Tuning Switch with Limit Indication for Screwdriver Antennas
By Phil Salas – AD5X

Introduction

I currently use a Little Tarheel screwdriver antenna for mobile operation. While I can readily find resonance during tuning (using the Tenna-Tune), I sometimes accidentally pass the optimum tune point and wind up at a coil upper or lower limit - and it takes me awhile to realize this. Therefore, I decided to build a new tuning switch for the Little Tarheel that would give me upper and lower coil limit indications.

Current Limit Measurements

The Little Tarheel motor draws very low current. I measured 50 milliamps on average during tuning, and 400-500 milliamps when the motor stalls. Therefore, a 10-ohm resistor in series with the motor causes a ½ volt drop during tuning, and about 4 volts when the motor stalls. Therefore a red LED with a current limiting resistor can be placed in parallel across the 10 ohm resistor to give a good motor limit indication.

The Circuit

The circuit is shown in Figure 1. Everything is built into a tiny plastic box. The small inexpensive rocker switch handles 13 amps – certainly plenty for this application! This small box and switch combination is great for either easily holding in your hand during operation, or attaching it to a surface using double-sided tape. I did have to cut about $1/10^{th}$ of an inch off the switch pins so the switch wouldn't exceed the depth available in the box. All lettering is done with Casio "white-on-clear" labeling tape. I labeled the high- and low-frequency motor drive positions as "6M" and "80M" respectively.

The most difficult part of the assembly is cutting the 0.75" x 0.5" rectangular hole for the switch. I scribed an outline of the required cut-out on the inside of the lid, and then drilled a series of holes inside the outline. Then I used an X-acto™ knife to trim the cut-out to the final size. The switch will snap into the cut-out and mount securely. The ultra-bright 6000 mcd LEDs are mounted by pressing them into 3/16" diameter holes and holding them in place with hot glue.

Everything is wired point-to-point (see photo "Inside"). The 10-ohm resistor dissipates 1.6 watts when the motor stalls, but you won't be keeping the switch pressed long when the LED lights up. So you can use a 1- or 2-watt resistor instead of the 3-watt unit called out if you wish. I used a 2-watt resistor from my junk box. For the DC input, I used a Powerpole connector, and I kept the same miniature Molex connector for the motor control interface as used by the Little Tarheel. These connectors can be seen in the photo "Inside & Cables". A close up of the final unit can be seen in the photo "Unit in Hand".

Operation

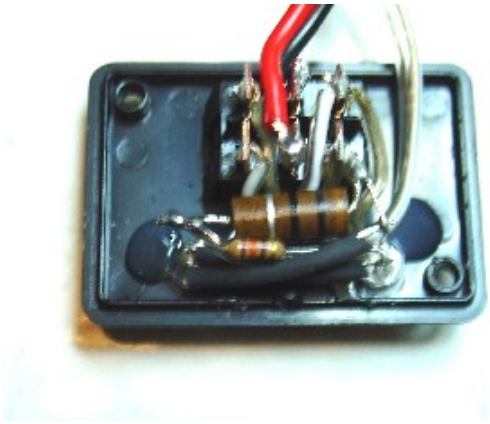
When you first press the rocker switch to move the frequency up or down, the appropriate LED will flash once and then go out. When you get to either coil limit, the LED associated with that limit will glow very bright.

Conclusion

The switch assembly described provides a visual indication when an upper or lower coil limit has been reached on the Little Tarheel screwdriver antenna. This design is easily modified for other types of screwdriver antennas. You'll just need to measure the running and stall currents and do a little experimenting.

Parts List

QTY	Description	Price
1	Rocker Switch (Mouser 629-GRS4023C13)	$1.41
1	4-pin Receptacle (Mouser 538-03-06-1044)	$0.77
2	Female sockets (Mouser 538-02-06-1103)	$0.19 ea.
1	1.97x1.38x 67 box (Mouser 546-1551GB)	$1.03
1	10-ohm 3-watt resistor (Mouser 71-CW2B-10)	$0.40
1	150-ohm ¼-watt resistor (Mouser 71-CCF07-J-150/R)	$0.02
2	Ultra-bright red 5mm LED (All Electronics LED-94)	$0.75 ea



Inside View

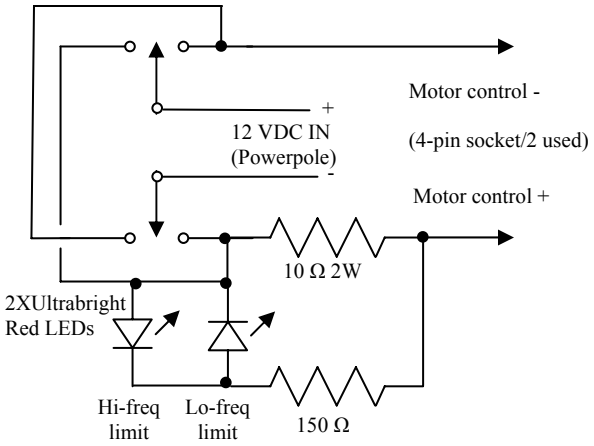
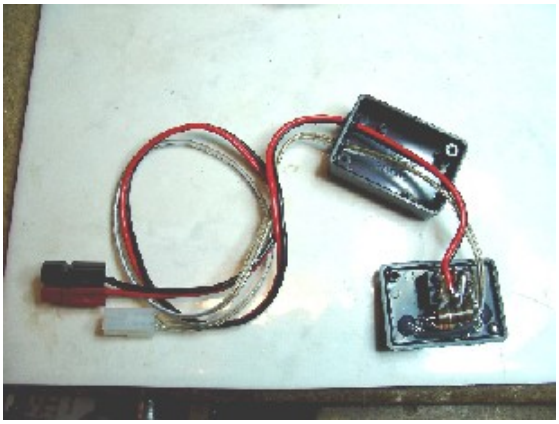


Figure 1 – Direction control and limit indicator



Inside and Cables

Unit in Hand