



Operating Manual

Sabre-arc 50i Sabre-arc 80i PT-81 Plasma Torch Plasma Arc Cutting Packages



**Please ensure that this
Instruction Manual is made
available to the user of
the equipment**



Contents

	Page
• Warnings	3
• Safety	4
• Introduction	5
• Specifications	6
• Un-packing	7
• Installation	8
• Controls & facilities	12
• Operation	13
• Maintenance	17
• Trouble shooting	22
• Circuit Diagrams	25
• Parts List	27



WARNING



This cutting equipment has been designed, manufactured and tested to the highest standards to ensure long and trouble free life. However, regular maintenance is an essential part of keeping the machine operating in a reliable and safe manner and your attention is drawn to any maintenance instructions that are contained in this manual.

In general, all cutting equipment should be thoroughly inspected, tested and serviced at least annually. More frequent checking will be required when the equipment is heavily used.

Wear and tear, particularly in electro-mechanical and moving components, are gradual processes. Caught in time, repair costs are small and the benefits in performance reliability and safety are significant. Left alone, they can put the equipment, and you, at risk.

Have this equipment regularly inspected and maintained by an approved service centre.



WARNING



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

ELECTRIC SHOCK - Can Kill

- Install and earth the welding 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 work.
- Ensure your working position is secure.

FUMES AND GASES - Can be Dangerous to Health

- Keep your head out of the fumes.
- Use ventilation, extraction at the arc, or both, to keep fumes and gases 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 screen and filter lens and wear protective clothing.
- Protect bystanders with suitable screens or curtains.

NOISE- Excessive noise can damage hearing

- Protect your ears. Use ear defenders or other hearing protection.
- Warn bystanders of the risks.

**READ AND UNDERSTAND THE INSTRUCTION MANUAL
BEFORE INSTALLING OR OPERATING AND SEE 18 PUBLICATION 237
'The arc welder at work' AVAILABLE FROM THE MANUFACTURER.**

PROTECT YOURSELF AND OTHERS

SAFETY

In any arc welding or cutting operation, it is the responsibility of the user to observe certain safety rules to ensure his personal safety and to protect those working near him.

Read all safety articles relevant to arc welding or cutting published by the WMA. Pay particular attention to any **CAUTION** or **WARNING** Notes included in this manual. **CAUTION** indicates possible equipment damage. **WARNING** indicates possible hazard to life.

⚠ **WARNING** ⚠

*The ON/OFF switch on this equipment does not isolate the unit from the mains electrical supply. **AC POWER IS PRESENT ON THE ON/OFF SWITCH TERMINALS.***

*The On/Off lamp is an indication that the supply is switched on and does not imply that the unit is isolated from the supply. **BEFORE REMOVING THE COVERS FOR MAINTENANCE, ISOLATE THE UNIT FROM THE MAINS ELECTRICAL SUPPLY.***

1. Electrical

- ⚠ Treat electricity with respect. Even the open circuit voltage of this equipment can be dangerous. Adjustments to the torch or replacement of torch parts should be undertaken with the mains supply isolated from the unit.
If damaged torch cables or torch components are found, the unit must be disconnected from the mains and defective parts must be replaced using only Murex spare parts.
- ⚠ Do not work on live circuits or cables. Disconnect the main power supply before checking the machine or performing any maintenance operation.
- ⚠ Be sure the case of the welding machine is properly connected to a good electrical earth.
- ⚠ Have the wiring for the welding machine installed by a qualified electrician. All connections must be made according to specifications in force and to general safety standards.
- ⚠ Do not stand in water or on damp floors while using an arc welder or cutter. Do not use in the rain.
- ⚠ Do not operate with worn or poorly connected cables. Inspect all cables frequently for insulation failure, exposed wires and loose connections.
- ⚠ Do not overload cables or continue to operate with overheating cables. Cables which are too small for the current carried will overheat, causing rapid deterioration of the insulation.
- ⚠ Pay attention that live parts of the torch do not touch any metal which is connected to the earth cable. Fix an insulated hook to hang the torch on when it is not in use.

1. Ventilation

- ⚠ Do not weld or cut on containers which have held combustible or flammable materials, or materials which give off flammable or toxic vapours when heated, without proper cleaning.
- ⚠ Locate the welding/cutting operation far enough from any vapour-type degreaser using trichlorethylene or other chlorinated hydrocarbons as solvents. The ultraviolet light from the arc can decompose these vapours into toxic gases at a considerable distance from the arc, even though the concentration of the gases is low enough to be undetectable by smell.
- ⚠ Be sure to provide adequate ventilation for removal and dilution of fume and gases. Fume exhaust facilities near the arc, or a ventilated helmet should be used when cutting in confined spaces or on toxic material.

2. Glare

- ⚠ Never look at the arc without wearing eye protection. Always use the proper protective clothing, filter glasses, and gloves. Be careful to avoid exposed skin areas. Do not use cracked or defective helmets or shields.
- ⚠ Never strike an arc when there is someone near who is not protected from the strong light of the arc.
- ⚠ Warn bystanders who are not aware of the dangers of ultraviolet light.

3. General

- ⚠ Take care when lifting the unit.
- ⚠ Ensure that cylinders are secured by chains.
- ⚠ Locate the unit so that there is adequate air flow to the ventilation louvres.
- ⚠ Always dress correctly to protect against glare, radiation and spatter.

4. Fire

- ⚠ Ensure that the correct type of fire extinguisher is available in the operating area.
- ⚠ Do not use near flammable materials or liquids, in or near explosive atmospheres, or on pipes carrying explosive gases.

5. Vehicle Electrics

- ⚠ When working on motor vehicles, remove the battery and any circuitry which may be damaged by the arc.
- ⚠ Whilst cutting be aware of the possibility of 'hidden wires' behind panels or bulkheads.

INTRODUCTION

Sabre-arc 50i & 80i power sources

The Murex Sabre-arc 50i and 80i are portable plasma cutting systems designed to work on industrial 380/415V power supplies and utilise clean and dry factory compressed air for both the plasma and secondary cooling gas. The power sources use inverter technology to give precise control of the cutting current and together with the PT-81 torch enables conducting materials up to 18mm (50i) and 25mm (80i) respectively.

PT-81 Plasma Cutting Torch

The patented Murex PT-81 torch is designed to operate to a maximum of 80 amperes at 100% duty cycle using clean dry air for both cooling and plasma gases. A built in air check valve inside the PT-81 torch head, in combination with air flow detection circuitry in the Sabre-arc power source, ensures the torch cannot be energised when the heatshield is removed.

The PT-81 is available with either 7.6m or 15m cables (7.6m is standard with both the Sabre-arc 50i and 80i).

The PT-81 is best applied using a 3mm to 6mm stand off (tip to work) for cutting material thicknesses of 3mm to 25mm.

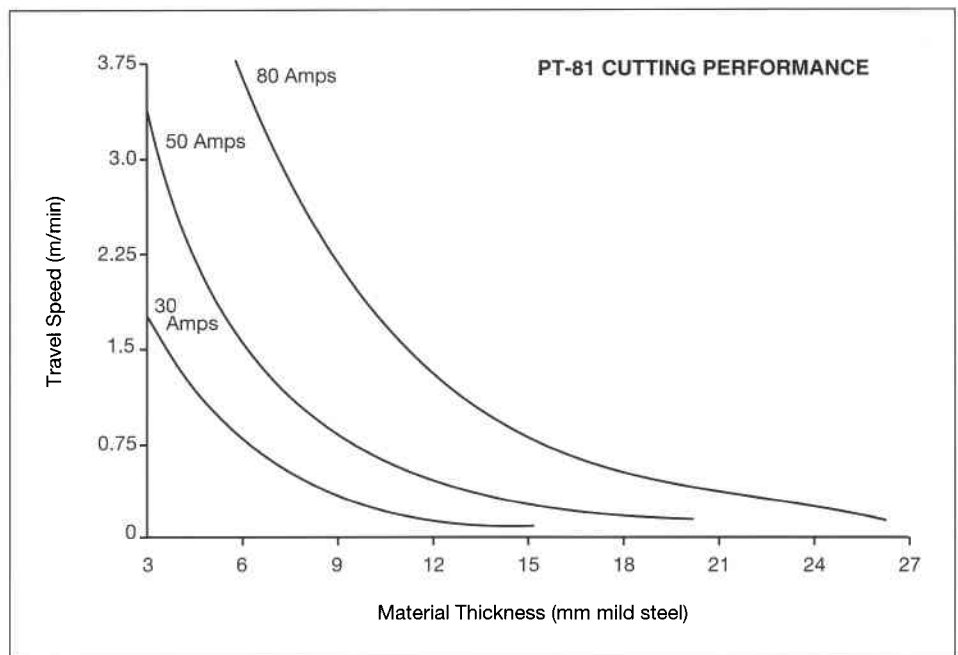


Figure 1.

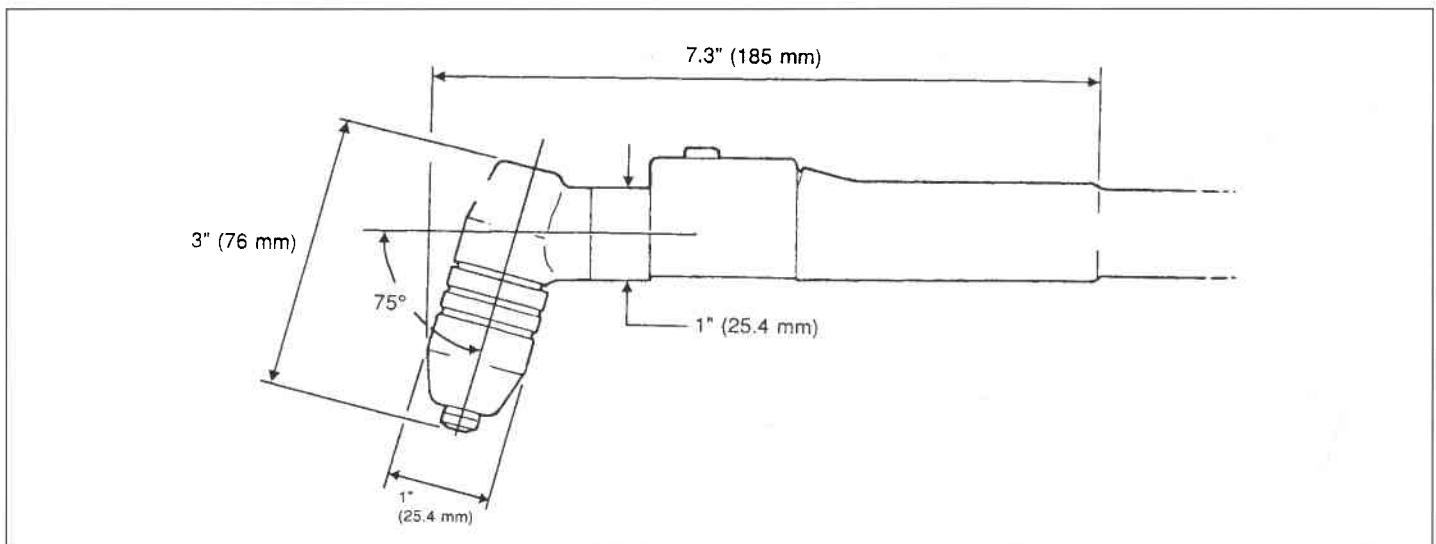


Figure 2. PT-81 Dimensions



SPECIFICATION

	SABRE-ARC 50i	SABRE-ARC 80i
Output		
Open Circuit Voltage	265Vdc	275Vdc
Output Current	10-50A	15-80A
Duty Cycle	50A @ 105Vdc	–
40%	40A @ 104Vdc	80A @ 108Vdc
60%	30A @ 103Vdc	50A @ 105Vdc
100%		
Input		
Mains Voltage	380/415Vac	380/415Vac
Frequency	50/60Hz	50/60Hz
Phases	3	3
Primary Current at Max Output	14A/Phase	20A/Phase
Fuse Rating	20 A	30A
Dimensions		
Length	483mm	750mm
Height	457mm	534mm
Width	305mm	305mm
(inclusive of torch storage)		
Weight	32kg	44kg

PT-81 PLASMA TORCH		
Duty Cycle		80A @ 100%
Weight	7.6m	2.4kg
	15m	4.4kg

UNPACKING

The Murex Sabre-arc systems comprise the following items

Description	Part No
SABRE-ARC 50i PACKAGE Containing: Sabre-Arc 50i Power Source with regulator	1415300
PT-81 Plasma Torch 7.6m	1415302
Work cable 7.6m	680560
Spare parts kit 50A (see table 1)	1415304
SABRE-ARC 80i PACKAGE Containing: Sabre-Arc 80i Power Source with regulator	1415301
PT-81 Plasma Torch 7.6m	1415302
Work cable 7.6m	30741
Spare parts kit 80A (see table 1)	1415305

Check that all required items are present and inspect carefully for evidence of damage which may not have been apparent on the external packing. If necessary notify the carrier or your Murex distributor immediately.

Table 1 PT-81 Spare Part Kits

Description	50i Kit 1415304	QTY	80i Kit 1415305	QTY
Heat Shield Long	1415306	2	1415217	2
50A Nozzle	1415211	4	-	
80A Nozzle	-		1415212	4
Stand off guide	1415215	1	1415215	1
Swirl Baffle	1415213	1	1415213	1
Electrode	1415214	3	1415214	3
Fuse	951780	4	951780	4
Valve Pin	21619	1	21619	1

INSTALLATION

Installation must only be undertaken by a qualified electrician or suitably trained person.

1. Choose a location so that the louvres on the front and rear are clear of any obstruction and permit free flow of air through and around the unit. Refer to Safety section for other precautions regarding siting the unit.

WARNING

Electric shock can kill! Precautionary measures should be taken to provide maximum protection against electric shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the primary cable to the unit when connections are made inside the power supply.

2. The Sabre-arc 50i and 80i

Power sources are equipped with a 3m primary input cable suitable for use on 380/415V 50/60Hz supply.

Connection should be made as follows:-

Brown - L1
Blue - L2
Yellow - L3
Green/Yellow - Earth

A suitable switched isolator should be used and the circuit must be protected by a suitable fuse.

Sabre-arc 50i - 20A fuse (slow blow)

Sabre-arc 80i - 30A fuse (slow blow)

3. For operator safety, the torch and work return cable connections are located on a panel behind the cover on the front bottom of the unit. Note that a safety interlock prevents the unit being operated whilst the cover is removed.

WARNING!

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

WARNING!

Do not use any torch with this unit other than the PT-81 torch without consulting Murex Welding products technical department. Serious injury may occur if used with any other torch.

4. Connect a supply of CLEAN DRY COMPRESSED AIR to the regulator input nipple. The supply requirements are 6 bar minimum, 10 bar maximum (90-150 psi) at 100-150 L/min. Do not use compressed air that has been oil loaded for pneumatic tools etc.

5. Clamp the work return clamp onto the workpiece ensuring that the connection point is free from rust, salt or paint.

6. Connect the workpiece at work table to an approved earth ground with a properly sized ground cable refer to figs 3 & 4.

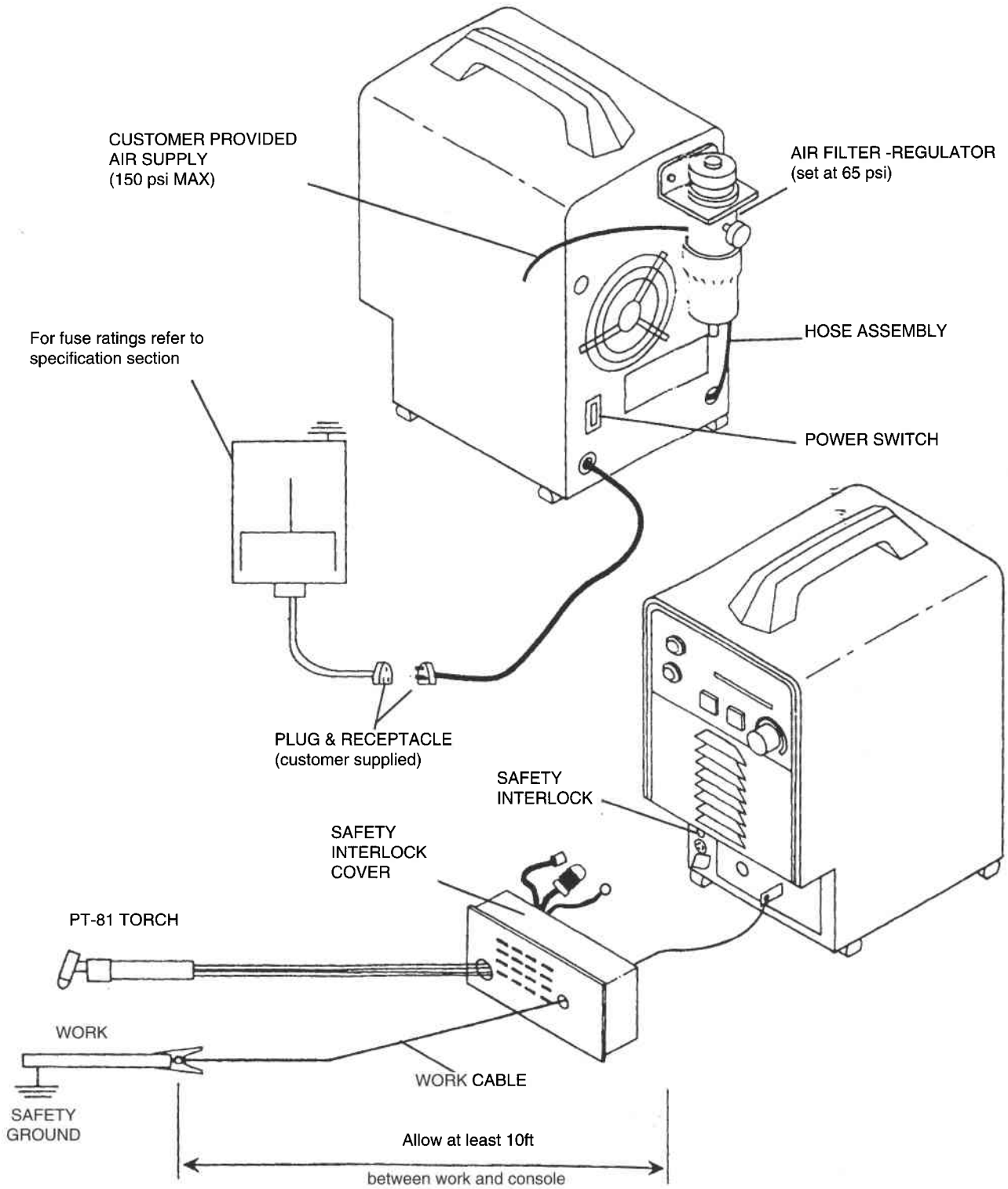


Figure 3. Sabre-arc Interconnection diagram

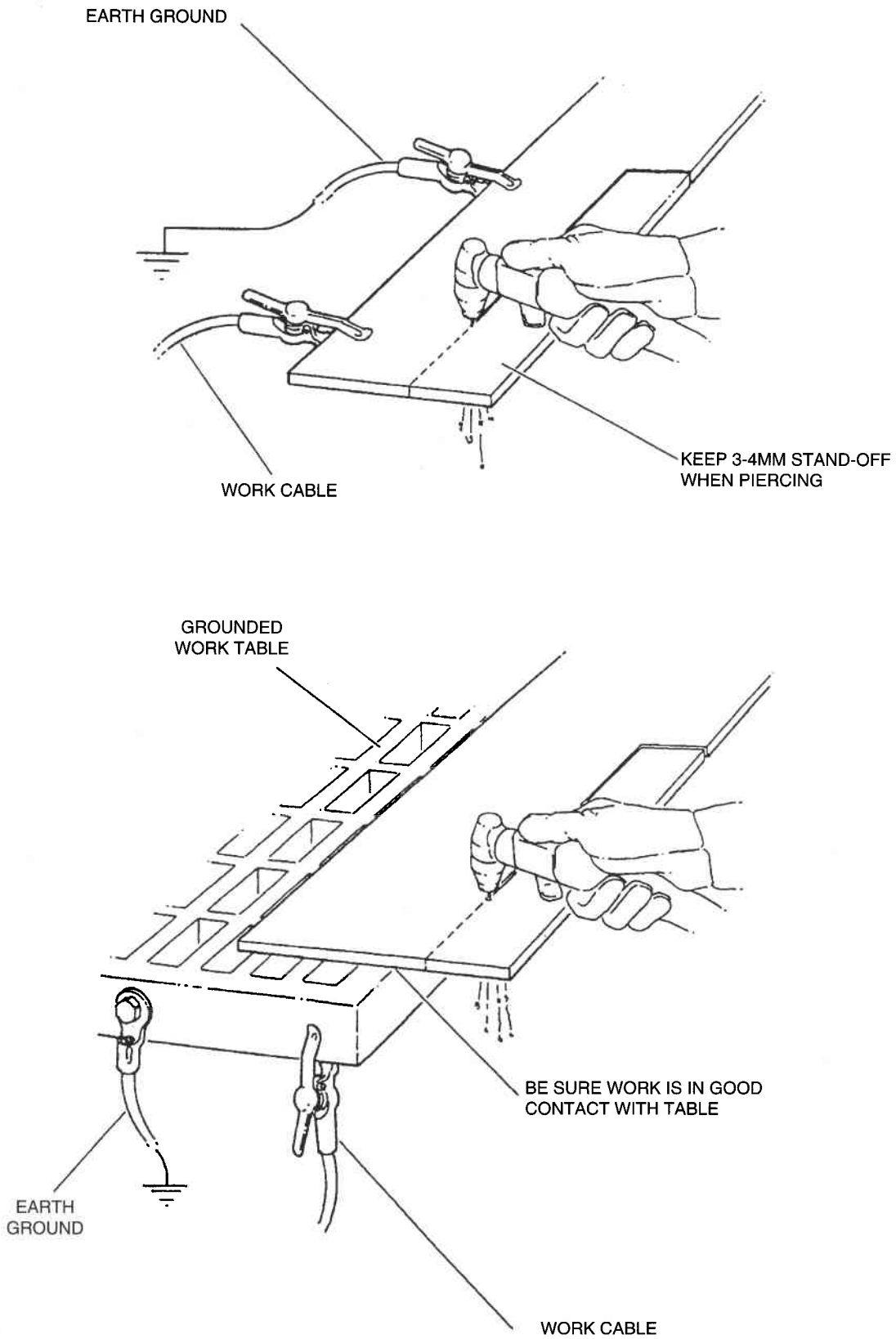


Figure 4. Ground and Work Cable Connections

ASSEMBLING THE PT-81 TORCH CONSUMABLES

WARNING!

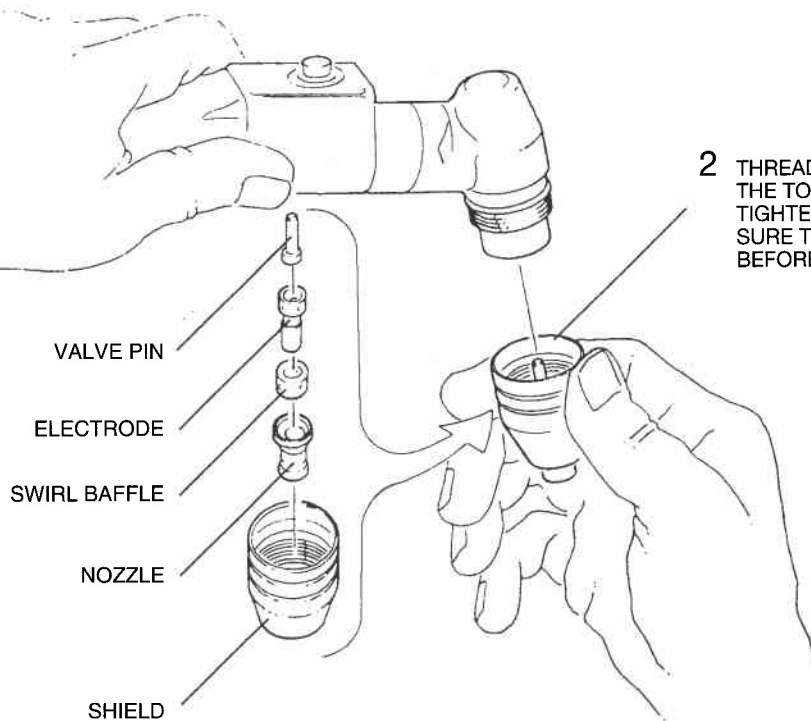
Make sure the power switch is on the Sabre-arc is in the off position and primary input power is de-energised.

The plasma arc process employs extremely high voltages. Contact with live parts of the torch and machine must be avoided.

The electrode seat comes factory assembled in the PT-81 Torch head. Make sure seat is firmly tightened with a 0.125-inch hex key. Do not overtighten. Refer to page 30 for installation procedure for installing seat in head.

Place the nozzle, swirl baffle, electrode and valve pin into the heatshield as shown in Figure 5. With the torch head front end facing downward, thread this assembly to the torch head and hand tighten snugly to hold parts in firm contact with each other and the torch head.

1 PLACE THE NOZZLE, SWIRL BAFFLE, ELECTRODE, AND VALVE PIN INTO THE SHIELD



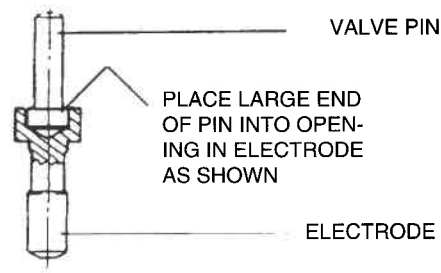
2 THREAD THIS ASSEMBLY TO THE TORCH BODY AND HAND TIGHTEN. ALWAYS MAKE SURE THE SHIELD IS TIGHT BEFORE CUTTING.

Figure 5 Assembly of PT-81 Torch Front End Parts

WARNING!

*The torch head contains a gas flow check valve that acts in conjunction with circuitry within the power source. This system prevents the torch from being accidentally energized with high voltage if the torch switch is closed when the shield is removed.

The valve pin is a crucial member of the system. Its function is to open the gas flow check valve that is permanently assembled within the torch head. If the pin is not correctly placed in the electrode, the valve will not open and the system will not function.



CAUTION

DO NOT REVERSE. Inserting the pin upside down will restrict air flow.

CONTROLS AND FACILITIES

1. Power on/off switch (rear panel)

In the on position the white pilot lamp is illuminated, the control circuitry is powered and the fan will run.

WARNING!

Placing the power switch in the OFF position does not totally isolate the unit from mains electrical power. Always isolate the machine from the electrical supply before carrying out any work on or in the power source.

2. Cutting Current Control

Enables the precise cutting current to the set for the plate to be cut. Control range is 10-50A (Sabre-arc 50i) and 15-80A (Sabre-arc 80i).

3. Air Check Switch. In the **ON** position, the air filter regulator can be adjusted to the required pressure, normally 60 psi, before cutting operations. In this mode air flows continuously and it is recommended, at least at the beginning of each shift, that the system is purged of any condensation that may have accumulated during the off period. Ensure the switch is in the **OFF** position before cutting.

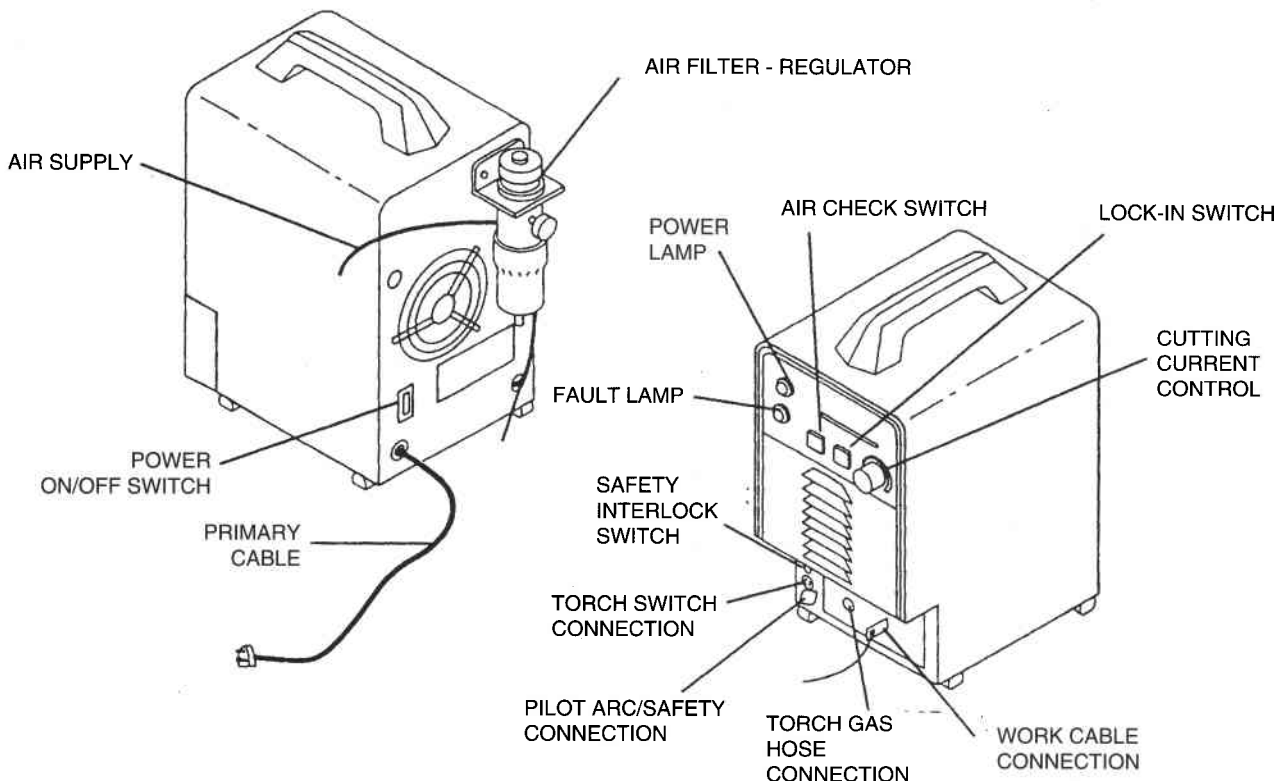
4. Lock-In Switch. In the **ON** mode the torch switch can be released after the cutting arc has been established. To stop the cutting operation momentarily operate the torch switch again or pull the torch switch away from the work. In the **OFF** mode the torch switch must be pressed during the entire cutting cycle.

5. Fault light

Will illuminate under the following conditions and the cutting output will be disabled.

- a. When the duty cycle has been exceeded (see specification section). If the power source is disabled due to this condition leave the machine with the power on and the fan running the thermal protection will automatically reset after a few minutes.
- 6. When the mains input voltage outside acceptable limits ie $\pm 10\%$ of normal values. To reset the machine turn the power **ON/OFF** switch off and then on.

Frequent operation of this fault condition should be investigated by a competent service engineer.



OPERATION

WARNING!

Refer to the safety notes at the front of this manual before commencing operation

WARNING!

Never under any circumstances operate the power source with the covers removed. In addition to the safety hazard, improper cooling may cause damage to internal components.

WARNING!

To prevent serious injury, never touch any parts forward of the torch handle (nozzle, heat shield, electrode, etc) when the ON/OFF switch on the Sabre-arc is in the ON position.

Use the following procedures to cut with the PT-81 Torch (figure 6).

1. Hold the torch approximately 3mm above the work and tilted at about 15-30°. If the PT-81's standoff tool is being used, set the standoff at 1.5mm for materials less than 6mm thick and 4 to 5mm for those over 6mm thick.
2. Depress the torch switch. Air should flow from the torch and the high frequency should energize.
3. Two seconds after depressing the torch switch, the Pilot Arc should start and the Main Arc should immediately follow allowing the cut to begin. (If using the LOCK-IN mode, torch switch may be released after establishing the cutting arc).
4. After starting the cut, the torch may be returned to the upright position. When not using the standoff guide, the nozzle should be held approximately 3mm from the work. When using the standoff guide, refer to Figure 8.

6. In the postflow mode, the arc can be restarted immediately by depressing the torch switch. The two second preflow will automatically cancel..

7. To determine the correct output current and travel speed for the material thickness being cut refer to figure 1 on page 5.

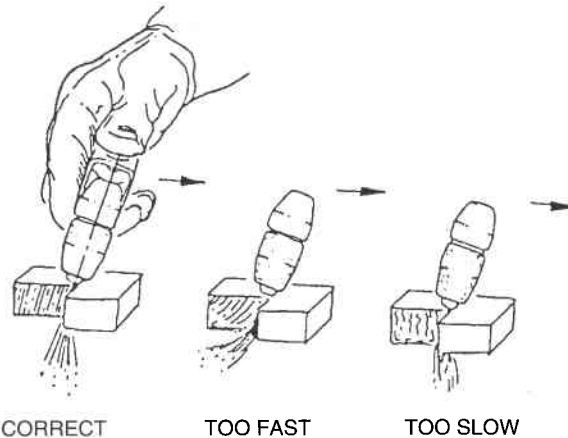


Figure 6 Effect of Cutting Speed

Caution

Be sure to change the electrode in the PT-81 torch before the length becomes shorter than 17mm. Using a shorter electrode will reduce nozzle life but more seriously it can cause a short and damage the torch and/or the power source.

Recommended Torch Angle of 5° to 15°

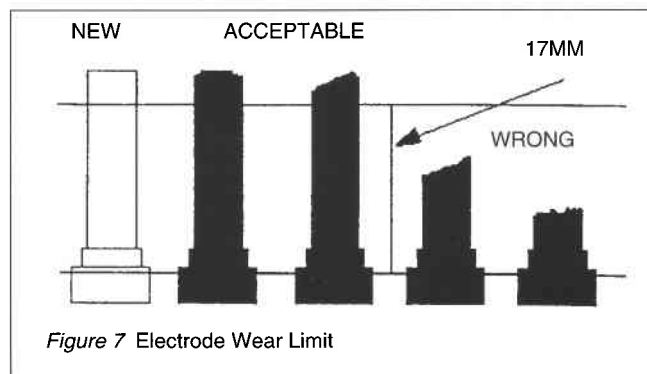
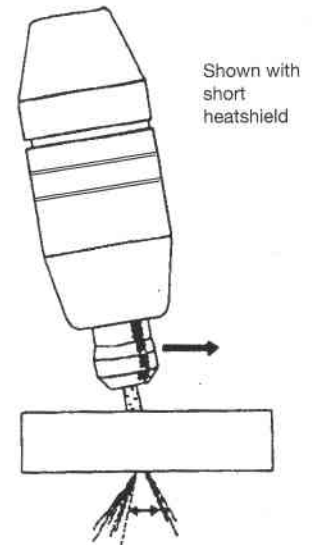


Figure 7 Electrode Wear Limit

Torch-To-Work Standoff Guide

If desired, a torch-to-work standoff guide (Pt No. 1415215) is available.

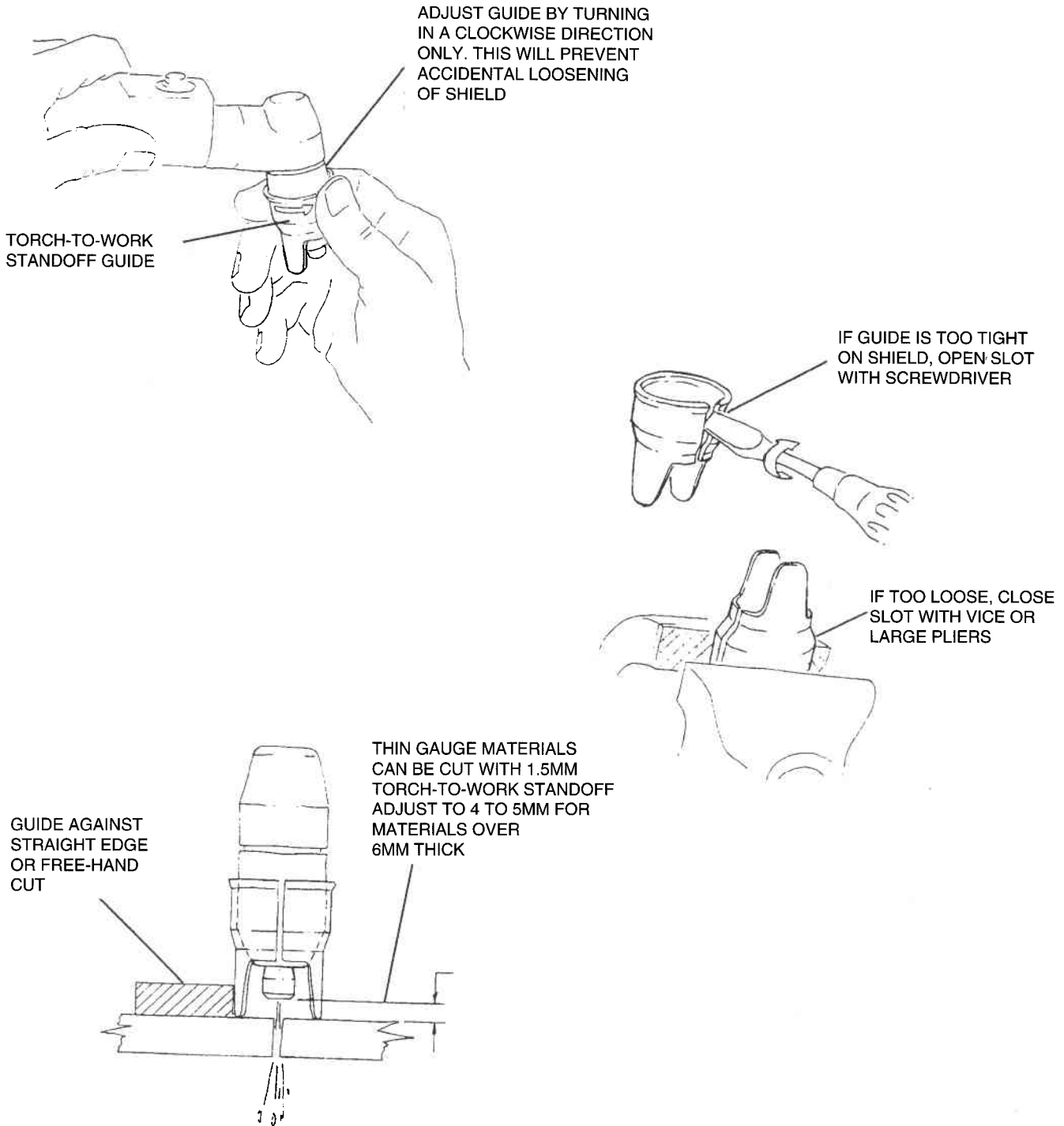


Figure 8 PT-81 Torch-To-Work Standoff Guide

COMMON CUTTING PROBLEMS

Problem	Remedy
1. Insufficient Penetration	<ul style="list-style-type: none"> • Cutting speed too fast • Damaged tip • Air pressure incorrect • Current too low
2. Main Arc Extinguishes	<ul style="list-style-type: none"> • Cutting speed too fast • Stand off distance too large • Worn electrode and tip • Duty cycle exceeded
3.Excessive Dross Formation Note if may be impossible with some materials and thicknesses to get totally dross-free cuts	<ul style="list-style-type: none"> • Incorrect cutting speed • Incorrect air pressure • Faulty tip or electrode
4. Double Arcing	<ul style="list-style-type: none"> • Low air pressure • Contact cutting at high current • Damaged or loose tip • Heavy spatter
5. Uneven Arc	<ul style="list-style-type: none"> • Damaged or worn tip and/or electrode
6. Unstable Cutting Conditions	<ul style="list-style-type: none"> • Incorrect cutting speed • Loose cables and connections • Faulty air supply
7. Main Arc Does Not Strike	<ul style="list-style-type: none"> • Heavily insulated plate • Work return not connected • Excess air pressure • Worn electrode and tip • Tip too far from work
8. Poor Consumable Life	<ul style="list-style-type: none"> • Improper air pressure • Contact cutting at high current • Piercing thick plate • Spatter • Contaminated air supply

PIERCING

The torch tip should be 3mm to 4mm from the work. This will reduce the chance of spatter front entering the torch. The torch should be angled at about 30° when starting to pierce, and then straightened after accomplishing the pierce.

MESH CUTTING

For rapid restarts use the lock in OFF torch switch mode and do not release the torch switch. This avoids the two second preflow portion of the cutting cycle.

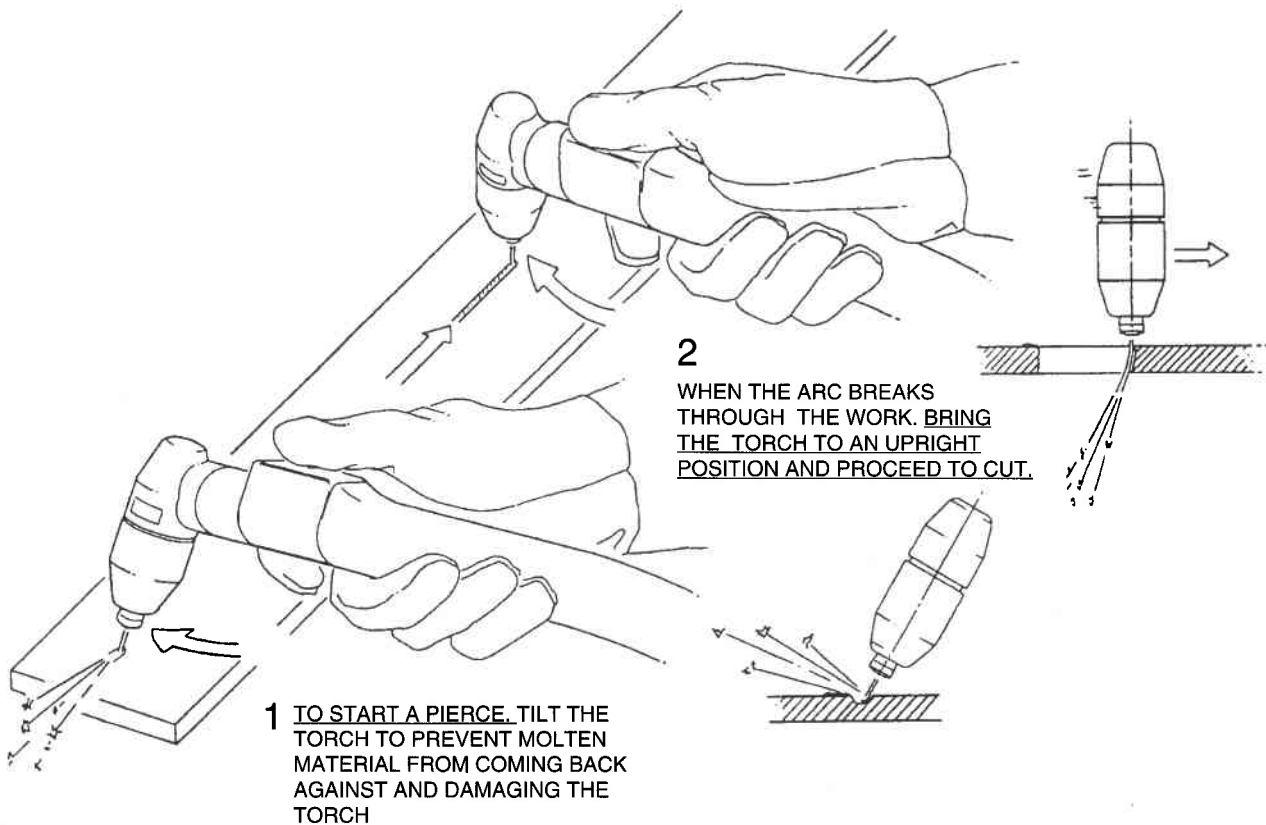


Figure 9 Piercing Technique with the PT-81

MAINTENANCE

Sabre-arc 50i and 80i

PT-81 Plasma Torch

WARNING!

Be sure that all primary power to the machine has been externally disconnected. Be sure that the wall disconnect switch or circuit breaker is in the OFF position before attempting any maintenance work on the Sabre-arc

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WARNING!

Maintenance work must be performed by a competent person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean or repair this equipment. Use only Murex replacement parts.

1. At regular intervals and wearing eye and face protection, blow out the inside of the unit using low pressure, dry compressed air.
2. Check all electrical connections and fittings are tight and that the cables are in good condition.
3. Check the air system for leaks.
4. Check and bleed water or oil from the air regulator filter assembly.
1. Remove heat shield
2. Inspect the front end components, replace if worn or damaged, to replace/install front end components refer to fig 5 on page 11.
3. If necessary, remove electrode seat from torch using a 1/4" hex key.
4. Apply a small amount of lubricant part no. 1414217 to the heat shield or to the O ring see fig 10.
5. Check O ring for damage.
6. Inspect electrode. Do not continue to use if the length is shorter than 17mm.

LUBRICANT (N° 1414217) CAN BE APPLIED TO O-RING OR HEAT SHIELD

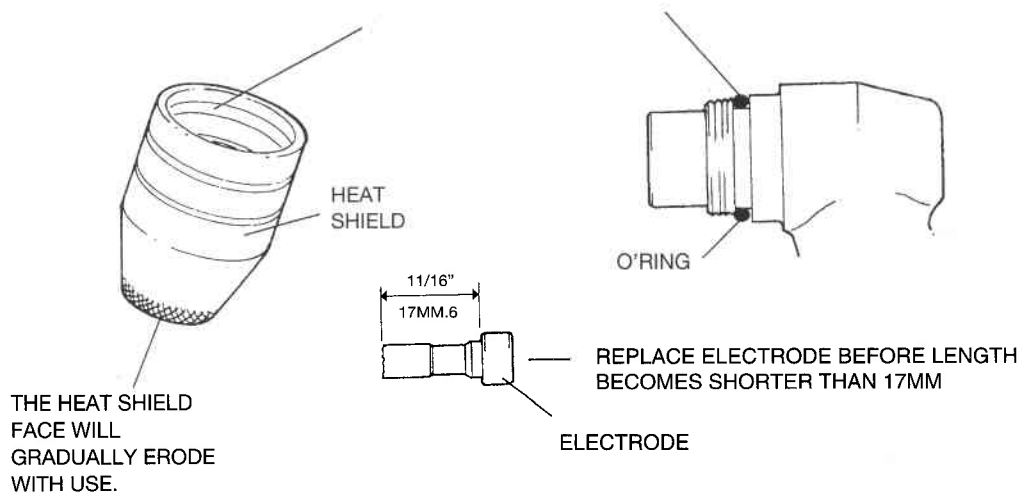


Figure 10 O ring and Electrode Maintenance

Removal of PT-81 Torch Head

Note: The power cable, the two white switch leads and the black lead in the service line should be inspected periodically. If damage to the protective sheath or if gas leaks are noted, replace the damaged parts.

For the procedure to remove torch head and switch from service line, refer to Figure 11. Note position of all components and tape locations before performing disassembly of service lines to ensure proper position of components and tape during reassembly procedure.

Replacing the Torch Head

Refer to Figure 11 and assemble in reverse order.

CAUTION!

Use two wrenches when installing torch head to power cable to prevent twisting copper tube

- A.** Slide handle over power cable. Slide black wire attached to the torch head through the handle.
- B.** Using two wrenches, screw torch head onto power cable.
- C.** Thread handle onto torch body and hand tighten.
- D.** Slide insulator over knife connections on black wire. Connect the black wire to same colour wire protruding from sheath. Slide the insulator back over knife connections. Be sure the insulator completely covers the knife connections.
- E.** Ensure that Nomex insulator is inserted between the power cable connection and the blue and black wires. Refer to fig 11.
- F.** Determine position of switch and cut to wires to desire length.
- G.** Splice switch wires to white wires protruding from the sheath.

NOTE

Switch may be positioned to suit user.

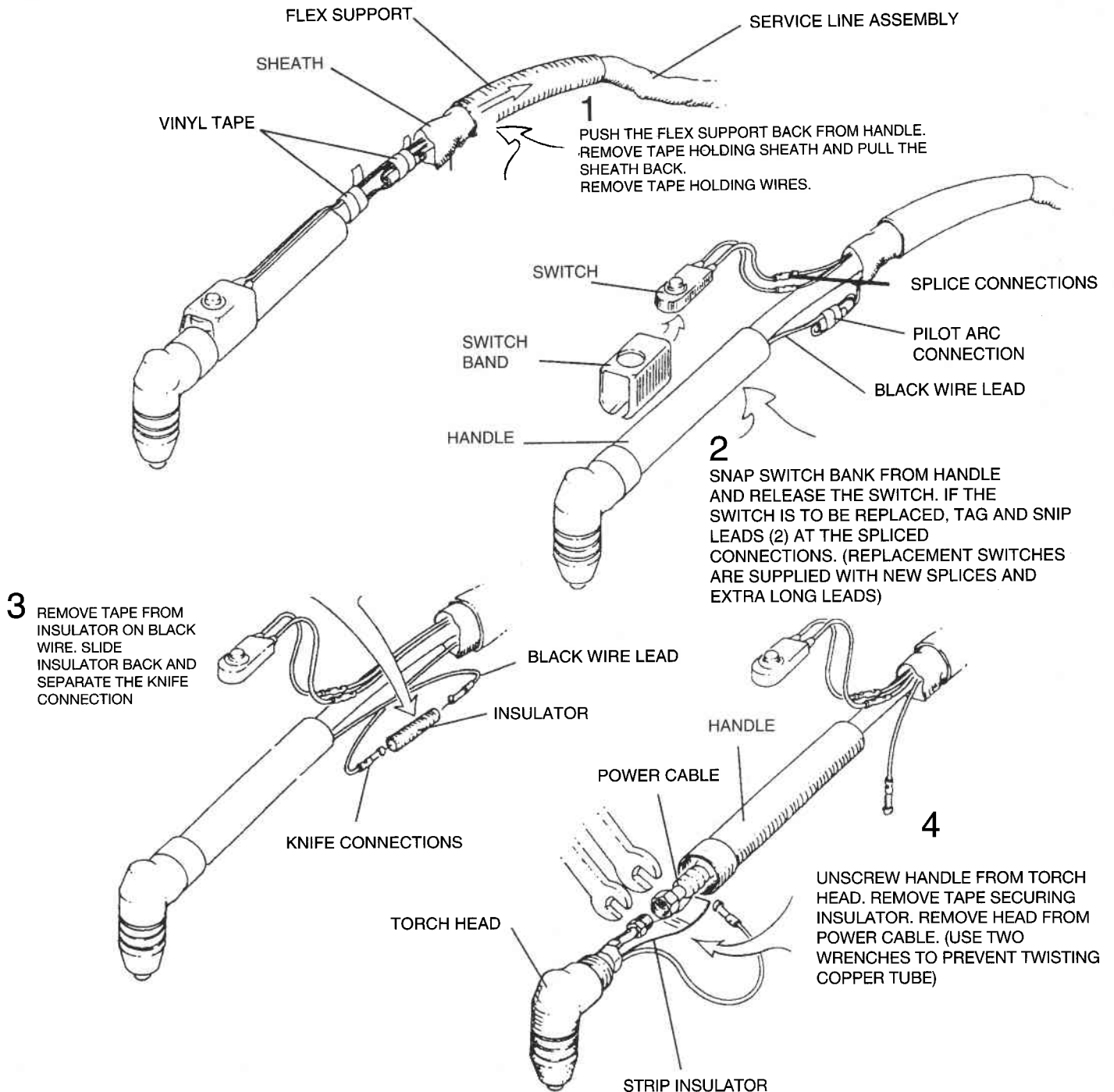
H. Place switch in switch band and snap onto handle at desire position.

I. Using vinyl tape, tape wires near handle as previously noted.

J. Pull sheath up to end of handle and tape to power cable and leads.

K. Plus flex support back up onto the handle.

Figure 11 Removal of PT-81 Torch Head and Switch from Hose Cable



Switch Plug Removal and Replacement

2. Replace in reverse order of removal.

WARNING!

DO NOT INTERCHANGE THE SWITCH PLUG AND PILOT ARC / SAFETY PLUG. INTERCHANGING THESE PLUGS WILL VOID THE SAFETY INTERLOCK CREATING AN UNSAFE CONDITION THAT MAY CAUSE ELECTRIC SHOCK AND BURNS.

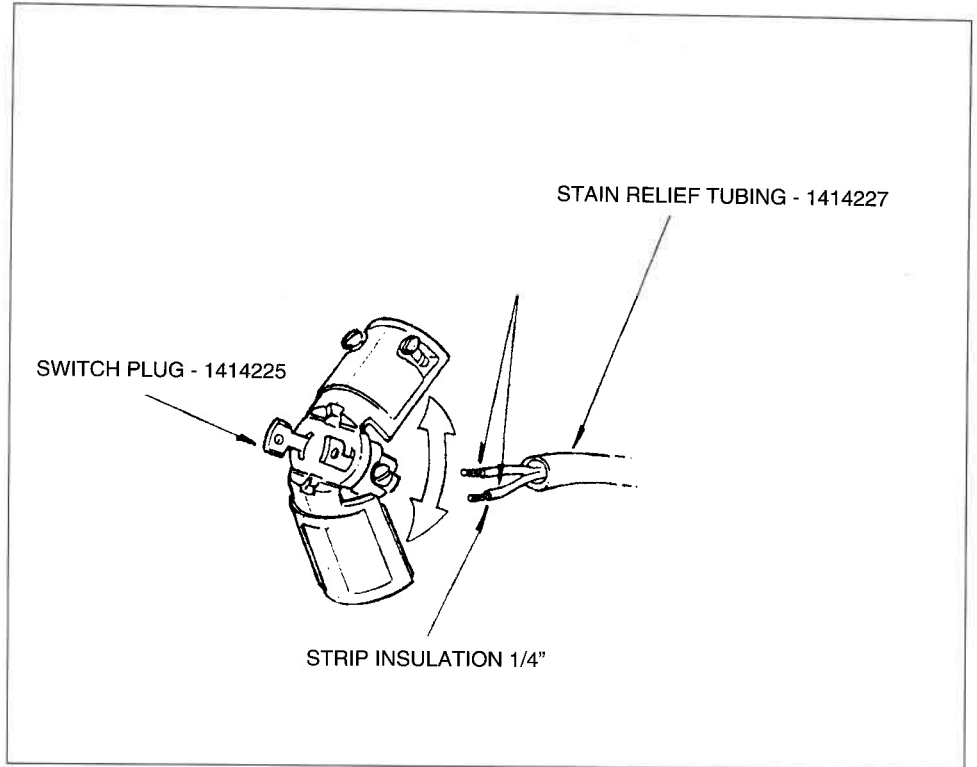
A. Switch Plug Removal

1. Loosen the two screws and open the plug as illustrated.
2. Loosen the screws clamping the two white leads in place.
3. Remove the plug

B. Switch Plug Replacement.

1. Strip wire lead insulation back 6mm

NOTE: Be sure the strain relief tubing (1414227) is inserted into plug so it will be secured when the plug is closed.



General

WARNING!

Troubleshooting work must be performed by a trained competent electrician. Do not permit untrained person to repair this equipment.

WARNING!

BE SURE THAT ALL PRIMARY POWER TO THE MACHINE HAS BEEN EXTERNALLY DISCONNECTED. OPEN WALL DISCONNECT SWITCH OR CIRCUIT BREAKER BEFORE ATTEMPTING INSPECTION OR WORK INSIDE THE POWER SOURCE.

WARNING!

VOLTAGES IN PLASMA CUTTING EQUIPMENT ARE HIGH ENOUGH TO CAUSE SERIOUS INJURY OR POSSIBLE DEATH. BE PARTICULARLY CAREFUL AROUND EQUIPMENT WHEN THE COVERS ARE REMOVED.

CAUTION!

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

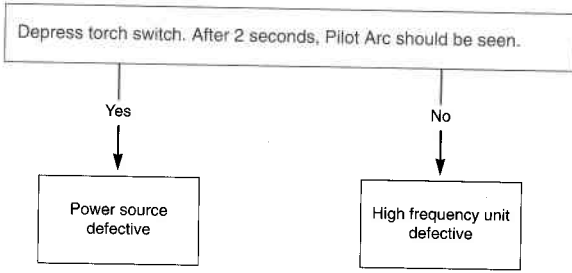
Check the problem against the symptoms in the following troubleshooting guide. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform a simple visual inspection of all the components and wiring. Check for secure terminal connections, 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 and electrical schematic diagrams on pages 28 and 29 and checking the various components. A volt-ohmmeter will be necessary for some of these checks.

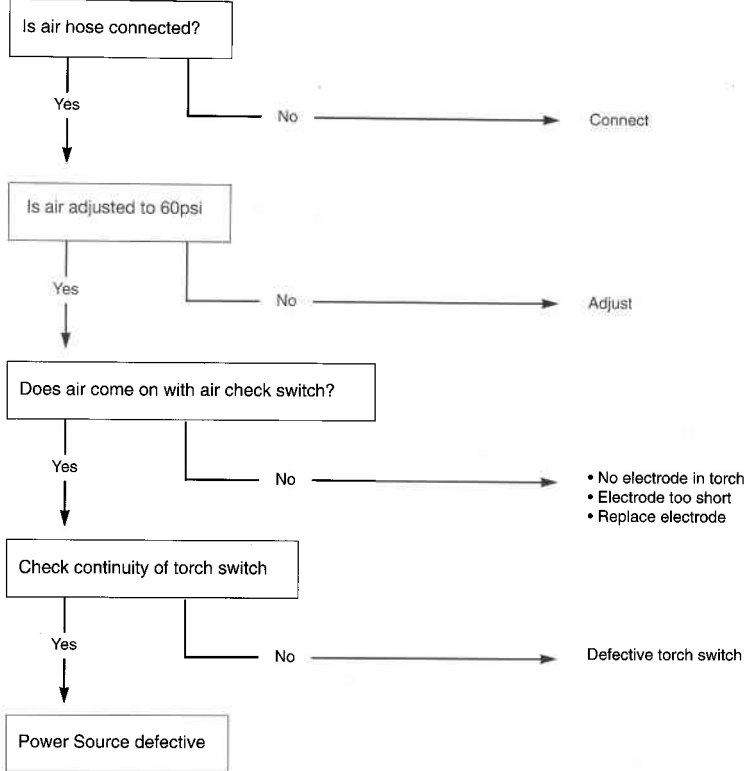
TROUBLESHOOTING GUIDE

1. Difficult Starting

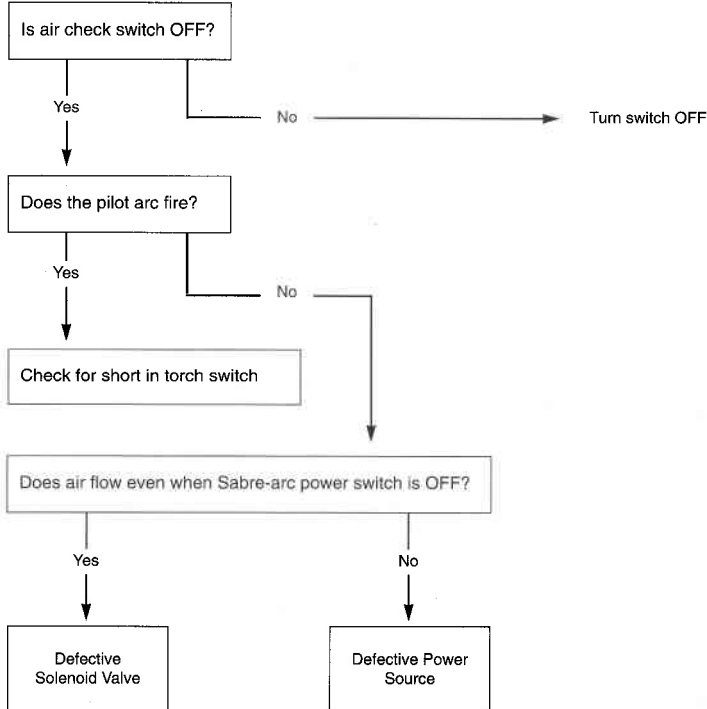
- Change electrode
- Change nozzle
- Check for clean ground connection
- Check air pressure (65 psi)
- Check torch power cable for continuity



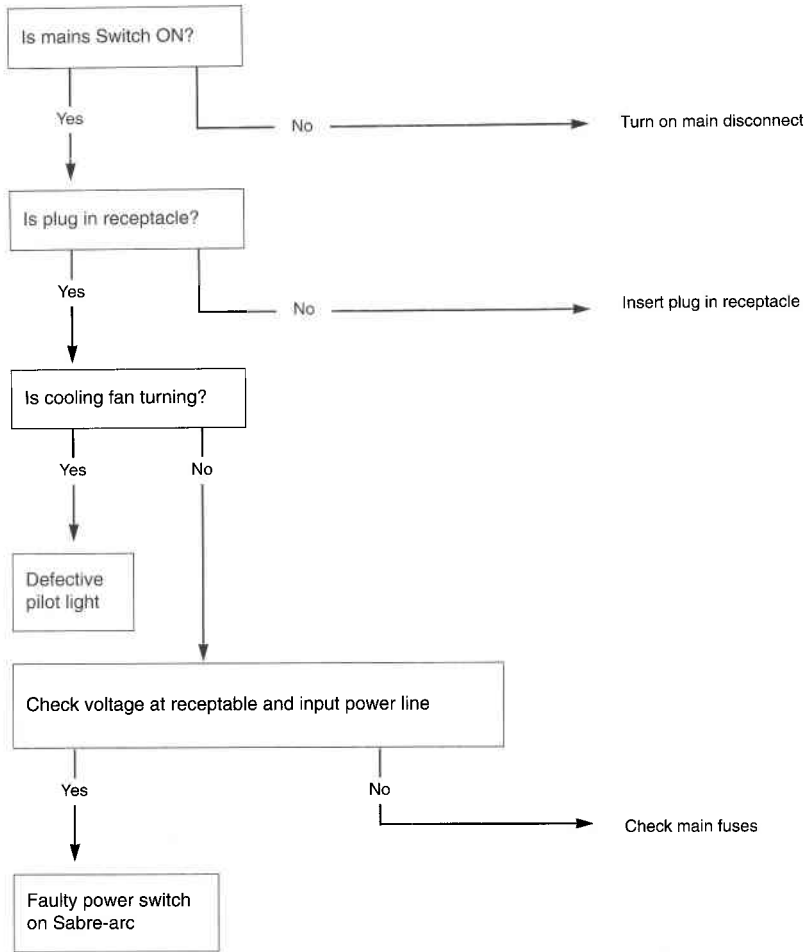
2. No Air



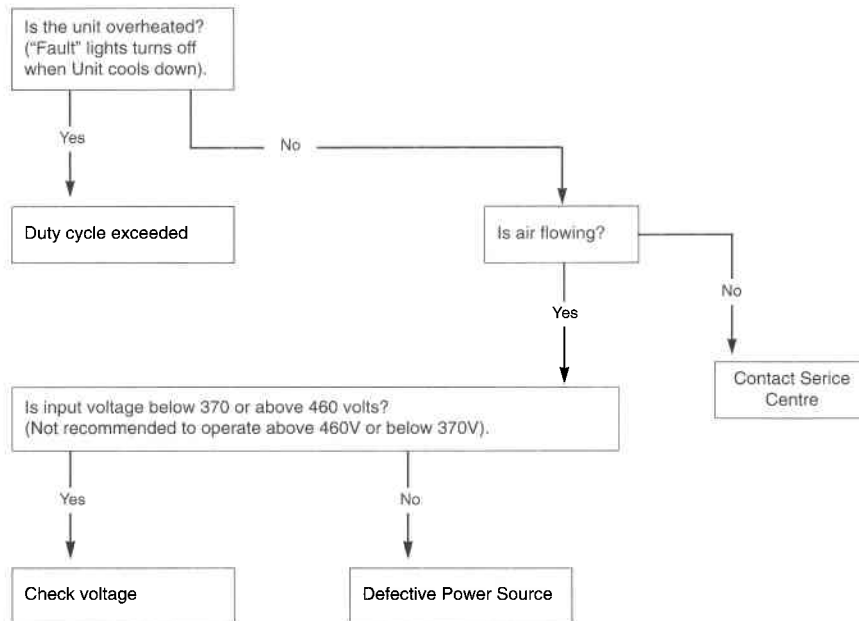
3. Air does not shut off



4. White "Power" light not energised



5. Red "Fault" light ON



• Fault light will energise if voltage falls below 370 volts for 0.3 seconds or exceeds 460 volts even for an instant. The light will not turn OFF even when correct voltage is restored. Reset by placing Sabre-arc 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.