



Application Notes

(Preliminary)

History and General Description

Kaltman Creations LLC secured the rights and ownership to advanced filtering technology which was previously used in military, nuclear plant and critical data communications. After two years of development, we have successfully produced a filter technology with Q-values over 6,000 which we have adapted to function in the UHF bands for professional audio wireless applications.

This product, aptly called RF-ResQ™, (Receiver Enhancement System) is an antenna signal processor which will rescue and salvage unusable RF spectrum and substantially reduce interference, plus it contains an improved antenna Diversity technology and frequency-independent, assignable amplifiers. With its router or “Mode” capability, the RF-ResQ can be used either as a direct replacement or in conjunction with existing antenna distribution system.

Software Installation

[Info to come]

Application Notes

FILTERS - The primary functions of the RF-ResQ allows for transmitter spacing closer than what is normally recommended by manufacturers of wireless microphones and to eliminate potential sources of RF interference. This is achieved through the use of frequency assignable, extremely high-Q* 150KHz bandpass filters. One filter is assigned per transmitter frequency.

Placing bandpass filters over each of your transmitters acts almost like a 'RF shield', protecting the transmitter from adjacent interference and allowing for incredibly close channel spacing, The "close channel spacing" produces the possibility of doubling the available channels in a given RF spectrum along with the peace-of-mind of protected transmitter assignments.

**Comparison note: A typical parametric audio Q value might be 6. The RF-ResQ Q factor might be as high at 6,000.*

The RF-ResQ bandpass filters offer enormous benefits, but there are a few cautionary notes.

1). Because commercial wireless microphone receivers have a bandwidth selectivity of around 300KHz, it is possible that a closely spaced, adjacent channel transmitter signal could leak, via other pathways, into the electronics of an unintended receiver. Therefore, it is possible the receiver could receive both signals via leakage or 'other pathways'.

Here is a possible scenario:

Transmitter A and its Receiver are set to 500.150MHz and Transmitter B and its Receiver are set to 500.300MHz (150KHz spacing) and this is acceptable when using the RF-ResQ. The two transmitters work flawlessly when on stage in the performance area where the transmitters are being received via paddle antennas. While still powered On, Transmitter A (500.150MHz) is brought within a few feet of (maybe set on top of) the Receiver equipment rack located in the stage wings. Because Receiver B's selectivity is 300KHz bandwidth, it is possible that Transmitter A's signal could radiate / leak into Receiver B's (500.300MHz) input electronics.

2). Some newer digital wireless systems incorporate Dual or Quad receivers integrated into one rack mounted housing incorporating a single, internal antenna distribution amp (two antenna inputs internally feeding multiple receivers, all in one housing). The RF-ResQ addresses this with selectable routing Modes (see MODES below).

Because the selectivity of the integrated receivers are larger than the bandpass filter (see #1 above), there is the possibility of adjacent channel leakage between the integrated dual or quad receivers. For this reason, and to keep our customers' from improper set-up, the RF-ResQ Mode 2 and Mode 4 of the software will not allow you to select frequencies closer than 200KHz. (there is an Override setting). Please remember that the 200KHz spacing condition/rule is only confined to the integrated receivers within one housing. So you can still select 150KHz adjacent channel spacing/frequencies of receivers from mixed integrated units.

3). "Other pathways" for potential RF leaks can occur within poor quality or incorrect impedance coax cable; through poorly shielded antenna splitters and amps, improper termination at RF connections, and the use of lower quality receivers with poor selectivity.

If your application requires the use of transmitters in very close proximity to the receiver rack, just use frequency spacing greater than 150KHz (maybe at 250KHz). In extreme circumstances, please contact us regarding our RF shielding materials.

4). An assignment of a bandpass filter for one of your wireless microphone transmitters does not mean that it is protected against interference from another transmitter on the exact same frequency. Or another way to look at it; if strong interference exists on the exact frequency, the bandpass filter will not eliminate it, but it will allow you to assign a transmitter very close to it.

Here are some examples of 150KHz bandpass filter tolerances: Your transmitter is set to 625.125MHz. There is strong interference at 625.250MHz (125KHz apart). The assignment of a 150KHz bandpass filter will not help because the transmitter and interference are less than 150KHz spacing.

But there is an exception! If that 625.250MHz interference is a relatively weak in comparison to your transmitter signal (-40dbm difference), you may be able to make it work under "last resort" conditions. Another possible exception is with digital signals. Because digital signals, like that of DTV and digital wireless microphones often have very "sharp" rise & fall waveform characteristics, you may be able to get away with placing a transmitter only 125KHz from a digital signal. General Rule of Thumb – Spacing greater than 300KHz is ideal and any spacing less than 150KHz is not recommended. The software will not allow you to select frequencies closer than 150KHz amongst all RF-ResQ connected units (there is an Override).

5). The RF-ResQ may not function properly with lessor expensive, semi-professional wireless microphone systems, (systems which are not 'frequency agile'). This will be dependent on the specific brand and model, and conditional on their transmitter bandwidth and their receivers' selectivity.

6). Do not attempt to use the RF-ResQ for Powered signals (**not for IEM use!**). Injecting or inputting a powered signal into the RF-ResQ will destroy the internal electronics and void the warranty.

DiverseQ™ - There are several Diversity schemes currently in use amongst various manufacturers. Some rely on first signal arrival, others on phase, and others on signal strength (or a combination thereof). When originally developed, some of these methods were considered advanced for their time, but in today's demanding and critical environments, these older technologies may not be maximizing 'best signal detection'. The RF-ResQ features a new antenna Diversity technology, called DiverseQ™, which processes the antenna A & B signals in the RF-ResQ's IF stage for the fastest, most accurate and quietest antenna switching possible. And because this improved Diversity function is being performed within the RF-ResQ, there is no longer a need for a two antenna connection at the receiver input. All connections from the output of the RF-ResQ feed just the A antenna input (or just the B input) of your receivers. The receiver's open antenna side must be terminated with our included, 50 ohm BNC terminator. Failure to terminate the receiver's open antenna input will result in erratic results.

ODD FREQUENCY SETTINGS - Most professional audio transmitters offer frequency selection in 25KHz increments. If you encounter transmitters with odd frequency selections, it is still possible to select the closest value RF-ResQ filter. For example: your transmitter is set to 527.133MHz. You might select a RF-ResQ filter value of 527.135MHz or 527.130MHz, both will work just fine.

AMPLIFIERS (PER CHANNEL) - Unlike amplified (active) antennas or coaxial inline amplifiers, which amplify all of the RF including noise and interference, the RF-ResQ offers an individual amplifier per channel. This feature allows you to assign either Unity or +10dbm Gain for each individual transmitter on an as-needed basis.

Amplifier applications might include:

A transmitter is always positioned at a greater distance from the antennas than the other transmitters (for example, out at FOH) or is located in a dead spot on stage (weak Tx signal). Or during a performance the transmitter moves beyond the pickup pattern of the antennas. In these situations, assigning an amplifier for that specific transmitter will be an enormous benefit and not a detriment to the rest of the transmitters.

MODES - To accommodate various receiver configurations, we have incorporated a router output assignment for the RF-ResQ. The most obvious and straight forward configuration is Mode 1, where one filter is assigned to one output (typically used for multiple, single receiver configurations). Modes 2 and 4 are typically used for Dual and Quad integrated housings where the antenna distribution is built into the receiver chassis.

*****If each receiver has its own antenna input - no integrated antenna distribution - then treat each receiver individually (see Mode 1).**

The Output assignment is as follows:

The router output assignment has five Modes of operation, selectable in the software configuration.

1). Mode 1. All eight filters will be assigned to their corresponding BNC outputs (basically one to one).

***Typically used for multiple, single receiver configurations**

2). Mode 2. The eight filters will be split into two, four channel groups and assigned to two outputs. Filters 1, 2, 3 and 4 will be assigned to BNC Output 2, filters 5, 6, 7, and 8 will be assigned to BNC Output 5.

***Typically used for Quad receivers with integrated antenna distribution or intercom systems**

3). Mode 3. All eight filters will be switch to single output at BNC Output 1.

***Typically for a filtered feed (up to 8 frequencies) into an existing antenna distribution system**

4). Mode 4. Channels will be assigned into pairs as follows:

a) Filters 1 and 2 assigned to BNC Output 3

b) Filters 3 and 4 assigned to BNC Output 4

c) Filters 5 and 6 assigned to BNC Output 6

d) Filters 7 and 8 assigned to BNC Output 7

***Typically for Dual receivers with integrated antenna distribution or intercom systems**

5). Mode 5. Filter Bypass. Antenna A feed is unfiltered, at unity gain, and assigned to all 8 BNC outputs.

***Typically for receiver channel scanning / programming**

***** When using Modes 2, 3, 4, only the assigned BNC outputs will offer signal output (no signals appear on the unused outputs).**

***** Corresponding green LEDs are illuminated when the BNC outputs are mode-activated.**

EXTERNAL POWER INPUT – Some receivers use their antenna distribution amplifier as their DC power supply source. If you need to supply receiver power via the coax, the RF-ResQ has an accessory input power jack. Applying power, up to 18VDC to this jack will place the DC voltage on the RF BNC outputs. Accessory power supply is not provided.

Note: No phantom power is available at the antenna inputs to power active antennas (see **AMPLIFIERS PER CHANNEL** above),

USB CONNECTION – For simultaneous control and programming of multiple RF-ResQ units simply use a USB Hub connected to your computer (Hub is an offered accessory – contact Kaltman Creations). Please note that you must select, via the rear panel slide switch, either USB or LAN communication (both cannot be used at the same time).

NON-VOLITABLE MEMORY - Once programmed, you can disconnect your computer from the RF-ResQ and it will retain all settings and will always power-up with the last shut-down configuration (continuous computer connection is not necessary). Any computer with the installed RF-ResQ software can read or modify current settings on any RF-ResQ unit.

ANTENNA CASCADING – To reduce unnecessary cost, we decided not to build-in internal antennas splitters for cascading or daisy chaining the antenna feed to multiple RF-ResQ units. Instead, we offer an optional antenna splitter that physically mounts to the A/B antenna BNC connections. These active antenna splitters (model IWxASQ), simply slip over & locks-down on the existing BNC antenna connection. Once connected, the splitter offers the ability to share the antenna feed to an unlimited number of RF-ResQ units without sacrifice of signal loss.

RACK EARS – Two rack ears (1 set) are provided for each RF-ResQ unit. Some applications may require the RF-ResQ to be reverse mounted in a rack cabinet for easy access BNC patching. You decide.

Warnings

[Info to come]

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Because of the RF-ResQ's superior internal **DiverseQ™** diversity function, all connections from the output of the RF-ResQ feed just the A antenna input (or just the B input) of your receivers. The receiver's open antenna input must be terminated with our included, 50 ohm BNC terminator. Failure to terminate the receiver's open antenna input will result in erratic results.

Minimum Requirements

Operating System: Windows XP, Vista, Windows 7 or 8
CPU: 2.0 GHz or above, 32 or 64-bit
Memory: 2 GB
Hard drive storage: Minimum 200 MB

For Technical Support, please contact Kaltman Creations LLC at: Sales@KaltmanCreationsllc.com or call 678-714-2000