

# **Telesto Private Wire Modem Manual**



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## Revision History

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# 1. Introduction

Telesto Private Wire Modems work in conjunction with Europa digitisers, greatly extending the aperture of Nanometrics terrestrial Callisto networks.

It is strongly recommended that you read the entire manual before commencing testing, configuring, or using the Telesto. On the following pages you will find a wealth of information regarding all aspects of the Telesto modem. Please read the instructions carefully.

If you have problems or need technical support, please submit requests for technical support by e-mail or fax. When communicating your problem to us please give as much information as possible and include "evidence" of the problem. This allows us to reproduce the problem in our laboratories and to find a solution to your problem.

**by e-mail:**    **support@nanometrics.ca**

**by fax:**        **To: Support at fax (613) 592-5929**

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## 2. Organization of this Manual

This manual is organized in these major sections:

<b>Chapter 1</b>	<b>Introduction</b>	Introductory notes to this manual.
<b>Chapter 2</b>	<b>Organization of this Manual</b>	Notes on how to use this manual.
<b>Chapter 3</b>	<b>Unpacking and Post Delivery Inspection</b>	Identifies components and references an "as-shipped" section.
<b>Chapter 4</b>	<b>Technical Description</b>	Description of features and technical specifications.
<b>Chapter 5</b>	<b>Servicing</b>	Recommended maintenance and repair procedures.
<b>Appendices</b>	These list pin connections, outline & installation drawings and the Telesto Private Wire Modem Technical Specification	

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### 3. Unpacking & Post Delivery Inspection

Open and inspect the shipment for possible damage. Carefully check each item for damage or defects. The following list includes items generally included with the Telesto modem. This list can vary from application to application. To determine the exact list of items included in your shipment refer to the shipping documents.

The system may include one or more of the following:

1. Telesto Private Wire Modem
2. Power cable
3. Telesto Private Wire Modem Manual
4. As-shipped Sheet
5. OEM Modem Manual

#### Checking the As-Shipped Sheets

Please study the as-shipped data sheet to determine the exact configuration of the Telesto modem. The as-shipped sheet lists the serial numbers of the parts shipped and the exact configuration of the parameters associated with your hardware. This determines how your Telesto modem operates when first powered-on and how it functions within your network.

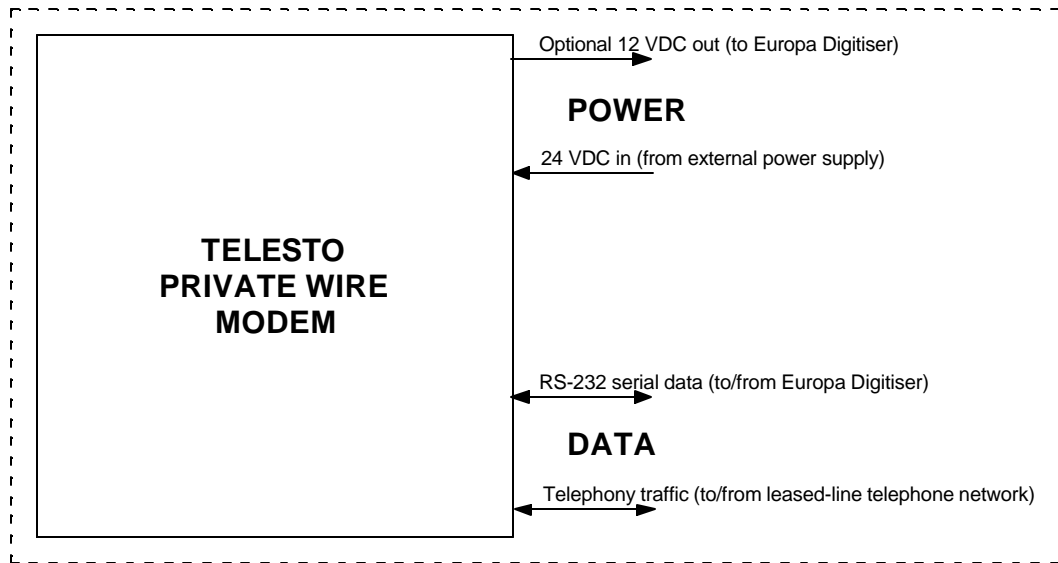
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## 4. Technical Description

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### Overview of the Hardware

The Telesto Private Wire Modem is the interface at a remote seismic site between the Nanometrics Europa digitiser and the telephony communications network. The Europa digitiser packages and outputs this information in the form of a serial data stream of a proprietary format. The Telesto modem integrates all the hardware necessary to receive data from the Europa digitiser and sends this data to the network central site. It also provides for the reverse flow of data by receiving various network management information from the central site and passing it to the Europa digitiser. Optionally, the Telesto Private Wire Modem provides power to its associated Europa digitiser. The general function of the Telesto is shown in Figure 1.



*Figure 1: Telesto Private Wire Modem, General Function*

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### Theory of Operation

The two main functions of the Telesto modem are to interface the data from the Europa digitiser to the leased-line telephony network and, optionally, to supply power to the Europa digitiser. The functions are performed by a Printed Circuit Board (PCB) mounted inside the Telesto enclosure. This PCB contains two principal components - a modem and three DC/DC converters. Other ancillary components include flex circuits which interface the PCB to the Telesto front panel connectors. The main functions are described below.

#### Interfacing serial data to the leased-line telephony network

The serial data stream produced by the Europa digitiser uses an RS-232 physical layer protocol. This format is not suitable for transmission over a leased-line telephone network because of signal

levels, voltages, bit duration, etc. In order to efficiently couple the RS-232 data to the telephone network a device known as a modem (MODulator/DEModulator) is used to transform the RS-232 digital data into an analog signal which can be efficiently carried on the telephony channel. By varying the properties of the analog signal such as signal amplitude, phase and duration, one can efficiently pack the RS-232 data onto the telephony channel. The telephony channel then carries the data traffic to the eventual destination. At the receiving end (in this case, the central station) the telephony signal is transformed back to RS-232 format which can then be used by DTEs (Data Terminal Equipment) such as computers and data processing equipment.

Therefore, the Telesto modem at a remote site must be paired with a corresponding modem at the central site. Both of these units perform the same function - they transform the local data stream to a form suitable for transmission on the leased line telephone network. Because data flow can occur in both directions, i.e., to/from a remote site, the Telesto private wire modem is a full-duplex device. This allows seismic data to be sent continuously to the central data acquisition site while also providing a return path for retransmission requests from the central site.

Both the remote site Telesto modem and its counterpart at the central site perform error detection and correction which may have been caused by noise on the telephone channel. This function is performed transparently, i.e., neither the Europa digitiser nor the central site data acquisition equipment have knowledge of this real-time error correction.

The Telesto modem has been designed to require no "handshaking" between itself and the data device connected to it, e.g., Europa digitiser. Only 3 signal lines are necessary to transmit/receive data over the leased-line telephone network with the Telesto; these are Tx (Transmit), Rx (Receive) and GND (Ground). Data to be transmitted is simply placed on the Tx line while data to be received is obtained by monitoring the Rx line; GND serves as an electrical return path.

### **Power Conversion (Optional)**

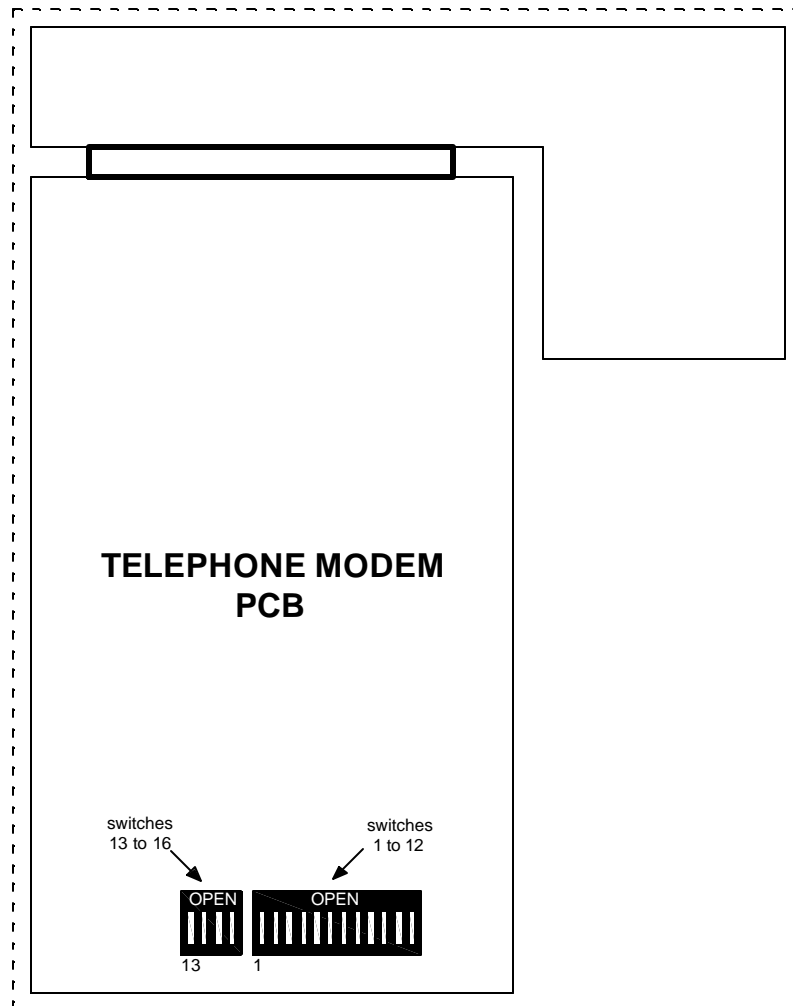
Because the available power at the remote site is 24 VDC, the Telesto Private Wire Modem converts this voltage to a 12 VDC level required by the Europa digitiser. As well the Telesto's internal electronics require different voltage levels. The power conversion is accomplished inside the Telesto with the use of 3 DC/DC converters. These solid state devices provide 15 VDC, 12 VDC and 5 VDC. The 12 VDC is made available to the Europa Digitizer via a MIL connector on the front panel of the Telesto enclosure.

## Configuration

The Telesto Private Wire Modem requires configuration in order to properly integrate it into the seismic network. This configuration assumes that the telephone network is a 4-wire leased line system. Because the Telesto Modem at the remote site is paired with a corresponding unit at the central site, it is important to configure the remote site Telesto Modem in ANSWER mode (the central site modem, in this case, is in ORIGINATE mode). Both the hardware and firmware configurations are detailed below.

### Hardware Configuration

Inside the Telesto Private Wire Modem can be found a telephone modem PCB (model Multitech, MT2834BLRe) as shown in Figure 2. The PCB has two dip switches containing a total of 16 switches which must be configured as in Table 1.



*Figure 2: DIP Switch Location on Telephone Modem PCB*

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## Technical Description

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TELEPHONE MODEM DIP SWITCH SETTINGS				
DIP Switch No.	Function		Manufacturer's Default	Telesto Modem
	UP	DOWN		
1	DTR from interface	DTR forced	down	down
2	Flow control enabled	Flow control disabled	up	down
3	Tx level = -15 dB	Tx level = -9dB	down	down
4	UUCP disabled	UUCP enabled	up	up
5	Originate	Answer	up	down
6	Maximum throughput enabled	Maximum throughput disabled	up	up
7	RTS normal	RTS forced on	down	down
8	Command modem disabled	Command modem enabled	down	down
9	Local loopback	Remote loopback	down	down
10	Dial-up	Leased line	up	down
11	AT result codes	MT result codes	down	down
12	Synchronous	Asynchronous	down	down
13	See note below	See note below	up	up
14	See note below	See note below	up	up
15	CD from interface	CD forced on	up	up
16	2-wire	4-wire	down	down

**Table 1: DIP Switch Settings (UP = OPEN, DOWN = CLOSED)**

NOTE:

Baud Rate(kbps)	Switch 13	Switch 14
28.8	UP	UP
19.2	DOWN	UP
14.4	UP	DOWN
9.6	DOWN	DOWN

### Firmware Configuration

Firmware configuration allows the user to tailor such configurable parameters as data port rate, flow control, error correction, etc. In this application, as a point-to-point private wire modem, the following settings are required. The Telesto Private Wire Modem is shipped with this configuration. The firmware configuration procedure is given below.

1. Ensure that the Telesto Private Wire Modem is undowered.
2. Remove the cover and gain access to the telephone modem PCB inside the Telesto Private Wire Modem.
3. Configure the DIP switches as described above.
4. Change dip switch 10 to UP position.



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## Technical Description

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5. Connect the comms port of the Telesto Private Wire Modem to the serial COM port of a PC or laptop computer.
6. Start a terminal emulator, e.g., ZOC, on the computer and configure it to the correct COM port.
7. Power up the Telesto Private Wire Modem.
8. Type in the following command (this is a sequence of “AT” commands) at the terminal emulator:

**at&e0&e3&e14\$sb9600&w0**

The modem should reply with: OK (displayed by the terminal emulator).

9. Reset the modem by typing **atz** in the terminal emulator. The modem should reply with: OK.
10. Type in **at!5** at the terminal emulator. The modem will display the configured parameters. Ensure that the above commands have configured the parameters correctly as shown in Table 2.
11. Power down the Telesto Private Wire Modem.
12. Change dip switch 10 to DOWN position.
13. The firmware has now been configured; reassemble the Telesto Private Wire Modem.

TELEPHONE MODEM “AT” COMMAND SETTINGS	
AT Command	Function
&e0	No error correction
&e3	No flow control
&e14	Data compression disabled
\$sb9600	Serial port data rate = 9600 bps

*Table 2: Telephone Modem “AT” Command Settings*

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# 5. Servicing

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### Basic troubleshooting

The Telesto Private Wire Modem is always used as part of a network containing Europa digitisers. Therefore troubleshooting the Telesto usually involves setting up some combination of (digitiser, Telesto Modem, central site) equipment under laboratory conditions. In this manner the commas port of the Telesto Modem can be checked for data continuity which is sufficient proof that the Telesto Modem is operational.

Before you attempt any troubleshooting check all the connections, batteries and fuses to rule out the possibility that the malfunctioning is due to one of these items.

#### Unable to communicate with the Telesto Modem

If the Telesto Modem fails to send any data or, during firmware configuration, the terminal emulator menu appears inaccessible on power-up, check both the settings of the terminal emulator and the Telephone Modem PCB firmware. In most cases the cause is either a mismatch in baud rate settings or the AT command settings in the modem PCB firmware are incorrect.

#### Disassembly and Reassembly

There are two paired boards within the Telesto. The objective is to troubleshoot to the board level and replace these boards. Attempt to identify the faulty PCB board pair by swapping in the corresponding board pair from a working unit. The necessary tools are:

1. Phillips screwdriver.
2. Allan key 3 mm for socket head cap screws.

#### Disassembly Instructions

1. Disconnect all the cables from the Telesto.
2. Remove the screws around the edge of the front plate of the enclosure box and pull out the electronics tray using two of the face plate connectors..
3. Remove the smaller board by first unscrewing the only screw on the board and then pulling out the board away from the edge connector.
4. Remove the other board by 1.unscrewing the 4 screws to the flex circuits attached to the front panel connectors, 2. Pulling off each flex circuit from the board connector, 3. unscrewing the 7 screws holding this board to the chassis .

#### Assembly Instructions

The assembly instructions are the reverse of the disassembly instruction. Make sure that the repaired unit has the same configuration parameter values as the previously faulty unit. Refer to the as-shipped sheets for the configuration parameters. After power up , check the following:

- } The telephone PCB firmware menu is accessible.
- } The Europa Digitiser is transmitting data.
- } Re-requested packets from the central site are received by the central site.

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## Appendix A - Connector Pinouts

Pin Number	Signal Name
SHD	Shield
H	RD
G	TD
T	Dgnd

*Table 1: Comms Connector Pinout*

Pin Number	Signal Name
A	leased 1
B	leased 2 (Dial 1)
C	leased 4
D	leased 3 (Dial 2)

*Table 2: Leased Line Connector Pinout*

Pin Number	Signal Name
A	Battery+
B	Earth
C	Battery-

*Table 3: Input Power Connector Pinout*

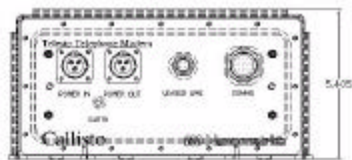
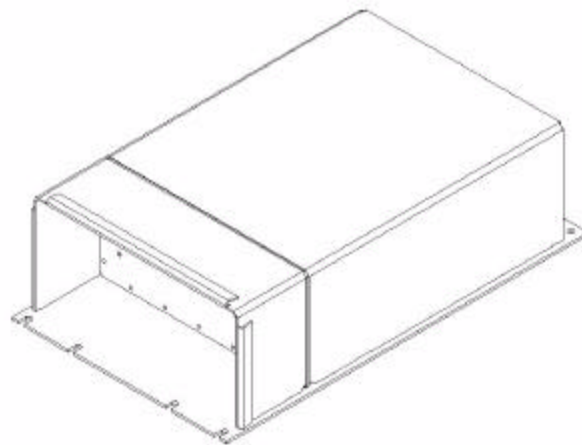
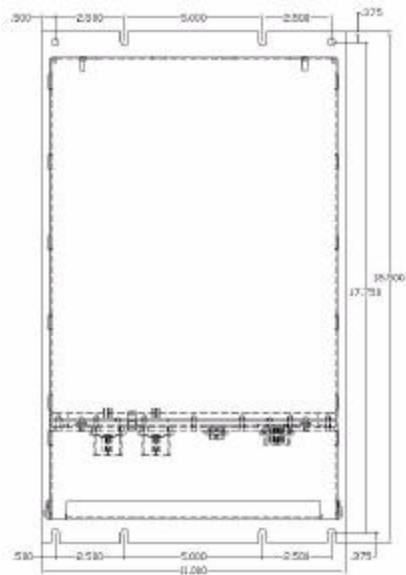
Pin Number	Signal Name
A	Battery+
B	Earth
C	Battery-

*Table 4: Output Power Connector Pinout*

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## Appendix B - Outline and Installation Drawing



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## Appendix C - Technical Specifications

### Description

The Telesto Private Wire Modem is an interfacing unit between an RS232 line and an analog private wire line (dedicated telephone line). At one end it connects to the serial data port (port 2) of the Callisto Europa digitiser and at the other end to a 2 or 4 wire analog telephone line. The Telesto is powered from a 24 Vdc power source and provides 12 Vdc to the Callisto Europa digitiser.

### Specifications

Power Consumption	15 W (Typical)
Supply voltage	24 Vdc
Voltage Range	22-26 VDC
Surge Level	no voltages above +/- 30 VDC

### Interfaces

To Callisto Europa:	RS232 with RTS/CTS data flow control
To telephone line:	analog private wire on 2 or 4 wires
Baud rate:	19.2K and below
Standards:	Data: Enhanced V.34, V.34, V.32bis, V.32, V.22bis
	Error Correction: V.42
	Data Compression: V.42bis, MNP® 3 & 4 & Class 5

### Environment

Housing	Rugged waterproof aluminum enclosure
Size	469.9 mm L x 279.4mm W x 137.2mm H (18.50" L x 11.00" W x 5.40" H)
Weight	3 kg (6 lbs)
Connectors	RS-232, 19 pin circular
	Power, 3 pin
	Telephone line, 4 pin circular
Environment	meets or exceeds protected outdoor specification, see Nanometrics document 13065



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**Included Parts**

Telesto Private Wire Modem

Power Mating connector

**Notes**

1. See Nanometrics document 13005 for physical characteristics.
2. The unit must be properly grounded with a ground wire connected to the grounding lug on the front panel.