

Welding Instructions for U-Weld Grinder

Prep the surfaces for welding by grinding away any foundry scale left on the parts. Clean, bare metal welds better than dirty metal. Generally, you will be welding 3/16" and 1/4" stock. Set your welder accordingly. A big hot welder can burn through the foundry scale but a smaller welder will struggle here. If you do not clean up the foundry scale now, you will spend that time cleaning up splatter and dodgy welds later.

Lay out and identify your parts to be welded. Most parts are asymmetrical and require you orient them properly.

Check on www.Knifedogs.com forum for additional pictures, videos and instructions! This will be our main support channel.

It is assumed the builder has at least some welding experience and appropriate welding equipment. If you are using a Harbor Freight 110v MIG flux core welder, you will need to hit every joint with a propane torch first to heat things up first. The HF 110v cheap welder can weld this thick but it needs a little help with some heat.

If you have never welded, get a buddy that has experience to help. The entire weld time is less than an hour. A 12 pack of beer should cover it.

BUTTON WELDS: It is important you only button weld the tab and slot grinder assembly at first. It is nearly impossible make corrections if you fill in weld the entire tab and slot on the first pass. Welding will take 30 to 60 minutes depending on your experience and there is no time saved by skipping the button weld step.



A button weld in the notch on the tab is all we want right now. It will be more than strong enough for assembly.

FITMENT: Each tab and slot should be flush and plumb. It may fit together easy enough but check it visually. I've welded a couple of these a bit crooked because I didn't look and the tab didn't seat completely. Look to see the tabs are fully seated! A few hammer taps usually seats the tab fully. If the tab is not seating fully, you may need widen the slot slightly. Use a file, rotary tool or a cut off disc on an angle grinder to slightly enlarge the slot. You can also thin the tabs slightly. We have adjusted the slot size to fit snug, a few taps of persuasion with a hammer may help seat the tabs. This is intentional.

(insert example pics of tab fitment)

TOOL BAR HOLDER: Begin assembly by installing and welding the 2 slot tool bar holder.



Locate the three "tool bar holders" and install into slots on main plate. Be sure the "short" side is toward the motor for clearance. Short side means one tab is closer to the end of the part.





(insert pic of main plate with 3 holders in tab slots and cage plate to the side)

Install the cage plate over the three tool bar holders. The tabs should all line up in the main plate and cage plate. Note there is a “long” side and “short” side on the cage plate. Make sure it is “short” side towards the motor. A few taps with a hammer will likely be needed to seat all of the tabs fully into the slots. Clamp it all together and give it 6 button welds. Note the tab location. The “short” side is by the motor.



Clamps are your friend here. Clamp the sub assembly together and button weld it.





Make sure your parts are all square. Tap in place with a hammer. Button weld into the notch on the tabs.

RETAINING NUTS: Weld 6ea $\frac{1}{2}$ "-13 retaining nuts onto the $\frac{1}{2}$ " holes in the assembly. 2 on the cage plate and 4 on the main plate. Make sure the nut is centered on the hole by threading a bolt onto the nut and the placing the bolt into the hole. Hold the bolt/nut in place and give it a stitch weld.

(insert pic of bolt on nut over hole)

Weld the retaining nuts to the main plate on the wheel side and to the cage plate on the motor side. These nuts are zinc plated so don't breathe in the fumes.



These cheap step drills can be used to enlarge an undersized hole. You should not need to enlarge any holes but just in case there is a piece of stubborn dross left from the cutting process.

MAIN PLATE ARC SWIVEL BRACKETS: Button weld the arc swivel brackets to the main plate. Note the orientation with the $\frac{1}{2}$ " hole at the top of the bracket.



There are two holes and a slot arc in this part. The $\frac{1}{4}$ " hole will be used later to locate and drill a mating hole in the vertical support bracket.

TENSION ARM SWIVEL BRACKETS: Identify the motor side and wheel side on the tension arm. Button weld the two swivel brackets to the tension arm on the wheel side.



FOOT PAD: Locate the foot pads and vertical support brackets and button weld them.



OPTIONAL ADJUSTABLE TOOL REST: If you have the optional adjustable tool rest, weld this together now. Weld the 1.75"x1.75" x 5" tube to the tool arm. Orient the tightening hole to the left or right side according to your preference and weld the retaining nut in place.

(insert pic of optional adjustable tool rest here)

STATIC TOOL REST: Weld the 1/2" tool rest plate to the top of the 1.75" square tube. Weld the table so it centers on the platen or wheel of your grinder.

(insert pic of static tool rest here)

STAR HANDLES: Lay your 3 star handles on your welding table, place the 1/2"-13 x 1" bolts into the hex cut out and weld the bolts to the star cut out. I prefer to weld on the thread side, you may want to weld on the bolt head side. If you do weld on the thread side, protect the threads from weld splatter using anti-splatter or tape.



The edges on the star handles can be sharp. Break the edges on your existing grinder or when your newly built grinder is finished round the edges with a slack belt. You will really want to do this.

That completes the initial welding. The grinder can now be fully assembled and tested for fitment. After making any adjustments to square things up, finish your welds by filling in the rest of the slot and tab locations.

Assembly of the U-Weld-Grinder

After you have completed the button welding (but not fully welded) your grinder kit we move to assembly.

SORT PARTS: Identify and sort the supplied fasteners. You might have some washers left over after assembly from wheel alignment, but all the nuts and bolts should be used. We use ½"-13, 3/8"-16 and ¼"-20 nuts and bolts.

ATTACH VERTICAL SUPPORTS: Begin by using ½" x 1" bolts with washers and lock nuts, attach the vertical support assemblies (vertical bracket and foot pad already welded) to the swivel arc bracket that is welded to the main plate.



The ½" bolts act as a pivot for the grinder to swivel to horizontal. The arc has a slot for a 3/8"x1" bolt and nut. Tighten this enough so the grinder swivels but doesn't wobble around. Put these bolts in both of the vertical supports. The ¼" stainless rod is the index rod and holds the grinder in a vertical position. We supply a simple ¼" stainless pin but you might want to fancy this up.

Note the swivel bracket is placed in "front" of the vertical support bracket. This allows you to drill the index hole for that pin later.

Using the 3/8"-16x1" bolts, place one bolt, washers and nut through each arc slot to the vertical support bracket. Once the motor is attached, the grinder body will want to flip to horizontal mode until we drill our hold pin hole. Tighten these bolts for now. You will loosen them when we need to drill the index pin. These bolts are just to dampen any vibrations and most likely will never be tightened beyond finger tight. If your grinder is dedicated to vertical or horizontal positions you can tighten these up and ignore them.

MARK YOUR BENCH MOUNTING HOLES: Now, with just the main plate attached to the vertical supports, place your grinder frame on your bench (or tool table) and mark your mounting holes

while it is easy to move around. Note your motor must clear the bench unless you have the optional 12" vertical mounts. We do not supply mounting bolts for this as we have no idea how you intend to mount your grinder. You can finish the build attached to your tool table or bench or attach it most any time in the build process

The grinder must be mounted so the motor can swivel down. If you can't change the bench or tool table for this, we offer the optional 12" vertical support and foot in $\frac{1}{4}$ " plate to accommodate the motor length so it can swivel over a bench top.



Optional 12" vertical support mounts for builds that have the motor swinging over the top of the bench.

MOUNT THE MOTOR: Mount your 56C faced motor to the main plain plate. See picture for orientation. The standard mounting screws in the motor are $\frac{3}{8}$ "-16x3/4" and we have supplied four of them along with washers.

ATTACH TENSION ARM: Using ½"-13x1.5" bolt, attach the tension arm to the main plate. Note the washer spacing in the picture. Depending on how things welded up, your washer count for spacing will vary.



The additional washers I am pointing to are simply for tracking wheel alignment. Use a locking nut.

Attach the handle to the tension arm. Hold off attaching the gas strut until the end. It just makes things a bit easier.



SWIVEL BLOCK ASSEMBLY: Attach the aluminum swivel block using the $\frac{1}{4}$ "-20x3" bolt, nut and washers to the tension arm swivel brackets. Use a washer between the brackets and block. Use the supplied locking nut. The aluminum block has a rounded top and bottom. Place the rounded side next to the tension arm. The rounding of the top and bottom is to allow a bit more swivel to the assembly for tracking.



Attach a star
to the motor
the tension



handle
side of
arm.



IDLER WHEEL ASSEMBLY: Using a $\frac{1}{2}$ "-13x3" bolt along with machinery bushings, attach the tracking wheel to the aluminum block. The block is already drilled and tapped for you. Use two machinery bushings on either side of the wheel bearings. These bushings are just the right size to ride on the

bearings and not the wheel when turning. This bolt should only be tightened enough to eliminate wobble. If you over tighten, the bearing will heat up, the seal will soften and grease in the bearings leaks out and the bearings will seize. Tighten just enough to hold everything in place.



Use two machinery bushings on both sides of all the idler wheels. These are just the right ID and OD to press only on the bearings. You may need to stack in some additional fender washers to get the wheels aligned but these go next to the wheels.



TRACKING WHEEL: Thread the tracking wheel onto the tracking block assembly. Check the tracking wheel to see it will tilt both directions. It does not take much “swivel” to move the belt. Don’t panic if the belt doesn’t seem to track far enough in one direction right now. Let’s check this under power before we panic.



All idler wheels will need some washer spacers. Here is a contact wheel with a stack of fender washers to get it in line with the drive and tracking wheels. It is a cheap and effective method.

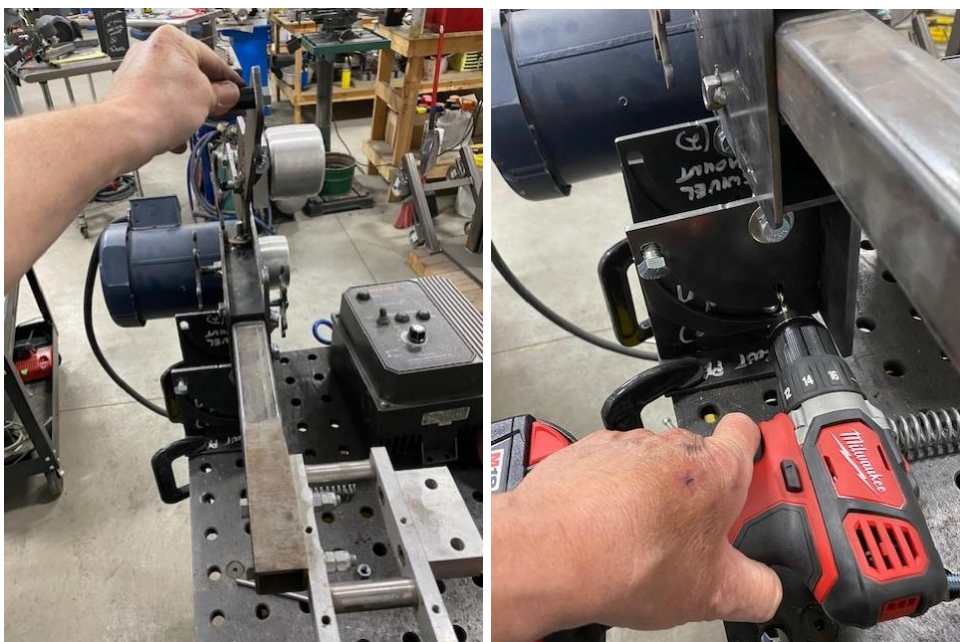
Continue the process of adding or subtracting spacer washers until the wheels line up. Remember to use the tracking wheel as your starting point. The tracking wheel can be adjusted with washers stacked between the block and wheel.

INDEX PIN DRILLING: This might be one of the most critical steps in the entire build. Take your time here. Once the motor is attached the grinder body wants to flip horizontal. We will drill a $\frac{1}{4}$ " hole through the vertical support and arc swivel brackets for an "index" pin to hold it in the vertical position. This pin is simply $\frac{1}{4}$ " stainless. With the grinder held in the vertical position drill through the locating hole on the vertical support through the arc bracket. Place the pin in the hole and the grinder is now held in the vertical position. You want the main plate to be plumb vertical, so all of your attachments are vertical. If you find the grinder sags after you pin it and it is not vertical to your satisfaction, drill a new set of holes.

You can leave the old holes or put a bit of weld in to fill in the misaligned holes to cover them up.



Make sure your main plate is just past vertical before drilling. The weight of the motor, tension arm and tool arms will cause it to lean a bit to the left so you need to compensate for that.





TIPS: loosen the bolts you have connecting the vertical support to the arc swivel bracket. The assembly needs to swivel freely at this point. The main plate is a stout plate of $\frac{1}{4}$ " but you may see some twist. It's just part of it. Keep in mind please, this is a budget kit grinder and not a machined \$3000 production built grinder.

Plan on some slight slumping of the assembly to the left from vertical when you put the index pin in so push the main plate slightly past vertical and then drill.

If you "miss" vertical, you just drill another hole in both brackets so don't panic but it's easier and faster if you go slow with this step. Do this until your main plate is vertical with motor mounted and tool arm mounted.

You can also shim your tool attachments for perfectly vertical later but getting the main plate vertical now is a much better solution.

SLACK&PLATEN ASSEMBLY: Assembly of Slack/Platen attachment. Skip ahead if you do not have this optional part.

Identify the wheel side and motor side of the attachment.

Using the $\frac{1}{2}$ "x3" bolts, attach the wheels to the wheel slots. Use two machinery bushings on either side of the wheel bearings. These bushings are just the right size to ride on the bearings and not the wheel when turning. This bolt should only be tightened enough to eliminate wobble. If you over tighten, the bearing will heat up, the seal will soften and grease in the bearings leaks out and the bearings will seize. Tighten just enough to hold everything in place as you will likely need to adjust the wheels if you attach a platen.



Attach the platen using $\frac{1}{4}$ "-20 bolts and nuts to the 90 degree slotted brackets. The long slot allows a wide range of adjustment. The platen provided is mild steel and is drilled and tapped for you. Using $\frac{1}{4}$ -20 bolts, thread the platen onto the bent brackets from the back. Any part of the bolt sticking out of the platen must be ground or filed flush to the platen for the ceramic glass installation. Do not use the mild steel as a platen without the glass provided. If you do not want glass, you will need to fabricate and heat treat a high carbon platen as the mild steel will show wear in just a few hours use.

Install the ceramic glass according to the separate instructions using the provided JB Weld. **DO NOT CLAMP** the glass when you are gluing it to the platen.

Locate and drill the holes in the provided tool arms. Weld $\frac{1}{2}$ " and $\frac{3}{8}$ " retaining nuts and using the appropriate bolts attach the slack/platen attachment to the tool arm.

OTHER TOOL ARMS: Assemble your contact wheel, if purchased, now with machinery bushings, washers and $\frac{1}{2}$ " bolts as before.



INSTALL DRIVE WHEEL: Install the drive wheel on the motor shaft. Make sure you have key stock in the key way slot and that is the contact point for the set screw. Tighten the set screw using a hex wrench. You will need to slide this around a bit to line up with the rest of the wheels so don't tighten too much yet. The "hollow" side of the drive wheel faces out. The edge of the hole on the wheel does not have to match the edge of the motor shaft.

LINE UP THE WHEELS: Mount the slack attachment to the grinder (or contact wheel if you do not have the slack attachment). Line up the wheels visually from the front. I normally place a belt on the wheels to help see the alignment. You can also use a yardstick or flat stock. They will not be lined up at all at this point. Using washers, line up your wheels to center on the tracking wheel. Always line your wheels up with the tracking wheel as it is the least adjustable wheel. Line up your drive wheel and tighten. The set screw is small and this is aluminum so easy on the tightening to avoid stripping the threads.



If you have other attachments, now is the time to fabricate and tune the alignment.



GAS STRUT: Attach your gas strut to the tension handle and main plate now.

WIRE SPRING OPTION: As an option, a compression spring can be mounted here. We have the wire spring as an option but we prefer the gas strut or pneumatic tension set up. To hold the wire spring in place, weld a bolt with washer to the top of the tool cage.



TIGHTEN IT ALL: Check to see all the bolts and set screw is properly tightened. It's show time!

FIRST RUN: Using your motor on slow speed put on a belt and check alignment tracking now. Make any other adjustments needed. The biggest single issue I see on home built grinders is not enough belt tension. Your grinding belt should sound like a guitar string when plucked.

FINISH YOUR WELDS: Once everything is tuned up, now go back and finish welding the tab and slots. It won't take much as you have learned by now the button welds are fiercely strong already. Just run a bead over the tab slot and previous button weld. It is OK to show a weld bead. It is NOT OK to have splatter and weld wires sticking out. Using an angle grinder, clean things up a bit.



PAINT: Paint your new grinder. Do not skip paint. Paint matters.

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