

Kestrel TSCM ® Professional Software



Intuitively Balanced TSCM Focused
Artificial Intelligence and Human
Intellect Support for a Standards-Based
Total Energy Capture (TEC) TM
Dimensional Geo-Location Heat Mapping
of the Complex Radio-Frequency (RF),
Power Line (PL) and Photonic (Optical)
Spectrum Environment

*Innovation is Simply the
Beginning for the Modern
Spectrum Warrior...*

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(Exclusive USA Distribution Partner)



Advancing the Art and Science of Technical Security

The competition tells its potential customers that the problem with the Kestrel TSCM ® Professional Software, is that it captures too many signals — Inexplicably Ironical!

Honestly, We Deliberately Made it Better...

Kestrel ® is a highly evolved TSCM | SIGINT | ELINT specific, operator centric SDR application, and we make no apologies for the advanced capability of this industry disruptive, standards-based capability, meeting new and evolving challenges of technical operators, working within the private sector, corporate sector, regulatory authority, law-enforcement, government, military, special forces, and the national security apparatus, who are faced with a modern moving target threat model, in combating the insidious and growing threat of cyber-espionage, international terrorism, and the devastating financial damage and lost business opportunities caused by state-sponsored espionage.

The Kestrel TSCM ® Professional Software is not a simplistic desktop spectrum analyzer, offering limited capability, but rather, a highly deployable, mission scalable, travel friendly, full featured TSCM focused product for professionals.

Kestrel TSCM ® Professional Software engages and brings the professional technical operator back into the equation with innovative, and many advanced never before seen, standard included, and optional features and functionality.

Kestrel TSCM ® is mission adaptable, scalable, upgradable, and well-positioned to generate the opportunity for new and recurring revenue streams, while exponentially improving real-world Probability of Intercept (POI) and Probability of Detection (POD) for the end-user, by embracing a modern moving target threat model, as defined under the TSB 2000 (Technical) Standard TM.

The technical operator; not the equipment manufacturers are now defining and redefining field deployment capability and the modern SDR resources that are decidedly founded on an entirely new professional service methodology!

It is the experience and real-world needs of professional technical operators like you that continue to drive the success and the future of the Kestrel TSCM ® Professional Software from a new innovation and development prospective.

Perhaps your innovative Software Defined Radio (SDR) idea or feature will be added to the next official release of the Kestrel TSCM ® Professional Software!

Paul D Turner, TSS TSI (PDTG)

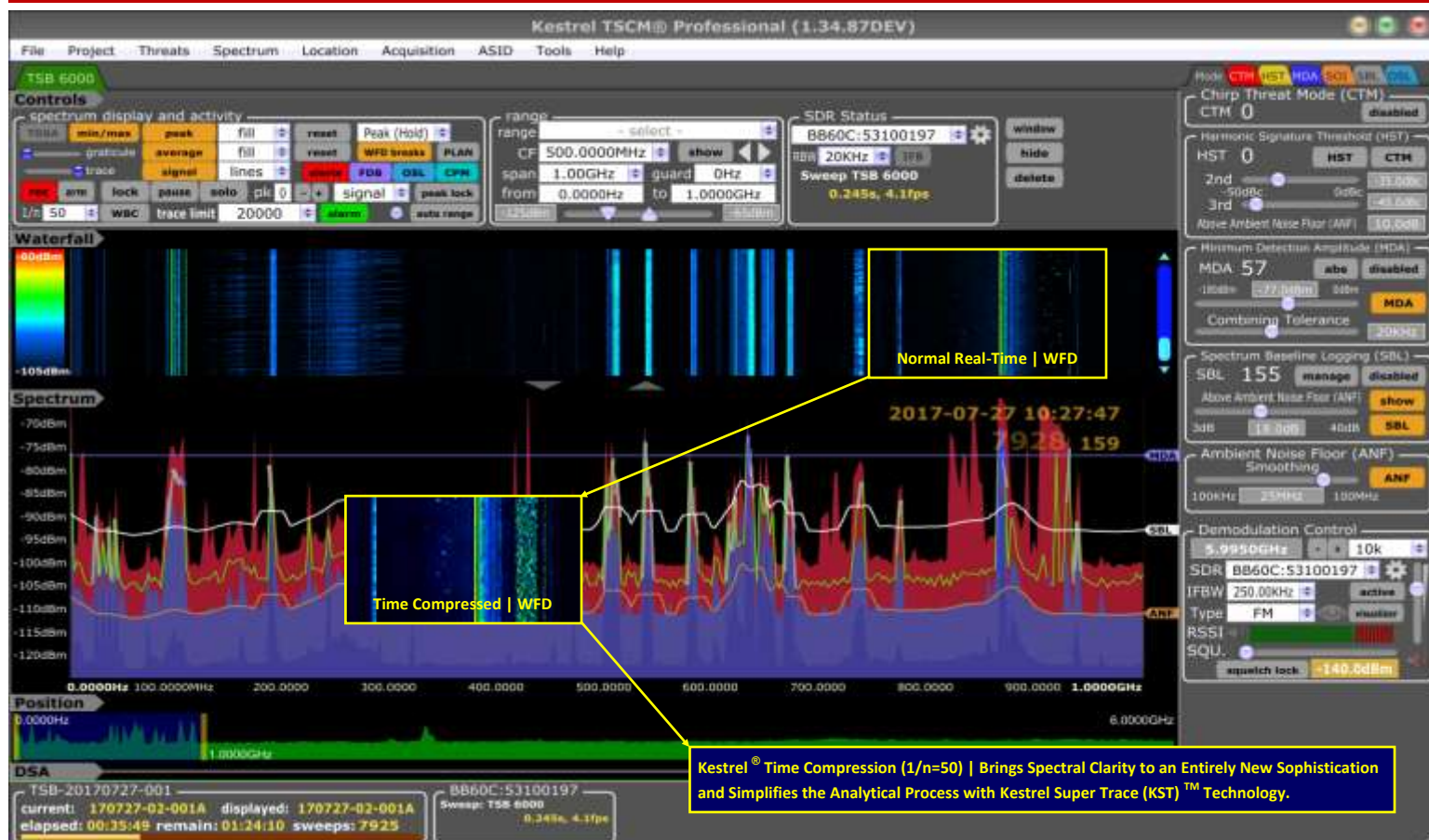


End-User Expectations — Delivered!

The Kestrel TSCM ® Professional Software delivers exceptional value, without the need to compromise on features and functionality. Kestrel ® is the product of years of operational field experience in delivering real-world defensive Technical Surveillance Countermeasures (TSCM) at all operational threat levels. The unique approach to developing, not only the most technologically advanced TSCM software available, while changing a complacent and outdated deployment methodology has revolutionized the technical security industry worldwide. The Kestrel TSCM ® Professional Software is always considered a work in progress, with room for improvement and the software engineering, and Technical Research and Standards Group (TRSG) TM, continue to work on entirely new, modern, operator centric, features and functionality. We encourage you to join the Kestrel ® revolution, and compare the many benefits of making the Kestrel TSCM ® Professional Software part of your primary deployment kit. ✈

If you would like additional information about Kestrel ®, or have technical questions, please email lm1@comsecllc.com for information.

Kestrel TSCM® Professional Software | Innovation is Simply the Beginning



Kestrel TSCM® Professional Software

Signals Intelligence Support System (SISS)™

The Kestrel TSCM® Professional Software leverages advanced Software Defined Radio (SDR) concepts to deliver proven, industry leading, standalone RF Remote Spectrum Surveillance and Monitoring (RSSM)™, collection and analysis functionality. Work-flow oriented features tailored to professional TSCM applications are integrated into an intuitive operator centric user interface and contributes to a high standard of usability. With its extensive functionality the Kestrel TSCM® Professional Software is the ultimate future-proof Radio-Frequency (RF) sensing solution for a wide range of applications. PDTG's Technical Research and Standards Group (TRSG)™ continues to develop unique innovative products and new deployment methods. The Kestrel® software is developed in Canada and supports a wide range and level of professional receivers and spectrum analyzers, and is available to technical security professionals in the USA, North & South America from ComSec LLC. ✓

User Interface (UI)

Kestrel's ergonomic user-interface promotes operator situational awareness by grouping and dynamically linking essential control elements in combination with intelligent automation.

RF Spectrum Display (RSD)

Multiple tabbed spectrum windows permit any number of frequency Ranges of Interest (ROI), or band allocations to be captured in parallel.

Waterfall Display (WFD)

The Waterfall Display (WFD) in combination with automatic spectra recording capability, enables historical signal events to be reviewed with the Positional Zoom and Zoom-to-Peak features.

Live View Analysis (LVA)™

Real-time analysis of continuous and periodic signal events, is supported without the need to interrupt the runtime data collection process.

Artificial Intelligence (AI)

The Threat Detection Algorithm (TDA), and Signal Combining Technology (SCT)™ detects and characterizes, wide bandwidth signals.

Spectrum Baseline Logging (SBL)™

The operator can quickly capture a baseline peak trace reference, and corresponding signal list.

Automatic Export Control (AEC)™

AEC provides programmable CSV exports and adds triggered IQ recording capability.

Dynamic Alert Annunciator (DAA)™

The DAA™ feature provides unlimited user defined independent alert trigger zones.

Kestrel® Demodulation and Visualization

Demodulate and record AM, FM and SSB audio, FT displays include the RF Spectrum, Spectral Density, IQ Diagram, IQ Vs Time, RSSI History, Analog RSSI, Audio Oscilloscope, AF Spectrum and NTSC Video decoding and visualization.

Threat Detection Algorithm (TDA)

Detection modes include, Minimum Detection Amplitude (MDA)™, Harmonic Signature Threshold (HST)™, and an analog audio transmitter Chirp Threat Mode (CTM)™.

Location Differential Signal Analysis (LDSA)™

A graphical LDSA™ model permits the import of floor plans, vertical risers, geographical maps, 3D rendering and photographs for direct comparative analysis of all collected data.

Time Differential Signal Analysis (TDSA)™

The TDSA™ feature provides the capability to generate operator defined DSA™ traces, based on runtime or post review, of operator defined time blocks, for direct time period comparative analysis filtering.

Session Report Generator (SRG)™

Kestrel's integrated report generator, and project management structure, provides unprecedented sophistication in reporting your findings.

Advanced Report Generator (ARG)™

The ARG™ is the comprehensive standards based report management resource that allows all aspects of the mission or assignment to be combined into a single automatically structured and professionally formatted report document.

User Interface (UI)

An intuitive, user-friendly, work-flow based, operator centric user-interface, places all essential, commonly used display and control groups up-front. Dynamic control linking, the use of Artificial Intelligence (AI) and predictive logic, optimize settings that remain under the full control of the operator during collection, review and analysis. ✎

Spectrum Display Activity | Control Group

The operator can setup, navigate, view and analyze, multiple instances of independent spectrum and waterfall data sets, in a familiar tabbed window format. Various global and independent preferences are supported, improving operator situational awareness. ✎

Automatic Threat List (ATL)™

Two primary levels of threat list integration and generation, work intuitively to provide advanced dynamic Positional Zoom Control (PZC)™, and discrete signal demodulation ability. The sidebar ATL provides immediate access to discrete signal events captured, and displays the frequency (MHz) and signal level (dBm). The Master ATL™ provides additional signal parameters including identified harmonic relationships, frequency (MHz), signal level (dBm), estimated bandwidth, date and time of collection and location details. The operator can add “identity” and “notes” relating to discrete signal events. Signals are placed on a uniquely color coded tabbed window, and duplicated on the Master ATL™ automatically. The “Drag and Drop” technology allows any detected signal to be demodulated, or dropped onto the spectrum display, to immediately invoke a 20x zoom focus on the Signal of Interest (SOI). The operator can enter a high resolution zoom up to 200x manually using the mouse. ✎

Live View Analysis (LVA)™

Real-time analysis of discrete spectral events is supported without the need to interrupt the runtime collection process, giving the operator the ability to instantly review historical trace data (on a trace by trace basis), directly on the RSD and WFD display, during runtime, or during off-line post event analysis and review, when working with a historical Kestrel Project File (KPF)™. ✎

ID	Harm	Frequency	Level	BW	Detected	Location	Identity	Notes
59	F	1.7384GHz	-87.0dBm	131KHz	2017-04-02 09:28:30	170402-01-001A	Audio TSD	Active Device H2
49	F	869.1934MHz	-84.1dBm	300KHz	2017-04-02 09:18:31	170402-01-001A	Audio TSD	Active Device
48	F	982.4888MHz	-75.1dBm	5MHz	2017-04-02 09:17:46	170402-01-001A	3G GSM DL	PICO CEL
41	F	2.4187GHz	-86.0dBm	1500KHz	2017-04-02 09:17:19	170402-01-001A		
40	F	2.4186GHz	-73.7dBm	200KHz	2017-04-02 09:17:19	170402-01-001A		
39	F	2.4185GHz	-73.3dBm	200KHz	2017-04-02 09:17:19	170402-01-001A		
38	F	2.4184GHz	-75.0dBm	300KHz	2017-04-02 09:17:19	170402-01-001A		
37	F	2.4183GHz	-73.1dBm	700KHz	2017-04-02 09:17:19	170402-01-001A		
36	F	2.4182GHz	-71.1dBm	200KHz	2017-04-02 09:17:19	170402-01-001A		
35	F	2.4181GHz	-86.5dBm	300KHz	2017-04-02 09:17:19	170402-01-001A		
34	F	2.4180GHz	-73.3dBm	200KHz	2017-04-02 09:17:19	170402-01-001A		
33	F	2.4179GHz	-86.1dBm	300KHz	2017-04-02 09:17:19	170402-01-001A	WDS 2.4 GHz	Operator Ignored
32	F	2.4178GHz	-76.2dBm	200KHz	2017-04-02 09:17:19	170402-01-001A	WDS 2.4 GHz	Operator Ignored
31	F	2.4177GHz	-71.3dBm	800KHz	2017-04-02 09:17:19	170402-01-001A		
4	F	861.2905MHz	-86.3dBm	300KHz	2017-04-02 09:17:16	170402-01-001A		
3	F	862.4428MHz	-76.1dBm	300KHz	2017-04-02 09:17:16	170402-01-001A		
2	F	861.1189MHz	-73.3dBm	200KHz	2017-04-02 09:17:16	170402-01-001A		
1	F	14.0484KHz	-59.8dBm	10KHz	2017-04-02 09:17:16	170402-01-001A		

Threat 1

1

Type: SOI

Frequency: 1.9267GHz

Bandwidth: 1MHz

Amplitude: -48.6dBm

Modulation: GFSK

Chirp result: -

CTM hit rate: -

Harmonic: -

Noise Floor: 53.9dB ANF

Notes: Boardroom Microphone

Location: 161018-02-001A

Receiver: USER

Identity: DECT 6.0

Date/Time: 2017-04-14 12:37:32

Related: 1:SOI(F) 1.9267GHz

Threat 1

1

Type: SOI

Frequency: 1.7175GHz

Bandwidth: 14MHz

Amplitude: -49.5dBm

Modulation: unknown

Chirp result: -

CTM hit rate: -

Harmonic: -

Noise Floor: 52.9dB ANF

Notes: LTE Modem

Location: 170615-03-001A

Receiver: USER

Identity: LTE

Date/Time: 2017-07-02 12:35:19

Related: 1:SOI(F) 1.7175GHz

Name (click to configure)	Type	SN	FW	License	Port	Connected	Spectrum	Demodulate	Analysis
BB60C:53100197	BB60C	53100197	7	Indefinite	USB3	YES	YES	YES	YES
RS500:150223505	RS500	150223505	1.4.0	Indefinite	TCP/IP:169.254.177.13	YES	YES	YES	-
WSA5000-220:140315022	WSA5000-220	140315022	4.5.3	Indefinite	TCP/IP:192.168.0.109	YES	YES	YES	-
WSA5000-427:150223312	WSA5000-427	150223312	4.5.3	Indefinite	TCP/IP:169.254.134.333	YES	YES	YES	-

Automatic Receiver and Spectrum Analyzer Identification | Configuration

All supported and connected receivers and spectrum analyzers are automatically detected and initialized during the Kestrel® Application start-up process. User definable configuration settings enable spectrum (sweep), demodulation, and analysis (threat detection) functions to be independently programmed at the radio level when multiple radios are present. ✎

Kestrel® Super Trace (KST)™

Support for time compressed spectra and waterfall trace data, provide unsurpassed clarity within the analytical process. Time compression is an advanced feature that permits the operator to write a single KST™ consisting of the combined peak data captured from any number of standard traces. ✎

Kestrel TSCM® Professional Software | IF Broadband (IFB) Mode™

During traditional sweep operation, it is necessary to interrupt the runtime collection process to accommodate demodulation and signal analysis, for features such as the Automatic Export Control (AEC), and Triggered IQ recording capability. Kestrel's IFB™ mode, permits the maximum real-time receiver, or spectrum analyzer IF bandwidth, down to the discrete signal level to be captured, recorded, processed and analyzed in | IF | mode. The Kestrel® IFB™ feature operates in a modified zero span runtime demodulation mode. This permits, the ability to capture prevent buffering associated with the triggered IQ capability. The normal sweep mode must be stopped to accommodate demodulation, resulting in a short mode change delay of up to 220 mSec (BB60C), or about 17 mSec (SM200B). Prevent buffering is not available, without the IFB™ mode enabled. ✎

03 | Key Features

Multiple Receiver Operation (MRO)™

Single Receiver Operation (SRO)™, Dual Receiver Operation (DRO)™, and Multiple Receiver Operation (MRO)™, are all supported with “on-the-fly” dynamic (spectrum and demodulation) “hand-off” between any number and type, of supported SDR receivers and spectrum analyzers. ✈

Professional SDR Radio Hardware Support

Kestrel Support Profiles (KSP)™ are available for a wide range of entry level and professional search receivers and spectrum analyzers, for TSCM, SIGINT, and Remote Spectrum Surveillance and Monitoring (RSSM)™ requirements and applications. ✈

Multiple Spectral Windows

The ability of the operator to display, search and analyze any number of independent spectral range windows, is supported. Multiple independent search Ranges of Interest (ROI) can be accessed on a single monitor via a familiar tabbed window interface, or moved to a second, or third display monitor. The ability to select and view any portion of a currently displayed ROI, and open a new sub-band window, is supported. The Kestrel® SOLO priority mode, allows the technical operator to assign real-time priority to any single tabbed window, and immediately zoom on any discrete runtime Signal of Interest (SOI). ✈

Positional Zoom Control (PZC)™

The operator can utilize the mouse wheel to focus and direct the desired zoom level on the spectral display. The operator may also navigate within the Positional Zoom Control (PZC)™ window. A double mouse click activates a 20x and 100x zoom factor. A right mouse click allows the operator to select from a menu list of dynamic zoom options based on the current CF and ROI displayed. A mouse based 200x high resolution zoom capability is also supported. “Drag and Drop” from the Automatic Threat List (ATL) focuses the SOI at CF with a 20x zoom factor. The CF, SPAN, START and STOP frequency can be set manually from the navigational control group. See Horizontal Range Control (HRC)™ for further options. ✈



Time Differential | Signal Analysis (TDSA)™

TDSA™ allows the technical operator to deploy the software for extended periods of time, in a Remote Spectrum Surveillance and Monitoring (RSSM)™ role, and generate a series of fixed, operator defined time blocks, captured in real-time within a runtime environment (recommended), or applied as a post analytical analysis tool, for a detailed time based Differential Signal Analysis (DSA)™, across hours, days, weeks, or months of complex spectra, captured from a single collection location. TDSA™ is a very powerful capability designed as an adaptive time block, based filter that is under full control of the professional technical operator. During post analysis specific operator defined data and time block periods can be generated, permitting a narrow more focused analytical time review of the spectra and waterfall data. ✈

Global Positioning System (GPS) | Receiver Support

The Kestrel TSCM® Professional Software provides advanced support for USB based GPS receiver hardware, and permits the capture of the latitude and longitude coordinates for DSA antenna locations, in support of Geographical Area Reviews (GAR)™, RF Direction Finding, Search and Rescue (SAR) assignments, and wireless survey work. Geographical coordinates can also be entered manually when a GPS signal is not available, such as when working indoors, or underground. GPS coordinates are utilized for plotting FCC and IC frequency database reference mapping. ✈

Multiple Receiver “Hand-Off” Capability

Synchronized, dynamic “hand-off” is available across all supported search receivers and spectrum analyzer types, regardless of manufacturer, or connectivity method. Seamlessly “hand-off” both the spectrum and demodulation functions, to any connected receiver in real-time. Operator defined programming supports, independent sweep, demodulation, and analyze mode configuration, within the Analyzer Control dialog window. ✈

“Specifications Subject to Change Without Notice...”

Location Differential Signal Analysis (LDSA)™

LDSA™ can be utilized in several operational modes depending on deployment parameters. Static and Echo LDSA™ modes allow the operator to collect comparative traces from any number of target area locations and overlay the trace data. Unlike standard spectrum analyzer trace math, Kestrel® supports MDA™, CTM™ and HST™ spectral marker flag integration, adding an important analytical layer that enhances the Probability of Detection (POD), and ability to identify hostile signal events. ✎

Live View LDSA (LVD)™

LVD™ enables the operator to review specific antenna location, comparative traces without interrupting the collection of LDSA™ trace data in the background. It can be used during active LDSA™ trace collection, or during post event analysis. Full display functionality, including the Positional Zoom Control (PZC)™ and all display parameters are preserved. When LDSA™ Comparative and Peak ECHO Mode™ are both active, real-time Differential Signal Analysis (LDSA)™ is dynamically displayed. ✎

Trace Math Analysis (TMA)™

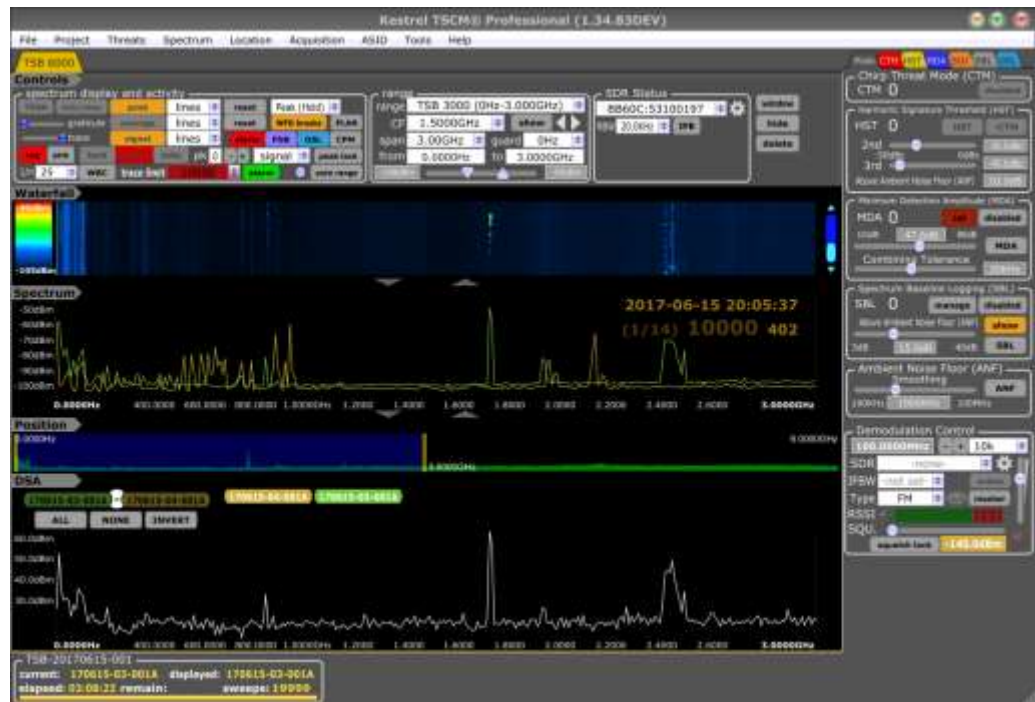
The ability of the technical operator to display a differential trace comparison for any two antenna locations, is supported. The DSA™ window supports (A - B) or (B - A) comparison modes for DSA™ antenna locations. The operator can “Drag and Drop” any two locations to the docking station to display a dedicated differential trace. ✎

Multiple Display Monitors

The operator can open and display, any number of independent spectral windows, across multiple receivers, and dynamically drag the windows to a separate display monitor, or view separate “hand-off” receivers on any available display monitor at, or above 1280 x 800. ✎

Comsec Kestrel Scout RF Locator Kits

The Kestrel TSCM® Professional Software can be provided in a convenient pre-configured kit, with laptop, SDR, antenna and backpack or rolling hard case. See <https://comsecllc.com/product/kestrel-scout-rf-locator/> ✎



Export | Operator Defined (CSV) Spectra

The ability to manually define and export Spectra data to | CSV | format is supported, based on operator defined parameters, including the | LOCATION |, | BAND |, | START / STOP TRACE INDEX |, and | START / STOP FREQUENCY |. Exported | CSV | files can be utilized in third-party productivity software to generate graphical representations of the original Spectra. ✎

Export | Runtime Triggered (CSV) Spectra and RSSI

Utilizing the Dynamic Alert Annunciator (DAA)™ both | SPECTRA | and | RSSI | values can be operator programmed to automatically export | CSV | values on the detection of | SIGNAL EXCEEDANCE | and / or | SIGNAL LOSS | events within the same alert zone. The Kestrel TSCM® Professional Software supports unlimited operator defined alert zones, which can be exported to | CSV | format and moved to another Kestrel® system, or imported into a new, or another existing historical Kestrel Project File (KPF)™. ✎

Automatic Export Control (AEC)™

The AEC™ module provides an important dimension for long-term, Remote spectrum Surveillance and Monitoring (RSSM)™ deployment, by automating the export process of | TIME PERIODIC | and | TRIGGERED | spectral events to | CSV | file format. The AEC™ capability also supports automatic | TRIGGERED IQ | export, across Single Receiver Operation (SRO)™, and Dual Receiver Operation (DRO)™ configurations. ✎

Command Line Programming (CLP)™

Kestrel's CLP™ module provides the ability to initiate triggered audio (sound) alerting across all existing detection modes. The ability to define system level actions, permits the use of additional external resources, including software programs, ECM command and control, IQ recorders and analyzers, and any number of hand-off and demodulation requirements. The ability to render operator defined network level alerts via email and SMS are fully supported. The CLP™ module is integrated with the Dynamic Alert Annunciator (DAA)™ and all other threat detection triggers. ✎



“Specifications Subject to Change Without Notice...”

TSCM | SIGINT Deployment Considerations

TSCM focused RF spectrum analysis requires innovative equipment resources, and perhaps more importantly, a comprehensive framework for applying the advanced procedures and deployment techniques needed, to meet a modern day, moving target threat model. ✈

Floor Plan (Import)

The ability to import | PNG |, | JPG |, or | GIF | images of the target area, or a facility floor plan, is supported in the Kestrel TSCM ® Professional Software. Differential Signal Analysis (DSA)™ is a feature, integrated with antenna location spectral data collection points, and is graphically represented on the imported floor plan utilizing Kestrel ® “Drag and Drop” technology. ✈

Vertical Riser Plot (Import)

Support for the import of vertical riser plots allow the operator to utilize the DSA™ functionality to capture and display collected spectrum data from multiple levels or floors of the target area, adding another dimension of comparative analysis. ✈

Geographical Area Map (Import)

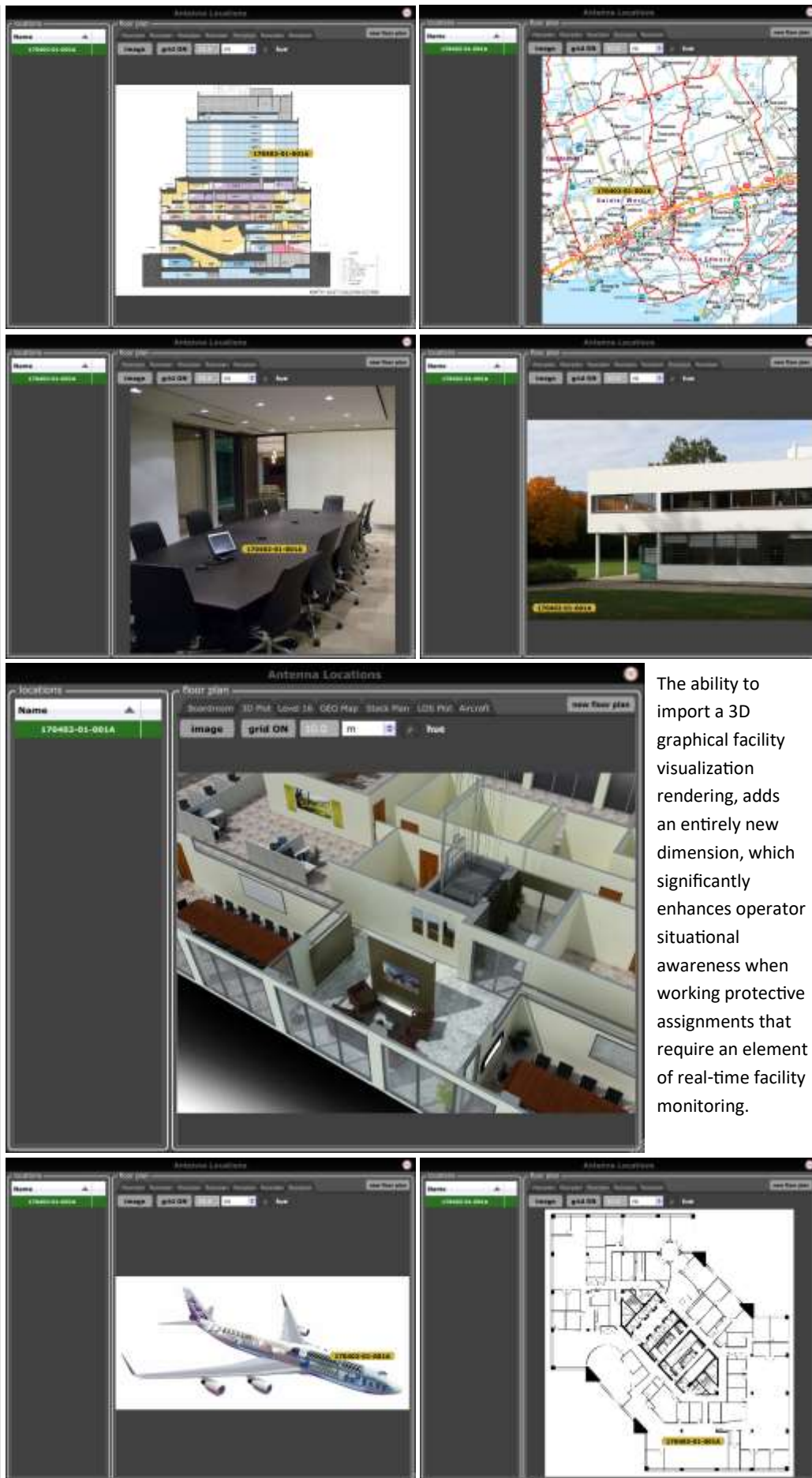
RF surveys and TSB 2000 (Technical) Standard™ based Geographical Area Reviews (GAR)™ are easily accomplished by importing any suitable map or chart, and deploying the DSA™ feature from a mobile collection platform such as a vehicle, aircraft or marine vessel. It is possible to deploy the software utilizing a series of fixed station, collection points, or even data from any number of non-related, co-located locations. ✈

Photo Realistic | Virtual Reality (Import)

The photo realistic virtual reality feature allows the operator to import actual target area, or facility level photographs, and overlay DSA™ antenna location data, directly on the image. This provides excellent situational awareness during Remote Spectrum Surveillance and Monitoring (RSSM)™ assignments. ✈

Import Historical Comparative Bands

The operator can import comparative spectrum trace data from any previously captured historical Kestrel Project File (KPF)™. ✈



The ability to import a 3D graphical facility visualization rendering, adds an entirely new dimension, which significantly enhances operator situational awareness when working protective assignments that require an element of real-time facility monitoring.

Award Winning | Industry Leading Software

The Kestrel TSCM ® Professional Software, is the first in its class to provide “on-the-fly” multiple receiver “hand-off” of the spectrum and demodulated signal events to all other supported and connected SDR search receivers and spectrum analyzers. ✎

Award Winning | Software Defined Radio (SDR) Design Excellence

The Kestrel TSCM ® Professional Software is the recipient of numerous awards including the CTSC 2013 and CTSC 2014 Software Defined Radio (SDR), Innovation, Research and Development Excellence award. The Kestrel TSCM ® Professional Software received the 2013 Glenn H. Whidden Award for the “Best New TSCM Product”, at the Espionage Research Institute International (ERII) Counterespionage Conference in Washington DC. ✎

Technical Operator Centric Design

Designed from the outset to support Multiple Receiver Operation (MRO) TM, the Kestrel TSCM ® Professional Software enables the operator to exploit the full potential of any number and combination of supported receivers and analyzers. Using independent tabbed windows, the operator can sweep any number of independent (active or standby) spectrum band allocations, or custom frequency Ranges of Interest (ROI), across any number of receivers. The ability of the operator to “hand-off” spectrum band allocations “on-the-fly”, facilitates uninterrupted dynamic “hand-off” to another connected device. The dynamic “hand-off”, dynamic synchronization, provides instantaneous connectivity, without data loss during the “hand-off” process. ✎

**Kestrel TSCM ® Professional Software | New Technology = New Terminology!**

New technology requires new terminology, and operators will soon become familiar with, and recognize, the level of sophisticated simplicity, workflow integration, and the wide ranging deployment benefits of the Automatic Threat List (ATL) TM, Positional Zoom Control (PZC) TM, Live View Analysis (LVA) TM, Live View LDSA TM, Location Differential Signal Analysis (LDSA) TM, Time Differential Signal Analysis (TDSA) TM, Receiver Differential Signal Analysis (RDSA) TM, Spectrum Baseline Logging (SBL) TM, Chirp Threat Mode (CTM) TM, Harmonic Signature Threshold (HST) TM, Minimum Detection Amplitude (MDA) TM, Signal Combining Technology (SCT) TM, Threat Detection Algorithm (TDA) TM, RF Spectrum Display (RSD), Waterfall Display (WFD), Dynamic Alert Annunciator (DAA) TM, Dimensional Geo-Location Heat Mapping, Harmonic Calculator Tool (HCT) TM, Image Capture Tool (ICT) TM, Differential Measurement Tool (DMT) TM, Demodulation, FFT Visualization, Spectra and RRSI export, Automatic Export Control (AEC) TM, Command Line Programming (CLP) TM, Autonomous Measurement and Collection System (AMCS) TM, IF Broadband (IFB) TM, Dynamic Spectrum Range (DSR) TM, RF Visualizer (RFV) TM, Operator Frequency Database (OFD) TM, and many other innovative features and functionality; with new features in each software release. ✎

Key Deployment Benefits

The combination of the Kestrel TSCM ® Professional Software, and an application specific SDR search receiver or spectrum analyzer, becomes part of a modern, TSCM optimized, work-flow oriented, Signal Intelligence Support System (SISS) TM. Kestrel's cost-effective state-of-the-art RF collection and analysis technology approach, provides a comprehensive suite of TSCM focused capabilities:

- Powerful signal detection, collection and analysis;
- Demodulation and FFT visualization;
- Operator assisted, real-time deployment and analysis ready;
- Unattended and real-time, Remote Spectrum Surveillance and Monitoring (RSSM) TM;
- Automatic real-time project file write and save process of all captured data;
- Fail-safe defensive code integration and project recovery;
- A fully integrated Session Report Generator (SRG) TM;
- Industry unique Advanced Report Generator (ARG) TM;
- Operator Deployment Log (ODL) TM;
- Inspection Summary Checklist (ISC) TM

National Security Oriented (TSCM | SIGINT) Proven Experience

The Kestrel TSCM Professional Software was conceived, and developed in Canada by TSCM professionals with 40+ years of operational field experience in delivering TSEC / TSCM professional services at all operational threat levels. The all-encompassing experience of PDTG's principals, forms the basis of the TSB 2000 (Technical) Standard TM and the TSCM Operational Standard | Policy and Procedure Guideline (OS-PPG) TM. The Software Development Group (SDG) TM, in conjunction with the Technical Research and Standards Group (TRSG) TM, have applied a common-sense and balanced approach centered on the TSB 2000 (Technical) Standard TM for designing and assimilating complex algorithms, Artificial Intelligence (AI) and Digital Signal Processing (DSP) technologies. This knowledge and experience is reflected in the successful development of an RF detection, collection, surveillance, and monitoring system that is both powerful and easy to use by operators at any experience level. The Kestrel TSCM ® Professional Software is suitable for TSCM deployment at all known and developing threat levels, and is currently sold in 57 countries worldwide, and is extensively utilized by the private sector, and national security apparatus, to replace obsolete equipment and methodologies. ✎

Advanced Signals Intelligence Database (ASID)

The ability to search Kestrel's proprietary Frequency Database (FDB)™ files, either geographically by radius distance, expressed in Nautical Miles (NM), and referenced to the current collection DSA™ antenna location, or by Free Space Propagation (FSP)™ for signal level (or both), is supported. It is possible to view FSP™ data (relative power levels) as a graphical overlay, directly on the UI during real-time collection, and during post analysis of historical Kestrel Project Files (KPF)™. The “FDB Entry” dialog window displays the bearing and distance to and from the station, Free Space Power (FSP)™ power level, and provides the operator with the ability to directly export, and display the “FDB Entry” on Google Maps, Satellite, and Street View imaging. The ability to display, and save a relative static overview map showing both the emitter site and reference collection location is supported. ✎

FCC | IC | Frequency Database (FDB)

The Kestrel TSCM® Professional Software includes an Advanced Signals Intelligence Database (ASID)™ that encompasses a number of essential component features, such as the Frequency Database (FDB)™, and Operator Signal List (OSL)™. The technical operator has the ability to overlay official Industry Canada (IC) and Federal Communication Commission (FCC) licensing data directly on the UI, providing an excellent visualization of spectrum allocations for the geographical region of interest, which can be as large as North America, country wide, or as specific as a region, or frequency range. This capability provides the technical operator with the ability to quickly identify known emitters that are licensed within or adjacent to the geographical area. It is often just as important to verify legitimate signals to rule them out as potentially hostile. The technical operator can define the search query for licensed emitters at arbitrary distances referenced to the collection GPS fix, or manually entered geographical coordinates can be utilized. A query based on Free Space Propagation (FSP)™ RSSI values within a search range of (-20 dBm to -90 dBm) is also supported. ✎



FDB™ Updates | Technical Support Group (TSG)™ | Resource Centre

Periodic Frequency Database (FDB)™ updates are available for download free of charge to licensed technical operators, from the password protected Technical Support Group (TSG)™ | Resource Center website. The operator may either download the entire FDB™ regional or national frequency database file sets, or a specific FDB™ file of interest, on demand during deployment. Internet access is required for FDB™ file download, and for access to online mapping resources. ✎

Operator Signal List (OSL)™

The Kestrel TSCM® Professional Software, Operator Signal List (OSL)™, is an important spectrum management component of the Advanced Signals Intelligence Database (ASID)™, as a user-defined database component list that spans multiple, Kestrel Project Files (KPF)™, and is therefore independent of any particular Kestrel Project File (KPF)™. Multiple OSL™ databases can be customized and maintained. An entry on the OSL™, is prompted from an operator defined signal event, for inclusion within the current OSL™ database file, and may be recalled, and displayed against the real-time, or a historical Kestrel Project File (KPF)™, during post analysis and review. ✎

“Specifications Subject to Change Without Notice...”

Receiver | Spectrum Analyzer Support

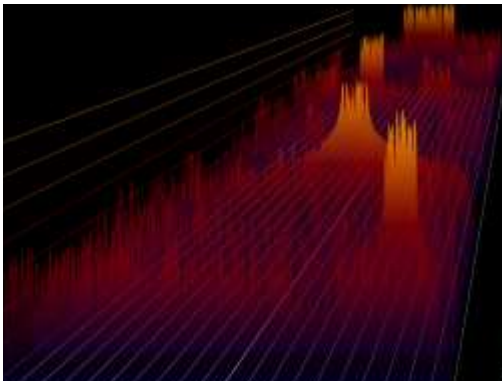
The Kestrel TSCM® Professional Software supports select; industry significant, Software Defined (SDR) search receivers and spectrum analyzers that compliment mission specific deployment requirements, and fulfill scalable budget realities. ⚡

Kestrel Support Profile (KSP)™

Kestrel Support Profiles (KSP)™, interface across supported SDR receiver or spectrum analyzer, allowing multiple manufacturers products to be deployed within the same system, and provides first in its class, dynamically synchronized hand-off, of the spectrum and demodulation processes without interruption, loss of spectrum data, or loss of search receiver communication. ⚡

Custom SDR Hardware Support

Support for additional end-user specific, Software Defined Radio (SDR) hardware is accomplished with a powerful Kestrel Support Profile (KSP)™ that becomes the interface between the Kestrel TSCM® Professional Software, and all other supported receivers and spectrum analyzers, to achieve full operability across all of the standard features and advanced functionality, including support for both spectrum and demodulation hand-off. Virtually any SDR hardware can be ported to Kestrel® with full support (contact us for KSP™ specifications, requirements, and anticipated development costs). ⚡



“Specifications Subject to Change Without Notice...”

Well Positioned to Hunt
in a Complex Signal Environment

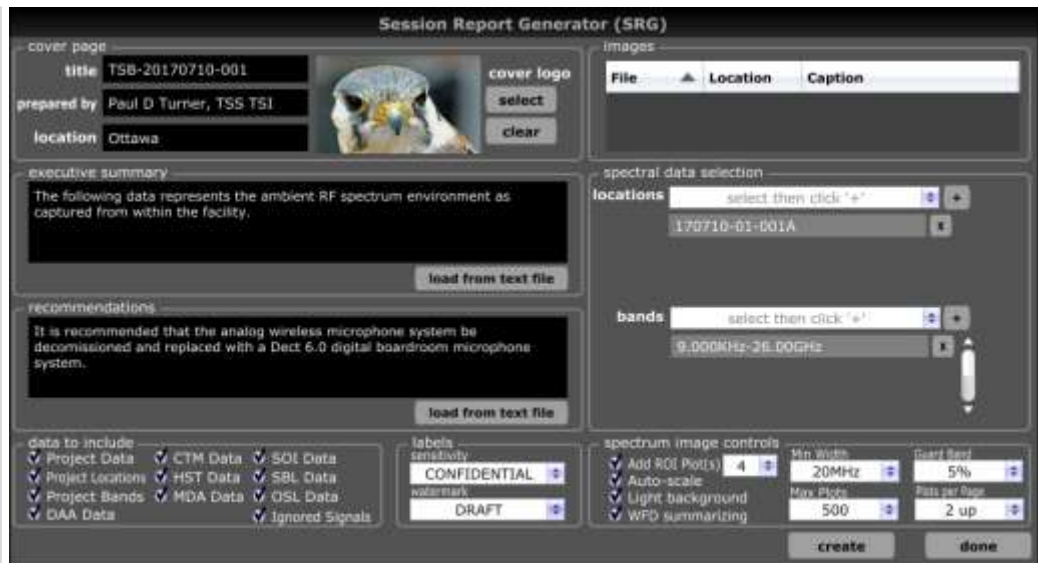
Kestrel TSCM® Professional Software SDR RF Switch Fiber-Optic Hardware Support				
Signal Hound Inc. United States of America				
Model	Bandwidth	IFBW	Connection	ROI Speed
SM435B	100 kHz TO 44.2 GHz	165 MHz	USB-C USB 3.0	1 THz @ 30 kHz
SM435C Photonic	100 kHz TO 44.2 GHz	165 MHz	SFP+ 10 GbE (Fiber-Optic)	1 THz @ 30 kHz
SM200C Photonic	100 kHz to 20.6 GHz	165 MHz	SFP+ 10 GbE (Fiber-Optic)	1 THz @ 30 kHz
SM200B	100 kHz to 20.6 GHz	165 MHz	USB-C USB 3.0	1 THz @ 30 kHz
BB60C/D	9 kHz to 6 GHz	27 MHz	USB-C USB 3.0	27 GHz @ 20 kHz
SA124B	100 kHz to 12.4 GHz	240 kHz	USB 2.0	140 MHz / Sec
SA44B	1 Hz to 4.4 GHz	240 kHz	USB 2.0	140 MHz / Sec
ThinkRF Corporation Canada				
Model	Bandwidth	IFBW	Connection	ROI Speed
R5500-408 418 427	9 kHz to 8 (18) (27) GHz	100 MHz	GIGABIT LAN	12 GHz / Sec
R-5750-408 418 427	9 kHz to 8 (18) (27) GHz	100 MHz	GIGABIT LAN	12 GHz / Sec
Rohde & Schwarz Germany				
Model	Bandwidth	IFBW DEMOD	Connection	ROI Speed (12.5 kHz)
EM100 (OPT RC + PS)	9 kHz to 3.5 GHz	10 MHz 500 kHz	LAN	1.3 GHz / Sec
EM100 (OPT RC + PS)	9 kHz to 7.5 GHz	10 MHz 500 kHz	LAN	1.3 GHz / Sec
PR100 (OPT RC + PS)	9 kHz to 3.5 GHz	10 MHz 500 kHz	LAN USB 2.0	1.3 GHz / Sec
PR100 (OPT RC + PS)	9 kHz to 7.5 GHz	10 MHz 500 kHz	LAN USB 2.0	1.3 GHz / Sec
Tektronix Canada				
Model	Bandwidth	IFBW	Connection	ROI Speed
RSA306-B	9 kHz to 6.2 GHz	40 MHz	USB-C USB 3.0	TBD
Anritsu Corporation Japan				
Model	Bandwidth	IFBW	Connection	ROI Speed
MS2090A (Pending)	9 kHz to 54 GHz	TBD	LAN	TBD
MS272xT	9 kHz to 43 GHz	TBD	LAN	TBD
MS272xC	9 kHz to 43 GHz	TBD	LAN	TBD
Shearwater TSCM United Kingdom				
Model	Bandwidth	IFBW	Connection	ROI Speed
Merlin MK 4	30 GHz	TBD	LAN	TBD
Merlin MK 3	30 GHz	TBD	LAN	TBD
CRFS United Kingdom				
Model	Bandwidth	IFBW	Connection	ROI Speed
RFeye Node	10 MHz to 6 GHz	10 MHz	LAN	TBD
RFeye Node	10 MHz to 18 GHz	10 MHz	LAN	TBD
Keysight FieldFox Handheld Microwave Spectrum Analyzer				
Model	Bandwidth	IFBW	Connection	ROI Speed
N9962A	5 kHz to 50 GHz	10 MHz	LAN	TBD
SDRPlay United Kingdom				
Model	Bandwidth	IFBW	Connection	ROI Speed
RSP2Pro (Uncalibrated IQ)	1 Hz to 2 GHz	8 MHz	USB 2.0	TBD
AirSpy (Pending Support)				
Model	Bandwidth	IFBW	Connection	ROI Speed
AirSpy HF + Discovery	500 Hz to 31 MHz 60 MHz to 260 MHz	8 MHz	USB 2.0	TBD
AirSpy R2	24 MHz to 1.7 GHz	8 MHz	USB 2.0	TBD
RF (Antenna) Switch Support Mini-Circuits United States of America				
Model	Range	Number of Ports	Connection	Control
RC-1SPDT-A18	DC to 18 GHz	2 Ports	USB 2.0 LAN (Pending)	Kestrel® Software Control
RC-1SP4T-A18	DC to 18 GHz	4 Ports	USB 2.0 LAN (Pending)	Kestrel® Software Control
RC-1SP6T-A12	DC to 12 GHz	6 Ports	USB 2.0 LAN (Pending)	Kestrel® Software Control
ICRON (Fiber-Optic) Remote Hardware				
Model	Fiber-Optic	Range	Connection	Ports
Spectra 3022	Multi-Mode 50/125	100 Meters	USB-C USB 3.0	2-Port
Raven 3124	Multi-Mode 50/125	200 Meters	USB-C USB 3.1	4-Port

Session Report Generator (SRG)™

The Kestrel TSCM® Professional Software includes the ability to generate and export a wide range of standard reporting elements for inclusion within a, structured session activity report. The Kestrel TSCM® Professional Software, Session Report Generator (SRG)™ provides the technical operator with the ability to generate comprehensive, multiple on-the-fly, runtime and post capture analysis and review reports, to highlight different aspects of the project, and accommodate the needs of the technical operator and end-user. The SRG™ is easy to use and renders internally generated PDF reports that include virtually all aspects of the runtime session, such as, operator defined spectrum plots of the entire Range of Interest (ROI), and operator selectable signal list data that can be tailored to the needs of the intended reader. For example, a simplified overview report can be generated for the client, management, or end-user, and a detailed technical report can be rendered for the technical operator, or analyst. The ability to import target area photographs, images, floor plans, riser plots, and screen captures, adds the powerful dimension of virtual reality capability that strengthens the entire reporting process. The convenient PDF file format is rendered as a standalone report, that can be viewed universally with any PDF viewing software, and custom mark-up can also be added with Adobe Acrobat. The exported PDF report is also ready for inclusion as an electronic attachment, within a more comprehensive, Electronic Reporting System (ERS)™ as defined under the TSB 2000 (Technical) Standard™, or if necessary printed as an included attachment. ✎

Deployment Reference Database (DRD)™

The ability of the technical operator to build and maintain simple reference databases for, captured IQ sample files, audio sample files, screen captures of signal characteristics, etc., can be accomplished by building a directory file structure and saving the reference files, filtered by date, location, or characteristics. The DRD™ concept is separate and apart from the Kestrel® application, and becomes a powerful proprietary resource for the technical operator, and is mission specific to the operators client base. ✎



Enhanced Operator Centric Work-Flow

The ambient RF spectrum represents a extremely complex and challenging work environment for the professional technical operator. The ability to separate what often amounts to many thousands of “friendly” ambient signal events, from perhaps the one difficult to detect “hostile” Signal of Interest (SOI), by design, significantly increases the Probability of Detection (POD) during active field deployment, when faced with an unfamiliar spectrum environment. The ability to detect, identify, verify, and dismiss with confidence, benign signals, is of considerable practical value. This powerful capability is further enhanced by the ability of the technical operator to populate, load, and display any number and type of custom Operator Signal Lists (OSL)™, designed to span multiple Kestrel Project Files (KPF)™ at the application level as an operator definable database resource. Any number of custom OSL™ files can be maintained for use within the application, defined by category, location, region, or other technical operator preferences, such as known friendly, known hostile, or reference Signals of Interest (SOI). The technical operators work-flow is intuitive from setup, through, runtime collection, event capture, and the analytical signal analysis process by the technical operator, or SIGINT analyst. The Kestrel TSCM® Professional Software easily transitions across challenging, mission specific, and operator deployment objectives, including those associated with, TSCM, RSSM™, SIGINT, Regulatory Compliance, Base Transceiver Station (BTS) site monitoring, and many other communications and Radio Frequency (RF) applications. ✎

Advanced Graphical Mapping | Heat Mapping Display (HMD)™

The ability to import images, such as floor plans, riser plots, 3D graphics, photographs, maps, or an operator rendered image, is fully supported with a powerful receiver level heat map overlay. ✎



10 | Key Features

RF Visualizer (RFV)™ Technology

The Kestrel TSCM® Professional Software includes the ability to literally visualize complex Radio-Frequency (RF) propagation characteristics for meeting communication standards and regulatory certification requirements, based on several powerful competing geo-location heat mapping algorithms, including Gaussian Weighting, Inverse Square Weighting, and Free Space Power Loss (FSPL) to achieve a never before realized level of clarity in resolving emitter location and / or propagation validation across the defined target area. ✈

TSCM | Signal Source Localization

The ability of the technical operator to complete a facility or site level walk and plot signal source search based on one (1) or more operator identified Signals of Interest (SOI) is fully supported, permitting the technical operator to quickly build a geo-location heat mapping process in real-time, based on an auto location Tap Capture Plot (TCP)™ process. ✈

Regulatory Inter-Operability Testing

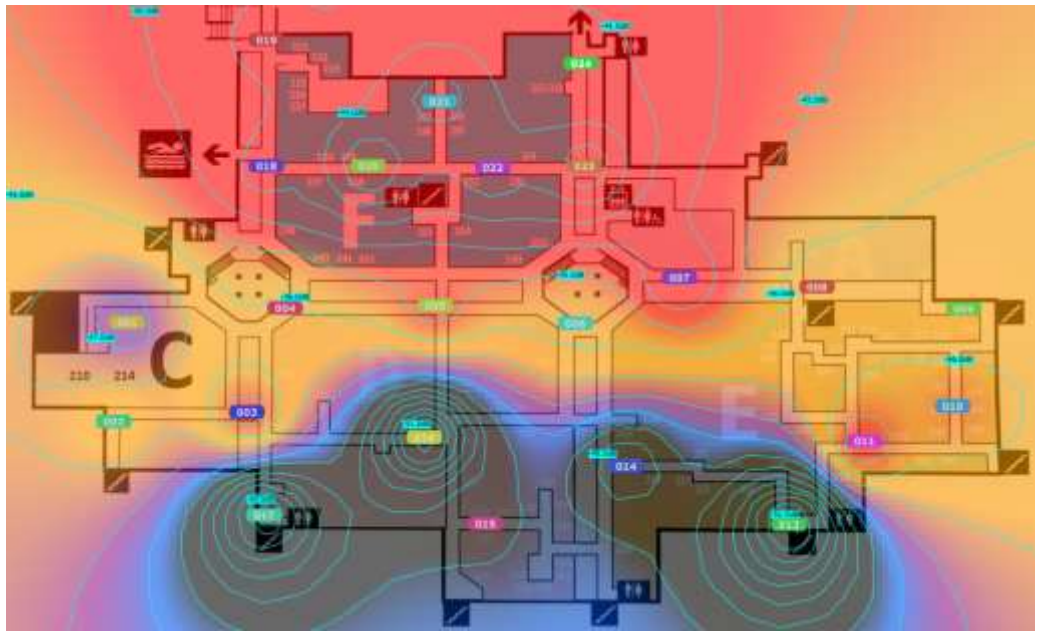
The ability of the technical operator to build and maintain regulatory reference databases of signal propagation characteristics, can easily be accomplished at the facility level to confirm for example that emergency services communication standards are validated across critical infrastructure and that repeaters are in-fact meeting the required level of coverage. The ability to maintain complex documented evidence of the testing protocol and process is fully supported with the Advanced Report Generator (ARG)™. ✈

Wi-Fi Coverage | Energy Heat Mapping

The ability of the technical operator or in-house Information Technology Security (ITS) personnel to build accurate propagation models at the facility level are realized utilizing the TAP CAPTURE PLOT (TCP)™ process. ✈

Cellular Repeater Coverage | Band Level

The ability of the technical operator, or mobile communication provider, to validate facility level repeater installations is supported across the various 3G, 4G | LTE network downlink frequency standards. ✈

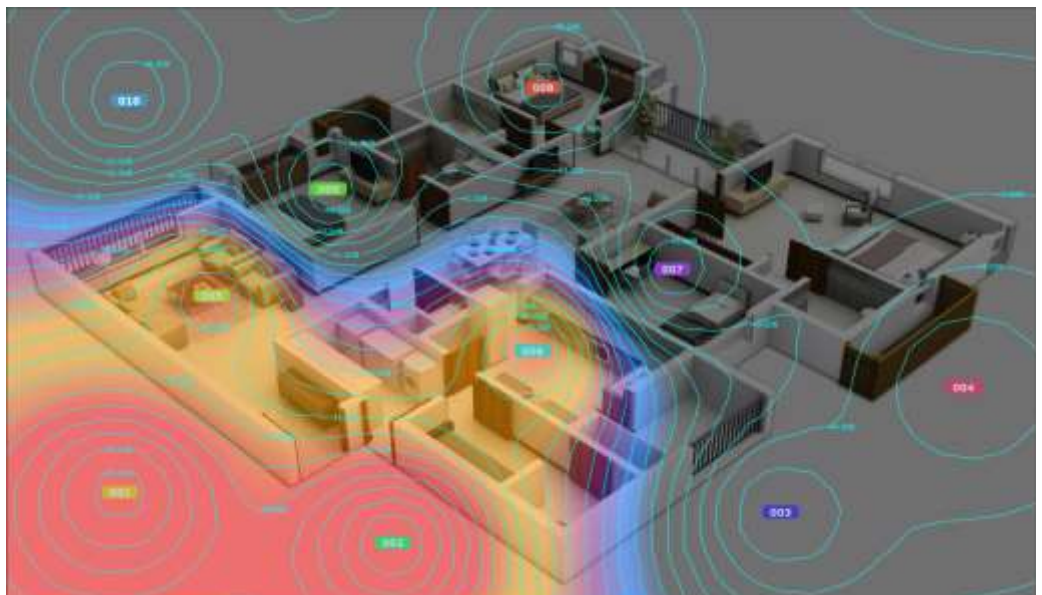


Next Generation | Total Energy Capture (TEC)™ | Tap Capture Plot (TCP)™

The future of communication security depends on the ability to visualize complex RF propagation characteristics across the defined target area, but must also extend across the far-field spectrum environment to include large commercial facilities, educational and business campuses, shopping malls, meeting and conference facilities, military bases, prison and correction facilities, hospitals, hostile war zones, cities, communities and even entire countries. The Technical Research and Standards Group (TRSG)™ recognizes the importance of this growing requirement for innovative new countermeasures with respect to the emerging 5G technology revolution and the many other communication modes currently being implemented or under development. The reallocation and reuse of older technologies for potentially hostile purposes is fast becoming a reality. ✈

Kestrel® TSCM Professional Software | RF Visualizer (RFV)™ Propagation Contour Overlay

Kestrel's advanced (agile) reference level propagation modeling and RF Visualizer (RFV)™ provides the technical operator with the ability to not only invoke any Signal of Interest (SOI) level event captured within the Location Differential Signal Analysis (LDSA)™ process, and render a powerful virtual reality geo-location heat map and then dynamically adjust the reference level to accentuate the emitter localization or propagation voids across the target area. ✈



Dynamic Trace Autonomous Platform (DTAP-GPS)™ | OPT DTAP-GPS

The Kestrel TSCM® Professional Software provides a powerful capability that can be deployed in a backpack (walking), or vehicle (mobile) to effectively capture and process wideband RF energy patterns within the defined “functional” target area and in real-time render a geo-location heat map that is built around a powerful RF propagation visualization modeling capability.

The autonomous capability is permits the technical operator to covertly deploy a powerful surveillance platform.

The ability to derive actionable RF intelligence quickly resolving mission critical challenges relating to signal localization or propagation voids is fully supported. ✈

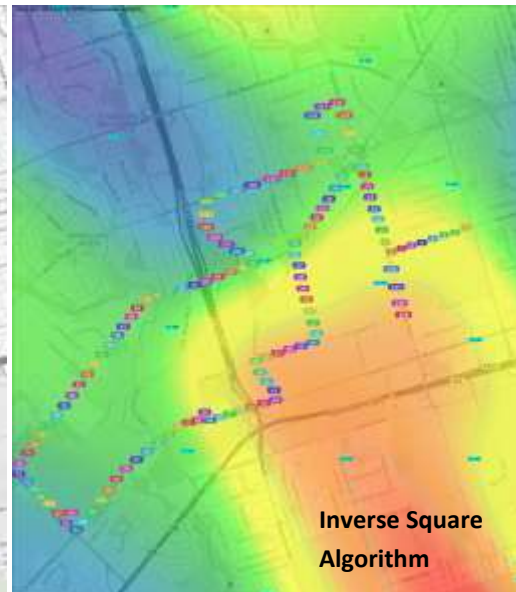
Tactical Field Deployment

Law-enforcement, special reaction teams, tactical scenarios, protective operations, pre-raid tactics, regulatory enforcement, government and military applications are significantly enhanced by real-time actionable RF intelligence.

Covert and overt deployment scenarios clearly benefit from the DTAP-GPS™ feature. ✈

Air | Space Applications

The ability to build and deploy fully autonomous platforms on a UAV, aircraft, helicopter, or space vehicle provides a new and powerful capability, in safely capturing mission critical RF intelligence within any number of hostile environments fully autonomously. ✈



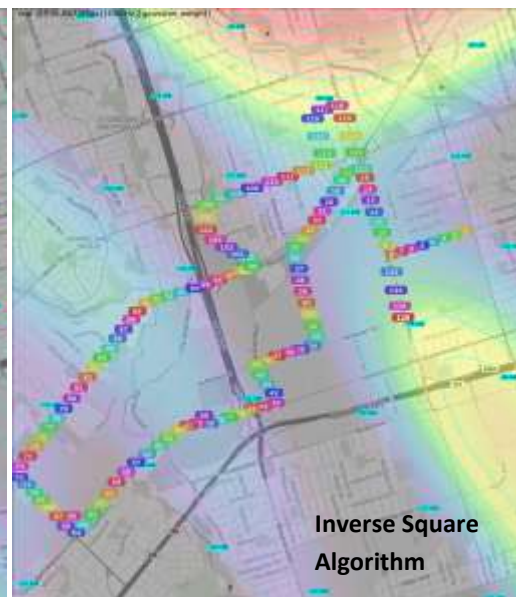
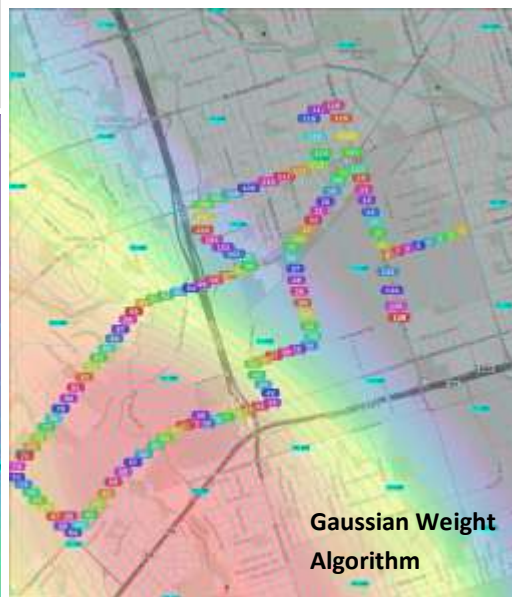
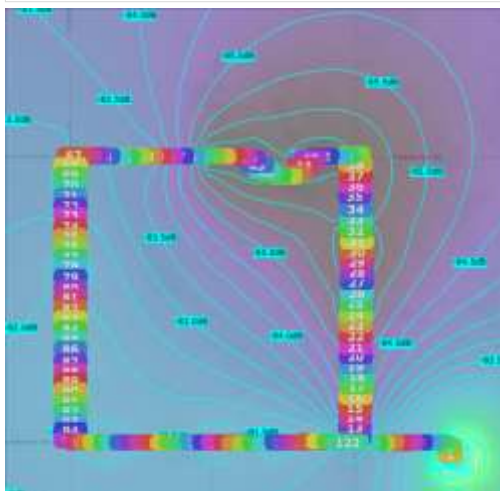
Dynamic Trace Autonomous Platform (DTAP-GPS)™ | OPT DTAP-GPS

DTAP-GPS™ is the next generation of wideband RF analytics; combining powerful geo-location heat mapping and advanced RF propagation modeling with fully autonomous operation across a single SDR radio, resulting in actionable RF intelligence for a wide range of mission specific applications.

The entire DTAP-GPS™ system can easily be deployed utilizing a small footprint tablet computer and launched covertly and autonomously in a unassuming backpack to establish an accurate RF propagation model at any outdoor special event, airport, high security construction site intended for the national security apparatus, law-enforcement, government and military contractor sites, regulatory emission evaluation, special purpose monitoring of the ambient RF spectrum, and for the detection of unintentional radiators at military bases and other critical infrastructure establishments.

The same powerful system can be operated within a vehicle for mobile applications for larger sites such as campuses, airports and military bases.

The Kestrel TSCM® Professional Software is an innovative new technology that delivers a new methodology firmly based on a modern moving target threat model by supporting the national security infrastructure with important Software Defined Radio (SDR) milestones. ✈

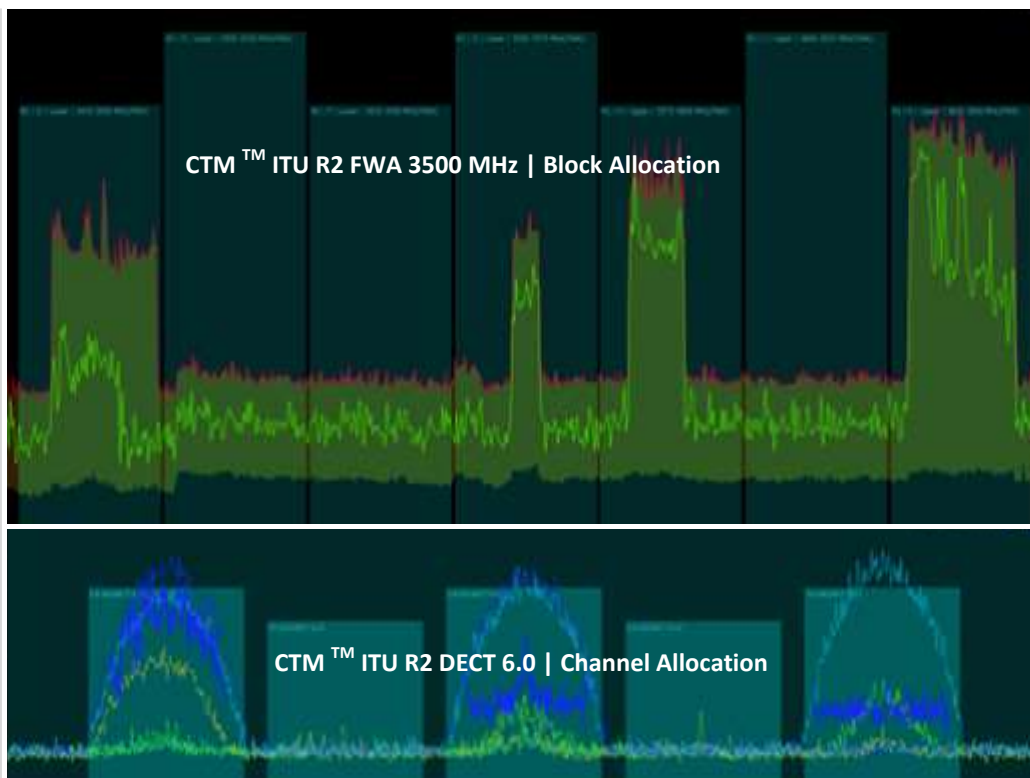
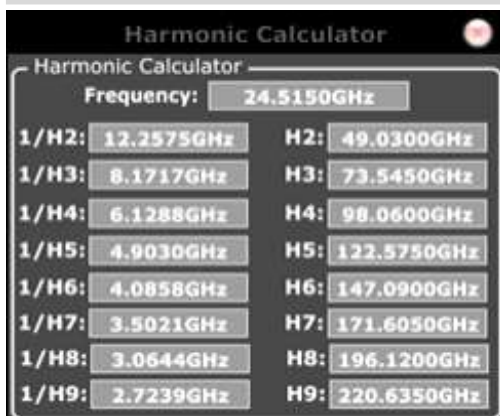


Channel Profile Mask (CPM)™

The ability to build “on-the-fly” channel level, and band oriented, Channel Profile Masks (CPM)™ is supported by the CPM™ editor. Multiple CPM™ files can be generated, maintained and recalled during runtime, copied to a new file, and imported from an operator defined | CSV | file. The ability to display overlapping channel masks, or band allocations is also supported. Operator level programming includes the Center Frequency (MHz), Bandwidth (MHz), and Rx Power (dBm), and the arbitrary display of a reference amplitude (dBm). The CPM™ database includes the ability to assign a | NAME | and | CLASS | tag. The database file is easily moved to another host computer running the Kestrel TSCM® Professional Software. Channel Profile Masks (CPM)™ are displayed by selecting the CPM™ button located within the Spectrum Display and Activity control group. The CPM™ database editor and file management tools are located within the | SPECTRUM | menu structure. ✎

Sub-Harmonic | Harmonic Calculator

The ability to quickly predict, and display harmonic, and sub-harmonic frequencies, and then correlate these with observed spectral events, supports the identification of potential spectral threat characteristics. Provisions are included for the demodulation of any Automatic Threat List (ATL)™, fundamental frequency or 2nd, 3rd, 4th, 5th, 6th, 7th, 8th, and 9th order, harmonic, and sub-harmonic events. The “Drag and Drop” functionality enables direct “Drag and Drop” to and from the demodulator frequency window, the sidebar ATL™ and the Master Automatic Threat List (MATL)™, as well as to, and from, the Harmonic Calculator Tool (HCT)™ window. ✎



Color Coded Spectrum Band | Receiver Status

Color coded spectrum band tabs significantly enhance technical operator situational awareness with immediate visual feedback and verification of the runtime status:

| **RED** | indicates that no SDR Rx is assigned for the spectrum band, frequency allocation, or channel.

| **YELLOW** | indicates that the SDR Rx is currently assigned, but collection is paused.

| **GREEN** | indicates that active runtime activity is present for the assigned spectrum band allocation.

| **BLUE** | indicates that the trace count limit (or trace time limit) for the current LDSA location has been reached and collection has been automatically | STOPPED | and | LOCKED |.

| **GRAY** | indicates bands that are automatically locked out whenever | SOLO | mode is enabled.

All significant status visualizations are intuitively positioned on the User-Interface (UI) and are designed to enhance operational situational awareness when multiple SDR radios and / or band allocations are present. Runtime SDR status dialog windows provide contextual operator feedback for each standby and / or active SDR Rx, and displays the receiver name, runtime sweep speed, and the current SDR state, for sweep, demodulation, and analysis modes. Kestrel's first of a kind Probability of Intercept (POI) calculator provides the real POI based on the actual full ROI computing conditions. ✎



Kestrel® File | Write Management

Kestrel® can capture and record all spectrum trace data in real-time (1/n=1), by default, or can be programmed to capture spectrum trace data at a recording rate (1/n=2, 1/n=5, 1/n=10, 1/n=20, 1/n=50, 1/n=100, 1/n=250, 1/n=500, 1/n=1000), or any value up to (1/n=10000), by the operator. Default recording is set for (1/n=1) real-time, for a measure of fail-safe deployment. “On-the-fly”, alert recording is provides optimal write file management. ✈

Spectrum Analyzer (SA) Mode

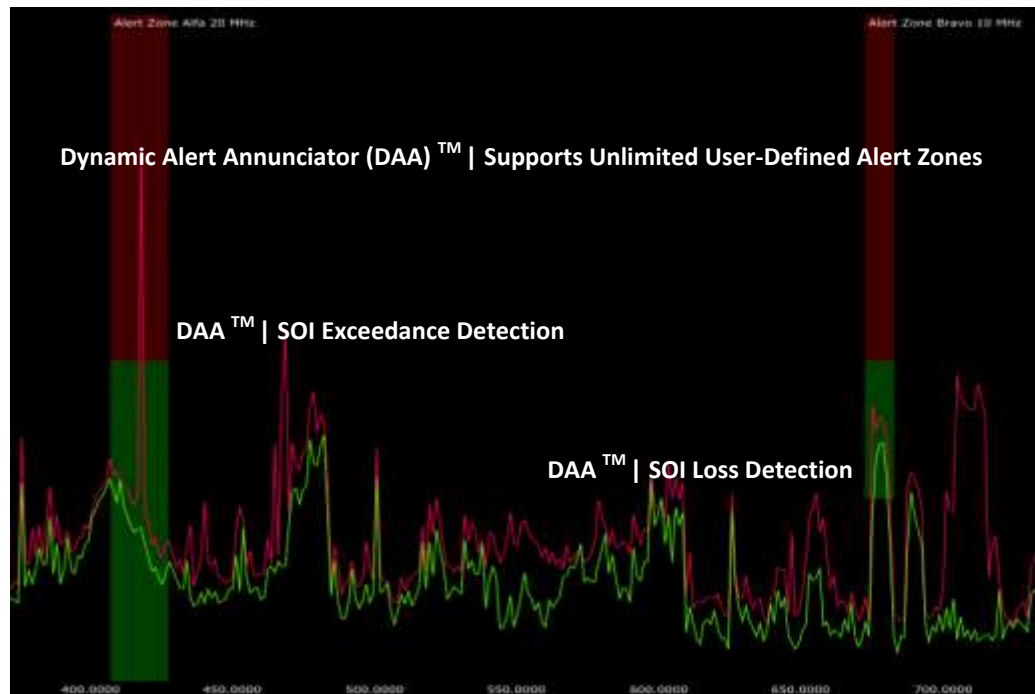
An advanced recording and file management mode allows the technical operator to run the software in a spectrum analyzer mode, without recording any spectrum data. If a potentially hostile Signal of Interest (SOI) is observed, the operator can quickly enable trace recording with a single button record ability, to initiate the capture of real-time spectrum trace data. This mode of operation results in a significant file size reduction since only, on-demand, spectrum trace data is recorded. ✈

Extended Deployment | File Size Management

To accommodate managed Remote Spectrum Surveillance and Monitoring (RSSM)™ assignments, incremental spectrum recording is fully supported. The operator is able to set the capture rate, from real-time (1/n=1) to incremental (1/n=10000) recording. Basically, for 1/n=100, 99 peak capture traces are represented as a single Kestrel Super Trace (KST)™. This process identifies and captures the peak energy that occur over the (1/n=?), time / trace interval, so that all captured spectral events are preserved and recorded for analysis. WFD compression enables a file size reduction up to 10000 times the real-time recording value, with only a minor displacement in event time accuracy that varies with the (1/n=?) value. ✈

Dynamic Alert Annunciator (DAA)™

The ability to capture targeted DAA™ signal events that either exceed, or drop below (loss), technical operator defined detection (alerting) thresholds, are delineated by any number of alert zones across the spectrum band allocation, is supported by the Kestrel TSCM® Professional Software. The export and import of alert zones, to and from a CSV file format, is supported. ✈

**Dynamic Alert Annunciator (DAA)™ | Triggered Export**

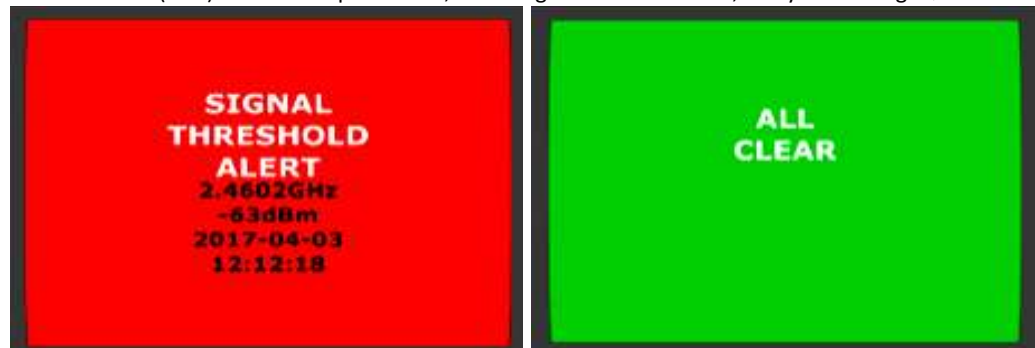
The ability to automatically capture and record trace level data, based on technical operator defined alerting zone threshold levels at either the band allocation, or discrete signal level, is fully supported. This feature not only captures the signal event, but also the trace data relative to both pre-event and post-event triggering values, as defined by the operator. This advanced mode of operation reduces the file size by orders of magnitude compared to the real-time value, as only the traces associated with specific alerting events are captured and recorded. ✈

Real-Time | Triggered Event Capture

The Dynamic Alert Annunciator (DAA)™, is a sophisticated feature designed to capture, log and display threshold defined signal level, exceedance and signal loss events. The DAA™ recording control has proven to be a very powerful operator centric feature, adding an entirely new dimension to the collection, and discrete signal analysis process. Focused analytical statistics for each signal event provide a clear picture of signal characterization patterns and appearance signatures. Additional data table columns may also be displayed within a familiar table structure. The ability to capture operator defined “Alert Zone” data within the DAA™ Signal List structure is fully supported, even when the trace recording control is not enabled. The DAA™ Signal List can be exported to a | CSV | file for comparative analysis, storage, or for use within third-party productivity programs. ✈

Audio Alerts | Kestrel Voice Annunciation (KVA)™

The operator can define audio alerts throughout the application, and utilize custom Kestrel® Voice Annunciation (KVA)™ Text-to-Speech files, including Kestrel's exclusive, Daisy and George. ✈



Kestrel® Analysis and Record Mode (ARM)™

This feature provides significant operator flexibility and programmability, while providing for a powerful measure of active file size management. The technical operator can deploy the system in a basic Spectrum Analyzer (SA) mode without storing any spectra, trace, or waterfall data, while maintaining the ability to actively review the current trace level data on the user-interface in real-time (subject to availability of unrecorded, buffered data). There are two | RECORD | related controls, the first is located on the Spectrum Display and Activity control group that | STARTS | and | STOPS | the write process “on-the-fly”, and the second is part of the | NEW SPECTRUM | dialog window. The | START | and | STOP | write process state can be changed on-the-fly, during runtime. ✎

Automatic Threat List (ATL)™ | CSV Export

The ability to export standardized | CSV | signal list data, for any automatically captured, or manually entered signal event, is supported within the Kestrel TSCM® Professional Software application. Support for the export of Chirp Threat Mode (CTM)™, Harmonic Signature Threshold (HST)™, Minimum Detection Amplitude (MDA)™, Spectrum Baseline Logging (SBL)™, Signal of Interest (SOI), Operator Signal List (OSL)™, and Dynamic Alert Annunciator (DAA)™ signal lists are supported. ✎



Title	Spectra	Locations
London (UK)	3	1
Sweden	2	2
Washington	1	5

Kestrel TSCM® Professional Software | Event Recording Mode (ERM)™

The Kestrel TSCM® Professional Software includes a fully automated alert, based recording control capability. Intuitive artificial intelligence and design level predictive logic enables the software to begin active “alert zone” capture and storage recording processes ahead of a signal events appearance within the spectrum. The “Great Kestrel” utilizes keen eyes, a photographic memory, and maybe even a little psychic ability to produce a clear picture of any alert zone based capture, and trace level recording of any Signal of Interest (SOI), leading up to its appearance, for the duration of the event, and for an operator defined period of time beyond the active alert. This innovative feature permits the technical operator to build a detailed picture of the ambient RF spectrum environment leading up to the Signal of Interest (SOI) alert. Consequently, all new and periodic signal events are well-documented, and are available for post event analysis and review, while economizing on storage requirements. In addition to performing continuous capture and recording for the duration of the event, It is possible to record a period of real-time trace data before the beginning of any signal event, and for an operator defined period of time beyond the end of the alerting event. ✎

Innovative | Active File Size Management

In order to facilitate operational deployment, and file size management, the | REC | control group also includes an advanced write control capability (1/n) = | 1 | 2 | 5 | 10 | 20 | 50 | 100 | 250 | 500 | and | 1000 | option list (default), or manually up to | 10000 | traces, representing the actual number of recorded traces that occur during runtime capture with (1/n=1) being real-time and (1/n=50) representing (1) in (50) peak traces being written to the local or network, storage device | + | all peak data captured from 100% of the traces, referred to as a Kestrel Super Trace (KST)™. The analytical advantages include an order of magnitude, of less trace by trace data, for the technical operator to analyze, and significantly enhanced performance of the host computer. ✎

Kestrel Project Template (KPT)™

The technical operator can define any number of project templates directly, from the included Kestrel Project Template (KPT)™ dialog window. Any number and type of deployment profiles can be created by the operator, managed, edited, stored, and recalled for deployment, for common runtime collection strategies. The ability to pre-configure a working template for different physical locations, or collection and analysis parameters, is fully supported. The current Kestrel Project File (KPF)™ can also be saved as a Kestrel Project Template (KPT)™. The KPT™ database file is easily transportable to another host computer. This ability is in keeping with the operator centric, and work-flow oriented philosophy, and provides a very powerful operator defined resource. ✎

1 DEFINE | 2 MANAGE | 3 EDIT | 4 DEPLOY

Operator Centric Design

The Kestrel TSCM® Professional Software philosophy is firmly based on providing advanced professional level features and real-world functionality that places the technical operator back in control of the deployment, collection, and analytical process. ✎



add template

project template editor

template description

template title

location name

antenna locations

spectrum bands



edit template

project template editor

template description

template title

location name

antenna locations

spectrum bands



Setup Wizard

new project setup wizard

project description

activity schedule

antenna locations

spectrum bands

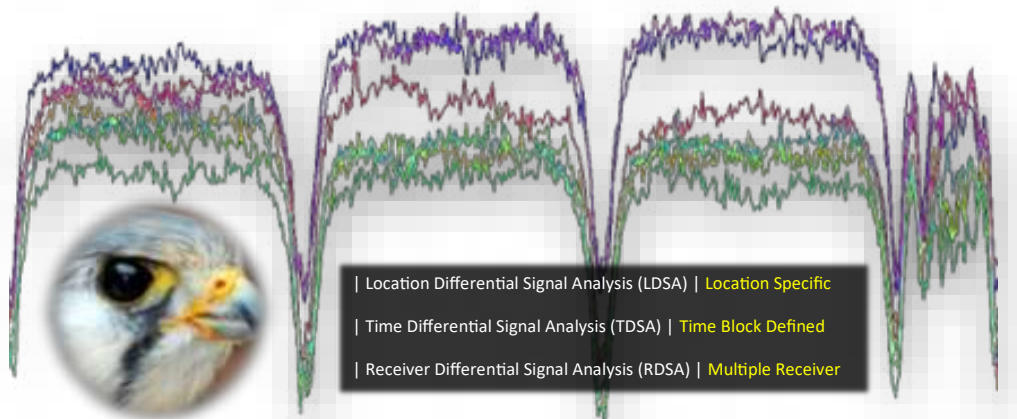
Operator Centric | Work-Flow Oriented

Kestrel TSCM[®] supports operator defined spectrum profiles, rapid deployment (tactical) project templates, and high resolution positional zoom control (up to 200x) for detailed analysis, and precise signal parameter measurements. ✈

Typical Deployment Applications

Kestrel TSCM[®] Professional Software is an ideal platform for a wide range of RF applications.

- Operator Assisted Radio Frequency (RF) Technical Surveillance Countermeasures (TSCM), Powerline Carrier (PLC), and Broadband Powerline (BPL) verification.
- Managed Remote RF Spectrum Surveillance and Monitoring (RSSM)[™].
- In-Place Spectrum Monitoring (IPSM).
- High-Risk, Protective Operational Support, Counter-Intelligence (CI) Applications, and Technical Surveillance Countermeasures (TSCM).
- Regulatory Spectrum Utilization, and validation, Enforcement, and Management.
- Regulatory Compliance, Investigations and Electro-Magnetic Interference (EMI) Analysis.
- Spectrum and Signal Integrity, Compliance and Verification.
- Telecommunications Industry, Base Station Transmitter Monitoring.
- Radio Frequency (RF), Spectrum Baseline Logging (SBL)[™].
- Tactical Intelligence Gathering, Barricaded Hostage, Radio Intercept and Communication Monitoring.
- Search and Rescue (SAR), Radio Direction Finding (RDF), Tactical Beacon Homing.
- Technical Surveillance Device (TSD), Testing, Analysis, and Signal Characterization, including Pre-deployment Testing of Offensive Surveillance Technology.
- Universities, Technical Colleges, Educational Institutions, and Radio Engineering.
- National Security Apparatus. ✈



Kestrel[®] High-Definition Spectra Literally wants to Fly off the Display!

Kestrel TSCM[®] Professional Software | Respected Worldwide

The Kestrel TSCM[®] brand is responsive to the needs of the end-user. The advanced software engineering, unique design, and innovative concept of the Kestrel TSCM[®] Professional Software has become the standard, against which, all other TSCM software applications will be compared, evaluated, and judged in the future. ✈

Unprecedented Innovation | Qualified Research and Development (R&D)

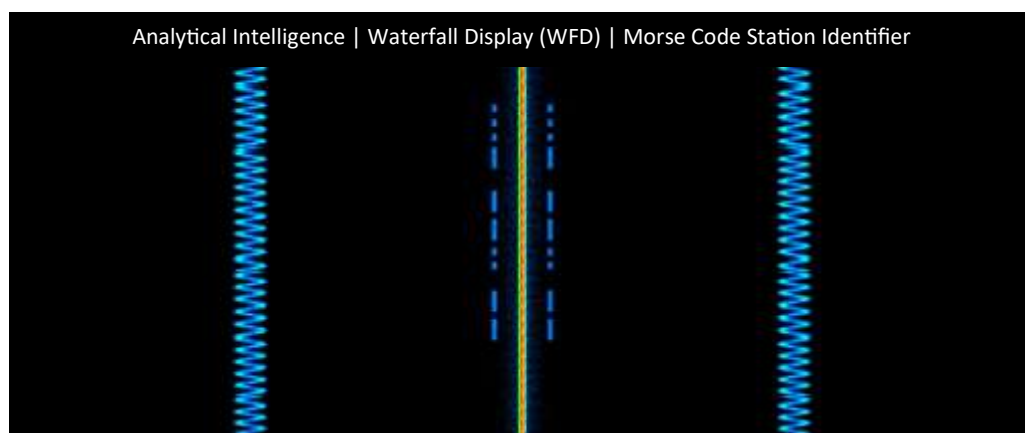
Kestrel[®] requires significant annual financial investment in Research and Development (R&D), to achieve new and innovative deployment tools that are operator centric, and provide unprecedented collection, capture, analysis and reporting capabilities for deployment in a modern moving target threat model. Significant, on-going R&D is essential in meeting tomorrow's threat environment. ✈

Deployment Flexibility | Scalability

Standard included features and functionality, ensure that the Kestrel TSCM[®] Professional Software is deployment ready at all known and developing threat levels, and encompasses the widest possible deployment requirements of professional operators. The Software Development Group (SDG)[™] is responsive to the needs of technical operators. In-fact, we encourage operators to share their software experiences and ideas, as part of the "work in progress" deployment methodology. PDTG's development philosophy is well founded, on continuous improvement, and new features. ✈

Typical Hardware Configuration | Considerations

The Kestrel TSCM[®] Professional Software is designed to run on the Windows OS, for deployment on an Intel i7 (6th, 7th, and 8th Generation) HQ processor, Laptop, or micro-computer with 16 GB of RAM. Kestrel's software supports search receiver connectivity using USB 2.0, USB 3.0, USB-C, interfaces and virtual LAN and Fiber-Optic modules permit USB 2.0 / USB 3.0 search receiver connectivity to be managed remotely over Cat 5e or Cat 6 LAN cabling infrastructure, or across a multi-mode 50 / 125 Fiber-Optic cable. Remote Desktop Software (RDS) permits full command and control via a LAN, or an Internet connection, including the use of 3G / 4G / LTE cellular modems. ✈



Kestrel® Licensing Process | Options

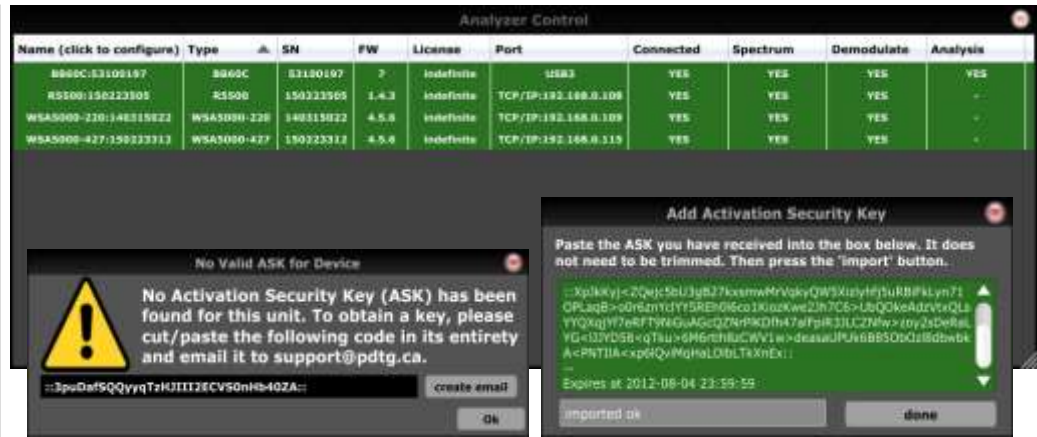
Kestrel's standard End-User License Agreement (EULA) includes a full version of the Kestrel TSCM® Professional Software, and two (2) Activation Security Keys (ASK)™, for use with any two (2) supported receivers or analyzers, across any two (2) host computer installations. The software activation is machine, and hardware specific, requiring an Activation Security Key (ASK)™ for each individual host computer and each receiver. Adding additional receivers, requires the purchase of a sub-license Activation Security Key (ASK)™. ✍

Multiple License Management (MLM)

MLM is available to meet the deployment requirements of larger organizations that need to manage multiple licenses across distributed Remote Spectrum Surveillance and Monitoring (RSSM)™ platforms. ✍

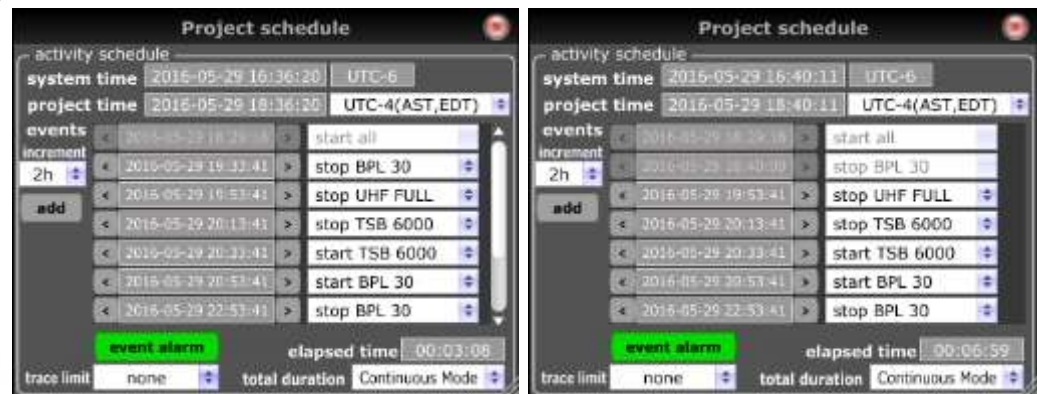
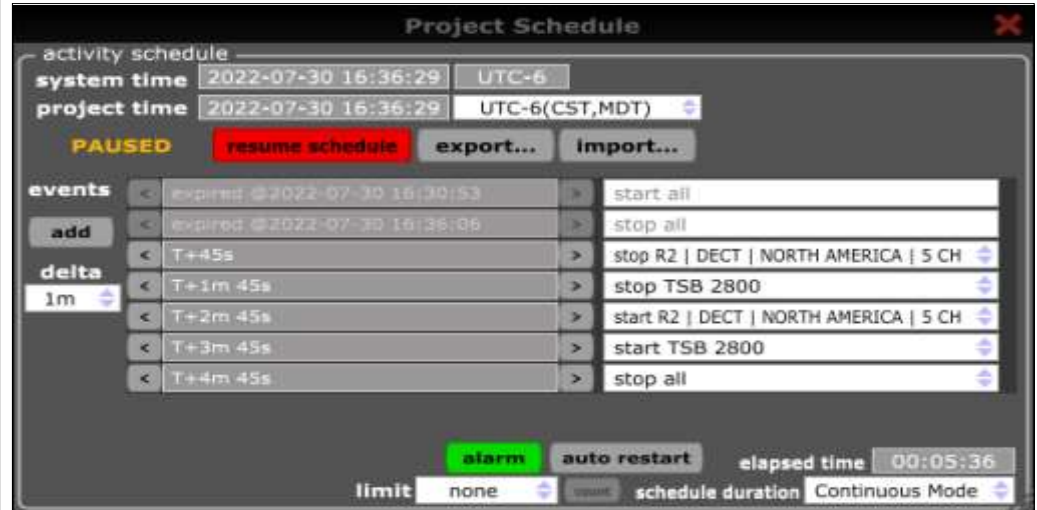
Kestrel® Software | Release Updates

Software updates are always provided free of charge, within the same software generation indefinitely. The latest software release is always available for download, from the password protected Technical Support Group (TSG) | Resource Center website. Additional tools, example files, and other resources are available for download, including the FDB spectrum licensing database for Canada, and the United States of America. Updated SPF™, CPM™, and OSL™ working files and examples are also provided. Keeping your Kestrel® software, computer OS, USB and graphics drivers up to date, is essential. ✍



Kestrel® Project Activity Scheduler | Time Zone Off-Set

The Kestrel TSCM® Professional Software includes a uniquely versatile Project Activity Scheduler that provides the ultimate control over the runtime collection process. The ability to individually schedule runtime activity across multiple search receivers and analyzers, is just the beginning. Full activity scheduling support is provided at the spectrum band level, giving the technical operator the ability to easily program complex multiple start and stop activity across multiple, independent spectrum band allocations, across each connected device. Programming is accomplished from either the Setup Wizard, or within the application during runtime. The advanced Time Zone Offset, provides accurate spectral time-stamping, without the need to change the host computer clock, when traveling. ✍



Time Differential Signal Analysis (TDSA)™

Technical Support Group (TSG)™

Several layers of advanced technical support are provided by the Canadian based Technical Support Group (TSG)™ specialists, including self-help access to the online (PW Protected) Technical Support Group (TSG)™ Resource Center website, and the exceptional local support knowledge offered by ComSec LLC specialists, and direct lines of communication with hardware manufacturers. Resources include a very comprehensive proprietary Software Programming and Operation Manual (SPOM)™, unlimited Email, and TeamViewer™ based technical support assistance, all designed to keep your system running smoothly. ✈

Operator Training | Certification Opportunities

A PDTG instructed 7-Day, Kestrel® Software | Technical Operator Certification program, a 5-Day, Kestrel® Software | Technical Operator Certification program and a 3-Day Kestrel® Software | Technical Operator Certification program are offered by ComSec LLC. Authorized Kestrel instructors are experienced technical operators and bring real-world applications into the training environment. ✈

Third-Party | Productivity Software

The ability to export data to standard CSV file format, allows the technical operator to arrange, select, edit and analyze raw Spectra, and RSSI values. The ability to generate custom graphical spectrum models for reports and presentations is realized, adding a powerful analytical capability to the Kestrel® software. ✈

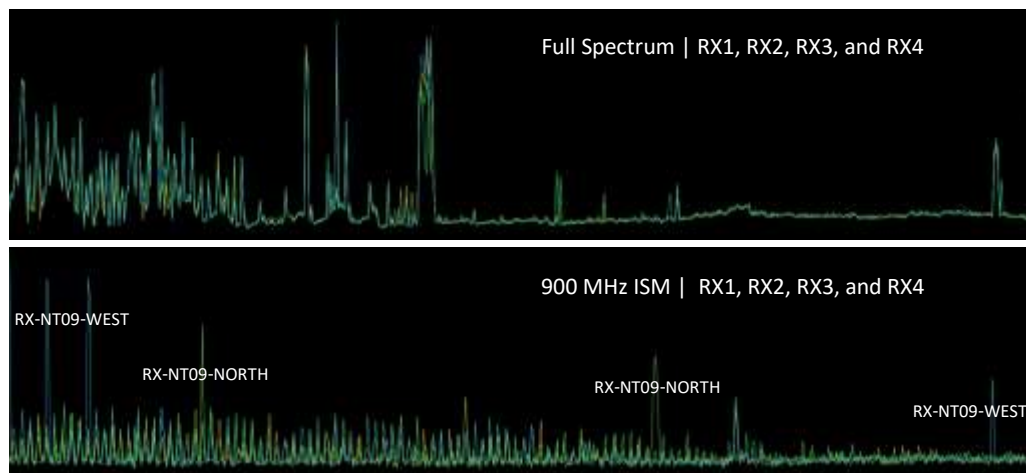
Frequently Asked Questions (FAQ)

Q | How does the Kestrel® Dual Receiver Operation (DRO)™ “Hand-Off” Work?

A | The dynamically synchronized, receiver “hand-off” capability extends to both the spectrum and demodulation process. It is not limited to Dual Receiver Operation (DRO)™, but rather supports multiple receivers. It is possible to connect a Signal Hound BB60C, ThinkRF R5500, and any other supported receiver, or analyzer, and dynamically “hand-off” the spectrum sweep and demodulation process across each device in real-time. Simply select the hand-off receiver, and the process is handled by the software, without data loss. ✈

Receiver Differential Signal Analysis (RDSA)™ | Operator Defined Receiver Location

With powerful standard included features and capability, such as Location Differential Signal Analysis (LDSA)™, for multiple (local) collection location comparative; enhanced by real-time echo differential mode, the powerful capability of Time Differential Signal Analysis (TDSA)™, for single location capture, time block comparative and analysis, and the innovative mission critical advantages of Receiver Differential Signal Analysis (RDSA)™, which removes the limitation of a single defined location, “collect and compare”, for peak static traces only, which often have little or no meaning once they become historical. RDSA™ is designed to provide the ability to display and compare real-time, peak, and average spectra across independent receivers, with the first in its class, dynamic sub-band drop in overlay — Kestrel® has you covered, no matter what your mission specific deployment requirements, objectives, or analytical plan. Receiver Differential Signal Analysis (RDSA)™ allows the operator to select and display any available receiver, or spectrum analyzer, as an overlay, running in either a Dual Receiver Operation (DRO)™, or Multiple Receiver Operation (MRO)™, environment. The RDSA™ feature not only supports real-time, and historical, multiple receiver trace level spectra comparative, but also extends the capability to include a unique, multiple trace Waterfall Display (WFD), providing the operator with a powerful, defined, real-time multi-layer waterfall display. RDSA™ is another example of a new class of features specifically developed for a modern moving target threat model. Receivers can be independently designated and all bands and sub-bands can be displayed in real-time, as a spectra overlay. ✈



RDSA™ | Spectrum in Spectrum | Drop in Spectrum

The ability to overlay the spectra from multiple defined locations, multiple time blocks, and multiple receivers, is yet another Kestrel® development milestone. Kestrel® includes a powerful multiple receiver waterfall, providing unprecedented comparative data, directly on the waterfall display. ✈

Precision Navigation | Horizontal Range Control (HRC)™

One of the many key design capabilities of the Kestrel TSCM® Professional Software is the powerful operator centric, Positional Zoom Control (PZC)™. The HRC™ feature is yet another innovative milestone found within the Kestrel TSCM® Professional Software, that significantly enhances rapid, precise spectral navigation. The technical operator can add, edit, maintain, or delete, any number of unique Spectrum Profile Files (SPF)™, which are then utilized to set the search receiver or spectrum analyzer to specified user-defined bands or sub-bands, frequency blocks, spectrum allocations, or channels. The HRC™ feature takes advantage of the SPF™ database and turns it into a powerful Horizontal Range Control (HRC)™ navigational tool. The technical operator can manually select any of the available HRC™ menu options which directly reflect the SPF™ database content, to precisely navigate to any defined Range of Interest (ROI). The Horizontal Range Control (HRC)™ is available during runtime and post analytical review of historical Kestrel Project Files (KPF)™, along with all other spectrum and waterfall navigation tools. ✈

Kestrel Spectrum Analytics (KSA)™

The ability to export user-defined Spectra trace data to CSV file format, is supported within the Kestrel TSCM® Professional Software. Spectra trace data export is useful for detailed and focused analysis of any SOI trace level data, when utilizing third-party RF analysis hardware, or productivity software. ✎

Export (CSV) Spectra

To aid technical operators in a more detailed analysis of collected trace level data, the ability to export operator defined Spectra values is supported. The operator is able to export Spectra to a | CSV | file, based on | LOCATION | and / or | BAND | related criteria. The ability to further refine the exported data, includes selecting the | START | and | END | trace number sequence. This feature can be utilized during runtime collection, or during post event analysis and review, by the technical operator, or SIGINT analyst. ✎

Dynamic Alert (CSV) | Spectra Export

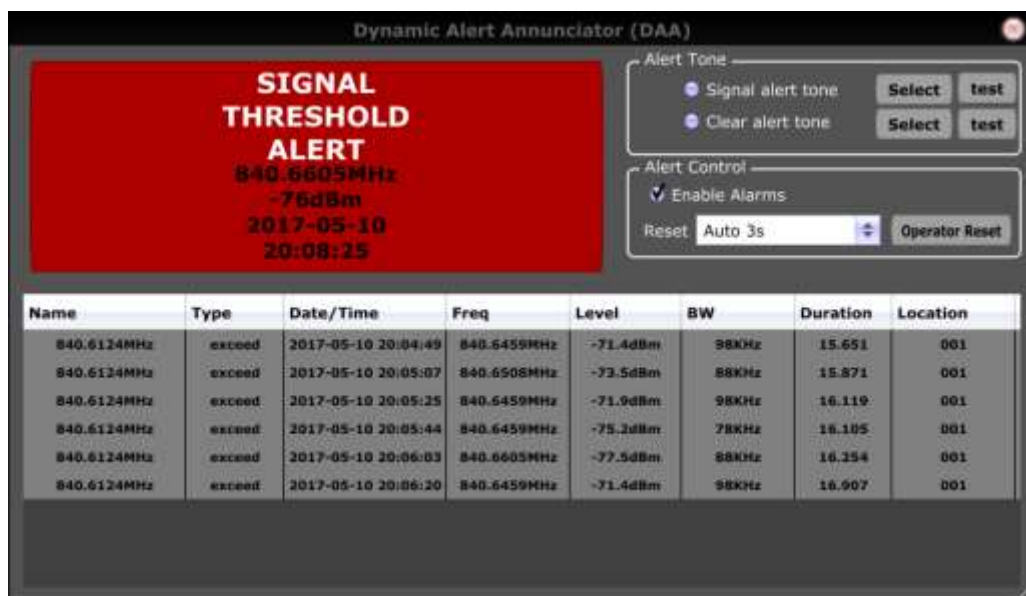
The ability to export Spectra trace data as associated with a dynamic alert, threshold violation, to a | CSV | format is supported. ✎

Dynamic Alert (CSV) | RSSI Export

The ability to export RSSI values based on a dynamic alert, threshold violation, to a | CSV | format is supported. ✎

Waterfall Display (WFD) | Analytical Review

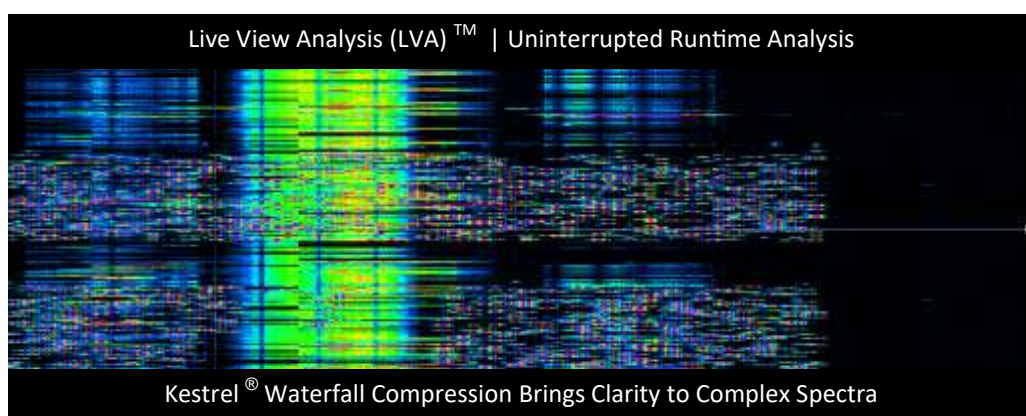
During normal runtime operation, all spectra and waterfall trace data is written to storage, in a playback ready format, unless the operator manually disables the write management feature for the runtime session, individual band allocation, or Range of Interest (ROI). This is an important element in the decision to purchase any particular TSCM equipment resource. All operator defined data must be stored in a format that permits full analytical playback and analysis. Kestrel TSCM® provides the ability to store, open, and even continue runtime collection at any time in the future, within the same Kestrel Project File™ bringing unprecedented capability to the analytical process. It is essential that write management be utilized to minimize the amount of data for long term deployment scenarios. ✎

**Kestrel Super Trace (KST)™**

During Remote Spectrum Surveillance and Monitoring (RSSM)™ over a period of days, weeks, or months, waterfall and trace data can become a storage challenge, and requires time-intensive post event analysis, which can be a daunting process. The unique write management feature, in combination with the ability to compress the trace and waterfall data, is a powerful innovation that significantly improves the operators analysis and review capability. The spectrum and waterfall compression method enhances rendering by reducing the memory and storage footprint, and brings exceptional clarity to the waterfall display. This unique functionality permits the technical operator to easily observe periodic peak energy patterns across the Range of Interest (ROI), over a period of time. A KST™ is the total combined energy based on the number of captured traces, and runtime capture time. ✎

Kestrel Super Trace (KST)™ | Waterfall Buffer Clear (WBC)™ Button

The Kestrel Super Trace (KST)™ feature is controlled by the technical operator, by first selecting the desired (1 / n = ?) write control setting value during setup, or within runtime capture. The WBC™ feature may be invoked by the operator by pressing the Waterfall Buffer Clear (WBC)™ button. This process clears all unsaved spectra data, leaving only the Kestrel Super Traces (KST)™ spectra. The write management strategy strikes an important balance between capturing too much, or too little analytical data. The technical operator should consider the anticipated length of the runtime deployment when configuring the optimal write management value. ✎



Automatic Export Control (AEC)™

The Kestrel TSCM® Professional Software by design supports Remote Spectrum Surveillance and Monitoring (RSSM)™ for a wide range of unattended field deployment applications. The Automatic Export Control (AEC)™ feature is a powerful, software module that seamlessly integrates with the Kestrel TSCM® Professional Software, and significantly enhances unattended operation, by periodically exporting the Automatic Threat List (ATL)™ data to CSV file format, on an operator defined, periodic, or event triggered basis. The technical operator can define the | EXPORT | directory location by selecting the | AEC DIRECTORY | menu option located within the | FILE | menu structure. By default, AEC files will be stored within the default | AEC | file directory, and not in the current Kestrel Project File (KPF). The operator can easily define the desired write storage location on any available local storage media, network drive, or cloud storage for easy retrieval, analytical review, and a measure of fail-safe data integrity. ✎

AEC™ | Periodic Export (CSV)

The time periodic export of | MDA™ | SBL™ | CTM™ | HST™ | and / or | DAA™ | data is supported, based on the selection of a default | AUTO EXPORT | value of | 1 | 3 | 8 | 12 | 24 | 48 | 72 | hours. Alternately, the operator may define any custom time value with the format | 30 S | 30 M | 30 H | 30 D | (seconds, minutes, hours, and days), to invoke the desired | TIME PERIODIC | export value. The operator can select | EXPORT ALL |, meaning all signal events are exported on each export cycle, or | ONLY CHANGES |, meaning only the changes since the last cycle are exported. The operator can reset the | AUTO EXPORT | time value at any time, and select | EXPORT NOW | should the operator not wish to wait for the current | AUTO EXPORT | cycle to complete. ✎

Kestrel IQ (KIQ)™ | Record and Playback

Building an | IQ Sample Reference database has never been so easy! Record, playback, sub-sample and loop captured IQ files in the proprietary binary Kestrel IQ (KIQ)™ format, or industry standard RAW CSV and WAV IQ file formats. Convert | RAW CSV | files to | KIQ | format using a built-in conversion utility. ✎

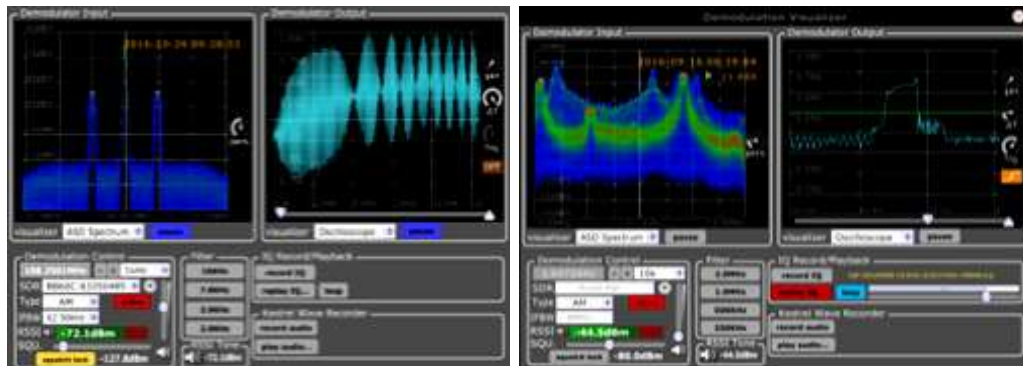


AEC™ | Triggered Export (CSV)

The AEC™ triggered export of | DAA™ EXCEED | DAA™ LOSS | NEW MDA™ | NEW SBL™ | NEW CTM™ | and / or | NEW HST™ | data, is supported for | EXPORT RSSI | EXPORT SPECTRA | and / or | EXPORT IQ | to | KIQ | and | CSV | file format. Triggering is a function of operator level programming of the Dynamic Alert Annunciator (DAA)™, Minimum Detection Amplitude (MDA)™ threshold, Spectrum Baseline Logging (SBL)™ threshold, as well as the CTM™ and HST™ detection profiles. The operator is able to define an IQ trigger | PRE-EVENT (IFB™ Mode Only) |, capture setting value of | NONE | 100 mSec | 250 mSec | 500 mSec | 1 Sec (Default). A | POST-EVENT | capture setting value of | 100 mSec | 250 mSec | 500 mSec | 1 Sec | 2 Sec | and | 5 Sec | are currently supported. An operator defined | MAXIMUM EVENT DURATION | capture setting value of | NONE (Not Recommended) | 100 mSec | 250 mSec | 500 mSec | 1 Sec | 2 Sec | 5 Sec | 10 Sec | 15 Sec | 20 Sec | 30 Sec | 60 Sec |, and | 120 Sec | are currently supported. ✎

Essential IQ Recording and Playback | FFT Demodulation Visualizer

Manually initiated IQ Recording and Playback (KIQ | CSV | WAV) is a standard feature within the Kestrel TSCM® Professional Software, providing the technical operator with a powerful analytical capability. Record, playback, sub-sampling playback, looping and a CSV to KIQ file conversion utility, are all available, along with real-time | IQ | FFT displays. Please note that the automatic IQ capture is only available within the Automatic Export Control (AEC)™ module. ✎



AEC™ | CSV Table Data

The ability to define the | CSV TABLE DATA FORMAT | for export, is supported to allow the technical operator to decide which export elements are required. The operator is able to independently select the | MDA™ | SBL™ | CTM™ | HST™ | and | DAA™ | elements, including select all columns, or select only those required. The technical operator can drag the desired values from the “available elements” to the “active elements” window. A | RESET | defaults, and | CLEAR | button has been included, to assist in advanced feature programming. ✎

Audio Demodulation | Signal Analytics

The Kestrel TSCM[®] Professional Software provides direct demodulation of AM, AM-USB, AM-LSB, FM, and NTSC analog video. The “Drag and Drop” technology allows any signal list event, to be dropped directly to the demodulation control group, from any populated signal list entry, including the Dynamic Alert Annunciator (DAA)[™], and Harmonic Calculator Tool (HCT)[™]. Additional Digital Demodulators and Kestrel Protocol Analytics (KPA)[™] are under development. ✓

Kestrel Demodulation Visualizer (KDV)[™]

The Demodulation Visualizer (KDV)[™] includes an RF Spectrum Display (RFD), Audio Spectral Density (ASD), IQ Diagram (IQD), IQ Vs Time Display, RSSI History Display (RHD), analog RSSI Display (ARD), and NTSC Video display. An Audio Oscilloscope Display (AOD), and (Audio Frequency) AF Spectrum Display (ASD), visualizes baseband signal representations, including the presence of embedded sub-carriers. Controls are provided for squelch, volume and mute. ✓

IF Filter Control (IFC)

During the demodulation process, various baseband (audio) filter options compatible with the currently selected IF Bandwidth (IFBW), are dynamically generated. The filter value is visually represented within the AF Spectrum Display (ASD), and applied to the demodulated audio stream. ✓

Kestrel Wave Recorder (KWR)[™]

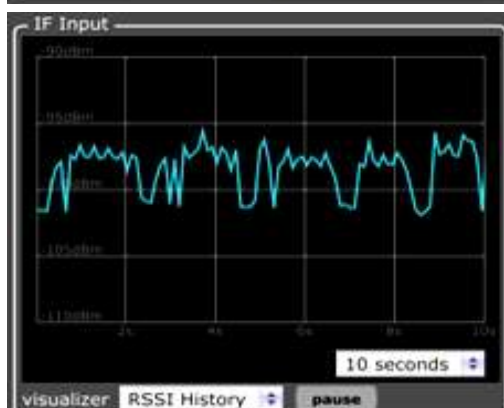
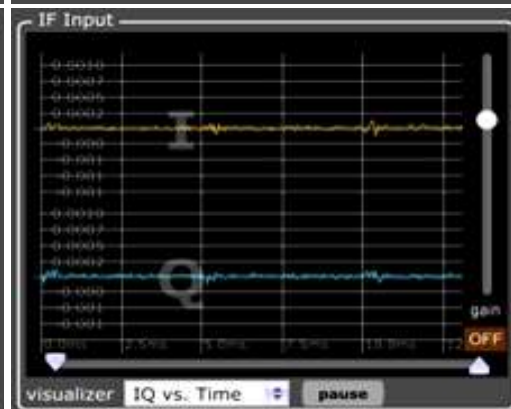
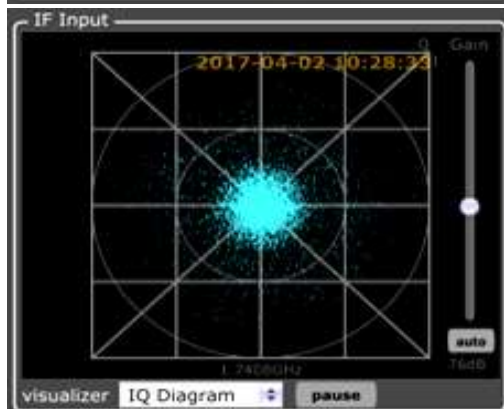
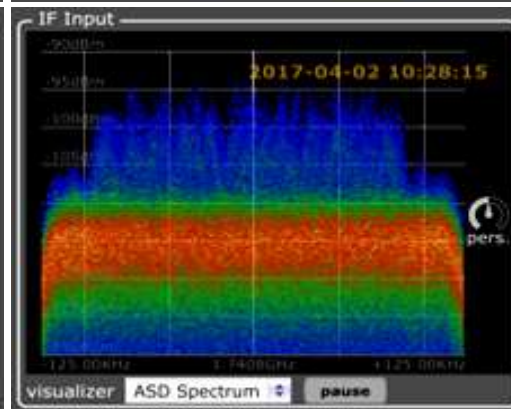
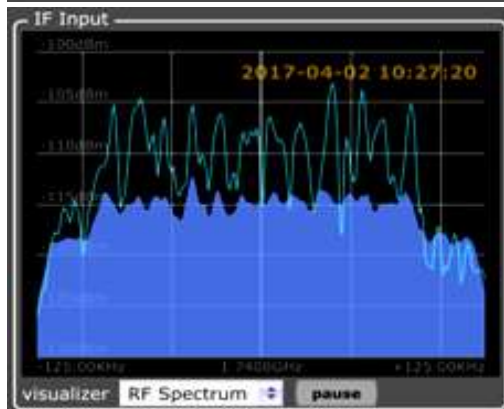
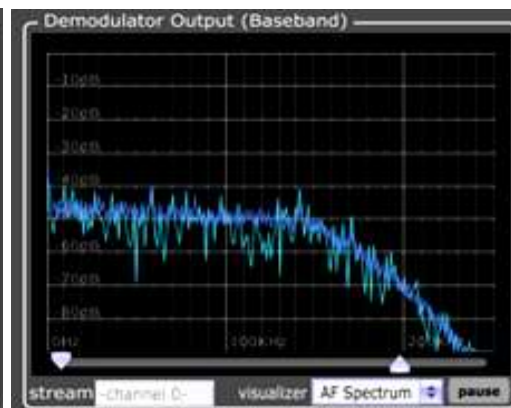
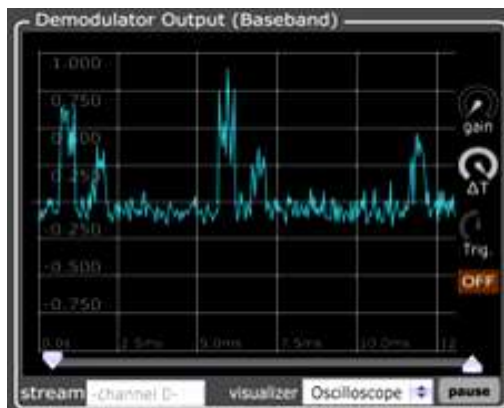
The Kestrel Wave Recorder (KWR)[™] permits the operator to record audio samples for further technical analysis, inclusion in reports, and for evidentiary, and training purposes. ✓

RSSI Tone Locator (RLT)[™]

The RSSI Tone Locator (RLT)[™] provides an amplitude sensitive audio alert tone that can be utilized independently, or simultaneously, over the originating audio, for emitter localization. ✓

RSSI Trending Display (RTD)[™]

To assist in quick emitter localization, a powerful RSSI Trending Indicator (RTI)[™] is included to aid the technical operator, when utilizing a directional antenna, such as the Kestrel Log Periodic (KLP)[™] antenna kit. ✓



Operator Defined | Demodulation Multiple Radio “Hand-Off”

The ability of the operator to dynamically “hand-off” the demodulation and analysis process to any other supported search receiver, or analyzer is supported. This essential feature permits the operator to utilize a dedicated, receiver or analyzer, for the demodulation and analysis process, while allowing the search receiver to continue uninterrupted runtime capture. ✓

Signal Detection | Identification | Analysis

The ability of the Kestrel TSCM® Professional Software to capture, and display near-field Signals of Interest (SOI), allows the technical operator to quickly identify the presence of potentially hostile signal events, and transition immediately, proceed to locate the source of the emission. Locating and neutralizing hostile emitters is the primary deployment objective of the operator. The analysis of any potential intelligence that might be contained within the Signal of Interest (SOI), or stored within the device is a secondary consideration. See the IQ capture capability for additional information. ✎

Channel Profile Mask (CPM)™

The ability to clearly identify official ITU bandwidth specific allocations at the signal and / or band level, promotes exceptional situational awareness, allowing the technical operator to focus on the identification of potentially hostile signal events, while verifying and ignoring, known friendly signals. ✎

Peak Envelope Capture (PEC)™

The ability to capture and display the ambient RF spectrum environment in a peak capture mode over a custom period of time, equal to the runtime capture time period, allows the technical operator, to not only detect, but clearly identify the presence of Frequency Hopping Spread Spectrum (FHSS) signals, even when operating at, or near the ambient noise floor. Often, the signal will hop at a rate that is difficult to observe within the Real-Time Event (RTE) trace, but will be easily identifiable using the peak capture mode. ✎

MIN-MAX | Peak Reference Trace

The MIN-MAX reference trace locks, and displays the minimum and maximum peak reference data, separate from the Peak Envelope Capture (PEC)™ trace. ✎

TDSA™ Reference Trace

When TDSA™ is enabled, a peak hold reference displays the | PEAK | for the current TDSA™ time period, and automatically resets, with each defined time period, providing a real-time, peak hold component during the runtime process, that is time sensitive against the PEC™, or the MIN-MAX peak reference trace. ✎

**RSSI Trending Display (RTD)™**

The RSSI trending display provides visual information about the RSSI Vs Time, RSSI Vs Location, and RSSI Vs Direction, when utilizing the Kestrel Log-Periodic (KLP)™ wideband search antenna. ✎

Power Line Carrier (PLC) | Broadband Power Line (BPL) | Kestrel Signal Analytics (KSA)™

The growing popularity of Power Line Carrier (PLC), and Broadband Power Line (BPL) devices, utilizing advanced signal classifications, and modulation types such as BPSK, FSK, and OFDM, are easily identified using the Kestrel TSCM® Professional Software, and the hardware based, Kestrel® 3D Energy Probe (KEP), Power Line and Radiated Antenna. ✎

Out of Band (Hostile) Signals

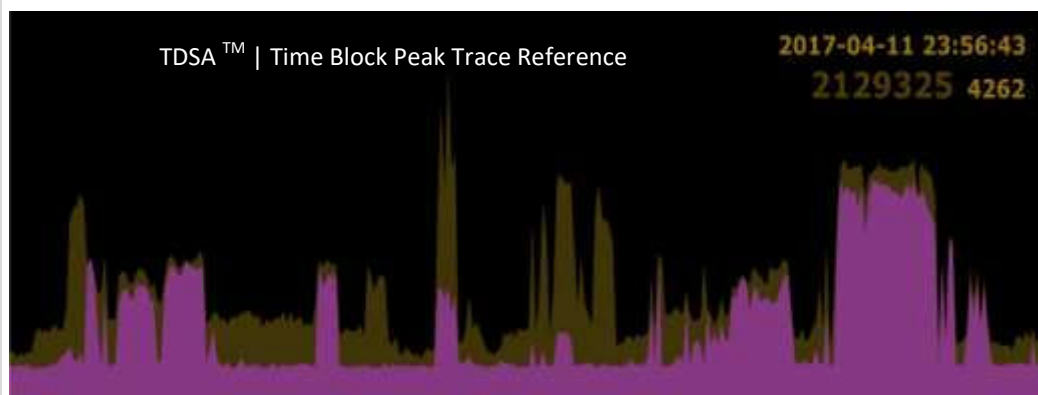
When the technical operator utilizes the Channel Profile Mask (CPM)™ capability, the presence of potentially hostile, out-of-band emitters are easy to identify, as operating within the ambient RF spectrum. Near-field emitters will often exhibit harmonic characteristics, even when their fundamental frequency lies within a legitimate band allocation. The radiated harmonics will fall outside of legal band allocations, thereby providing additional opportunities for the detection and identification of harmonic events. ✎

Digital Signal | Display and Capture

Wi-Fi, Bluetooth, ZigBee, FHSS, BPSK, DSSS, OFDM, ATSC, NTSC, GSM, CDMA, LTE, FSK, OOK, and many other signals types, can be captured, displayed and analyzed visually, and via IQ Capture (Advanced Digital Protocol Analytics (ADPA)™ is currently under development). ✎

Software Programming and Operation Manual (SPOM)™

The Kestrel TSCM® Professional Software includes, excellent Canadian technical support, and a detailed Software Programming and Operation Manual (SPOM)™. The manual provides advanced information for each feature, along with working examples, making it an excellent reference and training resource. Kestrel® Certified Technical Operator (CTO) training is highly recommended to ensure technical operators gain the maximum benefit from their software investment. ✎



DSA Trace Count Limit | Trace Time Limit

The Kestrel TSCM[®] Professional Software supports operator defined runtime DSA[™] trace count (time) limit automation. This feature allows the operator to complete other inspection related tasks, while the Kestrel[®] software stops (locks) runtime collection after completing the specified number of Differential Signal Analysis (DSA)[™] traces (or time), for the current antenna collection location. ✎

Event User Alarm | Activity Scheduler

DTL[™] is supported by an event process alarm that notifies the operator when the DSA[™] collection for the current antenna location is complete. The operator can manually over-ride the locked status and continue collection, or relocate to the next DSA[™] Location. This feature is part of the Activity Scheduler and can be programmed to respond to any scheduled events, programmed by the operator. ✎

DSA[™] ICON | Antenna Location

The ability to change the displayed color of any DSA[™] ICON is supported, allowing the technical operator to edit the default color representation of the DSA[™] trace and ICON. This is an important ability when importing historical trace comparative data from another Kestrel Project File (KPF). ✎

Multiple Runtime Instances of Kestrel[®]

The ability to run multiple instances of the application is supported, allowing the technical operator to maintain an active runtime session, and work with one, or more historical files outside of the runtime instance, for review, analysis, or report generation on the same host computer. ✎

Communication Receiver Mode (CRM)[™]

The normal practice is to establish a Kestrel Project File (KPF)[™], and then demodulate any Signals of Interest (SOI) from within the runtime environment. However, it is also possible to simply open the application window, and directly enter the Center Frequency (CF), and activate the demodulation and visualization process to listen, and visualize the signal. The ability to playback Kestrel IQ (KIQ)[™] or IQ captured as CSV files, is supported at any time with, or without an initialized receiver. ✎

Automatic Measurement and Collection System (AMCS)[™] | OPT AMCS

The AMCS[™] component within the Kestrel TSCM[®] Professional Software allows the application to operate “headless” in an embedded computing environment, significantly reducing the required memory footprint and processing overhead. AMCS[™] is perhaps described as one of the most powerful features ever developed for professional deployment requirements, and is configured by the technical operator, with a Kestrel[®] Configuration Script (KCS)[™] file. The Kestrel[®] application will automatically generate the project files and runtime configuration, to be able to immediately begin collection and operator defined “reporter” activity. Client applications may be connected to the Kestrel[®] software via a TCP/IP socket interface connection, to obtain the extracted data stream, and basic configuration information from the application. A measure of control is also offered to client applications. The AMCS[™] comprises of a powerful sub-system deep within the Kestrel[®] application. “Reporters” include both TCP/IP streaming, and the ability to write to the host sub-system simultaneously, or independently. The SDK provides an open-source API, that includes a graphical Data Visualization Interpreter (DVI), and console mode to recover, process and display the TCP/IP stream. An open source API and SDK is available to AMCS[™] licensed end-users.

AMCS[™] Licensing Activation

On initial connection of a supported receiver with Kestrel[®], a license key request must be generated in the form of a Challenge and Response (CRC)[™] code, and submitted to technical support by the technical operator. The CRC code is provided to the Technical Support (TSG)[™] of Professional Development TSCM Group Inc., and converted into an AMCS[™] specific Activation Security Key (ASK)[™] license, enabling the AMCS[™] capability. This process is necessary, even if the software currently is enabled with a valid license Comprehensive AMCS[™] programming and deployment documentation is available. ✎

AMCS[™] | Kestrel[®] Configuration Script (KCS)[™]

The AMCS[™] sub-system allows the Kestrel[®] Software to be operated in a stand-alone fashion. A configuration file allows autonomous collection to be set up and initiated on application start. Client applications can then connect to Kestrel[®] and obtain continuous TCP/IP measurement data. ✎

1 | Remote Spectrum Surveillance and Monitoring (RSSM)[™] | Setting up a kestrel[®] instance and receiver at a remote location, permits a continuous monitoring data feed, that can be obtained at a secondary monitoring location. Kestrel[®], operating in this mode is suitable for operation on an embedded PC platform, providing a low-cost, and very powerful remote RF monitoring solution. ✎

2 | Data Feed Integration | The remote feed configuration, utilizes an open "xml" style format allowing easy integration with additional data feeds, to provide a richer data stream, and permits the synthesizing of multiple sources into a single data feed. ✎

3 | Alarm and Alerting Integration | The integration of the AMCS[™] capabilities with the unique alarm and alerting architecture within Kestrel[®], provides the capability of obtaining RSSM[™] data, when specific events of interest occur within the ambient RF spectrum environment, thereby reducing the data transmission load, and providing advanced actionable intelligence relating to spectral activity. ✎

4 | Distributed (Managed) Remote Spectrum Surveillance and Monitoring (RSSM)[™] | Integrating multiple instances of Kestrel[®] with AMCS[™] and integrating their independent data feeds, ensures that powerful RSSM[™] solutions can be easily implemented at the facility level, or across national and international geographical collection locations. ✎

5 | Black Box Integration | The ability to utilize RF spectra as a sensory input to an existing black box system, or build powerful analytical solutions can be realized, when the AMCS[™] data feed is combined with other sensory inputs, including GPS, speed, altitude, temperature, RF interference detection, and other required end-user parameters. ✎

IQ Recording | IQ Playback | IQ Loop

The operator is able to Record, Playback, Loop, invoke Time Reference Sub-Sampling (TRSS)™, and save the new file during runtime, and post review and analysis. Controls for | RECORD IQ | PLAYBACK IQ | LOOP IQ | TRSS IQ | SAVE AS | controls are located within the Demodulation Visualizer control group. | RECORD IQ | writes the IQ sample as a proprietary | Kestrel IQ |, | RAW CSV | or | WAV IQ | file format, with a dynamically formatted File Naming Convention (FNC). The | PLAYBACK IQ | capability allows the operator to select a previously captured historical | KIQ |, | CSV | or | WAV IQ | file, and invoke IF visualization, and demodulated audio content | PLAYBACK | within the Demodulation Visualizer control group, without a an SDR radio connected. The | LOOP | feature, allows the IQ sample to run as a repeating | LOOP | to enhance operator analysis (visual and audio content). The Dynamic Source Transfer (DST)™ technology supports the capability of the operator to “hand-off” between live search receiver audio, and the historical IQ file. ✎

RAW CSV IQ | Conversion Utility

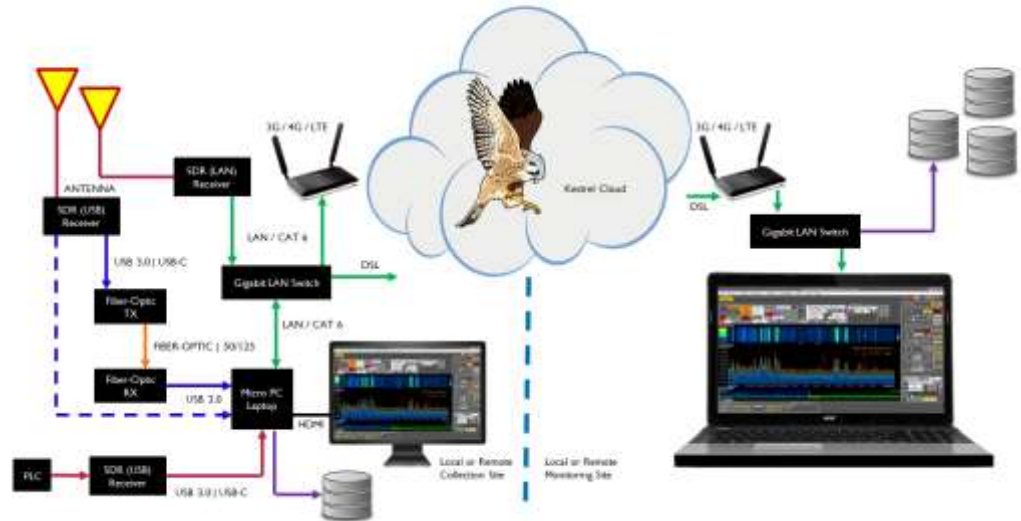
The software includes the ability to convert the | RAW CSV | IQ files to the more efficient, proprietary Kestrel IQ (KIQ)™ format, allowing the operator to convert the larger format files to smaller working files for playback and storage. The RAW CSV files can often be manually reformatted (edited) for compatibility with third-party IQ analyzer resources. Option AEC™ adds the ability to trigger IQ samples. ✎

Bluetooth and WI-FI Detection

The ability of the Kestrel TSCM® Professional Software to acquire and display WI-FI and Bluetooth signals within the immediate target area enables the technical operator to determine whether a signal originates from within the target area, or from outside, locate the emitter, and verify its origin and purpose. The Waterfall Display (WFD) verifies the presence of WI-FI and Bluetooth emitters operating within the ambient spectrum environment. The Kestrel® Channel Profile Mask (CPM)™ provides the technical operator with a clear channel occupancy pattern, down to the channel level for easy analysis. ✎

Kestrel-net™ | Autonomous Measurement and Collection System (AMCS)™

The Kestrel TSCM® Professional Software, and the Autonomous Measurement and Collection System (AMCS)™ in combination, provide the means for the advanced Kestrel-net™ capability, a diverse remote surveillance application for defensive and offensive mission specific requirements, for government entities, regulatory compliance, law-enforcement, corrections environments, and a range of military applications across securely encrypted private communication networks. ✎



Typical TSCM Remote Spectrum Surveillance and Monitoring (RSSM)™ Deployment Profile

Kestrel TSCM® Professional Software | Deployment Methodology

The Kestrel TSCM® Professional Software addresses a major capability gap, by delivering exceptional value, and a full featured, operator centric, and work-flow oriented application that is scalable, flexible and responsive to changing mission requirements. ✎

- 1 | Deploy** | Agile software with extensive TSCM specific features for traditional operator assisted Radio Frequency (RF) analysis; Unattended, managed Remote Spectrum Surveillance and Monitoring (RSSM)™; Basic Test & Measurement; Educational Institutions and Training environments; Spectrum Analysis and Complex Signal Analytics; Testing and Evaluation of offensive Technical Surveillance Devices (TSD), and other RF emitters. ✎
- 2 | Detect and Capture** | Runtime capability of days, weeks, or months; Capture spectrum data for real-time and post-event analysis and review; Manage long-term storage of spectrum data. ✎
- 3 | Analyze and Identify** | Live View Analysis (LVA)™ functions in parallel with real-time data collection; Differential Signal Analysis (DSA)™; Time Differential Signal Analysis (TDSA)™; Receiver Differential Signal Analysis (RDSA)™; Runtime and post event analysis, historical file review, with trace import capability; Export data for post event analysis, utilizing other available resources. ✎
- 4 | Confirm** | Audio and NTSC Video Demodulation capability and real-time visualization and analysis of Signals of Interest (SOI) events. ✎
- 5 | Locate** | Emitter localization is simplified utilizing a Relative Signal Strength Indicator (RSSI) value and basic Radio Direction Finding (RDF) techniques. ✎
- 6 | Neutralize** | Quickly neutralize, and potentially exploit hostile emitters. Terminating the threat is the top priority, analyzing intelligence and exploitation is generally a secondary consideration. ✎
- 7 | Report** | Generate custom, runtime, or post capture, session reports with support for images, photographs, and floor plans, internally generated as an exportable PDF file. ✎

Air Gap Licensing Model | Classified Machines

To meet the mandatory security requirements of many law-enforcement, government, military and national security organizations, the Software Development Group (SDG)™ has implemented an “air gap” licensing process for both generating the Challenge and Response (CRC)™ string and the return Activation Security Key (ASK)™ required to activate the software. The “air gap” solution adds a QR code generator as part of the CRC key request process. The technical operator generates a QR code, rather than the CRC string. A mobile device (smart phone), with an optional QR code reader, can decode the CRC string and send it via the mobile device, creating a secure “air gap” process. Alternatively, the operator can use the mobile device camera to take a picture of the displayed QR code, and email the file to technical support for processing directly from the mobile device. The returned ASK™ can be emailed as a QR code image to the “air gap” mobile device. The target computer camera can then be used to read the ASK QR code image and import the key directly, completing the licensing process. To illustrate this capability, the QR code on the right can be decoded with a QR code reader APP installed on a smart phone. There are many free QR Code readers available for download. Give it a try using the displayed QR code example. This eliminates the need to cut and paste or transfer the CRC and ASK by hand to activate classified computers. ✎

USB Media (CRC | ASK) Transfer

In the event that the target computer is not permitted to be connected to the network. USB media can be used to transfer the CRC and ASK from and to the machine. Other removable media such as an SD card may also be utilized where permitted. ✎

Resident Training Centre (RTC)™

Additional nights of accommodation may be required to accommodate training planning. ✎



Air gap license activation can be accomplished on a mobile device using Kestrel's integrated QR code licensing capability.

**Understanding Licensing Options (Pricing Subject to Change without Notice)**

The Kestrel TSCM® Professional Software licensing model provides all updates, new releases, and free email based technical support within the same generational software version (v1.0xx, 2.0xx and 3.0xx), purchased, for example.

Most of the key software functionality is included as standard features within the base software, referred to as OPT KTP. However, there are also a number of options, that add significant mission specific capability for specialized deployment requirements.

Standard Software License

- Kestrel TSCM® Professional Software (Dual Radio Ready) | [OPT KTP](#) | [Call for ComSec for Price](#)
- Additional Radio Support | Activation Security Key (ASK)™ | [OPT ASK](#) | [Call for ComSec for Price](#)

Available Options

- Autonomous Measurement and Collection System (AMCS)™ | [OPT AMCS](#) | [Call for Price](#)
- Dynamic Trace Autonomous Platform (DTAP-GPS)™ | [OPT DTAP-GPS](#) | [Call for Price](#)
- Kestrel Central Visualizer | Remote Radio Management (KCV-RRM)™ | [OPT KCV-RRM](#)
- Digital Signal Protocol Visualizer (DSPV)™ | [OPT DSPV](#) | [Call for Price](#)

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