Unified Centroid CNC12 v5.0 for Acorn, AcornSix, Oak, Allin1DC, MPU11 and Hickory

This is a Free Centroid CNC12 Software for anyone using the Acorn, AcornSix, Oak, Allin1DC, and MPU11 and Hickory CNC controller platforms.
- All existing License files work with v5.0
- All CNC features from previous versions of CNC12 are included in v5.0

CNC12 v5.0 installer download link.
https://www.centroidcnc.com/centroid_diy/centroid_cnc_software_downloads.html

v5.0 release notes. Changes from v4.82 and v4.22   4-26-23

- Improved the Installer Ethernet adapter auto configuration with more robust auto configuration and easier to understand UI

- Added Sub Net check to the installer when ensuring that network adapter is already set

- CNC12 checks if an IP address and subnet mask are set to 10.168.41.1 255.255.255.0 before trying to communicate with the board.

- Added Windows .NET 4.8 installer launch if Centroid installer detects it isn't installed. Microsoft .NET Framework v4.8 or greater is a requirement for the VCP to work so, now the CNC12 installer checks to see if it is installed on the CNC PC Windows installation and warns the user if Windows needs to be updated in this regard. If so, installer will ask you if you want to install the required .NET framework.

- Added Windows Region check and message to the installer.
"Please set Windows Regional Format to: "English (United States)" before running the CNC12 Installer.
See TB#309 for more information https://www.centroidcnc.com/dealersupport/tech_bulletins/uploads/309.pdf

- Added skinning calls CSR.DisableCSR and CSR.ReenableCSR

- In general, features from the Oak/Allin1DC branch of CNC12 have been added to the Acorn Branch and features from the Acorn branch of CNC12 have been added to the Oak/Allin1DC/MPU11 Branch

- AcornSix: Six Axis Interpolated Simultaneous motion feature now included with the installation of a AcornSix Ultimate Plus License.

- AcornSix: New "Scales for Position Correction" setup menu added to the AcornSix Wizard.

- Added CNC12 Color Picker for use of custom colors sets with CNC12. Yes now you can change any and all colors of the CNC12 GUI.

- AcornSix: Support for the new WMPG-6 (the six axis version of the WMPG-4) has been added to the Wizard.

- Added AcornSix Wizard menu for second spindle setup. (Note: Parm 459 is Second Spindle Enable, Parm 460 is Second Spindle Max Speed, Parm 461 is Second Spindle Min Speed, Parm 462 is Second Spindle Encoder Count, Parm 814 is read for Second Spindle Analog Limit, Parm 78 bit 3 is Second Spindle Encoder Enabled)

- Plasma Intercon: Teach Mode menu improvements to the GUI. Teach Mode now supports Laser Cross Hair tracing/manual tracing/digitizing.

- Plasma Intercon: Added Presets for DXF/SVG imports

- Plasma Intercon: Added hover preview to graph

- Four more rows have been added to the VCP

- The VCP Reset, Feedrate, VCP options, and Push To Free buttons are no longer hard coded and can be edited or deleted by the user just like any other buttons.

- VCP Background color can now be changed via the Color Picker.

- Simple PLC Diagnostic has dynamic colors based off of the colors set for CNC12 using the Color Picker.

- Search function has been added in the optional DOS style file menu.

- Added missing MPG Macros for Acorn Six Router and Mill

- Fixed CNC12 issue when after a certain amount of time it would not be able to open more files.

- Up to 128 timers are now supported.

- Changed Rack Mount ATC page in the Wizard to ATC Setup for setting up more ATC types than just Rack Mount.

- Y axis is now available on the Lathe

- Added vertical and horizontal alignment, type and significant nodes to plc_word node allowing for more customization of the plc_word display

- Added the ability for users to display plc word values on the VCP (see below for more info)

- Added push button .001 +/- incrementing to WCS origins menu

- Added CNC12 Color Picker Icon.

- Updated the Lathe threads database with more threads.

- Fixed issue with the Wizard setting home limits for axes that have N labels

- Added Acorn Six Drive Types for Wizard.

- Added M18 and M6 to Mill and Router for Wizard Rack ATC Functionality.

- Added "Print Screen" to the Wizard. Press <CTRL and P> to create a PDF of each Wizard menu with the current settings.

- Accelerated graphics defaulted to be on for Oak, Alin1DC, MPU11

- Added skinning calls GetUserVolatileSystemVariable, GetJobRepeatState, SetJobRepeatState, GetPartCount, and GetPartNumber

- Implemented Volumetric Compensation feature as a beta feature. Requires Ultimate or Ultimate Plus license. More info on how to setup and use VC will be posted on the Centroid Tech support forum.

- Fixed Oak/Allin1DC innocuous "412 MPG_ encoder error" that occurred with WMPG on power up.

- Fixed WMPG will now display during runtime graphics

- Improved Autosquaring macros to support wider variances in user setup configurations

- Plasma Restart Mode can now use G-code programs without spaces

- Reworked probe input (trigger and detection) firmware to unify logic across all hardware platforms. Needs

tested, Note: since this is 'low level' change be cautious on your testing, hand trigger probes before running a probing cycle to verify proper operation.

- Added user variables #27901-27908 for the axis home rate. Typically set by Wizard. But also can be used for custom home programs. Example M106/X P1 F#27901 ; seek home switch in X positive, look for input 1, move at feedrate specified by value in #27901

- Fixed issues importing licenses when they had lines terminated with non-Windows line endings. Reduces support issues related to users downloading license.dat file on non windows devices.
- Added F3 "Machine Notes" button in User Maintenance menu to open "machine_notes.txt" from cncm or cnct folder in text editor. Integrators asked for this so they can save a .txt file with any notes about the machine and control customizations and obvious other uses.

- Added Clearpath Hard Stop homing option and supporting home routine in homing wizard see TB319 for more info. https://www.centroidcnc.com/dealersupport/tech_bulletins/uploads/319.pdf
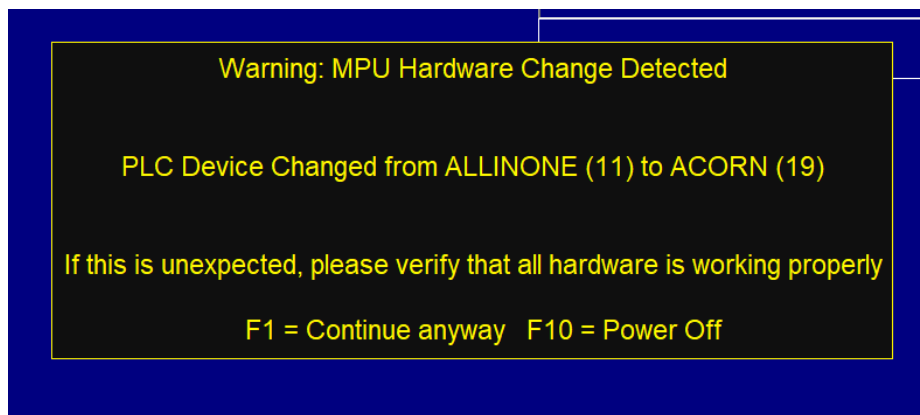
- Added one shot selections to the Wizard VCP aux key assignments page for mill/router and lathe

- Added "One Shot" common Lathe operations to the Lathe VCP (Virtual Control Panel)
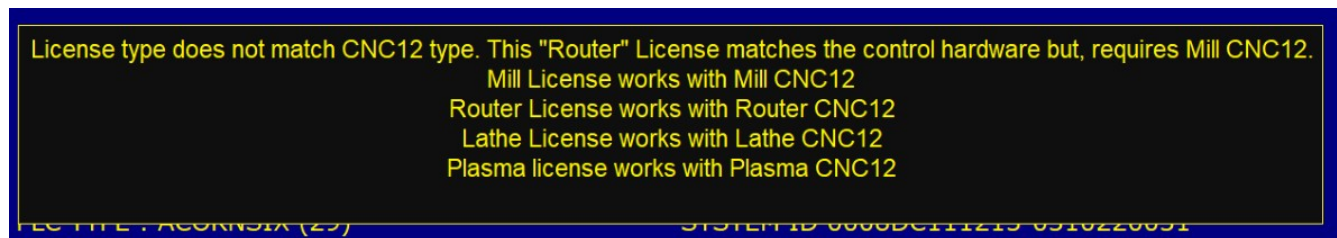
- To avoid unexpected movement, Keyboard jogging will disable itself and re-enable when leaving and entering the main menu. KB jogging can still be enabled in any menu by alt+j after being disabled by cnc12. For instance if keyboard jogging is active and user navigates to the CNC12 parameters menu, cnc12 will suppress keyboard jogging while in that menu and reactivate it when navigating back to the main menu of CNC12.

- Plasma Intercon: Added support for the DXF entity LWPOLYLINE

- Wizard ATC menu added a : "Fixed or Slider" Carousel ATC type selection.

- Added system variable SV_PLC_DISABLE_TRAVEL_LIMITS that can be set by a PLC program to disable travel limits when jogging or using the MPG. Example: IF INPUT THEN (SV_PLC_DISABLE_TRAVEL_LIMITS)

- VCP plc words now scales better in other 16:9 aspect ratio monitor resolutions other than the recommended 1920x1080.

- Fixed some cases of parsing errors with M120, M121, M223, M225, G65, and string user variable assignments when a semicolon appeared in a quoted string.

- Standardized and consolidated Allin1dc Mill PLC programs included with the CNC12 installer. This is the beginning of an overhaul of the "Stock" PLC programs included with the CNC12 installer with the goal to make PLC program selection for Oak and Allin1dc less confusing by improving standardization and eliminating old outdated files.

- renamed ncfiles\stressTest.cnc to "com_stress_test.cnc", left a copy of old stress test for now. No difference in the files, just a renaming.

- report.zip report now names the hardware AcornSix, Hickory, Oak, Allin1dc etc instead of generic "servo"

- Reverted g code file lock by cnc12 with G code preview feature to eliminate high cpu usage with large g code files. We will revisit this in the nex rev.

- Added "Cycle Start from Graph Menu" functionality. Acorn and AcornSix Wizard selectable ON/OFF and/or CNC12 parameter 400 is set to 1.

- Added WMPG Z axis x100 fast movement inhibitor., Acorn and AcornSix Wizard selectable and/or CNC12 Parameter 450 = 1 x100=x10 for Z axis when P450=1

- Added a "show 'hidden' parameter numbers" indicator in the Wizard. See which CNC12 parameters the Wizard is setting via alt+p.

- CNC12 Main menu now shows software/hardware version info on the Home not set screen as well as util and setup menus

- Added features in WCS Origin menu: Copy/Paste for cell/column, clear cell/column, and increment mode for adding entry to existing cell value.

- Added "Teach" button in WCS Return menu to copy axis machine coordinate value to the table

- Added support for WMPG-6 Six axis wireless MPG

- Wizard now will not let user pair an axis unless License file is installed to avoid confusion on why software pairing doesn't work (without a license installed)

- Ported Acorn user friendly Probe state graphics from Acorn Branch to Merge branch.

- Improved Wizard UI by adding AcornSix boot up LED1 animation to Wizard

- Set WCS menu plus and minus F keys to .01 mm for metric installations.

- misc. C axis setup improvements

- Eliminated a key stroke to install Acorn/AcornSix license file. Now "Import License"
 is direct with F8 key in utility menu.

- Added progress bar to Wizard while writing settings to CNC control

- Eliminated unwanted click and hold drag and drop feature from wizard tables.

- Fixed syntax error in Acorn resulting from semi colon use with certain variables

- Added ctrl+f to search in the PLC detective

- Updated main control board detection code so, when using with Acorn, you may get a (one time) error
message that looks like this. Press F1 continue and you will never get this message again.


```
                    Warning: MPU Hardware Change Detected


          PLC Device Changed from ALLINONE (11) to ACORN (19)


     If this is unexpected, please verify that all hardware is working properly

               F1 = Continue anyway   F10 = Power Off
```

- Updated the license/version mismatch message to provide more guidance to the user.


```
License type does not match CNC12 type. This "Router" License matches the control hardware but, requires Mill CNC12.
                    Mill License works with Mill CNC12
                    Router License works with Router CNC12
                    Lathe License works with Lathe CNC12
                    Plasma license works with Plasma CNC12
```

- Added Fast Plus, Fast Minus jogging speeds to the Acorn/AcornSix Wizard and the updated jog speed CNC12 config menu.

Lash Comp. *inches*	0	0	0	0
Max Rate *in./min or deg/min*	50	50	50	360
Fast Jog Plus Direction *in./min or deg/min*	50	50	50	360
Fast Jog Minus Direction *in./min or deg/min*	50	50	50	360
Slow Jog *in./min or deg/min*	10	10	10	36
Accel / Decel *seconds*	0.5	0.5	0.5	0.5

Jog Parameters

Axis	Machine Slow Jog (mm/min)	Machine Fast Jog (-) (mm/min)	Machine Fast Jog (+) (mm/min)	Max Rate (mm/min)	Deadstart (mm/min)
1	254	1270	1270	1270	127.00
2	254	1270	1270	1270	127.00
3	254	1270	1270	1270	127.00
4	36	360	360	360	5.00
5	1270	5080	5080	5080	127.00
6	1270	5080	5080	5080	127.00
7	635	5080	5080	5080	127.00
8	635	5080	5080	5080	127.00

- Added Probe Fast Minus, Probe Slow rates to Acorn/AcornSix Wizard and to the CNC12 config menu

Probe Configuration

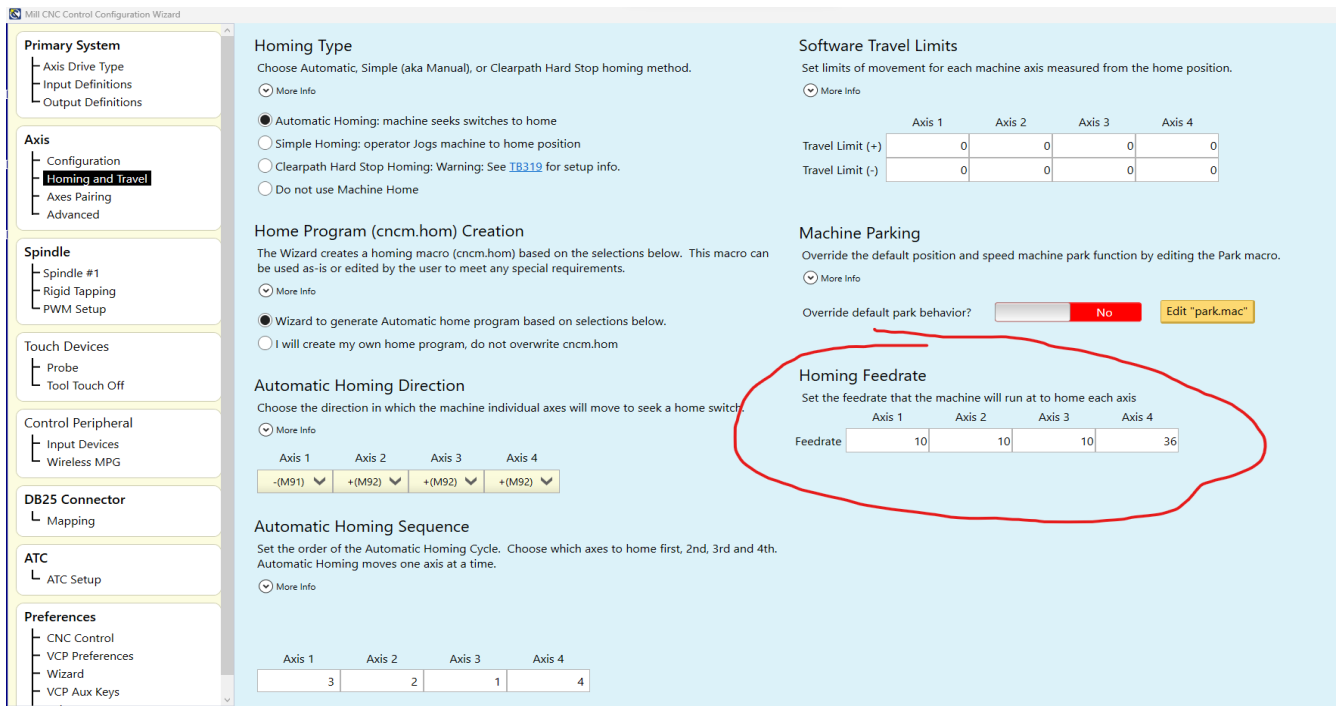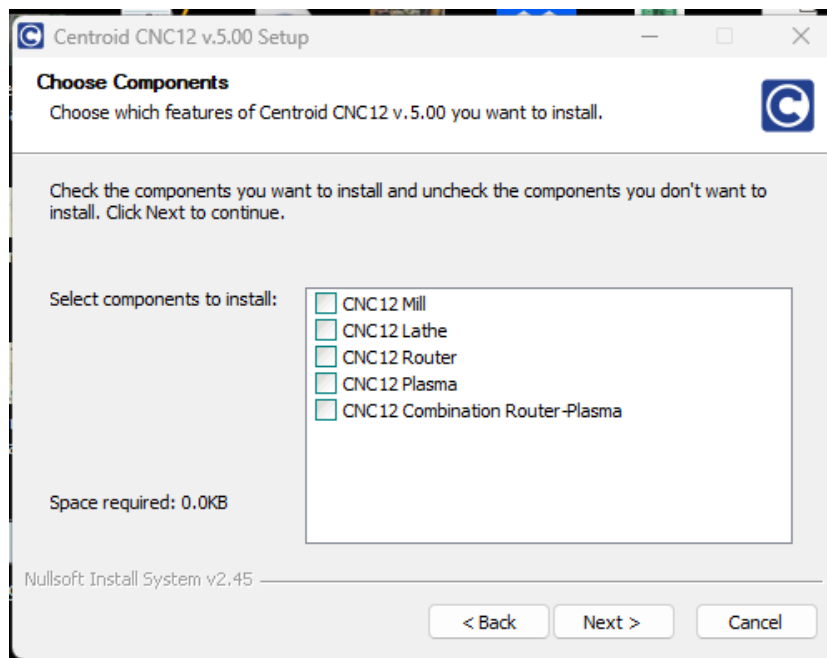|	
Probe PLC input	
Probe type	Mechanical
Input state when tripped *Probe Setup Documentation (PDF)	Closed*
Probe tool number	10
Fast probe rate	12
Slow probe rate	5
Recovery distance	0.05
Maximum probing distance	10
Probe Protection Enabled	Yes
Inhibit Spindle when Detect is on (Green)	Yes
Display Warning to Verify that Probe or TT is functioning properly	Yes

	Axis 1	Axis 2	Axis 3	Axis 4
Probe Slow Jog (in/min)	10	10	10	10
Probe Fast Jog (-) (in/min)	50	50	50	50
Probe Fast Jog (+) (in/min)	50	50	50	50

Jog Parameters

Axis	Probe Slow Jog (mm/min)	Probe Fast Jog (-) (mm/min)	Probe Fast Jog (+) (mm/min)
1	500	1270	1270
2	254	1270	1270
3	254	1270	1270
4	10	50	50
5	254	1270	1270
6	254	1270	1270
7	254	1270	1270
8	254	1270	1270

- Added Homing Feed rates for each axis to the Acorn/AcornSix Wizard and new Machine home speed CNC12 config menu The Automatic Wizard generated home program will use these values.
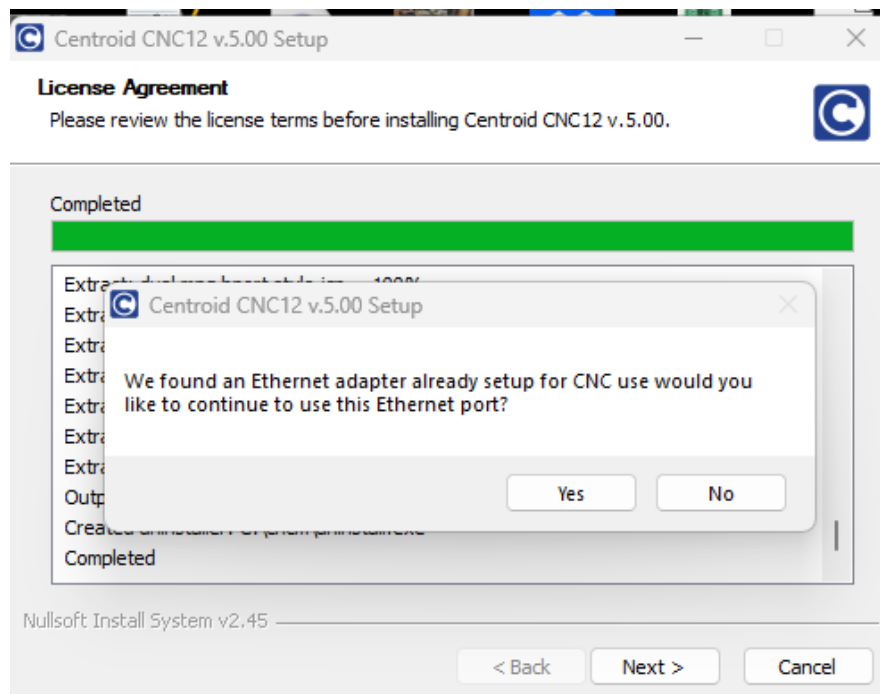

- Added Plasma Router Swap Automatic setup in the installer. This allows user to easily switch from Router CNC12 to Plasma CNC12 on the same machine.
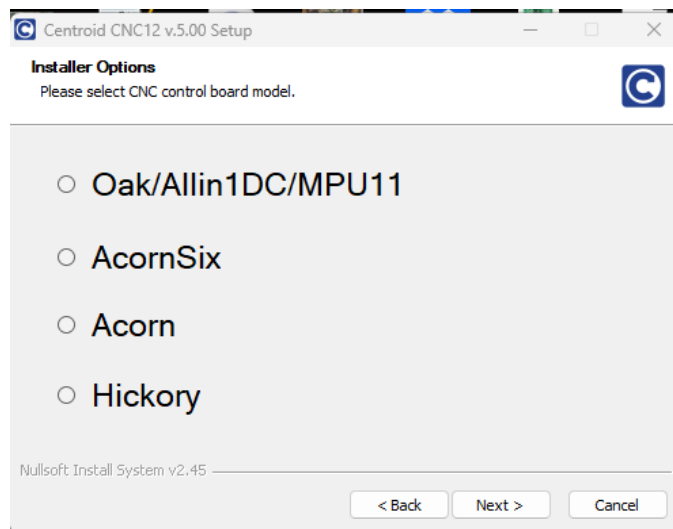
- Added error checking and better detection for available network adapters by the CNC12 installer

Now the installer will notice if there is already an Ethernet port setup for CNC use and ask if you want to use it.

- Hickory CNC control board option added to the CNC12 installer selection of CNC control board models.

- Improved system identification now displayed on the start up screen (as well as the setup screen and the options menu)
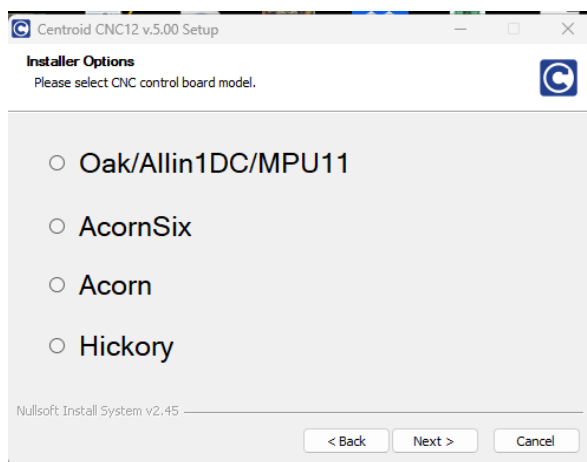

- We eliminated File Backup and Restore F keys in the Utility menu. These two F keys are throw backs to the DOS and Linux days when average users found it difficult to copy G code programs to another folder for backups. Use Windows file explorer to copy/move/delete files.

- Fixed M58 VCP button in Acorn / AcornSix ROUTER VCP that was broken in v4.82 in regards to installing swissi's excellent ProbeApp software for CNC12. More info on probe app here.
https://centroidcncforum.com/viewtopic.php?f=60&t=6149

- When working with an AcornSix always power cycle the AcornSix board after a configuration, parameter or PLC change.

- One CNC12 installer for all current Centroid CNC control platforms. Acorn, AcornSix, Oak, Allin1DC, and MPU11

- Added "remember last directory visited" feature for Windows F2 Load to parameter 4. Add 16 to the default value of 9 to enable this feature. (P4 = 25)

Acorn ATC Wizard menus: Mill and Router, Rack Mount and Carousel.

Mill CNC Control Configuration Wizard

Primary System
- Axis Drive Type
- Input Definitions
- Output Definitions

Axis
- Configuration
- Homing and Travel
- Axes Pairing
- Advanced

Spindle
- Spindle #1
- Rigid Tapping
- PWM Setup

Touch Devices
- Probe
- Tool Touch Off

Control Peripheral
- Input Devices
- Wireless MPG

DB25 Connector
- Mapping

ATC
- ATC Setup

Preferences
- CNC Control

ATC Setup

ATC Type	RackMount ˅
Custom Tool Change Macro (M6) in use	No
Number of Pockets	0
Tool Rack Holding Configuration	Fork

* Requires a Pro, Ultimate, or Ultimate Plus License

Choose Rack Mount Tool Length Method
- ⦿ Measure Tool Length after each Tool change at a Fixed Tool Touch Off position
- ○ Measure Tool Length after each Tool change using Surface Plate (operator will be prompted)
- ○ Maintain Tool Length Offset Library (requires accurate homing) and do not measure tool length with every tool change

	X	Y	Z
Fixed Tool Touch Off X Y Position (machine coordinates)	0	0	0

Fixed TT for Tool Offsets used with movable Surface Plate WCS part Zero		No

	X Position	Y Position	Distance to Clear	Clearing Axis	Z Height
Pocket 1 (Bin 1)	0	0	0	1	0
Pocket 2 (Bin 2)	0	0	0	1	0
Pocket 3 (Bin 3)	0	0	0	1	0
Pocket 4 (Bin 4)	0	0	0	1	0
Pocket 5 (Bin 5)	0	0	0	1	0
Pocket 6 (Bin 6)	0	0	0	1	0
Pocket 7 (Bin 7)	0	0	0	1	0
Pocket 8 (Bin 8)	0	0	0	1	0

Mill CNC Control Configuration Wizard

Primary System
- Axis Drive Type
- Input Definitions
- Output Definitions

Axis
- Configuration
- Homing and Travel
- Axes Pairing
- Advanced

Spindle
- Spindle #1
- Rigid Tapping
- PWM Setup

Touch Devices
- Probe
- Tool Touch Off

Control Peripheral
- Input Devices
- Wireless MPG

DB25 Connector
- Mapping

ATC
- ATC Setup

Preferences
- CNC Control

ATC Setup

ATC Type	Carousel ˅
Carousel Type	Fixed
Custom Tool Change Macro (M6) in use	No
Number of Pockets	0
Skip First Count on Carousel Reversal	No
Tool Change X Value	0
Tool Change Y Value	0
Tool Change Z Value	0
Distance to Clear	0
Clearing Axis	1

* Requires a Pro, Ultimate, or Ultimate Plus License

After configuration, the ATC must be initialized in CNC12

F1(Setup) → F3(Config) → F6(ATC Init.) This will ask you to put Tool 1 into the spindle. Ensure the carousel is also at position for Tool 1 when performing ATC Init.

Note: This process is required to be repeated if the carousel loses position

* Link to Acorn Wizard ATC setup guide

www.centroidcnc.com/centroid_diy/downloads/acorn_documentation/centroid_acorn_wizard_atc_setup_guide.pdf

And many Lathe Turret types are supported.
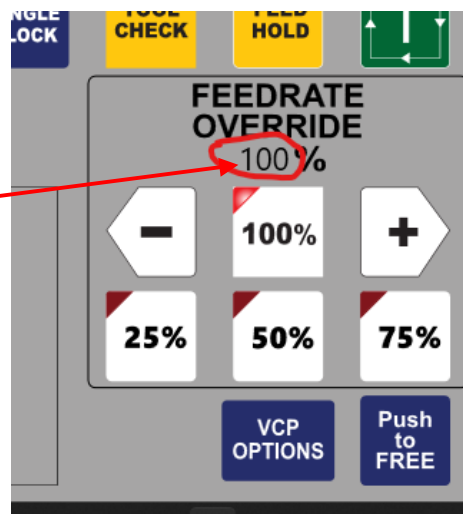Counter based Turret, Time based Turret, Axis motor driven turret, Grey code type 1, Grey code type 2!

Lathe CNC Control Configuration Wizard

Primary System
- Axis Drive Type
- Input Definitions
- Output Definitions

Axis
- Configuration
- Homing and Travel
- Axes Pairing
- Advanced

Spindle
- Spindle #1
- Rigid Tapping
- PWM Setup

Touch Devices
- Probe
- Tool Touch Off

Control Peripheral
- Input Devices
- Wireless MPG

DB25 Connector
- Mapping

ATC
- ATC Setup

Preferences

ATC Setup

ATC Type   None ▼   * Requires a Pro, Ultimate, or Ultimate Plus
                                            None   License
Custom Tool Change Macro (cnctch.mac) in use   Counter Turret
                                               Time Turret
Number of Pockets   Axis Driven Turret
                                               Grey Code 1
                                               Grey Code 2

After configuration, the ATC must be initialized in CNC12

F1(Setup) → F3(Config) → F6(ATC Init.) This will ask you to put Tool 1 into the spindle. Ensure the carousel is also at position for Tool 1 when performing ATC Init.

Note: This process is required to be repeated if the carousel loses position

* Link to Acorn Wizard ATC setup guide

www.centroidcnc.com/centroid_diy/downloads/acorn_documentation/centroid_acorn_wizard_atc_setup_guide.pdf

Virtual Control Panel additions for v5.0

The VCP now supports a new feature called "PLC Words". PLC Words allows you to display CNC data on the VCP in real time gathered from the PLC program. Analog input as a word value (number).

Below is a sample VCP XML file using PLC words to display in real time on the VCP the current Feedrate Override Percentage value.

```
<image>
    <column_span>3</column_span>
    <column_start>4</column_start>
    <row_span>1</row_span>
    <row_start>11</row_start>
    <path>C:\cncm(t)\resources\vcp\images\feedrate_override.svg</path>
</image>
<border>
    <column_span>3</column_span>
    <column_start>4</column_start>
    <fill>Transparent</fill>
    <row_span>2</row_span>
    <row_start>11</row_start>
    <outline_color>#000000</outline_color>
    <outline_thickness>1</outline_thickness>
    <plc_word>
        <number>31</number>
        <color>#000000</color>
        <fontsize>20</fontsize>
        <font>Arial</font>
        <fontstyle>bold</fontstyle>
        <verticalalignment>center</verticalalignment>
        <horizontalalignment>center</horizontalalignment>
        <marginbottom>30</marginbottom>
        <marginright>10</marginright>
    </plc_word>
</border>
<button row="11" column="1" column_span="3" row_span="3">reset</button>
<button row="12" column="4">feedrate_negative</button>
<button row="12" column="5">feedrate_100</button>
<button row="12" column="6">feedrate_positive</button>
<button row="14" column="4">vcp_options</button>
<button row="14" column="5">push_free</button>
```

This new feature allows users to display PLC Words directly on top of the VCP. The user can display the PLC Words on any VCP button or on the VCP borders. To display a PLC word simply add the plc_word node within a border node or a vcp_button node. An example of a plc_word node is below.

```
<plc_word>
    <number>31</number>
    <type>float</type>
    <significant></significant>
    <color>#000000</color>
    <fontsize>20</fontsize>
    <font>Comic Sans MS</font>
    <fontstyle>bold</fontstyle>
    <verticalalignment>center</verticalalignment>
    <horizontalalignment>center</horizontalalignment>
    <marginbottom>30</marginbottom>
    <marginright>10</marginright>
    <marginleft>5</marginleft>
    <margintop>5</margintop>
</plc_word>
```

The plc_word has several control settings that the user can use to style and place the PLC word.

In order to use the plc_word node, the user must set the number node which is the number that the plc word is in the PLC. See the feedrate override % value as an example.

The type node sets what type of plc word the user wants displayed. This is defaulted to Int type if no other types are set. Types Are: Int (Int = Interger such as 10), Float (Float – Floating Point vaule such as 10.1234). valid values are in the range of -2147483648 to 2147483647
(Typically not used but are available Double (64 bit), DoubleFloat (64 bit) which doubles the range values -9223372036854775808 to 9223372036854775807)

The significant node is for all plc word types except Int. This tells the VCP how many digits after the decimal point a user wants displayed. This is defaulted to 2.

The color node sets the color of the text displayed. This must be in hex code like example. This is defaulted to #000000.

The font size node sets the font size for the text. This must be an integer value. It is defaulted to 16.

The font node allows the user to set the font of the text. This is defaulted to Segoe UI. The list of fonts allowed are here, https://learn.microsoft.com/en-us/typography/font-list/. Users must put the font name in exactly as it is displayed in the list, spaces and all.

The font style node sets the style that the text is displayed in. This is defaulted to normal. The user can also set it to be bold, italics, normal or oblique.

The vertical alignment node sets the vertical alignment of the text displayed. The default is bottom. The user can set it to be top, center, or bottom.

The horizontal alignment node sets the horizontal alignment of the text. This is defaulted to left. The user can set it to be left, right, center.

The lastly the margin bottom, top, left, and right nodes sets the margins on the text. This allows users to fine tune where the text is displayed. This must be an integer and it is defaulted to 0.

Many PLC words are predefined in the Centroid provided and Wizard Generated PLC programs. They can be found under the Word Definitions section of the PLC program.
A number assigned to each of the PLC values.
For example "W31" is Word #31 which equals the current Feedrate Override Percentage value.

Commonly used stock PLC Word values are:

Spindle Speed Override %(SpinOverride_W is W19)
Feedrate Override % (FinalFeedOverride_W   is W31)
Target Voltage Override %(TargetVoltage_W is W7)
Current Carousel Position (CurrentCarouselPosition_W is W54)
Current Turret Position (CurrentTurretPosition_W is W52)

Below is an excerpt from the Acorn Mill PLC program showing the stock PLC Word Definitions.

```
;----------------------------------------------------------------------------
;                         Word Definitions
;----------------------------------------------------------------------------

SkinFeedOverride_W1            IS W1
TotalOffsetAppliedFW           IS W2
JogIncMultiplier               IS W3
ZJogOffset                     IS W4
ZAxisEncoder                   IS W5
TorchVoltage_W                 IS W6
TargetVoltage_W                IS W7
Last_TorchKnob_W               IS W8

ShuttleAxisSelect_W            IS W10
ShuttleResumeFeedOver_W        IS W11
SkinningInt12_W                IS W12
TwelveBitSpeed_W               IS W13
FaultMsg_W                     IS W14
ErrorMsg_W                     IS W15
InfoMsg_W                      IS W16

SpinOverride_W                 IS W19
Mem_W                          IS W20
Out_W                          IS W21
MpgOffsetWord                  IS W23

SpindleRange_W                 IS W24  ; 1 = low ... 4 = high
PrevFeedOverride_W             IS W25

UsbAxisMonitor_W               IS W26
UsbScaleMonitor_W              IS W27

AtcType_W                      IS W28
KbOverride_W                   IS W29
FeedrateKnob_W                 IS W30
FinalFeedOverride_W            IS W31
Last_FeedrateKnob_W            IS W32
LastKbOverride_W               IS W33
LastSkinFeedOverride_W         IS W34
UsbJog_W                       IS W35

MiniPLCStatus_W                IS W36
```

```
JogKeyCfg_W                    IS W37

UsbButtonMonitor               IS W38
UsbWheelCurrent                IS W39
UsbWheelLast                   IS W40
UsbWheelDelta                  IS W41
UsbMpgActiveAxes_W             IS W42
DefaultJogging_W               IS W43

LastCarouselDir_W              IS W49
PutBackPosition_W              IS W50
CurrentTurretPosition_W        IS W52
RequestedTurretPosition_W      IS W53
CurrentCarouselPosition_W      IS W54
RequestedCarouselPosition_W IS W55

CycloneStatus_W                IS W56
THCEncoderStatus_W             IS W9;57

PLC_Fault_W                    IS W61
PLCFaultAddr_W                 IS W62
```

Users can create their own Word Values here is an example of How to Display a Lathe Turret Position on the VCP.

How to create a word value that will "track" a 4 Tool Turret Location and then display Turret Position word value on the VCP to track turret location. This example will use a Typical Lathe Turret that has 4 separate inputs for each position. First we must define our word value in the PLC program and add the logic for that word value.

```
;---------------------------------------------------------------------------
;                       Word Definitions
;---------------------------------------------------------------------------
CurrentTurretPosition_W             IS W52
```

Next we will setup the logic that will assign values to our word value. The following code will set the Word value from 1 to 4 based on the Input.

```
IF TurretInput1 THEN CurrentTurretPosition_W = 1
IF TurretInput2 THEN CurrentTurretPosition_W = 2
IF TurretInput3 THEN CurrentTurretPosition_W = 3
IF TurretInput4 THEN CurrentTurretPosition_W = 4
```

Now when Input 2 is ON, the word value will be set to 2 for example. Now we want to see our current tool on our VCP button. We will add the word value 52, as we have defined in the PLC to the Button.xml file that we would like this value to be displayed on top of like so,

```
<plc_word>
      <number> 52</number>
```

Now when the tool turret changes tools, the current turret position will be displayed on that VCP button.

This is a simple example, however any value in the PLC when assigned a Word value can be displayed on the VCP. More complicated applications can be for example, displaying an analog Input from a pressure gauge, displaying calculated math done by the PLC, or even system variables (If its a 32 bit word variable).

Acorn Features added to Oak/Allin1DC/MPU11/Hickory that are controlled by parameter values.

Note: For Acorn and AcornSix these features are set/adjusted using the Acorn and AcornSix Wizard, If you have an Acorn or AcornSix use the Wizard to control how you would like these features to work, no need to adjust a the parameter level.   Press <Alt P> in the Acorn/AcornSix wizard to see the parameters being set by the Wizard.

If you have and Oak, or Allin1dc, or MPU11 or Hickory these features are controlled by parameter values (like all other adjustable CNC12 features for Oak, or Allin1dc, or MPU11).

-Preview gcode before running file (parm 417)
-Mini machine coordinates display (parm 143 add 64)
-Change dro display precision (parm 263)
-Active Gcode display changes
-Right Click and Close Application on CNC12 in the taskbar
-Beta expiration timer
-Run menu display changes
-Real time graph color changed form white to yellow
-Real time graphing screen has the drill removed from Acorn and distance to go, spindle speed and feedrate displayed
-Turn off Clean filter Message with Clean filter message parameter (parm 421)
-Using plc variables by their name in gcode files
-Open Keyboard jogging menu at startup (parm 148 add 4)
-Smart searching job by mcode
-G37 and Mcodes for laser
-Probe menu changes
-Simplified PLC Diagnostics (parm 422)
-Normally open probes detected like Acorn (parms 18 and 406)
-Display scale position on DRO (parm 423)
-CNC12 Color Picker (parm 7)
-Skinning check if CNC12 shutting down computer in sub applications
-Laser X and Y offsets (parm 560 and 561)
-5th axis pairing (parms 64, 507, and 508)
-2nd spindle (parms 78, 459, 460, 461, 462)