



# USB Indexer

USB Indexer for CNC Controls

©2009-2011 Calmotion LLC, All rights reserved

Calmotion LLC  
9909 Topanga Canyon Blvd. #322  
Chatsworth, CA 91311  
[www.calmotion.com](http://www.calmotion.com)

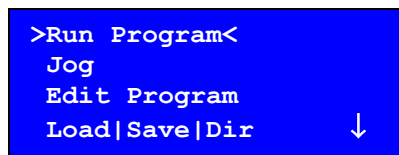
## Introduction

This manual is intended to provide a description of the Calmotion USB Indexer for rotary tables.

The Calmotion USB Indexer system features a USB interface that provides a fast and simple way to add a semi-4th axis to any CNC or run as a stand alone indexer. Capable of running a single program, the USB indexer executes indexed moves and sends non-rotary data machine data via DNC. In DNC mode, the USB Indexer automatically inserts and sends M function data to the CNC eliminating the user from having to insert them in a program and/or write custom print statements. This eliminates the need to write and coordinate multiple programs between an indexer and a CNC. With almost unlimited memory, the complexity of sub-routines, line repeat, sub-program calls, and nesting can be avoided. Even with applications that do not need a rotary table, the USB indexer is useful to load, save and DNC large programs to almost any CNC with a serial port. Individual serial settings can be saved for quick and easy connection to any number of machines. A menu driven interface with function keys allows easy operation for program entry and other control editing functions. The USB Indexer can be programmed from the front panel to rotate the spindle in either direction in step sizes from 0.001° to 30,000°.

## Navigating the Menus

There are four arrow buttons on the panel of the USB Indexer device. There is an up and a down pointing arrow button to move the cursor on the menu up or down. The Left and Right buttons can also be used to navigate across the menus. The cursor is typically shown bracketing items with > and < symbols. Press the Enter button to select the function pointed to by the cursor brackets.



There is an arrow on the right side of the display that will indicate a direction in which more menu items are available. Run Program is shown above. It is at the top of the menu and additional menu items are available below “Load|Save|Dir”. Pressing the down arrow will scroll the menu downward where additional selections will be available.

Selecting the Menu button will go return the display back to the main menu. The Menu button can be used to cancel out of functions or can be used to return to the main menu.

## Getting Started with the USB Indexer

1. Power on the USB Indexer with the main power switch located at the rear of the indexer box.
2. The display will show the copyright information and version number for about 6 seconds.

3. A “Press Start button to reset Motor Amplifier Fault” message will be displayed. To enable the axis power, release the Emergency Stop button and press the green start button to reset the fault.
4. Cursor to down to Cold Start menu choice to begin the rotary zeroing procedure. The indexer will be in jog mode at this time. Use the arrow keys to move the indexer to the desired cold start position. Press the green “Start” button. The indexer will attempt to find the zero mark. A message will be displayed that the indexer is trying to find the motor index mark. When complete, the display will return back to the main menu.

### **USB Disk Key Removal**

It is important to not remove the USB key when it is in use, otherwise corruption of the USB disk key will occur. A blinking light on a USB key typically indicates that files are being used and that it can not be removed. Only remove the USB disk key from the USBCNC Indexer unit when the Main menu is being displayed and the USB disk key is not blinking.

## Main Menu

### Run Program

Selecting “Run Program” will put the indexer in a mode whereby a program can be run from the internal memory. The active program number will be executed. Each line can be manually executed by pressing the green “Start” button. To cancel operation of a program while running, press the “Menu” key.

```
Pos:36.000 G90 L001
N1 90.000 F100.000
N2 45.000 F40.000
STOP
```

### Jog

In Jog mode, the USB indexer rotary table can be rotated both directions. Also, a specific location can be entered in the MDI portion of the Jog function display. The indexer will rotate to the position entered after pressing either the “Start” button.

```
Jog:160.000 .001
          ↑
          .1← →-.1
MDI:      ↓-.001
```

### Edit Program

In edit mode, the active program in internal memory can be edited. The arrow buttons are used to move to each NC value in the program. In each program, there are 5 values in a single block of code. The N-word is the program line number. The S-word value determines the step size value measured in degrees of the rotary table move. The F-word indicates the Feed rate value for the step in degrees per second. The G-word dictates the function or mode for the program. Finally, the L-word indicates the loop count value of how many times to repeat a line of code. Some of these NC words will take on different means with some G codes like G96 or G98.

```
N1 F160.000 G90
   S90.000 L1
N2 F      G90
#2 S-45.000 L1
```

The currently selected indexer internal program number is shown in the lower left hand corner of the editor screen. In the example above, the current program selected is #2.

Each program can have up to 100 N-words.

If a value is blank, it is considered to have no value. For example, a blank S-word value will result in no motion when running.

To change a value, use the arrow keys to move the cursor to the value to be changed. Type in a new value. Pressing enter key or moving the cursor to another location will load the value into the program.

```
N1 F160.000 G90
      S90.000 L1
N2 F G90
ENTER=Insert, DELETE
```

To insert a line of code, cursor to a N-word value. A sub-menu will be shown that will allow the line to be deleted or another line to be inserted just before the cursor position. The sub-menu is shown in the following display example above. If a new line is desired before the cursor position, press the Enter button. To delete a line where the cursor position is, press the Delete button

### Load|Save|Dir

```
Load USB Program
Save USB Program
Delete USB File
Select Program #
```

In the Load|Save|Dir mode, a new indexer program can be loaded into internal memory, it can be saved or a new one loaded. To save the current program in memory to the USB disk, select the Save USB Program option. The display will show ">[type file]<". Pressing enter will allow the user to name the file that will be saved on the USB key. Use the arrow key to scroll through the letter/numbers available. Press the left right arrow keys to change the cursor location on the file name. Do not exceed the 8.3 file format. File names cannot exceed 8 characters and the extension cannot exceed 3 characters. Once satisfied with the file name, press enter. The program file will be loaded to the USB key inserted for future use or safe storage.

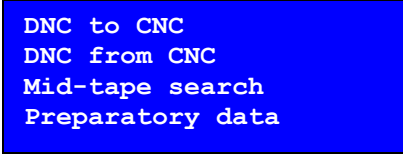
To load a program from a USB key into internal memory, select Load USB Program. Scroll through the available programs by using the up and down arrow keys. If the file name is known, it can be typed at the ">[type file]<" prompt.

The active program can be selected from those stored in local memory by choosing the Select Program # option from the menu. This will then show the available programs that can be used from the internal memory of the indexer.

```
Local Program 01
Local Program 02
Local Program 03
Local Program 04
```

## DNC

With the DNC selection, a program to run the indexer will either be drip fed (DNC) to the CNC and Indexer, or a program will be received from the CNC. See the later selection titled DNC to CNC for a more in-depth description.



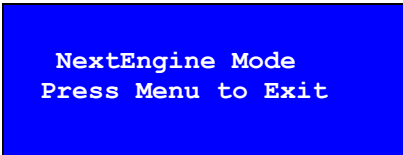
```
DNC to CNC  
DNC from CNC  
Mid-tape search  
Preparatory data
```

## NextEngine Mode

With the NextEngine mode selected, the Indexer control box will function with the optional Calmotion NextEngine interface box. The indexer will operate as a slave to the NextEngine laser scanner. This is an optional feature for the Indexer that requires the NextEngine Scanner in addition to the Calmotion interface box to the NextEngine.

To use the NextEngine mode:

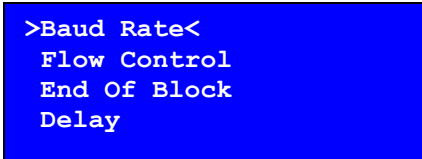
1. Remove power from the Indexer and the NextEngine scanner.
2. Connect the Calmotion NextEngine interface box to the NextEngine Scanner.
3. Apply power to the Indexer and the NextEngine scanner.
4. Select the NextEngine Mode on the Indexer from the main screen menu.
5. Use the NextEngine scanning software as if the standard NextEngine scanner were connected.



```
NextEngine Mode  
Press Menu to Exit
```

## Setup Menu Selection

The Setup selection allows settings to be established for RS-232 serial communication with a CNC. Highlight the parameter option from the list. Press the center button to select the highlighted option.



```
>Baud Rate<  
Flow Control  
End Of Block  
Delay
```

## Baud Rate

The Baud Rate menu is used to select a common communication rate of data transfer with a CNC. The baud rate is the number of bits per second the RS-232 serial port will communicate. The available choices are:

1200  
2400  
4800  
9600  
19,200  
38,400  
57,600  
115,200

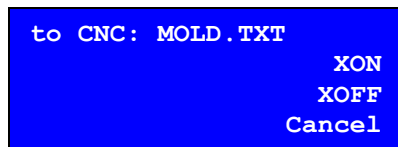
## Data/Parity/Stop

Set the number of Data, Parity and Stop bits used for serial communication. This setting is typically fixed on a CNC. Refer the CNC's manual for the proper combination. The following choices are available:

7 data, Even parity and 1 stop bit  
7 data, Even parity and 2 stop bit  
7 data, no parity and 1 stop bit  
7 data, no parity and 2 stop bit  
8 data, no parity and 1 stop bit  
8 data, no parity and 2 stop bit

## Flow Control

Flow control sets the streaming method of data to and from the CNC. This is typically a fixed method. Refer to the CNC manual to determine which type is used by the CNC. Hardware flow control uses two RS-232 signals (CTS and RTS) to start and stop data transmission. Software flow control uses XON/XOFF characters to start and stop data transmission. Software flow control is the preferred and easiest method to implement. This method is recommended.



When the Software flow control method is used, the most current XON or XOFF received during transmission will be displayed on the right of the display. The display of XON or XOFF characters is useful to troubleshoot communication issues should they arise.

## **End of Block Char**

End of block sets the format for the end of block characters. This parameter value will be the end of block that is used when sending data to the CNC. The most common end of block format used by most PC computers is the carriage return/ line feed. The next most common type is the Teletype end of block or line feed/carriage return. When data is received from a CNC, a carriage return/line feed end of block is always used. This allows the file to be viewed when using the USB disk on a computer.

The following choices are available:

CR LF  
LF CR  
LF CR CR  
LF  
CR  
None/binary

Use the 'None/binary' for controls that do not use text files or a file that does not contain control characters. For example, Mazak has an optional non-G code file system that will not work in text mode. The USBCNC will transfer those files when the binary option is selected.

## **End of Block Delay**

End of Block Delay sets a pause at the end of a block of data. Typically, this is set to 'no delay' to ensure the fastest data communication at the selected baud rate. Choose a delay if the CNC manufacturer requests a delay at the end of a block or if the CNC is losing blocks of data in the program. This feature is typically used for older CNC controls with low communication and baud rate capability.

## **Start of Tx**

This sets the character that will be sent prior to sending data in the selected file. The most common character used is the percent, %. Choose a setting as specified in the CNC manual. If the user programs have a % at the beginning of the file, choose "none".

The following choices are available:

%  
null char  
none

Use the null character for controls that need an ASCII char 0 to be used as the start character.

## **End of Tx**

This function sets the character that will be sent after sending data in the selected file. The most common character used is the percent, %. Choose the setting as specified by the CNC manual. If the user programs have a % at the end of the file, choose “none”.

The following choices are available:

%  
null char  
none

Use the null character for controls the need an ASCII char 0 to be used as the end character.

## **Rotary Ratio**

This function sets the rotary table ratio to be used. Choose this setting to match the rotary table being used. The 5C rotary ratio is 60:1. The VH-160 and VH-210 ratios are 90:1.

The following choices are available:

60:1  
90:1  
180:1

## **Probe RS-232**

This function shows the RS-232 levels present. This can be used to help diagnosis serial communication issues.

## **Start Rx**

This sets how the USBCNC will initiate receiving a file. Some machines require an initial XON to begin the transmission. Most machines do not and the ‘automatic’ setting will work for most machines.

## **Save Setting**

Multiple machine settings can be saved using this function. This feature is useful when connecting the USB Indexer to different machines each with unique communication settings. They can be easily recalled for quick start up. When selected, the current USBCNC setup parameters can be saved as a file using a name chosen by the operator. Typically, this name is associated with a specific machine. The parameter files created will be saved on the USB key in the INI directory.

```
>[type file]<
..<DIR>
Mazak
Fanuc
```

## Load Setting

Use this function to load a previously saved machine setup for easy recall. The parameter files saved in the INI directory on the USB key will be displayed. If multiple USB keys are used, copy the INI directory to all the USB keys used.

### Notes:

The USBCNC does not support long Windows type file names. Use a DOS type 8.3 file format with the USBCNC. 8.3 filenames have at most eight characters, optionally followed by a "." and a file name extension of at most three characters.

## Update Software

Use this function to update the firmware on the USB Indexer control. Only use software that has been provided directly from Calmotion LLC.

### *CNC DNC | Load | Save*

In this mode, the USBCNC Indexer can be used without a 5C or rotary table connected. Files can be sent or received from a USB key and CNC machine including DNC operation. The first set of menus will be shown as below.

```
> CNC TO USB <
USB to CNC
DNC to CNC
DNC from CNC
```

## CNC to USB

Choose this option to send files from a CNC to a USB key in the USB Indexer. A screen will be displayed that will allow the name of the file to be typed by the operator or chosen automatically by the USBCNC Indexer. e.g. a file name such as CNC16.TXT will be automatically generated by the USB Indexer control.\* If the operator desires to give a specific name to the file, press "Enter" to view file names already on the USB key that can be over written or allow the operator to give a unique name to the file.

*\*Automatic File Name Selection: All files saved to the USB use a file name with the following structure: CNC####.TXT The number will be the next number in the sequence of the files found on the USB disk key. If the largest sequence numbered file name number found is CNC15.TXT, then the next file name created will be CNC16.TXT.*

## **Naming a File**

If you wish to overwrite an existing file, select one of the files from the list. A warning will appear as shown below.

```
File exists, do you
want to overwrite
the file?      Enter = yes
                Delete = no
```

Confirm that you want to replace an existing file by selecting yes. Selecting No will take the operator back to the main menu.

## **Using the [type file] function**

Directory listings on the USB Indexer always have a [type file] option in the directory list. This function allows the operator to insert characters to name files. When selected in CNC to USB mode, a user may specify the name of the file on the key that is being saved. The Scroll function is used to increment to another letter or number. Use the arrow keys to accept characters and move to the next character in the file name. Press enter once satisfied with the file name. A character can be deleted by pressing the “Delete” key. In the example below, the USB Indexer will save a file on the USB key named 110808.NC. Press “Enter”, then press the “Start” button to prepare the USB to receive a file from the CNC. Press the button under the Cancel option to return to the main menu without creating a file. Once the “Start” has been pressed, a file send operation (punch) from the CNC should be initiated. Press and hold the “Menu” key to cancel this operation.

```
File Name:
110808.NC
```

## **USB to CNC Menu Selection**

With this menu selection, a file on the USB disk key can be sent directly to a CNC. The first files shown on the display are files on the USB disk key from the last selected directory. Use the arrow keys to highlight a particular file, highlight [type file] to type in a file name or select a new sub directory to display. Press the “Enter” button to select the desired file.

```
[type file]
CNC16.TXT
>MOLD.TXT<
NEXTJOB<DIR>
```

A new screen will appear showing the file to be sent along with “Start to Begin”, “Menu to Cancel”, and “Enter to View” displayed. Pressing the “Enter” button will result in the first few lines of the program in the file being displayed on the screen. This will give the operator a snapshot of the file being sent to ensure the correct one has been selected. Before pressing the Start button, prepare the CNC control to receive a file. When the CNC is ready to accept a file, press the “Start” button. Press the “Menu” to cancel this operation and return to the main menu.

```
to CNC: MOLD.TXT
START to Begin
Menu to Cancel
Enter to View
```

After pressing Start, the CNC will receive the data file selected. In the example above, file data contained in MOLD.TXT will be sent to the CNC. When the transmission is complete, the display will return to the main menu. On some machines, the operator may have to press cancel to return to the main menu after transmission of a file.

### **DNC\* Menu Selection**

With DNC selection, a file on the USB disk key can be sent directly to the CNC while the control is in Automatic mode. This function provides a way to ‘run’ a program off the USB disk key. The first files shown on the display are files on the USB disk key from the last selected directory. Use the arrow keys to highlight a particular file, highlight [type file] to type in a file name, or select a new sub directory to display. Press the “Enter” button to make the selection desired.

\*(DNC, Direct Numerical Control, may not be available on all CNCs. Check with the machine’s user manual to determine if this feature is available on the CNC control).

**After** pressing the Start button, prepare the CNC for DNC or “drip feed operation” and place into start DNC mode.

Note: In software handshaking mode, the USBCNC will wait for a start command before sending the file. If the CNC is placed into DNC mode before setting up the USB Indexer, the start command will be sent prematurely. The USBC Indexer will miss the start file command and will wait indefinitely in a wait state unless the user presses the “Menu” button.

## DNC Mid-tape Start

This menu selection allows for mid-tape starts if the operator wishes to start sending data midway through a program. Use the Mid-tape start option to do a block search within the file selected. Use the arrow keys to add text for where mid-tape should occur.



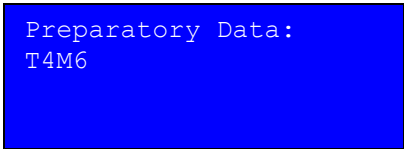
```
Midtape:  
N101
```

In the example above, the USB Indexer will search for N101 and begin DNC operation at the file location where N101 is found. Once the operator is satisfied that the text desired is on the display, press “Menu”.

Scroll to the “DNC to CNC” menu. Enter this mode and scroll using the arrow keys to find the desired file. Note: An N word can be added to a single line of the file in order to establish a starting block number should one not exist in the file.

## DNC with Preparatory Data:

Use the Prep-data option from DNC Options to insert text prior to file data that has been selected for DNC. For example, the operator might want to make a tool change prior to running a file. To do this, the operator would enter the appropriate NC codes to make a tool change like T4M6.



```
Preparatory Data:  
T4M6
```

The mid-tape or preparatory text can be typed using the left and the right arrow buttons to position the character cursor. A scrolling function for letters and numbers is achieved by using the up and down arrow keys. Alternatively, numbers can be typed in using the keypad adjacent to the display. Use the left and right arrow buttons to accept characters and move the cursor to the next desired location. Press the “Enter” button when finished typing the desired search string. Characters can be deleted by pressing the “Delete” button.

Once satisfied with the data that should be sent ahead of the data file, press the Menu button. Scroll the cursor to “DNC to CNC”. Select the desired file and press “Enter”. The preparatory data will be sent to the CNC without modifying the contents of the file. In the previous , T4M6 will be sent to the CNC followed by the rest of the file.

The Preparatory Data and Mid-Tape start can be used together to quickly resume operation in DNC mode without having to modify DNC files.

## **Cold Start**

Use this selection to initialize the rotary table at the desired the zero position on the table. Press the arrow buttons to adjust the rotary table position to the desired starting 0 degree position. Two sets of arrow buttons allow coarse and fine adjustment in both directions. The mark on the spindle and housing should be close to each other before starting the cold starting procedure. When the marks are close, start the cold start by pressing the start button, the USB Indexer will locate to the zero position on the table based on the encoder marks of the servo motor. The alignment of the marks on the spindle and the housing indicate a successful cold start position.

## **Zero Set**

Use this selection to set the indexer's 0 degree reference point to the current position. In jog mode, rotate the device using the arrow keys or by directly inputting the location using MDI (manual data input) to the desired location. Press and hold “Zero Set” for approximately 5 seconds. The location displayed on the screen will change to zero indicating a successful zero set. This reference will stay in effect until until it is either changed again or the unit is put through the cold start procedure.

## **Zero Return**

Press “Zero return” to rotate the indexer back to the zero position without having to type “0” and “Start”. This button is inactive while editing programs.

# **Indexer Programming**

## **Feed Rate**

Default = 300.000 degrees per second  
Range = 300.000 to 0.001 degrees per second

The feed rate is programmed in degrees per second. When entering an F value in a program, the indexer will rotate at this programmed speed on the current line and every line after it until a new F word is entered. When a new speed is desired, enter an F value on or before a move command. The F value will remain modal (in effect) until a new value is programmed.

## **Step**

Range = +30000.000 to -30000.000

The step is programmed degrees. The current coordinate system will determine whether a move will occur or not. There are two coordinate systems, absolute and incremental.

### **G90 Absolute Coordinate system**

Step values in the absolute coordinate system will move to that value relative to the home position on the rotary table. The home position is the position that is considered 0 degrees. Moves larger than 359.999 will be translated to a value in the range of 0.000 to 359.999 degrees.

### **G91 Incremental Coordinate system**

Step values in the incremental coordinate system will move the number of degrees in the value of the S word. All moves are relative to the current position of the rotary table.

## **G codes**

<b>G28</b>	Return to home position
<b>G86</b>	Turn CNC relay ON
<b>G87</b>	Turn CNC relay OFF
<b>G88</b>	Return to home position
<b>G89</b>	Wait for remote input
<b>G90</b>	Absolute coordinate system
<b>G91</b>	Incremental coordinate system
<b>G92</b>	Pulse CNC relay and wait for remote input
<b>G93</b>	Pulse CNC relay
<b>G94</b>	Pulse CNC relay and run next L number of steps without waiting for the CNC completion relay (M21).
<b>G95</b>	Return from G96 subroutine

<b>G96</b>	Subroutine call or jump to line in S word. The program execution will be redirected to the line number that is stored as a value in the S word. The G95 code is used to return to the line after the G96 coded line. The G96 is not nestable (only one maybe used at a time).
<b>G97</b>	Delay 0.1 seconds multiplied by L word
<b>G98</b>	360 degree division (circle division), L word will be the number of equal sized divisions of a complete rotation to make into steps. After completion, the rotary table will be back at the original starting location.
<b>G99</b>	End of program

### **Loop Values (L words)**

Values in the L word are typically used to control the number of times to repeat a line of code. For example, a program to move the rotary table 25 degrees three times could be accomplished using the code below:

```
N1 G91
N2 S25.000 L3
```

Other uses of the L word include using them in conjunction with G94, G98, and the G97. The L word value is used in these special function G codes as a parameter for the function.

### **Example Programs**

The following program will rotate the rotary table 90 degrees and then to 135 degrees using the absolute coordinate system, G90:

```
N1 F100.000 G90
N2 S90.000
N3 S135.000
N4 G99
```

The following program will rotate the rotary table 90 degrees and then to 135 degrees using the absolute coordinate system, G91:

```
N1 F100.000 G91
N2 S90.000
N3 S45.000
N4 G99
```

The following program will make ten 36 degrees moves on the rotary by using the circle division function:

```
N1 G98 L10 F100.000  
N2 G99
```

The following program will make ten 36 degrees moves on the rotary by using the L value to loop:

```
N1 G91 S36.000 L10 F100.000  
N2 G99
```

The following program will make ten 36 degrees moves on the rotary by using the subroutine calling function G96:

```
N1 G96 S4.000  
N2 G91 S36.000 F100.000  
N3 G95  
N4 G96 S2.000  
N2 G99
```

## **“A” move DNC to CNC Recognition**

The Calmotion USB Indexer features a G code recognition technology that separates G codes meant for the indexer and those for other machines. Standard machine data is sent to the CNC in DNC mode. When an indexer move is recognized, M function commands are self-generated and sent to the machine serially to activate machine contact closure for machine and CNC coordination. For CNC feedback, the USB Indexer dynamically generates its own internal M functions for indexer moves and closes a contact as feedback to a CNC machine tool. This auto insertion multi-axis DNC functionality makes multi-machine code easy to code and read by using 4th axis-like programming. Burdensome print statements are eliminated. In addition, the complexity of generating multiple programs and coordinating between them can be avoided. No loading of a program into CNC or indexer is required. Load files on a USB key with A move style programming and begin operation.

```
O0002
G00 G17 G40 G90 G98
T01 M06
A0.0 F50.0 G1 G90 ( Rotate to 0 degrees
G81 Z-.25 F4 .R.01 ( Drill first hole
A90.0 ( Rotate to 90 degrees
Y0 ( Drill second hole
G80
G0 Z0 H0
M30
```

**Text 1: Example code to drill two holes, one hole at 0 degrees and the other is at 90 degrees.**

When selecting “DNC to the CNC”, the Indexer will send the data to the CNC while keeping the rotary motion blocks for itself. The CNC will run in DNC mode receiving the NC blocks as they are drip feed from the Indexer. The Indexer will detect A axis rotary motion blocks automatically remove these blocks from the drip feed data and replace it with M21 indexing commands. The automatically generated M21 commands will synchronize the CNC and the Indexer box. If the CNC uses a different code other than M21 to close the indexer contact, they can be changed. See the INI section to change the M code.

### **DNC from CNC**

To DNC from the CNC, the Indexer NC blocks will be sent from the CNC to the indexer box typically using a RS-232 serial macro statement like DPRNT[G90A0] or #SPRINT “G90A0”.

### **USBCNC.INI file**

The USBCNC.INI file can be edited to make changes to the defaults for the USB CNC Indexer unit. To create this file, select SETUP menu from the main menu. Select “SAVE INI”. Enter the file name to be used. USBCNC.INI does not have to be the name of the file. The file created should have the following contents:

```
BAUD=5
FLOW=1
DELAY=0
EOB=0
STARTTX=0
ENDTX=0
BITS=0
STARTRX=0
COMMENT1=*
```

COMMENT2=(  
INDEX=M21

The parameters BAUD to STARTRX can be set directly from the SETUP menu, or the number after the = sign can be changed in the INI file and then loaded. The number corresponds to the position in the list for that parameter.

The COMMENT1= and the COMMENT2= should be edited off line on a computer. The characters after the = sign will set the default character(s) used by the CNC to identify comments in the CNC g-code. The defaults are \* and (.

The INDEX= sets the CNC code to close the indexer contact closure for indexing the program on the indexer. Typically, this is set to M21. If this is not the M code used by the CNC, it can be changed by editing and loading the INI file with the correct code after the INDEX=. This parameter is primarily used by the “DNC to CNC” feature of the USB indexer unit.

## Indexer Electrical Connections

### M-Function

The circular din on the back of the USB indexer box that is labeled as the M-function is the input and output for the CNC and Indexer completion relays.

Pin definitions on the circular DIN connector:

Pin 1	Red	Indexer Finished relay
Pin 2	Green	Indexer Finished relay
Pin 3	Black	CNC Start Relay (+24 Volts out from Indexer)
Pin 4	White	CNC Start Relay (Cycle Start on Indexer)