

LIGHTNING

THE NEW Hybrid Jammer Generation

**INTELLIGENT & REACTIVE
RCIED JAMMING**



WE GUARANTEE FOR LARGEST JAMMING DISTANCES FIELD TESTS / DEMONSTRATIONS AVAILABLE

The LIGHTNING is a hybrid jamming system consisting of a continuous jamming and a reactive jamming module, developed for vehicle installation. The continuous jamming creates a safe zone in the near-field. The reactive jamming module detects any adversarial signal stronger than the noise level created by the continuous jamming. The detected powerful adversarial signals are precisely blocked at the exact channel bandwidth with the full power of the dedicated amplifier. The reaction (detection & jamming) time of 90 micro-seconds (100 MHz bandwidth) allows to detect and block even the fastest frequency hopping radios available on the market (10'000 hops / second). This allows to block high power transmitters of terrorists (HF, VHF, UHF radios) also very close (e.g. 15-20 meters) to the receiver. The reactive jamming module may reach **jamming distances 100 times larger** than distances achieved by common jammers (e.g. considering 100 W output power dedicated on a channel (e.g. 1 MHz bandwidth) compared to 100 W output power distributed by sweeping on a frequency wideband of 500 MHz) .

Compared to traditional jamming systems, LIGHTNING's core technology is a signal generation module which allows to design any kind of RF waveform in order to adapt and cover the adversarial signal efficiently. The developable software and the hardware, - based on today's most powerful FPGA and DDS technologies, allow all required features for the efficient generation of jamming signals.

WHAT MAKES THE «LIGHTNING» THE TODAY'S MOST ADVANCED VEHICLE INSTALLED JAMMING SYSTEM:

- Detection of adversarial RF signal: the jamming system offers a real-time RF detection feature, allowing to detect any adversarial RF signal instantaneously and to jam on the specific detected channel / frequency band (Reactive Jamming).
- Four FPGA chips control 24 DDS chips. Each DDS chip controls an individual amplifier resulting in 24 simultaneous jamming signal generations. => Different jamming signal generations may be combined; covering the same frequency band, this results in high efficiency of jamming in the far-field as well as in the near-field.
- DDS / DSP technology: any kind of modulation may be generated.
- The jamming signal for each individual frequency bandwidth may be adapted in order to cover in an efficient way the adversarial signal => the signal for each frequency band will be generated with adapted signal parameters:
Speed of sweeping, carrier step size, power, channel raster and modulation.
Each communication medium (potential threat) does have specific RF characteristics and waveforms. Therefore the jamming signal is generated in each bandwidth with adapted characteristics covering each individual threat efficiently.
- Tone and DTMF code transmission combat VHF/UHF radios efficiently at large distances.
- Programmable filters offer precise and selectable channels for friendly communication.
- LIGHTNING achieved in several demonstrations (e.g. NATO trials) the largest jamming distances compared to any other system on the market.

SCG

Security &
Counterintelligence
Group LLC



SCG Security & Counterintelligence Group LLC

TECHNICAL SPECIFICATIONS

CONTROL MODULE



Standard configuration: 4 FPGA chips / 24 DDS chips / 24 DSP chips

- Frequency range: 10 MHz – 6 GHz, optionally up to 18 GHz
- Jamming modus: Sweeping, Sweeping Over Sweeping™, Hopping, Barrage, Spot
- Reactive Jamming: Reaction time (detection & jamming) 90 µs / 100 MHz
- Command of system:
 - Remote Control
 - Switches on Control Module / Amplifier Modules
- Signal programming: Software, upload through USB connector
- Programming Features:
 - Frequency bandwidth (Start / Stop)
 - Individual allocation of power for each bandwidth
 - Speed of sweeping carrier (raising and falling): 0.004 µs to 1 s
 - Carrier step size (raising / falling): 0.1 Hz to max. bandwidth
 - Modulation
- Modulation:
 - FM, Tone, PN, DTMF
 - Any kind of user-specific modulation (noise, sound, code sequences, waveforms etc.) may be uploaded
- GPS: Automatic program upload in relation to GPS coordinates (option)
- Amplifier protection: Protection against VSWR over-value
- System impedance: 50 Ohm
- HF-connections: N socket backside
- Power supply: 24 VDC
- Operation temperature: -10°C to +60°C
- Storage temperature: -55°C to +105°C
- Humidity: up to 95% (none condensing)
- Dimensions: H: 9 cm (2 U), W : 48 cm (19"), D : 40 cm
- Weight: < 5 kg



AMPLIFIER MODULES

Following amplifier configuration is recommended. The Continuous Jamming part represents the amplifiers jamming continuously (1292 W output power), whereas the Reactive Jamming part for the VHF and UHF bands (200 W output power) stays on stand-by and gets activated in case of detecting an adversarial signal stronger than the set threshold. The total output power of the continuously jamming modules and reactive jammer modules represents 1492 W.

The reactive jammer modules (200 W) may be any time applied for continuous jamming by simply switching off the RF detection module.

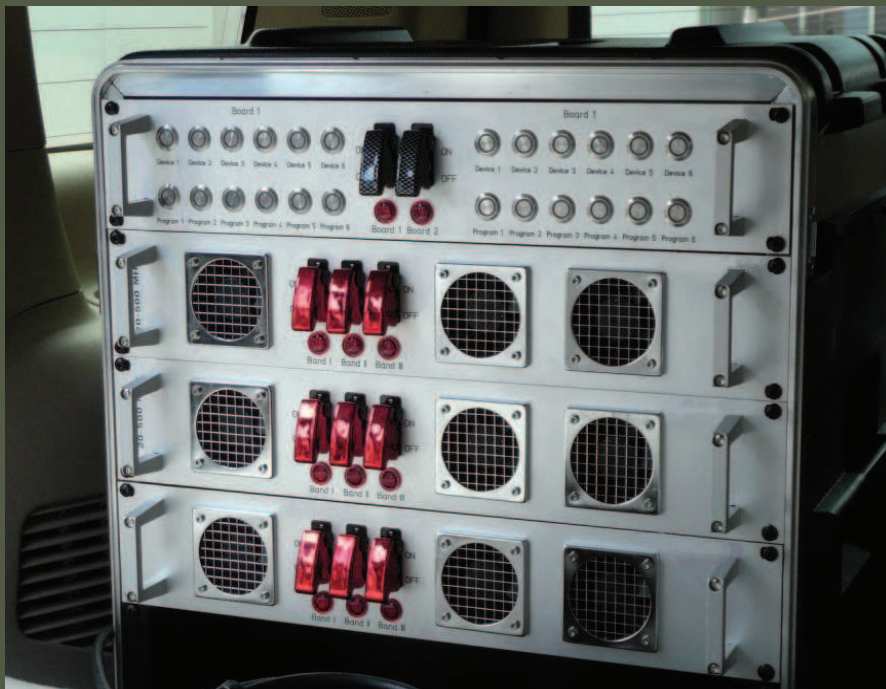
Frequency band:

Output power:

VHF 10 - 174 MHz	100 W	
VHF 20 - 300 MHz	100 W	+ 100 W Reactive Jammer
UHF 300 - 520 MHz	100 W	+ 100 W Reactive Jammer
500 - 2500 MHz	100 W	
2500 - 6000 MHz	40 W	
GSM 900 (925-960 MHz)	200 W	
GSM 1800 (1805-1880 MHz)	200 W	
UMTS (2110-2170 MHz)	200 W	
LTE 800 (790-821 MHz)	100 W	
LTE 2600 (2620-2690 MHz)	100 W	
Wi-Fi 2.4	40 W	
WiMax 5.7 - 5.9	12 W	

Total output power

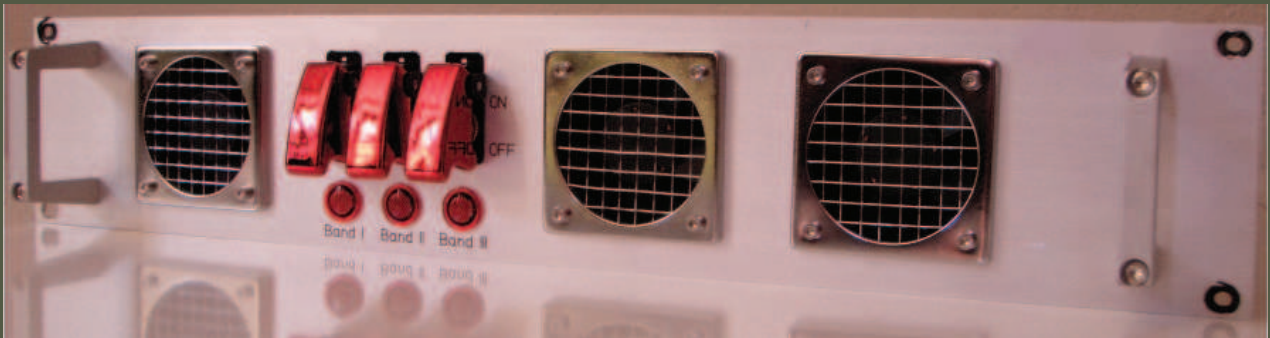
1292 W + 200 W = 1492 W TOTAL



Jamming System with 1 Control Module and 3 Amplifier Modules (partial configuration)

AMPLIFIER MODULES - SPECIFICATIONS

- Output power: up to 300 W CW
- Auxiliary shafts: -60 dB
- System impedance: 50 Ohm
- Input VSWR: 2.0:1 max. / 50 Ohm
- Output VSWR: 2.5:1 typ.
- Load VSWR: 2.0:1 max. without damage continuous
- Cooling forced air
- Power supply: 24 VDC, 18-30 A / amplifier module
- Operation temperature: -10 °C to +60 °C
- Storage temperature: -55 °C to +105 °C
- Weight: < 15 kg
- Dimensions: H: 9 cm (2 U), W : 48 cm (19"), D : 40 cm
- HF-connections: N socket backside
- Conformity: EN, CE and ETSI
- NATO Standards, Mil Standards
- Transport Method: 514-4 of MIL-STD-810 E Procedure I, Figures 514.4-1, 514.4-2, 514.4-3



REMOTE CONTROL

The remote control allows the operator to switch between 3 (optionally 6) stored jamming programs. This allows selecting the jamming configuration adapted to the environment or actual risk exposure; e.g. when crossing rural or urban territory different jamming modes are requested- during high-risk exposures e.g. when crossing bridges, a program with increased output power may be selected.

Optionally, the remote control is available with the CAN-BUS interface.



POWER SUPPLY - ADVANCED POWER MANAGEMENT

A second alternator supplies the energy for the jamming system. As soon as the engine is running, this alternator produces enough energy to charge one of the two Lithium-Ion Polymer batteries. The second Lithium-Ion Polymer battery is power supplying the jamming system. As soon as this battery will reach a certain level of discharge it will be switched automatically with the other battery to get charged by the additional alternator.

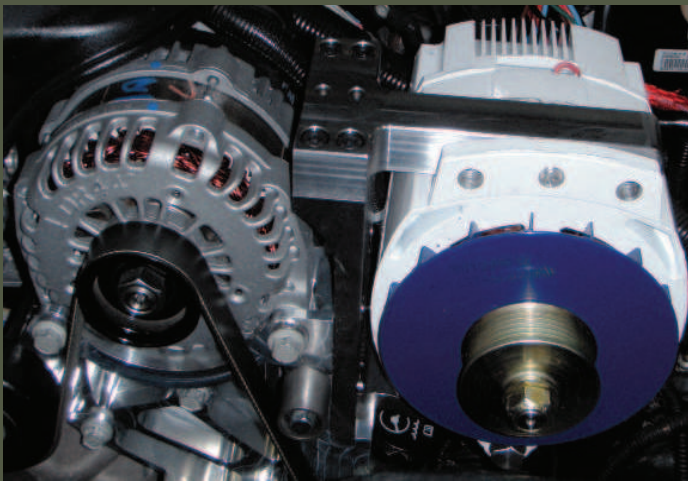
The advanced power management by separating the electric circuit (charging & power supplying) is important to reach highest stability and to protect the electronic equipment against eventually instable voltage levels produced by an alternator.

The patented multi-alternator holder is shaped out of an aluminium block with a special automotive design allowing a fixation without affecting the engine block (no drilling necessary). Alternator and alternator-holder are delivered plug & play allowing a fast installation.

The Power Supply Control Station controls permanently the power supply by the alternator, the voltage / current and temperature level of the battery as well the current consumption of each amplifier and remaining autonomy.

Power supply (alternator): 150 A @ 24 VDC

Batteries: Lithium-Ion Polymer: 2x 160 Ah, totally 320 Ah @ 24 VDC



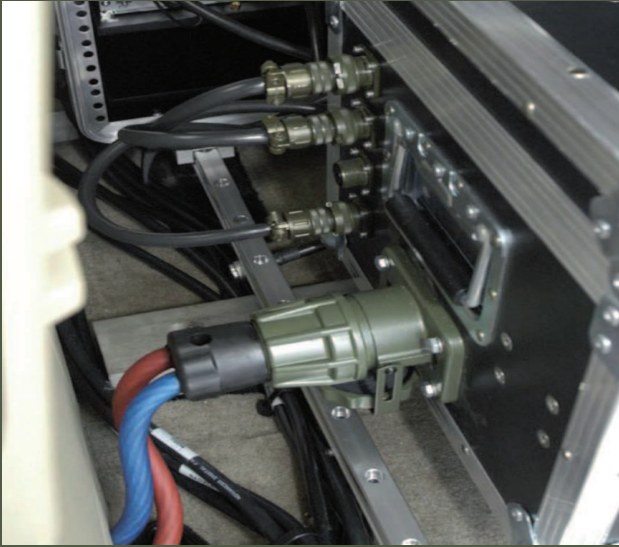
Additional alternator to charge batteries of Jamming System



*Multi-alternator holder for GMC / Chevrolet
Alternator holders for other car brands
available (e.g. Toyota Landcruiser)*

POWER SUPPLY

Power Supply Box integrating 2 pcs Lithium-Ion Polymer Batteries, 2 x 160 Ah, 24 VDC. Totally 320 Ah, 24 VDC.



Power supply control station controlling permanently:

- Power supply of alternator
- Battery status (voltage / current / temperature)
- Current consumption of each amplifier module
- Remaining jamming autonomy

All events regarding power supply (history) are stored (black box).



MIL-Standard power supply connectors

ANTENNA SYSTEM

The Antenna System consists of mainly omni-directional antennas. For the cellular phone bands are applied in addition to omni-directional antennas as well as high gain directional antennas, in order to cut the GSM base station contact in advance and with high power during fast driving.

For discreet applications, the same antennas may be hidden inside a car luggage box.



Recommended configuration:

Antenna no 1:	VHF 10-174 MHz:	Route-antenna, omni-directional, -7dBi to 1 dBi
Antenna no 2/3:	VHF 20-300 MHz:	Stab-antenna, omni-directional, 0 dBi
Antenna no 4/5:	UHF 300-520 MHz:	Stab-antenna, omni-directional, 0 dBi
Antenna no 6:	GSM 900:	Stab-antenna, omni-directional, 5 dBi
Antenna no 7:	GSM 900:	Patch-antenna, directional, 8 dBi
Antenna no 8:	GSM 1800:	Stab-antenna, omni-directional, 6 dBi
Antenna no 9:	GSM 1800:	Patch-antenna, directional, 8 dBi
Antenna no 10:	UMTS:	Stab-antenna, omni-directional, 5 dBi
Antenna no 11:	UMTS:	Patch-antenna, directional, 8 dBi
Antenna no 12:	LTE 800:	Stab-antenna, omni-directional, 5 dBi
Antenna no 13:	LTE 2600:	Stab-antenna, omni-directional, 5 dBi
Antenna no 14:	Wi-Fi 2.4:	Stab-antenna, omni-directional, 5 dBi
Antenna no 15:	WiMax 5.7-5.9:	Cylinder-antenna, omni-directional, 6 dBi
Antenna no 16:	500-2500 MHz:	Cylinder, omni-directional, -1dBi to 3 dBi
Antenna no 17:	2500-6000 MHz:	Cylinder-antenna, omni-directional, 2dBi to 6 dBi
Antenna no 18:	6000-18000 MHz:	Cylinder-antenna, omni-directional, 6 dBi

The short omni-directional antennas for detection (Reactive Jamming) are placed in each corner underside the car.

Antenna diagrams available on request.



ANTENNA SYSTEM

10-174 MHz



20-300 MHz



300-520 MHz



GSM 900 /
1800 / UMTS



Wi-Fi 2.4



LTE 800 /
LTE 2600



2500-6000 MHz /
6-18 GHz



500-2500 MHz



RF SHIELDING

RF shielding is essential for vehicles with installed jamming systems, considering the safety of the drivers and passengers inside the car as well as regarding the electromagnetic compatibility (EMC).

Considering a power output of more than 1000 W and up to 7 dBi gain of the antenna system, the created electromagnetic field reaches significant levels.

Therefore SCG LLC. developed procedures to shield cars efficiently, reaching final attenuation factors of min. 20 dB up to 40 dB.

The average attenuation factor is 30 dB, corresponding to an attenuation of 99.9%.

The efficiency of the final shielding is being tested in a high-tech measurement radome throughout the complete frequency bandwidth.

Each vehicle is delivered with an official shielding measurement protocol.



*Measurement radome - interior view
Vehicle placed for RF shielding measurements on rotating platform*

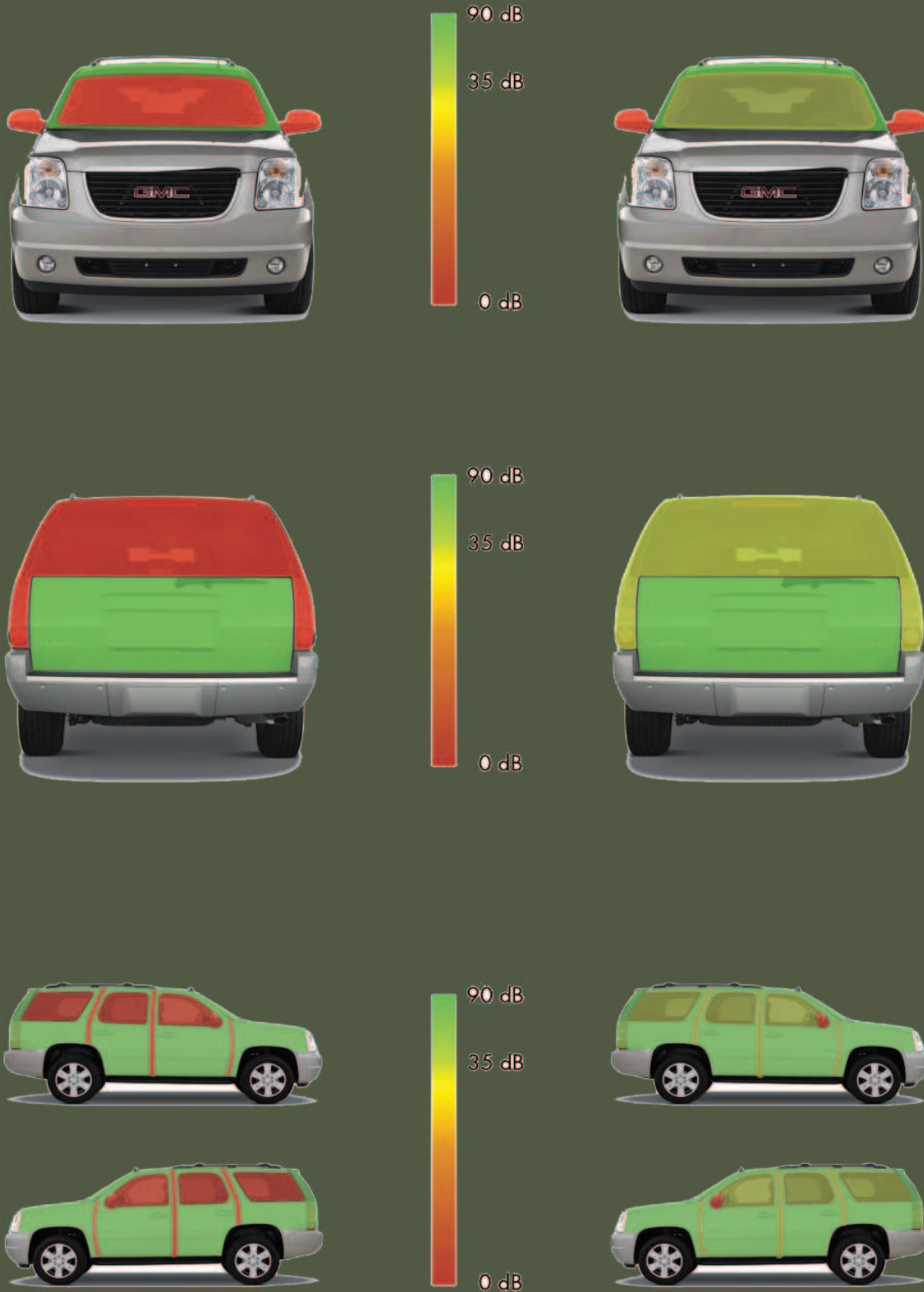


Measurement radome - exterior view

RF Shielding attenuation levels prior and after RF Shielding

Measurement prior shielding

Measurement after shielding



Specifications are subject to changes without prior notice

