



TruTOF[®] HT High Throughput TOFMS

LECO's TruTOF[®] HT TOFMS

High Throughput Time-of-Flight Mass Spectrometer



The solution to your analytical challenges

The TruTOF HT TOFMS combines LECO's benchtop Time-of-Flight Mass Spectrometer (TOFMS) with ChromaTOF[®] software to provide revolutionary Time-Compressed Chromatography, Automated Peak Find, and True Signal Deconvolution[®] in a high throughput, benchtop GCMS. No other benchtop system can match the TruTOF HT TOFMS for speed and accuracy, with the reliability you expect from LECO.

ChromaTOF Workstation

- Windows[®]-based platform
- High-speed processor
- Large data storage capacity
- Remote diagnostics

TruTOF HT TOFMS

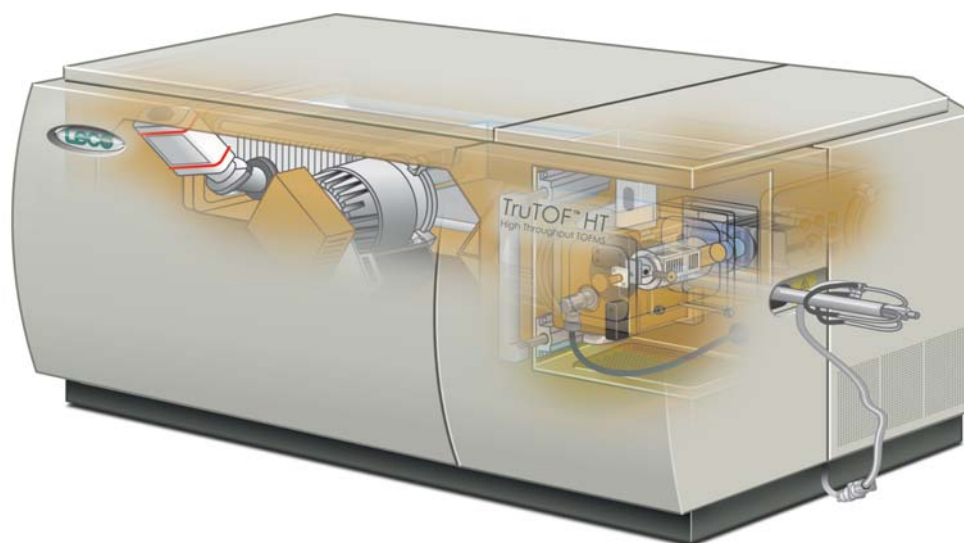
- Fast spectral acquisition rate (80 Hz)
- Electron ionization (EI) and chemical ionization (CI) sources
- Reliability you expect from LECO



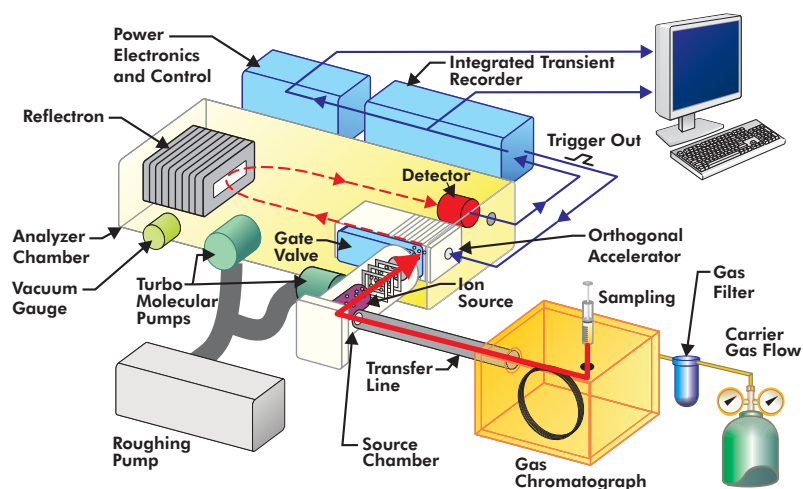
Patents include no. US4490806, US5175430, US5367162, US5712480, IT1167562, WO9220435, WO8304326, WO9500236, EP540720, CA1225155. Other patents pending.

The Power of LECO TOFMS

Features	Benefits
Benchtop design	Affordable GC-TOF capabilities • High throughput in a space-saving package Full-range mass sensitivity superior to SIM
Isolated Ion Source (Gate Valve)	Plug & play ion source for faster source swapping, automatic source identification and improved productivity
Full-range mass sensitivity	2 µg of Hexachlorobenzene on column produces signal-to-noise ratio >10 at mass 284 (EI) 10 µg of Benzophenone on column produces signal-to-noise ratio >10 at mass 183 (CI) Accomplish target and unknown analyses in one run
Linear dynamic range of 4 orders of magnitude or more	Analyze and quantitate real-life samples of varying concentrations in matrix, reducing the need for time-consuming dilutions & re-analysis
Electron (EI) and Chemical (CI) Ionization sources	Offering you the option between comparison with classic NIST spectra (EI) and superior preservation of the molecular ion (CI)
ChromaTOF software	Automated Peak Find and True Signal Deconvolution for fast/easy data analysis and clean library searches Custom report generation Comparison feature for fast and easy sample analysis and the ability to quickly determine quality lots
Integrated control from ChromaTOF software	GC unit • Multiple sample-handling accessories available including LEAP, Gerstel, and Agilent Remote start, contact closures for other instrumentation • Total system automation for maximum productivity
EPA Reporting Software	CLP-style reports • Fully customizable • Fully integrated within ChromaTOF



TruTOF HT Diagram



High Throughput GCMS

High throughput is the key to increased profitability and faster results. The need for SIM-mode operation and low dynamic range associated with traditional quadrupoles and ion traps take precious time and money away from your laboratory's bottom-line. The TruTOF HT combines another LECO fast acquisition mass spectrometer (80 Hz) with patented data-mining algorithms to produce the speed and resolution necessary to accomplish Time-Compressed Chromatography at an affordable base price.

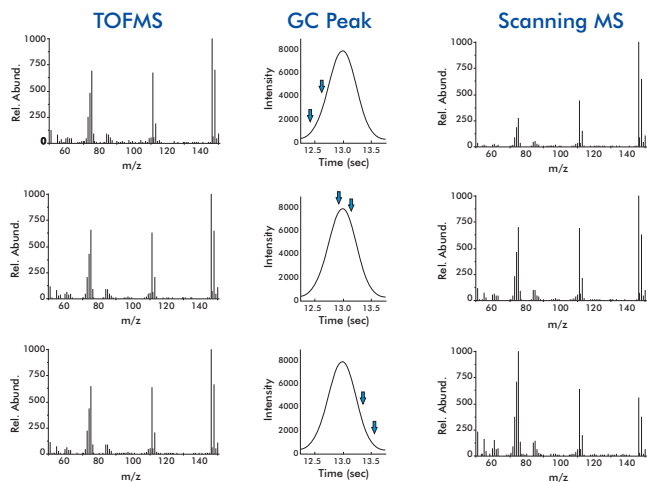
- Greater sample throughput by reducing run times
- Less sample degradation
- Faster method development
- No statistical under-sampling (associated with scanning detectors)
- Automated Peak Finding and True Signal Deconvolution

World's Fastest Benchtop Mass Spectrometer

Up to 80 full-range mass spectra/second (80 Hz)

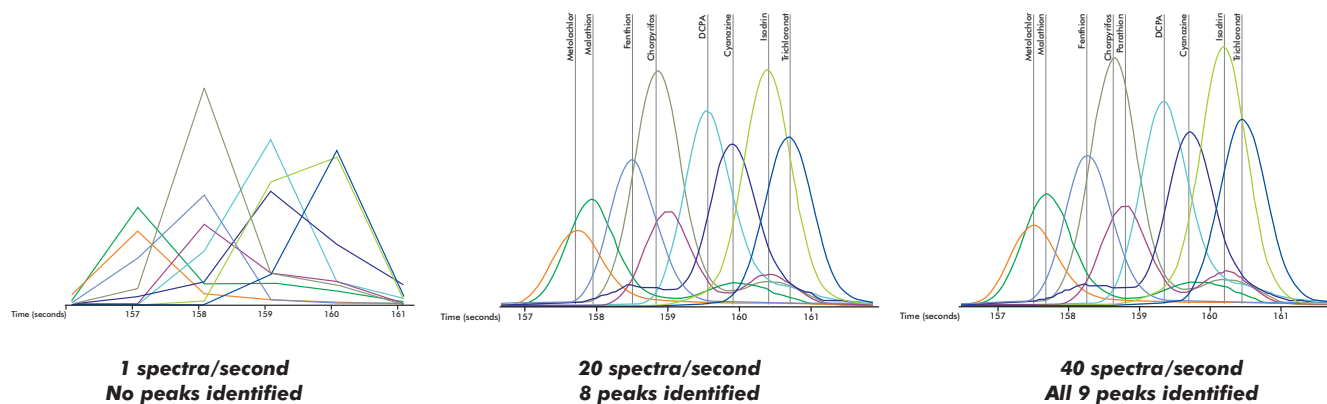
It is well agreed upon in the scientific community that a minimum of 10 data points across a fully-resolved chromatographic peak are needed for proper peak definition. However, 18-20 points are required for Automated Peak Find, True Signal Deconvolution, and proper peak identification and quantification in complex samples. Given that the TruTOF TOFMS detector is the only MS detector in its price range capable of collecting more than 50 full-range mass spectra/second; it is the ideal detector for **Routine GC Analysis and High-Speed GC**. With user-defined collection rates up to 80 Hz, the TruTOF TOFMS can deliver sufficient data density to accurately characterize GC peaks and increase productivity.

Spectral Continuity



An inherent advantage of TOFMS with time-array detection is the complete absence of ion concentration biasing (spectral skewing). With scanning instruments, the concentration in the chromatographic peak, and thus in the MS ion source, changes for each mass during a scan. If the concentration change is significant, spectral deconvolution of unknown peaks with significant chromatographic coelution is unreliable. TOFMS overcomes this limitation and provides skewed-free spectra across the entire peak.

Effect of Acquisition Speed on Automated Peak Find



**1 spectra/second
No peaks identified**

**20 spectra/second
8 peaks identified**

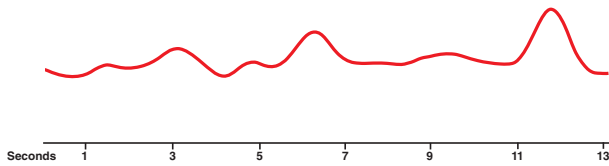
**40 spectra/second
All 9 peaks identified**

In this example, the ability to acquire data greater than 20 spectra/second (20 Hz) is necessary for automated peak identification and deconvolution of all 9 pesticides in this mixture.

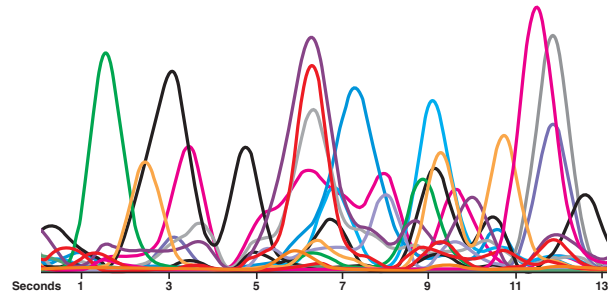
Acquisition Speed without Spectral Continuity=Limited Deconvolution
Spectral Continuity without Acquisition Speed=Limited Deconvolution
Acquisition Speed and Spectral Continuity=True Signal Deconvolution!

Automated Peak Find and True Signal Deconvolution[®]

Automated Peak Find



8 peaks are observed in this 13-second interval of the TIC.

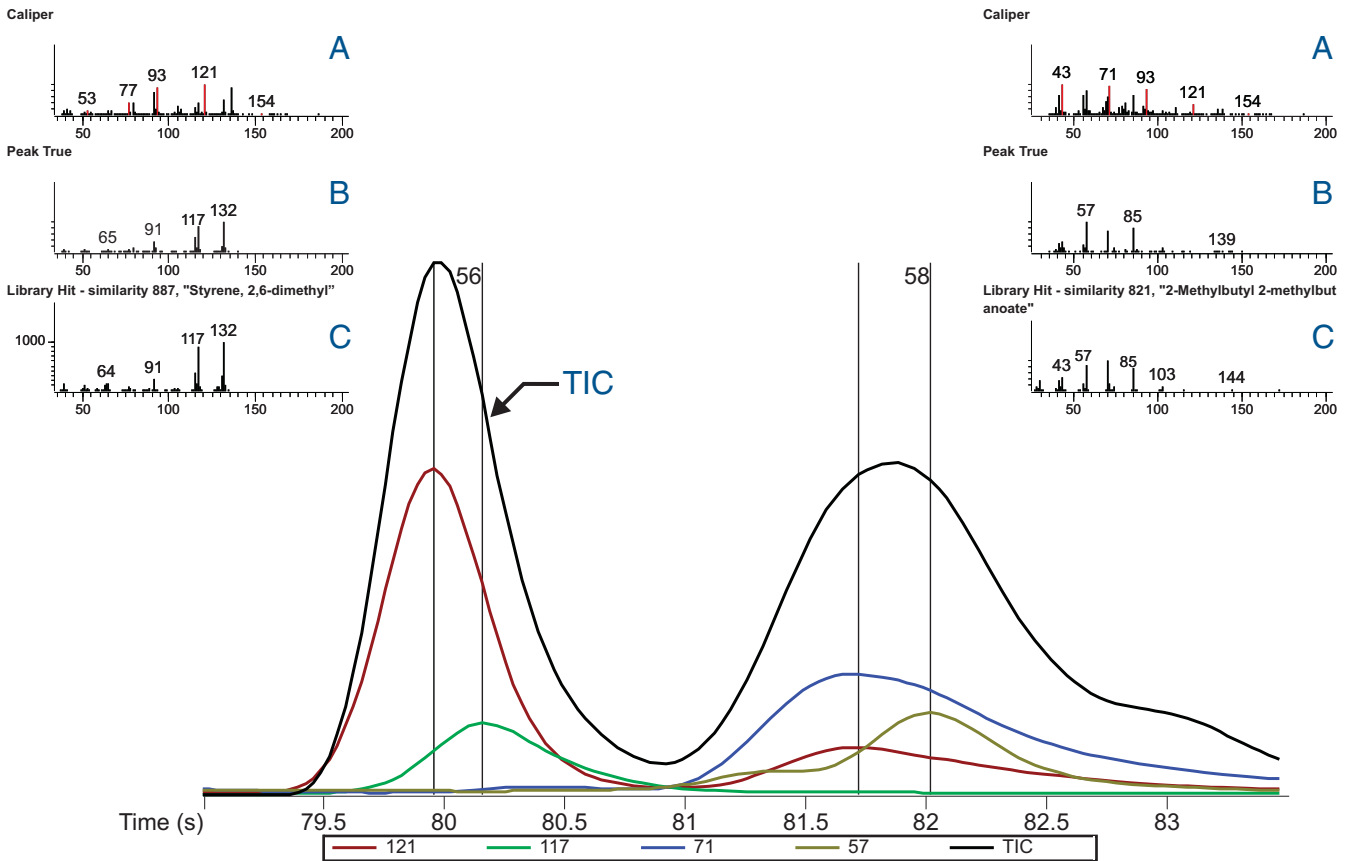


The Peak Find algorithm automatically detects 21 analytes in the same 13-second section of the chromatogram.

Detecting low-level unknown analytes is an extremely difficult task. Typically, the analyst is left to search the Total Ion Chromatogram (TIC), looking for small deviations in the baseline. The more complex the sample matrix the greater the background signal encountered in the TIC, causing the unknown analytes to be quickly lost in the background.

The Peak Find algorithm automatically locates all peaks in the chromatogram, when provided with only an expected chromatographic peak width and a signal-to-noise threshold. Coeluting analytes, peaks buried beneath the background of the TIC, and even small peaks buried beneath large matrix interferences are automatically detected and reported.

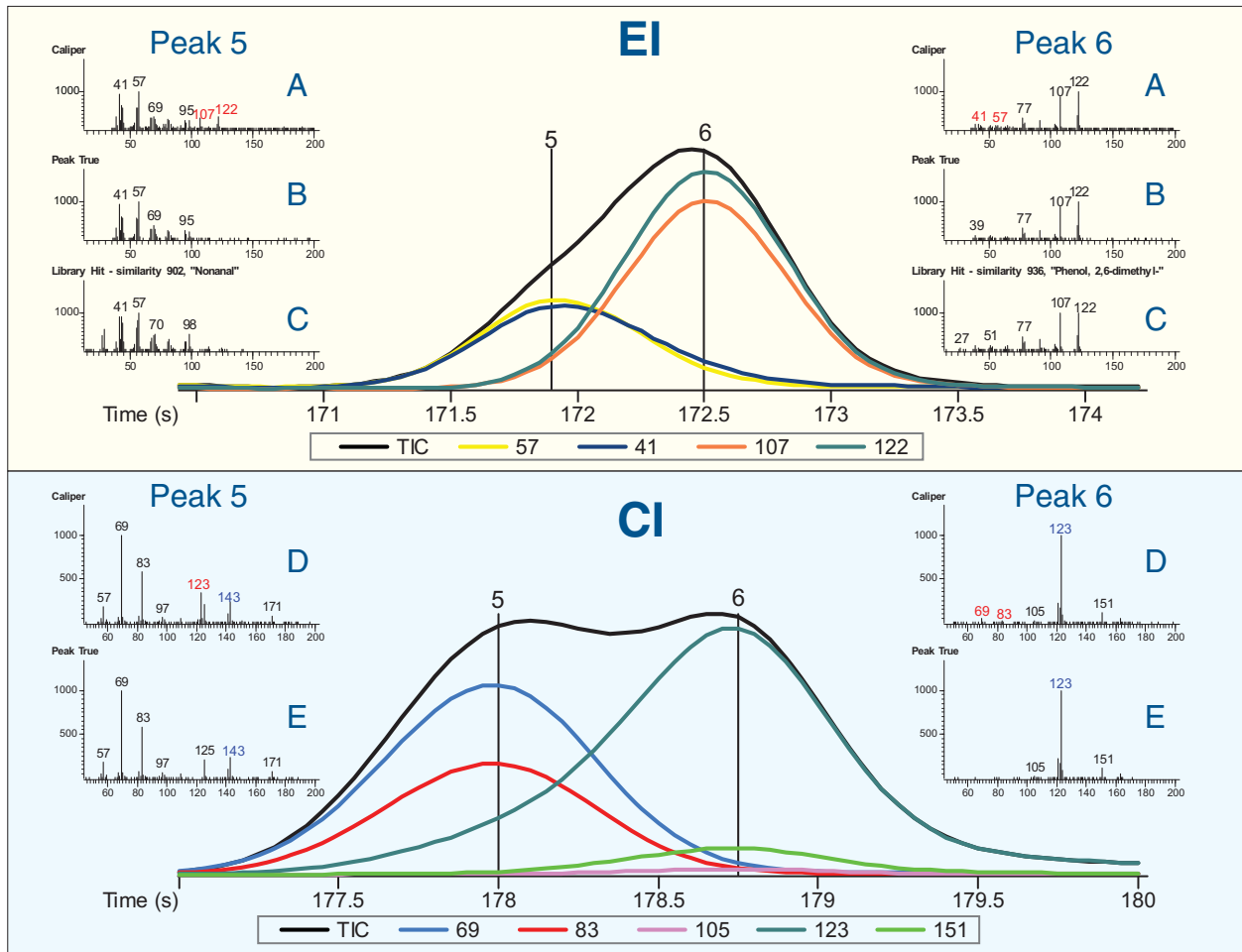
True Signal Deconvolution (TSD)



Shown for peaks 56 and 58 are the caliper (A), deconvoluted Peak True (B), and corresponding library spectra (C). True Signal Deconvolution automatically removes background signal from the caliper spectrum resulting in the deconvoluted Peak True spectrum. The Peak True spectrum is then used for peak identification by automatically comparing against standard libraries (commercially-available or user-developed). In this spearmint oil sample, deconvolution has allowed for the identification of peaks 56 and 58 though they coelute with other analytes in the sample. Notice the removal of shared signal in the caliper spectra (marked in red).

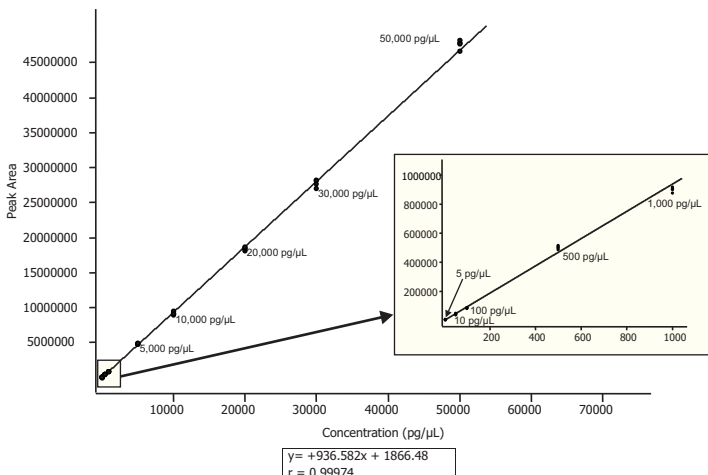
True Signal Deconvolution® (TSD®)

After the Automated Peak Find algorithm has located all of the analytes, a mass spectrum for each analyte is automatically extracted free of interferences from the system background, matrix background, and coeluting analytes using True Signal Deconvolution. Even ions that are shared between coeluting analytes are accurately proportioned to provide you with a complete mass spectrum. The resulting spectrum is then used for analyte identification by spectral interpretation or by library search using any number of commercially available or operator-prepared databases.



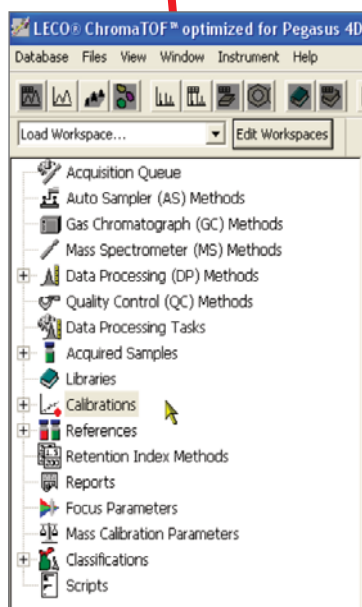
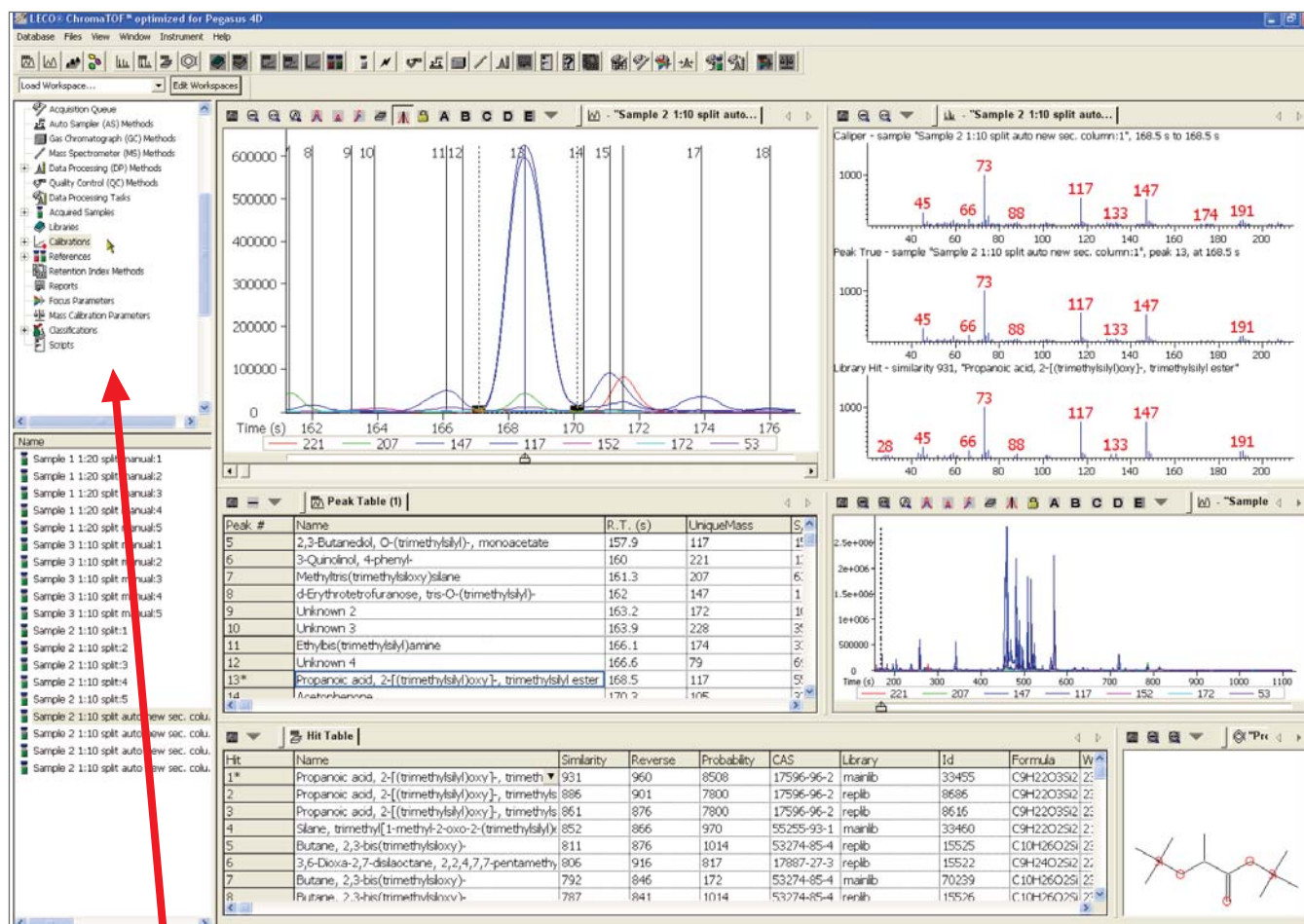
Within the 3-second time window of the above chromatograms, the benefit of True Signal Deconvolution becomes apparent. The same sample analyzed under both EI and CI conditions produced a coelution between peaks 5 and 6. The top chromatogram shows the coelution under EI conditions with the unique ions for each component clearly visible in the caliper spectra (A). The Peak True spectra (B) for both components clearly shows the removal of the coeluting compound's unique ions (in red) after deconvolution and the resulting match with the NIST library (C). The bottom chromatogram shows the coelution under CI conditions. Again the unique ions of the coeluting compound have been removed by deconvolution as shown in the Peak True spectra (D). Additionally, CI has allowed for the visibility of the protonated molecular ions (in blue).

Dynamic Range



Insufficient dynamic range causes productive laboratories to lose their edge by requiring multiple analyses on the same sample. A wide dynamic range is required to achieve quantitative results on samples with widely varying compound concentration levels. The TruTOF HT prevents that loss of productivity by offering a linear dynamic range of 4 orders of magnitude or more—decreasing the need for dilution and re-analysis of high concentration level samples, and increasing the throughput of your laboratory. The figure to the left shows a linear dynamic range of 4 orders of magnitude for HCB (5 pg/μL to 50,000 pg/μL).

ChromaTOF[®] Software



ChromaTOF Software

ChromaTOF software was designed with your laboratory in mind. With outstanding ease-of-use, ChromaTOF encapsulates the industry's most advanced qualitative and quantitative capabilities into one easy-to-use, seamless data-handling system.

- True Signal Deconvolution, Automated Peak Find, and Extended Range Calibration algorithms
- Semi-Quantitative Analysis for the reporting of non-calibrated compounds
- Fully-integrated Environmental Report Designer to meet EPA requirements
- Automatic tuning within user-defined Quality Control methods
- Integrated control of a variety of sample handling options from Gerstel, LEAP, and Agilent
- Customizable user interface
- Automatically export data to PDF, CSV, ANDI MS, NETCDF, or Raw file formats

Life Sciences and Chemical Analysis Solutions

Every day around the world, LECO instruments continuously perform analyses for today's most complex applications. Whether you are analyzing samples in the food, flavor/fragrance, petroleum, environmental, or biotechnology (metabolomics) industries, we have an instrument configuration to meet your needs.



Pegasus® 4D GCxGC-TOFMS

- Pegasus, with 500 spectra/second, offers you the only MS detector capable of comprehensive two-dimensional GC (GCxGC)
- ChromaTOF software gives you the ability to take your sample characterization to the next level
- The ultimate in chromatographic resolution from the pioneer of GCxGC technology



Pegasus HT TOFMS

- Acquisition speed up to 500 spectra/second offers you the ideal MS detector for unparalleled throughput
- Powerful Windows®-based ChromaTOF software simplifies component identification—providing a significant increase in efficiency and productivity
- Key features include automated data mining, chromatogram locking, reverse-library search mode, and data-dependent user-defined QC method development
- Ability to upgrade to Pegasus 4D GCxGC



GCxGC

- Offers you enhanced separating power for complex sample analysis
- Easy-to-use ChromaTOF software
- Classification software feature simplifies component identification
- Flame Ionization Detector (FID), Electron Capture Detector (ECD), and Sulfur Chemiluminescence Detector (SCD) available



Unique® HT TOFMS

- Accessible and affordable high-speed LC-TOFMS
- Compact benchtop TOFMS designed for complex sample analysis
- With collection rates up to 100 full-range mass spectra/second, the Unique is the best MS detector for the latest high-resolution/high-speed chromatographic applications
- Integrated control for high-speed Agilent 1200SL LC
- ChromaTOF Automated Peak Find and True Signal Deconvolution algorithms



Technical Research Center



Global Support Center



Life Science and Chemical Analysis Centre

A Commitment to Quality and Service

LECO instruments are noted for superior precision, speed, and ease-of-use. We are an international company with over 25 subsidiaries worldwide. Our global network of sales/support is dedicated to customer service and satisfaction, and our commitment to quality is further underscored with ISO-9001:2000 certification. We conform to CE quality and safety specifications, fully testing our instruments at our on-site Compliance Testing Center.

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Delivering the Right Results