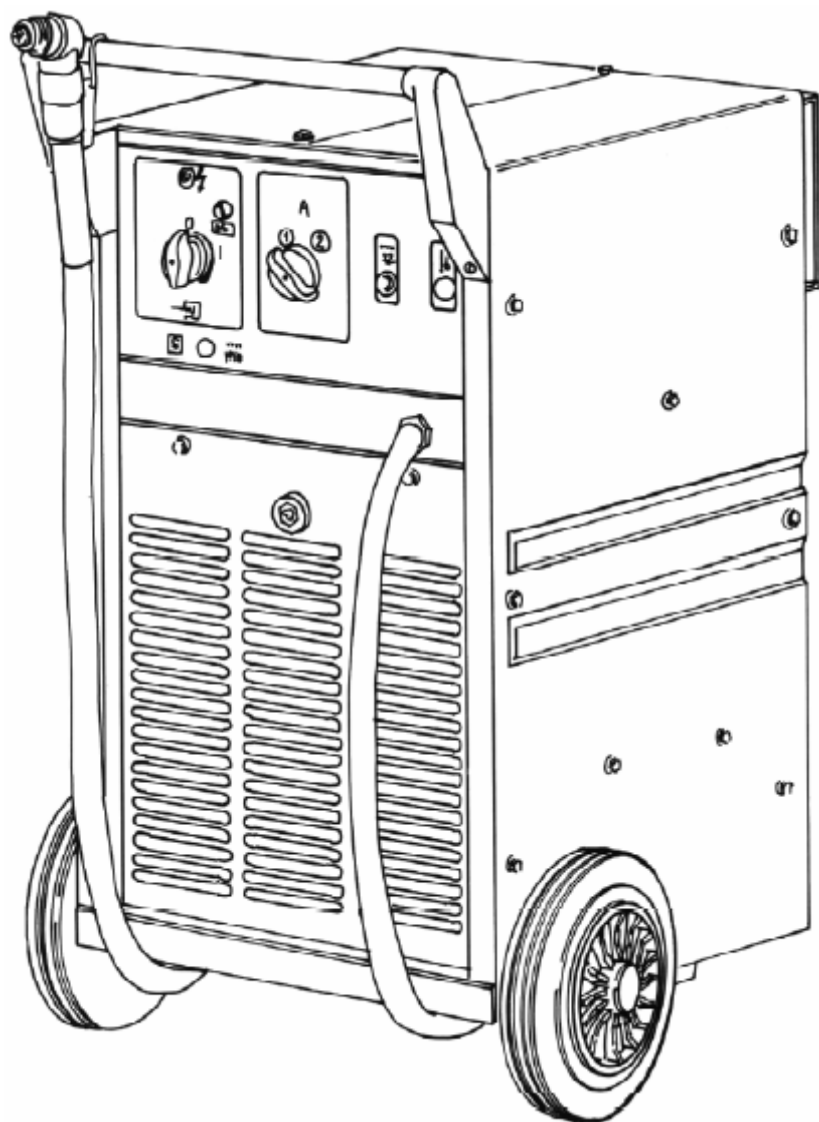


Service Manual for M12151, YA5550A & 83-383



Model Names: M12151, YA5550A, 83-383

How the 50A/30A PLASMA CUTTER works

Events that should happen when plasma cutter is turn on.

1. The **Fan Motor (40)** should start.
2. The **Auxiliary (Control) Transformer (7)** sends 20VAC and 27VAC to the **Main PCB (9)**.
3. At this point make sure air pressure is at 80 PSI, use **Pressure Regulator (15)** to adjust air pressure.
4. Make sure the red **Low Air Pressure Lamp (36)** is off on the front of the unit.
5. Make sure the **Yellow Thermostat Lamp (35)** is off lit on the front of the unit.
6. The **White Power Lamp (19)** is on.

Events that should happen when the trigger is pulled.

1. When trigger is pulled the **Air Solenoid (29)** with built in regulator (throttle) should open beginning air flow.
 2. If the above does not happen check voltage going to torch contacts at leads at **Terminal (5)** inside the machine to make sure that trigger has voltage.
 3. The solenoid is powered by 27VAC (2 brown wires from the eight pin connector on the **Main PCB (9)**).
- NOTE: If you do not begin cutting in 45-50 seconds the air flow will automatically cut off.**
4. When the trigger is held or pressed again while the air is flowing the **Large Contactor (8)** will drop in providing current to the **High Frequency Board (10)**.
 5. While the trigger is pulled, the **Large Contactor (8)** sends current to **Four Capacitors (68 & 71)** that power the 3rd phase of the **Power Transformer (57)**. This cause an arc at the high frequency points on the **HF Board (10)** causing the pilot arc at the torch.
 6. The **"Pilot Arc Circuit Only"** current path is as follows:
 - a. From **Rectifier negative (34)** to **Reactor (Impedance) Coil (67)**
 - b. To **Torch Electrode (47)** and **Nozzle (48)**
 - c. Back through the **Contactor (70)**
 - d. To **Resistors (32 and 33)**
 - e. Back to the **Rectifier positive (34)** completing the circuit

Event that should happen when cutting arc begins.

1. The pilot arc transfers current to the work piece, the cutting arc begins.
2. Current passes through work piece to **Ground Clamp and Cable (51)**
3. This closes the **Reed Relay Contact (39)**, located on the wire from ground receptical to the **Amerage Switch (23)**, this creates continuity across the 2 white wires connected from it to the **Main PCB (9)**.
4. Causing the **Main PCB (9)** to send current to second **Air Solenoid (29)** causing it to open and increases the air flow to approx. 6.4 CFM (180 liters per minute). You should notice a slight jump by the pressure gauge when the solenoid open.

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5. **Duty Cycle:** You can cut for approx. 5 minutes or 50% duty-cycle (based on a ten minute period at the 50A setting. The duty-cycle is 7 minutes or 70% at the 30A setting.
6. If you exceed the duty-cycle the **Power Transformer (57)** temperature will rise and trip the **Thermostat**, shutting off the cutting arc and turning on the **Yellow Thermostat Lamp (35)**.

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WARNING: All operations listed in this repair manual must be carried out by specialized, trained personnel.

Plasma generators require hazardous voltages for operation. When working inside the machine, be especially careful of all non-insulated wires and terminals and moving parts (motor-driven fan).

This repair manual is divided into two sections:

Section 1: Logical description and operating checks.

Section 2: Possible errors and troubleshooting, at the end.

Logical description and operating checks.

When the power cord is connected to the mains and the switch **22** is set to position "1", the motor-driven fan **40** starts and the service transformer **7** is activated, which in turn powers the circuit **9**.

Connect the pressure regulator **15** to the compressed air hose, adjust the intake pressure to approximately 5 BAR, then make sure that the red 'low pressure' lamp **30** and the yellow thermostat lamp **30** are not lit.

The air fitting to be connected to the pressure regulator must have a threaded portion no more than 6-8 mm long; longer threading may cause the regulator to malfunction. Make sure that the output voltages from the secondary circuit of the service transformer **7** are 20 VAC and 27 VAC, respectively.

At this point, when the torch trigger is pressed briefly, the solenoid valve **29**, fitted with a throttle **28**, opens to allow air to begin flowing through.

The torch trigger is wired in series to two safety contacts on the torch, which are short-circuited by the presence of the contact tip holder. Therefore, if the machine shows no sign of operating when the trigger is pressed, make sure the contact tip holder is correctly mounted on the torch. Then check the terminal board **5** inside the machine to make sure that the trigger command reaches the corresponding contacts (Fastons) properly. The solenoid valve with throttle **29** is powered at a voltage of 27 VAC (brown/brown wires) by means of the control circuit **9**.

If the user does not begin cutting, the air flow is automatically cut off after 45-50 seconds. If the torch trigger is pressed again while air is flowing, this closes the contact **8**, discharging the supply voltage to the power transformer **57** and the battery of 4 capacitors that power the third phase of the power transformer **57**. This causes a discharge lasting approximately 0.6-1 sec. at the tips of the HF board **10**, thereby striking the pilot arc.

The pilot arc starts on the negative pole of the rectifier **34** and returns to the positive pole of the rectifier **34** by following the path below:

- 1) Impedance **67**.
- 2) Torch electrode and nozzle.
- 3) Tips (closed in series) of the contact **70**.
- 4) Resistors **33** and **32**.

If the pilot arc fails to function at this stage, first make sure that the tips of contact **8** are intact and in good working order. The latter is powered at 27 VAC (white/black, white/black wires) by the control circuit **9**, through the microswitch of pressure switch **11** (gray/red and white/black wires). Next, make sure there is a brief spark between the tips (0.85 mm apart) on the HF circuit **10**. If this spark does not take place, check whether the 27 VAC (purple/purple wires connected to the HF circuit **10** intake, pins FT1 and FT2) are present for

approximately 0.6-1 second each time the torch trigger is pressed. If all of the checks performed thus far are successful, check the open-circuit voltage of the machine. To do so, disconnect the white wires (pins FT3 and FT4) of the HF circuit **10** and short-circuit the same contacts using a 1-m length of wire, with a cross section of approximately 1-2.5 mm², then press the torch trigger. You should measure approximately 250 VDC on the torch terminal board **5**, at the ends of the red (positive) and black (negative) wires. If this voltage is not present, the cause may lie in a breakdown in the resistors **31** and/or **32**, 2.1 and 1.5 Ohm, respectively. If a voltage of less than 250 VDC is detected, this may be caused to a malfunction in the rectifier **34**. If you notice a change in the "buzz" of the main transformer **57** when the contact **70** closes, this may mean that there is a current leak, probably due to a short-circuit in the head of the torch **69** or the rectifier **34**.

The machine limits the duration of the pilot arc to approximately 2 seconds. If cutting begins during this time, the current returns to the rectifier **34** through the grounding cable **51** and the switch **23** (if it is set to Pos. 1, 50A). If instead it is set to Pos. 2 (30A), it will force the current to pass through the resistor **32** as well.

If the machine works only in one of the two cutting positions, 30A or 50A, check the selector switch **23**.

When the pilot arc is transferred to the workpiece, when cutting begins, current passes through the grounding cable **51** to close the reed relay contact **39**, which sends an interface signal to the second solenoid valve **29** (without throttle) to open, increasing the air flow to approximately 180 liters/minute. This signal is sent through the control board **9**.

If the arc shuts off by itself approximately 2 seconds after cutting has begun, for no apparent reason, make sure the reed relay **39** is in good working order. When switching from the pilot arc to cutting (transfer), the reed **39**—through the control board **9**—opens the solenoid valve without throttle **29**. You should notice a slight jump by the pressure gauge needle when the solenoid valve **29** opens.

You may cut off current while cutting simply by releasing the torch trigger. Otherwise, when you have finished, the electric arc will find no more material to cut and will shut off automatically, by de-energizing the reed relay **39**. This will open the contact **70** and close the solenoid valve without throttle **29**, returning the machine to stand-by mode to await another pilot arc.

If, during prolonged cutting jobs, the temperature inside the machine reaches levels hazardous to the integrity of its components, the thermostat located in the power transformer **57** will automatically shut off the cutting arc. The yellow warning lamp **30** on the rear panel of the machine will light to indicate that the thermostat has been tripped.

POSSIBLE ERRORS - TROUBLESHOOTING

A) PILOT ARC DOES NOT WORK:

Probable causes:

- 1 - No torch trigger command.
Check the trigger and safety contacts.
- 2 - No high frequency:
Check the HF board **10**
Check the isolation of the HF transformer **25**
Check the filter circuit **6**
Check the command circuit **9**
- 3 - No open-circuit voltage

- Check the coil of the remote switch **8**
- Check the 24 VAC command from the command circuit **9**
- Check the continuity of the pilot arc resistors **31** and **32**

B) THE PILOT ARC STUTTERS

Probable causes:

- 1 - Phase missing
 Check the rectifier **34**
 Check all contacts on the remote switch **8**
 Check the main transformer **57**.
 Check the mains power supply (plug and cord).
- 2 - Air pressure too high
 Make sure the pressure regulator **15 is working properly**
 Check the cooling air flow, during which only the solenoid valve with throttle **29 should remain open**

C) NO TRANSFER

- 1 - The grounding cable is broken or not connected properly
 Make sure that the grounding cable is not closed on insulating surfaces
- 2 - The selector switch **23** does not close the contact towards the rectifier in positions 1 and/or 2.
 Make sure the grounding cable 51 and rectifier **34** are connected without interruption.

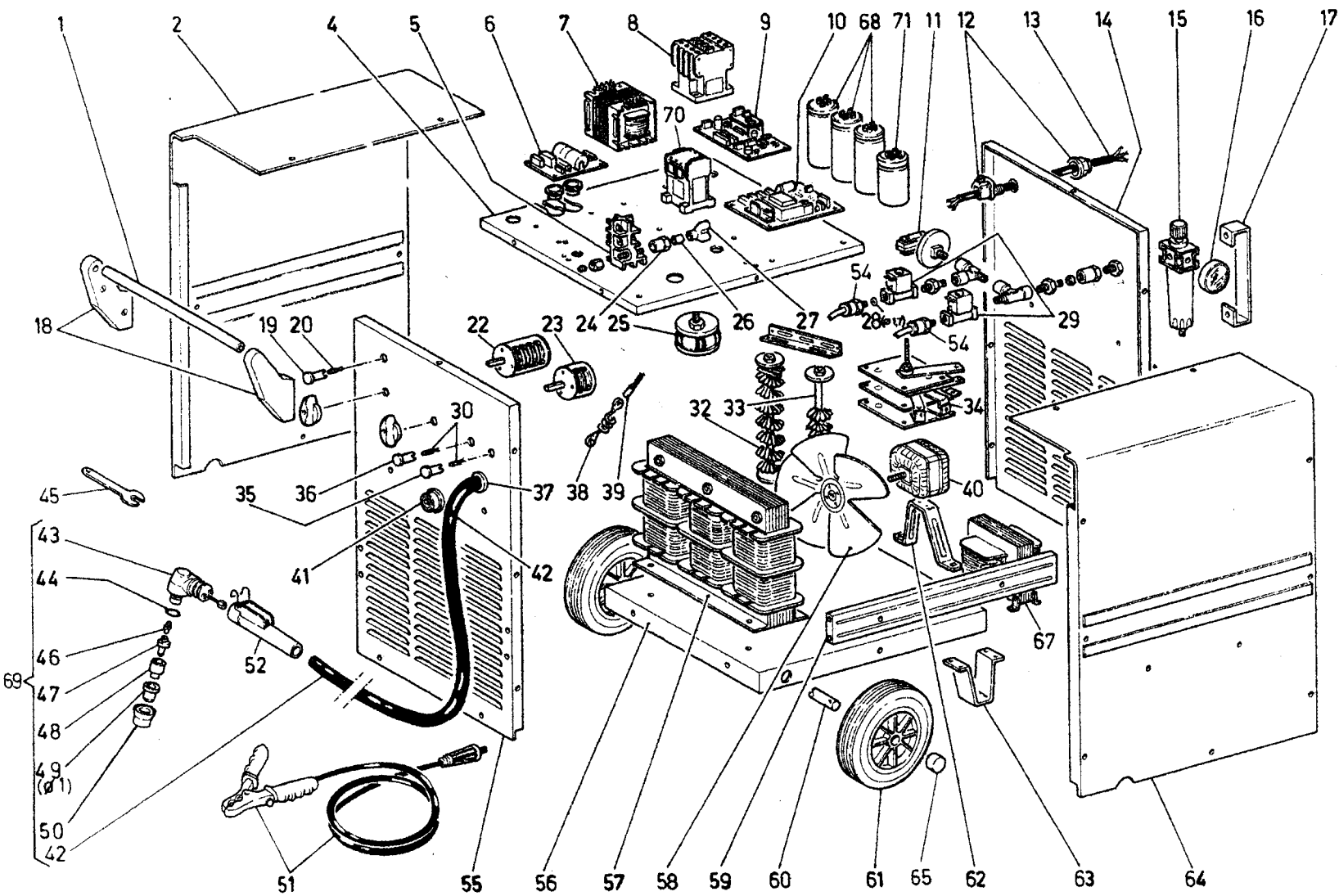
D) TRANSFER ONLY LASTS A FEW SECONDS.

- 1 - The reed relay **39** does not work.
 Make sure it is in good working order
- 2 - The control circuit **9** does not work
 Replace it

NOTES:

Always use original CEBORA spare parts
After every repair job, all safety tests must be carried out as described in paragraph 6.1.3 of the standard IEC 974.1.

WIRING DIAGRAM COLOUR CODE	A	B	C	D	E	F	G	H	K	J	I	L	M	N	O	P	Q	R	S	T	U
	BLACK	RED	GREY	WHITE	GREEN	PURPLE	YELLOW	BLUE	BROWN	ORANGE	PINK	PINK-BLACK	GREY-PURPLE	WHITE-PURPLE	WHITE-BLACK	GREY-BLUE	WHITE-RED	GREY-RED	WHITE-BLUE	BLACK-BLUE	YELLOW-GREEN



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Item	Lincoln Stock #	Customer #	Description
1	312-512-666	250728	Handle
2	411-109-026	250907	Left Side Panel
4		251176	Center Divider
5	239-298-666	B7009380	Terminal Board
6		251177 (5600834)	Filter Circuit
7		251178 (5600462)	Control Transformer
8		251179 (3190277)	Contacto
9		251180 (5600995)	Control Circuit Board
10		251181 (5600846)	High Voltage Circuit
11	246-532-666	B7005380	Pressure Switch
12	541-279-666	250874	Strain Relief
13	238-713-666	260472	Power Cord
14	411-120-016	250877	Back Panel
15	254-006-666	B7006380	Air Regulator
16	251-030-666	B7014380	Gauge
17	215-031-666	250901	Shield
18	312-514-666	250896	Handle Support
19	245-168-666	246250	Lamp Holder
20		B7011380	Pilot Lamp
22		260473	Switch w/knob
23	246-526-666	251220	Switch w/knob
24	253-340-666	B7013380	Coupling
25		251186	High Voltage Transformer
26		251187 (3160045)	Fitting
27		250872 (3160046)	Fitting
28	541-279-666	250894	Thermostat
29		B7105370 (3160181)	Solenoid
30		251188 (3175439)	Pilot Lamp
32	215-029-666	251189	Resistor
33	215-030-666	251190	Resistor
34	244-086-666	251191	Rectifier
35	245-170-666	B7015380	Lamp Holder
36	245-169-666	246251	Lamp Holder
37	334-607-666	B7016380	Strain Relief
38	210-358-666	251192	Coil
39	411-125-666	250885	Reed
40	216-108-666	246224	Fan Motor

Item	Lincoln Stock #	Customer #	Description
41	079-306-666	B7073370	Quick Connector
42		251193	Torch Cable
43	334-599-000	M15820,250747,83-673	Torch Head
44	512-264-666	251194	O-Ring
45		M15818,250745,83-671	Electrode Wrench
46		251195 (3065204)	Diffuser
47	334-591-000	M15815,YA5550A1,83-668	Short Electrode
	N/A	334-638-000, M15816Ya5550A4,83-669	Long Electrode
48	334-589-000	M15852,M15803,YA22257,83-667	Diffusers (2)
49	334-652-000	M15811,YA5550A3,83-663	Short Nozzle (0.9mm)
	334-653-000	M15814,YA22252,83-666	Short Nozzle (1.0mm)
	N/A	M15812,83-664	Short Nozzle (1.2mm)
	N/A	M15813,YA5550A5,83-665	Long Nozzle (0.9mm)
	N/A	334-593-000, M15805,YA22254,83-631	Long Nozzle (1.0mm)
50	334-651-000	M15810,YA22259,83-662	Nozzle Holder
51	238-714-666	251196	Ground Cable
52	312-518-666	B7037380	Handle & Trigger
54	253-341-666	B7004380	Coupling
55		260495	Front Panel
56	411-124-666	250893	Base
57	880-578-666	251199	Transformer
58	216-109-666	250726	Fan Blade
59	312-517-666	251201	Stiffener
60	413-121-666	250881	Axle
61	413-118-666	B7033380	Wheel
62	312-513-666	250879	Fan Motor Bracket
63	412-756-666	B7035380	Foot
64	411-108-026	250897	Right Side Panel
65	411-107-026	250224	Cover
67		251202 (3205328)	Reactor Coil
68	213-043-666	260468	Capacitor
69	334-630-000	M15828,250226,83-681, 334-600-000	Complete Torch, 18 Ft.
70		B7100370 (3190268)	Contacto
71	213-044-666	260477	Capacitor
72		247506	Product Label
73		247509	Warning Label
74		M15809, YA5550A8, 83-661	Standoff

11/29/07

Model	Primary Input	Input Plug	Duty Cycle at Rated Output
M12151	230 Vac, 50A	N/A	40%

Rated Output	Voltage Settings	Agency Listing	Max Cutting Thickness
50 amps	2	CSA	1/2"