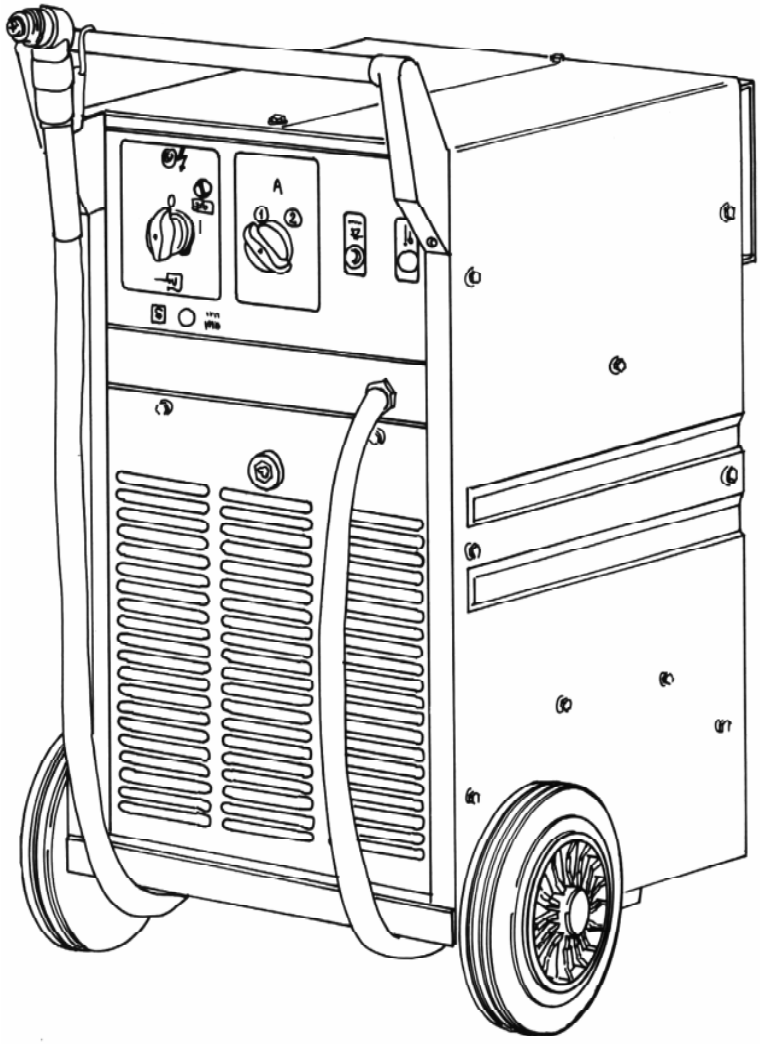
OPERATING INSTRUCTIONS
MANUEL D'INSTRUCTIONS
MANUAL DE INSTRUCCIONES

FOR MODELS:
SERIES B

M12151
83-383
YA5550A

M12151, 83-383, YA5550A



IMPORTANT OPERATING INSTRUCTIONS
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3.300.734/A

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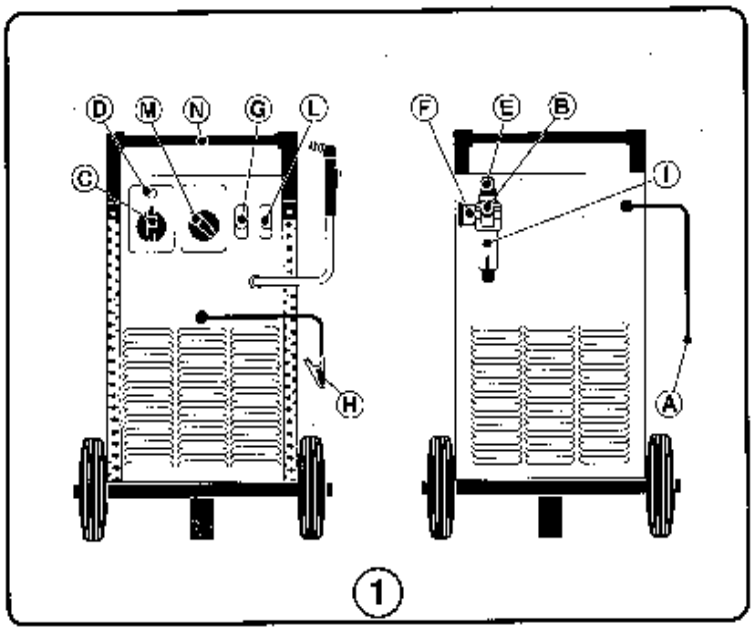
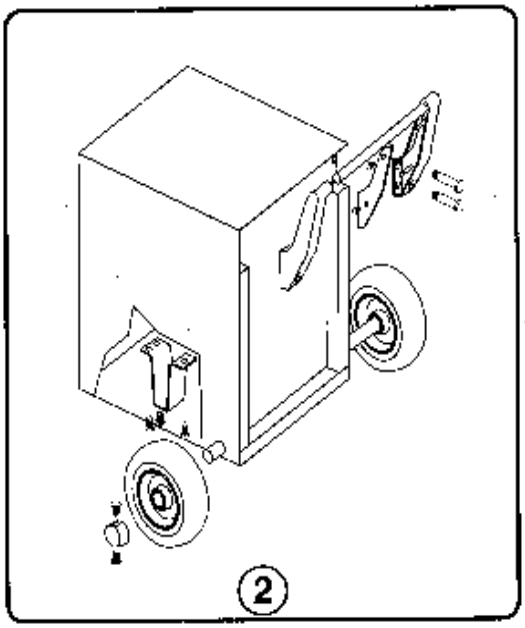
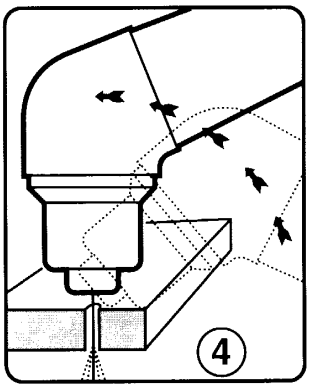
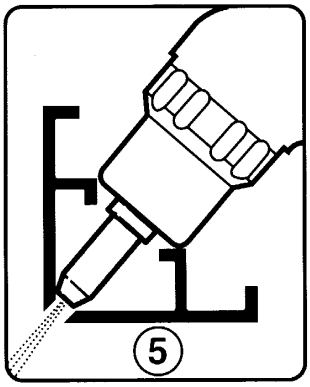
Form No.

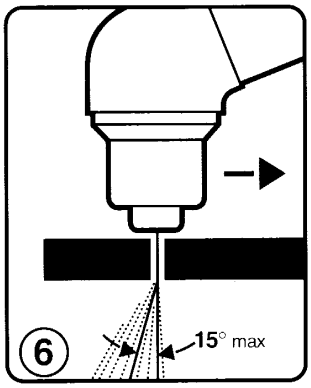
430696

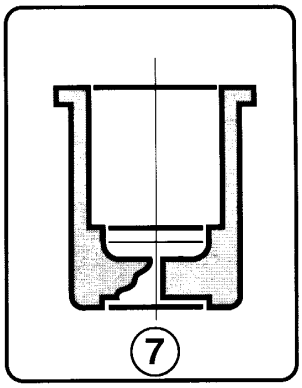


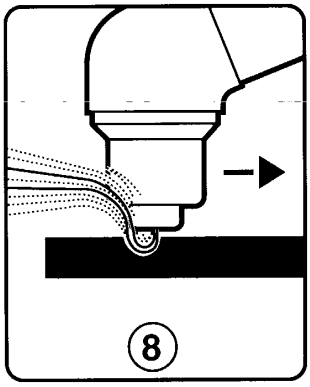


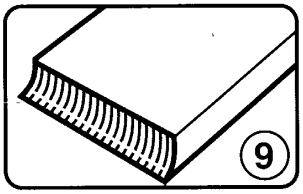


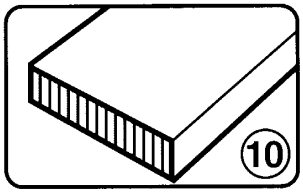


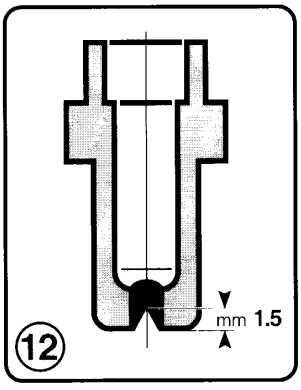


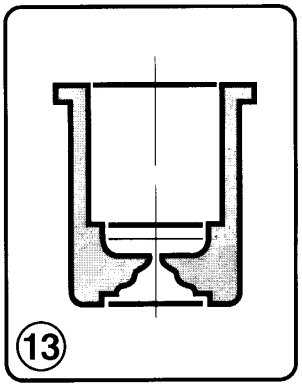


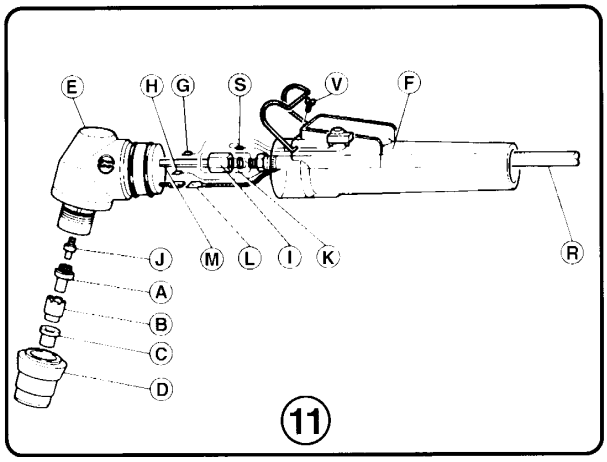












M12151, 83-383, YA5550A

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: CSA standards C22 N° 60M 1990) for the functions described below. Any other use not explicitly included shall be considered FORBIDDEN.
The machine must be used in sufficiently ventilated rooms, in the absence of dust and moisture; in any case, where there is no risk of fire, explosion, or flooding.
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.

SAFETY DEVICES

This unit is provided with the following safety devices:
Thermic: located on the power transformer windings to avoid overloads and signalled by indicator light G on (see picture 1).
Pneumatic: located on the torch feed line to avoid insufficient air pressure and signalled by indicator light L (see picture 1).
Electric: located on torch body to avoid dangerous voltages while replacing nozzle, diffuser, electrode or nozzle holder.
• 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.

DESCRIPTION OF TECHNICAL SPECIFICATIONS

C.S.A. This machine is manufactured according to these international standards.
N°. Machine Serial Number which must appear on requests or inquiries concerning the machine.
TORCH TYPE Type of torch that may by used with this device.
U_0. Secondary no-load voltage.
X. Duty-Cycle Percentage
The duty-cycle is the number of minutes, ex pressed as a percentage, the machine can oper ate(arc on) within a ten minute period without overheating. The duty cycle varies according to the output current.
I_2. Output cutting current
U_2. Secondary voltage with cutting current **I_2**
U_1. Rated supply voltage.
1~60Hz Single-phase input supply at 60 Hz
I_1. Input Amps absorbed corresponding to different output levels (**I_2**).
IP21. Machine case protection class.
The 1 in the second digit place means that this unit is not fit to work outdoors in the rain.

SERIES **B**	**Nº**		
TORCH TYPE			
A / V	A / V		CLASS OF INSULATION ISOLIERSTOFFKLASSE CLASSE DES ISOLANTS CLASE DE AISLAMIENTO CLASSE DI ISOLAMENTO **F**
U_0 V MAX. O.C.V.	**X**	%	
	I_2	A	
	U_2	V	THERMAL PROTECTION THERMISCH GESCHÜTZ PROTECTION THERMIQUE PROTECCION TERMICA PROTEZIONE TERMICA
1~ 60Hz	**I_1**	A	
	U_1	V	
CSA			FORCED VENTILATION KUHLART F VENTILE VENTILACION FORZADA VENTILAZIONE FORZATA
			IP 21

DESCRIPTION OF UNIT DEVICES (see picture 1)

A) Feed cable
B) Compressed air fitting (1/4" female gas thread)
C) Mains switch
D) Mains pilot light
E) Air pressure reducing unit
F) Gauge
G) Light signalling thermostat is open
H) Work clamp
I) Water trap
L) Light signalling air pressure is not enough
M) Cutting power adjusting knob
N) Handle (do not use for lifting up the machine)

ASSEMBLY AND ARRANGEMENT

Unpack the unit, fit wheels, stand and handle following the instructions of picture 2. Place the unit in properly ventilated if possible undusty room making sure that the air inlet and outlet from cooling slots are not obstructed.

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 feed to fitting **B** making sure that pressure is 88PSI (6bar or 0.6 MPa) at least with a minimal capacity of 420 CFH (200 liters/min.)

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 that the mains power supply matches that indicated on the front panel of the machine.
Connect supply cable **A**: the yellow-green wire of cable must be connected to an efficient earth plug of the system, the remaining wires should be connected to the feed line by means of the switch placed, if possible, close to the cutting area so as to switch the unit off quickly if necessary.
The magnetothermic switch capacity or of fuses in series with switch should be equal to the current $\mathbf{I}_1$ absorbed by the unit.
Current $\mathbf{I}_1$ absorbed is known by reading the technical specifications on the unit i.e. feed voltage $\mathbf{U}_1$ available.
Any extensions should have adequate sections for current absorbed $\mathbf{I}_1$.

USE

Switch the unit on by turning knob **C** of the mains switch; this is shown by light **D** which is on.
By pressing for a second the torch button, the compressed air flow is opened. Check that, under this condition, the pressure shown on gauge **F** is about 75 PSI (0.45÷0.47 bar or MPa), otherwise adjust it by means of knob **E** of reducing unit, then lock this knob by pressing it down.
Connect work clamp **H** to the piece to be cut.
Welding circuit should not be deliberately placed in direct or indirect contact with protection wire if not in the workpiece.
If earthing is deliberately made on the workpiece by means of protection wire, the connection must be as direct as possible, with the wire having a section at least equal to the welding return current wire and connected to the piece being worked on, in the same place as the return wire, using the return wire terminal or a second earth terminal closeby.
All possible precautions must be taken in order to avoid stray currents.
Set the cutting current by means of the knob **M.**
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 or 3 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 40 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 4). 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 5) it is recommended to use extended electrodes and nozzles.
Should circular cut be done it is recommended to use caliper (supplied on request).

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 - 15° (see picture 6). It is thus avoided to wear nozzle (see picture 7) out and to burn the nozzle holder (see picture 8).
• Excessive thickness of piece (see graph of cutting speed and thickness)
• Work clamp **H** not properly in electric contact with piece
• Worn nozzle and electrode
• Too low cutting current.
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 9) 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 10).
4) Excessive wear of consumable parts
This may be due to :
a) too low air pressure with respect to the recommended one
b) 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 favor 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 and to prevent dangerous situations always use genuine spares.**

TORCH MAINTENANCE

Always disconnect the unit before any repair of torch.
1) Replace wear parts (picture 11)
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 (see picture 12).
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 (see picture 13).
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 particulary the operator's safety.
2) Replace torch body E (see picture 11).
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.

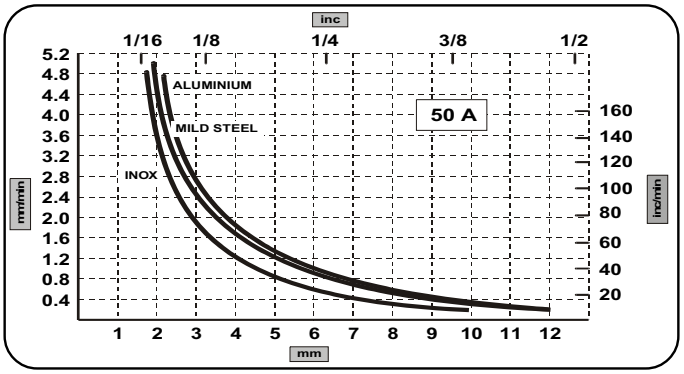
MAINTENANCE AND CONTROL

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 I 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

WARNING: DISCONNECT POWER SOURCE BEFORE DISASSEMBLY OF THE TORCH.

ELECTRIC SHOCK

Electric shock can kill. All electric shocks are potentially fatal.
This plasma cutter requires high voltages for arc spark starting (approx. 250 - 350 V). The following safety rules must be therefore 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.
• 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.
The absence of such parts jeopardizes the machine working and particulary 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 vapors.
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 put cylinder in electrical contact 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.
• Do not use compressed oxygen.

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 in a manner 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.

	WIRING DIAGRAM COLOR CODE
A	BLACK
B	RED
C	GREY
D	WHITE
E	GREEN
F	VIOLET
G	YELLOW
H	BLUE
K	BROWN
J	ORANGE
I	PINK
L	PINK-BLACK
M	GREY-VIOLET
N	WHITE-VIOLET
O	WHITE-BLACK
P	GREY-BLUE
Q	WHITE-RED
R	GREY-RED
S	WHITE-BLUE
T	BLACK-BLUE
U	YELLOW-GREEN

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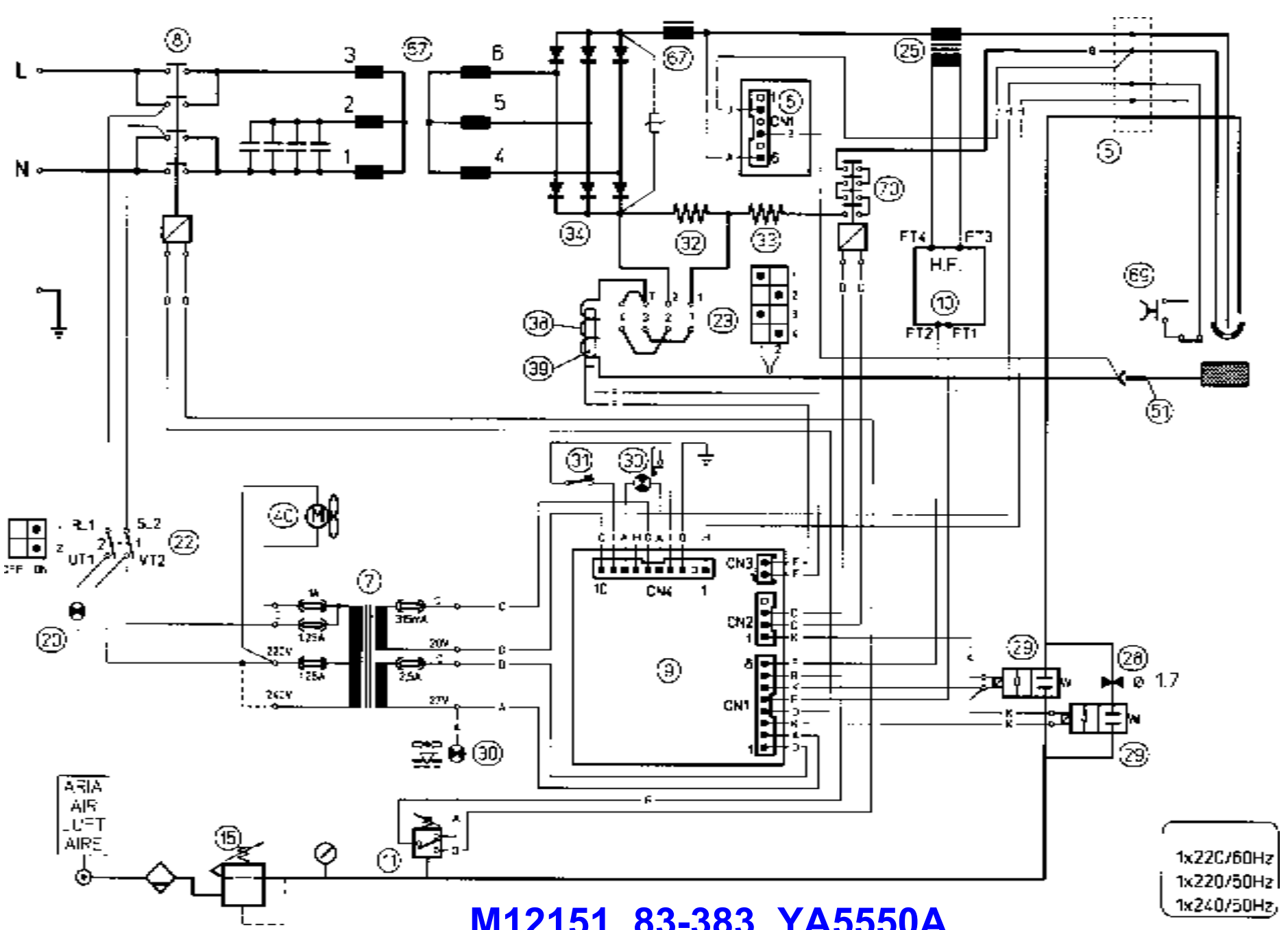

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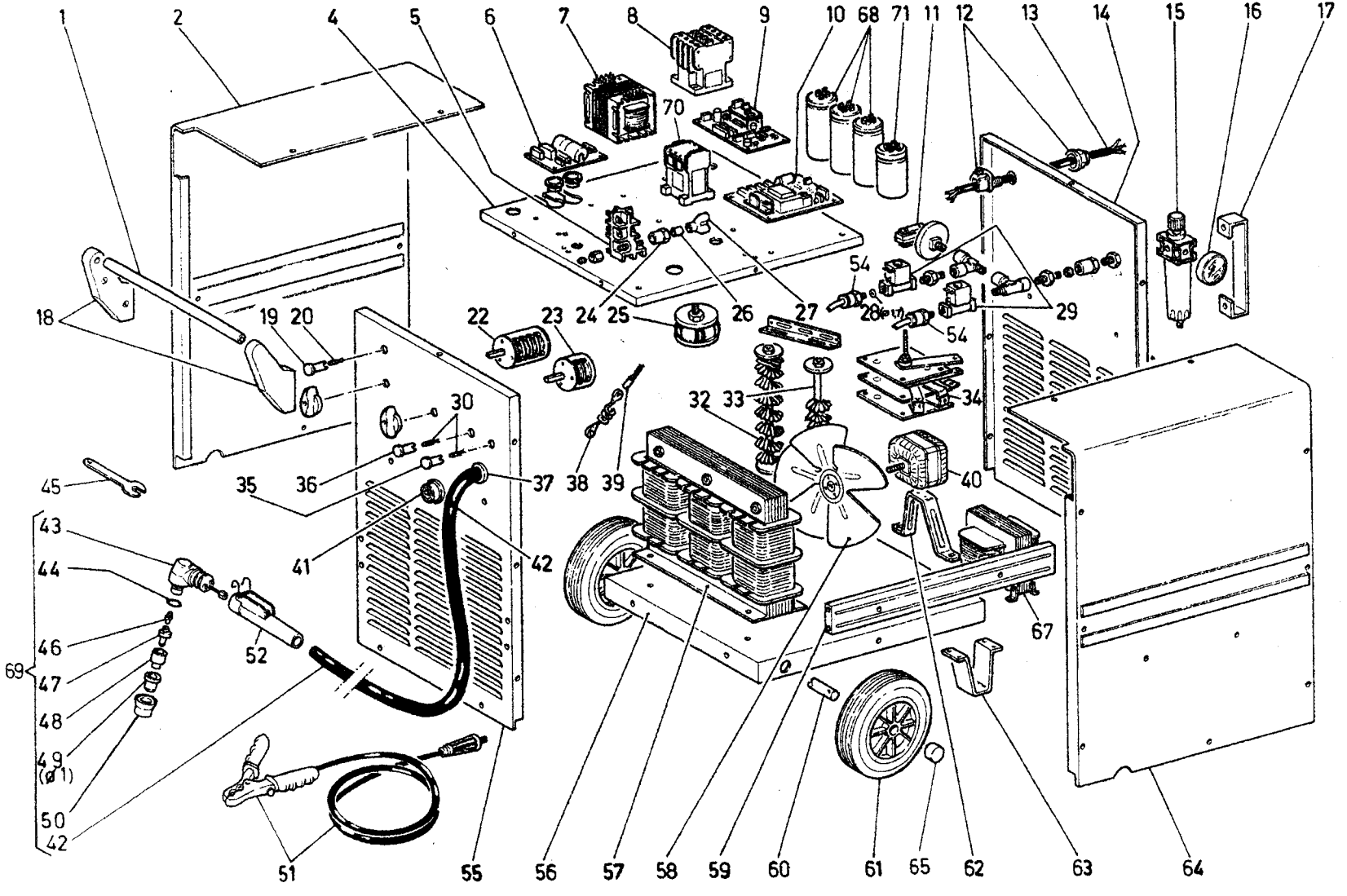

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Item	Lincoln Stock #	Customer #	Description
1	312-512-666	250728	Handle
2	411-109-026	250907	Left Side Panel
4		**251176**	Center Divider
5	239-298-666	B7009380	Terminal Board
6		**251177 (5600834)**	Filter Circuit
7		**251178 (5600462)**	Control Transformer
8		**251179 (3190277)**	Contactor
9		**251180 (5600995)**	Control Circuit Board
10		**251181 (5600846)**	High Voltage Circuit
11	246-532-666	B7005380	Pressure Switch
12	541-279-666	250874	Strain Relief
13	238-713-666	260472	Power Cord
14	411-120-016	250877	Back Panel
15	254-006-666	B7006380	Air Regulator
16	251-030-666	B7014380	Gauge
17	215-031-666	250901	Shield
18	312-514-666	250896	Handle Support
19	245-168-666	246250	Lamp Holder
20		**B7011380**	Pilot Lamp
22		**260473**	Switch w/knob
23	246-526-666	251220	Switch w/knob
24	253-340-666	B7013380	Coupling
25		**251186**	High Voltage Transformer
26		**251187 (3160045)**	Fitting
27		**250872 (3160046)**	Fitting
28	541-279-666	250894	Thermostat
29		**B7105370 (3160181)**	Solenoid
30		**251188 (3175439)**	Pilot Lamp
32	215-029-666	251189	Resistor
33	215-030-666	251190	Resistor
34	244-086-666	251191	Rectifier
35	245-170-666	B7015380	Lamp Holder
36	245-169-666	246251	Lamp Holder
37	334-607-666	B7016380	Strain Relief
38	210-358-666	251192	Coil
39	411-125-666	250885	Reed
40	216-108-666	246224	Fan Motor

Item	Lincoln Stock #	Customer #	Description
41	079-306-666	B7073370	Quick Connector
42		**251193**	Torch Cable
43	334-599-000	M15820,250747,83-673	Torch Head
44	512-264-666	251194	O-Ring
45		**M15818,250745,83-671**	Electrode Wrench
46		**251195 (3065204)**	Diffuser
47	334-591-000	M15815,YA5550A1,83-668	Short Electrode
	334-638-000	M15816Ya5550A4,83-669	Long Electrode
48	334-589-000	M15852,M15803,YA22257,83-667	Diffusers (2)
49	334-652-000	M15811,YA5550A3,83-663	Short Nozzle (0.9mm)
	334-653-000	M15814,YA22252,83-666	Short Nozzle (1.0mm)
		M15812,83-664	Short Nozzle (1.2mm)
		M15813,YA5550A5,83-665	Long Nozzle (0.9mm)
	334-593-000	M15805,YA22254,83-631	Long Nozzle (1.0mm)
50	334-651-000	M15810,YA22259,83-662	Nozzle Holder
51	238-714-666	251196	Ground Cable
52	312-518-666	B7037380	Handle & Trigger
54	253-341-666	B7004380	Coupling
55		**260495**	Front Panel
56	411-124-666	250893	Base
57	880-578-666	251199	Transformer
58	216-109-666	250726	Fan Blade
59	312-517-666	251201	Stiffener
60	413-121-666	250881	Axle
61	413-118-666	B7033380	Wheel
62	312-513-666	250879	Fan Motor Bracket
63	412-756-666	B7035380	Foot
64	411-108-026	250897	Right Side Panel
65	411-107-026	250224	Cover
67		**251202 (3205328)**	Reactor Coil
68	213-043-666	260468	Capacitor
69	**334-600-000**	**M15828,250226,83-681**	**Complete Torch, 18 Ft.**
70		B7100370 **(3190268)**	Contactor
71	213-044-666	260477	Capacitor
72		247506	Product Label
73		247509	Warning Label
74		M15809, YA5550A8, 83-661	Standoff

08/17/06

Model	Primary Input	Input Plug	Duty Cycle at Rated Output
M12151	230 Vac, 50A	N/A	40%

Rated Output	Voltage Settings	Agency Listing	Max Cutting Thickness
50 amps	2	CSA	1/2"