# MODEL 2802500

**Resolver to 12 Bit Parallel Converter**


## *** APPLICATIONS ***

**Ideal For Closed Loop Positioning Systems**
**Machine Tools**
**Servo Motor Control**
**Spindle Motor Control**
**PLC Positioning Control**
**Index/Rotary Tables**
**Transfer Lines**
**Positioning Systems**
**Robotic Applications**
**Nuclear Applications**

## ADVANCED FEATURES

**Compact Design only 17.5 mm wide**
**Single Supply Operation**
**Removable Screw Terminals**
**Jumper Selectable** excitation

RoHS Compliant

VEGA
1270 Souter Blvd.
Troy, MI 48083
248.585.3600

Version: V600.65

***PEOPLE IN CONTROL OF MOTION***

## 2802500 SPECIFICATIONS

| | |
|---|---|
| Excitation: | 2.5, 5, or 10 kHz @ 3.6 vpp |
| Resolver Signal: | 0.8 to 18 vpp |
| Power Requirements: | 7.5 to 25 vDC @ 325 mA |
| Drive Capacity: | 200 mA |
| Mechanical: | 4.10 x 0.75 x 5.00 |
| Accuracy: | +/- 3 arc minutes |

### MAXIMUM TRACKING RATE

The tracking rate is a function of the excitation frequency and quadrature counts. With a 2.5 kHz excitation and 4000 quadrature counts the tracking rate would be 9,600 rpm. With a 10.0 kHz excitation and 4000 quadrature counts the tracking rate would be 38,400 rpm.

### POWER REQUIREMENTS

The 2802500 converter requires +7.5 vDC to +25 vDCsupply @ 325 mAmp for operation. The supplied power should have less than 50 mVolts of noise and drift.

### Recommended Power Supplys (If Required)

TDK DSP30-5 (+5 vDC @ 3 Amps)
TDK DSP60-24 (+24 vDC @ 2.5 Amps)

### CABLE SPECIFICATIONS

The signals use by the 2802 converter are analog and proper routing and shielding techniques should be observed. Shielded twisted pair cables should be used for all interface signals. Multiple pair cable can be used if all pairs are individually shielded and have individual drain wires.

### Recommended Cable

Shielded (3) Twisted Pair with Drain Wire and TC Braid Shield
Belden #8103 or equivalent

## THEORY OF OPERATION

The return signal level is monitored for high signal level (HSG LED), and low signal level (FLT LED). The Mid green LED should be lit if the feedback signals are at the appropriate level. The red HGS LED and the Low signal FLT LED indicate an error.

The parallel output is updated at the same rate as the resolver excitation. There are 3 excitation frequencies that correlate to position update rates of 100, 200 and 400 usecs. The timing on the position update is consistent. The data is presented without the use of handshaking signals.

## POWER UP SEQUENCE

1) The 2802 allows 50 mSec for the power to stabilize
2) The 2802 then starts interrogating the resolver for position information
3) The 2802 will then set the parallel data to indicate absolute shaft position at the resolver update rate

## PARALLEL DATA OUTPUT

The VEGA 2802 series of converter boards uses open collector outputs for the parallel data bits. The parallel data bits use a 4.7 K pull up resistor to the vDC supplied on P2 pin 13 for each data bit output.

The output latency is dependent on the excitation frequency. At 2.5 kHz the response will be 400 uSec and at 10.0 kHz the response will be 100 uSec.

## P1 POWER CONNECTOR

| PIN# | FUNCTION | COLOR |
|---|---|---|
| 1 | No Connection | N/A |
| 2 | DC Ground | BLK |
| 3 | Shield In | SHLD |
| 4 | Fault Reset (V603.90 only) | WHT/BLU |
| 5 | No Connection | N/A |
| 6 | No Connection | N/A |
| 7 | No Connection | N/A |
| 8 | !Fault Output | ORG |
| 9 | I/O vDC IN | BLU/WHT |
| 10 | +7.5 to +25 vDC IN | BLU |

## P2 PARALLEL DATA CONNECTOR

| PIN# | FUNCTION |
|---|---|
| 1 | Data Bit 0 |
| 2 | Data Bit 1 |
| 3 | Data Bit 2 |
| 4 | Data Bit 3 |
| 5 | Data Bit 4 |
| 6 | Data Bit 5 |
| 7 | Data Bit 6 |
| 8 | Data Bit 7 |
| 9 | Data Bit 8 |
| 10 | Data Bit 9 |
| 11 | Data Bit 10 |
| 12 | Data Bit 11 |
| 13 | Data Bit Pull UP vDC |

## P4 RESOLVER CONNECTOR

| PIN# | FUNCTION | COLOR |
|---|---|---|
| 1 | Feedback LO | Yel/Wht |
| 2 | Feedback HI | Red/Wht |
| 3 | Shield Out | SHLD |
| 4 | Sine LO | Black |
| 5 | Sine HI | Red |
| 6 | Shield Out | SHLD |
| 7 | Cosine HI | Yellow |
| 8 | Cosine LO | Blue |
| 9 | Shield Out | SHLD |
| 10 | No Connection | N/A |
| 11 | No Connection | N/A |

## TEST POINTS

**ACOM** = Analog Ground
**PA+** = Sine HI (3.6 vDC Peak to Peak)
**PA-** = Sine LO (3.6 vDC Peak to Peak)
**PB+** = Cosine HI (3.6 vDC Peak to Peak)
**PB-** = Cosine LO (3.6 vDC Peak to Peak)

**SIG** = Signal Return (0.8-18.0 vDC Peak to Peak)
**ST1** = Stage 1 Signal (3.8 vDC Peak to Peak)

## JUMPER SETTINGS (JB1)

**FREQUENCY SELECTION (JB1-1 & JB1-2)**

The 802 converters provide selectable excitation frequencies of 2.5, 5.0 and 10.0 kHz via JB1-1 and JB1-2 jumpers.

**RESERVED (JB1-3 thru JB1-8)**

On the 2802 converter board Jumpers JB1-6 thru JB1-8 are reserved and should have all jumpers removed

**DIRECTION SELECTION (JB1-9**

Installing a jumper on JB1-9 will reverse the counting direction of the quadrature output.

**ACTIVE FILTER SELECTION (JB1-10)**

The 2802 also provides jumper selection of the active filter network for the return signal to provide the maximum noise immunity at the selected frequency. For the typical Resolver application operating at 2.5 kHZ JB1-10 jumper should be installed. For excitation frequencies above 2.5 kHZ JB1-10 jumper should be removed.

**INTERNAL GAIN SELECTION (JB1-11 & 12)**

The 2802 series of converters provide selectable gain selection via JB1 jumpers 11 and 12. Installing a jumper on JB1-11 selects a gain of x0.25 Installing a jumper on JB1-12 selects a gain of x1.0 and removing the jumpers JB1-11 and JB1-12 selects a gain of x4.0

See Figure 1.0 for SWB1 Jumper Chart.

## JB1 JUMPER BLOCK

| FUNCTION | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2.5 kHz Excitation** | **0** | **0** | | | | | | | | | | |
| **5 kHz Excitation** | **1** | **0** | | | | | | | | | | |
| **10 kHz Excitation** | **0** | **1** | | | | | | | | | | |
| **Reserved** | **1** | **1** | | | | | | | | | | |
| **Reserved** | | | **0** | **0** | **0** | **0** | **0** | **0** | | | | |
| **Quadrature+ =CW** | | | | | | | | | **0** | | | |
| **Quadrature- =CW** | | | | | | | | | **1** | | | |
| **5.0-10.0 kHz LPF** | | | | | | | | | | **0** | | |
| **2.5 kHz LPF** | | | | | | | | | | **1** | | |
| **x 4.0 Gain Select** | | | | | | | | | | | **0** | **0** |
| **x 0.25 Gain Select** | | | | | | | | | | | **1** | **0** |
| **x 1.0 Gain Select** | | | | | | | | | | | **0** | **1** |
| **Reserved** | | | | | | | | | | | **1** | **1** |

Figure 1.0

Indicates Default

## RESOLVER SET-UP PROCEDURE

1) With the power turned off. Install the 2802 board as described in the application drawing (Figure 2.0) and complete the following steps.
2) Select the excitation frequency by setting JB1-1 and JB-2 jumpers as described in the JUMPER SETTINGS (see jumper table Fig. 1.0). 2.5 kHZ is the DEFAULT setting with Jumper JB1-1 and JB1-2 removed.
3) Jumpers JB1-3 thru JB1-8 are reserved on the 2802500 board and should be removed
4) Select the passive filter setting by JB1-10 for the corresponding frequency setting. The DEFAULT setting is set to 10.0 kHZ and JB1-10 is removed.
5) Select the Internal Gain Selection by setting the JB1-11 and JB1-12 jumpers as described in the JUMPER SETTINGS section. The DEFAULT setting is for a board set to x1 Gain JB1-12 installed (See step 8 for detailed set-up instructions).
6) Starting with the JB1-11 jumper removed and the JB1-12 jumper installed (x1.0 Gain Selection). Turn the ADJ Potentiometer fully counter-clockwise (12 turn Pot) Observing the LO, MID, and HI LEDs apply power to the board.
   **NOTE:** If the MID or HI LEDs are turned on, remove JB1-12 and install JB1-11 (x0.25 Gain Selection).
7) Turn the ADJ potentiometer clock-wise until the (Green) MID LED turns on and the LO LED turns off. Continue turning the ADJ clock-wise until the HI LED turns on. Now turn the ADJ potentiometer counter-clockwise to position the ADJ in the middle of the MID LED band.

## APPLICATION INTERFACE

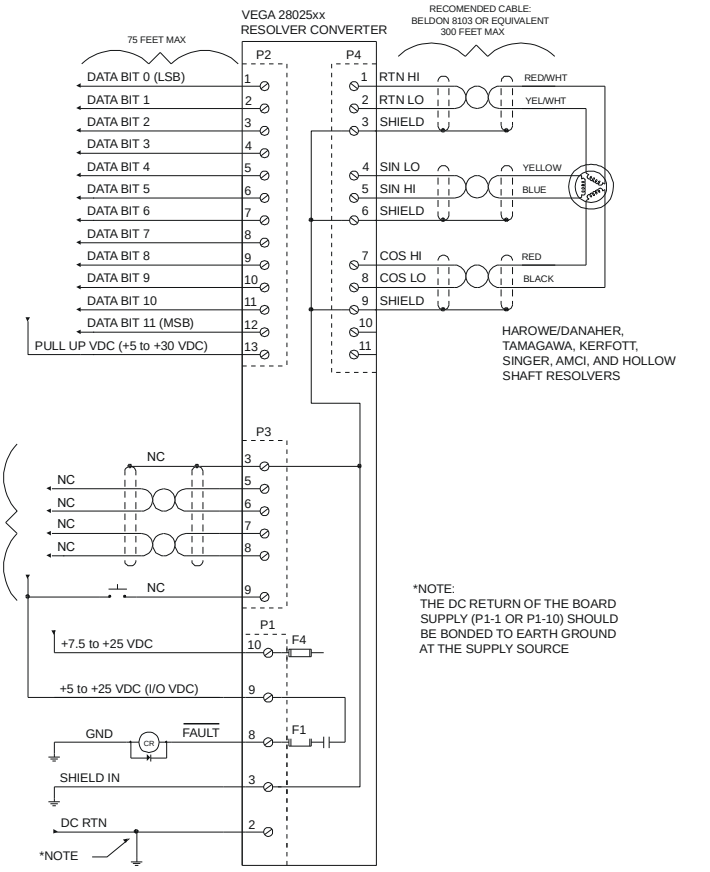



Figure 2.0



## RESOLVER SET-UP PROCEDURE

8) Starting with the JB1-11 jumper removed and the JB1-12 jumper installed (x1.0 Gain Selection). Turn the ADJ Potentiometer fully counter-clockwise (12 turn Pot) Observing the LO, MID, and HI LEDs apply power to the board.
   **NOTE:** If the MID or HI LEDs are turned on, remove JB1-12 and install JB1-11 (x0.25 Gain Selection).
9) Turn the ADJ potentiometer clock-wise until the (Green) MID LED turns on and the LO LED turns off. Continue turning the ADJ clock-wise until the HI LED turns on. Now turn the ADJ potentiometer counter-clockwise to position the ADJ in the middle of the MID LED band.
   **NOTE:** If you are unable to get the MID or HI LED to turn on, remove both JB1-11 and JB1-12 jumpers (x4.0 Gain Selection).
10) Phase the position loop if necessary by installing a jumper on JB1-9 to reverse the counting direction. At this point the basic set-up is complete and the position loop can now be closed.

## TROUBLE SHOOTING

| SYMPTOM | CHECKS | SOLUTION |
|---|---|---|
| No Power LED | Check +5 VDC or +24 VDC | VDC Present → Check Fuses F4 and F5 |
| LO LED (Low Signal) Continuous | Remove power and disconnect P4 from the board. Ohm the wires on P4-1 and P4-2 and note value. | Resistance values are less than 30 ohms – Check for shorts between P4-1 and P4-2 as well as ground. |
| | Remove power and disconnect P4 from the board. Ohm the wires on P4-4 and P4-5 and note value. Ohm the wires on P4-7 and P4-8 note value. | Resistance values are less than 30 ohms – Check for shorts between P4-4 and P4-5 as well as ground. Check for shorts between P4-7 and P4-8 as well as ground. |
| | Apply power and measure between P4-4 and P4-5 for 2.9 vRMS | Signal not present → Board Failure – Replace board |
| | Apply power and measure between P4-7 and P4-8 for 2.9 vRMS | Signal not present → Board Failure – Replace board |
| | Check “ST1” test point for 3.6 volts peak to peak | Repeat Step 11 of the Resolver Set-Up Procedure |
| Fault LED (Low Signal) Intermittent | Remove power and disconnect P4 from the board. Ohm the wires on P4-4 and P4-5 and note value. Ohm the wires on P4-7 and P4-8 note value. | Resistance values differ by more than 3 ohms of each other → Check resolver windings – Replace cables and/or resolver |
| | Check “ST1” test point for bounce | Repeat step 11 of the Resolver Set-Up Procedure |

## TROUBLE SHOOTING

| SYMPTOM | CHECKS | SOLUTION |
|---|---|---|
| Cyclic Error | Check “ST1” test point for bounce | Repeat step 11 of the Resolver Set-Up Procedure |
| | Remove power and disconnect P4 from the board. Ohm the wires on P4-4 and P4-5 and note value. Ohm the wires on P4-7 and P4-8 note value. | Resistance values are less than 30 ohms – Check for shorts between P4-4 and P4-5 as well as ground. Check for shorts between P4-7 and P4-8 as well as ground. |
| | Remove power and disconnect P4 from the board. Ohm the wires on P4-4 and P4-5 and note value. Ohm the wires on P4-7 and P4-8 note value. | Resistance values differ by more than 3 ohms of each other → Check resolver windings – Replace cables and/or resolver |
| HI LED (High Signal) Continuous | Check “ST1” test point for 3.6 volts peak to peak | Repeat Step 11 of the Resolver Set-Up Procedure |
| Hi LED (High Signal) Intermittent | Check “ST1” test point for 3.6 volts peak to peak | Follow procedures described in the LO LED (Low Signal) Intermittent section |
| MID LED (Signal Mid) Continuous | Signal Proper | No Problem…. Life is Good |
| MID LED (Signal Mid) Intermittent | Check “ST1” test point for bounce | Repeat step 11 of the Resolver Set-Up Procedure |
| Feedback polarity is reversed | None | Swapping the P4-4 (Sine HI) with the P4-5 (Sine LO) wires will reverse the feedback polarity |



## DISASEMBLY

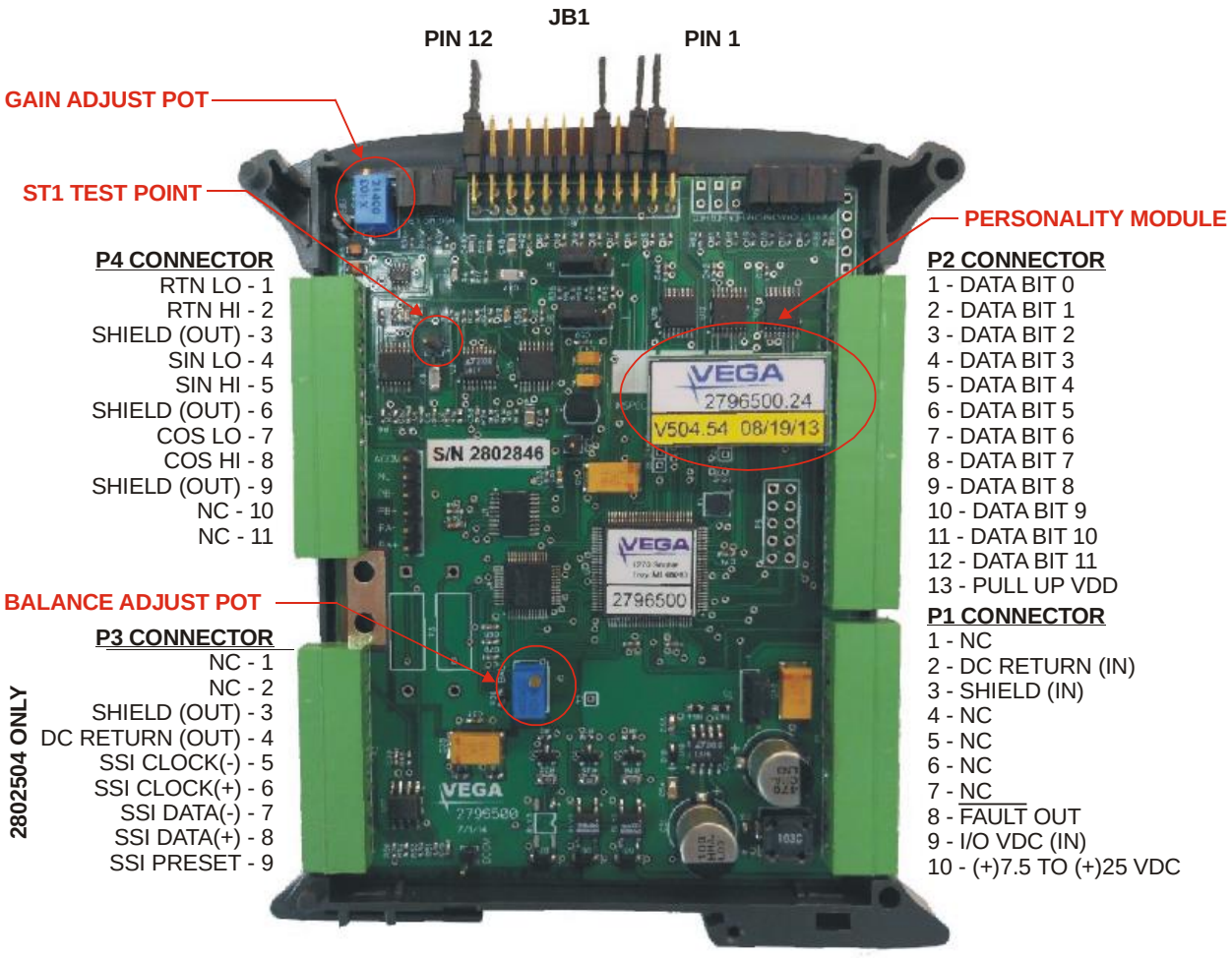
Firmly press the center of the latch hook down and slide towards the center of the enclosure.

**NOTE:** Use caution not to drop the spring under the latch hook.

Using a small flat head screwdriver release all four of the enclosure cover hooks.

**NOTE:** Use caution to avoid breaking the cover hooks.






**P4 CONNECTOR**
RTN LO - 1
RTN HI - 2
SHIELD (OUT) - 3
SIN LO - 4
SIN HI - 5
SHIELD (OUT) - 6
COS LO - 7
COS HI - 8
SHIELD (OUT) - 9
NC - 10
NC - 11

**P3 CONNECTOR**
NC - 1
NC - 2
SHIELD (OUT) - 3
DC RETURN (OUT) - 4
SSI CLOCK(-) - 5
SSI CLOCK(+) - 6
SSI DATA(-) - 7
SSI DATA(+) - 8
SSI PRESET - 9

**2802504 ONLY**

**P2 CONNECTOR**
1 - DATA BIT 0
2 - DATA BIT 1
3 - DATA BIT 2
4 - DATA BIT 3
5 - DATA BIT 4
6 - DATA BIT 5
7 - DATA BIT 6
8 - DATA BIT 7
9 - DATA BIT 8
10 - DATA BIT 9
11 - DATA BIT 10
12 - DATA BIT 11
13 - PULL UP VDD

**P1 CONNECTOR**
1 - NC
2 - DC RETURN (IN)
3 - SHIELD (IN)
4 - NC
5 - NC
6 - NC
7 - NC
8 - FAULT OUT
9 - I/O VDC (IN)
10 - (+)7.5 TO (+)25 VDC

## FAULT SIGNAL INTERFACE

### FAULT SIGNAL OUTPUT (P1-8)

The 2802 will open the contacts of the solid state relay between P1-8 and P1-9 to indicate a fault has occurred. The relay can drive 600 mAmps. The source voltage must be provided on P1-9 and can range from 5-25 vDC. The loss of signal fault is latched and can be reset by cycling the power or applying +5-25 vDC to the Fault Reset pin (P1-4).

### FAULT SIGNAL RESET (P1-4)

The loss of signal fault is not latched and will be reset when the fault is cleared. This will close the contacts between P1-8 and P1-9 and restart the tracking algorithm.

## REPAIR AND TECHNICAL SUPPORT

### REPAIR AND TECHNICAL SUPPORT

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