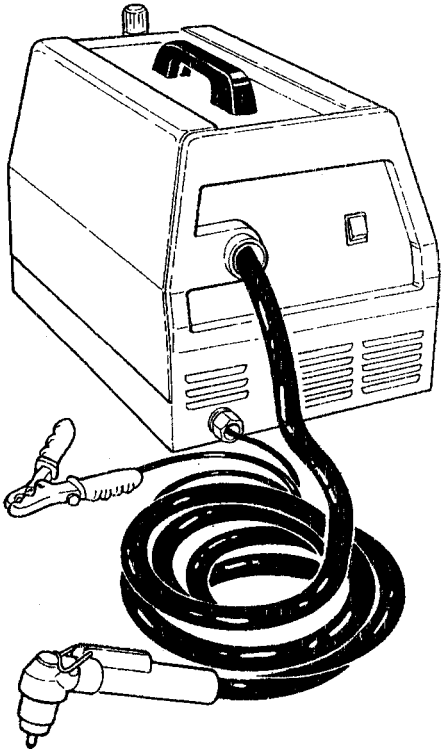
SERVICE MANUAL

M12149, 83-382, P10015, PCS21, YA2225



CONTENTS

1 - GENERAL INFORMATION

1.1 - Introduction.

The purpose of this manual is to train personnel assigned to carry out maintenance on the power source art. 922.83 for plasma cutting systems.

1.2 - General service policy.

It is the responsibility of the customer and/or operator to use the equipment appropriately, in accordance with the instructions in the Instruction Manual, as well as to maintain the equipment and related accessories in good working condition, in compliance with the instructions provided in the Service Manual.

Any internal inspection or repairs must be carried out by qualified personnel who are responsible for any intervention on the equipment.

It is forbidden to attempt to repair damaged electronic boards or modules; replace them with original Cebora spare parts.

1.3 - Safety information.

The safety notes provided in this manual are an integral part of those given in the Instruction Manual. Therefore, before working on the machine, please read the paragraph on safety instructions in the aforementioned manual.

Always disconnect the power cord from the mains, and wait for the internal capacitors to discharge (1 minute) before accessing the interior of the equipment.

Some internal parts, such as terminals and dissipators, may be connected to mains or otherwise hazardous potentials. It is therefore forbidden to work with the safety guards removed from the machine unless strictly necessary. In this case, take special precautions such as wearing insulating gloves and footwear, and working in a perfectly dry environment with dry clothing.

2 - SYSTEM DESCRIPTION

2.1 - Introduction.

The PLASMA 24 is a system for plasma arc cutting electrically conductive materials.

It essentially consists of an electrical power source, art. 922.83, with built- in torch.

The power source is controlled by an electronic circuit, gathered onto a single electronic board.

2.2 - Technical specifications.

To verify the technical specifications, see the machine plate, Instruction Manual, and Sales Catalogue.

2.3 - Description of power source art. 922.83.

Art. 922.83 is a direct current power source, made up of a three-phase transformer, powered in single-phase, and a three-phase rectifier bridge.

Referring to the electrical diagram in par. 4.1, drawing 3.1 and table 3.2, we can identify the main blocks that make up the power source.

The switch (42) powers the fan (15) and the control board (8).

The control board (8) generates voltage at the power source output by means of the input and output contactors (4), based on the signals present at its inputs.

With the switch (42) closed, the control board is powered and awaiting the start signal from the torch button. The power source provides no output voltage.

When the start button is pressed on the torch, the control board (8) opens the gas solenoid valve (12) and closes the input contactor (4).

The closure of the latter is also affected by the pressure switch (11), inserted in the plasma gas line (pressure > 3.2 bar = minimum working pressure = contact closed) and the thermostats (24) located on the windings of the transformer (29) (temperature correct = contacts closed).

The pressure switch (11) is inserted downstream from the solenoid valve (12) to provide the pre-gas function (with non-adjustable timing), and ensure that gas is flowing from the torch before voltage is applied to the electrode and nozzle torch terminals.

When the input contactor (4) closes, the single-phase mains voltage is applied to the three-phase transformer (29) and to the capacitors (16) and (23), which are connected in series to one of the windings of the primary transformer circuit to create the "third phase" necessary to the transformer (29).

Their value, calculated based on the characteristics of the primary winding, is the determining factor in proper phase desplacement and correct voltage value for the "third phase". The primary circuit of the transformer (29) is also made up of three windings, one for each column, with different numbers of turns so that they may operate on a single-phase mains, together with the capacitors.

A different capacity value of the capacitors or a different connection of the primary transformer circuit (29) produces three different voltages at the secondary circuit which, once rectified by the bridge (5), provide an unbalanced direct current that may make it difficult to light the arc or produce poor-quality cutting.

For proper operation, it is therefore essential to observe the capacity of the capacitors (C23 = 2 x 100 uF, 320 Vac; C16 = 1 x 60 uF 450 Vac, parallel connected) and how these are wired to the primary circuit (**DO NOT** reverse the primary circuit terminals).

Once the torch start button has been pressed and the input contactor (4) closed, the voltage rectified by the bridge (5) (= approximately 250 Vdc) is present at the electrode and nozzle torch terminals. In this situation you have 2 seconds to light the pilot arc.

After this time, if the pilot arc has not been lit, the input contactor (4) and the solenoid valve (12) are disabled and return to their resting state.

The pilot arc is started by striking (see Instruction Manual); once on, the pilot arc continues as long as the start button remains pressed.

With the pilot arc on, the output voltage between electrode and nozzle torch terminals drops below 190 Vdc, as a result of both the resistance (19) and the intrinsic inductance of the transformer (29). This inductance derives from the special shape of the transformer, and is necessary to level the power source output current and make it easier to maintain the arc even while cutting.

In this situation, the output contactor (4) is closed, and if the torch (with pilot arc on) is moved near the workpiece, the arc current begins circulating in the workpiece, as this is the preferential path due to the effect of the voltage drop at the ends of the resistance (19).

This is how the transfer arc, thus cutting, begins.

If you leave the workpiece while holding the start button pressed after you have finished cutting, the device returns to the pilot arc on condition; if instead the start button is released, it returns to the initial resting state (contactors (4) open and solenoid valve (12) closed).

If there is a delay during the attempt to start the pilot arc, and the torch is kept too long in short-circuit, or if a short-circuit or excess output load occurs while cutting, so that the output voltage of the power source between electrode and nozzle falls below 40 Vdc, the control board (8) detects the overload situation and blocks the power source by opening the output contactor (4), thereby preventing cutting from taking place.

To reset the power source from this situation, you must release the torch start button.

The output contactor (4) also performs a safety function against electrical shock from contact.

When it opens, it eliminates the risk of electroshock that the operator would face by touching the ground contact (32) and the electrode (throught torch nozzle), in the event of resistor (19) or pilot arc conductor interrumption.

Essentially, the output contactor (4) is closed only if the arc voltage is between 40 and 190 Vdc, thus with the arc on (pilot or transfer).

With a voltage greater than 190 Vdc, the contactors (4) are open and the solenoid valve (12) closed.

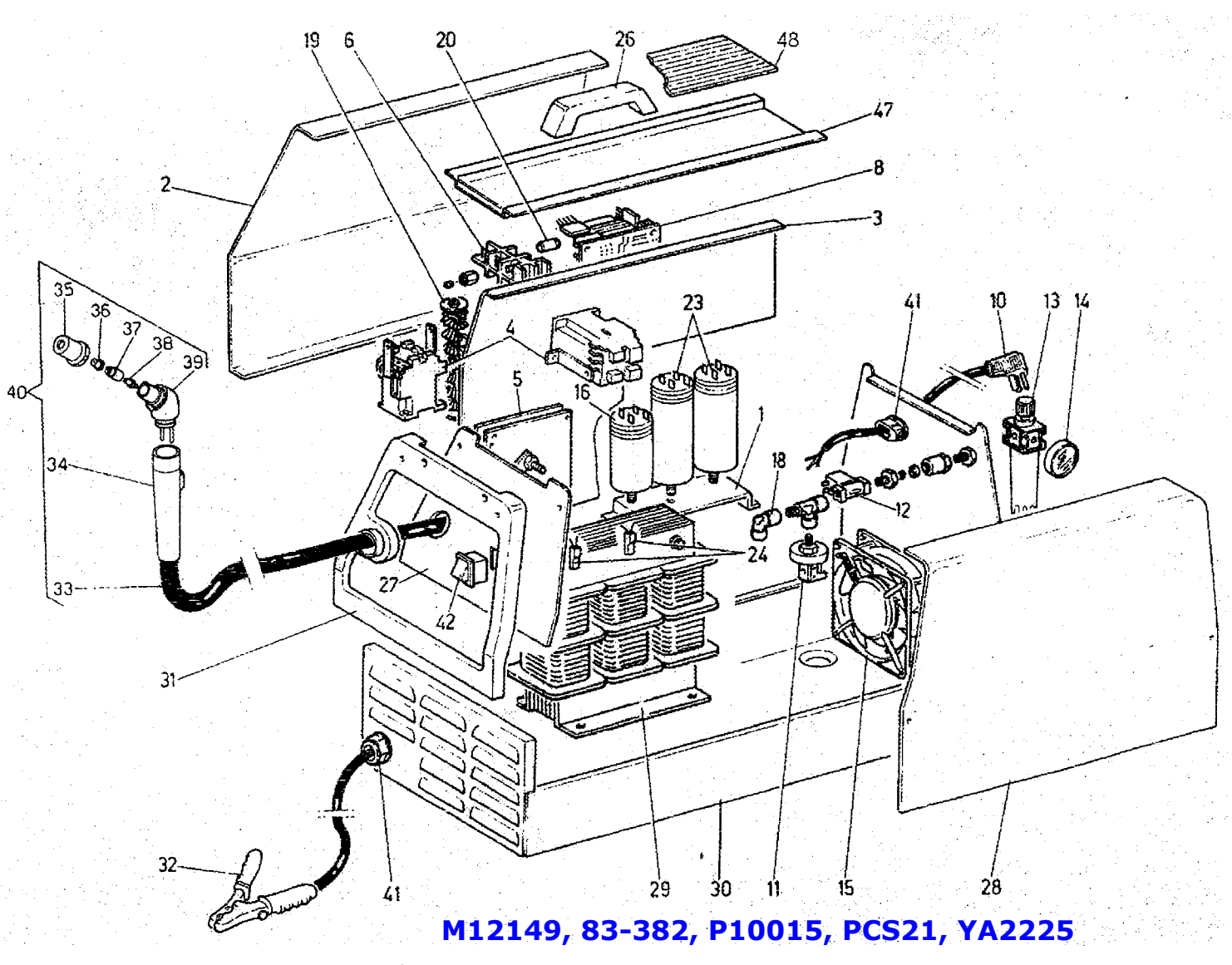
With a voltage lower than 40 Vdc, the power source is blocked with the output contactor (4) open, the input contactor (4) closed and the solenoid valve (12) open.

The contactors (4) and the solenoid valve (12) are devices operating at mains voltage, and are controlled by the following relays on the control board (8):

- input contactor (4) and solenoid valve (12) are controlled by RL3;
- output contactor (4) is controlled by RL2.

The relay RL1 is used to keep the torch trigger isolated from the board circuit. Basically, the torch trigger controls RL1, whose contact enables operation of the electronic circuits of the control board (8). The circuit for the torch button and RL1 coil is powered by a special secondary winding of the TR transformer on control board (8).

The pressure regulator (13) is mounted on the rear panel, equipped with filter and pressure gauge (14). The pressure regulator (13) must be adjusted for a pressure, as read on the pressure gauge (14), of approximately 4.7 bar (see Instruction Manual).



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M12149, YA2225, 83-382, P10015

Item	Stock #	Customer #	Description
1	412-754-666	260457	Support
2	411-118-026	260460	Left Side Panel
3	412-755-666	260459	Center Divider
4	246-519-666	B7053370	Contactor
5		251145	Rectifier
6	239-298-666	B7009380	Terminal Board
8	880-593-000	251148	Control Circuit Board
10	238-707-666	251150	Input Cable
11	246-532-666	B7005380	Pressure Switch
12	246-530-666	251036	Solenoid
13	254-006-666	B7006380	Regulator
14	251-030-666	B7014380	Gauge
15	216-110-666	260453	Fan Motor
16	213-043-666	260468	Capacitor
18		251153	Elbow Fitting
19	215-036-666	B7029380	Resistor
20	253-341-666	B7004380	Fitting
23	260-001-666	251155	Capacitor
24	246-531-666	251156	Thermostat
26	312-515-666	250975	Handle
27		260497	Control Panel
28	411-110-026	260461	Right Side Panel

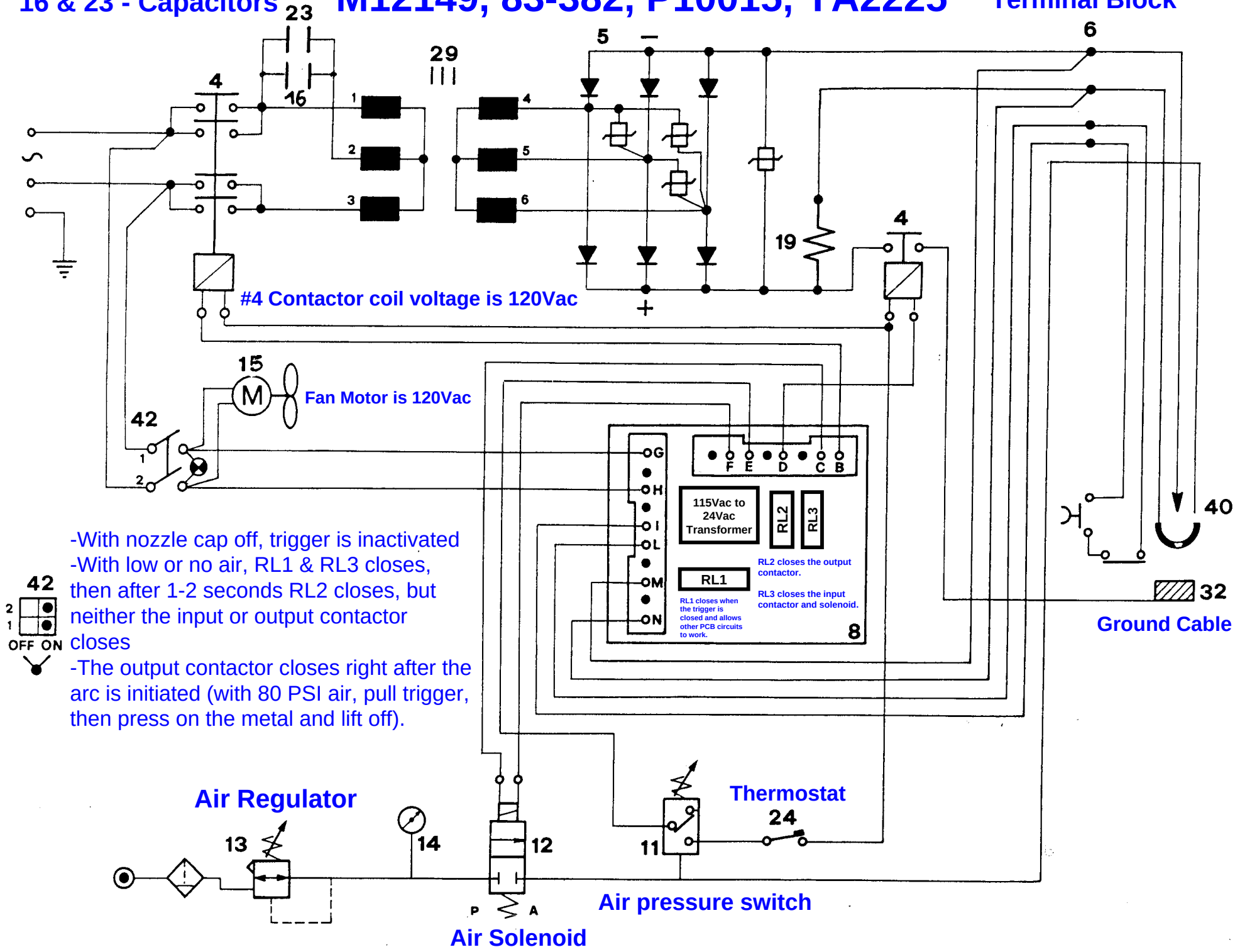
Item	Stock #	Customer #	Description
29	880-579-666	260464	Transformer
30	411-116-016	260500	Base
31	312-516-666	260470	Front Panel Frame
32	238-708-666	251159	Ground Cable
33		251160	Torch Cable
34	312-518-666	B7037380	Torch Handle & Trigger
35	334-651-000	M15810,YA22259,83-662	Nozzle Holder
36	334-653-000	M15814,YA22252,83-666	Standard Nozzle, 1mm
	334-593-000	M15805,YA22254,83-631	Long Nozzle, 1mm (3)
37	334-589-000	M15803,M15852,YA22257,83-629	Diffuser (2)
38	334-592-000	M15802,YA22251,83-628	Standard Electrode (5)
	334-594-000	M15807,YA22253,83-633	Long Electrode (2)
39	334-629-000	B7039380	Torch Head
40	**334-636-000**	**M15822,250748,83-675**	**Torch, 13FT**
41	414-020-666	B7018380	Strain Relief
42	246-537-666	B7069370	Switch
43		247541	Warning Label
44		247542	Warning Label
45		247505	Label
46		247509	Warning Label
47	411-119-026	260466	Top Panel
48	512-265-666	260467	Rubber Mat

8/17/2006

Model	Primary Input	Input Plug	Duty Cycle at Rated Output
M12149	120 Vac	15A	20%

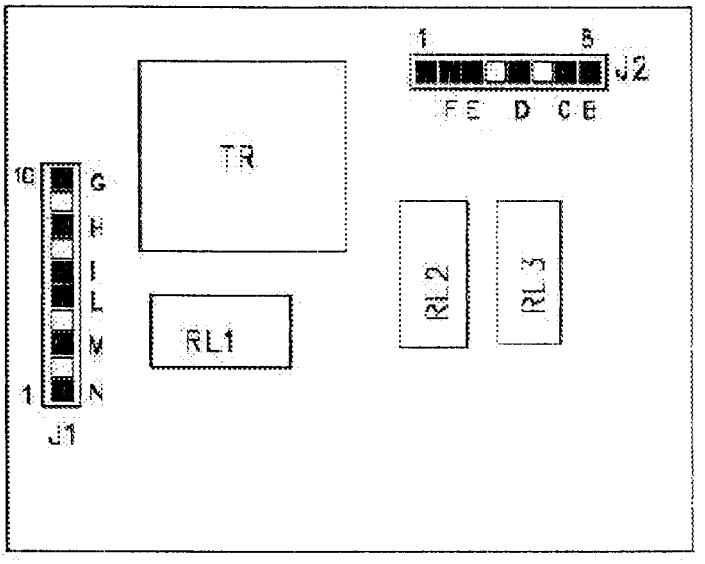
Rated Output	Voltage Settings	Agency Listing	Max Cutting Thickness
25 amps	1	CSA	3/16"

16 & 23 - Capacitors — M12149, 83-382, P10015, YA2225 — Terminal Block



4.2 - Control board (8) code 5.600.837.

4.2.1 - Topographical drawing.



4.2.2 - Connector table.

Connector	Terminals	Function
J1	G – H	control board (8) power supply input.
J1	I – L	start signal input from torch button.
J1	N(+) – M(-)	power source output voltage input.
J2	E	input and output contactors (4) shared power supply output.
J2	B	input contactor (4) command output.
J2	D	output contactor (4) command output.
J2	C – F	solenoid valve (12) command output.