USBCNC

USB Disk Key reader for CNC Controls

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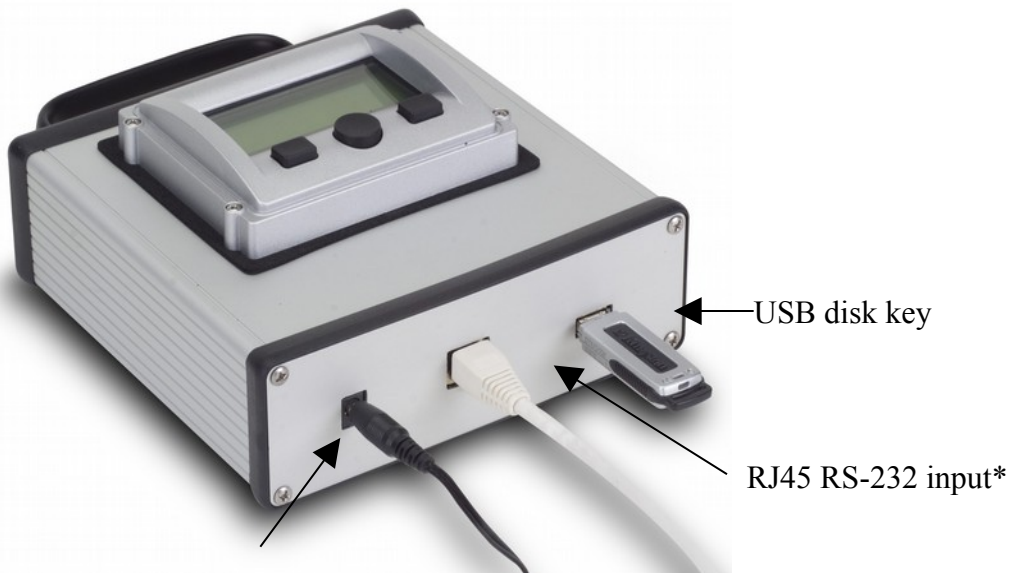
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Introduction

This manual is intended to provide a description of the Calmotion USBCNC UNIVERSAL disk key reader.

Requirements

The USBCNC device will work with a CNC control with a standard DB25 RS-232 serial connection to the control box for the purposes of input/output of CNC data. Typically, the CNC manufacturer refers to this as read and punch tape functions. Access to an AC power wall outlet will be required to power the unit.

USB disk key

RJ45 RS-232 input*

DC power

*This RJ45 connection is to be used only with a Calmotion RS-232 cable. Do not plug anything else into this connection, otherwise the USBCNC or other equipment will be damaged!

Navigating the Menus

There are three buttons on the panel of the USBCNC device. Two square buttons bracket a round button in the center. The square round buttons are used to control the cursor in order to highlight options from a menu or file selection. The cursor is typically shown bracketing items with > and < symbols. The center button typically selects the options or files highlighted with the > and < symbols.

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Main Menu

The following is the main menu displayed upon application of power. The outer round buttons are used to adjust the item to be selected either up or down. The center button is used to select the function that is highlighted with the > < symbols. The descriptions of each function are described later in the manual.

```
Select:> CNC to USB<
         USB to CNC
         DNC
v3.92.i  SETUP
```

The main menu is a safe place to remove the USB key from the unit. When the USB key is no longer blinking.

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. Typically the USB key is blinking a light to indicate files are being used and that it can not be removed. The time to safely remove the USB disk key from the USBCNC unit is when the Main menu is being displayed and the USB disk key is not blinking.

CNC to USB **Menu Selection**

With this selection, CNC data can be sent directly to the USB disk key. The file name used to transmit CNC data is generated automatically*. There is an optional file name feature that will name the file with the job number (O-word) of the NC program**. If a unique file name is desired, select 'Dir'. 'Dir' will display the directory. A different file name can be typed in by selecting [type File].

```
to USB:
CNC16.TXT


Dir    Start    Cancel
```

Shown in the above screen display, the file name CNC16.TXT has been automatically generated by the USBCNC control. Press the button under the **Start** option 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.

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*More about the 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.

**The File Name Feature when enabled in the setup menu, saves the file with the name of the job number (O-work) of the NC program file. The file can also be saved with the first or second word of the comment at the job number line as the file name.

Naming a File

Use the Dir button if the operator wishes the save the file using a user defined file name. Pressing the Dir button will display [type file] along with a list of files already on the USB key. 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?
Yes              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 USBCNC always have a [type file] option in the directory list. This function allows the operator to insert characters to various functions. 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 Next function to accept that character and move to the next character in the file name. Use the Cont. function to accept this as the file name. A character can be deleted by pressing the Left and Right buttons at the same time. In the example below, the USBCNC will save a file on the USB key named 110808.NC. Press Cont. and then have the CNC punch/send the file to the USB key.

```
File Name:
110808.NC
(delete=Left/Right)
Scroll  Cont.   Next
```

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Using the file name feature

There is an option in the Setup menu called 'File Name' that will name the saved NC file using the job number in the NC program, otherwise known as the O-word. If this option is selected the O-word at the beginning of the received NC file will be used as the file name that is saved to the Flash drive. Optionally the file name can be the first or the second word in the comment line of the O-word.

The following example NC program has a line at the beginning of the file with:

N1O6(SUB PROG22 LOGO, INCREMENTAL PROGRAM)

When the O-word option is enabled in 'setup' the received file will be renamed and saved to the Flash drive using the O-word of the example file. In this example after the file has been transferred and saved, the file name located on the Flash drive will be O6.NC.

When the 1st-word option is enabled in 'setup' the received file will be renamed and saved to the Flash drive using the 1st-word in the comment of the O-word line. In this example after the file has been transferred and saved, the file name located on the Flash drive will be SUB.NC.

When the 2nd-word option is enabled in 'setup' the received file will be renamed and saved to the Flash drive using the 2nd-word in the comment of the O-word line. In this example after the file has been transferred and saved, the file name located on the Flash drive will be PROG22.NC.

USB to CNC Menu Selection

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

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

Shown in this example screen above, the MOLD.TXT file is highlighted. Select the center key to prepare the file to be sent. A new screen will appear showing the file to be sent along with a Start and Cancel display. Before pressing the Start button, prepare the CNC control to receive a file. When the CNC is ready to accept a file, press the center button associated with the Start button on the screen. Press the right button to cancel this operation and return to the main menu. Use the View option to view the contents of the file selected before sending the file to the CNC.

```
to CNC: MOLD.TXT


View    Start  Cancel
```

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.

Using the [type file] function

Directory listings on the USBCNC always have a [type file] option in the directory list. This function allows the operator to insert characters to various functions. When selected in USB to CNC mode, a user may avoid scrolling down the list of files and simply specify the file to be sent. The Scroll function is used to increment to another letter or number. Use the Next function to accept that character and move to the next character in the file name. Use the Cont. function to accept this as the file name. A character can be deleted by pressing the Left and Right buttons at the same time. In the example below, the USBCNC will send the file on the USB key named PART5.NC.

```
File Name:
PART5.NC
(delete=Left/Right)
Scroll  Cont.   Next
```

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 buttons on the right and the left to highlight a particular file, highlight [type file] to type in a file name, or select a new sub directory to display. Press the center 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 is available on the CNC control).

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

Shown in this example screen shot, the MOLD.TXT file is highlighted and selected. If the user would like to start DNC from the beginning of the file, press the center button

that is associated with Start on the screen. Press the right button to cancel this operation and return to the main menu. **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 USBCNC, the start command will be sent prematurely. The USBCNC will miss the start file command and will wait indefinitely in a wait state unless the user presses cancel.

```
DNC:MOLD.TXT



Opt.    Start  Cancel
```

DNC Mid-tape Start

Select Options from the DNC mode as shown above. A screen with DNC options will appear as shown below in the example. The options menu allows for mid-tape starts and preparatory lines to be added to the file that has been selected.

```
DNC Options Menu
`
Mid-           Prep-
tape    Cont.  data
```

Use the Mid-tape start option to do a block search of the file selected. Press the button below Mid-tape. A new menu will appear as shown below.

An N will be automatically be inserted. The scroll button will increment the last character by one allowing the user to specify either letter or numbers. The Next button will move the cursor over allowing additional text to be inserted. Holding the left and right buttons at the same time will delete the last character.

```
Mid-tape:
N1000.2
(delete=Left/Right)
Scroll  Cont.  Next
```

In the example above, the operator would like to start DNC from line N1000.2.
Once the operator is satisfied that the text desired is on the display, press Cont. This will bring the display back to the DNC Options Menu.

```
DNC Options Menu

Mid-             Prep-
tape    Cont.    data
```

Pressing Cont. again will bring the USBCNC into DNC mode showing the file name along with the text string that will be searched. Using the example above, the display will show:

```
DNC:MOLD.TXT
Mid:N1000.2

Opt.   Start   Cancel
```

Using the example, by pressing Start DNC will begin when a block that contains "N1000.2" is found. Note: An N word can be added to a single line of the file in order to establish a starting block number.

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
(delete=Left/Right)
Scroll   Cont.    Next
```

The mid-tape or preparatory text can be typed using the left and the right buttons under the display. The Scroll function is used to increment to another letter or number. Use the Next function to accept that character and move to the next character in the text. Use the Cont. function to accept this as the file name. A character can be deleted by pressing the Left and Right buttons at the same time.

Once satisfied with the data that should be sent ahead of the data file, press Cont. This will bring the display back to the DNC Options Menu. Pressing Start from there will initiate the preparatory data being sent prior to the file data. In our example, 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.

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Setup Menu Selection

```
Select: CNC to USB
        USB to CNC
        DNC
v3.92i >SETUP<
```

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

```
>Baud Rate<
 Data/Par/Stp
 Flow Control
 EOB Delay
```

Baud Rate

Set the Baud Rate to communicate to the CNC with. The baud rate is the number of bits per second the RS-232 serial port will communicate. The user can choose from the following BAUD rate choices:

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
> 8 data, no parity and 1 stop bit
> 8 data, no parity and 2 stop bit

Flow Control

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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.

```
to CNC: MOLD.TXT
                       XON
                      XOFF
                    Cancel
```
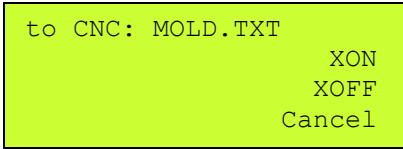
When the Software flow control method is used, the current XON or XOFF that has been received during transmission will be displayed on the right of the display. Use this feedback to determine if the USBCNC unit is receiving XON or XOFF characters.

End of Block Char

End of block sets the format for end of block characters. The most common end of block is the carriage return/ line feed used by most PC computers. The next most common is the Teletype end of block, which is line feed/carriage return.

This parameter value will be the end of block that is used when sending data to the CNC. When data is received from a CNC, a carriage return/line feed end of block is always used so the file can 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

Delay set 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's 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, %. If your file already contains a % sign at the beginning, set to none. Otherwise, two % signs will be sent consecutively that the CNC will interpret as a start and end of file without any data in between. Choose a setting as specified in the CNC manual.

The following choices are available:

> %
> null char
> none
> *Siemens

*The Siemens selection is invalid at this time

Use the null character for controls the 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.

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.

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, so the 'automatic' setting will work for most machines.

Locking feature for USB settings

 This feature is to prevent any accidental changes to the setup parameter file. No changes to the .INI can occur after the 'LOCK' command has been added to the .INI file and loaded. To add the 'LOCK' command edit the .INI file in the INI folder on the Flash Drive using a text editor such as notepad and add the line 'LOCK'. Save and then close the file.
Replace the Flash Drive in the device and go to the 'setup' menu. From the 'setup' menu go to the 'Load Settings' menu, and select the appropriate .INI file. After the parameters have been successfully loaded the 'LOCK' feature is now active and will prevent any changes to the currently loaded setup parameters. See the following example:

```
LOCK
BAUD=5
FLOW=1
DELAY=0
EOB=0
STARTTX=2
ENDTX=2
BITS=0
STARTRX=0
NAMING=0
```

 The 'LOCK' feature can be disabled by removing the 'LOCK' statement from the .INI file and then reload. The 'LOCK' statement is removed by editing the .INI file in the INI folder on the Flash Drive using a text editor such as notepad. Save and then close the file. Replace the Flash Drive in the device and and go to the 'setup' menu. From the 'setup' menu go to the 'Load Settings' menu, and select the appropriate .INI file. After the parameters have been successfully loaded the 'LOCK' feature is now disabled allowing changes to the setup parameters. See the following example:

```
BAUD=5
FLOW=1
DELAY=0
EOB=0
STARTTX=2
ENDTX=2
BITS=0
STARTRX=0
NAMING=0
```

Save Setting

Multiple machine settings can be saved using this function. When this is 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. This function is useful to save communication settings for a particular machine should the USBCNC need to be reconfigured for connection to multiple machines.

```
>[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 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 filename extension of at most three characters.

Error List

ERROR(2 or 4): DISK NOT FOUND
Solution:
Insert a USB disk key into the USBCNC and try again.

ERROR(10):
Solution:
1. Possibly a bad USB disk key, try another USB Flash Drive
2. Try another file or a file that has been proven to work in the past
3. Inspect for a damaged USB plug

ERROR(21): FILE DOES NOT EXIST ON USB
Solution:
File selected or entered does not appear to be on the USB disk key. Check the contents of the USB and try again.

ERROR(23 or 40): INVALID FILE NAME
Solution:

1. The file format is not the required in the 8 dot 3 format, e.g. TESTFILE.TXT. The USBCNC does not support long files names.
2. File selected or entered does not appear to be on the USB disk key.
Check the contents of the USB and try again.

ERROR(35): FILE DOES NOT EXIST ON USB
Solution:
File selected or entered does not appear to be on the USB disk key. Check the contents of the USB and try again.

ERROR(50, 51 or 52) BAD SUBDIRECTORY
Solution:
Directory selected does not appear to be on the USB disk key or it needed to be created by USBCNC. Check the contents of the USB and try again.

ERROR(All other Error Numbers):
Solution:
2. Possibly a bad USB disk key
2. USB disk key was incorrectly removed from USBCNC unit
3. The USBCNC unit is malfunctioning and needs repair.

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