Modification of AOR AR3030 receiver for DRM reception

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Introduction

A general-coverage short wave receiver, the AOR model AR3030, has been successfully modified to allow DRM reception using the Fraunhofer IIS software distributed via the www.drmrx.org website.

The modification makes use of the 12 kHz mixer module available from Sat Service Schneider.

Reasonable results have been achieved, with signal-noise rations of around 24dB being achieved in the Southern UK from the Deutsche Welle transmissions from Sines.

Modifications

The Fraunhofer IIS software requires an input to the PC soundcard centred on 12kHz. The IF frequency of the AR3030 is 455 kHz, and a down-converter is therefore required. A simple mixer module intended to perform this conversion is available from *Sat Service Schneider* (www.sat-schneider.de). A crystal controlled version of this converter is available, but the LC version has been used in the modification described here, with reasonable results.

The nominal bandwidth of a DRM transmission is 10 kHz, while the standard IF bandwidths available on the AR3030 are 2.4 kHz (SSB), 6 kHz (AM) and 15 kHz (FM).

While a spare filter position is available in the receiver (intended for a narrowband filter for CW reception), it was decided to make use of the 15 kHz FM filter for DRM reception. It should be borne in mind that strong adjacent channel signals may degrade DRM reception.

When ‘FM’ demodulation is selected, the AM signal path is not interrupted, and it proved convenient to take the input to the mixer module from a point immediately before the second 6 kHz filter which precedes the AM detector stages.

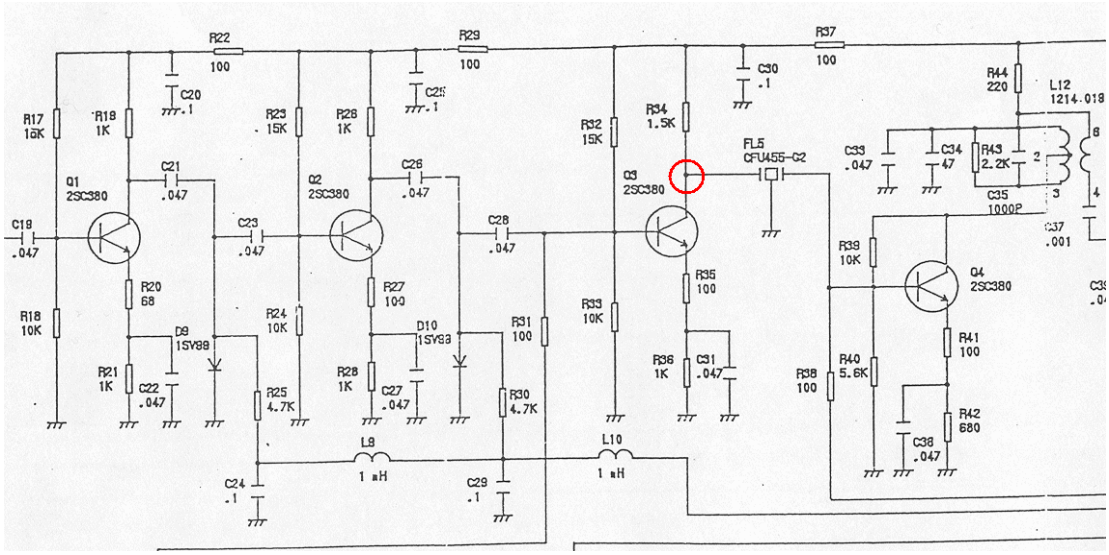

Figure 1: Circuit of IF/AF board (part) showing take-off point for mixer

The feed to the mixer is taken from the collector of Q3 (see figures 1 and 2) on the IF circuit board, using a short length of screened cable. No impact on normal AM performance of the receiver is apparent, though the input match of the filter will be disturbed by the modification.

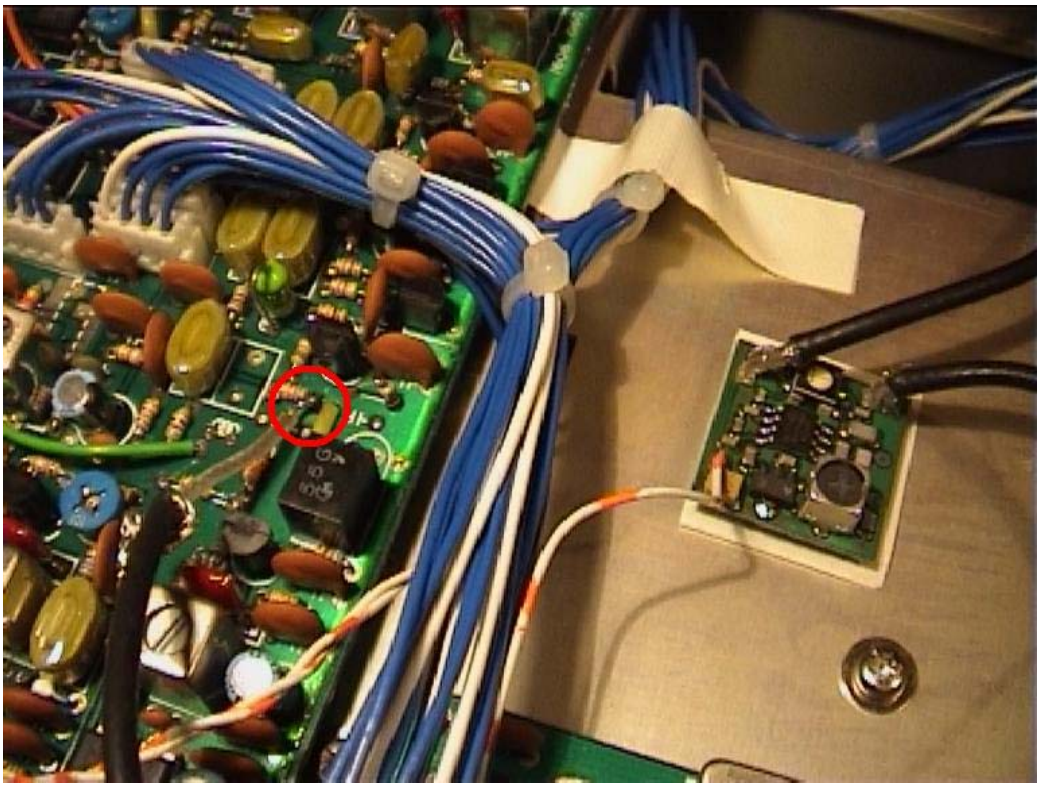

Figure 2: IF/AF board, showing take-off point for mixer

The power feed to the mixer is conveniently taken from the 9V regulator, U14, located on the same PCB (Figure 3).

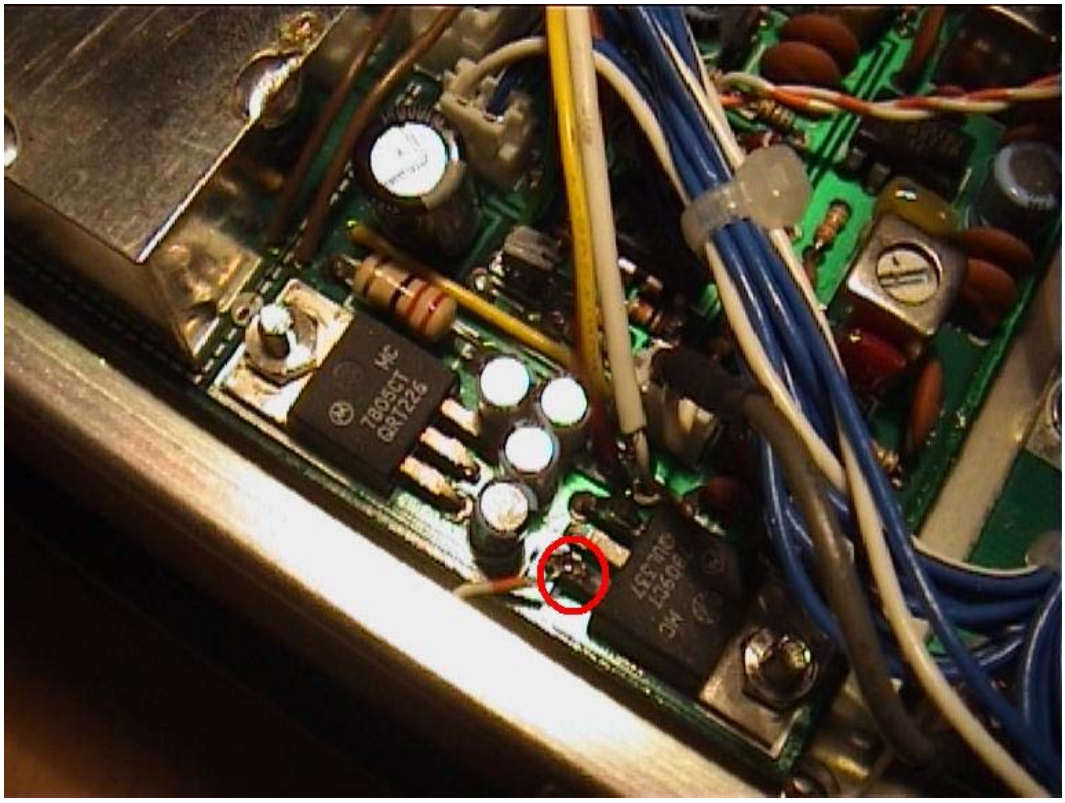

Figure 3: IF/AF board showing 9v power take-off point for mixer

The 12 kHz output from the mixer was routed to an unused BNC socket (intended for an optional VHF converter) on the back panel of the receiver.

Performance

The modified receiver has been tested over a period of several weeks, using a short (~3m) length of wire as an antenna. It is necessary to switch the receiver to 'FM' mode, and to select 'spectral inversion of input signal' in the software receiver setup menu.

Reception, on the South coast of the UK, of the Deutsche Welle test transmissions from Sines (15440 kHz) has been generally reliable, with Signal-Noise ratios typically 22-26 dB.

A typical screen shot, and a time series plot of the parameters logged by the software are illustrated in Figures 4 and 5 below.

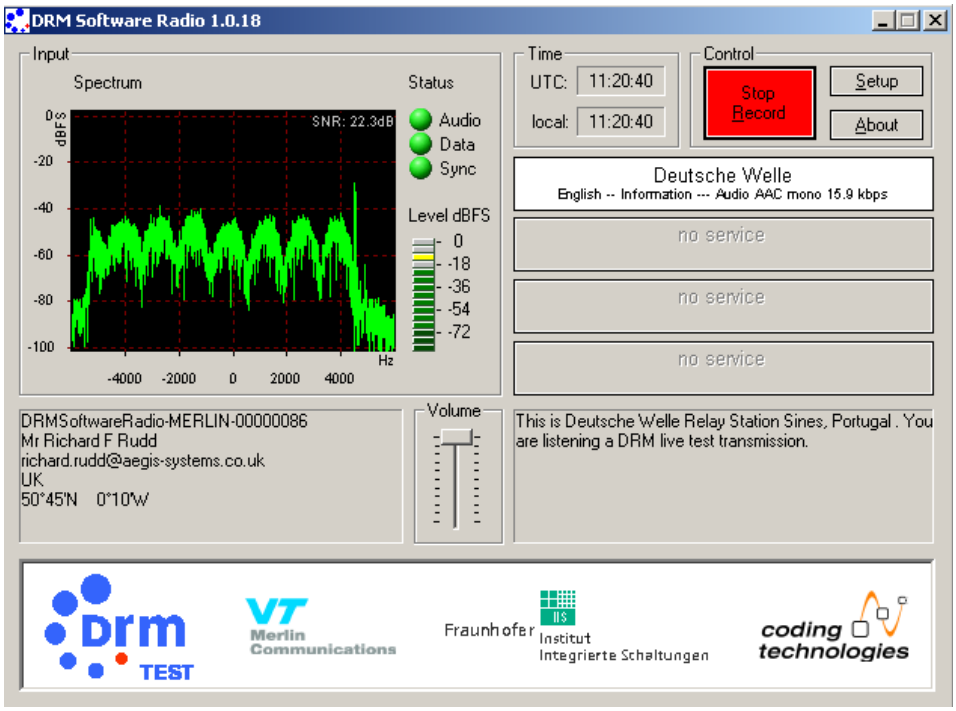

Figure 4: Software screenshot, showing multipath on Sines - Brighton path

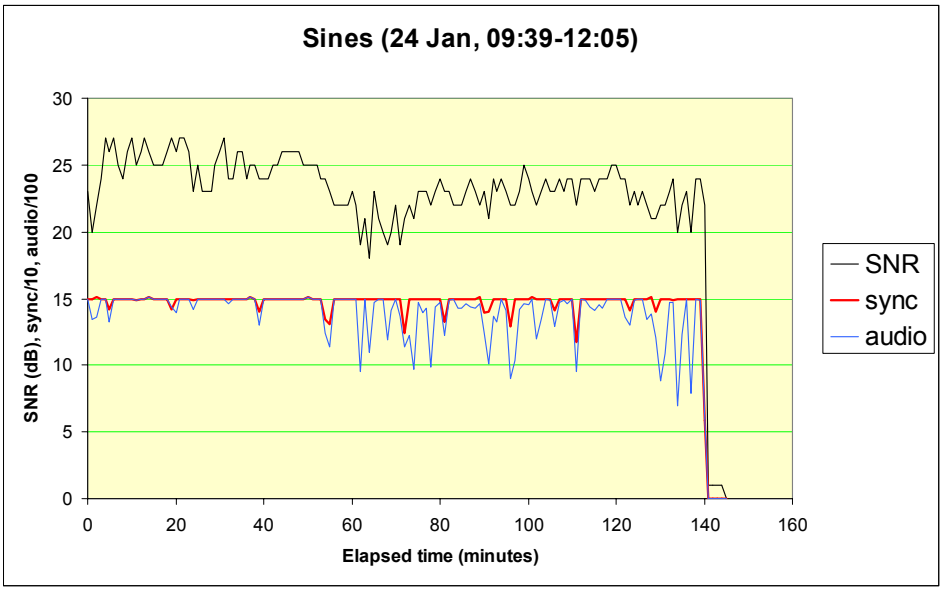

Figure 5: Time series of logged data

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