

INTELLIGENCE, CYBER & ELECTRONIC WARFARE SYSTEMS



MISSION-CRITICAL INTELLIGENCE WHEN IT'S NEEDED

In a dynamic world of rapidly changing technologies, capabilities, and threats, throughout the electromagnetic environment and in cyberspace, it is critical that governments and military surpass the pace of threats. Electronic Warfare (EW) solutions must provide disruptive capabilities while also delivering best value products, and responsive service. Because no one wants a fair fight.

Electronic warfare is the process of using the electromagnetic spectrum that surrounds us to our advantage, and limiting its availability to adversaries. At a high level, electronic warfare can be divided into three major areas: electronic attack (EA), electronic protection (EP), and electronic support (ES).

Leonardo DRS solutions include provisions for signals intelligence (SIGINT) and cyber operations. These capabilities defend

our military's networks and information systems while exploiting our adversaries' communications through intelligence gathering, analysis, and dissemination, ensuring the right information flows to the commanders who need it, when they need it.

Our portfolio of hardware and software capabilities provide signal recognition, detection, identification, and geolocation in order to detect, exploit, and attack. Our hardware is aligned with the warfighter's requirements for low size, weight and power (SWaP) without sacrificing high performance. The low SWaP form factors allow for multi-function EW (MFEW) capabilities where the equipment can be integrated into cross-domain platforms.

BLACKSTONE BODY-WORN DF/TDOA SYSTEM



DIRECTION FINDING AND GEOLOCATION SYSTEM

The Blackstone Body-Worn DF/TDOA System provides mission-critical intelligence to the warfighter by rapidly detecting and locating a wide range of threat signals, monitoring signals of interest, and supporting real-time analysis of the signal environment. The system's light weight, low power consumption, field programmability, and multiple deployment configurations make it well suited for a wide range of operational scenarios. This DF sensor can easily be easily integrated into existing MOLLE/PALS webbing chest rigs and with a tactical radio for internode and squad communications.

The Blackstone System utilizes ruggedized Smartphone Technology for configuration, command and control of the system. It also displays parameters of intercepted signals and the positions of team members overlaid on a geo-referenced map, which provides situational awareness.



BLACKSTONE BODY-WORN DF/TDOA SYSTEM

FEATURES

- Collapsible small form-factor DF antenna
- Employs a low-SWAP dual-channel 6 MHz SI-8649A Picoceptor™ in a ruggedized chassis designed to meet MIL-STD-810G specifications
- Picoceptor™ software load supports high-speed scanning, monitoring, and geo-location of narrowband signals in the 2-3000 MHz band
- Supports single- or multi-node operations
 - Utilizes tactical radio for communications infrastructure
 - Smartphone, chest-mounted or worn on forearm, features Android-based GUI
 - Flexible targeting control
 - Mapping of DF/TDOA and team node positions
 - Collaborative DF
 - Audio/Visual Target Alerts
- Supports the following external interfaces:
 - Telescoping small factor DF antenna assembly
 - Tactical radio (not supplied)
 - Scorpion H2 Android controller
 - 5590/2590 Battery connector
 - External SAASM GPS (not supplied)
- Mission-based system log files
- Single octopus cable connects all system elements

SYSTEM CAPABILITIES

PARAMETER	SPECIFICATION
Frequency Range	
DF (full specification)	100-1000 MHz
DF (reduced specification)	20-100 MHz; 1000-2000 MHz
TDOA (optional)	2-3000 MHz
Frequency Resolution	1 Hz
DF Accuracy	8 degrees RMS maximum
Modulation Types	AM, Narrowband FM, Wideband FM, USB, LSB, CW
DF of Frequency Hoppers	Yes, < 50/sec
Instantaneous IF Bandwidth	6 MHz
Tuning Speed	< 500 microseconds
Number of Channels	Two
I/O	1 USB HS port (host or device)
Optional I/O	RS-232, 1 pps input, 2nd USB
Data Output frequency	Scan (up/down reports), DF (w/ standard deviation), and audio logs in XML format)
GPS input	Internal or Optional External
Internal Storage	Up to 48 GB
Time Stamp	Yes
Overall Weight	13.8 lbs.



BLACKSTONE

Vehicle Mount Kit



GEOLLOCATION SENSOR

The Blackstone Vehicle Mount Kit (VMK) extends the utility of the Blackstone sensor into stationary mast and moving vehicle applications. The sensor and direction finding (DF) antenna head are repurposed from their on-the-march configuration to the VMK configuration in less than five minutes.

The Blackstone unit is a manpack ISR sensor used for HF/VHF/UHF signal detection, monitoring, direction finding, time tagging, and geo-locating. Vehicle mounting with the VMK improves the HF DF performance while extending mobility and field of view depending upon deployment.

The VMK is available at a technology readiness level 8 (TRL8) for evaluation in relevant environments including use in field exercises, environmental and end-user operational testing. Each VMK is supplied with a RedRock GUI license.



BLACKSTONE VEHICLE MOUNT KIT

HIGHLIGHTS

- Extends the utility of the Blackstone system beyond the on-the-march configuration
- Installs on stationary masts or moving vehicles of opportunity including maritime vehicles
- Ethernet and power through commonly available Power over Ethernet (POE)
- Laptop user interface with extended Blackstone interface including statistical geo-location
- Up to 50' remote power/control
- Installs in under 5 minutes with gloved hands
- Locking/ Captive thumb screws
- Thermal considerations for direct sunlight
- Package resistant to sand, dust, water intrusion

SPECIFICATIONS

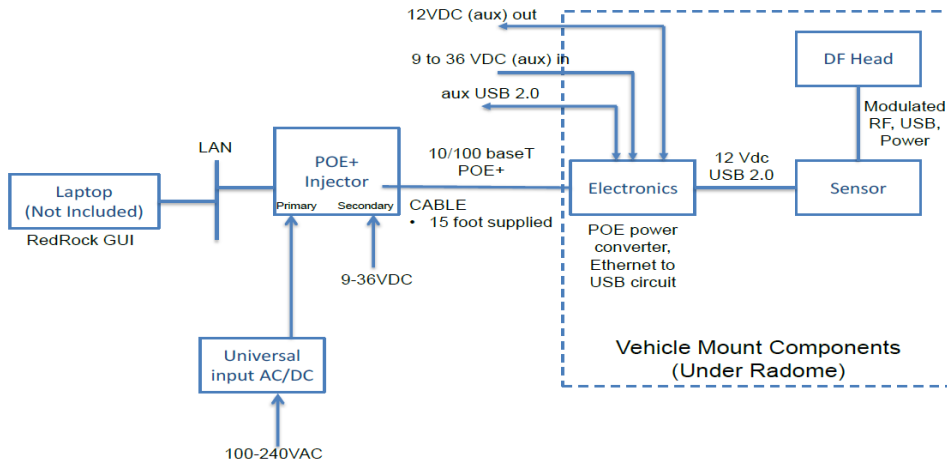
- Standard Blackstone performance
- Laptop user interface on remote LAN
- Improved HF DF performance
- Sensor installs to VMK in under 5 minutes
- Sensor attach w/ latching thumb screws
- 15 foot POE cable supplied
- 50 foot max remote Ethernet interface
- Rugged POE+ power injector
- Power injector supports 9 to 36VDC
- Auxiliary USB 2.0 host cable
- Commercial rugged environments
- 4 bolt interface to custom vehicle fixtures

ORDERING INFORMATION

PART NUMBER	DESCRIPTION
AD10-20170-01-01	Rugged Sensor Vehicle Mounting Kit (VMK) without Laptop, Active POE Option
AD10-20170-02-01	Rugged Sensor Vehicle Mounting Kit (VMK) with Laptop, Active POE Option

RADOME SPECIFICATIONS

- Quarter turn captive fasteners for quick install and removal
- Protects cables and electronics from direct sunlight and forest canopy
- Ventilation top and bottom for cooling
- VMK Height with radome of 15.5 inches



The Blackstone sensor and direction finding (DF) antenna head are easily repurposed from their soldier-worn configuration to a vehicle configuration in less than five minutes.

PITBULL™

MULTI-FUNCTION SENSOR



ENABLE COVERT MISSIONS FOR VIRTUALLY ANY COMMERCIAL MOBILE PROTOCOL

Pitbull is a compact, multi-functional, dual agile transceiver sensor capable of monitoring and locating multiple advanced signal emitters. The sensor can be used stand-alone or networked with other sensors to accomplish its programmed mission objective. Each controller attached to a sensor in a network can control and monitor both local and remote sensors in that network.

Pitbull includes many unique features that enable covert missions for virtually any commercial mobile protocol. Evaluation applications are available for conventional ISR, CDMA2000 emitter single or multi-sensor geolocation, LTE release 8/9 user equipment positive ID and LTE release 8/9 femtocell operation.

Pitbull is available at a technology readiness level 6 (TRL6) ready for evaluation in relevant environments including use in field exercises, environmental and end user operational testing.

KEY BENEFITS

- Small size and weight is easily transported in a backpack without detection
- Intuitive Android interface enables a large number of multi-protocol applications
- Infrastructure and mobile modes for software configurable active and survey applications
- Processing power to accommodate complex modern waveforms including LTE
- Operates from a wide range of DC power, from standard vehicle, aircraft or battery
- Integrated wireless comms for easy and concealable networking

KEY FEATURES

- 70 MHz to 6 GHz dual agile transceivers
- Thirty bands of advanced signal duplexers
- Concealed wideband diversity antennas
- Low SWaP - similar to a ream of paper
- Conduction cooled with optional convection
- Designed for IP67 water and dust protection
- Low power extended battery life operation

PITBULL MULTI-FUNCTION SENSOR

DUAL RECEIVER SPECIFICATION

2 independent or 2 coherent receivers
Frequency range: 70 MHz to 6 GHz
Instantaneous bandwidth (per receiver): up to 56 MHz
Noise figure, receive only: 6 dB
Noise figure, transmit/receive: 12 dB
Instantaneous dynamic range: 66 dB
Gain control dynamic range: 130 dB
Max RF input without damage: 30 dBm
Max RF input: 2 dBm
Loopback calibration and self test

DUAL TRANSMITTER SPECIFICATION

2 independent or 2 coherent receivers
FDD and TDD operation
Software selected internal FDD Tx filters: 60 bands
Power output per transmitter: 22 dBm
Software or hardware disable

ANTENNA CONFIGURATIONS (PER RADIO)

Dual internal receive diversity: 700 MHz to 6 GHz
Dual internal transmit diversity: 700 MHz to 6 GHz
Dual software selected external transmit
Single selectable external transmit
Internal wideband cellular antenna
Internal WiFi and Bluetooth antenna
Internal or external active GPS antenna: 1575 MHz RHCP

PHYSICAL SPECIFICATION

Size: 8.5" H x 11" W x 2.5" L
Weight: 8 lbs.
DC power interface: 9 to 36 Vdc
Internal battery: 48 watt-hrs
Power consumption, standby: 5 watts
Power consumption, dual receive: 20 watts
Power consumption, dual transceiver: 40 watts
Interface for external 2590/5590 battery: 110 watt-hrs
Conduction cooled, aux fans for convection cooling as required
Temperate range, ambient: -20° to 40°C
Intrusion (IP rating) design spec: IP67
MIL-STD design spec-vehicle and ground force operation

ACTIVE AND PASSIVE CONFIGURATION

Operable as infrastructure (eNodeB) or user equipment (UE)
GSM, CDMA2K, EVDO, WCDMA/UMTS, LTE R8/9, WLAN, et. al.

PROCESSING CAPABILITIES

FPGA-Xilinx Zynq 7045 w/dual core ARM A9 processors
GPP-Freescale i.MX6 quad A9 running at 1200 MHz (Linux)
DSP-TI Appleton quad 66x w/accelerators and ARM A8

COMMUNICATIONS

M2M 2G/3G/4G cellular, selectable bands
WiFi 802.11 a/b/c at 2.4 GHz and 5.4 GHz
2x USB 2.0, 1 host and 1 OTG
100BaseT Ethernet
152A radio interface
Operation as handset or infrastructure, software selectable
Optional CPRI for remote amplifiers

SENSOR REFERENCE

Timing accuracy, GPS disciplined: 15 nsec
Location accuracy: 2.5 meter
Orientation accuracy, 3 axis: ± 1 degree RMS

PLATFORM UTILITIES

Android user interface, handheld or tablet configuration
Transmit waveforms either radio
Receive and display via either radio
General DF utility
CDMA GPS referenced TOA utility
Wireless comms self-test

CDMA2000 APPLICATION (OPTIONAL)

DF using external four element array: ± 3 degrees RMS
TOA referenced to GPS: ± 15 nsec
Multipath time and angle discernment: up to 10 paths
Geolocation and ground based moving target tracking

LTE R8/9 APPLICATIONS (OPTIONAL)

LTE femtocell, 2 km range, 30 user capacity
UE identity authentication
LTE (FDD) bands 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 19, 20, 25

RIDGEBACK

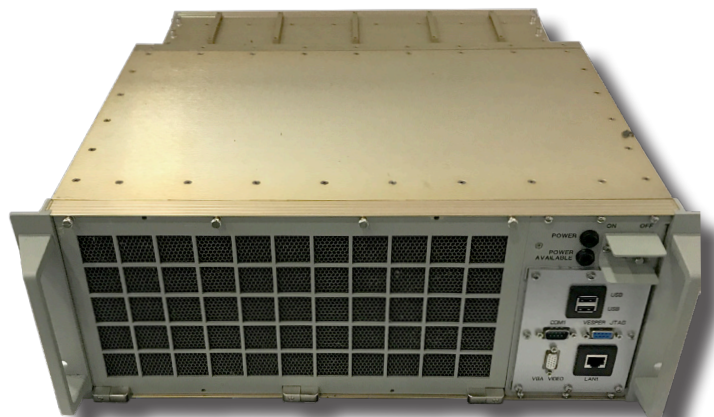
ELECTRONIC WARFARE SYSTEM

A WIDEBAND EW SYSTEM WITH COMMUNICATIONS INTELLIGENCE, GEOLOCATION AND ELECTRONIC ATTACK

The Leonardo DRS Ridgeback System is the top performing EW System in the industry today. Featuring a fully-digital signal processing path with up to 18 wideband channels, each with an extremely wide instantaneous bandwidth. The communications intelligence (COMINT) system provides ultra-fast scanning, signal detection, interception, direction finding (DF), collection, geolocation, measurement, analysis, signal recognition and the identification of conventional, modern, and agile signals.

This robust system offers performance that features a wideband intercept capability with simultaneous DF measurement. It utilizes Leonardo DRS' Vesper transceivers with an instantaneous bandwidth of 100 MHz to scan all or part of the 20 MHz to 6 GHz band at up to 20 GHz per second.

Along with the wideband DF, the system includes monitor channels with DDC narrowband capability. In addition, with the full monitor option, the system can have up to 48 DDCs (6 per each within the 8 independently tunable 100 MHz instantaneous bandwidth) each with selectable bandwidth filters. The DDCs include independently selectable IF bandwidth and streaming I/Q in VITA-49 format.



 **LEONARDO DRS**

RIDGEBACK ELECTRONIC WARFARE SYSTEM

HIGHLIGHTS

- Provides super high-speed wideband scanning with simultaneous DF, band channelization, signal acquisition, and recognition capabilities combined with a wideband recording interface.
- Optimized performance utilizing field-programmable gate arrays (FPGAs), NVIDIA graphic processing units (GPUs) and CUDA code processing.
- Operating modes include wideband scanning with DF, narrowband signal analysis and DF, multi-view hop plot, polar plot for situational awareness, geolocation using multiple sites, signal analysis, plus built in test (BIT).
- Precision DF using Leonardo DRS's proprietary correlative interferometry algorithm.
- Co-channel DF capability resolves lines of bearing to multiple frequency coincident interferers.
- Optimized relational database storage to an external recording device through a wideband digital interface.
- Seamlessly integrates with the Leonardo DRS EW Battalion System Software.

PERFORMANCE SPECIFICATIONS

DIRECTION FINDING	
Frequency Range DF	20 MHz to 6,000 MHz (Optional 2 MHz)
Tuner Channels	5 or 6 (Array Dependent, 5 ch std)
Instantaneous Bandwidth	100 MHz
Scan Rate	10 GHz/sec, 20 GHz/sec option available (over full frequency range @ 31.25 kHz channel resolution)
Available Channel Resolutions	500 kHz, 250 kHz, 125 kHz, 62.5 kHz, 31.25 kHz, 15.62 kHz, 7.81 kHz, 3.9 kHz
System DF Accuracy	<2 degrees RMS typical (platform, DF Array, and environment dependent)
System Sensitivity DF	-114 dBm minimum (in 3.9 kHz BW)
Techniques	Correlative interferometry, MUSIC co-channel processing
Frequency Agile Detection	500 Hops per second, standard
Minimum Signal Duration	1 ms
Instantaneous Dynamic Range	65 dB, two-tone method, 75 dB single-tone method (3.9 kHz bandwidth)

MONITORING	
Number of Digital Drop Receivers	6 DDCs per tuner typical 8 tuners DF/MON, 48 DDCs
DDC Selectable Bandwidths	3.3 kHz to 6 MHz DDC stream selection Up to 6 DDCs per tuner available 10 GigE Interface
DDC Output Format	VITA-49
Signal Recognition Interface	100+ modulation types and trainable knowledge base

EXCITER	
Center-tuned range	20 MHz to 6.0 GHz
Input	Various waveforms
IBW	100 MHz
Tuning Speed	100 microseconds
Output power	0 dBm

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