ViaLite
Digital GPS
Fibre Optic Link

User Manual

LSx-HB-8

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Instrument Care and Safety Information

*Please read the whole of this section before using your **ViaLite** product. It contains important safety information and will enable you to get the most out of your link.*

Electrical Safety

The ***ViaLite*** Power Supply Units are Safety Class 1 products (having a metal case that is directly connected to earth via the power supply cable).

When operating the equipment note the following:

- Hazardous voltages exist within the equipment. There are no user serviceable parts inside, and the covers should only be removed by suitably qualified personnel.
- The equipment does not have an isolating switch on the mains inlets. Equipment must be installed within easy reach of a clearly labelled dual pole mains isolation switch.
- Make sure that only fuses of the required rated current, and of the specified type (anti-surge, quick blow, etc.) are used for replacement.

Optical Safety

The ***ViaLite*** Digital GPS Link modules contain laser diode sources operating at 1300nm. These devices are rated at under IEC825-1 "Safety Of Laser Products", Part 1, First Edition, 1993 as CLASS 1 radiation emitting devices.

When operating the equipment note the following:

- Never look into the end of an optical fibre directly or by reflection either with the naked eye or through an optical instrument.
- Never leave equipment with radiating bare fibres accessible – always cap the connectors.
- Do not remove equipment covers when operating.
- Details of optical connections to the units, compatible fibre types and care instructions can be found in the ***ViaLite*** system handbook. Please read this section before using the link.

Adjustment, maintenance and repair of the equipment should only be carried out by suitably qualified personnel.

For more information on the *ViaLite* range of products, please refer to the generic *ViaLite* system handbook Lxx-HB.

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1 Introduction

The ***ViaLite*** Digital GPS Links are a family of fibre optically coupled link systems designed for the Full Duplex transmission of DC Coupled RS422 analogue signals over long distances in electrically noisy environments.

This handbook covers the following ***ViaLite*** Digital GPS Link part numbers:

- Transceiver units with part numbers starting LSx-
- Optical fibre interconnects with part numbers starting F6-.

The digital links comprise two Transceivers linked by a Fibre Optic Cable. The transceivers come in a range of channel options, starting with the standard model which has a single full-duplex channel working on two fibres.

The Fibre Optic Cable is single mode fibre type depending on span length, and uses FC/APC type connectors.

Care of fibre optic connectors

NB : When the fibre optic cables are not connected, it is essential that the cable and equipment connectors are protected by the Dust Caps provided with the system. Failure to do so may result in damage to the fibre ends, which are critical to the system performance.

2 Setting up and Understanding the Link

This section describes the connections between your Digital GPS Fibre Optic Transmitter and Receiver Modules, and the operation of both units in a system.

Please read fully document Lxx-HB for information on installing your ***ViaLite*** equipment before commissioning your digital link system.

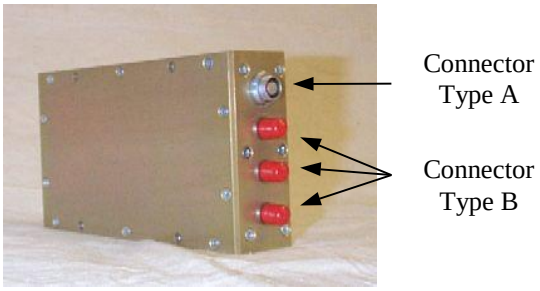
2.1 Module Formats

2.1.1 Shielded Remote Modules

The shielded remote modules are designed for use in electrically harsh environments and can withstand high electromagnetic fields. There are two types of connector on the front panel of the unit (see below).

Connector A is a Lemo multi-contact connector. This connector provides power and RS422 data to the unit.

Connectors B are FC/APC receptacles. These are the optical connections for linking the Transceivers together.

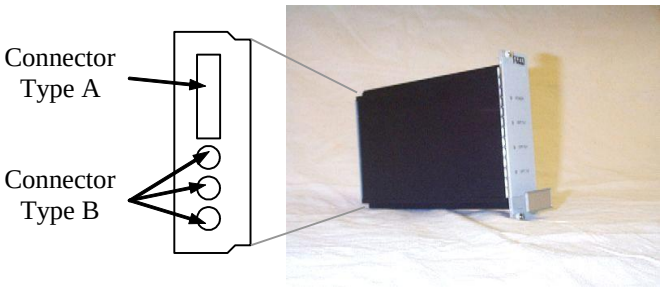


2.1.2 Plug-In Modules

The plug-in modules are designed for use in PPM's ***ViaLite*** 19" rack chassis. The module is powered from the rack chassis backplane and all connections are on the rear panel (see below).

Connector A is a DIN 41612 backplane connector providing power, RS422 data access and connectivity to the module alarm outputs.

Connectors B are FC/APC receptacles. These are the optical connections for linking the Transceivers together.



2.2 Fibre Optic Cable & Connectors

2.2.1 Connector and Cable Types

All ***ViaLite*** Digital modules use Single-mode (8µm/125µm) cables terminated with FC/APC or E2000/APC optical connectors. Cross-site cables are available in light (3mm O/D) and heavy-duty (8mm O/D) variants.

FC/APC is a standard for angle-polished connectors and must not be confused with standard FC/PC connectors. The two connector-types are not interchangeable and mating one with the other will damage both the cable and the module connectors.

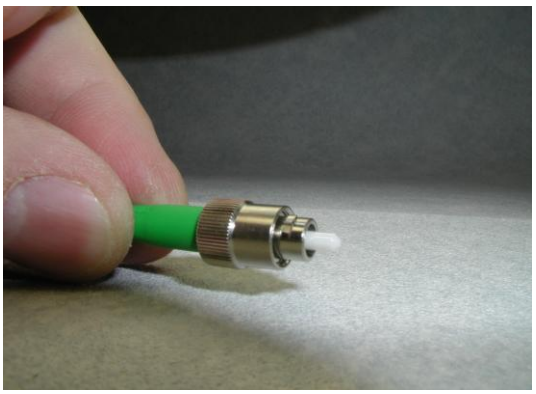
2.2.2 Connecting and Disconnecting

Before connecting optical fibres to the module or to each other, ensure that the mating connectors are clean (see below).

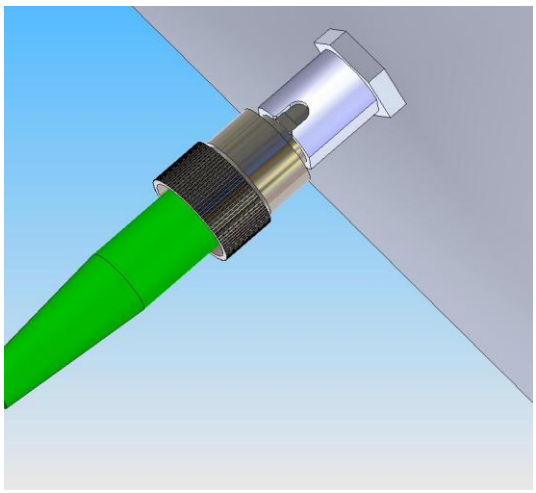
To connect FC/APC optical connectors, remove the dustcaps and align the centre ferrule on the cable connector with the receptacle. There is a lug on the side of the ferrule, which must match the gap in the receptacle shroud. When they are in alignment, push the plug gently home and finger tighten the knurled collet onto the threaded receptacle. See Figure 1 below.

To disconnect FC/APC connectors, unscrew the knurled collet on the plug and gently withdraw the plug. Replace the dustcaps on both the receptacle and the cable plug.

Figure 1
(a) showing FC/APC connector with dust cap removed, (b) showing alignment of the lug on the side of the ferrule, which must match the gap in the receptacle shroud before gently pushing the plug home and finger tighten the knurled collet nut onto the threaded receptacle.



(a)



(b)

2.2.3 Care and Cleaning

See ***ViaLite*** System Handbook Lxx-HB. A fibre cleaning kit is available from PPM for use with these modules.

2.2.4 Minimum Bend Radius

Because the optical fibre is made of glass, it is important not to subject it to too much bending. For this reason, each kind of fibre has a minimum bend radius (MBR) specification, beyond which the cable cannot be bent without damage occurring.

MBR specifications for PPM fibre are given in the ***ViaLite*** System Handbook Lxx-HB.

2.3 Using the Digital Link Module

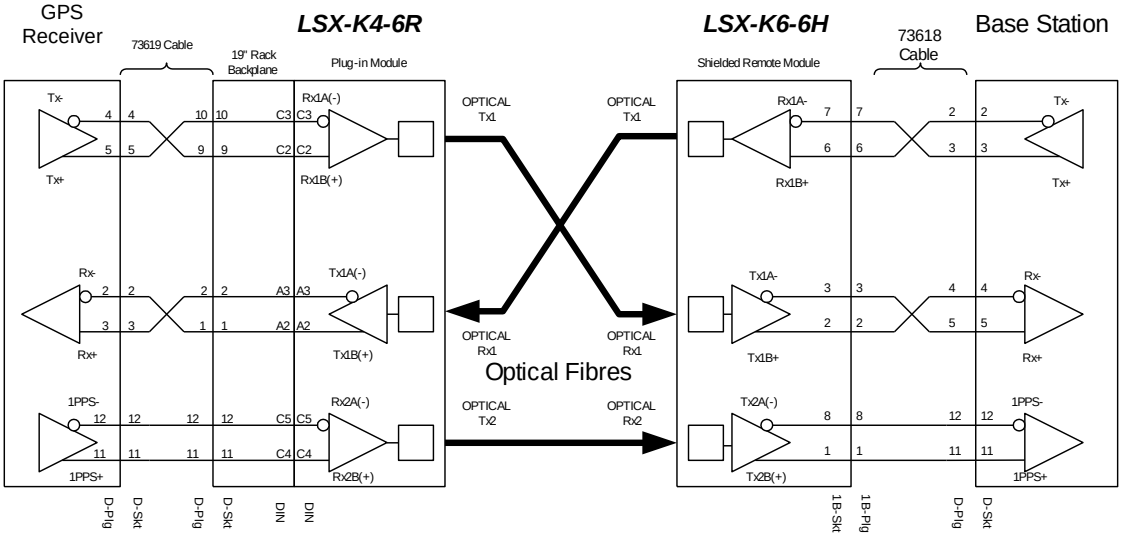
2.3.1 Data/Signal Connection

The user's signal is applied to the PWR/Data Connector on the Digital Module. Maximum ratings for this input are given in the technical specifications in section 3.

The units are set up at the factory to present a load impedance of 120Ω across the RX terminals. If your application requires an open circuit termination, refer to Appendix I for details

RS422 data is available on the multi way connector on the front panel of Shielded Satellite and the Backplane of the Rack for Rack Mount Modules. Please refer to Appendices II-IV for wiring details and options.

Connect the OPT Tx on one module to the OPT Rx on the other module, and vice-versa for full duplex operation.



2.3.2 External Equipment Power Feed

This option is available on Rack Mount module types and should be specified if a module is required to provide power to an external source through the rack backplane data connector.

This output has overcurrent protection, though it is possible that in the event of a short, the transmission will be interrupted momentarily.

2.3.3 Front Panel Indicators

The transmitter has a number of front panel LEDs for indication of the state of the module. The following table shows the operation of the front panel LEDs :

	Upper LED (Power)		**Lower LEDs (Channel Status)**	
	Standard	**Ext. Power Feed**	**Standard**	**Ext. Power Feed**
OFF	Unit Off	Unit Off	Idle	Idle
GREEN	Unit OK	Unit OK	Traffic Present	Traffic Present
RED	Internal Fault	Internal Fault or External Current Limit	N/A	N/A

3 Link Specifications

Parameter	Shielded Satellite / Satellite	Rack Mount
Module Operating Voltage and Power	1.44W at -48Vdc typical	1.32W at 12Vdc ± 0.5Vdc typical
Electrical Signal/Power Connector	Lemo 8 pin 1B Socket on SSM Front Panel.	User accessible 15-way D-Type Female via 19" Rack Shelf backplane
Optical Connections	FC/APC Singlemode Super Polished	FC/APC Singlemode Super Polished
Indicators	Front Panel LED "Power" Front Panel LED "Opt Tx 1" Front Panel LED "Opt Rx 1" etc.	Front Panel LED "Power" Front Panel LED "Opt Tx 1" Front Panel LED "Opt Rx 1" etc.
Alarms	Standard units: None External DC Feed Option has alarm for external current limit.	Standard units: None External DC Feed Option has alarm for external current limit.
DC Output Feed Voltage Option Rack Mount only	+5Vdc ± 0.5Vdc, 80mA maximum **or** Supply voltage @ 200mA max. to power external equipment via backplane connector. Fused with PTC Fuse at 400mA (20°C)	+5Vdc ± 0.5Vdc, 80mA maximum **or** Supply voltage @ 200mA max. to power external equipment via backplane connector. Fused with PTC Fuse at 400mA (20°C)
Data Channels	DC to >115kb/s NRZ, asynchronous	DC to >115kb/s NRZ, asynchronous
Data Format	EIA/TIA-422 Compliant Option for RS485 operation	EIA/TIA-422 Compliant Option for RS485 operation
Data Input Impedance	Default 120Ω	Default 120Ω
Absolute Maximum Input/Output Signal Lines Surge Protection	Driver Output Voltage ±13V Receiver Input Voltage ±25V	Driver Output Voltage ±13V Receiver Input Voltage ±25V
Maximum Consecutive Same Symbol Time (NRZ)	∞	∞
Duty Cycle Distortion	<5%	<5%
Bit Error Rate	<1 in 10^8	<1 in 10^8
Delay	<5µs with 1m fibre Add 5ns/m of fibre optic cable	<5µs with 1m fibre Add 5ns/m of fibre optic cable
Optical Path Length	1m to 250m MM 1m to 20km SM	1m to 250m MM 1m to 20km SM
Optical Power Budget	10dB Typical fibre losses: Fibre: 0.4dB/km Connectors: 0.5dB max. Fusion Splices: 0.1dB max.	10dB Typical fibre losses: Fibre: 0.4dB/km Connectors: 0.5dB max. Fusion Splices: 0.1dB max.
Jitter	<200ns rms	<200ns rms
Output Rise/Fall Time	<1µs	<1µs

4 Maintenance and Fault-Finding Guide

Refer to the following table that gives a list of commonly encountered problems and suggested solutions.

Fault	Possible Causes	Solution
"+12V" LED is not illuminated on the Rack Mount PSU.	Power is not attached to the PSU. Fuse has blown in PSU.	Connect mains power to the PSU. Replace fuse.
Power LED does not light on Shielded Satellite Module.	Power source not connected.	Connect power source.
Power LED lights up RED.	External Feed is in current limit.	Check external load.
Channel LED is flashing GREEN, but link not passing data.	Connector wiring is not correct.	Check wiring interface to user equipment.

In the event of any problems or queries about the equipment, contact PPM or your local agent.

5 Product Warranty

The Company guarantees its products, and will maintain them for a period of three years from the date of shipment and at no cost to the customer. Extended warranty options are available at the time of purchase.

Please note that the customer is responsible for shipping costs to return the unit to PPM.

The Company or its agents will maintain its products in full working order and make all necessary adjustments and parts replacements during the Company's normal working hours provided that the Customer will pay at the rates currently charged by the Company for any replacements made necessary by accident, misuse, neglect, wilful act or default or any cause other than normal use.

Claims must be made promptly, and during the guarantee period.

IMPORTANT: -

Please contact both your selling agent and PPM prior to returning any goods for Warranty or Non-Warranty repairs. Goods will not be accepted without a valid Goods Return Number (GRN).

Appendix I: RS422 Input Termination

The digital GPS modules are set to present a 120Ω input across the Rx A- and Rx B+ terminals. In certain applications, it may be desirable to have an open circuit load across Rx A- and Rx B+.

If you wish to change the input impedance, follow the instructions below.

CAUTION: The ***ViaLite*** Digital Links contain components that are sensitive to Electrostatic Discharge (ESD). Follow ESD precautions throughout this procedure.

CAUTION: The ***ViaLite*** Digital Links contain fragile optical fibres. Take care not to damage these fibres during this procedure.

Remove the Lid/Cover

Rack Mount Module

- Switch the Rack On/Standby switch to Standby.
- Remove the module from the rack by removing the top and bottom front panel screws.
- Remove the two cross-head fixings from the rear panel of the Rack Mount Module.
- The rear panel and PCB assembly may now be carefully removed from the cover.

Shielded Satellite Module

- Remove power connections from the Shielded Satellite Module.
- Remove all 10 lid fixing screws – do not remove the front panel fixing screws – and carefully remove the lid.

Set the Link

Link LK4 determines the input impedance of the receiver. Leave the link in place for 120Ω termination and remove for high impedance.

Replace the Lid/Cover

The lid or cover is replaced by reversing the above procedure.

Take extreme care not to damage the fragile optical fibres during this process.

Appendix II: Digital Link Connections
Satellite and Rack Mount

Module Pin Connections

Connector Type: 15-pin D-Sub Socket

Connections are shown below :

No.	Ident	RS422 Name	Description
1	D1	TX1_B+	Channel 1 Transmit + (Output*)
2	D2	TX1_A–	Channel 1 Transmit – (Output)
3	D3	TX2_B+	Channel 2 Transmit + (Output)
4	D4	TX2_A–	Channel 2 Transmit – (Output)
5			
6			
7	DC Output		DC Output Feed
8	GND		Ground
9	D5	RX1_B+	Channel 1 Receive + (Input*)
10	D6	RX1_A–	Channel 1 Receive – (Input)
11	D7	RX2_B+	Channel 2 Receive + (Input)
12	D8	RX2_A–	Channel 2 Receive – (Input)
13			
14	DC Output		DC Output Feed
15	GND		Ground

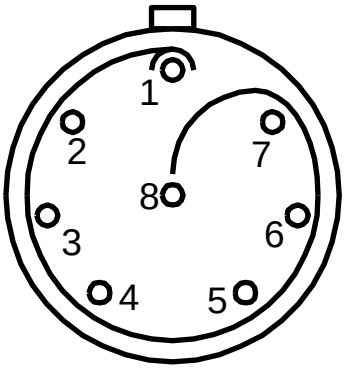
*** "Output" and "Input" refer to the RS422 connections to the link module.**

i.e. User data is applied to RXn_B+ and RXn_A- "Input" pins on a local module and will appear at the "Output" pins TXn_B+ and TXn_A- at the remote module.

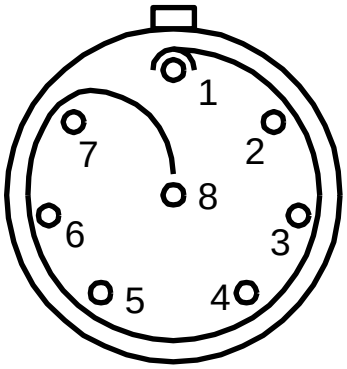
Appendix III: Digital Link Connections
Shielded Satellite

Module Pin Connections

Connector Type: Lemo 1B 8-pole free plug



Looking into panel-mounted socket



Looking into assembled plug

No.	Ident	RS422 Name	Description
1	D3/7	TX2_B+ or RX2_B+	Channel 2 + (if fitted)
2	D1	TX1_B+	Channel 1 Transmit + (Output)
3	D2	TX1_A–	Channel 1 Transmit – (Output)
4	Ground		Ground
5	Vsupply		Supply Voltage Input
6	D5	RX1_B+	Channel 1 Receive + (Input)
7	D6	RX1_A–	Channel 1 Receive – (Input)
8	D4/8	TX2_A– or RX2_A– or RTS485	Channel 2 – or RTS485 for RS485 units

Appendix IV: Wiring Options

For details of the Rear Bulkhead and other Rack accessories, consult your System Handbook (Lxx-HB) or consult PPM or your local representative.

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