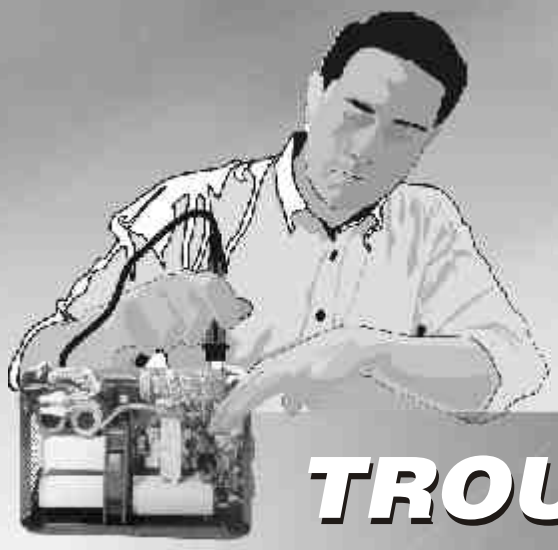
cod. 988361

TECHNOTRIS 180

MIG-TIG-MMA

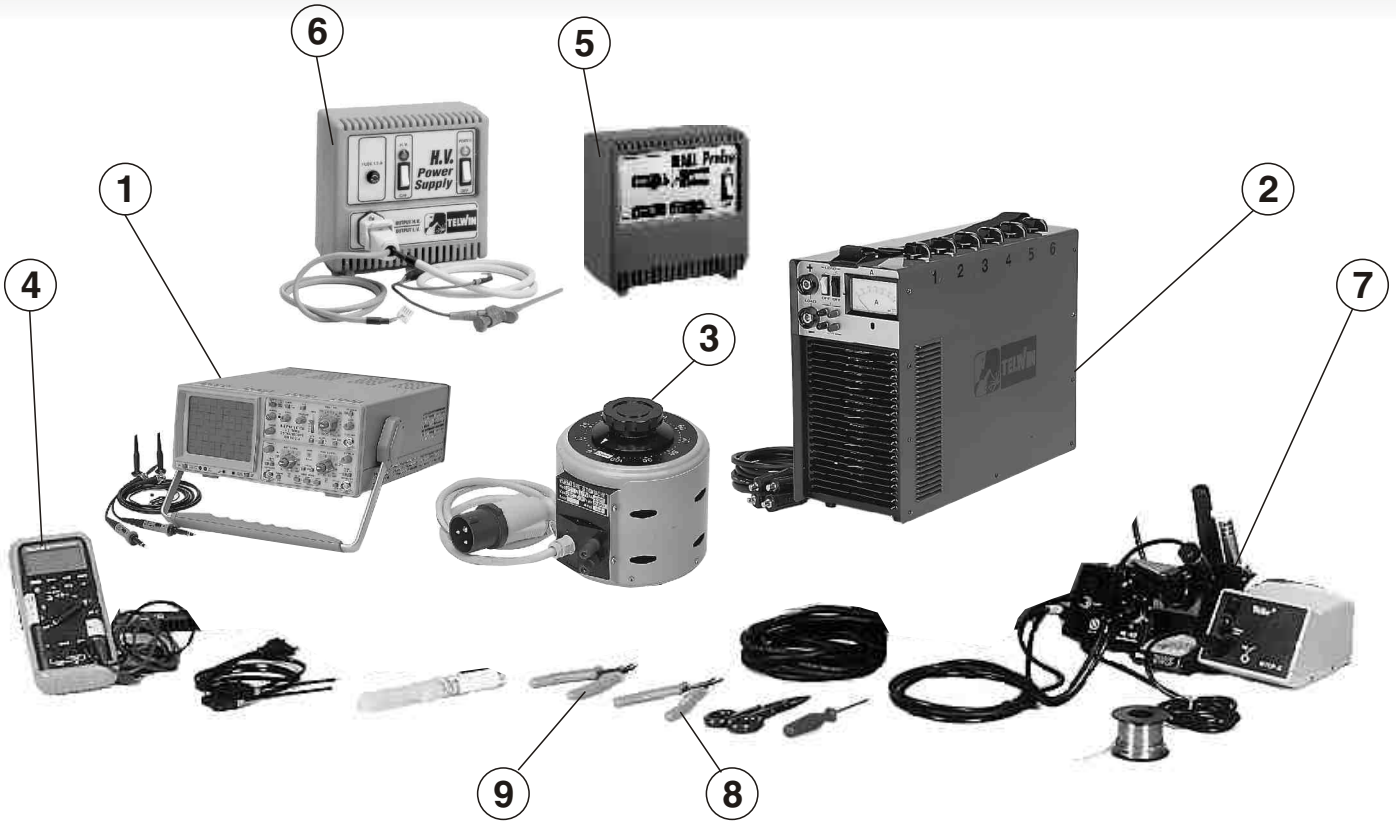
inverter



TROUBLESHOOTING AND REPAIR MANUAL

"reparation no problem!"

EQUIPMENT REQUIRED



ESSENTIAL INSTRUMENTS

1 Dual trace oscilloscope	***802401 (*)***
2 Static load generator	***802110 (*)***
3 Variac 0 - 300v 1500Kw	***802402 (*)***
4 Digital multimeter	
5 Hall probe	***802406 (*)***
6 HV Power Supply	***802403 (*)***

USEFUL INSTRUMENTS

7 Unsoldering station

MISCELLANEOUS

8 Flat jaw pincers
9 Cutting nippers

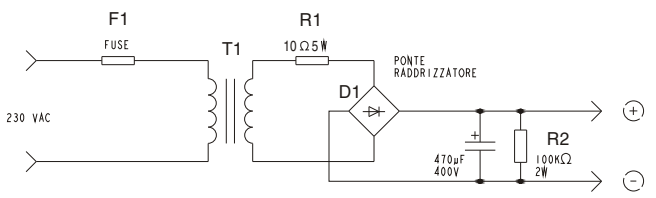
(*) The instruments with codes can be supplied by Telwin. The sale price is available on request!

HV POWER SUPPLY MODULE

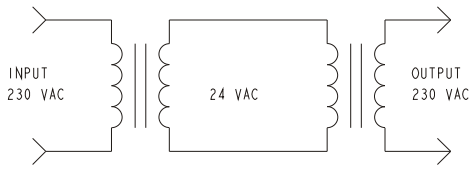
THE HV POWER SUPPLY is used to ensure operation of the switching power supply (the circuit on the primary board supplying auxiliary voltages), even if the machine is operating at low voltage.
It can be easily assembled by referring to the electrical diagrams in figure A and using the following components:

T1 = insulation transformer 230-230V 50VA(*)
D1 = rectifier bridge 36MB 80 (cod. 112357)
C1 = electrolytic capacitor 470uF 400V ALL
(cod.112514)
R1 = resistor 10 ohm 5W 5%
R2 = resistor 100K ohm 2W 5%
F1 = delayed action fuse 1.5 A Fuse holder 5X20mm
Female red and black faston
Plastic box.

Figura A ELECTRICAL DIAGRAM FOR POWER SUPPLY (HV OUTPUT):



THE INSULATION TRANSFORMER CAN BE REPLACED WITH TWO TRANSFORMERS OF THE SAME POWER, CONNECTING THE SECONDARIES ACCORDING TO THE FOLLOWING DIAGRAM:



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 MOSFET, IGBT's e DIODES in particular, take elementary antistatic precautions (use antistatic footwear and 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.
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 (IGBT rheophores, MOSFET etc.) should be left to reticulate before the machine is tested.
E) When the semi-conductor devices are soldered manually 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. We strongly advise labelling the wiring before disconnecting the connectors.
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 left out 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) In order to understand the correct use of the control panel and for further information on the specifications and operation of the machine, 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.

GUIDE TO REPAIRING THE MACHINE

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 2 screws near the black plastic clips on the top cover **(figure 1).**
B) Undo the 12 screws fastening the two plastic covers (6 each) to the front and back **(figure 2A – 2B)**.
C) To free the plastic cover from the front rotate the control panel slightly and pass it behind the cover **(figure 2A – 2B)**.
This operation can be made easier by disconnecting the panel wiring and removing the panel temporarily.
D) Slide out the 2 plastic covers by moving them outwards **(figure 2)**.
NOTE: the two parts are slightly different.
E) Undo the 14 screws fastening the top cover to the frame, 7 on one side and 7 on the other **(figure 3)**.
F) Remove the top cover **(figure 3)**.
G) Remove the base by taking out the 8 screws (**figure 4** – keep the toothed washers).

After completing the repairs, proceed in reverse order to re-assemble the base, top cover and plastic covers.

2) Cleaning the inside of the machine

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

Air extraction fan attached to front (figure 8):
check whether dirt has damaged the correct rotation of the blades, if there is still damage after cleaning replace the fan.

Air inlet fan attached to back (figure 8):
check whether dirt has damaged the correct rotation of the blades, if there is still damage after cleaning replace the fan.

Control board (figure 8):
Microcontroller U1 with extreme care,
Miscellaneous connectors.

Primary board (figure 5):
A) Rheophores of IGBT's Q6, Q7, Q8 and Q9 **(figure 10)**.
Also remove any dust between the rheophores and the dissipator.

B) Rheophores of recirculating diodes D21 and D25 (figure 10).
C) Rheophores of snubber network diodes D17, D18, D23 and D24 **(figure 10)**.
D) Photocouplers ISO4 and ISO5 **(figure 10)**.

Secondary board (figure 6):
A) Power diodes D1, D2, D3, D4, D5.
B) Thermostatic capsule on the dissipator.

Feeder assembly – wire feeder board – HF filter board (figure 7).

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 fans work correctly. Make a visual check of components listed below for signs of burning or breakage:

A) Main power supply switch (figure 8).
Use the tester 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) Varistor RV1 (figure 10).
Probable cause: machine connected to power supply voltage much higher than 230Vac (e.g.380Vac).

C) Relays K1and K2 (figure 10).
Probable cause: see main power supply switch.
NB. If the relay contacts are stuck together, do not attempt to detach them and clean them but replace the relay.

D) Electrolytic capacitors C33, C34, C35 and C36 (figure 10).
Probable cause:
- mechanical shock;
- machine connected to a much higher line voltage 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.

E) IGBT's Q6, Q7, Q8 and Q9 **(figure 10).**
Probable cause:
- discontinuation in snubber network;
- poorly functioning thermal contact between IGBT and dissipator (e.g. loosened attachment screw);
- fault in driver circuit
- loosened ferrites on power transformer;
- excessive overheating related to faulty operation.

F) Primary board diodes D17, D18, D21, D23, D24 and D25 **(figure 10).**
Probable cause:
excessive overheating related to faulty operation.

G) Secondary board diodes D1,D2,D3,D4,D5 **(figure 10).**
Probable cause:
- discontinuation in snubber network,;
- poorly functioning thermal contact between diodes and dissipator (e.g. loosened attachment screws:check),
- faulty connection at machine outlet.

H) Fuse situated upstream of auxiliary transformer (figure 5).
Check whether it has blown.

I) If the repair requires a more thorough check: condition of the transformer assembly – HF transformer – filter inductance **(figure 8).**

J) TIG and MIG solenoid valves **(figure 5)**.

K) Wire feeder motor 24Vdc **(figure 6)**.

L) Safety switch on side panel **(figure 7)**.

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 (make sure the screws fastening the bushes are tightened correctly).

In particular on the primary board (figure 5) it is necessary to check:

A) The main power supply connection to connectors CN4, CN5 and CN7A.

B) The connections from the power supply switch to connectors CN2, CN10, CN9 and CN11.
The primary terminals of the power transformer attached to CN3 and CN6 (the connecting cables for the primary are of different lengths).

D) The connections of the 230Vac auxiliary power supplies from the terminal board to connectors CN1 and CN8.

E) Power supply for fans and auxiliary transformer.

On the secondary board (figure 6) it is necessary to check:

A) The 2 connections from the power transformer to the first two bushes (also connection of one end of the filter inductance).

B) The connection of the positive dinse socket to the third bush. The shunt fastening between the third bush and the dissipator hole (and related reading wires).

D) The thermostat wiring on the dissipator.

Other checks:

A) The connection joining the HF transformer to the negative dinse outlet.

B) The connection from the positive dinse socket to the wire feeder compartment (to the positive – make sure the handwheel is attached properly).

C) The connection from the filter inductance to the wire feeder compartment (to the negative – make sure the handwheel is attached properly).

D) The connection from the MIG torch to the positive or negative in the wire feeder compartment: POLARITY CHANGE (make sure the handwheel is attached properly).

E) The 2 wire feeder motor control connections to J1 and J2 on the motor control board.

F) The wiring between the control board (at JP4) and the remote control socket.

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 bridges D19 and D22 **(figure 10)**.

B) IGBT's Q6, Q7, Q8, Q9 (absence of short circuits between collector-gate and between emitter-collector).

C) Direct and recirculating diodes on the secondary board between anode and cathode **(figure 11)**.

D) IGBT's and diodes Q1, Q3, D2, D6 on the motor control board (absence of short circuits between collector, gate and anode, cathode.

E) Rectifier bridge D5 and zener diode D8 on the power supply of the motor control board.

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

A) Resistor R34: 47 ohm ±5% 7W (pre-charge resistor in **figure 10**).

B) Resistors R35, R39: 20 ohm ±5% 25W (primary snubber in figure 10).

C) Resistor R4: 10 ohm ±5% 5W (secondary snubber in **figure 11**).

D) Resistor R20 (47 ohm ±10% 5W) on motor control board.

E) Thermostatic capsule continuity test on secondary board dissipator: disconnect the 2 wires from the capsule and measure the resistance over its ends, it should be approx.0 ohm.

F) Thermostatic capsule continuity test on filter reactance: disconnect one of the wires from the capsule and measure the resistance over its ends, it should be approx. 0 ohm.

6) Electrical measurements with the machine in operation

The tests described below can be used to check the workings of the power and control parts of the machine in relation to the different welding modes available..

Preparation for testing:
Extract the control panel as illustrated previously and fasten it to the front using the four screws then make sure it is connected correctly.
N.B. To prevent short circuits, all actions and operations involving the panel should be made with great care: keep it away from the metal frame of the machine when the latter is switched on.

B) Disconnect the wiring from fastons J2 and J 5 on the HF power source **(figure 6)**.

C) From the primary board on CN3 and CN6 disconnect the connections to the power transformer.

D) Set up the oscilloscope with voltage probe x100 connected between the rheophore of resistor R14 on the Q5 side (Q5 drain) and the rheophore of resistor R33 near PIN4 of U5 (earth) on the primary board.

E) Disconnect the jumper JP1 on the primary board.

F) Connect the HV outlet of the HV power supply to the primary board as follows (figure 10):
- (+) Positive (clamp) to the PIN of the JP1 connector from the resistor R54 side,
- (-) Negative (faston) to the negative faston of the diode bridge D19.

G) Remove the 2 cables from connectors CN1 and CN8 on the primary board and set up two connections to these free cables (connected to the terminal board– figure 8) so that the power supply (230 Vac) can be applied separately.

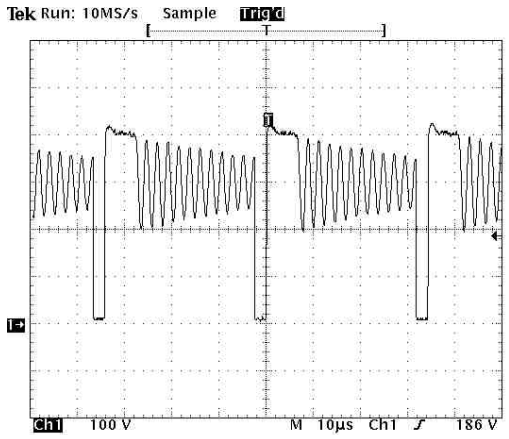
H) Connect the machine plug to a single-phase variac with variable output 0-300 Vac.

Operational tests on the small panel and primary board at low voltage:

A) Switch on the HV power supply and the separate 230 Vac power supply to the terminal board.
Make sure that after a wait of about 4 seconds (the panel display shows "_ _ _ _") relays K1 and K2 (figure 10) trip and the control panel is updated without an alarm signal.
NOTE: If the panel switches on correctly without the display being updated, this indicates a possible fault in the panel itself or in the motor control board.

B) Use the oscilloscope to check that the voltage wave form between the Q5 drain and the earth resembles that in **figure B**.

Figure B



Amplidude tolerance:±10%
Frequency: 33KHz±10%

C) On the primary board check the following power supply voltages:
- between the cathode of D14 and PIN4 of U5 equal to +15V ±5%,
- between PIN 3 of U2 and the case of U2 = +12V ±3%,
- between PIN 3 of U3 and the case of U2 = -12V ±3%,
- between PIN 3 of U4 and the case of U2 = +5V ±3%.

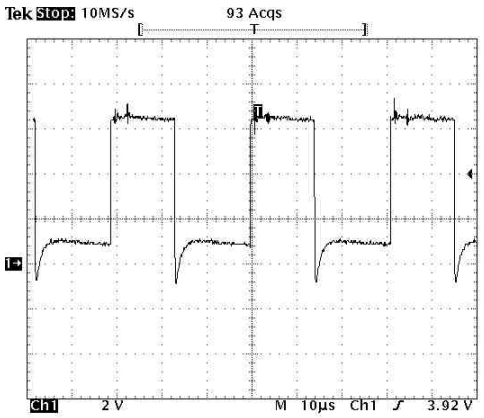
D) Turn the control panel encoder **(figure 2A)** and make sure the numeric display changes.

E) Using the keys, make sure the LED's light up on the panel for the different functions: **see tables 1 and 2** with the summary of modes and parameters.

F) Make cycle to load and program the welding parameters (**see Instruction manual:** programming). **NB.** For subsequent tests set in LOCAL mode (control from panel) and MMA welding (electrode).

G) With the voltage probe x10 between pin 4 of JP8 and TP1 (earth connector on the latter) on the control board (corner behind LOAD button), use the oscilloscope to make sure a waveform similar to that in **figure C** is present.

Figure C

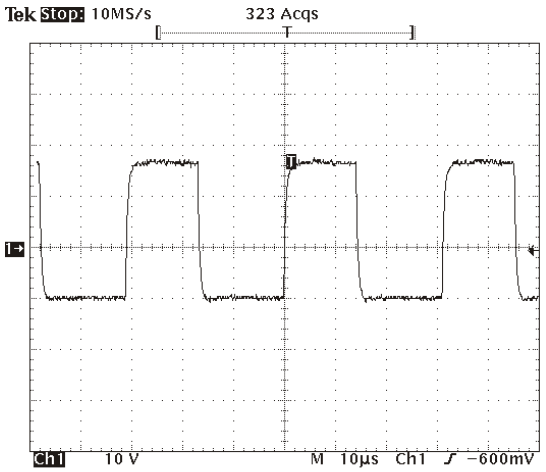


Amplitude tolerance: ±5%
Time tolerance:±10%

H) Make sure that between pins 7 and 8 of the optocouplers ISO4 and ISO5 on the primary board **(figure 9)** there is a voltage of 26 Vdc ±15%.

I) Use the oscilloscope (voltage probe x10) to make sure that the voltage wave form between the gate and emitters of IGBT's Q6, Q7, Q8, Q9 on the primary board **(figure 10)** resembles that in **figure D**.

Figure D



Amplidude tolerance: ±10%
Frequency: 33KHz±5%

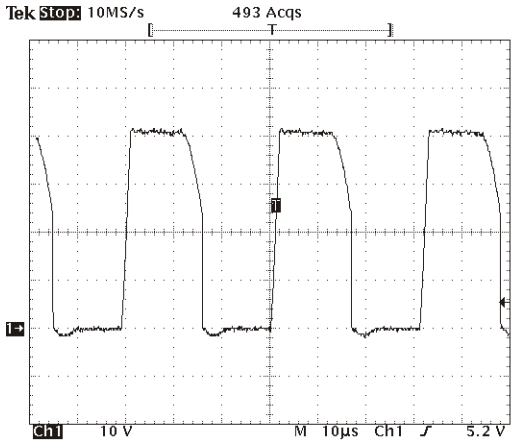
NB. If checks G, H, I are negative and/or the machine signals an alarm (see the Instruction Manual for a summary of the alarm signals) the fault could be in the control board (in which case we recommend replacing the control panel) or in the IGBT driver circuit.

J) Switch off the HV and reset the 2 fastons connecting the primary board and power transformer (CN3 and CN6).
- Switch on the HV, the separate 230 Vac power supply to the terminal board and the variac (initially set to the value 0 Vac).
Switch off the main power supply switch on the machine and gradually increase the voltage to 26Vac.

K) Make sure (voltage probe x100) that the voltage wave form between the collector and emitter of IGBT's Q6, Q7, Q8, Q9 on the primary

board **(figure 10)** is similar to that in **figure E**.

Figure E



Amplitude tolerance: ±10%
Time tolerance:±5%

L) Switch off the machine, the HV power supply and the separate 230 Vac power supply to the terminal board. Also:
- disconnect the HV from the machine,
- reset jumper JP1 on the primary board.
- remove the 2 connectors supplying the separate power supply to the terminal board and reconnect the cables to CN1 and CN8 (primary board).

M) Switch the machine back on (with the variac on 150Vac) and check whether there is an alarm indicator ("AL.1") with the yellow LED on the panel lit up **(figure 2A)**.
- Increase the voltage to 190Vac and check if the machine remains in alarm status.
- Increase the voltage on the variac again and make sure that between 200Vac and 260Vac (approx.) the machine leaves alarm status.
- Lastly, take the variac voltage to 270Vac and make sure the machine returns to alarm status (never take the variac above 275Vac).
- Bring the variac immediately back down to 230Vac and make sure the fans work correctly and that with welding in MMA mode the green LED on the panel lights up.
- Switch off the machine.

N) Reconnect the wiring J2 and J5 to the HF power source board (figure 6).

Operational tests on wire feeder in MIG, gas solenoid valves in MIG and TIG, TIG-HF and TIG-LIFT start:

A) Switch on the machine (powered at 230 Vac), set it in MIG mode and attach a MIG torch.

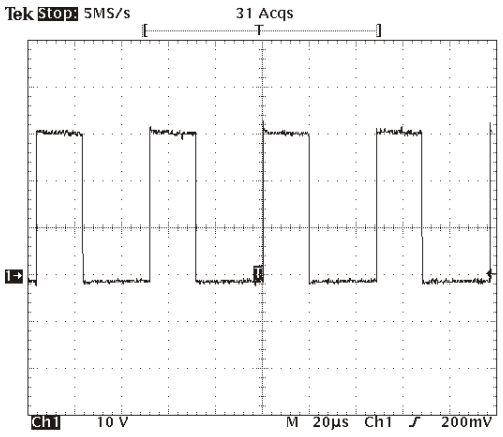
B) Check that under these conditions (metal work removed) that when the torch button is pressed the machine gives an alarm indication ("AL.3") with the yellow LED on the panel lit up **(figure 2A)**.
NOTA: To disable the safety device for the switch in the wire feeder compartment **(figure 7)** stick some adhesive tape on top to keep the contact permanently closed (after completing the tests remember to remove the adhesive tape).

C) Now check that after the torch button is pressed the MIG solenoid valve of the gas shield circuit is excited, the motors begin to turn and the green LED on the panel lights up (for details on managing the torch button in 2T and 4T **see table 3**).
NOTE: If this does not occur, try short circuiting PINs 1 and 2 of the JP6 connector on the control board (panel). If the solenoid valve is then excited the torch button closure circuit may be damaged: HF filter board and/or connections to/in the torch (in this case make a more thorough check for an exact identification of the origin of the problem).

D) Position a voltage probe x10 between J2 and J1 on the motor control board and set the wire feed rate at 20m/min.
- Press the torch button (or else the manual feed button in the wire feeder compartment – **figure 7**) and make sure the wave from at the ends of the motor resembles that in **figure F**.

NOTE: If no command reaches the dc motor check whether pressing the torch button will cause the signal between the rheophore of resistor R8 towards U1 and the case of U3 (earth) to change from the value +5V ±5% to the value 0V. If this occurs there is probably a fault in the motor control board: we advise either replacing it or making a more thorough analysis (e.g. power supply at +18V ±3% between PIN3 of U3 and ear th and at +15V ±3% between PIN3 of U1 and earth or presence of rectangular control wave between PIN6 of U4 and earth).

Figure F



Amplitude tolerance: ±10%
Time tolerance:±10%

E) Attach a TIG torch to the machine outlet.
Set the machine in TIG HF DC make sure that in this case the green led on the panel (figure 2A) lights up when the torch button is pressed (in 2T).

F) Make sure that after the torch button is pressed the TIG solenoid valve of the gas shield control circuit is excited.

G) Check for correct torch management in 2T and in 4T (**for details see table 4**).

H) Having set the machine in TIG LIFT and prepared it for welding check for a correct LIFT start (current 20A) both in 2T and 4T: the cycle will be similar to an HF start. When the tests are completed switch off the machine.
NOTE: If it is difficult to strike the welding arc with HF (weak high frequency), there could be a fault in the torch or in the HF strike circuit (check whether there are discharges inside the machine when the torch button is pressed).

7) Removing and repairing the primary board, secondary board

If repairing one or both of the boards is complicated or impossible, they should be completely replaced.
Each 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 continues after it has been replaced correctly, check the other machine components. Unless otherwise required by the procedure, never alter the board trimmers.

Removing the power part assembly (figure 8)
- remove the bands from the various wirings running along the side of the machine,
- detach the wiring connected to connector JP9 from the control board,
- detach the wiring connected to the connector J2 on the primary board,
- disconnect the faston from the thermostatic capsule, connecting it to the control panel.
- disconnect the 2 wires ensuring 0V and 230V to the auxiliary transformer from the terminal board attached to the side of the machine,
- from the primary board remove the fastons connected to CN4, CN5, CN7A which are connected to the power supply cable,
- remove the fastons connecting the primary board to the main power switch,
- from the front and back remove the connections restraining the TIG gas tube and the fastons connected to the TIG solenoid valve,
- remove the nuts fastening the OUT+ and OUT- cables to the + and - dinse sockets,
- also detach the OUT- connector in the wire feeder compartment (attached with a polarity change hand wheel),
- lastly disconnect the other wiring restraining the power assembly, - on the back undo the 4 screws from the 4 corners of the fan,
- on the front undo the 4 screws from the 4 corners of the fan,
- completely remove the power part assembly from the metallic structure by sliding it out sideways (open the metal structure slightly to ease removal). To re-assemble proceed in the reverse order : attach the assembly and re-set the various connections.

B) Removing the primary board (figure 9)
- working only on the power part assembly detach all the wiring connected to the primary board (CN1, CN2, CN3 and CN6),
- undo the 2 screws attaching the terminal board to the side of the assembly,
- undo the 4 screws (two on each side) fastening the primary radiator to the plastic shoulders **(figure 8)**,
- undo the 4 screws (two on each side) fastening the primary board PCB to the shoulders **(figure 9)**,
- remove the primary board complete with the radiator from the assembly by sliding them upwards. To re-assemble proceed in the reverse order : attach the board and re-set the wiring.

Please read the procedure for replacing the IGBT's and/or rectifier bridges carefully:
Even if only one IGBT is damaged, always replace all 4.
- Having removed the board from the machine undo the 4 nuts fastening the dissipators **(figure 10)**,
- unsolder the components, clean the solder from the printed circuit bump contacts and separate the dissipator from the board,
- before making the replacement check whether the components piloting the IGBT's are also damaged:
  with the multimeter on ohms make sure there is no short circuit on the board between the 1st and 3rd bump contacts (between gate and emitter) corresponding to each component, alternatively, the resistors R36, R37, R40 e R41 could have burst and/or diodes D1, D2, D4 and D5 may be unable to function at the correct Zener voltage (this should have shown up in the preliminary tests),
- remove the components (IGBT's, diode bridges or both) by loosening the screws fastening them to the dissipators,
- 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,
- prepare the components for replacement. For the IGBT's, bend the rheofores at 90° (never bend and/or place the parts under tension near the case).
- position the screws holding the components without fastening them down completely,
- join the dissipator/component assembly to the printed board, inserting all the rheofores in the bump contacts and the threaded spacers on the 4 attachment holes,
- attach the dissipators with the nuts and screw them down once and for all in the following order:
- the nuts fastening the dissipators to the printed circuit with a torque wrench setting of 2 Nm ±20%,
- the screws fastening the rectifiers to the dissipators with a torque wrench setting of 2 Nm ±20%,
- the screws fastening the IGBT's to the dissipators with a torque wrench setting of 1 Nm ±20%,
- solder the terminals taking care not to let the solder run along them.
- on the component side cut away the protruding part of the rheofores and check they are not shorted (especially the gate and emitter).

NB. The 4 IGBT's should belong to the same selection kit supplied by Telwin.

C) Removing the secondary board (figure 11)
Unless the dissipator is damaged due to a destructive explosion of the diodes, in general it is not necessary to remove the secondary board and the diodes can be replaced directly on the board mounted on the machine. Anyway, if it is necessary to remove it, undo the 4 screws attaching it to the shoulders, remove the 3 hexagonal-head screws fastening the shunt and connecting the power transformer then, lastly, disconnect the thermostatic capsule wiring and make the replacement.

Please read the procedure for replacing the secondary board diodes carefully (figure 11):
- turn the machine upside down, undo the screws fastening the damaged components to the dissipator and unsolder the metal tab.
- having removed the components, remove any dirt or irregularities from the dissipator,
- apply thermoconductive grease following the general instructions,
- place the components on the dissipator coinciding with the soldering areas and fasten them with the screws (torque wrench setting 1.4 Nm ±20%),
- solder the tabs, taking care not to let the solder form short circuits.

NB. Make sure that the resistor and capacitor (secondary snubber) are correctly soldered to the printed circuit.

8) Replacing the HF boards, motor control and control panel

If the HF board, the HF filter board or the motor control board are damaged, replace the complete boards by releasing them from the plastic columns fastening them to the metal structure **(figure 12)**. For the control panel (consisting of: control board, command board and metal support) just remove the screws fastening it to the machine structure.

9) Removing the wire feeder unit

We recommend turning the machine upside down to work on it.

A) Removing the feeder (figure 7)
- If the welding reel is in position wind up the reel so as to free the feeder,
- release the counter-roller and move it away from the lower roller, - undo the screw fastening the wire-guide hose on the of welding reel side and take it out,
- undo the 3 screws fastening the feeder to the motor,
- undo the screw fastening the roller to the motor shaft and remove the roller,
- undo the 3 screws fastening the feeder to the metallic support,
- undo the screw fastening the wire feeder tube on the MIG torch connector side,
- undo the 2 screws on the front panel that fasten the MIG torch connector and move it away from the feeder, - take out the feeder.

B) Removing the motor (figure 6)
- having removed the feeder, undo the 4 screws fastening the metal support to the metal diaphragm,
- disconnect the 2 fastons J1 and J2 from the motor control board,
- keeping the machine upside down extract the motor upwards.7

TESTING THE MACHINE

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

Preparation for testing

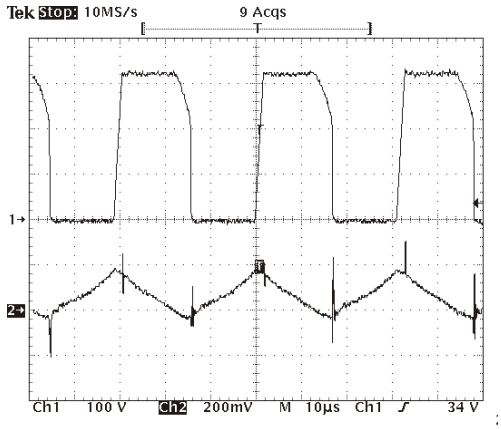
A) Disconnect the fastons J2 and J5 on the HF power source board **(figure 6)**.
B) Using cables with suitable dinse connectors, connect the machine to the static load generator.
C) Connect a voltage probe x100 between the collector (prod) and emitter (earth).
D) Pass the current probe of the Hall effect transducer along the cable connecting the power transformer to the faston CN6 on the primary board **(figure 5)**. (With current direction reference arrow entering CN6).
E) Connect the Hall Probe and the current probe to the oscilloscope.
F) Disconnect the jumper JP1 on the primary board.
G) Connect the HV outlet of the HV power supply to the primary board as follows **(figure 10)**:
(+) Positive (clamp) to the PIN of connector JP1 on the resistor R54 side,
(-) Negative (faston) to the negative faston of the diode bridge D19.
Remove the 2 cables from connectors CN1 and CN8 on the primary board and make 2 connections to these free cables (connected to the terminal board – **figure 8**) so that a separate power supply (voltage 230Vac) can be applied.
I) Connect the machine plug to a single-phase variac with variable output 0-300 Vac

Recommended tests.

A) No-load test:

- With the static load generator disconnected switch on the HV power supply and the separate 230 Vac power supply to the terminal board.
- Make sure the pre-charge relays K1 and K2 commute and the fans start operating.
  Make sure the control panel lights up and check its operation: see electrical measurements with the machine in operation.
- Carry out a cycle to load and program the welding parameters (see Instruction Manual: programming). **NB.** For subsequent tests set LOCAL mode (control from panel), MMA welding (electrode) and select Arc Force then bring it to the minimum using the encoder. - Switch on the machine and the variac and take it gradually from 0 Vac to 230Vac.
- Check that the voltage and current wave forms displayed on the oscilloscope resemble those in **figure G**.

Figure G



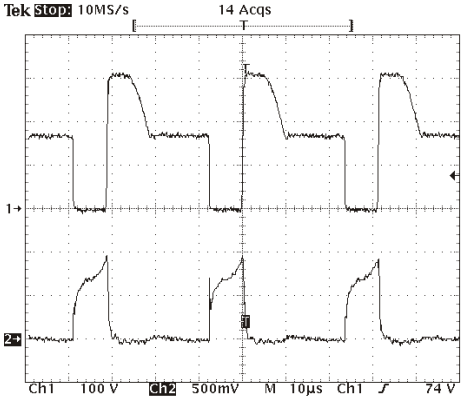
Time tolerance: 10%
Frequency: 33KHz 10%
Current scale: 200mV=2A

- Switch off the machine, the variac and the HV power supply.
- Disconnect the machine from the variac and the HV power supply.
- Reset jumper JP1.
- Remove the 2 connectors supplying the separate power supply to the terminal board and reconnect the cables to CN1 and CN8 (primary board).

B) Minimum load test:

- Set up the static load generator with the switch settings as in the table in **figure H**.
- Connect the machine power supply cable to the mains outlet and switch on.
- Use the encoder to set the current at 20A.
- With the load inserted, check that the voltage and current wave forms resemble those in **figure H**.

Figure H



Time tolerance: 10%
Current scale: 500mV=5A

1	2	3	4	5	6	Switch number
1	1	1	0	0	0	Switchposition

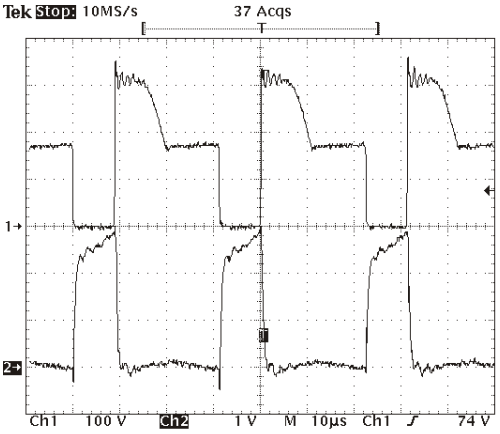
Voltage at ends of load: 20.8V ±1V
Current in load: 20A ±2A

C) Average load test:

Set up the static load generator as in the table in figure I, switch the machine back on, set a current of 80A and activate the load.

- Check that the voltage and current wave forms resemble those in **figure I.**

Figure I



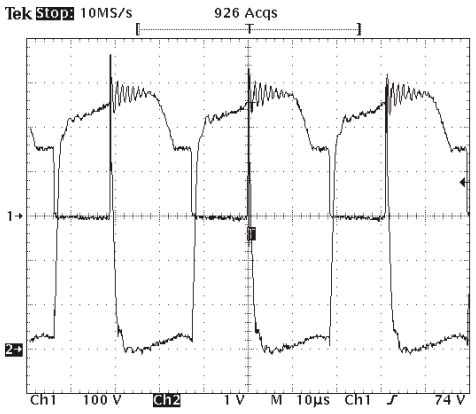
Time tolerance: ± 10%
Current scale: 1V=10A

1	2	3	4	5	6	Switch number
2	2	2	2	2	1	Switchposition

Voltage at ends of load: 23.2V ±2V
Current in load: 80A ±3A

D) Rated load test:
- Set up the static load generator as in the table in **figure J**, switch the machine back on, set a current of 170A and activate the load.
- Check that the voltage and current wave forms resemble those in **figure J.**

Figure J



Time tolerance: 10%
Current scale: 1V=10A

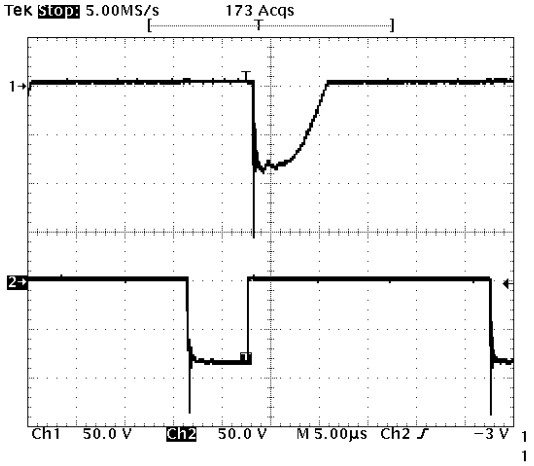
1	2	3	4	5	6	Switch number
3	3	3	3	2	2	Switchposition

Voltage at ends of load: 26.8V ±2V
Current in load: 170A ±3A

E) Maximum load test (rated voltage):
- Keeping a current of 170A, set the static load generator with all the switches in position 3.
  Check that the maximum current level read by the probe (still on CN6 on the primary board) does not exceed the value of 63A +0A -5A.

F) Checking the secondary board diode voltages:
- Connect 2 voltage probes x100 between the 2 outlets of the power transformer on the secondary board (prods) and the shunt towards the dissipator (earth).
- Connect the 2 probes to the oscilloscope and under the load conditions given in the table in figure J switch on the machine.
- Keeping the current on 170A check that the voltage wave forms displayed on the oscilloscope resemble those in **figure K**.
  Switch off the machine.

Figure K



Time tolerance: 10%
Reverse voltage peak/ should not exceed 250V

G) Operational checks:
- Tests in MIG mode, referring to the points given below:
- set up the static load generator with the switches set in positions 2-1-1-1-1-1;
- switch on the machine, carry out a cycle to load program P01 and connect a MIG torch (see Instruction manual: programming); with the wire feeder compartment open press the safety switch **(figure 7)**, press the torch button and make sure the feeder motor works correctly (**NOTE:** all parameters should be left in the factory settings for program P01);
  - check that the current on the load is 30A ±2A while the voltage is 15.5V ±1V;
  - check that the machine display shows the load current and voltage alternately (allowing for a slight margin), confirming the measurements on the load generator; release the torch button and press the manual wire feed button **(figure 7)**: if the wire feeder motor works correctly but wire feed is unsatisfactory refer to the instruction manual to correct any faults of a non-electrical origin.
  - Disconnect the oscilloscope and all other instruments.
  - Disconnect the machine from the static load generator and switch off.
  - Connect the HF power source (original connections to fastons J2 and J5 on the HF board). WARNING! The high frequency voltage will cause permanent damage to the static load generator and any other instrument connected to the machine. Before proceeding make absolutely sure all the instruments have been disconnected. Moreover, do not allow parts of the body to come into contact with outlets and internal parts of the power source.
  - Switch the machine back on, load program P13 and press the torch button: the TIG solenoid valve should trip and the HF generator will be activated.
    The HF should terminate its action after about 2 seconds. Release the torch button and check that the TIG solenoid valve is no longer excited.

H) Running time check and closing the machine:
With the load switches set in positions 3-3-3-2-2-2 and selecting MMA mode (electrode) with the current set on 150A, leave the machine in operation until the thermostatic capsules cut in (machine in alarm status).
- Check the correct positioning of the internal wiring and finally re-assemble the machine.

I) Welding test:
- **MMA Welding**
  With the machine preset as given in the instruction manual make a test weld in MMA mode at a current of 80A (electrode diam. 2.5mm) with the Arc Force parameter set on maximum (100%):check the dynamic behaviour of the machine and make sure Hot Start and Arc Force function correctly.
- **TIG Welding**
  With the machine preset as given in the instruction manual connect a TIG torch (green electrode 1.6mm and gas at 4.5l/min), load program P13 and make a test weld on iron or steel in 2T DC HF at 40A with down slope and postgas to check TIG operation.
- **MIG Welding**
  With the machine preset as given in the instruction manual connect a MIG torch (steel wire reel 0.8mm and Argon/CO2 gas mixture at 10 l/min), load program P05 and make a test weld on iron, checking for steady wire feed and melting (it may be necessary to adjust the voltage or wire feed rate slightly to obtain regular, frequent short circuits: an indicator of satisfactory machine operation).

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TAB. 1

OPERATING MODES

BASIC FUNCTIONS:	
MMA (electrode)	
TIG HF DC	• **CONTINUOUS**
	• **PULSED**
MIG/MAG Fe/Ss	
MIG/MAG Al	
MOG NO GAS	
TIG LIFT (in all le modes TIG HF illustrated)	

ADDITIONAL FUNCTIONS
Operator control from panel (**LOCAL**)
Remote operator control (**CAD**)
2T (torch button cycle 2 periods)
4T (torch button cycle 4 periods) Possibility of selecting up slope and base current parameters
SPOT (with spot welding timer) Possibility of selecting spot time parameter

TAB. 2

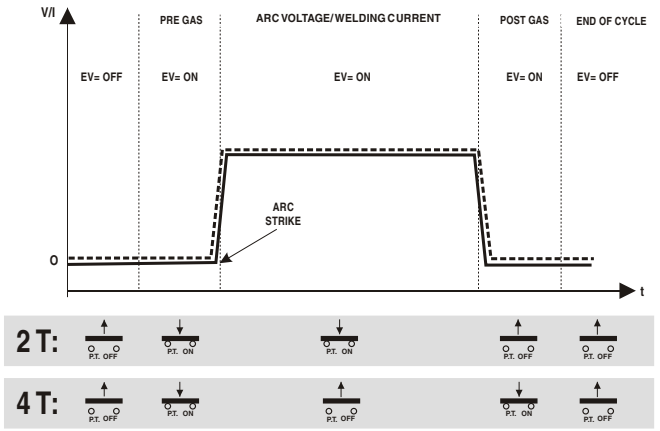
PARAMETERS FOR EACH MODE (IN 2T)

FUNCTIONS	BASE PARAMETERS
MMA	Main current Arc Force
TIG HF DC CONTINUED	Main current Postgas Down slope
TIG HF DC PULSED	Main current Base current Frequency Duty cycle Postgas Down slope
MIG/MAG Fe/Ss	Arc voltage Wire feed rate Electronic reactance
MIG/MAG Al	Arc voltage Wire feed rate Electronic reactance
MOG NO GAS	Arc voltage Wire feed rate Electronic reactance
TIG LIFT	Same paramaters as all TIG HG modes

NOTE: functions 4T and SPOT allow modification of related parameters as well

TAB. 3

MACHINE CYCLE MIG 2 T and 4T in Fe/Ss Al (——) - NO GAS (- - -)



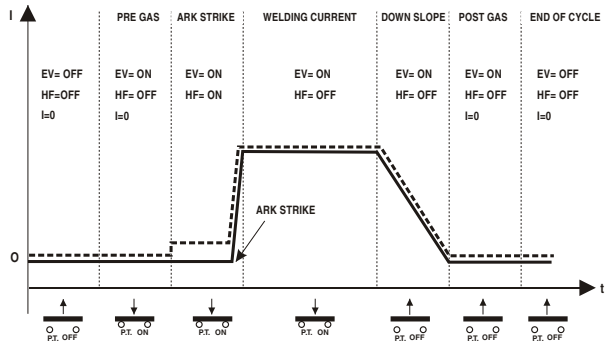
KEY **EV** = Solenoid valve **PT** = Torche button

(——)= WELDING AT CONSTANT VOLTAGE

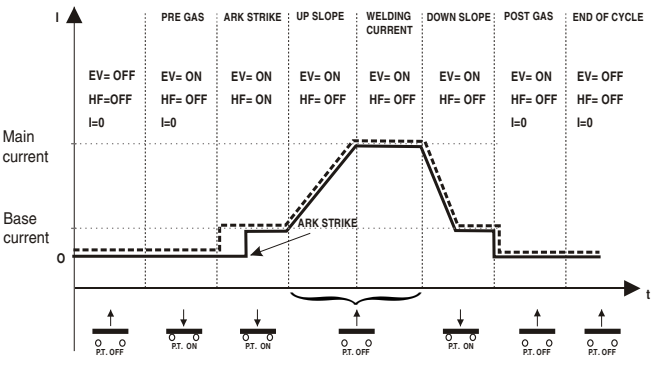
(- - -)= WELDING AT CONSTANT CURRENT

TAB. 4

MACHINE CYCLE TIG 2 T WITH HF (——) - LIFT (- - -)



MACHINE CYCLE TIG 4 T WITH HF (——) - LIFT (- - -)



KEY: **EV** = *Solenoid valve* **PT** = *Torch button*
I = *Welding current* **HF** = *High frequency (if activated)*

REFERENCES ILLUSTRATED

FIG. 1

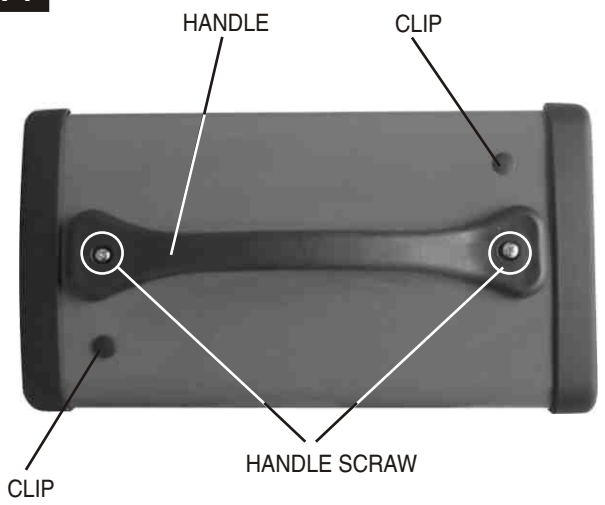


FIG. 2A

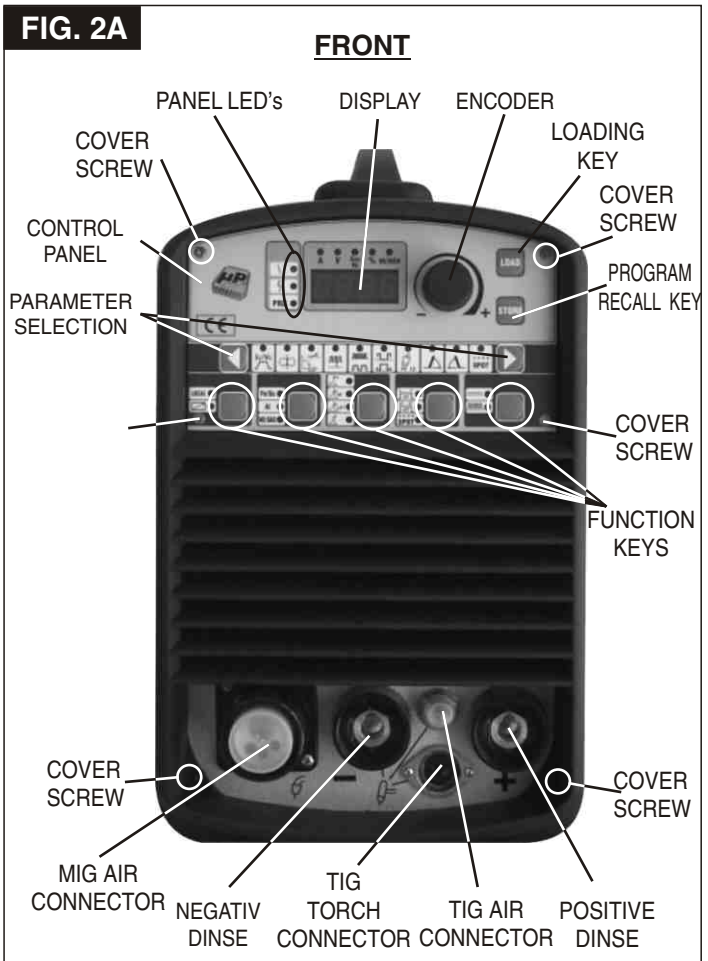


FIG. 3

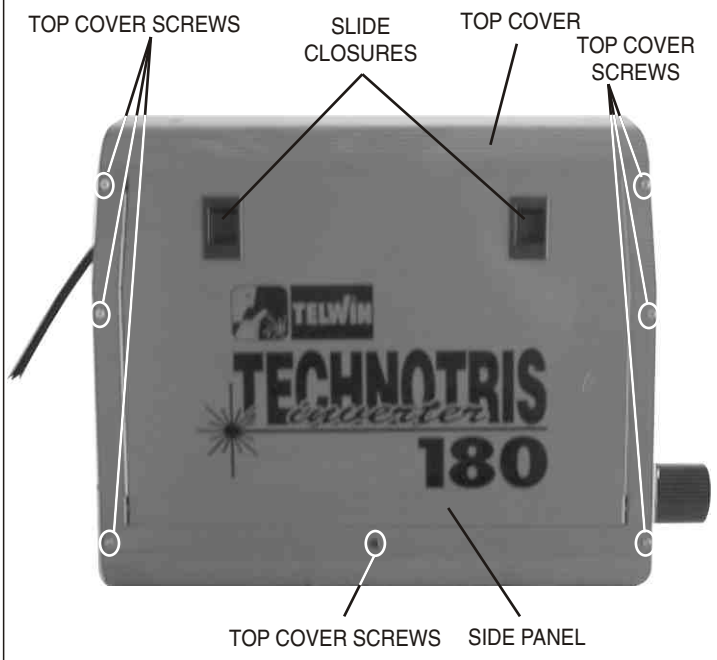


FIG. 2B

FIG. 4

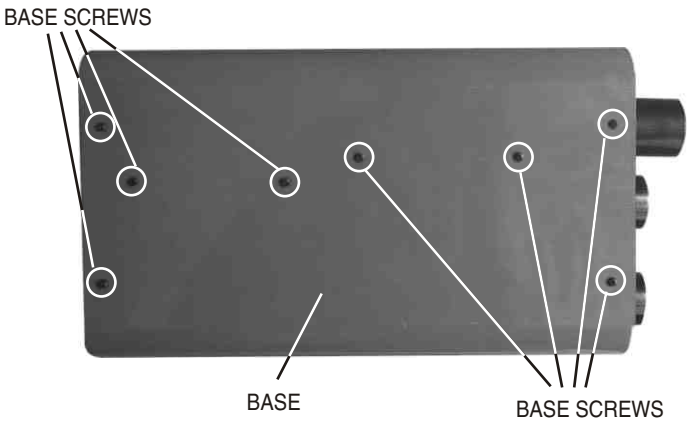


FIG. 5

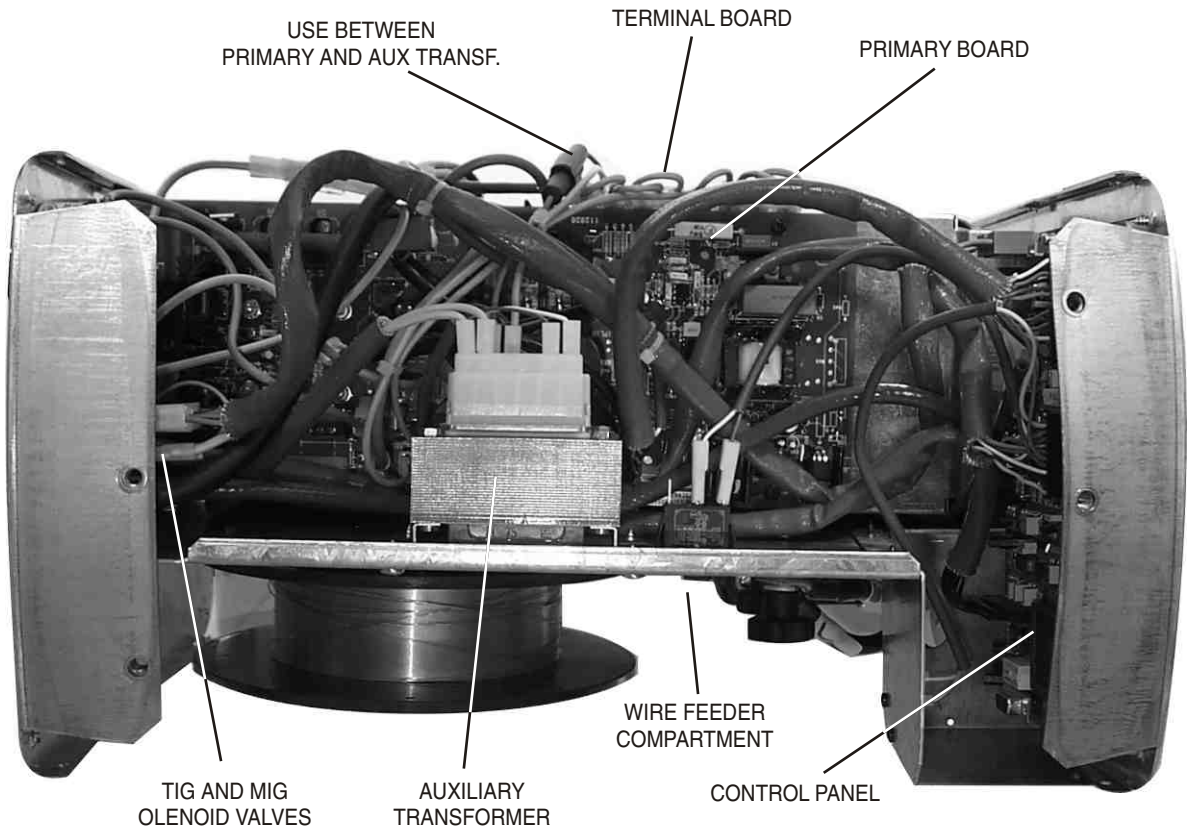

USE BETWEEN
PRIMARY AND AUX TRANSF.
TERMINAL BOARD
PRIMARY BOARD
WIRE FEEDER
COMPARTMENT
CONTROL PANEL
TIG AND MIG
OLENOID VALVES
AUXILIARY
TRANSFORMER

FIG. 6

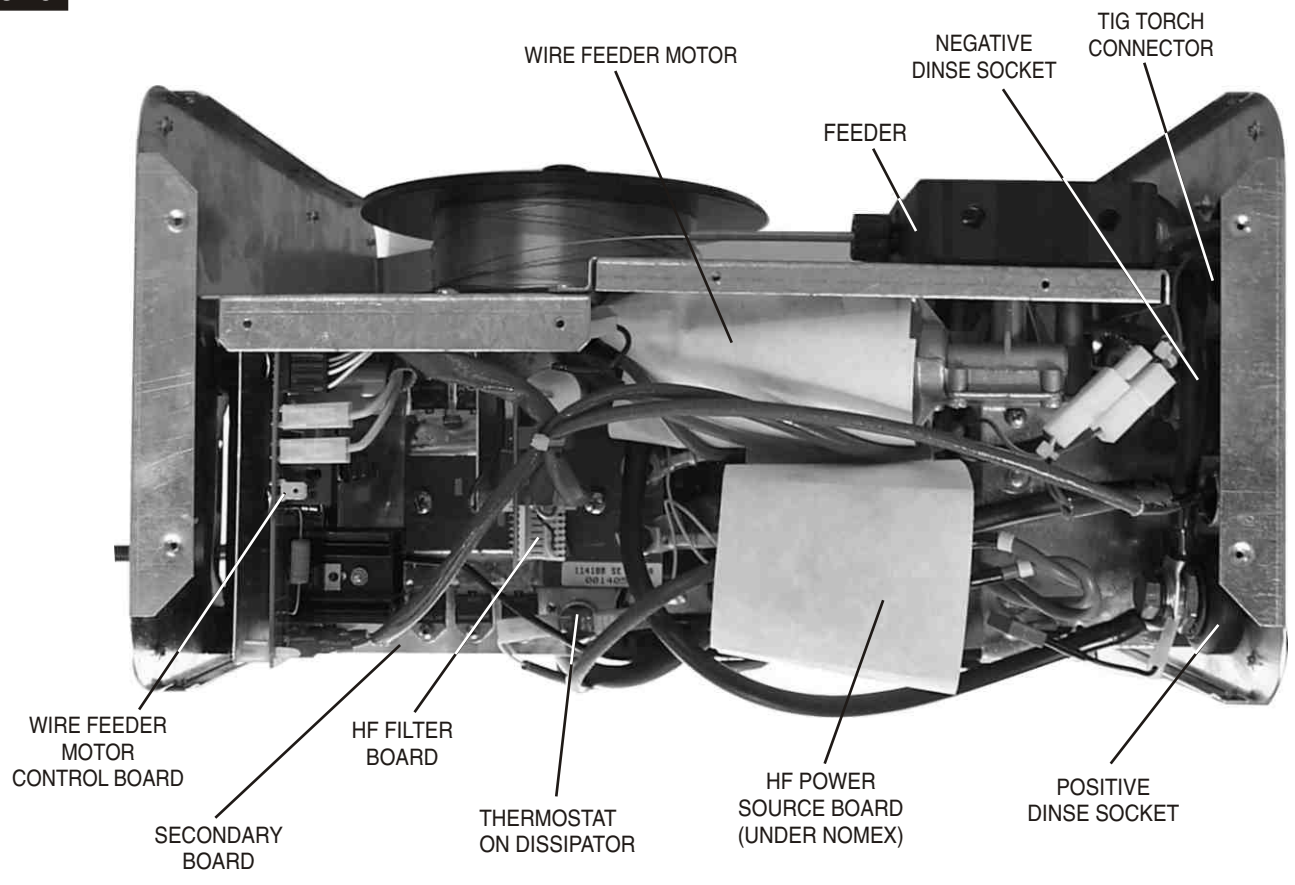

WIRE FEEDER MOTOR
NEGATIVE
DINSE SOCKET
TIG TORCH
CONNECTOR
FEEDER
WIRE FEEDER
MOTOR
CONTROL BOARD
HF FILTER
BOARD
SECONDARY
BOARD
THERMOSTAT
ON DISSIPATOR
HF POWER
SOURCE BOARD
(UNDER NOMEX)
POSITIVE
DINSE SOCKET

FIG. 7

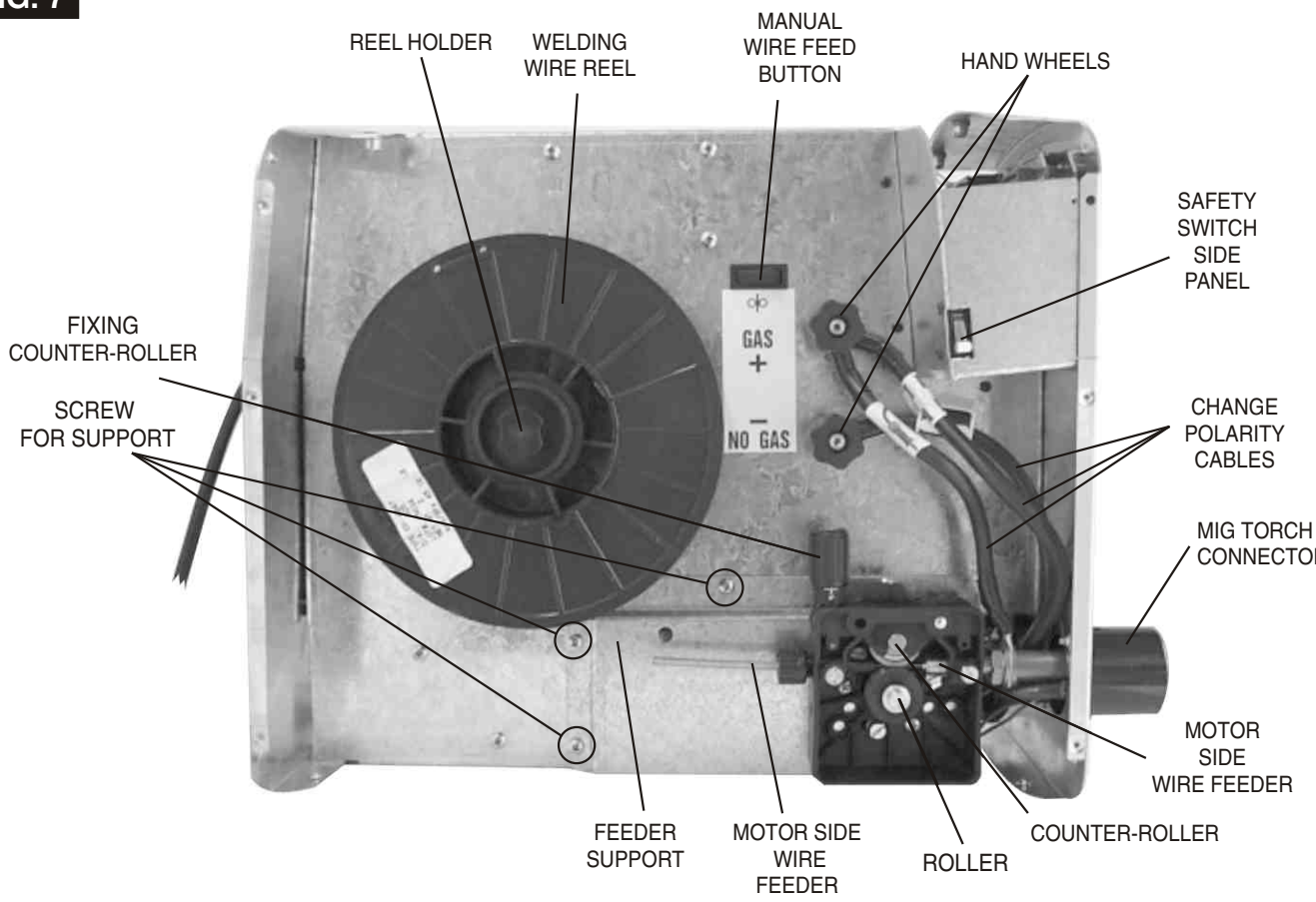

REEL HOLDER
WELDING WIRE REEL
MANUAL WIRE FEED BUTTON
HAND WHEELS
SAFETY SWITCH SIDE PANEL
FIXING COUNTER-ROLLER
SCREW FOR SUPPORT
CHANGE POLARITY CABLES
MIG TORCH CONNECTOR
MOTOR SIDE WIRE FEEDER
FEEDER SUPPORT
MOTOR SIDE WIRE FEEDER
ROLLER
COUNTER-ROLLER
GAS
+
–
NO GAS

FIG. 8

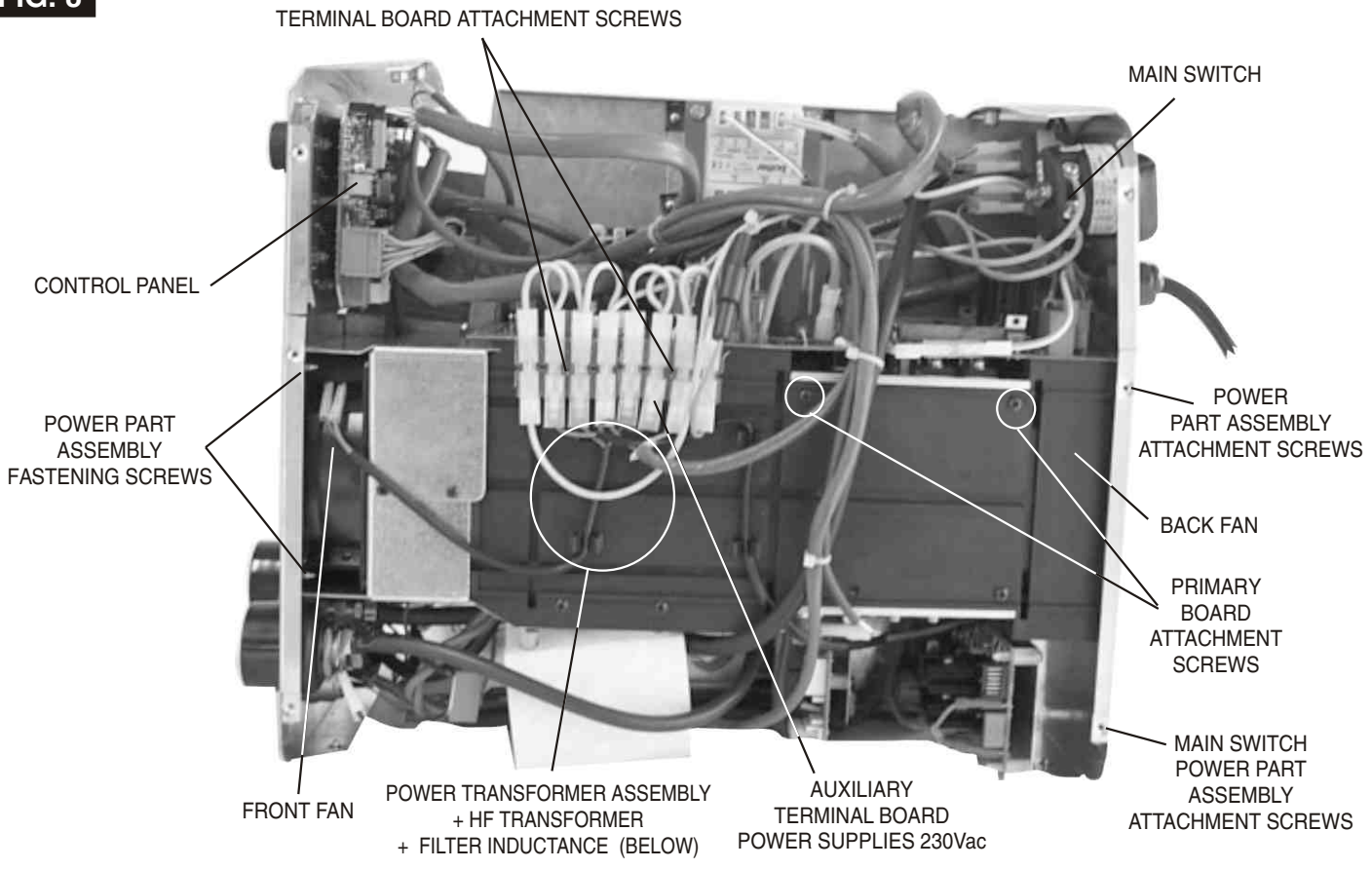

TERMINAL BOARD ATTACHMENT SCREWS
MAIN SWITCH
CONTROL PANEL
POWER PART ASSEMBLY FASTENING SCREWS
POWER PART ASSEMBLY ATTACHMENT SCREWS
BACK FAN
PRIMARY BOARD ATTACHMENT SCREWS
MAIN SWITCH POWER PART ASSEMBLY ATTACHMENT SCREWS
FRONT FAN
POWER TRANSFORMER ASSEMBLY + HF TRANSFORMER + FILTER INDUCTANCE (BELOW)
AUXILIARY TERMINAL BOARD POWER SUPPLIES 230Vac

FIG. 9

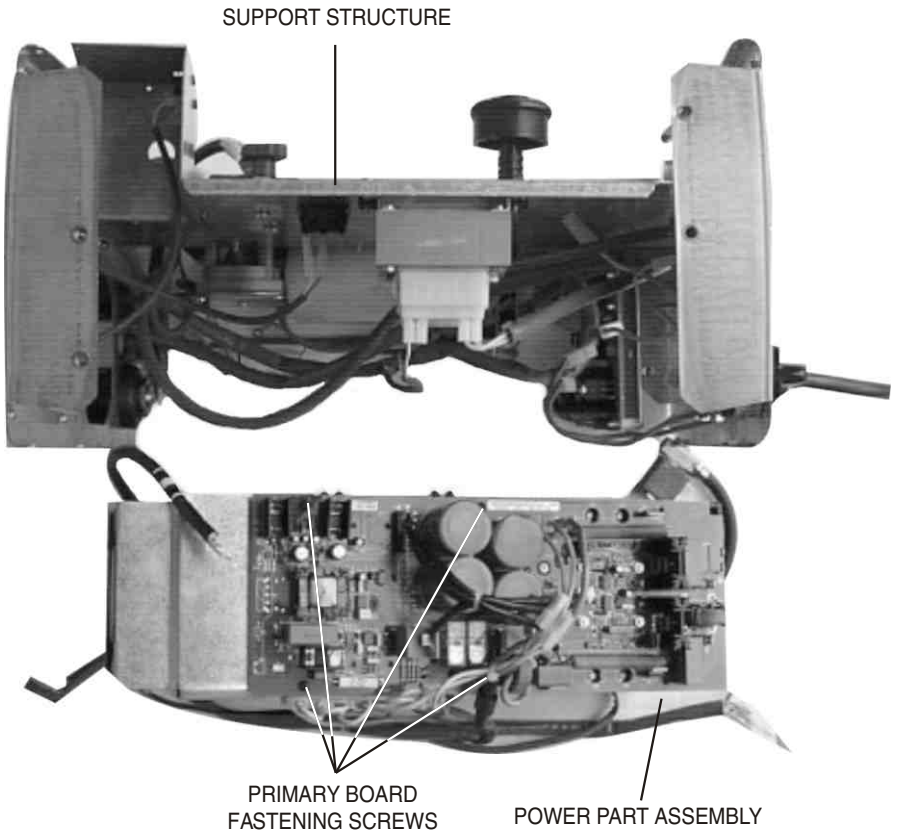

SUPPORT STRUCTURE
PRIMARY BOARD FASTENING SCREWS
POWER PART ASSEMBLY

FIG. 10

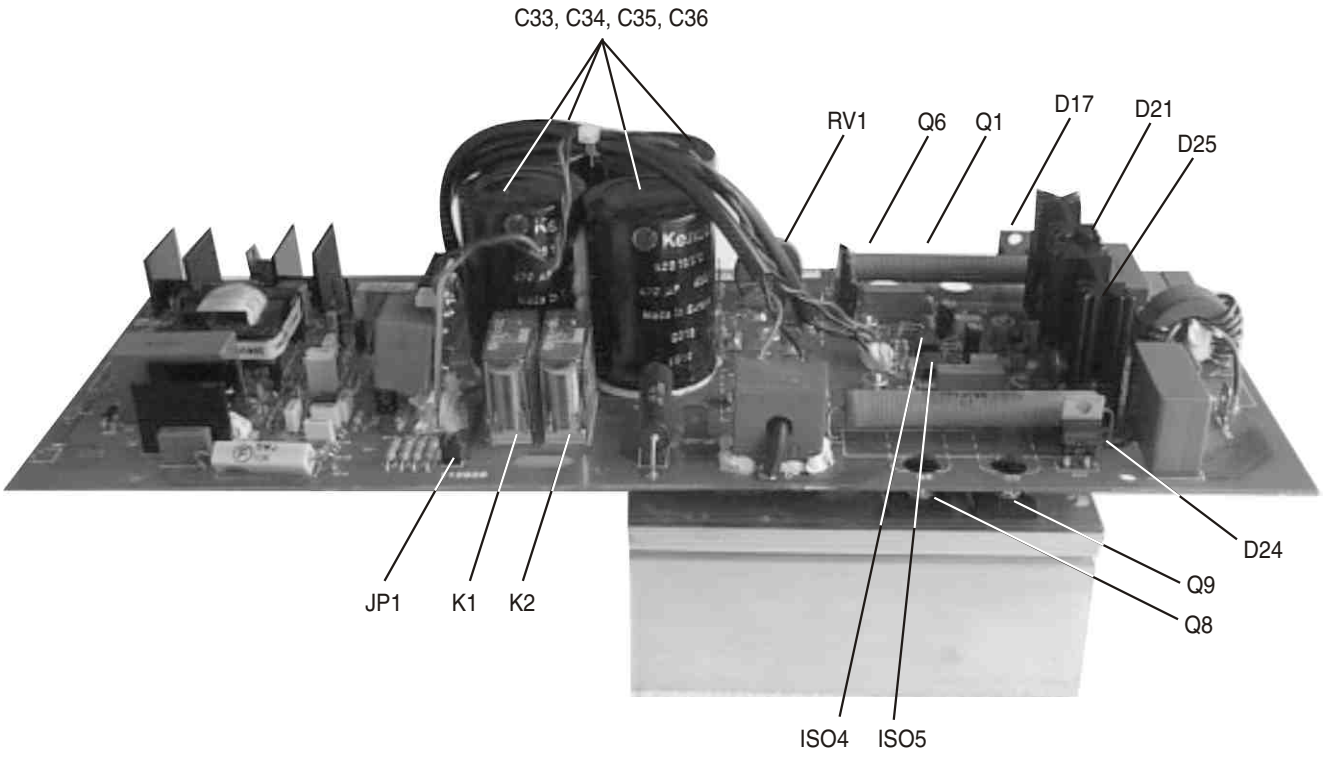

C33, C34, C35, C36
RV1
Q6
Q1
D17
D21
D25
D24
Q9
Q8
JP1
K1
K2
ISO4
ISO5

FIG. 11

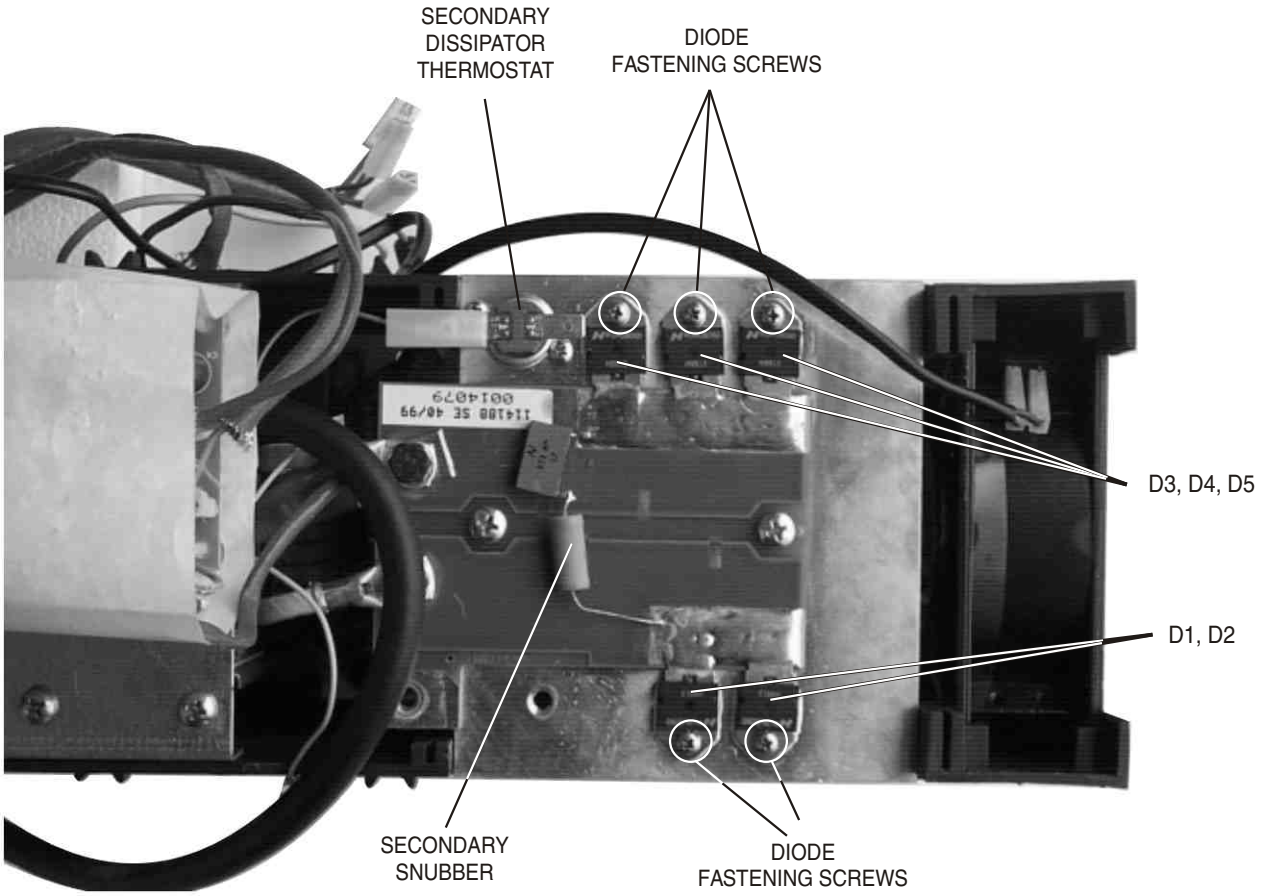
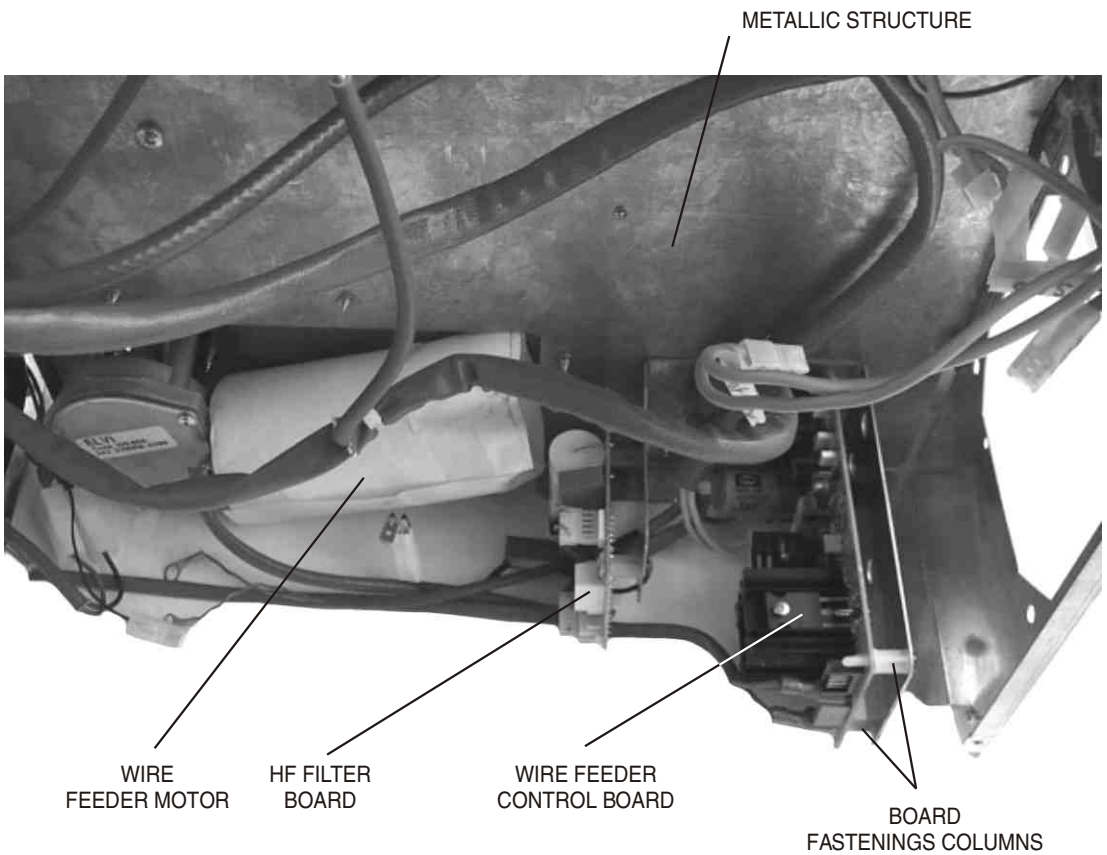

SECONDARY
DISSIPATOR
THERMOSTAT
DIODE
FASTENING SCREWS
D3, D4, D5
D1, D2
SECONDARY
SNUBBER
DIODE
FASTENING SCREWS

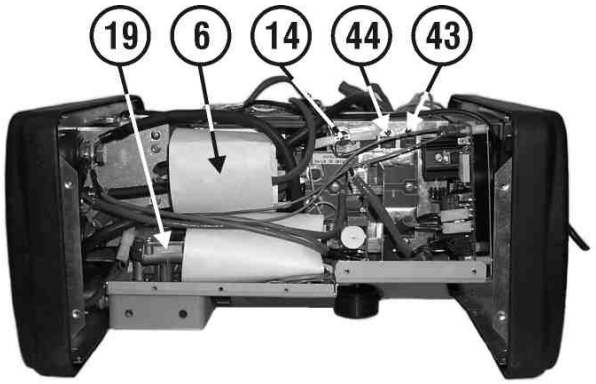
FIG. 12

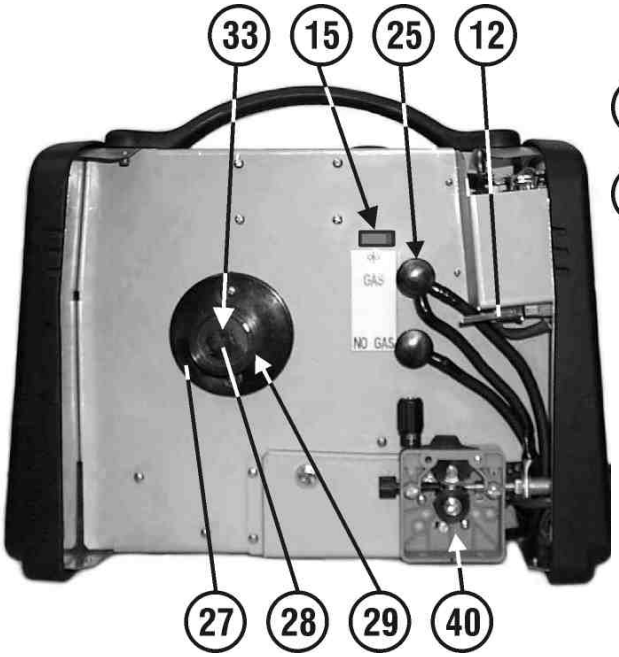

METALLIC STRUCTURE
WIRE
FEEDER MOTOR
HF FILTER
BOARD
WIRE FEEDER
CONTROL BOARD
BOARD
FASTENINGS COLUMNS

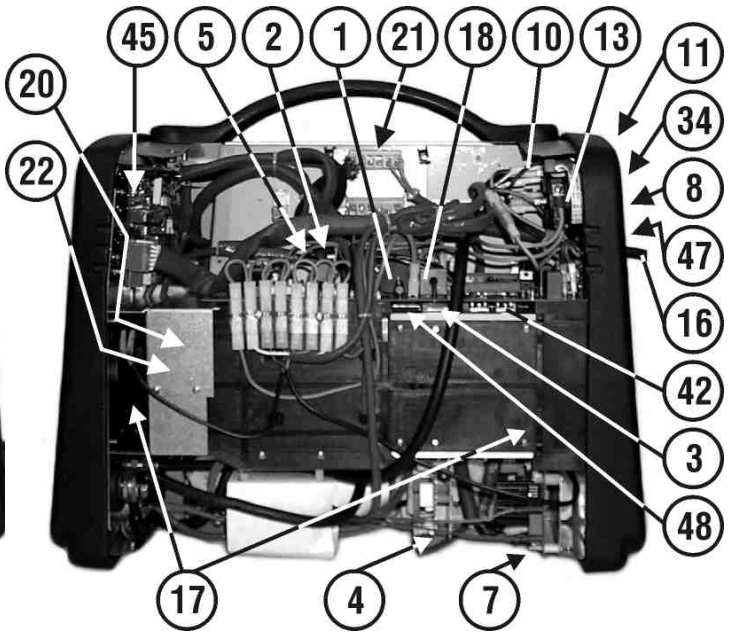
ELENCO PEZZI DI RICAMBIO
LISTE PIECES DETACHEES
SPARE PARTS LIST
ERSATZTEILLISTE
PIEZAS DE REPUESTO

TECHNOTRIS 180

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







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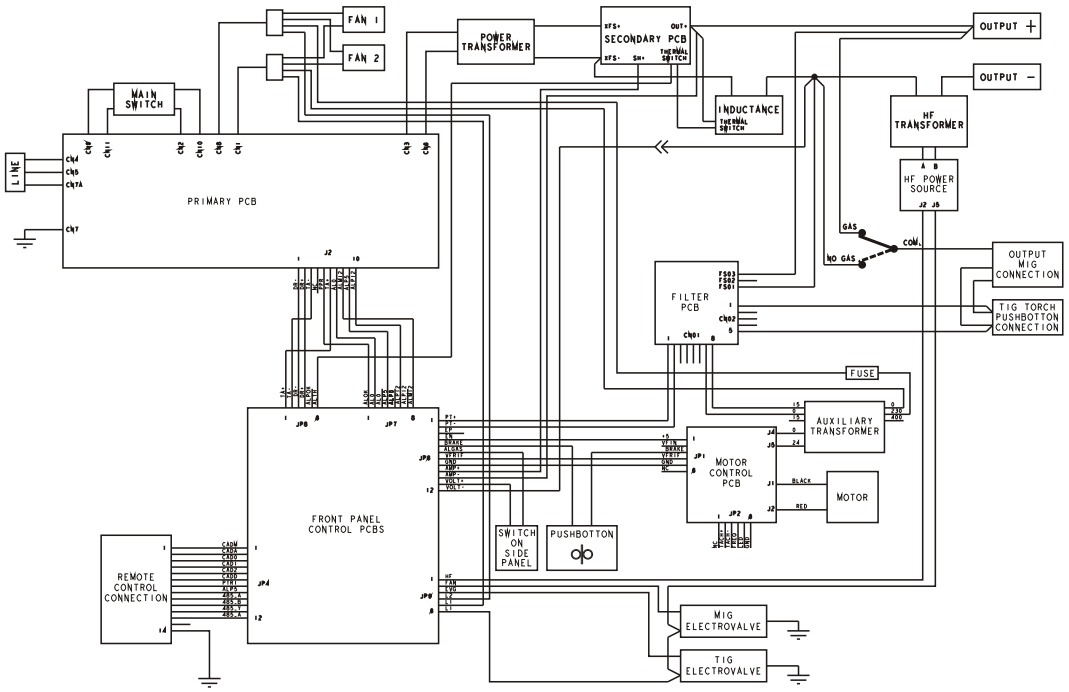
REF.	ELENCO PEZZI DI RICAMBIO PIECES DETACHEES SPARE PARTS LIST ERSATZTEILLISTE PIEZAS DE REPUESTO	CODE CODICE KODE
1	Resistenza Resistance Resistor Widerstand Resistencia	112048
2	Rele' Relais Relais Relais Relais	112342
3	Raddrizzatore Monofase Redresseur Monophase Single-phase Rectifier Einphasiger Gleichrichter Rectificador Monofasico	112357
4	Scheda Filtro Platine Filtre Filter Card Filterkarte Tarjeta Filtro	112478
5	Condensatore Condensateur Capacitor Kondensator Capacitor	112514
6	Scheda H.f. Platine H.f. H.f. Card H.f. Karte Tarjeta H.f.	114005
7	Scheda Di Controllo Platine Controle Control Card Steuerungskarte Tarjeta De Mando	114014
8	Cablaggio Controllo Cable De Controle Control Cable Kontrolkabel Cable De Control	120043
9	Cablaggio Presa Cable De Prise Socket Control Cable Steckdose Kontrolkabel Cable De Control Tomacorriente	120145
10	Elettrovalvola Electrovanne Electrovalve Elektroventil Electrovalvula	122035
11	Manopola Per Commutatore Poignee Pour Commutateur Switch Knob Schaltergriff Manija Por Conmutador	122058
12	Microinterruttore Microinterrupteur Microswitch Microschalter Microinterruptor	122944
13	Interruttore Interrupteur Switch Schalter Interruptor	122444
14	Termostato 10,0A Thermostat 10,0A Thermal Switch 10,0A Thermostat 10,0A Termostato 10,0A	122508
15	Pulsante Poussoir Pushbutton Druckknopf Pulsador	122927
16	Cavo Alimentazione Cable D'alimentation Mains Cable Netzkabel Cable Alimentacion	132158
17	Ventilatore Ventilateur Fan Ventilator Ventilador	152101
18	Trasformatore Di Corrente Ta Transformateur De Courant Ta Current Transformer Ta Stromwandler Ta Transformador De Corriente Ta	152231
19	Motorino Trainafilo Moteur Pour Devidoir Wire Feed Motor Drahtvorschubmotor Motor Por Arrastre Hilo	153000
20	Assieme Trasformatore Transformateur Transformer Assy Transformatorsatz Grupo Transformador	990594
21	Trasformatore Ausiliario Transformateur Auxiliaire Auxiliary Transformer Hilfstrafo Transformador Auxiliar	990598
22	Trasformatore Hf Transformateur Hf Hf Transformer Hf Trafo Transformador Hf	164977
23	Perno Pivot Pin Zapfen Perno	252000
24	Protezione Attacco Torcia Protection Attelage Torche Torch Connection Protection Schutz Des Schlauchpacketanschluss Enghanche Antorcha Proteccion	312045
25	Volantino Volant Handwheel Handrad Volant	312048
26	Assieme Frontale Ensamble Partie Frontale Front Panel Assembly Geraetefrontsatz Grupo Frontal	313501
27	Aspo Support Bobine Spindle Dorn Mandril	322172
28	Ghiera Per Aspo Embout Pour Support Bobine Reel Ring Nut Wicklernutmutter Virola Por Aspa	322173
29	Volantino Per Aspo Volant Pour Support Bobine Reel Handwheel Wicklerhandrad Volant Por Aspa	322174
30	Manopola Poignee Knob Griff Manija	322468
31	Cornice Cadre Frame Rahmen Marco	322486
32	Chiusura Slitta Fermeture Sliding Shutter Verschluss Cierre Plastico	322487
33	Molla Per Aspo Ressort Pour Support Bobine Reel Spring Wickler Feder Muelle Por Aspa	452065
34	Raccordo Acqua Raccord Eau Pipe Fitting Wasseranschluss Racor Agua	602052
35	Fondo Chassis Bottom Bodenteil Base	650307
36	Mantello Capot Cover Deckel Panel De Cobertura	655037
37	Pannello Laterale Partie Laterale Side Panel Seitenblech Flanco	655038
38	Presa Dinse Prise Dix Dinse Socket Dinse Steckdose Enchufe Dinse	712036
39	Attacco Torcia Attelage Torche Torch Connection Schlauchpacketanschluss Enghanche Antorcha	723001
40	Gruppo Traino Devidoir Wire Feed Assy Drahtvorschub Arrastre Hilo	723002
41	Kit Manopola Kit Poignee Knob Kit Griff Kit Kit Manija	990026
42	Kit Igbt Kit Igbt Kit Igbt Kit Igbt Kit Igbt	990054
43	Kit Scheda Secondario Kit Fiche Secondaire Kit Secondary Pcb Kit Sekundaertrafokarte Kit Tarjeta Secundario	990056
44	Kit Diodo Kit Diode Kit Diode Kit Diode Kit Diodo	990059
45	Kit Scheda Pannello Kit Platine Frontal Kit Front Panel Card Kit Geraetefrontskarte Kit Tarjeta Frontal	990075
46	Kit Raccordo Entrata Gas Kit Raccord Entree Gaz Gas Pipe Connector Kit Gaseintrittkit Kit Racor Entrada Gas	990120
47	Kit Pressacavo + Dado Kit Presse-cable + Ecrou Kit Cable Bushing + Nut Kit Kabelhalter + Mutter Kit Prensa Cable + Dado	990152
48	Kit Scheda Primario Kit Fiche Primaire Kit Primary Pcb Kit Primaertrafokarte Kit Tarjeta Primario	99015

Schema elettrico, Schéma électrique, Diagram, Schaltplan, Esquema de conexiones.



Notes:

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 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* ☐

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

Troubles evinced during repair :

_____

_____

_____

_____

_____

_____

_____

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CERTIFIED QUALITY SYSTEM