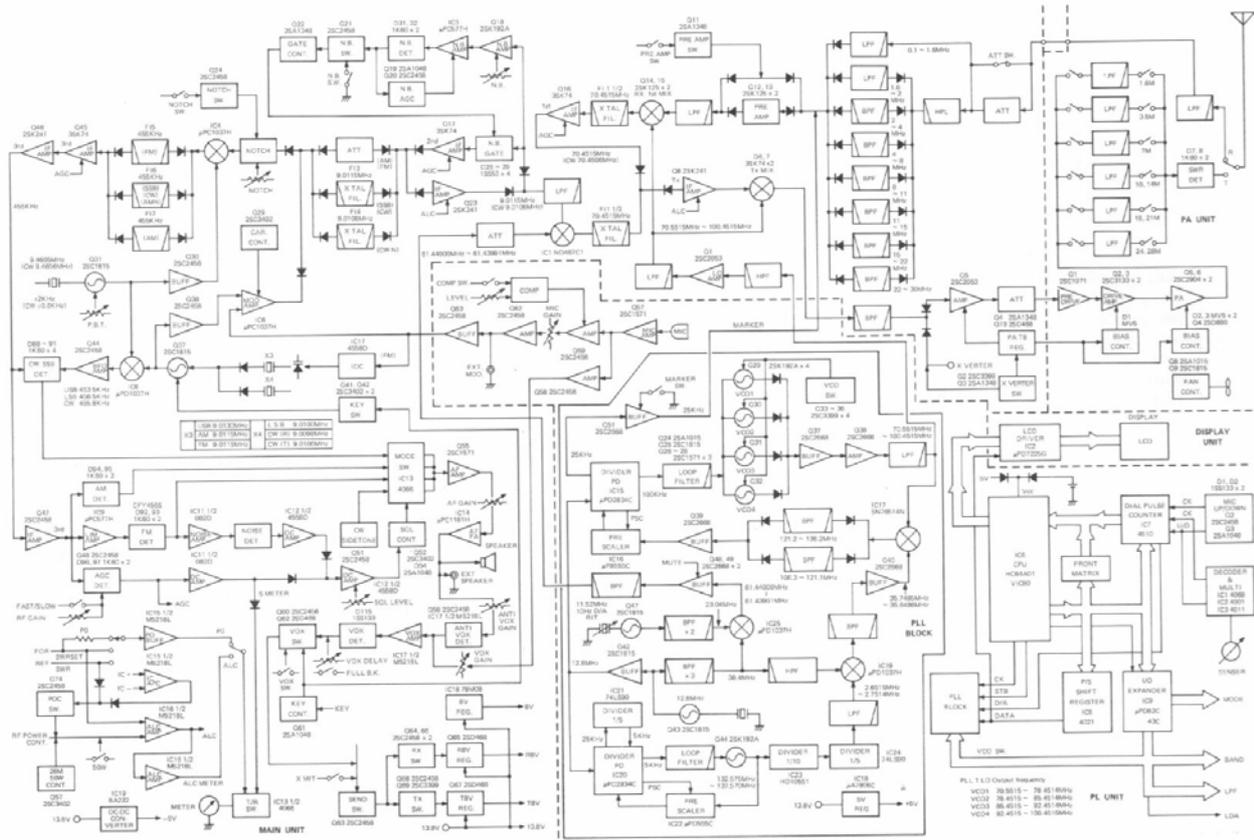


Modify the ICOM IC-735 HF-Transceiver for DRM reception

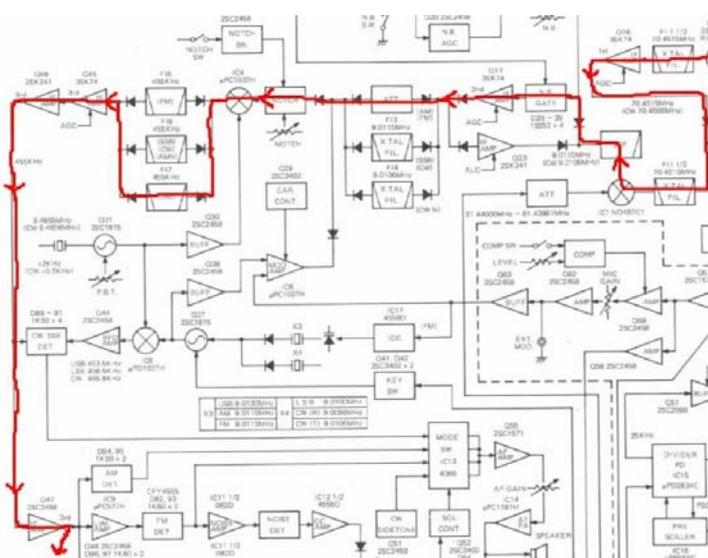
Introduction:

DRM reception is something I am very interested because the combination of new modulation schemes and use of the medium and short wave bands for BC-DX sounds very attractive to me. With the help of the FHG software package based on a soundcard as a decoder the efforts to spend are pretty low. Thus I decided to modify my HF-TRX by adding the necessary down converter offered by Sat-Schneider.

Complete Block diagram of the IC-735:



The more detailed signal flow in AM as I use it:



The IC-735 is a triple super heterodyne receiver. The IF frequencies are 70.4515 MHz, 9.0115 MHz and 455 kHz.

The selectivity in AM mode is:

6.0 kHz @ -6 dB

18 kHz @ -50 dB

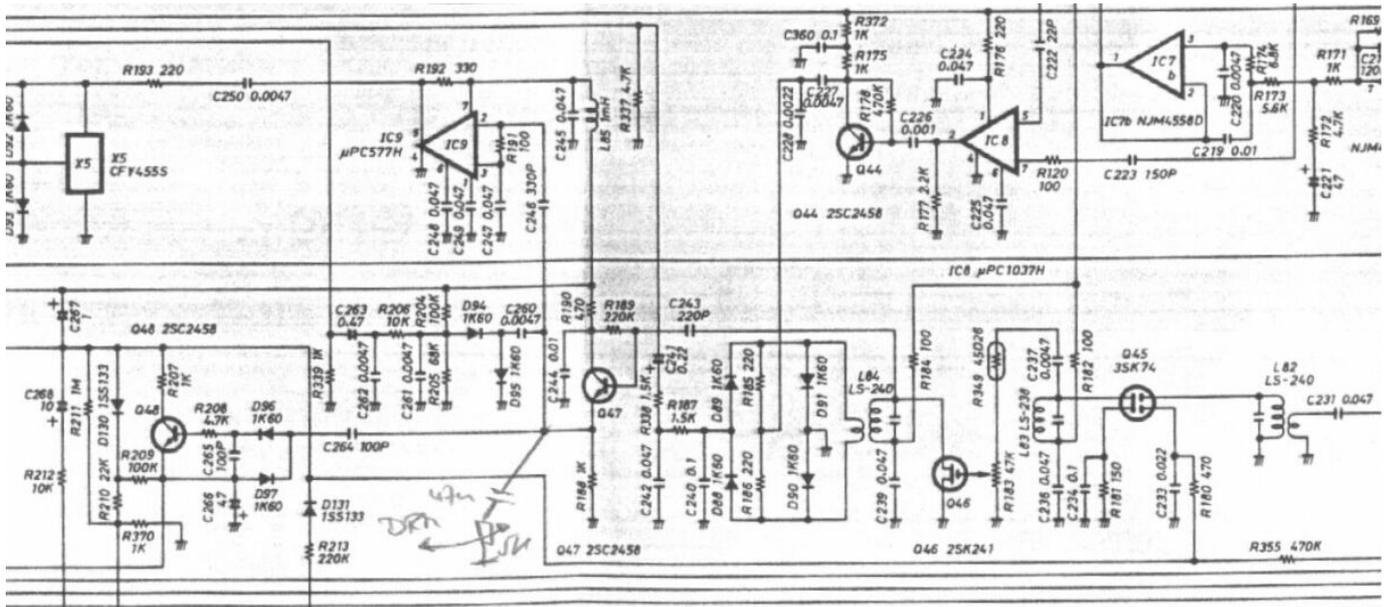
The selectivity in FM mode is:

15 kHz @ -6 dB

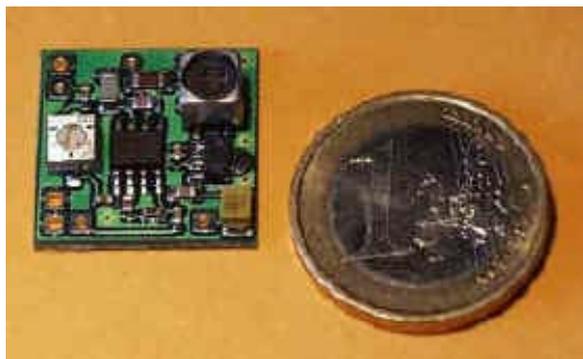
30 kHz @ -60 dB

The received signal is tapped at the output of the last IF amplifier stage before it is supplied to the AM detector/demodulator. This is an emitter follower stage (Q47) with low output impedance. The tapped signal is fed to the input of the small down converter board where it is subsequently down converted to the final IF of 12 kHz.

The part of the schematic showing where to tap the 455 kHz signal (at the emitter follower Q47):

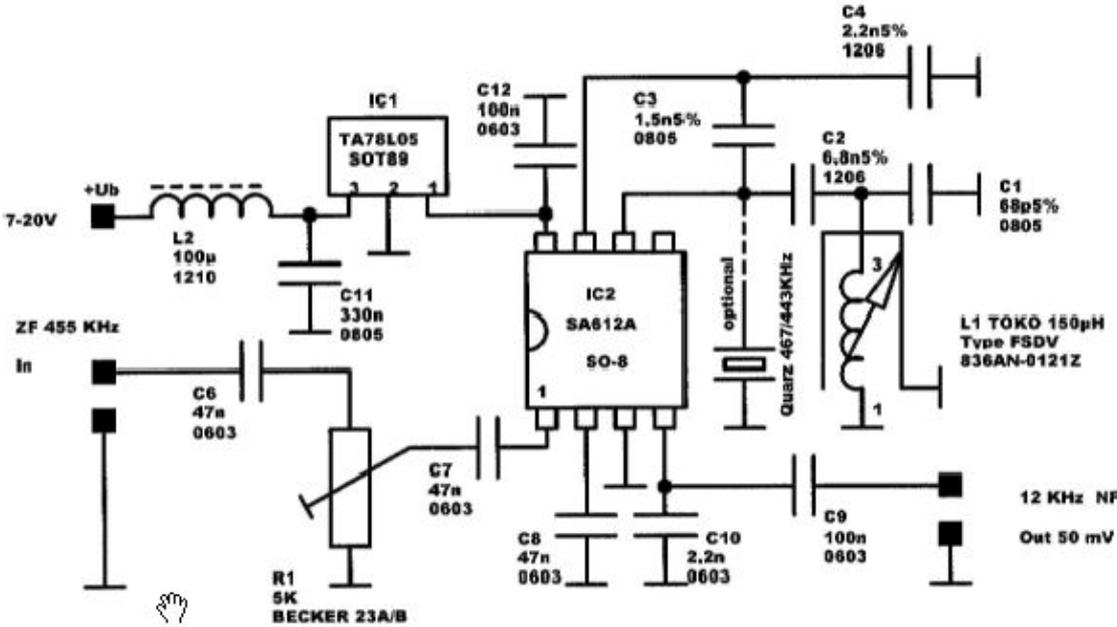


The additional downconverter from 455kHz to 12 kHz:



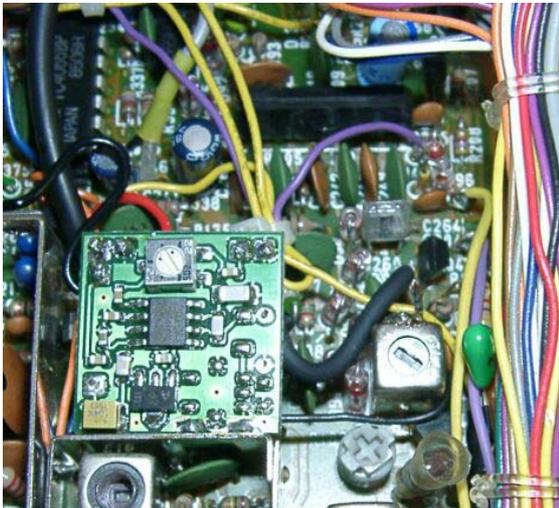
This universal down mixer unit from 455 KHz to 12 KHz is designed to modify existing AM-broadcast receiver and enable them for DRM-reception. The 12 kHz output is supplied to the input of a PC- soundcard where it is decoded using the software decoder from "Fraunhofer Institut für Integrierte Schaltungen" or other software decoders. Dimensions of the board are 20x20x8,5mm. The oscillator frequency of the chosen optional crystal oscillator is 443 KHz. The supply voltage range is 7 to 20V, the current consumption is < 6 mA. For further information please visit the Homepage of "Sat-Schneider" at: <http://home.t-online.de/home/sat-ervice/sat/DRM/DRM.htm>

Universal DRM- miniature mixer unit (surface mount)



Pictures of the modification:

The small PCB from Sat-Schneider is mounted inside the Transceiver IC-735. I soldered its ground plane to a metal shielding to guarantee optimum ground connection. Using a short shielded cable I tapped the output of Q47 (at its emitter) and supplied this signal to the PCB. The supply voltage was used from a close 8V supply rail. Finally the 12 kHz output of the small PCB is supplied using a shielded cable to a new 3.5mm jack, which I mounted in the back plate of the transceiver.

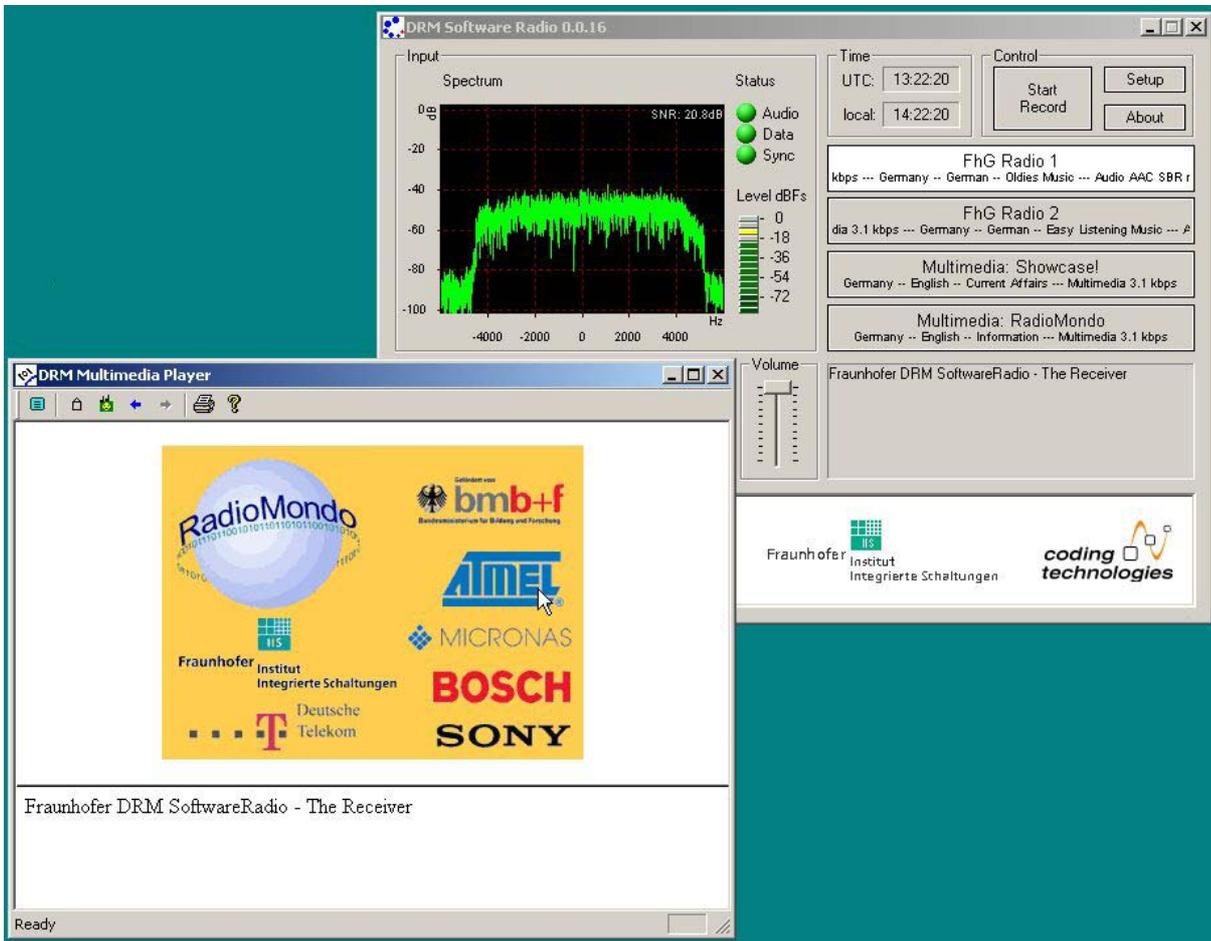


Soundcard:

Well, first I thought that the modification of the receiver would not work properly. However it turned out that the soundcard on the motherboard of my Windows-XP PC did not work properly with the FGH-software. It is a C-Media device using a CMI8738 chip (6 channels, 48kHz sampling rate, full duplex, incl. SPDIF-function). Cross checking with my Dell Laptop together with the modified IC-735 worked fine. So I decided to add a second soundcard to my PC. I now use in addition to the built in card a Soundblaster PCI512 (model CT4790) card. This configuration shows a very nice performance.

Results:

Below please find a screenshot of the received signal from T-Systems on 5975 kHz. In spite of the fact that the IF bandwidth of the receiver is slightly too narrow it works fine. Please make sure that you switch off your noise-blanker while receiving DRM signals otherwise your receive signal will be distorted and you achieve much worse results !



I cannot take any guarantee that the instructions and the software is error free. All modifications are at your own risk !

Kind regards

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