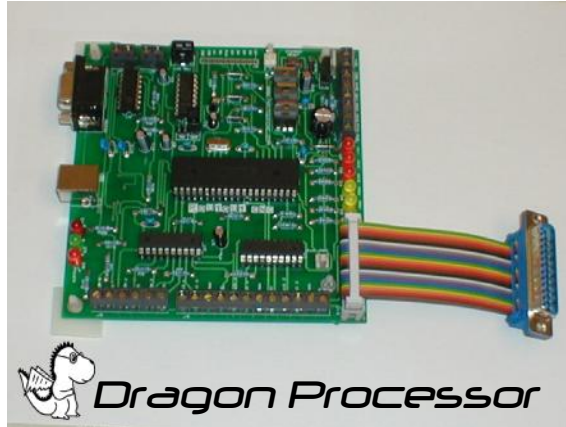




## Routout CNC Dragon Processor 3 Axis Stepper Motor Controller Version 1.2

The Routout CNC Dragon Processor is a three axis control board, and has many uses including for CNC retrofitting / robot control or driving you own CNC machine. It is simple to wire and is controlled via USB or RS232 serial connection. It is fully compatible with all step and direction motor drive cards, and utilises the same FL command Set as the Routout CNC CAD CAM Software. The Dragon processor also has some extended commands.



### Features.

- 3 X AUX Outputs -Darlington Transistor 1A Drive Capabilities.
- 3 X Enable Outputs.
- 3V to 5V logic inputs.
- 3 X Home inputs X,Y & Z.
- Limit Inputs.
- PCB foot-print only 127mm X 120mm
- USB or RS232 Serial Port
- Emergency Stop Input.
- Integral or External Reset circuitry.
- Built in regulator.
- Stepper motor drive outputs via screw terminals or 25 way LPT connector (Male or Female can be supplied).
- XP Operating system.

### Jumper Setting for communications Setting - Connector J9

To set the Serial Port see the Below :

**Table 1.**



USB Selected

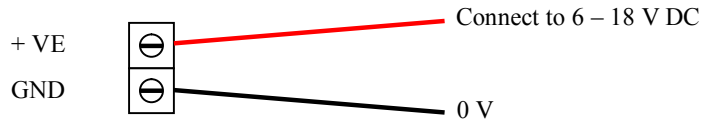


RS232 Selected

△ **Note** it will not communicate if this is set incorrectly.

## Wiring and setting up your Dragon Controller.

### **Power Supply – Connector J8.**



Wiring up your Stepper Motor Drivers to the Dragon Controller.

The Stepper Motor drivers can be wired in two ways, either via the supplied 25 Way D connector or Via the screw terminals.

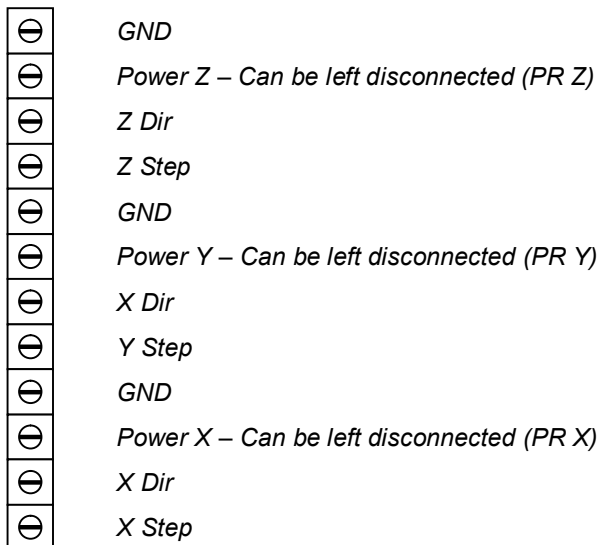
### **Using the 25 Way D Header Cable**

**△ Warning: DO NOT CONNECT THIS TO YOUR PC'S PRINTER PORT !!!!**

*The 25 Way D header provides the step and Direction Outputs Only and does not provide the connections to the limit switches. SEE BELOW:*

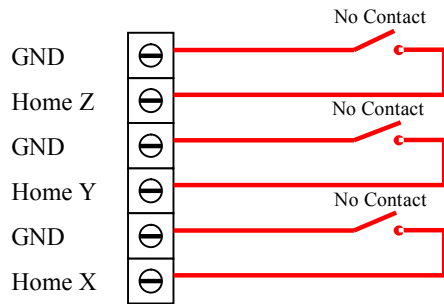
D25 Connector Pin Number	Description
2	X - Step
3	X - Direction
4	Y - Step
5	Y - Direction
6	Z - Step
7	Z - Direction
18-25	Ground (0V)

### **Using the screw terminals. Connector J3 – See Below.**



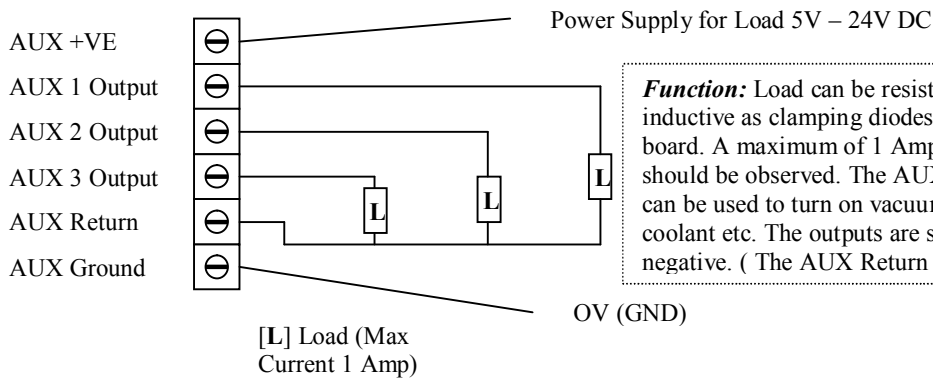
### Home Switch Connection – Connector J4.

Δ **NOTE:** Switches are Normally Open Type.



**Function:** When the Home, HomeZ or HomeXY commands are processed the relevant axis will drive until the home switches become closed circuit.

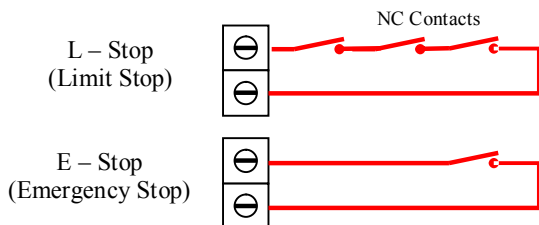
### Optional AUX Connection – Connector J12



**Function:** Load can be resistive or inductive as clamping diodes are on board. A maximum of 1 Amp per output should be observed. The AUX outputs can be used to turn on vacuum and coolant etc. The outputs are switched negative. ( The AUX Return is positive )

### E-stop and L-stop Connection – J2 & J10.

Δ **NOTE:** Switches are Normally Closed Type. For the board to function correctly these must be connected either to a switch or if no switches are connected these terminals should be connected together with a wire link.



**Function:** If either the E – Stop or L – Stop become open circuit the board will quit the current job, and you will not be able to move any axis. The L – Stop can have multiple switches connected in series to detect end of travel limit.

## Absolute Maximum Ratings

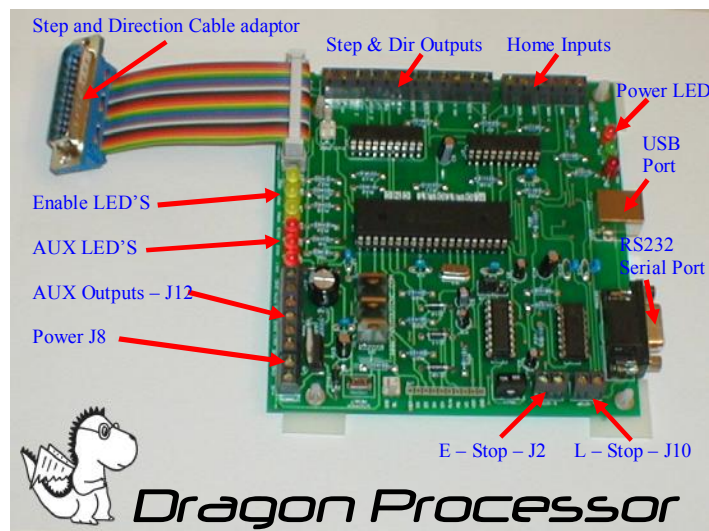
△ Exceeding these ratings **WILL** destroy your Dragon Processor card !

- Input Voltage (Power Supply for the board) 18 Volts DC
- AUX power supply Input (24V Max).

△ Never input external voltages into the Home / Limit or E- Stop pins, doing so will damage the Dragon Processor card.

△ Never exceed the 1 Amp / 24 Volts DC Max on the AUX Control Ports. Doing so could damage the Dragon Processor card.

## Quick Step Setup Guide RS232 and USB( Figure 1 ).



- Connect up the Power Supply to J8 as described above (taking particular care with the polarity)

**△Warning** : Check and double-check the polarity because if it's wrong it **WILL** blow the board up ! You have been warned.

- Insert your CD into the Drive
- Make sure E-Stop and L-Stop are connected.

- If you are going to connect the Dragon Processor to your PC with the supplied USB cable, then Select the USB mode on J9 otherwise select RS232 mode. If connecting via RS232 cable (not supplied) you can skip the rest of this section and go to the section 'FL Send software Installation'.
- Connect up the USB lead provided, to a spare USB port on your computer.
- Turn on the power to the board, the Power LED should light. If it does not turn off the power supply immediately, and re-check all of the above steps.
- Windows will now detect the new hardware. Follow the screens below to setup.

### Windows XP Installation.

If you are using the RS232 serial interface you can ignore this stage.

*Screen 1. – Select No at this time*



*Screen 2 – Select selection as below*



*Screen 3 - selection as below*



*Screen 4 - Click Finish*



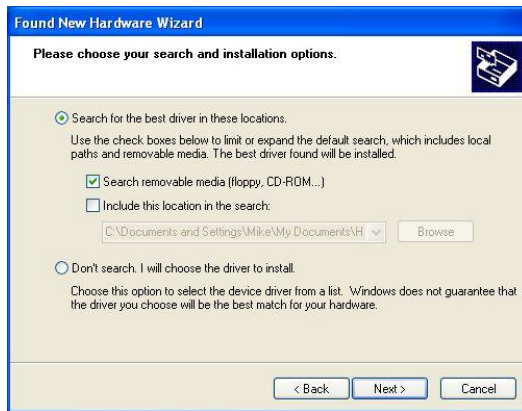
**Screen 5- Detects hardware again –Select NO**



**Screen 6 - selection as below**



**Screen 6 - selection as below**



Congratulations !! Your hardware is now installed. Proceed below to install FL Send software.

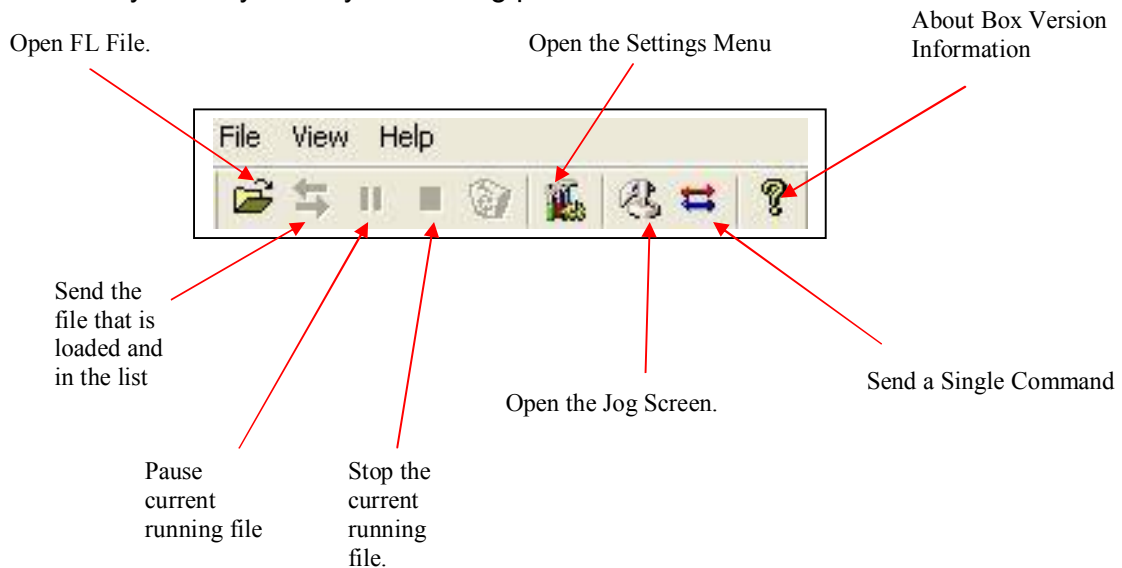
- Turn off the Power supply.
- You may now connect up your stepper motor 'Step and Direction' drivers and Any Limit / Home switches, Auxiliary relay outputs.

## **FL Send Software Installation**

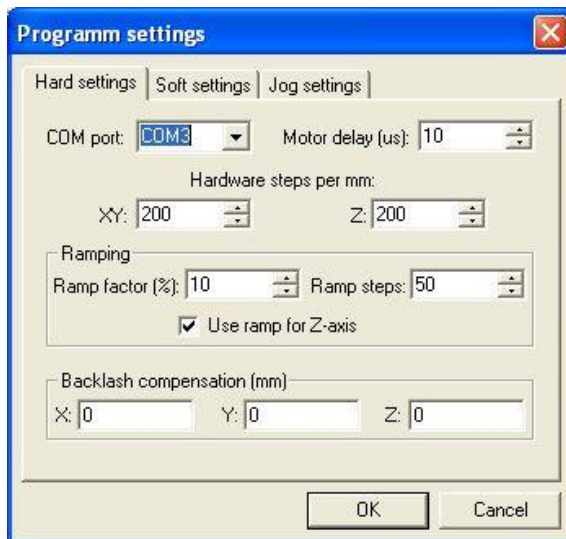
1. Make sure the Routout CNC CD is in the CD Drive.
2. From Your desktop, double-click on "My Computer", then double-click on the "D:drive" ("D" is usually the default drive letter for the CD-ROM).
3. Double-click on the "RFLSend.EXE" Icon and windows will begin to install the program onto your PC. After the program is installed, Windows may ask you to restart your computer. Please do so.
4. Installation will now be complete.
5. A desktop icon will be produced for the FL Send Application.

## FLSend Software Setup

The Setup of the software is very simple with a few initial settings to be done, and then your on your way to creating parts.



Click on the Settings menu Icon and set the Parameters you must set items marked in the text in **RED**, failure to do so will prevent the board from running / running properly .



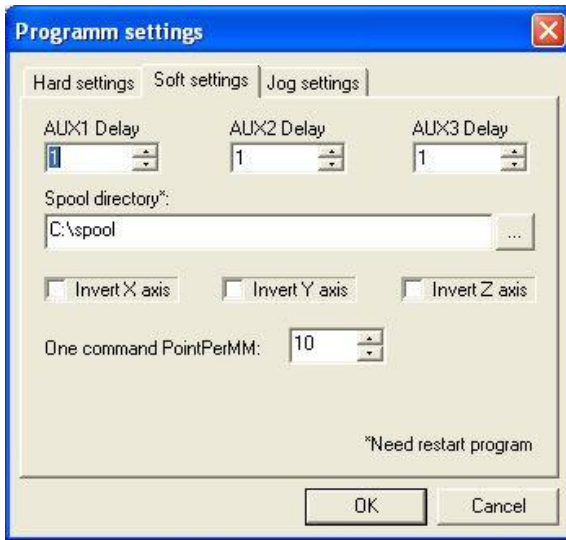
### Hardware Settings.

**Com Port Setup** : Select the correct port that your Dragon has been installed on. (RS232 usually Com1 or Com2 & USB usually is the highest comport number. This can also be found in Device manager under ports (look for the USB serial port) – **You must set this correctly.**

**Hardware Steps per MM**: (This is the number of steps you would issue to your stepper driver to move the axis 1mm - 200 is default) – **You must set this correctly.**

**Ramping**: Make sure this is ticked in the settings. Generally Ramp Factor should be one and ramping steps should be chosen to suit the application.

**Backlash compensation**: Select use backlash compensation to remove backlash out of the axis. Make sure if this option is selected that the backlash is correct, otherwise each move will contain an error. **If in doubt leave at Zero.**



## Software Settings.

**These setting require a restart of the software.**

**Auxiliary Delays :** *Delays can be specified for Aux commands, this is an advantage if for example you control your spindle etc via a relay. (Unit – ms)*

**Spool Directory :** *Spool directory sets the directory the software will spool for automatic unattended job submission.*

**Invert :** *Invert does exactly that it, reverses the direction of the drives.*

**One Command Point per MM:** *Set the points per mm initially for use with the 'send single command'.*



## Jog Settings.

**Jog speed :** *This sets the speed at which the jog buttons will move the axis **You must set this correctly.***

**Jog Time Out Delay:** *If the Dragon processor does not complete within XX(ms) then the software will time out. This is to prevent the software hanging waiting for the board if for example it has been disconnected. **You must set this correctly.***

**Hot Keys:** *Simply put you curser in the box and hit a key to set the keys that you want to use to jog the machine.*

Now that you have set all the parameters it is good practice to close the application and the reopen it.

Your Setup is **DONE !!**

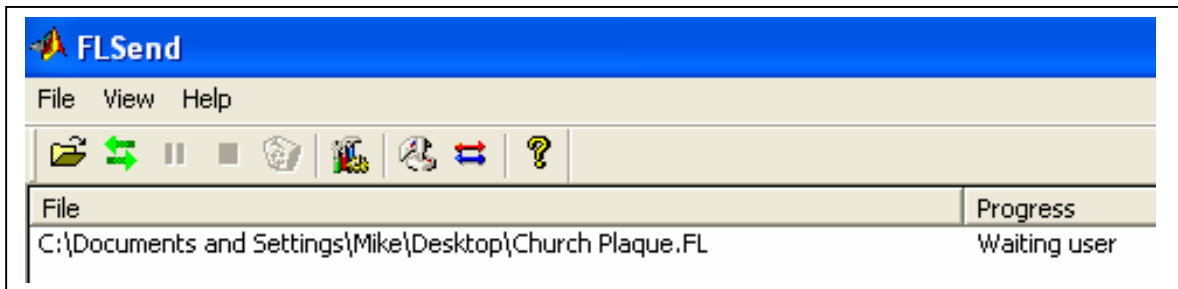
If you wish to save your settings this can be done from the File – Save Parameters menu. Like wise you can load the settings using File – Load Parameters.

**Now for the fun part.**

Providing you have completed the previous steps to setup your Dragon controller, you will be now ready to test your hardware and software.

To test your install (make sure the Dragon Controller is on and connected) and press the Jog screen button. Test the movement on all motors. If there is a problem go back and check your wiring and your FL Send Setup.

If all is OK Then you should be able to save a FL file from the Routout CNC viewer (See Routout CNC software manual). Then click on the open in the FL Send application, the file will be shown in the pending files list. Now click on the file and press the send button see below:



Notice the Send button has become illuminated. Click and the job will be processed.

## FL Command Set

For those of you who wish to create your own FL files without the use of the Viewer can do so with the below command list. FL file are simple txt documents with the extension .FL so you can create these manually with windows NOTEPAD or another TXT file editor of your choice.

### **REM**

**Rem** command adds a Rem Statement to file. The Rem statement has no function and the driver will pass it but it serves as a reminder for the FL file formatting. I.e. Points per MM, Date created etc.

Example:

```
? REM Created 11/06/2004 21:33:55  
? REM XOffset = 20  
? REM YOffset = 20  
? REM Count of PolyLines = 104
```

### **Home**

**Home** Command does exactly what it says on the tin ! It returns all Axis to the home position until the X, Y & Z switches are High ( +5V ) at which stage the motors will stop.

See Also: [HomeZ](#) and [HomeXY](#)

### **HomeXY**

**HomeXY** Command does exactly what it says on the tin ! It returns XY only to home at which stage the motors will stop.

See Also: [HomeZ](#) and [Home](#)

### **HomeZ**

**HomeZ** is the same function as home, but only returns the Z Axis to the home position.

See also: [Home](#)

## PointsPerMm #

**PointsPerMm** defines the number of points per mm that your drawing was designed in / the scale, for example : If drawing with **Coral Draw**, then exporting the image as a PLT file then you would get the option to set Number of plotter units if you were to set this to 508 per inch then this would be 20 per mm. Therefore PointsPerMm = 20

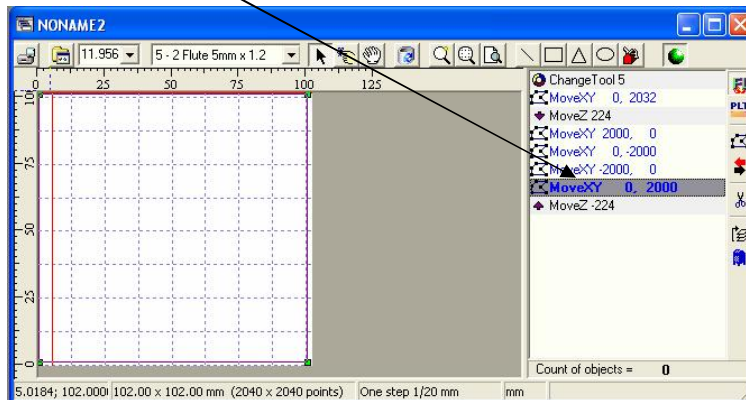
Example:-

- PointsPerMm = 20

Therefore MoveXY 2000,0 would move the router 100mm

## 100 X 100mm Square

```
MoveXY 0, 2032
MoveZ 224
MoveXY 2000, 0
MoveXY 0, -2000
MoveXY -2000, 0
MoveXY 0, 2000
MoveZ -224
```



## MaxSpeedTravelXY #

This is the Maximum speed that your CNC machine will travel in mm / second. So the larger the number the faster your CNC machine will go.

Example: **MaxSpeedTravelXY 5** {This will make your CNC machine travel at 5 mm / Second}

See also: [General Setup](#)

## MaxSpeedCuttingXY #

This is the Maximum speed that your CNC machine will cut in mm / second. So the larger the number the faster your CNC machine will go.

Example: **MaxSpeedCuttingXY 3** {This will make your CNC machine cut at 3 mm / Second}

### **MaxSpeedZ #**

This is the Maximum speed that your CNC machine will move the Z axis in mm / second. So the larger the number the faster your CNC machine will go.

Example: **MaxSpeedZ 4** {This will make your CNC machine move the Z Axis at 4 mm / Second}

### **ChangeTool #**

The ChangeTool command will prompt the user to replace the tool with the specified tool & give you the opportunity to adjust the X,Y,Z positions. for example:

**ChangeTool 1** { Prompt user to change tool to tool number 1, it will also give the option to adjust the XY & Z axis height }

### **MoveXY #,#**

Examples:-

**MoveXY 3,-5** (Step X Axis 3 Steps and Y Axis 5 Steps in reverse)

**MoveXY 4,0** (Step X Axis 4 Steps and Y Axis 0)

### **MoveXYZ #,#,#**

Examples:-

**MoveXYZ 3,-5,5** (Step X Axis 3 Steps and Y Axis 5 Steps in reverse and Z Axis 5 steps)

**MoveXYZ 4,0,5** (Step X Axis 4 Steps and Y Axis 0 and Z Axis 5 Steps)

### **MoveZ #**

Examples:-

**MoveZ 5** (Step Z Axis 5 Steps )

**MoveZ -10** (Step Z Axis -10 Steps in reverse)

### **PowerX #**

Examples:-

**PowerX 1** (Turn on PowerX output )

**PowerX 0** (Turn off PowerX output )

### **PowerY #**

Examples:-

**PowerY 1** (Turn on PowerY output )

**PowerY 0** (Turn off PowerY output )

## PowerZ #

*Examples:-*

**PowerZ 1** (Turn on PowerZ output )

**PowerZ 0** (Turn off PowerZ output )

## PowerXYZ #,#,#

*Examples:-*

**PowerXYZ 1,1,1** (Turn on PowerX, PowerY & PowerZ output )

**PowerX 0,1,0** (Turn off PowerX, turn on PowerY & Turn Off PowerZ output )

## AUX# #

General purpose output line for controlling spindle, coolant, vacuum etc

Example: **AUX1 1** (turn on AUX 1 output line)

Example: **AUX1 0** (turn off AUX 1 output line)

Example: **AUX2 1** (turn on AUX 2 output line)

Example: **AUX2 0** (turn off AUX 2 output line)

Example: **AUX3 1** (turn on AUX 3 output line)

Example: **AUX3 0** (turn off AUX3 output line)

## Zstep#

This function repeats the object between the Z down and Z up commands and increments Z in steps.  
For Example:

```
PointsPer Mm 10
ZStep 0.5 {Increment in 0.5mm increments}
MoveZ 50
Move XY 100,100
MoveZ -50
```

Therefore MoveZ would cut to a depth of 5mm in 0.5mm increments.

## **Repeat #**

This function repeats whole code # number of times. This command must be placed at the top of the FL file: For Example:

```
REM Test Repeat
PointsPerMm 1000
MaxSpeedTravelXY 10
MaxSpeedCuttingXY 10
MaxSpeedZ 10
Repeat 10
MoveXY 100,100      ---- This code repeated 10 times before ending.
MoveXY -100,-100
```

