

TIG WELDER

VERSION 3.1



AUTODESK
PIER 9

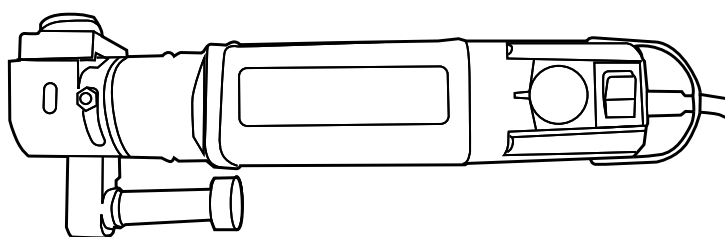
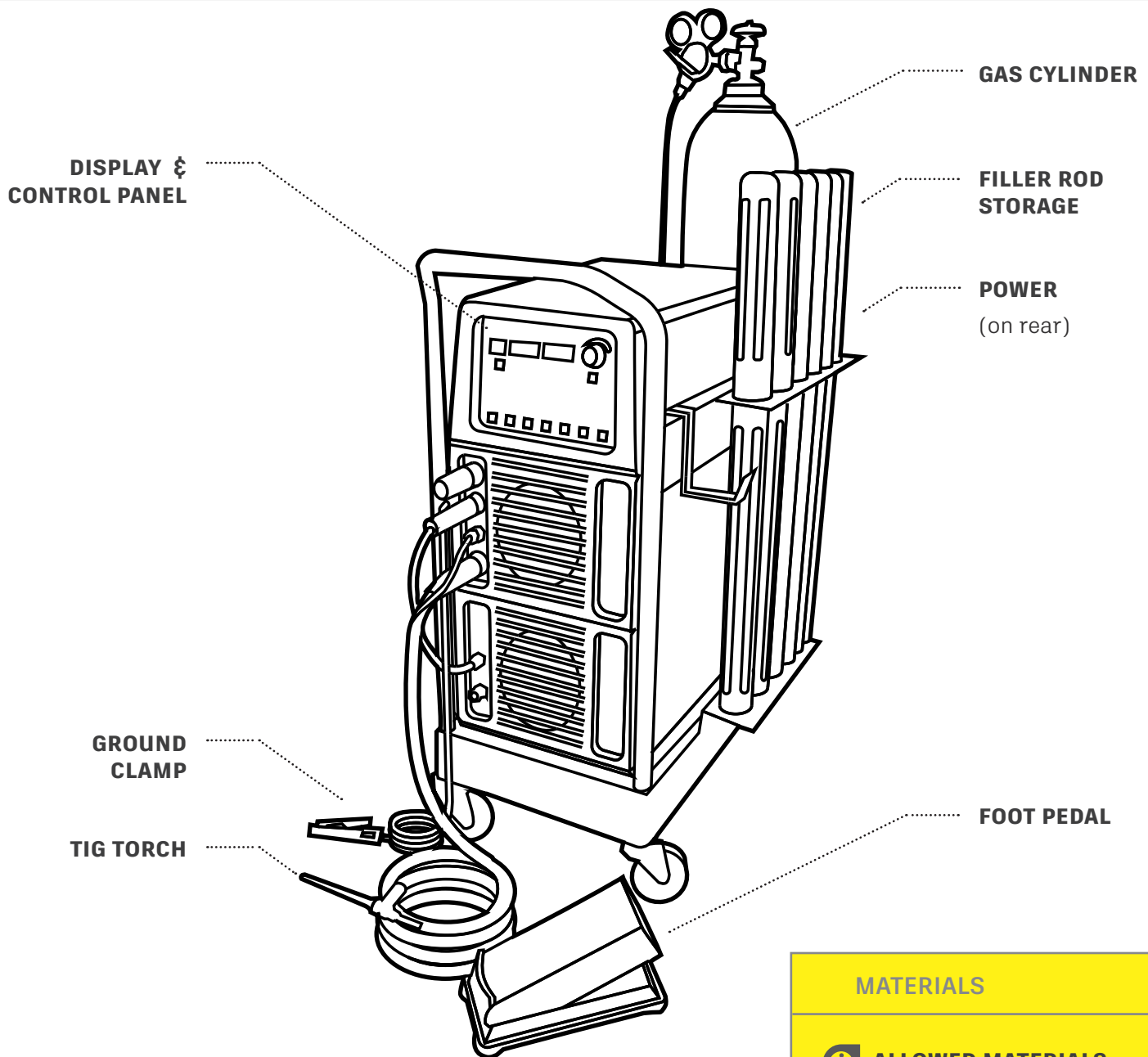
TIG WELDER

MACHINE
INTRODUCTION

VERSION 3.1

THE TIG WELDER IS A PRECISION TOOL FOR PERMANENTLY JOINING METAL.

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TUNGSTEN GRINDER

MATERIALS

i ALLOWED MATERIALS

- + Mild steel
- + Stainless steel
- + Aluminum

⊗ BANNED MATERIALS

- + Painted or plated materials
 - ▶ All coatings must be 100% removed by grinding before being welded.
- + Galvanized steel is never allowed.

TIG WELDER

KEEP IT SAFE

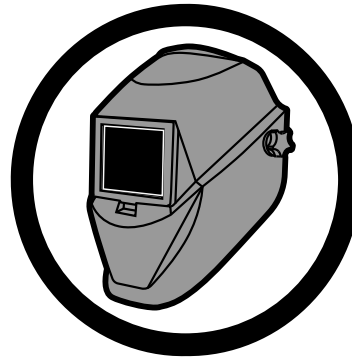
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TAKE PROPER SAFETY PRECAUTIONS WHEN OPERATING THE TIG WELDER.

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**PROTECT YOUR EYES
FROM SPARKS AND UV
RAYS.**



Always wear a welding hood with a shade 11 or darker lens and safety glasses under the hood.



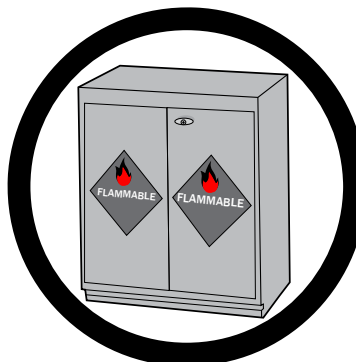
**PROTECT YOUR BODY
FROM SPARKS AND UV
RAYS.**



Always wear long gauntlet leather gloves, welding jacket, apron and leather shoes. Pull back and tuck in long hair, remove jewelry and lanyards, etc.



**SPARKS CAN CAUSE
A FIRE OR DAMAGE
NON-FLAMMABLE
OBJECTS.**



Ensure that the area is totally clear of any flammable objects.

THERE ARE MANY UNIQUE SAFETY PRECAUTIONS TO CONSIDER WHEN WELDING.

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PIER 9 WELDING FIRE WATCH

The fire code requires a *fire watch* policy.

- + After welding, users must return the welding area twice to check for signs of fire.
 - ▶ Return to the area 30 minutes after welding.
 - ▶ Return again, 30 minutes later.

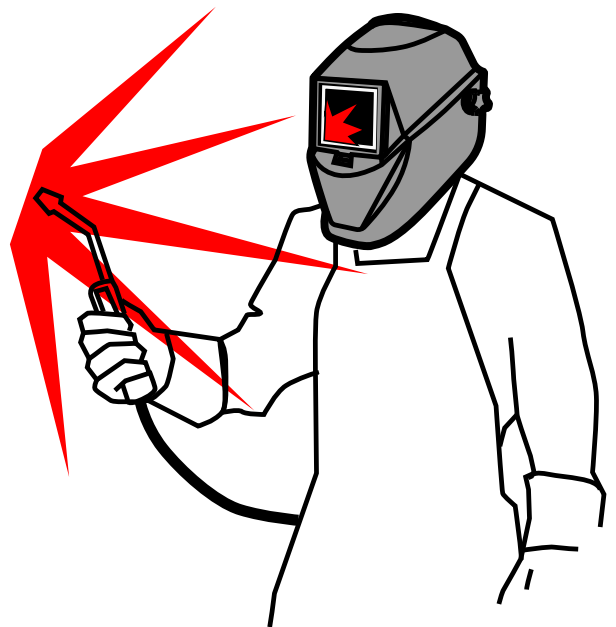
REQUIRED WELDING SPECIFIC SAFETY GEAR

- + Long sleeves and pants - natural fibers or leather
- + Leather shoes
- + Long gauntlet leather gloves
- + Welding hood - shade 11 or darker

ULTRA VIOLET (UV) LIGHT EXPOSURE

UV exposure will cause painful burns, similar to a sunburn.

- + Cover all skin from arc flash, at all times.
- + A full welding hood, at least #11 or darker, must be worn at all times.
- + All people in the welding area must wear all protective gear.
- + Fully surround the area with welding screens at all times.



WELDING COATED METAL

Metal with coatings like paint or powdercoat can emit harmful gases when heated.

- + Grind off all coatings before welding.
- + Use the fume extractor when grinding and when welding.
- + Never wear gloves when grinding.
- + Grinding or welding of galvanized material is not allowed.

TURN ON FUME EXTRACTOR WHEN GRINDING OR WELDING. TURN OFF WHEN FINISHED.

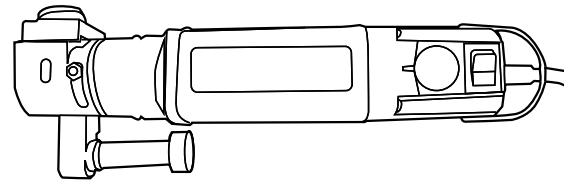
TUNGSTEN ELECTRODE

TIG welding uses a *tungsten electrode* to aim an electrical arc at the workpiece. Tungstens are available in 3 sizes: 1/16", 3/32" and 1/8". In general, use a larger tungsten for thicker material.

The tungsten must be sharpened on the *tungsten grinder* before assembling the torch. The grinder has three collets - one for each size tungsten.

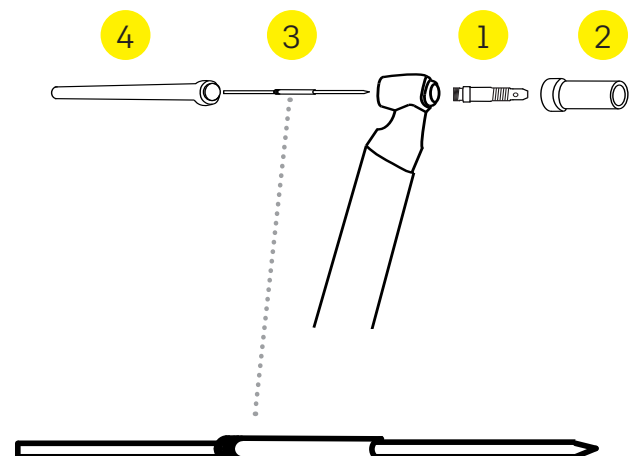
Never sharpen the painted end; the paint color identifies the type of tungsten.

1. Put on gloves.
2. If needed, install the correct collet for the diameter of your tungsten.
3. Turn the grinder on and insert the tungsten into the collet and press it against the wheel.
 - ▶ The position of the vacuum chamber will block the view of the grinding wheel.
4. Rotate the tungsten against the grinding wheel, smoothly and with even pressure.
5. Grind a point on the end and remove the tungsten from the grinder.
6. Rotate the vacuum chamber all the way to the left.
 - ▶ The grinding wheel will be visible.
7. Insert the sharpened tungsten into the correct hole on the top of the grinder and gently press down to blunt the end.



ASSEMBLING THE TORCH

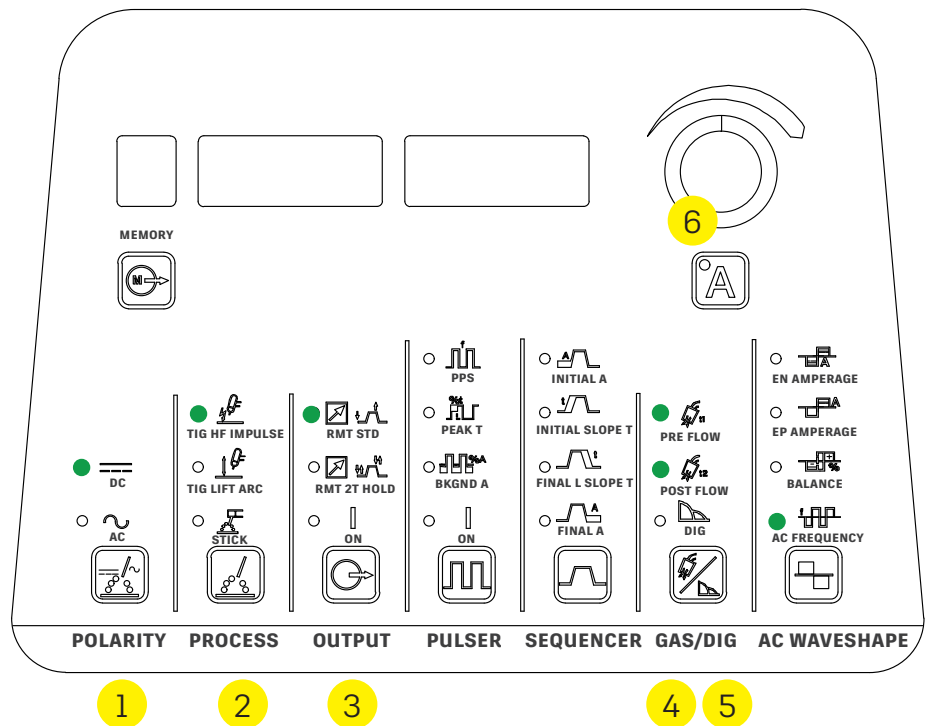
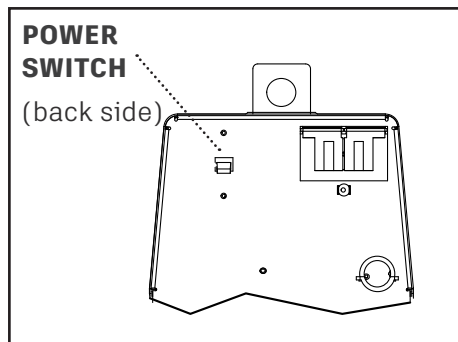
1. Screw the collet body into the torch body.
2. Screw the gas cup onto the torch body.
3. Push the tungsten into the collet and then thread the assembly into the collet holder.
 - ▶ Make sure the tungsten is poking a little ways out of the gas cup.
4. While holding onto the tip of the tungsten, screw the back end cap onto the torch.
5. Adjust the tungsten so that it sticks outside of the gas cup between 1/8" and 1/4".
6. Tighten the back end cap so that the tungsten doesn't move.



Collet detail: thick band at the back.

SETTINGS FOR WELDING STEEL

- + Turn the machine on with the switch on the rear panel.
- + To change the settings:
 - ▶ Push the buttons on the bottom row.
 - ▶ A green LED will indicate the selected option.
 - ▶ Some options require turning the *amperage knob*, and reading the result in the *display*.



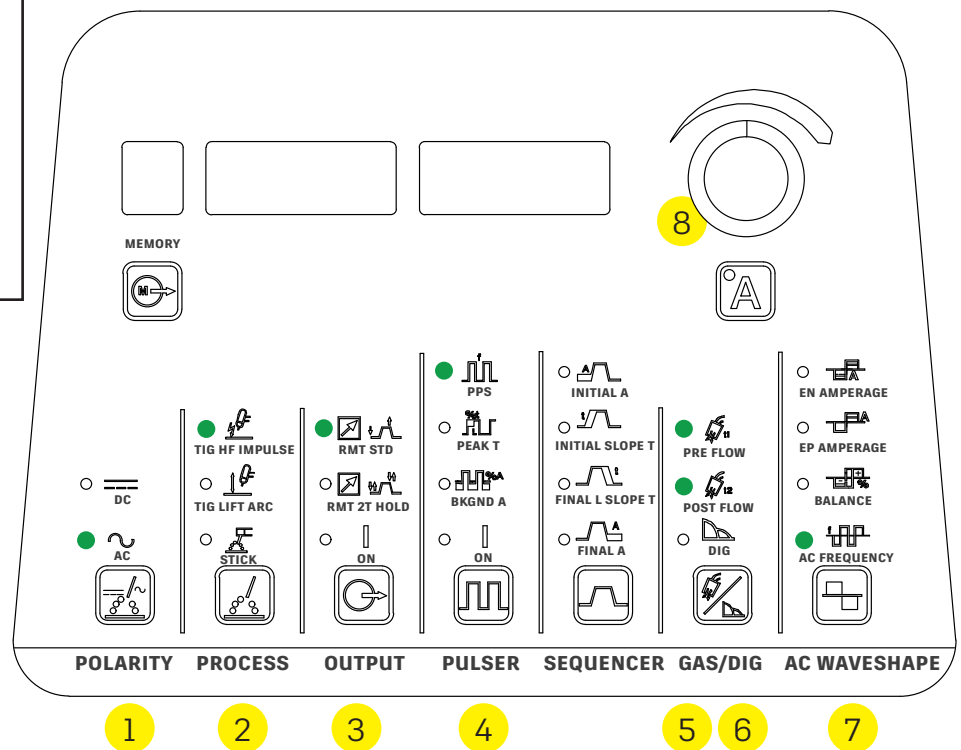
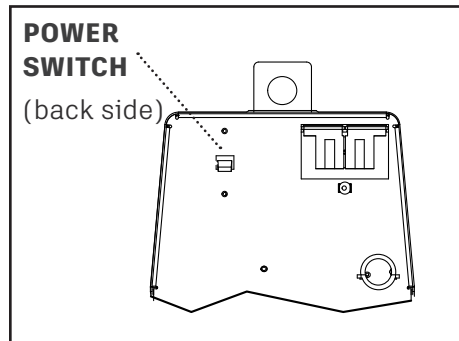
1. Set *polarity* to **DC**.
2. Set *process control* to **TIG HF Impulse**.
3. Set *output* to **RMT STD** to enable the foot pedal.
4. Set the *GAS/DIG* to **Pre Flow**
 - ▶ Rotate the *amperage knob* to select **.2 seconds**.
5. Set the *GAS/DIG* to **Post Flow**
 - ▶ Rotate the *amperage knob* to select **Auto**.
6. Press the "A" button and turn the *amperage knob* to set the maximum amperage you plan to use.
 - ▶ The foot pedal is used to control the amperage between 0 and the maximum you selected.
 - ▶ Try starting with one amp for every .001" of material thickness.
 - ▶ ex. For 1/8" (0.125") material, start with 125 amps.

ADJUST THE SETTINGS FOR WELDING ALUMINUM.

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SETTINGS FOR WELDING ALUMINUM

- + Use *pure tungsten*, with a green band on the end, or *thoriated tungsten*, with a red or yellow band.
- + Turn the machine on with the switch on the rear panel.
- + To change the settings:
 - ▶ Push the button on the bottom row.
 - ▶ A green LED will indicate the selected option.
 - ▶ Some options require turning the *amperage knob*, and reading the result in the *display*.

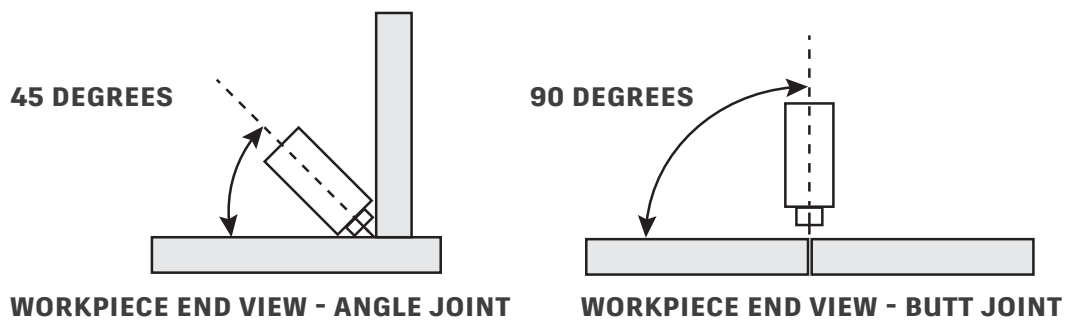


1. Set the *polarity* to **AC**.
2. Set the *process* to **TIG HF Impulse**.
3. Set *output* to **RMT STD** to enable the foot pedal.
4. Set the *pulser* to **PPS**
 - ▶ Rotate the *amperage knob* to set the number of pulses to 4.
5. Set the *GAS/DIG* to **Pre Flow**
 - ▶ Rotate the *amperage knob* to select **.2 seconds**.
6. Set the *GAS/DIG* to **Post Flow**
 - ▶ Rotate the *amperage knob* to select **Auto**.
7. Set the *AC waveshape* to **AC Frequency**.
8. Press the "A" button and turn the *amperage knob* to set the maximum amperage for the session.
 - ▶ The foot pedal is used to control the amperage between 0 and the maximum you set.
 - ▶ Start by setting one amp for every .001" of material thickness.
 - ▶ ex. For 1/8" (0.125") material, start with 125 amps.

HOLDING AND MOVING THE TORCH

Hold the torch so the tungsten is about 1/8" above the workpiece.

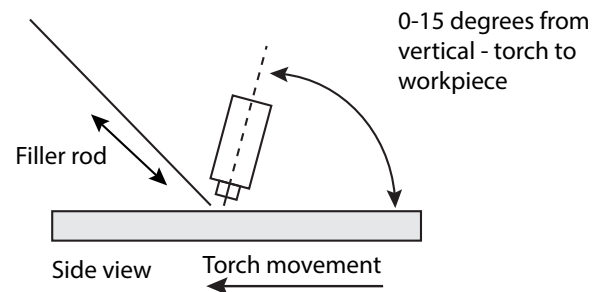
The angle that the torch intersects the workpiece is known as the *work angle*. In general the torch should bisect the angle of the two workpieces.



USING THE TORCH

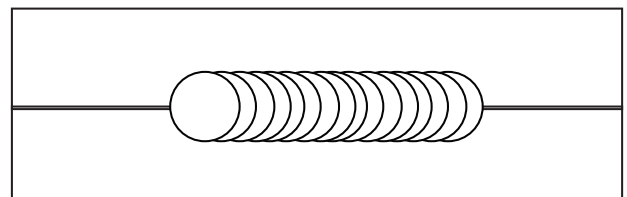
There are three actions the user must do at the same time.

1. Press the pedal with your foot.
 - ▶ Press the pedal further for more heat.
2. Hold the torch in one hand 1/4" to 1/2" away from the material.
 - ▶ Hold the torch still to form a small puddle.
3. Hold the filler rod with the other hand.
 - ▶ Dip the filler rod into the molten puddle.
 - ▶ Do not heat the filler rod.



After dipping the filler rod, move the torch slightly to the left, and repeat steps 2 & 3 (if welding from right to left).

Each puddle should overlap the previous and form a continuous bead of weld.



Top view of overlapping puddles forming a bead.

TIG WELDER

HANDS ON

VERSION 3.1

STEPS FOR SAFE MACHINE OPERATION.

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AREA AND MACHINE PREPARATION

1. Clean and clear the table.
2. Prepare your workpiece.
 - ▶ Completely grind all coatings from the metal; use the fume extractor.
 - ▶ Clean and degrease the metal.
3. Adjust the welding screens to protect people in the shop from flash.
4. Remove flammable materials from the area.
5. Cover the exposed parts of the table with the aluminum covers.
6. Slowly open the gas bottle fully.
7. Turn the machine on.
8. Adjust the settings for your material.

REMOVE GLOVES WHEN GRINDING ANY METAL.

OPERATING THE MACHINE

1. Bring the torch to approximately a 1/4" - 1/2" from the surface to be welded.
2. Hold the torch at the correct angle.
3. Press the foot pedal to start the arc.
 - ▶ Gas will come out of the tip of the torch.
4. Push the torch along the seam where the two pieces will be welded.
5. When the puddle forms, dip the filler rod.
6. Move forward and make a new puddle.
7. At the end of the weld, release the foot pedal and keep the torch in place for a few seconds before lifting it.

MAKE SURE THE FUME EXTRACTOR IS ON.

CLEANUP

1. Turn the voltage to the minimum setting.
2. Close the tank valve completely.
3. Press the foot pedal to release any gas.
 - ▶ Point the torch away from anything grounded.
4. Turn off the welder.
5. Loosely coil the cables and hang them from the welder.
6. Put the foot pedal away.
7. Put your materials away and put the machine back in it's storage location

YOU MUST PERFORM YOUR FIRE WATCH DUTY - 30 AND 60 MINUTES AFTER WELDING.