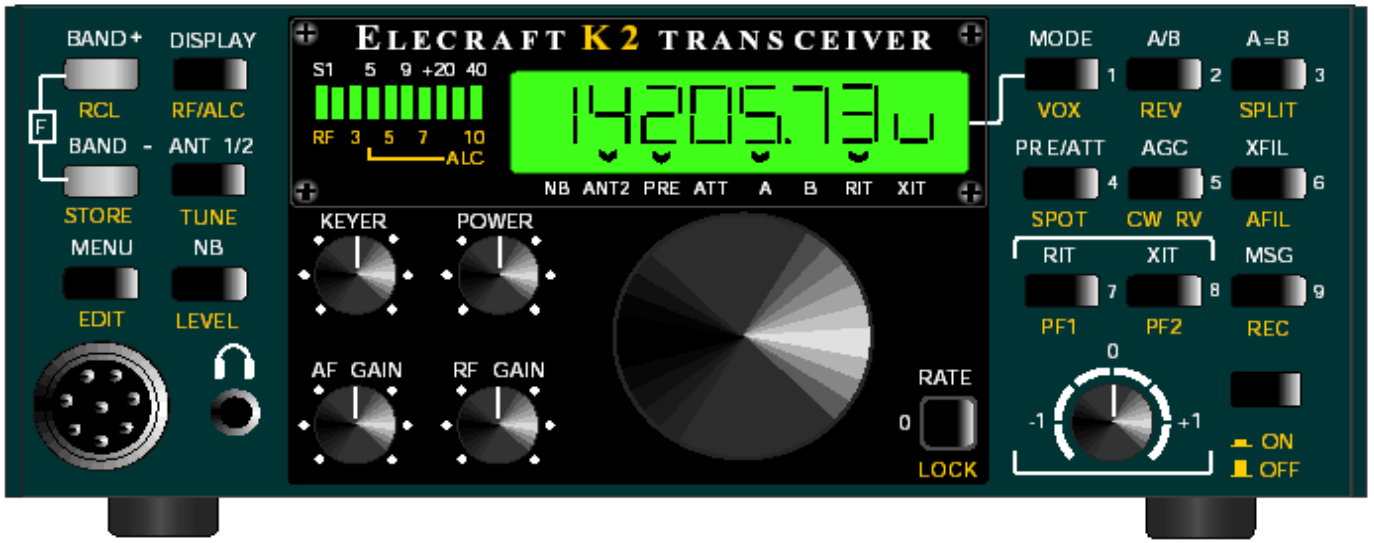
ELECRAFT K2 TRANSCEIVER



Alignment Instructions

Extracted from the K2 Manual

By Don Wilhelm W3FPR

Setting the AGC Threshold

Make sure the RF GAIN control is rotated fully clockwise.
Locate potentiometer R1 on the Control board (right side, as viewed from the front of the K2).
Set your DMM for DC volts. Connect the (-) lead of the DMM to one of the ground jumpers or to the K2 chassis ground.
Touch the (+) lead to pin 5 of U2 on the Control board. (U2 is located just above trimmer R1. Pin 5 is the pin nearest diode D1.)
Adjust R1 for a reading of **3.80** volts on the DMM. This is the suggested setting, but it can be adjusted later to suite the operator.

i The S-meter must be realigned anytime the AGC threshold setting is changed. S-meter alignment is covered in the following steps:

S-Meter Alignment

Using the menu, select the **CAL S LO** function (S-meter zero). Hold **MENU** a second time to activate it.
Turn the VFO knob until you see only the left-most segment of the LED bargraph lit. Then turn the knob a bit more clockwise until this LED just turns off.
Exit the **CAL S LO** function by tapping **MENU**. Enter the menu again and select **CAL S HI** (S-meter full-scale sensitivity).
Turn the RF GAIN fully counter-clockwise (minimum gain).
Adjust the VFO knob until you see segment 9 of the bar graph lit,
then turn it a bit more counter-clockwise until segment 10 just turns on (right-most segment).
Turn the RF GAIN control back to its full clockwise position.
Exit the **CAL S HI** function by tapping **MENU**.

4 MHz Oscillator Calibration

Plug the frequency counter probe into P6 (Control board). Connect the probe tip to the PLL reference oscillator test point, TP3 (left-front corner of the RF board, near U4). Using the menu, select **CAL FCTR** , then hold **MENU** a second time to enable the frequency counter. The counter should show a frequency of 12090 kHz +/- 30 kHz. If it is 0000.00, changing rapidly, or out of range, you could have a problem with the counter probe or the PLL Reference Oscillator. Use one of the following methods to adjust C22 on the Control board (listed in order of preference):

- Connect a calibrated external frequency counter probe to TP3, *without* removing the K2's internal counter probe. Adjust C22 until the K2's reading matches the external counter's reading.

- Alternatively, you can use a calibrated short-wave or ham-band receiver. Set the receiver for LSB or USB mode. Connect a short length of wire to the receiver's antenna jack, and lay the end near the 4 MHz crystal on the K2 Control board. Find the oscillator signal on the receiver. Tune the receiver to 4.000 MHz, and adjust C22 until you hear a zero-beat (pitch = 0 Hz).

- If you don't have a counter or receiver, leave C22 set at its mid-point for now. You can improve the calibration later using a calibrated signal generator or an on-air signal, such as WWV (at 10.000 MHz).

PLL Reference Oscillator Range Test

Set up the K2 internal counter as described for **4 MHz Oscillator Calibration** (at left, first three steps).

If you have an external frequency counter probe connected to TP3 along with the K2's internal counter probe, disconnect it.

When you're in frequency counter mode, the **BAND +** and **BAND -** switches can be used to check the range of the PLL reference oscillator. First, tap **BAND +** and write down the frequency reading below (typically about 12100 kHz). Then tap **BAND -** and write down this frequency reading (typically 12080-12090 kHz).

Ref. High Freq. Ref. Low Freq. Range (kHz)

_____ _____ _____

Subtract the lower frequency reading from the higher reading. The range must be between 9.8 and 13 kHz (if not, see Troubleshooting). Tap **M E N U** to exit **CAL FCTR** .

VCO (Voltage-Controlled Oscillator) Test

Use **BAND +** or **BAND -** to select the 80-meter band, and set the VFO for a frequency of about 4000.10 kHz.

Connect the frequency counter probe to the VCO test point, TP1. Activate the frequency counter using **CAL FCTR** as before.
You should now see a frequency counter reading in the 8 to 10 MHz range. It may or may not be stable at this time (i.e., the frequency may be changing). If the reading is 0000 kHz or is changing rapidly, you probably don't have the counter cable connected to the VCO test point. If the reading is fairly stable but
not between 8 and 10 MHz, refer to Troubleshooting.
Tap **MENU** to exit **CALFCTR** .

VCO Alignment

In the following steps you'll adjust the VCO inductor (L30) so that
the VCO control voltage is in the proper range.

Disconnect the internal frequency counter probe and remove it completely from the K2.

Select 80 meters, and set the VFO for about 4000 kHz.
Connect a DMM (digital multimeter) to the left end of resistor R30 (near the center of the synthesizer area of the RF board) and ground. Use a small alligator clip to ensure a good connection. (You
can also use the built-in voltmeter to measure the VCO control voltage. Refer to Voltmeter Probe Assembly in Part I.)

i It is possible to damage the slugs in slug-tuned inductors if you use a metal tool or if you tune the slug too far in or out. The tuning tool provided will not damage the slugs.

Using the wide end of the plastic tuning tool, adjust the slug in inductor L30 until the voltage at R30 reads 6.0 V. If the voltmeter
reading does not change at all as you tune L30 through its full range, refer to Troubleshooting. If the voltage changes but you cannot get to 6.0 V, you have probably wound the VCO inductor (T5) incorrectly or have installed the wrong value at L30 or C72.

Set the VFO for approximately 3500 kHz.

Measure and write down the VCO control voltage at this frequency in Table 6-1 (using pencil).

For each remaining band, set the VFO to the low and high frequencies listed in Table 6-1 and write down the VCO control voltages.
(You can tune quickly to the approximate frequencies in

the table by selecting the 1-kHz tuning rate.)

Table 6-1. VCO Voltage Readings

Band	Low Freq.	Voltage	High Freq.	Voltage
80 m	3500	_____	4000	_____
40 m	7000	_____	7300	_____
30 m	10000	_____	10150	_____
20 m	14000	_____	15000	_____
17 m	18000	_____	18200	_____
15 m	21000	_____	21450	_____
12 m	24800	_____	25000	_____
10 m	28000	_____	28800	_____

If some VCO control voltage readings above are < 1.5 V, *or* some of them are > 7.5 V, you may be able to shift the entire set of readings so that they are all within the 1.5 to 7.5 V range. Switch to the band (and frequency) that had the highest or lowest voltage, then adjust L30 to bring that reading into range. Then re-measure all of the voltages to make sure they're in range.

i If you have some voltages that are < 1.5 V and others that are > 7.5 V, you have probably installed the wrong value at one or more of the VCO capacitors (C71-C74) or varactor diodes (D21-D26). Another possibility is that T5 has the wrong number of turns or that you installed the wrong type of slug-tuned inductor at L30.

If you change any of these components, repeat the VCO alignment procedure.

Disconnect the DMM from R30.

BFO Test

The BFO (beat-frequency oscillator) will be tested in the following steps.

Switch to the 40-m band.

Connect the frequency counter to the BFO test point (TP2), which is on the right side of the RF board near the crystal filter. Using the menu, select **CAL FCTR** . The counter should show a frequency between 4908 and 4918 kHz.

i If you see a reading of **0000.00** kHz or one that is changing rapidly, you may not have the frequency counter probe connected properly, or the BFO may not be working (see Troubleshooting). If you see a stable frequency reading that is nowhere near 4908-4918 kHz, you may have installed the wrong crystals in the BFO (X3/X4).

When you're in frequency counter mode, the **BAND +** and **BAND -** switches can be used to check the range of the BFO. First, tap **BAND +** and write down the frequency reading below (typically about 4916-4917 kHz). Then tap **BAND -** and write down this frequency reading (usually about 4909-4912 kHz). Finally, calculate the BFO range (high - low) in kHz. Typical range is 4 to 6 kHz.

BFO High Freq. _____ (must be >= 4916.3 kHz)
BFO Low Freq. _____ (must be <= 4912.7 kHz)
Range (High - Low)_____ (must be >= 3.6 kHz)

If your BFO range is less than 3.6 kHz, you may have the wrong varactor diodes installed at D37 or D38, or the wrong crystals installed at X3 or X4.

If the BFO frequencies are shifted too high or too low, it may be due to one of the following:

- If you didn't calibrate the K2's internal frequency counter using an external counter, it may not be reading accurately. If possible, borrow an accurate counter and re-do the **4 MHz Oscillator Calibration**.

- The BFO range shift could be due to the inductance of L33 being too high or too low. However, since L33 is supplied prewound and tested, this is unlikely.

- The leads of R116 may have been heated excessively during soldering, shorting out a portion of L33's turns.

- One of L33's leads could be broken. Look closely at the leads using a magnifying glass.

- One or more of the capacitors or varactor diodes in the BFO circuit could be of the wrong value.

BFO Alignment

The K2 uses a variable-bandwidth crystal filter, allowing the operator to set up as many as four filter bandwidths for each operating mode. Each of these filter configurations requires an appropriate BFO setting, which determines the pitch you hear. Filter and BFO set up is done with the **CAL FIL** calibration function. **CAL FIL** is described in detail in the Operation section of the manual, under Calibration Functions. Rather than duplicate this information here, the instructions and example in the Operation section will be used.

Make sure the bottom cover is securely attached.

Tap **PRE/ATT** until the **PRE** annunciator is turned on. (Turning the preamp on will provide some background noise so you can hear the effect of changing filter bandwidths.)

Follow all instructions on page 85 to become familiar with the **CAL FIL** function.

Perform the steps in the example on page 86 to set up all filters. You'll use the filter and BFO data from Table 8-1 (for a CW-only K2), since the SSB adapter is not installed. If you later install the SSB adapter, you can easily change the settings to take advantage of the optimized, fixed-bandwidth SSB filter.

VFO Linearization

Make sure the bottom cover is securely attached.

Allow the K2 to stabilize for at least 10 minutes at room temperature (approx. 20-25°C). (**Note:** Avoid using a high-wattage
work lamp direct above the K2 during calibration. With the top cover removed, this could heat the RF board to a higher temperature than would ever be seen during normal operation.) Connect the internal frequency counter cable to the VCO output test point (TP1).

Use the procedure listed below to linearize the VFO. If you see any **INFO** messages, refer to Troubleshooting.

1. Use **BAND +** or **BAND -** to select 40 meters. Select CW normal mode and filter FL1.

2. Set the VFO to anywhere in the range 7000-7100 kHz.

3. Enter the menu and select **CAL PLL** , then hold a second time to start the VFO linearization sequence.

4. The frequency counter will show the VCO frequency as it decreases through a range of about 10-13 kHz. (The letter "**d** " will flash each time a calibration data point is stored.)

5. When calibration is completed (4-8 minutes), you'll see the message **End** on the LCD. You can then tap any switch to return to normal operation. If you see an **INFO** message rather than **End** , refer to Troubleshooting (Appendix E).

I.F. Amplifier Alignment

L34, located near the right front corner of the RF board, is used to
peak the output of the I.F. amplifier.

Using the wide end of the plastic tuning tool, adjust the slug in L34 until it is near the top of the can. **Stop turning the slug
when it appears to be at the top or when you feel resistance.**

Turn L34's slug one full turn clockwise (down into the can).

Set the band to 40 meters using **BAND +** or **BAND -** . Select CW Normal and FL2 (700 Hz nominal bandwidth).

Make sure the RF GAIN control is fully clockwise (max. gain).

Disconnect the antenna from J4, if one was connected.

Tap **PRE/ATTN** until the PRE annunciator turns on.

Connect a pair of headphones (stereo or mono) to the front panel jack, and turn the AF GAIN control to about midway.

Slowly tune the VFO to locate the weak internally-generated signal near 7000 kHz. If you can't hear the signal at all, you may have a receiver problem. Try the 40-meter Band Pass Filter Alignment, below, then refer to Troubleshooting if necessary.

While listening to the signal at 7000 kHz, adjust L34 for best signal strength and lowest noise. This setting occurs at about 1 to 1.5 turns below the top of the can. (You can use your DMM on AC
volts, at the speaker jack, to obtain a more sensitive indication.)

40-Meter Band Pass Filter Alignment

Connect an antenna or a signal generator to the antenna jack on the rear panel. If you use a signal generator, set it for approx. 7150 kHz at an output level of about -100 dBm, or strong enough
to activate the S-meter. If you're using an antenna, tune in a signal
in the range of 7100-7200 kHz. If you cannot find a signal, you can use atmospheric noise from the antenna to peak the filter.

Using the plastic tuning tool, adjust both L1 and L2 (back left corner) for peak signal strength. You may be able to use the bargraph if the signal is strong enough. If you do not hear any signals or noise, see Troubleshooting.

i In CW mode, the frequency shown on the display takes into account an offset equal to your sidetone pitch. This allows you to determine a station's actual carrier frequency by matching their pitch to your sidetone, rather than by zero-beating the signal. The **SPOT** switch can be used for this purpose.

Alignment and Test, Part III

In this section you'll complete alignment and test of the K2 on all bands.

Make sure the power switch, S1, is in the OFF position (out).

Connect your power supply or battery. For transmitter tests, a battery or well-regulated power supply that can handle at least 2 amps is recommended. Avoid using a switching power supply unless
it is well shielded and includes EMI filtering. A linear-mode supply
will typically generate much less noise in the HF bands. (See any recent *ARRL Handbook* for examples of both types.)

Connect a 50-ohm dummy load to the antenna jack. The dummy load should be rated at 10 watts or higher.

Connect a pair of headphones and a key or keyer paddle.

Set the POWER control fully counter-clockwise (minimum power output).

Turn on the K2. You should see **ELECRAFT** on the LCD, followed by the frequency display.

Select voltage/current display mode by tapping **DISPLAY** to make sure the receiver is not drawing excess current. (Typical current drain will be 180-250 mA depending on menu settings.) Return to frequency display mode.

Switch to CW and select FL1 using **XFIL**.

Use the menu to set up the desired CW sidetone volume and pitch if you have not already done so, using **ST L** and **ST P**.

The
pitch can be set from 400 to 800 Hz, although 500-600 Hz is recommended. The sidetone volume and tone will vary a small amount as the pitch is changed, but it should have a pleasant sinewave sound at any setting.

Set up the desired keying device using **INP**. If you're using a hand key or external keyer, use **INP HAND**. To use the internal keyer, select **PDL n** or **PDL r** (normal or reverse paddle). You can also connect a computer or external keyer along with the keyer
paddle. Refer to the Operation section for details on this "autodetect"
feature (Page 92).

To verify that the sidetone is functioning, hold the **SPOT** switch.
Tap any switch to turn the SPOT tone off.

40-Meter Transmitter Alignment

i To align the transmitter you'll need some means for monitoring power output as you adjust the band-pass filters. An analog wattmeter or oscilloscope is ideal. However, in the instructions that follow we'll assume that you're using the K2's built-in digital wattmeter, which will also provide satisfactory results.

Set the POWER control for 2.0 watts.

Switch to the 40 meter band and set the VFO for about 7100 kHz.

Locate the 40-meter band-pass filter inductors, L1 and L2, and be prepared to adjust them using the wide end of the tuning tool.

i In the following steps you'll place the K2 into "TUNE" mode by holding **TUNE**. You should limit key-down periods to about
5 or 10 seconds during tune-up for safety reasons. If you see or smell smoke turn the K2 off and refer to Troubleshooting.

Note: While in tune mode, it is normal to see power drift upward several tenths of a watt. You may also see a sudden jump in power
during alignment. The output will quickly be reduced to about 2.0 W
by the firmware if this happens.

Put the K2 into tune mode and activate the built-in wattmeter by holding **TUNE**. Using the alignment tool, adjust L1 for maximum output.

Tap any switch to exit TUNE mode.

Enter tune mode again and adjust L2 for maximum output.

Tap any switch to exit.

If necessary, repeat the adjustment of L1 and L2 two or three times to be sure that you have the inductors peaked correctly. If you cannot get power output to 2.0 watts or higher, see Troubleshooting
.

Make sure the bar graph is set for **DOT** mode using the **GRPH** menu entry.

Set power output to 5.0 W using the POWER control.

Tap **DISPLAY** to enter voltage/current display mode. When this display is selected, you can use **TUNE** to check your voltage and
current in transmit mode.

Enter tune mode and note the change in voltage and current.

Current drain at 5 watts is typically 1.3 to 1.6 amps.[10] If the current reading is much higher than this, or if the voltage drops more than 1 V, you may have a problem in the transmitter, load, or
power supply (see Troubleshooting).

Return to frequency display using the **DISPLAY** switch.

Set the POWER control for 10.0 watts.

Enter tune mode just long enough to verify that the wattmeter reads approximately 10 watts. If you then switch to voltage/current
display and hold **TUNE** again, you should see a current drain of typically 1.8 to 2 amps. If you see a "HI CUR" warning message (high current), use CAL CUR to set your transmit current limit higher. If current is much higher than 2 A, see Troubleshooting.

This completes transmitter alignment and test on 40 meters.

[10] The K2 transmitter is most efficient at 10 watts and higher; current drain at 5 watts CW may be higher than expected. This is unavoidable because the K2 is capable of up to 15 W output. Also, for a given power level, SSB
transmission requires more transmitter "overhead" to prevent distortion.

Receiver Pre-Alignment

Since the same filters are used on both receive and transmit, it is possible to align all the remaining bands on transmit only.

However, you can pre-align the filters on receive by using a signal
or noise generator, separate ham transceiver, or on-air signals and
atmospheric noise. This pre-alignment on receive will make transmitter alignment easier, since the filter adjustments will already be at or close to their final values.

Switch to 80 meters and set the VFO for about 3750 kHz (mid-band). Turn on the RF preamp by tapping **PRE/ATTN** until you see the PRE annunciator turn on.

Use a signal generator or an antenna to inject a signal or noise at this frequency.

Adjust L3 and L4 for maximum signal strength.

i Since some inductors are shared between two bands, you must always align the remaining bands in the order indicated. Always use this procedure if you re-align the filters later.

Switch to 20 meters (14100 kHz) and turn on the preamp. Set C21 and C23 to their mid-points. Adjust L8 and L9 for maximum
signal strength. (This step pre-sets C21, C23, L8, and L9 before final adjustment in the next two steps.)

Switch to 30 meters (10100 kHz) and turn on the preamp. Adjust L8 and L9 for maximum signal strength.

Switch back to 20 meters (14100 kHz). Adjust C21 and C23 for maximum signal strength.

Switch to 15 meters (21100 kHz) and turn on the preamp.

Adjust L10 and L11 for maximum signal strength.

Switch to 17 meters (18100 kHz) and turn on the preamp.

Adjust C32 and C34 for maximum signal strength.

Switch to 10 meters (28200 kHz) and turn on the preamp.

Adjust L12 and L13 for maximum signal strength.

Switch to 12 meters (24900 kHz) and turn on the preamp.

Adjust C44 and C46 for maximum signal strength.

This completes receiver alignment.

i During receiver alignment, you may have noticed that signal strength is somewhat lower in volume when you select the narrowest filter (100 Hz setting, FL4). This is because the K2's crystal filter is optimized for wider bandwidths (250-800 Hz). Despite the slightly greater attenuation, the narrower settings are very useful in reducing QRM (interference) from strong, nearby signals. (Any of the filter settings can be changed, and FL2-FL4 can
even be turned OFF. See page 85 for information on customizing filter settings.)

Transmitter Alignment

If you did the receiver alignment, above, you may find that little or
no transmit adjustment is required on most bands.

Set the POWER control for 2.0 watts.

Switch to 80 meters and set the VFO for about 3750 kHz (mid-band).

Enter tune mode and adjust L3 and L4 for maximum power as indicated on the internal wattmeter. (Use a more sensitive analog instrument if available.) Limit tune-up time to 5 or 10 seconds.

i Since some inductors are shared between two bands, you must always align the remaining bands in the order indicated. Always use this procedure if you re-align the filters later.

Switch to 20 meters (14100 kHz).

Set C21 and C23 to their mid-points.

Adjust L8 and L9 for maximum power output. (This step pre-sets C21, C23, L8, and L9 before final adjustment in the next two steps.)

Switch to 30 meters (10100 kHz) and adjust L8 and L9 for maximum power output.

Switch to 20 meters (14100 kHz) and adjust C21 and C23 for maximum power output.

Switch to 15 meters (21100 kHz) and adjust L10 and L11 for maximum power output.

Switch to 17 meters (18100 kHz) and adjust C32 and C34 for maximum power output.

Switch to 10 meters (28200 kHz) and adjust L12 and L13 for maximum power output.

Switch to 12 meters (24900 kHz) and adjust C44 and C46 for maximum power output.

This completes transmitter alignment.

Filter Settings (CAL FIL)

This section explains how to use **CAL FIL** to select the bandwidth and BFO settings. An example appears on the next page. The Elecraft web site provides information on other filter setup methods, including a method that uses a personal computer sound card. For a discussion of how the crystal filter and BFO settings are related, see page 104.

Basic CAL FIL Setup

1. Connect the frequency counter test cable to TP2 (BFO).
2. Set AF GAIN high enough to hear some background noise.
3. *Switch to a band between 160 m and 17 m*. (The sideband is inverted on 15 m and above, which may be confusing during filter setup.)
4. Select CW mode using **MODE**. If a bar appears above the *C*, the K2 is in CW Reverse mode; hold **CW REV** to select CW Normal mode.
5. Tap **XFIL** until **FL1** is selected.
6. Tap **MENU** and scroll to **CAL**. Hold **EDIT** to move the underline to **OFF**, then scroll until you see **CAL FIL** . Finally, hold **EDIT** again to activate the filter display.

Filter Bandwidth Display

The initial **CAL FIL** display shows the present filter bandwidth and the operating mode, e.g. **FL1 1.50c** . The number **1.50** indicates a bandwidth of *roughly* 1.50 kHz.[14] This parameter has a range of **0.00 - 2.49**. Above **2.49**, the parameter changes to **OP1 - OP5** , which can be used to select optional filters. For example, the filter on the SSB adapter (KSB2) is **OP1**.
Note the present bandwidth setting, then try using the VFO knob to change it. You'll hear the "shape" (or pitch) of the noise change. (Return to the original bandwidth after experimenting.)

[14] The number shown should be used only as a relative indication of filter bandwidth. Actual bandwidth will probably be narrower.

BFO Displays

Tap **BAND -** to display the BFO setting for filter FL1, which will be similar to **BF1 t 110 c** . The 3-digit number is the *BFO control parameter*. This number can be changed using the VFO knob, but you'll use a different BFO-setting method described below. The letter **t** after **BF1** is a reminder that the **BF1** BFO frequency is always used on transmit, which is important for SSB operation.

Whenever the BFO control parameter is displayed, you can tap **DISPLAY** to show the actual BFO frequency in kHz. The VFO knob can then be used to set the BFO directly. This method is used in the filter-setup example.

Note: After changing the BFO setting, you can tap **AGC** to remeasure and save the BFO information *without switching filters*. This is useful if you want to try various BFO settings for a particular filter to find the one with the best audio peak.

Other CAL FIL Operations

When you're in **CAL FIL** you can always tap **XFIL** to change to the next filter, tap **MODE** to change modes, and hold **CW REV** to switch from CW normal to CW reverse. *Whenever you switch modes or filters, the K2 will first record your new settings, if they have been changed.*

BAND + switches to the filter bandwidth display, and **BAND –** switches to the BFO display. Tapping **MENU** exits **CAL FIL** and returns to the normal display. (On exit from **CAL FIL**, changes are saved.)

Turning Selected Filters Off

FL2, 3, or 4 can be individually disabled. To turn off a filter, display the filter bandwidth using **CAL FIL** , then set the bandwidth number to **OFF**. (To get to **OFF** , go to **0.00** first, then turn the VFO knob a bit farther counter-clockwise.)

CAL FIL Example (setting up all filters):
Table 8-1 shows the recommended filer settings for a CW-only K2. If you already have the SSB adapter installed, use the SSB settings from the KSB2 manual.
1. Read the CAL FIL instructions on the previous page if you haven't already. You'll need to be familiar with CAL FIL displays and controls before proceeding.
2. Do the **Basic CAL FIL Setup** from the previous page exactly as described. You should then see a display similar to **FL1 1.50 c** .
3. Using the VFO knob, set **FL1** to the value shown for CW Normal (1.50). Tap **XFIL** to save the new value and move to **FL2** . (The CW Reverse bandwidth will also be updated.)
4. Set up **FL2**, **FL3**, and **FL4** in the same manner.
5. Use **XFIL** to return to **FL1** . Tap **BAND -** to show **BF1** .
6. Tap **DISPLAY** to show the actual BFO frequency. Use the VFO
knob to select the value shown in the table. Typically you'll be able to get to within +/- 20 Hz of the target frequency.
7. Tap **XFIL** to save the new value and move to **BF2**. Repeat steps
6 and 7 to set up **BF2**, **BF3**, and **BF4**.
8. Switch to CW Reverse by holding **CW REV**. Then repeat steps 6
and 7 for each CW Reverse BFO setting (**BF1** -**BF4**).
9. Tap **BAND +** to return to the filter bandwidth display. Use the **MODE** switch to select LSB, and return to **FL1** using **XFIL**.
10. Set up each LSB filter bandwidth according to the table. (This
also updates the USB filter bandwidths.)
11. Tap **BAND -** and set up each LSB BFO as you did for CW.
12. Tap **MODE** to select USB, and set up each USB BFO.
13. If you use settings that differ from the defaults, record them in
Table 8-2. Use pencil, since you may change them later.

Table 8-1. Recommended Filter and BFO Settings, CW-only K2

Mode	FL1	BF1	FL2	BF2	FL3	BF3	FL4	BF4
CW Norm.	1.50	4913.6	0.70	4913.2	0.40	4913.2	0.20	4913.1
CW Rev.		4915.0		4914.4		4914.4		4914.4
LSB	2.20	4913.7	2.00	4913.7	1.80	4913.5	1.60	4913.5
USB		4916.0		4915.7		4915.6		4915.3

Table 8-2. Filter and BFO Settings Used (record in pencil)

Mode	FL1	BF1	FL2	BF2	FL3	BF3	FL4	BF4
CW Norm.								
CW Rev.								
LSB								
USB								