newall

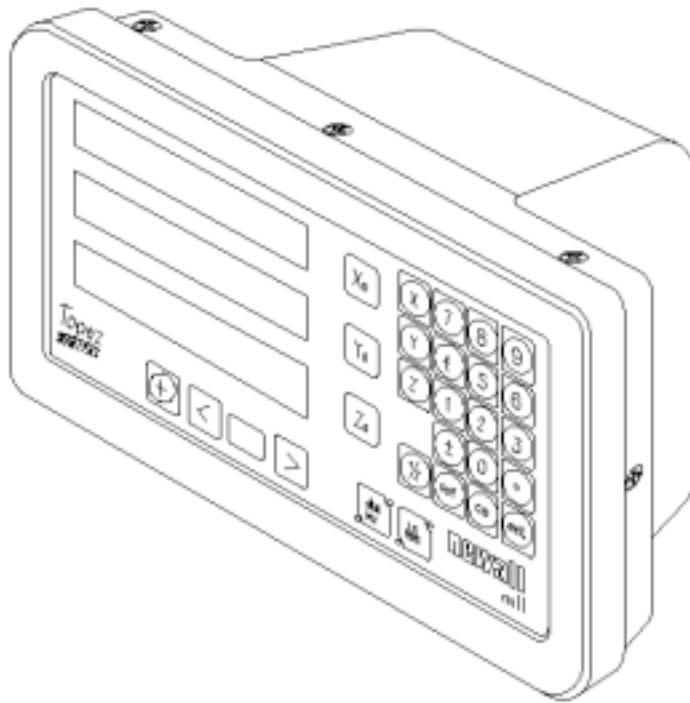**Newall Measurement Systems**

DIGITAL

INSTALLATION/USER MANUAL

Contents

1.0 Introduction

1.1 EMC AND LOW VOLTAGE COMPLIANCE

The Topaz *Digital* Readout conforms to the relevant European standards for electromagnetic compatibility and low voltage directive as detailed below.

BS EN 50081-2: Electromagnetic compatibility.
Generic Emission Standard - Industrial Environment

BS EN 50082-2: Electromagnetic compatibility.
Generic Immunity Standard - Industrial Environment.

BS EN 61010-1: Safety requirements for electrical equipment for
measurement, control and laboratory use.

ISO 9001

Certificate No FM36096

$C\epsilon$

1.2 TECHNICAL SPECIFICATIONS

Dimension:
    Height: 140mm (5.5in)
    Width: 240mm (9.5in)
    Depth: 80mm (3.2in)
    Weight: 2.5kg (5.5lbs)

Operating Voltage: 115 or 230V (switch selection)

Supply Voltage Fluctuation: Not to exceed +/-15% of the operating voltage

Supply Frequency: 50 to 60 Hz

Maximum Power Consumption: 18VA

Operating Temperature: 0 to 45°C

Storage Temperature: -20 to 70°C

Inputs
Connectors: 9 Way "D" - Type with the pinout arrangement as shown in Section 2.3.1
Input Signal Specification: A,/A.B,/B Quadrature Inputs with RS422 compatible line receivers
Differential or Single Ended Option
Input circuit diagram shown in Section 2.3.2

Reference Input: R, /R Reference input with RS422 compatible line receiver
Differential or Single Ended option
Input circuit diagram shown in Section 2.3.2

Power Supply: 5V DC with a maximum output of 250mA per axis

Resolution Options: 0.01mm / 0.005mm / 0.002mm / 0.001mm / 0.0005mm / 0.0002mm / 0.0001mm

Environmental Conditions: Indoor Use, IP20 (IEC 529)

    Relative humidity - maximum 80% for temperatures up to 31°C decreasing
    linearly to 33% at 45°C

    Transient overvoltage according to INSTALLATION CATEGORY II of IEC664

    POLLUTION DEGREE 2 in accordance with IEC664

NOTE: **NEWALL MEASUREMENT SYSTEMS RESERVES THE RIGHT TO CHANGE SPECIFICATIONS WITHOUT NOTICE.**

2.0 Installation

The symbol below appears on the equipment and refers to the safety aspects detailed below.

⚠ **2.1 MOUNTING**

Topaz *Digital* is supplied with a fixing kit consisting of a M10 stud, nut and washers. Figure 1.2b shows use of this in conjunction with a mounting arm.

Be sure that the mounting arrangements are secure as the operator will need to apply pressure to the front panel when using the keypad.

A single or double mounting arm bracket can be supplied as a optional extra.

An optional mounting assembly (Part no: 294-37740) is available which allows for tilt and rotation (See Figure 1.2a).

Select the location of the Topaz *Digital* with due regard to safety and ease of operation. Keep clear of moving parts and coolant spray. Ensure that the natural ventilation around the cabinet is not restricted.

To ensure correct operation of the Topaz *Digital*, it is recommended that the unit's case is grounded to the machine upon which it is fitted. Use a wire or strap of a least 1.5mm^2 (16 AWG) from the cabinet equipotential terminal (See Figure 1.3) to a suitable point on the machine body. The wire should be as short as possible. The machine must also be properly grounded to a good earth point.

⚠ **2.2 POWER SUPPLY**

BEFORE CONNECTING THE ELECTRICAL SUPPLY TO THE CABINET, CHECK THAT THE VOLTAGE SELECTOR SWITCH IS CORRECTLY SET. Figure 1.3 shows the position of this switch.

The mains supply is connected through a detachable supply cord. The Topaz *Digital* is supplied with a cord with a right-angle connector. If another supply cord is used, it must have fitted a IEC320, 10A, EARTHED mains connector with a cord rated for at least 10A.

The PROTECTIVE EARTH CIRCUIT of the mains supply MUST BE CONNECTED to the protective earth terminal of the cabinet through the supply cord.

The supply cord should be secured to the mounting arm or pillar with cable ties to ensure that it cannot drop into a hazardous position, ie. the floor or coolant tray, when disconnected from the cabinet.

The supply cord must be routed away from moving parts, swarf, coolant or sources of heat.

If a mains plug is not already fitted to the supply cord or is of the wrong type, then a suitable EARTHED plug should be used which complies with the relevant specifications for plugs and socket-outlets.

The mains supply fuse is a 20x5mm, type T0.5A, 250V. It is not to be replaced by the operator. If the fuse blows it is a possible indication of some significant problem with the power source. Check the supply and wiring carefully. If the fuse is replaced, the cabinet must first be disconnected from the supply by the removal of the IEC socket from the inlet. Do not position the equipment so that it is difficult to operate the disconnect device.

NOTE: **If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impared and may invalidate any warranty given.**
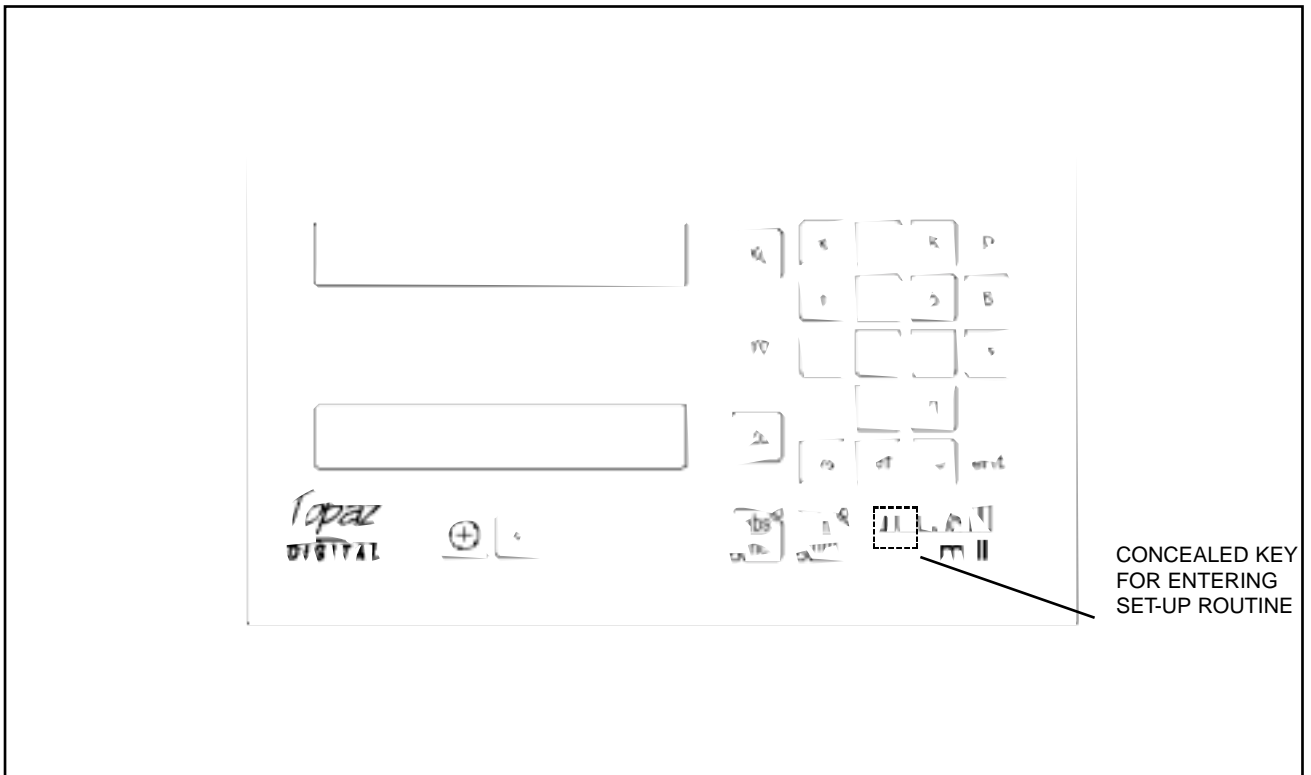
Figure 1.1 & 1.2

CONCEALED KEY FOR ENTERING SET-UP ROUTINE

Figure 1.1 Front View (3 Axis Mill)

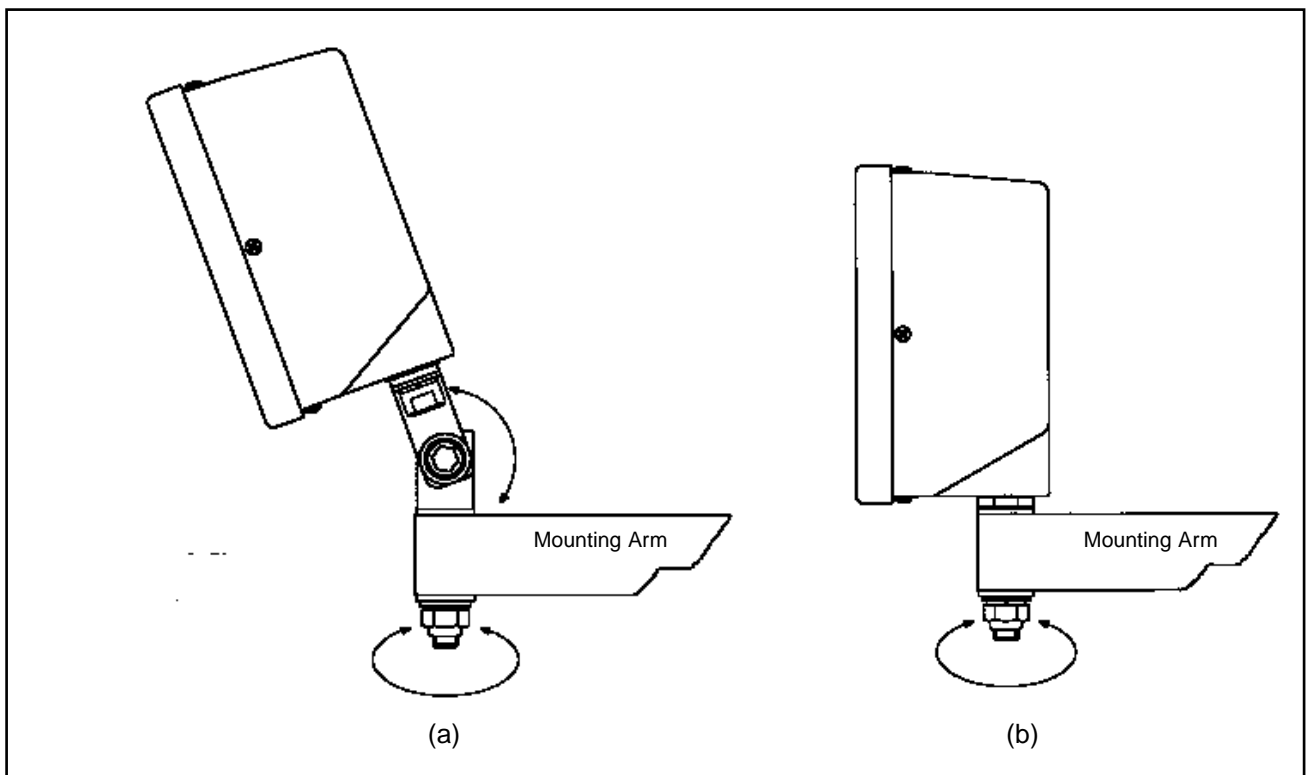Mounting Arm

Mounting Arm

(a)

(b)

Figure 1.2   Mounting Arrangements
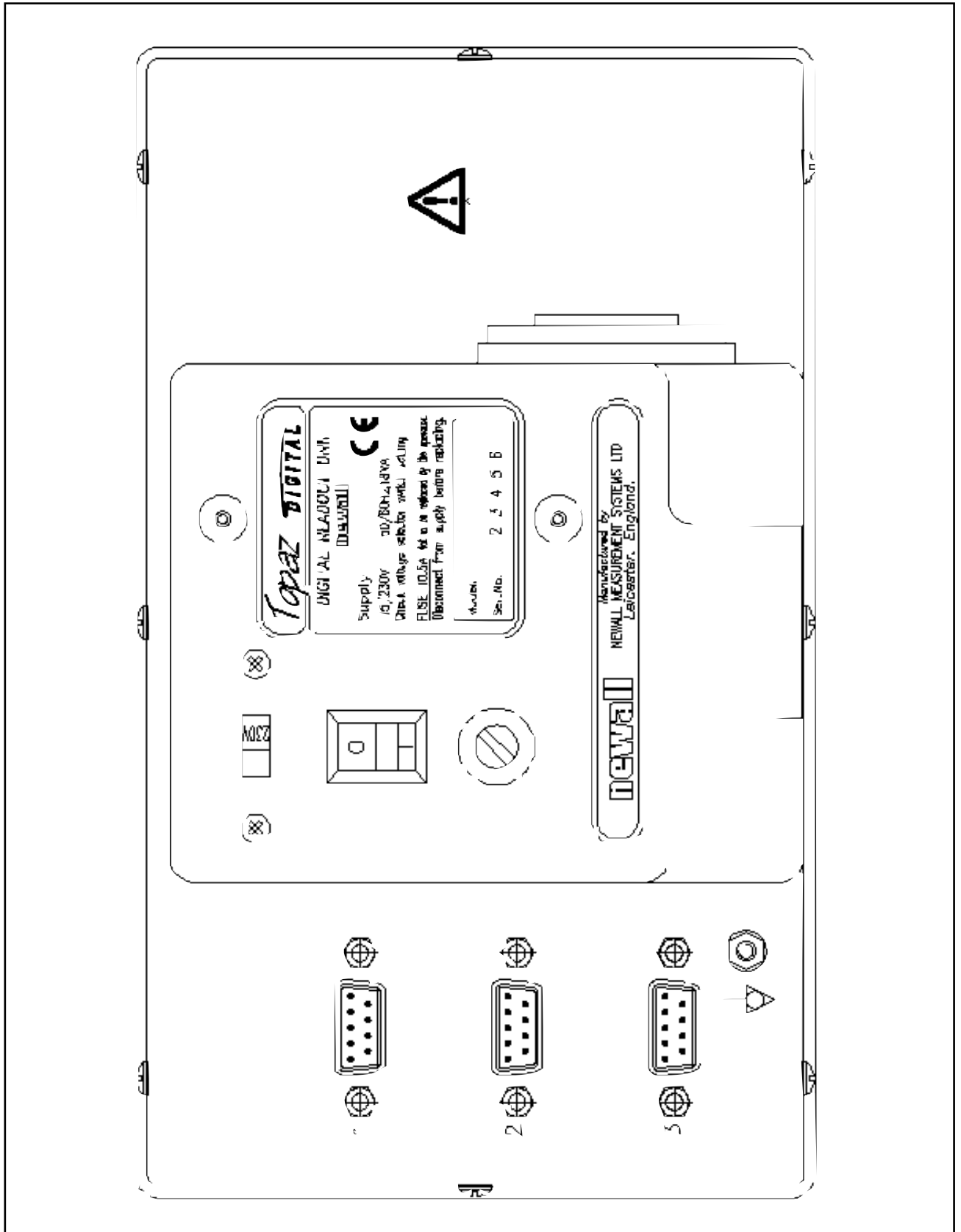
Figure 1.3

Figure 1.3   Connection Diagram

⚠ **2.3 CONNECTIONS**

Figure 1.3 shows the connection sockets at the back of the Topaz *Digital*. The Topaz *Digital* is designed for use with single ended or differential quadrature output encoders. See section 2.3.1 for connectors details. The encoders are connected to the Topaz *Digital* with 9-pin D Type connectors.

Switch off the Topaz *Digital* before connecting or disconnecting the encoders. To fit the connectors into the appropriate socket on the back of the Topaz *Digital*, first align the connector and then push firmly in place and secure with the locking bolts. To remove the connector, disengage the locking mechanism and pull the connector clear.

The encoders and digital readouts are connected at a separated extra low voltage (SELV) level. Any additional interconnections must also be at SELV level.

2.3.1   ENCODER CONNECTIONS

The axis connectors consist of 9 Way "D"-Type connectors with the following pin assignments for both single ended and differential connections, this is dependent on the Topaz *Digital* model.
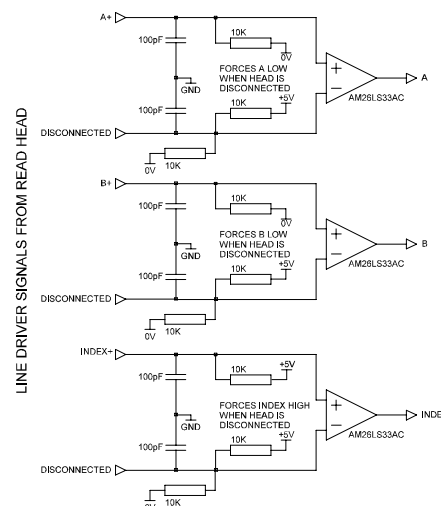
PIN NUMBER	SINGLE ENDED	DIFFERENTIAL
1	OV	OV
2	Phase A+	Phase A+
3	Disconnect	Phase A-
4	Phase B+	Phase B+
5	Disconnect	Phase B-
6	OV	OV
7	+ 5V	+ 5V
8	Index+	Index+
9	Disconnect	Index-

2.3.2 INPUT TYPE

DIFFERENTIAL INPUT CONFIGURATION
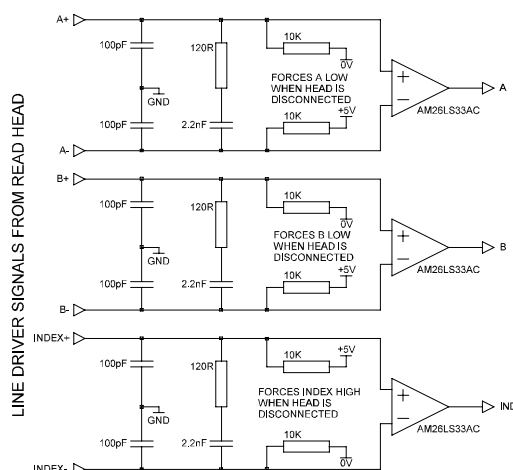
SINGLE ENDED INPUT CONFIGURATION

Note: When the encoder does not have a index marker pulse, the index+ pin should be connected to OV (pins 1 or 6). If this is not possible then the signal failure defect option must be turned off for that axis. See section 3.7

Default Setting	Topaz Standard	Topaz Mill	Topaz Lathe
Sleep	Off	Off	Off
Axis Resolution	0.001mm	0.001mm	0.001mm
Display Resolution	0.001mm	0.001mm	0.001mm
Direction	1	1	1
Radius/Diameter	Rad	Rad	X=Dia Z=Rad
Linear Compensation	0	0	0
Signal Failure	On	On	On

Table 1 - Default Settings

SLEEP
- ON
- OFF

AXIS RESOLUTION
0.01mm / 0.005mm / 0.002mm / 0.001mm /
0.0005mm / 0.0002mm / 0.0001mm

DISPLAY RESOLUTION
0.01mm / 0.005mm / 0.002mm / 0.001mm /
0.0005mm / 0.0002mm / 0.0001mm

DIRECTION
- 0
- 1

READINGS
- RADIUS
- DIAMETER

LINEAR ERROR COMPENSATION
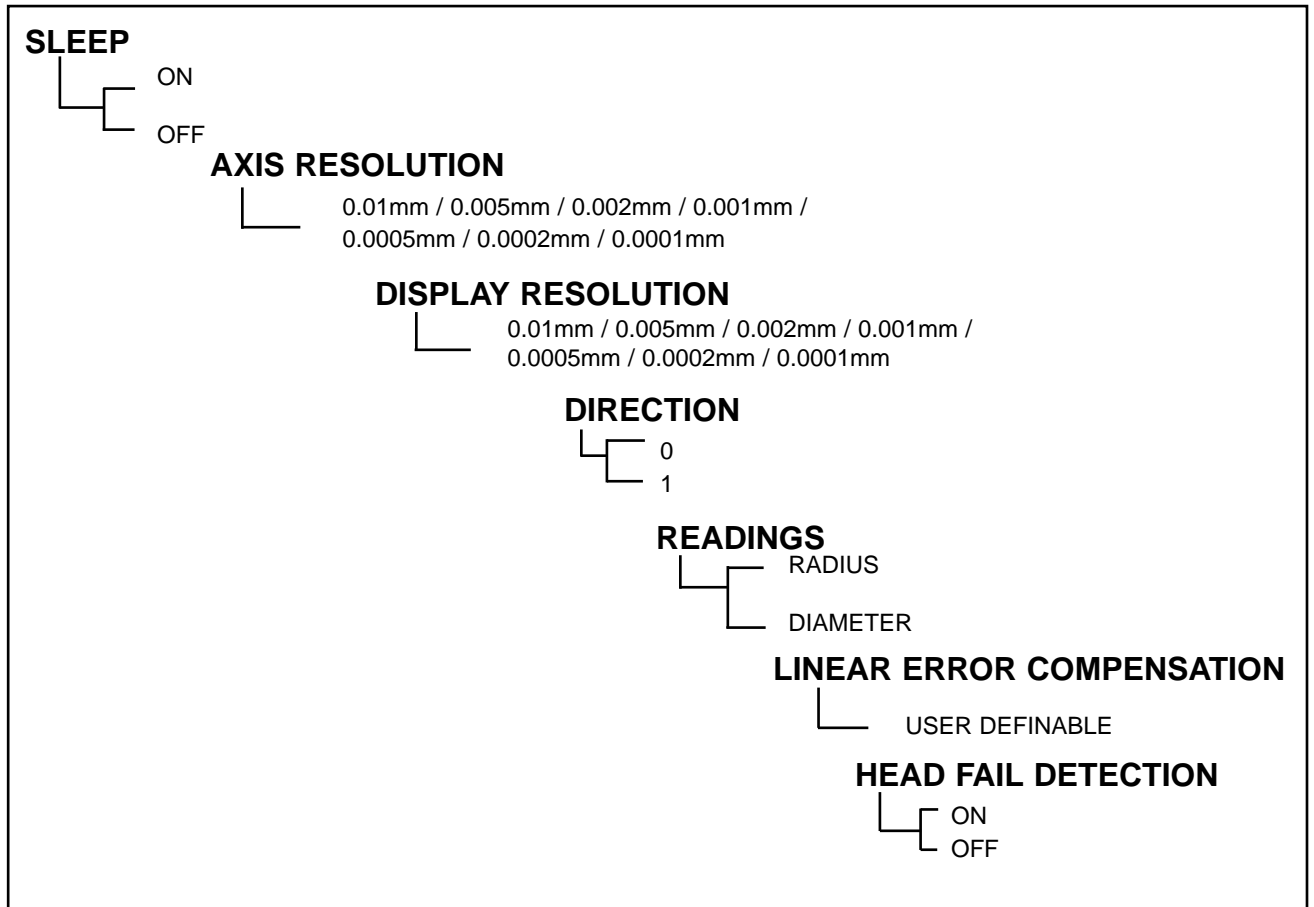- USER DEFINABLE

HEAD FAIL DETECTION
- ON
- OFF

Table 2 - Menu Options

2.4 SWITCHING ON

The mains supply switch for the Topaz *Digital* is mounted on the back of the unit as shown Figure 1.3.

When you switch on the Topaz *Digital* the unit will automatically go through a brief self diagnostic routine. During this routine, the name *Digital* will be shown then the software version number will be displayed and all segments of the displays will be lit.

After this routine, the unit will display measurements and is ready for use.

CONVENTIONS USED IN THIS MANUAL

The direction of travel of an axis refers to the travel of the tool relative to the workpiece. Keys on the keypad are signified in bold print, such as **[ent]** for the enter key.

3.0 Set-Up

The Set-Up procedure allows you to to change the main default settings as shown in Table 1.

The Set-Up procedure can only be activated just after power is switched on to the unit. After switching on, press the concealed key which is located under the "**ne**" of the newall logo on the keypad. The key must be pressed before the end of the initial self diagnostic routine.

When you have entered the Set-Up routine, the letters 'SET-UP' appear in an axis display window.

The Set-Up procedure makes use of a menu system. The main menu consists of a list of options that can be customised for your use. Press the **[abs/inc]** key to scroll through this list until you reach the option you wish to change. To change the option when selected, press the **[Xo]**, **[Yo]** or **[Zo]** key.

To exit the Set-Up routine press the concealed key ("**ne**" of newall).

The Set-Up menu structure is shown in Table 2.

3.1   SLEEP/DATAHOLD

In the Set-Up routine, press the **[abs/inc]** key until "SLP ON" is displayed. Press **[Yo]** and the choice of "SLP OFF" appears. You can toggle between "SLP ON" or "SLP OFF" by pressing the **[Yo]** key.

Select "SLP ON" if you want to be able to use the Datahold facility. Otherwise select "SLP OFF".

3.2   AXIS RESOLUTION

This option allows you to select the resolution of the encoder for a given axis. The list below shows the axis resolution settings, expressed in mm, that are available .

0.01mm / 0.005mm / 0.002mm / 0.001mm / 0.0005mm / 0.0002mm / 0.0001mm

In the Set-Up routine, press the **[abs/inc] key** until "**AR"** (Axis Resolution) is displayed. The display will show the last selected resolution eg. "Ar 0.001".

Press the **[Xo] [Yo]** or **[Zo]** key to change the resolutions.

When the unit is displaying the choices you wish to use, press **[abs/inc]** to continue to the next option.

3.3 DISPLAY RESOLUTION

This option allows you to select the Display Resolution, for a given axis, from the resolution settings availble. The resolution settings are the same as the Axis Resolution settings, except that the highest resolution available is limited to the resolution that was selected for the Axis Resolution. This prevents selection of a Display Resolution that is higher then the Axis Resolution.

In the Set-Up routine, press the **[abs/inc]** key until "**DR"** (Display Resolution) is displayed. The display will show the last selected resolution eg. "dr 0.001".

Press the **[Xo] [Yo]** or **[Zo]** key to change the resolutions.

When the unit is displaying the choices you wish to use, press **[abs/inc]** to continue to the next option.

Note: **Ensure Axis Resolutions are correctly selected, before selecting the desired Display Resolution.**

3.4   DIRECTION

The direction option allows you to change the direction of travel of each axis. For example, if after installation the **X** axis is measuring positive from right to left, you can use this option to change the direction of the **X** axis so it measures positive from left to right.

In the Set-Up routine, press the **[abs/inc]** until "DIR" (direction) is displayed.

Each axis display will show "0" or "1"

Pressing each axis key **[Xo] [Yo]** or **[Zo]** reverses the counting direction.   When the unit is displaying the choices you wish to use, press **[abs/inc]** to continue to next option.

3.5 RADIUS/DIAMETER

This option allows you to select any axis to display measurements at a two times (x2) factor. This is used on lathes and other turning applications to display part diameter rather than part radius.

In the Set-Up routine, press the **[abs/inc]** key until "R A D" or "DIA" is displayed.

Pressing each axis key **[Xo]**, **[Yo]** or **[Zo]**, switches between radius and diameter readings for that axis. When the unit is displaying the choices you wish to use, press **[abs/inc]** to continue to the next option.

3.6 LINEAR ERROR COMPENSATION

This option allows you to apply a constant correction factor to all measurements displayed. This factor is expressed in parts per million (PPM).

In the Set-Up routine, press the **[abs/inc]** key until **"LC"** (Linear Compensation) is displayed. The display will show "LC 0" or the last correction factor entered.

To insert or change a correction factor, select the axis and enter the factor you wish to use.

For example, to apply a factor of 200PPM to the **X** axis, press the following keys: **[X][2][0][0][ent] .**

If the unit is displaying measurements less than the actual measurement, enter a positive factor to compensate. A factor of 200PPM means displays are measurement x 1.000200. When each axis is displaying the correction factor you wish to use, press **[abs/inc]** to return to the first option.

3.6.1 CALCULATING LINEAR ERROR COMPENSATION

To establish a multiplication factor, check the measurements displayed by the axis against a known distance. The multiplication factor should be established while in operational mode and **NOT** in the Set-Up routine.

For example, you might use a known (standard) distance of 500mm, against which the axis displays 499.8mm. The correction factor you would then apply is:

$$(0.2mm/500mm) \times 1,000,000 = 400PPM$$

If the axis displays 500.2mm over the same distance, the correction factor would be:

$$(-0.2mm/500mm) \times 1,000,000 = -400PPM$$

WARNING. Once you have entered a multiplication factor for an axis, all measurements will be adjusted accordingly. If you wish to disable this adjustment, you will have to enter a compensation factor of zero.

3.7 HEAD FAIL DETECTION

Each axis can detect for the condition of a failed read head. This option allows you to enable or disable the axis fail detect function for each axis.

In the Set-Up routine, press the [abs/inc] key until FAIL is displayed.

Pressing each axis [X0],[Y0],or [Z0], switches between FAIL ON and FAIL OFF for that axis. When the unit is displaying the choices you wish to use, press [abs/inc] to continue to the next option.

Note: For the correct, operation of the head signal failure function the following note applies. The head signal failure detection system works by monitoring the incoming signal for the illegal input combination of A low, B low, and R (reference mark) high. If the head signal fails, or is disconnected, then the illegal input combination is generated internally within the Topaz Digital read out. The corresponding axis reading then displays SIG FAIL . If the read head, that is connected to the Topaz Digital readout, can generate the input signal combination of A low, B low, and R high in a normal state, then the axis fail detect function must be disabled.

During normal operation, with the head fail detection enabled, removal of a read head connector causes the corresponding axis to display SIG FAIL . If the read head is reconnected then the axis display continues to show SIG FAIL until the corresponding axis zero key [X0], [Y0],[Z0] or axis load key [X], [Y],[Z] is pressed followed by [ent].

Note:Please check encoder manual for index marker specification.
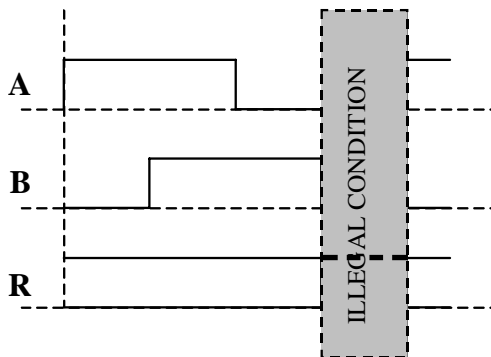
A	B	R	Status
L	L	H	SIG FAIL
0	1	H	OK
1	0	H	OK
X	X	L	OK

To leave the Set-Up routine press the concealed key, "ne" of newall.

4.0   User Instructions

4.1   OPTIONS

Topaz *Digital* is available in three models, the Standard, Mill and Lathe. Figure 1.4
shows the layout of the various keypad configurations.

MODELS	2 Axes	3 Axes	Additional Features
Topaz *Digital* Standard	✓	✓	
Topaz *Digital* Mill	✓	✓	PCD "Bolt Hole Circle" mode
Topaz *Digital* Lathe		✓	Tool Off-Sets mode

4.2   USING THE KEYPAD

Figure 1.4 shows the layout of the keypad. The keys are used as follows:

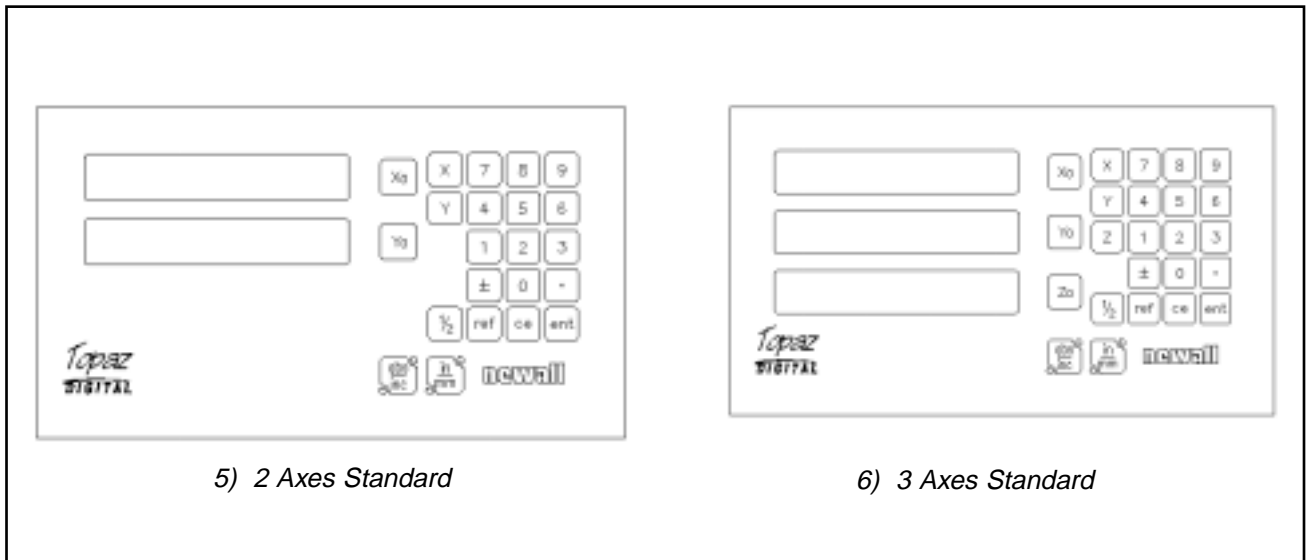| KEY	PURPOSE
Xo **Yo** **Zo**	Set the current position for the axis to zero (reset)
X **Y** **Z**	Select axis to enter dimension (preset)
abs/inc	Switches between absolute and incremental readings (LED indicates choice of mode)
ce	Clear entry values in preset mode
½	Centre find function
ent	Enter key to confirm data entry
ref	Find the reference position
in/mm	Switches between inch and millimetre display (LED indicates choice of mode)
± **1** **2** **3** **4** **5** **.** **6** **7** **8** **9** **0**	Numeric keypad for data entry
Set	For setting tool off-sets (Lathe model only)
(tool key)	Calls up the tool number to be used (Lathe model only)
⊕	For using the pitch circle diameter (PCD) function (Mill model only)

2) 3 Axes Mill

2) 2 Axes Mill

2) 2 Axes Lathe

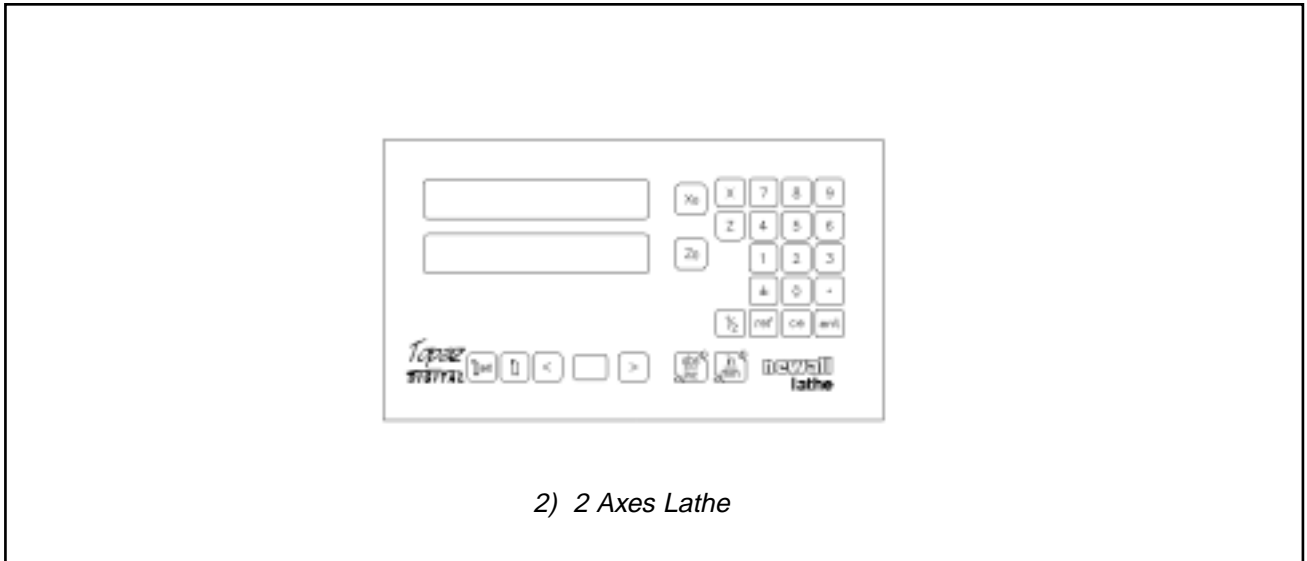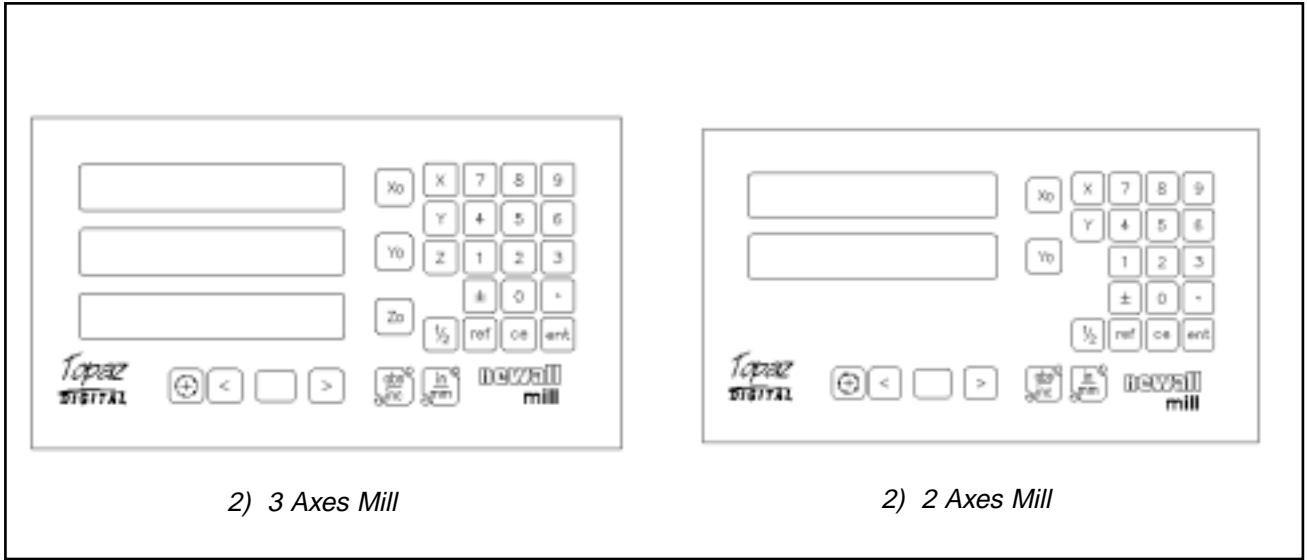*5) 2 Axes Standard*

6) 3 Axes Standard

Figure 1.4   Keypad Layout

5.0 Standard Functions

5.1 USING INCREMENTAL

(a) Purpose and Use

When the Topaz *Digital* is set to incremental mode, it can be used to display each new position relative to the last position. This is also known as point-to-point use.

On setting to incremental you can reset each axis by pressing **[Xo] [Yo]** or **[Zo]**.

As an alternative to resetting the axes, you can enter the coordinates relative to the current incremental position.

Each time you switch to incremental mode, the Topaz display will show the position relative to the last reset position while in the incremental mode.
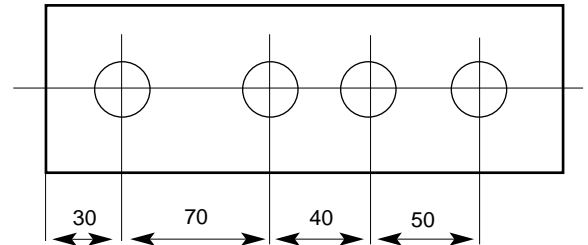
(b) Keystrokes

OPERATOR STEPS	KEYSTROKES	AXES DISPLAY
Set to incremental mode	**[abs/inc]**	
Reset axes	**[Xo]** **[Yo]** **[Zo]**	X 0.00 Y 0.00 Z 0.00
Enter the coordinates of a position, eg X100, Y50, Z25	**[X][1][0][0][ent]** **[Y][5][0][ent]** **[Z][2][5][ent]**	X100.00 Y 50.00 Z 25.00

5.2 USING ABSOLUTE

(a) Purpose and Use

When the Topaz *Digital* is set to absolute mode it will display the position relative to an established datum point.
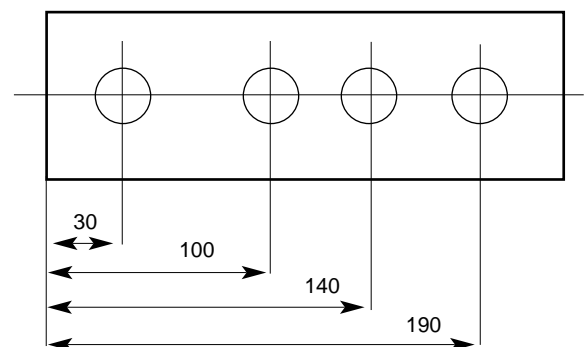
(b) Keystrokes

OPERATOR STEPS	KEYSTROKES	AXES DISPLAY
Set absolute mode	**[abs/inc]**	

(c)   Establishing the Datum

When you reset the display in absolute mode, you are setting the current position of your machine as your datum point. All absolute positions will be measured relative to this datum.

To set the datum, position the machine at the point you intend to establish the datum and then reset any or all axes, while in the absolute mode.

Keystrokes

OPERATOR STEPS	KEYSTROKES	AXES DISPLAY
Set to absolute mode	**[abs/inc]**	
Move machine to the datum location		
Reset axes	**[Xo]** **[Yo]** **[Zo]**	X 0.00 Y 0.00 Z 0.00

5.3   REFERENCE

Note: This function only works with encoders that provide an index marker output signal.

This feature allows for any given axes to be referenced to a datum position. The index marker pulse, from the encoder, is used to generate a signal that informs the DRO that the reader head has reached its datum position. Index pulses generally appear in one or two forms depending on the type of encoder connected. These can either be periodic, say every 20mm, or single action. Generally, when a scale has a single action index marker this is located at the centre of travel.

5.3.1   PERIODIC INDEX PULSES

Position the encoder such that it lies between the datum index marker and the next index marker position. (Say, within ±15mm for a 20mm index period).

Hint: Mark the datum position on the machine bed to allow for this position to be located quickly.

Press the Ref Key **[ref]**

Select the axis to datum, **[X], [Y], [Z]**. The axis will be reset to zero.

Move the axis towards the datum index position. Once the index marker has been triggered the axis will start to count. The axis position is now referenced to that datum position.

5.3.2   SINGLE END MARKER

Press the Ref Key **[ref]**

Select the axis to datum, **[X], [Y], [Z]**. The axis will be reset to zero.

Move the axis towards the datum index position. Once the index pulse has been triggered the axis will start to count. The axis position is now referenced to that datum position.

Note: Refer to the encoder manual for specification information relating to its index mark

5.4   DATA PRE-SET

To pre-set an axis dimension the following steps are required.

Select axis to preset **[X] [Y] [Z]**

Enter value to load into axis (use numerical keypad), if value is to be negative select **[±]**

Press **[ent]** to load entered value into the axis

Note: Pressing [ce], prior to pressing [ent] will cancel the operation and return the axis to the original value.

Keystrokes

OPERATOR STEPS	KEYSTROKES	AXES DISPLAY
To enter a negative dimension for X the axis	**[X][±][1][9][.][6][ent]**	X −19.600

Dimensions can be entered in either absolute or incremental modes.

5.5   INCH/MILLIMETRE

To change between inch and millimetre readings, press **[in/mm]**. The displayed data will be converted instantly. The LED beside the key reminds you which mode is being used.

When you switch on the Topaz *Digital*, it will display the same unit of measurement which was set prior to power loss.

5.6   CENTRE FIND

Centre Find halves the dimension displayed for any or all axes selected. You can use Centre Find in either absolute or incremental mode. The keystrokes are the same in either case.

In the following example, Centre Find is being used on the **X** axis to find the centre point of a workpiece that is 100mm wide.

OPERATOR STEPS	KEYSTROKES	AXES DISPLAY
Locate to your first position (one edge of your workpiece- and zero the axis)	**[Xo]**	X 0.00
Locate to the second position (the other edge of the workpiece)		X 100.00
Use Centre Find to locate the centre point	**[X][½]** or **[½][X]**	X 50.00

In either absolute mode or incremental mode, once you have used Centre Find you can locate to the centre point by moving until the display is at zero.

Note: If you are in absolute mode, remember that using centre find will set the datum to the centre point.

5.7   DATAHOLD (SLEEP)

Datahold allows you to disable the Topaz *Digital* but retain power to the measurement encoders and the memory circuits. You can use datahold to prevent unauthorised or accidental use of the Topaz *Digital* whilst unattended.

To select datahold, press the concealed key under the "**ne**" of the "newall" logo (See Figure 1.1).

While the Topaz *Digital* has been set to datahold, the keypad will not function and the displays will be blank. If the machine axis is moved, "DISPLACD" (displaced) will appear in the display window. The Topaz *Digital* will continue to record all transducer movement and will update the display once datahold is cancelled. If a key is pressed, "TOUCHED" (touched) will appear in the display to alert the operator that data entry has been attempted.

Note: To awaken the unit from datahold, press the concealed key ("ne" of the newall logo).

6.0   Optional Functions

6.1   TOPAZ *DIGITAL* MILL VERSION

The Topaz *Digital* Mill version is available in two or three axes and offers Pitch Circle Diameter (PCD) in addition to the Standard functions. PCD is also known as "Bolt Hole Circle". The convention for angular position is that the 0 degree position is at 3 o'clock and positive angles are measured anti-clockwise.

6.1.1   2 AXIS MILL VERSION

(a)   To access the PCD function press [⊕]

(b)   The two digit LED shows the letter "C" for centre. Each of the axes display the last entered coordinates for the circle centre

(c)   Enter the required centre points for the new PCD. eg **[X][2][2][.][5][ent]**, **[Y][2][5][.][5][ent]** Press **[>]** to move to the next input.

(d)   The two digit display now shows "D" prompting the diameter input. The **X** axis shows the last entered value for a circle diameter. The other axes are blank.

(e)   Enter a new diameter eg. **[2] [0] [ent]** Press the **[>]** key to move to the next input.

(f)   The display now shows "N", prompting the number of holes to be input. The **X** axis shows the last entered value for the number of holes.

(g)   Enter the number of holes in the pattern followed by **[ent]**, eg. **[5] [ent]**. Press **[>]** to advance to the next input.

(h)   The display now shows "A" for angle of the first hole. The **X** axis display shows the last entered angle.

(i)   Enter a new angle in decimal degrees followed by **[ent]** eg. **[1] [8] [ent].**   Note: Until this point the **[<]** key will allow the operator to move backwards through the previous inputs and make any amendments.

5 holes equally spaced
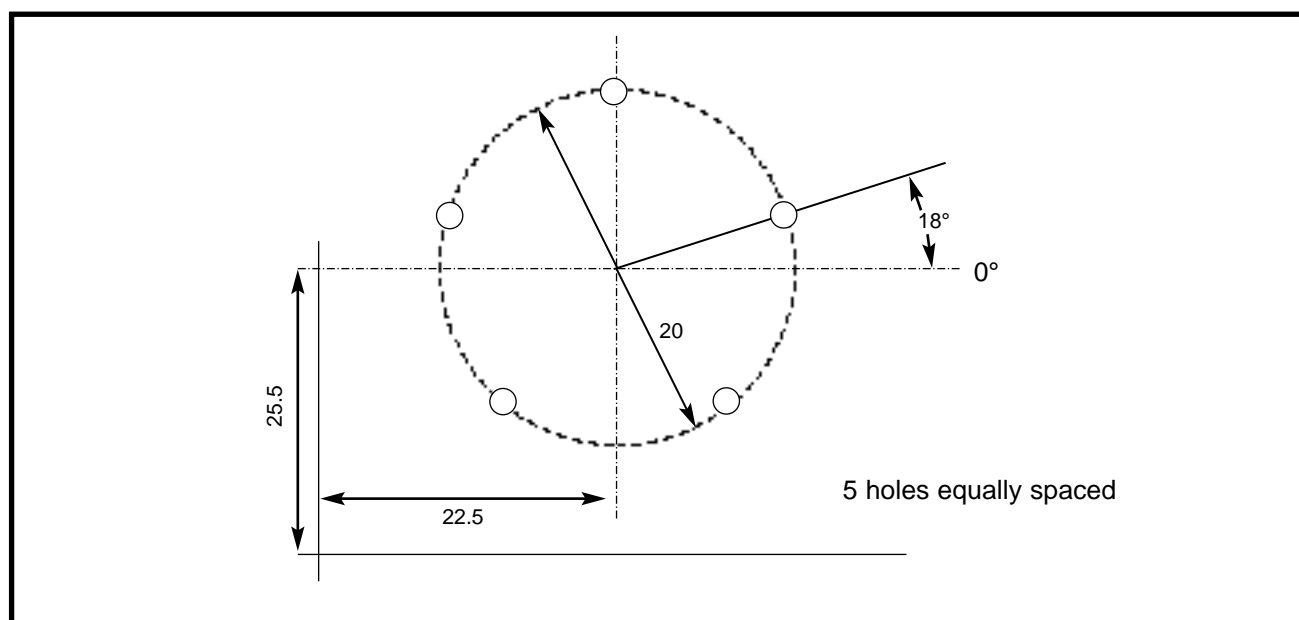
(j)   Pressing **[>]** key after the angle input will display the first hole position.

(k)   **[<]** or **[>]** now scrolls through the various hole locations. Each hole number being identified in the two digit display. The PCD feature functions as a "go to zero" command. The coordinates displayed with each hole number indicate the distance needed to travel to reach the hole location. To position to each hole location, move the axes until both of the displays read "0.000".

(l)   Pressing the PCD icon ⊕ returns the display to the standard function.

6.1.2   3 AXES MILL VERSIONS

The 3 axes mill operates in a similar manner to the 2 axes version except that the PCD is plane selectable.

(a)   On the 3 axes version when the PCD icon is pressed ⊕ the first input in the 2 digit display is the plane "P". The plane is identified by the horizontal LED segment adjacent to the corresponding axis.

(b)   The **[abs/inc]** key scrolls between **(x,y)**, **(x,z)** and **(y,z)** planes when pressed. When the desired plane is displayed press **[>]** to move to the next input "C" for centre position. All subsequent inputs are as the two axis version.

6.2   TOPAZ *DIGITAL* LATHE VERSION

Note: The conventional method of setting a lathe is to set the X axis as the cross travel and the Z axis as the longitudinal.

6.2.1 TO SET THE OFFSETS

(a)   Press ⤵Set to activate the tool set mode.

(b)   Press **[>].** The two digit display will show the first tool as "01".

(c)   To datum the **X** axis take a skim cut along the outside diameter. Move the tool away from the part but do not move in the **X** axis. Measure the diameter and enter the diameter of the part in to the **X** display. i.e.**[X][2][5][ent]**

(d)   To datum the **Z** axis take facing cut and move the tool away from the part but do not move in the **Z** axis. Enter zero in the **Z** display. i.e. **[Z][0][ent]**. The **[Xo]** and **[Zo]** keys are inactive in the tool set mode.

(e)   Press **[>]** to advance to the next tool. i.e. "02 will be displayed in the two digit display.

(f)   To set the remaining tools repeat (c) as above to datum the X axis. To datum the **Z** axis for each tool touch the tool onto the face and enter **[Z][0][ent].**

(g)   Press ⤵Set to exit the tool set mode.

6.2.2 TO USE THE TOOLS WITH OFFSETS

(a) Press [icon] . The 2 digit display now shows "01". Use the **[<]** and **[>]** keys to advance to the tool which is to be used.

(b) Datum the displays in the normal way. Use the **[<]** and **[>]** keys when changing tools. The display will show you true **X** and **Z** readings for the tool shown in the two digit display.

(c) Press [icon] to exit tool use mode.

6.2.3 EDITING TOOL OFFSETS

Tool editing allows you to update a tool offset should the tool become worn, broken or need replacing.

(a) Before editing the offset it is first necessary to activate an unchanged tool in tool use mode. Press and select the tool.

(b) To datum the **X** axis take a skim cut along the outside diameter. Move the tool away from the part but do not move in the **X** axis. Measure the diameter and enter the diameter of the part into the **X** display. e.g. **[X][2][5][ent]**

(c) To datum the **Z** axis, take a facing cut and move the tool away from the part but do not move in the **Z** axis. Enter zero in the **Z** display. i.e. **[Z][0][ent]**. The **[Xo]** and **[Zo]** keys are inactive in the tool set mode.

(d) Press [icon] to exit tool use mode.

(e) Press [icon]Set to activate the tool offset mode.

(f) Use the **[<][>]** keys to scroll to the tool to be edited. As an alternative the tool number may be entered directly. e.g. **[1][1][ent]**.

(g) To establish the **X** axis offset take a skim cut along the outside diameter. Move the tool away from the part but do not move in the **X** axis. Measure the diameter and enter the diameter of the part into the **X** display. e.g. **[2] [5] [ent]**

(h) To establish the **Z** axis offset touch the end face with the tool and enter zero in the **Z** axis display. e.g. **[0][ent]**. The **[Xo]** and **[Zo]** keys are inactive in the tool set mode

(i) Press [icon]Set to exit tool set mode.

7.0 Troubleshooting

SYMPTOM	SOLUTIONS
1 Nothing happens when the unit is switched on.	Check that the Topaz *Digital* is correctly connected to a working power source. Check the power lead is not damaged. Check the selector switch on the Topaz *Digital* is set to accept the correct power supply voltage. Check the fuse. Note that if the fuse has blown, this suggests a fault with the power source which must be corrected before the fuse is replaced. (See Section 2.2)
2 When the unit is switched on the displays are frozen.	This suggests that the mains supply voltage is to low. Check that the power source is within the limits accepted by the Topaz. (See Section 2.2)
3 The displays work, but reset from time to time without the keys being pressed.	This suggests either that the mains supply voltage is too low, or that the power source has an intermittent fault. Check the power source as above. Check that all connections are sound.
4 The displays work, but give erratic readings, the last digit jitters or the measurements jump to new figures unexpectedly.	This suggests that the there is a poor earth (ground) connection. Both the Topaz *Digital*, and the machine on which it is installed, must have proper earth (ground) connections. (See Section 2.1)
5 "`SIG FAIL`**" appears in the display.**	This means that the unit is not receiving a proper signal from the measurement encoder. Check that the encoder connection is good. Check that there is no damage to the connectors or to the encoder lead. If only one axis is displaying this message, connect the transducer from a working axis into the faulty axis. If the same message appears, the fault is likely to be in the Topaz and you should contact your local dealer. To clear the signal fail message select that axis **[X]**, **[Y]**, **[Z]** and then press **[ent]** . If this signal fail message remains, the fault has not been corrected.
6 The unit will not respond to keys.	Switch the Topaz *Digital* off and back on. Note that providing the machine has not been moved in any direction you will not lose your current position by switching off and on.

8.0 Cleaning

Disconnect the cabinet from the power supply before cleaning.

It is recommended that the cabinet be wiped over with a lint-free cloth with a non corrosive/abrasive cleaning fluid.

Do not use compressed air.

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