

# TOMAHAWK® 30K & 45

*For use with machines having code numbers: 50627 - 50628*



## SERVICE MANUAL



LINCOLN ELECTRIC EUROPE  
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## INDEX OF CONTENTS

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TECHNICAL SPECIFICATIONS.....	3
THERMAL PROTECTION .....	16
MAJOR COMPONENTS LOCATION .....	16
OVERLOAD PROTECTION.....	19
THERMAL PROTECTION .....	19
INSULATED GATE BIPOLAR.....	19
TROUBLESHOOTING AND REPAIR SECTION.....	20
COVER CASE REMOVAL AND DC BUS CAPACITORS DISCHARGE PROCEDURE.....	24
DISCHARGE PROCEDURE .....	26
INPUT RECTIFIER BRIDGE RESISTANCE TEST.....	27
MAIN BOARD THERMAL SENSORS TEST .....	29
POWER BOARD VOLTAGE TEST .....	31
DISASSEMBLY OPERATIONS.....	37
RETEST AFTER REPAIR.....	45
CALIBRATION PROCEDURE for TH 30K.....	46
CALIBRATION PROCEDURE for TH 45 .....	47
ELECTRICAL SCHEMATICS .....	48
NOTE .....	50

# TECHNICAL SPECIFICATIONS

NAME		INDEX		
TOMAHAWK®30K		K12038-3		
TOMAHAWK®45		K14391-1		
INPUT				
	Input Voltage U <sub>1</sub>	Input Power at Rated Output	EMC Class	Frequency
TOMAHAWK®30K	230V±15%	2,2 kW @ 100% Duty Cycle	A	50Hz
		3,3 kW @ 60% Duty Cycle		
TOMAHAWK®45	120V±15%	2,2 kW @ 100% Duty Cycle	A	50Hz
		3,3 kW @ 60% Duty Cycle		
	230V±15%	3,3 kW @ 100% Duty Cycle		
		4,6 kW @ 60% Duty Cycle		
		5,2 kW @ 45% Duty Cycle		
RATED OUTPUT AT 40°C				
	Duty Cycle (based on a 10 min. period)	Output Current	Output Voltage	
TOMAHAWK®30K	100%	25A	90Vdc	
	60%	30A	92Vdc	
TOMAHAWK®45 120V	100%	15A	86Vdc	
	60%	22A	88,8Vdc	
TOMAHAWK®45 230V	100%	30A	92Vdc	
	60%	40A	96Vdc	
	45%	45A	98Vdc	
OUTPUT RANGE				
	Cutting Current Range		Maximum Open Circuit Voltage	
TOMAHAWK®30K	15 – 30A		396Vdc	
TOMAHAWK®45 120V	15 – 22A		396Vdc	
TOMAHAWK®45 230V	15 – 45A		396Vdc	
EXTERNAL INLET COMPRESSED AIR				
	Required Inlet Flow Rate		Required Inlet Pressure	
TOMAHAWK®30K	125 ±10% l/min		5,0bar – 6,6bar	
TOMAHAWK®45	200 ±10% l/min		5,0bar – 6,0bar	
RECOMMENDED INPUT CABLE AND FUSE SIZES				
	Fuse (delayed) or Circuit Breaker ("D" characteristic) Size	Type of Plug (Included with Machine)	Input Power Cable	
TOMAHAWK®30K	16 A	SCHUKO 16A / 250V	3 x 1,5 mm <sup>2</sup>	
TOMAHAWK®45K	16 A	SCHUKO 16A / 250V	3 x 2,5 mm <sup>2</sup>	
PSYHICAL DIMENSION				
	Height	Width	Length (case only, without torch)	Weight
TOMAHAWK®30K	385 mm	215 mm	480 mm	18 – 18,5 kg
TOMAHAWK®45	385 mm	215 mm	480 mm	11,1 kg

# Electromagnetic Compatibility (EMC)

11/04

This machine has been designed in accordance with all relevant directives and standards. However, it may still generate electromagnetic disturbances that can affect other systems like telecommunications (telephone, radio, and television) or other safety systems. These disturbances can cause safety problems in the affected systems. Read and understand this section to eliminate or reduce the amount of electromagnetic disturbance generated by this machine.



This machine has been designed to operate in an industrial area. To operate in a domestic area it is necessary to observe particular precautions to eliminate possible electromagnetic disturbances. The operator must install and operate this equipment as described in this manual. If any electromagnetic disturbances are detected the operator must put in place corrective actions to eliminate these disturbances with, if necessary, assistance from

Lincoln Electric.

Before installing the machine, the operator must check the work area for any devices that may malfunction because of electromagnetic disturbances. Consider the following.

- Input and output cables, control cables, and telephone cables that are in or adjacent to the work area and the machine.
- Radio and/or television transmitters and receivers. Computers or computer controlled equipment.
- Safety and control equipment for industrial processes. Equipment for calibration and measurement.
- Personal medical devices like pacemakers and hearing aids.
- Check the electromagnetic immunity for equipment operating in or near the work area. The operator must be sure that all equipment in the area is compatible. This may require additional protection measures.
- The dimensions of the work area to consider will depend on the construction of the area and other activities that are taking place.

Consider the following guidelines to reduce electromagnetic emissions from the machine.

- Connect the machine to the input supply according to this manual. If disturbances occur it may be necessary to take additional precautions such as filtering the input supply.
- The output cables should be kept as short as possible and should be positioned together. If possible connect the work piece to ground in order to reduce the electromagnetic emissions. The operator must check that connecting the work piece to ground does not cause problems or unsafe operating conditions for personnel and equipment.
- Shielding of cables in the work area can reduce electromagnetic emissions. This may be necessary for special applications.

## **WARNING**

The Class A equipment is not intended for use in residential locations where the electrical power is provided by the public low-voltage supply system. There may be potential difficulties in ensuring electromagnetic compatibility in those locations, due to conducted as well as radiated disturbances.



## **WARNING**

While a high electromagnetic field occurs, a welding current can fluctuate.

## **WARNING**






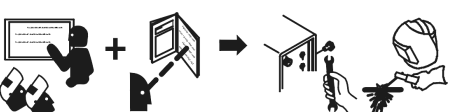


This equipment complies with IEC 61000-3-12.



## WARNING

This equipment have to be used by qualified personnel. Be sure that all installation, operation, maintenance and repair procedures are performed only by qualified person. Read and understand this manual before operating this equipment. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or equipment damage. Read and understand the following explanations of the warning symbols. Lincoln Electric is not responsible for damages caused by improper installation, improper care or abnormal operation.

	WARNING: This symbol indicates that instructions must be followed to avoid serious personal injury, loss of life, or equipment damage. Protect yourself and others from possible serious injury or death.
	READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Plasma cutting can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or equipment damage.
	ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is turned on. Insulate yourself from the electrode, work clamp, and connected work pieces.
	ELECTRICALLY POWERED EQUIPMENT: Turn off the input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.
	ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS: Electric current flowing through any conductor creates electric and magnetic fields (EMF). EMF fields may interfere with some pacemakers, and welders having a pacemaker shall consult their physician before operating this equipment.
	CE COMPLIANCE: This equipment complies with the European Community Directives.
	ARTIFICIAL OPTICAL RADIATION: According with the requirements in 2006/25/EC Directive and EN 12198 Standard, the equipment is a category 2. It makes mandatory the adoption of Personal Protective Equipment (PPE) having filter with a protection degree up to a maximum of 15, as required by EN169 Standard.
	ARC RAYS CAN BURN: Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing. To protect the skin, use suitable clothing made of durable, fireproof material. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.
	WORK MATERIALS CAN BURN: Cutting generates a large amount of heat. Hot surfaces and materials in work area can cause serious burns. Use gloves and pliers when touching or moving materials in the work area.
	CYLINDER MAY EXPLODE IF DAMAGED: Use only certificate, compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. Always keep cylinders in an upright position securely chained to a fixed support. Do not move or transport gas cylinders with the protection cap removed. Do not allow the electrode, electrode holder, work clamp or any other electrically live part to touch a gas cylinder. Gas cylinders must be located away from areas where they may be subjected to physical damage or the cutting process including sparks and heat sources.

	<p>Cutting sparks can cause explosion or fire. Keep flammables away from cutting. Do not cut or gouge near flammables. Have a fire extinguisher nearby, and have a watch person ready to use it. Do not cut on drums or any closed container.</p>
	<p>The plasma arc can cause injury and burns. Keep your body away from nozzle and plasma arc. Turn off power before disassembling torch. Do not grip material near cutting path. Wear complete body protection.</p>
	<p>Electric shock from torch or wiring can kill. Wear dry insulating gloves. Do not wear wet or damaged gloves. Protect yourself from electric shock by insulating yourself from work and ground. Disconnect input plug or power before working on machine.</p>
	<p>Breathing cutting fumes can be hazardous to your health. Keep your head out of the fumes. Use forced ventilation or local exhaust to remove the fumes. Use ventilating fan to remove fumes.</p>
	<p>Arc rays can burn eyes and injure skin. Wear hat and safety glasses. Use ear protection and button shirt collar. Use welding helmet with correct shade of filter. To protect the skin, use suitable clothing made of durable, fireproof material.</p>
	<p>Become trained and read the instructions before working on the machine or cutting.</p>
	<p>Do not remove or paint over (cover) the label.</p>
	<p><b>SAFETY MARK:</b> This equipment is suitable for supplying power for cutting operations carried out in an environment with increased hazard of electric shock.</p>

The manufacturer reserves the right to make changes and/or improvements in design without upgrade at the same time the operator's manual.

# Introduction

**TOMAHAWK®30K** allows for cutting and grid.

The complete package **TOMAHAWK®30K** contains:

- Work lead – 6m,
- Cutting Plasma Hand Torch LC30 – 4m,
- USB user manual.

**TOMAHAWK®30K** has a built-in compressor that allow to operates in areas where an external primary air is not available.

Recommended equipment, which can be bought by user, was mentioned in the chapter "Accessories".

## Installation and Operator Instructions

Read this entire section before installation or operation of the machine.

### Location and Environment

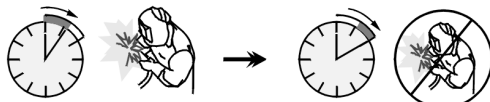
This machine will operate in harsh environments. However, it is important that simple preventative measures are followed to assure long life and reliable operation.

- Do not place or operate this machine on a surface with an incline greater than 15° from horizontal.
- Do not use this machine for pipe thawing.
- This machine must be located where there is free circulation of clean air without restrictions for air movement to and from the air vents. Do not cover the machine with paper, cloth or rags when switched on.
- Dirt and dust that can be drawn into the machine should be kept to a minimum.
- This machine has a protection rating of IP23S. Keep it dry when possible and do not place it on wet ground or in puddles.
- Locate the machine away from radio controlled machinery. Normal operation may adversely affect the operation of nearby radio controlled machinery, which may result in injury or equipment damage. Read the section on electromagnetic compatibility in this manual.
- Do not operate in areas with an ambient temperature greater than 40°C.

### Duty Cycle

The duty cycle of a welding machine is the percentage of time in a 10 minute cycle at which the welder can operate the machine at rated welding current.

Example: 60% duty cycle:



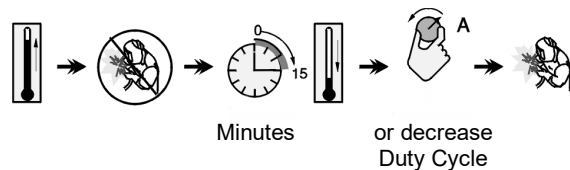
Excessive extension of the duty cycle will cause the thermal protection circuit to activate.

**TOMAHAWK®45** allows for cutting, grid and gouging.

The complete package **TOMAHAWK®45** contains:

- Work lead – 6m,
- Cutting Plasma Hand Torch LC45 – 6m,
- USB user manual.

Recommended equipment, which can be bought by user, was mentioned in the chapter "Accessories".



### Input Supply Connection

#### ⚠ WARNING

Only a qualified electrician can connect the equipment to the supply network. Installation had to be made in accordance with the appropriate National Electrical Code and local regulations.

Check the input voltage, phase and frequency supplied to this machine before turning it on. Verify the connection of ground wires from the machine to the input source.

**TOMAHAWK®30K & 45** must be connected to a correctly installed plug-in socket with an earth pin. Input voltage is:

- **TOMAHAWK®30K** 230Vac 50Hz;
- **TOMAHAWK®45** 120Vac, 230Vac 50Hz.

For more information about input supply refer to the technical specification section of this manual and to the rating plate of the machine.

Make sure that the amount of mains power available from the input supply is adequate for normal operation of the machine. The necessary delayed fuse or circuit breaker and cable sizes are indicated in the technical specification section of this manual.

#### ⚠ WARNING

The equipment can be supplied from a power generator of output power at least 30% larger than input power of the cutting machine.

#### ⚠ WARNING

**When powering the machine from a generator be sure to turn off machine first, before generator is shut down, in order to prevent damage to equipment!**

## Controls and Operational Features

### Front panel TOMAHAWK®30K

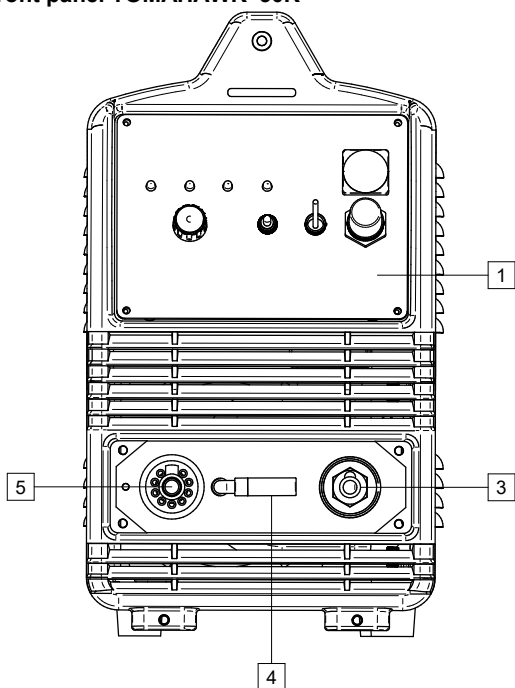


Figure 1

### Front panel TOMAHAWK®45

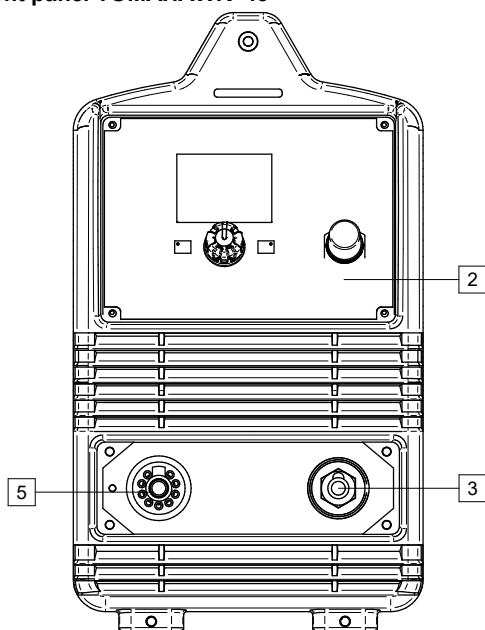


Figure 2

1. User Interface TOMAHAWK®30K: See User Interface TOMAHAWK®30K chapter.
2. User Interface TOMAHAWK®45: See User Interface TOMAHAWK®45 chapter.
3. Work Lead Connector.
4. Compressor Internal Air Filter: (TOMAHAWK®30K only).
5. Plasma Torch Connector.

### Rear Panel TOMAHAWK®30K & 45

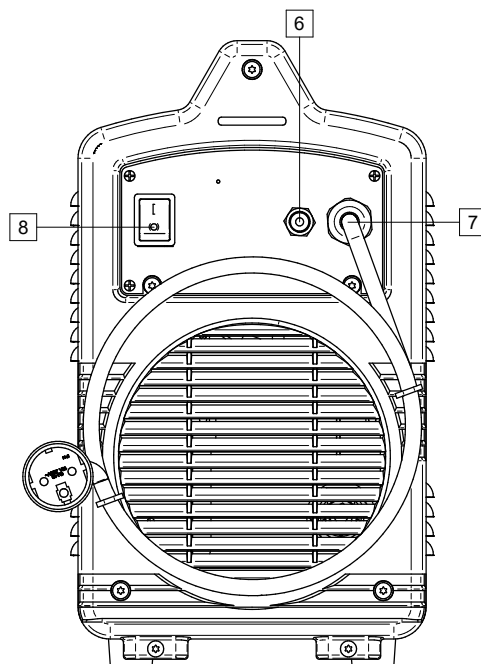


Figure 3

6. Air Connection Connector.
7. Input Cord 3m.
8. Power Switch ON/OFF (I/O): Controls the input power to the machine. Be sure the power source is properly connected to the mains supply before turning power on ("I"). See: Installation and Operator Instruction.



## User Interface TOMAHAWK®30K

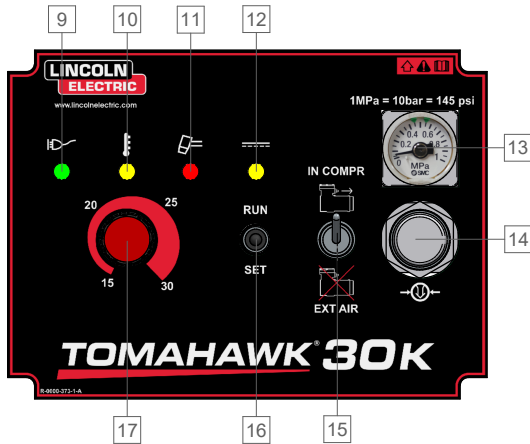











Figure 4

9. LED Indicator Power Switch: Lights up when the equipment is ON and connect to the power supply. 
10. Thermal LED: Lights up when the equipment is overheat. 
11. Connecting the torch: LED Indicator. Lights up when the torch is wrong connected to the connector [5] or the shield cup body is not tighten to the holder. 
12. LED Indicator: Lights up when the equipment is working. 
13. Manometer: Allows to read the air pressure. 
14. Purge Pressure Regulator Control: Allows to regulate the air pressure. 
15. Internal / External Air Switch: 

Symbol	Description
	Internal compressor
	External air network

16. RUN/SET Switch: In the "SET" you cannot cut.

Symbol	Description
<b>SET</b>	Purge test
<b>RUN</b>	Ready to cut

17. Output Current Control: Use to set the output current used during cutting.

## User Interface TOMAHAWK®45

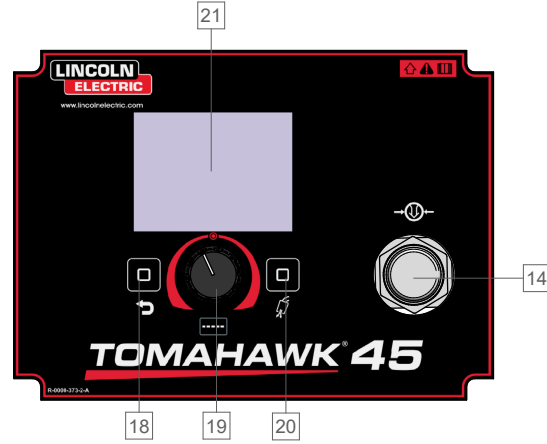





Figure 5

18. Home Button: Allows the user to return to the main view. 
19. Active Button Control: Used to select the available processes and their parameters, and to set the value current. 
20. Purge Test Button: Enables gas flow without turning on output voltage. 
21. LCD Display: Display shows processes and parameters.

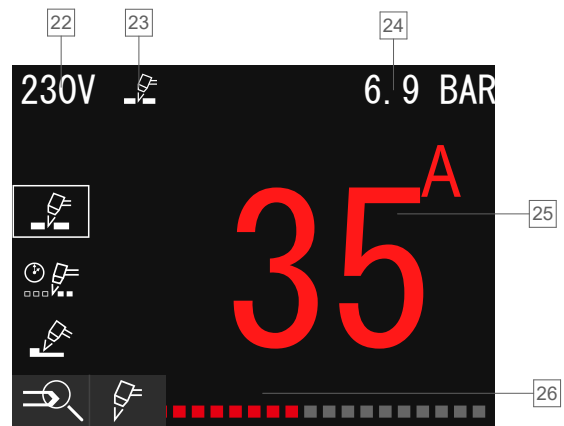


Figure 6

22. Supply Voltage: 120Vac or 230Vac. The equipment has a built-in detection of the supply voltage.



### WARNING

Gouging is only possible with a 230Vac supply voltage! Output current range 30-45A.

23. Current Process: See „Table 1. User Setup Menu“.
24. Air Pressure: To set the air pressure, use the control [14].
25. Set Value Current: To set the value current, use the Active Button Control [19].

26. User Setup Menu: Displays the available processes and parameters.

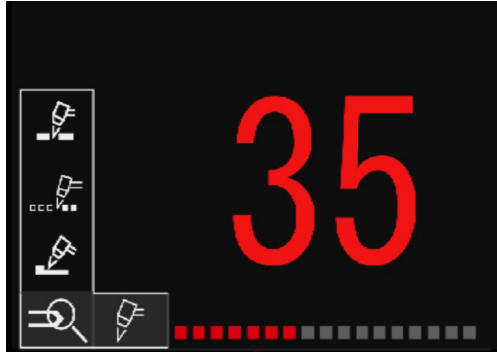






Figure 7

Table 1. User Setup Menu.

Symbol	Description
	Welding process / program selection
	Cutting
	Grid
	Gouging

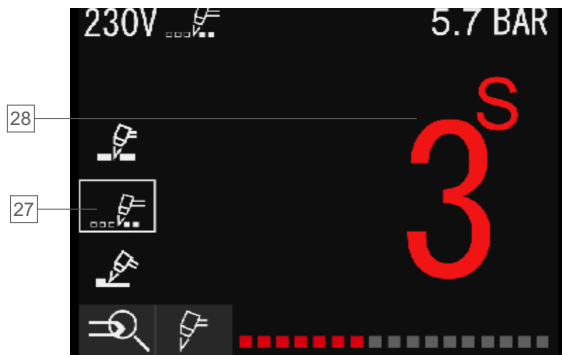


Figure 8

27. Selected grid process: To select a process, use the Active Button Control [19].

28. Pilot Current Backup Time Adjustment: Only for grid process.

## Select Program

- Press the control [19], to get access of user setup menu.
- Press [19] again to display the available process. Select a process by turning the control and confirm the selection [19].
- For grid process you can adjust the pilot current time between 1-5 seconds. The default time is 3 seconds. Press the control [19] to confirm your selection.
- Press "Home" [18] to return to the main view.

## TOMAHAWK®30K – cut, grid

After pressing the button in the torch:

- Preflow – purge flow before ignition of the pilot current – 2s (unalterable).
- Pilot current – maximum 3s, if it does not touch the material or the button in the torch is released, the pilot current will automatically turn off.
- Cutting current – proper cutting – lasts as long as the button in the torch is pressed.
- Pilot – sustaining the pilot current (grid process) – 3s. Is only possible when the button in torch is pressed. This enables the transition between the materials to be cut.
- Postflow – gas flow after cutting – 15s (unalterable).

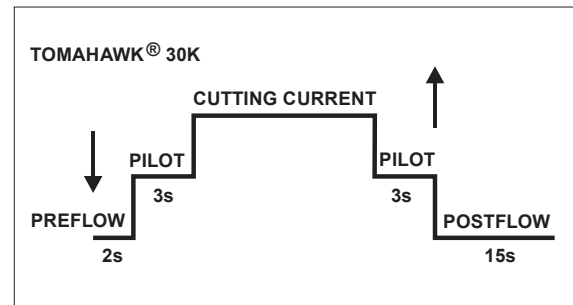


Figure 9

Table 2. TOMAHAWK®30K – Preflow/Postflow

Preflow	Current	Postflow
2 s	15-30 A	15 s

## TOMAHAWK®45 – cut

After pressing the button in the torch:

- Preflow – purge flow before ignition of the pilot current – 2s (unalterable).
- Pilot current – maximum 3s, if it does not touch the material or the button in the torch is released, the pilot current will automatically turn off.
- Cutting current – proper cutting – lasts as long as the button in the torch is pressed.
- Postflow – gas flow after cutting – time depends on the current – see Table 3.

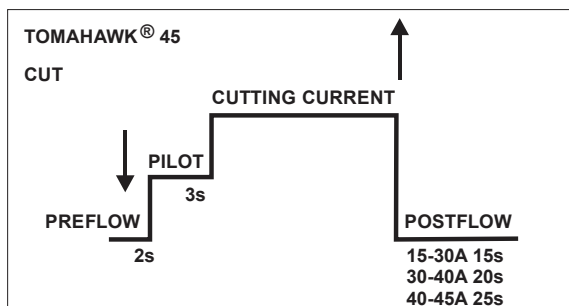


Figure 10

## TOMAHAWK®45 – grid

After pressing the button in the torch:

- Preflow – purge flow before ignition of the pilot current – 2s (unalterable).
- Pilot current – maximum 3s, if it does not touch the material or the button in the torch is released, the pilot current will automatically turn off.
- Cutting current – proper cutting – lasts as long as the button in the torch is pressed.
- Grid time – sustaining the pilot current, possible only the button in torch is pressed. Enables the transition between the materials to be cut. Adjustment range: 1 – 5s.
- Postflow – gas flow after cutting – time depends on the current – see Table 3.

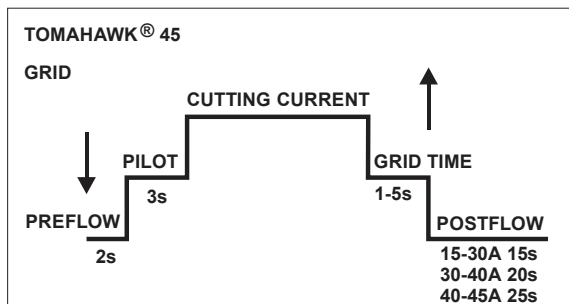


Figure 11

## TOMAHAWK®45 – gouging

After pressing the button in the torch:

- Preflow – purge flow before ignition of the pilot current – 2s (unalterable).
- Pilot current – maximum 3s, if it does not touch the material or the button in the torch is released, the pilot current will automatically turn off.
- Gouging current – lasts as long as the button in the torch is pressed.
- Pilot – sustaining the pilot current (grid process). Is only possible when the button in torch is pressed.
- Postflow – gas flow after gouging – 15s (unalterable).

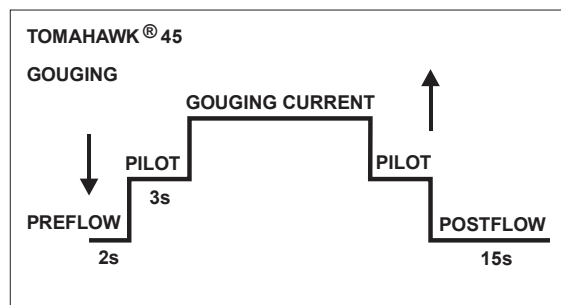


Figure 12

Table 3. TOMAHAWK®45 – Preflow/Postflow

Preflow	Current	Postflow
2s	15-30 A	15 s
	30-40 A	20 s
	40-45 A	25 s

## Preparing the equipment

**TOMAHAWK®30K** enables the cutting and grid process.

### **WARNING**

When preparing to work, make sure you have all materials needed to complete the work and have taken all safety precautions.

Procedure of begin of process:

- Turn the machine off.
- Connect the torch from the kit into the connector [5].
- Connect the work lead into the connector [3].
- Connect the other part of work lead to the material to be cut.
- Turn the machine on [8]. Check the LED [9] lights green and LED [11] is not lights red.
- Select a compressed air source [15].
- Select the airflow by switch [16] to "SET". Unlock the control [14] – pull control towards you and by turning to the right or left to set proper pressure.

### **WARNING**

The recommended value pressure for high-quality cut is 5 bar for external mains.

### **WARNING**

"Safety" function in torch – The button cover that prevents accidental ignition of the torch.

### **WARNING**

The User cannot start the cutting process, if the starts the equipment with the button in the handle is pressed.

- Set the cutting current [17].
- The equipment is now ready.

### **WARNING**

To start the cutting process just press the torch button, making sure you are not aiming the torch air blow towards people or foreign objects.

- By applying the principle of occupational health and safety, gouging can be begun.

**TOMAHAWK®45** enables be cut, grid and gouging.

**TOMAHAWK®45** does not include the accessories for gauging, but the one can be purchased separately (see "Accessories" chapter).

### **WARNING**

When preparing to work, make sure you have all materials needed to complete the work and have taken all safety precautions.

Procedure of begin process:

- Turn the machine off.
- Connect the torch from the kit into the socket [5].
- Connect the work lead into the socket [3].
- Connect the other part of work lead to the material.
- Turn the machine on [8].
- Check the air pressure with the purge test button. Unlock the control [14] – pull control towards you and by turning to the right or left to set proper pressure.

### **WARNING**

The recommended pressure value for a high-quality is 5,5 bar.

### **WARNING**

"Safety" function in torch – The button cover that prevents accidental ignition of the torch.

### **WARNING**

The User cannot start a process, if the starts the equipment with the button in the torch is pressed.

- Check process by Active Button Control [19]. For grid process you can adjust the plasma arc torch time between 1-5 seconds. The default time is 3 seconds. Press the control again to confirm your selection.

### **WARNING**

Gouging is only possible with a 230V supply voltage! Output current range 30-45A.

- Press the "Home" button [18] to return to the main view.
- Set the cutting value by the control [19] and turn it to the left or right to set the value.
- The equipment is now ready.

### **WARNING**

To start the process just press the torch button, making sure you are not aiming the torch air blow towards people or foreign objects.

- By applying the principle of occupational health and safety, process can be begun.

## Cutting Speed

The cutting speed is a function of:

- Thickness and type of material to be cut.
- Value of set current. The current setting affects the quality of the cut edge.
- Geometrical shape of the cut (whether straight or curved).

In order to provide indications on the most suitable setting, the following table was established, based on tests performed on an automatic test-bench: the best results however can only be achieved from direct experience by the operator in his actual working conditions.

**Table 4. Cutting Speed TOMAHAWK®30K**

TOMAHAWK®30K				
Material Thickness (mm)	Speed (cm/min.)			
	Current(A)	Mild Steel	Stainless Steel	Aluminum
1	30	100,5	100,5	100,5
2		51,5	35,2	66,2
3		25	19,5	35,8
4		14,5	12,8	23,5
5		12	9,6	-
6		6	5,5	17,5
8		4	3,5	5,8
10		2,7	2,1	4,4
12		2	-	2,5
15		1,2	1,6	1,15
20		0,8	-	-

**Table 5. Cutting Speed TOMAHAWK®45**

TOMAHAWK®45							
Material Thickness (mm)	Speed (cm/min.)						
	Current (A)	Best Quality Settings			Production Setting		
		Steel	Stainless Steel	Aluminum	Steel	Stainless Steel	Aluminum
2	45	55,4	54,5	78,9	76,45	75,8	95,85
3		38,9	31,8	48,5	53,65	45,5	71,2
4		27,5	19,3	36,7	37,95	28,5	56,5
6		14	11,1	20,6	19,8	16,5	30,95
8		9,8	8,3	13,3	13,1	10,7	18,3
10		7,6	5,6	8,6	8,7	8	10,15
12		5,4	3,7	6,2	6,75	5,25	7,45
15		3	2,3	3,3	3,8	3,05	3,5
20		1,55	1,5	1,5	2,2	1,95	1,8
25		1	-	-	1,3	-	-

## ERRORS

**Table 6 Errors for TOMAHAWK®30K**

Error code	Symptoms	Cause	Recommended Course of Action
Yellow	Overheat	<ul style="list-style-type: none"> <li>Air flow is blocked.</li> <li>Fan is blocked.</li> <li>Faulty components in the equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Check for air pressure are correct.</li> <li>Check and correct condition of fan.</li> <li>turn off the equipment for at least 10 minutes. Make sure the equipment has not been operated beyond the Duty Cycle (refer to technology parameters).</li> <li>Choose the proper voltage (refer to technology parameters).</li> <li>Return for repair or have qualified technician repair per Service Manual.</li> </ul>
Red	Cutting torch disconnection	<ul style="list-style-type: none"> <li>The cutting torch is not properly connected to the socket [5] or the cutting torch is damaged.</li> <li>Shield cup body is damaged or incorrectly installed.</li> </ul>	<ul style="list-style-type: none"> <li>Check the plasma torch is not damaged.</li> <li>Tighten the plasma cutting torch to the socket [5].</li> <li>Tighten the shield cup body.</li> </ul>

**Table 7 Errors for TOMAHAWK®45**

Error code	Symptoms	Cause	Recommended Course of Action
E01	Primary overheat	<ul style="list-style-type: none"> <li>Air flow is blocked.</li> <li>Fan is blocked.</li> <li>Faulty components in the equipment.</li> </ul>	<ul style="list-style-type: none"> <li>Check for air pressure are correct.</li> <li>Check and correct condition of fan.</li> <li>turn off the equipment for at least 10 minutes. Make sure the equipment has not been operated beyond the Duty Cycle (refer to technology parameters).</li> <li>Choose the proper voltage (refer to technology parameters).</li> <li>Return for repair or have qualified technician repair per Service Manual.</li> </ul>
E02	Secondary overheat		
E09	Overheat		
E07	Primary NTC not connected		
E08	Primary NTC not connected		
E12	Lack of gas	<ul style="list-style-type: none"> <li>Gas pressure is too low.</li> <li>Compressed air system fault.</li> </ul>	<ul style="list-style-type: none"> <li>Check the compressed air system.</li> <li>Use the pressure regulator control to set the gas pressure as recommended in this manual.</li> </ul>
E30	Cutting torch disconnection	<ul style="list-style-type: none"> <li>The cutting torch is not properly connected to the socket [5] or the cutting torch is damaged.</li> <li>Shield cup body is damaged or incorrectly installed.</li> </ul>	<ul style="list-style-type: none"> <li>Check the plasma torch is not damaged.</li> <li>Tighten the plasma cutting torch to the socket [5].</li> <li>Tighten the shield cup body.</li> </ul>

### **WARNING**

If for any reason you are unable to perform the recommended actions in the event of a fault, contact the nearest authorized Lincoln Electric service facility.

## Maintenance

### **WARNING**

For any repair operations, modifications or maintenances, it is recommended to contact the nearest Technical Service Center or Lincoln Electric. Repairs and modifications performed by unauthorized service or personnel will cause, that the manufacturer's warranty will be lost.

The frequency of the maintenance operations may vary in accordance with the working environment where the machine is placed.

#### **Routine maintenance (everyday)**

- Check condition of insulation and connections of the plasma cutting torch, work leads and insulation of input cord. If any insulation damage exists replace the lead immediately.
- Remove the spatters from the gas nozzle of the plasma cutting torch.
- Check condition and operation of the cooling fan. Keep clean its airflow slots!

#### **Periodic maintenance (every 200 working hours but at least once a year)**

Perform the routine maintenance and, in addition:

- Keep the equipment clean. Using a dry (and low pressure) airflow, remove the dust from the external case and from the cabinet inside.
- If it is required, clean and tighten plasma torch connector and work lead socket.
- Check cables and connections integrity. Replace, if necessary.
- Regularly clean the torch head, check its consumables and if necessary replace them.
- Regularly clean the compressor air filter.

### **WARNING**

Before replacing wear parts or going into service operations, read the attached manual instruction of the torch.

### **WARNING**

Do not open this equipment and do not introduce anything into its openings. Power supply must be disconnected from the machine before maintenance and service. After each repair, perform proper tests to check safety requirements.

## Customer Assistance Policy

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to [www.lincolnelectric.com](http://www.lincolnelectric.com) for any updated information.

# THERMAL PROTECTION

Thermal detection devices protect the machine from excessive operating temperatures. Excessive temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. If excessive operating temperatures should occur, the yellow LED will light and the detection device will prevent output voltage or current.

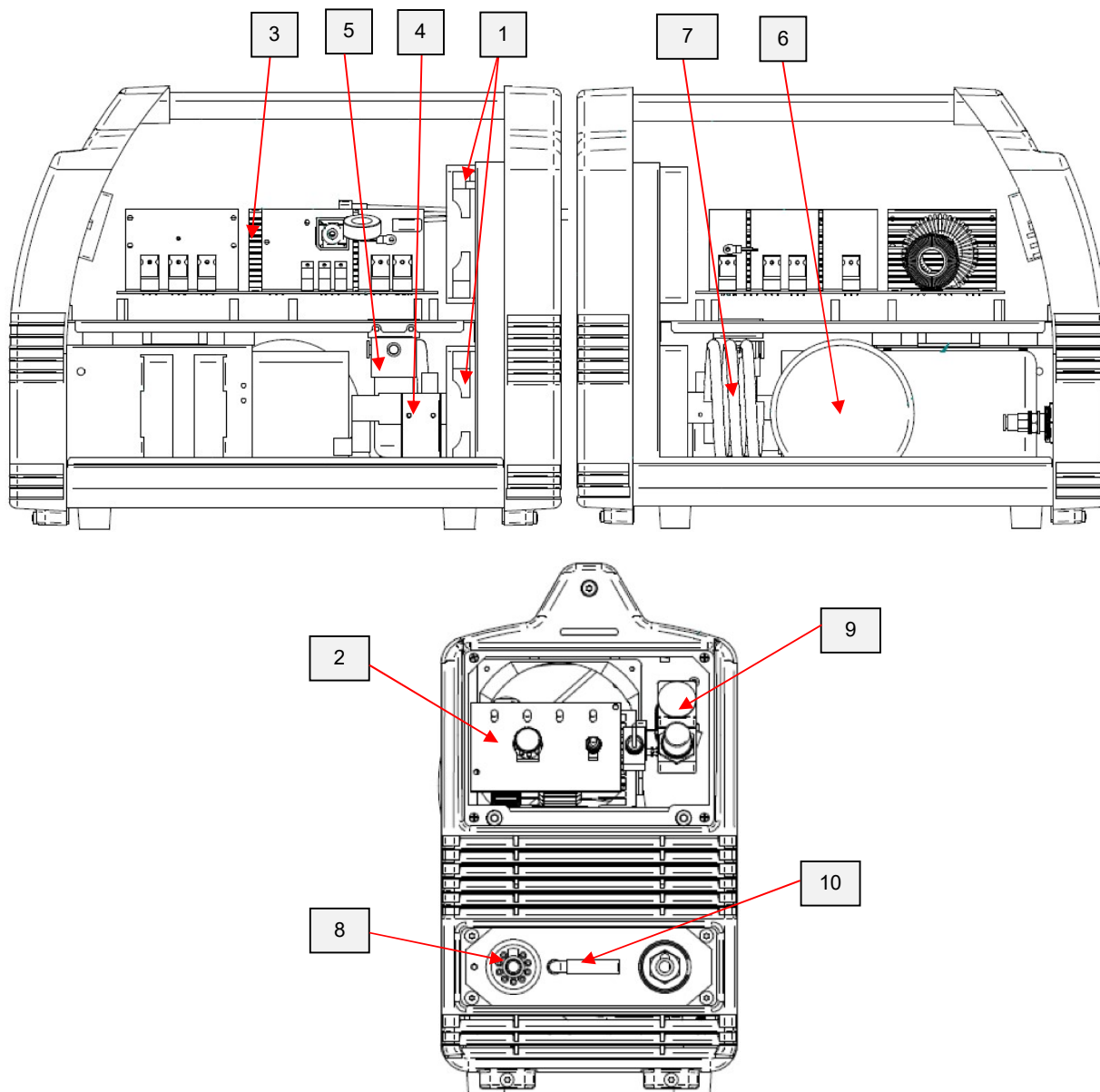
These detection devices are self-resetting once the machine cools sufficiently. If the thermostat shutdown was caused by excessive output or duty cycle and the fan is operating normally, the power switch may be left on and the reset should occur within a 15 minute period. If the fan is not turning or the air intake louvers were obstructed, then the power must be switched off and the fan problem or air obstruction must be corrected.

## MAJOR COMPONENTS LOCATION

### TOMAHAWK® 30K

1. Fans
2. Front UI Board
3. Power Board
4. Gas solenoid
5. Air Filter

6. Compressor
7. Cooling Spiral
8. Torch Connector
9. Pressure Gauge
10. Air Filter



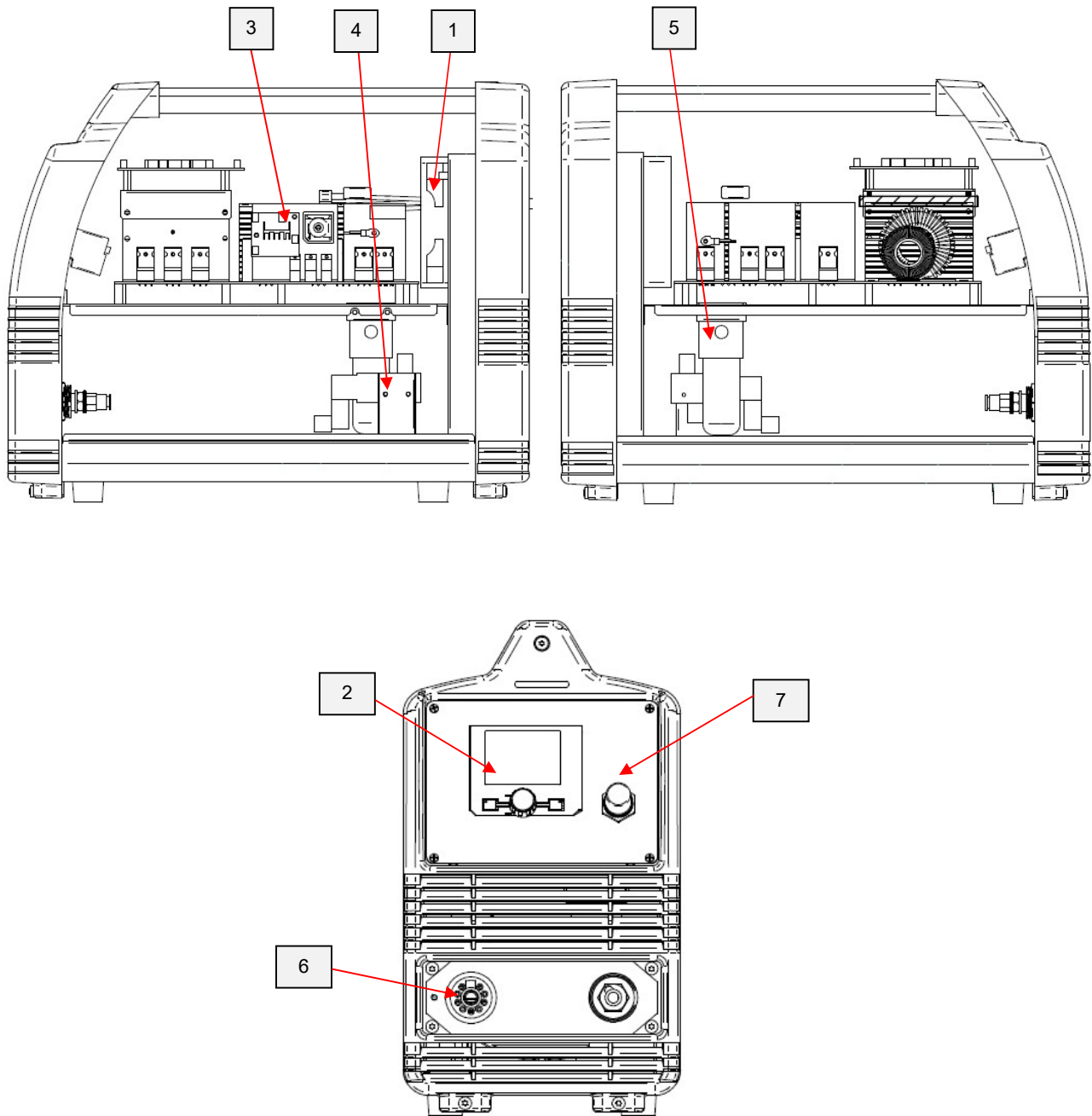


## MAJOR COMPONENTS LOCATION

### TOMAHAWK® 45

1. Fan
2. Front UI Board
3. Power Board
4. Gas solenoid

5. Air Filter
6. Torch Connector
7. Pressure Gauge



## OVERLOAD PROTECTION

TOMAHAWK® 30K & 45 are electrically protected from producing higher than normal output current. An electronic protection circuit limits the current to within the capabilities of the machine.

## THERMAL PROTECTION

There are thermal devices located on the power board. They protect the machine from excessive operating temperature. Excessive temperature may be caused by a lack of cooling air or by operating the machine beyond

the duty cycle and output rating. If excessive operating temperature should occur, the Thermal Overload indicator on the front panel, will turn ON and the thermostat will prevent output current.

The thermal protection devices are self-resetting once the machine cools sufficiently. If the shutdown was caused by excessive output or duty cycle and the fan is operating normally, the power switch may be left on and the reset should occur within about 8-10 minutes period. If the fan is not turning or the air intake louvers are obstructed, the input power must be removed and the fan problem or air obstruction must be corrected.

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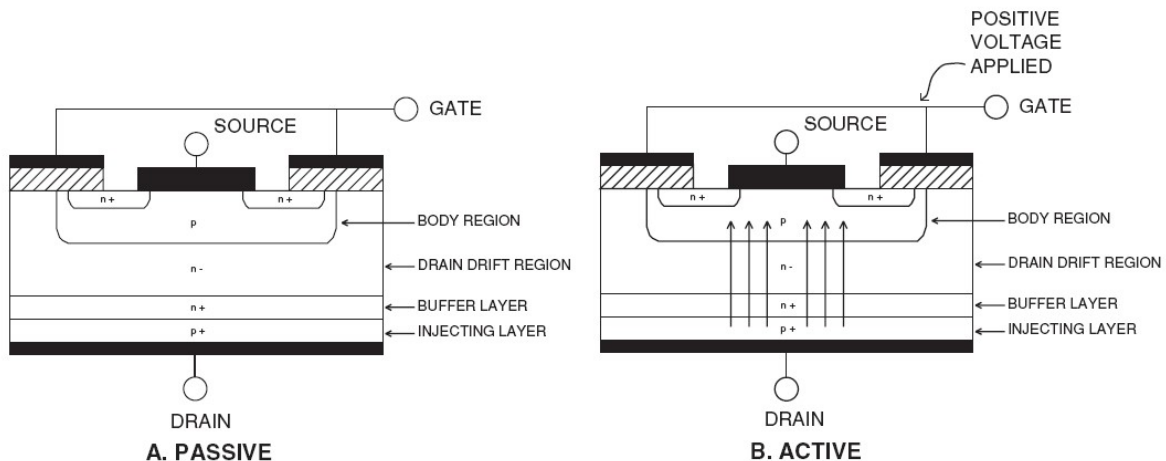
## INSULATED GATE BIPOLAR TRANSISTOR (IGBT) OPERATION

An IGBT is a type of transistor. IGBTs are semiconductors well suited for high frequency switching and high current applications. Drawing A shows an IGBT in a passive mode. There is no gate signal, zero volts relative to the source, and therefore, no current flow. The drain terminal of the IGBT may be connected to a voltage supply; but since there is no conduction the circuit will not supply current to components connected to the source. The circuit is turned off

like a light switch in the OFF position.

Drawing B shows the IGBT in an active mode. When the gate signal, a positive DC voltage relative to the source, is applied to the gate terminal of the IGBT, it is capable of conducting current. A voltage supply connected to the drain terminal will allow the IGBT to conduct and supply current to circuit components coupled to the source. Current will flow through the conducting IGBT to downstream components as long as the positive gate signal is present. This is similar to turning ON a light switch.

## IGBT



## **TROUBLESHOOTING AND REPAIR SECTION**

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- How to use troubleshooting Guide
- Troubleshooting Guide
- Side panels removal and capacitor discharge procedure

## HOW TO USE TROUBLESHOOTING GUIDE

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Service and repair should be performed by only Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

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This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

**Step 1. LOCATE PROBLEM (SYMPTOM).** Look under the column labeled "PROBLEMS".

This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting. Symptoms are grouped into three main categories: Output Problems, Function Problems, and LED Function Problems.

**Step 2. PERFORM EXTERNAL TESTS.** The second column, labeled "CHECKS", lists the obvious external possibilities that may contribute to the machine symptom. Perform these tests/checks in the order listed. In general, these tests can be conducted without removing the case wrap-around cover.

**Step 3. PERFORM COMPONENT TESTS.** The last column, labeled "RECOMMENDED COURSE OF ACTION" lists the most likely components that may

have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

All of the referenced test procedures referred to in the Troubleshooting Guide are described in detail at the end of this chapter. Refer to the Troubleshooting and Repair Table of Contents to locate each specific Test Procedure. All of the referred to test points, components, terminal strips, etc., can be found on the referenced electrical wiring diagrams and schematics. Refer to the Wiring Diagrams Section Table of Contents to locate the appropriate diagram.

## WARNING



### **ELECTRIC SHOCK** can kill

- Have an electrician install and service this equipment
- Turn the input power off at the fuse box before working on equipment
- Do not touch electrically hot parts
- Prior to performing preventive maintenance, perform the following capacitor discharge procedure to avoid electric shock

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Sometimes machine failures appear to be due to PC board failures. These problems can sometimes be traced to poor electrical connections. To avoid problems when troubleshooting and replacing PC boards, please use the following procedure:

1. Determine to the best of your technical ability that the PC board is the most likely component causing the failure symptom.
2. Check for loose connections at the PC board to assure that the PC board is properly connected.
3. If the problem persists, replace the suspect PC board using standard practices to avoid static electrical damage and electrical shock.

4. Test the machine to determine if the failure symptom has been corrected by the replacement PC board.

**NOTE:** Allow the machine to heat up so that all electrical components can reach their operating temperature.

5. Remove the replacement PC board and substitute it with the original PC board to recreate the original problem.
  - If the original problem does not reappear by substituting the original board, then the PC board was not the problem. Continue to look for bad connections in the control wiring harness, junction blocks, and terminal strips.
  - If the original problem is recreated by the substitution of the original board, then the PC board was the problem. Reinstall the replacement PC board and test the machine.
6. Always indicate that this procedure was followed when warranty reports are to be submitted.

**NOTE:** Following this procedure and writing on the warranty report, "INSTALLED AND SWITCHED PC BOARDS TO VERIFY PROBLEM," will help avoid denial of legitimate PC board warranty claims.

# TROUBLESHOOTING

## **!! WARNING !!**

**BEFORE CONNECT POWER SUPPLY, MAKE A CAREFUL VISUAL INSPECTION INSIDE THE MACHINE, CHECK ALL THE BOARDS AND HARNESES.**

PROBLEMS / SYMPTOMS	POSSIBLE AREAS OF MISADJUSTMENT(S)	CHECKS & RECOMMENDED COURSE OF ACTION
THE INPUT FUSES REPEATEDLY FAIL OR THE INPUT CIRCUIT BREAKERS KEEP TRIPPING.	<ul style="list-style-type: none"> <li>• MAKE SURE THE INPUT FUSES OR CIRCUIT BREAKERS ARE PROPERLY SIZED.</li> </ul>	<ul style="list-style-type: none"> <li>• PERFORM THE INPUT RECTIFIER BRIDGE TEST</li> <li>• PERFORM THE MAIN BOARD TEST</li> </ul>
THE MACHINE IS "DEAD". NO LIGHTS, NO OUTPUT, THE MACHINE APPEARS TO HAVE NO INPUT POWER.	<ul style="list-style-type: none"> <li>• MAKE SURE THE INPUT POWER SWITCH IS IN THE ON POSITION.</li> <li>• CHECK THE MAIN INPUT FUSES OR BREAKERS TO MAKE SURE THE CORRECT INPUT POWER IS PRESENT AT THE MACHINE.</li> </ul>	<ul style="list-style-type: none"> <li>• CHECK THE INPUT SWITCH FOR PROPER OPERATION.</li> <li>• CHECK THE ASSOCIATED LEADS FOR LOOSE OR FAULTY CONNECTIONS. SEE WIRING DIAGRAM.</li> </ul>
THERMAL INDICATOR IS ON (TH30K) OR THERMAL ERROR IS ON (TH45 User Interface)	<ul style="list-style-type: none"> <li>• INSUFFICIENT VENTILATION</li> <li>• AMBIENT TEMPERATURE IS TOO HIGH</li> <li>• EXCEEDING THE RATED DUTY CYCLE</li> </ul>	<ul style="list-style-type: none"> <li>• IMPROVE THE VENTILATION OR REMOVE ANY OBSTRUCTION FROM THE VENTILATION GRIDS</li> <li>• IT WILL AUTOMATICALLY RECOVER WHEN THE TEMPERATURE REDUCES</li> </ul>
RED LED IS ON (ONLY TH30K) ERROR E30 (ONLY TH45)	<ul style="list-style-type: none"> <li>• THE CUTTING TORCH IS NOT PROPERLY CONNECTED TO THE MACHINE SOCKET OR THE CUTTING TORCH IS DAMAGED</li> </ul>	<ul style="list-style-type: none"> <li>• CHECK THE PLASMA TORCH IS NOT DAMAGED</li> <li>• TIGHTEN THE PLASMA TORCH TO THE SOCKET</li> <li>• TIGHTEN THE SHIELD CUP</li> </ul>
PILOT ARC NOT START	<ul style="list-style-type: none"> <li>• TRIGGER IS FAULTY</li> <li>• TORCH HEAD MECHANISM IS DAMAGED</li> </ul>	<ul style="list-style-type: none"> <li>• CHECK THE TORCH TRIGGER</li> <li>• REPLACE THE TORCH HEAD</li> </ul>
E01 (ONLY FOR TH45) Primary overheat  E02 (ONLY FOR TH45) Primary overheat	<ul style="list-style-type: none"> <li>• AIR FLOW IS BLOCKED</li> <li>• FAN IS BLOCKED</li> </ul>	<ul style="list-style-type: none"> <li>• CHECK AND CORRECT CONDITION OF FAN</li> <li>• TURN OFF THE EQUIPMENT FOR AT LEAST 10 MINUTES. MAKE SURE THE EQUIPMENT HAS NOT BEEN OPERATED BEYOND THE DUTY CYCLE (REFER TO TECHNOLOGY PARAMETERS).</li> </ul>
CUTTING PERFORMANCES ARE POOR	<ul style="list-style-type: none"> <li>• CHECK THE TORCH CONSUMABLES TO BE SURE THEY ARE IN TIGHT, NOT DIRTY OR GREASY AND IN GOOD SHAPE.</li> <li>• CHECK AIR SUPPLY FOR OIL OR A GREAT DEAL OF WATER.</li> <li>• Air FLOW IS NOT ENOUGH</li> </ul>	<ul style="list-style-type: none"> <li>• REPLACE IF NECESSARY</li> <li>• IF THERE IS OIL OR A GREAT DEAL OF WATER, THE AIR MUST BE FILTERED</li> <li>• MAKE SURE THE AIR PRESSURE IS SET CORRECTLY</li> </ul>
PILOT ARC STARTS BUT WILL NOT TRANSFER WHEN BROUGHT NEAR WORK.	<ul style="list-style-type: none"> <li>• BAD WORK LEAD CONNECTION FOR CLEAN, SECURE CONNECTION.</li> <li>• WORKPIECE IS DIRTY, OR RUSTY</li> </ul>	<ul style="list-style-type: none"> <li>• CHECK FOR CLEAN, SECURE CONNECTION.</li> <li>• MAKE SURE WORK PIECE IS CLEAN AND DRY. REMOVE ANY SCALE, RUST OR DROSS.</li> <li>• PLASMA WILL ONLY CUT CONDUCTIVE MATERIAL. DO NOT ATTEMPT TO CUT FIBERGLASS, PLASTIC, RUBBER, PVC OR ANY OTHER NON-CONDUCTIVE MATERIAL.</li> </ul>

# COVER CASE REMOVAL AND DC BUS CAPACITORS DISCHARGE PROCEDURE

---

## WARNING

Service and repair should be performed only by Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual.

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

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## DESCRIPTION

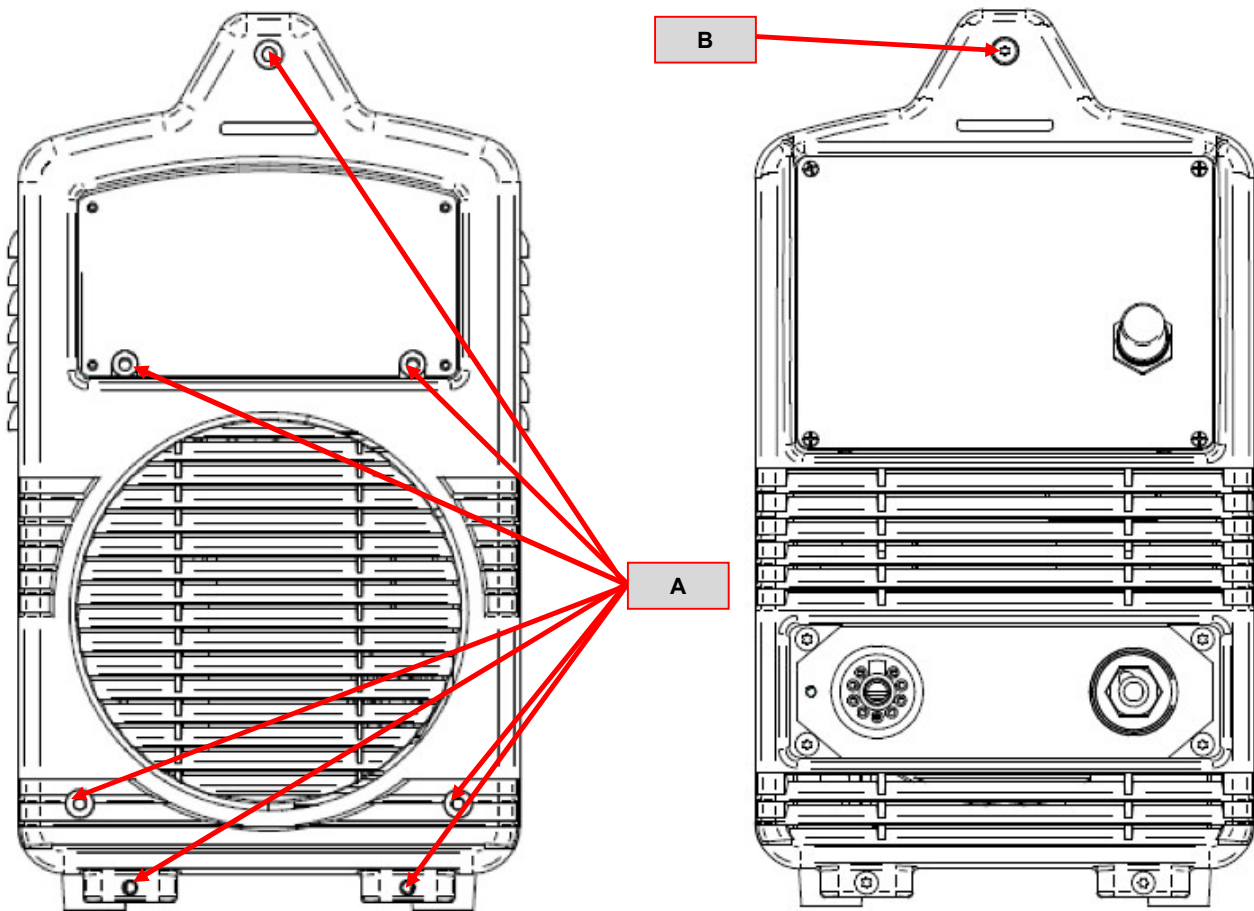
This procedure will aid the technician in the removal and replacement of the machine metal case and discharging the DC Bus capacitors making it safe for the technician to work on the machine.

## MATERIALS NEEDED

PH02 Screwdriver

## TOMAHAWK®30K & 45 –COVER REMOVAL

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### Necessary tool:

- PH02 screwdriver
- 7mm wrench

### Procedure:

1. Turn ON/OFF switch to OFF position.
2. Disconnect Input Power from the machine!
3. Remove the 7 screws (A) on the back panel. **See above pictures**
4. Remove the handle screw (B) on the front panel.
5. Pull out the rear panel, take off the handle, then lift the cover
6. Using the 7mm wrench remove the earth cable from the cover
7. Remove the cover

Follow the next session to **perform the discharge procedure**



# DISCHARGE PROCEDURE

---

## WARNING



**ELECTRIC SHOCK** can kill

Have an electrician install and service this equipment  
Turn the input power off at the fuse box before working on equipment

Do not touch electrically hot parts

Prior to performing preventive maintenance, perform the following capacitor discharge procedure to avoid electric shock.

## DC BUS CAPACITOR DISCHARGE PROCEDURE

1. Remove main input power to the Tomahawk® 30K and 45
2. Remove the machine cover following the case removal procedure available in this Service manual.
3. as there are no accessible points where to connect the resistor to discharge the capacitors, **wait 5 minutes, after having switched off and disconnected the machine from the mains, before carrying out any kind of test operation.**
4. For all the following operations **use electrically insulated gloves.**

# INPUT RECTIFIER BRIDGE RESISTANCE TEST

---

## WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

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## TEST DESCRIPTION

This test will determine if the Input Rectifier Bridge has failed.

## MATERIALS NEEDED

Volt / Ohmmeter  
Machine Wiring Diagram

## INPUT RECTIFIER BRIDGE RESISTANCE TEST (continued)

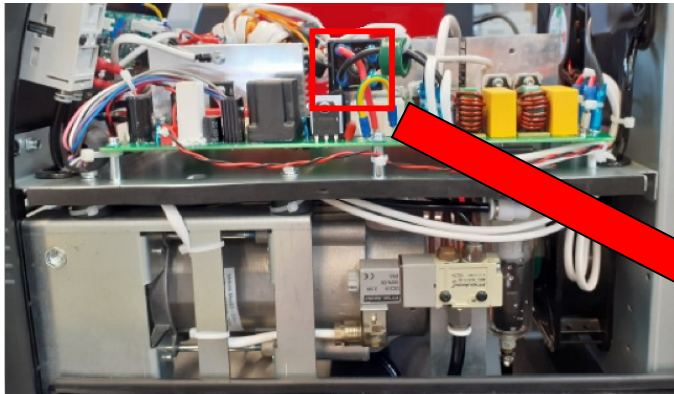


Image is from TH 30K

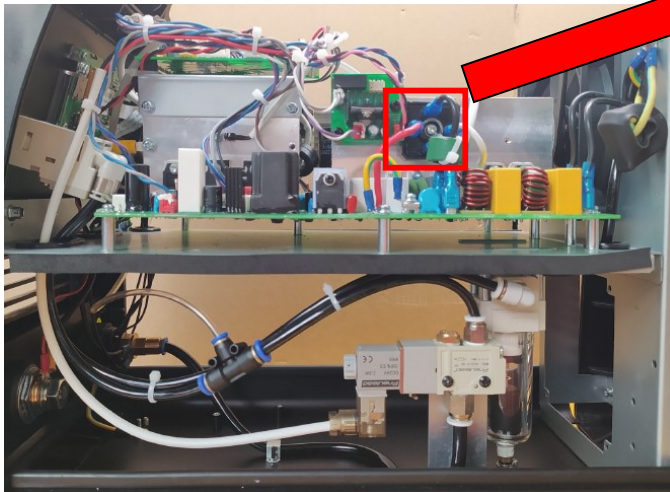
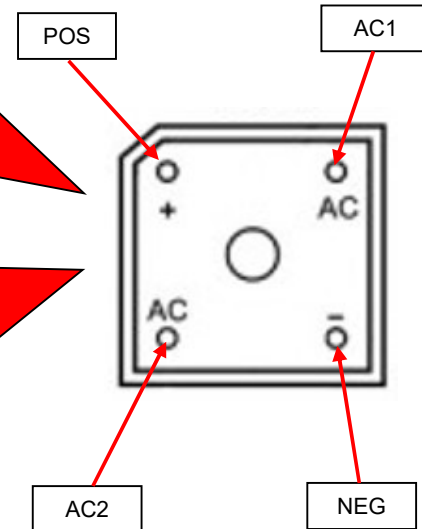


Image is from TH 45



### TEST PROCEDURE

1. Remove main input power to the Tomahawk® 30K or 45
2. Follow the instruction available at the **Discharge procedure** page.
3. Disconnect the cables from rectifier bridge terminals
4. Using the Volt-Ohmmeter (diode test mode) check the Input Rectifier (see **Table tests 1**)

Input Bridge - Table tests 1

Positive Probe (RED)	Negative Probe (BLACK)	Value
AC1	+	0.3V - 0.7V
AC2	+	0.3V - 0.7V
+	AC1	OPEN
+	AC2	OPEN
-	AC1	0.3V - 0.7V
-	AC2	0.3V - 0.7V
AC1	-	OPEN
AC2	-	OPEN

# MAIN BOARD THERMAL SENSORS TEST

---

## WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

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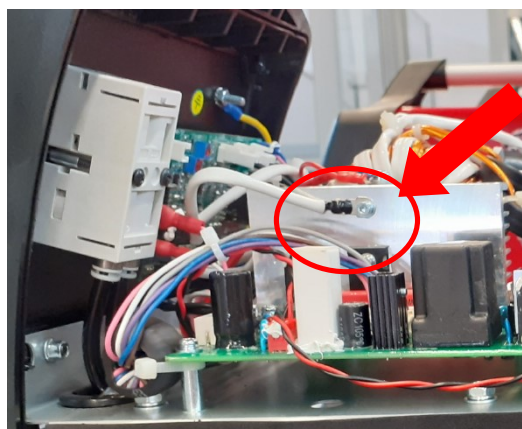
## TEST DESCRIPTION

This test will help to determine if the main power board is receiving the correct input voltages and if the correct regulated voltages are being processed and maintained by the board.

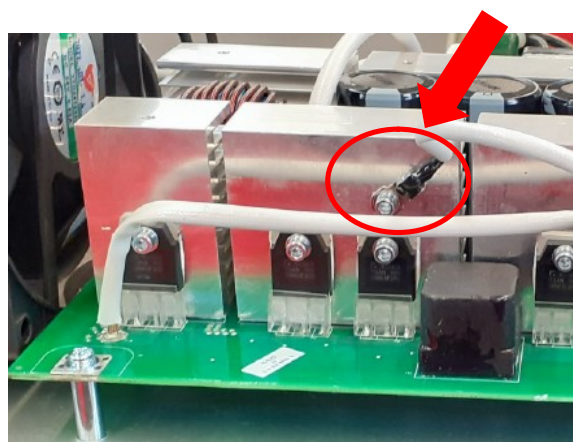
## MATERIALS NEEDED

Volt / Ohmmeter  
Machine Wiring Diagram

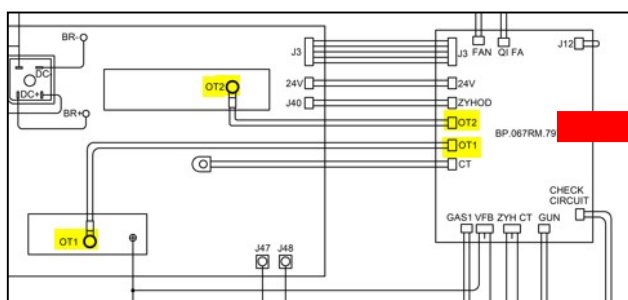
## MAIN BOARD THERMAL SENSORS TEST



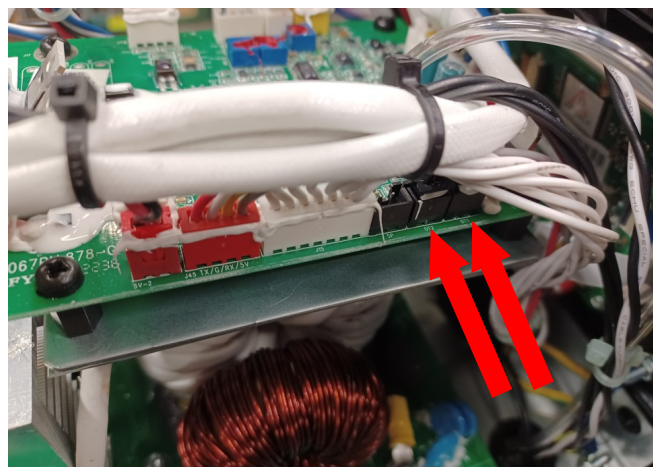
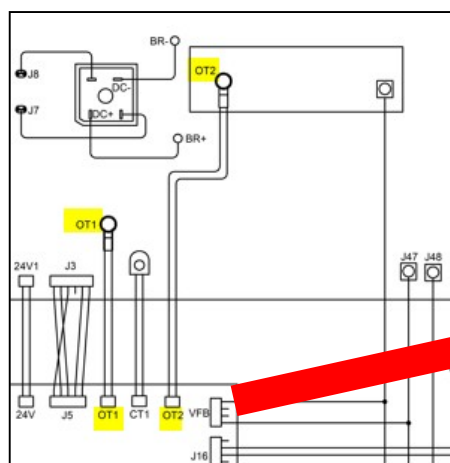
PTC on Output Diodes



PTC on IGBTs



TH 30K  
Figure 1



TH 45  
Figure 2

### TEST PROCEDURE

1. Remove main input power to the Tomahawk® 30K or 45
2. Follow the instruction available at the **Discharge procedure** page.
3. Disconnect the connectors "OT1" and "OT2" from the Board.
4. Using the multi-meter (ohm mode) check PTC "OT1" and PTC "OT2", value shall be between 12Kohms and 15Kohms. See **Figure 1** for correct locations on TH30K Control PCB and see **Figure2** for correct locations on TH45 Control PCB

# POWER BOARD VOLTAGE TEST

---

## WARNING

Service and repair should be performed by only Lincoln Electric factory trained personnel. Unauthorized repairs performed on this equipment may result in danger to the technician or machine operator and will invalidate your factory warranty. For your safety and to avoid electrical shock, please observe all safety notes and precautions detailed throughout this manual. If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact your Local Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed.

.....

## TEST DESCRIPTION

This test will help to determine if the main power board is receiving the correct input voltages and if the correct regulated voltages are being processed and maintained by the board.

## MATERIALS NEEDED

Volt / Ohmmeter  
Machine Wiring Diagram

## POWER BOARD VOLTAGE TEST (continued)

### INPUT VOLTAGE

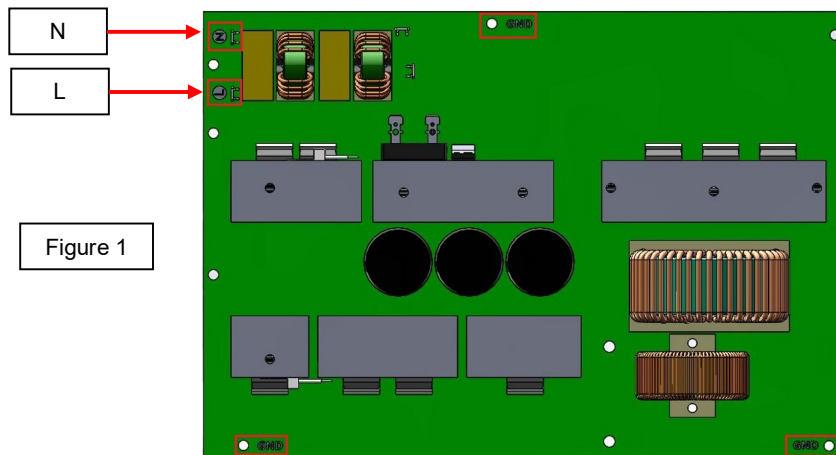


Figure 1

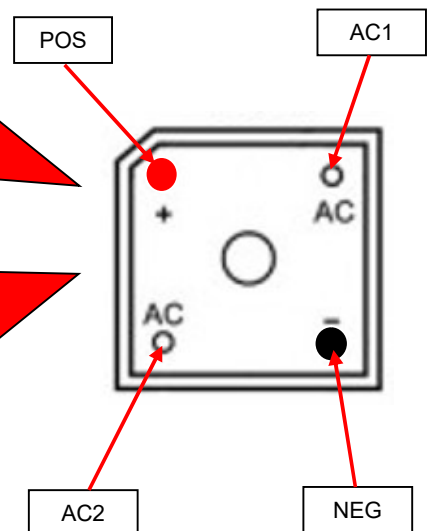
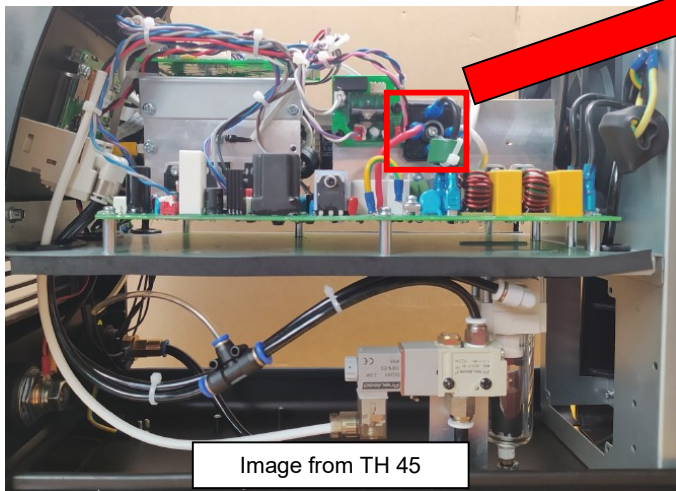
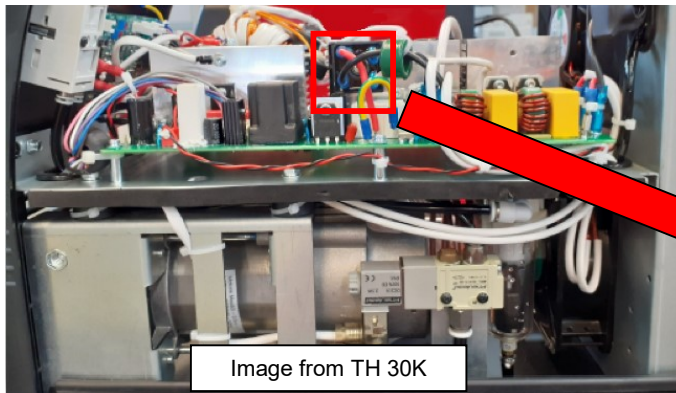


Figure 2

## TEST PROCEDURE

**⚠ Use always electrically insulate gloves during this test procedure**

1. Carefully apply 230Vac +/- 15% input voltage via the input cable to the Tomahawk® 30K or 45
2. Switch to ON position the mains switch located on the back of the machine
3. Check for 230Vac +/- 15% present at terminals "L" & "N" located on Power Board (see **Figure1**)
4. Check for 207Vdc +/-15% between terminals **POS** and **NEG** of the input rectifier bridge (see **Figure 2**)
5. If voltage is not present check the main switch and that supply voltage is present at wall plug

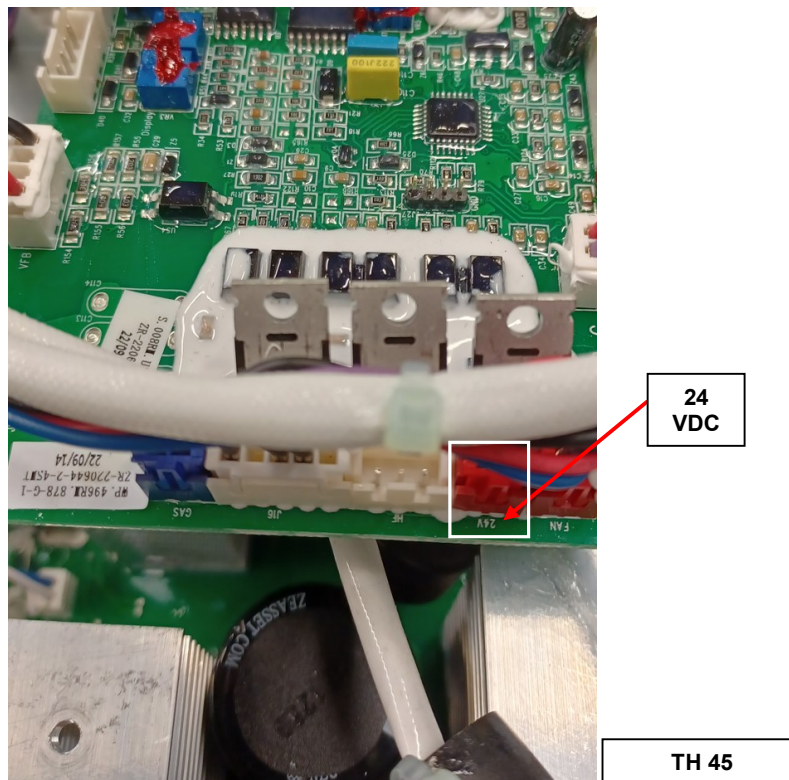
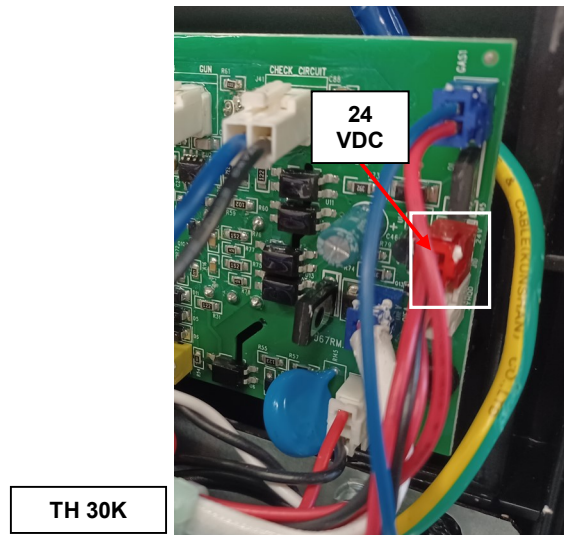






## POWER BOARD VOLTAGE TEST (continued)

### AUXILIARY SUPPLY VOLTAGE



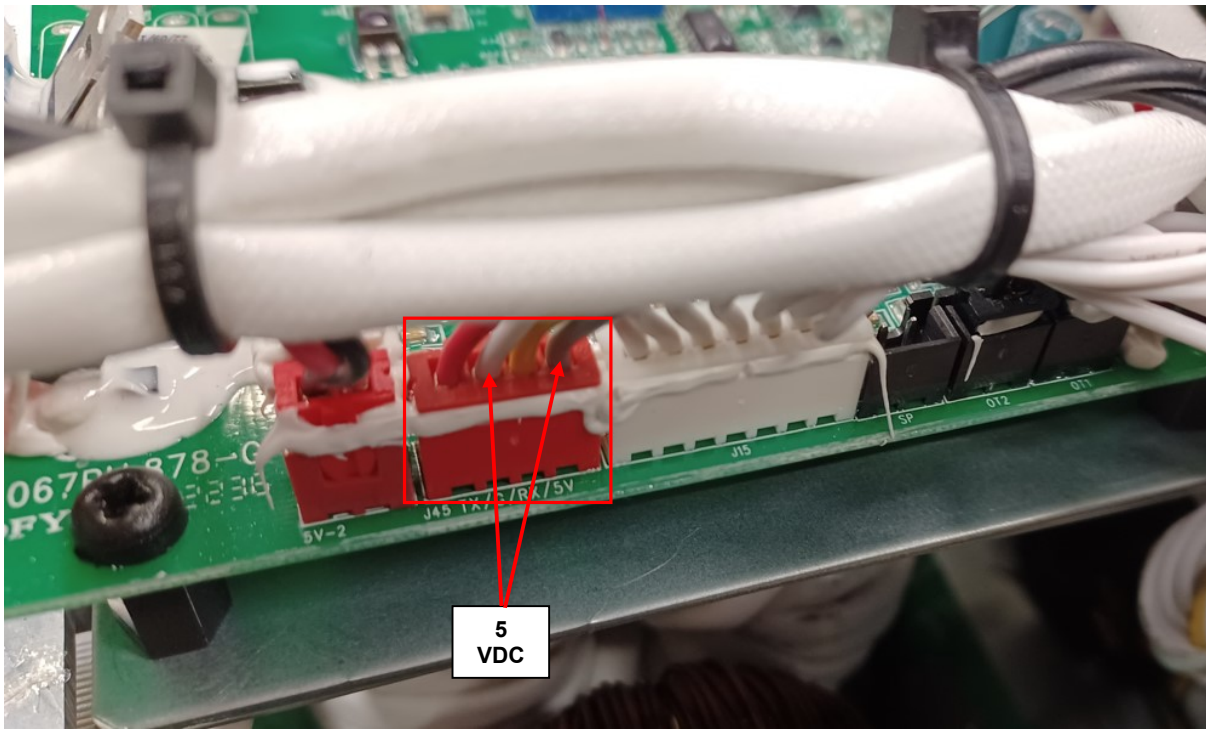
### TEST PROCEDURE

**⚠ Use always electrically insulate gloves during this test procedure**

1. Carefully apply 230Vac +/- 15% input voltage via the input cable to the Tomahawk® 30K or 45
2. Switch to ON position the mains switch located on the back of the machine
3. Check on Control Board (see above Pictures for correct location) the presence of 24Vdc on the connector named "24V". This power supply shall be always present when machine is switched ON.

## POWER BOARD VOLTAGE TEST (continued)

AUXILIARY SUPPLY VOLTAGE to UI (User Interface)  
ONLY TH 45



TH 45 control board

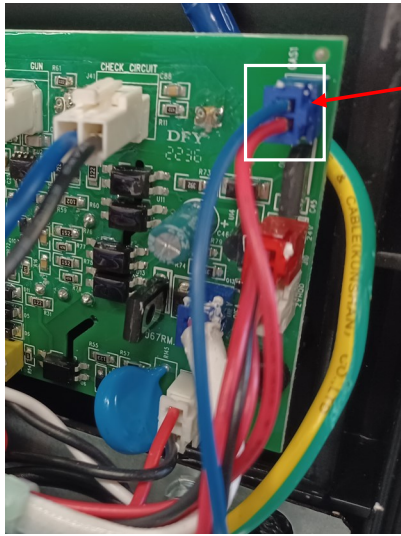
### TEST PROCEDURE

**⚠ Use always electrically insulate gloves during this test procedure**

4. Carefully apply 230Vac +/- 15% input voltage via the input cable to the Tomahawk® 30K or 45
5. Switch to ON position the mains switch located on the back of the machine
6. Check on Control Board (see above Pictures for correct location) the presence of 5Vdc on the connector named "J45" between wire grey and white. This voltage supply the UI (User Interface) and shall be always present when machine is switched ON. If not present the main Board may be faulty, while if present but the UI is OFF may be the UI is defect and has to be replaced.

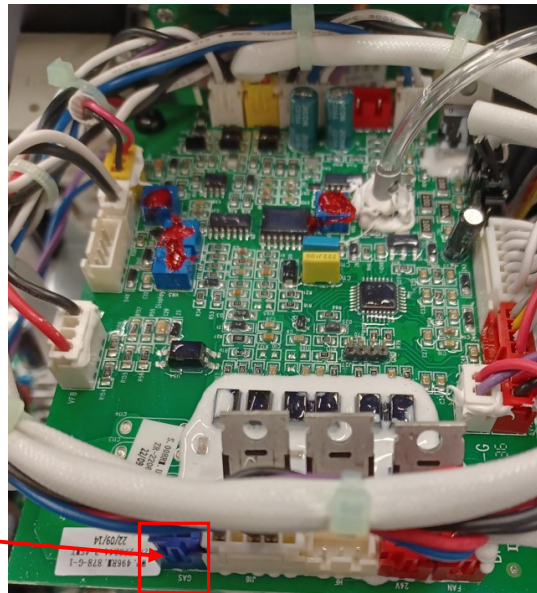
## POWER BOARD VOLTAGE TEST (continued)

### GAS SOLENOID SUPPLY VOLTAGE



GAS

TH 30K



TH 45

GAS

### TEST PROCEDURE

**⚠ Use always electrically insulate gloves during this test procedure**

1. Carefully apply 230Vac +/- 15% input voltage via the input cable to the Tomahawk® 30K or 45
2. Switch to ON position the mains switch located on the back of the machine
3. Check on Control Board the presence of 24Vdc on the connectors named "GAS". This voltage is present only when torch trigger is pushed, during purge or during pre/postflow. (ON BOTH MODELS 30K & 45)
4. Check presence of +5VDC. This power supply shall be always present when machine is switched ON. (ONLY MODEL 45)
5. Check presence of +15VDC. This power supply shall be always present when machine is switched ON. (ONLY MODEL 45)

# DISASSEMBLY OPERATIONS

## MAIN PCB REMOVAL AND REPLACEMENT PROCEDURE (30K & 45)

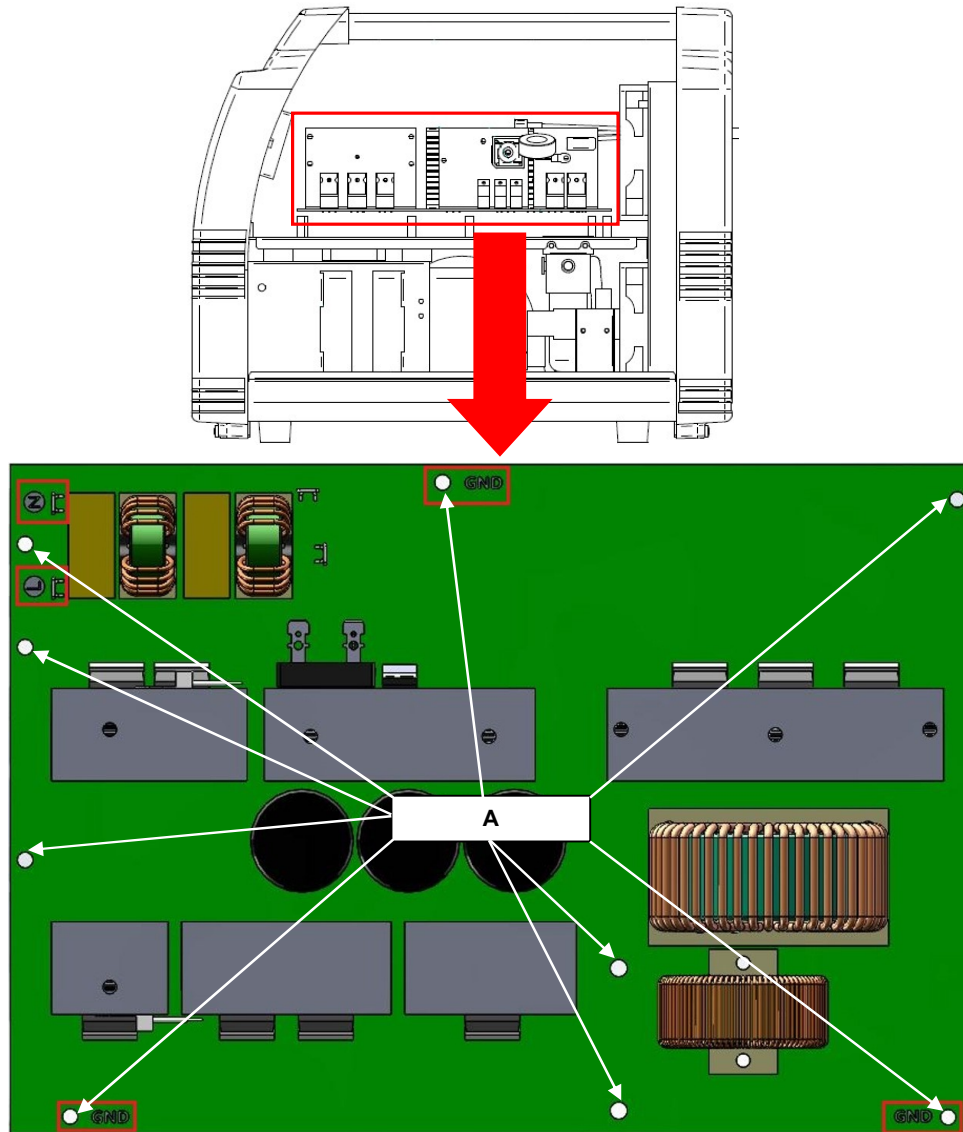


Figure 1

## REMOVAL PROCEDURE

### Necessary tools:

- Pliers
- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Locate the Main PCB. See **Figure1**.
5. Remove all the cables from the board which do not allow its removal.
6. Remove the 9 screws (**A**) that are fixing the board to the machine frame.
7. Carefully remove the board from the machine.

**For the board re-assembly operations**, make the previous steps in the reverse order.



# DISASSEMBLY OPERATIONS

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## FAN REMOVAL AND REPLACEMENT PROCEDURE

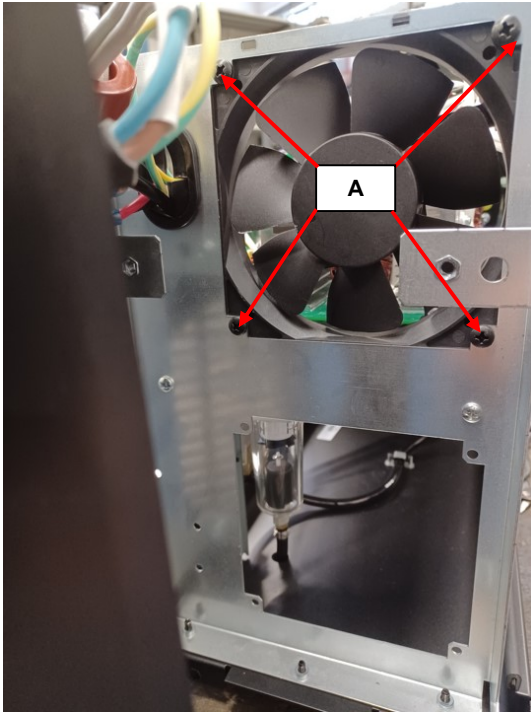


Figure 1 – TH 45

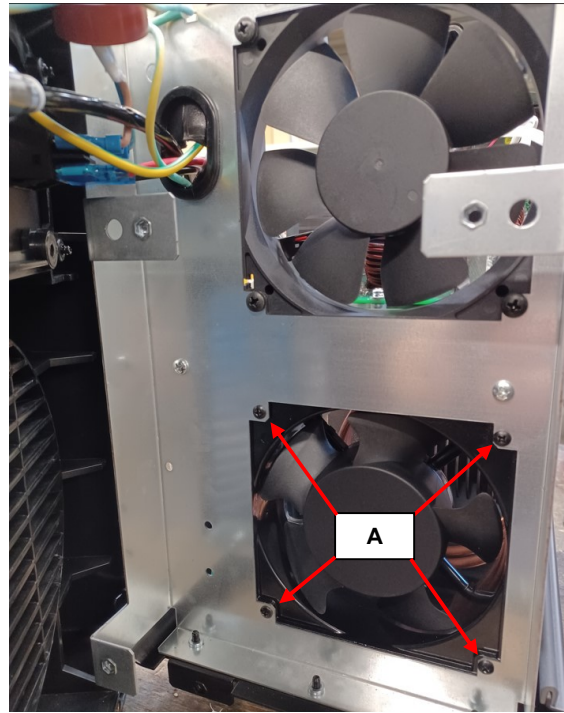


Figure 1a – TH 30K

## REMOVAL PROCEDURE

### Necessary tools:

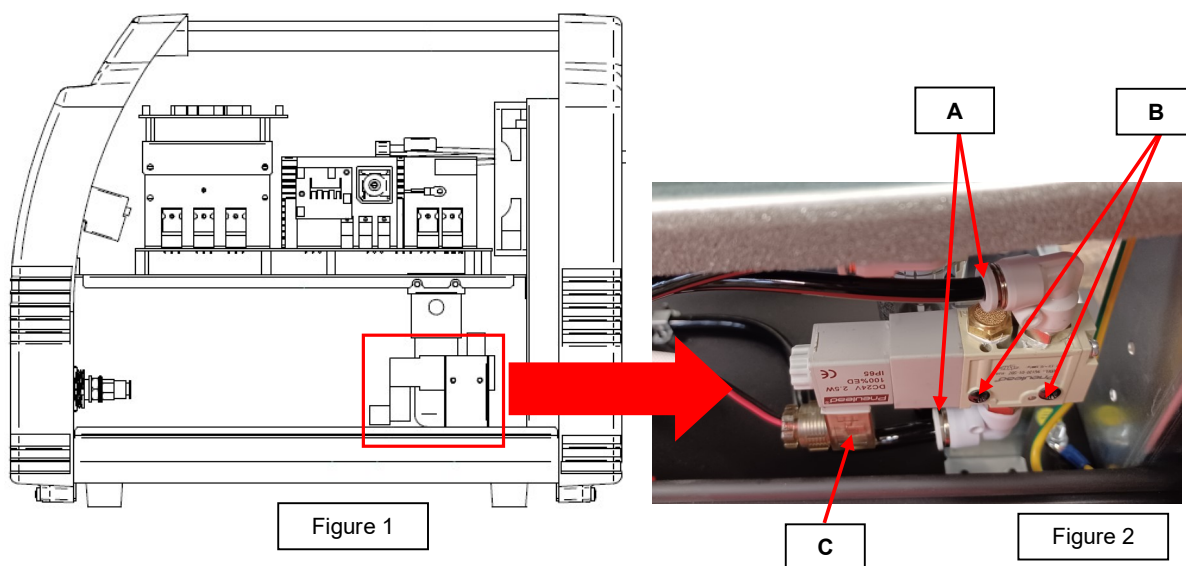
- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Locate the fan (TH45) or the fans (TH30K). See **Figure1** and **Figure 1a**.
5. Disconnect the connectors named "FAN" from the the control board.
6. Remove the plastic ties that are fixing the onput cables on the machine frame and rotate the rear panel to get access to the screws that are fixing the fan to the machine rear frame.
7. Remove the 4 screws (**A**) using the PH02 screwdriver from the fan you need to replace.
8. Carefully remove the fan from the machine.
9. For the fans re-assembly operations, make the previous steps in the reverse order.

**NOTE:** perform the same above operations to remove the second fan present inside the TH30K

# DISASSEMBLY OPERATIONS

## GAS SOLENOID REPLACEMENT PROCEDURE



### REMOVAL PROCEDURE

#### Necessary tools:

- Pliers
- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Locate the gas solenoid. See **Figure1**.
5. Remove the 2 pipes (**A**) from the gas solenoid. See **Figure2**.
6. Remove the 2 screws (**B**) using the PH02 screwdriver. See **Figure2**.
7. Now that the gas solenoid is free to move remove the screw that is fixing the connector (**C**) to the gas solenoid. See **Figure2**.
8. Carefully remove the gas solenoid.
9. **For the gas solenoid re-assembly operations**, make the previous steps in the reverse order.

# DISASSEMBLY OPERATIONS

## FRONT PANEL BOARD REMOVAL AND REPLACEMENT PROCEDURE TH 45

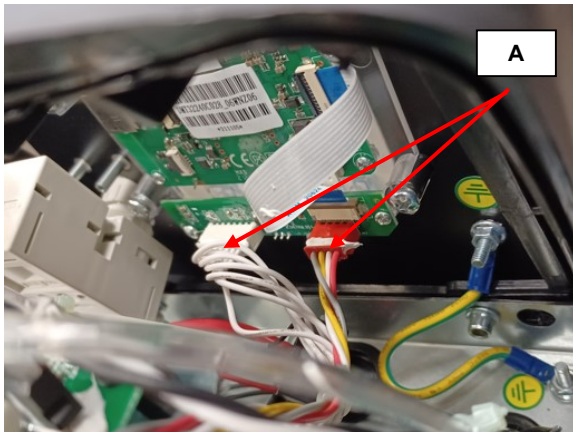


Figure 1

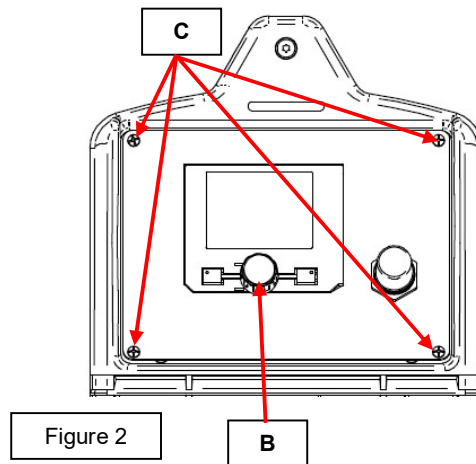


Figure 2



Figure 3

### REMOVAL PROCEDURE

#### Necessary tools:

- PH02 screwdriver
- 7mm socket wrench
- Pliers

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Remove the 2 connector (A) from the front panel board. See **Figure 1**
5. Remove the air flow regulator from the front panel.
6. Using the pliers loosen the knob nut that is under the knob cap (B) and remove the knob. See **Figure 2**.
7. Remove the 4 screws (C). See **Figure 2**.
8. Bend the front panel to be able to remove the 4 screws (D). See **Figure 3**
9. Carefully remove the front panel board.
10. **For the TH 45 front panel board re-assembly operations**, make the previous steps in the reverse order.

# DISASSEMBLY OPERATIONS

## FRONT NAMEPLATE ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE TH30K

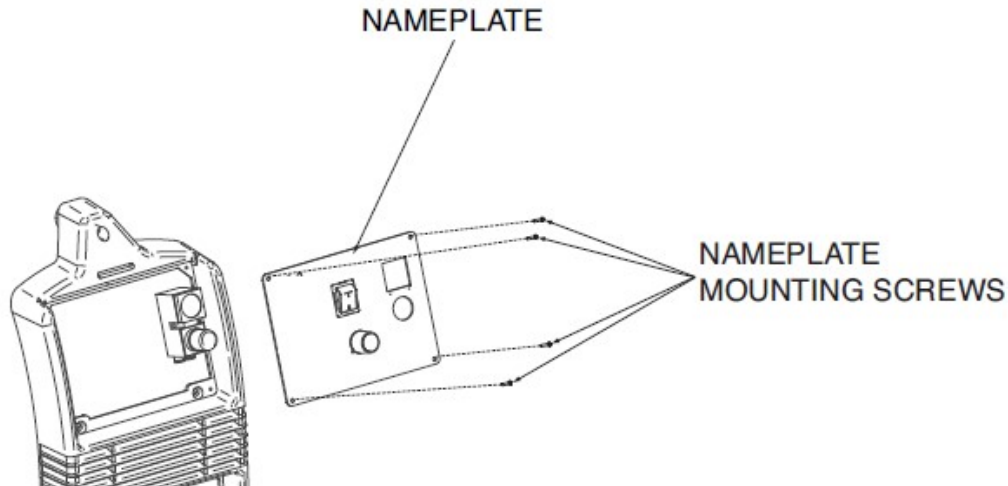


Figure 1

### REMOVAL PROCEDURE

#### Necessary tools:

- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Remove the 4 Nameplate Mounting screws from the front panel board. See **Figure 1**
5. Label and disconnect the ground lead connecting the Nameplate to the central machine frame.
6. Label and disconnect the air hoses connected to the bottom of the regulator / pressure gauge assembly
7. Label and disconnect the leads attached to the compressor switch.
8. Label and disconnect all the cables connected the front panel board
9. Nameplate Assembly can now be removed from the machine.



# DISASSEMBLY OPERATIONS

## FRONT PANEL BOARD REMOVAL AND REPLACEMENT PROCEDURE TH 30K

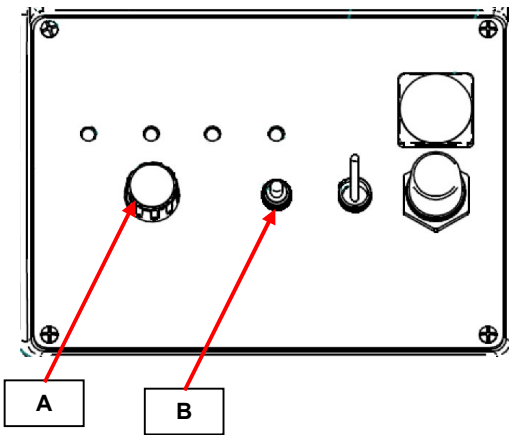


Figure 1

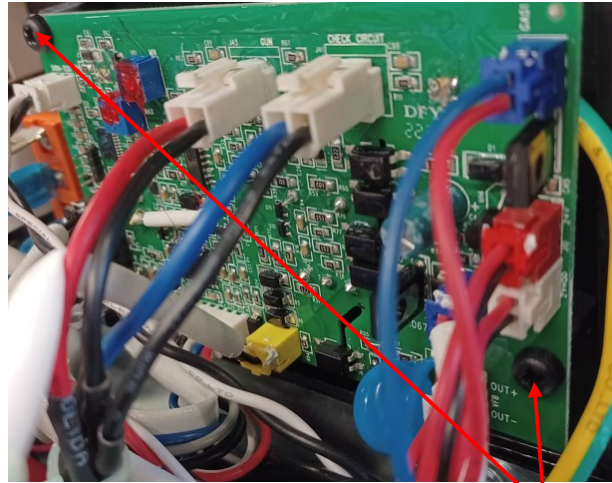


Figure 2

### REMOVAL PROCEDURE

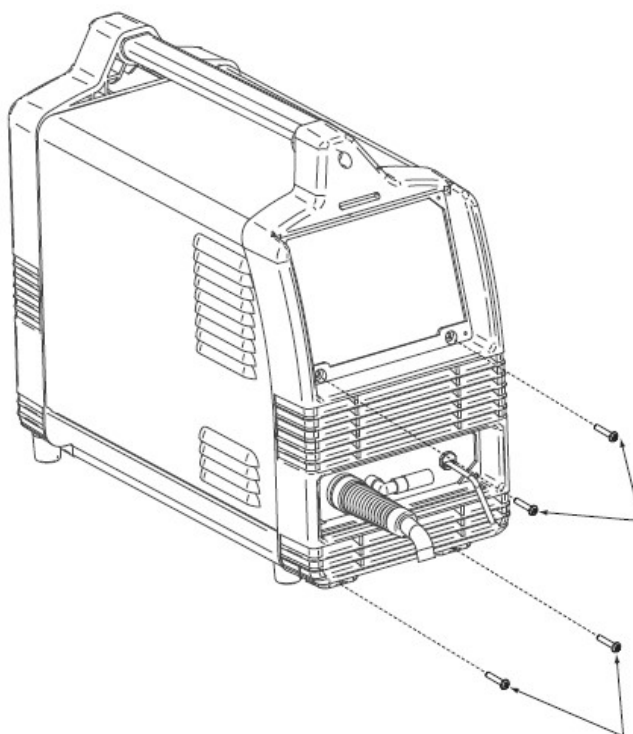
#### Necessary tools:

- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Follow the FRONT NAMEPLATE ASSEMBLY REMOVAL instructions
5. Remove the screw (A) that is fixing the knob to the potentiometer axle. See **Figure 1**
6. Remove the threaded ring (B). See **Figure 1**
7. Remove all the connectors from the Board
8. Using the Phillips screwdriver remove the 2 screws (C).
9. Carefully remove the Board from the machine.
10. **For the TH 30K front panel board re-assembly operations**, make the previous steps in the reverse order.

# DISASSEMBLY OPERATIONS

## FRONT PANEL REMOVAL AND REPLACEMENT PROCEDURE TH 30K



### REMOVAL PROCEDURE

#### Necessary tools:

- PH02 screwdriver

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the **Discharge procedure** page.
4. Perform Nameplate Assembly Removal Procedure.
5. Using a phillips screwdriver, remove the two screws on the feet of Front Panel (A)
6. Using a phillips screwdriver, remove the two Front Panel screws located behind the nameplate (B)
7. Disconnect the air hose from the torch connector
8. Label and disconnect the torch connector leads
9. Remove the female torch support panel.
10. **For the front panel re-assembly operations**, make the previous steps in the reverse order.

# DISASSEMBLY OPERATIONS

## COMPRESSOR REMOVAL AND REPLACEMENT PROCEDURE TH 30K

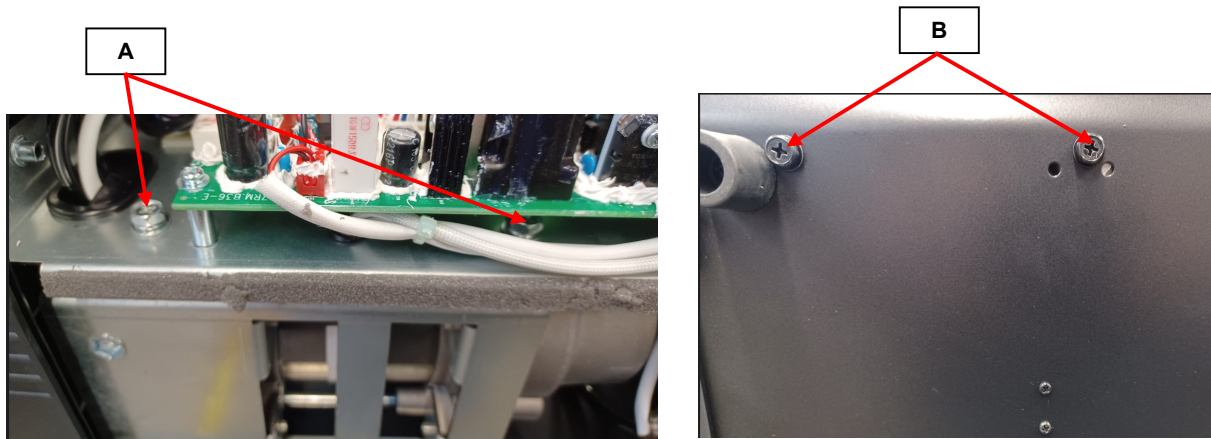


Figure 1

### REMOVAL PROCEDURE

#### Necessary tools:

- PH02 screwdriver
- 12mm wrench

1. Remove main input power to the machine
2. Remove the cover of the machine following the cover removal procedure.
3. Follow the instruction available at the Discharge procedure page
4. Perform the Front Panel Removal Procedure.
5. Locate the Compressor.  
**NOTE:** Compressor will be removed from the front of the machine.
6. Using a 12mm wrench, loosen the nut securing the copper air line to the Compressor.
7. Disconnect the copper Compressor air line from the air solenoid and remove out of the left side of the machine.
8. Using the phillips screwdriver, remove the two upper bolts (A) mounting screws located on the top side of the center divider panel.
9. Carefully place machine onto left side.
10. Using a phillips screwdriver, remove the bottom two screws (B) securing the Compressor lower shock mounts to the base sheet metal.
11. The Compressor assembly can now be removed out of the front of the machine.
12. **For the Compressor re-assembly operations**, make the previous steps in the reverse order.

## RETEST AFTER REPAIR

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Should a machine under test be rejected for any reason requiring the removal of any mechanical part that could affect the machine's electrical characteristics, or if any electrical components are repaired or replaced, the machine must be retested.

### Machine input and output

#### TOMAHAWK®30K & 45

Model	Input Voltage	Max. Input Current (A)	Rated Output in GMAW
TOMAHAWK® 30K	230Vac/1ph/50Hz	16 max	25A@100%
TOMAHAWK® 45	230Vac/1ph/50Hz	23 max	30A@100%

Output cutting current range
15-30 Amps – TOMAHAWK®30K
15-45 Amps – TOMAHAWK®45

Maximum Open Circuit Voltage $U_{0 \text{ peak}}$
396 Vp

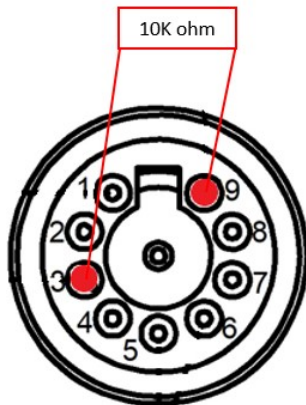
### **! IMPORTANT !**

After the repair, the unit shall be tested accordingly to the norm **EN60974-4**  
**Arc welding equipment “In-service inspection and testing”**

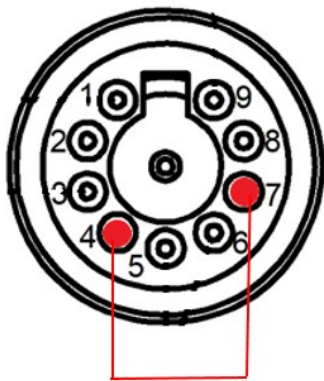
# CALIBRATION PROCEDURE for TH 30K

## Calibrate the Min and Max current:

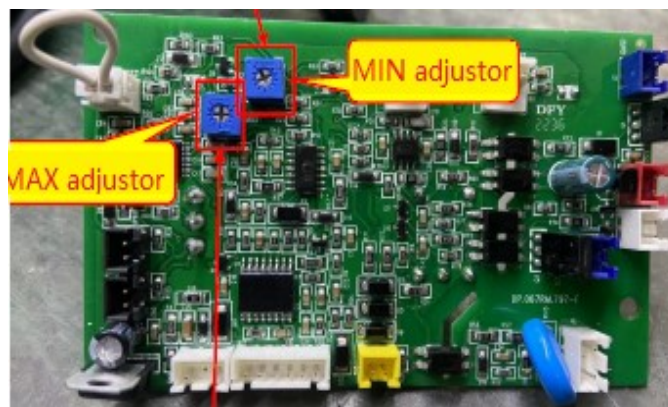
1. Add a 10K resistor between PIN3 and PIN9 of torch connector, then turn on the machine;



2. Machine switch into TEST mode; short the PIN4 and PIN7 of torch connector;



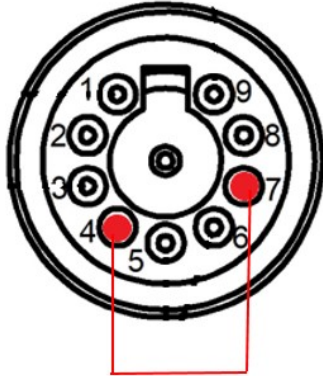
3. Connect proper pressure air into machine;
4. Connect a proper resistive load to the machine;
5. Adjust preset machine knob to maximum, close the torch switch (proper resistive load has to be connected to the unit)
6. Adjust the MAX trimmer shown into below picture, adjust the resistive load to have output 30A/92V;
7. Open the torch switch
8. Adjust preset machine knob to minimum, close the torch switch (proper resistive load has to be connected to the unit)
9. Adjust the MIN trimmer shown into below picture, adjust the resistive load to have output 15A/86V;
10. Check again if maximum output is OK, if not repeat procedure from point 6.



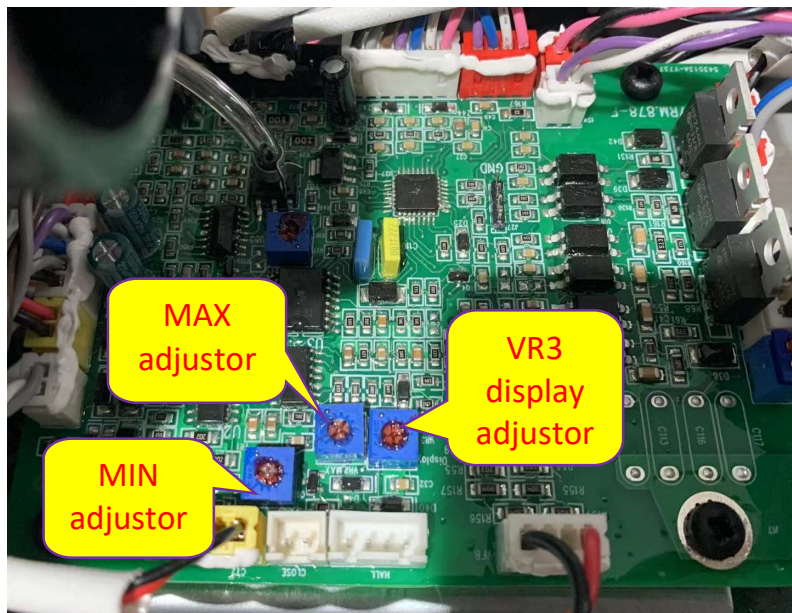
# CALIBRATION PROCEDURE for TH 45

## Calibrate the Min and Max current:

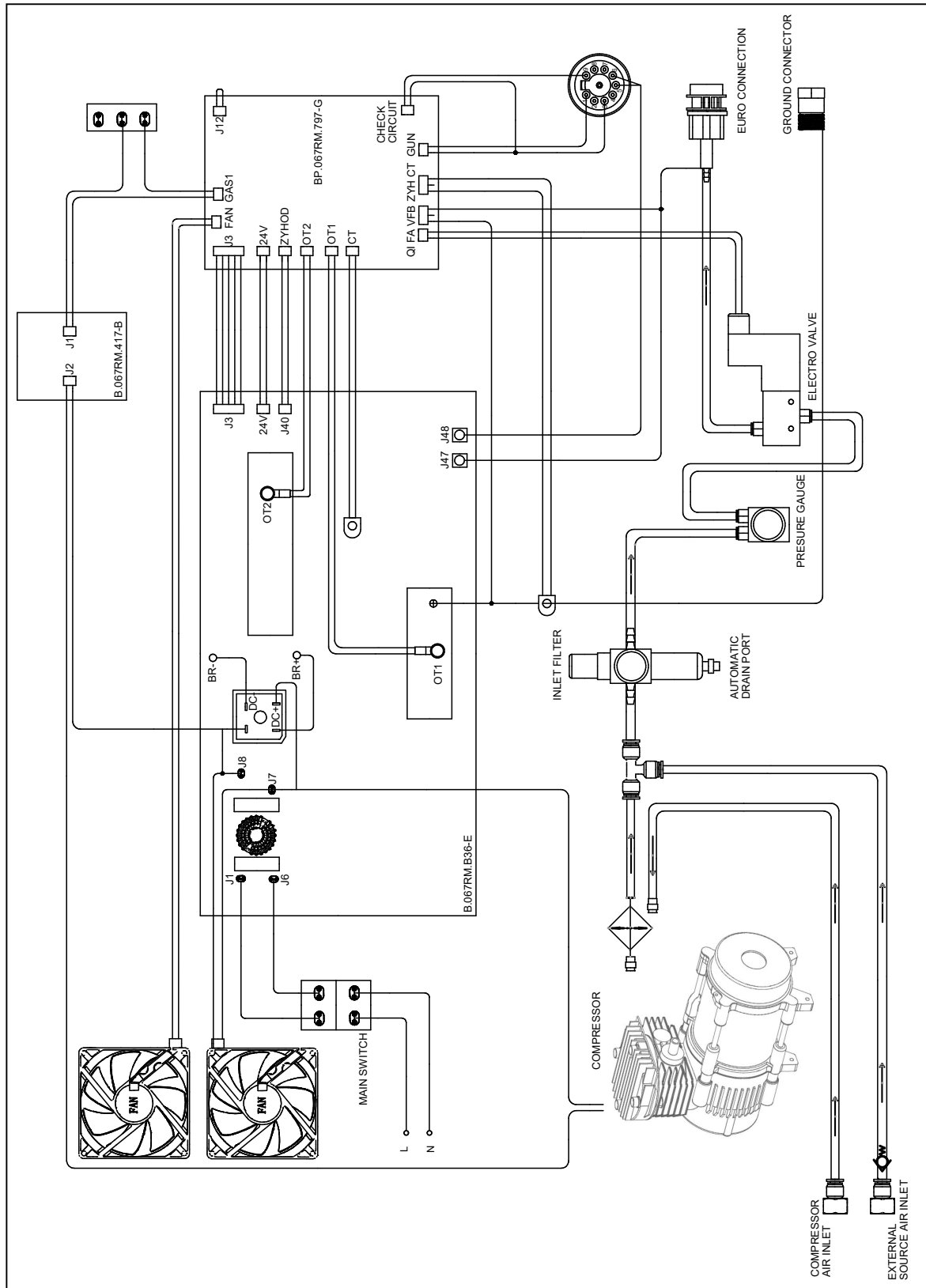
1. Keep Push both two buttons on front panel and turn on the machine;
2. Machine switch into TEST mode; short the PIN4 and PIN7 of torch connector;



3. Connect proper pressure air into machine;
4. Connect a proper resistive load to the machine;
5. Adjust preset to maximum, close the torch switch (proper resistive load has to be connected to the unit).
6. Adjust the MAX trimmer shown into below picture, adjust the resistive load to have output 45A/100V;
7. Adjust preset to minimum, close the torch switch (proper resistive load has to be connected to the unit).
8. Adjust the MIN trimmer shown into below picture, adjust the resistive load to have output 15A/86V;
9. Check again if maximum output is OK, if not repeat procedure from point 6.
10. If the displayed current is not correct, adjust the trimmer VR3 to make the display value same as the reading of the output reference instrument.

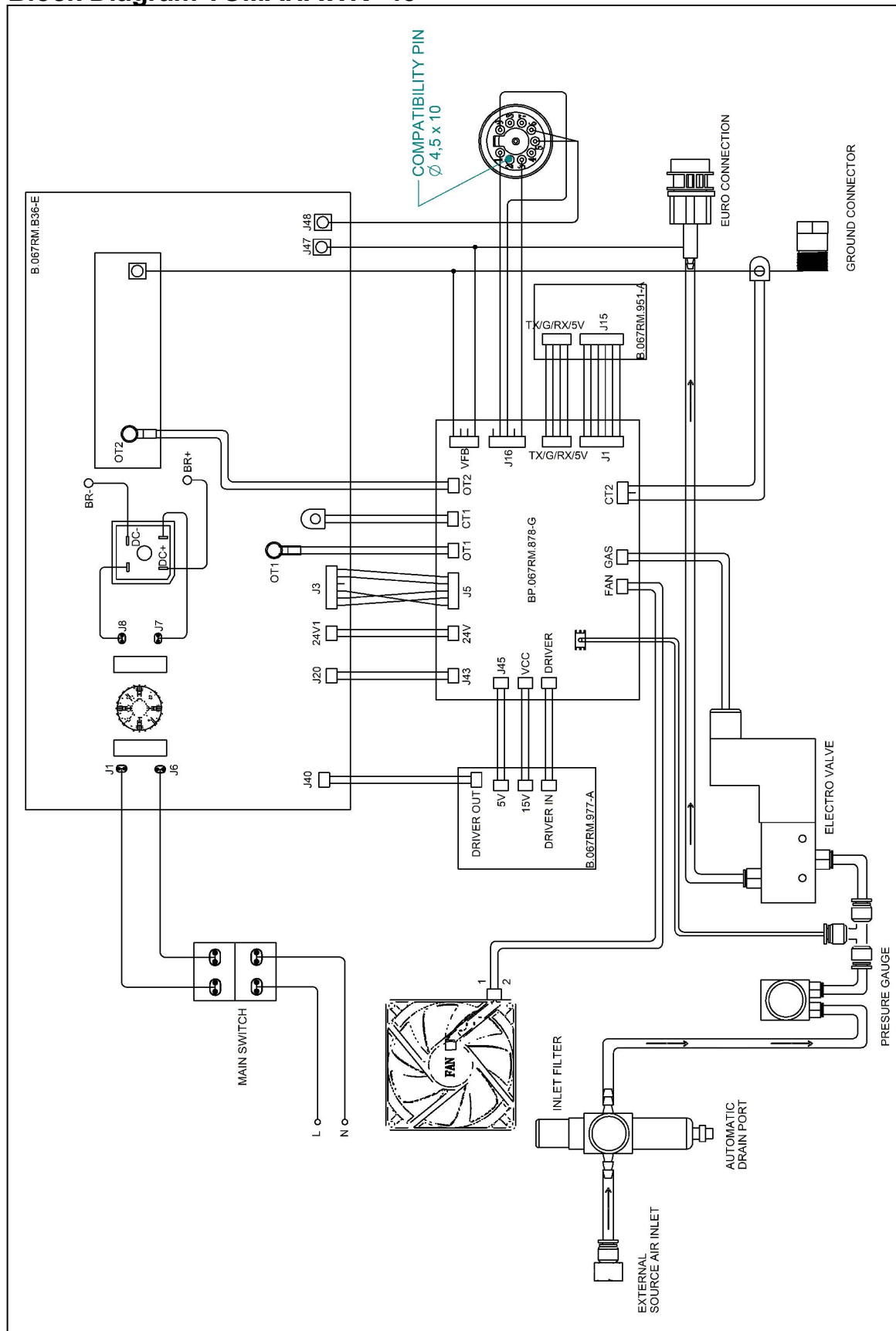


## Block Diagram TOMAHAWK®30K



# ELECTRICAL SCHEMATICS

## Block Diagram TOMAHAWK® 45





## NOTE

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