



OM-363

213117S

2007-03

**Processes**



TIG (GTAW) Welding



Stick (SMAW) Welding

**Description**



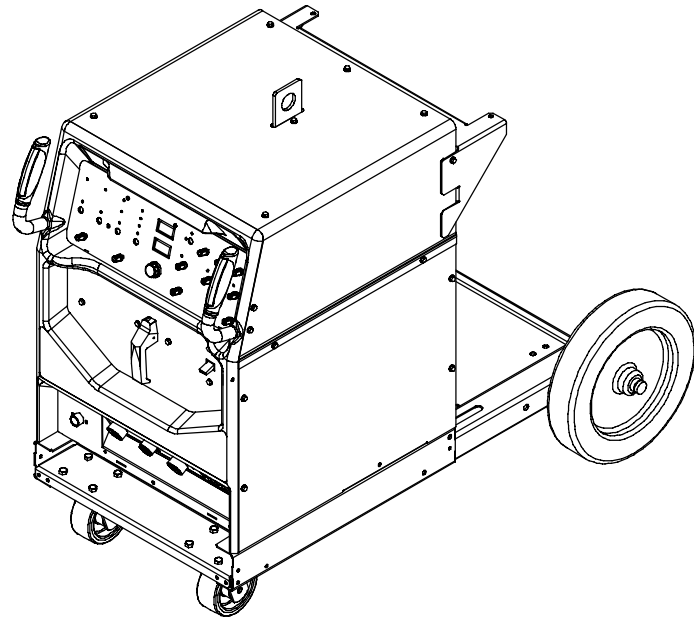
Arc Welding Power Source

ENGLISH

FRANÇAIS

ESPAÑOL

# Syncrowave<sup>®</sup> 250 DX / 350 LX



CE And Non-CE Models

## OWNER'S MANUAL



Visit our website at  
[www.MillerWelds.com](http://www.MillerWelds.com)

File: TIG (GTAW)



# From Miller to You

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*Thank you and congratulations* on choosing Miller. Now you can get the job done and get it done right. We know you don't have time to do it any other way.

That's why when Niels Miller first started building arc welders in 1929, he made sure his products offered long-lasting value and superior quality. Like you, his customers couldn't afford anything less. Miller products had to be more than the best they could be. They had to be the best you could buy.

Today, the people that build and sell Miller products continue the tradition. They're just as committed to providing equipment and service that meets the high standards of quality and value established in 1929.

This Owner's Manual is designed to help you get the most out of your Miller products. Please take time to read the Safety precautions. They will help you protect yourself against potential hazards on the worksite.

We've made installation and operation quick and easy. With Miller you can count on years of reliable service with proper maintenance. And if for some reason the unit needs repair, there's a Troubleshooting section that will help you figure out what the problem is. The parts list will then help you to decide the exact part you may need to fix the problem. Warranty and service information for your particular model are also provided.



Miller is the first welding equipment manufacturer in the U.S.A. to be registered to the ISO 9001:2000 Quality System Standard.



Miller Electric manufactures a full line of welders and welding related equipment. For information on other quality Miller products, contact your local Miller distributor to receive the latest full line catalog or individual specification sheets. **To locate your nearest distributor or service agency call 1-800-4-A-Miller, or visit us at [www.MillerWelds.com](http://www.MillerWelds.com) on the web.**



Working as hard as you do – every power source from Miller is backed by the most hassle-free warranty in the business.



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# Declaration of Conformity for European Community (CE) Products

**NOTE**


*This information is provided for units with CE certification (see rating label on unit).*

**Manufacturer:**

Miller Electric Mfg. Co.  
1635 W. Spencer St.  
Appleton, WI 54914 USA  
Phone: (920) 734-9821

**European Contact:**

Mr. Danilo Fedolfi,  
Managing Director  
ITW Welding Products Italy S.r.l.  
Via Privata Iseo 6/E  
20098 San Giuliano  
Milanese, Italy  
Phone: 39(02)98290-1  
Fax: 39(02)98290203

European Contact Signature: \_\_\_\_\_

Declares that the product:

## **Syncrowave® 250 DX**

conforms to the following Directives and Standards:

**Directives**

Low Voltage Directive: 73/23/EEC

Electromagnetic compatibility Directives: 89/336/EEC, 92/31/EEC

Machinery Directives: 98/37/EEC, 91/368/EEC, 92/31/EEC, 133/04, 93/68/EEC

**Standards**

Arc Welding Equipment – Part 2: Liquid Cooling Systems. IEC 60974-2 Ed. 1

Arc Welding Equipment – Part 10: Electromagnetic Compatibility (EMC) Requirements. IEC 60974-10, August 2002

Arc Welding Equipment – Part 1: Welding Power Sources: IEC 60974-1, Ed. 2.1

Degrees of Protection Provided By Enclosure (IP 23): IEC 60529 Ed. 2.1

Insulation Coordination For Equipment Within Low-Voltage Systems – Part 1: Principles, Requirements, And Tests. IEC 60664-1 Ed. 1.1

# Declaration of Conformity for European Community (CE) Products

**NOTE** 

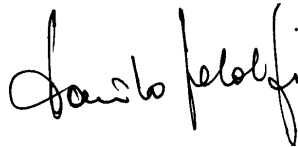
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Fax: 39(02)98290203



European Contact Signature: \_\_\_\_\_

Declares that the product:

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conforms to the following Directives and Standards:

**Directives**

Low Voltage Directive: 73/23/EEC

Electromagnetic compatibility Directives: 89/336/EEC, 92/31/EEC

Machinery Directives: 98/37/EEC, 91/368/EEC, 92/31/EEC, 133/04, 93/68/EEC

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IEC 60664-1 Ed. 1.1

# SECTION 1 – SAFETY PRECAUTIONS - READ BEFORE USING

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▲ **Warning: Protect yourself and others from injury — read and follow these precautions.**

## 1-1. Symbol Usage



Means Warning! Watch Out! There are possible hazards with this procedure! The possible hazards are shown in the adjoining symbols.

▲ **Marks a special safety message.**

☞ Means "Note"; not safety related.



This group of symbols means Warning! Watch Out! possible ELECTRIC SHOCK, MOVING PARTS, and HOT PARTS hazards. Consult symbols and related instructions below for necessary actions to avoid the hazards.

## 1-2. Arc Welding Hazards

▲ **The symbols shown below are used throughout this manual to call attention to and identify possible hazards. When you see the symbol, watch out, and follow the related instructions to avoid the hazard. The safety information given below is only a summary of the more complete safety information found in the Safety Standards listed in Section 1-5. Read and follow all Safety Standards.**

▲ **Only qualified persons should install, operate, maintain, and repair this unit.**

▲ **During operation, keep everybody, especially children, away.**



### ELECTRIC SHOCK can kill.

Touching live electrical parts can cause fatal shocks or severe burns. The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also

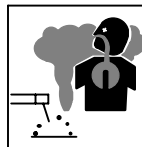
live when power is on. In semiautomatic or automatic wire welding, the wire, wire reel, drive roll housing, and all metal parts touching the welding wire are electrically live. Incorrectly installed or improperly grounded equipment is a hazard.

- Do not touch live electrical parts.
- Wear dry, hole-free insulating gloves and body protection.
- Insulate yourself from work and ground using dry insulating mats or covers big enough to prevent any physical contact with the work or ground.
- Do not use AC output in damp areas, if movement is confined, or if there is a danger of falling.
- Use AC output ONLY if required for the welding process.
- If AC output is required, use remote output control if present on unit.
- Additional safety precautions are required when any of the following electrically hazardous conditions are present: in damp locations or while wearing wet clothing; on metal structures such as floors, gratings, or scaffolds; when in cramped positions such as sitting, kneeling, or lying; or when there is a high risk of unavoidable or accidental contact with the workpiece or ground. For these conditions, use the following equipment in order presented: 1) a semiautomatic DC constant voltage (wire) welder, 2) a DC manual (stick) welder, or 3) an AC welder with reduced open-circuit voltage. In most situations, use of a DC, constant voltage wire welder is recommended. And, do not work alone!
- Disconnect input power or stop engine before installing or servicing this equipment. Lockout/tagout input power according to OSHA 29 CFR 1910.147 (see Safety Standards).
- Properly install and ground this equipment according to its Owner's Manual and national, state, and local codes.
- Always verify the supply ground – check and be sure that input power cord ground wire is properly connected to ground terminal in disconnect box or that cord plug is connected to a properly grounded receptacle outlet.
- When making input connections, attach proper grounding conductor first – double-check connections.
- Frequently inspect input power cord for damage or bare wiring – replace cord immediately if damaged – bare wiring can kill.

- Turn off all equipment when not in use.
- Do not use worn, damaged, undersized, or poorly spliced cables.
- Do not drape cables over your body.
- If earth grounding of the workpiece is required, ground it directly with a separate cable.
- Do not touch electrode if you are in contact with the work, ground, or another electrode from a different machine.
- Do not touch electrode holders connected to two welding machines at the same time since double open-circuit voltage will be present.
- Use only well-maintained equipment. Repair or replace damaged parts at once. Maintain unit according to manual.
- Wear a safety harness if working above floor level.
- Keep all panels and covers securely in place.
- Clamp work cable with good metal-to-metal contact to workpiece or worktable as near the weld as practical.
- Insulate work clamp when not connected to workpiece to prevent contact with any metal object.
- Do not connect more than one electrode or work cable to any single weld output terminal.

### SIGNIFICANT DC VOLTAGE exists in inverter-type welding power sources after removal of input power.

- Turn Off inverter, disconnect input power, and discharge input capacitors according to instructions in Maintenance Section before touching any parts.



### FUMES AND GASES can be hazardous.

Welding produces fumes and gases. Breathing these fumes and gases can be hazardous to your health.

- Keep your head out of the fumes. Do not breathe the fumes.
- If inside, ventilate the area and/or use local forced ventilation at the arc to remove welding fumes and gases.
- If ventilation is poor, wear an approved air-supplied respirator.
- Read and understand the Material Safety Data Sheets (MSDSs) and the manufacturer's instructions for metals, consumables, coatings, cleaners, and degreasers.
- Work in a confined space only if it is well ventilated, or while wearing an air-supplied respirator. Always have a trained watch-person nearby. Welding fumes and gases can displace air and lower the oxygen level causing injury or death. Be sure the breathing air is safe.
- Do not weld in locations near degreasing, cleaning, or spraying operations. The heat and rays of the arc can react with vapors to form highly toxic and irritating gases.
- Do not weld on coated metals, such as galvanized, lead, or cadmium plated steel, unless the coating is removed from the weld area, the area is well ventilated, and while wearing an air-supplied respirator. The coatings and any metals containing these elements can give off toxic fumes if welded.



### ARC RAYS can burn eyes and skin.

Arc rays from the welding process produce intense visible and invisible (ultraviolet and infrared) rays that can burn eyes and skin. Sparks fly off from the weld.

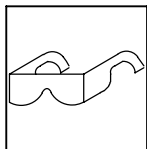
- Wear an approved welding helmet fitted with a proper shade of filter lenses to protect your face and eyes when welding or watching (see ANSI Z49.1 and Z87.1 listed in Safety Standards).
- Wear approved safety glasses with side shields under your helmet.
- Use protective screens or barriers to protect others from flash, glare and sparks; warn others not to watch the arc.
- Wear protective clothing made from durable, flame-resistant material (leather, heavy cotton, or wool) and foot protection.



### WELDING can cause fire or explosion.

Welding on closed containers, such as tanks, drums, or pipes, can cause them to blow up. Sparks can fly off from the welding arc. The flying sparks, hot workpiece, and hot equipment can cause fires and burns. Accidental contact of electrode to metal objects can cause sparks, explosion, overheating, or fire. Check and be sure the area is safe before doing any welding.

- Remove all flammables within 35 ft (10.7 m) of the welding arc. If this is not possible, tightly cover them with approved covers.
- Do not weld where flying sparks can strike flammable material.
- Protect yourself and others from flying sparks and hot metal.
- Be alert that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas.
- Watch for fire, and keep a fire extinguisher nearby.
- Be aware that welding on a ceiling, floor, bulkhead, or partition can cause fire on the hidden side.
- Do not weld on closed containers such as tanks, drums, or pipes, unless they are properly prepared according to AWS F4.1 (see Safety Standards).
- Connect work cable to the work as close to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock, sparks, and fire hazards.
- Do not use welder to thaw frozen pipes.
- Remove stick electrode from holder or cut off welding wire at contact tip when not in use.
- Wear oil-free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes, and a cap.
- Remove any combustibles, such as a butane lighter or matches, from your person before doing any welding.
- Follow requirements in OSHA 1910.252 (a) (2) (iv) and NFPA 51B for hot work and have a fire watcher and extinguisher nearby.



### FLYING METAL can injure eyes.

- Welding, chipping, wire brushing, and grinding cause sparks and flying metal. As welds cool, they can throw off slag.
- Wear approved safety glasses with side shields even under your welding helmet.



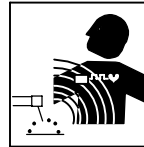
### BUILDUP OF GAS can injure or kill.

- Shut off shielding gas supply when not in use.
- Always ventilate confined spaces or use approved air-supplied respirator.



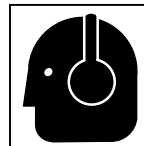
### HOT PARTS can cause severe burns.

- Do not touch hot parts bare handed.
- Allow cooling period before working on gun or torch.
- To handle hot parts, use proper tools and/or wear heavy, insulated welding gloves and clothing to prevent burns.



### MAGNETIC FIELDS can affect pacemakers.

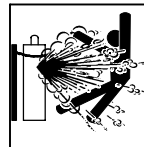
- Pacemaker wearers keep away.
- Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.



### NOISE can damage hearing.

Noise from some processes or equipment can damage hearing.

- Wear approved ear protection if noise level is high.



### CYLINDERS can explode if damaged.

Shielding gas cylinders contain gas under high pressure. If damaged, a cylinder can explode. Since gas cylinders are normally part of the welding process, be sure to treat them carefully.

- Protect compressed gas cylinders from excessive heat, mechanical shocks, physical damage, slag, open flames, sparks, and arcs.
- Install cylinders in an upright position by securing to a stationary support or cylinder rack to prevent falling or tipping.
- Keep cylinders away from any welding or other electrical circuits.
- Never drape a welding torch over a gas cylinder.
- Never allow a welding electrode to touch any cylinder.
- Never weld on a pressurized cylinder – explosion will result.
- Use only correct shielding gas cylinders, regulators, hoses, and fittings designed for the specific application; maintain them and associated parts in good condition.
- Turn face away from valve outlet when opening cylinder valve.
- Keep protective cap in place over valve except when cylinder is in use or connected for use.
- Use the right equipment, correct procedures, and sufficient number of persons to lift and move cylinders.
- Read and follow instructions on compressed gas cylinders, associated equipment, and Compressed Gas Association (CGA) publication P-1 listed in Safety Standards.



### 1-3. Additional Symbols For Installation, Operation, And Maintenance



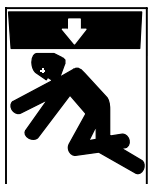
#### FIRE OR EXPLOSION hazard.

- Do not install or place unit on, over, or near combustible surfaces.
- Do not install unit near flammables.
- Do not overload building wiring – be sure power supply system is properly sized, rated, and protected to handle this unit.



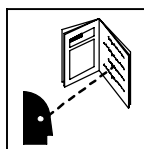
#### MOVING PARTS can cause injury.

- Keep away from moving parts such as fans.
- Keep all doors, panels, covers, and guards closed and securely in place.
- Have only qualified persons remove doors, panels, covers, or guards for maintenance as necessary.
- Reinstall doors, panels, covers, or guards when maintenance is finished and before re-connecting input power.



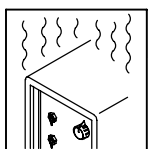
#### FALLING UNIT can cause injury.

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
- Use equipment of adequate capacity to lift and support unit.
- If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.



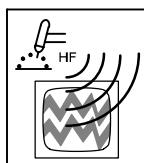
#### READ INSTRUCTIONS.

- Read Owner's Manual before using or servicing unit.
- Use only genuine Miller/Hobart replacement parts.



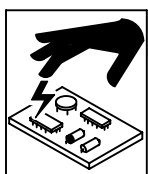
#### OVERUSE can cause OVERHEATING

- Allow cooling period; follow rated duty cycle.
- Reduce current or reduce duty cycle before starting to weld again.
- Do not block or filter airflow to unit.



#### H.F. RADIATION can cause interference.

- High-frequency (H.F.) can interfere with radio navigation, safety services, computers, and communications equipment.
- Have only qualified persons familiar with electronic equipment perform this installation.
- The user is responsible for having a qualified electrician promptly correct any interference problem resulting from the installation.
- If notified by the FCC about interference, stop using the equipment at once.
- Have the installation regularly checked and maintained.
- Keep high-frequency source doors and panels tightly shut, keep spark gaps at correct setting, and use grounding and shielding to minimize the possibility of interference.



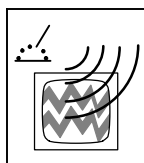
#### STATIC (ESD) can damage PC boards.

- Put on grounded wrist strap BEFORE handling boards or parts.
- Use proper static-proof bags and boxes to store, move, or ship PC boards.



#### MOVING PARTS can cause injury.

- Keep away from moving parts.
- Keep away from pinch points such as drive rolls.



#### ARC WELDING can cause interference.

- Electromagnetic energy can interfere with sensitive electronic equipment such as computers and computer-driven equipment such as robots.
- Be sure all equipment in the welding area is electromagnetically compatible.
- To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor.
- Locate welding operation 100 meters from any sensitive electronic equipment.
- Be sure this welding machine is installed and grounded according to this manual.
- If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.



#### WELDING WIRE can cause injury.

- Do not press gun trigger until instructed to do so.
- Do not point gun toward any part of the body, other people, or any metal when threading welding wire.

### 1-4. California Proposition 65 Warnings

- ▲ **Welding or cutting equipment produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code Section 25249.5 et seq.)**
- ▲ **Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling.**

#### For Gasoline Engines:

- ▲ **Engine exhaust contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.**

#### For Diesel Engines:

- ▲ **Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.**

## 1-5. Principal Safety Standards

*Safety in Welding, Cutting, and Allied Processes*, ANSI Standard Z49.1, from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

*Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping*, American Welding Society Standard AWS F4.1 from Global Engineering Documents (phone: 1-877-413-5184, website: www.global.ihs.com).

*National Electrical Code*, NFPA Standard 70, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

*Safe Handling of Compressed Gases in Cylinders*, CGA Pamphlet P-1, from Compressed Gas Association, 1735 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102 (phone: 703-412-0900, website: www.cganet.com).

*Code for Safety in Welding and Cutting*, CSA Standard W117.2, from Canadian Standards Association, Standards Sales, 178 Rexdale

Boulevard, Rexdale, Ontario, Canada M9W 1R3 (phone: 800-463-6727 or in Toronto 416-747-4044, website: www.csa-international.org).

*Practice For Occupational And Educational Eye And Face Protection*, ANSI Standard Z87.1, from American National Standards Institute, 11 West 42nd Street, New York, NY 10036-8002 (phone: 212-642-4900, website: www.ansi.org).

*Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*, NFPA Standard 51B, from National Fire Protection Association, P.O. Box 9101, 1 Battery March Park, Quincy, MA 02269-9101 (phone: 617-770-3000, website: www.nfpa.org).

OSHA, Occupational Safety and Health Standards for General Industry, Title 29, Code of Federal Regulations (CFR), Part 1910, Subpart Q, and Part 1926, Subpart J, from U.S. Government Printing Office, Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250 (there are 10 Regional Offices--phone for Region 5, Chicago, is 312-353-2220, website: www.osha.gov).

## 1-6. EMF Information

Considerations About Welding And The Effects Of Low Frequency Electric And Magnetic Fields

Welding current, as it flows through welding cables, will cause electromagnetic fields. There has been and still is some concern about such fields. However, after examining more than 500 studies spanning 17 years of research, a special blue ribbon committee of the National Research Council concluded that: "The body of evidence, in the committee's judgment, has not demonstrated that exposure to power-frequency electric and magnetic fields is a human-health hazard." However, studies are still going forth and evidence continues to be examined. Until the final conclusions of the research are reached, you may wish to minimize your exposure to electromagnetic fields when welding or cutting.

To reduce magnetic fields in the workplace, use the following procedures:

1. Keep cables close together by twisting or taping them.
2. Arrange cables to one side and away from the operator.
3. Do not coil or drape cables around your body.
4. Keep welding power source and cables as far away from operator as practical.
5. Connect work clamp to workpiece as close to the weld as possible.

### **About Pacemakers:**

Pacemaker wearers consult your doctor before welding or going near welding operations. If cleared by your doctor, then following the above procedures is recommended.

# SECTION 2 – DEFINITIONS

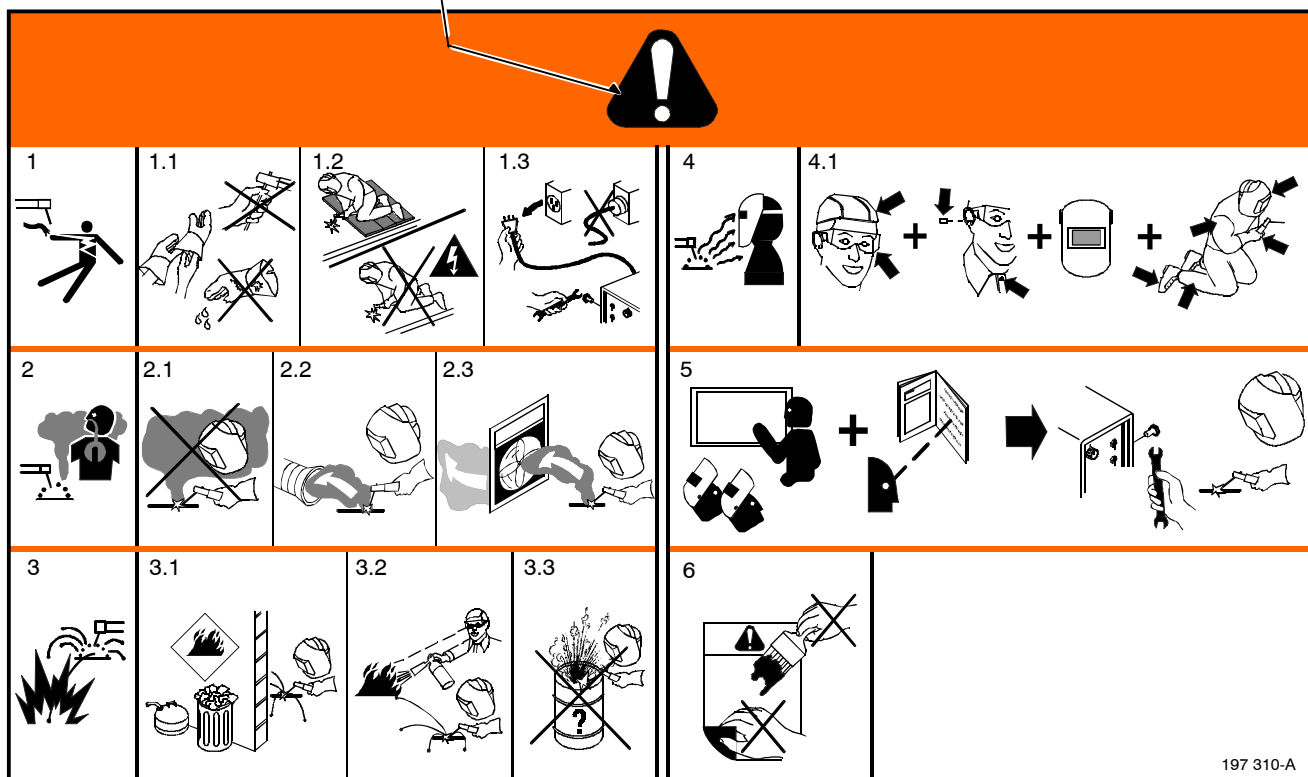
## 2-1. Warning Label Definitions

Warning! Watch Out! There are possible hazards as shown by the symbols.

- 1 Electric shock from welding electrode or wiring can kill.
- 1.1 Wear dry insulating gloves. Do not touch electrode with bare hand. Do not wear wet or damaged gloves.
- 1.2 Protect yourself from electric shock by insulating yourself from work and ground.
- 1.3 Disconnect input plug or power before working on machine.


- 2 Breathing welding fumes can be hazardous to your health.
- 2.1 Keep your head out of the fumes.
- 2.2 Use forced ventilation or local exhaust to remove the fumes.
- 2.3 Use ventilating fan to remove fumes.
- 3 Welding sparks can cause explosion or fire.
- 3.1 Keep flammables away from welding. Do not weld near flammables.
- 3.2 Welding sparks can cause fires. Have a fire extinguisher nearby, and have a watchperson ready to use it.


























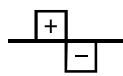








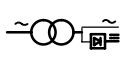


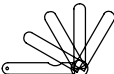
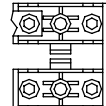



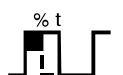


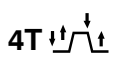
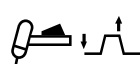



- 3.3 Do not weld on drums or any closed containers.
- 4 Arc rays can burn eyes and injure skin.
- 4.1 Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. Wear complete body protection.
- 5 Become trained and read the instructions before working on the machine or welding.
- 6 Do not remove or paint over (cover) the label.



197 310-A

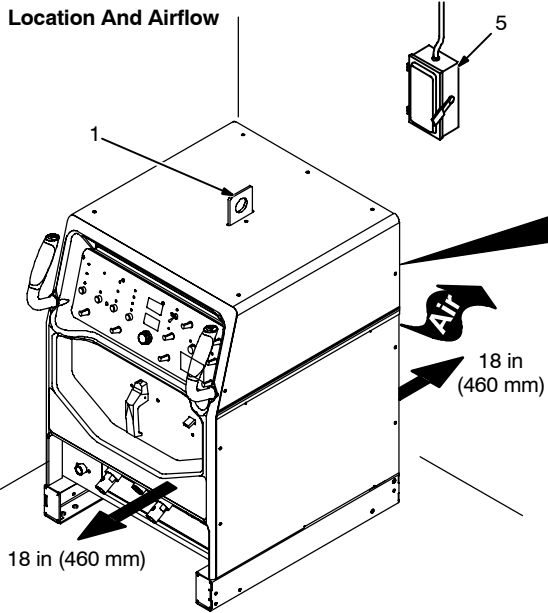
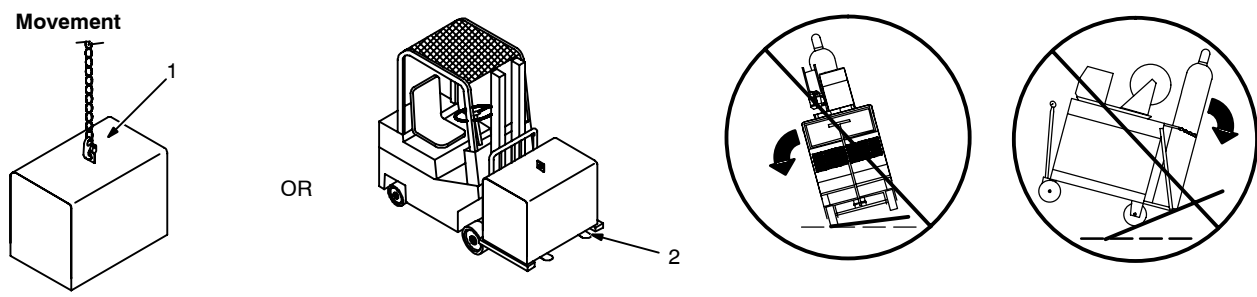
## 2-2. Symbols And Definitions

<b>NOTE</b> 	<i>Some symbols are found only on CE products.</i>
---	--

<b>A</b> Amperes	 Panel-Local	 Gas Tungsten Arc Welding (GTAW)	 Shielded Metal Arc Welding (SMAW)
<b>V</b> Volts	 Do Not Switch While Welding	 Arc Force (DIG)	 Background Amps
 Output	 Circuit Breaker	 Remote	 Temperature
 Protective Earth (Ground)	 Alternating Current	 High Frequency - Start	 Water Input
 $t_2$ Postflow Timer	 $t_1$ Prewflow Timer	 High Frequency - Continuous	 Water Output
 Gas (Supply)	 Gas Output	 Gas Input	 Increase/Decrease Of Quantity
<b>I</b> On	 Off	 Percent	 Direct Current
 Balance Control	 Maximum Cleaning	 Maximum Penetration	 Electrode Positive
 Electrode Negative	 Final Slope	 Meter	 Single-Phase
<b>U<sub>0</sub></b> Rated No Load Voltage (Average)	<b>U<sub>1</sub></b> Primary Voltage	<b>U<sub>2</sub></b> Conventional Load Voltage	 Line Connection
<b>I<sub>1</sub></b> Primary Current	<b>I<sub>2</sub></b> Rated Welding Current	<b>X</b> Duty Cycle	 Single-Phase Combined AC/DC Power Source
<b>IP</b> Degree Of Protection	<b>I<sub>1eff</sub></b> Maximum Effective Supply Current	<b>I<sub>1max</sub></b> Rated Maximum Supply Current	<b>Hz</b> Hertz
 Electrode	 Work	 Thickness Gauge	 Spark Gap
<b>S</b> Seconds	 Final Amperage	 Initial Time	 Initial Amperage
 $\% t$ Pulse Percent On Time	 $t$ Spot Time	 Lift-Arc™	 4 Step Trigger Operation Sequence
 Trigger Hold	 Pulser On-Off	 Pulse Frequency	 Input

# SECTION 3 – INSTALLATION

## 3-1. Selecting A Location



**250 DX Models**

3

SERIAL NO. XXXXXX3 LR5071  
 STOCK NO. XXXXXXXXXXXXX4 US

PROTECTED BY ONE OR MORE OF THE FOLLOWING US. PATENTS:  
 XXXXX05 XXXXX06 XXXXX07 XXXXX09  
 XXXXX10 XXXXX11 XXXXX15 XXXXX21  
 XXXXX24 XXXXX25 XXXXX26 XXXXX32  
 XXXXX42 XXXXX47 XXXXX48  
 EVIDENCE OF LABEL T AMPERING VOIDS WARRANT

4

Waveform	2A/12V				10A/11V							
	X	25%	40%	60%	100%	X	25%	40%	60%	100%		
	17	16	16.4	18	17	16	16.4	18	17	16	16.4	18
	17	16	16.4	18	17	16	16.4	18	17	16	16.4	18
	17	16	16.4	18	17	16	16.4	18	17	16	16.4	18

**350 LX Models**

3

SERIAL NO. XXXXXX3 LR5071  
 STOCK NO. XXXXXXXXXXXXX4 US

PROTECTED BY ONE OR MORE OF THE FOLLOWING US. PATENTS:  
 XXXXX05 XXXXX06 XXXXX07 XXXXX09  
 XXXXX10 XXXXX11 XXXXX15 XXXXX21  
 XXXXX24 XXXXX25 XXXXX26 XXXXX32  
 XXXXX42 XXXXX47 XXXXX48  
 EVIDENCE OF LABEL T AMPERING VOIDS WARRANT

4

Waveform	2A/12V				40A/11V							
	X	30%	40%	60%	100%	X	30%	40%	60%	100%		
	17.8	17.2	18.6	18	17.8	17.2	18.6	18	17.8	17.2	18.6	18
	17.8	17.2	18.6	18	17.8	17.2	18.6	18	17.8	17.2	18.6	18
	17.8	17.2	18.6	18	17.8	17.2	18.6	18	17.8	17.2	18.6	18

- ▲ Falling Unit Can Cause Injury.**
- Use lifting eye to lift unit only, NOT running gear, gas cylinders, or any other accessories.
  - Use equipment of adequate capacity to lift and support unit.
  - If using lift forks to move unit, be sure forks are long enough to extend beyond opposite side of unit.

- 1 Lifting Eye  
 2 Lifting Forks  
 Use lifting eye or lifting forks to move unit.  
 If using lifting forks, extend forks beyond opposite side of unit.
- 3 Serial Number/Patent Label  
 4 Rating Label  
 Use rating label to determine input power needs.

- 5 Line Disconnect Device  
 Locate unit near correct input power supply.
- ▲ Special installation may be required where gasoline or volatile liquids are present – see NEC Article 511 or CEC Section 20.**
- ▲ Be careful when placing or moving unit over uneven surfaces.**

Ref. 117 264-C / 803 584-B / 216 202-D / 216 203-C / 208 998

### 3-2. Dimensions And Weights

Dimensions	
Height	36-1/4 in (921 mm)
Width	23 in (584 mm)
Length	28 in (711 mm)
A	25 in (635 mm)
B	1-25/64 in (35 mm)
C	1-5/8 in (41 mm)
D	22 in (559 mm)
E	20 in (508 mm)
F	22-1/4 (565 mm)
G	1-1/8 in (29 mm)
H	1/2 in (13 mm) Dia
Weight	
400 lbs (181 kg) For 250 DX Models	
496 lbs (225 kg) For 350 LX Models	

### 3-3. Welding Power Source Specifications

#### A. For 350 LX Models

Rated Welding Output	PFC **	Amperes Input at AC Balanced Rated Load Output, 50/60 Hz, Single-Phase								KVA	KW	Amperage Range	Max OCV
		200V	220V	230V	400V	440V	460V	520V	575V				
NEMA Class I (60) – 300 Amperes, 32 Volts AC, 60% Duty Cycle	No PFC	125 3.3*	103 2.2*	110 2.0*	57 1.5*	52 1.2*	55 1.7*	43 1.0*	42 1.1*	25.0 0.9*	10.6 0.6*	3 – 400A	80V
	With PFC	92 77*	77 67*	78 69*	40 36*	39 33*	38 34*	33 28*	31 27.2*	18.0 16.6*	10.5 0.6*		
NEMA Class II (40) – 350 Amperes, 34 Volts AC, 40% Duty Cycle	No PFC	146 3.3*	120 2.2*	128 2.6*	66 2.5*	60 1.2*	65 1.7*	51 1.0*	50 1.1*	29.5 0.9*	13.7 0.4*	3 – 400A	80V
	With PFC	114 77*	95 67*	94 69*	49 36*	47 33*	47 34*	40 28*	38 27.2*	21.7 16.6*	13.3 0.6*		

\*While idling  
\*\*Power Factor Correction

**B. For 250 DX Models**

Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 60 Hz, Single-Phase				KVA	KW	Amperage Range	Max OCV
		200V	230V	460V	575V				
NEMA Class I (40) – 200 Amperes, 28 Volts AC, 60% Duty Cycle	No PFC	88 *3.3	77 *2.8	38 *1.5	31 *1.1	17.6 *.59	8.6 *.29	3 – 310A	80V
	With PFC	60 *55.3	52 *49.5	26 *24.5	21 *19.6	12.06 *11.2	8.11 *.39	3 – 310A	80V
NEMA Class II (40) – 250 Amperes, 30 Volts AC, 40% Duty Cycle	No PFC	110 *3.3	96 *2.8	48 *1.5	38 *1.1	21.98 *.59	11.76 *.29	3 – 310A	80V
	With PFC	82 *55.3	71 *49.5	35 *24.5	28 *19.6	16.32 *11.2	11.81 *1.93	3 – 310A	80V

\*While idling  
\*\*Power Factor Correction

Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 50/60 Hz, Single-Phase				KVA	KW	Amperage Range	Max OCV
		220V	400V	440V	520V				
NEMA Class I (40) – 200 Amperes, 28 Volts AC, 60% Duty Cycle	No PFC	82 *3.0	45 *1.6	41 *1.4	35 *1.2	17.6 *.59	8.6 *.29	3 – 310A	80V
	With PFC	61 *45.9	34 *25.1	31 *22.8	26 *23.2	12.06 *11.2	8.11 *.39	3 – 310A	80V
NEMA Class II (40) – 250 Amperes, 30 Volts AC, 40% Duty Cycle	No PFC	100 *3.0	55 *1.6	50 *1.4	42 *1.2	21.98 *.59	11.76 *.29	3 – 310A	80V
	With PFC	81 *45.9	44 *25.1	40 *22.8	34 *23.2	16.32 *11.2	11.81 *1.93	3 – 310A	80V

\*While idling  
\*\*Power Factor Correction

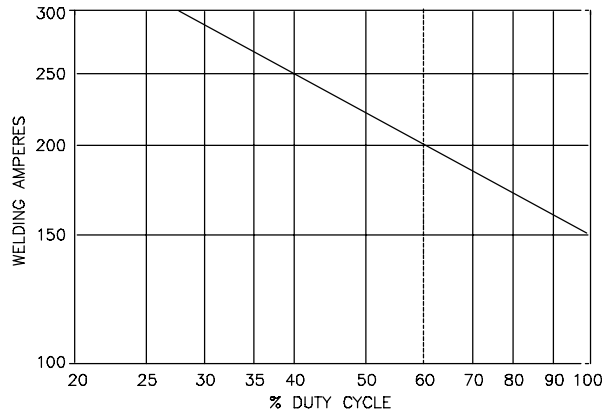
Rated Welding Output	PFC**	Amperes Input at AC Balanced Rated Load Output, 50 Hz, Single-Phase				KVA	KW	Amperage Range	Max OCV
		200V	230V	460V	575V				
NEMA Class I (40) – 175 Amperes, 27 Volts AC, 60% Duty Cycle	No PFC	80 *3.3	69 *2.8	35 *1.5	28 *1.1	15.9 *.59	7.4 *.29	3 – 310A	80V
	With PFC	52 *55.3	45 *49.5	22 *24.5	18 *19.6	10.3 *11.2	7.3 *.39	3 – 310A	80V
NEMA Class II (40) – 225 Amperes, 29 Volts AC, 40% Duty Cycle	No PFC	101 *3.3	88 *2.8	44 *1.5	35 *1.1	20.2 *.59	10.2 *.29	3 – 310A	80V
	With PFC	74 *55.3	64 *49.5	32 *24.5	26 *19.6	14.7 *11.2	10.1 *1.93	3 – 310A	80V

\*While idling  
\*\*Power Factor Correction

### 3-4. Duty Cycle And Overheating



#### 250 DX Models

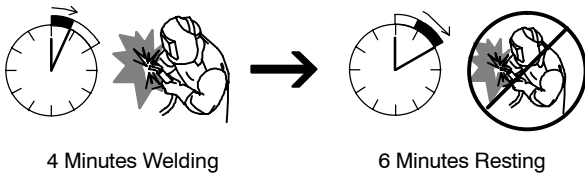


Duty Cycle is the percentage of 10 minutes that the unit can weld at rated load without overheating.

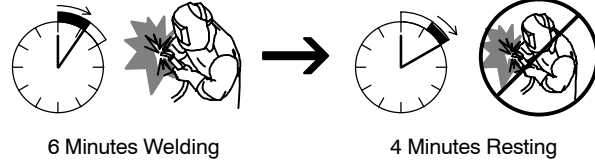
If unit overheats, output stops, front panel voltmeter/ammeter displays a HLP3 or HLP5 message (see Section 6-1), and cooling fans run. Wait fifteen minutes for unit to cool. Reduce amperage or duty cycle before welding.

**▲ Exceeding duty cycle can damage unit and void warranty.**

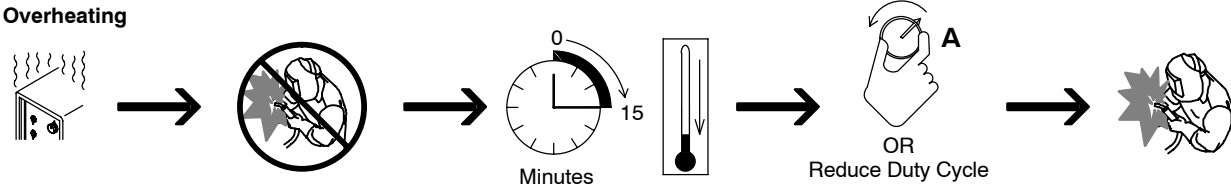
40% Duty Cycle At 250 Amperes



60% Duty Cycle At 200 Amperes

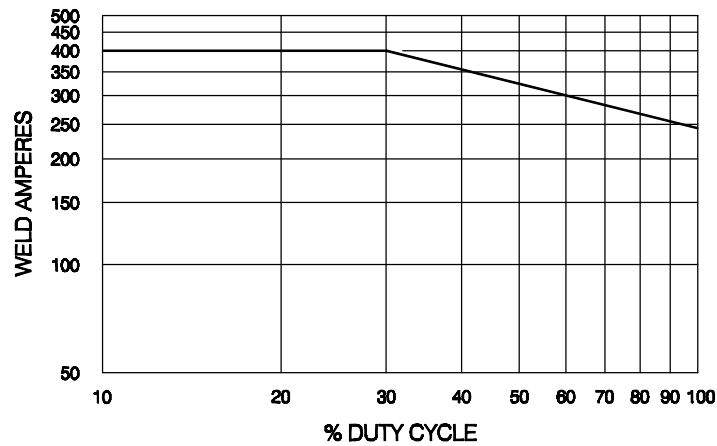


#### Overheating

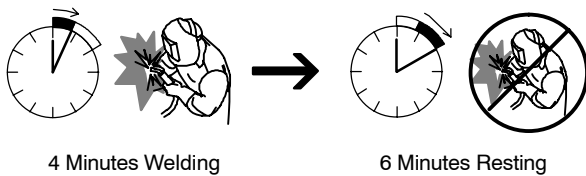


duty1 4/95 / Ref. 116 198

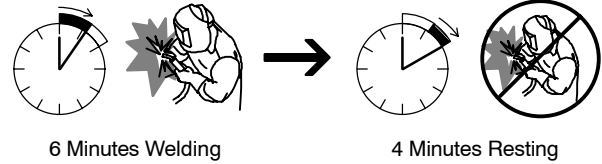
#### 350 LX Models



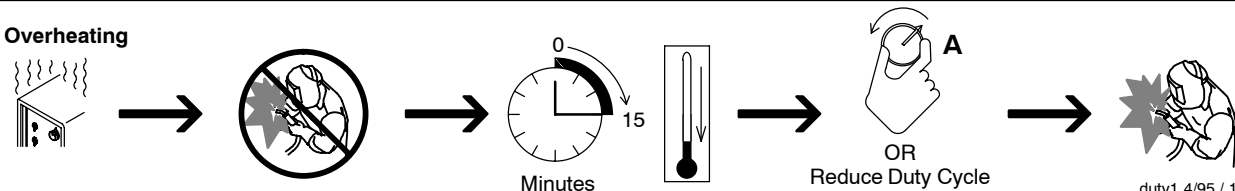
40% Duty Cycle At 350 Amperes



60% Duty Cycle At 300 Amperes



#### Overheating



duty1 4/95 / 190 276

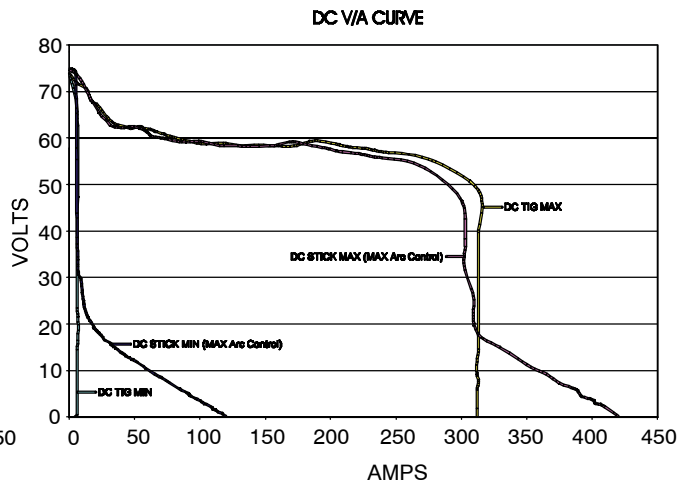
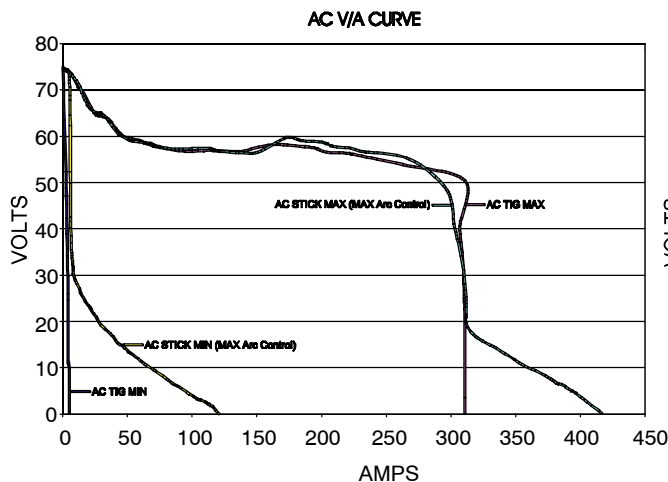


### 3-5. Volt-Ampere Curves

#### A. For 250 DX Models

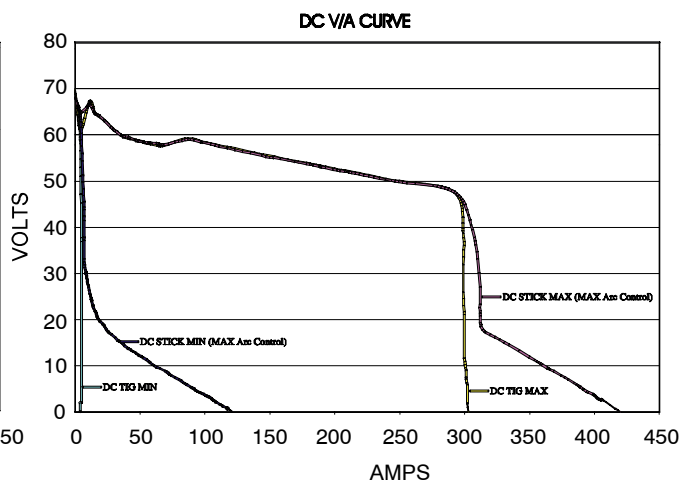
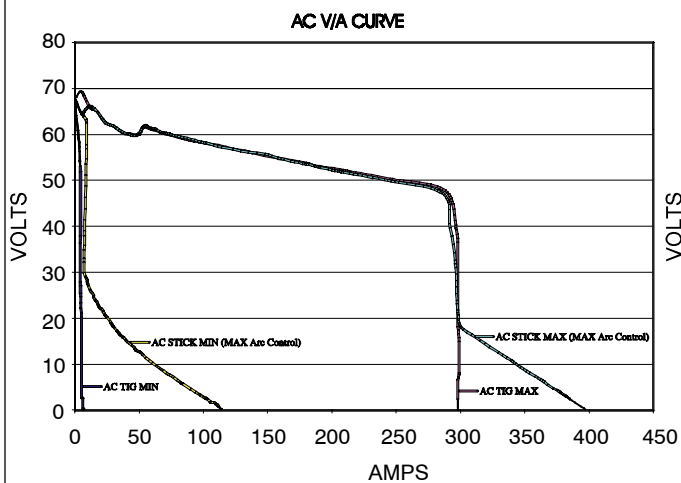
The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.

#### Non CE Models



194 385-A / 194 384-A

#### CE Models

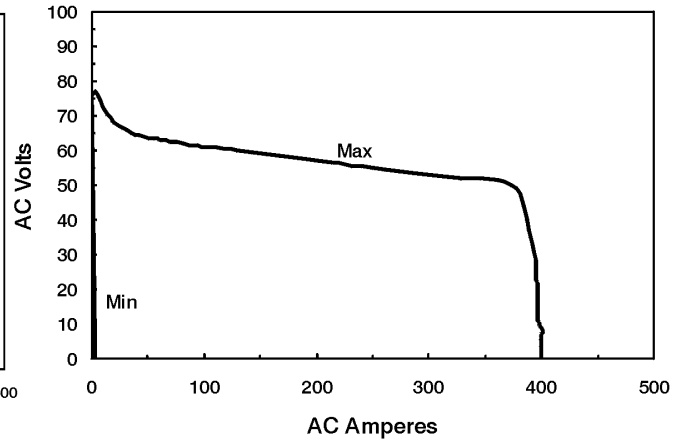
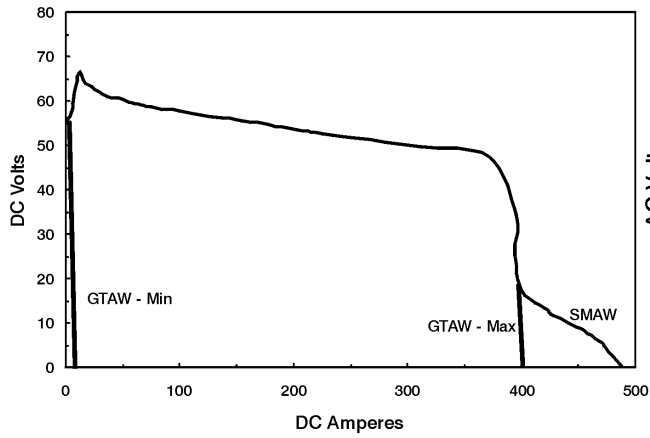


205 631 / 205 632

## B. For 350 LX Models

### 350 Amperes Models

The volt-ampere curves show the minimum and maximum voltage and amperage output capabilities of the welding power source. Curves of other settings fall between the curves shown.



ssb1.1 10/91 - ST-190 277 / ST-190 278

### 3-6. Weld Output Terminals And Selecting Cable Sizes



**▲ ARC WELDING can cause Electromagnetic Interference.**

To reduce possible interference, keep weld cables as short as possible, close together, and down low, such as on the floor. Locate welding operation 100 meters from any sensitive electronic equipment. Be sure this welding machine is installed and grounded according to this manual. If interference still occurs, the user must take extra measures such as moving the welding machine, using shielded cables, using line filters, or shielding the work area.

 <b>Weld Output Terminals</b> ▲ Turn off power before connecting to weld output terminals. ▲ Do not use worn, damaged, undersized, or poorly spliced cables.	Total Cable (Copper) Length In Weld Circuit Not Exceeding								
			100 ft (30 m) Or Less	150 ft (45 m)	200 ft (60 m)	250 ft (70 m)	300 ft (90 m)	350 ft (105 m)	400 ft (120 m)
	Welding Amperes	10 – 60% Duty Cycle	60 – 100% Duty Cycle	10 – 100% Duty Cycle					
 Ref. 803 588-B	100	4	4	4	3	2	1	1/0	1/0
	150	3	3	2	1	1/0	2/0	3/0	3/0
	200	3	2	1	1/0	2/0	3/0	4/0	4/0
	250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
	300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0
	350	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0	2-4/0
	400	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	2-4/0
	500	2/0	3/0	4/0	2-2/0	2-3/0	2-4/0	3-3/0	3-3/0

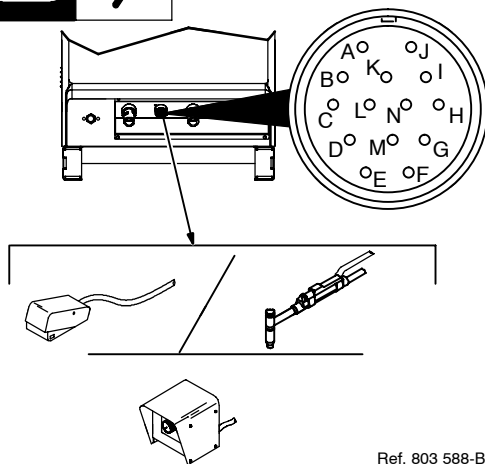
Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of at least 300 circular mils per ampere  
 \*Select weld cable size for pulsing application at peak amperage value..

S-0007-D

### 3-7. Remote 14 Receptacle Information



▲ Turn off power before connecting to receptacle.

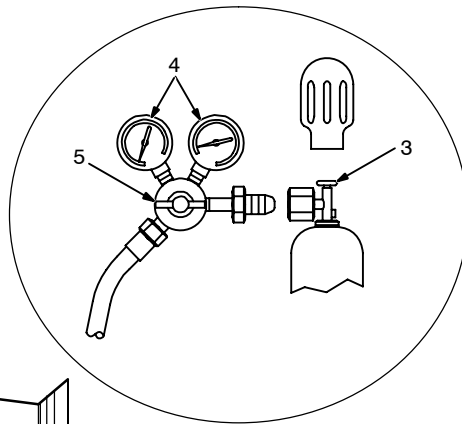


Ref. 803 588-B

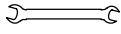
REMOTE 14	Socket*	Socket Information
<b>24 VOLTS DC</b> <b>OUTPUT CONTACTOR</b>	A	Contact control 24 volts dc.
	B	Contact closure to A completes 24 volts dc contactor control circuit and enables output.
<b>A</b> <b>REMOTE OUTPUT CONTROL</b>	C	Output to remote control; 0 to +10 volts dc output to remote control.
	D	Remote control/feedback circuit common.
	E	0 to +10 volts dc input command signal from remote control.
<b>A/V</b> <b>AMPERAGE VOLTAGE</b>	F	Current feedback; +1 volt dc per 100 amperes.
	H	Voltage feedback; +1 volt dc per 10 volts output.
<b>GND</b>	K	Chassis common.

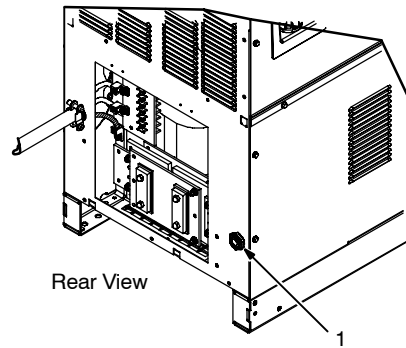
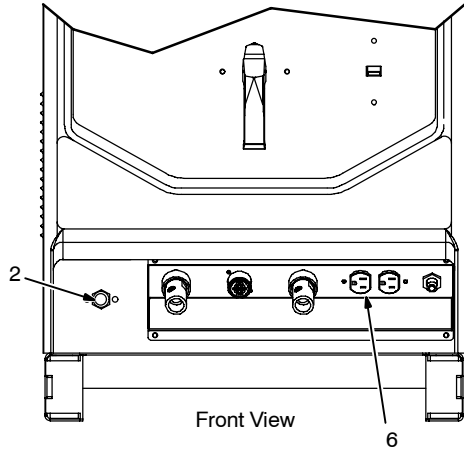
\*The remaining sockets are not used.

### 3-8. Shielding Gas Connections And 115 Volts AC Duplex Receptacle



Tools Needed:

 5/8, 3/4, 1-1/8 in

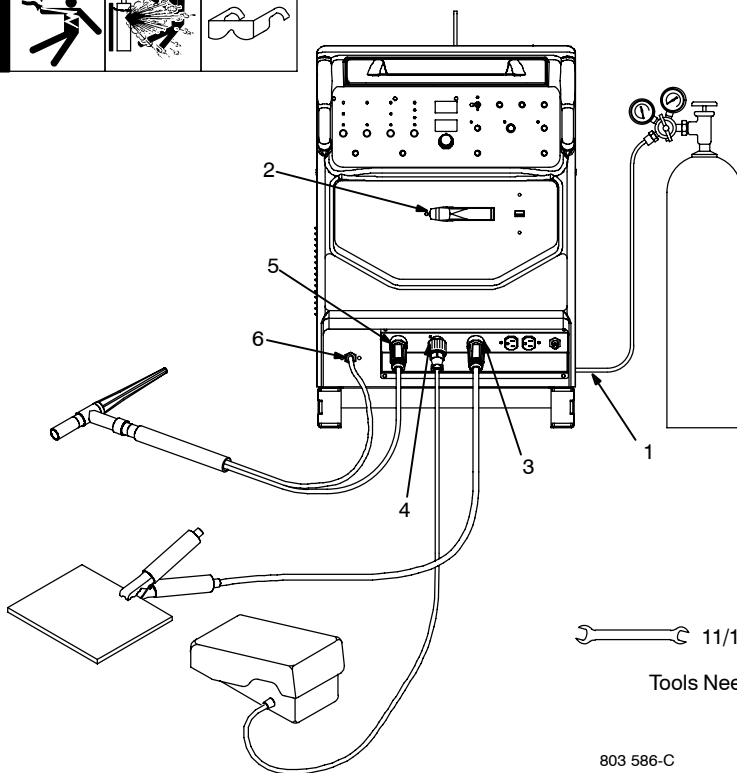


▲ **Turn Off power before connecting to receptacle.**

- 1 Gas Valve In Connection  
Located on rear of unit.
- 2 Gas Valve Out Connection  
Connections have 5/8-18 right-hand threads.
- 3 Cylinder Valve  
Open valve slightly so gas flow blows dirt from valve. Close valve.
- 4 Regulator/Flow Gauge  
Connect regulator/flow gauge to gas cylinder.  
Connect customer supplied gas hose between regulator/flow gauge and gas in fitting.
- 5 Flow Adjust  
Typical flow rate is 20 cfm (cubic feet per hour).
- 6 115 V 15 Amp AC Receptacle  
Receptacle is protected from overload by circuit breaker CB1 (see Section 5-2).

Ref. 803 588-B / Ref. 803 585-B / Ref. 157 858

### 3-9. TIG Connections With A Two-Piece Air-Cooled Torch



Tools Needed:

▲ **Turn Off power before making connections.**

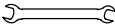
- 1 Gas-In Connection  
Connect gas hose from gas supply to gas-in connection.
- 2 Output Selector Switch (See Section 4-2)  
Switch is shown in DCEN (direct current electrode negative) position for TIG HF Impulse DCEN welding. For front panel control display, see Section 3-11. For TIG AC welding, place switch in AC position (see Section 4-2). For TIG AC front panel control display, see Section 3-12.
- 3 Work Weld Output Terminal  
Connect work lead to work weld output terminal.
- 4 Remote 14 Receptacle  
Connect desired remote control to Remote 14 receptacle (see Section 3-7).
- 5 Electrode Weld Output Terminal  
Connect TIG torch to electrode weld output terminal.
- 6 Gas-Out Connection  
Connect torch gas hose to gas-out fitting.

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### 3-10. TIG Connections With A One-Piece Air-Cooled Torch

**▲ Turn Off power before making connections.**

- 1 Gas-In Connection  
Connect gas hose from gas supply to gas-in connection.
- 2 Output Selector Switch (See Section 4-2)  
Switch is shown in DCEN (direct current electrode negative) position for TIG HF Impulse DCEN welding. For front panel control display, see Section 3-11. For TIG AC welding, place switch in AC position (see Section 4-2). For TIG AC front panel control display, see Section 3-12.
- 3 Work Weld Output Terminal  
Connect work lead to work weld output terminal.
- 4 Remote 14 Receptacle  
Connect desired remote control to Remote 14 receptacle (see Section 3-7).
- 5 Electrode Weld Output Terminal  
Connect TIG torch to electrode weld output terminal.
- 6 Gas-Out Connection  
Connect torch gas hose to gas-out fitting.

**Tools Needed:**  
 11/16, (21 mm)

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### 3-11. Front Panel Display For TIG HF Impulse DCEN (Direct Current Electrode Negative)

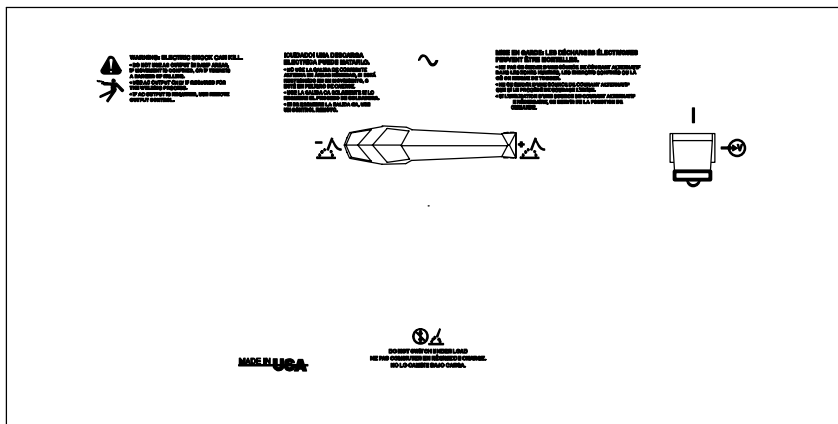
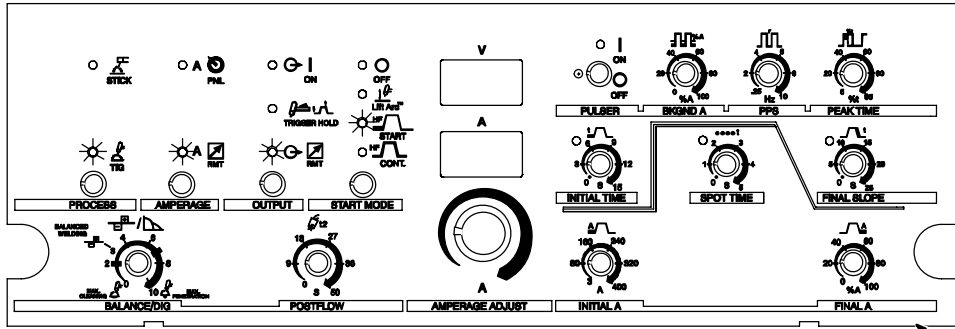


#### 1 Front Panel

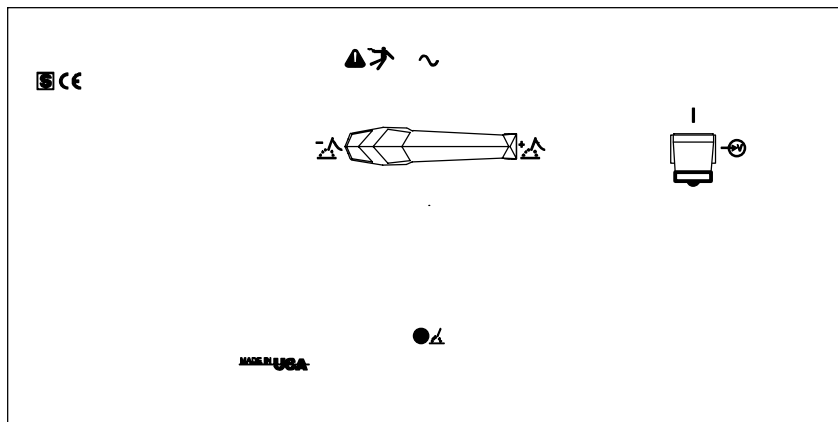
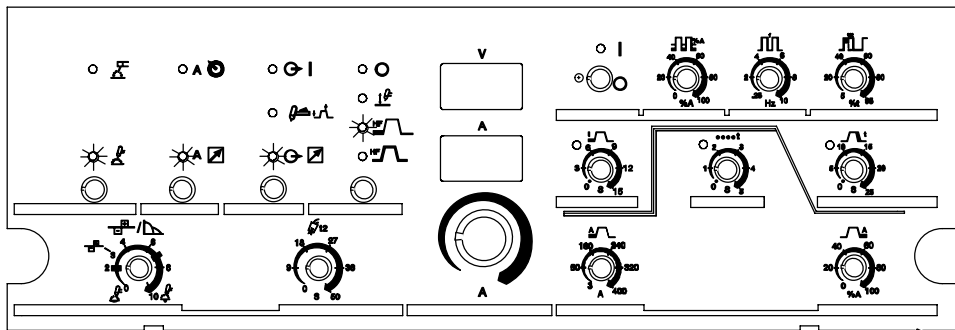
Correct front panel display for basic TIG HF Impulse DCEN welding.

For all front panel switch pad controls: press switch pad to turn on light and enable function.

NOTE: Green on nameplate indicates a TIG function (see Section 4-1 for description of controls).



(CE Nameplate)



### 3-12. Front Panel Display For TIG AC

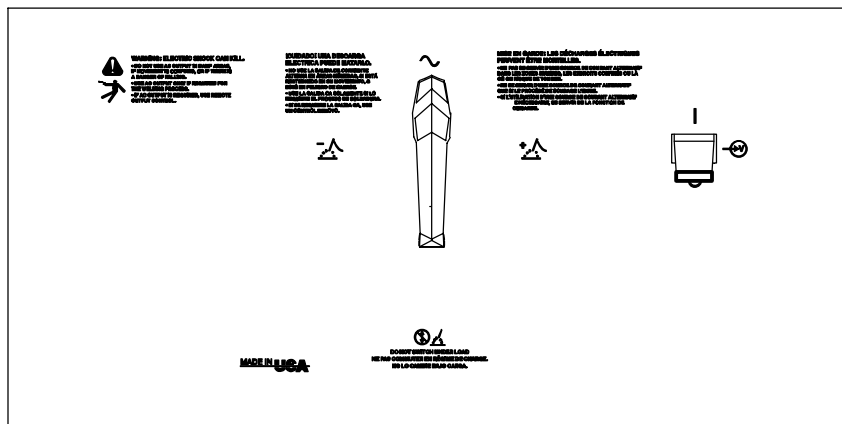
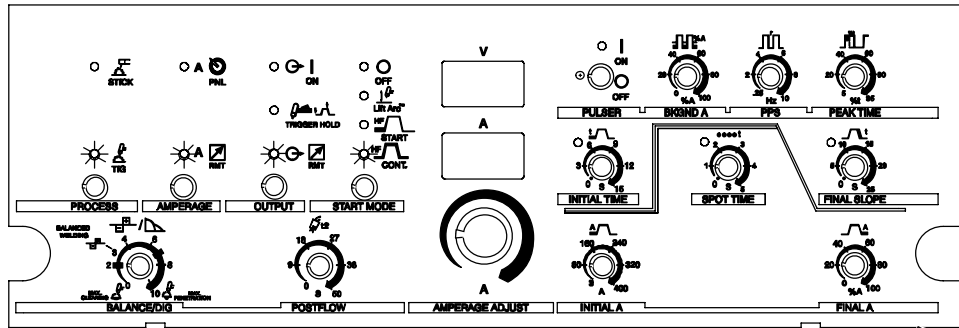


#### 1 Front Panel

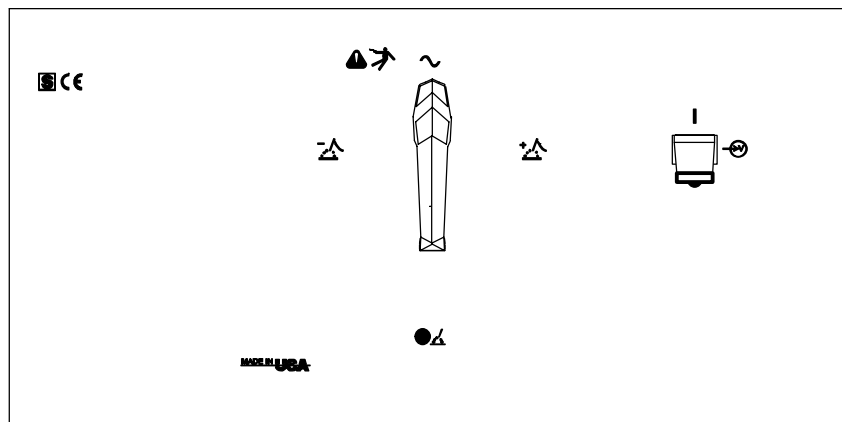
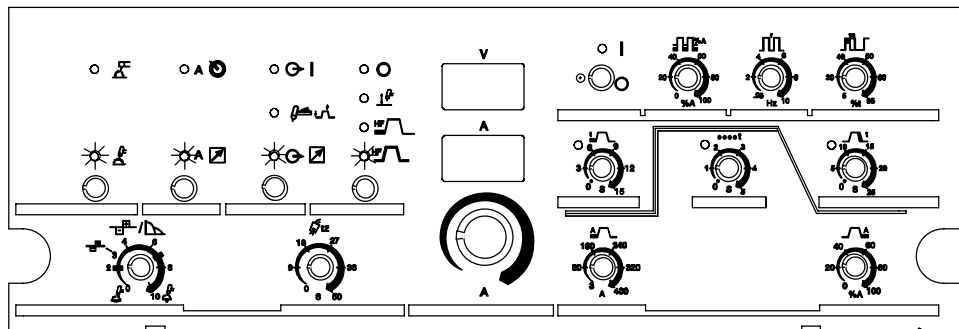
Correct front panel display for basic TIG AC welding.

For all front panel switch pad controls: press switch pad to turn on light and enable function.

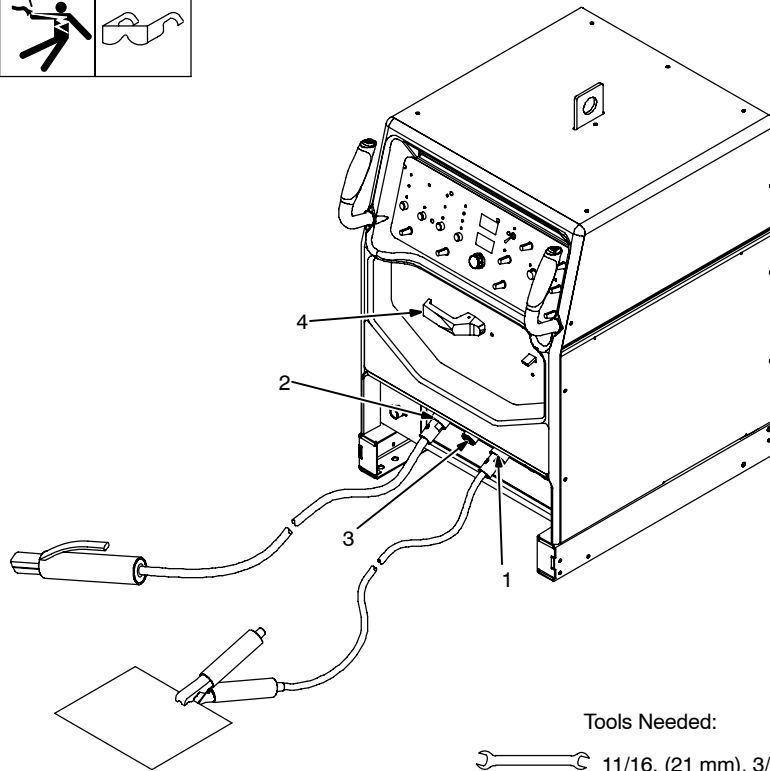
NOTE: Green on nameplate indicates a TIG function (see Section 4-1 for description of controls).



(CE Nameplate)



### 3-13. Stick Connections



▲ **Turn Off power before making connections.**

1 Work Weld Output Terminal  
Connect work lead to work weld output terminal.

2 Electrode Weld Output Terminal

Connect electrode holder to electrode weld output terminal.

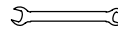
3 Remote 14 Receptacle

If desired, connect remote control to Remote 14 receptacle (see Section 3-7).

4 Output Selector Switch (See Section 4-2)

Switch is shown in DCEP (direct current electrode positive) position for Stick DCEP welding. For front panel control display, see Section 3-14. For Stick AC welding, place switch in AC position. For Stick AC front panel control display, see Section 3-15.

Tools Needed:

 11/16, (21 mm), 3/4 in

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### 3-14. Front Panel Display For Stick DCEP (Direct Current Electrode Positive)

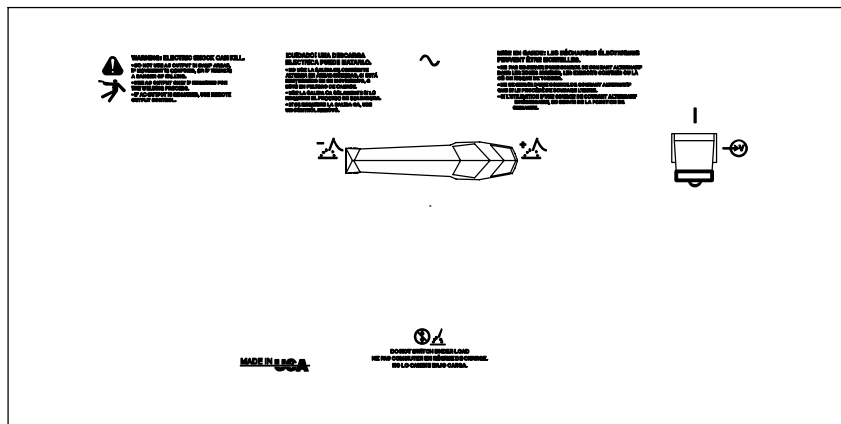
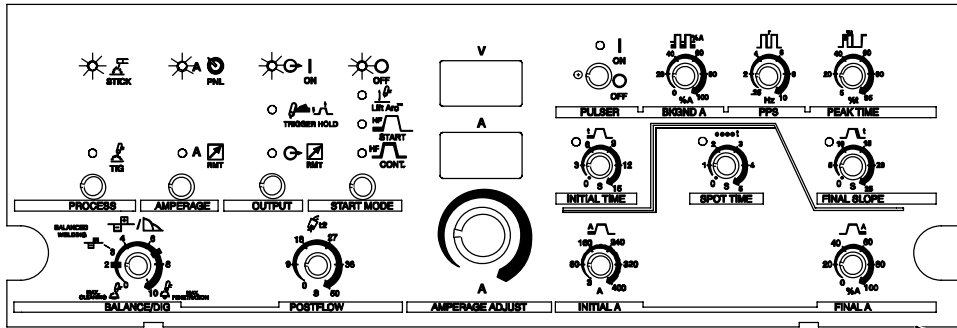


1 Front Panel

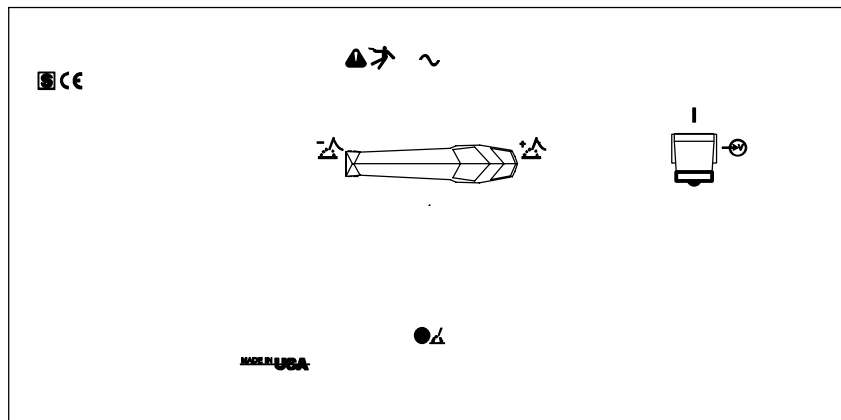
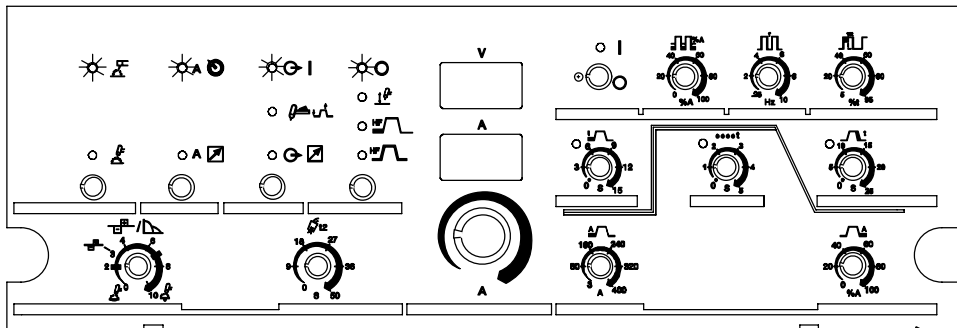
Correct front panel display for basic Stick DCEP welding.

For all front panel switch pad controls: press switch pad to turn on light and enable function.

NOTE: Gray on nameplate indicates a Stick function (see Section 4-1 for description of controls).



(CE Nameplate)



### 3-15. Front Panel Display For Stick AC

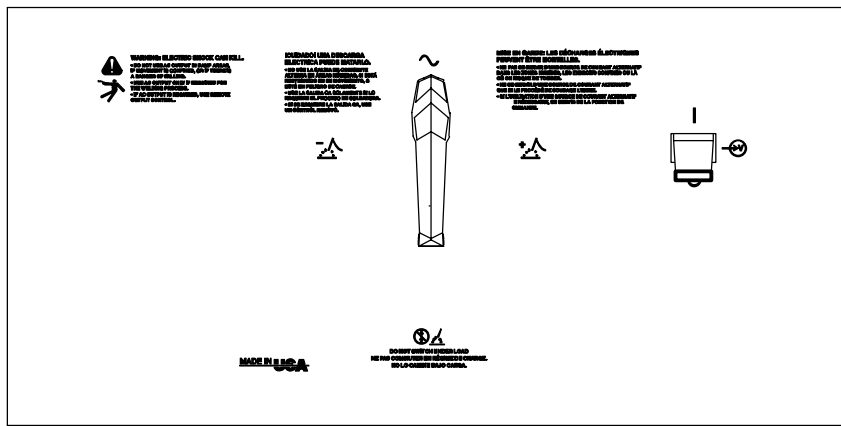
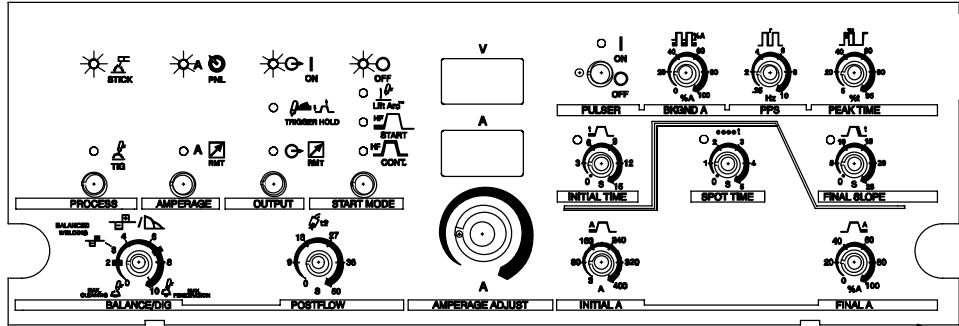


#### 1 Front Panel

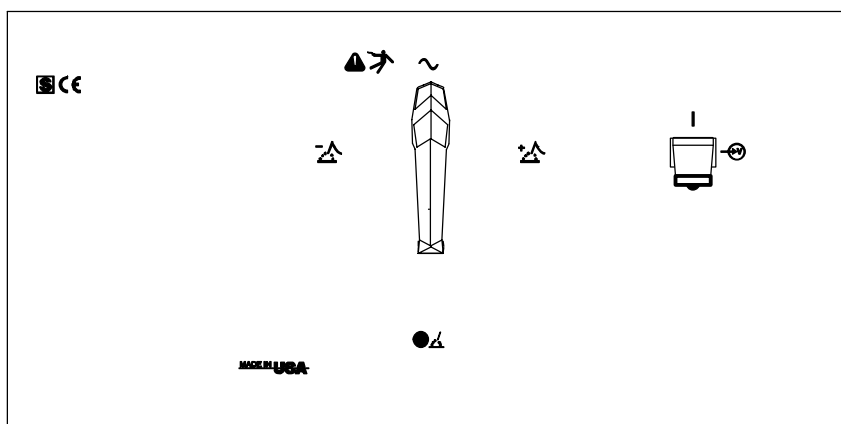
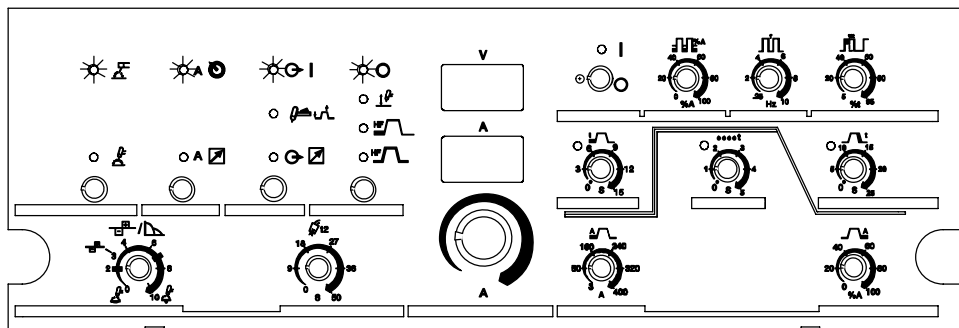
Correct front panel display for basic Stick AC welding.

For all front panel switch pad controls: press switch pad to turn on light and enable function.

NOTE: Gray on nameplate indicates a Stick function (see Section 4-1 for description of controls).



#### (CE Nameplate)



### 3-16. Electrical Service Guide

#### A. For 250 DX Models

<b>NOTE</b>	<i>All values in both tables were calculated at 60% duty cycle.</i>
-------------	---

<b>NOTE</b>	<i>Actual input voltage cannot exceed <math>\pm 10\%</math> of indicated required input voltage shown in both tables. If actual input voltage is outside of this range, damage to unit may occur.</i>
-------------	---

50/60 Hertz Models	Without Power Factor Correction							
<b>Input Voltage</b>	200	220	230	400	440	460	520	575
<b>Input Amperes At Rated Output*</b>	88	82	77	45	41	38	35	31
<b>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</b>	<b>Circuit Breaker <sup>1</sup></b>							
	<b>Time-Delay Fuse <sup>2</sup></b>							
	<b>Normal Operating (Fast) Fuse <sup>3</sup></b>							
	125	125	125	70	60	60	50	45
	125	125	125	70	60	60	50	45
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	4	6	6	8	8	10	10	10
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	167 (51)	137 (42)	153 (47)	305 (93)	369 (112)	281 (86)	352 (107)	439 (134)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	6	6	6	8	10	10	10	10

\* Input amperes at rated output is the amperage draw for that particular input voltage if the machine is run at its rated welding output (see Section 3-3 for rated welding output).

Reference: 2005 National Electrical Code (NEC)

- 1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.
- 2 "Time-Delay" fuses are UL class "RK5" .
- 3 "Normal Operating" (fast) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).
- 4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.


50/60 Hertz Models	With Power Factor Correction							
<b>Input Voltage</b>	200	220	230	400	440	460	520	575
<b>Input Amperes At Rated Output*</b>	60	61	52	34	31	26	26	21
<b>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</b>	<b>Circuit Breaker <sup>1</sup></b>							
	<b>Time-Delay Fuse <sup>2</sup></b>							
	<b>Normal Operating (Fast) Fuse <sup>3</sup></b>							
	90	90	80	50	45	40	40	30
	90	90	80	50	45	40	40	30
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	8	8	8	10	10	10	10	12
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	87 (26)	102 (31)	115 (35)	226 (69)	274 (84)	308 (94)	383 (117)	295 (90)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	8	8	8	10	10	10	10	12


\* Input amperes at rated output is the amperage draw for that particular input voltage if the machine is run at its rated welding output (see Section 3-3 for rated welding output).

Reference: 2005 National Electrical Code (NEC)

- 1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.
- 2 "Time-Delay" fuses are UL class "RK5" .
- 3 "Normal Operating" (fast) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).
- 4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

**B. For 350 LX Models**

**NOTE**  All values in both tables were calculated at 60% duty cycle.

**NOTE**  Actual input voltage cannot exceed  $\pm 10\%$  of indicated required input voltage shown in both tables. If actual input voltage is outside of this range, damage to unit may occur.

50/60 Hertz Models	Without Power Factor Correction							
<b>Input Voltage</b>	200	220	230	400	440	460	520	575
<b>Input Amperes At Rated Output*</b>	125	103	110	57	52	55	43	42
<b>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</b>	<b>Circuit Breaker <sup>1</sup></b>							
	<b>Time-Delay Fuse <sup>2</sup></b>							
	<b>Normal Operating (Fast) Fuse <sup>3</sup></b>							
	150	125	125	70	70	60	60	50
	175	175	175	90	90	80	70	70
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	3	3	4	8	8	8	8	8
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	151 (46)	182 (56)	171 (52)	246 (75)	298 (91)	326 (99)	416 (127)	509 (155)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	6	6	6	8	8	8	8	8

\* Input amperes at rated output is the amperage draw for that particular input voltage if the machine is run at its rated welding output (see Section 3-3 for rated welding output).

- Reference: 2005 National Electrical Code (NEC)
- 1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.
  - 2 "Time-Delay" fuses are UL class "RK5" .
  - 3 "Normal Operating" (fast) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).
  - 4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

50/60 Hertz Models	With Power Factor Correction							
<b>Input Voltage</b>	200	220	230	400	440	460	520	575
<b>Input Amperes At Rated Output*</b>	92	77	78	40	39	38	33	31
<b>Max Recommended Standard Fuse Or Circuit Breaker Rating In Amperes</b>	<b>Circuit Breaker <sup>1</sup></b>							
	<b>Time-Delay Fuse <sup>2</sup></b>							
	<b>Normal Operating (Fast) Fuse <sup>3</sup></b>							
	110	100	90	50	50	45	40	35
	125	125	125	70	60	60	50	45
<b>Min Input Conductor Size In AWG<sup>4</sup></b>	4	6	6	8	8	8	10	10
<b>Max Recommended Input Conductor Length In Feet (Meters)</b>	145 (44)	119 (36)	130 (40)	263 (80)	318 (97)	347 (106)	300 (91)	367 (112)
<b>Min Grounding Conductor Size In AWG<sup>4</sup></b>	6	6	6	8	10	10	10	10

\* Input amperes at rated output is the amperage draw for that particular input voltage if the machine is run at its rated welding output (see Section 3-3 for rated welding output).

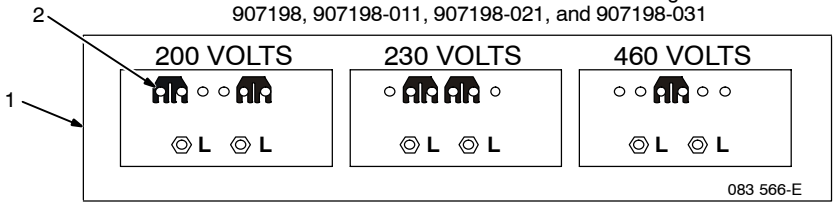
- Reference: 2005 National Electrical Code (NEC)
- 1 If a circuit breaker is used in place of a fuse, choose a circuit breaker with time-current curves comparable to the recommended fuse.
  - 2 "Time-Delay" fuses are UL class "RK5" .
  - 3 "Normal Operating" (fast) fuses are UL class "K5" (up to and including 60 amp), and UL class "H" ( 65 amp and above).
  - 4 Conductor data in this section specifies conductor size (excluding flexible cord or cable) between the panelboard and the equipment per NEC Table 310.16. If a flexible cord or cable is used, minimum conductor size may increase. See NEC Table 400.5(A) for flexible cord and cable requirements.

### 3-17. Placing Jumper Links



Label found on 250 DX models with the following stock numbers:  
907194, 907194-021 and, 907194-031

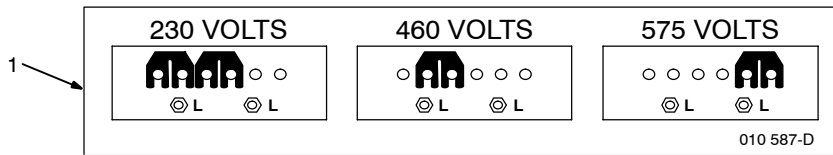
Label found on 350 LX models with the following stock numbers:  
907198, 907198-011, 907198-021, and 907198-031



Or

Label found on 250 DX models with the following stock numbers:  
907195, 907195-021 and, 907195-031

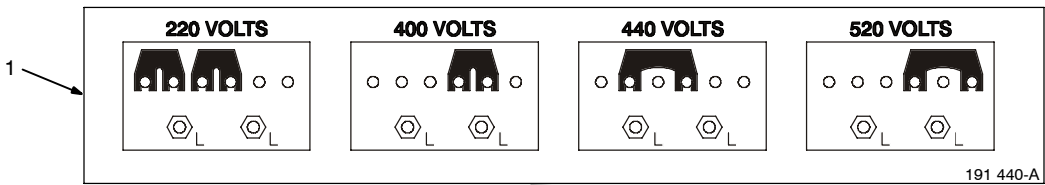
Label found on 350 LX models with the following stock numbers:  
907199, 907199-021, and 907199-031



Or

Label found on 250 DX models with stock number 907197

Label found on 350 LX models with stock number 907200



**▲ Disconnect and lockout/tag-out input power before installing or moving jumper links.**

Check input voltage available at site.

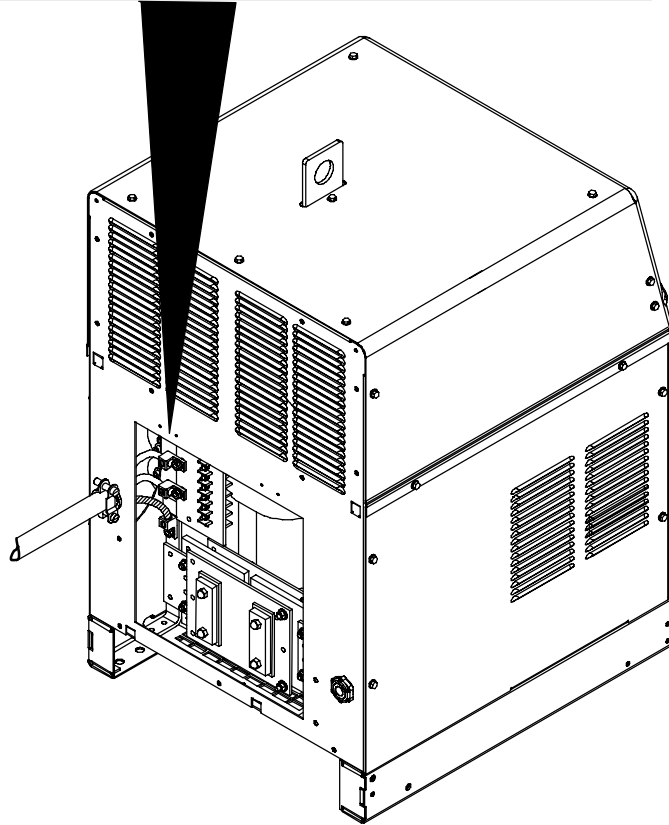
1 Jumper Link Label

Check label – only one label is on unit.

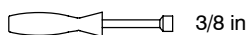
2 Jumper Links

Move jumper links to match input voltage.

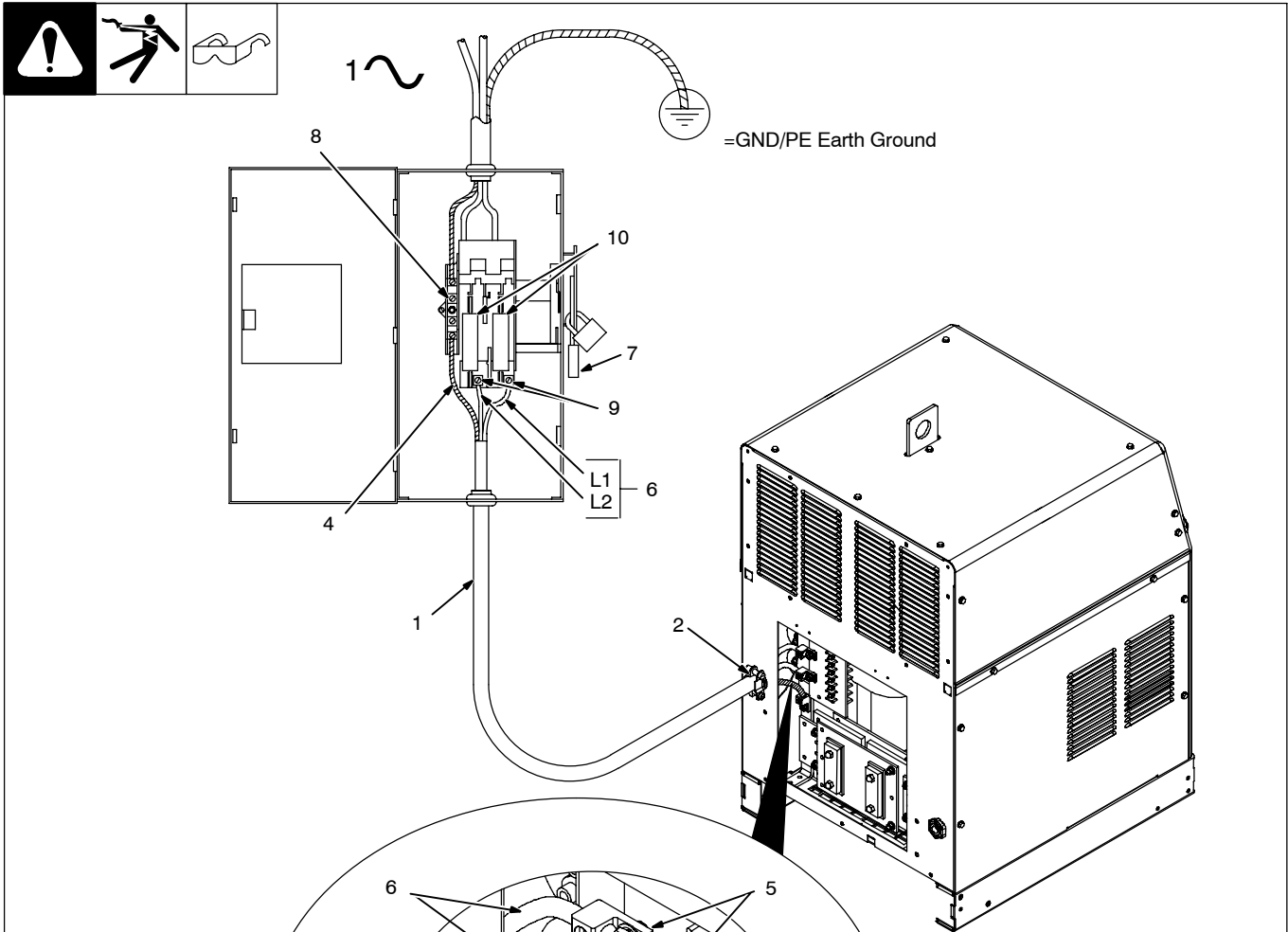
Close and secure access door, or go on to Section 3-18.



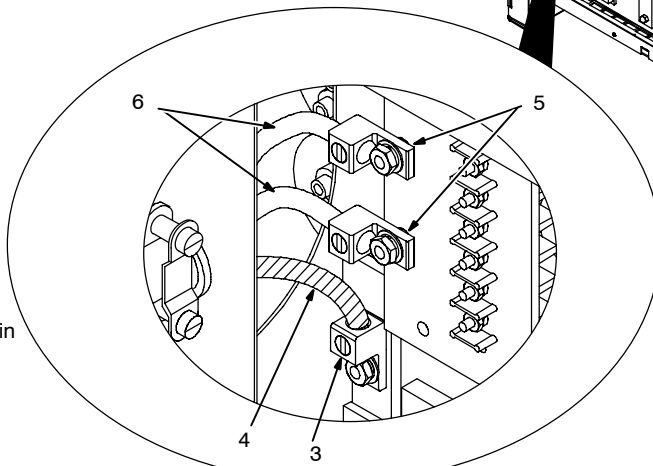
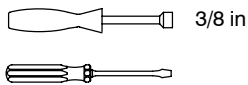
Tools Needed:



### 3-18. Connecting Input Power



Tools Needed:



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- ▲ Installation must meet all National and Local Codes – have only qualified persons make this installation.
- ▲ Disconnect and lockout/tagout input power before connecting input conductors from unit.
- ▲ Make input power connections to the welding power source first.
- ▲ Always connect green or green/yellow conductor to supply grounding terminal first, and never to a line terminal.

See rating label on unit and check input voltage available at site.

1 Input Power Conductors (Customer Supplied Cord)

Select size and length of conductors using Section 3-16. Conductors must comply with national, state, and local electrical codes. If applicable, use lugs of proper amperage capacity and correct hole size.

#### Welding Power Source Input Power Connections

- 2 Strain Relief  
Route conductors (cord) through strain relief and tighten screws.
- 3 Machine Grounding Terminal
- 4 Green Or Green/Yellow Grounding Conductor

Connect green or green/yellow grounding conductor to welding power source grounding terminal first.

- 5 Welding Power Source Line Terminals
- 6 Input Conductors L1 And L2

Connect input conductors L1 and L2 to welding power source line terminals.

Close and secure access door on welding power source.

#### Disconnect Device Input Power Connections

- 7 Disconnect Device (switch shown in OFF position)
- 8 Disconnect Device (Supply) Grounding Terminal

Connect green or green/yellow grounding conductor to disconnect device grounding terminal first.

9 Disconnect Device Line Terminals  
Connect input conductors L1 and L2 to disconnect device line terminals.

10 Overcurrent Protection

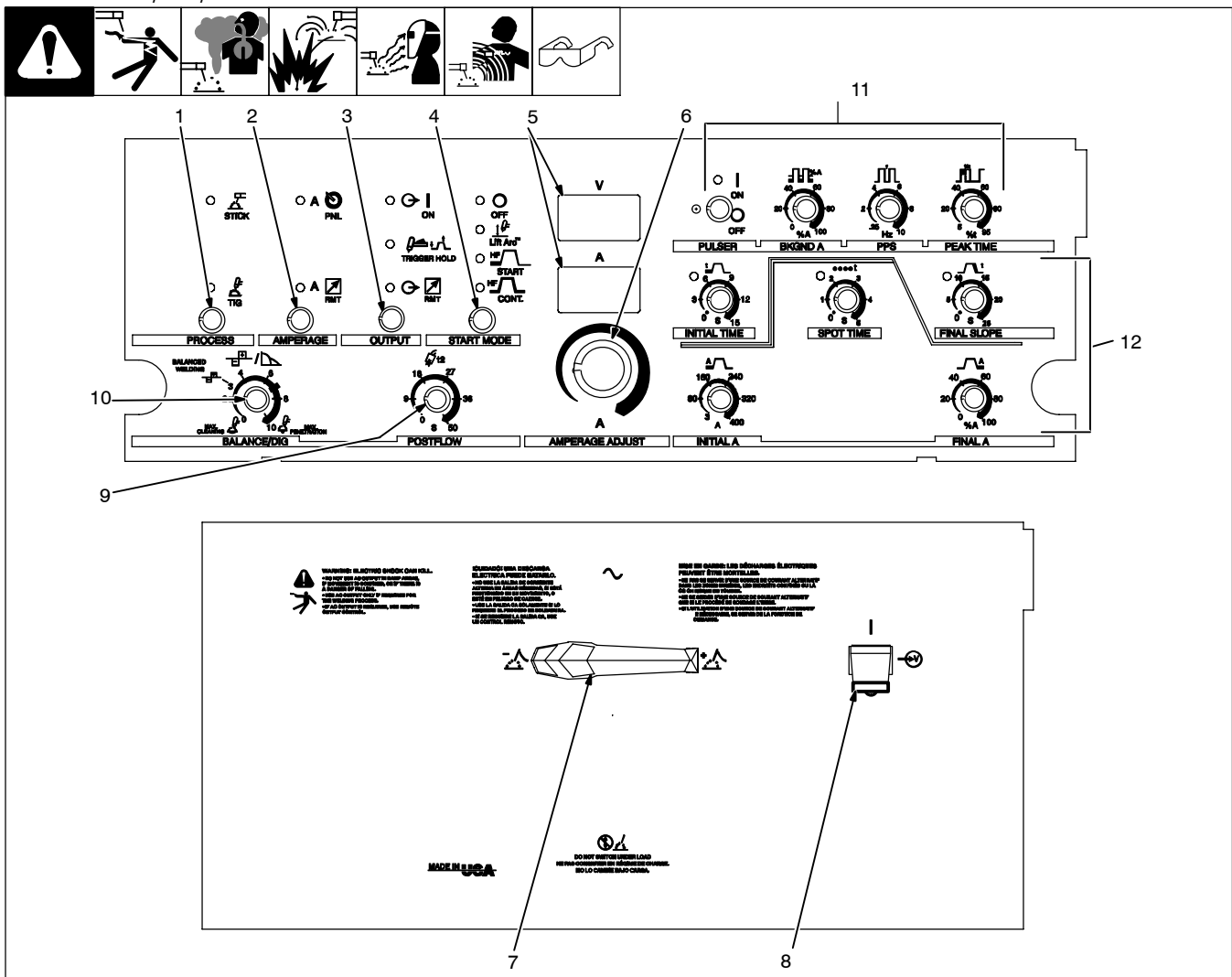
Select type and size of overcurrent protection using Section 3-16 (fused disconnect switch shown).

Close and secure door on line disconnect device. Remove lockout/tagout device, and place switch in the On position.

# SECTION 4 – OPERATION

## 4-1. Controls (350 LX Nameplates Shown)

### A. For 200/230/460 Volts And Non CE Units



☐ Top row of lights in upper left corner are On for SMAW. Bottom row are On for GTAW.

Green on nameplate indicates a TIG function, Gray indicates a Stick function.

- 1 Process Control  
See Section 4-3.
- 2 Amperage Control  
See Section 4-4.
- 3 Output Control  
See Section 4-5.
- 4 Start Mode Control  
See Section 4-9.
- 5 Voltmeter And Ammeter

Voltmeter displays average voltage (to the nearest 0.1 V) at the weld output terminals.

Use meter to preset amperage. Meter displays average weld amperage output of unit to nearest ampere when welding.

**NOTE:** Meters are self-calibrating. No adjust-

ment available.

- 6 Amperage Adjustment Control

Use control to adjust amperage, and preset amperage on ammeter. This control may be adjusted while welding.

**For remote amperage control**, front panel control setting is the maximum amperage available. For example: If front panel control is set to 200 amps, the range of the remote amperage control is 3 to 200 amps for 250 DX models, and 3 to 200 amps for 350 LX models.

**For pulse welding**, use Amperage Adjust control to select from 3-300 amps of peak amperage for 250 DX models, or 3-400 amps of peak amperage for 350 LX models (see Section 4-12).

**For spot welding**, use Amperage Adjust control to select from 3-310 amps for 250 DX models, or 3-400 amps for 350 LX models (see Section 4-16).

- 7 Output Selector Switch  
See Section 4-2.

- 8 Power Switch

Use switch to turn unit Off and On.

- 9 Postflow Time Control

Use control to set length of time (0-50 seconds) gas flows after welding stops. It is important to set enough time to allow gas to flow until after the tungsten and weld puddle has cooled down.

**Application:**

Postflow is required to cool the tungsten and weld, and to prevent contamination of tungsten and weld. Increase postflow time if tungsten or weld are dark in appearance (approximately 1 second per 10 ampere of welding current).

- 10 Balance/DIG Control

See Section 4-10.

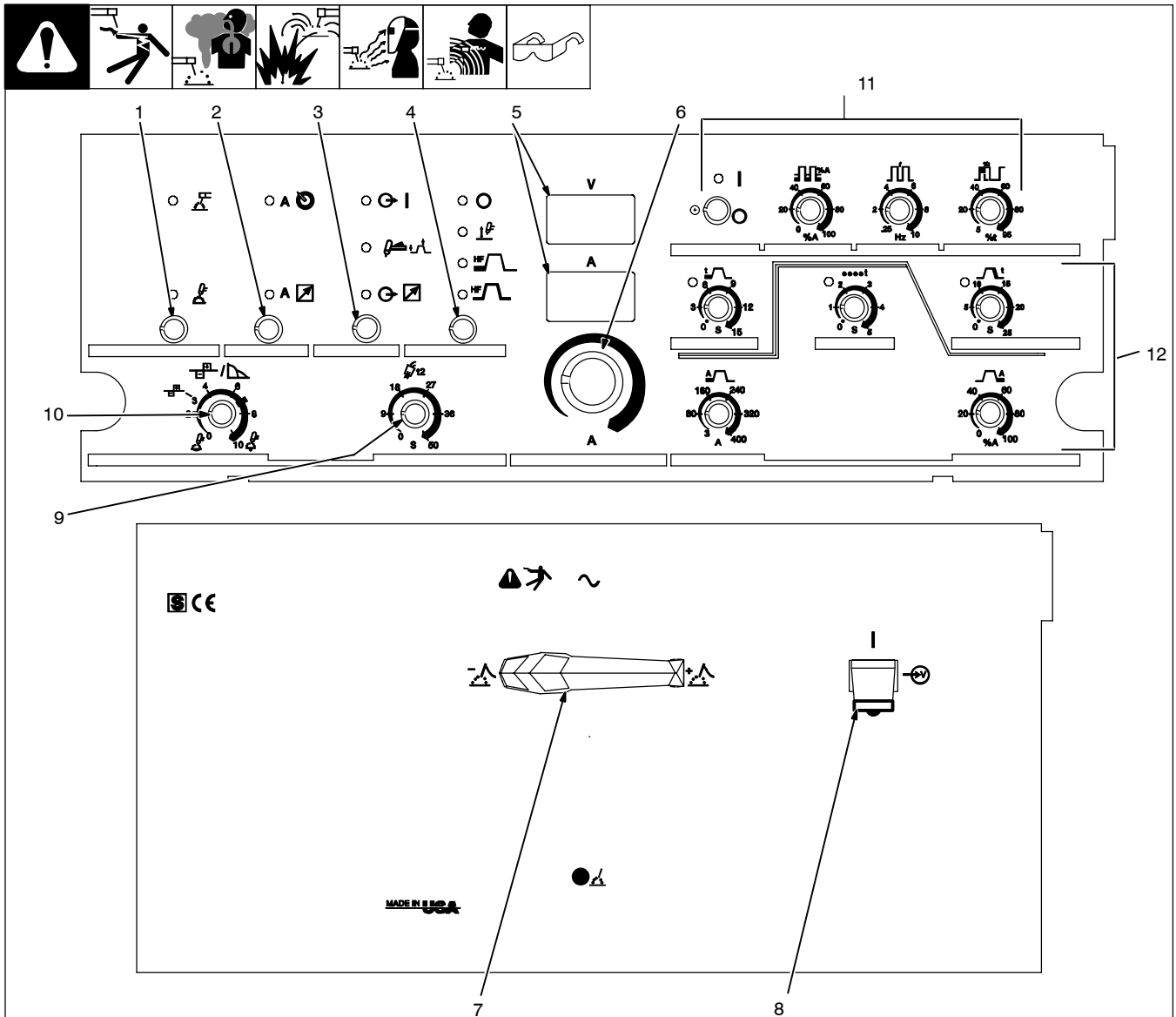
- 11 Pulser Controls (Optional on 250 DX model)

See Section 4-12.

- 12 Sequence Controls (Optional)

See Section 4-13.

## B. For CE Units



☞ Top row of lights in upper left corner are On for SMAW. Bottom row are On for GTAW.

Green on nameplate indicates a TIG function, Gray indicates a Stick function.

### 1 Process Control

See Section 4-3.

### 2 Amperage Control

See Section 4-4.

### 3 Output Control

See Section 4-5.

### 4 Start Mode Control

See Section 4-9.

### 5 Voltmeter And Ammeter

Voltmeter displays average voltage (to the nearest 0.1 V) at the weld output terminals.

Use meter to preset amperage. Meter displays average weld amperage output of unit to nearest ampere when welding.

**NOTE:** Meters are self-calibrating. No adjustment available.

### 6 Amperage Adjustment Control

Use control to adjust amperage, and preset amperage on ammeter. This control may be adjusted while welding.

**For remote amperage control,** front panel control setting is the maximum amperage available. For example: If front panel control is set to 200 A, the range of the remote amperage control is 3 to 200 amps for 250 DX models, and 3 to 200 amps for 350 LX models..

**For pulse welding,** use Amperage Adjust control to select from 3-300 amps of peak amperage for 250 DX models, or 3-400 amps of peak amperage for 350 LX models (see Section 4-12).

**For spot welding,** use Amperage Adjust control to select from 3-310 amps for 250 DX models, or 3-400 amps for 350 LX models (see Section 4-16).

### 7 Output Selector Switch

See Section 4-2.

### 8 Power Switch

Use switch to turn unit Off and On.

### 9 Postflow Time Control

Use control to set length of time (0-50 seconds) gas flows after welding stops. It is important to set enough time to allow gas to flow until after the tungsten and weld puddle has cooled down.

### Application:

Postflow is required to cool the tungsten and weld, and to prevent contamination of tungsten and weld. Increase postflow time if tungsten or weld are dark in appearance (approximately 1 second per 10 ampere of welding current).

### 10 Balance/DIG Control

See Section 4-10.

### 11 Pulser Controls (Optional on 250 DX model)

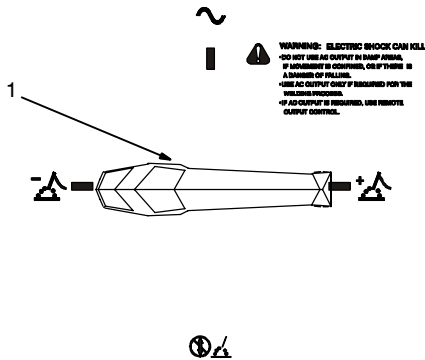
See Section 4-12.

### 12 Sequence Controls (Optional)

See Section 4-13.



### 4-2. Output Selector Switch



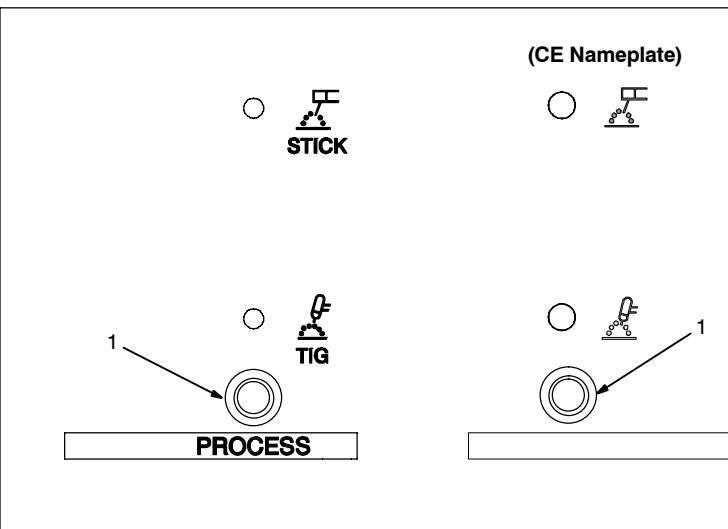
1 Output Selector Switch

- ▲ Do not use AC output in damp areas, if movement is confined, or if there is danger of falling. Use AC output ONLY if required for the welding process, and then use a remote control.
- ▲ Do not change position of switch while welding or while under load.

Use switch to select (DCEN) Direct Current Electrode Negative, AC, or (DCEP) Direct Current Electrode Positive output.

**NOTE:** Changing position of Output Selector switch may change Process control, Current control, and Start Mode control, and may require changing Output control settings to properly function with latest Output Selector switch setting.

### 4-3. Process Control



1 Process Control

Use control to select Shielded Metal Arc Welding (SMAW) or Gas Tungsten Arc Welding (GTAW) process.

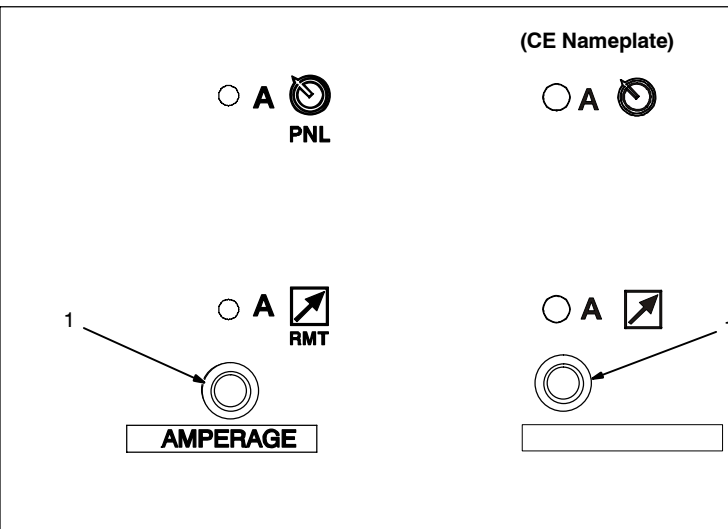
- ☀️ For SMAW, press button to toggle LED to Stick position.
- ☀️ For GTAW, press button to toggle LED to TIG position.

**NOTE:** Lit LED indicates selected mode.

When Output Selector switch position changes, LED may change position, based upon last selection.

Ref. 217 264-A / Ref. 215 460-A

### 4-4. Amperage Control



1 Amperage Control

Use control to select front panel or remote amperage control.

- ☀️ A For front panel amperage control, press button to toggle LED to Panel position.
- ☀️ A For remote amperage control, press button to toggle LED to Remote position (see Section 3-7).

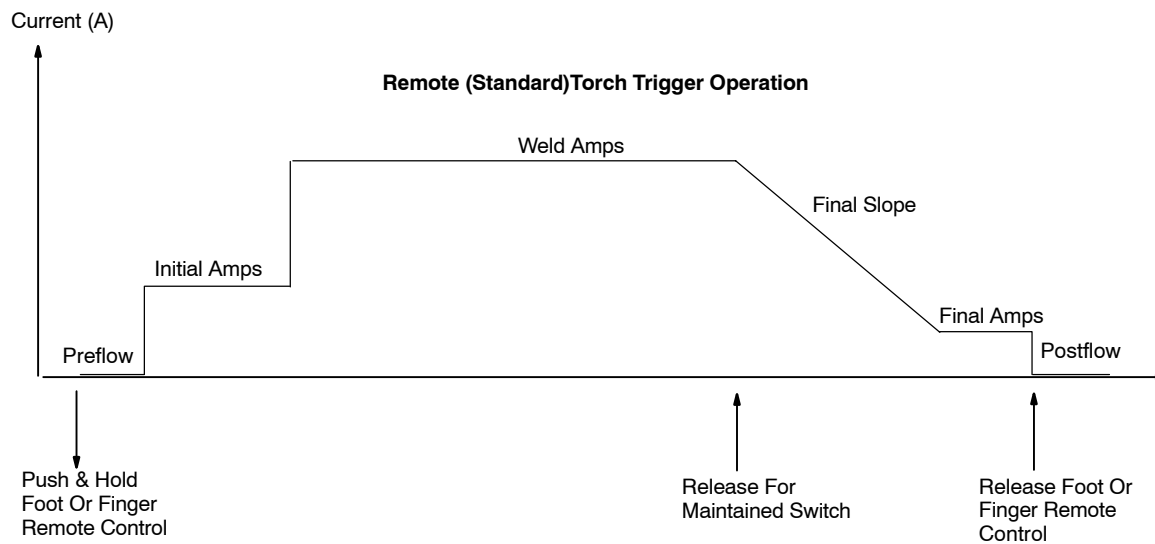
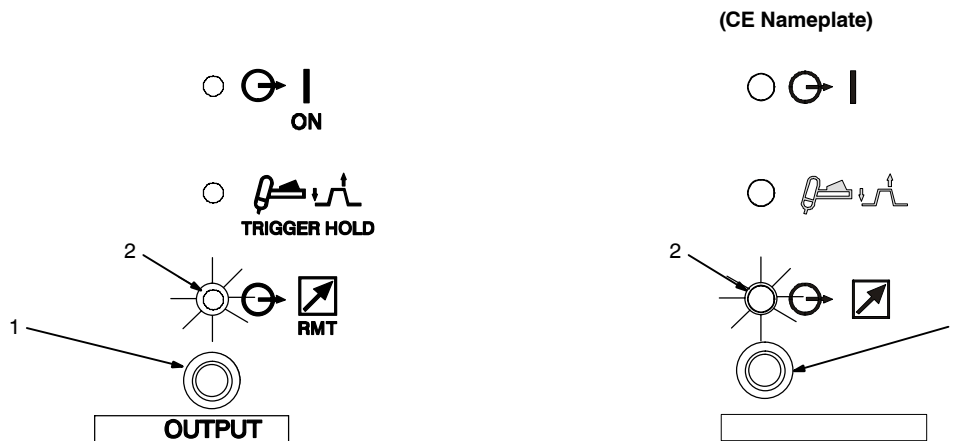
**NOTE:** Lit LED indicates selected mode.

When Output Selector switch position changes, LED may change position, based upon last selection.

## 4-5. Output Control



### Remote (Standard) Torch Trigger Operation



➡ 1 Output Control

▲ **Weld output terminals are energized when power is On, and Output On LED is lit.**

Use control to select front panel, trigger hold, or remote output control.

**NOTE:** Lit LED indicates selected mode.

▮ For weld output, press button to toggle LED to On position.

➡ 2 Remote Trigger (Standard) Operation

▮ For remote output control, press button to toggle LED to Remote position (see Section 3-7).

Torch trigger operation is as shown.

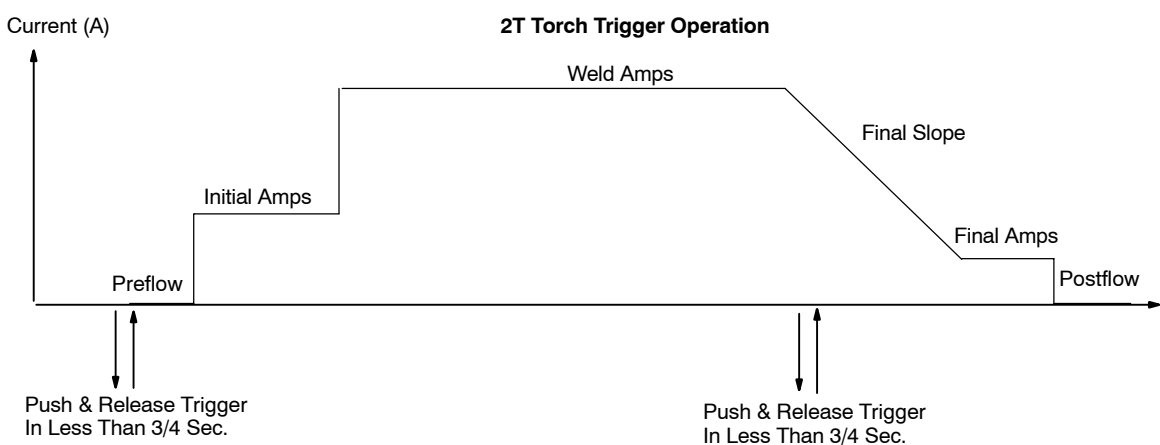
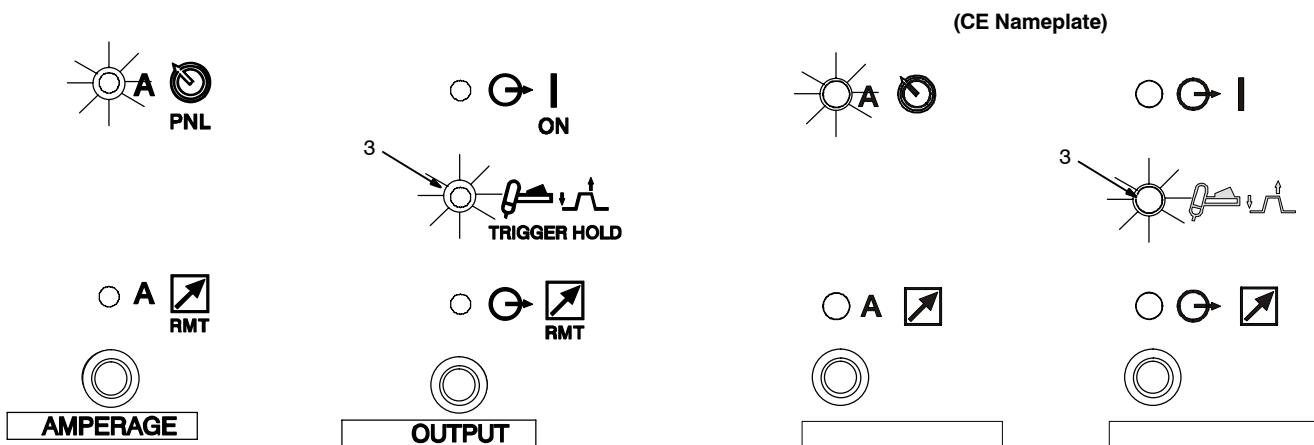
**NOTE:** Initial weld amperage and final amperage is controlled by the remote device, not by the welding power source.

**NOTE:** If On/Off only type trigger is used, it must be a maintained switch. All functions become active.

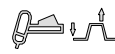
**Application:** Use Remote Trigger when the operator desires to use a foot pedal or finger amperage control.

When Output Selector switch (see Section 4-2) position changes, Output control LED will always switch to Remote.

Trigger Hold (2T)



NOTE: If torch trigger is held more than 3 seconds, operation reverts to Remote Trigger (Standard) mode (see previous page).  
 If arc is broken and trigger is depressed, HLP-10 will be displayed (see Section 6-1).



**3 Trigger Hold**  
 For trigger hold operation, press button to toggle LED to Trigger Hold position.  
 Torch trigger operation is as shown.

NOTE: When a foot or finger remote control is connected to the welding power source, only trigger input is functional, as amperage is controlled by the welding

power source.  
**Application:** Trigger Hold (2T) can help to reduce operator fatigue when long extended welds are made.

## 4-6. 4T, 4T Momentary, And Mini Logoic Trigger Operation (Requires Optional Sequence Controls)

### 4T Torch Trigger Operation

If unit is equipped with optional Sequence Controls (see Section 4-13), 4T trigger method is available.

4T torch trigger operation is as shown.

While in 4T mode, there is a feature available during the main weld sequence that al-

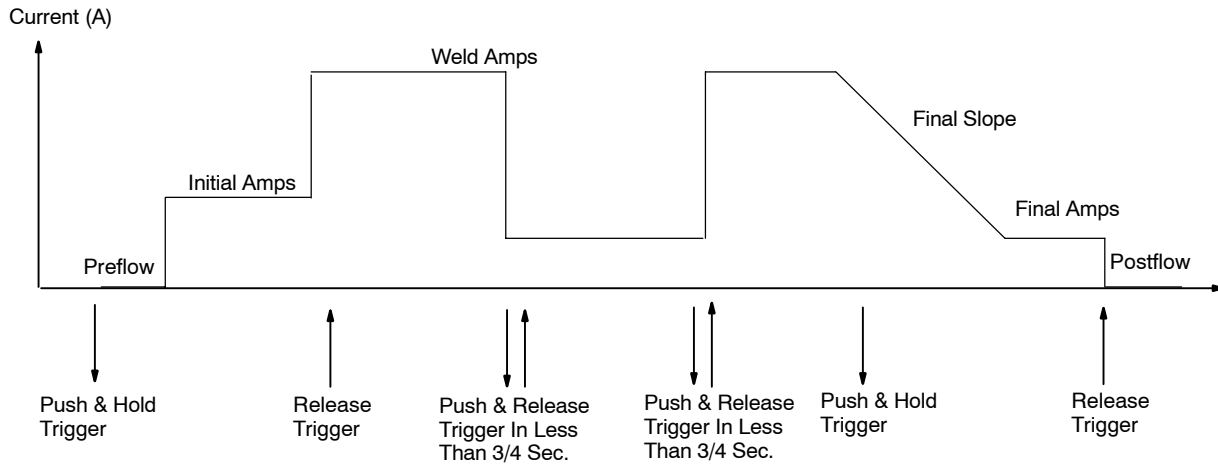
lows the operator to toggle between weld current and final current without breaking the arc.

NOTE: When a remote switch is connected to the welding power source, only trigger input is functional. Amperage is controlled by the welding power source.

#### Application:

Use 4T trigger method when the functions of a remote current control are desired, but only a remote on/off control is available.

Select 4T trigger method according to Section 4-7.



### 4T Momentary Torch Trigger Operation

If unit is equipped with optional Sequence Controls (see Section 4-13), 4T Momentary trigger method is available.

4T Momentary torch trigger operation is as shown.

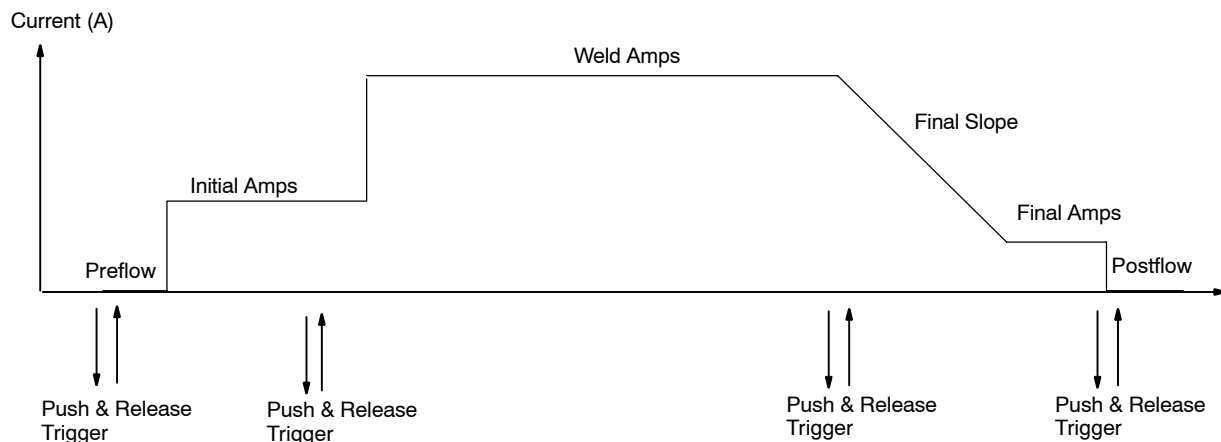
While in 4T Momentary mode, once the operator toggles out of weld current and begins final slope, toggling again will break the arc and go to postflow.

NOTE: When a remote switch is connected to the welding power source, only trigger input is functional. Amperage is controlled by the welding power source.

#### Application:

Use 4T Momentary trigger method when the functions of a remote current control are desired, but only a remote on/off control is available.

Select 4T Momentary trigger method according to Section 4-7.



### Mini Logic Operation

If unit is equipped with optional Sequence Controls (see Section 4-13), Mini Logic operation is available.

Torch trigger operation is as shown.

During Mini Logic welding operation, the weld amperage can be manually changed

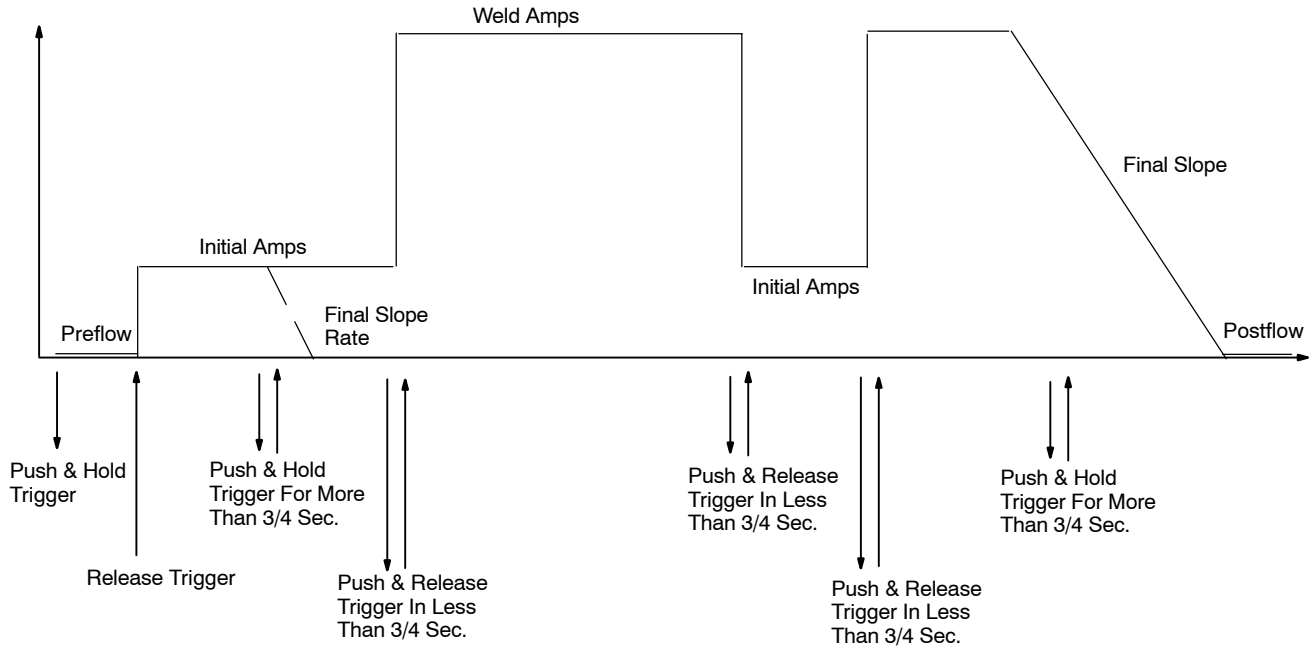
from the initial amps level to the main weld amps level by pressing and releasing the torch trigger in less than 3/4 seconds.

NOTE: When a remote switch is connected to the welding power source, only trigger input is functional. Amperage is controlled by

the welding power source.

**Application:** This ability to change amperage levels without either initial slope or final slope, gives the operator the opportunity to adjust filler metal without breaking the arc.

Select Mini Logic according to Section 4-7.



## 4-7. Reconfiguring Trigger Hold For 4T And Mini Logic Control

- 1 Output Control
- 2 Power Switch

To reconfigure Trigger Hold, turn Off power, push and hold Output control button and turn On power switch. Hold button for approximately 7 seconds (or until software version number \_\_\_\_\_ - clears, and meters display [SEL] [H-2].

Press Output control button to change functions. Active function will be displayed on amperage (bottom) meter.

### 3 Meter Displays

Meter displays for the different functions will be as shown.

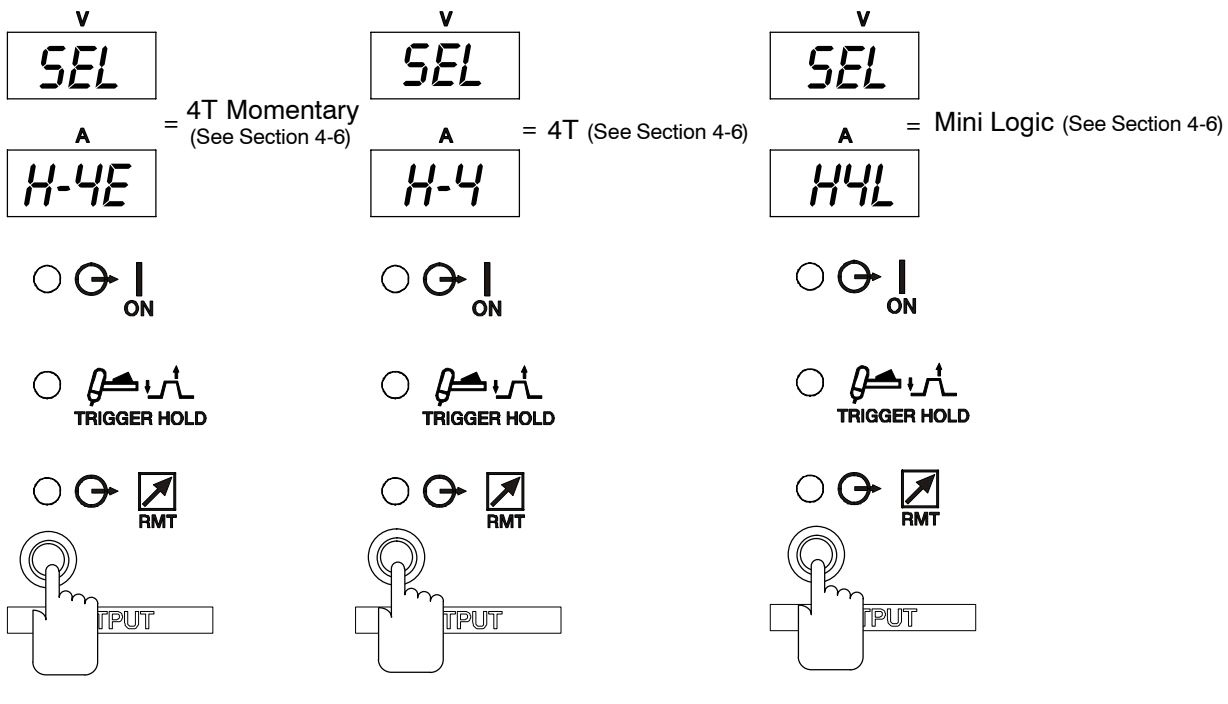
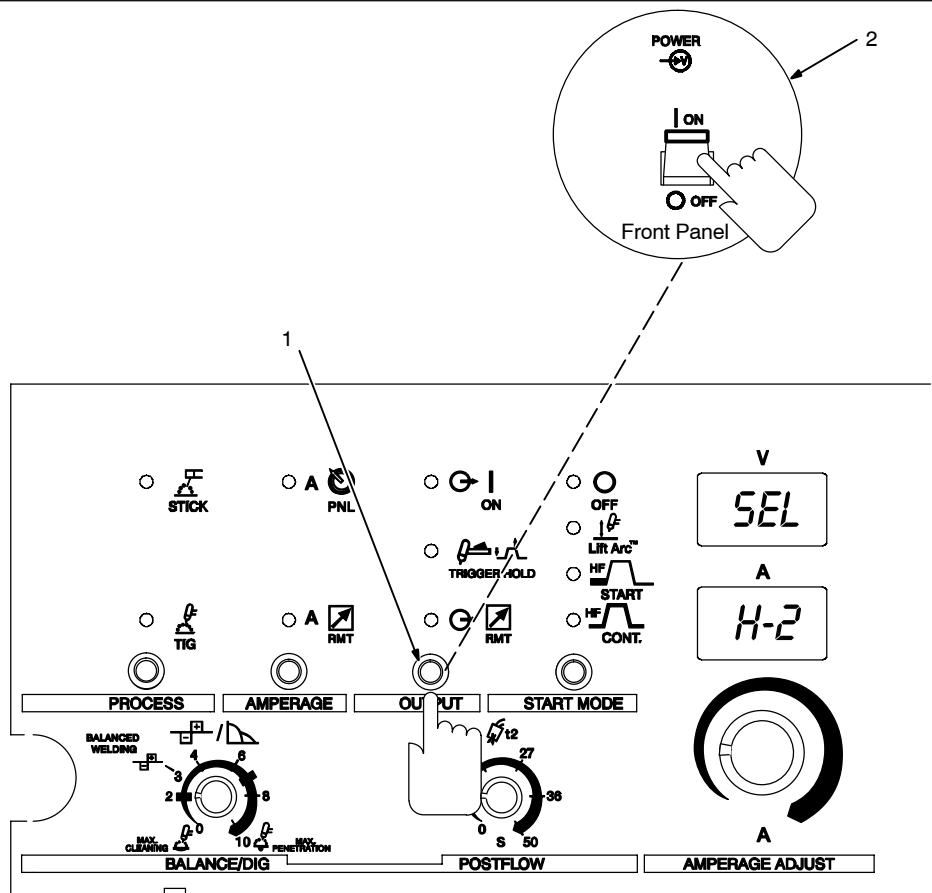
Press torch trigger or turn power Off to save setting.

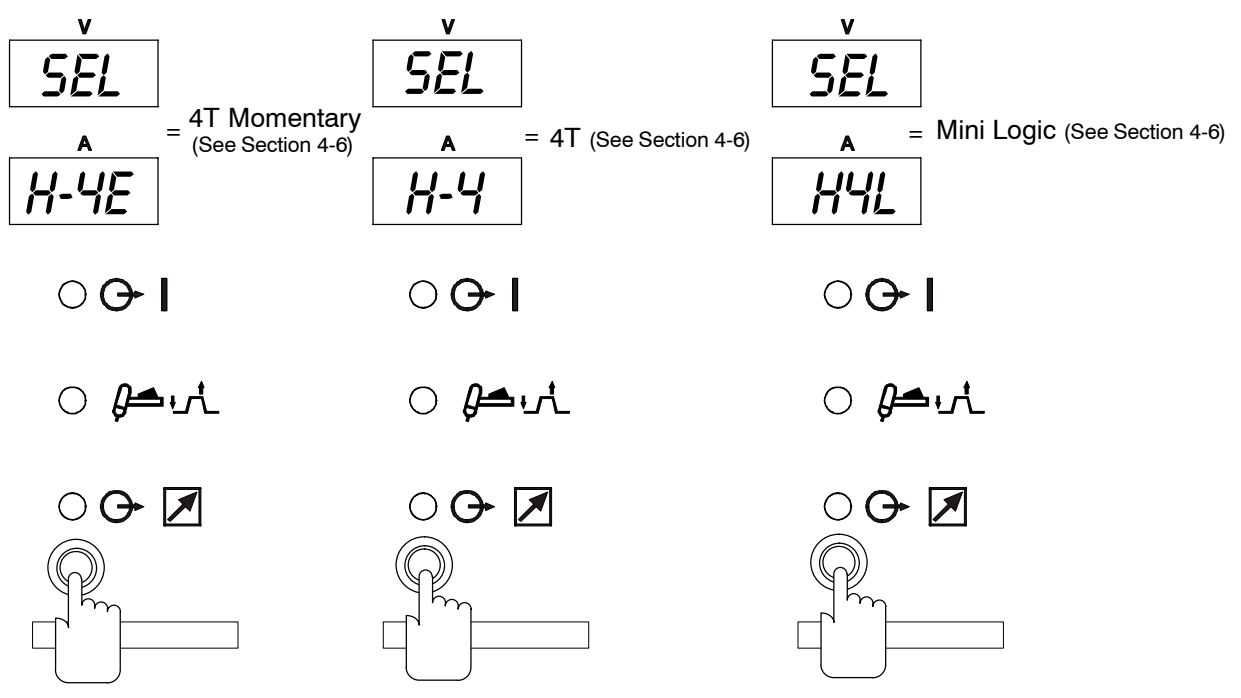
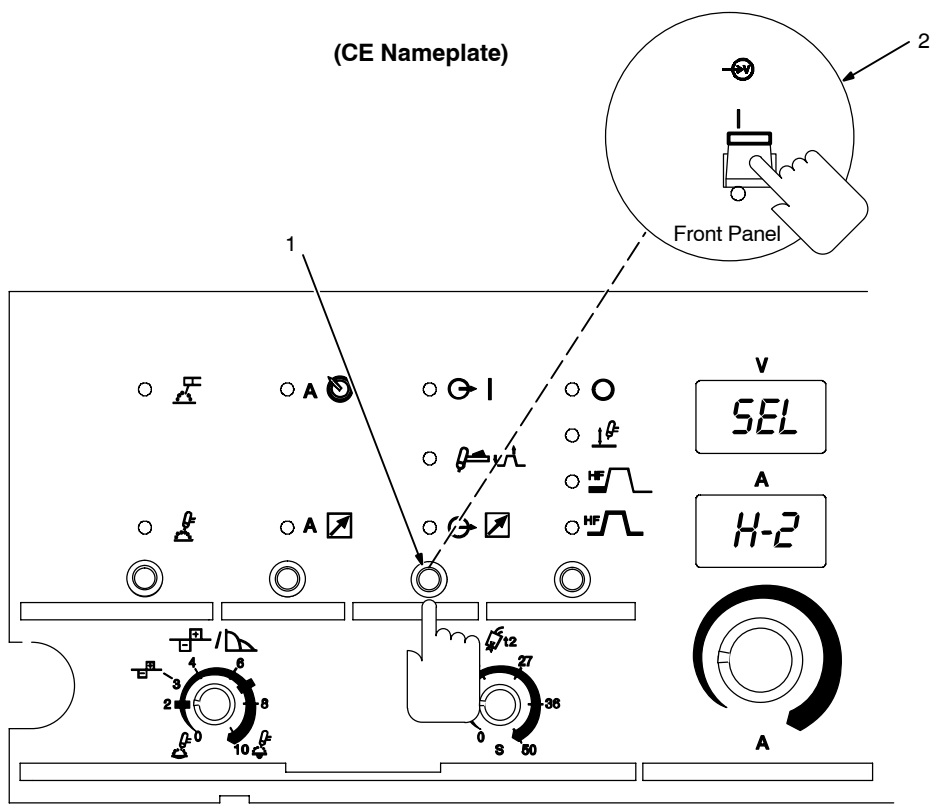
Proceed to Section 4-6 for 4T Operation.

Proceed to Section 4-6 for Mini Logic operation.

Proceed to Section 4-6 for 4T Momentary operation.

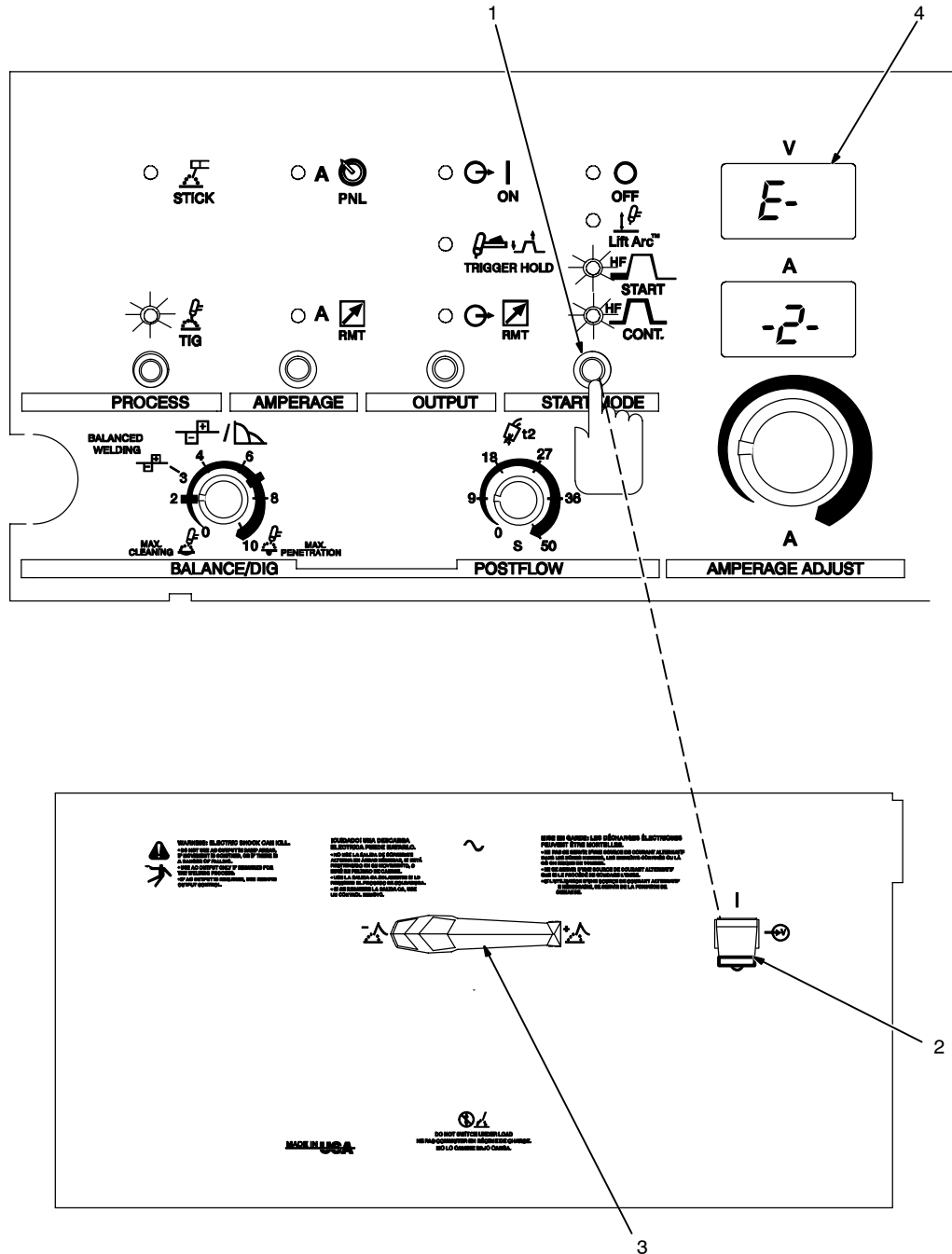
NOTE: These features are only available when optional Sequencer is installed.





3

## 4-8. Selecting TIG Starting Characteristics Using Syncro-Start™ Technology



Use this function to select desired TIG starting characteristics.

- 1 Start Mode
- 2 Power Switch
- 3 Output Selector Switch
- 4 Meters

To select or change TIG starting characteristics, proceed as follows: turn Off power. Place Output Selector switch in desired position (each position, DCEN, AC, or DCEP has three applicable start characteristics options). Push and hold Start Mode button and

turn On power. Hold button for approximately 7 seconds (or until software version number \_\_\_\_\_ clears meters).

The TIG LED and all four Start LEDs will light, and the meters will display [E] [-2], [AC] [-2], or [EP] [-2], depending on position of Polarity switch.

Press Start Mode button again to step through the three start characteristics choices. Amperage (bottom) meter displays active choice 1= light start, 2=medium/normal start, 3=high/hot start.

Press torch trigger or turn Off power to save setting.

### Application:

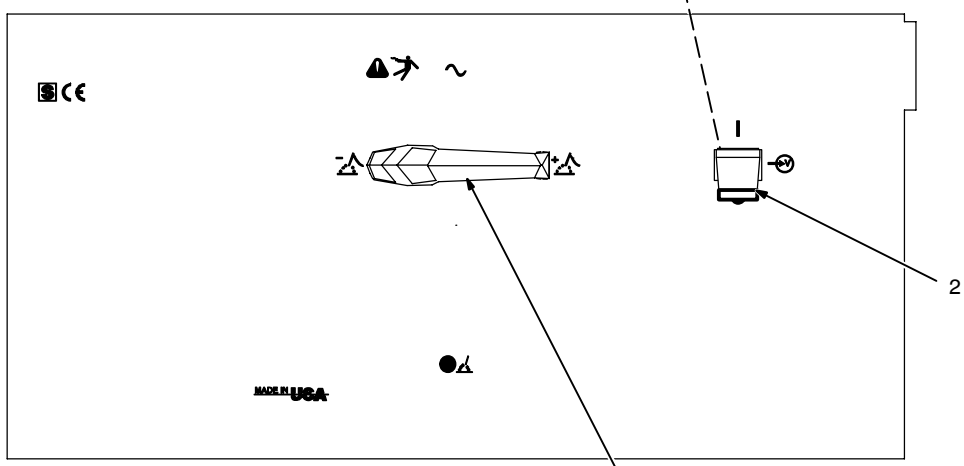
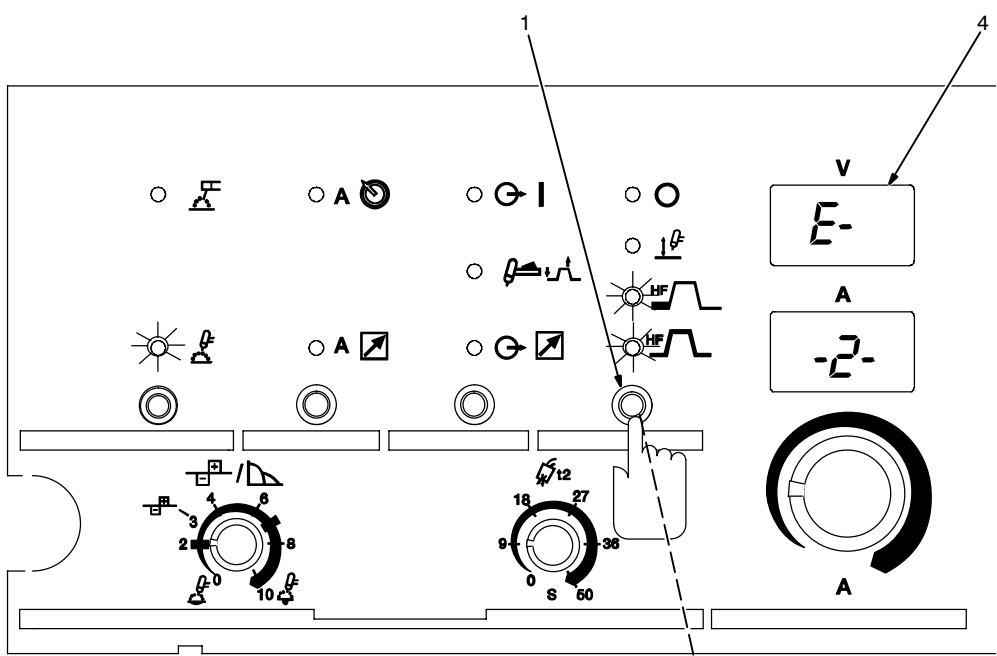
**Select 1** (light/soft start) – when welding at low amperages on thin gauge material.

**Select 2** (medium/normal start) – factory default setting used for most welding applications.

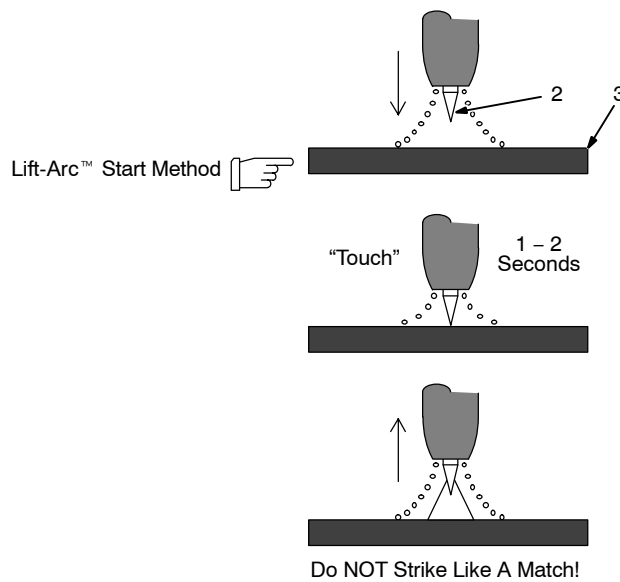
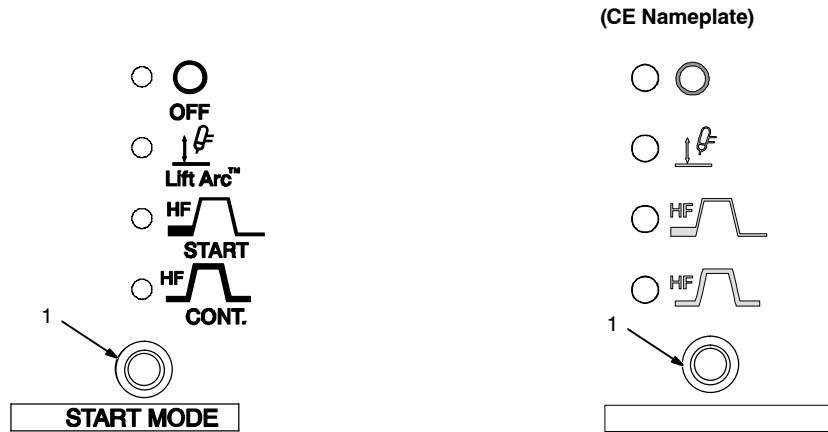
**Select 3** (high/hot start) – when welding at high amperages on thick materials with a large diameter tungsten.



(CE Nameplate)



## 4-9. Start Mode



### 1 Start Mode

☀ For SMAW welding, press button to toggle LED to Off position.

For GTAW welding, use control to select Off for no HF, Lift-Arc™, HF for arc starting only, or continuous HF.

#### Application:

When Off is selected, use the scratch method to start an arc for both the SMAW and GTAW processes.

☞ **When Lift-Arc is selected, start arc as follows:**

- 2 TIG Electrode
- 3 Workpiece

Touch tungsten electrode to workpiece at weld start point, enable output with torch trigger, foot control, or hand control. **Hold electrode to workpiece for 1-2 seconds,**

and slowly lift electrode. An arc will form when electrode is lifted.

Shielding gas begins to flow when electrode touches work piece.

Normal open-circuit voltage is not present before tungsten electrode touches workpiece, only a low sensing voltage is present between electrode and workpiece. The solid state output contactor does not energize until after electrode is touching workpiece. This allows electrode to touch workpiece without overheating, sticking, or getting contaminated.

#### Application:

Lift-Arc is used for the DCEN GTAW process when HF Start method is not permitted, or to replace the scratch method.

☞ **When HF Start is selected, start arc as follows:**

High frequency turns on to help start arc when output is enabled. High frequency

turns off when arc is started, and turns on whenever arc is broken to help restart arc.

#### Application:

HF Start is used when the DCEN GTAW process is required.

☞ **When HF Continuous is selected, start arc as follows:**

High frequency turns on when output is energized and remains on for duration of weld.

#### Application:

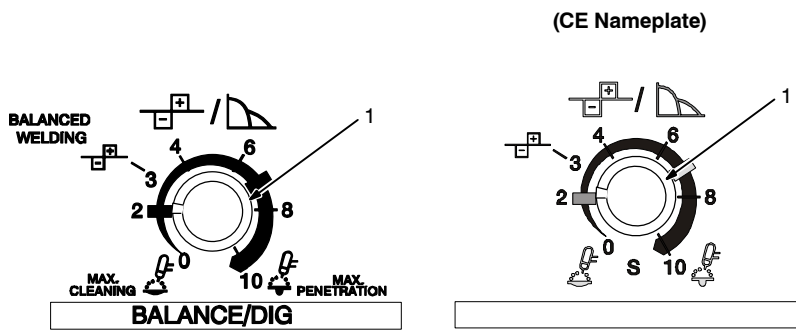
HF Continuous is used when the AC GTAW process is required.

**NOTE:** Lit LED indicates selected mode.

When Output Selector switch position changes, LED may change position, based upon last selection.

**NOTE:** Some start methods may not be available for all processes.

4-10. Balance/DIG Control



1 Balance/DIG Control

**Balance Control (AC GTAW):**

Control changes the AC output square wave. Rotating the control towards 10 provides deeper penetration. Rotating the control towards 0 provides more cleaning action of the workpiece.

When the control is in the Balanced position, the wave shape provides equal penetration and cleaning action.

**Application:**

When welding on oxide forming materials such as aluminum or magnesium, excess cleaning is not necessary. To produce a good weld, only a minimal amount, approximately a 0.10 in (2.5mm) of etched zone along the weld toes is required.

Set control to 3 and adjust as necessary. Joint configuration, set-up, process variables, and oxide thickness may affect setting.

NOTE: Arc rectification can occur when welding above 200 amps and/or while welding with helium gas. If this condition occurs, increasing the Balance control towards maximum penetration, may help to restabilize the arc.


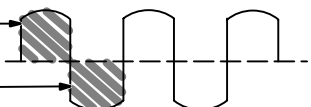

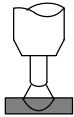

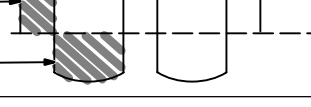
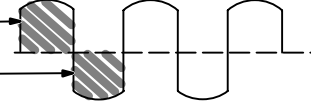
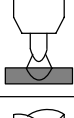

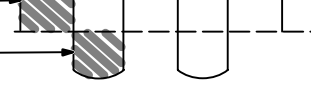


**DIG Control (AC And DC SMAW):**

When set at 0, short-circuit amperage at low arc voltage is the same as normal welding amperage.

When setting is increased, short-circuit amperage at low arc voltage increases. Set control at 2 and adjust as necessary. Joint configuration, set-up, and process variables may affect setting.

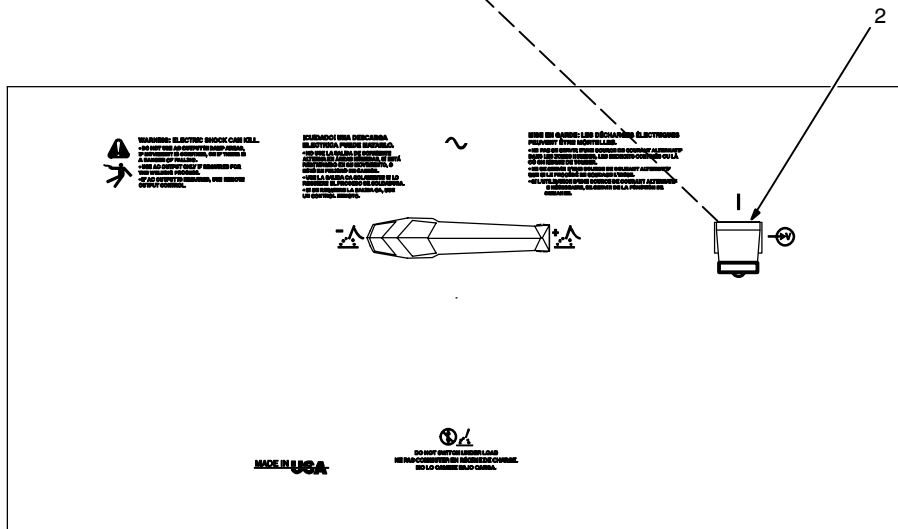
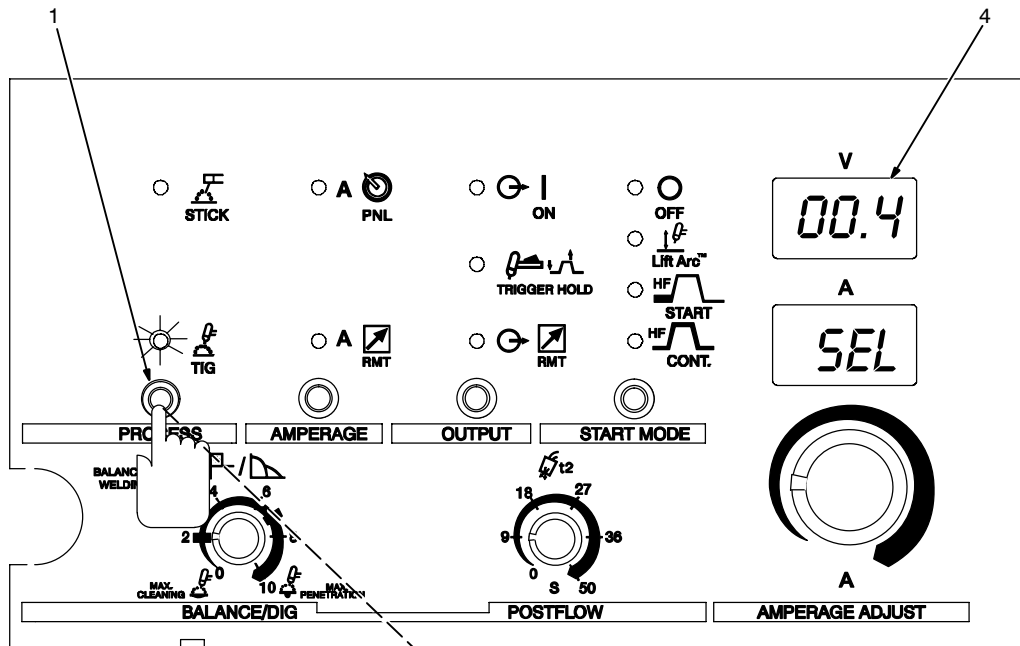
**Application:**

Control helps arc starting or making vertical, or overhead welds by increasing amperage at low arc voltage, and reduces electrode sticking while welding.

Balance Control Examples		
Setting	Output Waveforms	Arc
Balanced 	50% Electrode Positive  50% Electrode Negative 	
Max Penetration 	32% Electrode Positive  68% Electrode Negative 	
Max Cleaning 	55% Electrode Positive  45% Electrode Negative 	

Ref. S-0795-A

## 4-11. Prewflow Time Control



Use control to set length of time (0.2, 0.4, 0.6, 0.8, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5, 5.0 seconds) gas flows before welding starts.

- 1 Process Control
- 2 Power Switch
- 3 Meters

To change preflow time, proceed as follows:

Turn power off. Push and hold Process Control button and turn On power. Hold button for approximately 7 seconds (or until software version number \_\_\_\_\_ clears meters).

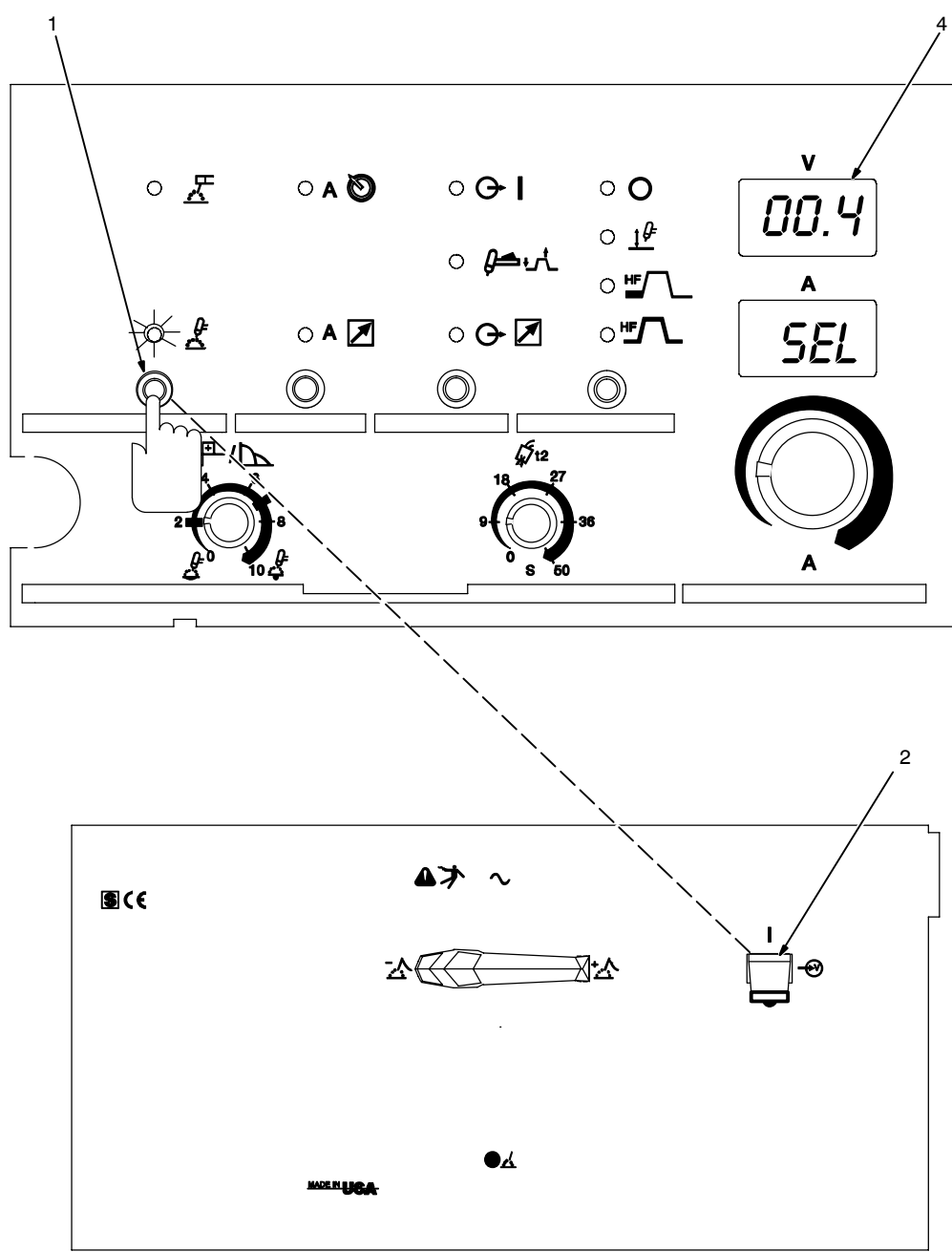
The TIG LED will light and the meters will display [0.4] [SEL]. The factory preflow default setting is 0.4 seconds. To change preflow

time, press and release Process Control button until desired time is displayed on meters.

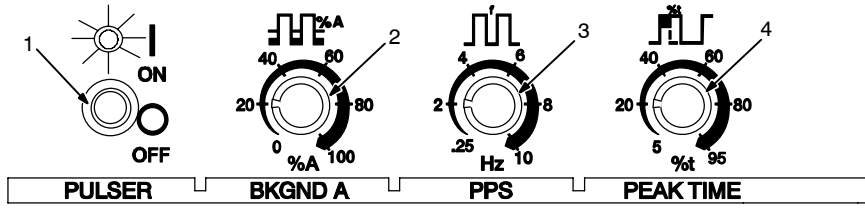
### Application:

Preflow is used to purge the immediate weld area of atmosphere. Prewflow also aids in consistent arc starting.

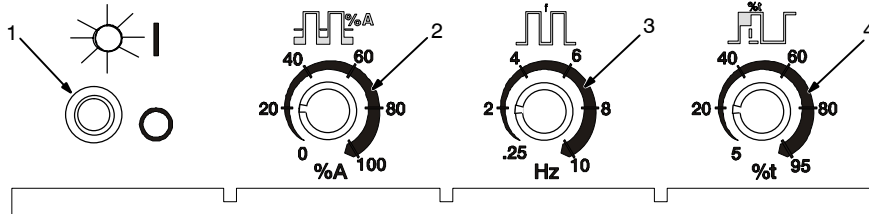
(CE Nameplate)



## 4-12. Pulse Controls (Standard On 350 LX Models, Optional On 250 DX Models)



(CE Nameplate)



- 1 On/Off Control
- Use control to turn pulse function On and Off.

- 2 Background Amps
- Use Background Amps control to set the low pulse of the weld amperage, which cools the weld puddle and affects overall heat input. Background Amps is set as a percentage of peak amperage.

- 3 Pulse Frequency
- Ranges from 0.25–10.0 pps (pulses per second). Control is used to determine appearance of weld bead.

- 4 Peak Time
- A range of 5–95% of each pulse cycle can be spent at the peak amperage level.

Peak amperage (3-310 amps for 250 DX models, and 3–400 amps for 350 LX models), is set with the Amperage Adjustment control (see Section 4-1). Peak amperage is the highest welding amperage allowed to occur in the pulse cycle. Weld penetration varies directly with peak amperage.

### 5 Pulsed Output Waveforms

Example shows affect changing the Peak Time control has on the pulsed output waveform.

### Application:

Pulsing refers to the alternating raising and lowering of the weld output at a specific rate. The raised portions of the weld output are controlled in width, height, and frequency, forming pulses of weld output. These pulses and the lower amperage level between them (called the background amperage) alternately heat and cool the molten weld puddle. The combined effect gives the operator better control of penetration, bead width, crowning, undercutting, and heat input. Controls can be adjusted while welding.

Pulsing can also be used for filler material addition technique training.

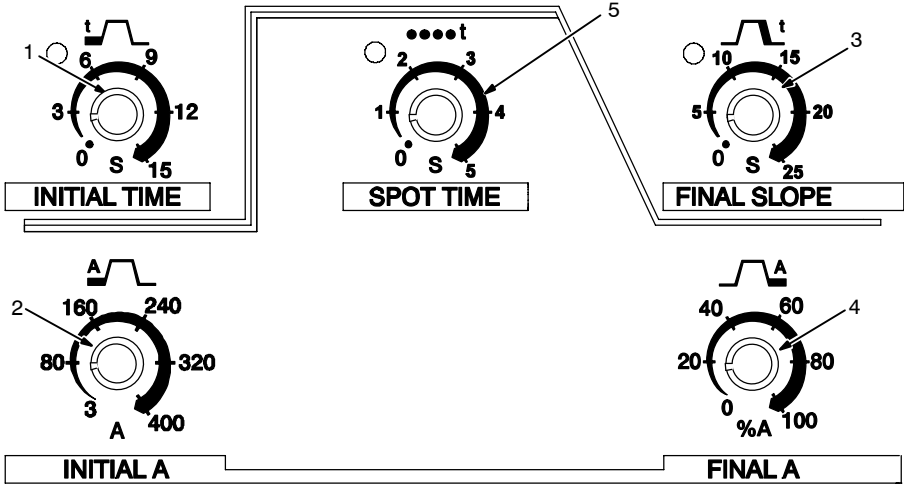
**NOTE:** Function is enabled, when LED is lit.

Percent (%) Peak Time Control Setting	Pulsed Output Waveforms
Balanced (50%) 	
More Time At Peak Amperage (80%) 	
More Time At Background Amperage (20%) 	

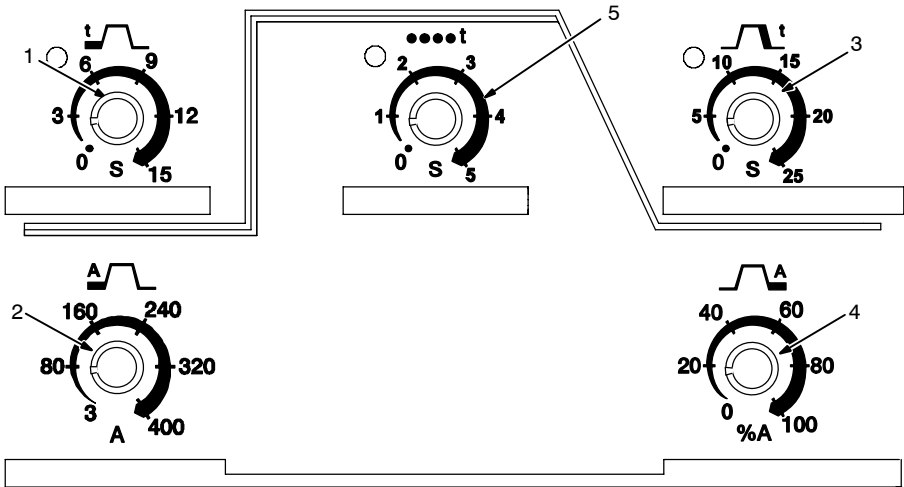
### 4-13. Sequence Controls (Optional)



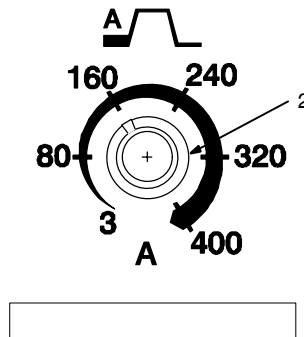
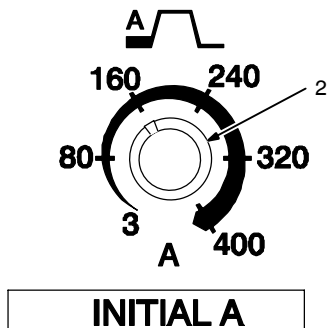
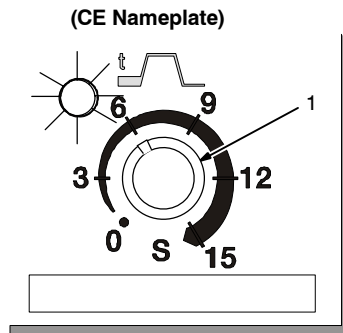
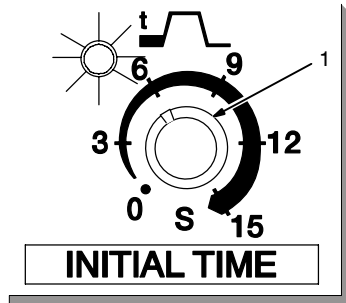
- 1 Initial Time Control  
See Section 4-14.
- 2 Initial Amperage Control  
See Section 4-14.
- 3 Final Slope Control  
See Section 4-15.
- 4 Final Amperage Control  
See Section 4-15.
- 5 Spot Time Control  
See Section 4-16.



(CE Nameplate)



## 4-14. Initial Time Control And Initial Amperage Control



### 1 Initial Time Control



Indicator light is on when Initial Time control function is active.

**NOTE:** Initial Sequence control function is inactive when Spot Time function is active.

Use control to select 0–15 seconds of start time.



### 2 Initial Amperage Control



Indicator Light is on when Initial Sequence control function is active.

**NOTE:** Initial Amperage control function is inactive when Spot Time function is active.

Use control to select a starting amperage (3–400 amps) that is different from the weld amperage. Note: Initial Amperage can be used with or without a remote control (Initial Amperage and Initial Time control settings will override a remote control device).

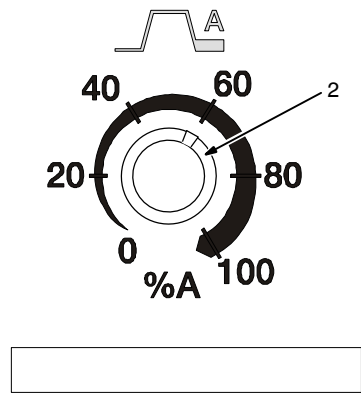
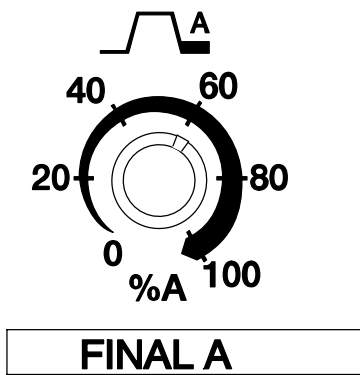
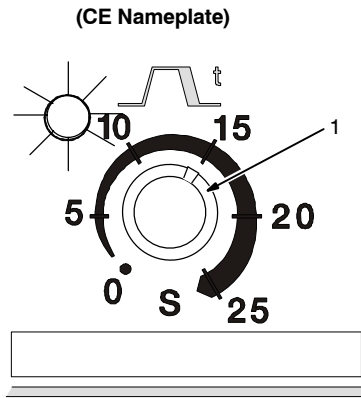
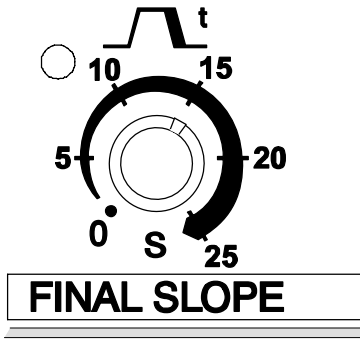
### Application:

Initial Amperage can be used while GTAW welding to assist in preheating cold material prior to depositing filler material, or to ensure a soft start. Initial Amperage can also be used for SMAW to ensure a more consistent arc strike.

**NOTE:** Function is enabled, when LED is lit.



### 4-15. Final Slope Control And Final Amperage Control



1 Final Slope Control  
Indicator light is on when Final Slope control function is active.

**Note:** Final Slope control function is inactive when Spot Time function is active.

Use control to reduce amperage over a set period of time (0–15 seconds) at the end of the weld cycle when NOT using a remote current control.



2 Final Amperage Control  
Indicator light is on when Final Amperage control function is active.

**Note:** Final Amperage control function is inactive when Spot Time function is active (see Section 4-16).

Final amperage is the amperage to which weld amperage has sloped down to (0–100% of amperage set on Amperage Adjust control).

**Application:**

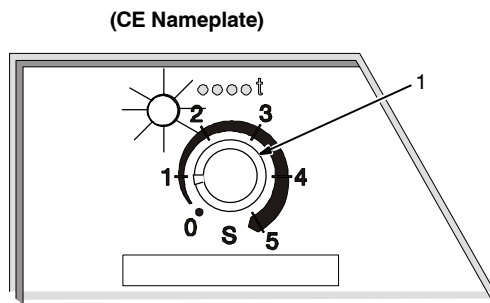
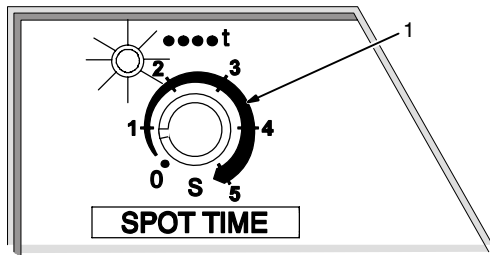
Final Slope should be used while GTAW welding materials that are crack sensitive, and/or the operator wants to eliminate the crater at the end of the weld.

**Note:** This applies if the operator is using an on/off only type control to start and stop the welding process.

**Note:** Do not use this function with a foot or finger amperage control.

**NOTE:** Function is enabled, when LED is lit.

### 4-16. Spot Time Control



○○○○○ 1 Spot Time Control



Indicator light is on when Spot Time function is active. When Spot Time function is active, Initial Time, Initial Amperage, Final Slope, and Final Amperage functions are inactive (see Section 4-13).

Used with the (GTAW) TIG Spot process, generally with a direct current electrode negative (DCEN) set-up.

Use control to select 0–15 seconds of spot time.

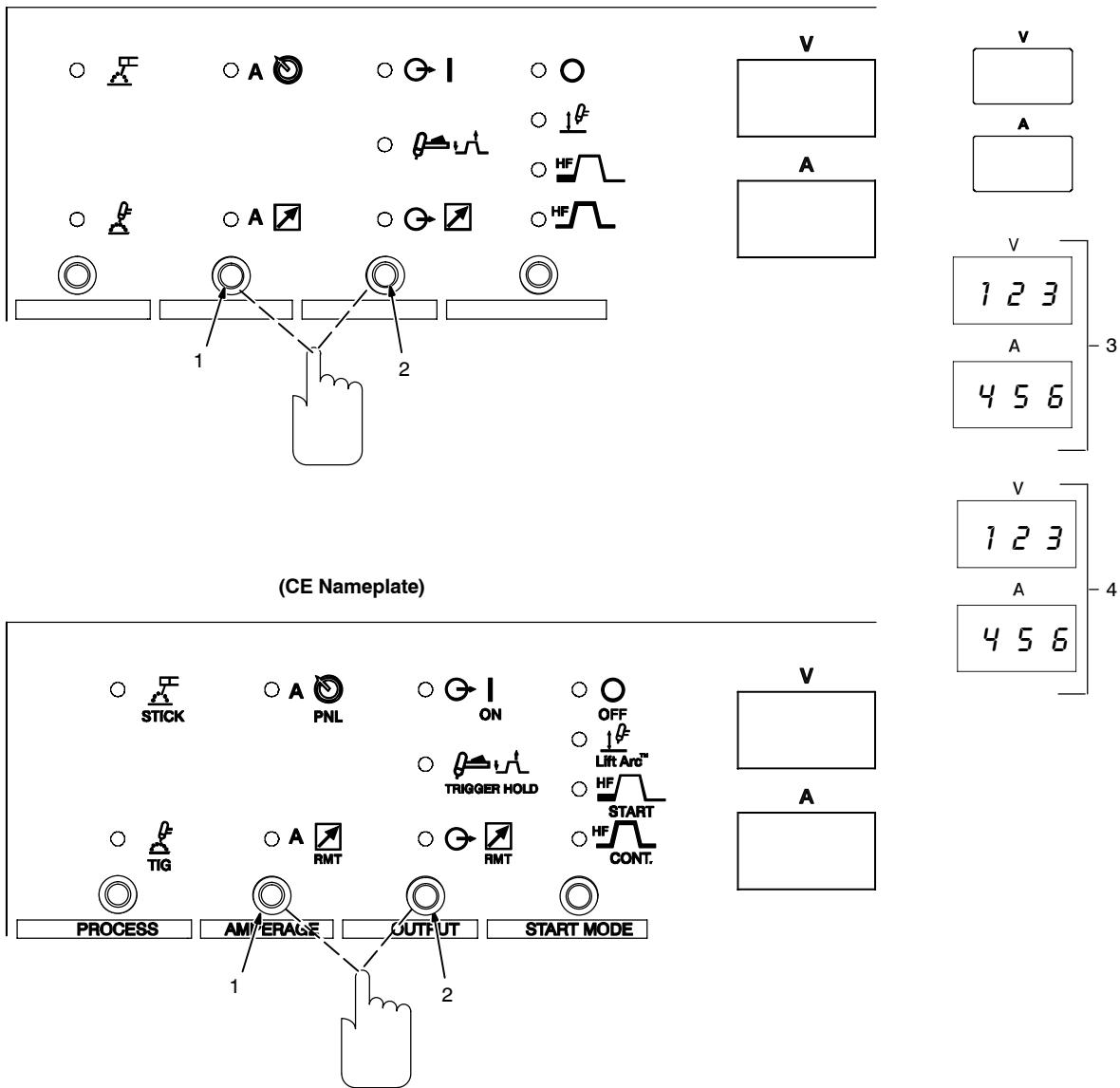
Use Amperage Adjust control (see Section 4-1) to set amperage.

**Application:**

TIG spot welding is used for joining thinner materials that are in close contact with the fusion method. A good example would be joining coil ends.

**NOTE:** Function is enabled, when LED is lit.

## 4-17. Timer/Cycle Counter



1 Amperage Control

2 Output Control (Contactor)

To read timer/cycle counter, hold Amperage and Output (contactor) buttons while turning on power. When machine first powers up, the displays will show the

software number and revision for the first seven seconds. It will then show arc time and cycle count.

3 Timer Display

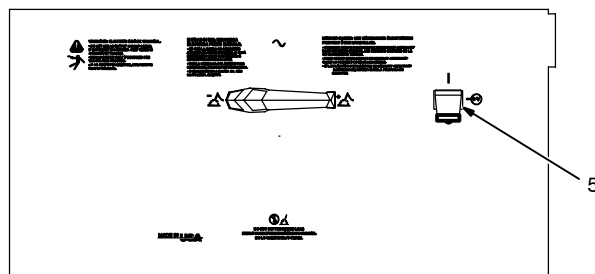
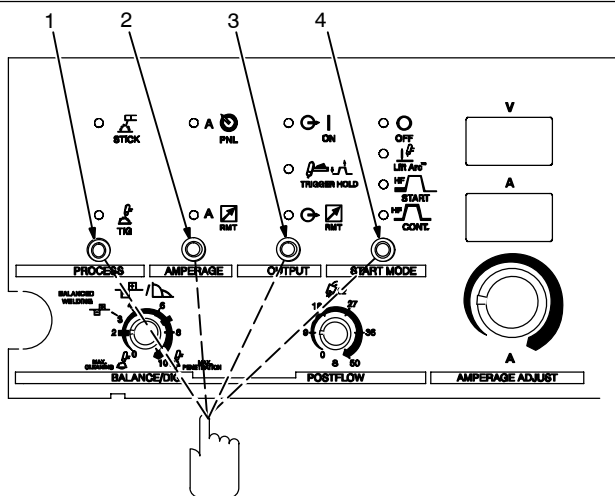
The hours and minutes are displayed on the volt and amp meters for the first five

seconds, and are read as 1, 234 hours and 56 minutes.

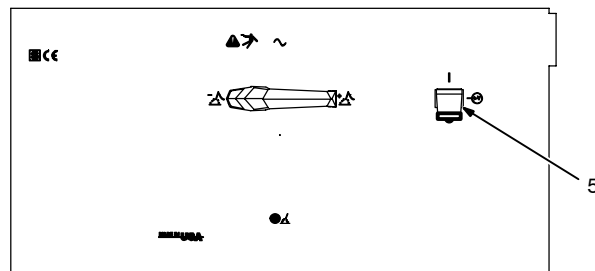
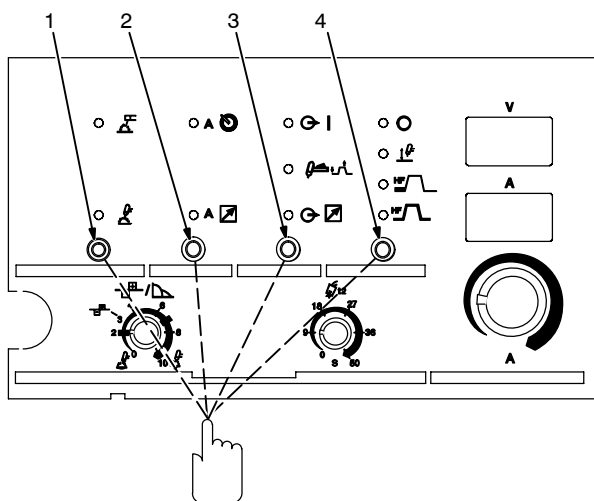
4 Cycle Display

The cycles are displayed on the volt and amp meters for the next five seconds, and are read as 123, 456 cycles.

### 4-18. Resetting Unit To Factory Default Settings (All Models)



(CE Nameplate)







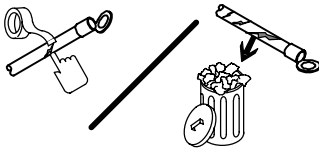
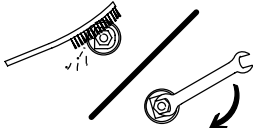

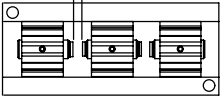


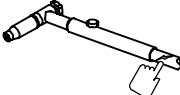

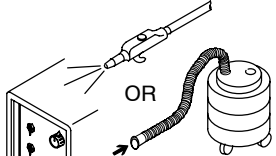

- 1 Process Control
- 2 Amperage Control
- 3 Output Control
- 4 Start Control

- 5 Power Switch
- To reset all welding power source functions to original factory settings, turn power off. Push and hold the Process, Amperage,


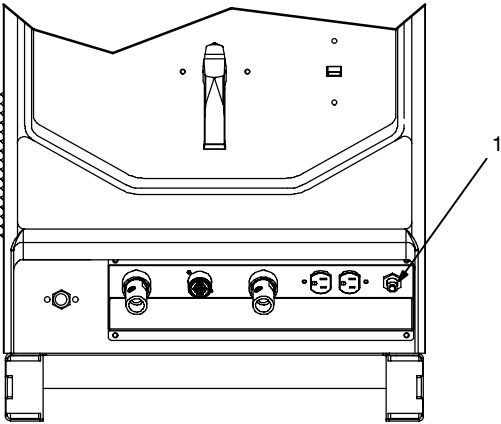
Output, and Start controls and turn On power. Hold switch pads for approximately 7 seconds (or until software version number -----\_ clears meters).

# SECTION 5 – MAINTENANCE

## 5-1. Routine Welding Power Source Maintenance

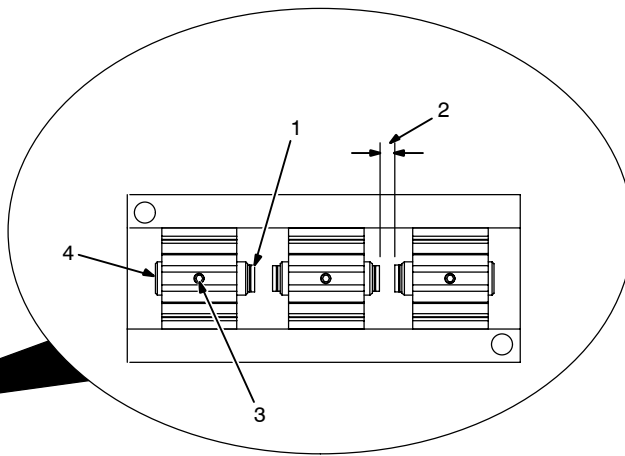
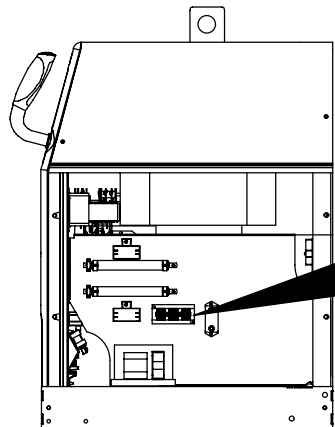
		<p>▲ Disconnect power before maintaining.</p>						
<p> <b>3 Months</b></p>								
		<p>Replace Unreadable Labels</p>		<p>Repair Or Replace Cracked Weld Cables</p>		<p>Clean And Tighten Weld Terminals</p>		
	<p>Adjust Spark Gaps</p> 		<p>14-Pin Cord</p>		<p>Gas Hose</p>		<p>Torch Cable</p>	<p>Replace Cracked Parts</p>
<p> <b>6 Months</b></p>								
		<p>Blow Out Or Vacuum Inside, During Heavy Service, Clean Monthly</p>						
<p>OR</p> 		<p>▲ Warranty is void if machine fails due to contaminates inside.</p>						

## 5-2. Circuit Breaker CB1

			<p>▲ Turn off power before resetting breaker.</p> <p>1 Circuit Breaker CB1</p> <p>If CB1 opens, high frequency and output to the 115 volts ac duplex receptacle stop. Press button to reset breaker.</p>
---	--	---	--

Ref. 803 588-B

### 5-3. Adjusting Spark Gaps



▲ Turn Off welding power source and disconnect and lockout/tagout input power before adjusting spark gaps.

Remove right side panel..

1 Tungsten End Of Point

Replace point if tungsten end disappears; do not clean or dress tungsten.

2 Spark Gap

Normal spark gap is 0.008 in (0.203 mm).

If adjustment is needed, proceed as follows:

3 Adjustment Screws

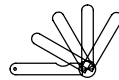
Loosen screws. Place gauge of proper thickness in spark gap.

4 Pressure Point

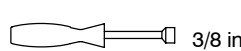
Apply slight pressure at point until gauge is held firmly in gap. Tighten screws. Adjust other gap.

Reinstall right side panel.

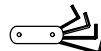
Tools Needed:



0.008 in (0.203 mm)



3/8 in

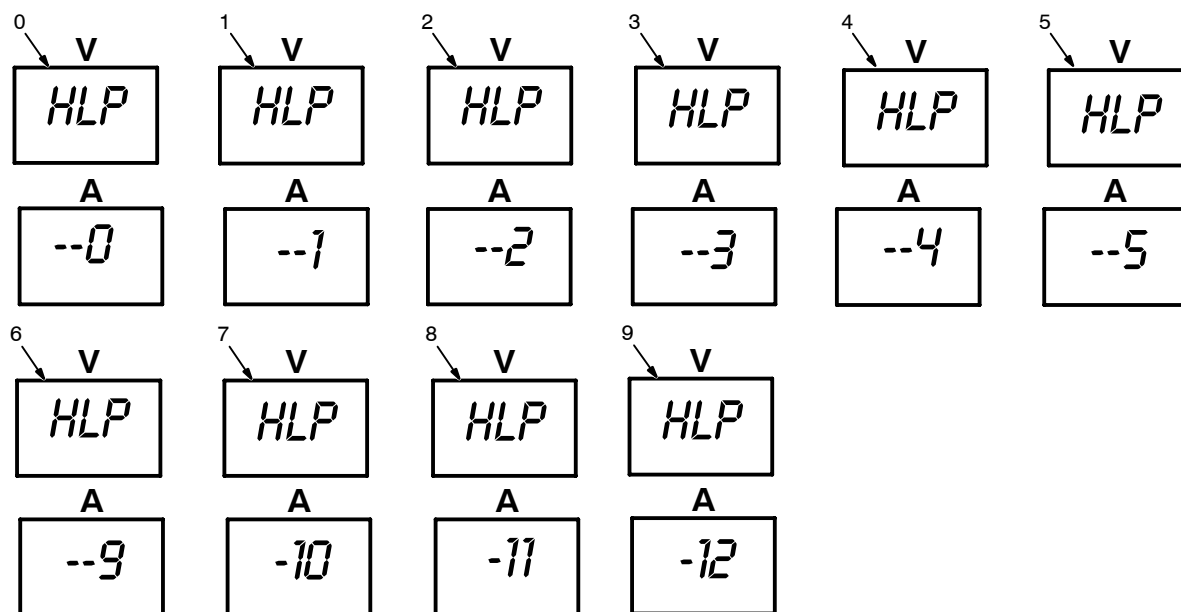


5/32 in

803 592-C

# SECTION 6 – TROUBLESHOOTING

## 6-1. Voltmeter/Ammeter Help Displays



All directions are in reference to the front of the unit. All circuitry referred to is located inside the unit.

### 0 Help 0 Display

Indicates a short in the thermal protection circuitry located on the transformer/stabilizer of the unit.

### 1 Help 1 Display

An SCR overcurrent or undercurrent condition has occurred. Turn power off and back on to correct condition.

### 2 Help 2 Display

Indicates an open in the thermal protection circuitry located on the transformer/stabilizer of the unit.

### 3 Help 3 Display

Indicates the transformer/stabilizer of the unit has overheated. The unit has shut down to allow the fan to cool it (see Section 3-4). Operation will continue when the unit has cooled.

### 4 Help 4 Display

Indicates an open in the thermal protection circuitry located on the rectifier assembly of the unit.

### 5 Help 5 Display

Rectifier assembly has overheated. The unit has shut down to allow the fan to cool unit (see Section 3-4). Operation will continue when the unit has cooled.

### 6 Help 9 Display

Indicates a short in the thermal protection circuitry located on the rectifier assembly of the unit.

### 7 Help 10 Display

Indicates Remote Output control is activated. Release Remote Output control to clear help message.

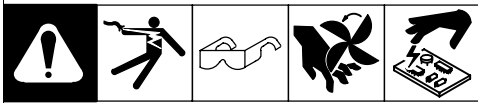
### 8 Help 11 Display

Output Selector switch is not in correct position (see Section 4-2).

### 9 Help 12 Display

Indicates a non-allowable set-up of the front panel.

## 6-2. Troubleshooting The Welding Power Source



**NOTE:** The remedies listed below are recommendations only. If these remedies do not fix the trouble with your unit, have a Factory Authorized Service Agent check unit.  
**There are no user serviceable parts inside unit.**

Refer to Section 6-1 for any Help (HLP) message displayed on voltmeter/ammeter.

Trouble	Remedy
No weld output; unit completely inoperative.	Place line disconnect switch in On position (see Section 3-18).
	Check and replace line fuse(s), if necessary (see Section 3-18).
	Check for proper input power connections (see Section 3-18).
	Check for proper jumper link position (see Section 3-17).
No weld output; unit on.	If using remote control, place Output control in Remote 14 position, and make sure remote control is connected to Remote 14 receptacle. If remote is not being used, place Output control in On position (see Section 4-1).
	Check, repair, or replace remote control.
	Have Factory Authorized Service Agent check unit.
Unit provides only maximum or minimum weld output.	Make sure Amperage control is in proper position (see Section 4-1).
	Have Factory Authorized Service Agent check unit.
Erratic or improper weld output.	Use proper size and type of weld cable (see Section 3-6).
	Clean and tighten all weld connections.
	Check position of Output Selector control (see Section Figure 4-1).
	If using remote control, check position of Amperage Adjustment control (see Section 4-1).
No control of weld output.	If using remote control, place Output control in Remote 14 position, and make sure remote control is connected to Remote 14 receptacle. If remote is not being used, place Output control in On position (see Section 4-1).
	Make sure Amperage control is in proper position (see Section 4-1).
No output from duplex receptacle RC2 and no high frequency.	Reset circuit breaker CB1 (see Section 5-2).
Lack of high frequency; difficulty in starting GTAW arc.	Reset circuit breaker CB1 (see Section 5-2).
	Select proper size tungsten (see Section 9).
	Be sure torch cable is not close to any grounded metal.
	Check cables and torch for cracked insulation or bad connections. Repair or replace.
	Check spark gaps (see Section 5-3).
Wandering arc – poor control of direction of arc.	Reduce gas flow rate.
	Select proper size tungsten (see Section 9).
	Properly prepare tungsten (see Section 9).
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Shield weld zone from drafts.
	Increase postflow time.
	Check and tighten all gas fittings.
	Properly prepare tungsten.
	Check for water in torch, and repair torch if necessary.
Fan not operating.	Unit equipped with Fan-On-Demand™. Fans run only when necessary. Unit equipped with circuitry to protect against overheating.

# SECTION 7 - ELECTRICAL DIAGRAM

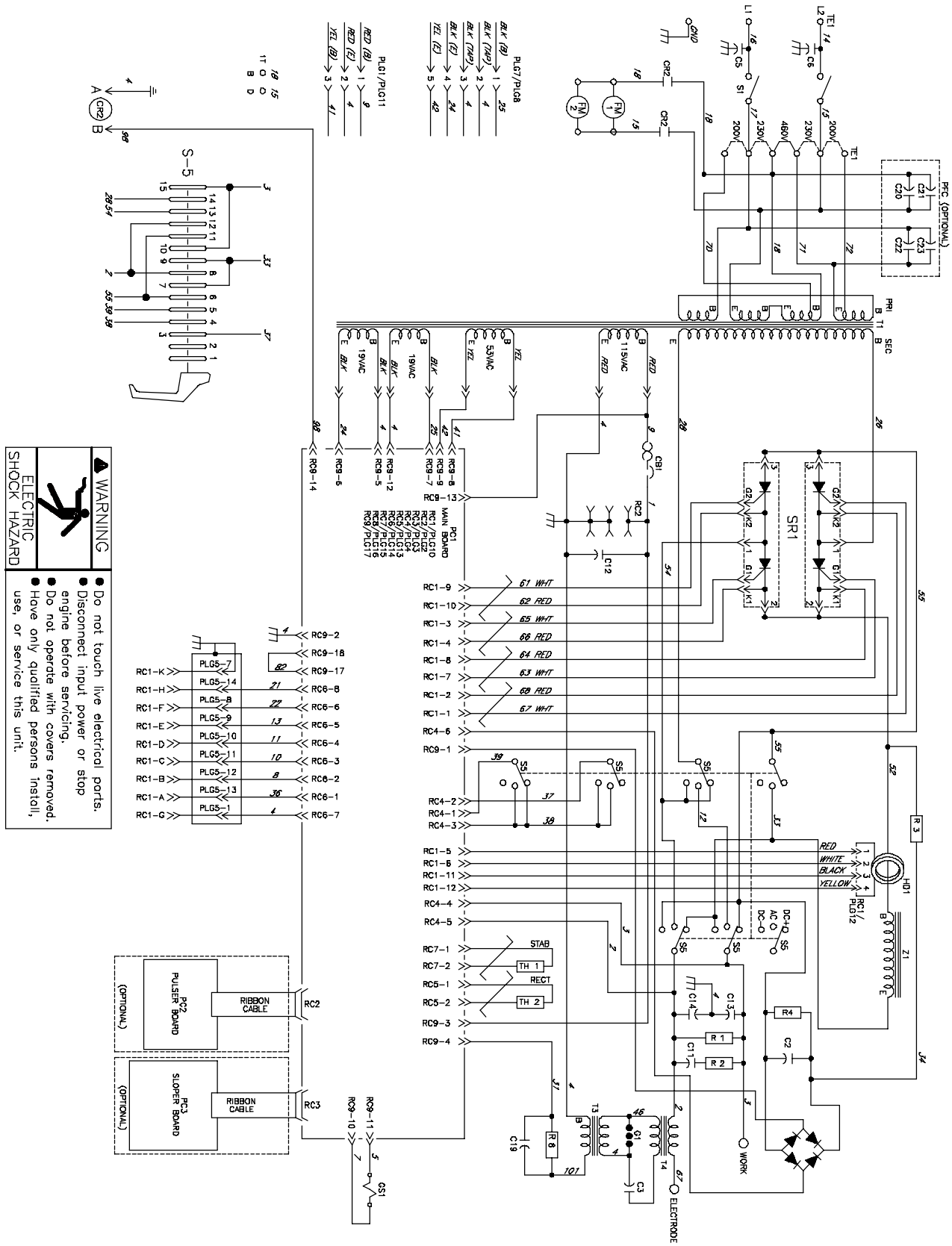
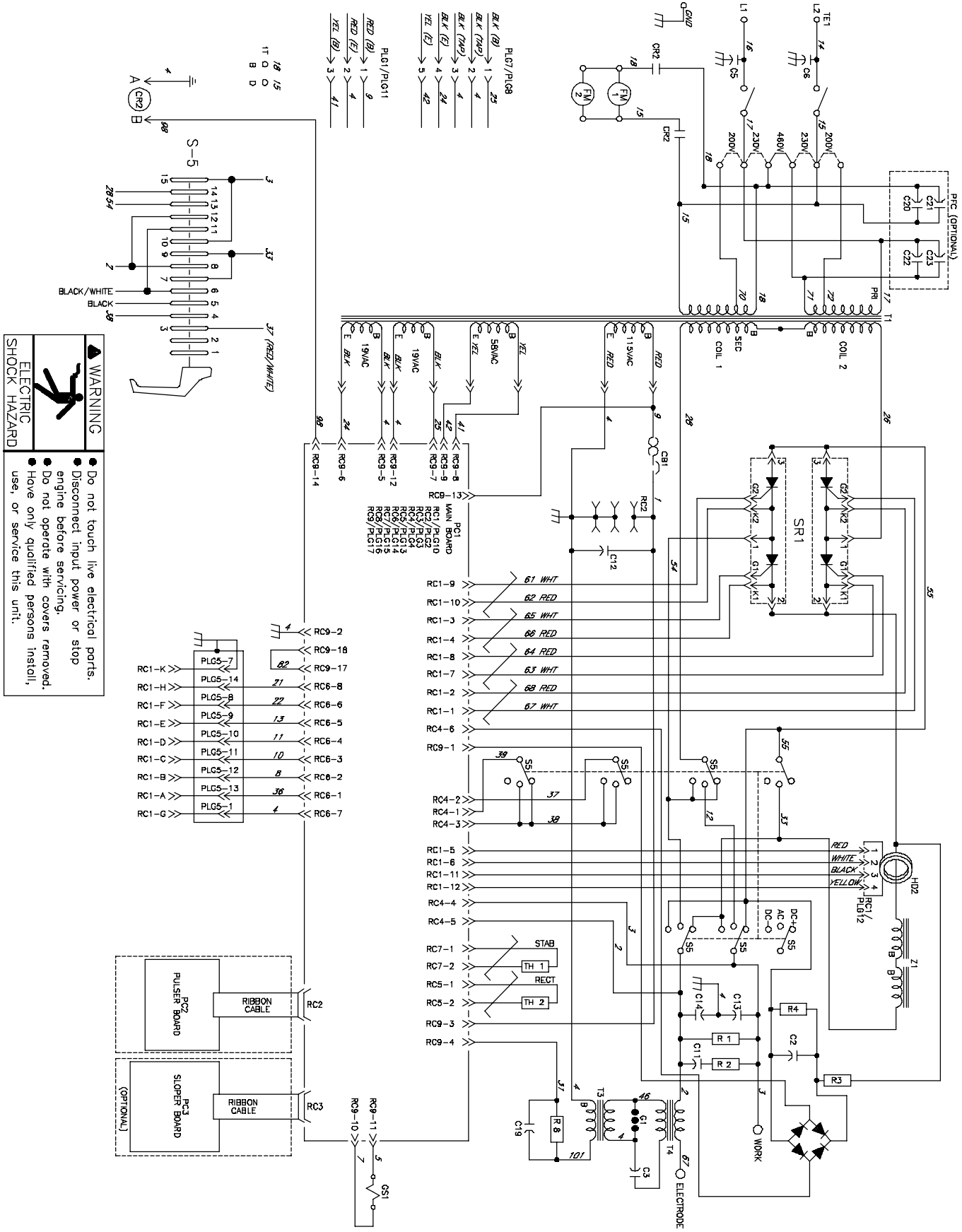


Figure 7-1. Circuit Diagram For 250 DX Models





**WARNING**

**ELECTRIC SHOCK HAZARD**

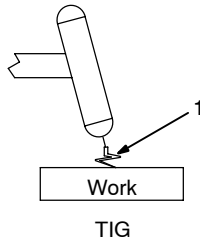
- Do not touch live electrical parts.
- Disconnect input power or stop engine before servicing.
- Do not operate with covers removed.
- Have only qualified persons install, use, or service this unit.

Figure 7-2. Circuit Diagram For 350 LX Models

231 395-A

# SECTION 8 – HIGH FREQUENCY

## 8-1. Welding Processes Requiring High Frequency

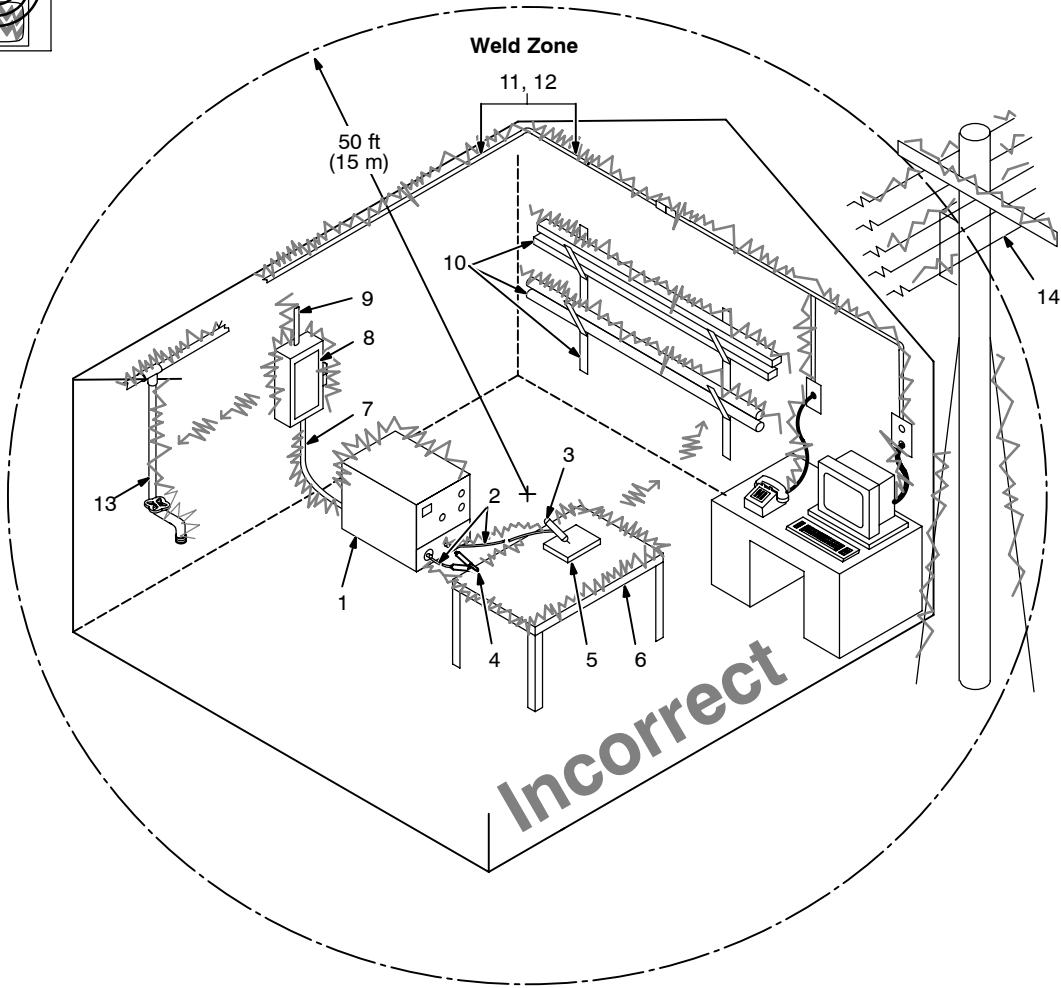


1 High-Frequency Voltage

TIG – helps arc jump air gap between torch and workpiece and/or stabilize the arc.

high\_freq 12/96 – S-0693

## 8-2. Incorrect Installation



### Sources of Direct High-Frequency Radiation

- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)
- 2 Weld Cables
- 3 Torch
- 4 Work Clamp
- 5 Workpiece
- 6 Work Table

### Sources of Conduction of High Frequency

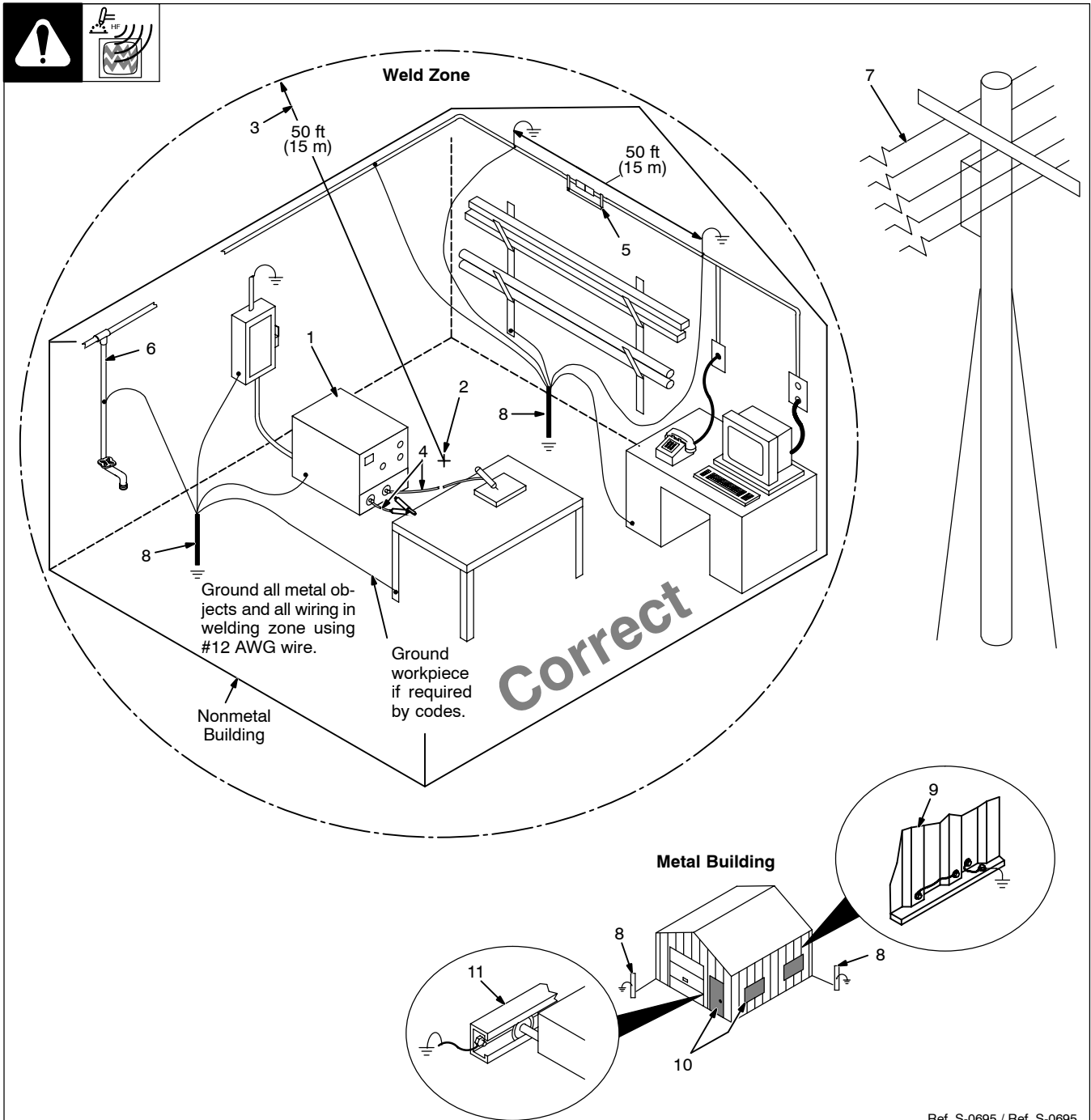
- 7 Input Power Cable
- 8 Line Disconnect Device
- 9 Input Supply Wiring

### Sources of Reradiation of High Frequency

- 10 Ungrounded Metal Objects
- 11 Lighting
- 12 Wiring
- 13 Water Pipes and Fixtures
- 14 External Phone and Power Lines

S-0694

8-3. Correct Installation



- 1 High-Frequency Source (welding power source with built-in HF or separate HF unit)  
Ground metal machine case, work output terminal, line disconnect device, input supply, and worktable.
- 2 Center Point of Welding Zone  
Midpoint between high-frequency source and welding torch.
- 3 Welding Zone  
A circle 50 ft (15 m) from center point in all directions.
- 4 Weld Output Cables  
Keep cables short and close together.

- 5 Conduit Joint Bonding and Grounding  
Electrically join (bond) all conduit sections using copper straps or braided wire. Ground conduit every 50 ft (15 m).
- 6 Water Pipes and Fixtures  
Ground water pipes every 50 ft (15 m).
- 7 External Power or Telephone Lines  
Locate high-frequency source at least 50 ft (15 m) away from power and phone lines.
- 8 Grounding Rod  
Consult the National Electrical Code for specifications.

- Metal Building Requirements**
- 9 Metal Building Panel Bonding Methods  
Bolt or weld building panels together, install copper straps or braided wire across seams, and ground frame.
  - 10 Windows and Doorways  
Cover all windows and doorways with grounded copper screen of not more than 1/4 in (6.4 mm) mesh.
  - 11 Overhead Door Track  
Ground the track.

Ref. S-0695 / Ref. S-0695

# SECTION 9 – SELECTING AND PREPARING TUNGSTEN ELECTRODE FOR DC OR AC WELDING

ac/dc\_gtaw 2/2000



▲ Whenever possible and practical, use DC weld output instead of AC weld output.

## 9-1. Selecting Tungsten Electrode (Wear Clean gloves To Prevent Contamination Of Tungsten)

Electrode Diameter	Amperage Range - Gas Type♦ - Polarity	
	(DCEN) – Argon Direct Current Electrode Negative	AC – Argon 65% Electrode Negative
<b>2% Ceria (Orange Band), 1.5% Lanthanum (Gray Band), Or 2% Thorium (Red Band) Alloy Tungstens</b>		
.040" (1 mm)	25-85	20-80
1/16" (1.6 mm)	50-160	50-150
3/32" (2.4 mm)	135-235	130-250
1/8" (3.2 mm)	250-400	225-360
<b>Pure Tungsten (Green Band)</b>		
.040" (1 mm)	Pure Tungsten Not Recommended For DCEN – Argon	10-60
1/16" (1.6 mm)		50-100
3/32" (2.4 mm)		100-160
1/8" (3.2 mm)		150-210

♦ Typical argon shielding gas flow rates are 11 to 35 cfh (cubic feet per hour).

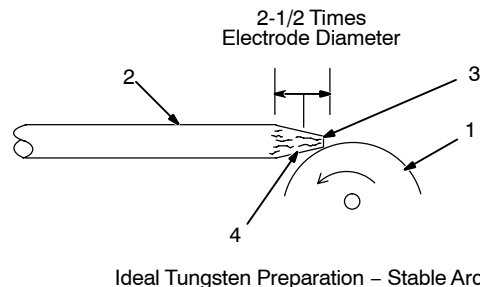
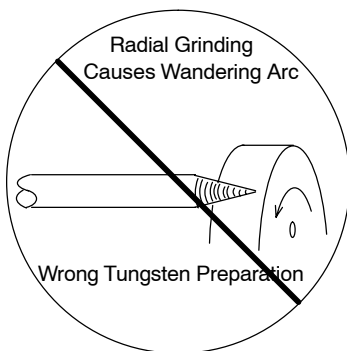
Figures listed are a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

## 9-2. Preparing Tungsten Electrode For Welding



▲ Grinding the tungsten electrode produces dust and flying sparks which can cause injury and start fires. Use local exhaust (forced ventilation) at the grinder or wear an approved respirator. Read MSDS for safety information. Consider using tungsten containing ceria, lanthana, or yttria instead of thoria. Grinding dust from thoriated electrodes contains low-level radioactive material. Properly dispose of grinder dust in an environmentally safe way. Wear proper face, hand, and body protection. Keep flammables away.

### A. Preparing Tungsten For DC Electrode Negative (DCEN) Welding Or AC Welding With Inverter Machines



1 Grinding Wheel

Grind end of tungsten on fine grit, hard abrasive wheel before welding. Do not use wheel for other jobs or tungsten can become contaminated causing lower weld quality.

2 Tungsten Electrode

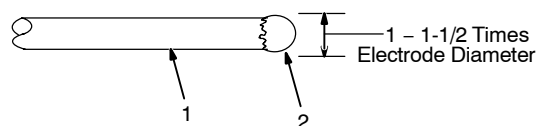
3 Flat

Diameter of this flat determines amperage capacity.

4 Straight Ground

Grind lengthwise, **not radial**.

### B. Preparing Tungsten For Conventional AC Welding



1 Tungsten Electrode

2 Balled End

Ball end of tungsten by applying AC amperage recommended for a given electrode diameter (see Section 9-1). Let ball on end of the tungsten take its own shape.



# SECTION 10 – PARTS LIST

350 LX Model Illustrated

☐ Hardware is common and not available unless listed.

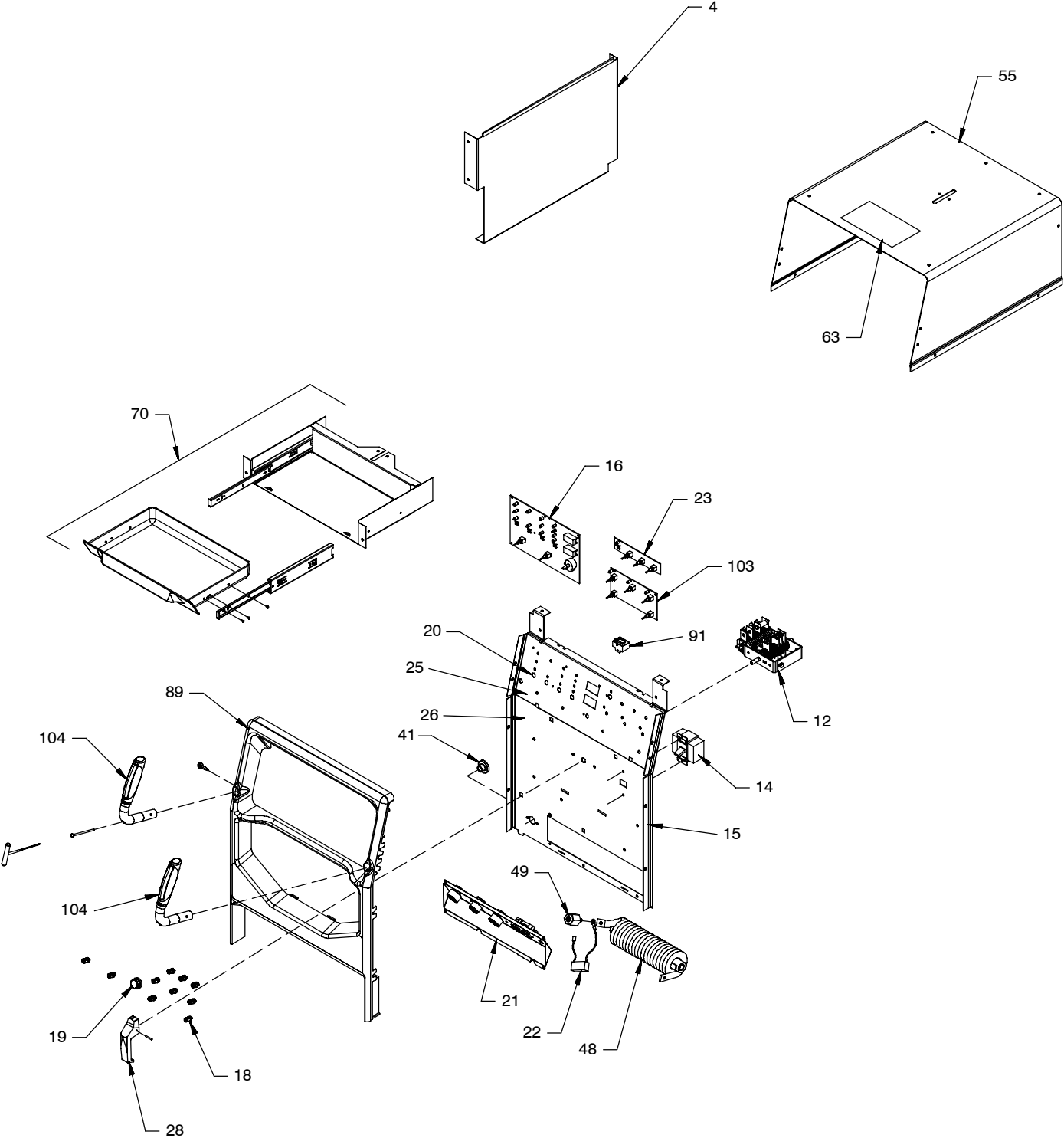
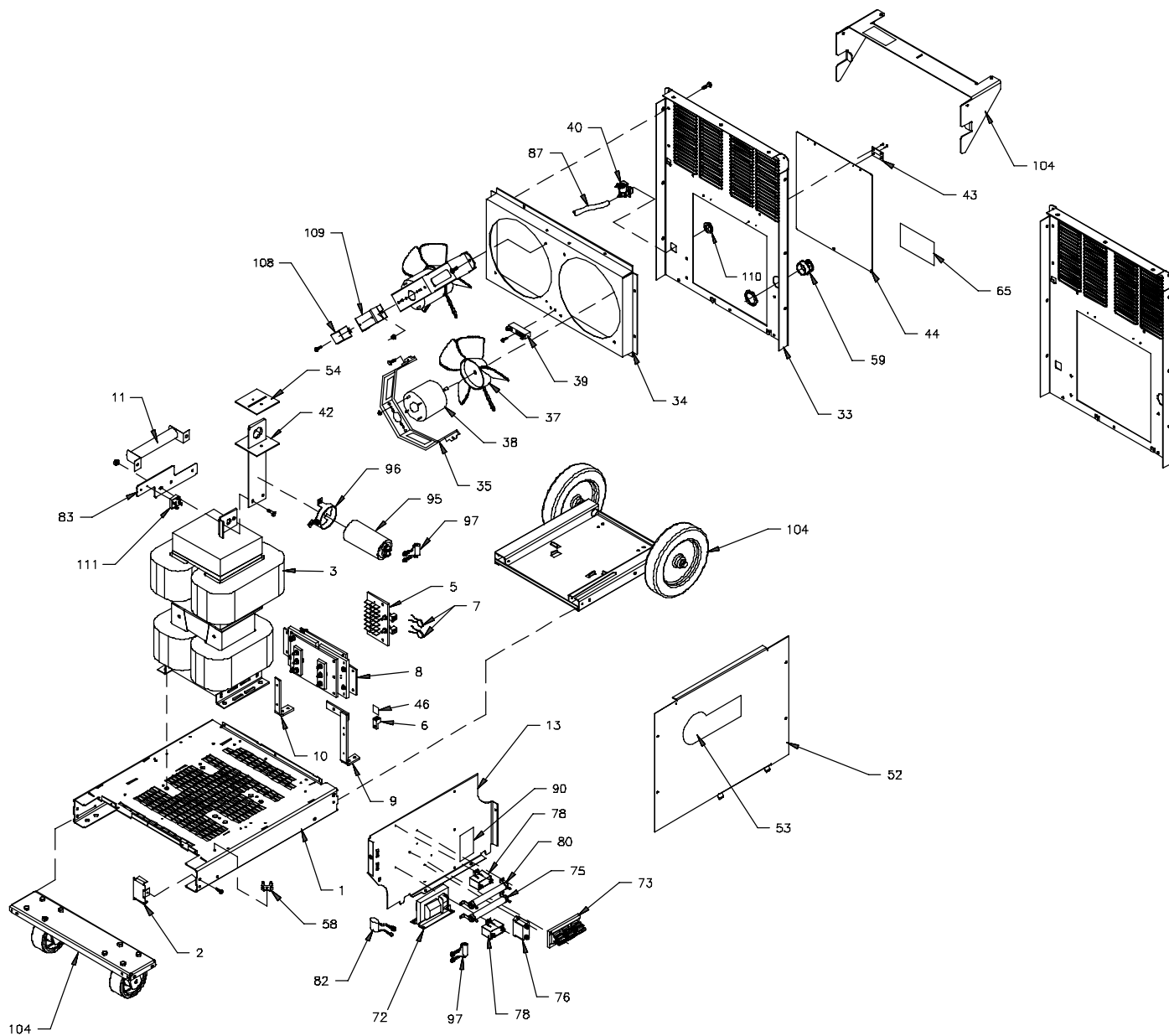


Figure 10-1. Main Assembly

### 350 LX Model Illustrated



Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model 250 DX	350 LX
<b>Figure 10-1. Main Assembly</b>					
...	1	211 038	.. BASE, ASSY	1	1
...	2	215 656	.. END CAP,	4	4
...	3	T1/Z1 212 555	.. XFMR/STABILIZER ASSY, 200/230/460	1	
...	3	T1/Z1 211 041	.. XFMR/STABILIZER ASSY, 230/460/575	1	
...	3	T1/Z1 219 652	.. XFMR/STABILIZER ASSY, 220/400/440/520	1	
...	3	T1/Z1 215 767	.. XFMR/STABILIZER ASSY, 200/230/460		1
...	3	T1/Z1 215 389	.. XFMR/STABILIZER ASSY, 230/460/575		1
...	3	T1/Z1 217 801	.. XFMR/STABILIZER ASSY, 220/400/440/520		1
...		TH1 201 443	.. THERMISTOR,NTC 10K OHM @ 25 DEG C 27.5IN LEAD	1	1
...	4	212 550	.. PANEL, LEFT WINDTUNNEL (for non-TIGRUNNER models)	1	1
...	5	TE1 224 127	.. TERM ASSY, PRI 1PH 3V	1	1
...	6	213 248	.. LUG, UNIV W/SCREW 2/0-14 WIRE .266STD	1	1
...	7	C5, 6 111 634	.. CAPACITOR ASSY,	1	1
...	8	SR1 212 558	.. RECTIFIER, SCR MAIN (INCLUDES)	1	1
...		218 581	.. THYRISTOR, SCR 300A 300V HOCKEY PUCK	4	4
...		TH2 218 580	.. THERMISTOR,NTC 30K OHM @ 25 DEG C 40IN LEAD	1	1
...	9	218 670	.. BRACKET, RECTIFIER RH	1	1
...	10	212 559	.. BRACKET, RECTIFIER LH	1	1
...	11	R3 186 949	.. RESISTOR, WW FXD 175 W 20 OHM W/CLIPS	1	1
...	12	S5 207 236	.. SWITCH ASSY, POLARITY (DX)	1	1
...	13	+213 105	.. PANEL, RIGHT WINDTUNNEL	1	1
...	14	S1 215 937	.. SWITCH, TGL ASSY	1	1
...	15	231 281	.. FRONT PANEL ASSY,	1	1
...		117 860	.. BLANK, SNAP-IN NYL .187 MTG HOLE BLACK	1	1
...		107 983	.. BLANK, SNAP-IN NYL .500 MTG HOLE BLACK	1	1
...		143 397	.. BLANK, SNAP-IN NYL .312 MTG HOLE BLACK	8	8
...	16	PC1 231 300	.. CIRCUIT CARD ASSY, CONTROL & INTERFACE W/PROGRAM	1	1
...	18	183 332	.. KNOB, POINTER .570 DIA X .125 ID W/SPRING CLIP	2	5
...	19	174 991	.. KNOB, POINTER 1.250 DIA X .250 ID W/SPRING CLIP-.21	1	1
...	20	195 778	.. ACTUATOR PUSH BUTTON ASSY	1	1
...	21	Figure 10-2	.. PANEL,LOWER DINSE CONN ASSY	1	1
...	22	C14 209 587	.. CAPACITOR ASSY,	1	1
...	23	PC2 ♦♦ 195 344	.. CIRCUIT CARD ASSY, PULSER (INCLUDES),	1	
...	23	PC2 195 344	.. CIRCUIT CARD ASSY, PULSER (INCLUDES)		1
...		215 446	.. CIRCUIT CARD, PULSER	1	1
...		183 332	.. KNOB, POINTER .570 DIA X .125 ID W/SPRING CLIP	3	3
...		195 778	.. ACTUATOR, PUSH BUTTON ASSY	1	1
...		190 512	.. STAND-OFF, NO.6-32 X .640 LG .250 HEX AL FEM	1	1
...	25		.. NAMEPLATE, UPPER (ORDER BY MODEL AND SERIAL NUMBER)	1	1
...	26		.. NAMEPLATE, LOWER (ORDER BY MODEL AND SERIAL NUMBER)	1	1
...	28	175 952	.. PLASTIC, HANDLE SWITCH	1	1
...		169 136	.. PIN, HANDLE	1	1
...	33	231 283	.. PANEL, REAR	1	1
...	34	184 058	.. FAN, PLENUM	1	1
...	35	187 807	.. BRACKET, MTG MOTOR FAN	2	2
...	37	150 783	.. BLADE, FAN 9.000 5WG 39DEG .312 BORE CW PLSTC	2	2
...	38	FM1, 2 220 393	.. MOTOR, FAN 230V 50/60HZ 1550 RPM .312 DIA SHAFT	2	2
...	39	1T 199 312	.. BLOCK, TERMINAL FAST-ON,20 AMP,250 VOLT	1	1
...	40	GS1 216 607	.. VALVE, 24VDC 2WAY CUSTOM PORT 1/8 ORF W/FRICT	1	1
...	41	208 408	.. FTG, BRS BARBED FEM 1/4 TBG X .625-18 FLANGE MTG	1	1
...		217 111	.. PLUG, PROTECTIVE	2	2



Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model 250 DX	Model 350 LX
<b>Figure 10-1. Main Assembly (continued)</b>					
42		204 293	SUPPORT, LIFT EYE	1	
42		212 552	SUPPORT, LIFT EYE		1
43		218 280	HINGE, CONT POLYOLEFIN	1	1
44		+215 657	DOOR, ACCESS	1	1
44		+229 068	DOOR, ACCESS VENTED (FOR MODELS W/COOLERS ONLY)	1	1
46		217 553	LABEL,GROUND/PROTECTIVE EARTH	1	1
48	T4	215 771	COIL, HF COUPLING	1	1
49		207 560	INSULATOR, STANDOFF WITH STUD	2	2
52		211 043	PANEL, SIDE	2	2
53		199 479	LABEL, MILLER	2	2
54		026 627	GASKET ,LIFTING EYE COVER	1	1
55		+231 280	COVER, TOP	1	1
58		208 294	CONNECTOR, FASTON MALE 4-PRONG	1	2
59		010 467	CONN, CLAMP CABLE 1.250	1	1
63		203 990	LABEL, WARNING GENERAL PRECAUTIONARY STATIC	1	1
65		218 598	LABEL, WARNING ELECTRIC SHOCK AND INCORRECT INPUT P	1	1
<b>66</b>			<b>FOR MODELS WITHOUT TIGRUNNER OR COOLER OPTIONS</b>		
66		201 019	LABEL, WARNING ELECTRIC SHOCK EXCESS WEIGHT (200/230/460 VOLT MODELS ONLY)	2	2
66		217 137	LABEL, WARNING ELECTRIC SHOCK CAN KILL (ENG/FR) (230/460/575 VOLT MODELS ONLY)	2	2
66		206 343	LABEL, WARNING ELECTRIC SHOCK EXCESS WEIGHT WORDLES (220/400/440/520 VOLT MODELS ONLY)	2	2
<b>66</b>			<b>FOR MODELS WITH TIGRUNNER OR COOLER OPTIONS, THERE ARE TWO SEPERATE LABELS FOR EACH VOLTAGE. CHECK BELOW TO ORDER CORRECT LABEL OR LABELS FOR CORRESPONDING VOLTAGES.</b>		
66		201 019	LABEL, WARNING ELECTRIC SHOCK EXCESS WEIGHT (200/230/460) VOLT MODELS ONLY)	1	1
66		219 178	LABEL, CAUTION INCORRECT COOLANT (200/230/460 VOLT MODELS ONLY)	1	1
66		217 137	LABEL, WARNING ELECTRIC SHOCK CAN KILL (ENG/FR) (230/460/575 VOLT MODELS ONLY)	1	1
66		219 177	LABEL, CAUTION INCORRECT COOLANT (ENG/FR) 230/460/575 VOLT MODELS ONLY)	1	1
66		206 343	LABEL, WARNING ELECTRIC SHOCK EXCESS WEIGHT WORDLES (220/400/440/520 VOLT MODELS ONLY)	1	1
66		219 176	LABEL, CAUTION INCORRECT COOLANT (CE) 220/400/440/520 VOLT MODELS ONLY)	1	1
70		212 557	DRAWER, ASSY (includes)	1	1
		213 111	DRAWER, PLASTIC	1	1
		213 112	DRAWER, FRAME	1	1
		217 255	SLIDE, DRAWER	2	2
72	T3	219 927	XFMR, HIGH VOLTAGE 115V PRI 3600V SEC 34 MA W/TERM	1	1
73	G1	231 258	SPARK GAP ASSY, (includes)	1	1
		231 259	BASE, SPARK GAP	1	1
		231 260	HOLDER, POINTS	3	3
		221 736	POINTS, SPARK GAP (DUAL)	1	1
		221 737	POINTS, SPARK GAP (SINGLE)	2	2
		231 261	BUSHING	3	3
75	R8	188 067	RESISTOR, WW FXD 100 W 200 OHM W/CLIPS	1	1
76	C3	215 779	CAPACITOR, MICA .002 UF 10000 V PANEL MTG W/LEA	1	1
78	C11, 19	195 552	CAPACITOR, POLYP MET FILM 20. UF 250 VAC 10%	2	2
80	R1	220 808	RESISTOR, WW FXD 100 W 50 OHM W/CLIPS	1	1
82	C13	206 878	CAPACITOR ASSY,	1	1
83		216 081	BRACKET, RESISTOR	1	1
87		218 170	HOSE, NPRN BRD NO 1 X .250 ID X 24.000	1	1
89		211 039	BEZEL, FRONT	1	1
90		224 459	LABEL, WARNING ELECTRICAL SHOCK ETC	1	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model	
<b>Figure 10-1. Main Assembly (continued)</b>				250	350
				DX	LX
... 91 ...	HD1 ..	191 941 ..	TRANSDUCER, CURRENT .....	1 ...	1
... 95 ...	C2 ..	031 668 ..	CAPACITOR, ELCTLT 4000 UF 100 VDC .....	1 ...	1
... 96 .....		108 105 ..	CLAMP, CAPACITOR .....	1 ...	1
... 97 ..	R2, 4 ..	118 459 ..	RESISTOR, WW FXD 10 W 1K OHM .....	2 ...	2
.. 103 ..	PC3◆◆	195 345 ..	CIRCUIT CARD ASSY, SEQUENCER (INCLUDES) .....	1 ...	1
.....		215 441 .....	CIRCUIT CARD, SEQUENCER .....	1 ...	1
.....		183 332 .....	KNOB, POINTER .570 DIA X .125 ID W/SPRING CLIP .....	5 ...	5
.. 104 .....	◆Figure 10-3	..	TIGRUNNER RUNNING GEAR .....	1 ...	1
.. 108 ..	CR2 ◆	059 266 ..	RELAY, ENCL 120VAC DPDT 10A/120VAC 8PIN .....	1 ...	1
.....	◆	194 744 ..	RFCS-14HD (FOOT CONTROL) .....	1 ...	1
.. 109 .....		222 451 ..	BRACKET, RELAY .....	1 ...	1
.. 110 .....		137761 ..	NUT, 750 NPT 1.31HEX .27H NYL BLK .....	1 ...	1
.. 111 .....		035 704 ..	RECTIFIER, INTEG BRIDGE 40. AMP 800V .....	1 ...	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

◆ Part of TIGRUNNER option.

◆◆ Field option only.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**

☞ Hardware is common and not available unless listed.

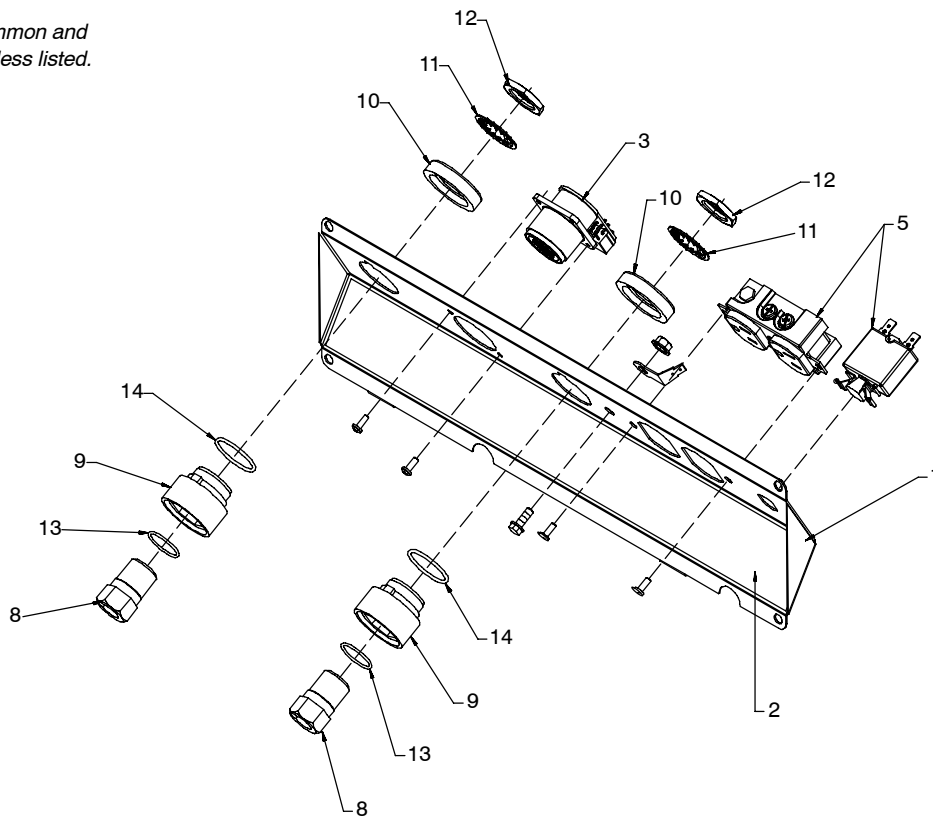


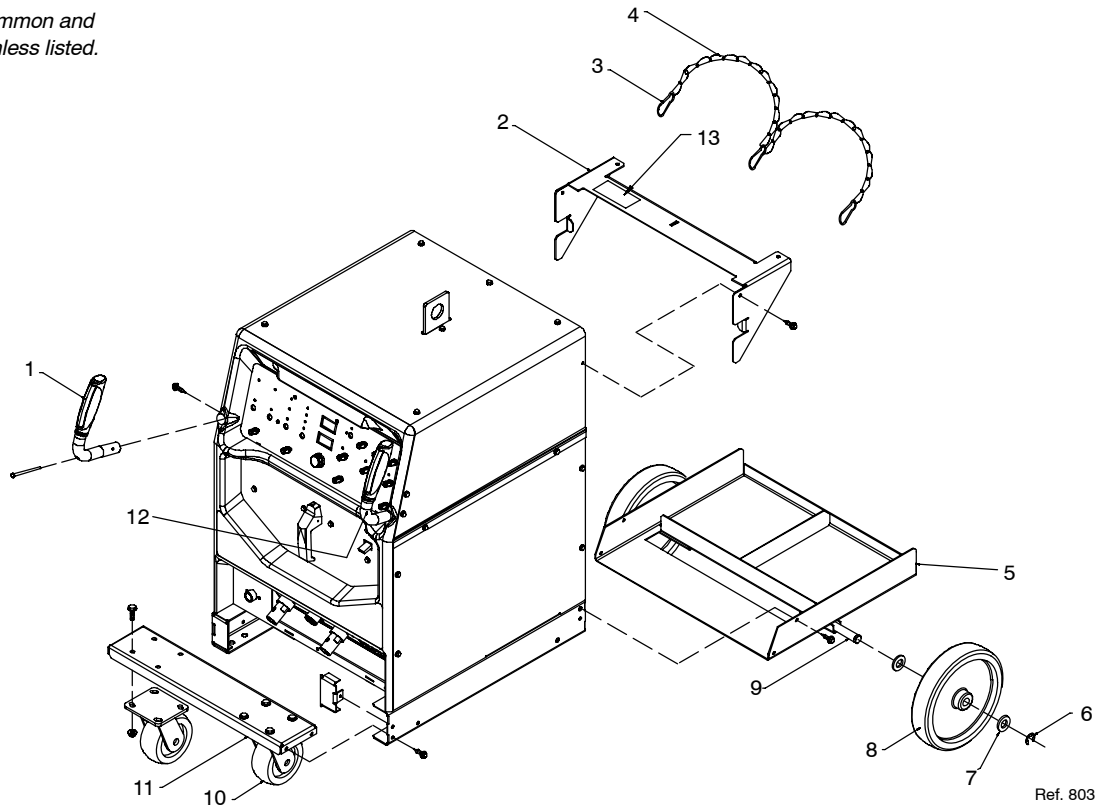
Figure 10-2. Panel, Lower Dinse Connector Assembly

803 775-A

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>220 509 Figure 10-2. Panel, Lower Dinse Connector Assy (Figure 10-1 Item 21)</b>				
1		213 109	PANEL, LOWER DINSE CONN	1
2		218 784	LABEL, COMPONENT IDENTIFICATION	1
3		224 529	CONN, CIRC MS/CPC 14SKT SIZE 20 RCPT W/FILTERING	1
5		218 174	RECEPTACLE, W/LEADS & CIRCUIT BREAKER	1
8		202 553	RECEPTACLE, TWIST LOCK BRASS POWER (FEMALE)	2
9		185 712	INSULATOR, BULKHEAD FRONT	2
10		185 713	INSULATOR, BULKHEAD REAR	2
11		185 714	WASHER, TOOTH 22MMID X 31.5MMOD 1.310-1MMT INTERN	2
12		185 717	NUT, M20-1.5 1.00HEX .19H BRS LOCKING	2
13		186 228	O-RING, 0.739 ID X 0.070 H	2
14		185 718	O-RING, 0.989 ID X 0.070 H	2

To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.

Hardware is common and not available unless listed.



Ref. 803 725-C

Figure 10-3. Optional Running Gear

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure 10-3. Running Gear (Optional) (Figure 10-1 Item 104)</b>				
...	1	218 134	.. HANDLE, LH	1
...	2	+215 928	.. BOTTLE SUPPORT	1
...	3	168 663	.. HOOK SPRING SNAP	3
...	4	602 387	.. CHAIN	2
...	5	191 158	.. BOTTLE TRAY	1
...	6	121 614	.. RETAINING RING	2
...	7	602 250	.. WASHER,FLAT .812IDX1.469ODX.134T STL PLD ANSI.750	4
...	8	209 869	.. WHEEL	2
...	9	191 167	.. AXLE	1
...	10	168 247	.. CASTER, SWIVEL	2
...	11	191 163	.. CASTER MOUNTING BRACKET	1
...	12	218 135	.. HANDLE, RH	1
...	13	217 140	.. LABEL,WARNING CYL MAY EXPLODE IF DAMAGED (ENG/FR) .. (230/460/575 VOLT MODELS ONLY)	1
...	13	200 285	.. LABEL,WARNING CYLINDER MAY EXPLODE IF DAMAGED .. (200/230/460 VOLT MODELS ONLY)	1

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

**To maintain the factory original performance of your equipment, use only Manufacturer's Suggested Replacement Parts. Model and serial number required when ordering parts from your local distributor.**





# TRUE BLUE<sup>®</sup>

## WARRANTY

Effective January 1, 2007

(Equipment with a serial number preface of "LH" or newer)

This limited warranty supersedes all previous Miller warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions below, Miller Electric Mfg. Co., Appleton, Wisconsin, warrants to its original retail purchaser that new Miller equipment sold after the effective date of this limited warranty is free of defects in material and workmanship at the time it is shipped by Miller. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

Within the warranty periods listed below, Miller will repair or replace any warranted parts or components that fail due to such defects in material or workmanship. Miller must be notified in writing within thirty (30) days of such defect or failure, at which time Miller will provide instructions on the warranty claim procedures to be followed.

Miller shall honor warranty claims on warranted equipment listed below in the event of such a failure within the warranty time periods. All warranty time periods start on the delivery date of the equipment to the original end-user purchaser, and not to exceed one year after the equipment is shipped to a North American distributor or eighteen months after the equipment is shipped to an International distributor.

1. 5 Years Parts — 3 Years Labor
  - \* Original main power rectifiers
2. 3 Years — Parts and Labor
  - \* Transformer/Rectifier Power Sources
  - \* Plasma Arc Cutting Power Sources
  - \* Process Controllers
  - \* Semi-Automatic and Automatic Wire Feeders
  - \* Inverter Power Sources (Unless Otherwise Stated)
  - \* Water Coolant Systems (Integrated)
  - \* Intellitig
  - \* Engine Driven Welding Generators  
**(NOTE: Engines are warranted separately by the engine manufacturer.)**
3. 1 Year — Parts and Labor Unless Specified
  - \* Motor Driven Guns (w/exception of Spoolmate Spoolguns)
  - \* Positioners and Controllers
  - \* Automatic Motion Devices
  - \* RFCS Foot Controls
  - \* Induction Heating Power Sources, Coolers, and Electronic Controls/Recorders
  - \* Water Coolant Systems (Non-Integrated)
  - \* Flowgauge and Flowmeter Regulators (No Labor)
  - \* HF Units
  - \* Grids
  - \* Spot Welders
  - \* Load Banks
  - \* Arc Stud Power Sources & Arc Stud Guns
  - \* Racks
  - \* Running Gear/Trailers
  - \* Plasma Cutting Torches (except APT & SAF Models)
  - \* Field Options  
(NOTE: Field options are covered under True Blue<sup>®</sup> for the remaining warranty period of the product they are installed in, or for a minimum of one year — whichever is greater.)
  - \* Bernard-Branded Mig Guns (No Labor)
  - \* Weldcraft-Branded TIG Torches (No Labor)
  - \* Subarc Wire Drive Assemblies
4. 6 Months — Batteries
5. 90 Days — Parts
  - \* MIG Guns/TIG Torches and Subarc (SAW) Guns

- \* Induction Heating Coils and Blankets, Cables, and Non-Electronic Controls
- \* APT & SAF Model Plasma Cutting Torches
- \* Remote Controls
- \* Accessory (Kits)
- \* Replacement Parts (No labor)
- \* Spoolmate Spoolguns
- \* Canvas Covers

Miller's True Blue<sup>®</sup> Limited Warranty shall not apply to:

1. **Consumable components; such as contact tips, cutting nozzles, contactors, brushes, slip rings, relays or parts that fail due to normal wear. (Exception: brushes, slip rings, and relays are covered on Bobcat, Trailblazer, and Legend models.)**
2. Items furnished by Miller, but manufactured by others, such as engines or trade accessories. These items are covered by the manufacturer's warranty, if any.
3. Equipment that has been modified by any party other than Miller, or equipment that has been improperly installed, improperly operated or misused based upon industry standards, or equipment which has not had reasonable and necessary maintenance, or equipment which has been used for operation outside of the specifications for the equipment.

MILLER PRODUCTS ARE INTENDED FOR PURCHASE AND USE BY COMMERCIAL/INDUSTRIAL USERS AND PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT.

In the event of a warranty claim covered by this warranty, the exclusive remedies shall be, at Miller's option: (1) repair; or (2) replacement; or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station; or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at customer's risk and expense. Miller's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a Miller authorized service facility as determined by Miller. Therefore no compensation or reimbursement for transportation costs of any kind will be allowed.

TO THE EXTENT PERMITTED BY LAW, THE REMEDIES PROVIDED HEREIN ARE THE SOLE AND EXCLUSIVE REMEDIES. IN NO EVENT SHALL MILLER BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING LOSS OF PROFIT), WHETHER BASED ON CONTRACT, TORT OR ANY OTHER LEGAL THEORY.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT TORT OR ANY OTHER LEGAL THEORY WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

Some states in the U.S.A. do not allow limitations of how long an implied warranty lasts, or the exclusion of incidental, indirect, special or consequential damages, so the above limitation or exclusion may not apply to you. This warranty provides specific legal rights, and other rights may be available, but may vary from state to state.

In Canada, legislation in some provinces provides for certain additional warranties or remedies other than as stated herein, and to the extent that they may not be waived, the limitations and exclusions set out above may not apply. This Limited Warranty provides specific legal rights, and other rights may be available, but may vary from province to province.

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### Warranty Questions?

Call  
1-800-4-A-MILLER  
for your local  
Miller distributor.

Your distributor also gives  
you ...

#### Service

You always get the fast,  
reliable response you  
need. Most replacement  
parts can be in your  
hands in 24 hours.

#### Support

Need fast answers to the  
tough welding questions?  
Contact your distributor.  
The expertise of the  
distributor and Miller is  
there to help you, every  
step of the way.





# Owner's Record

Please complete and retain with your personal records.

Model Name

Serial/Style Number

Purchase Date

(Date which equipment was delivered to original customer.)

Distributor

Address

City

State

Zip



## For Service

**Contact a DISTRIBUTOR or SERVICE AGENCY near you.**

Always provide Model Name and Serial/Style Number.

Contact your Distributor for:

Welding Supplies and Consumables

Options and Accessories

Personal Safety Equipment

Service and Repair

Replacement Parts

Training (Schools, Videos, Books)

Technical Manuals (Servicing Information and Parts)

Circuit Diagrams

Welding Process Handbooks

To locate a Distributor or Service Agency visit [www.millerwelds.com](http://www.millerwelds.com) or call 1-800-4-A-Miller

Contact the Delivering Carrier to:

File a claim for loss or damage during shipment.

For assistance in filing or settling claims, contact your distributor and/or equipment manufacturer's Transportation Department.

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Appleton, WI 54914 USA

### International Headquarters—USA

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[www.MillerWelds.com](http://www.MillerWelds.com)

