AXEL TECHNOLOGY

SHARK

DIGITAL STEREO RDS CODER

- Digital Stereo Coder
- Digital RDS/RBDS Coder
- Digital Audio Limiter / AGC
- Clipper MPX
- Stereo Enhancer
- Remote controllable by TCP/IP, RS232, modem
- Fully UECP compliant
- Full support for advanced RDS networks
- Comprehensive tools for use in national FM networks
- Advanced PS scrolling management

SHARK

Shark is a digital FM stereo generator & RDS/RBDS coder which utilizes the most advanced digital signal processing techniques to provide unsurpassed audio performance combined with the most advanced and comprehensive software control capability.

Beside MPX and RDS/RBDS coder, Shark also features an audio limiter + AGC, an audio changeover module, a Stereo Enhancer module, a MPX Changeover module + MPX Split function.

SHARK range includes an MPX stereo generator, a UECP-compliant RDS Encoder, an audio limiter + AGC, an audio changeover module, a Stereo Enhancer module, plus a Split function to switch on the same output an external Mpx source or the Shark Mpx source itself.

All functions and modules are accurately combined into 5 versions of SHARK, thus covering the most demanding requirements in MPX & RDS generation.

Using state-of-art, high-speed DSP technology, Shark range ensures the purest modulation quality without any artefact. The whole processing is performed by phase linear filters.
Its full-digital architecture also guarantees long term reliability and easy firmware updates.

SHARK is addressed to big FM radio broadcasters and syndicated FM Networks, but its design has been carefully budgeted in order to make Shark's technology affordable for small radio stations or local broadcasters as well.

SHARK features a wide range of control capabilities. An Ethernet port plus 4 RS232 ports (supporting any Dial-Up or GSM modem as well) gives control over Shark units from anywhere.

THE SHARK FAMILY

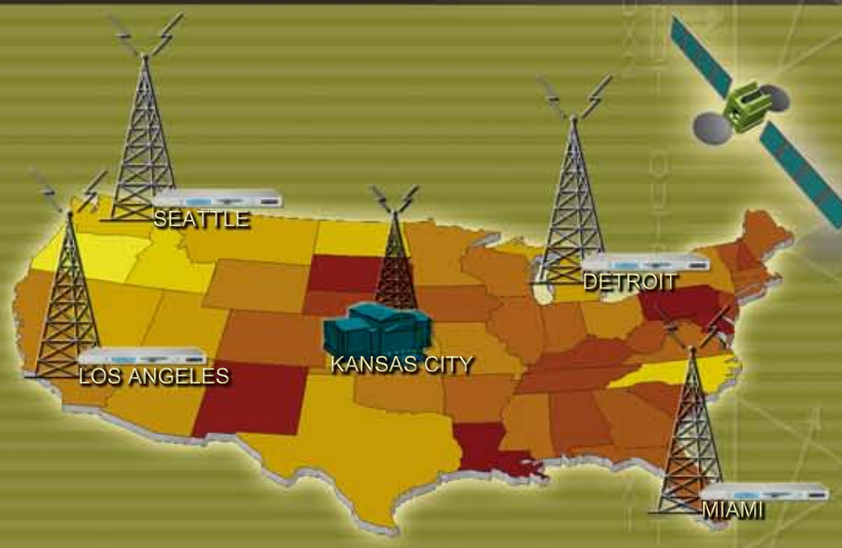
SHARK RDS
stand-alone digital RDS/RBDS encoder
fully UECP-compliant mode or extended mode
PS/PTY/RT scheduler
Interface capability to Radio Automated System

SHARK MPX
stand-alone digital Stereo generator
Analog and Digital audio inputs with separated level adj
Adjustable MPX Clipper
The purest modulation quality

SHARK LIM-MPX
digital Stereo generator + input Limiter
dynamic control of source level
digital Stereo Enhancer
AGC
automatic audio input changeover

SHARK MPX-RDS
digital Stereo generator + RDS/RBDS coder
Extraordinary space and money saving
Totally integrated controls
No more compatibility concerns!

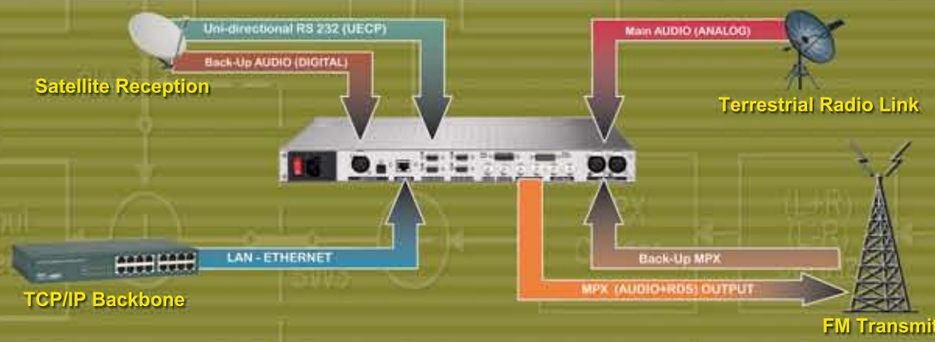
SHARK LIM-MPX-RDS
Full version, all included
Ideal for use at transmitter sites
The best modulation and audio level controls



SHARK's powerful resources allows the centralized management of multiple units located at the transmitter sites and spread into the largest territory.

Shark units can be addressed either individually or within groups.

Shark's Limiter & AGC input stages will continuously compensate for any fading or level variation induced on terrestrial or Satellite links.

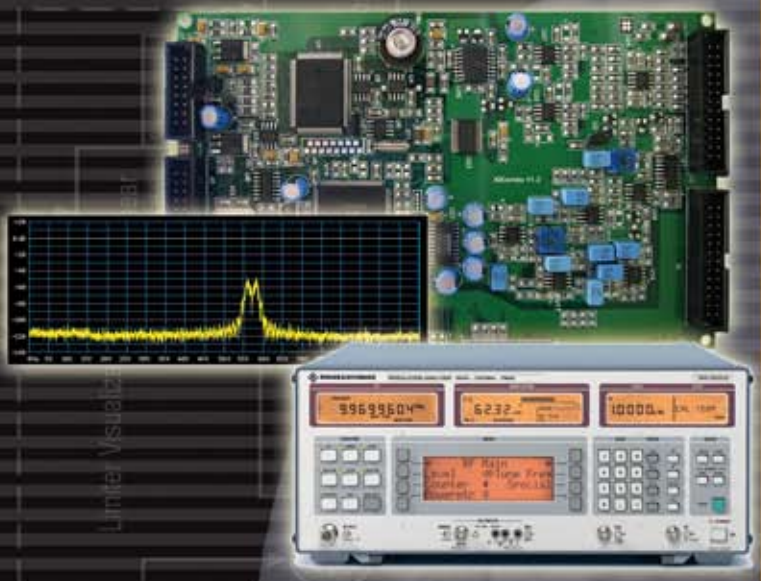


At each transmitter site, Shark receives analog and/or digital stereo feeds and digitally combines them into a Composite signal. RDS data are added at the same time, from integrated digital RDS coder. Overall MPX output then feeds one or more Exciters for FM broadcasting.

At the input, an automatic changeover allows connection for two audio sources (for example terrestrial STL + Satellite), one for Main and one for Back-up audio Program. A spare MPX source (such as an in-band relay FM receiver) can be connected as well.

RDS data and MPX Stereo coding parameters can be managed from remote using RS232 mono- or bidirectional data channels or TCP/IP links. For RDS Data and parameters, UECP protocols is normally used.

WITHOUT COMPROMISES



Using state-of-art, high-speed DSP technology, Shark range ensures the purest modulation quality without any artefact.

It features a full 24 bit processing and 380 KHz / 760 KHz sampling rate in multiple stages. Signal-to-Noise ratio in the Mpx stage exceeds 90 dB on a extended 100 KHz band. Separation exceeds 75 dB on the whole band and distortion on Composite signal is less than 0.01%.

The Shark also features one of the best 24-bit HiSpeed Digital-to-Analog Converter available on the market, a sophisticated Aes/Ebu interface including a sample rate converter, a 24bit/120 MHz Motorola DSP plus a 16bit Microcontroller.

The whole processing is performed by phase linear filters. Digital architecture guarantees long term reliability and easy firmware updates.

A POWERFUL, CENTRALIZED CONTROL

A dedicated Pc control software (BSN – Broadcast System Navigator) comes with the units.
The software screens reproduce, effectively and intuitively, all the controls available from the front panel menu, and integrates them with new functions for remote programming. There is no limit in the number of units which can be controlled from a single software license.

It is possible to give a specific address to every piece of equipment and to assemble them into groups, thus enabling selective or multiple unit programming at a glance.

A 64-event 'Scheduler' panel configures PS, PS Scrolling, RadioText, PTY / PIN messages to occur at any time. Flexible PS Scrollings and PS Carousels can display cyclic messages such as phone and fax numbers, web site address, or even song authors and titles.

Shark's configuration can be edited, saved and replicated in a textual way as well, using a simple ASCII language.

The BSN software uses Bi- or Mono-directional links, Serial RS232 / 485 or TCP/IP.

A FULL STANDARDIZED INTERFACE

Shark RDS/RBDS supports 4 General Purpose Data Sets, stored in a non-volatile memory and providing the largest range of standardized services, including PI, TP, TA, M/S, RT, PS, PTY, DI, AF, PIN, EON, CT, EWS, IH and TMC.

Beside the dedicated BSN dedicated software, those services can be programmed according to SPB 490 Universal Encoder Communication Protocol (UECP).

UECP is an harmonized environment that achieves interoperability of RDS system components from a variety of manufacturers. This enables more suitable or complex systems to be produced than otherwise possible.

Shark also supports the TMC – Traffic Message Channel, an international standard for the delivery of traffic information directly to vehicle's satellite navigation systems.

TECHNICAL SPECIFICATIONS

GENERAL

Dimensions	1 rack unit, 352 x 483 x 44 mm
AC Rate	230 Vac 50 Hz / 115 Vac 60 Hz +-10%
Type of power supply	Transformer based
Operating temp. range	-5 to +50 °C

COMPUTER INTERFACE

Connection capabilities	Serial, Modem, 10/100BaseTX Ethernet
Modem	Any dial-up modem - either GSM or Pots - can be connected to Serial Port for remote control.
Serial Port	4 RS 232 (2 on series + 2 optional) or 2 RS232 + 2 RS485 (optional), optically decoupled
Serial Connection Rate	1200 - 2400 - 4800 - 9600 - 19200 - 38400 Baud
TCP/IP Ethernet	RJ45 connector for 10/100 Mbps networks using CAT5 cabling
Pc Control Software	Dedicated, running on Windows XP sp2 or Windows 2000 Prof. sp4
Supported Protocol	UECP - SPB 490 (Version 6.02)

REMOTE CONTROL - GPI/O INTERFACE

Inputs	5, optocoupled, floating
Connector	SubD 15 pin female, EMI suppressed
Purpose	MPX, SCA, RDS inputs - Injection of a reference MPX signal for RDS sync purposes

AUX IN (1 AND 2)

Connector Type	Floating BNC, EMI suppressed
Pass-through Level	-40dB to + 20 dB trimmer adj max 24 Vpp input
Frequency response	30 Hz to 80 KHz +-0.1 dB
Distortion	< 0.03%
Input Impedance	> 10 Kohm
Purpose	MPX, SCA, RDS inputs - Injection of a reference MPX signal for RDS sync purposes

SYNC-OUT / SYNC-IN

Connector Type	Floating BNC, EMI suppressed
Purpose	TTL-level (5Vpp) 19 KHz Pilot Ref. Out / TTL Input for RDS Synch (ETS compliant)

MPX, RDS & MPX+RDS OUTPUTS

Number of Outputs	2, individually buffered, repeating the same signal
Connectors	Two BNC, floating over chassis ground, EMI suppressed
Load Impedance	600 Ohm or greater
Source Impedance	10 Ohm
External MPX summation	With external MPX injected into Aux 1 (Aux 2 if selected by jumper)
Composite output level	-9.0 dBm to +15.0 dBm (0.1 dBm step)

ANALOG AUDIO INPUT

Connectors	Two EMI-suppressed XLR female
Input Impedance	600 Ohms / 10 Kohms electronically balanced, jumper selectable
Nominal Input Level	Software adjustable from -9 dBm to +15 dBm
Level Range	-21 dBu to +24 dBu
Max Input Level	+24 dBu
Input CMRR	> 60 dB (20Hz-20KHz)
Headroom	10 dB (default) / 20 dB (Full Range Mode)
Automatic Changeover	Automatic switchover to digital input in the event digital source extinguishes

DIGITAL AUDIO INPUT

Connector Type	XLR female & optical tos/link. XLR transformer balanced & floating
Formats	AES3/EBU & Spdif
Input Rates	32/44.1/48/64/88.2/96 KHz with automatic selection and jitter correction. 16 / 24 bit resolution
Nominal Level adj	from 0.0 dBFs to -24 dBFs (0.1 dBu Step)
Level Range	0.0 dBFs to -36 dBFs
Dynamic Range	124 dB (32 KHz), 126 dB (44.1 KHz), 126 dB (48 KHz), 122 dB (96 KHz)
Automatic Changeover	Automatic switchover to analog input in the event digital source extinguishes

MPX (STEREO) CODING

Pilot Frequency	19 KHz +- 1 Hz
Pilot Injection	Adj from -25.0 dB to -15.5 dB (0.1 dB step) 6% to 18% of total deviation
Pilot Phase	Adjustable +- 12 deg. (1 deg. step)
S/N	>90 dB (on 100 KHz band)
Composite out THD	0.005% (typical on the whole band)
Linear Crosstalk	>-80 dB, main channel to sub-channel or sub-channel to main channel (ref. to 100% modulation)
Composite Clip Drive	+0.0 to +6.0 dB (0.1 dB step), software controlled (manually or automatically)
Digital filtering / band	30 Hz to 15 KHz (-0.1 dB), 17 KHz (-70 dB), 19 KHz (-100 dB)
57 KHz Protection	Better than 51 dB
Crosstalk M to S / S to M	>65 dB (minimum)
38 KHz suppress.	< -80 dB (typical)
Pre-emphasis	Off, 50uS, 75uS (+-0.1 dB)
Freq Response	+-0.3 dB (30 Hz - 15 Hz)
Stereo Separation	70 dB (typical on the whole band)

LIMITER / AGC / STEREO ENH.

Limiter modes	Disabled, Aggressive (Level 1), Protective (Level 2)
AGC speed	0.05 dB/s to 0.2 dB/s
Stereo Enh. - Effect Levels	Off / Low / Normal / High

RDS / RBDS MODULATION

RDS Signal generation	DSP-based, compliant to CENELEC EN 50067
RBDS Signal generation	DSP-based, compliant to United States NRSC
Coding / Modulation	Differential and bi-phase / Amplitude modulation double side band, with suppressed carrier
Subcarrier frequency	57 KHz +-3 Hz
Bandwidth	+- 2.5 KHz (-60 dB) / +- 3.0 KHz (-80 dB)
Linear Distortion	0.01 dB
RDS / RDBS output level	0 to 1200 mVpp (10 mVpp steps)
RDS phase	adj +-120 deg. (referred to MPX pilot). 1 deg step
Synchronization	Either to external 19 KHz pilot tone or to external FM stereo MPX signal.

RDS PROGRAMMING

RDS Command formats	fully compliant to UECP Forum document SPB 490 (ver. 6.01) plus extended manufacturer
Static services	DI, PI, TP, TA, M/S, RT, LA, EG, ILS, LSN, LGI, PSN, RT, PTY, PIN, AF, EON, CT
Dynamic services	EWS, IH, TMC, TDC
RDS Groups	0A, 0B, 1A, 1B, 2A, 2B, 3A, 6A, 6B, 8A, 9A, 10A, 14A, 14B, 15B
Character repertoires	ISO 8859: -1 (Latin 1), -2 (Ltin 2), -5 (Cyrillic), -7 (Greek), -9 (Turkish), -10 (Nordic languages)
Data Sets	4
AF lists for each DS	64, containing up to 25 freq each one
PS messages for each DS	64 (one of which programmable accordingly to UECP)
Type of PS scrolling	Up to 64 chars long text. User controls: N° of repetitions, step size, scrolling speed
RT messages for each DS	16, with A/B flag control
Scheduler	To program up to 64 events (PS, PS Scrolling, RT, PTY/PIN) to occur at any time

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