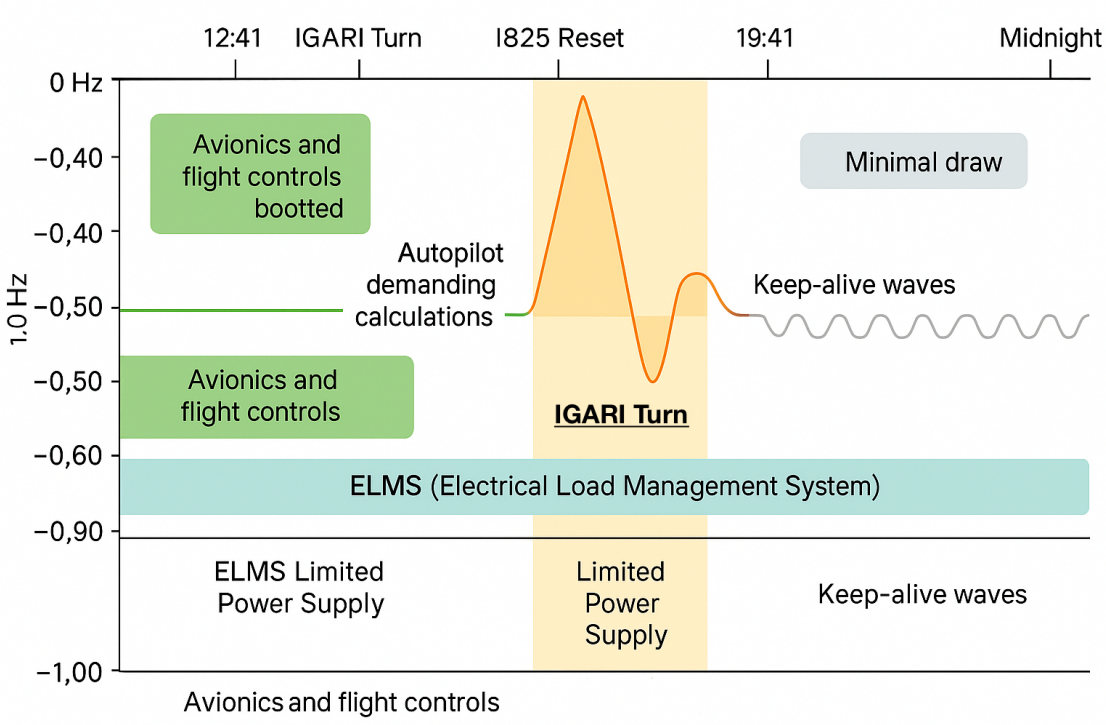
SDMR SYSTEMS- Technical Brief

Electrical Load Visualization

Executive Summary

Understanding System Activity Through Power Demand



Executive Summary

Modern aircraft contain hundreds of interconnected systems competing for electrical power. While most operate with predictable and stable demand, certain flight events require rapid calculations by avionics and flight control computers. These periods can produce measurable changes in electrical demand that help investigators better understand aircraft activity.

This visualization illustrates changes in electrical demand over time, highlighting periods of stable operation, increased computational activity, and a return to steady-state conditions. SDMR SYSTEMS correlates these patterns with other independent evidence sources to help build a more complete operational timeline.

Understanding the Visualization

The illustration is divided into operational phases representing changes in electrical demand throughout the flight. Stable operating periods establish a baseline, while peaks represent periods where onboard systems may be performing increased computational activity before returning to normal operation.

Stable Aircraft Operation

During routine flight, avionics and flight control systems maintain relatively constant electrical demand. Navigation, communications, and aircraft management functions continue within expected operating limits, providing investigators with a stable reference point.

Increased Computational Activity

Certain aircraft events require substantially greater onboard processing. Flight management calculations, navigation updates, automated flight control functions, and guidance computations may temporarily increase electrical demand before returning to a stable condition. SDMR SYSTEMS synchronizes these changes with other evidence sources to place them into operational context.

Return to Stable Operation

Following periods of increased processing, aircraft systems typically return to predictable baseline operation. These transitions help investigators distinguish routine behavior from significant operational events.

Correlating Multiple Evidence Sources

Electrical activity represents only one layer of evidence. SDMR SYSTEMS integrates these observations with radar, satellite communications, navigation data, aircraft performance, manuals, operational records, and timeline reconstruction to strengthen investigative understanding.

Why Visualization Matters

Interactive visualization converts complex engineering information into a format investigators can quickly understand. Instead of reviewing isolated numerical data, analysts can recognize patterns, compare evidence sources, and communicate findings more effectively.

The SDMR SYSTEMS Approach

The objective is not to rely on a single measurement. Every visualization becomes another evidence layer within a larger investigation, allowing independent sources to be compared inside one analytical environment.

Key Takeaways

- Establishes a stable electrical baseline.
- Highlights periods of increased computational demand.
- Synchronizes engineering data with operational events.
- Supports evidence correlation across multiple data sources.
- Improves technical communication through visualization.

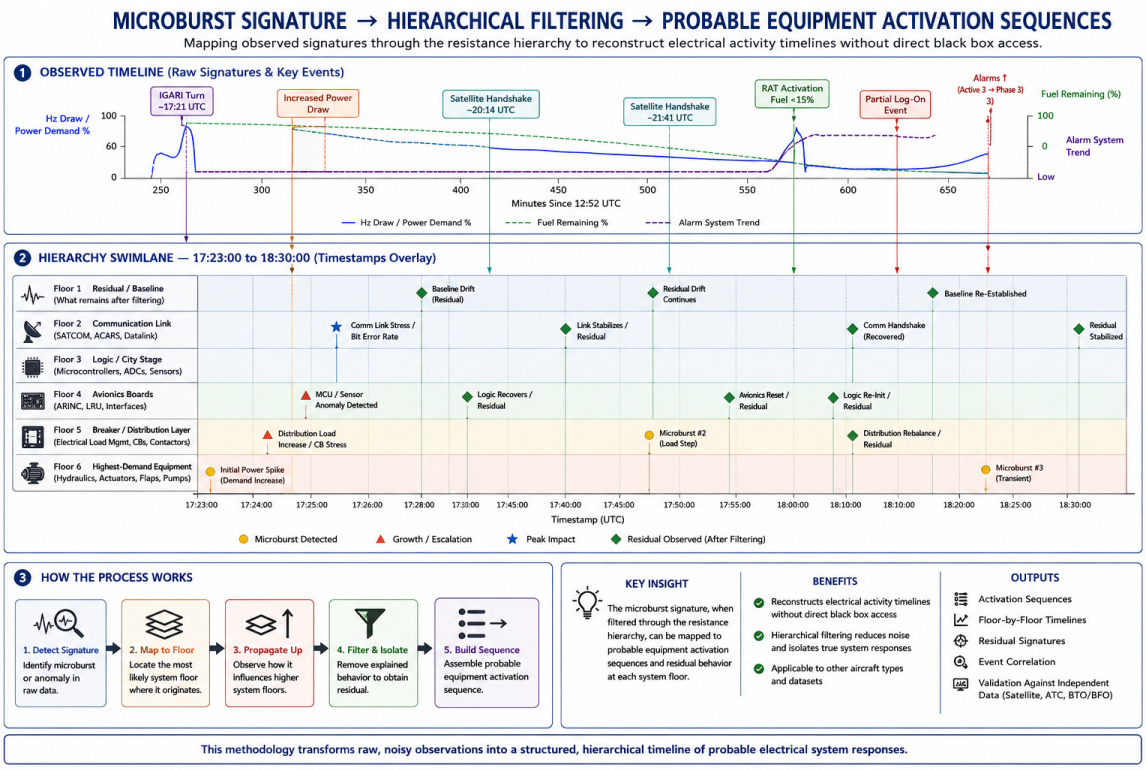
Closing

Every Signal Tells Part of the Story.

SDMR SYSTEMS connects those signals into one complete investigative picture.

Hierarchical Signal Analysis

Section Title: From Signals to System Behavior



From Signals to System Behavior

Every complex system leaves measurable traces during operation. While individual measurements may appear insignificant on their own, meaningful patterns begin to emerge when multiple signals are organized within their operational context.

The illustration demonstrates SDMR SYSTEMS' hierarchical analysis approach. Rather than examining a single signal in isolation, observed events are progressively organized into logical system layers. This process helps investigators distinguish routine background activity from meaningful operational changes while reducing noise that can obscure

important evidence.

Instead of asking, 'What does this single signal mean?', SDMR SYSTEMS asks a broader question: 'What sequence of system activity could reasonably produce the collection of independent observations we see?'

Building Confidence Through Correlation

By organizing observations into a structured hierarchy, investigators can compare events across avionics, communications, electrical systems, sensors, operational timelines, and external evidence. As each layer is evaluated, uncertainty is reduced and confidence increases.

This methodology does not rely on a single measurement. Each observation is evaluated alongside independent evidence—including aircraft performance, satellite communications, radar information, operational records, engineering documentation, and environmental conditions—to determine whether the complete sequence remains internally consistent.

Why Hierarchical Analysis Matters

Traditional investigations often examine one dataset at a time, requiring analysts to manually compare independent sources. SDMR SYSTEMS organizes observations into a common analytical framework where relationships become visible. Instead of searching for isolated anomalies, investigators evaluate how evidence behaves collectively across multiple system layers.

Key Benefits

- Reduces background noise while preserving meaningful observations.
- Correlates independent evidence within a unified timeline.
- Identifies consistent operational patterns across multiple systems.
- Evaluates competing explanations using measurable constraints.
- Builds confidence through evidence convergence rather than assumption.

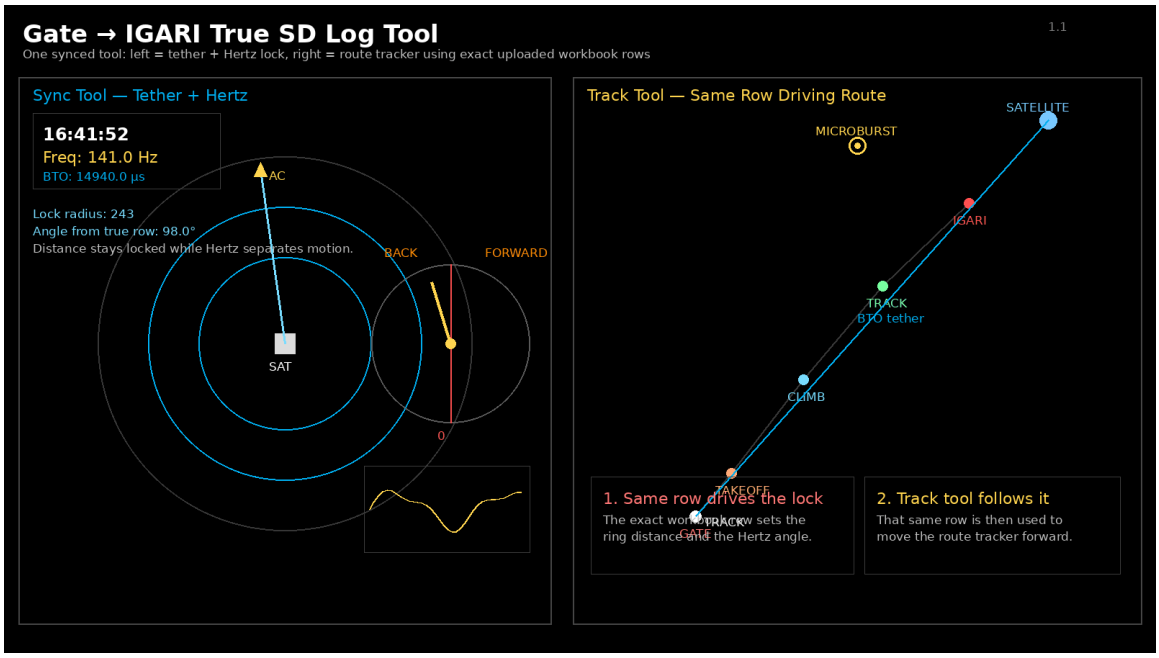
A Structured Framework for Investigation

The objective of hierarchical filtering is not to replace engineering analysis or flight data interpretation. Instead, it provides a structured framework that helps investigators organize complex information into a logical sequence of probable system activity.

As additional evidence becomes available, the framework can be refined without rebuilding the investigation from the beginning. Every new observation strengthens, weakens, or redirects the developing picture while maintaining a clear record of how conclusions were reached.

Closing

SDMR SYSTEMS transforms complex technical observations into structured investigative understanding—one evidence layer at a time.



Gate → IGARI True SD Log Tool

Executive Summary

Purpose

The Gate → IGARI True SD Log Tool establishes the investigation's verified starting point. Instead of beginning where information becomes uncertain, the tool reconstructs the aircraft's known operating state from gate departure through the IGARI waypoint. This creates a consistent baseline that every later analysis can reference.

What the Tool Does

The tool synchronizes independent information into one timeline so investigators can compare events using the same reference. Rather than viewing isolated data points, the investigator sees how aircraft movement, timing, navigation, and system activity relate to one another from the beginning of the flight.

Understanding the Display

• Left Side – Analysis Engine

The left side is the working portion of the tool. It continuously measures, aligns, and compares the available data against the established baseline. This is where the software performs the calculations that keep every dataset synchronized.

• Right Side – Investigation Result

The right side presents the outcome of those calculations in a simple visual path. Instead of forcing investigators to interpret thousands of individual values, the tool displays the evolving flight timeline and highlights where meaningful changes occur.

Why It Matters

Every successful investigation depends on having a reliable reference before examining anomalies. By beginning at the gate and continuing to IGARI, investigators can separate normal aircraft behavior from significant operational changes. This reduces false leads, improves consistency, and provides greater confidence for every later stage of reconstruction.

Benefits for Investigators

- Establishes one verified baseline for the entire investigation.
- Synchronizes independent evidence into a common timeline.
- Makes complex technical information easier to understand visually.
- Provides a repeatable workflow that can be applied consistently.
- Creates a foundation for signal analysis, reconstruction, and decision support.

Summary

The Gate → IGARI True SD Log Tool is the first operational step in the SDMR SYSTEMS workflow. It transforms complex technical information into a structured visual reference, allowing investigators to begin every investigation from the same verified starting point before analyzing what changed later in the flight.