DF9GR's ERC-3D Dual Axis Rotor Controller Interface Evaluation

(Note : a copy of this can also be found in **HRD WIKI**.)

Type: Kit, Dual Axis Azimuth (360 and 450 degrees) **AND/OR** Elevation (45, 90 and 180 Degrees).
Interface: RS232c, 9600bps, 8N1.
Protocol supported: GS232A-Az and GS232A-Az/Elev or GS232B-Az and GS232B-Az/Elev.
Rotor controllers supported: More then 72 different ones from 12 different manufacturers.
Firmware release tested: Release 1.6
Documentation: Specifications, Assembly and Installation
Software tested: HRD Rotator rel.: 2494, Logger32 rel 3.24.0, N1MM-Rotor rel.: 6.11.31, Wintest_Rotor rel.: 1.0, PST_Rotator-Lite and Nova 2.12B
Rotors Controllers tested: Alliance HD73, Yaesu G-500A, G-800SDX and G-5400B and Ham IV.
Softwares supplied with purchase: ERC-3D Utility, RC-3D Control and PST-Rotator-Lite
Web Site: http://schmidt-alba.de/English/english.html or www.easy-rotor-control.de
Cost: 94.00 €

Rene's DF9GR ERC-1 as you saw in my February 28th 2010 review (http://forums.ham-radio.ch/showthread.php?t=19140) is a very impressive little unit that really left its mark… Well in January 2010, Rene introduced the ERC-3D a dual Axis 3D (Az/Elev) version of his design… And I will admit being just as amazed with this flexible, small size, powerful dual axis unit, that can support a surprising 72 different rotors in either Azimuth AND/OR Elevation configuration! One of the most impressive portion of this design is the possibility of interfacing two completely mismatch rotor controllers, and thrust me I pushed this to the limit doing the classic G-5400B Az/Elev and then going as far as to drives ODD COUPLES like G-5400B Azimuth with G-500A Elevation or HD73 Azimuth with G-5400B Elevation or even G-800SDX Azimuth (450 Degrees) with G-500A Elevation and many many more strange ones….

Kit design, documentation and assembly (9/10):

The ERC-3D is just like the ERC-1 based on a very dense design where not a millimetre is misused… This makes it so that you need a good pair of glasses while soldering; and again even tough I tried I could NOT damage in anyway shape or form the high quality PCB using my FAR FROM BEING PROPER soldering practices, and trust me I tried… The design does not use any SMD components making assembly fairly easy. Every component is very well planned and positioned making the design incredibly small even tough it includes 5 good size relays?

The kit came with ALL parts nothing was missing, again all the way down to screws, nuts and even tie-wraps. Parts were found to be of high quality and chip sets were properly protected. The documentation is very well made and complete, board density is so high that the well documented images with parts placement made assembly a lot easier. Assembly took a little over an hour or so, including hardware, cables and suggested pre-power testing and unit came up on first try… Even if a little larger then the ERC-1, the ERC-3D is small enough to be directly integrated into most rotor controller enclosures.

The ERC-3D just like the ERC-1 is designed around a Atmel Mega168-20 CPU and a MAX232 serial interface, the feedback sensor circuitry is one of the best designs I have encountered yet! Based around a pair (one for Azimuth and the other for Elevation) of -15v to +15v bridged interfaces and the flexibility of the Atmel Mega168-20, well designed firmware and utility software, the ERC-3D uses an automatically selected multi range voltage scheme, that lets the unit select best voltages range up to 15 volts for the rotor you are "**calibrating**"… Again just like with the ERC-1, notice that I did not write "***trying to Calibrate***"… simply put that is because I have tested this unit with MULTIPLE rotors combinations and I did not find one yet that I was unable to calibrate on the FIRST try… Yes, even my old Alliance HD73...

The first things you notice when you look at the ERC-3D are these 4 large 5 Amp relays and one smaller one and then you start wondering just like with the ERC-1 why that 5th relay! And yes it is break support. The ERC-3D uses four large 5 Amp DPDT relays for Axis motion (UP/DOWN and/or CW/CCW) and one smaller SPST AUX relay for Break control. Break is supported in this AZ/Elev interface, since this interface supports any mismatched rotor pairs, thus it would be possible for the Azimuth to require a Break circuitry, like with the Yaesu SDX series and HAM IV during our tests… Break delays before and after motion request are configurable via the ERC-3D utility, like just about everything else in this tiny interface having to do with rotor handling for each axis... Some of the other interesting settings are the overshoot parameters giving you the possibility to control, on older rotor, how much in advance you want to cut the circuit so that your rotor stops in the proper position…

The relay based design of the ERC-3D makes it the easiest to integrate to almost ANY matched or mismatched rotor controller pairs… In most cases simply install a N.O. side of the relay in parallel with existing controller control switch and same thing with the other relay for the opposite direction… if you want to get fancy use one of the N.C. portion of the relay to prevent manual operations of the rotor controller in the opposite direction during automatic operations. The ERC-3D does come with a simple LED PCB with CW, CCW, UP, DWN and AUX. For power management reasons the LEDs are being used in low current and were a little dim for me, after discussions with Rene DF9GR, a simple change of the resistors to 1K Ohms on the new style LED PCB and I got my BIG BRIGHT LEDS (I love BIG BRIGHT LEDS!)… Then hook up the sensor, and if needs be the optional LCD display, calibrate and you are done!

When I was looking for something missing from the ERC-1, I mentioned the LCD display; well this is available for the ECR-3D as an option and this is a usefull option in some dual axis setup operating satellite operations. So the only minor issue is the fact that it is RS232c Based instead of USB…

Protocol compatibility and software supported (9/10):

The ERC-3D was designed around The GS232B-Az and GS232B-AZ/Elev protocols, the GS232A-Az and GS232A-AZ/Elev protocols were added to help compatibility with some softwares. Finally, the ERC-3D also supports GS232B-Az/Elev and GS232A-Az/Elev Elevation only operations, this is used in Elevation mode to properly control the ERC-3D when attached with only an Elevation Rotor, this feature was tested here with a G-500A and the elevation side of a G-5400B and both performed as expected, in this configuration HRD Rotator or Nova reported and controlled properly the Elevation and reported the Azimuth as 000 degrees (This is expected since the ERC-3D was not attached to a Azimuth Rotor during that portion of the tests).

The ERC-3D firmware automatically detects command sets sent to him by the application and switches automatically from AZ to AZ/Elev modes, to change between GS232A and GS232B this must be done using the ERC-3D utility because these two protocols are to similar. I made extensive tests using ERC-3D Release 1.6 firmware with HRD Rotator (GS232A-Az, GS232A-Az/Elev , GS232B-Az, GS232B-Az/Elev), Logger32 (GS232B-Az), N1MM_Rotor (GS232A-Az), Wintest Rotor utility (GS232b-Az), ERC Control, PstRotator-Lite (GS232B-Az, GS232B-Az/Elev) and Nova (GS232B-Az/Elev) while monitoring the communication port for proper protocol responses or handling issues and no anomalies were detected. Both GS232 series of protocols are widely used and supported protocols that makes this unit easy to use with most rotor control software.

Installation, Calibration and Operations (10/10):

Again, Rene's well prepared documentation featuring 72 rotor controllers from a dozen or so manufacturers was really helpful to understand and properly install the unit into most Rotor controllers. He uses a colour/numeric coded scheme that's simple enough to understand and almost foul proof… Yes I know, it worked with me! Proper warnings are clearly marked in the documentation when required, like when you're dealing with AC in the Ham IV Breaking circuitry…

Calibration is so easy with this unit it was just incredible, The ERC-1 and ERC-3D are just the easiest unit I have encountered yet as far as calibration is concerned… Simply start the ERC Utility Software that was sent with the unit, select the correct serial port, select the Azimuth calibration and follow a few simple steps (5 or so)! Do the same process with the Elevation and you are done! And if you're concerned your rotor sensor may not be linear (Got to love these Alliance HD73!), when you get to the end of the calibration process, you can exit or select extra calibration steps every 30 degrees in Azimuth mode or 15 degrees in Elevation mode… No more miniature pots that change values when you release the screw driver or when they get oxidized…

Now that your unit is calibrated, operating is as simple as starting HRD Rotator selecting between GS232A-Az, GS232A-Az/Elev, GS232B-Az or GS232B-AZ/Elev, proper speed (9600 bps for the ERC-3D), the proper serial port and you're done… you should not even have to worry about setting up offsets since this was corrected during calibration... ERC-3D Dual Axis interface is fully supported in all Ham Radio rotor control application that I have tested.

One little note about my G-800SDX, like many hams I push to tomorrow stuff that I really should do today (Yes Dear!), and when we installed my G-800SDX almost 25 years ago, the antenna was not lined up properly, it was sitting somewhere around 330 degrees for a 0 (North) indicator on the controller, being that the needle can EASILLY be moved to proper position what did I do, I took off the needle and moved it to 000 Degrees… Then came the day, years later when I automated my G-800SDX, I found my self offset by 30 degrees (360-330 = 30) and after many tests and conversations with the supplier of the interface, I was told that they expect the antenna to either North centered or South centered for this to work and I was not… So I ended up having to use the OFFSET feature of HRD to fix this issue at that worked fine. Well, with the ERC-1 and ERC-3D interfaces I don't have to worry about this anymore because the Calibration process takes lazy hams like myself into consideration and fixes my problems, since it doesn't care if your beam is properly lined up or not, during the calibration process, it steps you through pointing to beam to set positions and then stores these into the interface… Thus no more offset settings to think about in the different applications I use… Nice…

Support 10/10:

All emails sent to Rene DF9GR were responded to in a very short delay with very good information and when problems were found they were often resolved within a couple of days… I have tested this unit back and forth and found the ERC-3D Rel.: 1.6 firmware to be fully operational and stable.

ERC Also has a Yahoo support group which gives a community oriented support for exchange and more simple issues…

Conclusion 9.5/10:

Again Rene DF9GR is showing us why we need to keep eye on what this guy will come up with next… The ERC-1 was an impressive Single Axis interface, the ERC-3D is an even more powerfull design where you take all the power and flexibility from the ERC-1 and put that into an environment where you are attaching matched satellite boxes like my G-5400B or even better totally MISMATCHED rotor pairs that you never have thought of automating before… The added option of the LCD display covers the last missing link mentioned in the ERC-1 evaluation. And yes, I would recommend the ERC-3D anytime…

73, Richard VE2DX

Annexe 1

Table 1 : Software compatibility

	RC-3D Rel.: 1.1	HRD Rotator Rel.: 2494	Logger32 Rel.: 3.24.0	N1MM-Rotor Rel.: 6.11.31	Nova Rel.: 2.12b	Pst-Rotator_Lite Rel.: 1.50	Wintest_Rotor Rel.: 1.0
Yaesu G-800SDX	Yes, GS232B-Az/Elev	Yes, GS232B-Az, GS232B-Az/Elev, GS232A-Az, GS232A-Az/Elev.	Yes, GS232B-Az	Yes, GS232A-Az	Yes, GS232B-Az/Elev	Yes, GS232B-Az/Elev	Yes, GS232A-Az/Elev
Alliance HD73	Yes, GS232B-Az/Elev	Yes, GS232B-Az, GS232B-Az/Elev, GS232A-Az, GS232A-Az/Elev.	Yes, GS232B-Az	Yes, GS232A-Az	Yes, GS232B-Az/Elev	Yes, GS232B-Az/Elev	Yes, GS232A-Az/Elev
Ham IV	Yes, GS232B-Az/Elev	Yes, GS232B-Az, GS232B-Az/Elev, GS232A-Az, GS232A-Az/Elev.	Yes, GS232B-Az	Yes, GS232A-Az	Yes, GS232B-Az/Elev	Yes, GS232B-Az/Elev	Yes, GS232A-Az/Elev
Yaesu G-500A	Yes, GS232B-Az/Elev	Yes, GS232B-Az, GS232B-Az/Elev, GS232A-Az, GS232A-Az/Elev.	N/A	N/A	Yes, GS232B-Az/Elev	Yes, GS232B-Az/Elev	N/A
Yaesu G-5400B	Yes, GS232B-Az/Elev	Yes, GS232B-Az, GS232B-Az/Elev, GS232A-Az, GS232A-Az/Elev.	Yes, GS232B-Az	Yes, GS232A-Az	Yes, GS232B-Az/Elev	Yes, GS232B-Az/Elev	Yes, GS232A-Az/Elev

Annexe 2

Table 2 : Rotor Compatibility Tests

	Hook up Compatibility	Hook up Complexity	Calibration	450 Degree support	Elevation Support	KAT (Note 1)	CKAT (Note 2)
Yaesu G-800SDX	Yes	2	1 Had to do 2 extra steps for 450 Degree calibration	Yes	N/A	OK	OK
Alliance HD73	Yes	4	3 Very unstable rotor and none linear rotor did fine calibration to validate. Worked OK.	N/A	N/A	OK	OK
Ham IV	Yes	4	1	N/A	N/A	OK	OK
Yaesu G-500A	Yes	3	1	N/A	Yes	OK	OK
Yaesu G-5400B	Yes	1	1	N/A	Yes	OK	OK

1 = Easy … 10 = difficult

Annexe 3

Table 3 : Azimuth vs Elevation Rotor Compatibility Tests

	Yaesu G-800SDX	Alliance HD73	Ham IV	Yaesu G-5400B Azimuth	No Azimuth Rotor
Yaesu G-500A	1 supported 450 degree operations	2 Fine calibration required by HD73.	2	1 G-5400B hook-up directly via rear DIN connector.	1
Yaesu G-5400B Elevation	1 supported 450 degree operations G-5400B hook-up directly via rear DIN connector.	2 Fine calibration required by HD73. G-5400B hook-up directly via rear DIN connector.	2 G-5400B hook-up directly via rear DIN connector.	1 G-5400B hook-up directly via rear DIN connector.	1 G-5400B hook-up directly via rear DIN connector.
No Elevation Rotor	1 supported 450 degree operations	2 Fine calibration required by HD73.	2	1 G-5400B hook-up directly via rear DIN connector.	NA

1 = Easy … 10 = difficult

Annexe 4

Note 1: KAT = Kick Ass Test, where once the rotor is hooked up and tested, you send a series of 10 position request at very high speed to the controller alternating above and below the present position of the Controller, noting the reaction of both the application, communication protocol, Interface and rotor. Making certain that at end of test all position request were sent and accepted by the interface and controller and that the last position requested is the final position of the rotor.

Note 2: CKAT = Connection Kick Ass Test, where you connect and disconnect the interface to the application at very high speed, making certain the connection is always made and valid.

Note 3: Both KAT and CKAT were done with all applications, rotors and communications protocols