MaxStepper
Serial Step and Direction Pulse Generator

User Manual

Table of Contents

WARNING: Improper operation of CNC equipment can result in severe injury. Keep hands, fingers, loose clothing, long hair and all other body parts a safe distance away from moving parts.

Parts List
MaxStepper board
RS232 Serial Cable with a 9 Pin D-Sub connector
9 VDC 200mA AC Power Adaptor

Key Features
- Serial commands at 115,200 baud rate
- 24-bit motion commands; up to 16,777,215 steps per motion
- 77 Hz to 16 KHz adjustable step rate with 1 Hz resolution single axis motion
- 77 Hz to 14 KHz adjustable step rate with 1 Hz resolution dual axis motion
- 77 Hz to 13 KHz adjustable step rate with 1 Hz resolution triple axis motion
- 77 Hz to 14 KHz adjustable step rate with 1 Hz resolution quadruple axis motion
- Four-axis linear interpolation
- Hardware linear ramping in 1 to 10 Hz increments (user adjustable)
- User adjustable ramp up/down for fast sequences
- 39-motion command buffer for fast sequences of motion
- Dual limit switch inputs per axis (TTL or pull-up)
- E-stop input (TTL or pull-up) for instant stop
- Spindle clockwise and counter-clockwise digital outputs for solid state relays
- Flood and mist coolant digital outputs for solid state relays
- Two user-configured digital output for solid state relays
- One pulse-width modulated spindle speed output for solid state motor control
- One auxiliary digital input (TTL 5 VDC) for monitoring
- OCX control for Visual Basic (VB) and other software use
- KCam 4 compatible
- X,Y,Z,A Axis outputs: Step, Direction, Enable
- X,Y,Z,A Axis inputs: Forward Limit Switch, Reverse Limit Switch
- Stable motion with any operating system including Win95/98
- Output frequency is smooth and consistent regardless of PC operating system load

Introduction

MaxStepper is a PC-controlled serial step and direction pulse generator that provides exceptionally smooth operation at a reasonable price. It interfaces a PC running Microsoft Windows and a set of four stepper motor drivers, and uses a microcontroller to convert serial commands to pulses. MaxStepper can control auxiliary devices such as relays, and has inputs for monitoring devices or auxiliary switches.
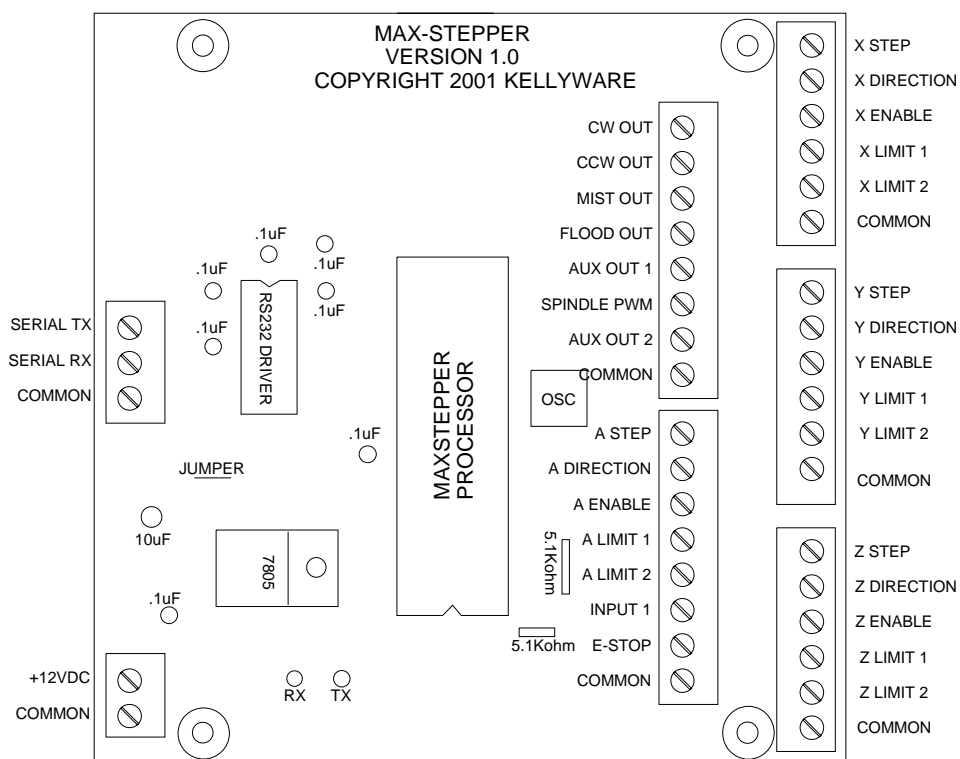
Installation

1. Connect the cable to a 9 pin serial port at the rear of the PC. (If only a 25 pin serial port is available, use an adaptor to convert to a 9 pin port).
2. Plug in the AC power adapter to a wall outlet.
3. Connect the stepper motor drivers to the X, Y, Z and A axis.

Setup

1. Start the KCam software.
2. From the **Setup** menu, select **Port Setup**.
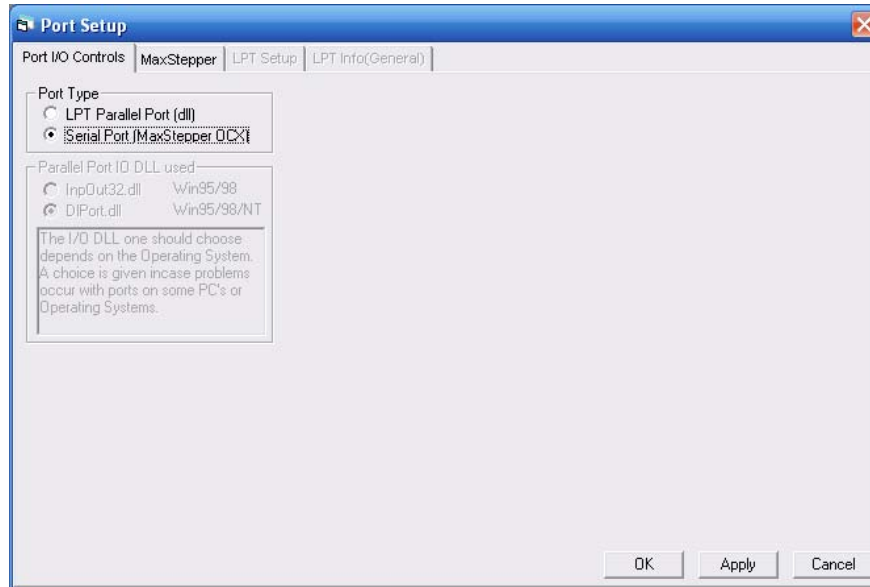3. Select **Serial Port (MaxStepper OCX)** (Figure 1).

Figure 1
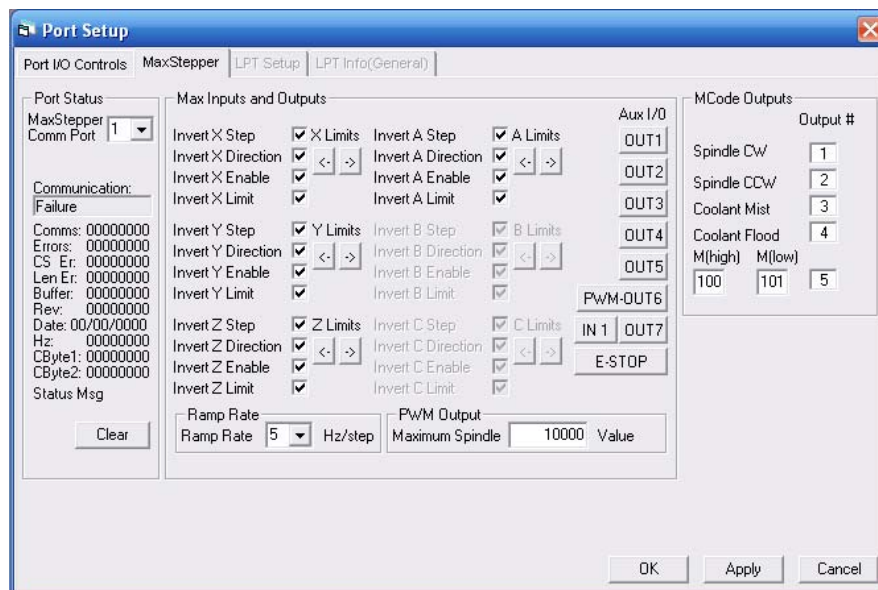
4. Select the **MaxStepper** tab (Figure 2).

Figure 2

5. Under **Port Status**, select the MaxStepper Comm Port to which you connected the serial cable during installation.
6. Make appropriate adjustments to the **Max Inputs and Outputs** to suit your stepper motor driver requirements.
7. Click **Apply** to save your parameters.
8. You should see the MaxStepper firmware **Rev** and **Date** information in the **Port Status** group.
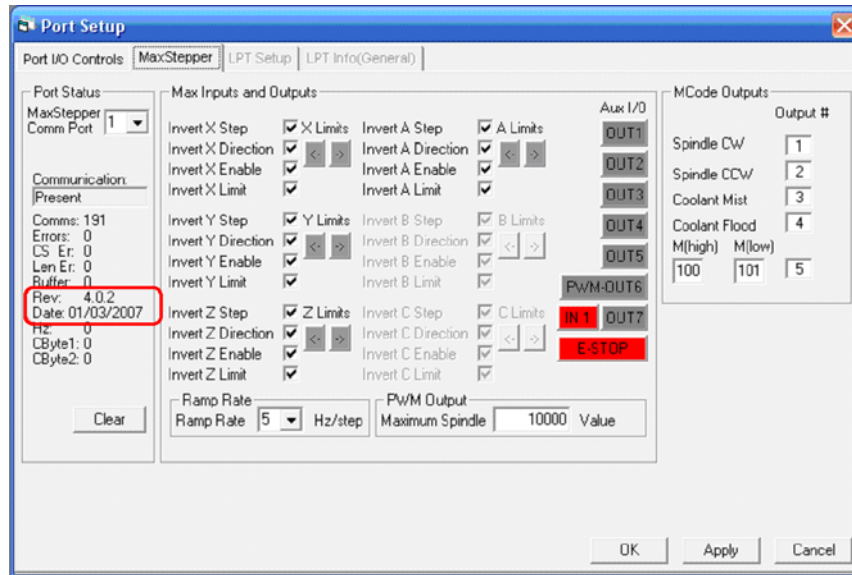

Figure 3

9. Close the **Port Setup** window.

10. From the **View** menu, select **CNC Controls**, and test the motors with the jog buttons. The motors should move as the jog buttons are pressed.
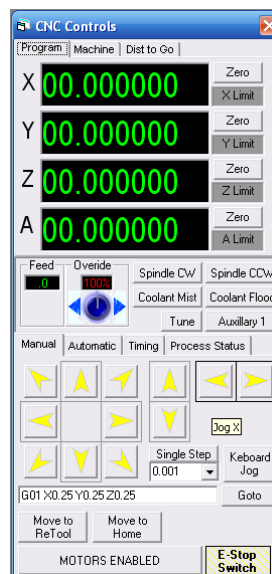

Figure 4

Setup is complete, and you are now ready to use KCam.

Troubleshooting

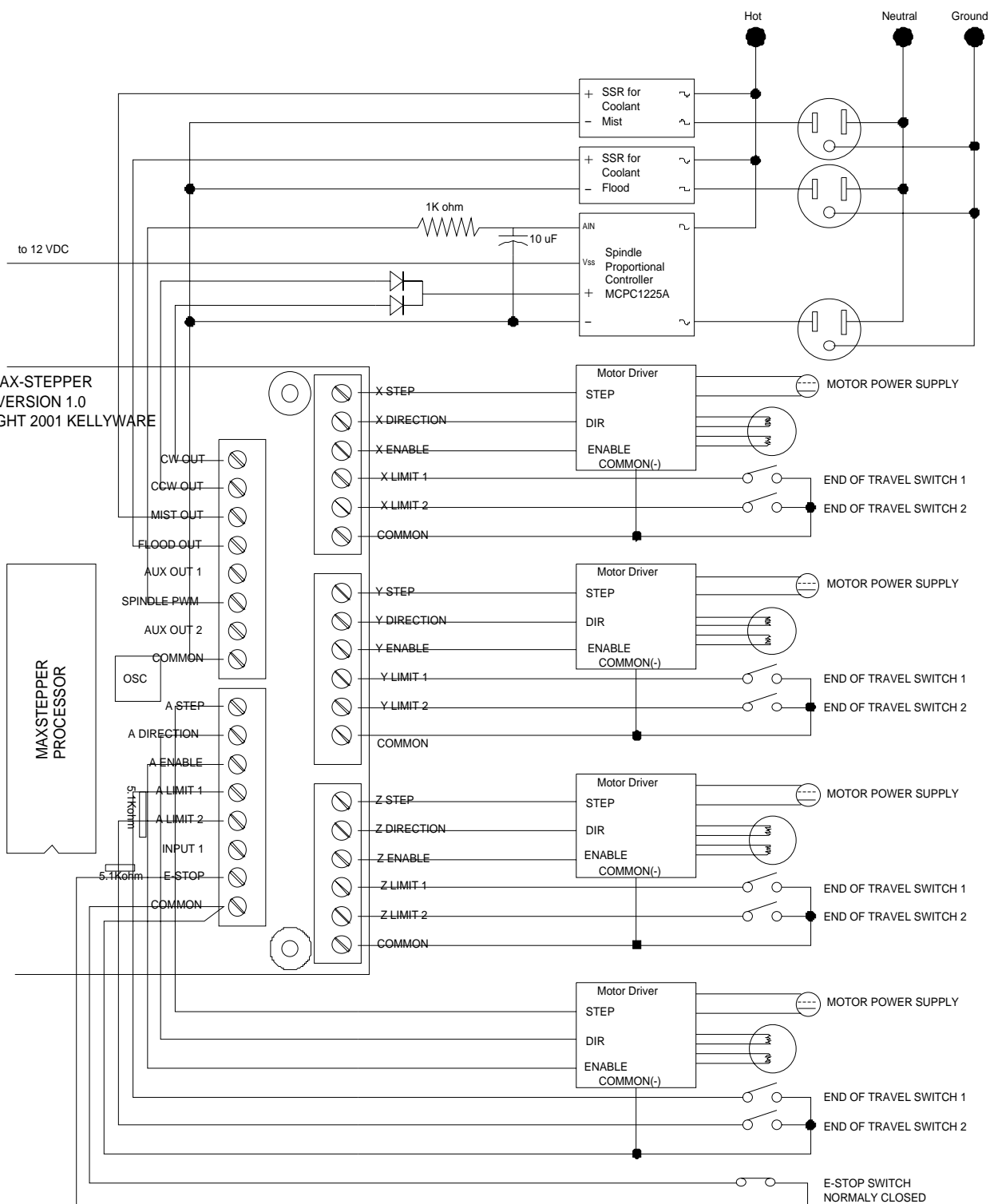| Problem	Solution
I just installed MaxStepper. The Status bar shows "MaxStepper Failure" and the Port Setup Window shows an increasing number in the Error status.	Make sure MaxStepper is connected properly to a working serial port on the PC. Verify and correct the KCam communication port configuration.
When I press the jog buttons, the position displays show change, but the motors to not move.	• Check and correct any mistakes with the wiring to the stepper motor drivers. • Is the enable wire connected? Drivers may need this to operate the motors. • The enable output may be inverted. If so, reverse the setting in the **Port Setup** window. • Make sure power is applied to the stepper motor drivers. • If the axis limit switches are displayed as set and limits are not engaged, reverse the **Invert _Axis_ Limit** as needed. • Check the E-Stop switch circuit. It should be closed during normal operation.
The stepper motors move, but one or more are running backwards.	Reverse the **Invert _Axis_ Direction** in the **Port Setup** window as needed.
The stepper motors move, but one or more do not stop with limit switches.	Reverse the **Limit Switches Disabled** in the **Table Setup** window.
The stepper motors move, but one axis occasionally goes in the wrong direction.	Swap the step and direction wires to the stepper motor driver for that axis.
The spindle speed output does not work with my Solid State Relay (SSR).	A special type of SSR is required for spindle speed control. A Crydom MCPC1225A Proportional Controller SSR or similar model along with a 1K ohm resistor and a 10uF capacitor will convert the PWM signal on Output 6 to a variable 110 VAC power source for a spindle motor or Dremel tool.

Wiring Diagrams

Diagram 1 - Typical Motor Connection

Note: If your motor drivers do not have an enable input, leave the MaxStepper Enable outputs unused.

to PROPORTIONAL CONTROLLER

MAX-STEPPER
VERSION 1.0
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PC SERIAL PORT
9 PIN DSUB

PIN 2	White	SERIAL TX
PIN 3	Red	SERIAL RX
PIN 5	Black	COMMON

.1uF
.1uF
.1uF
.1uF
.1uF
.1uF
.1uF

RS232 DRIVER

MAXSTEPPER PROCESSOR

JUMPER

10uF

7805
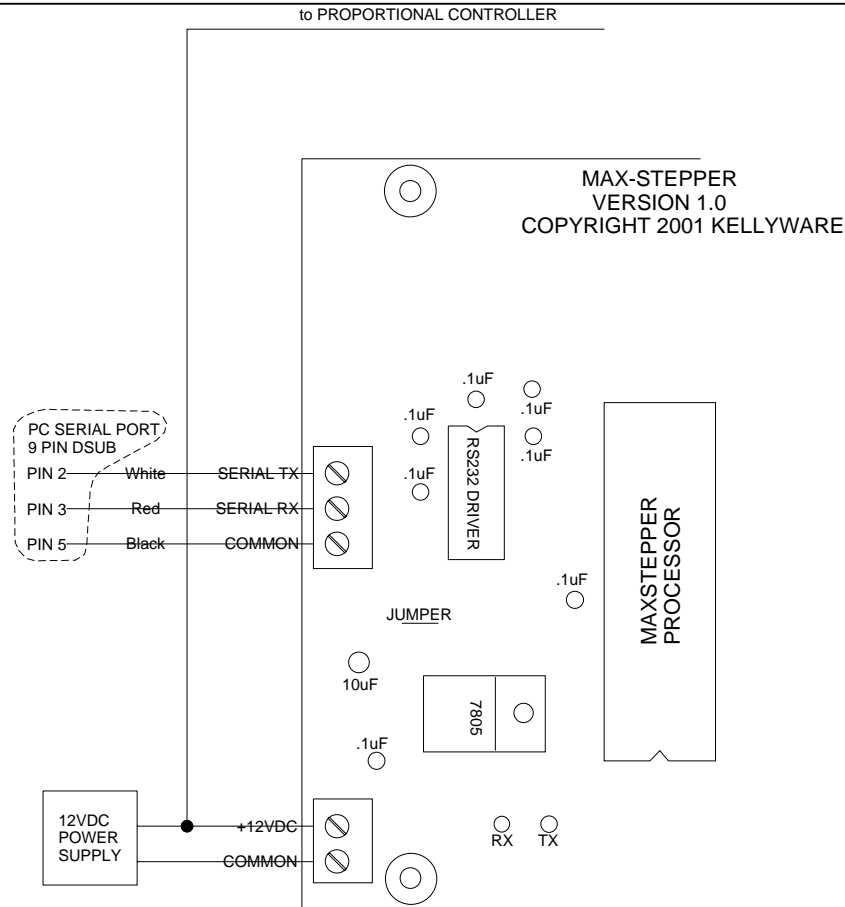
.1uF

RX   TX

12VDC POWER SUPPLY

+12VDC

COMMON

Diagram 2 - Serial Port and Power Supply Connection

Note: If you require a longer serial cable than the one supplied, you may extend its length. Add a length of 22 gauge 3 conductor shielded cable to the terminal end of the existing cable. Be sure to connect the shields of the two cables.
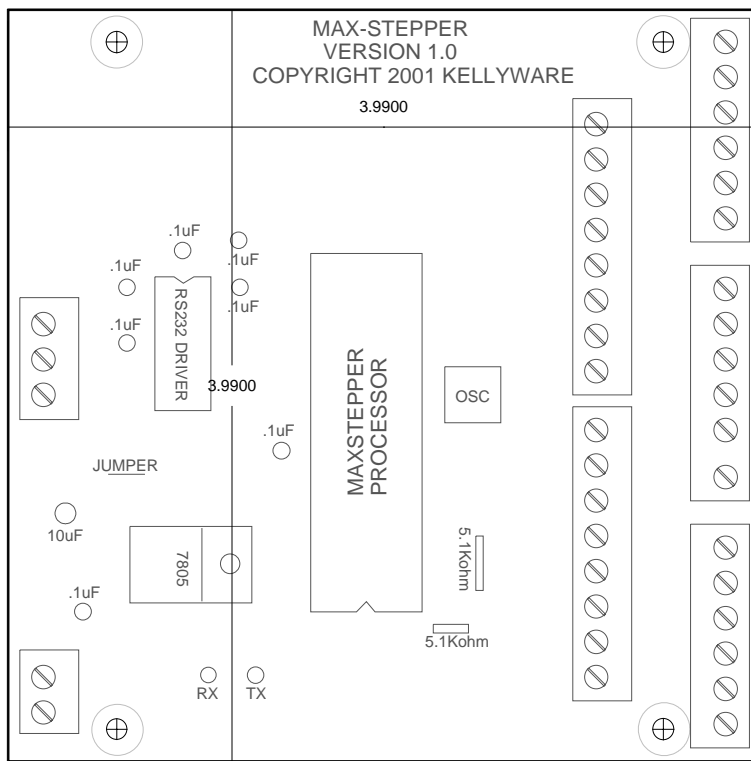
Circuit Board Mounting Pattern

Diagram 3 - Mounting Pattern