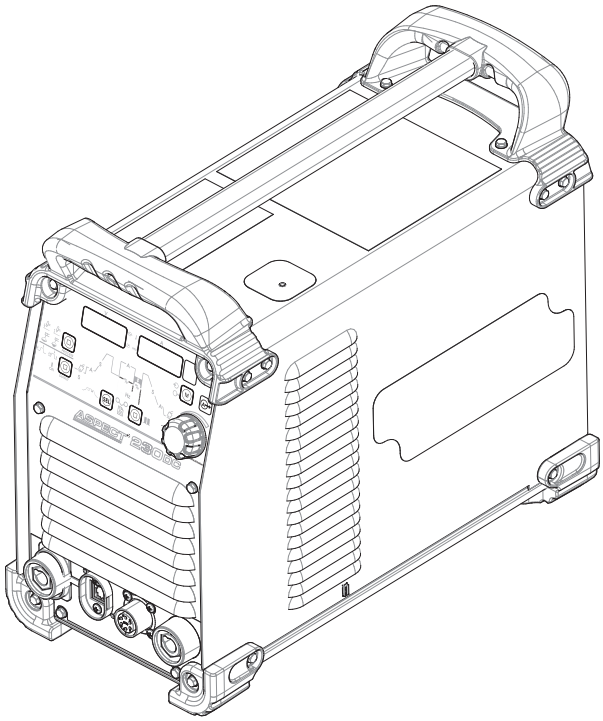
LINCOLN ELECTRIC

Operator's Manual

Aspect® 230 DC



For use with machines having Code Numbers:
12734

GENUINE LINCOLN PARTS™

Register your machine:
www.lincolnelectric.com/registration

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

IM10494 | Issue Date Dec-18

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, 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 § 25249.5 *et seq.)*

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (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, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

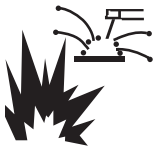
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

Content/details may be changed or updated without notice. For most current Instruction Manuals, go to parts.lincolnelectric.com.

The Aspect® 230 DC is an inverter based arc welding power source optimized for DC TIG (GTAW) and DC Stick (SMAW) welding. The Aspect® 230 DC includes TIG features, Amplitude Control, High frequency and Touch Start TIG®, 9 memory settings, Full sequencer including pulse controls, 2-step and 4-step output, Full digital controls, and Fan As Needed (F.A.N.). The Aspect® 230 DC also features Soft Stick and Crisp Stick welding modes.

A TIG Welding Cart and Cool Arc® 22 are both available as field installed options, or the entire system with welding power source is available as a fully integrated Ready-Pak®.

RECOMMENDED PROCESSES

The Aspect® 230 DC is recommended for manual GTAW and SMAW welding.

RECOMMENDED EQUIPMENT

Cooler: Cool Arc® 22 (K3475-1)

Low Conductivity Coolant (1 gal.) (KP4159-1)

Cart: TIG Welding Cart (K3949-1)

Ground Clamp and Stinger Set - 15ft (4.5m) (K2394-1)

Air Cooled 150A PTA-17 - 12.5ft (3.8m) torch (K1782-12) - or - Water Cooled 250A PTW-20 - 12.5ft (3.8m) (K1784-3) requires; Zippered Cable Cover (K918-1); Torch Twist Mate Connector (9ST14557-27)

Consumable Kit for PTW-20 (KP510)

Foot Amptrol - 25’ (7.6m) cable (K870)

Regulator w/ Flow Gauge - 3100211

PROCESS LIMITATIONS

The Aspect® 230 DC is not recommended for pipe thawing or for arc gouging.

EQUIPMENT LIMITATIONS

The Aspect® 230 DC is protected from overloading beyond the rated duty cycle and outputs of the machine. The duty cycle is based upon a 10 minute time period; a 30% duty cycle refers to 3 minutes of welding and 7 minutes of idling. If the duty cycle is significantly exceeded, the thermostatic protection will shut off the output until the machine cools to a normal operating temperature.

TECHNICAL SPECIFICATIONS ASPECT® 230 DC (K4346-1)

POWER SOURCE INPUT VOLTAGE AND CURRENT	
Max Input Amperes 120V/208V/230V/400V/460V	3-Phase NA/19/17/10/9 1-Phase 31/33/31/18/16
Input Voltage ± 10%	120[4]V Single Phase 208-460V Single or 3 Phase (includes 220, 380, 400)
Idle Power	100 Watts Max.
Power Factor @ Rated Output	.95

RECOMMENDED FUSE SIZES 1		
INPUT VOLTAGE / PHASE / FREQUENCY	**MAXIMUM INPUT AMPERE RATING**	**TIME DELAY FUSE OR BREAKER[2] AMPERAGE**
120[4]/1/50/60	31 A	30
208/1/50/60	33 A	50
230/1/50/60	31 A	50
400/1/50/60	18 A	30
460/1/50/60	16 A	30
208/3/50/60	19 A	30
230/3/50/60	17 A	20
380-415/3/50/60	10 A	20
460/3/50/60	9 A	20

RATED OUTPUT			
Input Power		**Duty Cycle**	**Rated Output Current and Voltage**
PHASE	**Voltage Frequency**		
120V Single Phase	120/50/60	100%	GTAW 110 A / 14.4 V SMAW 70 A / 22.8 V
		60%	GTAW 125 A / 15 V SMAW 85 A / 23.4 V
		35%	GTAW 150 A / 16 V SMAW 100 A / 24 V
Single or Three Phase	208-460/50/60	100%	GTAW 160 A / 16.4 V SMAW 120 A / 24.8 V
		60%	GTAW 190 A / 17.6 V SMAW 140 A / 25.6 V
		35%	GTAW 230 A / 19.2 V SMAW 180 A / 27.2 V

PHYSICAL DIMENSIONS			
HEIGHT	**WIDTH**	**DEPTH**	**WEIGHT**
16.5 in. 419 mm	9.7 in. 246 mm	19.9 in. 506 mm	46.5 lbs. (21kg.)

TEMPERATURE RANGES
OPERATING TEMPERATURE RANGE -10°C to +40°C (-4°F to +104°F)
STORAGE TEMPERATURE RANGE -20°C to +85°C (-40°F to +185°F)

OUTPUT RANGE			
Phase	**Type of Output**	**Output Current Range**	**Maximum Open Circuit Voltage[3]**
120V Single Phase	GTAW DC SMAW DC	2-150 Amps 5-100 Amps	105 Volts Max. 91 Volts Max.
208-460 VAC Single or Three Phase	GTAW DC SMAW DC	2-230 5-180	105 Volts Max. 91 Volts Max.

Thermal tests have been performed at ambient temperature. The duty cycle (duty factor) at 40°C has been determined by simulation.

IP23

1. Based on U.S. National electrical Code
2. Also called " inverse time" or "thermal / magnetic" circuit breakers; circuit breakers that have a delay in tripping action that decreases as the magnitude of the current increases
3. In some countries, U_0 is also known as open circuit voltage OCV (see CAN/CSA-W117.2)
4. The rated output is available when connected to a 30A branch circuit. When connected to a 15A branch cicuit the ratings are 75A for STICK at a 10% duty cycle and 105A for TIG at a 10% duty cycle. When connected to a 20A branch circuit the ratings are 90A for STICK at a 10% duty cycle and 120A for TIG at a 10% duty cycle.

INSTALLATION

SAFETY PRECAUTIONS

Read entire installation section before starting installation.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.**
- **Do not touch electrically hot parts.**
- **Always connect the ASPECT® 230 DC grounding screw (behind the terminal block located near the back of the right case side) to a good electrical earth ground.**
- **Always connect the ASPECT® 230 DC to a power supply grounded in accordance with the National Electrical Code and all local codes.**

SELECT SUITABLE LOCATION

Place the welder where clean cooling air can freely circulate in through the rear vents and out through the front vents. Dirt, dust or any foreign material that can be drawn into the welder should be kept at a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance trips.

GRINDING

Do not direct grinding particles towards the welder. An abundance of conductive material can cause maintenance problems.

STACKING

The Aspect® 230 DC cannot be stacked .

UNDERCARRIAGE LIFTING AND MOVING

When the Aspect® 230 DC is purchased as a welding package, or used with any of the available Undercarriage optional accessories, proper installation makes the Aspect® 230 DC handles nonfunctional. Do not attempt to lift the power source with an undercarriage attached. The undercarriage is designed for hand moving only; mechanized movement can lead to personal injury and/or damage to the Aspect® 230 DC.

TILTING

Each machine must be placed on a secure, level surface, either directly or on a recommended cart. The machine may topple over if this precaution is not followed.

ENCLOSURE RATING

Aspect® 230 DC power sources carry an IP23 Enclosure rating. They are rated for use in damp, dirty rain-sheltered environments.

MACHINE GROUNDING AND HIGH FREQUENCY INTERFERENCE PROTECTION

Locate the Aspect® 230 DC away from radio controlled machinery. The normal operation of the Aspect® 230 DC may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

The frame of the welder must be grounded. A ground screw marked with the symbol ⏚ is located on the rear panel for this purpose. See your local and national electrical codes for proper grounding methods.

The high frequency generator, being similar to a radio transmitter, can be blamed for many radio, TV and electronic equipment interference problems. These problems may be the result of radiated interference. Proper grounding methods can reduce or eliminate radiated interference.

Radiated interference can develop in the following four ways:

- Direct interference radiated from the welder.
- Direct interference radiated from the welding leads.
- Direct interference radiated from feedback into the power lines.
- Interference from re-radiation of "pickup" by ungrounded metallic objects.

Keeping these contributing factors in mind, installing the equipment per the following instructions should minimize problems:

1. Keep the welder power supply lines as short as possible. Input leads within 50 feet (15.2 m) of the welder should be enclosed in rigid metallic conduit or equivalent shielding. There must be good electrical contact between this conduit and the welder. Both ends of the conduit must be connected to a driven ground and the entire length must be continuous.
2. Keep the work and electrode leads as short as possible and as close together as possible. Lengths should not exceed 25 feet (7.6 m).
3. Be sure the torch and work cable rubber coverings are free of cuts and cracks that allow high frequency leakage. Cables with high natural rubber content, such as Lincoln Stable-Arc®, better resist high frequency leakage than neoprene and other synthetic rubber insulated cables.
4. Keep the torch in good repair and all connections tight to reduce high frequency leakage.
5. The work piece must be connected to an earth ground close to the work clamp, using one of the following methods:
   - A metal underground water pipe in direct contact with the earth for ten feet or more.
   - A 3/4" (19 mm) galvanized pipe or a 5/8" (16 mm) solid galvanized iron, steel or copper rod driven at least eight feet into the ground.

The ground should be securely made and the grounding cable should be as short as possible using cable of the same size as the work cable, or larger. Grounding to the building frame electrical conduit or a long pipe system can result in re-radiation, effectively making these members radiating antennas. (This is not recommended).

6. Keep all access panels and covers securely in place.
7. All electrical conductors within 50 feet (15.2 m) of the welder should be enclosed in grounded rigid metallic conduit or

equivalent shielding. Flexible helically-wrapped metallic conduit is generally not suitable.

8. When the welder is enclosed in a metal building, several good earth driven electrical grounds (as in 5 above) around the periphery of the building are recommended.

Failure to observe these recommended installation procedures can cause radio or TV interference problems and result in unsatisfactory welding performance resulting from lost high frequency power.

INPUT CONNECTION

⚠ WARNING

Only a qualified electrician should connect the input leads to the ASPECT® 230 DC. Connections should be made in accordance with all local and national electrical codes and the connection diagrams. Failure to do so may result in bodily injury or death.

A 10 ft. (2m) power cord is provided and wired into the machine.

For Single Phase Input

Connect green lead to ground per National Electrical Code.

Connect black and white leads to power.

Wrap end of red lead with electrical tape to provide 600V insulation.

For Three Phase Input

Connect green lead to ground per National Electric Code.

Connect black, red and white leads to power.

⚠ WARNING

This Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electro-magnetic compatability in those locations, due to conducted as well as radiated disturbances.

INPUT FUSE AND SUPPLY WIRE CONSIDERATIONS

Refer to Specification Section for recommended fuse, wire sizes and type of the copper wires. Fuse the input circuit with the recommended super lag fuse or delay type breakers (also called "inverse time" or "thermal/magnetic" circuit breakers). Choose input and grounding wire size according to local or national electrical codes. Using input wire sizes, fuses or circuit breakers smaller than recommended may result in "nuisance" shut-offs from welder inrush currents, even if the machine is not being used at high currents.

INPUT VOLTAGE SELECTION

The Aspect® 230 DC automatically adjusts to work with the input voltages listed on the rating plate. No reconnect switch settings are required.

⚠ WARNING

The ASPECT® 230 DC ON/OFF switch is not intended as a service disconnect for this equipment. Only a qualified electrician should connect the input leads to the ASPECT® 230 DC. Connections should be made in accordance with all local and national electrical codes and the connection diagram located on the inside of the right case side. Failure to do so may result in bodily injury or death.

POWER CORD REPLACEMENT

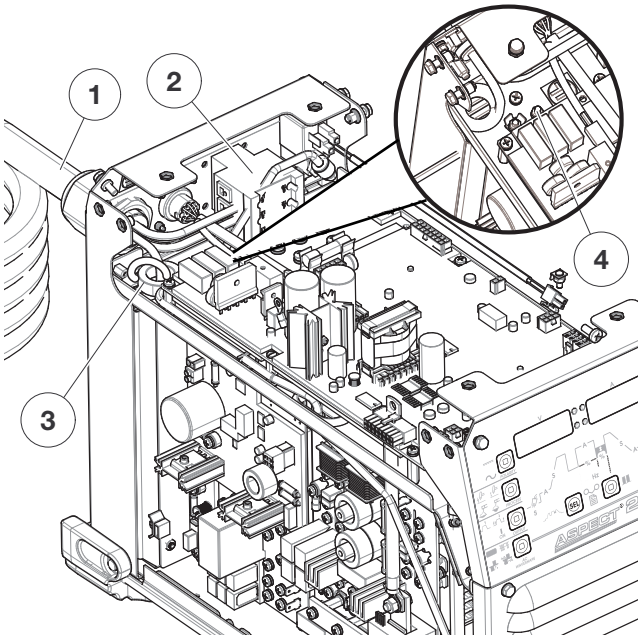
⚠ WARNING

Only a qualified electrician should connect the input leads to the ASPECT® 230 DC. Connections should be made in accordance with all local and national electrical codes and the connection diagrams. Failure to do so may result in bodily injury or death.

If the **input power cord** is damaged or needs to be replaced, an input power **switch** is located in the back of the machine with the case wraparound removed as shown in Figure A.1.

ALWAYS CONNECT THE **GROUNDING LUG** (LOCATED AS SHOWN IN FIGURE A.1) TO A PROPER SAFETY (EARTH) GROUND.

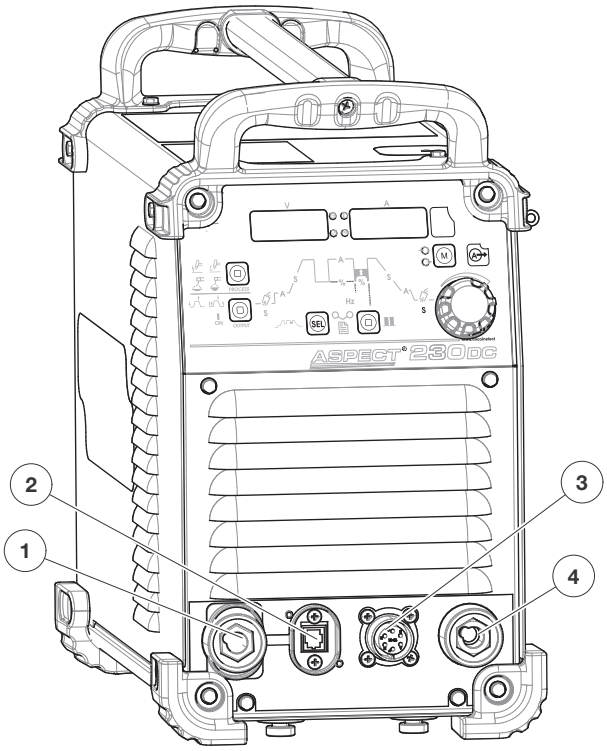
FIGURE A.1



1. **Input Power Cord**
2. **Terminal Block**
3. **Toroidal Core**
4. **Ground Lug**

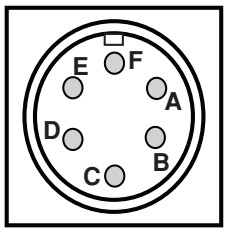
OUTPUT CONNECTIONS

FIGURE A.2



1. **Twist-Mate Electrode / Gas Output Connector**
2. **15VDC Supply for wireless foot pedal**
3. **6-Pin Remote Control Connector**
4. **Twist-Mate Work Connector**

The Aspect® 230 DC is equipped with Twist-Mate style front output connector. To connect cables, turn the power switch "OFF." Connect the torch Twist-mate plug into the electrode gas output receptacle on the front of the machine and turn clockwise until tight. This quick connect terminal also provides the shielding gas connection to the torch.

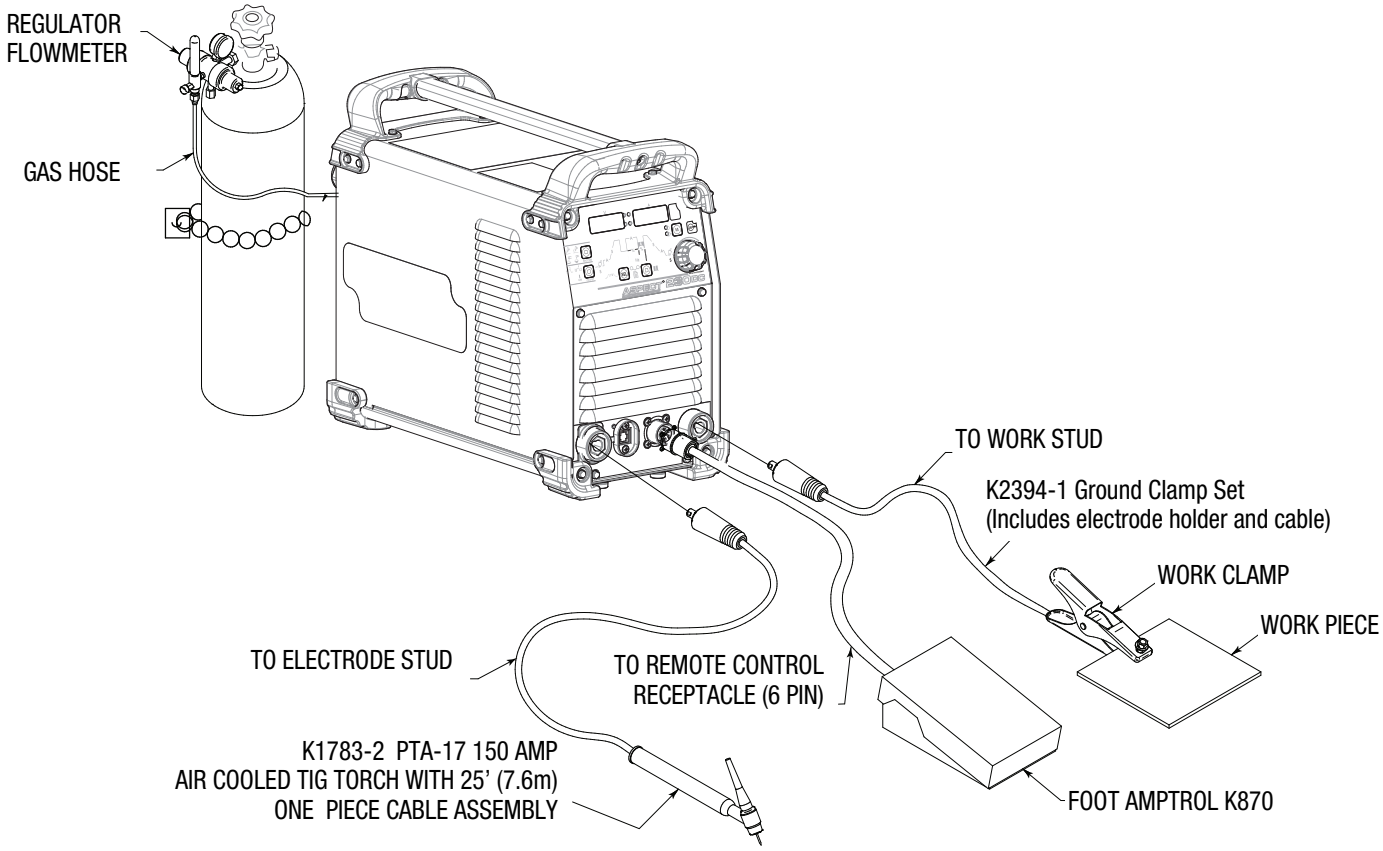


6-PIN REMOTE CONTROL CONNECTOR

Function	Pin	Wiring
6-PIN REMOTE CONTROL CONNECTOR FOR REMOTE OR HAND/FOOT AMPTROL.	A	REMOTE POTENTIOMETER, 10K
	B	REMOTE POTENTIOMETER, WIPER
	C	REMOTE POTENTIOMETER, COMMON
	D	TRIGGER, COMMON
	E	TRIGGER, INPUT
	F	GROUND

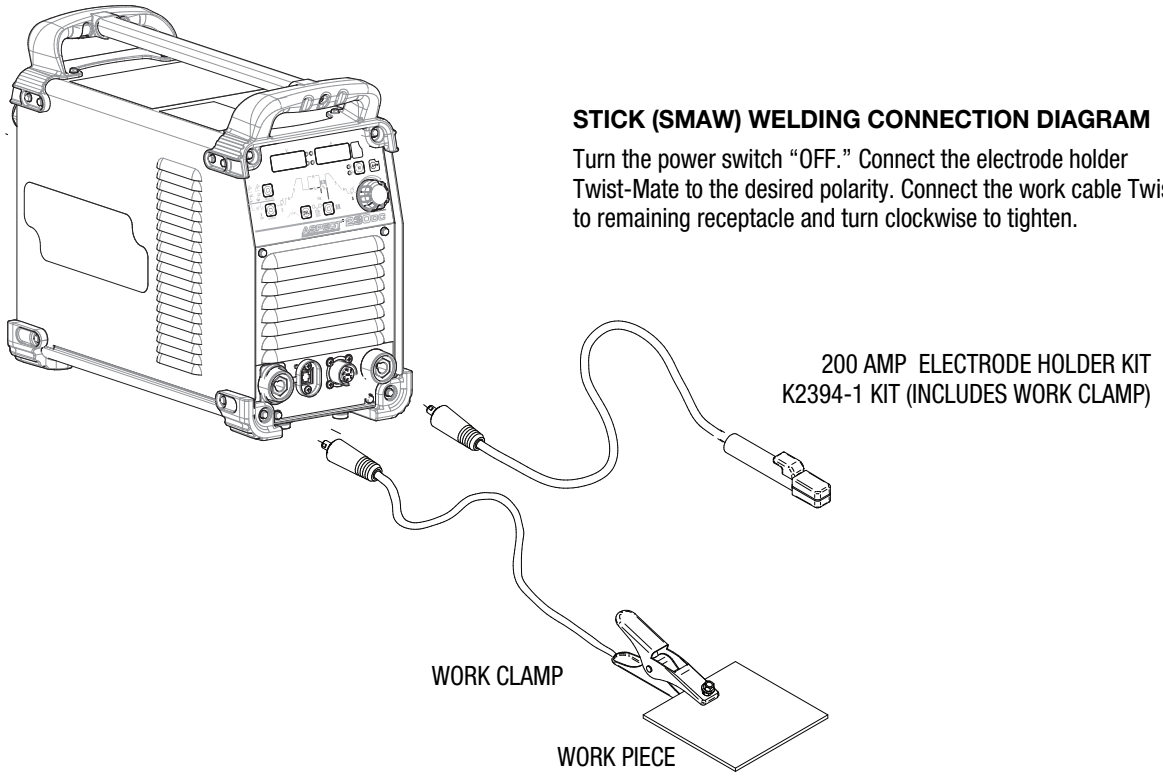
AIR COOLED TIG TORCH WITH WIRED FOOT PEDAL CONNECTION DIAGRAM

Refer to the following connection diagrams for specific information on connecting water cooled and air cooled torches.



STICK (SMAW) WELDING CONNECTION DIAGRAM

Turn the power switch "OFF." Connect the electrode holder Twist-Mate to the desired polarity. Connect the work cable Twist-mate to remaining receptacle and turn clockwise to tighten.

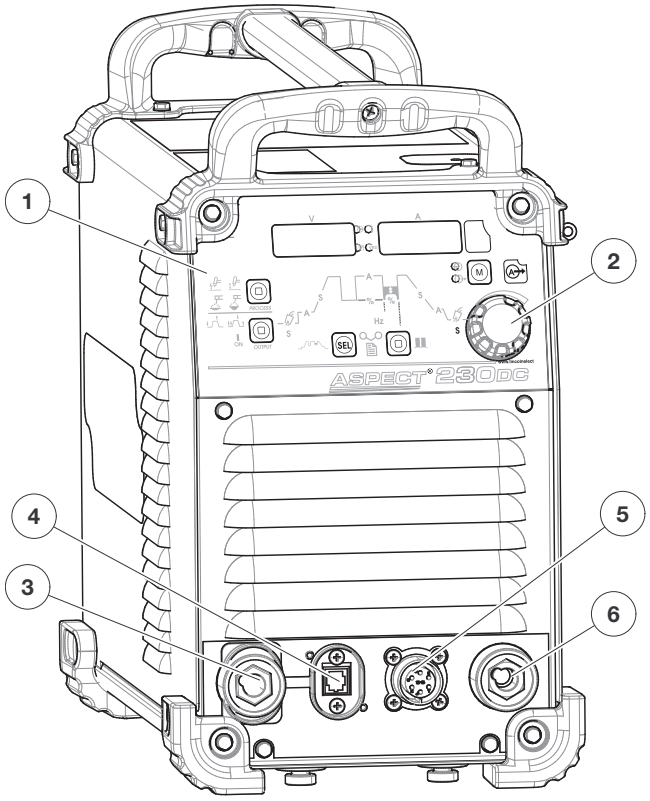


OPERATION

CASE FRONT CONTROLS

(See figure B.1)

FIGURE B.1

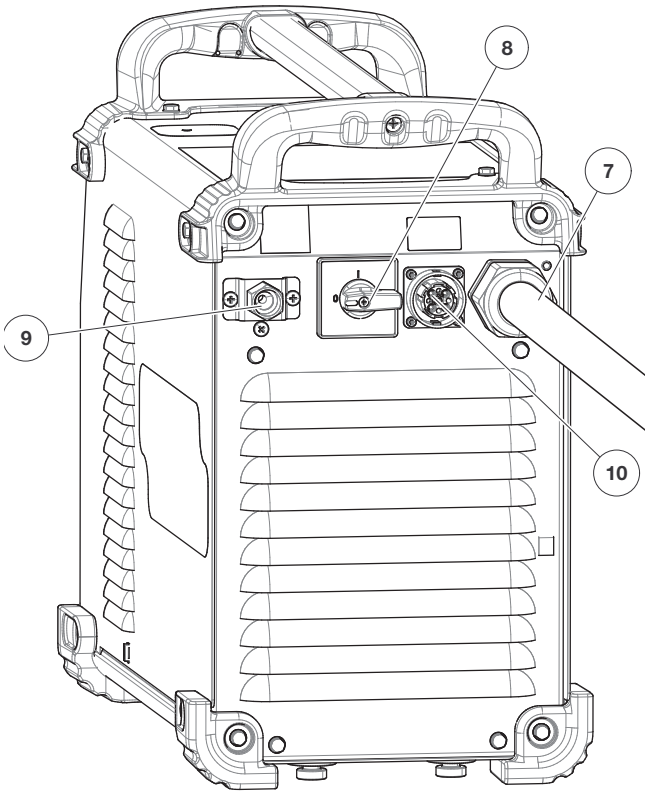


1. **User Interface** – For selecting process and parameters
2. **Control Knob –** Used to control machine output setting and to navigate through user interface menus
3. **Electrode Connector** - Connect tig torch or electrode holder
4. **15vdc Supply** - For wireless foot pedal
5. **6-Pin Remote Receptacle** – For connecting a foot amptrol or other remote control
6. **Work Connector** – For connecting the work lead

CASE BACK CONTROLS

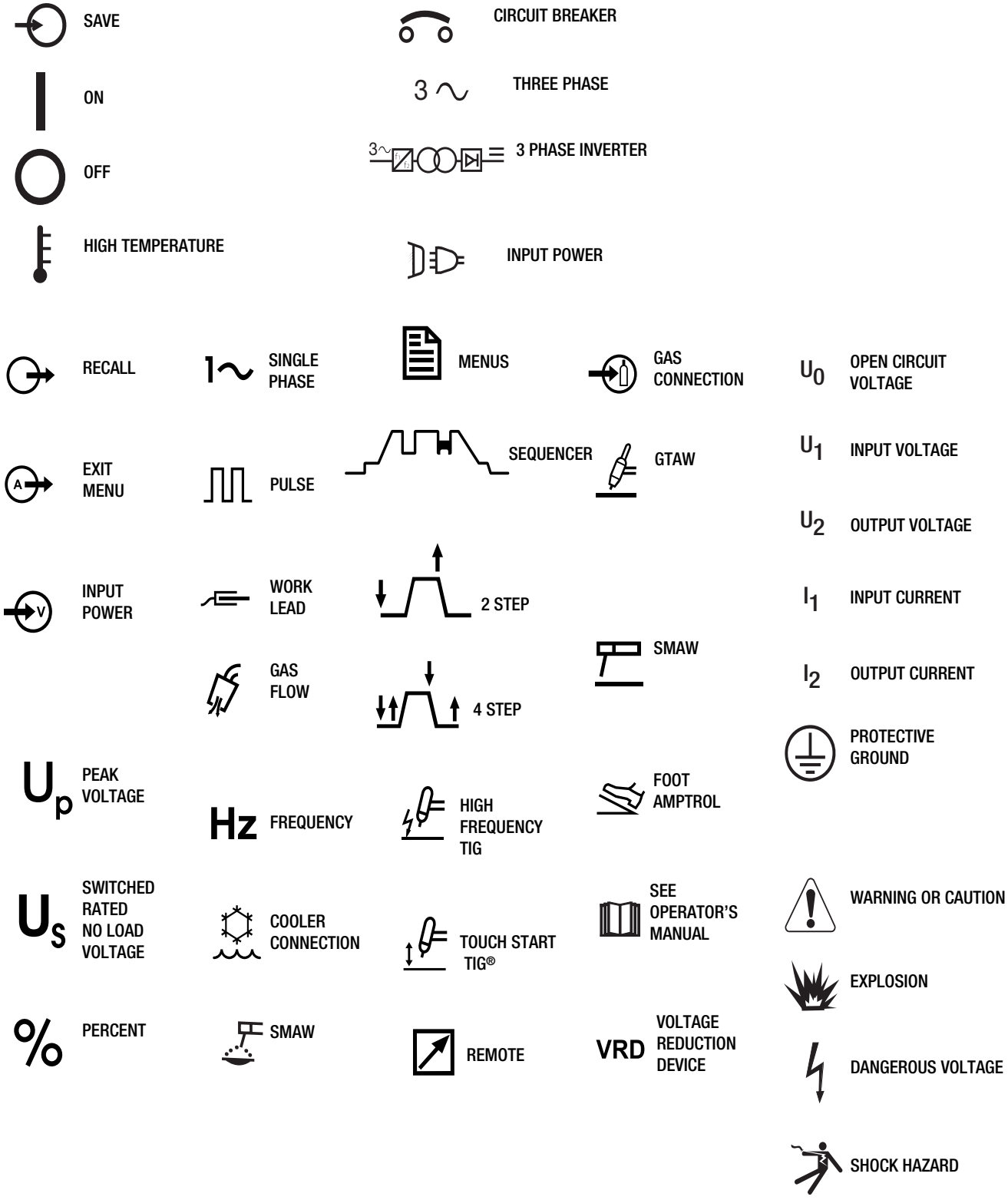
(See figure B.2)

FIGURE B.2



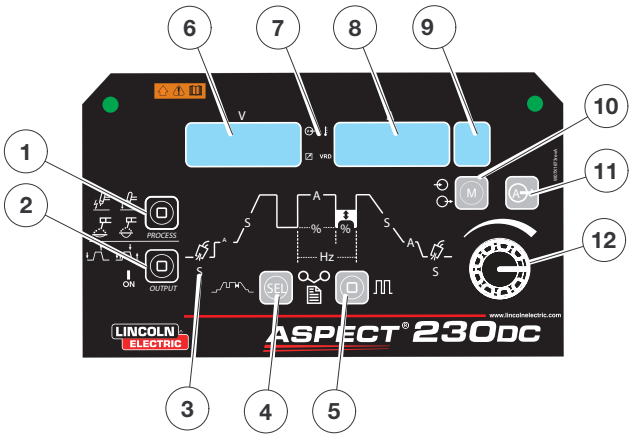
7. **Input Power Cord**
8. **Power Switch -** Controls power to the machine
9. **Gas Solenoid Input**
10. **9-Pin Water Cooler Connection** - connect to a Cool Arc 22

GRAPHIC SYMBOLS THAT APPEAR ON THIS MACHINE OR IN THIS MANUAL



USER INTERFACE CONTROLS

FIGURE B.3



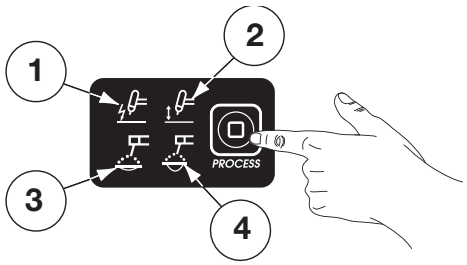
1. **Process Select** – Choose between High-Frequency TIG, Touch Start TIG®, Soft Stick (7018 electrodes), or Crisp Stick (6010 electrodes).
2. **Output Control** – Choose 2-Step, 4-Step, or Output On.
3. **Sequencer** – Allows control of options such as preflow, starting current, slope, etc.
4. **Sequencer Control** – Push to cycle through the sequencer settings.
5. **Pulse Sequencer** – Can set percent peak current, pulses-per-second, and percent background current.
6. **Voltage Display** – Displays the output voltage while welding.
7. **Status Lights** – Power on, thermal fault, remote, and VRD enable lights.
8. **Amperage Display** – Displays the current amperage setting.
9. **Memory Display** – Shows which of the 9 memory modes is currently selected.
10. **Memory Selection** – Ability to save up to 9 welding procedures and quickly recall them.
11. **Exit Menu Button** – A quick method to return to amperage adjustment from anywhere in the menus.
12. **Control Knob** – Used to set output current and to adjust settings.

Process

This switch allows the user to set the desired process. (See Figure B.4)

1. High-Frequency TIG
2. Touch Start TIG®
3. Stick – Soft Mode (7018 style electrodes)
4. Stick- Crisp Mode (6010 Style electrodes)

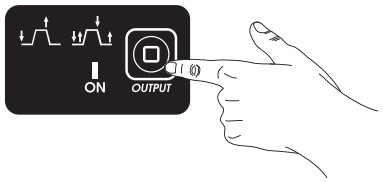
FIGURE B.4



Output Control

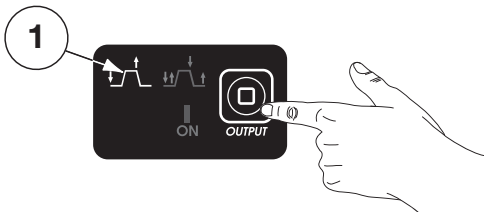
This switch allows the operator to set the desired output control method (See Figure B.5). To control the output with 2-step or 4-step, either a remote trigger (arc start switch) or remote trigger with amperage control (foot or hand amptrol) may be used.

FIGURE B.5



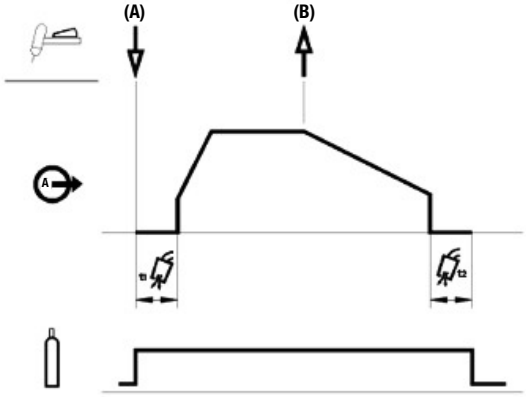
1. 2-Step (See Figure B.6 and B.7) – With 2-step trigger and a TIG welding mode selected, the following weld sequence will occur. If a standard foot amptrol is connected, it will take control of most sequencer functions, but pre-flow, starting current, finishing current, and post-flow can be defined. With an arc start switch, all sequencer functions must be defined by the user.

FIGURE B.6



A. Press and hold the torch trigger to start the sequence. The machine will open the gas valve to start the flow of shielding gas according to the set pre-flow time. After the pre-flow, the output of the machine is turned ON. The arc is started according to the selected weld mode and the specified starting current. After starting, the output current will be increased at a rate dependent on the specified initial slope time, until the operating amperage is reached.

FIGURE B.7



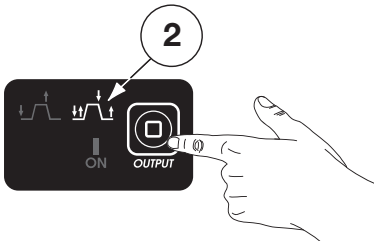
B. Release the TIG torch trigger to stop welding. The machine will decrease the output current at a rate determined by the specified final slope time, until the finishing current is reached and then the output of the machine is turned OFF.

After the arc is turned OFF, the shielding gas will continue to flow to protect the electrode and weld as specified by the post flow time.

This 2-Step sequence is the factory default setting.

2. **4-Step** (See Figure B.8) – With 4-step trigger mode and a TIG welding mode selected, the following weld sequence will occur. In 4-step, all sequencer functions should be set. If a standard foot amptrol is connected, only its trigger input is functional and the remote output control will be disabled

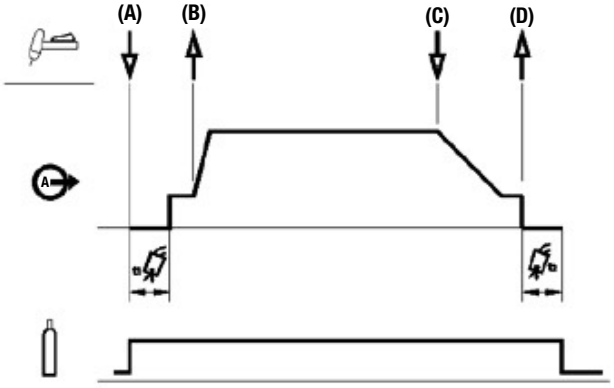
FIGURE B.8



4-Step Functionality

(See Figure B.9)

FIGURE B.9



A. Press and hold the TIG torch trigger to start the sequence. The machine will open the gas valve to start the flow of shielding gas according to the set pre-flow time. After the pre-flow, the output of the machine is turned ON. The arc is started according to the selected weld mode and the specified starting current. The starting current will be held until the torch trigger is released.

B. Releasing the trigger starts the initial slope function. The output current will be increased at a rate dependent on the specified initial slope time, until the operating amperage is reached.

If the torch trigger is pushed during the upslope time, the arc will immediately shut off and output will be switched OFF.

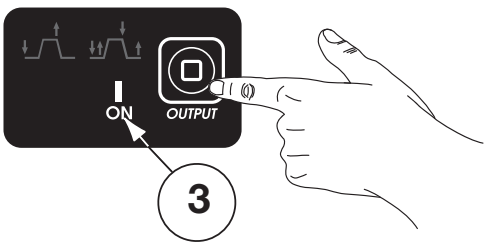
C. When the main weld is complete, push and hold the torch trigger to start the final down slope. The machine will decrease the output current at a rate determined by the specified final slope time, until the finishing current is reached.

D. The finished current will be maintained for as long as the torch trigger is held. Upon releasing the torch trigger, output will be switched OFF and the post flow time will start.

3. Output On-This function is designed to be used when TIG welding without the use of an arc-start controller. If "ON" is selected, the machine's output terminals are fully energized. Operator touches tungsten initiating the starting process. Once the tungsten is lifted from the work piece the amperage will proceed to welding amperage. Output "ON" is always illuminated when STICK welding.

(See Figure B.10)

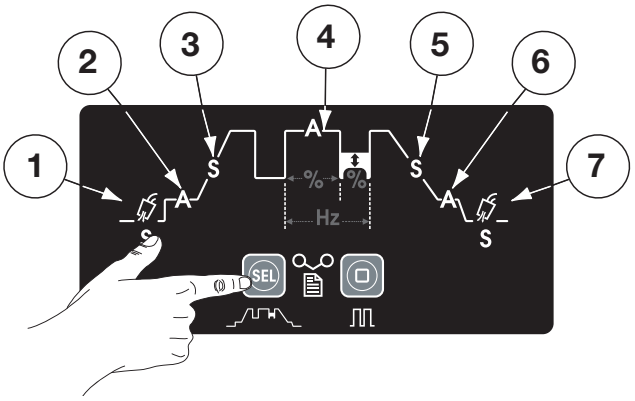
FIGURE B.10



SEQUENCER FUNCTIONS

The sequencer allows for customization of the TIG welding operation. Pressing the "SEL" button will cycle through the process graph (See figures B.11 and B.12).

FIGURE B.11



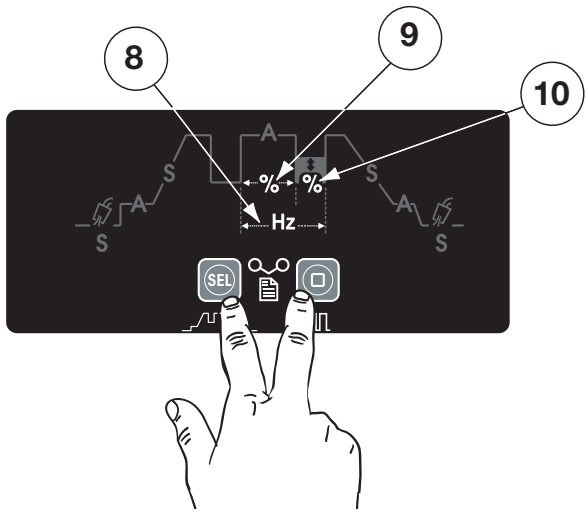
1. **Pre-Flow:** Sets the time in seconds that shielding gas will flow prior to arc-start initiation. Default = 0.5 sec (0-25 sec)
2. **Starting Current:** Sets the starting amperage for the process.
3. **Initial Slope:** Sets the time in seconds it takes the starting current to reach normal operating amperage. Only functions in 4-Step operation. (0-5 sec)
4. **Operating Amperage:** Sets max amperage for both 2-Step and 4-Step TIG welding applications.
5. **Final Slope:** Sets the time in seconds it takes the operating amperage to ramp down to the Finishing current. Only functions in 4-Step. (0 - 25 sec)
6. **Finishing Current:** Sets the finishing amperage for the process.
7. **Post Flow:** Sets the time in seconds shielding gas will flow after the arc is terminated. Default = AUTO

   Range = (.1 - 60 sec)

PULSE SEQUENCER FUNCTIONS

To access the pulse menu, select the Pulse Sequencer button once and then cycle through the Sequencer with the SEL button.

FIGURE B.12



8. **Pulses-Per-Second:** Sets the total number of pulse cycles per second of time. (.1 - 2000 Hz)
9. **Percent Peak Current:** This functions sets the amount of time the pulse waveform spends at the peak current setting. This function is set as a percentage of the total time for the pulse cycle. (5 - 95%)
10. **Background Current:** Sets the background amperage of the pulse waveform. Background amperage is set as a percentage of the peak current.

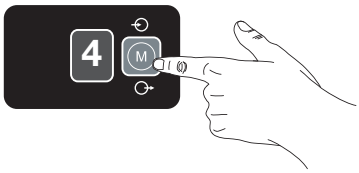
    (10 - 90%)

MEMORY SELECTION:

The memory function allows the operator to save up to 9 specific welding procedures. This memory switch has two functions:

1. Save memory settings
2. Recall memory settings.

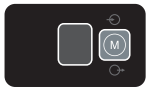
FIGURE B.13



Selecting Memory Functions

Pressing the memory button will allow the user to toggle between "saving" a memory, "recalling" a memory or operating without using a memory setting as seen in Figure B.14.

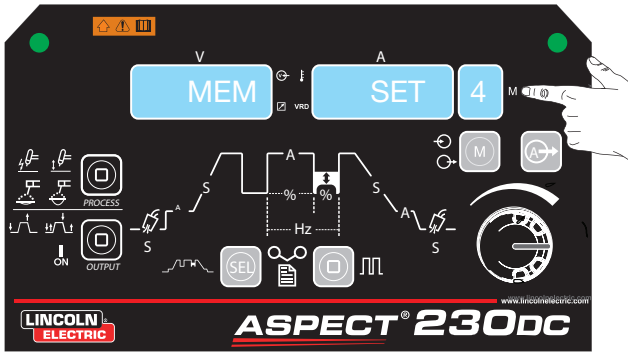
FIGURE B.14



Saving Memory Settings

In order to save process settings into a memory location it is first necessary to press the memory button so that the "memory save" icon is illuminated. Once illuminated, the number on the screen will flash to indicate this number can be changed by turning the control knob, and the voltage and amperage meters will say "MEM SET." Once the desired memory location has been selected using the control knob, pressing and holding the memory button for 3 seconds will save the settings in that location. During the 3 second hold period the "memory save" icon will flash. After 3 seconds the displayed settings will be saved to memory.

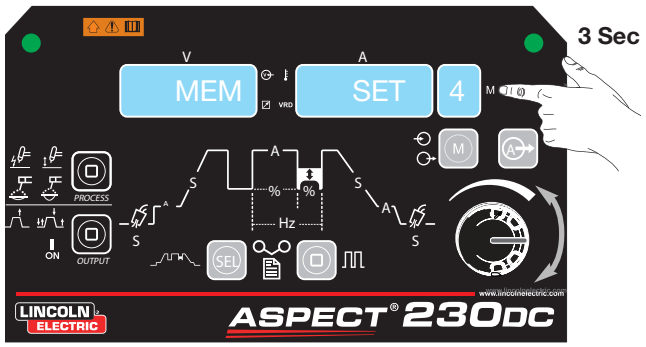
FIGURE B.15 MEMORY SET



Summary:

1. Press Memory button and display will indicate "Mem Set" icon
2. Turn Control Knob to select memory location
3. Press and hold memory button for 3 seconds to save

FIGURE B.16 SAVING

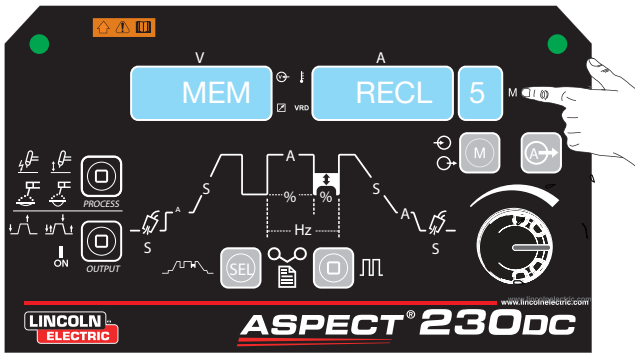


Memory Recall Settings

(See Figure B.17)

In order to recall process settings it is first necessary to press the memory button twice so that the “memory recall” is illuminated. Once the desired memory location has been selected using the control knob, pressing and holding the memory button for 3 seconds will recall the settings from that location. During the 3 second hold period the “memory recall” icon will flash. After 3 seconds the recalled settings will be displayed.

FIGURE B.17

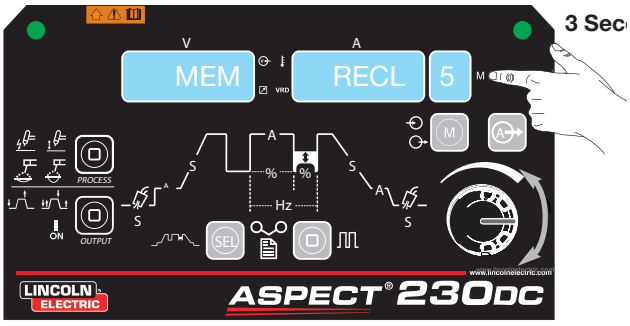


Summary:

(See Figure B.18)

1. Press Memory button to highlight “Memory Recall” icon
2. Turn Control Knob to select memory location
3. Press and hold memory button for 3 seconds

FIGURE B.18



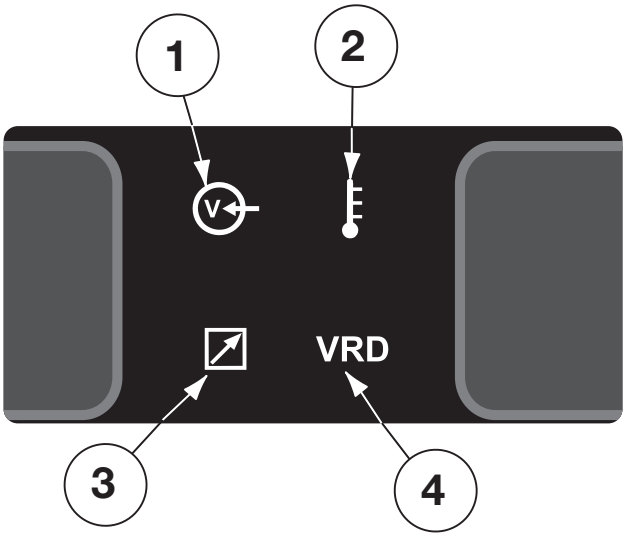
Status Lights:

(See Figure B.19)

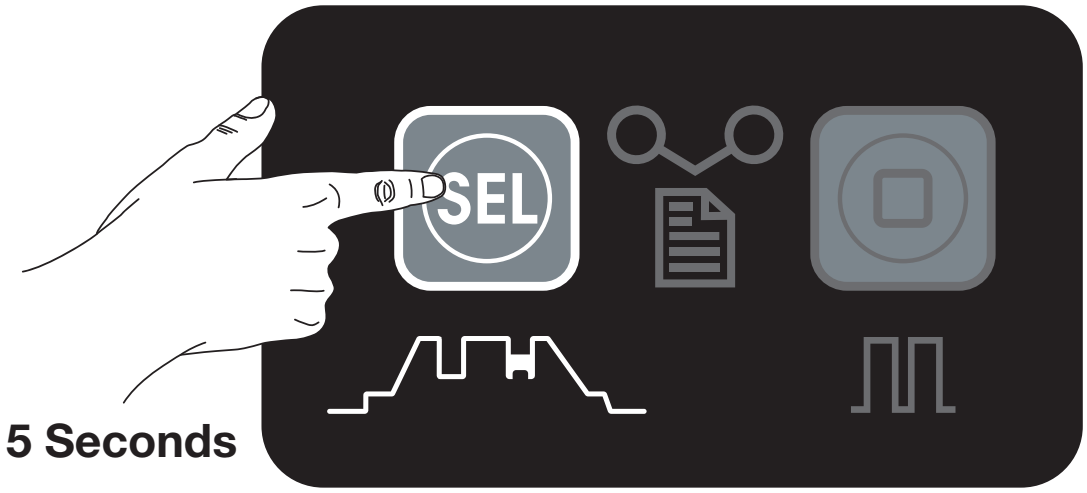
There are 4 status lights located between the voltage and amperage displays. These LEDs illuminate to display the following:

1. **Power on** – This light indicates that power has been applied to the machine and it is ready to weld. A blinking light indicates that the start up sequence is in process. When the light turns fully ON, the machine is ready to weld.
2. **Thermal Fault** – The thermal light will turn on if the machine has overheated. Welding may continue after the machine has cooled and the light switches off.
3. **Remote** – When a remote output control is connected to the 6 pin connector on the front of the machine, this LED will turn on.
4. **VRD** – When operating in VRD Mode (Voltage Reduction Device) this LED will light up when the output voltage is below 12 Volts. VRD may be turned ON / OFF in Setup Menu “SYS.”

FIGURE B.19

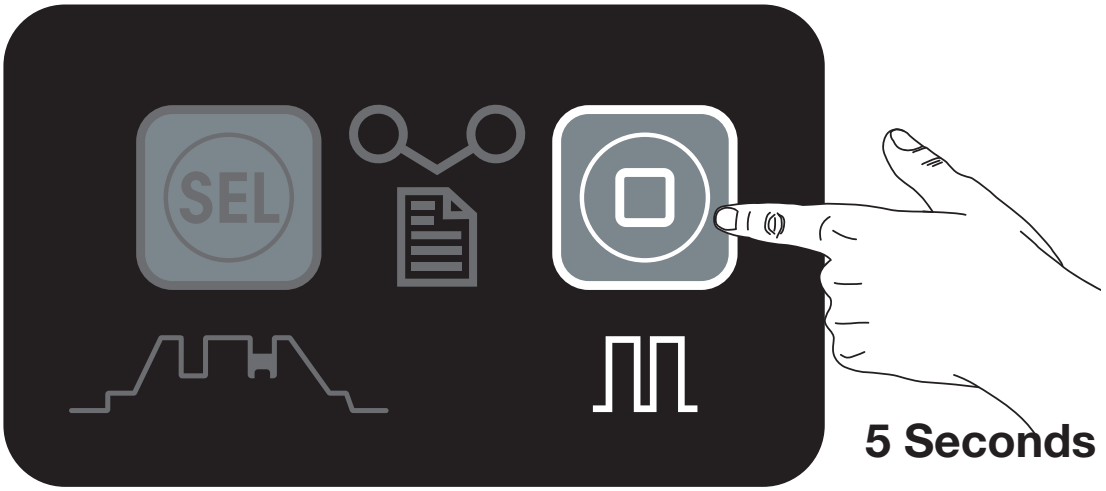


Hold Select button for 5 seconds to enter Menu “GTAW.”



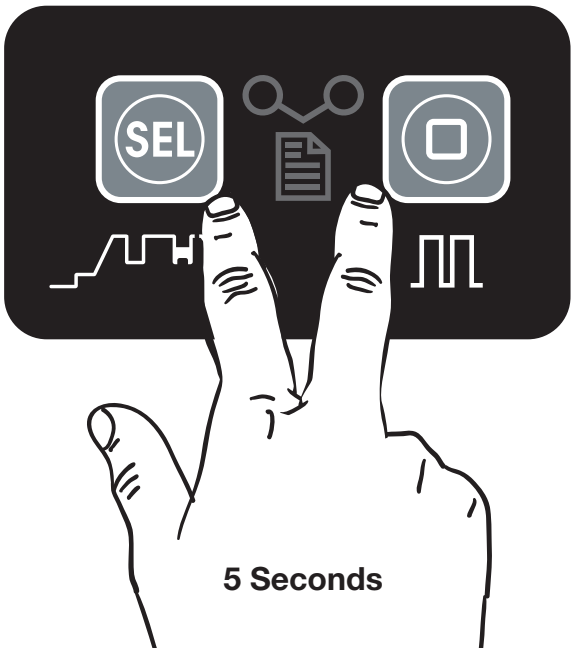
Setup Menu "GTAW" Press SEL to cycle through & rotate knob to change then SEL to save ‘A” to exit			TIG Settings
Display	**Item**	**Choices**	**Description**
2RST	Advanced Trigger	ON	Switch ON to enable 2 Step trigger with restart. See Appendix for more information.
		OFF	
4RST		ON	Switch ON to enable 4 Step trigger with restart. See Appendix for more information.
		OFF	
BILV		ON	Switch ON to enable Bi-level trigger. See Appendix for more information.
		OFF	
SPOT	Spot Timer	OFF - 100 s	Specify your spot weld time. Default = OFF.

Hold Pulse button for 5 seconds to enter Menu “SMAW.”



Setup Menu "SMAW"		Stick Settings	
Display	**Item**	**Choices**	**Description**
FRCE	Arc Force	0-75 for soft stick 75-200 for crisp stick	Specify your Arc Force setting
HSTR	Hot Start	0-75 for soft stick 50-200 for crisp stick	Specify your Hot Start setting

Hold both Select and Pulse buttons for 5 seconds to enter Menu “SYS.”



Then press ‘SEL’ to cycle through. To change, rotate knob then press ‘SEL’ to save “A’ to exit

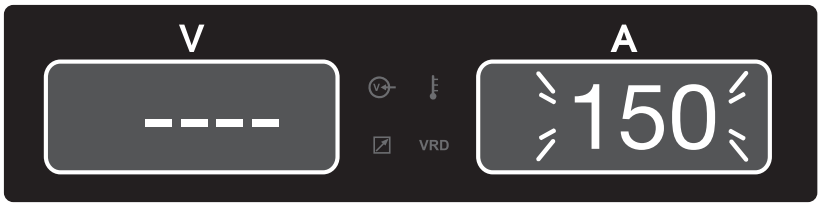
Setup Menu “SYS”		System Settings	
Display	Item	Choices	Description
VRD	Voltage Reduction Device	ON	Turn ON to enable VRD and limit machine OCV to 12 Volts
		OFF	
LED	LED Brightness	LOW	Adjusts the intensity of the display LEDs
		MED	
		HIGH	
COOL	Cooler Control	AUTO	On AUTO, the cooler turns on and off as needed. ON forces it to run continuously.
		ON	
CTRL	Control Board Software Version	-	Displays current control board software version
UI	User Interface Board Software Version	-	Displays current UI board software version
IC	Input Control Board Revision	-	Displays Input Control Board Revision
ERR	Error Messages	-	Displays error messages (See Troubleshooting Section)
HR	Arc Time	-	Displays total welding hours
CNT	Arc Counter	-	Displays total number of arc strikes amperage, memory & SYS menu
RSET	Reset to Default	YES/NO	Resets to factory default.
GRN	Green Mode	YES/NO	Allows the user to enable or disable the green mode
LOCK	Display Lockout	YES/NO	With lockout activated, all settings are frozen except amperage control, system menu and memory.

Appendix

A.1 Volt and Amp meter display while welding and idle.

While welding, the machine will show actual voltage and amperage on the meters. When the welding arc is extinguished, the meters will display (and flash) the final voltage and amperage of that weld for 5 seconds.

Figure B.25



A.2 Green Mode
(Show the V and A displays with GRN MODE)

Green mode is a feature that puts the machine in a standby condition after 10 minutes of inactivity.

- Output is Disabled.
- Fans Change to a Low Speed.
- LEDs Switch Off – Only the Power ON LED Remains Lit.
- A hash line will illuminate across the display.

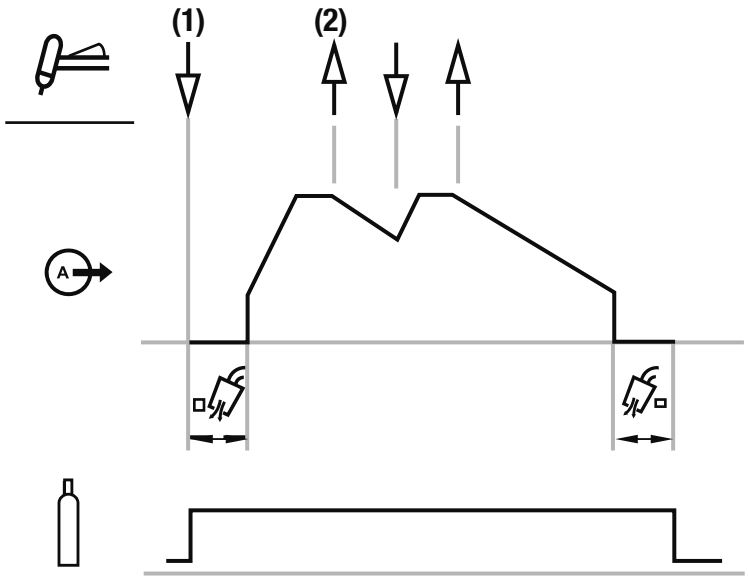
This feature will reduce the amount of dust and dirt that is drawn into the machine and will lower the machines power consumption.

To exit Green Mode, simply press the TIG remote trigger or any button on the front of the machine.

NOTE: If a Cool Arc® machine is connected to the Aspect® 230 DC, entering Green Mode will stop the coolant flow. To resume coolant flow, Green Mode must first be exited.

A.3 2-Step Trigger with Restart Sequence

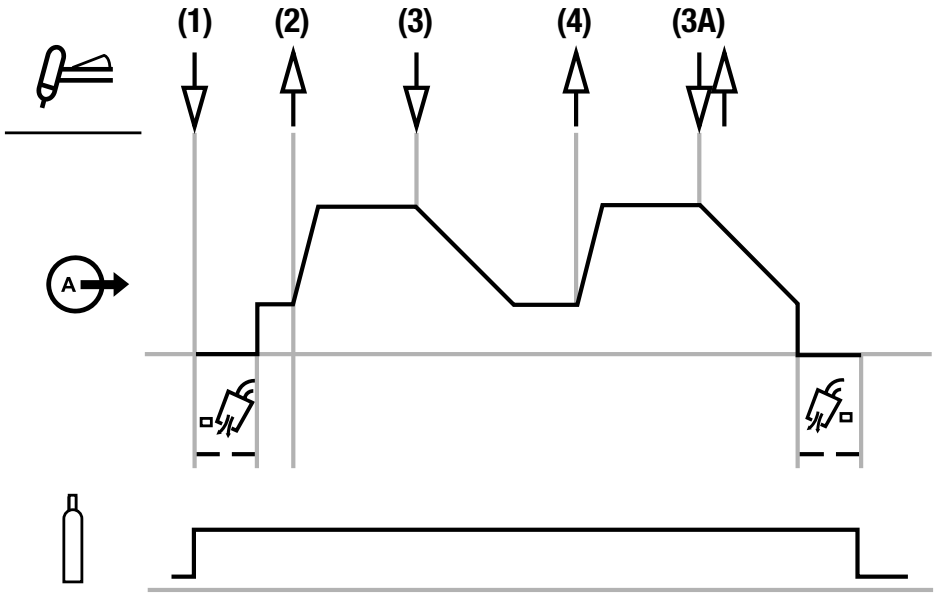
2-Step trigger with restart can be enabled in setup menu “GTAW” by switching 2RST to ON. If 2RST is ON, a TIG mode is selected, and 2-step is selected on the output section of the machine, the following sequence will occur.



This sequence is the same as 2-step, except when the switch is pressed while in final slope the welding current will ramp up again and resume. This process can be repeated as many times as necessary. When finished welding, simply release the trigger and allow the finishing current to end and the output to switch OFF followed by the post flow time.

A.4 4-Step Trigger with Restart Sequence

4-Step trigger with restart can be enabled in setup menu “GTAW” by switching 4RST to ON. If 4RST is ON, a TIG mode is selected, and 4-step is selected on the output section of the machine, the following sequence will occur.



This sequence is the same as 4-step, except when the switch is released during the finishing current, welding current will ramp up again to the operating amperage. This process can be repeated as many times as necessary. When welding is finished, quickly press and release the trigger to start the final slope, which will be followed by the finishing current at which point output is switched OFF, and the post flow will initiate.

A.5 Bi-Level Trigger Sequence

Bi-Level Trigger Sequence Bi-level trigger can be enabled in setup menu “GTAW” by switching BILV to ON. If BILV is ON, a TIG mode is selected, and 4-step is selected on the output section of the machine, the bi-level sequence will be followed. Bi-level follows the same sequence as 4-step but allows switching between operating amperage and a background current, A2. With Bi-level enabled, press the SEL button until the left display shows A2. Turning the control knob will allow the A2 level to be set as a percent of the operating current.

While welding at the set operating current, quickly press and release the trigger to switch to the A2 background current level. Quickly pressing and releasing the trigger again will switch the output back to the set operating current. Each time this trigger action is repeated the current level will switch between the two levels. When the main weld is complete, press and hold the trigger to start the final slope and finishing current. Release the switch to switch the output OFF and begin the post flow time.

GENERAL OPTIONS / ACCESSORIES

Field Installed

K870 - Foot Amptrol™ for TIG welding. The Foot Amptrol energizes the output and controls the output remotely. The Foot Amptrol™ connects directly to the 6- pin remote control connector.

K963-3 - Hand Amptrol™ for TIG welding. The Hand Amptrol™ energizes the output and controls the output remotely. The Hand Amptrol™ connects directly to the 6-pin remote control connector.

K814 - Arc Start Switch - Energizes the output for TIG welding if remote output control of the amperage is not desired. It allows on/off TIG welding at the amperage set by the Current Control on the control panel.

K3475-1 - Cool-Arc® 22 Water Cooler- Attaches underneath the Aspect® 230 DC and electrically connects to the Aspect® 230 DC. This smart cooler runs only when needed and shuts off welding if coolant flow is interrupted.

K4441-1 TIG Inverter Cart- Holds the Aspect® 230 DC, the Cool Arc® 22 and all accessories. Features low lift bottle loader and drawer for convenient storage.

K918-1 Zippered cable cover, 12.5 ft. (3.8 m)- to protect torch cables in high abrasion applications.

K918-4 Zippered cable cover, 25.0 ft. (7.6 m)- to protect torch cables in high abrasion applications.

Regulator with Flow Gauge and Hose Kit (3100211)

K2266-1 – TIG-Mate™ 17 Air Cooled TIG Torch Starter Pack. One complete easy-to-order kit packaged in its own portable carrying case. Includes: PTA-17 torch, parts kit, Harris flowmeter/regulator, 10 ft. gas hose, Twist-Mate™ adapter, work clamp and cable.

Magnum® TIG Torches – The following standard Magnum® TIG torches may be used with the Aspect® 230 DC.

- K1782-1 PTA-17 12.5 ft.(3.8m) Air-Cooled 150A
- K1782-3 PTA-17 25 ft.(7.6m) Air-Cooled 150A
- K1782-14 PTA-17 12.5 ft.3.8m) Air-Cooled 150A Ready Pak
- K1783-1 PTA-26 12.5 ft.(3.8m) Air-Cooled 200A
- K1783-3 PTA-26 25 ft.(7.6m) Air-Cooled 200A

Water cooled torches (The Cool Arc 22 is required)

- K1784-3 PTW-20 Water-Cooled 12.5 ft.(3.8m) 250A
- K1784-4 PTW-20 Water-Cooled 25 ft.(7.6m) 250A

K1622-5 Twist-Mate™ Adapter - Adapter needed for K4168-2 and K1784-3 and K1784-4 torches

NOTE: Each torch requires a Twist-Mate™ Adapter, collets, collet bodies, and nozzles and are not included and must be ordered separately.

KP2414-1 Gas Lens parts kit for PTA-9 and PTW-20 series torches.

KP508- Magnum® parts kit for PTA-17 series torches.

KP509- Magnum® parts kit for PTW-18 and PTA-26 series torches.

KP510- Magnum® parts kit for PTX-20, 20H-320-25R series torches.

K1803-3 - Work Lead Clamp with Twist-Mate™ plug, 15ft.(4.6m).

KP4159-1 Low Conductivity Coolant (1 Gal.)

K1622-3 Twist Mate Adapter for PTA-26 TIG Torch

K1622-1 Twist Mate Adapter for PTA-17 TIG Torch

MAINTENANCE

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this maintenance.**
- **Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.**
- **Do not touch electrically hot parts.**

⚠ WARNING

To avoid receiving a high frequency shock, keep the TIG torch and cables in good condition.

ROUTINE AND PERIODIC MAINTENANCE

Very little routine maintenance is necessary to keep your Aspect® 230 DC running in top condition. No specific schedule can be set for performing the following items; factors such as hours of usage and machine environment should be considered when establishing a maintenance schedule.

- Periodically blow out dust and dirt which may accumulate within the welder using an air stream.
- Inspect welder output and control cables for fraying, cuts, and bare spots.
- The fan motor has sealed ball bearings which require no maintenance.

OVERLOAD PROTECTION

FAN-AS-NEEDED (F.A.N.)

The Aspect® 230 DC has the F.A.N. circuit feature, which means the cooling fan will operate only as needed to assure proper machine cooling. This helps reduce the amount of dust and dirt drawn into the machine with the cooling air. The cooling fan will operate at lower speeds when the machine power is initially turned on or at idle, and continuously while the yellow Thermal Shutdown Light is lit (see Thermostatic Protection).

THERMOSTATIC PROTECTION

This welder has thermostatic protection from excessive duty cycles, overloads, loss of cooling, and excessive ambient temperatures. When the welder is subjected to an overload, or inadequate cooling, the primary coil thermostat and/or secondary coil thermostat will open. This condition will be indicated by the illumination of the yellow Thermal Shutdown Light on the front panel (see Item 2 in Figure B.19 Operation Section). The fan will continue to run to cool the power source. Postflow occurs when TIG welding is shut down, but no welding is possible until the machine is allowed to cool and the yellow Thermal Shutdown Light goes out.

NO ARC PROTECTION

The machine outputs (Background / OCV, gas and HF) will be shutdown, if the trigger is closed without welding for 15 seconds to protect the Background resistor from overheating with F.A.N. cooling off, as well as to conserve on gas waste.

FUSE PROTECTION

The cooler is protected by a 3-amp fast-acting fuse, located inside of the welding machine on top of the P.C. board. The fuse is identified as FS1. Ensure power is “off” and the machine is disconnected from power when measuring or replacing the fuse. The fuse is 600V 3-amp fast acting.

TROUBLESHOOTING

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

Observe all Safety Guidelines detailed throughout this manual

Error Code	Description	Possible Cause	Course Of Action
01	Input voltage too low	Input voltage is less than 90VAC, or drops below 90VAC under load	Check the input voltage with and without a load applied, check the cable size, and fuse size.
02	Input voltage too high	Input voltage is higher than 500VAC or spikes above 500VAC during load	Check the input voltage with and without a load applied.
03	Incorrect input connection	Input voltage not configured correctly	Turn OFF the machine and check the input connections. If three phase is being applied, ensure the voltage is at least 185VAC
04	Primary side voltage lock out	Indicates that an internal auxiliary voltage fault condition is detected.	Indicates that an overload condition occurred. Turn off the machine, wait one minute and then turn the machine on.
06	Inverter voltage lock out	Indicates that an Internal Voltage fault condition is detected.	Turn off the machine, wait one minute and then turn the machine on.
Conn Err	Connection Error	A communication error between the control and UI board has occurred.	Turn off the machine, wait one minute and then turn the machine on.
10	Fan fault	This error message indicates the fan is not operating properly. This prevents over temperature damage.	Turn off the machine, wait one minute and then turn the machine on.
11	Water Cooler Fault	Insufficient coolant in the cooler, TIG torch is undersized for application, TIG torch is pinched, faulty flow sensor in the cooler.	Check the TIG torch for kinks, check the cooler connections, verify the fluid in the cooler is within the suggested limits, replace damaged torch, replace torch with a higher ampacity torch, toggle flow switch on cooler to remove the error code.
12	Water Cooler Presence Fault	Cooler is not connected to the 9-pin connector,	Water cooler was connected/disconnected during operation. Turn off the machine, connect the cooler, wait one minute and then turn the machine on.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
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TIG WELDING ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Poor starting	Poor work clamp connection	Check and secure work connection
	Start current is too low	Increase start current
Black area along weld bead	Oily or organic contamination on work piece	Clean work piece
	Tungsten electrode may be contaminated	Grind to clean electrode
	Leaks in gas line or torch connection	Check connection
	Gas tank is near empty	Replace the gas tank
Output quits momentarily; gas flow and hi-freq are also interrupted	May be caused by hi-freq interference	Check for proper machine ground connection; surrounding machines that generate hi-freq also should be grounded properly
	Faulty Components, PC Boards or Connections	Contact your local Lincoln Authorized Service Facility
Arc flutters	Pulser may be turned on inadvertently	Turn Pulser off
	Electrode may be too large for current setting	Use smaller Tungsten
	Insufficient gas shielding	Adjust flow rate
	Contaminated gas or leaks in gas line, torch, or connections	Check gas line & connections
Output shut off during welding	Spot Timer may be turned on inadvertently	Access “GTAW” menu (see operation section) and change “SPOT” to “OFF”
	Faulty Components, PC Boards or Connections	Contact your local Lincoln Authorized Field Service Facility.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.

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STICK WELDING ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Poor starting	Hot start may be set too low	Access “SMAW”menu (see operation section) and increase “HSTR” setting
	Poor work clamp connection	Check and secure work connection
Stick electrode “blasts off” when arc is struck	Current may be set too high for electrode size	Adjust current
	Hot start set too high	Access “SMAW”menu (see operation section) and reduce “HSTR” setting
Electrode “sticks” in weld puddle	Current may be set too low for electrode size	Adjust current
	Arc force set too low	Access “SMAW” menu (see operation section) and increase “FRCE” setting
Insufficient penetration	Wrong Process setting	Set Process for Crisp Stick

START-UP ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Green Input indicator light does not stop blinking	Trigger or hand/foot Amptrol may be accidentally closed during start up	Turn machine off, open trigger or Amptrol, then turn machine on
	Input voltage is too high or too low	Check input voltage (115V to 460V)
	Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.
Meters don’t light up	Losing input to machine	Check input fuses and connection
	Faulty Components, PC Boards or Connections	Contact your local Lincoln Authorized Field Service Facility.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.

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OPEN CIRCUIT VOLTAGE (OCV) ISSUES

Note: Do not connect a meter to machine output terminals to measure voltage in TIG mode as hi-freq produced by machine may damage meter. When trigger is closed in TIG mode, machine displays OCV on left meter for approximately 3 seconds then output will turn off if a weld is not made. Machine does not display OCV in Stick mode even though the output is always on.

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
OCV is below 10V in TIG mode	Preflow time set too long	Set for typical 0.5 second preflow
	Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.
OCV is below 80V in TIG mode	Faulty Components, PC Boards or Connections	Contact your local Lincoln Authorized Field Service Facility.

OUTPUT ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Thermal light turns on	Welding application exceeds rated duty cycle	Reduce duty cycle
	Air intake & exhaust louvers may be blocked	Maintain sufficient clearance around machine
	Dirt and dust may have clogged the cooling channel inside machine	Blow out machine with clean, dry low pressure air
	Faulty fans or connections	Contact your local Lincoln Authorized Field Service Facility.
	Faulty Components, PCB or Connections	Contact your local Lincoln Authorized Field Service Facility.
Output o.k. in Stick but no output in TIG	No gas & no hi-freq Faulty trigger or hand/foot Amptrol or connection	Check trigger or Amptrol connection
	Gas & hi-freq o.k. Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.
No output in both Stick and TIG	Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.

REMOTE CONTROL ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Hand/foot Amptrol has no control	Machine set for 4-step trigger	Set for 2-step trigger
	Start current set too high	Reduce Start current
	Faulty Amptrol	Check Amptrol
	Faulty Components, PCB or Connections	Contact your local Lincoln Authorized Field Service Facility.

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.

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HI FREQUENCY ISSUES

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
No hi-freq	Wrong Process setting	Verify Process is set for hi-freq TIG
	Preflow time set too long	Set for typical 0.5 second preflow time
	Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.
Hi-freq does not initiate an arc	Insufficient gas flow	Check gas flow
	Poor work clamp connection	Check & secure work clamp
	Contaminated Tungsten	Grind to clean Tungsten
	Faulty torch	Check TIG torch & insulation
	Faulty PC Boards or connections	Contact your local Lincoln Authorized Field Service Facility.

WATER COOLER ISSUES

NOTE: If cooler control cable is connected to or disconnected from machine when machine is already turned on, machine must be recycled by turning off and then on so that cooler is recognized by machine; failure to do this may damage Tig torch when welding

Observe all Safety Guidelines detailed throughout this manual		
PROBLEMS (SYMPTOMS)	**POSSIBLE CAUSE**	**RECOMMENDED COURSE OF ACTION**
Indicator light on cooler does not turn on	Cooler is not plugged in	Plug cooler to 9-Pin Receptacle
	No voltage on 9-pin receptacle	Contact your local Lincoln Authorized Field Service Facility and/or check the 3-amp fuse located in the machine. See “Fuse Protection Section”
TIG torch runs hot	Cooler control cable is not plugged in	Turn machine off, plug control cable, then turn machine on
Machine displays ERR 11 when welding	Insufficient water in cooler	Check and refill water
	Air in water line	Activate trigger and depress Flow Sensor Bypass switch to prime cooler
	Cooler is not plugged in to 9-Pin receptacle, insufficient coolant in cooler, TIG Torch is undersized (amperage capacity) for application, or faulty flow sensor inside cooler.	**Initial Correction Measures:** Check Cooler Connections, Fill Cooler with additional Low Conductivity Coolant (KP4159-1), Replace with higher amperage capacity TIG Torch. Depress Flow Sensor Off button to remove error code. **Secondary Corrective Measures:** Service cooler

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.

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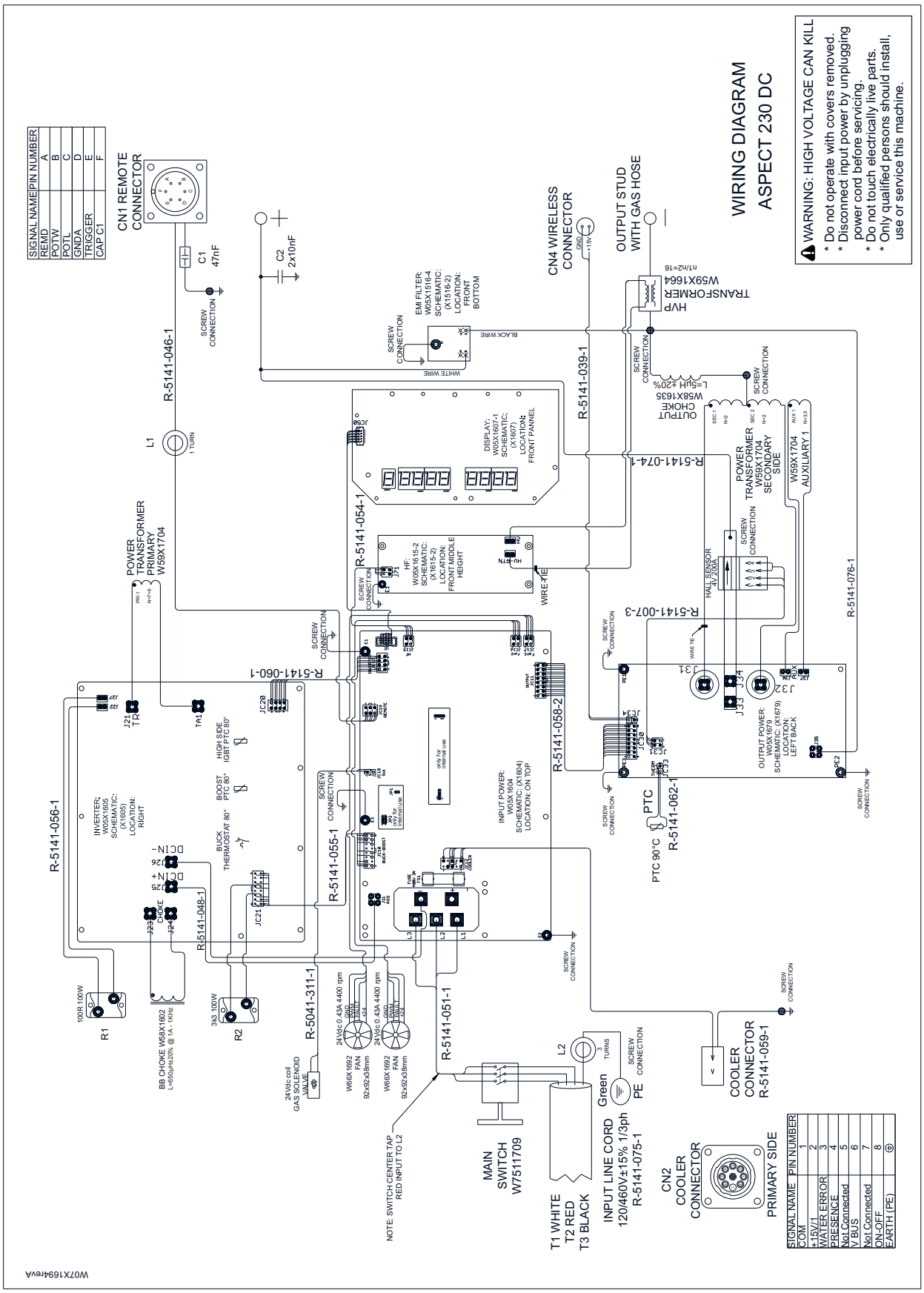
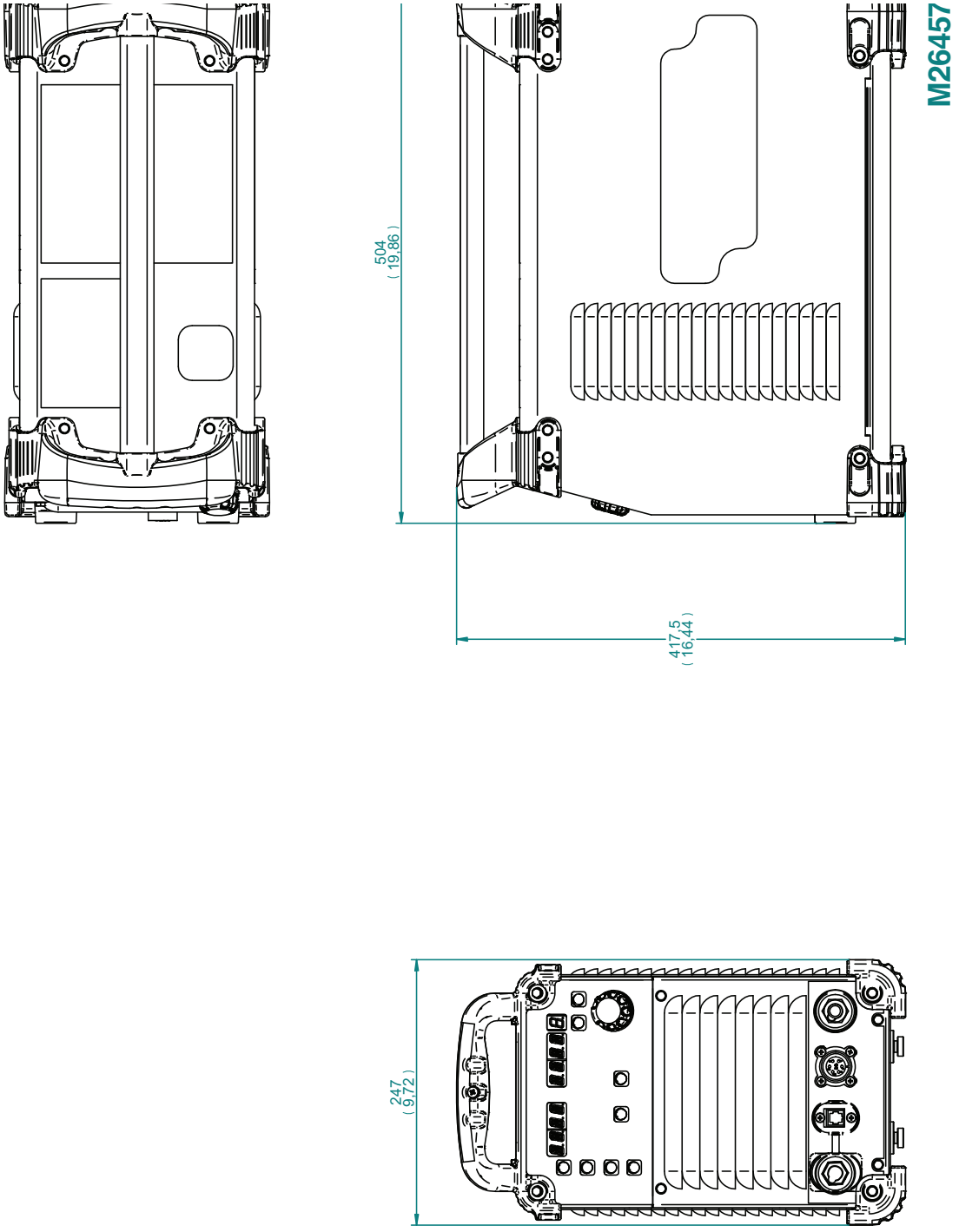


NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number.



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀捍材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com