

Acorn counter based tool turret with home sensor Instructions

This is a “Universal” ACORN lathe tool turret PLC program and supporting files that facilitates the operation of a lathe tool turret. This document covers the counter based turret that uses an input for incrementing tool count and an input to home the turret. Also, uses a single output to rotate turret.

V4.50+ Allows the use of the wizard for those who wish to use the beta ATC PLC. The wiring diagram for previous beta PLC's is still included as a guide on how to generally wire the Acorn, however inputs and outputs can be assigned to any input or output via the wizard.

Installation:

1. Install ACORN CNC12 V4.50+ on PC System.
2. (Optional) If upgrading restore report from previous version to retain Parameter settings.
3. Extract all files from ACORN_v4.50_Lathe_Universal.zip file into the [c:\cnc1](#) directory and overwrite all files.
4. Start CNC12 and open the Acorn Wizard. Assign Drive Type and Required I/O for your system and ATC. See the **Inputs and Outputs** section below for I/O that is used by this particular turret setup. Write Changes to CNC and follow on screen prompts.
5. Set the following CNC12 parameters. From the main screen press F1(Setup)→F3(Config)→137(Or User specified password)→F3(Params).
 - A. Parameter #6 = 1
 - B. Parameter #160 = 1 (Sets ATC to non-random type meaning it puts tools back into same positions)
 - C. Parameter #161 = Maximum number of tool positions
 - D. Parameter #830 = 2 ****NEW**** (Sets what type of ATC you have for PLC and macros, values are subject to change in future so ensure to check documentation on every update)
 - E. Parameters #831- #846 = The BCD values that the PLC program uses to determine the current tool position based on the state of the Bit 1-4 inputs. Please see below for a detailed explanation of BCD values or use the BCD Calculator Spreadsheet included with this document.
 - F. Parameter #849 = Amount of time in seconds to wait before faulting the tool change cycle. If the parameter is set to 0, it will default to 10s.
 - G. Parameter #850 = Amount of time to wait before actually seeing the tool counter input. This is done due to the turret having to reverse in order to lock which will place the turret behind the tool counter. Once the turret starts moving the control will skip the first count it sees. If the parameter is set to 0, it will default to 2.5 seconds.
 - H. Parameter #851 = Amount of time in seconds to go past the tool counter input before the turret reverses into the locked position. This is done so that the turret reverses into the correct tool location instead of the previous tool location. If the parameter is set to 0, it will default to 0.75 seconds.

Inputs and Outputs: Below is a Summary of the I/O that can be assigned that will be used by the Counter Based PLC and Macros

Inputs

1. ToolTurretSyncBit
2. ToolTurretCounter

Outputs

1. RotateToolTurret
2. ToolTurretEnable (Optional)

Initialize the turret:

The included M18 macro will “home” or “initialize” the turret. M18 rotates the turret to seek the turret home switch and waits for ToolTurretSyncBit, to trigger and sets the current turret tool position to 1.

The turret MUST be initialized prior to performing a tool change. If it's not, the control doesn't know the current tool location. Press F3(MDI) from the main page, type M18, and press Cycle Start. After the turret has been initialized, the CNC12 software will keep track of the turret's location.

If the Tool position is ever lost..for instance in the case of E-stop being pressed in the middle of a tool change, an M18 will need to be issued in order to “re-home” the turret.

Indexing the turret:

The Index Turret button is used to index the turret. When the Index Turret button is pressed, the PLC program will see what the current tool position of the turret is and move to the following. If it's at the maximum tool position then it will move the turret to tool position 1.

How the turret motor works:

Emco PC55

Single Winding 12VDC Motor

12VDC is applied for forward motion. To reverse it, the 12VDC polarity is flipped and a current limiting resistor is used so the motor doesn't over heat while holding the tool position against the pawl.

Other brands and types

Single Winding 24VDC Motor

24VDC is used to move the turret motor forward and 12VDC is used to move the motor backwards. The 12VDC needs the polarity flipped in order to reverse the direction of the motor. The lower voltage is used so the motor doesn't over heat while holding the tool position against the pawl.

Dual Winding Motor

Turret motor has both the forward and reverse winding often with lower voltage on the reverse coil. The lower voltage is used so the motor doesn't over heat while holding the tool position against the pawl.