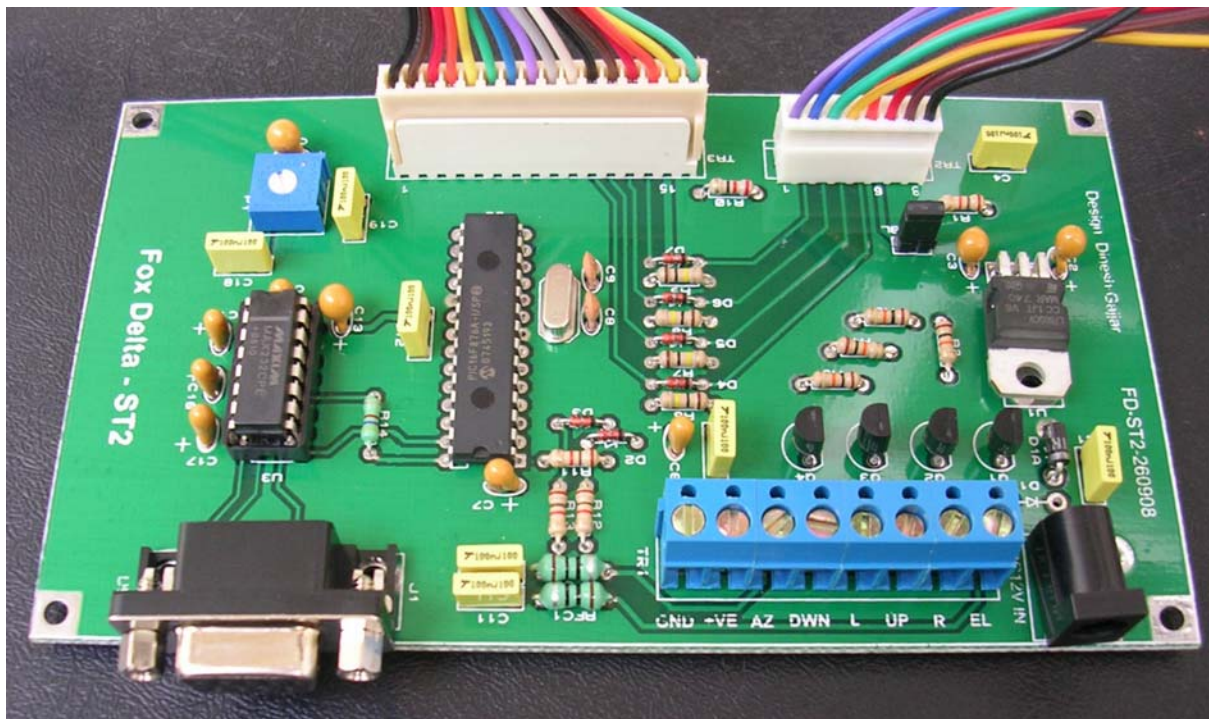




## Configuration Guide: PIC16F876A Satellite Tracker & Rotor Controller

### ST2: LCD Satellite Antenna Tracker & Rotor Controller



### Calibration

After the unit (PIC16F876A) is first programmed, it knows little about the voltages representing the rotator's maximum and minimum settings.

You can set these either from your computer (using the serial port & cable) or from the front panel buttons.

## Calibration from the PC Serial Connection:

- (1) Connect to the unit using a terminal emulator (Hyper-Terminal) at **9600 bps, 1 stop bit, no parity and no handshake**.
- (2) Check for communication by typing the 'C' key followed by the enter key. Note that there is no echo of your keystrokes. Commands are also not case sensitive. The azimuth should be returned, although it will be the uncalibrated value.
- (3) Using either the rotator control box switches or the optional front panel switches, move the rotator to its counter-clockwise end stop (zero degrees), which should be due North or due South depending on your rotator.
- (4) Move the elevation to zero degrees.
- (5) To set the left-most azimuth, type these four keys in sequence: 'F', 'A', 'S', Enter. You will receive a response like: **Az Offset=0099**
- (6) To set zero degrees elevation, type the four keys in sequence: 'F', 'E', 'S', Enter. You will receive a response like: **EI Offset=0326**
- (7) Using either the rotator control box switches or the optional front panel switches, move the rotator clockwise 360 degrees for both (a) 360 degree maximum azimuth rotators and (b) 450 degree South CCW stop rotators. For 450 degree North CCW stop rotators, move the rotator clockwise to 450 degrees.
- (8) Move the elevation to either 90 degrees, or 180 degrees, depending on the end stop of your rotator.
- (9) To set the right-most azimuth for both (a) 360 degree maximum azimuth rotators and (b) 450 degree South CCW stop rotators, type these four keys in sequence: 'F', 'A', 'E', Enter. For 450 degree North CCW stop rotators, type the four keys in sequence: 'F', 'A', 'F', Enter. In either case, you will receive a response like: **Az mul=0.897**
- (10) For 90 degree elevation rotators only: to set 90 degrees elevation, type the four keys in sequence: 'F', 'E', 'N', Enter. For 180 degree elevation rotators only: to set 180 degrees elevation, type the four keys in sequence: 'F', 'E', 'E', Enter. In either case, you will receive a response like: **EI mul=1.234**
- (11) If you have a South CCW stopping rotator, you should key in the three key sequence 'F', 'S', Enter. For a North CCW stopping rotator (default), key in the three key sequence 'F', 'N', Enter.

- (12) To commit (Write) this to EEPROM, type the three keys in sequence: 'F', 'W', Enter.
- (13) When you reset or switch the unit on and off, the calibration parameters should be remembered.

## Calibration from the Front Panel Buttons

You must have an LCD connected for this to work. To enter calibration mode, hold down one of the four front panel buttons as the unit is switched on. After the welcome screen (and potentially the Bad EEPROM message), you then enter the calibration mode.

The four buttons (from LSB to MSB) are Left, Right, Down, Up. On the LCD, these are referred to as L, R, D, U.

- (1) **Set Az=min & press D (U=esc)** Using the L button, move the rotator to its counter-clockwise stop. The R button also operates to move the rotator right, although normally would not be required at this point. Press D to accept, or U to abort the calibration completely.
- (2) **Set El=min & press L (R=esc)** Using the D button, move the rotator to the zero elevation stop. The U button also operates to move the rotator up, although normally would not be required at this point. Press L to accept, or R to abort the calibration completely.
- (3) **Set Az=max & press D (U=esc)** Using the R button, move the rotator to its clockwise stop. If you are using a 450 degree azimuth rotator with a South CCW stop, you should move the rotator to be at the South position 360 degrees clockwise of the CCW stop. The L button also operates to move the rotator left, although normally would not be required at this point. Press D to accept, or U to abort the calibration completely.
- (4) **Set El=max & press L (R=esc)** Using the U button, move the rotator to the maximum elevation stop (90 or 180 degrees). The D button also operates to move the rotator down, although normally would not be required at this point. Press L to accept, or R to abort the calibration completely.
- (5) **Az range: 450 U 360 D (R=esc)** For North CCW stop 450 degree rotators, press U. For 360 degree or South CCW stop rotators, press D. Press R to abort the calibration completely.
- (6) **El range: 0-90 U 0-180 D (R=esc)** For elevation rotators with a maximum elevation of 90 degrees, press U. For 'flipping' elevation rotators, press D. Press R to abort the calibration completely.

- (7) **CCW stop North=U South=D (R=esc)** For North CCW stop rotators, press U, for South CCW stop rotators press D. Press R to abort the calibration completely.
- (8) **EE Write: U (R=esc)** To commit the settings to EEPROM, press U. Press R to abort the calibration completely.
- (9) **EEPROM write OK Push btn to exit** Push any front panel button to return to normal mode.

## Quick configuration

If you know the calibration values for Az and El off and mul, you can set them directly using the following commands:

Az Off: FAOnnn  
Az Mul: FAMn.nn

El Off: FEOnnn  
El Mul: FEMn.nn

## Standard GS-232 commands supported

C      Return azimuth  
C2     Return azimuth and elevation  
Maaa   Set azimuth to <aaa> (Firmware 0.7 and above)  
S      Stop rotator  
Waaa   Set azimuth to <aaa>  
Waaa eee   Set azimuth and elevation to <aaa> and <eee>

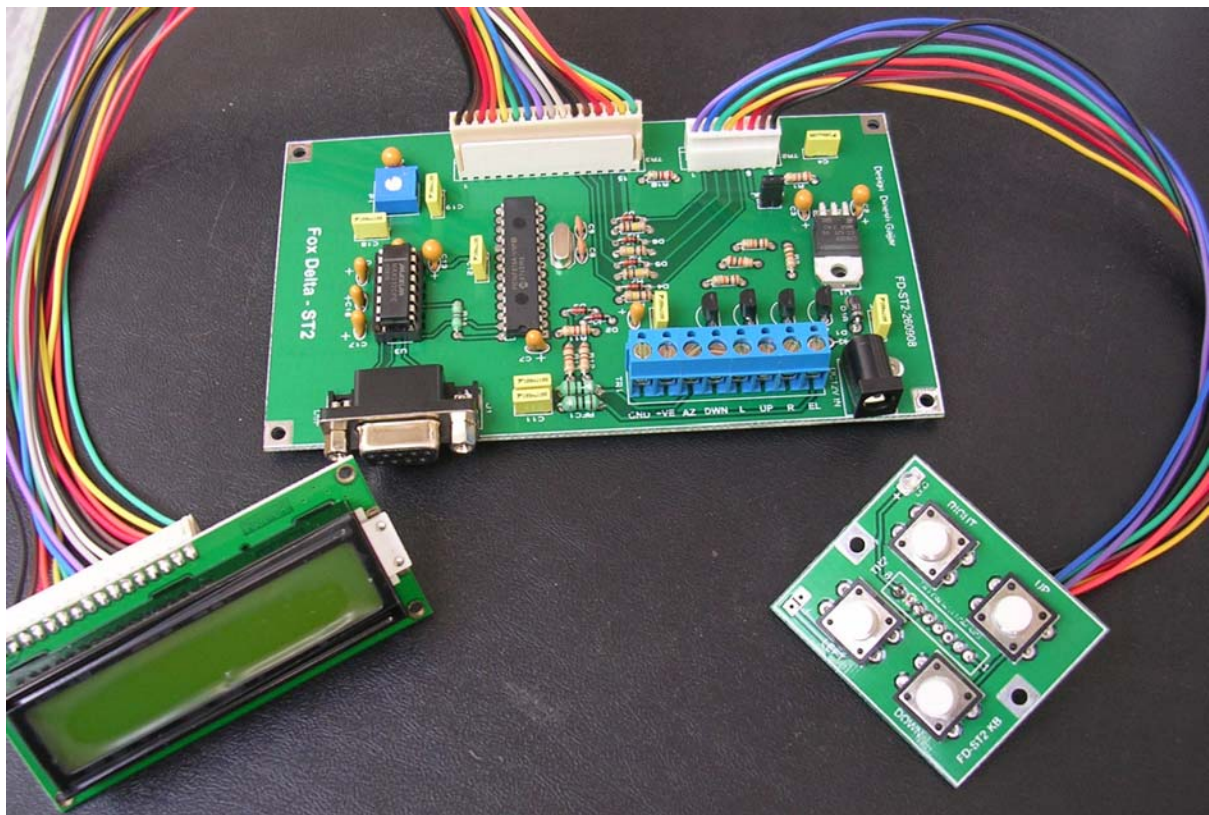
## Extended GS-232 command set supported

F AE    Set 360° azimuth calibration  
F AF    Set 450° azimuth calibration  
F AMm.mm   Set azimuth multiply parameter to <m.mm>  
F AOooo    Set azimuth offset parameter to <ooo>  
F AS    Set 0° azimuth calibration  
F EE    Set 180° elevation calibration  
F EMm.mm   Set elevation multiply parameter to <m.mm>  
F EN    Set 90° elevation calibration  
F EOooo    Set elevation offset parameter to <ooo>  
F ES    Set 0° elevation calibration  
F N    Set North CCW stopping rotator (default)  
F S    Set South CCW stopping rotator  
F W    Write calibration parameters to EEPROM

## Easycomm commands supported

AZaaa.a	(integer part only used)
ELeee.e	(integer part only used)
UPnnnnnnnnnnn mmm	(ignored)
DNnnnnnnnnnnn mmm	(ignored)

## ST2 Complete with LCD & Keyboard:



**73s/Dinesh Gajjar**  
**4<sup>th</sup> October 2008**

For more details, please visit Project Page: <http://www.foxdelta.com>