

# TB131 (Rev1) - Configure CNC7 for Summing of Z Axis with a Manually Operated Quill

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## Overview

This document explains how to configure CNC7 to operate with a manually operated quill and display the summed positions of Z and the quill on the CNC7 DRO.

The example in this document assumes that the machine units are inches. You must be using CNC7 version 7.50 or later.

## Procedure:

### 1. Configure the controlled axes X, Y, and Z

This example assumes that your machine is configured with axis 1 as X, 2 as Y, 3 as Z and 4 as N (none.)

This step was performed for you at the factory or by an authorized factory representative. For more information, consult your M-Series Operator's Manual or contact your authorized factory representative.

### 2. Add the M (manual) Axis

This step may also have been performed for you; however, you may need to change the M configuration to match the direction of the controlled Z axis.

From the main screen:

- 1. Press F1. (Setup)
- 2. Press F3. (Config)
- 3. Press F2. (Mach.)
- 4. Press F2. (Motor)
- 5. Move the cursor to the 4th axis label (which should be "N") and change it to "M" for "manual".
- 6. Enter the Motor revs/inch and Encoder counts/inch values for the quill encoder.
- 7. Press F10. (Save)
- 8. Move the quill. If you have Z set for negative travel (the typical configuration) moving the quill down should cause the M display to go more negative. Moving the quill up should cause the display to go more positive. If necessary, set the "Dir Rev" column to "Y" in the M axis row so that moving the quill down results in the same changes to the display as jogging the spindle down.

### 3. Set the Travel Limits for Z and Z+M

From the Machine Configuration menu (see previous step on how to get there):

- 1. Press F2. (Jog)
- 2. If travel limits have been entered for axis 3 (assumed to be Z for this example) do not change them.
- 3. Move the cursor to the Travel (-) column of axis 4 (assumed to be M for this example.) Enter the travel range of the summed (Z+M) travel range that you desire. Be careful not to specify a range that

would allow the Z-axis to hit the table. For most purposes, the M Travel (-) and Travel (+) values can be the same as set for the Z-axis.

- 4. Press F10. (Save)
- 5. Press Esc. (Return to Setup Menu)
- 6. Press Esc. (Return to CNC7 Main Menu)

#### **4. Set Parameter 75, Axis Summing Display Control**

From the CNC7 main menu:

- 1. Press F1. (Setup)
- 2. Press F3. (Config)
- 3. Press F3. (Parms)
- 4. Move the cursor to parameter 75. To use this parameter correctly, you must enter a four-digit number representing the summing configuration. The four digit positions represent the axes in this order: 4321. A 0 digit in any position disables axis summing for that axis. Digits 1-4 name an axis with which to sum. '6' means "hide" the axis display. "7" means display only when moved. For example:
  - 5. To display Z+M in the Z display position, enter 400.
  - 6. To display Z+M in the Z display position and hide M, enter 6400.
  - 7. To display Z+M in the Z display position and show M only when M is moved, enter 7400.
  - 8. To display M+Z in the M display position, enter 3000.
  - 9. Press F10. (Save)

If you entered 400, the DRO will display ZM in the 3rd display position. If you move the quill, you will see the M display change and the amount displayed in the M position will be added to the Z display.

If you entered 6400, M will not be shown at all.

If you entered 7400, M will be shown only if you move the quill. The M display will remain until you jog a controlled axis or press Cycle Start.

#### **5. Set Parameter 76, Manual Input Unrestricted Distance**

You may wish to set this parameter if you are using the quill for manual drilling programmed pauses in a job. This parameter specifies how far from a travel limit that you can move the quill without causing a fault. If you set this parameter, you can safely keep your hand on the quill handle while the job is running. Otherwise, a slight motion -- even if the quill is all the way up -- will cause a fault and stop the job. This could happen if you anticipate a stop and reach for the quill handle too quickly.

If you set this parameter and the quill is all the way up, you will be able to pull down on the quill by this amount while the table is in motion. Keep the value small and make sure that a fault occurs well before the tool reaches the surface of the material.

Enter a positive value to create an unrestricted range at the positive side of the travel limits. Enter a negative value to create an unrestricted range at the negative side of the travel limits.

#### **6. Set Parameter 77, Manual Input Movement Tolerance**

This parameter is designed to be used with a quill locking mechanism. It allows the lock to distort and/or slip a small amount when under stress. If the quill moves more than the given tolerance, the job will stop with a fault.

A typical setting for Parameter 77 is 0.005 inches.

## 7. Set Home for All Axes

You can use the MDI to set M and Z home with the M26 command:

M26/Z sets Z home.

M26/M sets M (quill) home.

M26/Z/M sets home for both Z and M.

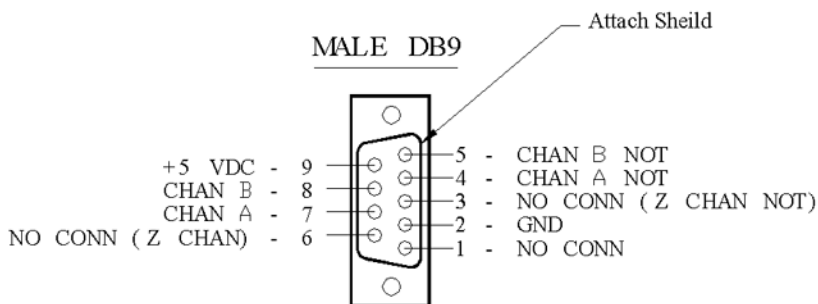
The best position for the quill when homed depends on the job and the configuration of your mill. For manual drilling, it may be best to home the quill when it is all the way up. Homing the quill at some point in the middle of its range allow you to pull the quill up for tool changes and pull it down for manual drilling.

Keep in mind that if you change the machine home of the quill, you may need to change the travel limits of the M axis.

If you home the quill somewhere in the middle of its range and then pull it up, keep in mind that you may not be able to mill as deeply into a part as the Z axis may reach the end of its travel limit before reaching the Z+M travel limit. This situation manifests itself as a "Z travel limit exceeded message" will before the ZM display reaches the travel limit set for M.

## SCALE REQUIREMENTS

1. SCALE TO HAVE DIFFERENTIAL OUTPUT (A, A-NOT, B, B-NOT)
2. SCALE TO OPERATE ON 5 VOLTS DC.
3. SCALE TO HAVE A DB-9M CONNECTOR, WIRED AS SHOWN BELOW.



SHOWN - SOLDER CUP SIDE

NOTE: We only need channels A and B. Please solder overall cable shield to the body of the DB-9 connector itself.

In summary, the steps required to configure CNC7 for summed axis display are:

1. Configure the controlled axes X, Y, and Z as you would for normal, controlled operation.
2. Add the M (manual) axis.

3. Set travel limits, if desired, for Z (in the Z travel limits) and Z+M (in the M travel limits).
4. Set Parameter 75 (Axis Summing Display Control) to 400. To hide the M display, enter 6400.
5. Optionally, set parameter 76 (Manual Input Unrestricted Distance) to allow for some unrestricted motion at the top of the travel range. (This can help avoid accidental faults when used with manual drilling.)
6. Set parameter 77 (Manual Input Movement Tolerance) to 0.005 (0.005 inches.)
7. Set home positions for all axes including the quill.

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#### **Document History**

Rev1 Created on **2001-12-19**