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## REPAIRS MANUAL



*Genesis 145*

**SELCO S.R.L.**

Via Palladio, 19

I - 35019 ONARA DI TOMBOLO (PD)

TEL. +39 049 9413111

FAX. +39 049 9413311

email: service.dept@selcoweld.com

How to contact Selco Service Department.:

**SELCO s.r.l**  
**Service Department**  
**c/o SELCO 2**  
Via Macello, 61  
I - 35010 CITTADILLA (Padova) Italy  
Tel. +39 049 9413111  
Fax. +39 049 9413311  
email: service.dept@selcoweld.com

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## 1) PURPOSE OF THE MANUAL

This manual is designed to provide authorised service centres with the basic information necessary for performing repairs on the models Genesis 145.

In order to avoid serious injury to persons or damage to things, this manual must be used only by qualified technicians.

Selco S.r.l. accepts no liability for any injury to persons or damage to things that may occur during performance of repairs, even after reading or practical application of this manual.

For a detailed description of the operation, use and ordinary maintenance of the machine, please refer to the "Instructions for use and maintenance manual" which must always accompany the machine. The purchaser must follow the directions contained in the above manual. Failure to do so will exempt Selco from all liability.

The operations described in this manual require the use of a digital multimeter, an DC ammeter clamp and a basic knowledge of how the machine works. Basic electrotechnical knowledge is also required.

**Repair consists in identification of the faulty part, included in the list of available spare parts, and replacement of it.**



**In the event of failure of an electronic board, repair entails replacement of the board and not replacement of the faulty electronic component on the board.**

Do not carry out modifications or maintenance not scheduled in this manual.

If the problem cannot be solved by following the instructions provided in this manual, contact the Selco Service Department or send the machine to Selco for repair.

## 2) WARNINGS, PRECAUTIONS AND GENERAL NOTICES FOR PERFORMING REPAIRS

Repairs must be performed by qualified personnel only.

Before performing the repair, you should read and assimilate the contents of this manual, in particular the safety precautions.

Avoid performing repairs without the presence of another person able to provide help in the event of an accident.

The repair of a machine requires access to its internal parts and consequently removal of some of the protective panels. Additional precautions are therefore necessary with respect to use of the machine for welding in order to prevent possible injury or damage caused by contact with

- live parts
- moving parts
- parts at high temperature

### CAUTION



#### LIVE PARTS

When handling internal parts of the machine, remember that opening of the switch does not prevent the risk of electric shocks: the machine must be unplugged from the power supply.

Wait approx. one minute before carrying out work on the internal parts as the capacitors may be loaded at high voltage.

### CAUTION



#### LIVE PARTS OF THE TOOLS

When taking measurements, remember that the measuring instruments can be live and you should therefore avoid touching their metal parts

### CAUTION



#### MOVING PARTS

Keep your hands well away from the fan when the machine is connected to the power supply. Ensure that the machine is unplugged and that the fan is at a standstill before replacing it.

### CAUTION



#### PARTS AT HIGH TEMPERATURE

When handling internal parts of the machine, remember that some of them may be very hot. In particular avoid contact with heat sinks.

### 3) INSTRUMENTS AND CONVENTIONS FOR PERFORMING DIAGNOSIS AND REPAIR

#### 3.1) INSTRUMENTS FOR BASIC DIAGNOSIS

The following are required:

- a multimeter with the following scales:
  - Ohm: from 0 ohm to a few Mohm
  - Diode testing
  - Direct voltage (Vdc): from mVdc to 1000 Vdc
  - Alternating voltage (Vac): from 10 Vac to 700Vac

**NOTE:** You are advised to use an instrument with automatic scale since it is not theoretically possible to predict the electrical quantity to be measured when the machine has broken down.

- an DC ammeter clamp at least in class 2.5 with e.o.s. 200A pk.
- alternatively to the ammeter clamp, a shunt can be used with value 60 mV @ 150 A.

#### NOTES:

- \* Remember that other types of shunts can also be used, but accuracy is reduced with higher capacities, whereas with lower capacities the measurement must be taken quickly to avoid overheating of the shunt
- \* Once fitted, the shunt is at welding potential
- \* The ammeter clamp is preferable as it is more practical

#### 3.2) REPAIR TOOLS

- Complete set of fork spanners
- Complete set of pipe spanners for hexagonal nuts
- Complete set of blade screwdrivers
- Complete set of Phillips screwdrivers
- Complete set of Allen keys
- Crimper for insulated wire terminals (blue, red and yellow)
- Pliers for AMP contacts
- Tweezers and cutting nippers - type commonly used for electronic components
- Tongs (dimensions suitable for closing gas pipe clamps)
- Welder for electronic components, minimum power 50 W
- Portable electric drill

#### 3.3) CONVENTIONS

By convention, when a measurement has to be taken between two points, for example a  $\leftarrow$  b, the arrow point indicates where to apply the red tip of the multimeter (a), while the black tip is applied at the other end (b).

When a double arrow appears between two measuring points (e.g.: c  $\longleftrightarrow$  d), the voltage to be measured is alternating (normally at 50 Hz), therefore it does not matter in which order the multimeter terminals are applied.

In drawings and tables, when a voltage measurement appears referring to terminals of components such as DIODES, BJT, MOSFET and IGBT, the multimeter is used in "diode test" mode (these measurements are always taken with the machine switched off and normally give values in the range +0.10 ... +0.90Vdc). In this case the following symbol is affixed beside the value to be measured



Junction measurement (multimeter in "diode test" mode)

The following symbols will be used in the same way:



AC or DC voltage measurement (multimeter in voltmeter mode).



Resistance measurement (multimeter in ohmmeter mode).



Current measurement (ammeter clamp or shunt + multimeter in millivoltmeter mode).



Frequency measurement (multimeter in frequencymeter mode).

The measuring conditions (power source on/off, MMA/TIG operating mode, etc.) are always clearly indicated beside the values to be measured.

The connector terminals are indicated by the name of the connector followed by a slash and the number of the terminal; for example CN1/2 indicates terminal 2 of connector CN1.

Unless otherwise specified, all the measurements must be performed with the boards fitted, together with their connections.



**Remember that the first of the tests to be performed is the VISUAL CHECK!**

**The visual check reduces troubleshooting times and directs any subsequent tests towards the damaged part!**

### 3.4) STATIC LOAD.

Use of grid load can speed up fault tracing and machine testing. Just remember that a fixed power resistor applied to machine's output is somewhat equivalent to a welding arc, but only inside of a narrow output voltage range, whose center value can be determined by the formula:

#### STICK WELDING:

$$V_{OUT} = 20 + 0.04 \times I_{OUT}$$

Es.: 22Vdc @ 50A  
24Vdc @ 100A  
28Vdc @ 200A etc.

#### DC TIG WELDING:

$$V_{OUT} = 10 + 0.04 \times I_{OUT}$$

Es.: 12Vdc @ 50A  
14Vdc @ 100A  
18Vdc @ 200A etc.

If output voltage goes too much above or below the rated value, the generator could either saturate or go into arc force or other special features could be performed (such as anti-flashing): in both cases real output current could be much different from expected value and the generator could even show an intermittent output power. Grid load resistor's rated power is also important, 'cos a 24Vdc @ 100A grid load produces 2400W to be dissipated by air cooling.



**So, when using grid load, pay attention to both output current & output voltage and use correct resistance value & power!**

## 4) USE AND ROUTINE MAINTENANCE OF POWER SOURCES AND ACCESSORIES, TECHNICAL DATES

Use and routine maintenance (extract from the "Instructions for use" manual provided with each power source).



# CAUTION



### 4.1) SAFETY

Prior to performing any operation on the machine, make sure that you have thoroughly read and understood the contents of this manual.

Do not perform modifications or maintenance operations which are not prescribed.

For any doubt or problem regarding the use of the machine, even if not described herein, consult qualified personnel.

The producer cannot be held responsible for damage to persons or property caused by the operator's failure to read or apply the contents of this manual.

#### 4.1.1 Operator and other persons' protection

The welding process is a noxious source of radiations, noise, heat and gas emissions. Persons fitted with pacemakers must consult their doctor before undertaking arc welding or plasma cut operations.

If the above prescription is not observed, the manufacturer accepts no liability for any damages sustained in the event of an accident.

#### Personal protection:

- Do not wear contact lenses!!!
- Keep a first aid kit ready for use.
- Do not underestimate any burning or injury.
- Wear protective clothing to protect your skin from the arc rays, sparks or incandescent metal, and a helmet or a welding cap.
- Wear masks with side face guards and suitable protection filter (at least NR10 or above) for the eyes.
- Use headphones if dangerous noise levels are reached during the welding. Always wear safety goggles with side guards, especially during the manual or mechanical removal of welding slags. If you feel an electric shock, interrupt the welding operations immediately.

#### Other persons' protection:

- Position a fire-retardant partition to protect the surrounding area from rays, sparks and incandescent slags.
- Advise any person in the vicinity not to stare at the arc or at the incandescent metal and to get an adequate protection.
- If the noise level exceeds the limits prescribed by the law, delimit the work area and make sure that anyone getting near it is protected with headphones or earphones.

#### 4.1.2 Fire/explosion prevention

The welding process may cause fires and/or explosions.

- Compressed gas cylinders are dangerous; consult the supplier before handling them.

Protect them from:

- \* Direct exposure to sun rays.
- \* Flames.
- \* Sudden changes in temperature.
- \* Very low temperatures.

Compressed gas cylinders must be fixed to the walls or to other supports, in order to prevent them from falling.

- Clear the work area and the surrounding area from any inflammable or combustible materials or objects.
- Position a fire-fighting device or material near the work area.

- Do not perform welding or cutting operations on closed containers or pipes.
- If said containers or pipes have been opened, emptied and carefully cleaned, the welding operation must in any case be performed with great care.
- Do not weld in places where explosive powders, gases or vapours are present.
- Do not perform welding operations on or near containers under pressure.
- Don't use this machine to defrost pipes.

#### 4.1.4 Positioning the power source

Keep to the following rules:

- Easy access to the equipment controls and connections must be provided.
- Do not position the equipment in reduced spaces.
- Do not place the generator on surfaces with inclination exceeding 10° with respect to the horizontal plane

#### 4.1.5 Installing the apparatus

- Comply with the local safety regulations for the installation and carry out the maintenance service of the machine according to the constructor's directions.
- Any maintenance operation must be performed by qualified personnel only.
- The connection (series or parallel) of the generators is prohibited.
- Before operating inside the generator, disconnect the power supply.
- Carry out the routine maintenance on the equipment.
- Make sure that the supply mains and the earthing are sufficient and adequate.
- The earth cable must be connected as near the area to be welded as possible.
- Take the precautions relevant to the protection degree of the power source.
- Before welding, check the condition of the electric cables and of the torch, and if they are damaged repair or change them.
- Neither get on the material to be welded, nor lean against it.
- The operator must not touch two torches or two electrode holders at the same time.

## 4.2) ELECTROMAGNETIC COMPATIBILITY (EMC)



# CAUTION



This device is built in compliance with the indications contained in the harmonized standard EN60974-10, to which the operator must refer for the use of this apparatus.

- Install and use the apparatus keeping to the instructions given in this manual.
- This device must be used for professional applications only, in industrial environments. It is important to remember that it may be difficult to ensure the electromagnetic compatibility in other environments.

### 4.2.1 Installation, use and area examination

- The user must be an expert in the sector and as such is responsible for installation and use of the equipment according to the manufacturer's instructions.  
If any electromagnetic disturbance is noticed, the user must solve the problem, if necessary with the manufacturer's technical assistance.
- In any case electromagnetic disturbances must be reduced until they are not a nuisance any longer.
- Before installing this apparatus, the user must evaluate the potential electromagnetic problems that may arise in the surrounding area, considering in particular the health conditions of the persons in the vicinity, for example of persons fitted with pacemakers or hearing aids.

### 4.2.2 Emission reduction methods

#### MAINS POWER SUPPLY

- The welding power source must be connected to the supply mains according to the manufacturer's instructions.

In case of interference, it may be necessary to take further precautions like the filtering of the mains power supply.  
It is also necessary to consider the possibility to shield the power supply cable.

#### WELDING POWER SOURCE MAINTENANCE

The welding power source needs routine maintenance according to the manufacturer's instructions.  
When the equipment is working, all the access and operating doors and covers must be closed and fixed.  
The welding power source must not be modified in any way.

#### WELDING AND CUTTING CABLES

The welding cables must be kept as short as possible, positioned near one another and laid at or approximately at ground level.

#### EQUIPOTENTIAL CONNECTION

The earth connection of all the metal component in the welding installation and near it must be taken in consideration.  
However, the metal component connected to the workpiece will increase the risk of electric shock for the operator, if he touches said metal component and the electrode at the same time.  
Therefore, the operator must be insulated from all the earthed metal component. The equipotential connection must be made according to the national regulations.

#### EARTHING THE WORKPIECE

When the workpiece is not earthed for electrical safety reasons due to its size and position, the earthing of the workpiece may reduce the emission. It is important to remember that the earthing of the workpiece should neither increase the risk of accidents for the operators, nor damage other electric equipment.  
The earthing must be made according to the national regulations.

#### SHIELDING

The selective shielding of other cables and equipment present in the surrounding area may reduce the problems due to interference.  
The shielding of the entire welding installation can be taken in consideration for special applications.

### 4.2.3 RISK ANALYSIS

Risks posed by the machine	Solutions adopted to prevent them
Risk of wrong installation	A manual with the instructions for use has been produced for this purpose
Electrical risks	Application of the EN 60974-1 / EN 60974-5 Standard
Risks connected with electromagnetic disturbances produced by the welding power source and induced on the welding power source.	Application of the EN 60974-10 Standard



## 5) MACHINE DESCRIPTION

These constant current inverter power sources are able to perform the following types of welding with excellent results:

- MMA,
- TIG (with reduction in the current on short-circuiting).

In inverter welders, the output current is unaffected by variations in the supply voltage and the length of the arc, and is perfectly levelled, giving the best welding quality.

The generator is equipped with:

- positive (+) and negative (-) socket,
- front panel,
- rear control panel.

### 5.1) FRONT CONTROL PANEL (FIG.1)

#### \* L1 : Voltage warning light green led.

Comes on with the start switch (Fig.2) "I1" in position "I" and indicates that the plant is on and there is voltage.

#### \* L2 : Safety device warning light yellow led.

Indicates that the safety devices like thermal cutout. With "L2" on, the power source remains connected to the supply mains, but does not supply output power. "L2" remains on until the fault has been removed and in any case until the inner temperatures are not within the normal values; in this case it is necessary to leave the power source on to exploit the operating ventilator and reduce the time when it is not active.

#### \* P1: Potentiometer for setting the welding current

Allows you to continuously adjust the current both in TIG and in MMA welding. This current stays unchanged when the supply and welding conditions vary within the allowed ranges.

In MMA welding, the presence of HOT-START and ARC-FORCE means that the average output current may be higher than that set.

#### \* S1: MMA/TIG selection switch.

With the lever down: it is in electrode welding (MMA) mode, and thus the HOT-START, ARC-FORCE and ANTI-STICKING are automatically activated.

With the lever up: it is in the mode for welding with non-consumable tungsten electrode in an inert atmosphere (TIG). The MMA functions are removed, and the LIFT start is activated.

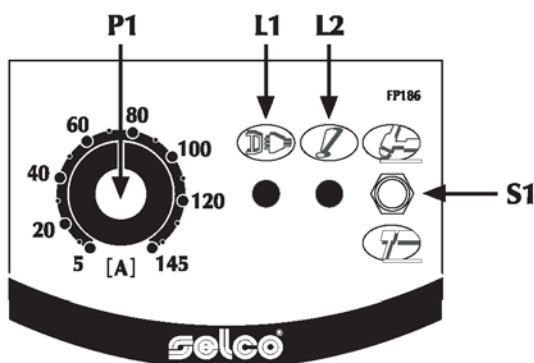


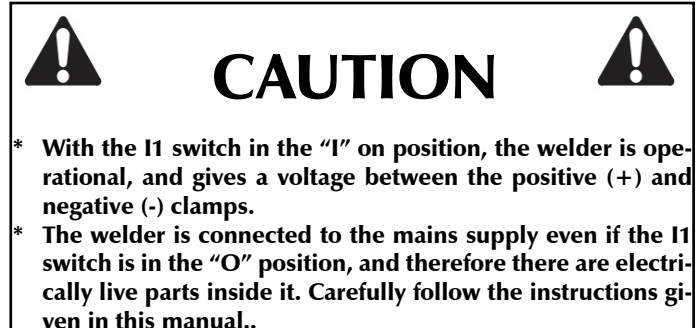
Fig. 1

### 5.2) REAR CONTROL PANEL (FIG. 2)

#### \* I1: Off/On switch

Turns on the electric power to the welder.

It has two positions, "O" off, and "I" on.



\* 1 : Supply cable

\* 2 : Ventilation slots. Never allow them to be obstructed.

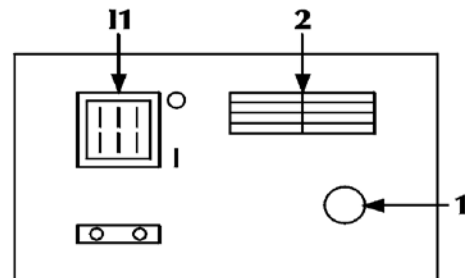


Fig.2

### 5.3) TECHNICAL CHARACTERISTICS

Power supply voltage 50/60Hz	1x230Vac $\pm$ 15%
Max. absorbed power (x=35%)	4.65kW
Max. absorbed current (x=35%)	31.1A
Absorbed current (x=100%)	18.6A
Absorbed current 2.50 (80A@40%)	9.2A
Absorbed current with 3.25 electrode (110 A @ 40%)	13A
Absorbed current with 4.00 electrode (140 A @ 40%)	17.8A
Efficiency (x=100%)	0.87
Power factor	0.7
Cos $\phi$	0.99
Welding current (x=35%)	145A
(x=60%)	120A
(x=100%)	100A
Adjustment range	5-145A
Open-circuit voltage (limited)	62V
Protection rating	IP23C
Insulation class	H
Construction standards	EN60974-1/EN50199
Dimensions (lxdxh)	111x280x220 mm
Weight	4.1kg

Above data are referred to environment at 40°C

#### 5.4) TRANSPORT - UNLOADING



Never underestimate the weight of the equipment



Never make the cargo pass or leave it suspended over people or things.



Neither let the equipment or the single unit fall, nor put it down with force.



Once it has been removed from the packing, the power source is supplied with an extendible belt which can be used to move it in the hand or on the shoulder.

#### 5.5) INSTALLATION



Choose an adequate installation area by following the criteria provided in Section "4.1 SAFETY" and "4.2 ELECTROMAGNETIC COMPATIBILITY (EMC)".



Do not position the power source and the equipment on surfaces with inclination exceeding 10° with respect to the horizontal plane. Protect the installation from heavy rain and sun.

##### 5.5.1 Electric connection to the supply mains

The equipment is provided with a single electric connection with a 2m cable positioned in the rear part of the power source. Size table of the power source input cables and fuses:

Rated voltage	230V $\pm$ 15%
Voltage range	195.5 - 264.5V
Delayed fuses *	20A - 250V
Power supply cable	3x3.5mm <sup>2</sup>

\*: Fuses with a 20A rating are required to be able to carry out 100 A electrode welding continuously and to make maximum use of the potential of the power source. 16 A fuses are sufficient for welding, with a normal use factor (40%), electrodes of 2.50, 3.25 and also 4.00 mm, as well as for TIG welding at every intensity and use factor up to 80%.



## CAUTION



- \* The electrical system must be made by skilled technicians with the specific professional and technical qualifications and in compliance with the regulations in force in the country where the equipment is installed.
- \* The welding power source supply cable is provided with a yellow/green wire that must ALWAYS be earthed. This yellow/green wire must NEVER be used with other voltage conductors.
- \* Verify the existence of the earthing in the used plant and the good condition of the socket/s
- \* Install only plugs that are homologated according to the safety regulations.

##### 5.5.2 Connecting the equipment components



Keep to the safety regulations contained in section "4.1 SAFETY".



Connect the components carefully, in order to avoid power losses.

##### Connection for MMA welding (Fig. 3)



The connection shown in the figure produces reverse polarity welding. To obtain straight polarity welding, invert the connection.

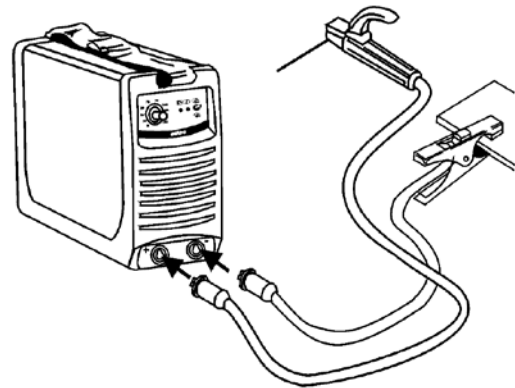



Fig.3

### Connection for TIG welding (Fig. 4)

- Separately connect the torch gas pipe connector to the gas distribution.

 The protection gas flow is adjusted using the tap normally located on the torch.

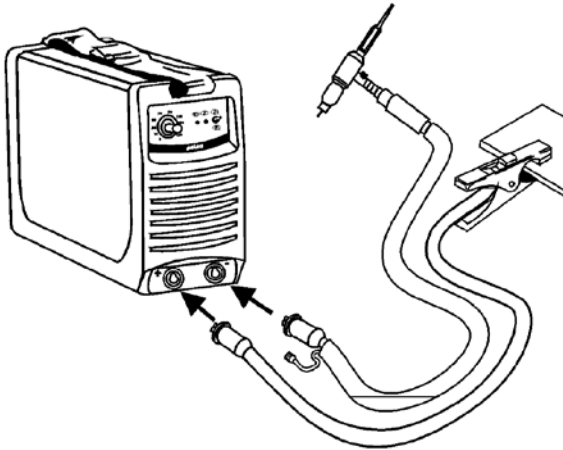


Fig.4

## 5.6) PROBLEMS - CAUSES

### 5.6.1 Possible faults in the MMA welding

Fault	Cause
Excessive spatter	1) Long arc 2) High current
Craters	1) Fast movement of the electrode away from piece.
Inclusions	1) Poor cleanliness or distribution of the passes 2) Defective movement of the electrode
Insufficient penetration	1) High progression speed 2) Welding current too low 3) Narrow chamfering 4) Deseaming failure on top
Sticking	1) Arc too short 2) Current too low
Blow-hole and porosity	1) Humidity in electrode 2) Long arc
Cracks	1) Current too high 2) Dirty materials 3) Hydrogen in weld (present on electrode coating)

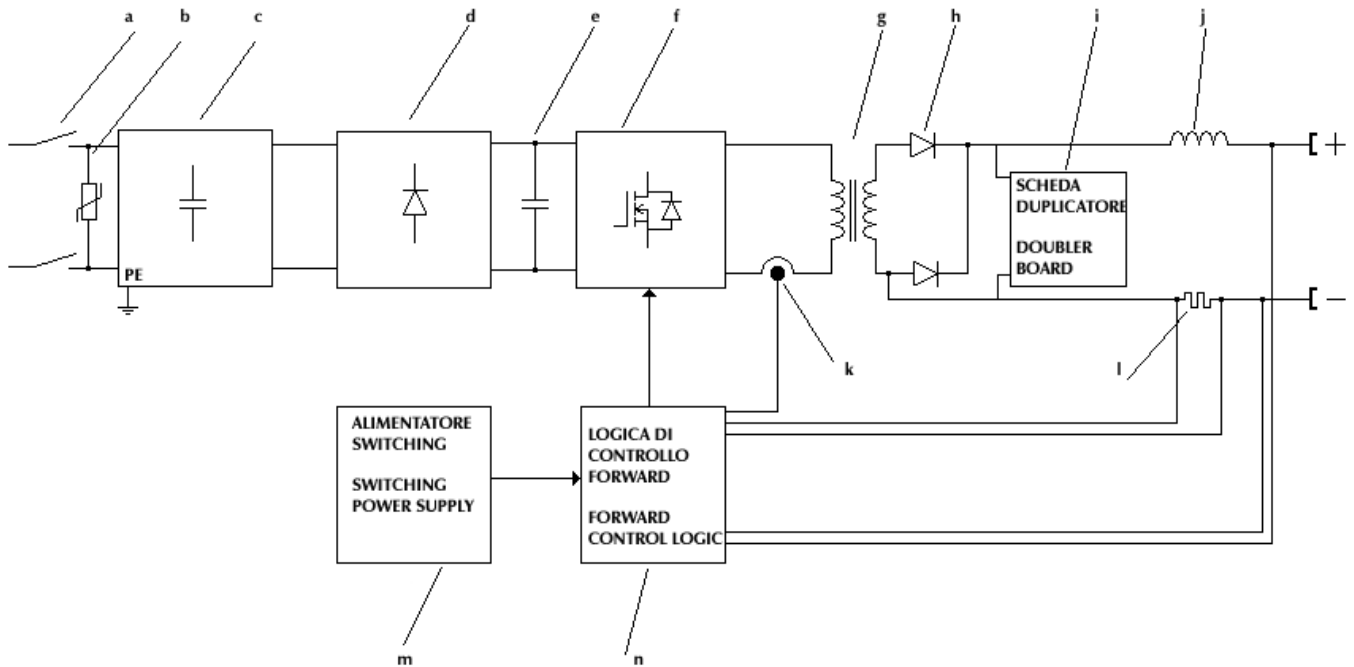
### 5.6.2 Possible faults in the TIG welding

Fault	Cause
Oxidations	1) Insufficient gas. 2) No protection on the reverse.
Tungsten inclusion	1) Incorrect electrode sharpening. 2) Electrode too small. 3) Operating failure (contact of the tip with the workpiece).
Porosity	1) Dirt on the edges. 2) Dirt on the filler material. 3) High advancement speed. 4) Current intensity too low.
Hot cracks	1) Unsuitable filler material. 2) High heat supply. 3) Dirty materials.

### 5.6.3 Possible electrical failures

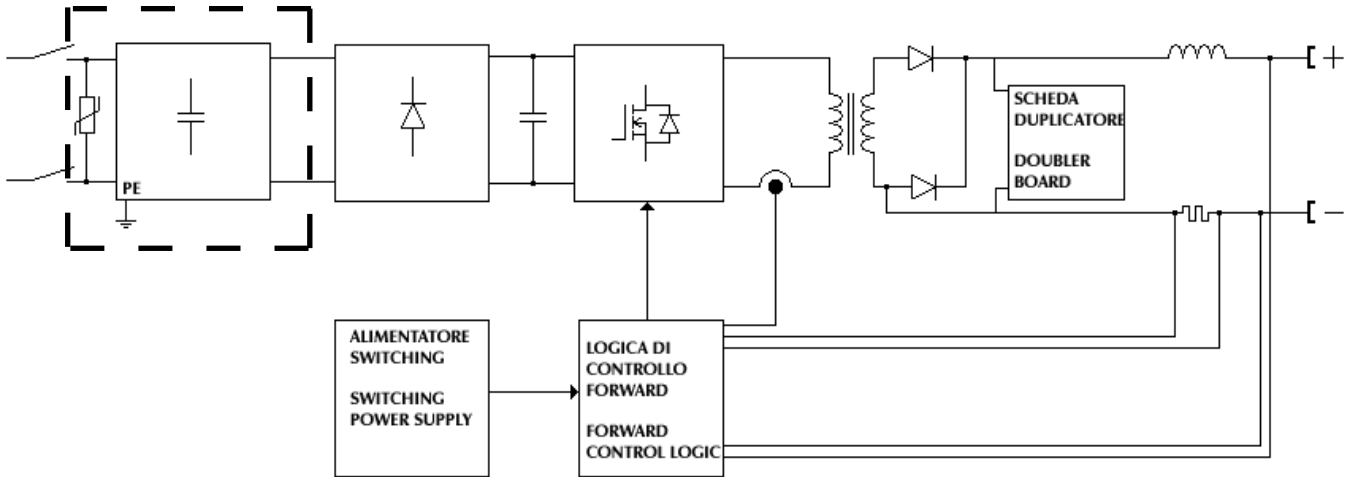
Fault	Cause
Machine fails to come on (Green LED off)	1) No current in the power socket 2) Faulty supply plug or cable 3) Internal fuse blown
Power output incorrect (Green LED on)	1) MMA/TIG selector switch in incorrect position or faulty 2) Low mains supply voltage 3) Faulty current control potentiometer
Absence of output current (Green LED on)	1) Equipment overheated (yellow LED on). With welder on, wait for it to cool.

## 6) DESCRIPTION OF GENERATOR FUNCTIONING (BLOCK DIAGRAM)



### Block diagram of Genesis 145

- a) Master switch
- b) Varistor
- c) EMI input filter board
- d) Input rectifier
- e) DC LINK capacitor
- f) Power stage (Forward converter)
- g) Power transformer
- h) Output rectifier
- i) Doubler
- j) Output inductor
- k) Primary sensor current
- l) Shunt
- m) Switching auxiliary power supply
- n) Control logic of forward converter



## 6.1) INPUT FILTER

The 230Vac - 50/60Hz single phase voltage is supplied to the input filter board 15.14.243.

Between phase and neutral there is a varistor, which is an electronic component which, when a voltage of around 500V appears on its terminals, becomes conductive extremely rapidly, absorbing a current peak so as to limit this overvoltage and so protect the other parts of the machine.

This process is not destructive for the component if the energy brought into play by the voltage peak is modest as in the case of atmospheric lightning. If, however, the overvoltage is high and the persistence time exceeds certain limits, the varistor is not capable of supporting this energy and burns out.

This happens, for example, as a result of overvoltages on the electric line or overvoltages caused by generating sets which are unstabilised and have insufficient output.

The filter circuit is made using passive components such as a toroidal inductor and some capacitors, some of them earthed. The filter has the dual role of containing the machine's radiofrequency emissions within the limits specified by legislation and of rendering it immune to interference from the supply sources.

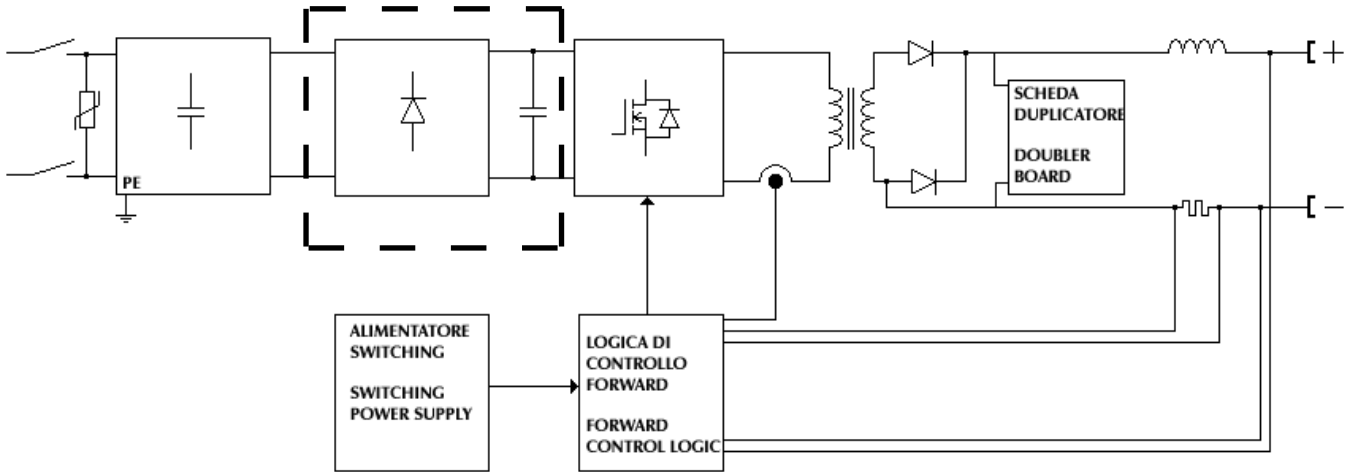
## WARNING



**When accessing parts inside the machine, remember that opening the circuit-breaker doesn't prevent the danger of electric shocks.**

**Therefore:**

**IT IS ADVISABLE TO PULL OUT THE POWER PLUG**



## 6.2) RECTIFIER BRIDGE AND DC LINK

The rectifier bridge has the job of making the first power conversion and in particular of making an AC/DC conversion.

The sinusoidal input voltage is rectified by a Graetz bridge rectifier which feeds a bank of smoothing capacitors.

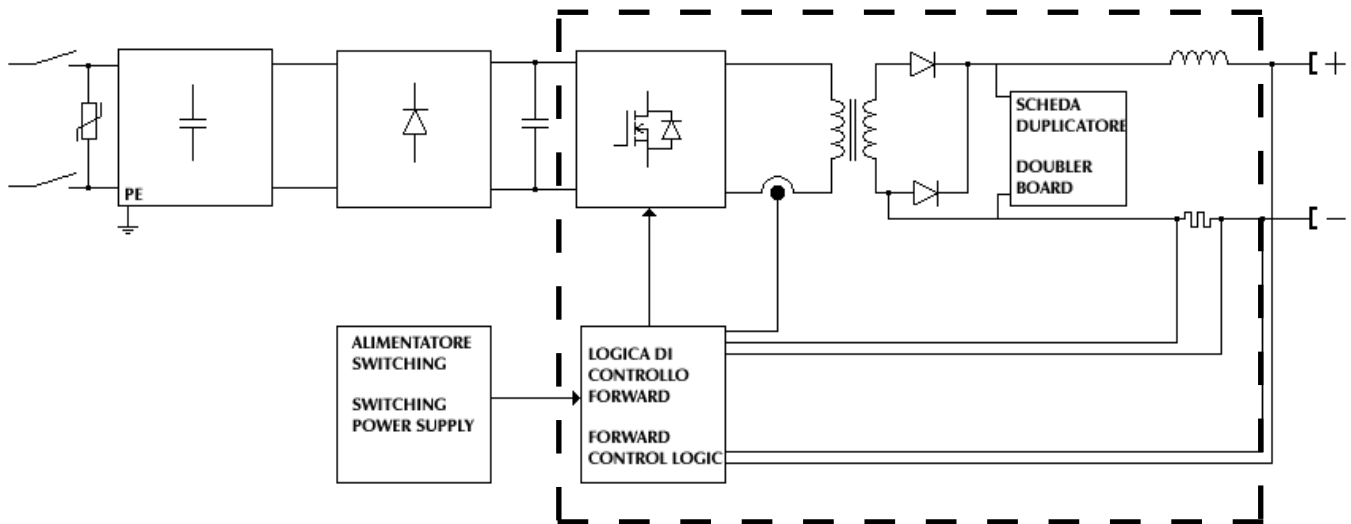
Thus, the capacitor bank forms a DC LINK or a connection between the rectifier stage and the inverter stage on which a constant voltage difference is present.

The value of the DC LINK voltage can be easily calculated by the following equation:

$$V_{BUS} = \sqrt{2} \times V_{ac} = 1.41 \times 230 = +325V_{dc}$$

Therefore, a continuous voltage of +325V is present on the bus.

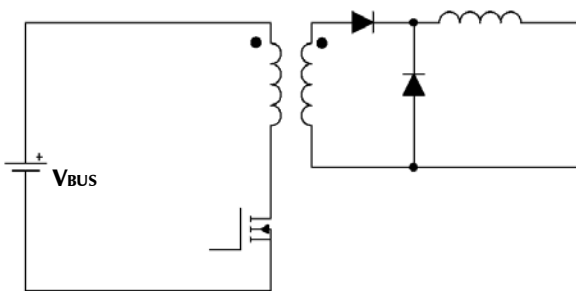
The DC voltage thus obtained will be the input voltage for the following inverter stage



### 6.3) POWER STAGE - FORWARD CONVERTER

The power stage is provided by a single switch type DC/DC Forward converter.

The functional diagram of this converter is illustrated in the figure below.

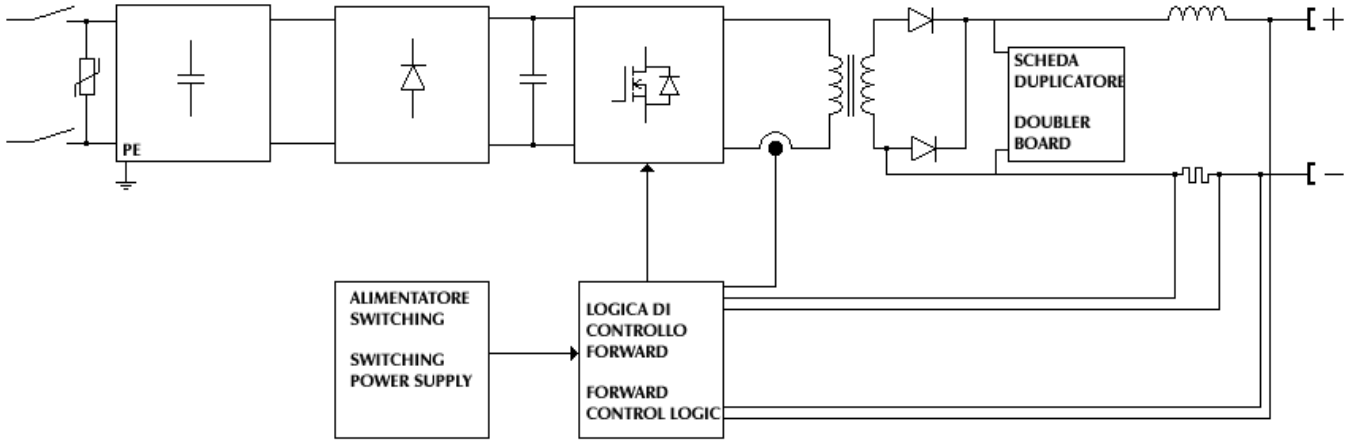


**Forward Converter**

The control logic controls the electronic power switch (MOSFET) appropriately so that the output current has the required dynamic range and the transformer does not become saturated.

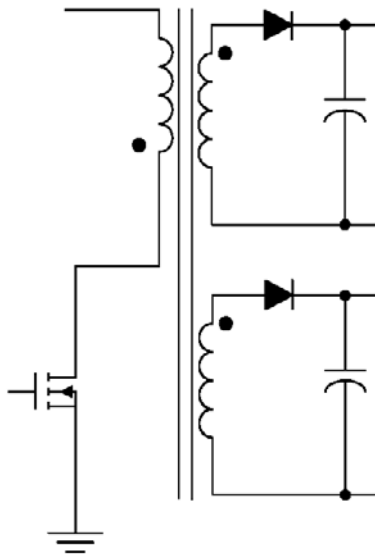
The Forward converter made by Selco provides a suitable transformer resetting circuit in order to improve the performance of the system and to have better control of the output current.

The transformer, in addition to adjusting the voltage and current levels, also makes it possible to obtain the galvanic isolation between the user and the mains required by the regulations in force.



#### 6.4) SWITCHING FEEDER

The switching feeder is provided by a DC/DC Flyback converter. The Flyback stage is supplied by the +325Vdc voltage present on the BUS and makes it possible to obtain the -12Vdc, +12Vdc, +15Vdc and +25Vdc voltages required to supply the various boards. The electronic switch of the feeder is a MOSFET. The functional wiring diagram of a multi-output DC/DC Flyback converter is illustrated in the figure below. The welding control logic present on board 15.14.243 and the power stage control logic present on board 15.14.244 monitor the state of the equipment and inform the operator via the LEDs present on the front panel.



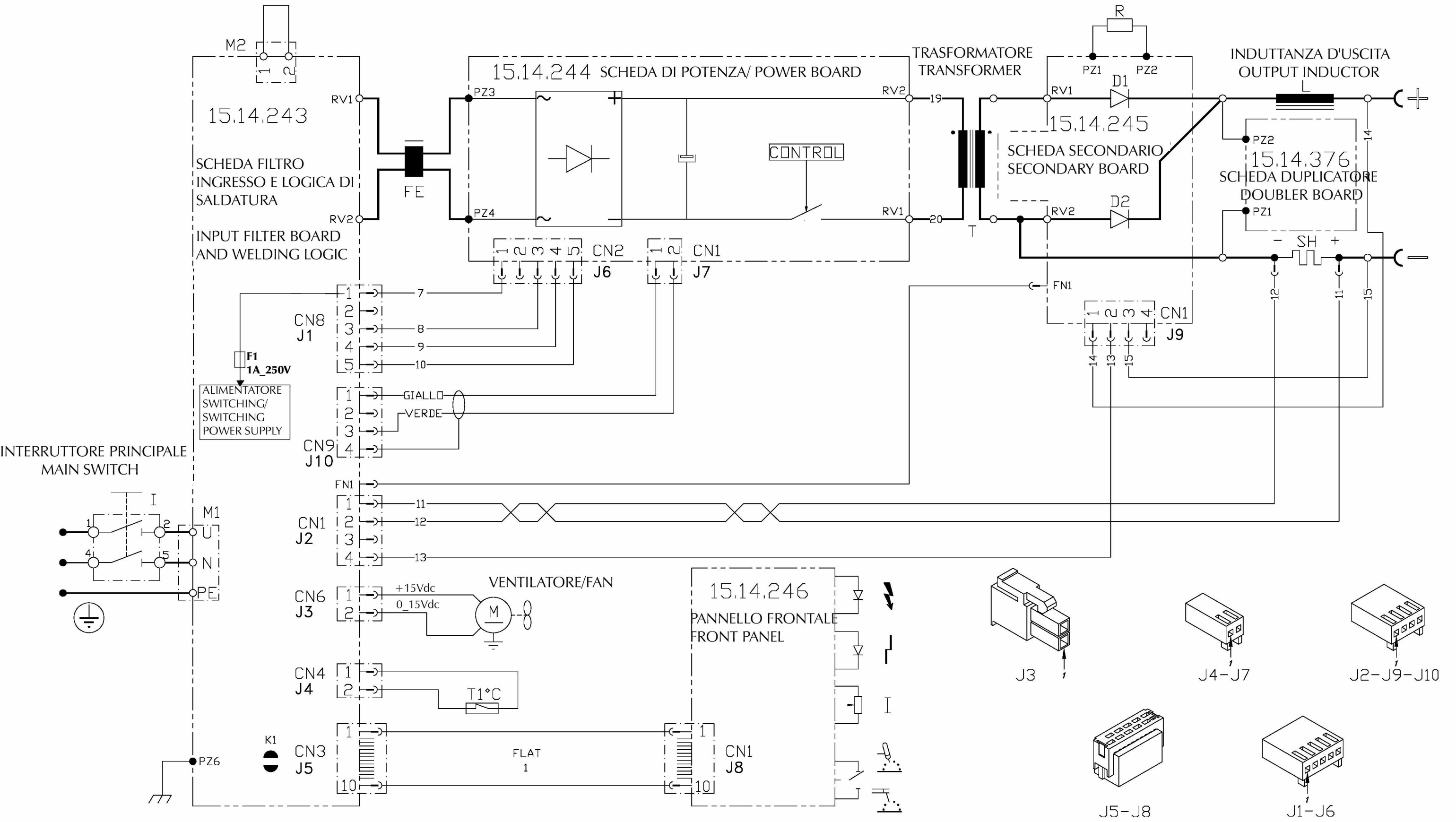
**Muti-output Flyback converter**



## 7) WIRING AND CONNECTION DIAGRAM



# 7.1) GENESIS 145 - SCHEMA ELETTRICO (WIRING DIAGRAM) AGGIORNAMENTO (UPDATED): 27/12/05

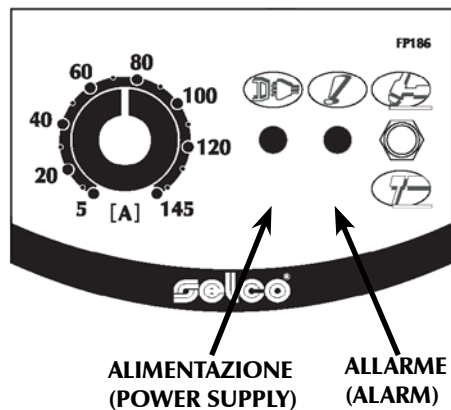


<b>Filo/ Wire</b>	<b>Descrizione</b>	<b>Description</b>
<b>1</b>	Fase U	Phase U
<b>2</b>	Fase U dopo l'interruttore	Phase U after switch
<b>4</b>	Neutro N	Neutral N
<b>5</b>	Neutro N dopo l'interruttore	Neutral N after switch
<b>7</b>	+V <sub>BUS</sub>	+V <sub>BUS</sub>
<b>8</b>	GND_BUS	GND_BUS
<b>9</b>	+18Vdc	+18Vdc
<b>10</b>	+25Vdc	+25Vdc
<b>11</b>	+V <sub>SH</sub>	+V <sub>SH</sub>
<b>12</b>	-V <sub>SH</sub>	-V <sub>SH</sub>
<b>13</b>	+V <sub>OUT</sub>	+V <sub>OUT</sub>
<b>14</b>	+V <sub>OUT</sub>	+V <sub>OUT</sub>
<b>15</b>	0_V <sub>OUT</sub>	0_V <sub>OUT</sub>

## 8) DESCRIPTION OF DIAGNOSTIC INDICATIONS

For the meaning and use of the various controls, please refer to the respective user manuals; only the diagnostic indications are described in this section.

### 8.1) EXTERNAL DIAGNOSTIC INDICATIONS OF GENESIS 145



The welding control logic present on board 15.14.243 and the power stage control logic present on board 15.14.244 monitor the state of the equipment and inform the operator via the LEDs present on the front panel.

#### POWER SUPPLY LED (GREEN)

Indicates the on/off status of the machine. Always illuminated if the panel, and therefore the machine, is correctly supplied.

#### THERMAL PROTECTION LED (YELLOW)

Indicates the temperature alarm status of the equipment. Is illuminated if the internal temperatures have exceeded the threshold values for the correct operation of the machine. If the machine has a temperature alarm, even if it is correctly supplied, it does not release the power output. For fast cooling leave the welding machine on, in order to make use of the internal fan and thus reduce the cooling time.

### 8.2) GENESIS 145 INTERNAL DIAGNOSTIC INDICATIONS

#### 8.2.1 LEDs of input filter board 15.14.243

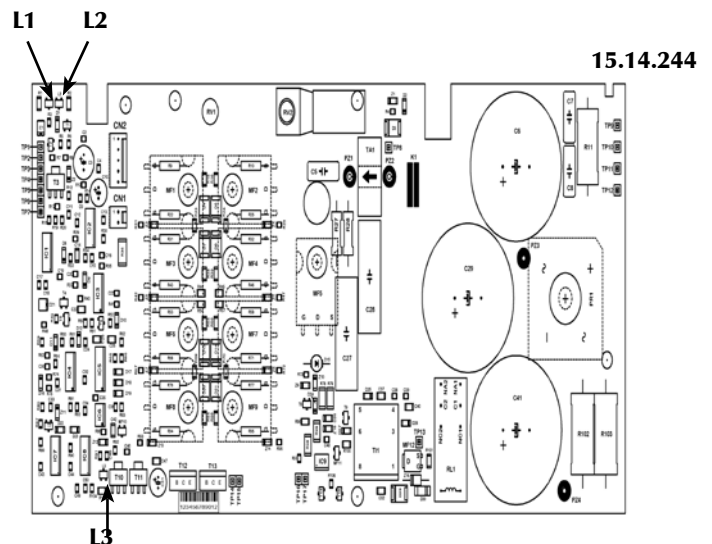
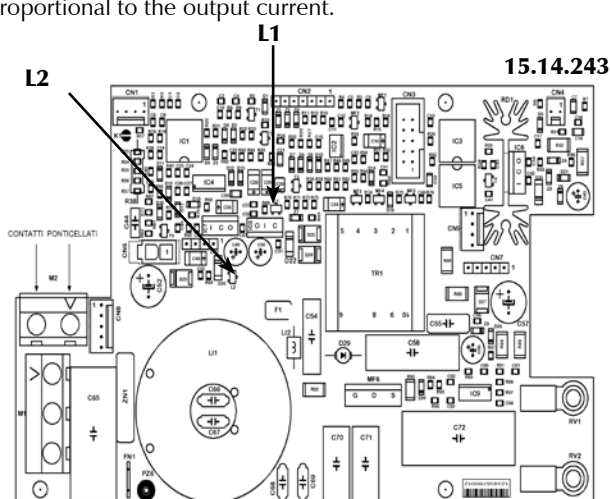
On the input filter and welding logic board there are two red LEDs L1 and L2 (see page 22) which indicate the presence of the -12Vdc and +12Vdc direct current supplies respectively.

These power supplies are provided by the switching feeder.

#### 8.2.2 LEDs of power board 15.14.244

On the power board there are two green LEDs L1 and L2 (see page 24) which indicate the presence of the +18Vdc and +25Vdc direct current supplies respectively. These power supplies are provided by the switching feeder.

There is also a red LED present, diode L3 (see page 24), which is illuminated by the PWM signal. Consequently, its luminous intensity is proportional to the output current.



## 9) DESCRIPTION, TESTING AND REPLACEMENT OF THE ELECTRONIC BOARDS, CURRENT CALIBRATION

The normal working conditions of the boards making up the generator are illustrated in the following sections and the standard values are given for the electrical parameters found at the main points of the boards themselves.  
All the measurements indicated can be made with a digital multimeter.



**It should be remembered that the first test to be performed is a VISUAL CHECK !**

**The visual check reduces the fault-finding times and guides any subsequent action towards the damaged part !**

In general, the points to be visually checked are:

- Input filter area.
- Electrolytic smoothing capacitors.
- Any traces of smoke found inside the casing.
- Power and signal connections.
- Overall state of the boards.

### WARNING



**When the machine is connected to the mains, the main circuit-breaker is live, independently of its position (open or closed) !  
Therefore, it is advisable to pull out the power plug before touching anything inside the generator !  
It is also necessary, because of the possible presence of capacitors charged to a high voltage, to wait for about one minute before being able to work on the internal parts !**

## 9.1) INPUT FILTER AND WELDING LOGIC 15.14.243

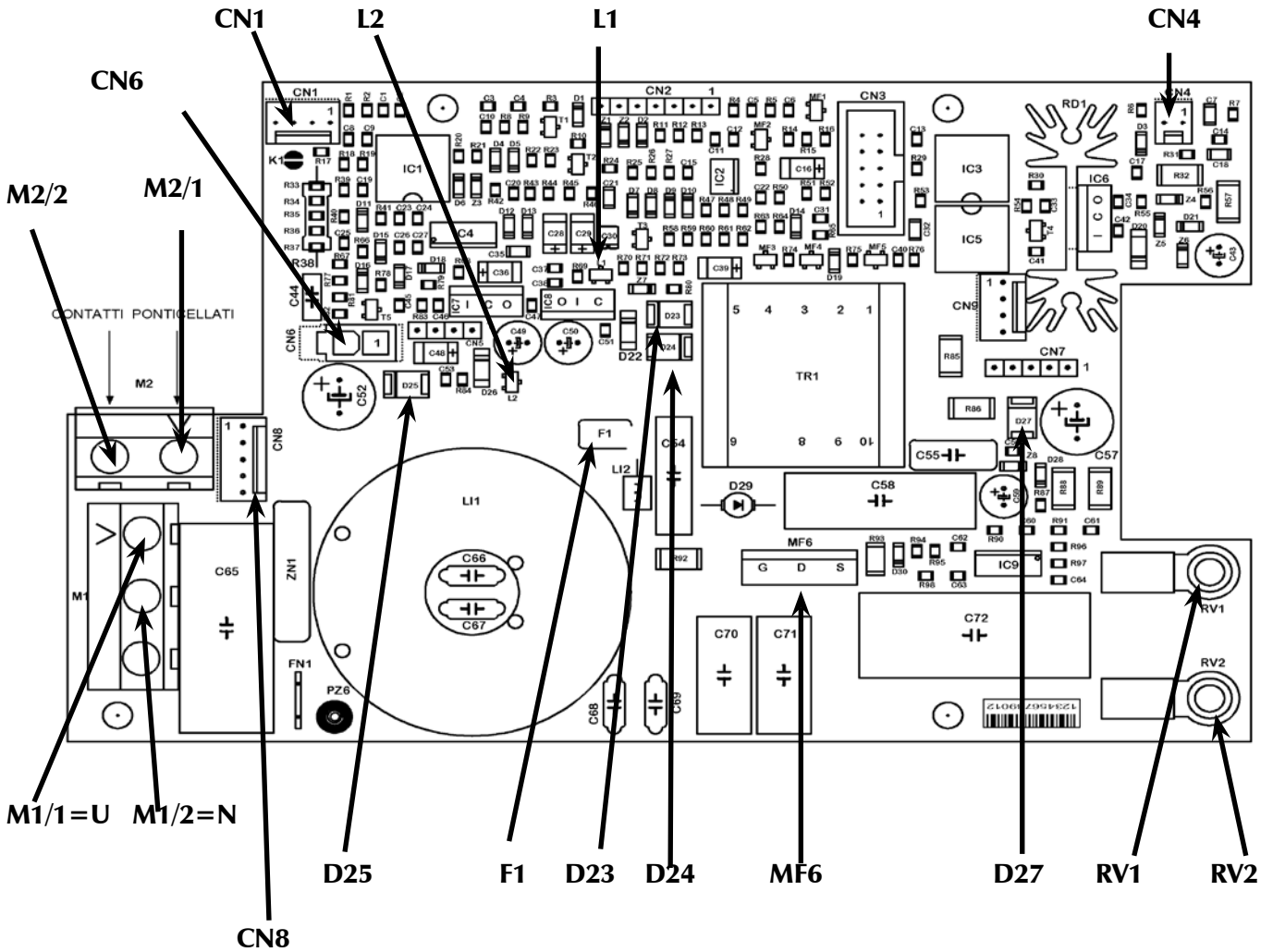
### DESCRIPTION

This board contains the overcurrent protection devices (varistor), EMC filter circuitry, the electronic welding logic and the switching power supply

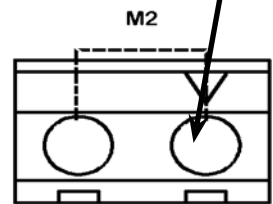
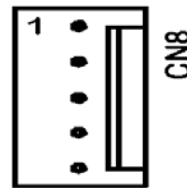
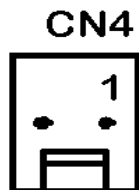
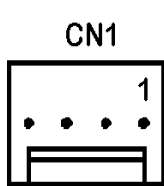
### INSTRUMENTS REQUIRED

- Multimeter
- Set of screwdrivers

### BOARD



### JUMPER



Functional part	Generator/ Mode	Component	Test Point	Value	Type of measure	Note
Supplies voltage	ON	---	M1/1 ↔ M1/2 RV1 ↔ RV2	230Vac ± 15% 230Vac ± 15%	ⓧ ⓧ	
Fan supply voltage	ON	---	CN6/1 ← CN6/2	+15Vdc	ⓧ	
Supplies voltage	ON	---	CN8/1 ← CN8/3 CN8/4 ← CN8/3 CN8/5 ← CN8/3	+325Vdc +18Vdc +25Vdc	ⓧ ⓧ ⓧ	
LEDs	ON	L1 = ON	---	---	---	-12Vdc power supply
		L2 = ON				+12Vdc power supply
Output voltage	ON	---	CN1/4 ← CN1/1	+50Vdc ± 5Vdc*	ⓧ	*Open Circuit Voltage
MOSFET MF6	OFF	---	S ← G S ← D	10kohm 0.5V	ⓧ ⓧ	
Diode of the switching feeder	OFF	D23	A ← K	+0.5Vdc	ⓧ	
		D24	A ← K	+0.5Vdc	ⓧ	
		D25	A ← K	+0.5Vdc	ⓧ	
		D27	A ← K	+0.5Vdc	ⓧ	
Fuse	OFF	F1	F1/1 ↔ F1/2	0ohm	ⓧ	
Thermal Protection	OFF	T1	CN4/1 ↔ CN4/2	0ohm	ⓧ	
Jumper	OFF	---	M1/1 ↔ M2/1	0ohm	ⓧ	
			M1/1 ↔ M2/2	0ohm	ⓧ	

**Note:**

\* Unless specified otherwise, all the measurements can suffer a variation ± 10%



## 9.2) POWER BOARD 15.14.244

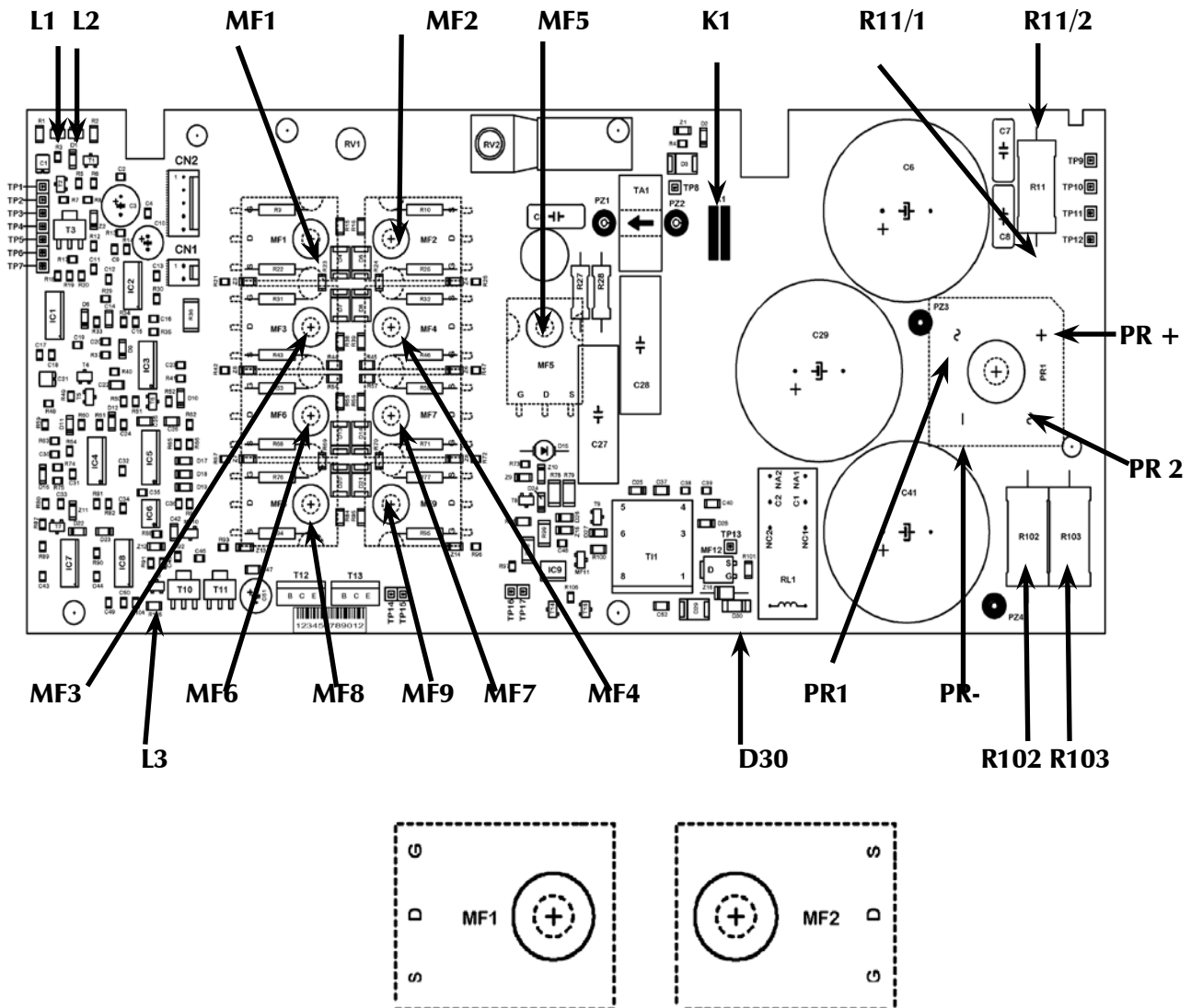
### DESCRIPTION

This PC board contains the input rectifier bridge, the forward converter and the control logic. The main switch of forward power stage is implemented with eight MOSFET connected in paralleling (MF1, MF2, MF3, MF4, MF6, MF7, MF8 and MF9). The MOSFET MF5 is the active clamp of the forward converter to get a quickly reset of the transformer and to better the performance of the power stage.

### INSTRUMENTS REQUIRED

- Multimeter
- Set of pipe spanners for exagonal nuts
- Set of screwdrivers

### BOARD



### NOTE:

**JUMPER SOLDERED K1 IS NORMALLY CLOSED.**

**IF THE POWER PART IS DAMAGED AND THE POWER SUPPLIES PART NEEDS TO BE CHECKED, OPEN JUMPER SOLDERED K1 IN ORDER TO SEPARATE THE FAULTY POWER PART FROM THE SUPPLIES PART AND TO AVOID DAMAGING OTHER PARTS.**

**WITH JUMPER SOLDERED K1 OPEN, SWITCH ON THE WELDING MACHINE AND CHECK THE SUPPLIES.**

Functional part	Generator/ Mode	Component	Test Point	Value	Type of measure	Note
DC LINK	ON	R11	R11/1 ← R11/2	+325Vdc	(V)	
MOSFET FORWARD	ON	MF1	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF2	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF3	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF4	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF6	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF7	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF8	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
		MF9	S ← D S ← G	+0.4Vdc 12kohm	(V) (Ω)	
MOSFET	ON	MF5	S ← D S ← G	+0.4Vdc 10kohm	(V) (Ω)	
Pre-load relay	ON	RL1	---	---	---	Listen to the preloading relay tripping with a time delay after switching on
		D30	K ← A	+24Vdc	(V)	Relay supply voltage
Power supply	ON	L1 = ON				+18Vdc logic voltage supply
		L2 = ON				+25Vdc relay voltage supply
		L3 = ON when the welding machine delivers current				The luminous intensity is proportional to the output current
Rectifier diodes	OFF	PR	PR1 ← PR+ PR2 ← PR+ PR- ← PR1 PR- ← PR2	+0.5Vdc +0.5Vdc +0.5Vdc +0.5Vdc	(V) (V) (V) (V)	
Pre-load resistance	OFF	R102	R102/1 ← R102/2	56ohm	(Ω)	
		R103	R103/1 ← R103/2	56ohm	(Ω)	

**Note:**

\* Unless specified otherwise, all the measurements can suffer a variation  $\pm 10\%$

## RECTIFIER BRIDGE 14.10.150 REPLACEMENT PROCEDURE



**WARNING:**  
**Work with the power supply plug disconnected from the mains.**

**If the rectifier bridge is found to have failed, it is recommended when replacing it:**

- 1) Remove the filter board 15.14.243
- 2) Remove the power board 15.14.244
- 3) Remove the sheet of SILPAD insulation underneath the MOSFET MF5 (WARNING: The sheet of SILPAD insulation can NOT be re-used).
- 4) Clean any high temperature grease off the heat sink.
- 5) Before unsoldering the rectifier bridge, break open its CASE with pliers so that only the pins of the component are soldered to the power board.
- 6) Clean the supports.
- 7) Fit the new diode bridge.
- 8) Smear high-temperature grease underneath the rectifier bridge and underneath the power devices MF1-MF2-MF3-MF4-MF6-MF7-MF8-MF9.
- 9) Position the new sheet of SILPAD insulation under the MOSFET MF5.
- 10) Before soldering the diode bridge, refit board 15.14.244 and fix the power devices and the rectifier bridge with the appropriate screws with torque of 2.2Nxm.
- 11) With the board fitted, solder the pins of the component.

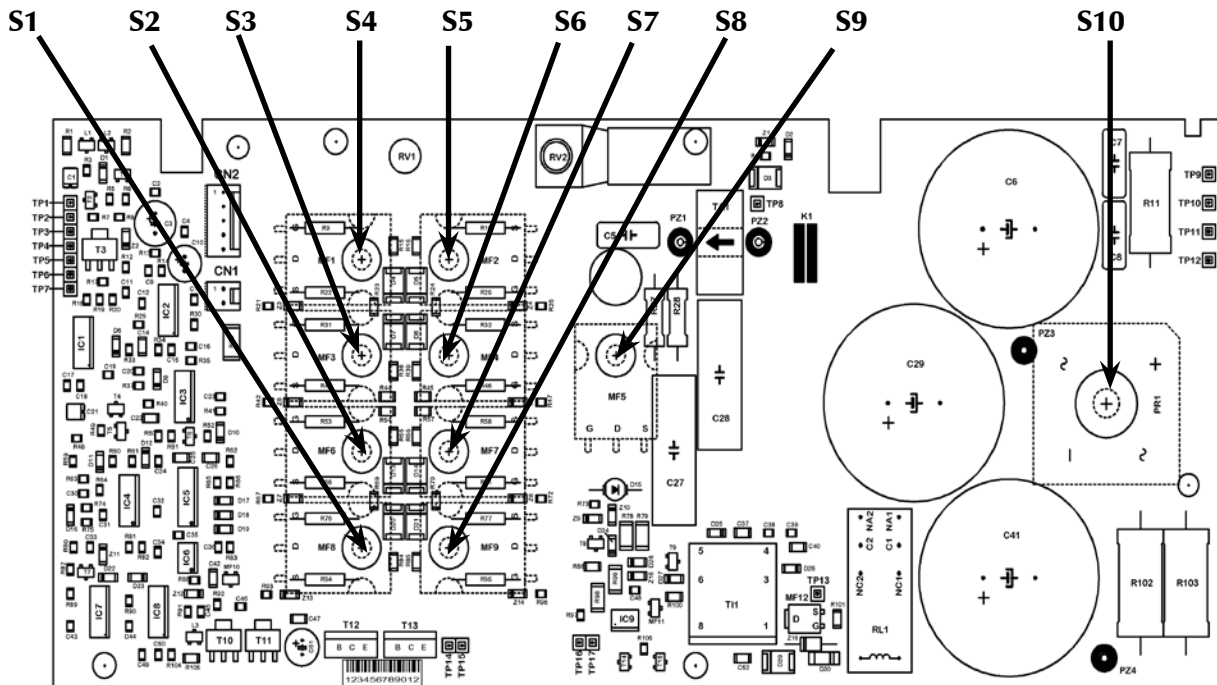
**Breaking the diode bridge before unsoldering it is recommended in order to assist the removal operation, thereby avoiding any excessive heating of the board's circuits which could be irreparably damaged**

**NOTE:**

**If the rectifier bridge has to be replaced, also replace the input switch.  
In fact, the failure of the rectifier bridge damages the input switch in many cases.**

## POWER BOARD 15.14.244 REPLACEMENT PROCEDURE

- 1) Remove board 15.14.243
- 2) Remove screws S1, S2, S3, S4, S5, S6, S7, S8, S9 and S10 which fix the power components and the rectifier bridge to the heat sink



- 3) Disconnect all the connected cables, paying special attention to remembering how they are connected.
- 4) Remove the board from the plastic support.
- 5) Remove the sheet of SILPAD insulation which insulates the MOSFET MF5. (**WARNING: The sheet of SILPAD insulation can NOT be re-used**).
- 6) Clean any high-temperature grease off the heat sink.
- 7) Smear high-temperature grease on the power devices MF1-MF2-MF3-MF4-MF6-MF7-MF8-MF9 and on the rectifier bridge.
- 8) Position of the new sheet of SILPAD insulation underneath the MOSFET MF5.
- 9) Fix the power devices and the rectifier bridge with the appropriate screws with torque of 2.2Nxm.
- 10) Reconnect all the various wires.
- 11) Refit board 15.14.243.

### 9.3) SECONDARY BOARD 15.14.245

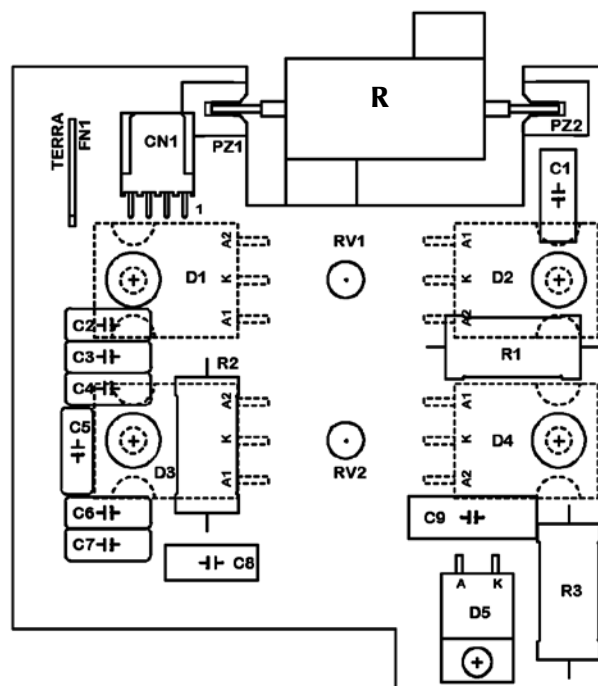
#### DESCRIPTION

This board contains the secondary rectifier.

#### INSTRUMENTS REQUIRED

- Multimeter
- Set of pipe spanners for exagonal nuts
- Set of screwdrivers

#### BOARD



#### NOTE:

Resistance R is not supplied with the 15.14.245 board. If board 15.14.243 is replaced, unsolder resistance R from the secondary board not in operation and solder it onto the new board

Functional part	Generator/ Mode	Component	Test Point	Value	Type of measure	Note
Diodes	OFF	D1	A1 ← K A2 ← K	+0.4Vdc +0.4Vdc	$\text{⊕}$ $\text{⊕}$	With board removed
		D2	A1 ← K A2 ← K	+0.4Vdc +0.4Vdc	$\text{⊕}$ $\text{⊕}$	With board removed
		D3	A1 ← K A2 ← K	+0.4Vdc +0.4Vdc	$\text{⊕}$ $\text{⊕}$	With board removed
		D4	A1 ← K A2 ← K	+0.4Vdc +0.4Vdc	$\text{⊕}$ $\text{⊕}$	With board removed
Diode	OFF	D5	A ← K	+0.4Vdc	$\text{⊕}$	
Resistance R	OFF	R	R/1 ↔ R/2	470ohm	$\text{⊖}$	

**Notes:**

\* Unless specified otherwise, all the measurements can suffer a variation  $\pm 10\%$

\*\* The diode measurements on this board are made with the board disconnected from the rest of the circuit.

## 9.4) DOUBLER BOARD 15.14.376

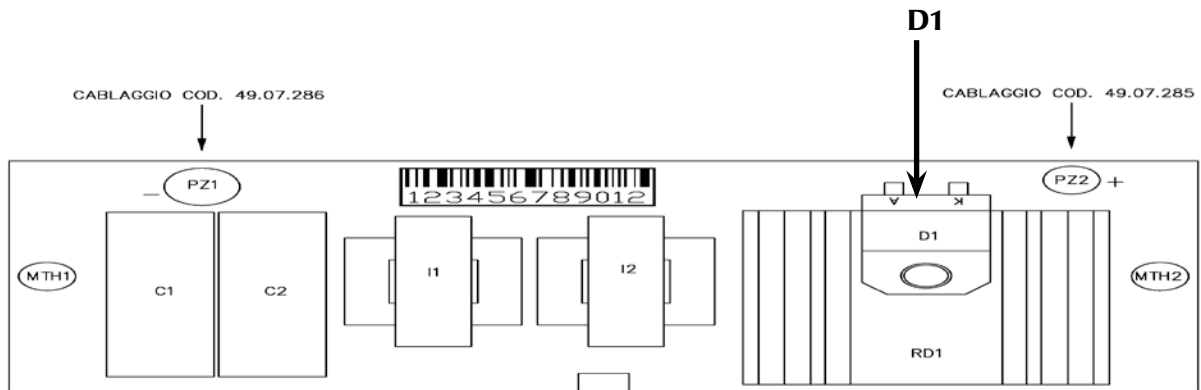
### DESCRIPTION

This board doubles the output voltage to optimise dynamic control of the arc and to ensure excellent arc striking in all welding conditions.

### INSTRUMENTS REQUIRED

- Multimeter
- Set of pipe spanners for exagonal nuts
- Set of screwdrivers

### BOARD



Functional part	Generator/ Mode	Component	Test Point	Value	Type of measure	Note
Diode	OFF	D1	A ← K	+0.3Vdc	⊕	

#### Note:

\* Unless specified otherwise, all the measurements can suffer a variation  $\pm 10\%$

## 9.5) FRONT PANEL BOARD 15.14.246

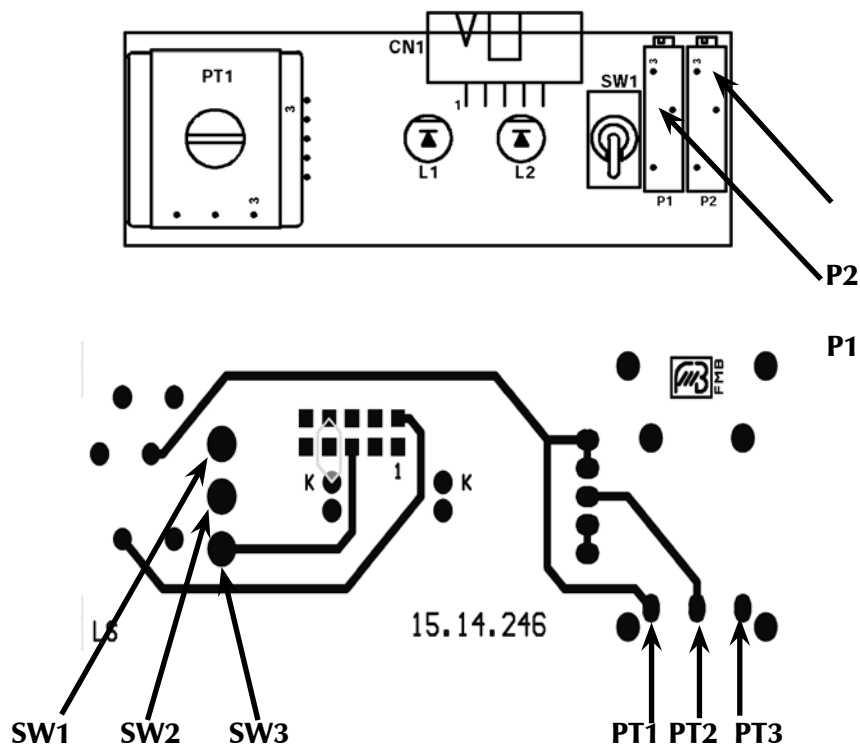
### DESCRIPTION

This board contains the switch to select MMA or TIG mode, the power supply led (green), the thermal protection led (yellow) and the potentiometer to adjust the output current between 0A and 145A.

### INSTRUMENTS REQUIRED

- Multimeter
- Set of pipe spanners for exagonal nuts
- Set of screwdrivers

### BOARD



Functional part	Generator/ mode	Component	Test Point	Value	Type of measure	Note
Switch	OFF	SW	SW1 ↔ SW2	0ohm	⊕	In MMA mode
			SW2 ↔ SW3	0ohm	⊕	In TIG mode
Potentiometer	OFF	PT	PT1 ↔ PT3	2.5kohm	Ω	
			PT1 ↔ PT2	Variable between 0 and 2.5 kOhm by rotating the potentiometer.	Ω	
			PT2 ↔ PT3	Variable between 0 and 2.5 kOhm by rotating the potentiometer.	Ω	

#### Note:

\* Unless specified otherwise, all the measurements can suffer a variation  $\pm 10\%$



## 9.6) OUTPUT CURRENT CALIBRATION

### MINIMUM CURRENT CALIBRATION

- 1) Set the generator to TIG LIFT mode.
- 2) Attach the ammeter clip to the negative cable.
- 3) Set the potentiometer on the front panel to the minimum value.
- 4) Begin to weld.
- 5) Calibrate, using trimmer P2 of the front panel board 15.14.246, the minimum welding current value to  $5 + 1A$ .

### MAXIMUM CURRENT CALIBRATION

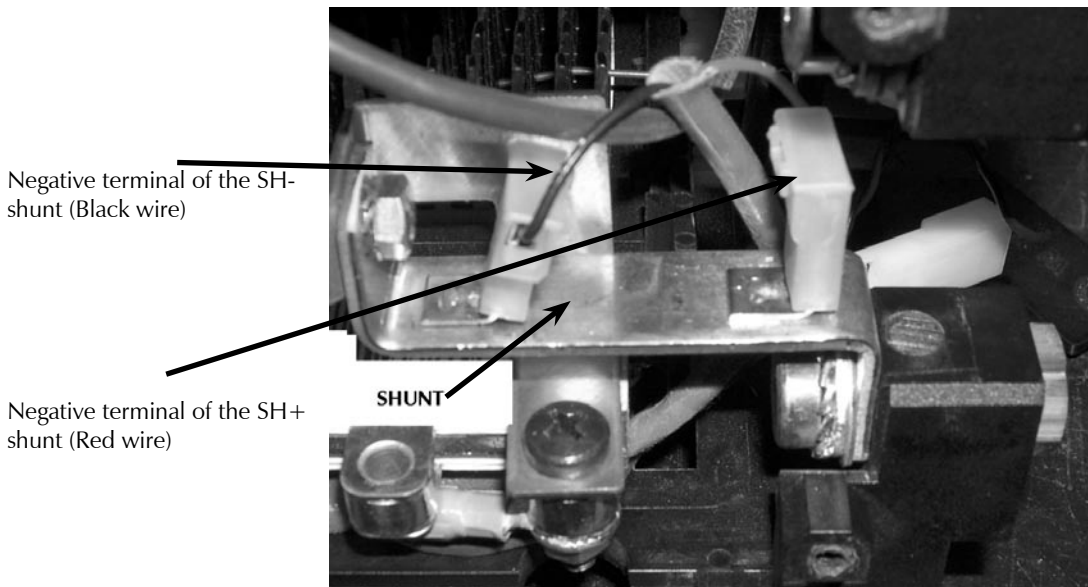
- 1) Set the generator to TIG LIFT mode.
- 2) Attach the ammeter clip to the negative cable.
- 3) Set the potentiometer on the front panel to the maximum value.
- 4) Begin to weld.
- 5) Calibrate, using trimmer P1 of the front panel board 15.14.246, the maximum welding current value to  $145 + 3A$ .

## 9.7) SHUNT CHECK

The current sensing is done by a shunt, i.e. a bar of very low resistance made of constantan alloy, through which the output current flows and a voltage drop proportional to the output current is generated.

This voltage difference, of a few dozen mV, is proportional to the output current and is processed by the control logic present on board 15.14.243 to generate the reference signals for the power stage.

The shunt of the Genesis 145 generator is illustrated in the figure below.



**SHUNT - View beneath the generator after removing the bottom**

**Ensure that the black wire and the red wire are properly connected and that the FASTON connectors are setting and tightening in the correct position.**

## 10 - TROUBLESHOOTING

This section of the repair manual gives assistance with locating and repairing possible malfunctions in the welding machine. This can be done by following this simple procedure:

- 1) **LOCATE THE PROBLEM:** The FAULT column in the various tables describes possible malfunctions of the welding machine. The first step is to identify the description which is closest to the problem you have. The problems are grouped into five sections:
  - 10.1 Power supply failed
  - 10.2 Fan
  - 10.3 Thermal alarm
  - 10.4 Open circuit volatage
  - 10.5 Power parts control
- 2) **POSSIBLE PROBLEM:** The second column in the tables, POSSIBLE PROBLEM, lists the possible faults which may cause the problem described.
- 3) **SUGGESTIONS:** The suggestions column gives tests or directs you to tests described in section 9 of this repair manual for checking the components which may be causing the machine to malfunction.

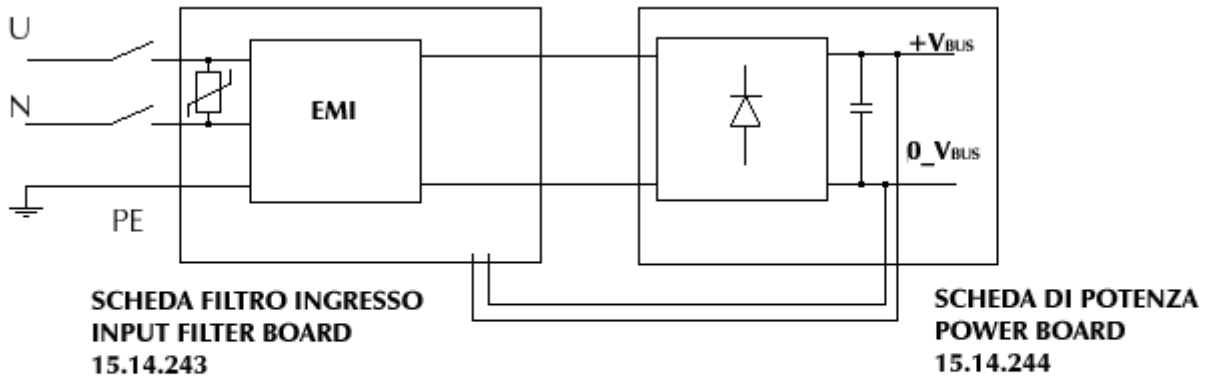
## 10.1 - POWER SUPPLY UNIT FAILED

### OPERATION FLOW SIGNAL

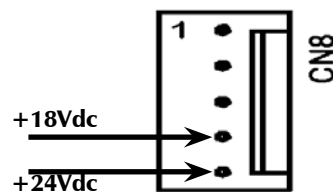
The welding machine is connected to the 230Vac 50/60Hz single-phase mains. When the input switch is closed, phase and neutral are connected to the welding logic and filter board 15.14.243. A varistor is connected between phase and neutral, i.e. a device protecting the downstream electronics against overvoltages. In case of an overvoltage which is too high or lasts for too long, the varistor explodes.

The single-phase supply is filtered for electromagnetic compatibility purposes and is fed to board 15.14.244 for the AC/DC conversion. In fact, power board 15.14.244 contains the rectifier bridge which allows a DC voltage of +325Vdc to be obtained.

### BLOCK DIAGRAM



Fault	Possible problem	Suggestions
The machine will not switch on	1. Faulty power supply cable or switch  2. Exploded varistor  3. Fuses	If the generator is connected to the 230Vac single-phase mains but this voltage is not found between input terminals M1/1 ↔ M1/2, check the input switch, the terminal strip connections and the supply cable.  If the varistor is found to have exploded when the case is opened, replace the filter board 15.14.243 and any other parts damaged by the overvoltage.  Check fuse F1 according to the procedure on page 23.
No voltage present on the DC LINK	1. The rectified 325Vdc voltage is not present	Check the welder power supply and the single-phase rectifier bridge according to the procedure illustrated on page 25.
The green and yellow LEDs lighten.	1 Switching feeder in overload	If the switching feeder is in overload some part of the welding machine doesn't work in correct mode.  1. Disconnect CN6 in input filter board 15.14.243 (in this way the fan isn't supply). If the fault persist the afn works correctly, otherwise change the fan.  2. Disconnect the front panel. If the fault persist, the front panel works correctly, otherwise change the front panel.  3. Disconnect from connector CN8 on input filter 15.14.243 the wire number 4 and the wire number 5 (+18Vdc and +24Vdc). If the fault persist change the PC board number 15.14.244 otherwise 15.14.243.



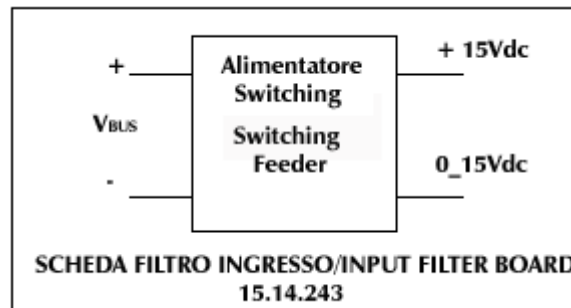
**Connector CN8 on the input filter PC board**

## 10.2 - FAN

### OPERATION FLOW SIGNAL

The machine is cooled by a ventilation system consisting of a fan which runs constantly. The fan is supplied by a +15Vdc voltage provided by the switching feeder.

### BLOCK DIAGRAM



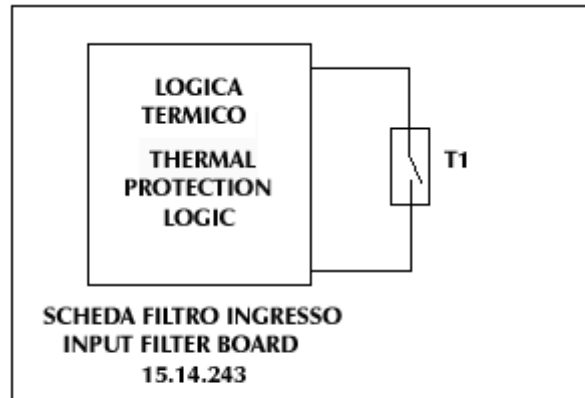
Fault	Possible problem	Suggestions
The fan will not start	<ol style="list-style-type: none"> <li>1. Fan broken</li>   <li>2. +15Vdc supply failure</li> </ol>	<p>If the fan is correctly supplied by a voltage of +15Vdc but does not work, replace the fan.</p> <p>The +15Vdc supply voltage is not present between CN6/1 ← CN6/2 on the input filter board 15.14.243.</p> <p>Check the supplies. If the DC_LINK correctly shows a voltage of +325Vdc, the problem will then lie in the switching feeder found on board 15.14.243.</p>

## 10.3 - THERMAL ALARM

### OPERATION FLOW SIGNAL

The generator is equipped with temperature control based on a temperature device T1. When the limit temperature is reached, the device opens the circuit and the machine enters the temperature alarm state with yellow LED illuminated and no power released. If the temperature device is broken, the machine remains in a temperature alarm state.

### BLOCK DIAGRAM



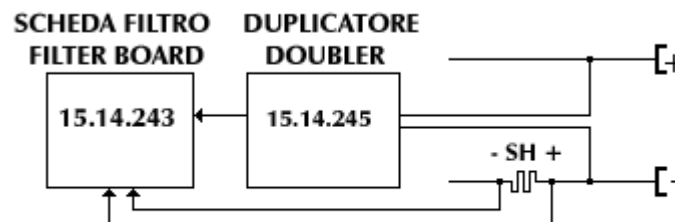
Fault	Possible problem	Suggestions
Machine in temperature alarm	<p>No problem</p> <p>Temperature device fault</p> <p>Logic fault</p>	<p>The machine was working correctly and entered into temperature alarm because the limit temperature was reached. Wait a few minutes for it to cool (leaving the machine on with the fan running to speed up the operation). When the correct temperature is reached, the system will start working again.</p> <p>The temperature device is broken. Perform the temperature device monitoring diagnosis according to the procedure on page 23. If the device is broken, replace it.</p> <p>If the temperature alarm persists, check board 15.14.243 and replace it if faulty.</p>

## 10.4 - OPEN CIRCUIT VOLTAGE

### OPERATION FLOW SIGNAL

The welding machine has a no-load voltage of about 50Vdc  $\pm$  5Vdc. If this is not the case, the problem could lie in the feedback control.

### BLOCK DIAGRAM



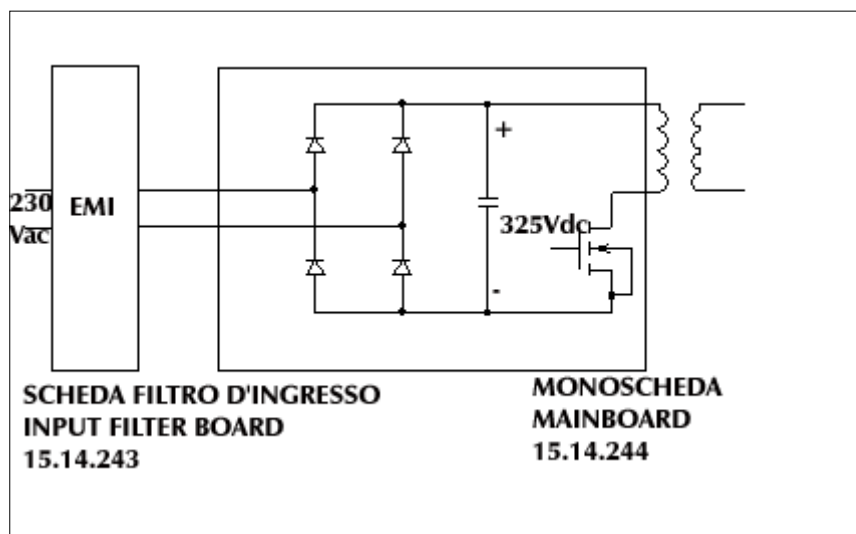
Fault	Possible problem	Suggestions
Incorrect no-load voltage	Lack of feedback signal	If the control system does not read the output voltage, the no-load voltage rises considerably (about 100V). In this case check that the red wire which reads the positive output voltage, connected to terminal Vout+, is properly connected at the front.
	Slightly high no-load voltage	In this case, the SHUNT and output voltage measurement connectors could be slightly splayed or oxidized. Clean them gently and secure them to the relative FASTON terminals.
	Zero no-load voltage	Check the power board 15.14.244 according to the procedure on page 25.

## 10.5 - POWER PARTS CONTROL

### OPERATION FLOW SIGNAL

The mainboard 15.14.244 contains the input rectifier bridge and the forward power converter.

### OPERATION FLOW SIGNAL



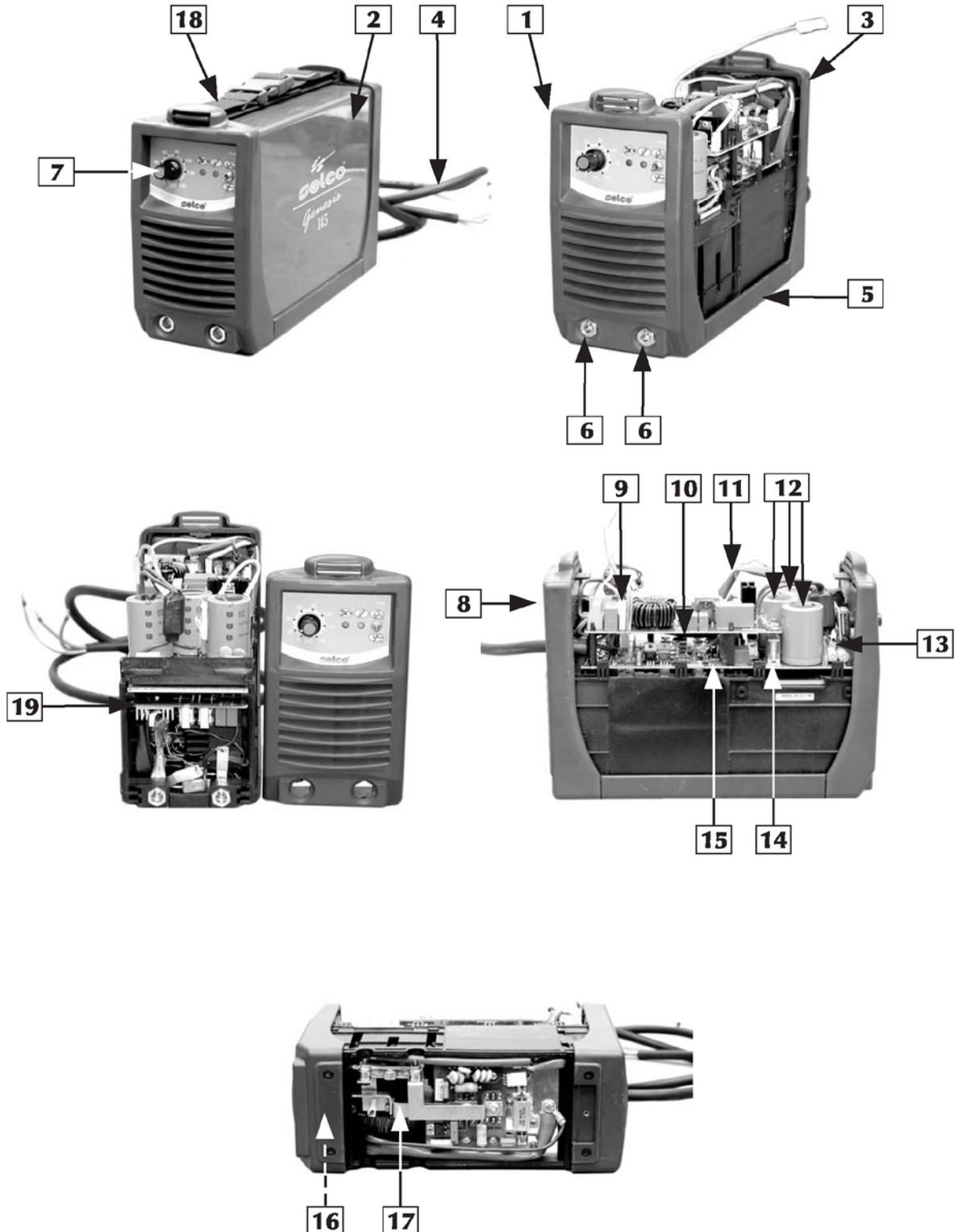
Fault	Possible problem	Suggestions
The main switch cuts off	Rectifier bridge is broken	Check the rectifier bridge according to the procedure on page 25. If you must replace the rectifier bridge, following the procedure on page 26.
The welding machine doesn't deliver the maximum power	The forward converter can have some problems	Check the power MOSFETs according to the procedure on page 25. If the mainboard 15.14.244 is broken, change the mainboard 15.14.244 according to the procedure on page 27



## 11) SPARE PART LIST

55.02.012 GENESIS 145

Lista ricambi, Spare parts list, Ersatzteilverzeichnis, Liste de pièces détachées, Lista de repuestos, Lista de peças de reposição, Reserveonderdelenlijst, Reservdelista, Liste med reservedele, Liste over reservedeler, Varaosaluettelo, ΚΑΤΑΛΟΓΟΣ ΑΝΤΑΜΑΚΤΙΚΩΝ



## ITALIANO

POS.DESCRIZIONE	CODICE	ENGLISH	DEUTSCH	FRANÇAIS	ESPAÑOL	CODIGO
1 Pannello plastico frontale	14.70.045	1 Front cap (plastic)	1 Stirplastiktafel	1 Panneau plastique antérieur	1 Panel plastico anterior	14.70.045
2 Cofano superiore	01.02.115	2 Wraparound	2 Oberes Gehäuse	2 Capot position haute	2 Capota superior	01.02.115
3 Pannello plastico posteriore	01.05.233	3 Rear cap (plastic)	3 Hintere Plastiktafel	3 Panneau plastique postérieur	3 Panel plastico posterior	01.05.233
4 Cavo di alimentazione	49.04.064	4 Input cord	4 Speisekabel	4 Câble d'alimentation	4 Cable de alimentación	49.04.064
5 Fondo plastico	01.06.101	5 Bottom cap (plastic)	5 Plastikboden	5 Fond plastique	5 Fondo plástico	01.06.101
6 Presa fissa	10.13.010	6 Dinse connector	6 Feste Steckdose	6 Prise fixe	6 Toma fija	10.13.010
7 Manopola	09.11.500	7 Knob	7 Drehknopf	7 Bouton	7 Botón	09.11.500
8 Interruttore	09.04.101	8 Switch	8 Schalter	8 Interrupteur	8 Interruptor	09.04.101
9 Varistore	11.26.001	9 Varistor	9 Varistor	9 Varistance	9 Varistor	11.26.001
10 Scheda	15.14.243	10 PC board	10 Karte	10 Platine	10 Tarjeta	15.14.243
11 Bus	49.02.79601	11 Bus wiring	11 Bus	11 Bus	11 Bus	49.02.79601
12 Condensatore elettrolitico	12.06.101	12 Electrolytic capacitor	12 Elektrolytischer Kondensator	12 Condensateur électrolytique	12 Condensador electrolítico	12.06.101
13 Ponte a diodi	14.10.150	13 Input rectifier-bridge	13 Diodenbrücke	13 Pontet à diodes	13 Puente de diodos	14.10.150
14 Relè	09.09.026	14 Relay	14 Relais	14 Relais	14 Relé	09.09.026
15 Kit scheda potenza	15.18.012	15 Power PC board Kit	15 Kit Leistungskarte	15 Lot carte puissance	15 Kit tarjeta potencia	15.18.012
16 Ventilatore	14.70.014	16 Fan	16 Ventilator	16 Ventilateur	16 Ventilador	14.70.014
17 Kit raddrizzatore secondario	15.18.025	17 Output rectifier Kit	17 Kit Sekundärgleichrichter	17 Lot redresseur secondaire	17 Kit rectificador secundario	15.18.025
18 Cinghia	21.06.012	18 Carrying strap	18 Riemen	18 Courroie	18 Correa	21.06.012
19 Scheda duplicatore	15.14.376	19 Voltage enhancer PC board	19 Ausgangsspannung Verdoppler	19 Doubleur de tension en sortie	19 Duplicador de tensión en salida	15.14.376

### Nota:

per i componenti elettronici di potenza ordinare anche 16.03.102 (pasta termica)

### Note:

with power electronic components order code 16.03.102 (thermal paste) too

### Merke:

für die elektronischen Leistungsbestandteile auch 16.03.102 (thermische Paste) dazubestellen

### Nota:

pour les composants électroniques de la force motrice commander également 16.03.102 (pâte calorifique)

### Nota:

para las componentes electronicos de potencias pedir también 16.03.102 (pasta térmica)

## ENGLISH

POS.DESCRPTION	CODE	DEUTSCH	FRANÇAIS	ESPAÑOL	CODIGO
1 Front cap (plastic)	14.70.045	1 Stirplastiktafel	1 Panneau plastique antérieur	1 Panel plastico anterior	14.70.045
2 Wraparound	01.02.115	2 Oberes Gehäuse	2 Capot position haute	2 Capota superior	01.02.115
3 Rear cap (plastic)	01.05.233	3 Hintere Plastiktafel	3 Panneau plastique postérieur	3 Panel plastico posterior	01.05.233
4 Input cord	49.04.064	4 Speisekabel	4 Câble d'alimentation	4 Cable de alimentación	49.04.064
5 Bottom cap (plastic)	01.06.101	5 Plastikboden	5 Fond plastique	5 Fondo plástico	01.06.101
6 Dinse connector	10.13.010	6 Feste Steckdose	6 Prise fixe	6 Toma fija	10.13.010
7 Knob	09.11.500	7 Drehknopf	7 Bouton	7 Botón	09.11.500
8 Switch	09.04.101	8 Schalter	8 Interrupteur	8 Interruptor	09.04.101
9 Varistor	11.26.001	9 Varistor	9 Varistance	9 Varistor	11.26.001
10 PC board	15.14.243	10 Karte	10 Platine	10 Tarjeta	15.14.243
11 Bus wiring	49.02.79601	11 Bus	11 Bus	11 Bus	49.02.79601
12 Electrolytic capacitor	12.06.101	12 Elektrolytischer Kondensator	12 Condensateur électrolytique	12 Condensador electrolítico	12.06.101
13 Input rectifier-bridge	14.10.150	13 Diodenbrücke	13 Pontet à diodes	13 Puente de diodos	14.10.150
14 Relay	09.09.026	14 Relais	14 Relais	14 Relé	09.09.026
15 Power PC board Kit	15.18.012	15 Kit Leistungskarte	15 Lot carte puissance	15 Kit tarjeta potencia	15.18.012
16 Fan	14.70.014	16 Ventilator	16 Ventilateur	16 Ventilador	14.70.014
17 Output rectifier Kit	15.18.025	17 Kit Sekundärgleichrichter	17 Lot redresseur secondaire	17 Kit rectificador secundario	15.18.025
18 Carrying strap	21.06.012	18 Riemen	18 Courroie	18 Correa	21.06.012
19 Voltage enhancer PC board	15.14.376	19 Ausgangsspannung Verdoppler	19 Doubleur de tension en sortie	19 Duplicador de tensión en salida	15.14.376

### Note:

with power electronic components order code 16.03.102 (thermal paste) too

### Merke:

für die elektronischen Leistungsbestandteile auch 16.03.102 (thermische Paste) dazubestellen

### Nota:

pour les composants électroniques de la force motrice commander également 16.03.102 (pâte calorifique)

### Nota:

para las componentes electronicos de potencias pedir también 16.03.102 (pasta térmica)

## 12) NOMINAL DATA

Power supply voltage 50/60Hz	1x230Vac $\pm$ 15%
Max. absorbed power (x=35%)	4.65kW
Max. absorbed current (x=35%)	31.1A
Absorbed current (x=100%)	18.6A
Absorbed current 2.50 (80A@40%)	9.2A
Absorbed current with 3.25 electrode (110 A @ 40%)	13A
Absorbed current with 4.00 electrode (140 A @ 40%)	17.8A
Efficiency (x=100%)	0.87
Power factor	0.7
Cos $\phi$	0.99
Welding current (x=35%) (x=60%) (x=100%)	145A 120A 100A
Adjustment range	5-145A
Open-circuit voltage (limited)	62V
Protection rating	IP23C
Insulation class	H
Construction standards	EN60974-1/EN50199
Dimensions (lxdxh)	111x280x220 mm
Weight	4.1kg

\*Above data are referred to environment at 40°C





Selco s.r.l. – Via Palladio, 19  
35010 Onara di Tombolo(Padova) – Italy  
Tel. +39 049 9413111 – Fax. +39 049 9413311  
e-mail: [info@selcoweld.com](mailto:info@selcoweld.com)