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Modification of JRC NRD-535 HF Receiver for the reception of DRM signals

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Summary

A JRC NRD-535 HF Receiver has been modified to make DRM reception possible with the DRM decoding software available at http://www.drmrx.org/ and at http://www.tu-darmstadt.de/fb/et/uet/fguet/mitarbeiter/vf/DRM/DRM.html

The 455 kHz Intermediate Frequency (IF) available within the NRD-535 is mixed down to 12 kHz with the LC-mixer available at:
http://home.t-online.de/home/sat-service/sat/DRM/DRM.htm

The necessary power to supply the LC-mixer can also be derived within the NRD-535.

The resulting 12 kHz IF is available on an extra 3.5mm connector mounted on the backpanel of the NRD-535. Via a standard 3.5 mm stereo cable the 12 kHz signal is fed into the line input of a soundcard in a computer. The software installed on this computer decodes the signal and the audio is audible via the computer loudspeakers.

The computer used is a Compaq Deskpro EN with a 1GHz CPU, 128 MB RAM, on-board soundcard and Windows 2000 Professional.

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Disclaimer

Attention!
This modification is done at your own risk! The author is not responsible for any damage to your receiver or anything else. You may also loose vendor warranty and liability.

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Modfication

The LC-mixer circuitboard is fixed with double sided tape on one of the NRD-535 cards called “CFH-36A IF filter”. The blockdiagram of this IF filter is given in Annex I.

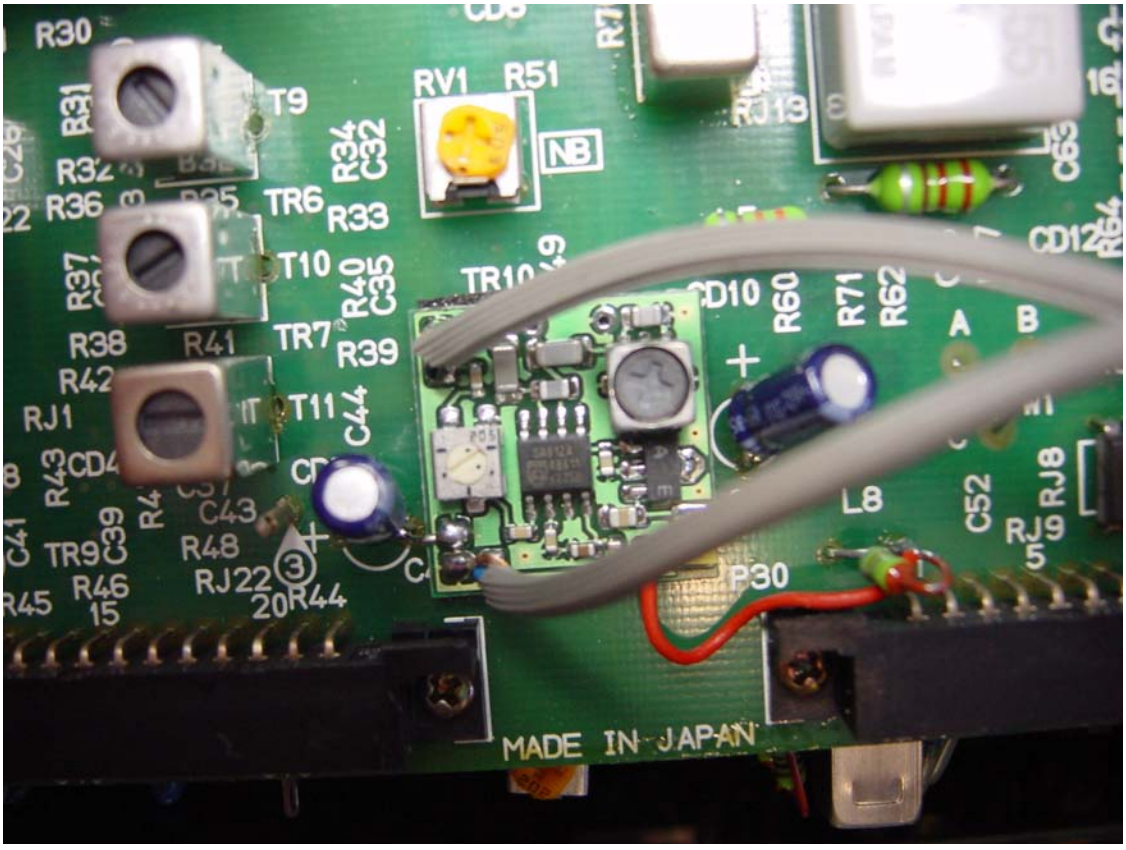
Ub
The power to supply the LC-mixer is available on pin 1 of connector P30 (10.8V) on this card. The connection between P30-1 and inductor L8 is used. (red wire on photo)

ZF
There are various ways to derive the 455 kHz IF within the NRD-535.

Method 1:

In our case the “CFH-36A IF filter” board has an additional filter on the “FL5 NARR” position and no additional filter on the “FL6 AUX” position. This means we can use the bandwidth setting in AUX-mode for DRM reception. Other bandwidth settings are not adequate as these attenuate the DRM signal too much.

The 455 kHz is available at pin 22 of connector P30 and ground is available at pin 21 of the same connector. These signals are fed into ZF and ground (near ZF) of the LC-mixer.



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***Method 2*:**
This method is independent of the available filters and can therefore be used in most of the cases.

The 455 kHz signal is derived just after the LC filter (C19 parallel with L3) but before the FL3-FL6 filters.

NF
The 12 kHz signal (NF) is fed to a special 3.5mm chassis part mounted on the rear panel of the NRD-535.

A standard 3.5 mm stereo cable is used to connect the soundcard of the computer to this chassis part. Please note that both the left and right pin of this chassis part must be connected to NF.

Ground (near NF) of LC-mixer is connected to ground of C4.

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Reception results

The NRD-535 has been used during many analogue years and it has always proven to be a good quality receiver in terms of sensitivity, selectivity and dynamic range. These receiver characteristics will still be very important during the DRM era: They can make the difference between good reception or no reception at all.

Reception of DRM signals have been performed on 10 kHz wide DRM transmissions within Europe in April 2003. Both software packages have been used to decode the DRM signals.

No problems were noticed during the reception. SNRs of up to 30 dB are no exception with either of the two modifications described earlier with both software packages and the use of an RF-systems GMDSS antenna.

A few screenhots are added in Annex II.

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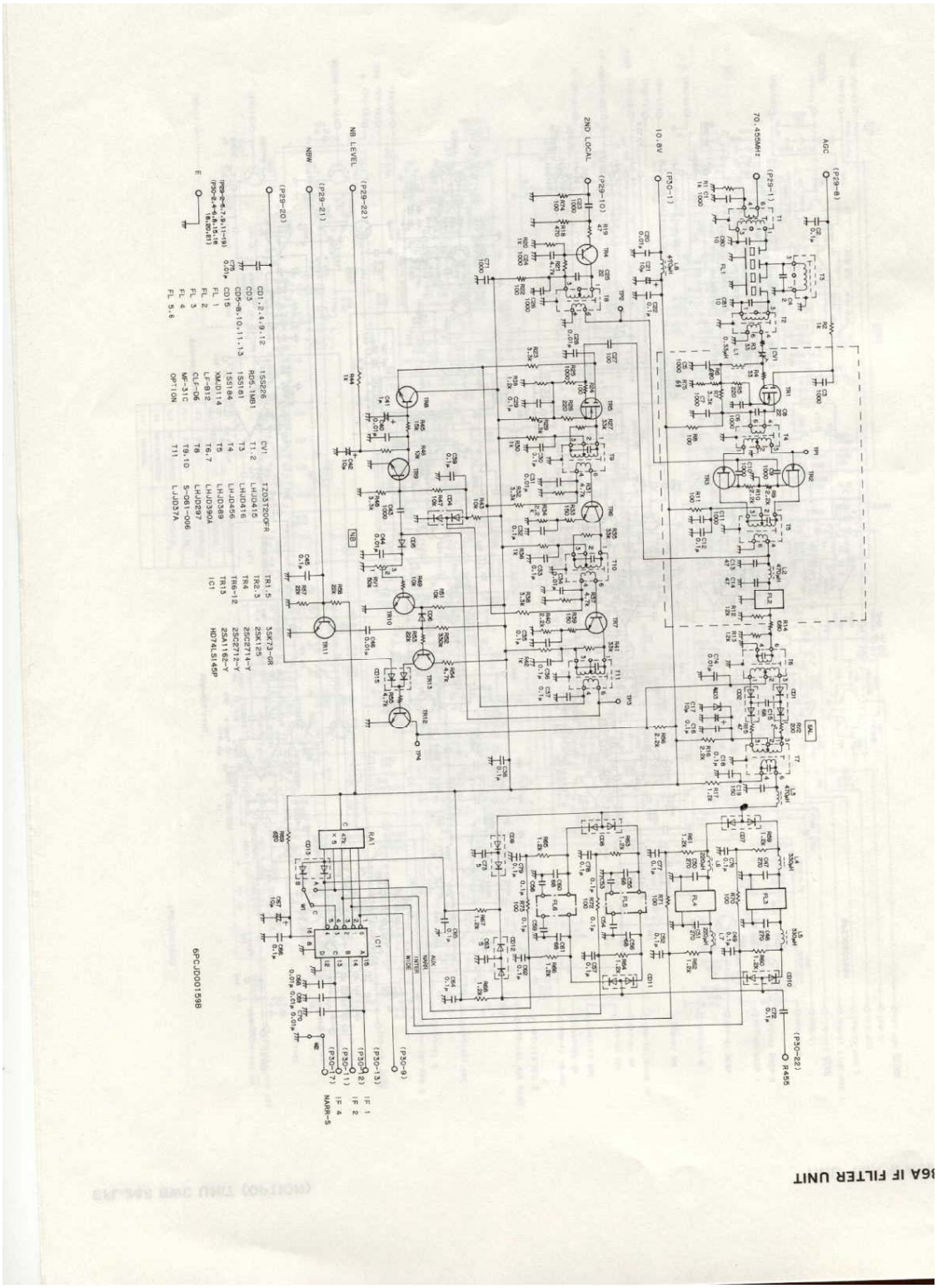
Annex 1: Block diagram of CFH-36A IF Filter unit



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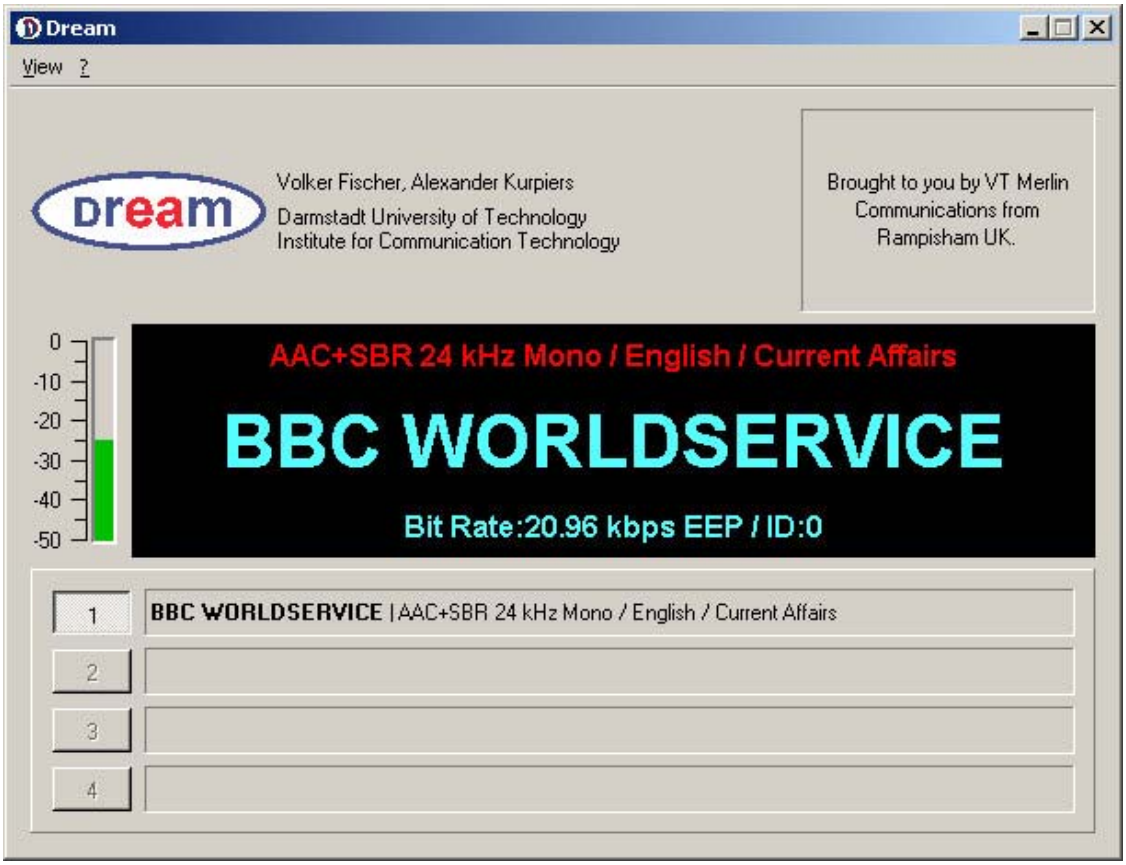
Annex II: Screenshots of open source DRM software receiver



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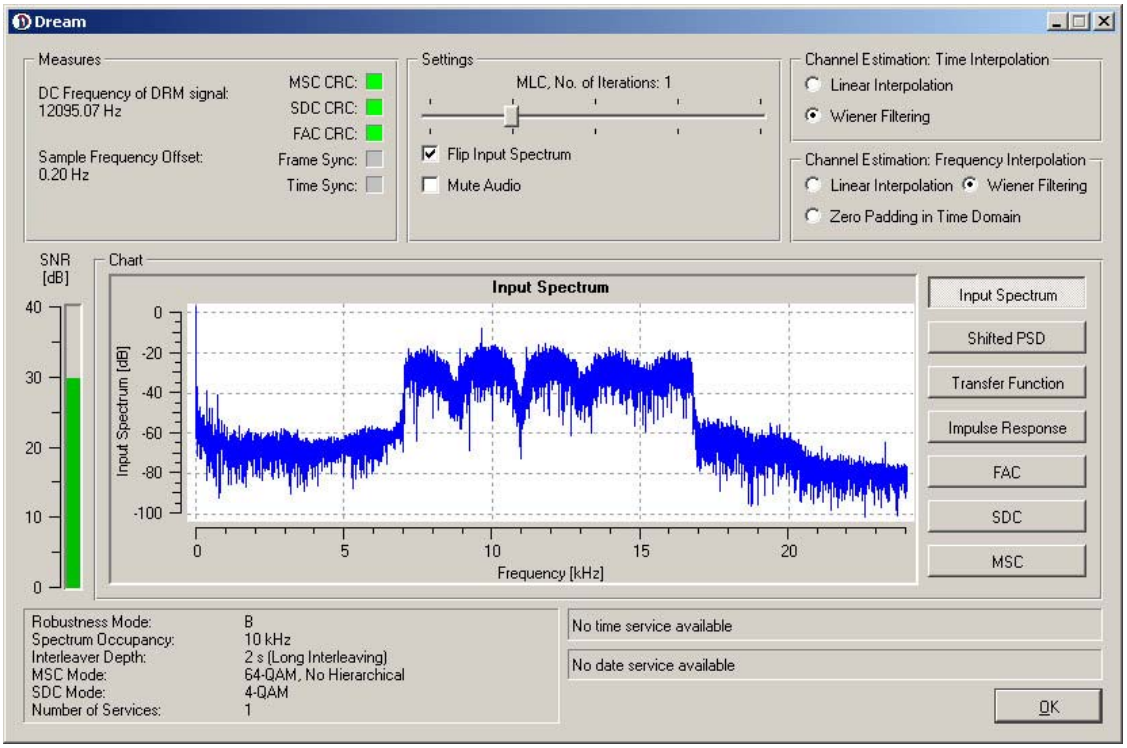

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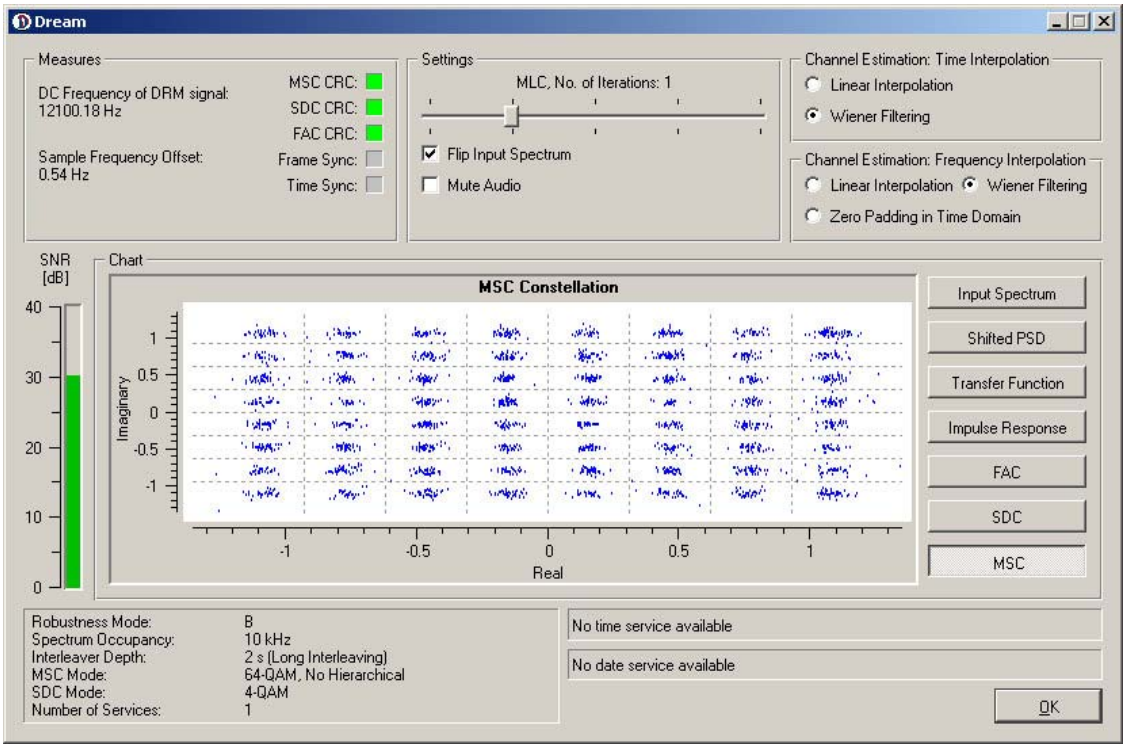
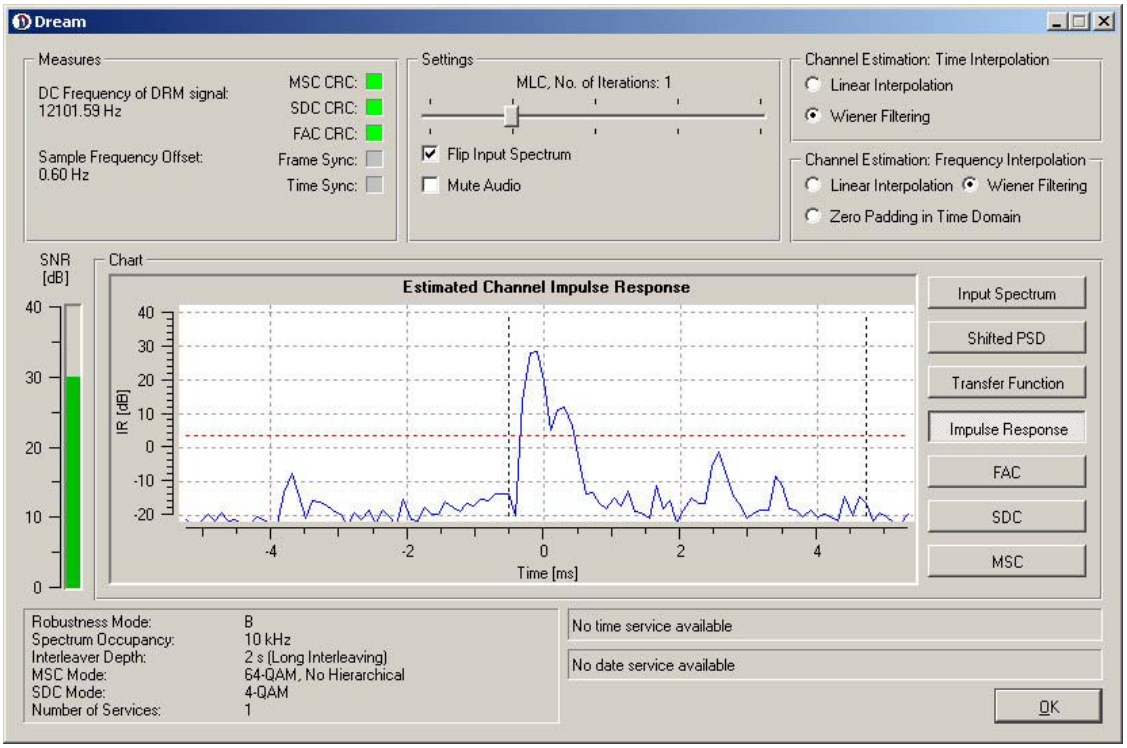
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