3 Axis (X, Y, Z) Stepping Motor Controller (Rev 3.0 Dec09)

Presents by
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This is a 3 Axis (X,Y,Z) CNC stepping motor controller/Driver. It built-in a spindle relay and all input is optical isolated from the outside providing safe (no feedback to your PC) and better response time. Support Mach2, Mach3, ArtCam, KCam. You can apply this card to a CNC machine or upgrade your old CNC machine to take advantage of new technology. It works for CO2 laser machine as well

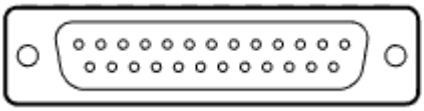
Features:

* Optical isolation for data In/Out
* Relay control for spindle (or laser)
* Four step speed setting
* High current Output
* Big Heat sink support up to 2.5A

Specification:

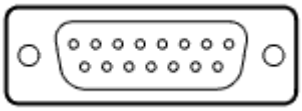
* In/Out Interface port: Parallel
* Built in Relay control for spindle
* Support 2/4 phases 4, 6, 8 wires stepping motor
* High speed optical isolation coupling
* Built in No. 4 Axis interface for expansion
* LED indicators for each Axis & Relay
* Current: 2A (2.5A max)
* Resolution: 1/8, 1/4, 1/2, 1
* Power: Single DC 12 ~ 24V (no 5V needed)
* Control port: DB manual control interface
* CAD system support: March2, Mach3, ArtCam, KCam

DB 25 Connector Pin layout

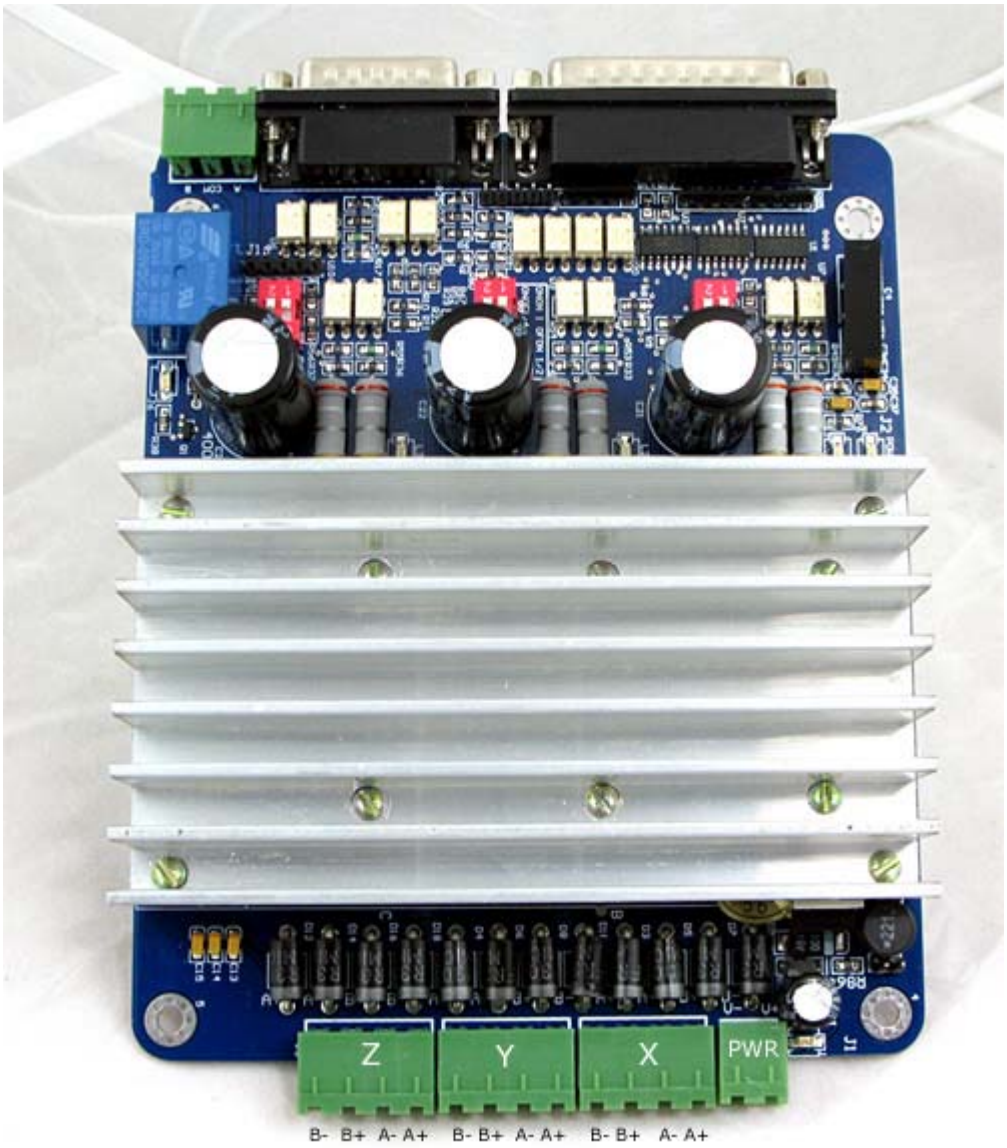


PIN1	PIN2	PIN3	PIN3	PIN5	PIN6	PIN7	PIN8	PIN9	PIN10
CKE	CKA	CWA	CKB	CWB	CKC	CWC			DIN1
E STEP	A STEP	A DIR	B STEP	B DIR	C STEP	C DIR			Limit1
PIN11	**PIN12**	**PIN13**	**PIN14**	**PIN16**	**PIN17**	**PIN18-25**			
DIN2	DIN3	DIN4	CWE	EN	RLY	GND			
Limit2	Limit3	Limit4	E DIR	Enable	Relay	Ground			

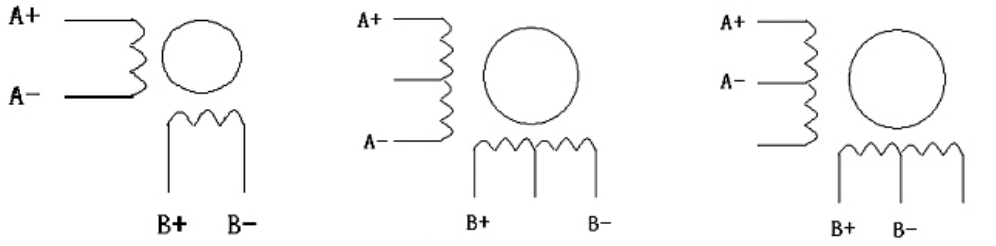
DB 15 Connector Pin layout



P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
CKA	CWA	CKB	CWB	CKC	CWC			CKE	CWE	EN	MOT	VCC		GND
A STEP	A DIR	B STEP	B DIR	C STEP	C DIR			E STEP	E DIR	En-able	Motor	Pwr		Gnd



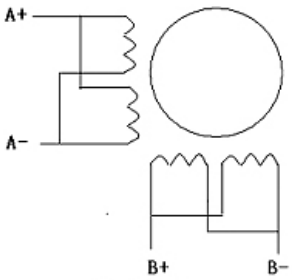
2 phases,4 phases stepping motor connection diagram (current 2A max)



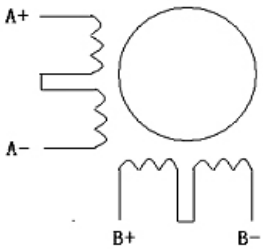
4 wires setup

6 wires high torque setup

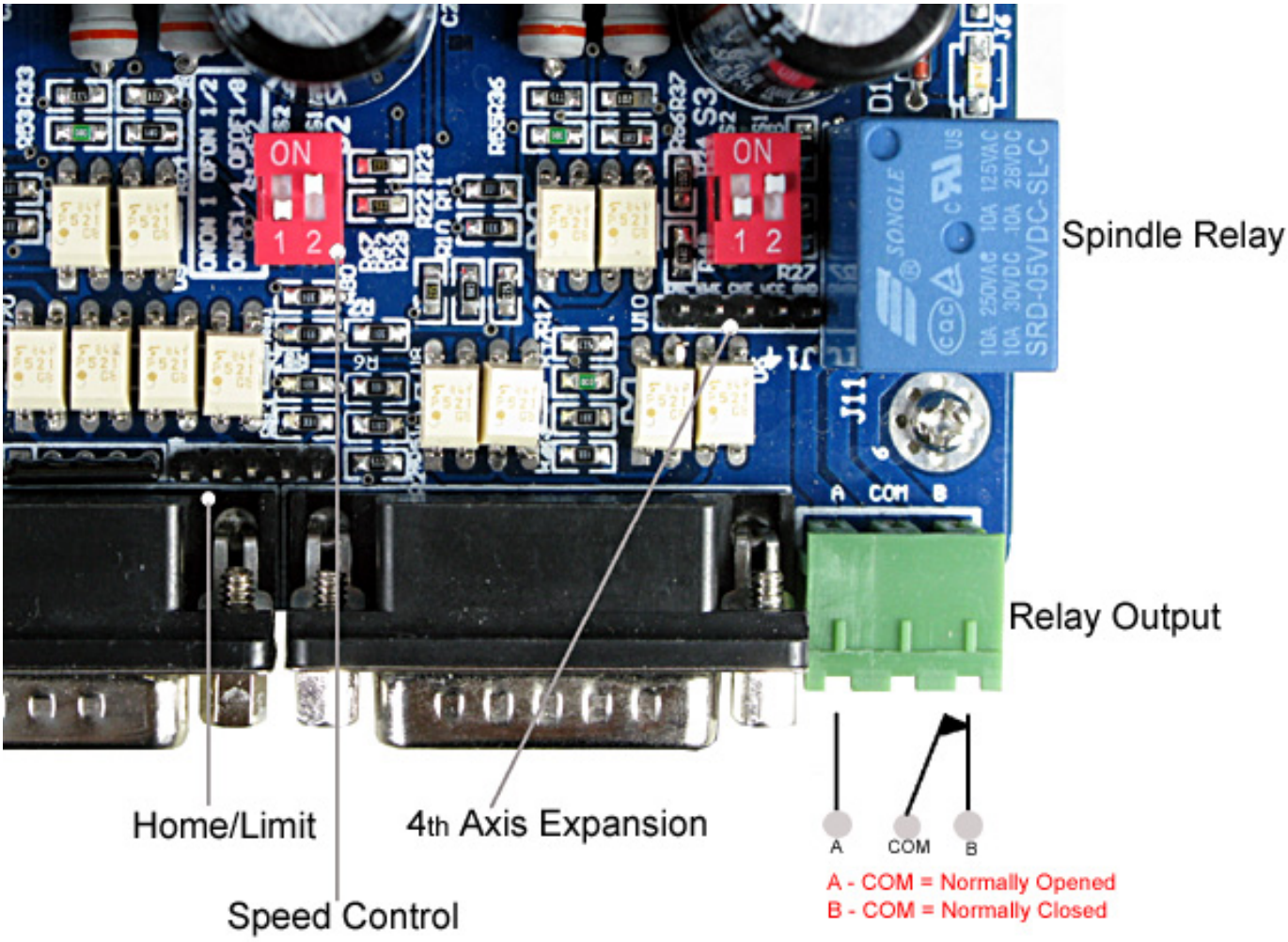
6 wires high speed setup



8 wires in parallel setup
(high speed,less torque)

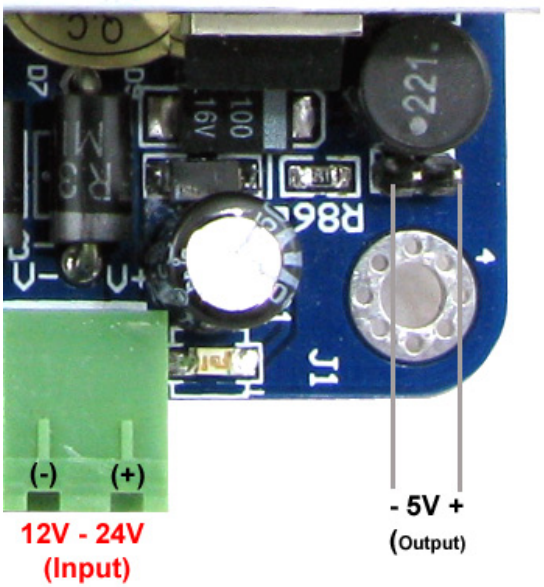


8 wires in series setup
(low speed, high torque)

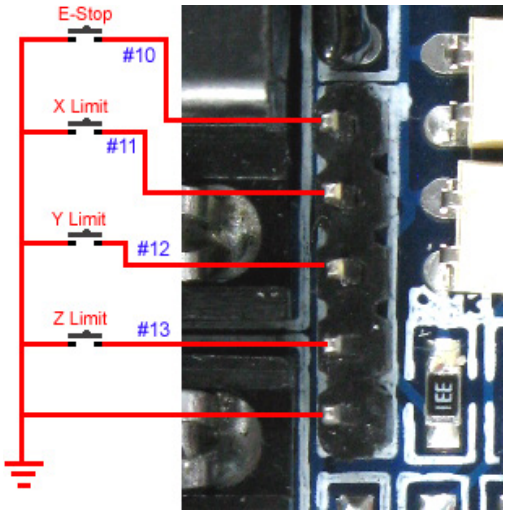


Power

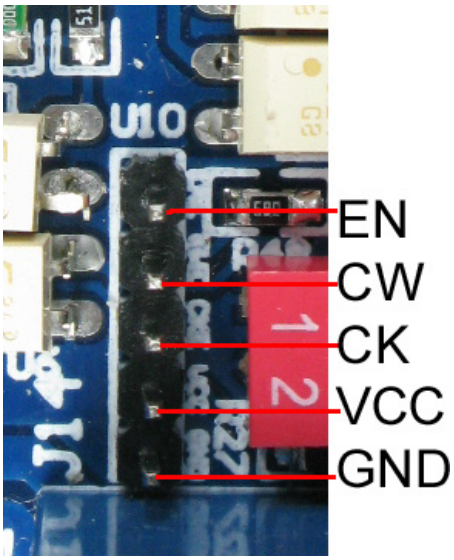
The controller can take DC 12~32V power input. The power supply should be able to provide at least 3A current in order to support smooth operation.



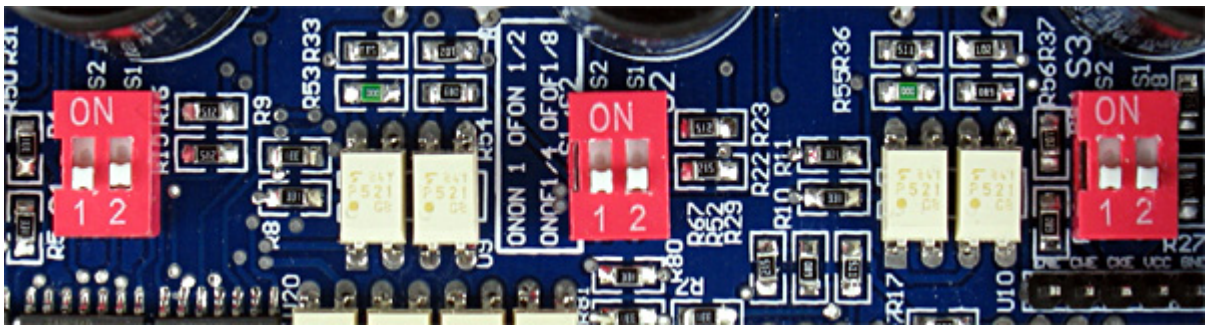
Home Limit and Emergency Stop Input pin
Note: All Limit Input are Active Low *



4th Axis Expansion Output pin
CW = PIN #14. It's used to output PWM signal as well. Or, you can use the output from #14 to trigger a 'Fire' signal for CO2 laser. The output level is +5 pulse so the CO2 power supply must support +5V triggering!

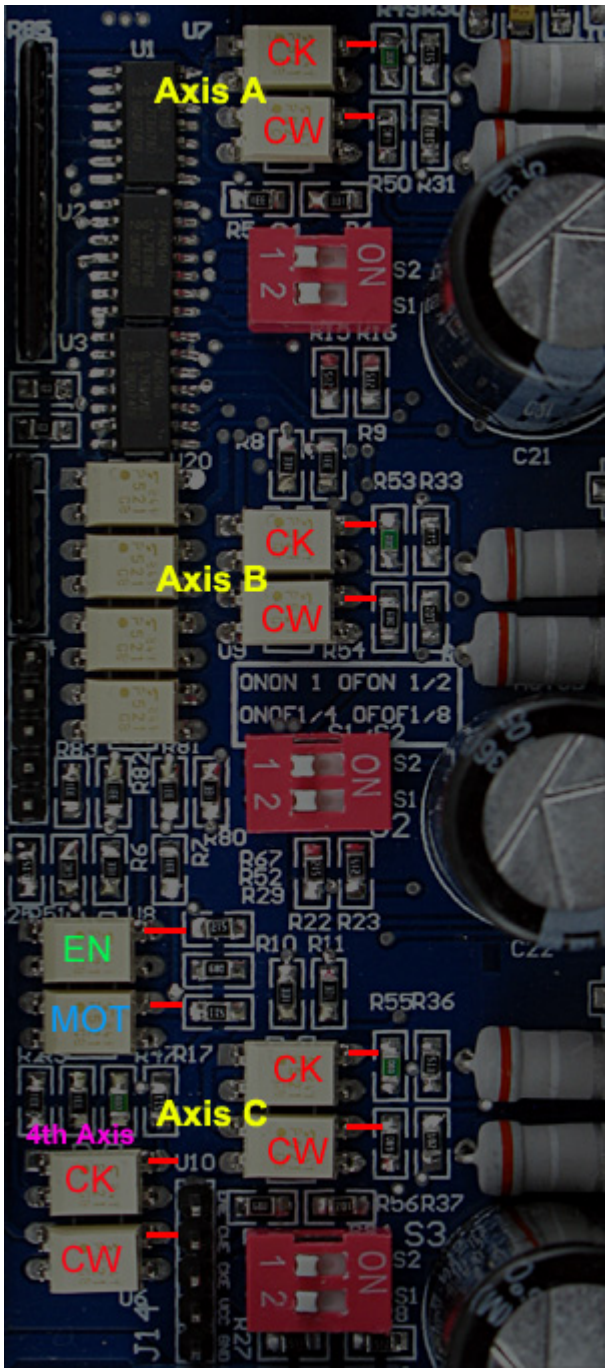


Resolution/ Speed Setting for X,Y,Z Stepping Motor



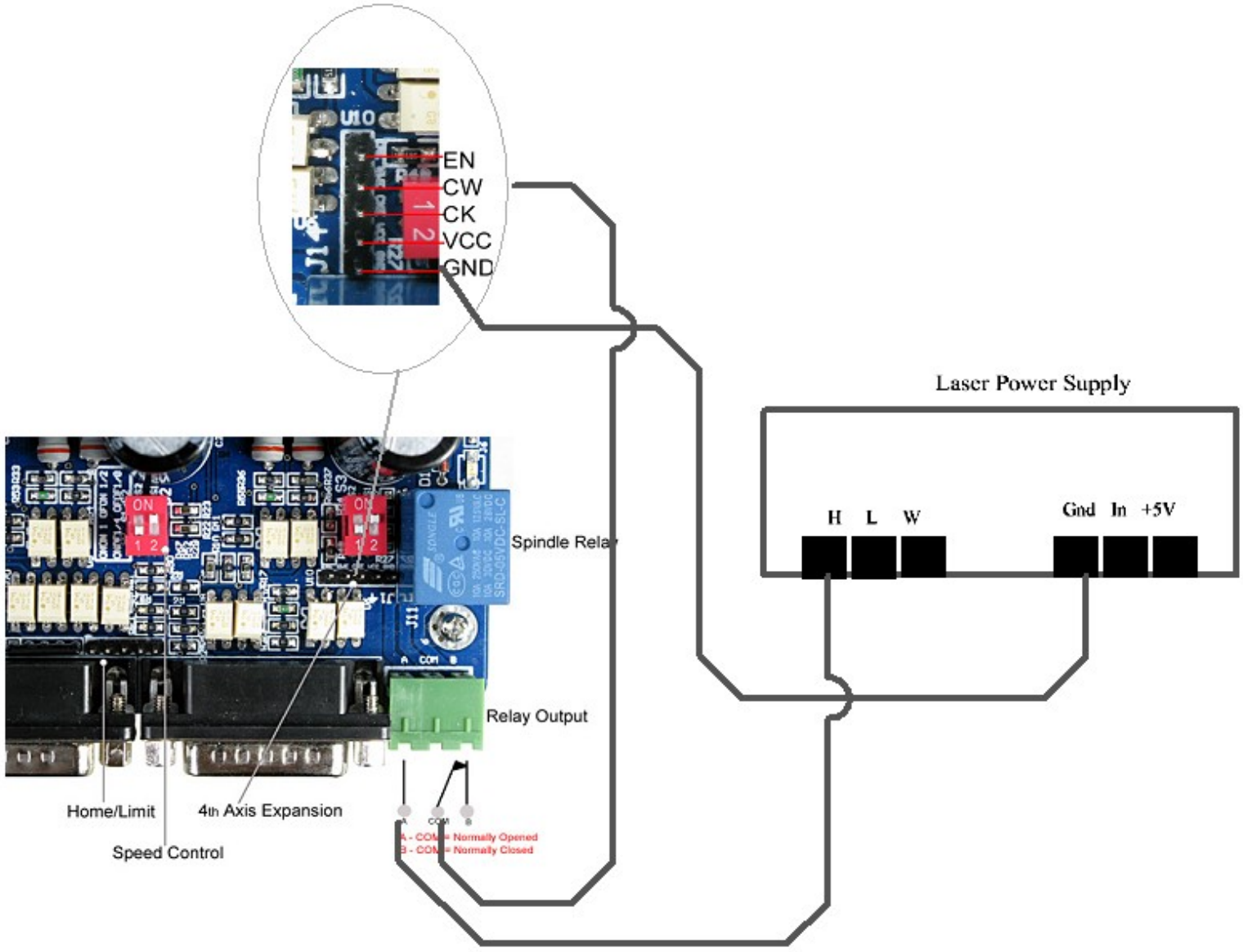
Full STEP	½ STEP	¼ STEP	1/8 STEP
1 - Off	1 – Off	1 - On	1 - On
2 - Off	2 - On	2 - Off	2 - On

Note: Signal Ground and the Output ground are totally isolated, no physical connection. But all grounds from the optical isolation module share the same ground.

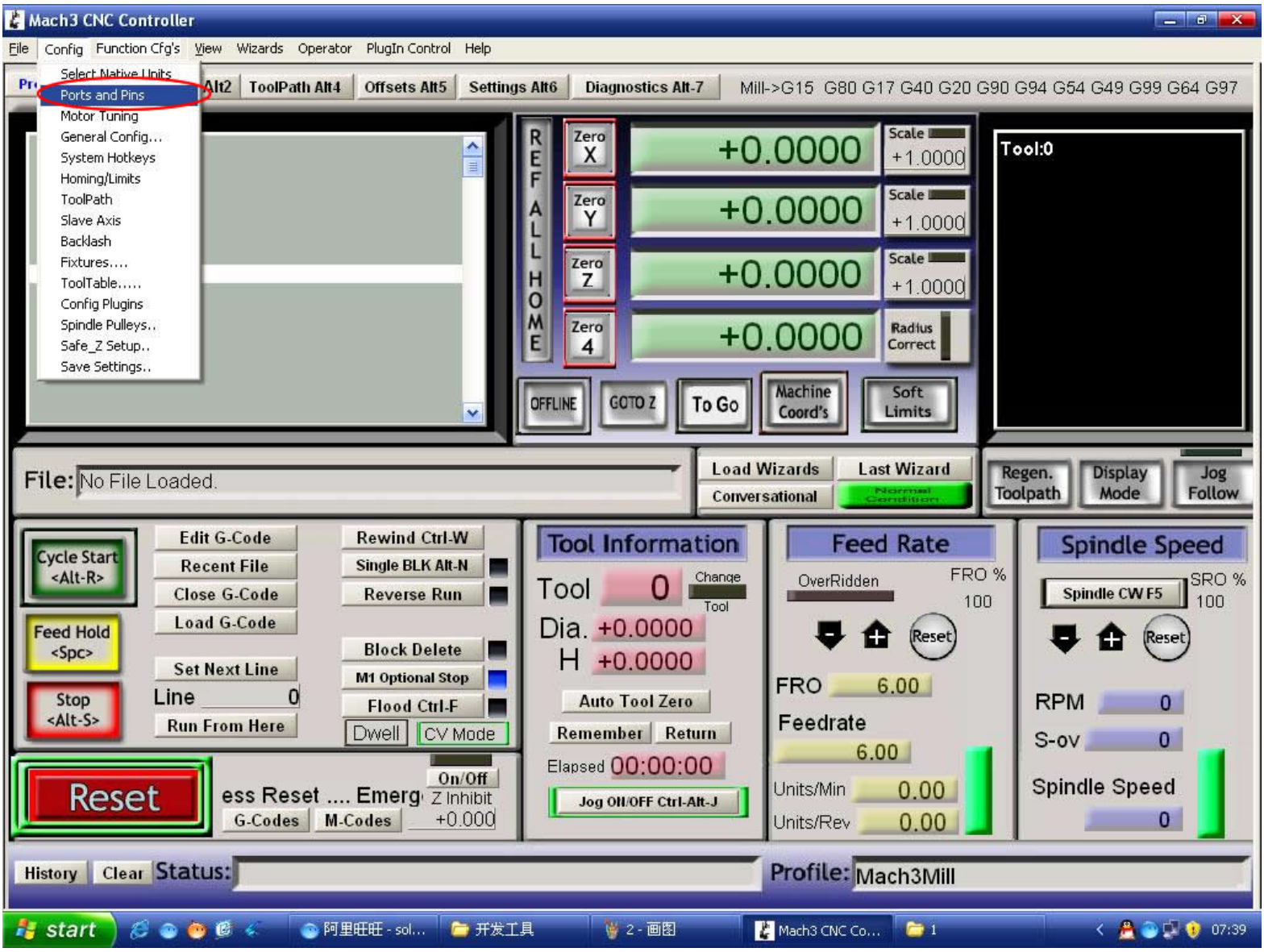


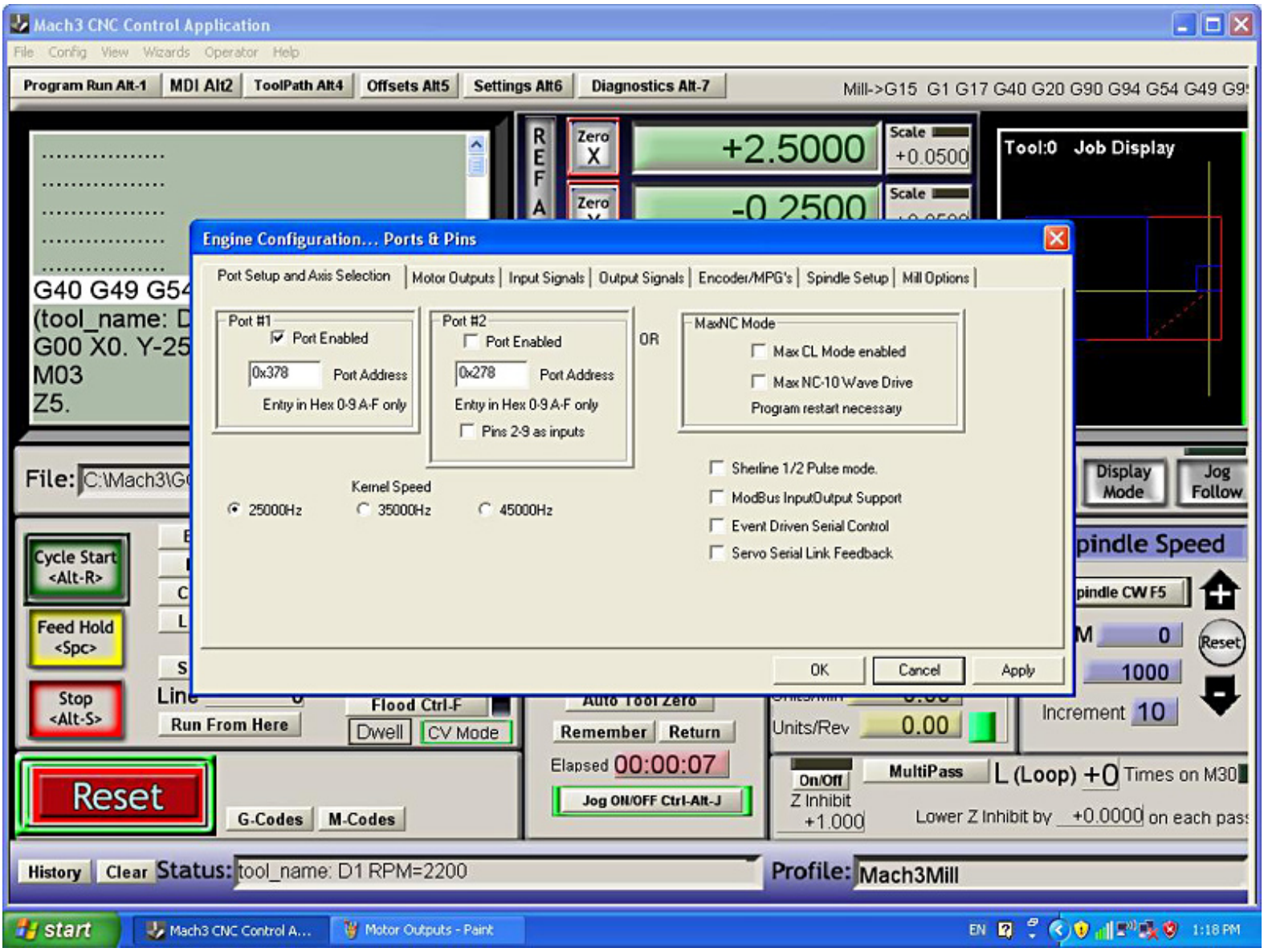
CO2 laser engraving machine 'Firing' setup

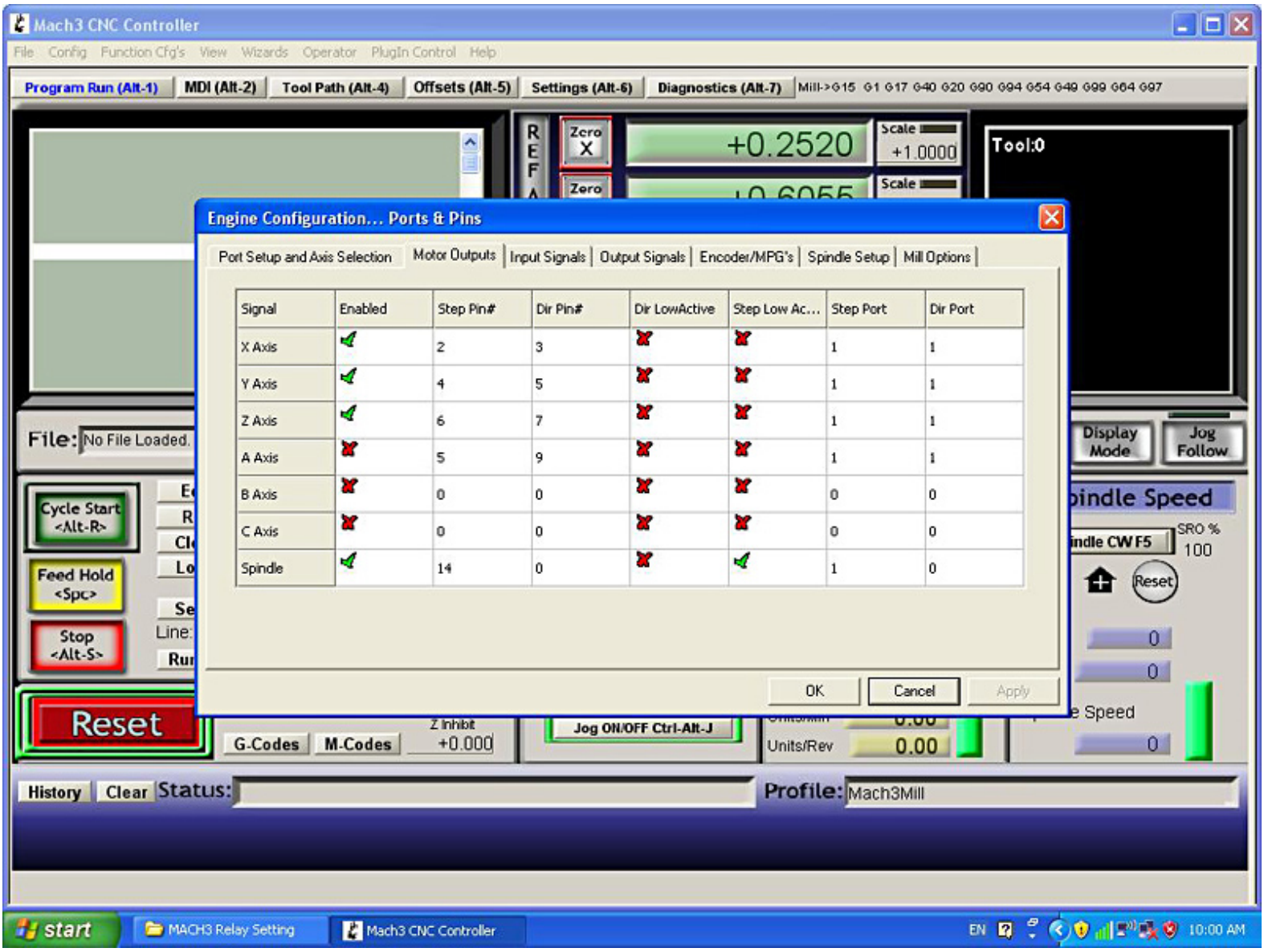
CW – the direction output of Z stepping motor send +5V when Z value change in positive direction (user configuration). It's connected to the COM port of the relay and the GND is connected to the Gnd(ground) of the CO2 power supply. Note, the power supply must support 5V triggering as the 'CW' output signal is TTL level, either in 0V or in 5V.

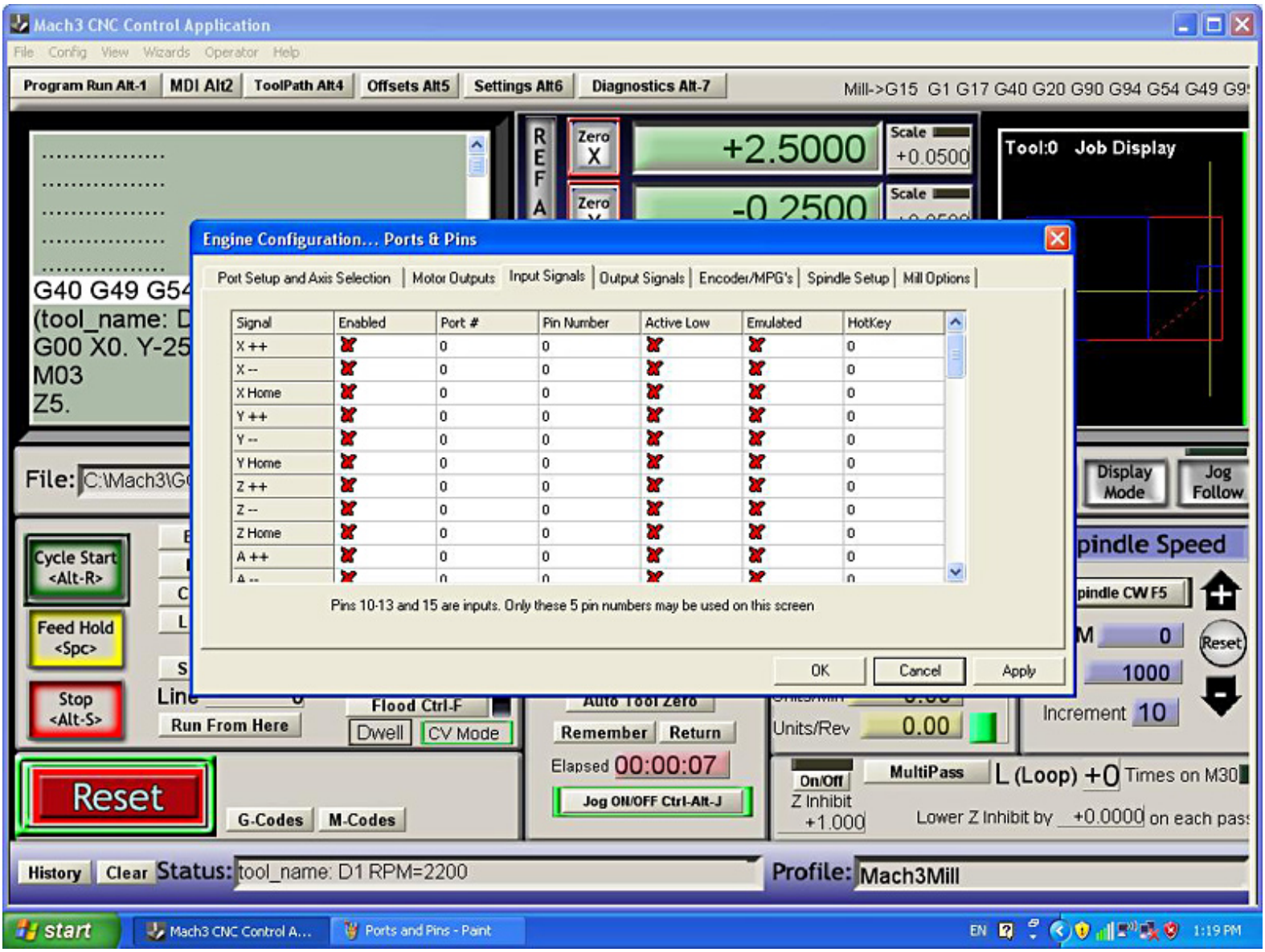


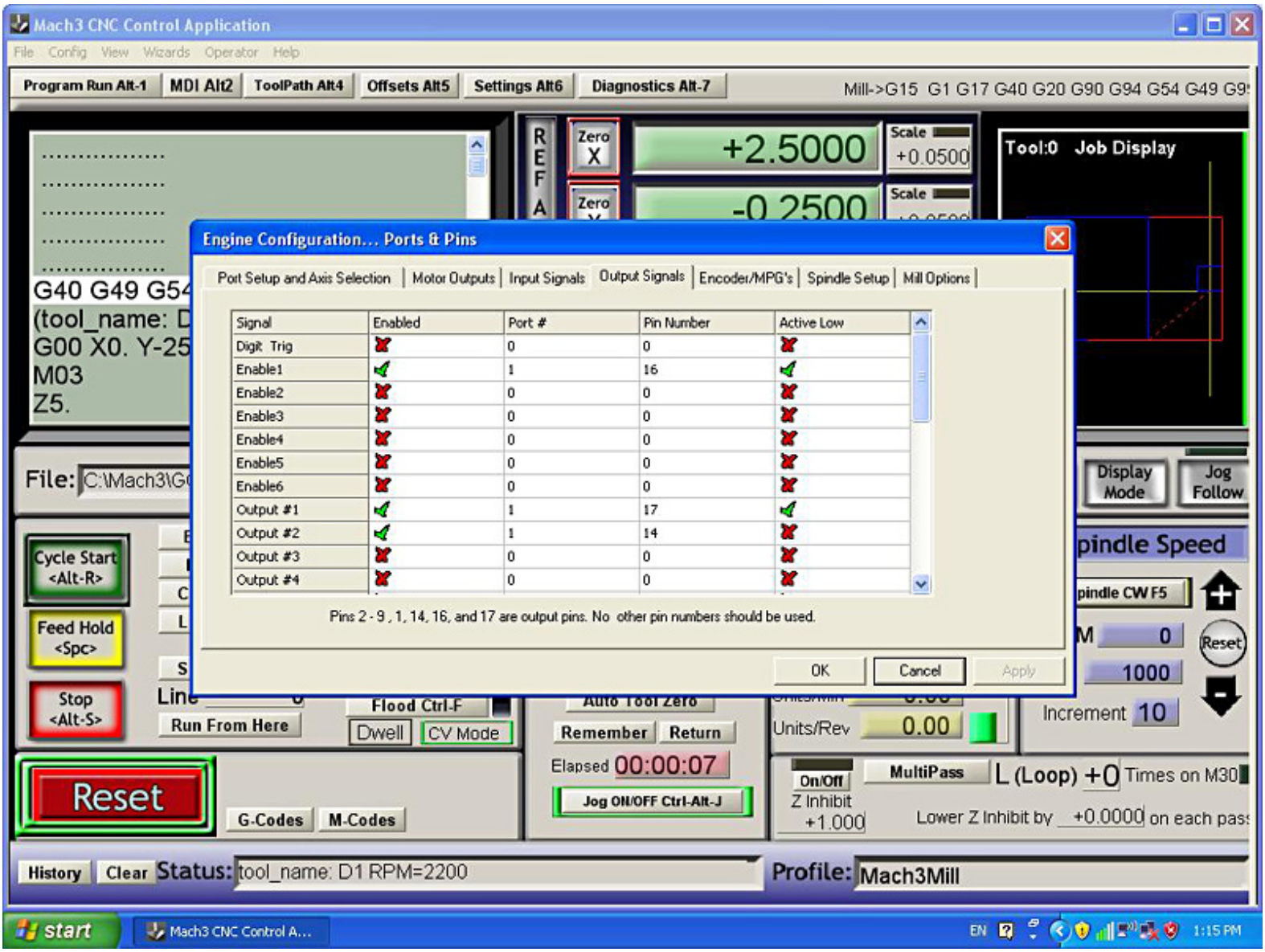
MACH3 Setup. Note: some parameters is in default setting




Mach3 CNC Control Application
File Config View Wizards Operator Help
Program Run Alt-1
MDI Alt2
ToolPath Alt4
Offsets Alt5
Settings Alt6
Diagnostics Alt-7
Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G9
Zero X
+2.5000
Scale
+0.0500
-0.2500
Tool:0 Job Display
G40 G49 G54
(tool_name: D
G00 X0. Y-25
M03
Z5.
Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Port #1
Port Enabled
0x378
Port Address
Entry in Hex 0-9 A-F only
Port #2
Port Enabled
0x278
Port Address
Entry in Hex 0-9 A-F only
Pins 2-9 as inputs
OR
MaxNC Mode
Max CL Mode enabled
Max NC-10 Wave Drive
Program restart necessary
Sherline 1/2 Pulse mode.
ModBus InputOutput Support
Event Driven Serial Control
Servo Serial Link Feedback
Kernel Speed
25000Hz
35000Hz
45000Hz
OK
Cancel
Apply
File: C:\Mach3\G
Display Mode
Jog Follow
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
Run From Here
Flood Ctrl-F
Dwell
CV Mode
Auto Tool Zero
Remember
Return
Elapsed 00:00:07
Jog ON/OFF Ctrl-Alt-J
Units/Rev 0.00
Increment 10
Reset
G-Codes
M-Codes
On/Off
Z Inhibit
+1.000
MultiPass
L (Loop) +0
Times on M30
Lower Z Inhibit by +0.0000 on each pass
History
Clear
Status: tool_name: D1 RPM=2200
Profile: Mach3Mill
start
Mach3 CNC Control A...
Motor Outputs - Paint
1:18 PM


Mach3 CNC Controller
File Config Function Cfg's View Wizards Operator PlugIn Control Help
Program Run (Alt-1) MDI (Alt-2) Tool Path (Alt-4) Offsets (Alt-5) Settings (Alt-6) Diagnostics (Alt-7)
Engine Configuration... Ports & Pins
Port Setup and Axis Selection Motor Outputs Input Signals Output Signals Encoder/MPG's Spindle Setup Mill Options
Signal | Enabled | Step Pin# | Dir Pin# | Dir LowActive | Step Low Ac... | Step Port | Dir Port
X Axis | ✓ | 2 | 3 | ✗ | ✗ | 1 | 1
Y Axis | ✓ | 4 | 5 | ✗ | ✗ | 1 | 1
Z Axis | ✓ | 6 | 7 | ✗ | ✗ | 1 | 1
A Axis | ✗ | 5 | 9 | ✗ | ✗ | 1 | 1
B Axis | ✗ | 0 | 0 | ✗ | ✗ | 0 | 0
C Axis | ✗ | 0 | 0 | ✗ | ✗ | 0 | 0
Spindle | ✓ | 14 | 0 | ✗ | ✓ | 1 | 0
OK Cancel Apply
+0.2520
Tool:0
File: No File Loaded.
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
Reset
G-Codes M-Codes
Z Inhibit +0.000
Jog ON/OFF Ctrl-Alt-J
Units/Rev 0.00
Display Mode
Jog Follow
SRO % 100
History Clear Status:
Profile: Mach3Mill
start
MACH3 Relay Setting
Mach3 CNC Controller
10:00 AM


Mach3 CNC Control Application
File Config View Wizards Operator Help
Program Run Alt-1
MDI Alt2
ToolPath Alt4
Offsets Alt5
Settings Alt6
Diagnostics Alt-7
Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G9
Zero X
+2.5000
Scale
+0.0500
-0.2500
Tool:0 Job Display
G40 G49 G54
(tool_name: D
G00 X0. Y-25
M03
Z5.
Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Signal
Enabled
Port #
Pin Number
Active Low
Emulated
HotKey
X ++
X --
X Home
Y ++
Y --
Y Home
Z ++
Z --
Z Home
A ++
Pins 10-13 and 15 are inputs. Only these 5 pin numbers may be used on this screen
OK
Cancel
Apply
File: C:\Mach3\G
Display Mode
Jog Follow
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
Run From Here
Flood Ctrl-F
Dwell
CV Mode
Auto Tool Zero
Remember
Return
Elapsed 00:00:07
Jog ON/OFF Ctrl-Alt-J
pindle Speed
pindle CW F5
Reset
1000
Increment 10
Units/Rev 0.00
On/Off
Z Inhibit
+1.000
MultiPass
L (Loop) +0
Times on M30
Lower Z Inhibit by +0.0000 on each pass
Reset
G-Codes
M-Codes
History
Clear
Status: tool_name: D1 RPM=2200
Profile: Mach3Mill
start
Mach3 CNC Control A...
Ports and Pins - Paint
EN
1:19 PM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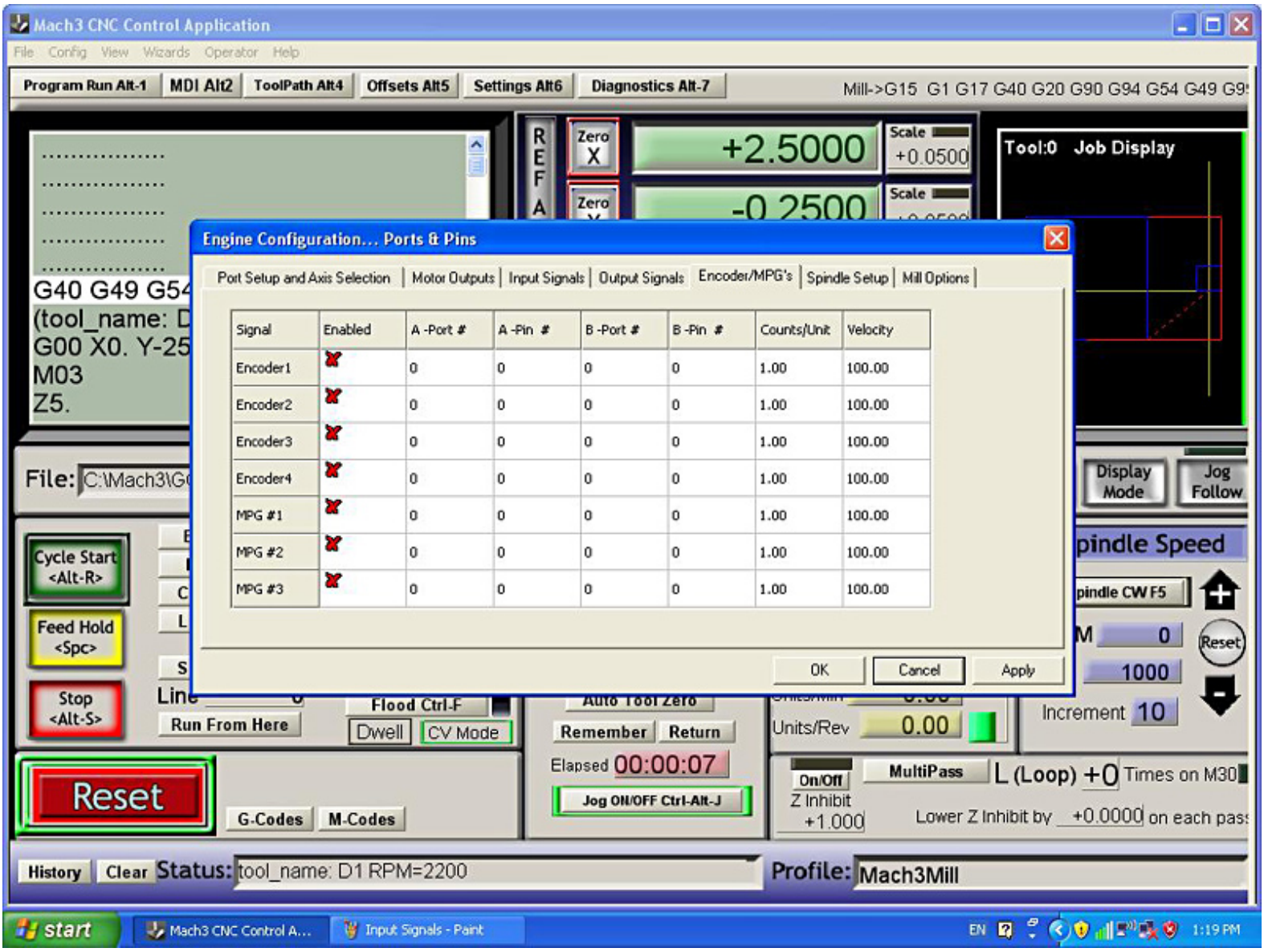
Program Run Alt-1
MDI Alt2
ToolPath Alt4
Offsets Alt5
Settings Alt6
Diagnostics Alt-7
Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G9
Zero X
+2.5000
Scale
+0.0500
-0.2500
Tool:0 Job Display
G40 G49 G54
(tool_name: D
G00 X0. Y-25
M03
Z5.
Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Signal
Enabled
Port #
Pin Number
Active Low
Digit Trig
Enable1
Enable2
Enable3
Enable4
Enable5
Enable6
Output #1
Output #2
Output #3
Output #4
Pins 2 - 9 , 1, 14, 16, and 17 are output pins. No other pin numbers should be used.
OK
Cancel
Apply
File: C:\Mach3\G
Display Mode
Jog Follow
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
Run From Here
Flood Ctrl-F
Dwell
CV Mode
Auto Tool Zero
Remember
Return
Elapsed 00:00:07
Jog ON/OFF Ctrl-Alt-J
pindle Speed
pindle CW F5
Reset
1000
Increment 10
Units/Rev 0.00
On/Off
Z Inhibit
+1.000
MultiPass
L (Loop) +0
Times on M30
Lower Z Inhibit by +0.0000 on each pass
Reset
G-Codes
M-Codes
History
Clear
Status: tool_name: D1 RPM=2200
Profile: Mach3Mill
start
Mach3 CNC Control A...
1:15 PM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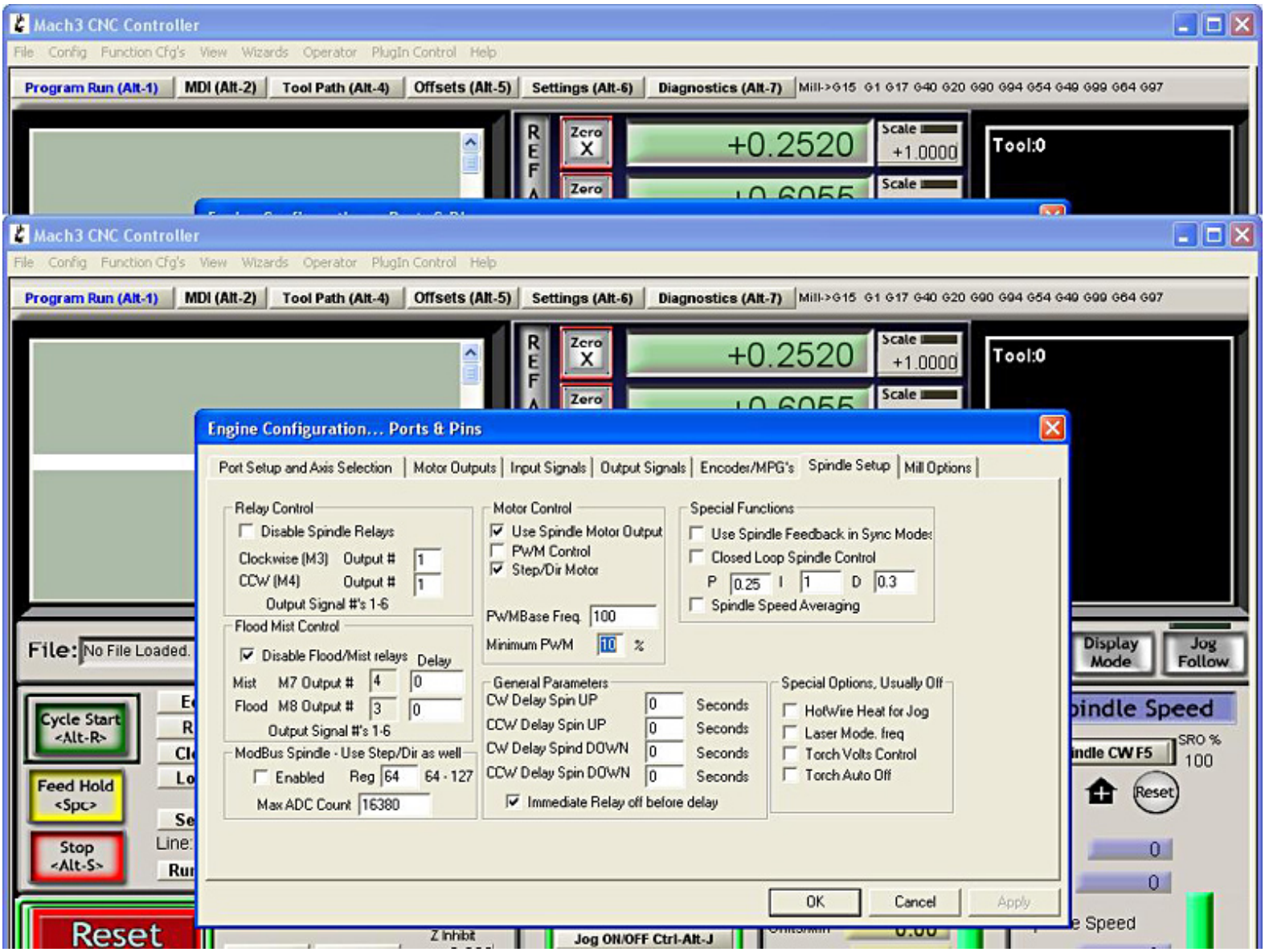
File Config View Wizards Operator Help
Program Run Alt-1
MDI Alt2
ToolPath Alt4
Offsets Alt5
Settings Alt6
Diagnostics Alt-7
Mill->G15 G1 G17 G40 G20 G90 G94 G54 G49 G9
Zero X
+2.5000
Scale
+0.0500
-0.2500
Tool:0 Job Display
G40 G49 G54
(tool_name: D
G00 X0. Y-25
M03
Z5.
Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Signal
Enabled
A -Port #
A -Pin #
B -Port #
B -Pin #
Counts/Unit
Velocity
Encoder1 0 0 0 0 1.00 100.00
Encoder2 0 0 0 0 1.00 100.00
Encoder3 0 0 0 0 1.00 100.00
Encoder4 0 0 0 0 1.00 100.00
MPG #1 0 0 0 0 1.00 100.00
MPG #2 0 0 0 0 1.00 100.00
MPG #3 0 0 0 0 1.00 100.00
OK
Cancel
Apply
File: C:\Mach3\G
Display Mode
Jog Follow
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
pindle Speed
pindle CW F5
M 0
Reset
1000
Increment 10
Run From Here
Flood Ctrl-F
Dwell
CV Mode
Auto Tool Zero
Remember
Return
Units/Rev 0.00
Elapsed 00:00:07
Jog ON/OFF Ctrl-Alt-J
Reset
G-Codes
M-Codes
On/Off
Z Inhibit
+1.000
MultiPass
L (Loop) +0
Times on M30
Lower Z Inhibit by +0.0000 on each pass
History
Clear
Status: tool_name: D1 RPM=2200
Profile: Mach3Mill
start
Mach3 CNC Control A...
Input Signals - Paint
EN
1:19 PM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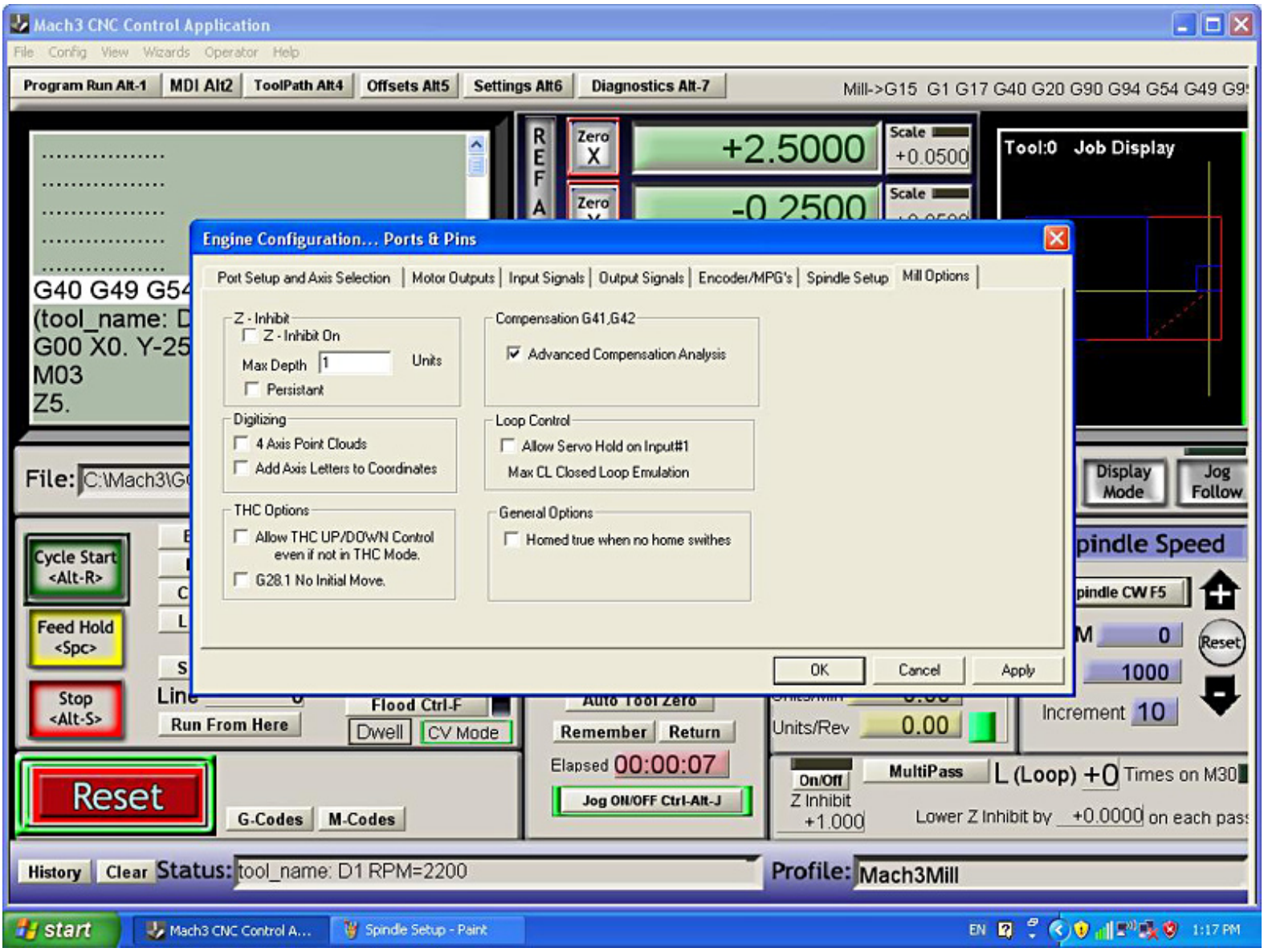
File Config Function Cfg's View Wizards Operator PlugIn Control Help
Program Run (Alt-1) MDI (Alt-2) Tool Path (Alt-4) Offsets (Alt-5) Settings (Alt-6) Diagnostics (Alt-7)
Zero X
+0.2520
Scale
+1.0000
Tool:0
Engine Configuration... Ports & Pins
Port Setup and Axis Selection
Motor Outputs
Input Signals
Output Signals
Encoder/MPG's
Spindle Setup
Mill Options
Relay Control
Disable Spindle Relays
Clockwise (M3) Output # 1
CCW (M4) Output # 1
Output Signal #'s 1-6
Flood Mist Control
Disable Flood/Mist relays
Delay
Mist M7 Output # 4 0
Flood M8 Output # 3 0
Output Signal #'s 1-6
ModBus Spindle - Use Step/Dir as well
Enabled Reg 64 64 - 127
Max ADC Count 16380
Motor Control
Use Spindle Motor Output
PWM Control
Step/Dir Motor
PWMBase Freq. 100
Minimum PWM 10 %
General Parameters
CW Delay Spin UP 0 Seconds
CCW Delay Spin UP 0 Seconds
CW Delay Spind DOWN 0 Seconds
CCW Delay Spin DOWN 0 Seconds
Immediate Relay off before delay
Special Functions
Use Spindle Feedback in Sync Mode
Closed Loop Spindle Control
P 0.25 I 1 D 0.3
Spindle Speed Averaging
Special Options, Usually Off
HotWire Heat for Jog
Laser Mode, freq
Torch Volts Control
Torch Auto Off
OK
Cancel
Apply
File: No File Loaded.
Display Mode
Jog Follow
Cycle Start <Alt-R>
Feed Hold <Spc>
Stop <Alt-S>
Reset
Jog ON/OFF Ctrl-Alt-J



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