cod. 988401

TECNICA 1400-1600

inverter

TROUBLESHOOTING AND REPAIR MANUAL

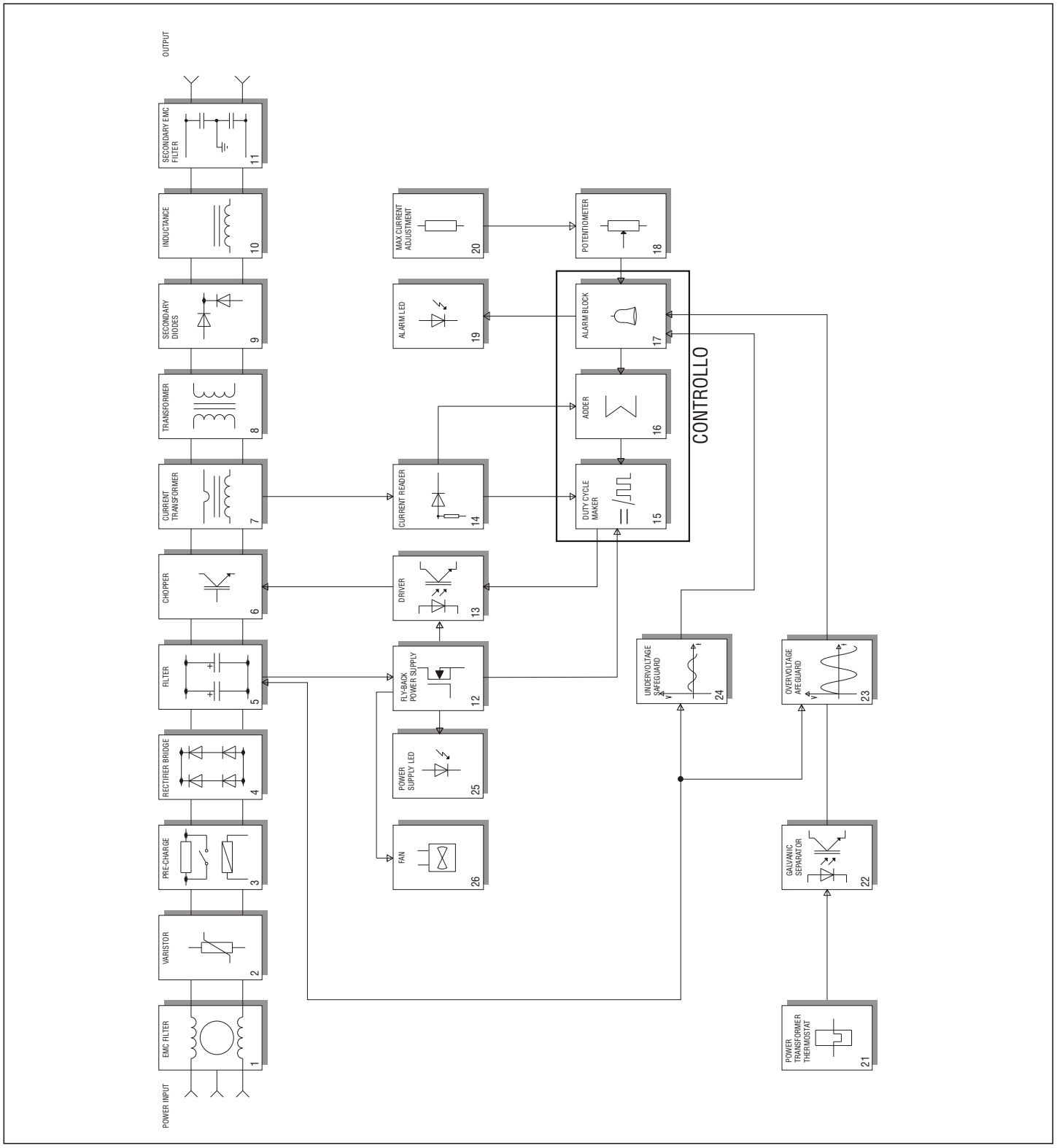
CONTENTS

31/05/02

"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 primary board.

Block 1

EMC Filter

Consisting of: C1, C5, C6, L1

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

Block 2

Varistor

Consisting of: RV1

Prevents spike noise from the mains, with amplitude greater than 400V, from entering the machine.

Block 3

Pre-charge

Consisting of: K1, R1

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 R1. When the capacitors are charged the relay is energised.

Block 4

Rectifier bridge

Consisting of: D1

Converts the mains alternating voltage into continuous pulsed voltage.

Block 5

Filter

Consisting of: C2, C3, C4

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

Block 6

Chopper

Consisting of: Q1, Q2

Converts the continuous voltage from the filter into a high frequency square wave (65 kHz approx.) capable of piloting the power transformer.

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

Block 7

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 14 (primary current reader).

Block 8

Power transformer

Consisting of: T3

Reduces the voltage converted by block 6 (chopper), adjusting voltage and current to values required for the welding procedure.

Also forms galvanic separation of primary from secondary (welding circuit from the power supply line).

Block 9

Secondary diodes

Consisting of: D21, D22, D23

D21 Eliminates the negative part of the secondary voltage.

D22,D23 Recirculate the inductance output current when the IGBT's are not conducting.

Block 10

Reactance

Consisting of: L2

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

Block 11

Secondary EMC Filter

Consisting of: C31, C32

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

Block 12

Flyback power supply

Consisting of: T1, U2, U1

Uses switching methods to transform and stabilise the voltage obtained from block 5 (filter) and supply 2 voltage values of 27V that enable block 13 (driver) to be powered correctly. It also generates a further stabilized voltage of 15V that is mainly used to power the control board.

Block 13

Driver

Consisting of: ISO2, ISO3

Takes the signal from block 12 (flyback power supply) and, controlled by block 15 (duty cycle maker), makes the signal suitable for piloting block 6 (chopper).

Block 14

Primary current reader

Consisting of: R20, R37, R38 and part of the control section.

Reads the signal from block 7 (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: U2 (control board) = UC 3845

Processes the information from block 16 (adder) and block 14 (primary current reader) 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 (control board)

Gathers all the information from block 14 (primary current reader), from block 17 (alarms) and from block 18 (potentiometer), and produces a signal with a suitable voltage for processing by block 15 (duty cycle maker).

Block 17

Alarm Block

Consisting of: U1A, U1C (control board)

When an alarm is detected the machine output current is drastically reduced by directly adjusting and changing the reference signal obtained from block 18 (potentiometer).

Block 18

Potentiometer

Consisting of: R7

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

Block 19

Yellow LED alarm light

Consisting of: D26 (yellow)

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

1) Triggering of thermostatic capsule on power transformer.
2) Triggering due to undervoltage.
3) Triggering due to overvoltage.
4) Short circuit at output (electrode holder and earth cable connected to each other or electrode stuck to piece being welded).

Block 20

Maximum current adjustment

Consisting of: R32, R33, R42

Used to adjust the maximum welding current supplied by the power source.

Block 21

Power transformer thermostat

Consisting of: ST1 thermostatic capsule.

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 22

Galvanic separator

Consisting of: ISO1

The signal from the thermostatic capsules is separated galvanically and sent to block 17 (alarms) for identification of possible alarm condition.

Block 23

Overvoltage safeguard

Consisting of: R3, R4 and part of the control section

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: R5, R6 and part of control board

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: D2

Shows that the machine is correctly powered and ready to weld.

On machines operating exclusively at 230V it is green.

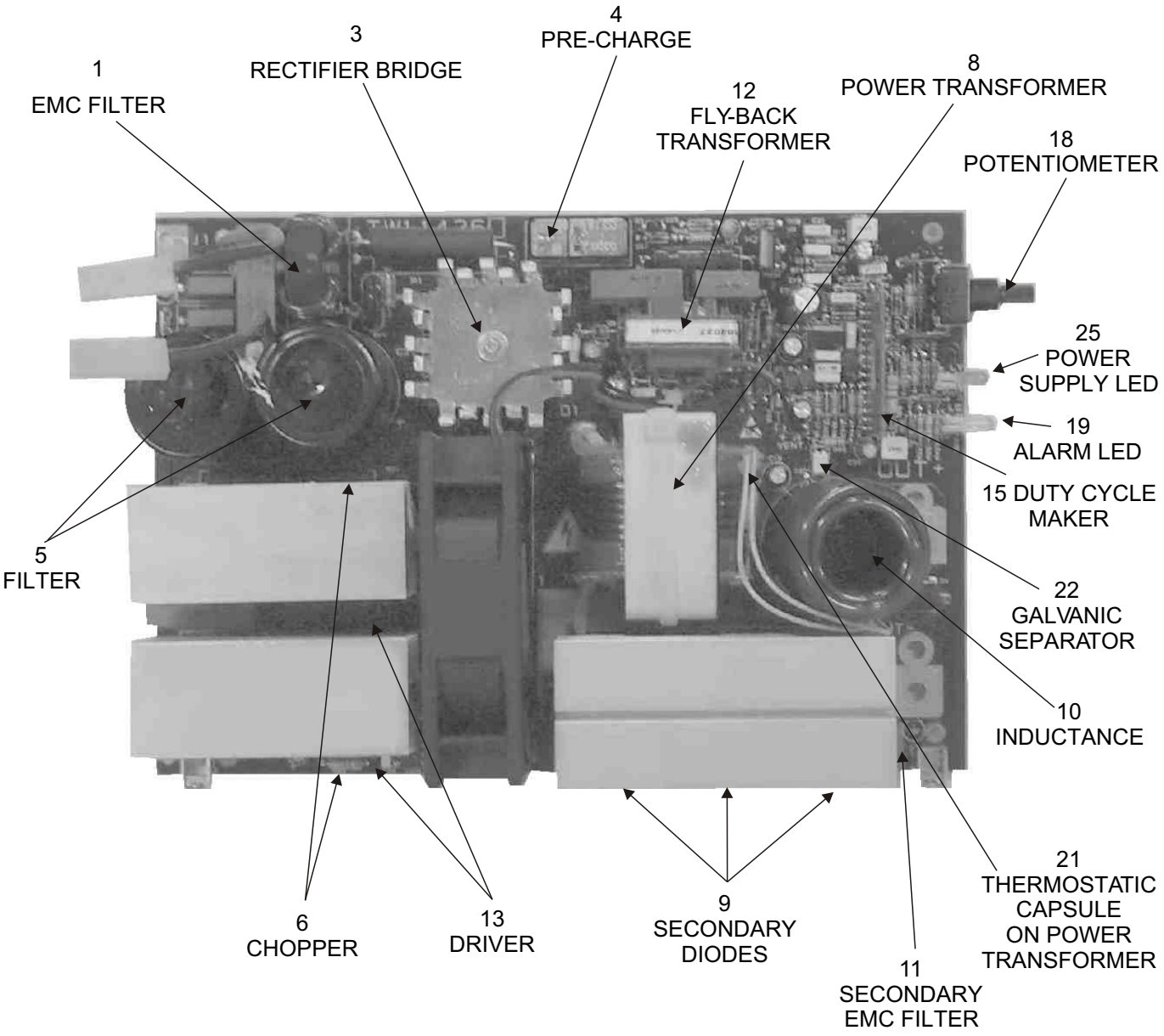
Block 26

Fan

Cools the power components. On machines operating exclusively at 230V it is powered directly by block 12 (at 12V).

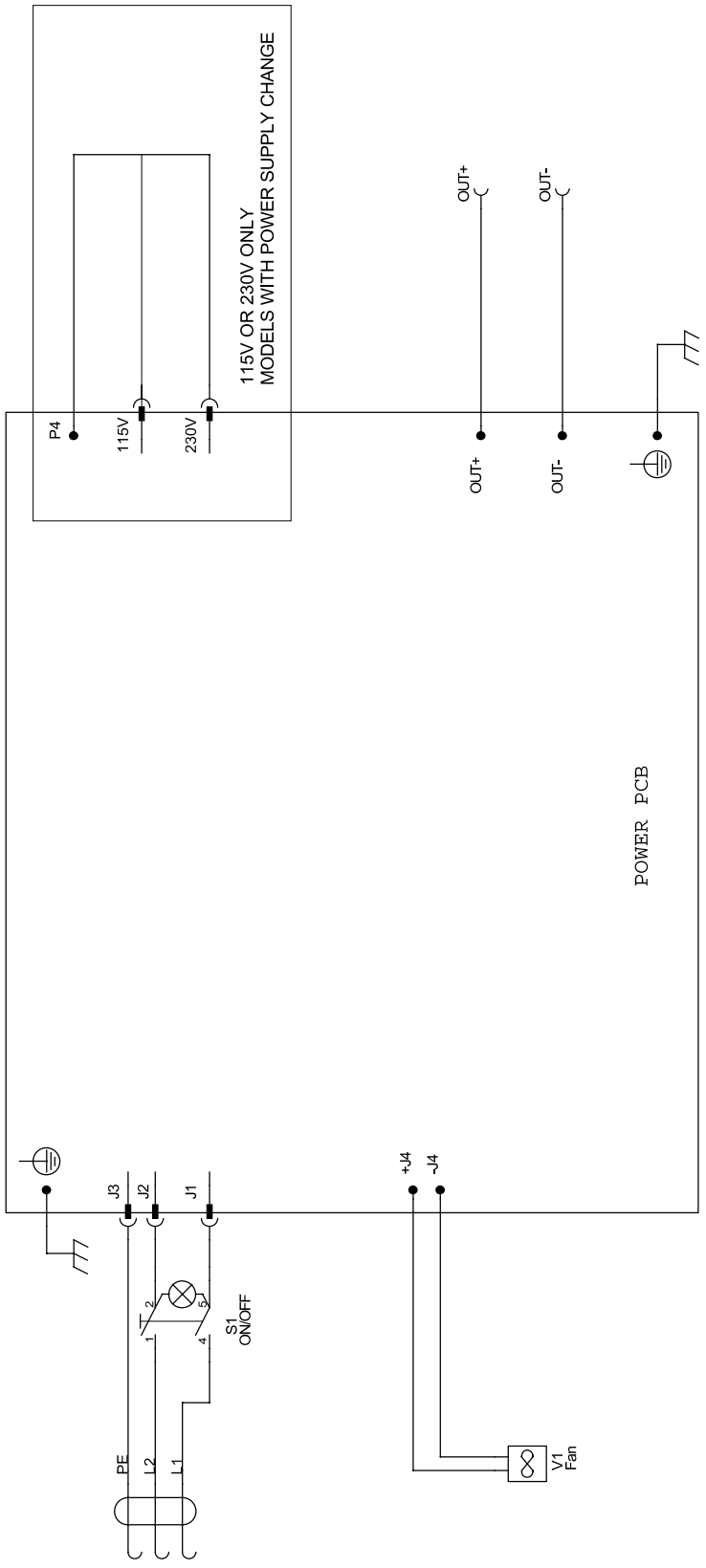
ILLUSTRATIONS

Power board

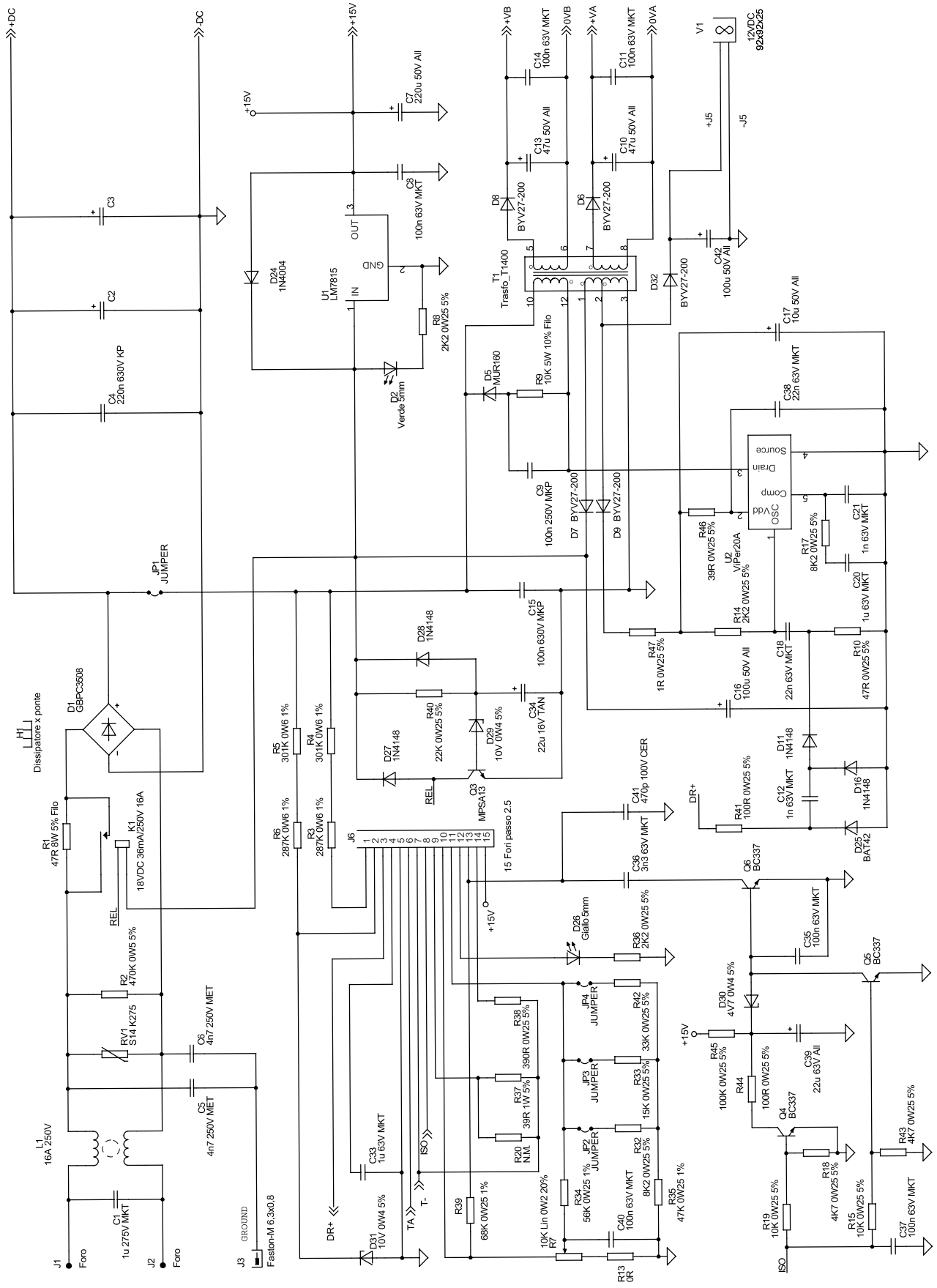


WIRING DIAGRAM

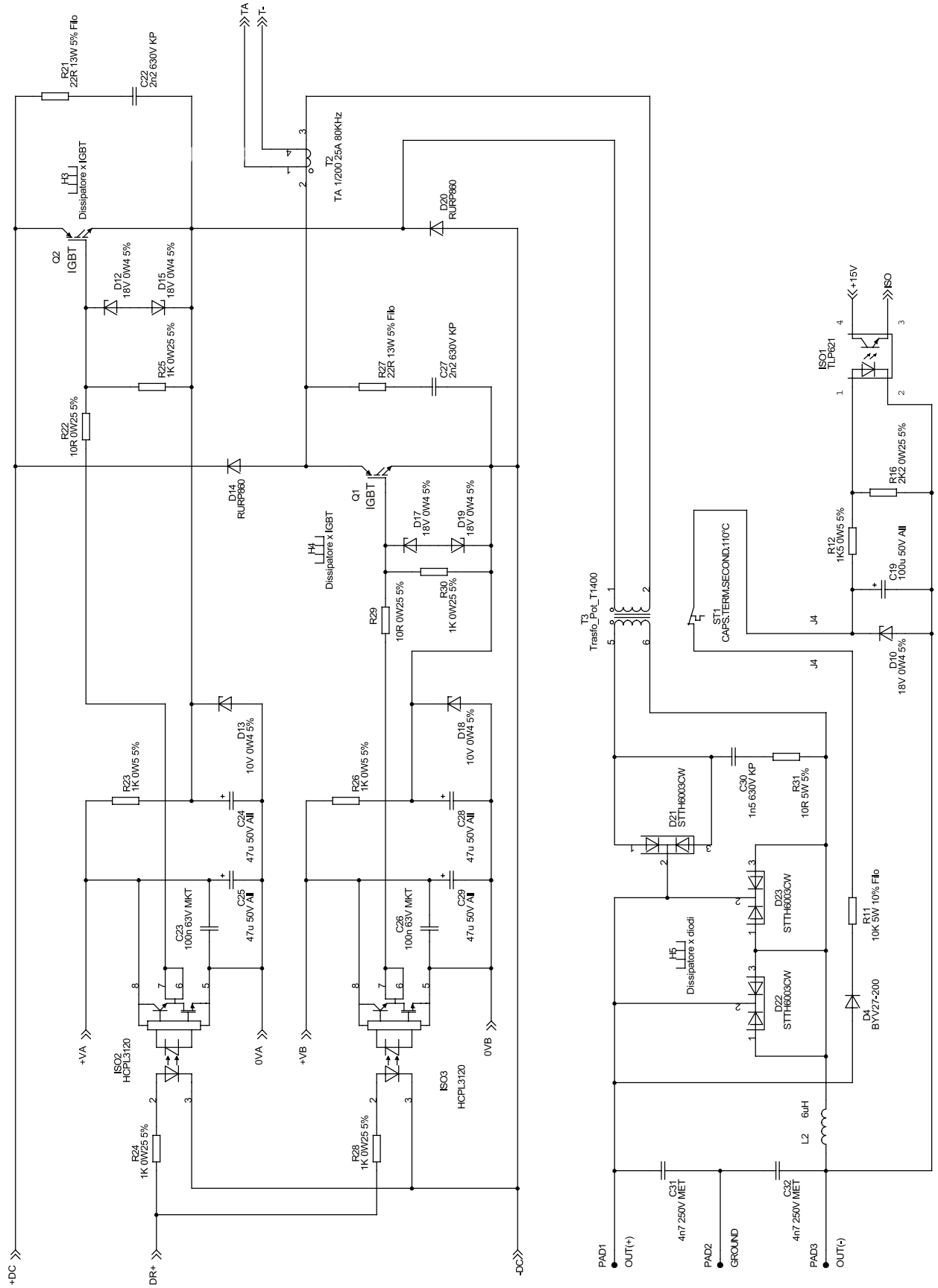
General wiring diagram – TECNICA 1400 – 1600



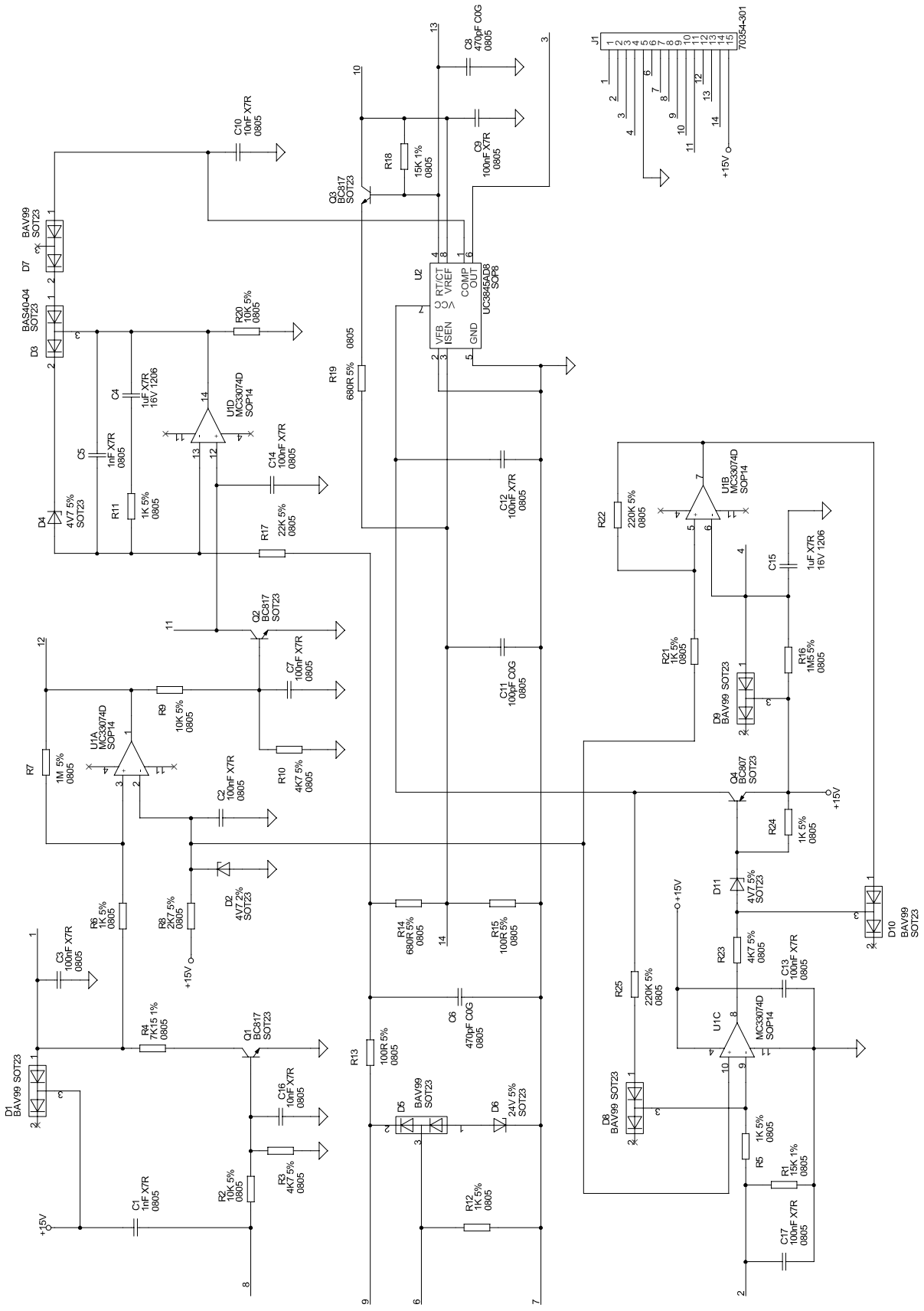
Wiring diagram for power – power supply/control board



Wiring diagram for power – power/driver board

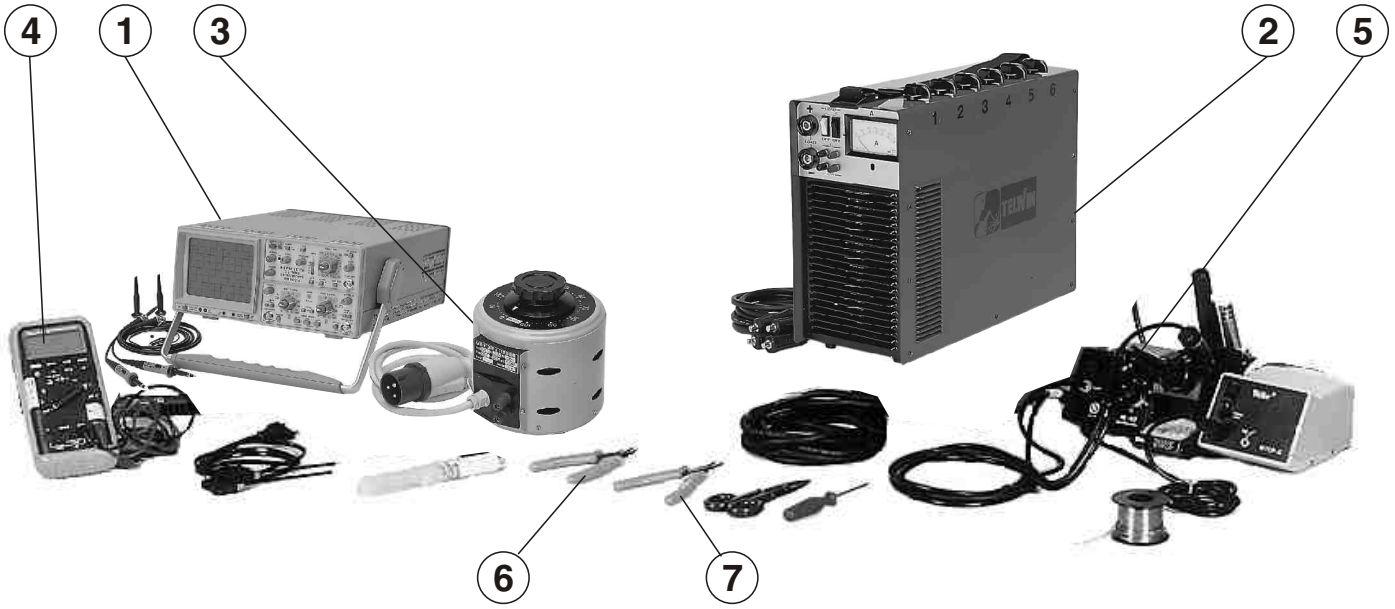


Wiring diagram for control board



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

MISCELLANEOUS

6 Cutting nippers
7 Flat jaw pincers

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

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.).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.
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.

NB. 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 semi-conductor 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) Disassembling the machine

Every operation should be carried out in complete safety with the power supply cable disconnected from the mains outlet.

A) Undo the 10 screws fastening the cover to the bottom:5 screws on each side (**figure 1**).

B) Slide out the cover upwards (**figure 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) Cleaning the inside of the machine

Using 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.
It is therefore important to take special care when cleaning the following parts

Fan (**figure 2A**): check whether dirt has damaged the correct rotation of the blades, if there is still damage after cleaning replace the fan.

Power board (**figure 2A e 2B**):

A) Rheofores of IGBT's Q1, Q2,
B) Rheofores of recirculating diodes D14, D20,
C) Rheofores of secondary power diodes D21,D22,D23,
D) Thermostatic capsule on power transformer (**figure 3**),
E) Photocoupler ISO1 (**figure 3**),
F) Control board (**figure 3**).

3) Visual examination 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.
Make a visual check of components listed below for signs of burning or breakage:

A) Main power supply switch (**figure 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).

B) Current potentiometer R7 (**figure 3**)
Probable cause: mechanical shock.

C) Varistor RV1 (**figure 3**)
Probable cause: machine connected to power supply voltage much higher than 230Vac (e.g.380 Vac).

D) Relay K1 (**figure 3**)
Probable cause: see main power supply switch

NB. If the relay contacts are stuck together, do not attempt to separate them and clean them, just replace the relay.

E) Electrolytic capacitors C2,C3 (**figure 3**)
Probable cause:
- mechanical shock,
- machine connected to power supply voltage much higher than 230Vac,
- broken rheophore on one or more capacitor: the remainder will be overstressed and become damaged by overheating,
- aging after a considerable number of working hours,
- overheating caused by thermostatic capsule failure.

F) IGBT's Q1, Q2 (**figure 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.

G) Primary diodes D14, D20 (**figure 4**)
Probable cause: excessive overheating related to faulty operation..

H) Secondary diodes D21, D22, D23 (**figure 4**) board removed from the machine)
Probable cause:
- discontinuation in snubber network,
- poorly functioning thermal contact between IGBT and dissipator (e.g. loosened attachment screws:check),
- faulty output connection

I) Power transformer and filter reactance (figure 2A).

4) Checking 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.
In particular, on the **power board** (**figure 2A**) it is necessary to check the power wiring:

A) The connection of the power supply cable to the fastons at the main switch and to the faston on the earth board (J3),
B) The connections from the board to the main switch (J1, J2),
In particular, on the **power board** (**figure 2B**) it is necessary to check the signal wiring :
A) The connections of the thermostatic capsule on the power transformer (J4),
B) The fan connections (J5+, J5-),

Other checks:
Make sure the connectors to the dinse sockets are attached correctly (**figure 2B**)

5) Electrical measurements with the machine switched off

With the digital multimeter set for **diode testing** check the following components (junction voltages not less than 0.2V):

A) Rectifier bridge D1 (**figure 3**).
B) IGBT's Q1, Q2 (absence of short circuits between collector-gate and between emitter-collector **figure 4**).
C) Secondary board diodes D21, D22, D23 between anode and cathode (**figure 4**).

NB. This can be done without removing the board: with one prod on the secondary board dissipator diodes and the other in sequence on the two power transformer outlets.

With the digital multimeter set on **ohms** check the following components:

A) Resistor R1: 47ohm 7W ±5% (pre-charge **figure 3**).
B) Resistors R21,R27: 22ohm 13W ±5% (primary snubber **figure 3**).
C) Resistor R31: 10ohm 5W ±5% (secondary snubber **figure 3**).
D) Thermostatic capsule continuity test on the power transformer: clean the paint from the bump contacts of J4 and measure the resistance between the two bump contacts, it should be approx. 0 ohm (**figure 2B**).

6) Electrical measurements with the machine in operation

The tests described below can be used to check the operation of the power and control parts of the machine

Preparation for testing.

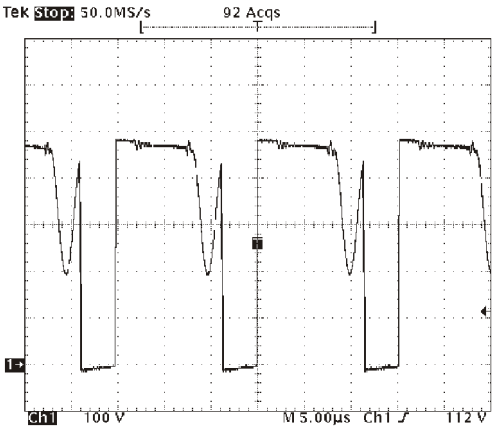
A) Set up the oscilloscope with voltage probe x100 connected between pin 3 of U2 (probe) and the case of U1 (ground) on the power board (**figure 3**).
B) Position the potentiometer R7 on maximum (turn clockwise as far as it will go).
C) Connect the machine plug to a single-phase variac with variable output 0-300 Vac.

Tests for theTECNICA 1400

A) Switch on the variac (initially set to the value 0 V), switch off the main switch on the machine, increase the variac voltage gradually to 230 Vac and make sure:
- the pre-charge relay K1 commutes (**figure 3**),
- the green power supply LED D2 lights up (**figure 3**),
- the fan starts up correctly,for voltages close to the rated power supply value (230Vac ±15%) the machine is not in alarm status (yellow LED D26 off). **NB.** If the machine stays in alarm status permanently, there could be a fault in the control board (in any case, proceed to make the other tests as in **figure 3**)

B) Use the oscilloscope to make sure that the voltage waveform between pin 3 of U2 and the ground resembles that in **figure A**.

FIGURE A



Amplitude tolerance: ±10%
Frequency: 65KHz ± 10%

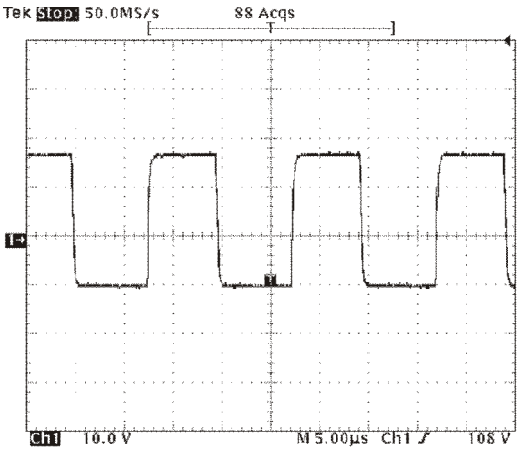
NB. If no signal is present, it may be necessary to replace the integrated circuit U2 (**figure 3**).

C) With the digital multimeter set on **volts** place the negative prod on the ground of U1 and check the following points with the positive prod:
- make sure that the voltage between pin 1 of U1 and the

ground is equal to +18V ±1V (**figure 3**).
- make sure that the voltage between pin 3 of U1 and the ground is equal to +15V ±0.5V (**figure 3**).
- make sure that the voltage between pin 2 of U2 and the ground is equal to +13V ±1V (**figure 3)**.
- make sure that the voltage between pad J5 and the ground is equal to +13V ±1V (**figure 3)**.

D) Set up the oscilloscope with the probe x100 connected between the collector (probe) and emitter (ground) of IGBT Q1.
Make sure the displayed waveform resembles that in **figure B**.

FIGURE B

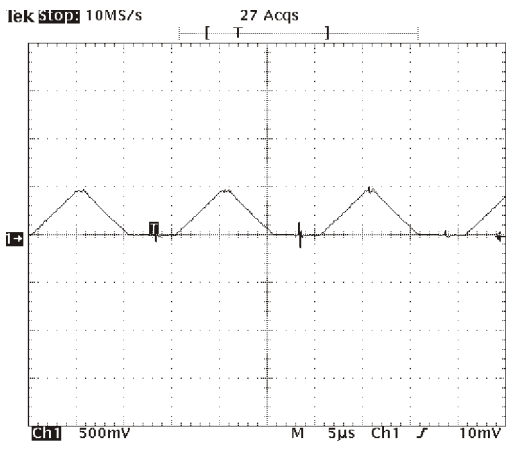


Amplitude tolerance: ±10%
Frequency: 65KHz ± 10%

N.B. If this signal is not present, there may be a fault in the IGBT driver circuit (**figure 4**) or the control board (**figure 3**). In the latter case, we recommend replacing the board.

E) Set up the oscilloscope with the probe x10 connected between pin 9 of the strip J6 (probe) and the case of U1 (ground) (**figure 3**). Make sure the displayed waveform resembles that in **figure C**. Make sure the output voltage between OUT+ and OUT- is equal to 85V ±10V.

FIGURE C



Peak amplitude 0.5V ± 20%

Switch off the machine and disconnect the oscilloscope.

F) Switch the machine on again at 230Vac and make sure that, following the brief start up time, the machine is not in alarm status (the yellow alarm LED D26 is off, **figure 3**).

N.B. If the machine remains in alarm status (and this is not due to a fault in the control board) there could be a fault in the photocoupler ISO1 (**figure 3**).

Tests for theTECNICA 1600:
In this case the tests are just the same and can be carried out in the same way.

7) 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.

REMOVINGTHE POWER BOARD (**figure 2A**)
- 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 (**figure 1**).
- Remove any bands constraining the board (e.g. on the power supply cable and connections to primary).
- Use a screwdriver from the welding side to undo the two screws fastening the dinse sockets to the printed circuit board (**figure 2B**).
- Use a screwdriver to undo the 4 screws fastening board to the bottom (2 screws on the component side of the board and 2 on the bottom of the machine **figure 2B**).
- After removing the screws, lift the board upwards to remove it from the bottom of the machine.
  NB. To re-assemble, proceed in the reverse order, remembering to insert the toothed washers on the ground screws.

A) Please read the procedure for replacing the IGBT's carefully: (**figure 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 Q1.(**figure 2B**)
- Undo the screws attaching the dissipator to the board to replace Q2 (**figure 2B**)
- Remove the 2 IGBT's Q1,Q2 and the 2 diodes D20, D14 by unsoldering the rheofores and then clean the solder from the printed circuit bump contacts.
- Remove the 2 dissipators from the board.

- Remove the springs 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 on **ohms** 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 R22 and R29 could have burst and/or diodes D12, D15, D17 and D19 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 thermoconductive 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: (figure 4).
The 3 SECONDARY DIODES are attached to the same dissipator, and when a replacement is required, all three should be replaced:
- Undo the screws attaching the dissipator to the board, to replace D21, D22 and D23.
- Remove the 3 secondary diodes D21, D22 and D23, 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 3 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 thermoconductive 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 welding side cut away the protruding part of the rheofores and check they are not shorted (between cathode and anode).

NB. Make sure resistor (R31) and capacitor (C30) on the snubber have been soldered to the PCB correctly (**figure 3**).

C) Control board (**figure 3**)
Whatever fault occurs in the control board, we strongly recommend its replacement without attempts at repair.
To remove it, cut and then unsolder the connector keeping it fixed perpendicular to the power board, replace it and resolder the connector.

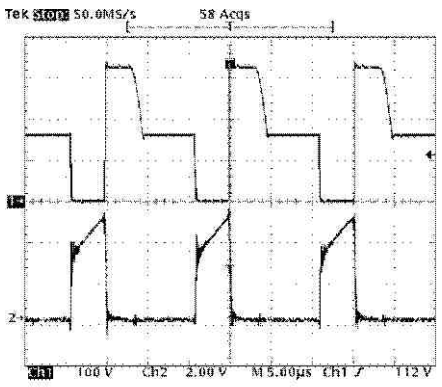
TESTING THE MACHINE

The test should be carried out on the assembled machine before closing it with the cover.
During tests with the machine in operation never commute the selectors or activate the noninductive load electromagnetic switch.

Preparation for testing.
A) Connect the machine to the static load generator (code 802110) using cables supplied with the appropriate dinse connectors.
B) Set up the oscilloscope with 2 channels.
C) Connect the voltage probe (CH1) x 100 between the collector (probe) and emitter (ground) of IGBT Q1.
D) Connect the voltage probe (CH2) x 10 between PIN 9 of strip J6 (probe) and the emitter.
E) Connect the machine plug to the variac.

Tests for the TECNICA 1400.
A) Average load test:
- With the static load generator disconnected, switch on the variac and the machine main switch.Gradually take the power supply voltage from 0V to 230Vac, make sure the pre-load relay commutes, the fan starts operating correctly and the power supply LED D2 lights up.
  Set up the static load generator with the switch settings as in the table in **figure D**, on the front panel position the welding current potentiometer on 60A and switch on the power supply:
- Check that the voltage waveforms on the oscilloscope display resemble those in **figure D.**

FIGURE D

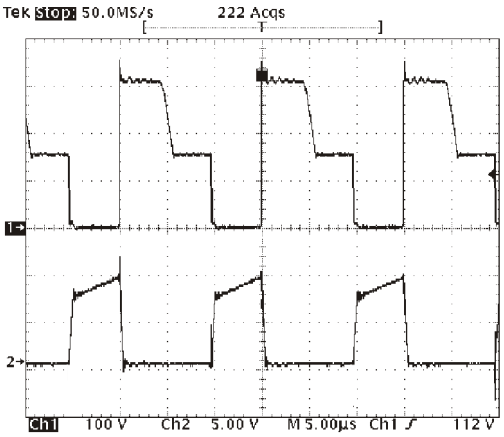


Voltage at ends of load: 20.5V ±5%
Current in load: 60A ±3%

1	2	3	4	5	6	SWITCH NUMBER
2	2	2	2	1	0	SWITCH POSITION

B) Rated load test:Set up the static load generator with the switch settings as in the table in **figure E**, on the front panel turn the welding current potentiometer clockwise to maximumand switch onthe power supply.
- Check that the voltage and current waveforms on the oscilloscope display resemble those in **figure E.**

FIGURE E



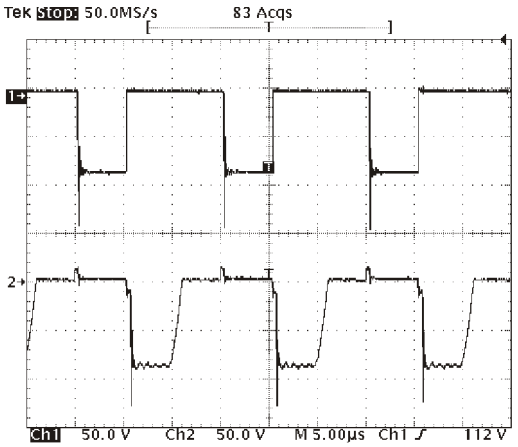
CH1 maximum amplitude 320V ± 10%
CH2 peak amplitude 8V ± 10%

1	2	3	4	5	6	SWITCH NUMBER
3	3	2	2	2	2	SWITCH POSITION

Voltage at ends of load: 24.8V ±5%
Current in load: 120A ±3%

C) Checking the secondary diode voltages:
- Connect 2 voltage probes x100 between the 2 outlets of the power transformer T1 (probe) and the secondary dissipator (ground).
- Connect the 2 probes to the oscilloscope and under the load conditions given in the second table in **figure E** switch on the machine and position the current adjustment potentiometer on maximum (turn clockwise as far as it will go).
- Check that the voltage waveforms on the oscilloscope display resemble those in **figure F.**

FIGURE F



Amplitude tolerance: ±10%
Reverse voltage peak should not exceed 150V

D) Running time check and closing the machine:
- With the load status as in **figure E** and the current adjustment potentiometer on maximum, switch on the machine 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.

E) Welding test:
With the machine preset as given in the instruction manual make a test weld with a current of 80A (electrode diam. 2.5 mm): check the dynamic behaviour of the machine.

Tests for theTECNICA 1600:
The tests for the Tecnica 1600 are as above and can be carried out in the same way except for the rated load test **(see B)** and the voltage check on the secondary diodes **(see C).**
NB. Rated load**:**
- Set up the static load generator with the switch settings as in the table in **table 1**, on the front panel turn the welding current potentiometer clockwise as far as it will go (maximum) and switch on the power supply.
- Check that the voltage and current waveforms on the oscilloscope display resemble those in **figure E.**Make sure the current value on the static load generator is 149A±3% with a voltage of 26V± 5%.**NB.** Checking the secondary board diode voltages:
- Set up the static load generator with the switch settings as in **table 1**, on the front panel turn the welding current potentiometer clockwise to maximum and switch on the power supply.
- Check that the voltage waveforms on the oscilloscope display resemble those in **figure F.**

1	2	3	4	5	6	SWITCH NUMBER
3	3	3	3	2	1	SWITCH POSITION

Table 1

WARNING!
Voltage and current measurements for the TECNICA 1400 and 1600 should be made at a main power supply voltage of at least 220Vac.
Main supply voltage should be measured over the main power switch with the machine operating at full power.

ILLUSTRATIONS

FIG. 1

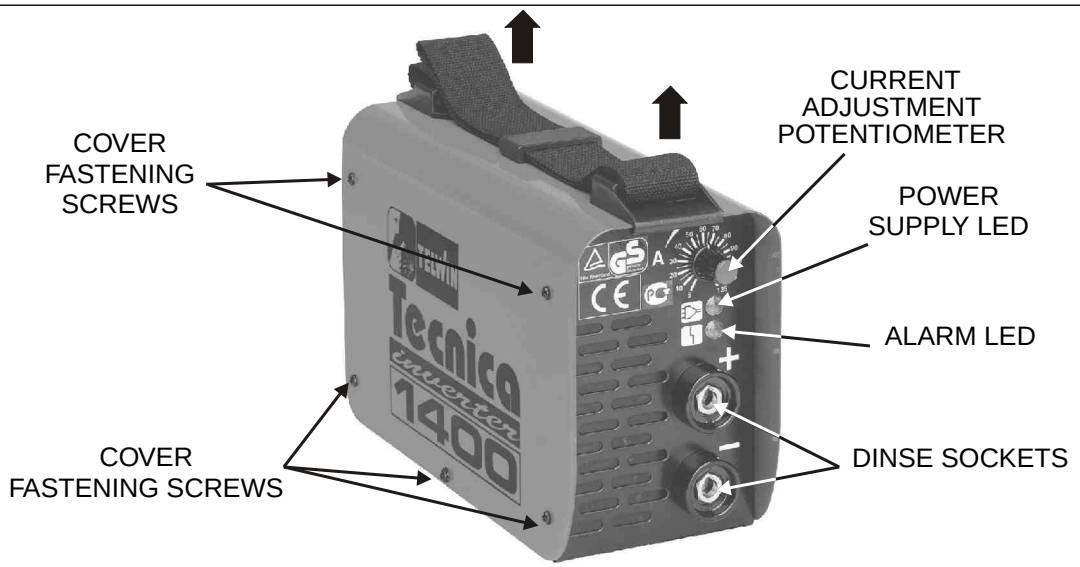


FIG. 2A

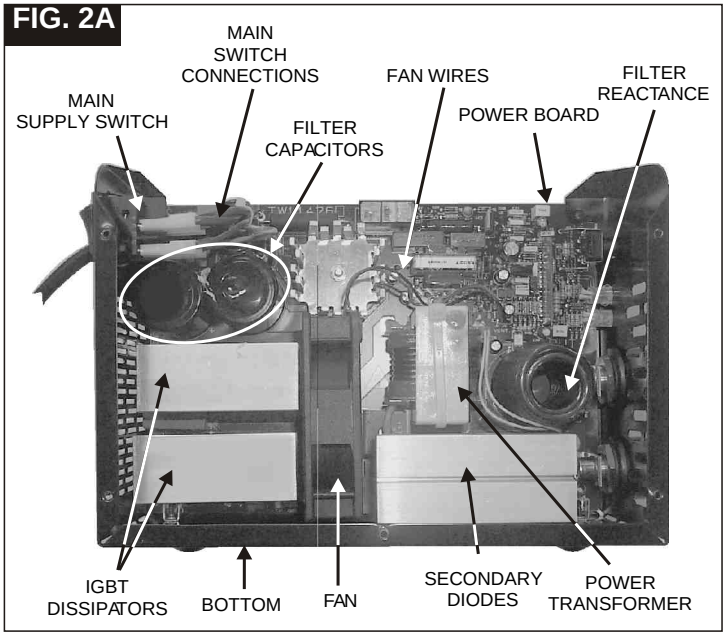


FIG. 2B

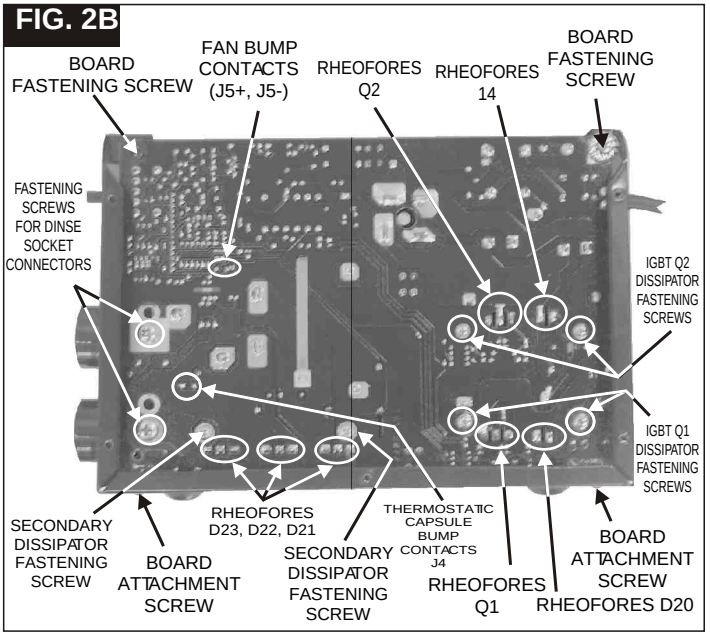


FIG. 3

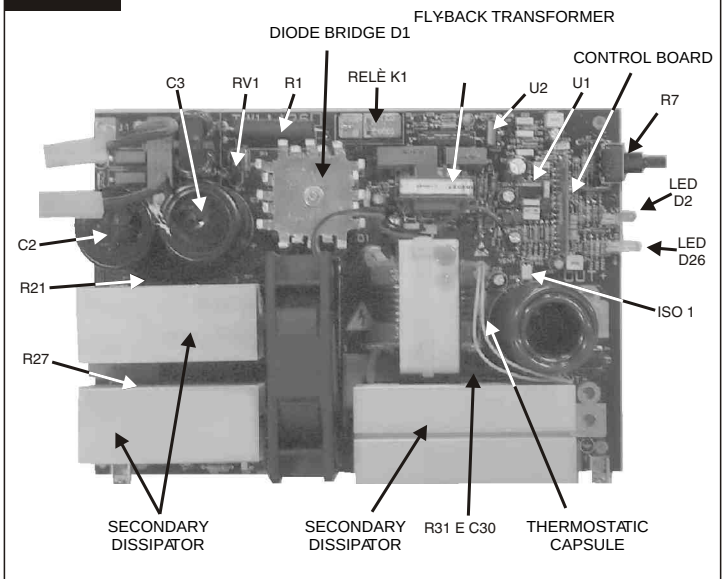
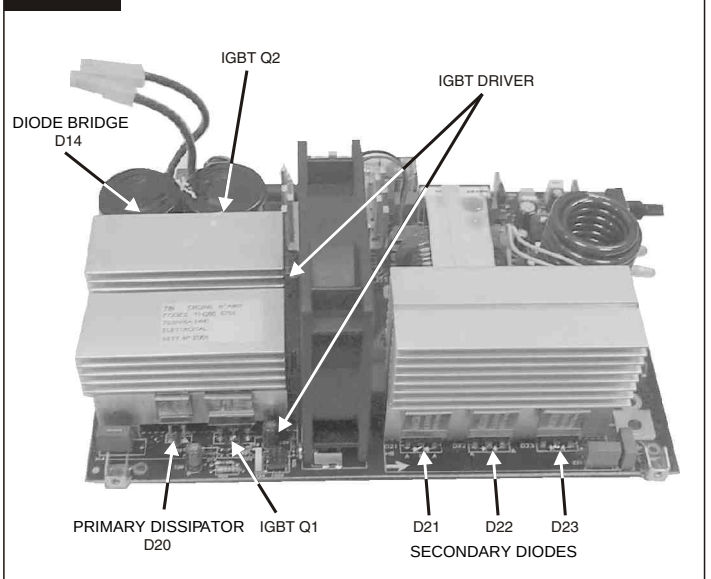
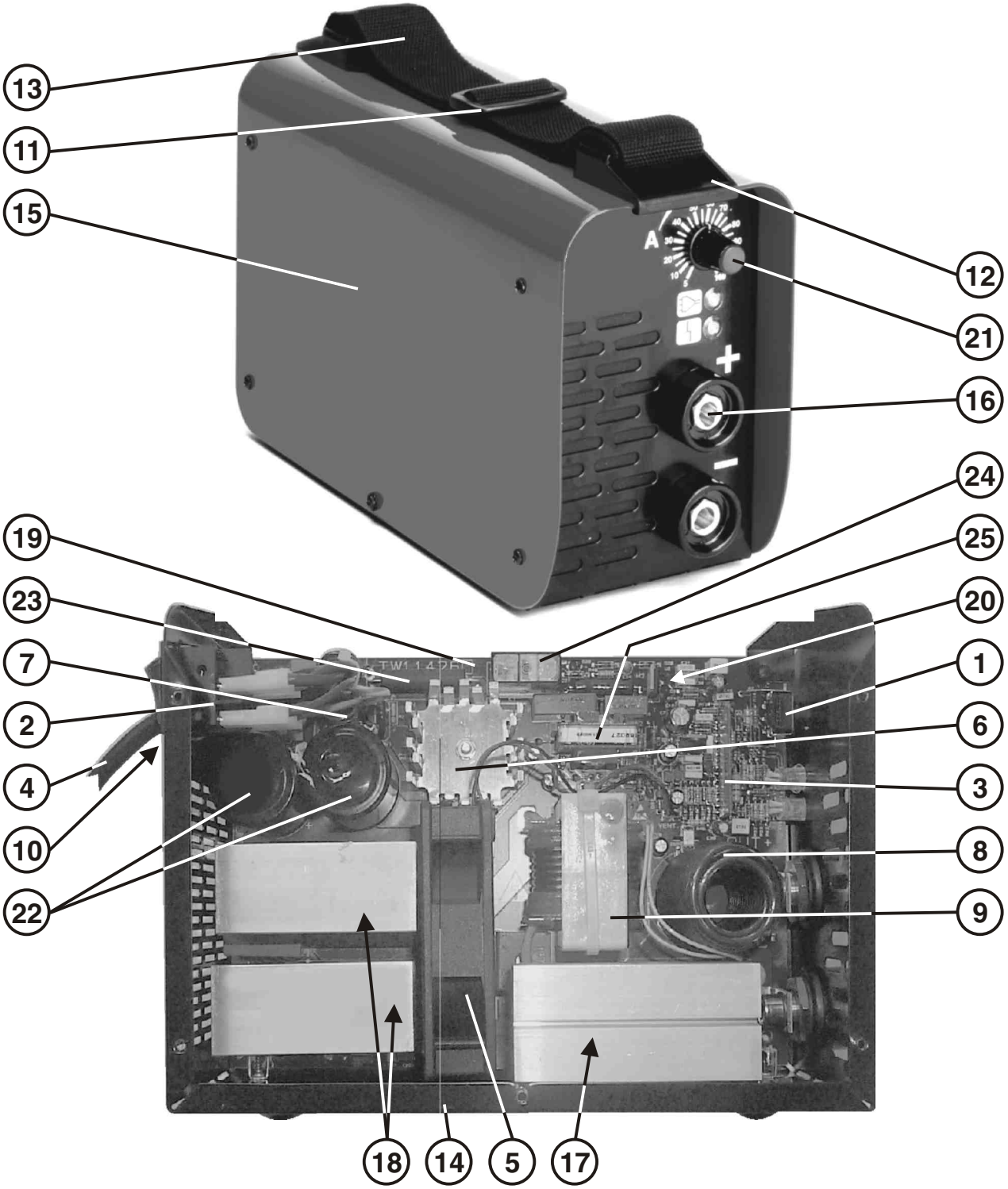


FIG. 4



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

TECNICA 1400 - 1600

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
1	Potenziometro Potentiometre Potentiometer Potentiometer Potenciometro
2	Interruttore Interrupteur Switch Schalter Interruptor
3	Scheda Controllo Platine De Control Control Pcb Steurungskarte Tarjeta De Controlo
4	Cavo Alimentazione Cable D'alimentation Mains Cable Netzkabel Cable De Alimentacion
5	Ventilatore Ventilateur Fan Ventilator Ventilador
6	Raddrizzatore Redresseur Rectifier Gleichrichter Rectificador
7	Induttanza Filtro Inductance Filter Filter Inductance Filter Drossel Induccion Filtro
8	Induttanza Inductance Inductance Drossel Induccion

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
9	Trasformatore Potenza Trasformateur Puissance Power Transformer Leistungstransformator Transformador De Potencia
10	Pressacavo Presse Cable Cable Bushing Kabelhalter Prensa Cable
11	Fibbia Per Cinghia Boucle Pour Courroie Belt Buckle Gurtschnalle Hebilla Para Correa
12	Aggancio Per Cinghia Accrochage Pour Courroie Belt Hook Gurthaken Gancho Para Correa
13	Cinghia Courroie Belt Gurt Correa
14	Fondo Chassis Bottom Bodenteil Fondo
15	Mantello Capot Cover Deckel Panel De Cobertura
16	Presa Dinse Prise Dix Dinse Socket Dinse Steckdose Enchufe Dinse

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
17	Diodo Diode Diode Diode Diodo
18	Kit Igbt + Diodo Kit Igbt + Diode Kit Igbt + Diode Kit Igbt + Diode Kit Igbt + Diodo
19	Kit Scheda Completa Kit Platine Complete Kit Complete Card Kit Komplette Karte Kit Tarjeta Completa
20	Pwm Controller Pwm Controller Pwm Controller Pwm Controller Pwm Controller
21	Kit Manopola Kit Poignee Knob Kit Griff Kit Kit Manija
22	Condensatore Condensateur Capacitor Kondensator Condensador
23	Resistenza Resistance Resistor Widerstand Resistencia
24	Rele' Relais Relais Relais Relais

REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO
25	Trasformatore Transformateur Transformer Transformator Transformador

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

Technical repair sheet:

To improve our service, on completing each repair we request all Service Centres to complete the technical repair sheet as on the next page, and return it to Telwin.

Official servicing centers Repairing card

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 circuit board: *yes* ☐ *no* ☐

Troubles evinced during repair :

TELWIN S.p.A. - Via della Tecnica, 3
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Fax +39 - 0445 - 858**800** / 858**801**
E-mail: telwin@telwin.com http://www.telwin.com

CERTIFIED QUALITY SYSTEM