



Modifications of an Icom PCR1000 For DRM Reception



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Introduction

The Icom PCR 1000 is a software-based receiver that is ideally suited to conversion for DRM reception with the minimum of modification to the existing circuitry. The Icom PCR 1000 has been successfully modified to receive DRM signals using the Fraunhofer DRM software distributed via the www.drm.org website.

The modification makes use of the universal downconverter available from www.sat-schneider.de website.

When tested using a DRM modulator the receiver yielded results up to 29dBs SNR.

Modifications

The receiver has software controlled IF filters capable of passing the widest DRM signals (20kHz), ample space for the downconverter board and easy connection to the circuit boards without intrusive modifications, for those with a fine Soldering Iron and a steady hand!

The universal mixer converts the 3rd IF (450kHz) to 12kHz using a SA612A mixer and LC oscillator; there is a crystal oscillator available from Sat-Schneider but it is not suitable for this IF. There are only three connections to the board: the IF input, which is taken from the output of a buffer amp feeding the AM detector, the 12kHz output, which is connected to an unused contact on switch S1, finally the DC input, connected to the switched 13.8Volt input.

The only other items needed are 20cms of RG178 coaxial cable and a short length of insulated wire.

Interconnection

Using a Dell Latitude C800 laptop with a Maestro sound card fitted: connection is between the 3.5mm Stereo microphone socket, and the 3.5mm external speaker socket on the Icom PCR1000. In an endeavour to minimise changing the Icom the wiring between the units the wiring is not standard, in that the wiring from the Icom is connected to the centre element of the plug and goes to the tip of the other plug that is fitted into the sound card.

Setting Up

The standard DRM signal used for HF broadcasting has a bandwidth of 10kHz therefore the IF filter is set to 15kHz and AM modulation on the receiver PC interface.

Note: the 12kHz output is an inverted spectrum of the original signal therefore the DRM software receiver will only decode this if the 'Inverted Spectrum' is selected in the *Setup* menu:

To set the 12kHz frequency use a known stable frequency source; a standard broadcast will do and tune the carrier to the centre of the DRM display using the Ferrite core in the inductor of the downconverter.

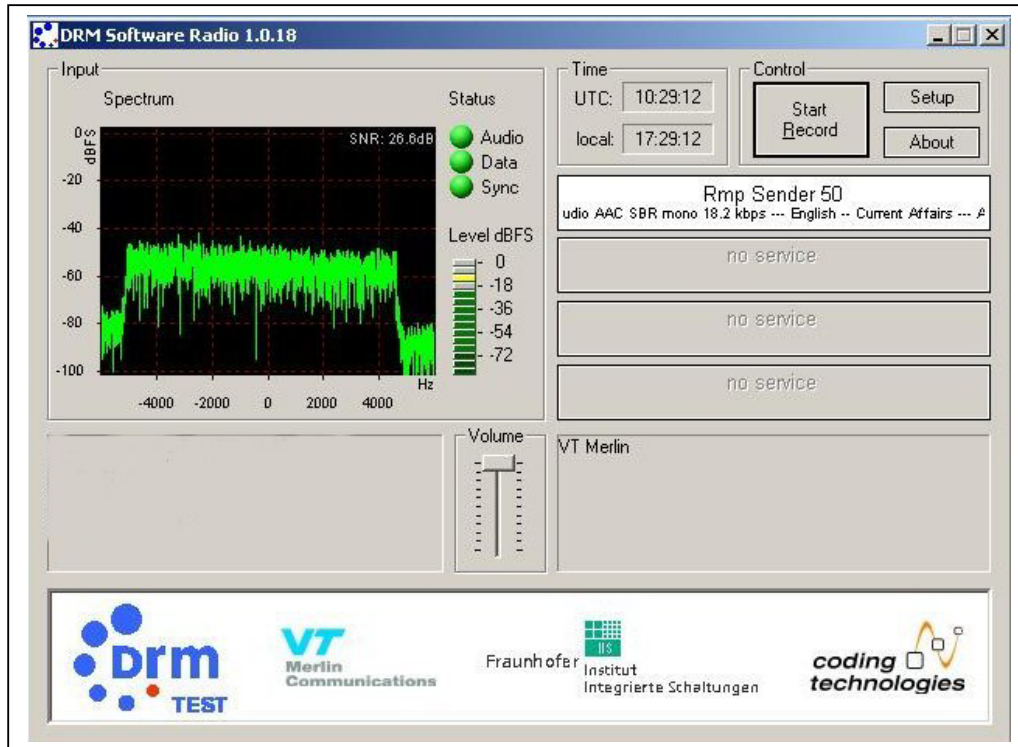
To set the 12kHz level output measure the output using an oscilloscope whilst receiving a DRM broadcast, set the output to give 600-700mV P-P using the 'pot' on the downconverter board. Optimisation is achieved by 'tweaking' for best SNR.

Results

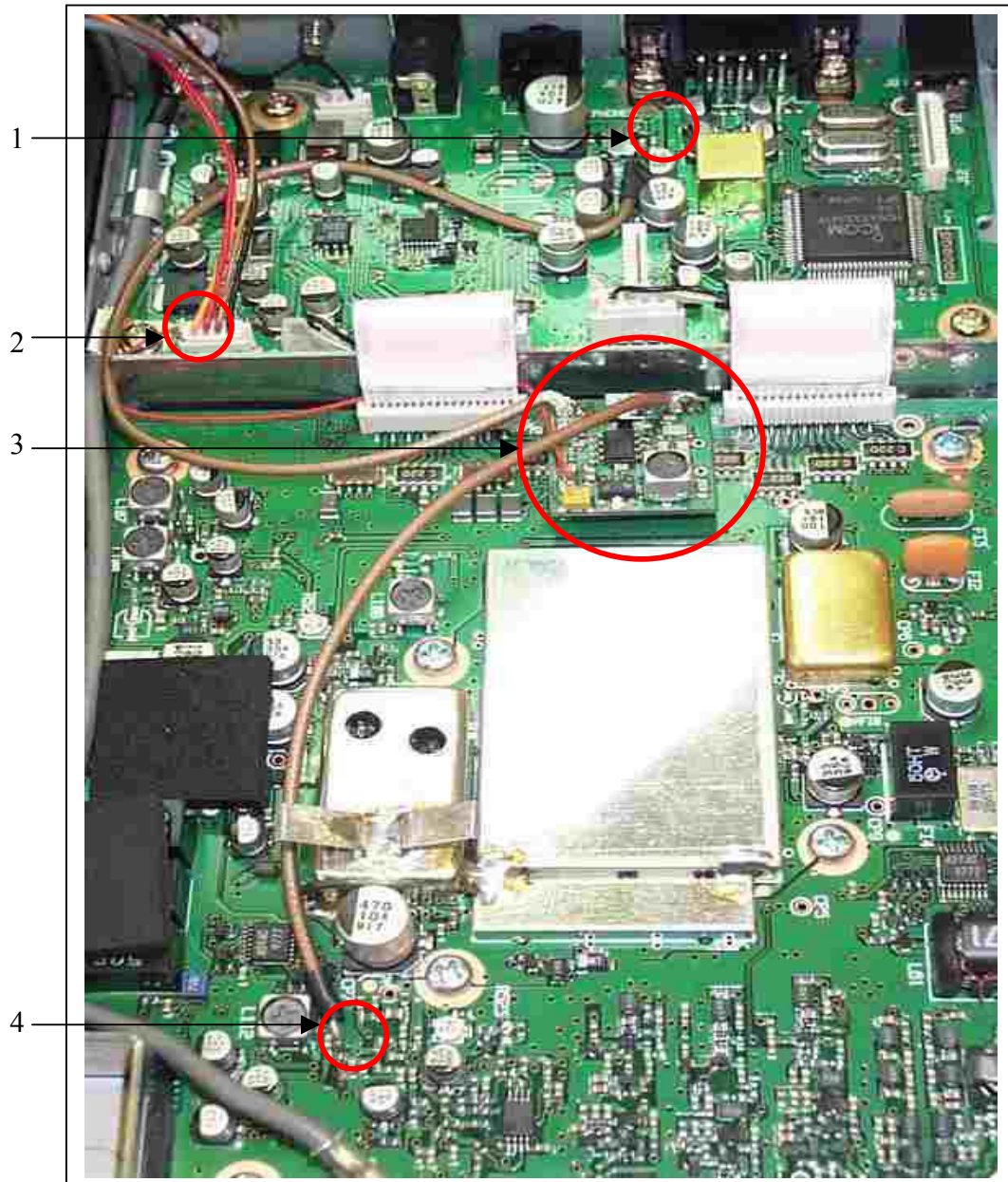
Using a DRM Modulator broadcasting a 10kHz DRM signal on a frequency of 9780kHz the following results were achieved:

Signal level	SNR dBs
S9	29.2
S7	28.8
S5	28
S3	25
S1	22

Field-test results yielded SNR figures between 18 and 24dBs from the Sines (Portugal) transmitter on 15440kHz received in Warwick UK. Reliable reception was achieved using the 0.7 metre telescopic antenna included in the Icom package.

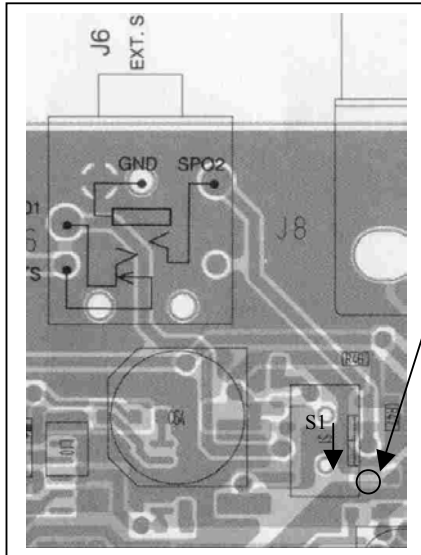


Board Layout

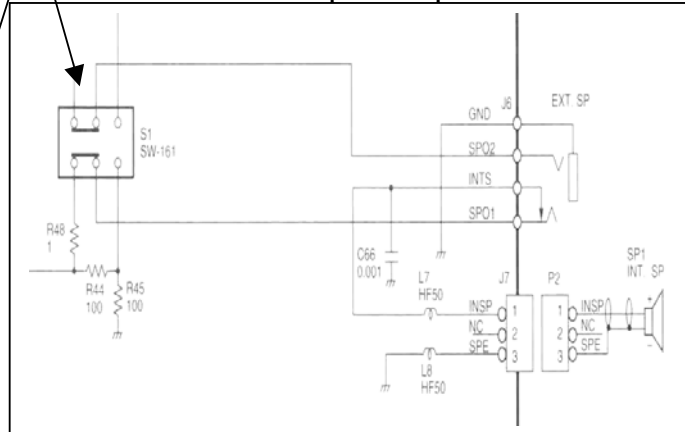


Board Layout & Circuit Details

1. 12kHz output connection



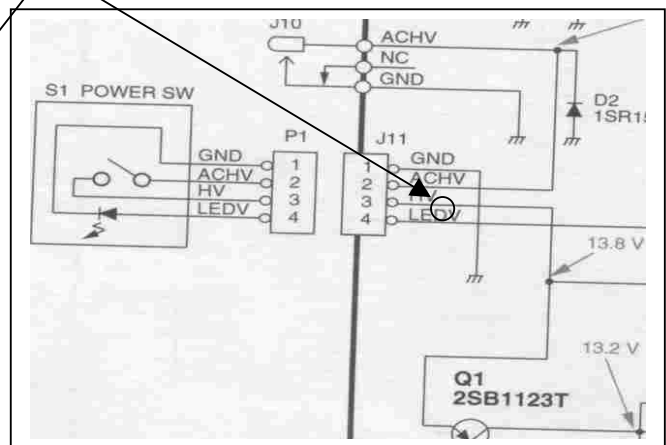
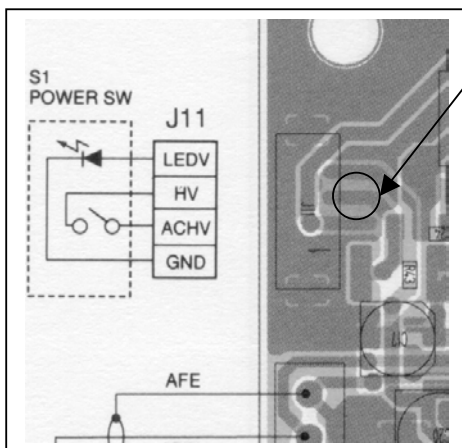
Coaxial cable inner connected here
Screen unconnected
Switch S1 in the speaker position



2. Power Connection

Pin 3: switched DC line

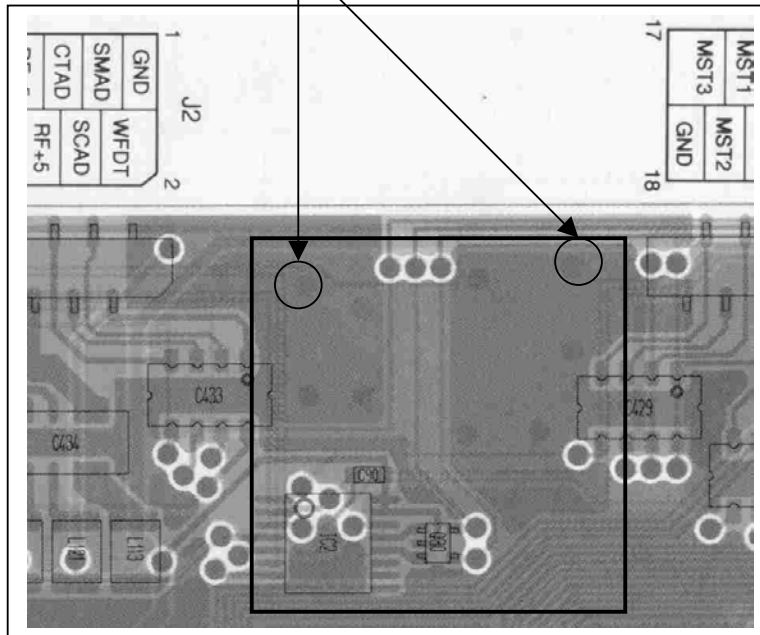
Connect Here



Board Layout & Circuit Details

3. 450kHz to 12kHz Downconverter

Board earthed with pins through plated holes, it is not recommended to enlarge holes due to proximity of layered track.



4. RF Connection

Coaxial cable inner connected to plated through hole
Screen unconnected

