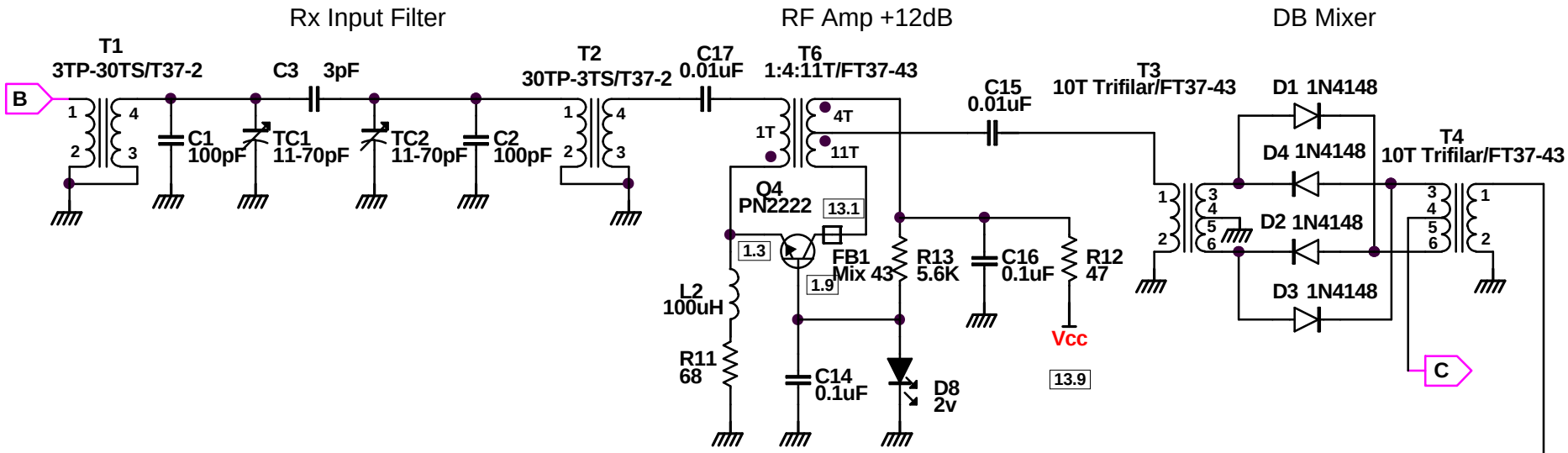
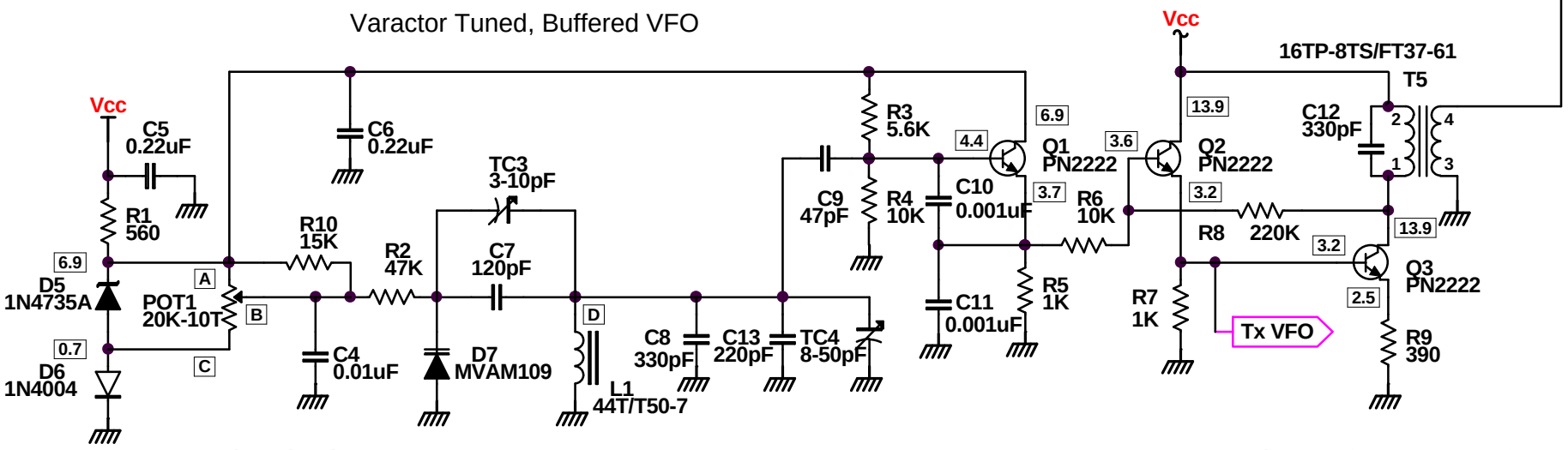
2N2/40+, A 40 Meter CW Transceiver

Designed by: Jim Kortge, K8IQY





Note: TC3 is optional

C10 & C11 are 5% polyester

C8 is polystyrene; C13 is NPO

C7 & C9 are NPO

Note: Select C12 from 270-390pF for max outp

2N240+AA.SCH; 02012002

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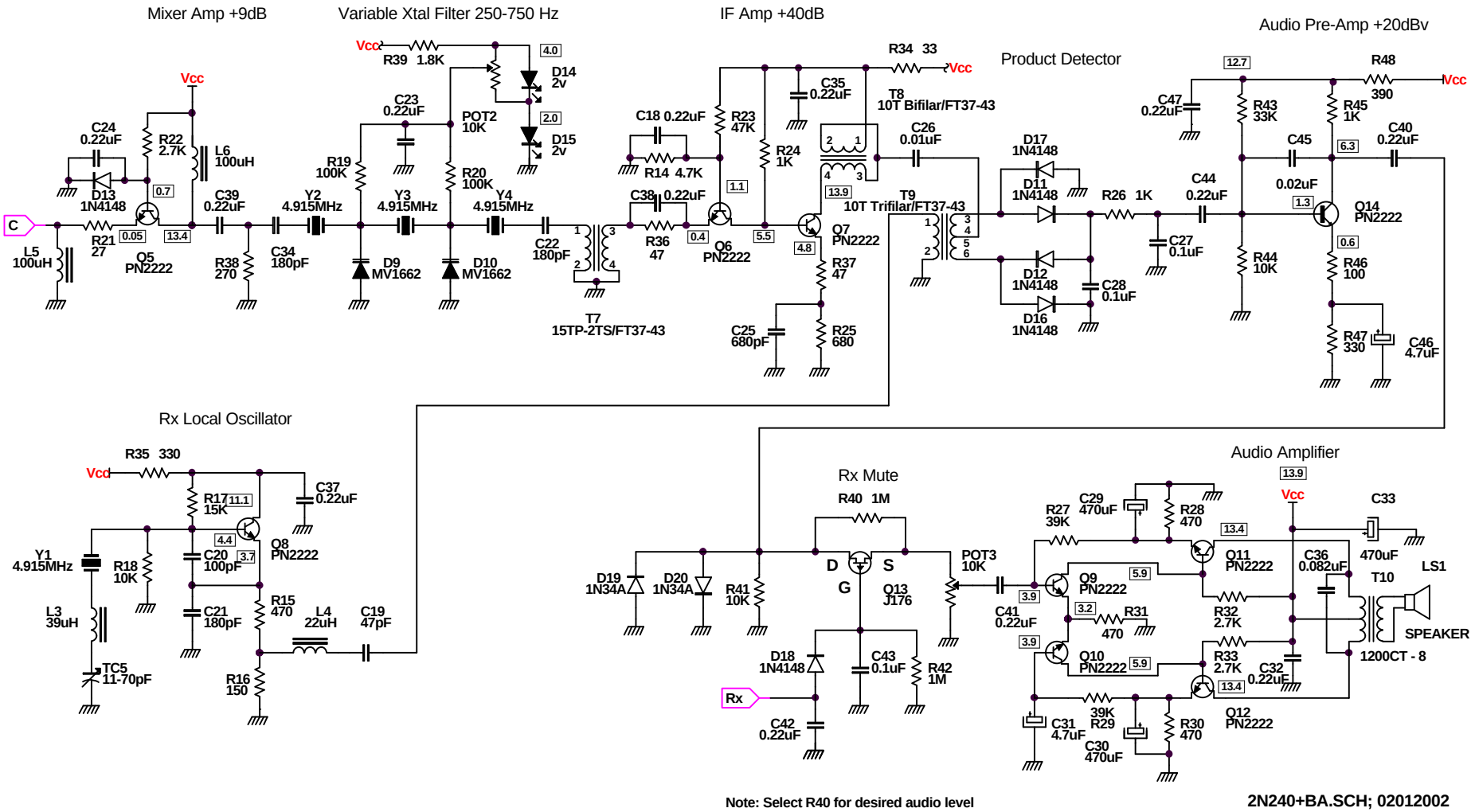

Note: Select R40 for desired audio level

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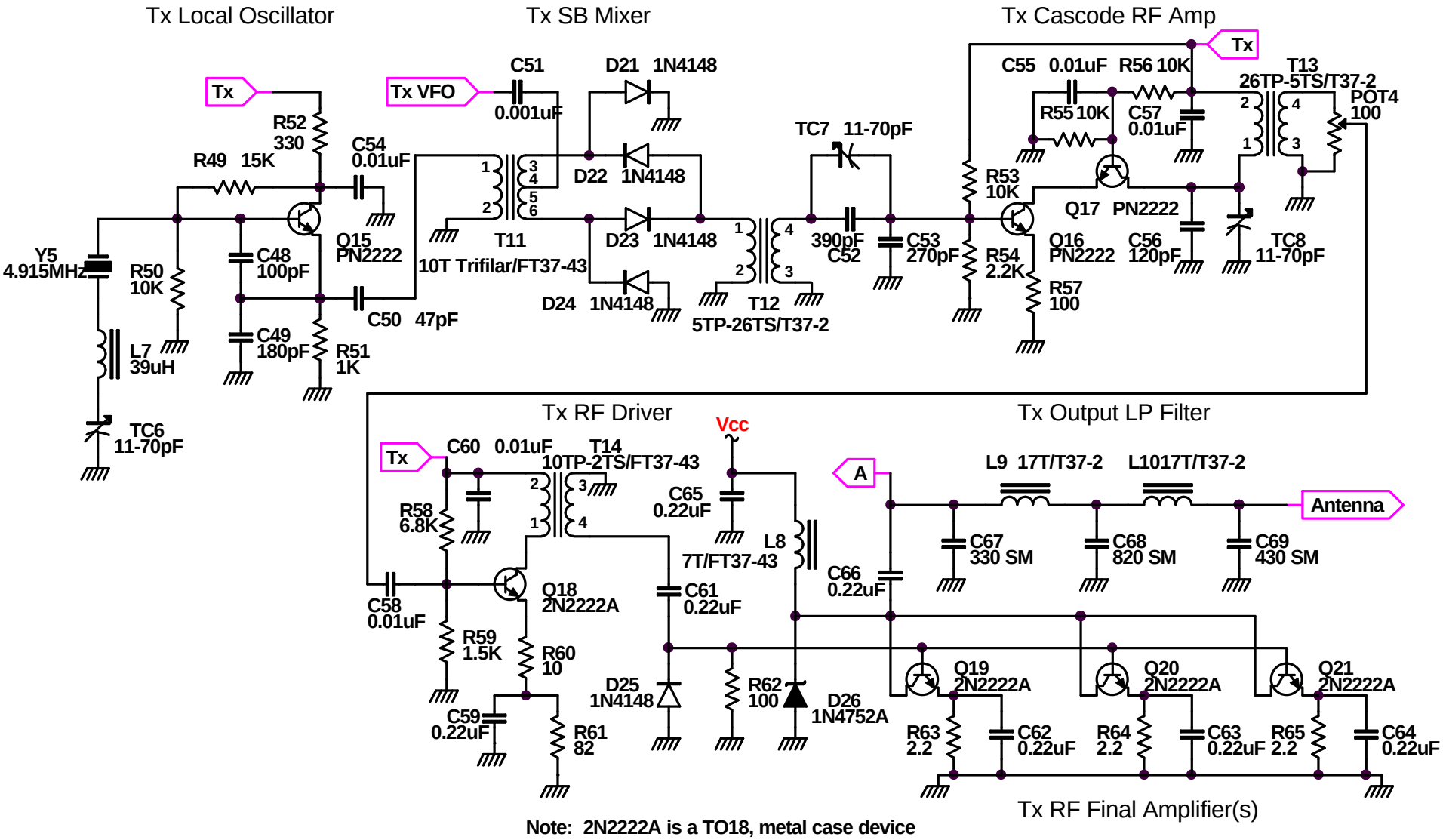

Note: 2N2222A is a TO18, metal case device

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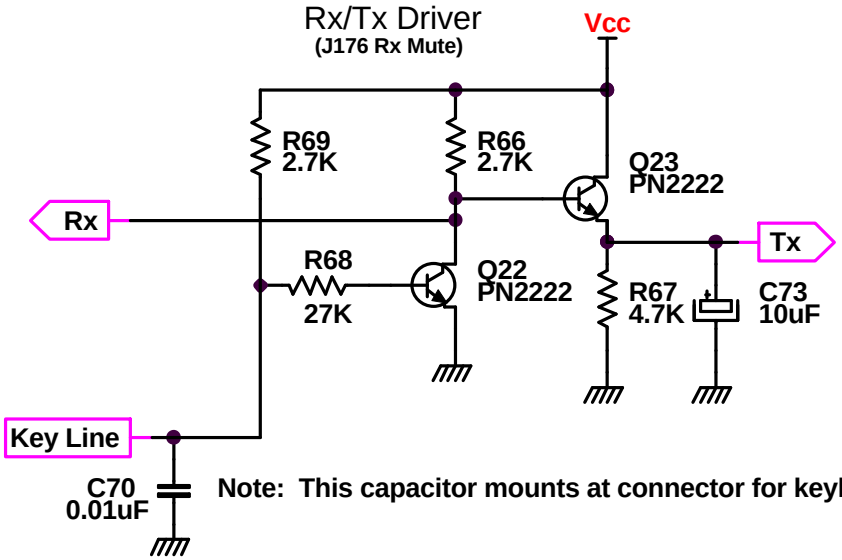
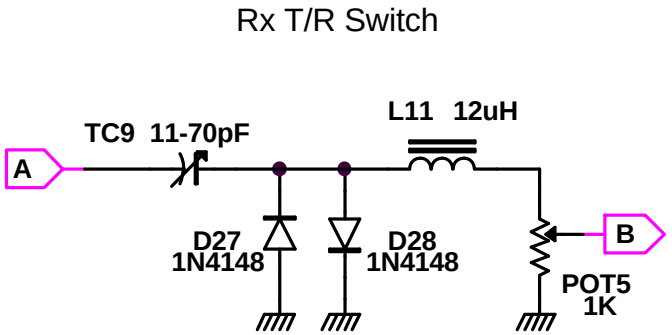
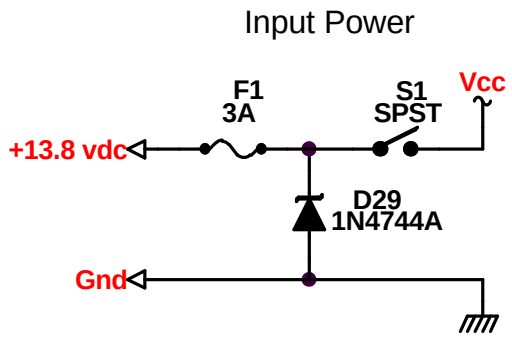


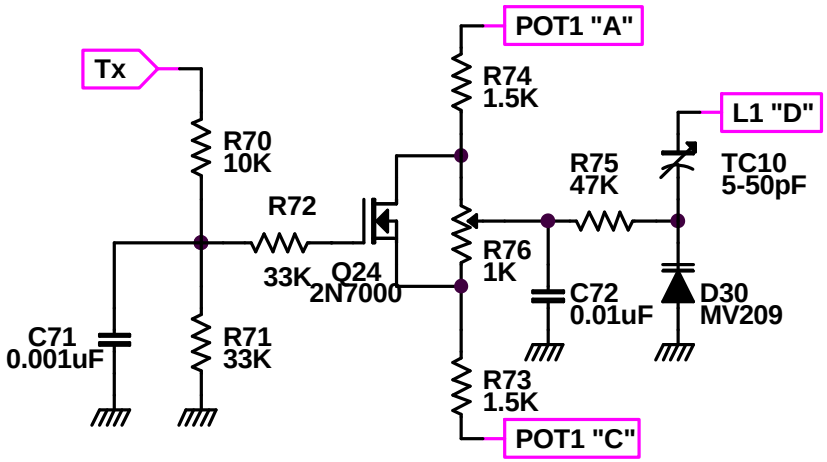
Note: This capacitor mounts at connector for keyline



TC9 can be 47pF, L11 10uH, for fixed tuned input



Note: S1 part of POT3



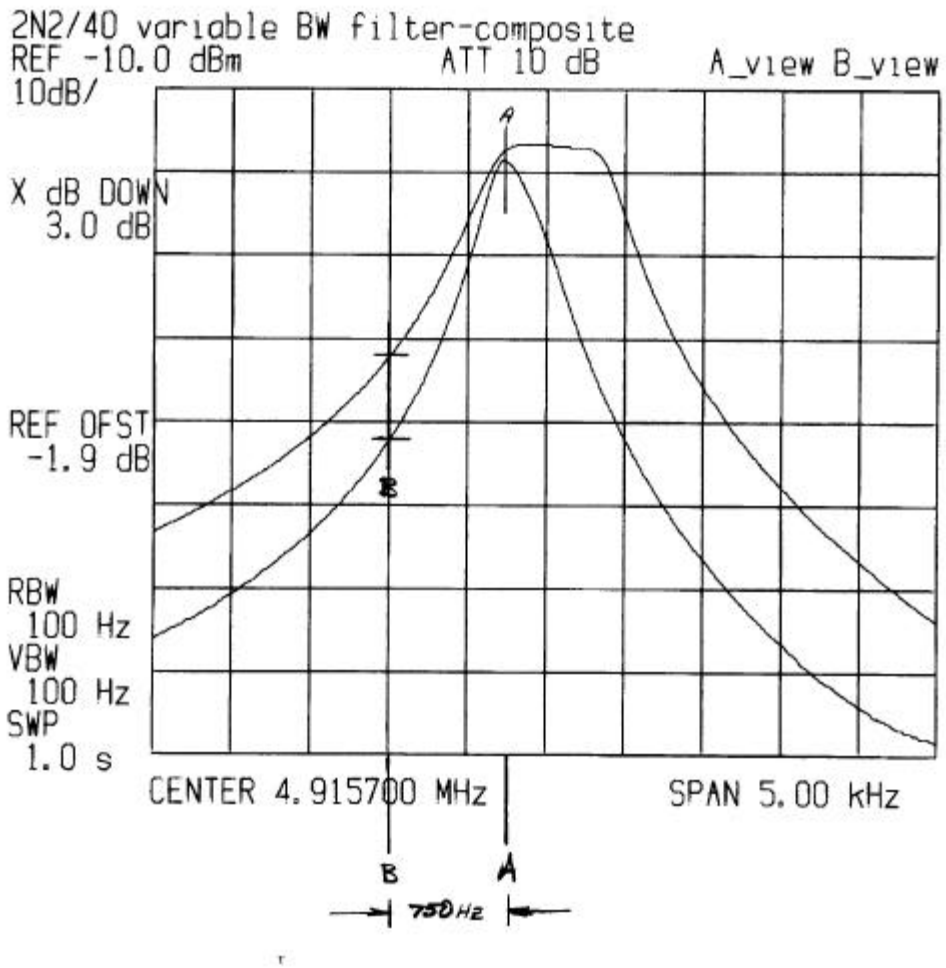
Note: TC10 can be fixed 47pF for fixed RIT span

2N240+DA.SCH; 02012002

2N2/40+ Receiver Alignment

Overview: This procedure is used to do the alignment of your 2N2/40+ when you have the receive portion of the rig completed. Correct alignment is necessary to obtain the best performance from the receiver, and done incorrectly, may render the receiver incapable of hearing any signals except for the very strongest. The basic process is to adjust the receive local oscillator so that it is about 700 Hz below the center of the filter pass band, when the filter is adjusted to its narrowest bandwidth, at around 250 Hz.

A diagram is provided for reference. It shows the extremes of the filter; when it is adjusted as wide as it will go, and at the narrowest bandwidth. These extremes are at 750 and 250 Hz pass band bandwidths.



Referring to this diagram, please note these important features. The center of the narrow pass band is at about 4.915450 MHz. That point is shown in this diagram as point "A". This is typical of the filters using crystals with a marked frequency of 4.9152 MHz. The center of the pass band of the filter is above the crystal's marked frequency by a few hundred Hz.

The design of the 2N2/40+ uses this filter as an upper sideband filter. That means the received signal will be somewhere in the pass band of the filter, above the frequency of the local oscillator driving the product detector. The product detector is the stage used to convert the received RF signal into an audio signal. The reason that an upper sideband configuration was chosen was to minimize receiver retuning when the pass

band of the filter is narrowed. As shown in the figure, when the filter is narrowed, the upper slope is the one that changes frequency. The lower slope changes its attenuation characteristics, but not where it is located in frequency.

For the receiver to be properly aligned to "hear" CW at 700 Hz, the receive local oscillator must be below the center of the narrow filter pass band by the same amount as the note we desire to hear when receiving. If 700 Hz is the desired note, then the receive local oscillator needs to be lower in frequency than point "A". The 700 Hz offset is shown on the diagram as point "B".

With these facts in mind, let's proceed to doing the alignment.

1) Set the filter pass band to its widest setting. Set trimmer capacitor TC5 to its maximum capacity position by either listening to the receiver local oscillator on another receiver tuned to approximately 4.914 MHz, or by measuring the output frequency of the local oscillator. This measurement can be made by attaching a counter probe to the ungrounded end of L3 and adjusting TC5 for the lowest frequency obtainable.

2) Tune the receiver to a signal, or if possible, generate a signal about mid-band, around 7.050 MHz. Tune across this signal by rotating the tuning potentiometer POT1. Notice that as the tuning potentiometer is rotated clockwise, the audio pitch of the received signal goes lower.

3) Listen for a peak in the audio response as the signal is tuned. We want this peak to occur at about 700 Hz. With TC5 set for maximum capacity, the peak is probably upwards of 1500 Hz. Slowly rotate TC5 to a lower capacity setting. Go a little at a time, and return the receiver, listening for the audio peak. You will hear it progressively moving to a lower pitch. As the pitch comes down, you can start narrowing the filter pass band too, to begin homing in on the very best setting.

4) Repeat the adjustment of TC5 and retuning the receiver until the pitch is where you like to listen to CW, the filter is as narrow as it will go, and the audio is the loudest you can make it. That's it…..the receiver is aligned.