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INTELEGENT SAFETY SYSTEMS

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Safety Protection Systems

IRJ-HYBRID
Intelligent & Reactive RCIED JAMMING

NEW Hybrid RCIED JAMMER
INTELLIGENT & REACTIVE RADIO-CONTROLLED
DESIGNED TO PREVENT IMPROVISED EXPLOSIVE DEVICES

Prevent trigger devices from activating remote controlled bombs.
Blocks signals from admitting the detonation signal sent by a terrorist threat to activate an improvised explosive device or IED.

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GUARANTEED FOR THE LARGEST JAMMING DISTANCES
FIELD TESTS / DEMONSTRATIONS AVAILABLE

The IRJ-HYBRID is a hybrid jammer consisting of a continuous jamming and a reactive jam-ming part. The continuous jamming creates a safe zone whereas the reactive jamming detects any adversarial signal stronger than the noise level created by the continuous jamming in order to block this signal with the full power of the dedicated amplifi er exactly at this specifi c frequen-cy. This allows to block even high power transmitters of terrorists also very close (few meters) to the receiver.

Jamming distances achieved by our reactive jamming system are at least 100 times larger compared to a standard jamming system.

Conventional Jamming Systems come with fi xed patterns for jamming signals. The Jamming System “IRJ-HYBRID” provides software with highest “flexibility” regarding signal generation and optimal utilization of output power to disable the adversarial RF signal. The developable software and the hardware, based on today’s most powerful FPGA chip (military industry), allow all required features for the efficient generation of jamming signals.

WHAT MAKES THE «IRJ-HYBRID» THE TODAY’S MOST ADVANCED

- 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 specifi c detected channel / frequency band (Reactive Jamming).
- Four FPGA chips control 24 DDS chips. Each DDS chip controls an individual amplifi er resulting in 24 simultaneous jamming signal generations. =>Different jamming signal generations may be combined; cov-ering the same frequency band, this results in high effi -ciency of jamming in the far-fi eld as well as in the near fi eld.
- 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 effi cient way the adversarial signal => the signal for each frequency band will be generated with adapted sig-nal parameters:
  Speed of sweeping, carrier step size, power, channel raster and modulation.
  Each communication medium (potential threat) does have specifi c RF characteristics and waveforms. Therefore we generate the jamming signal in each bandwidth with adapted characteristics covering each individual threat effi ciently.
  The signal characteristics of means of communication do also vary as to a country’s telecommunication infrastructure; the ability to adapt the jamming signal is therefore crucial
- The jamming mode “DTMF code transmission” suppresses the most dangerous and most frequent threat, bomb triggering by “DTMF code transmission”, at large distances.
- Programmable fi lters allow friendly communication; i.e. the users may have their own communication (option).
- IRJ-HYBRID achieved in several demonstrations (e.g. NATO trials) the largest jamming distances com-pared to any other system on the market.

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TECHNOLOGY DESCRIPTION

The latest development, the FPGA and DDS based technology was enhanced by the integration of DSP chips. This combination of different chips / technologies achieves highest capability in creation of adaptive jamming signal generation, resulting in highest jamming performances. Each DSP chip connected to a DDS chip is re-sponsible for the modulation whereas the DDS chip's res-ponsibility is the generation of the RF jamming signal. The separation of the tasks (RF signal generation and modulation) through the combination of DDS and DSP chips offers increased capacities and results in highest performance with respect to the achieved jamming signal.

- The DSP chip is fully programmable by individual software.
- The DSP chip allows applying and storing any kind of modulation (any waveform, sound, noise, speech, code sequences as well DTMF codes etc).

Especially the feature to transmit DTMF codes is an important issue in order to disable efficiently the remote controlling of bomb ignitions through DTMF codes. Our generated DTMF codes may be transmitted at large distances disturbing the adversarial radios effi ciently.

CONTROL MODULE

Standard confi guration: 4 FPGA chips / 24 DDS chips / 24 DSP chips

PROGRAMMING FEATURES

- Frequency band (Start / Stop)
- Individual allocation of power for each bandwidth
- Speed of sweeping (raising and falling carrier)
- Carrier step size (raising and falling carrier)
- Modulation: user specifi c modulation. User may apply any kind of modulation / signal, any sound or noise, speech, code sequences as well DTMF codes may be transmitted. User may design / create by software any form of modulation.

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TECHNICAL SPECIFICATIONS

- Frequency range: 10 MHz – 6 GHz, optionally up to 18 GHz
- Jamming modus: Sweeping, Sweeping Over Sweeping™, Hopping, Barrage, Spot
- Modulation:
- User specifi c modulation: User may design modulation by software and integrate any individual modulation, DTMF codes
- Dynamic Jamming through RF Detection capability (option)
- Programming interface: USB
- Command of system:
- Remote Control
- Switches on Control Module / Amplifi er Modules
- Jamming program creation by software. Upload by PC Laptop / Tough-book
- Programming Possibilities:
- Frequency bandwidth
- Individual allocation of power for each bandwidth
- Speed of sweeping carrier
- Carrier step size
- Automatic setting of stored settings in relation to GPS coordinates (option)
- Self-Protection of the system in case of any malfunction
- System impedance: 50 Ohm
- HF-connections: N socket backside
- Power supply: 24 VDC
- Operation temperature: -20°C to +85°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

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AMPLIFIER MODULES

Following amplifier configuration is recommended. The Continuous Jamming part represents the amplifiers jamming continuously, whereas the Reactive Jamming part stays on stand-by and gets activated in case of an adversarial signal detection

FREQUENCY	CONTINOUS	REACTIVE
VHF 10-174 MHz	200 W	100 W
VHF 174-300 MHz	200 W	100 W
UHF 300-520 MHz	200 W	100 W
GSM 900	100 W	
GSM 1800	100 W	
UMTS	100 W	
500-2500 MHz	100 W	
2500-6000 MHz	30 W	
6-18 GHz	6 W	
TOTAL	1030 W	300 W
TOTAL OUTPUT POWER	1336 W	

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

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AMPLIFIER MODULES - SPECIFICATIONS

SPECIFICATION TYPE	VALUES
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.
Lead VSWR	2.0:1 max. without damage
Cooling	Forced air
Power supply	24 VDC, 19-30 A / amolifier module
Operation Temperature	-20°C to+80°C
Storage temperature	-55°C to +120°C
Weight	<15 kg
Dimentions	Height 9cm x Width 48 cm x Depth 40 cm
HF-connections	N socket backside
Conformity	EN, CE and ETSI
Standards	NATO, Mil Standards
Transport method	514-4 of MIL-STD-810 E Procedure I, Figures 514.4-1, 514.4-2, 514.4-3

Jamming System with 1 Control Module and 3 Amplifi er Modules (partial confi guration)

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REMOTE CONTROL

The remote control allows the operator to switch between 3 (optionally 6) stored jamming programs. This allows selecting the jamming confi guration 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.

Jamming System with 1 Control Module and 3 Amplifi er Modules (partial confi guration)

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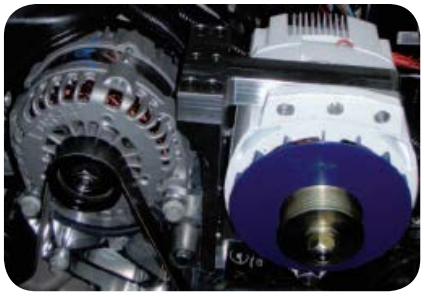
POWER SUPPLY

A second alternator supplies the energy for the jamming system. As soon as the engine is running, the 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 separation of the electric circuit (charging & power supplying) is important to reach highest stability of the power supply system 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 aluminum block with a special auto-motive design allowing a fi xation 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



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 control station controlling permanently:

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

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

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POWER SUPPLY

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

MIL-Standard power supply connectors

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ANTENNA SYSTEM

Antenna System consists of mainly omni-directional antennas. For the cellular phone bands are recommended in addition high gain directional antennas to cut the GSM base station contact in advance during fast driving.

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

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

Antenna diagrams available on request.

RECOMENDED CONFIGURATION

ANTENNA	FREQUENCY	DESCRIPTION
Antenna 1/2	2x VHF 10-174 MHz	Route-antenna, omni, -7dBi to 1 dBi
Antenna 3/4	2x VHF 100-300 MHz	Stab-antenna, omni, 0 dBi (±2dB) typical
Antenna 5/6	2x UHF 300-520 MHz	Stab-antenna, omni, 0 dBi (±2dB) typical
Antenna 7	GSM 900	Stab-antenna, omni, 5 dBi ± 0.5dB
Antenna 8	GSM 900	Patch-antenna, directional, 8 dBi ± 0.5dB
Antenna 9	GSM 1800	Stab-antenna, omni, 6 dBi ± 0.5dB
Antenna 10	GSM 1800	Patch-antenna, directional, 8 dBi ± 0.5dB
Antenna 11	UMTS	Stab-antenna, omni, 5 dBi typical ± 0.5dB
Antenna 12	UMTS	Patch-antenna, directional, 8 dBi ± 0.5dB
Antenna 13	500-2500 MHz:	Cylinder, omni, -1dBi to 3 dBi
Antenna 14	2500-6000 MHz	Cylinder-antenna, omni, 2dBi to 6 dBi
Antenna 15	6000-18000 MHz	Cylinder-antenna, omni, 2dBi to 6 dBi

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ANTENNA SYSTEM

10-140 MHz

GSM 900

GSM 1800

UMTS

100-300 MHz

300-520 MHz

500-3000 MHz

2000-6000 MHz /
6-18 GHz

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RF SHEILDING

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 we developed procedures to shield cars effi ciently, reaching fi nal 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 effi ciency of the fi nal 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 turning platform

Measurement Radome - exterior view

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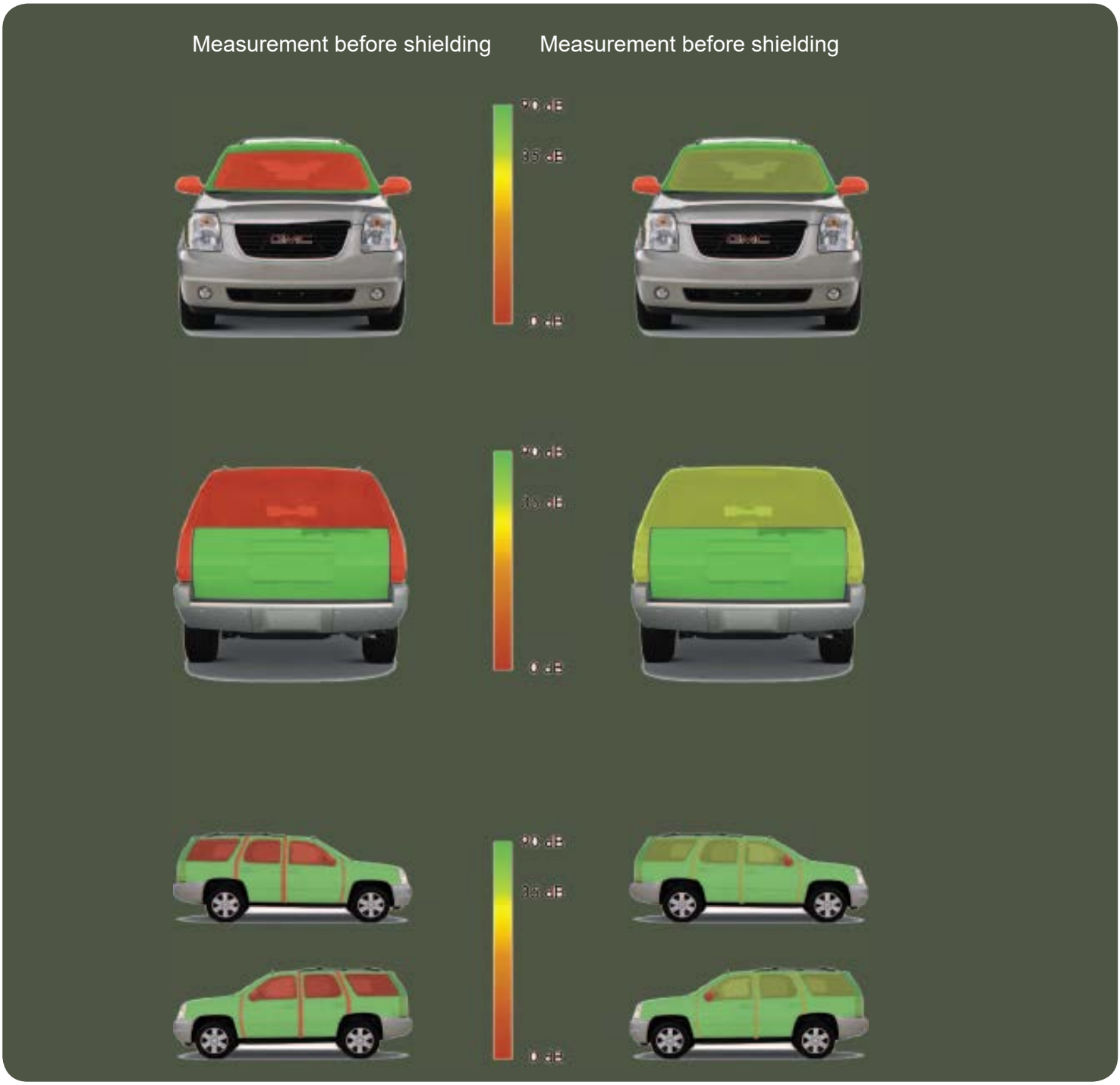
RF SHIELDING ATTENUATION LEVELS BEFORE AND AFTER RF SHIELDING



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