Application Note #1318

Motor and Encoder Configuration

Avoiding Runaway Due to Master Reset

It is recommended that the end user always configure their motion control system for stability even when the controller has been reset back to factory default values. When first setting up the motion control system, care must be taken to insure that the feedback of the motor is in the negative feedback direction. If the motor is in the positive feedback direction, it will run away. In the process of setting up the system, it can be very useful to switch the direction of the motor OR encoder through software configuration to achieve stability. If the motor or encoder configuration requires a change, it is always recommended to go back and invert the wiring (either in the motor or encoder) and set the configuration back to the controller's default value. It is important to insure that the system will be stable if someone gives a master reset to the controller or a new controller is installed. (Note: when operating with brushless motors, it is easiest to invert the direction of feedback by inverting the direction of the encoders. To do this, swap the A+ and A- signals OR B+ and B- wires. If the encoder is singled ended, swap the A and B signals.)

Reversing the Direction of Motion

Once stability has been achieved, the direction of the motor commands can be switched by 2 methods:

Method 1.

By reversing the encoder wiring and the motor wiring, the system will maintain stability and the direction of motion will be reversed. Reverse the encoder wiring by swapping the A+ and A- signals OR B+ and B- wires. If the encoder is singled ended, swap the A and B signals. Motor wiring can easily be reversed with a brush type motor by swapping the motor leads. For brushless motors, the motor wiring cannot be easily reversed and the following method is recommended.

Method 2.

The direction of the motor commands can be switched by issuing commands to switch the direction of the motor and encoder in firmware. When both the motor and encoder configurations have been switched, the system will remain stable. If the controller is given a master reset, it is still stable - motion commands will cause the motor to move in the wrong direction if commanded but under this condition the system will still be able to servo (won't run away). If it is necessary to invert the motor type and encoder direction through the parameter setup, check for these values before actually commanding a move.