SPURIOUS RESPONSES AND HOW TO RECOGNIZE THEM

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A spurious response (spur) is any signal heard on a frequency other than that upon which it is being broadcast. There are many causes of spurs, but they all involve receiver overload by a strong local station (or stations) in one way or another. The general classifications of spurs and how to recognize them are briefly described below.

True Images

A true image will often be heard at a frequency of twice the IF frequency of your receiver below the actual transmitting frequency. For example, if your receiver has an IF of 455 kHz (the most common IF frequency), a strong local station on 1600 kHz would be heard at 1600 - (2 x 455) = 690 kHz. To determine if your receiver is subject to true images, find the IF frequency of your receiver (most likely 455 kHz), multiply this by 2 and subtract the product from the frequency of the strongest local station in your area transmitting above 1450 kHz (note that 1450 - (2 x 455) = 540 , the lowest BCB frequency). Tune to this frequency (690 in the first example), and if no audio from the local station is heard, it is unlikely that any spurs that you may hear are true images.

Cross Modulation

Cross modulation may occur at frequencies close to a strong local station ("close to" may range from 10 kHz to 200 kHz or so, depending on the strength of the local). This condition is characterized by audio from the local station being heard along with a weaker station's audio on these adjacent frequencies. For example, if the strong local transmits on 1430 kHz, and audio from this station can also be heard along with audio from other stations on 1420, 1440, 1410, and 1450 kHz, then the problem is probably cross modulation. (Note that cross modulation is distinguished from overmodulation and normal sideband splatter which is not a receiver problem but a problem at the radio station's transmitter. Cross modulation effects are only heard when another station's carrier is present. If the local's signal is heard on 1455 kHz (between BCB channels), for example, the problem is overmodulation or sideband splatter).

Internal and External Mixing

These two spur classifications have very different causes, but the effect is nearly identical, hence they are discussed together. Mixing is probably the most common cause of spurs on the BCB, but unfortunately, it is also the most difficult to identify because of its complexity. Basically, two RF frequencies (in this case BCB stations) may combine to form what are called "product" frequencies which may be heard on the receiver. The problem is usually most severe when the two stations are transmitting on nearby frequencies, but may also occur in other instances. For two strong local stations, one transmitting on frequency A, the other on frequency B, the first "products" are A+A, A+B, B+B, A-B, and B-A. For example, consider the case when the locals are on 600 kHz (A) and 1000 kHz (B), respectively. Then mixing signals could occur on any (or all) of the following frequencies: 1200 kHz (A+A); 2000 kHz (B+B); 1600 kHz (A+B) or 400 kHz (B-A). To complicate matters still further, these first products may mix among themselves, the original (A and B) frequencies, and the signals from a third station, producing signals on 800 kHz (2B-2A); 1400 kHz (2B-A); 200 kHz (2A-B), etc. If the two stations are within 100 kHz of each other, the products 2A-B and 2B-A are particularly common.

IF Feedthrough and Audio Rectification

IF feedthrough and audio rectification are unique among spur classes in that their effects are independent of receiver tuning. If you hear Morse code, a local SW, FM, or TV station no matter what frequency you tune, this is your problem. A station broadcasting near the IF frequency of your receiver (usually 455 kHz) will often "feed through" the audio circuits in your receiver. This situation will be particularly bad if your receiver is in need of alignment. Morse code from a beacon station (or any station transmitting near 455 kHz) heard on your receiver will indicate this problem. The wiring of your receiver may act as a tuned antenna for some VHF frequencies. If a powerful local station (usually FM or TV) operates near one of these "tuned" frequencies, the audio from the station may be recovered by the receiver.

Cures

Prevent overload or remove unwanted signals with either an antenna tuner or a tuned antenna (like the loop). Also try reducing the RF gain control of your receiver, if either of the above don't work.