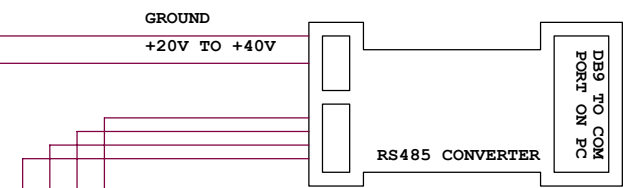


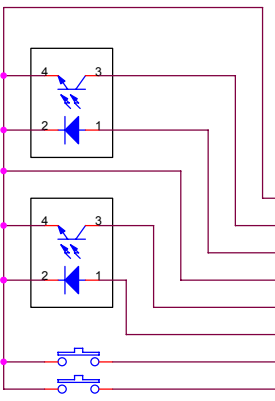
NOTE:  
INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.  
JUMPER MUST BE REMOVED FOR VOLTAGES >15V



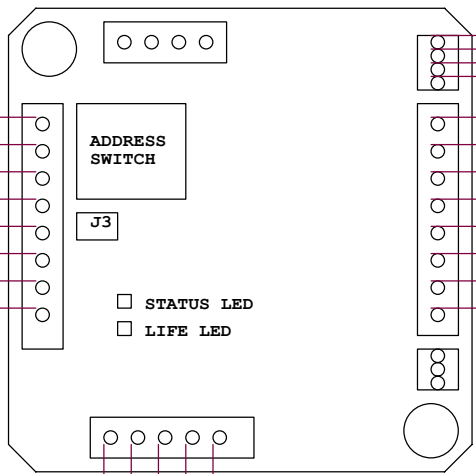
TO PC COM PORT  
USE 9600 BAUD  
8BIT, NO PARITY,  
1 STOP, NO FLOW  
CTRL.

TO OTHER EZ SERVOS  
OR EZ STEPPERS

- OPTO SENSOR #1 GROUND
- OPTO SENSOR #1 PHOTO TRANSISTOR
- OPTO SENSOR #1 LED
- OPTO SENSOR #2 GROUND
- OPTO SENSOR #2 PHOTO TRANSISTOR
- OPTO SENSOR #2 LED
- SWITCH #1 CLOSURE TO GROUND INPUT
- SWITCH #2 CLOSURE TO GROUND INPUT



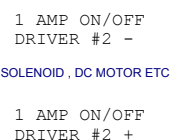
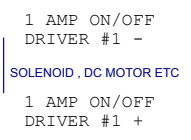
- +12V TO +40V
- GROUND
- RS485 B
- RS485 A



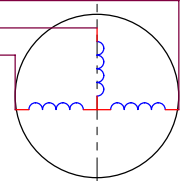
- STATUS LED
- LIFE LED

- GROUND
- INDEX
- CHAN A
- +5V
- CHAN B

NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL.  
THIS MAY REQUIRE EXTERNAL PULLUPS.



- HALL A
- HALL B
- HALL C
- +5V HALL SENSOR POWER
- HALL SENSOR GROUND
- PHASE A POWER DRIVER
- PHASE B POWER DRIVER
- PHASE C POWER DRIVER



**DO NOT UNPLUG LOADS  
WHILE POWER IS ON**



- NOTES:
- 1) INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.  
JUMPER MUST BE REMOVED FOR VOLTAGES >15V
  - 2) WHEN IN STEP AND DIRECTION MODE ( /ln32R ):  
SWITCH1 INPUT BECOMES THE STEP INPUT  
SWITCH2 INPUT BECOMES THE DIRECTION INPUT.
  - 3) IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH ENCODER A,B LINES
  - 4) KEEP ENCODER / INPUTS AWAY FROM NOISEY MOTOR POWER WIRES.

SEE PAGE 2 FOR BRUSH MOTOR WIRING  
SEE PAGE 3 FOR MANUFACTURER SPECIFIC  
BLDC MOTOR WIRING EXAMPLES

**EZSV23 SERVO WIRING  
DIAGRAM FOR BLDC MOTOR**

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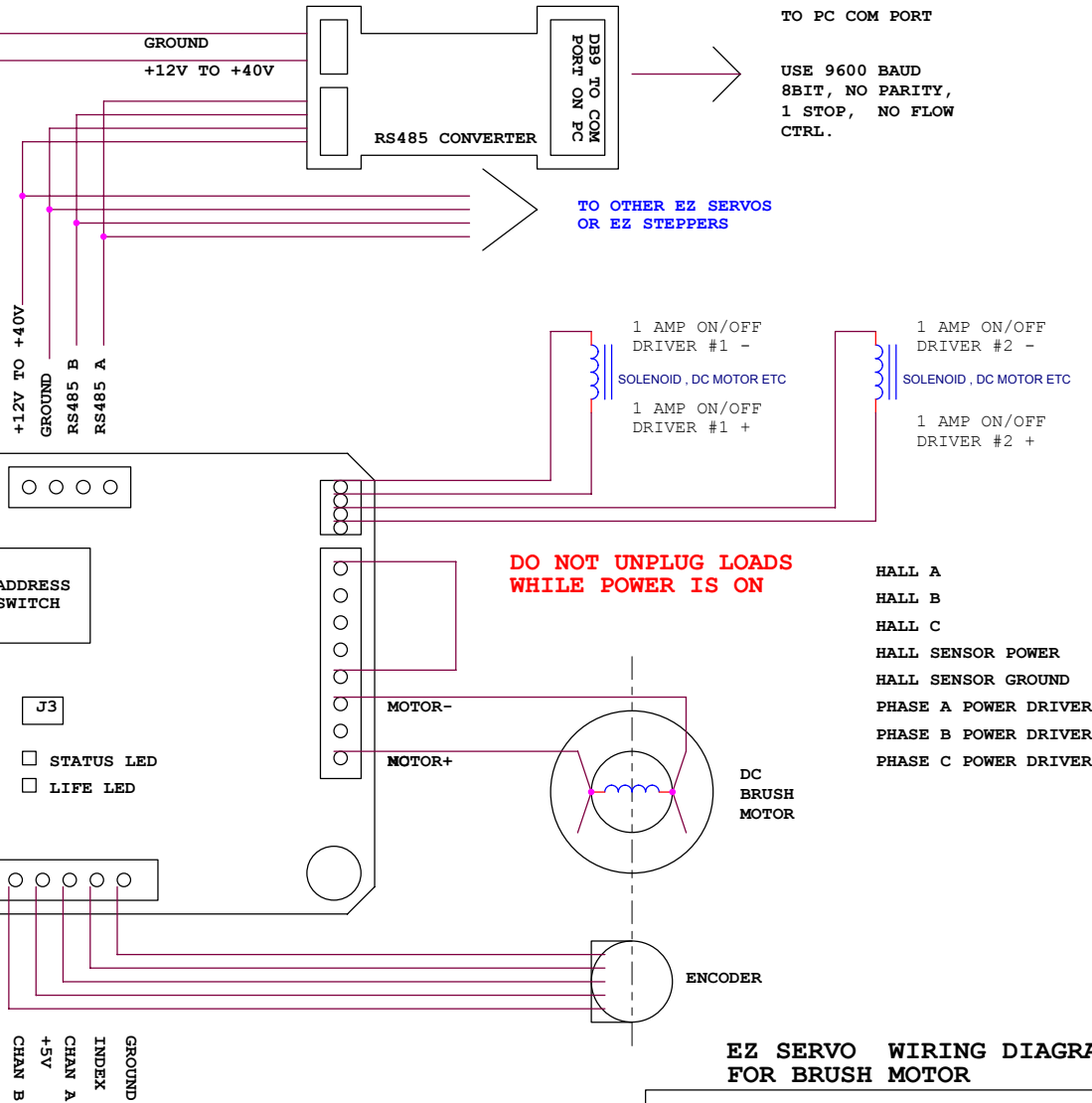
12V TO 40V SUPPLY

NOTE:  
INSTALL SHORTING JUMPER ON J3 FOR 12V-15V OPERATION.  
JUMPER MUST BE REMOVED FOR VOLTAGES >15V

OPTO SENSOR #1 GROUND  
OPTO SENSOR #1 PHOTO TRANSISTOR  
OPTO SENSOR #1 LED  
OPTO SENSOR #2 GROUND  
OPTO SENSOR #2 PHOTO TRANSISTOR  
OPTO SENSOR #2 LED  
SWITCH #1 CLOSURE TO GROUND INPUT  
SWITCH #2 CLOSURE TO GROUND INPUT

- NOTES:
- 1) IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH MOTOR POWER LEADS. OR SWITCH ENCODER A, B LINES
  - 2) WHEN IN STEP AND DIRECTION MODE ( /in160R ): SWITCH1 INPUT BECOMES THE STEP INPUT SWITCH2 INPUT BECOMES THE DIRECTION INPUT.
  - 3) KEEP ENCODER / INPUTS AWAY FROM NOISEY MOTOR POWER WIRES.

SEE PAGE 1 FOR BRUSHLESS MOTOR WIRING  
SEE PAGE 3 FOR MANUFACTURER SPECIFIC BLDC MOTOR WIRING EXAMPLES



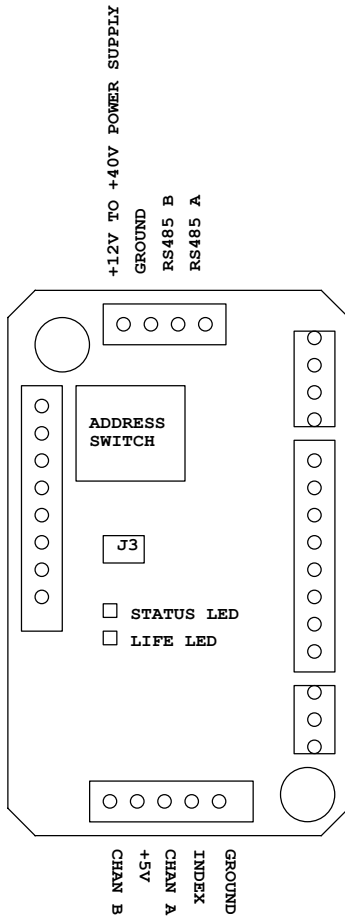
NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL.  
THIS MAY REQUIRE EXTERNAL PULLUPS.

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EZ SERVO WIRING DIAGRAM FOR BRUSH MOTOR

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**POWER INPUT AND COMMUNICATION**



+12V TO +40V POWER SUPPLY  
GROUND  
RS485 B  
RS485 A

On/Off Drivers deliver same voltage as input voltage.

- 1AMP ON/OFF DRIVER 1 -
- 1AMP ON/OFF DRIVER 1 +
- 1AMP ON/OFF DRIVER 2 -
- 1AMP ON/OFF DRIVER 2 +

**POPULAR MANUFACTURER WIRE COLORS**

	PITTMAN	MAXON	MAXON	EAD OPTICAL HALL	EAD MAGNETIC HALL	FAULHARBER	ANAHEIM AUTOMATION			
HALL A	WHITE	BLUE	RED/GREY	BROWN	YELLOW	GREEN	WHITE			
HALL B	GREY	GREY	WHITE/GREY	WHITE	GREEN	BLUE	BLUE			
HALL C	BLUE	VIOLET	BLACK/GREY	GREEN	GREY	GREY	GREEN			
+5V HALL SENSOR POWER	PURPLE	YELLOW	GREEN	NC	ORANGE	RED	RED			
HALL SENSOR GROUND	BLACK	GREEN	BLUE	NC	BLACK	BLACK	BLACK			
PHASE A POWER DRIVER	BROWN	ORANGE	WHITE	BROWN	BROWN	BROWN	BLACK (M)			
PHASE B POWER DRIVER	RED	RED	BLACK	WHITE	WHITE	ORANGE	YELLOW (M)			
PHASE C POWER DRIVER	ORANGE	BROWN	RED	BLUE	BLUE	YELLOW	RED (M)			

PHASE A POWER DRIVER HIGH CURRENT SCREW TERMINAL  
PHASE B POWER DRIVER HIGH CURRENT SCREW TERMINAL  
PHASE C POWER DRIVER HIGH CURRENT SCREW TERMINAL

Use screw terminal if > 3 Amp Current

FROM OPTICAL ENCODER + HALL  
GROUND BLACK  
INDEX ORANGE  
CHAN A YELLOW  
+5V RED  
CHAN B BLUE

**ENCODER CONNECTION**

NOTE: ENCODER SIGNALS MUST BE >4.5V HIGH LEVEL. THIS MAY REQUIRE EXTERNAL PULLUPS.

SIZE: 2.25" X 2.25" X 1.00" THICK

PLEASE NOTE: FOR OTHER MOTORS, ALLMOTION WILL BE PLEASED TO WORK OUT THE WIRING FOR NO CHARGE.

**EZSV23 SERVO WIRING DIAGRAM**

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## EZSV23 ACCESSORIES AND OTHER ELECTRICAL NOTES

### MATING CONNECTORS:

AMP MTA 100 SERIES  
 4PIN 22 GA DIGIKEY P/N A31108 (INPUT CONNECTOR)  
 8PIN 22 GA DIGIKEY P/N A31111 (NEMA23 MOTOR)  
 8PIN 24 GA DIGIKEY P/N A31023 (NEMA17 MOTOR)  
 8PIN 26 GA DIGIKEY P/N A31030 (FOR OPTOS)  
 5PIN 26 GA DIGIKEY P/N A31027 (FOR ENCODER)  
 T HANDLE CRIMP TOOL DIGIKEY P/N A9982  
 PISTOL GRIP TOOL DIGIKEY P/N A1998 + A2031

### OPTO HOME SWITCH:

- 1) "Z" OR HOME COMMAND RUNS MOTOR UNTIL OPTO #1 IS ON FLAG EDGE.
- 2) AN OPTO SWITCH PROVIDED WITH EACH STARTER KIT
- 3) USE TRANSISTOR OPTO THAT HAS  $I_c > 1\text{mA}$  @  $I_F = 20\text{mA}$ .
- 4) EXAMPLES OF ACCEPTABLE OPTOS ARE:
  - DIGIKEY P/N QVA11134
  - DIGIKEY P/N H21A1
  - HONEYWELL HOA1887-012 (IS PREWIRED)
  - HONEYWELL HOA1870-33 (IS PREWIRED)
  - OPTEK OPB830W11 (IS PREWIRED)
- 5) THE OPTO COUPLER LED PIN HAS 200 OHM TO 5V IN SERIES ON THE BOARD. THE 200 OHM CAN BE REMOVED IF DESIRED FOR RUNNING SENSORS THAT REQUIRE DIRECT ACCESS TO 5V. (OR USE ENCODER 5V POWER) THE COLLECTOR OF THE TRANSISTOR HAS A 10K PULLUP TO 5V. THE TOTAL CURRENT DRAWN FROM THE 5V SUPPLY (INCLUDING OPTOS) MUST BE LESS THAN 200mA.
- 6) ALL INPUTS ARE 0-3.3V ADC INPUTS, THE ONE/ZERO THRESHOLD IS FACTORY SET TO 1.23V, TO BE TTL COMPATIBLE, AND CAN BE CHANGED BY SOFTWARE COMMAND.

### ENCODERLESS OPERATION:

- 1) THE EZSERVO CAN PERFORM VELOCITY MODE CONTROL OF A MOTOR THAT DOES NOT HAVE AN ENCODER BY USING THE HALL SENSORS AS A GAGE OF SPEED. (N=0 MODE)
- 2) IT IS POSSIBLE TO USE THE N=1 POSITION CONTROL MODE BY WIRING TWO OF THE HALL SENSOR LINES TO THE ENCODER A AND B INPUTS IN ADDITION. THIS ALLOWS A CRUDE POSITION CONTROL MODE. IN THIS MODE THE VELOCITY CONTROL IS SUPERIOR TO THE N=0 MODE. USE SMALL ACCELERATIONS AND VELOCITIES IN THIS MODE. Eg TRY /1L1V10000P0R
- 3) THE RESPONSE CAN ALSO BE "STIFFENED" BY INCREASING THE PID GAIN CONSTANTS eg /1L10w3000y3000V10000P0R
- 4) IF WIRING HALL SENSORS AS ENCODERS, USE THE ENCODER 5 V TO POWER THE HALL SENSORS.

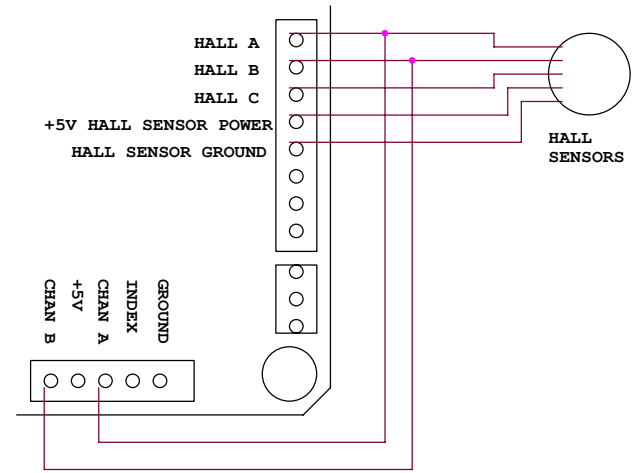
### MOTORS:

- 1) THE EZ SERVO WILL DRIVE MOST SERVO MOTORS
- 2) FOR BEST PERFORMANCE SELECT A MOTOR THAT HAS A BACK EMF OF ABOUT 1/2 OF THE SUPPLY VOLTAGE, AT THE MAX SPEED DESIRED TO RUN AT. (Eg USE A 12V MOTOR WITH A 24V SUPPLY).
- 3) TYPICALLY A MOTOR THAT HAS AN INDUCTANCE OF AROUND 1mH AND A RESISTANCE OF AROUND 1 OHM WORKS WELL. BUT OTHER VALUES ARE ALSO OK. (0.1mH MINIMUM)

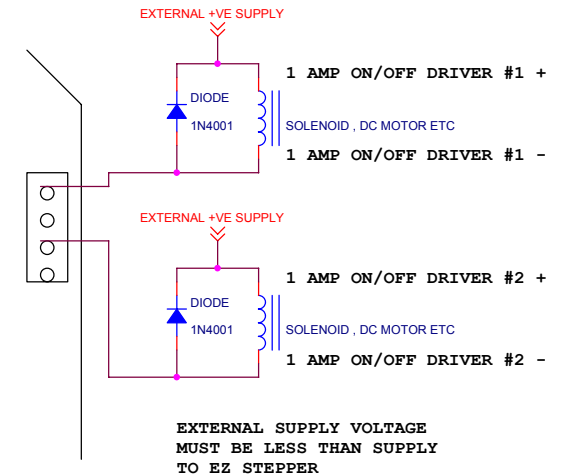
### ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM

- 1) ON/OFF DRIVERS RATED AT 2 AMPS PEAK, 1 AMP CONTINUOUS.
- 2) THE NEGATIVE PIN OF THESE DRIVERS IS ACTUALLY AN OPEN COLLECTOR TYPE OUTPUT THAT PULLS DOWN TO GROUND. IT IS POSSIBLE TO DRIVE LOADS THAT ARE OF A DIFFERENT VOLTAGE THAN THE SUPPLY VOLTAGE, BY CONNECTING THE POSITIVE SIDE OF THE LOAD TO AN EXTERNAL SUPPLY, AND THE NEGATIVE SIDE TO THE -VE OUTPUT PIN. HOWEVER, IN CASE THIS IS DONE IT IS NECESSARY TO PLACE AN EXTERNAL "FREE WHEELING" DIODE ACROSS ANY INDUCTIVE LOADS. EXTERNAL SUPPLY VOLTAGE MUST BE LESS THAN SUPPLY TO EZ STEPPER
- 3) EXTERNAL DIODE IS NOT NECESSARY IF BOTH SIDES OF LOAD ARE WIRED BACK TO THE EZ STEPPER.

### USE OF HALL SENSORS AS ENCODERS



### ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM



SEE NEXT PAGE FOR DIMENSIONAL INFO

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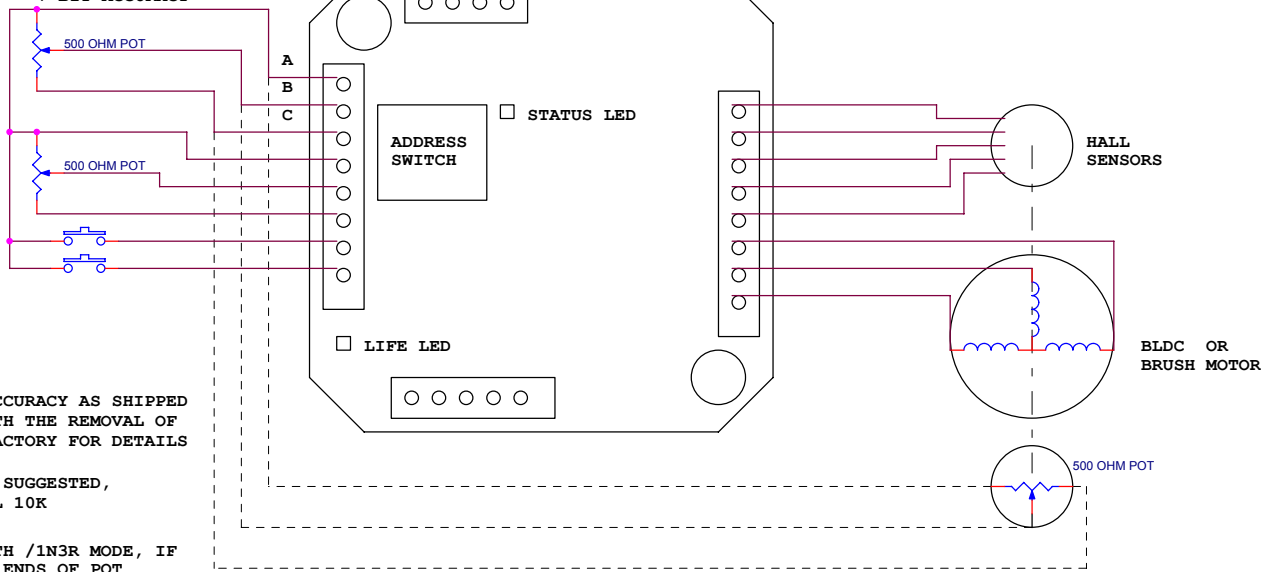
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FEEDBACK POT1 GROUND  
 FEEDBACK POT1 WIPER  
 FEEDBACK POT1 POWER

POSITION COMMAND POT2 GROUND  
 POSITION COMMAND POT2 WIPER  
 POSITION COMMAND POT2 POWER

SWITCH #1 CLOSURE TO GROUND INPUT  
 SWITCH #2 CLOSURE TO GROUND INPUT

**SIMPLE CIRCUIT,  
 7 BIT ACCURACY**

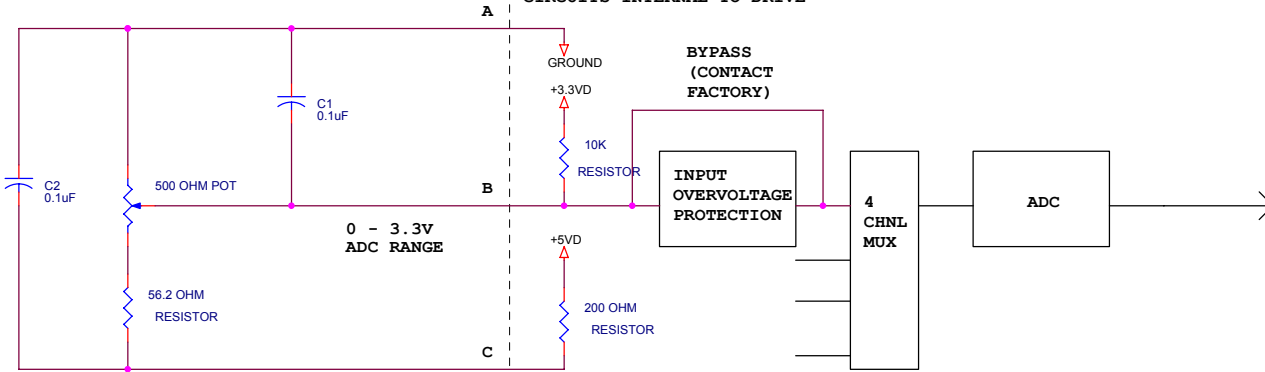


HALL A  
 HALL B  
 HALL C  
 HALL SENSOR POWER  
 HALL SENSOR GROUND  
 PHASE A POWER DRIVER  
 PHASE B POWER DRIVER  
 PHASE C POWER DRIVER

**NOTES:**

- 1) ALL 4 INPUTS ARE ANALOG INPUTS
- 2) ADC's VALUES RANGE FROM 0-16368. THE ACCURACY AS SHIPPED IS 7 BIT BUT CAN BE IMPROVED TO >10BIT WITH THE REMOVAL OF THE INPUT PROTECTION CIRCUITRY, CONTACT FACTORY FOR DETAILS
- 3) POTS IN THE RANGE OF 500 OHM - 10K ARE SUGGESTED, LOWER VALUES ARE LESS AFFECTED BY INTERNAL 10K PULLUP. 500 OHM RECOMMENDED.
- 4) IF USING POT FOR POSITION FEED BACK WITH /1N3R MODE, IF MOTOR EXHIBITS POSITIVE FEEDBACK, SWITCH ENDS OF POT
- 5) 10K INTERNAL PULLUP WILL INTERFERE WITH LINEARITY OF POT VOLTAGE, AND MAY NEED TO BE REMOVED - CONTACT FACTORY.
- 6) INPUT OVERVOLTAGE PROTECTION CIRCUITRY MAY NEED TO BE REMOVED FOR >7BIT ACCURACY - CONTACT FACTORY.

**CIRCUITS INTERNAL TO DRIVE**

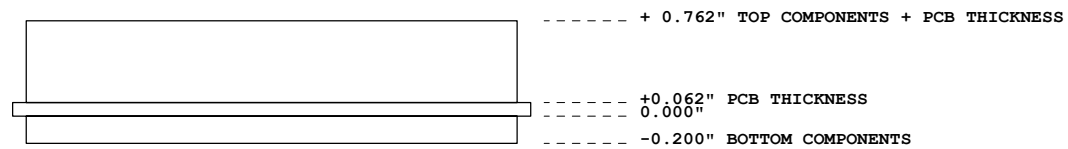
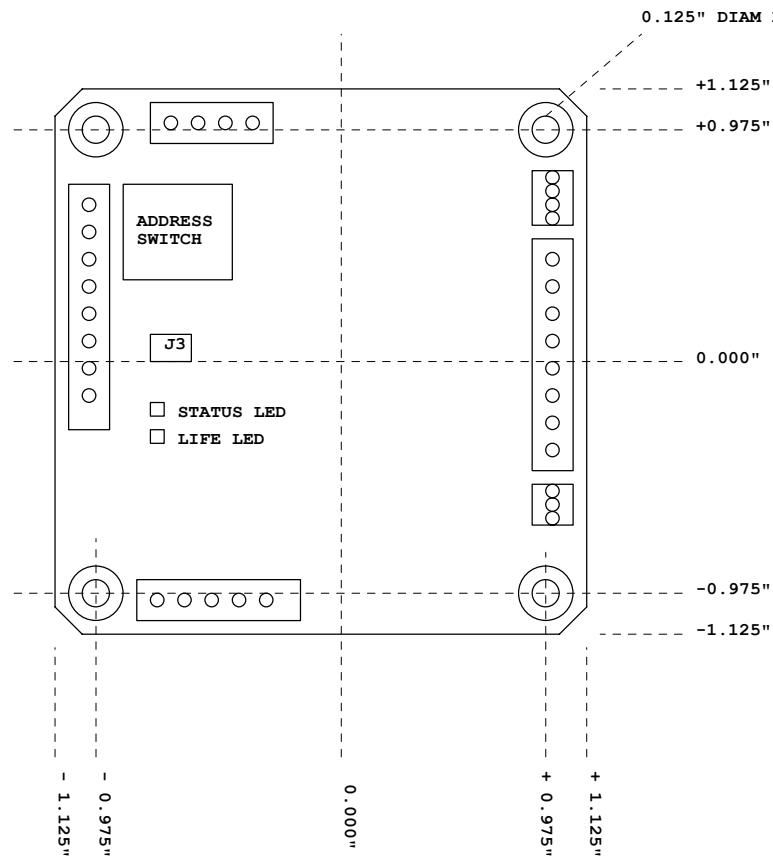


**ENHANCED EXTERNAL CIRCUIT FOR > 10BIT ACCURACY**

**WIRING DIAGRAM ANALOG INPUT OR  
 POTENTIOMETER FEEDBACK**

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