# Differential Step/Direction & Encoder Board (pn7737)

**Document Revision 1.5**

**(Update November 6, 2019)**



**Atlanta, GA USA**

**For more information please visit the product web page:**

**www.vitalsystem.com**

# Contents

# License Agreement

Before using the 7737 and accompanying software tools, please take a moment to go thru this License agreement. Any use of this hardware and software indicate your acceptance to this agreement.

It is the nature of all machine tools that they are dangerous devices. In order to be permitted to use 7737 on any machine you must agree to the following license:

I agree that no-one other than the owner of this machine, will, under any circumstances be responsible, for the operation, safety, and use of this machine. I agree there is no situation under which I would consider Vital Systems, or any of its distributors to be responsible for any losses, damages, or other misfortunes suffered through the use of the 7737 board and its software. I understand that the 7737 board is very complex, and though the engineers make every effort to achieve a bug free environment, that I will hold no-one other than myself responsible for mistakes, errors, material loss, personal damages, secondary damages, faults or errors of any kind, caused by any circumstance, any bugs, or any undesired response by the board and its software while running my machine or device.

I fully accept all responsibility for the operation of this machine while under the control of 7737, and for its operation by others who may use the machine. It is my responsibility to warn any others who may operate any device under the control of 7737 board of the limitations so imposed.

I fully accept the above statements, and I will comply at all times with standard operating procedures and safety requirements pertinent to my area or country, and will endeavor to ensure the safety of all operators, as well as anyone near or in the area of my machine.

**WARNING:** Machines in motion can be extremely dangerous! It is the responsibility of the user to design effective error handling and safety protection as part of the system. VITAL Systems shall not be liable or responsible for any incidental or consequential damages. By using this product, you agree to the license agreement.

# Introduction

The pn7737 Differential Step/Direction and Encoder Board allows access to the Step/Direction channels and more Encoder channels for the HiCON Integra (pn7766) or DSPMC (pnn7762) .

When used in tandem with a Drive Interface Board (EPx-DIB) for Maxsine AC Servo Drives, the 7737 allows a simple plug-and-play setup using HiCON Integra and DSPMC motion controllers.

Features:

- Color-coded RJ45 plugs for Controller-to-Drive Step/Dir and Encoder cables.
- 4 Differential Encoder Channels
- 4 Step/Dir Output Channels
- Drive Enable and 1 General Purpose 24V NPN Outputs
- Hardware Estop and Drive Error Inputs
- Status LEDs for I/O signals.

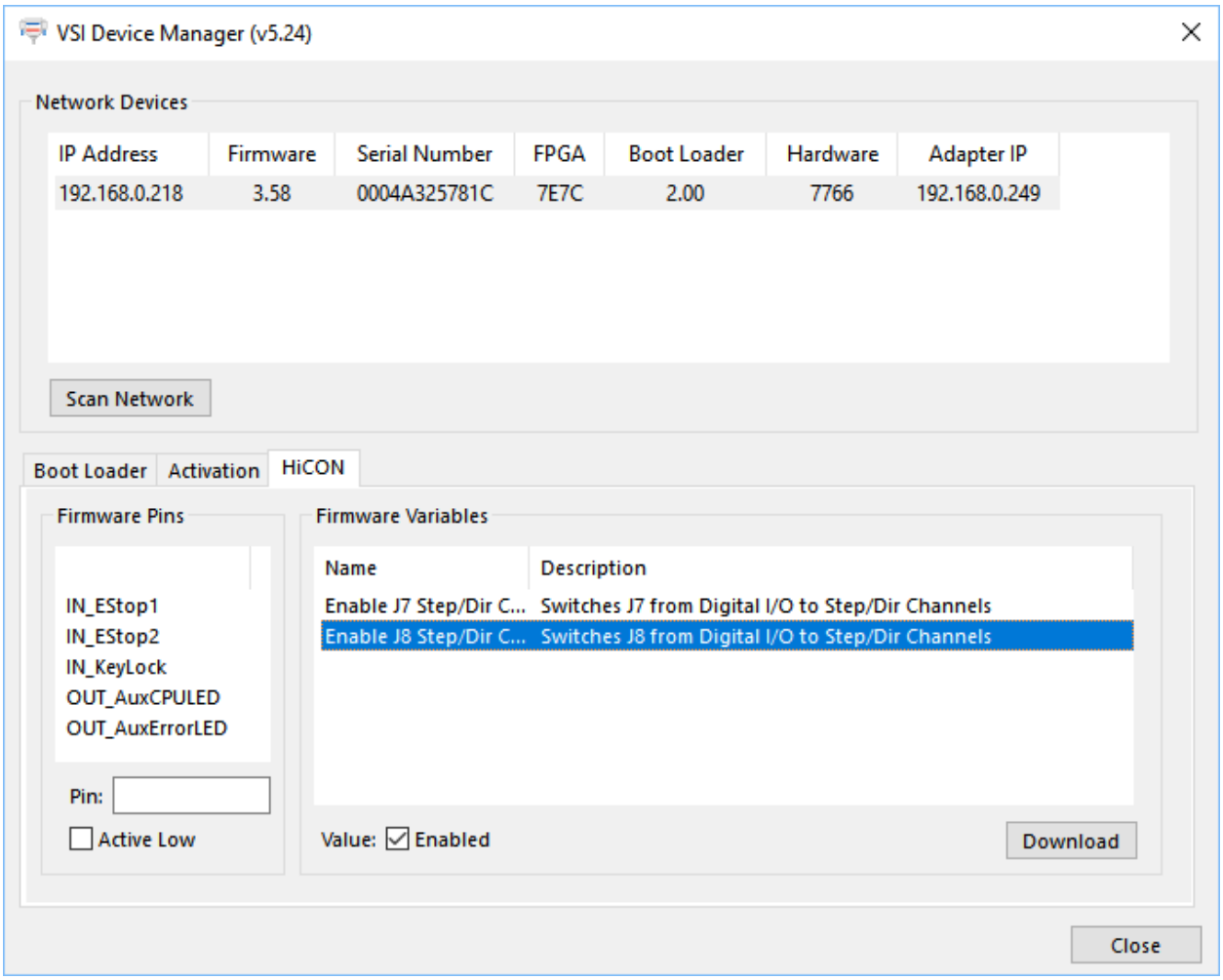
**IMPORTANT: PLEASE READ!!**

**pn7737 Estop Notes:**

- Estop signal can be overridden by installing a jumper between Estop and adjacent 24V terminals
- Drive Enable signal is automatically disabled if Estop is triggered
- Combined Estop on HiCON Integra (between J7 and J8) signal on Port14, input15 is preferred for Mach Estop pin mapping
- Use straight-thru RJ45 patch cables when connecting the 7737 breakout board to the Maxsine EPx-DIB drive interface board.

# VSI Device Manager Setup

The Integra J8 and J7 as well as DSPMC J11 and J12 expansion headers must be enabled for 7737 step/dir before use. To do this, open the VSI Device Manager and scan the network for your device. Once the device is found and selected, open the HiCON or DSPMC tab, highlight the desired expansion port and mark the value for the Enabled option. Press the Download button to send the changes to the device. If you are only using one 7737 board, make sure to only enable one expansion header. If you enable both headers and only one 7737 board is plugged, it will be permanently stuck in estop condition.



# Pre-requisites to get motion working on 7737 with Integra

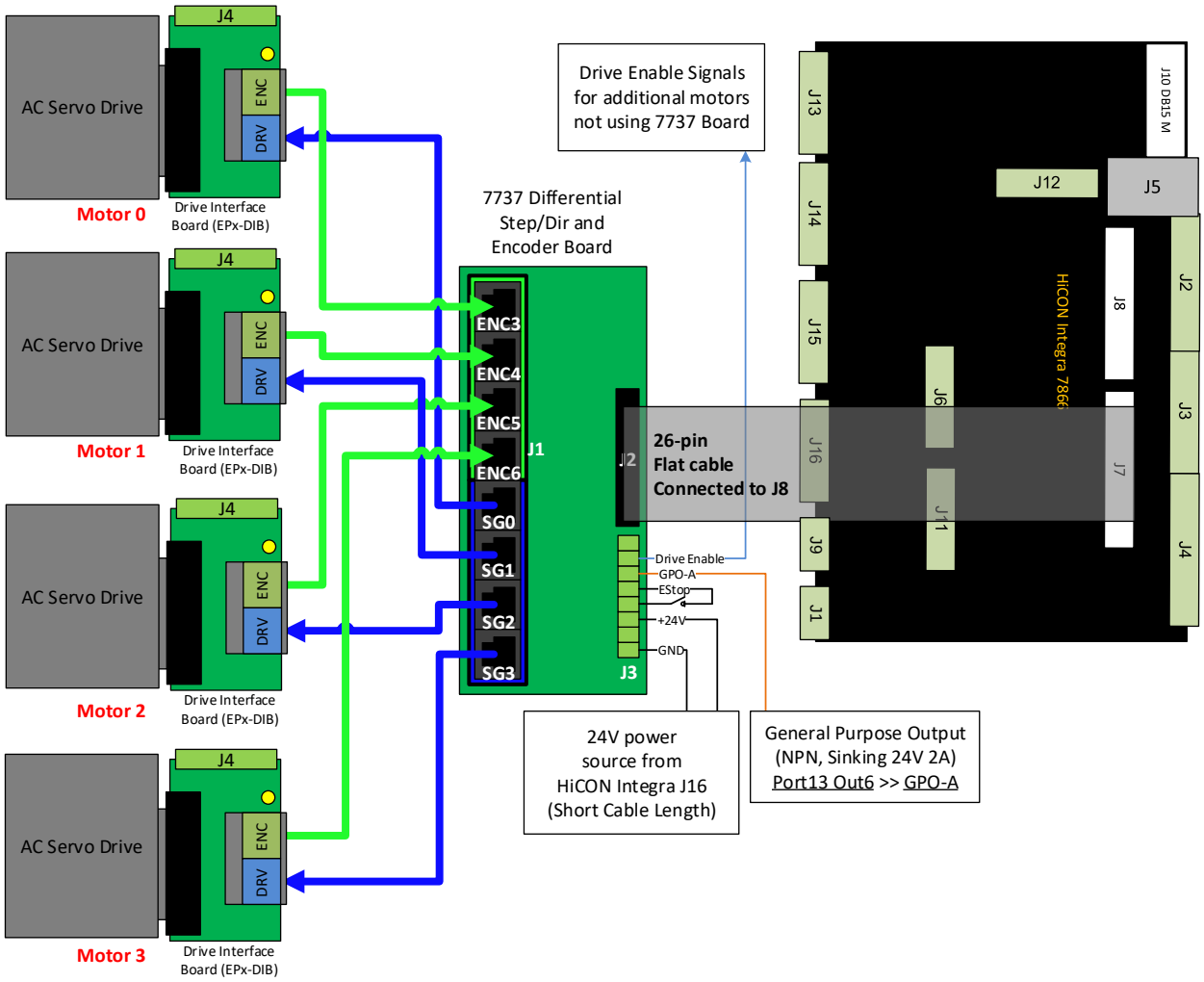
The 7737 and Integra combo requires these steps for proper operation:

1. Make sure that Integra has an Extended I/O Activation.
2. Enable J7/J8 plugs for Step/Dir operation using VSI Device Manager.
3. Map the Drive Enable pin of 7737 on Mach4. Make sure the polarity is such that when Mach4 is enabled, blue LED lights up on the 7737 Board.
4. Make sure ESTOP jumper is installed or ESTOP switch is closed on the 7737.
5. Optionally map Drive Error Signal.

# HiCON Integra Connection Diagrams with Black 7866

## Connection to J7

### Setup Diagram for 7737 Board and HiCON Integra 7866 (J7)




**Mach pin mapping (J8):**

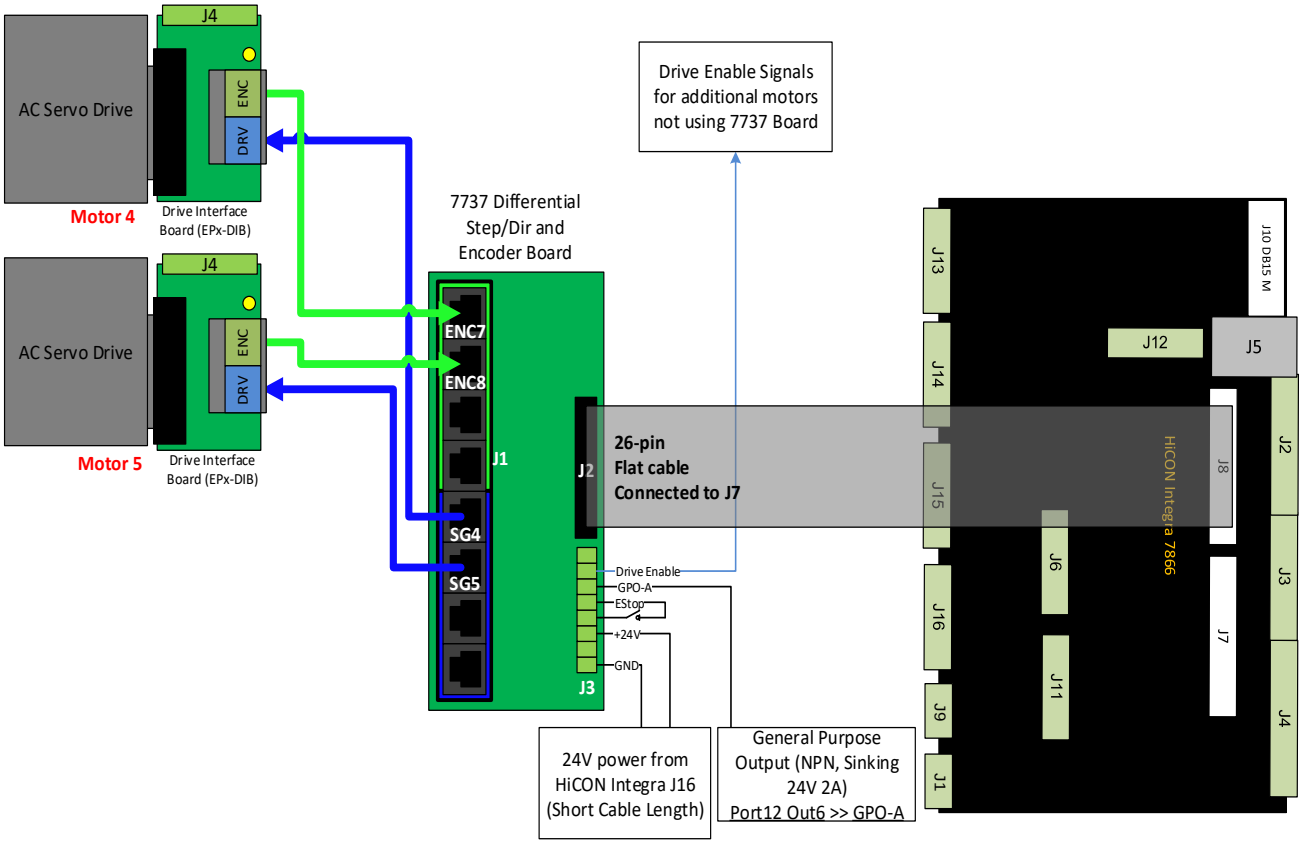
- Drive Enable – Port12, Out4
- GPO-A – Port12, Out6
- Estop – Port12, In12

**External Power:**

+24V and GND should be sourced from the J16 header on the Integra and the wires should be as short as possible.

## Connection to J8

### Setup Diagram for 7737 Board and HiCON Integra 7866 (J8)




**Mach pin mapping (J8):**

- Drive Enable – Port13, Out4
- GPO-A – Port13, Out6
- Estop – Port13, In12

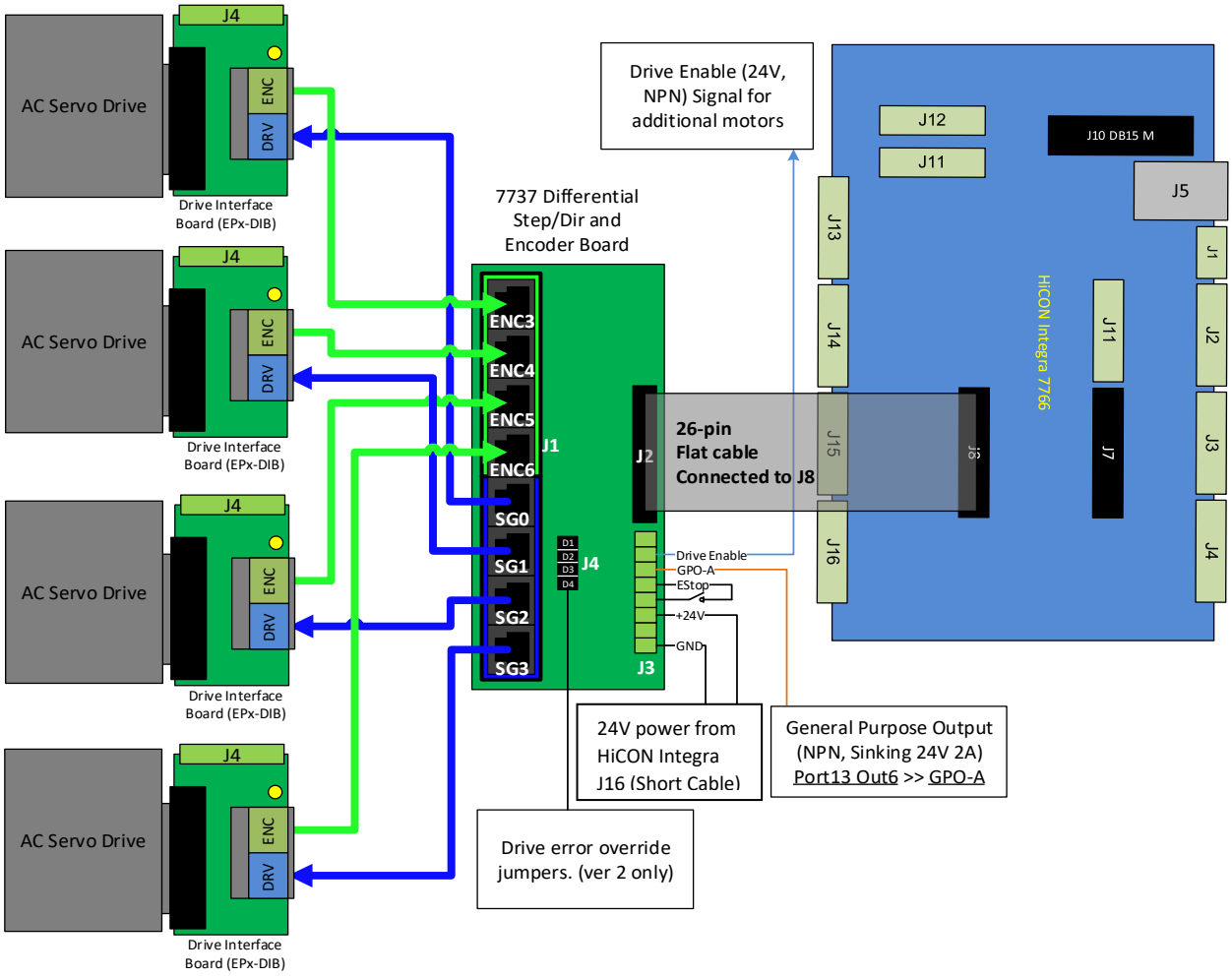
**24V Power:**

+24V and GND should be sourced from the J16 header on the Integra and the wires should be as short as possible

# HiCON Integra Connection Diagrams with Blue 7766

## Connection to J8

### Setup Diagram for 7737 Board and HiCON Integra (J8)




**Mach pin mapping (J8):**

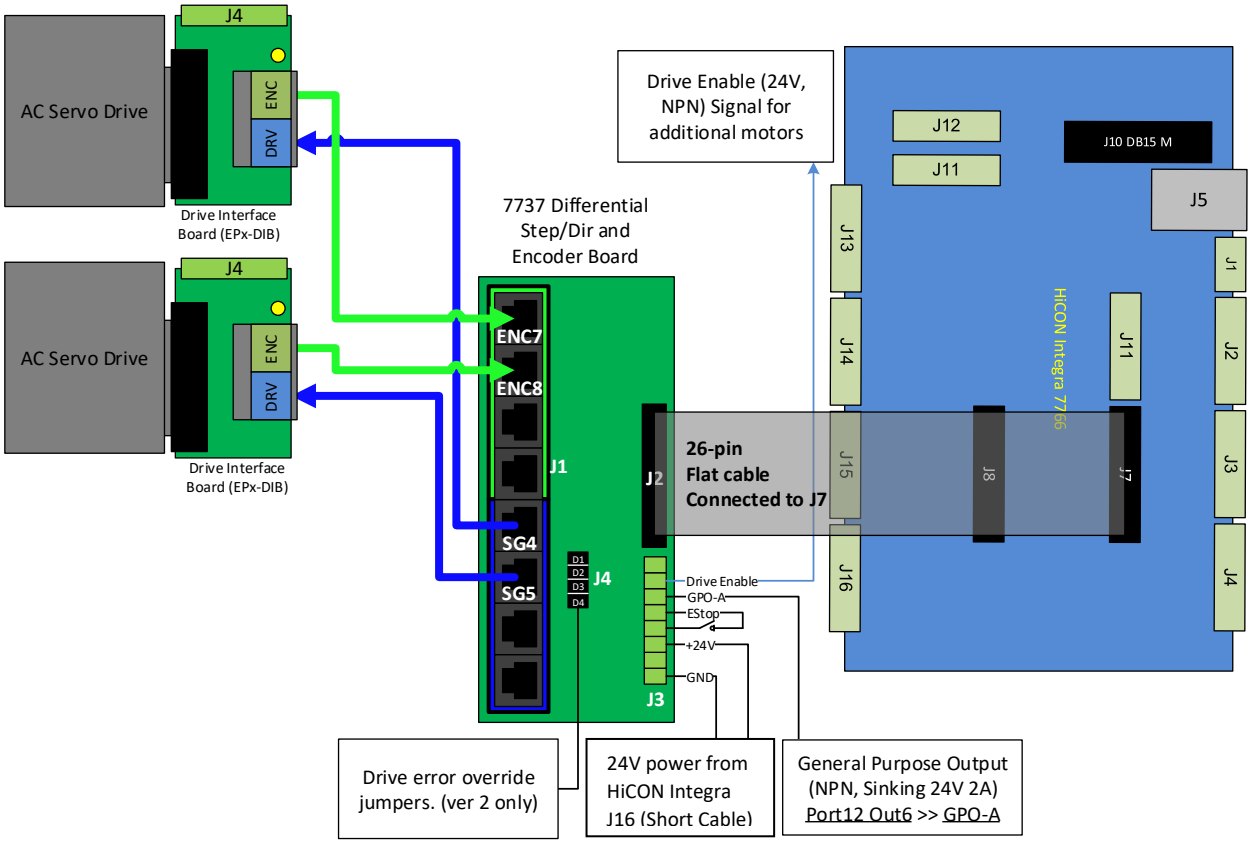
- Drive Enable – Port13, Out4
- GPO-A – Port13, Out6
- Estop – Port13, In12 (44 for VSIDeviceManager Estop setting)

**24V Power:**

+24V and GND should be sourced from the J16 header on the Integra and the wires should be as short as possible..

## Connection to J7

### Setup Diagram for 7737 Board and HiCON Integra (J7)




**Mach pin mapping (J7):**

- Drive Enable – Port12, Out4
- GPO-A – Port12, Out6
- Estop – Port12, In12 (38 for VSIDeviceManager Estop setting)

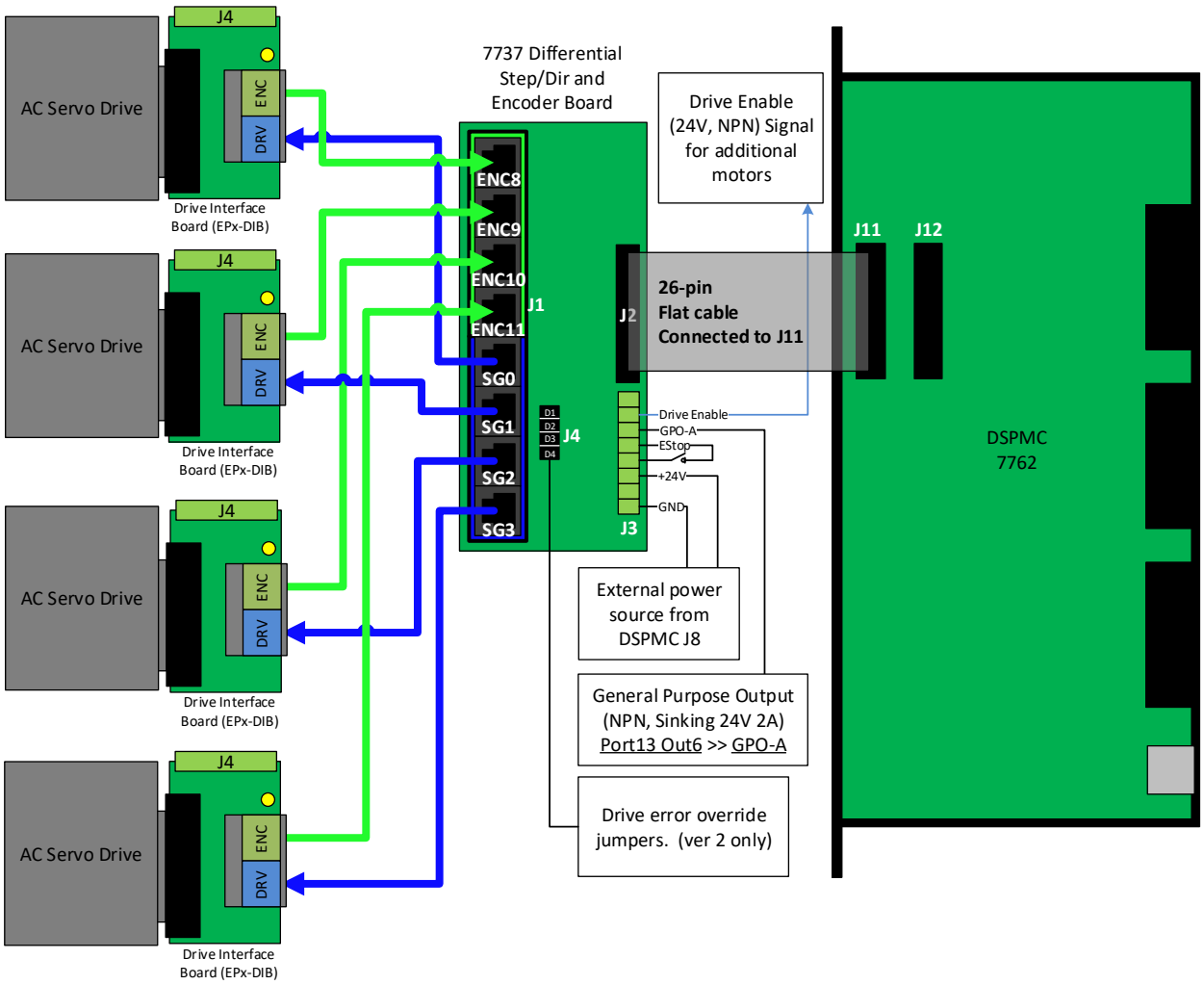
**External Power:**

+24V and GND should be sourced from the J16 header on the Integra and the wires should be as short as possible.

# DSPMC Connection Diagrams

## Connection to J11

### Setup Diagram for 7737 Board and DSPMC (J11)




**Mach pin mapping (J11):**

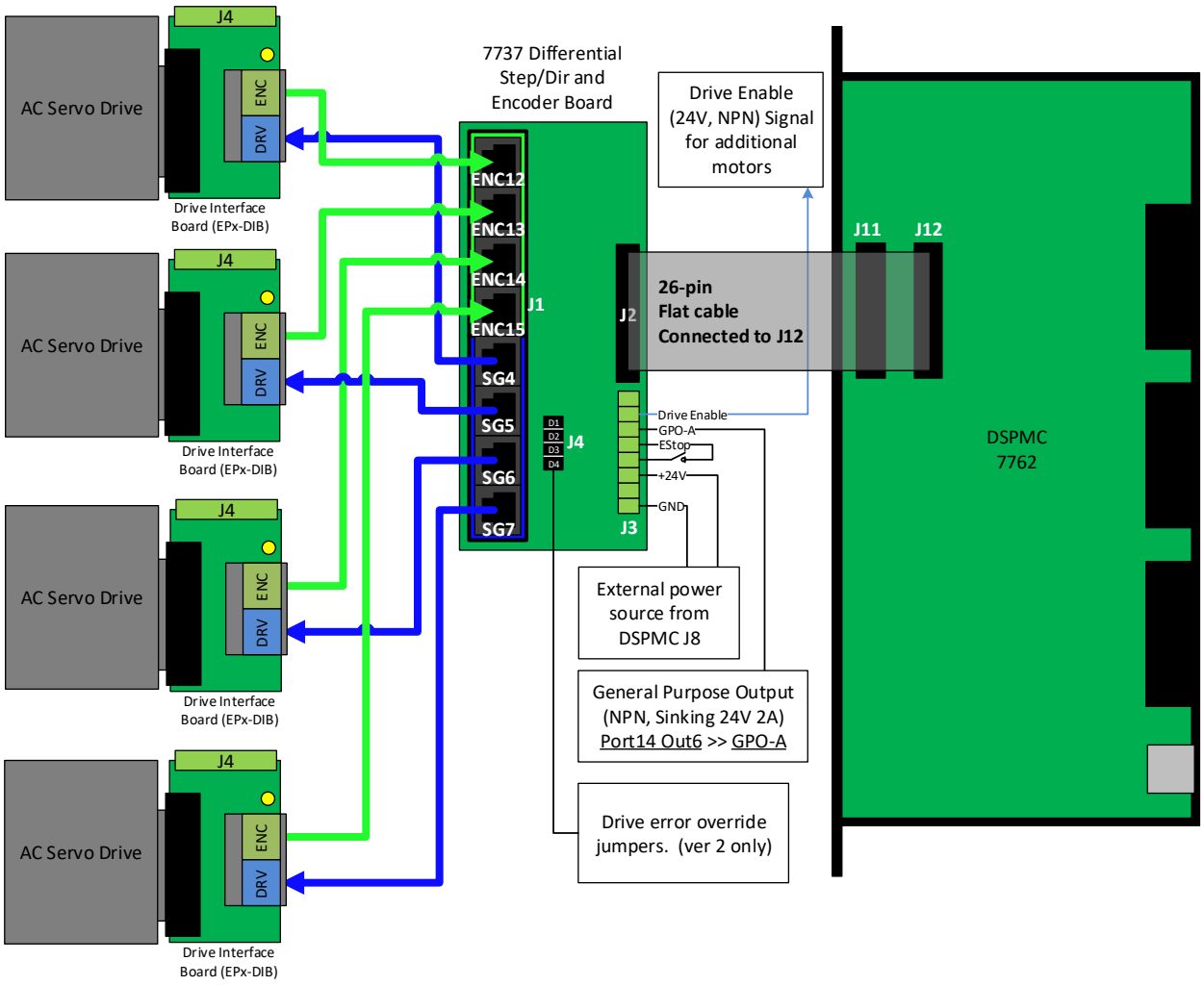
- Drive Enable – Port13, Out4
- GPO-A – Port13, Out6
- Estop – Port13, In12 (44 for VSIDeviceManager Estop setting)

**External Power:**

+24V and GND should be sourced from the J8 header on the DSPMC and the wires should be as short as possible. **Not following this advice can result in permanent damage to the hardware.**

## Connection to J12

### Setup Diagram for 7737 Board and DSPMC (J12)




**Mach pin mapping (J12):**

- Drive Enable – Port14, Out4
- GPO-A – Port14, Out6
- Estop – Port14, In12 (60 for VSIDeviceManager Estop setting)

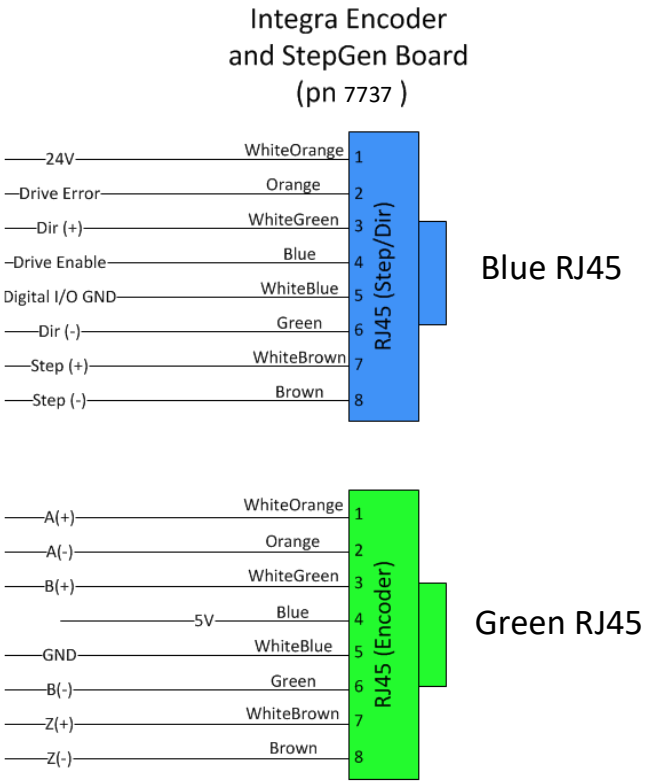
**External Power:**

+24V and GND should be sourced from the J8 header on the DSPMC and the wires should be as short as possible. **Not following this advice can result in permanent damage to the hardware.**

# Pin Layout on RJ45 Ports

Use straight-thru RJ45 patch cables when connecting the 7737 breakout board to the Maxsine EPx-DIB drive interface board.

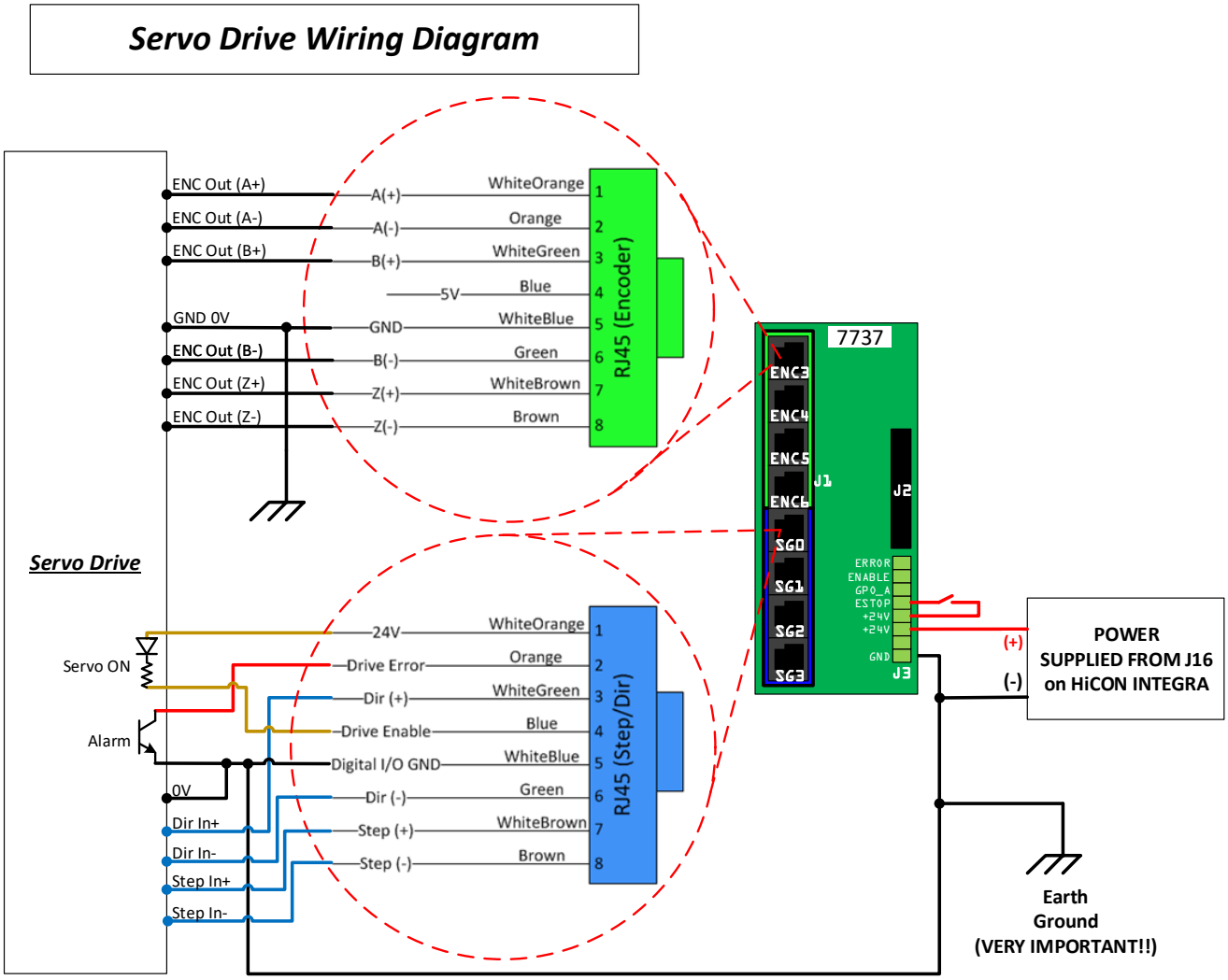
Wiring Diagram for RJ45 Ports (Encoder and Step/Dir Channels) on 7737 Board




Drive Error and Drive Enable signals are NPN (active Low)

The drawing below shows the connection between the servo drive and the 7737 board:

# RJ45 to Servo/Stepper Drive Connections




**Note About Servo Alarm Output:** For normal operation, the alarm output from the drive should be ON (active). When the Alarm output is OFF (open circuit) the 7737 reads it as a fault condition. You can override the fault condition by installing the jumper on J4 Drive Error override. We recommend you install the jumpers for all unused Drive-Error signals.