newall

DP7

DRO COUNTER
INSTALLATION & OPERATING INSTRUCTIONS

Ver 4.30.2003

1. Installation

1.1 Mounting

The DP7 is supplied with a mounting yoke as standard. Figure 1.1.1 shows how you can use this yoke to mount the DP7 from above or below.

The DP7 is supplied with a fixing nut (M10 x 80mm caphead bolt), M10 Nyloc nut, and a nylon washer. Be sure that the mounting hardware is tight and rigid, as you will need to apply pressure to the front panel when pushing button on the keypad.

A single or double mounting arm bracket can be purchased as an option.

1.2 Power Supply

The DP7 is equipped with a switch mode power supply that will accept 90-264VAC @ 47-63Hz. The power supply is rated at 30W.

The DP7 is also equipped with a fuse. A blown fuse is an indication of a significant problem with the power source. Check the power source and wiring carefully before replacing the fuse. The fuse is a 20 x 5mm glass type T1A. It is a 1A time delay (anti-surge) fuse.

It is important that the DP7 and the machine are properly grounded. An inadequate earth ground can cause problems with the DP7 and linear encoders.

The AC power cord is inserted into the socket on the rear of the unit. A clip is provided to hold the cord in place. Lift the clip up before inserting the lead, then push the clip down over the lead when finished.

1.3 Connections

Figure 1.1.1 shows the connection ports on the back of the DP7. These consist of:

Linear Encoder - Up to three round 7-pin connectors
RS232 - 25-pin D connector
Auxiliary output - 15-pin D connector. This is an optional feature.

Be sure to turn the DP7 unit off when connecting / disconnecting.

The DP7 is designed for use with Spherosyn and Microsyn linear encoders. Some early versions of the DP7 were only capable of using the Spherosyn linear encoders, as Microsyn did not exist at the time of manufacture. These units can be upgraded to work with Microsyn with a software update. Contact Newall Tech Support for details.

Connecting Linear Encoders: To connect the linear encoders, align the connector and push firmly. You should hear a click confirming that the locking sleeve has been engaged. To disconnect, pull back on the locking sleeve to disengage the locking mechanism.

WARNING: TWISTING THE LINEAR ENCODER CONNECTORS CAN RESULT IN DAMAGE

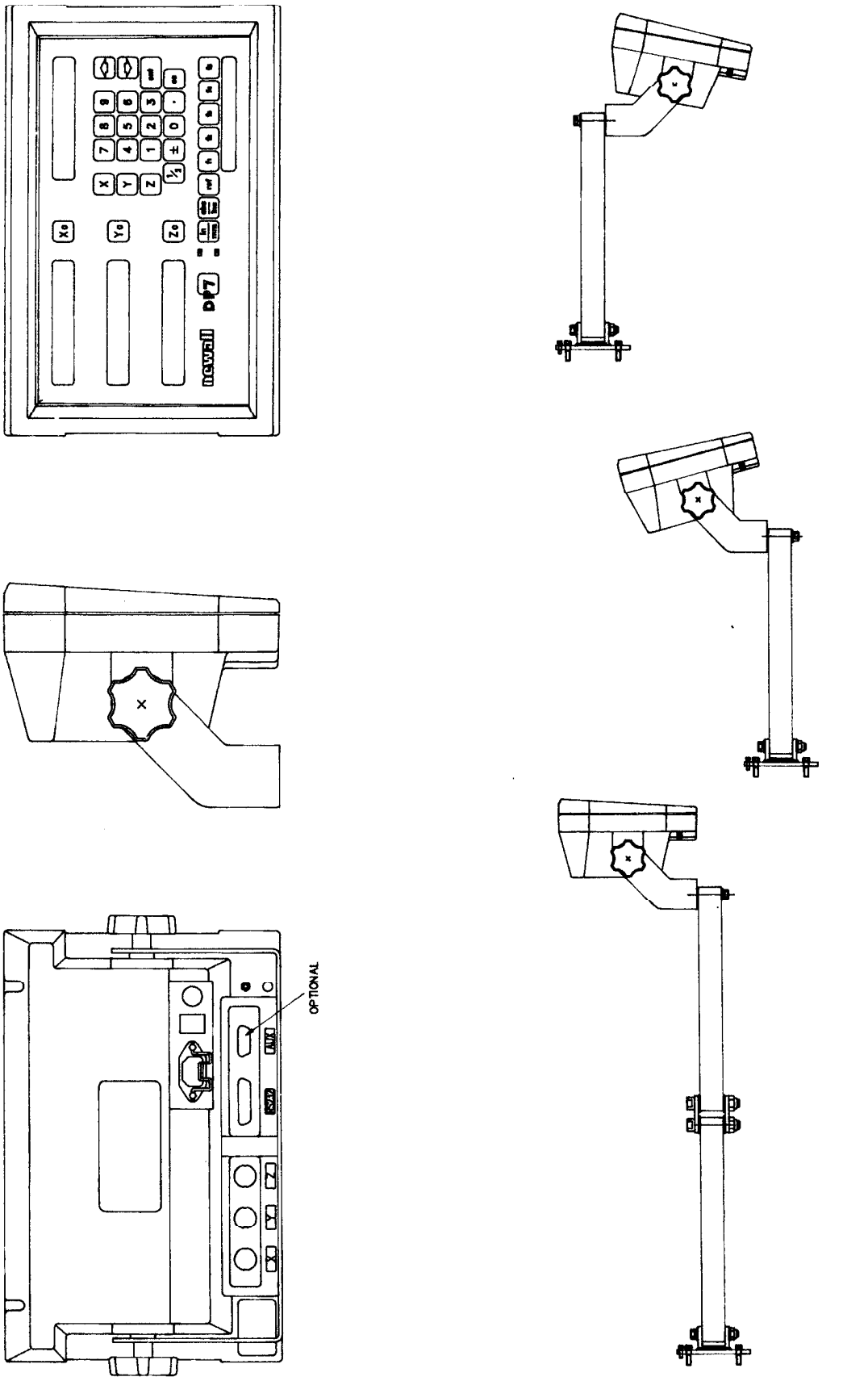


Figure 1.1.1

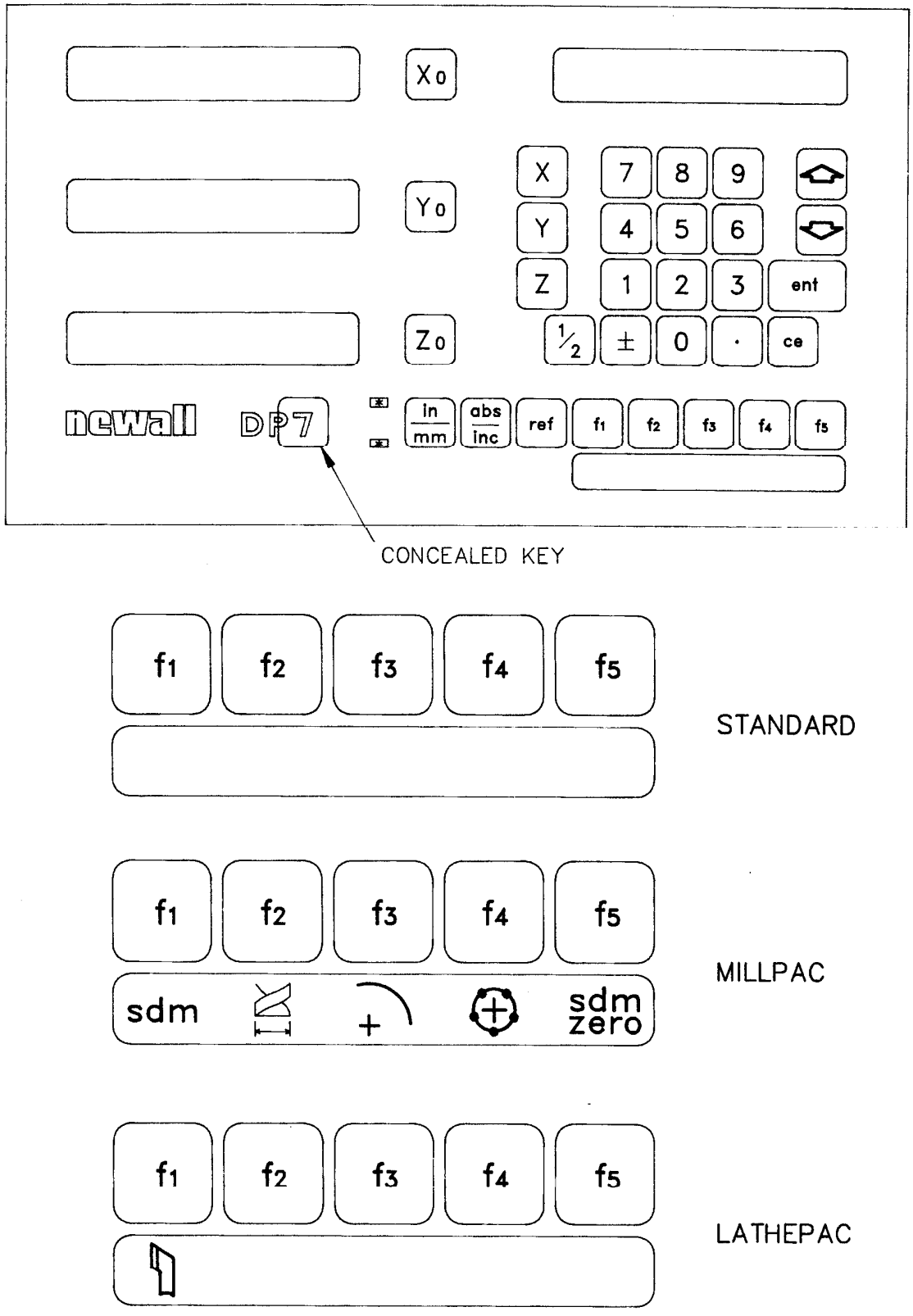

X0
Y0
Z0
X
Y
Z
7
8
9
4
5
6
1
2
3
ent
½
±
0
.
ce
newall
DP7
in
mm
abs
inc
ref
f1
f2
f3
f4
f5
CONCEALED KEY
f1
f2
f3
f4
f5
STANDARD
f1
f2
f3
f4
f5
sdm
sdm
zero
MILLPAC
f1
f2
f3
f4
f5
LATHEPAC

Figure 1.1.2

1.4 Switching On

The On / Off switch for the DP7 is mounted on the back of the unit as shown in Figure 1.1.1.

When the unit is turned on, it will automatically go through a brief self test routine. During this routine, the software version number will be displayed, and all the LED segments will momentarily light up. After the routine the unit will display current position and is ready for use.

The software version number is in the format 7B01.01. The first two digits refer to the type of unit you have purchased.

7B	DP7 Standard
7M	DP7 Mill
7L	DP7 Lathe

1.5 Input Signal

The DP7 is designed for use with Spherosyn and Microsyn linear encoders. Some early versions of the DP7 were only capable of using the Spherosyn linear encoders, as Microsyn did not exist at the time of manufacture. These units can be upgraded to work with Microsyn by updating the software. Contact Newall Tech Support for details.

Spherosyn: 2.0V +/- 0.5V RMS, 1kHz phase analog, 360 degrees per 12.7mm
Microsyn: 2.0V +/- 0.5V RMS, 1kHz phase analog, 360 degrees per 5.0mm

Conventions used in the manual

The direction of travel in an axis refers to the travel of the tool relative to the workpiece.

Keys on the keypad are shown in bold print, such as **<ent>** for the enter key.

Messages displayed in the message window are shown in capitals between quote. Example “SET UP”

2. SET UP

The set up procedure allows you to change the main default settings for the DP7. For normal use, you will probably find that you only need to perform the set up procedure once, and it is possible that the factory set defaults are suitable for your needs without change. At the end of the set up procedure, there is the option of restoring to the factory set defaults.

WARNING. The set up procedure will reset the memory of the DP7 unit, including all datums, subdatums and the Digifind. Do not enter set up unless you are prepared to lose this memory.

The set up procedure can only be activated just after power is switched on to the unit. On switching on the unit, press the concealed key under the "7" of the DP7 logo on the keypad. (See Section 3 'Using the Keypad' if you have difficulty locating this key). You must press and release this key during the initial self test routine when all segments of the display are lit. The concealed key will beep when pressed.

When you have selected set up, the words "SET UP" appear in the message screen.

The set up procedure makes use of a menu system. The main menu consists of a list of options that you can change. You simply press the arrow keys to scroll through this list until you reach the option you wish to change. To select an option to change, press **<ent>**.

The main menu consists of the following list of options:

MENU ITEM	MEANING
LANGUAGE	Selects the language for messages.
SLEEP	Enables or disables the datahold facility.
KEY BEEP	Enables or disables the audible beep when a key is pressed.
RESOLUTN	Selects the resolution for measurements to be displayed on each axis.
DIRECTN	Changes the direction of measurement for each axis.
RAD/DIA	Changes the measurement from normal to diameter for any axis.
LIN COMP	Selects a linear error compensation factor.
SHRINK	Selects a shrinkage allowance for all measurements.
TL COMP	Disables or enables the tool radius compensation function.
TOOL DIR	Changes the direction applied for tool radius compensation for each axis.
SDM	Disables or enables the subdatum function.
ARC	Disables or enables the arc function.
PCD	Disables or enables the PCD function.
POS OUT	Disables or enables the position output function.
POS SET	Sets the positions that trigger a pulse output.
PULSE	Sets the pulse length.
RS232	Sets up and enables the RS232 link.
NORMAL	Selects the factory set defaults for all the functions.
QUIT	Exits the set up procedure.

When you press **<ent>** for any of these options, a submenu will appear giving you the opportunity to select from alternatives or to enter data. These are listed below.

Remember:

- to scroll through the main menu, use the up down arrow keys
- to select an option to change, press **<ent>**
- to return to the main menu after selecting an option, press **<ent>**

(a) Language

In the main menu, press the arrow keys until “Language” is displayed. Press **<ent>**, and a list of languages will appear. You can scroll through this list by pressing the up / down arrow keys. Press **<ent>** to select the desired language, and you will be returned to the main menu.

English is available in all units. French, German, Spanish, Italian, and Danish are also available, depending on where the unit was purchased. Once a language is selected, all messages will subsequently appear in that language.

(b) Sleep / Datahold

In the main menu, press the arrow keys until “SLEEP” is displayed. Press **<ent>**, and the choice of “ON” and “OFF” is now available. Press the arrow keys to toggle between “ON” and “OFF”. Press **<ent>** to make your selection and return to the main menu.

Select “ON” if you want to be able to use the Sleep / Datahold feature. See section 4.7 for a full description of this feature.

(c) Key Beep

In the main menu, press the arrow keys until “Key Beep” is displayed. Press **<ent>** and the choice of “ON” or “OFF” is now available. Use the arrow keys to toggle between these two selections. Press **<ent>** to make your selection and return to the main menu.
ON - The DP7 will beep every time you press a key
OFF - No beep

( ) I/P TYPE (This menu option is only present in later versions of software)

In the main menu, press arrow keys until “I/P Type” is displayed. Press **<ent>** and message window displays “SEL. AXIS”. The axis windows will display the scale type that each axis is set to read. The scale type can be changed by pressing the blue axis keys (Ex Xo, Yo). Select the appropriate scale type (Spherosyn of Microsyn) for each axis, then press **<ent>** to return to the main setup menu.

(d) Display Resolution

This option allows you to select the resolution that is shown on the display for each axis. In Millimeter mode, the options are 0.005mm and 0.01mm. In Inch mode, the options are 0.0002” and 0.0005”. Example: If 0.01mm resolution is selected, all displayed measurements will be rounded to the nearest 0.01mm.

In the main menu, press the arrow keys until “RESOLUTN” is displayed. Press <ent> and the message “SEL AXIS” will appear in the message window. The current resolution setting will appear for each axis in the axis windows.
Pressing each axis key <X> <Y> or <Z> will change the resolution for each axis. Once the desired resolutions have been selected, press **<ent>** to return to the main menu.

(e) 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 the it measures positive from left to right.

In the main menu, press the arrow keys until "DIRECTN" is displayed. Press **<ent>** and the message "SEL AXIS" appears, asking you to select the axis or axes you wish to change.

Each axis display will show "0" or "1" depending on the direction set. Pressing each axis key, **<X>** **<Y>** or **<Z>**, switches the direction. When the unit is displaying the choices you wish to use, press **<ent>** to confirm your selection and to return to the main menu.

(f) Radius/Diameter

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

In the main menu, press the arrow keys until "RAD/DIA" is displayed. Press **<ent>** and the message "SEL AXIS" appears, asking you to select the axis or axes you wish to change.

The axes displays will show "RAD" and "DIA" depending on your previous selection. Pressing each axis key, **<X>** **<Y>** or **<Z>**, switches between radius (ie normal) display and diameter display for that axis. When the unit is displaying the choices you wish to use, press **<ent>** to confirm your selection and to return to the main menu.

(g) 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 main menu, press the arrow keys until "LIN COMP" is displayed. Press **<ent>** and the message "ENTR PPM" appears, asking you to enter the correction factor for the axis or axes you wish to change.

The axes displays will show the current correction factors. To change a correction factor, select the axis and enter the factor you wish to use. For example, to apply a factor of 15 PPM to the Y axis, press the following keys: **<Y><1><5><ent>**.

If the unit is displaying measurements less than the actual measurement, enter a positive factor to compensate. A factor of 15 PPM means displays are measurement x 1.000015.

When each axis is displaying the correction factor you wish to use, press **<ent>** to confirm your selection and to return to the main menu.

To establish a compensation factor, check the measurements displayed by the DP7 against a known distance. For example, you might use a known (actual) distance of 500mm, against which the DP7 displays 499.8mm. The correction factor you would then apply is:

(0.2mm/500mm) x 1,000,000 = 400 PPM

If the DP7 displays 500.2mm over the same distance, the correction factor would be:

(-0.2mm/500mm) x 1,000,000 = -400 PPM

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

(h) Shrinkage

This option allows you to set a shrinkage factor. Once you have set a shrinkage factor, all measurements will be adjusted by that factor. The letters "SH" or "S" appear in the message screen during normal use to remind you that this factor is being applied.

This facility is useful for mould making. For example, you are machining a mould from drawings that show actual dimensions. You wish to apply a 2.5% shrinkage factor, meaning that you wish the mould to be 2.5% oversize to allow for shrinkage. Having set the DP7 to use this factor, all measurements displayed will be reduced so that your mould will be made 2.5% oversize.

In the main menu, press the arrow keys until "SHRINK" is displayed. Press **<ent>** and the message "PERCENT?" appears, asking you to enter the shrinkage factor you wish to apply. Enter the factor you wish to use. For example, to enter 2.5%, press **<2><.><5><ent>**.

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

(i) Tool Radius Compensation

If you have a Millpac version of the DP7, you have a function called tool radius compensation. This is described in Section 5.3 below.

If you believe that you will not want to use this function, you can use this option to disable it. Once disabled, the function key for tool radius compensation will have no effect.

In the main menu, press the arrow keys until "TL COMP" is displayed. Press **<ent>** and the choice of "TC ON" and "TC OFF" appears. You can scroll between "TC ON" and "TC OFF" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

(j) Tool Direction

The tool radius compensation function uses the numeric keypad of the DP7 to select the direction of machining. Thus if you are machining from right to left (tool direction) on the X axis, you press keys **<1> <4>** or **<7>**. If you are machining from back to front (tool direction) on the Y axis, you press keys **<1> <2>** or **<3>** and so on. This is described in Section 5.3 below.

The direction of machining depends on which way you have set up each axis using the Direction set up procedure described in (e) above. This Tool Direction option allows you to change the direction of travel assumed by the tool radius compensation feature.

In the main menu, press the arrow keys until "TOOL DIR" is displayed. Press **<ent>** and the message "SEL AXIS" appears, asking you to select the axis or axes you wish to change.

Each axis display will show "0" or "1" depending on your previous selection. Pressing each axis key, **<X> <Y>** or **<Z>**, switches the direction. When the unit is displaying the choices you wish to use, press **<ent>** to confirm your selection and to return to the main menu.

You will have to experiment with the tool radius compensation feature until the direction of travel and the direction of machining meet your needs.

(k) Subdatums

If you have a Millpac version of the DP7, you have a function called subdatum. This is described in Section 5.2 below.

If you believe that you will not want to use this function, you can use this option to disable it. Once disabled, the function key for subdatum will have no effect.

In the main menu, press the arrow keys until "SDM" is displayed. Press **<ent>** and the choice of "SDM ON" and "SDM OFF" appears. You can scroll between "SDM ON" and "SDM OFF" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

(l) Arc

If you have a Millpac version of the DP7, you have a function called Arc. This is described in Section 5.4 below.

If you believe that you will not want to use this function, you can use this option to disable it. Once disabled, the function key for Arc will have no effect.

In the main menu, press the arrow keys until "ARC" is displayed. Press **<ent>** and the choice of "ARC ON" and "ARC OFF" appears. You can scroll between "ARC ON" and "ARC OFF" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

(m) Pitch Circle Diameter (Bolt Hole Circle)

If you have a Millpac version of the DP7, you have a function called Pitch Circle Diameter (PCD). This is described in Section 5.1 below.

If you believe that you will not want to use this function, you can use this option to disable it. Once disabled, the function key for PCD will have no effect.

In the main menu, press the arrow keys until "PCD" is displayed. Press **<ent>** and the choice of "PCD ON" and "PCD OFF" appears. You can scroll between "PCD ON" and "PCD OFF" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

(n) Position Output

The DP7 has an optional feature of an auxiliary output. This can be used to send a pulsed output signal when the measurement reaches each of three user-definable positions. If you have purchased a unit with this optional feature, you will have received a separate data sheet explaining how to make use of it.

This menu item enables or disables the position output facility.

In the main menu, press the arrow keys until "POS OUT" is displayed. Press **<ent>** and the choice of "POS ON" and "POS OFF" appears. You can scroll between "POS ON" and "POS OFF" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

WARNING. The position output function slows down the display update of the DP7. Even if you do not have the position output option fitted to your DP7, ensure that this option is set to "POS OFF".

(o) Position Set

The DP7 has an optional feature of an auxiliary output. This can be used to send a pulsed output signal when the measurement reaches each of three user-definable positions. If you have purchased a unit with this optional feature, you will have received a separate data sheet explaining how to make use of it.

(p) Pulse

The DP7 has an optional feature of an auxiliary output. This can be used to send a pulsed output signal when the measurement reaches each of three user-definable positions. If you have purchased a unit with this optional feature, you will have received a separate data sheet explaining how to make use of it.

(q) RS232

If you intend to use the RS232 output, a standard feature of the DP7, this option can change the method of operation from continuous output to key-press output.

If you set for continuous output, during operation measurements will be sent through the link continuously. If you set for key-press output, a single measurement will be sent each time you press **<ent>**.

In the main menu, press the arrow keys until "RS232" is displayed. Press **<ent>** and the choice of "232 KEY" and "232 CONT" appears. You can scroll between "232 KEY" and "232 CONT" using the arrow keys, **<⇑>** and **<⇓>**. Press **<ent>** to make your selection and to return to the main menu.

WARNING. Setting the RS232 output to continuous output will slow down the display update of the DP7. Even is you are not intending to use the RS232 link, ensure that this option is set to "232 KEY".

(r) Normal

The set up procedure involves a large number of options and is a powerful way of matching the way the DP7 works to your specific requirements.

If you wish to return to the factory set defaults, you can use this option to return all the settings to normal.

WARNING. Using this option will cancel any changes that you have made in the set up. Be careful to follow the exact keystrokes described below.

In the main menu, press the arrow keys until "NORMAL" is displayed. Press **<ent>** and "DEFAULT" will appear. If you wish to return to the factory set defaults, press **<ent>** to select that option and to return to the main menu.

If you decide not to return to the factory set defaults, press an arrow key and the message "QUIT NORMAL" appears. If you wish to quit without changing the set up, you must press **<ent>** when "QUIT NORMAL" is displayed.

The default settings are set out in the following table. A column is also left blank for you to keep a record of your own set up choices.

(s) Quit

Quit exits the setup mode and returns the DP7 to operational use.

In the main menu, press the arrow keys until “QUIT” is displayed. Press **<ent>** to return to operational use of the DP7.

Use the form below to record your setup parameter settings.

Parameter	**Axis 1**	**Axis 2**	**Axis 3**
Language			
Sleep			
Key Beep			
I/P Type			
Display Resolutn			
Directn			
Rad / Dia			
Lin Comp			
Shrink			
TL Comp			
Tool Dir			
SDM			
ARC			
PCD			
Pos Out			
Pos Set			
Pulse			
RS232			

3. USING THE KEYPAD

Figure 1.1.2 shows the layout of the keypad. The keys are used as follows:

Key	Purpose
<X_0><Y_0><Z_0>	Set the current position for that axis to zero.
<X><Y><Z>	Select axis to enter a dimension.
<½>	Centrefind function.
<0><1><2><3><4><5> <6><7><8><9> <±><.>	Numeric keypad for entering dimensions and other numbers.
<⇑><⇓>	Arrow keys to move to the next item in the message window.
<ent>	Enter key to confirm a dimension you have keyed with the numeric keypad, or to confirm a menu item displayed in the message screen.
<in/mm>	Switches between inch and metric display.
<abs/inc>	Switches between absolute and incremental mode.
<ref>	Selects the Digifind function.
<f_1><f_2><f_3><f_4><f_5>	Function keys. These are not used on the standard version of the DP7. On the DP7 Millpac and Lathepac, they are used for specific functions as described in this manual, and labels inserted below the keys give a pictorial reminder of their purpose. See Figure 1.1.2.

In addition, there is a concealed key under the "7" of the DP7 logo. This key is not embossed, but it will beep when pressed. The concealed key is used to enter the set up procedure and for the datahold feature.

4. STANDARD FUNCTIONS

4.1 USING INCREMENTAL

(a) Purpose and Use

When the DP7 is set to incremental use, it can be used to display each new position relative to the last position. This is also known as point-to-point use. An example of when to use incremental is shown in Fig 4.1.1.

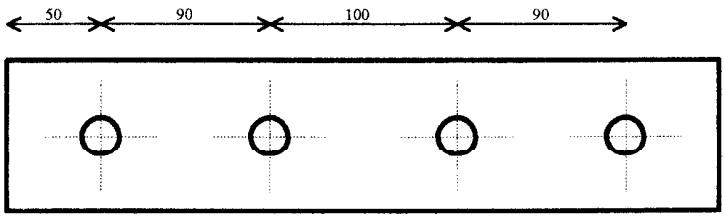


Figure 4.1.1

The DP7 is set to incremental use for all axes together. On setting to incremental, you can zero each axis by pressing **<X_0>,<Y_0>** or **<Z_0>**. This sets a temporary datum and movement will then be displayed relative to this datum. When you move to your second position, you can reset your temporary datum to this position and continue as before.

As an alternative to zeroing the axes, you can enter the coordinates of a position relative to the datum you wish to use.

Each time you switch to incremental mode, the DP7 will display your current position relative to the last datum you set in incremental mode - the DP7 keeps your last datum in memory.

(b) Keystrokes

Operator steps	Keystrokes	Axes Displays		Message Screen
Set all axes for incremental use	**<abs/inc>**			INC
Set a temporary datum	**<X_0>**	X	0.00	INC
	<Y_0>	Y	0.00	
	<Z_0>	Z	0.00	
Enter the coordinates of a position, eg X100,Y50,Z20:	**<X><1><0><0><ent>**	X	100.00	INC
	<Y><5><0><ent>	Y	50.00	
	<Z><2><0><ent>	Z	20.00	

4.2 USING ABSOLUTE

(a) Purpose

When the DP7 is set to absolute use, it can be used to display each new position relative to a constant datum. An example of when to use absolute is shown in Fig 4.2.1.

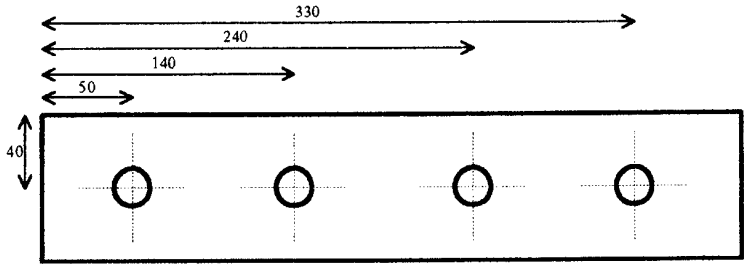


Figure 4.2.1

On setting to absolute, the display is automatically set to display the current position relative to the datum last used. This means that you can switch between absolute and incremental use without losing your absolute datum position.

(b) Keystrokes

Operator steps	Keystrokes	Axes Displays	Message Screen
Set all axes for absolute use	**<abs/inc>**		ABS

(c) Establishing the Datum

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

To set the datum, you must position the machine precisely at the point you intend to use as the datum, and then zero any or all axes. Alternatively, you can set the machine at known coordinates relative to datum, and then enter those coordinates.

Operator steps	Keystrokes	Axes Displays		Message Screen
Set all axes for absolute use	**<abs/inc>**			ABS
Move the machine to a precise position				
Either set that position as the datum	**<X_0>**	X	0.00	ABS
	<Y_0>	Y	0.00	
	<Z_0>	Z	0.00	

Operator steps	Keystrokes	Axes Displays	Message Screen
Or set that position to known coordinates relative to the datum, eg X100 Y50 Z20	<X><1><0><0><ent>	X 100.00	ABS
	<Y><5><0><ent>	Y 50.00	
	<Z><2><0><ent>	Z 20.00	

Take care not to zero your display unless you are sure that you wish to reset your datum.

In order to reduce the risk of you losing your datum point once set, the DP7 has a special unique feature called Digifind. Once you have established a datum in absolute mode, you may wish to make use of the Digifind feature - see Section 4.4 below.

4.3 USING ABSOLUTE AND INCREMENTAL TOGETHER

(a) Example

Figure 4.3.1 shows an example of a typical component that can be best machined using both the absolute and incremental mode of display. The keystrokes that you would use while machining this component are listed below.

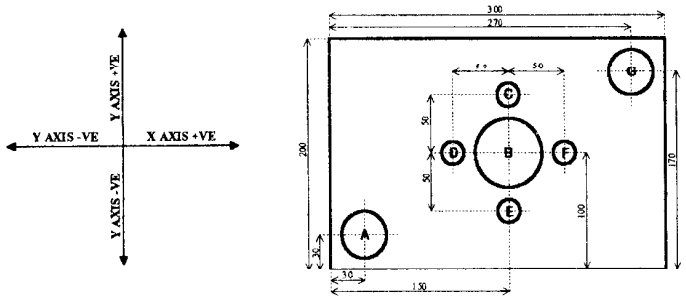


Figure 4.3.1

Operator steps	Keystrokes	Axes Displays	Message Screen
Set all axes for absolute use	<abs/inc>		ABS
Move the machine to the bottom left corner of the component and set the datum	<X_0>	X 0.00	ABS
	<Y_0>	Y 0.00	
Move to position A		X 30.00	ABS
		Y 30.00	
Move to position B		X 150.00	ABS
		Y 100.00	

Operator steps	Keystrokes	Axes Displays	Message Screen
Set to incremental use and set a temporary datum	<abs/inc><X_0><Y_0>	X 0.00 Y 0.00	INC
Move to position C		X 0.00 Y 50.00	INC
Move to position D		X -50.00 Y 0.00	INC
Move to position E		X 0.00 Y -50.00	INC
Move to position F		X 50.00 Y 0.00	INC
Reset to absolute use	<abs/inc>	X 200.00 Y 100.00	ABS
Move to position G		X 270.00 Y 170.00	ABS

4.4 DIGIFIND

(a) Purpose

Digifind is a new feature for DRO Counters and unique to the DP7. It takes advantage of the special configuration of the Spherosyn transducer system. Digifind greatly reduces the risk of losing your position and datum set up. With Digifind, you can be confident that you perform any precise set up of your workpiece once - and once only.

Digifind is a way of finding your position quickly and easily. It works automatically every time you switch on the DP7, and can be used manually to record and re-set datum points.

Because Digifind is a new feature, we recommend that you read the following instructions carefully and try it out for yourself. We are confident that you will find that it adds an invaluable new capability for your machining.

(b) On Power Up

Every time you switch on, the DP7 will automatically use the Digifind feature to compensate for any movement of the transducer up to 6mm (¼") in either direction since the unit was last used. This applies whether the DP7 was switched off deliberately or unintentionally - such as a power failure.

The following example illustrates how Digifind works. The table gives the actual position of the machine, and the displayed position, before and after a power failure. In the example, some slight movement has occurred - exaggerated for illustration. The table compares the display of a DP7 using the Digifind feature with a conventional DRO Counter.

		Actual Position		DP7 Display		Conventional DRO Display
Before power failure	X	100.00	X	100.00	X	100.00
	Y	50.00	Y	50.00	Y	50.00
	Z	20.00	Z	20.00	Z	20.00
After power failure	X	102.00	X	102.00	X	100.00
	Y	53.00	Y	53.00	Y	50.00
	Z	19.00	Z	19.00	Z	20.00

This feature applies for periods of at least 30 days, the life of the battery back-up.

(c) Use with a Datum

There are three ways that you can use the Digifind function:

METHOD 1 - USING A MACHINE MARKER

Figure 4.4.1 shows a workpiece set up on a machine with a datum point established in absolute mode. For simplicity a single axis is shown, but the same applies for all axes.

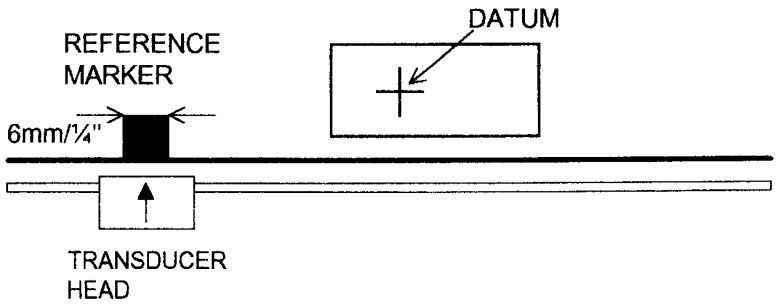


Figure 4.4.1

On this installation, a marker has been placed on the machine and on the measurement transducer. This marker can be at any convenient position. It could consist of any indelible mark or a feature of the machine such as the end-stock. Whatever type of mark you chose, it must enable you to move the machine to the same position within a band of 6mm/¼".

After you have established your datum relative to your workpiece, move to the marked point. You do not have to position the machine accurately, only within the 6mm/¼" band. You then use Digifind to set a reference point.

If you lose your datum at any time, either because you have moved the machine with power off or because you have accidently pressed the wrong keys, you can 'find' it again very quickly and easily.

Move back to the marker. Again, you do not have to position the machine accurately, only within the 6mm/¼" band. You then use Digifind to 'find' your reference point.

You have now re-set the DP7 to your original datum.

The keystrokes are as follows:

Operator steps	Keystrokes	Axes Displays	Message Screen
Set your datum.			
Move to the reference marker - anywhere within the 6mm/¼" band			
Use Digifind to store this position as the reference	**<ref>**		FIND 0
	<⇑>		SET REF
	<ent>		ABS
If you lose your datum:			
Move back to the reference marker - anywhere within the 6mm/¼" band			
Use Digifind to 'find' your reference position	**<ref>**		FIND 0
	<⇓>		FIND REF
	<ent>		ABS
You are now re-set to your original datum			

METHOD 2 - USING A WORKPIECE MARKER

Figure 4.4.2 shows a workpiece set up with a datum point established in absolute mode. For simplicity a single axis is shown, but the same applies for all axes.

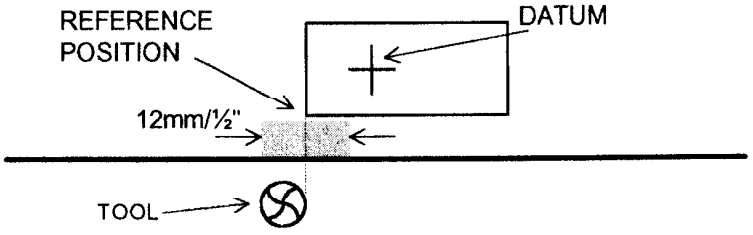


Figure 4.4.2

In this method, you use a convenient reference point on the workpiece. This could be the datum position itself or any other convenient point. You may wish to mark the point you have chosen with a marker pen to remind you where it is. Whatever point you chose, it must enable you to move the machine to the same position within ±6mm/¼" - ie within a band of 12mm/½". It should be possible to do this by eye.

After you have established your datum, move to the chosen marked point. Although you do not have to position the machine accurately, you must be able to return to the same position within ±6mm/¼". You then use Digifind to set a reference point.

If you lose your datum at any time, either because you have moved the machine with power off or because you have accidently pressed the wrong keys, you can 'find' it again very quickly and easily.

Move back to the marked point. You do not have to position the machine accurately, only within ±6mm/¼" of where you set the reference position. You then use Digifind to 'find' your reference point. (Because you are setting the reference position at a specific point, rather than just within a band as in Method 1, you have a wider margin within which you can 'find' that reference position.)

You have now re-set the DP7 to your original datum.

The keystrokes are as follows:

Operator steps	Keystrokes	Axes Displays	Message Screen
Set your datum.			
Move to your chosen reference position - anywhere that you can later return to within ±6mm/¼"			
Use Digifind to store this position as the reference	<ref> <⇑> <ent>		FIND 0 SET REF ABS
If you lose your datum:			
Move back to the reference position- anywhere within the 6mm/¼" band			
Use Digifind to 'find' your reference position	<ref> <⇓> <ent>		FIND 0 FIND REF ABS
You are now re-set to your original datum			

METHOD 3 - FINDING YOUR LAST DATUM

As a final fail-safe, you can use Digifind to 'find' the last datum you set in absolute mode, even if you forgot to set a specific reference point.

Figure 4.4.3 shows a workpiece. For simplicity a single axis is shown, but the same applies for all axes.

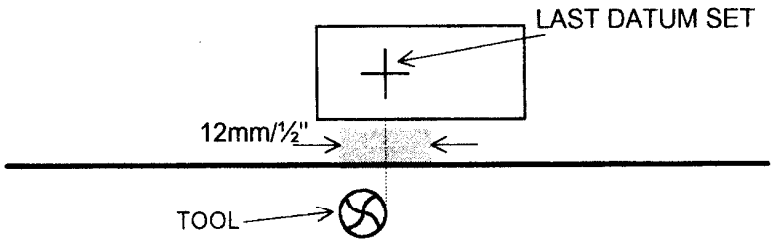


Figure 4.4.3

Let us assume that you have moved the machine to a datum position and zeroed the axes to set that datum in absolute mode. Subsequently you have lost this datum, perhaps because of a power failure.

Move back to the datum position. Again, you do not have to position the machine accurately, only within ±6mm/¼" of that datum. You then use Digifind to 'find' your last datum (the position you last zeroed the axes).

You have now re-set the DP7 to your last set datum.

The keystrokes are as follows:

Operator steps	Keystrokes	Axes Displays		Message Screen
Set your datum by zero'ing the axes.	<X_0>	X	0.00	ABS
	<Y_0>	Y	0.00	
	<Z_0>	Z	0.00	
If you lose your datum:				
Move back to the datum position - the last position you set to zero, within ±6mm/¼" on all axes				
Use Digifind to 'find' your last zero position	<ref>			FIND 0
	<ent>			ABS
You are now re-set to your last datum				

4.5 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 happens to be 100mm wide.

Operator steps	Keystrokes	Axes Displays		Message Screen
Locate to your first position - one edge of your workpiece - and zero the X axis.	<X_0>	X	0.00	ABS or INC
Locate to the second position - the other edge of the workpiece.		X	100.00	ABS or INC
Use centre find to locate the centre point:				
either	<X><½>	X	50.00	ABS or INC

Operator steps	Keystrokes	Axes Displays	Message Screen
or	<½><X>	X 50.00	ABS or INC

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.

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

4.6 INCH/MILLIMETRE

To change between display in millimetres and in inches, press **<in/mm>**. The displays will be converted instantly. A light beside the key reminds you which measurement you are using.

Selecting inch or millimetre display applies to all dimensions. For example, if you are in millimetre display, whenever you enter dimensions you should also use millimetres.

When you switch on the DP7, it will display in the same unit of measurement that you set when you last used the unit.

4.7 DATAHOLD (SLEEP)

Datahold allows you to disable the DP7 but retaining power to the measurement transducers and memory circuits. You can use datahold to prevent unauthorised or accidental use of the DP7 whilst unattended.

To select datahold, press the concealed key under the "7" of the DP7 logo (see Section 3 that explains the keypad).

To return to normal use, press the same key again.

While the DP7 has been set to datahold, the keypad will not function and the displays will be blank. If the machine is moved, "MOVED" will appear in the message screen to warn you of that movement. However, if any movement does occur, the DP7 will keep track of it and the positioned displayed after datahold will be the true position. If a key is pressed, "KEYED" will appear in the message screen to warn you that someone has attempted to use the keypad, although the keypress will have had no effect.

4.8 PRINT

The print facility sends the displayed position to the RS232 output to be transmitted to external devices such as a computer.

To use print, you should first set the RS232 output to either continuous or single key output using the set-up procedure (see Section 2(r) above).

If you have chosen continuous output, all displayed positions will be transmitted while you are using the DP7.

If you have chosen single key output, press **<ent>** each time you wish the displayed position to be transmitted.

The connector for the RS232 output is a 25-way D connector on the back of the DP7 display. The connections are detailed below.

Pin #	Purpose
1	Protective Ground (PG)
2	Transmitted Data (TXD)
7	Signal Ground (SG)
20	Data Terminal Ready (DTR)

The protocol is detailed below.

2400 Baud
8-bits Data
No Parity
One Stop Bit

5. MILLPAC FUNCTIONS

If you have a Millpac version of the DP7, you will find labels under the five function keys identifying the additional functions covered in this section. See Figure 1.1.2, which shows these labels.

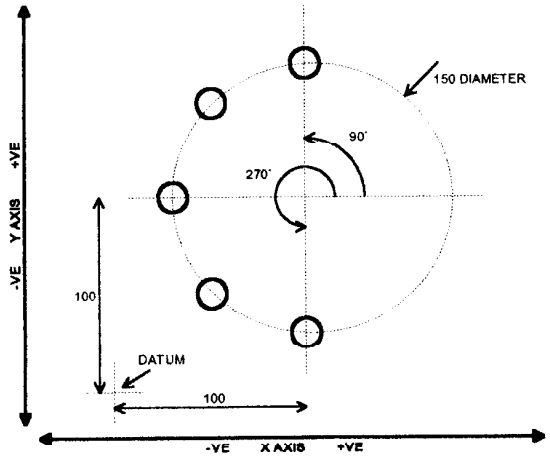
5.1 PCD

(a) Purpose

The PCD function or 'bolt hole circle' function is used to find the position of a series of points around the circumference of a circle. This is designed to speed up applications such as drilling holes around a flange.

The PCD function is made easy to use by the message screen. Once PCD is selected, the message screen will prompt you for the various parameters needed to define where the positions should be.

Figure 5.1.1 explains these parameters.



EXAMPLE PARAMETERS:

CENTRE OF CIRCLE	X100, Y100
DIAMETER OF CIRCLE	150
NUMBER OF HOLES	5
START ANGLE	90°
END ANGLE	270°

Figure 5.1.1

Note that in the example shown, the start angle and end angle are measured anti-clockwise from the X axis - ie the direction of the X axis measuring positive is at 0°. This is true for the orientation of the axes shown. Figure 5.1.2 shows how the orientation of the axes affects the way you measure this angle.

If you wish to have a complete circle, enter the same end angle as start angle.

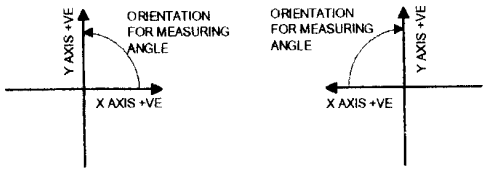


Figure 5.1.2

(b) Keystrokes

To select the PCD function, press <f4>. You can exit the PCD function at any time by pressing <f4> again.

In the following example, the keystrokes are given for the parameters shown in figures 5.1.1 above.

Operator steps	Keystrokes	Axes Displays	Message Screen
Select PCD function	<f4>		CENTRE?
Enter position of centre of circle (X100 Y100)	<X><1><0><0><ent> <Y><1><0><0><ent>	X 100.00 Y 100.00	CENTRE?
Continue to next step	<⇓>		DIA?
Enter diameter of circle (80)	<1><5><0><ent>	Y 150.00	DIA?
Continue to next step	<⇓>		NO HOLES
Enter number of holes (5)	<5><ent>	Y 5	NO HOLES
Continue to next step	<⇓>		ST ANG
Enter the angle of the first hole (90°)	<9><0><ent>	Y 90.00	ST ANG
Continue to next step	<⇓>		END ANG
Enter the angle of the last hole (270°)	<2><7><0><ent>	Y 270.00	END ANG
Display coordinates of the first hole (the figures displayed depends on your current position)	<⇓>	X 100.00 Y 175.00	HOLE 1
Move to first position, when displays show zero		X 0.00 Y 0.00	HOLE 1
Display coordinates of the second hole	<⇑>	X 47.00 Y 153.00	HOLE 2
Continue as for hole 1			

Operator steps	Keystrokes	Axes Displays	Message Screen
When you have completed the operation, exit PCD	<f4>		ABS or INC

At each step, the DP7 will show the figure you entered last time you used PCD. Just press **<ent>** or **<⇓>** if you wish to use the same figure.

5.2 SUBDATUMS

(a) Use of Subdatums for complex components

The component shown in Figure 5.2.1 is an example of a complex component with dimensions given relative to more than one datum point.

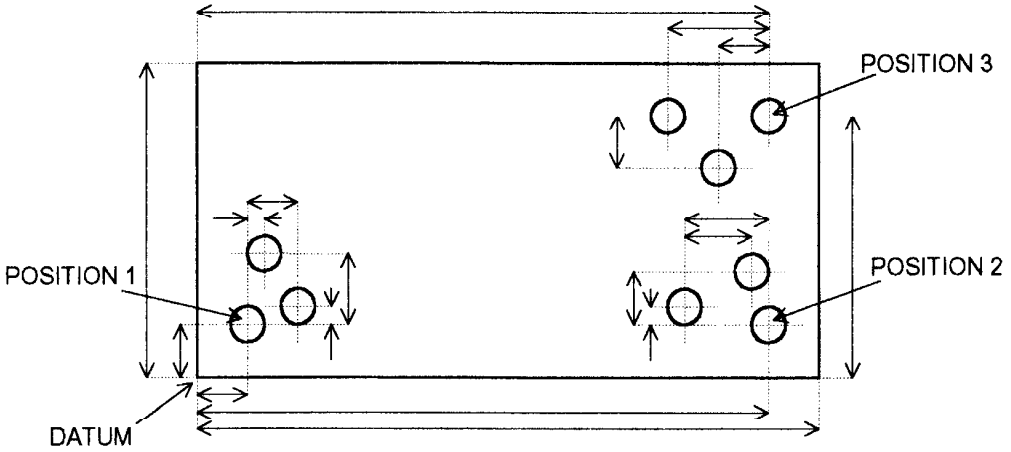


Figure 5.2.1

In this example, it would be convenient to set up your main datum in absolute mode. In other words, coordinates are displayed relative to this position in absolute mode.

However, you can also set up positions 1,2 and 3 as 'subdatums'. This means that you can also display coordinates relative to these positions.

When you have set up your subdatums, you can switch between them as well as absolute and incremental mode. They stay in memory and can be called up at any time.

You can set up as many as 199 subdatums in this way.

Subdatums remain in memory as coordinates relative to datum in absolute mode. If you change the datum in absolute mode, the subdatums will 'move' to stay the same distance from that datum.

There are three methods of entering subdatums:

METHOD 1	Manually enter the coordinates of your subdatums without moving the machine. Use this method if you are working from a drawing. You enter the subdatums relative to the datum used in absolute mode. Use this method when you are working directly from a drawing.
METHOD 2	Move the machine to the position you wish to enter as the subdatum, and enter that position.

METHOD 3 Move the machine to known coordinates relative to the subdatum, and enter those coordinates.

Note that in Method 2 and 3 you are moving the machine to a known position, but in Method 1 you do not need to refer to your current position. The keystrokes are shown below for each method. You will see that when you use method 1, the display will automatically convert the coordinates you enter to correct for your current position.

To select the subdatum function, press **<f1>**. When you wish to exit the subdatum function, press **<abs/inc>**.

Operator steps	Keystrokes	Axes Displays	Message Screen
Select subdatum function	**<f1>**		SDM NO?
Chose the subdatum number you wish to use (1-199 are available) eg 3	**<3><ent>**		SDM 3
METHOD 1 enter the coordinates of the position you want for the subdatum, relative to the absolute datum eg X100 Y30 Z20 (see note below)	**<X><1><0><0><f1>** **<Y><3><0><f1>** **<Z><2><0><f1>**	X -100.00 Y -30.00 Z -20.00	SDM 3
METHOD 2 enter the current position as the subdatum (see note below)	**<f5>**	X 0.00 Y 0.00 Z 0.00	SDM 3
METHOD 3 enter the current position relative to the subdatum eg X20 Y10 Z5	**<X><2><0><ent>** **<Y><1><0><ent>** **<Z><5><ent>**	X 20.00 Y 10.00 Z 5.00	SDM 3
Select the next subdatum	**<⇑>**		SDM 4
Select the previous subdatum	**<⇓>**		SDM 2
Skip to another subdatum eg 20	**<f1><2><0><ent>**		SDM 20

Note:

In Method 1, the coordinates displayed will automatically be corrected to display the coordinates of your subdatum relative to your current position. In this example, the current position is assumed to be at datum in absolute mode.

Pressing the **<f5>** key in Method 2 sets all axes to zero and has the same effect as pressing **<X0><Y0><Z0>**.

(b) Use of Subdatums for batch machining

Subdatums can be used as a programming tool to store sequences of machining steps. In this way, you can programme a sequence and repeat it as many times as you wish for batch machining of parts.

Because there are 199 subdatum memory spaces, you can store different machining sequences under different number sequences to call up for different jobs. For example, you may have five regular jobs that you machine from time to time, and you store them as follows:

Job Reference	Subdatum Sequence
A	1-18
B	20-31
C	40-55
D	60-73
E	80-108

To programme the steps, you can simply record the coordinates as you machine a component.

Operator steps	Keystrokes	Axes Displays		Message Screen
Establish datum in absolute mode, then move the machine to your first position				ABS
Select subdatum function	<f1>			SDM NO?
Chose the first subdatum number you wish to use (1-199 are available) eg 1	<1><ent>			SDM 1
Zero all axes	<f5>	X Y Z	0.00 0.00 0.00	SDM 1
Select the next subdatum	<⇑>			SDM 2
Move the machine to your second position and zero all axes	<f5>	X Y Z	0.00 0.00 0.00	SDM 2
Repeat for all your machine steps				
Exit subdatum function	<abs/inc>			ABS

If you prefer to enter the coordinates manually working from a drawing, you can enter the coordinates you wish to use relative to the datum used in absolute mode. Use the following keystrokes:

Operator steps	Keystrokes	Axes Displays	Message Screen
Select subdatum function	<f1>		SDM NO?

Operator steps	Keystrokes	Axes Displays	Message Screen
Chose the first subdatum number you wish to use (1-199 are available) eg 1	<1><ent>		SDM 1
Enter the coordinates of the position you want for the subdatum, relative to the absolute datum, eg X100 Y30 Z20 (see note below)	<X><1><0><0><f1> <Y><3><0><f1> <Z><2><0><f1>	X -100.00 Y -30.00 Z -20.00	SDM 1
Select the next subdatum	<⇑>		SDM 2
Enter coordinates as before			
Repeat for all your machine steps			
Exit subdatum function	<abs/inc>		ABS

Note. The coordinates displayed will automatically be corrected to display the coordinates of your subdatum relative to your current position. In this example, the current position is assumed to be at datum in absolute mode.

To use your programmed sequence:

Operator steps	Keystrokes	Axes Displays	Message Screen
Select subdatum function	<f1>		SDM NO?
Chose the first subdatum number in your sequence, eg 1	<1><ent>		SDM 1
Move the machine until all axes display zero - you are at your first position		X 0.00 Y 0.00 Z 0.00	SDM 1
Select the next subdatum	<⇑>		SDM 2
Move the machine until all axes display zero - you are at your second position		X 0.00 Y 0.00 Z 0.00	SDM 2
Repeat for all your machine steps			
Exit subdatum function	<abs/inc>		ABS

Remember that subdatums are all coordinates relative to the datum set in absolute mode. When you set up a new workpiece, you can set your datum in absolute mode and all the subdatum positions will be adjusted automatically relative to that datum.

As a shortcut, you can switch between absolute, incremental and subdatums by using the arrow keys, <⇑> and <⇓>, without having to press a function key.

5.3 TOOL RADIUS COMPENSATION

(a) Purpose

Tool radius compensation allows you to display the position of the cutting edge of the tool, and to adjust quickly and easily for a change in direction of cut. This is illustrated in figure 5.3.1.

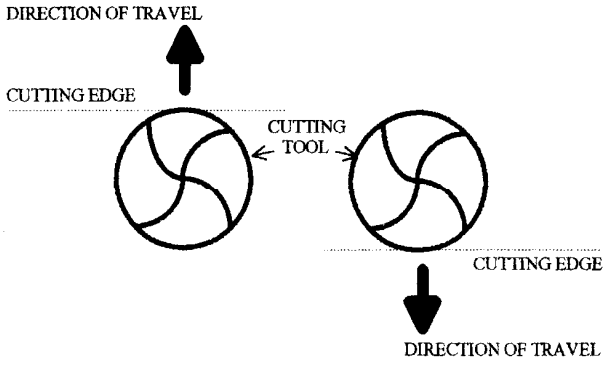


Figure 5.3.1

If you need to work to a datum point, remember to set to tool radius compensation before setting the datum, and when setting the datum, ensure that you are moving in the direction that you have selected for cutting.

(b) Keystrokes

Operator steps	Keystrokes	Axes Displays	Message Screen
Select tool radius compensation	<f2>		TOOL DIA?
Enter the tool diameter eg 20	<2><0><ent>		TOOL
Select the direction of cut (see below) eg right and up	<9>		TOOL ↑→
Select a new direction of cut (see below) eg left and down	<1>		TOOL ↓←
Exit tool radius compensation	<f2>		ABS

You set the direction of cut with the numeric keypad as shown in Figure 5.3.2. When you set the direction of cut, arrows appear in the message screen to remind you of your selection.

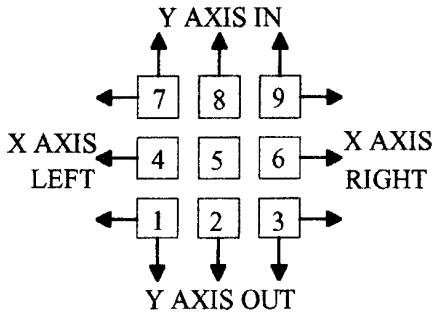


Figure 5.3.2

For example, if you are machining to the right - positive on the X axis - press **<6>**. If you are machining towards you - negative on the Y axis - press **<2>**. If you are machining in both directions, right and towards you, press **<3>**.

You can also scroll through the various direction settings using the arrow keys, **<⇑>** and **<⇓>**.

If when you first operate your DP7 the orientation of the tool radius compensation is not as described above, then there is the facility in the set-up procedure to change the tool direction for each axis. See Section 2(j) above.

When you are using tool radius compensation, you can still use other functions as normal. You can press **<X₀>**, **<Y₀>** or **<Z₀>** to zero an axis display. If you press **<X>**, **<Y>** or **<Z>**, you can enter a dimension as normal.

5.4 ARC

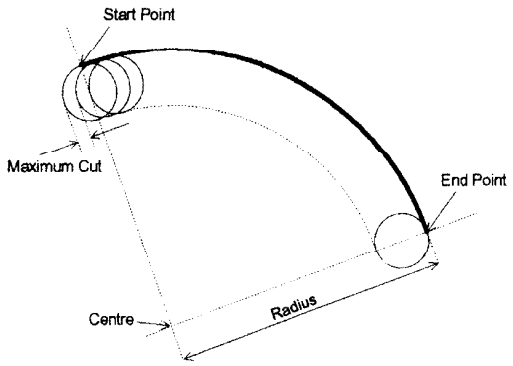
(a) Purpose

The ARC function is used for rough machining of an arc or radius.

The ARC function is made easy to use by the message screen. Once ARC is selected, the message screen will prompt you for the various parameters needed to define where the positions should be.

You can select to machine an internal or external arc. If you have a three axis unit, you can use ARC to machine in any of three planes - the XY plane (horizontal in normal convention), or one of two vertical planes, XZ and YZ.

Figure 5.4.1 explains the parameters.



EXAMPLE PARAMETERS:

CENTRE	X100 Y100
RADIUS	50
START POINT	X-17.100 Y+46.985
END POINT	X+46.985 Y+17.100
TOOL DIAMETER	10
INTERNAL/EXTERNAL	INTERNAL (RAD-TOOL)
MAXIMUM CUT	2.5

Figure 5.4.1

Note that ARC assumes that you wish to machine a arc of less than 180°. The start position and end position are therefore interchangeable - the DP7 will guide you round the internal angle defined by these points. If you specify an arc of exactly 180°, the function will describe an arc anti-clockwise from the start point, assuming you have configured your system conventionally (X axis +ve for tool movement left to right and Y axis +ve for tool movement front to back).

Note also that the radius and centre figures override the start and end points if there is an inconsistency between these figures.

One of the parameters you chose is the 'maximum cut'. This is the distance between positions on the arc you will machine. Chose a small distance to achieve a smooth arc. Chose a larger distance for quick machining of a rough arc.

(b) Keystrokes

To select the ARC function, press **<f3>**. You can exit the ARC function at any time by pressing **<f3>** again.

In the following example, the keystrokes are given for the parameters shown in Figure 5.4.1 above, in the XY (horizontal) plane.

Operator steps	Keystrokes	Axes Displays	Message Screen
Select ARC function	**<f3>**		ARC - XY
If you have a three axis unit, select the plane for machining by scrolling through with the arrow keys. If you have a two axis unit, proceed to the next step.	**<⇓>** **<⇓>** **<⇓>**		ARC - XZ ARC - YZ ARC - XY
In this example we will use the XY plane for machining.	**<ent>**		CENTRE?
Enter the coordinates of the centre of the arc eg X100 Y100	**<X><1><0><0><ent>** **<Y><1><0><0><ent>**	X 100.00 Y 100.00	CENTRE?

Operator steps	Keystrokes	Axes Displays		Message Screen
Continue to next step	<⇓>			RADIUS
Enter the radius of the arc eg 50	<5><0><ent>	Y	50.00	RADIUS
Continue to next step	<⇓>			ST PT?
Enter the position of one end of the arc	<X><-><1><7><.><1><ent> <Y><4><6><.><9><9><ent>	X Y	-17.10 46.99	ST PT?
Continue to next step	<⇓>			END PT?
Enter the position of the other end of the arc	<X><4><6><.><9><9><ent> <Y><1><7><.><1><ent>	X Y	46.99 17.10	END PT?
Continue to next step	<⇓>			TOOL DIA
Enter the tool diameter	<1><0><ent>	Y	10.00	TOOL DIA
Continue to next step	<⇓>			RAD+TOOL
Scroll to radius-tool (internal machining), or radius+tool (external machining), and select	<⇓> <⇓> <⇓>			RAD-TOOL RAD+TOOL RAD-TOOL
Continue to next step	<ent>			MAX CUT
Enter the maximum distance between machining positions eg 2.5	<2><.><5><ent>	Y	2.50	MAX CUT
The unit is now programmed. Use the arrow keys to scroll through each point on the arc (the coordinates displayed depend on your current position - this example assumes you are currently at datum)	<⇓>	X Y	-59.00 -81.44	PT 1
Move to position 1		X Y	0.00 0.00	PT 1

Operator Steps	Keystrokes	Axes Displays	Message Screen
Scroll to position 2	Up arrow key		PT 2
Continue through all the positions			
Exit ARC function	**<F3>**		ABS

At each step when you are entering parameters, the DP7 will show the figure you entered the last time you used the ARC. Just press **<ent>** or the up arrow key if you wish to use the same figure.

When you are using ARC, make sure that you move away from the arc you are machining before moving to the next point.

6. Lathepac Functions

6.1 Tool Offsets

If you have a Lathepac version of the DP7, you will find a label under the F1 key. Figure 1.1.2 (Page 3) shows the label.

The DP7 Lathepac display is a powerful tool for people who specialize in turning applications. One of the most powerful features of the DP7 Lathepac is Tool Offsets. Tool Offsets allow the operator to enter and store up to 99 offsets. This ensures that measurements will remain consistent throughout the tool library. Tool offsets can help provide increased speed on tool changes, increased productivity, and fewer scrapped parts.

There are two very important rules to remember when using Tool Offsets:
1. *Setting* tool offsets is a separate and distinct operation from *using* tool offsets.
2. The first tool entered in tool offets is *always* considered the reference tool. **All other tools entered are offseet in relation to the difference in length and width as compared to Tool 1.**

Entering tool offsets - (F4)

Set Tool 1 - This is the reference tool. All tools entered are offset in relation to Tool 1.

1. Set the display to ABS mode.
2. Take a skim cut off the part and zero each axis. The first tool offset is now ready to be entered.
3. Press **<F4>** key.
4. Press **<1>** key, then **<ent>**.
5. Touch tool 1 to the OD of the part and zero the corresponding axis. Select the zeroed axis with the red axis key and confirm by pressing enter.
6. Touch Tool 1 to the face of the part and zero the corresponding axis. Select the zeroed axis with the red axis key and confirm by pressing enter.

Set tool 2 through tool 99

1. Press **<F4>**.
2. Press the toll number you wish to enter (2-99) on the keypad, then press **<ent>**.
3. Touch the tool to the OD of the part. DO NOT ZERO THE AXIS. Select the corresponding axis with the red axis key, then press **<ent>** key. The displayed dimension is the tool's offset.
4. Touch the same tool to face of the part. DO NOT ZERO THE AXIS. Select the corresponding axis with the red axis key, then press **<ent>**. The displayed dimension is the tool's offset.
5. Repeat steps 1-4 for each tool you wish to enter. When finished press **<F4>**, then **<ent>**.

Using Tool Offsets - (F1)

1. Set the display to ABS
2. Take a skim cut off the diameter of the part and measure. Leave the tool on the part.
3. Press **<F1>**.
4. Press **<1>**, then **<ent>**.
5. Select the corresponding axis with the red axis key. Enter the measured diameter of the part via the keypad, then press **<ent>**. The diameter of the part is now set. DO NOT ZERO THE AXIS DURING THIS STEP.
6. Move tool 1 to touch the face of the part. Use the blue axis key to zero the corresponding axis.
7. To use tool 2- tool 99, press **<F1>**. Enter the tool number via the keypad, then press **<ent>**.
8. Repeat steps 1-7 to set up a new part.

7. Options

If you purchased a DP7 complete with the optional auxiliary output, the features listed below will be available.

Remote Zero

Position Output

Probe Interface

8. TROUBLESHOOTING

	Symptom	Solution
1	Nothing happens when the unit is switched on. Not even the in/mm light works.	Check that the unit is correctly connected to a working power source. Check that the power lead is not damaged. 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 1.2)
2	When the unit is switched on, the in/mm light works, but the displays are blank.	This suggests that voltage of the power source is too low. Check that the power source is within the limits accepted by the unit. (See Section 1.2)
3	The displays work, but reset from time to time without the keys being pressed.	This suggests either that the voltage of the power source is too low, or that the power source has an intermittent fault. Check the power source as above and 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 there is a poor earth (ground) connection. Both the DP7 unit itself, and the machine on which it is installed, must have proper earth (ground) connections.
5	"SPH FAIL" appears in the display.	This means that the unit is not receiving a proper signal from the measurement transducer. Check that the transducer connection is good. Check that there is no damage to the connectors or to the transducer 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 DP7 unit and you should contact your local dealer.
6	The unit works properly, but measurements are inaccurate	Check that the shrinkage factor is set to zero. (See Section 2) Check that the linear error compensation factor is set to zero, or try a different factor. (See Section 2) If the unit is still not giving the required accuracy, check your machine. Remember that the measurement transducers are usually installed at some distance from your workpiece. Any play in slideways will have a crabbing effect - a rotational movement - that will cause a difference in movement between the workpiece and the transducer. This appears like a backlash effect. Make sure you are always taking measurements when moving to positions from the same direction. If you are still not achieving the results you need, contact your local dealer.

	Symptom	Solution
7	One display is not working properly	Swap transducers between axes to see whether the problem is associated with the transducer or with the DP7 unit.
8	The unit will not respond to keys	Switch the unit off and back on. Note that because of the Digifind feature, provided the machine has not moved more than 6mm/¼" in any direction, you will not lose your current position by switching off and on.
9	The unit works, but the displays are very slow to update as the machine moves	Check that the RS232 output is set to "232 KEY" and that the position output is set to "POS OFF". (See Section 2)
10	When the unit is switched on, it displays the message "SET UP"	This means that the unit has been left with no power for more than 30 days, and the battery back-up is exhausted. All the set up options will have been set to the factory defaults. If these defaults are satisfactory to you, press the arrow keys until "QUIT" is displayed and press **<ent>**. Otherwise follow the instructions in Section 2 to establish the options you require.
11	None of the procedures above corrects the fault	You should contact your Newall dealer. The DP7 is designed as a sealed unit, and the electronic components inside are not suitable for repair by the user. Opening the case will invalidate the warranty.

Digital Readout Systems • Linear Encoders

Troubleshooting Guide for Newall Digital Readout Systems

For Display Models: Sapphire, DP7, DPG, Topaz, DP8, DPG2000, E70

This Troubleshooting Guide is intended for use in conjunction with the applicable user manuals. Please follow the troubleshooting steps below and call our Tech Support Department with the results.

Nothing happens when the power switch is turned on (Axis windows are blank)

1. Ensure that the input voltage switch is set to the proper setting (115 / 230). This does not apply to DP7.
2. Check the fuse.
3. Test the input voltage to the display unit with a voltmeter.
4. Turn display off using the power switch.
5. Disconnect all reader head cables. A defective reader head could prevent the display from powering up.
6. Turn display on.

Inaccuracy in one axis

1. Get into "Setup mode" and check the following settings:
   a) ***Linear Compensation*** - Set to 0 on all axes.
   b) ***Scale Type / Input Type*** - Set to read the correct scale type (Spherosyn, Microsyn 5, Microsyn 10).
   c) ***Radius / Diameter*** - Diameter will display a 2:1 ratio. Radius will display a 1:1 ratio.

2. Put a dial indicator on the edge of the *reader head*. Move the axis. Compare the dial indicator reading to the display reading. If there is a discrepancy that exceeds our accuracy specifications, proceed to the next step.

3. Take the reader head cable from the malfunctioning axis and plug it into the other axis of the display (You may need to get into setup mode and ensure that this axis is set up to read the correct type of scale).

4. If the malfunction was corrected when the cable was moved to the other axis, the source of the fault is the display. The display will need repaired.

5. If the malfunction followed the cable to the other axis, the source of the fault is the reader head and scale assembly. If this is the case, proceed to the next step.

6. Check for any physical damage to the reader head and cable.

7. Check the reader head for proper alignment. It must be aligned within .002" on each side. Refer to the installation manual for instructions on reader head alignment.

8. Check the scale to make sure there is no binding on the scale. If the scale brackets are slightly loosened, you should be able to slide the scale back and forth through the brackets with minimal resistance.

9. If you have a Spherosyn scale, ensure that the scale is not bent. Remove the scale and roll it on a flat surface. If the scale is bent at all, it will cause inaccuracies. Replace scale if bent.

10. If there is no binding on the scale, the reader head is aligned, and the scale is not bent, the malfunction must be coming from the reader head. Replace the reader head.

Display shows "Signal Fail" or "No Signal" in one axis

1. Turn off display.
2. Take the reader head cable from the malfunctioning axis and plug it into the other axis of the display.
3. Turn display on.
4. If the scale works properly when connected to the other axis of the display, the source of the fault is the display. The display will need repaired. Note: You may need to get into setup mode and adjust the scale type, radius / diameter, and linear compensation (set to 0) parameters to get accurate readings. The main goal in this step is to identify the source of the signal fail / no signal error.
5. If the malfunction followed the scale cable to the other axis of the display, the source of the fault is the reader head. Replace the reader head.
   Note: Signal Fail or No Signal errors can NOT be caused by incorrect parameter settings.

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