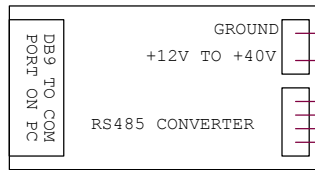


TOP VIEW OLD BARE BOARD RS485 CONVERTER  
BOTTOM VIEW NEW ENCLOSED RS485 CONVERTER

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

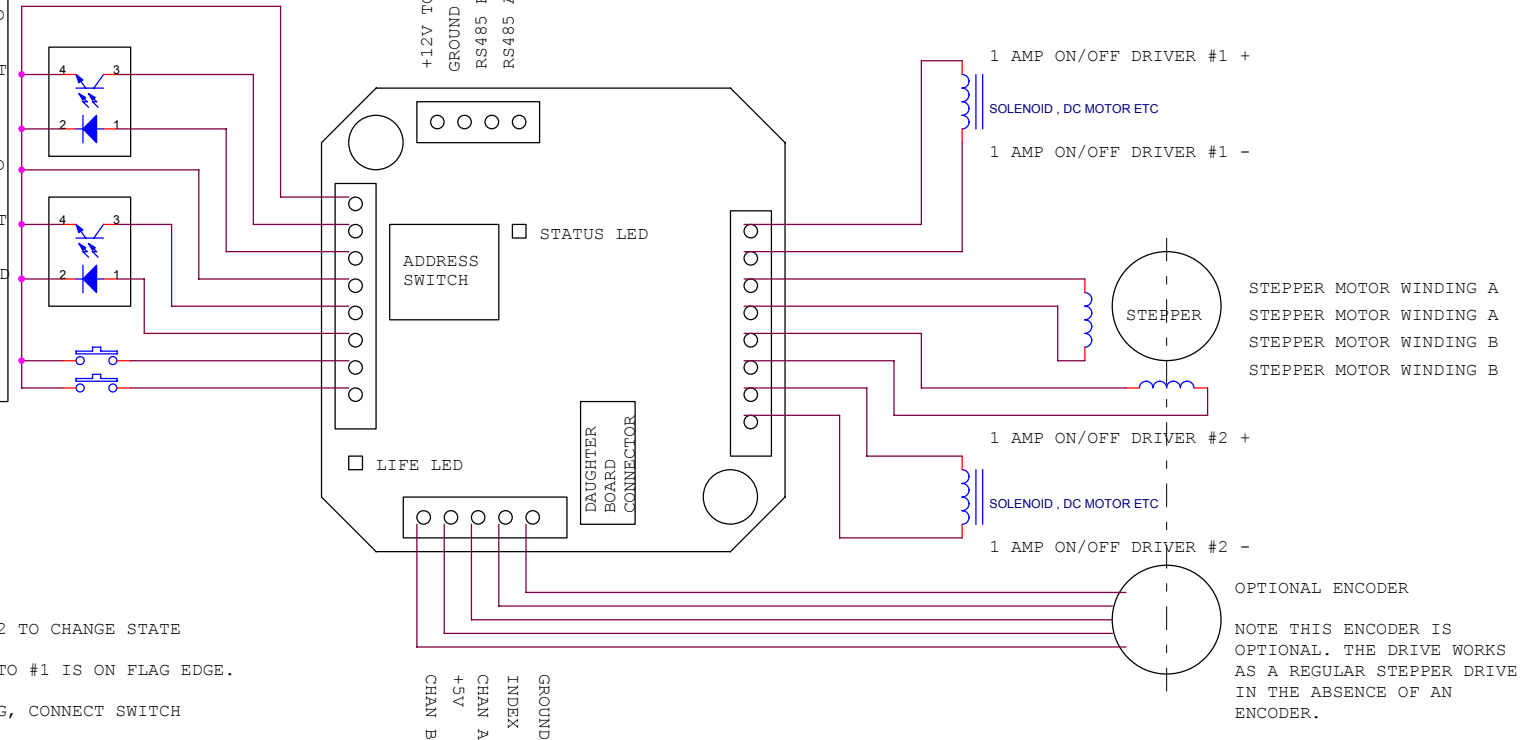


12V TO 40V SUPPLY

TO OTHER  
EZ STEPPERS

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

MODE2 STEP AND DIR IN	MODE1 DUAL ENCODERS	MODE 0
		OPTO SENSOR #1 GROUND
		OPTO SENSOR #1 INPUT
		OPTO SENSOR #1 LED
		OPTO SENSOR #2 GROUND
	INDEX 2	OPTO SENSOR #2 INPUT
		OPTO SENSOR #2 LED
STEP IN	CHAN A2	SWITCH #1 INPUT
DIR IN	CHAN B2	SWITCH #2 INPUT



## NOTES:

"H" OR HALT COMMAND WAITS FOR SWITCH #2 TO CHANGE STATE

"Z" OR HOME COMMAND RUNS MOTOR UNTIL OPTO #1 IS ON FLAG EDGE.

A SWITCH CAN REPLACE THE OPTO FOR HOMING, CONNECT SWITCH FROM PHOTO TRANSISTOR INPUT TO GROUND.

TOTAL CURRENT DRAW FROM ENCODERS + LEDS MUST BE < 200mA

DO NOT BUNDLE ENCODER OR SENSOR WIRES WITH THE MOTOR WIRES.

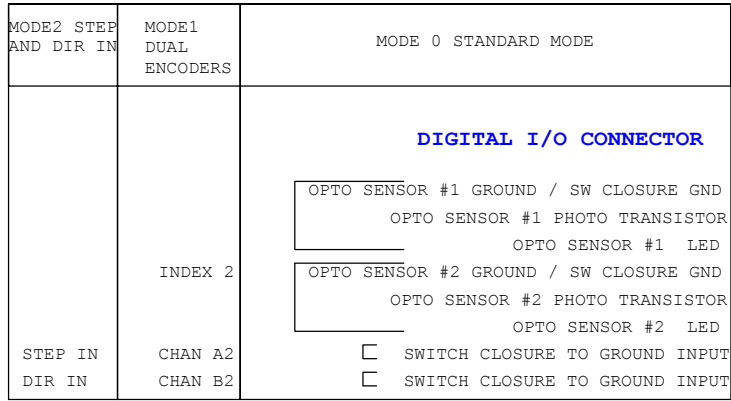
SHIELD MOTOR WIRES WITH A GROUNDED BRAID TO REDUCE EMI

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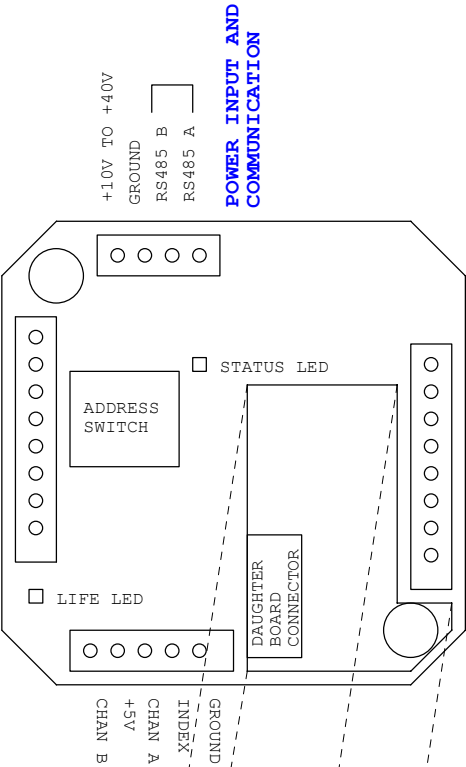
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4 SWITCH CLOSURE,  
OR 2 OPTO AND 2  
SWITCH CLOSURE  
INPUTS

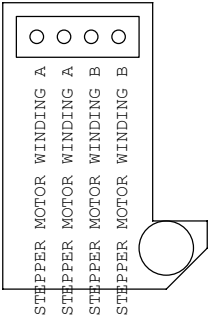


POWER INPUT AND  
COMMUNICATION

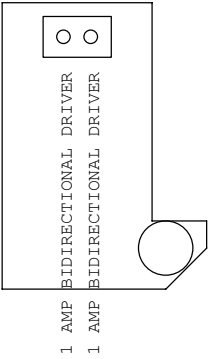
POWER OUTPUT DRIVERS

2 AMP PEAK BIPOLAR  
STEPPER DRIVE, AND  
2 AMP PEAK ON/OFF  
DRIVERS FOR RELAYS,  
DC MOTORS,  
SOLENOIDS ETC.

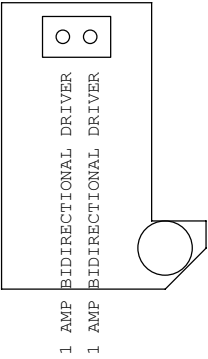
NOTE: MAX  
30V SUPPLY  
WHEN USING  
STEPPER  
DAUGHTER



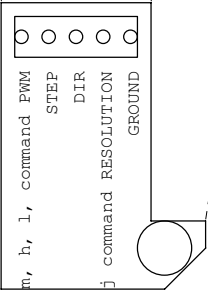
DAUGHTER BOARD  
OPTION1  
SECOND STEPPER  
DRIVE



DAUGHTER BOARD  
OPTION2  
BIDIRECTIONAL  
CURRENT DRIVER



DAUGHTER BOARD  
OPTION3  
BIDIRECTIONAL PWM  
VOLTAGE DRIVER



DAUGHTER BOARD  
OPTION 4  
STEP AND DIR  
PULSE OUTPUT

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## EZHR17 AND EZHR23ENHC ACESSORIES 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

### MOTORS:

1) THE EZ STEPPER WILL DRIVE MOST STEPPER MOTORS  
2) FOR BEST PERFORMANCE SELECT A MOTOR THAT IS RATED AT ABOUT 1/4 OF THE SUPPLY VOLTAGE. (Eg USE A 6V MOTOR WITH A 24V SUPPLY).  
3) FOR (UNIPOLAR) STEPPER MOTORS WITH CENTER TAPPED WINDINGS , TYPICALLY LEAVE THE CENTER TAP UNCONNECTED, OR WIRE PER MANUFACTURERS RECOMMENDATIONS.

### SUITABLE POWER SUPPLIES:

1) FOR FIRST TIME USERS, TO GUARD AGAINST A POSSIBLE MISWIRE, A CURRENT LIMITED LAB SUPPLY SET TO 12V AND 0.5A IS RECOMMENDED.

2) A SUPPLY OF 24V AND 2A CAPABILITY IS GOOD FOR MOST PURPOSES. POSSIBLE CHOICES ARE:

DIGIKEY P/N 237-1296

DIGIKEY P/N 237-1395

3) INPUT CURRENT IS MUCH LESS THAN MOTOR CURRENT DUE TO THE SWITCHING (PWM). IT CAN BE CALULATED BY CONSIDERING CONSERVATION OF POWER. HOWEVER IT IS IMPORTANT TO MAKE SURE THAT THE SUPPLY WILL NOT FOLD BACK AS IT IS COMING UP SINCE THE EZ STEPPER WILL DRAW MORE CURRENT AT LOWER VOLTAGES.

### 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 150 OHM TO 5V IN SERIES ON THE BOARD. THE 150 OHM CAN BE REMOVED IF DESIRED FOR RUNNING SENSORS THAT REQUIRE DIRECT ACCESS TO 5V. THE COLLECTOR OF THE TRANSISTOR HAS A 10K PULLUP TO 5V.

6) ALL INPUTS WORK ON TTL LEVEL SIGNALS

### ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM

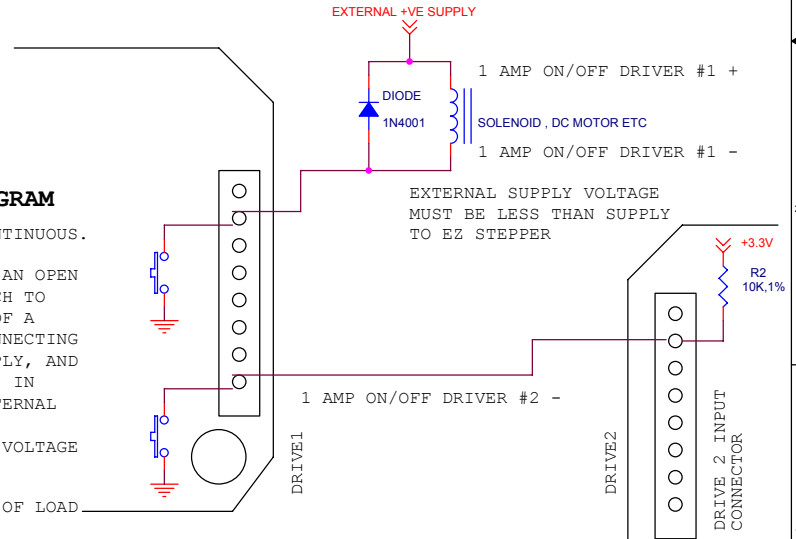
1) ON/OFF DRIVERS RATED AT 2 AMPS PEAK, 1 AMP CONTINUOUS.

2) THE NEGATIVE PIN OF THESE DRIVERS IS ACTUALLY AN OPEN COLLECTOR TYPE OUTPUT THAT IS ESSENTIALLY A SWITCH 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 VOLTAGE TO EZ STEPPER

3) EXTERNAL DIODE IS NOT NECESSARY IF BOTH SIDES OF LOAD ARE WIRED BACK TO THE EZ STEPPER.

4) NOTE OUTPUT IS A SWITCH TO GROUND, DRIVES CAN BE SYNCHRONISED BY CONNECTING THE OUTPUT OF ONE DRIVE TO THE INPUT OF ANOTHER AS SHOWN. THE 10K PULLUP IS INTERNAL TO THE DRIVE.

### ON/OFF DRIVERS ALTERNATE WIRING DIAGRAM



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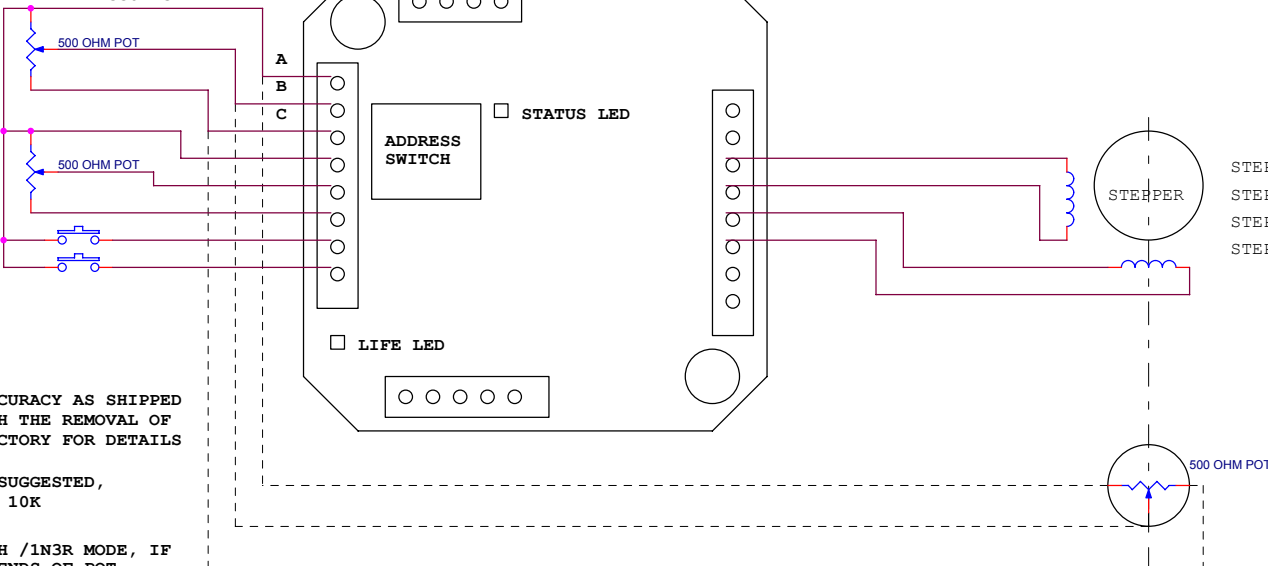
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FEEDBACK POT1 GROUND  
FEEDBACK POT1 WIPER  
FEEDBACK POT1 POWER

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



# 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

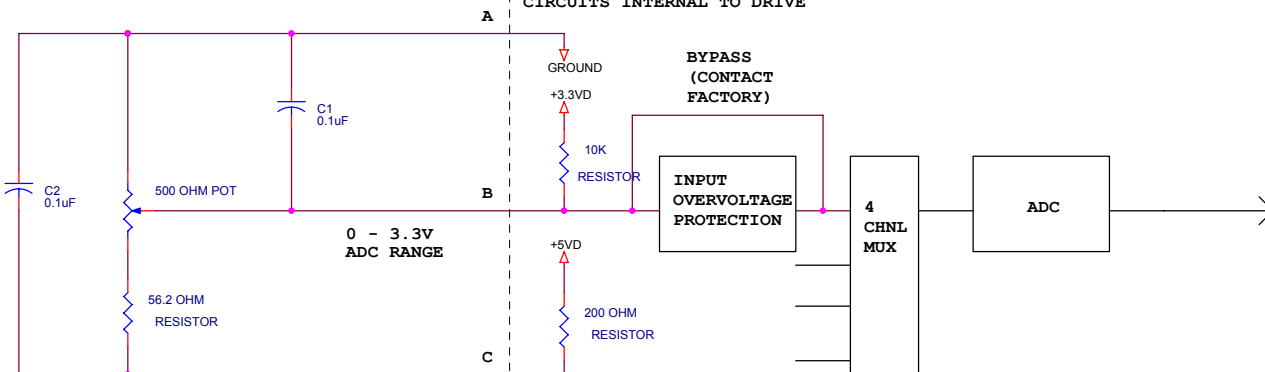
3) POTS IN THE RANGE OF 500 OHM - 10K ARE SUGGESTED, LOWER VALUES ARE LESS AFFECTED BY INTERNAL 10K PULLUP. 500 OHM RECOMMENDED.

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

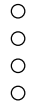
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## DAUGHTER CARD DETAIL

### DAUGHTER BOARD OPTION 1 SECOND STEPPER DRIVE -ST

STEPPER MOTOR WINDING A  
STEPPER MOTOR WINDING A  
STEPPER MOTOR WINDING B  
STEPPER MOTOR WINDING B



THE STEPPER DAUGHTER CARD DRIVES A SECOND STEPPER MOTOR AT 1Amp 1/16th STEP  
THE SECOND AXIS USES THE SWITCH INPUTS FOR LIMITS/HOME  
USE COMMANDS TO SECOND AXIS Eg /1aM2A1000A0R  
**THE MAX SUPPLY VOLTAGE IS 30V WITH THIS DAUGHTER CARD**

### DAUGHTER BOARD OPTION 2 BIDIRECTIONAL CURRENT MODE PWM DRIVER -BD

1 AMP BIDIRECTIONAL DRIVER  
1 AMP BIDIRECTIONAL DRIVER



THE BIDIRECTIONAL DAUGHTER CARD ALLOWS A BIDIRECTIONAL CURRENT TO BE OUTPUT  
USE THE l (lower case L) COMMAND TO SET CURRENT (remain in aM1 mode).  
/1180R SETS THE CURRENT TO 80%  
USE THE O AND I COMMANDS TO SET THE DIRECTION OF THE CURRENT  
/101R SETS THE CURRENT ONE WAY, /111R SETS THE CURRENT THE OTHER WAY  
USE WITH INDUCTIVE LOADS SUCH AS SOLENOIDS, CAN BE USED TO CONTROL A DC BRUSH MOTOR AS A POSITION SERVO.  
THE MAX SUPPLY VOLTAGE IS 40V WITH THIS DAUGHTER CARD

### DAUGHTER BOARD OPTION 3 BIDIRECTIONAL VOLTAGE MODE PWM DRIVER -PW

1 AMP BIDIRECTIONAL DRIVER  
1 AMP BIDIRECTIONAL DRIVER



THE BIDIRECTIONAL DAUGHTER CARD ALLOWS A BIDIRECTIONAL PWM VOLTAGE TO BE OUTPUT  
USE THE l (lower case L) COMMAND TO SET THE PWM ON OFF DUTY. THIS SETS THE AVERAGE VOLTAGE AS A FRACTION OF THE SUPPLY VOLTAGE.  
/1180R SETS THE VOLTAGE TO 80%  
USE THE O AND I COMMANDS TO SET THE DIRECTION OF THE CURRENT  
/101R SETS THE CURRENT ONE WAY, /111R SETS THE CURRENT THE OTHER WAY  
BOARD CAN BE USED FOR DC MOTOR OPEN LOOP SPEED CONTROL, RESISTIVE HEATER ETC.  
THE MAX SUPPLY VOLTAGE IS 40V WITH THIS DAUGHTER CARD

### DAUGHTER BOARD OPTION 4 LOGIC LEVEL OUTPUT OF STEP/DIR/PWM -LO

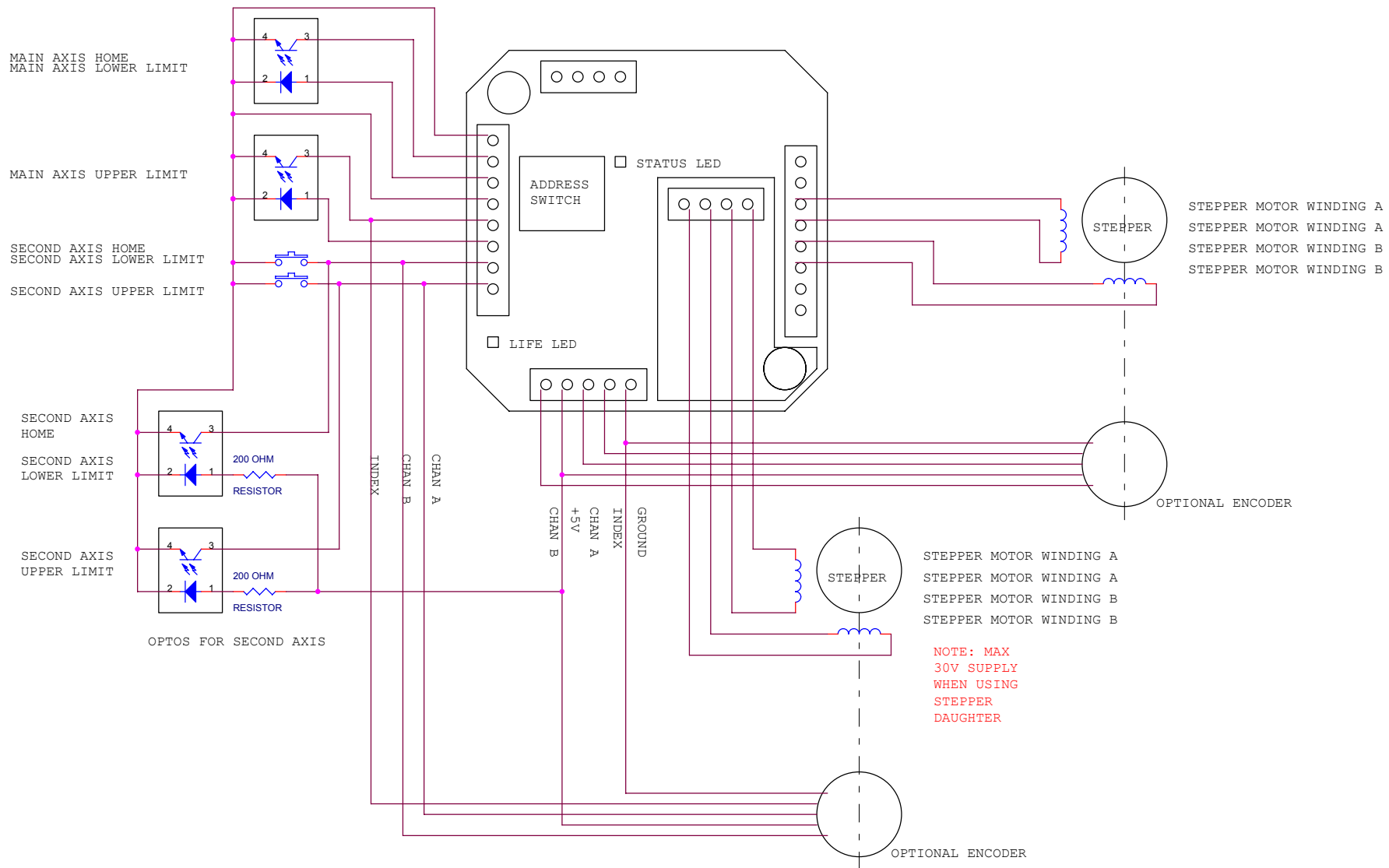
m or h or l command PWM  
STEP  
DIR  
j command RESOLUTION  
GROUND



LOGIC LEVEL OUTPUT DAUGHTER CARD OUTPUTS STEP AND DIRECTION PULSES TO AN EXTERNAL DRIVER.  
THE OUTPUTS ARE 4V, 24mA CAPABLE DRIVERS IN SERIES WITH 100 OHM RESISTORS.  
THE PWM OUTPUT SETS THE CURRENT LEVEL IN THE DRIVE AND VARIES WITH THE m OR h or l (lower case L) VALUES  
C4 ON THE PCB CAN BE POPULATED TO SMOOTH OUT THE PWM OUTPUT AND YEILD A DC VOLTAGE  
THE RESOLUTION OUTPUT CAN BE USED AS AN ENABLE LINE AND CHANGE VIA THE j2 AND j16 COMMANDS  
USE COMMANDS TO SECOND AXIS EG /1aM2A1000A0R  
SECOND AXIS HOMES TO SWITCH INPUTS  
THE MAX SUPPLY VOLTAGE IS 40V WITH THIS DAUGHTER CARD

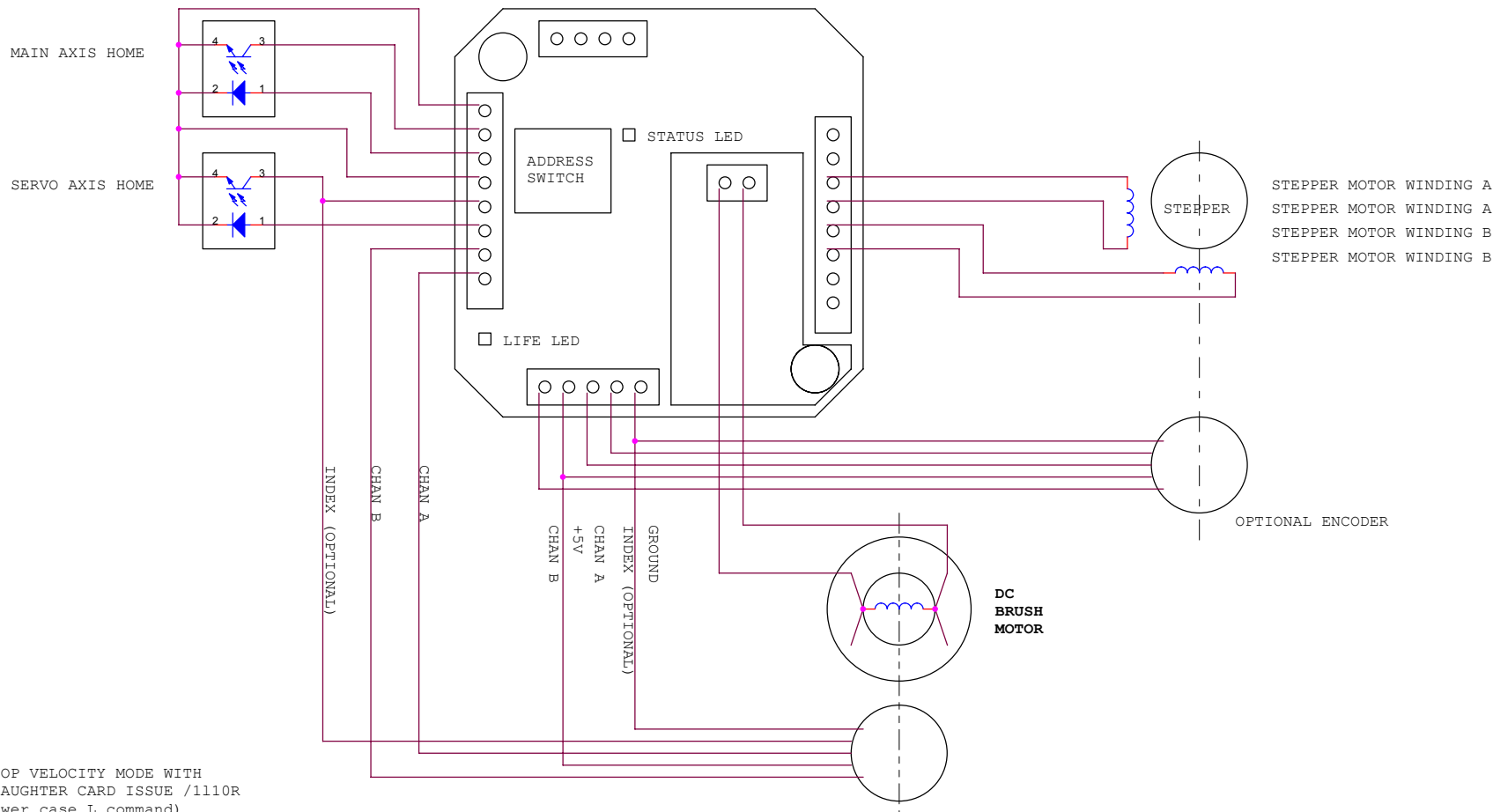
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**DUAL AXIS STEPPER DRIVE WITH DUAL ENCODERS  
(ENCODERS ARE OPTIONAL)**

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NOTES:

1) FOR OPEN LOOP VELOCITY MODE WITH VOLTAGE MODE DAUGHTER CARD ISSUE /1110R /1160R etc (lower case L command)

2) FOR DC SERVO MODE WITH CURRENT MODE DRIVER CARD ISSUE /1N8am2A10000A0R SEE COMMAND SET FOR MORE DETAILS.

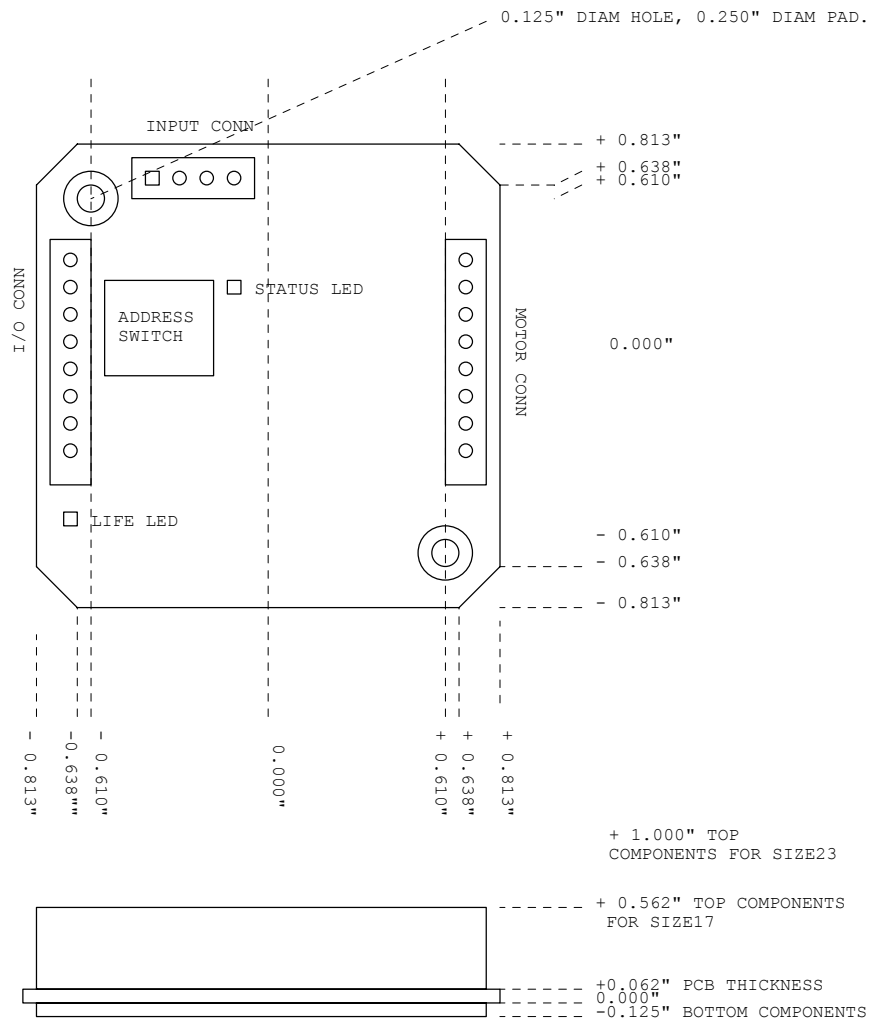
3) RESISTIVE HEATERS ETC CAN BE RUN WITH THE VOLTAGE MODE PWM CARD

ENCODER REQUIRED FOR POSITION MODE WITH CURRENT MODE BI DIRECTIONAL DAUGHTER CARD.

ENCODER NOT REQUIRED FOR OPEN LOOP VELOCITY MODE WITH BI DIRECTIONAL VOLTAGE PWM MODE DAUGHTER CARD.

DUAL AXIS: STEPPER DRIVE + DC SERVO

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DESIGN USES THE NEMA 17 SIZE  
STANDARD 1.22" SQUARE BOLT PATTERN

## EZHR17EN DIMENSIONAL INFORMATION

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