

Layout Input Monitor 2 – Technical Details

Introduction

For anyone who is interested, the circuit schematic of the Layout Input Monitor Version 2 is shown on the following page, with brief descriptions of how everything operates and fits together.

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The LIM-2 is normally powered from the +12 volt supply carried by the NCE Cab Bus, plugged into socket J1, and routed through from J1 to J2 (pins 7 and 8) via a shorting link placed on pins 1 and 2 (Thro) of header JP2 (Cab Bus Power Routing). The Cab Bus supply is also taken to pin 3 of header JP3 (LIM-2 Power Select) where a shorting link placed on pins 2 and 3 (CBus) routes the +12 volt supply to voltage regulator VR1 which, in turn, supplies +5 volts to the Arduino Pro Micro and its associated circuitry

Power for the board can come alternatively from an external source (9 - 16 volts AC or DC) which is rectified as necessary by diode bridge BR1 then connected via a shorting link placed on pins 1 and 2 (Ext) of header JP3 (LIM-2 Power Select) to supply the voltage regulator VR1.

The normal power dissipation of the LIM-2 will be below 0.25 watts which could be handled by the LM7805 regulator on its own. However, in the interests of long-term reliability it is recommended that a heatsink is attached to the regulator.

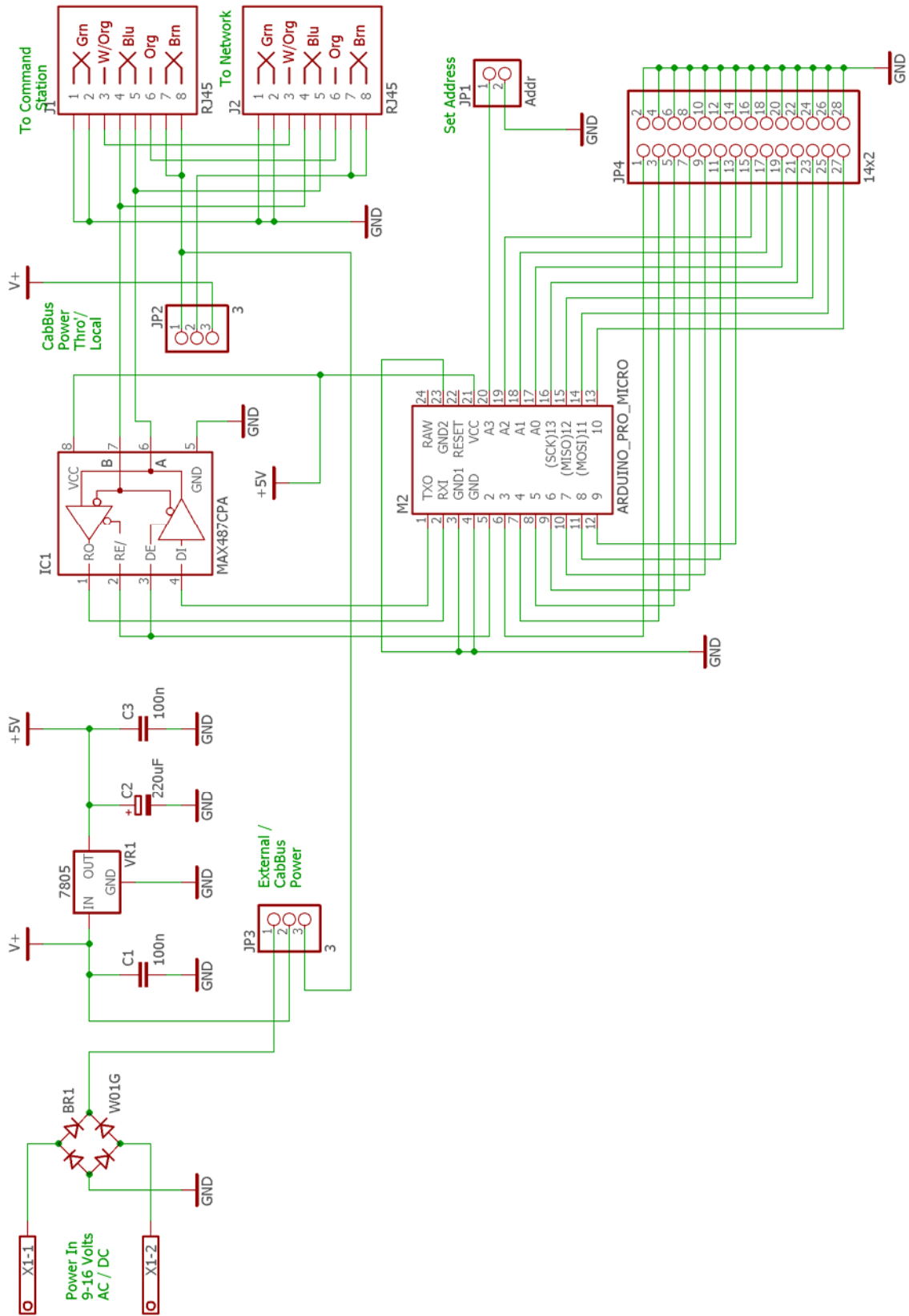
The +12 volt supply carried by the NCE Cab Bus, to power handheld controllers or other devices plugged into the bus, is normally passed through from J1 to J2 (pins 7 and 8) via a shorting link placed on pins 1 and 2 (Thro) of header JP2 (Cab Bus Power Routing). The link can be changed to short pins 2 and 3 (Local) if you wish to power downstream Cab Bus devices from the LIM-2 when the module is configured to run from an external power supply. In this case the power supply connected to the LIM-2 Power-In terminal block X1-1 and X1-2 must be 13.5 volts in order to compensate for the voltage drop across bridge rectifier BR1 and provide +12 volts out to the Cab Bus. This, in turn, will increase the power dissipated in voltage regulator VR1 emphasising the need to fit a heatsink.

The MAX487 transceiver receives commands from the NCE Cab Bus which is looped through the LIM-2 module via connectors J1 and J2 using standard Cat5/6 Ethernet patch cables. The commands are passed to the Arduino Pro-Micro module pin RX1, decoded by the uploaded code, and the appropriate response returned from the Pro-Micro pin TX0 back to the NCE Cab Bus via the MAX487 transceiver. The output from pin D2 of the Pro-Micro enables the transceiver to transmit the response over the Cab Bus at the correct time.

Note that the USB interface of the Pro-Micro (not shown on the schematic) is completely independent of the TX0/RX1 serial link and can, therefore, be used to monitor operation of the Pro-Micro at any time without interfering with NCE Cab Bus data traffic.

Pins D3 to D13, together with pins A0 to A2, of the Pro-Micro are normally configured with internal pull-up resistors and act as the 14 sensor inputs to the LIM-2 via the 14x2 pin header JP4.

Pin A3 is also configured as an input, with an internal pull-up resistor, to put the LIM-2 into Set Cab Bus Address mode when a shorting link (Set Monitor Address) is placed on header JP1. When this is done, pin A1 is reconfigured as an output to drive the LED fitted to the Set Address module, which will be plugged on to the first 10 pairs of pins of header JP4.



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Set Address and Status View Modules

Details of these subsidiary modules can be found in the Quad Servo Decoder-Monitor – Technical Details document