

# Operation of the new FPS-4 Front Panel Switch Plus Some Alignment Tips

The replacement dual-concentric switch and knobs for roofing filter selection and AGC control operate as follows.

We added an AGC speed between Fast and Medium and a second one between Medium and Slow. Thus the AGC knob now turns two more positions further clockwise than normal, with the AGC speed getting progressively slower as you rotate it clockwise. The knob for the AGC is the larger rear knob.

For the roofing filters, the small front knob more or less follows the PBT position.

For CW, the 600 Hz roofing filter is selected with the rear FPS-4 switch set to 10 o'clock. Passband tuning must be set in the LSB range to align with the roofing filter centered on an approximate 700 Hz beat note, +/- 250 Hz.

For LSB, set the FPS-4 switch to 11 o'clock.

The original 8 kHz filter, for optimum blanker performance or AM operation, is selected at 12 o'clock, straight up. This returns the R-4C to stock operation.

For USB, set the FPS-4 switch to 1 o'clock.

Crisscrossing a roofing filter with a second IF filter will result in little or no signal. In other words, if the roofing filter is set to LSB and the PBT to USB, little will be heard.

For CW operation, one may not always want to use the 600 Hz roofing filter and a 500 Hz or narrower second IF filter. Under some conditions of high noise, or in cases in a contest where stations are coming back to you off frequency, you may choose to use the LSB roofing filter in combination with a CF-1700/8, FL-1500 or FL-1000 filter in the second IF. Of course one could also operate on CW on the USB side by selecting the USB roofing filter. However the T-4XC will not transceive properly in this mode.

Operating with a wider SSB roofing filter and an appropriate wider second IF filter on CW maintains most of the vast improvement of the Sherwood roofing filter system. Opposite sideband leakage is still eliminated. High-pitched leakage above 2 kHz is also eliminated. Second-mixer overload is significantly reduced over the stock 8 kHz filter, though not as much as when using the CF-600/6.

## Third-mixer LO operation and calibration:

In SSB mode, the 3<sup>rd</sup> mixer LO comes from the transmitter. In CW, or if the receiver is not connected to the T-4XC, the 3<sup>rd</sup> mixer LO comes from the R-4C. The frequency adjustment is the top compression trimmer under the mode switch cover. The oscillator crystal drifts down about 100 Hz during receiver warm-up. A counter may be plugged into the Carrier Oscillator jack on the rear of the receiver for adjustment purposes. I generally set the oscillator 50 Hz high with the radio cold. If the 3<sup>rd</sup> mixer oscillator is significantly off frequency, it will affect the centering of the roofing filters.

## A comment on alignment:

Over the years, I have developed a method of aligning the receiver that is somewhat different than the method described in the Drake manual. Of great annoyance is the factory method of soldering in two 10K resistors across the pre-mixer LO injection coils for alignment of the preselector. The two LO coils are over coupled, thus they have a double hump in the passband, making it inappropriate to try to just peak them. One may do all front-end alignment by using the S meter and crystal calibrator.

To solve the over coupling problem, tune in the calibrator at mid band, and misadjust the rear-most band trimmer to drop the S meter as much as possible, though not below S3. A 20 dB drop or more is desirable. Try turning the trimmer both to maximum or minimum capacity, to achieve the desired out of alignment condition. Then peak the second from the rear capacitor for maximum S meter reading. Without retouching the second from the rear compression trimmer, re-peak the rear-most trimmer. Now peak the two front RF amplifier trimmers for maximum S meter reading.

If the S meter is calibrated properly, the crystal calibrator should read between S9 +10 and S9 +15 on 80 – 10 meters. 40 meters tends to be down a few dB from 80 or 20 meters. 160 meters is usually down 10 dB from the higher bands, an insignificant issue. The WARC bands will usually be a bit lower than 20 meters.

Peak the compression trimmer on the bottom side of the radio for maximum S meter reading. Do the same with T-6 next to the 3<sup>rd</sup> mixer tube socket. With the MIX-4, the peak on T-6 is more broad, since the IF chain peak is not also affecting the LO injection.

If the 3<sup>rd</sup> mixer is on frequency, and the lowest-pitched band noise does not occur with the PBT set to 12 o'clock, then the BFO slug needs slight adjustment. The pitch of band noise at 9 o'clock and 3 o'clock on the PBT control should be very similar, though possibly not exactly identical.

The most critical tube in the radio is the last IF tube, that is very difficult to remove. To change it, I remove the blanker board, and remove the rear-most screw holding the left blanker bracket in place. Rotate the bracket clockwise to obtain better access to the tube.