PKR1 Tuning Pulser

Rev0 5 Dec 2024

Please see the online YouTube video at **https://youtu.be/MOXBThbrAOc?si=XtDkJkZ14ylfoyY4** for additional operation details. The goal of this or any tuning pulser is to minimize the average envelope power while still allowing the full peak envelope power.

The CTR Engineering PKR1 is a self-contained internally powered CW-mode tuning pulser. Everything is in the 4”x3”x1” self-contained box, with one lead to the radio. It has a front panel LED that shows the inverse of the pulse, longer or brighter illumination indicates a shorter and more ideal pulse time. The center pin of the output phono jack is the positive polarity. It can key voltages anywhere up to 150 volts and 100 mA. The unit is ground independent, this unit can key either positive or negative key lines by reversing the phono jack connections.

The duty cycle or “weight” is adjustable from near 0% to 100%. The pulse rate is adjustable from around 5 PPS (pulses per second) to around100 PPS.

This unit uses a standard garage door remote 12Vdc battery. Battery life is essentially battery shelf life when used in normal daily operation.

Hardware Requirements

Optimal and safest amplifier tuning will be best accomplished when using a good peak reading power meter and one of our TOF modules.

TOF Module

Grid current is the single most important indicator of proper amplifier tuning and operation. In cathode driven or ground grid amplifiers, control grid current indicates resonance far better than a plate current dip. (In grid driven tetrodes and pentodes, the best indicator is control grid current for drive level and screen grid current for loading adjustments.)

The TOF module allows direct reading of control grid current on voice or while pulse tuning. The TOF has an external overload LED indictor. For additional safety, the TOF disables the amplifier should grid current become excessive. The TOF is optimized for use with tuning pulsers as well as all common transmission modes.

Output Power Meter

In June of 1983 the FCC changed the maximum amateur radio power level from a maximum dc plate input power of 1kW to a maximum peak envelope RF output power of 1500 watts (depending on band and licensed class). CW carrier power is the same as CW peak power. Because of this, a CW jack pulser also works to tune for voice PEP.

Amateurs operating near their licensed power limit are required to know the RF output peak envelope power. A good peak-reading power meter is not only a requirement when near the legal limit, it is also an asset to station tuning and clean amplifier operation. A properly designed and constructed linear amplifier tuned for optimum PEP power will be clean and linear up to that tuned peak power. Do not tune or peak the amplifier at lower power values and exceed that value in operation.

The operator is faced with two main display choices in RF power meters, digital and analog. While digital is great for steady levels, analog meters are the preferred indictor for monitoring changing levels. This is especially true when peaking or tuning a responsive stage.

A second issue surrounds supporting electronics in RF power meters. Response and accuracy of power meters with a digitized chain are determined by the processing code written for that specific instrument. While possible to write useful peak and average meter code, generally the peak and average response codes are poorly written. Unless the meter response is known to be good, like the Bird digital, it is best to avoid digital meters or analog meters with microprocessor interfacing.

Many digital meters make good power indicators but very few digital meters work well as tuning adjustment aids or fine-tuning indicators. Rapidly changing numbers are too difficult to recognize. The solution to that is a bar graph, but bar graphs have terrible resolution and are not particularly “eye-friendly.” It is very easy to follow a meter pointer with the eye while adjusting with a hand as the pointer moves the slightest amount lower or higher in power. This is not generally true with a bar graph. It is certainly not the case with a changing digitally displayed number.

Connecting the PKR1 Tuning Pulser

The PKR1's only external connection is from the PKR1 output to the radio's CW key jack. Our supplied cord has a mono phono male on the PKR1 end and a standard ¼" stereo male phone plug on the radio end. The ¼" male phone plug, with tip to key and floated ring terminal, is the most common radio CW manual key connection. See figure 1:

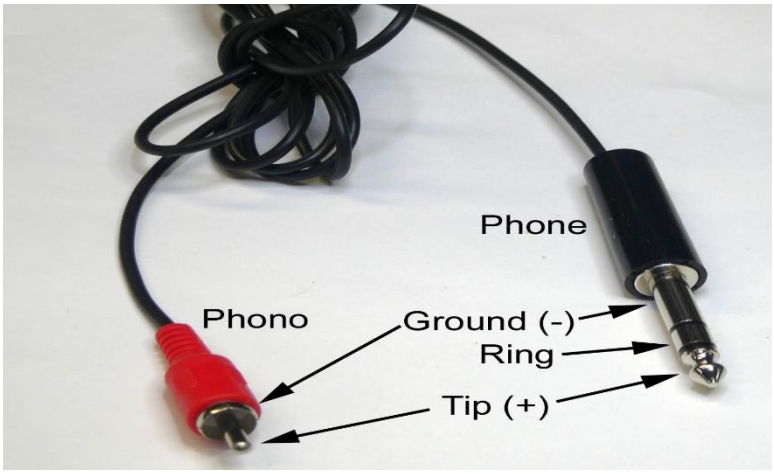

Figure 1 interface cord

The radio must be set to external manual key.

The PKR1 output port is fully open-circuit when off. If you operate CW with an external keyer you can use a ¼" stereo headphone Y adaptor to parallel the PKR1 with your keyer output.

If you use the radio's internal keyer with an external paddle the radio key and keyer selection must be set to manual. The PKR1 can still be used with a ¼" stereo Y adaptor.

Operation and Adjustment

See figure 2.

This device uses a 12V internal battery. Normal battery life is years. It can use an external 10-20Vdc supply should you ever wish to eliminate the internal battery.

The PKR1 becomes operational when the push-to-pulse button is pressed.

1.) The control to the LED's left is the pulse duty cycle or pulse "weight." Full counter clockwise (CCW) or "down" is minimum duty cycle or weight. Full CCW is zero pulse width and will produce a solid green LED. Someplace approaching full clockwise the duty cycle becomes 100% and a solid carrier is generated. The LED will extinguish as a steady carrier is approached. **The best setting is rotated as far CCW (brightest LED) as your radio and power meter allow while still showing a steady highest-power reading on your PEP meter. The adjustment goal is the lowest average power with highest peak power.**

2.) The control to the LED's right is pulse rate. At some slow pulse rate setting (CCW) the RF power meter might "flicker" or bounce with pulses. Keep pulse rate just clockwise from this lower pulse rate limit. The upper pulse rate or pulse speed limit is set by the radio keying response. This is likely almost at a humming or buzzing sound. The radio sidetone monitor should produce clear fast tone pecks or very truncated "dits." The acceptable speed range of pulse rates will be quite wide, but any error would be best made adjusted toward a slower rate. The adjustment goal is minimum average power while maintaining maximum peak power and not flickering meters. The meters should be stable or steady on peak and not waddle around on average.

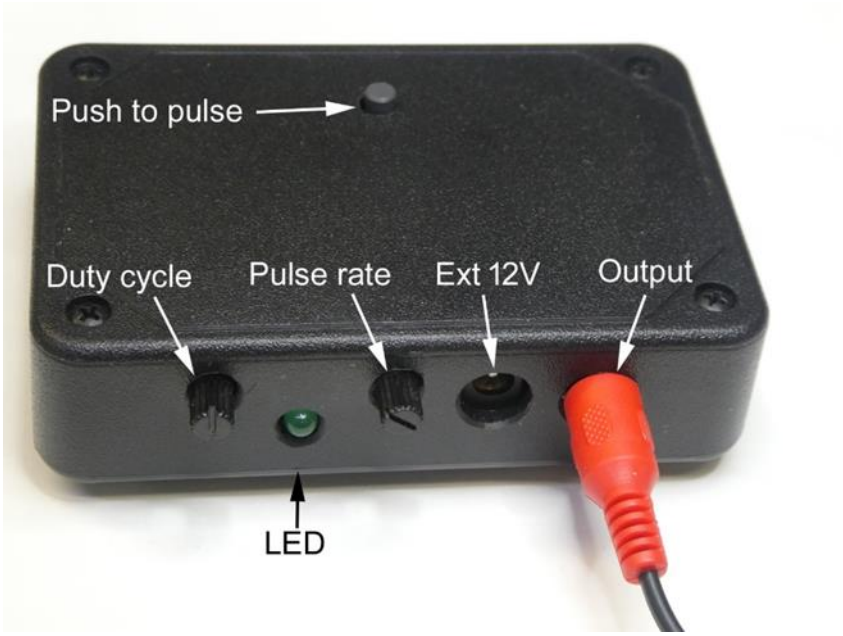

Figure 2 controls and jacks