cod. 988637

TECNICA 144-164

inverter

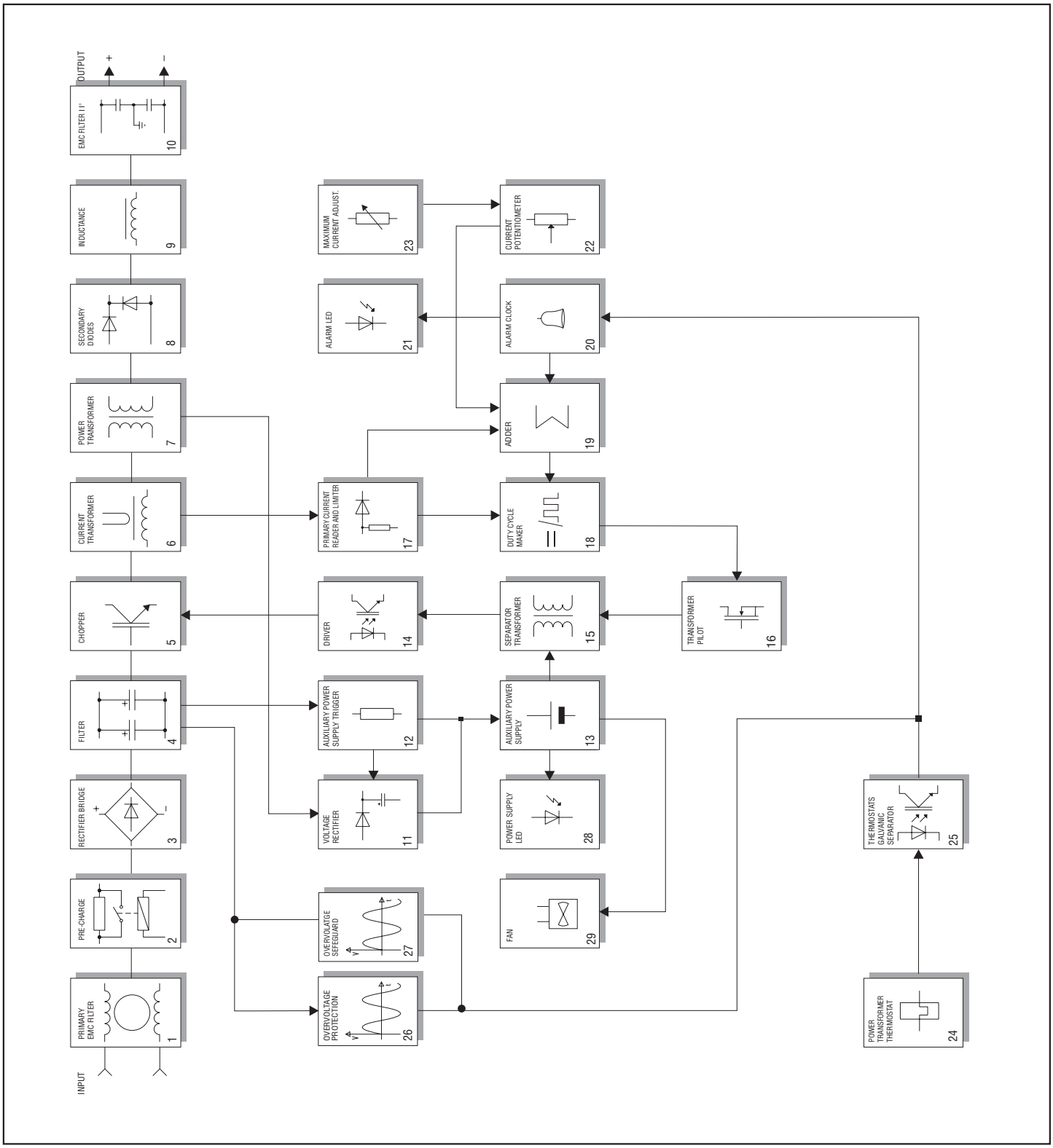
TROUBLESHOOTING AND REPAIR MANUAL

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, T4, C8, C15.
Prevents noise from the machine from being transmitted along the main power line and vice versa.

Block 2

Pre-charge

Consisting of: PD1, R4.
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 PD1 is de-energised, capacitors C21, C22, C27 are then charged by R4. When the capacitors are charged the relay is energised.

Block 3

Rectifier bridge

Consisting of: PD1.
Converts the mains alternating voltage into continuous pulsed voltage.

Block 4

Filter

Consisting of: C21, C22, C27.
Converts the pulsed voltage from the rectifier bridge into continuous voltage.

Block 5

Chopper

Consisting of: Q5, Q8.
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: T3.
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 diodes

Consisting of: D32, D33, D34 .
D34 converts the current circulating in the transformer to a single direction, preventing saturation of the nucleus.
D32, D33 recirculate the inductance output current (block 9) when the IGBT's are not conducting, bypassing the power transformer (block 7).

Block 9

Inductance

Consisting of: L1.
Levels the secondary board diodes' output current making it practically continuous.

Block 10

Secondary EMC Filter

Consisting of: C28, C33.
Prevents noise from the power source from being transmitted through the welding cables and vice versa.

Block 11

Voltage rectifier

Consisting of: D11,C18.
Rectifies and filters the voltage from the tertiary winding of the power transformer (block 7).

Block 12

Auxiliary power supply trigger

Consisting of: R18, R35, C20.
Via the resistors, the power source supplies the necessary voltage to power block 13 (power supply).

Block 13

Auxiliary power supply

Consisting of: U3, C17.
Stabilises the voltage at 12Vdc for the power arriving from block 12 (auxiliary power supply trigger) and from block 11 (voltage rectifier).

Block 14

Driver

Consisting of: Q6, D19, D23, Q7, D27, D26
Picks up the signal arriving from block 15 (separator transformer) and under the control of block 17 (transformer pilot) adjusts it to suit piloting of block 5 (chopper).

Block 15

Separator transformer

Consisting of: T1.
Supplies two signals, which are separated galvanically from one another, that will be sent to power block 14 (driver).

Block 16

Transformer Pilot

Consisting of: Q4, D20, D22, D24.
Amplifies the signal arriving from block 18 (duty cycle maker), needed to pilot block 15 (separator transformer).

Block 17

Primary current reader and limiter

Consisting of: D2, R25.
Reads the signal from block 6 (current transformer) and scales it down so it can be processed and compared in blocks 18 and 19.

Block 18

Duty cycle maker

Consisting of: U1.
Processes the information from block 19 (adder) and block 17 (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 19

Adder

Consisting of: U2C.

Gathers all the information from block 17 (primary current reader and limiter), from block 20 (alarms) and from block 22 (current potentiometer), and produces a signal with a suitable voltage for processing by block 18 (duty cycle maker).

Block 20

Alarm Block

Consisting of: Q3, R43, R44, R38, R36

When an alarm is detected the power source output current is drastically reduced by making direct adjustments to block 18 (duty cycle maker) and directly changing the reference signal obtained from block 22 (current potentiometer).

Block 21

Alarm LED

Consisting of: D12.

It is switched on by block 20 (alarms) in the event of:

1) Triggering of thermostatic capsule/thermostat on power transformer.
2) Triggering due to undervoltage.
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 22

Current potentiometer

Consisting of: R23.

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 23

Maximum current adjustment

Consisting of: JP1, JP2, JP3.

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

Block 24

Power transformer thermostat

Consisting of: ST1.

When the temperature of the power transformer is too high, this safeguard is triggered. It is reset automatically after the alarm condition has ceased.

Block 25

Galvanic separation

Consisting of: ISO1.

The signal arriving from blocks 24 (power transformer thermostat) is separated galvanically and sent to block 20 (alarms) for detection of a possible alarm event.

Block 26

Overvoltage safeguard

Consisting of: R1, R5, R14, R19, R24, R29, U2A.

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 27

Undervoltage safeguard

Consisting of: R39, R64, U2B .

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 28

Power supply LED

Consisting of: D10.

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

Block 29

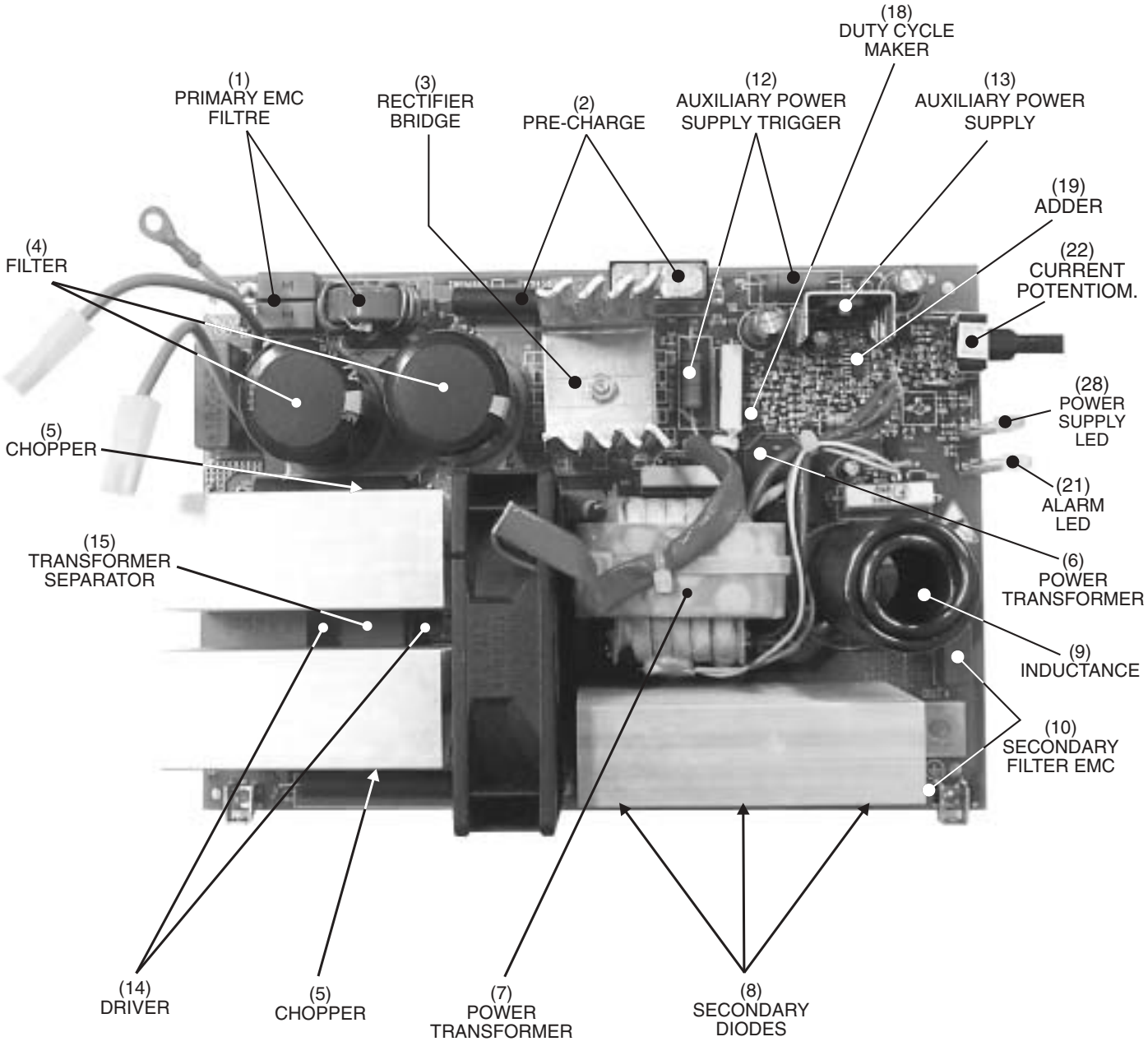
Fan

Consisting of: V1.

Powered directly by block 13 (flyback transformer) and cools the power components.

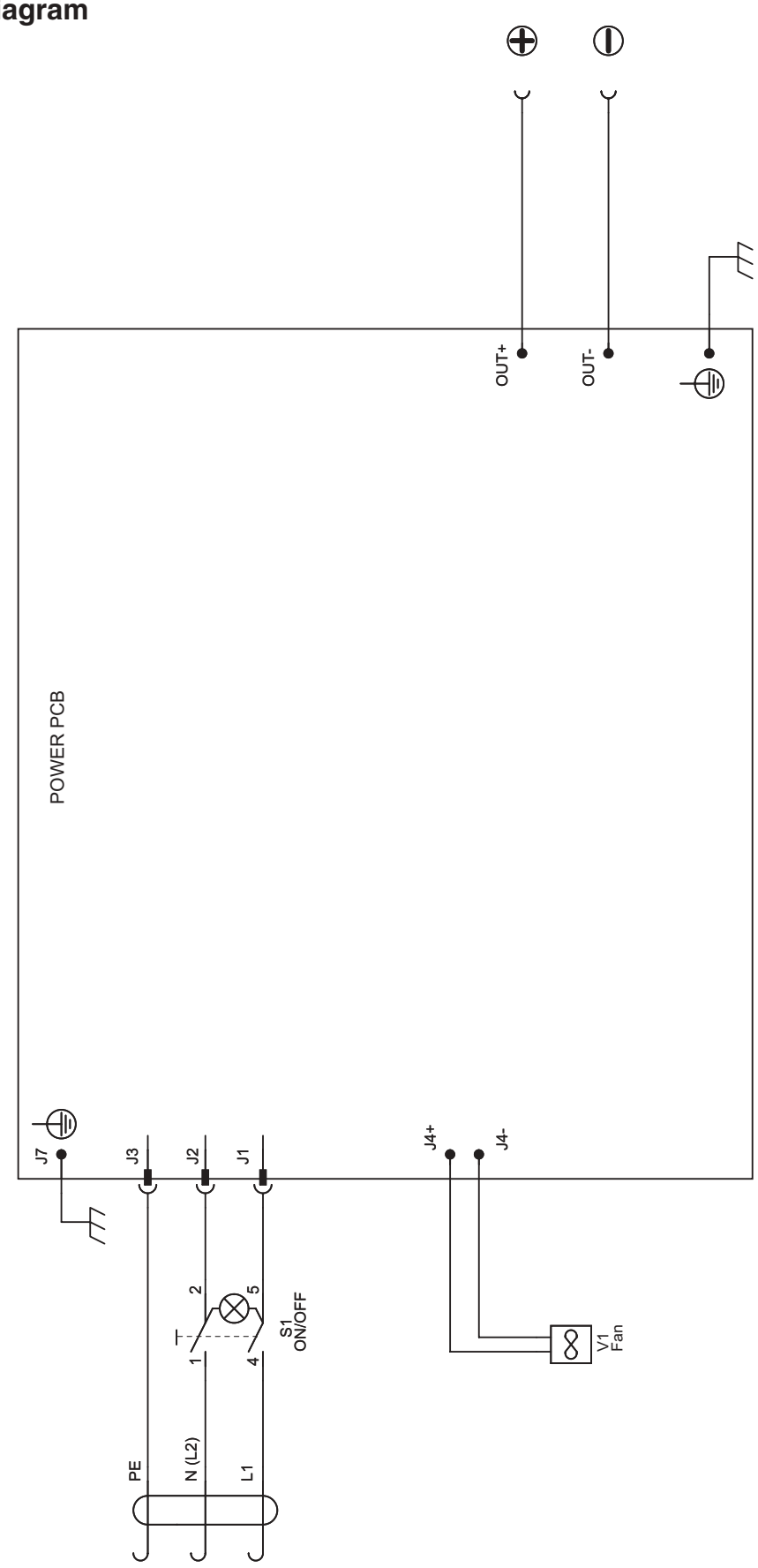
ILLUSTRATIONS

Power boad

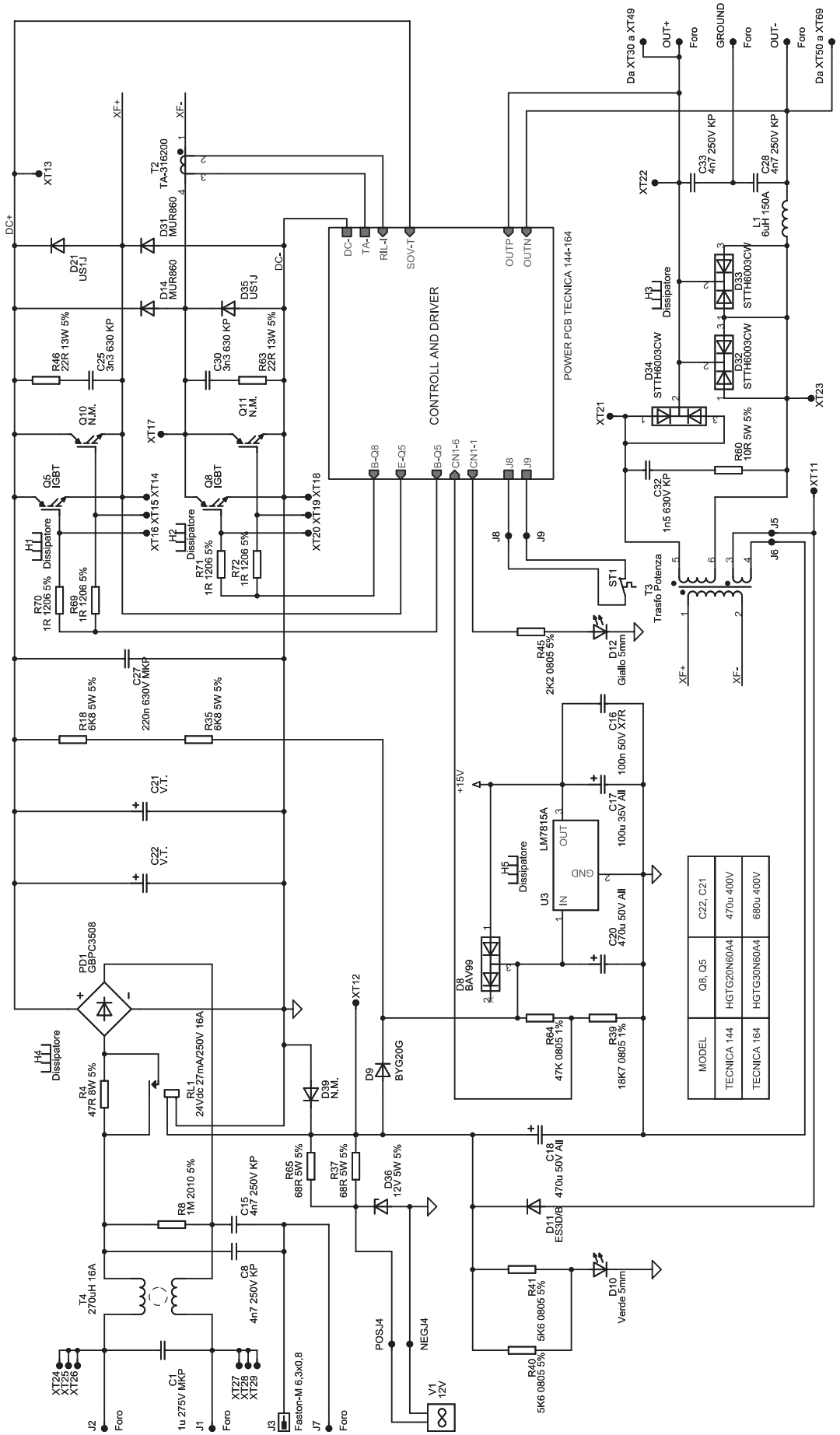


WIRING DIAGRAMS

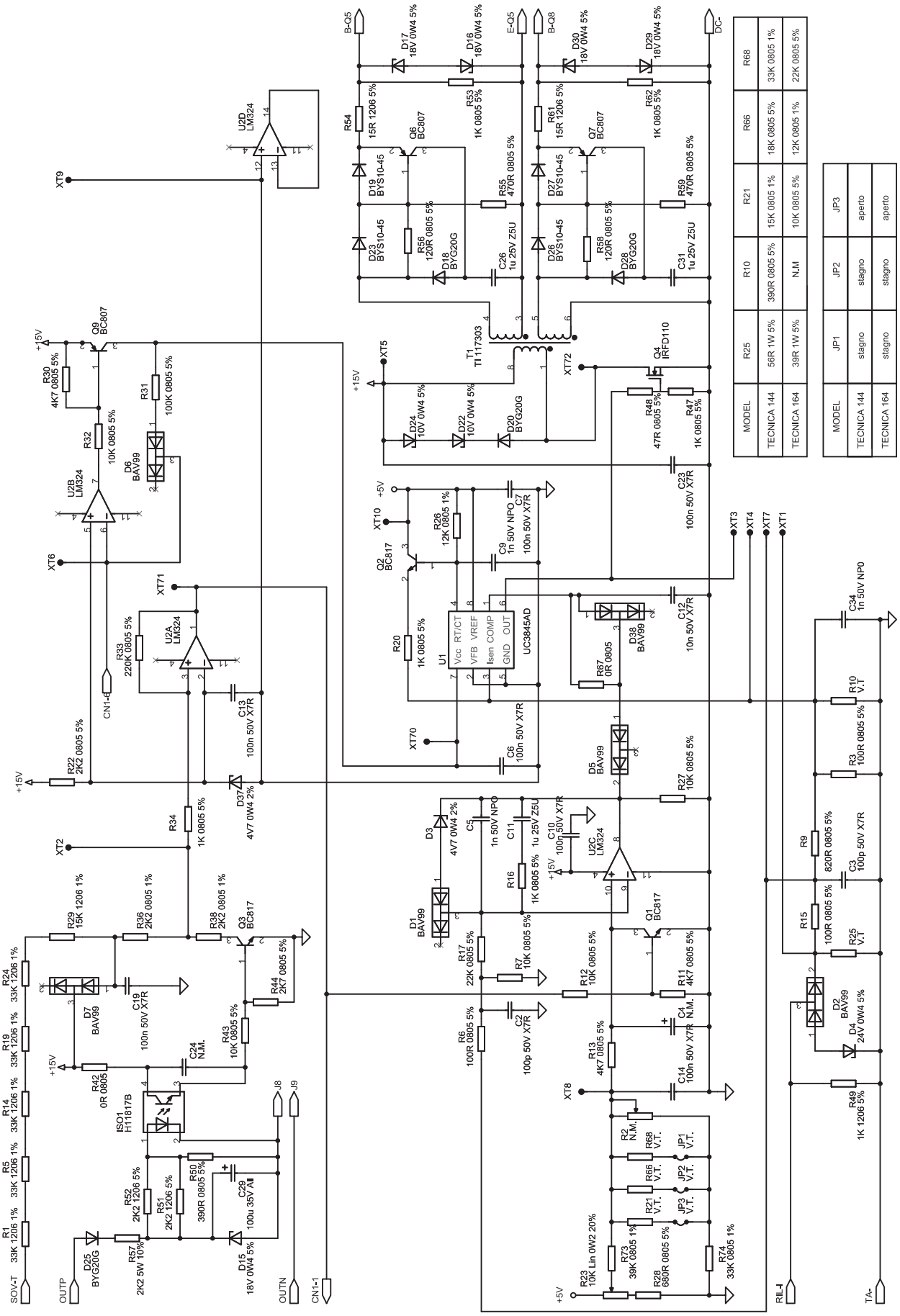
General wiring diagram



Wiring diagram power board – power supply



Wiring diagram power board – driver / control

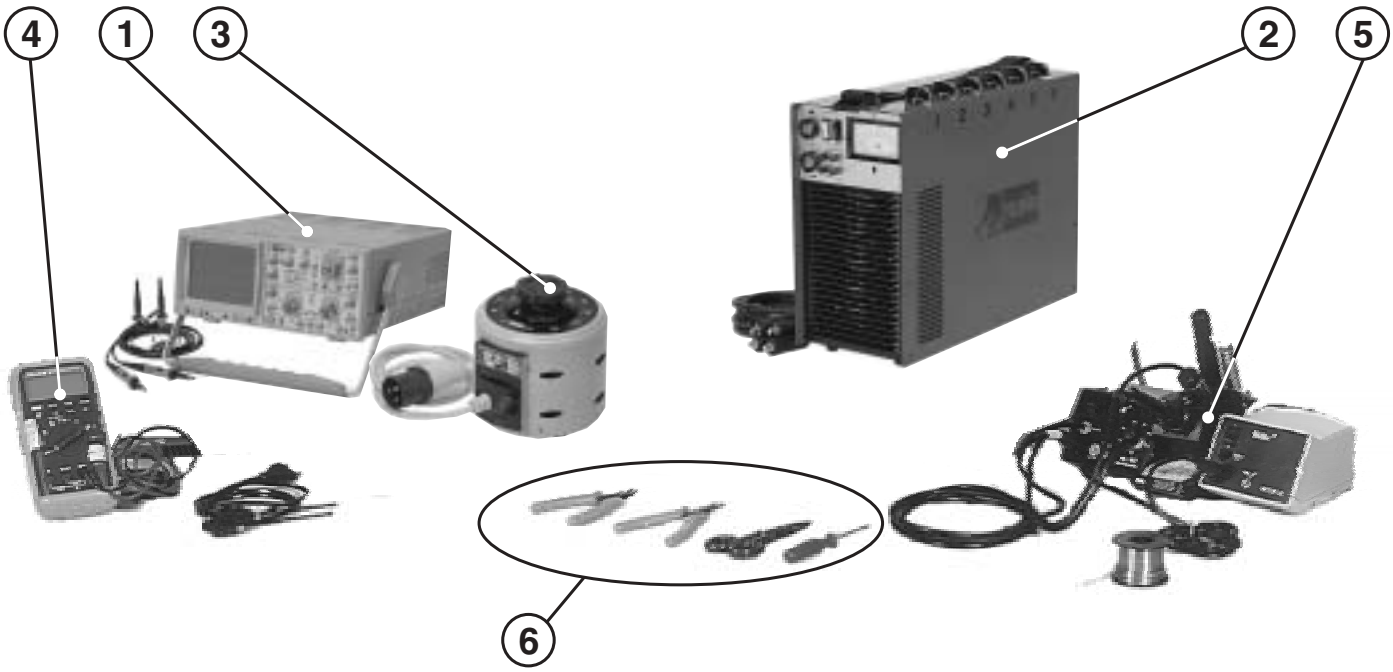


MODEL	R25	R10	R21	R66	R68
TECNICA 144	56R 1W 5%	390R 0805 5%	15K 0805 1%	18K 0805 5%	33K 0805 1%
TECNICA 164	39R 1W 5%	N.M	10K 0805 5%	12K 0805 1%	22K 0805 5%

MODEL	JP1	JP2	JP3
TECNICA 144	stagno	stagno	aperto
TECNICA 164	stagno	stagno	aperto

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**);

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's Q5, Q8;
- rheofores of recirculating diodes D14, D31;
- rheofores of secondary power diodes D32, D33, D34;
- thermostat ST1 on power transformer;
- 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 R23 (fig. 3)

Probable cause:

- mechanical shock.

Relay RL1 (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 C21,C22 (fig. 3)

Probable cause:

- 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 Q5, Q8 (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.

Primary diodes D14, D31(fig. 4)

Probable cause:
- excessive overheating related to faulty operation.

Secondary diodes D33, D34 (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 inductance (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.

1.0 Checking the power and signal wiring

It is important to make sure that all the connections are in good condition and that 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 on diode testing check the following components (joint voltages not less than 0.2V):
- rectifier bridge PD1 (**fig. 3**)
- IGBT's Q5, Q8 (no short circuits between collector-gate and collector-emitter (**fig. 4**));
- secondary diodes D32, D33, D34 between anode and cathode (**fig. 4**). The secondary diodes can be tested without removing the power board: with a prod on the secondary diode dissipator and the other in sequence on the 2 power transformer OUT terminals;

B) With the multimeter in ohm mode check the following components:
- resistor R4: 47ohm (preload **fig. 3**);
- resistors R46, R63: 22ohm (primary snubber **fig. 3**);
- resistor R60: 10ohm (secondary snubber **fig. 3**);
- continuity test for the thermostat on the power transformer: clean the resin from the bump contacts for ST1(J8,J9) and measure the resistance over these two bump contacts, it should be approx O ohm. (**fig. 2B**).

6.0 Electrical measurements with the machine in operation

WARNING! Before proceeding with faultfinding, 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 the operation of the power and control parts of the power source.

6.1 Preparation for testing

A) Set up the oscilloscope with the voltage probe x100 connected between pin 3 of Q4 and the earth on the case of U3 (**fig. 3**).

B) Set up the multimeter in DC mode and connect the prods to the OUT+ and OUT- bump contacts.

C) Position the potentiometer R23 on maximum (turn clockwise as far as it will go).

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

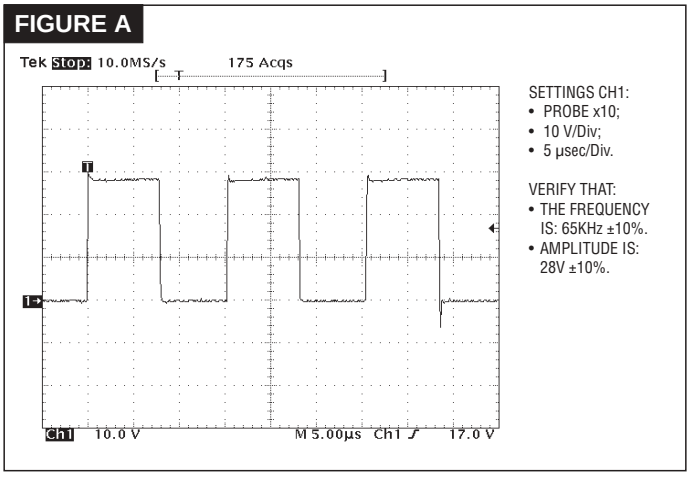
6.2 Tests for the TECNICA 111

A) Switch on the variac (initially set to the value 0 V), switch off the main switch on the power source and increase the variac voltage gradually to 230 Vac and make sure:
- the green power supply LED D10 lights up (**fig. 3**),
- the fan for the power transformer starts up correctly,
- the pre-charge relay K1 commutes (**fig. 3**),
- for voltages close to the rated power supply value (230Vac ±15%) the power source is not in alarm status (yellow LED D12 off).

NB. if the power source stays in alarm status permanently, there could be a fault in the control board (in any case, proceed to make the other tests)

B) Make sure the waveform shown on the oscilloscope resembles **Fig. A**.

FIGURE A



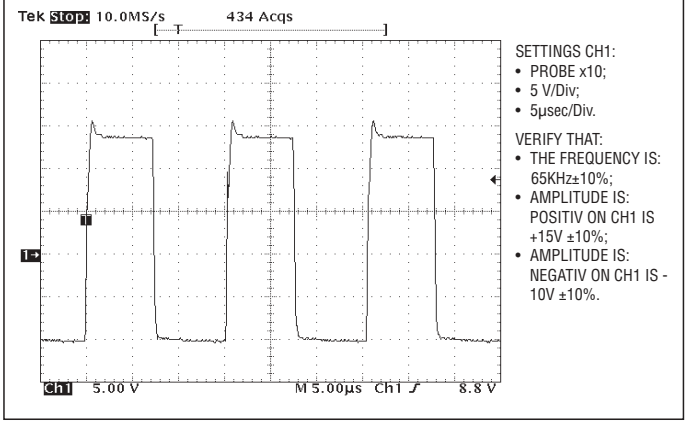
N.B. If this signal is absent it may be necessary to replace component Q4 (**fig. 3**).

C) Set up a multimeter in volt mode and make sure that **(fig. 3):**
- the voltage over Test Point XT5 and the case of U3 is equal to +15Vdc ±5%;
- the voltage over Test Point XT12 and the case of U3 is equal to +26Vdc ±5%;
- the voltage over Test Point XT10 and the case of U3 is equal to +5Vdc ±5%;
- the voltage over Test Point XT2 and the case of U3 is equal to +3.7Vdc ±5%;
- the voltage between the cathode of diode D36 and the case of U3 is equal to +12Vdc ±5%;

D) Set up the dual trace oscilloscope. Connect the probe CH1(x100) to the Q8 collector and probe CH2(x10) to the gate, also of Q8. The earth connections are both made to the emitter of Q8.

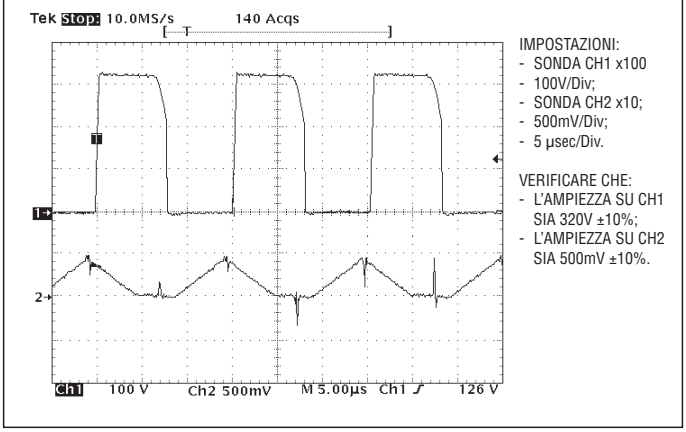
E) Make sure the waveform displayed on the oscilloscope resembles **fig. B.**

FIGURE B



F) Repeat this test on Q5 as well using the differential probe.
N.B. if the signal is not present, there may be a fault in the IGBT driver circuit (**fig. 4**).
G) Set up the dual trace oscilloscope. Connect probe CH1 (x100) to the collector of Q8 and probe CH2 (x10) on Test Point XT5. The earth terminals are connected together to the emitter of Q1.
H) Make sure the waveform displayed on the oscilloscope resembles **fig. C** and that the output voltage over OUT+ and OUT- is equal to +75Vdc±10%.

FIGURE C



I) Switch the power source on again and make sure that, following the brief start up time, the machine is not in alarm status (the yellow alarm LED D12 is off, **fig. 3**). **N.B.** If the machine remains in alarm status (and this is not due to a fault in the control) there could be a fault in the photocoupler ISO1 (**fig. 3**).

6.3 Scheduled tests for the TECNICA 164
WARNING! In this case the tests are the exactly the same as those for the Tecnica 144 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) Please read the procedure for replacing the IGBT's carefully: (fig. 4).
The 2 IGBT's are attached to 2 different dissipators and whenever a replacement is required, both IGBT's should be replaced.
- undo the screws attaching the dissipator to the board to replace IGBT (**fig. 2B**);
- undo the screws attaching the dissipator to the board to replace IGBT(**fig. 2B**);
- remove the 2 IGBT's Q5,Q8 and the 2 diodes D14, D31 by unsoldering the rheofores and then clean the solder from the printed circuit bump contacts;
- remove the 2 dissipators from the board;
- undo the screws locking the 2 IGBT's.

Before making the replacement make sure the components piloting the IGBT's are not also damaged:
- with the multimeter set in **ohm** mode make sure there is no short circuit on the PCB between the 1st and 3rd bump contacts (between gate and emitter) corresponding to each component;
- alternatively, resistors R54 and R61 could have burst and/or diodes D16, D17, D29 and D30 may be unable to function at the correct Zener voltage (this should have shown up in the preliminary tests);
- clean any irregularity or dirt from the dissipators. If the IGBT's have burst the dissipators may have been irreversibly damaged: in this case they should be replaced;
- apply thermo-conductive grease following the general instructions.
- Insert the new IGBT's between the dissipator and the spring, taking care not to damage the component during assembly (the spring should be inserted under pressure on the dissipator so as to lock the component);
- place the dissipators with the new IGBT's and primary diodes D14 and D20 (**WARNING!** Make sure there is insulation between the case of diode D20 and the dissipator) in the PCB bump contacts, placing 4 spacers between the dissipator and the PCB (2 for each dissipator) and fasten them down with the screws (torque wrench setting for screws 1 Nm ±20%);
- solder the terminals taking care not to let the solder run along them;

- on the welding side cut away the protruding part of the rheofores and check they are not shorted (between the gate and emitter in particular).

B) Please read the procedure for replacing the secondary board diodes carefully (fig. 4):
The 3 SECONDARY DIODES are attached to the same dissipator, and when a replacement is required, all of them should be replaced:
- undo the screws attaching the dissipator to the board, to replace diodes D32, D33 and D34;
- remove the 3 secondary diodes unsoldering the rheofores and cleaning any solder from the bump contacts on the board;
- remove the dissipator from the board;
- remove the spring locking the 2 diodes;
- clean any irregularity or dirt from the dissipator. If the diodes have burst the dissipator may have been irreversibly damaged: in this case it should be replaced;
- apply thermo-conductive grease following the general instructions;
- insert the new diodes between the dissipator and the spring, taking care not to damage the component during assembly (the screw should be inserted under pressure on the dissipator so as to lock the component);
- place the dissipator with the new components in the PCB bump contacts and fasten them down with the screws (torque wrench setting for screws 1 Nm ±20%);
- solder the terminals taking care not to let the solder run along them;
- on the soldering side cut away the protruding part of the rheofores and check they are not shorted (between cathode and anode);

N.B. make sure resistor R60 and capacitor C32 on the snubber have been soldered to the PCB correctly (**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.

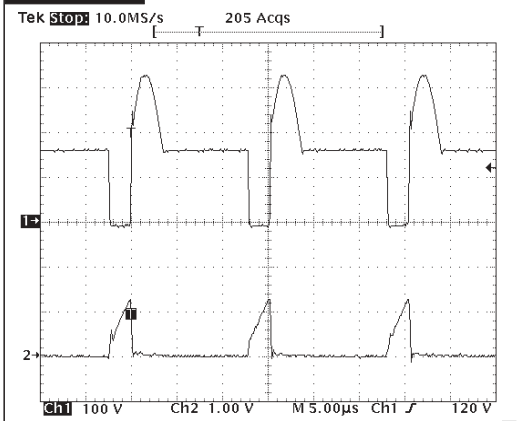
1.1 Preparation for testing.

A) Connect the power source to the static load generator using cables fitted with the appropriate dinse connectors (code 802110).
B) Set up the dual trace oscilloscope, connecting probe CH1 (x100) to the collector on Q8 and probe CH2 (x10) to pin 1 on TP (or the rheofore of R25 towards R2). The earth terminals are connected together to the emitter, also of Q8.
C) Set up the multimeter in DC mode and connect the prods to the OUT+ and OUT- bump contacts.
D) Connect the power supply cable to the 230Vac power supply.
WARNING! During tests the operator must avoid contact with the metal parts of the torch because of the presence of dangerous, high voltage.

1.2 Scheduled tests for the TECNICA 144

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 +16Adc ±20% and the output voltage is equal to +13Vdc ±20%.
- switch off the ohmic load.

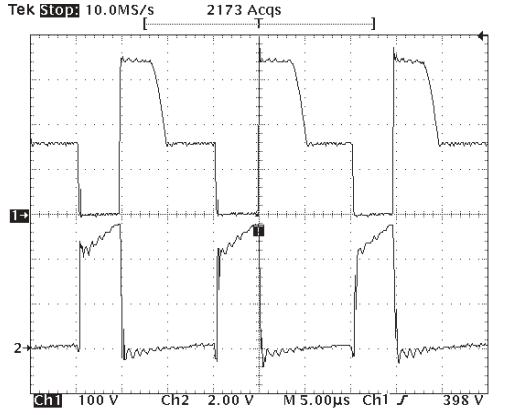
FIGURE D



1	2	3	4	5	6	number switch
1	2	0	0	0	0	position switch

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 75A (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 +75Adc ±10% and the output voltage is equal to +24Vdc ±10%.
  - switch off the ohmic load.

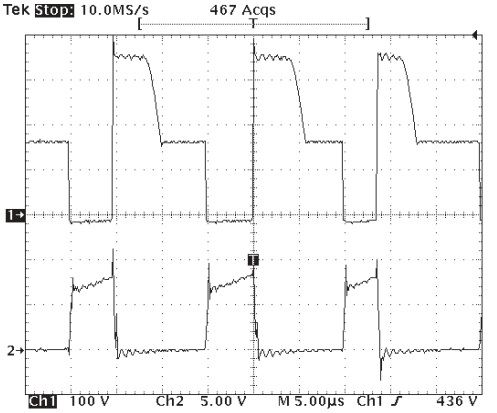
FIGURE E



1	2	3	4	5	6	number switch
2	2	2	2	2	0	position switch

C) Rated load test:
- set up the ohmic load 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);
- start up the ohmic load and make sure that:
  - the waveforms displayed on the oscilloscope resemble those in **fig. F**;
  - the output current is equal to +120Adc ±5% and the output voltage is equal to +24.8Vdc ±5%; if the output current reading is not 120A ±5%, adjust the current using jumpers JP1, JP2 and JP 3 (**fig. 7**).
- switch off the ohmic load.

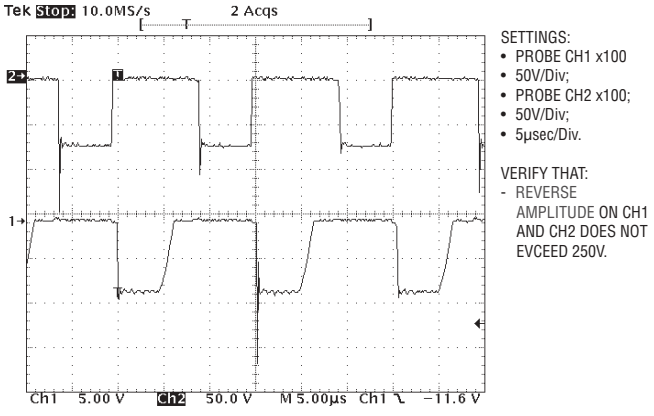
FIGURE F



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

D) Checking the secondary diode voltages:
- set up the dual trace oscilloscope, connecting probe CH1 (x100) to the anode of diode D33 and probe CH2 x100 to the anode of diode D34. The earth terminals should be 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**;
- 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. G**.
- switch off the ohmic load and switch off the main switch.

FIGURE G



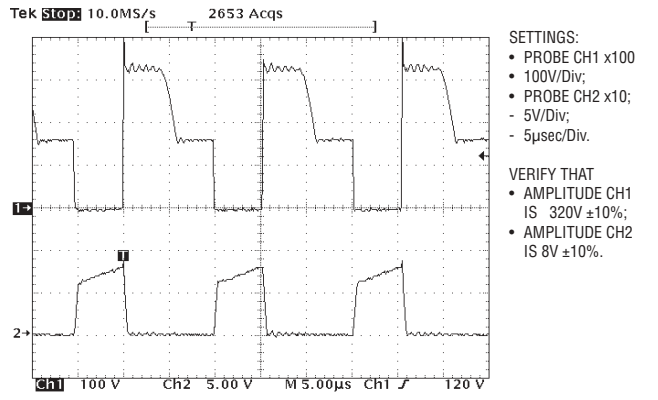
E) Running time test and closing the machine
Under the load conditions shown in **fig. F** and with the current adjustment potentiometer R23 on maximum, switch on the power source and leave it in operation until the thermostatic capsules trigger (machine in alarm). After making sure the internal wiring is positioned correctly assemble the machine once and for all.

F) Welding test
With the power source set up according to the instructions in the handbook make a test weld at 80A (electrode diameter 2.5 mm). Check the dynamic behaviour of the power source.

Scheduled tests for the TECNICA 164
In this case the tests are the exactly the same as those for the Tecnica 144 and can be carried out in the same way, with the exception of the rated load test (point 1.2 C).

A) Rated load test
- set up the ohmic load with the switch settings as in the table in **fig. H**;
- 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 that:
  - the waveforms displayed on the oscilloscope resemble those in **Fig. H**;
  - the output current is equal to +150Adc ±5% and the output voltage is equal to +26Vdc ±5%; if the output current reading is not 150A ±5%, adjust the current using jumpers JP1, JP2 and JP 3 (**fig. 5**).
- switch off the ohmic load.

FIGURE H



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

ILLUSTRATIONS

FIG. 1

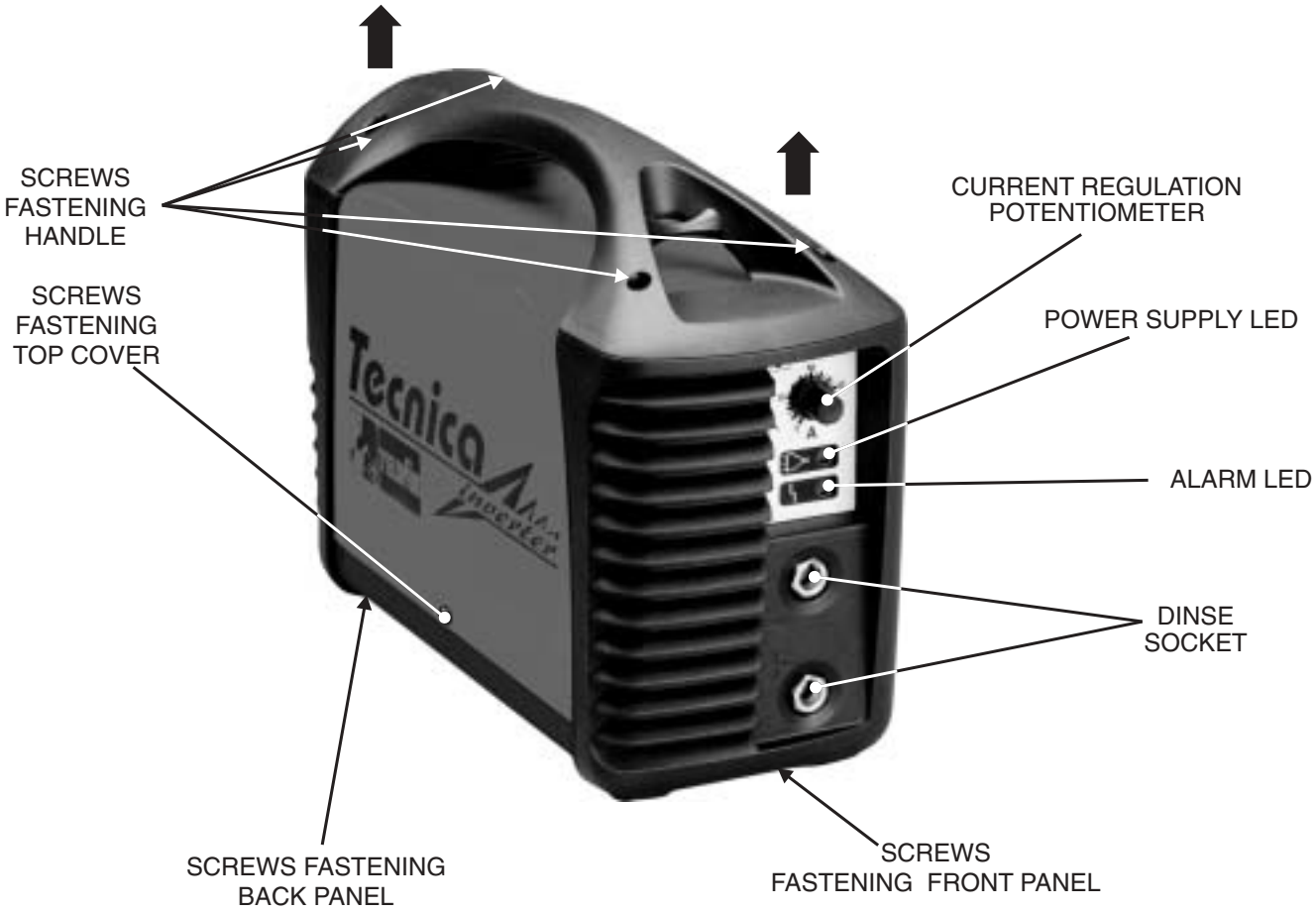


FIG. 2A

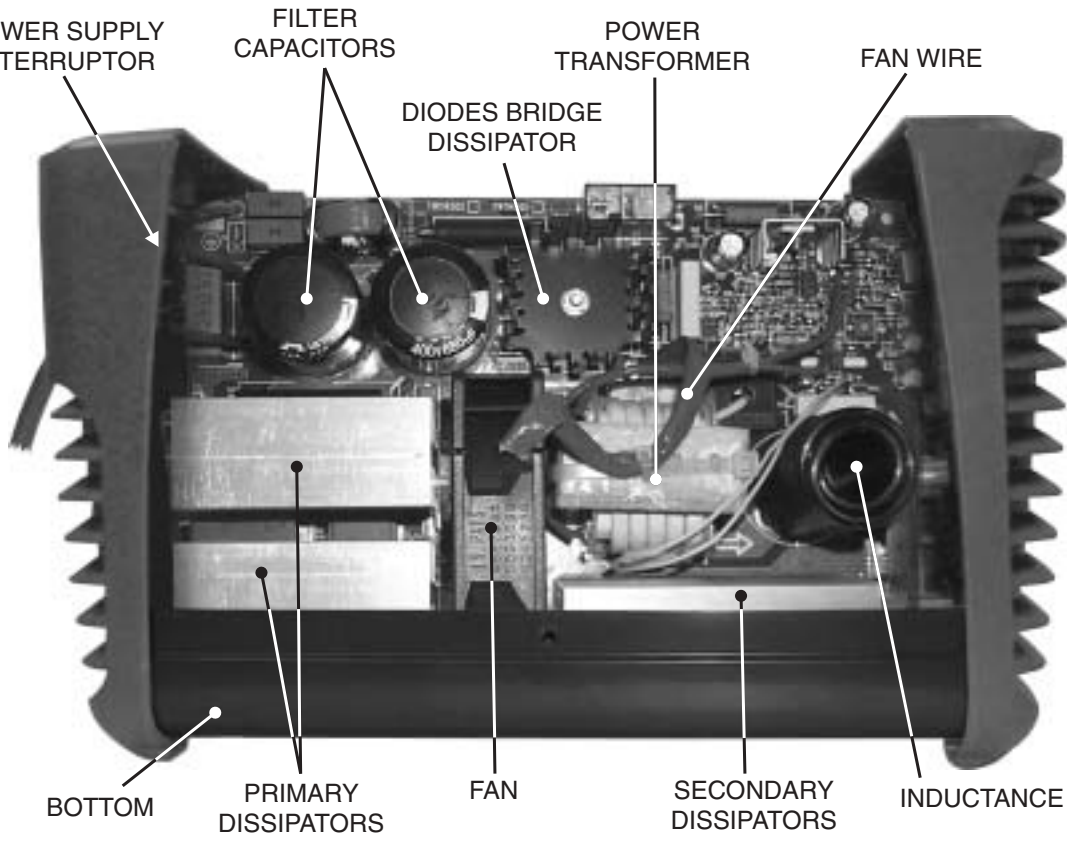

POWER SUPPLY INTERRUPTOR
FILTER CAPACITORS
POWER TRANSFORMER
FAN WIRE
DIODES BRIDGE DISSIPATOR
BOTTOM
PRIMARY DISSIPATORS
FAN
SECONDARY DISSIPATORS
INDUCTANCE

FIG. 2B

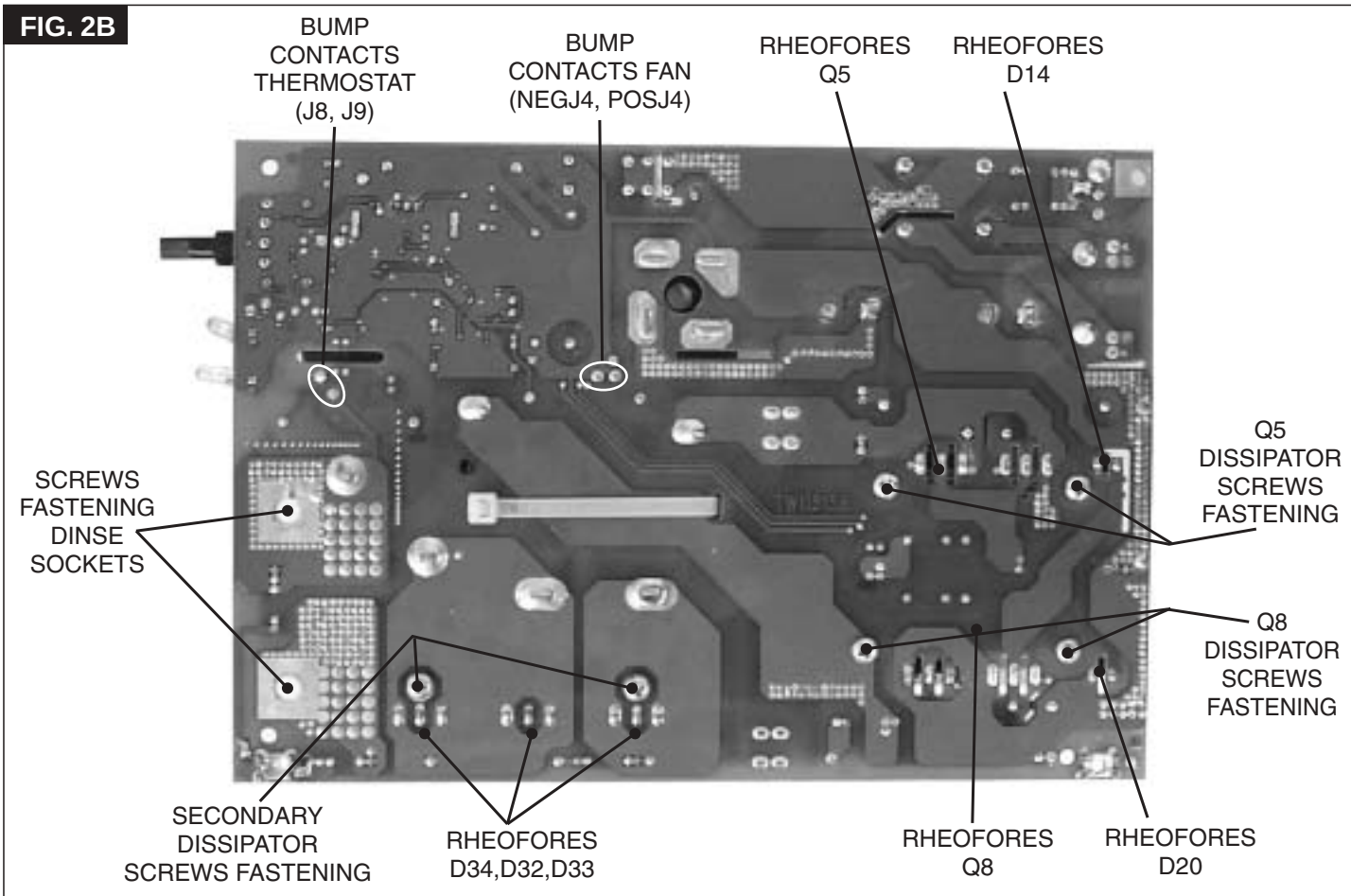

BUMP CONTACTS THERMOSTAT (J8, J9)
BUMP CONTACTS FAN (NEGJ4, POSJ4)
RHEOFORES Q5
RHEOFORES D14
SCREWS FASTENING DINSE SOCKETS
Q5 DISSIPATOR SCREWS FASTENING
Q8 DISSIPATOR SCREWS FASTENING
SECONDARY DISSIPATOR SCREWS FASTENING
RHEOFORES D34,D32,D33
RHEOFORES Q8
RHEOFORES D20

FIG. 3

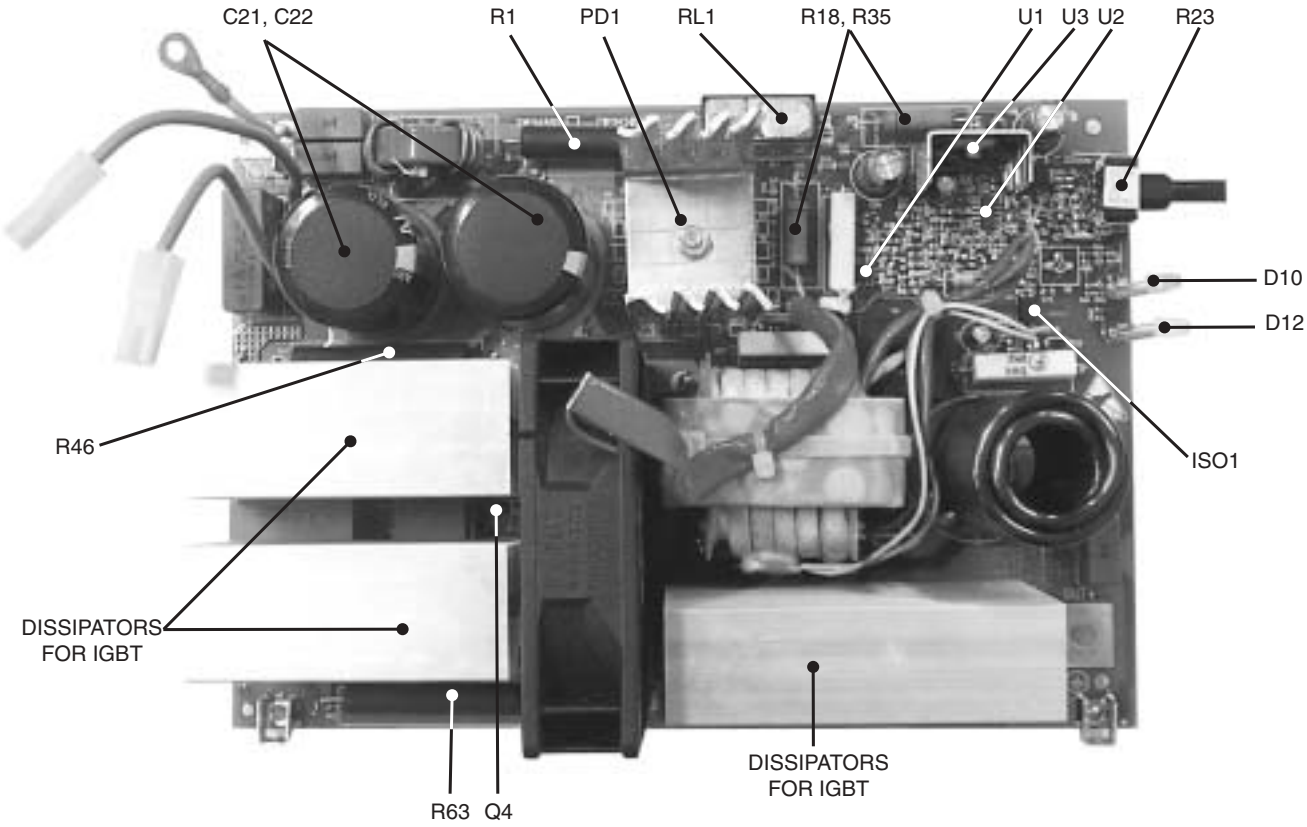
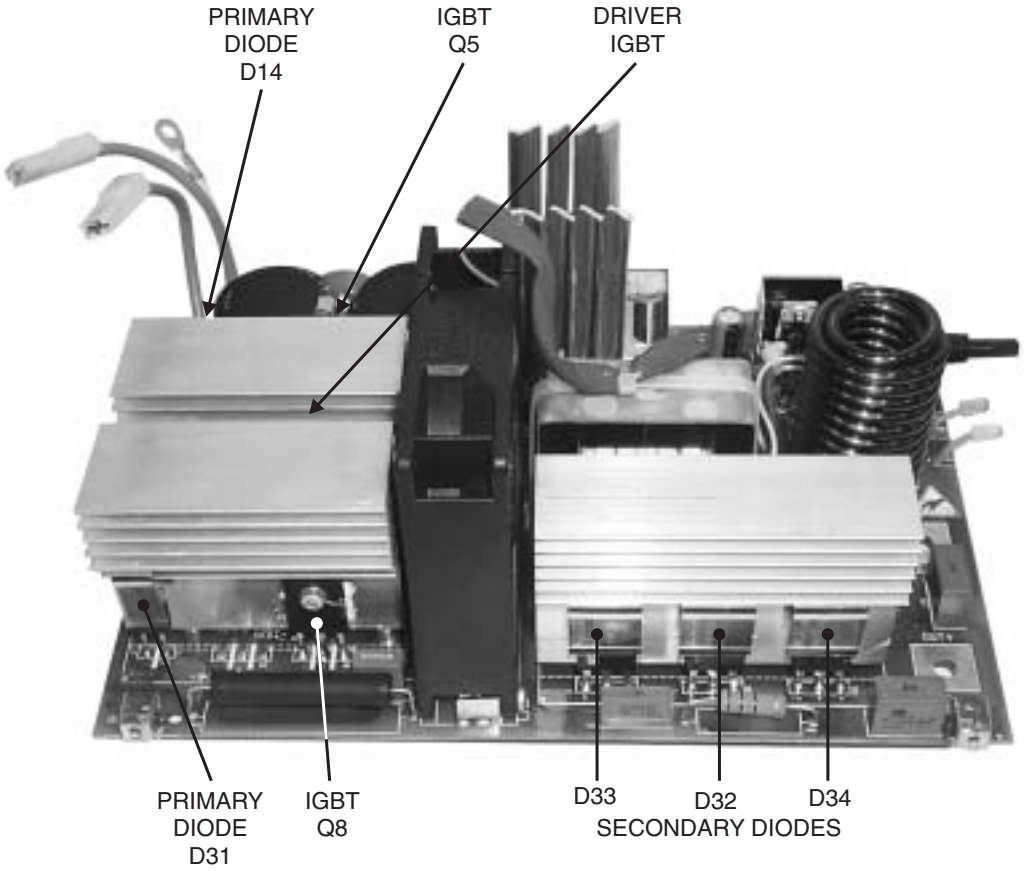
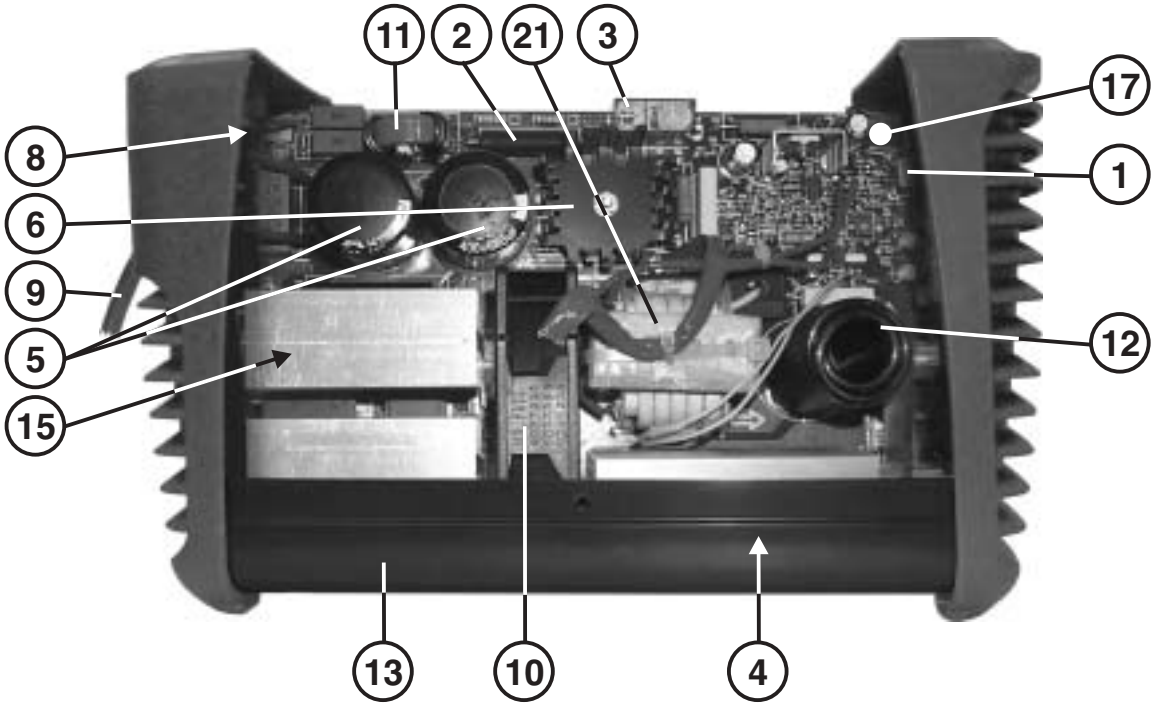

C21, C22
R1
PD1
RL1
R18, R35
U1
U3
U2
R23
D10
D12
R46
ISO1
DISSIPATORS
FOR IGBT
R63
Q4
DISSIPATORS
FOR IGBT

FIG. 4


PRIMARY
DIODE
D14
IGBT
Q5
DRIVER
IGBT
PRIMARY
DIODE
D31
IGBT
Q8
D33
D32
D34
SECONDARY 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	Resistenza Resistance Resistor Wiederstand Resistencia
3	Rele' Relais Relais Relais Relais
4	Diodo Diode Diode Diode Diodo
5	Condensatore Condensateur Capacitor Kondensator Condensador
6	Raddrizzatore Redresseur Rectifier Gleichrichter Rectificador
7	Manopola Potenziometro Poignee Pour Potentiometre Knob For Potentiometer Potentiometergriff Malja Por Resist.electr.variable
8	Interruttore Interrupteur Switch Schalter Interruptor

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
9	Cavo Alim. Cable Alim. Mains Cable Netzkabel Cable Alim.
10	Ventilatore Ventilateur Fan Ventilator Ventilador
11	Induttanza Filtro Inductance Filter Filter Inductance Filter Drossel Induccion Filtro
12	Induttanza Inductance Inductance Drossel Induccion
13	Fondo Chassis Bottom Bodenteil Fondo
14	Presa Dinse Prise Dix Dinse Socket Dinse Steckdose Enchufe Dinse
15	Kit Igbt + Diodo Kit Igbt + Diode Kit Igbt + Diode Kit Igbt + Diode Kit Igbt + Diodo
16	Kit Mantello Kit Capot Cover Kit Deckel Kit Kit Panel De Cobertura

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
17	Kit Scheda Completa Kit Platine Complete Kit Complete Pcb Kit Komplette Steurungskarte Kit Tarjeta Completa
18	Frontale Partie Frontal Front Panel Geraetefront Frontal
19	Retro Partie Arriere Back Panel Rueckseite Trasera
20	Maniglia Poignee Handle Handgriff Manija
21	Trasformatore potenza Transformateur Puissance Power Transformer Leistungstransformator Transformador De Potencia

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 :

_____

_____

_____

_____

_____

_____

_____

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CERTIFIED QUALITY SYSTEM
UNI EN ISO 9001:2000