

# GREEN HERON ENGINEERING LLC

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## 28VDC REMOTE POWER UNIT *RT-21 CONTROLLER REMOTE SYSTEMS FOR PROP PITCH MOTORS*

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# USER GUIDE

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DOCUMENT REVISION: 1.0

APRIL 24, 2012



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## 1 The Remote Power System

1. The Remote Power Unit is designed for HD service where excessive cable runs lengths would reduce the voltage available at the rotor. Prop Pitch motors draw a lot of current ! The Remote Power 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 may be installed outdoors at the tower or anywhere between the RT-21r and the motor as long as you are aware of the voltage drop between the RPU and the motor. The RPU is powered by a 115 or 230 VAC line connection and is designed for direct wire-in. The output is 28 VDC and is rated @ >14 A continuous The AC input MUST have a 2<sup>nd</sup> fuse added if you desire to run from 230 VAC line. Please contact GHE for instructions.
2. The RPU contains the power supply, power control relay, reversal relay, and power MOSFET that provides for full PWM speed control with ramping. A drawing showing the inter-connects of the RPU is provided for your convenience.
3. Although Prop Pitch motors are three wire devices, this unit will also support two wire DC motors where the voltage needs to be reversed in polarity to change direction as opposed to a separate CW and CCW windings with a common. Connect the CCW and CW wires to terminals 1 and 2 on the Motor terminal Strip, the common goes to terminal 4. In order to convert to a two-wire motor, place a jumper wire between Terminals 3 and 4 of the Motor Terminal Strip, then use terminals 1 and 2 to connect to your motor.
4. Connect the pulse feedback wires to J4-1 and 2 of the PCB on the RPU. If one is grounded, use #1 for that one. For POT systems, use J4-1, J4-2 and J4-3 as shown in the drawing. J4 is really just a convenient way to connect these wires and the PCB simply route them over to the 6 terminal connector for attachment to the RT-21r cable.
5. Use only a GBB or ABC style fuse for the fast blow DC circuit. 15A should be OK for most applications. If you get nuisance blows on large Prop Pitch units, it's OK to go to a 20A fuse. Use a 4 or 5A SB for the input side.
6. As an additional protection for the FET driver in case of an output short circuit or locked motor, the 0.1 Ohm 30W resistors will limit initial surge, and one or both may open on more than a momentary short. If you have motor no motor voltage but the output of the transformer is good, then you should suspect an open resistor.
7. A main drive FET failure will typically cause full speed motor voltage until the fail-safe relay drops. If your rotator overshoots by 4-6 seconds, then suspect a shorted FET. Please do not continue to rely on the fail-safe relay. Although they are rated to switch this kind of load, the relay is the last safety to prevent a runaway. Do not continue to operate the rotator with the drive FET shorted.

## 2 RT-21r Setup Notes

1. Use OPTION = POT or OPTION = COUNTER as appropriate. If you use a pot system and are using 85% or less of the whole pot, you may use OPTION = TIC-PST to provide extra protection from the POT Out-Of-Range error that this option provides.
2. Use a 1A SB 5x20 mm (GMA) fuse. There is a spare included and more are commonly available at Radio Shack.
3. This unit contains a fail safe circuit and relay to operate a power enable relay at the RPU. This will prevent unwanted runaways. Should a component fail, or any other condition that would cause the motor to run continuously the fail safe circuit will disrupt power to the motor after a pre-determined delay 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.

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) to drive 24 VDC relays as shown in the RT-21 manual.

### ^CALIBRATION INSTRUCTIONS - Pulse Count:

1. Set the pulse divider to your required number, 9576 is the default.
2. Mechanically set your antenna 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

### 2.1 CALIBRATION INSTRUCTIONS – Potentiometer systems:



Ensure that someone is watching the rotator during this procedure until you are sure the calibration is done properly. Use only the CW and CCW buttons during this process too. It is possible to over-rotate your system until it is properly calibrated.

1. With the system set at it's desired center of rotation, rotate the pot shaft until it is also at center as read with an Ohmmeter, then tighten so it's connected to the rotator.
2. Turn the system with the CCW button until the system is exactly 180 degrees CCW from center. Press CANCEL + CCW to calibrate the CCW endpoint. (Note the number displayed and keep it for future reference.

**RT-21R SETUP NOTES**

3. Turn the system with the CW button until the system is rotated through 360 degrees and is again pointed in the same direction as the previous step. Press CANCEL + CW to calibrate the CW endpoint. (Note the number displayed and keep it for future reference.)
4. 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

### 3 **OPTIONAL – Converting an RT-21 for use with RPU Main PCB version 2.0 or later**

It is possible to use a standard RT-21 with an RPU. Reversing these instructions would then allow you to use the RT-21 with any commercial rotor again. Refer to section 1.1 for the drawing showing all the jumpers and connectors on the PCB.

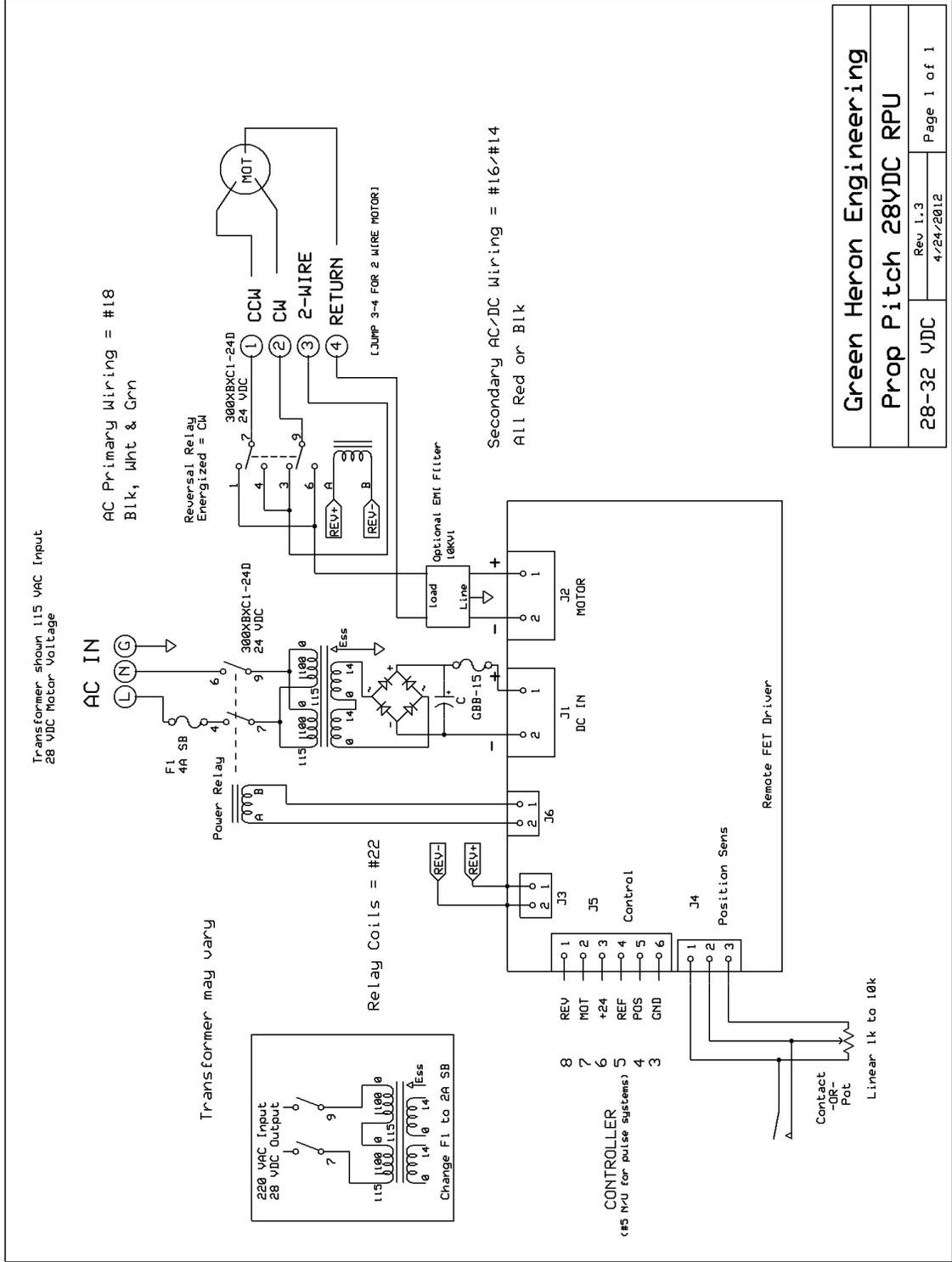
1. Inside the controller, disconnect and secure the two wires from terminal 7 and 8 that go to the AC motor start capacitor. Also remove the white wire from terminal 6 and J8-3.
2. Install TVS (20V Transorb devices) on terminals 7 and 8 to ground)
3. Install the 3 conductor ribbon cable (from the factory) between J13 on the PCB, to terminals 6, 7 and 8 on the rear panel. (J13-1 goes to 6, J13-2 goes to 7 and J13-3 goes to 8.)
4. Set J10, J12 and J14 for DC motor operation. Remove the two large transformer wires from J9. an add wire nuts to protect them from shorting.
5. Set the controller for POT or COUNTER with J5 and J6 as needed.
6. Add a jumper on J4 1-2 (24VDC Relays)

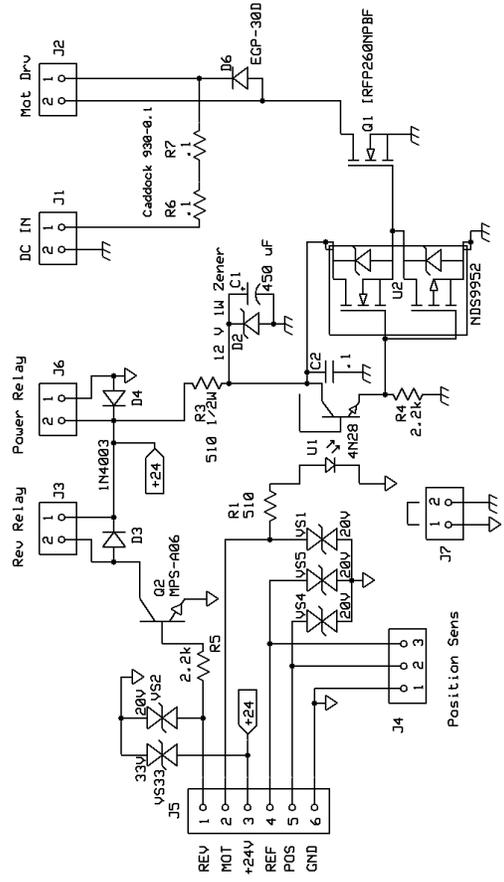


**WARNING:** If J4 jumper is added and the transformer is still connected to J9, (step 4) damage to the RT-21 will result.

7. Label the rear panel terminals:

|          |     |
|----------|-----|
|          |     |
| <b>6</b> | +24 |
| <b>7</b> | MOT |
| <b>8</b> | REV |





28 VDC MOTOR

J7 = IN  
R6, R7 = .1 Ohm Fusible Limiting Resistors  
Caddock # MP938-0.1  
VS1-VS5 = Littlefuse 1.5KE28CA  
VS33 = Littlefuse 1.5KE33CA

|                                |                       |
|--------------------------------|-----------------------|
| <b>Green Heron Engineering</b> |                       |
| <b>Remote FET Driver</b>       |                       |
| J. Ach                         | Rev 1.4<br>11/30/2011 |
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