CADMOS
microsystems

SAM unit instrument

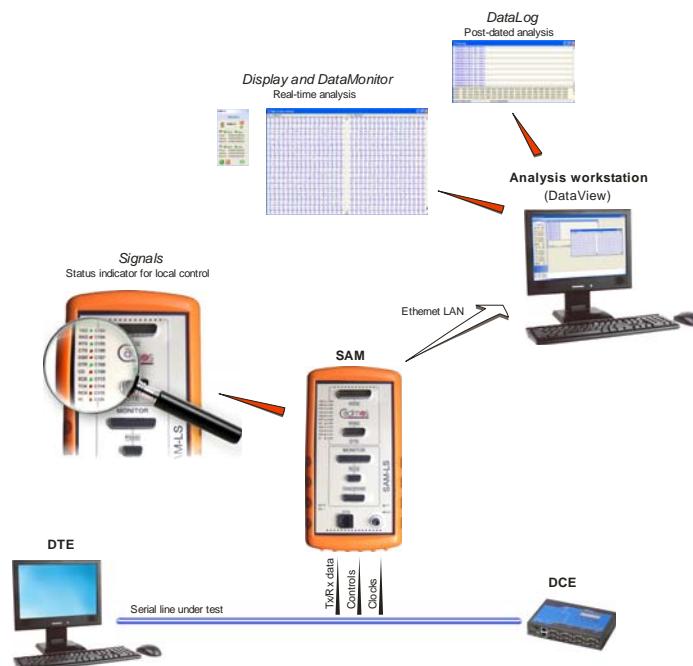# Sampling acquisition and measurement

Highlights

- **Multi-drop monitoring** of synchronous and/or asynchronous serial lines.

- **Real time monitoring** of serial line, in raw mode or data packets mode.

- **Advanced data tester function**, operating with different ATC specific protocols.

- **Serial-to-Ethernet Bridge feature**, sending pay-load of valid packets on LAN network.

- **Protocols**:
  - AIRCAT 500
  - CD2
  - Asterix
  - HDLC

- **Fully user-configurable**.

- **Capability to co-operate** with other SAM instruments (site monitoring) and to **record collected data** for deferred analysis.

- Link to **proprietary software** (DataView) for monitoring and data analysis on a centralized station.

The SAM series instruments (Sampling, Acquisition and Measurement) are an ideal solution for applications that require to monitor and check serial lines, by centralizing the measurement on a remote station of a network.

Main features of the SAM instrument, that make it unique, are the capabilities to acquire and analyze data from asynchronous or synchronous serial lines, where data are formatted with protocols such as **Aircat500**, **CD2**, **Asterix** and **HDLC** (making the instrument fully compliant with radar systems). The instrument can be expanded with additional specific protocols upon request.

DataLog
Post-dated analysis

Display and DataMonitor
Real-time analysis

Analysis workstation
(DataView)

Signals
Status indicator for local control

Ethernet LAN

SAM

DTE

TxRx data
Controls
Clocks

DCE

Serial line under test

Line Monitor (SAM-LS)

SAM series

Typical applications

The portability, the small size and the ability to be remotely controlled via Ethernet network connection, make SAM the optimal solution for monitoring serial lines located in remote areas, including unattended sites.

The instrument can be connected in multi-drop to a serial line and used as a sensor for monitoring it, with full integration in LAN networks for continuous monitoring.

Sam instruments are designed for best results in both short- or long-time monitoring of serial links and/or serial devices. The instrument can interface several kinds of serial links (RS-232 V.24, RS-422 X.21/V.11, RS-485), by using different communication protocols (which can be further customized to meet application specific needs) and allowing the user to freely set the main operating parameters.

Display and DataMonitor
Real-time analysis

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Status indicator for local control

Analysis workstation
(DataView)

Ethernet LAN

SAM

DCE

Serial link under test

DCE

SAM
(Loop)

SAM merges into a single product the technology of the industrial electronics applied to the "hard real-time" process control, and the sophisticated data presentation features of PC applications.
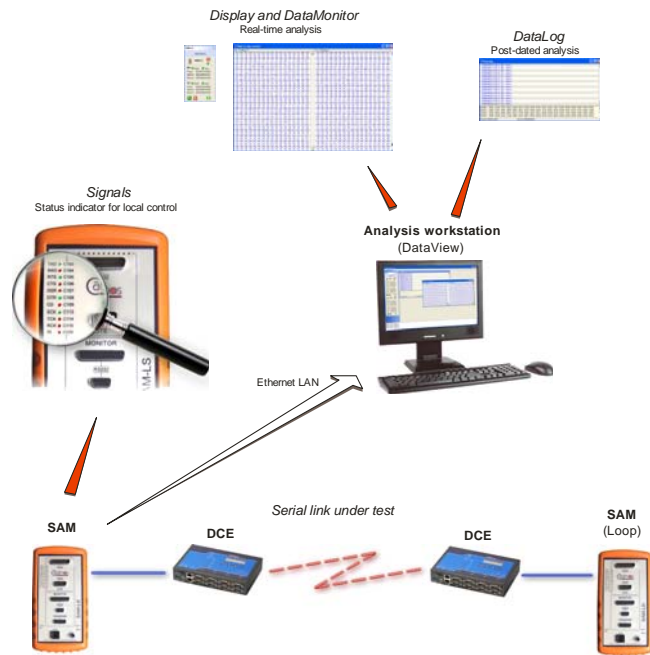
The main features of SAM instruments can be summarized as follows:

- data sampling and acquisition from bidirectional serial lines, synchronous or asynchronous, with time correlation of acquired data,

- data acquisition and analysis from both asynchronous or synchronous lines, raw or formatted with ATC specific protocols such as Air-cat500, CD2, Asterix and HDLC,

- portability, ease of placement and total remote controllability, which make SAM an ideal instrument for all operative scenarios.
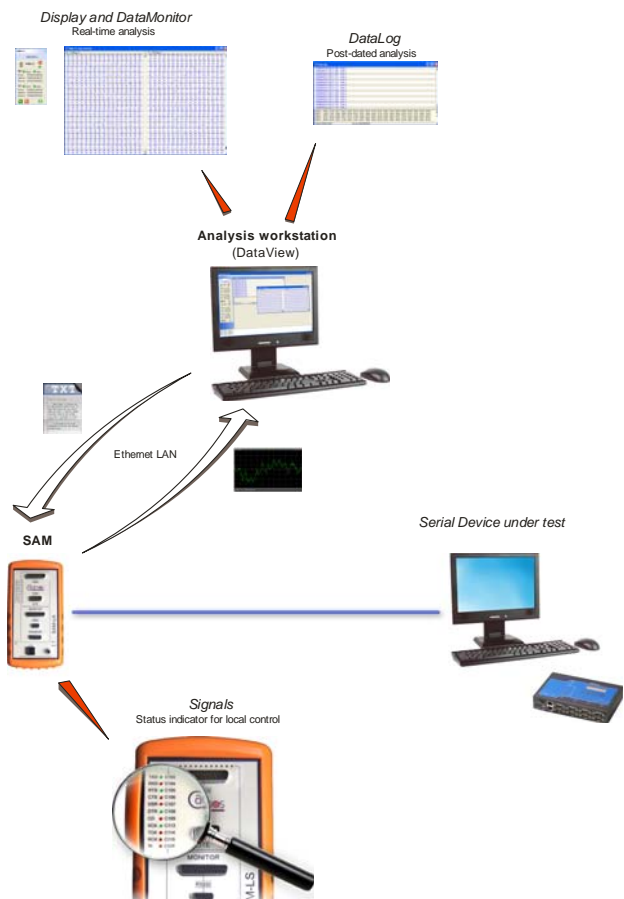
SAM functional architecture is based on a powerful RISC 32-bit microprocessor, which acquires real-time data. Data viewing and post-acquisition analysis is performed by an external PC connected via Ethernet LAN 10/100 Mbps.

SAM can be connected in multi-drop to a serial line without affecting the electrical characteristics of the line itself, by setting the monitor port to high impedance (1 MΩ).

In case of point-to-point connection, the port can be configured to low impedance (5 kΩ) to reduce the signal/noise ratio on the transmission line. Instrument includes line drivers and receivers to match serial interface standard RS-232 (V.24), RS-422 (X.21) and RS-485.

Display and DataMonitor
Real-time analysis

DataLog
Post-dated analysis

Analysis workstation
(DataView)

Ethernet LAN

SAM

Serial Device under test

Signals
Status indicator for local control

Unit features

The protocol analysis, as well as the data acquisition, is performed at hardware level, through an FPGA device (which also adds an accurate time-stamp to each data packet - 10 μsec. resolution), directly connected to the 32-bit RISC microprocessor.

SAM collects data and sends them to a PC (running Cadmos DataView application), connected through the Ethernet port 10/100 Mbps of the instrument. DataView classifies received data, sorting them by hardware-generated time-stamps for chronological analysis.

DataView also stores both received data packet or sync / idle / flag characters that may occur between data packets, into a single file for further off-line analysis.

Real-time data viewing of received data is always available, both in raw or data packets mode.

Detected CRC or parity errors are highlighted, as well as framing errors or other anomalies.

Configuration and Accessories

SAM series instruments are available in different models, to satisfy any Customer requirements. Each model includes a set of accessory parts.

More in detail, SAM is available in the following models:

- **SAM-LS**: with all the capabilities to monitor multi-standard serial lines,

- **SAM-LH**: with all the capabilities to monitor multi-standard serial lines, to perform data tester measurements, to operate as Pattern generator, etc.

as shown in the following table.

INSTRUMENT MODELS					
Model	Code	Functions			
		Line Monitor	Data Tester	Arbitrary Pattern Generator	Serial-to-Ethernet bridge
SAM-LS	700-001	X			
SAM-LH	805-001	X	X	X	X
NOTE: All SAMs are provided with AC/DC adapter and network cable (cross-over type).					
ACCESSORIES INCLUDED					
Data View	700-002	It controls several SAM instruments, with capabilities to perform configuration of any instrument and operation as real-time monitoring and off-line analysis.			
SAM handy bag	700-003	It allows a safe transportation of the instrument, protecting it from shocks and weather. It includes a handle, shoulder strap and belt loop for a convenient portability. Equipped with multiple pockets, it allows easy storage of the instrument and all accessories supplied (AC/DC adapter, network cable, etc.).			

Reliability and Maintainability

SAM unit highlights are:

- *high reliability;* the state-of-the-art architecture and components are designed to achieve a high MTBF, and all its parts can be redundant, to avoid any possible breakdown;

- *optimized maintainability;* with redundant modules hot-swap interfaces, thus obtaining an extremely low MTTR (Mean Time to Restore) and a network down time close to zero (99.9999% availability).

Technical Specifications

Operational purpose:

Instrument for Sampling, data Acquisition and Measurement, able to analyze serial connections with the following operating modes:

- Line monitor of synchronous and/or asynchronous serial lines, RS-232, RS-422 (X.21) or RS-485, by setting the inputs for high (1MΩ) or low (5kΩ) impedance. High impedance allows to prevent interference on measured signals.

- Data Tester (SAM-LH only) with generation of pseudo-random patterns, in accordance to the ITU-T O.150 recommendation.

- Arbitrary Pattern Generator (SAM-LH only) to send user-defined patterns to the equipment under test.

- Serial-to-Ethernet bridge (SAM-LH only), which sends payload of valid received packet on the network, in UDP packets.

Valid protocols:

Instrument (all versions) can operate with the following protocols: AIRCAT 500, CD2, Asterix, HDLC

(additional protocols can be implemented by the manufacturer upon customer request)

Unit configuration:

By means of DataView application, used to detect, configure and monitor all SAMs connected to the network.

Operation:

Local mode: limited to signal monitor, by means of signal status indicators, located on the front panel.

Remote mode: configuration, monitoring for real-time analysis, data recording for post-dated analysis, by means of DataView application, running on a remote workstation on the LAN network.

MTBF

>500.000 hours
(MIL-HDBK-217F Part stress)

Mains:

By AC/DC adapter (supplied) with AC input:

- typical: 220 Vac / 50 Hz
- max range: 90 ÷ 264 Vac

Power consumption:

500 mA (+12Vdc)

Dimensions (including rubber cover)

Height: 220 mm
Width: 120 mm
Depth: 45 mm (max size)