ENGLISH

SAM

- SAMPLING, ACQUISITION AND MEASUREMENT -

USER MANUAL

Doc. n. 700-001-903 / EN - 1.02

SAM - Sampling, Acquisition and Measurement

Edition 1.02 – May 2009

Unit and all its parts (except power supply module) are designed and manufactured by Cadmos Microsystems.

All software and firmware provided with the equipment are property of Cadmos Microsystems.

Operating system installed into the equipment is the O.S. Open Source Linux 2.4

Made in Italy

Caution and Warning Notes

The CAUTION note denotes a hazard. It calls attention to a procedure which, if done incorrectly or inattentively, could damage or destroy part or all of the product. Do not proceed beyond a CAUTION note until the indicated conditions are fully understood and met.

The WARNING note denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not done correctly or adhered to, could result in injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

The following conventions are used throughout this manual:

 NOTE	Notes contain important information set off from the text.
 CAUTION	Caution messages indicate procedures which, if not observed, could result in damage to equipment.
 WARNING	Warning messages call attention to situations that could result in personal injury.

Safety and Precautions

 WARNING	Disconnect the unit from its power source whenever performing any maintenance or installation procedure.
 WARNING	Any unauthorized removal of safety covers, manipulation of safety switches, and interference with the safety system is **strictly prohibited**. **Such actions can cause personal injury and can damage the unit.** Also make sure that the operating and maintenance areas are not obstructed in any way.

Please address any comments or questions with respect to this document to:

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Introduction

Thank you for purchasing an instrument of the SAM series, manufactured by Cadmos Microsystems.

This manual is written in order to describe the instrument capabilities. If you run into any questions or problems, you can call Manufacturer Service and receive immediate assistance. See Warranty and Support for support telephone numbers.

This manual is organized as follows:

Section 1, General Description:

This chapter describes the equipment and its parts, its operative architecture and its use in a Network, as a general overview of the equipment configuration and use.

Section 2, Preparation to use

This chapter reports all procedures necessary to prepare the instrument for a correct use, starting from materials reception and ending with the procedure to make it ready to use.

Section 3, Use and configurations:

This chapter covers the basic information needed to use the instrument in local mode and depicts typical measurement scenarios where the instrument is an ideal partner.

Section 4, Maintenance:

This chapter covers all the details to maintain and repair the equipment, when a trouble or a malfunction is detected.

Appendix A, V.24 / X.21 standards:

This annex lists all signals identified for the V.24 (RS-232) and X.21 (RS-422) standard, following the ITU-T recommendations.

Appendix B, Assistance:

This chapter provides a list of phone numbers you can call for free assistance during the installation process, and if any problem with the equipment should arise.

Preview

Instruments of the SAM series (Sampling, Acquisition and Measurement) are an ideal solution for applications where it is required to monitor and check serial lines, by centralizing the measurement on a remote station of a PC network.

Main features of the SAM instrument, that make it unique, are the capabilities to acquire and analyze asynchronous or synchronous serial lines, with formatted data with protocols such as **Aircat 500**, **CD2**, **Asterix** and standard **HDLC** (by making the instrument absolutely compliant with radar systems). At the customer request, the instrument can be expanded with additional specific protocols.

The feature of portability, the small size and the ability to be totally controlled remotely via Ethernet network connection, makes SAM the optimal solution for the monitoring of 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.

Main characteristics of SAM instruments can be summarized as:

- multi-drop monitoring of synchronous and/or asynchronous serial lines,
- real time monitoring of the serial line, in raw mode and by filtering data packets,
- advanced data tester function, with capability to operate with different protocols,
- 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 by centralized station,

The instrument, shown in the figure below, comes complete with handy bag for transport, including all the needed accessories.

SAM instrument series – Overall view

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1 General description

This chapter provides a preliminary description of the instrument.

In the following paragraphs, information about the product is given as follows:

- System Architecture: contains key information to understand the architecture of the instrument, as well as its use to measure serial devices and lines under test.
- Configuration: provides useful information to optimize the instrument configuration in according to the Customer requirements.
- Unit composition: specifically describes the instrument and its components.
- Specifications: lists the main features of the instrument.

NOTE

It is advisable to acquire what described in the present section correctly, before proceeding with the reading of the next sections, which describe in detail the following:

- Chapter 2 - Preparation to use: it contains the step-by-step procedures for material receiving, correct connection of the cables, first unit activation, as well as the procedures for shipping and storing the unit;
- Chapter 3 - Use and configuration: it contains the procedures for the correct use of the equipment and for the correct configuration of all the operative parameters and the single functions of the Unit;
- Chapter 4 - Maintenance: it contains either the procedures for the preventive maintenance of the unit and those for the unit repair in consequence of possible failures.

1.1 System architecture

Sam instruments are designed to satisfy the requirement to monitor for short- or long-time, serial links and/or serial devices. The instrument is able to interface several kinds of serial links (RS-232 V.24, RS-422 X.21/V.11, RS-485), by using different communication protocols (also customized to meet specific needs of the Customer) and allowing the user to set main operating parameters.

SAMs merge into a single instrument the technology of the industrial electronics applied to the “hard real-time“ process control and PC technology, to easily realize sophisticated applications for data presentation.

More in detail, most important features of SAM instruments can be synthesized as follows:

- data sampling and acquisition from bidirectional serial lines, synchronous or asynchronous, by time correlation of acquired data,
- data acquisition and analysis from asynchronous lines or formatted with protocols like Aircat 500, CD2, Asterix and HDLC standard,
- handling features, ease of placement and total remote controllability, such as to make SAM an ideal instrument for any operative scenarios.

Functional architecture of SAM is based on a powerful RISC architecture 32-bit microcontroller, to acquire real-time data. Data viewing and post-acquisition analysis are conducted 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, thanks to the ability to set the monitor port to high impedance (1 MOhm). In case of point-to-point connection, the port can be configured to low impedance (5 KOhm) to reduce the noise effect on the detected signals.

Instrument includes line drivers and receivers to match serial interface standard RS-232 (V.24), RS-422 (X.21) and RS-485.

The analysis of various protocols, so as the data acquisition, are performed at hardware level, through FPGA device, directly connected to the 32-bit RISC microcontroller. It collects the data and sends them to a PC (running DataView application), connected through the Ethernet port 10/100 Mbps of the instrument. DataView provides to catalog received data, adding to them a time-stamping for chronological analysis.

DataView also provides to store both received data packet or sync / idle / flag characters that may be present 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 by filtering the data packets only.

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

Figure 1-1 shows the functional architecture of SAM instrument.

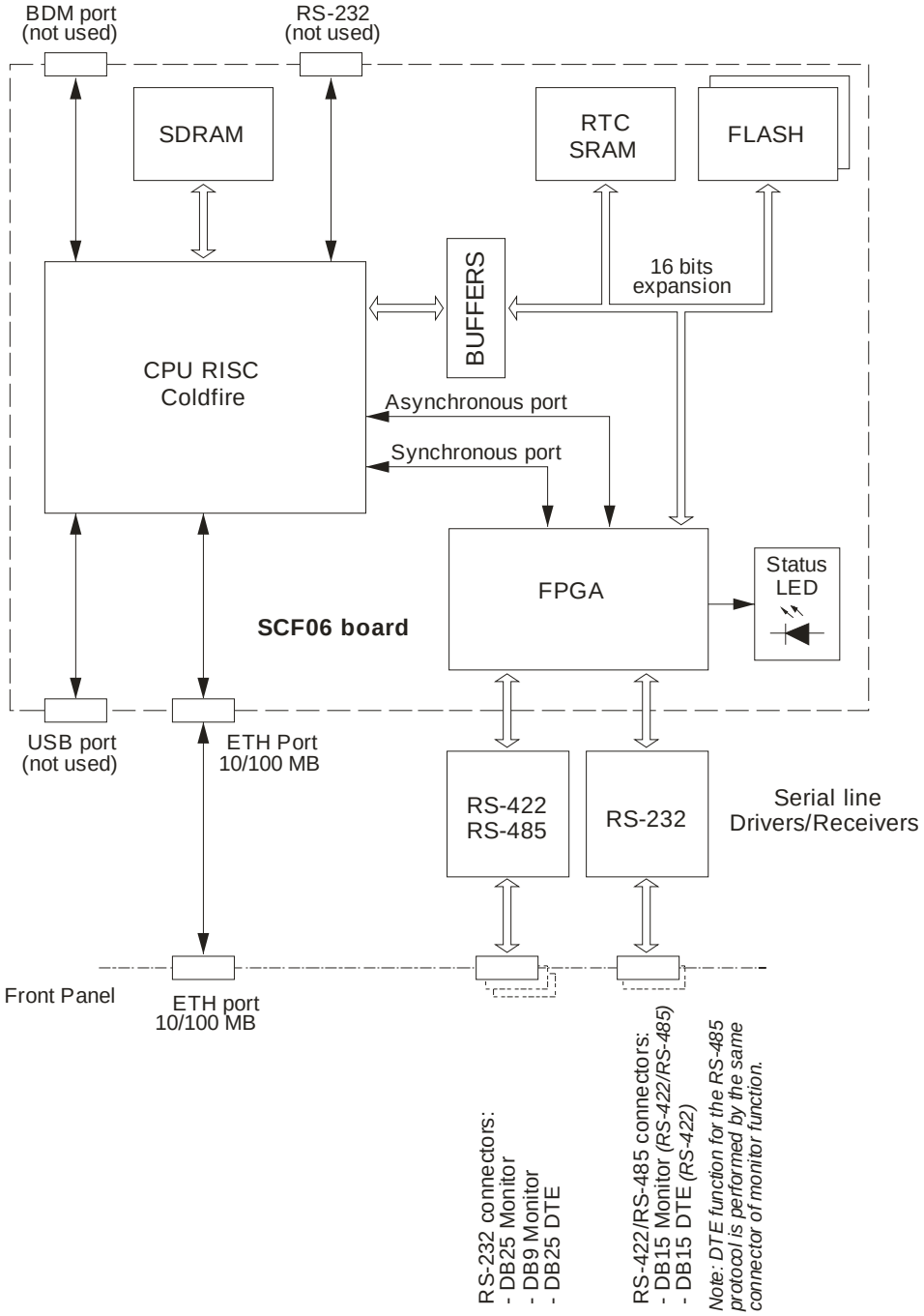


Figure 1-1 – Functional Architecture

1.2 Configuration

SAM series instruments are available in different models, to satisfy any Customer requirements. Each model is provided complete 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
SAM-LS	700-001	X		
SAM-LH	805-001	X	X	X
NOTE: All SAMs are provided with AC/DC adapter and network cable (cross-over type).				

ACCESSORIES INCLUDED IN THE PROVISION		
Data view	700-002	It controls several SAM instruments, with capabilities to perform configuration of any instrument and operation as real-time monitoring and postdate analysis.
SAM handy bag	700-003	It allows a safe transportation of the instrument, protecting it from shock and weather. It is furnished complete of handle, shoulder strap and belt loop for a convenient transportation. Equipped with multiple pockets, it allows easy storage of the instrument and all part supplied (AC/DC adapter, network cable, etc.).

1.3 Instrument description

SAM series instruments are provided complete of all accessories and parts necessary to a right operation, with the exception of the test cables which have to be carried out in accordance to operational condition (type of serial line under test, length of cable, etc.).

More in detail, the provision includes:

- the measure instrument SAM, available in several models as yet introducing in the previous paragraph, all assembled in handy case protected by rubber shell to prevent shock damages;
- a 12V AC/DC adapter, complete of safety connectors with ring shaped reinforcement,
- a network "cross-over" type cable, to be used to link a local PC to perform configuration and measurement operation.

Including in the provision, the following parts are supplied:

- DataView software, to be installed on any computer based on Windows operative system, whose primary task is to allow the configuration and monitoring of SAM instruments,
- handy bag, ideal for a convenient storage and transportation of the instrument and all its accessories.

Figure 1-2 shows the composition of provision, while the next subparagraph describe each part.

Figure 1-2 – Composition of provision

1.3.1 SAM

SAM series instruments are assembled in a handy case, protected by a rubber cover with high shock resistance.

All status indicators and connectors are placed on front panel. The instrument provides different connector types to match any kind of serial line, so it is extremely easy to make the connection with the serial line under test.

On the front panel, so as depicted in figure 1-3, the following primary sections are present:

- "Monitor" area: this section is used when the equipment is set for "Monitor" mode (monitoring of the serial line without interference on the signals);

  in this section are located two female connectors (DB25 and DB9) to monitor RS-232 (V.24) serial lines and one female connector (DB15) to monitor RS-422 (X.21) and/or RS-485 serial lines;

- "DTE" area: this section is used when the equipment is set to operate as Data Tester and/or Arbitrary Pattern Generator. These modes are available to check serial devices and serial links, where the instrument sends user-defined patterns to a serial device or operates as transceiver of pseudo-random patterns defined with accordance to ITU-T O.150 recommendation;

  in this section one D25 male connector (RS-232 - V.24 serial line) and one DB15 male connector (RS-422 - X.21 serial line) are located;

- status indicators: these indicators are located in the left upper side of the front panel and are available to check the status of all the signals of the serial line. These indicators are active both in Monitor or Data Tester (or Pattern Generator) modes.

Figure 1-3 – SAM unit overall view

Furthermore, in the lower side of the front panel the following controls are located:

- two indicators: ON = powered; ACT = init OK,
- two controls: one reset switch and one default switch (used to restore default configuration),
- two connectors: one for power connection (AC/DC adapter) and one for Ethernet LAN connection (10/100Mbps).

The plastic case encloses all instrument boards, such as the SCF06 True Embedded CPU, based on industrial SCF (Scalable Cpu Family) series CPU, with highly advanced characteristics in terms of miniaturization, flexibility and technological integration.

Supplied with the instrument is an AC/DC adapter (12Vdc OUT) and a network "cross-over" cable suitable for direct connection to a local PC. Note that in the event of connection to a HUB (without "auto detect" feature) a standard network cable must be used..

1.3.2 Portable bag

Together with the SAM instrument (all versions) a portable bag is supplied. Made entirely in robust material (polyester), the bag ensures easy transportation of the instrument, by assuring at the same time an effective protection to shock and weather.

The bag has several compartments, as follows:

- padded pocket, reserved for SAM (the padding assures the maximum protection),
- two pockets with zip enclosures, one on the rear of the bag and the other in the internal side of the frontal folding (the latter normally houses the AC/DC adapter),
- an external pocket closed with tear (inside this pocket, the software/documentation CD-ROM is stored).

On the padded pocket, an elastic band is available to place little tools, such as screwdrivers, etc.

A quick-release sealing system allows to easily close the bag, ensuring maximum safety when traveling.

The bag is designed to be easily carried by handle, shoulder strap or belt loop.

1.3.3 DataView

DataView is a network application, supplied with SAM, which allows to operate as centralized station, by linking several types of Cadmos Microsystems instrumentation (i.e. SAM series instruments).

The DataView has the main goal to collect and analyze data incoming from several instruments deployed on field. In this way, DataView allows to implement a network of analyzers, by linking the instruments through an Ethernet network (10/100Mbps) and by centralizing the network control on a single PC (refer to figure 1-4).

For this purpose, the DataView allows to:

- manage several analyzers in an independent mode,
- set the main operative parameters of each analyzer (protocol type, communication parameters, etc), by changing the configuration in real-time mode,

- continuous monitoring of main parameters of each analyzer. For example, monitoring of the SAM is relevant to:
  - frequency of the serial line clock signal,
  - counting of number of bytes (asynchronous line) or data frames (synchronous line) detected on the monitored line,
  - counting of detected errors;
- analysis of the data exchanged on the serial line, with real-time data monitor,
- data recording, for postdated analysis,
- Data Log and Data Monitor functions.

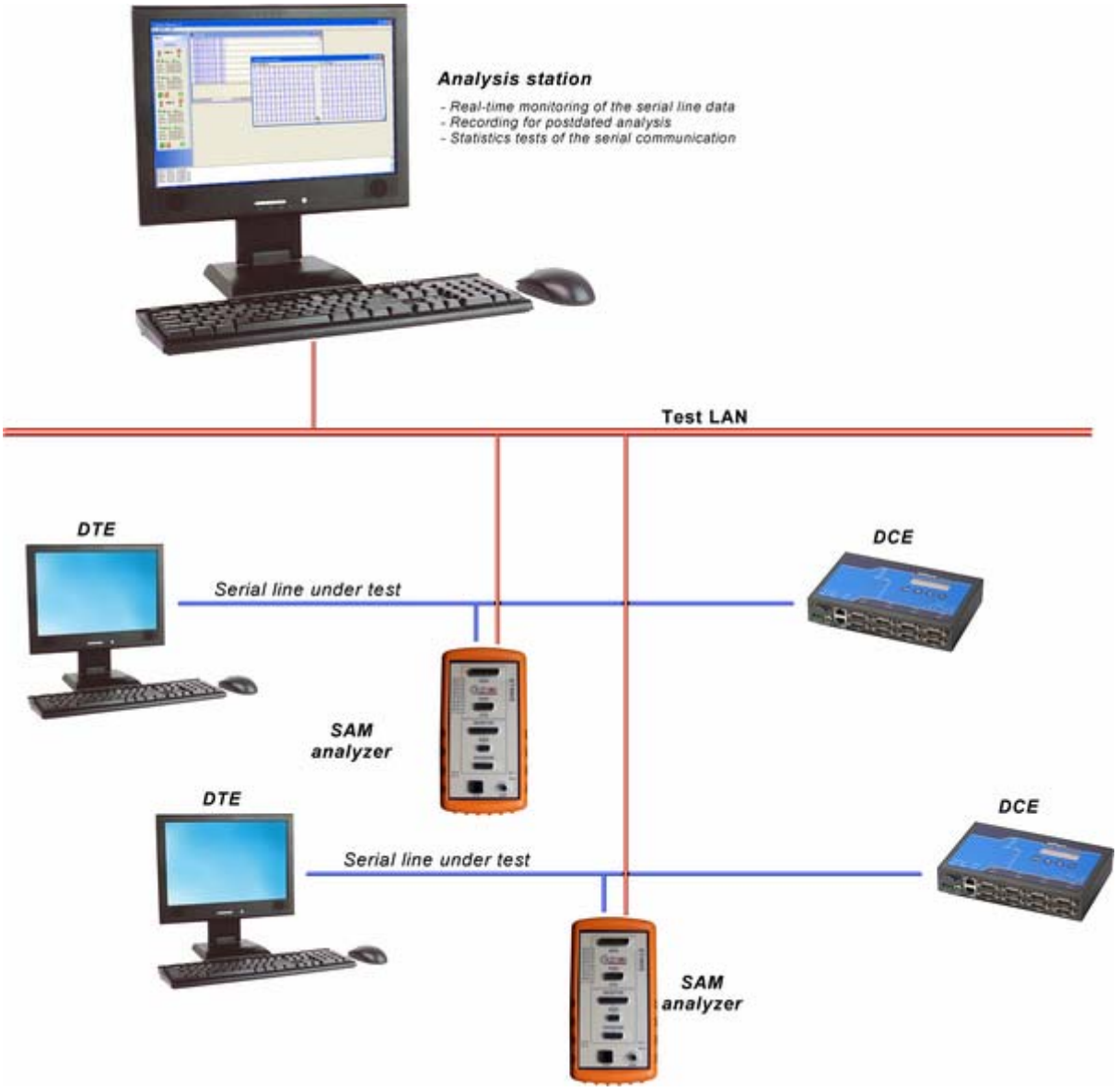


Figure 1-4 – Operative architecture of DataView application

DataView provides a graphical user-friendly human-machine interface, for an easy and intuitive use. When running the application, the user can, at a glance, monitor all major parameters and, if necessary, go to any additional function with a simple click of the mouse.

DataView home page is subdivided into four primary areas:

- operative menu, located on the upper side of the screen,
- instruments bar, located on the left side of the screen,
- data visualization area, which covers the remaining area of the screen and is reserved to display the operative windows (data log, data monitors, etc.),
- system messages area, locate in the lower side of the screen, is reserved to list the system messages (operative instrument status, initialization messages, etc.),

as shown in figure 1-5. For further details on the DataView capabilities, refer to the relevant User's Manual.

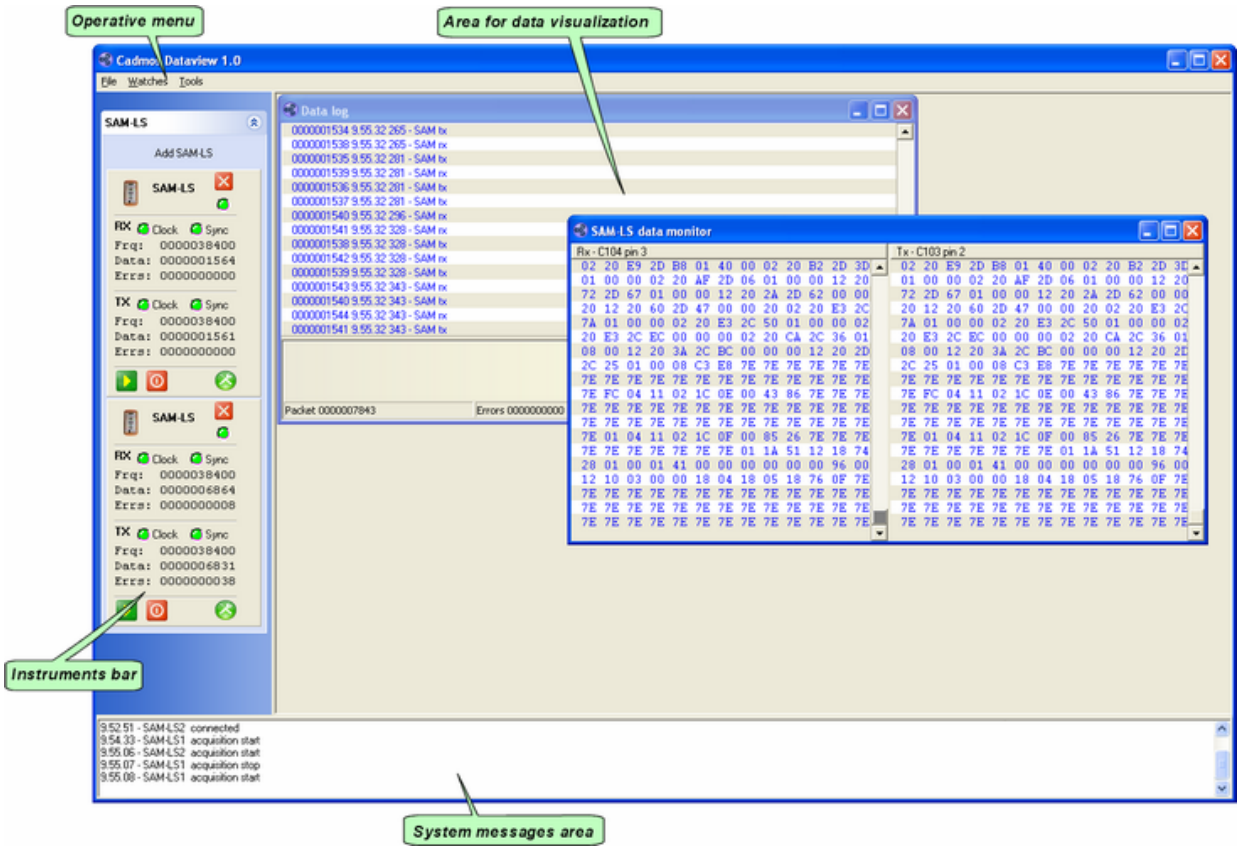


Figure 1-5 – DataView Home page

1.4 Specifications

The main characteristics of SAM instruments (all models) are defined as follows.

GENERAL CHARACTERISTICS

- 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 (1MW) or low (5kW) 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.
- Valid protocols: Instrument (all versions) can operate by using one of the following protocols:
  - AIRCAT 500
  - CD2
  - Asterix
  - HDLC standard

  (specific 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.

POWER SUPPLY

- Mains: By AC/DC adapter (supplied) with AC input:
  - typical: 220 Vac / 50 Hz
  - max range: 90 ÷ 264 Vac
- Absorption: 500 mA (+12Vdc)

INSTRUMENT DIMENSIONS (complete of protection rubber cover)

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

2 Preliminary operations

This chapter contains the procedures for a correct instrument preparation to use. It includes the following:

- instructions for reception and unpacking operations (see Materials check);
- instructions for shipping and storage operations (see Shipping and storing);
- unit cabling procedures (see Interconnections);
- post installation test procedures (see First power-on).

 CAUTION	Equipment is arranged to be easily and safely installed. Personnel should be qualified as Technician, with good knowledge of electronic systems and test instrumentations. Furthermore, if a procedure can imply any degree of danger, notes and advertisements are put in evidence in the first of the relevant paragraph and, in any case, before the dangerous operation can occur.

Use and preparation can be performed without specific tools and materials.

The following table gives a list of tools, instruments and material required for equipment installation.

For each tool or instrument, the operation in which they should be used is also indicated.

Table 2-1 – Tools, instruments and material required for installation

TOOLS, INSTRUMENTS, MATERIALS	USE
Clippers, tongs, scissor and/or Cutters	Unpacking
Wire stripper / insulated scissor	Cable heading
Digital multimeter	General test

2.1 Materials check

This paragraph contains the information needed to unpack the equipment and its related accessories and spare parts, as well as the instructions to check the incoming materials.

Before unpacking, inspect the containers for evidence of damage during shipment. All claims for damage in shipment should be filed promptly with the transportation personnel.

NOTE	Save the original packaging cases and materials, to be reused at reshipment. To re-ship the equipment, the use of original packaging is strongly recommended.

When packed for shipment, the equipment is normally protect from:

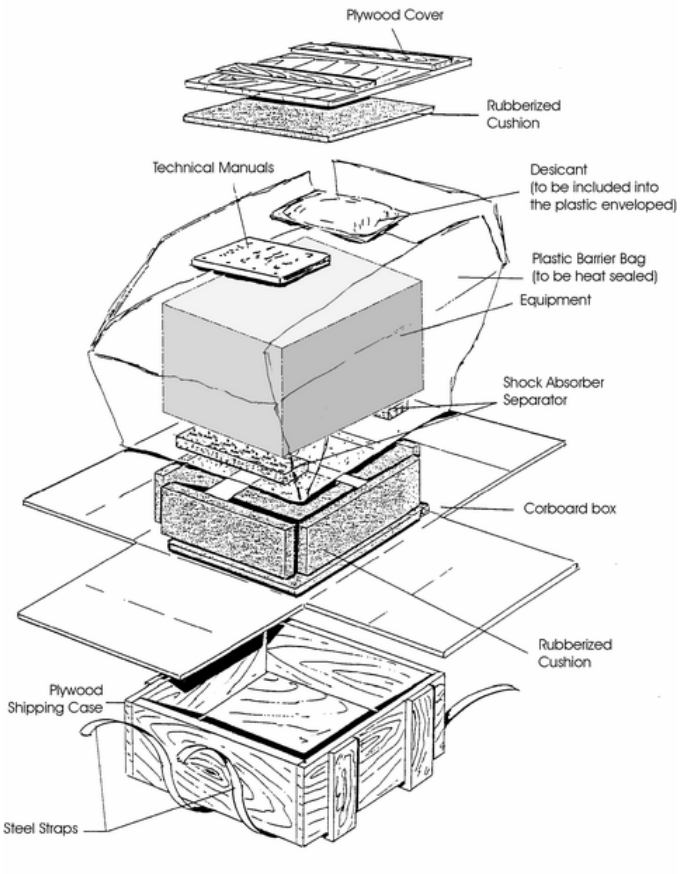
- shocks and undesired movements inside the package, by cushioning all surfaces with specific materials (pluriball, shock absorbers, etc),
- moisture, by using plastic bag sealed with water-resistant tape and desiccant salts
- shipping damages, by using robust shipping box (cardboard or wood boxes).

NOTE: SAM is provided complete of Portable Bag. When shipping, the instrument is normally inserted inside the bag with all accessories.

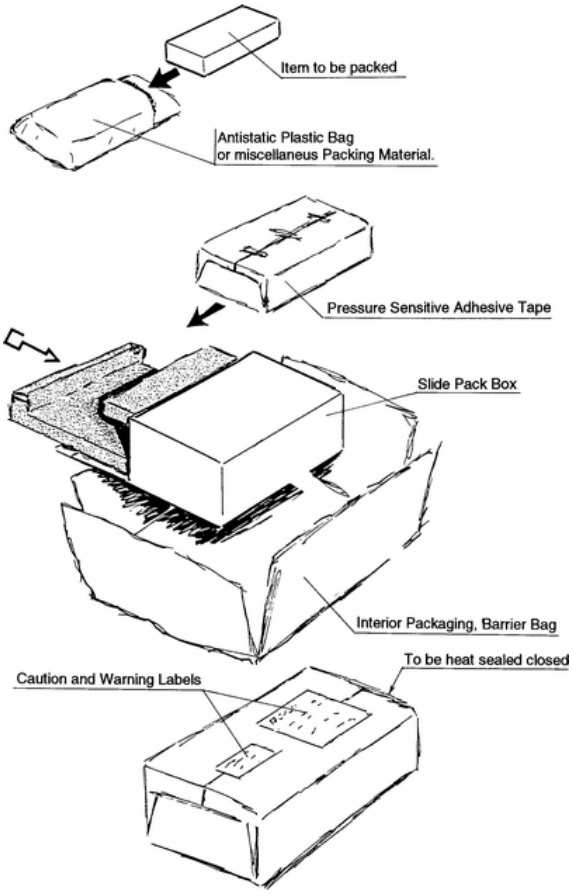
Technical manual and shipping documentation is also placed in the shipping box, with specific protection.

Caution labels (fragile, top, etc.), as well as the identification of addressee and sender, have to be applied outside of the shipping box.

A typical shipping box and its contents are shown in the following figure 2-1.



Packaging for Equipment



Packaging for spare parts

Figure 2-1 – Example of package for shipping or movements

2.1.1 Equipment unpacking

 CAUTION	Removal of equipment package must be performed with care to prevent possible content damage. Retain the packing material when removed, to be reused at reshipment.

To unpack the equipment the following materials are required:

- shear o tongs, to remove package nails and fixing devices,
- scissor and cutter, to open envelope bags, taped parts, etc.

Unpacking of equipment is broken down into the following steps:

1. Carefully open the container, in compliance with the external caution labels.
2. Remove the packing material present into the container.
3. Remove the air cushion protections enveloping the equipment (pluriball, polystyrene, etc.).
4. Remove the plastic envelope of the equipment and remove the desiccant (plastic bags, salts, etc.).
5. Take the unit from the container and remove any plastic cap securing the external connectors of the unit.
6. Perform a visual inspection and a preliminary check-out.

2.1.2 Equipment inspection and preliminary check-out

Inspection of unpacked equipment is needed prior to its installation.

First of all, verify that all materials recorded on the Shipping Check List are presents.

Then, for each unit and part contained in the package, perform the following:

- Check the equipment for any loss or damage that might have occurred during shipment. Pay attention to prominent or external parts, such as controls, connectors, levers, etc.

  If the equipment or a part has been damaged or is incomplete, reship it to the manufacturer.
- Check all exposed surfaces for scratches, nicks, dents and fractures that could cause improper equipment operation when installed. Check also for moisture damages, etc.
- Check the inside of the equipment thoroughly, paying strict attention to any detail. Inspect all modules for loose connectors.

2.2 Shipping and storing

To prepare the unit for storage or shipment, proceed as follows:

- disconnect all test cables and enters the instrument into its bag or in a hardy case, as well as all supplied accessories (adapter, network cable, etc.);
- prepare it to be shipped or stored as described in the next paragraphs.

In order to move the unit for short stretches no further operations are required. Vice versa, for unit storage and shipping proceed as described in the following Storing and Moving and shipping paragraphs.

2.2.1 Storing

First, the instrument and all accessories have to be entered into the bag. Then the equipment storage shall be done by leaving it in the original shipment case. If case have been opened for shipment acceptance and inspection, some new desiccant bags shall be put inside the cases and adhesive tape shall seal these again.

This precaution will avoid that dust and moisture may cause damage.

Environmental conditions of the site used for housing the equipment shall have the features specified in Specifications.

 CAUTION	When storing the equipment in an internal room, assure that it is not located near hot sources, electro-magnetic, electric or electrostatic fields that may damage the equipment or its components.

2.2.2 Moving and shipping

The unit does not require any special preparation for reshipment. General methods and conditions requested are the observation of handling cares required by any electronic equipment.

The instrument and all accessories have to be entered into the bag, before reusing original shipping cases. If these are no more available, packing cases shall be prepared as described below.

The exact procedure for repackaging depends on the material available and the conditions under which the equipment should be shipped or stored. Adapt the procedures outlined below based on circumstances. The information on the original packaging will also be helpful.

A general packing procedure is outlined in succession:

1. Protect the equipment and all accessories from dust, scratches and humidity by wrapping them in a polyethylene bag to be heat sealed.
2. Include into the bag a Dehydrator Silica gel, then heat seal everything.
3. Place proper shock absorber separators made up of foam rubber and use as prime container a cardboard box with PVC auto-adhesive tape.
4. Verify that the unit is surely fixed in the shipping box, to prevent undesired movements inside the container during shipment.
5. Put external labels indicating addressee and sender, as well as caution messages (fragile, up, etc.).

2.3 Interconnections

The present paragraph contains the step-by-step procedures to carry out all test cables and external unit connections.

The connections depend on the operative scenarios and are as follows:

- Network connection: this cable must be realized when the supplied cross-over cable does not satisfy the operating requirements,
- Test cables for "Line Monitor" functions, that have to be fitted as follows:
  - Serial cable to monitor RS-232 V.24 line,
  - Serial cable to monitor RS-422 X.21 line,
  - Serial cable to monitor RS-485 line;
- Test cables for "Data Tester" and/or "Pattern Generator" functions, that have to be fitted as follows:
  - Serial cable for RS-232 V.24 line,
  - Serial cable for RS-422 X.21 line;

 CAUTION	Observe some precautions when interconnecting the instrument to the units under test: route wires and cables away from circuits carrying heavy currents, pulses and other sources of electromagnetic interference. Observe also the normal safety precautions.

2.3.1 Network connection

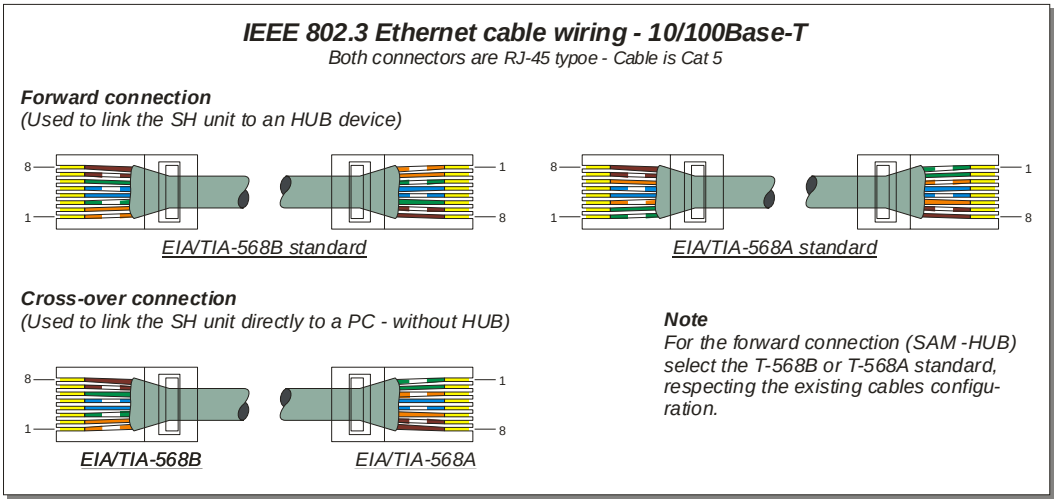
To perform the network connection, a LAN cable must be connected to the RJ-45 connector locate on SAM front panel.

Cable configuration is as follows:

- to link an Ethernet LAN network, through a Hub or a Switch, the cable has to be configured as "direct",
- to directly link a PC, without using a Hub, the cable has to be configured as "cross-over".

  NOTE: SAM is supplied with a "cross-over" cable with a length of 1,8 m. So, if connection distance is no more long of 1.8m and the instrument has to becconnected to a PC or an Hub with "cable autodetect" function, this cable is preferred and recommended.

The following figure shows both connection types. Note that two standards (EIA/TIA-568A or EIA/TIA-568B) may comply when configuring "direct" cable. Both standards are equivalent. The choice on which standard to use can be done following the rule of the "currently used configuration" in the other network cables. If any restriction has to be observed, the EIA/TIA-568B should be normally preferred.



RJ-45 connector heading

EIA/TIA-568B

Pin	T568B pair	Color code
1	3	White Orange
2	3	Orange
3	2	White Green
4	1	Blue
5	1	White Blue
6	2	Green
7	4	White Brown
8	4	Brown

EIA/TIA-568A

Pin	T568A pair	Color code
1	2	White Green
2	2	Green
3	3	White Orange
4	1	Blue
5	1	White Blue
6	3	Orange
7	4	White Brown
8	4	Brown

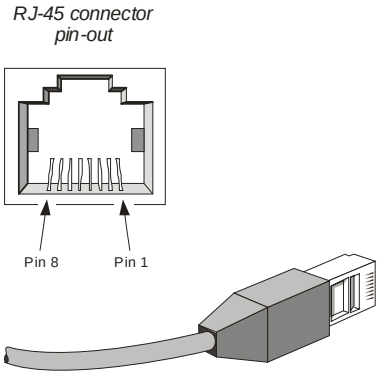


Figure 2-2 – Ethernet connection

2.3.2 Connections for "Monitor" functionalities

"Line Monitor" measurements require a test cable to connect the line under test to one of the following "Monitor" section connectors:

- DB25 female connector: used to connect a RS-232 synchronous/asynchronous serial line,
- DB9 female connector: used to connect a RS-232 asynchronous serial line (9 wires),
- DB15 female connector: used to connect a RS-422 synchronous/asynchronous serial line or a RS-485 asynchronous serial line.

Refer to the following sub-paragraphs for further details about cable heading.

A. Monitor RS-232 V.24

The connection required to monitor RS-232 (V.24 standard) serial lines can be performed by using DB25 female or DB9 female connectors, located in the "Monitor" section. The main differences between the connectors is the presence (DB25) of the synchronization signals.

The test cable requires 3 connectors, where two ending connectors are reserved to serial devices (DTE-DCE) while the other is reserved for SAM connection. Note that the connectors on SAM are configured with all signals in input.

The following figure 2-3 shows a typical cable to monitor a DTE-DCE serial line with 25- or 9-wires.

For further information about serial line at V.24 standard, refer to Appendix A.1.

B. Monitor RS-422 X.21

The connection required to monitor RS-422 (X.21 standard) serial lines can be performed by using DB15 female connector, located in the "Monitor" section.

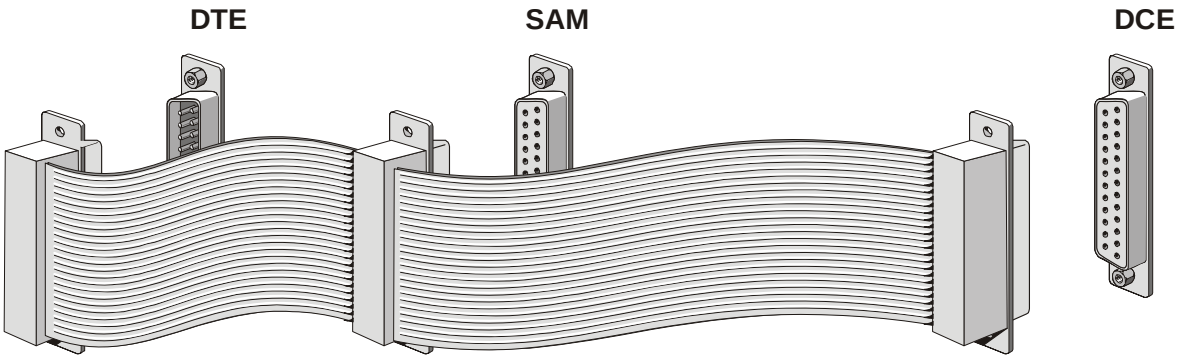
The test cable requires 3 connectors, where two ending connectors are reserved to serial devices (DTE-DCE) while the other is reserved for SAM connection. Note that the connectors on SAM are configured with all signals in input.

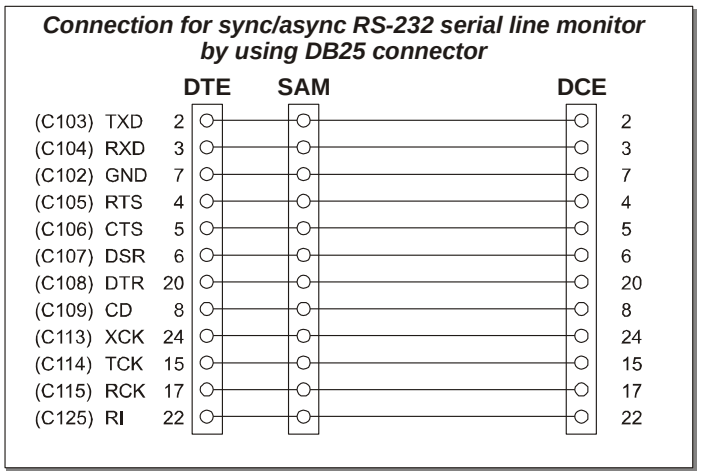
The following figure 2-4 shows a typical cable to monitor a DTE-DCE serial line with 15-wires.
For further information about serial line at X.21 standard, refer to Appendix A.2.

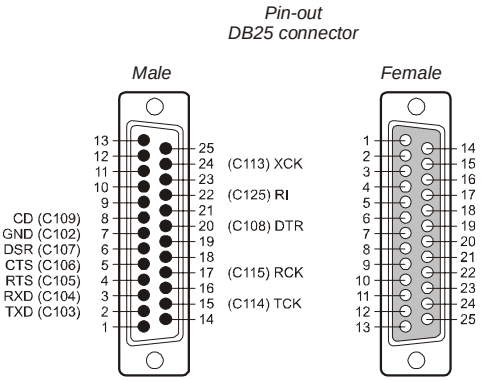
C. Monitor RS-485

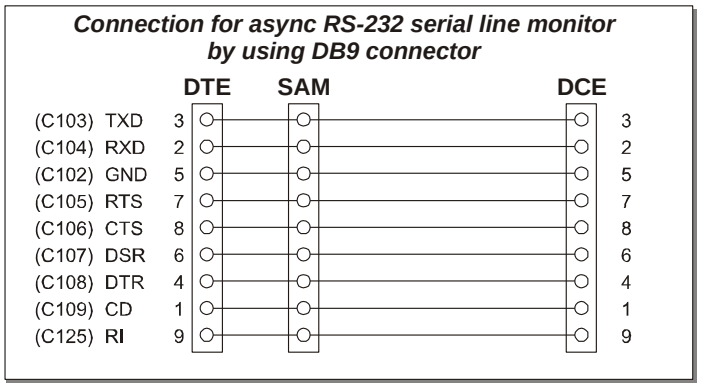
The connection required to monitor (as well as to send patterns in Data Tester or Pattern Generator functionalities) RS-485 serial lines can be performed by using DB15 female connector, located in the "Monitor" section.

The test cable has to be realized by inserting, on the RS-485 line (multi-point line), a DB15 connector headed as depicted in figure 2-5.









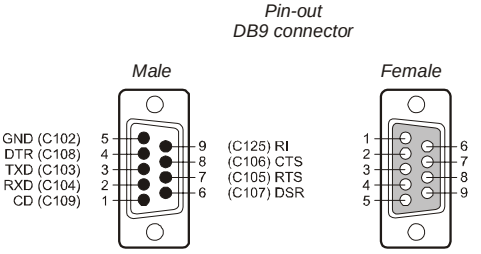
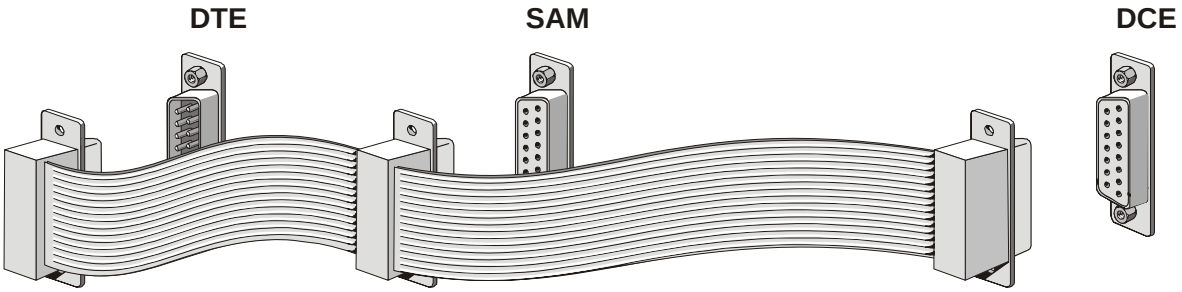
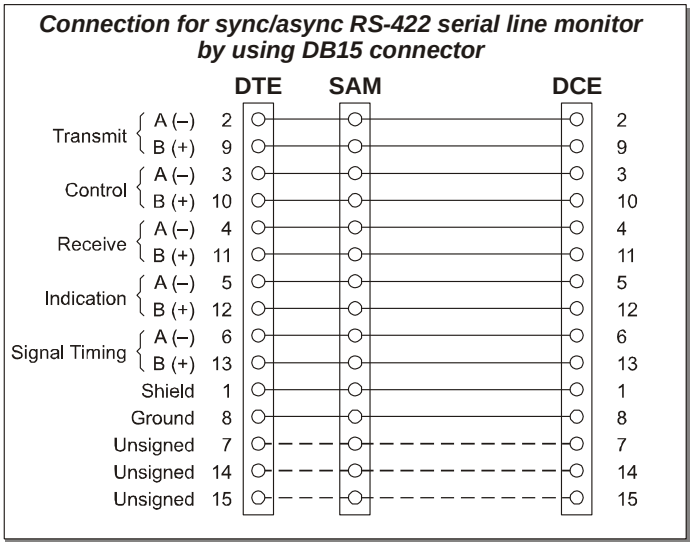


Figure 2-3 – Connection to monitor serial line type RS-232 (V.24 standard)





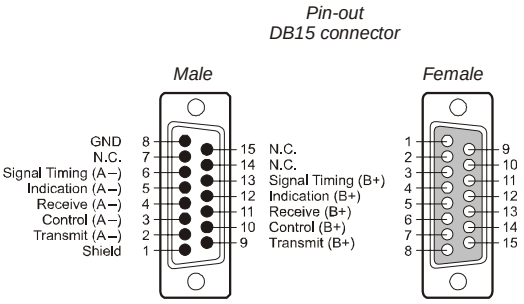


Figure 2-4 – Connection to monitor serial line type RS-422 (X.21 / V.11 standard)

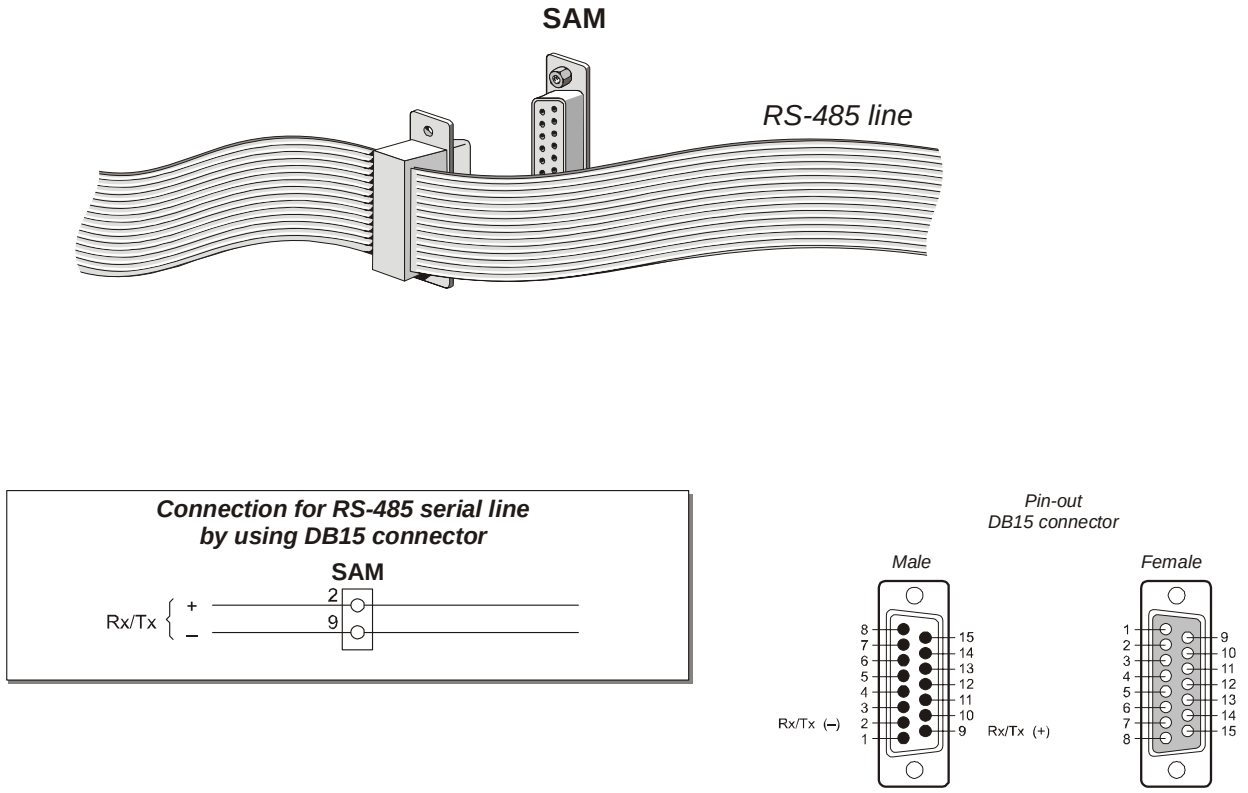


Figure 2-5 – Connection to link serial line type RS-485

2.3.3 Connections for "DTE" functionalities

"Data Tester" or "Pattern Generator" measurements require a test cable to connect the line/device under test to one of the following "DTE" section connectors:

- DB25 male connector: used to connect a RS-232 synchronous/asynchronous serial line,
- DB15 male connector: used to connect a RS-422 synchronous/asynchronous serial line.

Note that measurements on RS-485 asynchronous serial lines must be performed by using the DB15 female connector located in the "Monitor" section.

Refer to the following sub-paragraphs for further details about cable heading.

A. DTE RS-232 V.24

The connection required to perform DTE functionality (Data Tester and/or Pattern Generator) on RS-232 (V.24 standard) serial lines can be performed by using DB25 male connector, located in the "DTE" section.

The test cable requires two ending connectors, where a DB25 female is reserved to connect the SAM and the other DB25/DB9 is reserved to connect the DCE device.

Note that connectors on SAM are configured as DTE. So, to connect a DCE device, it is necessary to head a direct cable, while to connect a DTE device, it is necessary to head a cross cable, as shown in the following figure 2-6.

For further information about serial line at V.24 standard, refer to Appendix A.1.

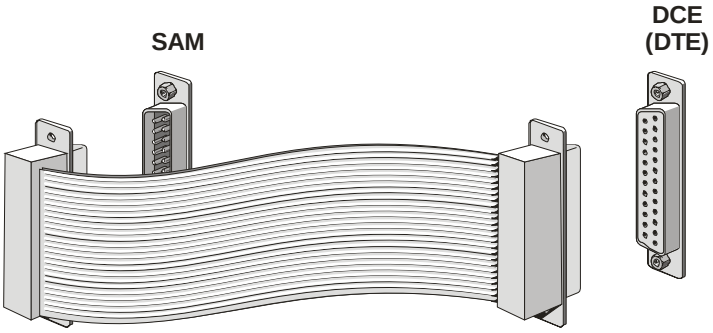
B. DTE RS-422 X.21

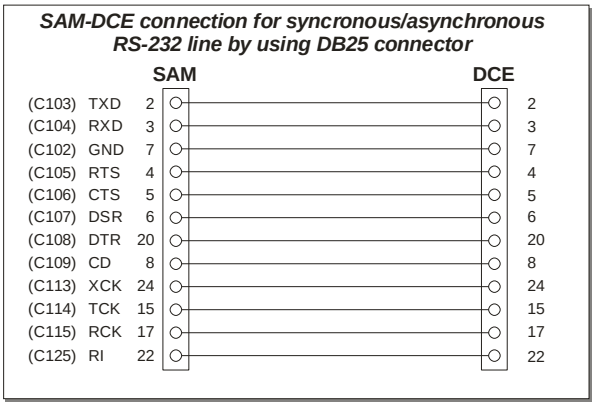
The connection required to perform DTE functionality (Data Tester and/or Pattern Generator) on RS-422 (X.21 / V.11 standard) serial lines can be performed by using DB15 male connector, located in the "DTE" section.

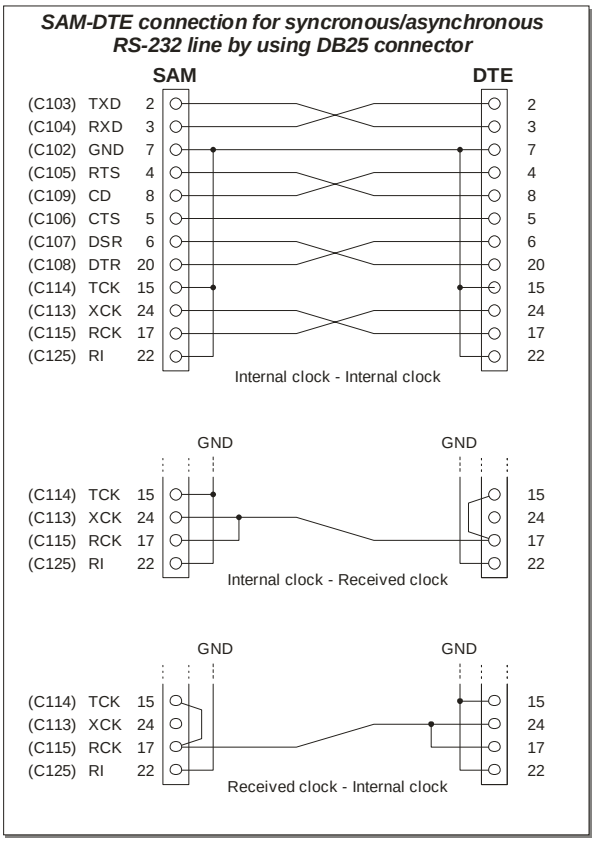
The test cable requires two ending connectors, where a DB15 female is reserved to connect the SAM and the other DB15 is reserved to connect the DCE device.

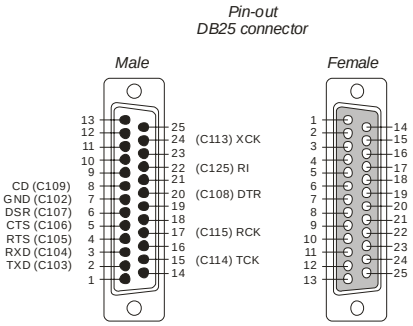
Note that connectors on SAM are configured as DTE. So, to connect a DCE device, it is necessary to head a direct cable, while to connect a DTE device, it is necessary to head a cross cable, as shown in the following figure 2-7.

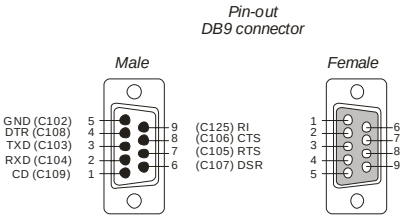
For further information about serial line at V.24 standard, refer to Appendix A.2.





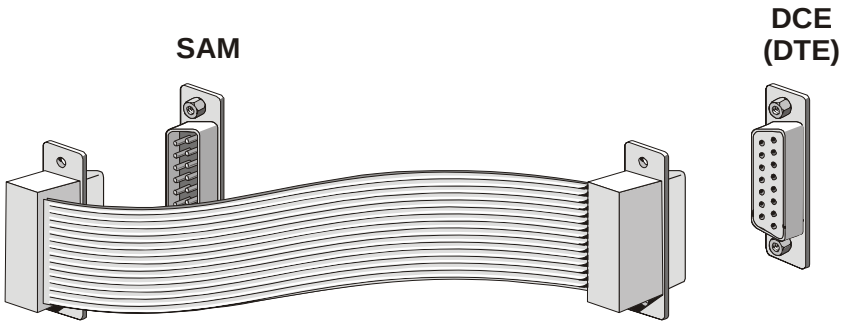


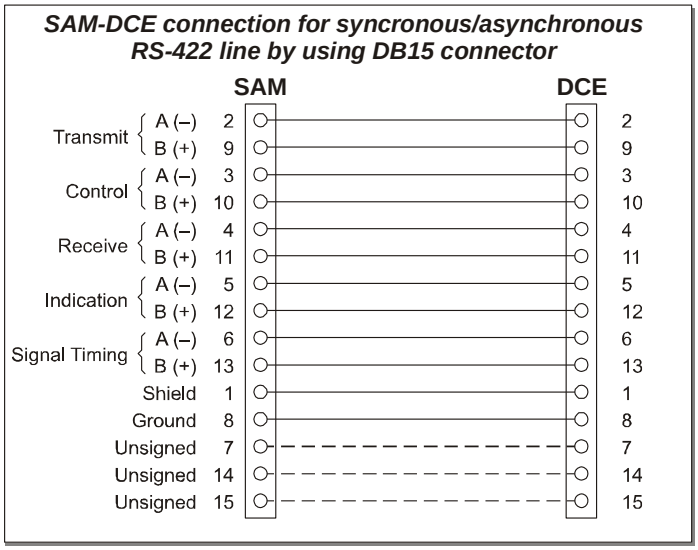


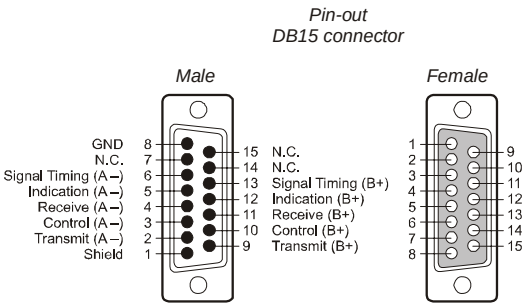


NOTE
To connect DCE (or DTE) with DB9 connector (asynchronous serial line) the cable has to be performed with one DB25 (SAM side) and one DB9 (DCE or DTE side) connectors.

Figure 2-6 – DTE functionalities connection for RS-232 (V.24 standard) serial line







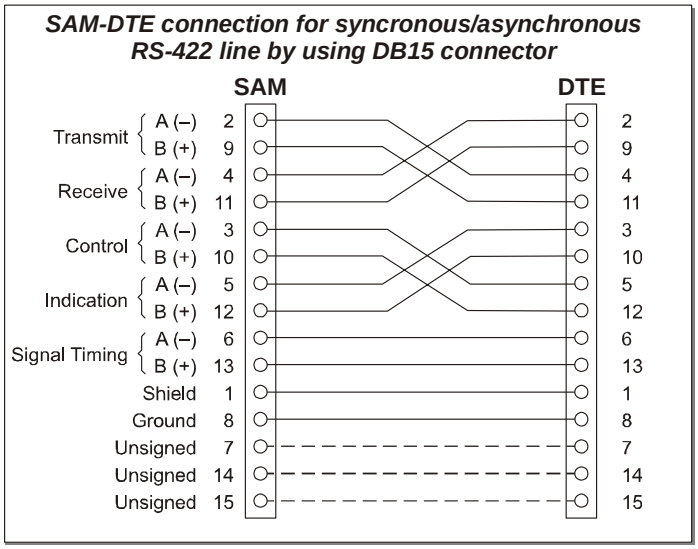


Figure 2-7 – DTE functionalities connection for RS-422 (X.21 / V.11 standard) serial line

2.4 First power-on

This phase completes the unit preparation and is needed to check the correct operation of the instrument and to correctly set he relevant configuration (normally this operation has to be performed only during the first power on).

To perform the first power on sequence proceed as follows:

- Preliminary checks: this operation consists of some visual inspections and a first power on sequence (necessary to check that all parts are operating, even if they have not yet been configured).
- First settings: this operation consists in carrying out the correct unit configuration according to the actual operative conditions (i.e. according to network identification parameters, e.g. name and IP address).

Once completed the unit configuration, SAM is ready to operate. No calibration is required, but a first functional test should be performed to check the instrument operation. Refer to Functional test paragraph for more details.

2.4.1 Preliminary checks

The preliminary checks to carry out for the first power-on mainly consist of:

- visual inspection of the equipment and all accessories,
- first unit power-on and check of the indications of the LEDs on the front panel.

A. PRELIMINARY VISUAL INSPECTION

- check that the equipment does not present external damages due to shock or weather, the cables are rightly wired and the controls are free from obstacles;
- check that all mechanical mountings and protection panels are properly installed and the screws tightened;
- check for continuity and isolation of cables and grounding wires by using a multimeter.

B. FIRST POWER-ON

- Power on the instrument by using the AC/DC adapter and check that the ON indicator is lit,
- Check that, after a first initialization phase (which takes about 30 seconds), the ACT LED present on front panel is flashing to indicate that the CPU initialization has successfully completed.

Remaining LEDs should be off.

If any failure is detected, refer to Troubleshooting paragraph to identify the faulty part.

2.4.2 First settings

The equipment is supplied by the manufacturer with a standard pre-configuration and the following pre-defined values:

IP address:	**192.168.0.12**
Net mask:	**255.255.255.0**
Host name:	**SAM-xx**
MAC Address:	**not modifiable pre-defined value**
Instance:	**1**
Product code:	**product identification, not modifiable pre-defined value**
Product name:	**product identification, not modifiable pre-defined value**

If the instrument has to be linked to a monitoring network (or for any other user requirement) it is possible to change some identification data (i.e. "IP Address", "Host name" and "Instance"), as follows:

- connect the instrument to a local PC running DataView, or to a network with a monitoring station running DataView, and perform the following steps:
  - power on the instrument and wait for initialization phase,
  - run DataView and add a new SAM display (if no other one is available) in the home page "Instrument Bar",
  - open the "configuration" page, by pressing the  button;
- in the configuration page, shown in figure 2-8, it is possible to discovery the instrument by acting as follows:
  - when the configuration page is open, all instruments currently connected are listed in the lower side (each one identified by its IP address),
  - DISCOVERY push button makes a refresh of the instruments list, so to indentify any new instrument or a previous instrument with the IP address changed after the page has been open,
  - if two or more instruments have the same configuration (e.g. the pre-defined configuration), each instrument can be identified by means of the APPEAR push button. This button commands all LEDs of the instrument to flash for about 5 seconds.
- in the configuration page it is possible to change the identification data of the instrument (i.e. IP address, host name, etc.):
  - select (by clicking on it) the field to be changed and then press the function key F2 to enter "edit" mode,
  - enter the new value, by confirming it thru the ENTER key,
  - press the SET push button to confirm the sequence and to store the new value in the instrument flash memory,
  - press the DISCOVERY push button to refresh the instrument list and to check that the new value has been saved.

At the end, configure the instrument for DataView, by selecting it in the instrument list (double click on the IP address). The "IP address" field is updated with the IP address of the selected instrument. Confirm with the OK button and, if required, save the configuration changes by means of the "Setup" function of DataView.

NOTE: for further details, refer to the DataView User Manual.

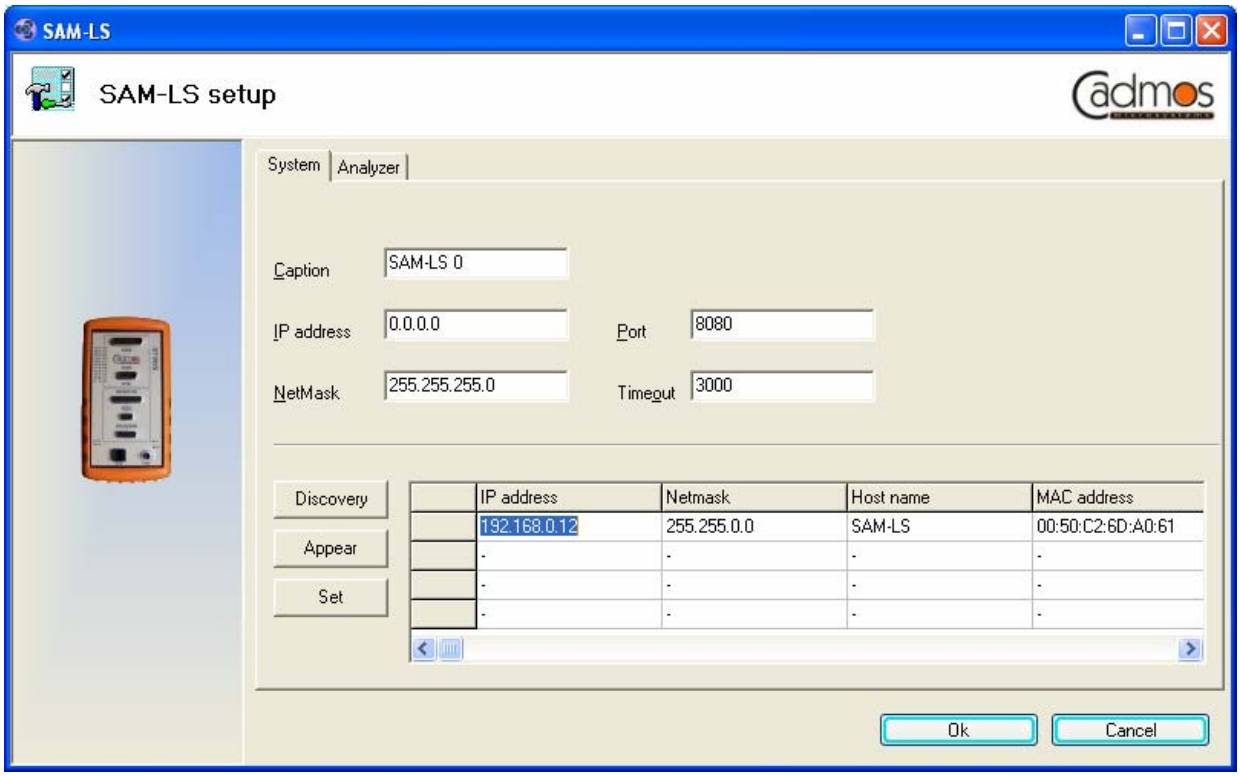


Figure 2-8 – Changing predefined configuration by DataView

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3 Use and configuration

The present chapter provides procedures for a correct use of the instrument, subdividing information into two main sections:

- Local use: it describes the use of the instrument in local mode, by reporting the power-on and power-off procedures, as well as description of controls and indicators.
- Operative scenarios: it depicts several typical measuring scenarios (i.e. Line Monitor, Data tester, etc.) where the instrument can be used.

Note that the instrument is designed to be totally remote controlled, by using DataView application. Refer to its User Manual for further details for instrument configuration and measurement.

3.1 Local use

SAM is designed and realized to operate in fully automatic mode, without local intervention of the operator.

However, as described in the following, some local procedures are required, typically limited to startup and shutdown the instrument.

The following subsections describe:

- the power-on of the instrument,
- the local use of the indicators and controls of the instrument,
- the power-off of the instrument.

Instrument configuration, as well as procedures to set the instrument for its use in several measurement scenarios, are reported in the following chapter Operative scenarios and, in more details, in the DataView User's Manual.

More in detail, the following chapter describes the optimal use of the instrument, depending on the operative requirements, while the DataView User's Manual describes how to properly set each configuration parameter.

3.1.1 Power on

The instrument power-on does not require special directions, but is simply done by connecting it to an electrical socket through the AC/DC adapter (refer to figure 3-1):

- insert the adapter into a wall socket and plug the cable to the PWR connector located on the SAM front panel. The ON yellow led turns on,
- wait about 30 seconds for the initialization phase to complete. When the initialization is done, the ACT green led starts flashing.

The instrument is now ready to operate. If the instrument is already configured and connected to the serial line, the status indicators will begin to operate, according to collected data.

To properly configure the instrument, refer to DataView User's Manual and to the following chapter Operative configuration.

For a complete description of the indicators, controls and connectors, refer to the following paragraph Controls and indicators.

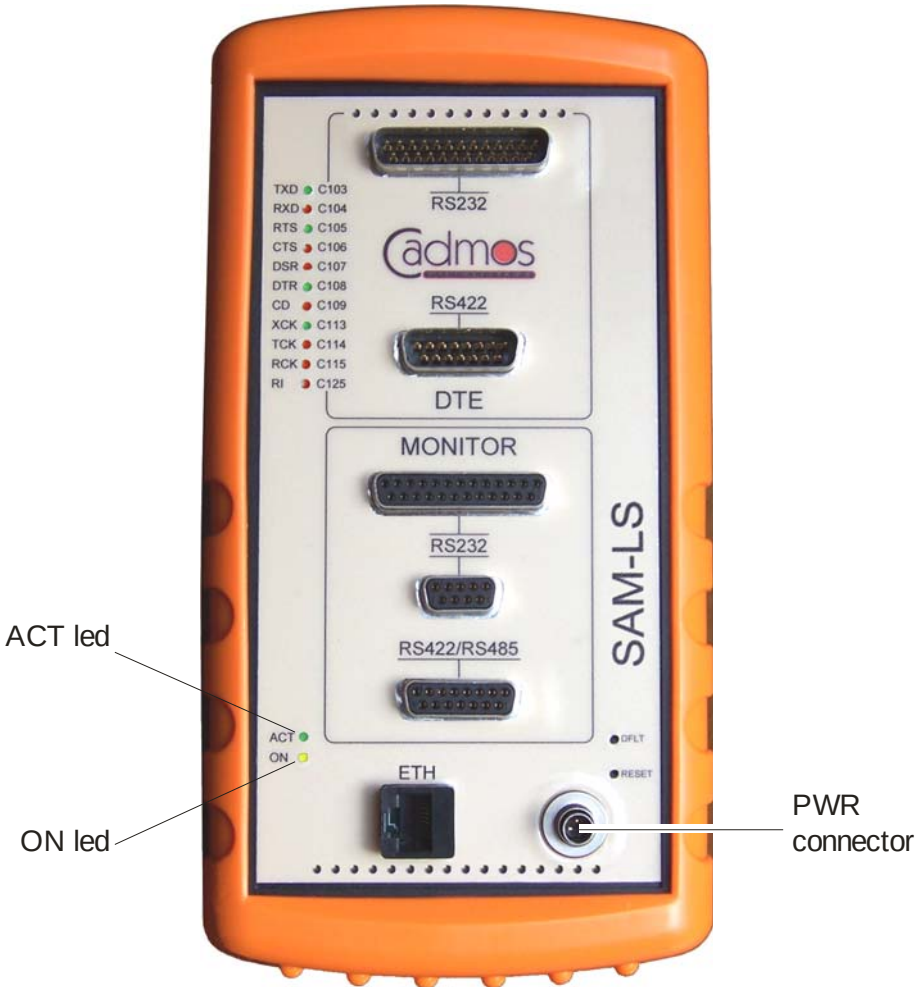

Figure 3-1 – Power ON

3.1.2 Controls and indicators

As already introduced, the instrument is designed to be remotely controlled, via Ethernet link.

However, on the unit front panel you will find: several status indicators for monitoring serial line signals, all the connectors and two controls which can be used to restore the configuration data and restart the instrument, if needed.

Indicators, controls and connectors are described in the following, subdivided by type.

INDICATORS

Indicators (LEDs), are located in the left side of the front panel and subdivided in two groups:

- activity indicators,
- serial line status indicators, to monitor all the signals of the serial line.

More in detail:

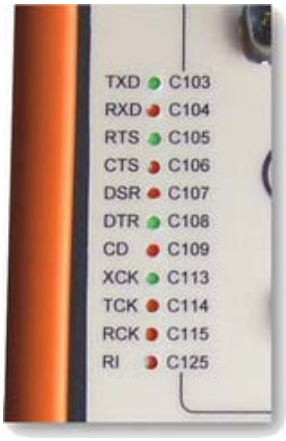

Figure 3-2/A – Indicators

ACTIVITY INDICATORS					
ACT	Green	Flashing when the instrument has completed the initialization phase and is ready to operate. Light on when the instrument is performing measurement activities.			
ON	Yellow	Light on indicates that the instrument is powered.			
STATUS LINE INDICATORS (ON when signals are active)			RS-232 V.24	RS-422 X.21/V.11	RS-485
TXD	Green	Monitor of TX Data signal (C103 circuit).	TXD	Transmit	Transmit (only for Data Tester)
RXD	Red	Monitor of RX Data signal (C104 circuit).	RXD	Receive	Receive
RTS	Green	Monitor of RTS signal (C105 circuit).	RTS	Control	- - -
CTS	Red	Monitor of CTS signal (C106 circuit).	CTS	- - -	- - -
DSR	Red	Monitor of DSR signal (C107 circuit).	DSR	- - -	- - -
DTR	Green	Monitor of DTR signal (C108 circuit).	DTR	- - -	- - -
CD	Red	Monitor of CD signal (C109 circuit).	CD	Indication	- - -
XCK	Green	Monitor of XCK signal (C113 circuit).	XCK	- - -	- - -
TCK	Red	Monitor of TCK signal (C114 circuit).	TCK	Signal Timing	- - -
RCK	Red	Monitor of RCK signal (C115 circuit).	RCK		- - -
RI	Red	Monitor of RI signal (C125 circuit).	RI	- - -	- - -

CONTROLS

Controls are provided to restore normal operation, as follows:

Figure 3-2/B - Controls

DFLT	When pressed with a sharpened object (such as a clip), it restores the default settings.
RESET	When pressed with a sharpened object (such as a clip), it activates the instrument reset sequence.

CONNECTORS

Connectors on the front panel are divided into several sections, as follows:

Figure 3-2/C - Connectors

Measurement connections - "DTE" section (used for Data Tester and/or Arbitrary patterns generator tests)		
DB-25 male	RS-232	Connection to RS-232 serial line to perform "Data Tester" measurements (instrument is set as DTE)
DB-15 male	RS-422	Connection to RS-422 serial line to perform "Data Tester" measurements (instrument is set as DTE)
Measurement connections - "MONITOR" section (used for Line monitor tests)		
DB-25 female	RS-232	Connection to synchronous/asynchronous RS-232 serial line (25-wire cable) to perform "Line Monitor" measurements.
DB-9 female	RS-232	Connection to asynchronous RS-232 serial line (9-wire cable) to perform "Line Monitor" measurements.
DB-15 female	RS-422 RS-485	Connection to RS-422 and RS-485 serial lines to perform "Line Monitor" measurements.
General connection		
RJ-45	ETH	Connection to the LAN Ethernet 10/100 Mbps. This connection is used to link the workstation running DataView (supplied with the instrument) to perform configuration and data analysis.
Power connector	(PWR)	Connection to the AC/DC adapter, supplied with the instrument.

3.1.3 Power off

The instrument shutdown is simply made by disconnecting it from the power supply: disconnect the AC/DC adapter from the PWR connector and unplug the AC/DC adapter from the socket.

Configuration data are automatically lost.

3.2 Operative scenarios

SAM is primarily designed to realize an analysis station for synchronous/asynchronous serial lines, finding ideal application as:

- Line Monitor for multiprotocol multistandard serial lines,
- Data Tester for serial links,
- Arbitrary Pattern Generator.

The following paragraphs describes in more detail the primary operating scenarios, putting in evidence, for each one, the instrument capabilities and proper settings.

3.2.1 Line Monitor

The main feature of SAM (all models) is to operate as Serial Line Monitor, allowing both to analyze a single serial link/device or to make an advanced monitoring network to check several serial links in a whole site. Data are centralized on a workstation with DataView application, in order to perform data checking, analysis and recording.

When the SAM is used as Line Monitor, it detects the status of signals with no electrical interference on the data exchanged between serial devices. Thus the actual status of the signals is displayed.

In figure 3-3, the operative scenario of SAM used as Line Monitor is depicted.

In this operation, SAM allows to:

- detect data exchanged on the serial line under test, in compliance with the relevant communication protocol,
- verify the accuracy of the clock signals,
- monitor the performances of all signals on the serial line under test.

SAM can interface devices equipped with synchronous / asynchronous serial ports, RS-232, RS-422 and/or RS-485. Main operating parameters are user-configurable.

All detected data, together with some pre-analysis information (i.e. error data counting, etc.), are centralized on DataView for both monitoring and real time analysis (displaying the data in a separate Data Monitor) or post-dated analysis (through a Data Log function and recording function which store data in a centralized archive).

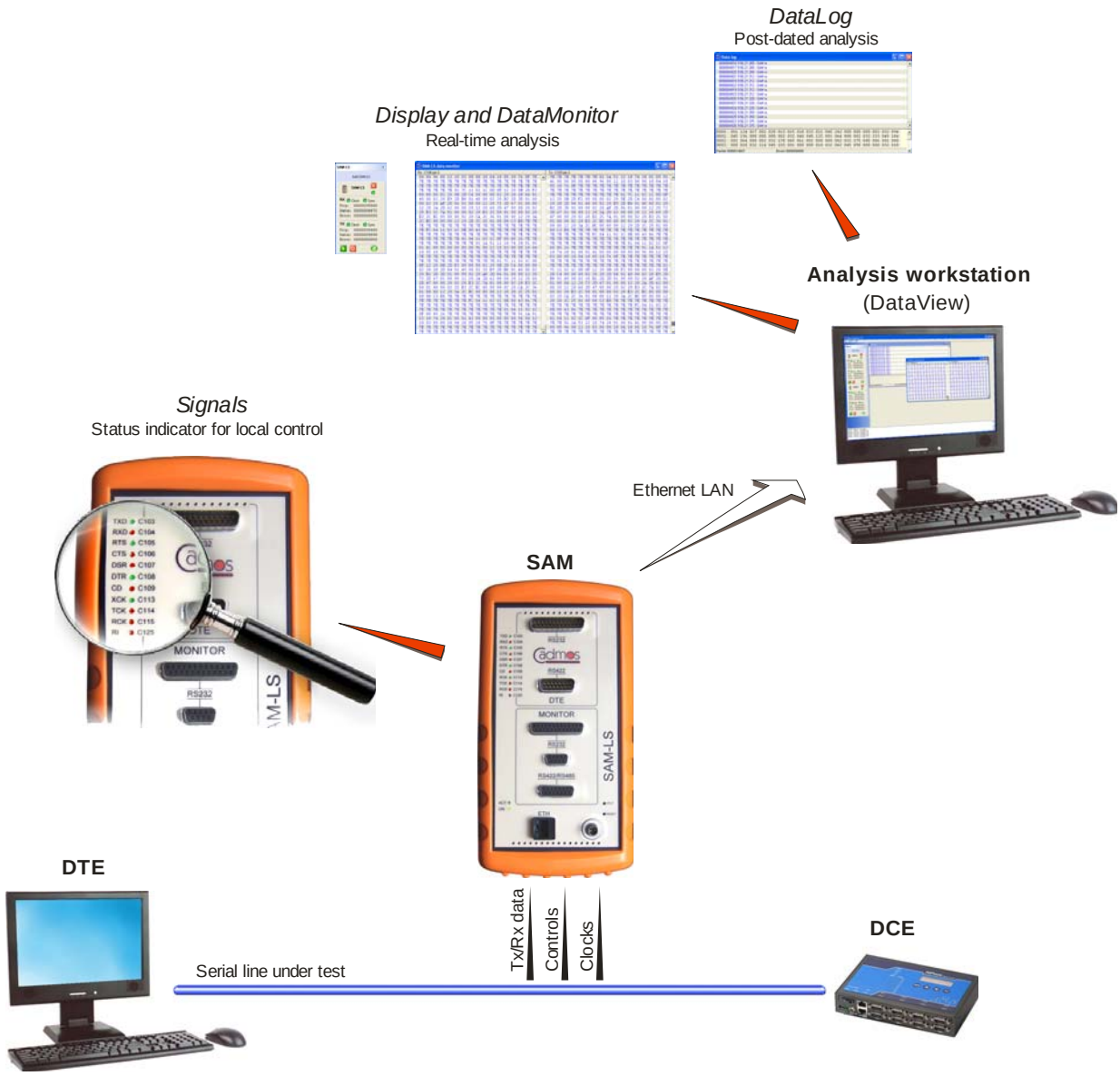

Figure 3-3 – Line Monitor – Operating scenario

A. Monitoring sites

The continuous monitoring of entire sites is a major capability of SAM series instruments, which allow to monitor, without service interruption, serial connections with different protocols.

As shown in figure 3-4, where it is necessary to constantly monitor one or more serial lines, for random anomalies or only for analysis, you can use SAM (any model), linking it to the serial line under test, by means of "Monitor" connectors and by setting the input signals for high impedance. In this way, monitoring is done without interference to the signals of the serial line under test.

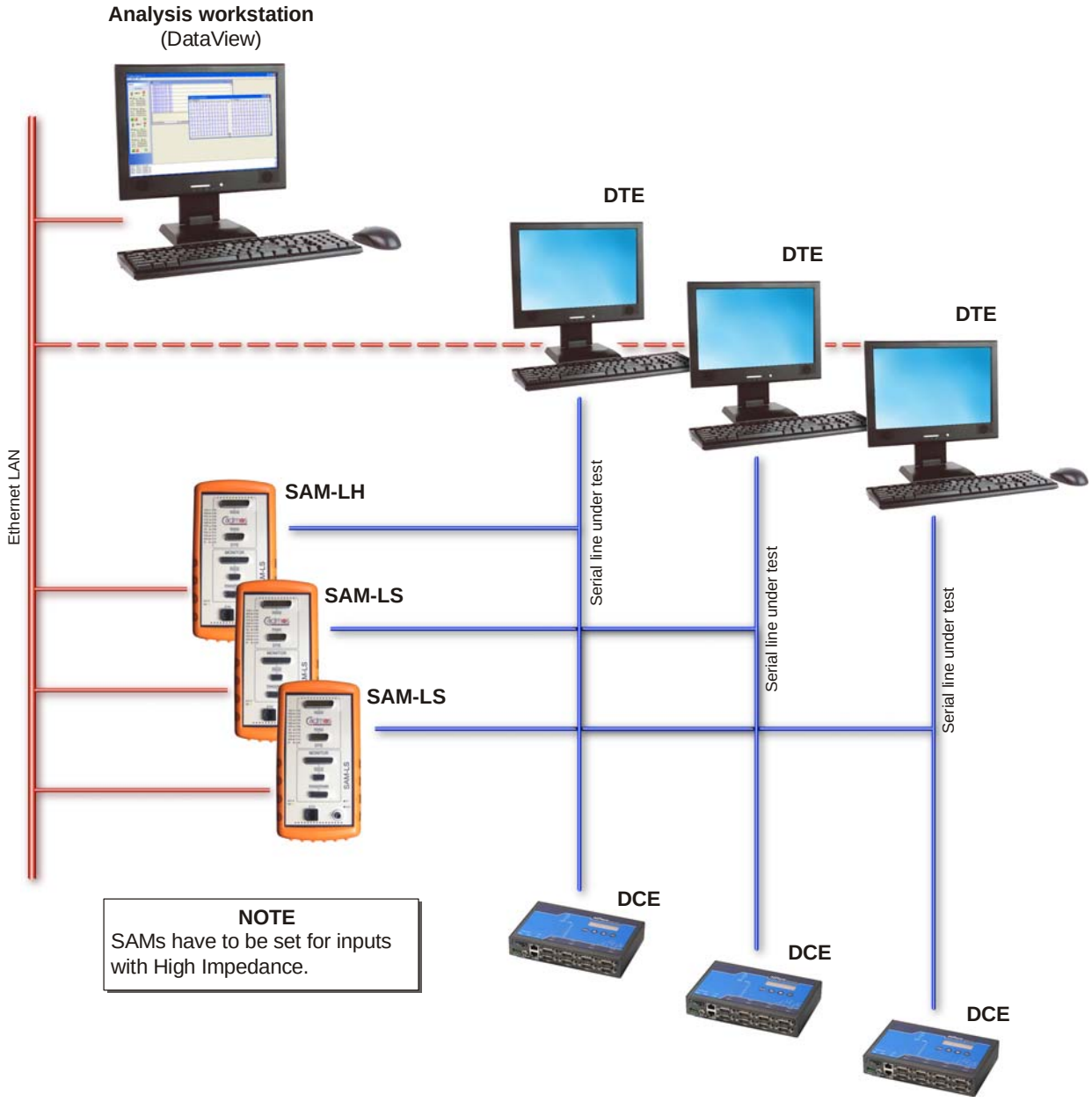

Figure 3-4 – Line Monitor application – Sites monitoring

To set the SAM for operation, it is necessary to:

- identify the instrument on the network (IP address, name, etc.),
- set the input signals of RS-232 ports as "**high impedance**",

NOTE: for the RS-422 and RS-485 interface, the impedance does not require any changes because the drivers impedance has a high value that does not disturb serial communication.

- select the protocol used for connection and then set all relevant operating parameters (different for synchronous or asynchronous serial line).

By properly setting the protocol, SAM provides to detect data exchanged on the serial line (Rx and Tx), making it available to the analysis station, on which it is possible to monitor several instruments and, for each of them, performs real-time or post-dated analysis, in the latter case by recording data in a centralized database.

More in detail, to track multiple connections, the DataView allows, for any configured instrument, viewing general information on the relevant window (located on left side of the screen) and, if requested, monitoring data in real-time mode through Data Monitors, as shown in figure 3-5.

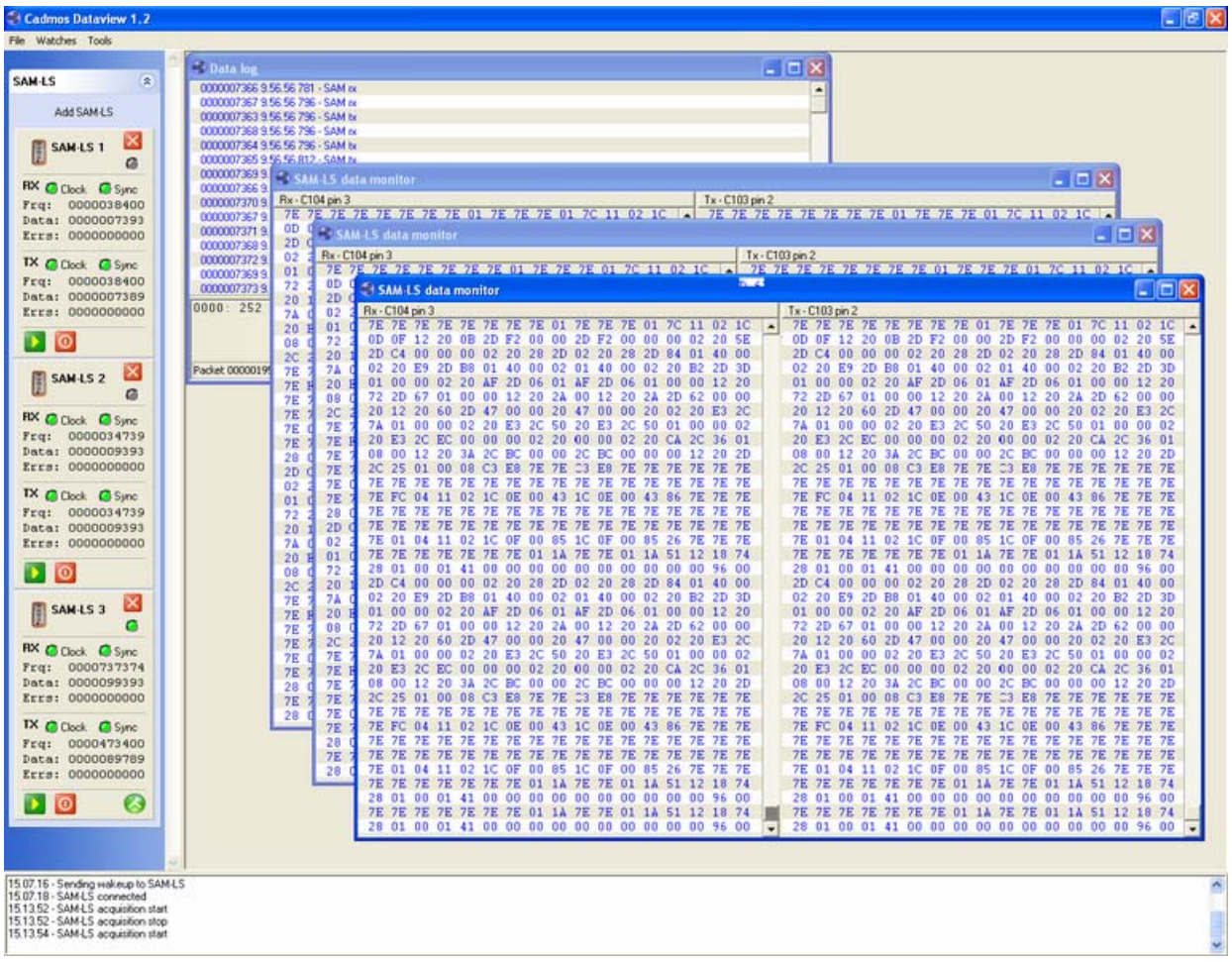

Figure 3-5 – DataView used for checking remote site connections

B. Monitoring a single DTE

SAM provides test functions to monitor a single DTE, by checking the data generated by DTE itself, without replying to it.

As shown in figure 3-6, to check the data generated by a DTE it is sufficient to connect the serial line to a Monitor connector of the SAM, by setting the input signal as "Low Impedance".

To set the SAM for operation, it is necessary to:

- identify the instrument on the network (IP address, name, etc.),
- set the input signals of RS-232 ports as "**low impedance**",

NOTE: for the RS-422 and RS-485 interfaces, no impedance changes are required, since the drivers impedance has a high value that does not disturb serial communication.

- select the protocol used for connection and then set all relevant operating parameters (different for synchronous or asynchronous serial line).

By properly setting the protocol, SAM provides to detect data sent from DTE, making it available to the analysis station, on which it is possible to perform real-time or post-dated analysis, in the latter case by recording data in a centralized database.

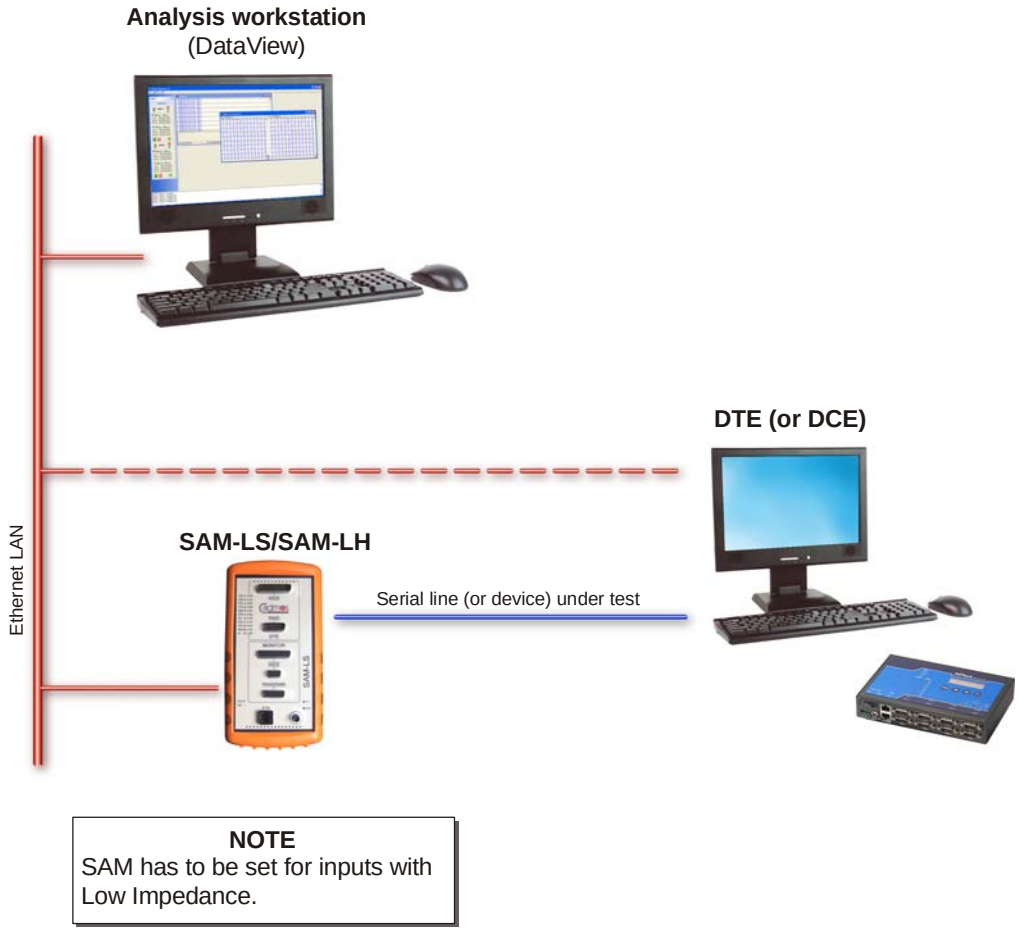

Figure 3-6 – Line Monitor application – Single DTE monitoring

3.2.2 Data Tester

Data Tester function (SAM-LH only) allows monitoring of serial links and serial devices, generating standard pseudo-random test patterns, in accordance to ITU-T O.150 recommendations, as follows:

No. of BITs		Description
511	$2^9 - 1$	511-bit pseudo-random test sequence
2.047	$2^{11} - 1$	2 047-bit pseudo-random test sequence
32.767	$2^{15} - 1$	32 767-bit pseudo-random test sequence
1.048.575	$2^{20} - 1$	1 048 575-bit pseudo-random test sequence
8.388.607	$2^{23} - 1$	8 388 607-bit pseudo-random test sequence
536.870.911	$2^{29} - 1$	536 870 911-bit pseudo-random test sequence
2.147.483.647	$2^{31} - 1$	2 147 483 647-bit pseudo-random test sequence

This function is used to perform analysis and BER (Bit Error Rate) measures, to calculate the ratio of bits received as incorrect and total bits sent on serial links, as shown in figure 3-7.

As for the previous case, SAM sends the data collected, via Ethernet, to a central station running the DataView application.

In this condition, SAM allows to:

- generate data patterns to be sent on a serial line,
- synchronize data transmitted with data received from the remote correspondent (both from remote loop connection or from another SAM) in order to perform a BERT - Bit Error Rate Test - of the link,
- calculate the BER of connection, detecting the link quality,
- check, in local mode, all signals of the connections under test by means of the status indicators located on the front panel.

SAM can interface devices equipped with synchronous / asynchronous serial ports, RS-232, RS-422 and/or RS-485. The main operating parameters are user-configurable.

All data are centralized on DataView for both monitoring and real-time analysis (displaying data in a separate Data Monitor) or post-dated analysis (through a Data Log function and recording function which stores data in a centralized archive).

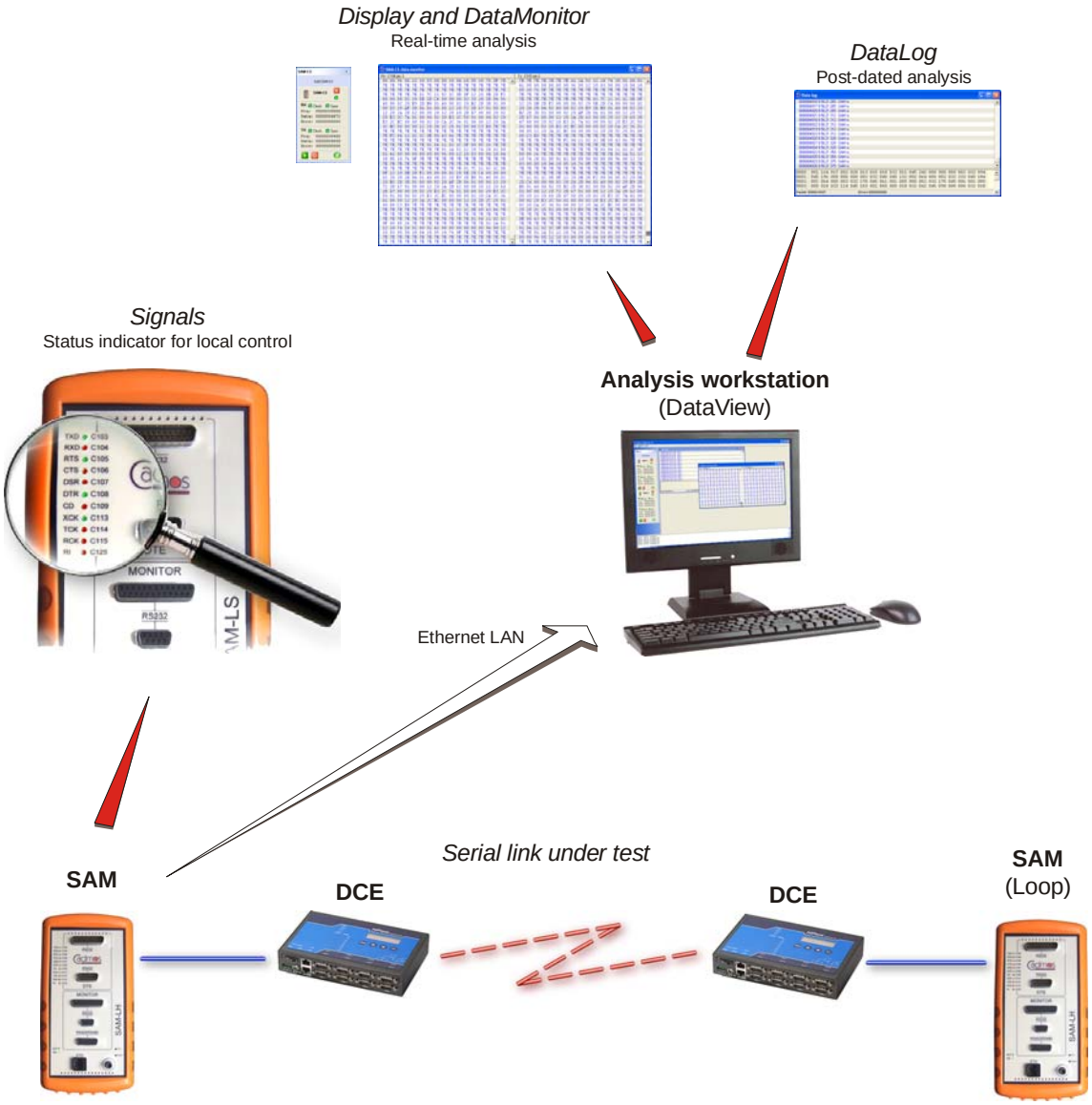

Figure 3-7 – Data Tester – Operating scenario

3.2.3 Arbitrary Pattern Generator

Arbitrary Pattern Generator function (SAM-LH only) is specifically designed to perform tests of serial devices, by creating patterns (sequences) of bits with few simple and intuitive steps and by using SAM to send these sequences on serial line.

Analysis may be performed by sending the test packet data and checking the reply from the pairing.

Figure 3-8 shows the operating scenario for this function.

The SAM operates with a centralized location (via Ethernet) running DataView application.

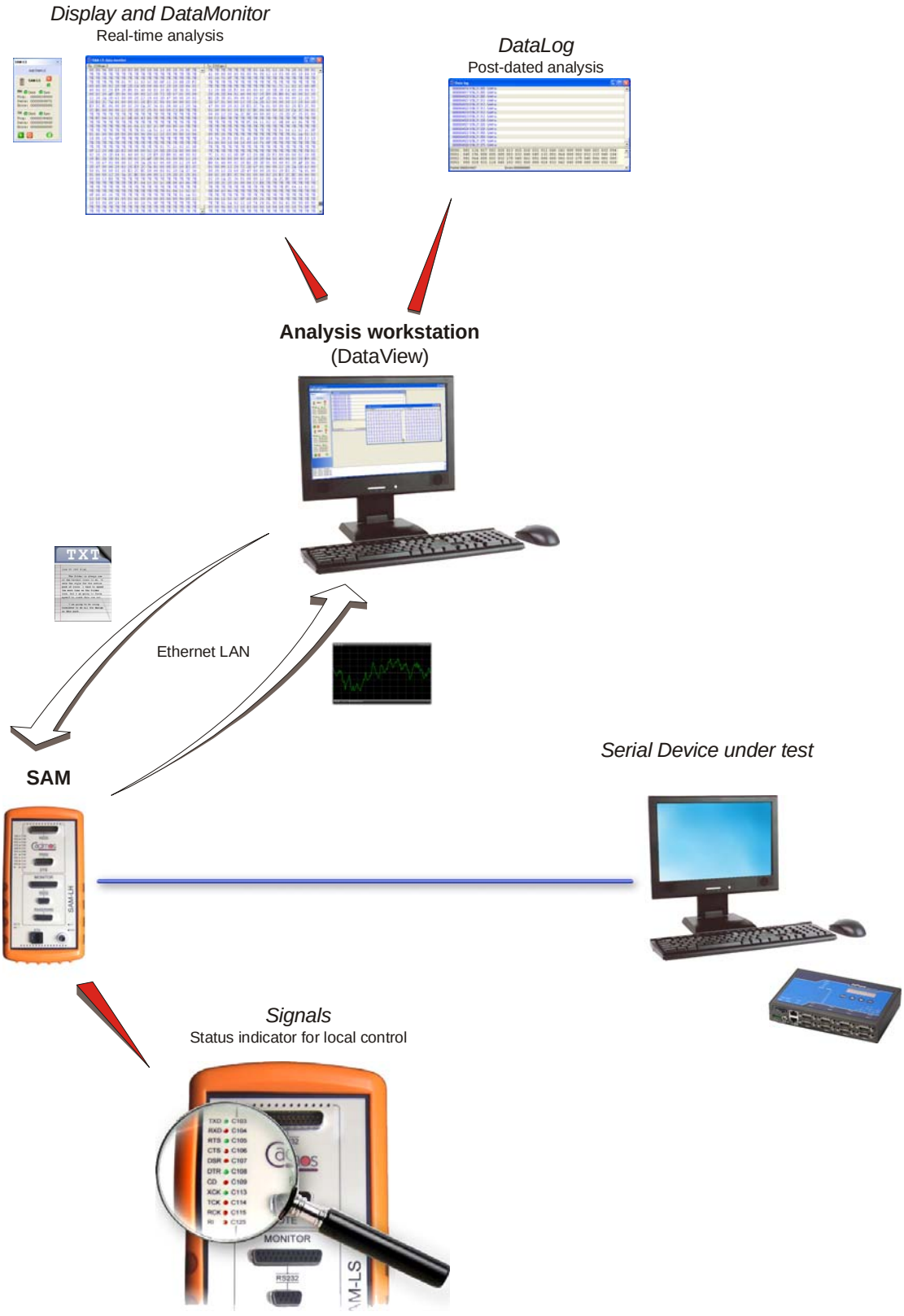

Figure 3-8 – Arbitrary Pattern Generator – Operating scenario

In this condition, the SAM allows to:

- generate test patterns to be sent via serial line to the device under test,
- monitor the response of the device under test, by checking that patterns are correctly received and that the expected action is performed by tested device,
- check, in local mode, all signals of the connections under test by means of the front panel status indicators.

SAM can interface devices equipped with synchronous / asynchronous serial ports, RS-232, RS-422 and/or RS-485. The main operating parameters are user-configurable.

All data are centralized on DataView for both monitoring and real-time analysis (displaying the data in a separate Data Monitor) or post-dated analysis (through a Data Log function and recording function which stores data in a centralized archive).

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4 Maintenance

Maintenance must be carried out in safe conditions, by bearing in mind that the instrument is powered with low voltages and that the only high voltages are localized into the AC/DC adapter.

This section contains information needed to maintain and service the Unit, consisting of:

- a summary of maintenance operations,
- recommended test equipment and procedures for performance tests and calibrations,
- troubleshooting procedure for fault isolation.

The unit maintenance is organized as follows:

- Cleaning and preliminary checks
- Troubleshooting
- Functional test

Personnel qualified for maintenance operations is a Technician (a person with a good knowledge of electronics and experienced in use of electronic instrumentation).

Tools, material, and test equipment required to carry out maintenance procedures are listed in the following table 4-1 (they are normally provided to the service personnel).

Table 4-1 – Tools, instruments and materials required for maintenance

INSTRUMENTS	**USE**
Digital multimeter	General purpose, to measure voltage, current and continuity.
Serial line simulator	Synchronous/asynchronous serial line monitoring, to test SAM.
TOOLS	**USE**
Vacuum cleaner for electronic	Unit cleaning
Brushes	Unit cleaning
Set of screwdrivers	Mechanical fixing and/or part replacement procedures
MATERIALS AND CONSUMABLES	**USE**
Compress air spray (low pressure)	Unit cleaning
Soft clothes	Unit cleaning
Contact cleaner spray	Connectors and contacts cleaning

4.1 Cleaning and preliminary checks

A. EQUIPMENT INSPECTION

Inspection is the most important task in the preventive maintenance procedures: all accessible components and parts should be examined.

Inspection will save repair time and may also avoid further damage.

Check all exposed surfaces for scratches, or evident damages, which could cause improper equipment operation.

Thoroughly inspect the unit for any abnormal conditions. If any are found, the cause of such conditions should be determined and the defects remedied before proceeding with the troubleshooting and other tests described in the following paragraphs.

Chassis and case	Examine the chassis for mechanical defects, dirt, and corrosion.
Wiring	Examine for charred, loose, defective, or broken wiring and insulation.
Mounting hardware	Examine all nuts, bolts, and other mounting hardware on the chassis to make sure that they are not loose. Loose mounting hardware may cause intermittent noises in the unit and in the set associated with it.

B. CABLES AND CONNECTORS INSPECTION

Verify the state of connectors and related cables. Inspect that ground connections are made properly.

Regularly, inspect connector pins. If necessary, clean pins with an electrical contact cleaner.

Corroded connectors are cleaned with fine (#0000) sandpaper. It is important that the entire surface of the connector be should cleaned.

At the end, connect a test cable to perform some functional tests, checking electrical contacts.

C. CLEANING

Equipment chassis surfaces can be cleaned with a commercial, spray-type window cleaner or with a mild soap and water solution.

 CAUTION	Avoid the use of chemical cleaning agents, which might damage the plastic parts and deteriorate engraved labels. Recommended cleaning agents are isopropyl alcohol or a solution of 1% mild detergent and 99% water.

When the finish on the case or on the panels has been badly scarred or damaged, rust and corrosion can be prevented by touching up bared surfaces.

Corroded spots are best removed with soap and water. Stubborn residues can be removed with a fine abrasive. Protect such areas from further corrosion with an application of silicone resin.

4.2 Troubleshooting

This paragraph provides instructions and information to locate faults on the Unit.

One important prerequisite for successful troubleshooting is understanding how the unit is composed and designed to operate. Refer to the Chapter 1 - General description for further details.

No matter how well equipment is designed and manufactured, faults occur either during normal operation or during performance tests. The latter condition normally occurs while already performing off-line test procedures and hence any troubleshooting initiates in this phase.

4.2.1 General

A. GENERAL INFORMATION

During normal operation the equipment is controlled by BITE circuits and continuous software routines, which monitor some of the most important parameters of the unit.

In general, the kind of malfunctions are grouped as:

- malfunctions that cause the equipment to cease operation;
- malfunctions that appear randomly and in general do not compromise the equipment operation;
- malfunctions that are detected during normal use, appearing as degraded performance;
- front panel LED indications, signalling that BITE localizes a malfunctioning part.

The first remedy is to turn off the unit, wait a couple of seconds and then turn equipment on again; if the problem disappears, it was probably caused by a glitch or transient in the microprocessor circuits.

If the problem does not disappear, a complete troubleshooting procedure must be performed to localize the faulty part.

B. TROUBLESHOOTING PROCEDURES

The first step in servicing a defective equipment is to sectionalize the fault. Sectionalization means tracing the faults to the section responsible for the abnormal operation of the unit.

The second step is to localize the fault. Localization means tracing the fault to the defective module or part responsible for the abnormal condition.

Troubleshooting procedures associate the probable cause and the corrective action to the given fault symptom. More than one probable cause can be associated to a fault symptom; in that case they are listed in the probability order of occurrence.

NOTE	Not all the symptoms of malfunction may be caused by component failures. Some faults gradually degrade performances below the specified minimum level and cannot be easily located. It is however important to locate any performance degradation to avoid a complete equipment failure.

To correctly analyze a fault symptom follow what indicated below:

- first of all, refer to BITE indications paragraph, which lists the relationships between the LED status (on the front panel) indications and the most probable faulty modules.
- then, refer to Fault symptoms paragraph, which lists the most probable symptoms, which may be easily recognized by the operator and gives the probable location of the trouble and the corrective action.

4.2.2 BITE indications

If any failure is detected, different indications may be shown by the front panel indicators or thru DataView messages.

The following failures can be detected using the BITE indications.

Figure 4-1/A – Anomalous condition
- Activation phase -

INCORRECT ACTIVATION *(refer to fig. 4-1/A)*

When the equipment is powered, the correct operation can be monitored with the following two LEDs:

- ON yellow Led: it is lit when the instrument is powered. If the instrument is powered but the LED is OFF, trouble may be localized on the AC/DC adapter or in the power supply circuits of the instrument itself.
- ACT green Led: at the end of the initialization phase, it starts flashing until a new measure begins (when measuring, the LED is steadily lit). If initialization fails, the LED remains OFF.

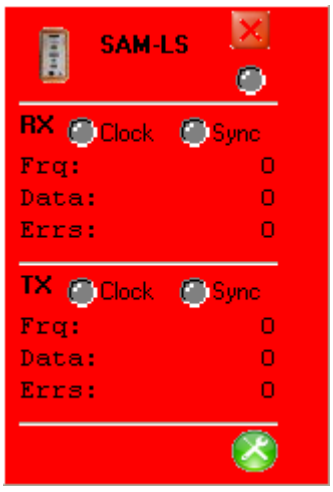

Figure 4-1/B - Anomalous condition
- No network link -

NO LINK DATAVIEW (NETWORK CONNECTION FAILS) *(refer to fig. 4-1/B)*

During normal operation of DataView, each connected instrument is identified in a frame. If it turns red during normal operation or remains red at DataView start-up, there is probably a failure condition in the network connection or the instrument configuration is not correct.

In the latter case, it is possible to check the instrument configuration through DataView.

4.2.3 Fault symptoms

SYMPTOM	PROBABLE CAUSE	CORRECTIVE ACTIONS
Instrument is dead.	AC/DC adapter Power supply circuits of the instrument	Check the AC/DC adapter: output voltage must be at least 12Vdc. If the adapter is ok, there is probably a failure in the power supply circuits of the instrument (contact the Manufacturer Assistance).
Instrument does not link to the LAN network or it does not communicate with the monitoring station (DataView).	Incorrect configuration Network connection	At first, check the network connection (cable, hub or switch, etc.). Then, check that the instrument is properly configured and all network identification parameters are correctly set (refer to First setting paragraph for more details). If configuration and connection are ok, there is probably a failure in the network interface of the equipment (contact the Manufacturer Assistance).
Front Panel LEDs (line status) show anomalous indications which do not correspond with the actual operative conditions.	Test cable Instrument failure	Anomalous indications usually indicate one or more anomalies on the serial line under test. Check the serial line. Furthermore, if the serial line signals are certainly correct and the anomalous indications are still present (measuring different lines), the instrument could be in failure (contact the Manufacturer Assistance).
Instrument, when used as Pattern Generator (Datat Tester or Arbitrary Patter Generator) does not send any data sequence.	Test cable Instrument failure	At first, check the cable continuity and verify if the malfunction is still present for different serial devices (the trouble should be located on the device under test). Otherwise, there is a failure in the instrument. Send it for maintenance (contact the Manufacturer Assistance).

4.3 Functional test

Instrument functional test can be simply performed by checking a sample serial line (serial line generator) with several measurements (Monitor and DTE).

A. Check *Line Monitor* function

To check the Line Monitor functionality, connect the sample serial line (RS-232, RS-422 or RS-485) to the relevant connector located in "Monitor" section and then start a monitoring sequence.

Check that DataView displays measured data, while the front panel LEDs display the actual status of serial line signals.

B. Check *DTE* (*Pattern generator*) functions

To check Pattern Generator functionality (Data Tester, Arbitrary Pattern Generator, etc) connect the sample line (RS-232, RS-422 or RS-485) to the relevant connector of DTE section (for RS-485 only the connector to be used is located in the Monitor section) and then start a measurement sequence.

Verify on DataView that data are correctly exchanged.

A. V.24 / X.21 standards

A.1 V.24 standard

The present Annex lists the pin-function for the V.24 standard, based on ITU-T recommendations.

For each signal, the correlation between signal name, circuit number, pin number (DB25 and DB9 connectors), DTE direction and a brief description are available.

PIN DB25	PIN DB9	Signal name	ITU-T	Dir.	Direction DTE side	Description
2	3	TXD	103	→	OUT	**Transmit Data** Data Transmitted from DTE to DCE.
3	2	RXD	104	←	IN	**Receive Data** Data Received by DTE (transmitted from DCE to DTE).
4	7	RTS	105	→	OUT	**Request to Send** Asserted by DTE to prepare DCE to receive data. The DCE is disabled to transmit, until this signal is active. Active status: high.
5	8	CTS	106	←	IN	**Clear to Send** Asserted by DCE to acknowledge RTS and allow DTE to transmit. The DTE is disabled to transmit, until this signal is active. Active status: high.
6	6	DSR	107	←	IN	**Data Set Ready** Asserted by DCE to indicate to DTE that DCE is ready to operate and to receive data. Active status: high.
7	5	GND	102	—	- - -	Ground connection.
8	1	CD	109	←	IN	**Carrier Detect** Asserted by DCE to indicate to DTE that DCE is ready to receive data or is been received a carrier from another device (for example, the modem receives the carrier from the telephone line).

PIN DB25	PIN DB9	Signal name	ITU-T	Dir.	Direction DTE side	Description
15	- - -	TCK	114	←	IN	**Transmission Signal Element Timing** Clock signal, send by DCE for the synchronization of DTE data transmission (SD - C103).
17	- - -	RCK	115	←	IN	**Receiver Signal Element Timing** Clock signal, send by DCE for the synchronization of DCE data transmission (RD - C104).
20	4	DTR	108	→	OUT	**Data Terminal Ready** Asserted by DTE to indicate to DCE that DTE is ready to receive data. Active status: high.
24	- - -	XCK	113	→	OUT	**Transmit Signal Element Timing** Clock signal, send by DTE for the synchronization of DTE data transmission (SD - C103).
22	9	RI	125	←	IN	**Ring Indicator** Asserted by DCE to indicate to DTE that the telephone line is ringing.

Direction:

→ From DTE to DCE

← From DCE to DTE

A.2 X.21 (V.11) standard

The present Annex lists the pin-function for the X.21 (that includes the recommendation of V.11) standard, based on ITU-T recommendations.

For each signal, the correlation between signal name, circuit number, pin number (DB15 connector), DTE direction and a brief description are available.

PIN	Signal name	ITU-T	Dir.	Direction DTE side	Description
2 9	Transmit - Transmit +	T	→	OUT	**Transmit Data** Data Transmitted from DTE to DCE.
4 11	Receive - Receive +	R	←	IN	**Receive Data** Data Received by DTE (transmitted from DCE to DTE).
3 10	Control - Control +	C	→	OUT	**Control** Asserted by DTE to prepare DCE to receive data. The DCE is disabled to transmit, until this signal is active. Active status: high.
5 12	Indication - Indication +	I	←	IN	**Clear to Send** Asserted by DCE to prepare DTE to receive data. The DTE is disabled to transmit, until this signal is active. Active status: high.
6 13	Signal Timing - Signal Timing +	S	←	IN	**Signal Element Timing** Clock signal, send by DCE for the synchronization of data exchange.
1	Shield	G	— → ←	- - -	**Shield** Shield connection.
8	Ground	G_a	—	- - -	**Ground** Ground connection.

Direction:

→ From DTE to DCE

← From DCE to DTE

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B. Assistance

Any technical assistance requests for installation, use and maintenance, should be directly forwarded to the manufacturer:

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