

ANILAM

Wizard Digital Readouts Operation Manual

For Models:

150 PLUS

350 PLUS

LATHE

800

FEATURE, OPERATION AND TECHNOLOGY

WIZARD Digital Readouts provide the absolute latest in ease of operation, capability and technology. As a result, ANILAM, Inc. may alter and enhance operation, features and capabilities without notice.

TABLE OF CONTENTS

Introduction To The WIZARD	1
First Time User Checklist	3
Layout of Manual	5
Function Code Listing	6
List of Icons	7
Beeper	8
Keyboard Entry Error	9
Presetting a Dimension	10
Resetting an Axis to Zero	11
Recall an Entered Dimension	12
Clear an Entered Dimension	13
Inch/Metric Conversion	14
The +/- (Plus/Minus) Key	15
Centering	16
Absolute/Incremental	17
Absolute/Incremental Key	18
Absolute Zero Set	19
Zero Marker Pulse	20
Set Correction Factor	21
Correction Factor Off/On	22
Radius/Diameter	23
Approaching Zero Indicator	24
Position Tolerance Indicator	25
Approaching Zero Audio On/Off	26
Approaching Zero Axis Select	27
Edge Sensor Probe	28
Last Position Save/Recall	29
Part Edge Save/Recall	30
Variable Resolution	31
Axis Reset Only	32
Mirror Image	33
Axis Coupling	34
Resolution Setting For Inch Reading Scales	35
Resolution, Count Direction, Zero Out, Power On	36
Beeper Off/On	37
Display Dim Off/On	38
Axis Designation	39
Zero Output Time Select	40
Feed Rate On/Off	41
RS-232 Setup	42
RS-232 On/Off	43
Mill/Lathe Setup	44
Electronic Notepad	45
Recall Electronic Notepad	48
Clearing Notepad	49
Advanced Function Key	50
Help	51

TABLE OF CONTENTS (continued)

Bolt Hole Pattern	52
Bolt Hole Recall (WIZARD 350 Plus)	54
Taper Calculator	55
Advanced Bolt Hole Pattern	56
Advanced Bolt Hole Recall	59
Axis Add	60
Axis Subtract	61
Notepad Insert	62
Notepad Delete	63
Linear Hole Pattern	64
Linear Hole Pattern Recall	67
Skew	68
Datum Set	71
Datum Recall	72
Datum Clear	73
Tool Offset Set (Mill)	74
Tool Offset Set (Lathe)	75
Tool Offset Modify (Lathe)	76
Tool Offset Recall	77
Tool Offset Clear	78
Scale Error Detect Off/On	79
Remote In/Out Test	80
Wizard Diagnostics	81
Troubleshooting	82
Part Replacement	84
Warranty	87
Appendix A Bolt Hole Pattern	A1
Appendix B Correction Factor	B1
Appendix C Linear Hole Pattern	C1
Appendix D Skew	D1
Appendix E Taper Calculations	E1
Appendix F Datum Explanation	F1
Appendix G Tool Offset Mill	G1
Appendix H Tool Offset Lathe	H1
Appendix I Input/Output Connections	I1
Appendix J Advanced Notepad Example	J1
Appendix K Remote Operation	K1
Appendix L Sending DRO Data to Printers and Data Collection Devices	L1

Index

NOTE: A complete index arranged alphabetically is available at the end of the manual.

INTRODUCTION TO THE WIZARD



Thank you for purchasing the Anilam Wizard Series Digital Readout System.

Please review these pages carefully to insure proper operation of the system.

The new WIZARD Series Digital Readout System includes many new capabilities never before used in conventional DRO Systems.

As a result, Anilam has provided this manual with the operator in mind. Please take the time to review this manual in detail.

POWER COMPENSATION



POWER COMPENSATION- The newest capability in power supply systems protects the WIZARD console from the hazards of AC power fluctuations, increasing the reliability of your new system. **POWER COMPENSATION** automatically compensates for power variations from 90 - 260 VAC without the added expense of additional power conditioning devices.

INTERLINKING KEYBOARD SYSTEM

INTERLINKING KEYBOARD SYSTEM reflects state-of-the-art designs for upgrading a DRO system.

As the requirements of manual machining become more demanding, new and more powerful capabilities may be added to your existing console by replacing the **INTERLINKING** keyboard, at a cost much lower than a new console.

INTERLINKING keyboards for two axis models are shown below:

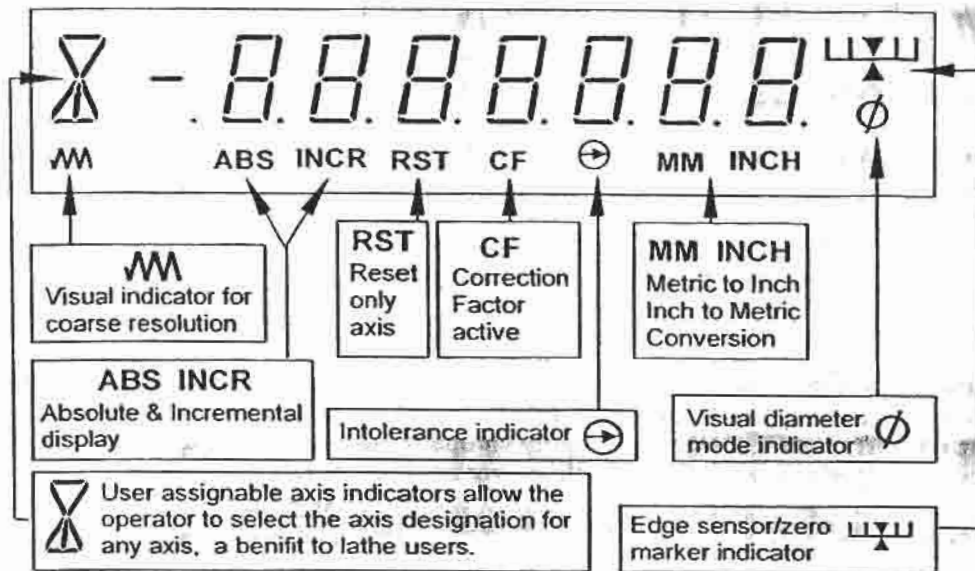
WIZARD 150 PLUS MODULE	P/N 30500059
WIZARD 350 PLUS MODULE	P/N 30500036
WIZARD 800 MODULE	P/N 30500038
WIZARD LATHE MODULE	P/N 30500040

For other one- or three- axis models, please contact your local Authorized Anilam DRO Distributor or contact Anilam at:

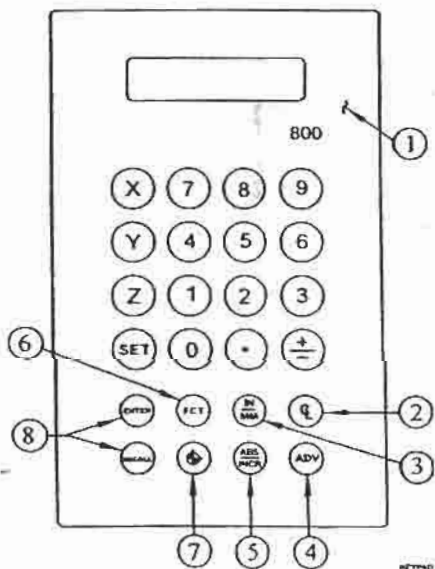
ANILAM Inc.
3300 Corporate Way
Miramar, FL 33025
Phone: (954) 430-6600
Fax: (954) 450-6700

INTRODUCTION (continued)

Anilam's new Vacuum Fluorescent Display is easier to read.



The Anilam Wizard Keyboard Design



- ① Numeric Keypad
- ② Centering Key
- ③ Inch/MM Key
- ④ Advanced Functions Key
- ⑤ Absolute/Incremental Key
- ⑥ Function Key
- ⑦ Datum Key
- ⑧ Enter/Recall Positions

FIRST TIME USER CHECKLIST

STOP

MODELS	150 PLUS	350 PLUS	800	LATHE
--------	----------	----------	-----	-------

Your new WIZARD console has many settings preset at the factory. Before proceeding, please review the following checklist to verify these default settings.

DESCRIPTION OF SETTING	FACTORY DEFAULT	YOUR SETTING
1. MILL/LATHE OPERATION (Refer to page 44)	MILL	
2. SCALE RESOLUTION: (Refer to page 36)		
X AXIS	.0002"/.005 mm	
Y AXIS	.0002"/.005 mm	
Z AXIS	.0002"/.005 mm	
3. DIRECTION OF COUNT: (Refer to page 36)		
X AXIS	+	
Y AXIS	+	
Z AXIS	+	
4. POSITION TOLERANCE INDICATOR (Refer to page 25)		
X AXIS	SET TO ZERO	
Y AXIS	SET TO ZERO	
Z AXIS	SET TO ZERO	
5. AUDIBLE KEYBOARD TONE: (Refer to page 37)	ON	
6. DISPLAY RESOLUTION: (Refer to page 31)		
X AXIS	.0002"/.005 mm	
Y AXIS	.0002"/.005 mm	
Z AXIS	.0002"/.005 mm	
7. DISPLAY DIMMING: (Refer to page 38)	15 MINUTES	

CONTINUED ON NEXT PAGE.....

FIRST TIME USER CHECKLIST (continued)

7. RADIUS DIAMETER			
MODE:	X AXIS	RADIUS	
(Refer to page 23)	Y AXIS	RADIUS	
	Z AXIS	RADIUS	
8. WIZARD LATHE (ONLY):			
	X AXIS	DIAMETER	
	Y AXIS	RADIUS	
	Z AXIS	RADIUS	

For operator safety and to prevent machine damage, verify the following.

9. CONSOLE ARM AND CONSOLE ARE SECURELY MOUNTED TO THE MACHINE	SECURED	YES/NO
10. CONSOLE IS PROPERLY GROUNDED	GROUNDED	YES/NO
11. ALL SCALE CABLES ARE OFF THE FLOOR AND AWAY FROM POINTS THAT COULD CUT OR DAMAGE THE CABLES	CABLES CLEAR	YES/NO

<p><i>(This area is intentionally left blank for handwritten notes or signatures.)</i></p>	<p><i>(This area is intentionally left blank for handwritten notes or signatures.)</i></p>
--	--

LAYOUT OF MANUAL

This manual contains limited text and enlarged graphics for easy use.

Actual keystrokes are displayed in graphics.

This manual covers all Wizard models. ICONS have been used to indicate the availability of a feature in a particular model. Please refer to the LIST OF ICONS on page 7.

FEATURE HEADING	ICON
DESCRIPTION OF THE FEATURE	
EXAMPLE WITH KEYSTRIKES	
EXPLANATION OF PROCEDURES AND OBSERVATIONS	
NOTE: INDICATE IMPORTANT CAUTION	

FUNCTION CODE LISTING

CODE	DESCRIPTION	PAGE
F00	TOOL OFFSET MODIFY (LATHE)	75
F01	ABSOLUTE ZERO X,Y,Z SET	19
F02	ZERO MARKER PULSE	20
F03	CF ENTER BY AXIS	21
F04	CF AXIS ON/OFF	22
F05	RADIUS/DIAMETER PER AXIS	23
F06	POSITION TOLERANCE INDICATOR	25
F07	APPROACHING ZERO AUDIO ON/OFF	26
F08	APPROACHING ZERO AXIS SELECT	27
F09	EDGE SENSOR PROBE	28
F10	LAST POSITION STORE	29
F11	LAST POSITION RECALL	29
F12	PART EDGE SAVE	30
F13	PART EDGE RECALL	30
F15	VARIABLE RESOLUTION	31
F16	AXIS RESET ONLY MODE	32
F17	MIRROR IMAGE (X OR Y)	33
F18	AXIS COUPLING	34
F19	RESOLUTION SETTING FOR INCH READING SCALES	35
F20	RESOLUTION/COUNT DIRECTION/ZERO OUT ENABLE	36
F21	BEEPER OFF/ON	37
F22	DIM MODE ACTIVE (ON)	38
F23	DIM MODE INACTIVE (OFF)	38
F24	AXIS DESIGNATION	39
F25	ZERO OUTPUT TIME SELECT	40
F26	FEEDRATE OFF/ON	41
F27	RS 232 SETUP	42
F28	RS 232 ON/OFF	43
F29	MILL/LATHE SETUP	44
F30	CLEARING NOTEPAD	49
F31	DATUM CLEAR (MULTIPLE ABSOLUTE ZERO)	73
F32	TOOL OFFSET CLEAR (Z AXIS)	78
F40	SCALE ERROR DETECT (OFF)	79
F41	SCALE ERROR DETECT (ON)	79
F42	REMOTE IN/OUT TEST	80
F45	WIZARD DIAGNOSTICS MANUAL TEST	81

LIST OF ICONS



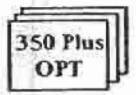
This icon in the corner page indicates that the feature described on the page is available on all consoles starting from WIZARD 150 Plus through WIZARD 800 and WIZARD Lathe.



This icon indicates that the feature described is only available on WIZARD 150 Plus Option consoles and Option consoles above.



This icon indicates that the feature described is only available on WIZARD 350 Plus consoles, WIZARD 800 and WIZARD Lathe.



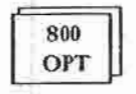
This icon indicates that the feature described is only available on WIZARD 350 Plus Option consoles, WIZARD 800 Option and WIZARD Lathe Option.



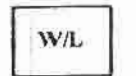
This icon indicates that the feature described is only available on WIZARD 800 and WIZARD Lathe consoles.



This icon indicates that the feature described is only available on WIZARD 800 consoles.

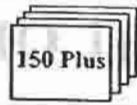


This icon indicates that the feature described is only available on WIZARD 800 Option and WIZARD Lathe Option consoles.



This icon indicates that the feature described is available on WIZARD Lathe consoles only.

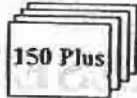
BEEPER



All Consoles come standard with a beeper. Use the beeper to:

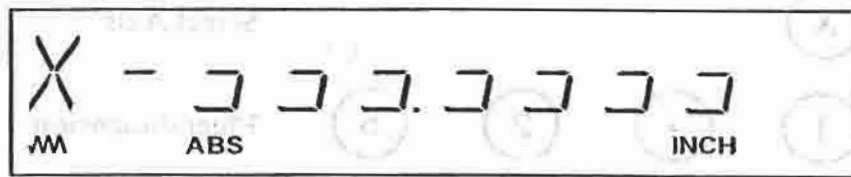
1. Acknowledge the press of a key. For correct key strokes, a short tone sounds. For incorrect key strokes, a long tone sounds. The beeper default, preset at the factory, is ON. To turn the beeper OFF, use the function F21 (BEEPER OFF/ON).
2. Indicate approach to zero. See function F07 (APPROACHING ZERO AUDIO ON/OFF). The beeper must be turned ON to use this feature.

KEYBOARD ENTRY ERROR



In the event the operator enters too many numbers on an axis, the console will flash backward C's on that axis display. A long tone will be sounded if the beeper is turned ON. To allow number entry again, press the SET key or the axis key.

When an incorrect function number is pressed, the message window displays FUNCERR, if the window is available, and a long tone sounds.



Display if too many numbers were entered



Display in message window if available

PRESETTING A DIMENSION

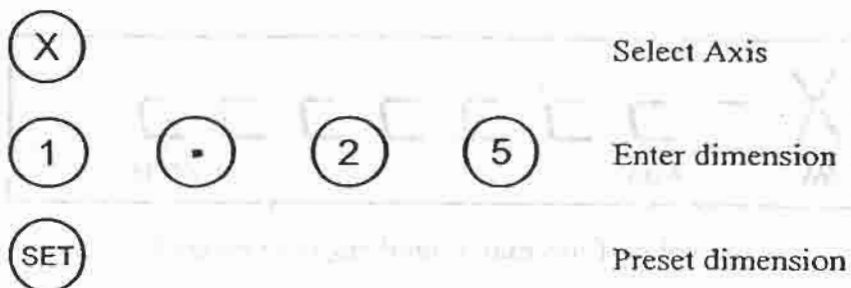


Presetting allows a dimension to be entered into any axis display.

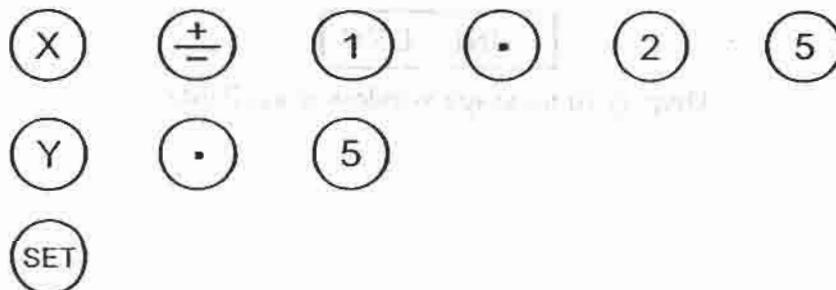
Once the dimension has been preset, move the machine until the axis display shows zero.

Presetting can also be used as a one line recall mode if set in the incremental display.

EXAMPLE 1: Preset the dimension 1.2500 on the X axis display.

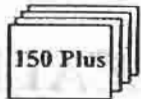


EXAMPLE 2: Preset the dimensions -1.2500 on X axis and .5000 on Y axis displays.



NOTE: As a safety feature, the preset axis will not display movement until the SET key is pressed. If the SET key is pressed after the machine is moved, the console will automatically update to the new position.

RESETTING AN AXIS TO ZERO



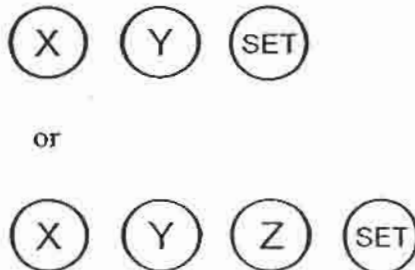
Resetting an axis is setting the display to zero.

Resetting an axis is used when establishing part zero (datum) or clearing the axis at each part location (making incremental moves).

Resetting a single axis (may be X,Y or Z).



Resetting multiple axes at one time.



RECALL AN ENTERED DIMENSION


150 Plus

Allows recalling an entered dimension to the axis display.

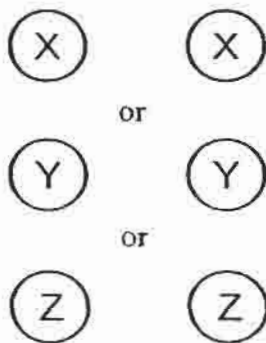
Use this feature when making multiple moves of the same dimension.

NOTE: This feature works only in the INCR mode.

First, set the display to incremental (INCR.)

This is done by pressing 

Press any axis key two times to recall a dimension that has been previously entered into that axis display.

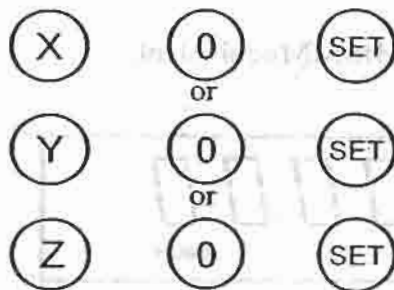


CLEAR AN ENTERED DIMENSION

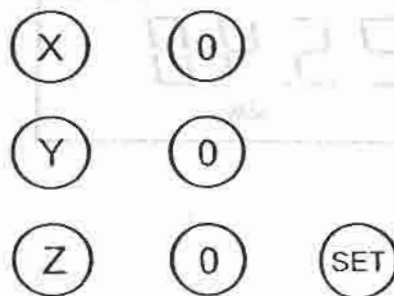


Clearing a dimension will zero the previously entered dimension in an axis. To clear entered dimensions, a dimension of zero must be entered into each axis display.

Press the following keys to clear entered dimensions, one axis at a time.



Press the following keys to clear entered dimensions, all axes at one time.

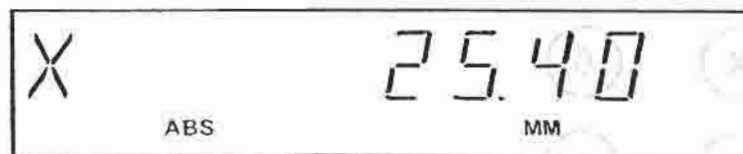
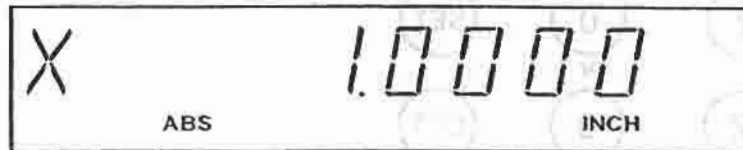


INCH/METRIC CONVERSION



Allows the conversion of inch values to metric or metric to inch on all axes.

Example: Change 1.0000 INCH to MM equivalent.



NOTE: INCH or MM symbol is only illuminated in the X axis display.

THE +/- KEY

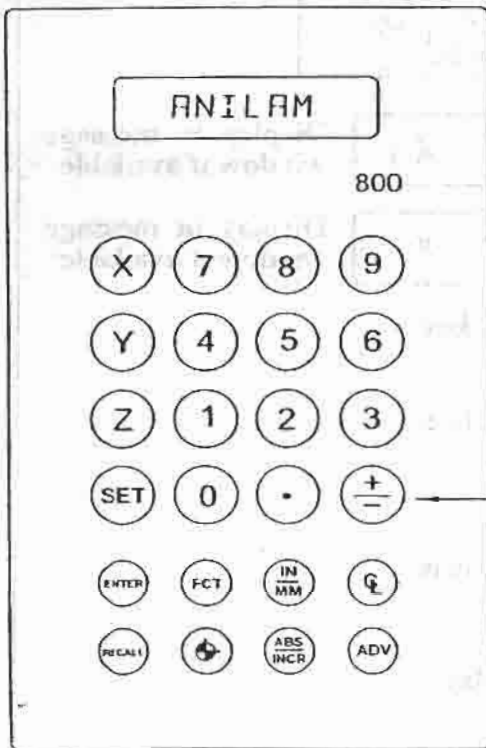


The main function of the plus/minus key (+/-) is to change the sign of a preset value.

The (+/-) key is used to print the axis display to a printer if the I/O option is available. Printing is possible only if the console is not in axis preset mode.

The (+/-) key is used to scroll through the function code list in the HELP mode.

The (+/-) key is also used to move from one field to the other in the SYSTEM SETUP mode (F20).



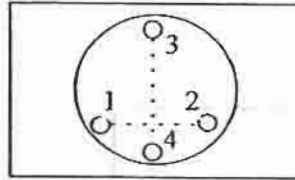
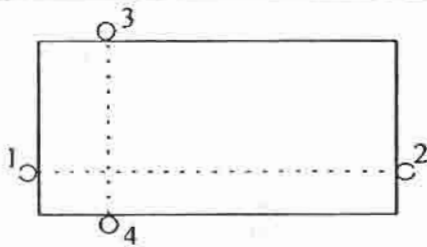
Plus/Minus Key is Located Here

CENTERING



Allows user to position the center of the spindle on the center line of a part, or feature of a part.

Example: Position the spindle at the center of the part.



Activate centering function.

EDGE

X1

Display in message window if available



Move tool to position #1, press ENTER key

EDGE

X2

Display in message window if available



Move tool to position #2, press ENTER key
Follow similar procedure for the Y axis



To find the center of Y axis instead of X, press Y key after activating centering

Move the X and Y axes until the display reads zero.



Press SET to exit (Set also exits after an axis is completed without doing the second axis)



0

1

Sets both ABS & INCR displays

NOTE: During this operation, INCR indicator blinks on the X or Y axis display.

ABSOLUTE/INCREMENTAL



To fully utilize the WIZARD, the user must understand the two types of dimensions most commonly used by draftsmen in blueprints, called Absolute (ABS) and Incremental (INCR).

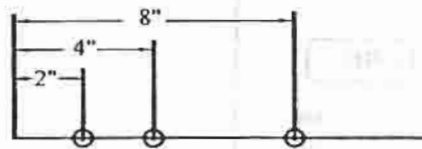
ABSOLUTE:

The term absolute applies when measurements are given from a common reference point (see illustration A below). In the illustration, the common reference or 'zero' reference point is located on the lower left-hand side of the part. These absolute dimensions are frequently seen in many blueprints.

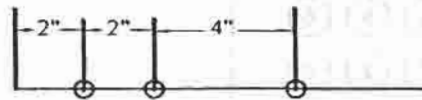
INCREMENTAL:

Incremental dimensioning occurs when the measurements on a part have no common reference point to find the next location. Illustration B shows the same diagram dimensioned incrementally. Each location is dimensioned in steps, or increments.

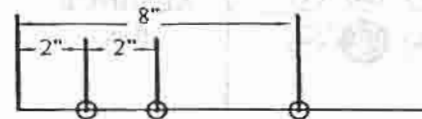
Sometimes, both absolute and incremental measurements are used on a single blueprint. In illustration C, the first two holes are dimensioned incrementally and the third hole is dimensioned from the absolute zero point or dimensioned in absolute mode.



A. ABSOLUTE DIMENSIONING

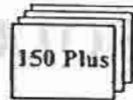


B. INCREMENTAL DIMENSIONING



C. COMBINATION INCR-ABS DIMENSIONING

ABSOLUTE/INCREMENTAL KEY

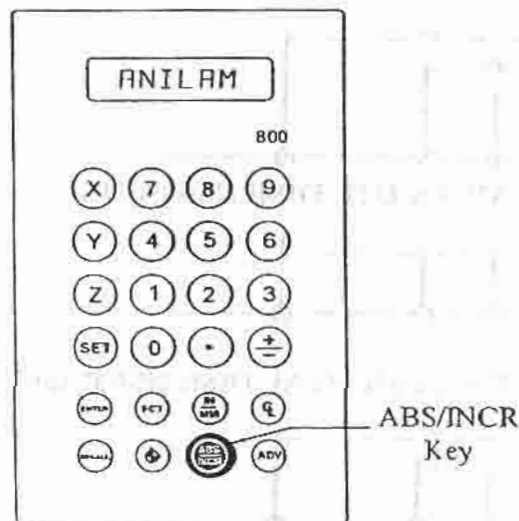


The ABS/INCR key, located on the bottom row of the keypad, toggles the WIZARD between Absolute and Incremental Modes.

When the INCR indicator is on, the readout measures in increments and internally tracks the corresponding absolute (ABS) dimensions. This is a safeguard to counting the total distance being moved on any axis. (INCR is indicated under the number display on the X axis). Press the ABS/INCR key to switch the display to read ABS, and the absolute dimension from the starting point is displayed on the axis display.

For example: If a series of six 2.00"/50.80 mm incremental moves are made, change to ABS mode to display the total distance moved, which is 12.0000"/304.80 mm.

To clear the readout and establish a new absolute zero, press INCR, all AXIS keys, SET, ABS, all AXIS keys again and SET. A simplified way to clear both ABS and INCR is to press F01.



P18_1

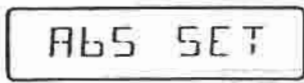
ABSOLUTE ZERO SET



This function establishes a part zero.
All counters, both absolute and incremental, and displays are cleared to zero. This is similar to power turn ON mode.



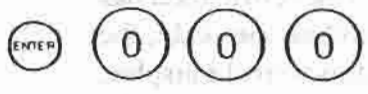
Selects function



Display in message window if available



These key strikes will also establish an absolute zero



NOTE: Refer to Appendix F on Datums for more information.

ZERO MARKER PULSE



Zero Marker Pulse is used to set a machine reference location, commonly referred to as machine home. The reference marks are located every 50 mm, starting in the center of the transducer or scale.

NOTE: European and Asian scales have only one marker, located at the center of the scale.

This marker is in a fixed location. The operator can return to this marker and reset a machine zero if power is lost.

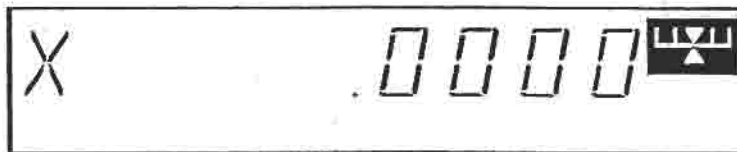
NOTE: Prior to activating this feature, move the machine to a reference location.



Selects function



Display in message window if available



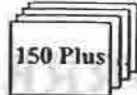
The visual indicator shown above will only be active when the zero marker has been activated by F02. Once the marker has been found on the scale, the indicator light will go OFF on the axis that has been crossed and zero the display, indicating the home position is established. Another axis marker can now be found.



Deactivates Marker

NOTE: KM, PGS-E & PGS-P Transducers do not have zero reference marks.

SET CORRECTION FACTOR



Allows operator to compensate for nominal linear inaccuracies of the machine or for adding material Shrinkage/Expansion as in mold work.

Maximum allowable settings: +/- 40%.

NOTE: See APPENDIX B for more details on Correction Factor.

Example: Consider a 1.325" travel on the display which is only 1.320" actual distance moved on the X axis.

X 1 . 3 2 5 Enter displayed value.

X 1 . 3 2 0 Enter actual distance.

FCI 0 3 Activate CF function.

Similar example for X & Y axis.

X 1 . 3 2 5

X 1 . 3 2 0

Y 2 . 1 0 5

Y 2 . 0 9 0

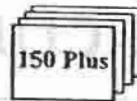
FCI 0 3

CF SET

Display in message window, if available.

The CF indicator in the selected axis displays will turn ON.

CORRECTION FACTOR OFF/ON



This function allows the operator to selectively turn the CF ON or OFF and store the values in memory.

NOTE: Turn CF OFF on X axis.

(FCT) (0) (4)

Select function.

(X) (SET)

Select X axis Activate OFF function.

CF ACTV

Display in message window, if available.

(FCT) (0) (4)

Same procedure, to turn CF OFF on two axes.

(X) (Y) (SET)

To turn CF ON,

(FCT) (0) (4)

Turn CF ON

(SET)

Activate function.

The CF indicator in the activated axis display will turn ON.

X F 04



RADIUS/DIAMETER

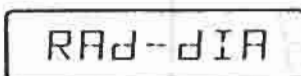
150 Plus

This function enables a desired axis to display in diameter. In diameter mode, the movement and resolution in that axis are doubled.

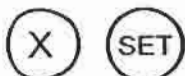
Example 1: Set X axis as diameter.



Select function.



Display in message window, if available.



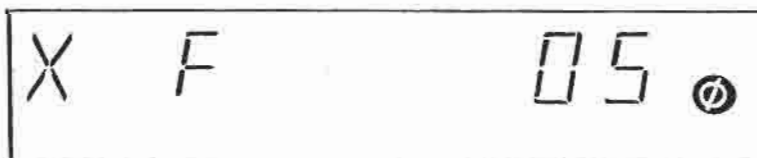
Select X axis.
Activates function.

Example 2: Set X and Y axes as diameter.



Activate function.

The radius diameter symbol will be ON in the activated axis display.



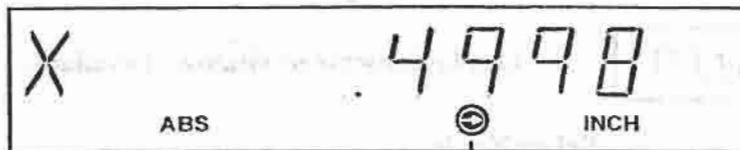
To turn Diameter OFF, repeat F05 and press the axis key. The symbol will turn OFF returning the axis to normal reading.

APPROACHING ZERO INDICATOR



This feature indicates to the operator that the machine is inside a set range and approaching zero.

The set range for WIZARD 150 Plus is .5000"/12.70 mm. The range can be preset on WIZARD 350 Plus, 800 and Lathe. See page 25 for setting range.



Approaching zero indicator
Also used as:
Position tolerance indicator
on W350 Plus, W800 & W/L
models

POSITION TOLERANCE INDICATOR

350 Plus

Indicates when an axis approaches zero, within a predetermined range.

Example 1: Set the range of 0.015 on the X axis.

X . 0 1 5

FCT 0 6

Activates function.

Example 2: Set a range of 0.015 on X and Y axis.

X . 0 1 5

Y . 0 1 5

FCT 0 6

SAVE APZ

Display in message window, if available.

X .0074
ABS ⊖ INCH

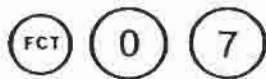
When the axis is within the preset range, the symbol lights.

NOTE: When axis reaches zero, the Position Tolerance Indicator turns off.

APPROACHING ZERO AUDIO ON/OFF

150 Plus

This feature gives an audible indication of when the selected axis is moving within the preset range.



Select function.



Selects OFF/ON.



Activate function.

BEEP ON

Display in message window, if available.

BEEP OFF

NOTE: The beeper should be turned on for this feature. (See BEEPER OFF/ON F21, Page 37.)

APPROACHING ZERO AXIS SELECT

(FOR OUTPUT ONLY)



A signal to a remote device can be given when a selected axis moves within the indicator range. (+/- .5000" on WIZARD 150 Plus. Preset on 350 Plus, 800 and Lathe.)

Example: Set X axis for this feature.

FCT **0** **8** Select function.

X **SET** Activate function.

APZ OUT Display in message window, if available.

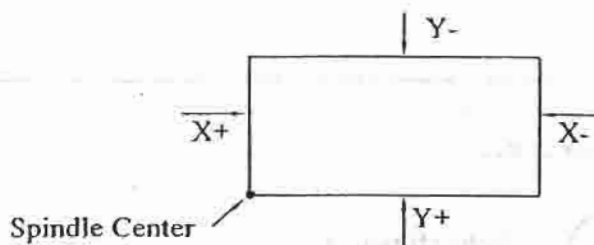
NOTE: To activate and operate this feature, the console should have the I/O option. If the console is not equipped with the I/O option, **APZ ERR** will be displayed in the message window, if available.

Only one axis can be output at a time.

EDGE SENSOR PROBE

150 Plus
OPT

Allows user to position the center of the spindle on the part edge. See figure below.

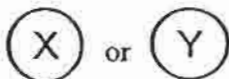


Enter Probe Diameter in X axis. The direction of movement of the probe to touch the part is as shown by arrows in the figure above.

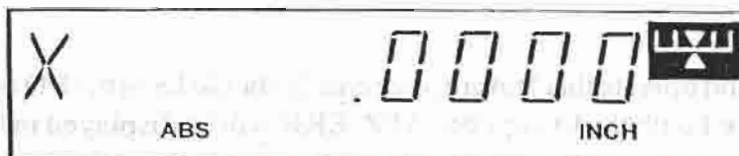
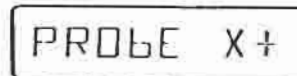
For example: moving the probe on the X axis from left to right is positive (+).
Moving the probe on the Y axis from top to bottom is negative (-).



Activates function.



Press axis key required.



When probe touches part, indicator will turn OFF. Move machine until display reads .0000.
Repeat the procedure for Y axis.

LAST POSITION SAVE/RECALL

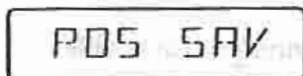
150 Plus

This feature saves the last position of the machine, before turning the console OFF.

IMPORTANT NOTE: Lock all axes of machine movement first.



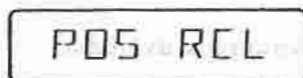
Select function and saves present position.



Display in message window, if available.



Select function and recall the last position of the machine to the display.



Display in message window, if available.

Unlock machine and continue with the job.....

NOTE: This stores display information only and will not track table movement when power has been turned OFF.

PART EDGE SAVE/RECALL

150 Plus

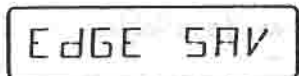
This feature saves the distance from a reference marker on the scales and saves the distance to the Absolute Zero of the part.

To save the part edge distance:

Activate Zero Marker Pulse and cross the established marker on each axis.
Move to the edge of the part.



Select function and save present position.



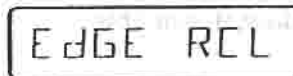
Display in message window, if available.

To recall Part Edge:

Activate Zero Marker Pulse and cross the established marker on each axis.



Select function and recall the distance from the marker to the Absolute Zero of the part.



Display in message window, if available.

NOTE: Refer to Zero Marker Pulse on Page 20 and Appendix F on Datum for more information.

VARIABLE RESOLUTION

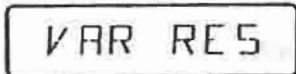


Allows the operator to change an axis display resolution to a coarser resolution.

Example: Change display resolution to .0005" (10 Micron) when the scale resolution is .0002" (5 Micron) on the X, Y, Z axes.



Select function.



Display in message window, if available.



Press desired axis.



Axis display shows available coarse resolution. Each press of axis key changes resolution displayed in that axis display.

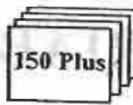


Activate the desired resolution.



The variable resolution symbol lights in the activated axis display.

AXIS RESET ONLY



This feature is useful for quick positioning. A single press of the axis key will zero the display in ABS or INCR mode. Only the displayed mode is set to zero.

Example 1: Set X axis as axis reset only.

(FCT) (1) (6) Select function.

(X) (SET) Set function and return to operation.

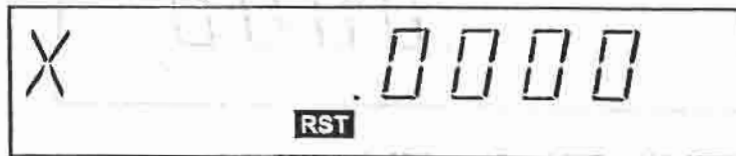
Example 2: Set X and Y axis as axis reset only.

(FCT) (1) (6)

(X) (Y) (SET)

AXIS RST Display in message window, if available.

RST symbol will be ON in the axis display.



NOTE: Follow the same procedure to turn axis reset OFF.

MIRROR IMAGE

800

Once part dimensions are entered to the Electronic Notepad, all positions can be reversed or mirrored on X and/or Y axis without re-entering position coordinates.

Example 1: Set X mirror image on X axis.

(FCT) (1) (7) Activate function.
(X) (SET) Select X axis.
MIR--X Display in message window.

Example 2: Set X, Y axes as mirror.

(FCT) (1) (7)
(X) (Y) (SET)
MIR-- XY

NOTE: Follow the same procedure to turn mirror image Off.

AXIS COUPLING

W/L

(3 AXIS ONLY)

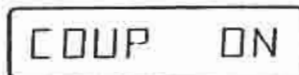
This feature allows Z and Z1 axes to be summed together on Z axis.



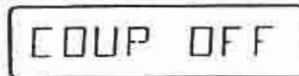
Activate function.



Toggle Coupling ON/OFF.



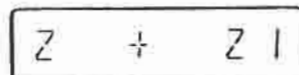
Display in message window when ON.



Display in message window when OFF.



Select mode displayed.



Display in message window when coupling is active.

NOTE: Z1 axis display will be OFF while coupling is active.

RESOLUTION SETTING FOR INCH READING SCALES

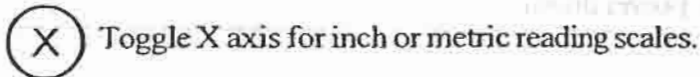


This feature configures each axis for use with BT or JB inch reading scales (not applicable for metric scales).

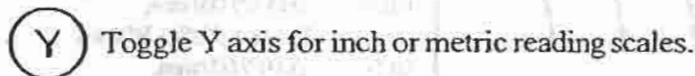
NOTE: The configuration can be mixed with inch and metric readings.



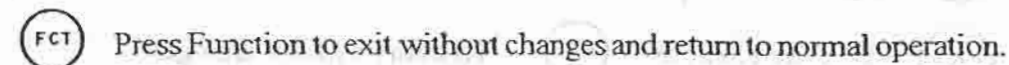
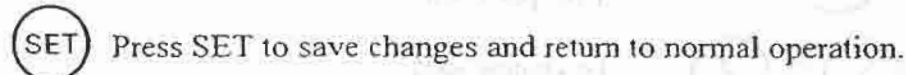
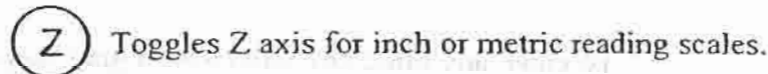
Activate function.



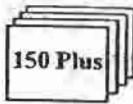
Axes configured to use inch reading scales display a 1.



Axes configured to use metric reading scales display a 0.



RESOLUTION, COUNT DIRECTION, ZERO OUT, INCH METRIC POWERON

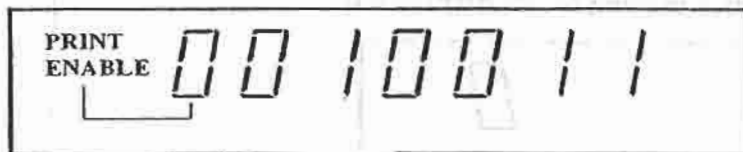


Allows set up of the following system parameters on all axes.

1. Axis Resolution
2. Count Direction (Change from 0 to 1 to Change Direction)
3. Zero Output (Change to 1 to Enable)
4. Print Enable (Change to 1 to Enable)
5. Inch/Metric Poweron (1 = Inch, 0 = Metric on X only)

These parameters are saved even after power down.

FCT 2 0



	RESOLUTIONS
010=	.00005"/.001mm, E-1,B-1,RBS-1,RBM-1
011=	.0001"/.002mm, A-2,F-2,RBS-1,RBM-1
100=	.0002"/.005mm,B-5,E-5,PGSE, RBS-5,PGS-P,RBM-5
101=	.0005"/.010mm, A-10,D-10,RBS-10

(+/-)

To move without entering

(0) or (1)

To enter, any other key will cause a long beep if beeper is on

(X) (Y) or (Z)

To change axis

(SET) To store changes

(FCT) To abort without changes

BEEPER OFF/ON



This function enables or disables the beeper in the console. Default is beeper ON.



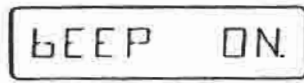
Turn Beeper OFF.



Display in message window, if available.



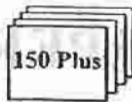
Turn Beeper ON.



Display in message window, if available.

NOTE: Beeper is standard in all models.

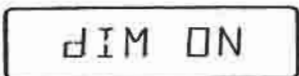
DISPLAY DIM OFF/ON



To increase the life of the VFD displays, if the console is not used for 15 minutes, it automatically switches to dim mode. Dim mode is indicated by moving decimal points (.) in all axis displays. The operator can turn OFF the dimming action. However, if the dimming is turned OFF and the console remains unused for more than 1 hour, the console will automatically go into dim mode. The console will remain in dim mode until a key is pressed or the scales move. Default is dim mode ON.



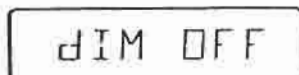
Selects function DIM ON.



Display in message window, if available.



Select function DIM OFF.



Display in message window, if available.

AXIS DESIGNATION



Assigns an axis, selected by the user, to each axis display. The operator can change the assignment of any axis to X, Y or Z.

FCT

2

4

Select function.

Press the desired axis key to toggle axis display.

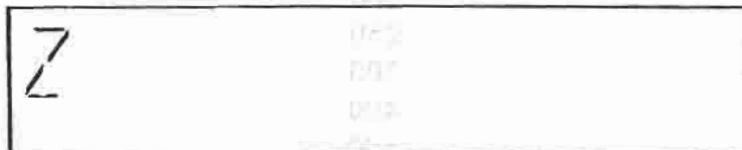


On each press of the axis key, the axis names will change on that axis display.

X



X



AXIS LOC

Display in message window, if available.

SET

Activate change.

ZERO OUTPUT TIME SELECT



Allows signaling to a remote device through the I/O port that the selected axis has crossed zero. Only one axis can be selected at a time. Use F20 to select the axis.

This function will select the time for which the remote is turned on when zero is crossed. Default is 100 milliseconds.

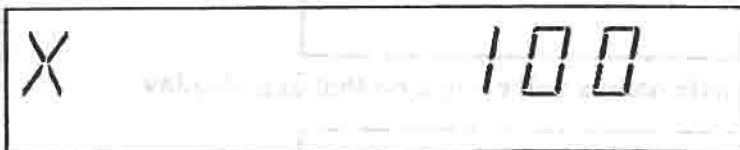
This feature is useful to adjust the sensitivity of the remote device.



Select function.

ZERO TIM

Display in message window, if available.



Change range.

RANGE: 100

150

200

250

300

400

500

700 Milliseconds



Set range shown in display.

NOTE: Zero out must be activated in RESOLUTION, COUNT DIRECTION, ZERO OUT, INCH, METRIC POWERON function (F20, Page 36).

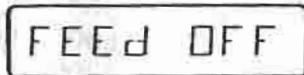
FEED RATE ON/OFF



This feature displays the maximum feedrate of the X or Y axis on the message window. The display is in inches per minute in INCH mode and meters per minute in MM mode. Default is feedrate ON.



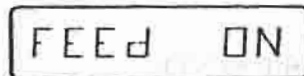
Select function and disable feedrate.



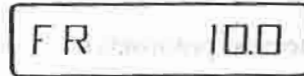
Display in message window.



Select function and enable feedrate.



Display in message window.



Feedrate shown in message window.

NOTE: Feed rate is only capable of showing the feed on two axes. These are X and Y on the mill and X and Z on the Lathe. The display will indicate the fastest moving axis if two axes are moved at the same time.

RS 232 SETUP

350 Plus
OPT

Allows set up of the parameters for the RS232 communications.

The parameters are:

1. Baud Rate (bd)
2. Parity (PAR)
3. Data Bits (dT)

RS 232 conforms to EIA Standards. See Appendix I for connector details.

(FCT) (2) (7)	
bd 110	Display in message window.
(+) (-)	Change Baud Rate.
bd 300	Display in message window.
(ENTER)	Select rate and move to next parameter.
PARI OFF	
(+) (-)	Change Parity to ON, OFF or NO.
(ENTER)	Select Parity and move to next parameter.
7 BIT dT	
(+) (-)	Change Bit from 7 to 8.
(ENTER)	Select Bit.

If RS 232 is not available, R 232 ERR will be displayed in the message window.

NOTE: 150 Plus and 350 Plus have print capability, but do not support RS 232.

RS 232 ON/OFF

800
OPT

Allows user to load a program from an external device into the console. External device could be a PC or another console.

Example: Enable RS 232 port to load program from PC.

FCT

2

8

Turn port ON.

R232 ON

Display in message window.

FCT

2

8

Turn port OFF.

R232 OFF

Display in message window.

AXIS DISPLAY PRINT: This function should be enabled for Y and Z with RESOLUTION, COUNT DIRECTION, ZERO OUT, INCH METRIC POWER ON (F20).

The X axis default is ON, preset at the factory. The feature will output the axis display.

MILL/LATHE SETUP

350 Plus

(ONLY)

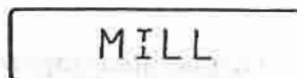
Allows the console to be set up to operate as a mill or lathe.



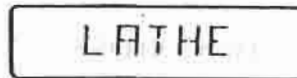
Activate function.



Change console type.



Display in message window.



Select displayed type.

ELECTRONIC NOTEPAD

800

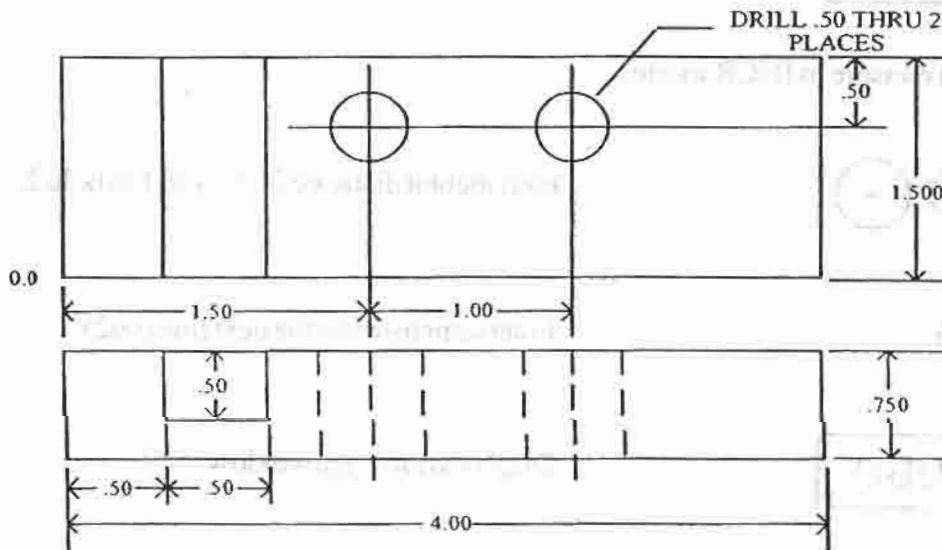
This feature allows entering dimensions into the Electronic Notepad for later use. The Electronic Notepad is like a paper notepad. There are a maximum of 250 lines. Each line can record an X, Y, Z dimension.

The entered dimension can be recalled for performing an operation.

The Electronic Notepad retains the entered information even after the power is turned OFF. Information can be retained for as long as 5 years.

Axis information entered.

	MILL	LATHE
3 AXIS	X Y Z	X Z Z1
2 AXIS	X Y	X Z
1 AXIS	X	N/A



EXAMPLE: To enter X, Y, Z dimensions to the electronic notepad, follow the procedure shown.

ELECTRONIC NOTEPAD (continued)

Refer to absolute zero set page 19.



Set console to ABS mode for the first entry. In all cases, step 1 must be in ABS mode.

X 1 . 5

X and Y dimension of first hole.

Y 1 .

ENTER 0 0 1

Enter above dimension into Electronic Notepad on line 1.

ENT 001

Display in message window.



Set console to INCR mode.

X 1 .

Incremental distance from hole 1 to hole 2.

ENTER ENTER

Enter dimension to the next line (002).

ENT 002

Display in message window.



Set console to ABS mode.

ELECTRONIC NOTEPAD (continued)

(X) (.) (7) (5)

Dimensions to prepare to cut slot.

(Y) (+/-) (.) (3)

(Z) (+/-) (.) (5)

(ENTER) (ENTER)

Enter dimension to the next line (003).

ENT 003

Display in message window.

(SET)

Exit notepad entry and return to standard operation.

RECALL ELECTRONIC NOTEPAD

800

This feature recalls entered dimensions from the electronic notepad.

Move the machine to absolute zero or the start position of the part.

   Set Zero in both ABS and INCR.

    Recall dimensions from line 1.


 Display in message window when recall is pressed.

 Display in message window after the number is entered.

Axis information is recalled to the axis displays. Recalled dimension is the incremental distance to reach the target position from the present position. The console will automatically change to INCR mode. Move the machine until axis displays read .0000.

  Recall next consecutive line.

Lines from the Electronic Notepad can be recalled out of sequence by pressing

 and entering the line number.

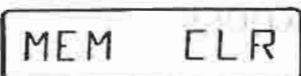
CLEARING NOTEPAD

800

This function is used to clear all lines in the Electronic Notepad before entering new information into the Notepad.



Select function.



Display in message window.

ADVANCED FUNCTION KEY

350 Plus

Press the ADV key to display Advanced Functions in the message window.

ADV

Press the ADV key to cycle through the available functions, listed below.

HELP

HELP FOR FUNCTION CODES

BHP CMP

BOLT HOLE PATTERN COMPUTATIONS

AXIS ADD

ADD TWO NUMBERS (WIZARD 800 AND LATHE ONLY)

AXIS SUB

SUBTRACT TWO NUMBERS (WIZARD 800 AND LATHE ONLY)

ENP INS

INSERT A LINE OF DATA TO EXISTING NOTEPAD (WIZARD 800 AND LATHE ONLY)

ENP DEL

DELETE A LINE OF DATA FROM EXISTING NOTEPAD (WIZARD 800 AND LATHE ONLY)

LIN HOLE

LINEAR HOLE PATTERNS (WIZARD 800 ONLY)

SKEW CMP

SKEW COMPENSATION SETUP (WIZARD 800 ONLY)

TAPER

TAPER CHECKING (WIZARD 350 PLUS AND LATHE ONLY)

ENTER

Select function that is displayed.

FCT

Exit this mode.

HELP

350 Plus

This is a quick and easy way to find a function code or activate a function without using the function code list.

Press ADV key until HELP is displayed on the message window.



HELP

Press ENTER key, the message window will display +/- key.



HELP

+/- KEY



Press +/- key and each key press will indicate the function number on the first axis display and the corresponding function name in the message window.

ABS SET

F 01



Activate function shown on display.



Step backward through function codes.



Exit HELP without activating function.

BOLT HOLE PATTERN

350 Plus

(ONLY)

This feature enables the calculation of X, Y positions for a known number of holes around the circle of a given diameter.

EXAMPLE: Enter a hole pattern for a 2.00"/50.80 mm diameter circle with 8 holes. The first hole is positioned at 45 degrees and all other holes are equally spaced in a full pattern. The center of pattern is X (3.0000"/76.20 mm) and Y (2.0000"/50.80 mm).

ADV

ADV

Select function.

bHP CMP

Display in Message window.

ENTER

Activate function for data entry.

Enter diameter of Bolt Hole Pattern.

bHP DIR

X 002.0000
INCH

ENTER

Activate next prompt.

Enter the Start Angle of the first hole.

bEG ANG

X 045.0000
INCH

ENTER

Activate next prompt.

BOLT HOLE PATTERN (continued)

Number of holes to be drilled (maximum 24).

QTY HOLE

X 08

ENTER

Activate next prompt.

Enter the X dimension of the center of the pattern.

X CENTER

X 003.00000
INCH

ENTER

Activate next prompt.

Enter the Y dimension of the center of the pattern.

Y CENTER

X 002.00000
INCH

ENTER

Complete pattern.

bHP DONE

Indicates completion.

BOLT HOLE RECALL

350 Plus
(ONLY)

Allows recall of Bolt Hole steps. Bolt Hole Pattern must be computed prior to recalling the steps.

See Bolt Hole Pattern for compute on page 51.

Before recalling a bolt hole pattern, move to zero position on the part, or be sure that a zero position has been set.



Recall the X, Y location of the first hole.

Indicate the hole number in the pattern.

bHP 001

Display incremental distance to the first hole pattern.

X - 3.7072
INCR INCH

Y - 2.7072

Move machine until display reads zero and do operation required.



Recall the X, Y incremental distance to the next hole.

Follow the procedure above until bHP END is shown in the message window. This indicates the pattern is complete.

bHP END



Reset Bolt Hole Pattern to hole 1 to repeat this pattern.



Return to hole location/and Repeats Pattern.

NOTE: Pattern will be lost if power is turned OFF. If recall is pressed without a pattern computed, NO bHP will be displayed in message window.

TAPER CALCULATOR

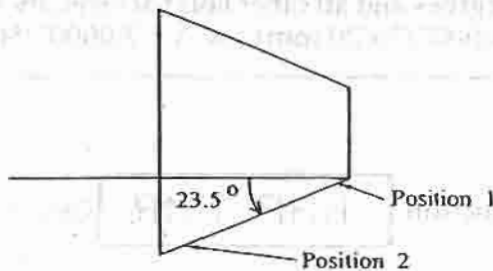
W/L

(LATHE ONLY)

This feature allows presetting a taper angle on the lathe crossslide attachment without having to make a test cut. It may also be used to calculate the taper of a part.

The console must first be set to lathe mode. Refer to function F29 Mill/Lathe Setup.

EXAMPLE: Set the taper attachment to a 23.5 degree taper.



Move attachments to approximately the correct angle.

ADV **ADV** Select function. **TAPER** Display in message.

ENTER Activate function. **XZ POS 1** Display in message window.

Move to the first position.

ENTER Enter first position. **XZ POS 2** Display in message window.

Move to the second position.

ENTER Enter the second position.

÷ 23.34 Display computed taper in message window.

ENTER Return to normal DRO mode.

Adjust attachment and repeat process until angle is correct.

ADVANCED BOLT HOLE PATTERN

800

This feature enables the calculation of X, Y positions for a known number of holes around the circle of a given diameter.

See Appendix A for more detailed information.

EXAMPLE: Enter a hole pattern for a 2.00"/50.80 mm diameter circle with 8 holes. The first hole is positioned at 45 degrees and all other holes are equally spaced in a full pattern. The center of pattern is X (3.0000"/76.20 mm) and Y (2.0000"/50.80 mm).



Select function.

bHP CMP

Display in message window.



Activate function for data entry.



Press to change Full or Partial Bolt Hole Pattern.

FULL

PARTIAL



Select pattern displayed.

Enter diameter of Bolt Hole Pattern.

bHP DIA

X

002.0000

INCH



Activate next prompt.

ADVANCED BOLT HOLE (continued)

Enter the Start Angle of the first hole.

BEG ANG

X 045.000



Activate next prompt.

Enter the quantity of holes to be drilled (maximum 99).

QTY HOLE

X 08



Activate next prompt.

Enter the X dimension of the center of the pattern.

X CENTER

X 3.0000
INCH



Activate next prompt.

ADVANCED BOLT HOLE (continued)

Enter the Y dimension of the center of the pattern.

Y CENTER

X 002.0000
INCH



Start Bolt Hole compute if Full Pattern.
Activate next prompt if Partial Pattern.

Enter the End Angle of the pattern if Partial Pattern is selected.

END ANG

X 000.0000
INCH



Start Bolt Hole compute.

bHP DONE

Indicate completion.

NOTE: The Bolt Hole Pattern will automatically be saved to the first available line in the Electronic Notepad.

If a number that cannot be computed is entered, bHP ERR will be displayed in the message window and a long tone will be sounded.

ADVANCED BOLT HOLE RECALL

800

Allows recall of Advanced Bolt Hole steps. Bolt Hole Pattern must be computed prior to recalling the steps.

See Advanced Bolt Hole Pattern on page 56.

RECALL

0

0

1

Recall the X, Y location of the first hole.

Indicate the hole number in the pattern.

6001 d1

Display incremental distance to the first hole in the pattern.

X - 3.7072
INCR INCH

Y - 2.7072

Move machine until display reads zero and do operation required.

RECALL

RECALL

Recall the X, Y incremental distance to the next hole.

Follow the procedure above until

bEND

is shown

in the message window. This indicates the pattern is complete.

SET

Return console to normal DRO mode.

AXIS ADD

800

Adds a dimension to the axis display on any axis or adds two numbers together.

Example 1: Add 1.375 to 2.475 on the X axis display. Press axis key, enter dimensions to be added.

(X) (1) (.) (3) (7) (5)
(X) (2) (.) (4) (7) (5)

(ADV) (ADV) (ADV)

AXIS Add

Press ADV key until AXIS ADD is displayed in the message window.

(ENTER)

Activate function.

X 3.8500

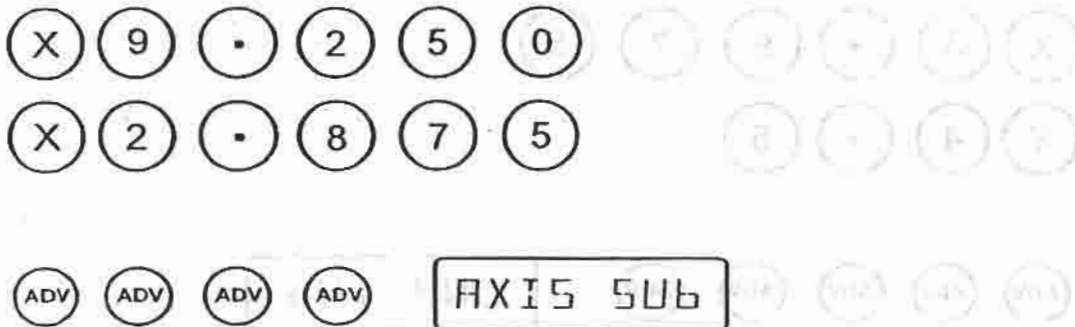
Flashing axis is displayed. SET key stops flashing and sets number to the display.

AXIS SUBTRACT


800

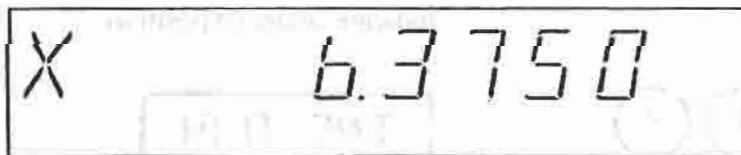
Subtracts two numbers or subtracts a number from the displayed dimension on any axis.

Example 1: Subtract 2.875 from 9.25 on the X axis display. Press axis key and enter dimension. Press axis key again and enter the number to be subtracted.



Press ADV key until AXIS SUB is displayed in the message window.

 Activate function.



Flashing axis is displayed. SET key stops flashing and sets the number to the display.

NOTEPAD INSERT

800

Allows the user to insert a line of information or step into the Electronic Notepad.

Example 1: Enter X 3.875 and Y 4.5 in line 014 of Electronic Notepad.

X 3 . 8 7 5 F S . 6 X
Y 4 . 5 6 Y R . 2 3

ADV ADV ADV ADV ADV

ENP INS

Select Notepad Insert function.

Display in message window.

ENTER

Activate function.

I 000 000

Indicate last insert position.

ENTER

0 1 4

INS 0 14

Enter line number to be inserted.

NOTEPAD DELETE

800

This function will delete a line of information or step from Electronic Notepad.

Example: Delete line 023 from Electronic Notepad.

(ADV) (ADV) (ADV) (ADV) (ADV) (ADV)

Activate Notepad Delete function.

ENP DEL

Display in message window.

(ENTER)

Select function.

0000 000

Indicate previous block.

(ENTER)

(0) (2) (3)

Enter line number to be deleted.

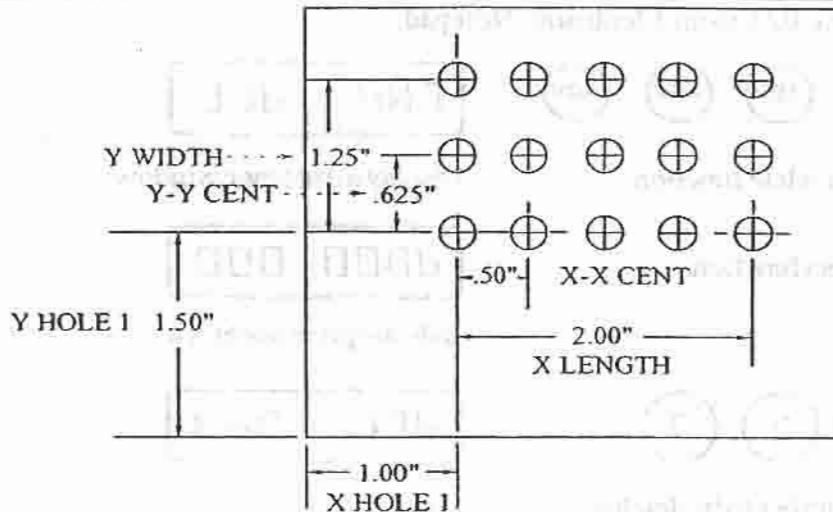
DEL 023

LINEAR HOLE PATTERN

800

This feature enables the calculation of X,Y positions for a linear pattern of holes, for a specified length and width of pattern and distance between holes.

EXAMPLE: Drill a linear hole pattern of holes with a length $L=2.00"$, width $W=1.25"$, X distance between holes $X=.5"$, Y distance between holes $Y=.625"$. The first hole center is at $X=1.00"$ and $Y=1.5"$.



ADV ADV ADV ADV ADV ADV ADV LIN HOLE

Select function.

Display in message window.

ENTER Activate function.

Enter the X dimension to the center of hole 1.

X HOLE 1

X 00 1.00000
INCH

LINEAR HOLE PATTERN (continued)



Activate next prompt.

Enter Y dimension to the center of hole 1.

Y HOLE 1

X 001.5000
INCH



Activate next prompt.

Enter X length of the hole pattern.

X LENGTH

X 002.0000
INCH



Activate next prompt.

Enter X distance between holes.

X-X CENT

X 000.5000
INCH

LINEAR HOLE PATTERN (continued)



Activate next prompt.

Enter Y width of hole pattern.

Y WIDTH

X 00.12500
INCH

P65.2



Activate next prompt.

Enter Y distance between holes.

Y-Y CENT

X 000.6250
INCH



Activate compute.

Indicate holes on X and Y axis.

X05 Y03

X 000.0000
INCH



Enter dimensions to Electronic Notepad and return to normal operation.

NOTE: A maximum of 250 holes can be computed. Linear Hole Pattern must be computed first before dimensions are entered to the Notepad. The Linear Hole Pattern always starts at line 1. Any dimension previously entered will be overwritten.

LINEAR HOLE PATTERN RECALL

800

Allows recall of Linear Hole Pattern steps. Linear Hole Pattern must be computed prior to recalling the steps.

See Linear Hole Pattern for compute on page 64.



Recall the X, Y location of the first hole.

Indicate the hole number in the pattern.

L001 d1

Display incremental distance to the first hole pattern.

X	1.0000
	INCR INCH
Y	1.5000

Move machine until display reads zero and do operation required.



Recall the X, Y incremental distance to the next hole.

Follow the procedure above until

LEND

is shown in the message window. This indicates the pattern is complete.



Return console to normal DRO mode.

SKEW

800

Allows the electronic alignment of a part placed on a machine for setup. It is used for hole drilling only.

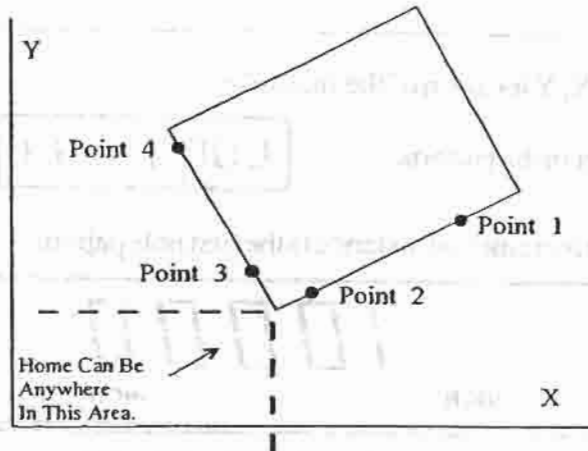


Figure 1

ADV ADV ADV ADV ADV ADV ADV ADV

SKEW CMP

Select function.

ENTER

Activates function.

TOOL DIA

Display in message window.

Enter the diameter of the edge finder.

X 000.2000 INCH

SKEW (continued)



Activate next prompt.

IN POSN

Display in message window.

Move to Home Position (See Figure 1 on previous page).



Activate next prompt.

X1 POS

Display in message window.

Move to the first point and touch the part with the edge finder.



Activate next prompt.

X2 POS

Display in message window.

Move to the second point and touch the part with the edge finder.



Activate next prompt.

Y1 POS

Display in message window.

Move to the third point and touch the part with the edge finder.



Activate next prompt.

Y2 POS

Display in message window.

Move to the fourth point and touch the part with the edge finder.

SKEW (continued)



Activate function.

CAL SKEW

Display in message window.

Move the quill to the up position.

Move the machine until the X and Y axis displays read zero.



Establish absolute zero.

Information can now be recalled from Electronic Notepad.

SKEW ON

Display in message window while Skew is activated.



Exit Skew mode and returns console to normal operation.

NOTE: Correction factor cannot be active with this feature.

DATUM SET

800

This feature allows entry of Datum table. A maximum of 9 values can be entered.

Example: Set datum 1 at X= 1.375 and Y= -2.675.

Dimensions entered should be opposite in sign of displayed dimensions.

X $\frac{+}{-}$ 1 . 3 7 5
Y 2 . 6 7 5



Activate entry.



Press Datum key until

ENT \square \square

is displayed in the message window.



Enter datum number desired (0-9).
Save the dimension to the datum table.

NOTE: Refer to Datum Explanation Appendix F for more information.

DATUM RECALL

800

Recall set Datum. Datum must be set before recall. Refer to Datum Set on page 71 and Datum Explanation in Appendix F.



Press Recall key until

RCL 000

is displayed in the message window.



Activate Datum.

Press until d00 is shown in message window.

RCL d 0

Display in message window.



Enter Datum number required (0-9).

Recall Datum to display and return to previous mode.

NOTE: When program is recalled, a datum must be recalled or the last datum will be displayed. Datum 0 will be active. A block of memory must be recalled after datum is recalled.

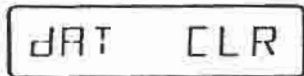
DATUM CLEAR

800

This function is used to clear all preset datum points before entering new values.



Select function.



Display in message window.

NOTE: Refer to Appendix F on Datum for more information.

TOOL OFFSET SET (MILL)

800

(3 AXIS ONLY)

This feature allows entry of the Z tool offset into the tool table. A maximum of 9 values can be entered. This feature is available on three axis consoles only.

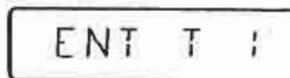
Example: Enter a tool offset length of -1.3" as tool number 1.



Activate entry.



Press Datum key until the message window.



is displayed in



Enter tool number desired (0-9).
Save the dimension to the tool table.

NOTE: Refer to Tool Offset Mill Appendix G for more information.

TOOL OFFSET SET (Lathe)

W/L

This allows entry of X and Z offsets into the tool table for each tool. A maximum of 9 tool offsets can be entered.

For proper operation of this feature, an interchangeable tool system is required.

NOTE: A machine home position must be established on the lathe. Use Zero Marker Pulse, (FO2, page 20) or Absolute Zero Set, (F01, page 19) prior to setting tool length offsets. See Appendix H for more information.

While the machine is at the home position, set Tool Zero.

(X) (0) (Z) (0) (ENTER) (TOOL) (0)

Place the first tool on the post and face off the part. Do not move the carriage.

(ABS INCR) (Z) (0) (SET) Switch to **Incremental**, set zero for Z axis.

Make a skim cut on the diameter and without moving the tool away from the OD of the part, move the Z axis until the display reads zero. Measure the diameter.

EXAMPLE: The diameter = 2.3762".

(ABS INCR) Switch to **Absolute** mode.

Enter X axis Diameter value and Z value of zero.

(X) (2) (.) (3) (7) (6) (2)

(Z) (0)

(ENTER) Activate entry.

(TOOL) (1) Press TOOL key. ENT T I Display in message window.

Repeat above procedures (except face and skim cut) by touching each tool on the face for Z and diameter for X. Preset the same diameter on X and Z zero for each tool as shown above.

TOOL OFFSET MODIFY (LATHE)

W/L

Allows the Z offset to be modified for all tools without reentering.

Place the new part into the spindle.

SET Insures Electronic Notepad is not active.

RECALL **TOOL** **0** Activate home position.

RECALL **TOOL** **#** Activate tool number of active tool (1-9).

Face off the new part. Do not move the Z axis after the part is faced.

Z **0** **FCT** **0** **0** Changes all offsets that were set to the new Z axis offset distance.

NOTE: A known distance for the offset may be entered in place of zero.

TOOL OFFSET RECALL

800

Recalls Tool Offset that has been set. Tool Offset must be set before recall. Refer to Tool Offset Set (Mill & Lathe) on pages 74 and 75 and Tool Offset in Appendix G and H.

WIZARD 800



Select recall Display in message window.



Activate Tool on the mill.
Press until T O is shown in message window.



Display in message window.



Enter Tool number required (0-9).
Recall Tool to display and return to previous mode.

WIZARDLATHE



Select Recall mode.



Access Tool tables on the Wizard Lathe only.



Display in the message window.



Enter Tool number required (0-9).
Recall Tool to display and return to previous mode.

NOTE: Tool number is constantly displayed when recalled (lathe only).

TOOL OFFSET CLEAR

800

Clears all the preset tool offset values from memory.

FCT **3** **2** Select function.

TOOL CLR Display in message window.

SCALE ERROR DETECT OFF / ON



All consoles come with advanced scale error checking circuitry. This checks for scale miscounts and repeatability. The factory setting of this feature is ON.

(FCT) (4) (0)

Select OFF - deactivate all axes.

ENCE OFF

Display in message window, if available.

(FCT) (4) (1)

Select ON - activate all axes.

ENCE ON

Display in message window, if available.

If an error is detected, it will be displayed in that axis display. The other axis displays are blanked for a short period and the beeper sounds.

X E A A A A

REMOTE IN / OUT TEST

150 Plus
OPT

When activated, this function tests any remote devices attached. The attached devices will be turned ON and OFF. Remote inputs to the console are also toggled one at a time, as displayed in the message window, if available. The beeper also sounds a short beep after each test.

(FCT) (4) (2) Select function.

X OUT Display in message window, if available.

Y OUT

Z OUT

APZ ON

(FCT) Exit test.

(SET) Return to normal operation.

WIZARD DIAGNOSTICS

150 Plus

All consoles have the ability to perform system diagnostics such as display, counters, memory and option board, if available. If an error occurs during diagnostics, an error number is displayed in the X axis display.

NOTE: Disconnect encoder before starting diagnostics. If this is not done, Error 5, 6, or 7 will occur.

ERROR CODES:

- 1 - 4 CPU Board Failure
- 5 - 7 Encoder Failure

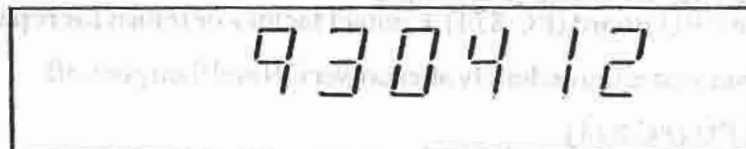


Select function.

First display seen.



Software code (varies with console type).



Sequence following software code:

0 through 9 will step across each axis.

Each indicator then illuminates.

The decimal points step across the displays.

The axis indicators illuminate.

The minus sign illuminates.

Either number 41, 21 or 11 is displayed.

Press  +/- key to exit.

Power interrupt will occur, showing diagnostic completed and passed.

IMPORTANT NOTE: When diagnostics activates, all information stored on the Notepad is lost.

TROUBLESHOOTING

150 Plus

This section lists and troubleshoots common problems.

DISPLAY RELATED PROBLEMS:

SYMPTOM: Axis display does not illuminate.

SOLUTION:

1. Check to see that the power cord is connected properly.
2. Check the AC voltage where the power cord is plugged in.
3. There is a ribbon connector between the main CPU and the display board. Make sure this connector is plugged in all the way.
4. If all of the above are checked and O.K., the Display Board (PC 872) should be replaced. See the Part Replacement section on page 84 for the correct part number corresponding to your console type.

SYMPTOM: Segments of the axis display do not illuminate. Any segment of the numbers or any of the indicators below the numbers.

SOLUTION: Replace Display Board (PC 872). See Part Replacement on page 84 for the correct part number.

SYMPTOM: Message window does not illuminate or is dim.

SOLUTION:

1. Replace Display Board (PC 872) or
2. Replace CPU Board (PC 874). Contact factory or return for repair.

SYMPTOM: Display illuminates immediately after power ON and then goes off.

SOLUTION: Replace CPU (PC 874).

SYMPTOM: One axis display is relatively dim after power ON and then goes off.

SOLUTION: Replace Display Board (PC 872).

KEYBOARD PROBLEM:

SYMPTOM: Flashing backward C's seen after power ON, but pressing SET key does not zero display.

SOLUTION: Make sure the keyboard connector is completely plugged in. If this is checked and there is still a failure, the CPU (PC 874) or keypad may have failed. Replace CPU and keypad module.

TROUBLESHOOTING

150 Plus

SYMPTOM: When pressing a key or several keys, the console does not respond.

SOLUTION: Make sure the keyboard connector is completely plugged in. Replace keyboard.

MAIN CPU BOARD PROBLEM:

SYMPTOM: Information in the electronic notepad is lost when the power is turned OFF. (WIZARD 800 and WIZARD LATHE only)

SOLUTION: CPU board (PC 874) is defective. Replace.

SYMPTOM: Set parameters are not retained as entered.

SOLUTION: CPU board (PC 874) is defective. Replace.

SYMPTOM: Information recalled from Notepad is incorrect. (WIZARD 350+ WIZARD 800, WIZARD LATHE)

SOLUTION: CPU board (PC 874) is defective. Replace.

GENERAL:

SYMPTOM: When any axis is moved, the axis displays do not update.

SOLUTION:

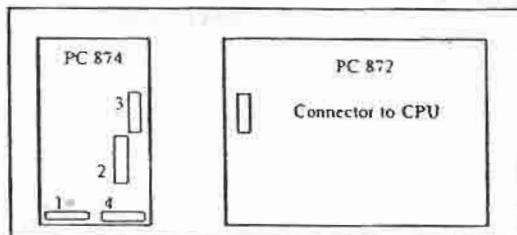
1. Disconnect scales from the back of the console. Run WIZARD Diagnostics (F45.) to see that console is functioning properly. If an error is displayed, replace CPU board (PC 874).
2. If the console passes diagnostics, turn on Scale Error Detect (F41). Move the axis that is not updating. If ERROR is displayed, replace the reader head on the axis.

SYMPTOM: Beeper does not sound when turned ON and a key is pressed.

SOLUTION: CPU board (PC 874) is defective. Replace.

- 1 - Keyboard Connector
- 2 - Encoder Connector
- 3 - Display Connector
- 4 - RS 232 Connector

REAR VIEW OF
FRONT BEZEL



PART REPLACEMENT



If your WIZARD should have a problem, the following parts list will assist you in ordering your replacement parts.

WIZARD 150 Plus	1 AXIS	P/N	A19501
Keyboard Assembly			22100043S
1 Axis Display Board (PC872)			30500004S
1 Axis Encoder Board (PC876)			30500053S
Main CPU Board (PC874)			30500058S
Power Supply			90600330S

WIZARD 150 Plus	2 AXIS	P/N	A19502
Keyboard Assembly			22100046S
2 Axis Display Board (PC872)			30500005S
2 Axis Encoder Board (PC876)			30500054S
Main CPU Board (PC874)			30500058S
Power Supply			90600330S

WIZARD 150 Plus	3 AXIS	P/N	A19503
Keyboard Assembly			22100047S
3 Axis Display Board (PC872)			30500006S
3 Axis Encoder Board (PC876)			30500055S
Main CPU Board (PC874)			30500058S
Power Supply			90600330S

WIZARD 350 Plus	1 AXIS	P/N	A1920000
Keyboard Assembly			22100026S
1 Axis Display Board (PC872)			30500004S
1 Axis Encoder Board (PC876)			30500053S
Main CPU Board (PC874)			30500021S
Power Supply			90600330S

WIZARD 350 Plus	2 AXIS	P/N	A1920001
Keyboard Assembly			22100048S
2 Axis Display Board (PC872)			30500005S
2 Axis Encoder Board (PC876)			30500054S
Main CPU Board (PC874)			30500021S
Power Supply			90600330S

PART REPLACEMENT (continued)

WIZARD 350 Plus 3 AXIS	P / N	A 1920002
Keyboard Assembly		22100049S
3 Axis Display Board (PC872)		30500006S
3 Axis Encoder Board (PC876)		30500055S
Main CPU Board (PC874)		30500021S
Power Supply		90600330S

WIZARD 800 1 AXIS	P / N	A 1940000
Keyboard Assembly		22100050S
1 Axis Display Board (PC872)		30500004S
1 Axis Encoder Board (PC876)		30500053S
Main CPU Board (PC874)		30500022S
Power Supply		90600330S

WIZARD 800 2 AXIS	P / N	A 1940001
Keyboard Assembly		22100050S
2 Axis Display Board (PC872)		30500005S
2 Axis Encoder Board (PC876)		30500054S
Main CPU Board (PC874)		30500022S
Power Supply		90600330S

WIZARD 800 3 AXIS	P / N	A 1940002
Keyboard Assembly		22100051S
3 Axis Display Board (PC872)		30500006S
3 Axis Encoder Board (PC876)		30500055S
Main CPU Board (PC874)		30500022S
Power Supply		90600330S

WIZARD LATHE 2 AXIS	P / N	A 1930000
Keyboard Assembly		22100052S
2 Axis Display Board (PC872)		30500005S
2 Axis Encoder Board (PC876)		30500054S
Main CPU Board (PC874)		30500019S
Power Supply		90600330S

PART REPLACEMENT (continued)

WIZARD LATHE 3 AXIS P/N A 1930002

Keyboard Assembly	22100052S
3 Axis Display Board (PC872)	30500006S
3 Axis Encoder Board (PC876)	30500055S
Main CPU Board (PC874)	30500019S
Power Supply	90600330S

OPTIONAL I/O BOARD (PC878) 30500063S (Common to all consoles.)

1 Axis Board	30500051S
2 Axis Board	30500049S
3 Axis Board	30500050S

WARRANTY



Anilam warrants its products to be free from defects in material and workmanship for three (3) years from date of installation. At our option, we will repair or replace any defective product upon prepaid return to our factory.

This warranty applies to all products when used in a normal industrial environment. Any unauthorized tampering, misuse or neglect will make this warranty null and void.

Under no circumstances will Anilam, any affiliate, or related company assume any liability for loss of use or for any direct or consequential damages.

The foregoing warranties are in lieu of all other warranties expressed or implied, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

CONSOLE TYPE:

- WIZARD 150 Plus
- WIZARD 350 Plus
- WIZARD 800
- WIZARD LATHE

SYSTEM PURCHASED FROM: _____

CONSOLE PART NUMBER: _____

CONSOLE SERIAL NUMBER: _____

DATE OF INSTALLATION: _____

CONNECTING THE PROBE

IMPORTANT NOTE: Disconnect the power cord from the back of the console before performing the procedure.

1. Locate the green ground wire on the back of the DRO and connect it to the frame of the machine to achieve a proper ground.
 2. Place the round spring clip in the appropriate groove on the probe. (Refer to **Figure 2.**)
 3. Plug the other end of the probe cable into the circular jack on the back of the DRO. (Refer to **Figure 1.**)
 4. The red LED on the probe should glow dimly, indicating a proper connection. When the tip of the probe touches the work piece, the LED glows brightly.
- NOTE:** Some probes require that adjustments be made to the DRO before use. If the probe LED does not light when the probe is connected to the DRO, call the factory.

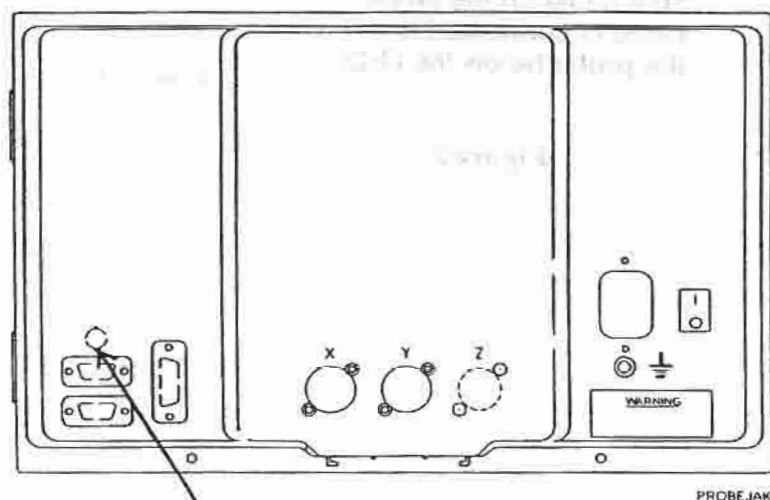


Figure 1

CONNECTING THE PROBE

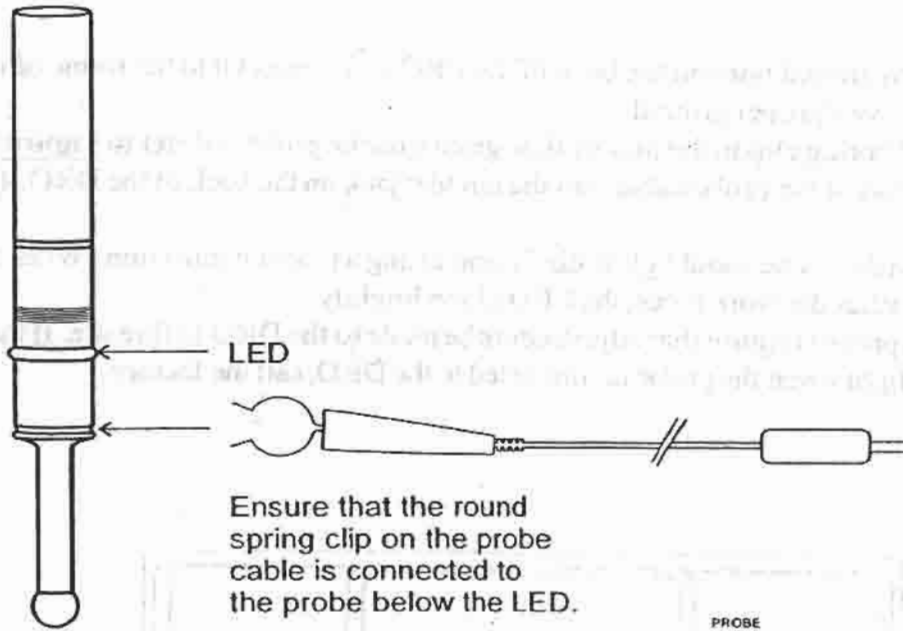
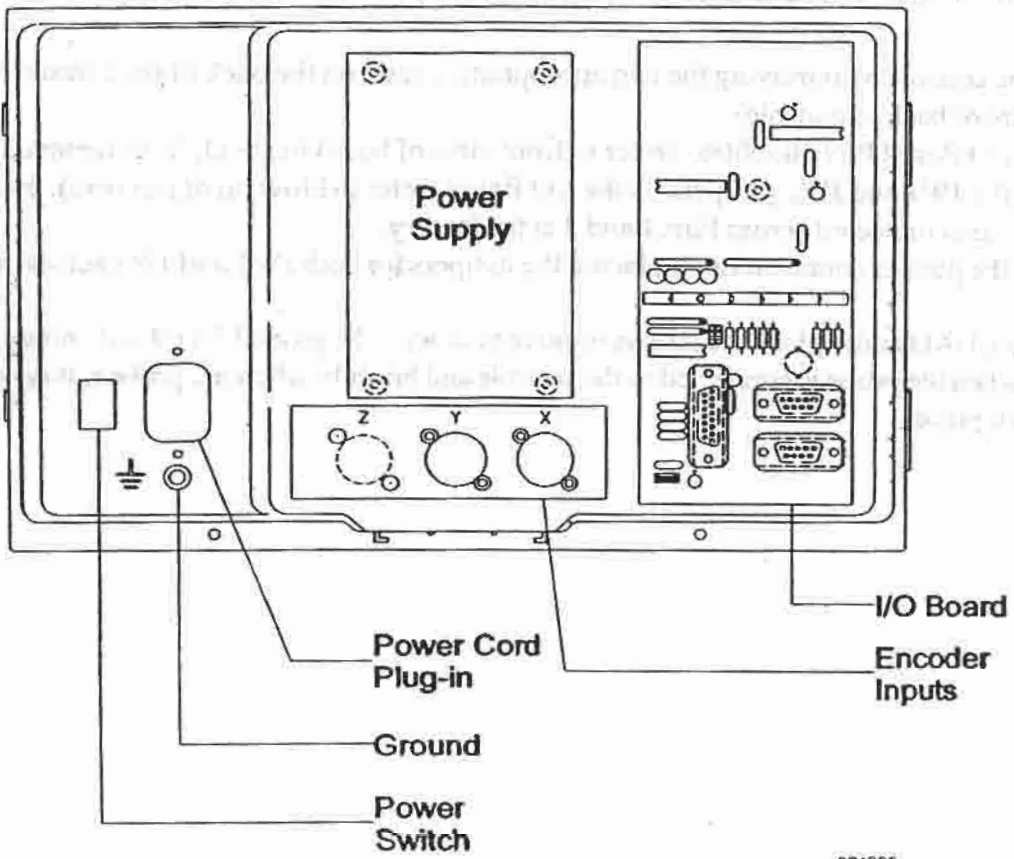


Figure 2



BOARDS

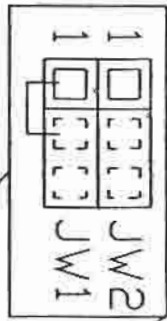
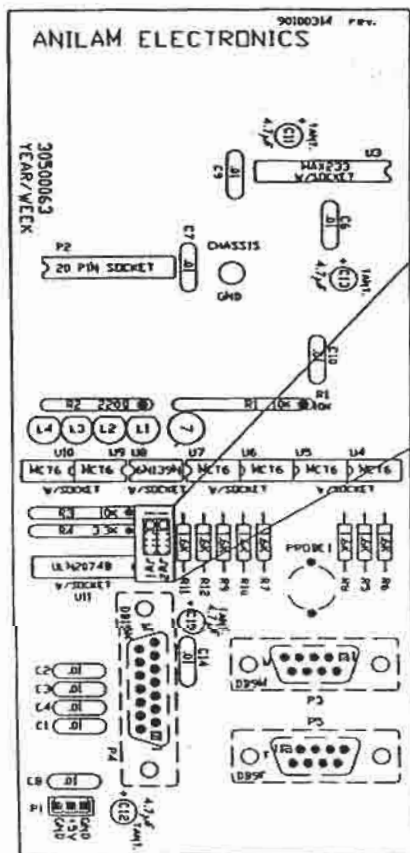
SWITCHING THE JUMPERS

IMPORTANT NOTE: This procedure should only be performed if the probe LED did not respond appropriately, as documented in Connecting the Probe. Be careful not to disconnect any harnesses or wires during the procedure.

Wear a wrist strap if one is available to avoid unnecessary Electrostatic Discharge.

1. Open the console by removing the two appropriate screws on the back of the console (refer to picture of back of console)
2. to picture of back of console)
3. Locate I/O Board P/N 30500063 (refer to front view of board in DRO, front removed)
Locate the JW1 and JW2 jumpers on the I/O Board (refer to blow up of jumpers). Both jumpers are connected across Pins 1 and 2 at the factory.
4. Switch the jumper connections by placing the jumpers for both JW1 and JW2 across pins 2 and 3.
5. Close the DRO and replace the screws removed earlier. The probe LED should now glow dimly when the probe is connected to the console and brightly when the probe is touched to the work piece.

Blow up of Jumpers



Pin 1
Pin 2
Pin 3
(As shown, pins would be jumpered vertically.)

Pin 1 and Pin 2 are jumpered as the default.

JUMPER

BOLT HOLE PATTERN APPENDIX A

Bolt hole pattern is a very basic drilling operation in many industries.

Basics: Bolt hole pattern is used to drill holes around the circumference of a circle.

(See Figure 1)

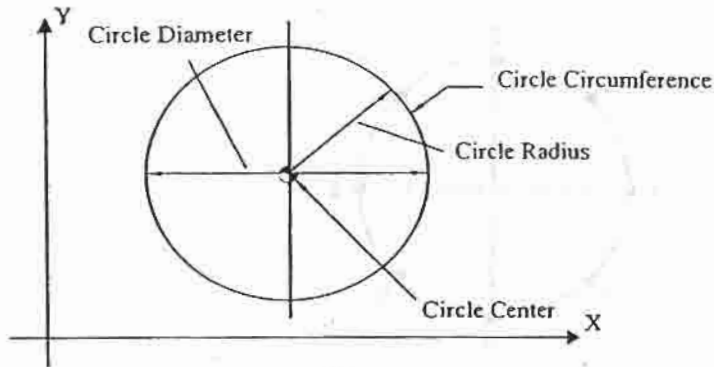


Figure 1

There are 2 different types of patterns.

- 1) Partial Pattern
- 2) Full Pattern

Partial Pattern: In this pattern the holes do not cover the entire circumference of the circle, but form an arc, called a partial pattern. (See Figure 2)

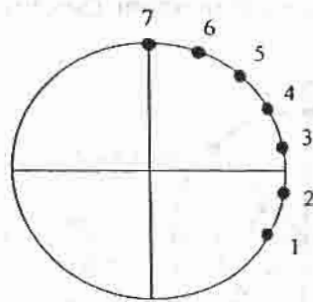


Figure 2

BOLT HOLE PATTERN (continued)

Full Pattern: In this type of pattern, the holes cover the entire circumference of the circle as shown in Figure 3.

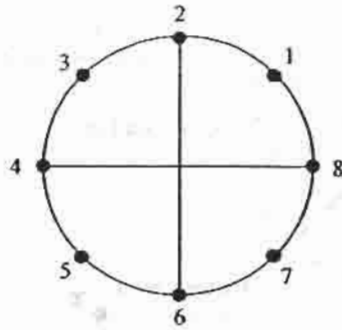


Figure 3

The holes are always numbered in the counter clockwise manner, as shown in figure above.

The angle of the first hole with respect to the X (horizontal) axis is the starting angle. (See Figure 4.) Start angles are always measured counter clockwise (CCW) from the 3 o'clock position. The angle of the last hole, with respect to the X axis, is the end angle. This is measured in a clockwise direction. (See Figure 4.)

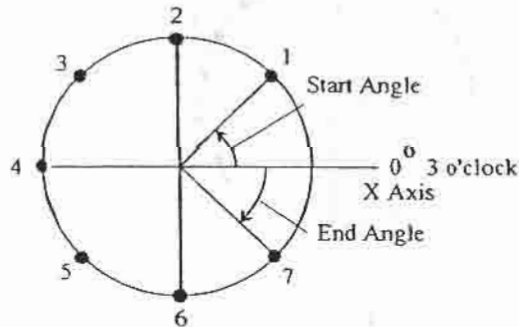


Figure 4

BOLT HOLE PATTERN (continued)

HOW TO COMPUTE bEG ANG: One complete rotation around a circle is equal to 360 degrees.

All beginning angles (bEG ANG) are measured in a counter clockwise (CCW) direction from the 3 o'clock position. As seen from Figure 5, the angle of hole 1 is 135 degrees.

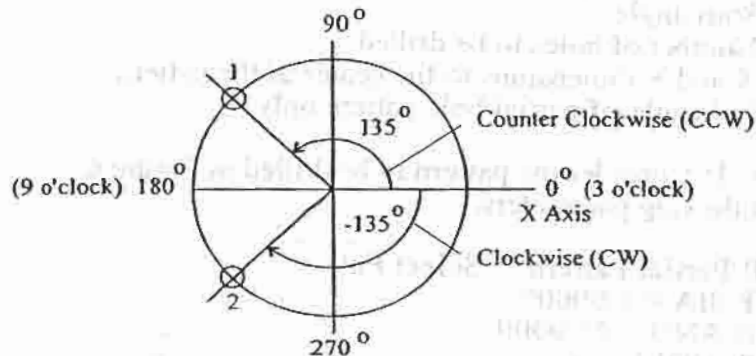


Figure 5

Angles for starting holes can also be shown on a part print measured in the clockwise direction as shown in Figure 5 for hole 2.

This angle is also shown as 135 degrees, but its sign is negative. The actual bEG ANG is therefore $360 - 135 = 225$.

HOW TO COMPUTE END ANG: All end angles (END ANG) are measured in a clockwise (CW) direction from the 3 o'clock position.

As seen from Figure 5, the angle of hole 2 is -135 degrees. If hole 2 was the end hole of the pattern, then enter END ANG as 135. The console will automatically enter the value as a negative value.

Often part prints give the following details (as seen in EXAMPLE 2 on page A5):

Quantity of Holes = 7

Angle between holes = 24 degrees

Beginning Angle = 315 degrees

Total angle (angle between the first hole to the last hole) = angle between holes x (times) the quantity of holes - (minus) 1. i.e. $(24 \times (7-1)) = 144$

The first hole starts at 315 degrees. The last hole is at $315 + 144 = 459$. Since a complete circle is only 360 degrees, the last hole would be at $459 - 360 = 99$. (CCW)

Therefore, the end angle (END ANG) measured clockwise (CW) is $360 - 99 = 261$. This is the value to be entered for END ANG.

BOLT HOLE PATTERN (continued)

The parameters required for computing the bolt hole pattern are:

- 1) Full or Partial Pattern
- 2) Diameter of pattern
- 3) Start angle
- 4) Number of holes to be drilled
- 5) X and Y dimensions to the center of the pattern
- 6) End angle (if partial hole pattern only)

Example 1: Consider the pattern to be drilled in Figure 6.
Enter the following parameters.

Full/Partial Pattern Select Full
bHP DIA = 2.0000"
bEG ANG = 45.0000
QTY HOLE = 8
X CENTER = 2.0000"
Y CENTER = 2.0000"

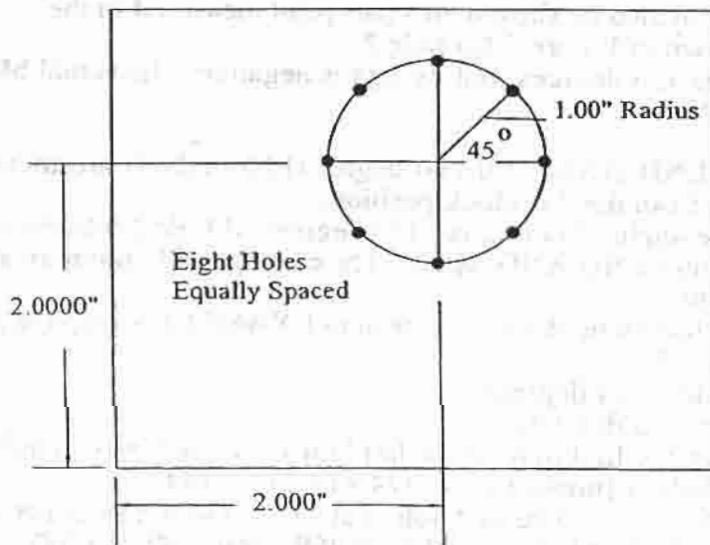


Figure 6

BOLT HOLE PATTERN (continued)

Example 2: Drill 7 holes in a Partial Pattern as seen in Figure 7. Holes are equally spaced and the angle between holes is 24 degrees.

Full/Partial	Select Partial
bHP dIA = 1.0000"	
bEG ANG = 315.0000	
QTY HOLE = 7	
X CENTER = 1.5000"	
Y CENTER = 1.0000"	
END ANG = 261.0000	

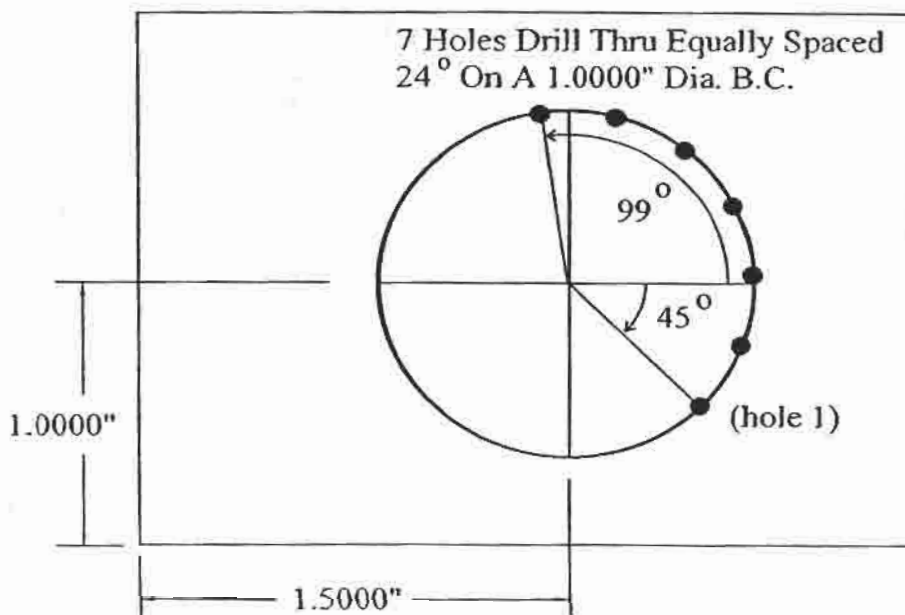


Figure 7

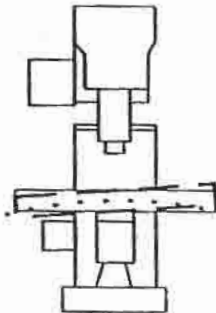
CORRECTION FACTOR APPENDIX B

There are two common types of machine errors. 1) Lead Screw Error 2) Pitch Error

Any conventional readout is independent of the lead screw error and automatically compensates for this type of error. (Scales read table movement and not lead screw movement.)

Machine inaccuracies or Pitch Error is caused by age, wear or construction of the machine as well as the size and weight of the work piece. These inaccuracies can cause increased or decreased dimension on the part. For example, if one inch is displayed on the axis display, but the actual distance moved (measured with a dial caliper) is more or less than an inch, an error has occurred.

Pitch error is illustrated in the figure below.



PITCH ERROR

As the machine table moves to the left, it tends to tilt to the left. The same applies when moved to the right. The result is a pitch having a theoretical center point below the machine. The pitch error is increased as larger and heavier parts are placed on the machine.

Machine errors can cause inaccurate readings on a readout even though the console and the scales are accurate and working properly.

EXAMPLE: The console displays 1.0000" on the X axis, but the distance measured on the part is only .9950. To compensate for this error, follow this procedure.

X 1.0000	ENTER DISPLAY VALUE
X .9950	ENTER ACTUAL DISTANCE
F03	ACTIVATE CORRECTION FACTOR

The X axis display will have CF indicator ON when F03 is entered.

LINEAR HOLE PATTERN APPENDIX C

An application may require the DRO to drill a pattern of holes, as shown in the figure below.

Parameters required to compute the linear hole pattern are:

- 1) (X, Y) location of the first hole
- 2) Length of pattern in X axis
- 3) Distance between holes in X axis
- 4) Width of pattern in Y axis
- 5) Distance between holes in Y axis

DISPLAY IN MESSAGE WINDOW

X HOLE 1
Y HOLE 1

XLENGTH
X-X CENT
Y WIDTH
Y-Y CENT

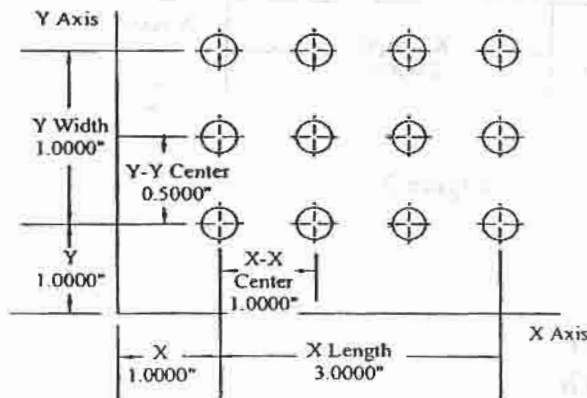


Figure 1

Example 1: Refer to figure 1

X HOLE 1 = 1.0000 inch

Y HOLE 1 = 1.0000 inch

Length of pattern on X axis (X-LENGTH) = 3.0000"

Distance between holes on X axis (X-X CENT) = 1.0000"

Width of pattern on Y axis (Y-WIDTH) = 1.0000"

Distance between holes on Y axis (Y-Y CENT) = .5000"

Number of holes in the X axis is $(X \text{ LENGTH} / X\text{-X CENT}) + 1 = 3/1 + 1 = 4$

Number of holes in the Y axis $(Y - WIDTH / Y - Y CENT) + 1 = 1/.5 + 1 = 3$

Total number of holes = $4 \times 3 = 12$

LINEAR HOLE PATTERN (continued)

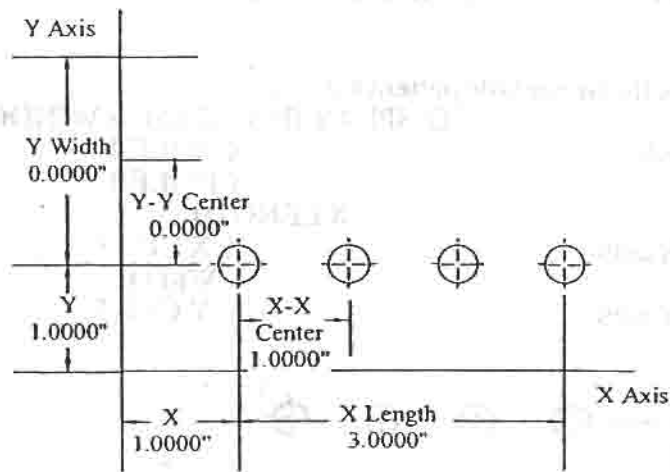


Figure 2

Example 2:

X HOLE 1 = 1.0000 inch
 Y HOLE 1 = 1.0000 inch
 X LENGTH = 3.0000
 X-X CENT = 1.0000
 Y Width = 0.0
 Y-Y CENT = 0.0

Number of holes in the X axis is $3 + 1 = 4$

Number of holes in the Y axis is $0 + 1 = 1$

Total number of holes = 4

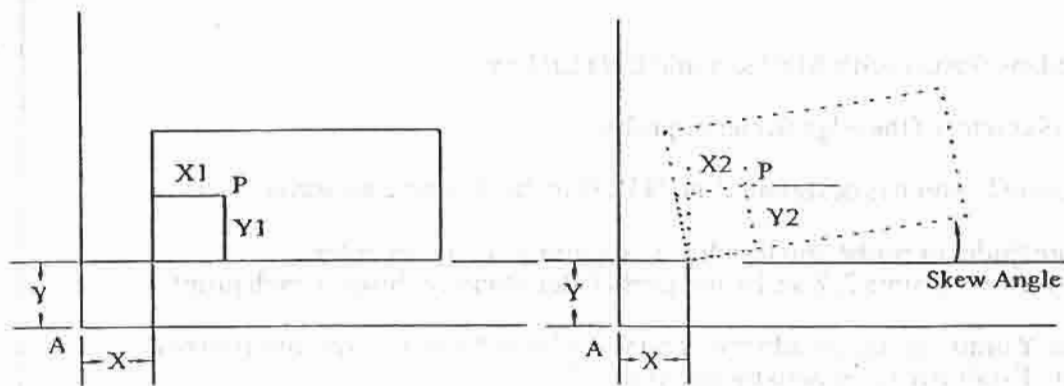
SKEW APPENDIX D

The Skew feature allows the operator to place a part on the machine and perform drilling operations, without aligning the part.

In Figure 1, the part edge is aligned to the table. If P is at $X = 1.0000''$ and $Y = 1.0000''$, and the part edge is $X = 1.0000''$ and $Y = 1.0000''$ from (0,0) Point A, then the table must move $2.0000''$ in both X and Y to reach point P.

Now consider the same part is shifted or skewed around the part edge. (Figure 2)

For the same point P on the part, the table will have to move less than $2.0000''$ on the X axis and more than $2.0000''$ on the Y axis. The part is said to be misaligned with respect to the table at a skew angle of some unknown number of degrees.



STAGED PART

Figure 1

SKEWED PART

Figure 2

Continued on next page

SKEW (continued)

EXAMPLE: Refer to in Figure 3. The part does not have a corner that can be used as a reference point and it is also skewed with respect to X axis on the table.

Consider a drilling operation, stored in the Electronic Notepad, to be performed on the part. Simply recalling lines from the notepad and moving to zero will not be correct because the part is skewed.

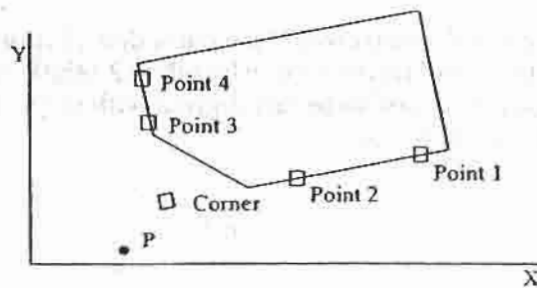


Figure 3

Procedure:

- (1) Activate Skew feature with ADV key and ENTER key.
- (2) Enter the diameter of the edge finder or probe.
- (3) Move to point P which is designated as IN POS in the message window.
- (4) Move edge finder or probe and touch part at point 1 and press enter. Similarly, move to points 2, 3 and 4 and press enter after touching at each point.
- (5) Move X & Y until displays read zero. You would now be at the unknown corner of the part. Establish a part zero by entering F01.
- (6) Recall the information from the Electronic Notepad and move to zero.

The console will automatically compensate for the misaligned part on the table. Once program is complete, press SET to deactivate skew mode.

NOTE: You cannot activate Correction Factor on the X or Y axis when in Skew mode. Skew is strictly for drilling operations only and not milling operations.

TAPER CALCULATIONS APPENDIX E

In turning operations, it is often required to determine the taper angle of a part and also to set the lathe taper attachment to cut the taper.

Most often this angle is found by trial and error while trying to cut the part. This can lead to a waste of time and also a scrapped part.

The Taper Calculator finds the exact angle of the part without making a cut, and the crossslide can be accurately set to this angle.

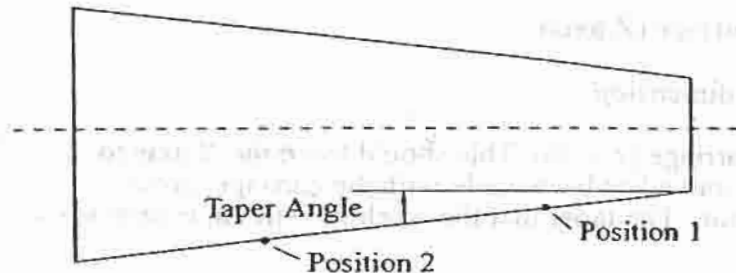


Figure 1

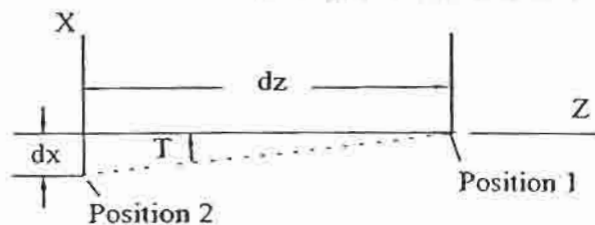


Figure 2

$$\text{Tangent (T)} = \frac{dx}{dz}$$

Taper Calculator is only active when in the Lathe Mode in Standard consoles, but is always active in the WIZARD LATHE.

1. If you are using a Standard Console, switch the console to lathe mode. Use F29. If you have a WIZARD LATHE, start from the second procedure.
2. Select TAPER from the ADV key.
3. Touch the part at position 1 and press ENTER.
4. Touch the part at position 2 and press ENTER.

TAPER CALCULATIONS (continued)

Taper angle is now displayed in the Message Window.

A crossslide taper attachment taper can be found without touching the part.

1. Attach the taper equipment and set the taper attachment to approximately the correct angle.
2. Activate Taper Calculator with the ADV key.
3. Make a small move with the carriage (Z axis).
4. Press ENTER to enter the first dimension.
5. Make another move with the carriage (Z axis). This should force the X axis to move also. When a reasonable move has been made with the carriage, press ENTER for the second dimension. The taper that the machine will cut is displayed in the message window.

This allows the correct taper to be set without a chip being made.

DATUM EXPLANATION APPENDIX F

Datum is a point or a reference location, from which a part can be machined.

1. **MACHINE ZERO (HOME):** This is a reference point on the machine commonly used to establish a part zero or part Datum. On the cartesian coordinate system it is the (0,0) point of the machine. (See Figure 1)

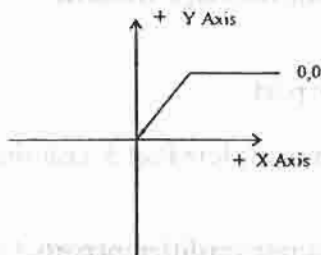


Figure 1

2. **ABSOLUTE ZERO or DATUM ZERO:** Consider the situation where 3 different parts are placed on the table. A similar machine process is to be performed on each part as in Figure 2.

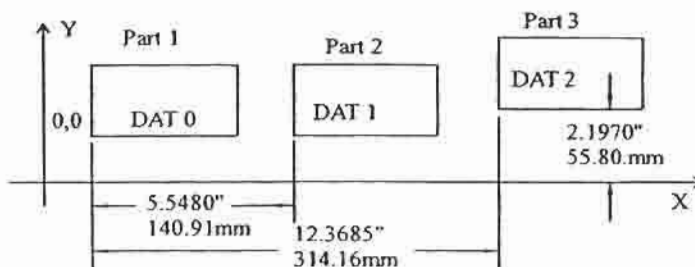


Figure 2

PROCEDURE:

1. Turn power ON, press SET
2. Move to corner of Part 1 designated as DAT 0 in Figure 2
3. With spindle center over the corner of Part 1, establish Absolute Zero by pressing F01
4. Move spindle center to the corner of Part 2 designated as DAT 1
5. Write the X and Y axis display dimensions down for entry later
6. Move spindle center to the corner of Part 3 designated as DAT 2
7. Write the X and Y axis display dimensions down for entry later
8. Move back to Absolute Zero or DATUM 0 of Part 1
9. To set DATUM 1, press X, -5.5480" (-140.91mm), Y, 0, ENTER key, DATUM key until d00 is displayed in message window, number 1 key, SET key
10. To set DATUM 2, follow the procedure described in step 9 but replace dimensions with X, Y dimensions of DATUM 2

DATUM (continued)

If a program has already been entered, simply recall the program to complete Part 1.

To recall Datum 1 for Part 2, press the following keystrokes

- (1) RECALL
- (2) DATUM key until d0 is displayed in the message window
- (3) Number 1
- (4) SET
- (5) Recall your program and machine the part.

Repeat the procedure described above to complete Part 3, entering DATUM 2 in place of DATUM 1.

Datum points help to machine a similar program on different parts. Once the 3 parts are machined, a new group of 3 parts can be placed on the machine.

TOOL OFFSET MILL APPENDIX G

An operation might require different tools. Each tool has a different diameter and length called (tool offset). Each tool can be programmed with a tool number assigned to each tool.

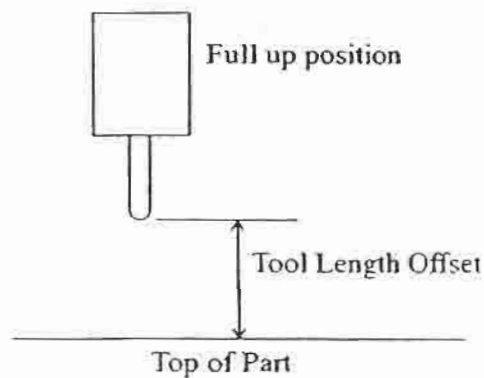
To Set Tool Offset:

NOTE: Offsets cannot be used with tools in a collet. You must use preset tooling.

Move the Z axis to the full up position and establish an absolute zero on this axis only.

(ABS, Z, O, SET, INCR, Z, O, SET)

Place the tool in the spindle and move spindle down until the tool touches the surface of the part. (See fig. below) The distance displayed on the Z axis is the tool length of the present tool. This is the dimension that is entered to the tool table. Follow the procedure specified on page 74 for TOOL OFFSET SET (Mill).



NOTE: Tool preset is not available in a 2 axis console.

TOOL OFFSET LATHE APENDIX H

This section illustrates the method to preset and modify tool offsets.

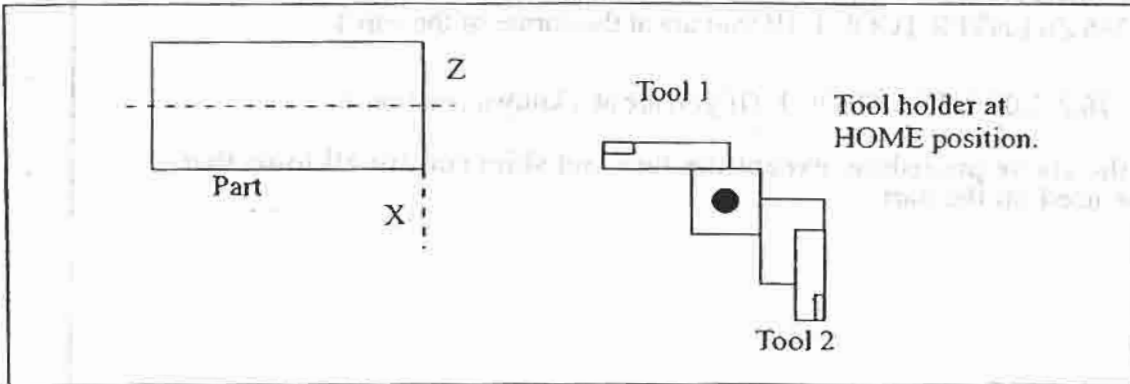


Figure 1

- 1.) Establish a home or tool change position away from the part as shown in Figure 1. Home position can be established using absolute zero (F01) or marker pulse (F02).
- 2.) Preset Tool 0 at this location. Press [X, 0, Z, 0, Enter, Tool, 0].
- 3.) Select Tool 1 on your tool holder and make a face cut of the part with this tool. Do not move the carriage after the face cut is made, but back the crossslide off from the part. Change the display to INCREMENTAL and press [Z, 0, SET].
- 4.) Move the tool to the part and make a skim cut on the diameter just long enough to allow a micrometer to measure the part. Measure the diameter. For example: $D=2.376$."
- 5.) Position the tool at the corner of the part or at any known position as shown in Figure 2.

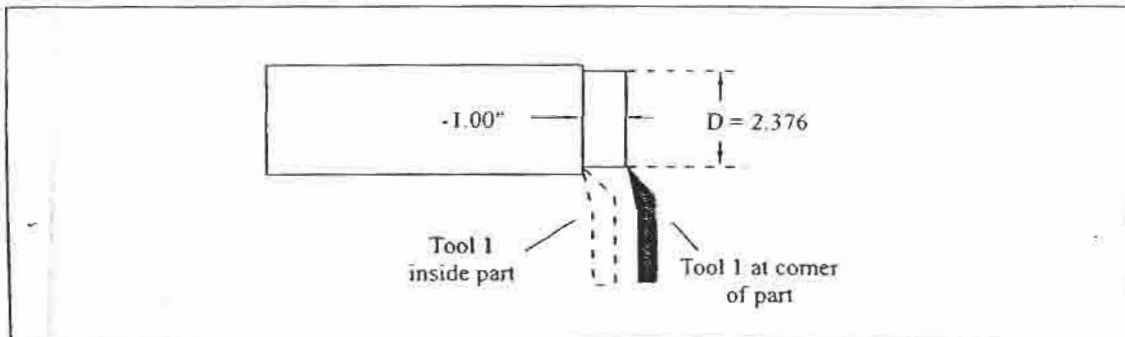


Figure 2

TOOL OFFSET LATHE (continued)

6.) Preset the offset for the tool as shown below.

X 2.376 Z0 ENTER TOOL 1 (If you are at the corner of the part.)

or

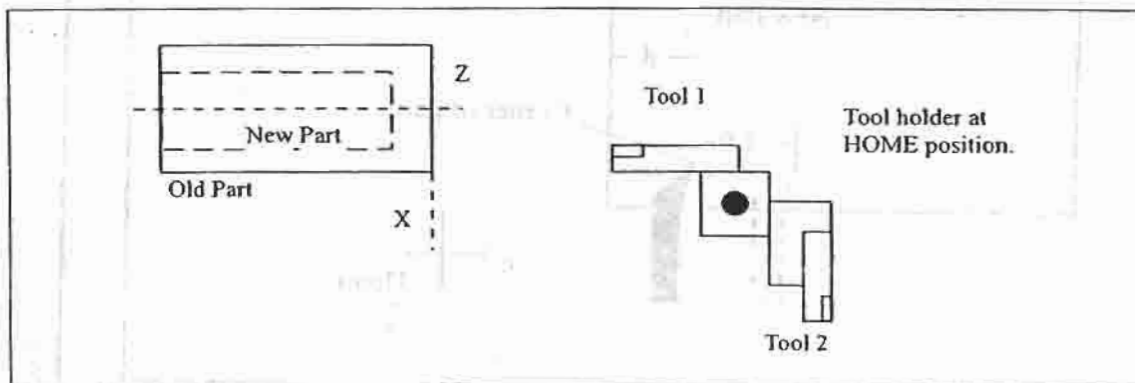
X 2.376 Z-1.0 ENTER TOOL 1 (If you are at a known position.)

7.) Repeat the above procedure, except the face and skim cut, for all tools that are to be used on the part.

TOOL OFFSET MODIFY (LATHE)

Allows the Z offset to be modified for all tools without reentering values.

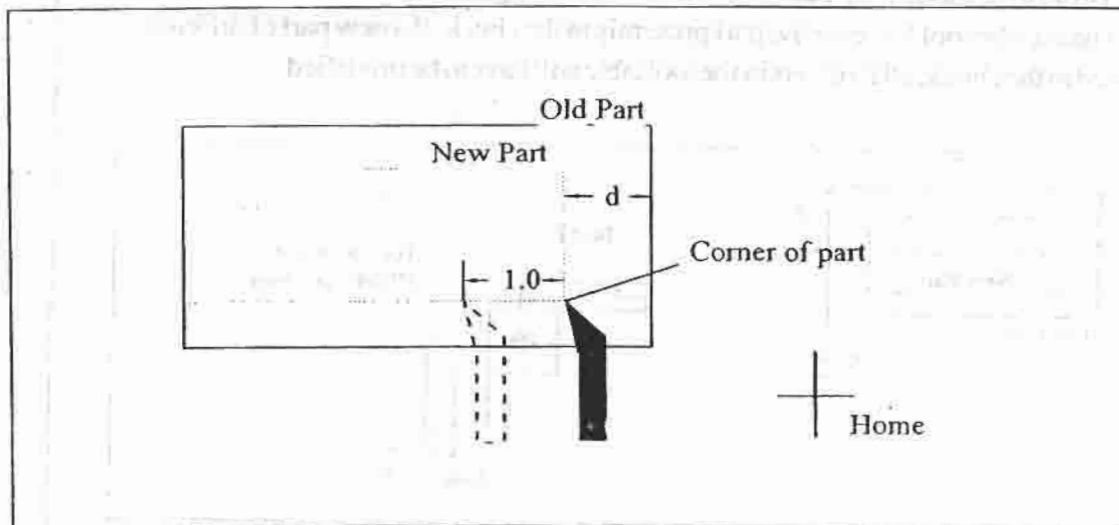
The operator has set the tool table for the part presently in the chuck. If a new part of different length is placed in the chuck, all Z offsets in the tool table will have to be modified.



METHOD 1

- 1.) Recall Tool number that is used to face a part. EXAMPLE: Tool 1. Press **RECALL TOOL 1**.
- 2.) Place the new part in the chuck and make a face cut. Do not move the carriage, but back the tool off the face with the crossslide.
- 3.) Press **Z0 F00**.
- 4.) Recall any tool and the Z offset for the tool will be adjusted to the new offset distance.

TOOL OFFSET MODIFY (LATHE)



METHOD 2

- 1.) Recall the present tool that is being used. EXAMPLE: Tool 2. Press **RECALL TOOL 2.**
- 2.) Move the carriage until the Z axis display reads zero.
- 3.) Move to the corner of the new part and press **Z0 F00** or move to the known position inside the part and press **Z-1.0 F00.**

INPUT / OUTPUT CONNECTIONS APPENDIX I

The input connections allow signals from external devices to activate specific DRO functions.

The output connections allow the DRO to generate signals to operate external devices. Output signals are generated when selected DRO functions are activated.

The RS 232 port allows the DRO to exchange data with other RS 232 devices. The DRO can be connected to an RS 232 compatible printer to make hard copies of stored programs. When the DRO is used as part of a coordinate measurement system, the finished part's coordinates can also be sent directly to a printer. Wizard 800 and lathe DROs equipped with the options package can also be remotely controlled by connecting the RS 232 port to a dumb terminal or an IBM compatible PC running a terminal program.

Input/Output connectors are located on the back of the unit, oriented as shown in Figure 1.

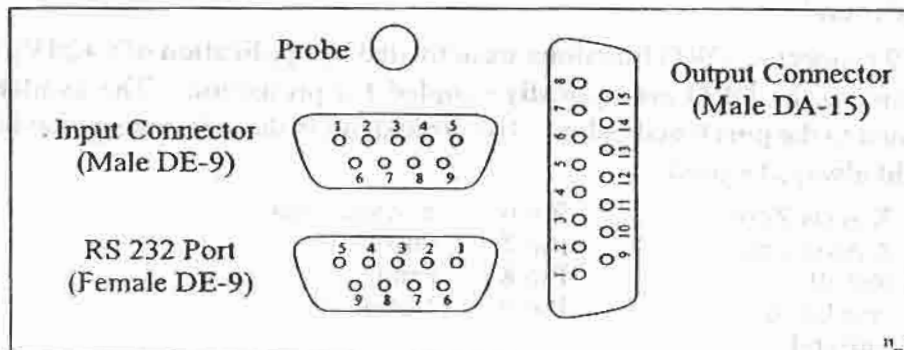


Figure 1, Input/Output Connectors

Input/Output cables should be no longer than 8 feet (2.5 meters) in length. All cables should be constructed from high quality shielded (screened) cable, Belden type 9538 or equivalent. Wire shielding should be electrically bonded to the metal back shell on both connectors. Connectors with plastic back shells are unacceptable.

Probe: A single lead RCA type phono jack for an edge sensor probe.

INPUT / OUTPUT CONNECTIONS (continued)

Outputs: (Male DA15 connector) Outputs are enabled by applying a constant +24VDC, 50mA source to pins 7 & 14 and a ground to any two ground pins. Once enabled, pins 3, 4 and 11 will generate a 24V common signal at the listed axis zero. Pin 10 generates a 24V common signal within range of an axis zero. Function 08 activates the output and Function 6 defines the range. Each output can sink 500mA of current when active. The 24V common output is generally used to complete a relay control circuit. The relay controls the external device. Figures 2 & 3 are generic circuits for wiring output circuits. Figures 4 & 5 are wiring diagrams for installation of Anilam Z Axis Zero Output Kits, P/N 30000210.

Pin 1	Not Used	Pin 9	Not used
Pin 2	Not Used	Pin 10	Approaching Zero
Pin 3	X Axis Zero	Pin 11	Y Axis Zero
Pin 4	Z Axis Zero	Pin 12	Not Used
Pin 5	Ground	Pin 13	Ground
Pin 6	Ground	Pin 14	+24 Volts
Pin 7	+24 Volts	Pin 15	Ground
Pin 8	Ground		

Inputs: (Male DE-9 connector) DRO functions are activated by application of a +24VDC, 10mA signal. Inputs to the DRO are optically coupled for protection. The available functions are assigned to the pins listed below. The ground pin is the reference ground for the input and should always be used.

Pin 1	X Axis Zero	Pin 6	Y Axis Zero
Pin 2	Z Axis Zero	Pin 7	Store
Pin 3	Recall	Pin 8	Print
Pin 4	Not Used	Pin 9	Not used
Pin 5	Ground		

RS 232 Port: (Female DE-9) Pin assignments are as listed below

Pin 1	Not Used
Pin 2	TXD (Transmit Data from Console)
Pin 3	RXD (Receive Data to console)
Pin 4	Not Used
Pin 5	Ground
Pin 6	Not used
Pin 7	CTS (Clear to Send to Console)
Pin 8	RTS (Request to Send from Console)
Pin 9	Not used

INPUT / OUTPUT CONNECTIONS (continued)

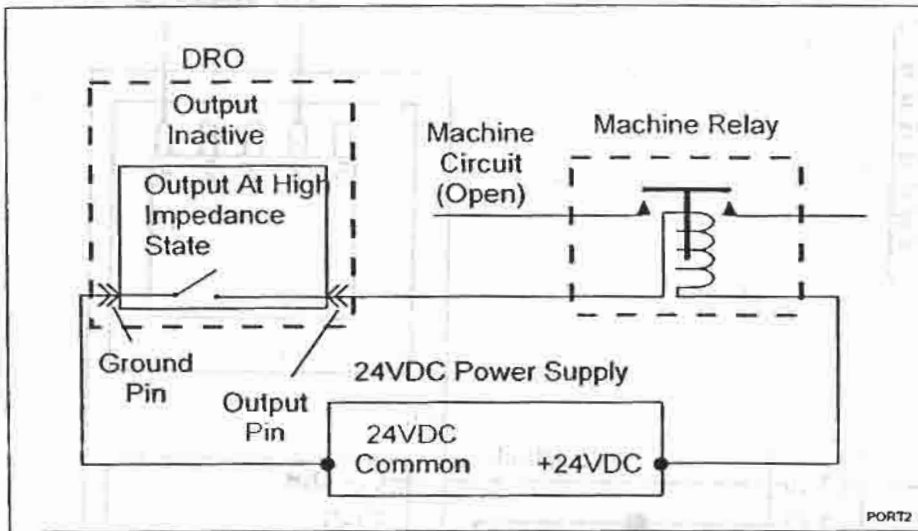


Figure 2, Generic Output Circuit, Inactive Output

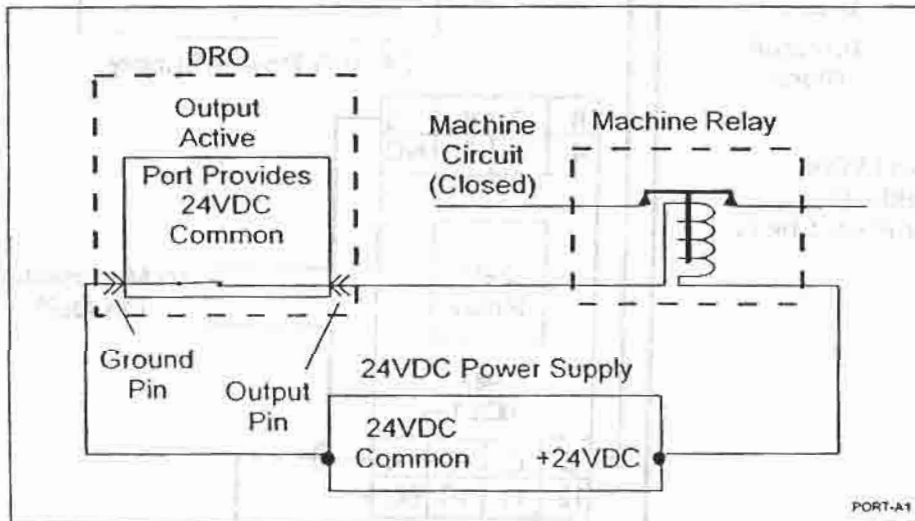


Figure 3, Generic Output Circuit, Active Output

INPUT / OUTPUT CONNECTIONS (continued)

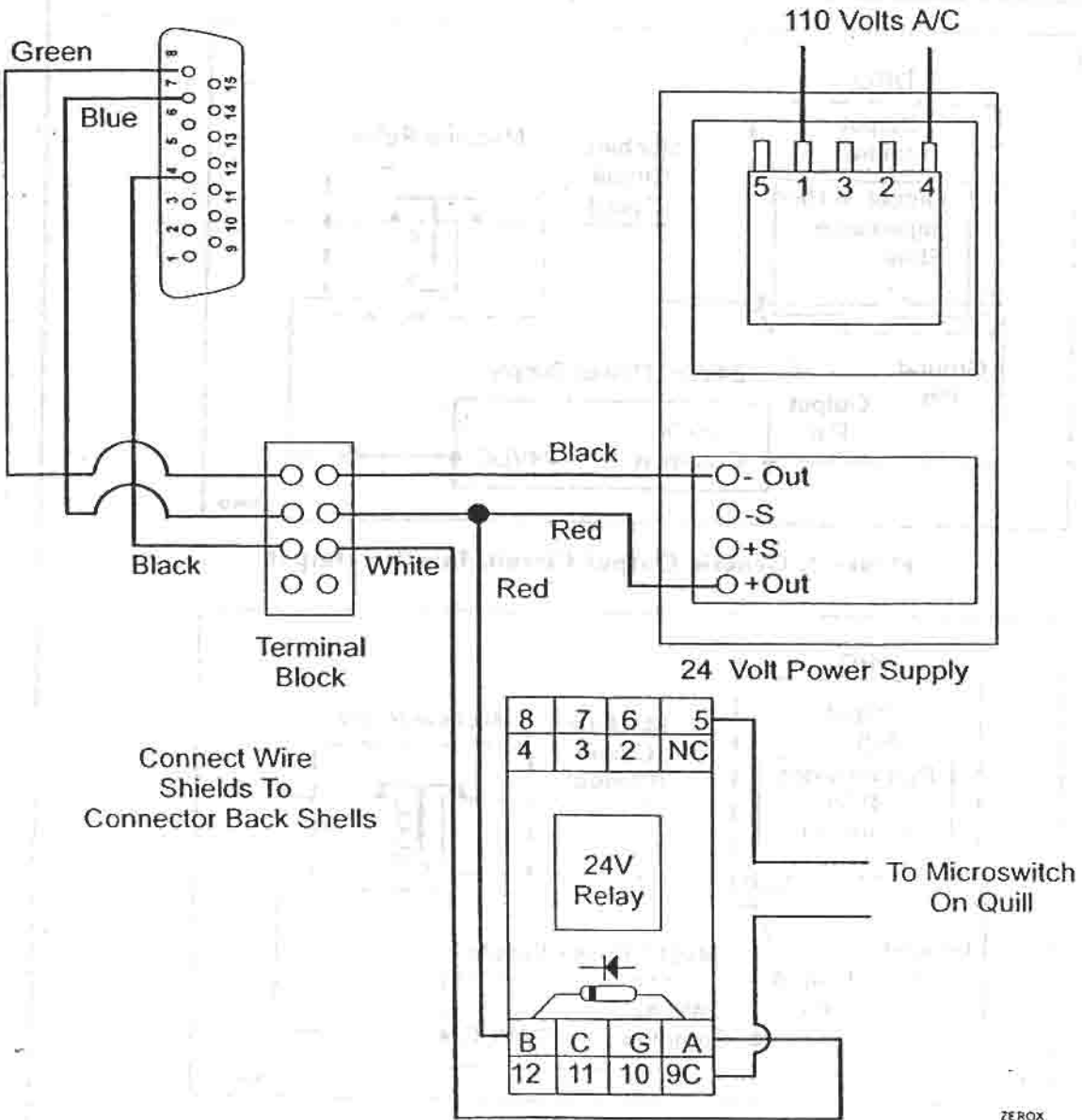
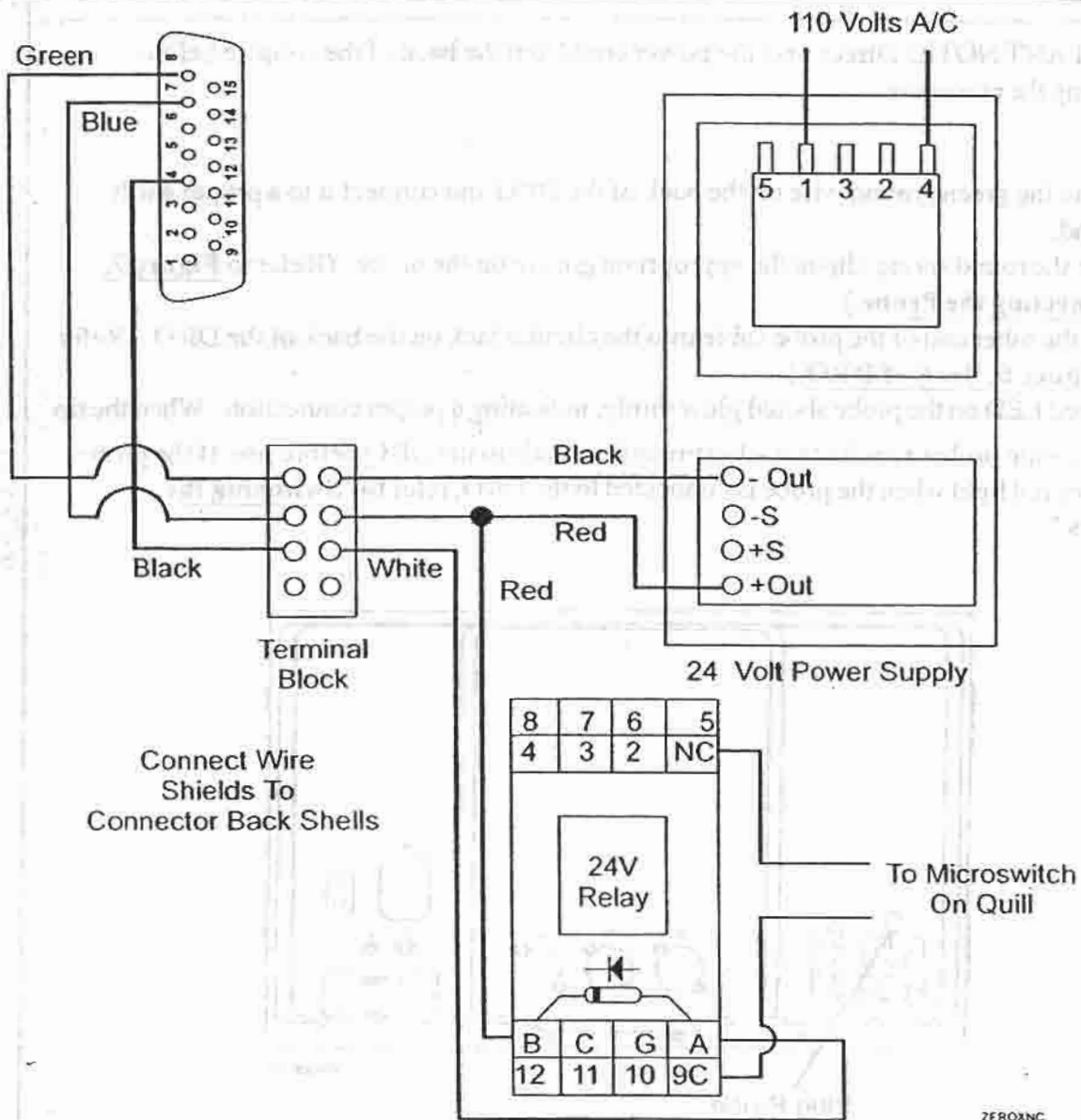


Figure 4, Wiring Details For Z Axis Zero Output Kit with Normally Open Switch

INPUT / OUTPUT CONNECTIONS (continued)



ZEROXNC

Figure 5, Wiring Details For Z Axis Zero Output Kit with Normally Closed Switch

CONNECTING THE PROBE

IMPORTANT NOTE: Disconnect the power cord from the back of the console before performing the procedure.

1. Locate the green ground wire on the back of the DRO and connect it to a proper earth ground.
2. Place the round spring clip in the appropriate groove on the probe. (Refer to **Figure 7, Connecting the Probe.**)
3. **Connecting the Probe.**
Plug the other end of the probe cable into the circular jack on the back of the DRO. (Refer to **Figure 6, Back of DRO.**)
4. to **Figure 6, Back of DRO.**)

The red LED on the probe should glow dimly, indicating a proper connection. When the tip
NOTE: Some probes require that adjustments be made to the DRO before use. If the probe LED does not light when the probe is connected to the DRO, refer to "**Switching the Jumpers.**"

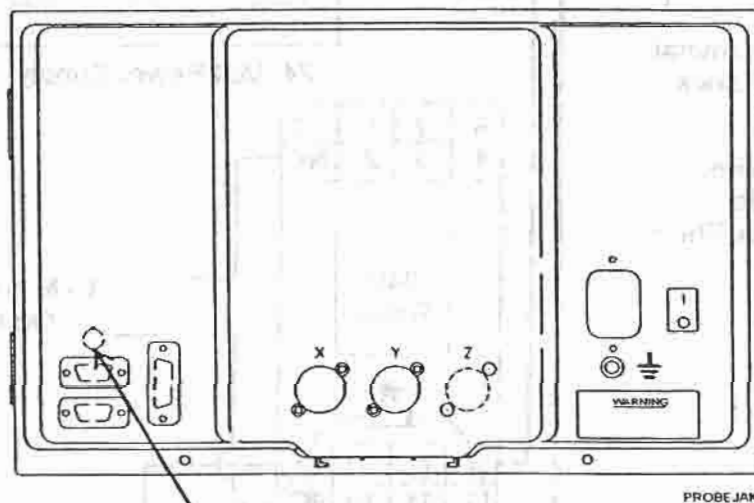


Figure 6, Back of DRO

CONNECTING THE PROBE (continued)

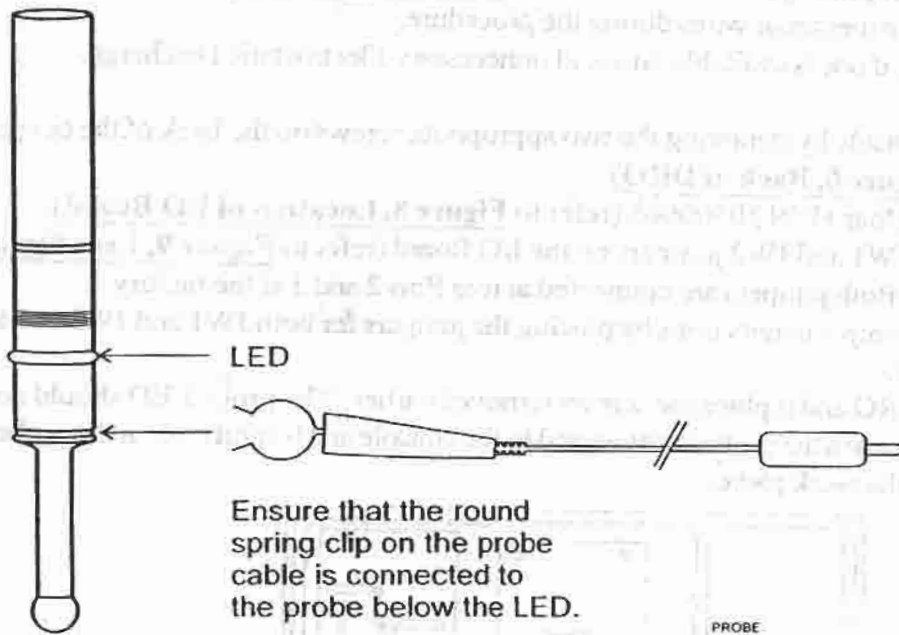


Figure 7, Connecting the Probe

SWITCHING THE JUMPERS

IMPORTANT NOTE: This procedure should only be performed if the probe LED did not respond appropriately, as documented in Connecting the Probe. Be careful not to disconnect any harnesses or wires during the procedure.

Wear a wrist strap, if one is available, to avoid unnecessary Electrostatic Discharge.

1. Open the console by removing the two appropriate screws on the back of the console (refer to **Figure 6, Back of DRO**).
2. Locate I/O Board P/N 30500063 (refer to **Figure 8, Location of I/O Board**).
3. Locate the JW1 and JW2 jumpers on the I/O Board (refer to **Figure 9, Location of Jumpers**). Both jumpers are connected across Pins 2 and 3 at the factory. Switch the jumper connections by placing the jumpers for both JW1 and JW2 across pins 1 and 2.
4. Close the DRO and replace the screws removed earlier. The probe LED should now glow dimly when the probe is connected to the console and brightly when the probe is touched to the work piece.

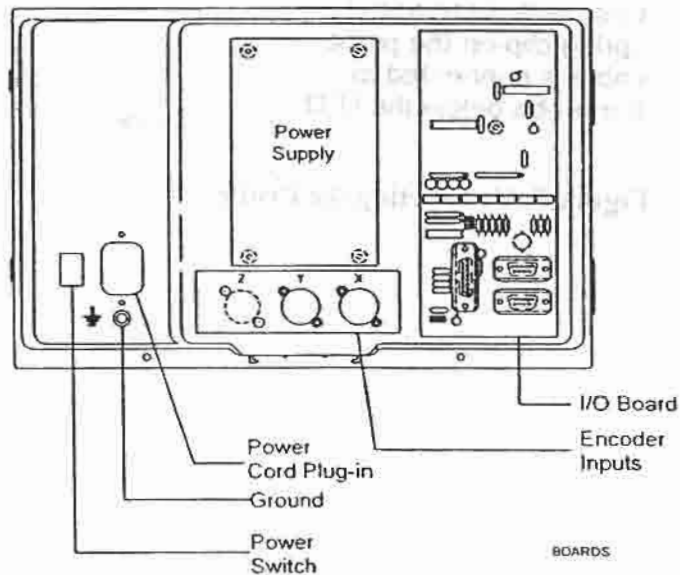


Figure 8, Location of I/O Board

SWITCHING THE JUMPERS (continued)

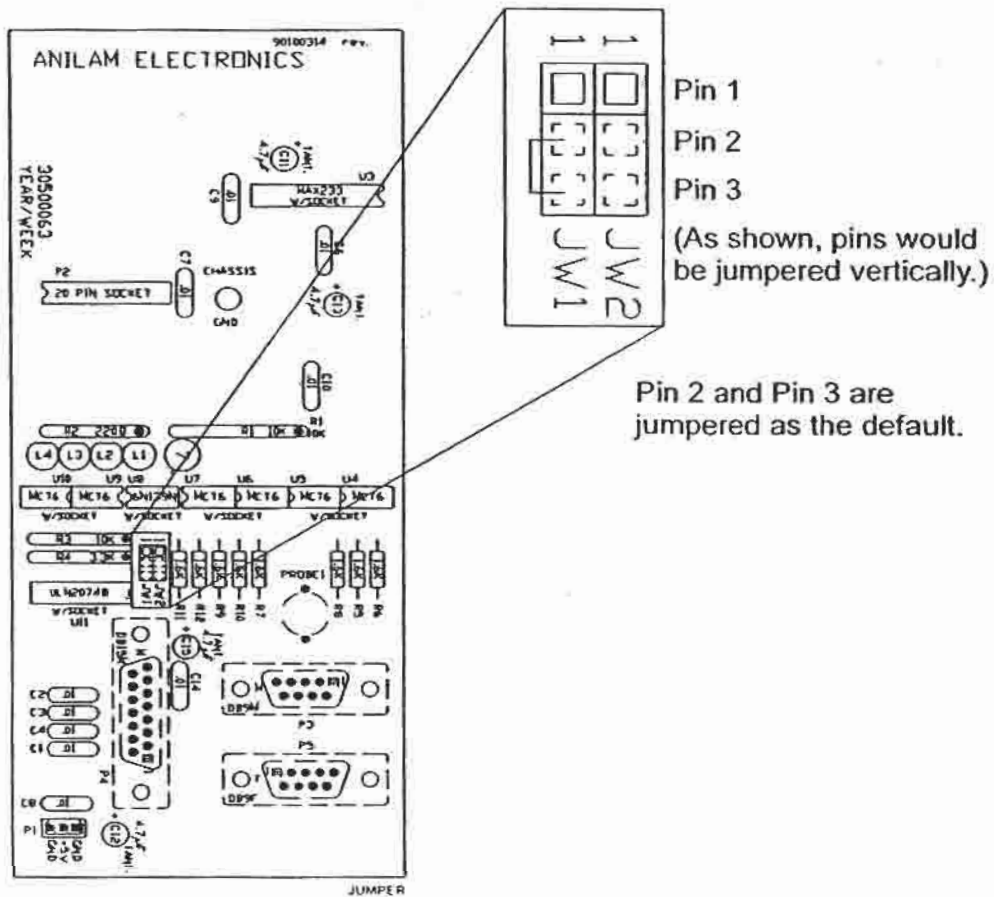


Figure 9, Location of Jumpers

ADVANCED NOTEPAD EXAMPLE APPENDIX J

The following features have been used to illustrate the advanced Electronic Notepad Example:

1. Edge Sensor Probe
2. Linear Hole Pattern
3. Bolt Hole Pattern (Partial)
4. Datum Set
5. Electronic Notepad Enter
6. Mirror Image
7. Bolt Hole Pattern (Full)
8. Datum Recall
9. Centering

(Drawing continued on next page)

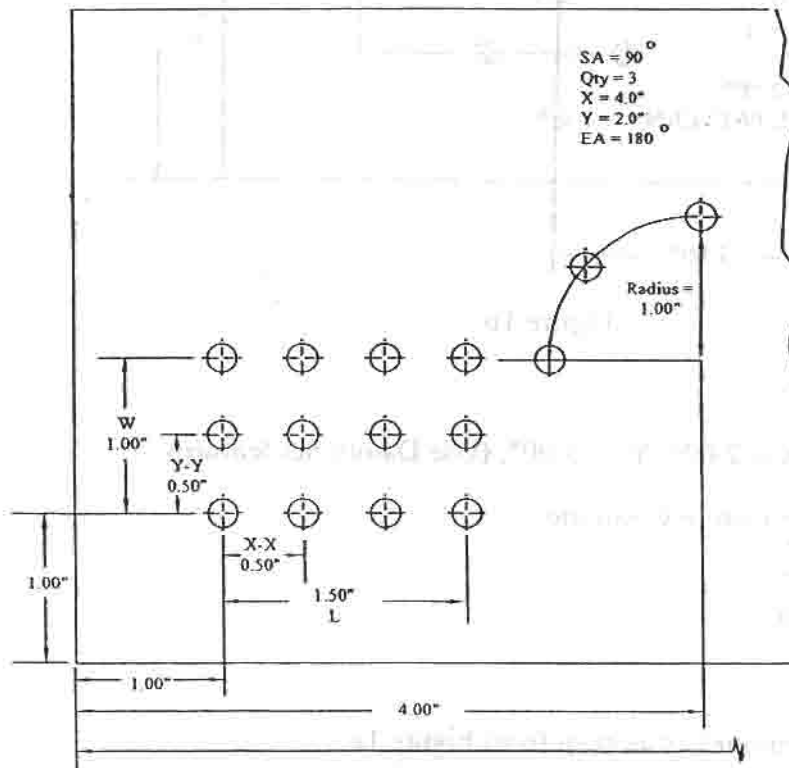


Figure 1a

ADVANCED NOTEPAD EXAMPLE (continued)

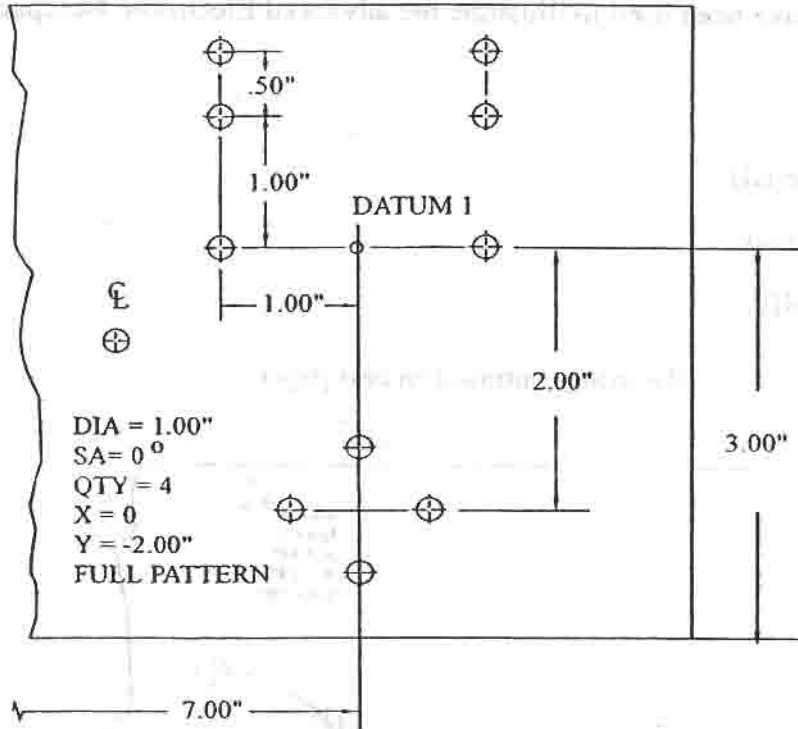


Figure 1b

NOTEPAD ENTRY:

1. Enter Datum 1 as $X = 7.00"$, $Y = -3.00"$. (Use Datum Set feature)
2. Do the Linear Hole Pattern Compute
X HOLE 1 = $1.00"$
Y HOLE 1 = $1.00"$
X LENGTH = $1.50"$
X-X CENT = $.50"$
Y WIDTH = $1.00"$
Y-Y CENT = $.50"$
Using the above parameters as seen from Figure 1a

ADVANCED NOTEPAD EXAMPLE (continued)

3. Do the Partial Bolt Hole Pattern Compute

bHP dIA = 2.00"

BEG ANG = 90

QTY HOLE = 3

X CENTER = 4.00"

Y CENTER = 2.00"

END ANG = -180

4. Enter the following dimensions to the Electronic Notepad

X - 1.00" INCR

Y 0.0"

X 0.0" INCR

Y 1.00"

X 0.0" INCR

Y 0.50

(Use Electronic Notepad Enter)

5. Do the full Bolt Hole Pattern Compute

bHP dIA = 1.00"

bEg ANG = 0.0

QTY HOLES = 4

X CENTER = 0.0

Y CENTER = 2.00"

This will complete data entry to the Electronic Notepad.

SETUP AND RECALL FROM ELECTRONIC NOTEPAD:

1. Place the part on the table properly. The part must be indicated to align the part. This must be done because of Centering.
2. Use Centering to find the center of the part and drill the hole.
3. Position the center of the spindle on the part edge. (Use Edge Sensor Probe).
4. Recall Linear Hole Pattern on Figure 1a from the Electronic Notepad (Use Linear Hole Pattern Recall).
5. Recall Bolt Hole Pattern on Figure 1a from Electronic Notepad.
6. Recall Datum 1 (Use Datum Recall).
7. Recall lines for the three holes that are to be drilled.
8. Set the console to Mirror X axis. (Use Mirror Image).

ADVANCED NOTEPAD EXAMPLE (continued)

9. Recall the previous three lines of dimensions to do the second set of three holes from figure 1b.

10. Recall the second Bolt Hole Pattern.

The job will now be complete.

REMOTE OPERATION APPENDIX K

800
OPT

The DRO can be remotely operated from an IBM compatible computer (running a terminal program) or a dumb terminal via a RS-232 serial link.

Remote operation also permits the up loading and down loading of DRO notepad files. A computer ASCII text editor can be used to write a DRO notepad. Once written, the notepad can be uploaded for use on the DRO. DRO notepads can also be downloaded from the DRO to an off line computer (running a terminal program). Once down loaded, the notepad can be saved as a computer file for later reuse.

The baud rate, parity, and data bit settings of the DRO and the terminal (or computer) must agree. The remote terminal (or computer) must also be set to send upper case ASCII characters. If a PC computer running a terminal program is being used, ensure that the program does not generate any modem control signals. The DRO does not recognize modem commands.















































Note: Activation of the display dim feature inhibits remote operation. If required, reactivate the display before attempting remote operation.

Setup remote operation of the DRO as follows:

1. Connect the cable from the terminal's (or computer's) RS-232 serial port to the DRO's RS-232 serial port. Ensure the cable is wired so TXD pin on the terminal is connected to the RXD pin on the DRO and the RXD pin on the terminal is connected to TXD pin on the DRO (Refer to Appendix I).
2. Adjust baud, parity, and data bit settings of the DRO and the terminal (or computer program) to agree (refer to Function 27).
3. Turn the DRO's RS-232 port on (refer to Function 28).
4. DRO can now be operated by pressing keyboard keys.

REMOTE OPERATION APPENDIX K (continued)

Once the RS-232 link is activated, the DRO can be operated by pressing the terminal's keyboard keys. Remote operation of the DRO is exactly the same as from the keypad. The following list shows the keypad's equivalent keyboard keys.

(Datum Mode)

(Tool Mode)



(Absolute Mode)



(Incremental Mode)



(Inch Mode)



(Metric Mode)

REMOTE OPERATION APPENDIX K (continued)

Example #1: Preset X axis to 12.45 by keying in

X 1 2 . 4 5 S

DRO displays.

X 12.450
ABS ⊕

Example #2: Set datum #1 at X-23, Y-13 and datum #2 at X-34, Y-45.

X - 2 3

Y - 1 3

E D

Display in message window.

ENT

1

(enter second datum)

X - 3 4

Y - 4 3

E D 2

REMOTE OPERATION APPENDIX K (continued)

Example #3: Enter offset of Z-13 for tool #1 and offset of Z-45 for tool #2.

Z - 1 3

E T

Display in message window.

ENT T I

1

(enter second offset)

Z - 4 5

E T 2

Example #4: Clear X axes.

C X S

Example #5: Clear all axes.

F 0 1 or C A S

Example #6: Recalling notepad blocks..

R 0 0 1 Recalls block #1.

R R Recalls block #2.

R R Recalls block #3.

REMOTE OPERATION APPENDIX K (continued)

Example #7 Use a text editor to create a notepad file and upload it to the DRO.

Most IBM compatible PC computers come with an ASCII text editor already installed. Notepad files must be written in capital letters. Mode changes (inches to mm or absolute to incremental) are accomplished by using G-codes. The following list shows the ASCII character keypad equivalent keys.

X, Y, Z	(X)	(Y)	(Z)	0-9	(0)	(9)	(-)	(+/-)	G71	(IN/MM)
S	(SET)				(.)		G90	(ABS/INCR)	G70	(IN/MM)
R	(RECALL)		E	(ENTER)			G91	(ABS/INCR)		
							ABS		Inch	
							INC			

Key in the following notepad. Note the following format rules:

All characters are upper case.

All decimal points are included.

An E00# or EE is required after each X, Y, Z position.

Each entry is followed by a carriage return/line feed combination.

REMOTE OPERATION APPENDIX K (continued)

G90 (activate absolute coordinates)
X10.0
Y10.0
Z-2.0
E001 (ENTER block 001)
X20.0
Y20.0
Z-2.0
EE (ENTER next block)
G91 (activate incremental coordinates)
X10.0
Y10.0
EE (ENTER next block)
X10.0
Y10.0
EE (ENTER next block)
S (SET exits memory mode)

Save the notepad as a file.

Uploading a notepad to the DRO.

- 1) Establish an RS-232 link between the PC and the DRO (ensure display dim has not activated).
- 2) Using the tools provided by the terminal program, send the notepad to the DRO. Each of the positions will flash rapidly on the display as they are received by the DRO.

REMOTE OPERATION APPENDIX K (continued)

Example #7 Down load a notepad blocks 1 through 10.

B 0 0 0 1 - 0 1 0

Downloaded file will appear on the communication program's screen, use the software tools provided to save the down loaded notepad as a file. Note that any absolute/incremental mode changes and inch/mm mode changes will not appear in the downloaded notepad listing. These will have to be manually edited into the notepad file with a text editor if the file is to be uploaded for use again.

SENDING DRO DATA TO PRINTERS AND DATA COLLECTION DEVICES

APPENDIX L

800
OPT

The DRO can send displayed positions to RS 232 compatible printers, data collectors, off-line computers etc. This enables the DRO to generate finished part verification data when used as part of a coordinate measuring system.


To send data (or print), the baud rate, parity and data bit settings of the DRO must match those of the receiving device.

Setup data transmission (remote printing) as follows:

1. Connect the cable from the printer's RS 232 serial port to the DRO's RS 232 serial port. Ensure the cable is wired so the RXD pin on the terminal is connected to TXD pin on the DRO (Refer to Appendix I).
2. Adjust baud, parity and data bit settings of the DRO and the receiving device (printer) so they match (refer to Function 27).
3. Turn the DRO's RS 232 port on (refer to function 28).

Note: Before sending data (or printing), ensure the DRO is not in the preset mode. If the preset mode is active one of the axis letters will flash on and off. Turn off the preset mode by pressing the letter key (X, Y, Z) of the flashing axis.

Example #1, Sending displayed positions to an RS-232 device (a printer).

Press , X, Y, and Z. axis position is sent to the printer.

INDEX

Absolute Zero Set	19	
Absolute / Incremental Key	18	
Absolute / Incremental	17	
Advanced Bolt Hole Pattern	56,	Appendix A
Advanced Bolt Hole Recall	59	
Advanced Function Key	50	
Approaching Zero Audio On / Off	26	
Approaching Zero Axis Select	27	
Approaching Zero Indicator	24	
Axis Add	60	
Axis Coupling	34	
Axis Designation	39	
Axis Reset Only	32	
Axis Subtract	61	
Beeper Off / On	37	
Beeper	8	
Bolt Hole Pattern	52,	Appendix A
Bolt Hole Recall (WIZARD 350 Plus)	54	
Centering	16	
Clear an Entered Dimension	13	
Clearing Notepad	49	
Correction Factor Off / On	22,	Appendix B
Data Collection Devices	15,	Appendix L
Datum Clear	73	
Datum Recall	72	
Datum Set	71,	Appendix F
Diagnostics	81	
Display Dim Off / On	38	
Edge Sensor Probe	28	
Electronic Notepad	45	
Feed rate On / Off	41	
First Time User Checklist	3	
Function Code Listing	6	
Help	51	
Inch / Metric Conversion	14	
Introduction To The WIZARD	1	
Keyboard Entry Error	9	

INDEX (continued)

Last Position Save / Recall	29	
Layout of Manual	5	
Linear Hole Pattern Recall	67	
Linear Hole Pattern	64, Appendix C	
List of Icons	7	
Mill / Lathe Setup	44	
Mirror Image	33	
Notepad Delete	63	
Notepad Insert	62	
Part Edge Save / Recall	30	
Part Replacement	84	
Printing From The DRO	15, Appendix L	
Position Tolerance Indicator	25	
Presetting a Dimension	10	
Radius / Diameter	23	
Recall an Entered Dimension	12	
Recall Electronic Notepad	48	
Remote In / Out Test	80	
Remote Operation	Appendix K	
Resetting an Axis to Zero	11	
Resolution, Count Direction, Zero Out, Poweron	36	
Resolution Setting For Inch Reading Scales	35	
RS-232 On / Off	43	
RS-232 Setup	42	
Scale Error Detect Off / On	79	
Set Correction Factor	21	
Skew	68, Appendix D	
Taper Calculator	55, Appendix E	
The +/- (Plus / Minus) Key	15	
Tool Offset Clear	78	
Tool Offset Modify (Lathe)	76	
Tool Offset Recall	77	
Tool Offset Set (Lathe)	75, Appendix H	
Tool Offset Set (Mill)	74, Appendix G	
Troubleshooting	82	
Variable Resolution	31	
Warranty	87	
Zero Marker Pulse	20	
Zero Output Time Select	40	

ANILAM

ANILAM Inc.

3300 Corporate Way
Miramar, FL
USA 33025

☎ (954) 430-6600
FAX (954) 450-6700

ANILAM Ltd.

16 Plover Close, Interchange Park
Newport Pagnell
Bucks MK16 9PS
England

☎ (01908) 514500
FAX (01908) 610111

ANILAM Ltd.

(Regional office) Petalling Jaya Ind. Park
A1 - A14, Ist/FL., Jalan Klemajuan
46200 Petalling Jaya, Malaysia

☎ (603) 757 7619
FAX (603) 757 4659

ANILAM GMBH

Kehisteinstrasse 2
D-84529 Tittmoning

☎ (08683) 8985-21
FAX (08683) 7347

ANILAM s.r.l.

10043 Orbassano
Strada Borgaretto 38
Torino, Italy

☎ (011) 900 2606
FAX (011) 900 2466