RF*Hawk*™ Signal Hunter

Scan - Classify - Locate

Handheld Signal Hunter providing unique signal scanning, classification and location capabilities.

- Very fast update rates to capture short duration events
- Quick and simple classification of *legitimate* signals for exclusion
- Rapid targeting of *illegitimate* signals with field-proven signal hunting, mapping and documentation tools

Overview

The Tektronix® H600 RF*Hawk* will quickly scan the RF environment, classify the known signals and help you locate the unknown signals with its field-proven signal hunting tools. It is a handheld, rugged, battery operated RF signal hunter with an intuitive set of field signal hunter tools that are matched to the task. It allows for quick scanning of the RF environment, simple, reliable classification of legitimate signals for exclusion and gives you field-proven signal hunting, mapping and documentation tools. The RF*Hawk* has surveillance grade hardware featuring an outstanding noise figure and the sophisticated tools necessary to rapidly scan, classify and locate illegitimate analog and digital RF transmission sources in the field.

Features & Benefits

- Scan
  - Benchtop Spectrum Analyzer performance in a battery-operated field unit
  - Input Frequency Range to 10kHz-6.2GHz to cover most modern signal sources
  - Excellent sensitivity for detecting very low level signals with -153 dBm DANL at 10 Hz RBW
  - User interface designed for field conditions

- Classify
  - Match signals to known standards using frequency, bandwidth and other criteria
  - Expert-system help with on-screen profile masks for quick frequency offset estimations
  - Flexibility to upgrade databases
  - Examine cyclo-stationary make-up of a given signal to look for specific cyclic components

- Locate
  - Hunts outdoor signals by plotting measurements directly into GPS-integrated geo-referenced maps
  - Hunts in-building signals with a Tap-and-Walk-and-Tap interface
  - No need to return to the office for analysis of difficult problems

- Handheld form factor
  - Field Tested
  - Rugged
 - Touch Screen for intuitive use
  - Long battery life

Tektronix®
Communications

RF*Hawk*: Scan, Classify, Locate

RF*Hawk*

Evolving digital wireless communication standards pose an unprecedented challenge to the surveillance and security community. For this community, identification of unknown signals and determining their precise location has traditionally been accomplished using a combination of lab-grade spectrum analyzers, handheld spectrum analyzers, oscilloscopes and off-line analysis capabilities using PCs. When lab equipment is used in the field, several limitations appear. Such instruments are not meant for field use, can be easily damaged, are not portable and require AC power. Signal classification using these systems often requires a lot of prior knowledge about these signals, particularly when they are digital. With such systems the unknown signals can be difficult or impossible to identify.

Scan

Scanning the RF spectrum allows users to spot which signal emitters are in the area. Of particular interest are signals that are present in the spectrum today but were not present yesterday. New signals with significant power are usually the first candidates for further analysis.
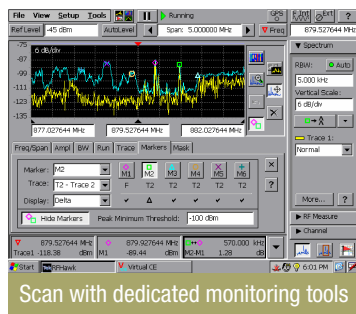
Scan with dedicated monitoring tools

Weak signals can also be of interest particularly when they are close to strong signals. The RF*Hawk* makes scanning easier by quickly logging signals that are weak, bursty, hopping, time multiplexed, or intentionally sporadic. It uses trace math, a trace mask and a spectrogram display to do these tasks. It also takes advantage of the FFT-based spectrum analysis capability to allow the users to see the true shape of the signal even when the signal is bursty. Masks can be automatically created from traces captured earlier. You can compare this mask to the current trace and if a mask violation occurs, the trace is logged. Finally, when the spectrogram is paused, users can scroll through the spectrogram's time-axis and view the results.

Classify

Once signals of interest are found, it becomes necessary to identify and classify each of them. Are they authorized, legal signals, or are they illegitimate, malicious signals? Digital signal classification can be a
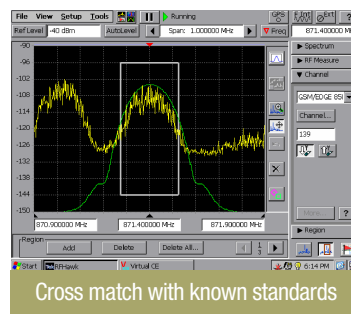

Cross match with known standards

particularly difficult part of the signal hunter's job requiring extensive knowledge of signal characteristics. The signal may be weak, subject to fading or intermittent conditions. In addition antenna position may be sub-optimal. All of this makes classification of signals more challenging when using traditional signal identification tools. The RF*Hawk* provides advanced algorithms that are capable of classifying signals that cannot be analyzed with other methods.

The RF*Hawk* offers unique expert systems guidance to aid the user in classifying signals. It provides graphical tools that allow users to quickly create a spectral region of interest, enabling users to identify and sort signals efficiently. The spectral profile mask, when overlaid on top of a
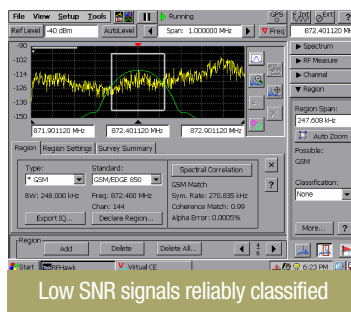

Low SNR signals reliably classified

trace, provides signal shape guidance while frequency, bandwidth, channel number, and location are displayed allowing for quick checks. In-depth analysis is provided by a Spectral Correlation Density (SCD) measurement which will spot hidden cyclo-stationary components. SCD provides information on how well the framing, time slot, chip rates and other internal signal rates match the rates of a valid signal.

It is faster than manual signal identification techniques, does not require prior knowledge of the signal, and is robust when working with poor signals. SCD tolerates a poor SNR, large carrier frequency offset and fading.
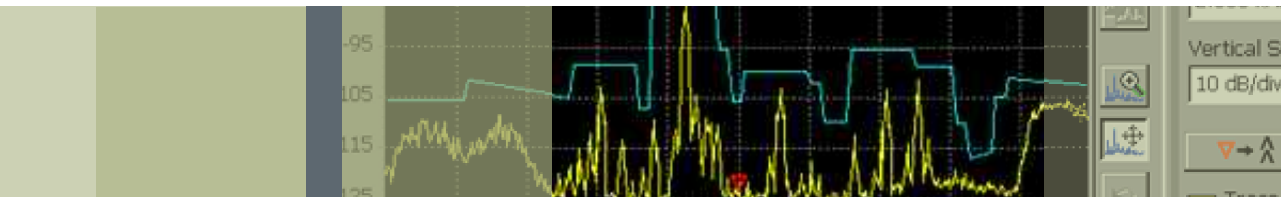
Locate

Once the signal has been identified as a threat, the RF*Hawk* provides various field-proven signal-hunting tools to locate the offending signals. For the easier to find signals, the signal strength meter produces tones that vary with pitch as a function of the strength of this signal. This allows the operators to look for signals while watching their surroundings, not the screen.

For signals that are harder to find, such as signals influenced by multipath, fading, low signal strength etc, the RF*Hawk* provides several signal mapping tools to facilitate hunting for these signals. Analyzing mapped signals is a quick way to find signals that can be difficult to find otherwise. The mapping capability is also a way to document what you have found. Traces can be recorded on a map either manually or automatically. Built-in GPS can be used to automatically record signal position and time data as the operator moves. For indoor use, a unique tap-and-walk interface provides signal mapping capability. Color-coded icons automatically record the relevant measurements based on pre-set thresholds for acceptability.
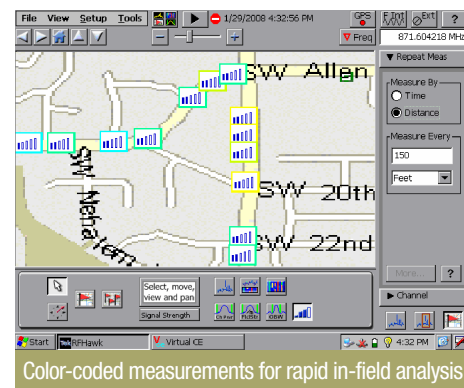
Color-coded measurements for rapid in-field analysis

Characteristics

Frequency Characteristics
Input Range:
  10kHz to 6.2GHz
Internal Frequency Accuracy
(Time base Error):
  ±0.5 ppm
Resolution Bandwidths:
  10Hz to 3MHz, 1Hz steps
Phase Noise:
  -95 dBc/Hz @10kHz offset
  -97 dBc/Hz @ 100kHz offset

Amplitude Characteristics
Accuracy:
  ≤ 1.2 dB,1 MHz to 3.2 GHz, preamp off
  ≤ 2.4 dB, 10 MHz to 3.2 GHz, preamp on
  ≤ 1.8 dB, 3.2 GHz to 6.2 GHz, preamp off
  ≤ 3 dB, 3.2 GHz to 6.2 GHz, preamp on
Reference Level:
  +20 dBm max
Signal Related Spurious Response:
  2nd harmonic better than –60 dBc
DANL:
  10 MHz to 2GHz: -153dBm @10Hz RBW
Noise Figure:
  11dB to 2 GHz, up to 19 dB at 6.2 GHz
  (with preamp)
Amplitude Display:
  10 divisions; 1 to 15dB per division.

General
RF Input Overload Protection:
  15 W rms between 3.2 GHz and 6.2GHz
  50 W rms below 3.2 GHz
Battery Life:
  5 hours for continuous Spectrum Mode (with optional second battery). Actual life can be higher depending on usage.

Inputs
RF:
  50 Ω, type N female.
External Frequency Reference:
  1500 Ω, type BNC (f).
  $freq_{in}$ = Any multiple of 1 MHz up to 20 MHz ± 1 ppm in 1 MHz steps

Displays:
Spectrum / Signal Classification / Mapping

Traces:
Two active traces; each can be in Normal, Average, Min Hold, Max Hold or Min/Max Hold mode

One Math trace that supports the sum or difference of between any two enabled waveform traces

Two Reference traces which can be created from any live waveform (Trace 1, Trace 2, or Math), or loaded from a saved waveform

Markers:
7 available markers

General Purpose Measurements:
Audio Demod / Channel Power / Field Strength
Occupied Bandwidth / Signal Strength

Map Types Accepted
Google Maps
Microsoft Map Point
USGS DLG (*.opt) (PC based converter provided)
MapInfo (*.mif)
ESRI ArcInfo Shape (*.shp) (PC based converter provided)
Bitmaps (*.bmp)
RF Hawk map with results (.zip)

Physical Characteristics
Operating Temperature:
  Specified temperature range: 0 °C to 50 °C
Functional temperature range:
  –10 °C to +50 °C
Storage Temperature:
  –40 °C to +60 °C
Weight:
  12.27 lbs
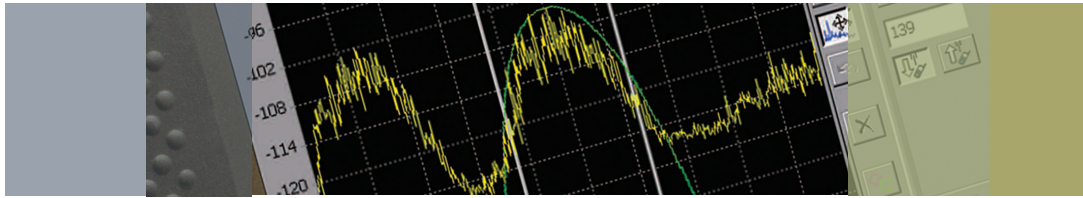
Ordering Information

H600   RF***Hawk*** Signal Hunter with built-in GPS (includes GPS antenna)

Warranty
- One Year on parts and labor

Language Options
- H600 L0   English manual

Standard Accessories
- H600 RFHawk Quick Start User Manual
- H600 RFHawk installation software
- AC Power Adapter
- Lithium-Ion Battery
- GPS Antenna
- Tilt stand
- Soft carry case
- BNC Connector cover (2)
- N Connector cover (1)
- Audio jack mute plug (mute all audio output from the instrument speaker)

Service Options
- H600 R3   Repair Service 3 Years (including warranty)
- H600 R5   Repair Service 5 Years (including warranty)
- H600 C3   Calibration Service 3 Years
- H600 C5   Calibration Service 5 Years
- H600 CA1   Provides a single calibration event or coverage
- H600 D1   Calibration Data Report
- H600 D3   Calibration Data Report 3 Years (with Option C3)
- H600 D5   Calibration Data Report 5 Years (with Option C5)

Power Options
- H600 L99   No Manual Power Options
- H600 A0   North America
- H600 A1   Universal EURO
- H600 A10   China
- H600 A11   India
- H600 A2   United Kingdom
- H600 A3   Australia
- H600 A5   Switzerland
- H600 A6   Japan
- H600 A99   No Power Cord or AC Adapter

Suggested RF***Hawk*** Accessories

- **Antenna**

Beam Antenna, 824 to 896 MHz: Order 119-6594-00
Beam Antenna, 896 to 960 MHz: Order 119-6595-00
Beam Antenna, 1710 to 1880 MHz: Order 119-6596-00
Beam Antenna, 1850 to 1990 MHz: Order 119-6597-00
Magnetic Mount Antenna, 824 to 2170 MHz: Order 119-6970-00 (needs adapter 103-0449-00)

- **Filters**

Pre-Filter, General Purpose, 824 to 2500 MHz, Type-N (f) Connector – Order 119-7246-00
Pre-Filter, General Purpose, 824 to 6200 MHz, Type-N (f) Connector – Order 119-7426-00

- **Cables**

Cable, 50 Ω, BNC (m) 3 foot (91 cm): Order 012-0482-00
Cable, 50 Ω, Straight Type-N (m) and angled Type-N (m) connector, 1.6 foot (50 cm): Order 174-4977-00
Cable, 50 Ω, Type-N (m) to Type-N (m) connector, 3 foot (91 cm): Order 174-5002-00

- **Misc**

External Charger: order 119-6030-00
AC Power Supply: order 119-6984-00
DC Vehicle Adapter: order 119-6028-00
Lithium-Ion Battery: order 146-0151-01
Display Protector Sheets (5): order 016-1882-00

About Tektronix:

Tektronix has more than 60 years of experience in providing network operators and equipment manufacturers a comprehensive and unparalleled suite of network diagnostics and management solutions for fixed, mobile, IP and converged multi-service networks.

These solutions support such architectures and applications as fixed mobile convergence, IMS, broadband wireless access, WiMAX, VoIP and triple play, including IPTV.

For Further Information:

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology.

Please visit www.tektronix.com/communications

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