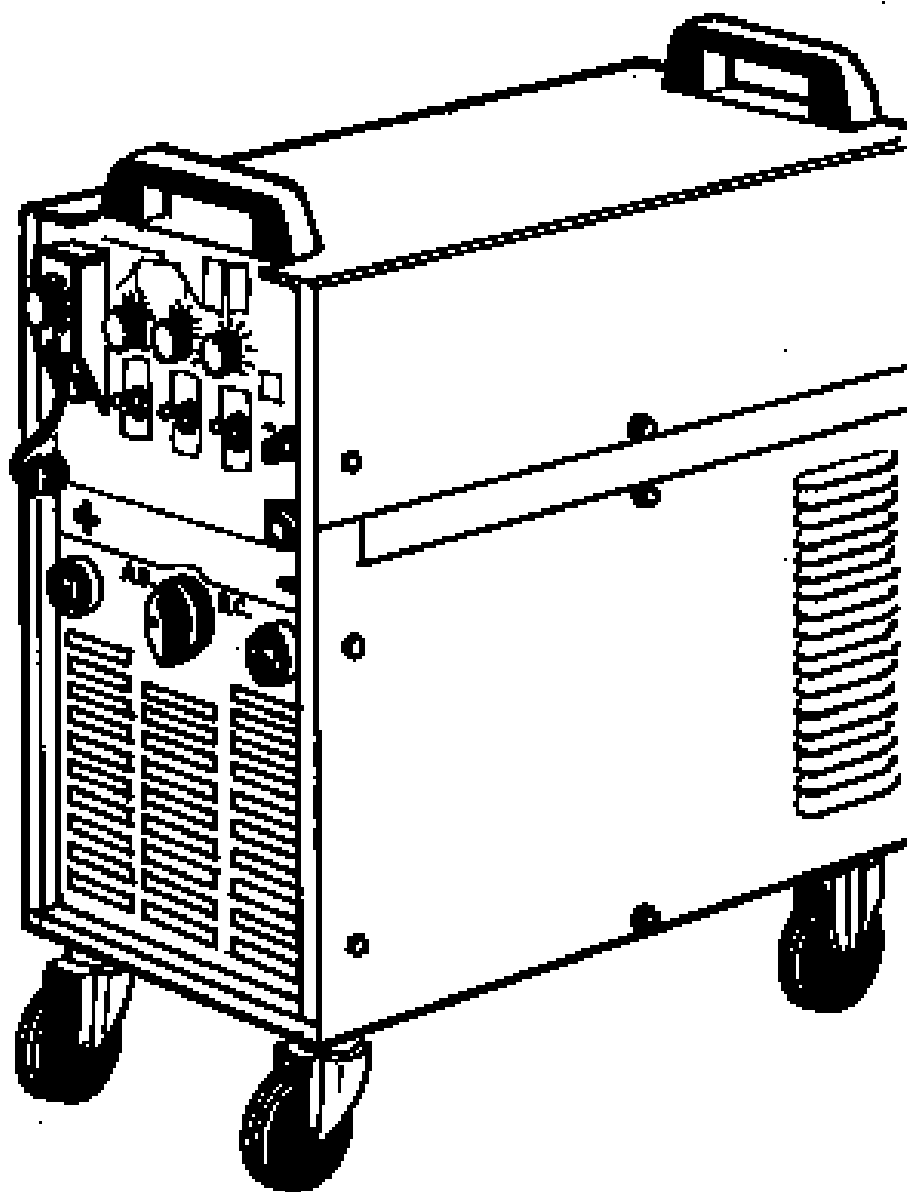


REPAIR MANUAL  
for  
TIG STAR 16 P AC/DC  
Art. 235



---

**WARNING:** All the operations described in this manual must be carried out by qualified and trained personnel.  
This manual must be read in full, along with the instruction booklet 3.300.431

## **DESCRIPTION OF OPERATING LOGIC.**

By turning on the switch (59), the following elements are powered: the power transformer (31), the phase advancement condensers (47), the motor-driven fan (34), the main service transformer (16) and the HF service transformer (9). The main service transformer powers the HF command board (19) and the control board (10), which in turn powers the CURRENT TRANSDUCTOR (14).

At start-up, the power transformer (31) is very briefly powered by a power resistance (60), with the purpose of limiting the starting spike.

### **Manual Metal Arc Operation (MMA)**

Once the switch (59) is turned on, if the welder has the deflector switch (C) set to MMA and the selector (41) set to DC, the controlled diodes (49) and (54), the board (15) and the current control box (4) are powered.

If instead the selector (41) is set to AC, the controlled diode (49) and the current control box (4) are powered.

### **TIG Operation**

If the welder has the deflector switch (C) set to TIG and the deflector switch (M) set to high frequency when the switch (59) is turned on, the HF command board (19) and the HF board (18) are powered. In this case, if the torch trigger is pressed the same conditions arise as for MMA operation in AC and DC modes.

## **DESCRIPTION OF THE BOARD POWER SUPPLIES.**

The main service transformer (16) powers: the control board (10) through an 8-pole connector, and the HF command board (19) and control board (10) through a 10-pole connector.

### **Voltages to check on the control board (10):**

CONNECTOR (1)	Between the two pink wires: 24 V AC
CONNECTOR (2)	Between the two gray wires: with selector (41) set to AC, 24 V AC with selector (41) set to DC, 0V
	Between the two white wires: 27 V AC
CONNECTOR (4)	Between the black wire and the two white wires: 6.5 V AC Between the two white wires: 13 V AC Between the two blue wires: 6.5 V AC Between the brown wire and the 2 red wires: 18 V AC Between the two red wires: 36 V AC

### **Voltages to check on the HF command board (19):**

CONNECTOR (9)	Between the two black wires: 27 V AC
CONNECTOR (8)	Between the two black wires: 380 V AC, output voltage from the service transformer (9).

**With selector (41) set to AC or DC and the deflector switch (C) set to TIG (without torch trigger being pressed)**

### **Voltages to check on the HF command board (19):**

CONNECTOR (9)	Between the two purple wires: 27 V AC with deflector switch (M) set to HF ON (High frequency on).
---------------	---

---

CONNECTOR (8)      With deflector switch (M) set to HF OFF: 0 V  
Between the two white wires: 380 V AC with deflector switch (M) set to HF ON (High frequency on).  
With deflector switch (M) set to HF OFF: 0 V (high frequency turned off).

**Voltages to check on the HF board (18):**

CONNECTOR (12)      Between the two white wires: 380 V AC with deflector switch (M) set to HF ON (High frequency on).  
With deflector switch (M) set to HF OFF: 0 V

**Voltages to check on the control board (10):**

CONNECTOR (2)      Between the two purple wires: 27 V AC with deflector switch (M) set to HF ON (High frequency on). With deflector switch (M) set to HF OFF: 0 V  
CONNECTOR (5)      Between the gray and brown wires: 15 V DC.  
Between the gray and purple wires: 15 V DC.  
These voltages must be present even when the deflector switch (C) is set to MMA.

**Voltages to check on the base current board (15):**

There are 60 V AC between the 2 wires arriving from the power transformer. This voltage must be present even when the deflector switch (C) is set to MMA.

**With selector (41) set to AC or DC and the deflector switch (C) set to TIG**

(With the torch trigger pressed, and thus with high frequency present on the torch. A slight humming may be heard inside the machine).

**Voltages to check on the control board (10):**

CONNECTOR (2)      Between the two blue wires: 0 V.  
Between the two brown wires: 27 V AC, with the HF deflector switch (M) set to ON.  
With HF deflector switch (M) set to HF OFF: 0 V

**Voltages to check on the base current board (15):**

CONNECTOR (11)      Between the two blue wires: 0 V.

**Voltages to check on the HF command board (19):**

CONNECTOR (9)      Between the two brown wires: 27 V AC with the HF deflector switch (M) set to ON.  
With the HF deflector switch (M) set to HF OFF: 0 V

**With selector (41) set to DC and the deflector switch (C) set to TIG**

(With the torch trigger pressed, and thus with high frequency present on the torch. A slight humming may be heard inside the machine).

**Voltages to check on the control board (10):**

CONNECTOR (2)      With the HF deflector switch (M) set to ON:  
Between the two blue wires: 27 V AC.  
Between the two brown wires: 27 V AC.  
With the HF deflector switch (M) set to OFF:  
Between the two brown wires: 0 V

---

**Voltages to check on the HF command board (19):**

CONNECTOR (9) Between the two brown wires: 27 V AC with the HF deflector switch (M) set to ON.  
0 V with the HF deflector switch (M) set to OFF.

**Voltages to check on the base current board (15):**

CONNECTOR (11) Between the two blue wires: 27 V AC.

**With selector (41) set to AC and the deflector switch (C) set to MMA**

With the deflector switch (C) set to MMA, the boards (19) and (10) are powered only by the service transformers, and do not run.

Direct command to the controlled diode (49) and voltage to the remote control (4).

**“The machine is ready to weld !!”**

**With selector (41) set to DC and the deflector switch (C) set to MMA**

Direct command to the controlled diodes (49) and (54), and voltage to the remote control (4).

**“The machine is ready to weld !!”**

**Voltages to check on the control board (10):**

CONNECTOR (2) Between the two blue wires: 27 V AC.  
0 V with the selector (41) set to AC.

**Voltages to check on the base current board (15):**

CONNECTOR (11) Between the two blue wires: 27 V AC.  
0 V with the selector (41) set to AC.

The open-circuit output voltage from the generator must always be checked in DC mode and with the high frequency turned off. It cannot be checked in AC, since the generator always starts with a single half-wave.

The open-circuit voltage is the one indicated on the specifications plate, measured per standards (CEI 26.13) between the 2 outputs + and -, or on the FASTON connectors of the board (15) at the 2 red and black wires.

The AC open-circuit voltage may be measured at the secondary outlet of the power transformer (31); it must be 55 V AC.

**POSSIBLE BREAKDOWNS**

Below are described a few hypothetical defects. Please contact us if you encounter any defects not described in this manual.

**When the torch trigger is pressed:**

A. No gas comes out:

- 1) Solenoid valve (58) defective
- 2) The 27 V AC do not arrive at the connector (2). Either the board (10) or the connectors are defective.
- 3) The command does not reach the control board. Either the torch trigger connector (1) or the control board (10) does not work.

B. No high frequency in welding:

- 1) The high-frequency transformer (55) is not connected.
- 2) The filter circuit (57) is not connected properly. It must always be connected before the high-frequency transformer (55). See electrical diagram.

- 
- 3) HF board (18) is defective. Replace.
  - 4) The HF command board (19) does not power the HF board (18).

To make sure that the HF command board (19) is running properly, turn the deflector switch (M) to make sure that the relay in front of the 6-pole connector (8) closes. Also make sure that the second relay on the board (19) follows the torch trigger command. If the defect is not eliminated even when the 2 relays work, either the command board (19) is defective or no voltage arrives at the service transformer (9). In this case, make sure its fuse is not burnt out.

After checking the above, with the machine set to TIG DC make sure that the 60 V AC sent by the power transformer arrive at points C and D on the board (15), and that the relay on board (15) follows the torch trigger command. At this point the torch should have high frequency.

If the high frequency disappears when switching between DC and AC, the breakdown can be attributed to the control board (10), or to the phases between the power transformer (31) and the main service transformer (16) being improperly connected. In this case, reverse the connection.

**C. The arc starts with some hesitation in TIG DC at low currents:**

This cause probably depends on a lack of base current; therefore, check:

- 1) The voltage between points C and D on the board (15).  
It must be 60 V AC. If it is not there, check the connections and the power transformer.
- 2) The relay on board (15) must follow the torch trigger command. Make sure that power reaches the board (15) from the control circuit (10).
- 3) Board diodes interrupted (replace the board (15)).
- 4) Resistance (29) interrupted. Replace.

**D. The arc starts and welds with some hesitation in TIG AC:**

- 1) Contact C1-C2 of the selector (41) does not close. If this occurs, when the torch trigger is pressed a single half-wave does not start, and thus connector n. 10 of the board (19) has the open-circuit voltage of the power transformer. In addition, the relay on the base current board (15) closes.
- 2) Incorrect starting control by the board (10). Replace.
- 3) Malfunction of the board (53). Replace.
- 4) High-frequency command not given correctly. Replace the board (19).

**E. Welding current not controlled:**

- 1) Controlled diodes (49) and (54) have short-circuited, and thus the maximum welding current is uncontrollable.
- 2) The impedance (40) has short-circuited.
- 3) The diode bridge (52) has short-circuited (for DC only).
- 4) Control board (10) defective.

If the service transformer (16) power supply is disconnected during maintenance, when replacing it make sure to connect it as it was originally. If the connection is reversed, the current can no longer be controlled. This defect disappears when the service transformer (16) power supply is connected properly.

**Notes:**

Always use genuine CEBORA spare parts.

After each repair, you must perform the safety tests prescribed in paragraph 6.1.3 of the IEC 974.1 standards.