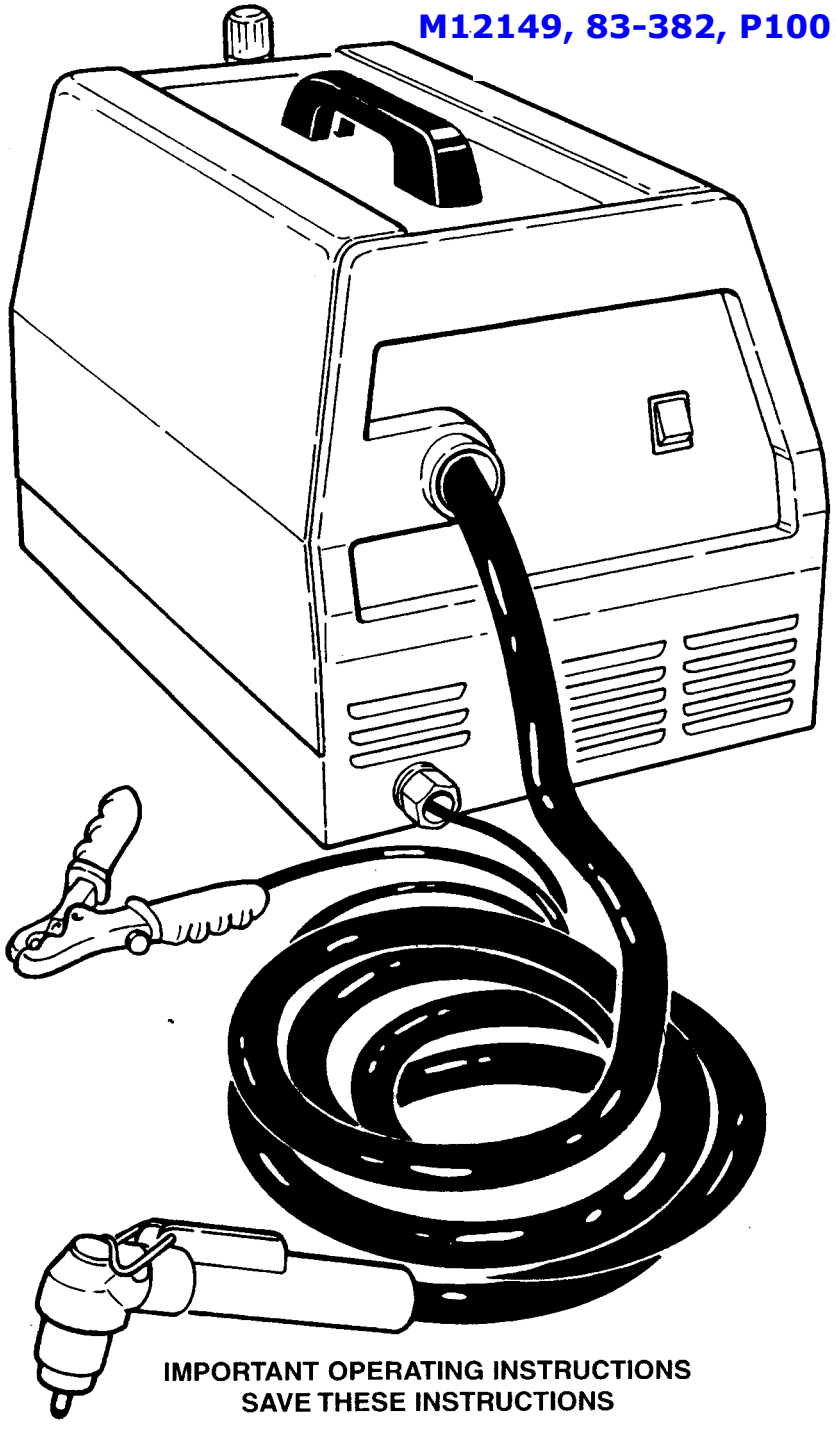
OPERATING INSTRUCTIONS
MANUEL D'INSTRUCTIONS
MANUAL DE INSTRUCCIONES

FOR MODELS:
M12149
83-382
P10015
YA 2225

M12149, 83-382, P10015, PCS21, YA2225



IMPORTANT OPERATING INSTRUCTIONS
SAVE THESE INSTRUCTIONS

3.300.754/A

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BASIC SAFETY PRECAUTIONS

ELECTRIC SHOCK

WARNING: Disconnect power source before dissembly of the torch.

Electric shock can kill. All electric shocks are potentially fatal.
This plasma cutter requires high voltages for arc spark starting (approx. 250 - 350V). The following safety rules must be observed when using the unit:

- Do not touch live parts.
- Insulate yourself 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 3) to torch body without fitting consumables electrode A, diffuser B, nozzle C.
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 losen 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 thir doctor before going near any arc welding, gouging, cutting, or spot welding equipment in operation.

PUBLICATIONS

The following publications provide additional information on safety precautions:

A) Bulletin No. C5.2-83 «Recommended Safe Practices for Plasma Arc Cutting»

B) American National Standard ANS1Z49.1-83 «Safety in Welding and Cutting»
Both are available from: American Welding Society Inc. - 2501 Northwest 7th Street - Miami, Florida 33125 - Telephone (305) 443-9353
C) OSHA Safety and Health Standards, 29CFR 1910, available from the U.S. Department of Labor, Washington, D.C. 20210.

SAFETY DEVICES

The equipment is provided with the following safety devices:

Thermic: located on the transformer windings to avoid eventual overloads.

Pneumatic: located on torch feed to avoid insufficient air pressure.

Electric: located on torch body to avoid the presence of dangerous voltages in the event of removal of nozzle holder.

INSTALLATION AND OPERATION

Install the equipment in an adequately ventilated area, taking care that there be no obstruction to the input and output of air from the cooling slots.
Connect power cable **A** to socket provided with an efficient earth wire. Eventual extension leads should be of adeguate sections.
Connect air feed to connector **B** and ensure that pressure be at least 90 PSI with a minimum yield of 250 SCFH.
Lift the pressure regulator knob **E** up and adjust the pressure, shown by the gauge **F**, to approx. 80 – 88 PSI (5,5 – 6 bar). Turn the device on by activating on network switch **C**.
The emission of the compressed air flow is controlled by pressing the torch button. Make sure that at this stage pressure shown by the gauge

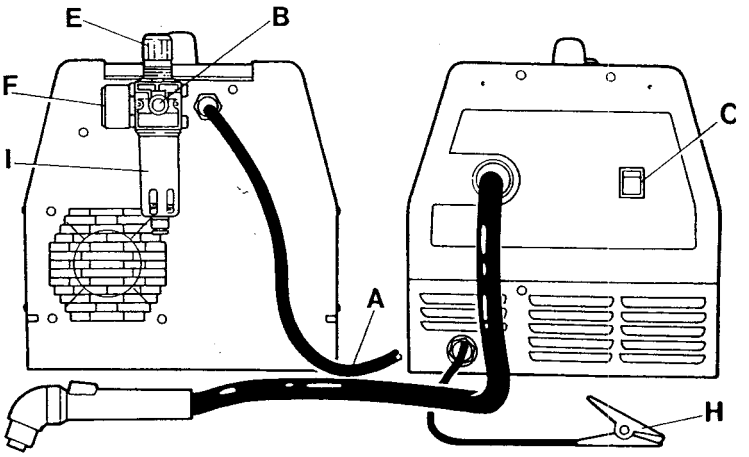

Fig. 1

F is between 60 and 70 PSI (4 and 4,7 bar); if not, adjust the pressure by means of the pressure regulator knob **E** and then lock the knob by pressing it downwards.
Connect earth clamp **H** to part to be cut, ensuring that there be a good electrical contact, especially in the case of painted or oxidized sheet metal or sheet metal with insulation coatings.
Bring the nozzle against the workpiece to be cut and exent a firm pressure (**A**) on the torch while pressing (Fig. 2) the push button.
Keeping the push button pressed, immediately release the pressure (**B**) by a quick movement without however moving the nozzle away from the workpiece.
The ignition of cutting arc must occur within about 2 seconds from the moment in which the torch pushbutton is pressed; in case of no-ignition you will have to let the pushbutton go and then press it again repeating the operation in the following 2 seconds.

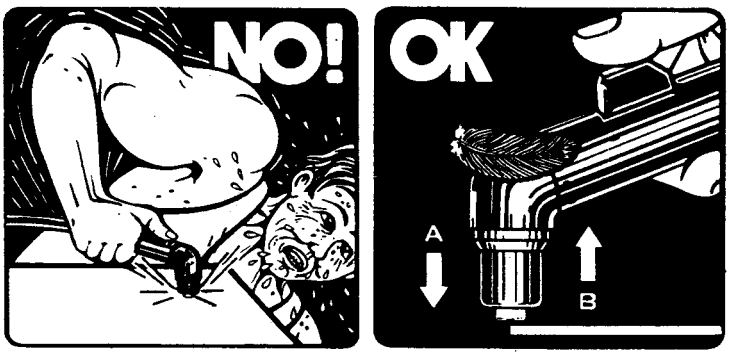

Fig. 2

Carry out the cutting by sliding the nozzle on the workpiece.
Flowability of the nozzle holder should be checked manually every time the machine is used. Of course this operation must be carried out when the machine is switched off.

N.B. Avoid arc switched on while in the air to avoid useless consumption of electrode, nozzle and diffuser.
Should the air in the system contain considerable quantities of humidity or oil, we suggest to use a special drier to avoid excessive wear of consumable parts and damage to the torch.

TORCH MAINTENANCE

Power to the equipment should be cut off prior to any intervention on the torch.

1) **Substitution of consumable parts** (fig. 3).

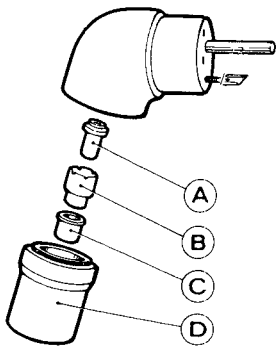

Fig. 3

Parts subject to wear are the electrode **A**, the diffuser **B** and the nozzle **C**. Nozzle holder **D** must first be unscrewed before any of these parts can be substituted.
The electrode **A** must be replaced when it has a crater in the middle approx. 1.5 mm. deep (see fig. 4). The nozzle **C** must be replaced when the central hole is too large compared to that of the new or worn out workpiece (see fig. 5).

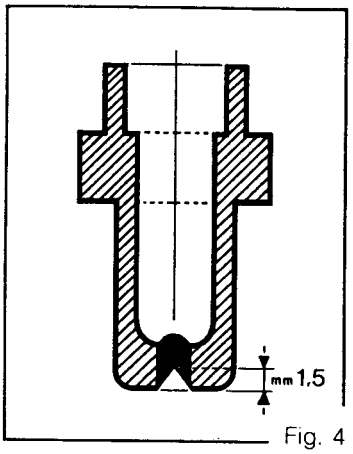

Fig. 4

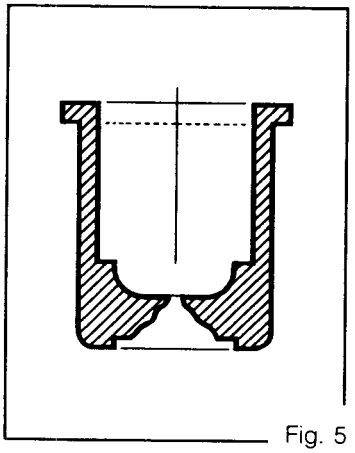

Fig. 5

When the electrode is worn out the nozzle wears very rapidly. When the electrode is worn out the machines looses its cutting power.
A delayed replacement of electrode and nozzle causes an excessive overheating of parts such as to jeopardize life of diffusor **B**.
Electrode **A** is fixed by screw. When the electrode is replaced, it must be tightened to avoid loosenings during the working as in this way it may be seriously damaged: moreover you must pay attention to not engrave it during the assembly.
Nozzle holder **D** should be sufficiently tightened after such substitution and a manual check be done to ensure that nozzle **C** not rotate.

CUTTING PROBLEMS

1) **Insufficient penetration**
This problem may be caused by:
— high speed. Always ensure that arc fully goes through the workpiece to be cut and that its inclination is never higher than 10 ÷ 15° (see fig. 6). This will prevent misuse of nozzle (see fig. 7) as well as burnings to nozzle holder (see fig. 8).
— excessive thickness of part;
— low power voltage;
— earth clamp **H** not in good electrical contact with part.

N.B.: When arc does not cut, molten metal slag obstructs nozzle.

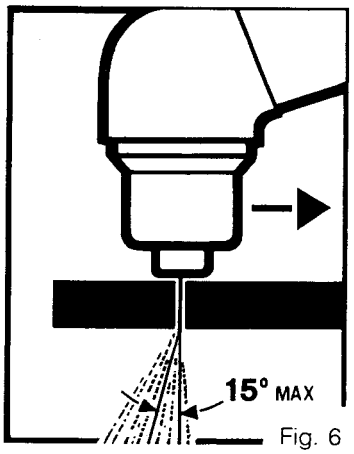

Fig. 6

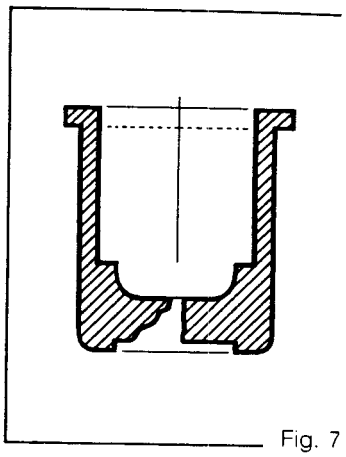

Fig. 7

2) **Cutting arc is extinguished**
This problem may be caused by:
— worn nozzle, electrode or diffuser;
— excessive air pressure.

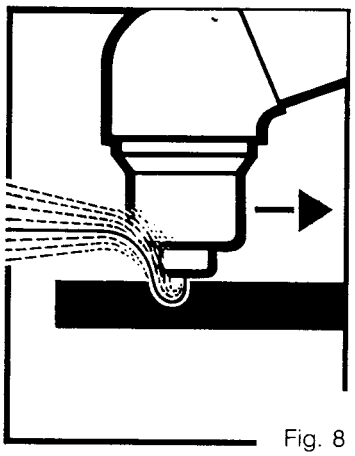

Fig. 8

3) **Inclined cut.**

Should the cut be inclined (see fig. 9) loosen the nozzle holder **D** and rotate nozzle **C** one fourth of a turn, then tighten it.
Repeat this operation until the cut is straight (see fig. 10).

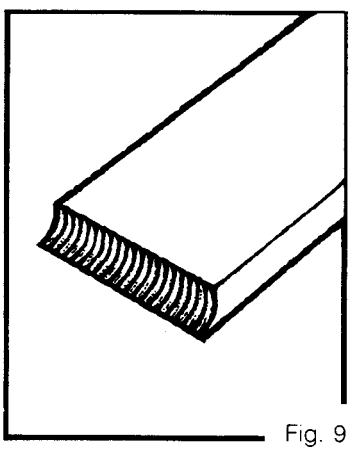

Fig. 9

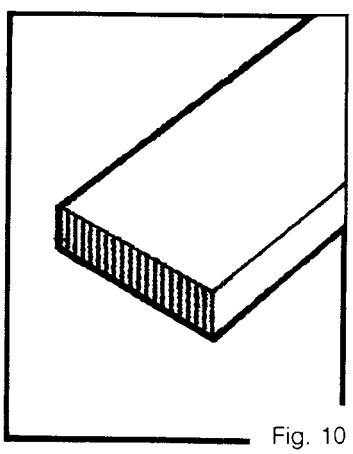

Fig. 10

4) **Information about possible faults**

The possible faults here below listed, refer to tests on a lit machine and with the compressed air pipe connected.
Possible checks must always be carried out with the supply wire disconnected from the network.

A) Pushing the button no air comes out from the torch.
Verify:
— that there is pressure in the air supply system
— the efficiency of pushbutton and of safety-contacts on the torch
— the correct working of the solenoid valve on air circuit
— the efficiency of the printed circuit board.
B) Pushing the button air comes out from the torch but you cannot light the cutting arc.
Verify:
— that air pressure is sufficient
— the efficiency of the pressure switch
— the efficiency of the power main contactor
— the efficiency of the rectifier
— that the thermostat on transformer is not momentarily open because of machine overload or is interrupted because of a fault.
— the efficiency of the printed circuit board
— that condensers do not present any anomalous swelling
— the possible electric circuit cutoff
C) Cutting power is insufficient
After having checked that the trouble does not depend from a cuase listed in paragraph «Cutting problems», verify:
— the efficiency of the main contactor on ground return wire **H** and its working with a lit cutting arc
— the efficiency of the printed circuit board
— that one condenser does not present any anomalous swelling.

MAINTENANCE AND CHECK-UP

Any slags must be removed from the nozzle; for this operation simply use a steel brush. Pointed bodies should not be used as they could cause damage to nozzle hole.
Although the equipment is provided with an automatic device for the discharge of condensate, which functions whenever air feed is shut off, it is recommended that periodical check that no condensate is in the container **I** (Fig. 1) of the pressure regulator.
From time to time the unit must be cleaned inside from the steel dust which can accumulate, simply by using compressed air. Before carrying out this operation, remove the power supply cable from the socket.

Remember: correct operation and good maintenance of your **PLASMA** will ensure best results.