cod. 988656

TELWIN

TECNICA 114

inverter

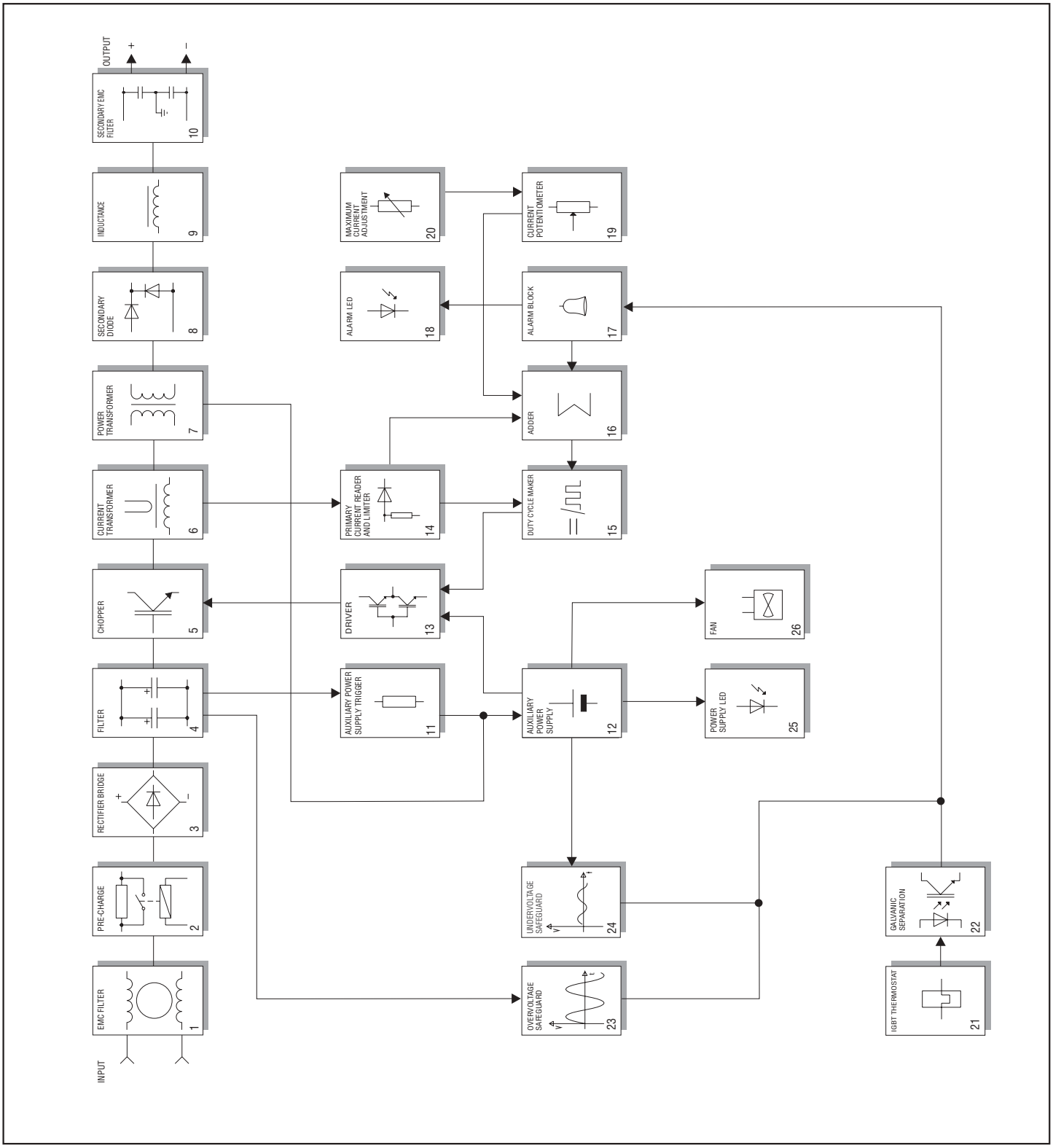
TROUBLESHOOTING AND REPAIR MANUAL

CONTENTS

"reparation no problem !"

OPERATION AND WIRING DIAGRAMS

BLOCK DIAGRAM



ANALYSIS OF THE BLOCK DIAGRAM

NOTE: Unless indicated otherwise, it should be assumed that the components are assembled on the power board.

Block 1

EMC Filter

Consisting of: C1, C8, C9, L1.

Prevents noise from the machine from being transmitted along the main power line and vice versa.

Block 2

Pre-charge

Consisting of: K1, R2.

Prevents the formation of high transitory currents that could damage the main power switch, the rectifier bridge and the electrolytic capacitors.

When the power source is switched on the relay K1 is de-energised, capacitors C2, C3, C4 are then charged by R2. When the capacitors are charged the relay is energised.

Block 3

Rectifier bridge

Consisting of: D1.

Converts the mains alternating voltage into continuous pulsed voltage.

Block 4

Filter

Consisting of: C2, C3, C4.

Converts the pulsed voltage from the rectifier bridge into continuous voltage.

Block 5

Chopper

Consisting of: Q1.

Converts the continuous voltage from the filter into a high frequency square wave capable of piloting the power transformer.

Regulates the power according to the required welding current/voltage.

Block 6

Current transformer

Consisting of: T2.

The C.T. is used to measure the current circulating in the power transformer primary and transmit the information to block 17 (primary current reader and limiter).

Block 7

Power transformer

Consisting of: T1.

Adjusts the voltage and current to values required for the welding procedure. Also forms galvanic separation of the primary from the secondary (welding circuit from the power supply line).

Block 8

Secondary diode

Consisting of: D22

Diode D22 converts the current circulating in the transformer to a single direction, preventing saturation of the nucleus, and recirculates the inductance output current (block 9) during the time when the IGBT's are not conducting, bypassing the power transformer (block 7).

Block 9

Inductance

Consisting of: L2.

Levels the secondary board diodes' output current making it practically continuous.

Block 10

Secondary EMC Filter

Consisting of: C23, C24.

Prevents noise from the power source from being transmitted through the welding cables and vice versa.

Block 11

Auxiliary power supply trigger

Consisting of: R13, R14, R15, C13

Via the resistors, the power source supplies the necessary voltage to power block 12 (auxiliary power supply).

Block 12

Auxiliary power supply

Consisting of: D10, C11, Q11, D11

Rectifies, filters and stabilises the voltage arriving from the tertiary winding of the power transformer (block 7).

Block 13

Driver

Consisting of: Q6, Q7, D46, D47

Picks up the signal arriving from block 15 (duty cycle maker) adjusts it to suit piloting of block 5 (chopper).

Block 14

Primary current reader and limiter

Consisting of: D42, D45, R56, C44, R57, R58, R59.

Reads the signal from block 6 (current transformer) and scales it down so it can be processed and compared in blocks 15 and 16.

Block 15

Duty cycle maker

Consisting of: U3, U2B.

Processes the information from block 16 (adder) and block 14 (primary current reader and limiter) and produces a square wave with variable duty cycle limiting the primary current to a maximum pre-set value under all circumstances.

Block 16

Adder

Consisting of: U1D.

Gathers all the information from block 14 (primary current reader and limiter), from block 17 (alarms) and from block 19 (current potentiometer), and produces a signal with a suitable voltage for processing by block 15 (duty cycle maker).

Block 17

Alarm Block

Consisting of: Q3, U1A, U1C.

When an alarm is detected the power source output current is drastically reduced by making direct adjustments to block 15 (duty cycle maker) and directly changing the reference signal obtained from block 19 (current potentiometer).

Block 18

Alarm LED

Consisting of: D35.

It is switched on by block 17 (alarms) in the event of:

1) Triggering of thermostatic capsule/thermostat on power transformer.
2) Triggering of thermostatic capsule on secondary diodes.
3) Triggering due to overvoltage.
4) Short circuit at output (electrode holder clamp and earth cable connected to one another or electrode stuck to piece being welded).

Block 19

Current potentiometer

Consisting of: R75.

This is used to set the reference voltage needed to adjust the output current: when the potentiometer knob is turned the cursor voltage varies, thus varying the current from the minimum to the maximum value.

Block 20

Maximum current adjustment

Consisting of: R70, R71, R72, R73, R74.

Used to adjust the maximum cutting current to be supplied by the power source.

Block 21

IGBT Thermostat

Consisting of: ST1

When the temperature of the IGBT dissipator reaches a given temperature the thermostat cuts in, sending an alarm signal to block 22 (galvanic separation). It is reset automatically when this alarm condition is no longer present.

Block 22

Galvanic separation

Consisting of: ISO1

The signal arriving from blocks 21 (IGBT thermostat) is separated galvanically and sent to block 17 (alarms) for detection of a possible alarm event.

Block 23

Overvoltage safeguard

Consisting of: R40, R41, R42, Q3.

If the main supply voltage exceeds the maximum value this safeguard triggers (a tolerance of approx. ±15% of the power supply voltage is allowed: outside this range the safeguard triggers).

Block 24

Undervoltage safeguard

Consisting of: R63, R64, U1C, Q8.

If the main supply voltage falls below the minimum allowed

value this safeguard triggers (a tolerance of approx. ±15% of the power supply voltage is allowed: outside this range the safeguard triggers).

Block 25

Power supply LED

Consisting of: D34.

Indicates when the power source is correctly powered and ready for use.

Block 26

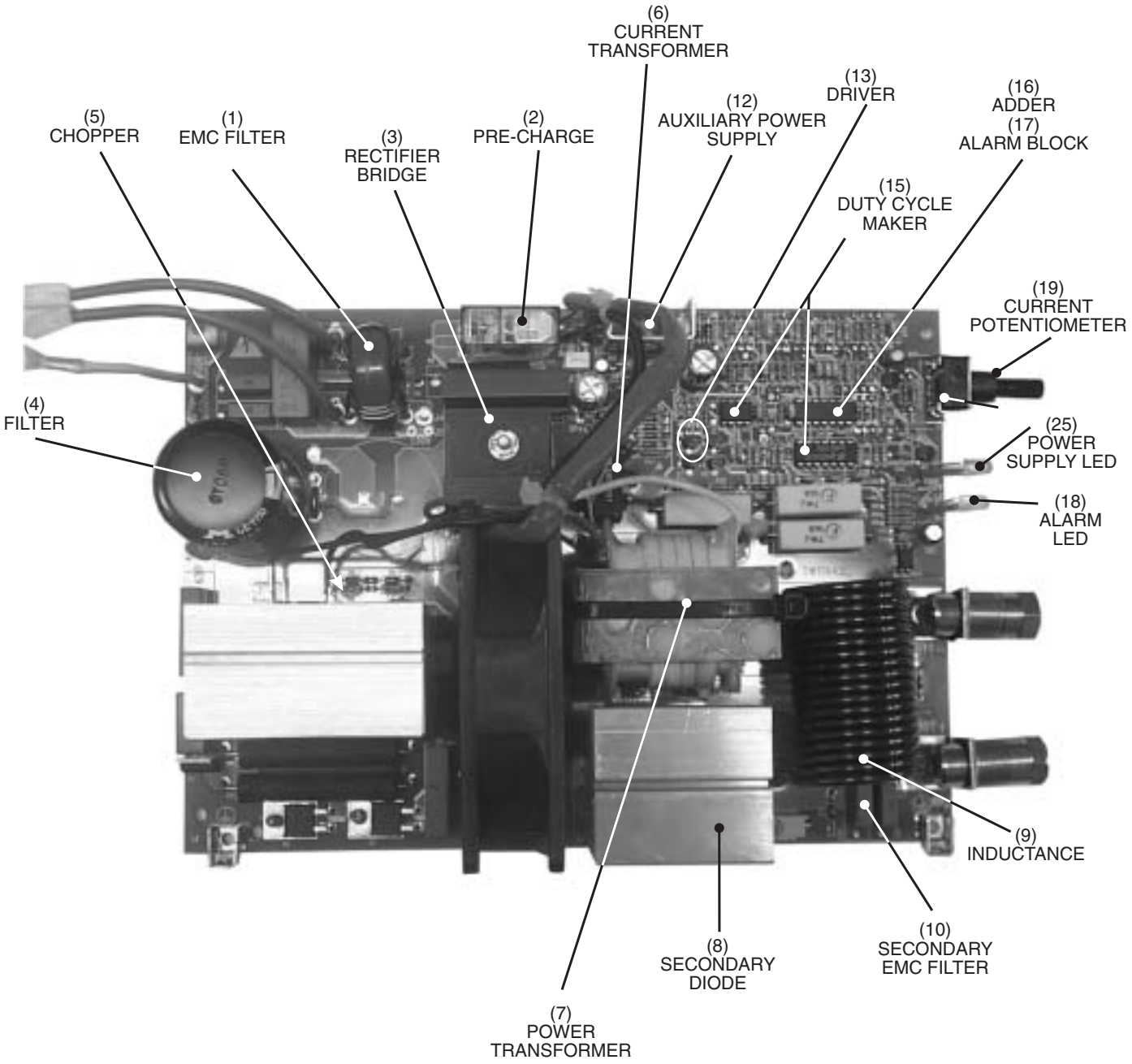
Fan

Consisting of: V1.

Powered directly by block 12 (a*uxiliary power supply*) and cools the power components.

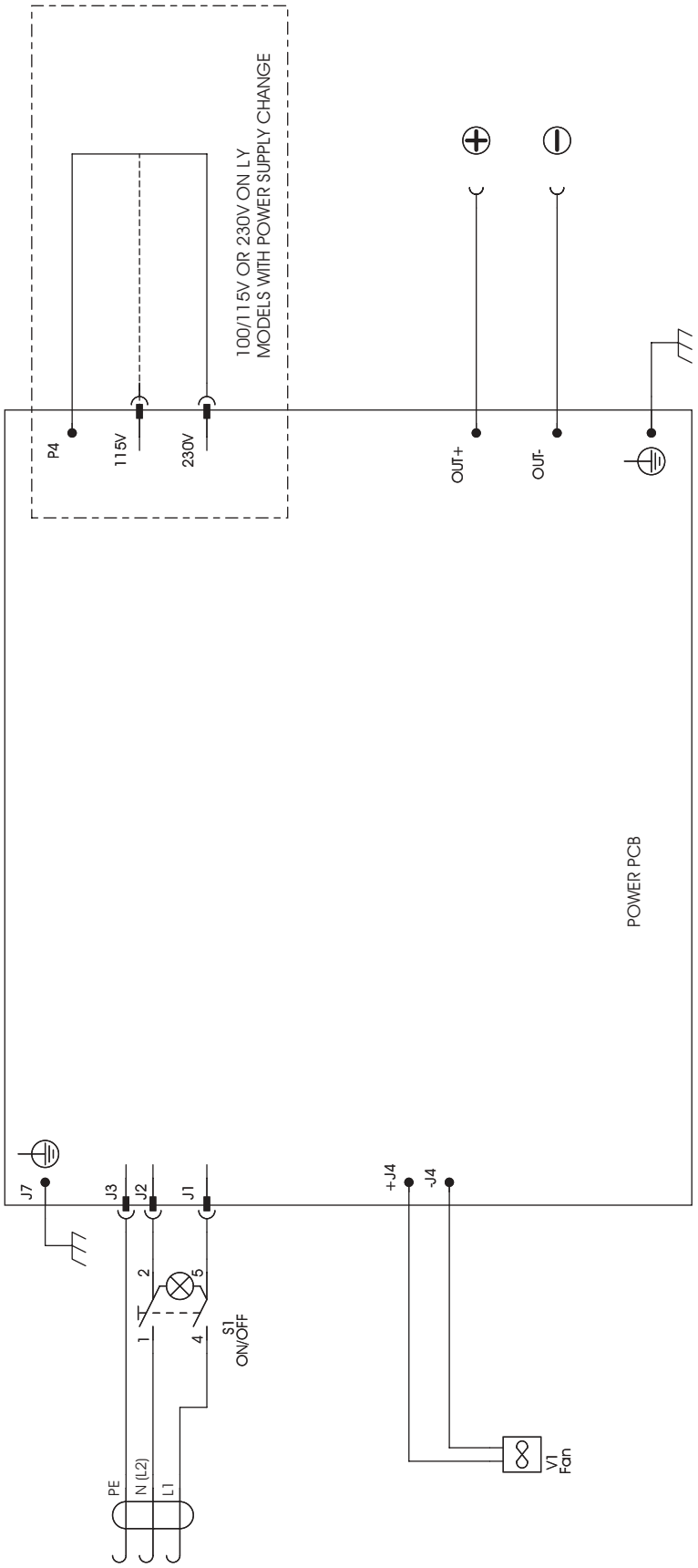
ILLUSTRATIONS

Power boad

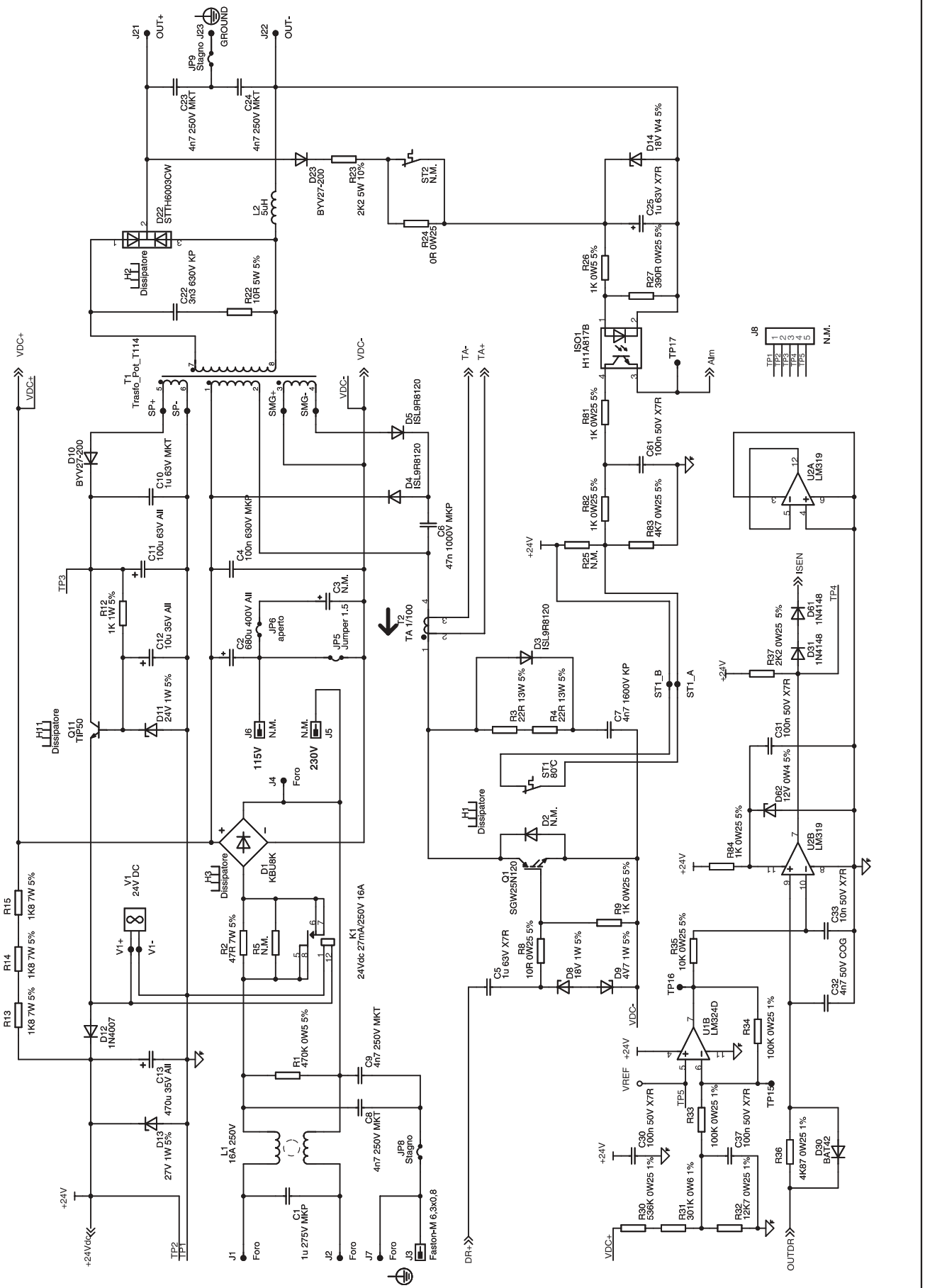


WIRING DIAGRAMS

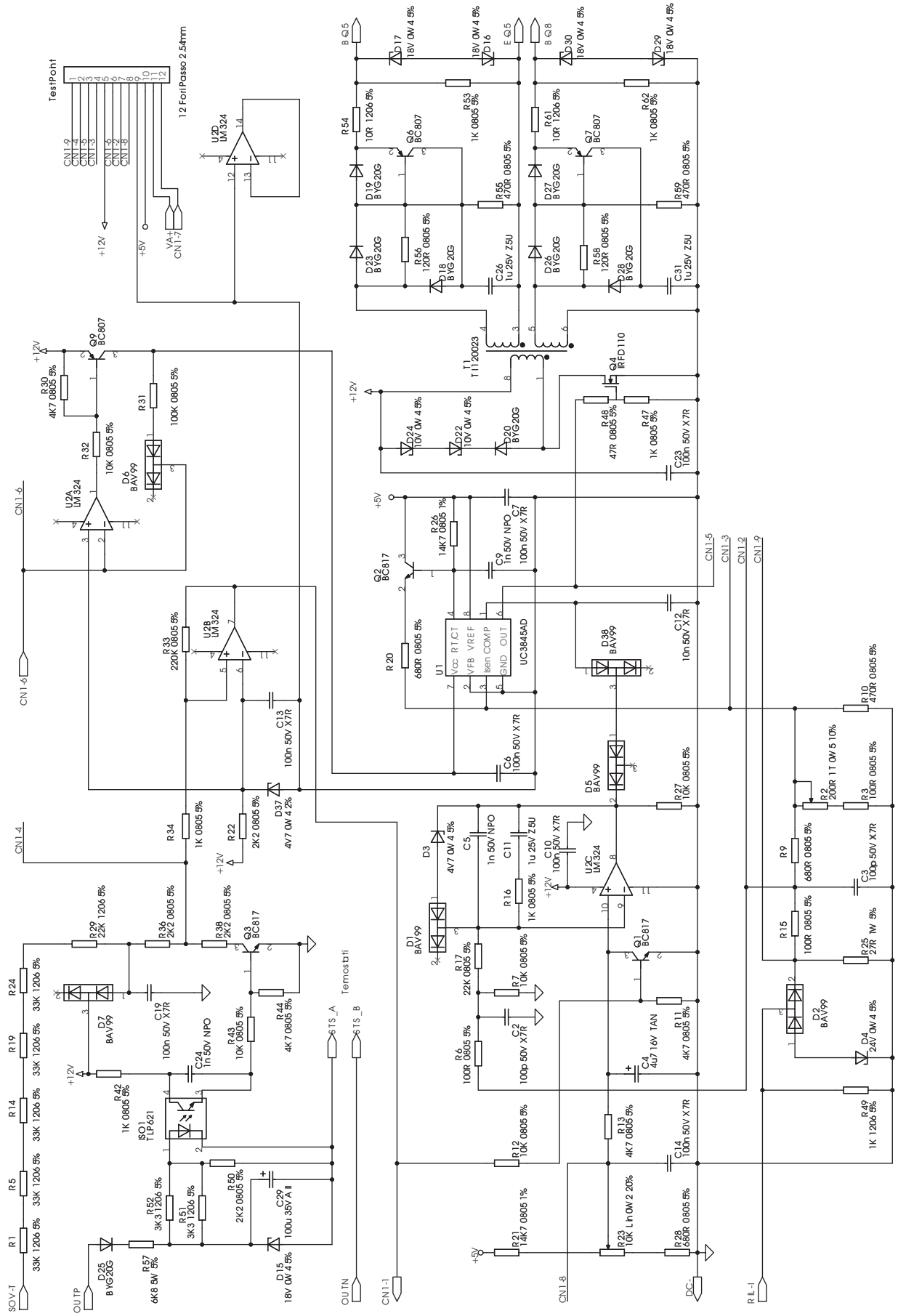
General wiring diagram



Wiring diagram power board – power supply

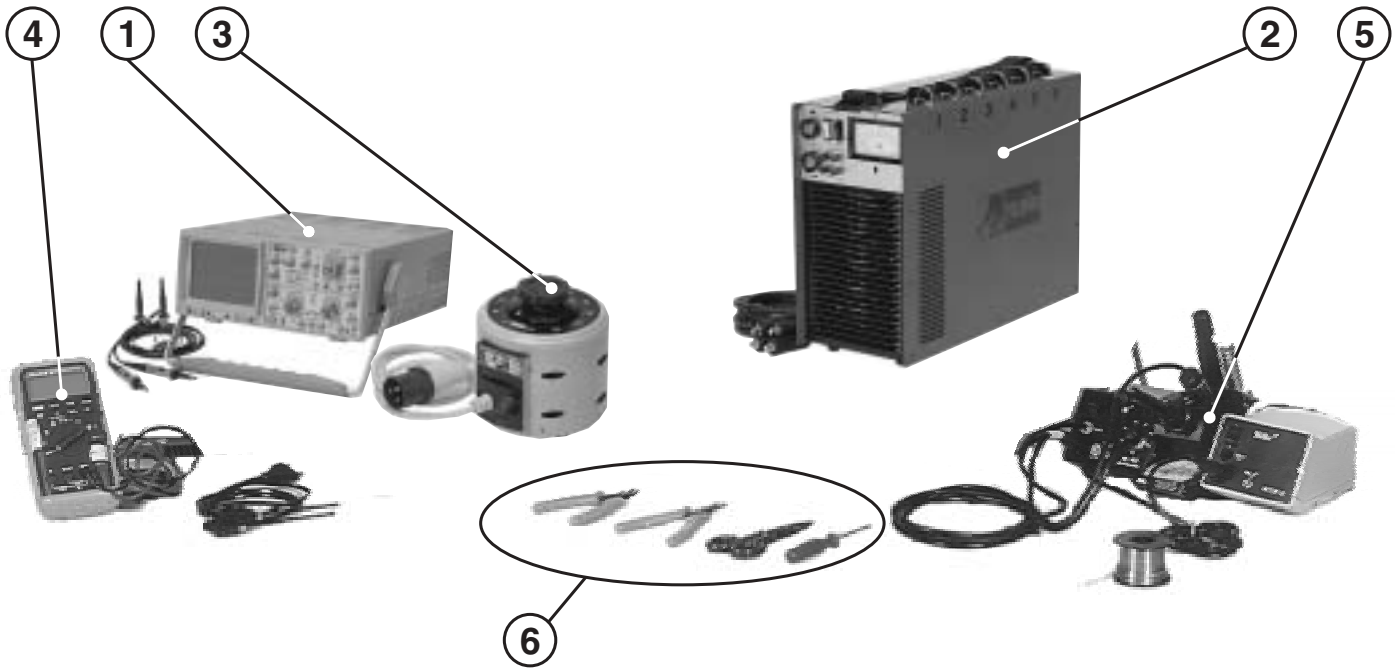


Wiring diagram power board – driver / control



REPAIR GUIDE

EQUIPMENT REQUIRED



ESSENTIAL INSTRUMENTS

1 Dual trace oscilloscope	***cod. 802401 (*)***
2 Static load generator	***cod. 802110 (*)***
3 Variac 0 - 300v 1500 VA	***cod. 802402 (*)***
4 Digital multimeter	

USEFUL INSTRUMENTS

5 Unsoldering station
6 Miscellaneous tools

(*)The instruments with codes can be supplied by Telwin. The sale price is available on request.

WARNING:

BEFORE PROCEEDING WITH REPAIRS TO THE MACHINE READ THE INSTRUCTION MANUAL CAREFULLY.

WARNING:

EXTRAORDINARY MAINTENANCE SHOULD BE CARRIED OUT ONLY AND EXCLUSIVELY BY EXPERT OR SKILLED ELECTRICAL-MECHANICAL PERSONNEL.

WARNING:

ANY CHECKS CARRIED OUT INSIDE THE MACHINE WHEN IT IS POWERED MAY CAUSE SERIOUS ELECTRIC SHOCK DUE TO DIRECT CONTACT WITH LIVE PARTS.

GENERAL REPAIR INSTRUCTIONS

The following is a list of practical rules which must be strictly adhered to if repairs are to be carried out correctly.

A) When handling the active electronic components, the IGBT's and Power DIODES in particular, take elementary antistatic precautions (use antistatic footwear or wrist straps, antistatic working surfaces etc.).

B) To ensure the heat flow between the electronic components and the dissipator, place a thin layer of thermo-conductive grease (e.g. COMPOUND GREASIL MS12) between the contact zones.

C) The power resistors (should they require replacement) should always be soldered at least 3 mm above the board.

D) If silicone is removed from some points on the boards, it should be re-applied.
N.B. Use only non-conducting neutral or oximic reticulating silicones (e.g. DOW CORNING 7093). Otherwise, silicone that is placed in contact with points at different potential (rheophores of IGBT's, etc.) should be left to reticulate before the machine is tested.

E) When the semiconductor devices are soldered the maximum temperature limits should be respected (normally 300°C for no more than 10 seconds).

F) It is essential to take the greatest care at each disassembly and assembly stage for the various machine parts.

G) Take care to keep the small parts and other pieces that are dismantled from the machine so as to be able to position them in the reverse order when re-assembling (damaged parts should never be omitted but should be replaced, referring to the spare parts list given at the end of this manual).

H) The boards (repaired when necessary) and the wiring should never be modified without prior authorisation from Telwin.

I) For further information on machine specifications and operation, refer to the Instruction Manual.

J) **WARNING!** When the machine is in operation there are dangerously high voltages on its internal parts so do not touch the boards when the machine is live.

TROUBLESHOOTING AND REMEDIES

1.0 Disassembling the machine

Every operation should be carried out in complete safety with the power supply cable disconnected from the mains outlet and should only by done by expert or skilled electrical-mechanical personnel.

- undo the 4 screws attaching the handle to the top cover (**fig. 1**);
- undo the 2 screws fastening the two plastic shells to the base: 1 screw on each side (**fig. 1);**
- undo the 2 screws attaching the handle to the base: 1 screw on each side (**fig. 1**);
- on the top cover undo the nut for the earth connection (J7);
- slide out the top cover upwards (**fig. 1**);
- undo the two screws fastening the power board to the base.

After completing the repairs, proceed in the reverse order to re-assemble the cover and do not forget to insert the toothed washer on the ground screw.

2.0 Cleaning the inside of the machine

Using suitably dried compressed air, carefully clean the components of the power source since dirt is a danger to parts subject to high voltages and can damage the galvanic separation between the primary and secondary. To clean the electronic boards we advise decreasing the air pressure to prevent damage to the components. It is therefore important to take special care when cleaning the following parts:

Fan (fig. 2A)

Check whether dirt has been deposited on the front and back air vents or has damaged the correct rotation of the blades, if there is still damage after cleaning replace the fan.

Power board (figs. 2A and 2B):

- rheofores of IGBT Q1;
- rheofores of secondary power diode D22;
- thermostat ST1 on the IGBT;
- opto-coupler ISO1.

3.0 Visual inspection of the machine

Make sure there is no mechanical deformation, dent, or damaged and/or disconnected connector. Make sure the power supply cable has not been damaged or disconnected internally and that the fan works with the machine switched on. Inspect the components and cables for signs of burning or breaks that may endanger operation of the power source. Check the following elements:

Main power supply switch (fig. 2A)

Use the multimeter to check whether the contacts are stuck together or open. Probable cause:

- mechanical or electric shock (e.g. bridge rectifier or IGBT in short circuit, handling under load).

Current potentiometer R75 (fig. 3)

Probable cause:

- mechanical shock.

Relay K1 (fig. 3)

Probable cause:

- see main power supply switch. **N.B.** If the relay contacts are stuck together or dirty, do not attempt to separate them and clean them, just replace the relay.

Electrolytic capacitors C2,C3 (fig. 3)
Probable cause (No C3 on 230V version of Tecnica 114):
- mechanical shock;
- machine connected to power supply voltage much higher than the rated value;
- broken rheophore on one or more capacitor: the remainder will be overstressed and become damaged by overheating;
- ageing after a considerable number of working hours;
- overheating caused by thermostatic capsule failure.

IGBT's Q1 (fig. 4)
Probable cause:
- discontinuation in snubber network;
- fault in driver circuit;
- poorly functioning thermal contact between IGBT and dissipator (e.g. loosened attachment screws: check);
- excessive overheating related to faulty operation.

Secondary diodes D22 (fig. 4)
Probable cause:
- discontinuation in snubber network;
- poorly functioning thermal contact between IGBT and dissipator (e.g. loosened attachment screws: check);
- faulty output connection.

Power transformer and filter reactance (fig. 2A)
Inspect the windings for colour changes. Probable causes:
- power source connected to a higher voltage than 280Vac;
- ageing after a substantial number of working hours;
- excessive overheating related to faulty operation.

4.0 Checking the power and signal wiring
It is important to check that all the connections are in good condition and the connectors are inserted and/or attached correctly. To do this, take the cables between finger and thumb (as close as possible to the fastons or connectors) and pull outwards gently: the cables should not come away from the fastons or connectors. **N.B.** If the power cables are not tight enough this could cause dangerous overheating. In particular, on the power board it is necessary to make sure all the wiring is inserted correctly into the corresponding connectors or fastons. Also make sure that the connections to the dinse sockets are attached correctly to the power board.

5.0 Electrical measurements with the machine switched off
A) With the multimeter set in **diode testing** mode check the following components (junction voltages not less than 0.2V):
- rectifier bridge D1 **(fig. 3)**;
- IGBT's Q1 (absence of short circuits between collector-gate and between emitter-collector **fig. 4**);
- secondary board diodes D22 between anode and cathode (**fig. 4**). The secondary diodes can be checked without removing the power board: with one prod on the secondary board dissipator diodes and the other in sequence on the two power transformer outlets;

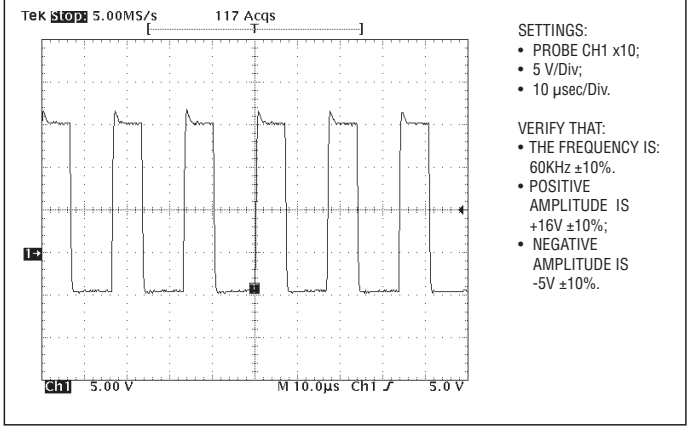
B) With the multimeter set in ohm mode check the following components:
- resistor R2: 47ohm (pre-charge **fig. 3**);
- resistors R3, R4: 22ohm (primary snubber **fig. 3**);
- resistor R22: 10ohm (secondary snubber **fig. 3**);
- thermostat continuity test on IGBT dissipator: clean the resin from the bump contacts for ST1(A,B) and measure the resistance over these two bump contacts, it should be approx 0 ohm (**fig. 2B**).

6.0 Electrical measurements with the machine in operation
WARNING! Before proceeding with troubleshooting, we should remind you that during these tests the power source is powered and therefore the operator is exposed to the danger of electric shock. The tests described below can be used to check operation of the power and control parts of the power source.

6.1 Preparation for testing
A) Set up a multimeter in DC volt mode and connect the prods to the OUT+ and OUT- bump contacts.
B) Position the potentiometer R75 to maximum (clockwise as far as it will go). **N.B.** to check correct operation of the control circuit without powering the power board we recommend carrying out the test given at point 6.2, otherwise pass to the test at point 6.3.

6.2 Scheduled tests for the TECNICA 114 at low voltage
A) Between the cathode of diode D10 (+) and the anode of diode D11(-) insert a stabilised power supply that is able to supply 40Vdc 500mA.
B) Set up the oscilloscope with the voltage probe x100 connected between the gate of Q1 and the earth on the emitter, also of Q1 **(fig. 3)**.
C) Switch on the stabilised power supply (initially set to 0V) and gradually increase the generated voltage until it reaches 40Vdc.
D) Make sure the waveform shown on the oscilloscope resembles **fig. A**. **N.B.** if the signal is not present it may be necessary to replace component Q1 or, alternatively, the driver circuit U3, Q6 and Q7 (**fig. 3**).
E) Set up a multimeter in volt mode and make sure that (**fig. 3**):
- the voltage over pins 2 and 1 of J8 is equal to +23V ±5%;
- the voltage over pins 5 and 1 of J8 is equal to +5Vdc ±5%;
- the voltage over pins 4 and 1 of J8 is equal to +500mVdc ±5%;
- the voltage over pins 8 and 1 of J8 is equal to 0Vdc.

FIGURE A



6.3 Scheduled tests for the TECNICA 114 (230V)

A) Disconnect the stabilised power supply from the power board.

B) Set up the dual trace oscilloscope. Connect probe CH2 (x100) to the collector of Q1 and probe CH1 (x10) to the gate, also of Q1. The earth terminals are connected together to the emitter of Q1.

C) Connect the power supply cable to a single phase variac with variable output 0-300 Vac.

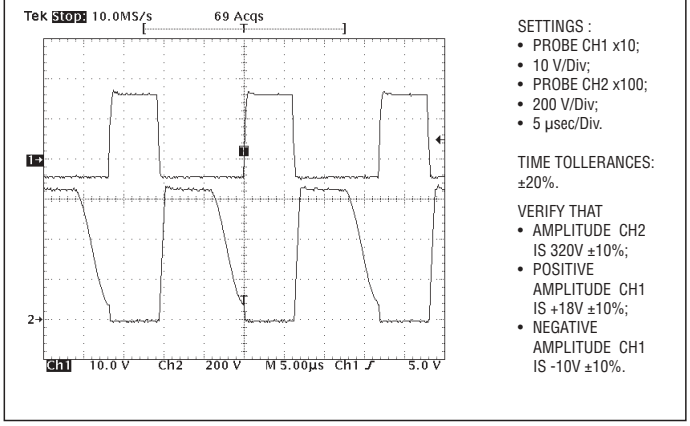
D) Switch on the variac (initially set to 0V), close the main power supply switch on the power source and gradually increase the voltage generated by the variac until it reaches 230Vac then make sure that:

- the green power supply LED D34 lights up (**fig. 3**);
- the fan starts to turn for the power transformer;
- pre-charge relay K1 closes (**fig. 3**);
- for voltages close to the rated power supply value (230Vac ±15%) the power source does not signal an alarm (yellow LED D35 off).

N.B. if the alarm persists in the power source this could be due to a fault in the control components (in any case proceed to make further tests).

E) Make sure the waveform shown on the oscilloscope resembles **fig. B**. **N.B.** if the signal is not present it may be necessary to replace component Q1 or, alternatively, the driver circuit U3, Q6 and Q7 (**fig. 3**).

FIGURE B



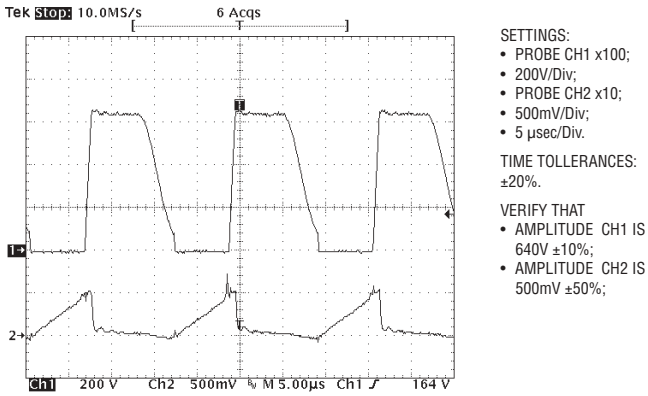
F) Set up a multimeter in volt mode and make sure that (**fig. 3**):

- the voltage over pins 2 and 1 of J8 is equal to +23Vdc ±5%;
- the voltage over pins 5 and 1 of J8 is equal to +5Vdc ±5%;
- the voltage over pins 4 and 1 of J8 is equal to +500mVdc ±5%;
- the voltage over pins 8 and 1 of J8 is equal to 0Vdc;
- the output voltage over OUT+ and OUT- is equal to +80Vdc ±10%.

G) Set up the dual trace oscilloscope. Connect the voltage probe x100 between the gate of Q1 and the earth to the emitter, also of Q1 (**fig. 3**). Probe CH2 (x10) to the rheofore of R55 towards C11 and the earth to the anode of D11.

H) Make sure the waveform shown on the oscilloscope resembles **fig. C**.

FIGURE C



I) Switch the power source off and on again and make sure that, after the transitory switch-on time, there is no alarm (yellow alarm LED D12 is off **fig. 3**). **N.B.** If an alarm persists (and is not caused by a fault in the control board) there could be a fault in the opto-coupler ISO1 (**fig. 3**).

6.4 Scheduled tests for the TECNICA 114 (115V)

WARNING! Power the power source at the rated voltage of 115Vac. In this case the tests are exactly the same as those for the Tecnica 114 (230V) and can be carried out in the same way.

7.0 Repairs, replacing the boards

If repairing the board is complicated or impossible, it should be completely replaced. The board is identified by a 6-digit code (printed in white on the component side after the initials TW). This is the reference code for requesting a replacement: Telwin may supply boards that are compatible but with different codes.

Warning: before inserting a new board check it carefully for damage that may have occurred in transit. When we supply a board it has already been tested and so if the fault is still present after it has been replaced correctly, check the other machine components. Unless specifically required by the procedure, never alter the board trimmers.

7.1 Removing the power board (fig. 2A)

If the fault is in the power board remove it from the bottom as follows:

- with the machine disconnected from the main supply, disconnect all the wiring connected to the board;
- remove the current adjustment knob on the front panel of the machine (**fig. 1**);
- remove any bands constraining the board (e.g. on the power supply cable and connections to primary);
- from the welding side undo the two screws fastening the dinse sockets to the printed circuit board (**fig. 2B**).
- undo the 2 screws fastening the board to the bottom (**fig. 2B**).
- undo the 2 screws fastening the board to the front and back on the inside (**fig. 2B**).
- after removing the screws, lift the board upwards to remove it from the bottom of the machine.

N.B. to re-assemble, proceed in the reverse order, remembering to insert the toothed washers on the earth screws.

A) Take special note of the procedure for replacing the IGBT (fig. 4):
- to replace the IGBT undo the screws fastening the dissipator to the board (**fig.2B**);
- remove IGBT Q1 by unsoldering the rheofores and also remove the solder from the bump contacts on the PCB;
- remove the dissipator from the board;
- undo the screws holding the IGBT.

Before proceeding with the replacement make sure that the parts piloting the IGBT are not damaged as well:
- with the multimeter set on **ohms** check the PCB to make sure there is no short circuit between the 1st and 3rd bump contacts (between gate and emitter) corresponding to each component;
- alternatively, resistors R8 and R9 could have blown and/or diodes D8 and D9 may be unable to work at a correct Zener voltage (this should have been detected in the preliminary tests);
- clean any irregularities or dirt from the dissipator. If the IGBT module has blown the dissipator may be irreparably damaged: in such a case it should be replaced;
- apply thermoconductive paste following the general instructions;
- attach the new IGBT to the dissipator with the screw (torque wrench setting 1 Nm ±20%);
- place the dissipator with the new IGBT on the bump contacts of the PCB, interposing, and attach it with the screws (torque wrench setting 1 Nm ±20%);
- solder the terminals taking care not to let the solder run along them;
- on the solder side cut the protruding part of the rheofores and make sure they have not shorted (between the gate and emitter in particular).

B) Take special note of the procedure for replacing the secondary diodes (fig. 4):
- undo the screws fastening the dissipator to the board;
- remove the secondary diodes by unsoldering the rheofores and also remove the solder from the bump contacts on the PCB;
- remove the dissipator from the board;
- remove the springs locking the diode;
- clean any irregularities or dirt from the dissipator. If the diode has blown the dissipator may have been irreparably damaged: in such a case it should be replaced;
- apply thermoconductive paste following the general instructions;
- insert the new diode between the dissipator and the spring, taking care not to damage the component during assembly (the spring should be inserted by pressure on the dissipator in order to lock the component);
- place the dissipator with the new component on the bump contacts of the PCB, and attach it with the screws (torque wrench setting 1 Nm ±20%);
- solder the terminals taking care not to let the solder run along them;
- on the soldering side cut the protruding part of the rheofores and make sure they have not shorted (between cathode and anode).

N.B. make sure that resistor R22 and capacitor C22 of the snubber are soldered correctly to the PCB (**fig. 3**).

TESTING THE MACHINE

Tests should be carried out on the assembled machine before closing it with the top cover. During tests with the machine in operation never commute the selectors or activate the ohmic load contactor.
WARNING! Before proceeding to test the machine, we should remind you that during these tests the power source is powered and therefore the operator is exposed to the danger of electric shock.
The tests given below are used to verify power source operation under load.

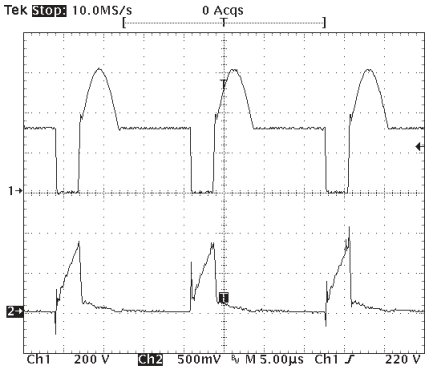
1.1 Preparation for testing

A) Connect the power source to the static load generator (code 802110) using cables fitted with the appropriate dinse connectors.
B) Set up the dual trace oscilloscope. Connect the voltage probe x100 between the gate of Q1 and the earth to the emitter, also of Q1. Probe CH2 (x10) to the rheofore of R55 towards C11 and the earth to the anode of D11.
C) Set up a multimeter in DC volt mode and connect the prods to the OUT+ and OUT- bump contacts.
D) Connect the power supply cable to the main 230Vac power supply.
WARNING! during testing prevent contact with the metal part of the torch because of the presence of high voltages that are hazardous to the operator.

1.2 Scheduled tests for the TECNICA 114 (230V)

A) Minimum load test:
- set up the ohmic load with the switch settings as in the table in **fig. D**;
- on the front panel turn the current potentiometer to minimum (turn anti-clockwise as far as it will go);
- switch on at the main switch;
- start up the ohmic load and make sure that:
  - the waveforms displayed on the oscilloscope resemble those in **fig. D**;
  - the output current is equal to +9Adc ±5% and the output voltage is equal to +15Vdc ±5%;
- switch off the ohmic load and switch off the main switch.

FIGURE D



SETTINGS:
- PROBE CH1 x 100
- 200V/Div;
- PROBE CH2 x10;
- 500mV/Div;
- 5 µsec/Div.

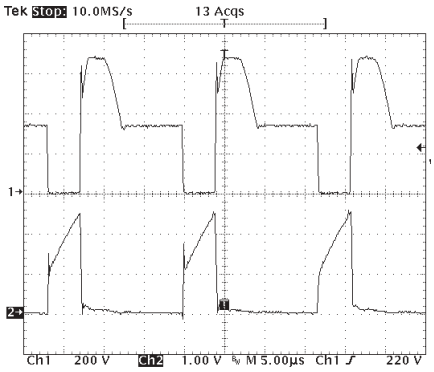
TOLERANCES:
- FOR TIME 20%.

VERIFY THAT:
- PEAK AMPLITUDE CH1 600V ±10%.
- PEAK AMPLITUDE CH2 900mV ±30%.

1	2	3	4	5	6	Numero commutatore
1	0	0	0	0	0	Posizione commutatore

B) Intermediate load test:
- set up the ohmic load with the switch settings as in the table in **fig. E**;
- on the front panel turn the current potentiometer to 40A (approx. Half-way);
- switch on at the main switch;
- start up the ohmic load and make sure that:
  - the waveforms displayed on the oscilloscope resemble those in **fig. E**;
  - the output current is equal to +40Adc ±10% and the output voltage is equal to +21.6Vdc ±10%;
- switch off the ohmic load and switch off the main switch.

FIGURE E



SETTINGS:
- PROBE CH1 x100
- 200V/Div;
- PROBE CH2 x10;
- 1V/Div;
- 5 µsec/Div.

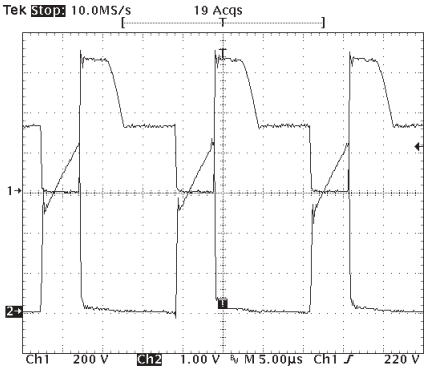
TIME TOLLERANCES ±20%.

VERIFY THAT:
- PEAK AMPLITUDE CH1 680V ±10%.
- PEAK AMPLITUDE CH2 2.5V ±30%.

1	2	3	4	5	6	number switch
1	1	1	1	1	1	position switch

C) Rated load test:
- set up the static load generator with the switch settings as in the table in **fig. F**;
- on the front panel turn the current potentiometer to maximum (turn clockwise as far as it will go);
- to the maximum (turn the knob clockwise as far as it will go) and switch on the main switch;
- activate the static load generator and make sure that:
  - the voltage waveforms on the oscilloscope display resemble those in **fig. F**;
  - the output current is equal to 75Adc ±5% and the output voltage is equal to +23.6Vdc ±5%; if the output current reading is not 75A ±5%, adjust the current using jumpers JP1, JP2 and JP3 (**fig. 5**).
- switch off the ohmic load and switch off the main switch

FIGURE F



SETTINGS:
- PROBE CH1 x100
- 200V/Div;
- PROBE CH2 x10;
- 1V/Div;
- 5µsec/Div.

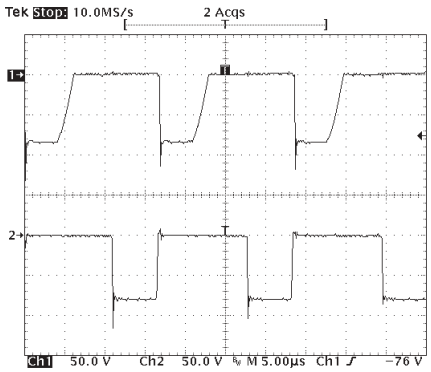
TIME TOLLERANCES ±20%.

VERIFY THAT:
- PEAK AMPLITUDE CH1 680V ±10%.
- PEAK AMPLITUDE CH2 4.2V ±20%.

1	2	3	4	5	6	Switch number
2	2	2	2	2	1	Position of switch

D) Checking the secondary diode voltages:
- set up the dual trace oscilloscope by connecting probes CH1 and CH2 x100 to the two secondary outputs of the power transformer. The earth terminals are connected together to the secondary dissipator;
- remove the multimeter from the OUT+ and OUT- bump contacts;
- set up the ohmic load with the switch settings as in the table in **fig. F**;
- switch on at the main switch;
- on the front panel turn the current potentiometer to maximum (turn clockwise as far as it will go);
- start up the ohmic load and make sure the waveforms;
- displayed on the oscilloscope resemble those in **fig. H**;
- switch off the ohmic load and switch off the main switch.

FIGURE G



SETTINGS:
- PROBE CH1 x100
- 50V/Div;
- PROBE CH2 x100;
- 5V/Div;
- 5µsec/Div.

TIME TOLLERANCES ±20%.

VERIFY THAT
- REVERSE AMPLITUDE CH1 AND CH2 DOES NOT EXCEED 250V.

E) Running time check and closing the machine

With the load status as in **fig. F** and the current adjustment potentiometer on maximum, switch on the power source and leave it in operation until the thermostatic capsules trigger (machine in alarm status). Check the correct positioning of the internal wiring and finally re-assemble the machine.

F) Welding test

With the power source set up according to the instructions in the handbook make a test weld at 40¸70A (electrode diameter 2.5 mm). Check the dynamic behaviour of the power source.

1.3 Tests for the TECNICA 114 (115V)

WARNING! Power the power source at the rated voltage of 115Vac. In this case the tests are exactly the same as those for the TECNICA 114 (230V) and can be carried out in the same way.

ILLUSTRATIONS

fig. 1

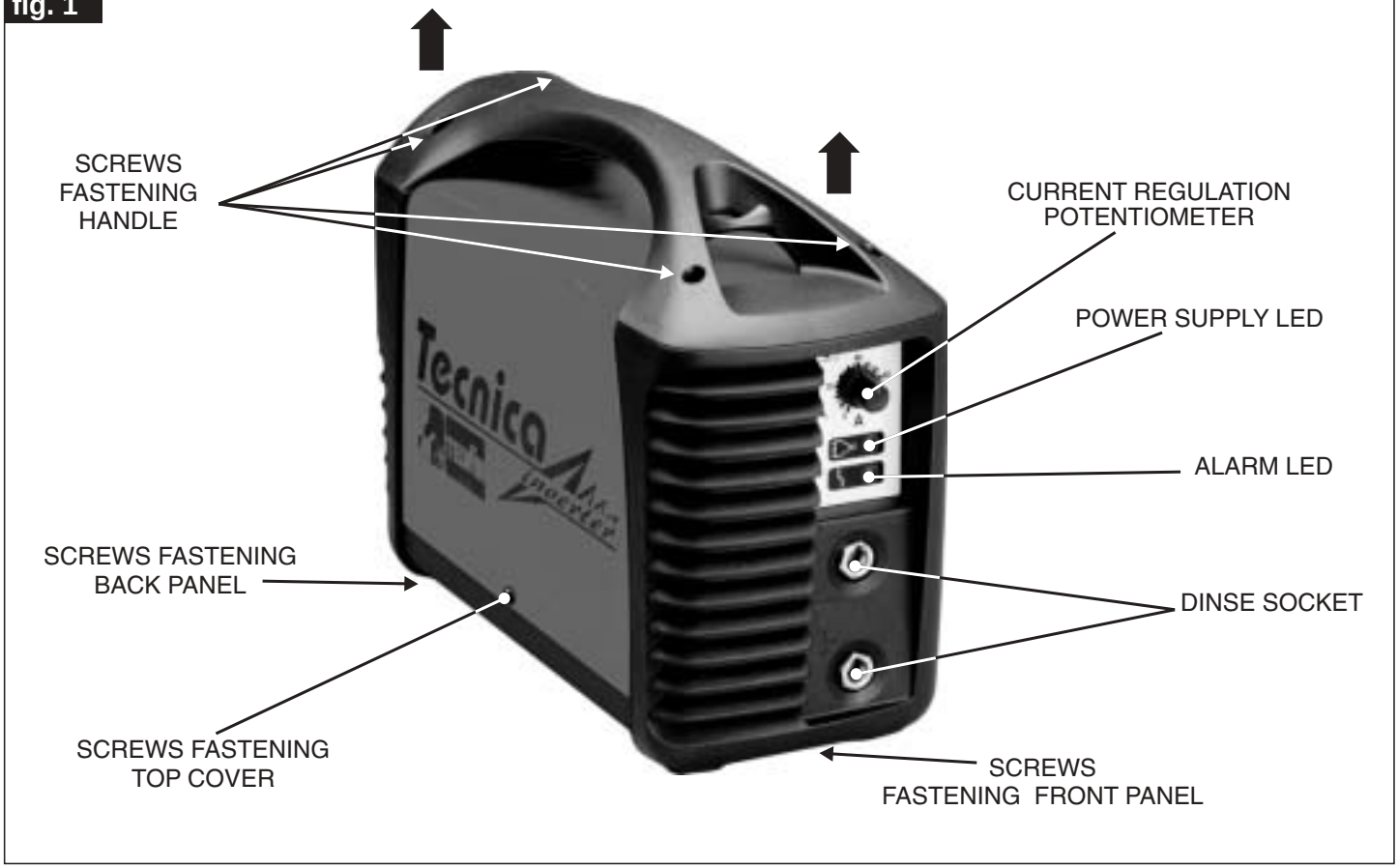


fig. 2A

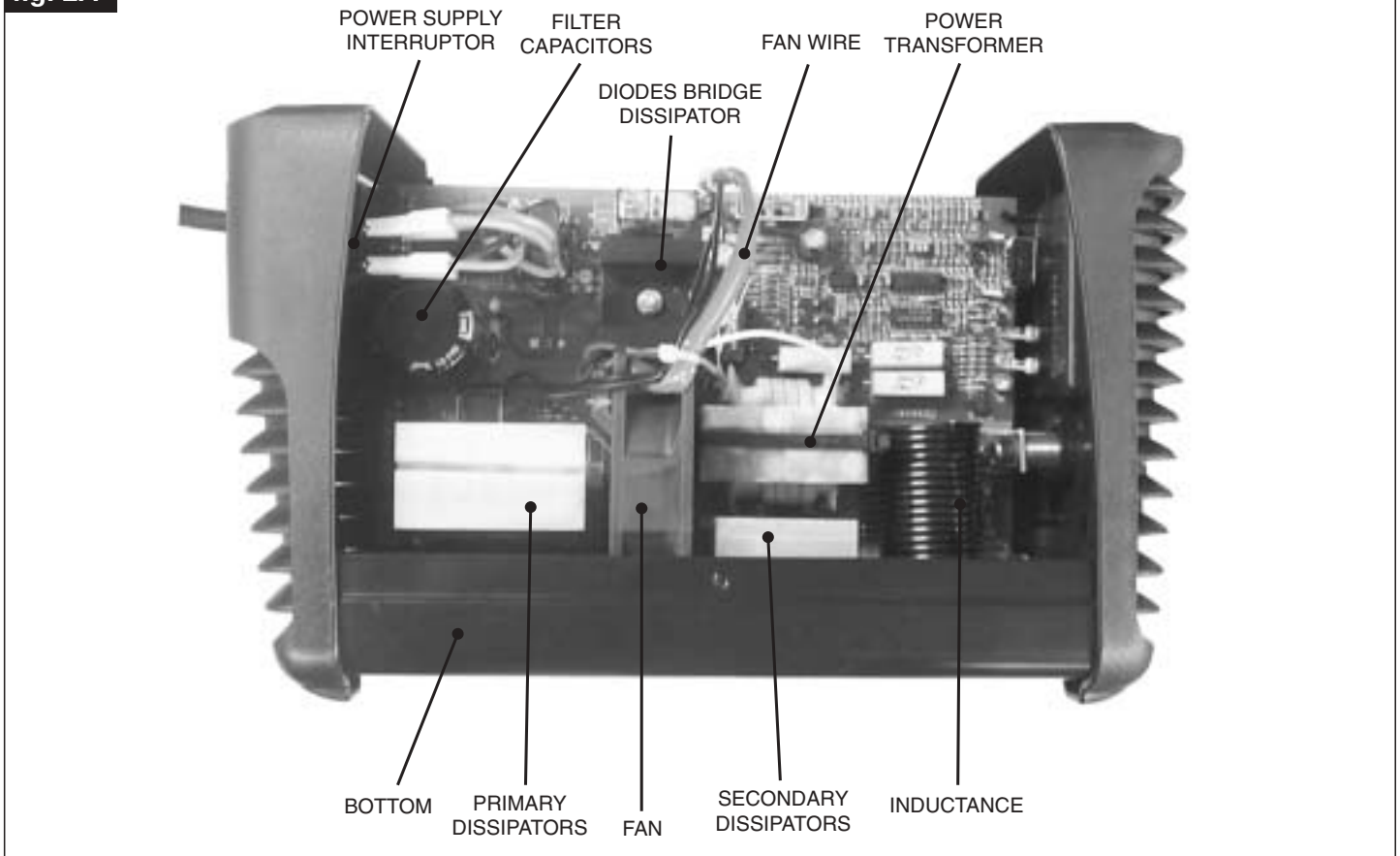


fig. 2B

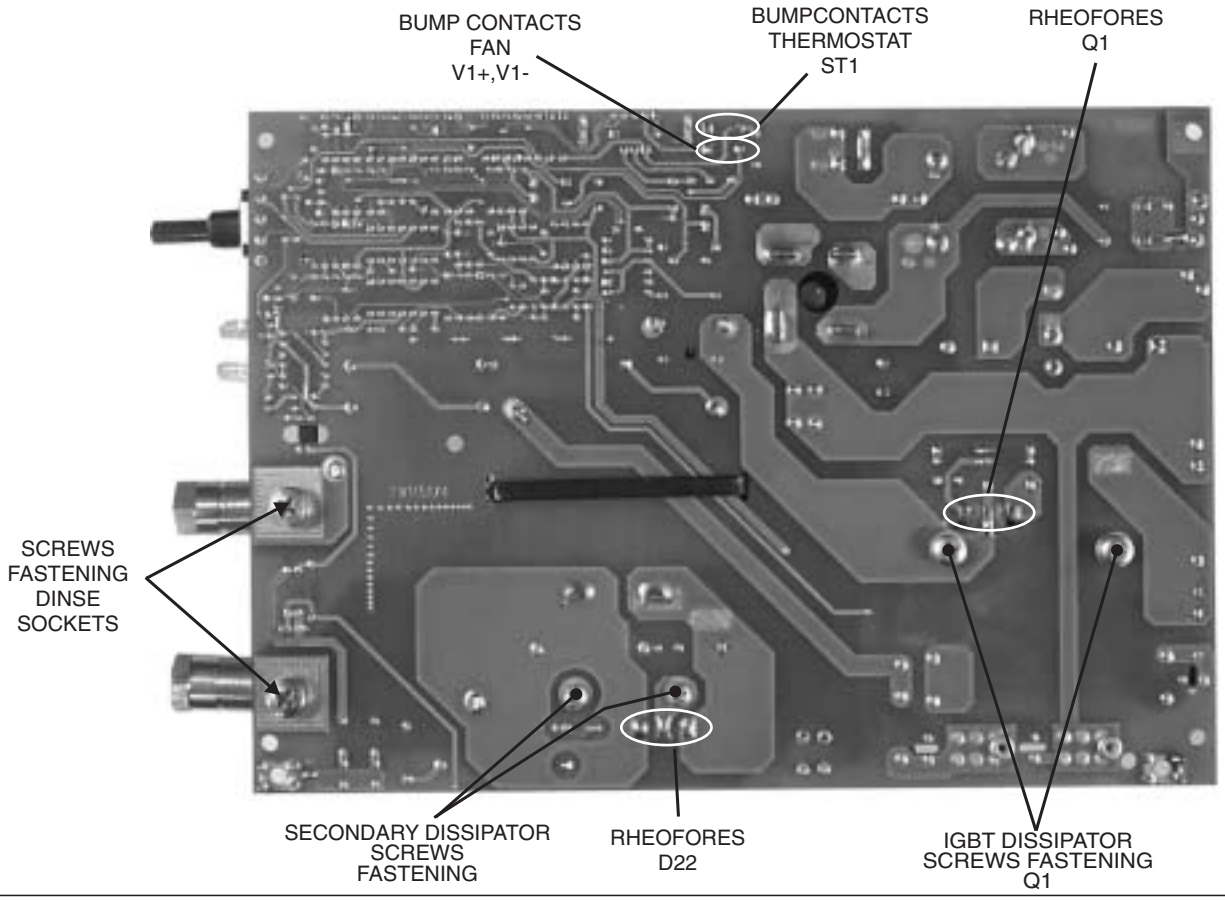
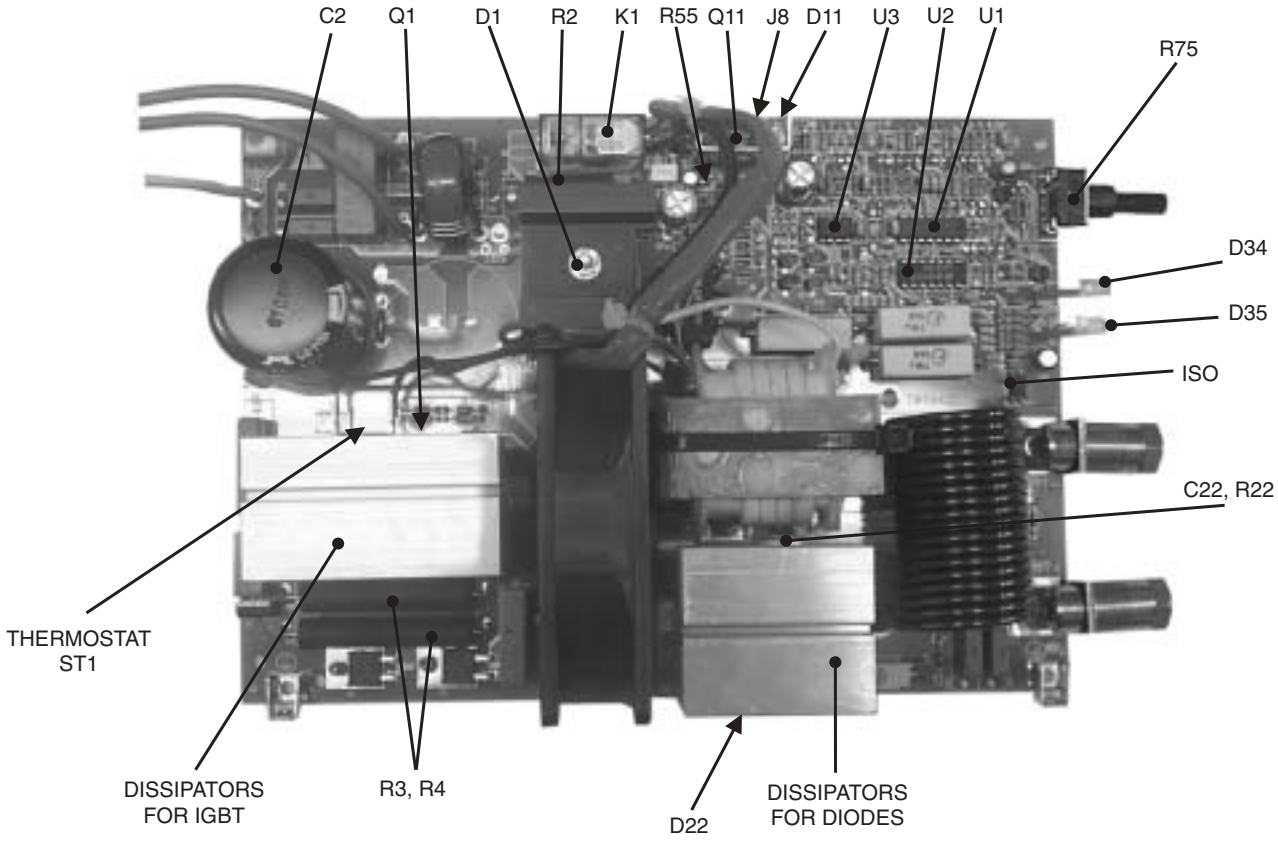
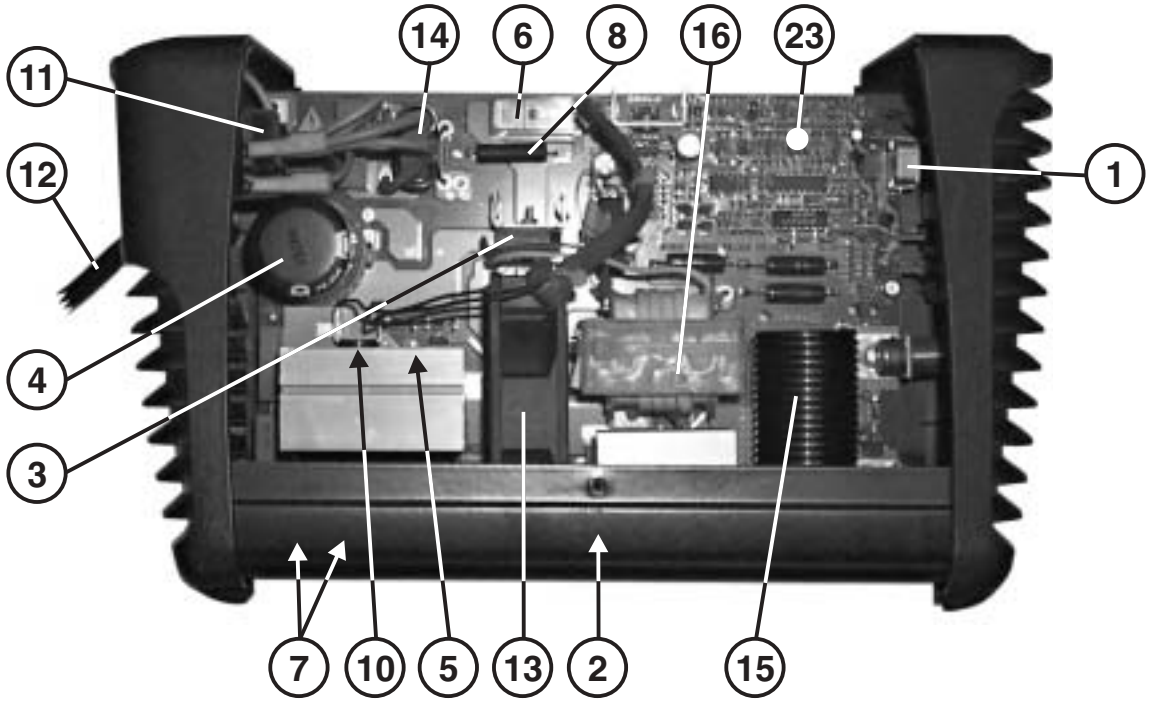

BUMP CONTACTS
FAN
V1+,V1-
BUMPCONTACTS
THERMOSTAT
ST1
RHEOFORES
Q1
SCREWS
FASTENING
DINSE
SOCKETS
SECONDARY DISSIPATOR
SCREWS
FASTENING
RHEOFORES
D22
IGBT DISSIPATOR
SCREWS FASTENING
Q1

fig. 3


C2
Q1
D1
R2
K1
R55
Q11
J8
D11
U3
U2
U1
R75
D34
D35
ISO
C22, R22
THERMOSTAT
ST1
DISSIPATORS
FOR IGBT
R3, R4
D22
DISSIPATORS
FOR DIODES

ELENCO PEZZI DI RICAMBIO - LISTE PIECES DETACHEES
SPARE PARTS LIST - ERSATZTEILLISTE - PIEZAS DE REPUESTO

Esploso macchina, Dessin appareil, Machine drawing, Explosions Zeichnung des Geräts, Diseño seccionado maquina.



Per richiedere i pezzi di ricambio senza codice precisare: codice del modello; il numero di matricola; numero di riferimento del particolare sull'elenco ricambi.
Pour avoir les pieces detachees, dont manque la reference, il faudra preciser: modele, logo et tension de l'appareil; denomination de la piece; numero de matricule
When requesting spare parts without any reference, pls specify: model-brand and voltage of machine; list reference number of the item; registration number
Wenn Sie einen Ersatzteil, der ohne Artikel Nummer ist, benoetigen, bestimmen Sie bitte Folgendes: Modell-zeichen und Spannung des Geraetes; Teilliste Nuemmer; Registriernummer
Por pedir una pieza de repuesto sin referencia precisar: modelo-marca e tension de la maquina; numero di riferimento de lista; numero di matricula

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
1	Potenziometro Potentiometre Potentiometer Potentiometer Potenciometro
2	Diodo Diode Diode Diode Diodo
3	Raddrizzatore Monofase Redresseur Monophase Single-phase Rectifier Einphasiger Gleichrichter Rectificador Monofasico
4	Condensatore Condensateur Capacitor Kondensator Condensador
5	Igbt Igbt Igbt Igbt Igbt
6	Rele' Relais Relais Relais Relais
7	Diodo Diode Diode Diode Diodo
8	Resistenza Resistance Resistor Widerstand Resistencia

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
9	Manopola Potenziometro Poignee Pour Potentiometre Knob For Potentiometer Potentiometergriff Malja Por Resist.electr.variable
10	Termostato Thermostat Thermal Switch Thermostat Termostato
11	Interruttore Interrupteur Switch Schalter Interruptor
12	Cavo Alim. Cable Alim. Mains Cable Netzkabel Cable Alim.
13	Ventilatore Ventilateur Fan Ventilator Aventador
14	Induttanza Filtro Inductance Filter Filter Inductance Filter Drossel Induccion Filtro
15	Induttanza Inductance Inductance Drossel Induccion
16	Trasformatore Potenza Transformateur Puissance Power Transformer Leistungstransformator Transformador De Potencia

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
17	Frontale Partie Frontal Front Panel Geraetefront Frontal
18	Retro Partie Arriere Back Panel Rueckseite Trasera
19	Maniglia Poignee Handle Handgriff Manija
20	Fondo Chassis Bottom Bodenteil Base
21	Presa Dinse Prise Dix Dinse Socket Dinse Steckdose Enchufe Dinse
22	Kit Mantello Kit Capot Cover Lit Deckel Kit Kit Panel De Cobertura
23	Kit Scheda Kit Fiche Kit Board Kit Karte Kit Tarjeta

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO

TECHNICAL REPAIR CARD.

In order to improve the service, each servicing centre is requested to fill in the technical card on the following page at the end of every repair job. Please fill in this sheet as accurately as possible and send it to Telwin. Thank you in advance for your co-operation!

Official servicing centers Repairing sheet

Date: _____

Inverter model: _____

Serial number: _____

Company: _____

Technician: _____

In which place has the inverter been used?

☐ *Building yard*

☐ *Workshop*

☐ *Others:* _____

Supply:

☐ *Power supply*

☐ *From mains without extension*

☐ *From mains with extension m:* _____

Mechanichal stresses the machine has undergone to

Description: _____

_____

Dirty grade

Dirty inside the machine

Description: _____

Kind of failure	Component ref.
Rectifier bridge	
Electrolytic capacitors	
Relais	
In-rush limiter resistance	
IGBT	
Snubber	
Secondary diodes	
Potentiometer	
Others	

Substitution of primary power board: *yes* ☐ *no* ☐

Troubles evinced during repair :

_____

_____

_____

_____

_____

_____

_____

TELWIN S.p.A. - Via della Tecnica, 3
36030 VILLAVERLA (Vicenza) Italy
Tel. +39 - 0445 - 858811
Fax +39 - 0445 - 858800 / 858801
E-mail: telwin@telwin.com http://www.telwin.com

CERTIFIED QUALITY SYSTEM
UNI EN ISO 9001:2000