Data Acquisition, Processing, Analytics, and Display

**INSIGHT**

Ground support software and equipment for complex aerospace platforms
Satellites, launch vehicles, aircraft, and missiles are complex systems that require equally sophisticated ground support equipment. Connect your monitor and test software to the platform under test with AMERGINT’s inSIGHT products.

**Data Acquisition:** Whether it is tens, hundreds, or thousands of channels, the inSIGHT Networked Data Acquisition products provide direct connection to analog, digital, and discrete data. Our software is also compatible with other commercial products to open up nearly any data acquisition capability to the power of inSIGHT.

**Data Processing:** The functionality of our Software Device libraries put SOFTLINK’s configurable processing power to work on your data. inSIGHT provides the software for transporting, formatting, and converting from raw inputs to processed data.

**Data Recording:** Store and replay raw data streams and archive processed measurands to inSIGHT’s time-series database. Measurands are stored with millisecond time-stamp accuracies.

**Data Analytics:** Rapid analysis of long-term data collected over weeks or comparison between data sets can yield a deeper understanding of important test and operational data.

**Data Visualization:** inSIGHT’s data display capabilities bring a person in the loop to monitor systems where vehicle safety or personnel safety factors require human decision making.
inSIGHT Ground

inSIGHT Ground interfaces with software applications, hardware components, and host servers to collect ground system status and control actions.

Status parameters include data quality indicators such as lock states, device configuration settings, data rates, and data formats. CPU loading and internal queue depths are examples of processing performance statistics. Collectively they provide an in-depth look at how data moves through your ground system.

Time Series Database

The reportable statistics, settings, and other parameters are captured, given a time-series representation, and stored in real time to a database. inSIGHT collects and manages large data sets collected over long periods of time. This provides a historical record that is fully searchable as part of engineering analysis or troubleshooting.

Rapidly Reprocess Historical Data

Archived raw telemetry can quickly be reprocessed for historical analysis and comparison to current data. This feature decommutates measurands at speeds on the order of three or four magnitudes faster than the original data rate. Months of data can be reprocessed in a matter of minutes.
Data Visualization and Data Analytics

Merging system status with measurands from telemetry adds a new dimension for data visualization and analysis.

Leveraging Grafana’s rich data analytics and monitoring features, inSIGHT provides for visualization and analysis of historical data as time-series data—how parameters varied over time and how these variations might be interrelated. This provides new insight to test and operational performance of the asset under evaluation.
Customer Applications

**System monitoring** of AMERGINT Apps and ground systems

**Satellite test** systems for command, telemetry, umbilical discretes, power control, and 1553 monitoring

**Launch vehicle monitoring and control** systems that connect to hundreds or thousands of switches, gauges, probes, and other sensors to provide real-time status for test and launch operations

**Range telemetry** systems to acquire and process real-time data streams during factory and flight testing

**Communications test** systems that generate and receive RF waveforms
inSIGHT Telemetry

inSIGHT’s Telemetry provides full function processing of multiple telemetry streams needed for launch and range applications.

Interface adaptors are available to meet most physical, electrical, and protocol interfaces.

Each software function can be added, replicated, ordered, or deleted to tailor the inSIGHT telemetry processing.

Algorithm Development, Data Gather, and Scram Net Adaptors provide backward compatibility with user software.

We can customize inSIGHT to your telemetry processing needs.
Key Features

- Telemetry Format Definitions in Excel, XML, JSON, and Other Formats
- Mission Definition Files Instantiate Software Bit Syncs, Frame Syncs, and Decommutation
- EU Conversion and Calculated Parameters
- Data Visualization and Analytics

General Specifications

- Telemetry Inputs: Analog, Digital, TMoIP
- Data Rates: Up to 20 Mbps
- Outputs: Serial, Digital, TMoIP
- Options: Chapter 10 Recorder, Best Source Selection
inSIGHT Data Acquisition

inSIGHT Data Acquisition systems enable ground support equipment to control and monitor hundreds or thousands of channels and serial data streams using our software-configurable data acquisition hardware.

nDAQ Hardware

The nDAQ product family features a set of data acquisition modules that connect to sensors, relays, and other discrete signals. nDAQ input modules consolidate the readings from all channels into Ethernet data packets at configurable rates up to 1500 samples per second. nDAQ output modules work in reverse, allowing customers to send control signals to the channel outputs.

nDAQ modules have 32 or 64 channels and can be delivered in 4-slot and 21-slot configurations. Other than power, each slot is fully independent, and this allows multiple inSIGHT Apps to share a physical nDAQ chassis.

Each module has an independent Ethernet connection which allows the nDAQ modules to be collocated with the physical sensors and equipment. nDAQ Modules consolidate software-to-sensor cabling down to a single Ethernet cable per module that can easily be run over any distance.
nDAQ Software

Software drivers for the nDAQ modules are available for incorporation into your monitoring and control applications, with the software handling all network communications and device configuration. nDAQ systems are engineered for low latency, minimizing any time delays from changes in sensor data to updates in the current value tables.

The software libraries are fully compatible with inSIGHT Applications to enable additional parameter processing and display.

nDAQ Management Application

One step provisioning is a feature that enables nDAQ modules installed as a replacement module to acquire their IP address, load updates, and auto-configure. The new nDAQ module is automatically configured to the functionality of the failed module it replaces.
nDAQ DO64

- 64 Discrete Output Channels
- Opto-Isolated Transistor Outputs
- Utilizes Externally Provided Input Voltage Source and Load per Channel
- Up to 48V and 300mA per Channel
- Software Configurable Pulse Mode with Durations from 2μs to 4.29s

nDAQ AO32-M

- 32 Analog Output Channels
- 16-bit D/A Converter
- Up to 48 kHz Sampling Rate (1.5 kHz per Channel)
- Configurable for Voltage or Current Mode (Individual Channels)
- Software Configurable Unipolar or Bipolar Voltage Output Modes
- Current Output Mode with Range of 0mA to 20mA

All nDAQ modules are hot swappable to support high availability installations
nDAQ IN64-M

- 64 Input Channels (Analog or Discrete)
- 16-bit A/D Converter (Differential Sampling)
- Up to 128 kHz Sampling Rate (2 kHz per Channel)
- Software Configurable Digital FIR Filter
- Software Configurable Input Voltage Ranges up to 48V
- Software Configurable Discrete High/Low Thresholds

nDAQ DO32-R

- 32 Relay Output Channels
- Normally Open, Normally Closed, and Common Terminal Outputs
- Up to 220 VDC or 250 VAC Maximum Voltage per Channel
- Up to 1A Current per Connection
- Software Configurable Pulse Mode with Durations from 1ms to 4.29s
- Dual Pole Relays Utilize Second Pole to Provide Readback of Relay States
- Software Configurable Sampling Rate for Relay Status
**MFDM-2**

The MFDM-2 provides high density I/O, supporting up to ten full-duplex differential serial channels. In addition, there are IRIG inputs and outputs for high-precision time-data correlation of data streams and on-board RAM for enhanced data buffering. Coupling the MFDM-2 with AMERGINT’s family of I/O panels allows customers to connect a large number of serial interfaces and a variety of electrical signals (TTL, RS-422, LVDS, 1 PPS, and IRIG).

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**MFDM**

The Multi-Function Digital Module is a PCIe board that connects inSIGHT to legacy devices that use RS-422 and TTL serial interfaces without requiring an external I/O panel. The hardware supports multiple channels of clocked binary and ternary data. IRIG inputs and outputs support timing references.
Network

inSIGHT easily connects to sensors and test equipment with Ethernet, Bluetooth, or other network options.

Signal

inSIGHT systems can leverage the line of satTRAC Signal Converters and satTRAC Waveform Apps to receive and demodulate RF inputs and modulate and transmit RF outputs.

Custom

Signal conditioning and translation may be needed to adapt our commercial edge devices to the system being tested and monitored. Fault isolation and protection is often important when connecting inSIGHT systems to costly assets.

We offer engineering design services that deliver turn-key systems.
inSIGHT Connects to Customer Applications

Our customers have significant investment in their test applications and associated test scripts. Built up over many years, this software encompasses countless hours of work.

With inSIGHT, we allow customers to replace the aging front end of their hardware test systems with a configurable, software-extensible system. AMERGINT is adept at building adaptor software to bridge the ‘new’ back to the ‘old.’ Customers continue to use their extensive test software which now interoperates with the new front end.

Automation

AMERGINT’s TestExec software provides additional options for test automation. Python-based test scripts run within the TestExec framework to perform testing, collect results, and generate reports.

Customization and Tailoring

There is no turn-key satellite, launch vehicle, missile, or other complex aerospace platform. Therefore, there is no turn-key system for testing them. AMERGINT performs the configuration and tailoring needed to deliver inSIGHT with the insight you need.

inSIGHT systems can be rapidly configured and deployed
inSIGHT Employs the Full Power of SOFTLINK

inSIGHT Apps are built on a proven library of more than 1,000 software devices.

This allows each system to be tailored to the requirements specific to your test and monitoring system.

Processing chains configured via Python scripts move data from the sensor and telemetry interfaces to your processing and controls from your processing to the platform under test.

ICDs and application diagrams are auto generated and used for integration and support.