

FLASHCUT CNC

®

Control Made Simple

I/O Expansion Board Manual



West Coast Office

299 Old County Rd. #16
San Carlos, CA 94070

Phone (650) 595-9305 ♦ Fax (650) 595-9315
www.flashcutcnc.com

Midwest Office

444 Lake Cook Road, Suite 17
Deerfield, IL 60015

Phone (847) 940-9305 ♦ Fax (847) 940-9315
www.flashcutcnc.com

© 1998-2007 FlashCut CNC, Inc.

Latest rev 1-19-07

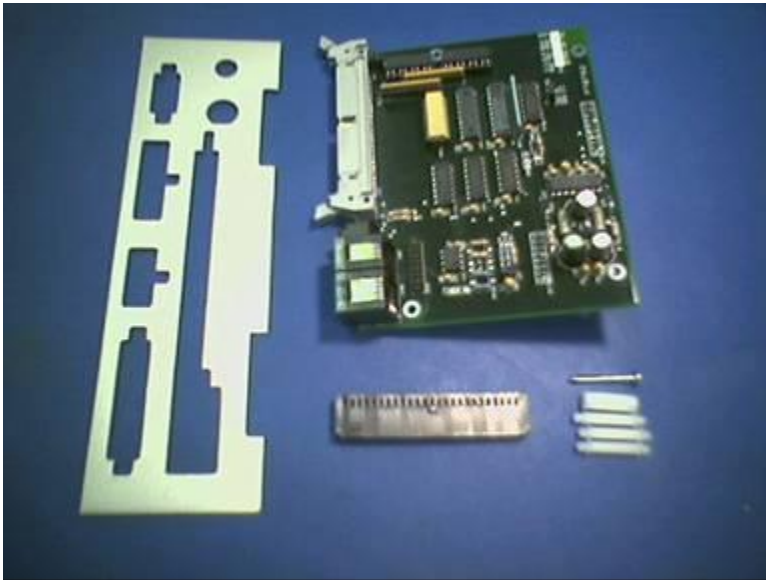
Thank you for purchasing the FlashCut CNC I/O Expansion Board.

To install on your system, you must have the following:

1. Signal Generator with serial number 101xxx or later
2. Lightning M202A microprocessor chip or later
3. FlashCut CNC Software Version 2.1.0 or later

I/O Expansion Board Upgrade Kit

If you are upgrading a current Signal Generator, the I/O Expansion board upgrade kit includes the following:



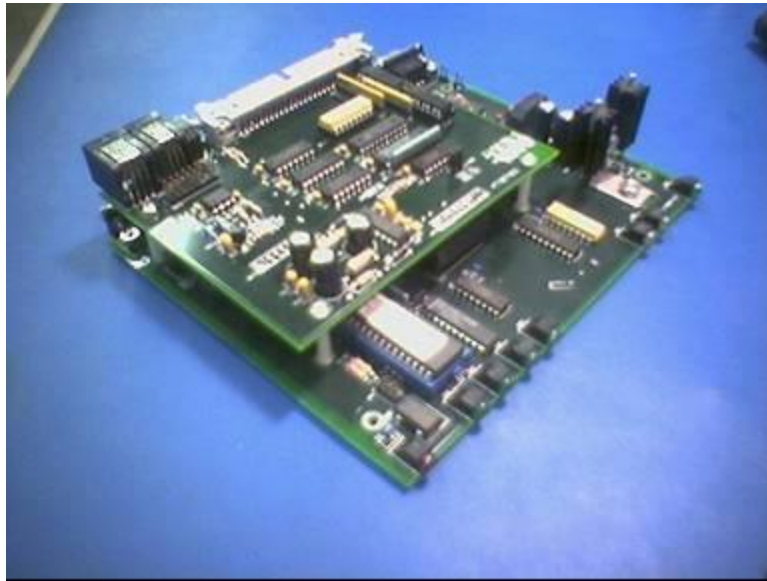
1. I/O Expansion Board
2. (3) $\frac{3}{4}$ " Plastic Standoffs with male board inserts
3. (1) $\frac{3}{4}$ " Round Plastic Spacer
4. (1) 1" Self Tapping Screw
5. (1) Back Panel with I/O Expansion Board cutouts
6. (1) 50 Pin Female connector
7. (1) Lightning M202A chip or Later (Unless your signal generator already had one)

Installation of the I/O Expansion Board

1. Remove the two screws from the bottom of your signal generator
2. Remove the top cover of the signal generator
3. Replace the current Microprocessor in the blue 40 pin ZIF socket with the M202A or greater chip. Make sure that the notch on the end of the chip is towards the lever of the ZIF socket. The lever of the ZIF socket releases and secures the chip. Send the old chip back to FlashCut CNC.
4. Unplug the switch, power and fuse cable connectors from the board.
5. Remove the (4) self tapping screws and washers that secure the main circuit board to the case. They are located in the 4 corners of the board.
6. Carefully remove the circuit board and the front and rear panels from the bottom of the case.
7. Place the (3) standoffs with the mail inserts into the bottom of the I/O expansion board using the holes shown below.



8. Carefully place the I/O Expansion board onto the signal generator board. Make sure that the male pins on headers IDC4 and IDC5 line up properly with the female sockets on the bottom of the I/O expansion board. Also make sure that the inserts of the plastic standoffs mate properly with the corresponding holes on the signal generator board.
9. Place the 1" self tapping screw through the remaining hole next to IDC6 on the I/O expansion board. The 3/4" round plastic spacer should go over this screw sandwiched in-between the two boards.



10. Remove the power jack assembly and the fuse assembly from the old rear panel of the signal generator. Pay attention to the order of the washers and nuts.
11. Install these assemblies onto the new rear panel in the exact manner that they were installed on the old rear panel. It is very important that the two plastic shoulder washers prohibit the power jack from making electrical contact with the rear panel.
12. Plug in the orange connectors from the switch, power and fuse assemblies onto the signal generator board. The direction or order does not make a difference.
13. Place the front and rear panels onto the board assemblies and carefully insert this assembly into the bottom half of the plastic case.



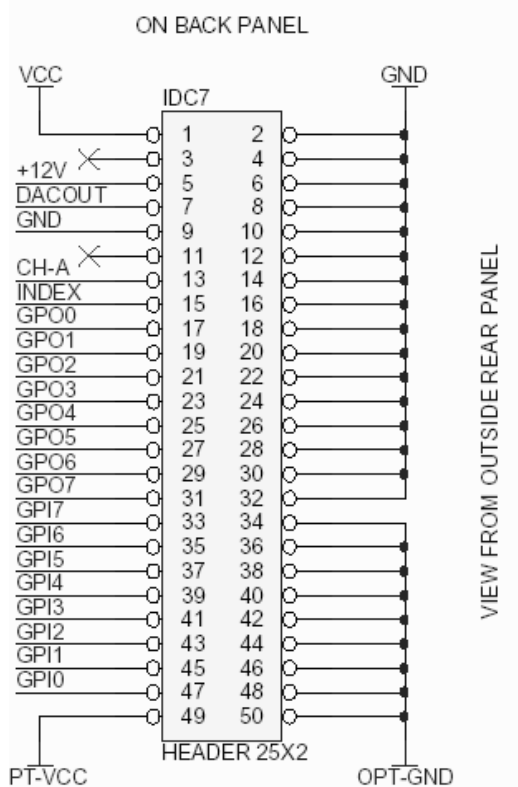
14. Replace the top half of the plastic case and secure with the 2 screws.
15. You have now completed the installation process.

Connectors



The I/O expansion board has 3 connectors on it:

The 50 Pin connector has all of the connections for the upper 8 input lines (GPIO-GPI7), the upper 8 output lines (GPO0-GPO7), Spindle encoder inputs (CH-A, INDEX) and the analog output (DACOUT). The pinout was designed for compatibility with Grayhill or Opto-22 I/O racks. The pinout is as follows:



The 6-Pin RJ-12 Connector is for spindle encoder input. This pinout was made to be compatible with the cable assembly from US-Digital encoders (part number CA-3134-6FT, where 6FT is the length and can be ordered in different lengths). An example of an encoder that connects with this cable and works with the I/O Expansion Board is the US Digital 500 line encoder with an index pulse. 500 lines works very well, but this could vary from 100 to 1000. The index pulse is not absolutely necessary, but it comes in handy if you have to re-start a thread in progress. A US Digital part numbers that works is E6S-500-625-IH. They can be reached at www.usdigital.com.

The 8-Pin RJ-45 Connector is for the spindle control. A Cat-5 cable connector (Ethernet Cable) will plug into it. For your convenience, you can get an 8-pin wiring block from Radio Shack (PN 279-411). This has screw terminals for all 8 pins. They can be reached at www.radioshack.com.

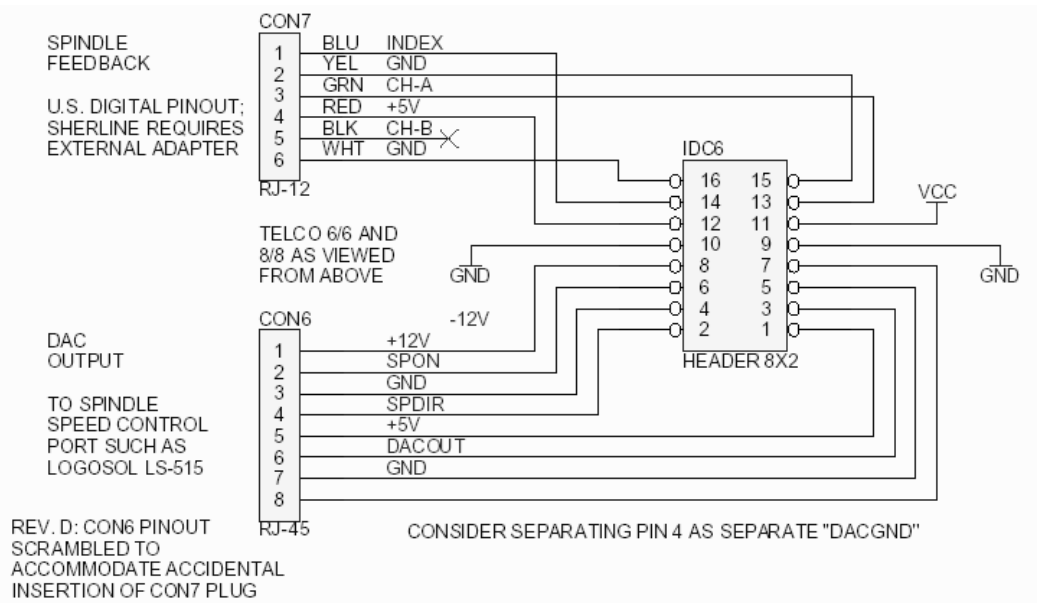


US Digital Encoder



Radio Shack 279-411

For your convenience, a 16 pin header (IDC6) has all of the encoder and spindle control outputs contained in the 6-pin and 8-pin connectors mentioned above. The Pinout for all 3 of these connectors are shown in the schematic below:



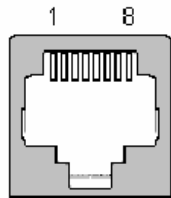
LED's

There are two LED's on the back of the I/O Expansion Board. The top, yellow LED shows the encoder pulses and the bottom, red LED is on if any of the input lines are open or closed (depending on the status of jumper JP5). If JP5 is shorted, then the normal state of all switches is normally open. Therefore, if any of the switches are closed, the LED will be on. If JP5 is open, then the normal state of the switches is normally closed. Therefore if any of the switches are open, the LED will be on.

Making Cables for Spindle Connections

Spindle speed can be controlled from the RJ-45 8-pin jack on the enhanced I/O accessory board that is sold as an optional upgrade to your signal generator box.

Note that there are two "RJ-style" jacks on the board. The smaller, 6-pin, RJ-12 jack carries the signals for spindle encoder monitoring.



The pins on the RJ-45 jack are described in Table 1. A sketch of the RJ-45 jack is shown at left as you would see it looking in from the back of the signal generator. Pins 1 and 8 are indicated.

The mated plug is shown at right with pins 1 and 8 marked for reference.

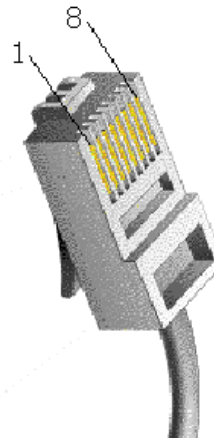


Table 1. RJ-45 Spindle Speed Control connector

PIN	NAME	DESCRIPTION
1	+12 VDC	UP TO 50 MA
2	SPON	"SPINDLE ON" BIT; SAME AS GPOUT BIT 09
3	GND	LOGIC COMMON
4	SPDIR	"SPINDLE DIRECTION" BIT; SAME AS GPOUT BIT 10
5	+5 VDC	UP TO 50 MA
6	DACOUT	UNIPOLAR 0 TO 10 VDC; MIN. EXTERNAL LOAD = 10 KOHM
7	GND	DAC COMMON
8	UNUSED	NOT CONNECTED

The RJ-45 pins are assigned to alleviate electrical damage if the 6-pin encoder plug is inserted into the 8-pin spindle speed jack. Of course, the 8-pin spindle plug will not fit in the 6-pin encoder jack.

The pins on the RJ-12 jack for spindle encoder inputs are described in Table 2. They are arranged to be compatible with off-the-shelf cables from U.S. Digital. The encoder interface also works with Sherline products with the addition of an external adapter assembly.

The RJ-12 jack is shown at right again as you would see it looking at the rear panel of the signal generator box. The pin 1 convention is the same as that of the RJ-45 jack and plug shown above.

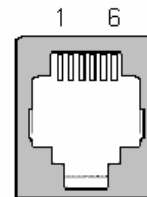


Table 2. RJ-12 Encoder Interface connector

PIN	NAME	DESCRIPTION
1	INDEX	INDEX PULSE, IF PRESENT
2	GND	LOGIC GROUND
3	CH-A	ENCODER CLOCK;; SEE CH-B
4	+5 VDC	UP TO 50 MA
5	CH-B	NOT USED
6	GND	LOGIC GROUND

Note that only the A phase of the quadrature encoder clock is accepted and utilized.



