

TABLE OF CONTENTS

1.0 What's in Your Kit?

1.1 Building the Frame

1.2 Adding the Electronics

1.3 Building the Temporary Sled

1.4 Installing the Z-Axis

1.5 Calibrating Your Maslow

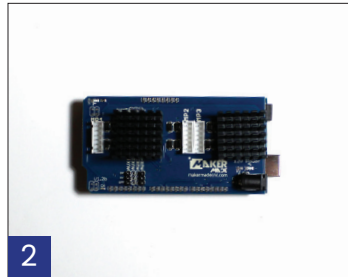
1.6 Building Final Sled

1.0 WHAT'S IN YOUR KIT?



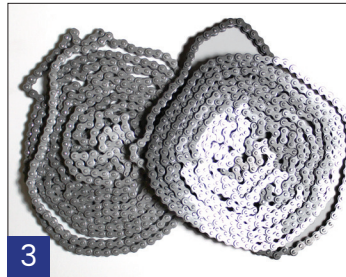
1

AC POWER CABLE



2

ARDUINO MOTOR & SHIELD



3

CHAINS(2)



4

DC POWER SUPPLY



5

RING BEARINGS(4)



6

RING BRACKET



7

RING BRACKET MOUNTS(3)



8

RING CARRIAGE(2)



9

USB CABLE



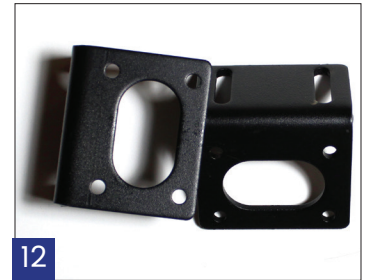
10

USB FLASH DRIVE



11

X/Y MOTOR CABLES



12

X/Y Motor Mounts(2)



13

X/Y MOTORS



14

Z AXIS MOTOR



15

Z AXIS MOTOR CABLE



16

Z AXIS MOTOR MOUNTS(2)

HARDWARE BAGS



BAG #1
Attaches chains to frame



BAG #2
Cords, hardware for attaching to frame



BAG #3
Holds bricks in place on sled



BAG #4
Multiple uses



BAG #5
Fastens motor to mounts



BAG #6
Attaches Arduino to frame



BAG #7
Attaches carriages to ring



BAG #8
Fastens L-brackets to ring, and to sled



BAG #9
Attaches Z axis to router and sled



1.1 BUILDING THE FRAME



TOOLS NEEDED:

- Saw
- Power Drill
- Screwdrivers
- Safety goggles

MATERIALS LIST:

- (7) 10' long 2x4s
- (1) 8' long 2x4
- (1) 6' long 2x4
- (1) 4X8 sheet .75" plywood
- (75-100) 2.25" wood screws
- Wood glue
- Hardware & parts from kit

BUILD TIME:

About 5 hours, plus
glue drying time

CUT LIST:

- | | |
|----------|----------|
| 2x4s | |
| (1) 120" | (2) 34" |
| (1) 88" | (2) 30" |
| (2) 82" | (2) 28" |
| (2) 79" | (2) 7" |
| (2) 60" | (4) 3.5" |

Difficulty Level



Precision Level



COST:

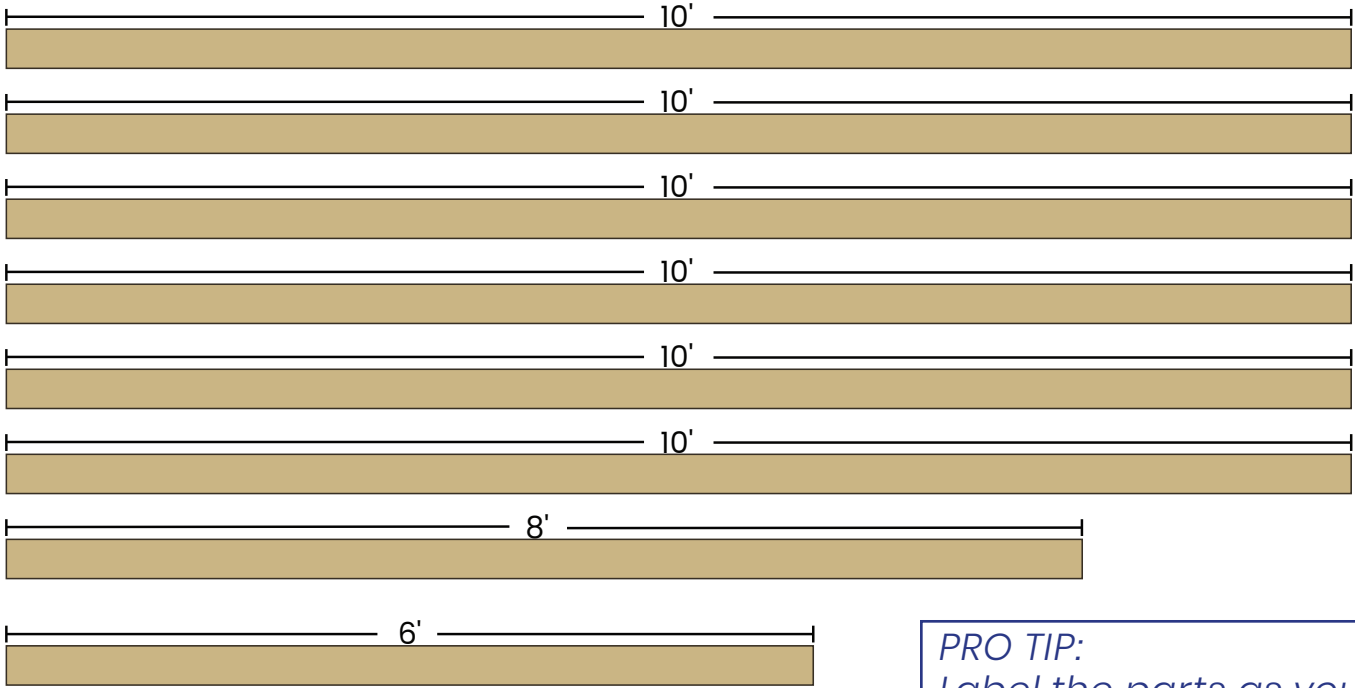
Approximately \$90

BEFORE BEGINNING
Acquaint yourself with
standard practices for
workshop safety.

Note: Lumber dimensions are not critical, if 2x4s are not available in your area the local equivalent will work. When cutting, try to keep the ends as square as possible, but small errors in the lengths of any of the parts will not affect accuracy of the machine.

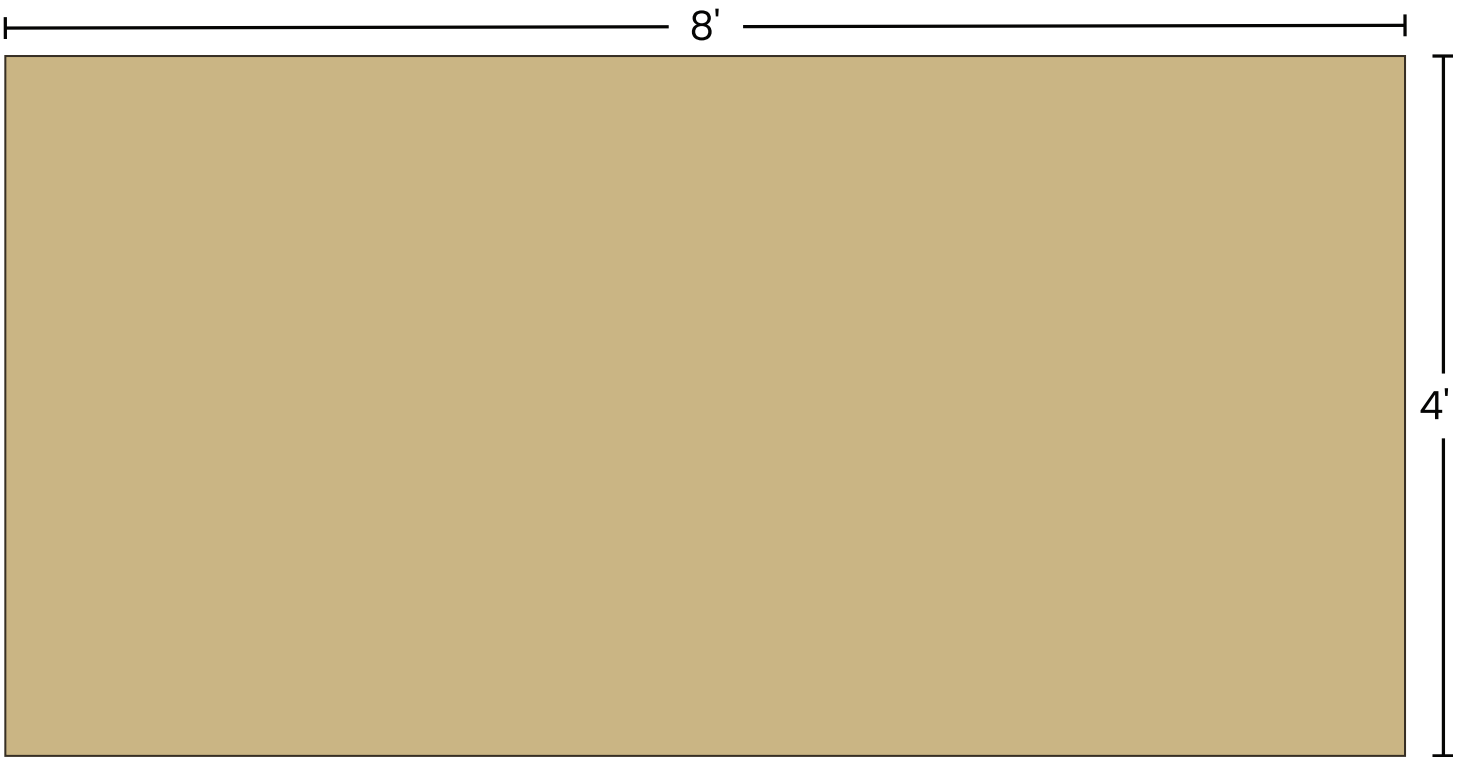
STEP 1: BUY MATERIALS

2X4 (or equivalent lumber)

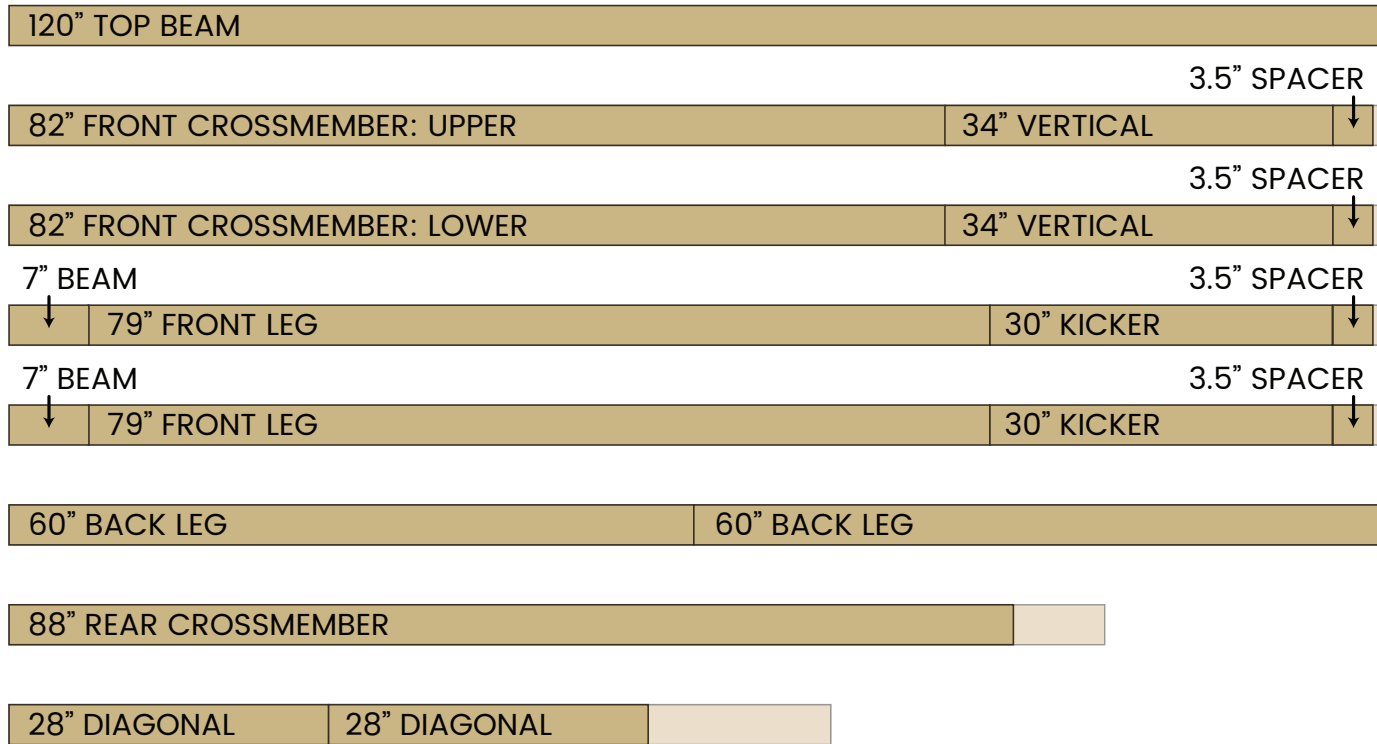


*PRO TIP:
Label the parts as you
cut them, you'll be glad
you did.*

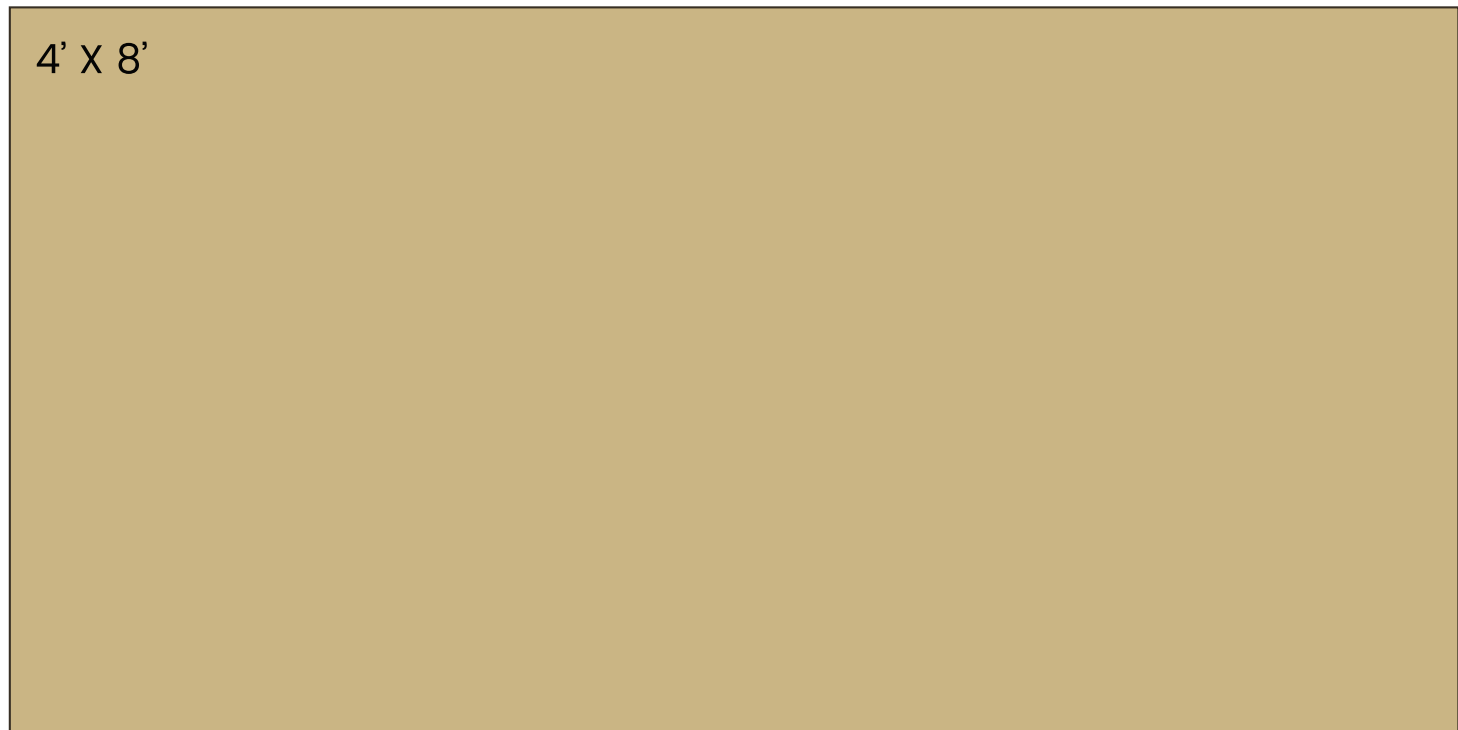
PLYWOOD

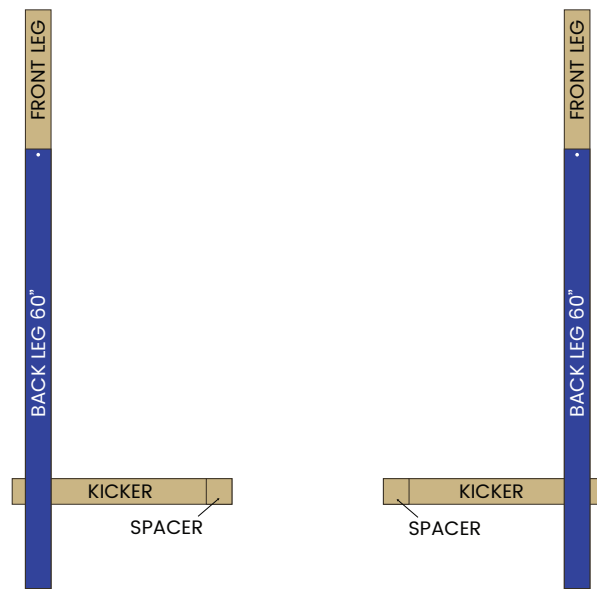
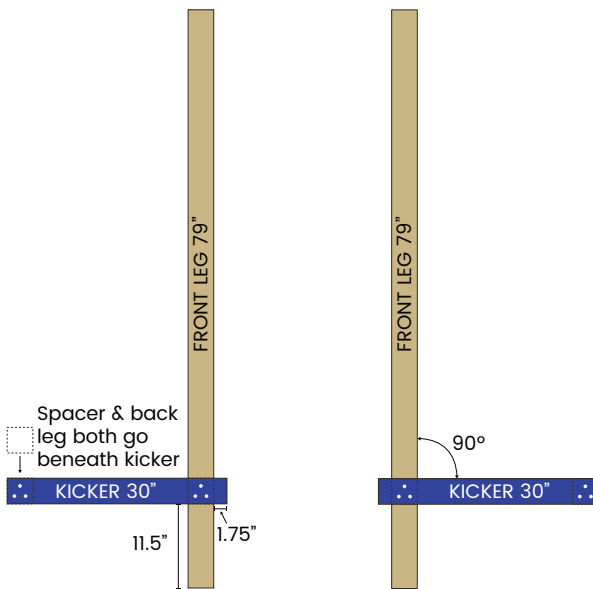


STEP 2: CUT OUT PIECES AS SHOWN
2X4 (or equivalent lumber)



PLYWOOD



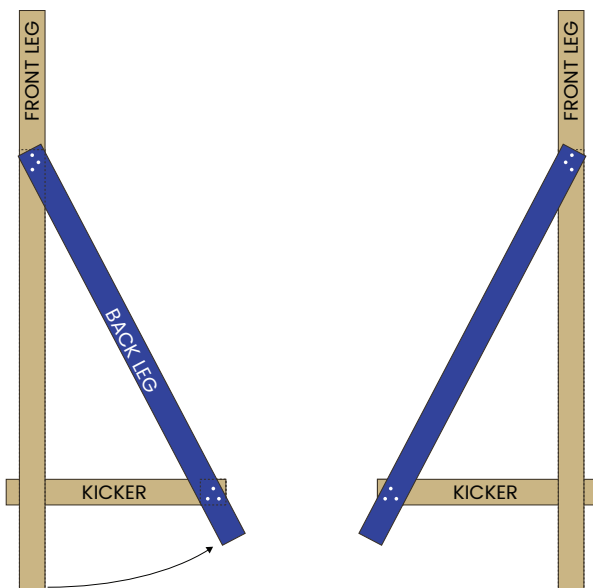


STEP 3/4A ATTACH KICKERS TO FRONT LEGS

- Kickers at 90° angle to front legs
- Kickers 11.5" from bottom of front legs, and overhanging by 1.75"
- Screw through top of kickers into front legs
- Screw through top of kickers into spacers
- Flip each assembly over for next step

STEP 3/4B ADD BACK LEGS

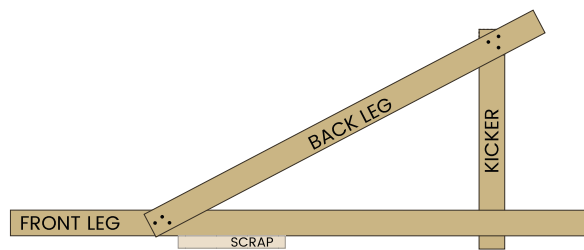
- Place back legs on top of front legs, aligning bottom ends
- Mark center of back legs 1" from top end
- Screw through top center of back legs into front legs at marked spot
- Only 1 screw per leg, NO GLUE



STEP 3/4C POSITION BACK LEGS

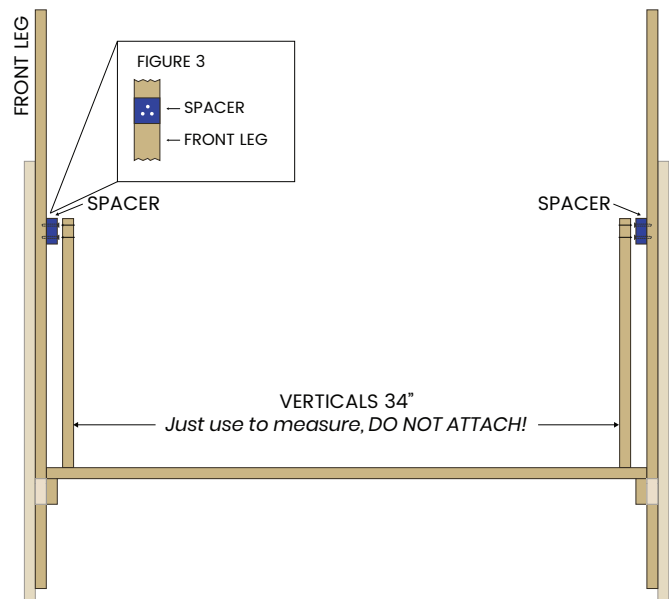
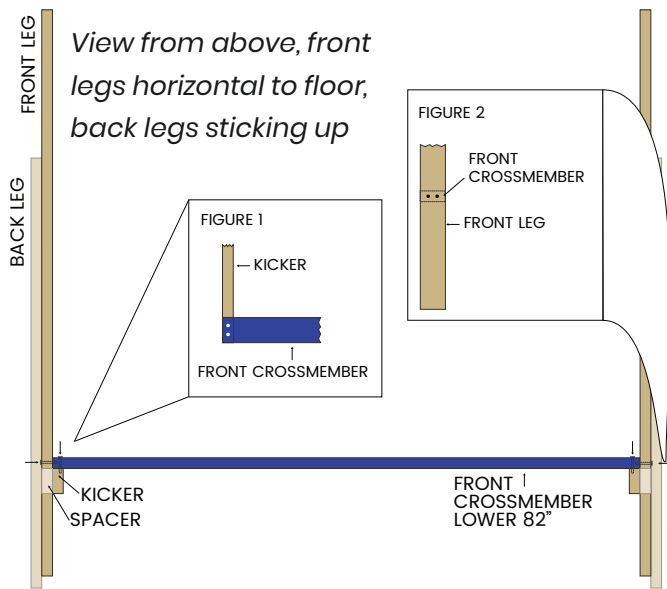
- Rotate back legs out to end of kickers
- Screw bottom of back legs to kickers
- Add more screws to top of back legs

LEGS ARE NOW COMPLETE!



Next steps are most easily done with front legs horizontal to floor, as shown. Prop with scraps to keep things level.



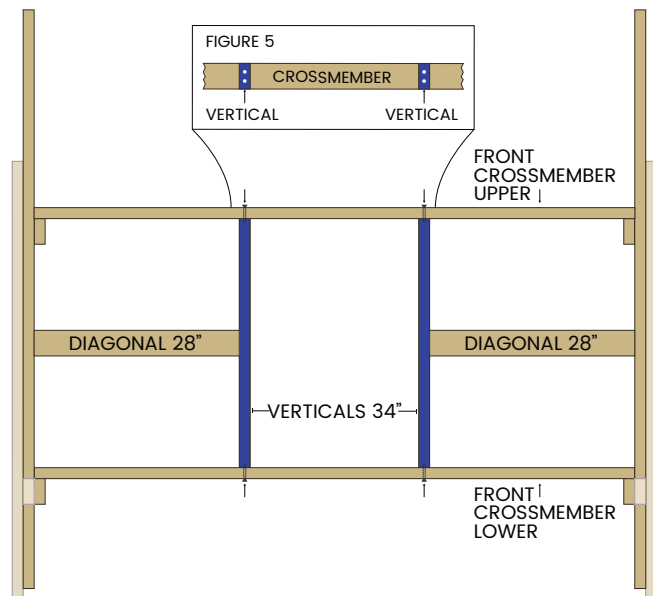
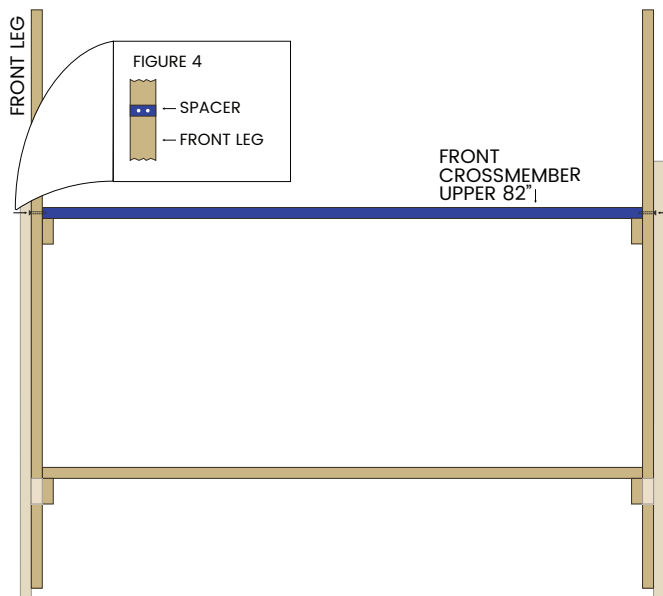


STEP 5A ATTACH LOWER FRONT CROSSMEMBER

- Rest lower front crossmember on kickers
- Screw from top of crossmember into each kicker- see Figure 1
- Screw from side of each front leg into crossmember- see Figure 2

STEP 5B ADD SPACERS

- Use verticals to measure placement of spacers on inside of front legs
- DO NOT ATTACH VERTICALS IN THIS STEP
- Screw through spacers into front legs



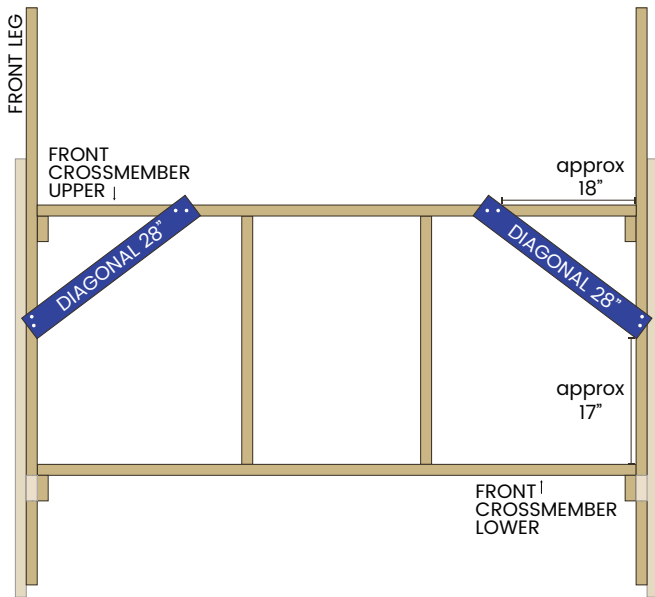
STEP 5C ATTACH UPPER FRONT CROSSMEMBER

- Rest upper front crossmember on spacers
- Screw through sides of front legs into crossmember

STEP 6 ATTACH VERTICALS

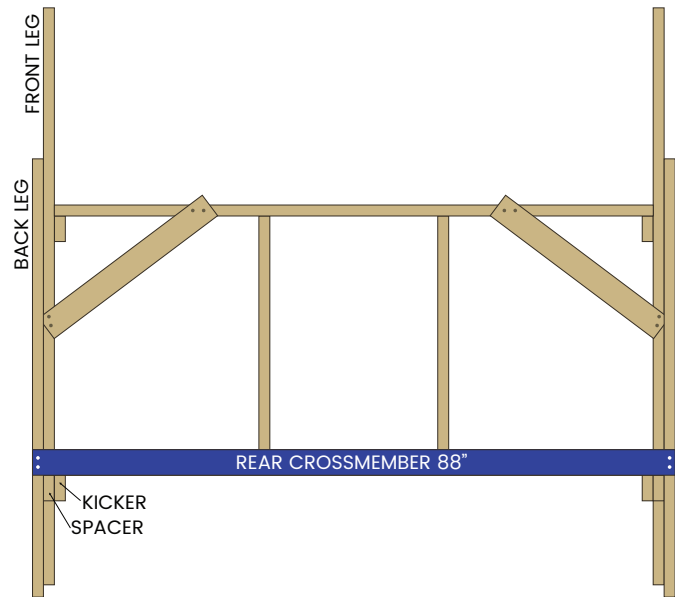
- Use diagonals to place verticals
- DO NOT ATTACH DIAGONALS IN THIS STEP
- Screw through top crossmember into verticals
- Screw through bottom crossmember into verticals





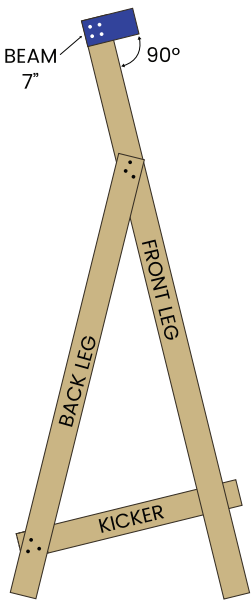
STEP 7 ATTACH DIAGONAL BRACING

- Rest diagonals with one end on front leg, one leg on upper crossmember
- Screw diagonals in place on each end
- Placement of diagonals need not be exact



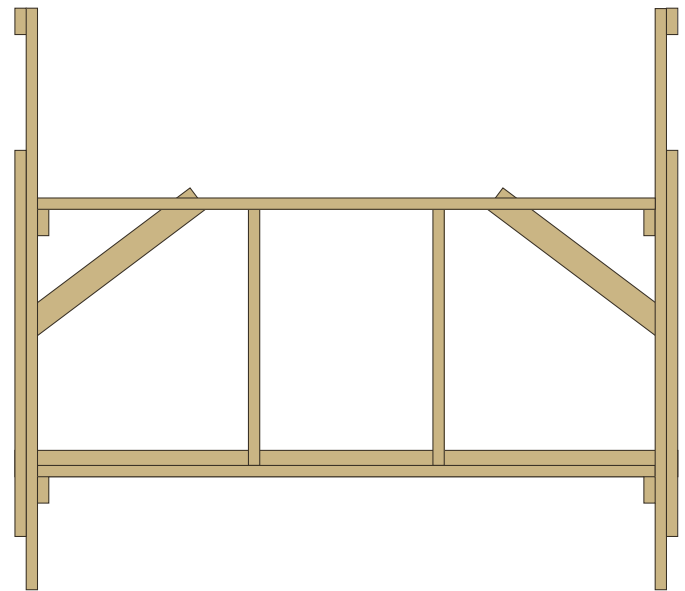
STEP 8 ATTACH REAR CROSSMEMBER

- Rest rear crossmember on top of kickers where they protrude from back legs
- Screw through rear crossmember into back legs



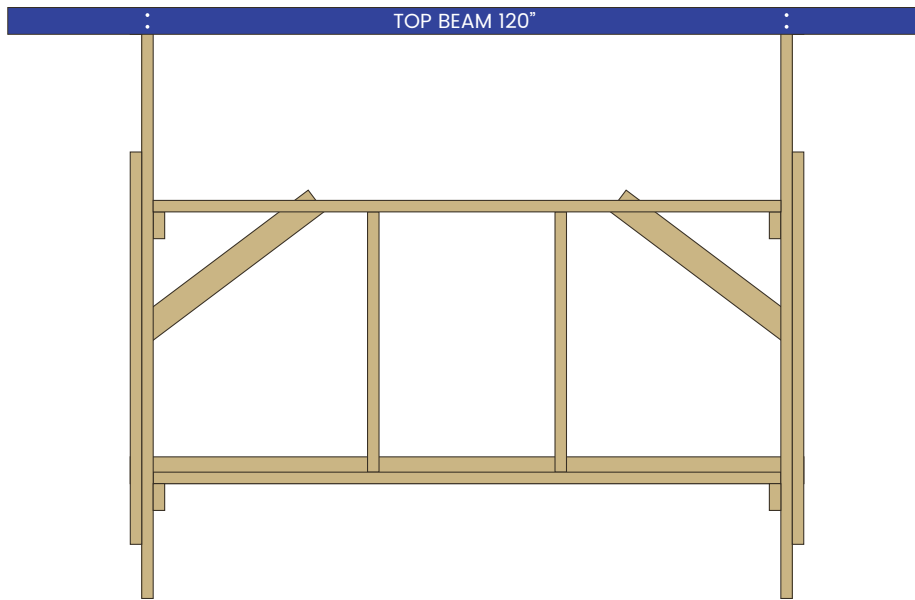
STEP 9 ATTACH SIDE BEAMS

- Beams were placed on cut list to have one factory end, this end should face out so top beam has a flat surface to rest on
- Place beams at 90° angles to each front leg
- Screw through beams into front legs



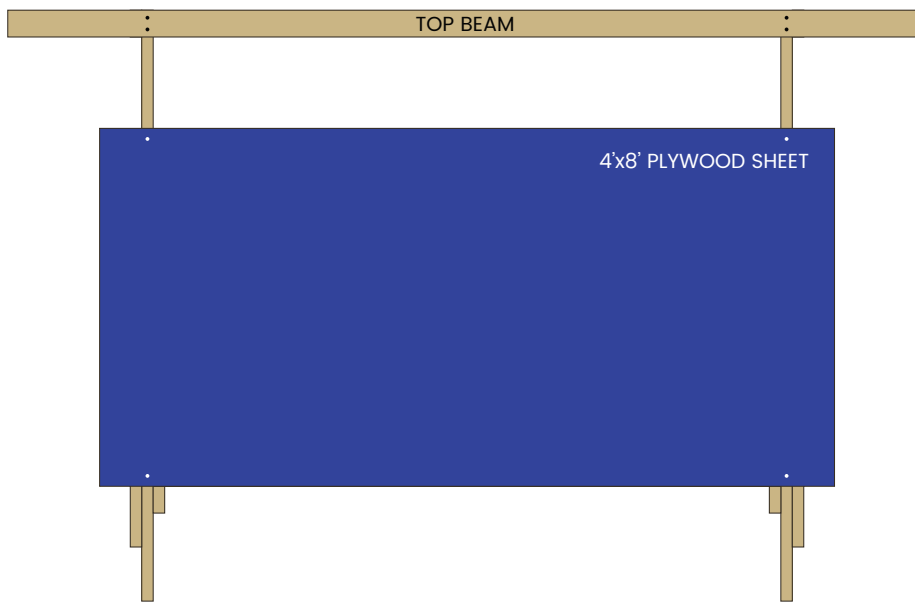
ALMOST FINISHED!





STEP 10 ATTACH TOP BEAM

- Center top beam across front
- Screw through top beam into 7" beams on each side



STEP 11 STAND UP FRAME & ATTACH PLYWOOD

- Rest plywood on kickers
- Attach with screws through front of plywood into each front leg

You now have a complete frame!
NEXT STEP: ATTACHING THE ELECTRONICS

DESIGN BY THE MASLOW COMMUNITY, PARTICULARLY USERS DLANG AND MADGRIZZLE

1.2: ADDING THE ELECTRONICS



TOOLS NEEDED:

Power Drill
Screwdrivers
Safety goggles
Computer or tablet
Internet connection

BUILD TIME:

About 1 hour

Difficulty Level



Precision Level

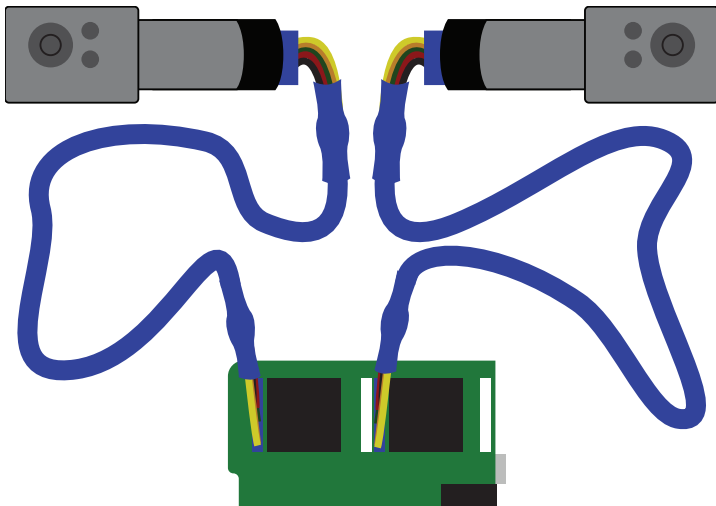


MATERIALS LIST:

Part #1 AC Power Cable
Part #2 Arduino with Heat Shield
Part #4 DC Power Supply
Part #9 USB Cable
Part #10 Flash Drive (optional)

Part #11 X and Y Motor Cables
Part #12 X and Y Motor Mounts
Part #13 X and Y Motors
Hardware Bag #5
Hardware Bag #6

Before adding the electronics to the frame, there's a bit of setup- downloading and adding programs and information, that needs to be done



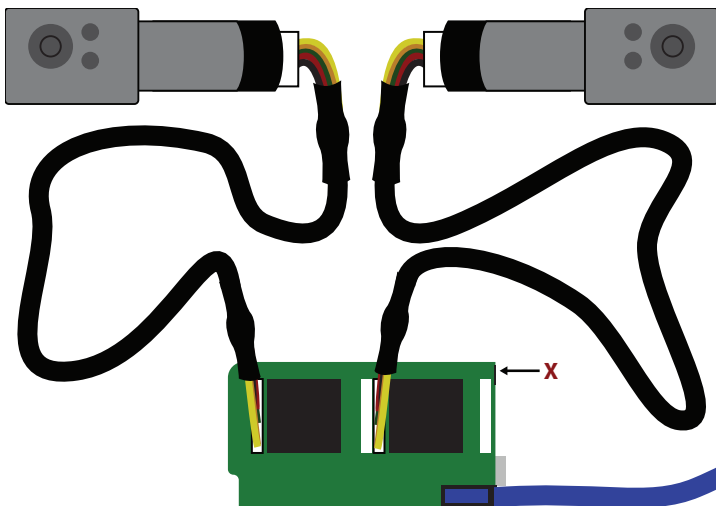
STEP 1: CONNECT THE MOTORS

PART #2 Arduino with Heat Shield

PART #11 X & Y Motor Cables

PART #13 X & Y Motors

- X and Y motor cables, as well as motors, are interchangeable at this point
- Insert one end of a cable into each motor
- Insert other ends into to Ports 1 and 3 on Arduino with yellow wire at bottom as shown
- Port 3 controls left motor Port 1 controls right motor as viewed when facing the Maslow CNC.

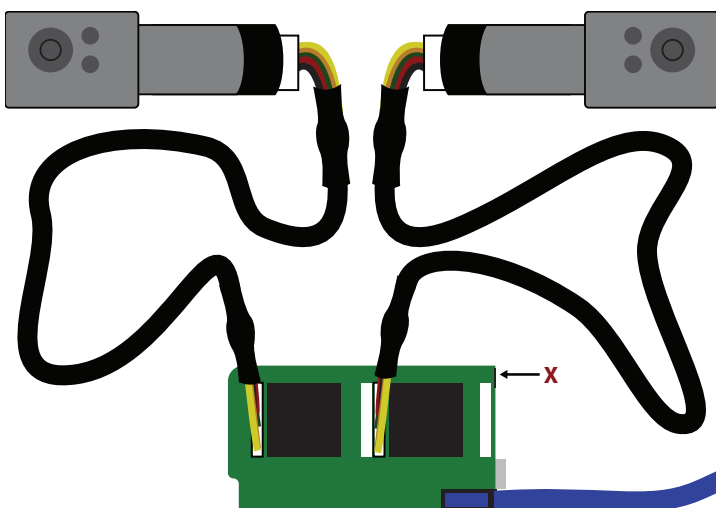


STEP 2: CONNECT THE POWER SUPPLY

PART #1 AC Power Cable

PART #3 DC Power Supply

- Plug DC power supply into shield
- Arduino also has a power supply port, plugging power supply into it will not damage it, but will not provide power to motors
- Connect power cable to DC Power Supply
- Plug power cable into surge protected electrical outlet



STEP 3: CONNECT THE USB CABLE

PART #9 USB Cable

Computer or tablet

- Plug USB cord into Arduino
- Plug other end into your computer
- USB light will come on to indicate that board is connected and receiving power from your computer

STEP 4: DOWNLOAD THE ARDUINO IDE

Internet connection
Computer or tablet

- In your browser, navigate to <https://www.arduino.cc/en/Main/Software>
- Download latest version of Arduino IDE
- Note: Some users have reported problems with “Windows App” version
- Open zip folder
- Install program on your computer
- Open program

STEP 5: DOWNLOAD MASLOW FIRMWARE

- In your browser, navigate to <http://github.com/MaslowCNC/Firmware/releases/>
- Download latest version of firmware
- Open zip folder
- Install program on your computer

STEP 6: SET UP FIRMWARE

- Click File -> Open
- Select cncctrlv1.ino
- Click Tools -> Board
- Select Arduino/Genuino Mega or Mega 2560
- Click Tools -> Port -> Your Port
- Select port- on Windows, COM3, on Mac and Linux computers dev/tty/
- If unsure, disconnect USB cable from Arduino, check which option disappears.

STEP 7: ADD FIRMWARE TO ARDUINO

- Click upload button in top left corner
- This uploads firmware to Arduino
- Linux users: if getting timeout or permissions errors, try adding username to dialout group then logging out and back in
- When upload finishes, close Arduino IDE

NOTE: Ground Control is the program which runs on your computer and lets you control your Maslow CNC. It's free and is updated often.

STEP 8: INSTALL GROUND CONTROL

- In your browser, navigate to <https://github.com/MaslowCNC/GroundControl/releases>
 - Download latest version of Ground Control
- WINDOWS USERS

- Open zip folder
 - Click Launch Ground Control” shortcut
- MAC USERS
- Install Ground Control by moving it into your applications folder
 - Click icon in applications folder
 - Select “Open”

Linux and Raspberry Pi users:

- Reference instructions online at <http://maslowcommunitygarden.org/GroundControl.html?instructions=true>

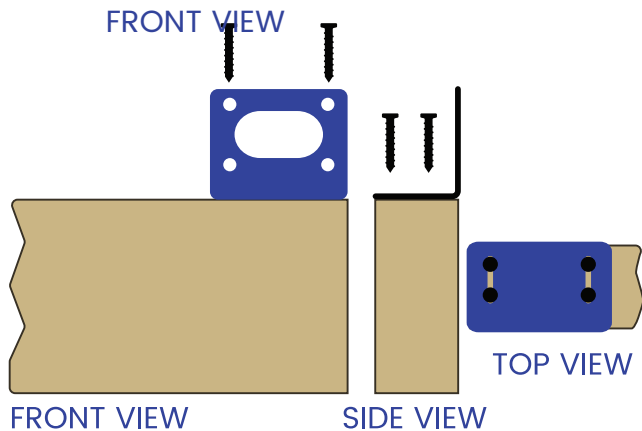
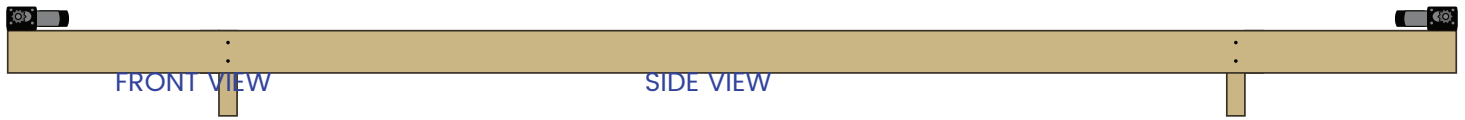
STEP 9: CONNECT GROUND CONTROL TO MASLOW

- In Ground Control, click ACTIONS on top left
- Click PORTS, a list of ports will appear
- Select same port you used in Step 6
- Click CONNECT

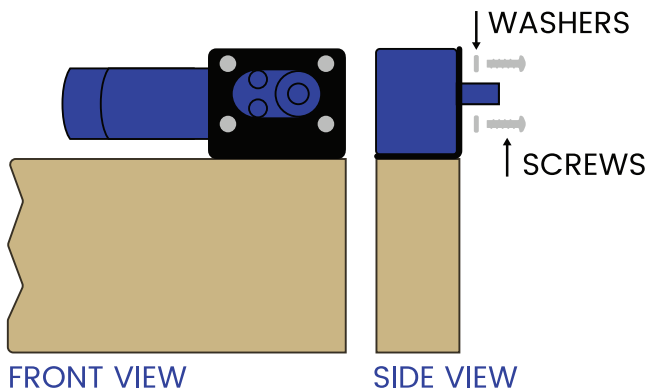
THAT PART'S DONE! YOU'RE NOW READY TO INSTALL THE ELECTRONICS ON THE FRAME. BEFORE PROCEEDING DISCONNECT POWER CABLES, USB CABLES, AND MOTOR CABLES.



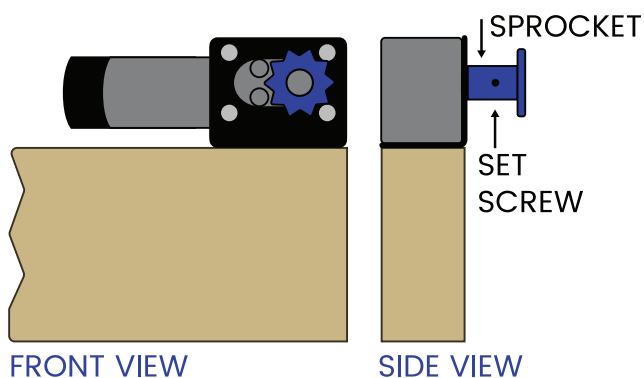
STEPS 12-14 TAKE PLACE ON THE TOP BEAM OF THE FRAME, REPEATED ON EACH END



- STEP 12: INSTALL MOTOR MOUNTS ON FRAME**
BAG #4 (8) wood screws
PART #12 X/Y Motor Mounts
- Position motor mounts on beam flush with front and side edges
 - Using two screws per slot on base of each motor mount, fasten motor mounts to beam with wood screws

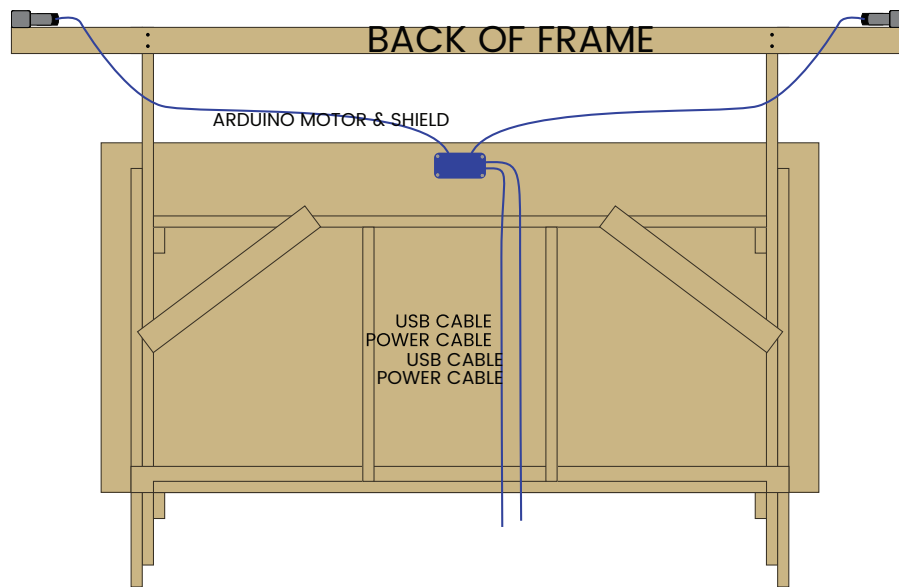


- STEP 13: ATTACH MOTORS TO MOUNTS**
BAG #5 (8) small screws, (8) lock washers
PART#13 X/Y Motors
- Place one motor in each bracket
 - Slide lock washers over screws
 - Fasten screws through front of motor mount into aligned holes in motor



- STEP 14: INSTALL SPROCKETS ON MOTOR SHAFTS**
BAG#1 (2) sprockets, (2) set screws
Allen wrench
- Insert set screw in hole on side of sprocket
 - Screw in slightly with allen wrench
 - Place sprocket over motor shaft
 - Tighten set screw with allen wrench

STEPS 15-16 TAKE PLACE ON THE BACK OF THE FRAME



STEP 15 ATTACH THE ARDUINO

BAG #6 screws, standoffs

PART #2 Arduino

- Gently remove shield from Arduino
- Position Arduino in center of plywood
- Insert screws through holes
- Slide standoffs over screws
- Screw into plywood
- Re-attach shield

STEP 16 RECONNECT ELECTRONICS

PARTS #1-2 Power Cable, Power Supply

PART #9 USB Cable

PART #11 X/Y Motor Cables

- Attach Arduino to motors with cables
- Connect power supply to Arduino
- Connect USB cord to Arduino
- For more details review electronics setup guide

NEXT STEP: BUILDING THE TEMPORARY SLED

DESIGN BY THE MASLOW COMMUNITY, PARTICULARLY USERS DLANG AND MADGRIZZLE

1.3 BUILDING THE TEMPORARY SLED



TOOLS NEEDED:

Router, .25" router bit
Handsaw or Circular Saw
Phillip's Head Screwdriver
Power Drill, .25" & .5" drill bits
Socket Wrench, various sizes

5/16 Allen Wrench
Pencil
Safety goggles
Clamps (optional)

Difficulty Level



Precision Level

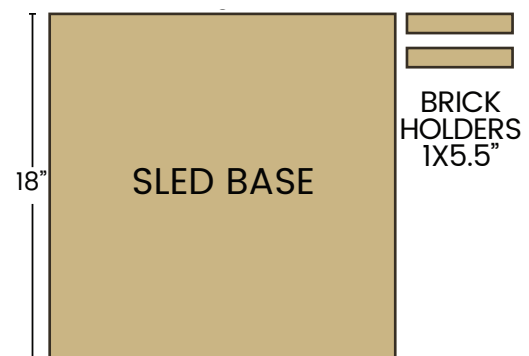


MATERIALS LIST:

(1) 4x8 Plywood, .75" thick*
(2) Bricks**
(3) Size 10-32 Machine Screws
Part #5 Ring Bearings
Part #6 Ring Mount
Part #7 Ring Bracket Mounts
Part #8 Ring Carriage
Hardware Bags #3,6,7,8

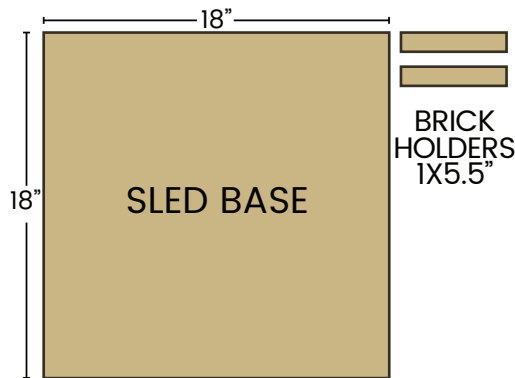
CUT LIST:

(1) 18x18" square
(2) 1x5.5" rectangles**



**If you have scrap plywood on hand, it's not necessary to buy a whole sheet of plywood*

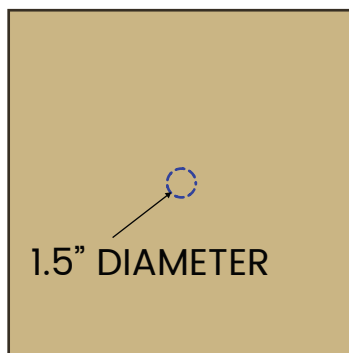
***If using MakerMade metal brickholders bricks should be no more than 4.5" wide*



STEP 1 CUT OUT PLYWOOD PARTS

Saw, ruler

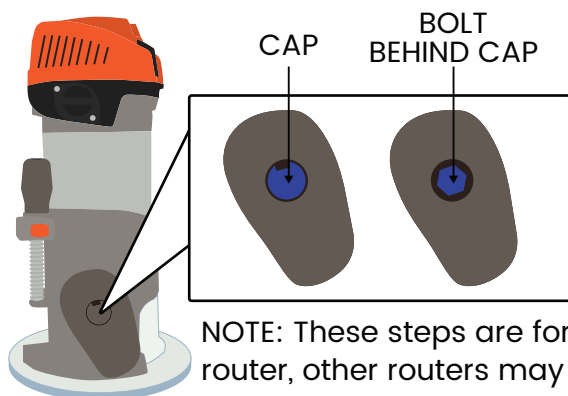
- Mark dimensions of parts on plywood
- Exactness is not critical for temporary sled
- Using hand or circular saw, cut out parts



STEP 2 CUT CENTER HOLE FOR BIT

Router, .25" router bit, pencil

- Mark 1.5"x1.5" hole in center of sled
- Use router to cut out hole, going down approx 1/10" per pass



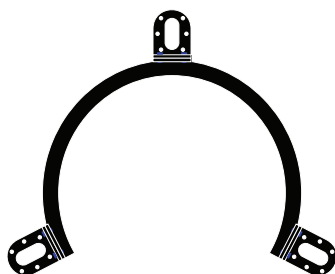
NOTE: These steps are for the Rigid router, other routers may differ

STEP 3 REMOVE ROUTER HANDLES, BASEPLATE

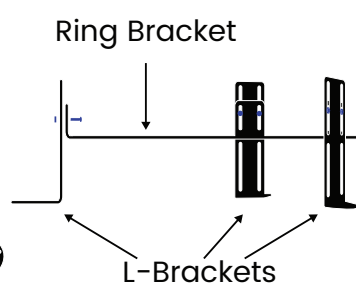
5/16 allen wrench, screwdriver

- Remove cap on side of handle
- Bolt inside hole may be unscrewed with a 5/16 allen wrench
- Turn router over so baseplate is up
- Use Phillips-head screwdriver to remove 3 machine screws from bottom of baseplate
- Set router and baseplate aside

TOP VIEW



SIDE VIEW



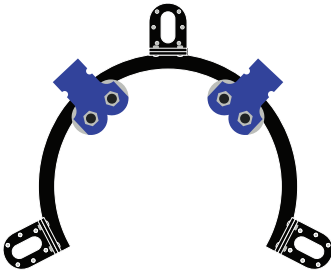
STEP 4 ATTACH L-BRACKETS TO RING

BAG #8 (6)nuts, (6)bolts, allen wrench

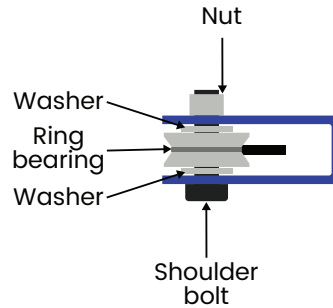
PARTS #6-7 Ring bracket, (3)L-brackets

- Line up L-brackets as shown with rectangular brackets on ring
- Insert bolts from inside of ring bracket out through L-brackets, two per bracket
- Secure with nuts, using allen wrench to tighten

TOP VIEW



SIDE VIEW



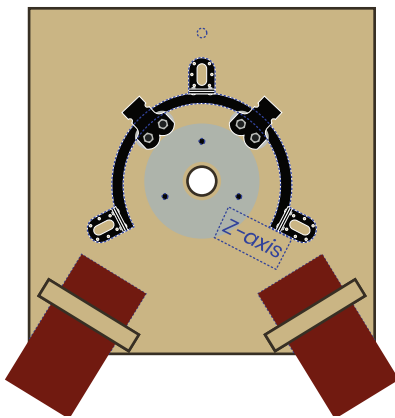
STEP 5 ATTACH CARRIAGES TO RING

BAG #7 (4) shoulder bolts, (4) nuts, (8) washers, allen wrench

PART #2 Ring Bearings

PART #5 Carriage mounts

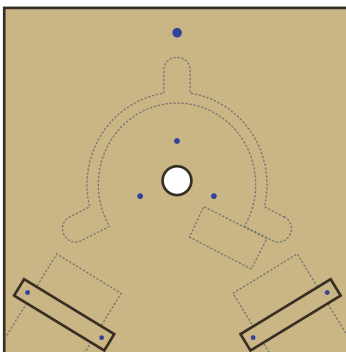
- Place one carriage on either side of ring
- Insert shoulder bolt up through bottom of carriage, slip one washer over bolt, then one ring bearing, then another washer
- Push shoulder bolt through top of carriage, fasten with nut
- Do this twice for each carriage
- Use allen wrench to tighten bolts
- Bearings should still rotate freely



STEP 6 MARK PLACEMENT OF COMPONENTS

Pencil

- Place components on sled as shown above
- Baseplate of router in center of sled
- Ring assembly centered around baseplate
- Bricks and holders in corners, exact placement not critical
- Use pencil to mark 3 holes in baseplate
- Mark placement of ring and brick holders
- Mark .5" circle as shown, middle of sled, halfway between top edge and ring
- If using Z-axis with temporary sled, leave room for that as marked above

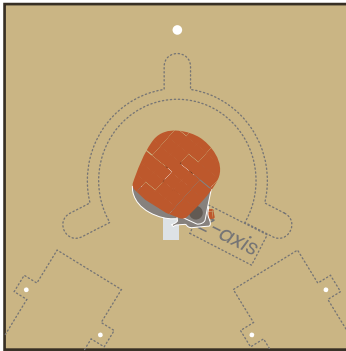


STEP 7 DRILL HOLES

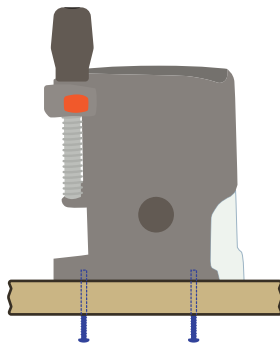
Power drill, .25" and .5" drill bit, optional clamps

- Place brick holders in marked spots, clamp into place (optional but helpful)
- Mark a spot on each end of holder just outside of where the brick will be
- Drill through holders and sled with .25" bit
- Drill 3 holes where marked for router with .25" bit
- Drill top hole with .5" bit

TOP VIEW



SIDE VIEW

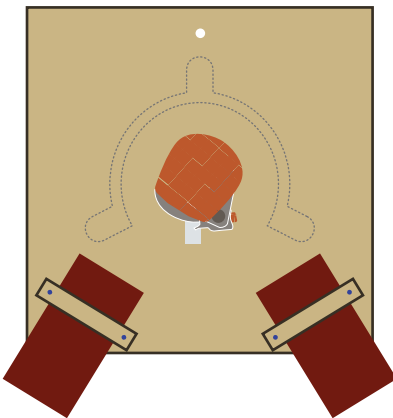


STEP 8 ATTACH ROUTER, TO SLED

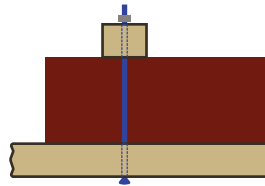
(3) 10-32 machine screws

- Insert screws through pre-drilled holes from bottom of sled into router
- Tighten with Phillips-head screwdriver

TOP VIEW



SIDE VIEW



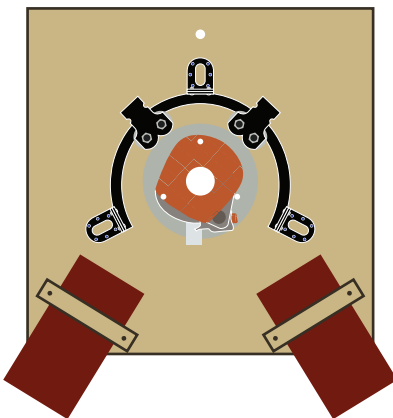
STEP 9 ATTACH BRICKS TO SLED

Bag #3 Nuts, bolts

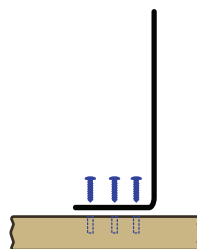
(2) brick holders

- Insert bolts through pre-drilled holes from bottom of sled through to the top
- Place bricks between bolts
- Place wooden brick retainers over bolts
- Secure with nuts

TOP VIEW



SIDE VIEW



STEP 10 ATTACH RING TO SLED

BAG #8 (18) small screws

- Place ring on sled centered around router
- Each L-bracket has six small holes, insert a small screw through each hole
- Fasten with Phillips-head screwdriver

NEXT STEP: INSTALLING THE Z-AXIS



TERMS OF USE

This work is licensed under the
CREATIVE COMMONS
Attribution-NonCommercial-NoDerivatives
4.0 International License

To view a copy of this license
visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>
or send a letter to
Creative Commons
PO Box 1866
Mountain View, CA 94042

YOU ARE FREE TO:

Share — copy and redistribute the material in any medium or format
The licensor cannot revoke these freedoms as long as you follow the license terms.

UNDER THE FOLLOWING TERMS:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for commercial purposes.

NoDerivatives — If you remix, transform, or build upon the material, you may not distribute the modified material.

No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

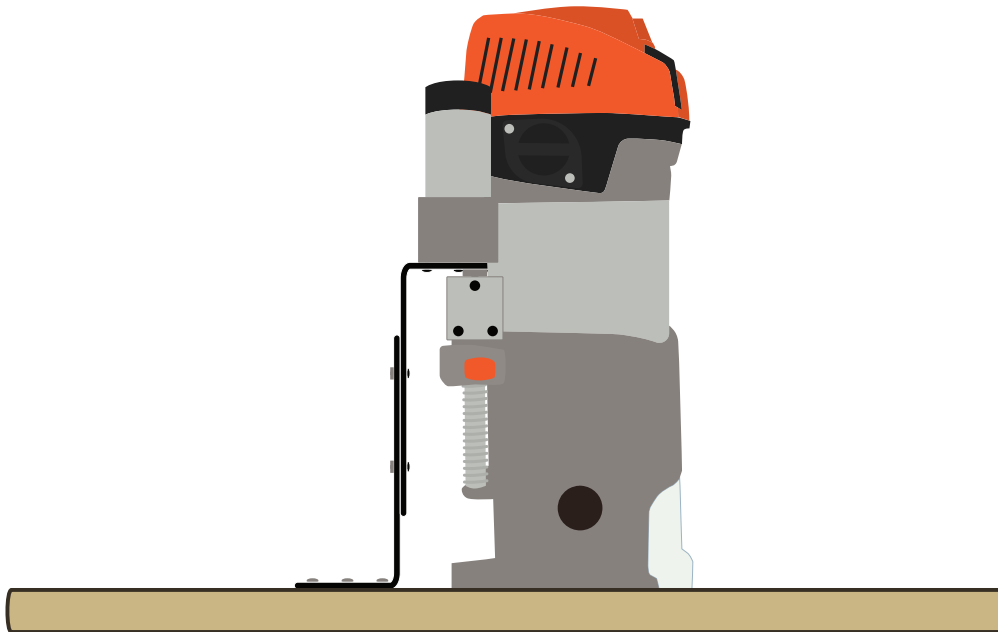
NOTICES:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.



FROM THE MAKERMADE LEARNING LIBRARY, WITH THANKS TO THE MASLOW COMMUNITY

1.4 INSTALLING THE Z AXIS



TOOLS NEEDED:

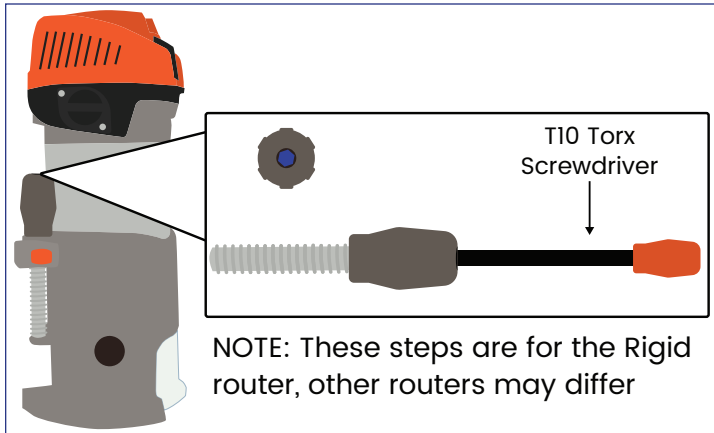
Phillips-head screwdriver
T10 Torx Screwdriver
Safety goggles
Computer or tablet
Ground Control software (free)

MATERIALS LIST:

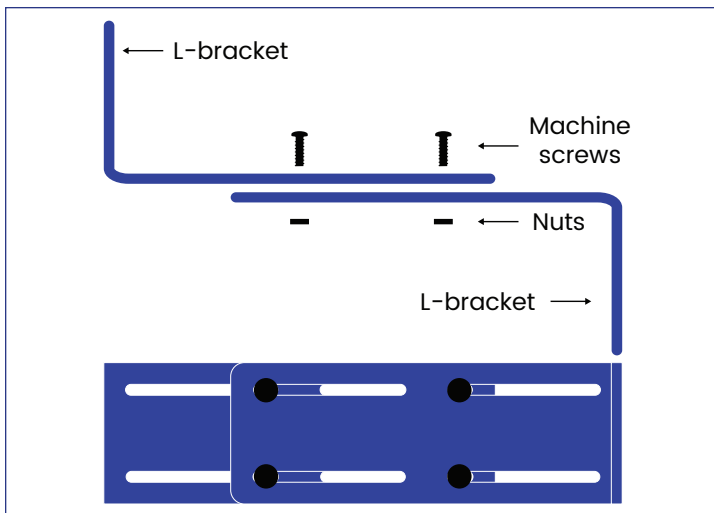
Part #14 Z Axis Motor
Part #15 Z Axis Motor Cable,
Part #16 Z Axis Motor Mounts (2)
Hardware Bag Z
(2) Zipties

In manual use, your router has a knob/screw assembly that you turn in order to move the bit up and down. The Z axis is designed to replace that, saving you painstaking manual adjustments

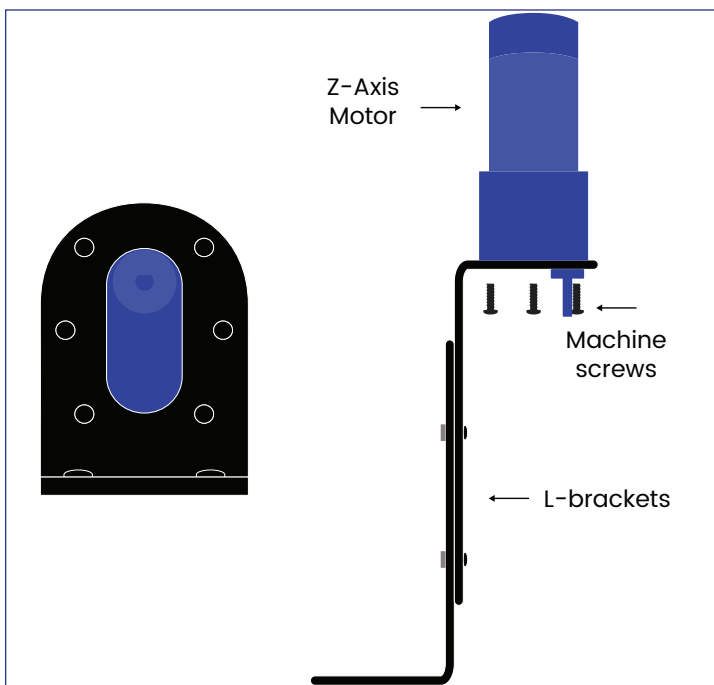
These instructions are tailored to the Rigid router, if you have a different router, procedure may vary.



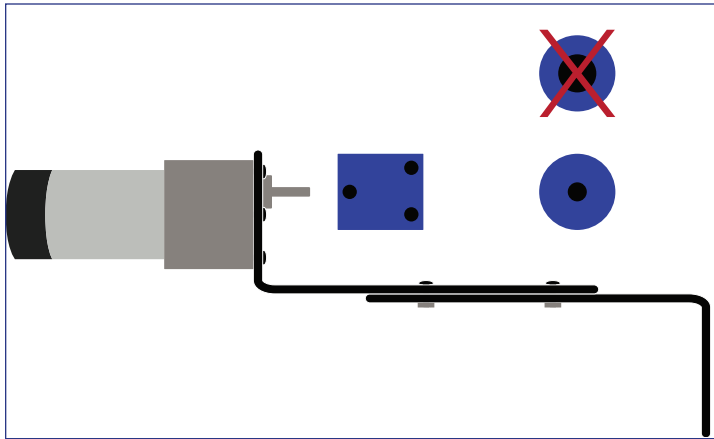
- STEP 1 REMOVE ROUTER ADJUSTMENT KNOB**
T10 Torx Screwdriver
- In the Rigid router, adjustment knob is dark gray, located on side of router
 - Insert T10 torx screwdriver into hole in top of adjustment knob
 - Loosen screw, remove knob
 - Save knob/screw in case you want to restore your router to manual control



- STEP 2 JOIN MOTOR MOUNTS**
Bag Z (4) bolts, (4) nuts
Bag #8 allen wrench
Part #16 Z Axis Motor Mounts (L-brackets)
- Place L-brackets back to front as shown, with lengthwise slots lined up
 - Insert bolts through slots in both brackets
 - Hold bolts steady with allen wrench
 - Twist nuts over end of bolts to secure
 - Leave loose for later adjustment



- STEP 3 ATTACH MOTOR TO MOUNTS**
Bag Z (6) screws
Part #14 Z Axis Motor
Phillips-head screwdriver
- Insert motor shaft through opening in bottom of L-bracket, from outside to inside
 - Align six small holes in bracket with matching holes in motor
 - Insert screws through holes
 - Tighten with Phillips-head screwdriver

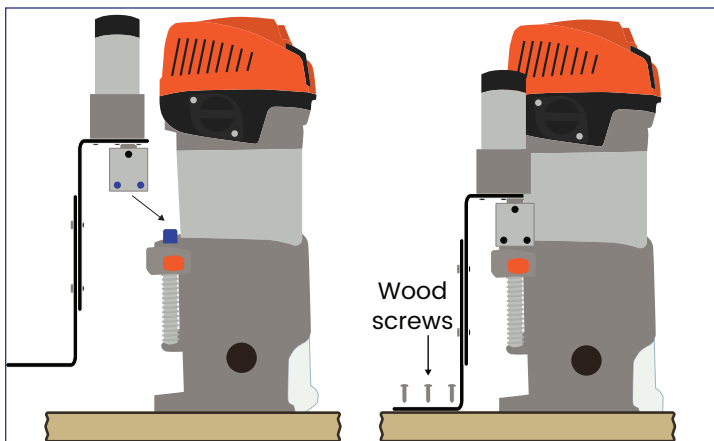


STEP 4 ATTACH THE SHAFT COUPLER

Bag Z shaft coupler

Bag #8 allen wrench

- Shaft coupler has a larger hole on one end, a smaller hole on the other end
- Slide end with smaller hole over motor shaft
- Use allen wrench to tighten set screw nearest to motor
- Leave other 2 set screws as is until Step 5



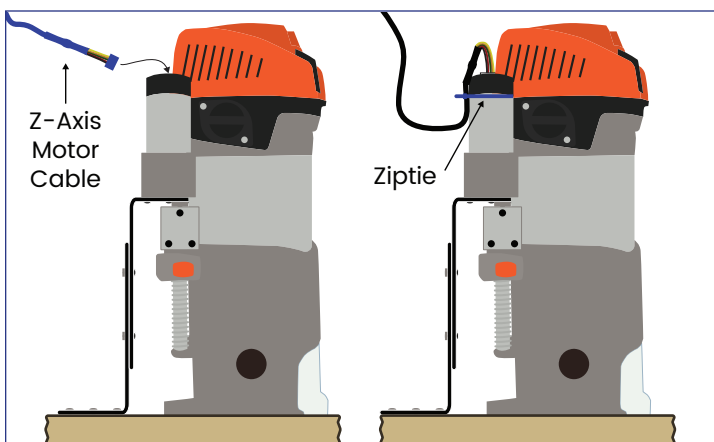
STEP 5 ATTACH Z AXIS TO ROUTER AND SLED

Bag Z (6) wood screws

Bag #8 allen wrench

Phillips-head screwdriver

- Slide free end of shaft coupler over adjustment screw on router
- Use allen wrench to tighten 2 set screws to engage shaft coupler with router
- If unable to reach a screw, leave it for later when the motor gets rotated
- Adjust/slide L-brackets so bottom bracket rests on sled
- Insert wood screws through small holes in bottom of L-bracket, screw into wood of sled

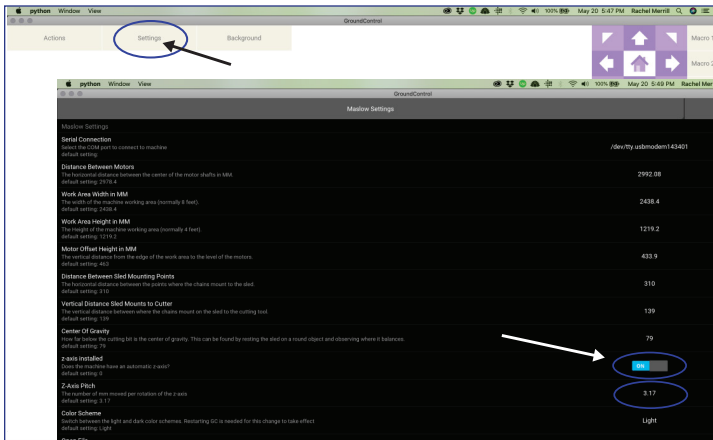


STEP 6 ATTACH MOTOR CABLE

Bag #2 zip tie

Part #15 Z Axis Motor Cable

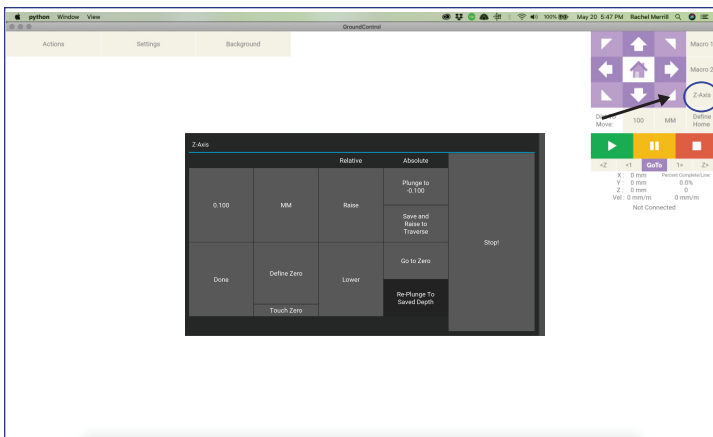
- Insert one end of motor cable into end of Z Axis motor
- Insert other end of cable into MP2 slot on Arduino
- Use zip tie to secure cable to motor to provide relief from strain as sled moves



STEP 7 ENABLE THE Z AXIS IN SETTINGS

Computer or tablet
Ground Control software

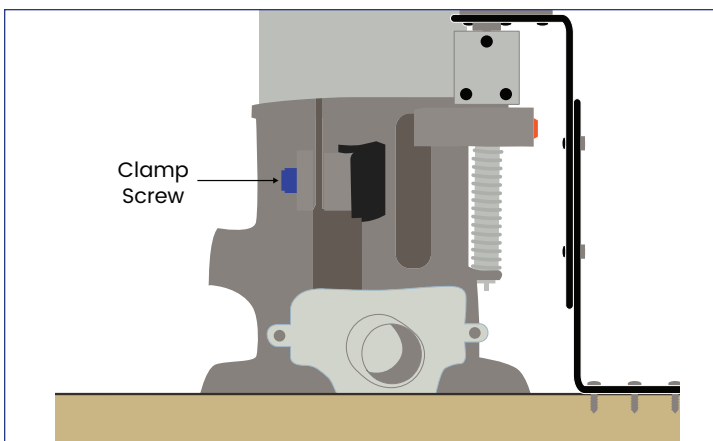
- Open Ground Control
- From main screen, click Settings
- Scroll down to “z-axis installed”
- Click switch to “on”
- Directly below, check “z-axis pitch” setting
- For Rigid router, setting should be 3.17
- If using another router, check markings on knob removed from router. It should indicate the distance per-rotation, ie how far down the bit goes each time the handle is fully rotated



STEP 8 TIGHTEN SHAFT COUPLER

Bag #8 allen wrench
Computer or tablet
Ground Control software

- If a set screw in the shaft coupler still needs to be tightened-
- Rotate shaft coupler to access it using z-axis buttons in Ground Control
- Tighten with allen wrench



STEP 9 LOOSEN ROUTER CLAMP

Phillip's head screwdriver

- On Rigid router, clamping mechanism must be adjusted to allow movement
- Loosen screw on inside of clamp
- Correct tension will allow router to move freely but not wiggle

NEXT STEP: CALIBRATING YOUR MASLOW

TERMS OF USE

This work is licensed under the
CREATIVE COMMONS
Attribution-NonCommercial-NoDerivatives
4.0 International License

To view a copy of this license
visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>
or send a letter to
Creative Commons
PO Box 1866
Mountain View, CA 94042

YOU ARE FREE TO:

Share — copy and redistribute the material in any medium or format
The licensor cannot revoke these freedoms as long as you follow the license terms.

UNDER THE FOLLOWING TERMS:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for commercial purposes.

NoDerivatives — If you remix, transform, or build upon the material, you may not distribute the modified material.

No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

NOTICES:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.



FROM THE MAKERMADE LEARNING LIBRARY, SPECIAL THANKS TO USER MADGRIZZLE

1.5 CALIBRATING YOUR MASLOW



TOOLS NEEDED:

Maslow CNC
Router, .25" bit
Safety goggles
Protective gloves
Screwdrivers

Power Drill, .5" bit
Hardware and components from kit
Computer or tablet
Ground Control software

MATERIALS LIST:

(1) 4x8 plywood, .75" thick*
(1) .5" carriage bolt

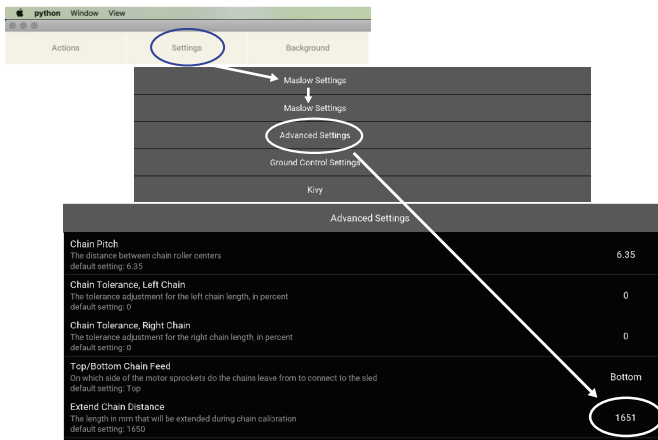
Calibration is the step that sets your machine up so it will cut designs accurately. Calibration is of paramount importance and is probably the most difficult, and sometimes frustrating, part of owning a Maslow. **Because every user sets up their own frame, there are a lot of varying factors that may cause temporary hiccups.** If you do get frustrated, take a break and come back to it.

NOTE: SLED/ CHAINS SHOULD NOT BE ATTACHED TO FRAME AT THIS POINT!

If they were attached previously, remove them before proceeding

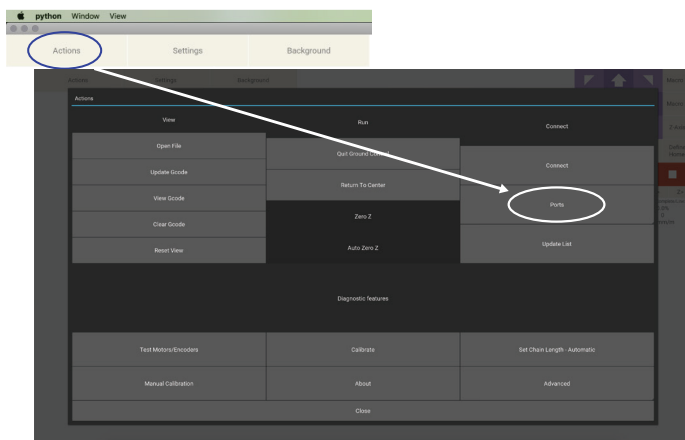
Observe proper safety precautions, including wearing safety goggles and protective gloves especially anytime chains are attached and moving

STEP 1: OPEN GROUND CONTROL TO BEGIN!



STEP 2: CHANGE EXTEND CHAIN DISTANCE

- Go to SETTINGS at top left of screen
- Find Extend Chain Distance
- Click MASLOW SETTINGS at top of screen
- Click ADVANCED SETTINGS
- Find EXTEND CHAIN DISTANCE, set to 1651
- If using an alternate setup, setting should be a multiple of 63.5 MM, approximate distance from motor sprocket to where ring sled will rest in center of plywood.



STEP 3: CONNECT PORT

- Go to ACTIONS->PORT
- Click on the port that you set up previously when you set up the electronics
- If you don't see the correct port, click UPDATE LIST
- Once port is selected, click CONNECT

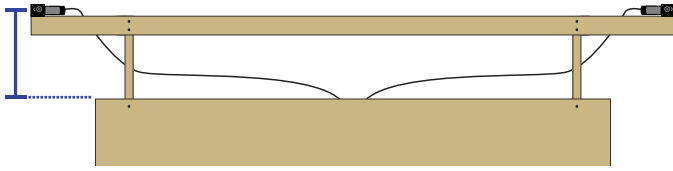
STEP 4: INTRODUCTION

- Read instructions,
- Click BEGIN

NOTE: For a variety of reasons you may have to run the calibration process more than once. If so, there are some steps you can skip. This manual will give you guidance on which you can skip and which you can't. YOU MAY ONLY SKIP STEPS IF IT'S NOT YOUR FIRST TIME CALIBRATING

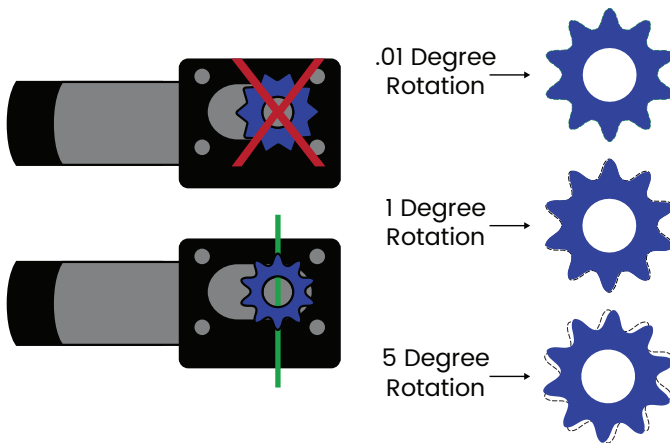
STEP 5: CHAIN ATTACHMENT METHOD

- If using the ring that MakerMade shipped with your kit, choose TRIANGULAR
 - If using a custom setup, it's probably still TRIANGULAR
- SKIP if you've done this before, and haven't changed your setup. This is true for all subsequent "Skip" instructions.*



STEP 6: DISTANCE FROM MOTOR TO PLYWOOD

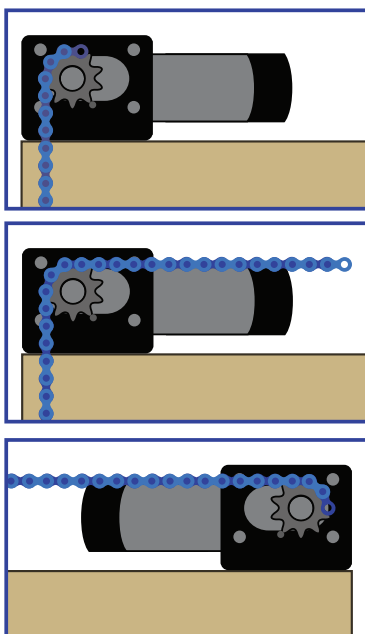
- Measure approximate distance from center of motor shaft to top of plywood, value will be fine tuned during calibration
 - CONVERT TO MM! 1 IN = 25.4 MM
 - Click ENTER MEASUREMENT
 - Enter measurement, click DONE
- SKIP, if measurement hasn't changed since previous calibration procedures*



STEP 7: SET SPROCKETS VERTICAL

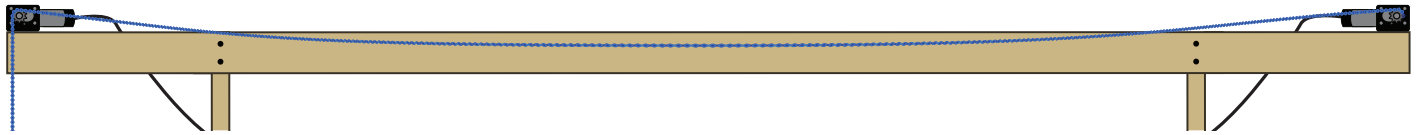
- The goal is to get one tooth on each motor sprocket pointing straight up, 12:00 position
 - Buttons rotate sprocket to specified degree
 - CW = clockwise) CCW = counter-clockwise
 - Eyeballing is fine, just get it close
 - Click SET ZERO
 - Don't use AUTOMATIC button
- SKIP, if there have been no "location lost" errors in previous procedures or errors with chains skipping or tangling*

NOTE: USE EXTEND BUTTON TO FEED OUT CHAIN for the following steps. Draping chains over sprocket manually then clicking PULL CHAIN TIGHT & MEASURE will not work.



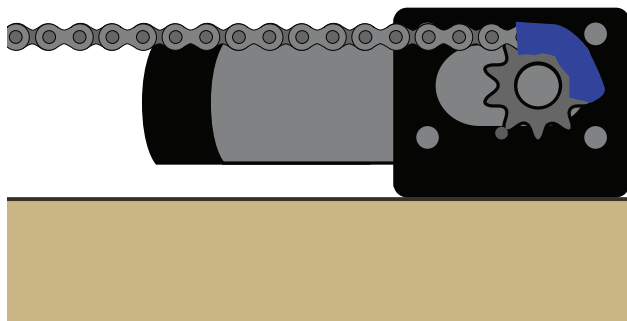
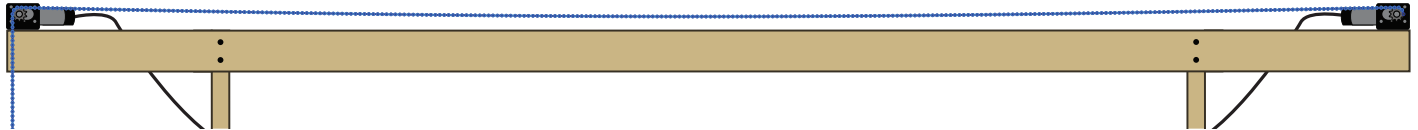
STEP 8: DISTANCE BETWEEN MOTORS

- Place first link of left chain on left sprocket
- Click EXTEND
- Left sprocket will rotate clockwise and feed out 100 mm of chain
- Hold chain to make sure it doesn't wrap around sprocket.
- Change value to "1000 mm"
- Click EXTEND 3 times more, still holding onto chain, keeping tension on it
- Chain should now reach first link on right sprocket
- If not, change 1000 mm value to 10 mm, click it until it does
- Place end of left chain on right sprocket



STEP 9: SCREEN 5 MEASURING DISTANCE BETWEEN MOTORS

- If value is still at 1000mm change to 10 MM
- Click RETRACT until most, but not all slack is gone

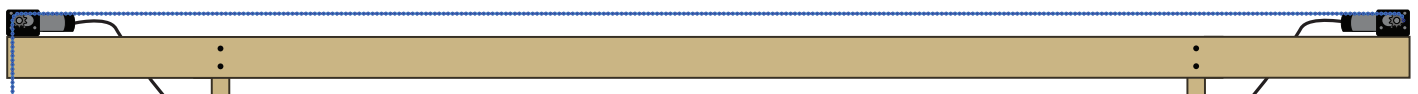


CAUTION: during the next step, the chain may come off the right sprocket. It can be under a lot of tension and if it comes off, make sure you're not within range

A carefully placed small piece of duct tape may provide some stability. Just be sure the tape doesn't interfere with movement of the sprocket.

STEP 10: SCREEN 5 MEASURING DISTANCE BETWEEN MOTORS

- Pay attention to motors and frame during this time, if motors move or frame flexes, make adjustments to your frame so this doesn't happen
- Click PULL CHAIN TIGHT AND MEASURE. During this step, slack will be taken up and software will determine, distance between motors based upon how much chain is fed out.



- Chain will slacken up when operation is done



- Remove chain from frame, set aside until later

STEP 11: SCREEN 6: PICK CHAIN FEED ARRANGEMENT

- If using default frame, Click CHAIN OFF BOTTOM

SKIP- if you've done this before

STEP 12: SCREEN 7- REVIEW THE MEASUREMENTS

- For future reference- jot down numbers, screenshot, or take a picture
- If numbers look off, click back button to go back and redo steps related to any numbers that look off
- If numbers look good, click LOOKS GOOD

SOME BALLPARK PARAMETERS FOR NUMBERS:

Distance btwn motors = <3048 MM if using 10' top beam, <3568 MM for 12' top beam

Vertical motor offset = # entered in Step 3

Kinematic type = Triangular

Chain feed type = Bottom

Rotation radius = 140 mm

Chain sag correction value = varies

STEP 13: SCREEN 8- GENERATE CALIBRATION PROCEDURE

- The machine is doing all the work here,
- Take a deep breath, relax for a minute

DON'T SKIP

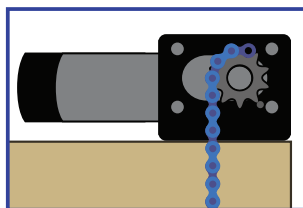
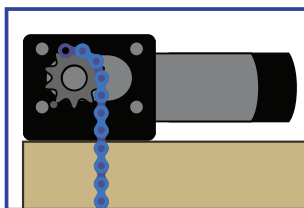
STEP 14: SCREEN 9- SET SPROCKETS VERTICAL

- Same procedure as Step 4
 - This time it may work to hit AUTOMATIC
 - If it doesn't work, don't panic
 - Re-adjust sprockets with buttons as before
 - When sprockets are in place, click SET ZERO
- SKIP only if chains are attached to sled because you skipped other steps*

STEP 15: SCREEN 10- ENTER ROTATIONAL RADIUS ESTIMATE

- Use numbers given on screen
- Click ENTER MEASUREMENT and enter appropriate value for your kit
- Click NEXT

SKIP- if you've done this before



STEP 16: SCREEN 11- ADJUST CHAIN LENGTHS

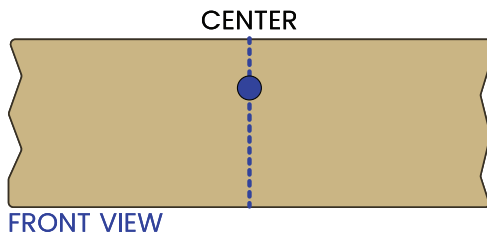
- Place left chain on left sprocket as shown
- Click ADJUST LEFT CHAIN while holding on to left chain to prevent wrapping
- Left sprocket will turn counter-clockwise and extend chain to a determined length
- Repeat with right chain

SKIP only if chains are attached to sled because you skipped other steps

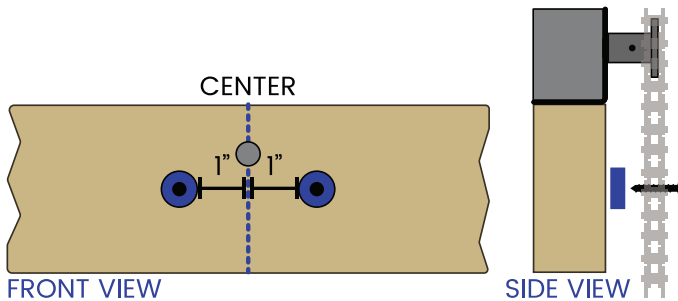
NEXT YOU'LL ATTACH THE SLED TO THE CHAINS, LEAVE CHAINS EXACTLY WHERE THEY ARE

DO NOT CHANGE THEIR POSITION ON THE SPROCKETS!

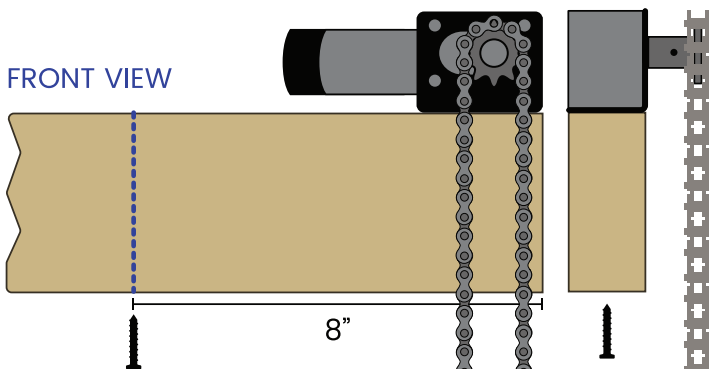




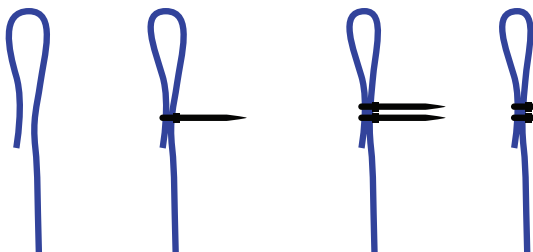
- STEP 17: INSTALL BOLT FOR SLED**
BAG #2 pulleys, BAG #4 wood screws
- Mark center front of top beam, about .5" from top edge
 - With .5" drill bit, drill hole in marked spot
 - Insert .5" carriage bolt into hole
 - Secure with nut



- STEP 18: INSTALL PULLEYS FOR CABLES**
BAG #2 pulleys, BAG #4 wood screws
- Use center beam mark from Step 17
 - Mark 1" to the left, 1" to the right
 - Insert a screw through center of each pulley
 - Screw into marked spots



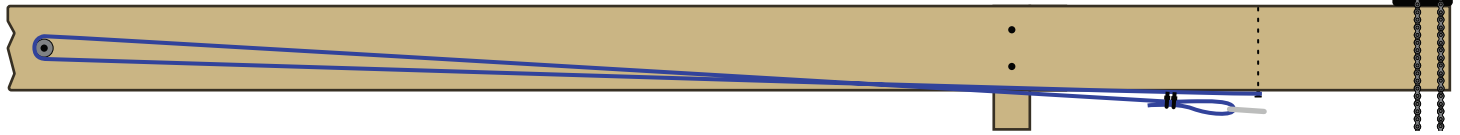
- STEP 19: INSTALL CHAIN HARDWARE**
BAG #4 wood screws
- Mark 8" from end of top beam
 - Insert wood screw in marked spot on underside of top beam
 - Leave it protruding about .25"



- STEP 20: PREPARE STRETCHY CORDS**
BAG #2 stretchy cord, zip ties
- Fold over end of stretchy cord 3", fasten with zip ties
 - Trim ends of zip ties, repeat on all cord ends

STEP 21: ATTACH STRETCHY CORD TO FRAME

Bag #1 S hooks 1. Loop stretchy cord around center pulley



BOTTOM VIEW

2. Loop one end of stretchy cord to screw under beam

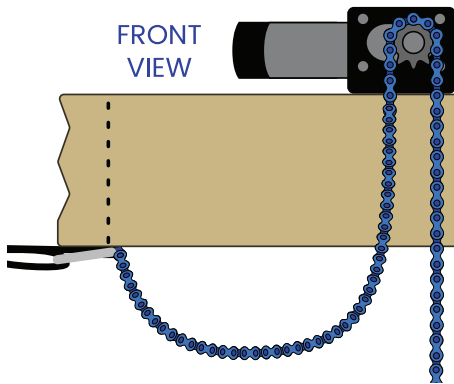


3. Insert S-hook in free loop on other end of cord

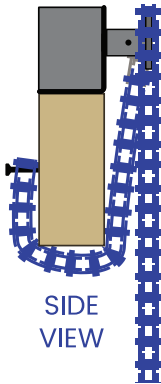


BOTTOM VIEW

4. Hook temporarily to same screw as first loop



FRONT VIEW



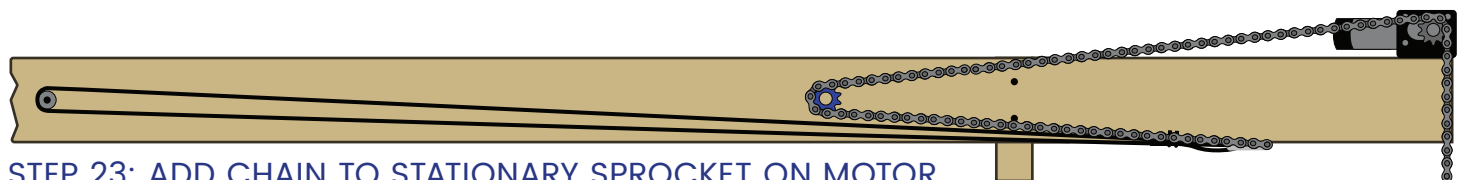
SIDE VIEW

STEP 22: ATTACH CHAIN TO MOTOR

BAG #1 small nails

PART #3 Chains

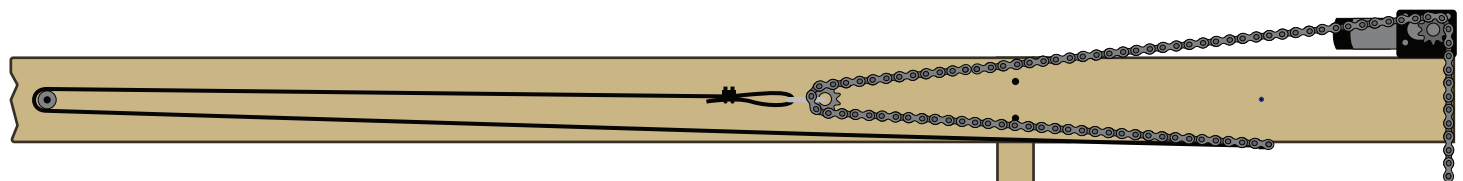
- DO NOT CHANGE POSITION OF CHAIN ON SPROCKET
- Pick up inside end of chain
- Insert small nail through circular piece at other end of chain
- Hammer into center of beam 8" from end



STEP 23: ADD CHAIN TO STATIONARY SPROCKET ON MOTOR

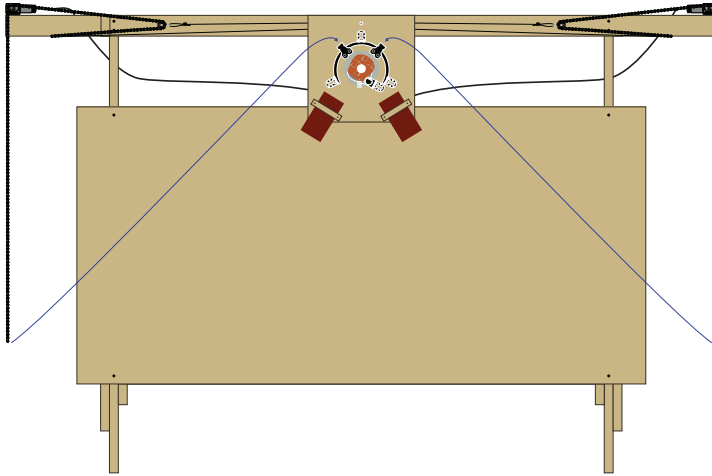
BAG #1 sprockets

- Grab bottom of "u" of hanging chain, pull up and over nail towards center of frame
- Place sprocket in loop of chain, holding onto sprocket and chain for next step



STEP 24: CONNECT CHAIN TO STRETCHY CORD

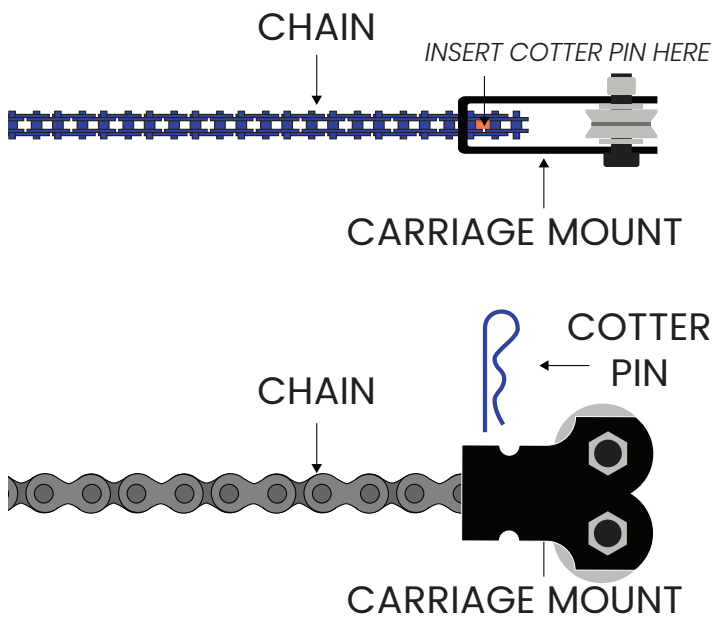
- Hold chain and sprocket with one hand, grab s-hook from bottom nail with other hand
- Insert s-hook through center of sprocket



STEP 25: ATTACH CHAINS TO SLED

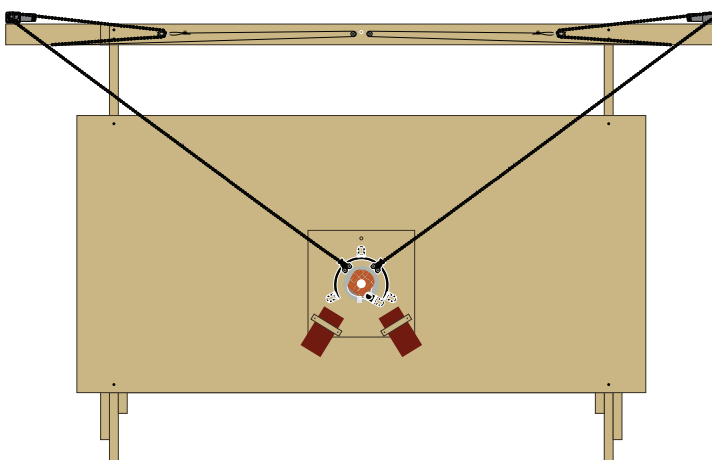
- Carefully hang sled on bolt in top beam
- This is optional, but very helpful, as it may be impossible for one person to balance the heavy sled assembly while pulling the chains through the carriage mounts
- A step ladder is also helpful here

THIS IS A GOOD TIME TO MAKE SURE THAT YOU'VE LOADED A WORKING PIECE OF PLYWOOD ONTO YOUR FRAME IF YOU DON'T WANT THE TEST CUTS TO BE MADE INTO YOUR BACKING PLYWOOD



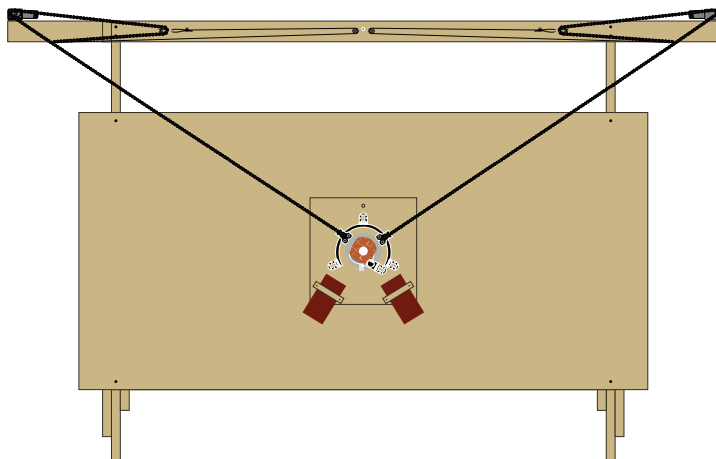
STEP 26: ATTACH CHAINS TO SLED

- Grab dangling end of left chain, thread through hole in end of carriage mount
- Insert cottoer pin to fasten chain
- DO NOT USE OPEN LINK AT END OF CHAIN, GO BACK TO LAST FULL LINK
- Repeat with right chain
- Gently lift sled off bolt and allow weight of sled to hang from chains
- Sled should rest against plywood now



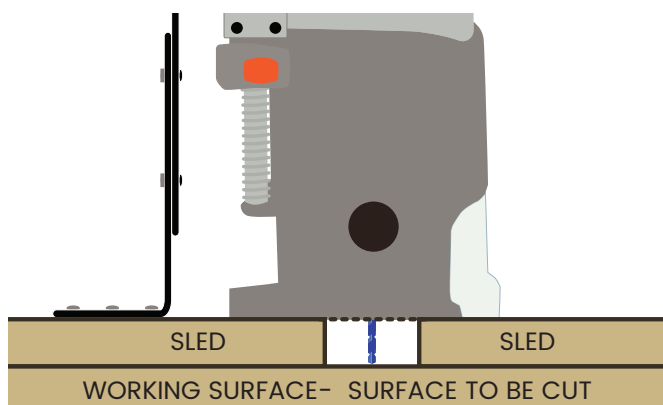
STEP 27: ADJUSTING THE RING

- Router should hang vertically
- If it's tilted, loosen bolts on L-brackets
- Move ring up or down on brackets until sled rests against plywood without tilting away



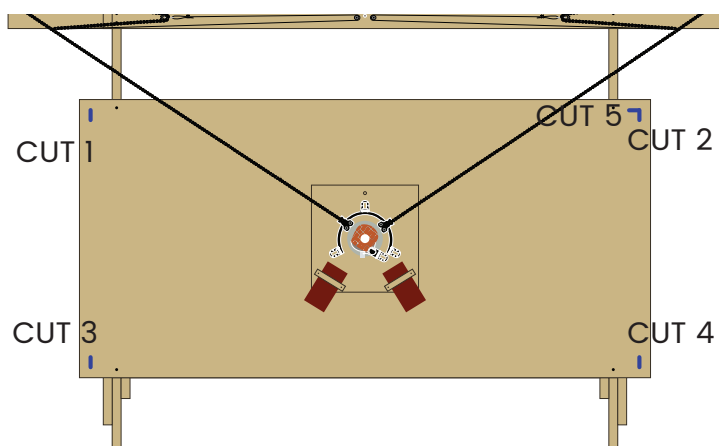
STEP 28: MOVE SLED TO CENTER

- Return to Ground Control screen
- Click MOVE TO CENTER
- Sled should move to center of plywood
- Click NEXT



STEP 29: SET HOME POSITION FOR Z-AXIS

- If Z-Axis is installed, make sure ENABLE AUTOMATIC Z-AXIS is turned on
- Click ADJUST Z-AXIS until router bit just touches surface of wood
- If Z-Axis is not installed, adjust bit depth manually
- Click DEFINE ZERO



STEP 30: RUN TEST PATTERN

- With router bit at zero, turn router on
- Click CUT TEST PATTERN
- The Maslow will now cut 5 shapes as shown

STAY CLEAR OF MACHINE WHILE PATTERN RUNS, IF CHAINS WRAP AROUND SPROCKETS OR ANYTHING ELSE HAPPENS, CLICK "STOP CUT" THEN TURN ROUTER OFF BEFORE TOUCHING CHAINS OR ANY OTHER MOVING PART

STEP 31: ENTER MEASUREMENTS

- When pattern stops, follow onscreen instructions for measuring
- Measuring distance and entering distance between cuts helps software dial in machine settings

STEP 32: REVIEW MEASUREMENTS

- Same as STEP 7, if they look wonky, go back and redo steps related to numbers that are off
- If they look good, jot them down
- Click LOOKS GOOD

CALIBRATION COMPLETE!



TERMS OF USE

This work is licensed under the
CREATIVE COMMONS
Attribution-NonCommercial-NoDerivatives
4.0 International License

To view a copy of this license
visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>
or send a letter to
Creative Commons
PO Box 1866
Mountain View, CA 94042

YOU ARE FREE TO:

Share – copy and redistribute the material in any medium or format
The licensor cannot revoke these freedoms as long as you follow the license terms.

UNDER THE FOLLOWING TERMS:

Attribution – You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial – You may not use the material for commercial purposes.

NoDerivatives – If you remix, transform, or build upon the material, you may not distribute the modified material.

No additional restrictions – You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

NOTICES:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.



DESIGN BY THE MASLOW COMMUNITY, PARTICULARLY USERS DLANG AND MADGRIZZLE

1.6 BUILDING THE FINAL SLED



TOOLS NEEDED:

Router, .25" router bit
Screwdrivers
Power Drill, .25" drill bit
Sandpaper
Socket wrench, various sizes

5/16 Allen Wrench
Pencil
Safety goggles
Clamps (optional)

Difficulty Level



Precision Level

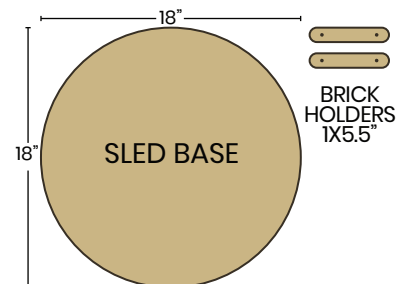


MATERIALS LIST:

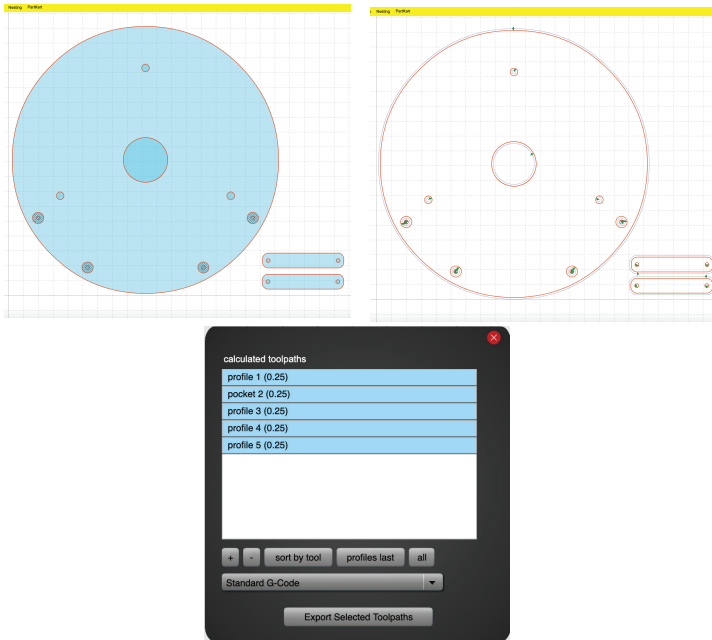
- (1) 4x8 Plywood, .75" thick*
- (2) Bricks**
- (3) Size 10-32 Machine Screws

CUT LIST:

- (1) 18x18" circle
 - (2) 1x5.5" rectangles
- If using MakerMade metal brick holders or pre-made sled these pieces aren't needed*

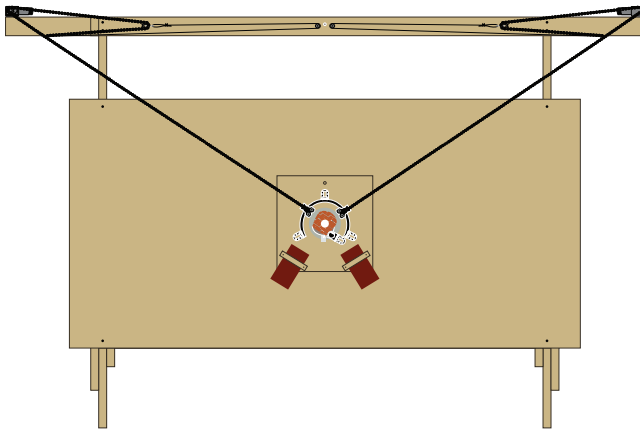


**If you have scrap plywood on hand, it's not necessary to buy a whole sheet of plywood*
***If using MakerMade metal brickholders bricks should be no more than 4.5" wide, you can re-use bricks from temporary sled*



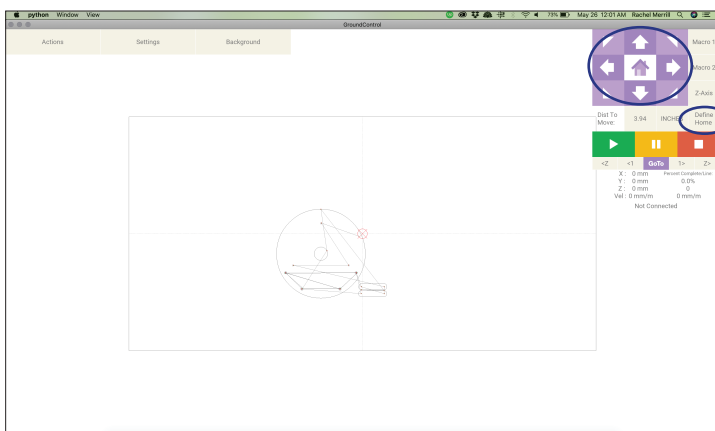
STEP 1 GENERATE G-CODE FOR SLED FILES

- Download sledfiles.zip at Github/MaslowCNC/Mechanics/SVG Files
- Unzip folder, locate svg file for sled- New Sled With Tool Paths.svg
- Open makercam.com in a browser window
- Click FILE->OPEN SVG File, select sled file, shapes should open up as shown on left
- This file already has toolpaths set, so click CAM->CALCULATE ALL
- Blue paths will appear, showing path of the router, green arrows indicate cut direction
- Click CAM -> EXPORT GCODE
- Click SELECT ALL to select all of the paths
- Click EXPORT SELECTED TOOLPATHS
- Save to your desktop as .nc file



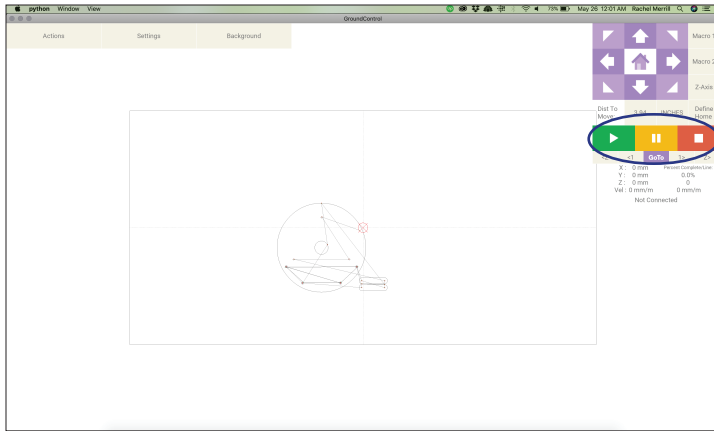
STEP 2 LOAD PLYWOOD ONTO MASLOW

- Hang sled on bolt in center of top beam to keep it out of the way
- Load plywood onto frame
- Remove sled from bolt and gently bring it to rest against plywood
- A full sheet of plywood is not necessary, but may be easier to work with
- This is a SECOND piece of plywood, in addition to the plywood used as backing for your frame



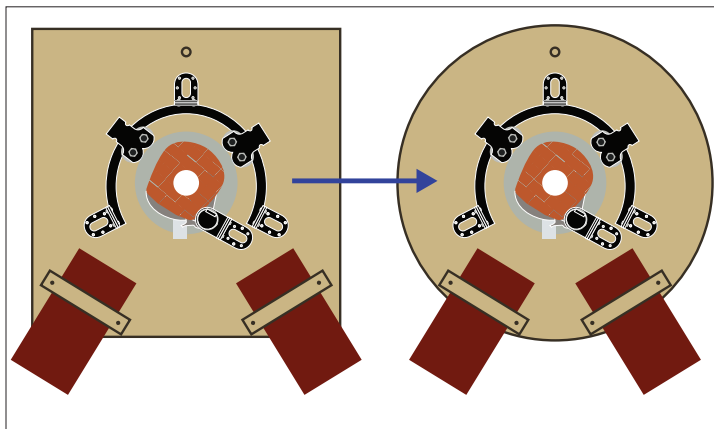
STEP 3 OPEN FILE IN GROUND CONTROL

- Click ACTIONS-> OPEN FILE
- If using scrap plywood it may be necessary to reposition the design
- Move sled to desired position on plywood using arrow keys in top right corner of Ground Control
- Sled will be cut to the left and down from beginning sled position
- When router is in desired position, click DEFINE HOME



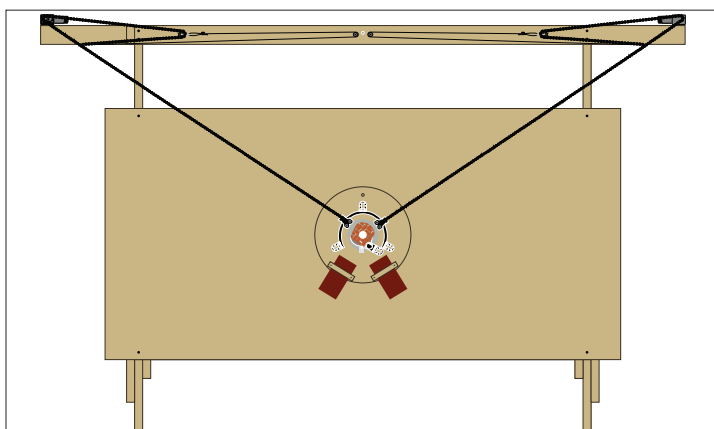
STEP 4 CUT THE SLED

- Turn router on
- In Ground Control, click green arrow button
- Router will move through pattern
- Do not leave Maslow unattended while work is in progress
- If you need to leave for any reason, click yellow pause button, turn router off
- If shapes appear off, click red stop button and troubleshoot
- If you began the cut, then stopped because it was off, when you start again you can move your sled to a new area of your plywood, then re-define HOME



STEP 5 ASSEMBLE FINAL SLED

- Once pieces are cut, turn router off
- Hang temporary sled on bolt in top beam
- Remove chains from carriage mounts
- Remove sled from bolt, set on workbench
- Remove bolts holding bricks, router, and ring kit to temporary sled
- Transfer everything to final sled, referencing instructions in Temporary Sled section if needed
- Sled will slide across the work area more smoothly with a rounded edge
- Use sandpaper to round the edge



STEP 6 ATTACH FINAL SLED TO FRAME

- Hang final sled on bolt in top beam
- Attach chains to sled, referencing instructions in Temporary Sled section if needed
- Remove sled from bolt and gently lay against work surface
- You're now ready to begin making amazing projects!!

TERMS OF USE

This work is licensed under the
CREATIVE COMMONS
Attribution-NonCommercial-NoDerivatives
4.0 International License

To view a copy of this license
visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>
or send a letter to
Creative Commons
PO Box 1866
Mountain View, CA 94042

YOU ARE FREE TO:

Share — copy and redistribute the material in any medium or format
The licensor cannot revoke these freedoms as long as you follow the license terms.

UNDER THE FOLLOWING TERMS:

Attribution — You must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use.

NonCommercial — You may not use the material for commercial purposes.

NoDerivatives — If you remix, transform, or build upon the material, you may not distribute the modified material.

No additional restrictions — You may not apply legal terms or technological measures that legally restrict others from doing anything the license permits.

NOTICES:

You do not have to comply with the license for elements of the material in the public domain or where your use is permitted by an applicable exception or limitation. No warranties are given. The license may not give you all of the permissions necessary for your intended use. For example, other rights such as publicity, privacy, or moral rights may limit how you use the material.

