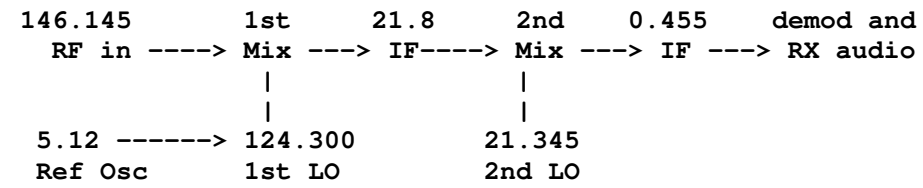
The IC-RP1510 receiver looks like this (everything in MHz).



There is also the 146.745 transmit frequency, and 91.1 FM broadcast station frequency involved.

This time, I think I found the intermod mechanism. As usual, nothing is simple until the answer is found. Then, it looks easy.

It's called "Half IF" and it's about as obscure as it gets.
http://www.radioing.com/eengineer/rfi.html
What happens is that an incoming signal (as generated by an intermod mix), mixes with 146.745 transmit signal, to produce one half of the 1st IF frequency. The half IF is then multiplied by two in the fist mixer, to produce the 1st IF frequency, and ruin my day.

The half-IF frequency is:
146.145 - (21.8/2) = 146.145 - 10.9 = 135.245

This frequency is produced by the IMD mix as [1]:
TX-freq - (3 * 1st-LO) + FM-station =
146.745 - (3 * 124.3) + 90.910 = 135.245

The 1st LO then mixes with the spurious 135.245 signal to produce:
124.3 - 135.245 = 10.945

The 2nd harmonic of the above mix lands in the middle of the 2nd IF as:
10.945 * 2 = 21.89
Close enough considering the bandwidth of the FM broadcast occupied bandwidth [1].

Unlike my previous guess(tm), this IMD mix has all the necessary components. It involves both the repeater TX frequency and the FM broadcast station. It does NOT involve any clock oscillators which is unlikely due to the repeater shielding. So far, it looks right.

The 1:1 relationship with the transmit repeater TX frequency explains why there was feedback squeal and why it was NOT over-deviated feedback, as it would be if it were a multiple of the TX frequency.

The fix is fairly easy. Get the FM signal out of the repeater receiver.
Exactly how to do that will require some sophisticated testing (i.e. trial-and-error), as well as building a suitable FM notch filter (i.e. cut-n-try). A spectrum analyzer isn't going to help much.
Since the mix involves the 1st LO frequency, reinstalling the RF preamp that's sitting next to the repeater might be possible.

[1] Note that the FM broadcast frequency that I used is not 91.1 rather 90.910. That is within the approximate occupied bandwidth of an FM station as calculated by Carson's Rule:

Occupied Bandwidth =

2 * (deviation + max_audio_freq) = 2 * (75Khz + 53KHz) = 256Khz

The 53KHz is the highest modulation frequency without RDS and SCA sub-carriers.

The range of occupied spectra would therefore be between:

91.1 – 0.256 = 90.84 MHz

92.1 + 0.256 = 91.35 MHz

http://www.axino-tech.co.nz/documents/Bandwidth%20needed%20for%20FM%20broadcasts.html