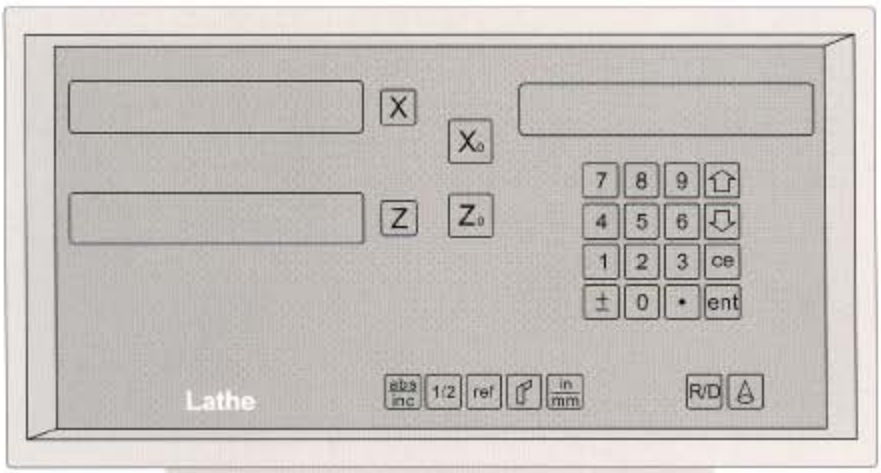
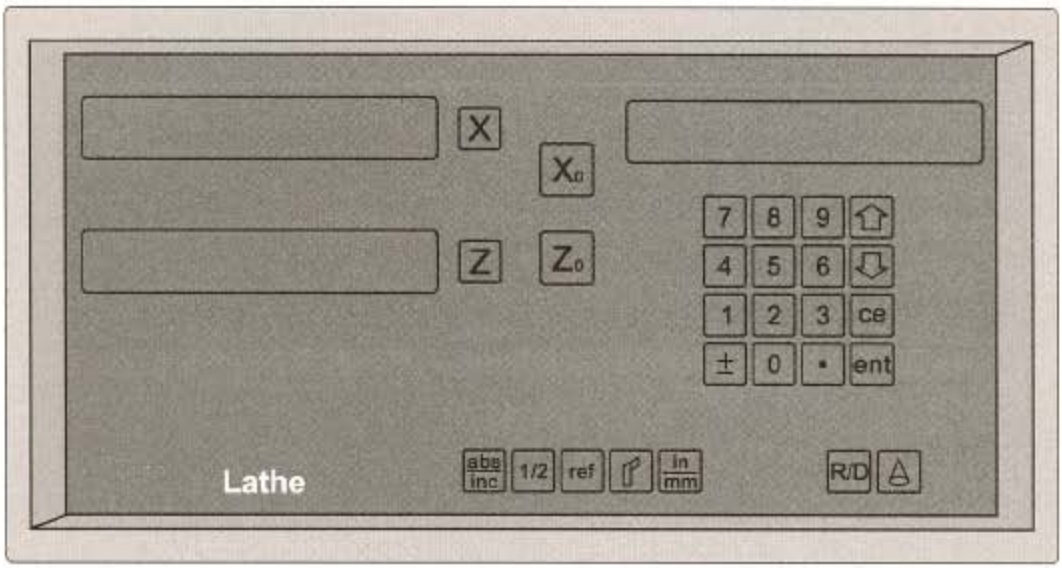


Always Committed to Quality, Technology & Innovation

Digital Readout System
Operation Manual
(Lathe Option)

Content

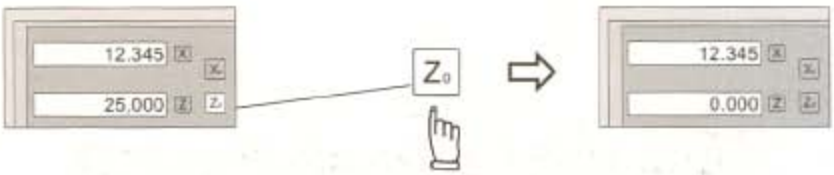
Basic Functions



Set Display to Zero

Purpose: **Set the current position for that axis to zero**

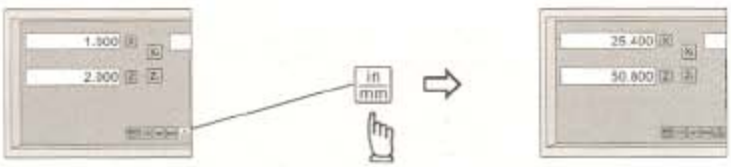
Example : To set the current **Z Axis** position to **zero**



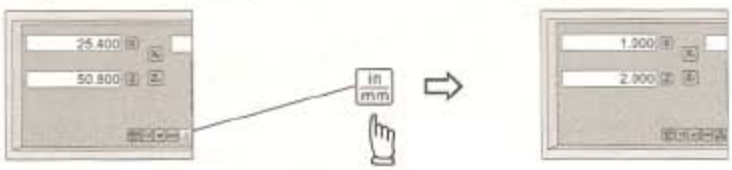
Inch / Metric Display Conversion

Purpose: **Switches between inch and metric display**

Example 1 : Currently in **inch** display, to switch to **metric** display



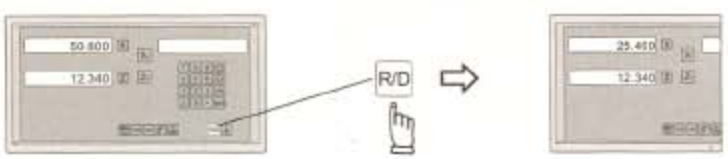
Example 2 : Currently in **metric** display, to switch to **inch** display

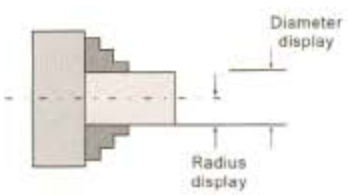


Radius / Diameter Display for X Axis

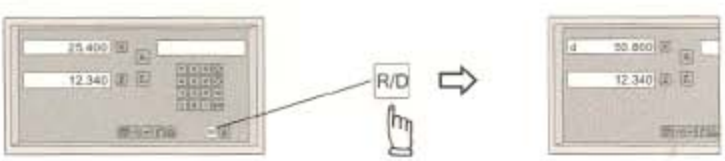
Purpose: **During the machining on lathe, because the turned part's size reduced at twice as much as the actual X axis cross feed increment. Therefore, to obtain a direct diameter reading of the part that being machined, the readout offers Radius/Diameter display for X axis.**

Example 1 : Currently in **Radius** display, to switch to **Diameter** display





Example 2 : Currently in **Diameter** display, to switch to **Radius** display



In Diameter display mode, the readout display double of the X axis increment.

During the Diameter display, a '**d**' appears on the leftmost X axis digit display to indicate the readout is in Diameter display mode. Also, the display resolution is 0.01 mm rather than 0.005mm as in Radius display mode.

Dimension Preset

Purpose: **Set the current position for that axis to an entered Dimension**

Example : To set the current **X Axis** position to **45.800 mm**

Application Tips : The dimension preset function provides a very convenience way to monitor your cross feed machining, the X axis machining.

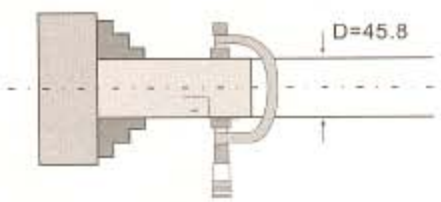
a) Switch the readout to Diameter (D) display for X axis.

b) Make a slight first cut at the work piece, after finished this first cut, move the tool away from the work piece along the Z axis, it is important that don't move the X axis at all in roder to keep the X axis right at the cut position.

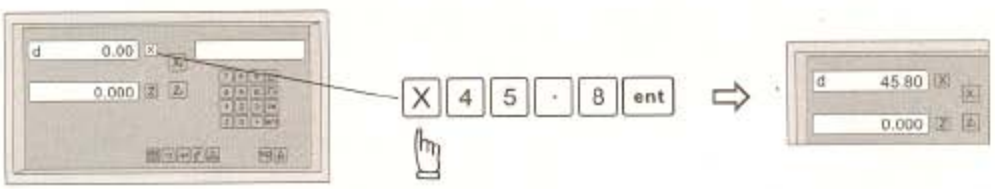
Make the first slight cut at the work piece

Move the tool away from the work piece without any move in the X axis.

C) Measure the work piece by a caliper. (i.e. the measured diameter of the work piece is 45.80mm).



d) Enter the measured diameter into the readout by the dimension preset function.



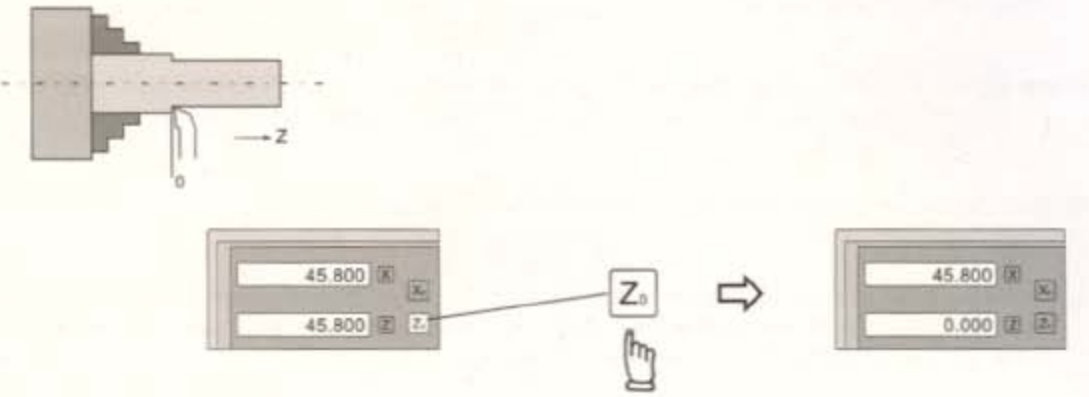
e) Since the X axis tool position is now at the first cut position, by presetting the present tool position as the measured diameter, then from now on, whatever dimension shown on the readout is the actual diameter dimension in the work piece.

Center Find

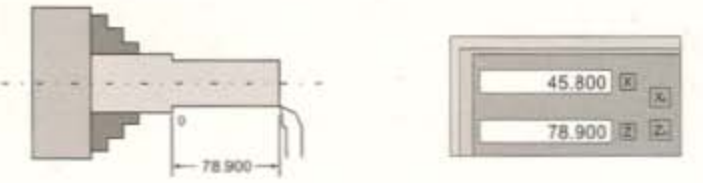
Purpose: **Counter provide center find function by halfing the current display coordinate, so that the zero point of the work piece is located at the center of the work piece.**

Example : To set the Z Axis zero point at the center of the work piece.

Step 1: Locate the edge finder at one end of the work piece, then zero the Z Axis.

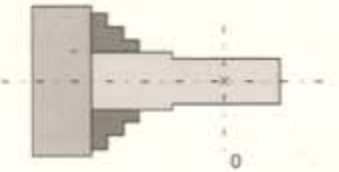


Step 2: Locate the edge finder at the opposite end of the work piece.



Step 3: Then half the display coordinate using center find function as per follows

Now the Z Axis zero point (0.000) is located right at the Z center of the work piece.



ABS / INC Coordinates display switches

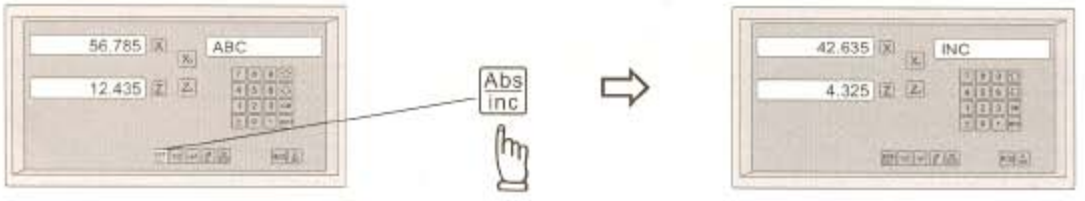
Purpose: **Counter provides two sets of basic coordinates display, they are ABS (absolute) and INC (incremental) displays.**

During machining operations, operator can store the work piece datum (zero *position) in ABS coordinate, then switch to INC coordinate to continue machining operations.*

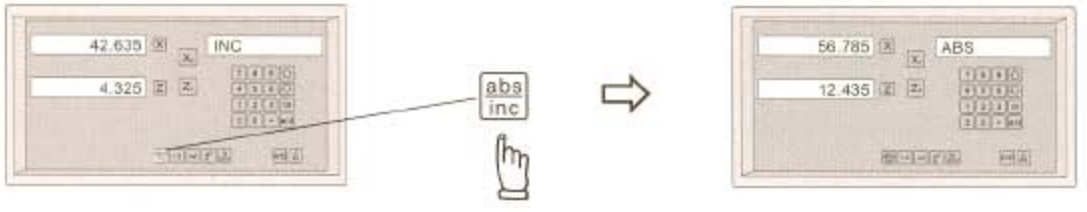
Then the operator is free to zeroing the axes or preset any dimensions into any axes in INC coordinate for any relative position machining. The work piece datum (work piece zero position) is still keep in ABS coordinate if Counter.

Operator can then switches between ABS (absolute) and INC (incremental) coordinate without losing the work piece datum (work piece zero position).

Example 1: Currently in **ABS** display coordinate, to switch to **INC** display coordinate



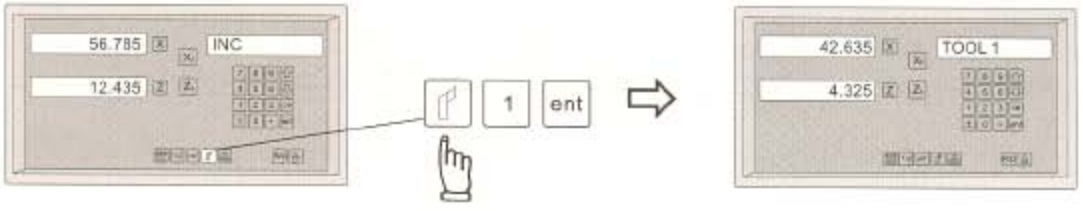
Example 2: Currently in **INC** display coordinate, to switch to **ABS** display coordinate



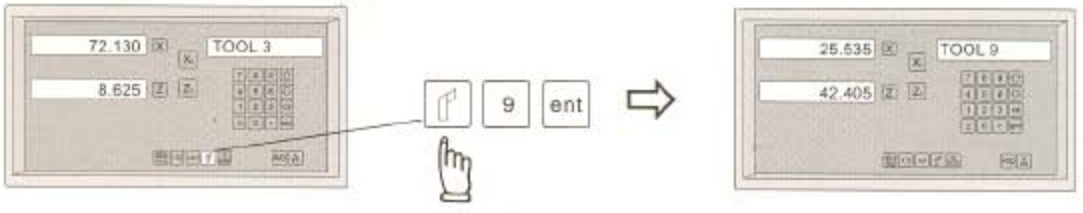
199 Tools memory

Purpose: **The readout offer 199 Tools memory function, it is offered as a supplement of ABS/INC coordinates. For the lathe that have a high repeatability tool changer, this function provides a very quick ways to memory the tool tips offsets, so that user don't have to datum the tool tips.**

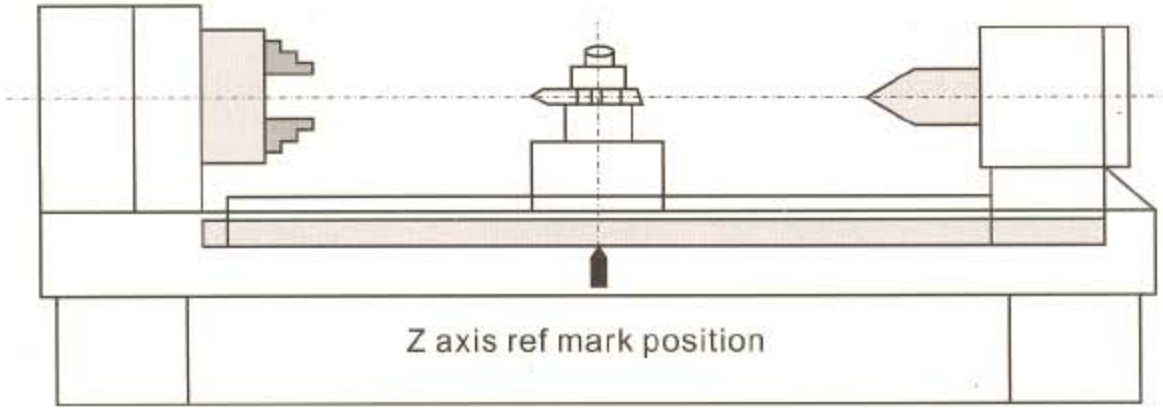
Example 1: Currently in **INC** display coordinate, to switch to **TOOL 1** display coordinate



Example 2: Currently in **TOOL 3** display coordinate, to switch directly to **TOOL 9** display coordinate



ref datum memory



Function: **During the daily machining process, it is very common that the machining cannot be completed within one work shift, and hence the DRO have to be switched off after work, or power failure happen during the machining process which is leading to lost of the work piece datum (work piece zero position), the re-establishment of work piece datum using edge finder or other method is inevitably induce higher machining inaccuracy because it is not possible to re-establish the work piece datum exactly at the previous position.**

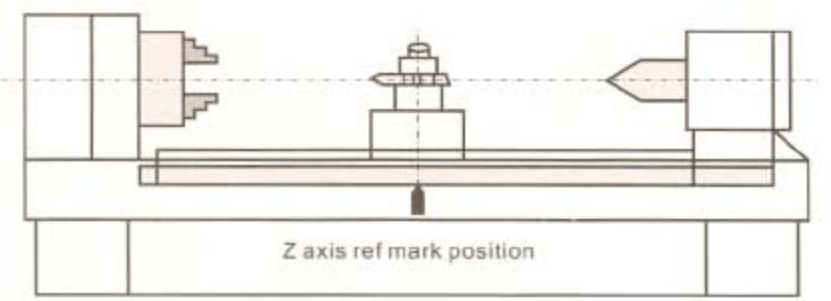
To allow the recovery of work piece datum very accurately and no need to re-establish the work piece datum using edge finder or other methods, every glass grating scale have a ref point location which is is equipped with ref position to provide datum point memory function.

The working principal of the ref datum memory function are as follows.

- There are a permanent and fixed mark (position) in the centre of every glass grating scale, normally called ref mark or ref point..

Since this ref point position is permanent and fixed, it will never change or disappear when the DRO system is switched off. Therefore, we simply need to store the distance between the ref point and the work piece datum (zero position) in DRO's memory. Then in case of the power failure or Counter being switched off, we can recover the work piece datum (zero position) by presetting the display zero position as the stored distance from the ref point.

Example: to store the Z axis work datum



Operation: Counter provides one of the most easy to used *ref* datum memory function.

There is no need to store the relative distance between the *ref* mark and your work datum zero into Counter, *whenever you alter the zero position of ABS coordinate, such as by zeroing, centre find, coordinate preset or etc.., Counter will automatically store the relative distance between ABS zero and the ref mark location into Counter's memory.*

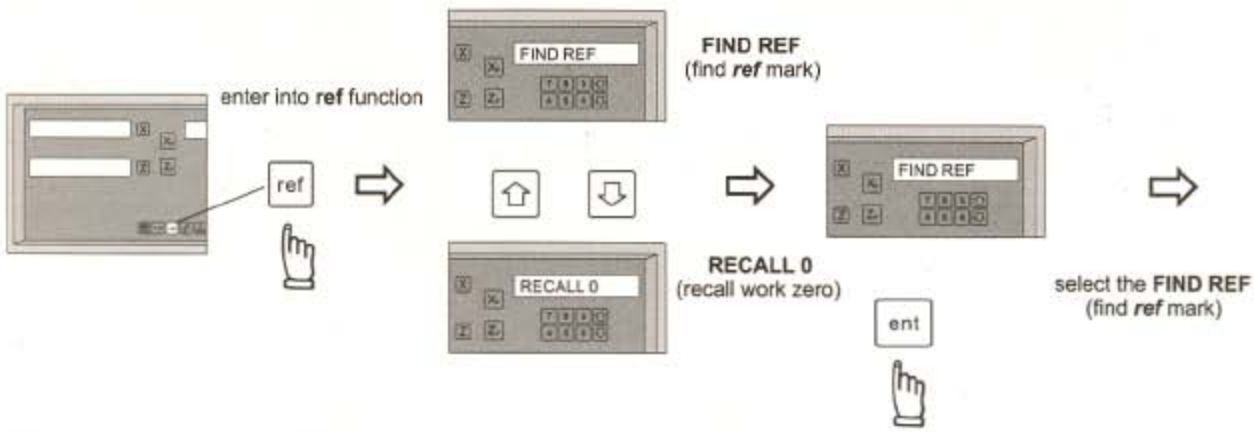
In daily operation, operator simply need to find the *ref* mark position whenever they switch on the Counter to let Counter know where the *ref* mark position is, then Counter will automatically do the work datum storage on its' own whenever you alter the ABS zero position. In case power failure or the Counter switched off, the operator can recover the work piece datum easily by the RECALL 0 procedure.

find the scale's ***ref*** mark position (***FIND REF***)

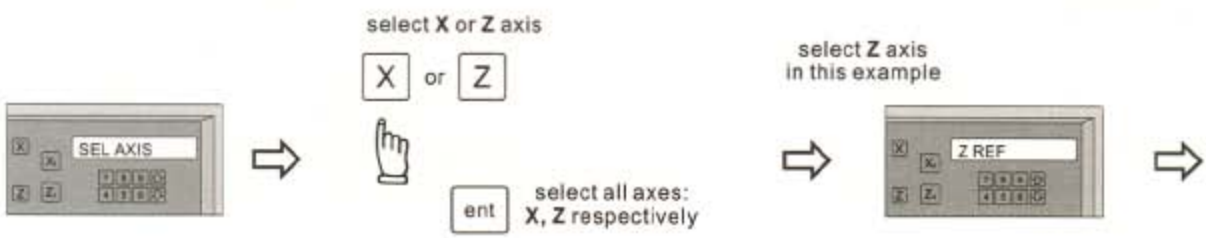
Function: **Because in Counter's ref datum memory function, Counter will automatically store the relative distance between the ref mark position and the work piece datum (zero position) whenever the operator alter the ABS zero position, such as zeroing, centre find, coordinate preset or etc...**

Therefore, Counter need to know where the ref mark position in prior to machining operation. In order to avoid the lost of work piece datum (zero position) during any accidential or unexpected events, such as power failure or etc.. It is highly recommend that operator find the ref mark position using the (FIND REF) function whenever they switch on the Counter.

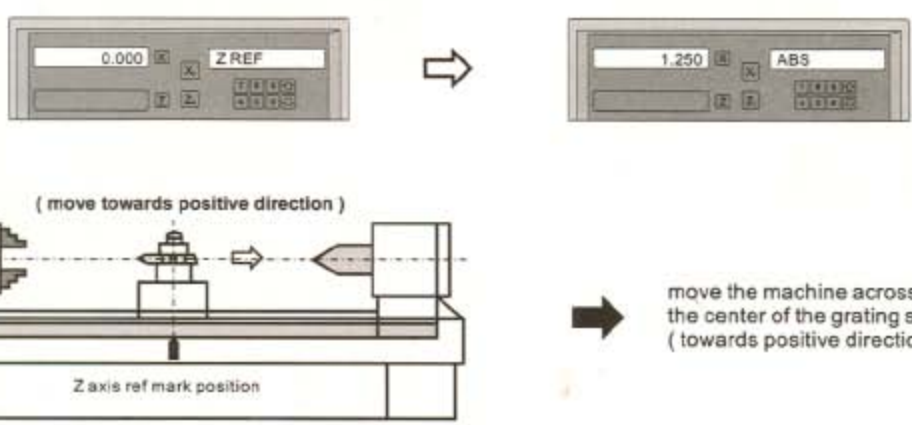
step 1 : enter into the ref function, select the **FIND REF** (find **ref** mark)



step 2 : select the axis of which ***ref*** mark needed to be found



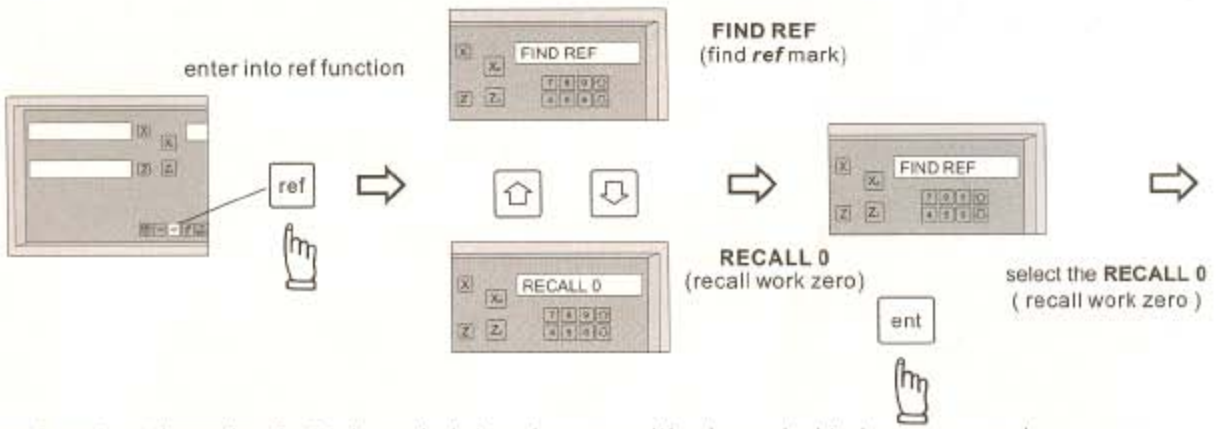
step 3: move the machine across the center of the glass grating scale until digits display in Counter start run.



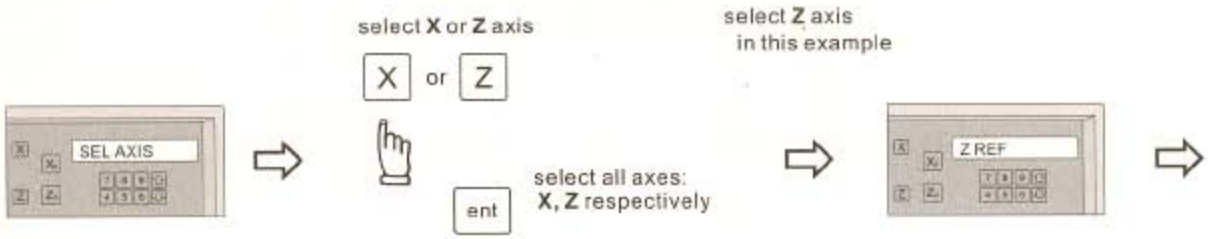
recall the work datum zero (**RECALL 0**)

Function: **after lost of the work piece datum due to power failure or switch off of Counter, the work piece datum can be recover byRECALL 0 function as per following procedures.**

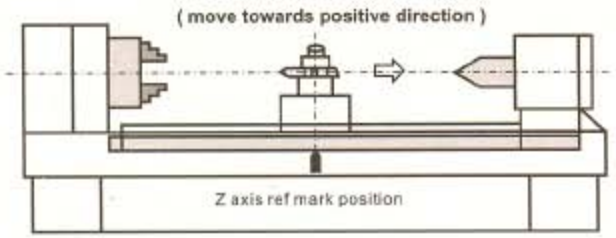
step 1: enter into the **ref** function, select the **RECALL 0** (recall work piece zero)



step 2: select the axis of which work datum (zero position) needed to be recovered

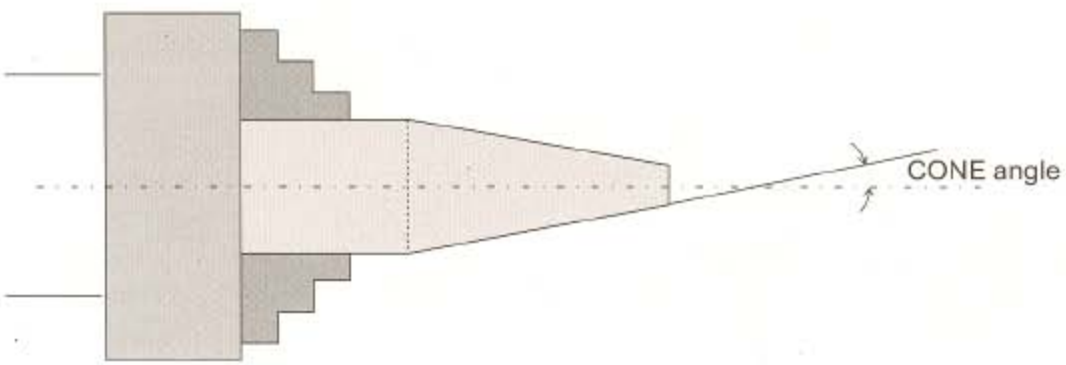


step 3: move the machine across the centre of the glass grating scale until digits display in Counter start run, then the work piece datum is recovered



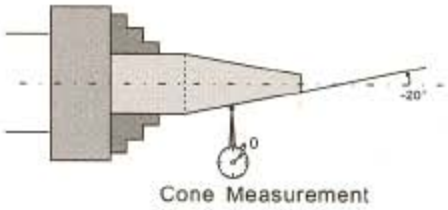
move the machine across
the center of the grating scale
(towards positive direction)

Cone - Cone measurement function

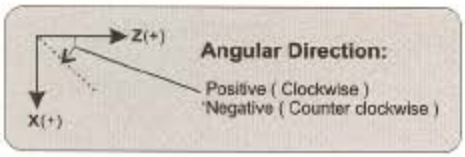


Function: **During daily lathe machining process, it is quite common to machine a conical work piece.**

The readout provides cone measurement function for ease of conical work piece measurement.



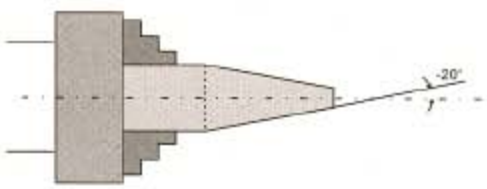
Cone Measurement



Example :

Normally, the top slide on the cross slide of the lathe can be swing to an angle for conical machining, however, there are only a very inaccurate dial marked on this top slide. In order to obtain better conical machining accuracy, the readout offers cone measurement function for the ease of cone angle measurement to help user to obtain a better & faster iteration process.

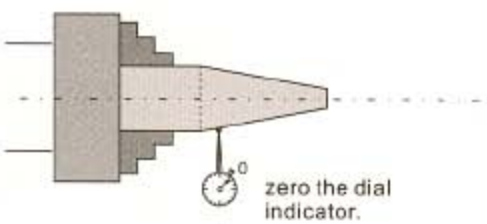
for example, to verify a work piece that have been machined at 20 degree on the XZ plane as shown in follows.



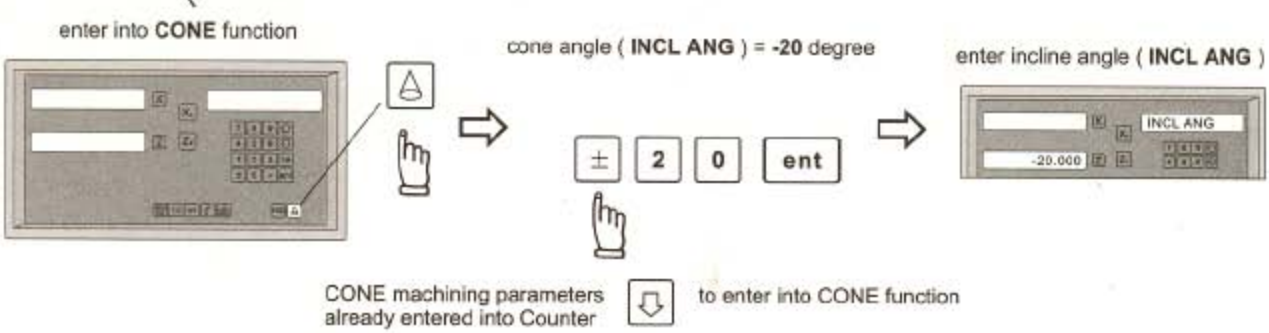
a) To adjust the top slide on the cross slide of the lathe to 20 degree as accuracy as possible according to the dial marks on the cross slide, and then start the initial conical cutting, (please make sure to leave some metal for the final cut).

b) Using a dial indicator to start the cone measurement as per following procedure.

Set up the dial indicator as per following diagram suggested.

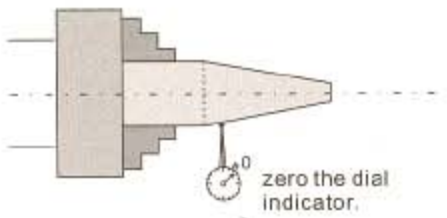


c) Enter the cone measurement function and enter the -20 degree as the cone comparison parameter.

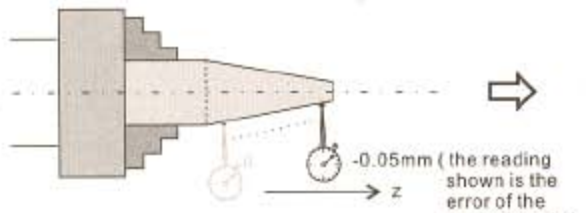


d) After the cone measurement angle have been entered into the readout, the X axis zero will move as the Z axis travel at -20 degree.

A) zero the dial indicator on one end of the work piece



since in INCL mode, the X display is set according to Z * tan (ANG), therefore, zeroing the Z axis also clear the X axis.



X axis zero position will follow the Z axis position at the angle of ANG (-20 degree in this example) operator just move the X axis to display = 0.000 it is then at highly accurate -20 degree position to the Z axis.

B) After move the machine along the Z axis, the X zero position will automatically set at -20 degree to the Z axis. By moving the X axis position to zero (X = 0.000mm), then the dial indicator will display the error of the conical work piece from a true -20.0 degree.

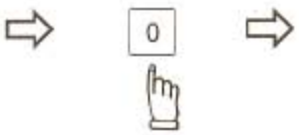
User then make a fine adjust to the top slide angle to make a closer cut to achieve a better cone angle accuracy.

Repeat the above procedures d) until satisfactory cone angle accuracy achieved.

Anytime the operator want to check or verify if Counter's CONE calculation correct or not, or want to temporarily exit the CONE function Cycle (swap to normal XZ display). Operation are as follows:

presently in **CONE** cycle

temporarily **swap** to normal XZ coordinate display

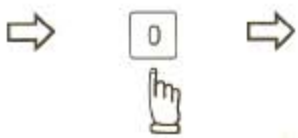


temporarily return to XZ coordinate display

swap back to CONE cycle to continue the **INCL** incline angle alignment

presently in the temporarily XZ coordinate display

swap back to **CONE** function cycle



presently in **CONE** cycle