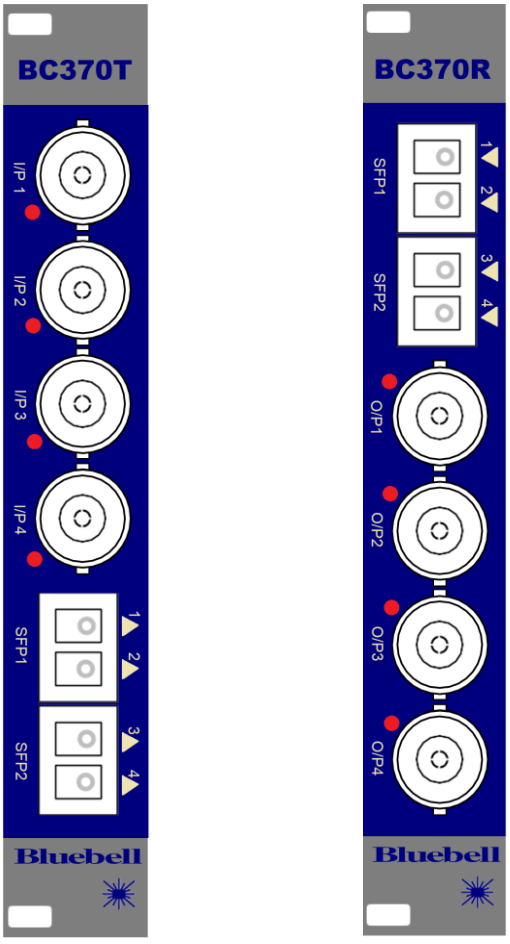
Bluebell

BC370 Series
3G quad channel Electrical to Optical interfaces



Operation Guide

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Table of Contents

Overview

Thank you for purchasing this Bluebell Opticom professional broadcast video product. If you are new to Bluebell products, or to the subject of transmitting video and/or other types of signal over fibre links, please take the time to read through this document before putting the module to use.

Introduction

The BC370T and BC370R plug-in cards belong to the range of the Bluebell Opticom BC Series modular fibre interfaces, designed primarily for TV Outside Broadcast (OB) or studio applications. The cards have been designed for the transport of 3G SDI video over a fibre-optic link: typically they will be used to connect video cameras installed at remote locations, as may be the case at large-scale sporting events, music festivals and similar OB situations. They are compatible with SD, HD and 3G SDI video standard.

The BC370 range comprises two variants:

- BC370T transmitter – four independent channels, quad SDI inputs to quad fibre outputs
- BC370R receiver – four independent channels, quad fibre inputs to quad SDI outputs

Cards will normally be used in pairs, typically with a BC370T installed at the remote end (camera station) and a BC370R at the control centre end (base station).

Singlemode fibre operation will normally be at 1310 nm; alternative CWDM grid wavelengths are also possible. The optical option is generally specified at the time of order. The optical receiver will be wideband.

Physical formats

All BC370 Series cards fit the Bluebell BC100i and BC160i 19" modular frames. These frames can house fifteen (BC100i) or six (BC160i) interface cards, and are fitted with dual internal AC power supplies. The cards are also compatible with earlier Bluebell 19" modular frame types BC100 and BC160.

Alternatively, cards may be fitted into smaller aluminium chassis; the BC101 and BC102 hold one and two cards respectively and require an external DC power source, while the BC120 holds three cards and has an integral mains PSU.

Power requirements

Power supply requirements are dictated by the enclosure type used.

BC100i modular frames:
This is normally fitted with two identical AC mains PSU modules. Each module has sufficient capacity to power a fully-loaded frame. The AC connection is via standard IEC cables, DC power distribution inside the frame is via the motherboard. See the Operation Guide supplied with the frame for more details.

BC160i modular frames:
This is fitted as standard with dual internal AC mains power supplies, each of sufficient capacity to power a fully-loaded frame. The AC connection is via standard IEC cables, DC power distribution inside the frame is via the motherboard. See the Operation Guide supplied with the frame for more details.

BC101 and BC102 single- and dual-slot chassis:
These are supplied with an external Universal AC adaptor which connects to the chassis via a flying lead terminated in a 4-pin locking XLR connector. Mains connection is via an IEC connector.

BC120 triple-slot chassis:
This housing for three plug-in modules is fitted with an internal AC mains supply; mains connection is via a rear IEC connector.

Inputs and outputs

SDI Video:

BC370 interfaces can be used with serial digital video signals having data rates up to 3 Gb/s. Standards supported are:

SD-SDI : SMPTE ST 259 compliant
HD-SDI : SMPTE ST 292 compliant
3G-SDI : SMPTE ST 424 compliant

Video inputs and outputs are on 75 ohm BNC sockets. Both variants have four connectors: four inputs on the BC370T and four outputs on the BC370R.

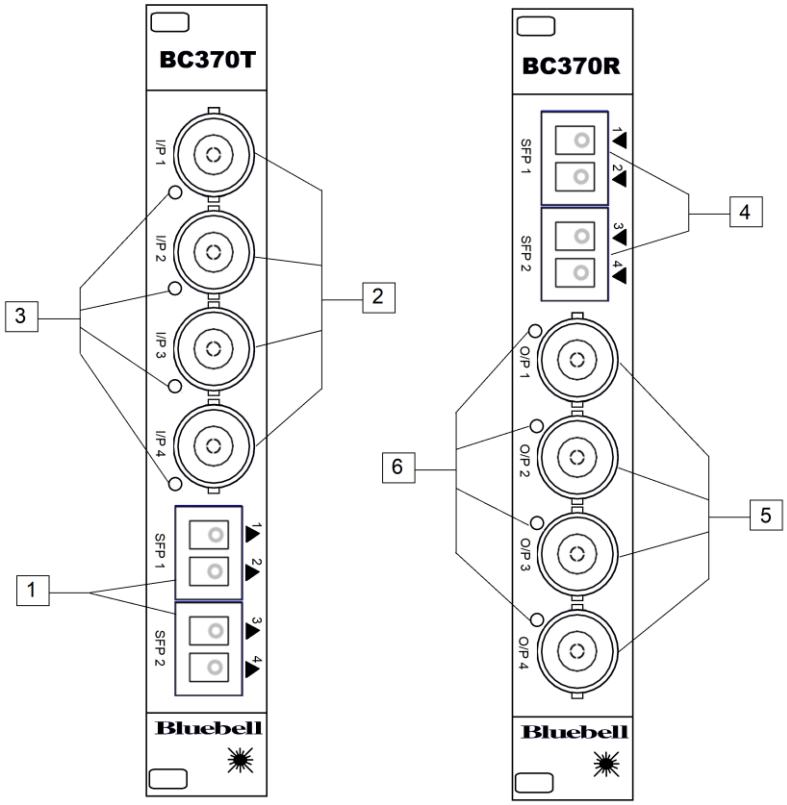
Optical:

Two SFP cages are each fitted with a dual LC optical module as standard on the BC370T and BC370R; the module type will depend on the variant. Each SDI stream uses one of the four optical fibre ports.

Optical operation is single-mode. The standard transmission wavelength is 1310 nm. Transmitters fitted with lasers tuned to specific CWDM wavelengths are also available: any alternative option will have been specified at the time of order.

> Note that the optical receivers in the BC370R are wideband, and can be used with all wavelengths in the range 1270 – 1610 nm.

BC370 Series connections and indicators



BC370T – four independent transmission channels

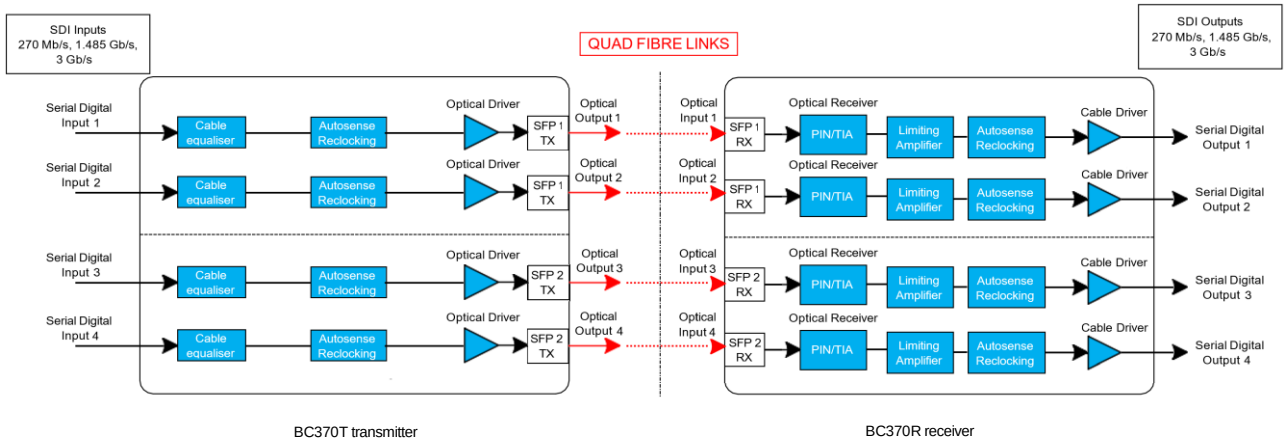
1. **OPT O/P** - SFP carrier factory-fitted with dual LC optical connector. Each port is a dual transmitter, one LC connector per channel. The standard operating wavelength is 1310 nm; alternative wavelengths may have been specified at time of order.
2. **TX I/P** – 75 ohm BNC socket for connection to an SDI video source: one per channel.
3. **S/L** – a bi-colour LED for each channel indicating SDI status. The LED illuminates green to confirm that valid data is detected at the channel's SDI input, and red if no valid signal is detected.

BC370R – four independent receive channels

4. **OPT I/P** - SFP carrier factory-fitted with dual LC optical connector. Each port is a dual receiver, one LC connector per channel. The optical receiver is wideband in the range 1270 to 1610 nm.
5. **RX O/P** – two 75 ohm BNC sockets per channel, carrying the SDI video signal recovered from the optical input. The two outputs of each channel are identical, but fully buffered from each other.
6. **S/L** – a bi-colour LED for each channel indicating SDI status. The LED illuminates green to confirm that valid data is available at the channel's RX O/P socket, and red if not.

Signal routing

BC370T/BC370R pair:



In this application, a BC370T will typically be installed at a remote camera location and a BC370R at the base location. Four independent SDI signals applied at the inputs of BC370T will be transported over separate optical links, and can be recovered at the SDI outputs of the BC370R. The video signal in each channel may be of any of the supported SDI standards.

IMPORTANT: Please read the Guide section "Setup options" if non-standard SFPs are to be used.

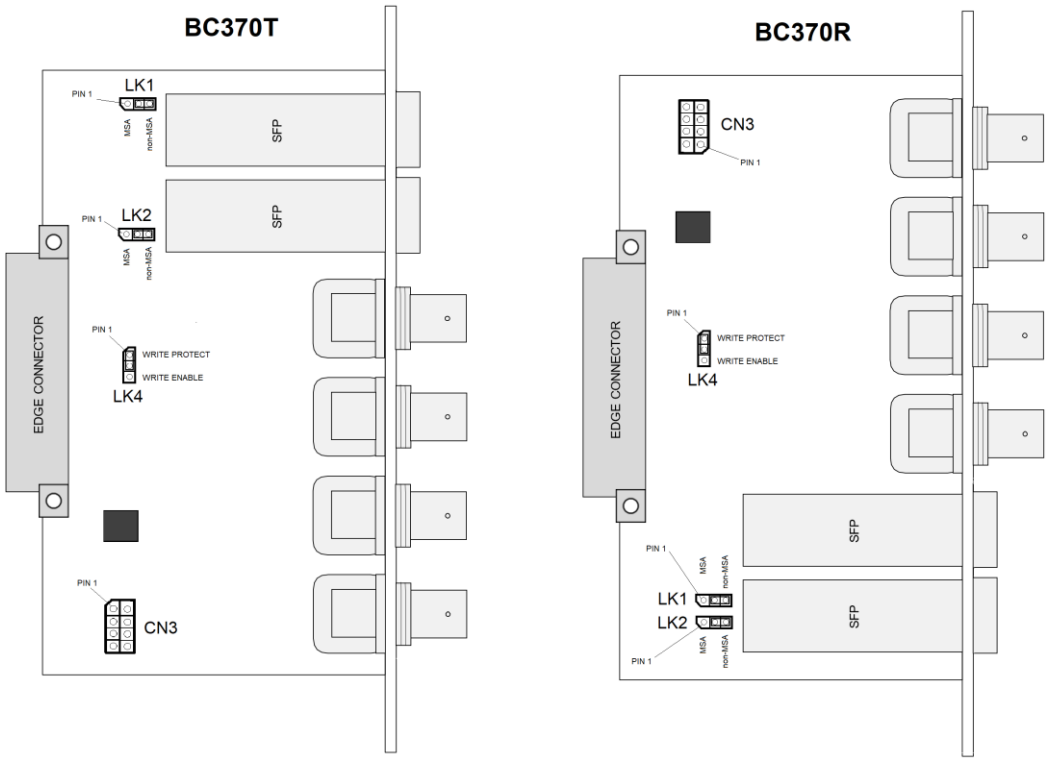
Setup options

BC370T and BC370R have four internal PCB jumpers: LK1, LK2, LK3 and CN3, whose position modify the interface's operation. There are no other user adjustments.

The "LK" links are set on 3-pin headers: a jumper is positioned either on pins 1 and 2 or 2 and 3 of the header. LK1 and LK2 should be set according to whether either or both SFPs fitted are MSA or non-MSA (the default setting). LK4 is for factory use only and in its default setting, the module's EEPROM is write-protected.

Links 1-2 on CN3 determines the chA and chB status LEDs when monitored in a 1U or 3U frame, or externally on a webpage/SNMP. If a jumper is positioned, chA LED will be red/green depending on the lock status of inputs 1 and 2, and chB LED will be red/green depending on the lock status of inputs 3 and 4. If removed, input 1 lock status drives chA LED, input 2 lock status drives chB LED (red = unlocked, green = locked).

The diagram and table below summarises the jumper settings – factory defaults are shown in ***Bold Italics***.



NOT TO SCALE – FOR LOCATION PURPOSES ONLY. (ONLY PRIMARY COMPONENTS SHOWN)

Link summary

Jumper	Setting	Effect
LK1	Pins 1-2 linked	When SFP 1 is data type (MSA)
	Pins 2-3 linked	***When SFP 1 is video type (non-MSA)***
	Links removed	SFP 1 monitoring is disabled
LK2	Pins 1-2 linked	When SFP 2 is data type (MSA)
	Pins 2-3 linked	***When SFP 2 is video type (non-MSA)***
	Links removed	SFP 2 monitoring is disabled
LK4	Pins 1-2 linked	***(or no link) – EEPROM protected***
	Pins 2-3 linked	For factory use only
CN3	Pins 1-2 linked	***Ch A LED - Input 1&2 lock status*** ***Ch B LED - Input 3&4 lock status***
	Pins 1-2 unlinked	Ch A LED - Input 1 lock status Ch B LED - Input 2 lock status

External monitoring

When installed in a BC100i, BC100, BC160i or BC160 frame, all cards in the Bluebell modular range can report their status to the frame's monitoring system. The BC100i and BC160i frames provide visual indication of correct card operation (or otherwise) on the Home page of the frames' LCD touchscreens: extended card data is available on other pages. Earlier BC100 and BC160 frames provide card status information using two LEDs per card slot.

On all the above frame types, remote monitoring is also available if the optional network interface card is fitted. Contact Bluebell for the relevant .mib file.

Please refer to **Setup options – Link CN3** to configure ch A and ch B LED status.

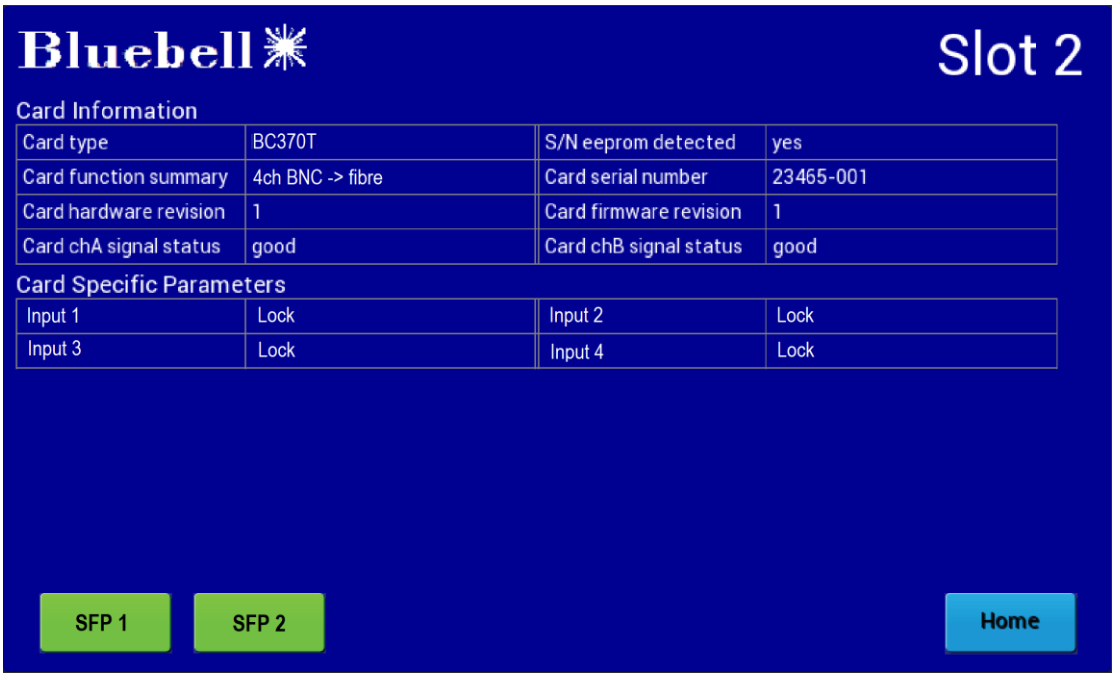
Frame monitoring

BC100i/160i Home page or BC100/160 Frame LEDs

		BC370/365T/365TR
LED Ch A	Green	Ch A data locked
	Red	Ch A data not locked (invalid signal)
LED Ch B	Green	Ch B data locked
	Red	Ch B data not locked (invalid signal)

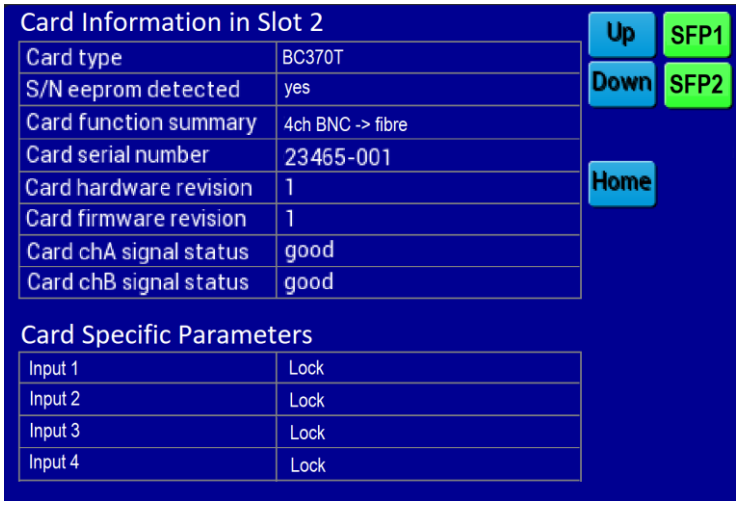
BC100i Card Info page

When operating correctly, the BC100i Card info page for a BC370T card will appear as below (items specific to individual cards excepted). The Card Info pages for BC370R are very similar.



BC160i Card Info page

When operating correctly, the BC160i Card Info page for a BC370T card will display a subset of the data shown below (items specific to individual cards excepted). Use the Up and Down scroll buttons to show data not currently displayed. The Card Info pages for BC370R are very similar.



Monitoring via webpages:

"Overview" webpage:

		BC370/365T/365TR
LED Ch A	Green	Ch A data locked
	Red	Ch A data not locked (invalid signal)
LED Ch B	Green	Ch B data locked
	Red	Ch B data not locked (invalid signal)

"Frame Information" webpage:

Signal status		**BC370T/365R/365TR**
LED Ch A	"good"	Ch A data locked
	"fail"	Ch A data not locked (invalid signal)
	"unknown"	Card not recognised
LED Ch B	"good"	Ch B data locked
	"fail"	Ch B data not locked (invalid signal)
	"unknown"	Card not recognised

Remote monitoring via SNMP

		BC370T/365R/365TR
cardsigChA	"good"	Ch A data locked
	"fail"	Ch A data not locked (invalid signal)
	"unknown"	Card not recognised
cardsigChB	"good"	Ch B data locked
	"fail"	Ch B data not locked (invalid signal)
	"unknown"	Card not recognised

Appendix

Specifications – BC370 Series

	BC370 – Tx channels	BC370 – Rx channels
Electrical Inputs and Outputs		
SDI standards – conformities	Compliant with: SD-SDI : SMPTE ST 259 compliant HD-SDI : SMPTE ST 292 compliant 3G-SDI : SMPTE ST 424 compliant	
Signal standards:	SD-SDI, HD-SDI, 3G-SDI	
Equalisation (T only)	Automatic to: SD-SDI : 400 m @ 270 Mb/s HD-SDI : 240 m @ 1.485 Gb/s 3G-SDI : 170 m @ 2.97 Gb/s	
Return Loss	<15 dB, 5 Mb/s – 1.485 Gb/s <12 dB, 1.485 Gb/s – 2.97 Gb/s	<17 dB, 5 Mb/s – 1.485 Gb/s <12 dB, 1.485 Gb/s – 2.97 Gb/s
Connectors	4 x 75 ohm BNC per IEC 60169-8, Amendment 2	
Format	Re-clocked (may be bypassed)	
Polarity (R only)		Non-inverting
Signal Level (R only)		800 mV +/-10%
Timing Jitter (R only)		0.2 UI line equalised @ 270 Mb/s 1 UI line equalised @ 1.485 Gb/s 2 UI line equalised @ 2.97 Gb/s
Alignment Jitter (R only)		0.2 UI line equalised @ 270 Mb/s 0.2 UI line equalised @ 1.485 Gb/s 0.3 UI line equalised @ 2.97 Gb/s
Optical Inputs and Outputs Most specs determined by SFP fitted. Typical values given below.		
Optical conformity	SMPTE ST 297 compliant	
Connector	4 x female LC	
Wavelength	1270 – 1610 nm	
Optical power (T only)	-15 dBm @1310 nm multimode -6 dBm @ 1310 nm singlemode -6 dBm @1310 nm (4K emSFP)	
Sensitivity (R only)		>-25 dBm @ 1.485 Gb/s >-22 dBm @ 2.97 Gb/s
Monitoring		
Front panel	S/L: bi-colour LED per channel indicating a valid and locked signal	
External via BC100i/ BC160i rack frame	Bi-colour LED indicating electrical lock status configured to each channel	Bi-colour LED indicating optical lock status configured to each channel
External via BC100i/ BC160i rack frame with BM102i card fitted	Bi-colour virtual LED indicating electrical lock status configured to each channel	Bi-colour virtual LED indicating optical lock status configured to each channel
SNMP monitoring (via BC100i/BC160i rack frame with BM102i card fitted)	LED status of each channel configure to electrical lock status	LED status of each channel configure to optical lock status

Conformities		
Laser Safety	Complies with Class 1 laser product	
RoHS & WEEE	Complies with RoHS Directive 2011/65/EU, WEEE Directive 2012/19/EU	
General		
Input Voltage	6 – 18 V	
Power consumption	5 W Typical	
Depth	85 mm (60 mm excluding connectors)	
Width	20 mm (4HP)	
Height	129 mm (3RU)	
Weight	100 g (excluding SFP)	
Operating Temperature	-30 to +70 °C	