

A DRM down-converter for 455 kHz IF receivers

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DRM, which stands for Digital Radio Mondial, is the only universal, open standard, digital AM radio system with near-FM quality sound available to markets worldwide.

The quality of DRM audio is excellent, and the improvement upon analogue AM is immediately noticeable. DRM can be used for a range of audio content, including multi-lingual speech and music.

Besides providing near-FM quality audio, the DRM system has the capacity to integrate data and text. This additional content can be displayed on DRM receivers to enhance the listening experience.

Unlike digital systems that require a new frequency allocation, DRM uses existing AM broadcast frequency bands. The DRM signal is designed to fit in with the existing AM broadcast band plan, based on signals of 9 kHz or 10 kHz bandwidth. It has modes requiring as little as 4.5 kHz or 5 kHz bandwidth, plus modes that can take advantage of wider bandwidths, such as 18 kHz or 20 kHz.

This project came about due to my interest in a new form of radio transmission called DRM. This is a new form of digital

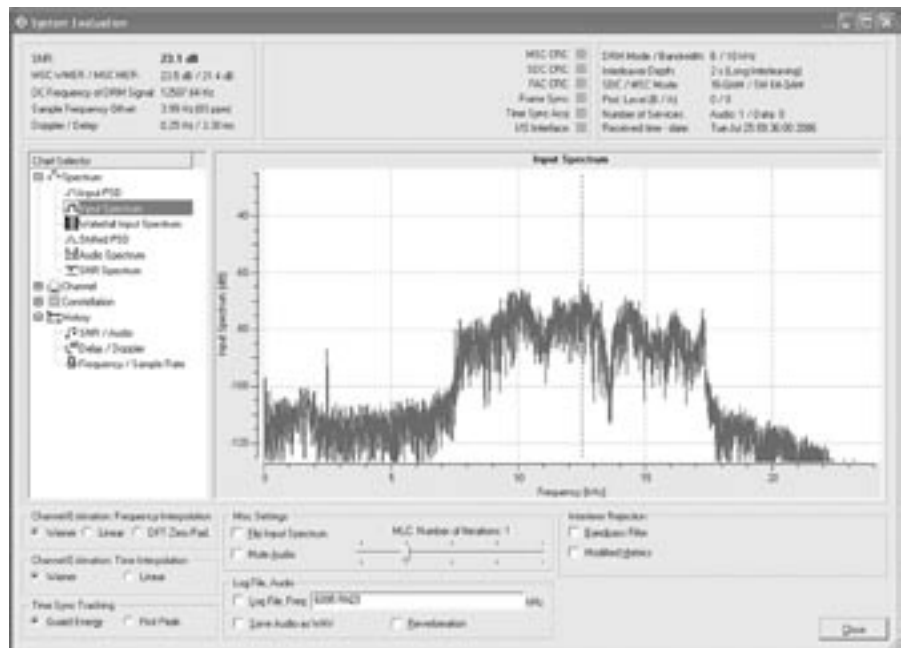


Fig 2 - RNZI being received on 6,095 kHz.

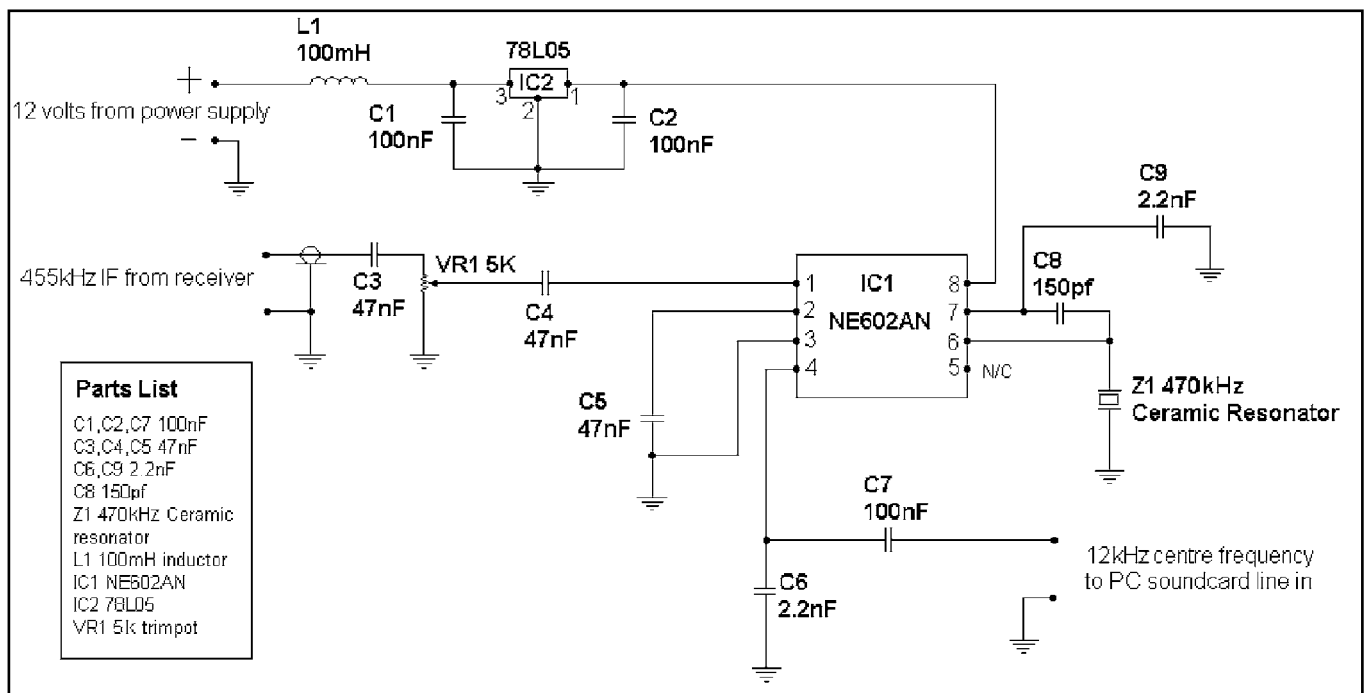


Fig 1 - Circuit of the DRM down-converter for 455 kHz IF receivers

short wave transmission. A few devices were available from Europe for decoding the digital signals, but the price was high. I decided to modify an existing circuit, using a stable purpose-built 470 kHz ceramic resonator as the oscillator, instead of the original unstable L/C circuit.

How it works

The 455 kHz IF signal is fed into the input (pin 1) of IC1 through a variable resistor VR1. The output to a PC sound card is taken from pin 4 of IC1 through a DC isolating capacitor C7. With C8 set to 150 pF, the oscillator frequency should be around 467.5 kHz. You can check if the oscillator is working by putting it near a receiver tuned to 467 kHz. You should hear a beat frequency.

The IF signal of 455 kHz is mixed with 467 kHz, giving an output of $467 - 455 = 12$ kHz centre frequency. Since the DRM signal is 10 kHz wide, the sound

card should have no trouble sampling this frequency. I have found a number of software defined radio applications also work well with this converter. All the demodulation for SSB, AM, and FM, is done in software, as well as providing DSP functions.

If all is well, connect your 455 kHz IF to the input, and your computer sound card to the output. Run the Dream software, and tune to 6,095 kHz (RNZI), or 1,440 kHz (SBS). You should see the Dream software lock onto the DRM transmission, and audio should start playing from the computer speakers.

The NE602AN oscillator/mixer and 470 kHz resonator are available from me at a cost of \$12.50. You can pay via Paypal, or email me for payment information at jwtitmus@bigpond.com. I can also supply a CD with various software defined receivers, as well as the latest Dream software decoder.