

**JP1 Inputs**

Same orientation as the board layout above.



The outputs are enabled by a low logic signal (less than .7vdc) on the Enable pin. A second option of connection to the board is leaving JP1 off and installing a 6 pin polarized connector (.1 inch spacing).

**Setting Current Limit**

Measuring the DC voltage between the Ref Pin and GND. Adjust R11 as follows:  
 $V_{ref} = 1.6 * \text{Max motor current}$ . i.e. 1A max = 1.6V , 1.7A max =2.72V, 2.5A max = 4V.

**Setting PFD**

R10 sets the voltage utilized to establish the mixed decay set point of the A3977. Initially set that voltage to 2.5VDC between ground and pin 9 of the 3977. (There is a through hole right next to pin 9 of the chip that can be used) If the voltage at the PFD pin is between 1.5vdc and 2.4Vdc the 3977 will operate in the mixed decay mode depending on micro-stepping setting. See 3977 data sheet for description.

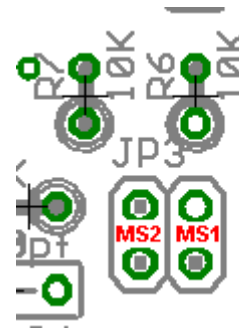
**External 5VDC Supply**

By not installing IC2 (7805 5VDC on board regulator) an external 5 volt DC supply can be used. To do that, install a jumper across JP4. Do not install JP4 and IC2. External 5VDC can be supplied via pin 9 of the IDC connector JP1, or via the EXT +5V connection point. For the highest reliability and noise immunity, install IC2.

## Jumpers for Micro-Stepping

**Table 1. Microstep Resolution Truth Table**

| MS <sub>1</sub> | MS <sub>2</sub> | Resolution          |
|-----------------|-----------------|---------------------|
| L               | L               | Full step (2 phase) |
| H               | L               | Half step           |
| L               | H               | Quarter step        |
| H               | H               | Eighth step         |



Jumper in = L, jumper out = H i.e. for full steps both MS1 and MS2 need to be installed.

## Using the board

The board was designed with a high noise immunity environment in mind. Switching heavy currents and inductive loads are prone to noise. The A3977 driver chip is a chopper, in that it turns the outputs of the driving bridge on and off tens of thousands of times a second. The opportunity for electrical noise is a concern. For that very reason, IC1 is utilized to provide excellent noise rejection. There are two options for IC1. Either a 40106 or 74HC14 Schmitt Trigger Inverter can be installed. The 40106 is older slower technology is preferred for the best noise immunity, but can't be relied to be driven directly by a PC's parallel port. If driving from a PC parallel port with no active conditioning logic, a 74HC14 must be used.

## Parts

| Qty | Part                           | Ref Designator                    |
|-----|--------------------------------|-----------------------------------|
| (2) | 1000pf CAPACITOR               | C1, C4                            |
| (6) | .1uf CAPACITOR                 | C2, C3, C7, C8, C9, C13           |
| (3) | .22uf CAPACITOR                | C5, C6, C10                       |
| (4) | 470pf CAPACITOR                | C11, C14, C17, C18                |
| (1) | 10uf POLARIZED CAPACITOR       | C12                               |
| (2) | 100uf POLARIZED CAPACITOR      | C15, C16                          |
| (1) | 40106N Hex SCHMITT TRIGGER     | IC1                               |
| (1) | 7805 VOLTAGE REGULATOR         | IC2                               |
| (1) | 10 PIN HEADER                  | JP1                               |
| (1) | 3 PIN HEADER                   | JP2                               |
| (2) | 2 PIN HEADER                   | JP3, JP4                          |
| (1) | 3mm LED                        | LED1                              |
| (2) | .2ohm RESISTOR                 | R1, R2                            |
| (9) | 10K RESISTOR                   | R3, R4, R5, R6, R7, R13, R16, R18 |
| (2) | 51K RESISTOR                   | R8, R9                            |
| (1) | 1K RESISTOR                    | R12                               |
| (1) | 2.2K RESISTOR                  | R14                               |
| (1) | 370 RESISTOR                   | R15                               |
| (2) | 10K Trim Pot                   | R10, R16                          |
| (1) | A3977SED Allegro Driver PLCC44 | U1                                |
| (3) | WAGO SREW CLAMP                | X1, X2, X3                        |

## Parts Reference Designators

| Part | Value     | Device          | Package              | Description     |
|------|-----------|-----------------|----------------------|-----------------|
| C1   | 1000pf    | C-US025-024X044 | CAPACITOR,           | American symbol |
| C2   | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C3   | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C4   | 1000pf    | C-US025-024X044 | CAPACITOR,           | American symbol |
| C5   | .22uf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C6   | .22uf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C7   | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C8   | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C9   | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C10  | .22uf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C11  | 470pf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C12  | 10uf tant | CPOL-USE2.5-5   | POLARIZED CAPACITOR, | American symbol |
| C13  | .1uf      | C-US025-024X044 | CAPACITOR,           | American symbol |
| C14  | 470pf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C15  | 100uf     | CPOL-USE2.5-5   | POLARIZED CAPACITOR, | American symbol |
| C16  | 100uf     | CPOL-USE2.5-5   | POLARIZED CAPACITOR, | American symbol |
| C17  | 470pf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| C18  | 470pf     | C-US025-024X044 | CAPACITOR,           | American symbol |
| IC1  | 40106N    | 40106N          | Hex SCHMITT TRIGGER  |                 |
| IC2  | 7805      | 78XXS           | VOLTAGE REGULATOR    |                 |
| JP1  |           | PINHD-2X5       | 2X05                 | PIN HEADER      |
| JP2  | DIR       | PINHD-1X3       | 1X03                 | PIN HEADER      |
| JP3  | StepRate  | PINHD-2X2       | 2X02                 | PIN HEADER      |
| JP4  |           | PINHD-1X2       | 1X02                 | PIN HEADER      |
| LED1 |           | LED3MM          | LED3MM               | LED             |
| R1   | .2        | R-US_0613/5V    | RESISTOR,            | American symbol |
| R2   | .2        | R-US_0613/5V    | RESISTOR,            | American symbol |
| R3   | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R4   | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R5   | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R6   | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R7   | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R8   | 51K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R9   | 51K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R10  |           | R-TRIMM64PRM    | Trim resistor        |                 |
| R11  | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R12  | 1K        | R-US_0204/2V    | RESISTOR,            | American symbol |
| R13  | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R14  | 2.2K      | R-US_0207/2V    | RESISTOR,            | American symbol |
| R15  | 370       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R16  | 10K       | R-TRIMM64PRM    | Trim resistor        |                 |
| R17  | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| R18  | 10K       | R-US_0207/2V    | RESISTOR,            | American symbol |
| U1   | A3977SED  | A3977SED        |                      |                 |
| X1   | OUT2      | W237-02P        | WAGO SREW CLAMP      |                 |
| X2   | OUT1      | W237-02P        | WAGO SREW CLAMP      |                 |
| X3   | VDC       | W237-02P        | WAGO SREW CLAMP      |                 |

