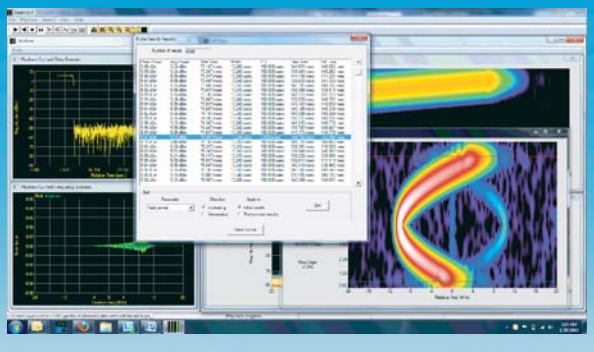

A Bird Technologies® Company

Spectro-X

Signal Analysis Toolkit

Spectro-X is versatile software that allows users to visualize and analyze up to four recorded RF signal simultaneously. It is a valuable tool for system and test engineers developing and analyzing conventional and AESA radar, ELINT, SIGINT, ECM, ESM, multi-channel communications, telemetry, and MIMO systems.

Using the comprehensive set of tools available within Spectro-X requires no programming and can dramatically reduce the time needed to find and analyze RF anomalies and quantify signal behavior over time.

Recordings can be from microseconds to days in duration. Signals can be captured over the air using X-COM's IQC5000B or an IQC91000A Signal Record and Playback Systems as well as recordings made using other systems. Playback files can contain recorded signals or signal files created in The Mathworks' MATLAB® or other popular 3rd party VSA software

Three discrete search engines (carrier, arbitrary waveform, and pulse), within Spectro-X allow users to"zoom in" to specific sections of capture files in frequency, time, or both to locate signals of interest. Results in frequency and time are displayed graphically simultaneously. Selected portions of large recordings can be exported in file formats usable by vector signal analysis software for demodulation and detailed analysis. Spectro-X can operate on signal files of unlimited size and duration.

Pulse waveforms can be characterized by their rise and fall times, pulse width, pulse repetition interval, peak and average power, and carrier frequency. Spectro-X, when used with X-COM's Graphical RF Signal Editor software, allows users to edit signal data, insert new spectra and waveforms, modify spectrum in the frequency domain, and combine signals to create complex spectra with any combination of any type of signals. The system allows users to create a dynamic spectrum environment that can contain one, dozens or even hundreds of different signals.

FEATURES

- Simultaneously view and analyze up to 4 signal files (channels), with each channel displayed in frequency, time, and magnitude plots chosen by the user.
- Play back all or a portion of a file.
- Files can be played forward or backward, paused, or stepped in any direction with adjustable playback speed.
- Visualize the amplitude summary of entire capture files.
- Zoom into specific portions of a file to quickly identify time segments of interest for analysis.
- No limitation on file duration.
- Single or multiple display environment.
- User-adjustable channel playback time offsets with sub-sample precision.
- Unlimited number of user-placed and adjustable measurement markers (crosshair or plot-spanning) per plot. User can link markers in common domains across plots within channels.
- User-defined marker math to measure time and frequency differences within or between channels.
- Static time domain or spectrogram plot can be viewed at any marker location.
- Files can contain IRIG-B and GPS time and position stamps.
- Zoom within any plot applies to all other plots in that channel.
- Zoom parameters can be applied to single or multiple channels.
- View Spectrogram and View Time Domain Plots windows provide high-resolution snapshot of transient events .
- Pulse Search characterizes the pulse trains using pulse descriptor words (PDW).
- Carrier searches can be used to identify all stationary carriers over a specified time range.
- Arbitrary Waveform Search will identify unique waveforms from a single reference or a library of signals
- GSM, EDGE, Wifi, and some types of LTE can be identified using Wave form Search with the supplied reference waveforms.
- Accommodates capture-on-trigger files with time discontinuities in the file.
- Support for multiple input and export file types.

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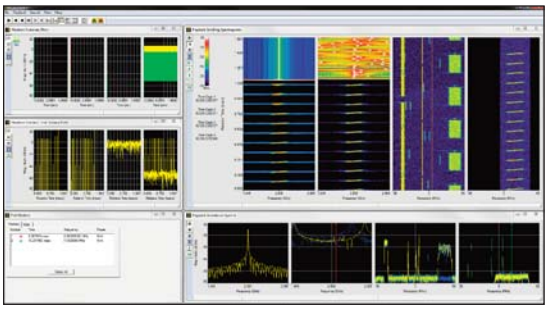
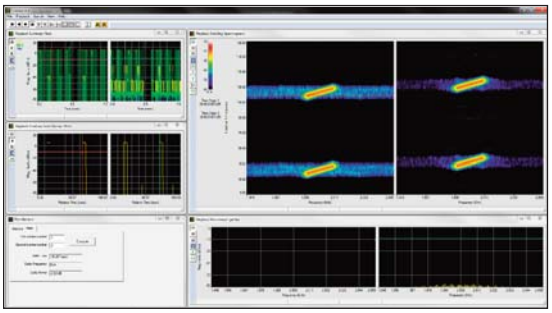
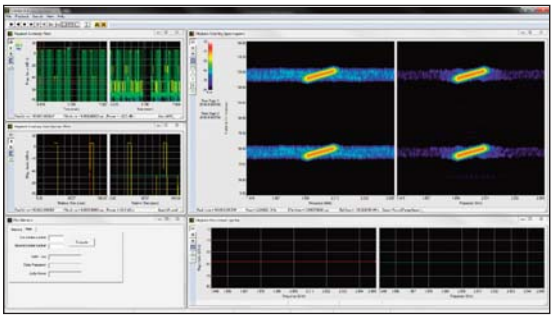


Simultaneously view and analyze up to four signal files (channels).
The user can choose frequency, time, and magnitude plots for each channel.

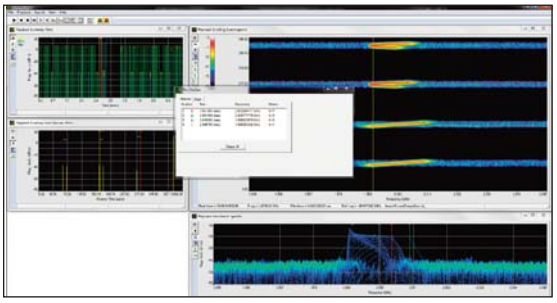


Before playback offset (measured channel 1 to channel 2 time offset of 10 µs).

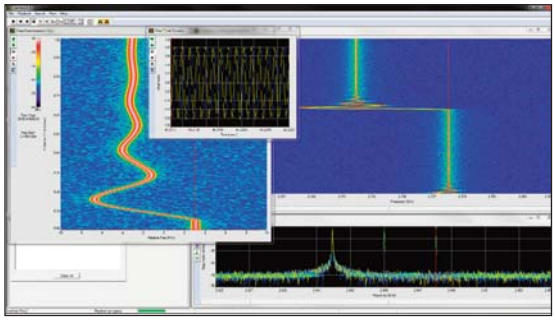


After channel 2 playback offset of 10 µs.

User-adjustable channel playback offsets provide subsample precision.

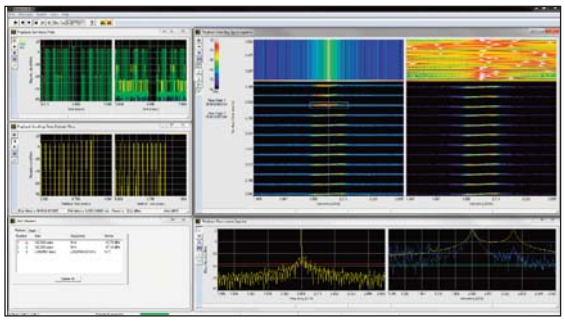


User-defined marker math allows time and frequency differences to be measured within or between channels.

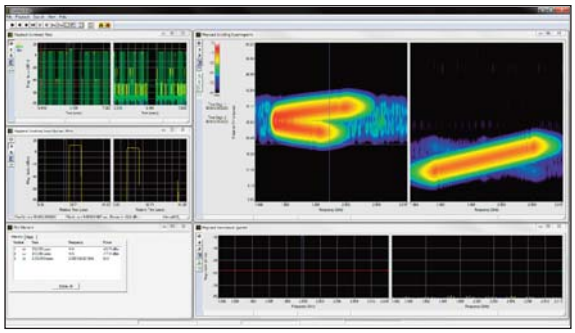


Spectrogram time windows positioned in time and frequency by marker placement.

View Spectrogram and View Time-Domain Plots provide high-resolution, with finely detailed snapshots of transient events.

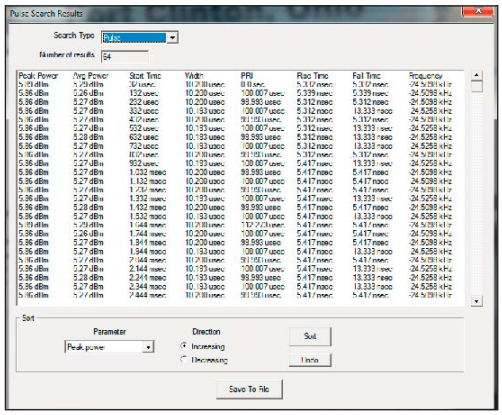


Before Zoom

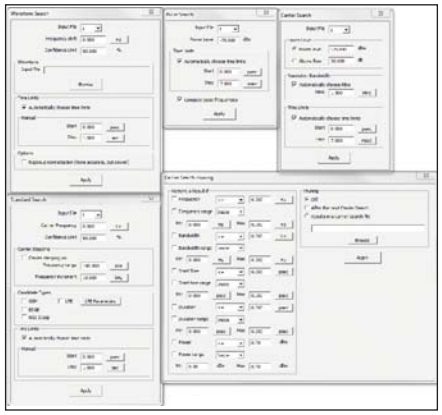


After Zoom

Zoom within any plot applies to all other plots in that channel. Zoom to examine waveforms in greater detail. Zoom parameters can be applied to single or multiple channels.



Pulsed waveforms can be searched for and characterized by their rise and fall times, pulse width, pulse repetition interval, peak or average power, or carrier frequency.



Discrete search engines are available for locating carrier, wireless standard, and arbitrary waveforms.

SPECTRO-X SPECIFICATIONS

CARRIER SEARCH	
Types	CW and stationary modulated carriers.
Options	Power: ≥dBm, dB above noise floor. RBW: auto select, user-selectable. Search windows: Start time, stop time relative to start time.
Results	Number of matches, carrier frequency, bandwidth, start time, duration, power, save results. Prune results: from saved results file, next search. Prune IF (matching carrier): frequency, bandwidth, start time, duration, or power (≥ or ≤ user-specified value), inside or outside user specified range.
WAVEFORM SEARCH	
Types	Search against a library of user-defined reference waveforms, I & Q Time domain matching .
Options	Correlation level, high selectivity filter, reference waveform (one or many), frequency shifting modes (auto or manual), time parameters. Reference waveform at f1, capture file at f2, shift (f2-f1). Included Waveforms EDGE, IEEE-802.11a/g, LTE, normal, extended prefix, 1.4, 3, 5, 10, 20 MHz.
Results	Number of matches, carrier frequency, start time, confidence, Waveform File
PULSE SEARCH	
Types	Search and quantify pulsed waveforms in capture file.
Options	Detection threshold power level, start and stop time for search, compute pulse frequencies, smoothing number of points.
Results	Peak power, average power, start time in file, width, PRI, rise time, fall time (10% to 90% referenced to detection threshold power level, phase, frequency. Sort results by any results parameters. Prune results: from saved results file, next search. Prune (matching pulse): peak power, average power, start time, width, PRI, and frequency (≥ or ≤ user-specified value), inside or outside user specified range).
ZOOM FUNCTIONS	
Analysis windows	Left mouse click and drag to define zoom box, expand X and Y axes to limits of box, zoom/unzoom and plot type.
Playback input	Zoom box defines start and stop times of next file playback.
PLOT TYPES	
Playback time overview	Magnitude versus time, for entire file
Scrolling time domain	Magnitude versus time, for current playback view
Current time domain	Magnitude versus time, phase versus time, unwrapped phase versus time, imaginary versus time, real and imaginary versus time.
Scrolling or static spectrogram	Time versus frequency with color-coded power, time in vertical access waterfall display with most recent time on top, power displayed as color gradient, user-selectable range of power display.
Persistence spectrum	Visual accumulation of magnitude versus frequency over time, user-selectable persistence decay rate (infinite, slow, medium, fast).

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SPECTRO-X SPECIFICATIONS CONTINUED

FILE PLAYBACK	
Direction and speed	Playback time overview, play, reverse, stop, jump, double speed, half speed. Minimum time increment (441 x sample rate).
Time and scaling	Program auto-select or user selectable playback start and stop times, time increment, jump time, spectrogram Y axis plot size, persistence spectrum Y axis plot size. Frequency domain plots (upper and lower frequency limits, absolute or relative center and span, number of points between limits). Resolution bandwidth and resolution time width, magnitude (maximum and minimum values).
DATA ACCESS	
Input	.xdat, .xiq, .bin, .tiq and columnar ASCII (.txt or .csv)
Save and copy	Search results, program setup, intermediate spectrogram, persistent spectrums. Copy and plot any main window as JPG file.
Export	.xdat, .xiq, .bin, .tiq and .mat with selectable time parameters, filtering, frequency shifting, and/or decimation.
HARDWARE REQUIREMENTS	Windows 7 PC (64-bit), 120 Mbytes available on OS drive (>100 GB recommended for storage of playback files), 2GB RAM minimum.

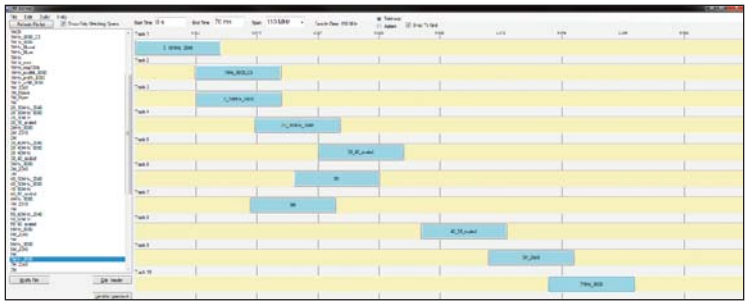
RELATED X-COM PRODUCTS

IQC5000B Record and Playback System

The IQC5000B series is the smallest, lightest, best-performing system available for the capture and replay of RF and microwave signals for mission-critical applications. Weighing less than 10 lb. and measuring only 5.25" H x 12" D x 10.5"W, the IQC5000B Series systems can record and play back one or two independent channels of signal activity up to 165 MHz in bandwidth from HF through millimeter wavelengths

RF Editor Signal Editing Software

RF Editor is a drag-and drop graphical editing tool that easily modifies I&Q signals of any length and creates entirely new ones. Users can modify and build signal waveforms in the time and frequency domains, make frequency domain signal modifications and move any signal or slice of spectrum anywhere among 10 time-domain tracks in the recording. Snippets of recorded data can be dragged and dropped onto any track and delayed, filtered, and shifted in frequency before playback.



ADDITIONAL SPECTRO-X RESOURCES

- Demonstration videos
- 30-day software trial
- RF Editor RF signal editing software data sheet
- IQC5000B series brochure

ORDERING INFORMATION

Description	Order Number	Additional Information
Spectro-X Signal Analysis Toolkit	Spectro-X	includes CD

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