ELECRAFT KX3 Application Note
All-Band Receive Side Band Null
With Optional Gain/Phase Adjustment
(RXSBNL*)

Revision A, October, 2012

Background

The KX3 has been designed to have some performance improvements made by the operator while in the field. This Application Note documents an improvement you can make to receiver performance in the KX3.

Discussion

This procedure allows for improved opposite sideband suppression during reception, relative to the normal level of suppression. Transmit sideband suppression is not affected nor is it being addressed with this Application Note.

For KX3s with the KXFL3 Roofing Filter option, sideband suppression procedures will be applied to null each filter on each band. An optional procedure is presented to apply per-band nulling for the MENU: RX SHFT = 8.0 setting.

While the KX3 Operator has the option of applying this procedure to individual bands, Elecraft recommends that the procedure be applied to all bands.

After this procedure is completed, be sure to perform a Configuration Backup using the KX3 Utility. This will preserve the settings for later use if your KX3 needs to be restored with all prior configuration items unique to your rig.

Firmware revision required

KX3 firmware version 1.22 or later

Note that there may be some points in the procedure which require that some switches be pressed twice while in the menu. This will be improved in later firmware releases.

Equipment Required

RF Signal Generator: Elecraft XG3 or equivalent.

Note that the signal generator must be capable of developing S9 to S9+30 signal levels on HF bands.

RXSBNL* Procedure

In this first step, you will be setting initial values for all bands based on the 20M band settings.

- Set MENU:RX SHFT to NOR on all bands. Exit menu. Turn off DUAL RX.
- Select CW mode, with sidetone PITCH = 550 Hz. Normalize PBT (400 Hz BW, FL3).
- Turn on RIT and set the offset to -1.10 kHz. THEN TURN RIT OFF (for now).
- Set up your all-band RF signal source for convenient target frequencies within each band.
    - Choose a frequency in the middle of each band rather than band edges where possible. You may encounter undesired or misleading modulation effects there.
- Switch the KX3 to each band in turn, selecting CW (normal) mode and using the VFO to tune in the signal source on that band.
- Locate the RXSBNUL menu entry and unlock it.
- Tap CMP to switch from the original RXSBNUL scheme to per-band. The menu entry name will change to RXSBNL*.
- Hold CLR to copy the original 20-meter gain/phase data for FL1/2/3 (as well as for RX SHFT=8.0) to ALL bands.

At this point, the opposite-sideband null depth on each band has been applied to all other band settings. Elecraft has found that this will provide a good start will not change since you just duplicated the 20 meter data, above. As a result, the original fixed compensation will still apply.

Proceed to Optimize FL1/2/3 gain/phase for each band

In this step, you will be stepping through each HF band, nulling the sideband for each of the filters installed in your KX3. Note that the steps below will be repeated a number of times and are nested for that reason.

- Switch both the signal source and KX3 to the target band
  (NOTE: you can change bands from within the RXSBNUL menu entry)
    - Turn on RIT
        - Confirm that you still have -1.10 in the VFO B window
        - You should now be listening to the opposite sideband
    - Now, perform the RXSBNUL procedure
        1. Make sure FL3 is still selected
            - If not, then adjust PBT I (WIDTH) until it shows under XFIL
        2. Tap APF to automatically find GAIN and PHASE
            - This should take about 15 seconds

        - VFO A will show both gain (G) and phase (P) values during the search
    3. Optional: Tweak GAIN or PHASE
        - Tap PRE or ATTN, respectively, and adjust VFO A

- If you have the KXFL3, repeat steps 1 through 3 for FL2 and FL3

- Switch both signal source and KX3 to the next target band and repeat the procedure above for all bands.

Optional Enhancement - RX SHFT=8.0 gain/phase adjustment:

This optional procedure applies only to the MENU: RX SHFT setting. It is the same procedure as above but applies only to this one MENU setting.

- Set RX SHFT to 8.0 on all bands
    - NOTE: you can change bands from within the RX SHFT menu entry

- Go to RXSBNUL menu entry
    - The "FL1" icon will be flashing as a reminder that RX SHFT is in effect

- Now, perform RXSBNUL on each band
    1. Make sure FL3 is still selected
        - If not, then adjust PBT I (WIDTH) until it shows under XFIL
    2. Tap APF to automatically find GAIN and PHASE
        - This may take about 15 seconds
        - VFO A will show both gain (G) and phase (P) values during the search
    3. Optional: Tweak GAIN or PHASE
        - Tap PRE or ATTN, respectively, and adjust VFO A

- Return RX SHFT back to NOR on all bands

Reminder – Back Up your Configuration File

This completes the Receive Sideband Null procedure. Please take a moment to perform a Configuration Backup with your KX3 Utility. This will preserve the settings made during these procedures.