TIGER SHARK

DIGITAL STEREO GENERATOR

HIGH PERFORMANCE
DYNAMIC RDS/RBDS ENCODER

- RDS/RBDS encoding + Audio processing + Dynamic Stereo MPX Digital
- Completely UECP compliant EON, TMC, ODA
- Audio & MPX changeover
- Digital Audio Limiter/AGC
- MPX composite clipper
- Advanced automation interface: TCP/IP Web Server, PC software, IH protocol
- Advanced structured Networks Management
- SNMP agent
- GPS interface, NTP protocol

AXEL TECHNOLOGY

TIGER SHARK

TIGER SHARK is a top-class RDS/RBDS and Stereo Generator equipment.
It has been designed to provide every custom requirement of a structured FM network, especially managing advanced machine control and signal changeover, using a PC and web server interface.

TIGER SHARK

RDS SERVICES

TIGER SHARK supports the most advanced RDS dynamic services, including TMC, ODA, IH, TDC and EWS.

In addition to standard CENELEC methods, RDS programming has been enriched with larger PS and RT sets (also available in dynamic mode) with powerful scheduling capabilities.

ALWAYS ON TIME

GPS satellite receiver, such as our Sat Time Synchronizer, can broadcast local time info as part of the RDS data.

RDS service carries also 4 IH (InHouse Application) remote controls, that can be used to start advertising breaks on distant networks, to split broadcasting areas, to activate / deactivate Recorders.

COMMUNICATIONS

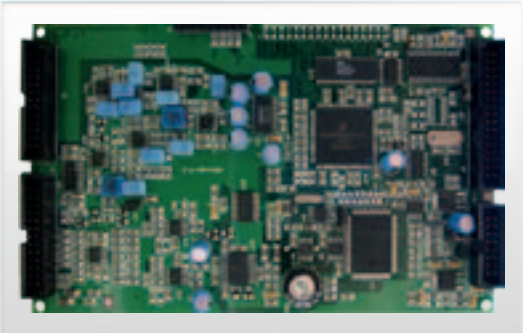
TIGER SHARK communication features have been enforced with comprehensive remote control via RS232, RS485, modem or TCP/IP: its built-in, password-protected server is compatible with FTP, Telnet, SNMP, HTTP and UECP protocols.

Simply interfacing with Automation Systems using ASCII protocol for broadcast song/artist information.
In case of alarms, it supports SNMP alerting for automation systems, and eventually SMS notification (by a GSM modem connection).

STATE OF THE ART

TIGER SHARK has been accurately designed to satisfy the most demanding requirements in FM Stereo generation and advanced RDS/RBDS encoding.

It is built with the best cutting-edge technology: surface-mount components and multi-layer circuit boards keep the signal path safe from any issue, providing the purest modulation quality.
Its digital architecture guarantees long term reliability and easy firmware updates, directly on field or from remote.



AD COMBO

UECP - ODA - TMC

TIGER SHARK is fully UECP compliant, and conforms to recommendations of the EBU-UER SBP490 document.

UECP represents a standard for communication and control of a network of different encoders by a single protocol.
It allows the broadcasting of Open Data Applications (**ODA**) onto the RDS data, including TMC service.

The Traffic Management Channel (**TMC**) is a method of communicating real time traffic information to vehicles equipped with the proper receivers to decode and display that data.

TIGER SHARK gives full and standard support to TMC broadcasting, thus allowing FM broadcasters to offer their user that value-added service.

UECP - ODA - TMC

MANAGING UNITS FROM REMOTE

Based on European public broadcasters custom needs, we provided **TIGER SHARK** with the most advanced network management system for both audio and RDS paths.

According to UECP, it is possible to give a specific address to every encoder or group according to selected criteria (for example, group all encoders belonging to the same FM network, etc).

With a Unidirectional (tipically: satellite) or a Bi-directional communication channel (tipically: TCP/IP network) available, you may control either individual encoders (e.g.**TIGER SHARK** encoder on a given location and of a given Program), or coders in group (e.g. with the same command shared among all the encoders on to the same network).

Remote control capability is a 'benefit' that allows you to upgrade RDS messages (PS, RT, etc), alter any audio / RDS coding parameters (level for example), change AF lists, load new Datasets, etc from remote and with no needs for a local intervention.

When no communication channel is available, **TIGER SHARK** will work perfectly also as stand-alone coder anyway.

MANAGING UNITS FROM REMOTE

FEATURES

TIGER SHARK

- Digital Stereo Generator (MPX)
- Dynamic RDS/RBDS encoder
- AGC input stage, Audio Limiter, Stereo Enhancer
- Automatic changeover between Analog, AES/EBU and external MPX input
- UECP compliant
- Dynamic ODA, TMC, EWS and IH services
- Advanced PS scrolling. PS, RT, PTY scheduler
- 8 GPI / 8 Relay interface.
- 3 serial connections to control and send messages
- Pc control software.
- Ethernet connection with SNMP protocol
- ASCII protocol
- TCP/IP server
- GPS Interface
- Incoming MPX detector stage
- Radio Automation Systems Interface

TIGER SHARK - R

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- UECP compliant
- Dynamic ODA, TMC, EWS and IH services
- Advanced PS scrolling. PS, RT, PTY scheduler
- 8 GPI / 8 Relay interface.
- 3 serial connections to control and send messages
- RDS decoder for re-broadcasting messages
- Pc control software.
- Ethernet connection with SNMP protocol
- ASCII protocol
- TCP/IP server
- GPS Interface
- Radio Automation Systems Interface

ANALOG AUDIO, AES/EBU AND MPX CHANGEOVER

TIGER SHARK manages 4 input sources:

Audio, stereo analog on **XLR**
- Audio, stereo digital on **AES/EBU**
- **MPX**, external/backup
- Mp3 Player on SD Card (optional)

Selection between sources may be achieved either manually or automatically, by internal changeover stage and silence detectors or by contact closure (GPI input).

Input changeover stage prevents the transmission chain from any interruption in case of main input failure.

MPX as main source:
TIGER SHARK checks MPX signal coming from antenna and delivers it directly to output (bypass).

In case of MPX input issue Tiger Shark takes over with his own MPX-RDS/RBDS backup signal.

Audio as main source (with external MPX backup):
TIGER SHARK generates his own MPX-RDS/RBDS signal based on the audio input.

In case of audio modulation issues **TIGER SHARK** routes straightforward the external MPX source to its output.

PC CONTROL SOFTWARE (Tiger-Shark Remoter)

TIGER SHARK remote control software provides an intuitive user interface, which enables remote control of all the encoders connected to the network, either via TCP/IP or RS232, in either bi-directional or unidirectional mode.

The software screens show all controls and settings available on the machine, and integrates them with new and helpful functions for remote programming and advanced scheduling.

The software is also a useful tool for the centralized control of all the installed at remote transmitting sites, where each unit can be addressed either individually or within groups.
A 'textual' Configuration Editor allows parameter setting saving, recalling and even duplicating on multiple Targets very easily.

Any operative configuration of a given encoder (e.g. input gain, pilot level, RDS
contents, RDS groups, Port settings, etc) may be modified or set through commands / values provided in a textual (ASCII) way and saved / recalled as simple textual file.
Every system parameter settings can be saved, recalled or easily replicated on a limitless number of Targets at any time.

TCP / IP ETHERNET SERVER

TIGER SHARK can be connected to any Ethernet-based network, and controlled by a hub, switch, or router, or directly connected to a PC.

By its secure **TCP/IP** connection you will have the whole RDS/RBDS network under your fingers by simply accessing to the internet.

From the web interface you can:
- Check the status of every installed machine
- Set RDS/RBDS status
- Set input source and audio/MPX routing
- Set UECP mode, PS and dataset
- Set MPX I/O parameters
- Set audio processing parameters

PC CONTROL SOFTWARE (Tiger-Shark Remoter)

TCP / IP ETHERNET SERVER

TIGER SHARK OPTIONAL ACCESSORIES

TSK-MP3

An optional built-in Mp3 player from SD Card may replace either the Analog or the Digital input on the Tiger-Shark, serving as backup of local audio source whenever main audio is lost.

TSK-485

RS485 interface provides easy straightforward connection of multiple devices in chain/cascade. Featuring an either Male or Female DB8 connector internally paralleled, multiple Tiger Shark units can be connected with a forward (pin-to-pin) serial cable. The device supports both full and half connection modes.

TSK-24V

An optional transformer-based power supply allows connection to mains 230/115 Vac at 50/60 Hz. A 24 VDC input is provided for applications where backup power is required. Switchover to backup power is automatic and silent.

TIGER SHARK 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
Processing architecture	fully digital. Based on DSP 24bit/100Mhz. Signal processing is performed by phase linear filters.
Operating temp. range	- 5 to + 50 °C

COMMUNICATION

I/O COMMUNICATION PORTS

Serial Ports	3 x RS232 optoinsulated or 2 x RS232 + 1 x RS485 (option). Serial Port 1 is replicated on Front Panel for easy connection. 1200 –- 38400 Baud. Serial Port 1 supports dial-up modem.
Ethernet	10/100 BaseT Ethernet on RJ45 connector
Supported Protocols	SNMP, UECP, TCP/IP, NTP, UDP
Communication tools	Web Server, dedicated Pc Control Software, textual Configuration Editor
Front panel LEDs	Dynamic Buffer, current audio source, serial port activity, alarms

INPUT & OUTPUT

GPI/O INTERFACE

Inputs	5, optocoupled, floating
Outputs	4 Relays
Connector	2 x SubD 25 pin female

AUX IN (1 AND 2)

Connector Type	floating BNC, EMI suppressed
Pass-through Level	-40dB ÷ + 20 dB trimmer adj. max 24 Vpp input
Frequency response	30 Hz ÷ 80 KHz +/- 0.1 dB
Distortion	< 0.03 %
Input Impedance	> 10 Kohm

SYNC-OUT *

Connector Type	floating BNC, EMI suppressed
Purpose	TTL-level (5Vpp) 19 kHz Pilot Ref. Out for synchronizing external RDS coders
Sync Out phase error	+/- 2 degrees (maximum)

SYNC-IN **

Connector Type	floating BNC, EMI suppressed
Sync-In	Accepts TTL (square-wave) for RDS synch. (ETS compliant). Enabled by software

MPX, RDS & MPX+RDS OUTPUTS

Output Connectors	2 BNC, floating over chassis ground, EMI suppressed
Load / Source Impedance	600 / 10 Ohm Ohm
External MPX summation	With external MPX injected into Aux 1 (Aux 2 if selected by jumper)
Composite output level	- 9.0dBm to +15.0 dBm (0.1 dBm step)

ANALOG AUDIO INPUT

Connectors	Two EMI-suppressed XLR female
Input impedance	600 / 10K / 50 K ohms electronically balanced, jumper selectable
Nom.Input Level (sensistivity)	Software adjustable from –-9dBm to +15.0 dBm
Level Range / Max level	–21.0dBu ÷ + 24.0dBu / + 24 dBu
Headroom	10 dB (default) / 20 dB (Full Range Mode)

DIGITAL AUDIO INPUT

Connector Type	XLR female & optical tos/link. XLR transformer balanced & floating. 110 Ohm impedance
Formats	AES3/EBU & Spdif
Input Rates	32/44.1/48/64/88.2/96KHz with automatic selection and jitter correction. 16 / 24 bit Res.
Nominal Level adj (sensitivity)	From 0.0dBFs to –24dBFs (0.1dBu Step)
Level Range	0.0 dBFs ÷ -36dBFs

MP3 PLAYER (available as an option)

Storage card Type	SD CARD
Supported audio files	.Wav and .Mp3 audio files
Purpose	Back-up audio source. Replaces either the analog or the digital input

* active on Tiger-Shark only
** active on Tiger- Shark- RDS only

INPUT CHANGEOVER / LIMITER / MPX DETECTOR

MPX DETECTOR STAGE

Input	Any external MPX signal applied to AUX-1 input (by default) or Aux-2 input / the same MPX generated by the Tiger-Shark
Controls	MPX deviation, Audio Presence, Pilot presence, RDS Presence / PI Code
Purpose	Detecting an external MPX source, in order to replace it by self-generated MPX in the event of any fault.

INPUT CHANGEOVER

Inputs	Stereo analog audio, AES / EBU audio, Auxiliary MPX
Fail mode	Lack of analog or AES/EBU audio / any of MPX Detector controls
Fail Time	From 1 to 120 seconds
Restore Time	5 secs or 5 minutes (user settable)

AUDIO LIMITER

Limiter modes	Disabled, High Protection, Low Protection, LookAhead Mode
Limiter stage sources	Audio limiter applies to both analog and digital input sources
AGC speed controls	0.05 dB/s ÷ 0.2 dB/s
Stereo Enhancer - Effect Levels	Low / Normal / High

REMOTE CONTROLS ON IH

Purpose	Carrying of 4 contact closures on IH (In House Application) RDS service (silently)
Remote controls input	GPI in on transmitting side
Remote controls output	Relay outputs on receiving side

MPX (STEREO) GENERATION

Signal processing is performed by phase linear filters / all measurements referenced to 100% modulation unless otherwise noted. Tiger-Tiger-Shark version only.

Pilot Frequency	19 KHz +/- 1Hz
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)
Pilot distortion	0.05 % (typical)
Pilot distortion + Noise	0.068% (on 100Khz Band)
S/N	> 90 dB (on 100 kHz band)
Composite out THD	0.005 % (typical on the whole band)
Stereo Separation	>70 dB (typical on the whole band)
Linear Crosstalk	>–80 dB, main channel to sub-channel or sub-channel to main channel (referenced to 100% modulation)
Composite Clip Drive	+0.0 to +6.0dB (0.1dB 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 (RDS/RBDS) Protection	Better than 51 dB
Main to Sub/Sub to Main	> 65 dB (minimum)
38KHz suppress.	< - 80dB (typical)
Pre-emphasis	Off, 50uS, 75uS (+-0.1dB)
Freq Response	±0.3 dB (30Hz-15kHz)
Operation	Mono /Stereo

TEST CONDITIONS: OUT LEVEL = +12dBm, LOAD=600Ohm, PILOT LEV= -20Db MODE=STEREO

RDS / RBDS ENCODING

MODULATION

RDS Signal generation	DSP-based , compliant to CENELEC EN 50067
RBDS Signal generation	DSP-based , compliant to United States NRSC
Linear Distortion	0.01 dB
RDS / RBDS output level	0 ÷ 1200 mVpp (10 mVpp steps)
RDS phase	adj +/-120 deg (referred to MPX pilot). 1 deg step
Synchronization	Either to external 19Khz pilot tone or to external FM stereo Mpx signal. Automatic switchover to internal oscillator in case of absence or low quality of external reference signal

RDS PROGRAMMING

RDS Command formats	fully compliant to UECP Forum document SPB 490 (Version 6.02) plus extended manufacturer 's commands list			
Static services supported	PS	Programme Service	PI	Programme Identification
	ECC	Extended Country Codes	PTY	Programme-type
	PTYN	Programme Type Name	TP	Traffic-programme
	TA	Traffic-announcement	MS	Music Speech
	DI	Decoder Identification	AF	Alternative Frequencies
	PIN	Programme-item number	EON	Enhanced Other Networks
	CT	Clock-time and date	RT	Radio Text
	LA	Linkage Actuator	EG	Extended Generic indicator
	ILS	International Linkage Set indicator	LSN	Linkage Set Number
	LIC	Language Identification Code	SLC	Slow Labeling Code
Dynamic services supported	ODA	Open Data Application		
	TMC	Traffic Message Channel		
	EWS	Emergency Warning System		
	IH	In House application		
Groups	0A, 0B, 1A, 1B, 2A, 2B, 3A, 3B, 4B, 5A, 5B, 6A, 6B, 7A, 7B, 8A, 8B, 9A, 9B, 10A, 10B, 11A, 11B, 12A, 12B, 13A, 13B, 14A, 14B, 15B			
Character repertoires (ref Cenelec tables E1, E2, E3)	ISO 8859-1(Latin 1), ISO 8859-2(Latin 2), ISO 8859-5(Cyrillic), ISO 8859-7(Greek),ISO 8859-9(Turkish), ISO 8859-10(Nordic languages)			
Data Sets	6 (recall by software, UECP command or GPI)			
AF lists for each Data Set	64, containing up to 25 freq each one			
PS messages for each Data Set	64 (one of which programmable accordingly to UECP)			
RT messages for each Data Set	16 with A/B flag control			
Scheduler	up to 64 events (PS, PTY/PIN) to occur at any time			
Interface to external Radio Automation Systems	Achieved by dedicated ASCII protocol, for RT and PS Scrolling external-driven messages			

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