SVM 3109
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ASPECT® 200

For use with machines having code numbers: 50455

SERVICE MANUAL

LINCOLN ELECTRIC EUROPE
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TECHNICAL SPECIFICATIONS AND ACCESSORIES

ASPECT® 200

NAME	INDEX
Aspect® 200ACDC	**K14189-1**

INPUT							
Input Voltage U_1						**EMC Class**	**Frequency**
115 - 230Vac ± 15%						A	50/60 Hz
Input Line	**Mode**	**20%**	**35%**	**60%**	**100%**	**Input Amperes I_{1max}**	**PFmax**
115Vac	STICK	3.2 kW		1.9 kW	1.4 kW	30 A	0.93
	TIG DC		2.4 kW	1.8 kW	1.4 kW		
	STICK AC	3.2 kW		2.0 kW	1.5 kW		
	TIG AC		2.6 kW	2 kW	1.6 kW		
Input Line	**Mode**	**30%**	**35%**	**60%**	**100%**		
230Vac	STICK	5.5 kW		3.7 kW	2.9 kW	27,2 A	0.88
	TIG DC		4.8 kW	3.7 kW	2,8 kW		
	STICK AC	5.5 kW		3.9 kW	3.0 kW		
	TIG AC		5.0 kW	4.0 kW	3,2 kW		

RATED OUTPUT									
		Output Current I_2 Duty Cycle at %				**Output Voltage U_2 Duty Cycle at %**			
Input Line	**Mode**	**20%**	**35%**	**60%**	**100%**	**20%**	**35%**	**60%**	**100%**
115Vac 1ph	STICK DC	100A		60A	45A	24V		22.4V	21.8V
	TIG DC		115A	90A	70A		14.6V	13.6V	12.8V
	STICK AC	100A		60A	45A	24V		22.4V	21.8V
	TIG AC		115A	90A	70A		14.6V	13.6V	12.8V
Input Line	**Mode**	**30%**	**35%**	**60%**	**100%**	**30%**	**35%**	**60%**	**100%**
230Vac 1ph	STICK DC	160A		115A	95A	26.4V		24.6V	23.8V
	TIG DC		200A	165A	130A		18V	16.6V	15.2V
	STICK AC	160A		115A	95A	26.4V		24.6V	23.8V
	TIG AC		200A	165A	130A		18V	16.6V	15.2V

OUTPUT RANGE	
Welding Current Range	**Maximum Open Circuit Voltage OCV U_0**
2 – 200A	109 Vdc

RECOMMENDED INPUT CABLE AND FUSE SIZES	
Fuse (time delayed) or Circuit Breaker Size	**Input Power Cable**
16A@115Vac – 16A@ 230Vac	3x2.5mm^2

DIMENSIONS AND WEIGHT			
Height	**Width**	**Length**	**Net Weight**
419 mm	246 mm	506 mm	23 kg

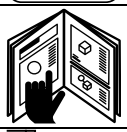
Operating Temperature	**Storage Temperature**	**Operating Humidity (t=20°C)**	**Protection Degree**
-10°C to +40°C	-25°C to 55°C	Not Applicable	IP23

Accessories

W000011139	KIT 35C50
W000382715-2	PROTIGIIIS 10RL C5B-S 5M
W000382716-2	PROTIGIIIS 10RL C5B-S 8M
W000382717-2	PROTIGIIIS 20RL C5B-S 5M
W000382718-2	PROTIGIIIS 20RL C5B-S 8M
W000382719-2	PROTIGIIIS 30RL C5B-S 5M
W000382720-2	PROTIGIIIS 30RL C5B-S 8M
W000382721-2	PROTIGIIIS 40RL C5B-S 5M
W000382722-2	PROTIGIIIS 40RL C5B-S 8M
W000382723-2	PROTIGIIIS 10W C5B-S 5M
W0003827242	PROTIGIIIS 10W C5B-S 8M
K14147-1	Remote Control 15m
K14190-1	Water Cooler
W000010167	FREEZCOOL
K14148-1	Extension Cord 15m (*)
K870	Foot Amptrol.

WARNING

This equipment must 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 damage to this equipment. 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 damage to this equipment. Protect yourself and others from possible serious injury or death.
	READ AND UNDERSTAND INSTRUCTIONS: Read and understand this manual before operating this equipment. Arc welding can be hazardous. Failure to follow the instructions in this manual could cause serious personal injury, loss of life, or damage to this equipment.
	ELECTRIC SHOCK CAN KILL: Welding equipment generates high voltages. Do not touch the electrode, work clamp, or connected work pieces when this equipment is on. Insulate yourself from the electrode, work clamp, and connected work pieces.
	ELECTRICALLY POWERED EQUIPMENT: Turn off input power using the disconnect switch at the fuse box before working on this equipment. Ground this equipment in accordance with local electrical regulations.
	ELECTRICALLY POWERED EQUIPMENT: Regularly inspect the input, electrode, and work clamp cables. If any insulation damage exists replace the cable immediately. Do not place the electrode holder directly on the welding table or any other surface in contact with the work clamp to avoid the risk of accidental arc ignition.
	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	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 Equipments (PPE) having filter with a protection degree up to a maximum of 15, as required by EN169 Standard.
	FUMES AND GASES CAN BE DANGEROUS: Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. To avoid these dangers the operator must use enough ventilation or exhaust to keep fumes and gases away from the breathing zone.
	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. Use suitable clothing made from durable flame-resistant material to protect you skin and that of your helpers. Protect other nearby personnel with suitable, non-flammable screening and warn them not to watch the arc nor expose themselves to the arc.
	WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION: Remove fire hazards from the welding area and have a fire extinguisher readily available. Welding sparks and hot materials from the welding process can easily go through small cracks and openings to adjacent areas. Do not weld on any tanks, drums, containers, or material until the proper steps have been taken to insure that no flammable or toxic vapors will be present. Never operate this equipment when flammable gases, vapors or liquid combustibles are present.
	WELDED MATERIALS CAN BURN: Welding 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.
	SAFETY MARK: This equipment is suitable for supplying power for welding operations carried out in an environment with increased hazard of electric shock.
	CYLINDER MAY EXPLODE IF DAMAGED: Use only 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 welding process including sparks and heat sources.
HF	CAUTION: The high frequency used for contact-free ignition with TIG (GTAW) welding, can interfere with the operation of insufficiently shielded computer equipment, EDP centers and industrial robots, even causing complete system breakdown. TIG (GTAW) welding may interfere with electronic telephone networks and with radio and TV reception.
	NOISE APPEARES DURING WELDING CAN BE HARMFUL: Welding arc can cause noise with high level of 85dB for 8-hour week day. Welders operating welding machines are obligated to wear the proper ear protectors. Employers are obligated to carry examinations and measurements of health harmful factors.

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

Introduction

General Description

Aspect® 200 machine is designated to performe MMA (SMAW) and TIG (GTAW) welding process in DC and AC current.
Unit is designed mainly to satisfy TIG requestes in both DC and AC mode: thanks an advance menu options both beginners and experts welder can adjust welding parameters to have the best welding performances.

Following paragraphs will show how to access to the menu and the parameters tha can be set.
The following equipment has been added to **Aspect® 200**:

0656-790-105 HOSE CLAMP
R-8040-356-1 GAS HOSE
W8800030 MOUNT HOSE
W8800031 NUT HALF BLIND 1/4F
W8800072 MALE QUICK COUPLING HOSE

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

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 IP23. 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.

Input Supply Connection

Check the input voltage, phase, and frequency supplied to this machine before turning it on. The allowable input voltage is indicated in the technical specification section of this manual and on the rating plate of the machine. Be sure that the machine is grounded.

Make sure the amount of power available from the input connection is adequate for normal operation of the machine. The fuse rating and cable sizes are both indicated in the "Technical Specification" section of this manual.

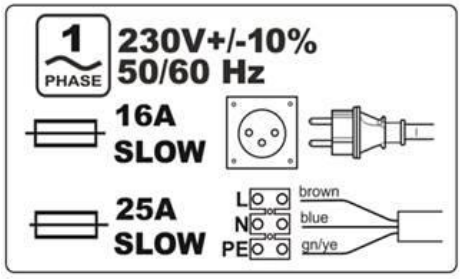
The machines are designed to operate on engine driven generators as long as the auxiliary can supply adequate voltage, frequency and power as indicated in the "Technical Specification" section of this manual. The auxiliary supply of the generator must also meet the following conditions:

230Vac 1 phases:
Vac peak voltage: below 280V
Vac frequency: in the range of 50 and 60Hz
RMS voltage of the AC waveform: 230Vac ± 15%

115Vac 1 phases:
Vac frequency: in the range of 50 and 60Hz
RMS voltage of the AC waveform: 115Vac ± 15%
Note: if connected @ 115Vac the equipment has output derating
It is important to check these conditions because many engine driven generators produce high voltage spikes. Operation of this machine on engine driven generators not conforming to these conditions is not recommended and may damage the machine.

Caution: To provide fully performance of duty cycle You need to change overcurrent protection for 25A type D and change for a proper input plug (or connect directly to a power network)

Example:



Output Connections

A quick disconnect system using Twist-Mate™ cable plugs is used for the welding cable connections. Refer to the following sections for more information on connecting the machine for operation of M welding (MMA) or TIG welding (GTAW).

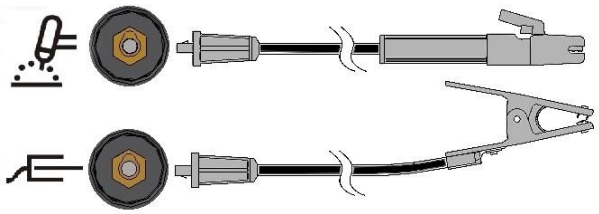
Table 1.

	Quick Disconnect: Torch (for MMA and GTAW process) output connector for the welding circuit.
	Quick Disconnect: workpiece output connector for the welding circuit.

Stick Welding (MMA)

This machine does not include a MMA welding kit cables, but may be purchased separately. Refer to the accessories section for more information.

First determine the proper electrode polarity for the electrode to be used. Consult the electrode data for this information. Then connect the output cables to the output terminals of the machine for the selected polarity. Shown here is the connection method for torch.

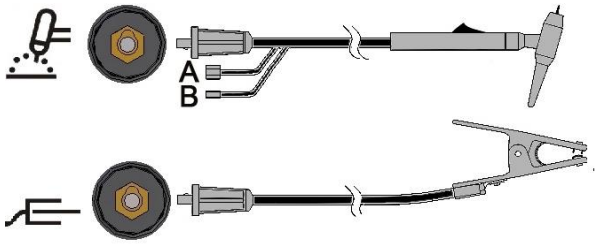


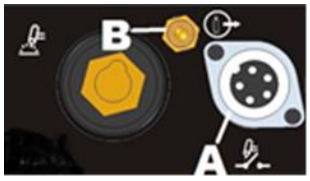
Connect the electrode cable to the torch terminal and the work clamp to the work piece terminal. Insert the connector with the key lining up with the keyway and rotate approximately ¼ turn clockwise. Do not over tighten.

Polarity for Stick can be selected between (DC+, DC-, AC) by front panel push button and menu, see following.

TIG Welding (GTAW)

This machine does not include a TIG torch necessary for TIG welding, but one may be purchased separately. Refer to the accessories section for more information.





Connect the torch cable to the torch terminal of the machine and the work clamp to the work piece terminal. Insert the connector with the key lining up with the keyway and rotate approximately ¼ turn clockwise. Do not over tighten. Finally, connect the gas hose from the TIG torch to the gas connector (B) on the front of the machine. If necessary, an extra gas connector for the fitting on the front of the machine is included in the package. Next, connect the fitting on the back of the machine to a gas regulator on the cylinder of gas to be used. The required fittings are included in the package. Connect the TIG torch trigger to the trigger connector (A) on the front of the machine.

TIG Welding with a Water Cooled Torch

A cooling unit can be applied to the Machine:
COOLARC-24
If a Coolarc unit listed above is connected to the Machine, it will be automatically turned ON and OFF in order to ensure the torch cooling. When Stick welding mode is used the cooler will be OFF.

This machine does not include a cooled TIG torch, but one may be purchased separately. Refer to the accessories section for more information.

⚠ WARNING

The Machine is provided with an electrical connection for the Coolarc unit on its rear side. This socket is ONLY for the connection of the Coolarc unit listed above.

⚠ WARNING

Before connecting the cooler unit to the Machine and operate, read and understand the Instruction Manual supplied with the cooling unit.

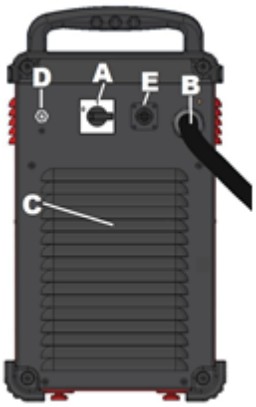
⚠ WARNING

Connect and disconnect the cooler with the unit switched OFF.

Remote Control Connection

Refer to the accessories section for a list of remote controls. If a remote control is used, it will be connected to the remote connector on the front of the machine. The machine will automatically detect the remote control, turn on the REMOTE LED, and switch to remote control mode. More information on this mode of operation will be given in the next section.

Rear Panel



A. Power Switch: It turns ON / OFF the input power to the machine.

B. Input cable: Connect it to the mains.

C. Fan: Do not obstruct or filter the fan inlet. The "F.A.N." (Fan As Needed) feature automatically turns OFF/ON the fan. The fan will start with welding operations and will continue to run whenever the Machine is welding. If the Machine doesn't weld for more than 10minutes, it will go in Green Mode.

Green Mode

The Green Mode is a feature that puts the machine in a stand-by condition:
The output is disabled
The fans are speed down
All LEDs on the front panel are switched OFF except the Power ON LED (solid ON) and the VRD LED (solid ON) if the VRD is enabled
Display show the dash char

This reduces the amount of dirt that can be drawn inside the Machine and the power consumption.

To restore the Machine restart to weld or push the TIG trigger or push any buttons in the front panel or turn the encoder knob.

NOTE: If a COOLARC TIG torch cooling unit is connected to the machine, it will be turned ON/OFF by the Green Mode feature based also to COOL option. See Menu SYS section for more details.

NOTE: It is possible to allows the user to enable or disable the green mode. See Menu SYS section for more details.

Idle Mode

After 30 minutes without welding the machine will enter a deep low power mode. It will shut down all indicators: only Power ON Led is blinking.

To restore the Machine restart to weld or push the trigger or push any buttons in the front panel or turn the encoder
Exit procedure will take 6-7s: after this time the unit is ready to weld.

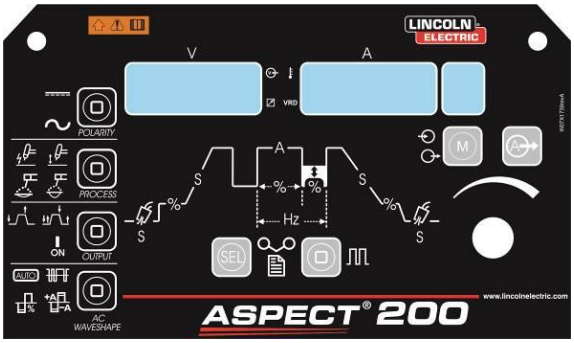
D. Gas Inlet: Connector for the TIG shielding gas. Use the supplied connector to connect the machine to the gas source line. The gas source must have a pressure regulator and flow gage installed.

E. Power supply socket for Coolarc: 400Vdc socket. Connect here the Coolarc cooling unit.

Controls and Operational Features

Machine Start-Up:

When the machine is turned ON an auto-test is executed.
The Machine is ready to operate when on the Front Control Panel lights up the "Power ON" LED, the "A" LED (placed on the middle of the synoptic) with one of the LED of the Welding "MODE" command. This is the minimum condition: depending by the welding selection others LEDs may be ON.



Front Panel Indicators and Controls

Power ON LED:

This LED blinks during the machine start-up or during restart after idle mode and lights up steadily when the machine is ready to operate.

If the Input Voltage Overrange protection becomes active, the Power ON LED starts blinking and an error code is shown on the displays. The machine restarts automatically when the Input Voltage returns in the correct range. For further detail read the Error Codes and Troubleshooting section.

If the trigger is pushed before the unit is ready to weld, or after a weld is completed in GTAW mode, the Power ON LED will blink at a fast rate. Release the trigger to restore normal operation.

Remote LED:

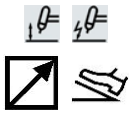
This indicator will turn on when a Remote command is connected to the machine via the remote control connector.

If a Remote command is connected to the Machine, the Output Current knob operates in two different modes: STICK and TIG:

STICK mode: with a Remote command connected the output of the machine is ON. A Remote Amptrol or Pedal are allowed (trigger is ignored).

Connecting the Remote command excludes the Output Current Knob of the Machine's user interface. Through the Remote command is available the full Output Current Range.

TIG mode: in Local and remote mode the output of the machine is OFF. A Trigger is necessary to enable the output.



The Output Current range selectable from the Remote command depends by the Machine's user interface Output Current Knob. Eg.: if the Output Current is set to 100A with the Machine's user interface Output Current Knob, the Remote command will adjust the Output Current from the minimum allowable current to a maximum of 100A.

The output current set by Output Current Knob is shown for 3 second whenever the knob is moved. After the 3 second the value shows is the current select by the Remote command.

Remote Pedal: For a correct use, the "Menu GTAW" and "Menu SYS" must be enabled in the setup menu:
2-step sequence is automatically selected
Upslope / Downslope ramps and Restart are disabled.
Spot, Bi-Level and 4-step functions aren't selectable

(Normal operation is restored when the Remote command is disconnected.)

Thermal LED:

This indicator will turn on when the machine is overheated and the output has been disabled. This normally occurs when the duty cycle of the machine has been exceeded. Leave the machine on to allow the internal components to cool. When the indicator turns off, normal operation is again possible.

VRD LED (enabled on Australian Machines only):

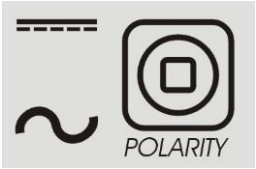
This machine is provided by VRD (Voltage Reduction Device) function: this reduces the voltage at the output leads.

The VRD function is enabled by factory default only on machines that meet the AS 1674.2 Australian Standards. (C-Tick logo "✓" on/near the Rating Plate applied on the machine).

The VRD LED is ON when the Output Voltage is below 12V with the Machine at idle (no welding time).

For others machines (CE & USA) this function is abled into Menu SYS.

Polarity:



This icon is designated to set the polarity of the process in use: DC+, AC stick, DC- & AC TIG operations.

NOTE: Pressing the button assigned to process POLARITY will toggle the illumination of the icon between DC & AC polarity.

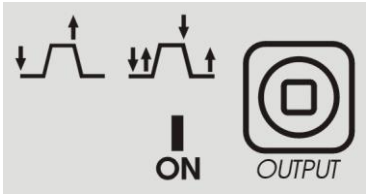
Process:

The function of this icon is to allow the user to set the determined process.
1. High-Frequency TIG
2. Lift-Start TIG
3. Stick – Soft Mode (7018 style electrodes)
4. Stick- Crisp Mode (6010 Style electrodes)

NOTE: Arc control parameters, Hot start and arc force parameters, are different in two stick modes. In menu SMAW is possible to change hot start and arc force diagram.

NOTE: Pressing the button assigned to PROCESS selection will toggle the illumination of the icon from left-to-right following the progression of the numbers.

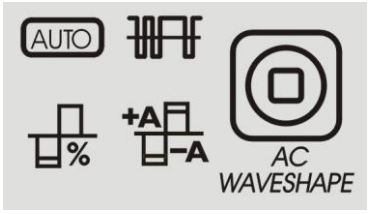
Output:



This section is designated to allow the operator to set the desired output control method
1. 2 STEP
2. 4 STEP
3. ON: no trigger required to start.

Pressing the button assigned to OUTPUT selection will toggle the illumination of the icon from left-to-right

AC Wave Shape:



These icons allow the operator to customize the arc-performance for TIG welding in AC polarity only.
AUTO and Expert Mode:
By default the AUTO icon is lit. This means that AC waveshape parameters are automatically managed depending on the welding current. The only available parameter is AC-Frequency.
AC-Frequency: This function controls the frequency of the AC Wave shape in cycles per second

When AUTO is selected the relationship between Amperage and Balance is shown in table below:

Table 2.

Amperage	AC Balance %
I <= 50	60%
50 < I <= 93	65%
93 < I <= 120	65%
120 < I <= 155	70%
155 < I <= 200	70%

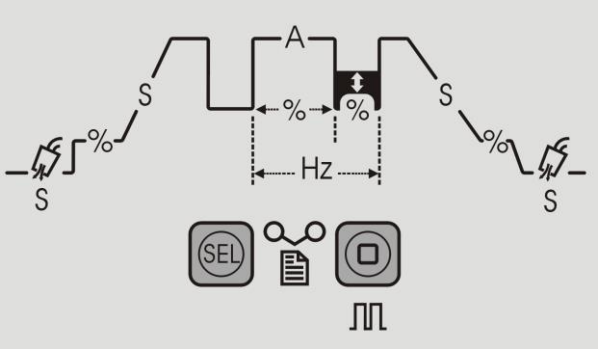
To enable Expert mode:
Push the AC WAVESHAPE button twice: The AUTO icon will start to blink and the display will show the message AUTO ON.
Turn the encoder to select AUTO OFF
Confirm the selection by pushing the AC WAVESHAPE button again. The AUTO icon will turn OFF and all the AC WAVESHAPE parameters will become available.

To revert to AUTO mode perform again the steps above pushing several times until AUTO icon will start blinking, then select AUTO ON with the encoder.

In Expert mode the following parameters are available:
1. AC-Frequency: This function controls the frequency of the AC Wave shape in cycles per second.
2. AC-Balance: AC balance controls the amount of time, as a percentage, that the polarity is electrode negative.
3. Electrode Negative/Positive offset: This function controls the amperage setting for the negative and positive side of the wave when TIG welding in AC polarity.

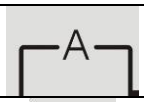
The voltage display screen shows an abbreviated description of the icon selected. The amperage display screen shows the value to be adjusted.

Sequencer Functions:



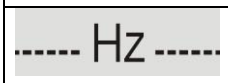
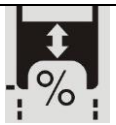
The sequencer allows for the customization of the TIG welding operation both in AC & DC- polarities. Pressing the “Sel” button will cycle through the process graph.

Table 3.

	**Pre-Flow**: Sets the time in seconds gas will flow prior to arc-start initiation
	**Starting Current:** Sets the starting amperage for the process.
	**Initial Slope**: Sets the time in seconds it takes the starting current to reach normal operating amperage.
	**Operating Amperage**: Sets the amperage for all welding process permitted.
	**Final Slope:** Sets the time in seconds it takes the operating amperage to ramp down to the Finishing current.
	**Finishing Current:** Sets the finishing amperage for the process.
	**Post Flow:** Sets the time in seconds gas will flow after the arc is terminated

Pulse Sequencer Functions:

Table 4.

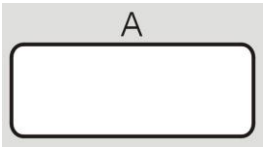
	**Percent Peak Current:** This functions sets the amount of time the pulse waveform spends at the peak current setting. This function is set as a percentage of the total time for the pulse cycle.
	**Pulses-Per-Second:** Sets the total number of pulse cycles per second of time.
	**Percent Background Current:** Sets the background amperage of the pulse waveform. Background amperage is set as a percentage of the peak current.

Main Amperage Control:

The main amperage control button is intended to be a quick selection method to adjust the main amperage setting. This function will allow users to quickly exit the sequencer portion of the U/I, eliminating the need to cycle through all possible sequencer functions to adjust the main amperage or exit the sequencer menu.

This knob is also a multi-purpose command: see the “Operating Instruction” section for a description of how to use this command for parameter selection.

Displays:



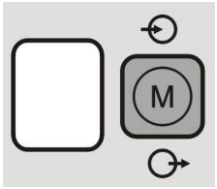
The right meter displays the preset welding current (A) before welding and the actual welding current during welding, and the left meter shown the voltage (V) at the output leads.

A flashing on both displays indicate that the value read is the average value of the previous welding operation. This feature shown the average value for 5seconds after every welding time.

If a remote control is connected (the Remote LED is ON), the left meter (A) indicates the preset and the actual welding current following the instruction explained in the “Remote LED” description above.

The dispays are used to indicate during setting of parameters, the name and the value of them. Also are used for menu indication and error codes displaing.

Memory Selection:



The memory function is designed to allow the operator to save up to 9 specific welding procedures. This memory button will have two functions:

1. Save memory settings
2. Recall memory settings.

Selecting Memory Functions: Pressing the memory button will allow the user to toggle between "saving" a memory, "recalling" a memory or operating without using a memory setting.

1. Pushing 1 time "M" icon, SAVE icon turned on.
2. Pushing 2 times "M" icon, RECALL icon turned on.
3. Pushing 3 times Icon and diplays turn off.

Saving Memory Settings:
In order to save process settings into a memory location it is first necessary to press the memory button so that the "memory save" icon is highlighted. Once highlighted, the number on the screen will flash to indicate this number can be changed by turning the control knob below, and the voltage and amperage meters will say "MEM SET". Once the desired memory location has been selected using the control knob, pressing and holding the memory button for 3 seconds will save the settings in that location. During the 3 second hold period the "memory save" icon will flash. After 3 seconds the displays will show "MEM SAVE"

OPERATION:

1. Press Memory button to highlight "Memory Save" icon;
2. Turn Control Knob to Select memory location;
3. Press and hold memory button for 3 seconds.

Recalling Memory Settings:
In order to recall process settings it is first necessary to press the memory button so that the "memory recall" icon is highlighted. Once highlighted, the number on the screen will flash to indicate this number can be changed by turning the control knob below, and the voltage and amperage meters will say "MEM RECL". Once the desired memory location has been selected using the control knob, pressing and holding the memory button for 3 seconds will recall the settings from that location. During the 3 second hold period the "memory recall" icon will flash. After 3 seconds the displays will show "RECL MEM"

OPERATION:

1. Press Memory button to highlight "Memory Recall" icon.
2. Turn Control Knob to Select memory location.
3. Press and hold memory button for 3 seconds.

Menu:

This unit permits an advance setting divided in 3 menu:

1. If process GTAW Press and Hold (SEL) for 5 seconds to access setup menu "GTAW".
2. If process SMAW Press and Hold ⎍ for 5 seconds to access setup menu "SMAW".
3. In all process Press and Hold (SEL) + ⎍ for 5 seconds to access setup menu "SYS".
4. Upon entering one of the three menus , progression is accomplished by pressing (SEL).
5. While moving backward is accomplished by pressing ⎍.
6. Changes to menu items will be accomplished by using the Control Knob .
7. After an item is changed it will be saved if (SEL) or (A) is pressed.
8. Each menu can be exited by pressing (A).

Operating Instruction

DC Stick (SMAW) Welding

To start DC Stick welding process:

1. Set polarity
2. To select Stick welding:

Process	Visualization
PROCESS	Crisp Soft

Press MODE several times until the LED above lights up

ON (led ON) is turned on.

When the Stick position is selected, the following welding features are enabled:

Hot Start: This is a temporary increase in the output current during the start of the stick welding process. This helps ignite the arc quickly and reliably.

Anti-Sticking: This is a function which decreases the output current of the machine to a low level when the operator makes an error and sticks the electrode to the work piece. This decrease in current allows the operator to remove the electrode from the electrode holder without creating large sparks which can damage the electrode holder.

Auto Adaptive Arc Force: this function increases temporary the output current, used to clear intermittent connections between the electrode and the weld puddle that occur during stick welding. This is an active control feature that guarantees the best arrangement between the arc stability and spatter presence. The feature "Auto Adaptive Arc Force" has instead of a fixed or manual regulation, an automatic and multilevel setting: its intensity depends by the output voltage and it is calculated in real time by the microprocessor where are also mapped the Arc Force levels. The control measure in each instant the output voltage and it determines the amount of the peak of current to apply; that value is enough to breaks the metal drop that is being transferred from the electrode to the workpiece as to guarantee the arc stability, but not too high to avoid spatters around the welding puddle. That means:

Electrode / workpiece sticking prevention, also with low current values.

Spatters reduction.

The welding operations are simplified and the welded joins looks better, also if not brushed after the welding.

In Stick mode, two different setup are available, and they are completely separate into Process setup:

SOFT Stick: For a welding with a low spatter presence.

CRISP Stick (Factory Default): For an aggressive welding, with an increased Arc stability.

For default the polarity is DC+. To change in DC- see menu SMAW operation section.

See menu SMAW to change value of hot start and arc force.

AC Stick Welding

To start AC Stick welding process:

1. Set polarity
2. To select Stick welding:

Process	Visualization
PROCESS	Crisp Soft

Press MODE several times until the LED above lights up

ON (led ON) is turned on.

By default the output current wave form is a 60Hz sinusoidal current with balance 50% without offset. Accessing to AC wave shape it is only possible change the frequency.

Indicators AUTO, EN/EP and Balance are OFF.

GTAW welding

DC TIG Welding

To start DC Tig welding process:

1. Set polarity
2. To select TIG welding:

Process	Visualization
PROCESS	Lift HF

Press MODE several times until the LED above lights up

Led 2T turned on for default.

LIFT TIG

When the mode pushbutton is in the Lift TIG position, the machine is ready for Lift TIG welding. Lift TIG is a method of starting a TIG weld by first pressing the TIG torch electrode on the work piece in order to create a low current short circuit. Then, the electrode is lifted from the work piece to start the TIG arc.

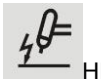
HF TIG
When the mode pushbutton is in HF TIG position, the machine is ready for HF TIG welding. During the HF TIG mode, the TIG arc is started by HF without pressing the electrode on the work piece. The HF used for starting the TIG arc will remain on for 3 seconds; if the arc is not started in this time limit, the trigger sequence must be restarted.

NOTE: The HF start strength is adjusted to the tungstensize and type, which can be selected in menu GTAW.

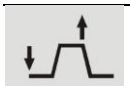
AC Tig Welding

To start AC Tig welding process:

1. Set polarity 
2. To select AC Tig welding:

Process	Visualization
	 Lift  HF

Press MODE several times until the LED above lights up

 2T led is turned on for default.

Ac wave shape section is available. About Lift and Tig starting see section above.

TIG Welding Sequences

During no welding operation at each pressure of SEL push button, it's possible to step through all sequencer and set parameters.

During welding the Sel pushbutton is enabled for the following functions:
Output current
Only if Pulse Function is active: is possible operates on the values of Duty (%), Frequency (Hz) and Background current (A).

The new parameter value is automatically saved.

TIG Trigger Sequences

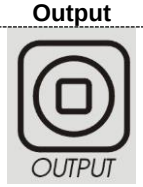
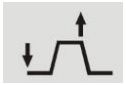
TIG welding can be done in either the 2-step or 4-step mode. The specific sequences of operation for the trigger modes are explained below.

Table 5. Legenda of the symbols used

	Torch Pushbutton
	Output Current
	Gas Pre-flow
	Gas
	Gas Post-flow

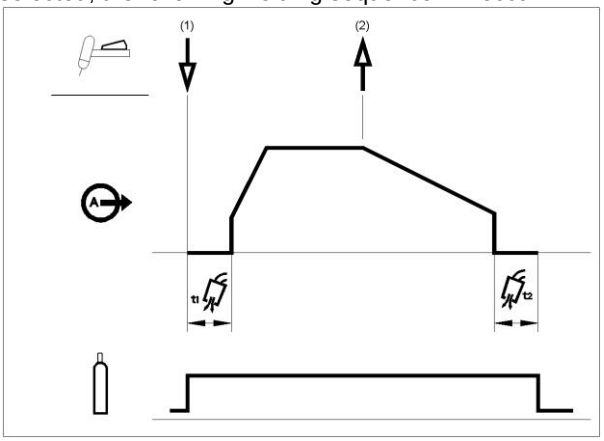
2-Step Trigger Sequence

To select 2-Step sequence:

Output	Visualization
	

Press several times until the LED above lights up

With the 2-step trigger mode and a TIG welding mode selected, the following welding sequence will occur.

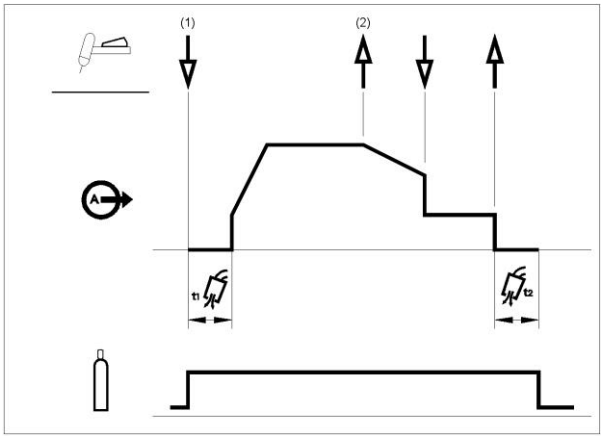


1. Press and hold the TIG torch trigger to start the sequence. The machine will open the gas valve to start the flow of the shielding gas. After the preflow time, to purge air from the torch hose, the output of the machine is turned ON. At this time the arc is started according to the selected welding mode. The initial current is set to 25A for LIFT starting (starting current parameter is disabled in the sequencer) or set according to the Starting current parameter for HF starting. After the arc is started the output current will be increased at a controlled rate, or upslope time, until the Welding current is reached.

   If the torch trigger is released during the upslope time the arc will stop immediately and the output of the machine is turned OFF.

2. Release the TIG torch trigger to stop welding. The machine will now decrease the output current at a controlled rate, or downslope time, until the Crater current is reached and the output of the machine is turned OFF.

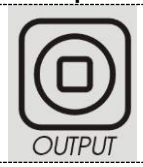
   After the arc is turned OFF, the gas valve will remain open to continue the flow of the shielding gas to the hot electrode and work piece.



As shown above, it is possible to press and hold the TIG torch trigger a second time during downslope to end the downslope function and maintain the output current at the Crater current. When the TIG torch trigger is released the output will turn OFF and the postflow time will start. This operation sequence, 2-step with restart disabled, is the default setting from the factory.

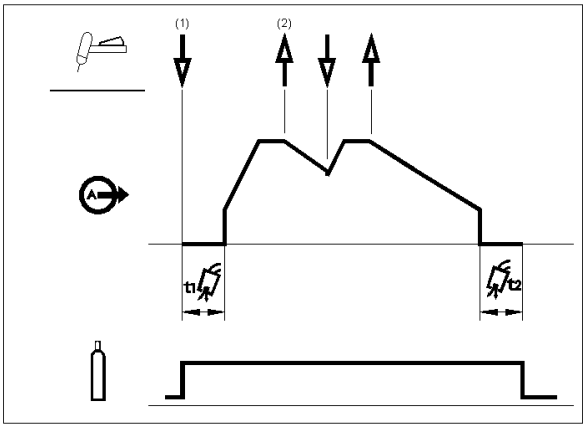
2-Step Trigger Sequence with Restart Option

To select 2-Step with restart sequence:

Output	Visualization
	
Press several times until the LED above lights up	

Enter Menu GTAW and enable 2RST option.

If the 2-step restart option is enabled from the setup menu the following sequence will occur:

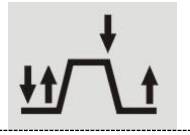


1. Press and hold the TIG torch trigger to start the sequence as described above.

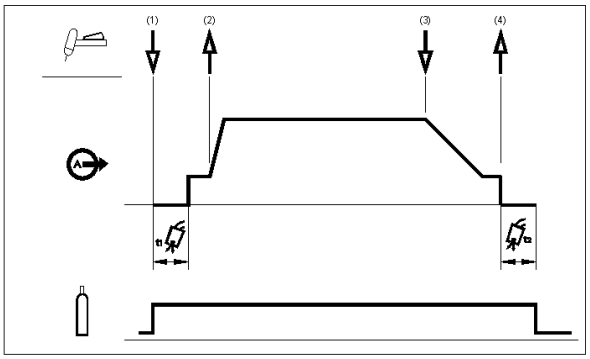
2. Release the TIG torch trigger to start the downslope. During this time press and hold the TIG torch trigger to restart welding. The output current will increase again at a controlled rate until the Welding current is reached. This sequence can be repeated as many times as necessary. When the welding is complete release the TIG torch trigger. When the Crater current is reached the output of the machine is turned OFF.

4-Step Trigger Sequence

To select 4-Step sequence:

Output	Visualization
	
Press several times until the LED above lights up	

With the 4-step trigger mode and a TIG welding mode selected, the following welding sequence will occur.



1. Press and hold the TIG torch trigger to start the sequence. The machine will open the gas valve to start the flow of the shielding gas. After the preflow time, to purge air from the torch hose, the output of the machine is turned ON. At this time the arc is started according to the selected welding mode. In LIFT starting the touching current is 25A until the short circuit is removed.
   After the arc is started the output current will be at the Start current. This condition can be maintained as long as necessary.

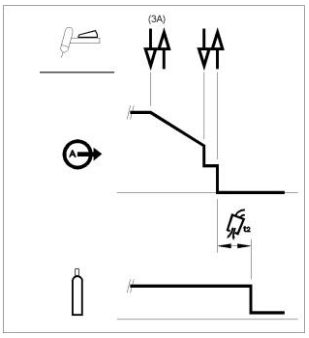
   If the Start current is not necessary, do not hold the TIG torch trigger as described at the beginning of this step. In this condition, the machine will pass from Step 1 to Step 2 when the arc is started.

2. Releasing the TIG torch trigger starts the upslope function. The output current will be increased at a controlled rate, or upslope time, until the Welding current is reached. If the torch trigger is pushed during the upslope time the arc will stop immediately and the output of the machine is turned OFF.

3. Press and hold the TIG torch trigger when the main part of the weld is complete. The machine will now decrease the output current at a controlled rate, or downslope time, until the Crater current is reached.

4. This Crater current can be maintained as long as necessary. When the TIG torch trigger is released the output of the machine is turned OFF and the postflow time will start.

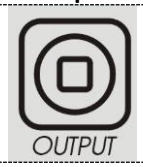
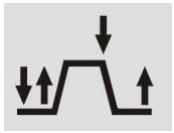
As shown here, after the TIG torch trigger is quickly pressed and released from step 3A, it is possible to press and hold the TIG torch trigger another time to end the downslope time and maintain the output current at the Crater current. When the TIG torch trigger is released the output will turn OFF.



This sequence operation, 4-step with restart disabled, is the default setting from the factory.

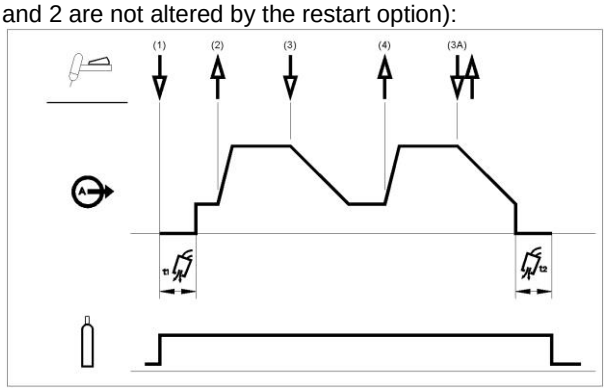
4-Step Trigger Sequence with Restart Option

To select 4-Step with restart sequence:

Output	Visualization
	
Press several times until the LED above lights up	

Enter Menu GTAW and enable 4RST option.

If 4-step restart is enabled from the setup menu the following sequence will occur for steps 3 and 4 (steps 1 and 2 are not altered by the restart option):

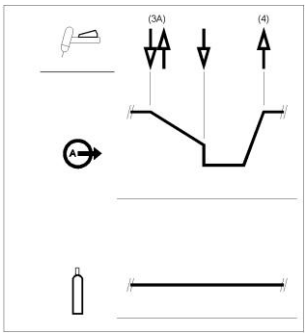


3. Press and hold the TIG torch trigger. The machine will now decrease the output current at a controlled rate, or downslope time, until the Crater current is reached.
4. Release the TIG torch trigger. The output current will again increase to the Welding current, like in step 2, to continue welding.

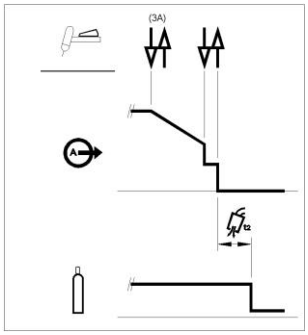
If the weld is completely finished, use the following sequence instead of step 3 described above.

3.A. Quickly press and release the TIG torch trigger. The machine will now decrease the output current at a controlled rate, or downslope time, until the Crater current is reached and the output of the machine is turned OFF. After the arc is turned OFF the postflow time will start.

As shown here, after the TIG torch trigger is quickly pressed and released from step 3A, it is possible to press and hold the TIG torch trigger another time to end the downslope time and maintain the output current at the Crater current. When the TIG torch trigger is released the output will again increase to the Welding current, like in step 4, to continue welding. When the main part of the weld is complete go to step 3.



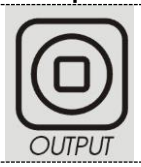
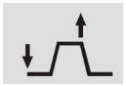
As shown here, again after the TIG torch trigger is quickly pressed and released from step 3A, it is possible to quickly press and release the TIG torch trigger a second time to end the downslope time and stop welding.



Spot TIG (GTAW welding)

Enter in Menu GTAW to enable spot welding function. When enabled, the spot tig function replaces the 2S trigger sequence.

To select Spot function:

Output	Visualization
	
Press until the LED above lights up	

This welding mode is especially thought to tack or weld thin materials.

It uses HF start and immediately delivers the set current without any upslope/downslope.

When spot is selected automatically you have this setting:

- 2S without restart
- Working only in HF mode
- Upslope and downslope are disabled

When spot is selected in left display without any welding operation you can see the text:

S-V.V

V.V indicates the output voltage [1.0-1.5V] when not welding.

While right displays shown the set current.

For default the spot time is 0s: that means the output current is delivered only when the trigger button is pushed.

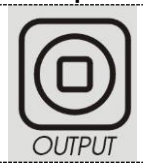
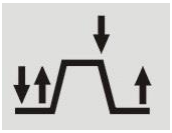
The welding time is set with the spot time control and will be constant independently from the operation of the Trigger.

To set the spot time, user has to push SEL button until text SPT appears on the left display: turning now the main know is possible to set SPT time from 0 to 100s

Bi-Level (Set/A2) Trigger sequence

Enter Menu GTAW and enable BILV option.
When enabled, the bi-level tig function replaces the 4S trigger sequence.

To select Bi-Level sequence:

Output	Visualization
	
Press several times until the LED above lights up	

When bi-level is selected in left display without any welding operation you can see the text:

B-V.V

V.V indicates the output voltage [1.0-1.5V] when not welding.
With this sequence the arc is started as in the 4S sequence, this means that steps 1 and 2 are the same.

3. Quickly press and release the TIG torch trigger. The machine will switch the current level from Set to A2 (background current). Each time this trigger action is repeated the current level will switch between the two levels.
   3.A. Press and hold the TIG torch trigger when the main part of the weld is complete. The machine will now decrease the output current at a controlled rate, or downslope time, until the Crater current is reached. This Crater current can be maintained as long as necessary.

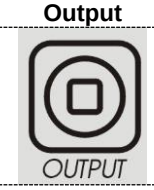
To set the A2 level, user has to push SEL button until text A2 appears on the left display: turning now the main know is possible to set A2 in percentage of the setting current.

NOTE: The Restart option and the Pulse function are not available for Bi-Level Trigger sequence

LIFT TIG ON sequence

When lift tig process is selected, it is possible to performe welding operation without the use of a trigger.

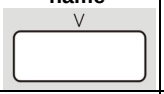
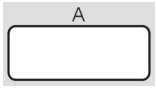
To select ON sequence:

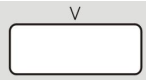
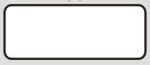
Output	Visualization
	
Press several times until the LED above lights up	

When the sequence is selected it is possible to start a weld with the lift method without pushing trigger.
To end the weld it is necessary to break the arc.
The parameter Starting current, Final slope and finishing current are ignored.

List of parameters and Factory stored programs

Table 6. List of parameters and Factory stored programs

Function	Factory Configuration Default	Selectable Value Range 	Displayed parameter name 	Displayed value 
Preflow	0.5	0 - 25s (step 0.1s)	PRE	Current selected value (s)
Starting Current	100	10 – 200 % (step 1%)	STRT	Current selected value (%)
Initial slope	0.1	0 – 5s (step 0.1s)	UP	Current selected value (s)
Operating Amperage	50	TIG PROCESS 2 – 200 A (step 1A) 2- 115A (step 1A) derating TIG PROCESS 5 – 160 A (step 1A) 5- 110 (step 1A) derating		Current selected value (A)
Final Slope	0	0 - 25s (step 0.1s)	DOWN	Current selected value (s)
Finishing Current	30	10 – 90 % (step 1%)	END	Current selected value (%)
Post flow	AUTO	0.1 - 120s (step 0.1s) Note A	POST	Current selected value (s)

Percent of Peak Current / Duty Cycle (Only when pulse function is enabled)	40	5-95 (step 5%) Note B	PEAK	% of FREQ
Pulses-Per-Second DC (Only when pulse function is enabled)	0.1	0,1 – 10 Hz (step 0.1Hz) 10 – 500Hz (step 1Hz) 500 – 2000Hz (step 10Hz)	FREQ	Current selected value (Hz)
Pulses-Per-Second AC (Only when pulse function is enabled)	0.1	0,1 – 10 Hz (step 0.1Hz) 10 – 100Hz (step 1Hz) Note C	FREQ	Current selected value (Hz)
Background Current (Only when pulse function is enabled)	25	10 -90 % (step 1%)	BACK	Current selected value (%)
SPOT time (Only when spot function is enabled)	0	0 – 10s (step 0.1s) 10 – 100s (step 1s)	SPT	Current selected value (s)
Low level background (Only when Bilevel function is enabled)	25	10 -90 % (step 1%)	A2	Current selected value (%)
AC Wave Balance (NOTE D)				
Function	**Factory Configuration Default**	**Selectable Value Range** 	**Displayed parameter name** V 	**Displayed value** A 
EN Offset	50	2 – 200A (step 1A) 2 – 115A (step 1A) derating	EN	Current selected value (A)
EP Offset	50	2 – 200A (step 1A) 2 – 115A (step 1A) derating	EP	Current selected value (A)
AC-Balance	75	35 – 95 % (step 1%)	%BAL	Current selected value (%)
AC-Frequency	120	40 – 400Hz (step 1Hz)	FREQ	Current selected value (Hz)

Note A: When AUTO is selected means 1s/10A; minimun value is 3s.

Note B: For frequency value higher than 500Hz, PEAK is locked to 50%.

Note C: In AC polarity the pulse frequency is limited to ¼ of the AC-frequency: if AC frequency is 120Hz that means the max pulse frequency is 30Hz . If the pulse frequency is higher than 1/10 of the AC frequency, the PEAK is fixed to 50%.

Note D: Once AUTO is selected the default parameter are used.

Menu GTAW

To enter into Menu GTAW see section Menu, described above.

The ADVANCED menu part is available only in AC polarity

Table 7. MENU GTAW Menu

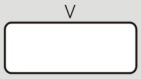
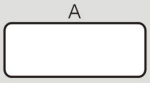
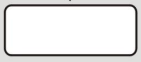
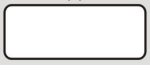
Function	Factory Configuration Default	Selectable Value Range 	Displayed parameter name V 	Displayed value A 
Restart 2S	OFF	ON/OFF	2RST	Current selected value (-)
Restart 4S	OFF	ON/OFF	4RST	Current selected value (-)
Bi-level function	OFF	ON/OFF	BILV	Current selected value (-)
Spot function	OFF	ON/OFF	SPOT	Current selected value (-)

Table 8. GTAW ADVANCED Menu

Function	Factory Configuration Default	Selectable Value Range 	Displayed parameter name V 	Displayed value A 
Wave Form	SQRE	SOFT SINE SQRE TRI	WAVE	Current selected value type
Tungsten size	AUTO	AUTO (Note E) 0.5mm (0.02”) 1mm (0.04”) 1.6mm (1/16”) 2.4mm (3/32”) 3.2mm (1/8”) ADV (Note F)	DIA	Current selected value
Tungsten Type (Note G)*	GRN	GRN WHTE GREY TURQ GOLD	TYPE	Current selected value Colour
TIG STARTING PARAMETERS (NOTE F)				
Polarity	EP	EN/EP	POL	Current selected value (-)
Amperage	120	2 – 200A (step 1A) 2 – 115A (step 1A) derating	SCRT	Current selected value (A)
Time	100	1 – 1000ms (step 1ms)	STME	Current selected value (ms)
Start Slope Time	40	0 – 1000ms (step 1ms)	SSLP	Current selected value (ms)
Preset Amperage Min	5	2-50A (step 1A)	PCRT	Current selected value (A)

Note E. When AUTO is selected, the starting parameters are automatically recalled based on the set current adjustable by main knob in the front panel. Diameter of the electrode is automatically recalled based on the following table.

Table 9

User dialed weld I (AMP)	Tungsten diameter
<=200 and > 25	2.4 mm
<=25 and > 7	1.6 mm
<=7	1 mm

Note F: When ADV option is enabled, the user can create his personal starting setting according to "TIG AC starting parameters").

Note G: This option is accessible only when a specific diameter is selected. When DIA = AUTO or DIA = ADV, that option is not visible and the default starting parameters of green (GRN) electrode are recaled.

WAVE-FORM selection

With this option is possibile to select between four different waveforms:

"Soft" shape: to have a nice balance between a focused Arc and low noise.

"Fast" shape: to have more focused arc.

"Sin" Wave shape: comparable with older conventional machines, not very concentrated but very soft.

"Triangle" shape: to reduce the amount of heat delivered to the workpiece.

Default setting: SQRE

Tungsten Size and Type

In order to ensure the maximum performance and arc striking reliability the operating parameters of the machine are automatically adjusted to the type and size of the tungsten electrode in use. Selecting the appropriate diameter of the electrode, automatically a recorder set of parameter is recalled to assure in AC mode a good striking.

Other then recalled the specific starting parameters selecting the electrode diameter it is also fixed the minimum allowable current.

Table 10

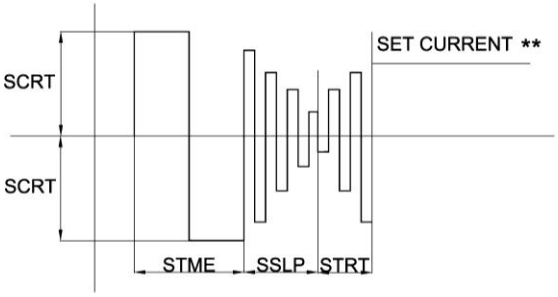
Tungsten diameter	Min AMP
3.2 mm	20
2.4 mm	10
1.6 mm	7
< 1 mm	2

For AC welding advanced users is present the possibility to modify the AC starting parameters

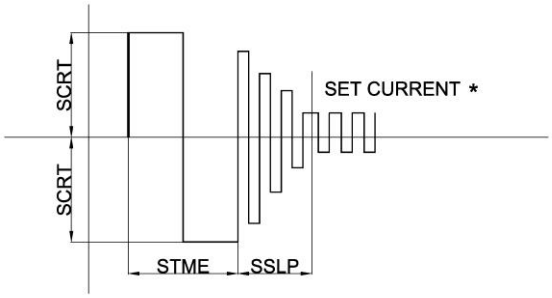
Tig AC starting parameters

The unit is delivered not allowing to the user to change starting parameters: for default option "Tig starting parameters", from now on TSTR, is selected in AUTO. When AUTO is selected for TSTR option, the value of the 4 parameters settable (SCRT, STME, SSLP and PCRT) and polarity (EP) are stored in unit and can be modified by the user.

Following picture show the meaning of the parameter for a local hand working. The ramp in SSLP time ends when STRT current level is reached: if STRT is lower than PCRT, the level will be PCRT.
Note: when PCRT is set in the range above, the minimun current delivered by the unit is PCRT level

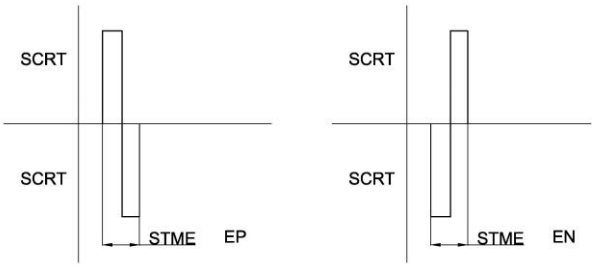


The starting sequence changes also if the foot paddle is present: in fact taking care of the STRT level is not settable, the level at the end of the SSLP ramp is the level from the footpaddle or the PCRT level.



NOTE: the setting parameters stored assure the striking of the arc when correct electode (diameter and colour) has been correctly selected.

In order to allow maximum flexibility to advanced users that need complete control over the welding process, the AC starting parameters can be modified by selecting MANL for the TSTR (Tig Starting Parameters) option in Menu C.
User can change polarity,



values of the other parameters creating its personal waveform for starting.

NOTE: the changing of the parameters above, could affect the striking of the arc if not correcting set.

Restart 2S, Restart 4S, Spot and Bi-level

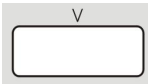
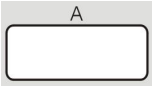
See GTAW section above for details about mode of working.

Menu SMAW

To enter into Menu SMAW see section Menu, descriped above

In AC polarity only the HOT Start parameter is visible and can be changed

Table 11. SMAW Menu

Function	Factory Configuration Default	Selectable Value Range 	Displayed parameter name V 	Displayed value A 
Arc Force	SOFT: 35%	0 – 75% (step 1%)	FRCE	Current selected value (%)
	CRISP: 75%	75 – 200% (step 1%)		
Hot Start	SOFT: 30%	0 – 75% (step 1%)	HSTR	Current selected value (%)
	CRISP: 50%	50 – 200% (step 1%)		
Stick Polarity	DC+	DC+ or DC-	STPL	Current selected value (-)

ARC FORCE and HOT START

With those two parameters, user can change the behaviour of unit in STICK DC stick welding. See DC stick welding for a better understanding of both features.

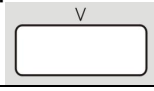
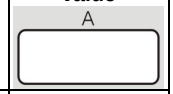
STICK POLARITY

With this function is possible to change polarity of the electrode clamp without any change in work cables connections. For default stick polairity is DC+.

Menu SYS

To enter into Menu SYS see section Menu, descriped above

Table 12. SYS Menu

Function	Factory Configuration Default	Selectable Value Range 	Displayed parameter name V 	Displayed value A 
Units	mm	mm / INCH	UNIT	Current selected value
VRD	OFF	ON/OFF	VRD	Current selected value
LED Brightness/Intensity		LOW	LED	Current selected value
	X	MED		
		HIGH		
TIG Remote Options	AMP	FOOT	RMTE	Current selected value type
		AMP		
Up/Down	OFF	OFF	UPDN	Current selected value type
		AMPS		
		MEM		
MAX amparage	OFF	51 – 199 - OFF	AMPS	Current selected value (A)
Cooler option	AUTO	AUTO	COOL	Current selected value type
		ON		
Control firmware revision	N/A	N/A	CTRL	Current SW revision
UI firmware revision	N/A	N/A	UI	Current SW revision
IC firmware revision	N/A	N/A	IC	Current SW revision
Diagnostics	N/A	List of #'s	ERR	#ERR
Arc Time	-	-	HOUR	Current value from 0 to 9999
Arc Counter	-	-	CNT	Current value from 0 to 9999

Reset	N/A	YES/NO	RSET	
Green Mode	ON	ON/OFF	GRN	Current selected value
Lockout	NO	YES/NO	LOCK	Current selected value

LED Brightness/Intensity

By this option is possible to select the intensity of the LEDs present in the user interface: three level can be selected by the user. High level is reccomended when the unit is used outside with high sun light luminosity

TIG Remote options

This remote section in Menu SYS is dedicate to select the appropriate kind of remote devices connected. Unit detects itself the present of a remote devices (amptrol, footpaddle): selecting AMP you indicate the unit and amptrol is connected while selecting FOOT a footpaddle is conected. By default this selection is for AMP. The selection of FOOT and AMP changes dynamically also the possibility to select and change parameters as described in previous paragraphs.

UP/DOWN options

AMP MODE

Three operating modes, corresponding to different states of the machine, are identified:

1) Before welding: pressing the UP or DOWN key causes a change of value of the Set current
2) While welding: pressing the UP or DOWN key causes a change of value of the Set current during all phases of welding process except during the start functions, where the UP/DOWN function is masked.
3) Pre/post Flow: pressing the UP or DOWN key causes a change of value of the Set current.

The change will be realized in two ways depending on pressed button time:

1) Step function: pressing the UP/DOWN button for a minimum time of 200ms and releasing it, causes the set current raises/falls of 1A.
2) Ramp function Pressing the UP/DOWN button for a time greater than 1 sec., the set current start to increase/decrease with a (5A/s) ramp. If press for more than 5 sec increase/decrease with a ramp of (10A/s). The current ramp will end when the UP/DOWN button previously pressed is released.
3) When a remote (FOOT or AMP) device is present, depending on welding process selected, the UP/DOWN behavior is different.

In SMAW welding mode, the remote device set the amperage setting in the whole range, bypassing the main control knob in front User interface. In that case the signals coming from UP/DOWN **are ignored**.

In GTAW mode of welding, the remote device set the percentage of the main set delivered by the machine. Regulating the main amperage, the UP/DOWN with remote device will work as described above.

MEM MODE

By pressing torch buttons user will be allowed to change over settings stored in memory locations from 1 to 9. The feature is not available during welding.

MAX amparage option

This option allows the user to set the maximum current supplied by machine

COOLER option

This option permits to the user to activate permanently the water cooler when ON is selected.Cooler is switched OFF only in Idle state.
For default AUTO is enable and the water cooler follows the timeline of welding, green mode and idle state.
Cooler is switched OFF when green mode is activated; the entering in IDLE mode confirms the OFF status of Cooler.

Error Codes and troubleshooting.

If an error occurs, turn Off the machine, wait for a few seconds, then turn ON again. If the error remains, a maintenance is required. Please contact the nearest technical service center or Lincoln Electric and report the error code displayed on the meter of the Front Panel.

By ERR option (Menu SYS) is possible to see a list of the last 10 different errors happened and recorder by the unit. If the same error comes many times, only the last one is recorder.

To reset the register, perform the follow procedure:

Push SEL button  for 5s. After that time the errors list is reset
Release SEL Button

Table 13.

Err	Error code table
01	**Input voltage too low** LED is blinking (at 5Hz). Indicates that an Input Undervoltage protection is active; the Machine restarts automatically when the Input Voltage returns in the correct range.
02	**Input voltage too high** LED is blinking. (at 5Hz). Indicates that an Input Voltage Overvoltage protection is active; the Machine restarts automatically when the Input Voltage returns in the correct range.(280Vac)
03	**Wrong input connection** LED blinking. (at 5Hz). Indicates that the power supply network to which the machine is connected has serious problems. Turn OFF the machine and check the power supply network.
04	**Primary side voltage lock out** LED blinking. (at 5Hz). Indicates that an Internal Auxiliary Voltage fault condition is detected. To restore the machine: Turn OFF then ON the Mains Switch to restart the machine.
06	**Inverter voltage lock out** LED blinking. (at 5Hz). Indicates that an Internal Auxiliary Voltage fault condition is detected. To restore the machine: Turn OFF then ON the Mains Switch to restart the machine.
09	**Connection error** This error message indicates the communication between Control and UI is not working. To restore the machine: Turn OFF then ON the Mains Switch to restart the machine.
10	**FAN fault** This error message indicates the fan is not operating properly. This prevent overtemperature damage. LED blinking. (at 5Hz).
11	**Water cooler fault** LED blinking. (at 5Hz). Cooler fluid is not correctly flowing through the torch. See the water cooler instruction manual for more details.
12	**AC Switch Overload** Indicates that an overload condition occurred. To restore the machine: Turn OFF then ON the Mains Switch to restart the machine. LED blinking. (at 5Hz).
15	**Water cooler presence fault** LED blinking. (at 5Hz). Water cooler was connected/disconnected during operation. To restore the machine: Turn OFF then ON the Mains Switch to restart the machine.

Arc Time & Arc Counter

These two options show to the welder the total working hours and the total numeber of arc striking (max 9999). To reset one or both register, perform the follow procedure:

Push SEL button  for 5s. After that time the counter is reset: 0.0 presents in Voltage displays
Release SEL Button

UI, CTRL & IC firmware revision

By this option is possible to see the current software revision in both UI, control and input board.

GREE MODE option

By this option is possible to disable green mode and idle mode

LOCKOUT option

By this option is possible to enable the display lockout feature.
When LOCK ON is set in SYS menu only the Main Amperage setting, Memory functions and SYS menu are available.
Factory reset in SYS menu will revert to LOCK OFF
Memory recall will load all settings stored in the save operation, including menu settings
Memory recall will preserve LOCK status

RESET

By this option an end user can reset all the settings present in the machine to factory default indicated in this manual for all parameters. Memory locations are not affected by this reset.

MAINTENANCE

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.

INPUT DC BUS CAPACITORS DISCHARGE PROCEDURE

1. Remove input power to the ASPECT®200
2. Remove the cover following the instruction available in this Service manual.
3. Check the voltage across the two terminals. Voltage should be zero. If any voltage remains, apply the following procedure.
4. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is NOT supplied with the machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
5. Locate the two terminals **DC+** and **DC –** on the Caps Board (**See Figure 1**).
6. Use electrically insulate gloves and insulated pliers. Hold the body of the resistor and connect the resistor leads across the two terminals. Hold the resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.

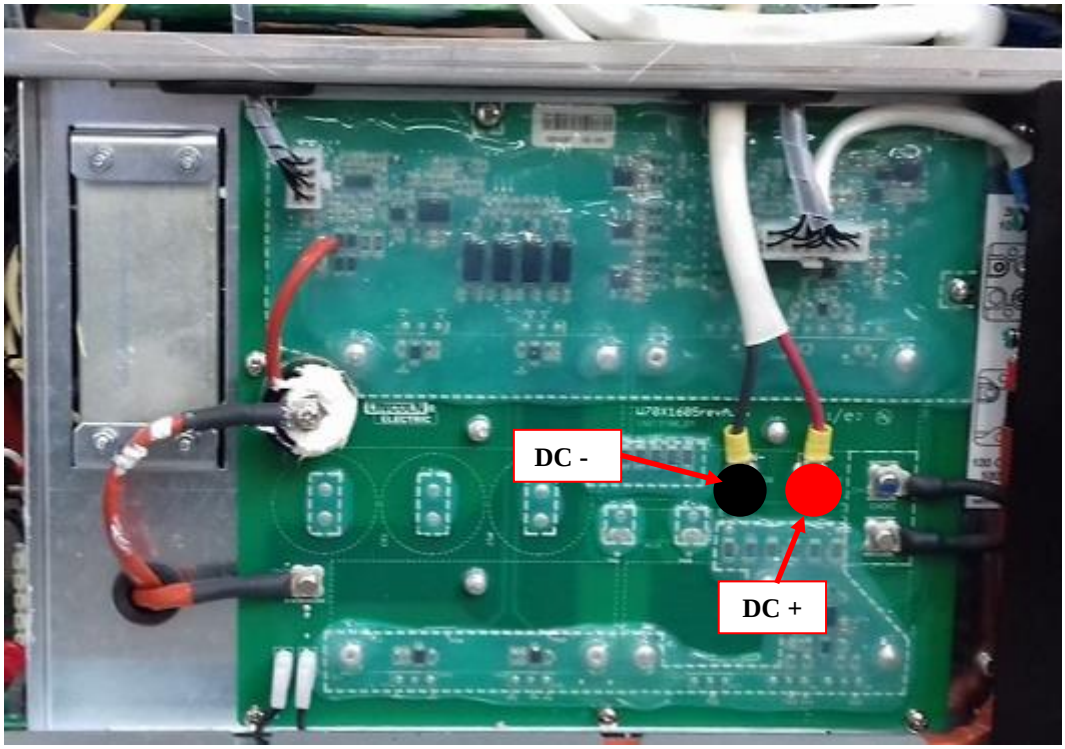


Figure 1 – W05X1605 Inverter Board located on the right side of the machine

ROUTINE MAINTENANCE

1. Keep the welding area around the machine clean and free of combustible materials. No debris should be allowed to collect which could obstruct air flow to the machine
2. The frequency of the maintenance operations may vary in accordance with the working environment. Any noticeable damage should be reported immediately. The machine should be cleaned with a low pressure and dry airstream. Keeping the machine clean will result in cooler operation and higher reliability.
3. Examine the sheet metal case for dents or breakage. Repair the case as required. Keep the case in good condition to insure that high voltage parts are protected and correct spacing are maintained. All external sheet metal screw must be in place to ensure case strength and electrical ground continuity.
4. Check cables and connections integrity. Replace,if necessary.

THERMAL PROTECTION

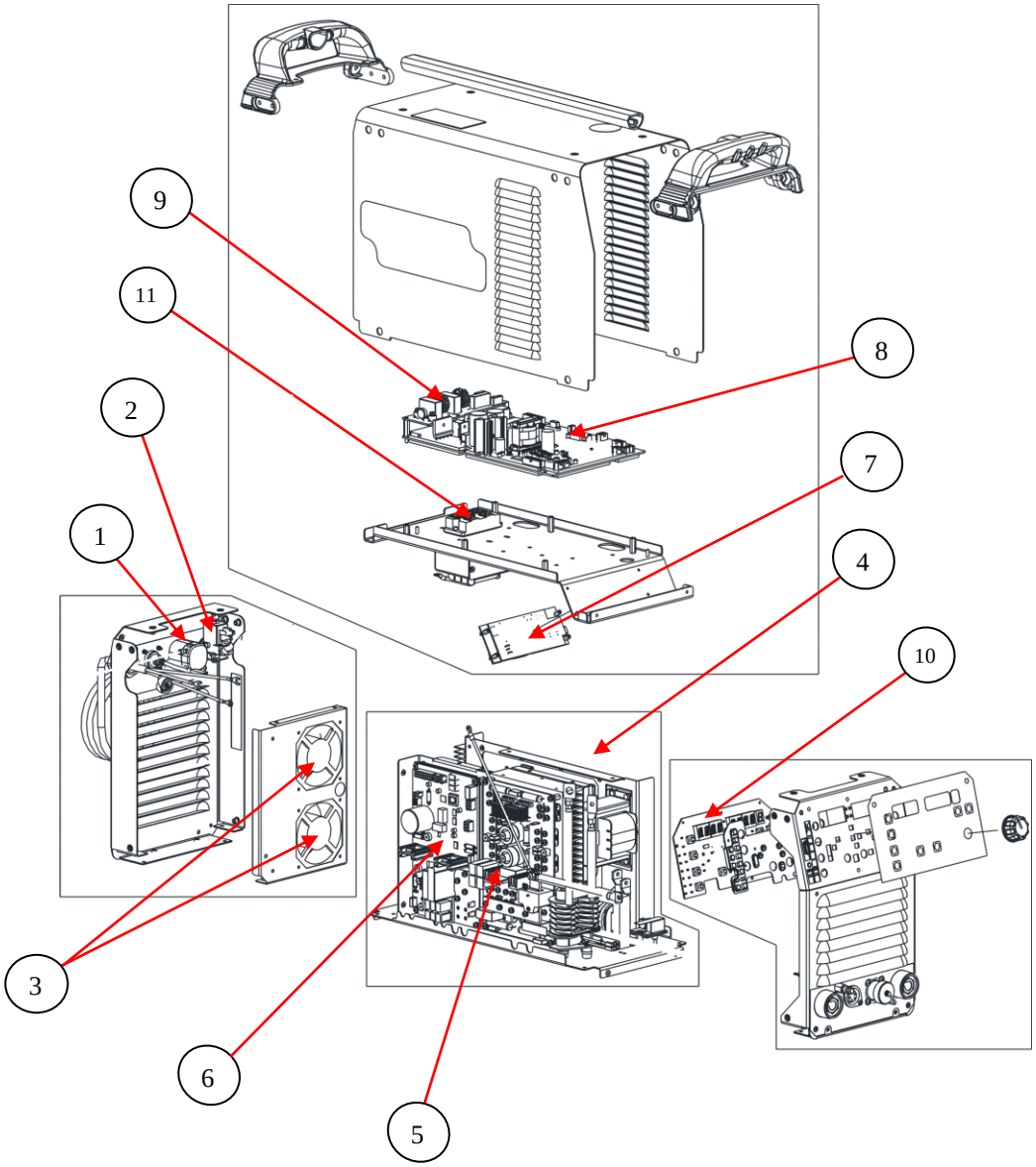
Thermal detection device protect the machine from excessive operating temperatures. Excessive temperatures may be caused by a lack of cooling air or operating the machine beyond the duty cycle and output rating. If excessive operating temperatures should occur, the yellow LED will light and the detection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

These detection device 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

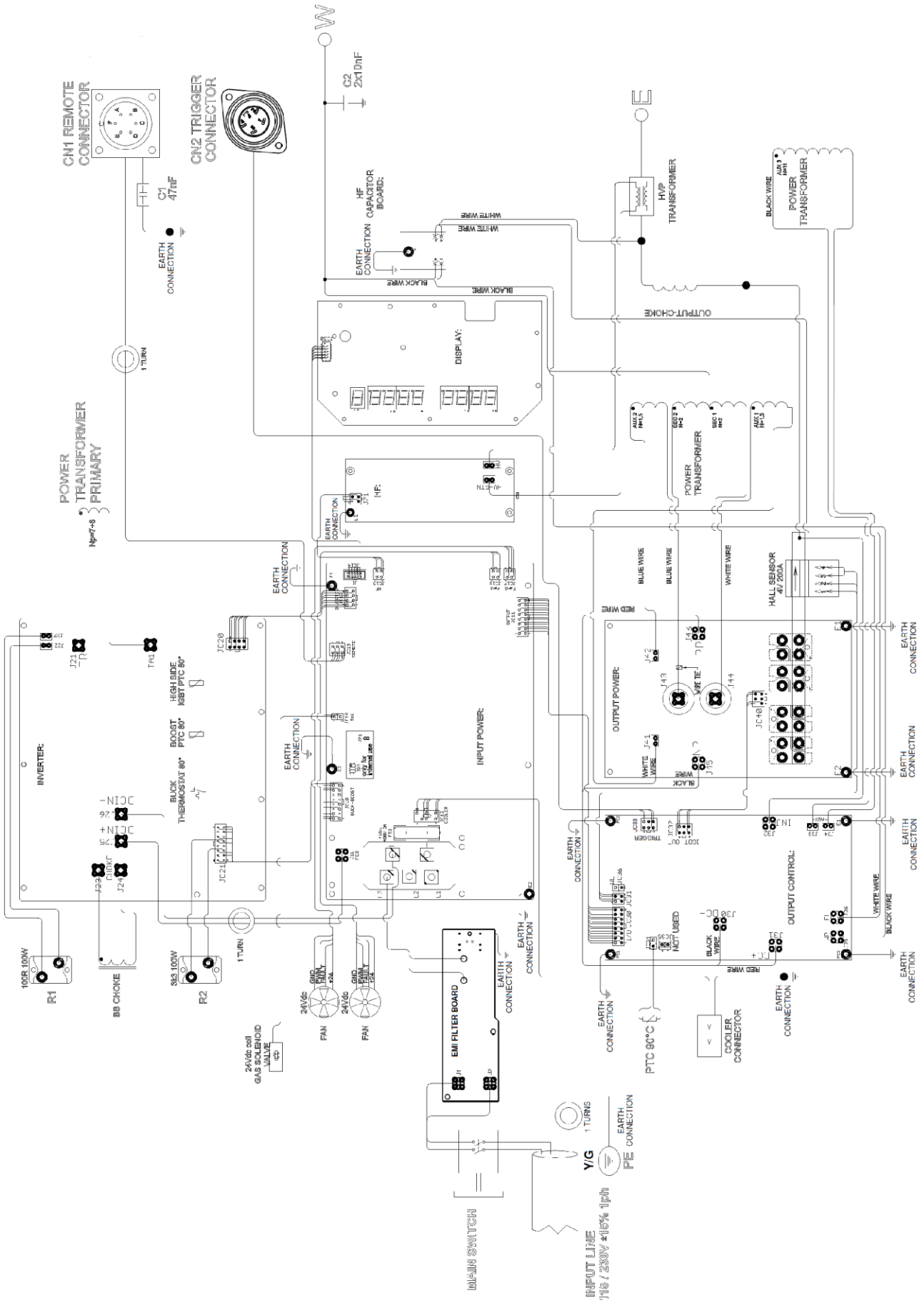
ASPECT® 200

1. Mains switch
2. Gas solenoid valve
3. Fan and Fan1
4. Right side: Boost & Inverter Board
5. Output Power Board
6. Output Control Board
7. HF Board
8. Input Board
9. Input Filter Board
10. Display & UI Board
11. Input Rectifier Bridge

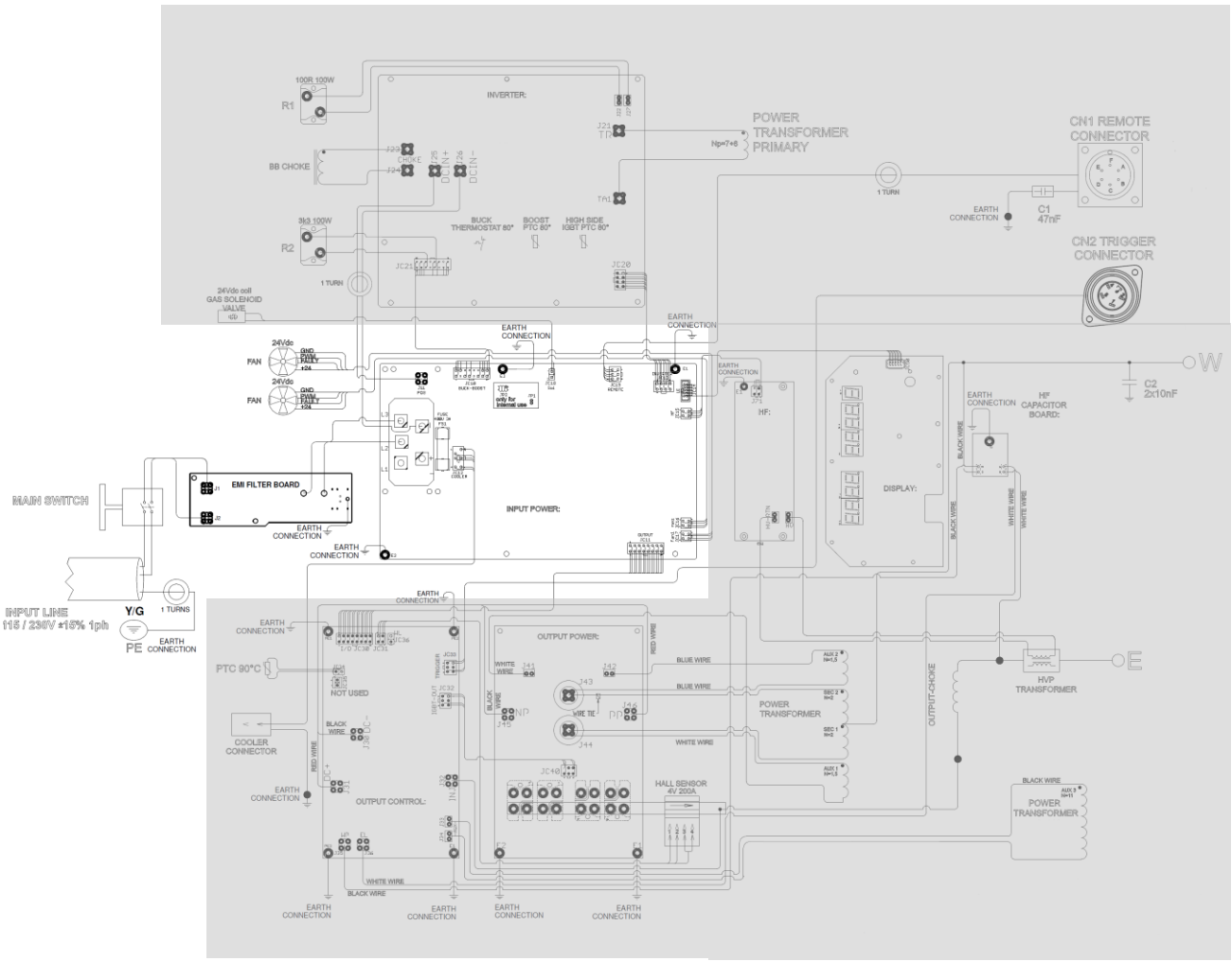


ASPECT®200 - SCHEMATIC DIAGRAM

code 50455



INPUT



GENERAL DESCRIPTION

The **ASPECT®200** is an inverter based welding power source that offers multi-mode (TIG DC, TIG AC STICK DC and STICK AC) constant current welding. The machine operates on single phase input voltage 115Vac or 230Vac 50 or 60 Hz thanks to the Buck/Boost circuitry available on this welding power source. The welding response of these Invertec has been optimized for the stick (SMAW) and TIG AC/DC (GTAW) welding processes.

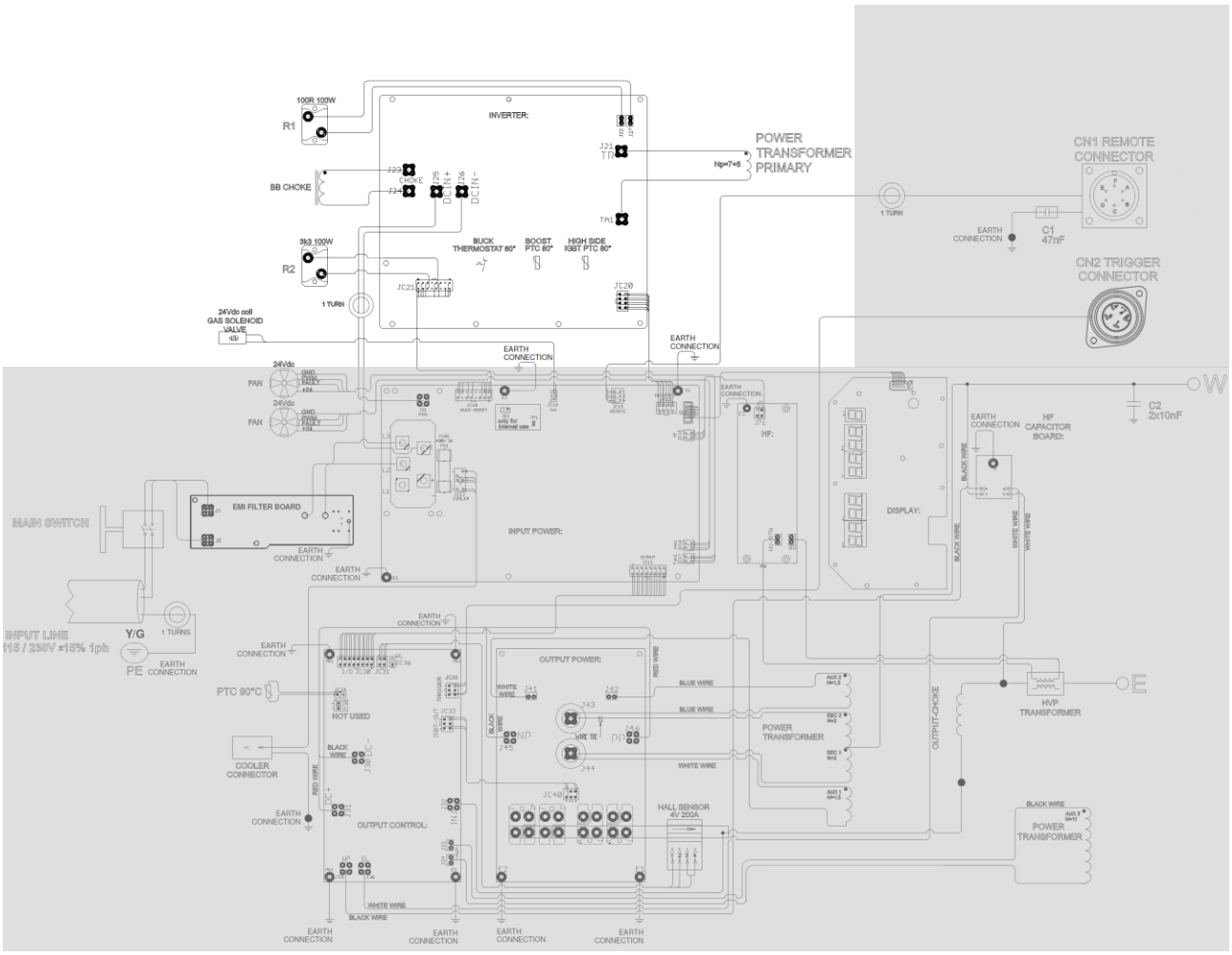
EMI FILTER

EMI filter circuit, prevents noise from the machine from being transmitted along the main power line and vice versa, necessary to be in accordance with all relevant directives and standards. EMC filter is also providing the AC power supply to the Input Power Board.

INPUT BRIDGE, INPUT BOARD

When the main switch is closed the 115 Vac or 230Vac input power is applied to the input rectifier through the EMI filter where it is rectified to a DC voltage. This rectified input voltage is applied to the Boost and Inverter Board.
The Input board is providing all the auxiliary supplies for the machine circuits.
The Input board houses the Buck/Boost PWM and driver circuits; it is also driving the machine power-up sequence (pre-charge), fan, HF, gas solenoid and Cooler ON/OFF. It also responsible for all PTC thermal sensors managements and for the control of the correct value of the input voltage supply.

BOOST & INVERTER PCB – OUTPUT TRANSFORMER



BOOST & INVERTER, OUTPUT TRANSFORMER

The input rectifier voltage coming from the Input board are applied to the Boost circuit, integrated into the inverter board. The constant voltage of 390VDC coming out from the Boost circuit is filtered by the DC bus capacitors and applied to an IGBT controlled full wave bridge inverter.

The IGBT switch the DC power from the bus capacitors "on and off," thus supplying pulsed DC current to the main transformer primary windings.

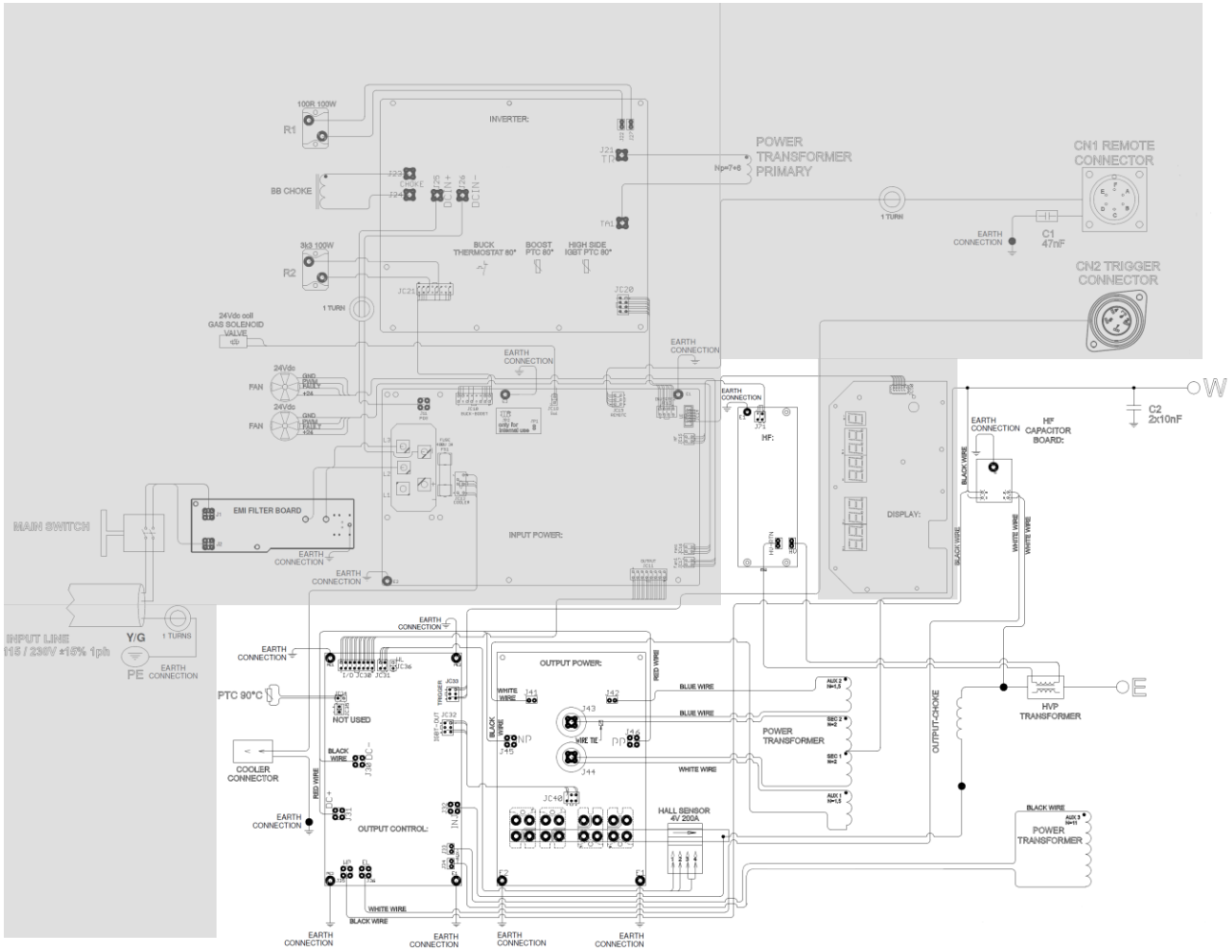
The full bridge inverter switching frequency is 47KHz. Current transformer located on the inverter board monitor the primary current. If the primary current become abnormally high, the inverter control circuit will shut off the IGBTs, thus disabling the machine's output.

Three thermal sensors are located in the BUCK, BOOST & INVERTER heatsinks, one for the PRECHARGE buck IGBTs, one for the Boost IGBTs and one for the inverter IGBTs.

The main transformer insulate the primary circuit from the secondary circuit and reduces the high voltage (low current) input applied to the primary winding and through transformer action develops a lower secondary voltage capable of high output currents. Main transformer has also two auxiliary wingings for the doubler circuits, that provide the extra voltage required when special stick electrodes, like cellulosic, are used with the machine or during HF TIG arc starting and 1 auxiliary winding for the output PCB snubber capacitor precharge.

The AC output of the Main Transformer is applied to the Output Power PCB for full rectification depending on the output polarity selected.

OUTPUT, POWER CONTROL BOARD, HF BOARD



OUTPUT CONTROL BOARD and OUTPUT POWER BOARD

The OUTPUT CONTROL board provides the managing signals and the insulated power supply for the driver of the Output IGBTs. A special circuit necessary for the switching transition in AC mode, is present in this board.
This output board also houses:

- the pre-charge circuit for the snubber capacitor and the active snubber discharge circuit for the power IGBT module used for AC switching.
- The lift tig arc starting detection

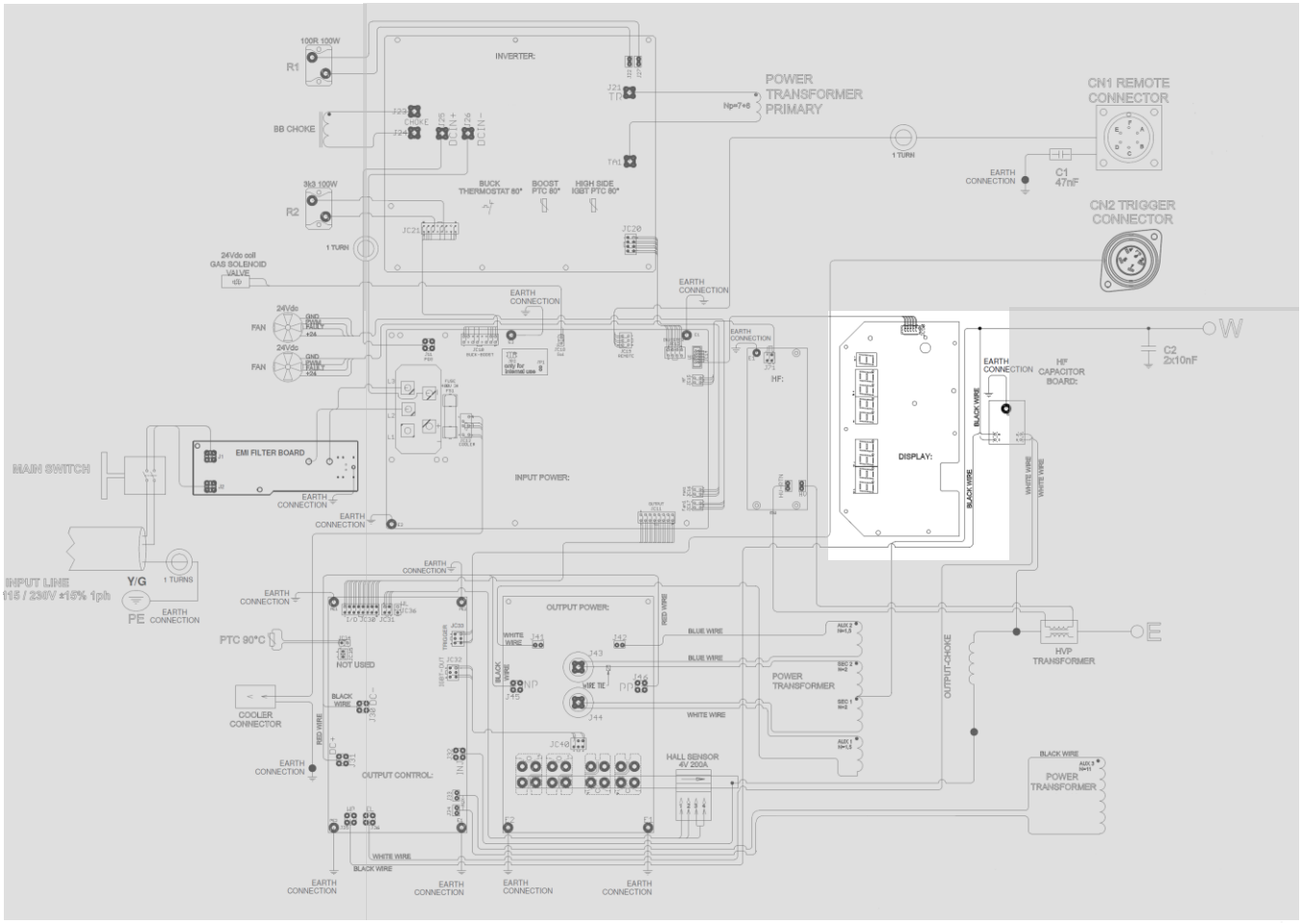
On the Output control PCB is also connected the output current transducer. The output current and voltage feedback are rectified then sent to the microprocessor on the input board.

On the OUTPUT POWER BOARD are connected the rectifier diodes, the diodes for the doubler circuit (for the cellulosic welding) and the IGBTs for the output polarity change of the machine that can be either DC positive, DC negative or AC.

HF BOARD, HF TRANSFORMER

The HF Board generates a set of 97Hz pulses of about 1000V. These pulses are applied to the high voltage/frequency transformer and are amplified to about 12KV.
This high frequency/voltage pulse is transferred to the TIG torch via the **high frequency transformer**.
This allows the remote starting of the TIG arc without touch the tungsten electrode to the work.
This high frequency pulse is switched off when the welding arc is established.
The HF command signal is received from the microprocessor on the Input Power Board and stays on, if the welding arc is not established for about 3-4 seconds maximum. The HF Board is supplied from the input power board with 24Vdc.
HF is disable in Stick and Lift TIG modes.

UI and DISPLAY BOARD



DISPLAY BOARD

The Display board houses the control panel, LEDs, push buttons, encoder and functions as the interface between the user and the ASPECT®200 machine. The Display board receives signals and power from Input Power board and it creates the reference signals for the inverter and the output IGBT modules.

Control board communicate using serial bus to the input power board.

OVERLOAD PROTECTION

ASPECT®200 is electrically protected from producing higher than normal output currents. An electronic protection circuit limits the current to within the capabilities of the machine.

THERMAL PROTECTION

Thermal Protection Devices protect the machine from excessive operating temperatures.

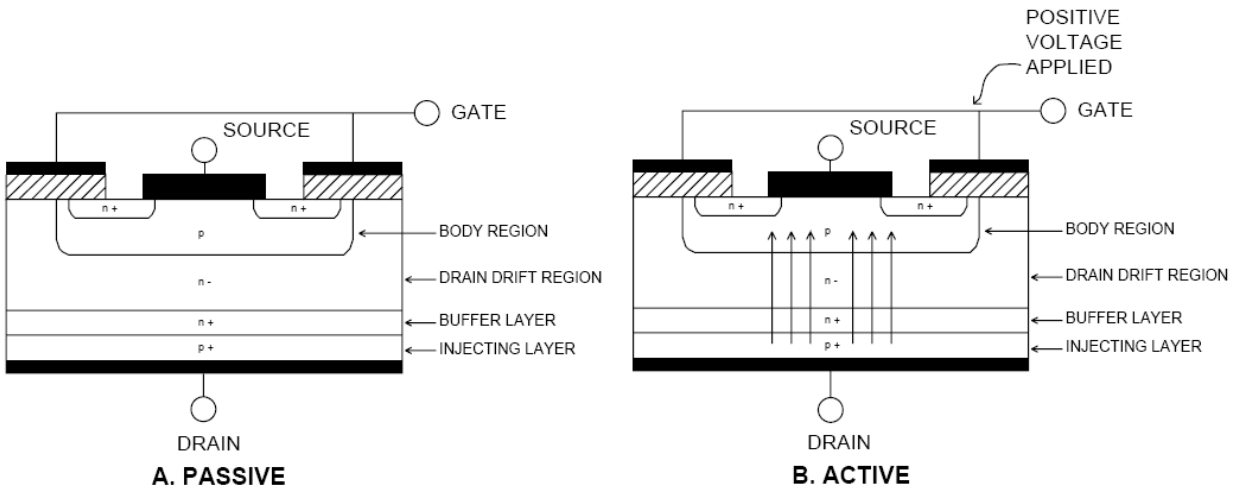
Excessive temperature may be caused by a lack of cooling air or by operating the machine beyond the duty cycle and output rating. If excessive operating temperature should occur, the Thermal LED indicator on the User Interface board, will turn ON and the thermostat will prevent output current.
The thermal protection device is self-resetting once the machine cools sufficiently. If the shut down 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 15 minute 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.

INSULATED GATE BIPOLAR TRANSISTOR (IGBT) OPERATION

An IGBT is a type of transistor. IGBTs are semicon-ductors 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

- How to use troubleshooting Guide
- Troubleshooting Guide
- Case cover removal and DC BUS capacitor discharge procedure
- EMI Filter board test
- Input Rectifier test
- Input Power board test
- Buck Boost and Inverter board test
- Output Control board test
- Output Power board test
- HF board test
- Display board test
- Gas solenoid test
- Disassembly Operations

HOW TO USE TROUBLESHOOTING GUIDE

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 toassure 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 HARNESS.**

PROBLEMS / SYMPTOMS	CHECKS / ERROR DESCRIPTION	RECOMMENDED COURSE OF ACTION
A VISUAL DAMAGE IS EVIDENT WHEN YOU OPEN THE COVER	----------	• CHANGE THE BROKEN PART AND PERFORM THE TESTS FOR THE OTHER MACHINE COMPONENTS*
MACHINE IS DEAD, NO LED, NO FAN	• MAKE SURE THAT THE INPUT LINE IS PRESENT • CHECK THE INPUT SWITCH • PERFORM THE EMC BOARD TEST AND INPUT POWER BOARD TEST	• CONNECT THE INPUT LINE • REPLACE THE INPUT SWITCH IF NECESSARY* • REPLACE THE EMC BOARD OR INPUT POWER BOARD IF NECESSARY*
THE MAIN INPUT FUSES OR BREAKERS REPEATEDLY FAIL	• MAKE CERTAIN THE FUSES OR BREAKERS ARE PROPERLY SIZED FOR THE INPUT DRAW OF THE MACHINE. SEE MACHINE RATING PLATE OR TECHNICAL SPECIFICATION AVAILABLE IN THIS SERVICE MANUAL • INPUT BRIDGE OR ONE OF THE MACHINE PRIMARY SIDE CIRCUITS MAY BE FAULTY	• USE CORRECT SIZE OF FUSES OR CIRCUIT BREAKER • PERFORM THE INPUT BRIDGE TEST* • PERFORM THE BOOST & INVERTER TEST*
THE THERMAL LED IS LIT PERMANENTLY	• ONE OF THE MACHINE THERMAL SENSOR IS DEFECT. • THE INPUT POWER BOARD IS DEFECT • THE CONTROL BOARD IS DEFECT	• CHECK THE THERMAL SENSORS* • CHECK THE HARNESS OF THE THERMAL SENSORS* • PERFORM THE INPUT POWER BOARD TEST* • PERFORM THE CONTROL BOARD TEST*
 LED ON THE FRONT PANEL IS BLINKING (at 5Hz) AND ERROR 01 OR ERROR 02 IS DISPLAYED.	• INDICATES THAT AN INPUT UNDERVOLTAGE OR OVERVOLTAGE PROTECTION IS ACTIVE. THE MACHINE RESTARTS AUTOMATICALLY WHEN THE INPUT VOLTAGE RETURNS IN THE CORRECT RANGE, IF THE ERROR PERSISTS FOLLOW THE RECOMMENDED TESTS	• CHECK THE VALUE OF THE INPUT VOLTAGE , MUST BE 115VAC OR 230VAC +/- 15% • PERFORM THE EMC FILTER TEST* • PERFORM THE INPUT POWER BOARD TEST*
 LED ON THE FRONT PANEL BLINKING (at 5Hz) AND ERROR 03 IS DISPLAYED.	• INDICATES THAT THE MACHINE IS INCORRECTLY CONNECTED TO THE SUPPLY LINE	• CHECK THAT POWER SUPPLY IS ARRIVING TO INPUT BRIDGE* • PERFORM THE EMC FILTER BOARD TEST*
 LED ON THE FRONT PANEL BLINKING (at 5Hz) AND ERROR 06 IS DISPLAYED.	• INVERTER AUXILIARY VOLTAGE FAULT CONDITION DETECTED	• PERFORM THE INPUT POWER BOARD TEST (FOCUS ON AUXILIARY VOLTAGE +15VDC)*
 LED ON THE FRONT PANEL BLINKING (at 5Hz) AND ERROR 12 IS DISPLAYED	• IGBT OUTPUT SWITCH MODULE OVERLOAD VOLTAGE	• PERFORM THE OUTPUT CONTROL BOARD TEST*
 LED ON THE FRONT PANEL BLINKING (at 5Hz), ERROR 11 IS DISPLAYED THE WATER COOLER (IF CONNECTED) IS NOT WORKING.	• PERFORM THE INPUT POWER BOARD TEST TO CHECK IF WATER COOLER POWER SUPPLY IS PRESENT • CHECK FUSE “FS1” ON INPUT POWER BOARD	• IF POWER SUPPLY IS PRESENT, REPLACE THE INPUT POWER BOARD* • IF FUSE “FS1” IS OPEN, REPLACE AND PERFORM THE WATER COOLER TESTS*
 LED ON THE FRONT PANEL BLINKING (at 5Hz), ERROR 10 IS DISPLAYED	• FAN ISSUE	• CHECK THE FAN AND PERFORM THE FAN TEST

* This tests and repair should only be performed by Lincoln Electric 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.

CASE COVER REMOVAL AND DC BUS CAPACITOR 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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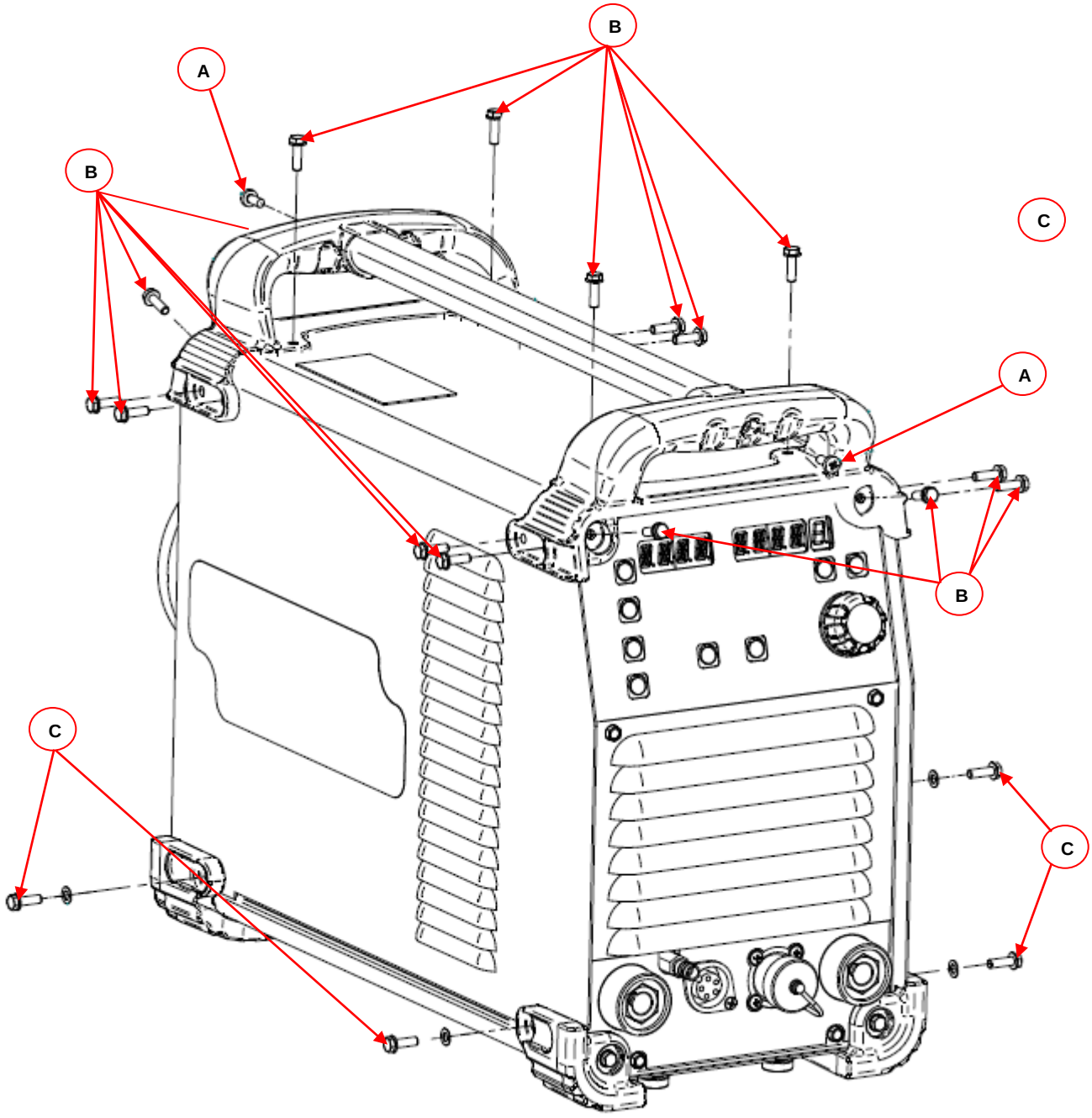
DESCRIPTION

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

MATERIALS NEEDED

Screwdriver type PH02
8 mm nut driver

ASPECT®200 - CASE COVER REMOVAL



Procedure:

1. Turn ON/OFF switch to OFF position.
2. **Disconnect Input Power from the machine**
3. Remove the 2 screws (A) of the rear and front plastic handle using the PH02 type screwdriver
4. Remove the 16 screws (B) that fix the plastic front and rear handle using the 8 mm nut driver
5. Remove the 4 screws (C) from the right and left side of bottom rubber corners of the machine.
6. Don't remove the 4 bottom rubber corners
7. Pull up the red case cover taking care of the ground wire connection.
8. Follow the next page for **DC BUS capacitors discharge procedure !**

DC BUS CAPACITORS 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.

INPUT DC BUS CAPACITORS DISCHARGE PROCEDURE

7. Remove input power to the ASPEC®200
8. Remove the cover following the instruction available in this Service manual.
9. Check the voltage across the two terminals. Voltage should be zero. If any voltage remains, apply the following procedure.
10. Obtain a high resistance and high wattage resistor (25-1000 ohms and 25 watts minimum). This resistor is NOT supplied with the machine. NEVER USE A SHORTING STRAP FOR THIS PROCEDURE.
11. Locate the two terminals **DC+** and **DC –** on the Caps Board (**See Figure 1**).
12. Use electrically insulate gloves and insulated pliers. Hold the body of the resistor and connect the resistor leads across the two terminals. Hold the resistor in place for 10 seconds. DO NOT TOUCH CAPACITOR TERMINALS WITH YOUR BARE HANDS.

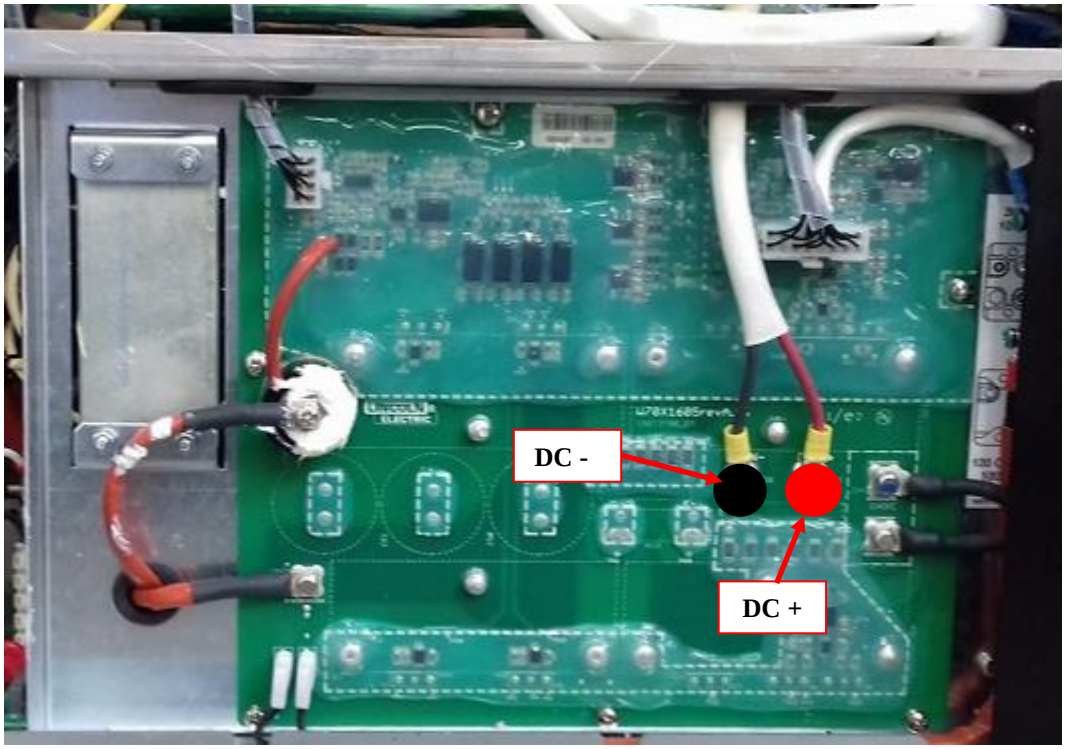


Figure 1 – W05X1605 Inverter Board located on the right side of the machine

EMI FILTER BOARD 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 EMI Filter board has failed.

MATERIALS NEEDED

Volt/Ohmmeter
Machine Wiring Diagram

EMI FILTER BOARD TES (continued)

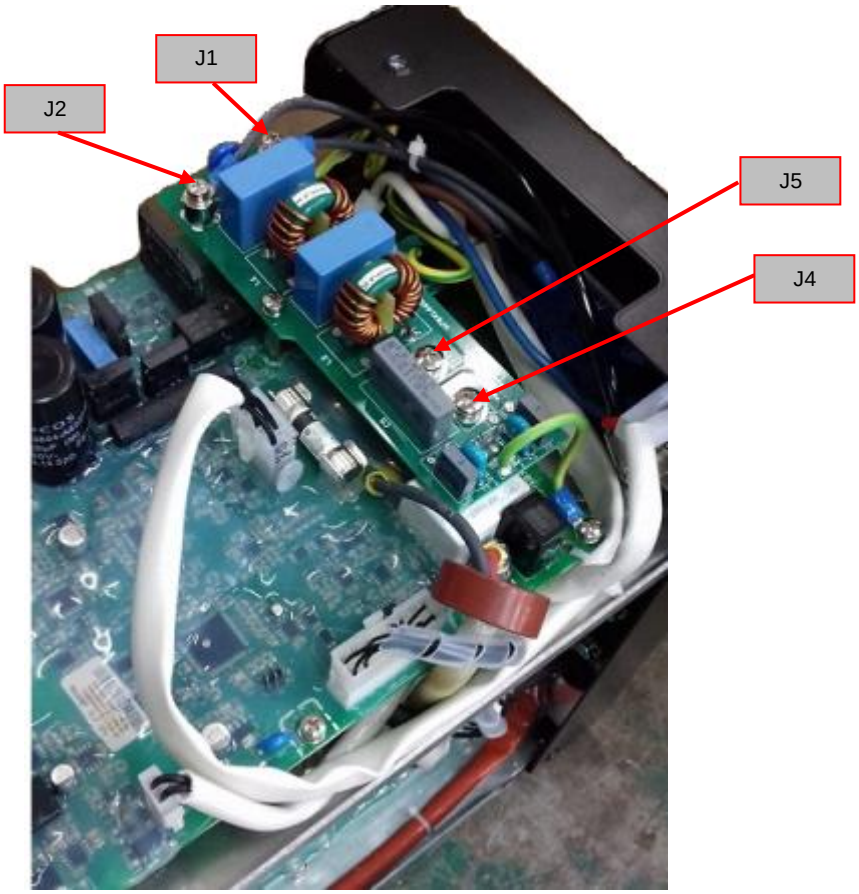

Figure 2 – W05X1665 – EMI FILTER BOARD

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the EMI Filter Board W05X1665 (see **Figure 2**).
4. Visually check for burned or damaged components. If any components are physically damaged the EMI Filter board should be replaced
5. Using the Volt-Ohmmeter (ohm mode) perform the tests as indicated in **Test Table 1**. See **Figure 2** for correct test points location.
6. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
7. Switch to ON position the main switch and using the voltmeter in AC mode perform the tests as indicated in **Test Table 2**. See **Figure 2** for correct test points location.
8. If any of the tests listed on Test Tables are not correct the EMI Filter Board may be faulty. Please follow the EMI Filter Board removal and replacement procedure.

Test Table 1 - EMI Filter Board Resistance Tests

Machine condition	Positive Probe (RED)	Negative Probe (BLACK)	Value
OFF	J1	J5	0 (zero) ohm
OFF	J2	J4	0 (zero) ohm
OFF	J1	J2	Open/Cap charge
OFF	J4	J5	Open/Cap charge

Test Table 2 - EMI Filter Board Voltage Tests

Positive Probe (RED)	Negative Probe (BLACK)	Value (Machine connected to 115Vac/1ph)	Value (Machine connected to 230Vac/1ph)
J1	J2	115Vac +/-15%	230Vac +/- 15%
J4	J5	115Vac +/-15%	230Vac +/- 15%

INPUT RECTIFIER 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 TEST (continued)

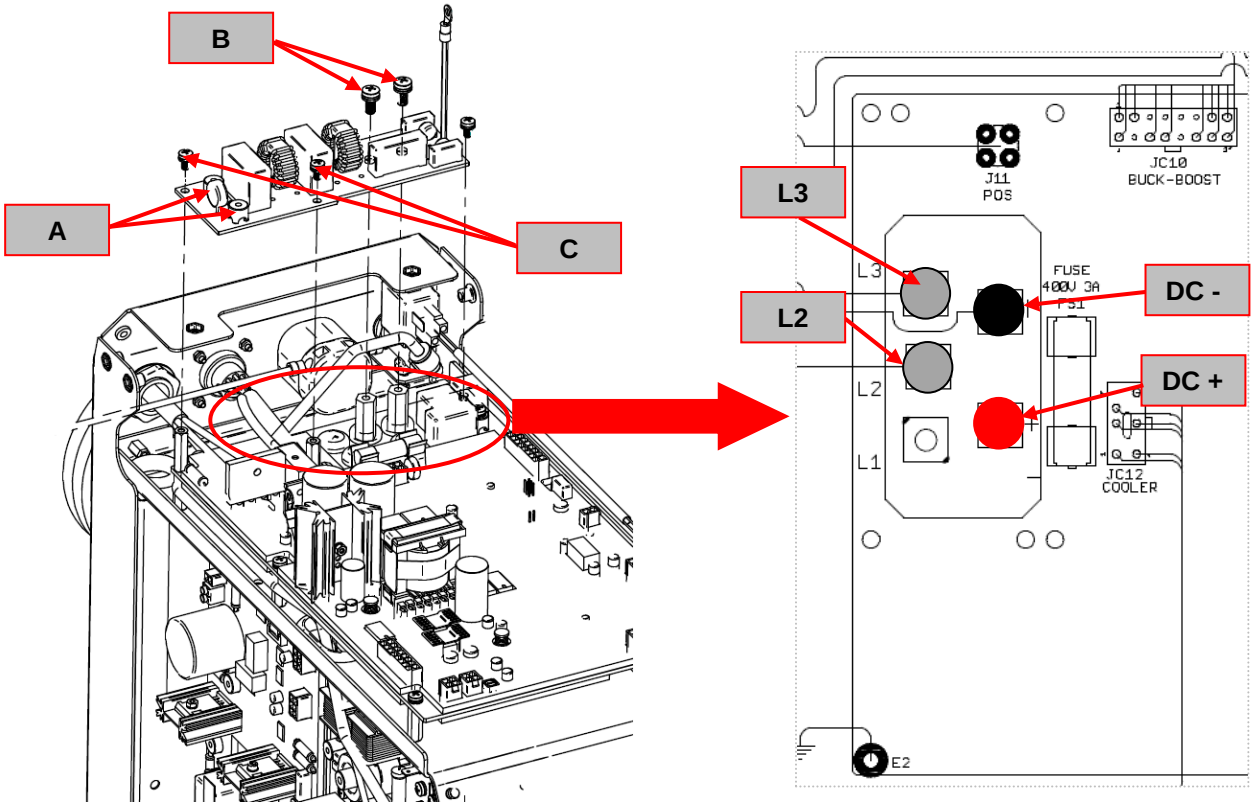

Figure 3 – W05X1665-1 Input Rectifier Bridge location and Test

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the EMI Filter Board. Remove the screws **A**,**B** & **C** and remove the EMI Filter board. See **Figure 3**.
4. Using the multimeter in Diode mode, locate the Input Rectifier Bridge as shown on **Figure 3**.
5. Perform the tests as detailed in **Test table 3**. Refer to **Figure 3** for terminals locations.
6. If the tests results are questionable, remove the input power board and re-test the input rectifier alone.
7. If any portion of the test fails, the input rectifier may be faulty and must be replaced.

Test table 3 – Input Rectifier Bridge Test

Machine condition	*Positive Probe (RED)*	*Negative Probe (BLACK)*	*Value*
OFF	Terminal L2	Terminal DC+	0.3 - 1.0V Forward Diode Drop
OFF	Terminal L3	Terminal DC+	0.3 - 1.0V Forward Diode Drop
OFF	Terminal DC-	Terminal L2	0.3 - 1.0V Forward Diode Drop
OFF	Terminal DC-	Terminal L3	0.3 - 1.0V Forward Diode Drop
OFF	Terminal DC+	Terminal DC-	Open

INPUT POWER BOARD TEST

WARNING

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TEST DESCRIPTION

This test will help to determine if the Input Power Board is providing all the correct auxiliary voltages to the machine boards.

MATERIALS NEEDED

Volt/Ohmmeter
Machine Wiring Diagram

Calibration must be done if the Input Power board is replaced! See dedicated section.

INPUT POWER BOARD TEST (continued)

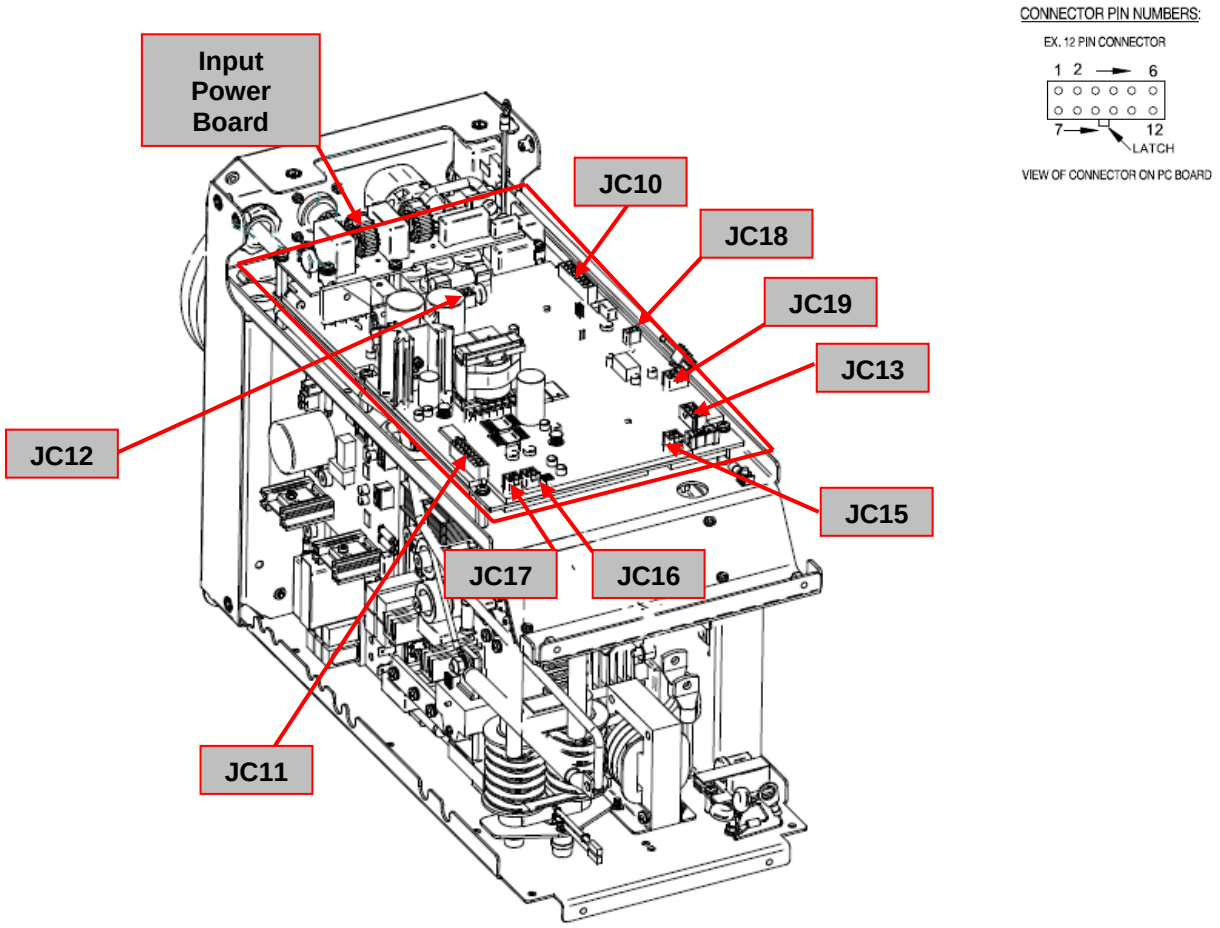


Figure 4 – W05X1604-2 Input Power Board location

VOLTAGE TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Input Power Board. See **Figure 4**.
4. Visually check for burned or damaged components. If any components are physically damaged the Input Power board should be replaced
5. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
6. Switch to ON position the main switch and using the voltmeter perform the tests as indicated in **Test Table 4**. See **Figure 4** for correct test points location.

Test table 4 – INPUT POWER BOARD - Voltage Tests

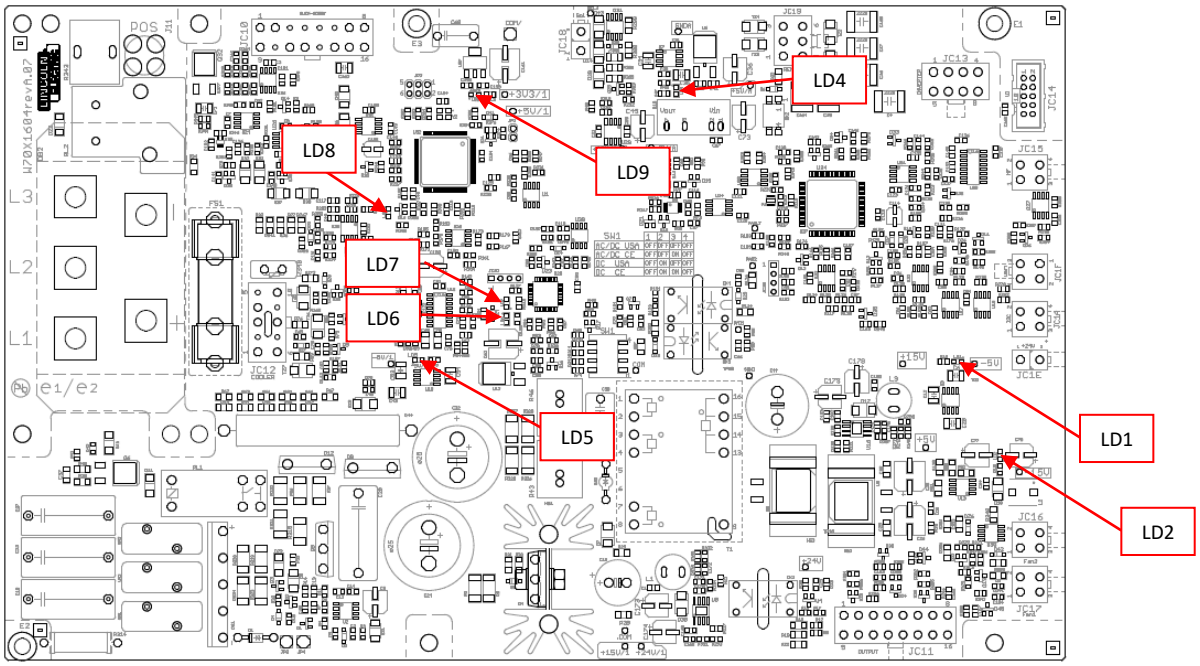
Machine AC input voltage	*Test Points*	*Expected reading*	*LEDs status and color*	*Note*
115Vac +/-15% or 230Vac +/-15%	Plug **JC13** pin 3 (+) to pin 6 (-)	-5Vdc	LD1 ON Green	-5Vdc secondary side present
115Vac +/-15% or 230Vac +/-15%	Plug **JC11** pin 3 (+) to pin 5&15 (-)	-15Vdc	LD2 ON Green	-15Vdc secondary present
115Vac +/-15% or 230Vac +/-15%	Plug **JC16 & JC17** pin 3 (+) to pin 1 (-)	+5Vdc	LD3 ON Green	+5Vdc secondary present
115Vac +/-15% or 230Vac +/-15%	-	-	LD4 ON Green	-5Vdc present
115Vac +/-15% or 230Vac +/-15%	-	-	LD5 ON Green	-5Vdc primary side present

INPUT POWER BOARD TEST (continued)

Test table 4 – INPUT POWER BOARD - Voltage Tests (continued)

Machine AC input voltage	*Test Points*	*Expected reading*	*LEDs status and color*	*Note*
115Vac +/-15% or 230Vac +/-15%	-	-	LD6 ON Green	Green while the machine is wake up, flashing when machine is in idle mode
115Vac +/-15% or 230Vac +/-15%	-	-	LD7 ON Green	Green while the machine is wake up, flashing when machine is in idle mode
115Vac +/-15% or 230Vac +/-15%	Plug **JC10** pin 7 (+) to pin 4&8 (-)	+15Vdc	LD8 ON Green	+15Vdc primary side present
115Vac +/-15% or 230Vac +/-15%	-	-	LD9 ON Green	+3,3V present for the uC processor
115Vac +/-15% or 230Vac +/-15%	Plug **JC11** pin 13 (+) to pin 5&15 (-)	+15Vdc	-	+15Vdc to Output Control board
115Vac +/-15% or 230Vac +/-15%	Plug **JC13** pin 2 (+) to pin 6 (-)	+15Vdc	-	+15Vdc to Inverter board
115Vac +/-15% or 230Vac +/-15%	Plug **JC12** pin 6 (+) to pin 1 (-)	390Vdc	-	Water Cooler power supply
115Vac +/-15% or 230Vac +/-15%	Plug **JC15** pin 2 (+) to pin 4 (-)	+24Vdc	-	HF power supply
115Vac +/-15% or 230Vac +/-15% LIFT TIG MODE	Plug **JC18** pin 2 (+) to pin 1 (-)	+23Vdc	-	Gas solenoid power supply, present only when trigger is pressed /test has to be done in LIFT TIG)
115Vac +/-15% or 230Vac +/-15%	Plug **JC19** pin 4 (+) to pin 1 (-)	+12Vdc	-	Remote power supply Insulated

Input Power Board LEDs Location



BOOST AND INVERTER BOARD TEST

WARNING

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TEST DESCRIPTION

This test will aid the technician to determine if the Boost & Inverter Board is receiving the correct input voltages.
The outputs and input voltages between the Input Power Board and the Buck/Boost & Inverter Board will also be tested.
This test will NOT determine the functionality of the entire board.

MATERIALS NEEDED

Volt/Ohmmeter
Screwdriver type PH02
Machine wiring diagram

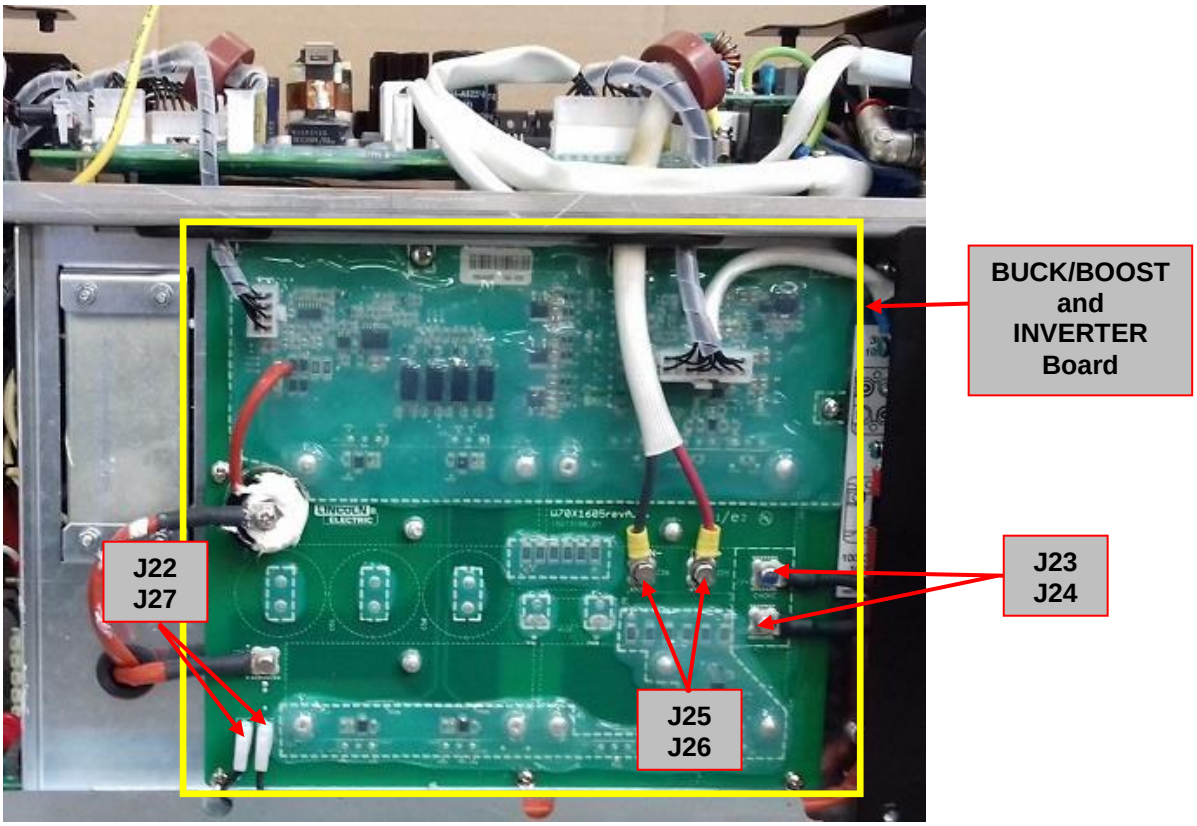


Figure 5 – W05X1605 BOOST and INVERTER Board location

RESISTANCE TEST PROCEDURE

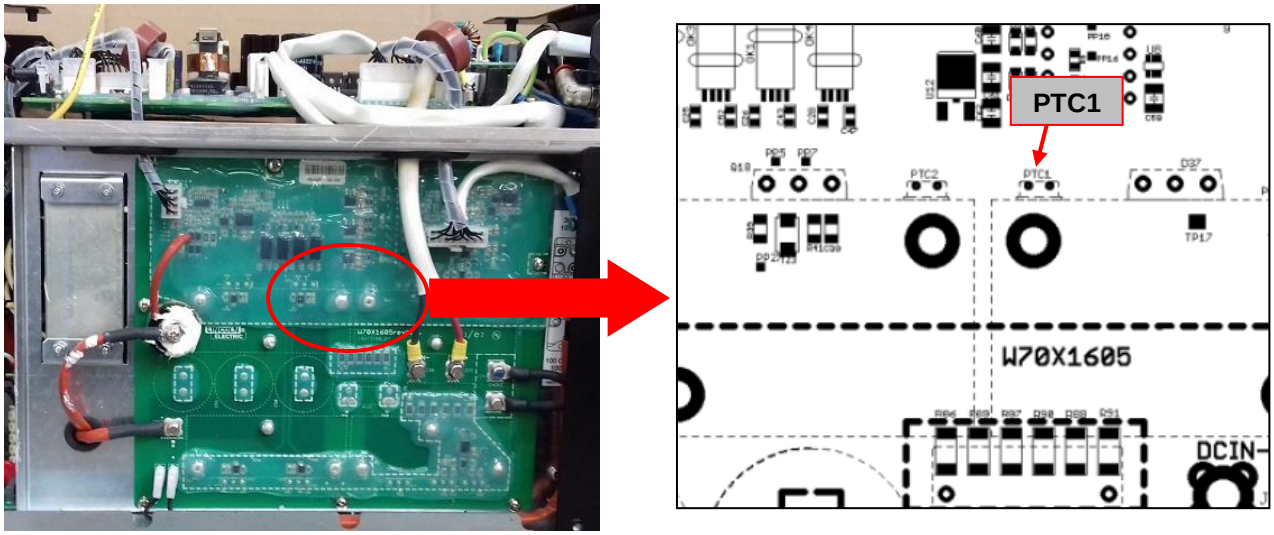
⚠ **Use always electrically insulate gloves during this test procedure**

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Boost and Inverter board on the right side of the machine. See **Figure 5**.
4. Visually check for burned or damaged components. If any components are physically damaged the Buck/Boost and Inverter board should be replaced
5. Perform the Boost and Inverter circuits resistance tests detailed in **Test Table 5, 5a**. See **Figure 5** for Test Point locations

Test table 5 – BOOST circuit - Resistance Tests

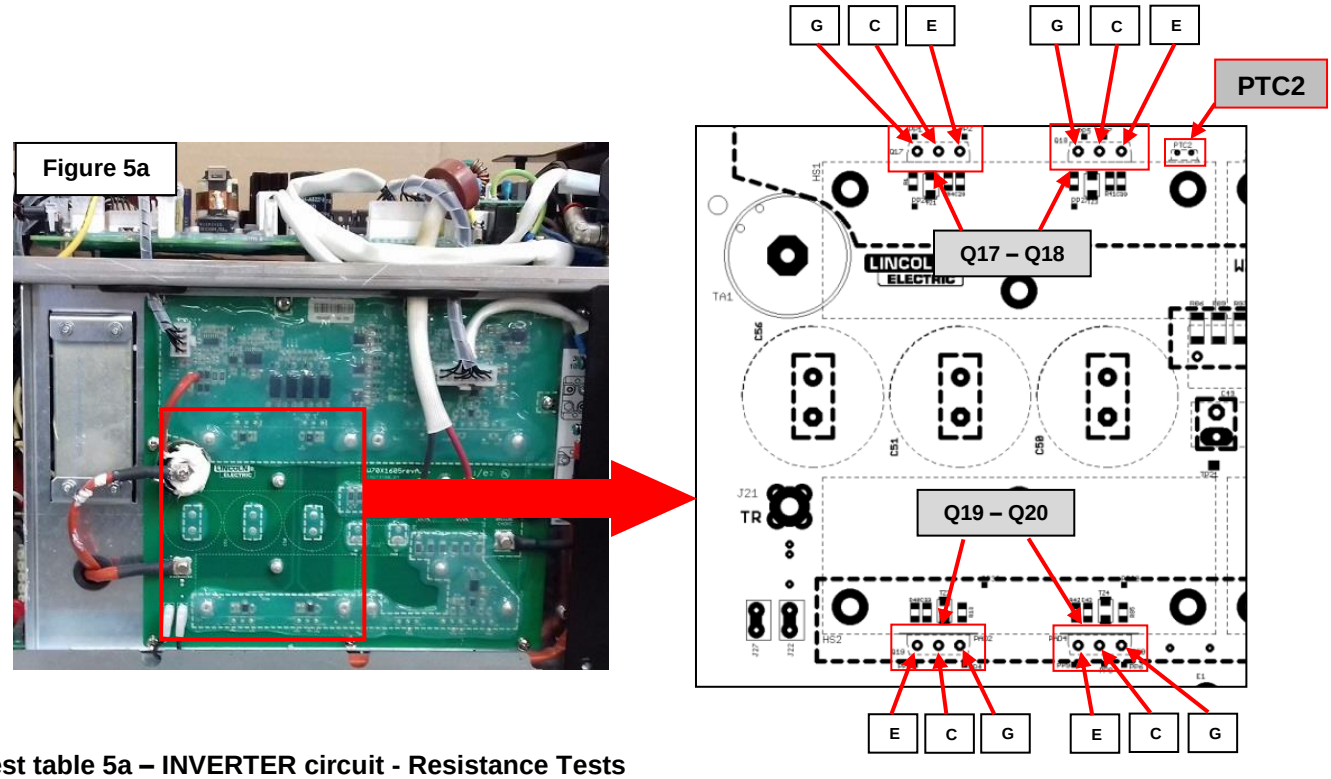
Machine condition	*Test Points*	*Expected reading*	*Note*
Machine disconnected from input voltage and capacitors discharged.	**J23** to **J24**	0 (zero) Ohms	Continuity of BB choke
	J22 to **J27**	100 Ohms +/- 10%	Inverter power resistor
	J25 to **J26**	Open (Test Diode mode)	In case of low reading value, disconnect the POS and NEG cables and repeat the test, if still low resistance value, replace the Boost and Inverter board
	J24 (positive test probe) to **J26** (negative test probe)	Charge (Test Diode mode)	Measurement taken with the leads disconnected from PCB. If short circuit is found the boost transistor may be damaged. Replace the Boost and Inverter board.
	J24 (negative test probe) to **J26** (positive test probe)	0,3-1,0 V Forward diode drop (Test Diode mode)	Measurement taken with the leads disconnected from PCB. If a short circuit is found the boost transistor may be damaged. Replace the Boost and Inverter board.
	J26 (negative test probe) to **J23** (positive test probe)	Open (Test Diode mode)	Measurement taken with the leads disconnected from PCB. If a short circuit is found the buck transistor may be damaged. Replace the Boost and Inverter board
	J26 (positivetive test probe) to **J23** (negative test probe)	0,3-1,0 V Forward diode drop (Test Diode mode)	

BOOST AND INVERTER BOARD TEST (continued)



Machine disconnected from input voltage and capacitors discharged	Between solder points of **PTC1** (ohm mode)	60-70 Ohm +/-25% @20°C	Boost IGBTs PTC

Figure 5a



Test table 5a – INVERTER circuit - Resistance Tests

Machine condition	***Test Points***		***Expected reading***	***Note***
Machine disconnected from input voltage and capacitors discharged	Between solder points of **PTC2** (ohm mode)		40-50 Ohm +/-25% @20°C	PTC test on Inverter IGBTs heatsink
Machine condition	***Test Points for each IGBT (Q17,18,19,20) (diode mode)***		***Expected reading***	***Note***
	Positive Probe (RED)	***Negative Probe (BLACK)***		
Machine disconnected from input voltage and capacitors discharged	Emitter (E)	Collector (C)	0.3V - 0.7V	Inverter IGBTs test
	Collector (C)	Emitter (E)	Capacitor charge	
	Emitter (E)	Gate (G)	*0.3V – 1.0V forward diode drop*	

BOOST AND INVERTER BOARD TEST (continued)

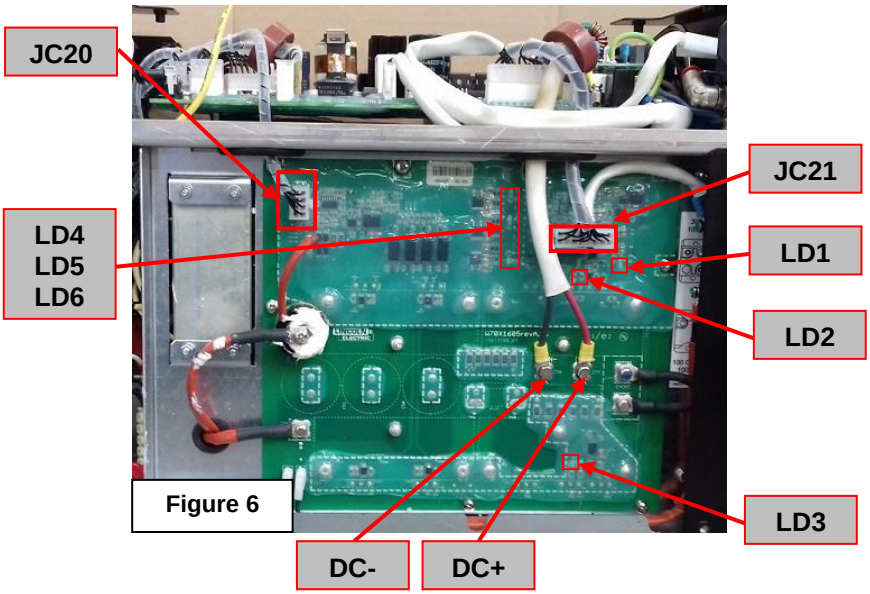
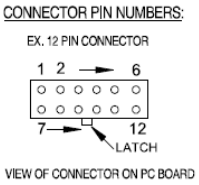


Figure 6



VOLTAGE TEST PROCEDURE

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

7. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
8. Switch to ON position the main switch and using the voltmeter perform the tests as indicated in **Test Table 6**. See **Figure 6** for correct test points location.

Test table 6 – BOOST and INVERTER Board - Voltage Tests

Machine AC input voltage	*Test Points*	*Expected reading*	*Note*
230Vac +/-15%	**DC+** to **DC-**	235 Vdc +/-15%	Input voltage to boost & Inverter board. Machine powered, no load
230Vac +/-15%	Plug **JC21** Pin 6,8,14 (-) to Pin 4,11,12 (+)	393 Vdc +/-15%	Input rectifier voltage for range check to input power board
115Vac +/-15% or 230Vac +/-15%	Plug **JC21** Pin 6,8,14 (-) to Pin 7 (+)	+15Vdc (primary side)	Auxiliary power supply (not insulated) for Boost circuits from input power board
115Vac +/-15% or 230Vac +/-15%	Plug **JC20** Pin 6 (-) to Pin 2 (+)	15 Vdc	Auxiliary power supply for Inverter circuits from input power board
115Vac +/-15% or 230Vac +/-15%	Plug **JC20** Pin 6 (-) to Pin 3 (+)	-5 Vdc	Auxiliary power supply from input power board
115Vac +/-15% or 230Vac +/-15%	LD1	ON Green	Boost +15Vdc is present
115Vac +/-15% or 230Vac +/-15%	LD2	ON Green when Boost is working	Boost IGBT driver signal LED
115Vac +/-15% or 230Vac +/-15%	LD3	ON Green when Buck is working	Buck IGBT driver signal LED
115Vac +/-15% or 230Vac +/-15%	LD4	ON Green when Inverter is ON	Inverter IGBT driver signal LED
115Vac +/-15% or 230Vac +/-15%	LD5	ON Green when Inverter is ON	Inverter IGBT driver signal LED
115Vac +/-15% or 230Vac +/-15%	LD6	ON Green when Inverter is ON	Inverter IGBT driver signal LED

OUTPUT CONTROL BOARD 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 output board is receiving the correct input signals and if the correct signals are being processed and applied to the Output Power board.

MATERIALS NEEDED

Volt/Ohmmeter
Machine wiring diagram

OUTPUT CONTROL BOARD TEST (continued)

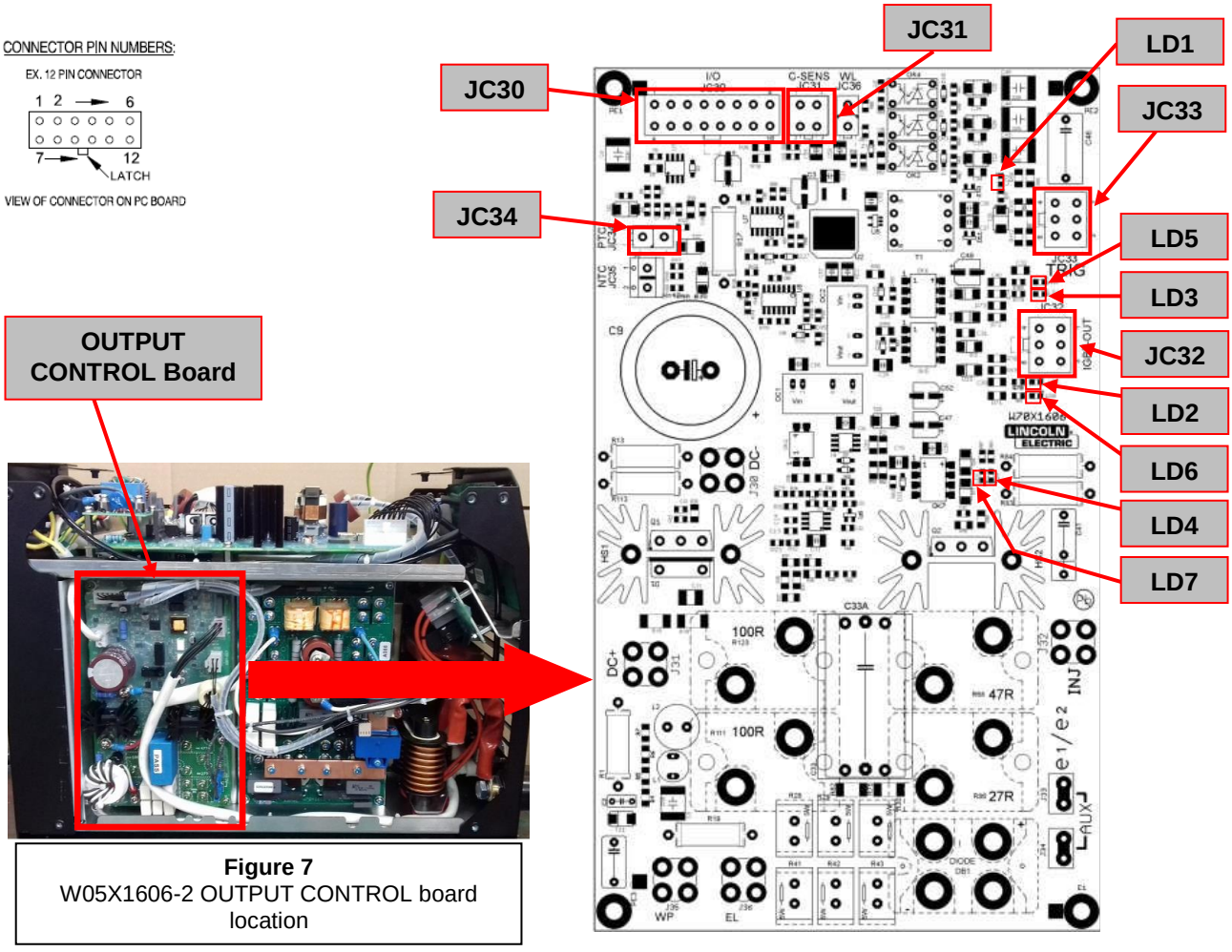


Figure 7
W05X1606-2 OUTPUT CONTROL board location

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Output Control board on the left side of the machine. See **Figure 7**.
4. Visually check for burned or damaged components. If any components are physically damaged the Output Control board should be replaced
5. Perform the Output Control board circuits resistance tests detailed in **Test Table 7**. See **Figure 7** for Test Point locations

Test table 7 – OUTPUT CONTROL BOARD - Resistance Tests

Machine AC input voltage	*Test Points*	*Expected reading*	*LEDs status and color*	*Note*
Machine disconnected from input voltage and capacitors discharged	Plug **JC34** pin 1 to pin 2 (ohm mode)	65 - 70 Ohms +/-10%	-	PTC sensor

OUTPUT BOARD TEST (continued)

6. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
7. Switch to ON position the main switch and using the voltmeter perform the tests as indicated in **Test Table 8**. See **Figure 7** for correct test points location.

Test table 8 – OUTPUT CONTROL BOARD - Tests

Machine AC input voltage and mode	*Test Points*	*Expected reading*	*Note*
115Vac +/-15% or 230Vac +/-15%, any mode	LD1	ON green	Auxiliary power supply present
115Vac +/-15% or 230Vac +/-15%, in stick mode	LD2	ON red	When present signal to positive OUTPUT IGBT gate
115Vac +/-15% or 230Vac +/-15%, in TIG DC mode	LD3	ON red	When present signal to negative OUTPUT IGBT gate
115Vac +/-15% or 230Vac +/-15%, in any mode	LD4	ON green	+15Vdc present on positive OUTPUT IGBT circuit
115Vac +/-15% or 230Vac +/-15%, any mode	LD5	ON green	+15Vdc present on negative OUTPUT IGBT circuit
115Vac +/-15% or 230Vac +/-15%,	LD6	ON green	+15Vdc present on positive OUTPUT IGBT circuit
115Vac +/-15% or 230Vac +/-15%, any mode	Plug **JC30** pin 13 (+) to pin 5&15 (-)	+15Vdc	+15 Vdc Auxiliary power supply present
115Vac +/-15% or 230Vac +/-15%, any mode	Plug **JC30** pin 3 (+) to pin 5&15 (-)	-15Vdc	-15 Vdc Auxiliary power supply present
115Vac +/-15% or 230Vac +/-15%, any mode	Plug **JC31** pin 1 (+) to pin 4 (-)	+15Vdc	+15 Vdc Auxiliary power supply for current probe present
115Vac +/-15% or 230Vac +/-15%, any mode	Plug **JC31** pin 2 (+) to pin 4 (-)	-15Vdc	-15 Vdc Auxiliary power supply for current probe present
115Vac +/-15% or 230Vac +/-15%, any mode	Plug **JC31** pin 3 (+) to pin 4 (-)	Output current feedback signal	200A=4Vdc
115Vac +/-15% or 230Vac +/-15%,	Plug **JC32** pin 1 (+) to pin 4 (-)	+15Vdc	Signal to negative Output IGBT (when negative ouput start is selected)
115Vac +/-15% or 230Vac +/-15%,	Plug **JC32** pin 3 (+) to pin 6 (-)	+15Vdc	Signal to positive Output IGBT (standard condition)

OUTPUT POWER BOARD 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 determine if the “power section” of the output power board are functioning correctly. This test will NOT indicate if the entire PC board is functional but will give you the first feedback regarding the status of the output power components.

MATERIALS NEEDED

Volt/Ohmmeter
Machine wiring diagram

OUTPUT POWER BOARD TEST (continued)

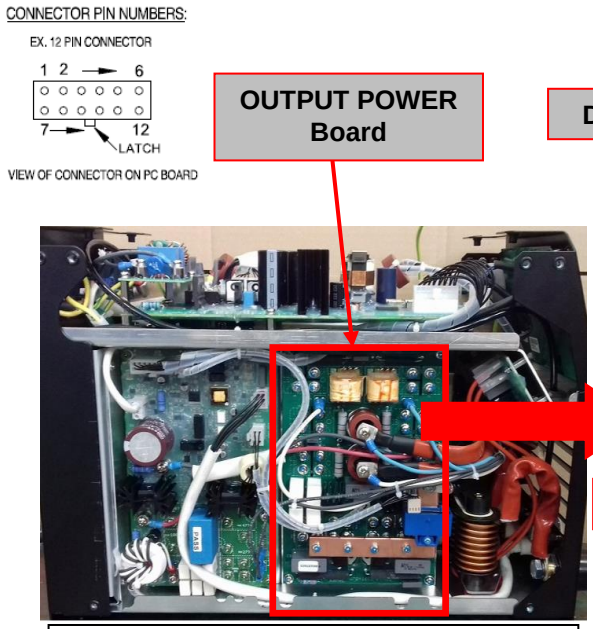
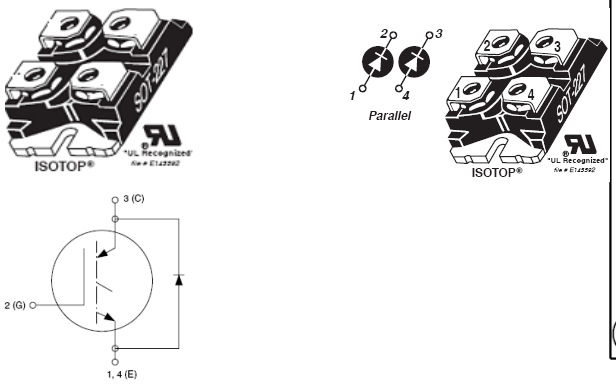


Figure 8 – OUTPUT POWER board location



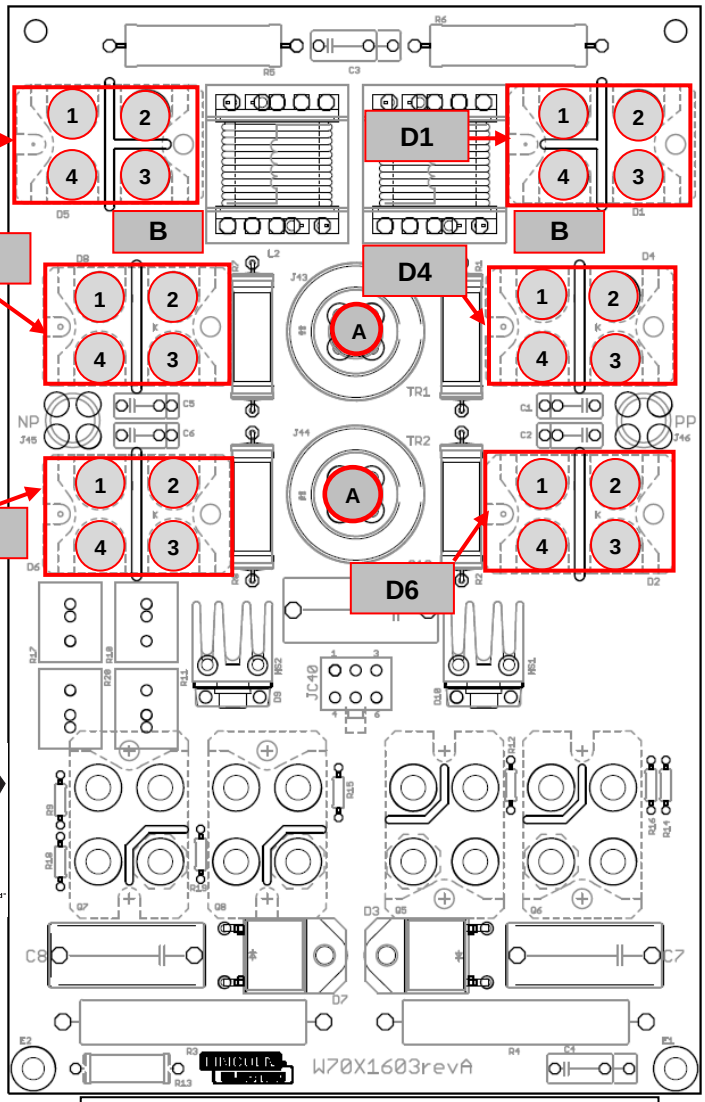


Figure 9 – OUTPUT POWER Diodes location

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Output Power board on the left side of the machine. See **Figure 8.**
4. Visually check for burned or damaged components. If any components are physically damaged the Output Power board and diodes/ IGBTs modules should be replaced.
5. Disconnect the two transformer cables and the two auxiliary winding cables (**A**) and the two auxiliary windings cables (**B**). Mark their position before removing them.
6. Follow the **Test table 9** to perform the Diode modules tests. See **Figure 9** for Test Point locations. NOTE: If a short circuit is detected during this test, to determinate which is the diode module defected is necessary to remove the Outoput Diode board and check one by one the diode modules alone. See Output Diode board disassembly procedure available inside this manual.

Test table 9 - Output Diode modules test

Positive Probe (RED)	Negative Probe (BLACK)	Value
4 (anode)	**3** (cathode)	0.3V - 0.7V Forward Diode Drop
3 (cathode)	**4** (anode)	Charge
1 (anode)	**2** (cathode)	0.3V - 0.7V Forward Diode Drop
2 (cathode)	**1** (anode)	Charge

TEST PROCEDURE

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

7. Check each IGBT module (**Q5,Q6,Q7,Q8**), with multimeter in diode test mode, following the **test table 10**, below. See **Figure 10** for Test Point locations.

Table 10 – Output IGBT modules - table tests

Positive Probe (RED)	*Negative Probe (BLACK)*	*Value*
Emitter (E)	Collector (C)	*0.3V - 0.7V*
Collector (C)	Emitter (E)	Capacitor charge
Emitter (E)	Gate (G)	*0.3V - 0.7V*

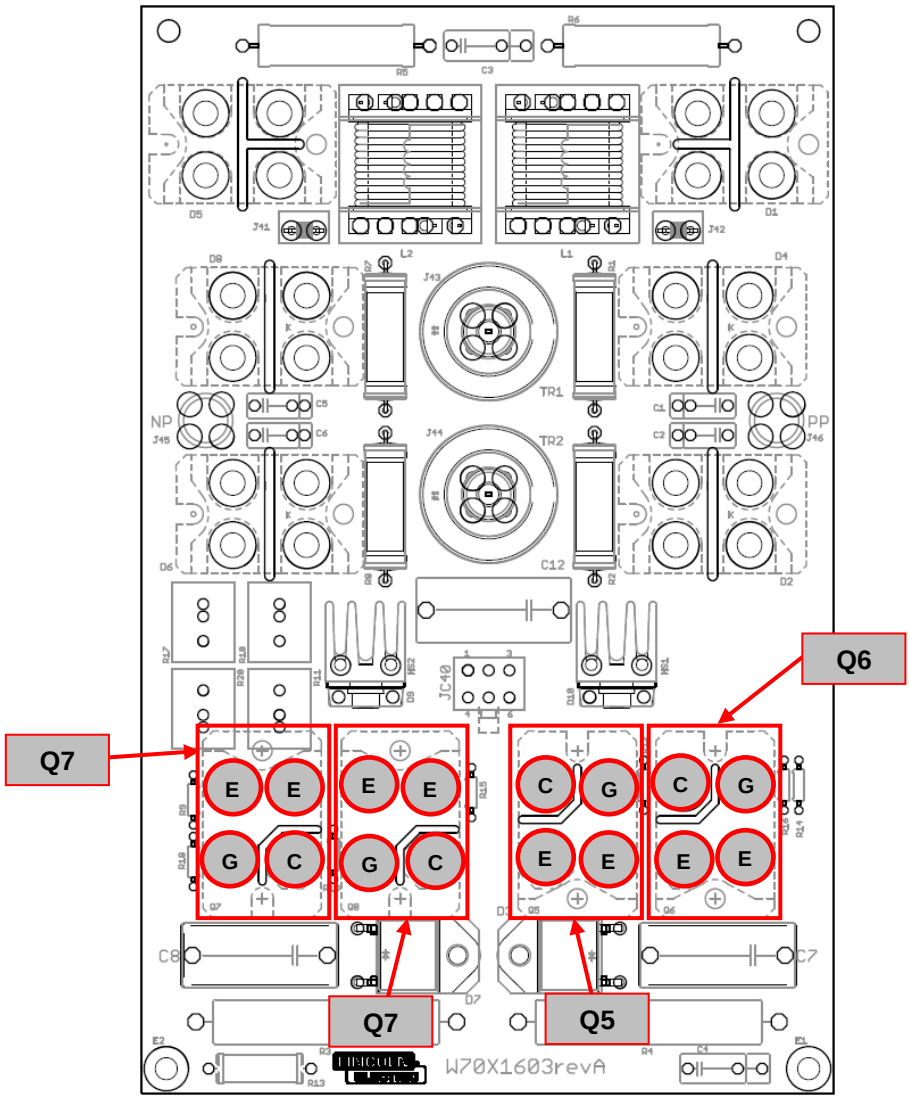


Figure 10 – OUTPUT POWER IGBTs location

HF BOARD 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 HF (High Frequency) board (W05X1615-2) is faulty.

MATERIALS NEEDED

Volt/Ohmmeter
Oscilloscope
Maschine schematic

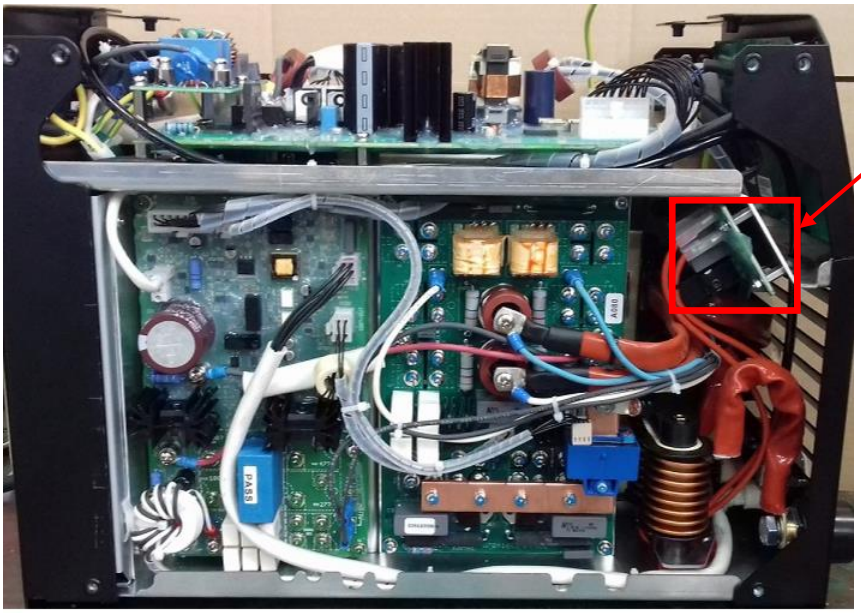


Figure 11 – W05X1615-2 HF board location

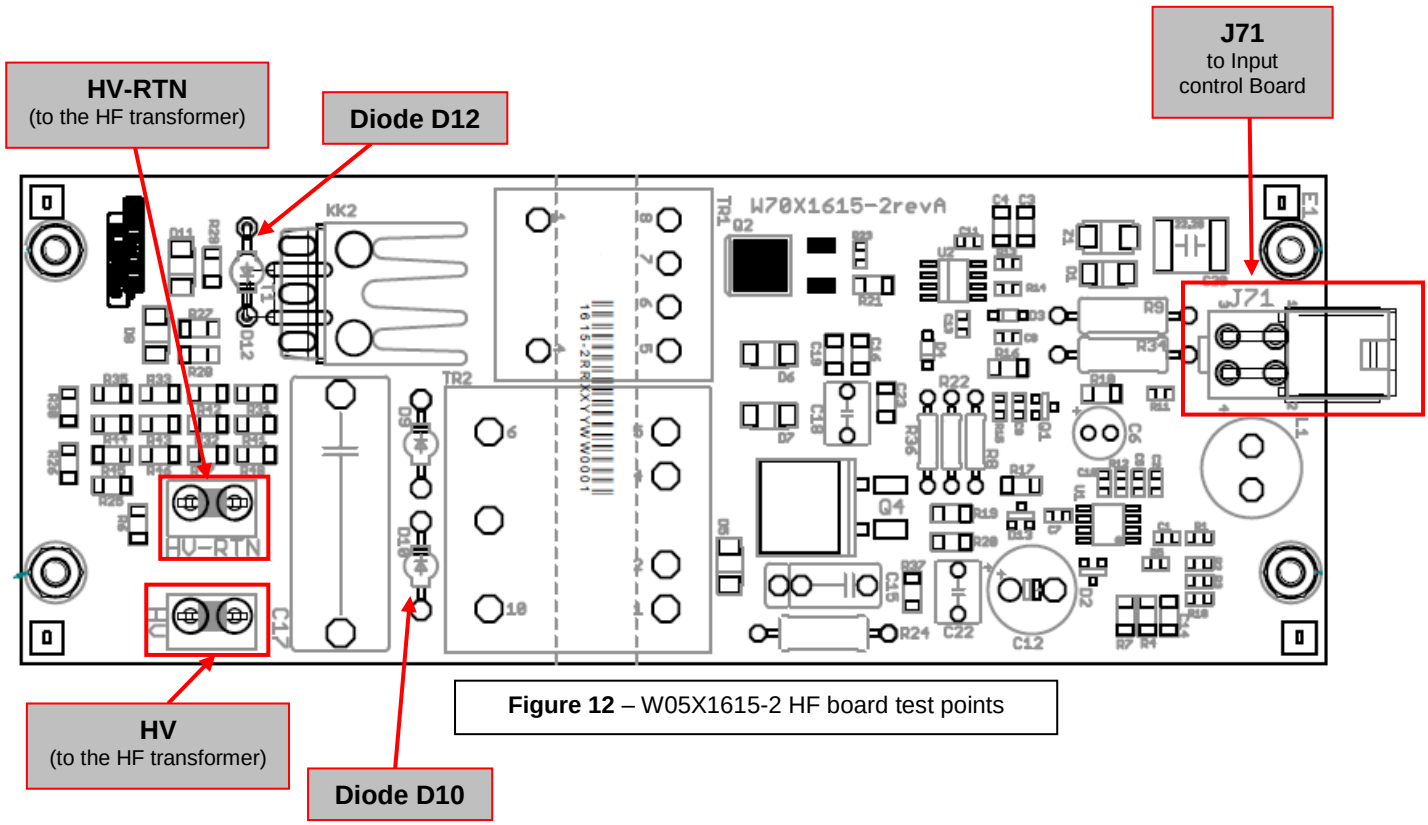
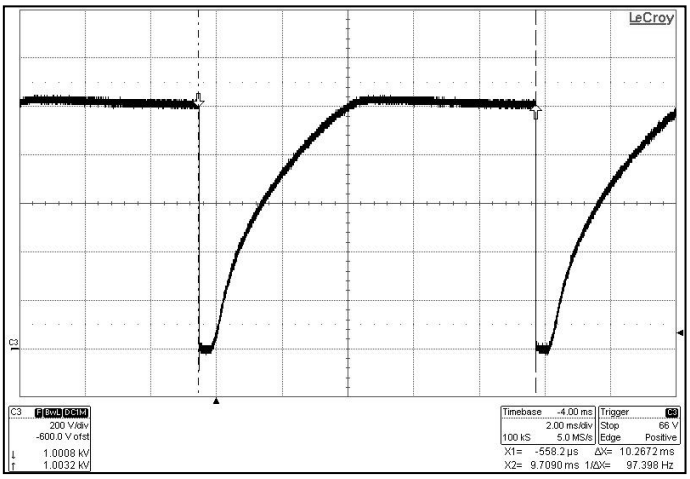


Figure 12 – W05X1615-2 HF board test points

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the HF Board. See **Figure 11**.
4. Visually check for burned or damaged components. If any components are physically damaged the HF board should be replaced
5. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
6. Switch to ON position the main switch
7. Set the machine to TIG DC or AC HF welding mode and connect the TIG torch to the machine.
8. Check between **J71** pin 2 & pin 4 for 24Vdc always present. See **Figure 12** for Test Point locations.
9. Check between **HV-RTN** and **cathode of diode D10** for 1000V +/- 40V
10. Press the trigger and check between **J71** pin 3 & pin 4 for 15Vdc (only for 3 seconds)
11. When 15Vdc are present between **J71** pin 3 & pin 4 check waveform, as indicated on the figure below, between cathode and anode of **D12**. NOTE: HV and HV-RTN have to be connected to the HF transformer during this test.



DISPLAY BOARD 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

The DISPLAY board is not easy to be checked, as it works mainly with software; this section will provide information how to Calibrate it , as best as possible, to determine if the control board is faulty and how to interpret error codes.

MATERIALS NEEDED

Volt/Ohmmeter
Machine wiring diagram

Calibration must be done if the display board is replaced! See dedicated section.

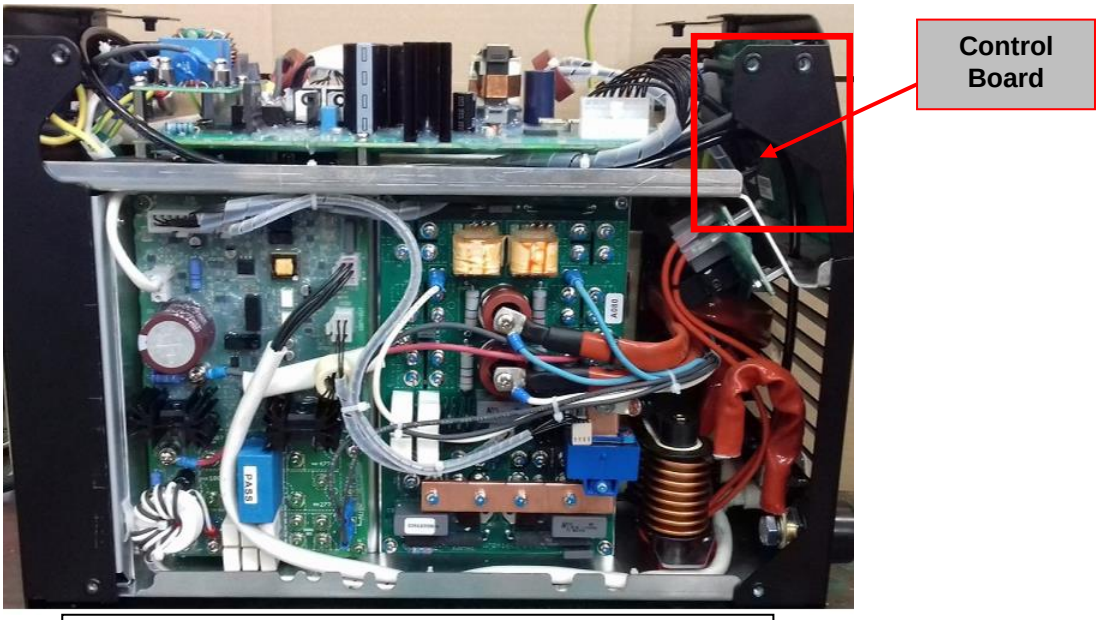


Figure 13 – W05X1607-2 Display board location

GAS SOLENOID 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 aid the technician to determine if the Gas solenoid is receiving the correct input voltage and if the solenoid is good

MATERIALS NEEDED

Volt/Ohmmeter
Machine wiring diagram

GAS SOLENOID TEST (continued)

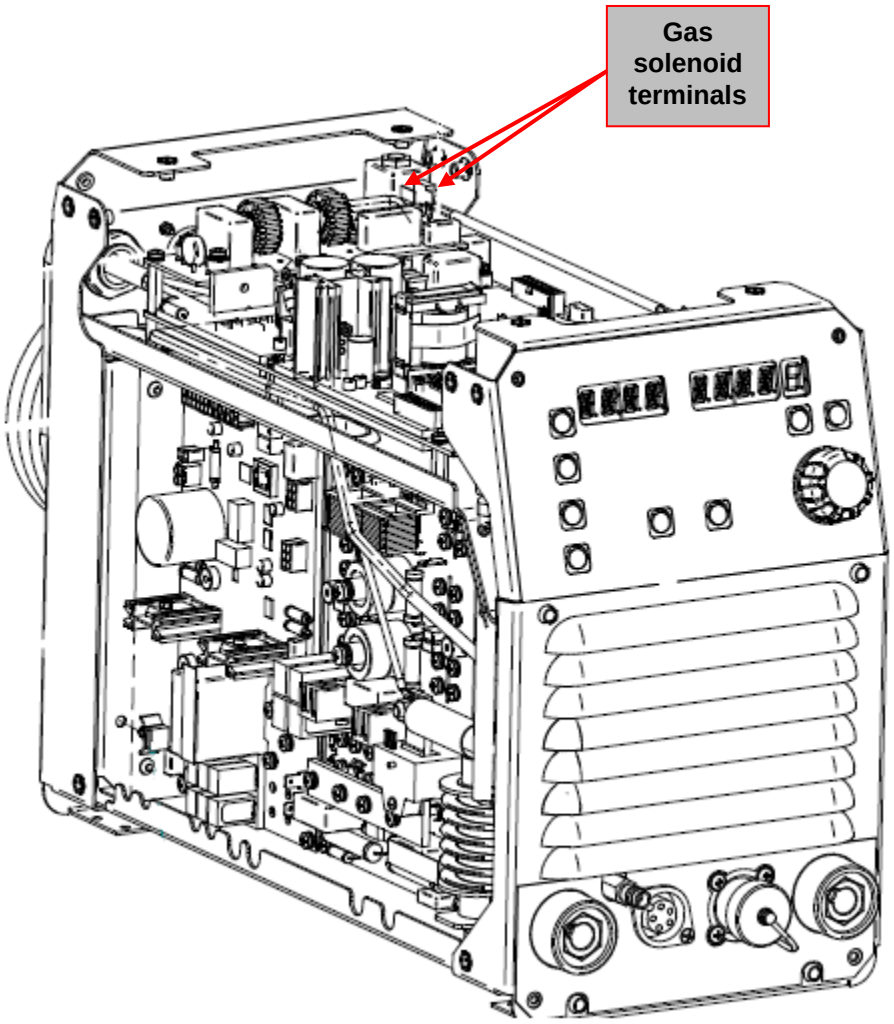


Figure 14 – Gas Solenoid location

TEST PROCEDURE

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

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the **Gas Solenoid**. See **Figure 14**.
4. Carefully apply the correct input voltage 115Vac/1ph +/-15% or 230Vac/1ph +/-15% via the input cable to the ASPECT®200.
5. Switch to ON position the main switch
6. Set the machine to TIG DC or AC HF welding mode and connect the TIG torch to the machine.
7. Push the trigger and with voltmeter check for +24Vdc between Gas solenoid terminals.
8. If voltage supply is not present the Input Power board is not sending the correct activation voltage. May be a problem can be present on the board
9. If the voltage supply is present at the Gas solenoid terminals, check the solenoid resistance.
10. Remove the two leads from the Gas solenoid and check the Gas solenoid coil resistance. Normal coil resistance is 55 Ohms +/-10%
11. If the coil resistance is very high or very low the Gas solenoid may be faulty, replace.

DISASSEMBLY OPERATIONS

EMI FILTER BOARD REMOVAL AND REPLACEMENT PROCEDURE

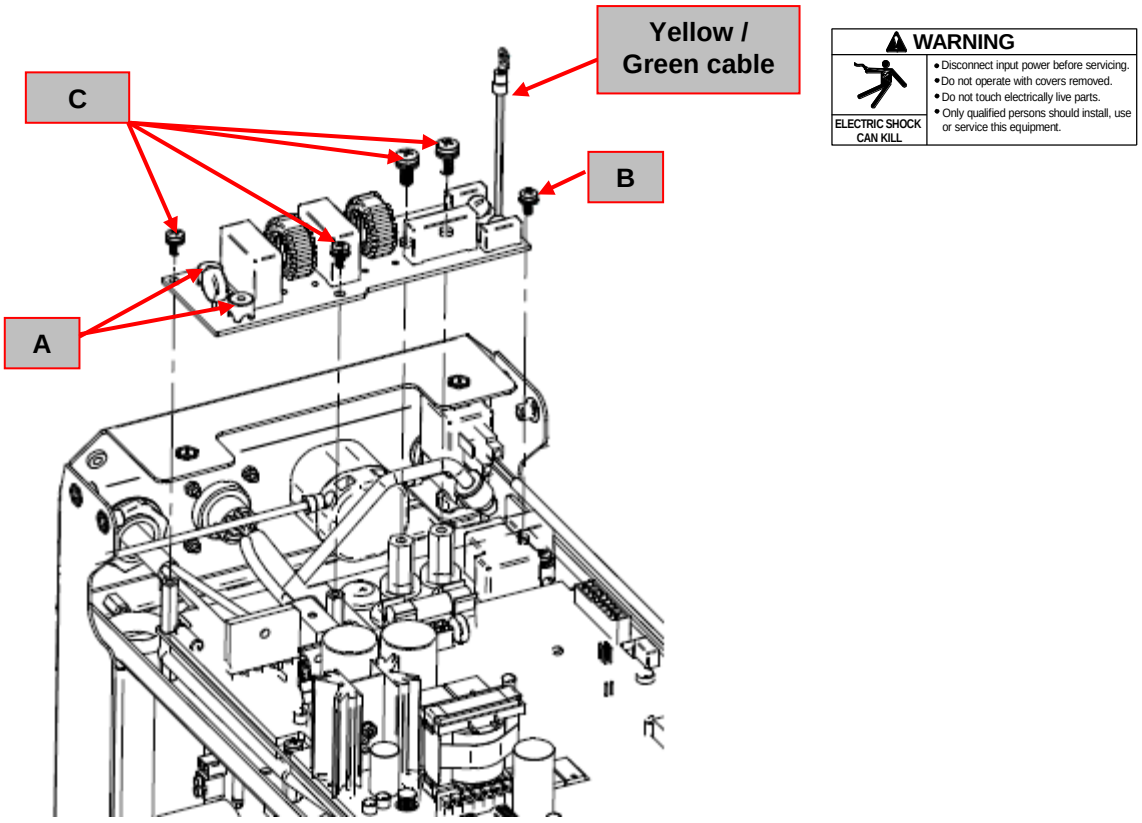


Figure 15

REMOVAL PROCEDURE

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

Necessary tool:

- A screwdriver type PH02

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the EMI board W05X1665. See **Figure 15**
4. Using a screwdriver type PH02 remove the 2 screws (**A**) that hold the input cables from the ON/OFF switch to the J1 and J2 connections.See **Figure 15**
5. Using a screwdriver type PH02 remove the screw (**B**) that fix the Yellow/Green cable to the Input Power board earth point. See **Figure 15**.
6. Using a screwdriver type PH02 remove the 4 screws (**C**) that fix the EMI board to the Input Power board. See **Figure 15**
7. Remove the EMI board from the machine.
8. **For the new Input Board re-assembly operations,** make the previous steps in the reverse order.

DISASSEMBLY OPERATIONS

INPUT POWER BOARD REMOVAL AND REPLACEMENT PROCEDURE

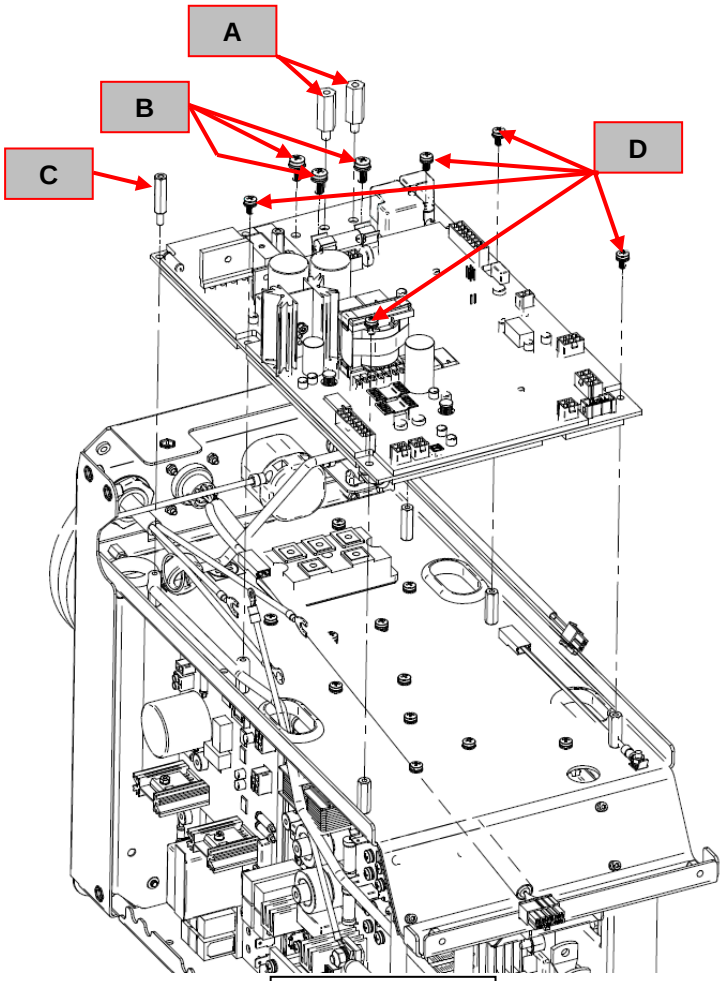


Figure 16

WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

REMOVAL PROCEDURE

Necessary tools:

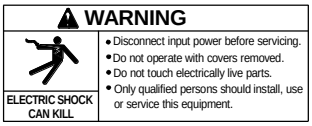
- Screwdriver type PH02
- Wrench 9mm
- Wrench 6mm
- Silicon sealer

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Input Power board W05X1604-2. See **Figure 16**
4. Unplug all the harness connectors that are connected to the Input Power board.
5. Using the 9mm wrench remove the two stand off (**A**)
6. Using a screwdriver type PH02 remove the 3 screws (**B**) that are connecting the input rectifier bridge to the Input Power board. See **Figure 16**
7. Using the 6mm wrench remove the stand off (**C**) used to fix the EMI board. See **Figure 16**
8. Using a screwdriver type PH02 remove the screws (**D**) that fix the Input Power board. See **Figure 16**
9. Remove the input Power board from tha machine.
10. **For the new Input Board re-assembly operations,** make the previous steps in the reverse order, taking care to put back silicon to assure better insulation between the input rectifiers screws/connections.

DISASSEMBLY OPERATIONS

INPUT RECTIFIER BRIDGE REMOVAL AND REPLACEMENT PROCEDURE



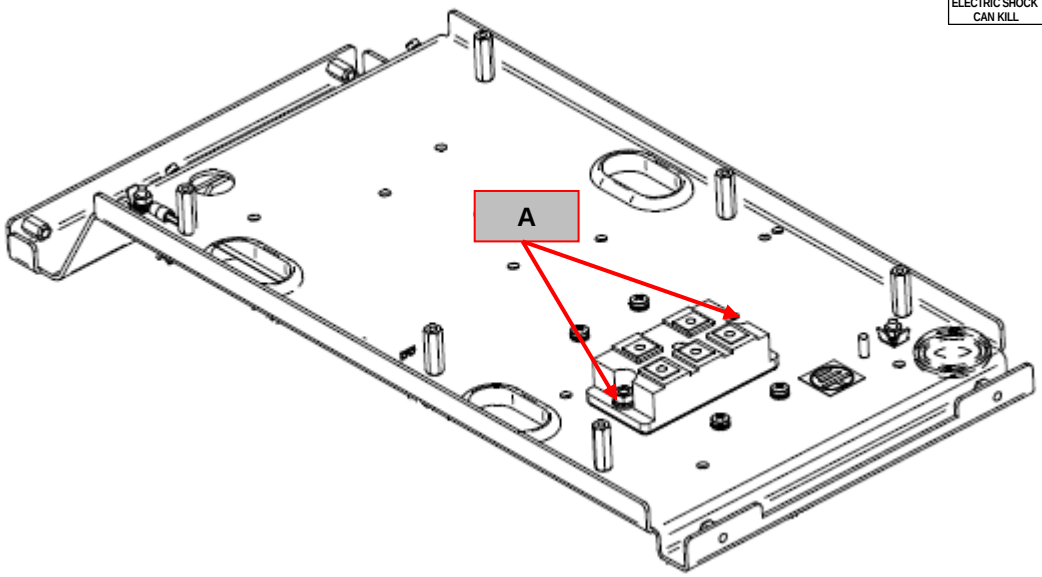


Figure 17

REMOVAL PROCEDURE

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

Necessary tools:

- 9mm socket wrench
- KERATHERM KP92 Heat Sink Compound
- Torque wrench

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Input Rectifier Bridge. See **Figure 17.**
4. Unscrew the two nuts (**A**), remove the washers and remove the Input Rectifier Bridge.

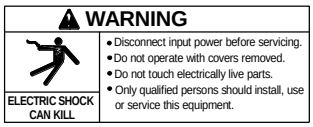
REASSEMBLY PROCEDURE

1. Clean the heat sink mounting surface removing carefully the old thermal compound.
2. Apply a thin layer of new thermal compound to the mating surfaces (KERATHERM KP92)
3. Assemble the new Input Rectifier bridge to the heat sink using the washers and nuts previously removed (torque 1,5 Nm max.)

DO NOT USE CORDLESS SCREWDRIVERS FOR THE POWER MODULEs!

DISASSEMBLY OPERATIONS

BUCK/BOOST and INVERTER BOARD REMOVAL AND REPLACEMENT PROCEDURE



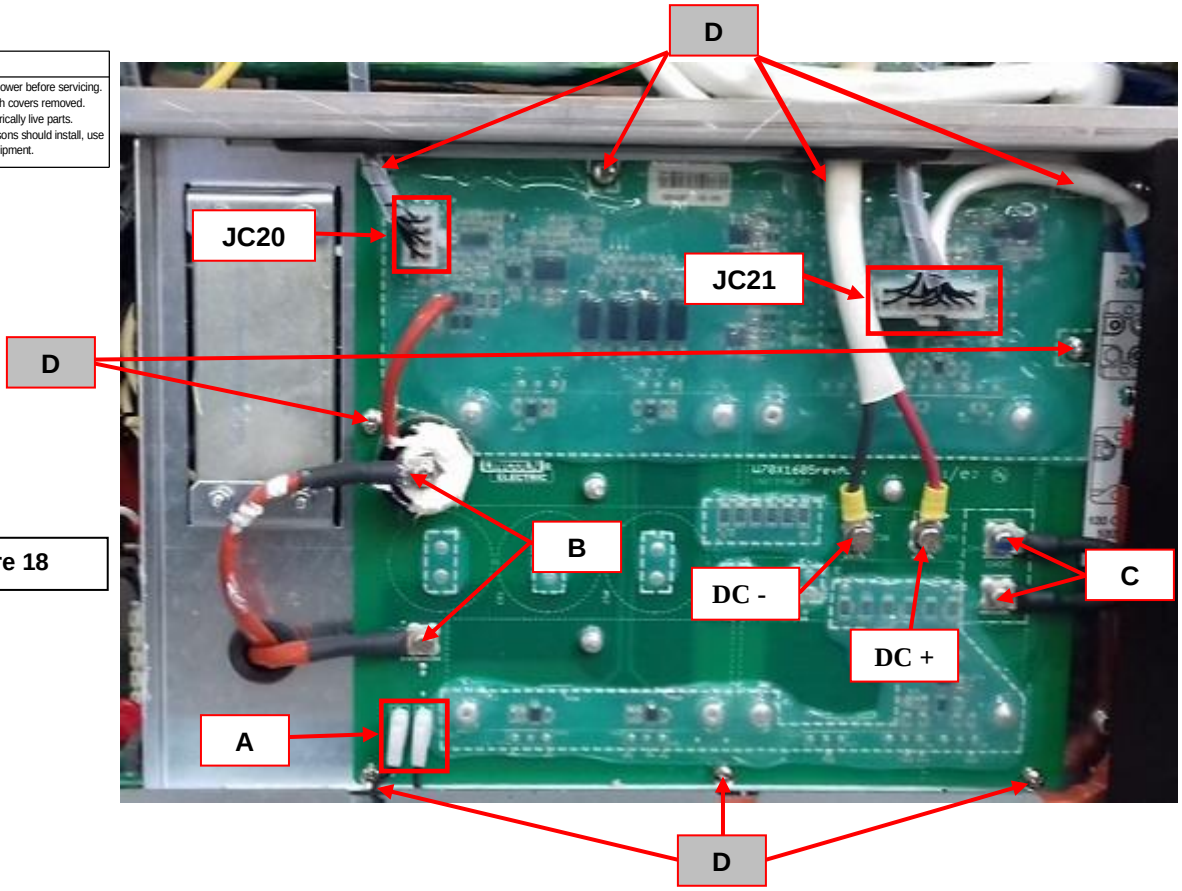


Figure 18

REMOVAL PROCEDURE

Necessary tools:

- Screwdriver type PH02
- Wrench 7mm
- Wrenck 8 mm

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Buck/Boost and Inverter Board. See **Figure 18**.
4. Unplug the two cables (**A**)
5. Unpug connectors **JC20** and **JC21.**
6. Using the wrench and the PH02 screwdriver remove the two screws (**B**) and remove the cables marking their position before removal.
7. Using the wrench remove the two screws (**C**) and remove the cables marking their position before removal.
8. Using the wrench remove the two screws that are fixing the negative and positive cable **DC-** and **DC+**.
9. Using the PH02 screwdriver remove the 9 screws (**D**).
10. Remove carefully the Buck/Boost and Inverter board from the machine.
11. **For the new Buck/Boost and Inverter board re-assembly operations,** make the previous steps in the reverse order.

DO NOT USE CORDLESS SCREWDRIVERS FOR THE POWER MODULEs!

DISASSEMBLY OPERATIONS

OUTPUT CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

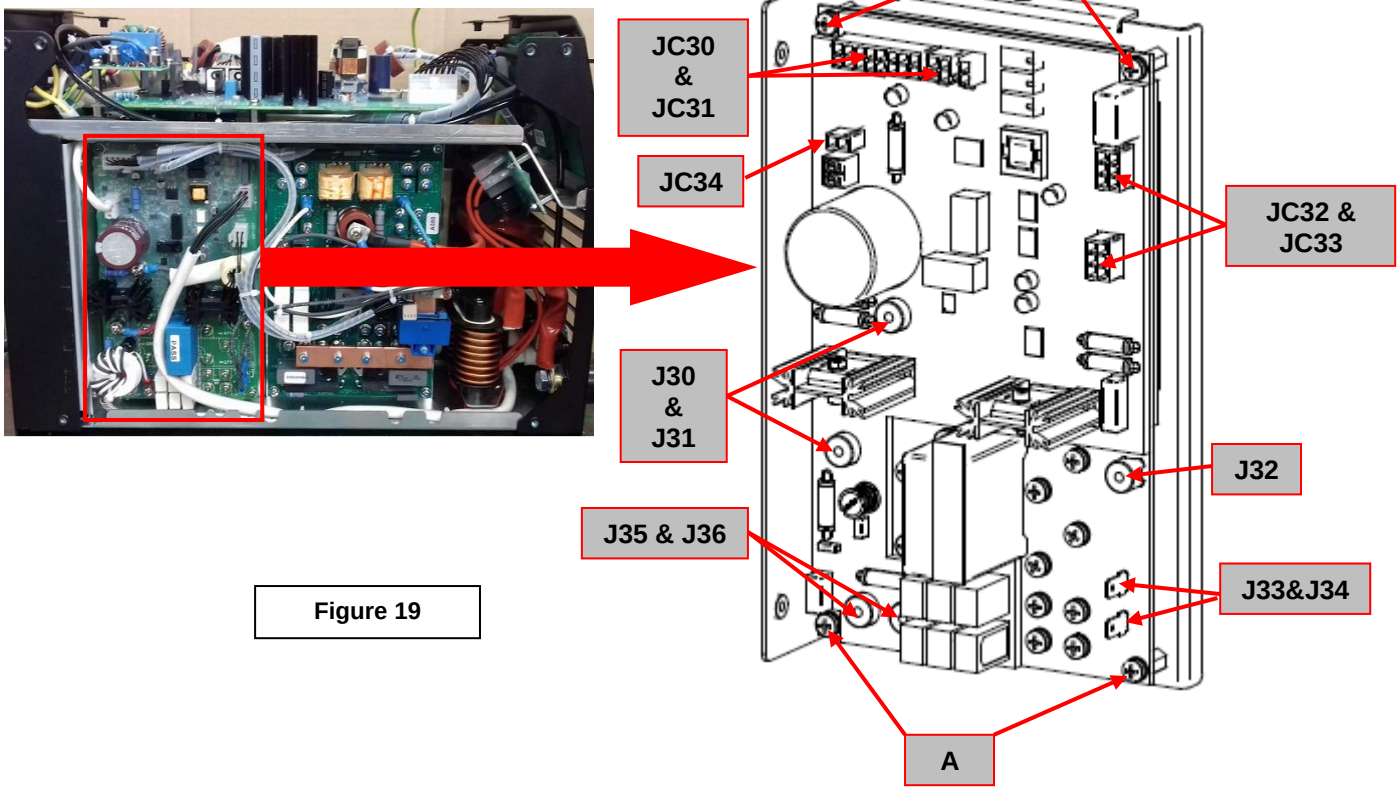


Figure 19

REMOVAL PROCEDURE

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

Necessary tools:

- Screwdriver type PH02
- Torque wrench

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Output Control board. See **Figure 19**.
4. Unplug the two cables (**A**)
5. Unplug the connectors **JC30, JC31, Jc32, JC33** and **JC34.**
6. Using the screwdriver type PH02 remove the cables from terminals **J30, J31, J32, J35** and **J36.** marking their position before removal. See **Figure 19**
7. Remove the two cables from **J33** and **J34**. See **Figure 19**
8. Using the screwdriver type PH02 remove the 4 screws (**A**). **See Figure 19**

DISASSEMBLY OPERATIONS

OUTPUT CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE (continue)

WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

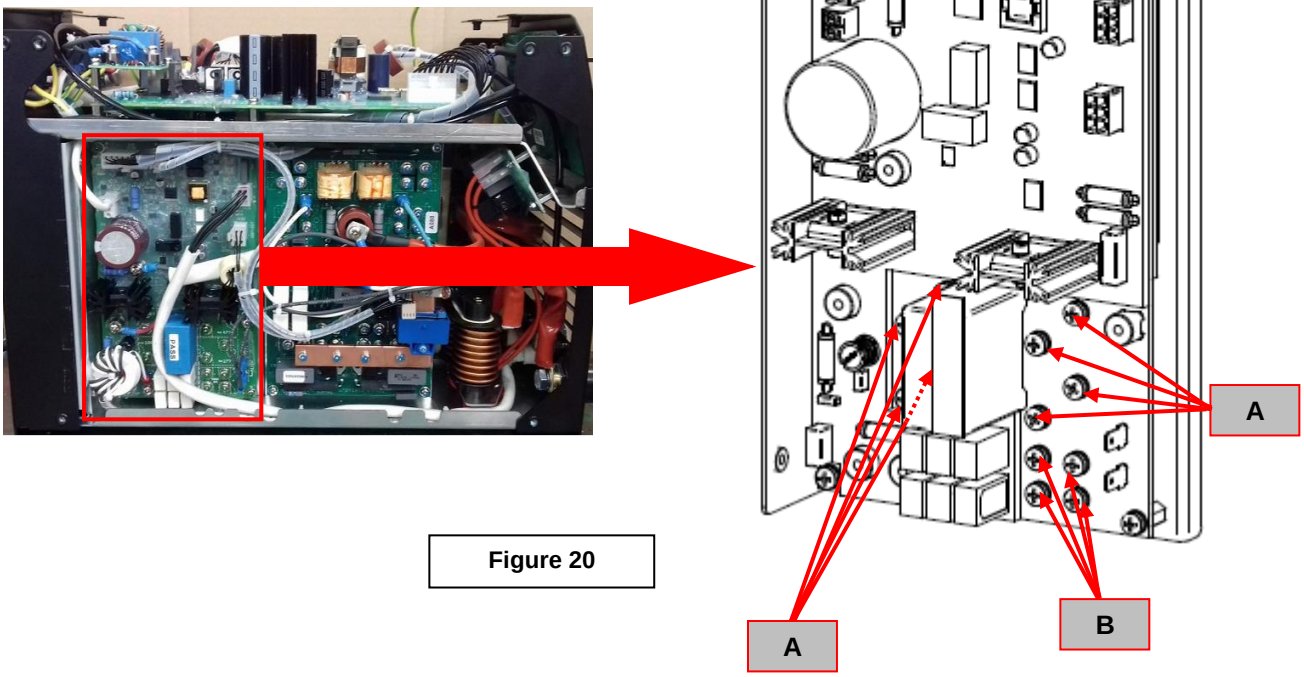


Figure 20

REMOVAL PROCEDURE

Necessary tools:

- Screwdriver type PH02
- Torque wrench
- KERATHERM KP92

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Output Control board. See **Figure 20**.
4. Using the screwdriver type PH02 remove the 8 screws (**A**) that are fixing the Resistors modules to the Output Control board. **See Figure 20**
5. Using the screwdriver type PH02 remove the 4 screws (**B**) that are fixing the Rectifier module to the Output Control board. **See Figure 20**
6. **For the new Output Control board re-assembly operations,** make the previous steps in the reverse order, taking care to tightening the resistor modules screws (**A**) with torque 1,2Nm max. and the Rectifier module (**B**) with torque 1,3Nm.
7. If any of the Resistor modules or the Rectifier bridge module need to be replaced, before the re-installation of the new modules, clean carefully the heatsing surface and apply a thin layer (0,1mm) of KERATERM KP92.

DISASSEMBLY OPERATIONS

OUTPUT POWER BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

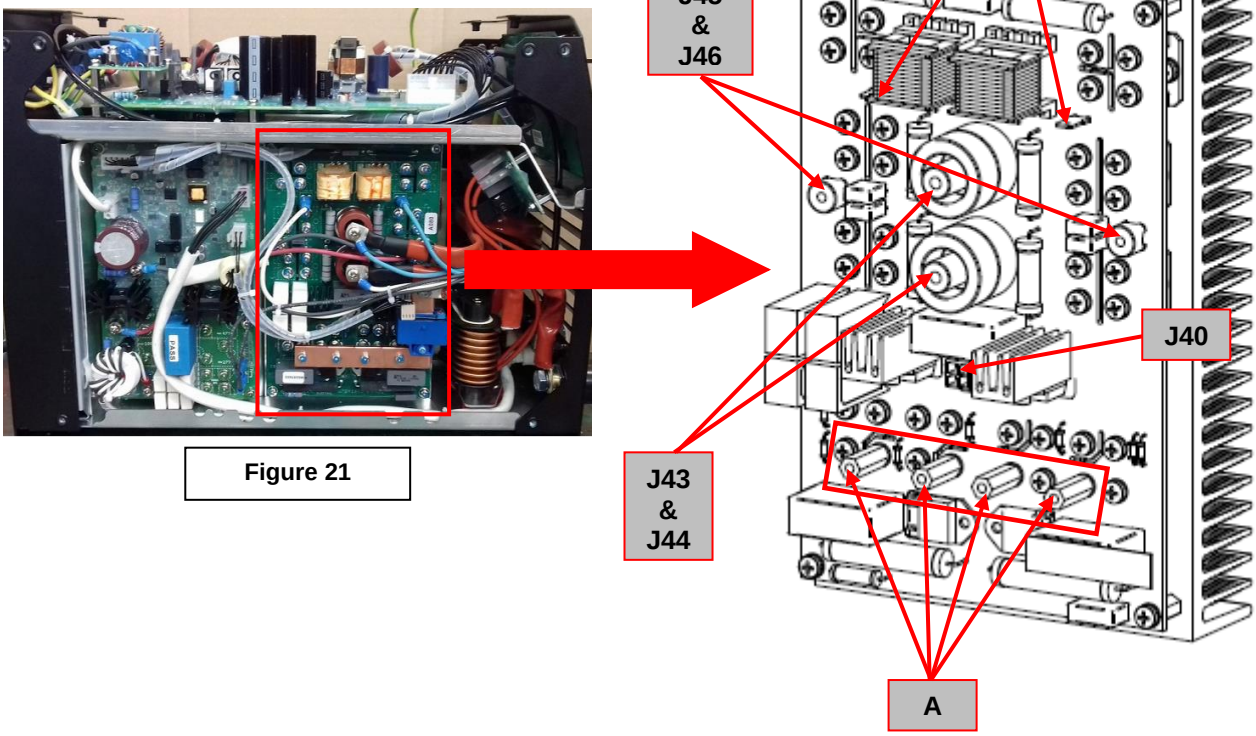


Figure 21

REMOVAL PROCEDURE

Necessary tools:

- Screwdriver type PH02
- Torque wrench
- Wrench 6mm
- KERATHERM KP92

!! During performing the following steps take note of the size and type of screws being removed and associated washers. Upon reassembly the same type and size screw and washers MUST be used.

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Output Control board. See **Figure 21**.
4. Remove the two cables from **J41** & **J42**. See **Figure 21**.
5. Using the screwdriver type PH02 remove the cables from **J43** & **J44**. See **Figure 21**.
6. Using the screwdriver type PH02 remove the cables from **J45** & **J46**. See **Figure 21**.
7. Using the screwdriver type PH02 remove the 4 screws (**A**) that are fixing the copper bar on the 4 stands-off. See **Figure 21**.
8. Remove the copper bar.

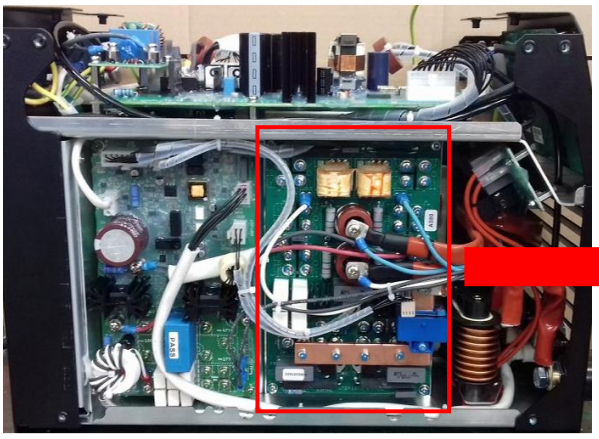
DISASSEMBLY OPERATIONS

OUTPUT POWER BOARD REMOVAL AND REPLACEMENT PROCEDURE (continue)

⚠ WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.



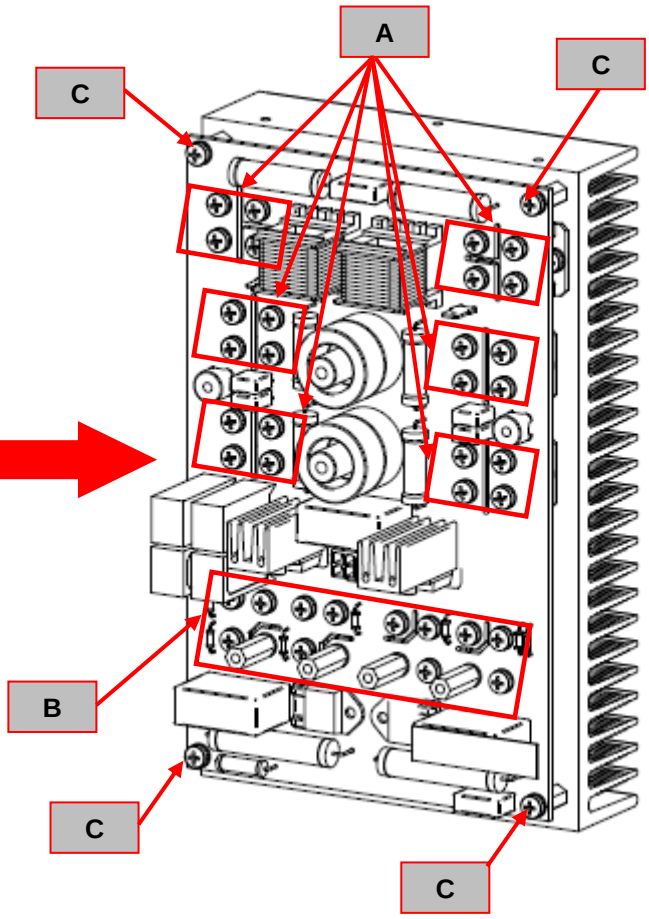


Figure 22

9. Using the screwdriver type PH02 remove the 24 screws (**A**) that are fixing the Diodes modules to the Output Power board. See **Figure 21**.
10. Using the screwdriver type PH02 and the 6mm wrench remove the 12 screws and 4 stands off (**B**) that are fixing the IGBT modules to the Output Power Board. See **Figure 22**.
11. Using the screwdriver type PH02 remove the 4 screws (**C**) that are fixing the Output Power board to the heatsink. See **Figure 22**.
12. Carefully remove the Output Power board.
13. **For the new Output Power board re-assembly operations,** make the previous steps in the reverse order, taking care to tightening the Diodes and IGBTs modules screws (**A**) & (**B**) with torque 1,1Nm max.
14. If any of the Diodes modules or IGBTs module need to be replaced, before the re-installation of the new modules, clean carefully the heatsing surface and apply a thin layer (0,1mm) of KERATERM KP92 and tight with 1,3Nm torque.

PAY ATTENTION ! of how to position the open end mounting of modules to heat-sink.

See printed circuit board for reference

DO NOT USE CORDLESS SCREWDRIVERS FOR THE POWER MODULEs!

DISASSEMBLY OPERATIONS

DISPLAY BOARD REMOVAL AND REPLACEMENT PROCEDURE

WARNING

ELECTRIC SHOCK CAN KILL

- Disconnect input power before servicing.
- Do not operate with covers removed.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this equipment.

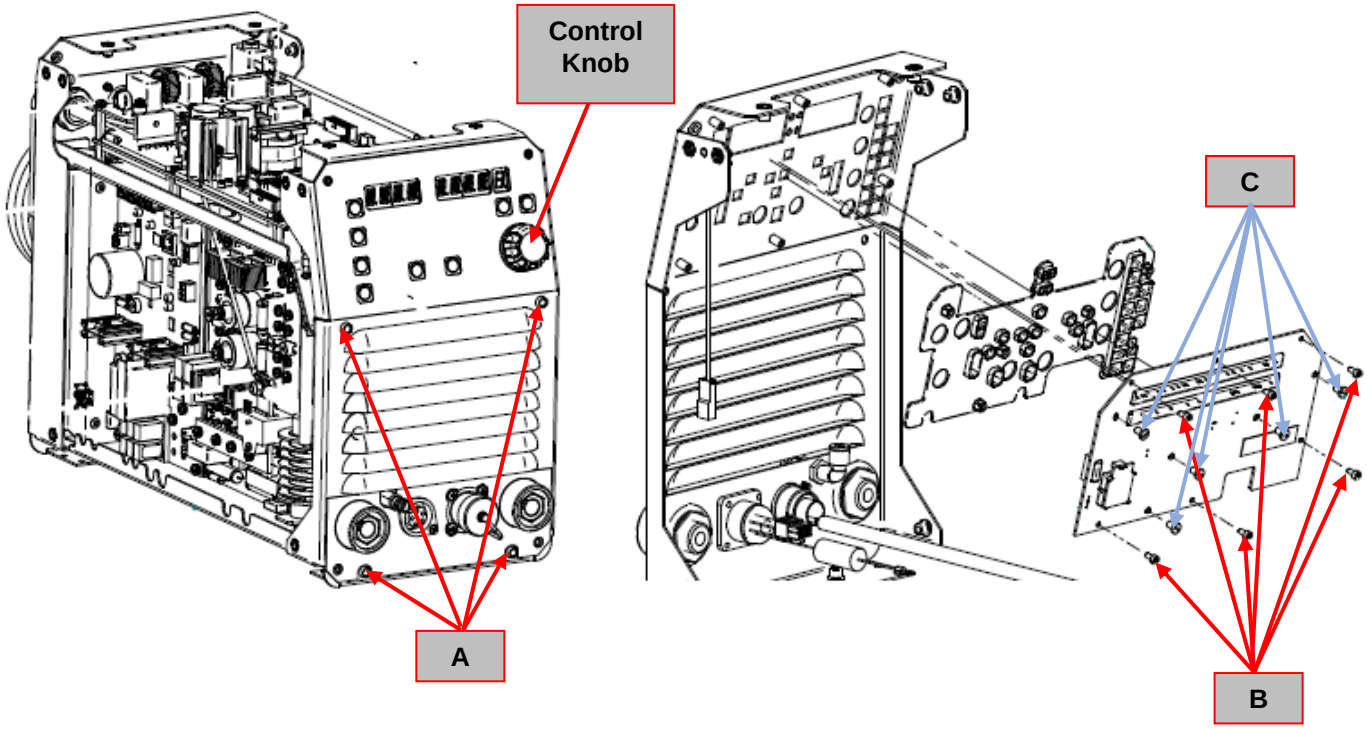


Figure 23

REMOVAL PROCEDURE

Necessary tools:

- Phillips screwdriver PH02
- 8 mm nut driver
- Flat and short screwdriver
- Allen wrench 2 mm

1. Remove main input power to the ASPECT®200.
2. Perform the **Case removal** and **Discharge procedure**
3. Locate the Display board. See **Figure 23.**
4. Remove, using the 8 mm nut driver the 4 screws (**A**) that are fixing the front panel to the machine frame. See **Figure 23**.
5. Remove the grey flat cable from the UI connector on the input power board.
6. Using the 2 mm allen wrench remove the control knob. See **Figure 23**.
7. Pull as much as you can the front panel and remove the 6 screws that are fixing the Display board to the front panel, see **Figure 23**.
8. Carefully remove the Display board from the machine.
9. Remove the 5 screws (C) that are fixing the light guide to the Display board. See **Figure 23**.
10. **For the new Display board re-assembly operations,** make the previous steps in the reverse order.

DISASSEMBLY OPERATIONS

HF BOARD REMOVAL AND REPLACEMENT PROCEDURE

Figure 24

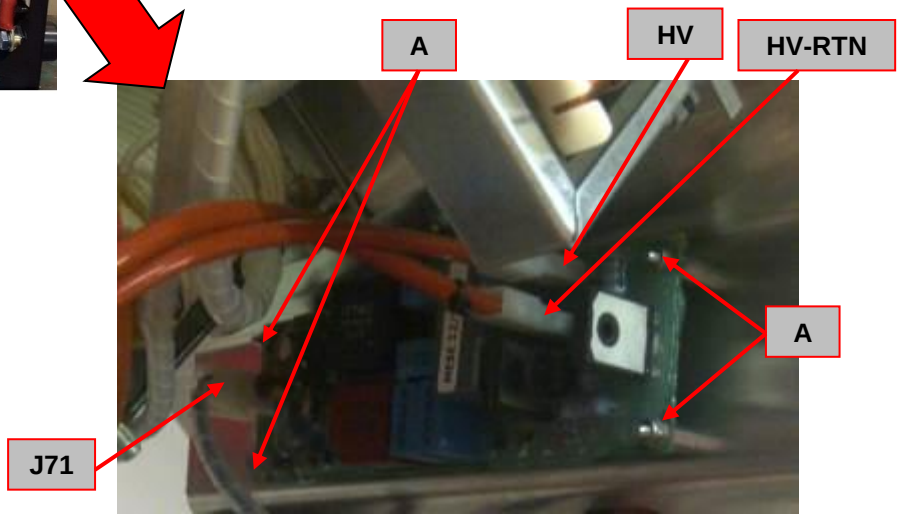


Figure 25

REMOVAL PROCEDURE

Necessary tools:

- Wrench 5,5 mm

1. Remove main input power to the ASPECT®200
2. Perform the **Case Removal** and **Discharge procedure**
3. Locate the HF board W05X1615-2, see **Figure 24**
4. Disconnect the two HF transformer terminals **HV** and **HV-RTN**. Take note about the lead marked with a black tie , it must be re-connected to the same terminal. See **Figure 25**
5. Remove connector J71 from HF board. See **Figure 25**
6. Using the 5,5 mm wrench remove the 4 nuts (**A**) that fix the HF board to the machine frame. See **Figure 25**
7. Remove the HF board from the machine.
8. **For the HF board re-assembly operations**, make the previous steps in the reverse order. **Note:** the new HF board will come with the standoffs already mounted, remove them before reinstall the new board inside the machine (standoffs are already present on the machine frame, from the removal procedure sequence). This operation is suggested to avoid complete removal of machine front panel.

RETEST AFTER REPAIR

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

ASPECT®200

Input Voltage	Input Current	Rated Output
115Vac-1ph-50/60Hz	30A	Stick mode 100A/24V@20%
230Vac-1ph-50/60Hz	27,2A	Stick Mode 160A/26,4V@30%

Output Current/Voltage range	
STICK DC & AC	5A/20,2V - 160A/26,4V
TIG DC & AC	2A/10V – 200A/18V

Open Circuit Voltage	
STICK DC & AC	75 V
TIG HF DC & AC*	109V**

* Disconnect JP1 from HF board before measure this voltage with multimeter

** Available only for 3 seconds after trigger pressed

CALIBRATION PROCEDURE

Calibration must be done every time
Display board is replaced
OR
Input Power board is replaced

Display Board W05X1607-2 Calibration Procedure

NOTE: An external voltmeter must be connected directly, as close as possible to the output terminals of the device to minimize the difference in reading between the external voltmeter and an internal meter of the device.

Input voltage: 1 phases **230** V.
Output load: set **0,09Ω** ---------- **STATUS**: closed.

Configuration
Make sure that the load is connected and its output is set for **200** A, 18±1V.

While holding together the **WAVE SHAPE**, **SEL** and **PULSE** buttons pressed, switch on the device.

After the power-up sequence is completed, he displays will show **CALI PROC** message. Wait until the device is fully operational and on the displays will blink the **SET CURR?** message.
Press the **SEL** button to confirm.

The displays show **ISET 200** – to confirm, press the **SEL** button.
The displays show **ENBL OUT?** – to confirm, press the **SEL** button.
The displays show **OUTP ENBL** – **start the burn-in time measurement.**

NOTE: if the load is too high or not connected the display shows **CHCK STUP,** turn off the machine and restart the procedure.

Press the **SEL** button to confirm, the displays will show **ADJ 200**
Press the **SEL** button to confirm, the left display will show **ADJ**, while right will show a **number.**

Ammeter calibration (60974-1 para. 16.3)
The left display will show the **CURR** message, and on the right display will appear a number determining the value of the current measured by the internal ammeter of the device. By turning the knob, set the output current value to match the reading on the external ammeter on the test bench (**200** A ±1%) – increasing or decreasing the value.
To confirm, press **SEL** button.

Voltmeter calibration (60974-1 para. 16.3)
While blinking, the left display will show **MSTR** message, and on the right display will appear a number determining the value of the measured voltage by the internal voltmeter of the device. Press the **SEL** button to confirm.
Displays will stop blinking. By turning the knob, set the output voltage value to match the reading on the external ammeter on the test bench (V_{OUT} = **18** ±1 V_{DC}) increasing or decreasing the value.

To confirm, press **SEL** button.

The displays will show measured current and voltage.

Press the **SEL** button twice to confirm, display will show **CALI COMP**, switch off the device.

CALIBRATION PROCEDURE (continue)

Input Power board W05X1604-2 Calibration procedure

NOTE: An external voltmeter must be connected directly, as close as possible to the output terminals of the device to minimize the difference in reading between the external voltmeter and an internal meter of the device.

Input voltage: 1 phases **230** V.
Output load: set **0,09Ω** ---------- **STATUS**: closed.

Configuration
Make sure that the load is connected and its output is set for **200** A, 18±1V.
Selection of the factory calibration is done by having the trigger input closed when entering the procedure.
While holding together the **WAVE SHAPE**, **SEL** and **PULSE** buttons pressed, switch on the device.

After the power-up sequence is completed, he displays will show **CALI PROC** message. Wait until the device is fully operational and on the displays will blink the **SET CURR?** message.
Press the **SEL** button to confirm.

The displays show **ISET 200** – to confirm, press the **SEL** button.
The displays show **ENBL OUT?** – to confirm, press the **SEL** button.
The displays show **OUTP ENBL** – **start the burn-in time measurement.**

Output calibration
Press the **SEL** button to confirm, the displays will show **ADJ 200**.
Press the **SEL** button to confirm, the left display will show **ADJ**, while right will show a **number**.

By turning the knob, set the output current of the devices until the ammeter show value of 200 A - increasing the value is in accordance with the clockwise direction, and decreasing with the counter-clockwise direction.

To confirm, press **SEL** button.

Ammeter calibration (60974-1 para. 16.3)
The left display will show the **CURR** message, and on the right display will appear a number determining the value of the current measured by the internal ammeter of the device. By turning the knob, set the output current value to match the reading on the external ammeter on the test bench (**200** A ±1%) - increasing the value is in accordance with the clockwise direction, and decreasing with the counter-clockwise direction.
To confirm, press **SEL** button.

Voltmeter calibration (60974-1 para. 16.3)
While blinking, the left display will show **MSTR** message, and on the right display will appear a number determining the value of the measured voltage by the internal voltmeter of the device. Press the **SEL** button to confirm.
Displays will stop blinking. By turning the knob, set the output voltage value to match the reading on the external ammeter on the test bench (V_{OUT} = **18** ±1 V_{DC}) increasing the value is in accordance with the clockwise direction, and decreasing with the counter-clockwise direction.

To confirm, press **SEL** button.
The displays will show measured current and voltage.

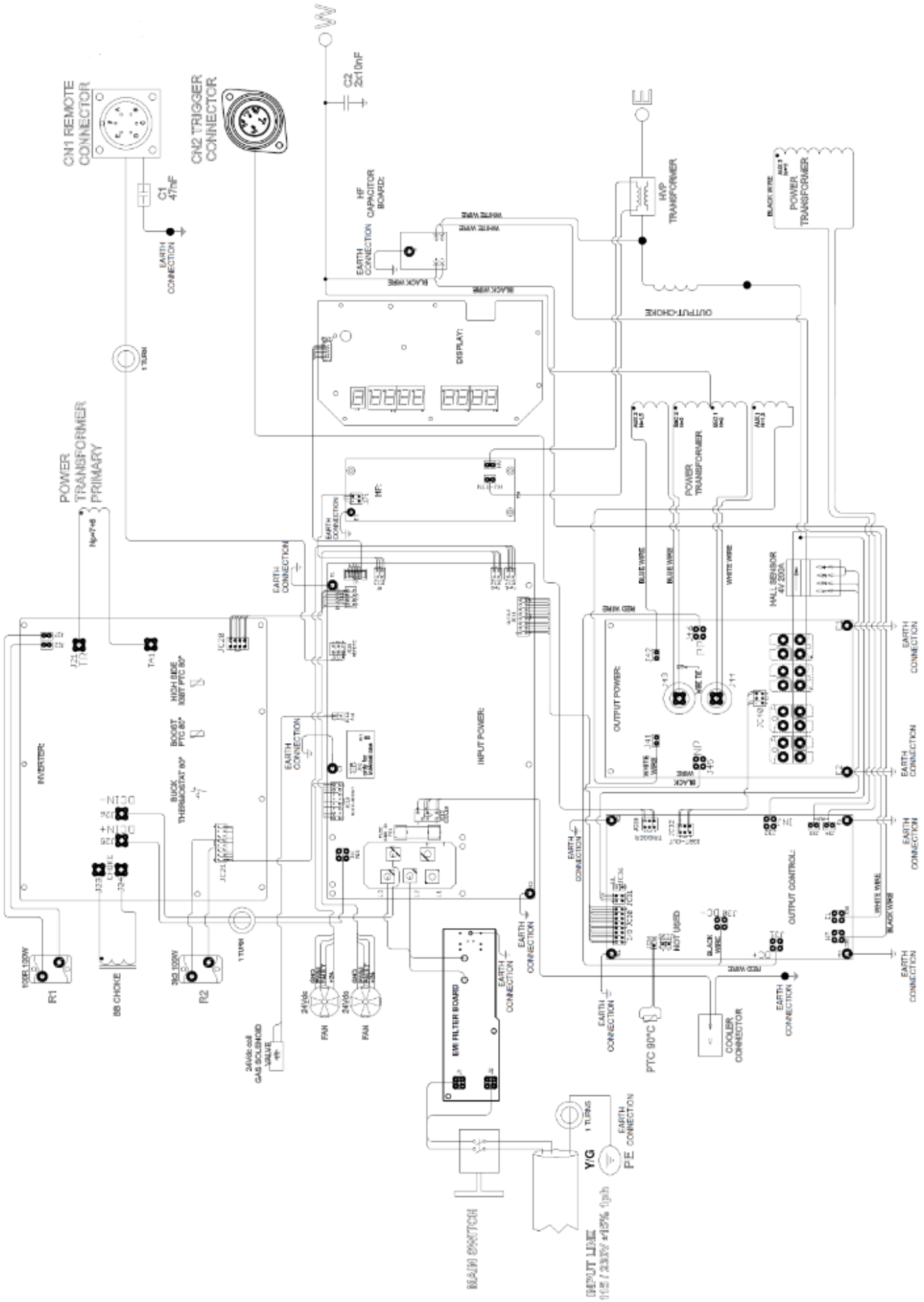
Press the **SEL** button to confirm.

BURN IN starts. Press **SEL** button to stop **BURN IN.**
The display will show **CALI COMP** message, switch off the device**.**

NOTE: if the load is too high the the machine does not enter **BURN IN** mode and the display shows **CHCK STUP,** turn off the machine and restart the procedure.

ELECTRICAL SCHEMATICS

Block Diagram :



NOTE

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