

Ref : LL400uwdw.doc

Ver 1.0

LIGHTLINK 400
FOUR CHANNEL RS232 MULTIPLEXER
OPERATION MANUAL
ver 1.0
18 February, 2003

This document describes the LightLink 400 (LL400) four channel RS232 multiplexer unit.

ADVANCED DIGITAL DEVICES
P O BOX 2549, RANDBURG 2125
JOHANNESBURG, REPUBLIC OF SOUTH AFRICA
Tel : (011) 789 4420
Fax : (011) 789 4309

INDEX

CONTENTS	PAGE
INTRODUCTION	4
OPERATION	6
DESCRIPTION	8
Front panel	8
Multiplexer status	8
Channel status	8
Backpanel	8
CONFIGURATION SETUP	10
Data connections	10
Clock selection	10
Remote & local loopback	12
PREPARATION FOR USE	13
CHANNEL SPLITTING	13
SPECIFICATIONS	14
APPENDIX A : REVISION HISTORY	

THIS PAGE LEFT BLANK FOR LL400 FRONT & BACK PANEL

INTRODUCTION

A multiplexer is used to combine a number of signals or data channels into a single high speed data link and sent to another multiplexer that separates this highspeed datalink into the corresponding data channels (fig 1). The main reason for using a multiplexer is to reduce the number of interconnections (wires) between data equipment. A multiplexer is also referred to as a mux.

Fig 1 : Typical multiplexer interconnection

The equipment connected to the multiplexer is not affected by combining signals into a single highspeed datalink as this process is transparent to the equipment connected to the mux.

The multiplexing is done by sampling all input channels at a high rate and sending the data serial to the other multiplexer where the separate channel data is reconstructed from this serial data (serial to parallel). This has a limitation that there is a maximum input data rate on the channels that can be reconstructed.

Data transmission on optical fibre is an ideal medium for the high data speed datalink as it can handle very high data rates for longer distances than copper cable. It is also not susceptible to noise from external sources such as electrical equipment or lightning. Furthermore it doesn't generate electrical noise that can interfere with other equipment.

RS232 is an electrical interconnection specification only and only refers to the voltage levels used and maximum data speed on an interconnection between data equipment. It does not refer to the protocol used. The multiplexer pair is transparent to the protocol used. The data is sent on one copper conductor, and received on a separate conductor.

Handshake signals are additional signals that are used between equipment/equipment or equipment/modem data transfers to control the start and stop of the data transmission.

Synchronous data is data that has a clock sent on a separate wire together with the data. It is also referred to as sync data.

Asynchronous data is data sent without a separate clock. Also referred to as async.

The data rate is measured in bits/second baud or baudrate. The baudrate only needs to be set up when the multiplexer is used in synchronous mode and when the multiplexer needs to generate it. It is left in External clock (Dipswitch 8 on) in all other cases (including async data transmission.)

OPERATION

The multiplexer samples the input signals on each channel at a rate of 307 000 Samples per second. This sampled parallel signals are then serially sent across the optical fibre to the receiving multiplexer where it is serial to parallel converted to regenerate the sampled signals. Additional data is added by the multiplexer to enable timing information to be extracted and the signals to be allocated to the corresponding channels.

Local and remote loopback facilities are provided.

Local loopback will loop all signals received on the multiplexer to be looped back to the source internally in the unit (see Fig 2). Local loopback will be indicated on the back panel. Local loopback can be selected and will operate correctly even if no remote multiplexer unit is connected.

Remote loopback will loop received signals back by instructing the remote unit to loop the signals sent to it from this mutiplexer back to this multiplexer (fig 2). Remote loopback will be indicated on the local multiplexer indicating that this was selected. This is to indicate to the user that the data received on the unit is not the data generated at the other end but data send from this unit. No LED indication is given on the remote unit.

Fig 2 : Local & remote loopback

If local loopback is selected on a unit while remote loopback is selected, local loopback will always override.

These loopbacks are used to test specific units during commissioning or faultfinding. Local loopback is used to test the inner working of the Mux and the cabling between the mux and the data equipment connected to it. The remote loopback is used to test the Fibre link and the optical interfaces.

Synchronous datacommunication requires a clock to be sent with the data. The multiplexer can use one of three sources for this clock namely internally generated, Externally generated, and received clock. The source of this clock is selean eight way DIP switch. Only one switch must be switched on at a time. rotary setting. The required clock selected (from the three sources) is then also provided as an output by the multiplexer as transmit clock (fig 4).

Internal clock (Baudrate generator). The multiplexer has an internal baudrate generator that can generate 1200, 2400, 4800, 9600, 19200 and 38400 baud. This is used to generate clocks to clock data from data equipment that has no clock internal generator.

External clock. This is a clock that is generated by the data equipment and sends the clock together with the data to the multiplexer. The multiplexer takes this external clock as an input.

Received clock. This is the clock that is received with the data stream arriving from the remote multiplexer. It is usual to select receive clock at one of the multiplexers and either internal baudrate or external clock at the other multiplexer. This will enable the transmit and receive path to utilize exactly the same baudrate. Receive clock or internal clock should not be selected at both multiplexers.

All the inputs are sampled at the same rate. There is no difference in the capabilities of the data channels and the control or handshake signals. Thus all the inputs can be used as RS232 channels. The External clock channel can also be used as a RS232 Channel by selecting external clock on both multiplexers

DESCRIPTION

The multiplexer is housed in a metal case with rubber feet for free standing model.

FRONT PANEL. The front panel consists of a lexan panel with status LED's behind it indicating the operation of the multiplexer unit. It also indicates the different channel data levels (transmitted and received data).

MULTIPLEXER STATUS

Multiplexer status is indicated by red LED's and are: Power and Local error.

Power: This Led will light up when the unit is connected to mains supply and indicates that power is supplied to the unit.

Local error: This LED will light up while the multiplexer doesn't receive a valid optic input signal.

CHANNEL STATUS

The following signals are displayed on the front panel for each of the channels:

<u>Red LED</u>	<u>Green LED</u>
TXD (Transmit data)	RXD (Received data)
RTS (Request to send)	CTS (Clear to send)
DTR (Data terminal ready)	DSR (Data set ready)
TXC (Transmit clock)	RXC (receive clock)

The signals represented in red are the electrical inputs to the multiplexer and transmitted onto the fibre and signals represented by the green LEDs are received on fibre and transmitted electrically from the multiplexer.

BACKPANEL. The backpanel consists of power connection point, four channel connectors with four corresponding transmit clock selectors, fibre optic interface connectors (transmit and receive), and local and remote loopback selection.

Local and remote loopback signals are displayed by red LEDs. The loopback selection affects all the channels simultaneously on the multiplexer (that is all channels are looped or not looped back).

Local loopback will light up when it is selected.

Remote loopback will light up when selected.

Power connector: The power connection to the multiplexer is is a computer type plug that will take a 3 pin computer type socket. It has a built-in sliding drawer for a fuse (300mA).

Data connector: The four data connectors are 25 pin Dtype sockets with locknuts. Channel 1 on the left and channel 4 on the right.

Clock selector: The four DIP switches are used to select the transmit clock source for the corresponding channel.

Remote & local loopback: The loopback switches are located below the clock selection switches. It is a two way DIP switch with the corresponding LED indications next to it.

CONFIGURATION SETUP

DATA CONNECTION.

The signals on the DB25 connectors are the following:
Shown in fig 3.

Pin	Signal	Mux Input/Output
1	GND (signal ground 0V)	-
2	TXD (Transmit data)	Input
3	RXD (receive data)	Output
4	RTS (Request to sent)	Input
5	CTS (Clear to sent)	Output
6	DSR (Data set ready)	Output
7	GND (signal ground 0V)	-
8	DCD (Data Carrier Detect)	Output
9	12 Volt	Output
12	Pullup (12V through 2k2)	Output
13	Pulldown (-12V through 2k2)	Output
15	TXC (Transmit Clock)	Output
17	RXC (Received clock)	Output
20	DTR (data Terminal Ready)	Input
24	EXC (Extern Clock)	Input

CTS will go high on local mux \pm 50 msec after RTS goes high.

CLOCK SELECTION.

The 8 way DIP switch is set to select transmit clock source. Only one switch per channel must be on at any one time.

DIP Switch	Clock source
1	Received Clock
2	1200 baud
3	2400 baud
4	4800 baud
5	9600 baud
6	19200 baud
7	38400 baud
8	External Clock (Factory Default)

In async mode it can be left in position "0".

Fig 3 : Data paths for a channel between two multiplexers

Fig : Transmit clock selection

REMOTE & LOCAL LOOPBACK.

Local loopback loops data internal in multiplexer. Remote loopback loops data in the remote multiplexer back to local unit.

There is a two way DIPswitch with 2 switches.

Loopback is activated with switch in "on" (right hand)
and deactivated with switch in "off" (Left side)

The loopback switch affects all channels simultaneously.

PREPARATION FOR USE

Connect power (220 VAC) cable to the local and remote multiplexer. The power light should light up when power is applied.

Connect the first fibre to the optical transmit interface on the remote multiplexer and to the optical receive interface on the local multiplexer. The "receive" LED should light up.

Connect the second fibre to the optical receive interface on the remote multiplexer and to the optical transmit interface on the local multiplexer.

With both fibres connected the multiplexers should electrically detect each other and the error LEDs should be off.

Select a channel pair on the multiplexers that will be used for the data transmission link. All channels behave identically. The channels must have the same numbers on both multiplexers. Connect data cables from the data equipment to the DB25 connectors of the selected channel.

If data is synchronous data, select the correct transmit clock source on the 8 way dipswitch. This must be done on both multiplexers. (It is usual to select receive clock on one of the multiplexers).

If data is transmitted on the channel the corresponding data channel LEDs will light up on the front panel. Red LEDs for data received from the data equipment and sent out on the fibre and green LEDs for data received on the fibre and out of mux to data equipment.

CHANNEL SPLITTING

If some of the signals are not used, they can be used as extra RS232 data channels. Select external clock (switch 8 ON) on the DIP switch.

Channel	DB25 Pin nr	Input/Output to Mux
A TXD	2	Input
A RXD	3	Output
B TXD	4	Input
B RXD	8	Output
C TXD	20	Input
C RXD	6	Output
D TXD	24	Input
D RXD	17	Output

SPECIFICATIONS

Data capacity :	4 Synch Channels with 2 handshakes & clock or 16 Async channels no handshake or Mix of above.
Sampling Rate:	307k samples / second
Clock source :	Internal, receive, external
Internal clock :	Dip switch selectable 1200, 2400, 4800, 9600, 19200, 38400 Baud
Loopback:	Remote and local loopback. All channels simultaneously.
Error indication:	Local Error on Optic input

Optical Interface

850 nm unit:

Connector :	SMA 905 or ST
Optical Wavelength :	820 nm
Optical source :	Light Emmiting Diode
Output power :	- 18 dBm into 50/125 Fibre
Optical Detector :	Pin Diode
Input sensitivity :	-30 dBm

1300 nm Intermediate range unit:

Connector :	ST
Optical Wavelength :	1300 nm
Optical source :	Light Emmiting Diode
Output power :	- 18 dBm into 50/125 Fibre
Optical Detector :	Pin Diode
Input sensitivity :	-30 dBm

1300 nm Long range unit:

Connector :	ST
Optical Wavelength :	1300 nm
Optical source :	Light Emmiting Diode
Output power :	- 16 dBm into 50/125 Fibre -22 dBm into 9/125 Fibre
Optical Detector :	PinFet module
Input sensitivity :	-46 dBm

Power Supply

Power supply input : 220 VAC @ 50 hz \pm 10 %

Power supply output : 5V DC \pm 5%
12V DC \pm 5%
- 12V DC \pm 5%

Power supply type: Linear regulation.

Connection : 3 Pin computer type female socket
Fused @ 300 mA.

Power consumption : Approximately 10 watt

Mechanical

Height : 70 mm plus 10mm high rubber feet
Width : 275 mm
Depth : 250 mm
Weight : 3.2 kg

Unit is supplied with rubber feet as a table model.
The enclosure is powder coated mild steel.