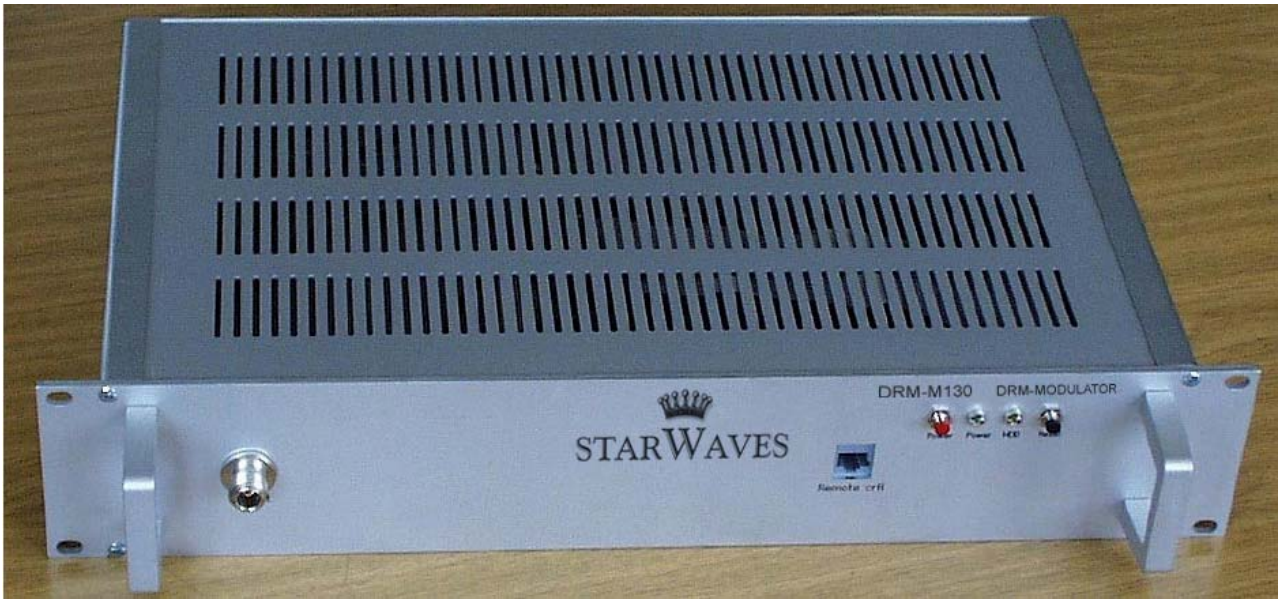
STARWAVES

YOUR DIGITAL WORLD

DRM-M130 DRM- Baseband Modulator
50 KHz to 28 MHz



Freq. Range:	50 KHz – 28 MHz, steps 1 KHz, steps until 0,1 Hz possible on request
Freq. Accuracy:	+-1,5ppm ex factory at 25°C Additional +-5ppm over full TCXO temperature range –20°C to +80°C Additional aging +-3ppm /5years
Output Signal:	Base band at final transmitting frequency, no I/Q outputs
Output Level:	0dbm true rms according 10 dBm peak
Linearity:	serves ITU limit- curve
Pre-correction Unit:	Internal as option, serves 100W with pre-correction or 75W without by use together with our 100W linear DRM power amplifier
Power Supply:	Internal, 115, 230 or 240V AC, max. 100W
Dimensions:	19" 2 Highness units
Output:	50 Ohms N female
Audio Input:	Chinch R+L 10 KOhms unsymmetrical Optional also 600 Ohms symmetrical
Remote Control:	Ethernet RJ45
Operating System:	Linux
Processor:	VIA C3 1000MHz
HDD:	1 GB Bootable memory card

1. Functionality

The PC based DRM modulator developed by STARWAVES is able to generate a DRM signal. As input, audio signals fed to the input connectors or provided as an internet stream or file stored on disk may be used.

In addition, text messages can be sent, which can be entered directly using the PC keyboard also during generation of the output signal. A number of text messages can be sent cyclically (text carousel) with preset duration of each message.

Further, service information such as station label, PTY, Language can be sent in the FAC/SDC. This information is static and must be entered when the modulator is started.

The DRM signal is generated as samples of the time domain signal at an adjustable intermediate frequency in the audio frequency range, usually 12 kHz. The sampling rate is 44.1 kHz and the resolution of the individual samples is 16 bit. Hence, the signal bandwidth is limited to 18 kHz. Alternatively, I and Q signals can be put out through separate outputs (DRM-M 230).

The signal level and the output frequency are adjustable. The signal level will control the output power of the transmitter.

Along with the software a graphical user interface is provided for setting up the DRM signal parameters (e.g. audio bit rate, transmission mode, spectrum occupancy), the stream sources and destinations (sound card/file/internet stream) and service information (e.g. Label).

The Modulator will be controlled by an external IP based terminal (PC). The terminal software is part of the standard accessory.

2. Licensed Third Party Software

For audio coding, a software library for MPEG AAC+ coding, available from Coding Technologies, Deutschherrnstr. 15-19, D- 90429 Nuernberg, Germany, (http:// www.codingtechnologies.com) is implemented. The modulator provides interfaces to the AAC software for real time operation. The interoperation has been tested in laboratory and life implementations using the latest version of the library which generates a DRM signal compying with the ETSI standard.

In addition, a software library for performing FFTs is implemented. The interoperation has been tested in laboratory and life implementations using the following version of the library: library "fftw" Version 2.1.3 + jfftw-1.2 java wrapper classes.

3. Restrictions

The following restrictions to the functionality and the operation of the modulator DRM-M130 apply:

General:
Up to four audio streams can be used for generation of the DRM signal; one audio stream can be read from the sound card, the others must be provided by other ways. The DRM Multiplex is static, reconfiguration during operation is not supported. Hierarchical modulation is not supported.

The following subset of SDC and FAC signalling is provided:

FAC:
channel parameters
with reconfiguration index = 000 being static
service parameters

SDC:
Only data entities of types 0, 1, 9 are generated (static).

Audio
For audio coding, only AAC (with or without SBR) is possible. The PC Software does not provide interfaces for other coding software than the one described under "Licensed Third Party Software".

DRM signal
The STARWAVES DRM-M130 DRM Modulator generates a signal which can be decoded by a DRM receiver, e.g. the STARWAVES W37, STARWAVES CarBox, Mayah 2010, Fraunhofer DRM Software Radio, Coding Technologies World Traveller and the DREAM Software Radio.

Real time operation
The Modulator works in real time operation. Due to internal buffering, the overall delay between the analogue audio input and the DRM signal output will be in the order of 5 seconds.

Reliability
In our laboratory implementation, the software is stable and has been tested in a permanent life setup of two radio transmitters in continuous operation for more than three years (March 03– May 2006) without any indications of instability or other problems.

Spectrum, Timing, Frequency accuracy
Our experimental results using the DRM software receiver on a separate PC which is directly connected to the modulator, a SNR of better than 40 dB was obtained. The RF SNR at transmitter output in our laboratory setup is better than 30 dB.

Screenshot of the GUI.