ST2 Interface Programming for Yaesu G5500
with Ham Radio Deluxe

Before beginning to program the ST2 to use with the Yaesu G5500 Rotor System and Ham Radio Deluxe I suggest a few things be checked or accomplished prior to starting:

First label the ST2 buttons using Dinesh's diagram in his instructions.
Right, Up across the top then Left and Down across the bottom.

This way when you are pressing buttons to add data to the EEProms before they are written to, you will insure you pushed the correct buttons when asked to do so.

The other item to be addressed is making sure the mast or structure the G5500 is mounted on is plumb or true vertical and not leaning one way or another.

This is important for tracking satellites or celestial objects. Failure to plumb true the mast will result in tangential errors in tracking.

This shows the importance of proper alignment.

I suggest using bubble levels on the antennas and T spirit levels mounted around the mast at the four cardinal points of the compass.

Make sure you also follow the set up instructions in the G5500 instruction manual so that the G5500 is set up and calibrated properly before starting.

Once these previous items are checked and or completed then you are ready to begin the calibrations process. This also assumes that you fabricated a cable between the ST2 and the Yaesu G5500 rotor controller box and that it is wired correctly and that the wiring has been confirmed as correct. Failure to determine the correctness of the fabricated cable may lead to many hours of troubleshooting and frustration with the ST2 and your Yaesu G5500 system.

Dinesh's instructions are as follow. I will reprint them here and follow through with my own comments or additions after this.

Connect the ST2 to the rotor controller

Power on the ST2.
Keep pressing one of the front panel buttons until you see the following menu on LCD
Now, with rotor connected and G5500 powered on, follow the LCD setup menu and enter rotor data by way of moving rotor.
At the end of EEPROM configuration, save and exit.
At next start up (power On) you will not see "Bad Eeprom" message.

My notes and or comments follow:

Check your wiring on the cable that you fabricated. I had an issue with this and it caused me quite a few hours of frustration. Had I checked and even triple checked my work I would not have experienced this frustration. Make sure you knnow which wires are connected to the up/down and left/right connection header at the back of the ST2. Also while you have the lid off, check the jumper setting for powering the ST2 from USB or 12VDC from the rotor controller box.

Connect the ST2 to the Yaesu G5500 Rotor Control box by plugging the 8 pin din plug into the back of the rotor controller box.

Power on the Rotor Controller and immediately start rapidly pressing the Left or Right Buttons on the front panel of the ST2 until you obtain the following on the LCD display:
Set AZ=Min & press D (U=esc)
(So set your rotor azimuth to minimum, in my case 0 degrees, then press the down button on the ST2 to save that set point.)
Set El=Min & press L (R=esc)
(Set the rotor elevation to minimum, in my case 0 degrees, then press the left button on the ST2 to save the set point.)
Set AZ=max & press D (U=esc)
(Set the rotor azimuth control CW to maximum or 450 degrees, press the down button on the ST2 to save the set point.)
Yaesu rotors can travel 450 degrees in azimuth, 0 degrees on the left is CCW while 0 degrees on the right side of the meter is equal to 450 degrees of rotation travel.
Set El=max & press L (R=esc)
Yaesu rotors can travel from 0 to 180 degrees. 0 degrees is down while 180 degrees is all the way up according to the meter on the Yaesu rotor controller.
Az range: 450 U 360 D (R=esc)
Select the correct azimuth range for your type of rotor system. For the Yaesu G5500, it has an azimuth range of 450 degrees.
El range: 0 - 90 U 0 - 180 D (R=esc)
Select the correct elevation range for your type of rotor system. For the Yaesu G5500, it has an elevation range of 180 degrees.
CCW stop North=U South=D (R=esc)
The CCW stop is the point that your rotor stops. For the Yaesu G5500 CCW is 0 degrees i.e. north on the far left side of the meter display on the rotor control box.
EE Write: U (R=esc)
Up writes the set points to the EEPROM
EEPROM write OK Push btn to exit
This means the write function to the EEPROM was successful.

Once the ST2 has been calibrated it is now time to bring in Ham Radio Deluxe software for actually controlling the rotor system. This will also allow us to troubleshoot any issues with the wiring of the eight pin DIN plug and cable that was fabricated.

Start HRD
Connect to your radio, I am using the FT-847.
You should now be on the HRD Rig Control page.
Verify your version, mine is Version 6.8.0.273 Release 6.8.0.273
Now find the satellites Icon and select that. Once HRD Satellite Tracking page is started look for the drop down menu called Rotator.
On the Rotator Tab you will see three highlighted lines available, Enable, Start and Options.
I strongly suggest you select options then view. This will open up the procedure in a word processor document that you must follow in the exact order laid out by HRD. Failure to follow directions will result in HRD not working correctly or not working at all.
Below are HRD's directions for using rotor control:

"The HRD Satellite Tracking program uses the HRD Rotator for rotor control.

HRD Satellite Tracking communicates with HRD Rottor using Dynamic Data Exchange (DDE). HRD Satellite Tracking is the DDE Server, the data format is HRD SatTrack. You do not need to understand how DDE works – everything is built into the programs (the DDE data is shown in the HRD Rotator status bar).

In HRD Satellite Tracking:

- Select Start from the Rotator menu to start HRD Rotator.
- Select Enable from the Rotator menu to enable rotator control via HRD Rotator.
- Make sure the [X] RX tracking option is selected in the current satellite window; the data needed by HRD Rotator is only generated when a satelliote is selected.

In HRD Rotator:

- Select and start your rotator.
- Select HRD SatTrack from the DDE server menu.
- Start the DDE connection by selecting Connect from the DDE Server menu.
- Select Track DDE from the DDE Server menu to track the azimuth and elevation values supplied by HRD Satellite Tracking.

The rotator now follows the azimuth and elevation values for the currently selected satellite in HRD Satellite Tracking. In HRD Satellite Tracking the current rotator position is shown in the Rotator toolbar (selected from the View menu)."

That is word for word from the HRD manual for using the Rotor Tracking Software.

Now let me add some notes of things I had to go through to get the latest version of hrd working with my system. I want to add that HRD is one awesome system, once it is working correctly. But like all software it requires input and setup to function correctly.

Issues I had:

I was using an older version of HRD and discovered from Dinesh that there was a newer version. I also discovered that if you had once purchased HRD, as I did in 2018, that HRD reached out and offered me a license for the new release. And they stated that once you pay for a copy of HRD and you register it with them then you will continue to receive support as new versions come available without cost to the buyer, I.e, myself. I would strongly suggest if you are using an older version of HRD to pay for a license and upgrade to the latest software. If you have already paid previously and didn't upgrade like I had not done in 2019 then I strongly suggest you do. I am not sponsored by HRD or Fox Delta but find their products are wonderful products.

Now after downloading and installing the latest version of HRD, you will need to register it and enter your station information as well as location. This is done on the logging page. You have to go there and enter your information otherwise the location places you at zero degrees latitude and zero degrees longitude which is off the west coast of Africa.

After doing that start the Satellite page and let's look at the settings that need to be set.

Start the HDR rotator page.
Then select Yaesu GS-232A Az/El
Select the correct COMPORT, mine was COMPORT 12
(I had to go download the correct drivers from the Fox Delta website and install them)
(And look at my device manager page to see which ComPort was the correct one)
Select your speed. In this case my setting is set to 9600(buad)
Select Refresh rate, I selected 1 second though this might be too much for some applications.
Stop Position Computer Managed.

At this point I experienced a number of problems. I was not initializing HRD Rotator in the correct sequence and I had issues with my up/down wires but did not know that yet.

After I re-read the instructions for using HRD Rotator and following them to the letter I was able to aquire a satellite but I noticed that the azimuth was correct. However the elevation function made a small correction and then slewed my elevation rotor to the opposite end of the meter. I had to disconnect the DDE and stop the rotor.

I tried using the reverse button in HRD Rotator and I noticed the issue swapped from elevation to azimuith. This led me to start thinking that even though I had ohm'd out the fabricated cable that there was an issue.

I swapped the up and down wires coming into the header on the rear of the Fox Delta Interface and that fixed the problem and my system would now track satellites as it was supposed to do.

One word of caution. Take your time with your satellite system. If you have an issue or problem, analyze what is wrong. Is it software settings? Is it hardware? Is it the cable between the ST2 and the Yaesu rotor controller? Did I follow the setup procedures in the operating manual for the G5500? Did I take the time to align the azimuth and elevation meters in the rotor controller? Did I set the voltage needed to drive the rotor? Did I plumb true vertical for the mast that the G5500 rotor motors are mounted onto? Is my time correct in my computer? You can't track satellites correctly if your time is off.

My intention when I started this journey about eighteen to twenty-four months ago was to be able to use the G5500 and the VHF/UHF system I built to do EME or Earth-Moon-Earth communications with a small and compact but efficient setup using digital modes. Currently I am still adding equipment and learning what must be done to accomplish this task.

It is my sincere hope that this will help someone who might be struggling with satellites or EME or someone like myself that wants to chase EME and satellites but can't afford all the pieces at once. Take your time, think through what needs to be done and enjoy amateur radio and learn what you can to make your station a better station.

73

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