

# GREEN HERON ENGINEERING LLC

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## 90/180 VDC REMOTE POWER UNIT for large motor systems up to 2

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# USER GUIDE

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## 1 The Remote Power System

1. The Remote DC Motor system is designed for HD service for large rotating systems utilizing fractional, up to 2 HP DC Motors @ 90 or 180 VDC. The system consists of an indoor unit (RT-21r) that is connected to the Remote Power Unit (RPU) with 5 or 6 small gauge wires. The RPU is intended for outdoor mounting at the tower. The RPU is powered off its own 115 or 230 VAC line connection and is designed for direct wire.
2. The RPU contains the AC Mains relay, reversal relay, and DC Drive that provides for full PWM speed control with ramping. A drawing showing the inter-connects of the RPU is provided for your convenience.
3. This unit supports up to 1 HP motor at 90 VDC or 2 HP at 180 VDC. See the Remote interconnect drawing for Motor, DC Drive and VAC and fuse requirements.
4. Connect up the pulse feedback wires to J4-1 and 2 of the PCB on the RPU. If one is grounded, use #1 for that one. Pot systems use J4 1,2 and 3 as shown as well as requiring an additional wire into the shack to the RT-20r control box. (6)
5. Use only a fast blow fuse in the RPU. See drawing for recommended sizes. NEVER USE F2 for 115 VAC input and ALWAYS USE F2 for 230 VAC systems. A wiring change will need to be made to go from one to the other.



It is strongly recommended that all systems use limit switch protection. We recommend appropriate limit switches in the main DC to the motor as shown in the schematic drawing.

A less desirable alternative would be to use the primary power relay control that is included on the interface board. This is a low voltage/current limit switch arrangement that drops power to the AC mains relay when the motor is operated in the direction of an open limit switch. See the RPU drawing for the connections. Connecting the CWL or CCWL to ground will bypass that limit and allow rotation beyond.

## 2 Rt-21r Setup Notes

1. Use a 1A 5x20 mm (GMA) fuse. There is a spare included and more are commonly available at Radio Shack.
2. This unit contains a Fail Safe circuit and relay to operate a power enable relay out in the RPU. This will protect from unwanted runaways. Should a component fail, or the common wire short to ground out at the tower that enables the motor all the time, then the fail safe circuit will disrupt power to the motor after the Brake Delay Time has expired. If your LCD display seems to start full speed and stay running after you release the button for a few seconds, you should suspect that a failure or short has occurred.
3. Any pulse divider setting of up to 32,600:1 can be programmed. If your system requires 10,000 or more, you will need to use the SETUP Utility to set the value.

SETUP->OPTION = COUNTER

4. The RT-21r does not contain a motor power supply and is not capable of driving a rotor motor directly. It can be used in a relay control system (without an RPU), as shown in the RT-21 manual, to drive 24 VDC relays.
5. POT FEEDBACK systems have an additional protection feature that limits normal rotation to the center 90% of the pot. Whenever the controller senses that the pot is outside the normal 90% range, "POT OUT-OF-RANGE" is displayed continuously and no motor turns are allowed until the POT is sensed to be in-range. Travel into the end 5% is NOT allowed unless the SETUP ->MODE = Debug is turned on.

SETUP->OPTION = POT – This allows full pot range with no OUT-OF-RANGE checking

SETUP->OPTION = TIC-PST – This incorporates the above described range check

### 2.1 CALIBRATION INSTRUCTIONS – Pulse Systems

1. Set the pulse divider to your required number.. .
2. Mechanically set your antennas to the desired center of rotation direction with enough coax loop to reach at least 180 degrees each direction.
3. If your center is South, then set the OFFSET value to 0, if your center is North, then set the OFFSET value to 180. You may set an offset value that yields a center to any possible direction.
4. Set the CALIBRATION value to your antenna's heading (0 If North 180 if South)
5. If you desire to increase the amount of allowable rotation to beyond 360 degrees, then set the CCW LIMIT left of center by the number of additional degrees you wish to allow to go CCW. Set the CW LIMIT right of center by the number of additional degrees you wish to allow to go CW

## **2.2 CALIBRATION INSTRUCTIONS – POT Systems**

1. Ensure the pot is loose and can freely be adjusted.
2. Set MODE = Debug and turn antenna with CW or CCW switch until pointed in the desired center of rotation range. This is typically North but doesn't need to be
3. If your center is South, then set the OFFSET value to 0, if your center is North, then set the OFFSET value to 180. You may set an offset value that yields a center to any possible direction. Ensure the proper OFFSET is programmed into the RT-21r controller
4. With the POT wires disconnected from the controller and using an Ohm Meter, adjust the loosened POT to exactly the center of it's range, then tighten the mounting hardware.
5. the POT wiring and set MODE = Norma;. Turn (with the CCW Button) until the system is EXACTLY 180 degrees CCW from where you put it in #2. This sets the CCW endpoint. Perform the CCW Calibration by pressing CANCEL + CCW and holding until the displays says CAL CCW = xxx. Xxx should be a number below 200. (THIS IS 180 degrees for a North Center, it is 0 degrees for a South Center) The exact values displayed is dependent on the potentiometer ratios and range. The wider difference between the CW and CCW numbers, the higher the resolution of the display will be. If you have a diff of 360, the resolution will be 1 degree. If the difference is 720, the resolution will be ½ degree. 1/3 degree is best resolution you can obtain with the standard controller. We can supply a 12 bit A/D CPU (extra cost) that can increase the resolution to 1/10 degree.
6. Using the CW Button, turn the CW exactly 360 degrees to the CW endpoint so that the antennas are in exactly the same position as in #5 and perform the CAL CW by holding the CANCEL + CW until the display reads CAL CW = xxx where xxx this time should be higher and typically above 700.
7. If you desire to increase the amount of allowable rotation to beyond 360 degrees, then open the Soft Limits (see manual) to allow more rotation.

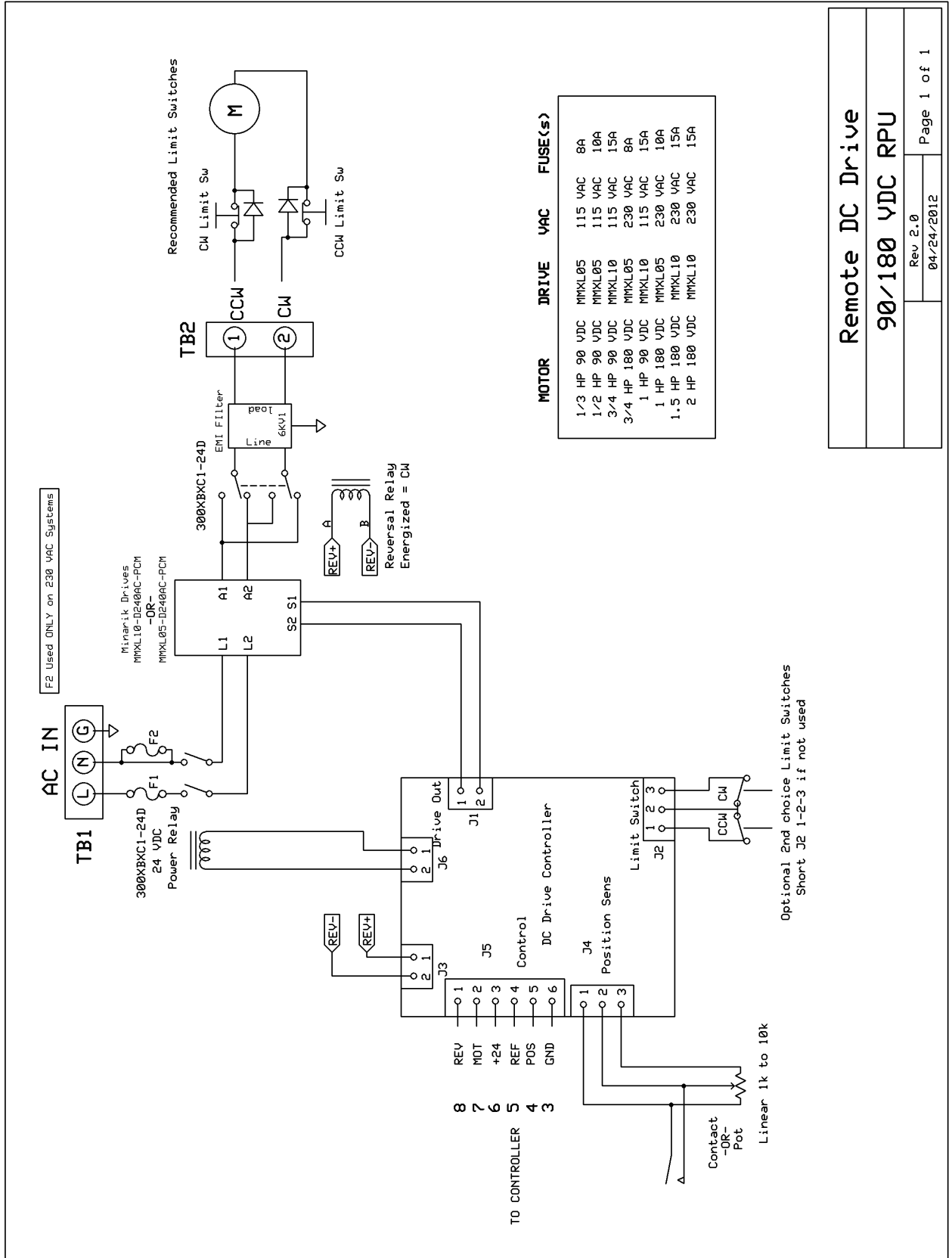
### **3 PWM DC Drive Adjustment**

The motor drives (Minarik) are all adjusted to their factory defaults as in the small manual included EXCEPT for MAX SPEED.

1. Make sure the Min Speed, Decelerate and Accelerate are all set to zero (FULL CCW)
2. You may reset the Current Limit and IR Comp if you would like, but this is not normally necessary for our tower rotation application.
3. MAX SPEED is different and is adjusted to match the output of the PC board voltage in order to get our full ramp speed range.
  - a. Set MAX SPEED to full CW
  - b. Set controller for a preset heading that will allow the motor to stay at full speed for the adjustment.
  - c. When speed reaches 10 as shown on the controller, slowly adjust MAX SPEED CCW until the motor just starts to slow down, then go back CW just to the point of full motor speed. You may just use your ear for this.

This adjustment is not all that critical, if it's set too far CW, you will not get all the ramp speed steps as the motor will reach its max speed before the controller reaches speed 10. If MAX SPEED is too far CCW, you will simply reduce the speed that the motor will reach at speed 10 from the controller.





**Remote DC Drive**  
**90/180 VDC RPU**

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