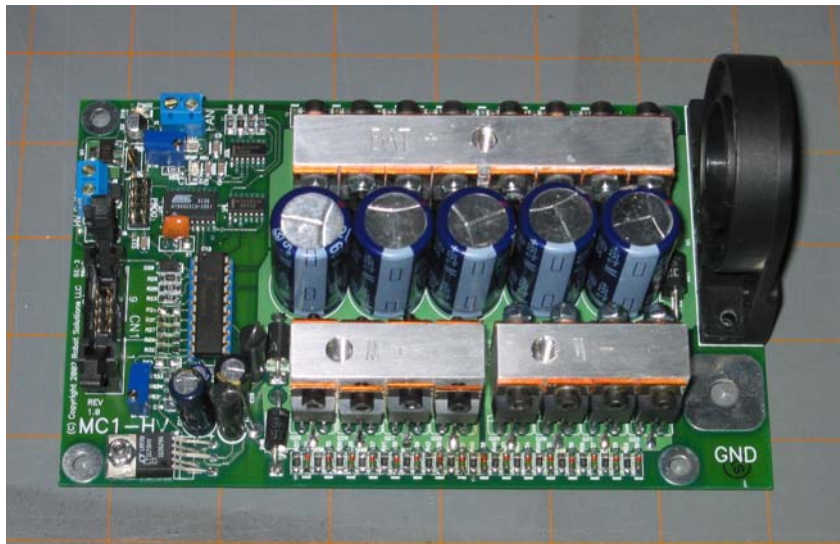


MC1-HV

Brushed PWM Motor Controller



Robot Solutions, LLC

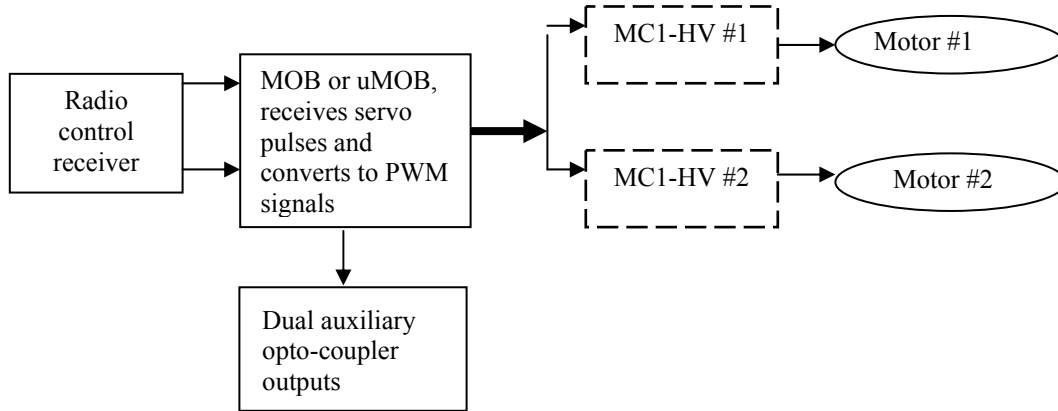
Robot-Solutions.com

December 2002

MC1-HV - Motor Control

Introduction

The electronic speed controller is a “smart” controller. It has an onboard microprocessor to monitor the current to the MC1-HV board. A conceptual block diagram of components necessary for a basis system is illustrated below:



Note: 1 MOB (or uMOB) can control 2 MC1-HV boards.

The MC1-HV uses “H-Bridge” technology for direction and speed control. Generally, it controls the direction of current through the DC motor thus forcing the rotor to turn clockwise (or counter clock-wise). One of the unique features of the MC1-HV is that it will operate on battery voltages as low as 4V and as high as 42V. Voltages over 36V require the addition of a logic supply to the board. The MC1-HV also features user adjustable current limiting. The MC1-HV boards are made with heavy duty, extra-thick PCBs to carry the high currents and to give the board better mechanical stability.

Mounting the MC1-HV Controller

The operator of the MC1-HV board may choose to use the MC1-HV with an enclosure to protect the controller from debris, vibration, and impacts of the environment for which it will most likely be used. The MC1-HV (with or without an enclosure) needs to be shock mounted to further protect the board. This is also highly recommended for all other electrical components in your system. There are a number of ways to shock mount the controller that usually involves the use of some sort of flexible mounting system. The most common method is the use of rubber shock mounts. Rubber washers, or medical hose/tubing may also be used. The nuts are tightened enough so the controller will stay put, but still are able to move a little when needed. This will greatly help to take up most of the energy of the shock or impact. Lockite is needed to keep the nuts on the bolts held firmly. The mounting plate can then be bolted to the frame via large rubber grommets. Supplies for shock mounting the controller are available at most hardware stores.

MC1-HV - Motor Control

Current Limiting

The MC1-HV has current limiting (CL) capabilities to monitor the controller's input current from the power supply. The CL will momentarily disable the MC1-HV if the input current exceeds a user-adjustable current threshold. The limiting occurs on a pulse-by-pulse basis so as to enable the MC1-HV to operate at the maximum current as set by the user. The CL uses a hall effect sensor to monitor current instead of the less efficient dropping resistor method.

See the MC1-HV Setup section for details on adjusting the current limiting.

MC1-HV Setup

- 1) Remove the top cover of the enclosure (if utilizing an enclosure).
- 2) Install the controller using shock mounting as described in the "Mounting the MC1-HV Controller" section.
- 3) Connect the motor cables to the M+ and M- terminals on the large aluminium busbar/heatsinks.
- 4) Connect the power ground lead cable to the GND terminal on the MC1-HV board using the nut and washer supplied.
- 5) If the main battery voltage is over 36V, jumper J5 must be moved to the HV position and a logic battery supply must be connected to the HV SUPPLY connector. The HV supply can range from 4V to 36V.
- 6) Connect the main battery positive cable to the BAT+ terminal on the long busbar/heatsink. The cable should be threaded through the large round hall sensor to make the connection to the BAT+ terminal. **Note: the BAT+ cable MUST pass through the hall sensor for the current limiting function to operate properly. Failure to do so will render the current limiting capabilities useless and will allow the MC1-HV to draw excess current and possibly result in damage to the MC1-HV.**
- 7) At this point, there should be power to the MC1-HV board and the power LED should be lit.
- 8) Adjust the current limiting as follows:
 - (a) Select the peak or RMS current desired from the graph provided in Appendix A and identify the TRIP voltage.
 - (b) With a voltmeter, adjust the voltage from GND to TRIP on connector J3 to match the TRIP voltage identified in the chart provided in Appendix A.
 - (c) Note: connector J4 may be used for future updates of the current limiting software and is not normally necessary for current limiting operations as the unit comes pre-programmed. This connector will only be used as software updates become available.
- 8) Connect the MOB, uMOB, or other PWM micro-controller to the MC1-HV with a ribbon cable to connector CN1. See the schematic for detailed pin descriptions.

Replacement Parts

Replacement parts are available through the Robot Solutions web site at:

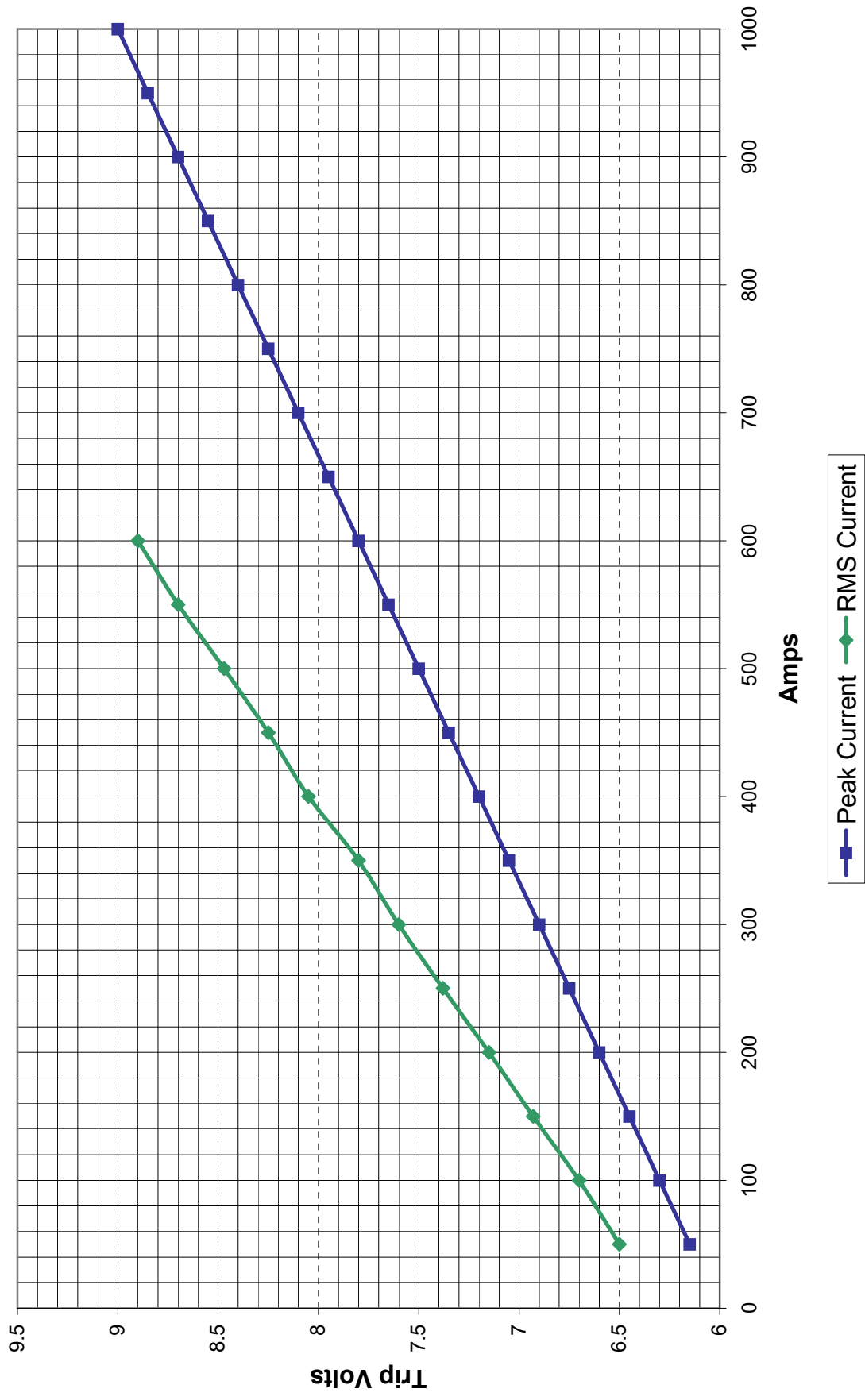
www.robot-solutions.com

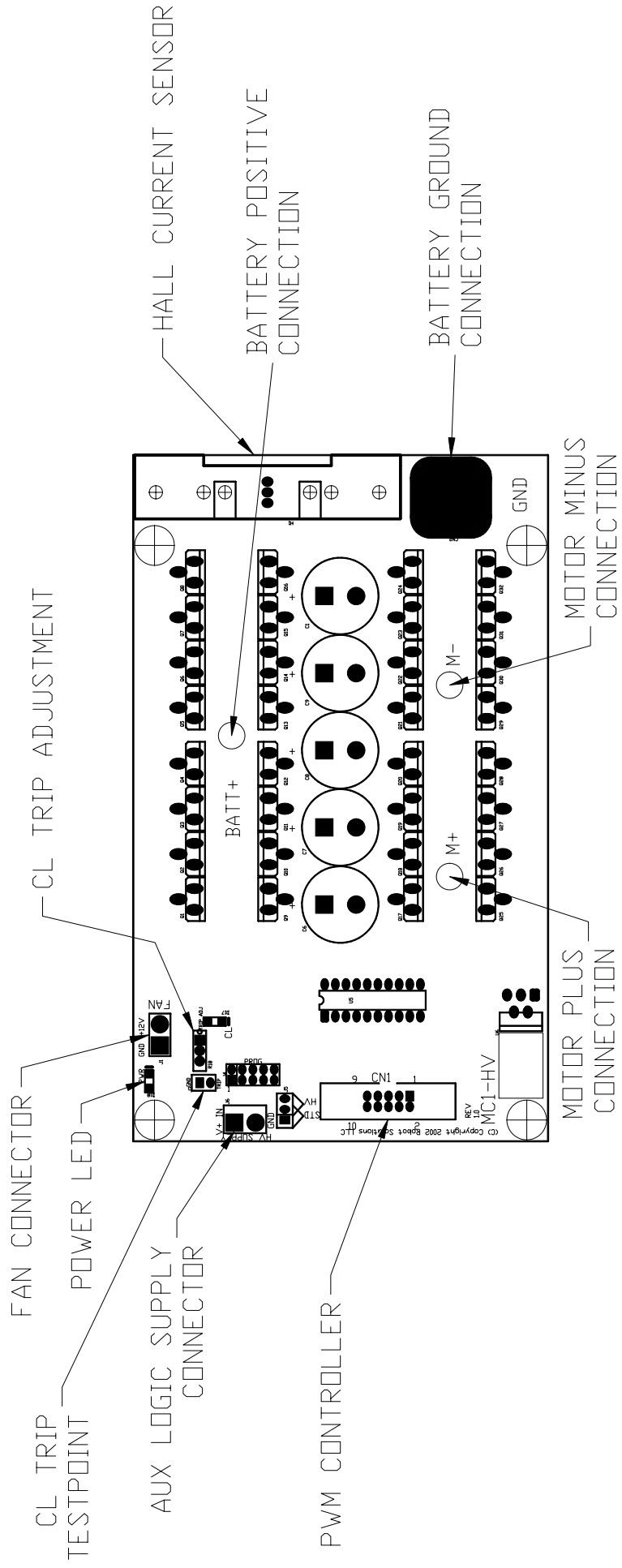
For additional information or for parts not listed on the web site, send an e-mail to David@robot-solutions.com.

General Guidelines

- Caution does need to be taken with the use of the MC1-HV as with any other motor controller. In some cases where the motor controller fails, it can lock in the “ON” position with no ability to stop the motor that is being controlled. All users should utilize a safety disconnect to the main power to allow for the safe disconnect of the power.
- While it was designed to withstand significant abuse, normal static handling procedures should be observed.
- Robot-Solutions, LLC provided no warranties of suitability or performance for any purposes for the MC1-HV. Use of the MC1-HV software or hardware is at the user’s own risk.

MC1-HV Current Limiting Setup





CL TRIP TESTPOINT

FAN CONNECTOR

POWER LED

AUX LOGIC SUPPLY CONNECTOR

PWM CONTROLLER

CL TRIP ADJUSTMENT

HALL CURRENT SENSOR

BATTERY POSITIVE CONNECTION

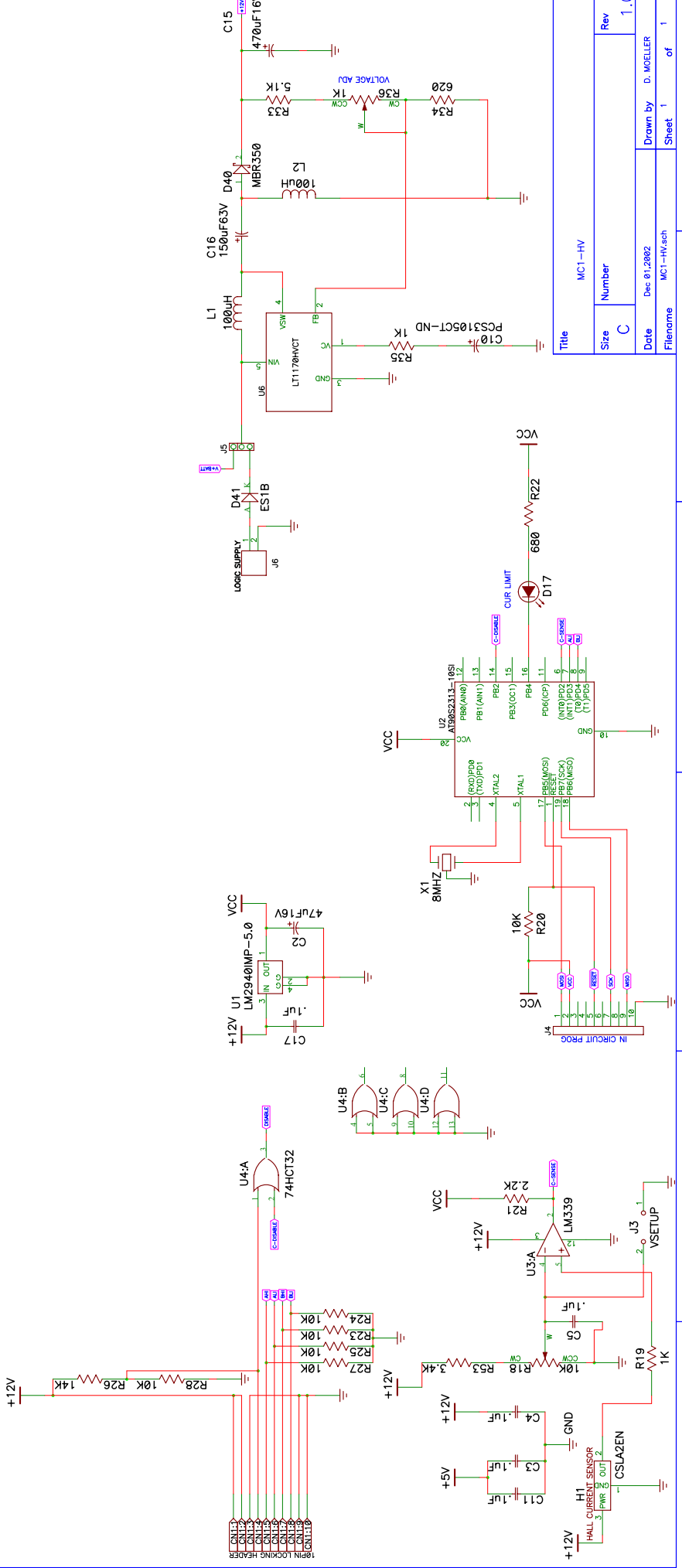
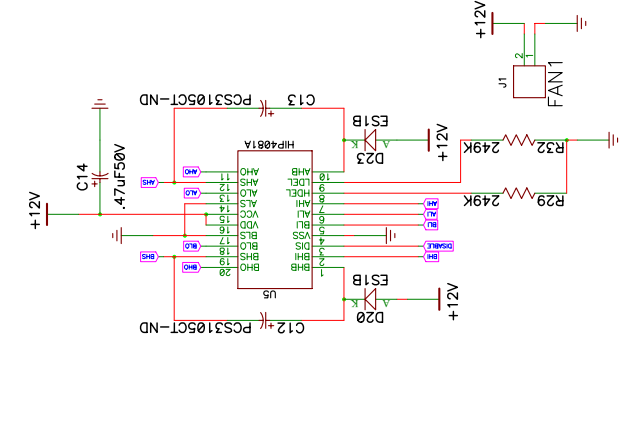
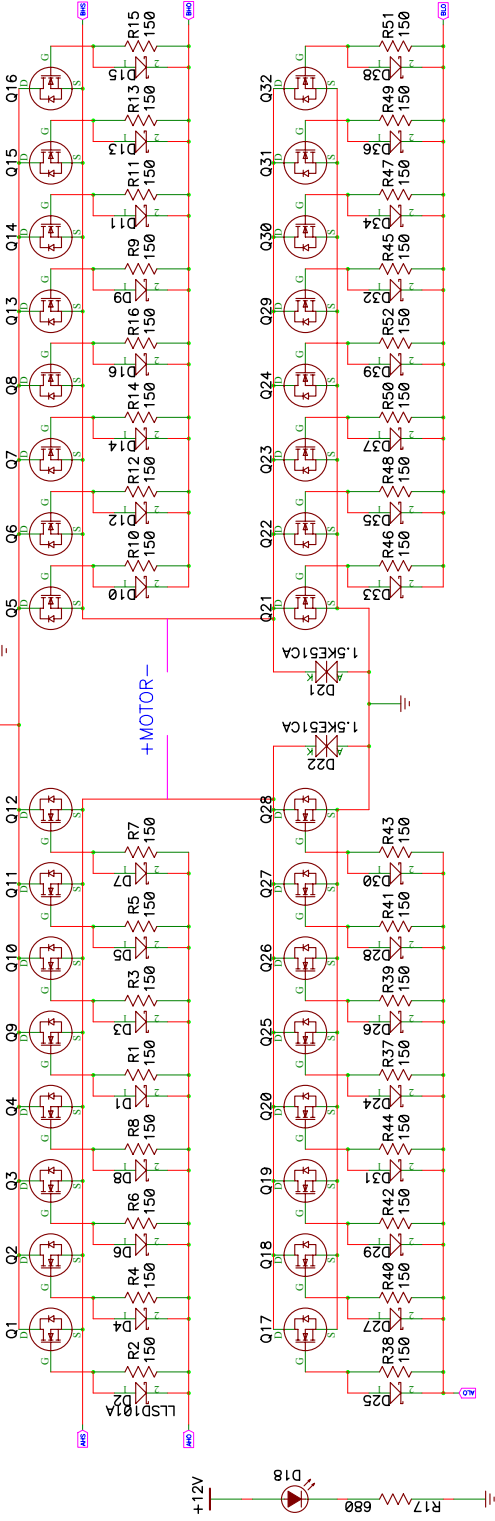
BATTERY GROUND CONNECTION

MOTOR PLUS CONNECTION

MOTOR MINUS CONNECTION

Suggested Input Waveforms

01-032 = RF1485 OR EQUV
 AH BH AU BU Disable Function
 1 1 PWM 0 Forward
 1 1 PWM 0 Reverse
 1 1 X X X 0 Brake
 1 1 X X X 1 Disabled
 X=don't care 0= 0V 1= 5V
 PWM = Pulse Width Modulated Signal.
 NOTE: When all nets are installed limit PWM frequency to <= 16khz



Title		MC1-HV	
Size	Number	Rev	1.0
Date	Dec 01,2002	Drawn by	D. MOELLER
Filename	MC1-HV.sch	Sheet	1 of 1

Copyright ©2002 Robot Solutions LLC

Author: David Moeller

Contact info: David@Robot-Solutions.com

Files means any text,pdf's, html or source files that came with this copyright notice. This means all the contents of the directory containing this notice, including sub-directories.

You may use, embed, modify or distribute the contents of the file(s) in any way you see fit as long as you include this copyright notice in or with the resulting file(s).

Any for-profit use whether from distributing the design files or any hardware that incorporates any part or all of the design files requires the written authorization of the copyright holder(s). Simple e-mail is sufficient.

No guarantees are made about fitness, functionality, correctness or performance of the file(s). The file is supplied on a "AS IS" basis, with no responsibility assumed by the author(s) for bug fixes, support, or damages of any sort arising from the use of the file(s).

Contact the author with problem reports or fixes, feature requests or additions and questions. They are welcomed and will be incorporated as time permits