

EVERLAST

POWER TIG® SERIES **TIG (GTAW) AND MMA (SMAW)** **WELDERS**

Operator 's Manual for PowerTig® AC/DC Welders

Includes Power i-Tig® DC Models



Safety, Setup and General Use Guide

THANK YOU FOR PURCHASING AN EVERLAST PRODUCT. WE APPRECIATE YOUR PATRONAGE AND HOPE THAT YOU WILL ENJOY YEARS OF USE FROM OUR PRODUCT.

PLEASE GO DIRECTLY TO THE EVERLAST WEBSITE TO REGISTER YOUR UNIT AND RECEIVE YOUR WARRANTY INFORMATION. YOUR UNIT REGISTRATION IS IMPORTANT SHOULD ANY INFORMATION SUCH AS PRODUCT UPDATES OR RECALLS BE ISSUED. IT IS ALSO IMPORTANT SO THAT WE MAY TRACK YOUR SATISFACTION WITH EVERLAST PRODUCTS AND SERVICES. IF YOU ARE UNABLE TO REGISTER BY WEBSITE, CONTACT EVERLAST DIRECTLY THROUGH THE CONSUMER DEPARTMENT AT THE MAIN NUMBER. YOUR UNIT WILL BE REGISTERED AND WARRANTEE WILL BE ISSUED AND IN FULL EFFECT.

Serial number: _____
Model number: _____
Date of Purchase _____

EVERLAST

Contact Information

Everlast consumer satisfaction email: sales@everlastwelders.com

Everlast Website: everlastwelders.com

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NOTES:

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GENERAL

Everlast is dedicated to providing you with the best possible equipment and service to meet the demanding jobs that you have. We want to go beyond delivering a satisfactory product to you. That is the reason we offer technical support to assist you with your needs should an occasion occur. With proper use and care your product should deliver years of trouble free service.



Safe operation and proper maintenance is your responsibility.

We have compiled this operator's manual, to instruct you in basic safety, operation and maintenance of your Everlast product to give you the best possible experience. Much of welding and cutting is based upon experience and common sense. As thorough as this welding manual may be, it is no substitute for either. Exercise extreme caution and care in all activities related to welding or cutting. Your safety, health and even life depends upon it. While accidents are never planned, preventing an accident requires careful planning.

Please carefully read this manual before you operate your Everlast unit. This manual is not only for the use of the machine, but to assist in obtaining the best performance out of your unit. Do not operate the unit until you have read this manual and you are thoroughly familiar with the safe operation of the unit. If you feel you need more information please contact Everlast Support.

The warranty does not cover improper use, maintenance or consumables. **Do not attempt to alter or defeat any piece or part of your unit, particularly any safety device.** Keep all shields and covers in place during unit operation should an unlikely failure of internal components result in the possible presence of sparks and explosions. If a failure occurs, discontinue further use until malfunctioning parts or accessories have been repaired or replaced by qualified personnel.



Note on High Frequency electromagnetic disturbances:

Certain welding and cutting processes generate High Frequency (HF) waves. These waves may disturb sensitive electronic equipment such as televisions, radios, computers, cell phones, and related equipment. High Frequency may also interfere with fluorescent lights. Consult with an electrician if disturbance is noted. Sometimes, improper wire routing or poor shielding may be the cause.



HF can interfere with pacemakers. See EMF warnings in following safety section for further information. Always consult your physician before entering an area known to have welding or cutting equipment if you have a pacemaker.

SAFETY PRECAUTIONS



These safety precautions are for protection of safety and health. Failure to follow these guidelines may result in serious injury or death. Be careful to read and follow all cautions and warnings. Protect yourself and others.



Welding and cutting processes produce high levels of ultraviolet (UV) radiation that can cause severe skin burn and damage. There are other potential hazards involved with welding such as severe burns and respiratory related illnesses. Therefore observe the following to minimize potential accidents and injury:



Use appropriate safety glasses with wrap around shields while in the work area, even under welding helmets to protect your eyes from flying sparks and debris. When chipping slag or grinding, goggles and face shields may be required.



When welding or cutting, always use an approved shielding device, with the correct shade of filter installed. Always use a welding helmet in good condition. Discard any broken or cracked filters or helmets. Using broken or cracked filters or helmets can cause severe eye injury and burn. Filter shades of no less than shade 5 for cutting and no less than shade 9 for welding are highly recommended. Shades greater than 9 may be required for high amperage welds. Keep filter lenses clean and clear for maximum visibility. It is also advisable to consult with your eye doctor should you wear contacts for corrective vision before you wear them while welding.



Do not allow personnel to watch or observe the welding or cutting operation unless fully protected by a filter screen, protective curtains or equivalent protective equipment. If no protection is available, exclude them from the work area. Even brief exposure to the rays from the welding arc can damage unprotected eyes.



Always wear hearing protection because welding and cutting can be extremely noisy. Ear protection is necessary to prevent hearing loss. Even prolonged low levels of noise has been known to create long term hearing damage. Hearing protection also further protects against hot sparks and debris from entering the ear canal and doing harm.



Always wear personal protective clothing. Flame proof clothing is required at all times. Sparks and hot metal can lodge in pockets, hems and cuffs. Make sure loose clothing is tucked in neatly. Leather aprons and jackets are recommended. Suitable welding jackets and coats may be purchased made from fire proof material from welding supply stores. Discard any burned or frayed clothing. Keep clothing away from oil, grease and flammable liquids.



Leather boots or steel toed leather boots with rubber bottoms are required for adequate foot protection. Canvas, polyester and other man made materials often found in shoes will either burn or melt. Rubber or other non conductive soles are necessary to help protect from electrical shock.



Flame proof and insulated gauntlet gloves are required whether welding or cutting or handling metal. Simple work gloves for the garden or chore work are not sufficient. Gauntlet type welding gloves are available from your local welding supply companies. Never attempt to weld with out gloves. Welding with out gloves can result in serious burns and electrical shock. If your hand or body parts comes into contact with the arc of a plasma cutter or welder, instant and serious burns will occur. **Proper hand protection is required at all times when working with welding or cutting machines!**

SAFETY PRECAUTIONS

continued



WARNING! Persons with pacemakers should not weld, cut or be in the welding area until they consult with their physician. Some pacemakers are sensitive to EMF radiation and could severely malfunction while welding or while being in the vicinity of someone welding. *Serious injury or death may occur!*



Welding and plasma cutting processes generate electro-magnetic fields and radiation. While the effects of EMF radiation are not known, it is suspected that there may be some harm from long term exposure to electromagnetic fields. Therefore, certain precautions should be taken to minimize exposure:

- Lay welding leads and lines neatly away from the body.
- Never coil cables around the body.
- Secure cables with tape if necessary to keep from the body.
- Keep all cables and leads on the same side the body.
- Never stand between cables or leads.
- Keep as far away from the power source (welder) as possible while welding.
- Never stand between the ground clamp and the torch.
- Keep the ground clamp grounded as close to the weld or cut as possible.



Welding and cutting processes pose certain inhalation risks. Be sure to follow any guidelines from your chosen consumable and electrode suppliers regarding possible need for respiratory equipment while welding or cutting. Always weld with adequate ventilation. Never weld in closed rooms or confined spaces. Fumes and gases released while welding or cutting may be poisonous. Take precautions at all times. Any burning of the eyes, nose or throat are signs that you need to increase ventilation.

- Stop immediately and relocate work if necessary until adequate ventilation is obtained.
- Stop work completely and seek medical help if irritation and discomfort persists.



WARNING! Do not weld on galvanized steel, stainless steel, beryllium, titanium, copper, cadmium, lead or zinc without proper respiratory equipment and or ventilation.



WARNING! This product when used for welding or cutting produces fumes and gases which contains chemicals known to the State of California to cause birth defects and in some cases cancer. (California Safety and Health Code §25249.5 *et seq.*)



WARNING! Do not weld or cut around Chlorinated solvents or degreasing areas. Release of Phosgene gas can be deadly. Consider all chemicals to have potential deadly results if welded on or near metal containing residual amounts of chemicals.



Keep all cylinders upright and chained to a wall or appropriate holding pen. Certain regulations regarding high pressure cylinders can be obtained from OSHA or local regulatory agency. Consult also with your welding supply company in your area for further recommendations. The regulatory changes are frequent so keep informed.



All cylinders have a potential explosion hazard. When not in use, keep capped and closed. Store chained so that overturn is not likely. Transporting cylinders incorrectly can lead to an explosion. Do not attempt to adapt regulators to fit cylinders. Do not use faulty regulators. Do not allow cylinders to come into contact with work piece or work. Do not weld or strike arcs on cylinders. Keep cylinders away from direct heat, flame and sparks.

SAFETY PRECAUTIONS

continued



WARNING! Electrical shock can kill. Make sure all electrical equipment is properly grounded. Do not use frayed, cut or otherwise damaged cables and leads. Do not stand, lean or rest on ground clamp. Do not stand in water or damp areas while welding or cutting. Keep work surface dry. Do not use welder or plasma cutter in the rain or in extremely humid conditions. Use dry rubber soled shoes and dry gloves when welding or cutting to insulate against electrical shock. Turn machine on or off only with gloved hand. Keep all parts of the body insulated from work, and work tables. Keep away from direct contact with skin against work. If tight or close quarters necessitates standing or resting on work piece, insulate with dry boards and rubber mats designed to insulate the body from direct contact.



All work cables, leads, and hoses pose trip hazards. Be aware of their location and make sure all personnel in area are advised of their location. Taping or securing cables with appropriate restraints can help reduce trips and falls.



WARNING! Fire and explosions are real risks while welding or cutting. Always keep fire extinguishers close by and additionally a water hose or bucket of sand. Periodically check work area for smoldering embers or smoke. It is a good idea to have someone help watch for possible fires while you are welding. Sparks and hot metal may travel a long distance. They may go into cracks in walls and floors and start a fire that would not be immediately visible. Here are some things you can do to reduce the possibility of fire or explosion:

- Keep all combustible materials including rags and spare clothing away from area.
- Keep all flammable fuels and liquids stored separately from work area.
- Visually inspect work area when job is completed for the slightest traces of smoke or embers.
- If welding or cutting outside, make sure you are in a cleared off area, free from dry tender and debris that might start a forest or grass fire.
- Do not weld on tanks, drums or barrels that are closed, pressurized or anything that held flammable liquid or material.



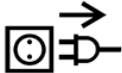
Metal is hot after welding or cutting! Always use gloves and or tongs when handling hot pieces of metal. Remember to place hot metal on fire-proof surfaces after handling. Serious burns and injury can result if material is improperly handled.



WARNING! Faulty or poorly maintained equipment can cause injury or death.



Proper maintenance is your responsibility. Make sure all equipment is properly maintained and serviced by qualified personnel. Do not abuse or misuse equipment. Keep all covers in place. A faulty machine may shoot sparks or may have exploding parts. Touching uncovered parts inside machine can cause discharge of high amounts of electricity. **Do not allow employees to operate poorly serviced equipment.**



Always check condition of equipment thoroughly before start up. Disconnect unit from power source before any service attempt is made and for long term storage or electrical storms.



Further information can be obtained from The American Welding Society (AWS) that relates directly to safe welding and plasma cutting. Additionally, your local welding supply company may have additional pamphlets available concerning their products. Do not operate machinery until you are comfortable with proper operation and are able to assume inherent risks of cutting or welding.

PRODUCT FEATURE COMPARISON

<i>Everlast</i> PowerTig® PRODUCT FEATURES	250 EX	225 LX	200 DX	315 DX
OVER CURRENT WARNING	YES	YES	YES	YES
HIGH FREQUENCY START	YES	YES	YES	YES
LIFT START TIG	YES	YES	No	No
AC SQUARE WAVE (ALUMINUM)	YES	YES	YES	YES
PULSE FREQUENCY CONTROL	.5-500 Hz	.5-25 Hz	.5-25 Hz	.5-25Hz
PULSE TIME ON (WIDTH)	10-90%	10-90%	10-90%	10-90%
PULSE AMP RATIO	5-95%	5-95%	5-200 A*	30-315 A*
ARC FORCE CONTROL (DIG)	YES	NONE	NONE	YES
STICK (SMAW) @35% DUTY CYCLE	5-200 A	5-160 A	5-160 A	30-250 A
AC FREQUENCY CONTROL	10-90%	30-70%	30-70%	30-70%
AC BALANCE CONTROL	5-250 Hz	5-200 Hz	5-250 Hz	20-100 Hz
4T/2T REMOTE	YES	YES	YES	YES
SPOT TIMER	0-10 s	NONE	NONE	NONE
PRE-GAS FLOW TIMER	0-10 s	0-10 s	NONE	NONE
POST-FLOW TIMER	0-25 s	0-25 s	0-25 s	0-25 s
START AMPS (INITIAL)	0-100 A	NONE	NONE	NONE
UP SLOPE TIMER	0-10 s	0-10 s	NONE	0-10 s
DOWN SLOPE TIMER	0-10s	0-10 s	0-5s	0-10 s
END AMPS (FINAL)	0-100 A	NONE	NONE	NONE
VOLTAGE (OCV 60-80V)	220-240 V 1-3PH	220/240 V 1PH	220/240 V 1PH	220/240V 3 PH ONLY
DUTY CYCLE @ RATED AMPS GTAW-P	60%@250 A	60%@225 A	35%@200 A	35%@315 A

*PULSE AMP RATIO IS CONTROLLED BY SETTING SEPARATE BASE AMP AND PEAK AMP CONTROLS.

POWERTIG DX, LX AND EX MODELS, I-TIG MODELS**POWERTIG DX SERIES****POWERTIG LX SERIES****POWERTIG EX SERIES****POWER I-TIG SERIES**



**POWERTIG 315
INDUSTRIAL**



**POWERTIG TIG (GTAW)
WP 26 TORCH ASSEMBLY**



**POWERTIG TIG (GTAW)
FOOT PEDAL ASSEMBLY**



**POWERTIG DELUXE
STICK (SMAW, MMA)
ELECTRODE HOLDER
AND GROUND CLAMP
FOR TIG AND STICK
OPERATION**



**POWERTIG TIG (GTAW)
TORCH ACCESSORY PACK**

1.1 This manual has been compiled to give an overview of operation and is designed to offer information centered around safe, practical use of the machine. It is not intended to teach welding technique. All suggestions and techniques given are approximations and should be used as a general guide only.

1.2 To ensure that your Everlast product is in top condition, carefully inspect unit for damage upon opening the box, looking for damage on the surface of the unit and to the machine itself and all its accessories. Do this immediately upon receipt of product. Any damage issues must be resolved right away. It is further recommended that the product be tested at the same time for proper operation, even if it is to be stored for a while. Check to make sure all passages, connections and fittings are clear of any packing material or other obstruction. Record the serial number on the page provided in this manual. Include purchase date for warranty reference. Serial numbers are located on the rear of the machine.

1.3 The PowerTig (includes I– Tig) units are used daily in the industry performing day to day fabrication and repair activities. The exceptional arc characteristics are provided by the inverter based technology that employs the use of reliable IGBT transistors technology from Germany. Light-weight inverters allow a machine to be finely tuned for precise arc characteristics, while consuming less power than the larger transformer based machines. PowerTig units allow non-contact starts, eliminating the problem of tungsten contamination. Depending upon the unit, precise control of the welding arc is allowed through the adjustments available on the panel face. The independent controls allow for a virtually limitless number of configurations to suit every type metal and weld condition encountered. The use of High Frequency arc starting in AC and DC modes, greatly simplifies the TIG(GTAW) process.



1.4 Be careful to observe duty cycles of the machine posted in this manual and on the machine itself.

A duty cycle is a rating of percentage of time out of 10 minutes the machine can be used at the rated power setting. Overheating may occur if the duty cycle is exceeded. On multi-voltage, multi-phased machines, note that the rated duty cycle will change. Duty cycle for Maximum rated GTAW amps is @ 35% DX series and 60% I-Tig, LX, and EX series. For SMAW operation duty cycle is rated @ 35% for all units.

1.5 The unit should be stored in a dry place for long term storage. Humid/wet conditions can contribute to the eventual decay of the circuitry in the machine. For safety reasons, do not use this machine directly in the rain or with soaked clothing or protective gear.

1.6 Use only the provided handles to lift the unit. Do not suspend by cables or chains or use fork trucks to lift the units. If necessary, use two people to carry the unit.

1.7 Make sure that the units cooling fan and exhaust vents are kept free of obstruction. Before every operation, inspect the unit for unexpected obstructions such as insect and rat nests. From time to time, a cleaning of the machine with low pressure air and a small plastic bristle brush is necessary to ensure long life. On these occasions only, unplug unit and remove cover to access interior. Concentrate efforts on aluminum heat sinks and panel vents to remove dust and dirt.

1.8 Refer to the following pages to locate your particular unit and its specifications. Note that product specifications are subject to change without notice due to product improvements. If any additional information is needed contact Everlast. Schematics are not offered due to the proprietary information that they contain. However, simple wiring diagrams may be obtained for basic diagnosis and may be obtained from technical support.

SECTION 2

KNOW YOUR MACHINE

2.1 Panel Face. The following is a unit panel face from an EX series unit. Depending upon your unit, the panel face may vary with regard to quantity and location of controls and features. Use the appropriate referenced number to refer to equivalent features on your unit. Names or designation of control features may slightly vary. I-tig model layout varies slightly.

1. **On lamp.** This light illuminates while the machine is powered on.

4. Pulse power control*. This 3 position rocker switch allows for use of the built in pulse. You may select: Off, Low (L), or High (H). This feature pulses (cycles) the amperage between base and peak amps to maintain fine control of welding on thin materials or on out-of-position welds. Noticeable fluctuation of the arc intensity occurs when the pulsing mechanism is on at low frequency levels.

***Note:** On DX , LX Models have only 2 position rocker switches.



2. **Over Current/Overheat lamp.** This lamp illuminates when the duty cycle has been exceeded or the machine has overheated due to improper ventilation. Discontinue use until lamp goes out. Allow the fan to continue to run. Once lamp goes out, you may resume using the unit. If frequent or continuous overheating is encountered, contact Everlast.

3. **Digital Display.** The display posts the welding amps within ± 3 amps. Display will change to reflect actual welding amps while welding and pulse cycle amps, although at a fast pulse setting the minimum and maximum amperages may not be accurately posted.

I-Tig models select for DC or Pulse DC only. **Model 315 DX** has no dedicated switch control for the pulse. Turn the pulse off by turning the pulse amps control to lowest setting and use only the base amps to select amperage.

5. **Pulse Frequency.** The pulse frequency controls the number of pulse cycles per second (Hz). Where applicable, when the pulse is selected for Low, the inner numbers are read. (.2 -20 cycles per second). When the pulse is selected for High, read the outer numbers. (5-500)

continued

6. Pulse Amps. This gives proportional control of the Pulse Amps. Example: If the Amperage is set for 100 amps, and the Pulse Amps control knob is set for 95% (.9), then the low (base) amperage cycle of the pulse will be approximately 95 (90) amps. Regardless of nomenclature, the basic function of the control is the same. **DX model** ratio are adjusted independently by using the main amp and pulse amp controls. Adjust the pulse (peak)amps above the main (base) amps for proper control of the pulse cycle.

7. Pulse Time On: Some models: Pulse Width. This controls the ratio of the relative amount of time that the pulse spends on during a defined cycle. For example: A setting of 50% will result in a balanced and equally shared amount of time between the Pulse current and the base current. A setting of 95% will result in the favoring of the Pulse stage of the cycle with only 5% of the time spent in the base stage of the Pulse cycle.

Note: This does not control the overall length of the pulse. The pulse frequency setting sets the cycle length, thereby determining the overall length of each leg of the cycle. Within each cycle length, there is a certain amount (ratio) of time that the pulse spends in the base (low) amperage stage of the cycle and in the peak (high) amperage stage of the cycle. As the cycle frequency (Hz) increases, overall cycle length is shortened, thereby compressing the exact amount of time that the cycle spends in each stage. However, the pulse ratio continues to function within the compressed cycle proportionately.

8. Main Amperage Control. Some models: Welding Amps. Locations may vary. This control knob allows for precise control over the welding current. This control knob also is used in conjunction with the pulser to select the pulse time on amps.

9. Arc Force. This controls the dig of the arc. The dig is a term used to describe the intensity of the arc. It determines how hard the arc penetrates the metal when the arc is held short by boosting amps in a short

arc situation. This is an exceptionally helpful feature in SMAW/Stick operation. It helps hold the molten metal in place in out-of-position welds by providing a crisp, forceful arc. Or, it can provide a soft, buttery arc that easily washes the metal into the toes of the weld. This is a matter of operator preference. Rotating the knob clockwise increases dig. There are no recommended settings regarding this feature. Skill, operating styles and electrode selection are controlling variables that help determine the optimum setting of the arc force. With a little experimentation, the proper setting can be found for each task.

10. AC Frequency Control. This control narrows the welding arc and helps to control penetration and weld shape.

Image 2.1.10– Frequency effects on weld puddle.



AC Hz

20 AC Hz

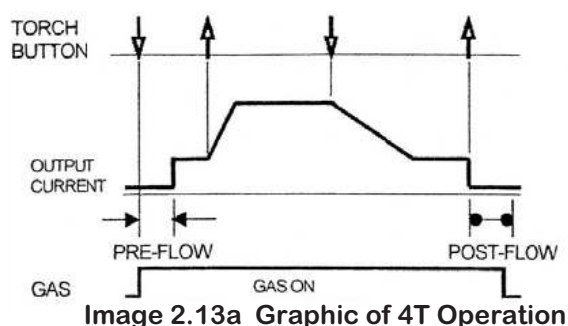
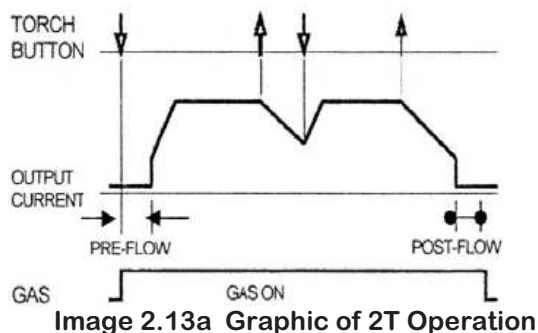
200

11. AC Balance. This control determines the amount of time the AC cycle spends in DCEN (-) or DCEP (+). More DCEP is preferred for cleaning oxidation, particularly in aluminum. More DCEN is preferred for better penetration. A 30% setting is customarily preferred. Try this setting first as a starting point for adjustment.

12. AC/DC Rocker Switch. This switch selects the use of either AC or DC current. AC current is used primarily when TIG welding aluminum. Certain stick electrodes can be welded in this mode to prevent arc blow and increase penetration.

13. 4T/2T Rocker Switch. This switch selects for control of the TIG weld cycle via the TIG torch trigger. In the 2T mode, simply touch and hold the trigger to start the arc and continue holding while welding. The machine will cycle automatically according to the settings selected on the machine. Release trigger the to finish.

continued



4T operation allows full control of the welding cycle. By touching and releasing the trigger once, the pre-flow, start current and up slope are initiated. By touching and releasing again, the down slope, end current, and post flow are initiated. Only a momentary pause between touching and releasing is necessary to activate the up or down cycle.

***Note:** The use of the foot pedal overrides some of these functions. Place the setting in the 2T position to use the foot pedal. The foot pedal is used to manually control the cycle.

14. Spot Timer. This allows automation of the TIG welding cycle by providing current and gas flow long enough to make a uniform spot weld. Activate the spot timer by pressing and holding the torch trigger until the spot timer cycle is completed (2T or pedal only).

15. TIG/Stick rocker switch. This switch allows you to select the use of either High Frequency TIG, Lift Start TIG or the conventional SMAW (stick) welding features. For sensitive areas requiring a non high frequency start, select lift start. Simply touch tungsten to work and energize the torch. Watch the tungsten for a slight glow and raise the torch to start

the arc. Do not use this for Aluminum.

16. Pre Gas Flow. This timer allows the appropriate amount of shielding gas to flow to purge the gas lines and to provide adequate shielding gas coverage over the weld before the weld arc initiates. The gas flow rate is affected by the torch cup size and welding conditions.

17. Post Flow. This timer controls the flow of shielding gas after the weld arc is terminated. Too little post flow time can cause weld contamination or torch overheating. **I-tig models** have a switch that selects a preset time for post flow.

18. Up Slope. This controls the time that the machine takes to ramp up the current from the start current to the normal welding current. This provides for excellent control over the welding puddle after it is developed and allows the operator to adjust manipulation techniques as the puddle warms up.

19. Down Slope. This controls end cycle of the weld by slowly ramping down the welding current. As the end of the weld is reached, the down slope helps prevent weld cracking and hole formation in the crater by allowing controlled cooling of the puddle.

20. Start Current. This selects the initial current for puddle development before upslope occurs. Also it may be set higher than main current for "hot" starts for thin materials..

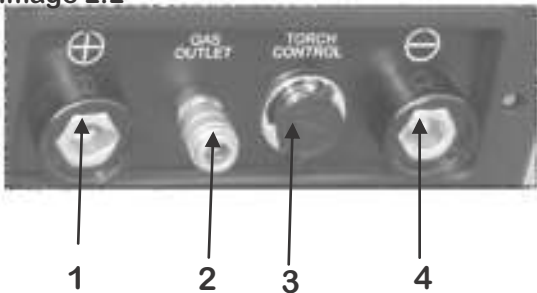
21. End Current. This selects the destination current of the down slope. This is the residual current required for the operator to properly fill the weld crater to prevent cracking and holes at the end of the weld.

22. Spot Time. Controls weld time for spot welding. Touch torch switch in 2t mode to activate timer or use foot pedal for controlled spot weld size.

continued

2.2 Lower Panel. The lower front panel is depicted below. Each terminal or lug should be kept free of dirt or obstructions.

Image 2.2



1. Positive Lug. For TIG, most situations require the work clamp to be in the positive lug. Mate the ground clamp cable lug into the hole by aligning the raised tab. Give a slight clockwise twist to lock the cable onto the machine. Also, when using MMA/Stick, either terminal may be used for the ground. However, most stick electrodes require the use of Direct Current Electrode Positive (DCEP, or commonly known as reverse polarity). In the case of the electrode positive requirement, connect the electrode holder cable to this side of the panel.

2. Quick Connect Gas Outlet. To secure the TIG torch to the outlet, simply slide the collar rear ward to ward the machine . Hold the collar and plug the gas line from the torch into the fitting. To release, simply slide the collar reward again and pull the torch fitting from the coupling. Once the coupling has been released, the collar should remain retracted so that the subsequent connection only needs to be pushed in and the collar will snap in place automatically. The operation is similar to commercial air line quick connect fittings. Check for leaks.

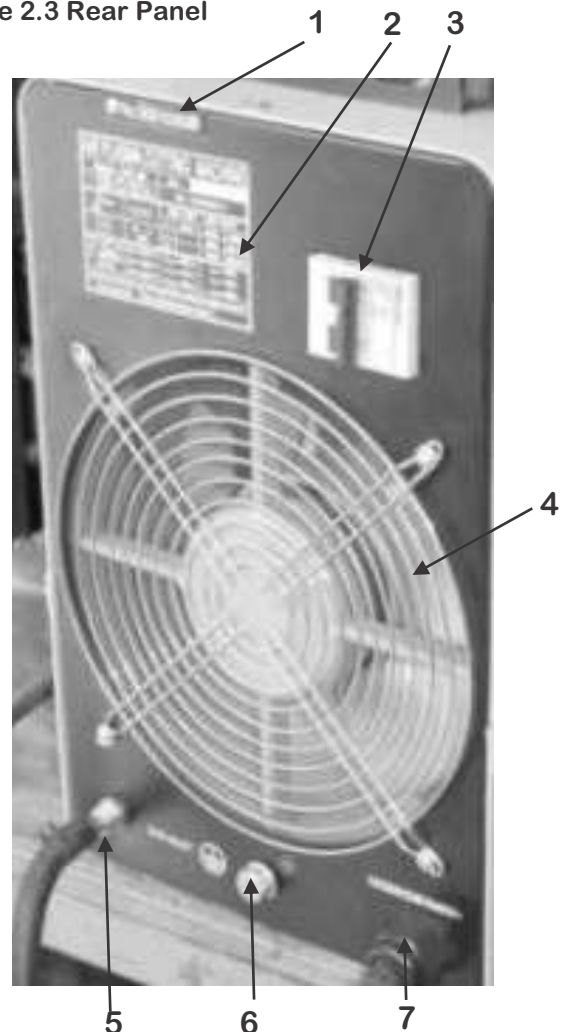
3. Torch Control. Plug either the foot pedal or the torch trigger lead directly into this plug. Tighten the collar to secure the plug onto the machine. The use of the foot pedal prevents the use of the torch trigger.

4. Negative Lug. For TIG operation, connect the TIG torch to this side. Connecting the TIGTorch to the Positive side will result in overmelting of the tungsten electrode.

***Note:** For proper use of DCEN and DCEP while stick welding, consult enclosed information usually supplied with stick electrodes.

2.3 Rear Panel. The following depiction is a typical rear panel view. Yours may vary.

1. Serial Number. Use for reference.
Image 2.3 Rear Panel



2. Machine Specifications. This information supersedes any specifications offered in the manual as specification changes do occur.

3. Double Pole Power Switch. This heavy duty switch powers the unit. Flipping the switch turns the unit on or off.


4. Fan. Allow 12 inches of clearance between the fan and any object that could restrict air flow. This includes walls and workbenches.

5. Shielding Gas Inlet. Connect to regulator.

7. HF Ground connection. See section 3.6.1

6. Power Cord. See section 3.6.1

3.1 These are general guidelines for use and maintenance for your PowerTig unit. Take into account all safety rules and recommendations first before operation and service. Do not let untrained personnel operate or service equipment in any way.

3.2 Shielding gas selection.
 Do not attempt to operate your unit with out proper shielding gas!

Proper shielding gas selection is crucial to satisfactory operation of your TIG machine. Shielding gas is a special gas or mixture of gases designed to cover and protect your weld from contamination from the atmosphere while welding and as it cools. Oxygen and other gases from the atmosphere can infiltrate the weld and make it unserviceable. Do not be fooled by the weld's appearance, because many defects are contained inside the weld without the use of proper shielding gas. The most economical and available gas is 100% Argon. Helium and Argon/Helium mixes are also available. Helium offers faster weld rates while Argon offers a more focused cone and better cleaning action. Do not attempt to use common shielding gases designed for MIG welders. These will melt the tungsten and contaminate the weld. If you have never developed a working relationship with your local welding supplier, then it is time to make a visit to purchase or lease a tank of shielding gas. Many sizes of tanks are available. Choose the size that best fits your long term needs.

3.3 Regulator/ flow meter selection. You will need a flow meter/ regulator designed to be fitted onto your shielding gas tank. It controls the flow rate of shielding gas into your PowerTig. There are two styles generally available. The first has two gauges, one for pressure the other for flow. These are the least accurate, but usually the most economical. The best regulator has a pressure gauge and a flow meter with a ball that floats when gas flows. Certain flow meters can regulate Helium, Argon or Helium/Argon mixes equally well. However, others cannot. It is advisable that a flow meter be selected that can regulate both.


 Always be sure to select the correct flow meter for the type of shielding gas that is in use. Never substitute oxygen or acetylene regulators!



Image 3.3a Ball type flow meter



Image 3.3b Ball type flow meter

3.4 Regulator/Flow meter connection. After connecting regulator safely to tank, attach hose end to shielding gas inlet. (see 2.3.5) Firmly clamp and secure hose end to the unit. Depending upon the flow meter manufacturer, you may have to cut and remove the pre-crimped hose fitting to attach the hose to the shielding gas inlet barb. Open the tank valve slowly and gradually increase the regulator flow to check for leaks.

3.5. Regulator /Flow meter adjustment.

continued

Adjust the flow meter per manufacturer's recommendations. Generally, the flow should be set around 15-25 CFH indoor for Argon. Helium settings are usually at least twice the flow rate of Argon. You will have to increase the flow of gas if weld porosity, sootiness, or weld discoloration is encountered. If a draft is present or welding is done outdoor, additional flow may be needed. Increase flow meter output until symptoms disappear.

3.6. Machine set up .

1. Power Plug installation. Due to the lack of standards concerning 220V plug configurations, Everlast chooses to ship most of our units without a plug for service. We recommend a license electrician be consulted to connect your welder for service to ensure all codes are followed. The following is provided as a general guide only. Determine the plug prong pattern of the existing 220V outlets in your shop or garage. Make sure both plug and receptacle match perfectly. We recommend the standard 50 A NEMA welder plug. Higher amperage units require twist lock type connections. Do not force plugs to mate . The green wire is used as the ground and the black and white wires are "hot" 110 V wires. To make a 220V circuit work, two "hot" wires must be used from separate phase 110V wires from the panel. Do not attempt to wire the unit from the same phase 110 V leg of the panel. Identify your green ground wire first and properly attach the wire to the ground prong. The remaining black and white wires are your 110V "hot" wires. Attach the two remaining wires to the remaining two prongs. Multi phase/Three phase units have a third red wire designed to be connected to the third "hot" leg/wire of a three phase system. Typically, it is recommended for use in a 240V Delta 3 phase system. 208 Y balanced leg system may be used, but performance will be reduced slightly. The ground bolt on the rear of the machine is designed to help eliminate High Frequency interference from the machine. Ground the case bolt to a separate wire connected to a metal ground rod outside of the facility that is in moist soil

. Occasionally multiple ground points are required.

Do not ground back to electrical circuit ground as harmful HF feedback can occur. If you notice significant computer interruptions or other electronic device issues, consult your electrician immediately for proper HF grounding and shielding techniques.



Image 3.7a Painted Tips

3.7 Tungsten Electrode Selection. Currently there are many choices available for tungstens. Tungstens are generally referred to by

a colored band painted on the end of each electrode. Each color represents a certain alloying element that is present with the tungsten that helps to extend tungsten life. Sizes also vary. Each size tungsten is capable of handling a certain current range. Not all tungstens are alike. Pure tungsten (Green) is not recommended for use in any Everlast PowerTig machine. Pure tungsten is not capable of handling the heat and stress placed upon it by an inverter based welder. Although pure Tungsten is the most affordable, it forms a large ball that makes the arc erratic and difficult to control in inverter based machines. Old style transformer welders are better suited for pure tungsten. The most widely used tungsten is thoriated (Red). It withstands the heat of inverter based welding quite well and retains its shape without over-melting. Red (thoriated) tungsten may pose a health risk as it is slightly radioactive. Inhalation of the grinding dust or microscopic particles is possible. Although it is suited for welding use in an Everlast machine, many people choose not to risk their health. Red tungsten has been available for a long time and is the standard tungsten in the industry today. However, as concerns rise, more companies are looking for alternatives. The most favored alternatives have become either a Ceriated (Orange) tungsten or Lanthanated (Gold) tungsten. Both are suitable for use in an Everlast PowerTig unit. Costs for these electrodes are considerably higher than thoriated types of tungsten. Many welders experiment with several types, eventually finding one that they favor in all situations.




SECTION 3**GETTING STARTED**

continued

The following table supplies basic information about Tungsten selection and suitability.

Table 3.7.1

DIRECT CURRENT, A**ALTERNATING CURRENT, A**

Electrode Diameter			Straight Polarity DCEN	Reverse polarity DCEP	Unbalanced Wave	Balanced Wave
NR	.020"	.050mm	5-20	Not Recommended	5-15	10-20
	.040"	1.0mm	15-80		10-60	20-30
OK	1/16"	1.6mm	70-150	10-20	50-100	30-80
	3/32"	2.4mm	150-250	15-30	100-160	60-130
	1/8"	3.2mm	250-400	25-40	150-210	100-180
	5/32"	4.0mm	400-500	40-55	200-275	160-240
NR	3/16"	4.8mm	500-750	55-80	250-350	190-300
	¼"	6.4mm	750-1100	80-125	325-450	325-450
Material		United States		Europe	Japan	
	4% Thoriated	(*)		Orange	(*)	
	2% Thoriated	Red		Red	Red	
OK	2% Lanthanated	Blue (+)		(*)	Yellow-Green	
	1.5% Lanthanated	Gold (+)		(*)	(*)	
	1% Lanthanated	Black		Black	Black	
	2% Ceriated	Orange		Grey	Grey	
	1% Zirconiated	Brown		White	(*)	
NR	Pure Tungsten	Green		Green	Green	
(*) not standardized (+) Pending 1997 revision to the ANSI/AWS A5.12 will add standardization.						

Note: Use only recommended sizes in Tig torches unless you purchase additional collets to fit the electrodes snugly. Loose fitting electrodes quickly ruin TIG torch parts.

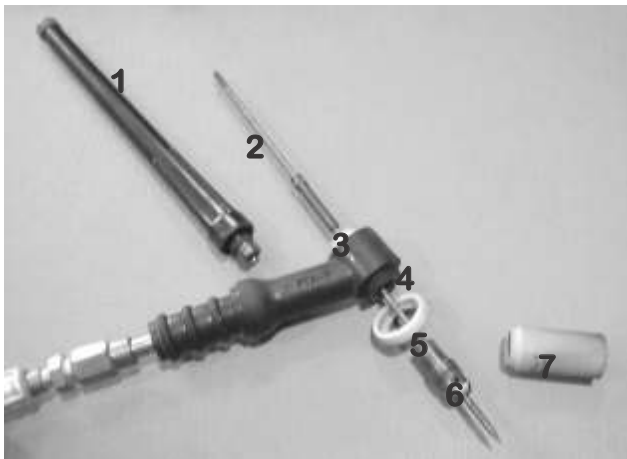
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Image 3.8a
PowerTig Torch
Assembly

3.8 TIG Torch. Becoming familiar with a TIG torch is a necessary step to becoming proficient at TIG welding. Due to constant issues with sharpening and replacement of the tungsten, frequent adjustment and breakdown of the torch components is often required. Refer to the following image for a typical TIG torch breakdown.

Image 3.8b Typical Torch Parts



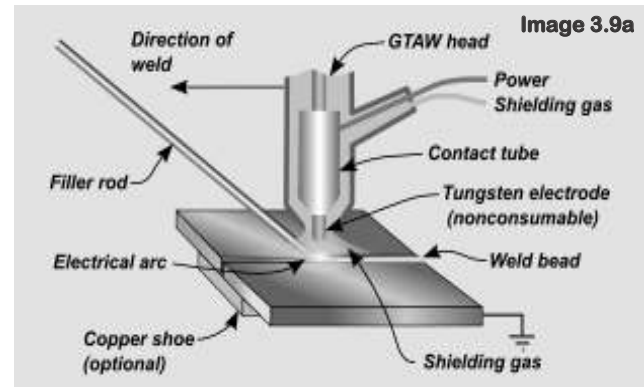
1. **Cap.** This is also referred to as a Spur or Rooster Spur. Short caps are available to provide easy access to tight places.
2. **Tungsten.** Be sure to select proper sized tungsten for job. Avoid use of green tungsten (pure) on Everlast PowerTig welders.
3. **Collet.** A snug fitting collet must be used to prevent slippage and internal arcing.
4. **Torch body.** All parts connect inside or to the outside of the torch body through threaded connections.
5. **Gas Insulator.** Prevents loss of shielding gas around cup.
6. **Collet body.** Holds collet.
7. **Cup.** Focuses and directs shielding gas around weld area.

3.9 TIG Operation and Principles.

 **Before any welding takes place, it is necessary to put on protective gear and familiarize yourself with safety precautions.**

TIG welding is an elite form of welding. Not many people learn to fully master the technique due to the patience and practice this art form requires. This manual cannot make you a good welder. Only practice and skill can do that. Everlast provides this basic information as a general guideline to assist the operator in learning basic principles and techniques.

Notice the basic components of the TIG process in the image below.



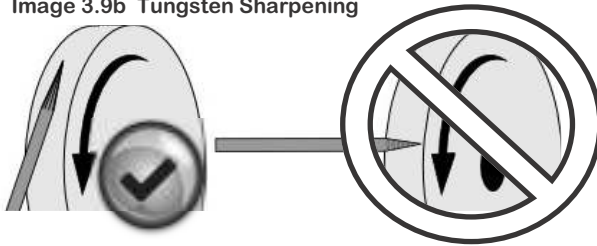
The shielding gas flows out from the torch head to cool and protect the molten puddle and the tungsten as the arc continues to melt the base metal. As the metal melts and a circular puddle is formed, the TIG torch is slowly moved forward. While the metal gently flows together, the filler rod is kept near the arc and in the gas cone to keep it hot and keep it from oxidizing. As the metal begins to form a “keyhole” shaped puddle and penetration of the metal is achieved, the filler rod is gently added to the molten puddle and then removed as a molten drop of filler material is added to the base material.

As you familiarize yourself with the above digest of basic TIG welding, there are a couple of basic knowledge items that need to be addressed.

The tungsten must be shaped prior to initiating an arc. With inverter based TIG welders,

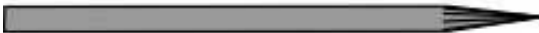
tungsten sharpness is important. Refer to the following diagram to correctly sharpen a Tungsten electrode. Notice the incorrect way of sharpening an electrode. Radially sharpening an electrode will cause an unstable, wandering arc, making it difficult to control the weld puddle. Carefully rotate the tungsten as it is being ground to prevent a flat spot or a hollow ground point. Also note that tapering the tungsten to 2.5 X's of its diameter is generally recommended

Image 3.9b Tungsten Sharpening



for most DC welding applications. For higher amperage DC welding, do not over sharpen the point, but leave a slight truncation on the end of the electrode. This prevents the tungsten tip from breaking away and falling into the weld. When AC welding, a small ball may form. This is normal. How-

For use with DC lower than 20 Amps.
Sharpen point to 2.5 times the diameter.



For use with AC or DC higher than 20 Amps.



Image 3.9c

ever, if a large globular ball begins to form, re-sharpen the tungsten and adjust the AC balance. It is also normal for a slight dome to form on the tungsten in DC mode. However, if the arc becomes erratic or the arc is difficult to start, regrinding will be necessary. If the tungsten is accidentally dipped into the weld puddle, re-grind the tungsten, particularly on aluminum. Grind tungsten only on a dedicated stone, free of contamination from other metals. Hand held tungsten grinders usually grind perfect points.

Once the tungsten has been sharpened, install it into the torch, with approximately 1/8 of an inch of the tungsten sticking out.

continued

3.10. Filler Rod Selection. Depending upon the metal to be welded, filler rod selection is critical. Consult with your local welding supplier for the optimum filler rod to properly complete the weld. In certain applications, TIG welding can be performed without the use of a filler rod.

3.11 Beginning the TIG weld. One of the biggest issues for beginning welders is holding and maintaining an arc. Starting an arc with your High Frequency Everlast welder is quite simple. Select the machine for TIG operation. Then, select the desired amperage. Grip the torch in a manner that is comfortable to you. (Many skilled welders use an underhanded grip to steady themselves on the metal.) Place the torch so that the tungsten is no more than 1/8 inch from the weld surface. Depending upon the setup, either press the foot pedal down or touch the torch and hold (2T setting. See section 2.13) the trigger to initiate the high frequency arc. A small blue glowing cone may be observed. This is the high frequency arc. Immediately after that, you should see a strong, stable arc flowing from the torch. As the arc begins to grow, a molten puddle will appear. If it does not appear, stop welding and increase the amperage. Repeat the start sequence.

For the following, reference illustration 3.11a on the next page.

1. To help the molten puddle form, slowly make small circles with the torch to build the heat in the weld area. A bright, fluid puddle will begin to form.

2. Once a uniform puddle is established, tilt the torch head about 75 degrees from the weld surface into the direction of the weld. This will direct the arc to the front of the weld puddle.

3. Grip the filler rod at a 15 degree angle to the weld surface with the other hand. Hold the rod in the iridescent cone of gas that surrounds the weld puddle. Do not hold it in the arc. Keep it close to the

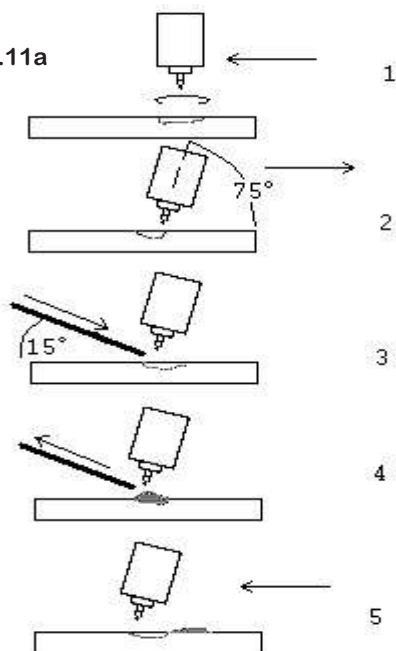
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weld. A “skeleton” keyhole will begin to form in front of the weld. The keyhole is evidence that you are ready to add filler material and move forward. Introduce the filler rod into the key hole area underneath the arc. Wait for a single molten drop to fall off the tip of the rod.

4. When a molten drop falls from the rod, quickly remove the rod, keeping it inside the gas cone. The molten drop of filler metal should blend quickly into the puddle.

5. Move the torch forward slightly, carrying the keyhole with the weld. If the key hole is lost, then forward travel was too fast or too far. When the keyhole shows good development, repeat the steps 3-5 until you have a proper weld bead established.

Image 3.11a



3.12 Weld termination. When the weld bead has reached the desired length, add a final drop of filler and slowly circle the torch over the end of the weld to fill the crater. If the weld crater is not correctly filled, cracking and weld failure may occur. This is a small but important step to properly completing a weld. Release the foot pedal or release the trigger to stop.

3.13 Machine operation. MMA/Stick (SMAW)

Select switch for Stick operation.

1. **Insert electrode into electrode holder.** Position the electrode for the most comfortable position so that the electrode can be held directly over the work piece with a slight angle.

2. **Set Amperage to the recommended amperage by the electrode manufacturer.**

Strike an arc by swiping it briskly across the work piece in the same manner as one would strike a match. Alternatively, you

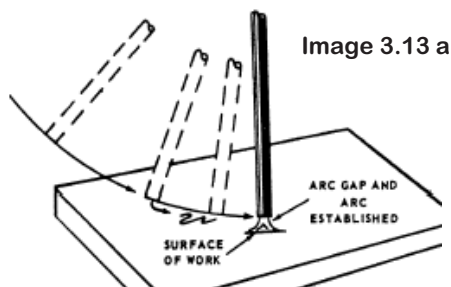


Image 3.13 a

may strike an arc with firm tapping motion against the work piece. Either method is acceptable. An arc should initiate. Continue to keep the arc going by holding the electrode off the work piece no more than the electrode width. Continue the arc by feeding the electrode into the weld puddle while moving the electrode forward. This will take some coordination, but will be fairly easy to do after practice. Do not allow the arc to become too long, because air and slag can become entrapped in the metal. The sound of a proper arc will be similar to a gentle frying sound. A long arc will emit a humming sound. An arc that is too short may be extinguished and the electrode may stick to the work piece. If the electrode sticks, immediately release the electrode from the electrode holder and break the electrode loose by hand. If the flux breaks off, simply trim off the excess rod until flux and electrode metal meet. A welding rod must have flux to shield the weld from the atmosphere or the weld will fail.

continued

4. Use the Arc force and Amp adjustment to change arc qualities. Adjust the amperage according to the recommendations of the electrode (welding rod) manufacturer for the type and size of the electrode used.

The arc force will affect how crisp the arc is whether it is smooth and buttery or deeply penetrating. Use it to suit the desired weld finish. Experimentation will be required to find the optimal setting desired. It is an excellent tool for out of position welding.

5. Electrode selection. Electrodes are usually given performance and characteristic ratings using a system of letters and numbers determined by the American Welding Society (AWS). The rating system includes the minimum tensile strength of the finished weld, the weld position (flat, vertical, horizontal, or overhead or a combination of two or more positions) and the flux type. Additional information may be given. Each manufacturer has their individual name and terminology as well. As there is no general recommendation that can be made about a particular electrode selection, except for practice welds, a electrode designated by the AWS as E 6011, E 6013, E 7014, or E 7018 may be used, each having its own distinct features and purpose. These are among the most common electrodes used in the industry and are not difficult to find. E 6011 electrodes are not as smooth running as some of the other electrodes, but offer the advantage of being able to weld on rusty metal and contaminated surfaces. It is widely used and requires very little skill to begin using. This is not a particular endorsement of an E6011, rather a simple example of what may be used in developing proficient technique. It is recommended that a variety of electrodes be used and practiced with. Consultation with an experienced local welding supplier will help greatly in determining what welding electrode is the best for your given situation. Many times, samples or small packages of electrodes are available at relatively low cost to determine for yourself the best electrode to use.

Be sure to observe the manufacturer recommendations regarding polarity. If the weld appears lumpy, porous or otherwise malformed, change the polarity of the ground cable and the electrode holder cable. Many electrodes run with a reverse, (DCEP) setting. A few run with a straight polarity (DCEN). Some will run either way.

3.14 Proper weld identification. The following image is designed to help you identify welding issues related to amperage and speed. These are the two major issues that are encountered when most people learn to weld. Notice that the weld bead

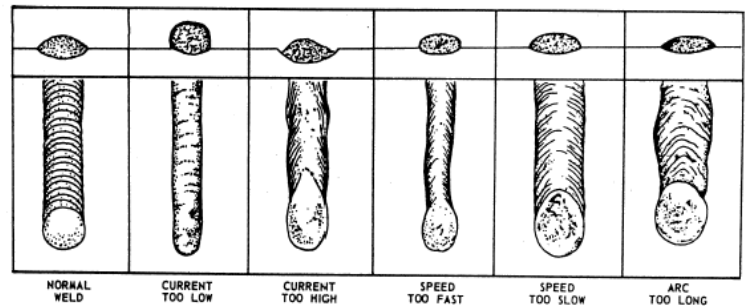


Image 3.14a

contour is affected as well. Overlap and undercutting are two main causes of weld failure. Proper washing of the weld bead into the sides or “toes” of the weld is important. Keep the welding electrode or the TIG tungsten and welding arc within the weld joint to prevent overlap. Pausing on the sides of the welds to wait for the sides to fill reduces the chance of undercutting, even if the current is a little too high. If it is possible, with any practice weld, cut the joint down the middle, lengthwise, or place the weldment in a vice and use a hammer to bend the metal over the weld area until it is either broken or bent 90 degrees. This destructive testing method will help you improve your skill by revealing faults and flaws in your welds.

SECTION 4**TROUBLE SHOOTING**

TROUBLE:	CAUSE/SOLUTION
Machine will not turn on	Check cords and wiring. Loose wires in plug connection. Check circuit breaker. If no fault is found, contact Everlast Support.
Machine runs, but will not weld in either mode.	Check for good work clamp contact. Make sure work cable and TIG Torch is securely fastened to lug and receptacle. Check work clamp for loose bolt. Check that the switch is correctly selected for TIG or STICK. Check Spot Timer switch position is turned to off, unless operation is desired.
Machine welds, but displays will not illuminate.	Check for loose internal wire or machine fuse. Contact Everlast Support for further remedy.
Tungsten is rapidly consumed.	Inadequate gas flow. Wrong size tungsten. Increase size. Wrong shielding gas. Use only Ar. Improperly using green tungsten: Use only red or other color even in AC mode. Too much DCEP. Turn balance readjust balance control to 30%.
Tungsten is dull/ contaminated.	Tungsten is dipping into weld. Check and adjust stick out to minimum 1/8 inch. Tungsten is melting. Reduce amperage or increase tungsten size. Brace off better. Possible improper gas or poor flow. Check for drafts. Poor torch angle.
Porosity of the weld. Discolored weld color. Tungsten is discolored.	Low flow rate of shielding gas. Too short of post flow period. Wrong TIG cup size. Too much torch angle. Tilt no more than 20 degrees from vertical. Possible gas leaks internally or externally due to loose fittings. Base metal is contaminated with dirt or grease.
Weld quality is poor. Weld is dirty/oxidized.	Eliminate drafts. Check if there is sufficient shielding gas left in tank. Check gas flow. Adjust for higher flow of gas. Listen for audible click of gas solenoid. If no click or no gas flow is heard, contact Everlast Support.
Will not operate in Stick.	Check that Stick has been selected. Make sure cables are securely in lugs. Make sure of good work clamp attachment/ bolt tightness.
Weld quality is poor in MMA.	Check and adjust settings. Adjust polarity settings per electrode manufacturer. (Usually DCEP)
Over current LED illuminates.	Duty cycle exceeded. Allow machine to cool. Make sure fan is not blocked. Clean inside machine with compressed air.
Unstable Arc.	Poorly ground or shaped tungsten. Possible improper Frequency control or AC balance control adjustment. Regrind to proper point. Change frequency. Or, move work clamp to prevent wander.
Nearby Computers/lights/ electronics malfunction.	Connect HF ground. Use lift tig feature in DC.
Other issues.	Contact Everlast support.

A.1 Foot Pedal use. The foot pedal controls the amperage manually and independently of most of the preprogrammed settings, except down slope and pre/post flow controls. To use, select the machine for 2T setting only. The 4T setting is specifically designed to work in conjunction with the torch switch. Usually, a simple check of the 2T/4T switch position will resolve any problems with malfunction of the foot pedal. On some DX series and I tig series, the foot pedal has a rheostat type control built into the foot pedal to regulate maximum amperage. The rotation of the rheostat increases or decreases maximum available amperage to the foot pedal control. **This means that the panel control will not regulate maximum amperage for the DX and I-TIG units with pedal mounted rheostat controls.**

On all LX and EX series units, the foot pedal is limited by the main panel amperage control. Simply select the maximum amperage desired with the main amperage control on the front panel and the foot pedal will function within the preselected panel range. The use of the foot pedal excludes the use of the torch switch. The connector of the foot pedal and the torch switch operate from a common port, so one can only be plugged in at a time. Either the torch switch with the panel control programming or the foot pedal may be used. Both cannot be used at the same time. Simply ignore the torch switch if using the foot pedal. Use of the foot pedal will not prevent the use of the pulse function. It will however, work within the parameters of amperage that the foot pedal position dictates to the welder. Occasionally, a malfunction of the foot pedal may be observed if it is dropped or mistreated. The rubber rack (down rod) may have become bent and the foot pedal gear cog may be jammed or not fully contacting the rubber rack that rotates the cog. Simply clear any binding and reengage the rack on the cog that is visible through the slot in the box part of the housing.

A.2 Water Cooler Use. Any PowerTig unit when used over 160 amps may require the addition of a water cooler and the use of a water cooled torch. The LX and EX units both come with a standard water cooled torch, which will operate up to 160 amps as an air-cooled torch. However, considerable duty cycle will be lost when operated with air cooling only with the water cooled torch. Operation of the torch over 200 amps is forbidden without the use of a water cooler. Melting and destruction of the torch will result. The Everlast PowerKool

water cooler system provides excellent cooling capability. If you expect to use the full capacity of your unit, then plan on purchasing a separate water cooler to protect your torch and consumable while improving the quality of your work. Use distilled water only in temperate climates in the water cooler. In cold climates or in areas where the machine is exposed to freezing temperatures, special anti-freeze, available from many welding supply stores or online suppliers of welding products may be used. Although not designed for this application, RV antifreeze may be substituted. Do not use standard automotive antifreezes as compatibility with torch components cannot be guaranteed. Of course, any reputable, name brand cooler may be used, as long as it has 300 amp or better cooling capacity.

A.3 Torches and Consumables. The consumables required for your standard ergonomically designed WP18 and WP26 TIG torches that are issued with the PowerTIG and I-TIG series welders, are designed to be compatible with standard and locally available consumable parts from common aftermarket suppliers such as WeldCraft®. Additionally the design of the connectors on the panel front are compatible with 3/8" DINSE connectors which will allow virtually any aftermarket torch to be connected to any PowerTIG or I-TIG unit. Please consult your local welding supplier for aftermarket applications.