

Setting Up Your Combo TIG/Stick Welder and Plasma Cutter

By Kent Hartland



If you've been around metal working for very long at all you should know that TIG welding and plasma cutting are pretty much the preferred choice of the pros. They offer greater control, better appearance and more effective results than similar methods of MIG/wire-feed welding and oxyacetylene cutting. If you've watched any of the popular TV shows involving car, truck, hot rod or custom motorcycle building you've probably seen them using TIG and plasma.

Thus, if you're in the market for a welder or cutting torch, you are also probably thinking you may not be able to afford such high tech goodies. Not so fast, amigo.

There are several inexpensive 3-in-1 TIG/Stick Welder/Plasma Cutters on the market these days. Most if not all of these units are made in China or India and, like so many imports, one of the things lacking is good documentation. I recently bought one and was seriously frustrated by the poor setup instructions and complete lack of a user guide. There were also a few items required to complete the setup that were not included and I was left to figure out how to do it.

So, I am publishing this to share some of what I learned for those considering buying one of these machines. Since the various brands seem similar or identical I think this can be helpful regardless of which one you buy.

Are these machines junk?



They certainly are inexpensive. I paid less than \$400 for mine in the fall of 2010. That's in a market where \$1500+ machines are the norm. I haven't owned mine but a couple days so I can't speak to their long term quality (or even their short term quality!) but here's what I understand.

These units are a kind of newish design utilizing more solid state electronics that replace older tech transformers. I'm sure there must be advantages and disadvantages to each but the solid state stuff is clearly smaller, lighter weight and consumes less power. So, think about that. If the welder is smaller and lighter it costs less to ship it and import it. That's a fairly big deal, financially speaking, and a win for you!

On a transformer style welder if you fry the transformer, you may as well scrap it. On one of these, if you toast a printed circuit board, you pop it out and pop in a new one. It may cost \$150 for the replacement board, but hey., have it overnighter to you (again small and cheap shipping) and you're welding again the next day.

In my opinion, based on what little I know so far, it makes sense that these welders would be noticeably less expensive than expected. They don't look cheap and the fit and finish is respectable, too, so relax a little.



Another advantage is that these machines combine the common electrical elements of a TIG, MMA (stick) welder and plasma cutter in a single unit so you gain economies based on that.

In sort, these “do it all” machines put some pretty impressive, professional-quality capabilities in the hands of the average “garage builder“. **Time will tell if they are indeed worth the money but I suspect they are.**

How do they work?

I won't go into the principles of TIG welding or plasma cutting. As far as the machines go, the concept is that you can convert the machine from a TIG to a plasma cutter or stick welder and back in a few minutes. Its kind of like the Shop Smith woodworking machine I used to have. It could drill, saw, sand, turn spindles and make you a cup of coffee too but you had to go through a take down/set up procedure to convert the unit from one function to another.

That doesn't work well in a production shop with a lot of work to do. In that environment you want

dedicated machines designed for one function. You move the work from one machine to the next. But, for the small machinist or 'garage builder' with a lower volume of work, the ability to squeeze multiple functions out of a single compact machine is quite attractive, despite the few minutes required to switch from one function to another. These are not professional, production machines, they are targeted at the



Small builder or home workshop.

Likewise their duty cycle is not up to 'production' standards. The duty cycle indicates how long and hard you can run the machine before it needs to rest and cool. Most of these units are rated at about 60% which means you can work it for six out of ten minutes. Patience is a virtue BUT if you have a LOT of work to do in a short amount of time, buy a production class machine with a bigger duty cycle instead.

How Do You Use it?

Basically, you plug the attachments in you want to use (stick welder cable, TIG torch or plasma torch) and attach the type of gas you want to use (if any). If you are going to stick weld, you don't need any gas. If you are going to use the plasma cutter, you will plug in a hose from your air compressor. If you want to TIG weld, you will plug in a hose from an Argon (or argon/helium) tank.



The gas, either air or argon, goes into one common pressure regulator/“moisture trap“, like the one above (which is woefully inadequate), before entering the machine. In its simplest form (like I built) you install pneumatic type quick connects to literally unplug either the air hose or argon hose upstream of the regulator to convert from TIG welding to plasma cutting.

Moisture is the enemy of TIG and plasma work. A droplet of water condensed from the compressed air, slipping past the ‘trap’ shown above, can ruin a plasma cutter nozzle or foul up a weld. So in addition to what comes with the welder you will need a desiccant type air drier to really remove the water before the gas enters the machine. A basic, inexpensive one like this \$8 Harbor Freight unit:



May be all you need. It is filled with silica desiccant beads that turn color when saturated. Just unscrew the unit, dump the damp beads out and put in fresh dry ones. A two pound bag is about five bucks. Mount this unit downstream of the bowl type moisture trap that comes with the machine. As I write this, my HF is on backorder so I am awaiting delivery of two of these, one I will mount on my welder, the other I will mount on my compressor.

Some guys have built manifolds or added three way valves to switch from air to argon or back, but I like simple systems and the conscious act of having to literally unplug one hose and plug in the other. That leaves less chance for screwing up, like trying to weld with air or cut with argon. But maybe I'll just come to the opposite conclusion over time and install a three way valve! We'll see.

What they don't provide or tell you

You may need to relocate the gas/air regulator from its 'standard' location on the rear of the machine to either the side of the machine or the welder cart, if that's what you are using. My regulator was supposed to mount on the back of the machine but that's where the argon tank was, so I just moved the regulator to the side of the machine, as shown.



I drilled two holes in the welder cover (remove it, make sure you aren't going to short against anything!) and popped in two nut rivets. Those are like pop rivets except they are threaded 'nuts' instead of rivets. Very cool tool.



In the pic above, the air hose (the yellow hose) is plugged into the regulator, ready to plasma cut. The black hose dangling down is the argon hose, waiting to be plugged in to the regulator for TIG welding. Notice the quick connect couplers on the air and argon hoses. The black hose going from the center of the regulator to the back of the machine supplies the pressure gauge on the front panel of the machine. The light blue hose coming from the regulator to the back of the machine is the gas line (air or argon) into the machine and then on to the TIG torch hose or plasma cutter torch hose.

I like a basic Harbor Freight-style 'MIG' welding cart because it is small, reasonable quality and CHEAP (I paid \$50). It gives the machine a place to live, is easy to roll around and catches your welding helmet, gloves, electrodes, argon tank and all the little bits associated with this way of working with metal.

I also added a handle to the front of the cart to facilitate pushing and pulling it around.



In summary, plan on buying a few fittings like 1/4" elbows, nipples and maybe a couple pneumatic quick connect couplers. You may need two or three feet of plastic tubing and some Teflon thread tape. You won't know what you need until you open the box and see what you have. It took two trips to the hardware store before I had everything I needed.

Depending on your purchase, you may need to buy some tungsten electrodes and welding rods. Rods are available in different diameters and alloys depending on the type and thickness of metals you plan to weld. I got 10 each 1/16" and 3/32" tungsten electrodes and a pound each of 1/8" 308 (for stainless) and 309 (for mild steel) welding rods. You will need an argon tank which you can buy, rent or lease. Generally the larger ones (40lbs+) give you the best buy for the gas. I rented the tank in the pictures for \$6 a month and it cost \$36 to fill.

I think this machine will be a good investment. If you obey the duty cycle, turn your gas off after every use (so it doesn't leak out - don't ask how I know), keep it clean, mind your ground connection and pay attention to the condition of your electrodes and such, you should be okay.

Bone up. Read about TIG welding and plasma cutting. Take a course at the local Vo-Tech or community college. Watch YouTube videos. Join welding forums and talk to experienced metal workers.

Practice.

And have fun! TIG and plasma is pretty cool stuff!

Good luck.

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