

How to convert the LIGHTNING™ II-to-SMC interface from XY2-100 to GSBUS

1 Introduction

This Application Note describes how to convert the LIGHTNING™ II-to-SMC interface from XY2-100 to GSBUS.

NOTE: Refer to Application Note AN00007 to convert a LIGHTNING™ II system from USB Direct to GSBUS connection to the SMC.

The following sections are included in this document:

[Introduction](#)

[Background information](#)

[Hardware and Configuration Setup](#)

[Referenced Documents](#)

[Contact Us](#)

Keywords: ScanMaster™ Controller, SMC, LIGHTNING™ II, XY2-100, XY2-100 adapter board, GSBUS, GSBUS interface board, camera link cable, safety clip

2 Background information

Users have traditionally sent commands to the LIGHTNING™ II scanning system by the industry standard XY2-100 interface or by USB Direct. LIGHTNING™ II scanning systems include an XY2-100 adapter board that receives XY2-100 commands. The LIGHTNING™ II servo board includes a USB port that receives commands directly from the PC via a USB cable.

The ScanMaster™ Controller (SMC) now supports a third method—the GSBUS interface and protocol—for communicating with the LIGHTNING™ II scanning system. GSBUS is a high-speed, 24-bit, bi-directional interface that is proprietary to Cambridge Technology. It allows up to 8-axis synchronous control through a single interface.

When compared with the XY2-100 interface, the advantages of the GSBUS interface include (but are not limited to) the following:

- Support for L2-proprietary 24-bit, ultra-high resolution
- Support for a 10.67µs command tick period (which matches the LIGHTNING™ II servo board processing clock)

3 Hardware Setup and Configuration

This section describes how to convert the LIGHTNING™ II -to-SMC interface from XY2-100 to GSBUS. The upgrade kit for the LIGHTNING™ II -to-SMC interface conversion consists of the GSBUS interface board, which is shown in the following figure.



Figure 1 - The GSBUS interface board

Refer to the following procedures to do the conversion from XY2-100 to GSBUS:

- "Remove the XY2-100 adapter board from the LIGHTNING™ II scanning system" (below)
- "Connect the LIGHTNING™ II scanning system to the SMC via the GSBUS interface" on page 6

3.1 Remove the XY2-100 adapter board from the LIGHTNING™ II scanning system

Do the following to remove the XY2-100 adapter board from the LIGHTNING™ II scanning system:

1. Remove the existing GSBUS cable and LIGHTNING™ II servo boards from the board stack.
 - a. Before detaching the GSBUS cable, remove the safety clips on all GSBUS connectors. You can use a screw driver to help remove the safety clips, as shown in the following figure. **HOWEVER, YOU SHOULD BE VERY CAREFUL AND GENTLE IN DOING THIS.**

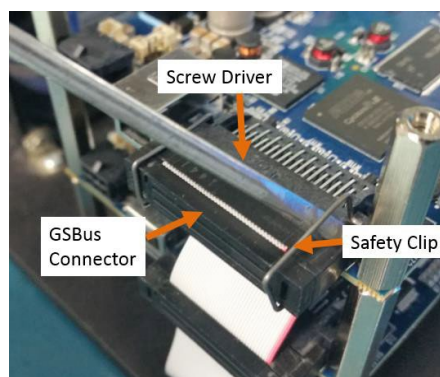


Figure 2 - Removing safety clips from the existing GSBUS cable

- b. After removing the safety clips, remove the GSBUS cable from the LIGHTNING™ II servo boards.
- c. Remove all other cables—including the galvo cables, power cables, and USB cable—from the LIGHTNING™ II servo boards.

- d. Remove the top four "long" standoffs and remove the top servo board from the stack. (The top servo board is the Z board in the 3-axis system or the Y board in the 2-axis system.)
- e. Repeat step d (above) to remove all other servo boards until the XY2-100 adapter board is exposed. Leave the final four "long" standoffs attached to the baseplate.
- f. Unscrew the four screws that secure the XY2-100 adapter board, and remove the XY2-100 adapter board. Leave the 4 "short" standoffs that were used to support the XY2-100 adapter board still attached to the baseplate (see the following figure).



Figure 3 - Four "long" standoffs and four "short" standoffs still attached to the baseplate

- 2. Set the DIP switches on the GSBUS interface board to "3" (0011) as shown in the following figure.

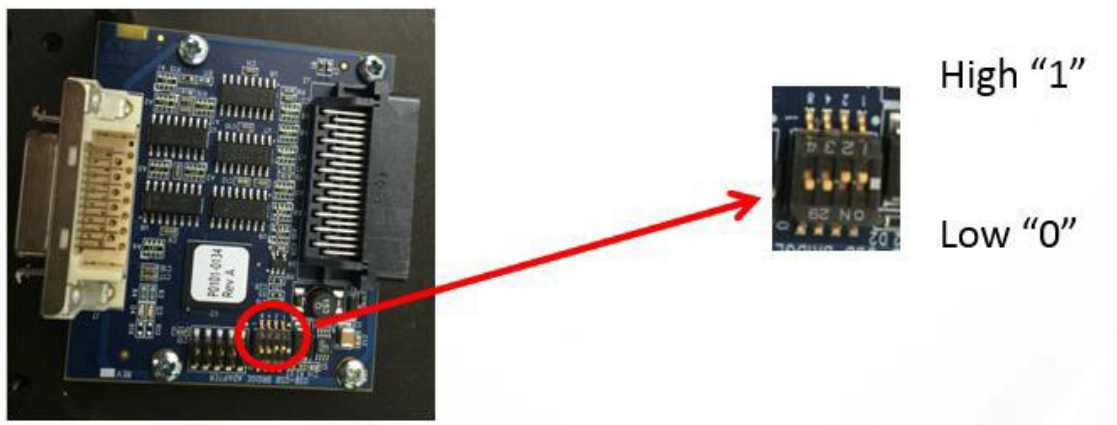


Figure 4 - GSBUS Interface board and DIP switch

3. Install the GSBUS interface board in the LIGHTNING™ II servo board stack.
 - a. Place the GSBUS interface board on the four "short" standoffs with the camera link connector facing the closest edge of the baseplate. Secure the GSBUS interface with four screws as shown in the following figure.

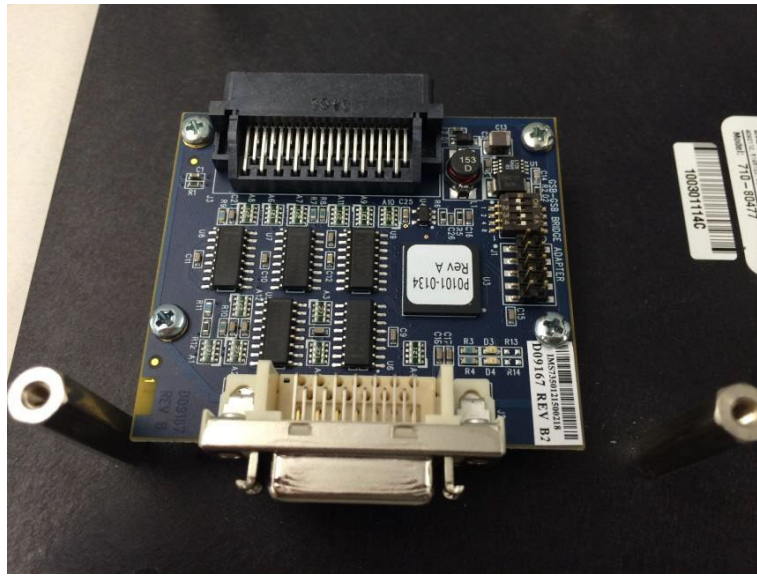


Figure 5 - Install GSBUS interface board

- b. The original GSBUS cable that was used for the XY2-100 interface connection still works for the GSBUS interface connection. Attach the GSBUS cable to the GSBUS interface board using the end connector that is farthest apart from the other GSBUS connectors (as shown in the following figure). Secure the connector with a safety clip.

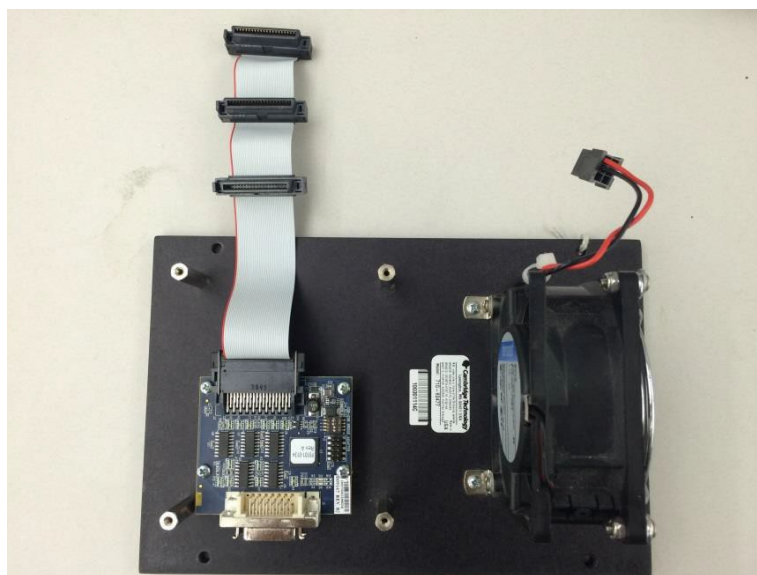


Figure 6 - Reattach the new GSBUS cable to the GSBUS interface board

NOTE: To ensure secure GSBUS connection, a safety clip is used at every GSBUS connector on a LIGHTNING™ II servo stack. Although it is tricky to remove and install the safety clips, Cambridge Technology highly recommends that you put the safety clips on whenever you re-install the GSBUS cable. The following figure shows how to install the safety clip.

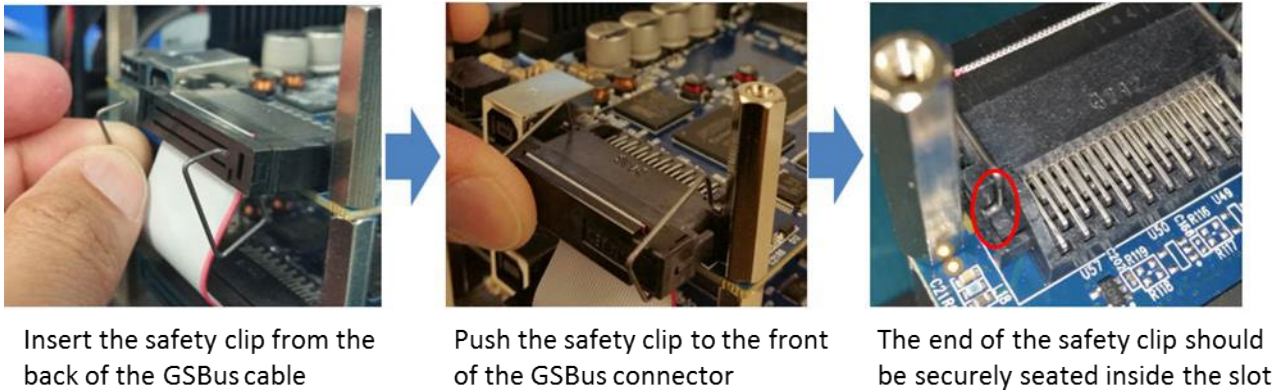


Figure 7 - Secure the connector with a safety clip

4. Install the LIGHTNING™ II servo boards back in the stack.
 - a. Place the LIGHTNING™ II X servo board over the four "long" standoffs with its heatsink facing the fan. Secure the X servo board with four more "long" standoffs as shown in the following figure. Attach the next GSBUS connector in the series to the LIGHTNING™ II X servo board and secure it with a safety clip.

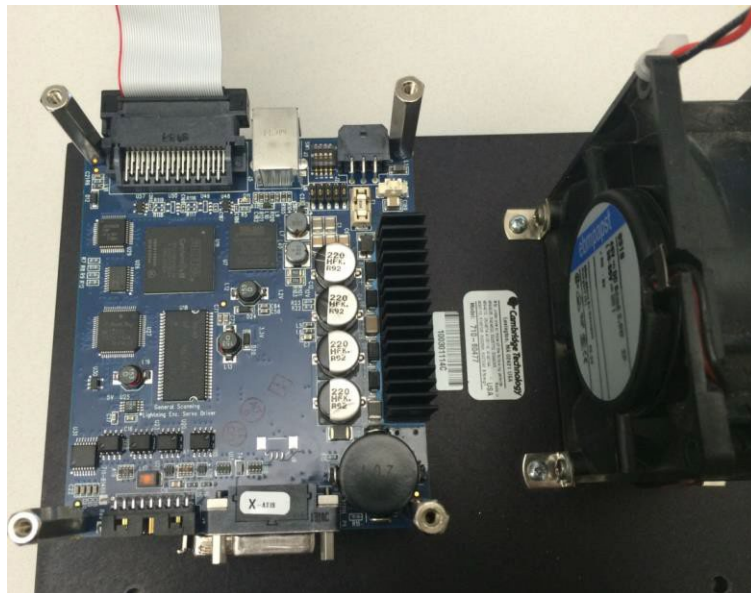


Figure 8 - Install LIGHTNING™ II X servo board

- b. Place the LIGHTNING™ II Y servo board over the standoffs with its heatsink facing the fan. Secure the board with four more "long" standoffs. Attach the next GSBUS connector to the Y board and secure it with a safety clip. If it is a 3-axis LiGHTNING™ II scanning system, repeat the same step to install the LIGHTNING™ II Z servo board.

- c. Verify that the routing of the GSBUS cable between the boards maintains a gentle bend radius and is neatly contained within the envelope of the board as shown in the following figure.

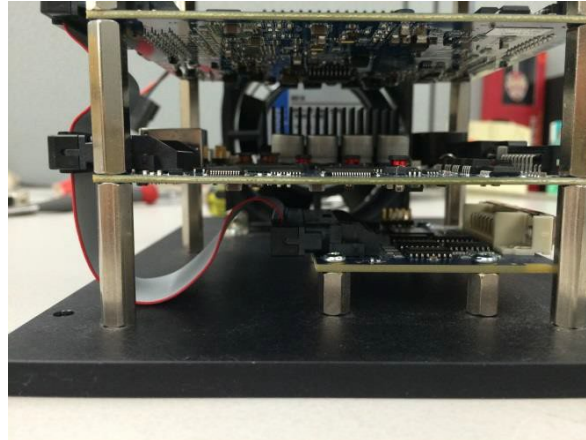


Figure 9 - The routing of the GSBUS cable is neatly contained and maintains a gentle bend radius

- d. Now you can attach all of the other cables back to the servo boards (e.g. power cable and galvo cables).

3.2 Connect the LIGHTNING™ II scanning system to the SMC via the GSBUS interface

The figure on the right shows the connection of the LIGHTNING II system to the SMC via a GSBUS interface. The GSBUS interface board connects to a camera link cable provided by the user; the other end of the camera link cable connects to the GSBUS/Camera link converter, which then connects to the SMC via a short GSBUS cable. The GSBUS interface board is provided to the user for the upgrade. The GSBUS/Camera link converter and the GSBUS cable are included in the SMC package. (Refer to the Application Note APN_SMC_006A ("SMC Quick Startup Guide") for the items included in the SMC package.) The GSBUS cable that comes with the GSBUS/camera link converter is available in two lengths: 1.5 inches and 2 feet.

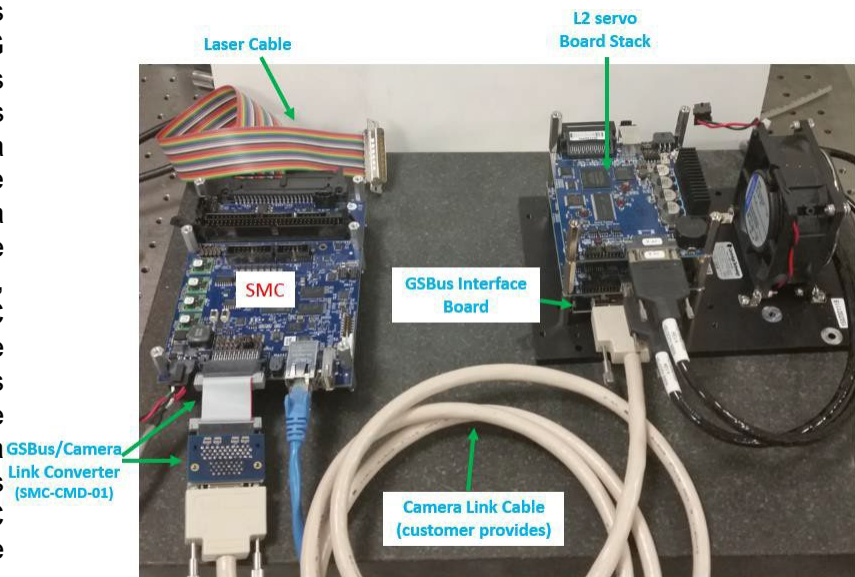


Figure 10 - Connect the Lightning II system to the SMC with the GSBUS interface/Camera Link cable

4 Referenced Documents

The following table lists the Application Notes that are referenced herein.

NOTE: Unless otherwise noted, the current version of the following Application Notes is the applicable one.

Table 1 - Referenced Application Notes

Lit. No.	Title
AN00003	ScanMaster™ Controller Quick Startup Guide
AN00007	How to Convert LIGHTNING™ II-to-SMC Interface from USB Direct to GSBUS