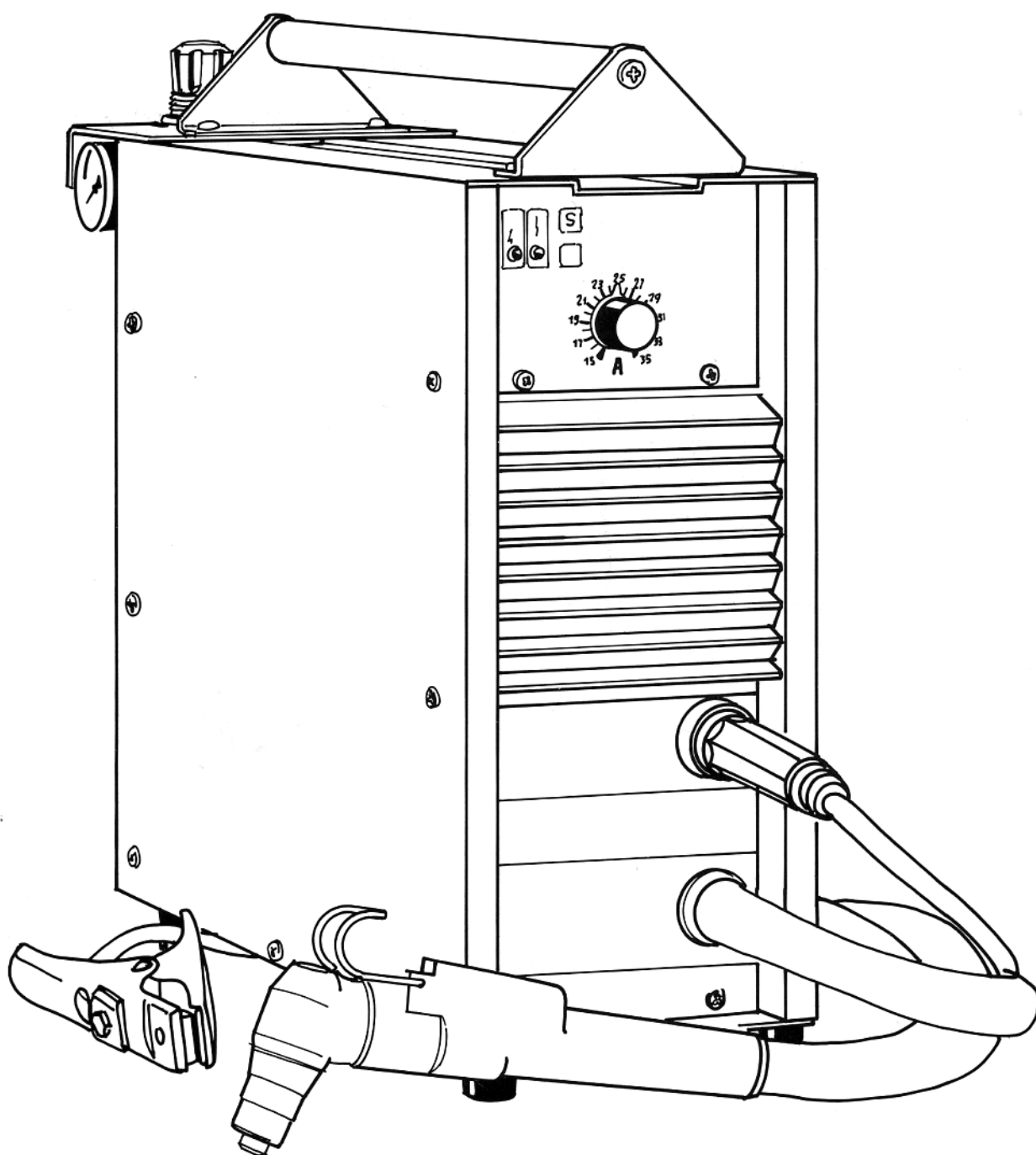
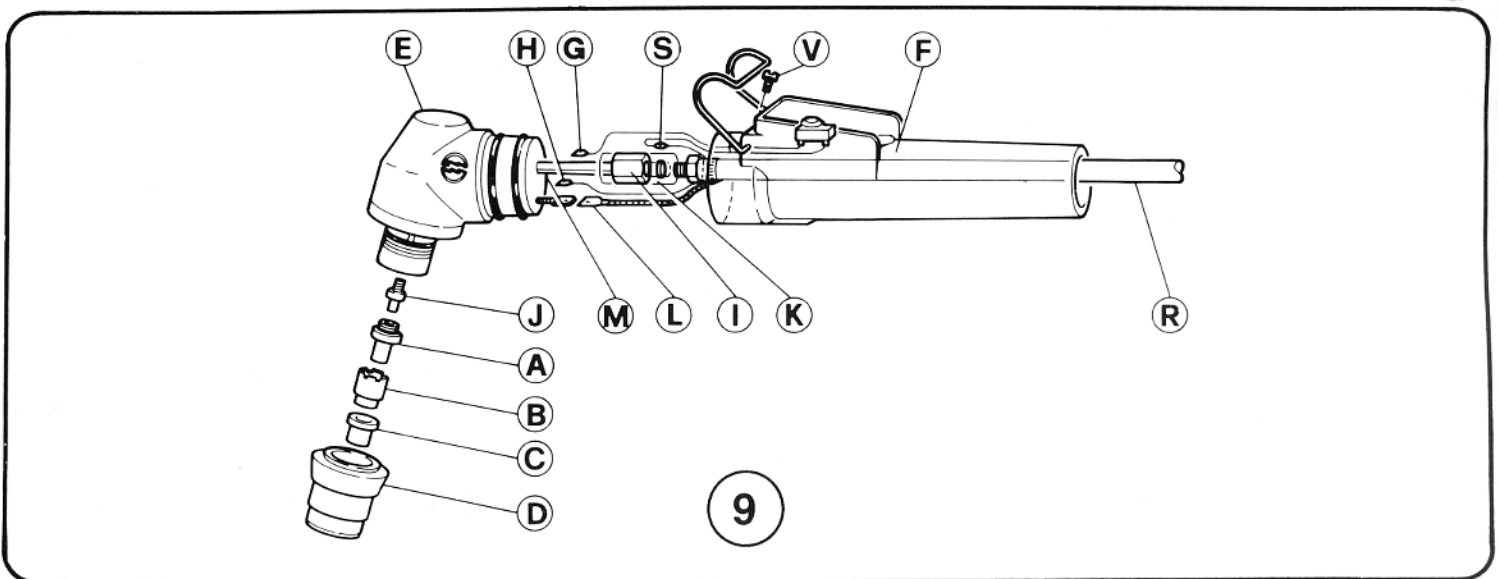
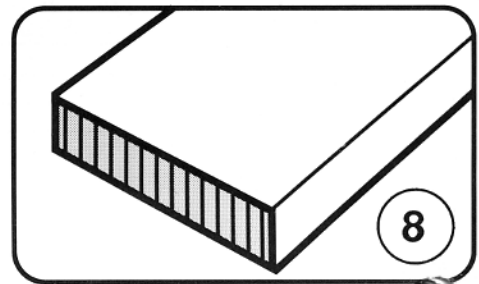
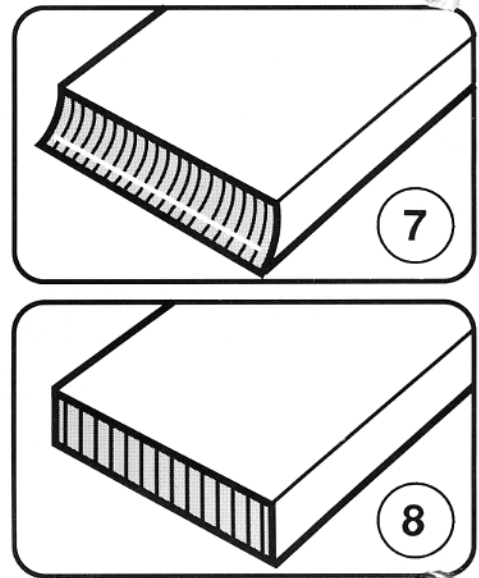
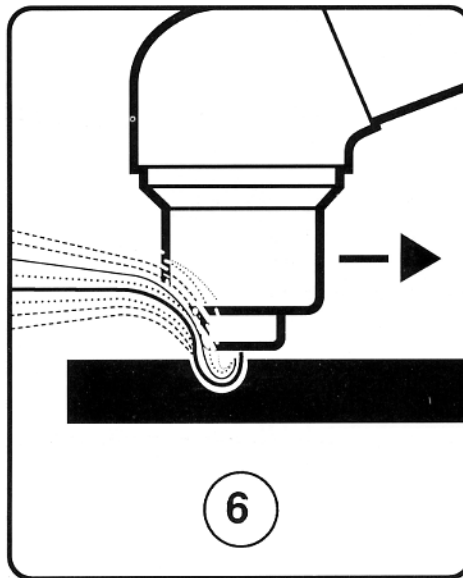
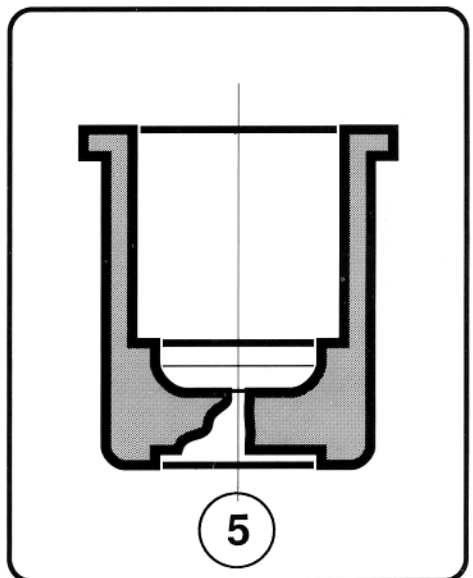
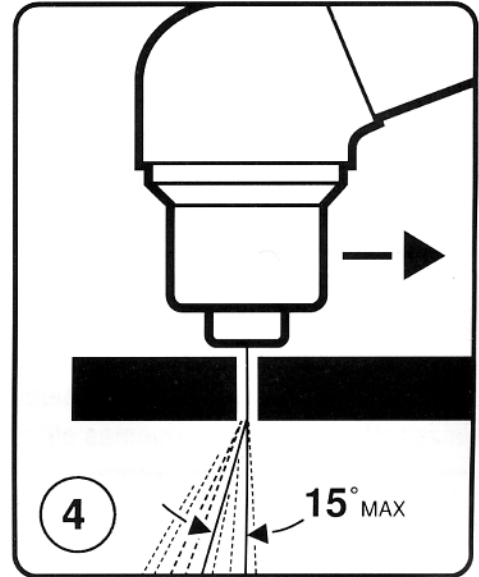
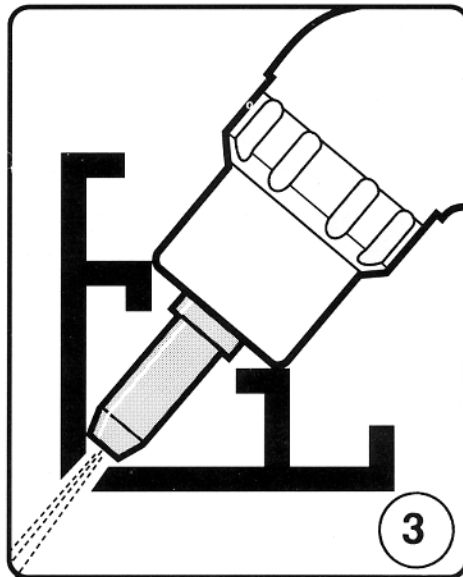
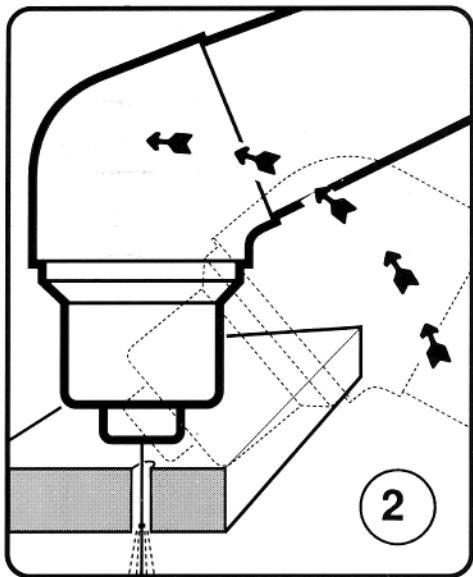


<b>I</b>	MANUALE DI ISTRUZIONE PER APPARECCHIO DI TAGLIO AL PLASMA	Pag. 3
<b>GB</b>	INSTRUCTION MANUAL FOR PLASMA CUTTER	Page 8
<b>D</b>	BETRIEBSANLEITUNG FÜR PLASMASCHNEIDGERÄT	Seite. 13
<b>F</b>	MANUEL D'INSTRUCTIONS POUR MACHINE A COUPER AU PLASMA	Page 19
<b>E</b>	MANUAL DE INSTRUCCIONES PARA EQUIPO DE CORTE EN PLASMA	Pag. 24

Parti di ricambio e schemi elettrici  
Spare parts and wiring diagrams  
Ersatzteile und elektrische Schaltpläne  
Pièces de rechange et schémas électriques  
Piezas de repuesto y esquemas eléctricos

Pagg. Seiten. 30 ÷ 32





# INSTRUCTION MANUAL FOR PLASMA CUTTER



Read this manual carefully before using the machine. Failure to respect the rules described herein shall exempt the manufacturer from any liability.

The machine has been designed, built and protected (per standards: IEC 974.1 - EN 60974.1) for the functions described below. Any other use not explicitly included shall be considered FORBIDDEN.

The machine must be started, used and serviced by qualified personnel. Always follow current safety regulations.

The manufacturer shall not be held responsible for any damage caused by incorrect use of the machine.

## INTRODUCTION

This device must be used exclusively for cutting on any electrically conductive material (metals and alloys).

PLASMA cutting takes place due to the high temperature generated by a concentrated electric arc, and thus highly dangerous situations may arise; it is therefore essential to pay the utmost attention to the chapter entitled SAFETY PRECAUTIONS.

The symbols next to certain paragraphs indicate points requiring extra attention, practical advice or simple information.

This manual must be kept carefully in a place familiar to everyone involved in using the machine. It must be consulted whenever doubts arise and be kept for the entire life-span of the machine; it will also be used for ordering replacement parts.

## ASSEMBLY

Unpack the machine and place it in an adequately ventilated area, dust-free if possible, taking care not to block the air intake and outlet from the cooling slots.

CAUTION: REDUCED AIR CIRCULATION causes overheating and could damage internal parts.

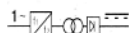
Keep at least 500 mm of free space around the device.

## DESCRIPTION OF TECHNICAL SPECIFICATIONS

**IEC 974.1** This machine is manufactured according to these international standards.

**EN 60947.1** Machine Serial Number which must appear on requests or inquiries concerning the machine.

**N°.** Single-phase static frequency converter-transformer-rectifier.



Transformer-rectifier.



Drooping characteristic.



PAC

Plasma Arc cutting.

**TORCH TYPE**

Type of torch that may be used with this device.

**U<sub>0</sub>.** Secondary no-load voltage (peak value).

**X.** Duty-Cycle Percentage

The duty-cycle is the number of minutes, expressed as a percentage, the machine can operate (arc on) within a ten minute period without overheating.

**I<sub>2</sub>.** Output cutting current

**U<sub>2</sub>.** Secondary voltage with cutting current I<sub>2</sub>

**U<sub>1</sub>.** Nominal supply voltage

**1~50/60Hz** Single-phase input supply at 50 or 60 Hz

**I<sub>1</sub>.** Input Amps absorbed corresponding to different output levels (I<sub>2</sub>).

**IP23.**

Grade of protection of frame

Grade 3 as a second digit means that this unit is fit to work outside under the rain.

Fit to work in hazardous areas.

**S**

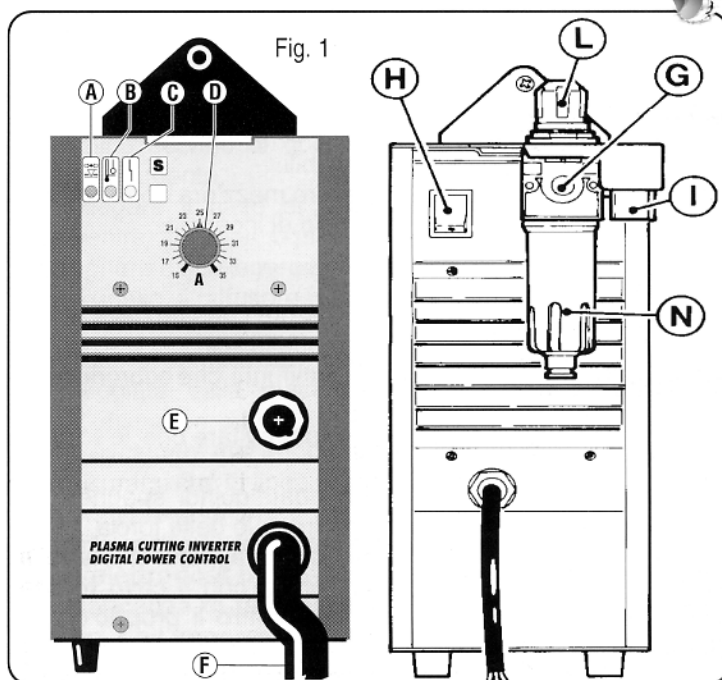
**NOTE:**

This machine has also been designed to work in class 3 pollution areas (see IEC 664)

IEC 974-1/ EN 60974-1			
	 PAC TORCH TYPE CEBORA P70		
A ÷ A - V			
U <sub>0</sub> V PEAK	X	%	%
	I <sub>2</sub>	A	A
	U <sub>2</sub>	V	V
U <sub>1</sub> 1x220V 50/60Hz	I <sub>1</sub>	A	A
MADE IN ITALY		IP 23	

## DESCRIPTION OF UNIT DEVICES (see picture 1)

- A) Insufficient air pressure LED.
- B) Thermostat LED.
- This lights when the operator exceeds the duty cycle allowed for the machine, and simultaneously cuts off the current output.
- C) Cut out LED.
- D) Cutting current adjustment knob.
- E) Ground cable terminal.
- F) Torch
- G) Compressed air fitting (1/4 female gas thread).



- H) On/Off switch
- I) Pressure gauge
- L) Pressure setting knob
- N) Water trap.

## DESCRIPTION OF PROTECTIONS

### Thermic protection


This unit is protected by a usually closed thermostat placed on the dissipator.

When the thermostat intervenes, the machine stops supplying current, but the ventilator continues to work.



The intervention of the thermostat is indicated by the led turning on (B) fig.1.

### Cut out Protections

These protections are indicated when the LEDs A-B and C light steadily or flash ( see pict. 1).

1) The red LED  lights:

- a) if the supply voltage is less than 150 V.
- b) during starting, only for approximately 2 seconds
- c) while the machine is being turned off. It is normal for the LED C to light and flash for a few seconds after the machine has been turned off. **During this time, do not start the machine or work on its interior.**

2) The yellow LED  and red LED  light:

- a) due to an error in the micro-controller memory.
- b) if there is an incorrect signal on the current sensor during start-up.
- c) when the torch trigger is pressed. In this case, turn off the machine and make sure that there is no dirt or short-circuit between the electrode and the torch tip.

**Electrical protection:** Located on the torch body to prevent contact with dangerous voltages on the torch when replacing the tip, diffusor, electrode or tip holder.

**Pressure protection:** 

The protection is achieved through a pressure switch, which prevents the machine from running when the pressure supply falls below 3.5-3.6 bars (0.35-0.36 MPa).

- **Do not remove or short-circuit the unit safety devices.**
- **Only use original spares.**
- **Always replace any damaged part of the unit or torch with original material.**
- **Do not use any torches other than the original one.**
- **Do not let the unit work without covers. This would be dangerous for operator and for those who are surrounding the work area and would prevent the unit from cooling efficiently.**

## SETTING AT WORK

The unit must be installed by skilled personnel. All fittings must be in conformity with the existing rules and in full compliance with safety regulations.

Connect the air supply to the fitting G (picture 1), making sure that the system can provide a minimum of 200 liters/min. with a pressure of 5 bars (0.5 MPa). Should air feed come from a pressure reducing unit of a compressor or of a centralized plant, the reducing unit should be adjusted at the highest

output pressure which should not exceed 120 PSI (8bar or 0.8 MPa). Should air feed come from a compressed air bottle, this should be provided with a pressure regulator; **never connect compressed air bottles directly to the reducing unit! Pressure may exceed the reducing unit capacity and then explode!**

Check to see that power supply voltage corresponds to voltage indicated on the welding machine technical specification tag. Connect the power cord to a plug with a sufficient capacity, making sure that the yellow/green conductor of the power cord is connected to the grounding pin.

The magnetothermic switch capacity or of fuses in series with switch should be equal or above the current  $I_1$  absorbed by the unit.

Current  $I_1$  absorbed is known by reading the technical specifications on the unit i.e. feed voltage  $U_1$  available.

Any extensions should have adequate sections for current absorbed  $I_1$ .

## USE

Switch the unit on by turning knob H (picture 1), of the mains switch.

By pressing for a second the torch button, the compressed air flow is opened. Check that, under this condition, the pressure shown on gauge I is about 75 PSI (0.45÷0.47 MPa), otherwise adjust it by means of knob L of reducing unit, then lock this knob by pressing it down.

Connect work clamp to the piece to be cut.

Set the cutting current by means of the knob D (picture 1).

Clean the work piece to ensure good electrical contact of the work clamp.

Do not connect work clamp to the material to be removed.

Press torch button to start pilot arc, if cutting does not start after 2 seconds, the pilot arc turns off and the button should be pressed again to repeat the operation.

When possible, the torch should be pulled. Pulling is easier than pushing.

Keep torch in vertical position when cutting.

Once cutting is over and after releasing button, air continues to flow out of the torch for about 30 seconds so it enables torch to cool down. It is recommended not to turn the unit off before that time.

Should holes be drilled or should the piece be cut starting from its center, torch should be tilted and then slowly straighten to prevent molten metal from being spread on nozzle (see picture 2). This operation should be carried out with material thickness above 1/16"(2 mm). If you have to cut near angles or recesses (see picture 3) it is recommended to use extended electrodes and nozzles.

Should circular cut be done it is recommended to use caliper (supplied on request).

N.B. : Avoid keeping pilot arc uselessly on, in air to avoid electrode, diffuser and nozzle consumption.



**When you have finished working, turn off the machine and hang the torch on the hook provided.**

## CUTTING TROUBLE

1) Insufficient penetration

This may be due to:

- high speed. Always make sure that arc thoroughly passes through the piece to be cut and that it is not tilted, when going

forward, by a percentage above  $10 \div 15^\circ$  (see picture 4). It is thus avoided to wear nozzle (see picture 5) out and to burn the nozzle holder (see picture 6).

- Excessive thickness of piece (see graph of cutting speed and thickness)

- Work clamp not properly in electric contact with piece
- Worn nozzle and electrode
- Tip hole diameter too large: use tips with a hole having a diameter of 0.9 mm.

- Too low cutting current.

N.B. : When the unit does not thoroughly pass through, nozzle is clogged by scums.

## 2) Cutting arc switches off

This may be due to:

- worn nozzle, electrode or diffuser
- too high air pressure
- too low feed voltage

## 3) Tilted cutting

When cutting is tilted (see picture 7) switch the unit off, loosen nozzle holder and turn nozzle by a quarter turn, then lock and try again.

Repeat until cutting is straight (see picture 8).

## 4) Excessive wear of consumable parts

This may be due to :

- too low air pressure with respect to the recommended one
- excessive burns on the end part of nozzle holder.

## PRACTICAL RECOMMENDATIONS

- If the system air contains much humidity and oil it is required to use a drying filter to avoid excessive oxidation and wear of consumable parts, to avoid torch damage or to reduce speed and quality of cutting.

- Impurities of air favour oxidation of electrode and nozzle and make it difficult to start pilot arc. If this occurs, clean the end part of electrode and inside the nozzle with fine abrasive paper.

- Make sure that new electrode and nozzle to fit are clean and degreased.

- To avoid damage of torch always use original spares.

## TORCH MAINTENANCE

Always disconnect the unit before any repair of torch.

### 1) Replace wear parts (picture 9)

The parts subject to wear are electrode **A**, diffuser **B** and nozzle **C**.

Either part may be only replaced after loosening nozzle holder **D**.

Electrode **A** should be replaced when a  $1/16"$  (1.5 mm) deep crater is created in the middle.

**ATTENTION! Do not make sudden stresses when unscrewing the electrode, but gradually force so as to have the thread unlocked. Lubricate the thread of the new electrode with silicone lubricant (on supply with the unit). This new electrode is required to be screwed in its housing and locked without tightening.**

Nozzle **C** should be replaced when its central hole is damaged or enlarged with respect to the new part.

Use of worn electrode quickly wears out the nozzle.

Excessive use of electrode causes overheating and reduces the life of diffuser **B**.

Make sure that after replacing it, nozzle **D** is tight enough.

**ATTENTION! Nozzle holder **D** should be only screwed on head when electrode **A** diffuser **B** and nozzle **C** are assembled.**

**The absence of such parts jeopardizes the machine working and particularly the operator's safety.**

### 2) Replace torch body **E** (see picture 9).

Remove the screw **V**.

Withdraw handle **F** from body **E** by swaying it and making sure that button wires are not torn when separating both parts.

Withdraw the **G** and **H** safety contacts wires.

Withdraw the contact **L**. Unscrew fitting **I** after cutting the insulating hose **K**.

Assemble the new body of torch making all above operations inversely.

Fitting **I** is insulated by shrink hose **K** stuck to the fitting when heated by a small source (ex. a lighter).

Before replacing handle make sure that cables are far away from each other and that fittings are tightly secured.

### 3) Replacement of handle with button.

To replace handle with button it is required to follow instructions as per pos. 2.

### 4) Replacing the complete torch (see picture.10)

- Remove the guard (Note the position of the two serrated disks that ensure continuous grounding).

- Remove the base by unscrewing the 4 screws holding the support feet.

- Remove the stop ring **O** from inside the sheath.

- Disconnect the two fastons of the control wire and the red wire.

- Unscrew the fitting **P**.

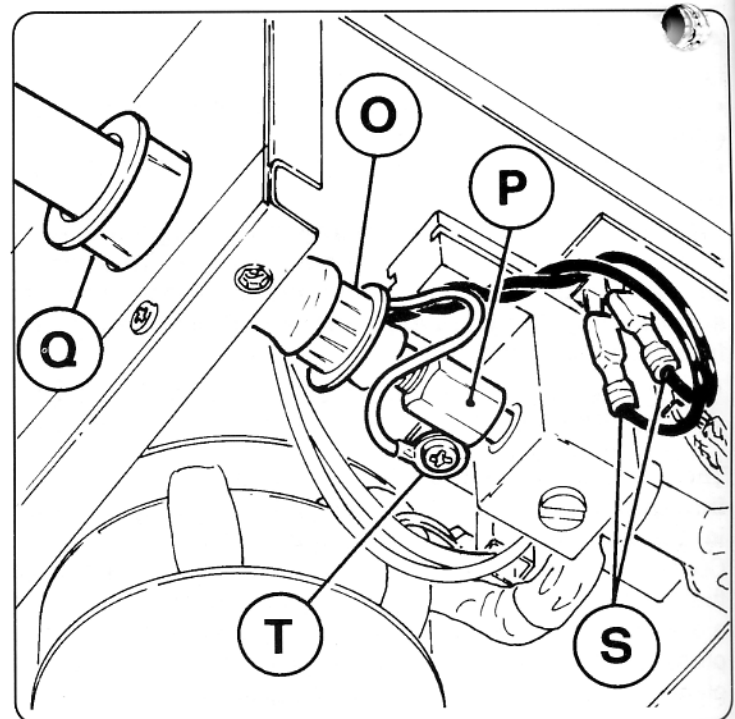
- Remove the torch.

- Remove the stop ring **Q**.

Insert the end of the new torch into the ring **Q**, insert the ring **O** inside the sheath, then fasten the sheath in place.

- Insert the ring **Q** into the hole **R**. If necessary, compress the two stop pegs to make insertion easier.

- Screw the fitting **P** back on.





- Connect the two control wires and the red wire of the pilot arc.
- Replace the base and guard.

## MAINTENANCE AND CONTROL

It is recommended to keep nozzle free from slag. Avoid using sharpened bodies thus avoiding damaging the nozzle hole.

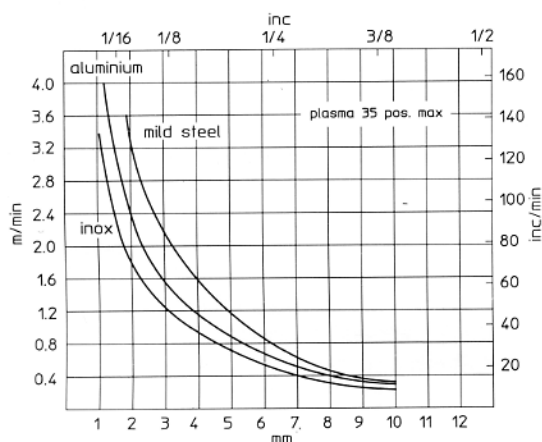
Even if the unit is provided with an automatic device for water discharge, working whenever air feed is closed, it is recommended to check from time to time that no water remains in trap **N** of reducer (picture 1).

It is required to clean from time to time the unit inside and make it free from metal dust by means of compressed air. Operations to be carried out inside the unit must be effected after disconnecting feed cable.

## PRECAUTIONS TO TAKE AFTER A REPAIR

After making repairs, take care to re-order the cables so that there is sure to be insulation between the primary and secondary sides of the machine. Make sure that the wires cannot come into contact with moving parts or parts that heat during operation. Replace all clamps in their original positions on the machine, to prevent a connection between the primary and secondary circuits if a conductor accidentally breaks or disconnects.

## CUTTING SPEED SCHEME



## BASIC SAFETY PRECAUTIONS

### ELECTRIC SHOCK



Electric shock can kill. All electric shocks are potentially fatal.

This plasma cutter requires high voltages for arc spark starting. The following safety rules must be therefore observed when using the unit:

- Do not touch live parts.
- Insulate yourselves from the piece to be cut and from earth by wearing insulating gloves and clothing
- Keep your clothing (gloves, shoes, hats, dresses) and body dry
- Do not work in humid or wet areas
- Avoid touching or holding by hand the piece to be cut
- Always arrange for a proper insulation against electric shock. Should you work close to or in a dangerous area use all

possible precautions.

• If you feel even the slightest electric shock sensation, stop cutting at once. Do not use the machine until the problem is identified and solved.

• Always fit an automatic wall switch with adequate power, if possible close to the machine so as to immediately switch the unit off in an emergency event.

• Check often mains cable, torch cable, earth cable and torch. Never use the unit when one of them is damaged. Replace them immediately.

• Disconnect mains cable from mains before replacing cables or before removing unit covers.

• Always switch the unit off or disconnect it before replacing nozzle, swirl ring, electrode or nozzle holder.

• Do not use the unit without protecting covers.

• Always replace any damaged parts of the unit, torch and cables with original material.

• Never remove torch or unit safety devices.

• Make sure that the supply mains line is equipped with an efficient earth plug.

• Make sure that the work table is connected to an efficient earth plug.

• Any maintenance should be only carried out by qualified personnel aware of the risks due to dangerous voltages necessary to make the unit work.

**ATTENTION: Never screw nozzle holder D (see picture 11) to torch body E without fitting consumables electrode A, diffuser B, nozzle C. (see picture 10)**

**The absence of such parts jeopardizes the machine working and particularly the operator's safety.**

## RADIATIONS



Ultraviolet radiations created by the arc may damage your eyes and burn your skin. Then:

• Wear proper clothing and helmets.

• Do not use contact lenses!! The intense heat coming from the arc may stick them on the cornea.

• Use masks with grade DIN 7 or 8 safety lenses, at least.

• Protect people surrounding the cutting area.

## FUMES



Cutting operations give off fumes and harmful metal dusts which may damage health, therefore:

• Do not work in areas without proper ventilation.

• Keep your head out of fumes.

• In closed rooms use suitable exhaust fans, placed under the cutting area, if possible.

• If ventilation is not enough, use breathing sets approved for this procedure.

• Clean the material to be cut of any solvents or halogen degreasers giving rise to toxic gases when cutting: Some chlorin solvents may decompose with radiation emitted by the arc and create phosgene gas.

• Do not cut plated metals or metals containing lead, graphite, cadmium, zink, chrome, quicksilver or beryllium unless you have a proper breathing set.

• The electric arc creates ozone. After long exposure to high concentrations of ozone you may have headache, nose, throat and eyes irritation as well as serious congestion and chest pains. **IMPORTANT: DO NOT USE OXYGEN FOR VENTILATION.**

## FIRE



• Avoid causing fire because of sparks, hot metal or pieces.

• Make sure that suitable fireproof devices are

available close to cutting area.

- Remove from cutting area and surrounding area (33 feet at least) all inflammable and combustible material.
- Do not cut containers of combustible or lubricating material, even when empty. These should be carefully cleaned before being cut.
- Let the material cut cool down before touching it or putting it in contact with combustible or inflammable material.
- Do not cut parts with hollow spaces including inflammable material.
- Do not work under conditions of high concentration of combustible vapours, gases or inflammable dust.
- Always check the work area half an hour after cutting so as to make sure that no fire is starting to burn.

### BURNS

- Wear fire-proof clothes all over your body to protect your skin against burns caused by ultraviolet radiations from the arc, from sparks and hot metal.
- Wear no turn-up trousers to prevent sparks and metal to deposit in them.
- Wait for the torch to be cooled down and then switch the unit off before touching the front side of the torch.
- **Torch is provided with a pilot arc, then as soon as you press the button, the plasma spark starts even if earth cable is not connected. Avoid directing jet towards your own body or towards other people surrounding the cutting area.**
- **To prevent spark to starts by chance, always switch the unit off before putting down your torch.**
- Do not carry combustible material, such as lighters or matches in pocket.

### EXPLOSIONS



- Do not cut above or near containers under pressure.
- Do not cut in environments containing explosive dusts, gases or vapours.

This plasma cutter uses compressed air to work; should you use compressed air bottles follow suitable precautions:

### A) CYLINDERS

- Do not directly connect cylinders to reducing unit without a pressure regulator; pressure might exceed the reducing unit capacity making it explode.
- Feeding pressure must not exceed 120 PSI (8bar/0.8 MPa)
- Handle or use pressure cylinders in conformity with the existing rules.
- Do not use leaking or damaged cylinders.
- Do not use cylinders which are not properly secured.
- Do not carry cylinders whose content is not clearly identified.
- Never lubricate cylinder valves with oil or grease.
- Do not put electrically in contact cylinder with plasma arc.
- Do not expose cylinders to excessive heat, sparks, hot metal or flames.
- Do not tamper with cylinder valves.
- Do not try to loosen all tight valves by means of hammers, keys or something else.

### B) PRESSURE REGULATORS

- Keep pressure regulators in good conditions. Damaged regulators may give rise to damage or accidents; they should only be repaired by skilled personnel.
- Do not use regulators for gases other than those they are manufactured for.
- Never use a leaking or damaged regulator.

- Never lubricate regulators with oil or grease.

### C) AIR HOSES

- Replace air hoses if damaged.
- Keep hoses unwound so as to avoid bending.
- Keep excess hose wound and keep it out of the working area to avoid any damage.

### NOISE



These power sources alone do not produce noise levels exceeding 80 dB. The cutting procedure, however, may produce noise levels in excess of 80 dB in which case the operator must take the necessary safety precautions as prescribed by the national safety regulations.

### PACEMAKER

Magnetic fields created by the high currents in the cutting circuit can affect pacemaker operation. Persons wearing electronic life support equipment (pacemakers) should consult their doctor before going near any arc welding, gouging, cutting, or spot welding equipment in operation.