

The Green Heron RT-21 Digital Rotor Controller



PHOTO 1: The complete Green Heron digital rotor controller package.

ROTATOR CONTROL. I first saw this piece of equipment at Friedrichshaven a couple of years ago when it was then the RT-20. I thought at the time that it was an innovative piece of engineering, catering as it does for a large range of different rotators. Since then I have had a problem with one of my controllers. Spares are no longer available, boards unavailable, so a replacement was about the only option. I was offered an upgrade to the latest controller, but the prices have increased considerably and I was therefore very pleased when offered the option to review the Green Heron. This bird may not be migrating again! I have had numerous rotators and control units in my 50 years on the air and to have one controller that fits all seems a superb solution to the rotator control problem.

DESCRIPTION. As you see from **Photo 1**, it arrives complete with a 47 page manual, leads and a CD with supporting software. I was supplied with the standard grey-face with a back-lit LCD display. This is no problem as I sit in front of it most of the time anyway. However, if you want the deluxe version, the RT-21D, it comes with a black face and a vacuum fluorescent high visibility display. This will not suffer from parallax

when viewed at an angle. However, for this facility you pay another \$140, which to my G3 mind is not worth the extra!

It is constructed in a box, 8.1 inches wide, 3.9 inches tall and 7.25 inches deep and weighs 7.5lbs. Power requirements are 115 or 230V AC. The one supplied for review was in the 115V position, so check this before plugging it in. The rotor supplied voltages are 18-36V AC and 24-48V DC.

Looking at **Photo 2**, the inside view, you can see that the top is removable with 12 screws and everything is immediately accessible, a well laid out piece of equipment. The main PCB is removable with a minimum of fuss, just a few screws and leads to remove, with the display board mounted on the front panel, again removable with no fuss. A circuit showing basic connections to the PCBs is given in the manual, but no circuit of the main board or the LCD board. Servicing will therefore be limited to fuses, checking plugs and sockets and determining where a fault lies, if any occur! The reliability of modern equipment though, is such that it will probably just soldier on, abuse and lightning strikes excepted, of course.

The back panel, **Photo 3** shows the mains input socket, with fuse above, the mains voltage adjustment, a USB socket

for computer connection and a DB-9 RS232 connector for interconnection to other RT21 controllers and for loading new software updates from Green Heron. The top terminal strip connector is used to interface with your rotator and within the manual there is an appendix for a large number of different rotators together with connection details.

The RT-21 is the successor to the RT-20 and there are new features on this model, including USB and EIA232 interfaces, a variable display intensity, improved ramp control and flexibility and an enhanced computer interface and setup. It can control just about any AC or DC motor rotator whether it has potentiometer or pulse type position feedback including the Tic-Ring rotators.

Most types of rotator are catered for, so for those lucky enough to have several different rotators, the controllers can all be standardised with the Green Heron making the desk look neater. Not only that, but full advantage can be taken of the fact that the Green Heron is digital, so hooking it up to the computer, the application program can control the rotator, providing that facility is catered for in the program. Accuracy is to 0.1 of a degree, so I think that is near enough for most people! Of course, having several controllers would be an expensive outlay, but for the very keen multi-tower, multi antenna contest station, standardisation can only be a good thing.

CONTROLS AND MODES. The rotator can be used by commanding the antenna to turn by using the 'point and shoot' preset knob on the RT-20's front panel. The controller can also turn the antenna by commands, issued from compatible software running on your computer, such as N1MM Logger. It can also be used much like the older rotators by manually pressing the CW/CCW (clockwise/counterclockwise) switches.

Gradual start and stop operation is possible. The controller ramps the motor voltage up and down in 10 steps. This helps to protect the rotator, especially useful when using large arrays with a huge torque when both starting and stopping. This used to be a problem with the T2X (Tail twister), sometimes snapping a brake wedge.

Normal Mode. This behaves much like a standard rotator control unit, manually controlling the antenna with the push buttons and rotary control on the front panel and also computer control via the USB port on the rear panel.

Master/Slave mode. This is a very useful mode for the station with a large tower with multiple antennas. It does require a stack of controllers too, which can be quite expensive. I shall cover this in a later paragraph, as it will

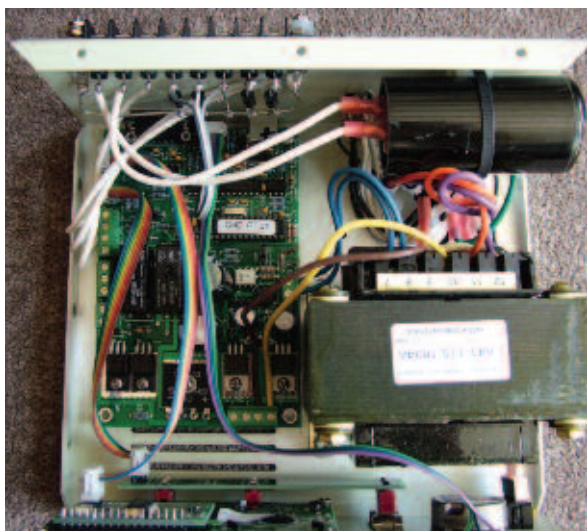


PHOTO 2: The top is removable with 12 screws and everything is immediately accessible.



PHOTO 3: The back panel showing, amongst others, the connection for downloading software updates.

only apply to the few sophisticated stations that can afford it!

Master/Counter-rotate Mode. This too is for those with a more sophisticated stack of antennas on the same tower and is used in conjunction with another RT-21 in Slave/Counter rotate mode. Again I will describe it in a later paragraph.

Debug Mode. This mode is used for troubleshooting the whole system.

INSTALLATION AND SET-UP. If you are buying the controller for a specific rotator, Jeff Ach, W2FU, the owner of Green Heron Engineering, will set the links and options for you. This will save you some work, but it is quite straightforward to do anyway with reference to the 47 page manual that comes with the controller. Setting the options is accomplished from the front panel, again following the steps in the handbook, or from the setup utility once installed on your computer. Once these preparatory steps have been taken, connect the rotator to the strip on the back panel. Once again this is covered in the handbook in the appendix section. Full procedures are given there, although I did have an initial problem when looking for my PST61 rotator, which uses a model B control unit. However, an e-mail to Jeff again soon answered my problem. Jeff is very quick to try to help with any problem you might have.

The controls on the front panel are just about self-explanatory, **Photo 4**. Each of the buttons has two labels as can be seen. The active function depends on whether the unit is in Setup or Normal operation. The CCW and CW are obvious. The cancel button is used in three ways. One tap on the button cancels the current rotation from the front panel. Holding the button down for a couple of seconds puts the controller into Setup. Tapping the button toggles the unit into M/C (Master/Counter Rotate) M/S (Master/Slave) or S/C (Slave/Counter Rotate) modes.

The heading control is used for point and shoot operation just like a normal rotator control. It is also used for changing desired values on the display when in Setup. The backlit multi-function LCD display shows the current heading, position of pre-set knob and state of operation. The handbook covers the functions in detail.

OPERATION. Having set all the links, installed the software and configured the options for your rotator, you should make sure you know exactly what bearing your rotator is currently set to and then connect your rotator control cable to the rear panel. The final step is to calibrate the RT-21 to the heading you noted previously. Rotators using potentiometers for position feedback also need to be calibrated at zero and full-scale. Again, full details of this and lots of other information are in the handbook.

Software control can be used via the USB port using the utility on the supplied disk and it is also possible to use it via other programs, N1MM has an in-built program called N1MM Rotor and you can control the rotator from within N1MM. I have never explored this possibility as I prefer to use my rotator manually. However with a very sophisticated system it would be a very useful facility. The DB-9 connector is used for firmware upgrades and also for stacking other RT-21 controllers. The RT-21, as it stands, has a problem with my old PST-61 rotator. This uses an AC motor and I do have about 200ft of control cable on it. The standard RT-21 cannot supply enough AC motor voltage for the PST rotors as they need at least 48VAC to run. In order to support the AC motor PST, you would need to either:

1. Use a special transformer supplied by Green Heron that will supply the 48 VAC needed, or
2. Wire in the transformer from your PST 'B' control box as an external transformer, or

3. Use a boost transformer (also external) to augment the voltage. It would be possible to use the transformer out of the old B controller.

This information followed my e-mail to Jeff to sort out the problem. The newer model PST-61D with the D type controller has a DC motor and is much more suited to the RT-21.

The place the RT-21 really shines is handling the larger, more powerful DC motor units where the PWM speed control and ramping is really the most beneficial. AC motor speed can't be controlled particularly well with PWM. It is best to use Variable Frequency Drives (VFD) in order to speed control AC motors effectively, but this technology is much more expensive.

PWM, or Pulse Width Modulation, is a method of controlling the amount of power to a load without having to dissipate any power in the load driver. It is used to drive motors and control their speed, hence the use of this technology in this particular controller. It tends to work better with rotators using DC motors; the control parameters are adjustable within the Setup mode. If you want to read more about PWM and indeed VFD, go to Wikipedia and search for a description of that technology.

SOPHISTICATION. Now, I am not aware of anybody in the UK owning a rotatable tower, but I am prepared to be educated! However, there are quite a number of UK amateurs with Christmas tree installations, stacked beams on one tower. I won't go too deeply into this, but just a general description of what can be done will whet your appetite I am sure!

The main problem with this type of installation is the cost. You will need a stack of beams, rotators for each beam and a controller for each rotator. But the versatility is well rewarded for, say, a multi-multi serious contesting station.

Master/Slave Mode. Imagine a rotating tower with several beams. It is only possible to rotate the tower and all the beams face in the same direction. Now, with one fixed tower and stacked beams, the lower ones on a Tic-ring, it is possible to control them individually, with an RT-21 on each antenna, or control them, in Master/Slave Mode, all from one controller. Incidentally, if you are using a side-mounted rotatable array, it is possible to program the end stops in software. The limits are shown in the setup utility as a red bar. The centre of the limits window is always the centre of rotation. With all the controllers stacked and connected, control is possible from just one.

The greatest benefit of Master/Slave mode is the ability to separate antennas for different directions and then return them to the starting position. It's better than a rotating tower where you must have the stack pointed in the same direction. There are several variations on a theme here and I leave that to your imagination and pocket!

Counter/Rotate Mode. This only applies to a rotating tower. When two rotators are stacked one above the other and controlled by RT-21's in counter-rotation mode, a change in position of the lower rotator causes an equal

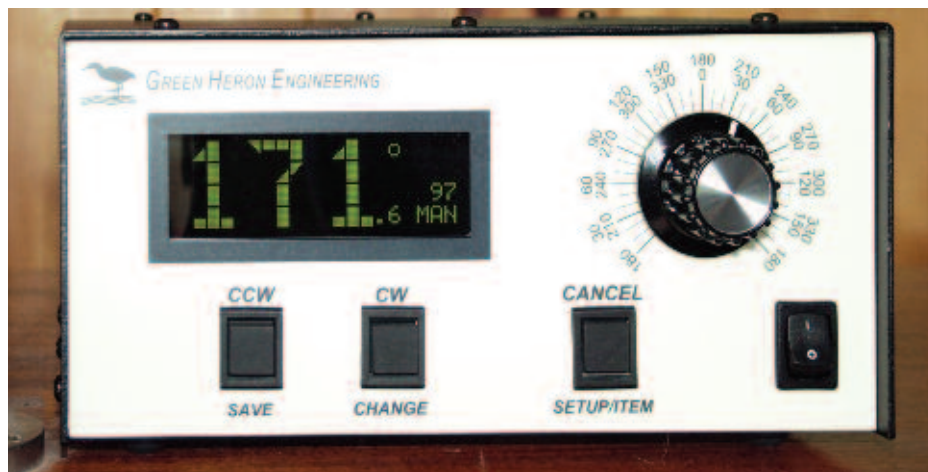


PHOTO 4: The front panel controls are just about self-explanatory.

and opposite change in position of the upper rotator. So, when you rotate the lower from north to east, the antenna on the top remains pointed toward its target through active rotation in the opposite direction of the movement of the lower rotator. It really is something I think the average UK amateur can only dream about. I can just see the look on the face of the Council guy when I present an application for a 200ft rotating tower, if I could even afford one in the first place!

However, as a good old friend once quoted me, "It's not getting what you want

that counts, but wanting what you get".

My thanks to Jeff Ach, W2FU, of Green Heron Engineering for allowing me to review this very desirable controller. It is the latest in technology and a very nice unit. At \$559 it is expensive, but so are the others in the UK now and the exchange rate is improving in our favour. Somehow I think this Green Heron won't be flying back to the USA!

[Editorial note: the Green Heron RT-21 is only available direct from the manufacturer as a personal import because it does not currently claim CE certification or RoHS compliance.]

Attention all Evil Geniuses!

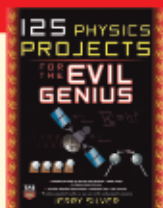
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