ADDENDUM:

PM45-CNC Setting Limit Switches and Home to the South-West Corner

WARNING: This document does not cover personal safety issues. The user of this product must be familiar with machine shop procedures, machinery and safety practices. If you are not familiar with these matters, seek professional instruction.

NOTE: Do not modify any switches or setting in the control cabinet of the unit.

NOTE: Prior to first testing the machine, manually raise the head so the spindle is at least 4-5 inches above the table; furthermore, center the table below the spindle. The manual table cranks can be turned when the unit is not powered on.

NOTE: The parameters herein do not adjust all table limits as this will depend on how the user programs their CNC software.

NOTE: Care must always be taken when operating the machine. Pressing the red Reset button on the main menu or on the mill operator panel will stop the machine. Always watch the machine carefully and be prepared to press the Red Reset or emergency stop button.

 The parameters and settings herein are a starting point for future modification and customization by the user. It is the user's responsibility to know and understand how to use Mach 3 to control the mill. Until the user gains familiarity with the system, make changes cautiously, always observe proper shop safety protocol and be prepared to press the Reset or Stop buttons.

General Considerations:

It is assumed the user of this product is familiar with computers as well as general knowledge of typical software installation procedures. This document does not show every possible screen the user will see during installation. Only the most significant screen-shots are shown. The user is expected to know how to follow on-screen installation instructions.

The computer on which Mach 3 will be run must have adequate processing power to run the software. Very important details about this are found on the ArtSoft website.

User Resources:

General Mach 3 instruction and essential information are contained in 5 videos:

http://www.youtube.com/watch?v=R3futACR6dM

http://www.youtube.com/watch?v=ACx64oWwbMc

http://www.youtube.com/watch?v=ma7lMocQbv0

http://www.youtube.com/watch?v=3Ychv0q38MY

http://www.youtube.com/watch?v=e5bWH_ET3E4

Mach 3 help and reading materials are available at the following location and are highly recommended:

http://www.machsupport.com/help-learning/

Many prefer to have the home location of the table set to the South-West corner of the mill. This can be accomplished by relocating the Home switch stops. Furthermore, adjusting the limit switches allows the user to limit the travel of the table to safe levels. To a large extent, the Home switches also serve a similar safety function.

Because each user may physically set the home and limit switch stops in slightly different locations, the exact values of the Mach 3 settings will need fine tuning to your machine.

WARNING: When making these changes, the Mach 3 "Reset" button must be activated (flashing) to disable the mill from moving while the switches are manually checked.

WARNING: In order to follow these instructions, you MUST have previously followed the basic software setup and Mach 3 configuration procedures.

The following procedure involves determining which switches activate the Limit signals and which activates the Home signals. The stop tabs are then rearranged and positioned to engage the switches to achieve the desired stopping location.

When this procedure is followed, the mill's home location will show like this:

Adjusting the Y Limit

WARNING: Exercise caution and ensure the Mach 3 Reset switch is flashing and the mill is in the disabled mode.

First locate the Y-direction limit switch on right side of the mill table. Notice the two roller switches one on top of the other. One of the roller switches activates the limit signals and the other activates the home signals. When a home switch is activated, the controller software (Mach 3) knows the table has reached its physical Zero location in a given axis. When a limit switch is activated, the software then knows it has reached the opposite maximum physical location in a given axis. Note that soft limits are logical areas within the boundaries of the physical home and limit ranges as defined by the physical switch settings and stop tabs.
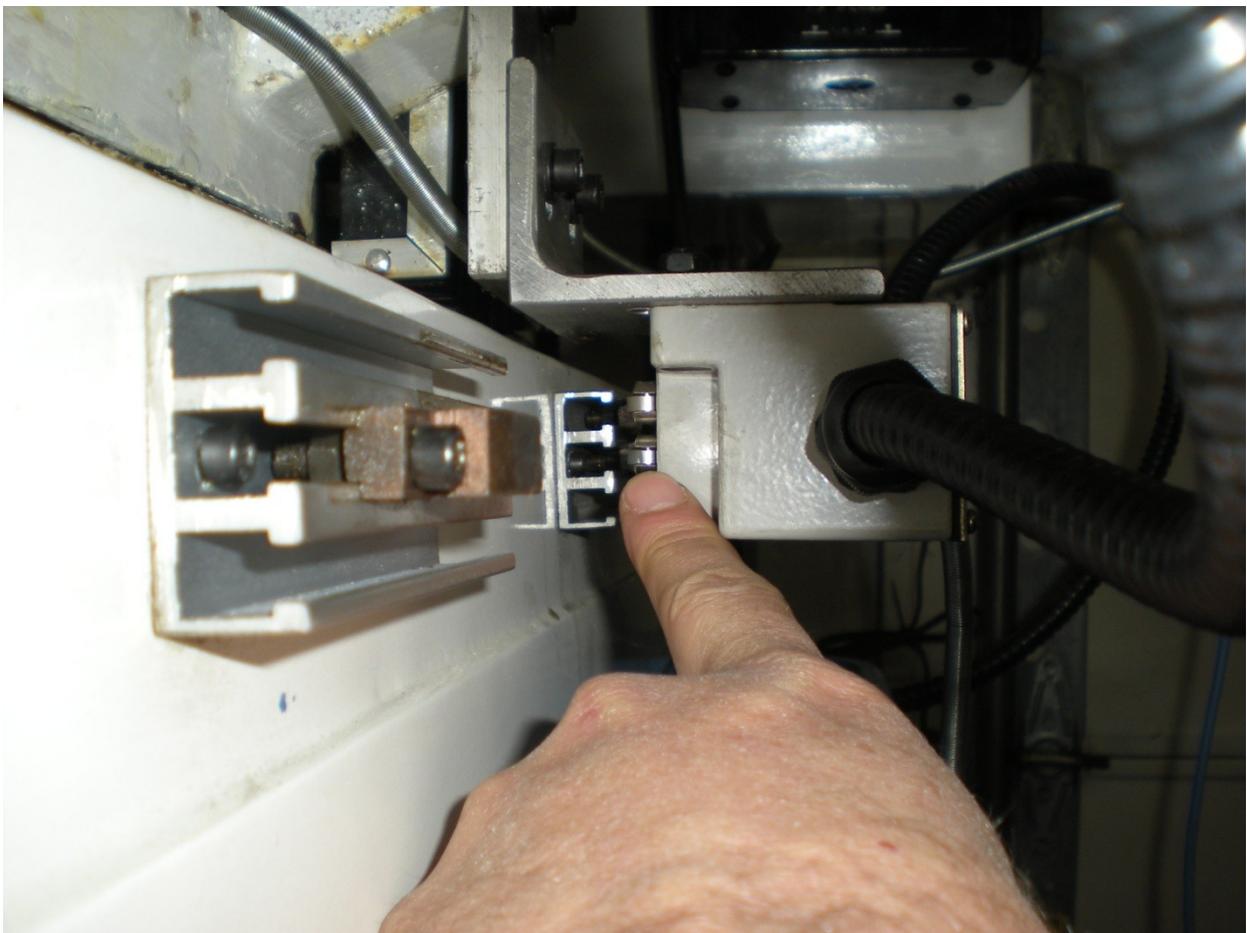
Set the Mach 3 program to the "Diagnostics" screen.

Note that which switch (Top or Bottom) that lights the limit indicators is arbitrary as, it is the positioning of the metal activator tabs which defines the behavior of the system. In your system, depending on how wired at the factory, your machine may be opposite from this example. The instructions herein provide the generalized steps to perform this adjustment.

Manually press each switch until the Motor Limit Light indicators show as active. Note which switch (top or bottom) produces this screen. See the picture below.
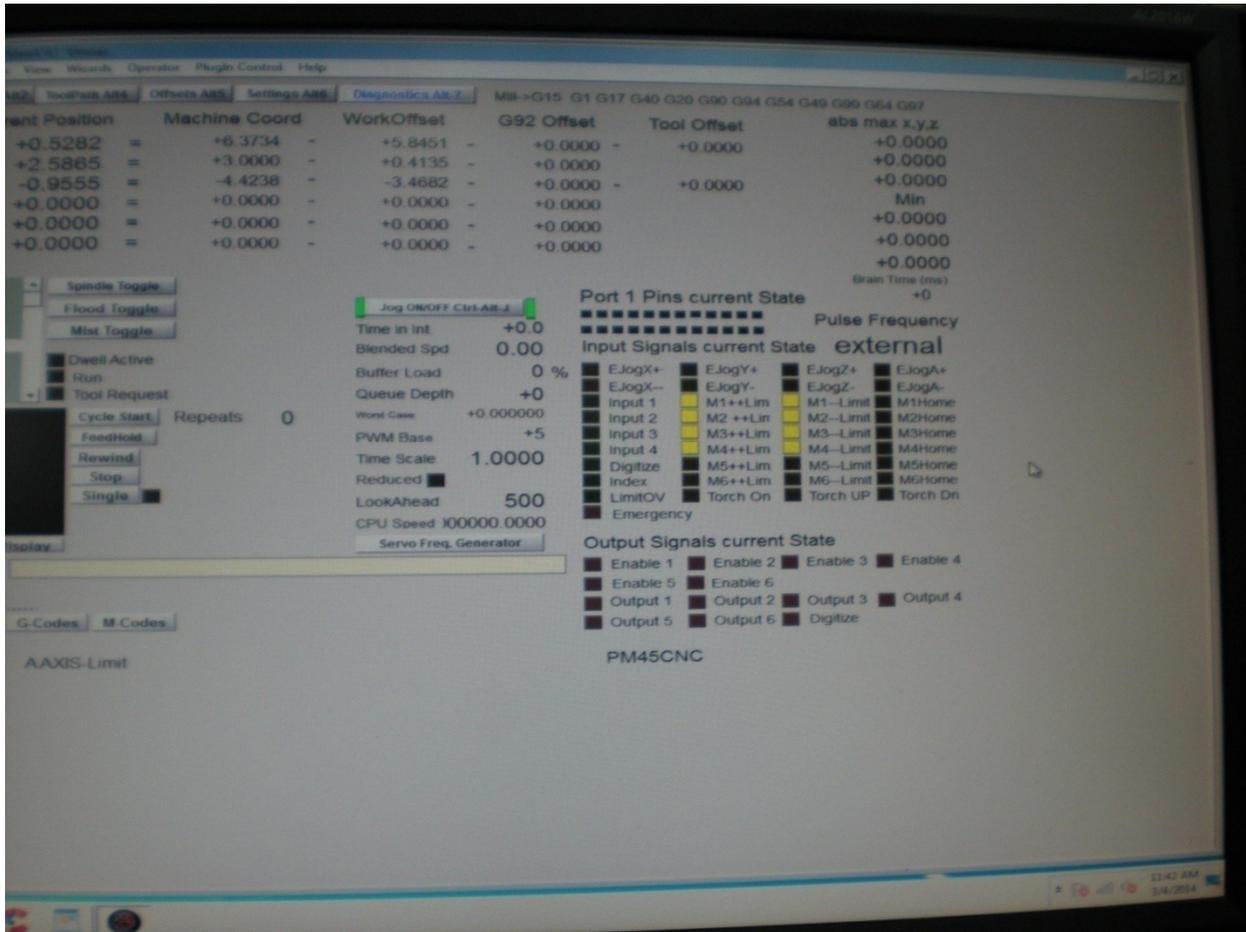
For reference, each home switch (X, Y and Z) has its own diagnostic indicator which looks like this:
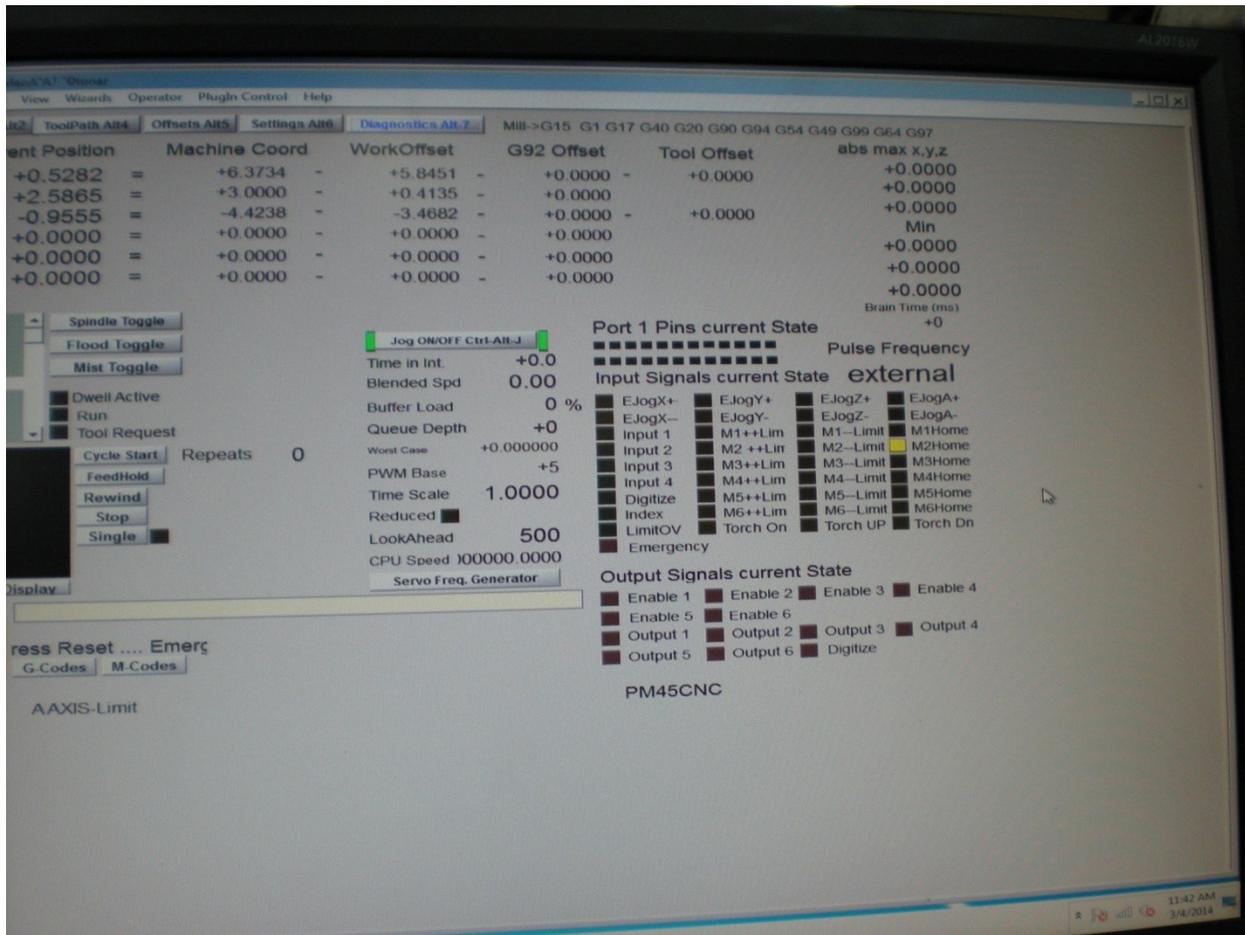
In order to home the mill to the South-West corner one of the front Y limit tabs must to be relocated to the rear set of tabs (covered in the next set of steps).

The picture below is the front Y axis limit stop tab which prevents the table from moving too far forward. It must be adjusted in the proper track to engage the switch (top or bottom) identified as being the Limit switch. In this case, the correct tab is located in the center track. Exact positioning (left or right in the track) of the tab must be customized to your individual mill and where you want the Y limit to occur.
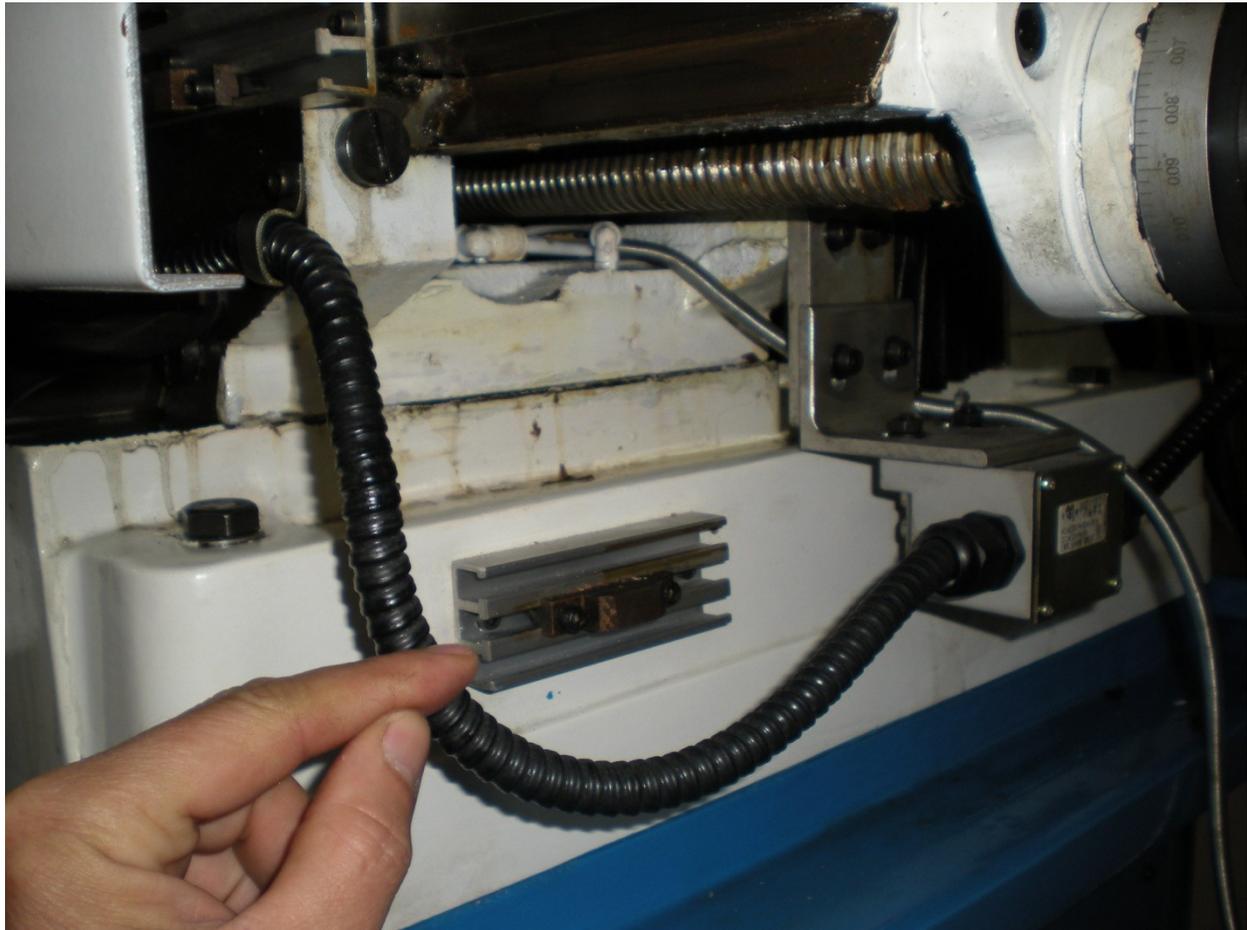
In the rear set of Y axis tabs, the tab which engages the Home switch (in this case, the top switch) must be positioned in the track which activates Home switch. In this case the top slot aligns with the top (Home) switch and the tab must be positioned about 3/8" forward of the Limit tab below it. As the table moves toward the column, the top tab will engage the Home switch first.

It is important to keep the Limit tab aligned in the slot so it will always engage the limit switch. This is a safeguard to stop the table in the event the Mach 3 parameters are not set properly. At either end of the Y axis, engaging the limit switch will stop the table.
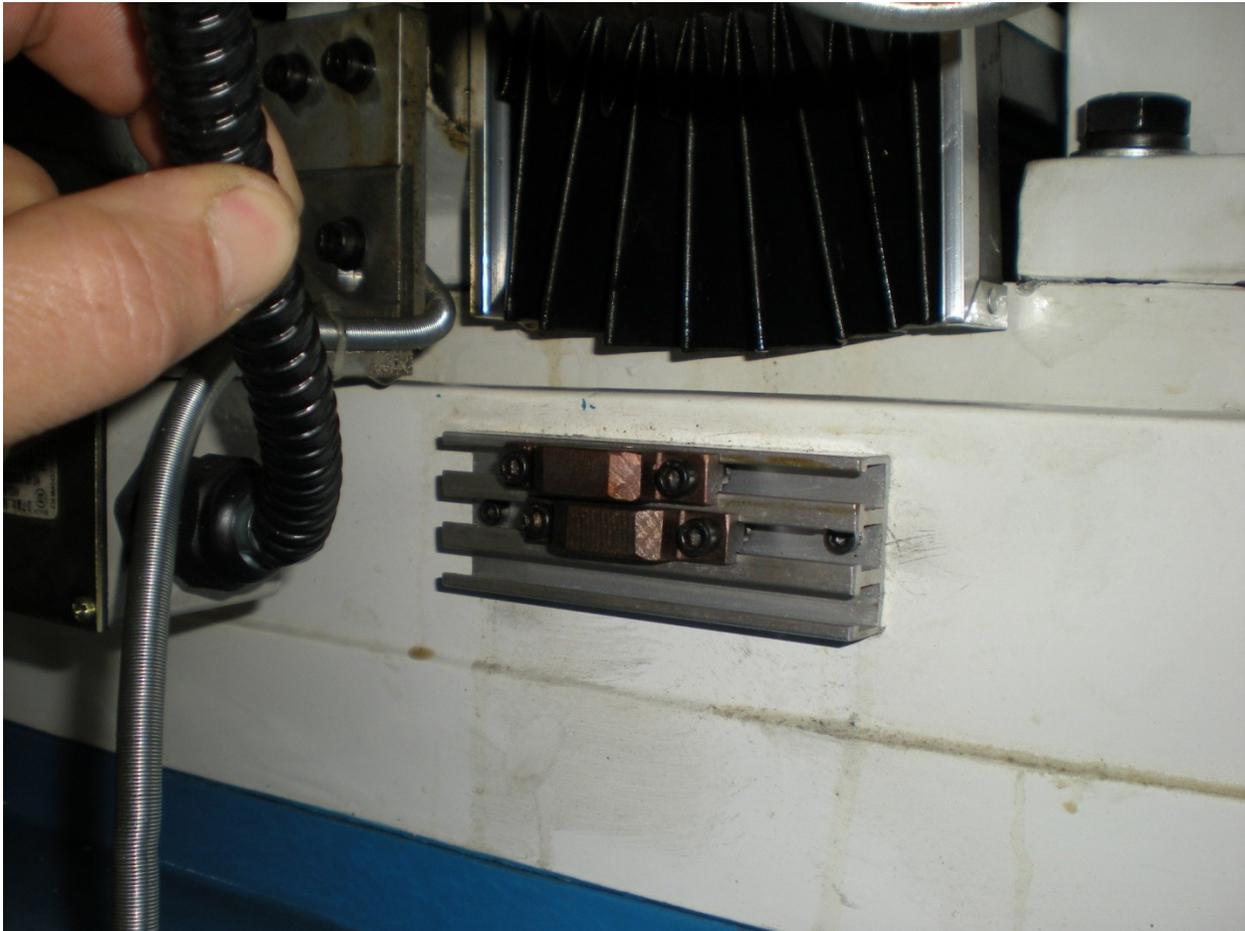
Adjusting the X Limit

The procedure for adjusting the X limit and Home switches is the same as adjusting the Y axis; however the switch is located in the center of the X axis table direction. Keep in mind, that from the factory, the orientation of the top and bottom switches may not be the same as this example. The procedure involves determining which switch activates the Limit signals and which activates the Home signal. The stop tabs are then positioned to engage the switches to achieve the desired stopping location.

For homing the mill as outlined in this procedure, the left-side X axis requires two tab stops and the right side requires one tab.

The following image shows the X axis limit switch and the stop tab on the right-hand (X-axis) side of the table.

The following image shows the left side stop tabs. Notice that the tab corresponding to the Home switch is approximately 3/8" forward of the limit switch. The orientation on your particular machine depends on which switch you determined was the Home switch and which was the limit switch. In this case, bottom tab corresponds to the bottom (Home) switch. To determine which switch controls the Home or Limit signals, read the procedure for setting the Y axis but instead, toggle and test the X switches.

Setting the Mach 3 parameters.

With Mach 3 communication established,

Select: Config->Homing/Limits
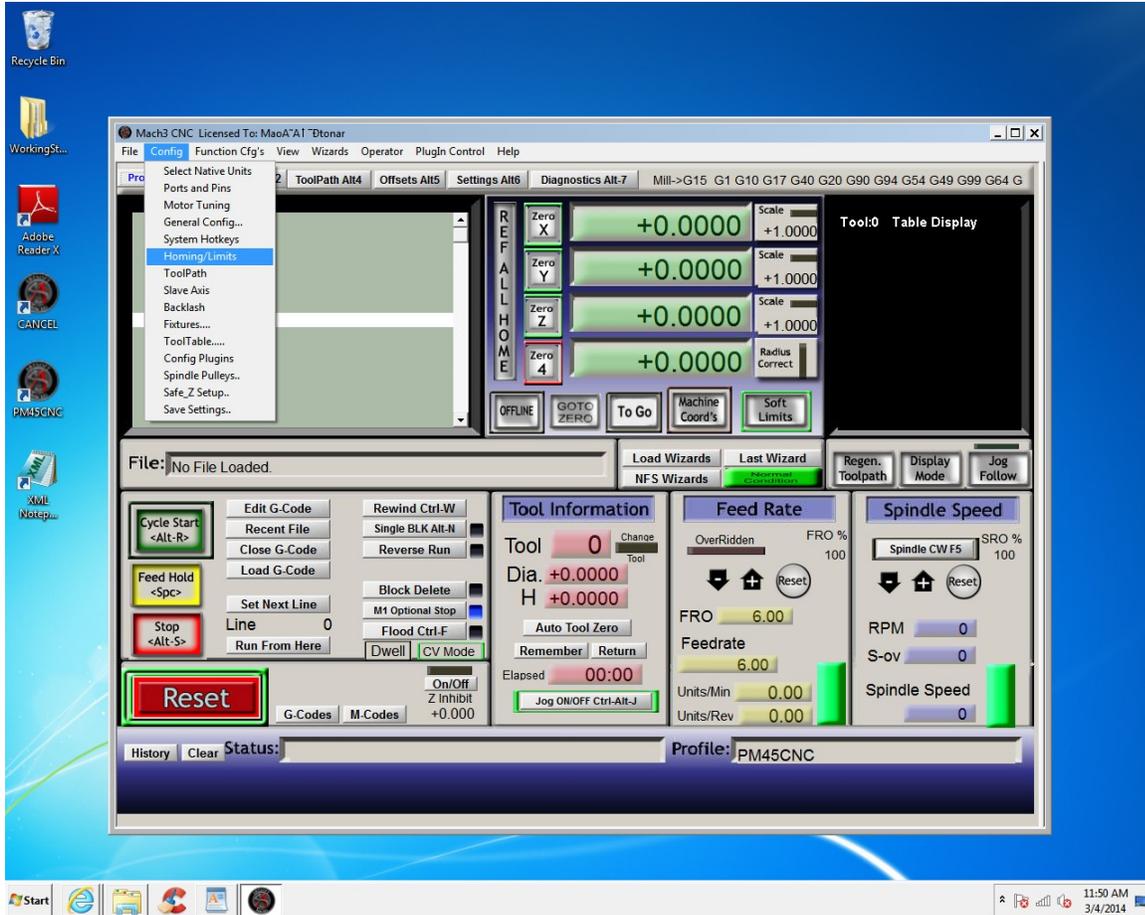
Set the table parameters as shown. In this example, the table size is limited to 17.25 x 7.75 inches. You may adjust these parameters to your liking within practical limits of the actual table size and desired range of motion. It is up to the user to set the Home and limit tab stops to prevent the table from exceeding its physical range of motion which is physically defined by the ballscrew mechanism.   You may adjust this to your liking. Note that the "soft" values should be adjusted to stop the table before the limit switches are ever engaged. Engaging a limit switch will cause the Mach 3 reset to become active and this requires an override operation to clear the Reset. In such cases, a popup will ask you to override the condition after which, the Reset button must be reset to the non-flashing condition.

Motor Home/SoftLimits

Entries are in setup units.

Axis	Reversed	Soft Max	Soft Min	Slow Zone	Home Off.	Home N...	Auto Zero	Speed %
X	✖	17.25	0.00	1.00	0.0125	✔	✔	75
Y	✖	7.75	0.00	1.00	0.0125	✔	✔	75
Z	✔	0.00	-12.50	1.00	0.0125	✖	✔	75
A	✖	100.00	-100.00	1.00	0.0000	✖	✔	20
B	✖	100.00	-100.00	1.00	0.0000	✖	✔	20
C	✖	100.00	-100.00	1.00	0.0000	✖	✔	20

G28 home location coordinates

| X	0	A	0
Y	0	B	0
Z	0	C	0

OK

To verify proper setting of the table parameters, press the Reset button to stop any Reset conditions and press the REF ALL HOME button. The table will move to its new home location.
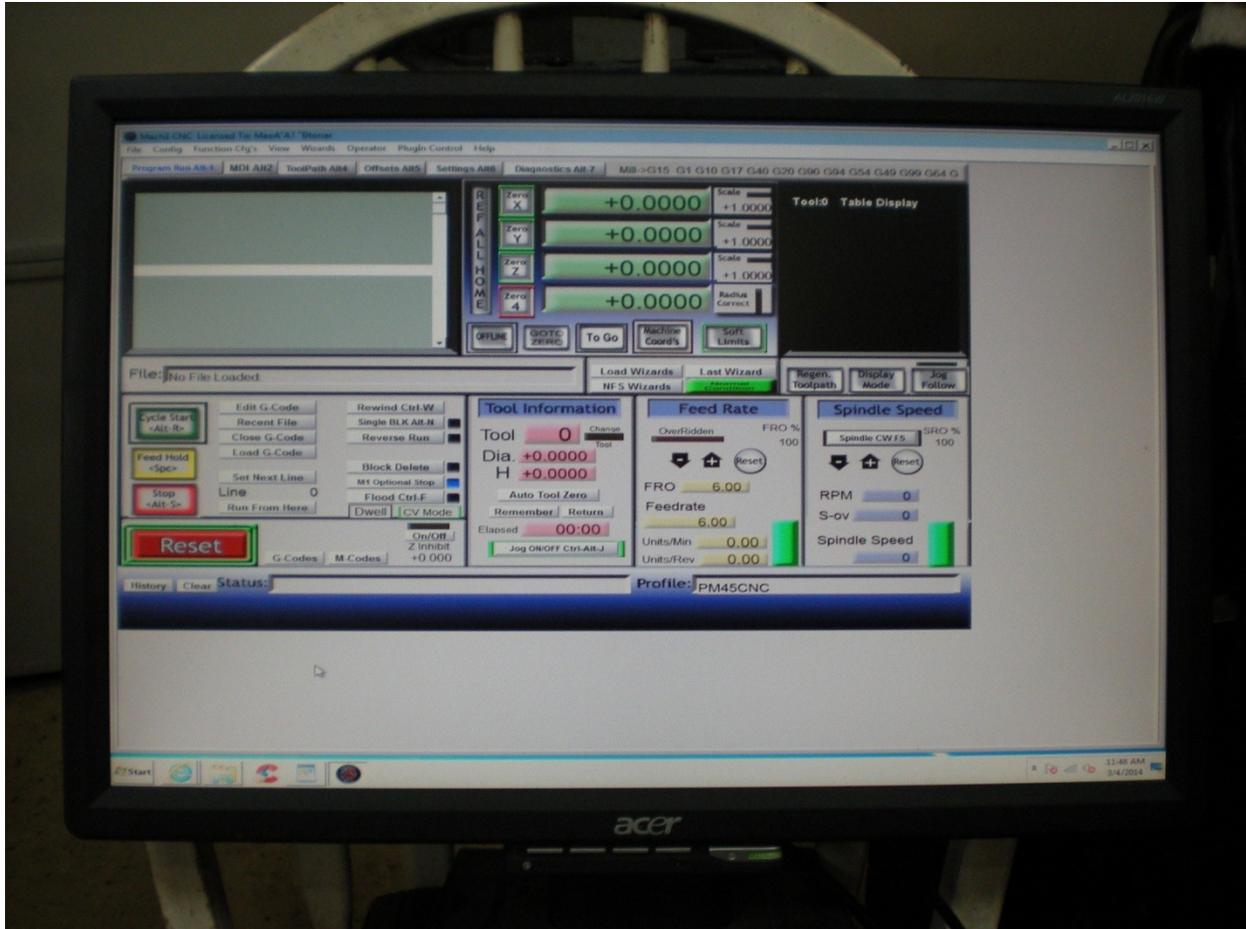
Load the roadrunner g code which comes as a sample with Mach 3.

From Mach 3, Select: File->Load G-Code to see the following screen.

The roadrunner g-code is located under C:\Mach3\Gcode (note: this depends on where you installed Mach 3).
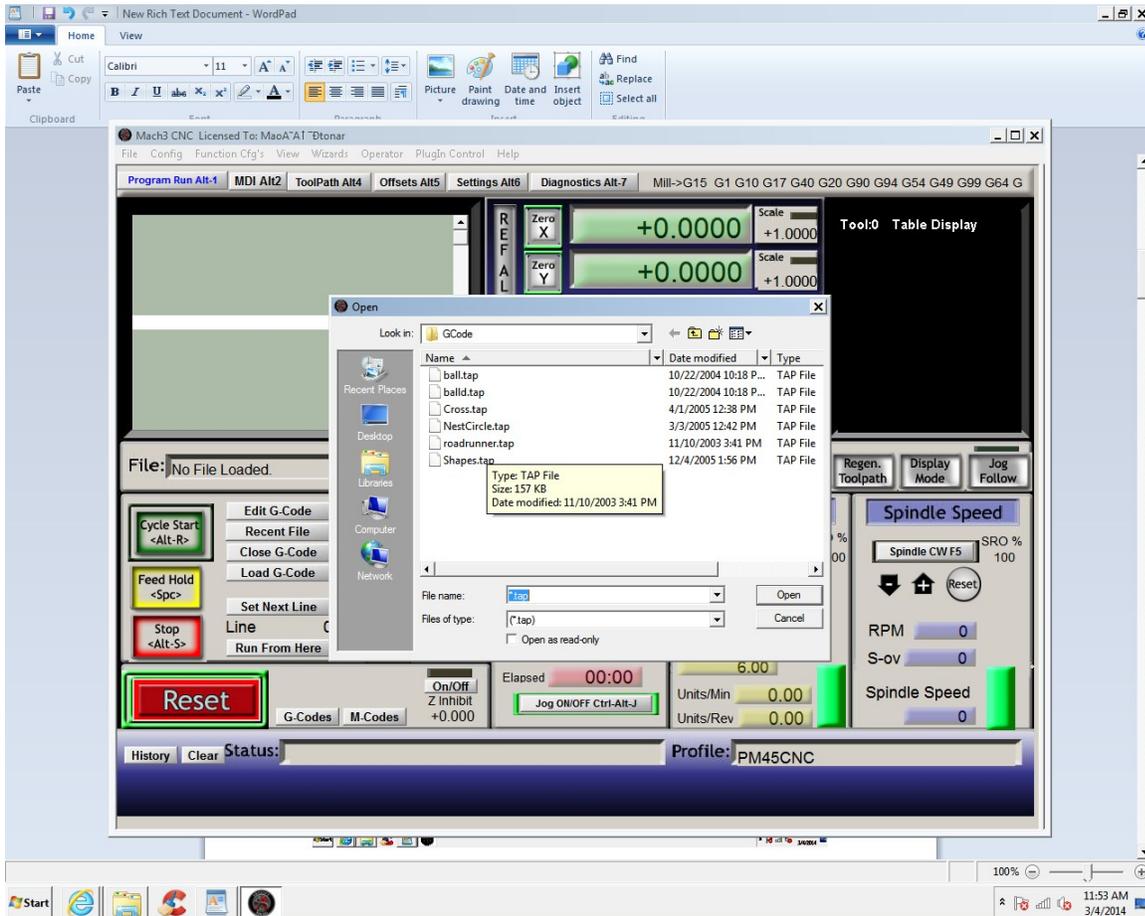
Once the program is loaded, press Display Mode to show "Table Display". You will see the outline of the table and the G-code image at the new home location.

Note: With the mill head lowered to about 10" off the table, it is OK to run the roadrunner g-code. This is an adequate distance from the table to prevent the spindle from contacting the table.

WARNING: Do not attempt to actually use a cutting tool to cut this pattern as, the code sample does not set spindle speeds appropriately for cutting any material.

This concludes the setup process of changing the factory default home table location.