Instructions

P/N 1000-175
Encoder & RS485 Option Board

for 3540i Programmable Step Motor Drive

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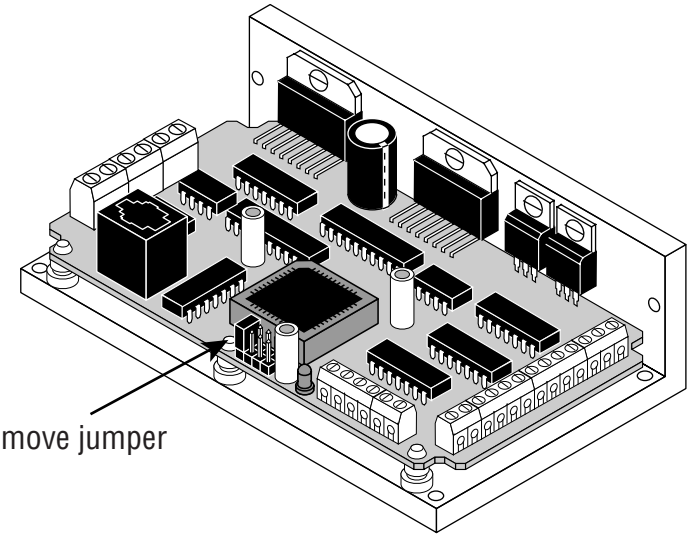
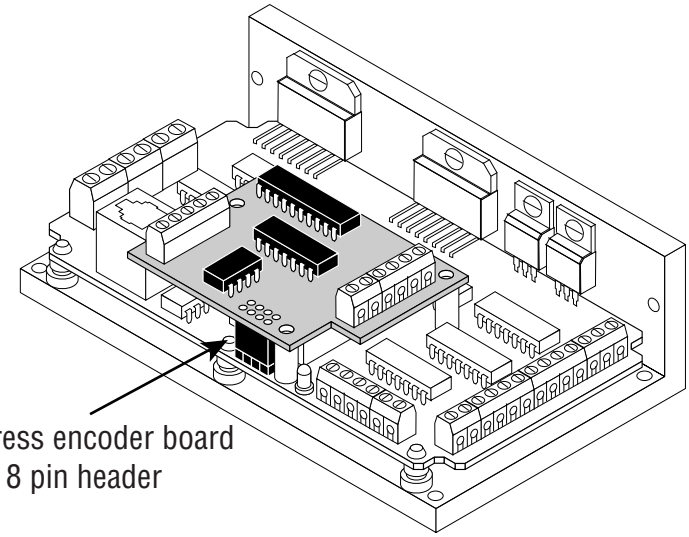
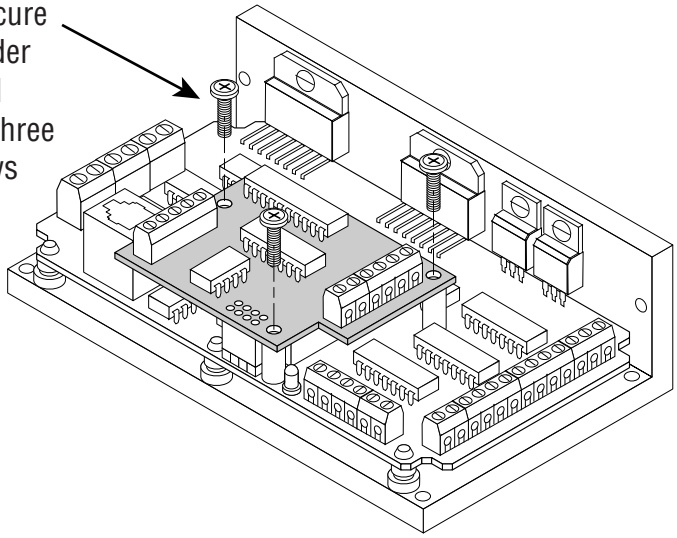
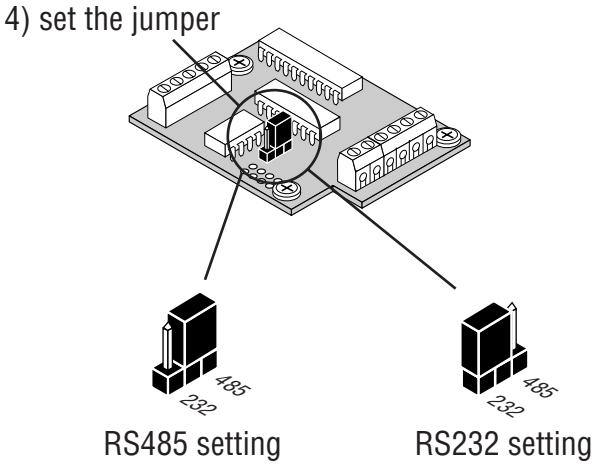
Installation

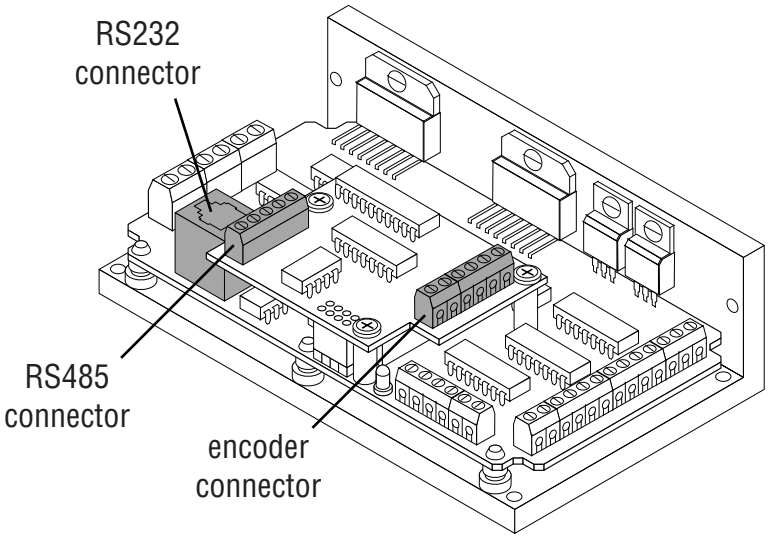








Connectors



RS232

To use the RS232 interface, connect your drive using the RS232 cable & adaptor provided with your 3540i drive.

Set the jumper as shown above.

RS485

Set the jumper as shown on page 2 of these instructions.

Our RS485 implementation is a multi-drop network with separate transmit and receive wires. One pair of wires must connect the host computer's transmit signals to each drive's RX+ and RX- terminals. Another pair connects the TX+ and TX- drive terminals to the host computer's receive signals. A logic ground terminal is provided on each drive and can be used to keep all drives at the same ground potential. This terminal connects internally to the DC power supply return (V-), so if all the drives on the RS485 network are powered from the same supply it is not necessary to connect the logic grounds. You should still connect one drive's GND terminal to the host computer ground. ***Before wiring the entire system, you'll need to connect each drive individually to the host computer so that a unique address can be assigned to each drive.*** Proceed as follows:

1. Connect the drive TX+ to the PC's RX+ terminal.
2. Connect the drive TX- to PC RX-.
3. Connect RX+ to TX+.
4. Connect RX- to TX-.
5. Connect GND to GND.

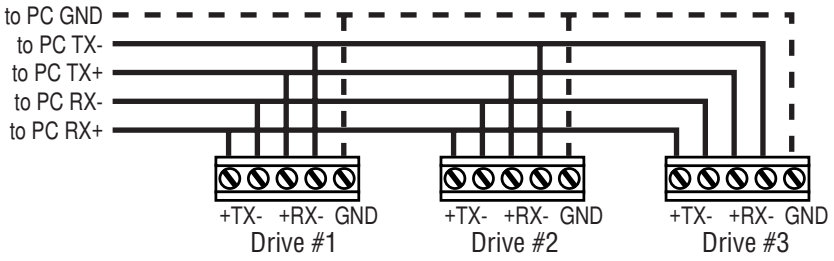
Apply power to the PC and start the *SiNet™ Setup* software. Select the proper comm port (1,2,3 or 4) then apply power to the drive. Press the Caps Lock key. ***The drives only accept commands in uppercase.*** Type RV then press ENTER. If the drive has power and is properly wired, it will respond with "RV=x". Where x is the firmware version of your drive. If the drive responds, you're home free: the RS485 network is functioning.

Next, you must choose an address for this drive. Any of the "low ascii" characters (many of which appear above the number keys on a PC keyboard) is acceptable: ! " # $ % & ' ( ) * + , - . / 0 1 2 3 4 5 6 7 8 9 : ; < > ? @

To find out what address is in the drive now, type DA then press enter. The drive will respond with DA=x, where x is the address that was last stored. (For example, the response might be DA=@ or DA=!). To change the address, type DAy, where y is the new address character, then press ENTER.

To test the new address, type yRV, then press ENTER. For example, if you set the address to % and want to test that, type %RV. The drive should respond just as it does to RV, the global revision level request.

Once all the drives have been assigned unique addresses, you can proceed to wire the whole system together as shown below.



Getting an RS485 adaptor for your PC

Model 117701 from Jameco Electronics (800-831-4242) works well. This adaptor is for a 25 pin serial port. If you are like most people and have a 9 pin serial port on your PC, you will also need to purchase Jameco cable 31721. Connect as follows:

adaptor	drive
1	RX+
2	RX-
3	TX-
4	TX+

Set the switches for DCE and TxON,RxON

Don't forget to plug in the DC power adaptor that comes with the unit.

Wiring the Encoder

The 1000-175 option board is designed for use with single ended or differential output quadrature encoders. Differential encoders are recommended because they provide better noise immunity.

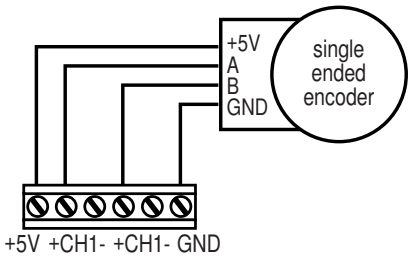
There is one restriction on your choice of encoder. The motor resolution must be a multiple of the encoder resolution. Keep in mind that the drive uses "X4" decoding of the encoder signals, so a 1000 line encoder produces 4000 counts per revolution.

An excellent choice of encoders is the U.S. Digital E2-1000 series. That unit has a 1000 line code wheel, which produces 4000 counts/rev at the drive. That will work well with a motor resolution of 20000 step/rev, which is the default setting. Simply set the encoder ratio (ER software command) at 5.

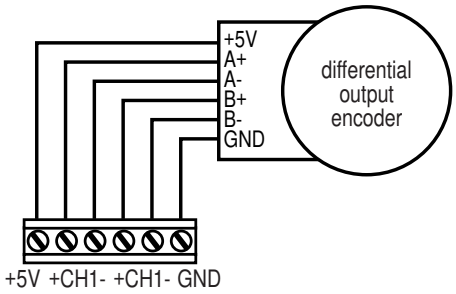
The U.S. Digital E2-500 series is also popular and provides 2000 counts/rev. For the E2-500, set ER at 10.

The sketches on the right show proper wiring for single ended and differential encoders. Built-in "pull up" resistors are provided for "open collector" encoder outputs. A +5VDC output is provided for powering the encoder. 100 mA is available.

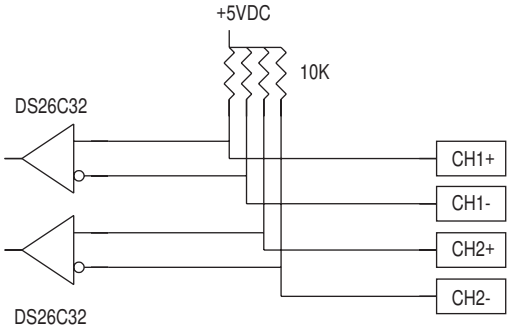
The schematic diagram of the encoder input circuitry is shown at the right.



Connecting a Single Ended Encoder



Connecting a Differential Encoder



Encoder Board Schematic

Testing the Encoder

In the diagram above, we suggested that you connect the encoder A channel to the drive's CH1 input, and the encoder B channel to CH2. However, depending on how your motor is wired, this might cause the encoder to count in the opposite direction as the motor. That's bad, because encoder position tracking depends on the encoder counting up when the motor does.

The best way to test the encoder is:

1. Wire the motor, encoder, power supply, and PC. Connect only one drive for this test. (It makes no sense to wire the others now, as we aren't certain about the encoder connections yet.)
2. Power up the computer and the drive.
3. Launch the SiNet™ Setup software.
4. Type "EP" then press enter. The drive will respond with "EP=" and some number, near 0. That's your power on encoder position, in encoder counts.
5. If EP is not 0, type EP0 to make it so.
6. Type "SP" then press enter. The drive will send "SP=0". The motor position is 0 steps.
7. Type FL. The motor will move one revolution in the positive direction.
8. Type SP. The new motor position should be "SP=20000". You've moved 20000 steps, the power on default distance.
9. Type EP. The drive will tell you the new encoder position. If that position is negative, you must power down the drive and switch the encoder A and B wires. (On a differential output encoder, swap A+ for B+ and A- for B-.)
10. Power up and try again.
11. Once you've gotten the encoder counting in the right direction, you'll need to set the encoder ratio (ER). ER is the ratio of encoder counts to motor counts. If, after step 9, you got SP=20000 and EP=4000, the ratio is 5. Type ER5.

Note: the drive does not "remember" the ER setting when power is removed. You'll need to reset this parameter each time power is applied to the drive. This is true of nearly all SiNet™ Command Language parameters. The only parameters that can be committed to nonvolatile memory are power on current (PC), power up mode (PM) and RS485 address (DA).