

EVERLAST

POWER MTS 160 and 200S

CC/CV MULTI-PROCESS WELDER

GMAW/GTAW/SMAW



Operator's Manual for the Power MTS 160/200

Safety, Setup and General Use Guide

TABLE OF CONTENTS

Section.....	Page
Letter to the Customer	3
Everlast Contact Information.....	4
Safety Precautions.....	5
Introduction and Specifications.....	9
Specifications MTS 160.....	9
Specifications MTS 200S.....	10
Main Component and Performance Information..	11
General Description.....	12
Recommendations and Settings.....	13
Front Panel Overview.....	14
Rear Panel Overview.....	15
Side Panel Overview.....	16
Wire Roll Installation.....	16
Front Panel Detail Description.....	17
Rear Panel Detail Description.....	18
Side Panel Detail Description.....	24
MIG Drive Components, Expanded View.....	20
MIG Torch Assembly.....	21
TIG Torch Assembly.....	22
Synergic MIG /Manual MIG Operation.....	23
Lift Start Tig Operation.....	24
Stick Operation.....	25
Trouble Shooting.....	26
Appendix A: Schematic.....	27
Notes.....	28

Dear Customer,

THANKS! You had a choice, and you bought an Everlast. We appreciate you as a customer and hope that you will enjoy years of use from your welder.

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 sales department through the main customer service number in your country. Your unit will be registered and warranty will be issued and in full effect. Keep all information regarding your purchase. **In the event of a problem you must contact technical support before your welder can be a candidate for warranty service and returned.**

Please review the current online warranty statement and information found on the website of the Everlast division located in or nearest to your country. Print it for your records and become familiar of its terms and conditions.

Everlast offers full technical support, in several different forms. We have online support available through email, and a welding support forum designed for customers and noncustomer interaction. Technical advisors are active on the forum daily. We also divide our support into two divisions: technical and welding performance. Should you have an issue or question concerning your unit, please contact performance/technical support available through the main company headquarters available in your country. For best service call the appropriate support line and follow up with an email, particularly if off hours, or you cannot reach a live person. In the event you do not reach a live person, particularly during heavy call volume times, holidays, and off hours, leave a message and your call will normally be returned within 24 hours. Also for quick answers to your basic questions, join the company owned forum available through the website. You'll find knowledgeable, helpful people and staff available to answer your questions, and perhaps find a topic that already addresses your question at <http://www.everlastgenerators.com/forums/>.

Should you need to call or write, always know your model name, purchase date and welder manufacturing inspection date. This will assure the quick and accurate customer service. **REMEMBER: Be as specific and informed as possible. Technical and performance advisors rely upon you to carefully describe the conditions and circumstances of your problem or question. Take notes of any issues as best you can. You may be asked many questions by the advisors to clarify problems or issues that may seem very basic. However, diagnosis procedures MUST be followed to begin the warranty process. Advisors can't assume anything, even with experienced users, and must cover all aspects to properly diagnose the problem. Depending upon your issue, it is advisable to have basic tools handy such as screwdrivers, wrenches, pliers, and even an inexpensive test meter with volt/ohm functions before you call.**

Let us know how we may be of service to you should you have any questions.

Sincerely,

Everlast Customer Service

Serial number: _____
Model number: _____
Date of Purchase_____



Contact Information

Everlast US:

Everlast consumer satisfaction email: sales@everlastwelders.com
Everlast Website: everlastwelders.com
Everlast Technical Support: support@everlastwelders.com
Everlast Support Forum: <http://www.everlastgenerators.com/forums/index.php>
Main toll free number: 1-877-755 WELD (9353) 9am—5pm PST M-F
11am-4pm PST Sat.

FAX: 1-650-588-8817

Everlast Canada:

Everlast consumer satisfaction email: sales@everlastwelders.ca
Everlast Website: everlastwelders.ca
Everlast Technical Support: sales@everlastwelders.ca
Telephone: 905-630-8246 9am-4:30pm EST M-F
10am-1pm EST Sat.

FAX: 1-905-639-2817

Everlast Australia:

Sydney: 5A Karloo Parade Newport NSW 2106
(02) 9999 2949
Port Macquarie: 2B Pandorea Place Port Macquarie
(02) 6584 2037
After hours support: 0410 661 334
Everlast Technical Support: support@pickproducts.com

SAFETY PRECAUTIONS

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



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



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.



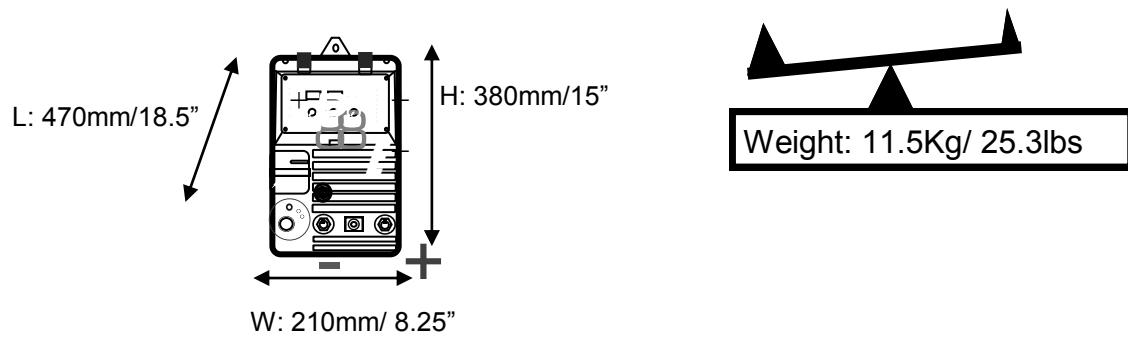
Keep all covers in place. A faulty machine may shoot sparks or may have exploding parts. Touching uncovered parts inside machine can cause discharge of high amounts of electricity. **Do not allow employees to operate poorly serviced equipment.** Always check condition of equipment thoroughly before start up. Disconnect unit from power source before any service attempt is made and for long term storage or electrical storms.



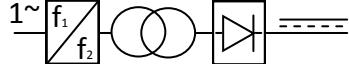
THINK Safety Further information can be obtained from The American Welding Society (AWS) that relates directly to safe welding and plasma cutting. Additionally, your local welding supply company may have additional pamphlets available concerning their products. Do not operate machinery until you are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

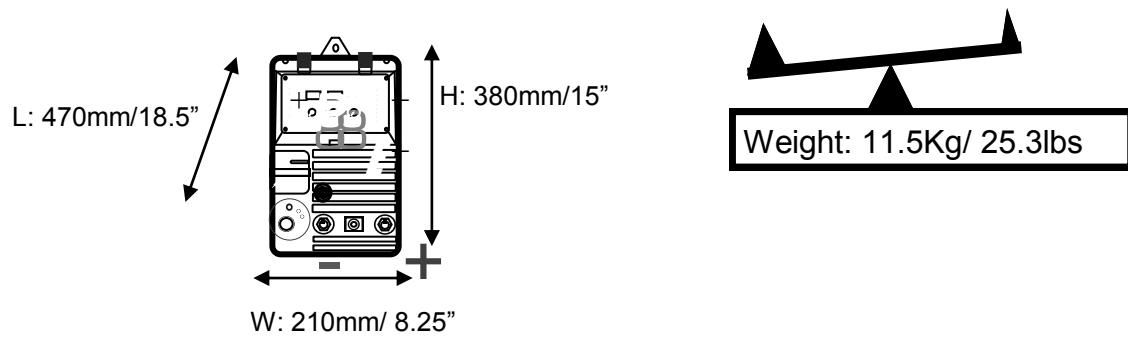
Power MTS 160 Technical Parameters*

EVERLAST MIG/TIG/STICK INVERTER					
MODEL: PowerMTS 160		No.			
		EN/ IEC60974.1			
		DC: 25-160 A			
	U ₀ V 58	I ₂	160 A	115 A	90 A
		U ₂			
		DC: 10-160 A			
	U ₀ V 58	I ₂	160 A	115 A	90 A
		U ₂			
		DC: 10-160 A			
	U ₀ V 58	I ₂	160 A	115 A	90 A
		U ₂			
		U ₁ 220-240V ±10%	I _{1MAX} : MIG 27 A TIG 22 A SMAW 31.6		
PROTECTION:	IP23S	COOLING METHOD:		INSULATION:	
		FAN		F	

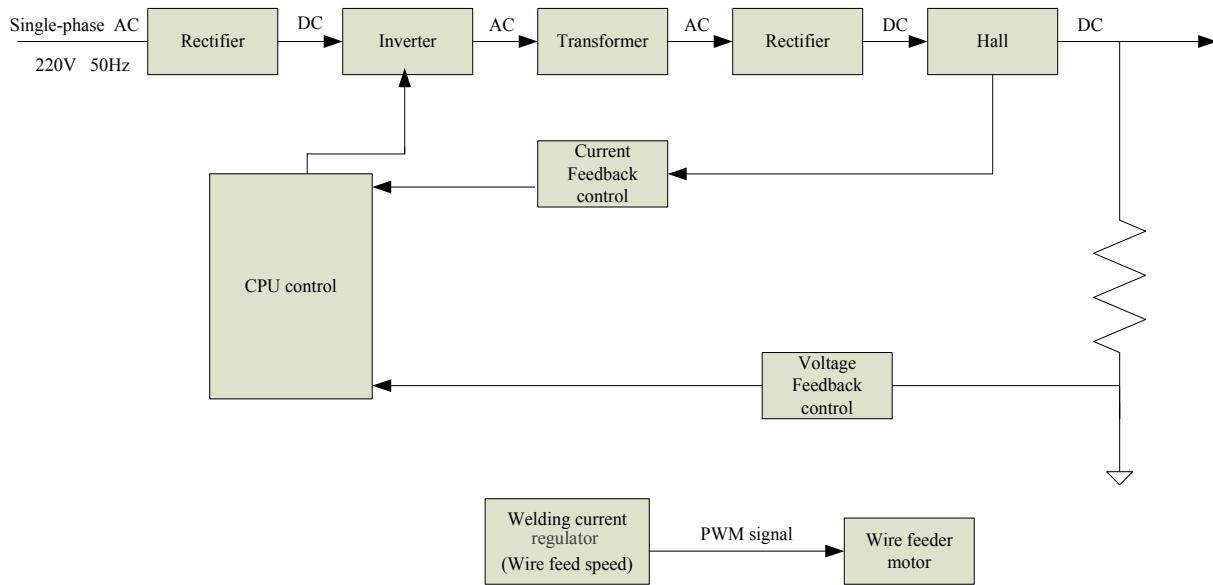


Power MTS 200S Technical Parameters*

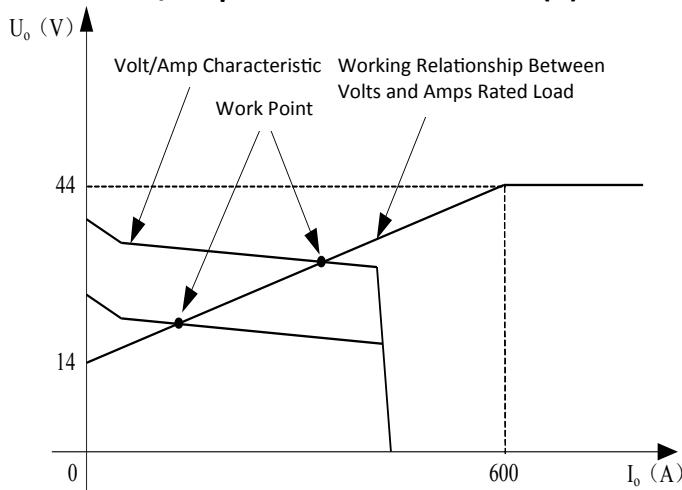
EVERLAST MIG/TIG/STICK INVERTER					
MODEL: PowerMTS 200S			No.		
			EN/ IEC60974.1		
		DC: 25-200 A			
	U ₀ V 58	X	25%	60%	100%
		U ₂			
		DC: 10-200 A			
	U ₀ V 58	X	25%	60%	100%
		U ₂			
		DC: 10-170 A			
	U ₀ V 58	X	30%	60%	100%
		U ₂			
	U ₁ 220-240V ±10%	I _{1MAX} : MIG 37 A TIG 29A SMAW 33			
INSULATION IP23S	COOLING METHOD: FAN		INSULATION: F		



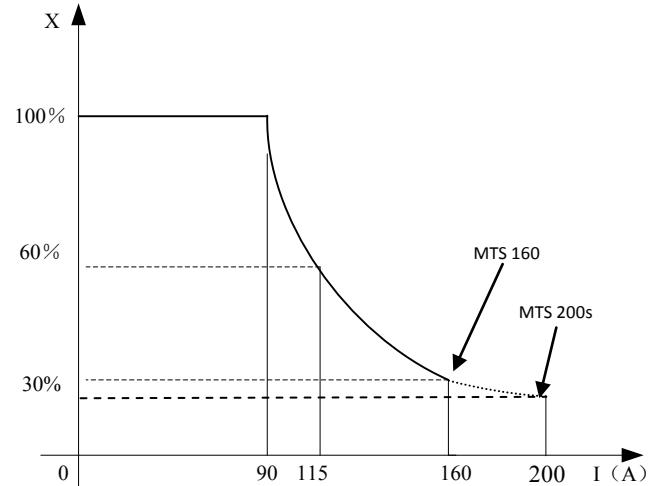
Main Component/Circuit Flow Diagram



Volt/Amp Formula: $U_2 = 14 + 0.05I_2(V)$



MIG Volt/Amp Performance



Duty Cycle/Amp Performance Curve

SECTION 1

INTRODUCTION AND SPECIFICATIONS

1.1 General Description, Purpose and Features. The PowerMTS 160 and 200S, are compact lightweight CV/CC welders capable of handling most jobsite duties and portable repairs. Operating on 1 phase 220-240V 50/60Hz, the units are designed to strike an excellent balance between versatility and performance. The following processes are included on the PowerMTS series.

- 1) **GMAW (MIG)** offers wave form control which results in a smooth, stable arc . Digital controlled MIG components precisely control functions and give real-time feed back about the welding output parameters. The 200S also utilizes fully digital synergic technology with a manual override function for standard operation. (see below). MTS 160 has manual function MIG with no synergic capability.
- 2) **GTAW (TIG)** offers advanced lift start DC TIG operation includes a standard gas valve torch. (Series 17 compatible). **Note:** DC Lift start is actuated by the remote contactor built into the handle (included). The TIG torch is not live until the contactor switch is depressed. The user has a choice of either 2T or 4T operation while welding.
- 3) **SMAW (Stick)** delivers smooth spatter free welds. Arc force control increases performance, and improves out of position welding characteristics. Smooth spatter free welds are easily obtained on ER 7018, 309L, and many specialty rods.

1.2 Basic Design and Construction. The PowerMTS series units uses advanced Pulse Width Modulation coupled with IGBT module construction to produce a stable arc without consuming large amounts of power attributed to standard transformer welders. Inverter frequency is approximately 40KHz. Welding power is generated as follows (**See page 11 for flow diagram**) : Single phase 220V AC (nominal) power is fed into the welder, where it is rectified in to 350V DC. After it passes through an intermediate transformer, reducing the voltage, power is fed to the IGBT based inverter where it is converted to converted to AC power cycling around 40Khz. Next power and passed back through fast recovery diodes to rectify the power back to DC while being filtered through an inductor circuit. The circuit then uses current/voltage feedback sensing technology through the means of its CPU control board to maintain stable TIG/ Stick performance, ensuring stable MIG performance as well. Welding parameters can be infinitely and continuously adjusted while the unit is in operation, offering instant welding response.

1.3 Installation and Wiring. The basic construction of the PowerMTS is rugged and durable, and is considered

ideal for circumstances where multiple welders may be required, but not available. Critical components are protected by coatings to make the welder environmentally resistant with a water ingress rating of IP23S, among the highest in the industry. However, some care and common sense should be taken to make sure that the welder offers the safest and best performance. Please note the following items regarding safe operation:

- 1) Do not use the welder in damp or wet areas. Perspiration and other forms of water in contact with the body can increase the risk of electrocution. VRD technology helps to reduce the risk of electrocution from high OCV, but does not necessarily eliminate the risk, especially while welding.
- 2) Do not use the welder in extreme corrosive environments. To maintain optimum power transfer, check main connections, clamps and cables frequently to ensure that components are not corroded. Excessive corrosion and oxidation can result in an unstable arc and excessive heat build-up.

Match the correct colored wires located on page 15 with the wires found on your unit so that the unit can be properly connected to the power supply. Be sure to make a secure ground connection to the plug and identify the correct 115 V power legs on the power input side, commonly referred to as "hot" wires. A neutral wire is not required, and should not be used. If a 4th wire on the input side is found in a single phase system, it is probably a neutral. The circuit should be rewired if this neutral is present so that only two "hot" wires and one ground wire is present. Everlast strongly recommends using the NEMA 6-50, a three wire 50 amp plug and receptacle, available at almost all hardware stores. The NEMA 6-50 P/R is the industry standard plug / receptacle for welders. Consult local codes and licensed electricians should any doubts or problems arise. If doubts remain, contact Everlast for more information. Wiring the welder incorrectly can result in failure/damage to the welder.

NOTE: DC TIG is not generally considered capable of welding Aluminum. The MTS units are DC only and do not have AC capability.

Aluminum welding may be performed with the MIG process, with Argon gas, and a suitable gun liner. Recommended wire size for welding aluminum is .040". 50XX series wire is also recommended. 40XX series may have difficulty feeding.

SECTION 2**SETUP GUIDE AND COMPONENT IDENTIFICATION****GENERAL POLARITY RECOMMENDATIONS***

Table 1

**Consult manufacturer directions of filler material. There are exceptions!*

PROCESS	TORCH POLARITY	WORK POLARITY
MIG (GMAW)	+	-
FLUX CORE (FCAW)	-	+
TIG (GTAW)	-	+
STICK (SMAW)	+	-

GAS SELECTION GUIDE

Table 2

PROCESS	GAS
MIG (GMAW) STEEL	80/20 Argon/CO ₂ (For optimum synergic operation)
MIG (GMAW) STAINLESS	98/2 Argon/O ₂ (For optimum synergic operation)
MIG (GMAW) ALUMINUM	100% Argon
DC TIG (GTAW)	100% Argon

Table 3 **MIG (GMAW) CURRENT/WIRE/THICKNESS GENERAL SUGGESTIONS**

WIRE DIAMETER	WELDING AMPS (A)	PLATE THICKNESS	GAS FLOW RATE
.023" (0.6)	25-110	.040"-.063" (1.0-1.6)	15-20 CFH /7-10 lpm
.030" (0.8)	35-160(200)	.040"-.128" (1.0-3.2)	20-25 CFH/ 10-14 lpm
.035" (0.9)	45-160(200)	.040"-.128".(1.0-3.2)	20-30 CFH/ 10-16 lpm
.040" (1.0)	45-160(200)	.050"-.25"+(1.2-6.0+)	25+ CFH/ 14+ lpm

Table 4 **DC TIG (GTAW) OPERATION GUIDE**

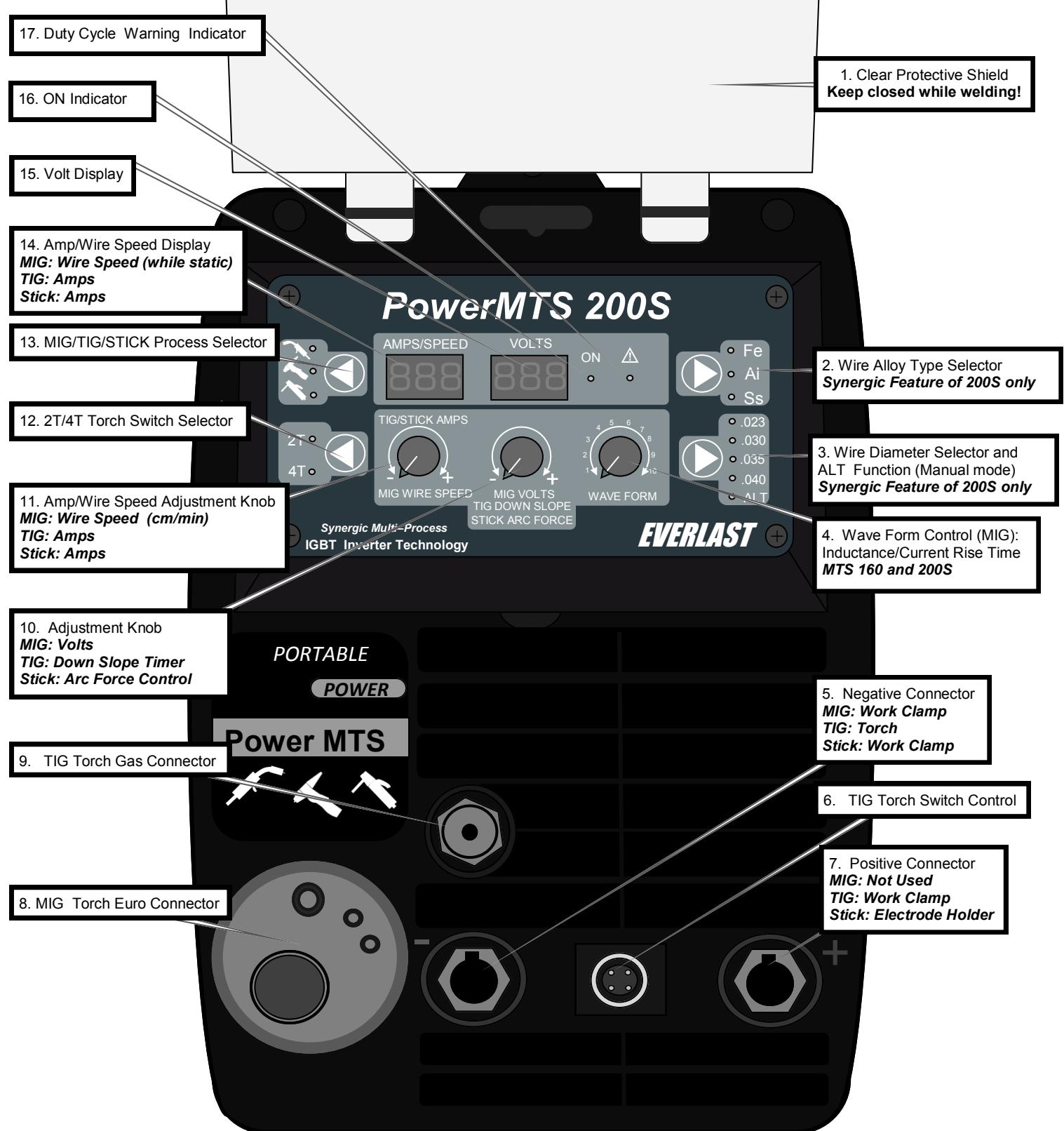
METAL THICKNESS	WELDING AMPS (A)	TUNGSTEN DIA.	Ar FLOW RATE
1-3 mm/.040"-1/8"	40-80	1-2 mm/.040"-3/32"	8-15 CFH /4-7 lpm
3-6 mm/ 1/8"-3/16"	80-200	2-3 mm/ 3/32"-1/8"	15-25 CFH/ 7-14 lpm

Table 5 **DC STICK (SMAW) OPERATION GUIDE**

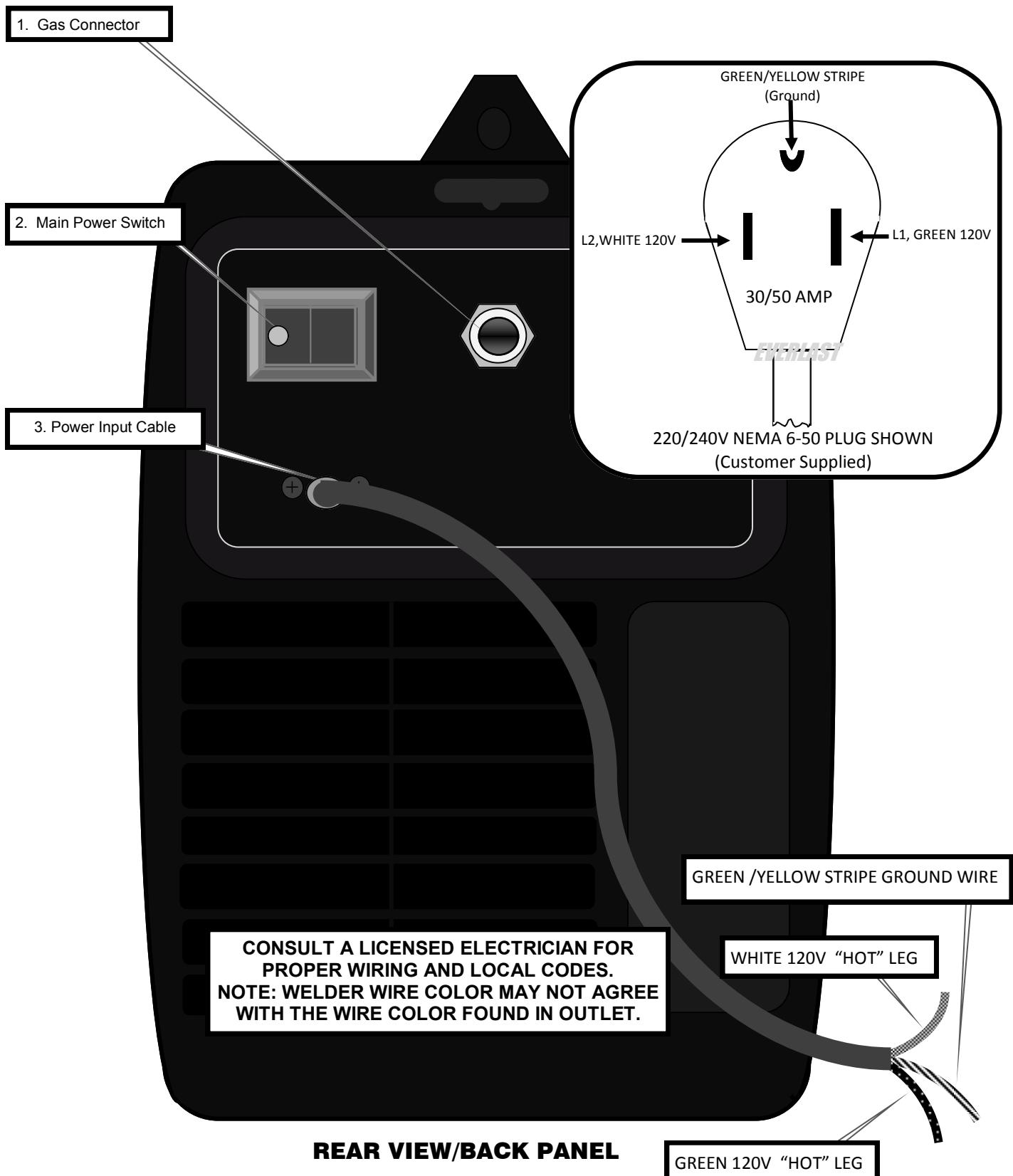
METAL THICKNESS	ELECTRODE SIZE	WELDING AMPS
< 1 mm/.040"	1.5 mm/ 1/16"	20-40
2 mm/.080"	2 mm/3/32"	40-50
3 mm/ 1/8"	3.2 mm/1/8"	90-110
4-5 mm/ 3/16"	3.2-4 mm/ 1/8"-3/16"	90-130
6-12 mm/ 1/4"-1/2"	4-5 mm/ 3/16"	130-170

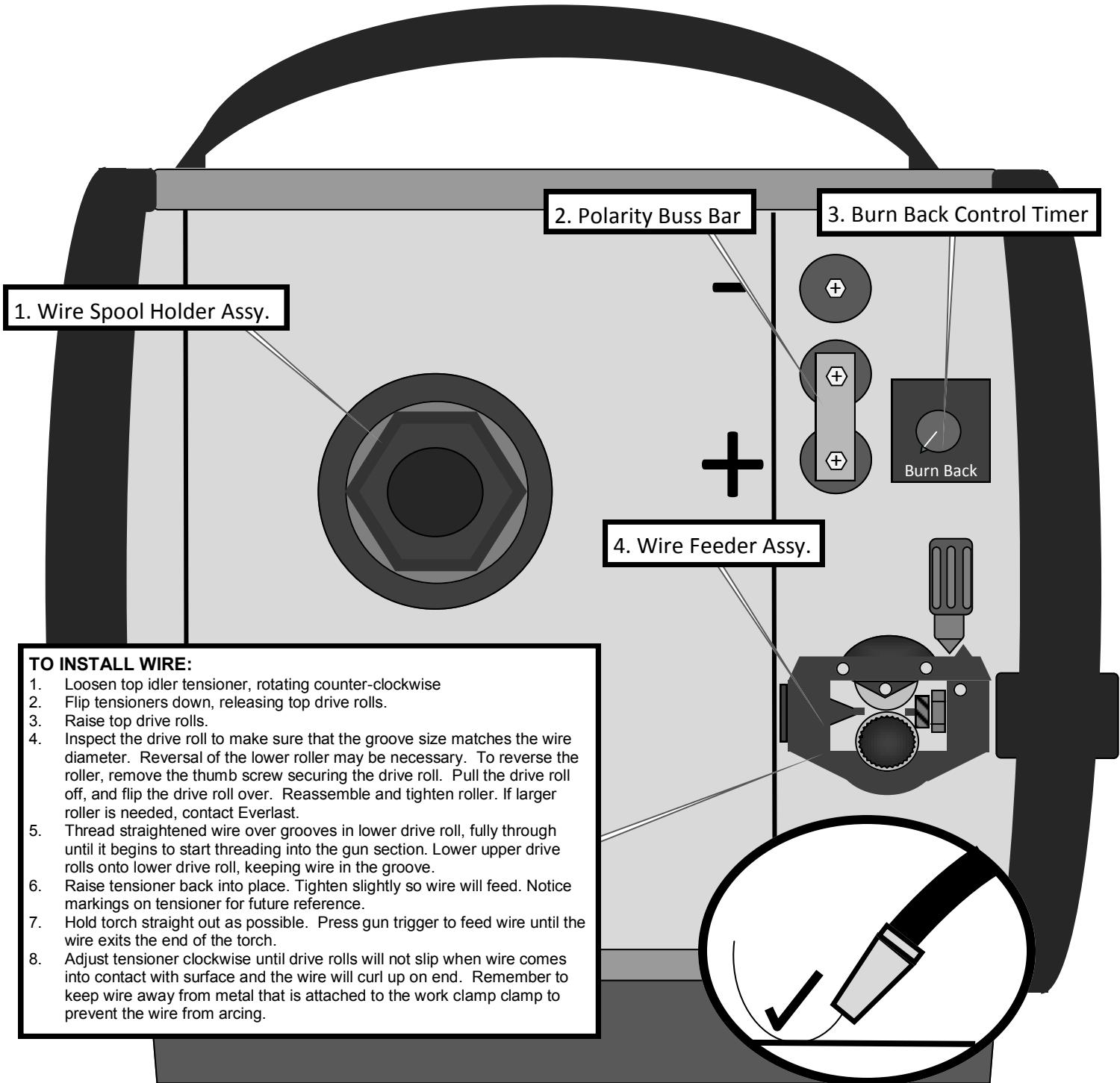
SECTION 2

SETUP GUIDE AND COMPONENT IDENTIFICATION



FRONT VIEW/ MAIN PANEL

SECTION 2**SETUP GUIDE AND COMPONENT IDENTIFICATION**



SIDE VIEW

Front Panel:

1. **Clear Protective Cover.** Prevents damage to the control and display area. Keep closed while welding and grinding or during long term storage.
2. **Wire Alloy Selector.** This function applies to only the Synergic MIG function of the MTS 200S. Does not apply to the standard MTS 160. Select your wire type according to the basic categories of Fe (Steel), Ss (Stainless Steel) or Al (Aluminum). This input must be made to properly use the Synergic function to automatically adjust the Volts needed to weld at the selected wire speed.
3. **Wire Diameter/ALT selector:** *This function applies only to the Synergic MIG function of the MTS 200S . Does not apply to the standard MTS 160.* Select your wire diameter according of the type wire you are using. Selecting the correct wire diameter is critical to optimum Synergic function of the welder, automatically compensating the voltage while the wire speed is adjusted. For alternate full manual control of the welder to function in "normal" mig mode, select ALT. This will allow for full, independent control of MIG wire speed and voltage.
4. **Wave Form Control.** Varies the slope of the current rise time between during short circuit MIG operation. This affects the actual point where the current has risen sufficiently to burn back the wire. The point at which it has burned back is considered the "pinch point". To put it in more practical terms, the user will see that the wire is sticking out longer or shorter from the MIG torch before it burns away, depending upon the exact setting. This controls spatter, penetration and bead profile. It also will be noted that the arc is more "stiff" and penetrating, or more "fluid" and the wire wets in more easily into the toes of the weld. Bead profile changes will occur as well. A stiffer arc will produce a deep but narrow profile. A buttery/fluid arc will produce a wider, shallower weld, usually with an improved bead appearance and less spatter. This is an unique feature from Everlast and separates it other small MIG units. Wave form control is also known as inductance control, slope or arc force control (MIG). By changing the wave form, the user can achieve arc performance that is similar to or identical to the unit he/she is accustomed to using as well. The arc pitch will change as the wave form is adjusted, going from a pitched whine to a frying sizzle. All brands with no wave form control have a fixed slope, though not all are set at the same level. A person using the MTS unit can achieve an arc that is very similar to what he/she is used to and then use the control to improve the units versatility.
5. **Negative Polarity Connector.** Connects to work clamp while in MIG/Stick mode. Connects directly to TIG torch while in TIG mode.
6. **Control.** Plug the control wire from the torch switch directly into this receptacle. This allows the torch switch to initiate the arc through 2T or 4T mode. (Not designed for foot pedal use.)
7. **Positive Polarity Connector.** Connects to Stick torch in Stick Mode. Connects to work clamp in TIG mode. Not used for MIG.
8. **Euro Quick Connect for MIG.** This style of connection makes the MTS unit compatible with many after market MIG torches/guns. Connect the MIG torch by aligning pins on the gun cable with the receptacle and pushing in. Twist the collar on the cable connector to lock in place. Do not use pliers or other tools to tighten. Hand tighten only.
9. **TIG Gas Connection.** The gas line from the TIG torch should be connected to control the gas flow while in TIG mode. This feature provides a solenoid controlled stop/start of gas flow while using the tig torch.
10. **MIG Volt/TIG Down Slope/ Stick Arc Force Control.** In each mode, the function of the control changes. In the MIG mode, the control is used to adjust the arc voltage. While in TIG mode, the it functions to adjust the down slope of the arc current while the unit is used in 4T mode. In Stick mode, the control is used to vary the automatic arc force current response. When used for stick welding the arc force is also known as "dig". When welding in stick mode, the current is increased as the volts fall off due to a short arc length. This helps maintain the arc by providing more wattage.
11. **Amp/Wire Speed Control.** For Stick and TIG function, this adjusts the amps. For MIG operation, the amps are directly tied to the wire speed feed. Increasing the speed increases the amps and vice versa. While the unit displays in cm/min for MIG operation, a change in this

- control also results in a change of amps.
12. **2T/4T Torch Trigger Selector.** The torch trigger function is designed to operate for both MIG and TIG functions. To operate in 2T mode, the trigger on either the MIG or TIG torch should be simply held down. The 4T function operates as a torch “latch” in MIG mode that locks the MIG torch on without needing to hold the trigger. To operate 4T in the MIG mode, simply press the torch trigger and hold it down until the arc starts. To lock it on, release the trigger and weld without holding the trigger down. To stop, the trigger must be pressed again, and then released after 1-2 seconds. The 4T function in TIG mode acts similarly, but in conjunction with the down slope timer. As the torch trigger is pressed for the second time, the trigger should be held in until the downslope timer completes its cycle. The trigger may then be released to end the arc. Releasing before the down slope is finished will terminate the arc immediately.
NOTE: The unit will always default to 4T operation each time the unit is powered on.
 13. **Process Selector.** Each icon graphically represents each process for rapid eye acquisition when changing processes. The top function represents MIG. The middle function represents Stick. The bottom function represents TIG. **Note: The unit will default to MIG each time the power is cycled on.**
 14. **Volt Display.** The display displays MIG volts that are selected either through the automatic synergic function (200S) or through the manual adjustments made with the MIG Volt control knob. The function of the Volts display will change to reflect actual welding volts during welding. This may reflect a slightly different voltage than selected. This is normal and due to minor variations of arc length, power input etc. The Volt meter also registers TIG and Stick voltage, though the voltage is non adjustable on these functions.
 15. **Power Indicator.** This L.E.D. should remain on while the switch is on.
 16. **Duty Cycle/Overcurrent/Over or Under-Voltage Warning.** When the duty cycle has been exceeded or an overcurrent, over-voltage or under-voltage condition has occurred, the L.E.D. will light. Allow the unit to cool while running until the light goes off or for 10 minutes before resetting the welder. If condi-

tion persists check for loose wires or voltage supply problems.

Rear Panel:

1. **Gas Supply.** Connect the Gas regulator hose to this point via the brass fitting. (Regulator is customer supplied and not provided as standard equipment at time of publication.)
2. **Power Switch.**
3. **Power Input Cable.** The MTS requires a 220/240 V single phase 50/60 Hz power input. Do not attempt to hook to any other power configuration. See page 13 for proper wiring instructions. If used on a generator, the generator must labeled as “clean power” and provide a sine wave with less than 10% variation.

Side Panel:

1. **Wire spool holder assembly.** See page 21 for the detailed view. Make note of the correct assembly order of the rubber tension washers and spring. *The order in which they are assembled is important to be able to provide enough resistance to prevent de-spooling of the wire.* When inserting the spool, make sure the small tab on the inside of the spool holder is located in one of the recesses made into the spool, if any. Tighten the outer hand nut after installing the wire spool so that the wire will not continue to keep rolling after wire has stopped feeding. Do not over tighten so that the drive rolls slip or the feeder strains to pull the wire. The tensioner assembly can accommodate either 8" or 4" spools of wire. However, the black center adapter must be removed to use the smaller rolls.
2. **Polarity Buss Bar.** Note the "+" and "-" symbols located on the inside of the unit next to the buss bar terminals. To change the polarity of the MIG torch, simply loosen the middle screw and remove the top and bottom screws on the terminals. By pivoting the buss bar on the center, loosened screw., swing the buss bar into position over the desired polarity. Reinstall the screws, lining up the holes in the buss bar with the terminal. Tighten all buss bar screws. Always remember to alter your work clamp to reflect the polarity change. If the terminal buss bar is oriented to negative, then the work clamp should be in the "+" posi-

tive output terminal. **Standard polarity is “+” (DCEP) with the work clamp in the (-) negative output terminal. For flux core use see manufacturer’s direction for polarity recommendation. See TABLE 1 for complete recommendations**

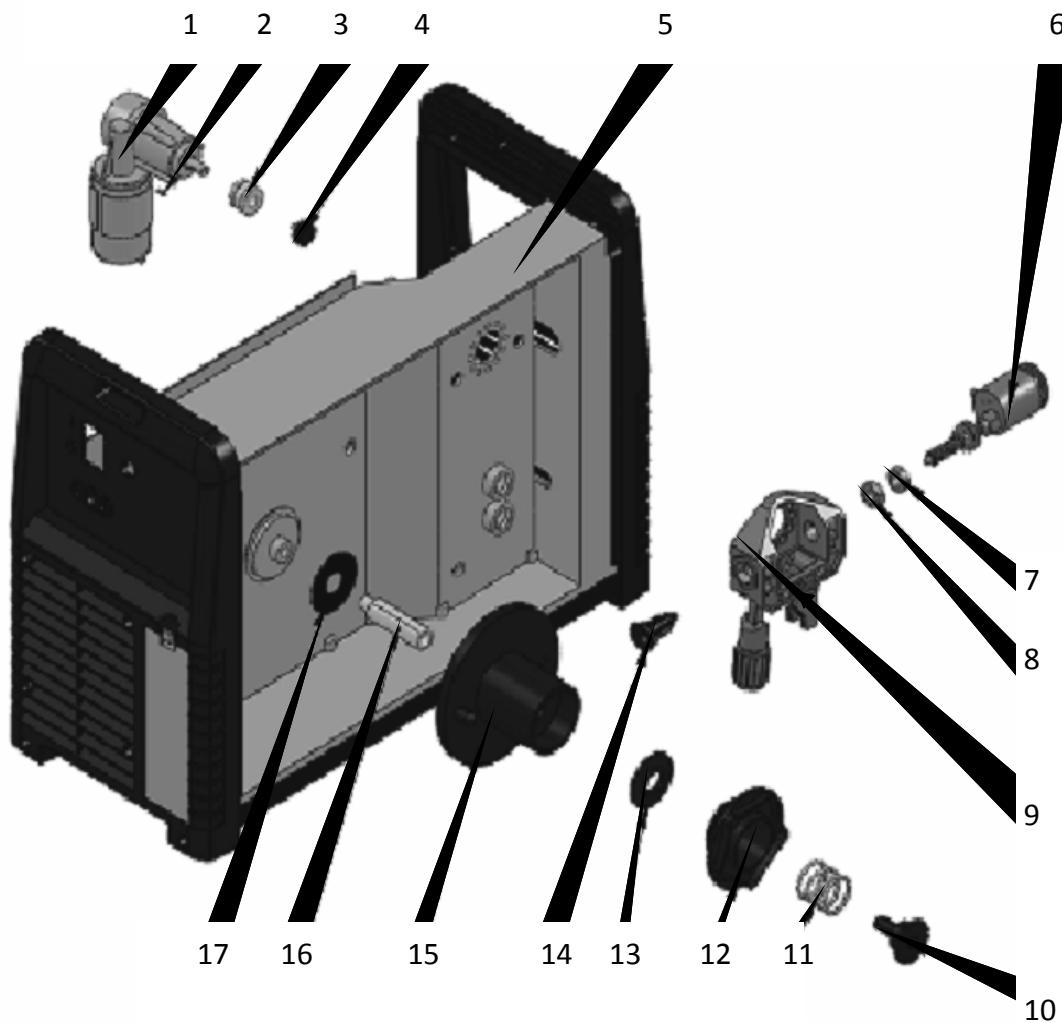
3. **Burn Back Timer Control.** The burn-back control helps to prevent too much stick out when stopping and restarting a weld, by keeping the arc energized for a short time after the wire feeder stops feeding and while the gas is post flowing. The wire will burn back to the length desired by adjusting the control. This improves re-starts and keeps the user from having to re-trim the wire between welds. It should also be adjusted while feeding aluminum, preventing the wire from burning back into the tip and seizing.
4. **Wire Feed Assembly.** Note the numbers on the side of the tensioner. These numbers are a reference point to help properly tension the wire so that the drive roller will not slip. Do not over tension the wire because it can create a condition known as birds nesting, where the wire will ball up trying to feed if too much resistance is met. Too little tension will result in wire slipping and fast wear on the drive components. Note that while welding aluminum, the tension is absolutely critical. Do not deform the wire. Use 50XX series wire for Aluminum, with a diameter of .040" for best results. Test the tension of the wire and inspect for proper feeding before beginning a weld. Occasionally cleaning of the feeder mechanism is necessary to prevent wear and damage to the feeder and to the MIG gun liner. Monitor any metal flaking that may occur, and dirt accumulation and clean it away gently with compressed air as necessary. Use proper safety attire while doing this, i.e. glasses, gloves etc to prevent injury. Do not use cleaners or solvents. Felt wire lubricators may be bought and

used to keep feeding cleanly while using steel or stainless wire.

NOTE: Keep welder at least 10-12 inches away from all objects for proper cooling. Regularly inspect and clean the welder, and its circuits on a quarterly basis with dry compressed air. Remove the covers only after the unit has been turned off and discharged for 30 minutes to help prevent electrocution.

EXPANDED VIEW OF MAJOR MIG DRIVE COMPONENTS*

*Some non-significant variation may occur in component details. Not all components are individually serviceable, and are added for detail and explanation of assembly



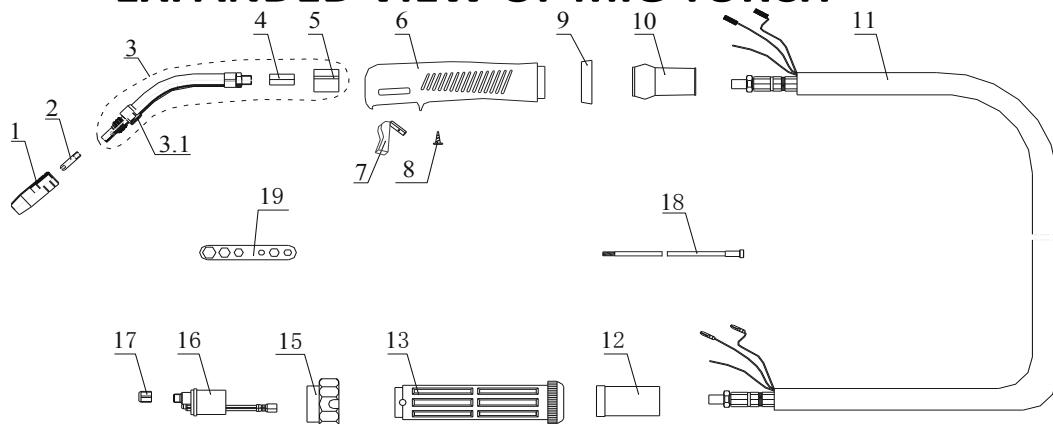
NO.	Parts	Qty
1	Wire feed motor	1
2	Key	1
3	Feed roller	1
4	Locking screw	1
5	Machine	1
6	Connector	1
7	Screw thimble	1
8	Screw nut	1
9	Feed strut	1

NO.	Parts	Qty
10	Locking thumb screw	1
11	Tensioning Spring	1
12	Reel Retaining cover	1
13	Friction 7 washer	1
14	Wire guide tube	1
15	Wire reel shaft	1
16	Shaft core	1
17	Washer	1

SECTION 2

SETUP GUIDE AND COMPONENT IDENTIFICATION

EXPANDED VIEW OF MIG TORCH



NO.	PARTS	QTY
1	Diffuser D.12 14-15AK	1
2	Contact Tip 0.8/M6*25	1
3	15AK Goose gun neck assy.	1
4	Adapter for goose neck	1
5	Plastic adapter	1
6	MIG gun handle	1
7	Torch switch 21.8mm	1
8	Screw D.3*10	3
9	Handle locking ring	1
10	Articulating joint 15AK	1
11	Coaxial cable assy /16mmq/3m	1
12	Cable thimble 12-16-25 MMQ	1
13	CO ₂ Euro-rear connector handle	1
14	Retaining Screw M4*6 UNI 6107	1
15	Knurled locking nut	1
16	Euro-main connector	1
17	Securing nut for gas input	1
18	Insulating feed pipe 0.6-0.8 3m, Blue	1
19	Contact Tip Wrench	1

NOTE: Some components may appear slightly different as design/supplier changes are made from time to time. At time of publication, the standard torch provided with MTS 160/200S is the Trafimet Ergoplus 15, which interchanges consumables with the Binzel MB15ak torch used elsewhere in the Everlast I-MIG line. The widely used Euro-connector on the MTS series MIG torches allows the customer to select and install about any brand after-market torch desired.

TO INSTALL MIG GUN/TORCH:

- Align pins on #16 with the feeder receptacle.
 - Fully engage the connector into the receptacle.
 - Twist knurled nut (#15) on connector until the nut is snug.
- DO NOT OVERTIGHTEN! USE HAND PRESSURE ONLY.**

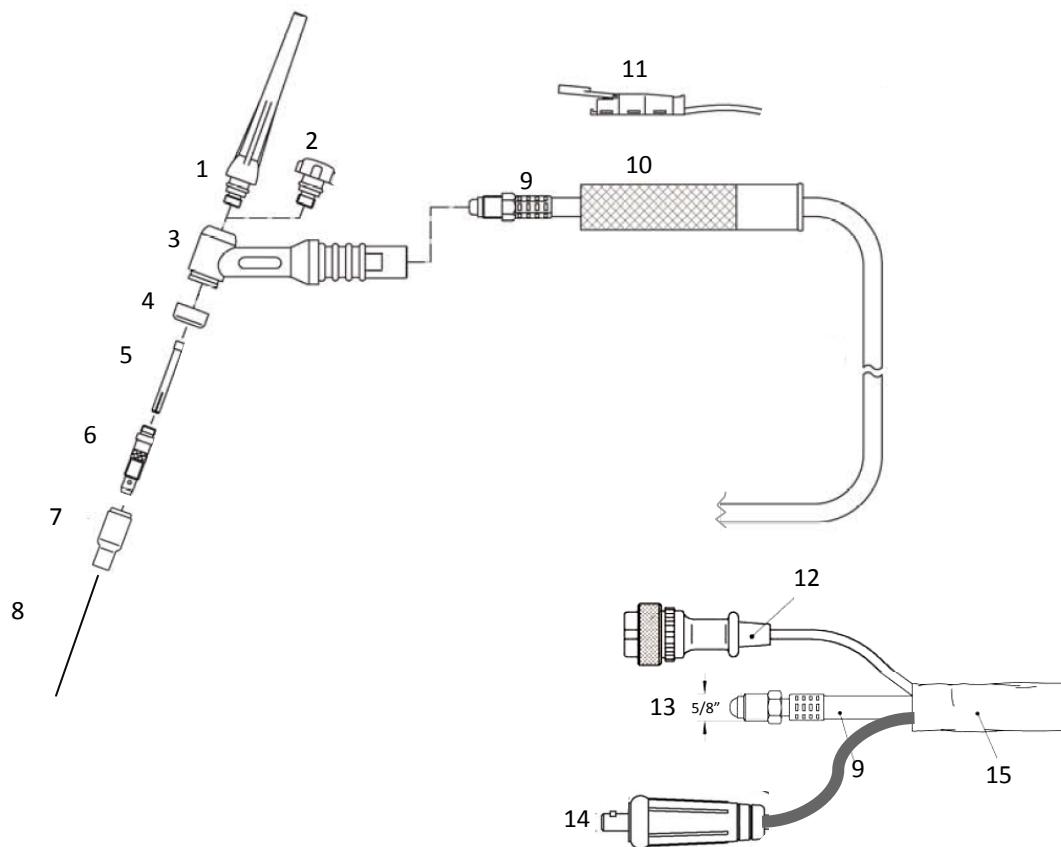
NOTE: Over time, pressure on the drive rolls causes metal fragments from the filler wire's surface to find its way to the gun cable liner. If the wire guide is not cleaned, it can gradually clog up and causes wire feed malfunctions. If feeding difficulty is observed, clean the liner in the following manner:

- 1) Remove the welding gun's gas nozzle, contact tip and contact tip's adapter.
- 2) With an air nozzle below compressed air through the wire guide. Wear eye protection!
- 3) Blow the wire feed mechanism and reel housing out with dry compressed air.
- 4) Reassemble components. Tighten the contact tip and contact tip's adapter to spanner tightness.

The liner may eventually become worn and will need to be replaced. When welding aluminum, a Teflon or special liner must be used, necessitating a liner change. To change the liner:

- 1) Remove the securing nut of the liner (#17) which exposes the end of the wire guide.
- 2) Straighten the gun cable and withdraw the liner from the gun.
- 3) Carefully push a new wire guide in to the gun. Make sure that the wire guide travels all the way to the contact tip.
- 4) Make sure the O-ring at the machine-end of the gun is installed
- 5) Tighten the wire guide in place.
- 6) Cut the liner 2mm from the mounting nut and file the sharp edge of the liner.
- 7) Reattach the gun and tighten all parts.
- 8) Re-thread wire.

EXPANDED VIEW OF TIG TORCH



NO.	PARTS FOR SR 17 TORCH (STYLE MAY VARY)	QTY.
1	Long Back Cap with O-Ring	1
2	Short Back Cap	Opt.
3	Torch Head	1
4	Insulator	1
5	Collet 1/16 or 3/32	1
6	Collet Holder	1
7	Ceramic Cup #5,6, or 7	1
8	Tungsten (customer supplied)	0
9	Torch Cable	1
10	Torch Handle (Blue ergo handle std, not pictured)	1
11	Torch Switch (Built into ergo handle, separate on straight handle)	1
12	Torch Switch Connector	1
13	5/8 connection for Gas.	1
14	Power Connector	1
15	Protective Synthetic Rubber Cover	1

SYNERGIC AND BASIC MIG OPERATION

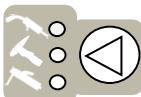
Synergic vs. Manual Setup and Operation

How Synergic MIG operates:

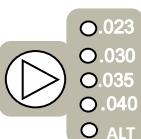
The Synergic function of the MIG (200S) component allows the user to only need to use the wire feed speed control to make the unit operate. The welder is programmed to automatically adjust the voltage based off the users input of wire diameter, and filler metal type when the wire speed is increased or decreased by turning the wire speed adjustment knob. While in the Synergic mode, the user can make manual adjustment to "fine tune" the voltage if he chooses by turning the voltage up or down after adjusting the wire feed speed. If the wire speed is readjusted after manual adjustment to voltage is made, the unit defaults to the synergic mode again, and voltage is once again adjusted automatically. The welder may be used in full Manual mode, with independent control of the wire feed speed by simply selecting ALT on the wire diameter selector. Settings will not be saved when the unit cycles off and back on and will default to factory settings. If stepping away briefly it is best to keep the unit on, or the settings will not remember the last settings if it is turned off.

How to setup the Synergic and Manual functions:

1. Turn unit on. Wait for it to go through the power up cycle. (MTS 160, 200S)
2. Select the MIG icon with the Process Selector button.



3. Select the wire diameter of the wire being used. Selecting ALT defaults unit to full manual mode. (MTS 200S) Aluminum will default to only 040" so that the wire will not jam or birds nest while feeding. .



4. Select the filler wire type. Fe= Steel, Al= Aluminum, Ss= Stainless Steel. (MTS 200S)



5. Select 2T or 4T function. 2T is simply press and hold the torch trigger to start and activate the torch. 4T requires the trigger to be pressed to start the arc. Once started, the trigger should be released to weld. The trigger should once again be pressed, held briefly and then released to terminate the arc when ready. (MTS 160,200S)

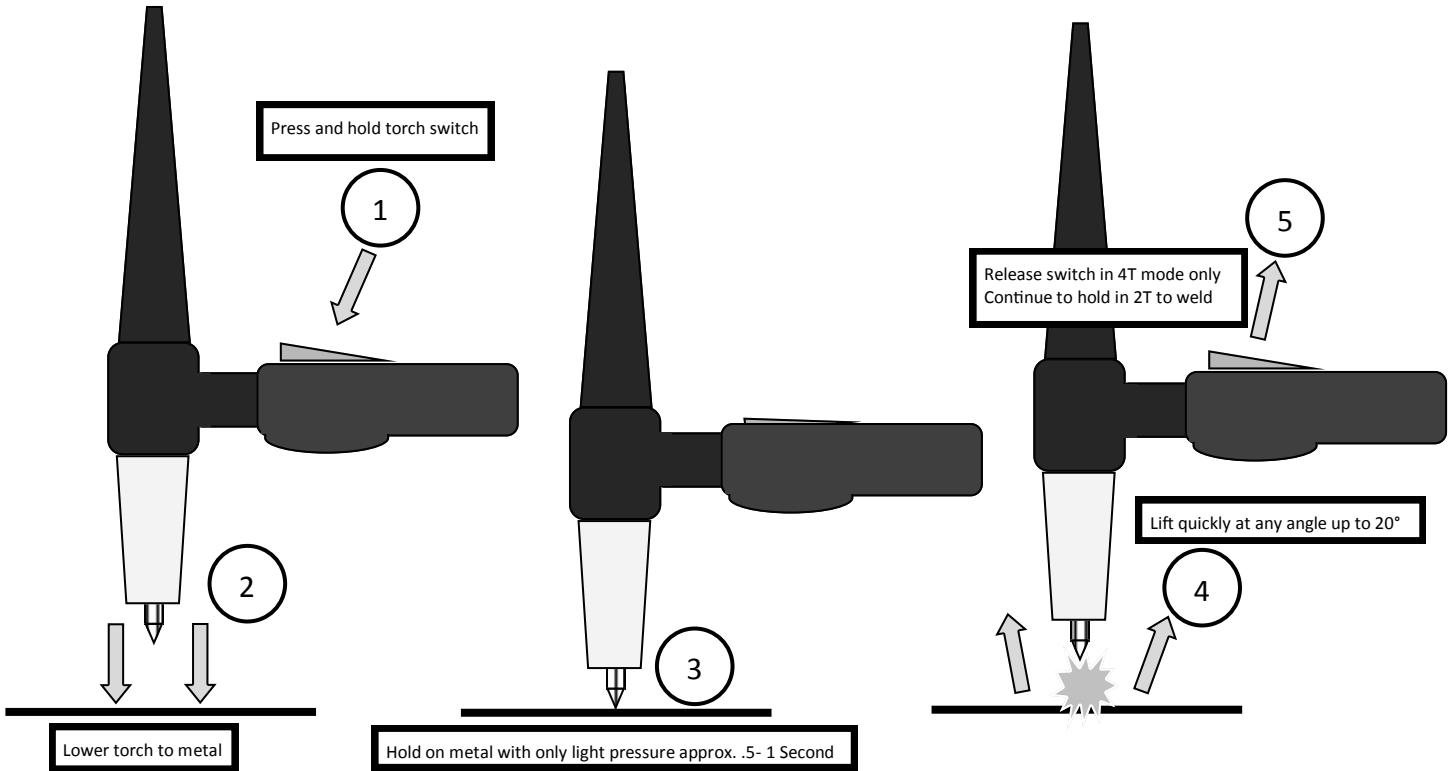


6. If used in the manual mode (ALT), select the appropriate wire feed speed and voltage to match wire type, and size. (160 is purely manual only.) Listen for a steady frying sound while welding to give you a key as to when it is adjusted properly. IF used while in Synergic mode, select the desired wire speed, and the voltage will adjust automatically. If a minor voltage adjustment is felt like it is needed while in the synergic mode, simply turn the voltage knob to increase the voltage from the automatically selected setting. If more wire feed speed is desired, the unit will default back to the automatic setting as the wire feed speed is increased or decreased. However, manual control can once again be asserted over the automatic setting by simply turning the voltage knob once again.

Note the recommended gas choice for proper MIG operation in the Synergic mode located in table 2 on page 13. Other gas mixes may not offer ideal adjustment while in the Synergic mode.

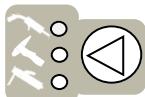
7. Use the Wave Form control to select the desired arc qualities, and adjust the arc qualities, whether a stiff, penetrating arc with a narrow bead profile and slightly more spatter, or a wider, more fluid puddle that easily wets in with low amounts of spatter. Overhead welding usually requires a more stiff penetrating arc. Flat welding will accept a wider, more fluid puddle.

LIFT START TIG OPERATION

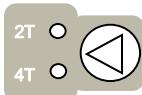


General Operation of Lift Start TIG

1. Turn unit on, allow time for power up cycle to complete its start up process.
2. Press process selection button until the TIG Icon LED is lit.

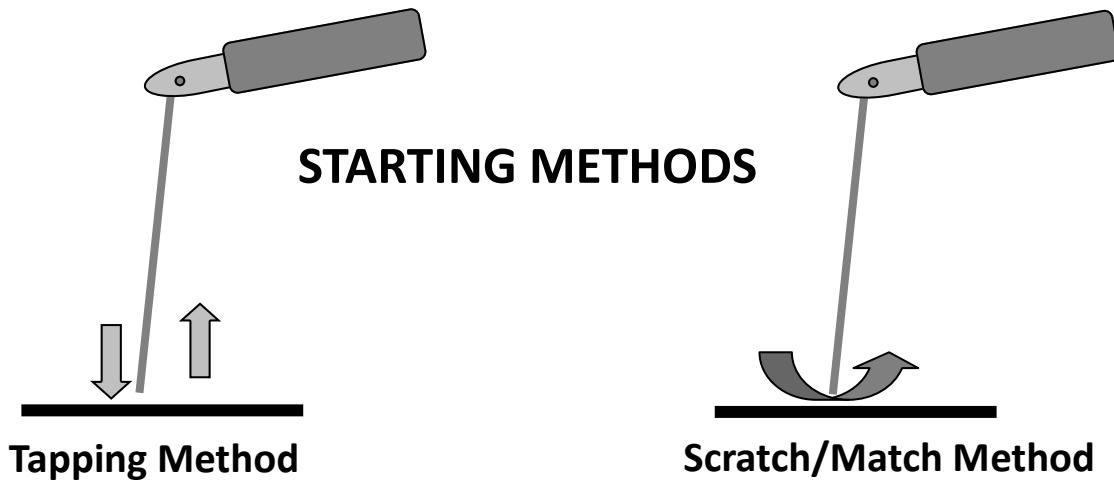


3. Select 4T or 2T mode with the selector button.

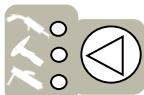


4. If using 4T mode, select down slope time by rotating the knob to increase/decrease default time.
5. Adjust amps with amp control knob.
6. Start arc as depicted above.
7. If using 2T, continue to hold the torch switch until you are ready to stop welding. Release switch. Arc will then cease.
8. If using 4T, release switch, after arc initiates. Continue to weld without holding the switch down. When you are ready to stop welding, press the switch again, and hold. Down slope will begin. Release switch when down slope is finished.

NOTE: DC TIG is not generally considered capable of welding Aluminum. The MTS units are DC only and do not have AC capability.

STICK OPERATION

1. Turn on unit. Allow unit to cycle through its start up program.
2. Select the Stick icon on the Process Selector.



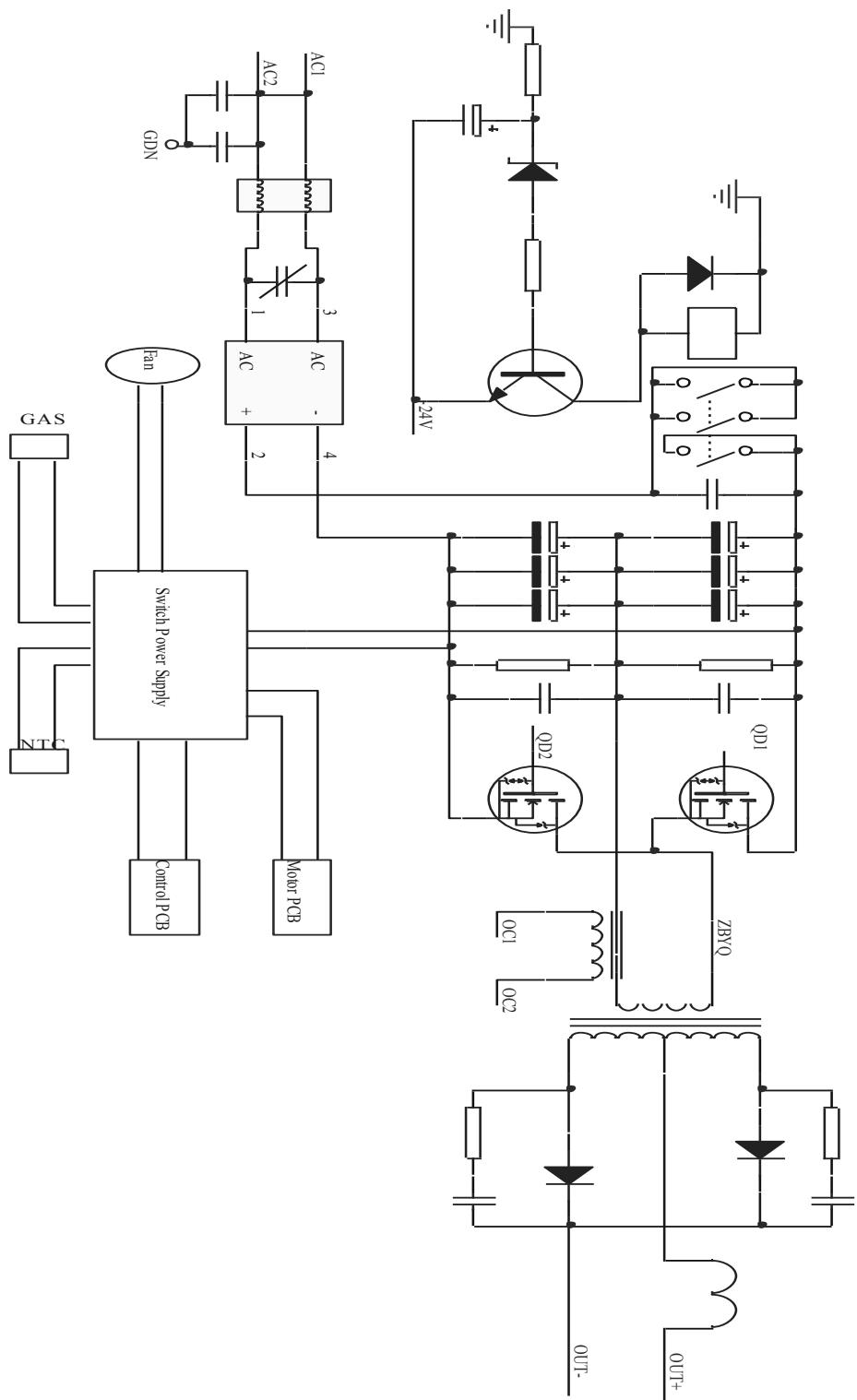
3. Make sure electrode holder is in the Positive side and the work clamp is in the negative connector.
4. Select the Amp level desired. Use table 5 on page 13 to determine approximate amps suitable for the rod size selected. Consult the welding electrode manufacturer's recommendation as well for proper amperage. No voltage adjustment is available.
5. Use the arc force control to select the desired arc characteristics, creating the desired arc characteristic and amp response needed to maintain the arc. Cellulose electrodes will require more arc force control than other rods, but each brand and size will weld a little differently. The arc force control setting will vary from person to person as well, with different rod angles, positions, and arc lengths all factoring into the arc force control performance.
6. Strike the arc with either the tapping method or the match strike method. Beginners usually find that the match strike method yields best results. The Voltage Reduction Circuit may require more than one strike or tap to fully energize the rod so that the arc will strike properly.

SECTION 3**TROUBLE SHOOTING**

TABLE 6

NO.	Trouble	Possible Cause	Solution
1	Unit is switched on, but the power light isn't on	Switch damaged	Replace
		Fuse damaged	Replace
		Power damaged	Replace
2	After welding machine is over-heat is overheating, the fan does not work	Fan damaged	Change it
		Fan power connector is loose	Tighten wires, check for dislodged connectors
3	When torch switch is pressed, no gas glows	No gas in the gas cylinder	Replace
		Gas pipe leaks gas	Resolve
		Gas solenoid valve damaged	Check and clean/replace
		Torch switch damaged	Repair or Replace
		Control circuit damaged	Inspect the circuit
4	Wire reel does not turn	Motor damaged	Check and Replace
		Control circuit damaged	Check the board
	Wire-feeder does not work	The tensioner is loose or wire slips on rollers	Increase tension
		The drive roller doesn't fit the diameter of weld wire	Change roller or wire size to match
		Wire Spool is damaged	Change out wire spool
		Gun liner is jammed	Repair or change it, clear wire from liner/clean liner with compressed air
		Contact Tip is jammed because of slag or burn back	Clean or replace. If with Aluminum, increase tip size to next size.
5	No arc, or no output voltage	Work clamp engaged in wrong connector	Change polarity
		Control circuit damaged	Check the circuit
6	Welding stops, and warning light is on	Self-protection has engaged	Check over-voltage, over-current, over-temperature, lower-voltage and over-temperature. Allow unit to cool if over heated. Check power plug for problems
7	Welding Voltage/Current is uncontrollable	Potentiometer damaged	Repair or Replace it
		The control circuit damaged	Check the circuit
8	The Down Slope cannot be adjusted	Main PCB damaged	Repair or replace PCB
9	No post-gas	Main PCB damaged	Repair or replace PCB

APPENDIX A: MAIN UNIT SCHEMATIC



NOTES: