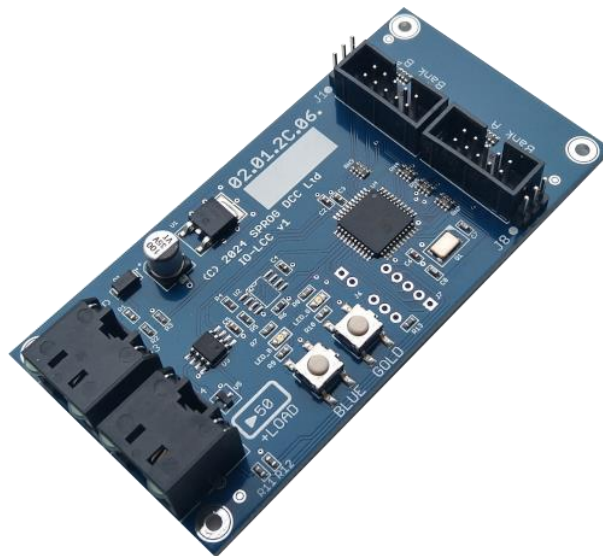
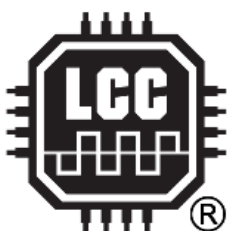




IO-LCC Module for LCC®/OpenLCB™ SPROG DCC Ltd



Firmware v2.0



Copyright © September 2024 SPROG DCC Ltd.

This document may be distributed it under the terms of Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0/>), version 3.0 or later.

Contact:

SPROG DCC Ltd
Anvil House, Butt Lane
Harbury
Leamington Spa CV33 9JL
United Kingdom
<https://www.sprog-dcc.co.uk>
sprog@sprog-dcc.co.uk

Date	Revision	Comments
May 2024	1.5	Aligned to firmware version 1.5
September 2024	2.0	Aligned to CANSERVOIO-LCC firmware version 2.0

Unless otherwise notes references in this document to LCC apply equally to OpenLCB, and vice-versa.

LCC® is a registered trademark of the NMRA

OpenLCB™ is a trademark of the OpenLCB Group

Contents

1	Introduction.....	4
1.1	Features.....	4
1.2	Electrical Specifications	5
2	Installation	5
2.1	LCC Network	5
2.2	Blue/Gold Buttons and LEDs.....	6
2.3	Hardware Setup.....	6
2.3.1	I/O Bank A and Bank B Terminal Blocks	6
2.3.2	Bank A Pull-up/Pull-down	7
2.3.3	Bank B Pull-up/Pull-down	7
2.4	Using The IO-LCC With Servos	8
3	Configuration using the CDI (Configuration Description Information).....	8
4	Links to Further Information	8

1 Introduction

NOTE: This User Guide should be read in conjunction with the [SERVOIO-LCC User Guide](#), which can be downloaded from our website.

The IO-LCC is a cost reduced version of the SERVOIO-LCC with differences in physical format and connector options. This User Guide covers the differences between the SERVOIO-LCC and IO-LCC.

NOTE: This document should also be read in conjunction with the SERVOIO-LCC Errata, which can be downloaded from our website, for a list of known and fixed issues for this release.

NOTE: To fully fix the servo errata requires a “return to base” for the node firmware to be updated. Please contact SPROG DCC Ltd or BBM Group in North America for details of the process involved.

Nodes will still function if v2.0 firmware is loaded with the v1.x bootloader

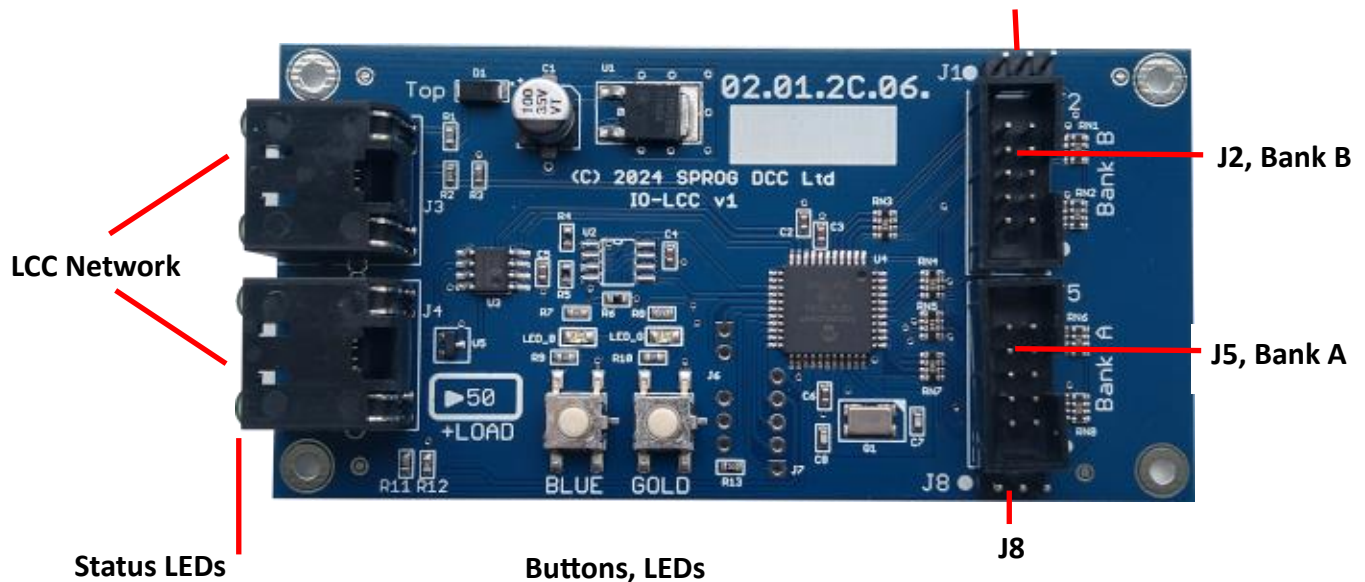
1.1 Features

The main features of the IO-LCC are

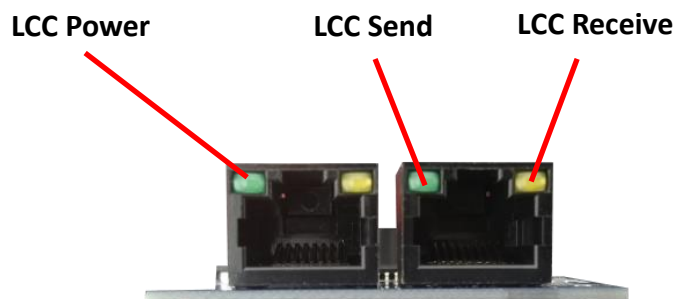
- Two I/O banks of eight channels for a total of sixteen channels
- Support for servos on bank A (requires external hardware)
- Eight individual logic level I/O channels per bank
- Jumper selectable pull-up/down for I/O channels
- Flexible configuration through the CDI (Configuration Description Information)
- Two status LEDs configurable through the CDI
- Two pushbuttons configurable through the CDI
- Can consume own generated events for event chaining (secondary events)
- Dual RJ45 for network pass-through or terminator
- Powered from the LCC network for simple I/O
- Bootloader for firmware updates

Unlike the SERVOIO-LCC, the IO-LCC does not have servo connectors, servo power supply nor high current output option. It does, however, use the same firmware as the SERVOIO-LCC and can be used with servos with additional hardware, see [2.4 USING THE IO-LCC WITH SERVOS](#)

J1



Three status LEDs are built in to the network connectors to indicate LCC power, message send and message receive. The LCC send and receive LEDs blink briefly for each message.



NOTE: The LED colours may vary in the final version of the IO-LCC.

1.2 Electrical Specifications

The IO-LCC takes power from the LCC network, consuming less than 50. Additional loads taking power from the network (e.g., LEDs connected to I/O) must be added to this when calculating the total power budget for the LCC network.

If the IO-LCC is used to drive servos, an external 5V powers supply must be used to power the servos.

2 Installation

2.1 LCC Network

The SERVIOIO-LCC has two LCC connectors, allowing for the required “daisy-chain” network connection between nodes.

2.2 Blue/Gold Buttons and LEDs

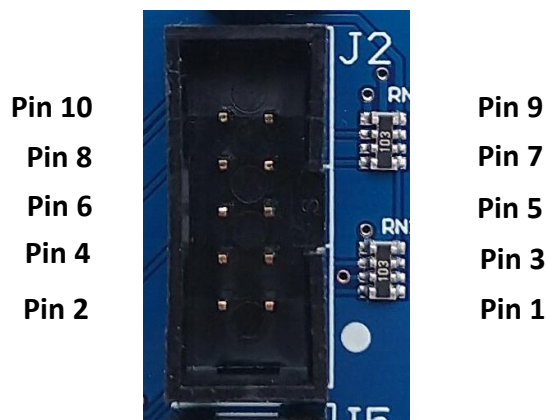
The LCC specification allows for very simple node configuration using the so-called Blue/Gold buttons and LEDs. The IO-LCC does not support this and all configuration is done through the CDI (Configuration Data interface) with a suitable software tool, such as JMRI (Java Model Railroad Interface).

The Blue/Gold buttons may, instead, be configured through the CDI to produce events and the LEDs to consume events or display module status.

2.3 Hardware Setup

2.3.1 I/O Bank A and Bank B Terminal Blocks

The two 10-way headers, J5 for Bank A and J2 for Bank B have the same pinout, numbered as shown in the picture, with the connections shown in the table. Connection can be made with an IDC socket (supplied, recommended) and ribbon cable or individual “Du-Pont” style flying leads.



Pin	Bank A (J5) or Bank B (J2) Function
1	Channel 1
2	Channel 2
3	Channel 3
4	Channel 4
5	0 V
6	+5 V
7	Channel 5
8	Channel 6
9	Channel 7
10	Channel 8

2.3.2 Bank A Pull-up/Pull-down

Bank A I/O may have 10k ohm pull-up or pull-down resistors on each channel, selected by J8:

J8	I/O Termination	
Jumper pins 1 to 2	Pull-up to 5 V, derived from the LCC network power	
Jumper pins 2 to 3	Pull-down	

J8 Pin is denoted by the white circle on the top side of the PCB and the square pad on the bottom side.

2.3.3 Bank B Pull-up/Pull-down

Bank B I/O may have 10k ohm pull-up or pull-down resistors on each channel, selected by J1:

J1	I/O Termination	
Jumper pins 1 to 2	Pull-up to 5 V, derived from the LCC network power	
Jumper pins 1 to 3	Pull-down	

J1 Pin is denoted by the white circle on the top side of the PCB and the square pad on the bottom side.

2.4 Using The IO-LCC With Servos

External hardware must be provided by the user to connect servos to the IO-LCC.

The Bank A (J2) header pinout must be adapted to 3-pin servo connectors.

The 5 V supply on J2 pin 6 must not be used to power servos. Instead, a suitable external PSU (Power Supply Unit) must be used. The PSU common (0 V) must be connected to J2 pin 5.

3 Configuration using the CDI (Configuration Description Information)

The IO-LCC has the same CDI interface as the SERVOIO-LCC, with the exception of the Model name.

4 Links to Further Information

SPROG DCC Ltd website <https://www.sprog-dcc.co.uk> For all our products and support.

SPROG DCC Ltd Official YouTube Channel <https://www.youtube.com/@sprogdcc>

SPROG DCC Ltd Introduction to LCC/OpenLCB <https://www.sprog-dcc.co.uk/downloads/lcc/lcc-basics.pdf>

OpenLCB group <https://openlcb.org> The group behind the OpenLCB/LCC standards.

NMRA LCC standards page <https://www.nmra.org/lcc> The LCC standards adopted by the NMRA.

OpenLCB discussion group <https://groups.io/g/openlcb/topics> Discussion of OpenLCB topics, more developer focussed.

The NMRA's LCC user group <https://groups.io/g/layoutcommandcontrol/topics> a good starting point for asking questions of other LCC users.

JMRI users <https://groups.io/g/jmriusers/topics> JMRI software topics.

JMRI website <https://www.jmri.org> Download the latest JMRI releases and access support pages.

Book: Introduction to Layout Command Control <https://www.amazon.co.uk/Introduction-Layout-Command-Control-Practical/dp/0988825902> focussed on RR-Cirkit's products but the concepts are applicable to any LCC hardware.