POWERCUT 650

Portable Plasma Cutting System

Instruction Manual (EN)

ESAB Consoles:
ESAB P/N 0558005151 - 230V, 1/3-Phase, 50/60 Hz - "CE"
ESAB P/N 0558005152 - 400V, 3-Phase, 50/60 Hz - "CE"
ESAB P/N 0558007820 - 400V, 3-Phase, 50/60 Hz

0558005362

BE SURE THIS INFORMATION REACHES THE OPERATOR.
YOU CAN GET EXTRA COPIES THROUGH YOUR SUPPLIER.

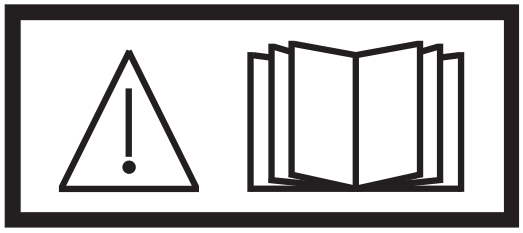
CAUTION

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

USER RESPONSIBILITY

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 Safety Precautions

Users of ESAB welding and plasma cutting equipment have the ultimate responsibility for ensuring that anyone who works on or near the equipment observes all the relevant safety precautions. Safety precautions must meet the requirements that apply to this type of welding or plasma cutting equipment. The following recommendations should be observed in addition to the standard regulations that apply to the workplace.

All work must be carried out by trained personnel well acquainted with the operation of the welding or plasma cutting equipment. Incorrect operation of the equipment may lead to hazardous situations which can result in injury to the operator and damage to the equipment.

1. Anyone who uses welding or plasma cutting equipment must be familiar with:
   - its operation
   - location of emergency stops
   - its function
   - relevant safety precautions
   - welding and / or plasma cutting

2. The operator must ensure that:
   - no unauthorized person stationed within the working area of the equipment when it is started up.
   - no one is unprotected when the arc is struck.

3. The workplace must:
   - be suitable for the purpose
   - be free from drafts

4. Personal safety equipment:
   - Always wear recommended personal safety equipment, such as safety glasses, flame proof clothing, safety gloves.
   - Do not wear loose fitting items, such as scarves, bracelets, rings, etc., which could become trapped or cause burns.

5. General precautions:
   - Make sure the return cable is connected securely.
   - Work on high voltage equipment **may only be carried out by a qualified electrician**.
   - Appropriate fire extinquishing equipment must be clearly marked and close at hand.
   - Lubrication and maintenance **must not** be carried out on the equipment during operation.

CAUTION

Class A (400V CE) 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 electromagnetic compatibility of Class A equipment in those locations due to conducted as well as radiated disturbances.

WARNING

WELDING AND PLASMA CUTTING CAN BE INJURIOUS TO YOURSELF AND OTHERS. TAKE PRECAUTIONS WHEN WELDING OR CUTTING. ASK FOR YOUR EMPLOYER'S SAFETY PRACTICES WHICH SHOULD BE BASED ON MANUFACTURERS' HAZARD DATA.

ELECTRIC SHOCK - Can kill.
- Install and earth (ground) the welding or plasma cutting unit in accordance with applicable standards.
- Do not touch live electrical parts or electrodes with bare skin, wet gloves or wet clothing.
- Insulate yourself from earth and the workpiece.
- Ensure your working stance is safe.

FUMES AND GASES - Can be dangerous to health.
- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to take fumes and gases away from your breathing zone and the general area.

ARC RAYS - Can injure eyes and burn skin.
- Protect your eyes and body. Use the correct welding / plasma cutting screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

FIRE HAZARD
- Sparks (spatter) can cause fire. Make sure therefore that there are no inflammable materials nearby.

NOISE - Excessive noise can damage hearing.
- Protect your ears. Use earmuffs or other hearing protection.
- Warn bystanders of the risk.

MALFUNCTION - Call for expert assistance in the event of malfunction.

READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.

PROTECT YOURSELF AND OTHERS!

POWERCUT® 650 Cutting Package

- *Manually cuts 15.9mm (5/8 inch) and severs 19.1mm (3/4 inch) - powerful cutting performance*
- *Economical price - tremendous cutting value for the money*
- *Compact portable design - goes to the job, easily moved about*
- *Delivers big machine cutting power in a rugged, lightweight package.*
- *Arrives ready to cut, with torch connected and front-end parts in place, for the ultimate in operator convenience.*
- *High frequency starting - starts through paint*
- *Trigger lock-in for long-cut operator comfort.*
- *Adjustable output - tailor the current to the material being cut*
- *Compact simple torch - easy access, little maintenance*
- *New quick - connect torch switch plug*
- *New durable torch cable prevents snagging on fixtures and materials*
- *Patented XT nozzles - extended shape gives good visibility as well as good consumable life*
- *Drag or standoff cutting - easy operation with little or no training*
- *Template following feature - easily duplicates curves or straight lines*
- *Tolerates poor power lines*

Specifications

Cuts 15.9mm (5/8 in.); severs 19.1mm (3/4 in.)

Output:	40% duty cycle	40A/120V
	60% duty cycle	30A/120V
	100% duty cycle	22A/120V
Output Current Range		10 to 40 Amperes
Open Circuit Voltage		290 Vdc Nominal
Input @ 40A/120V		230 vac 1/3 ph. 50/60 Hz., 37/20 amps
Input @ 40A/120V		400 vac 3 ph. 50/60 Hz., 9 amps
400V CE Mains Supply		$S_{sc\ min}$ 1.3MVA
		Z_{max} 0.118Ω
Power factor @ 40A Output		76% (1 Phase)
Efficiency @ 40A Output		85% (Typical)
Air requirements		118 l/m @ 5.5 bar (250 cfh at 80 psig)
Dimensions:	Length	406mm (16.00")
	w/ handles	653mm (25.70")
	Height	416mm (16.38")
	Width	318mm (12.50")
	w/ Opt. torch wrap	394mm (15.50")
Weight (less torch & work cable)		24 kg (53 lbs.)

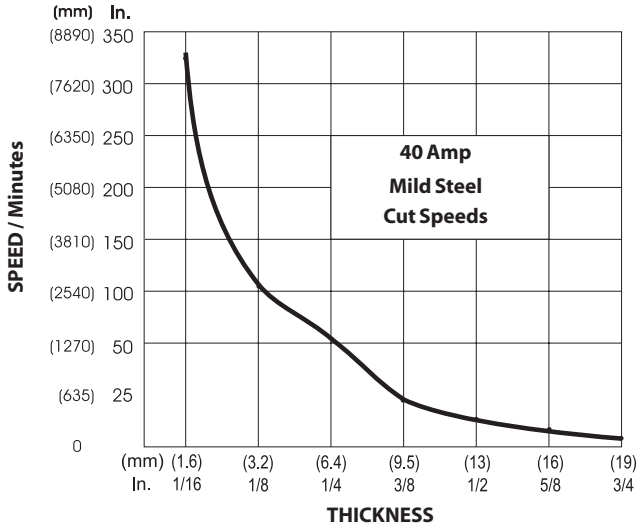
400V CE Mains Supply, $S_{sc\ min}$
Minimum short circuit power on the network in accordance with IEC61000-3-12.

400V CE Mains Supply, Z_{max}
Maximum permissible line on the network impedance in accordance with IEC61000-3-11.

Instruction Literature P/N 0558005362

The POWERCUT® 650 comes out of the box ready to go! The torch is attached with parts in place, primary cord is attached and the filter/regulator is installed. Just hook up the air, plug it in and cut.

POWERCUT® 650 / PT-31XLPC Cutting Performance



How To Order

The POWERCUT® 650 comes complete with everything you need: console, 7.6m (25 ft.) PT-31XLPC torch, torch spare parts kit, air filter/regulator, input power cord with plug, 7.6m (25 ft.) work cable with clamp. System arrives fully assembled and ready to cut.

Ordering Information

POWERCUT® 650 / 7.6m (25 ft.) PT-31XLPC "CE" package

POWERCUT® 650,

230 vac 1/3 ph. 7.6m (25 ft.) PT-31XLPC - "CE"	0558004800
400 vac 3 ph. 7.6m (25 ft.) PT-31XLPC - "CE"	0558004801
400 vac 3 ph. 7.6m (25 ft.) PT-31XLPC	0558007821

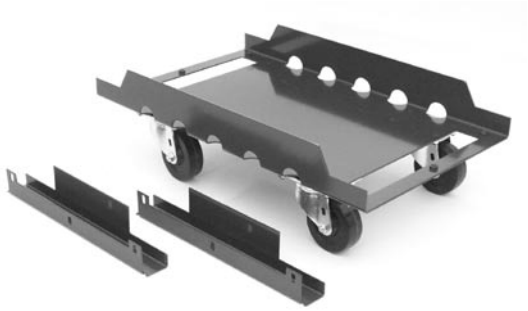
Optional Accessories

Torch Guide Kits
The Deluxe kit, in a rugged plastic carrying case, includes attachments for circle and straight line cutting on ferrous and non-ferrous metals
Deluxe: 44.5mm - 1,066.8mm (1 3/4" - 42") Radius 0558003258
Basic: 44.5mm - 711.2mm (1 3/4" - 28") Radius.....0558002675

Plasma Flow Measuring Kit
This valuable troubleshooting tool allows measurement of the actual plasma gas flow through the torch....0558000739 (19765)

Input Receptacle
230vac/50Amp, 3 Prong.....674540

Torch Wra
This enables operator to store S/P Kit, wrap torch and work cable for easy transport and storage.....0558003398

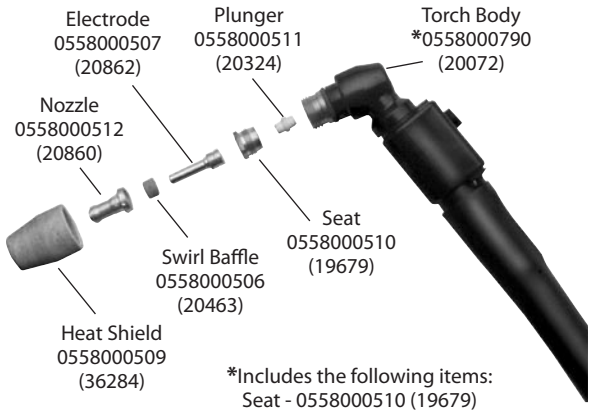


Wheel Kit
For easy transport of system.....0558003399

POWERCUT shown with Optional Torch Wrap and Spare Parts Kit Holder installed.

PT-31XLPC Replacement Torch 0558005393
Torch comes assembled with Long "CE" Heat Shield, Nozzle, Electrode, and Swirl Baffle.

PT-31XLPC Spare Parts Kit (P/N 0558005392) includes:
Heat Shield, Long (1).....0558000509 (36284)
Nozzles, High Performance (3).....0558000512 (20860)
Swirl Baffle (1).....0558000506 (20463)
Electrodes (2).....0558000507 (20862)



*Includes the following items:
Seat - 0558000510 (19679)
O-ring - 0558000514 (950790)

WARNING

Do not use any torch with this power source other than the ESAB brand PT-31XLPC torch. Serious injury may occur if used with any other torch.

2.0 GENERAL

The POWERCUT 650 is a compact, completely self-contained plasma cutting system. As shipped, the system is fully assembled and ready to cut after being connected to input power and a source of prefiltered compressed air (6.2-10.3 bar / 90-150 psig). The POWERCUT 650 package uses the PT-31XLPC torch to deliver cutting power for materials up to 15.9mm (5/8-in.) thick or for severing up to 19.1mm (3/4-in.) thick.

2.1 SCOPE

The purpose of this manual is to provide the operator with all the information required to install and operate the POWERCUT 650 plasma arc cutting package. Technical reference material is also provided to assist in troubleshooting the cutting package.

3.0 GENERAL

Proper installation can contribute materially to the satisfactory and trouble-free operation of the POWERCUT 650 cutting package. It is suggested that each step in this section be studied carefully and followed as closely as possible.

3.1 EQUIPMENT REQUIRED

A source of clean, prefiltered dry air that supplies 118 l/m @ 5.5 bar (250 cfh at 80 psig) is required for the cutting operation. The air supply should not exceed 10.3 bar (150 psig), the maximum inlet pressure rating of the air filter-regulator supplied with the package.

3.2 LOCATION

Adequate ventilation is necessary to provide proper cooling of the POWERCUT 650 and the amount of dirt, dust, and excessive heat to which the equipment is exposed, should be minimized. There should be at least one foot of clearance between the POWERCUT 650 power source and wall or any other obstruction to allow freedom of air movement through the power source.

Installing or placing any type of filtering device will restrict the volume of intake air, thereby subjecting the power source internal components to overheating. The warranty is void if any type of filter device is used.

3.3 INSPECTION

A. Remove the shipping container and all packing material and inspect for evidence of concealed damage which may not have been apparent upon receipt of the POWERCUT 650. Notify the carrier of any defects or damage at once.

B. Check container for any loose parts prior to disposing of shipping materials.

C. Check air louvers and any other openings to ensure that any obstruction is removed.

3.4 CONNECTIONS

3.4.1 PRIMARY ELECTRICAL INPUT CONNECTIONS (FIGURE 3.1)

WARNING

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when connections are made inside of the power source.

A line (wall) disconnect switch with fuses or circuit breakers should be provided at the main power panel (see Fig. 3-1 and Table 3-1 for fuse sizes). The input power cable of the console may be connected directly to the disconnect switch or you may purchase a proper plug and receptacle from a local electrical supplier. If using plug/receptacle combination, see Table 3-1 for recommended input conductors for connecting receptacle to line disconnect switch.

The POWERCUT 650 power source with 230 vac, 1 / 3 -phase input capability is factory set for 230 vac input.

CAUTION

Be sure that the power source is properly configured for your input power supply. DO NOT connect a power source configured for 230 V to a 460 V input power supply. Damage to the machine may occur.

NOTE: PC-650 input cable differences
The colors of input phases of the CE models differ from those of the "non CE" models. Below is a table comparing the two:

Input	Standard
L1	Black
L2	Red
L3	White
GND	Green

Input	CE
L1	Brown
L2	Grey
L3	Black
GND	Green/Yellow

400 & 460-Volt CE
For the 400 and 460-Volt units, it isn't important which leg is connected to L1, L2 and L3, when 3-Phase input is used, however if inputting 1 phase power, L2 will be the un-used leg. The T2 must have power to operate and it is connected across L1 and L3.

208/230-Volt models
****FOR SINGLE-PHASE CONNECTION OF 230-Volt CE MODELS:****
If single-phase connection is desired, connect the **BLACK** leg to **"L3"** and the **BROWN** leg to **"L1"** with the **GREY (L2)** leg disconnected, lugged, and taped back. , L2 will be the un-used leg. The T2 must have power to operate and it is connected across L1 and L3.

NOTE !!!

400V CE Mains Supply Requirements:
High power equipment may, due to the primary current drawn from the mains supply, influence the power quality of the grid. Therefore connection restrictions or requirements regarding the maximum permissible mains impedance or the required minimum supply capacity at the interface point to the public grid may apply for some types of equipment (see technical data). In this case it is the responsibility of the installer or user of the equipment to ensure, by consultation with the distribution network operator if necessary, that the equipment may be connected.

The Powercut 650 "CE model" is available as 230 vac single-phase power, or as 400 vac 3 phase.

Note: The 400 vac 3 phase unit is designed to work best when 3 phase input power is used, however with a slight de-rating of the machine output, the PC-650 can be used on single phase.
Reasons for de-rating:

Input diode stress. 1 phase uses 4 diodes at higher current levels
Buss capacitors will see higher ripple currents

Connecting PC-650 for 208 vac input:

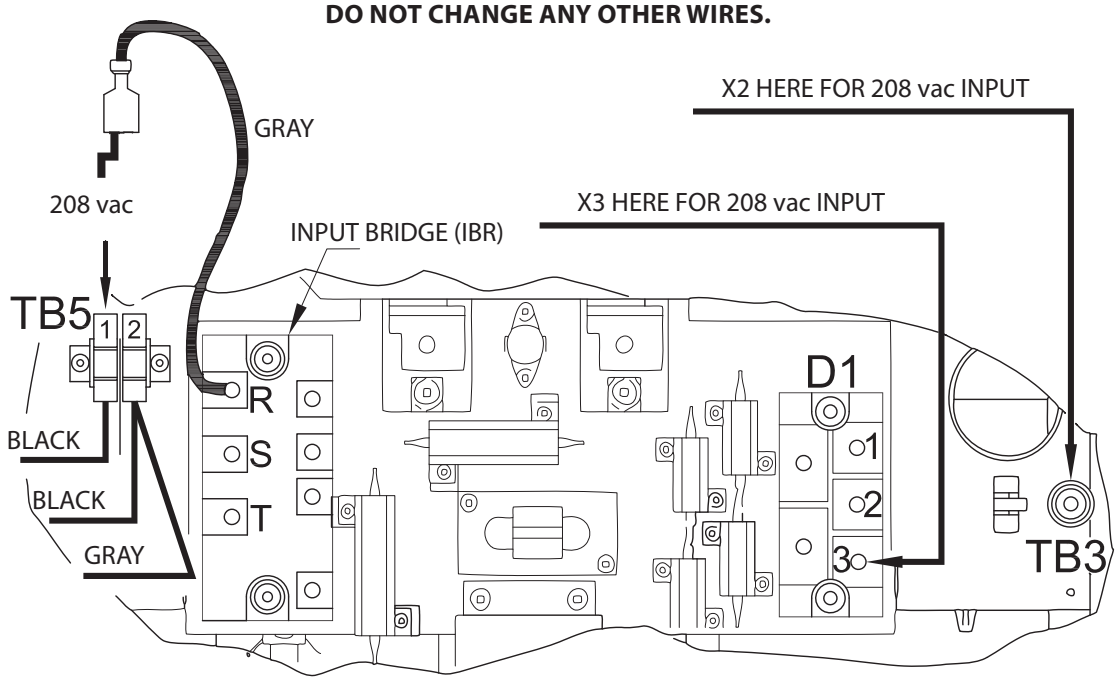
1. Unplug the unit from the primary input power.
2. Remove the left side panel by removing the rear handle and sliding the cover forward from the aluminum frame rail.
3. Locate the input bridge (IBR) and the two-position terminal block on the left side of the unit towards the rear panel. Locate the gray wire connected to TB5-2 and to IBR terminal "R". For 208 vac input, disconnect the gray wire from TB5-2 and then firmly connect it to TB5-1.
4. Locate the output bridge (D1) on the left side towards the front panel. Disconnect and swap leads X2 and X3 from the main transformer. For 208 vac input, X2 is connected to TB3 and X3 is connected to terminal 3 of D1. Make sure the connections are firmly tightened.
5. Leave all other wires the same.
6. Reinstall cover by sliding it back into the frame rail. Connect the rear handle and connect the Powercut 650 to the 208 vac input power.

208 V CONFIGURATION

NOTE:

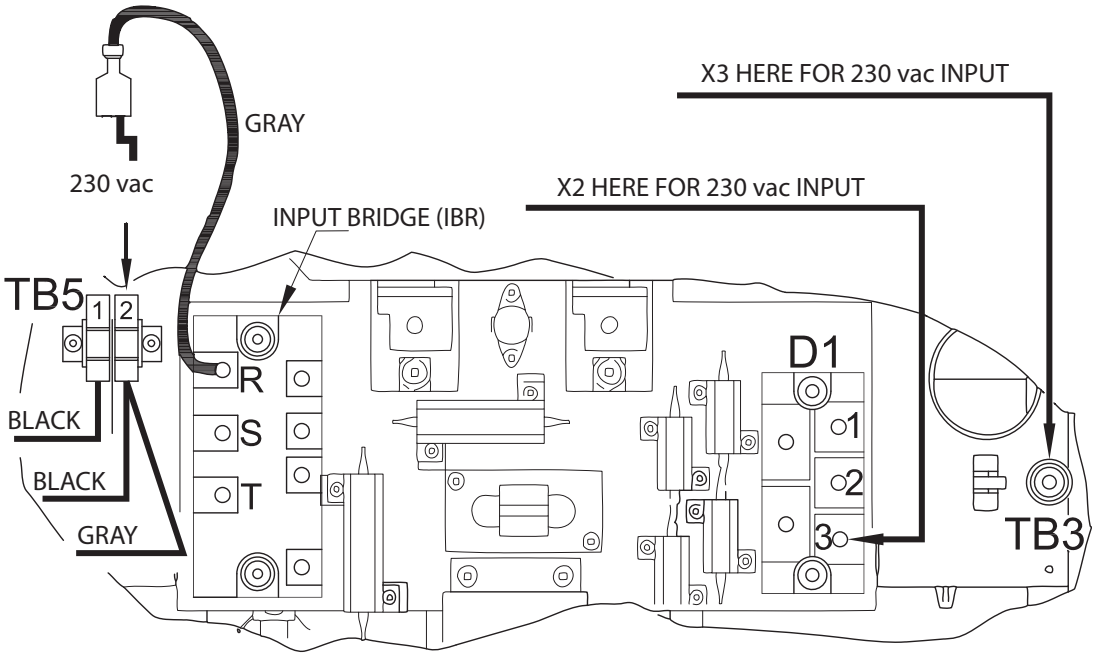
FOR 208 vac MOVE GREY WIRE FROM TB5-2 TO TB5-1, MOVE T1 LEAD X2 TO TB3 AND T1 LEAD X3 TO D1-3.

DO NOT CHANGE ANY OTHER WIRES.



FACTORY SET FOR 230 vac INPUT

DO NOT CHANGE ANY OTHER WIRES.



Rated Input			Input & GND Conductor CU/AWG*	Fuse Size Amps
Volts	Amp	Phases		
230	37/20	1/3	No. 6mm	50/40
400	9	3	No. 4mm	15

Table 3.1. Recommended Sizes for Input Conductors and Line Fuses

* Sized per National Code for 80°C rated copper conductors @ 30°C ambient. Not more than three conductors in raceway or cable. Local codes should be followed if they specify sizes other than those listed above.

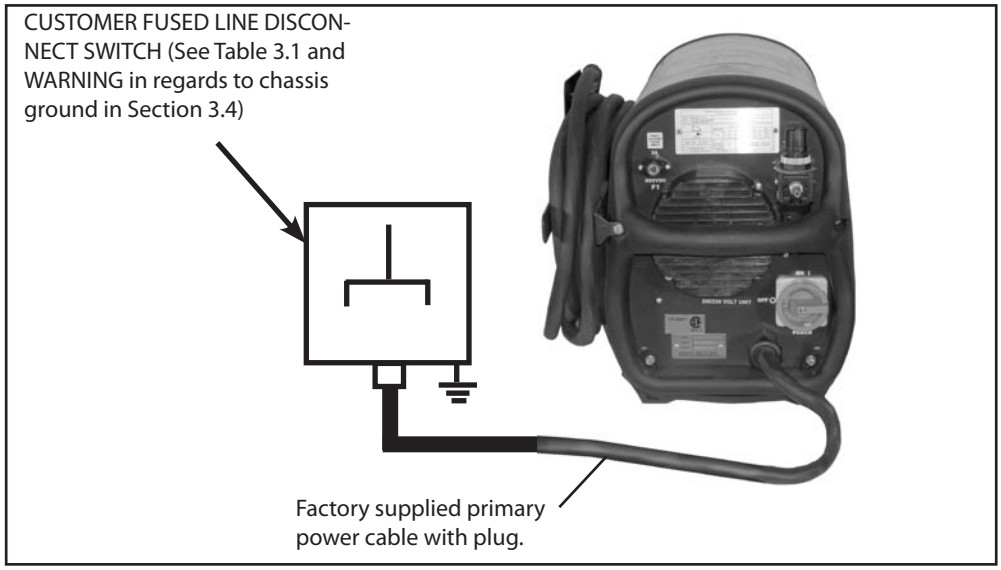


Figure 3.1 Customer Fused Line Disconnect and Receptacle

3.5 SECONDARY CONNECTIONS (REFER TO FIG. 3.3)

WARNING

Before making any connections to the power source output terminals, make sure that all primary input power to the power source is deenergized (off) at the main disconnect switch and that the input power cable is unplugged.

1. The POWERCUT 650 is supplied from the factory with the complete PT-31XLPC torch and the work cable with clamp assembly pre-installed. No further installation is required. For information on torch connections or refitting the torch (see Sec. 5.4).
2. Connect your air supply to the inlet connection of the filter-regulator.
3. Clamp the work cable to the workpiece. Be sure the workpiece is connected to an approved earth ground with a properly sized ground cable.

WARNING

ELECTRIC SHOCK CAN KILL! Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when reconnecting for 208 vac input.

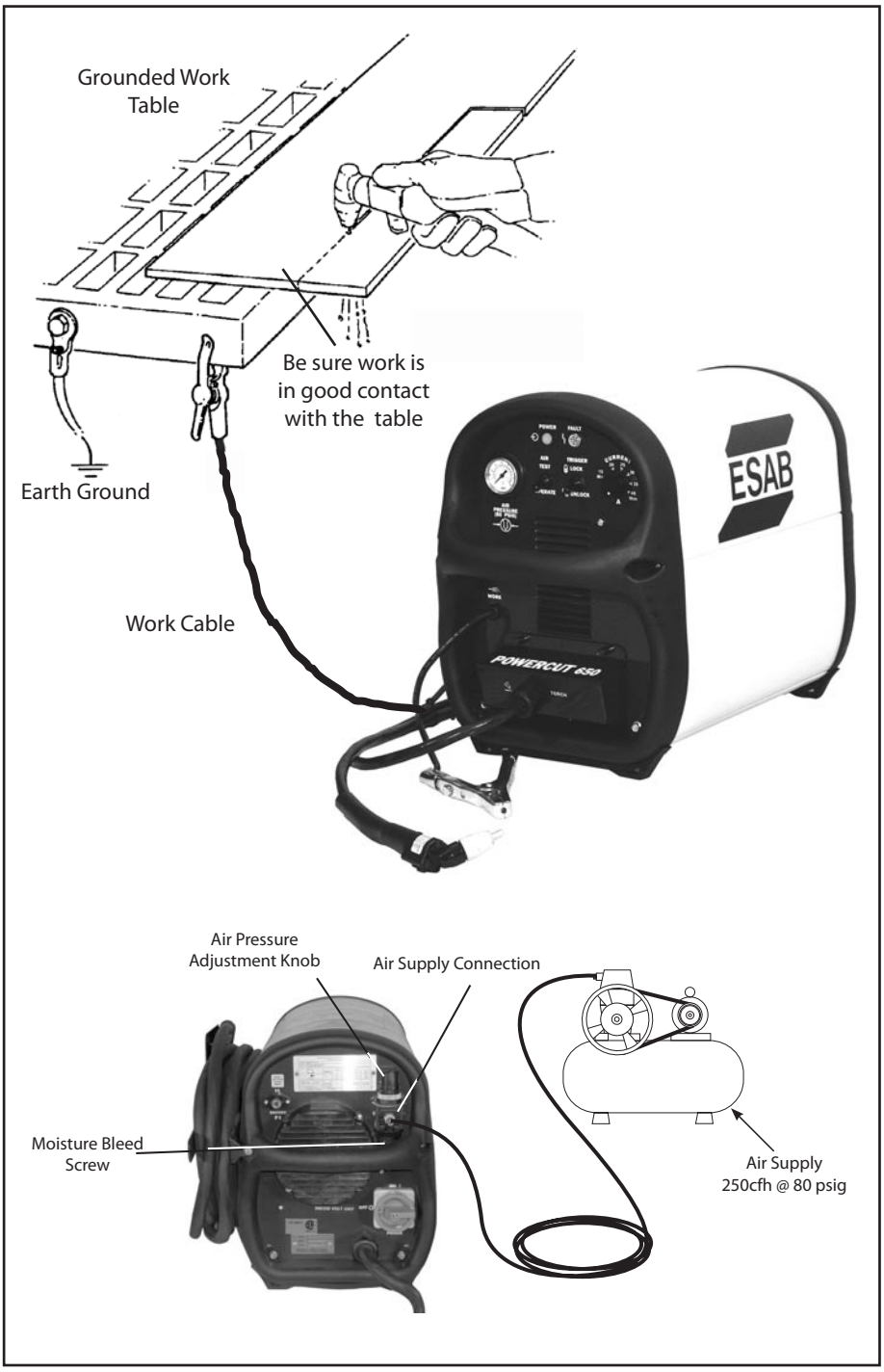


Figure 3.3 Secondary Connections Diagram

WARNING

Make sure power switch on power source is in OFF position and primary input power is deenergized.

WARNING

BE SURE to install the swirl baffle in the torch. Failure to do so would allow the nozzle (tip) to contact the electrode. This contact would permit high voltage to be applied to the nozzle. Your contact with the nozzle or workpiece could then result in serious injury or death by electric shock.

WARNING

The PT-31XLPC torch head contains a gas flow check valve that acts in conjunction with the flow switch and circuitry within the power source. This system prevents the torch from being energized with high voltage if the torch switch is accidentally closed when the shield is removed. ALWAYS REPLACE TORCH WITH THE PROPER TORCH MANUFACTURED BY ESAB SINCE IT ALONE CONTAINS ESAB'S PATENTED SAFETY INTERLOCK.

3.6 ASSEMBLING PT-31XLPC CONSUMABLE PARTS

The PT-31XLPC Torch is supplied complete; ready to cut and needs no further assembly. If it becomes necessary to inspect the front end wear parts, see Figure 3.4 for correct assembly order.

Install the electrode, baffle, nozzle, and heat shield as shown in Fig. 3.4. Tighten heat shield snugly but do not overtighten.

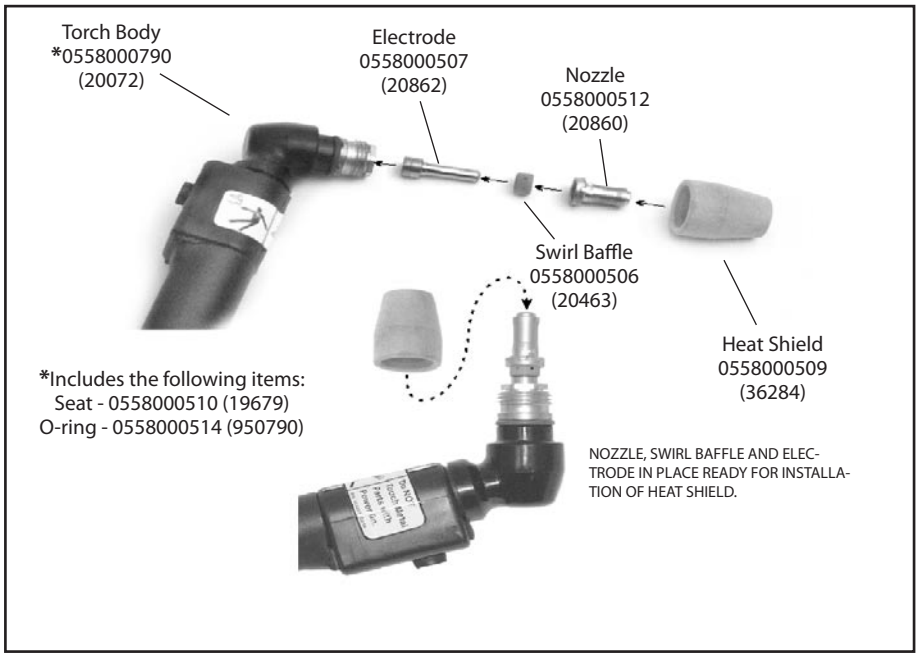


Figure 3.4 Assembly of "XT" Consumable Parts

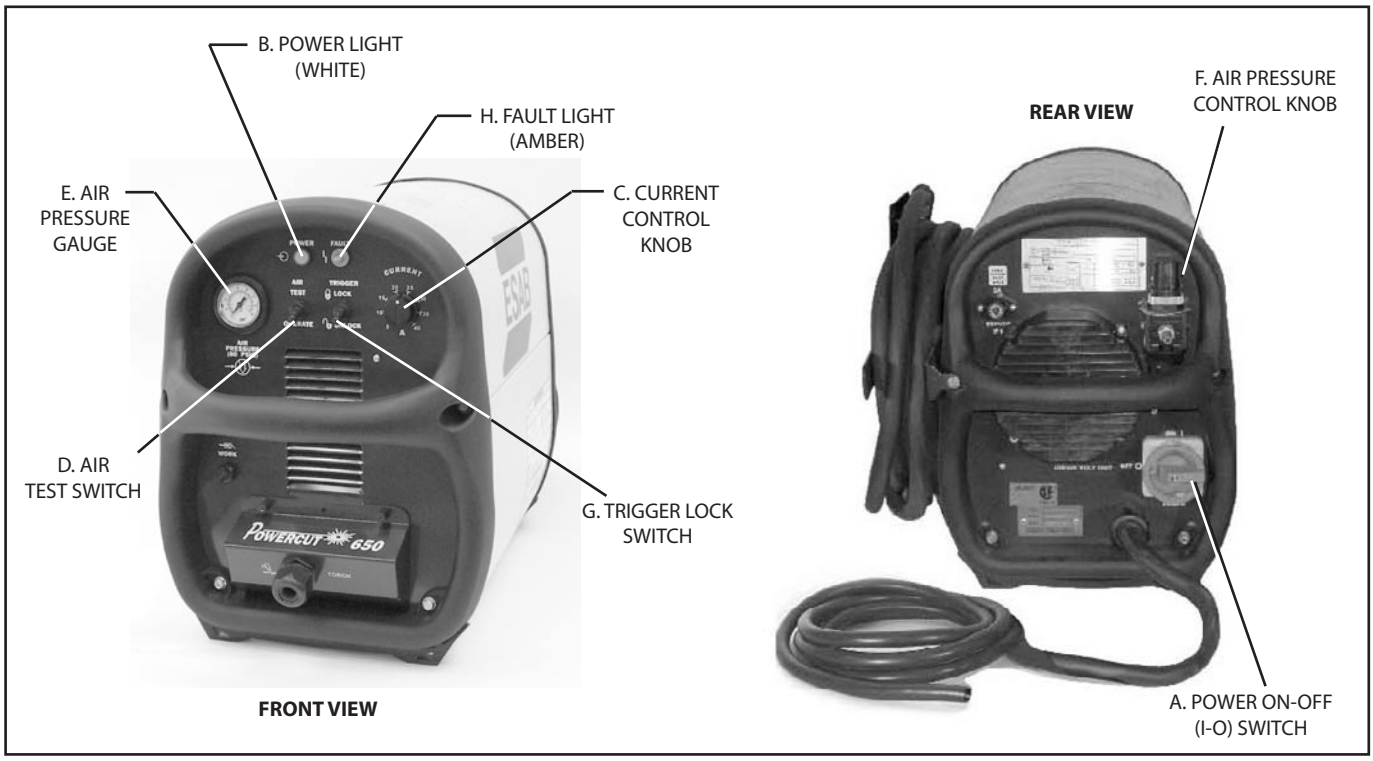


Figure 4.1. POWERCUT 650 Controls

4.0 POWERCUT 650 CONTROLS (FIGURE 4.1)

WARNING

ELECTRIC SHOCK can kill.

- **Do NOT operate the unit with the cover removed.**
- **Do NOT apply power to the unit while holding or carrying the unit.**
- **Do NOT touch any torch parts forward of the torch handle (nozzle, heat shield, electrode, etc.) with power switch on.**

WARNING

ARC RAYS can burn eyes and skin; NOISE can damage hearing.

- **Wear welding helmet with No. 6 or 7 lens shade.**
- **Wear eye, ear, and body protection.**

A. Power Switch (located on rear panel). When placed in ON position, the white pilot light will glow indicating control circuit is energized and the cooling fan will run. The POWERCUT 650 is now in the "READY" mode given a suitable air supply and a properly assembled torch.

B. Power Light. Indicates that the Power Switch is in the ON position.

C. Output Current Control. Adjustable from 10 to 40 amperes to suit cutting conditions.

D. Air Check Switch. When placed in ON position, air filter-regulator can be adjusted to desired pressure (5.5 bar / 80 psig) before cutting operations. Allow air to flow for a few minutes. This should remove any condensation that may have accumulated during shutdown period. Be sure to place switch in OFF position before starting cutting operations.

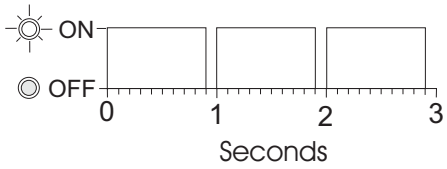
E. Air Pressure Gauge. Indicates supply pressure to the unit.

F. Air Regulator Control Knob. Used to adjust the air pressure for the cutting process. Proper operating range for the POWERCUT 650 is 5.5 bar (80 psig).

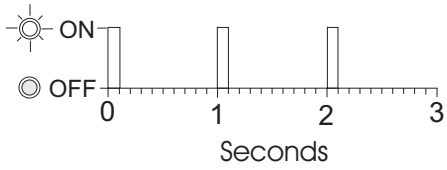
G. Lock-In Switch. When placed in ON position, permits releasing torch switch button after cutting arc has been initiated. To extinguish arc at end of cut, press and release torch switch button again or pull torch away from work. When placed in OFF position, torch switch must be held closed by the operator during the entire cutting operation and then released at the end of cut.

H. Fault Light. Will glow amber under the following conditions and operations will come to a complete stop.

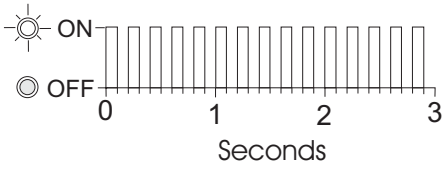
Flow Fault: The fault light will be **mostly on** but will flick off for approx.1/10th of a second every second. This indicates that the air flow supply is low.



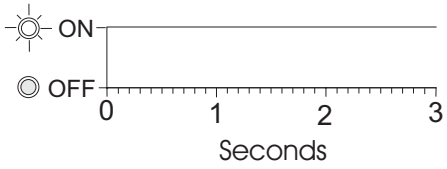
Over Temperature: The fault light will be **mostly off** but will flick on for approx. 1/10th of a second every second. This indicates that the duty cycle has been exceeded. Allow the power source to cool down before returning to operation.



High/Low Line Voltage: The fault light will **rapidly blink on and off** (five times per second). This indicates that the input voltage is outside the "+ or -" 15% range of the input rating.



Over-Current: The fault light will be on **continuously**. This indicates that input current has been exceeded.



All fault signals will remain on for a minimum of 10 seconds. If fault clears, all will reset automatically except for over-current. To clear over-current, the power must be shut off for 5 seconds and then turned back on.

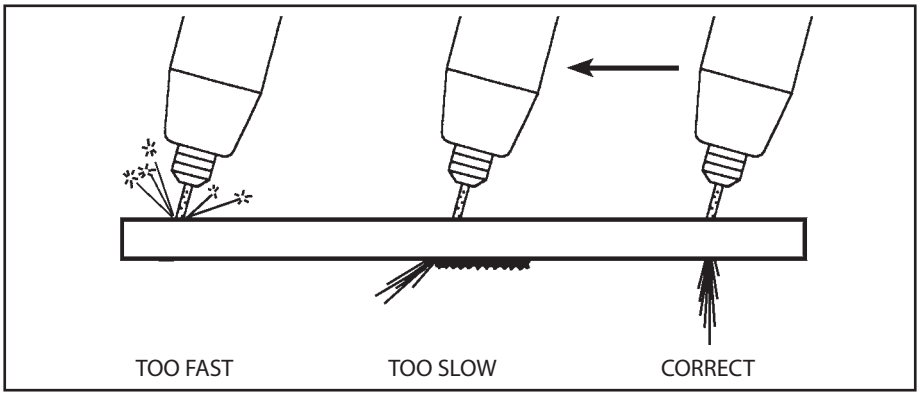


Fig. 4.2 - Effect of Cutting Speed

WARNING

Wear the usual protective gloves, clothing, and helmet. Helmet with filter lens shade No. 6 or 7 should provide adequate protection for your eyes.

WARNING

Never touch any parts forward of the torch handle (tip, heat shield, electrode, etc.) unless the power switch is in the OFF position.

WARNING

Position the POWERCUT 650 at least 10 feet (3 meters) from the cutting area to protect the unit from sparks and hot slag from the cutting operation.

4.1 CUTTING WITH THE PT-31XLPC

After placing the primary (wall) switch to the ON position and making control and air pressure adjustments as described above, proceed as follows:

1. Touch the tip of the torch to the workpiece (or within 0.5mm / 0.02in. of the workpiece) holding the torch at about 15- 30° angle to avoid damaging the tip.
2. Depress the torch switch. (Air and high frequency should energize.)
3. Two seconds after depressing torch switch, the plasma arc will start cutting. (If using the LOCK-IN mode, torch switch can be released after establishing the cutting arc.)
4. After starting the cut, the tip can be dragged along the workpiece if cutting up to 6.4mm (1/4") thick material. When cutting material greater than 6.4mm (1/4"), maintain a 3.2mm (1/8") tip-to-work (standoff) distance.
5. When ending a cut, the torch switch should be released (press and release if using LOCK-IN mode) and lifted off the workpiece just before the end of the cut to minimize double-arcing which can damage the tip. This is to prevent high frequency from reigniting after cutting arc extinguishes.
6. In the postflow mode, the arc can be restarted immediately by depressing the torch switch. The two second preflow will automatically cancel.

4.2 OPERATING TECHNIQUES

1. **Piercing** - Materials (up to 3.2mm / 1/8in. thick) may be pierced with the torch touching the work. When piercing thicker materials (up to 4.8mm / 3/16in. aluminum or 6.4mm / 1/4in. stainless or carbon steel) at an angle, position the torch 0.5mm (.02") above the workpiece. Start the cutting arc, then immediately raise the torch to 1.6mm (1/16") stand-off and move the torch along the cut path. This will reduce the chance of spatter from entering the torch and prevent the possibility of welding the tip to the plate. The torch should be angled at about 30° when starting to pierce, and then straightened after accomplishing the pierce.

2. **Grate Cutting** - For rapid restarts, such as grate or heavy mesh cutting, do not release the torch switch. This avoids the 2 second preflow portion of the cutting cycle.

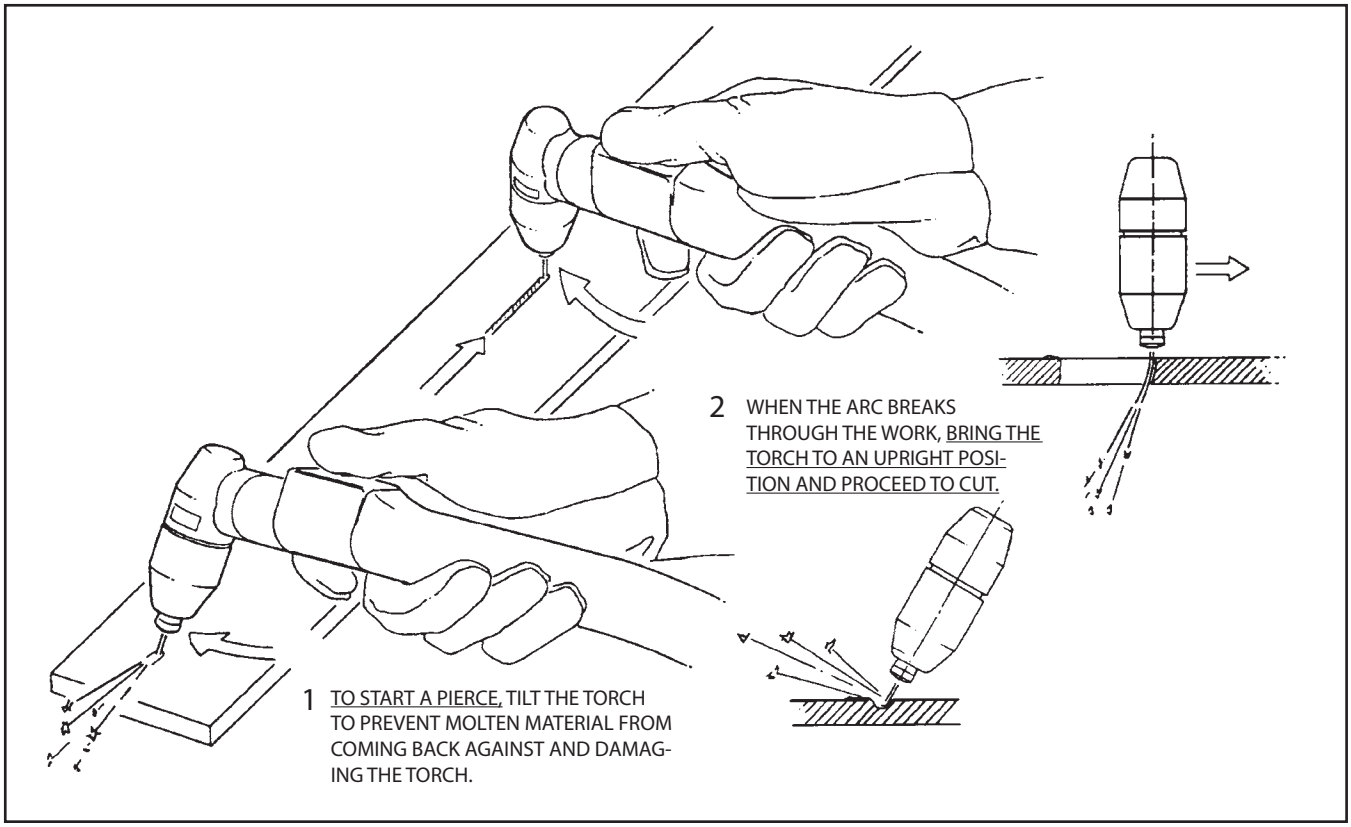


Figure 4.3. Piercing Technique using the PT-31XLPC

NOTE: Lower the air pressure to 5.2 bar (75 psig) on materials ≤ 1.6mm (1/16") or when inconsistent arc starting is experienced at 5.5 bar (80 psig).

NOTE: The speeds given here are typical for best quality cuts. Your actual speeds may vary depending on material composition, surface condition, operator technique, etc. If cutting speed is too fast, you may lose the cut. With slower speeds excessive dross may accumulate. If speed is too slow, the arc may extinguish. Air cutting typically produces a rough face on stainless steel and aluminum.

Cutting Speed Range — POWERCUT 650
(Using Air with XT Consumables 40A @ 5.2 bar / 75 psig)
Nozzle - P/N 0558000512 (20860), Electrode - P/N 0558000507 (20862)
With 1.6mm (1/16") Standoff (Tip to Work Distance)

Material	Thickness (mm / in.)	Cutting Speed (mm/m / ipm)
Carbon Steel (AISI 1020)	1.6 (1/16)	8,382 (330)
	3.2 (1/8)	2,667 (105)
	6.4 (1/4)	1,346 (53)
	9.5 (3/8)	559 (22)
	12.7 (1/2)	305 (12)
	15.9 (5/8)	203 (8)
	19.1 (3/4)	102 (4)
Stainless Steel (AISI 304)	1.6 (1/16)	8,128 (320)
	3.2 (1/8)	2,286 (90)
	6.4 (1/4)	1,016 (40)
	9.5 (3/8)	508 (20)
	12.7 (1/2)	305 (12)
	15.9 (5/8)	203 (8)
	19.1 (3/4)	76 (3)
Aluminum (6061)	1.6 (1/16)	11,430 (450)
	3.2 (1/8)	5,080 (200)
	6.4 (1/4)	1,778 (70)
	9.5 (3/8)	762 (30)
	12.7 (1/2)	356 (14)
	15.9 (5/8)	279 (11)
	19.1 (3/4)	203 (8)

4.3 COMMON CUTTING PROBLEMS

Listed below are common cutting problems followed by the probable cause of each. If problems are determined to be caused by the POWERCUT 650, refer to the maintenance section of this manual. If the problem is not corrected after referring to the maintenance section, contact your ESAB representative.

A. Insufficient Penetration.
1. Cutting speed too fast.
2. Damaged cutting nozzle.
3. Improper air pressure.

B. Main Arc Extinguishes.
1. Cutting speed too slow.

C. Dross Formation. (In some materials and thicknesses, it may be impossible to get dross-free cuts.)
1. Cutting speed too fast or too slow.
2. Improper air pressure.
3. Faulty nozzle or electrode.

D. Double Arcing. (Damaged Nozzle Orifice.)
1. Low air pressure.
2. Damaged cutting nozzle.
3. Loose cutting nozzle.
4. Heavy spatter.

E. Uneven Arc.
1. Damaged cutting nozzle or worn electrode.

F. Unstable Cutting Conditions.
1. Incorrect cutting speed.
2. Loose cable or hose connections.
3. Electrode and/or cutting nozzle in poor condition.

G. Main Arc Does Not Strike.
1. Loose connections.

H. Poor Consumable Life.
1. Improper gas pressure.
2. Contaminated air supply.

5.0 INSPECTION AND CLEANING

CAUTION

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.

Frequent inspection and cleaning of the POWERCUT 650 is recommended for safety and proper operation. Some suggestions for inspecting and cleaning are as follows:

A. Check work cable to workpiece connection.
B. Check safety earth ground at workpiece and at power source chassis.
C. Check heat shield on torch. It should be replaced if damaged.
D. Check the torch electrode and cutting nozzle for wear on a daily basis. Remove spatter or replace if necessary.
E. Make sure cable and hoses are not damaged or kinked.
F. Make sure all fittings and ground connections are tight.
G. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the POWERCUT 650 using low-pressure dry compressed air.

5.1 FLOW SWITCH (FIGURE 5-1)

WARNING

Be sure that the wall disconnect switch or wall circuit breaker is open before attempting any inspection or work inside of the POWERCUT 650.

When excessive contamination is found in the air, the flow switch (FS) should be removed, disassembled and cleaned as follows:

A. Ensure the system is shut down and there is no trapped air under pressure in the piping.
B. Remove the piston plug.
C. Remove the spring (FS-4 only). Use care when handling spring to prevent distortion.
D. Remove the piston.
E. Clean all parts with cleaning agent. Ensure cleaning agent does not contain solvents which can degrade polysulfone. Warm water and detergent is recommended for cleaning. Allow all parts to dry thoroughly before reassembly.

Reassemble the flow switch in reverse order.

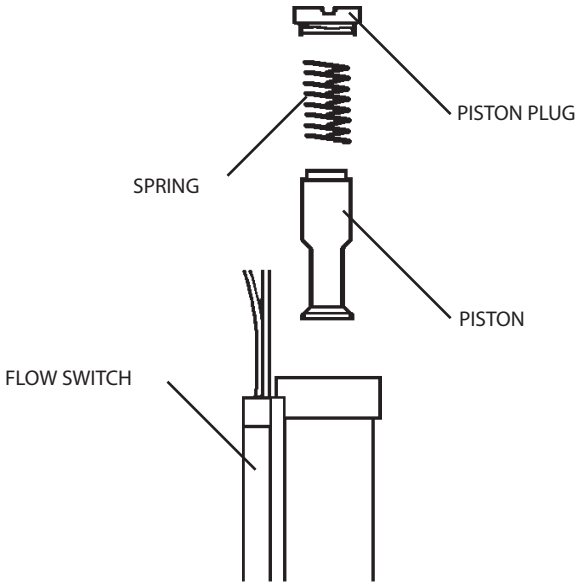


Figure 5-1. Disassembly / Assembly of Flow Switch

5.2 TROUBLESHOOTING

WARNING

ELECTRIC SHOCK CAN KILL! Be sure that all primary power to the machine has been externally disconnected. Open the line (wall) disconnect switch or circuit breaker before attempting inspection or work inside of the power source.

Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for secure terminal connections, loose or burned wiring or components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can be found by referring to the sequence of operations (Figures 5-2 and 5-5) and electrical schematic diagram and checking the various components. A volt-ohmmeter will be necessary for some of these checks.

WARNING

Voltages in plasma cutting equipment are high enough to cause serious injury or possibly death. Be particularly careful around equipment when the covers are removed.

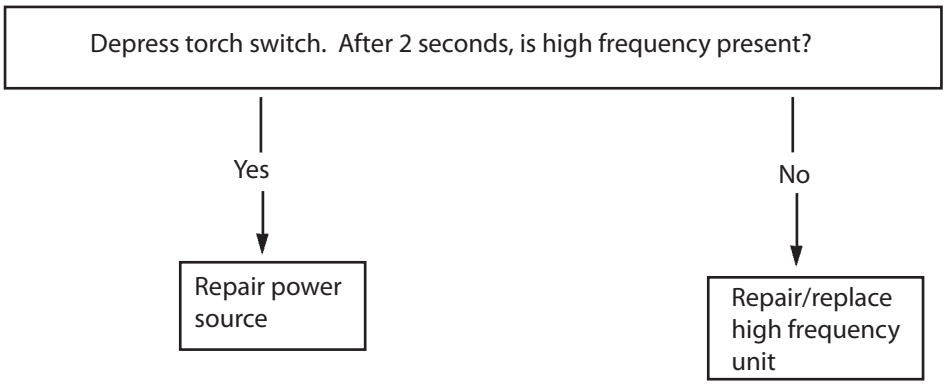
NOTE

Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

5.3 TROUBLESHOOTING GUIDE

A. Difficult Starting.

- Change electrode
- Change nozzle
- Check for good, clean connection of work lead to workpiece
- Check air pressure (4.5-5.2 bar / 65-75 psig)
- Check torch power cable for continuity



B. No Air

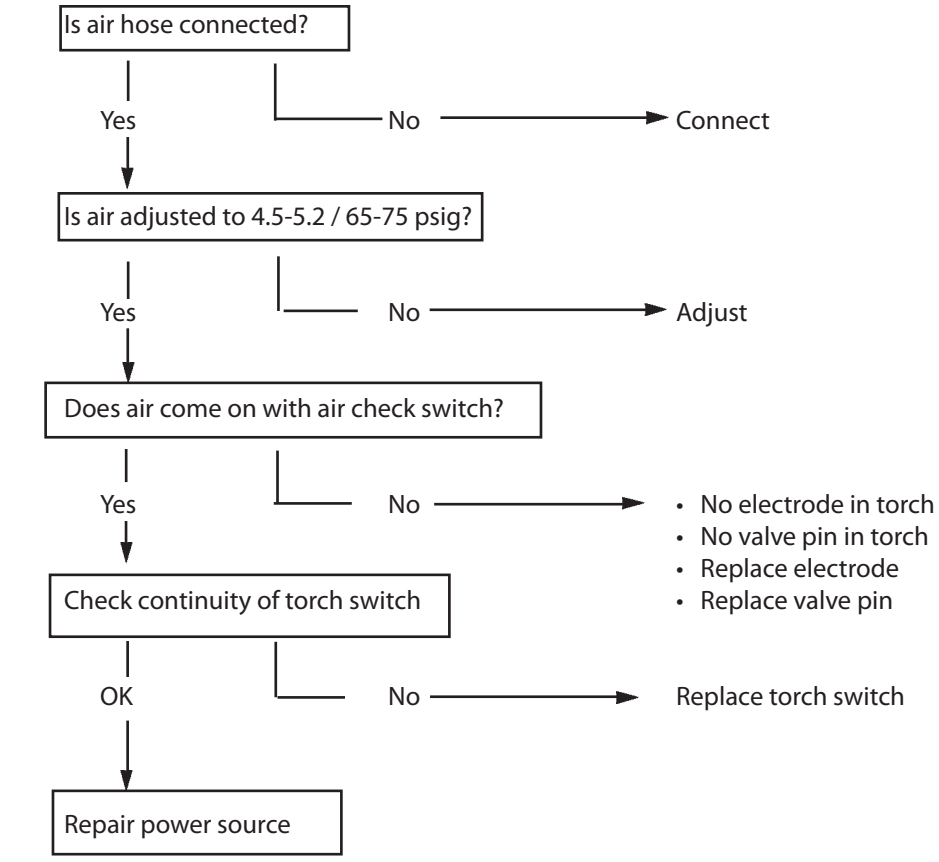


Figure 5-2. Sequence of Operations

C. Air does not shut off

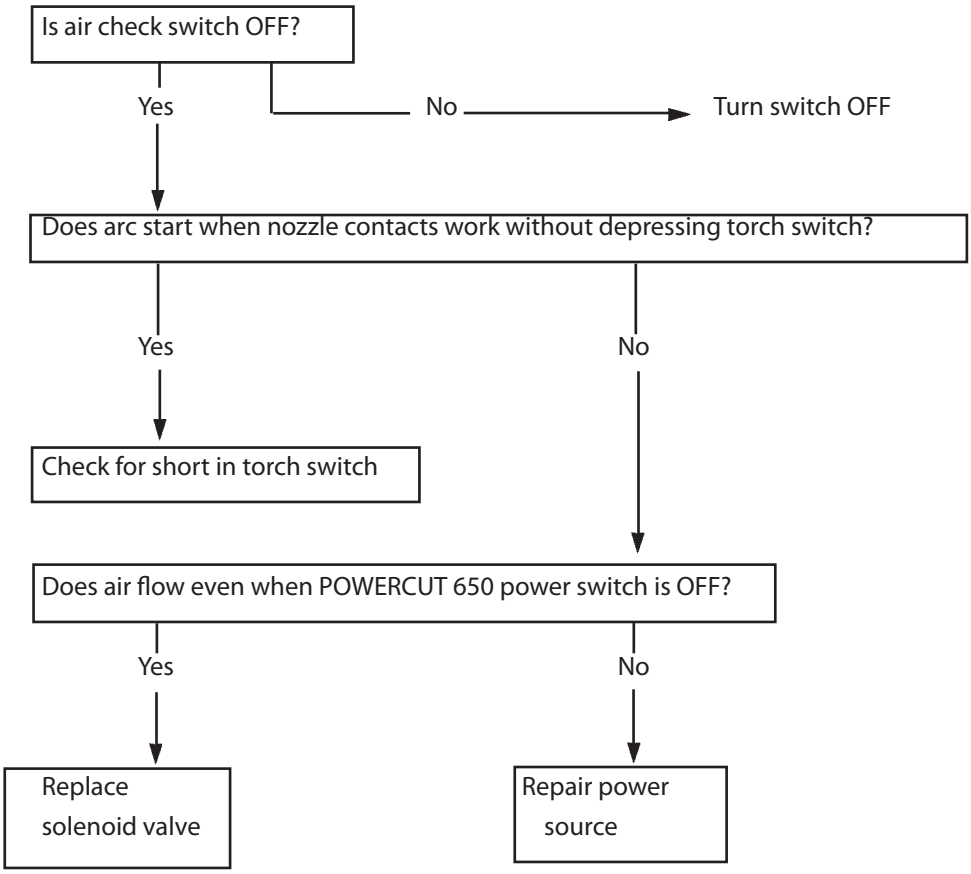


Figure 5-3. Sequence of Operations

D. White "Power" light not energized.

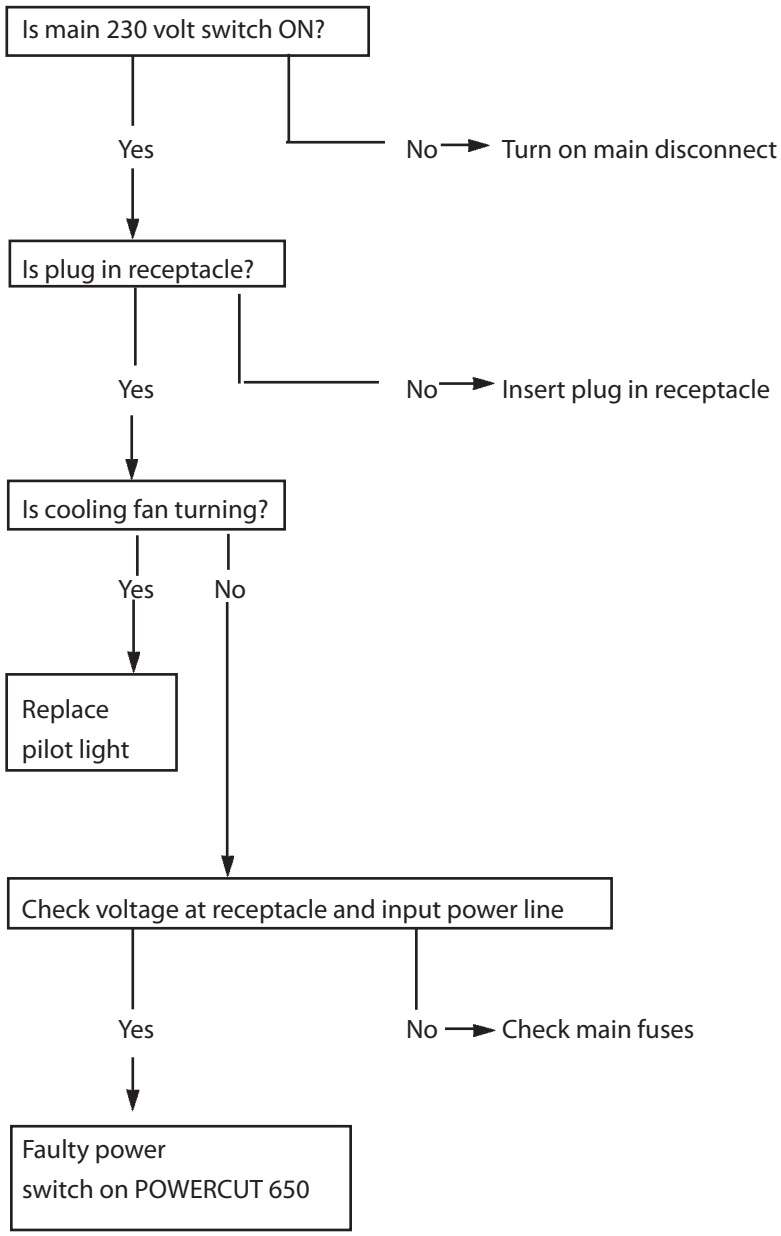


Figure 5-4. Sequence of Operations

E. Amber "FAULT" light ON.

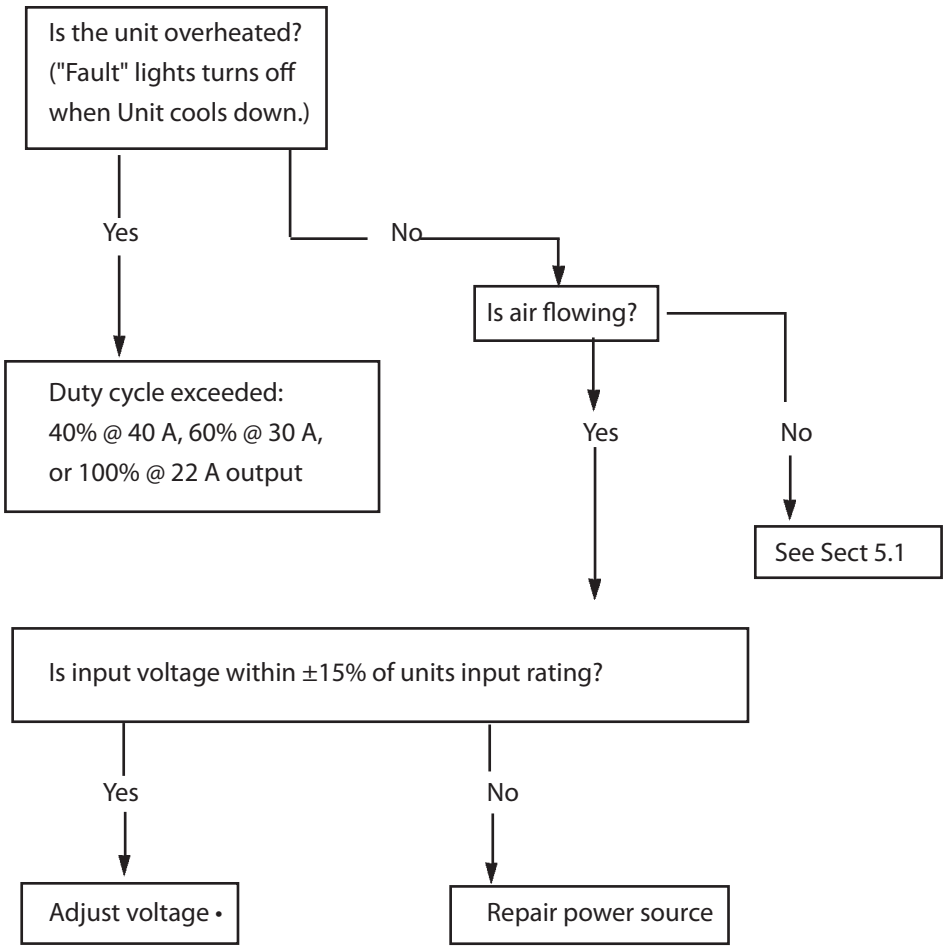


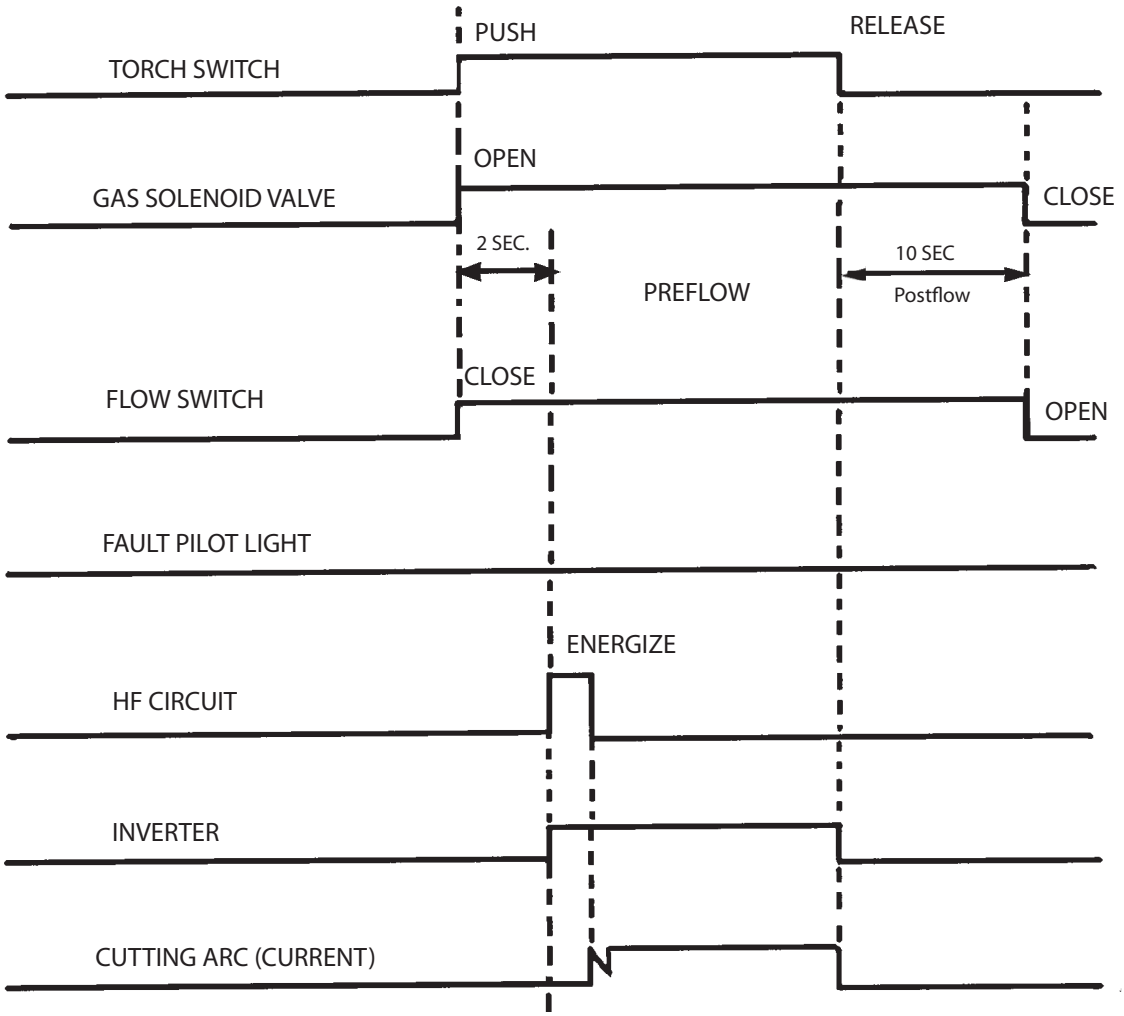
Figure 5-5. Sequence of Operations

- Fault light will energize if input voltage goes below or above ±15% of units input rating. The light will not turn OFF even when correct voltage is restored. Reset by placing POWERCUT 650 power switch OFF and then ON again.

NOTE: When in LOCK-IN mode, the FAULT light will turn on during second "trigger". This does not affect performance. Turn off.

5.4 SEQUENCE OF OPERATION

A. LOCK-IN "OFF" position

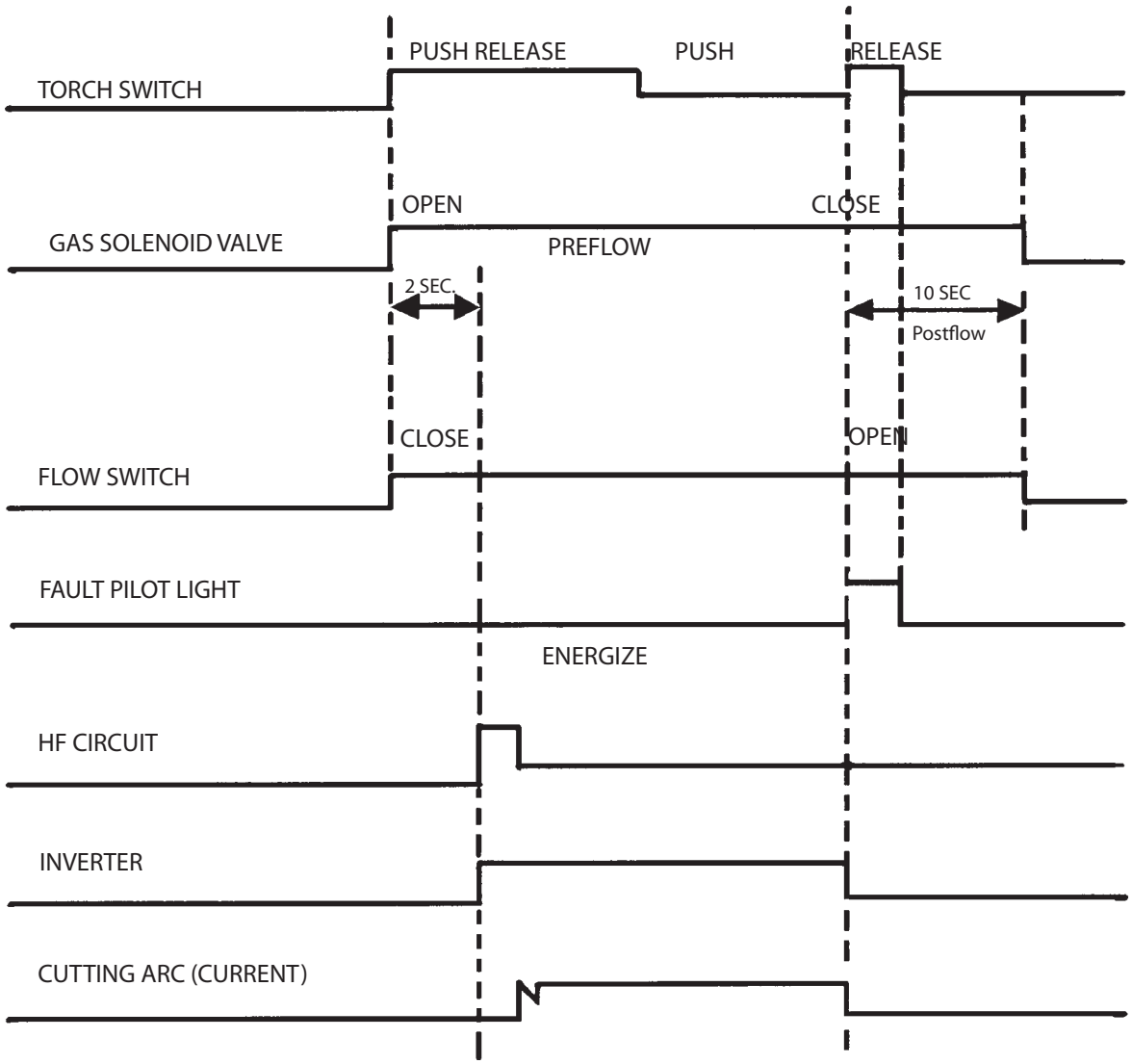


NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.

2. When the amber fault pilot light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.

B. LOCK-IN "ON" position



NOTES:

1. When the torch switch is pushed during postflow period, the postflow and preflow times are canceled, and the HF is energized immediately.

2. When the amber fault pilot light comes on, cutting operation should be stopped. The postflow time starts from the moment the torch switch is released.

3. FAULT pilot light is on during second "turn-off" trigger only. This does not affect performance in any way.

5.5 RE-FITTING THE PT-31XLPC TORCH

1. For operator safety, the torch connections are located on the output terminal board behind the lower portion of the front panel.

2. Thread the power cable and switch lead of the PT-31XLPC through the Strain Relief on the Access Cover. Connect power cable to the torch fitting (left-hand threads) and plug in the switch lead to the torch switch receptacle on the output terminal board. Make sure the power cable connection is wrench-tight. Make sure plug of switch lead is firmly locked in place.

3. Reassemble the access door to the power source. Retighten Strain Relief to secure power cable, but do not overtighten.

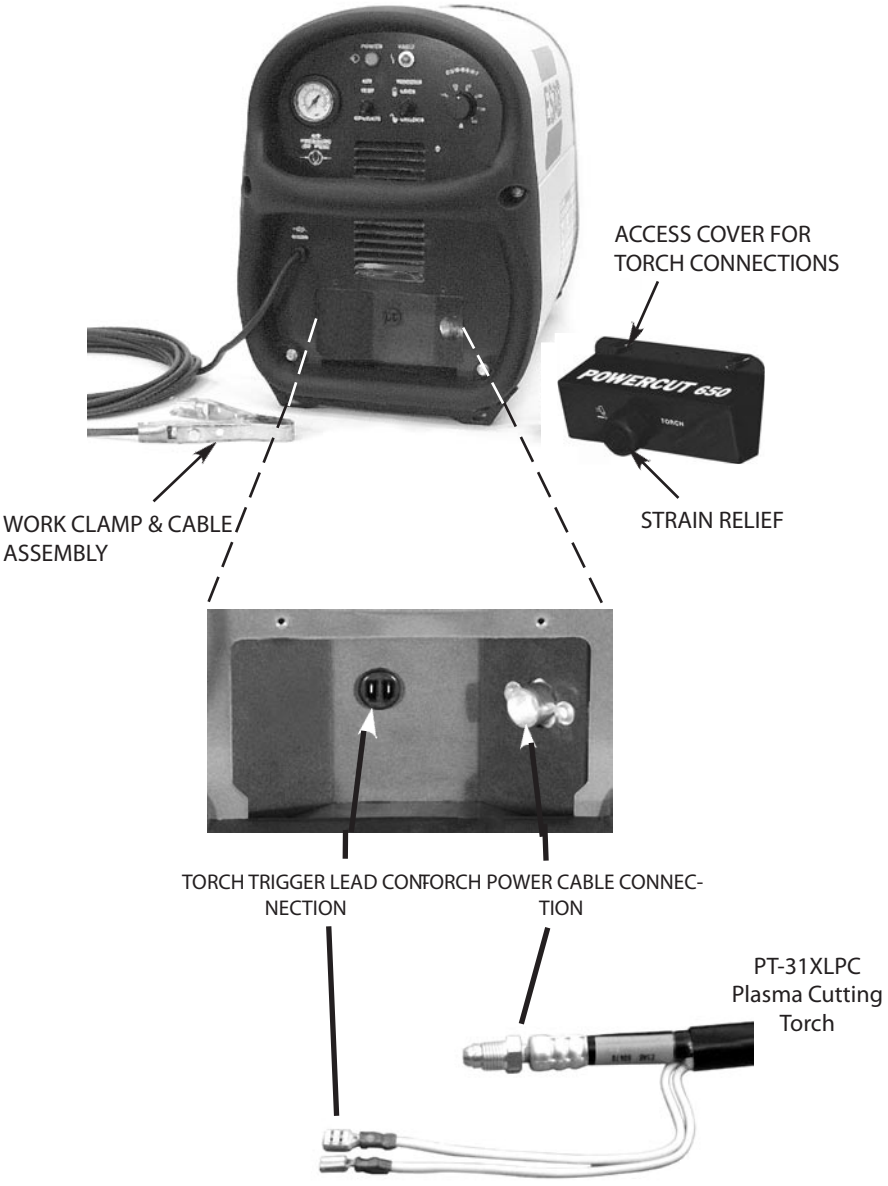


Figure 5-6. PT-31XLPC Torch Connections

NOTE:

Schematics and Wiring Diagrams on 279.4mm x 431.8mm (11″ x 17″) paper are included inside the back cover of this manual.