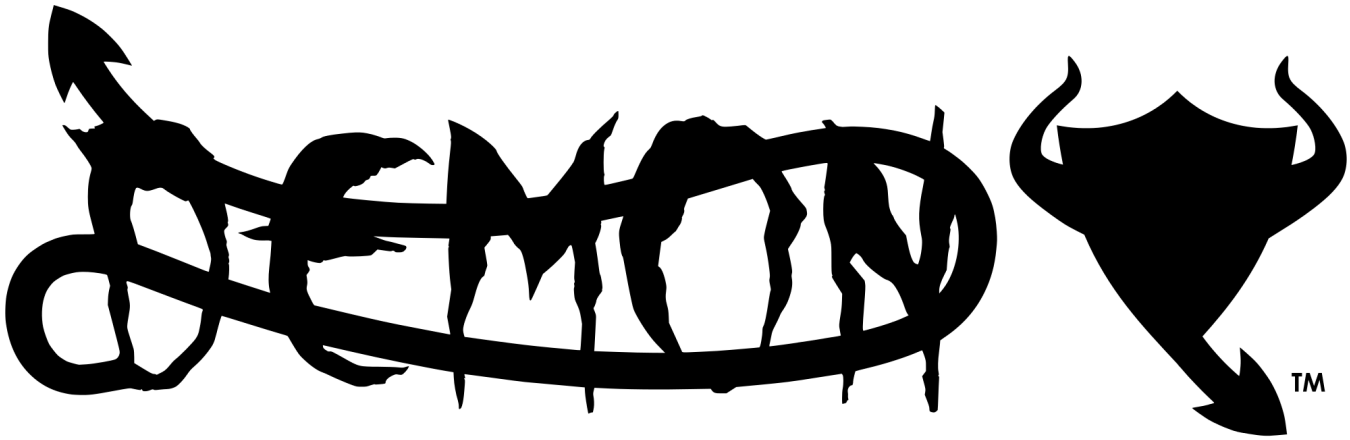
INSTRUCTION MANUAL

REV 05—8/13/2020



THE EASY PATH TO DIY CNC

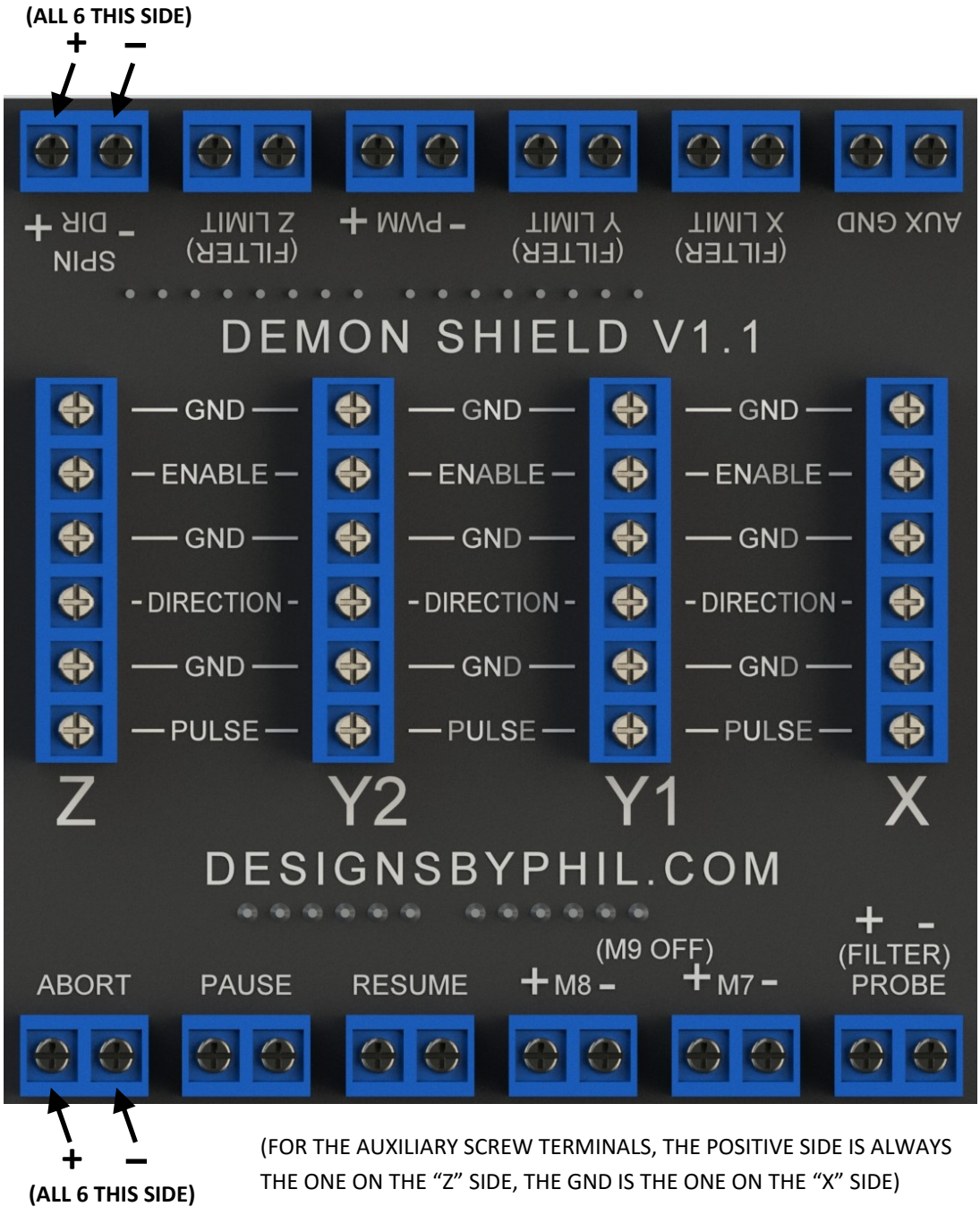
DEMON SHIELD IS A PRODUCT OF DESIGNS BY PHIL, LLC

DESIGNS BY Phil .com

Thank you for purchasing my Demon Shield for the Arduino uno R3. The purpose of this shield is to eliminate extensive wiring when making a Demon Controller for DIY CNC. It also includes a noise filter for the 3 limit switches and probe. There are easy connect ports on both sides of the shield for SPINDLE DIRECTION (often used with VFD spindles), PWM, LIMIT SWITCHES, ABORT (push button connection), FEED HOLD (push button connection), RESUME (push button connection), COOLANT (M7, M8, M9 commands—relay connections), and PROBE. To be used with 3 or 4 TB6600 stepper motor drivers and a 15 amp 24VDC power supply. For GRBL 0.9 and newer only. I recommed the version 1.1f found on my website (https://www.designsbyphil.com/loading-grbl.html).

The kit includes:

- 1 Demon Shield



(FOR THE AUXILIARY SCREW TERMINALS, THE POSITIVE SIDE IS ALWAYS THE ONE ON THE “Z” SIDE, THE GND IS THE ONE ON THE “X” SIDE)

This diagram shows all possible device connections (except VFD spindle direction).

USB CABLE (DOUBLE SHIELDED WITH FERRITE ENDS RECOMMENDED)

iot RELAY FOR SPINDLE CONTROL.

FEED CONTROL MOMENTARY PUSH BUTTONS.

AUX. RELAYS (M7 AND M8) FOR COOLANT CONTROL OR OTHER POWERED DEVICES.

AUX GROUND TERMINALS FOR CABLE SHIELDING.

X, Y, AND Z LIMIT SWITCHES ON FILTERED CIRCUIT.

RIBBON CABLES OR STANDARD WIRE CONNECT TO FOUR TB6600 DRIVERS WITHOUT JUMPING GROUNDS AT THE DRIVER FOR EASY CONNECTION.

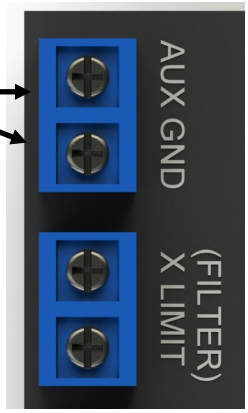
PROBE CONNECTION (POSITIVE AND NEGATIVE)

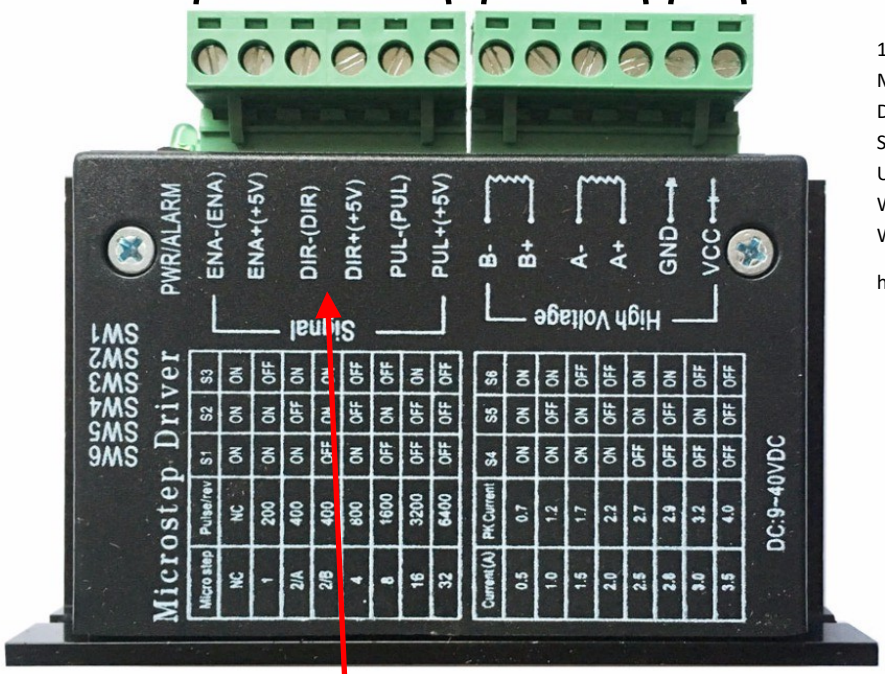
FOUR STEPPER MOTORS (2 SLAVED Y). TB6600 DRIVERS CAN POWER UP TO 4 AMP MOTORS (DEPENDING ON POWER SUPPLY). 269oz MOTORS RECOMMEND.

PHYSICAL ORDER OF SIGNAL INPUTS MAY VARY. IT'S IMPORTANT TO MATCH THE OUTPUT ON THE DEMON SHIELD UP TO THE MATCHING INPUT ON THE DRIVER. THIS IS LOW VOLTAGE SIGNAL SO THE WIRE GAUGE DOESN'T NEED TO BE BIG.

USE 18/4 SHIELDED SECURITY CABLE OR SIMILAR. CONNECT THE SHIELD DRAIN WIRES ON THIS END ONLY TO ONE OF THE AUX GND CONNECTIONS (SEE FIG. A). THE OTHER AUX GROUND IS FOR THE LIMIT SWITCH SHIELD DRAINS. I RECOMMEND 22/2 SHIELDED SECURITY CABLE FOR THE LIMIT SWITCHES.

24VDC FROM POWER SUPPLY. 14 AWG MAIN FEEDS TO 18 AWG LEADS RECOMMENDED. (SEE FIG. B)





14 AWG MAIN FEED WIRE RECOMMENDED. 14 AWG SHOULD BE USED AS THE MAIN LEAD BECAUSE IT HAS THE POTENTIAL TO CARRY THE LOAD OF ALL 4 DRIVERS FULL POWER AT THE SAME TIME. THEN 18 AWG LEADS CAN BE SPLICED TO THE 14 AWG WIRE TO FEED THE INDIVIDUAL DRIVERS. DO NOT USE BUTT CONNECTORS. SPLICE (SOLDER RECOMMENDED) SMALLER GAUGE WIRE, THEN USE HEAT SHRINK OVER THE SOLDER JOINT. SEE THE FOLLOWING WEBPAGE FOR DETAILED INSTRUCTIONS.

http://www.designsbyphil.com/diy-demon-controller-instructions.html

FIG. B

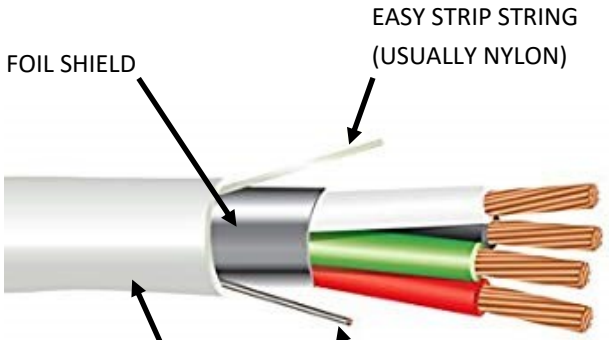
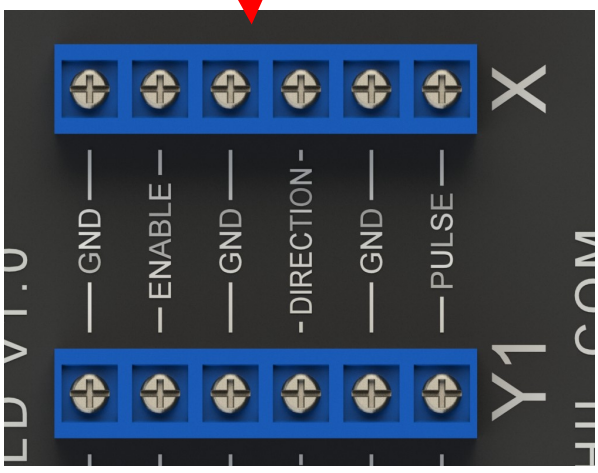


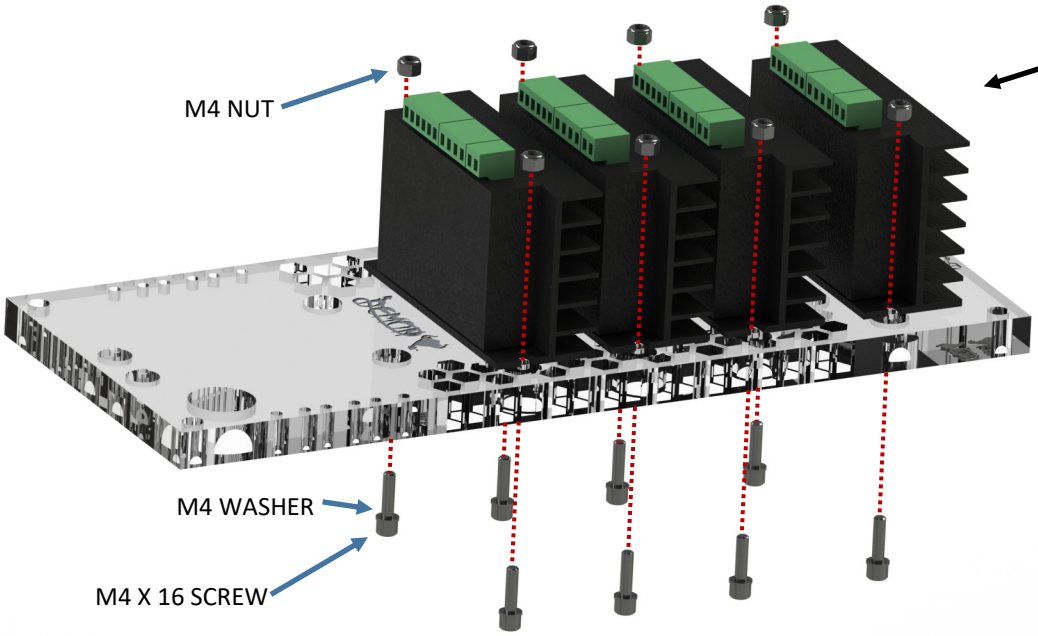
FIG. A



ON THE CONTROLLER SIDE, STRIP THE CABLE JACKET BACK TO EXPOSE ENOUGH OF THE DRAIN WIRE TO REACH THE AUX. GND TERMINAL ON THE DEMON SHIELD WHEN THE MOTOR CABLES ARE ATTACHED. YOU CAN REMOVE THE EXPOSED FOIL UP TO THE JACKET. ON THE MOTOR SIDE, MAKE SURE NO SHIELD FOIL OR DRAIN WIRE IS EXPOSED. TRIM THEM TO WHERE THE CABLE JACKET IS STRIPPED TO. THEN WRAP TWICE AROUND WITH ELECTRICAL TAPE. ***DO NOT GROUND THE MOTOR SIDE OF THE DRAIN CABLE***.

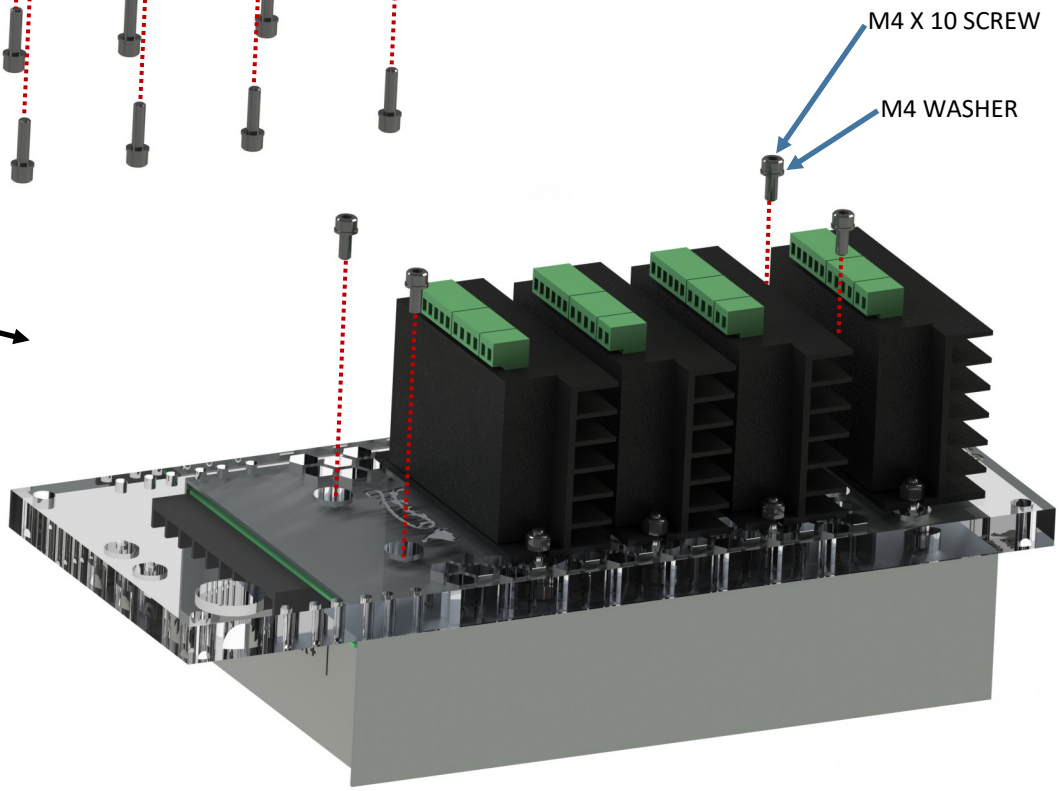
DEMON PLATE ASSEMBLY

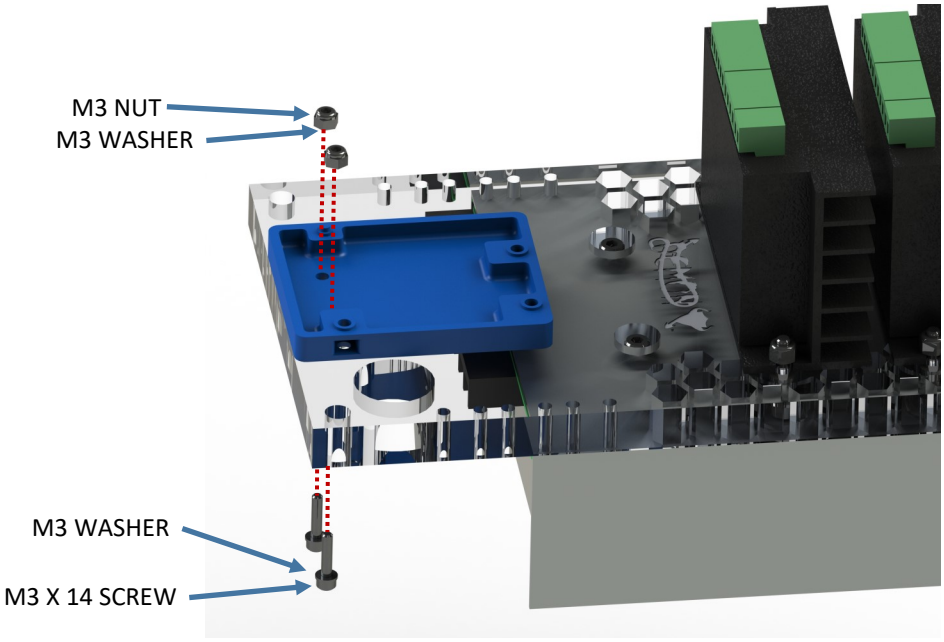
(AVAILABLE FOR PURCHASE OR FILES AVAILABLE ON WEBSITE FOR CNC/LASER CUTTING)



STEP 1: ATTACH THE 4 STEPPER MOTOR DRIVERS TO THE PLATE WITH THE (QTY 8) M4 X 16MM SCREWS, WASHERS, AND LOCKNUTS. THE SCREW HEAD AND WASHERS SIT IN THE COUNTERBORE ON THE BOTTOM SIDE OF THE PLATE.

STEP 2: ATTACH THE POWER SUPPLY TO THE PLATE WITH THE (QTY 4) M4 X 10MM SCREWS AND WASHERS. THE SCREW HEAD AND WASHERS SIT IN THE COUNTERBORE ON THE TOP SIDE OF THE PLATE. THE BACK TWO ARE IN BETWEEN THE LAST TWO MOTOR DRIVERS.





STEP 3: ATTACH THE ARDUINO MOUNT TO THE PLATE WITH THE (QTY 2) M3 X 14MM SCREWS, WASHERS, AND LOCKNUTS. THE SCREW HEAD AND WASHERS SIT IN THE COUNTERBORE ON THE BOTTOM SIDE OF THE PLATE. THE ARDUINO MOUNT FILE CAN ALSO BE FOUND ON THE WEBSITE, BUT IT IS INCLUDED WITH THE DEMON PLATE IF PURCHASED.

*** DO NOT SIT POWER SUPPLY DIRECTLY ON A SURFACE. THE COOLING FAN MUST HAVE AIR FLOW. SEE NEXT PAGE FOR SUGGESTED MOUNTING.**

DEMON PLATE MOUNTING

(AVAILABLE FOR PURCHASE OR FILES AVAILABLE ON WEBSITE FOR CNC/LASER CUTTING)

*** DO NOT SIT POWER SUPPLY DIRECTLY ON A SURFACE. THE COOLING FAN MUST HAVE AIR FLOW. USE STANDOFFS OR MOUNT ON A BOARD VERTICALLY UNDER YOUR TABLE AS SHOWN BELOW.**