Software Manual for the Coil Winding Arm Controller MKII Software.

Version 1.0 1st January 2018.

This documentation applies for use of the software on the following machines:

- CNC 200mm Coil Winder MK4 fitted with ARM Controller MKII
- Mini Coil Winder MK4 fitted with ARM Controller MKII
- Custom Coil Winders fitted with ARM Controller MKII

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Automated Coil Winding - Tab.

This tab shows a simple wizard which only needs a few basic settings to be made and you will be up and winding your coil in the quickest time.

For a quick start you only have to set four parameters in the **Automated Coil Winding** tab to wind a coil.

Set the **Bobbin Width**, Set the **Total Windings**, Set the **Wire Size** and Set the **Desired Speed**. Then simply click the Start Button.

The software will then Wind the coil back and forth until the coil is complete.

Below we will go through each option panel and detail what they are.
The **Convert awg>mm** will take the value entered in the box and convert from awg to millimetres. This is a handy tool for people used to dealing with awg wire sizes.

In the example above it has converted 22awg, which calculates to be 0.6438mm.

The **Switch to Pickups** button changes the screen from normal bobbins to the Guitar Pickup screen. This will be covered later on in the manual.

The **TPL Calculator** button will bring up a calculator panel on the screen. This will be covered later on in the manual.

The **Tension Calculator** button will bring up a calculator panel on the screen. This will be covered later on in the manual.

Next, with three simple steps you can setup the software to wind your desired coil.

1.) **Enter the width of your bobbin** is the actual length of the bobbin you wish to wind wire across.

2.) **Enter Total Windings** for the coil you wish to make.

3.) **Enter the wire Size** you wish to wind but also allow for the coating. Typically this can be 10%-15% of the size of the wire.

After you have set these parameters, then the software will auto calculate the nearest settings that are suitable for the machine you have connected and will display them in the **Status and Calculations** panel.
Based on the parameters entered in the Bobbin Dimensions panel, the actual working values that get sent to the Coil Winding Machine are displayed in the Status and Calculations panel. These calculations take into consideration the machine that is connected to your computer and also the resolution settings applied.

In the example above, it has taken the parameters and calculated that the 16 winds will be wound each layer and based on the width of wire, this would make the actual winding area of wire cover 10.32mm and not the 10mm specified.

On the back of these calculations, it has also calculated that 31.25 layers will be wound onto the bobbin. This is 16 winds to the right for the first layer and then 16 winds to the left for the second layer and so on until the total windings are complete.

Now if your bobbin width is 10mm maximum then you will need to reduce the bobbin size to reduce the windings per layer. The simple fact is that 10mm will not divide by the width of your wire 10mm/0.6438=15.53 unless you are going to chop your wire in half at the end of each layer, which is not possible!

In the screenshot below, you can see by reducing the Bobbin Width to 9.99mm it has reduced the layers to 15 and also the bobbin width to 9.675mm. Not ideal as you may get spacing created between each winding, which leads to uneven windings as your layers build up.

The ideal bobbin would be the correct width to allow the exact number of windings you require using the wire you need to use. But this is not always possible.
We also have some status display objects in this panel.

**Reply** is the answer coming back from the Coil Winding Machine after each command is sent.

**Hardware Status** shows if the Coil Winding Machine is connected or not connected to the computer.

**Bobbin Name Loaded** is the name of the bobbin that has been chosen from the drop down box in the Load/Save Bobbin panel below.

As you can see all of the objects in this panel are for information purposes only and cannot be set by the person using the software.
The **Load/Save Bobbin** panel not only allows you to save and remove bobbin parameters, but also lets you set other parameters that will affect the coil you are winding. These settings, along with other settings from other panels get saved to the computers registry, which can be backed up and reloaded in the future. This is usually due to either moving the software to a new machine and wanting to bring your saved bobbins across to it, or in case of a failure.

Starting from the top of the panel and working downwards we first have the drop down box. This will allow you to choose previously saved bobbin configurations.

When clicking the **Save** button it will ask for a name that you wish to call the bobbin and save all the parameters set for that bobbin to the registry. If you wish to remove the saved bobbin from the registry, then click the **Remove** button and it will delete that bobbin.

The yellow box below the drop down box is for any notes you wish to save against that bobbin. These notes will be saved along with other parameters and recalled when a bobbin is selected.
**Homing Configuration** group box.
Sets the offset distance that the feeder arm will move away from the limit switch when the Home button is clicked.
For example if it is set to 10mm then when the Home button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.
By ticking the **Use Homing Offset on Start** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.
This option is only available for machines with the homing/limit switches installed.

**Wire Direction** group box.
Sets the direction for the feeder arm when winding starts.

**Bobbin Direction** group box.
Sets the direction for the bobbin when winding starts.

**Ramping Configuration** group box.
We use stepper motors on our machines then to get them to higher speeds we need to ramp up the motor speed gradually.
You have two variables you can set to get the desired curve as such.
The Steps variable is the divider of the target frequency that we want the bobbin motor to run at. So if the software calculated that the bobbin motor should run at 1000kHz and the steps box is set to 100 then we can see that the steps would be 1000/100 = 10 Hz increments.
The Pause variable is the time between each increment.

**Ramping each layer** checkbox.
If this box is left unchecked then the machine will ramp up at the beginning of the winding routine and at the end only. When the feeder gets to the end of the layer it will simply change direction. If the box is checked then the bobbin motor and feeder motor will ramp up at the start of each later and ramp down at the end of each layer.

**Pause at the end each Layer** checkbox.
Checking this box will pause the machine after each layer has been wound. This option can only be used if **Ramping each layer** is also checked.
**Bobbin Speed** group box.
Desired speed is the variable that will tell the machine what speed you want the bobbin motor to run at.

As the bobbin motor and feeder motor are interpolated, then most of the time the speed of the bobbin motor will be divided down to set the speed of the feeder arm motor to suit and keep that interpolation correct. But if you require the wire size or movement pitch to be a large number that requires the feeder arm motor to run faster than the bobbin motor, then the bobbin motor will automatically drop and the calculated speed will be displayed below.

**Disable Hover Help Tips** checkbox.
You can move the mouse over any object within the software and if left over that object for a certain amount of time a Hover Tip will appear giving you information on that object. By checking this box then it will stop these hover tips appearing.

![](http://www.ukcnc.net)

The **Status** panel has the following objects.

**Padlock** Icon
Clicking on this will ask you for a password and is used by the developers for diagnostics and troubleshooting if needed. You should never have to go into this area.

**Winds Completed** display.
Displays the amount of winding that have been wound.

**Feeder Position** display.
Displays the position of the feeder arm on the machine.
**RPM** display.
Displays the speed that the bobbin motor is running at.

**Reset** button.
Pressing this button will reset the feeder position to zero.

**Goto Zero** button.
Pressing this button will tell the feeder arm to return to its zero position.

**Return to Zero** checkbox.
If this is checked then when the machine has finished its winding routine the feeder arm will automatically move back to the zero position.

The **Controls** panel has the following objects.

**Disengage Motors** button.
When clicked this will disengage the motors so they can be turned by hand. The motors will automatically re-engage when start or jog buttons are clicked. You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

**Start** button.
Clicking this button starts the winding routine.

**Stop** button.
Clicking this button stops the winding routine.

**Pause/Resume** button.
While winding is in progress and you wanted to pause the machine, then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.
While paused you can cancel the winding routine by pressing the stop button.
Also while paused the Left and Right button can be used to jog the feeder arm to a new position. This will not increment the feeder position and can be used for adjustments needed without having to restart the whole winding routine from the beginning.

**Home** button.
This can only be used if there are limit/homing switches installed on the machine. Based on the variable set in the **Homing Configuration** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

**Reverse** button.
This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the reverse direction.

**Forward** button.
This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the forward direction.

**Left** button.
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.
Sets the travel in millimetres that the feeder arm will move if either the **Left** or **Right** buttons are clicked.

**Bobbin Travel per click** variable.
Sets the amount of revolutions that the bobbin motor will move if either the **Forward** or **Reverse** buttons are clicked.

**Manual Speed Override** checkbox.
If checked then when the **Start** button is clicked the software will pass control over to the manual speed controller on your controller box. The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.
On the **Bobbin Dimensions** panel we have a **TPL Calculator** button. When clicked this switches the appearance of the panel as can been seen below

This will allow you to calculate the Turns Per Layer by simply entering the turns required for each layer, the bobbin width and the amount of layers you wish to wind.

**Close** button.
Closes the TPL panel.
**Calculate** button.
This will populate the result green boxes with the values that have been calculated, based on what you entered in the top boxes.

**Populate Results** button.
This will take the values that have just been calculated and populate the main bobbin dimensions screen.

Above after clicking the Populate Results button.
On the *Bobbin Dimensions* panel we have a **Tension Calculator** button. When clicked this switches the appearance of the panel as can been seen below.

![Tension Calculator](http://www.ukcnc.net)

- **Close** button.
  Closes the Tensioner panel.

- **Calculate** button.
  This will take the wire size entered in the top box and give the results in the green boxes.
On the **Bobbin Dimensions** panel we have a **Switch to Pickups** button. When clicked this switches the appearance of the panel as can be seen below:

We now have a guitar pickup picture displayed and also a few more options.
The main thing that has changed is that we now have extra variables that can be set and saved against the bobbin. These are shown in green and are for information only. They do not affect the way the pickup is wound.

Also you will notice that we now have a **Populate Default Pickups** button.

When you first run the software you will see that nothing has been saved yet. But by click the **Populate Default Pickups** button it will populate the database with a set of common guitar pickups. Any of these once loaded can be changed and saved back to suit your custom needs.
A new feature is the Mixed TPL Mode button.

A lot of our customers that are winding Guitar Pickups are now using the Scripting Engine for creating some Mixed Turns Per Layer (TPL) to build up their coil shapes into various shapes and also to try and get close to a Scatter Wind effect.

We do have a Beta Scatter Winding tab in the software, but it is based on a different position per revolution, rather than allowing for mixed TPL setups, that can then be merged together.

A quick couple of paragraphs on Scatter Winding first.

**What is scatter winding?**

_When wire is wound into coils on a pickup, the most basic definition of scatter-wound means “non-uniform.”_  

Imagine a spool of thread that doesn’t have thread on it yet that you’re going to wrap thread around.

If you were to wrap that thread in a uniform way, you would start the wrap on one side, with each consecutive wrap following the other until you reach the other side, then start wrapping in the other direction and crisscross until you were finished.

If you were to wrap the same thread in a non-uniform way where you wrap a few times on one side, then go straight to the other side and get a few wraps there, then to the middle and “fill” the spool in a non-uniform way, that’s a scatter-wind.
Does scatter winding have a “standard?”

No. Scatter-winding is particular to manufacturer. Seymour Duncan will scatter-wind differently than Lindy Fralin and differently than other pickup makers and so on. In addition, there are also pickup makers who scatter-wind by hand, and still others who will use a machine. There is no single “right way” to scatter-wind.

What pickup makers do is experiment with different scatter-wind techniques until they find one they think works well, and go with that.

One of the down sides of using the scripting is that for higher speeds, each command will need to be ramped up and ramped down. If not then the motors will just stall.

Just like any CNC machine out there, that is using Stepper motors, they need to be ramped.

Now the big question or observation I get is that in the Automated Tab, you can setup all the parameters of the pickup you wish to wind, click on the start button and away the machine will go, without it having to ramp up and down each layer.

The main reason we can do this is because the feeder (with small wire) is never running faster than the bobbin motor and the speed it is running at 99% of the time means we can change direction of the feeder without ramping.

So we calculate total windings, along with the turns per layer and send this as one command to the firmware. You will still get a ramp at the beginning and also a ramp at the end of the winding. But no ramping in-between layers as the firmware simply changes direction of the feeder when it hits it desired TPL.

With the scripting we send one command for each layer.

So now to try and make winding a little bit smoother, we have added a new button on the Automated tab Pickup Screen. This is called Mixed TPL mode and allows you to save different combinations of winding sets and to execute them one after the other.

You will still need to ramp up and down for each set, but depending on how many windings are in a set and how many total winds you need to do, it will reduce the ramping per layer a lot.

Main rules to stick to are to make sure each winding set you create has at least two layers and that total layers are a whole number (Integer).

The reason for this is so you do not lose your zero point in-between the winding sets. If you try to send say 10 windings at a 1.0mm pitch for the first layer and then send 5 windings at
1.0mm for the next layer, then obviously the starting point for the next command is not at zero point and it would actually be 5.0mm.

In the scripting engine you could send a movement command to bring it back to zero, but for this feature under the Mixed TPL Mode, that will not be possible.

So a little bit of a trade off, but it should suit most people’s needs.

Here are some screenshots with instructions on how it works.

![Set the Pickup Height, Windings and wire size, then click Save to Mixed TPL.](http://www.ukcnc.net)
Check the Total Layers and make sure this is greater than 1 and also an even number.

Here is where you can specify a name for your winding setup before saving it to the Combination List.

To save this, enter a Name

Click the Save button
Next we setup another winding setup and check the Total Layers is an even number.

Choose a name

Click the Save button

Once saved the winding setup should now be listed in the drop down box.

Also the Bobbin Name should update.

Click the OK button

Next to use the TPL combinations we have saved, we click the Mixed TPL Mode button.
We can see our saved items are available from the drop down list. When selected all the various settings will be shown in the relevant boxes.

Click Add to List button

The item shown in the drop down box will now be added to the list on the right hand side.

The total Windings counter will be updated.
We now choose another item from the drop down list.

Click the Add to List button

The TPL Combination List should now be updated with the new item.

The total Windings counter will be updated adding the windings from each entry on the list.

Now we can add various combinations that we require to the List to build up our total windings.
1. You can manually edit the items in the list and remove as shown above.

2. After any manual editing make sure you click on the Recalculate List button.

3. The total Windings counter will be updated.

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1. Make sure your machine is plugged in and then hit start!
   It should now go through each entry in the list and execute the command.
Standard Script Engine – Tab

This tab allows us to have more control over the coil winding process by allowing us to create a series of commands to control bobbin windings and feeder movement.

These commands can be built up and saved as a script for later use.

Creating the commands is very simple by using the GUI interface to choose the options you want for each new command and press the **Add Command** button.
Below we will go through each option panel and detail what they are.

The **Script Window** panel has the following objects

The Script window itself is where each command is appended to and built up.

The command structure is very simple to understand and a quick breakdown is.

**G1** – This lets the software know it is a Standard command.  
**SR1** – Sets the Start Ramp to on.  
**WS000.1000** – Sets the Wire Size or pitch to 0.1mm to move per wind.  
**WI000050** – Sets the amount of winds to be completed.  
**BD1** – Sets the Bobbin Direction to forward  
**WD1** – Sets the Wire Direction to move to the right.  
**PA0** – Tells the software not to pause for each layer.  
**SP1000** – Sets the speed to 1000 RPM  
**FR1** – Sets the Finish Ramp to on.

This will again interpolate the bobbin and feeder motors so that they start and stop at the exact time across each wind.

If you just wanted the feeder arm to move and not the bobbin motor then simply set the windings to zero (**WI000000**). When this command is then executed it would move the feeder arm 0.1mm.

The same if you just wanted the bobbin motor to do 50 turns without the feeder moving. Set the wire size to zero (**WS000.0000**).
There are also another set of commands that can be added to your script.

*comment* - Anything with a * in front of it will be treated as a comment.

M1–message - Pauses the script and allows a message to be displayed.

M2-Start Loop10 – Start of loop command. Any commands inserted between the M2 and M3 commands will be repeated. In this example 10 times.

M3-End Loop – End of loop command.

M4-Zero Windings Counter – Zero the Total Windings counter

M5-Zero Feeder Position – Zero the Feeder Position.

M6-Pause100 – Pause between commands

Rather than manually adding commands, we would recommend using the GUI Add Command buttons to build the script as each command has to be in this exact format as shown above.

*Clear Window* button.
Clears the current window and deletes your script. If it has not been saved beforehand then you will not be able to recover it.

*Load Script* button.
Loads a script from the computers file system into the script window.

*Save Script* button.
Saves the script in the Script Windows to the computers file system and allows you to choose where to save it and what filename to call it.

*Analyse Script* button.
This runs through your script and then opens up a separate window with the result of your script.
As you can see, our command of:

G1-SR1-WS000.1000-WI000050-BD1-WD1-PA0-SP1000-FR1

Instructs the machine to do 50 windings, with the feeder moving 0.1mm per wind.

Below we will look at the GUI interface for adding these commands.
The **Standard and Advanced Commands** panel is shown above.

All the settings above the first Add Command button are a standard command.
All the settings above the next Add Command button are advanced commands.

http://www.ukcnc.net
Add Standard Winding Command

The objects for the standard command are as follows:

**Start Ramp** group box.
Sets whether the bobbin and feeder motors should ramp up on the beginning of the command.
Usually you would always set this to **True** unless using the servo motor option. If setting it as **False** with stepper motors on the machine and running at speeds over 100RPM then you are going to jam the motor. So please be aware of this.

**Wire Size** group box.
This can be set for just moving the feeder arm or moving it per winding revolution. If the **Winds** variable is set to greater than zero then the feeder arm will move the distance of the **Wire Size** variable each turn of the bobbin motor. If the **Winds** variable is set to zero then the feeder arm will move the total distance of the millimetres set in the **Wire Size** variable.

**Winds** group box.
Sets the total winds for this command.

**Bobbin Direction** group box.
Sets the direction of the bobbin motor for this command.

**Wire Direction** group box.
Sets the direction of the feeder motor for this command.

**End Pause** group box.
Tells the software to pause after the command has completed.
The Pause button will change to Resume and will needed to be clicked before the next command is executed.

**Speed RPM** group box.
Desired speed is the variable that will tell the machine what speed you want the bobbin motor to run at.
As the bobbin motor and feeder motor are interpolated, then most of the time the speed of the bobbin motor will be divided down to set the speed of the feeder arm motor to suit and keep that interpolation correct. But if you require the wire size or movement pitch to be a large number that requires the feeder arm motor to run faster than the bobbin motor, then the bobbin motor will automatically drop and the calculated speed will be displayed below.

**Finish Ramp** group box.
Sets whether the bobbin and feeder motors should ramp down at the end of the command. Usually you would always set this to **True** unless using the servo motor option.

**Add Command** button.
After setting all the other options above this button, you simply click this button to add the command to the script window.

**Add Advanced Winding Command**

![Image of advanced winding command interface](http://www.ukcnc.net)

The objects for the advanced command are as follows:

**Start Ramp** group box.
Sets whether the bobbin and feeder motors should ramp up on the beginning of the command.
**Wire Size** group box.
This is the distance that the feeder arm will move per degree movement of the bobbin motor.

**Bobbin Degrees** group box.
Sets the movement in degrees of the bobbin motor for this command.

**Bobbin Direction** group box.
Sets the direction of the bobbin motor for this command.

**Wire Direction** group box.
Sets the direction of the feeder motor for this command.

**End Pause** group box.
Tells the software to pause after the command has completed.
The Pause button will change to Resume and will needed to be clicked before the next command is executed.

**Speed** group box.
This variable that will tell the machine what speed you want the bobbin motor to run at.

**Finish Ramp** group box.
Sets whether the bobbin and feeder motors should ramp down at the end of the command.

**Add Command** button.
After setting all the other options above this button, you simply click this button to add the command to the script window.
More Commands

On the *Standard and Advanced Commands* panel there is also a More >>> button.

When clicked it brings up a new panel with Extra commands that can be inserted into your script.

http://www.ukcnc.net
**comment** - Anything with a * in front of it will be treated as a comment.

**M1–message** - Pauses the script and allows a message to be displayed.

**M2-Start Loop with Count** – Start of loop command. Any commands inserted between the M2 and M3 commands will be repeated. In this example 10 times.

**M3-Finish Loop** – End of loop command.

**M4-Zero Windings Counter** – Zero the Total Windings counter

**M5-Zero Feeder Position** – Zero the Feeder Position.

**M6-Pause100** – Pause between commands

 Less<<<< button.
This closes the panel.

**Add Command** button.
After setting all the other options above this button, you simply click this button to add the command/commands to the script window.

The objects for the other options on the panel are as follows:

**Disable Hover Help Tips** checkbox.
You can move the mouse over any object within the software and if left over that object for a certain amount of time a Hover Tip will appear giving you information on that object.
By checking this box then it will stop these hover tips appearing.

**Ramping Configuration** group box.
We use stepper motors on our machines then to get them to higher speeds we need to
ramp up the motor speed gradually.
You have two variables you can set to get the desired curve as such.
The Steps variable is the divider of the target frequency that we want the bobbin motor to run at. So if the software calculated that the bobbin motor should run at 1000kHz and the steps box is set to 100 then we can see that the steps would be 1000/100 = 10 Hz increments.

The Pause variable is the time between each increment.

**Homing Configuration** group box.
Sets the offset distance that the feeder arm will move away from the limit switch when the **Home** button is clicked.
For example if it is set to 10mm then when the **Home** button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.
By ticking the **Use Homing Offset on Start** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.

This option is only available for machines with the homing/limit switches installed.

**Reply** is the answer coming back from the Coil Winding Machine after each command is sent.

**Hardware Status** shows of the Coil Winding Machine is connected or not connected to the computer.

The **Load/Save Settings** group box.
Allows you to save and remove scripting parameters.

When clicking the **Save** button it will ask for a name that you wish to call the set and save all the parameters to the registry. If you wish to remove the saved set from the registry, then click the **Remove** button and it will delete it.
The **Status** panel has the following objects:

**Winds Completed** display.
Displays the amount of winding that have been wound.

**Feeder Position** display.
Displays the position of the feeder arm on the machine.

**RPM** display.
Displays the speed that the bobbin motor is running at.

**Commands Processed** display.
Displays the amount of commands that have been processed.

**Reset** button.
Pressing this button will reset the feeder position to zero.

**Goto Zero** button.
Pressing this button will tell the feeder arm to return to its zero position.

**Return to Zero** checkbox.
If this is checked then when the machine has finished its winding routine the feeder arm will automatically move back to the zero position.

**Manual Speed Override** checkbox.
If checked then when the **Start** button is clicked the software will pass control over to the manual speed controller on the controller box.
The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.

Ramping will be disabled for this mode as not needed and it will be down to control of the user to make sure the speed is controlled so no jamming of the motors will occur.
The **Control** panel has the following objects

**Disengage Motors** button.
When clicked this will disengage the motors so they can be turned by hand. The motors will automatically re-engage when start or jog buttons are clicked. You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

**Start** button.
Clicking this button starts the winding routine starting with the first command in the script window.

**Stop** button.
Clicking this button stops the winding routine.

**Pause/Resume** button.
While winding is in progress and you wanted to pause the machine then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.
While pause you can cancel the winding routine by pressing the stop button. Also while paused the Left and Right button can be used to jog the feeder arm to a new position. This will not increment the feeder position and can be used for adjustments needed without having to restart the whole winding routine from the beginning.

**Home** button.
This can only be used if there are limit/homing switches installed on the machine. Based on
the variable set in the **Homing Configuration** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

**Left** button.  
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.  
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.  
Sets the travel in millimetres that the feeder arm will move if either the Left or Right button are clicked.
Absolute Scripting Mode – Tab

With the new ARM Controller MKII, we have now on board Flash memory that can be used for buffering loads of small commands. This removes any small delays that can be caused by the USB communications latency.

Unlike the Standard Scripting Engine which is Incremental positioning for each command, this is absolute positioning on each command.

For example if you set the bobbin position to be 10.00 and feeder position to be 5.00 in a command (10.00,5.00,100,) then it will rotate the bobbin 10 times and move the feeder by 5mm. If you then send a command (11.00,6.00,100,) it will move the bobbin by 1 turn and the feeder by 1mm, at a speed of 100 RPM.

The scripts can be created in Excel spreadsheet and saved as a CSV file. This can then be loaded into the script window. The format for each command is:

Bobbin position, Feeder position, Speed, Comment

If the bobbin, feeder and speed are set to zero (0,0,0,Paused) then the script will pause and display the comment.

You will need to create your own ramping if required as shown in the example.

http://www.ukcnc.net
The **Absolute Scripting** panel has the following objects.

**Script Line** display.
Displays which line of the script is being executed out of the total number of lines loaded.

**Clear Script** button.
Clears the current window and deletes your script. If it has not been saved beforehand then you will not be able to recover it.

**Load Script** button.
Loads a CSV script from the computer’s file system into the script window.

**Save Script** button.
Saves the script in the Script Windows to the computer’s file system and allows you to choose where to save it and what filename to call it.

**Enumerate Script** button.
After manually editing the script in the window, you will need to enumerate it by clicking this button.

The check for invalid characters should not now be needed and was there while we were testing. But handy to check if your script file has any hidden characters in there.
The **Status** panel has the following objects.

**Bobbin Position** display.
Displays the position of the bobbin on the machine.

**Feeder Position** display.
Displays the position of the feeder arm on the machine.

**Completed Windings** display.
Displays the amount of winding that have been wound.

**RPM** display.
Displays the speed that the bobbin motor is running at.

**Reset** button.
Pressing this button will reset the bobbin and feeder position to zero.

**Reverse** button.
This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the reverse direction.
**Forward** button.
This is a manual jog for the bobbin motor and when clicked the bobbin motor will move in the forward direction.

**Left** button.
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the left.

**Right** button.
This is a manual jog for the feeder arm and when clicked the feeder arm will move to the right.

**Feeder Travel per click** variable.
Sets the travel in millimetres that the feeder arm will move if either the **Left** or **Right** buttons are clicked.

**Bobbin Travel per click** variable.
Sets the amount of revolutions that the bobbin motor will move if either the **Forward** or **Reverse** buttons are clicked.

The **Control** panel has the following objects

**Start** button.
Clicking this button starts the buffering routine first and once all the commands are buffered to the controller, then it will start winding.

**Stop** button.
Clicking this button stops the winding routine.
**Pause/Resume** button.
While winding is in progress and you wanted to pause the machine then click this button. It will then turn to a flashing Resume status and clicking it again will allow the machine to carry on from where it was paused.
Because of the nature of the absolute scripting, it is not possible to use ramping. So again this should only be used at low speeds.

**Home** button.
This can only be used if there are limit/homing switches installed on the machine. Based on the variable set in the **Homing Configuration** will determine the distance that the feeder arm will travel away from the limit switch once it has been triggered.

**Speed Override** checkbox.
If checked then the speed is ignored in the script and it will use the value set. You have no ramping when this is selected, so only suitable for low speeds.

**Reply Frequency** box.
Due to the speed and small movements, it can sometimes not be possible to receive replies back from the controller as quick as they are being executed and you could get some stalling or lockups. We recommend keeping this set to 2 or above.

**Homing Configuration** group box.
Sets the offset distance that the feeder arm will move away from the limit switch when the **Home** button is clicked.
For example if it is set to 10mm then when the **Home** button is clicked the feeder arm will move to the left until it gets to the limit switch on the machine. It will then move to the right 10mm.
By ticking the **Use Homing Offset on Start** option will cause the machine to home when the Start button has been clicked. The machine will then home before the winding starts.
This option is only available for machines with the homing/limit switches installed.

**Disengage Motors** button.
When click this will disengage the motors so they can be turned by hand.
The motors will automatically re-engage when start or jog buttons are clicked.
You will not be able to disengage the motors when paused, but if you need to move the motors at this point, then simply turn the power off to the motors via the switch. Do the adjustments and then turn the power back on before pressing resume in the software.

[http://www.ukcnc.net](http://www.ukcnc.net)
ABOUT button.
This will display a short description of the commands, but also allow you to load a sample script when the button is clicked.

![Diagram](http://www.ukcnc.net)

**Manual Winding Mode – Tab**
This mode is for people wishing to use their machine for semi-automatic winding of guitar pickups.
This will only turn the bobbin motor and control will be handed over to the manual controller, which must be connected to the controller box.

The manual controller dial needs to be fully turned to the left before it will start to wind and the speed of the bobbin motor and feeder arm will increase or decrease depending on the position of the dial.

Ramping will be disabled for this mode as not needed and it will be down to control of the user to make sure the speed is controlled so no jamming of the motors will occur.
Activate Manual Winding Mode button
This will start the winding routine.

De-Activate Manual Winding Mode button
This will stop the winding routine.

Target Windings variable.
This is the amount of windings you wish the machine to do.
It can be set manually by clicking on the blue input box and entering a number or using the drop down box and choosing from a previously saved pickup bobbin.

Bobbin Direction group box.
Sets the direction of the bobbin motor for this command.

Winds Completed display.
Displays the amount of winding that have been wound.

RPM display.
Displays the speed that the bobbin motor is running at.

Reply is the answer coming back from the Coil Winding Machine after each command is sent.

Hardware Status shows if the Coil Winding Machine is connected or not connected to the computer.
Settings/Diagnostics – Tab

This tab has a mixture of settings and also diagnostics displays.

The diagnostic displays you do not have to really worry about and more there for trouble shooting if needed.

Below we will go through the settings that can be changed to suit your machine and any add-ons you use.
**Current Config** display.
This displays what configuration has been detected when the machine is plugged into your computer or displays what has been manually set.

**200mm Coil Winder** button.
Sets the correct variables needed for the 200mm Coil Winding Machine.

**Mini Coil Winder** button.
Sets the correct variables needed for the Mini Coil Winding Machine.

**Auto Detect** button.
Automatically communicates with the Coil Winding Machine attached to the machine to detect what model it is and sets the correct variables needed.

**Backup** button.
This backs up all the bobbins and all the settings for all tabs within the software and allows you to save as a .REG file.
If you move the software onto a new machine then make sure you use this button to back up the settings and then copy the .REG file over to your new computer.
Next just double click the .REG file and follow the instructions on the screen.
When you launch the software on the new machine it should pick up all the settings.

**Frequency** display.
This value is automatically calculated on the value of the SPBR variable.

**SPBR** variable.
This variable sets the Steps Per Bobbin Revolution needed to suit the Coil Winding Machine attached to your computer.

**Feeder Jog Speed** variable.
Sets the speed of the feeder arm motor when using the Jog buttons. This is set in frequency, rather than RPM.

**Bobbin Jog Speed** variable.
Sets the speed of the bobbin motor when using the Jog buttons. This is set in RPM.

**Resolution** display.
Displays the resolution of the feeder arm.
This value is automatically calculated on the value of the SPFR variable and BSP variable.
SPBR variable.
This variable sets the Steps Per Feeder Revolution needed to suit the Coil Winding Machine attached to your computer.

BSP variable.
This variable sets the Ballscrew Set Pitch needed to suit the Coil Winding Machine attached to your computer.

Pause Boundary variable
If the pause button is used near the start of each layer and at the end of each layer then it can throw either the position read off or not complete the pause.
This is because when the Pause key is clicked when winding and there is not enough travel left in the winding for a ramp down and then a ramp up after pause.
By the default the Pause boundary is 1.0mm into the wind and the width of bobbin minus 1.0mm.

Set Default Startup variable
Sets which tab should display on start-up of the software.

Enable Timeout Alert checkbox
Enables the command timeout value for communications. If no reply has come back to the software from the controller in the value entered, then it will cause an alert box to be displayed.

Enable Command Pause checkbox
Enables the pause between commands sent from the Standard Scripting Engine.
This is useful if small commands are sent and you need to slow it down to avoid communication conflicts.

Limit Switches installed checkbox
If you have installed the limit/homing and emergency stop kit onto your 200mm Coil Winder then you need to check this option to let the software know. It will then enable the homing features of the software.

Emergency Stop installed checkbox
If you have installed the limit/homing and emergency stop kit onto your 200mm Coil Winder then you need to check this option to let the software know. It will then enable the extra features of the software.

Reverse Bobbin Motor checkbox
Will reverse the direction of the bobbin motor to suit motor attached to your machine.
Reverse Feeder Motor checkbox
Will reverse the direction of the feeder motor to suit motor attached to your machine.

Save button.
Saves the settings that have been set in all the variables above.

The only control on the middle section is the **Reset Flash** button.
This is only to be used when installing a new Flash Chip on the controller board. It then resets the counters on the controller and initialises the new memory installed.
The other display boxes are for information when diagnosing any issues.

At the bottom of the tab we also have some other settings.

Firmware button.
When clicked it displays the current Firmware of the connected Coil Winding Machine.

Under the Change Colours group box we have:

Background button.
Changes the background colour of each tab.

Foreground button.
Changes the foreground colour of each tab.

Border button.
Changes the border colour of each tab.
Reset to Default button.
Sets all colours back to the original style.

Info box.
Clicking on URL will take you to product web page.

Keyboard Mapping – Tab

This tab lets you map keyboard keys to the buttons within the software.
By selecting the drop down box next to each control, you can map this to a key on the keyboard. Or by simply clicking on the button image and then pressing a key.
Also these keys can be mapped to inputs on the controller board that have switches attached.
Upgrading the Firmware.

With the new ARM Controller MKII you can no longer upgrade the firmware via the software and will need to use a JTAG programmer that is supplied with the machine.

Please check the download area of our website for the full instructions, depending on what machine you have.

http://www.ukcnc.net/index.php/downloads/