

Triton Hub Transceiver Manual

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Revision History

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Rev	Date	Author	Description
A	March 7, 2000	Milivoje Jevtovic	Initial release.

Approval: _____

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1. Introduction

Congratulations on your choice of the Triton hub unit. The Triton works in conjunction with Europa digitisers and Telesto repeaters, acting as a central site telemetry hub for Nanometrics terrestrial Callisto networks.

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

If you have problems or need technical support please submit requests for technical support by e-mail or fax. This permits you to fully explain your problem and include "evidence" as it allows us to submit your problem to the most knowledgeable person for reply.

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 five major sections:

Chapter 1	Introduction	Introductory notes to this manual.
Chapter 2	Organization of this Manual	Notes on how to use this manual.
Chapter 3	Unpacking and Post Delivery Inspection	Identification of the components you have purchased. It also references an "as-shipped" section.
Chapter 4	Technical Description	Description of features and technical specifications of the Triton.
Chapter 5	Servicing	Recommended maintenance and repair procedures, including firmware update instructions.
	Appendices	These list mostly tabular material such as pin connections and cable drawings.

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3. Unpacking & Post Delivery Inspection

Checking the Shipping List

Open and inspect the shipment for possible damage. Carefully check each item for damage or defects. Study the shipping list and verify that all the items were included in the shipment. This list might vary from application to application. Generally, the Triton is shipped built-in a standard 19" rack which usually contains other devices which constitute the central site equipment for your network. You may have several Triton units in your 19" rack depending of the topology of your network.

Checking the As-Shipped Sheets

As written, this manual covers the Triton hub unit. Please study the as-shipped data sheet to determine the exact configuration of the unit. The as-shipped sheet lists the serial numbers of the parts shipped, the exact hardware and software configuration and calibration constants associated with your hardware. It also includes a hard copy of the as-shipped sheet of the Triton hub unit. This will determine how your Triton operates when first turned on. Several features may have been added to the digitiser since this manual was released. Such new features are described in the Release Notes which have precedence over what is in the manual.

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4. Technical Description

Overview of the Hardware

The core of Nanometrics Callisto terrestrial networks is the Europa 24 bit digitiser. The Europa digitises an analog seismic signal, packages and outputs information in the form of a serial data stream of a proprietary format. The data packets are transmitted to the network central site by the telemetry module of the Europa digitiser. Where the link between the remote and the central site can not be established in a single hop the Telesto repeaters are employed. All the telemetry links within a seismograph network eventually end at one location usually referred to as the *central site* or the *hub*. The Triton is the hub telemetry unit.

The Triton integrates all the hardware necessary to receive data packets from all the remote sites within the network. It also provides the reverse flow of data by receiving various network management information from the central site acquisition software and transmitting it to the targeted Europa digitiser. In doing so the Triton can be configured to make use of various kinds of telemetry or combinations of different kinds of telemetry.

Depending on the telemetry modules employed the Triton can come in one of the following configurations:

- } Telesto (SS1), with a spread spectrum transceiver 902-928 MHz.
- } Telesto (SS2), with a spread spectrum transceiver 2.4-2.4835 GHz.
- } Telesto (422), with a RS-422 interface.

Other custom configurations are also possible, such as VHF/UHF radio or fibre optic modem, to suit any given network topology. Please consult factory for all the available options. Up to five telemetry modules can be built into a Triton. If necessary, several Tritons can be installed within a single 19" rack.

This section of the manual gives a short overview of the major hardware components.

Spread Spectrum Transceiver Module

The Europa digitiser can be configured with a spread spectrum radio transceiver operating in either 900 MHz or 2.4 GHz license-free bands under Part 15 of the FCC rules. For the most part configuration options and operation of these two types of transceivers are identical unless specifically mentioned otherwise.

Description and Operation

The transceiver operates as a wireless modem, connecting two devices by a RS232 communication link. The spread spectrum transceiver uses frequency hopping as a spreading technique. It is possible to configure the transceiver to use a specific hop table to suite various national regulatory environments. By selecting the hop table a specific portion of the frequency band is selected. Within the specified band the user can further select the number of frequencies to be used. Lastly, there are provisions to select a particular pseudo-random hopping pattern so that different groups of transmitters within a network use different hopping patterns. This ensures that the interference between the transceivers operating in the same area is minimized allowing for the design of large networks with license-free operation.

Technical Description

The transceivers can be configured for point-to-point, point-to-multipoint or time division multiple access (TDMA) mode. By entering the serial number of the remote transceiver into the transceiver's call book in point-to-point and point-to-multipoint modes the user insures that the link will be established only with the selected transceivers and no interference will be caused by or incurred to the links between other transceivers in the network. In the TDMA mode the network is subdivided into the subnetworks by selecting different hopping patterns and/or network ID. Within each subnetwork the transceivers will be assigned specific time slots within a frame to transmit a message, receive a message, repeat another transceiver's message or do nothing. This protocol is a greatly enhanced version of point-to-multipoint communications, enabling creation of large networks with a reduced amount of hardware due to multiplexing of multiple data channels into one data channel of a higher baud rate.

There are other configuration parameters which can further fine tune operation of a network, such as the size of internal data packets, number of retry odds, transmit power level, serial port baud rate and so on. There are also provisions for assessing the quality of the link between two transceivers. For all these details please refer to the separate Spread Spectrum Data Transceiver manual and TDMA User Manual.

Configuration

Within the Triton box the transceiver engine is installed on the universal interface board (UIB) which is for this application configured to provide a RS232 compliant access to the configuration port of the transceiver. To configure the transceiver please connect the unit to a PC running a terminal emulator with a standard CAT5 LAN cable and a custom made RJ-45 to DB9 adapter labeled "Triton SS Config Female Serial Adapter #12690A", as per *Figure 1*.

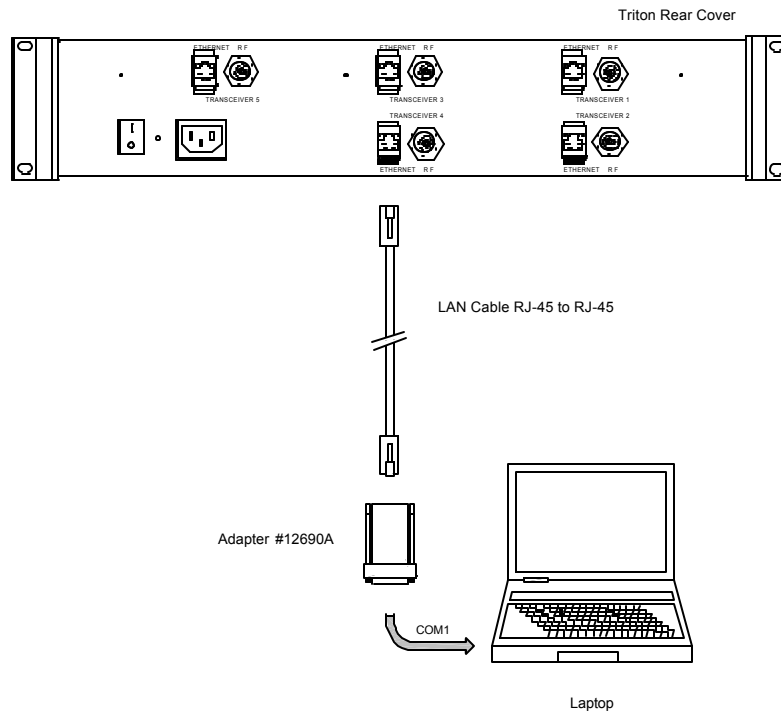


Figure 1: Triton (SS) test /config cable usage

Follow the procedure:

1. Run the terminal emulator and set the baud rate to 19200 baud.

Technical Description

2. Press the setup button on the front plate of the Triton box, see *Figure 2*. The transceiver main menu should appear on the screen. Navigate through the submenus and edit the configuration if necessary.
3. Press “Esc” several times to exit the menu mode. If the transceiver is configured to point-to-point or point-to-multipoint mode and the link is established with a remote transceiver the LED will turn green which signals there is a carrier detected. In the TDMA mode the LED will remain red even when the link is established but will blink for each data packet sent.

The transceiver is now ready for operation.

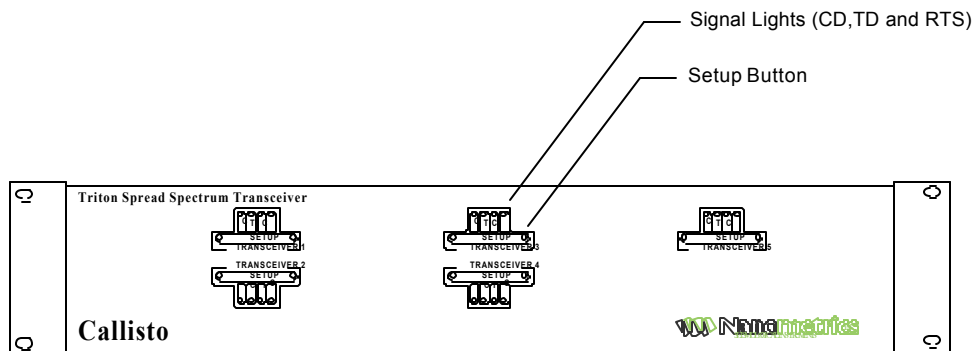


Figure 2: Triton (SS) front plate

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5. Servicing

Basic troubleshooting

The objective of troubleshooting is to locate and replace the faulty board. Troubleshooting on the board level can only be done in factory conditions.

Spread spectrum transceiver does not send data

Check the signal LEDs on the Triton front cover. Refer to the transceiver manual and check if the light signals behave in accordance with the configuration and operation of the transceiver. If the signaling of the LEDs appear to be normal and yet the transceiver fails to send any data to the serial port most of the time it is due to a configuration problem. Connect the test/configuration cable, access the transceiver menu and carefully examine *all* the configuration parameters. Check the as-shipped sheets to understand how the transceiver is configured within the network and how the remote digitisers and repeaters are configured to fit with the Triton transceiver. Check the baud rates, transmission parameters, TDMA tables (if applicable), etc.

Cannot communicate with the transceiver

Check the signal lights on the Triton front cover. If all the lights on other transceivers are lit and the ones on the transceiver under test are not, open the Triton box and check the internal power cable leading to that transceiver board. If the power is present the board is likely faulty and need to be replaced.

If the lights appear to be normal and there are no configuration errors the likely cause is the Universal Interface Board (UIB), the board on which the transceiver is installed. Try swapping the UIB from another transceiver to verify.

Disassembly and Reassembly

The only tool necessary to disassemble and reassemble the Triton is a Phillips screwdriver.

Disassembly Instructions

1. Disconnect the AC power cord from the Triton box.
2. Disconnect all the signal and antenna cables from the rear plate of the Triton. Record the position of each cable since this will help when reassembling.
3. Remove the Triton from the 19" rack.
4. Remove the front plate, then remove the top and the bottom plates.
5. Disconnect the internal cables from each transceiver.
6. Undo the screws attaching the transceivers to the UIBs.
7. Undo the screws attaching the UIBs to the tray.

Assembly Instructions

The assembly instructions are the reverse of the disassembly instruction. Make sure that the repaired unit has the same configuration parameter values the faulty unit had. Upon power up of the Triton check the operation.

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Appendix A - Connector Pinouts

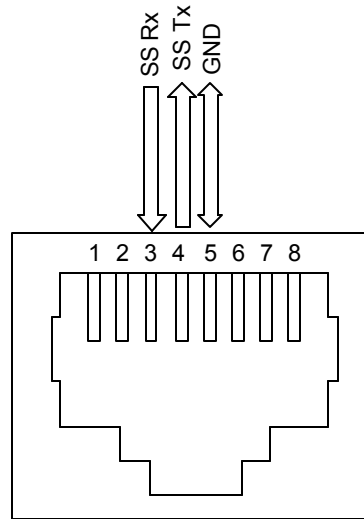


Figure 3: Triton (SS) Rear Plate Data Connector

The RF antenna connector is a standard female N type bulkhead jack.

Table 1: RF Antenna Connector

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Appendix B - External Cable Drawings

Doc. Number:	12690	Approved:	Date:
Revision:	A	Hardware Eng.	
File Name:	N:\Drawings\12690a.lpw	System Eng.	
Title:	Triton SS Config Port RJ-45 to DB-9 Female Adapter Wiring		
Originator:	H Booyens		
Date:	February 19, 2002		

Revision History:

Rev.	Date	Author	Description
A	February 19, 2002	HLB	Initial revision.

Triton SS Config Port RJ-45 to DB-9 Female Adapter Wiring

1. Obtain a female DB-9 modular adapter kit (CON0613).
2. Assemble the adapter according to the wiring list Table 1 given below. Note that all manufacturers may not use the same color-coding for the wires.
3. Label the adapter with the drawing number and revision, and the title "Triton SS Config Female Serial Adapter".

Triton SS				DTE	
RJ-45 5 Pin	Signal Name (Serial)	Signal Name (Config)	Wire Colour	DB-9 Pin	Signal Name
8	N/C			9	RI
7	N/C			6	DSR
6	N/C			4	DTR
5	GND	GND	green	5	GND
3	Tx	Tx	red	3	TX
4	Rx	Rx	black	2	RX
2	Rts	Rts	orange	7	RTS
1	Cts	Cts	blue	8	CTS

Table 2: Adapter Wiring

Appendix B

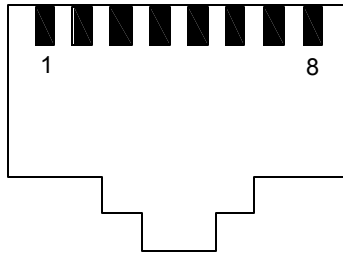


Figure 4: RJ-45 Modular Jack Pinout