BRAVO MIG

POWER SOURCES
arts. 574 – 575 – 591 – 593

SERVICE MANUAL

CONTENTS

1 - GENERAL INFORMATION

1.1 - Introduction.

The purpose of this manual is to train personnel assigned to carry out maintenance on the power sources art. 574, 575, 591 and 593 for welding systems with MIG process.

1.2 - General service policy.

It is the responsibility of the customer and/or operator to use the equipment appropriately, in accordance with the instructions in the Manual, as well as to maintain the equipment and related accessories in good working condition, in compliance with the instructions provided in the Service Manual.

Any internal inspection or repairs must be carried out by qualified personnel who are responsible for any intervention on the equipment.

It is forbidden to attempt to repair damaged electronic boards or modules; replace them with original Cebora spare parts.

1.3 - Safety information.

The safety notes provided in this manual are an integral part of those given in the Instruction Manual. Therefore, before working on the machine, please read the paragraph on safety instructions in the aforementioned manual.

Always disconnect the power cord from the mains before accessing the interior of the equipment.

Some internal parts, such as terminals and dissipaters, may be connected to mains or otherwise hazardous potentials. It is therefore forbidden to work with the safety guards removed from the machine unless strictly necessary. In this case, take special precautions such as wearing insulating gloves and footwear, and working in a perfectly dry environment with dry clothing.

1.4 - Electromagnetic compatibility.

Please read and observe the instructions provided in the paragraph “Electromagnetic compatibility” of the Instruction Manual.

2 - SYSTEM DESCRIPTION

2.1 - Introduction.

The BRAVO MIG system is made up of equipment for welding mild steel, stainless steel and aluminum using the MIG process. Each piece of equipment essentially consists of an electric power source with built-in wire feed unit.

The power sources that make up the series include arts. 574, 575, 591 and 593.

2.2 - Technical specifications.

To verify the technical specifications, see the machine plate, Instruction Manual, and Sales Catalogue.

2.3 - Description of power sources.

The articles in the BRAVO MIG series described in the present manual are direct current power sources, essentially electromechanical, made up of a single-phase (art. 574) or three-phase transformer (arts. 575, 591 and 593) and a rectifier bridge.

Referring to the electrical diagrams in par. 5, the figs. in par. 4 and fig. 3.2.1 you can see the main blocks that make up the power sources.

In power sources arts. 574 and 575, the switch (E) (50) acts as both the main switch and output voltage selector for the power source. Depending on its position, the supply voltage is applied to the various intermediate sockets of the primary winding of the transformer (30), for the purpose of altering the voltage on the secondary winding and thus at the power source output. This adapts the output current of the power source to specific welding needs.

In power sources arts. 591 and 593 the switch (E) (51) acts as a main switch, while the output voltage is selected via the combined action of the two switches (F)(50) and (E)(51).

The mains voltage is applied to the power transformer (30) only after the contactor (47) is closed as controlled by the control board (42) based on the operating conditions of the power source.

The switches (50) or (51) directly affect the service transformer (44), which powers the control board (42), which contains all circuits that manage all of the power source functions, included the wire feeder motor speed control.

The wire speed is adjusted manually, thus regardless of the position of switches (50) and (51), and may be adjusted from 0 to approximately 20 m/min. using knob (D).

The motor speed is adjusted by the electronic regulator present on the control board (42), which is powered with the same supply voltage as the control board (42), supplied by the service transformer (44).

On power source control panel is the knob (A) for adjusting welding spot time. With this knob rotated in maximum contrary-clockwise, a build in switch disables the timing function and allows the welding as long as the pressure on the start button lasts.

The secondary transformer circuit (30) is connected to the rectifier bridge (24), which rectifies the welding current.

The choke (49) inserted downstream from the rectifier bridge (24) in arts. 574 and 591 serves to level the welding current.

The intermediate socket in art. 591 maximize the welding quality for the various materials to be welded, and the resistor (18) improves the welding start.

The polarity selector switch (61) provided on arts. 574 and 575 makes it possible to use these power sources with flux-cored wire.

The power source power outputs are gathered together on the front panel. A central adapter (H) (39) is set up for the torch with a built-in power socket, two contacts for the start command, and a pneumatic socket for gas.

The gas solenoid (14) and the line contactor (47) are activated by the torch start button, and their condition depend on the status of the safety parts in the power source (safety switch (59) on the wire feed unit guard, and thermostat (63) on the windings of the power transformer (30)).

When these are tripped they stop the power source, opening the contactor (47) and lighting the led (C) on the control panel.

The signals processed by the electronic board and present at its connectors are listed in the table in chapter five of this manual.

3 - MAINTENANCE

WARNINGS

ANY INTERNAL INSPECTIONS OR REPAIRS MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.

BEFORE CARRYING OUT ROUTINE MAINTENANCE, DISCONNECT THE POWER SOURCE FROM THE MAINS.

3.1 - Periodic inspection, cleaning.

Periodically remove dirt and dust from the internal parts of the power source, using a jet of low-pressure dry compressed air or a brush.

Check the condition of the output terminals and power cables of the power source and torch; replace if aged or damaged.

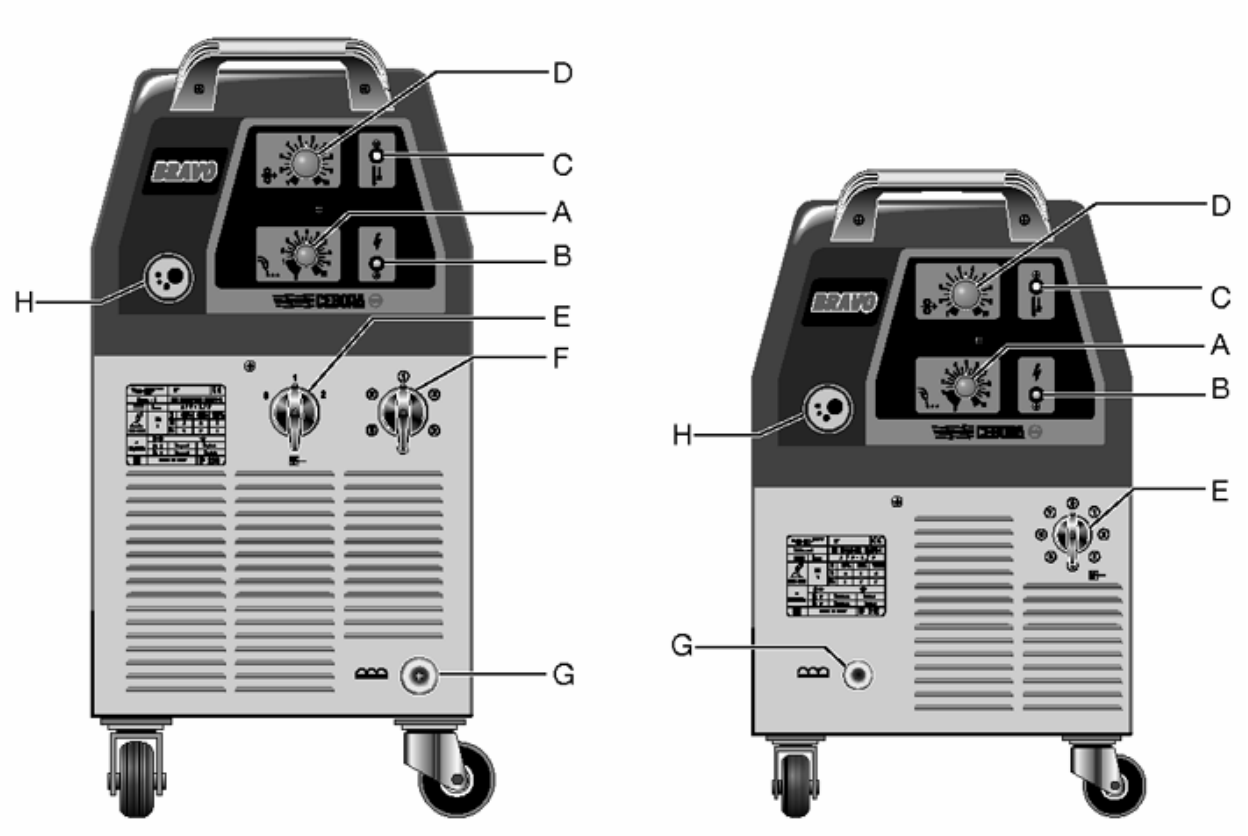
Check the condition of the internal power connections and connectors on the electronic board; if you find “loose” connections, tighten or replace the connectors.

3.2 - Operating sequence.

The following sequence represents correct functioning of the machine. It may be used as a guiding procedure for troubleshooting.

It must be carried out after each repair without any errors.

3.2.1 - Power source commands and signals.



NOTES

- Operations preceded by this symbol refer to operator actions.
- ♦ Operations preceded by this symbol refer to machine responses that must occur following an operator action.

3.2.2 - Power source operation.

- System shut off and disconnected from the mains.
- Connect the gas supply to the fitting provided on the rear panel.
- Connect the torch to the central adapter (H) of the power source.
- Connect the cable of the power source negative pole (G) to the workpiece.
- Connect the power source to the mains.
- Set the selector switch (E) to position 1.
  - ♦ System powered, fan running, led (B) lit.

Correct? NO (see 3.3.1, 3.3.2).
▼ YES

- Open momentarily the safety switch (59) on the wire feed unit guard.
  - ♦ On control panel led (C) lights for as long as the guard stay open.

Correct? NO (see 3.4).
▼ YES

WARNING

DURING THE FOLLOWING TESTS DO NOT AIM THE TORCH AT PEOPLE OR PARTS OF THE BODY, BUT ONLY TOWARDS AN OPEN SPACE OR THE WORKPIECE.

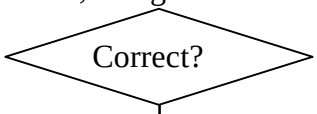
- Turn the switches (50) and/or (51) for an output voltage suitable for the kind of welding to be done.
- Turn knob (A) in maximum contrary clockwise rotation, to disable the timed welding.
- Turn knob (D) for a wire speed suitable for the set welding current.
- Hold down the torch start button for a few seconds.
  - ♦ Gas begins to flow from the torch, open-circuit output voltage is generated, and the wire begins to feed from the torch, or at least the wire feeder motors begin running, for as long as the button is held down.

Correct? NO (see 3.3.3, 3.3.4, 3.3.5, 3.3.6).
▼ YES

- Move the torch near the workpiece and press the torch trigger.
  - ♦ Begin welding. Turn knob (D) to the wire speed suitable for the kind of welding to be performed.

Correct? NO (see 3.3.7).
▼ YES

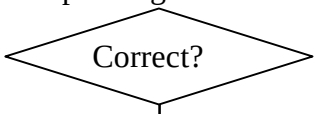
- Release the start button, holding the torch in welding position.
    - The arc shuts down immediately without the wire sticking to the workpiece, the wire stops exiting the torch, and gas flow is interrupted.



NO (see 3.3.8).

YES

- Turn the knob (A) to the central position (spot welding).
- Move the torch near the workpiece and press the start button.
    - Begin welding, that lasts only for the time set by knob (A). Once this time is elapsed the arc shuts down immediately without the wire sticking to the workpiece, the wire stops exiting the torch, and gas flow is interrupted. For a new spot welding, release and press again the start button.



NO (see 3.3.7, 3.3.8).

YES

REGULAR OPERATION.

3.3 - Troubleshooting.

WARNINGS

ANY INTERNAL INSPECTIONS OR REPAIRS MUST BE CARRIED OUT BY QUALIFIED PERSONNEL.

BEFORE CARRYING OUT ROUTINE MAINTENANCE, DISCONNECT THE POWER SOURCE FROM THE MAINS.

NOTES

Items in **boldface** describe problems that may occur on the machine (symptoms).

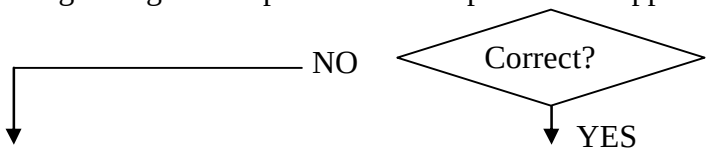
- ❑ Operations preceded by this symbol refer to situations the operator must determine (causes).
- ♦ Operations preceded by this symbol refer to actions the operator must perform in order to solve the problems (solutions).

In the following chapters the tests and descriptions preceded by a parenthetical indication, e.g. (art. 574) refer only to the power sources listed in parentheses. If there is no such indication, the test and description refer to all power sources.

3.3.1 - The power source does not start, control panel off.

MAINS SUITABILITY TEST.

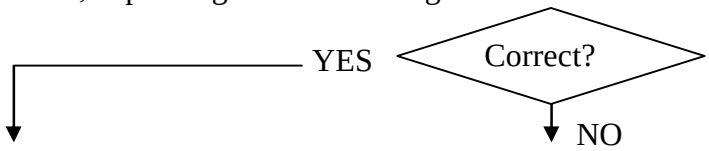
- ❑ Missing voltage at the power source input due to tripped mains protection.



- ♦ Eliminate any short-circuits or isolation leaks between the various conductors and towards earth in connections between the power cable, terminal board (46), contactor (47), switches (50) and (51), service transformer (44) and fan (26).
- ♦ Mains not suitable to power the power source (ex.: insufficient installed power).

MAINS CONNECTION TEST.

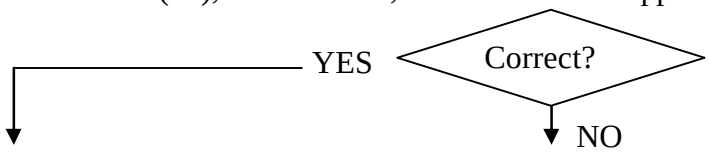
- ❑ (art. 574) Contactor (47), power terminals = approximately 230 Vac.
- ❑ (arts. 575, 591, 593) Contactor (47), power terminals = approximately 3 X 400 Vac or 3 X 230 Vac, depending on mains voltage.



- ♦ Check power cable and plug and connections on terminal board (46), and replace if necessary.
- ♦ Check the mains voltage conditions.

CONTROL BOARD (42) POWER SUPPLY TEST.

- Control board (42), connector J1, terminals 1 - 2 = approximately 28 Vac.

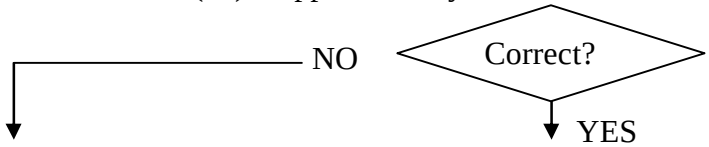


  - ♦ Check the wiring between service transformer (44) and control board (42).
  - ♦ Check the wiring between contactor (47), switches (50) or (51), voltage change terminal board (29) (where present) and service transformer (44).
  - ♦ (arts. 575, 591, 593) Make sure the setting of the voltage change terminal board (29) matches the mains voltage.
  - ♦ Make sure the fuse is intact at the secondary service transformer circuit (44). If interrupted, replace and check the resistance between terminals 1 and 2 of J7 on control board (42). Correct value = >Mohm in both measurement directions. If incorrect, also replace control board (42).
  - ♦ Make sure the fuse is intact on the primary circuit of the service transformer (44). If interrupted, replace and check the resistance of the primary winding.
    Correct values:
    terminals 0 – 230V = approximately 10 ohm, (arts. 574, 575);
    approximately 6 ohm, (arts. 591, 593);
    terminals 0 – 440V = approximately 18 ohm, (arts. 574, 575);
    approximately 11 ohm, (arts. 591, 593).
  - ♦ Check the efficiency of the switches (50) and (51) (see contact table in the electrical diagram of par. 5).
  - ♦ Replace the service transformer (44).
- ♦ Replace the control board (42).

3.3.2 - Power source powered, led (B) lit, fan (26) stopped.

FAN (26) TEST.

- Terminals of fan (26) = approximately 230 Vac, with mains at either 230 Vac or 400 Vac.

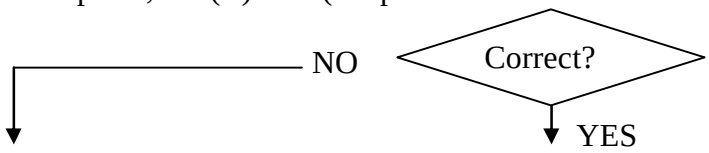


  - ♦ Check the wiring between fan (26) and terminal board on service transformer (44).
  - ♦ Make sure that there are no mechanical impediments blocking the fan.
  - ♦ Replace the fan (26).
- ♦ Make sure the fuse on the power supply for fan (26) is intact, located on the terminal board of the service transformer (44). If interrupted, replace and check the resistance between the terminals of the fan (26).
  Correct values = approximately 500 ohm, (arts 574, 575);
  approximately 60 ohm, (arts. 591, 593).
  If incorrect, also replace fan (26).
- ♦ Replace service transformer (44).

3.3.3 - The start button produces no effect.

POWER SOURCE SAFETY TEST.

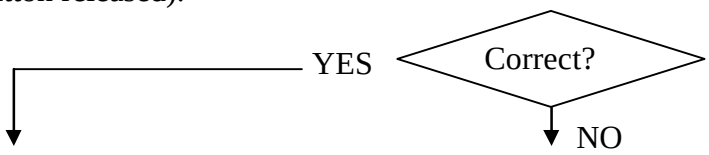
- Control panel, led (C) = lit (temperature outside limits or wire feed unit guard open).



  - ♦ See “Alarm signals”, par. 3.4.

START COMMAND TEST.

- Control board (42), connector J1, terminals 9 – 10 = 0 Vdc with button pressed (40 Vdc with button released).

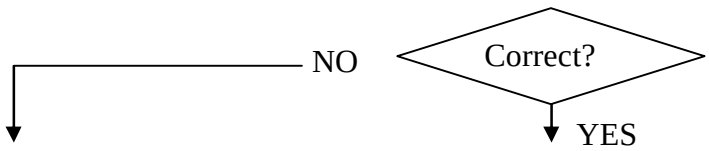


  - ♦ Check the wiring between connector J1 control board (42), fast-on connector located on the wiring, central adapter (39) and torch trigger.
  - ♦ Check torch button. Replace if defective.
  - ♦ See CONTROL BOARD (42) POWER SUPPLY TEST, par. 3.3.1.
  - ♦ Replace the control board (42).
- ♦ Replace the control board (42).

3.3.4 - Power source powered, no gas flows from the torch.

SOLENOID VALVE (14) TEST.

- Solenoid valve (14) terminals = 27 Vac with torch button pressed and as long as the button is held down.

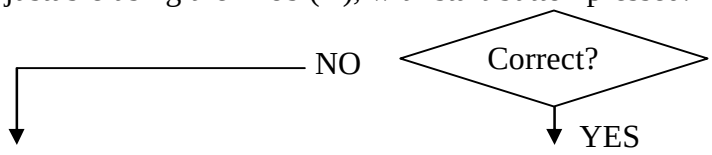


  - ♦ Check the presence of gas at the fitting provided on the rear panel, and make sure that the pressure and air flow in the intake line comply with the values specified for the BRAVO MIG power sources.
  - ♦ Make sure there are no occlusions in the gas hoses of the power source.
  - ♦ Check the resistance on the solenoid valve terminals (14) (with wires disconnected) = approximately 25 ohm. If >Mohm (winding broken), replace the solenoid valve (14).
  - ♦ Replace the solenoid valve (14).
- ♦ Check wiring between terminals 3 and 5 of J1 on control board (42) and solenoid valve (14).
- ♦ Check resistance on the solenoid valve terminals (14) (with wires disconnected) = approx. 25 ohm. If 0 ohm (short-circuit), replace solenoid valve (14) and control board (42).
- ♦ See CONTROL BOARD (42) POWER SUPPLY TEST, par. 3.3.1.
- ♦ Replace the control board (42).

3.3.5 - Power source powered, the wire feeder motor does not work.

WIRE FEEDER MOTOR (5) TEST.

- Control board (42), connector J2, terminals 1 (+) and 2 (-) = 0 / +28 Vdc approximately adjustable using the knob (D), with start button pressed.



  - Check the wiring between J2 control board (42) wire feeder motor (5).
  - Make sure there are no mechanical impediments blocking the motor.
  - Check the motor rotation direction; if incorrect, reverse the wires on the terminals of J2 on control board (42).
  - With the power source off, temporarily disconnect the terminals of the wire feeder motor (5) from the connector J2 control board (42), and check the resistance between the motor terminals left free. Correct value = approximately 1 ohm (resistance of the motor winding). If >Mohm (winding broken), replace wire feeder motor (5).
  - Replace the wire feeder motor (5).

- Make sure the wire feeder motor start command is present by carrying out the START COMMAND TEST, par. 3.3.3.
- With the power source off, temporarily disconnect the terminals of the wire feeder motor (5) from the connector J2 control board (42), and check the resistance between the motor terminals left free. Correct value = approximately 1 ohm (resistance of the motor winding). If 0 ohm (short-circuited), replace the wire feeder motor (5) and control board (42).
- See CONTROL BOARD (42) POWER SUPPLY TEST, par. 3.3.1.
- Replace the control board (42).

3.3.6 - In open circuit operation, the output voltage is not regular.

NOTE

In power sources with three-phase power supply, when the switches (50) and (51) are set to certain positions, the secondary voltage values between phases are different due to the particular connections between switches (50) and (51) and the primary circuit of the transformer (30) (see tables in the diagrams of par. 5). This situation is deliberate in order to offer more voltage levels, with minor differences among them, using a lower number of intermediate sockets on the windings of transformer (30).

OPEN-CIRCUIT OUTPUT VOLTAGE TEST.

- Output terminal (G) power source (-) and output terminal (H) power source (+) = values direct current (Vdc) according to the table, with start button pressed and rated mains voltage.

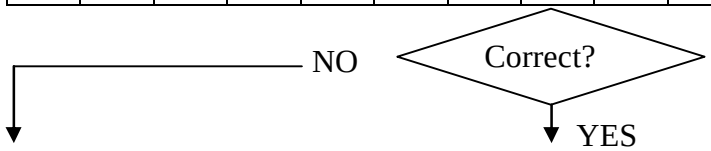
NOTE

The table give the THEORETICAL mean value of the rectified secondary circuit voltages.

When the power source has no load at all, the values that may actually be measured may in some cases be much higher than those given, due to incorrect operation by the rectifier bridge (24) without any load at its output.

With a small load (ex. 100 ohm) applied at the power source output, the operation of the rectifier (24) may improve, and the measurable values may become closer to those given (+/- 10%). Therefore, for measuring we recommend using the latter method, and consider not so important the precision of the absolute value measured, but rather the difference in value as the position of switches (50) and (51) changes.

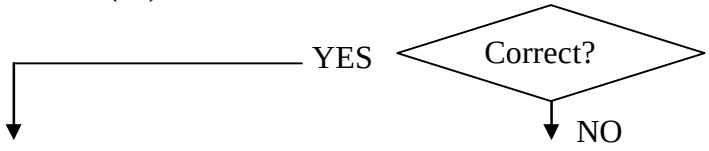
Art	Switch 51 position = 1							Switch 51 position = 2						
	Switch 50 positions							Switch 50 positions						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
574	+15	+17	+18.5	+20	+22.5	+25.5	+29	-	-	-	-	-	-	-
575	+16	+18	+20.5	+23	+25.5	+28	+31	-	-	-	-	-	-	-
591	+16	+17	+18	+19	+20	+21	-	+22	+24	+26	+29	+30.5	+33.5	-
593	+17.5	+18.5	+19.5	+20.5	+22	+24	-	+26	+28.5	+31	+34	+36.5	+42	-



- ♦ Regular operation.

INPUT CONTACTOR (47) TEST.

- Contactor (47) coil terminals = 27 Vac, contacts closed, with start button pressed.



- ♦ Check the wiring between contactor (47) coil and J1 control board (42).
- ♦ With the power source off and unplugged, disconnect temporarily J1 from control board (42), and check the resistance between the terminals of the contactor (47) coil. Correct value = approximately 4.7 ohm. If 0 ohm (short-circuit), replace contactor (47) and control board (42).
- ♦ Check efficiency of start command, performing if necessary the tests in par. 3.3.3.

- With the power source off and unplugged, disconnect temporarily J1 from control board (42), and check the resistance between terminals of contactor (47) coil. Correct value = approximately 4.7 ohm. If incorrect, replace contactor (47).

VOLTAGE TO SECONDARY CIRCUIT OF THE TRANSFORMER (30) TEST.

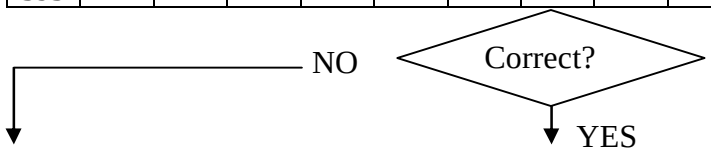
- Disconnect the terminals of transformer (30) secondary circuit from the rectifier bridge (24).
- Terminals of transformer (30) secondary circuit = alternating voltage (Vac) values as shown in the table, with start button pressed, open-circuit power source and rated mains voltage.

NOTE

The table shows the value of the three alternating voltages measured at the secondary circuit; if these are different (marked by an asterisk (*)) the table gives their average.

This average is thus slightly different from the value of each individual phase measured.

Art	Switch 51 position = 1							Switch 51 position = 2						
	Switch 50 positions							Switch 50 positions						
	1	**2**	**3**	**4**	**5**	**6**	**7**	**1**	**2**	**3**	**4**	**5**	**6**	**7**
574	18.5	20.5	22	23.5	27	30	33.5	-	-	-	-	-	-	-
575	13	14.5*	16*	18	20*	22*	24	-	-	-	-	-	-	-
591	12	13*	14*	15	15.5*	16	-	17	18.5*	20*	22	23*	25	-
593	13.5	14.5*	15.5*	16.5	17.5*	19	-	20	22*	24*	26.5	28.5*	32	-



- Check the wiring between transformer (30) secondary circuit and rectifier (24).
- Check the efficiency of the rectifier bridge (24).
- Check the wiring between the negative terminal of rectifier bridge (24), choke (49) (where present), polarity inverter (61) (where present), and output terminal (-) (G) of the power source, and between the positive terminal of rectifier bridge (24), polarity inverter (61) (where present), and central torch adapter (+) (H). If you find loose connections, tighten them and replace any components with damaged terminals.

- Check the wiring between power cord, contactor (47), switches (50) and (51) and primary winding of the transformer (30).
- (575, 591, 593) Make sure the primary circuit of the transformer (30) is properly connected on the voltage change terminal board (29), and that the position of the voltage change (29) matches the mains voltage.
- (575, 591, 593) Check the delta connection of the windings that make up the secondary transformer circuit (30).
- Check the efficiency of the switches (50) and (51).
- With the power source off and unplugged, check the efficiency of the contacts of contactor (47), tripping it manually and checking whether the resistance on each contact is approximately 0 ohm. If you find burnt contacts or have difficulty moving the mobile equipment, replace the contactor (47).
- Replace the transformer (30).

3.3.7 - In resistive load operation, the output voltage is not regular.

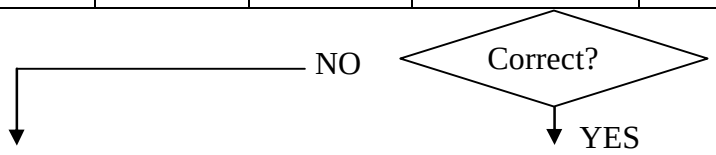
NOTE

Only the tests loaded at the maximum output voltage are described below, and thus at the maximum current of the power source, since it is assumed that the OPEN CIRCUIT OPERATION TEST in par. 3.3.6. has been successfully completed, and thus the connections, turns ratio and operation of the transformer (30) are all assumed correct.

OUTPUT VOLTAGE TEST ON RESISTIVE LOAD.

- Output terminal (G) power source (-) and output terminal (H) power source (+) = direct current values as shown in the table, with start button pressed.

Power Source Art.	Position switch 50	Position switch 51	Resistive load resistance	Power source output current (Adc)	Power source output voltage (Vdc)
574	7	-	0.143 ohm	150	+21.5
575	7	-	0.132 ohm	170	+22.5
591	6	2	0.12 ohm	200	+24
593	6	2	0.1 ohm	250	+26.5



- ♦ Regular operation.

- ♦ Make sure the connections of the primary circuit of the transformer (30) to the switches (50) and (51) and the voltage change terminal board (29) (where present) are intact. If you find loose connections, tighten them and replace any components with damaged terminals.
- ♦ Check the efficiency of switches (50) and (51), especially make sure there are no signs of burned or misshapen contacts. If necessary replace the defective switch.
- ♦ With the power source off and unplugged, check the efficiency of the contacts of contactor (47), tripping it manually and checking whether the resistance on each contact is approximately 0 ohm. If you find burnt contacts or have difficulty moving the mobile equipment, replace the contactor (47).
- ♦ Check the wiring between the secondary circuit winding of transformer (30) and rectifier bridge (24). If you find loose connections, tighten them and replace any components with damaged terminals.
- ♦ Check the efficiency of the rectifier bridge (24).
- ♦ Make sure the connections between the negative terminal of rectifier bridge (24), choke (49) (where present), polarity inverter (61) (where present), and output terminal (-) (G) of the power source are intact, as well as between the positive terminal of rectifier bridge (24), polarity inverter (61) (where present), and central torch adapter (H) (+). If you find loose connections, tighten them and replace any components with damaged terminals.
- ♦ Replace the transformer (30).

3.3.8 - When start button is released, the wire sticks to the workpiece (ineffective motor braking).

NOTE

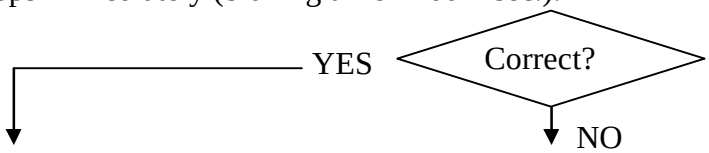
In the power sources covered by this manual, the electronic power source delays ceasing to generate current while the wire from the torch slows, since although it brakes after welding, the wire feeder motor still takes some time to come to a complete stop.

This time depends on various circumstances such as the type of torch, size of the wire coil, type of wire, wire speed during welding, etc.

Thus if the wire sticks to the workpiece at the end of welding, consider the above conditions and carry out the test that follows.

WIRE FEEDER MOTOR (5) BRAKING TEST.

- Control board (42), connector J2 terminals 1 and 2 (gnd) = fig. 5.2.1, when the start button is released, with the power source open-circuit (no wire in the torch). The wire feeder motor stops immediately (braking time <400 msec.).



  - If you encounter fig. 5.2.2 (the motor slows from its own inertia), the braking circuit on the control board (42) does not work properly, replace control board (42).
- Make sure that there are no mechanical impediments preventing the wire coil from stopping despite the braking action of the motor (ex.: sliding by wire feeder rollers, improperly adjusted roller spring).
- Replace the control board (42) and/or motor (5).

3.4 - Alarm signals.

3.4.1 - Led (C) lit = high temperature signal, or open wire coil cover.

This alarm indicates that the temperature of the transformer (30) has risen beyond the allowed limits, or the safety cover of the wire feeder unit is open.

In the former instance we recommend not to shut off the power source, to keep the fan running and thus allow rapid cooling. Normal operation is restored automatically as soon as the temperature returns within the allowed limits.

If the alarm occurs repeatedly, we recommend that you:

- Make sure the fan (26) is operating correctly.
- Make sure that air is flowing properly and that there is no dust or other obstacles to cooling.
- Make sure that the working conditions comply with the specified values, especially observing the “duty cycle”.
- Make sure that the thermostat mounted on the transformer (30) is properly assembled and functioning correctly; its contact must be closed at ambient temperature.
- Make sure the safety switch (59) and the wire feed unit guard are in good condition and properly mounted. With the guard closed the contact of switch (59) must be closed. If incorrectly positioned, correct the position; replace if defective.
- Make sure that the voltage on terminals 7 (+) and 8 (-) of J1, control board (42) = 0 Vac (contacts closed) with temperature correct and wire feed unit guard closed; (+35 Vdc approx. with thermostat on transformer (30) or wire feed unit guard open). If correct, replace control board (42). If incorrect, check the wiring between terminals 7 and 8 of J1 control board (42), thermostat on the transformer (30), switch (59) on the guard of the wire feed unit.
- Replace the control board (42).

4 - COMPONENTS LIST

4.1 - Power sources arts. 574–575–591–593 : see file ESP5**.pdf enclosed at the end of the manual.

4.2 - Components table : see file ESP5**.pdf enclosed at the end of the manual.

4.3 - Spare parts list.

Essential spare parts.

Ref.	Description	Qty.	Art. 574	Art. 575	Art. 591	Art. 593
26	motor-driven fan	1	3165075	3165075	-	-
26	motor	1	-	-	3165203	3165203
27	fan	1	-	-	3065103	3065103
38	knob	1	3055137	3055137	3055137	3055137
40	knob	1	3055136	3055136	3055136	3055136
42	progr. control circuit	1	5602151	5602151	5602151	5602151
47	contactor	1	3190268	3190268	3190268	3190276

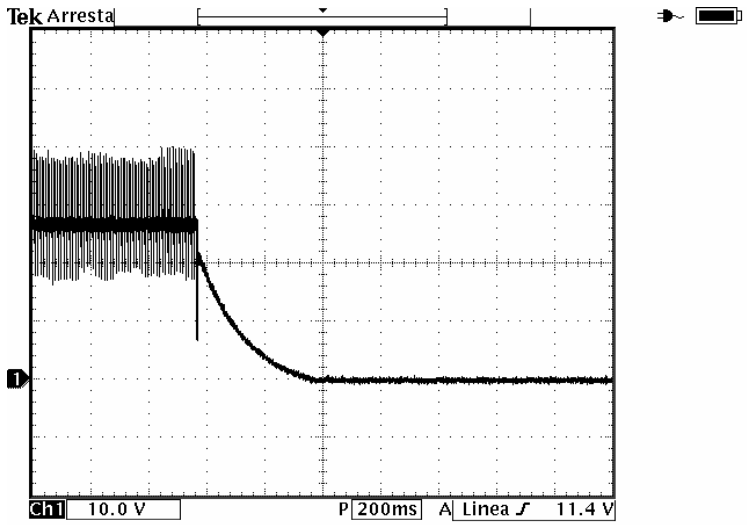
Recommended spare parts.

Ref.	Description	Qty.	Art. 574	Art. 575	Art. 591	Art. 593
6	coil support	1	3060278	3060278	3060278	3060278
14	solenoid valve	1	3160181	3160181	3160181	3160181
24	rectifier	1	3200326	3200330	3200305	3200328
44	service transformer	1	5610043	5610043	5610034	5610034
50	selector switch	1	3190507	3190508	3190505	3190512
51	selector switch	1	-	-	3190504	3190514

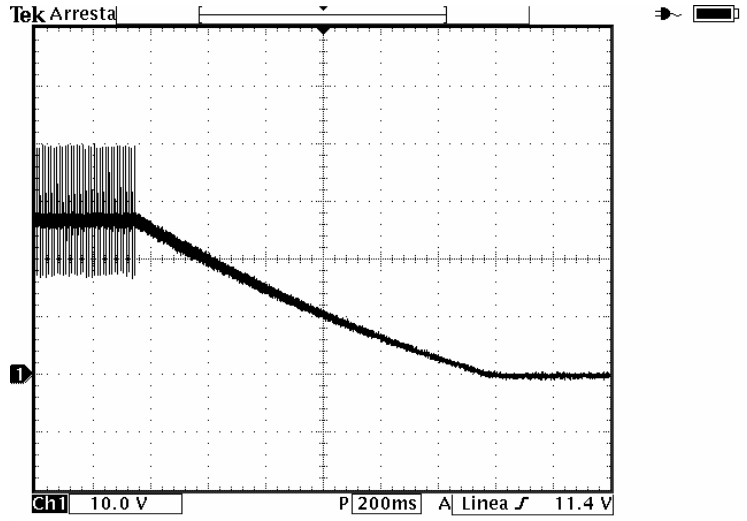
5 - ELECTRICAL DIAGRAMS

5.1 - Power sources arts. 574-575-591-593 : see file SCHE5**.pdf enclosed at the end of the manual.

5.2 - Waveforms.



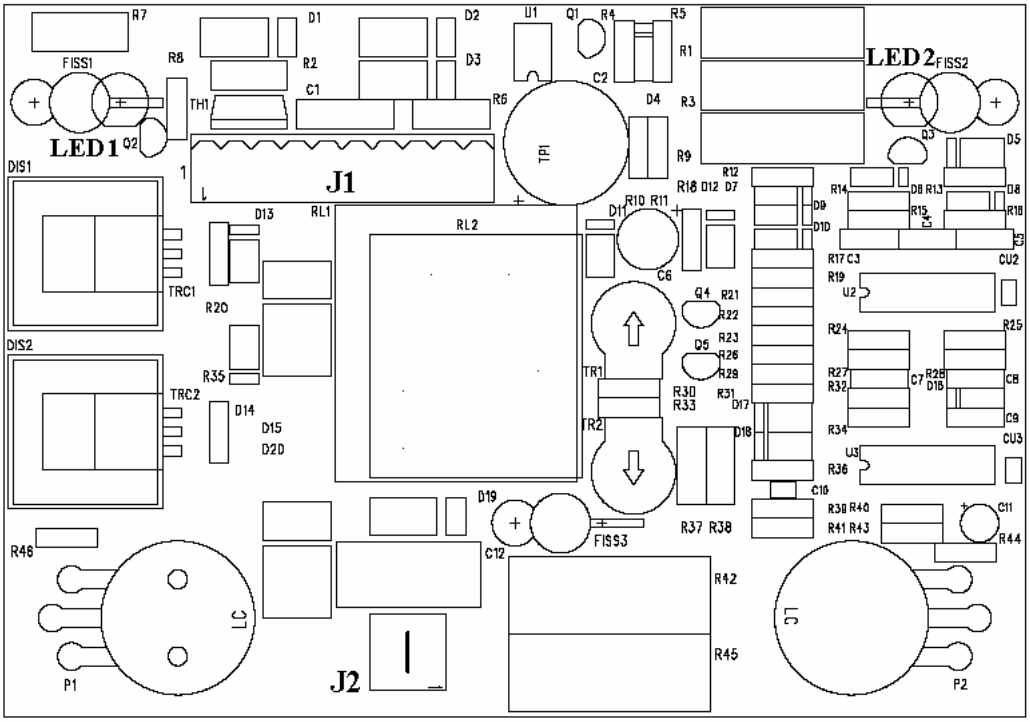
5.2.1 - Wire feeder motor (5) voltage during correct braking (par. 3.3.8).



5.2.2 - Wire feeder motor (5) voltage during incorrect braking (par. 3.3.8).

5.3 - Control board (42) code 5.602.151.

5.3.1 - Topographical drawing.



5.3.2 - Connector table.

Conn.	Terminals	Function.
J1	1 - 2	28 Vac input for control board (42) power supply.
J1	3 - 5	solenoid valve (14) command output.
J1	4 - 6	contactor (47) command output.
J1	7 - 8	input signal from safety circuits (thermostat (63) and wire feeder unit guard switch (59)).
J1	9 - 10	start signal input from torch button.
J2	1(+) - 2(-)	wire feeder motor (5) command output.