
Directions**



Press **ENTER** for the desired axis to switch between positive and negative scale directions.

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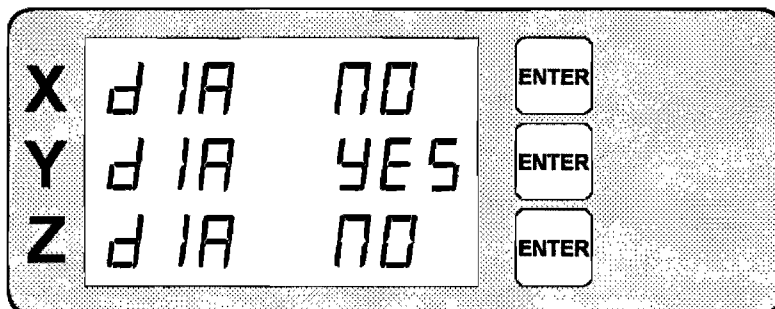
**Radius/Diameter  
Enable  
Description**

When radius/diameter enable has been set as described below, the radius/diameter button will then affect each axis that has been enabled and will not affect any axis that has been disabled.

Radius tracks the actual scale movement. Diameter displays double this movement.

---

**Enabling and  
Disabling the  
Radius/  
Diameter Button**



Press **ENTER** for the desired axis to switch between radius/diameter button enabled (YES) and disabled (NO).

---

**Exiting the  
Setup Screens**

When scale resolutions, scale directions and radius/diameter button enable are all correctly set, exit setup mode by pressing **A/I** or any other button except **ENTER**, **inch/mm** or **NEXT**. When setup mode is exited, the Gold Tracer will go to the mode that was last active when it was powered down.

# 4

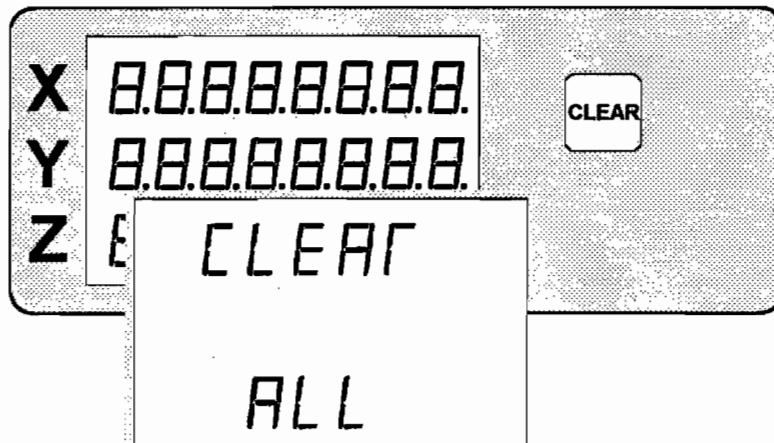
## Clearing All Memory

### Clearing All Memory Description

**CAUTION !** The following will occur when memory is cleared.

- ◆ Resolutions will be set to 10 micron, scale directions will be set to negative, and radius/diameter button will be enabled for Y axis only.
- ◆ Near Zero Warning window will be set to  $\pm 0.2000$  inch.
- ◆ Bolt hole and line hole programs will be erased and replaced by sample demo programs.
- ◆ Position information will be lost.
- ◆ MEC scale factors will be set to 1.

### Entering the Clear All Screen



After power up and while the display is still flashing **8.8.8.8.8.8.8.8.** press and hold **CLEAR** until the clear all screen is displayed.

### Clearing All Memory

To clear all memory, press any **ENTER** button. The Gold Tracer will momentarily display **CLEARED**, all memory will be cleared and the Gold Tracer will go to normal mode.

### Exiting Without Clearing Memory

To exit the clear all screen without clearing memory, press **▲** or any other button except **ENTER**. The Gold Tracer will go to the mode that was last active when it was powered down.

# 5

## Relation Between Normal, Program and Run Modes

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### Normal Mode Description

This is the basic digital readout mode. It is used for normal operations where the bolt and line hole programs are not required.

### Program Mode Description

When a bolt or line hole pattern is to be used it must first be programmed into the Gold Tracer's memory. The Gold Tracer memory will hold one bolt hole program and one line hole program. Once a program is entered, it may be used as many times as required without further programming.

### Run Mode Description

Programs are run in incremental mode. If, when run mode is selected, the Gold Tracer is in absolute mode, it will automatically switch to incremental mode. Absolute reference is not altered while in run mode.

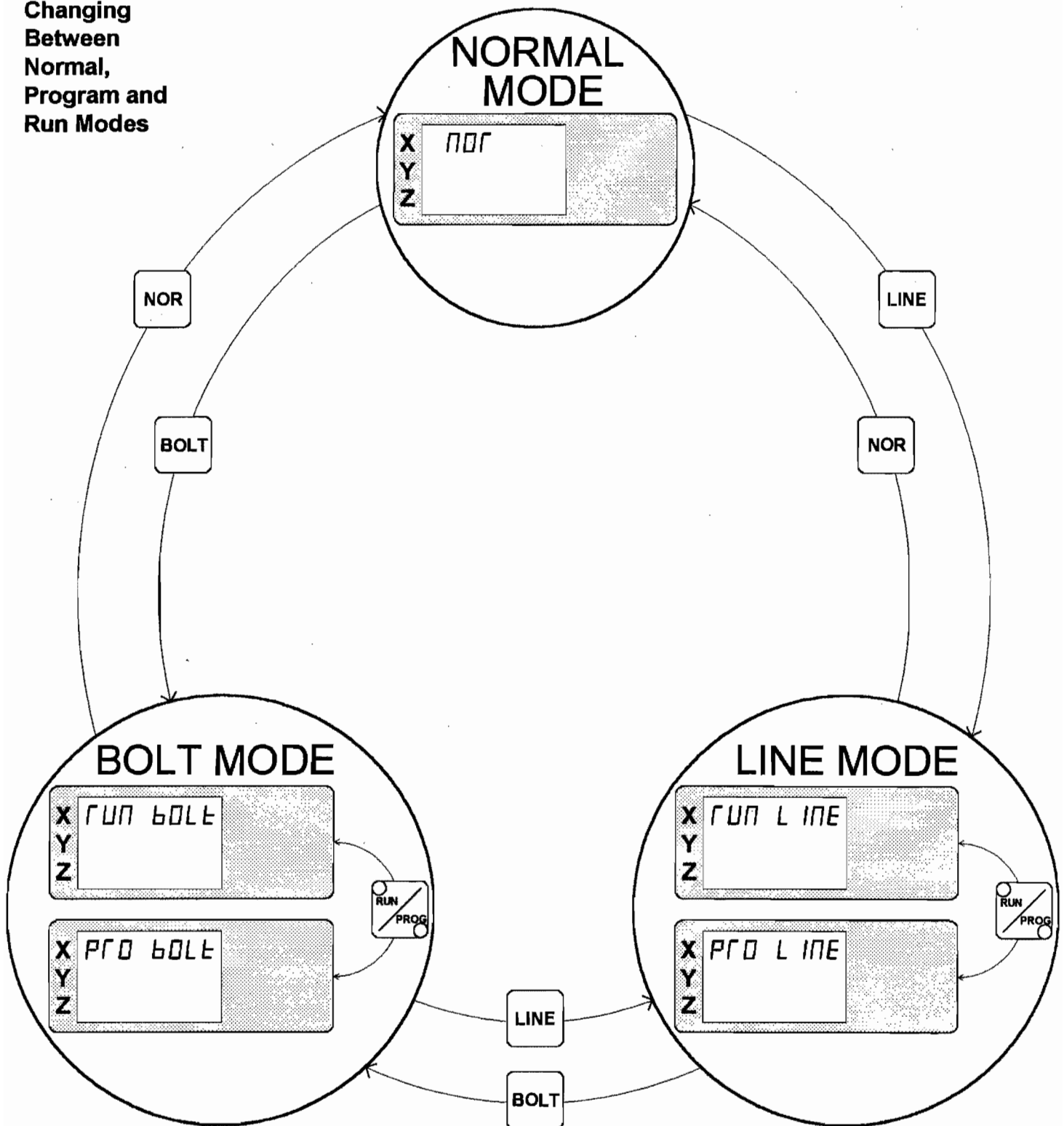
### Getting into Normal, Program and Run Modes

- ◆ When the power switch at the rear of the Gold Tracer is initially set to ON.
- ◆ The display will flash 8.8.8.8.8.8.8.8.
- ◆ Momentarily press any button to terminate flashing. The Gold Tracer will go to the mode that was last active when it was powered down.
- ◆ One of the following will be momentarily displayed:

NOR  
PRO BOLT  
RUN BOLT  
PRO LINE  
RUN LINE

## 5: Relation Between Normal, Program, and Run Modes (Continued)

Changing  
Between  
Normal,  
Program and  
Run Modes



Viewing the  
Current Mode

Press **MODE** to determine which mode the Gold Tracer is currently in. The mode as well as the step within that mode (for program and run modes) will be displayed.



# 6

## Absolute and Incremental Modes

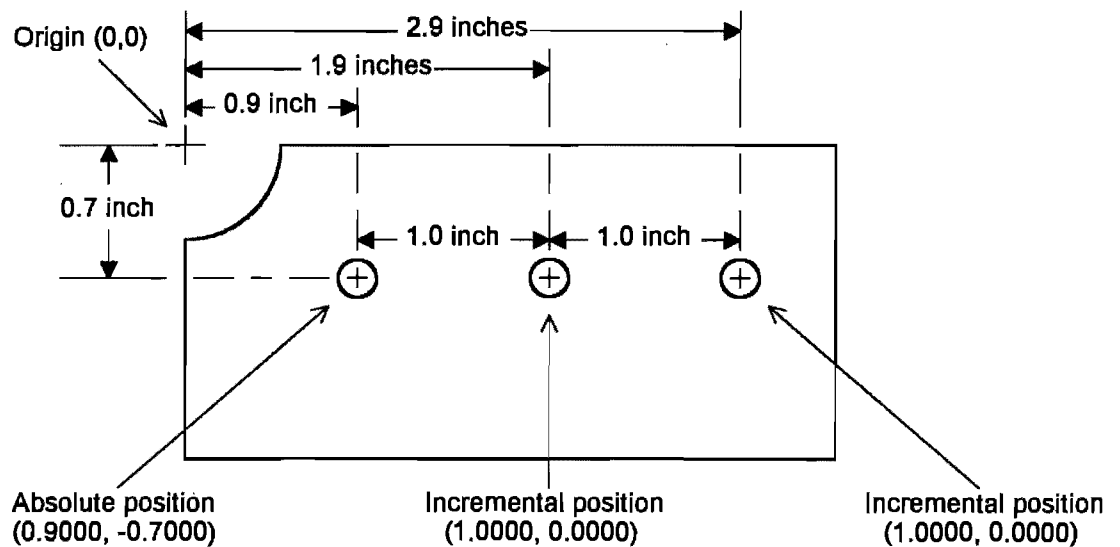
### The Difference Between Absolute and Incremental Modes

The absolute position is the distance between a fixed starting point on the work piece and another point to which the machine has been moved. The incremental position refers to distances that are not measured with reference to a fixed origin, but instead, the distance is measured between the previous point and some new point.

Absolute and incremental registers are both updated during table movement regardless of which is currently displayed.

Absolute and incremental registers are otherwise independent; that is, clearing one will not affect the other.

### Absolute and Incremental On a Sample Work Piece



### Switching Between Absolute and Incremental Display Modes

Press **[A/I]** to switch between absolute and incremental position displays. LEDs behind the button indicate which mode is active.

# 7

## Numerical Data Entry

---

### Clearing Absolute Position Register

The absolute and the incremental position registers are cleared independently. Clearing one will not affect the other.

1. The Gold Tracer must be in absolute mode to clear the absolute registers.
2. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
3. Press **CLEAR**. The selected axis will display 0.0 with the appropriate number of trailing zeroes. The decimal point will no longer be flashing.

### Canceling an Incorrect Entry

This feature is to prevent accidentally losing the absolute position coordinates. It is applicable to absolute mode only.

- ◆ If **ENTER** has been pressed in error and therefore the decimal point is flashing, again press **ENTER** (for the same axis) without keying in any value or pressing any other button. The original position will again be displayed.
- ◆ If numbers have already been keyed in (other than a single zero, "0.") but **ENTER** has not yet been pressed a second time: Press **CLEAR** then press **ENTER**. The original position will again be displayed.

### Clearing Incremental Position Register

The absolute and the incremental position registers are cleared independently. Clearing one will not affect the other.

1. The Gold Tracer must be in incremental mode to clear the incremental registers.
2. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
3. Press **CLEAR**. The selected axis will display 0.0 with the appropriate number of trailing zeroes. The decimal point will no longer be flashing.

---

### Entering a Preset Dimension

1. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
2. Use the numeric keypad to key in the desired dimension.

**Note:** When **+/-** is used while entering a dimension, it must be pressed after a numeral other than 0 has been keyed in. When the value is negative, the minus sign is displayed. When the value is positive, no sign is displayed.

3. Again press **ENTER** (for the same axis). The selected axis will display the preset dimension that was keyed in. The decimal point will no longer be flashing.

---

### Adding To or Subtracting From a Dimension

1. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
2. Use the numeric keypad to key in the desired value.
3. Press **+** or **-** as appropriate. The keyed in value will be added to or subtracted from the previous displayed value and the result will then be displayed.

---

### Centering a Dimension

The absolute and the incremental position registers are centered independently.

1. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
2. Press **C**. The word **CENTERED** will be momentarily displayed. The dimension on the selected axis will be centered (divided by 2) and the result will then be displayed.

---

### Recalling a Preset Dimension

This feature allows the operator to repeat an incremental step without again keying in the dimension. It is applicable to incremental mode only.

- ◆ When the Gold Tracer is in incremental mode, press **ENTER** for the appropriate axis, twice, without keying in any value. The last preset dimension that was entered for that axis will be recalled.

# 8

## Target Dimensions

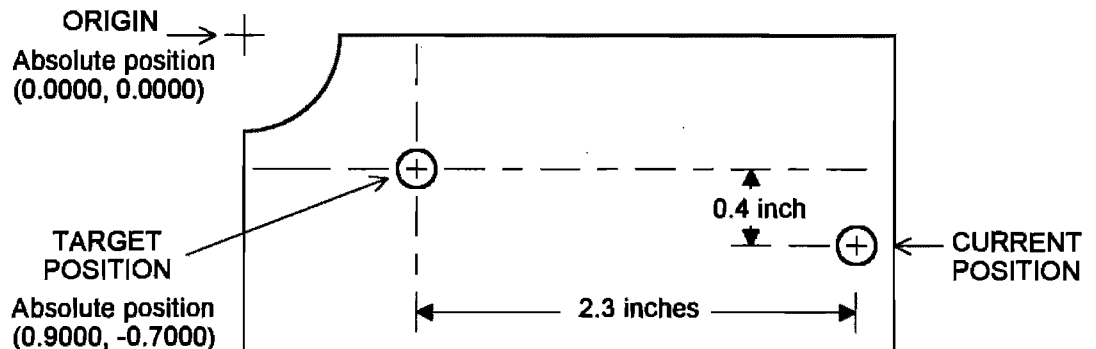
### Target Dimension Description

Target presetting is used to move from the current position to a specified absolute position. Target presetting is performed in incremental mode.

### Entering Target Dimensions

1. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
2. Use the numeric keypad to key in the target position coordinate.
3. Press **TARGET**. The Gold Tracer will display a value which when zeroed (by moving the table towards the target position) will locate the target position. If the Gold Tracer is not in incremental mode when **TARGET** is pressed, it will automatically switch to incremental mode.
4. Repeat the procedure for the remaining axes that are included as part of the target position.

### Target Dimension Example

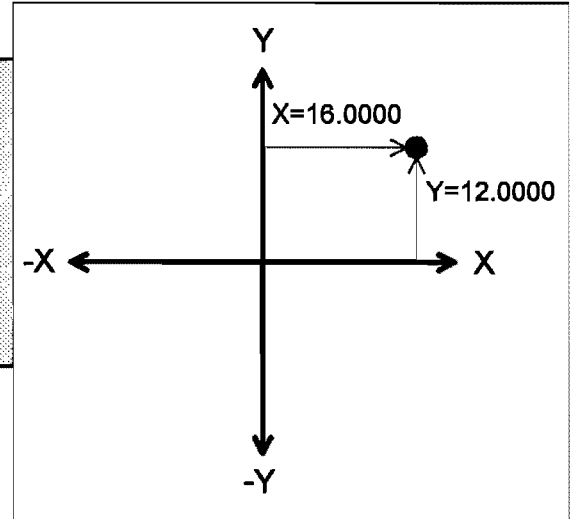
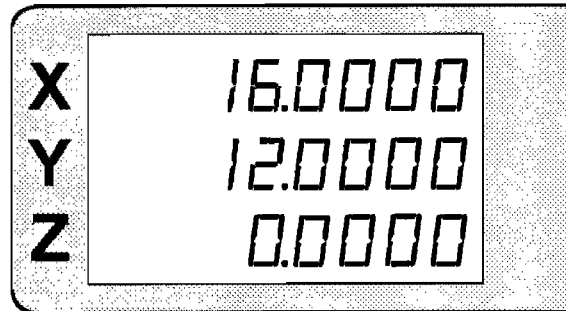


1. The cutting tool is at "current position" and the operator wishes to move to "target position."
2. On the X axis: Press **ENTER** **.** **9** **TARGET**. The X axis will display 2.3000.
3. On the Y axis: Press **ENTER** **.** **7** **+/-** (changes the value to negative) **TARGET**. The Y axis will display -0.4000.
4. To reach the target point, move the table until X = 0.0000 and Y = 0.0000.

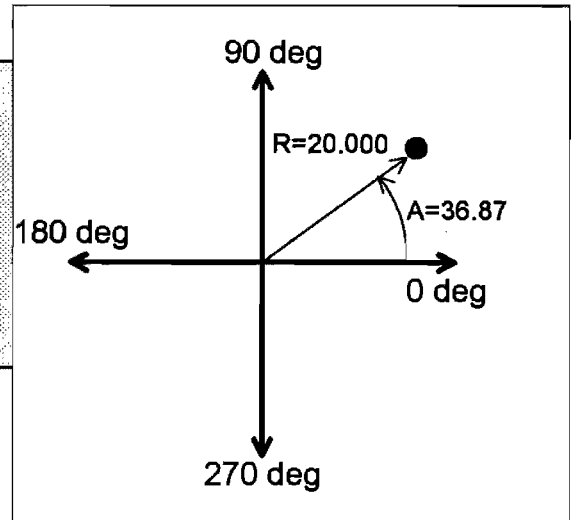
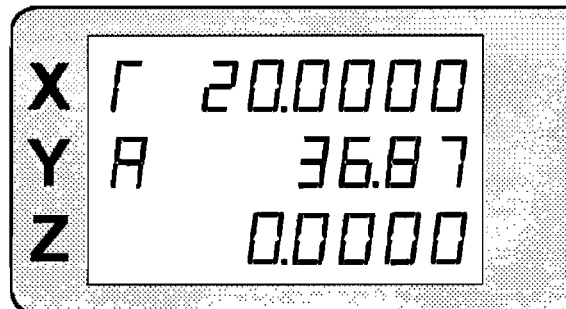
# 9

## Cartesian and Polar Coordinates

### Cartesian Coordinates



### Polar Coordinates



### Switching Between Cartesian and Polar Coordinates

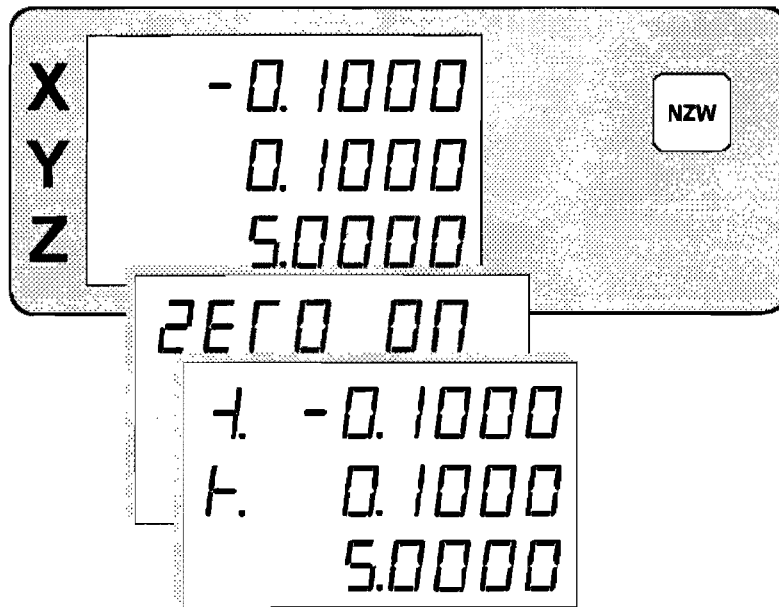
Cartesian coordinates are converted by the Gold Tracer to polar coordinates. Numbers cannot be entered while the Gold Tracer is in polar mode.

- ♦ To switch between Cartesian and polar coordinates press  $\boxed{\frac{xy}{re}}$ .

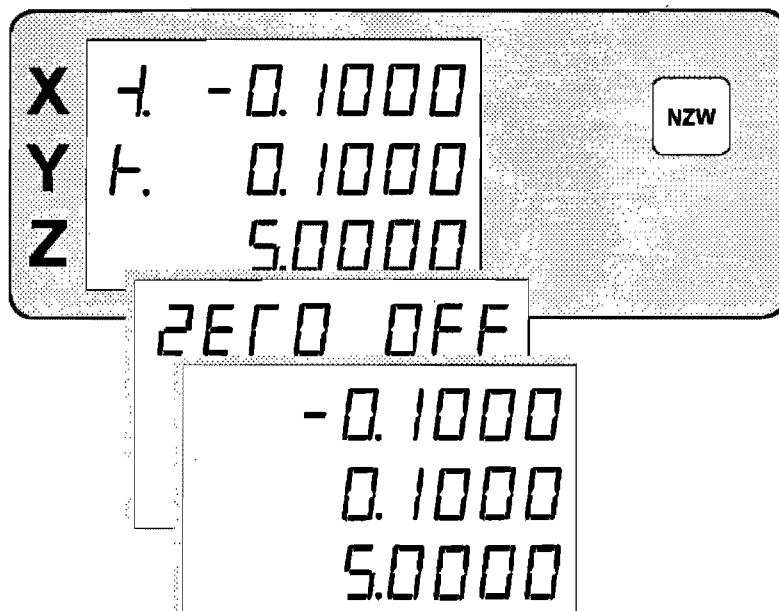


## Enabling and Disabling the Near Zero Warning Indicator

Press **NZW** to switch between near zero warning enabled (ON) and disabled (OFF). The words ZERO ON or ZERO OFF will be momentarily displayed. The Gold Tracer will then return to the mode that was active before **NZW** was pressed.



To enable the near zero warning indicator, press **NZW**. The Gold Tracer will momentarily display ZERO ON and then return to the previous display.



To disable the near zero warning indicator, press **NZW**. The Gold Tracer will momentarily display ZERO OFF and then return to the previous display.

# 11

## Machine Error Compensation (Scale Factors)

---

### Machine Error Compensation Description

A standard vertical milling machine would have no error if its table movements followed perfectly straight lines. This, however, is not the case. There will always be some finite transfer error.

**Definition.** Transfer Error is the difference between displacement at the linear scale and displacement at the cutting tool.

Machine tool error is the difference between the actual length of a standard certified gauge block and the value displayed by a digital readout when the gauge block is measured using standard machine shop practices. This error will also be present in any work piece machined in that axis.

Machine Error Compensation (MEC) multiplies incoming scale signals by a factor such that the displayed value will be correct. This factor is stored in the Gold Tracer's nonvolatile memory and is set at the factory to 1.000000.

**Example.** A 10.0000 inch standard gauge block is measured on a knee mill with a result of 9.9950 inches. MEC will reportion this dimension so that the correct value (10.0000 inches) is displayed. The 0.0050 inch error has been distributed over the 10.0000 inches of travel. Thus the "Machine Error" has been "Compensated" for.

$$MEC\ Factor = \frac{10.0000}{9.9950} = 1.000500$$

MEC should be a one time job. However, an operator may wish to recalibrate for a particular area on the machine table where work is to be performed.

Although MEC can improve machine table performance, it is not intended as a substitute for proper machine maintenance.

---

### Viewing MEC Factors

- ◆ Press and hold the decimal point button to view the MEC scale factors for all axes.

$$MEC\ Factor = \frac{True\_Value}{Measured\_Value}$$



---

## Clearing MEC Factor

1. Press **ENTER** to select the appropriate axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
2. Set the MEC switch (at rear of unit) to CAL, then return it to OFF.
3. Press and hold the decimal point button to verify the MEC scale factor is now 1.000000.

---

## General MEC Calibration Notes

- ◆ The MEC procedure is performed on one axis at a time.
- ◆ For best results the Gold Tracer should be calibrated in the units (inch or mm) in which it will be used.
- ◆ The Gold Tracer should be calibrated on the table area that is most commonly used.
- ◆ Absolute and incremental modes have the same calibration factor for a given axis.

---

## Calibrating MEC

1. Clear the MEC factor as described above.
2. Set the radius/diameter button to radius.
3. Measure the gauge block (with the Gold Tracer) using standard machine shop procedures and practices.
4. After the measured gauge block value is displayed, press **ENTER** for that axis. All but the leading zero will be blanked and the decimal point will flash for the selected axis.
5. Use the numeric keypad to key in the true value (the actual certified gauge block length).
6. Set the MEC switch (at rear of unit) to CAL, then return it to OFF.
7. Measure the gauge block again to ensure the Gold Tracer is now properly calibrated.
8. Repeat the procedure for the remaining axes if required.

# 12

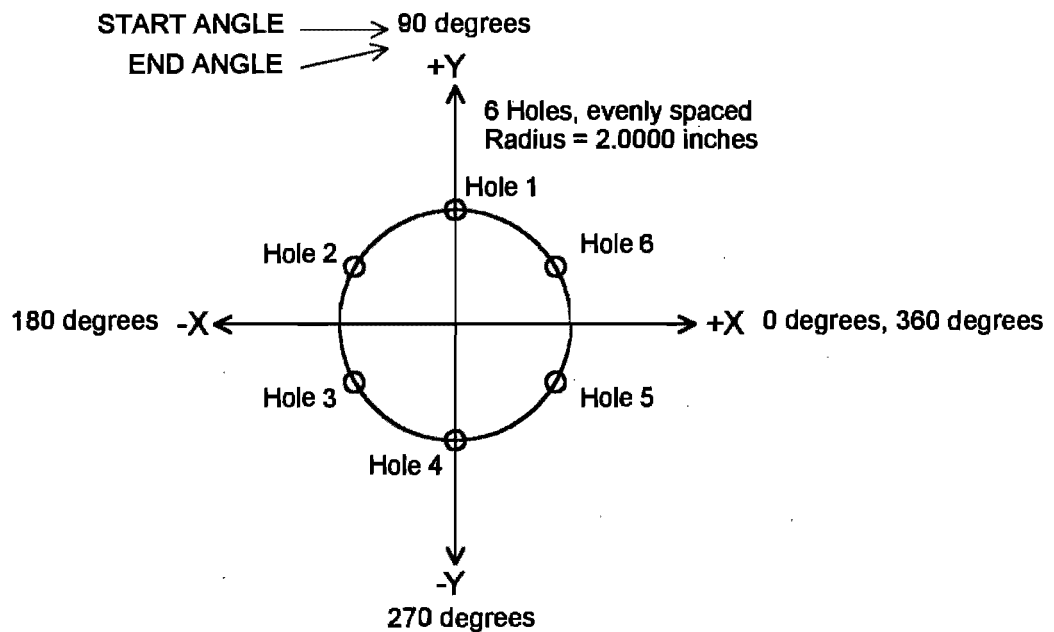
## Bolt Hole Patterns

### Bolt Hole Description

A bolt hole pattern is a series of holes spaced around the circumference of a circle. Once a bolt hole pattern has been programmed into the Gold Tracer's memory it may then be used as many times as required by running the bolt hole program. The program will stay intact even when the Gold Tracer is off.

### Bolt Hole Pattern Around the Entire Circumference of a Circle

When the start angle and the end angle are the same, the Gold Tracer will evenly space the holes around the circumference of the bolt hole pattern.

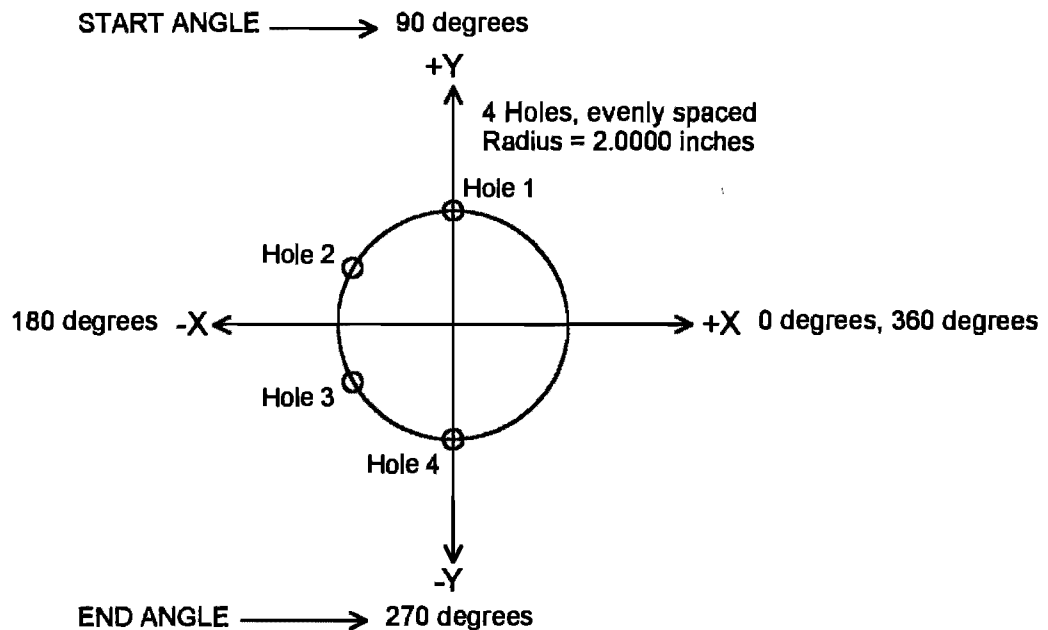


In order to create the bolt hole pattern shown above, the following information must be programmed into the Gold Tracer.

Required Information	Values
RADIUS	2.0000 inches
START ANGLE	90 degrees
END ANGLE	90 degrees
NUMBER OF HOLES	6

**Bolt Hole Pattern Around a Portion of the Circumference of a Circle**

When the start angle and the end angle are not the same, the Gold Tracer will place the first hole at the start angle position and the last hole at the end angle position. The remaining holes will be evenly spaced between the first and last holes.



In order to create the bolt hole pattern shown above, the following information must be programmed into the Gold Tracer.

Required Information	Values
RADIUS	2.0000 inches
START ANGLE	90 degrees
END ANGLE	270 degrees
NUMBER OF HOLES	4

**General Notes For Using the Bolt Hole Feature**

- ◆ Press **BOLT** to enter bolt hole mode.
- ◆ Press **LINE** or **NOR** to exit bolt hole mode.
- ◆ For a further description of the relation of bolt hole mode to the rest of the system, refer to Section 5 of this manual.
- ◆ Press **MODE** to display the current mode and the current step within that mode.

## 12: Bolt Hole Patterns (Continued)

### Programming a Bolt Hole Pattern

Press **BOLT** to enter bolt hole mode.  
Press **RUN/PROG**, if required, to enter program mode. This screen is momentarily displayed.

Enter the desired radius if different from the displayed value.

Enter the desired start angle if different than the displayed value.

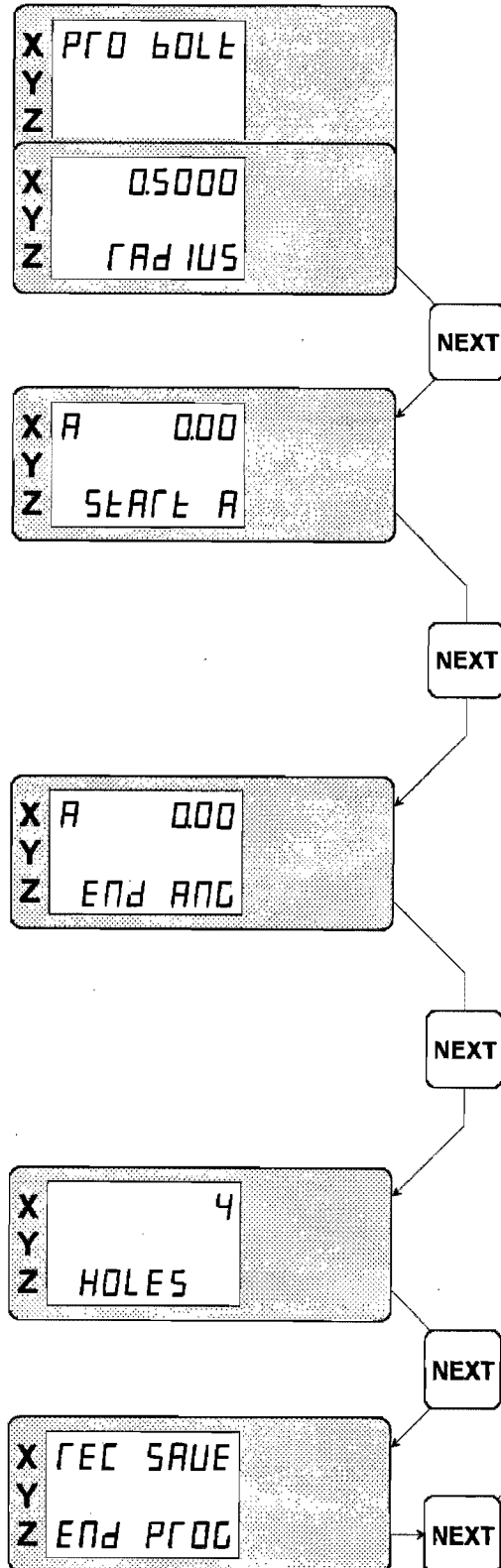
Enter the desired end angle if different than the displayed value.

If the end angle is the same as the start angle, the holes will be equally spaced around the entire circumference of the bolt hole pattern. The first hole will be determined by the start angle.

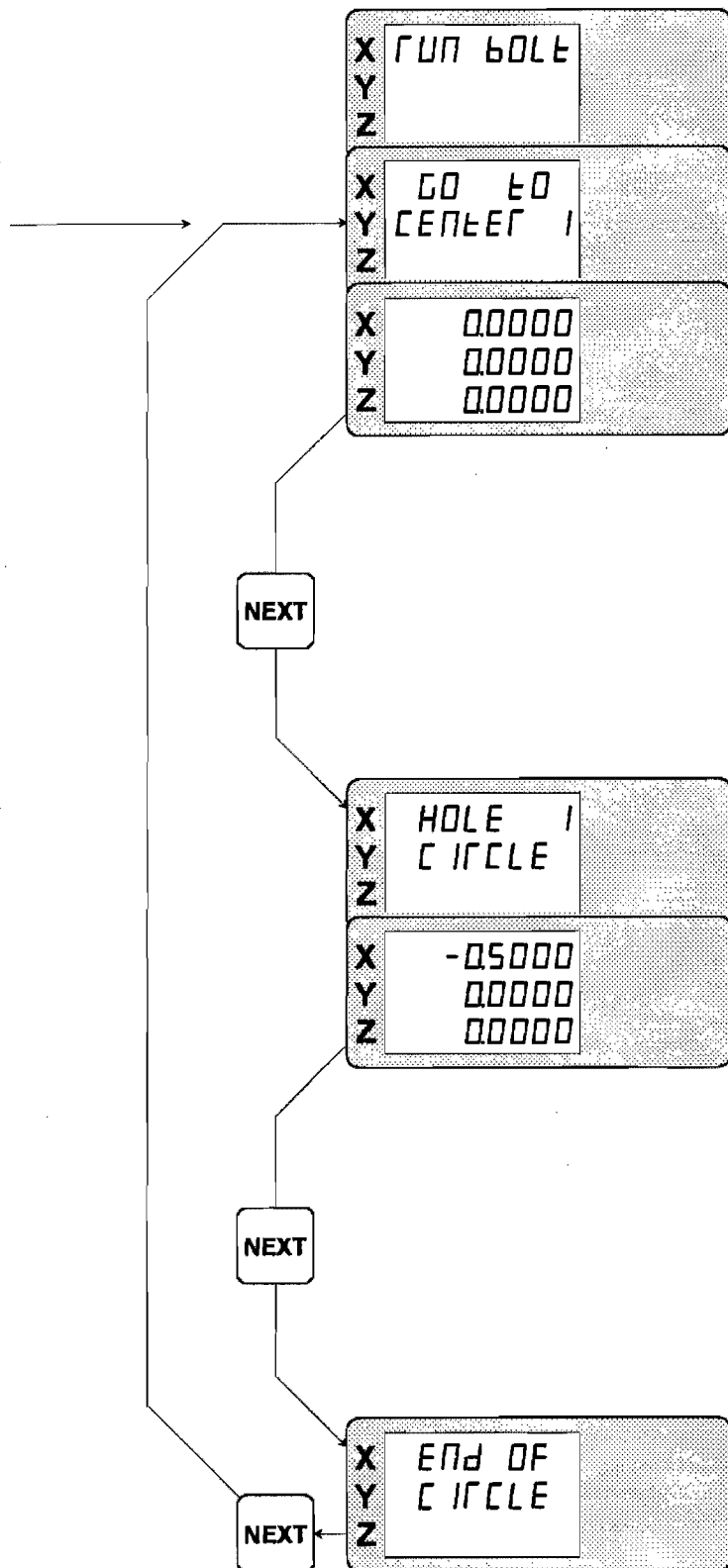
If the end angle is not the same as the start angle, the holes will be equally spaced along a segment of the circumference of the bolt hole pattern. The first hole will be determined by the start angle and the final hole will be determined by the end angle.

Enter the desired number of holes if different than the displayed value.

When this screen is displayed, the program has been stored in the Gold Tracer's memory.



## Running a Bolt Hole Program



Press **BOLT** to enter bolt hole mode.  
Press **RUN/PROG**, if required, to enter run mode.  
This screen is momentarily displayed.

This screen is momentarily displayed.

Move the table to position the cutting tool at the center of the desired bolt hole pattern on the workpiece, then set both X and Y axes to 0.

**OR**

If this is the second time through the same bolt hole pattern around the same center, do not set X and Y axes to 0.

This screen is momentarily displayed followed by the X and Y coordinates required for the next hole.

Move table until Gold Tracer displays 0 on both X and Y axes, then perform cutting operation.

Repeat the sequence of:

1. Press **NEXT**
  2. Move Table
  3. Perform cutting operation
- until the bolt hole pattern is complete.

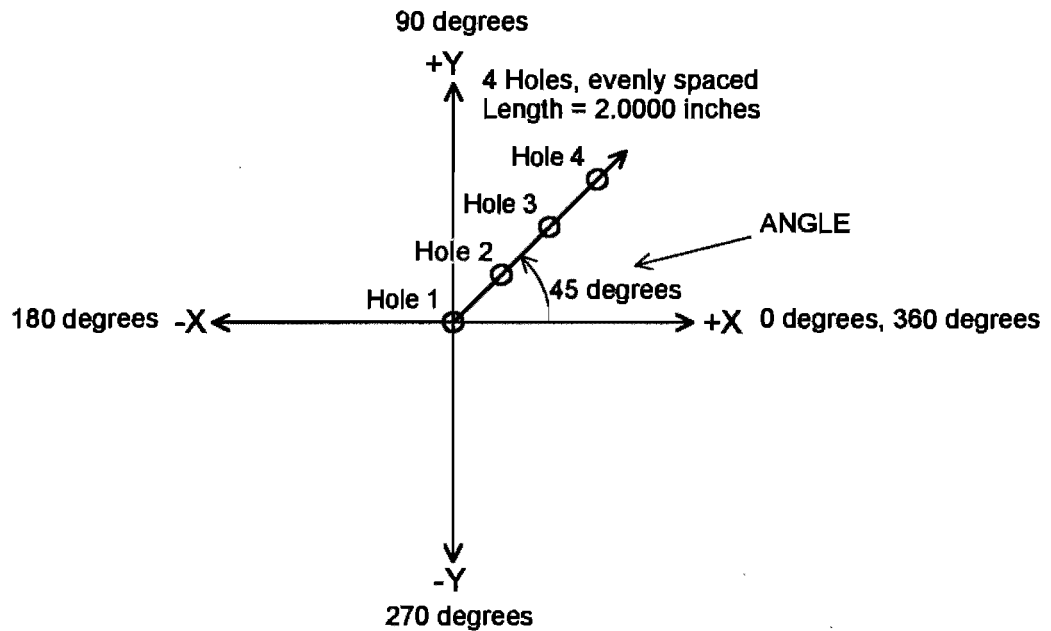
The same bolt hole pattern may be run through as many times as required. For example: tapping, counter boring, etc.

# 13

## Line Hole Patterns

### Line Hole Description

A line hole pattern is a series of holes spaced along a line segment. Once a line hole pattern has been programmed into the Gold Tracer's memory it may then be used as many times as required by running the line hole program. The program will stay intact even when the Gold Tracer is off.



In order to create the line hole pattern shown above, the following information must be programmed into the Gold Tracer.

Required Information	Values
LENGTH	2.0000 inches
ANGLE	45 degrees
NUMBER OF HOLES	4

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**General Notes  
For Using the  
Line Hole  
Feature**

- ◆ Press **LINE** to enter line hole mode.
- ◆ Press **BOLT** or **NOR** to exit line hole mode.
- ◆ For a further description of the relation of line hole mode to the rest of the system, refer to Section 5 of this manual.
- ◆ Press **MODE** to display the current mode and the current step within that mode.

# 13: Line Hole Patterns (Continued)

## Programming a Line Hole Pattern

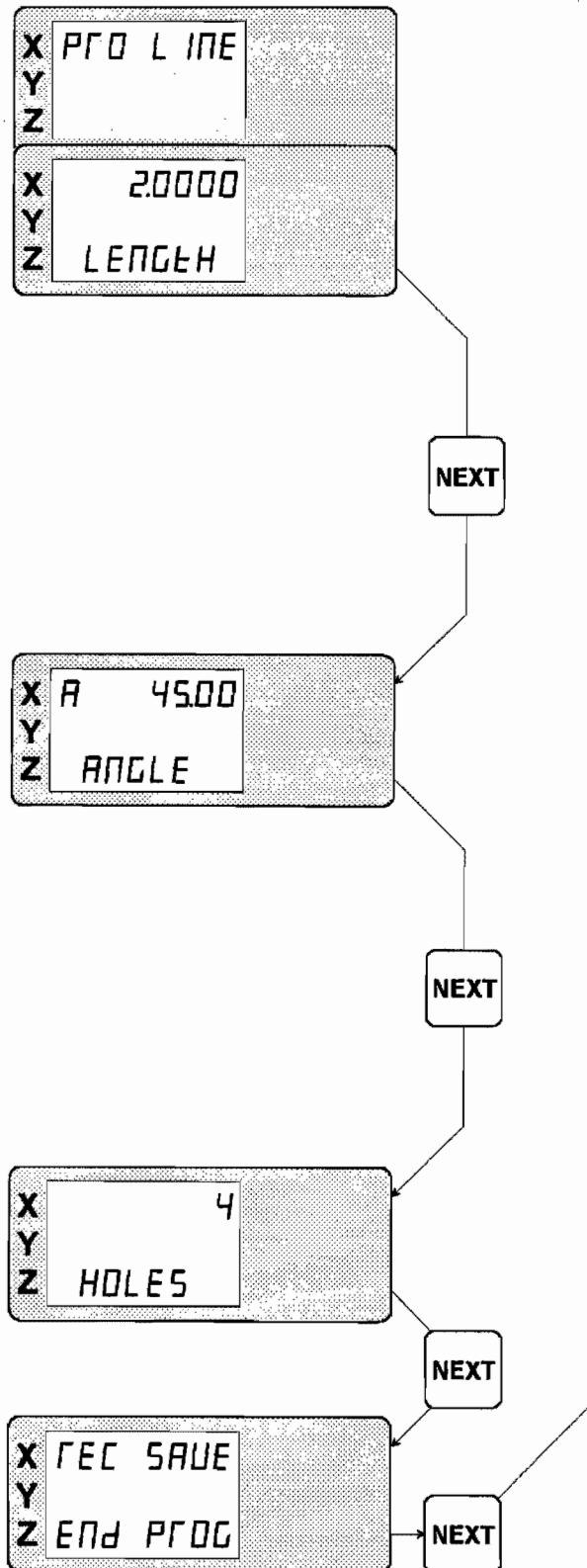
Press **LINE** to enter line hole mode.  
Press **RUN/PROG**, if required, to enter program mode. This screen is momentarily displayed.

Enter the desired line segment length, from first hole to final hole, if different from the displayed value.

Enter the desired angle of the line segment if different than the displayed value.

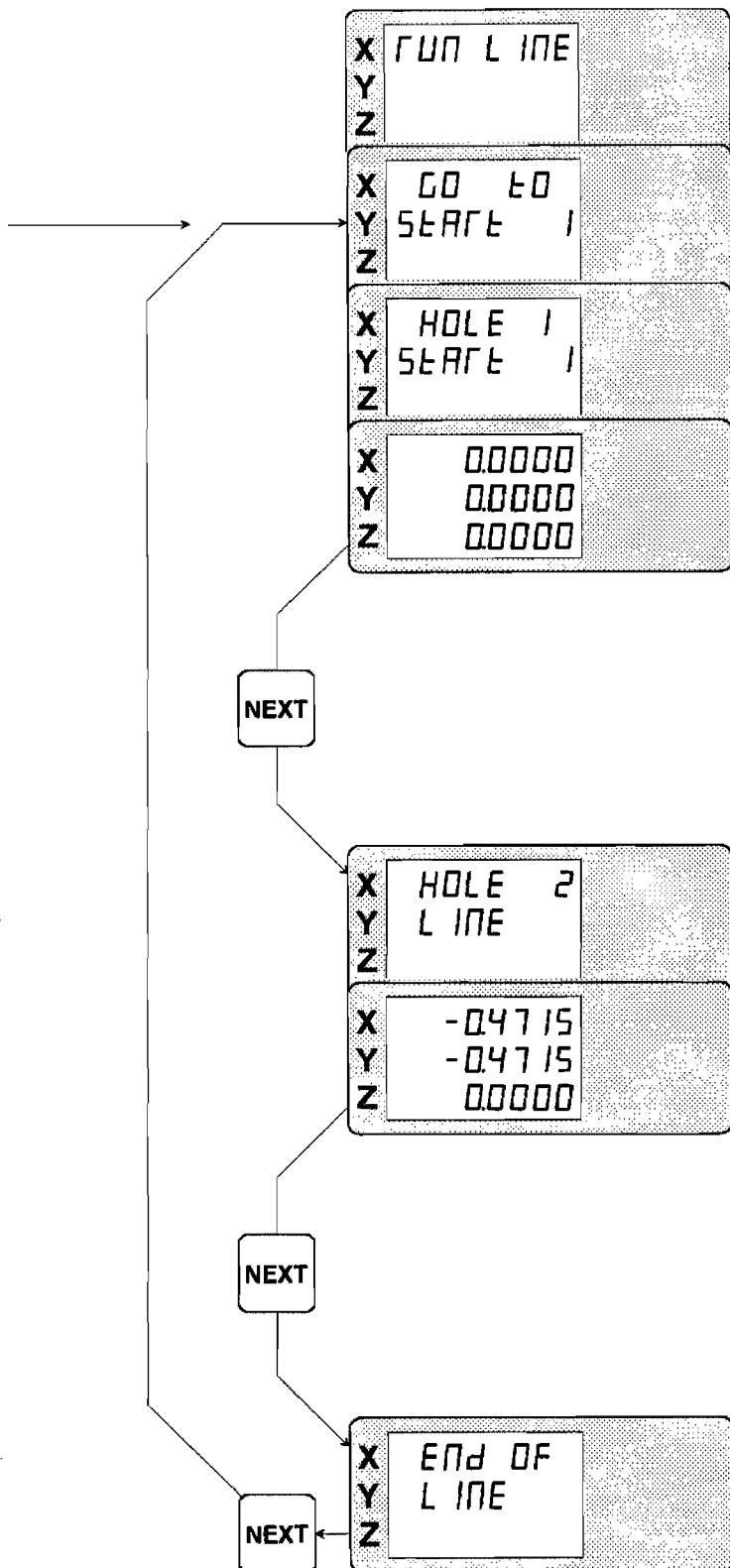
Enter the desired number of holes if different than the displayed value.

When this screen is displayed, the program has been stored in the Gold Tracer's memory.





## Running a Line Hole Program



Press **LINE** to enter line hole mode.  
Press **RUN/PROG**, if required, to enter run mode. This screen is momentarily displayed.

These screens are momentarily displayed.

Move the table to position the cutting tool at the first hole of the line hole pattern on the workpiece, then set both X and Y axes to 0. Perform cutting operation for first hole.

**OR**

If this is the second time through the same line hole pattern with the holes in the same position, do not set X and Y axes to 0. Move table until Gold Tracer displays 0 on both X and Y axes, then perform cutting operation.

This screen is momentarily displayed followed by X and Y coordinates required for the next hole.

Move table until Gold Tracer displays 0 on both X and Y axes, then perform cutting operation.

Repeat the sequence of:

1. Press **NEXT**
2. Move Table
3. Perform cutting operation

until the line hole pattern is complete.

The same line hole pattern may be run through as many times as required. For example: tapping, counter boring, etc.

