ST2 Review at HRD Forum:

By VE2DX
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Howard's (G6LVB) LVB Tracker Rotor Interface (and VU2FD version the ST2)

Notes :
March 31st 2010 : Added comments from Howard G6LVB.
March 31st 2010 : Added N1MM and PSTRotator test results.
April 1st 2010 : Corrected Marinus Call to ZS6MAW (oops!)

Type: Project, Kit and/or Pre-assembled, Dual Axis Azimuth (360/450 Degrees)/Elevation (180 Degrees).

Interface: RS232c, 9600 bps, 8N1 (USB and Ethernet options available for the G6LVB)

Protocol supported: Expanded GS232A command set

Rotor controllers supported: Kempro/Yaesu G-5X00 Series rotors only.

Firmware release tested: Release 0.7

Documentation: Construction, Source Code, Installations and calibration instructions

Software tested: HRD Rotator 2494, Nova 2.12b, Logger32 3.24.0

Rotors Controllers tested: Yaesu G-5400b Series rotors.

Softwares supplied with purchase: web based documentation.

Web Site: www.g6lvb.com, www.amsat.org, www.foxdelta.com (http://www.foxdelta.com)

Cost Table:
Amsat-NA : Complete unit assembled 200$, PCB only 20$, case only 50$, shipping ?

Amsat-UK : Complete kit 159$, Kit no case 98$, Kit no case or LCD 60$, PCB only 15$, Shipping 15$.

VU2FD (FoxDelta) ST2: Complete unit assembled 89$, Complete Kit 79$, PCB and Case 15$, PCB Only 5$, Shipping 10$.

Important note from Howard G6LVB, the AMSAT-NA and AMSAT-UK profits from the sale of G6LVB LVB Tracker are directly used to fund AMSAT projects.

Over the past ten years there has been some great rotor interface projects like Goetz (DL7AOT), Lucien (F1TE), Rene (DF9GR), the Saebrtrack project by Mark (N8MH) and Gene (KC4SA) and so many others... Howard's (G6LVB) project the LVB Tracker (also known as the Las Vegas Boulevard Tracker) is definitively one that is a must on this famous Hall of Fame...

His design was picked up soon after it's release as one of the AMSAT standard used by many of there members. Variations were also released by many clubs as kits all over the Ham community and more recently by VU2FD at affordable price as the www.FoxDelta.com ST2.

For these tests we were using the VU2FD ST2 version of Howard's (G6LVB) LVB Tracker and we will take the time to compare both versions, Marinus ZS6MAW assisted with tests and feedback from a kit variation that he purchased at a local club.

Design, documentation and assembly (Howard's (G6LVB) LVB Tracker 8/10 and VU2FD ST2 7/10):

Howard's (G6LVB) LVB Tracker design is build around a PIC16F876A processor. His original design offered three different communication interfaces, a standard MAX232 interfaced RS232c port, an optional USB card that could easily be added in an expansion socket or a Lantronix Xport based Ethernet interface that could also be added to the expansion socket.

The VU2FD ST2 version eliminated this expansion socket and only offers the RS232c connection, this is viewed as a minor issue since external USB and Ethernet serial interfaces are available off the shelf. An optional ICD debugger port was also eliminated in the VU2FD ST2 pcb design and the programming circuitry was also eliminated. These are the main changes made to the original pcb design from Howard's (G6LVB), the main concern here is the elimination of the programming jumper in the VU2FD ST2.

But, it should also be noted that Dinesh made some minor improvements to the hardware design adding features and better filtering of the feedback circuitry. The VU2FD ST2 pcb is well designed, clearly marked and all parts were present and accounted for in the kit except for a pair of small pcb mounted switches that I bypassed with jumpers.

The LVB Tracker does come with four control switches for UP/Down/CW/CCW, that can also be used during the configuration and calibration process. One odd thing in the VU2FD ST2 as to be the fact that the holes in the case are not arranged in the usual star like setup, instead the CW and CCW buttons are above each other and the same with the Up and Down buttons, this makes operations somewhat bizarre... changing this to the star like approach would be a nice simple improvement to the ST2 design.

Assembly took a little over an hour, proper documentation was included with the unit and also available on the www.g6lvb.com and www.foxdelta.com web sites.

Howard (G6LVB) keeps updating his web site with data and firmware updates for the LVB Tracker. Marinus ZS6MAW, did have some documentation issue with his local kit that he was able to resolve thanks to Howard (G6LVB) web site online information. Other information is available from multiple HAMs on this design with modifications or add-on for it. I did run into some bizarre intermittent problems with the switch PCB that was caused by a bad cable supplied in the FoxDelta kit, the cable was replaced locally and the issue resolved. When soldering the PCB from FoxDelta you do have to be very careful not to overheat the traces.

First power up was a little weird… The VU2FD ST2 kit came with a contrast adjustments that reacts mainly in the first 25% of blades tracking… so at first it looked like it didn`t work… Until I tried that adjustment again and saw the display come up…

Then I did a Power Up test and saw the firmware release and that bizarre memory error and some bizarre Azimuth and Elevation numbers! As they say RTFB (Read the … book!)… all of the above issues are normal, until you save (and I mean SAVE (FW command)) a calibration into the LVB Tracker you will get these issues.

My rating of the Howard's (G6LVB) LVB Tracker is an 8/10 and the VU2FD ST2 version of the LVB Tracker gets a 7/10 for dropping some of the features and options from the original design.

Protocol compatibility and software supported (9/10):

One of the LVB Trackers biggest strength has to be the fact that it is not only GS232A-Az/Elev compatible, but Howard (G6LVB) also added a set of special commands to help in the calibration of the LVB Tracker. Howard's (G6LVB) LVB Tracker/Dinesh (VU2FD) ST2 both uses the G6LVB firmware.

HRD Rotator version 2494 : running GS232A-Az/Elev, showed proper control of the G-5400B via the LVB Tracker/ST2 and proper protocol support. GS232A-Az configuration was also tested and found to work fine as an "Azimuth only" controller, this could be used with rotors with 0-5VDC feedback that support simple non-relay control like the SDX series of rotors.

Nova rel.: 2.12b : did not show any problems while operating in GS232A-Az/Elev mode.

Logger32 Release 3.24.0 : GS232A-Az azimuth only commands test ran properly.

N1MM Rel 1.0 : GS232A-Az azimuth only commands test ran properly.

PSTRotator Rel 5.24 : GS232A-Az azimuth only and GS232A/Elev commands test ran properly.

Installation, Calibration and operations (8/10):

Installation receives a 9/10, it is simple and very easy to do… Design specifically for Kempro/Yaesu G-5X00 series rotor controllers, the installation is simple and easily done in minutes. Simply plug the DIN connector in the back of the rotor controller. But it is limited to this family of rotors only. Again the fact that it is a widely used design you may find HAMs that have adapted the LVB Tracker to other rotors.

Calibration was Ok, it is not that hard but you really need to sit down and

read the instructions carefully first (I didn't! Yes! Dear! I know you told me to!)…

- **Start a terminal application like HyperTerminal, set it to the proper Port and communication settings.**

- **- Set your LVB Tracker to North centre or South centre (FN or FS).**

- **- Move the rotors to lower end and set your starting point (FAS (Azimuth) and FES (Elevation))**

- **- Move to the maximum of your rotor path and set your end point (FAE and FEE)**

- **- And… PLEASE don't forget to save your calibration (FW)**
  (or else next power up, you'll have to restart all over again... I did... 3 times… Yes! Honey! I know you told me to read the book! Sorry about the XYL QRM guys… haven't found the proper XYL DSP filtering system yet!).

  Calibration receives a 8/10 based on my evaluation and Marinus ZS6MAW evaluation of the process, since it is expecting a 0-5VDC output from both axis reference voltages and that limits it to specific type of rotors.

  Operations get a 8/10, since it is using a GS232A command set, the front panel switches and real vs requested positions in the LCD panel are also making operations easy.

  Support 9/10:

  Both Howard (G6LVB) and Dinesh VU2FD, always responded to all my emails very fast and even when a unit got lost in the past because of some postal issues Dinesh VU2FD was very helpful even tough it was not his fault. Marinus ZS6MAW, did have some problems with support locally for his kit, he was helped thanks to information found on the web.

  Conclusion (Howard's (G6LVB) LVB Tracker 8/10 and Dinesh (VU2FD, http://www.foxdelta.com/) ST2 7/10):

  Howard (G6LVB) LVB Tracker is a powerful, small interface design for specific series of Kempro/Yeasu controller that support properly a good solid protocol set (GS232A-Az and GS232A-Az/Elev) making it easy to interface with most applications. But it is limited to mainly the Kempro/Yaesu G-5X00 series rotor controllers.

It should be mentioned that the pricing at Amsat-NA is somewhat high compared to both Amsat-UK and specially compared to the lower cost offered with the VU2FD ST2 version, but it should be mentionned that Amsat kits profits are used to fund projects from these two associations.

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- One could argue that the VU2FD ST2 as minor draw back, most of these are with optional features of the design, if anything Dinesh VU2FD did add a couple of improvement in the original design with added RF chokes in the rotor feedback lines and other small changes. So in my book Howard's (G6LVB) LVB Tracker is an 8/10 and VU2FD ST2 is an 7/10.

Special thanks to Marinus ZS6MAW for his feedback on the LVB Tracker variation he purchased from his local club.

73

Richard VE2DX