BASIC CNC LATHE INFORMATION

The CNC Controller is a software Program called Mach 3 Lathe and provides for controlling all the movements and associated commands. The axis directions are shown next to the controller in Figure 1 and are about the center of the lathe spindle. Some lathes are front and some are back thus the X direction moves are reversed. The CNC controller (Mach) does not know a practical Machine Reference Point to work from, thus, the controllers "0,0" is somewhat meaningless and has unlimited movement capability. When the controller is turned on it monitors axis movement starting from it's "0,0" value for each axis and displays the absolute movement. Machine X & Z=0 can be anywhere and can be set by the user manually, via switches, and other ways. (Note, do not confuse 0,0 with a switch position, as the switch just provides for a repeatable carriage location.)

Machine Zero is a fixed point within the machine travel limits and does not normally change. It is typically called Machine Reference point, machine zero, or simply Home Position. Machine zero is located at the furthest distance from the lathe centerline and also as far as possible from spindle head (because different chucks, faceplate etc can be used). The position provides for full available machine usage and is the usual setup. A user may decide to define a different location for Home.

Program Zero, or a better description Part Zero, is a reference point defined during coding of a program. It is not known by the machine until defined. It is the origin for all coding in the program. For the lathe, Part Zero is the X axis Zero X=0 which is always the center line of the spindle. Z axis Zero can be anywhere, but, usually the front of the stock / machined surface after a facing cut is made is used for Z zero.

So the blue grid portrays an exaggerated possible carriage movement. The green grid shows the possible tool travel. The user can set home at a more convenient location and can also use that position as a tool change position (dark blue). Stock in the chuck is shown and the location of the part away from Home is called Part Zero. The above is graphically depicted in Figure 1.

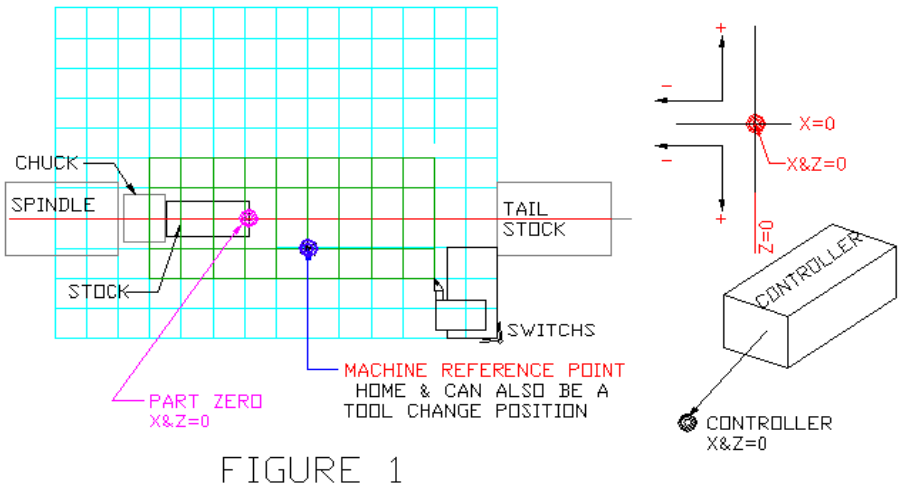


FIGURE 1

BASIC COORDINATE INFORMATION

(FIGURES SHOWN BELOW ARE FROM MY SCREEN SET)
Three buttons provide for selecting what coordinate location will be displayed in the axis DRO. The coordinate systems are as follows:
- Machine Coordinates
- Part Coordinates
- Program Coordinates

The current position of the tool is defined by the following formula.

	Current Position		Machine Coord		WorkOffset		G92/ G52 Offset		Tool Offset
X Pos	+0.0000	=	+0.0000	-	+0.0000	-	+0.0000	-	+0.0000
Z Pos	+0.0000	=	+0.0000	-	+0.0000	-	+0.0000	-	+0.0000

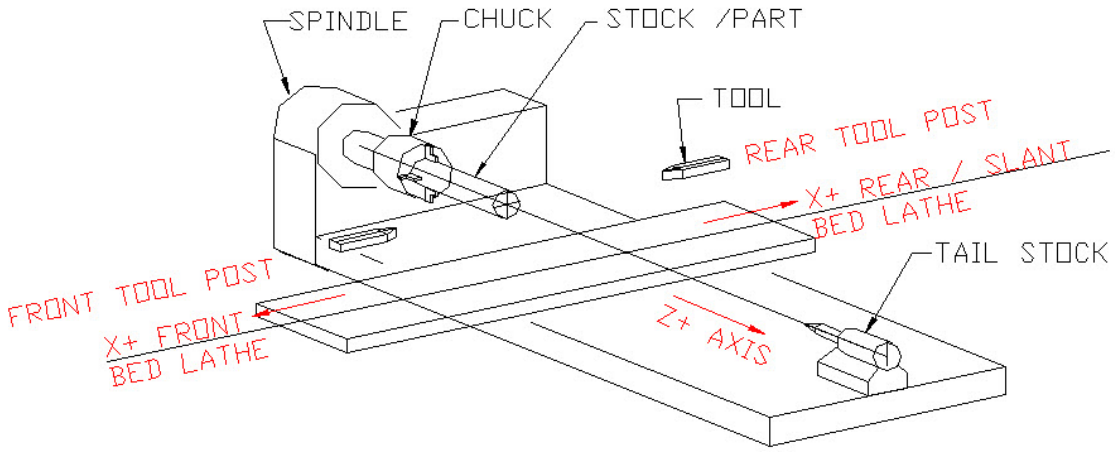
The formula can be manipulated:

Current Position = Machine Coord - Work Offset - G92 Offset - Tool Offset
Machine Coord = Current Position + Work Offset + G92 Offset + Tool Offset
Work Offset= Current Position - Machine Coord - Work Offset - G92 Offset -Tool Offset
(typical for X & Z axis and values can be + or -)

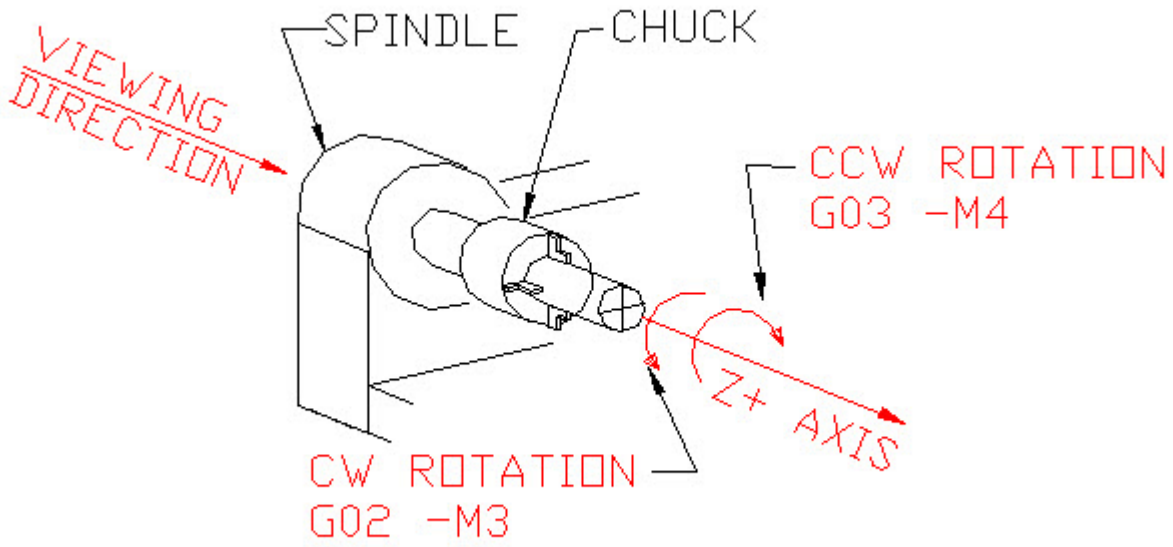
Where the tool is (Current Position) relative to Machine Coordinates is influenced by the other factors of the formula. The Part Coordinates displays where the tool is when Work and Tool Offsets are in affect (doesn't include G92/G52) *and excludes machine coordinates.* The Program Coordinates are like Part Coordinates but include any G92 / G52 offsets. So if there are no G52 or G92 (one or the other / not both) offsets then Part = Program Coordinates. If there are no G54, G52, or tool offsets then Part Coordinates = Machine Coordinates.

BASIC LATHE INFORMATION

The figure below portrays a basic two axis horizontal lathe and the difference between a front and rear lathe.



- Direction of spindle rotation is the same as the mill, namely, one views from the spindle towards to the chuck.



Enjoy the learning curve Dave and there is lots more you need to understand. Since your using the generic screen set would suggest you have a read of the file

RICH