

PRECISION MATTHEWS LATHE DRO

This is a two-axis DRO. The procedure for installing the glass scales is described in other Precision Matthews publications. It is not repeated here.

FIRST USE?

1. Connect the **X-axis scale** (cross-slide) to the **upper connector** on the back of the DRO, the Z axis scale (saddle/longitudinal) to the lower.
2. Connect 110Vac power to the DRO through a **surge protector**.
3. If the 110Vac outlet is not grounded, connect a **ground wire** between the lathe and DRO.

The system should now be immediately functional, with the two numerical displays responding to machine movements.

FAQ

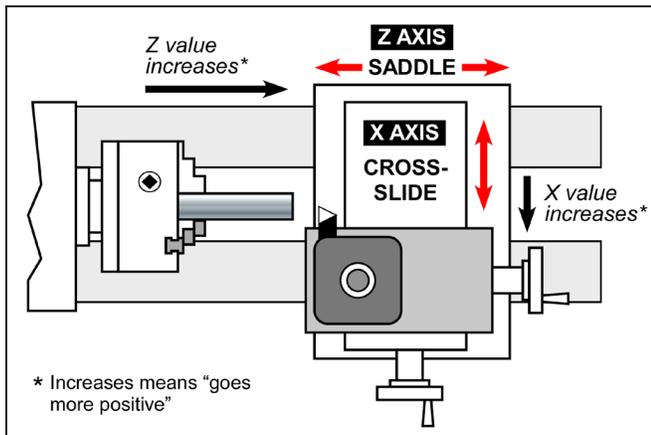
Q: Why does the X-axis report 5X actual cross-slide motion, or some other incorrect value?

A: This is because the DRO display as shipped was configured for 5 micron (0.005 mm) resolution scales. The scale supplied by Precision Matthews for the cross-slide has a resolution of 1 micron (0.001 mm).

This is a parameter setting, see the blue inset at right.

FAQ

Q: Do the numerical displays work like this?



In this diagram the X value increases as the tool moves toward you, away from the lathe's centerline; similarly, the Z value increases as the tool moves away from the headstock.

If you would prefer a different direction vs. displayed value setup, *see the blue inset at right.*

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Precision Matthews two-axis DRO

DRO parameters

To review DRO parameters, switch off the DRO. Wait 10 seconds or so; switch it on again, then press the numeral **6** (six) on the calculator keypad. Press it repeatedly if necessary. This will display **EXIT** in the info window. Press the UP or DOWN arrows below the info window at right to display a series of choices.

Skip this parameter ...

if the X and Z displays are reporting travel distances correctly. If not, when **RESOLUTE** appears, press **ENT** to confirm. The upper (X) display should read 0.001.



Press the blue **X** key repeatedly until 0.001 is displayed, then press **ENT** to confirm.



Press the blue **Z/Y** key repeatedly until 0.005 is displayed, then press **ENT** to confirm.

Q: Why the difference in the two settings? **A:** Because the cross-slide and longitudinal scales have resolutions of 0.001 mm and 0.005 mm respectively.

Skip this parameter ...

if you like the scale directions as they are. If not, press the UP or DOWN arrows to display **DIRECT**, then press **ENT** to confirm. This displays **SEL AXIS**, and either **1** or **0** in the position windows. Press the blue **X** key to switch from **1** to **0**, or vice versa, then do the same for the other axis (or leave it alone), blue **Z** key. Press **ENT** to confirm.

Skip this parameter ...

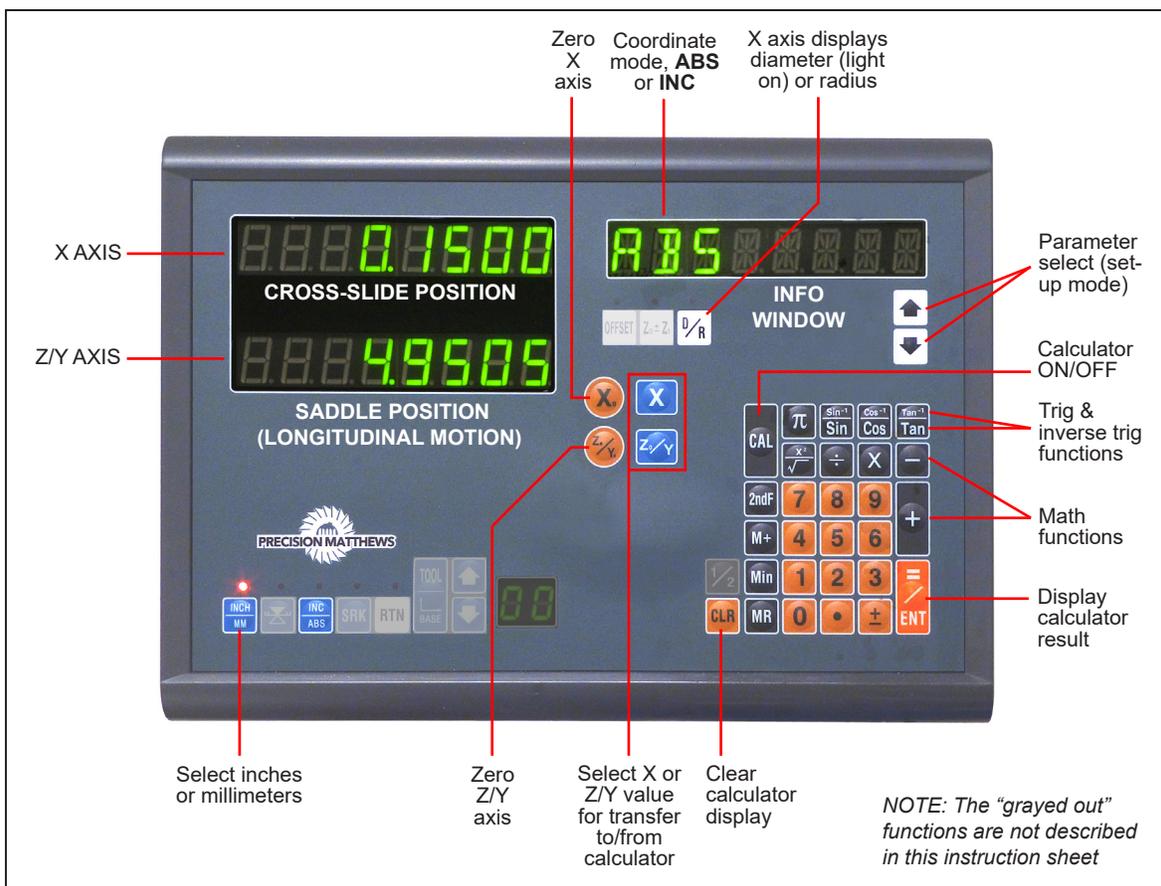
if you like the attention-getting beep (wrong/inappropriate key action). If you don't, press **ENT** when **BEEP** is displayed. Press **ENT** again to switch from **BEEP ON** to **BEEP OFF**.

System reset

To restore the DRO to its as-shipped condition, press the UP or DOWN arrows to display **ALL CLR**, then press **ENT** to confirm. Wait for **CLR OK**.

Exit the parameter mode

by pressing the UP or DOWN arrows until **EXIT** is again displayed. Press **ENT** to confirm.



INCHES vs. METRIC UNITS

Press the **INCH/MM** button at any time to switch the display system from inches to millimeters, and vice versa.

DIAMETER or RADIUS, D vs. R

On most lathes a 1 mil (0.001 inch) movement of the cross-slide dial means a 1 mil change in the **radius** of the workpiece, therefore a 2 mil change in its **diameter**. Ordinarily the DRO is operated in the “R” mode, with the X display tracking physical movement of the cross-slide one to one. Press the **D/R** button to double the X axis display (red light on).

CHOICE OF ABS OR INC MODES

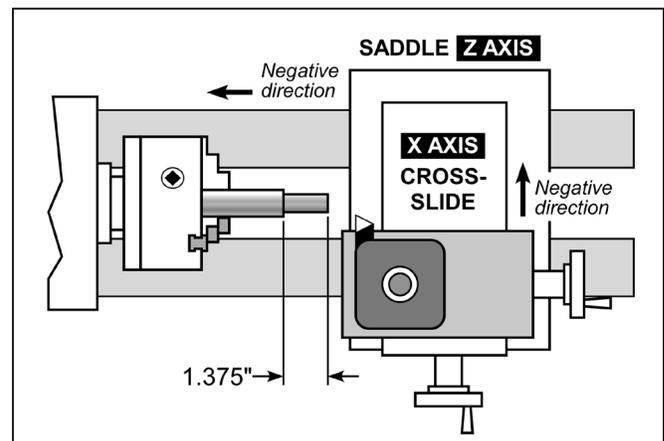
ABS stands for Absolute Mode, **INC** for Incremental Mode. Superficially, they are similar — both modes display X and Z coordinates in the same way, and both can be zeroed by the **X₀** and **Z₀/Y₀** keys. Some users are content with whatever mode the DRO happens to be in. Others set up ABS coordinates at the beginning of a work session, thereafter working in the INC mode — knowing that the starting coordinates are **available at any time** simply by switching to ABS.

EVERYDAY MACHINING OPERATIONS

In just a few minutes of hands-on experiments you will see what a game-changer the DRO can be, compared with yesterday’s cut-stop-measure-cut operations.

Suppose you need to reduce the diameter of a bar over a distance of 1.375 inches from the end face. The typical way of doing this is to set the tool tip gently against the out-facing end of the workpiece, then press the orange **Z₀** key to zero

the Z display (use either **ABS** or **INC** mode). Having set the X axis (cross-slide) to the desired depth of cut, you then make a cutting pass from right to left, stopping when the Z display is exactly **-1.375**. Successive cutting passes would be made in decrements as small as 0.0005 inches, even less, approaching the target diameter in an equally predictable way.



Using the calculator in machining operations

Here are two other ways of doing a “turn down” job similar to the above. They are not better or easier than the conventional method previously described, but they may be helpful in some situations:

1. Overriding the displayed value

Set the tool tip gently against the out-facing end of the work-piece. Now, instead of zeroing the Z display, tell the DRO that the tool is at **1.375** instead:

Make sure the Calculator is OFF!

 * then key in **1** **.** **3** **7** **5** **ENT**

Z AXIS DISPLAY 

Now make the cutting pass, stopping when the display reads **0.0000**.

* When the blue Z/Y key is pressed, the info window reads **NEW BASE** in the ABS mode, **ENTR DIM** in INC.

Press the  key to override the X axis in a similar way.

2. Transferring a calculated value

This is a quite different routine compared to (1) above. It calls for the display to be pre-zeroed. Also, the **Calculator has to be ON!**

This is the procedure for a Z axis transfer:

- With the tool tip against the end face, press the  Z_0/Y_0 key to zero the Z display.
- Press the **CAL** key to activate the calculator.
- Suppose you wish to transfer the result of multiplying **2.8** x **0.365** to the Z axis. The result is 1.022:

2 **.** **8** **x** **.** **3** **6** **5** **±** **=**

INFO WINDOW 

Q: Why the minus sign? **A:** Because we will be cutting from right to left, the negative-going direction, 1.022 inches from the Z zero.

- Press the  Z_0/Y_0 key again to transfer the result:

Z AXIS DISPLAY 

Possible display variance of $\pm 0.0002''$ or $0.0004''$

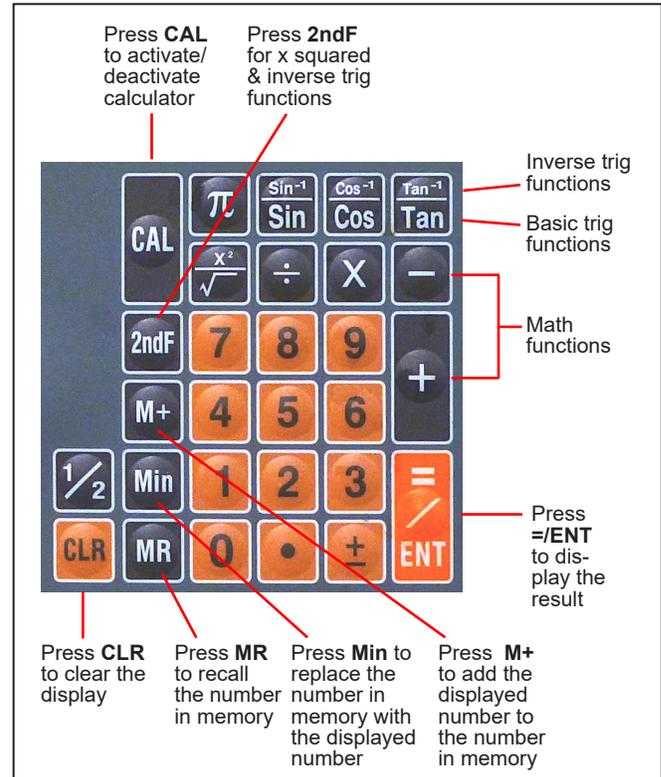
- Leave the **Calculator ON** while machining. The usual aim in this type of action would be to reduce Z to **0.0000**, similar to example (1).

MATH CALCULATIONS

The DRO calculator is similar to a basic handheld. It can be used in the ordinary way for all basic math functions. It can also be used to transfer a numerical value to the X or Z axis, see page 3.

Key facts ...

- The calculator has a single value memory, just one number at a time.
- When the DRO is powered-up, the value in memory is a random number.
- The **CLR** key (clear) does not erase the memory.
- Clear the memory by entering zero value: press the **0** key, then **Min**.



Starting calculations

- Press the **CAL** key to activate the calculator.
- If you plan to use the memory function, press the **MR** key to check the number in memory. If it is anything other than zero, press the **0** key followed by **Min** (memory input).

Ending calculations

- To exit the calculator function press the **CAL** key again.

To change the sign of an entry, press the **±** key before or after keying in the number:

CLR **±** **1** **.** **8** **7** **5**
CLR **1** **.** **8** **7** **5** **±**
 SAME EFFECT!


Calculation examples

Multiply 12 by 4, then add 3:



Put the number 123 into memory:



Add the number 456 to the 123 in memory:



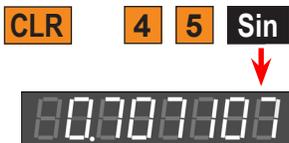
Recall the total in memory, then divide it by 2.5:



Calculate the square of 79:



Find the sine of 45 degrees:



Find the angle whose cosine is 0.5:



Use an X or Z value as an input to the calculator:

