

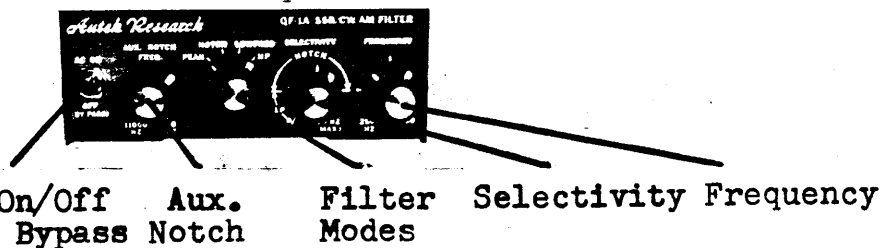
# THE AUTEK QF-1A

## AN ACTIVE AUDIO FILTER

JERRY STRAWMAN

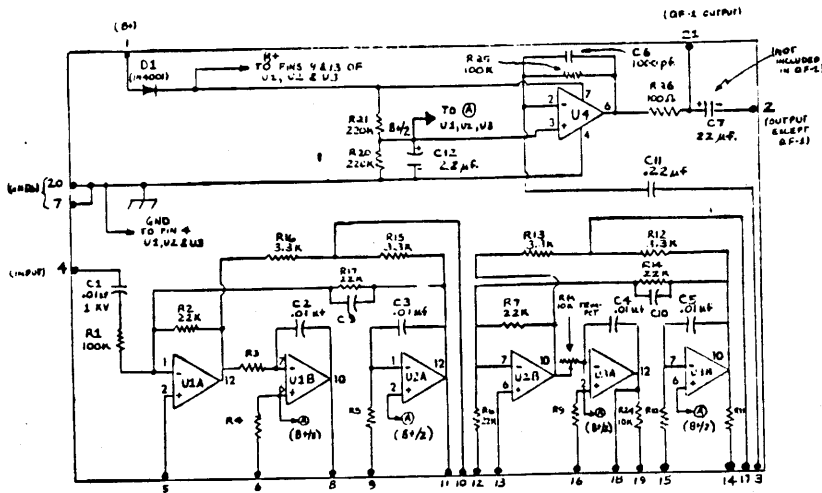
The Autek QF-1A audio filter is a third generation device, superceding models QF-1 and QF-2, produced in the early to late 1970's. The first design was to be installed within an existing receiver, between the first and second audio stages. The QF-1 received power from the host receiver. The subsequent QF-2 had its own power supply and audio amplifier. The receiver speaker or headphone jack supplied the needed audio input. Both models offered the same filter functions; audio peak, audio notch, and a lowpass audio response.

### THE AUTEK "QRM ELIMINATOR"

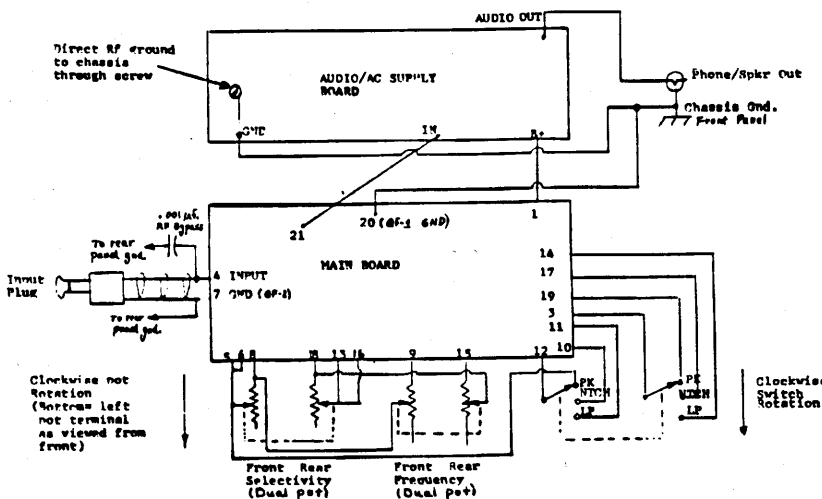


The current QF-1A is an improvement, with the addition of a second notch and a highpass audio mode. The unit is enclosed in a metal case, 4" deep, 8" wide, and 3" high. The picture above illustrates the front panel controls. Audio input is by a shielded audio cable terminated in a  $\frac{1}{4}$ " phono plug. The filter output jack is a  $\frac{1}{4}$ " phone jack. Three integrated circuits comprise the heart of the filter. Two LM 348 quad op amps perform the filter functions, while an LM 380 power amplifier develops one watt of audio. The audio output is suitable for headphones and will drive a communications speaker to a room-filling level. The input level is controlled by the receiver volume control. The internal power supply accepts 117 volts. John R. Tow suggests that the QF-1A can be powered by applying +12 volts (negative ground) across the power supply filter capacitor. He has also noticed that there is AC leakage from the power line bypass capacitor. This results in a slight shock when plugging the QF-1A's input into a grounded receiver headphone jack. He indicates that the remedy for this problem is to isolate the receiver from the electric service ground and to ground the receiver through a separate ground rod.

Properly designed audio filters can improve the audio quality of any receiver. It can augment audio improvement functions that are designed into today's professional and semi professional receivers, as well as aid the radio listener who uses an inexpensive consumer-grade radio. The following schematics detail the design of the Autek QF-1. The design of the current model is similar, but uses different IC's .



The audio filter has an effect analogous to the use of an audio equalizer. It filters audio signals and can select or reject audio frequencies. I have found that an equalizer can be useful in peaking or reducing undesirable audio frequencies. Side-by-side comparison with the QF-1A shows that the latter is more versatile and more effective. Several examples point to this fact.



Reducing frequencies below 3500 KHz by 12 Db improves the intelligibility of the jumble of signals on 1340 KHz. The QF-1A highpass filter increases the effect further. In using the crystal filter

on my Hammarlund HQ-150, the narrowest positions produce muffled audio. Again, frequencies below 3500 KHz are reduced on the equalizer to improve the audio, while the Autek highpass filter makes the recovered audio sound normal.

At various times, either RTTY or CW signals interfere with Kol Israel on 12077 KHz. Using the equalizer to reduce audio frequencies above 3500 KHz by 12 Db, the desired signal is more readable. The QF-1A lowpass filter carries the effect further and the auxiliary notch totally eliminates the offending signal. The BBC on 6005 KHz is the recipient of an annoying het from Costa Rica on 6006 KHz. The equalizer reduces the het to a tolerable level, while the Autek notch eliminates the heterodyne.

In general, the Autek highpass filter can eliminate or reduce 60 and 120 Hz rumble, low frequency hets from off-frequency signals, and clean up muddy audio. The effect is most apparent on receivers with mediocre selectivity. The lowpass filter is useful in reducing high frequency hiss, commonly encountered when receiving single sideband. The audio peak is handy to have available to lift weak CW signal from the background noise.

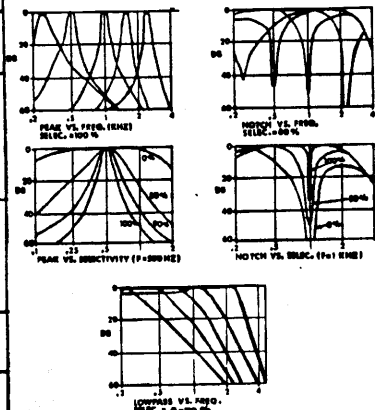
To my way of thinking, the notch function is the most useful. A notch is employed to reject a narrow band of frequencies. On the Autek QF-1A, the width of this narrow band of frequencies is set by adjusting the selectivity control. The center of the notch may be placed anywhere in the range of 250 to 2500 Hz. Most of the better communications receivers have a notch filter. In comparing the depth of the QF-1A notch to that of the Drake R7 and Icom R70, I find the Autek notch depth to be comparable, 30 to 40 Db. There are frequent occasions when a single notch will not do the trick. The two separate notch filters available on the Autek QF-1A can be used simultaneously with the receiver notch to eliminate strong hets, or be used independantly to reduce or eliminate up to three interfering signals.

Many radio listeners use a tape recorder to preserve their prized catches. Why not use this filter between the receiver and recorder to clean up the recorded signal; or between two tape recorders for the same purpose?

The manufacturer in the Autek operating manual provides the following suggestions for addressing various problems encountered. Also included are graphs depicting the effects of the various adjustments possible with this device.

CONDITION	USEFUL ADJUSTMENTS
Desired CW Signal	Peak. Adjust selectivity near full Clockwise (CW). Peak desired station using frequency control. Use as much selectivity rotation as required for conditions. Note that maximum selectivity produces the highest gain at the peak.
SSB, AM, CB, FM, or broadcast station. No heterodyne or whistle.	Lowpass. Rotate selectivity 10% CW or as far as possible without producing audible ringing (not critical). Turn frequency control for desired rejection of high frequencies. Note: greater than 50% rotation makes signals bassy, because important voice frequencies are rejected.
Heterodyne, whistle, TV oscillator radiation (bussing noise), or code station interfering with desired signal. Also for CB beats.	Notch. Rotate selectivity 40% or more. Adjust frequency control to reject undesired signal. Large selectivity rotations yield the narrowest and shallowest notch; also the hardest to tune. Therefore, rotate selectivity no more than required to avoid rejecting the desired signal. Note: to help find the correct rejection frequency, it may help to momentarily switch to peak, peak the interference, then switch back to notch. The peaked signal is then rejected. A slight frequency touchup may help since peak and notch frequencies may not track perfectly.
SSB, AM, CB, FM or broadcast station.	Under some conditions the following may also be useful: 1. Peak. Selectivity 20% to 60% rotated. Frequency adjusted for best clarity. Sometimes very useful. 2. Notch. Selectivity 0% to 30% rotated. Frequency 0% to 20% rotated. Produces an extremely sharp cutoff of high frequencies. If a heterodyne appears, you can quickly turn controls as above. Preferred by many CB and 160, 80, and 40 meter operators for voice reception.
Weak CW	An AC voltmeter or scope across the speaker or phones is a big aid in peaking an extremely weak signal, especially if he fades below the noise occasionally. Also, you can pick up 10 db or so in moonbounce if you use PDI, a pen recorder, and send at 3-4 WPM. See below.
Strong signal	A "flat" response is obtained in: 1) Lowpass. Selectivity 10%. Frequency 0%. 2) Notch. Select. 100% Freq. 0%. 3) Peak. Select. 0%. Freq. 40%.

A FEW OF THE INFINITE NUMBER OF RESPONSES



I acquired my used Autek QF-1A at a hamfest for \$30. The filter is available new from the manufacturer, Autek Research, of Odesa, Florida for \$79. Autek Research advertises in QST Magazine and the World Radio-TV Handbook. The device cannot eliminate all the problems encountered by the radio listener, however, I have found it to be an effective and reliable performer.