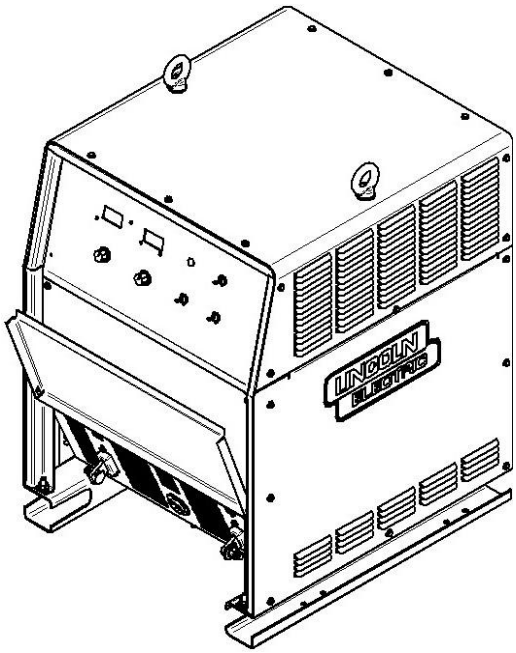
SVM 7003

August, 2009

Rev. 1

POWERPLUS™ II500

For use with machine Code **POWERPLUS™ II 500 76074 & 76075**



Safety Depends on You

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation and thoughtful operation on you part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

SERVICE MANUAL

• World's Leader in Welding and Cutting•
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⚠ WARNING

ARC WELDING CAN BE HAZADOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS.

1.a Electric current flowing through any conductor causes localized Electric and Magnetic Field (EMF). Welding current creates EMF fields around welding cables and welding machines.

1.b EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physican before welding.

1.c All welders should use the following procedures in order to minize exposure to EMF fields from the welding circuit:

1.d.1 Route the electrode and work cables together – Secure them with tape when possible.

1.d.2 Never coil the electrode lead around you body.

1.d.3 Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

1.d.4 Connect the work cable to the workpiece as close as possible to the area being welded.

ARC RAYS CAN BURN

2.a Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc. Headshield and filter lens should conform to ANSI Z87. I standards.

2.b Use suitable clothing made from durable flame-resistant maerial to protect your skin and that of your helpers from the arc rays.

2.c Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

ELECTRIC SHOCK CAN KILL.

3.a The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hand.

3.b Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, grating or scaffolds; when in vramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e Ground the work or metal to be welded to a good electrical (earth) ground.

3.f Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g Never dip the electrode in water for cooling.

3.h Never simultaneously touch electrically “hot” parts of electrode holder to two welders because voltage between the two can be total of the opencircuit voltage of both welders.

FUMES AND GASES CAN BE DANGEROUS.

4.a Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of fume. Use enough ventillation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, arespirator may be required. Additional precautions are also required when welding on galvanized steel.**

4.b Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays or the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

4.c Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

4.d Read and understand the manufacturer's instrucions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

FOR ELECTRONICALLY POWERED QUIPMENT.

5.a Turn off input power using the disconnect switch at the fuse box before working on the equipment.

5.b Install equipment in accordance with national standard, all local standards and the manufacturer's recommendations.

5.c Ground the equipment in accordance with the national standards and the manufacturer's recommendations.

WELDING SPARKS CAN CAUSE FIRE OR EXPLOSION.

6.a Remove fire hazards from the welding area. If this is not possible, cover them to prevent the weldingsparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cranks and opening to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b When not welding, make certain no part of the electrode circuit is touching the working or ground. Accidental contact can cause overheating and create a fire hazard.

6.c Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from subtances inside. They can cause an explosion even though they have been "cleaned".

6.d Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trouses, high shoes and a cap over your hair.

CYLINDER MAY EXPLODE IF DAMAGED

7.a 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. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c Cylinder should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté specifiques qui parraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:
   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans
      les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:
   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.
6. Eloigner les matériaux inflammables ou les recouvrir afin de
7. Quand on ne soude pas, poser la pince à une endroit isolé de
   la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus prés possible de
   la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage.
   Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir
    le code "Code for safety in welding and cutting" CSA Standard
    W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faires des travaux à l'interieur de poste, la debranch- er à l'interrupteur à la boite de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

MASTER TABLE OF CONTENTS

TABLE OF CONTENTS INSTALLATION

TECHNICAL SPECIFICATIONS – POWERPLUS™ Ⅱ500

INPUT – THREE PHASE ONLY		
	Standard Voltage/Phase/Frequency	Input Power at Rated Output
POWERPLUS™ Ⅱ500	380V ~ 415V(±10%)/3/50 or 60 Hz	30.6KVA/24.5 KW@ 60% Duty Cycle

RATED OUTPUT – DC ONLY			
	Duty Cycle	Amperes	Volts at Rated Amperes
POWERPLUS™ Ⅱ500	60%	500A	39V
	100%	390A	33.5V

OUTPUT			
	Welding Current Range	Open Circuit Voltage	Welding Voltage Range
POWERPLUS™ Ⅱ500	60A ~ 500A	66V	17 V ~ 41.5V

RECOMMENDED INPUT WIRE AND FUSE SIZES						
	Input Voltage/ Frequency (Hz)	Maximum Input Ampere	Maximum Effective Supply Current	60°C Copper Wire in Conduct Sizes	Fuse or Breaker Size (Super Lag)	Grounding Conductor Size
POWERPLUS™ Ⅱ500	342V ~ 456V/ 50Hz or 60Hz	52A	38A	16mm^2	80A	10mm^2

PHYSICAL DIMENSIONS				
	Height	Width	Depth	Weight
POWERPLUS™ Ⅱ500	755mm	505mm	570mm	175Kg

TEMPERATURE RANGE	
Operating Temperature Range	Storage Temperature Range
-10°C ~ +40°C	-25°C ~ +55°C

For any maintenance or repair operation it is recommended to contact the nearest technical service center or directly consult machine division of the Shanghai Lincoln Electric. Maintenance or repairs performed by unauthorized service center or personnel will void the manufacturer's warranty.

SAFETY PRECAUTIONS

Read the entire installation section before starting installation.

⚠ WARNING

ELECTRIC SHOCK can kill.
Only qualified personnel should perform this installation.
Turn this input power OFF at the main switch fuse box before working on this equipment. Turn off the input power to any other equipment connected to the welding system at the main switch or fuse box before working on the equipment.

- **Do not touch electrically "Hot" parts.**
- **Always connect the POWERPLUS™ grounding lug (located at the rear of the case) to a proper safety (Earth) ground. POWEWRPLUSTM is for use on 4 wire system with earthed neutral.**

SELECT SUITABLE LOCATION

This power source should not be subjected to falling water, nor should any parts of it be submerged in water. Doing so may cause improper operation as well as pose a safety hazard. The best practice is to keep the machine in a dry, sheltered area.

⚠ CAUTION

The bottom of machine must always be placed on a firm, secure, level surface. There is a danger of the machine toppling over if this precaution is not taken.

Place the welder where clean cooling air can freely circulate in through the side and back louvers and out through the case bottom. Water, dirt, dust or any foreign material that can be drawn into the welder should be kept a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdowns.
Locate the POWERPLUS™ machine away from radio controlled machinery. Normal operation of the welder may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

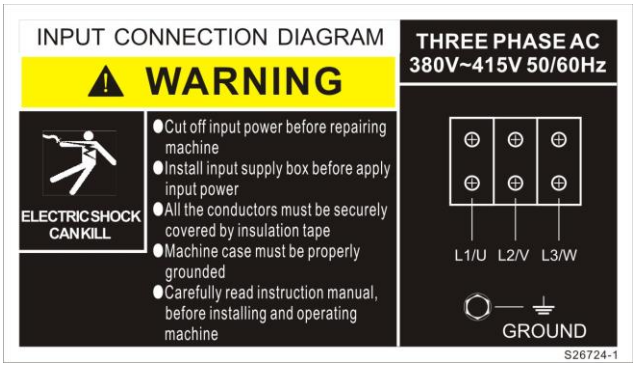
INPUT POWER AND GROUNDING CONNECTION

⚠ WARNING

Only a qualified electrician should connect the input leads to the POWERPLUS™. Connections should be made in accordance with the connection diagram. Failure to do so may result in body injury or death.

Open the input box on the rear of the case. Use a three-phase supply line, the three live wires should go through the three holes of the input wire holder and be securely clamped and fixed. Connect L1, L2, L3 and ground according to the Input Supply Connection Diagram decal; refer to Figure A.1 on this page.

FIGURE A.1 – Input Supply Connection Diagram



The POWERPLUS™ is supplied connected for 50Hz input. In regions where the frequency of electricity is 60HZ, the POWERPLUS™ machine can identify the 60 HZ frequency automatically and works in terms of this frequency.
Make sure the amount of power available from the input connection is adequate for normal operation of the machine. Refer to the Technical Specifications at the beginning of this Installation section for recommended fuse and wire sizes. Fuse the input circuit with the recommended super lag fuse or delay type breakers. Using fuses or circuit breakers smaller than recommended may result in "nuisance" shut-offs from welder inrush currents, even if the machine is not being used at high currents.

OUTPUT AND WIRE FEEDER CONNECTIONS

Connect a work lead of sufficient size and length (Per Table A.1) between the Negative Output terminal on the power source and the work. Be sure the connection to the work makes tight metal-to-metal electrical contact. To avoid interference problems with other equipment and to achieve the best possible operation, route all cables directly to the work and wire feeder. Avoid excessive lengths and do not coil excess cable.
Minimum work and electrode cable sizes are as follows:

TABLE A.1

Current (60% Duty Cycle)	Minimum Copper Work Cable Size
	Up To 30m Length
200A	30 mm^2
300A	50 mm^2
400A	70 mm^2
500A	95 mm^2

Note: The recommended cable size may need change depend on its quality. When the rated current flaw goes through, the total voltage drop on ground cable and electrode cable must not exceed 4 volts.

⚠CAUTION

For secure electrical connections, the Nuts connecting the output terminals and cables must be tightened. Damage to output studs and poor performance may occur, if this instruction is not followed.

GUN AND CABLE INSTALLATION

Optional guns with various cable lengths can be used with the POWERPLUS™

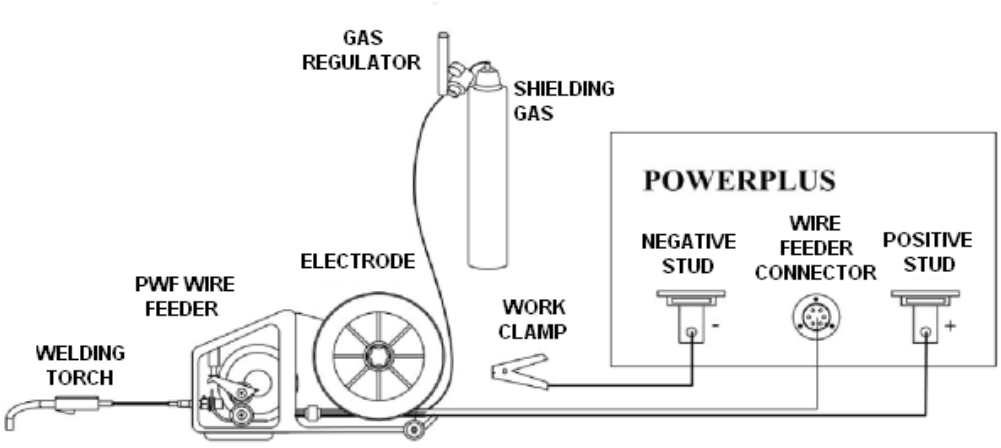
⚠ WARNING

Turn the welder power switch off before installing gun and cable.

Gun and cable assembly installation instruction

- Unscrew the hexagon head screw in front of the wire drive unit (inside wire feed compartment) until tip of screw no longer protrudes into gun opening as seen from front of wire feeder.
- Insert the male end of gun cable into the female casting. Make sure connector is fully inserted and tighten the hexagon head screw.
- Connect the two-pin gun trigger connector from the gun and cable to the mating receptacle, then tighten the retaining ring.
- Connect the gas connector to the mating receptacle at front of wire feeder, and tighten the copper retaining ring.

FIGURE A. 2 – OUTPUT AND WIRE FEEDER CONNECTIONS



PWF wire feeder connection instructions
(See Figure A. 2)

- Turn the POWERPLUS™ power switch "OFF".
- Connect the control cable from the PWF feeder to the 6-pin connector. 4 wire feeder models are: PWF-2/PWF-4/PWF-2plus/PWF-4plus/PWF-4SS/PWF-4GS
- Connect the electrode cable to the Positive Output terminal.

CONNECTING SHIELDING GAS

POWERPLUS™ supports Gas Metal Arc Welding Process. User must provide gas cylinder of appropriate type shielding gas for the process being used with the POWERPLUS™.

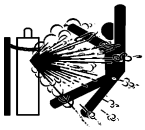
⚠ WARNING

CYLINDER may explode if damaged. Gas under pressure

is explosive. Always keep gas cylinders in an upright position and always keep chained to undercarriage or stationary support.

Install shielding gas supply as follows:

Remove the cylinder cap. Inspect the cylinder valves and regulator for damaged threads, dirt, dust, oil or grease. Remove dust and dirt with a clean cloth.



DO NOT ATTACH THE REGULATOR IF OIL, GREASE OR DAMAGE IS PRESENT!

Inform your gas supplier of this condition. Oil or grease in the presence of high pressure oxygen is explosive.

- Stand to one side away from the outlet and open the cylinder valve for an instant. This blows away any dust or dirt which may have accumulated in the valve outlet.
- Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench.

NOTE: When connecting to a CO_2 cylinder, please select a CO2 Regulator Heater for the prevention of ice build up. Failure to do so, may result in poor welding performance. The power cord of the gas heater must be plugged into the receptacle on the rear of the POWERPLUS™ case.

- Attach the end of the inlet gas hose, from the wire feeder, to the outlet fitting of the flow regulator, and tighten the union nuts securely with a wrench.
- Before opening the cylinder valve, turn the regulator adjusting knob counterclockwise until the
- adjusting spring pressure is released.
- Standing to one side, open the cylinder valve slowly a fraction of a turn. When the cylinder pressure gauge pointer stops moving, open the valve fully.

⚠WARNING

Never stand directly in front of or behind the flow regulator when opening the cylinder valve. Always stand to the side.

- The flow meter is adjustable. Adjust it to the flow rate recommended for the weld procedure.

TABLE OF CONTENTS OPERATION

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK CAN KILL

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**

Always wear dry insulating gloves.

FUMES AND GASES CAN BE DANGEROUS.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

WELDING SPARKS can cause fire or explosion.

- **Keep flammable material away.**
- **Do not weld on closed containers.**

ARC RAYS CAN BURN EYES AND HAND.

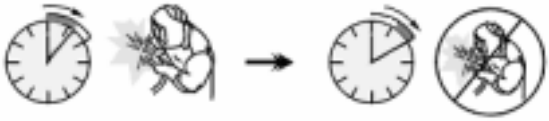
- **Wear eyes, ear and body protection.**

GENERAL DESCRIPTION

The POWERPLUS™ is a semiautomatic DC arc welding machine offering CV DC welding. It is rated as following: POWERPLUS™ Ⅱ500: 500amps, 39volts at 60% duty cycle.

DUTY CYCLE

The duty cycle of a welding machine is the percentage of time in a 10 minute cycle at which the welder can operate the machine at rated welding current.
60% duty cycle:

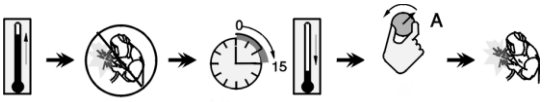


Weld for 6 minutes Break for 4 minutes

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

The POWERPLUS™ machine is equipped with a thermostat overheating protection device. When machine detects overheating, the output will cease, and the Thermal Indicator Light will turn “ON“. When the machine has cooled to a safe temperature, the Thermal Indicator Light will go out and the machine may resume normal operation.

Note: For safety reasons the machine will not come out of the thermal shutdown if the trigger on the welding gun has not been released.



Wait for its cooling down Or decrease duty cycle

OPERATIONAL FEATURES AND CONTROLS

FRONT Panel (PLEASE SEE FIGURE B.1)

1. ON/OFF POWER SWITCH

After input power is connected and the power switch is turned on, the display meter will show the date. The voltage meter will show the default.

2. THERMAL INDICATOR

This status light illuminates when the power source has been driven into thermal overload. The indicator light also glows when the POWERPLUS™ is starting up. The indicator light has an ON to OFF cycle to show that the POWERPLUS™ has passed the initial self test.

3. GAS ADJUSTING AND WELDING SWITCH

When this switch is turned to the gas adjusting position, user can adjust the rate of gas flow on gas flow meter.
NOTE: There is no welding voltage output and no wire feeding, when this switch is switched to the gas adjusting position, even trigger is closed.

4.2 STEP AND 4 STEP SWITCH

This toggle switch enables the selection of 2-step or 4-step mode. Enable or disable the crater mode is also selected by this switch.
NOTE: The POWERPLUS™ machine also features a Crater mode. During 2-step mode, there is no crater output. During the 4-step mode, after the welder activates the trigger, the POWERPLUS™ shifts to crater mode.
Please see FIGURE B.2 for an understanding of the time sequences for 2 and 4 step modes.

FIGURE B.1

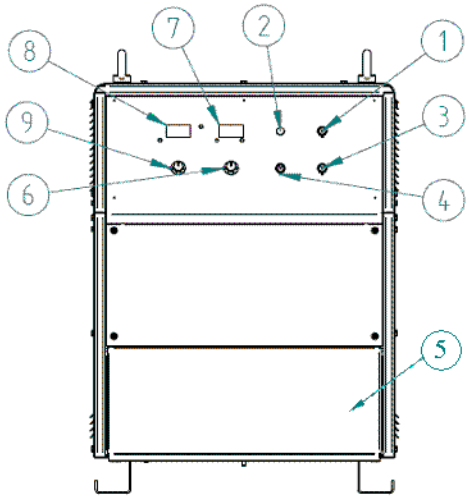
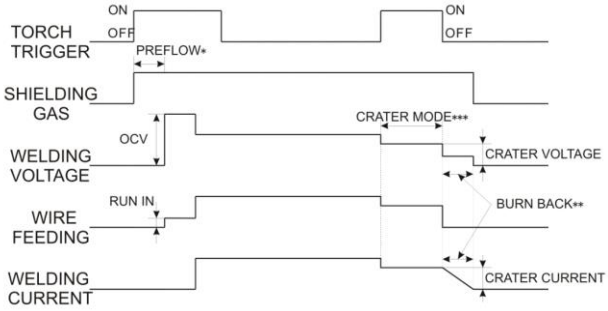
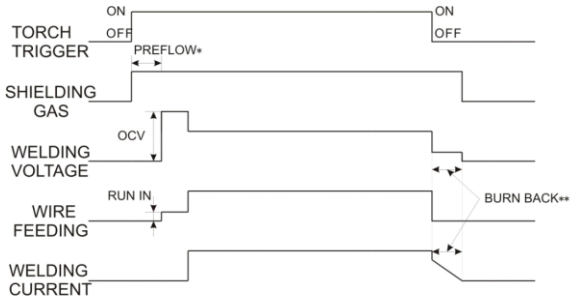


FIGURE B.2



FOUR STEP



TWO STEP

NOTE:

* Enable or disable the PREFLOW function can be operated by the DIP switch on PC borad, please refer to B-4.
** Burn back mode can be selected by DIP switch on PC board, please refer to B-4.
*** The output during the crater period is determined by the control knob on the power source panel. (Not by the PWF wire feeder.)

5. PROTECTION DOOR

This door is used to protect the output terminal and wire feeder connector. Turn off the power switch. Open protection door to connect the welding cable and PWF feeder control cables.

⚠ WARNING

Do NOT operate the POWERPLUS™ machine with this door open.

6. CRATER VOLTAGE

This knob adjusts the value of output voltage, when the POWERPLUS™ crater mode is selected.

7. VOLTAGE METER

This meter displays the welding voltage or open circuit voltage, when trigger is closed.

8. AMPERAGE METER

During the welding process, this meter displays the welding current value.

9. CRATER CURRENT

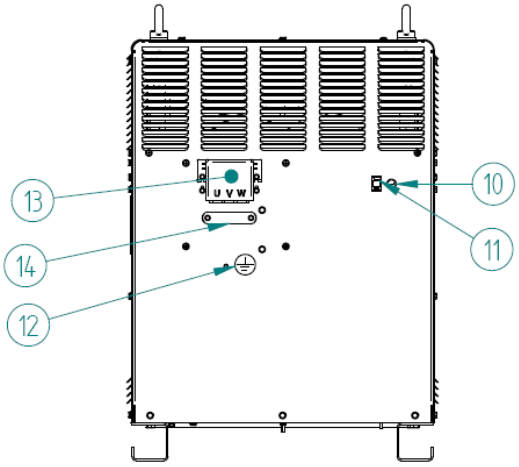
This knob adjusts the output current (wire feeding speed), when the POWERPLUS™ machine is in crater mode.

REAR PANEL (PLEASE SEE FIGURE B.3)

10. 8A FUSE AND FUSE HOLDER

For machine code 76075: A 250V **8A** fuse is located to protect the auxiliary **36V** Power outlet.
For machine code 76074: A 250V **2A** fuse is located to protect the auxiliary **220V** Power outlet.

FIGURE B.3



11. LOW VOLTAGE RECEPTACLE

For machine code 76075: This is a 36V 200 W max. auxiliary power output socket, for plugging the CO2 gas regulator heater.

⚠ CAUTION

Only 36V gas regulator heaters can be plugged into this receptacle. DO NOT plug any other electrical devices into the socket. (This action may damage POWERPLUS™ machine)

For machine code 76074: This is a 220V 200 W max. auxiliary power output socket, for plugging the CO2 gas regulator heater.

⚠ CAUTION

Only 220V gas regulator heaters can be plugged into this receptacle. DO NOT plug any other electrical devices into the socket. (This action may damage POWERPLUS™ machine)

12. GROUND CABLE CONNECTION

Connect the input earth cable to the rear of the case. A Earth Hex. Screw is located on the lower rear of the case. Secure the Earth cable lug-end with the screw into the case hole.

13. INPUT BOX

This insulation box is used to cover the input connections, offering insulating protection to the operator

⚠ WARNING

This insulation box must be installed before turning on the main power supply.

14. INPUT CABLE HOLDING BRACKET

This bracket holds the three phase power cables securely.

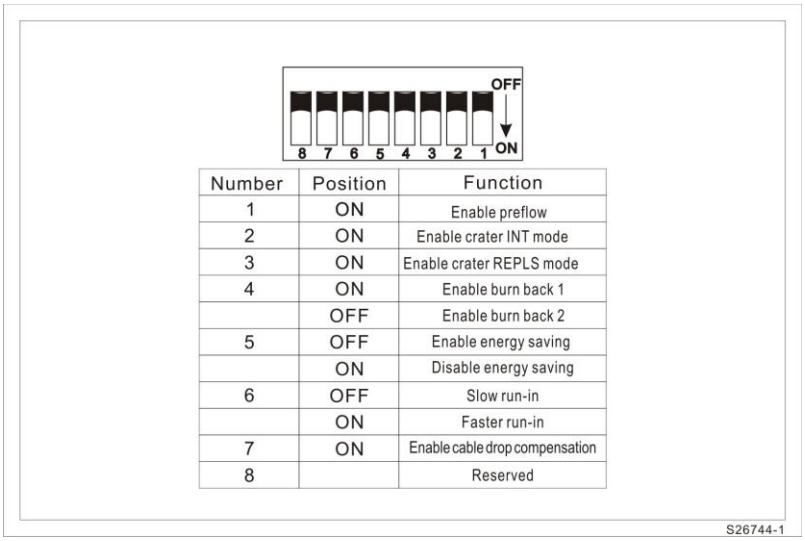
ADVANCED FEATURES

The POWERPLUS™ machine offers a DIP switch on the PC board, which allows the user to have additional features.
There are 8 individual switches integrated on this DIP switch. (Please see FIGURE B.4)

1. PREFLOW ON/OFF SWITCH

This switch enables the preflow of shielding gas before turning on the output voltage.

FIGURE B.4



Number	Position	Function
1	ON	Enable preflow
2	ON	Enable crater INT mode
3	ON	Enable crater REPLS mode
4	ON	Enable burn back 1
	OFF	Enable burn back 2
5	OFF	Enable energy saving
	ON	Disable energy saving
6	OFF	Slow run-in
	ON	Faster run-in
7	ON	Enable cable drop compensation
8		Reserved

2. CRATER INITIAL MODE SWITCH

This switch enables the crater output right after the arc is established. The initial crater output is a buffer
between arc start and regular welding output. This function offers a smoother arc start. For thin metals or spot welding, it will have a positive effect to the arc start performance. Please see figure B.5 for detail.

3. CRATER REPEAT MODE SWITCH

Should the operator find a visible crater appearing after releasing the trigger, and, within 2 seconds, activating the trigger again, the power source will continue output at crater voltage and current to fill this crater. For more detail, please see figure B.5.

4. BURN BACK SWITCH

This switch determines burn back mode within burn back 1 (ramp down burn back) and burn back 2 (precipitous drop burn back).After the operator releases the trigger/ wire feeding stops right away, the power source keeps voltage/current output between electrode and work piece for a short time to avoid electrode being stick in the puddle. This short time output is named as burn back.

2 burn back modes are equipped in POWERPLUS™
- Burn back 1: Shorter burn back time. Form a globule on the end of the wire not easily.
- Burn back 2: Longer burn back time. Form a globule on the end of the wire easily.

5. ENERGY SAVING SWITCH

When the DIP switch is in the “OFF” position, the POWERPLUS™ machine will operate in power saving mode.

Note: After the machine has not been activated for longer than 5 minutes, the operator may experience a weld start delay of less than 1 second.

6. FASTER OR SLOW RUN-IN SWITCH

The fast or slow run-in of the welding wire is selected by this switch.
NOTE: Please set this switch at the slow run-in to get a smoother arc start.

7. CABLE DROP COMPENSATION ON/OFF SWITCH

This switch enables long control cable voltage drop compensation. When the interconnection cables are longer than 10M, this switch should be turned “On”.

8. SELECT SWITCH FOR POWER SUPPLY SOURCE

This switch enables power supply from dynamo source. When the power supply from network source, the switch is “OFF”; when power supply from dynamo source, the switch is “ON”. This function can improve the performance of arc starting, and make welding smooth.

Standard setting of DIP switch: OFF, OFF, OFF, ON, ON, OFF, ON, OFF.

Note: Turn the machine off when switching DIP switch.

FIGURE B.5

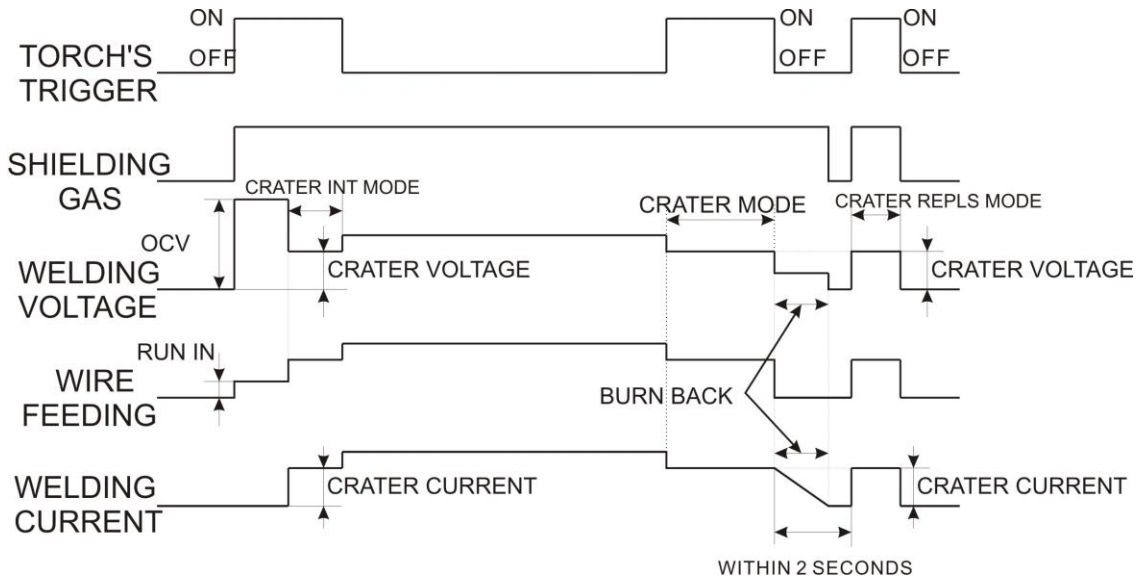


TABLE OF CONTENTS ACCESSORIES

OPTIONAL ACCESSORIES

Field Installed Options

Wheel kit

KP61163	Wheel kit (4 wheels /PC)

Remote Voltage Control

K60030-8M	Remote Control Box,8M
K60030-15M	Remote Control Box,15M
K60030-30M	Remote Control Box,30M

Euro Gun Connection Adaptor

KP61108-2	Euro Gun Connection Adaptor

TABLE OF CONTENTS MAINTANECE

SAFETY PRECAUTIONS

Read the entire installation section before starting installation.

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

- Only qualified personnel should perform this installation.
- Turn the input power off at the main switch before working on this equipment.

Turn off the input power to any other equipment connected to the welding system at the main switch before working on the equipment.

- Do not touch electrically “Hot” parts.
- Always connect the POWERPLUSII™ grounding lug (located at the rear of the case) to a proper safety (Earth) ground.

POWERPLUSII™ is for use on a 4 wire system with earthed neutral.

⚠ WARNING

For any maintenance or repair operations it is recommended to contact the nearest technical service center or Lincoln Electric. Maintenance or repairs performed by unauthorized service centers or personal will null and void the manufacturer’s warranty.

ROUTINE AND PERIODIC MAINTENANCE

The frequency of the maintenance operations may vary in accordance with the working environment. Any noticeable damage should be reported immediately.

- Check cables and connections integrity. Replace, if necessary.
- Clean the power source inside by means of low pressure compressed air.
- Keep the machine clean. Use a soft dry cloth to clean the external case, especially the airflow inlet / outlet louvers.

⚠ WARNING

Do not open this machine and do not introduce anything into its openings.
Power supply must be disconnected from the machine before each maintenance and service. Always use gloves in compliance with the safety standards.
After each repair, perform proper tests to ensure safety.

THERMAL PROTECTION

Thermostats 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 temperature should occur, the thermostat will prevent output voltage or current.

Thermostats 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 and normally, the Power Switch may be left on.

MAJOR COMPONENT LOCATIONS

FIGURE D.1 MAJOR COMPONENT LOCATIONS

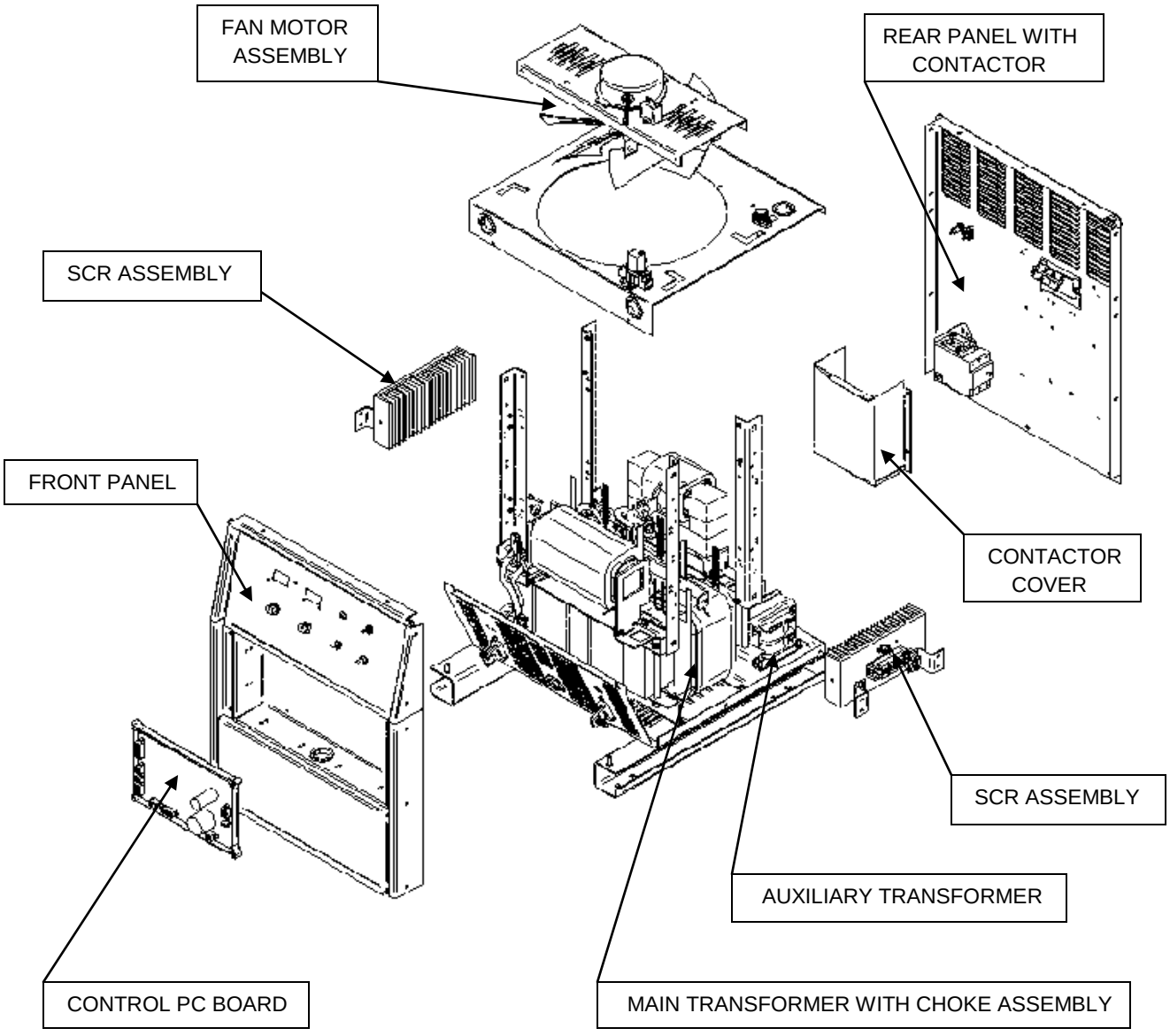
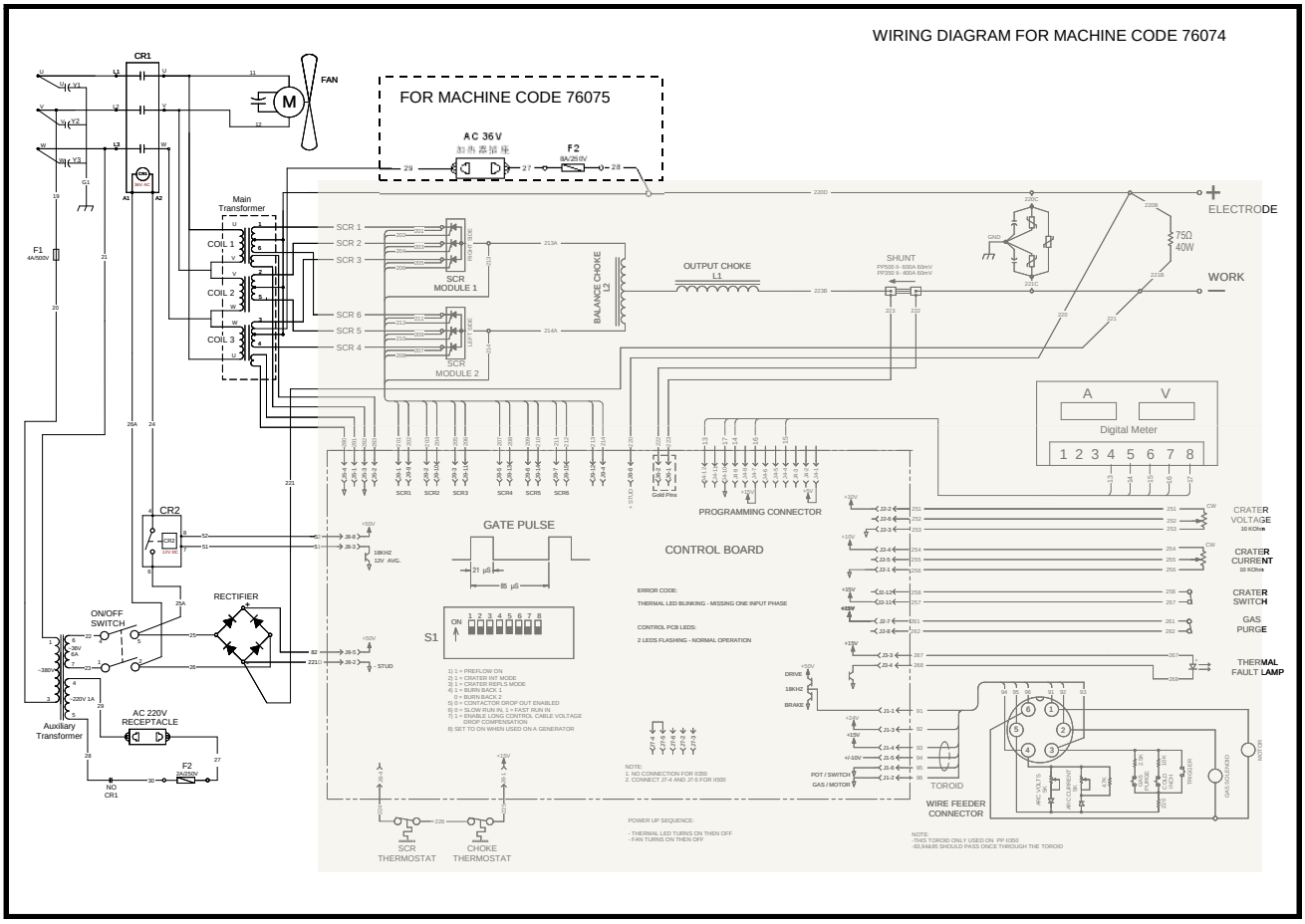


TABLE OF CONTENTS THEORY OF OPERATION

FIGURE E.1 – INPUT LINE VOLTAGE, CONTACTOR, MAIN AND AUX TRANSFORMER



NOTE: Unshared areas of Wiring Diagram are the subject of discussion.

GENERAL DESCRIPTION

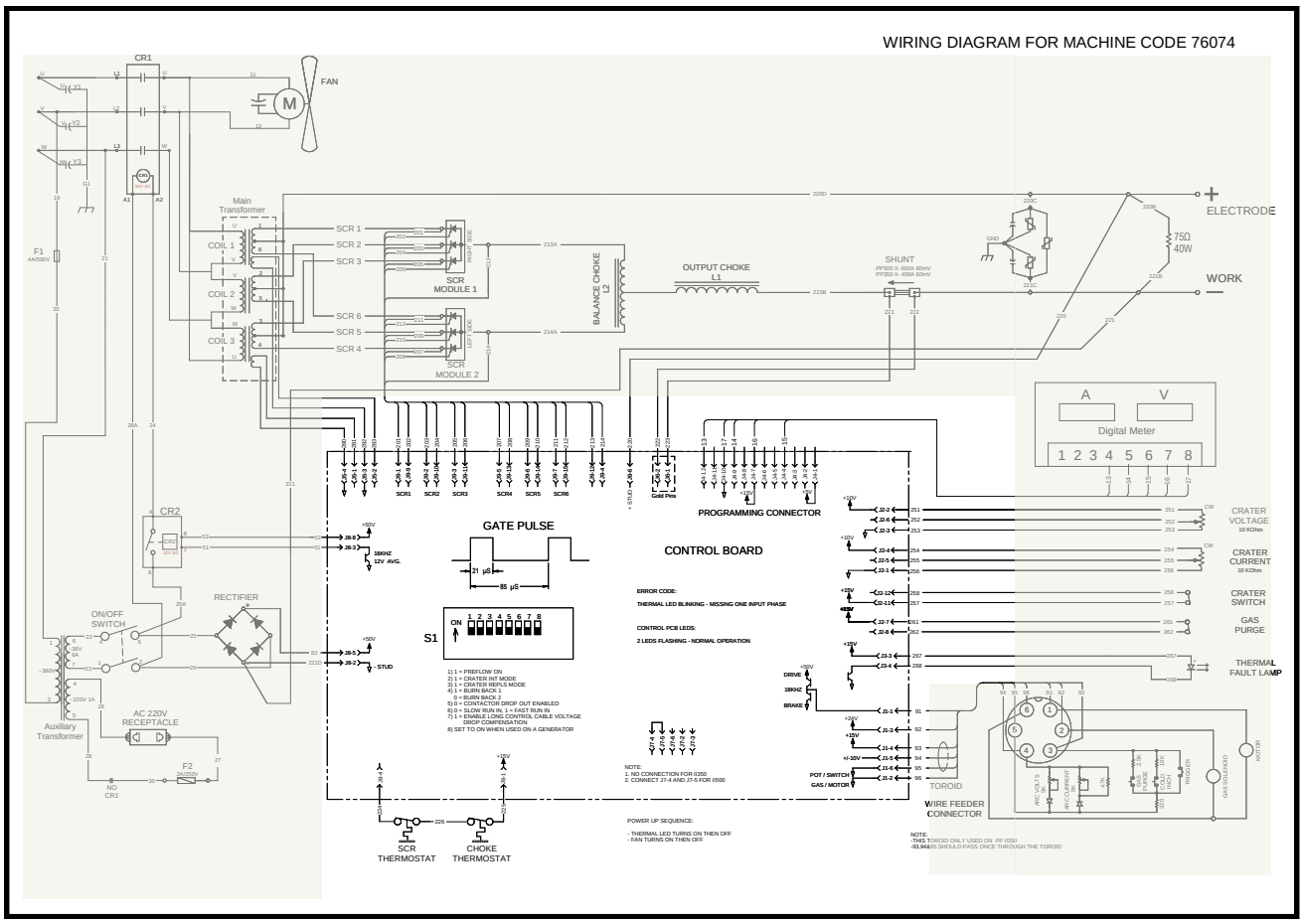
The POWERPLIUSII™ 500 is an SCR controlled three-phase DC power source that offers constant voltage (CV) and is rated at 500 amps at a 60% duty cycle. It is designed for all open arc constant voltage (CV) processes within the capacity of the machine. The output characteristics have been optimized for CV processes without the use of a variable arc control. Minimum to maximum output is obtained with a single potentiometer control.

INPUT LINE VOLTAGE, CONTACTOR, Main TRANSFOEMER AND AUXILIARY TRANSFORMER

The POWERPLIUSII™ 500 is connected with 380VAC, 50/60Hz three-phase power supply. The desired three-phase input power is connected to the POWERPLIUSII™ 500 through an input contactor, located in the input box at the rear of the machine. **For machine code 76074:** Two phases of the input line are also connected to the auxiliary transformer through the switch, which supplies power to activate the Control PC Board and heat gas regulator (**For machine code 76075 is different, the gas regulator is heated by main transformer.)**. **See Figure E.1**

This three phase AC input is applied to the primary of the main transformer. The transformer changes the high voltage, low current input power to a lower voltage, higher current output. The two Zero cross harness are also housed in the main transformer assembly. These windings provide "timing" for the control board. The type of main secondary coils connection is three-phase double WYE. The three center taps of the main secondary coils are connected together. The three stars are connected to SCR module 1, and the three finishes are connected to SCR module 2.

FIGURE E.2 – CONTROL PC BOARD AND THERMOSTATS



NOTE: Unshared areas of Wiring Diagram are the subject of discussion.

CONTROL PC BOARD AND THERMOSTATS

CONTROL PC BOARD

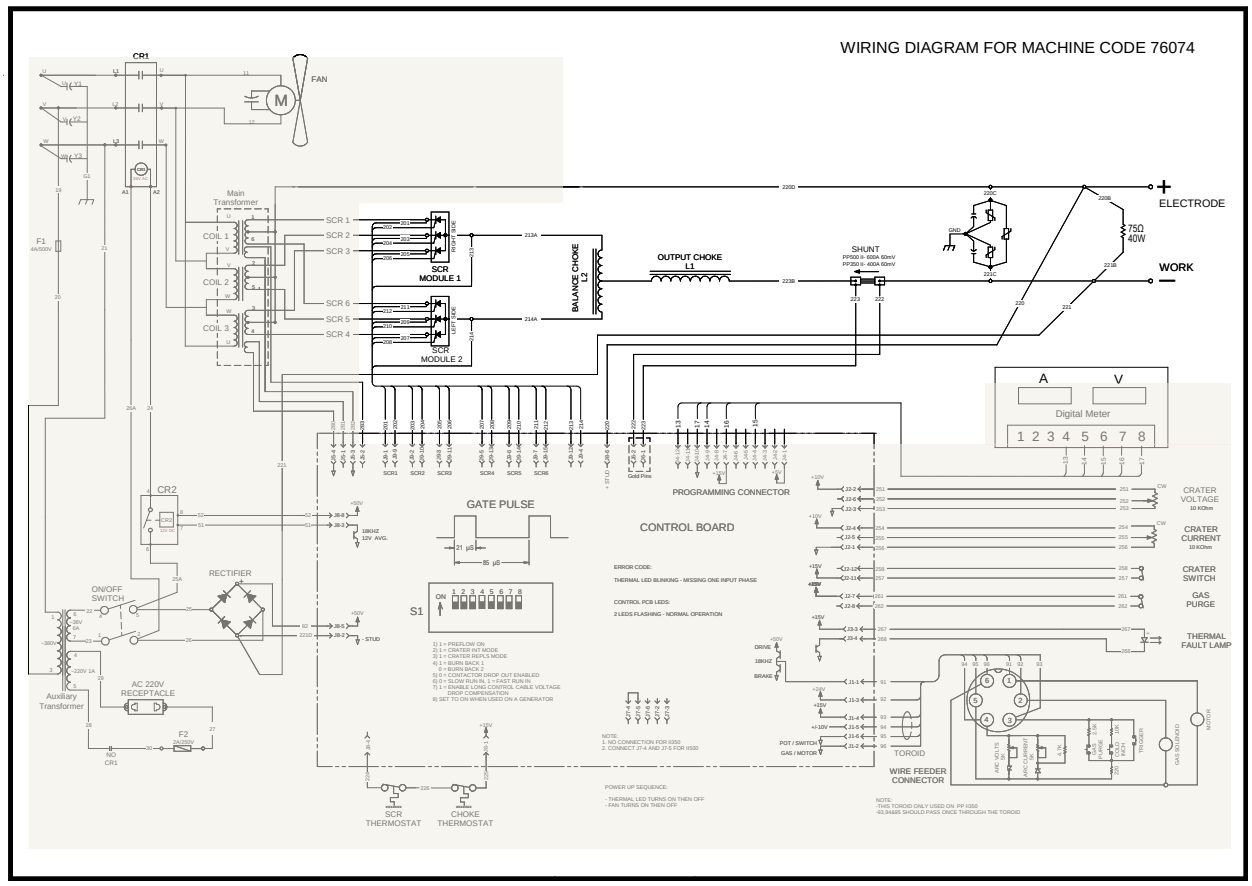
The control board is powered by Auxiliary transformer windings. When a gate firing enable signal is received (trigger closed), the control board supplies the proper amount of energy to the gates of the power SCRs. When this gate firing signal is applied at the correct time, the SCR will turn ON. The amount of ON time versus OFF time determines the output of the machine. At the same time the latching resistor (75Ω40W) is connected across the machine's output circuit. The latching resistor provides a pre-load for the SCR, and then the SCR's will keep providing an open circuit voltage (OCV). The control board compares the commands of the output control with the feedback information, and sends the appropriate gate firing signals to the SCR.

A six pin control cable connected with control PC board and wire feeder. It receives command signals from control box of wire feeder, which include current, voltage, cold inch, gas purge, and drives operations of wire feeder motor and gas solenoid. The operation of contactor is controlled by a relay which is drived by control PC board.

THERMOSTATS

Two normally closed (NC) thermostats protect the machine from excessive operating temperatures. These thermostats are wired in series and connected to the control board. One of the thermostats is located on the heat sink of the SCR bridge, and another is located inside the output choke.

FIGURE E.3 – Output Rectifier， Balance Choke and Output choke

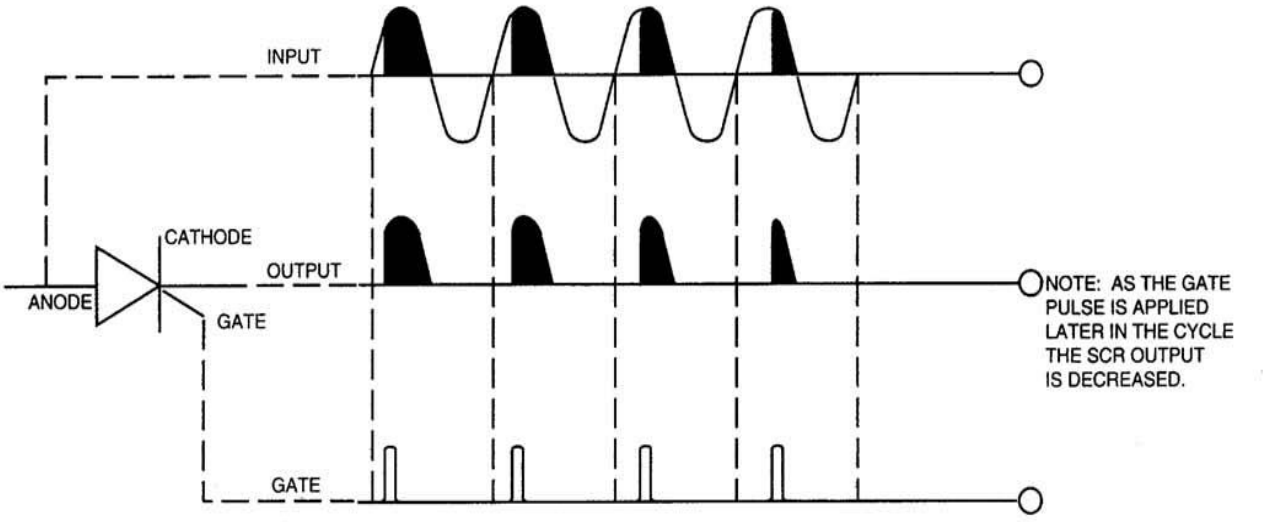


NOTE: Unshared areas of Wiring Diagram are the subject of discussion.

Output Rectifier, Balance Choke and Output choke

The three-phase AC output from the main transformer secondary is rectified and controlled through the SCR bridge. Balance Choke enable two SCR modules work together. Output choke, which is in series with the negative output terminal, stores energy and provides current filtering.

FIGURE E.4 - SCR OPERATION



SCR OPERATION

A silicon controlled rectifier (SCR) is a three-terminal device used to control rather large currents to a load. An SCR acts very much like a switch. When a gate signal is applied to the SCR, it is turned ON and there is current flow from anode to cathode. In the ON state the SCR acts like a closed switch. When the SCR is turned OFF, there is no current flow from anode to cathode. Thus the device acts like an open switch. As the name suggests, the SCR is a rectifier, so it passes current only during positive half cycles of the AC supply. The positive half cycle is the portion of the sine wave in which the anode of the SCR is more positive than the cathode.

When an AC supply voltage is applied to the SCR, the device spends a certain portion of the AC cycle time in the ON state and the remainder of the time in the OFF state. The amount of time spent in the ON state is controlled by the Gate.

An SCR is fired by a short burst of current into the gate. This gate pulse must be more positive than the cathode voltage. Since there is a standard PN junction between gate and cathode, the voltage between these terminals must be slightly greater than 0.6V. Once the SCR has fired, it is not necessary to continue the flow of gate current. As long as current continues to flow from anode to cathode, the SCR will remain on. When the anode to cathode current drops below a minimum value, called holding current, the SCR will shut off. This normally occurs as the AC supply voltage passes through zero into the negative portion of the sine wave. If the SCR is turned on early in the positive half cycle, the conduction time is longer, resulting in greater SCR output. If the gate firing occurs later in the cycle, the conduction time is less, resulting in lower SCR output.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ 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

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 "PROBLEM (SYMPTOMS)". 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 Welding Problems.

Step 2. PERFORM EXTERNAL TESTS.

The second column, labeled "POSSIBLE AREAS OF MISADJUSTMENT(S)", 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 Electrical Diagrams Section Table of Contents to locate the appropriate diagram.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

CONTROL PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK CAN KILL. Have an electrician install and service this equipment. Turn the input power at the the fuse box before working on equipment. Do not touch electrically hot parts.

⚠ CAUTION

Sometimes machine failures appear to be due to PC Board if 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 Control PC Board is the most likely component causing the failures symptom.
2. Check for loose connections at the PC Board to assure that the Control 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. Read the warning inside the static resistant bag and perform the following procedures:

Control PC Board CAN BE DAMAGED BY STATIC ELECTRICITY.

ATTENTION
Static-Sensitive Devices
Handle only at Static-Safe Workstations

-- Remove your body's static charge before opening the static-shielding bag. Wear an antistatic wrist strap. For safety, use a 1 Meg ohm resistive cord connected to a grounded part of the equipment frame.

-- If you don't have a wrist strap, touch an unpainted, grounded, part of the equipment frame. Keep touching the frame to prevent static build-up. Be sure not to touch any electrically live parts at same time.

– Tools which come in contact with the PC Board must be conductive, anti-static or static-dissipative.

– Remove the PC Board from the static-shielding bag and place it directly into the equipment. Don't set the PC Board on or near paper, plastic or cloth which could have a static charge. If the PC Board can't be installed immediately, put it back in the static-shielding bag.

- If the PC Board uses protective shorting jumpers, don't remove them until installation is complete.

- If you return a PC Board to the Lincoln Electric company for credit, it must be in the static-shielding bag. This will prevent further damage and allow proper failure analysis.

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

NOTE: It is desirable to have a spare (known good) PC Board available for PC Board troubleshooting.

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.
6. 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.
7. 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.
8. 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 GUIDE

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major Physical or Electrical Damage is Evident.	1. Contact your local Lincoln Electric Authorized Field Service Facility.	Contact The Shanghai Lincoln Electric Service Dept. (8621)6602 6620.
Machine is dead - No output, no action for the fan and display.	1. Check the fuse F1 or fuse holder.	Replace fuse F1 or fuse holder.
	2. Power switch may be faulty.	Replace the power switch.
	3. Maybe one input phase missing.	Check and reconnect.
	4. Check the three phase input line voltage at the machine. Input voltage must match the rating plate.	Connect the right power supply.
	5. Check Auxiliary Transformer	Replace Auxiliary Transformer
The machine has action for the fan and display, but no output.	1. The remote control panel on PWF wire feeder or trigger of torch is damaged.	Repair or replace
	2. Check for loose or faulty connections at the output terminals and the heavy current carrying leads.	Reconnect.
	3. The PC board is faulty or connection is loose.	Replace.
	4. 6 pin control cable is faulty of the open circuit.	Check and reconnect.
	5. The PC board is faulty.	Check and replace.

TROUBLESHOOTING GUIDE

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The machine has low output and no control. The fan runs.	1. Voltage or current adjust elements on PWF wire feeder control panel damaged.	Repair or replace.
	2. SCR module is damaged.	Replace SCR module.
	3. Check for loose or faulty connections at the output terminals and the heavy current carrying leads.	Reconnect.
	4. The PC board is faulty.	Replace.
	5. 6 pin control cable is shortcut.	Check and repair.
Machine has high output and no control.	1. Voltage or current adjust elements on PWF wire feeder control panel damaged.	Repair or replace.
	2. Loose or faulty connection at the feedback leads from the shunt and the output terminals to the control board.	Reconnect.
	3. The PC board is faulty.	Replace.
	4. 6 pin control cable of #94 is faulty of open circuit.	Check and repair.
Machine does not have maximum output.	1. The adjust elements of voltage or current on remote PWF wire feeder control panel may be damaged.	Check and replace.
	2. The control board is faulty.	Replace.
	3.SCR or drive leads maybe is faulty	Check and replace.
Machine does not have 4-STEP mode.	1. Welding current feedback circuit disconnected or reversed.	Reconnect.
	2. 2 step/4 step switch is faulty.	Check and replace.
	3. The control board is faulty.	Check and replace

TROUBLESHOOTING GUIDE

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
	OUTPUT PROBLEMS	
The yellow thermal LED is solid on, no output.	1. There is overheating with SCR or Choke.	Wait for machine cooling
	2. Thermostat trip error. Fan motor doesn't run or run in a low speed.	Replace fan motor
	3. The thermostat is damaged.	Replace. *Change the choke when thermostat is inside.
	4. Leads #224, #225, or #i226 are open circuit.	Check and repair.
	5. Control PC board is faulty.	Check and replace.
The yellow thermal LED is fast flash (2s on - 1s off), no output, and show “Err 059” on the display.	1. Zero cross harness error.	Check and repair.
	2 .Zero cross harness disconnect or PCB connection is faulty.	Check and repair.
	3. Control PC board is faulty.	Check and replace.
The yellow thermal LED is fast flash (2s on - 0.5s off), no output, and show “Err 049” on the display.	1. Phase detection error. At least one phase lost.	Make certain the three-phase input voltage matches the machine’s rating plate.
	2. Main contactor is faulty.	Check and replace.
	3. Control PC board is faulty.	Check and replace.
The yellow thermal LED is fast flash (0.5s on - 0.5s off), no output, and show “Err 081” on the display.	1. Motor over current error.	Check and remove.
	2. Block of the feeding liner.	Clean or replace
	3. Wrong of the drive roll.	Check or replace.
	4. Shaft of wire spool is too tight.	Check and adjust
	5. Control PC board is faulty.	Check and replace.
The yellow thermal LED is slow flashing (0.5s on - 2s off), no output, and show “Err 039” on the display.	1. Power supply frequency is out of range.	The frequency should be kept within 48~62 Hz.
	2. Control PC board is faulty.	Check and replace.
The yellow thermal LED is solid on and shown “Err 041” on the display.	1. Time of over current more than 1.28s. * Max output current of II500 is 600A	Press torch trigger again.
	2. Lead #222 or #223 is loosening or faulty connected.	Check and reconnect.
	3. Shunt is faulty.	Check and replace.
	4. Control PC board is faulty.	Check and replace.

TROUBLESHOOTING GUIDE

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
The meter reading is incorrect.	1. The PC board is faulty.	Check and replace.
	2. Loose or bad connections on the feedback, leads 220 & 221, 222 & 223.	Check and correct.
	3. Loose or faulty connections at the shunt.	Reconnect.
	4. The display is faulty.	Replace.
	5. Latching resistor is faulty.	Replace.
The machine will NOT shut off.	1. The contactor is faulty.	Replace.
The welding arc is variable and sluggish	1. The welding cable connections are loose or faulty.	Check and reconnect.
	2. Make sure the wire feed speed, voltage, and shielding gas is correct for the process being used.	Check and correct.
	3. The PC board is faulty.	Replace.
	4. Bad connection of the input cable.	Check and correct.
The arc striking is poor.	1. Bad grounding connection.	Check and reconnect.
	2. There is oil on the surface of the work piece.	Check and replace.
	3. Output voltage is abnormal.	Check whether the open circuit voltage is normal.
	4. The parameter is not correct: WFS is too fast, or voltage is lower.	Readjust the parameter.
	5. Control PC board is faulty.	Check and replace.

CASE COVER REMOVAL PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the case cover(s).

MATERIALS NEEDED

8mm Metric ratchet socket key
250mm/10^ adjustable spanner

CASE COVER REMOVAL PROCEDURE *(CONTINUED)*

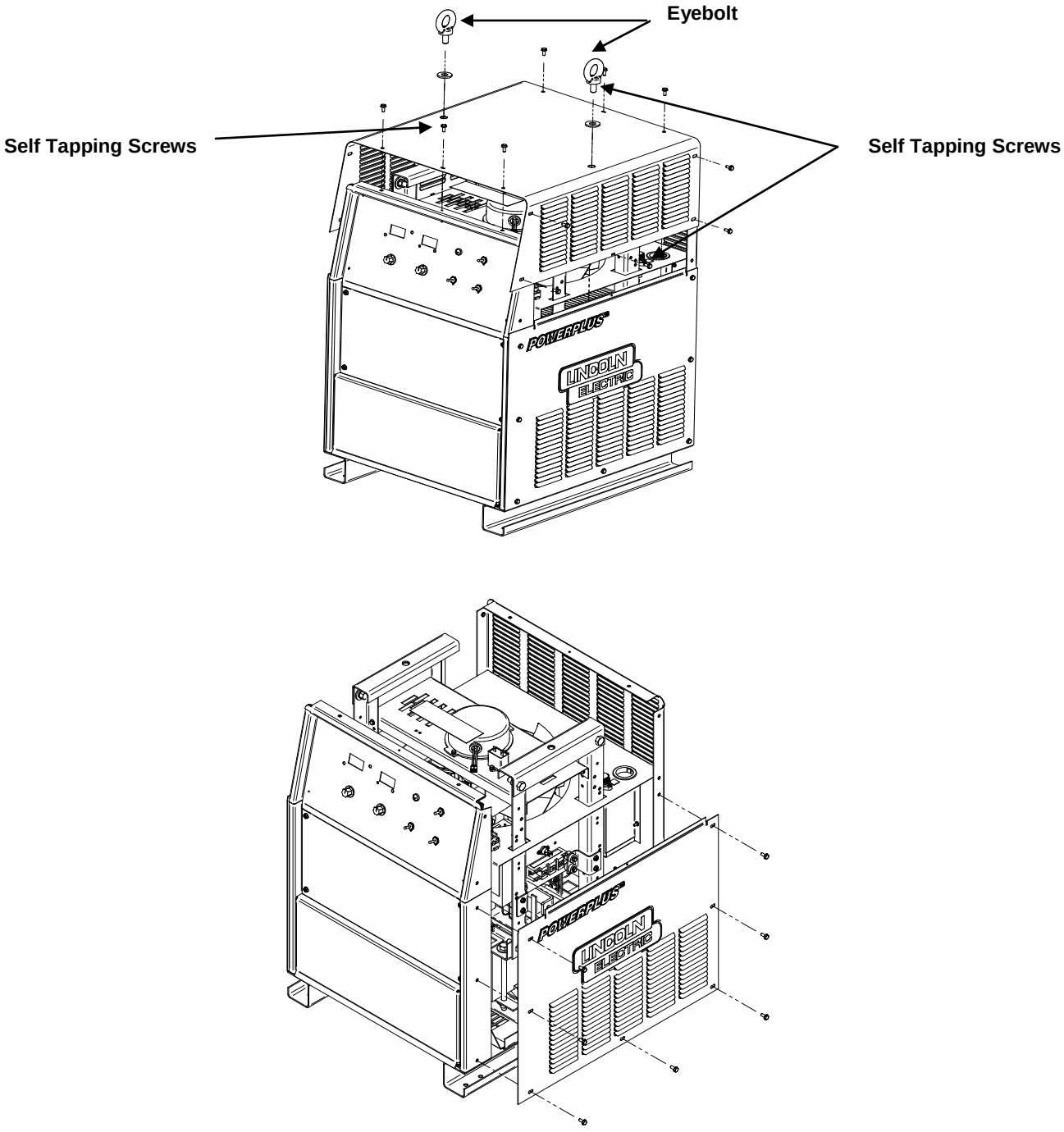
PROCEDURE

1. Disconnect the power to POWERPLUS™ II 500

2. Using a 8mm metric ratchet socket key removes the six screws and two eyebolts on top panel, and ten screws on both side. See Figure F.1

Note: The type of four top rear side screws is self tapping.

FIGURE F.1 – TOP AND RIGHT PANEL SCREW LOCATIONS



3. Then remove the seven screws on right panel. See FigureF.1
4. At last, remove the seven screws on left panel. See Figure F.2
5. Remove four screws on control PC board cover. See Figure F.3

FIGURE F.2 – LEFT PANEL SCREW LOCATIONS

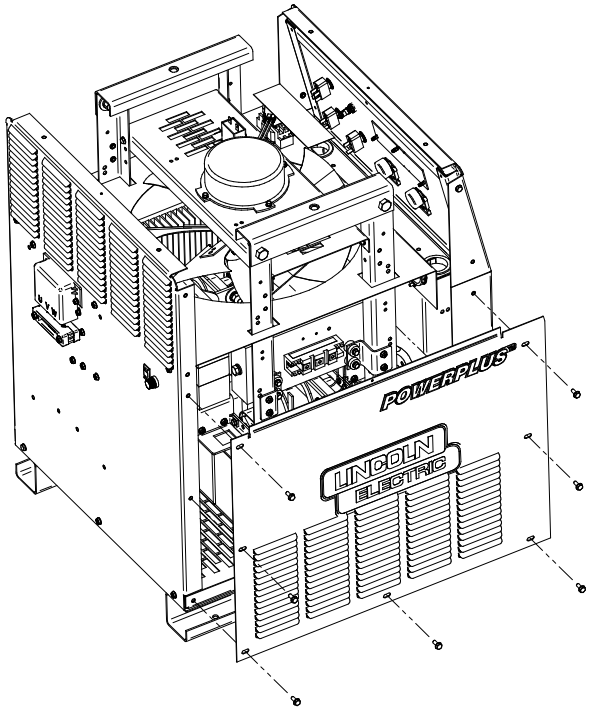
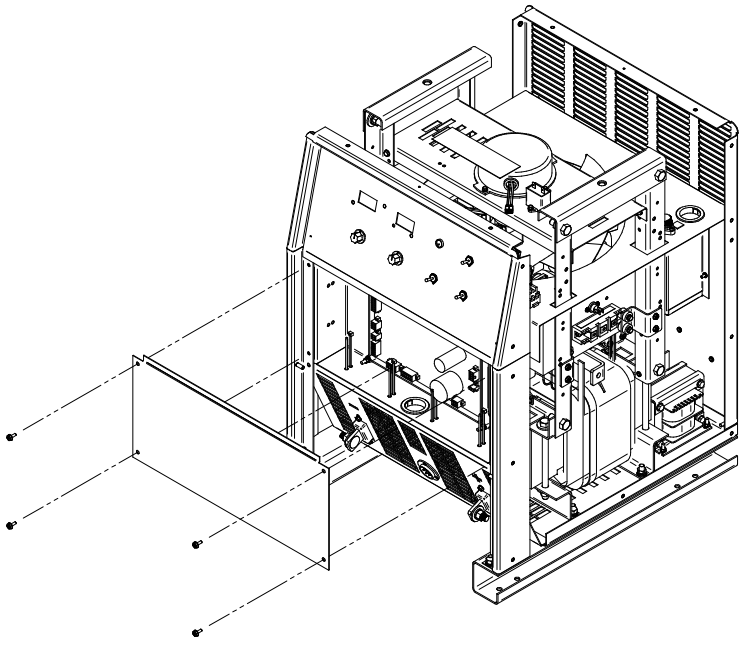


FIGURE F.3 – FRONT PANEL SCREW LOCATIONS



CONTROL PC BOARD REMOVAL PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

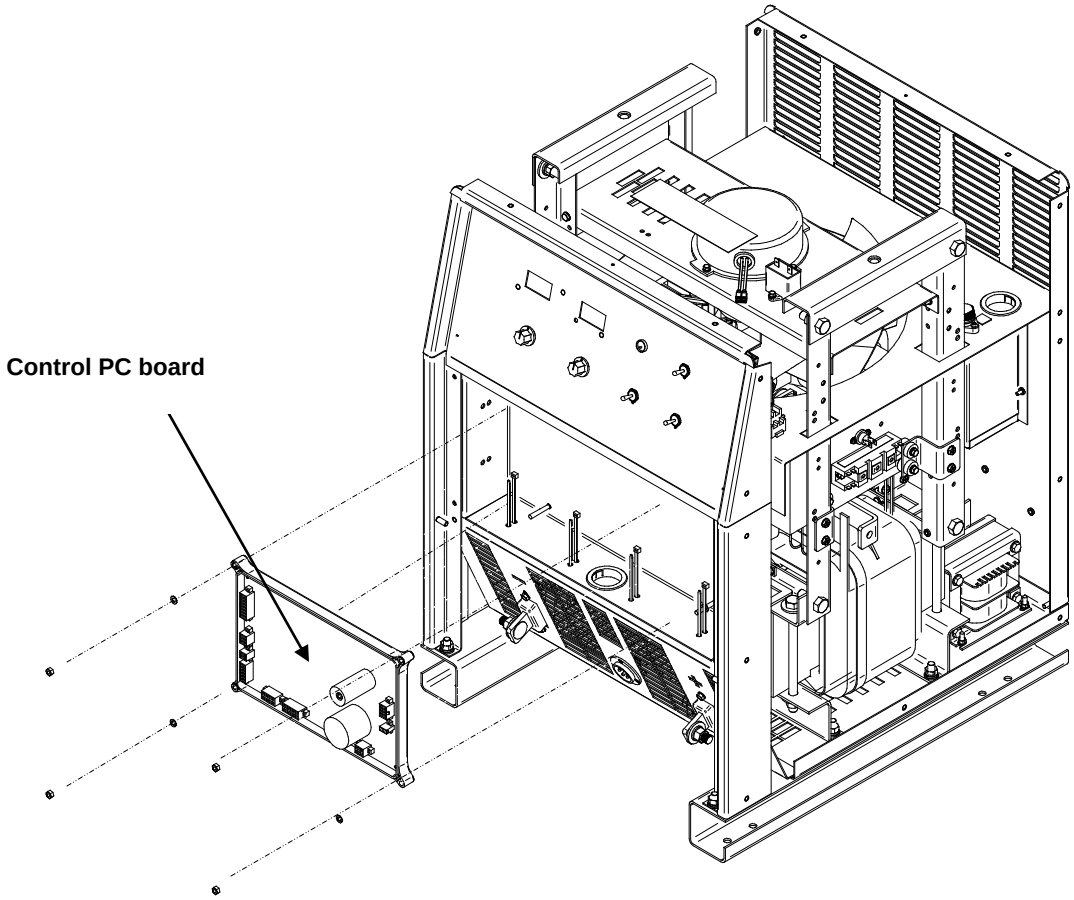
This procedure will aid the technician in the removal and replacement of the Control PC Board.

MATERIALS NEEDED

8mm Metric ratchet socket key

CONTROL PC BOARD REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.4 – CONTROL PC BOARD AND BOLTS LOCATION

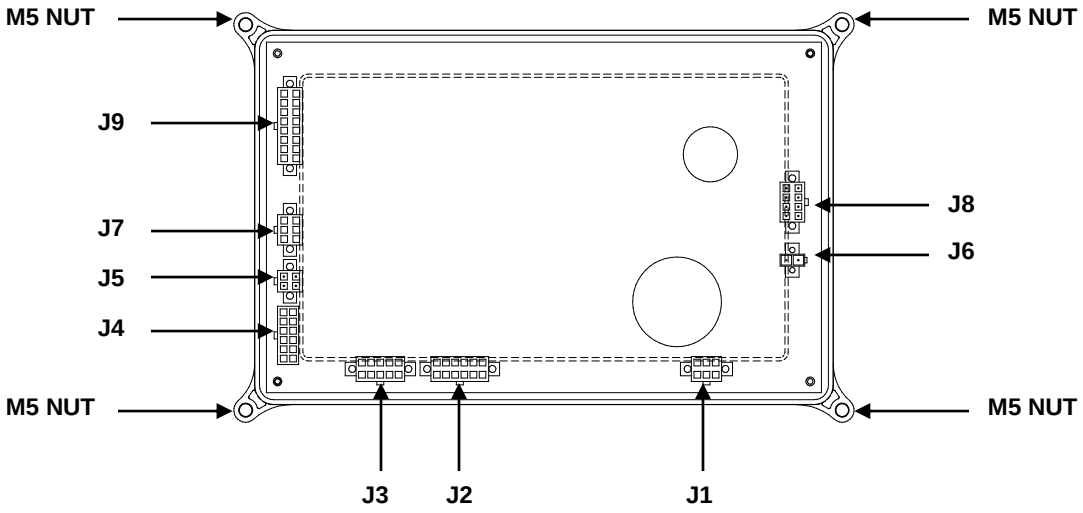


PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500
2. Perform the ***Case Cover Removal Procedure***
3. The control board is located behind front plate. See Figure F.4.

CONTROL PC BOARD REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.5 – CONTROL PC BOARD SOCKETS AND BOLTS LOCATION



4. Disconnect harness plugs from sockets J1，J2，J3，J4，J5，J6，J7，J8 and J9. See Figure F.5

5. Using 8mm socket key to loosen four screws, and remove the washes.

6. Then the control PC board can be taken out of the machine.

Note: The Molex connectors have electrical grease to prevent corrosion. Do not clean it off during the procedure.

Note: Keep plugs in right location while reinstalling the control PC board.

SCR MODULE REMOVAL PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

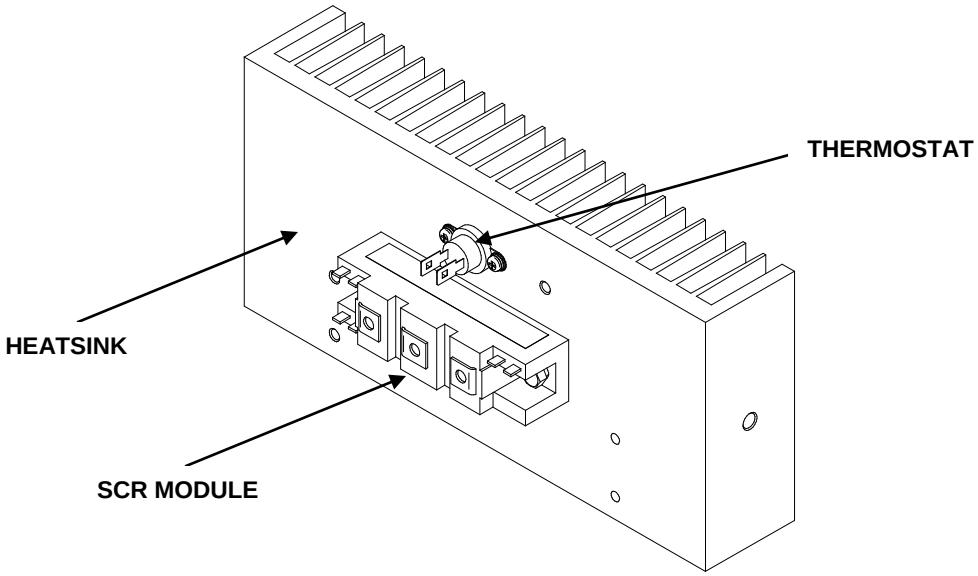
This procedure will aid the technician in the removal and replacement of the SCR module.

MATERIALS NEEDED

8mm Metric ratchet socket key
Thermal compound
Thermal electrical compound

SCR MODULE REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.6 – SCR MODULE LOCATION（RIGHT SIDE）



PROCEDURE

1. Disconnect power to the POWERPLUS™ II500.
2. Perform the ***Case Cover Removal Procedure.***
3. Disconnect the harness as following:
   SCR module on right side: 201 and 202，203 and 204, 205 and 206. See Figure F.7
   SCR module on left side: 207 and 208.，209 and 210，211 and 212. See Figure F.8

Note: Keep these leads in right connect while refixing SCR module. The left side heat sink doesn't have thermostat.

Note: Thermal compound is applied on interface between thermostat and heat sink while refixing thermostat to heat sink.

⚠ WARNING

High voltage is present at secondary windings of main transformer. High voltage can kill!

SCR MODULE REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.7 – SCR MODULE LEADS LOCATION（RIGHT SIDE）

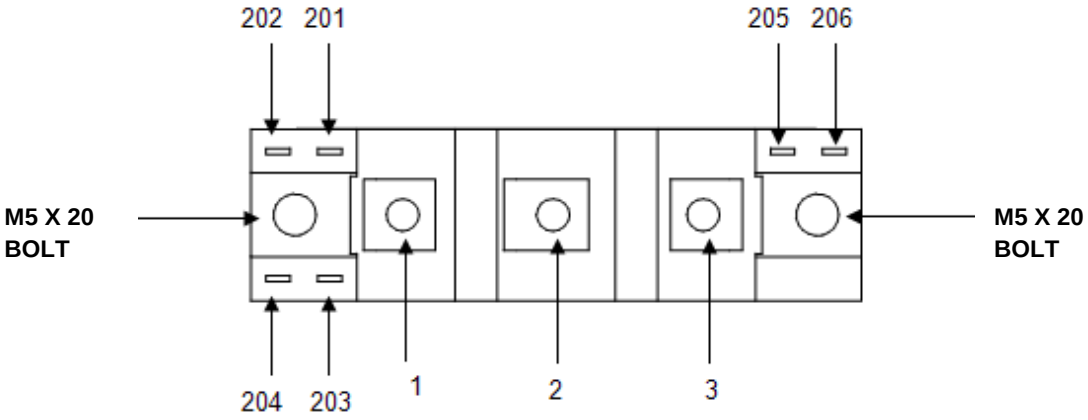
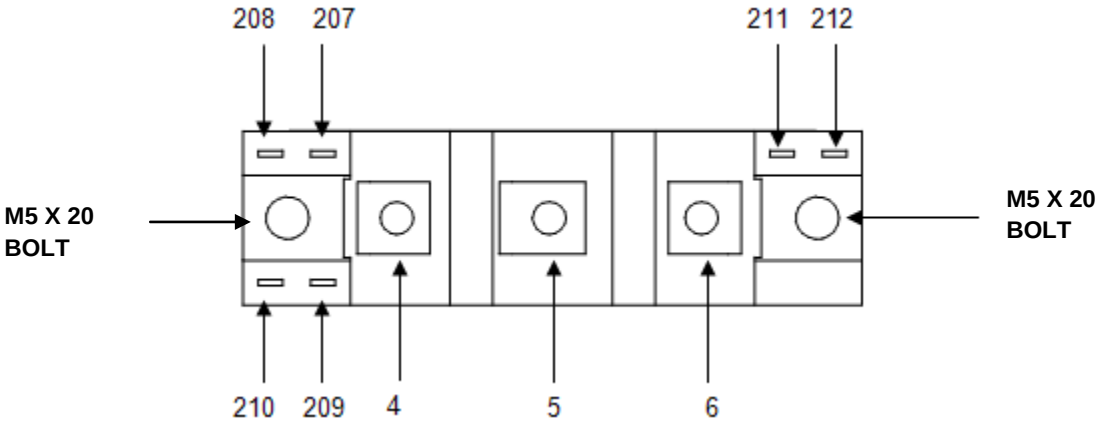


FIGURE F.8 – SCR MODULE LEADS LOCATION（LEFT SIDE）



4. Using 8mm metric ratchet socket key to loosen the starts of main transformer's secondary windings.

Note： SCR module on right side：1#，2# and 3#
SCR module on left side 4#，5# and 6#

Note: Keep the leads in right location while refixing the SCR module.

5. Using 8mm metric ratchet socket key to loosen bolts on SCR module.

6. Then, take the modules out.

⚠WARNING

High voltage is present at secondary windings of main transformer. High voltage can kill!

Note: Thermal electric compound is applied on interface between SCR module and heat sink while refixing SCR module to heat sink.

Note: The torque specs for SCE bolts are 4.7NM.

CONTACTOR REMOVAL PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

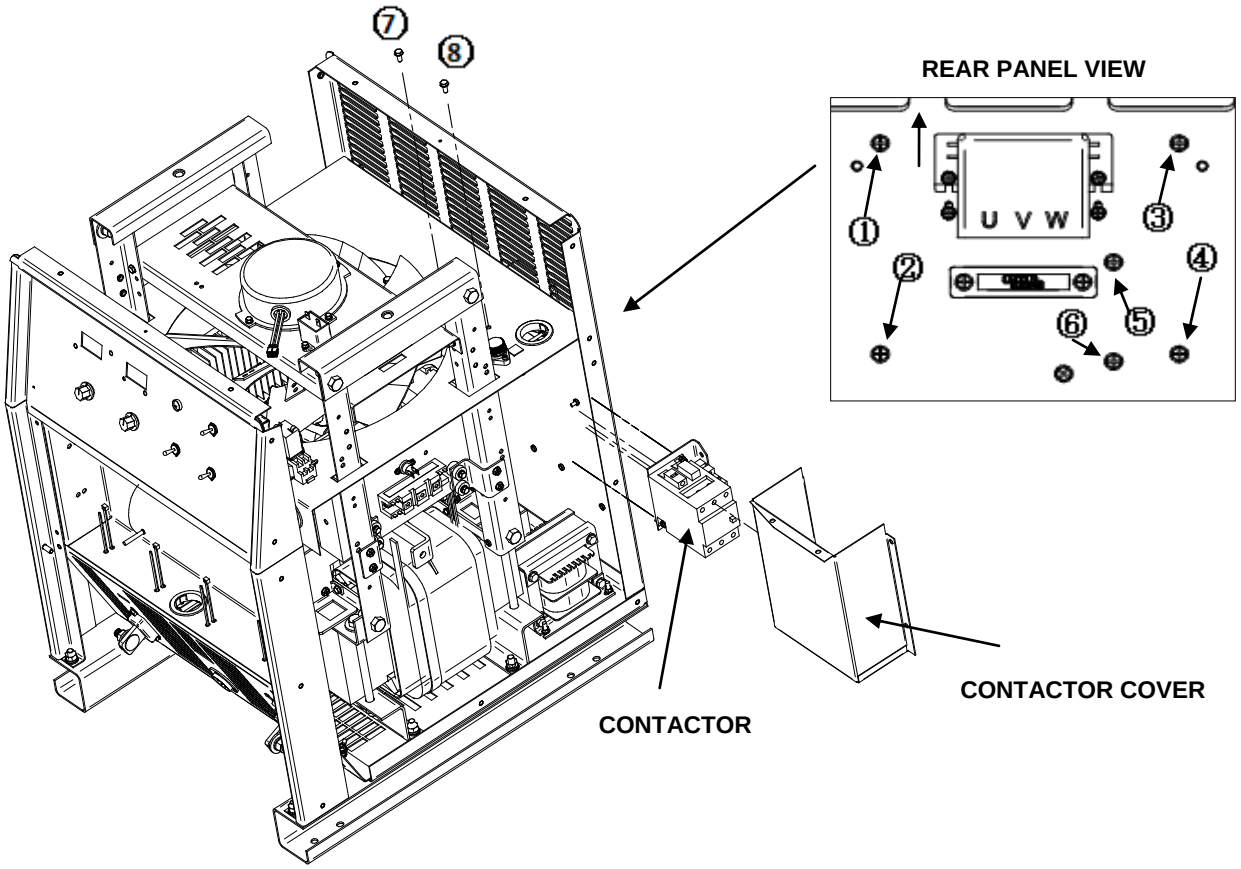
This procedure will aid the technician in the removal and replacement of the contactor.

MATERIALS NEEDED

7mm Metric ratchet socket key
8mm Metric ratchet socket key

CONTACTOR REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.9 CONTACTOR AND SCREWS LOCATION



PROCEDURE

1. Disconnect power to the POWERPLUS ™ II 500.
2. Perform the ***Case Cover Removal Procedure.***
3. Locate the contactor.
4. Loosen the four screws on rear panel (①②③④) and two screws on middle panel (⑦⑧). See Figure F.9.
5. Take the contactor cover out.
6. Disconnect the leads from contactor as following:
   L1, L2, L3, T1, T2, T3, A1, A2
   See Figure F.10.

Note: Keep the leads in right location while refixing the contactor.

7. Loosen the two screws (⑤⑥) fixing contactor and bracket assembly.
8. Then take out the contactor and bracket assembly.

⚠ WARNING

High voltage is present at contact leads. High voltage can kill!

CONTACTOR REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.10 CONTACTOR LEADS LOCATION

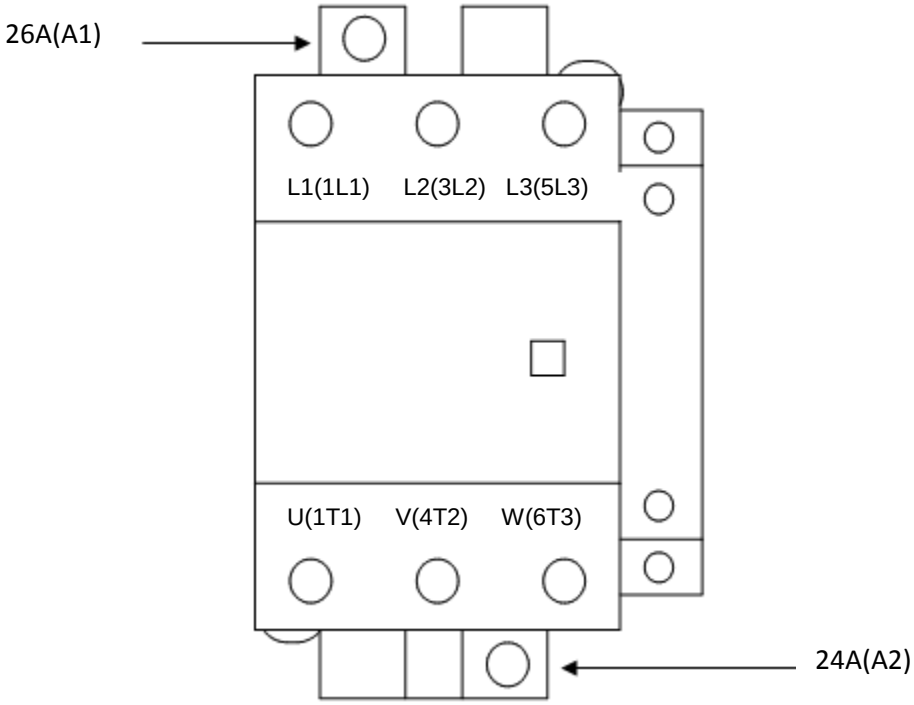
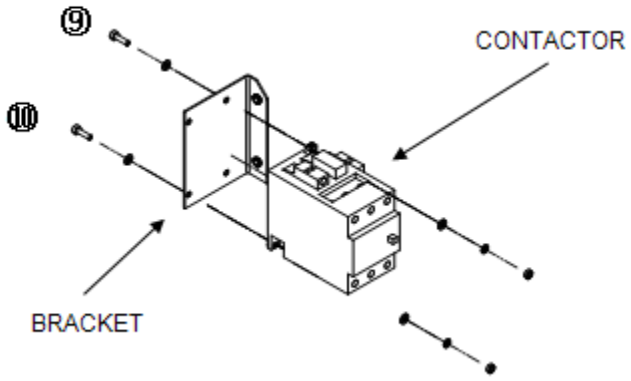


FIGURE F.11 CONTACTOR AND BRACKET LOCATION



9. Loosen two screws (⑨⑩) to remove contactor from bracket. See Figure F.11.

10. Then take contactor out.

FAN MOTOR REMOVAL PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

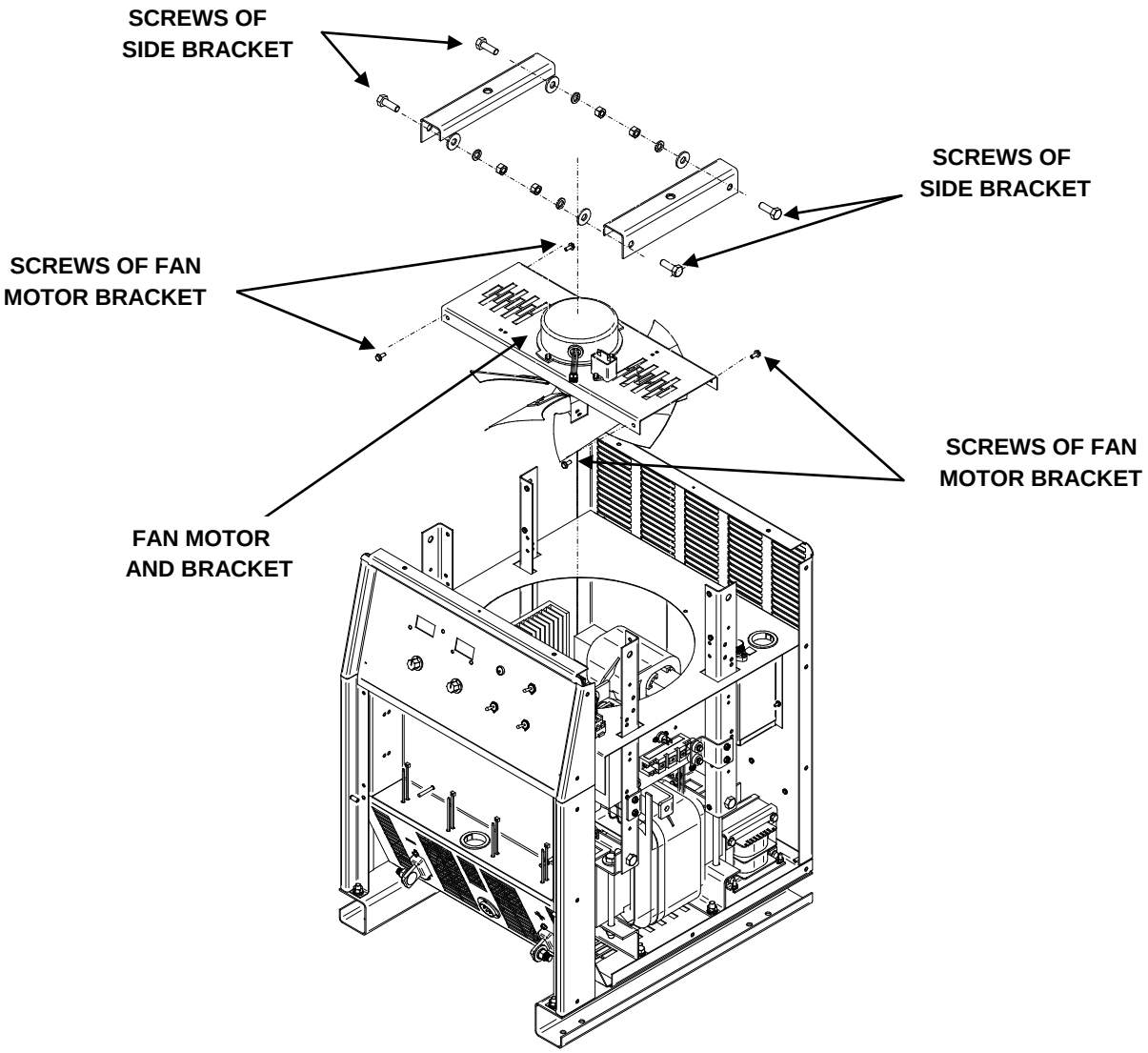
This procedure will aid the technician in the removal and replacement of the fan motor.

MATERIALS NEEDED

8mm Metric ratchet socket key
7mm Metric ratchet socket key
Cross Screwdriver
Lock-Tight (Glue)

FAN MOTOR REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.12 FAN MOTOR LOCATION



PROCEDURE

1. Disconnect the power to POWERPLUS™ II 500.
2. Perform the ***Case Cover Removal Procedure.***
3. Locate the fan motor.
4. Loosen the four screws of both side brackets. See Figure F.12.
5. Disconnect the leads #11 and #12 of fan motor.
6. Loosen four screws of fan motor bracket. See Figure F.12.

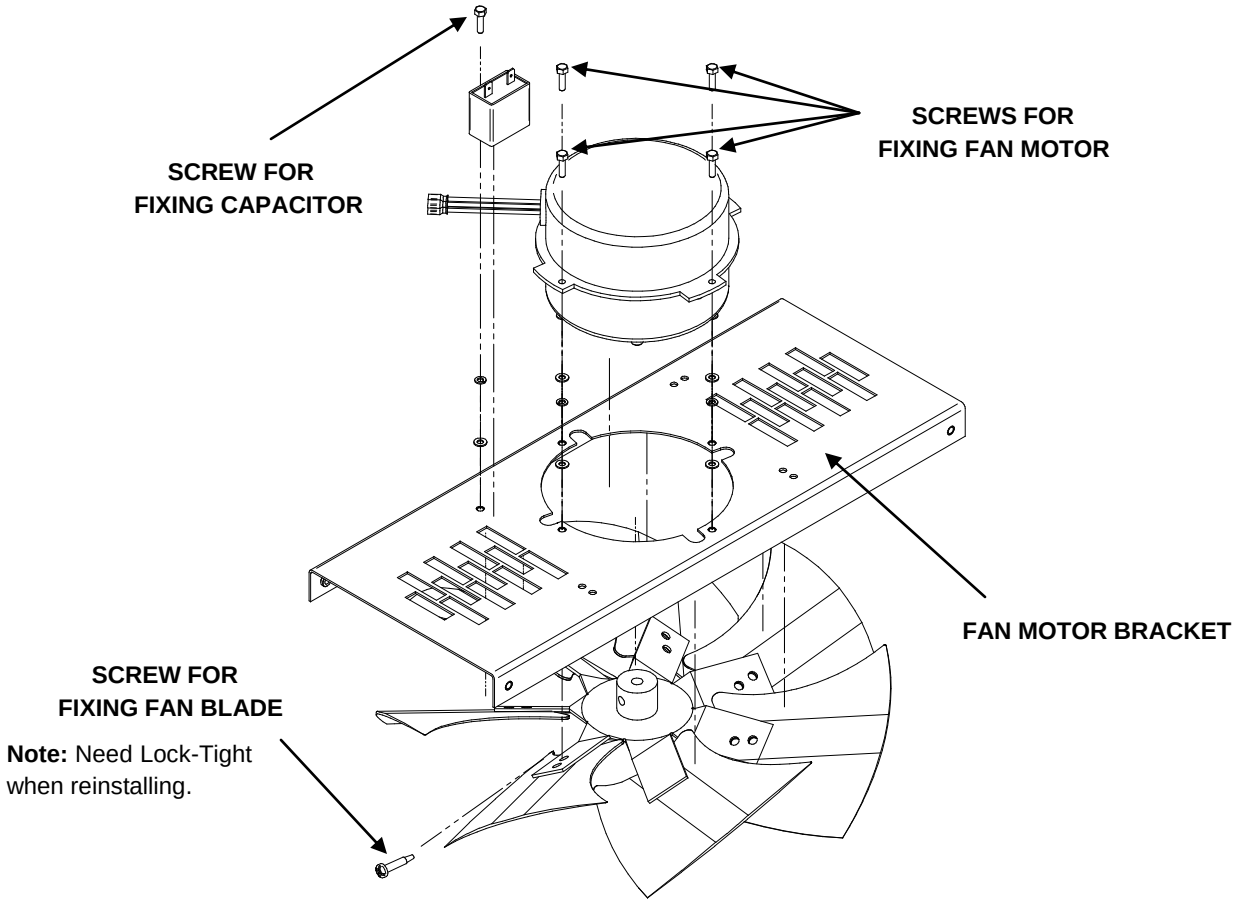
Note: Keep the leads in right location while refixing the fan motor.

⚠ WARNING

High voltage is present at fan motor leads. High voltage can kill!

CONTACTOR REMOVAL PROCEDURE *(CONTINUE)*

FIGURE F.13 FAN MOTOR AND BRACKET LOCATION



7. Use Phillips screwdriver to loosen one screw on fan blade. See Figure F.13

8. Remove fan blade from fan motor.

Note: Sharp fan blade can cause scuffing.

9. Unplug the connecting wire of fan motor and capacitor.

⚠ WARNING

High voltage is still present at capacitor while disconnect power. High voltage can kill!

10. Loosen the four screws on bracket. See Figure F.13.

11. Take fan motor out.

12. Loosen one screw on capacitor, and then take it out. See Figure F.13.

Note: Keep the leads in right location while refixing the fan motor.

⚠ WARNING

High voltage is present at fan motor leads. High voltage can kill!

CONTROL PC BOARD TEST PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if the control PC board is functioning properly.

MATERIALS NEEDED

8mm Metric ratchet socket key

Wiring diagram

FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

CONTROL PC BOARD TEST *(CONTINUE)*

FIGURE F.14 – CONTROL PC BOARD LEAD LOCATION

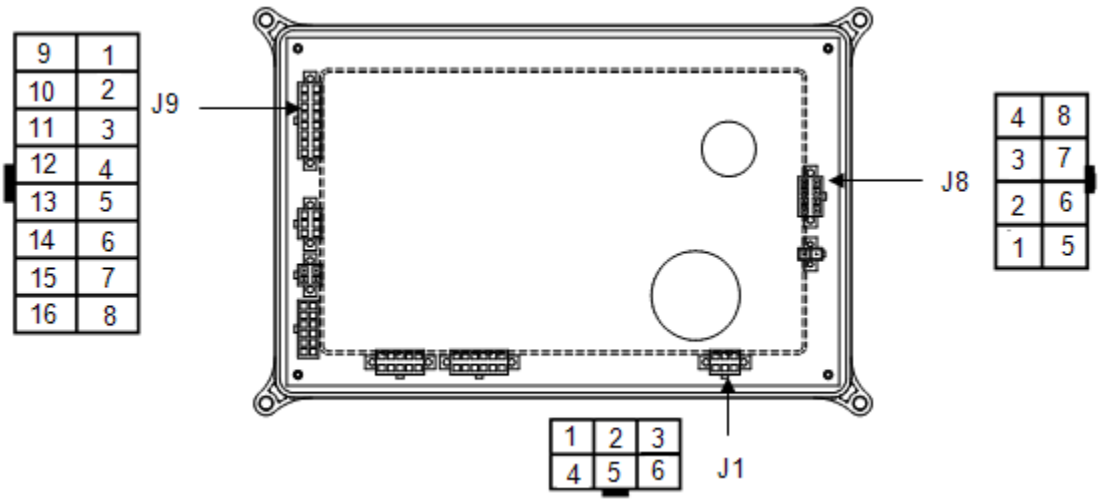


TABLE F.1 – CONTROL PC BOARD TEST POINT WHICH RELATED WITH CONTACTOR DIVING PART

TEST POINT TERMINALS		DIGITAL MULTI-METER DIODE MODE
+ PROBE	**- PROBE**	**ACCEPTABLE READINGS**
J8-2	J8-3	0.54±0.2V
J8-3	J8-2	∞

PROCEDURE

1. Disconnect power to the POWERPLUS ™ II 500.
2. Perform the ***Case Cover Removal Procedure.***
3. Locate the control PC board.
4. Unplug J1，J8 andJ9. See Figure F.14
5. Actions as following according to fail mode:

   Contactor no action: Using the digital multi-meter in diode check mode to perform the test details in table F.1.

   No output voltage from wire motor: Using the digital multi-meter in diode check mode to perform the test details in table F.2

   Low open-circuit voltage: Using the digital multi-meter in diode check mode to perform the test details in table F.3.

   The control PC board is probably faulty if there is no acceptable reading as table F.10 shown, and then replaces it. See ***Control PC Board Removal Procedure.***

CONTROL PC BOARD TEST *(CONTINUE)*

TABLE F.2 – CONTROL PC BOARD TEST POINT RELATED WITH WIRE FEEDER MOTOR DRIVING PART

TEST POINT TERMINALS		DIGITAL MULTI-METER DIODE MODE
+ PROBE	- PROBE	ACCEPTABLE READINGS
J8-2	J8-5	0.45±0.1V
J8-5	J8-2	∞
J1-1	J1-2	∞
J1-2	J1-1	0.37±0.1V
J1-1	J8-5	0.53±0.1V
J8-5	J1-1	∞

TABLE F.3 – CONTROL PC BOARD TEST POINT RELATED WITH SCR MODULE DRIVING PART

TEST POINT TERMINALS		DIGITAL MULTI-METER DIODE MODE
+ PROBE	- PROBE	ACCEPTABLE READINGS
J9-1	J9-9	0.47±0.1V
J9-9	J9-1	∞
J9-2	J9-10	0.47±0.1V
J9-10	J9-2	∞
J9-3	J9-11	0.47±0.1V
J9-11	J9-3	∞
J9-5	J9-13	0.47±0.1V
J9-13	J9-5	∞
J9-6	J9-14	0.47±0.1V
J9-14	J9-6	∞
J9-7	J9-15	0.47±0.1V
J9-15	J9-7	∞

SCR MODULE TEST PROCEDURE

⚠ 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 these procedure or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if the SCR module is functioning properly.

MATERIALS NEEDED

8mm Metric ratchet socket key

Wiring diagram

FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

SCR MODULE TEST *(CONTINUE)*

FIGURE F.7 – SCR MODULE LEADS LOCATION (RIGHT SIDE)

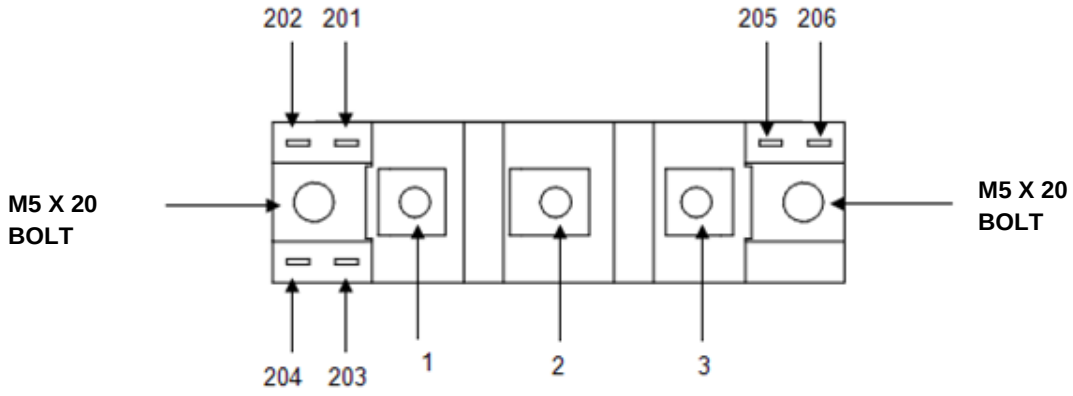


FIGURE F.8 – SCR MODULE LEADS LOCATION (LEFT SIDE)

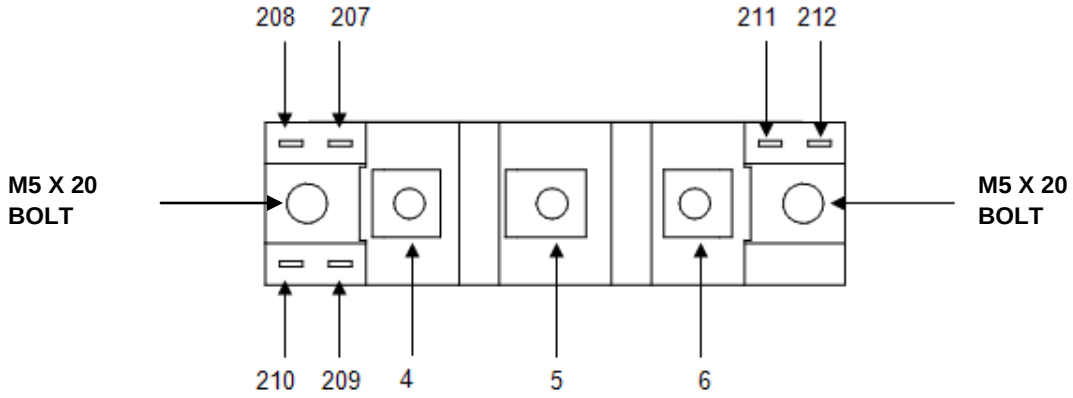
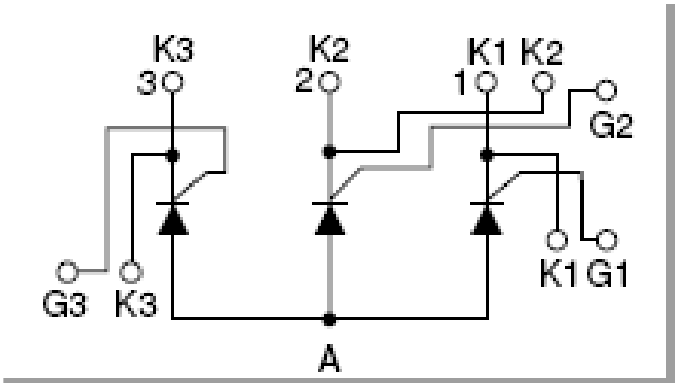


FIGURE F.15 – SCR MODULE WIRING DIAGRAM



SCR MODULE TEST *(CONTINUE)*

TABLE F.4 – SCR MODULE TEST POINT

TEST POINT TERMINALS		DIGITAL MULTI-METER RESISTANCE MODE
+ PROBE	**- PROBE**	**ACCEPTABLE READINGS**
1 (K1)	A	∞
2 (K2)		∞
3 (K3)		∞
A	1 (K1)	∞
	2 (K2)	∞
	3 (K3)	∞
K1	G1	7.8 ± 1Ω
K2	G2	7.8 ± 1Ω
K3	G3	7.8 ± 1Ω

PROCEDURE

1. Disconnect power to the POWERPLUS ™ II 500
2. Perform the ***Case Cover Removal Procedure.***
3. Unplug the leads as following:

   SCR module on right side: 201and 202, 203and 204, 205and 206. See Figure F.7
   SCR module on left side: 207and 208, 209and 210，211and 212. See Figure F.8
4. Using 8mm socket key to loosen the bolts on SCR module.

Note: SCR module on right side 1#，2#和 3#
SCR module on left side 4#，5#和 6#

Note: Keep the leads in right location while changing SCR module.

5. Use the digital multi-meter in resistance mode to perform the test detailed in Table F.4. See the wiring diagram Figure F.15.
6. SCR module is probably faulty if no acceptable reading as table F.1 shown. See ***SCR module Removal Procedure.***

Note: Check if control PC board and main transformer are functioning proper or not before changing SCR module.

⚠ WARNING

High voltage is present at secondary windings of main transformer. High voltage can kill!

FAN MOTOR TEST PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if both fan motor and capacitor are functioning properly.

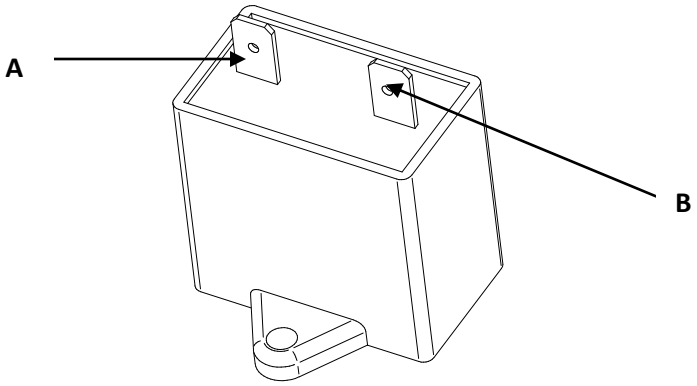
MATERIALS NEEDED

8mm Metric ratchet socket key
7mm Metric ratchet socket key
Adjustable Spanner
Wiring diagram
FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

FAN MOTOR TEST *(CONTINUE)*

FIGURE F.16 FAN MOTOR LEADS LOCATION

FIGURE F.17 MOTOR CAPACITOR LEADS LOCATION



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500.
2. Perform the ***Case Cover Removal Procedure.***
3. Locate fan motor and capacitor. See Figure F.16
4. Unplug the wires #11 and #12 connecting with fan motor and power source.

Note: Keep the leads in right location while refixing the fan motor.

⚠ WARNING

High voltage is present at fan motor leads. High voltage can kill!

5. Unplug the connecting wire of fan motor and capacitor. See Figure F.17.

Note: Keep the leads in right location while refixing the fan motor.

⚠ WARNING

High voltage is still present at capacitor while disconnect power. High voltage can kill!

FAN MOTOR TEST *(CONTINUE)*

TABLE F.5 – FAN MOTOR TEST POINT

LEAD IDENTIFICATION	NORMAL EXPECTED RESISTANCE
BLACK AND BLUE	242±2Ω
BROWN AND BROWN	203±2Ω
SHELL OF MOTOR TO WIRES	∞

TABLE F.6 – MOTOR CAPACITOR TEST POINT

LEAD IDENTIFICATION	NORMAL EXPECTED CAPACITANCE
A AND B	4μF

6. Use the digital multi-meter in resistor mode to perform the test detailed in Table F.5

7. Fan motor is probably faulty if no acceptable reading as table F.5 shown. See ***Fan Motor Removal Procedure.***

Note: It is probably the fuse inside failed while primary of Aux transformer opening. Don't change the fuse.

8. Use the digital multi-meter in resistor mode to perform the test detailed in Table F.6.

9. Motor capacitor is probably faulty if no acceptable reading as Table F.6 shown. Then change the capacitor.

.

AUXILIARY TRANSFORMER 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if any output coil of the auxiliary transformer is damaged.

MATERIALS NEEDED

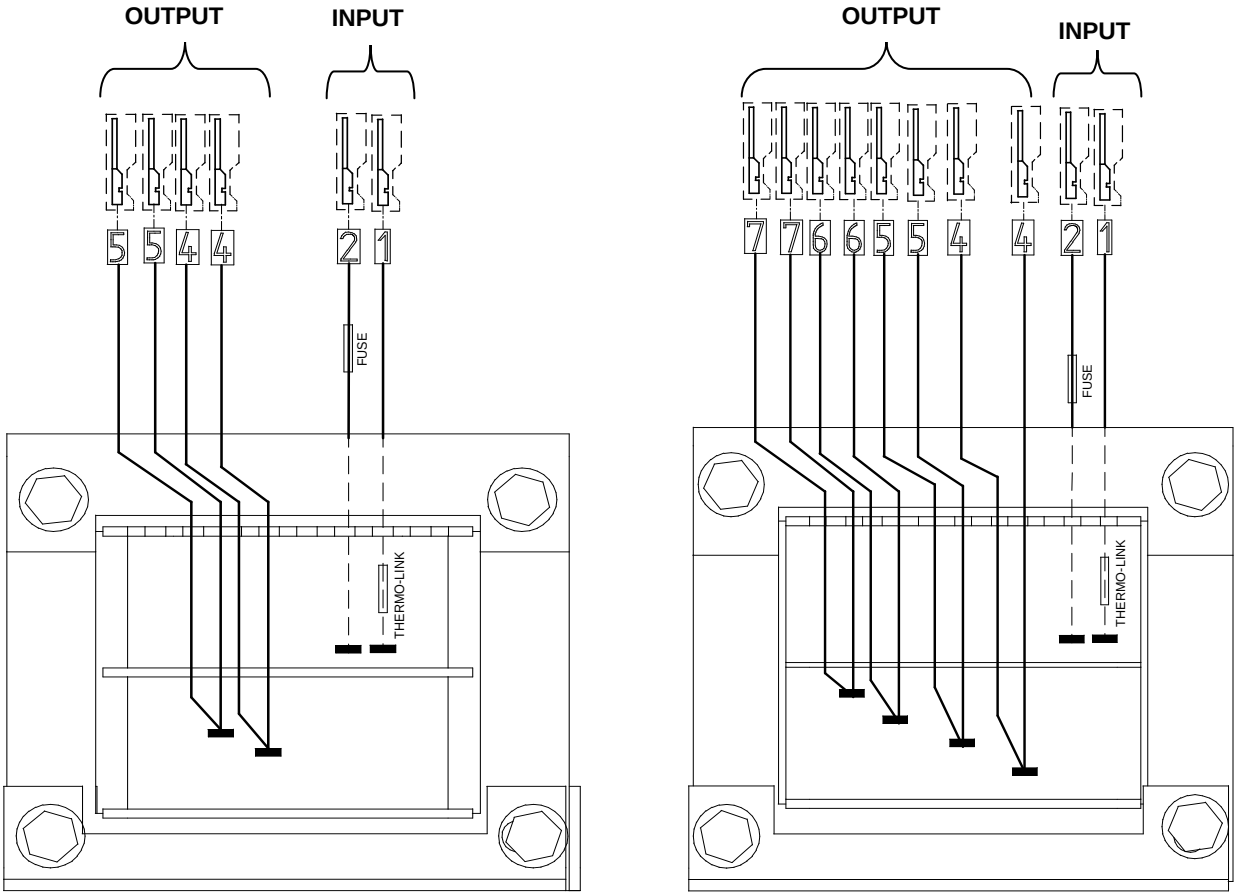
8mm Metric ratchet socket key

Wiring diagram

FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

AUXILIARY TRANSFORMER TEST *(CONTINUE)*

FIGURE F.18 – AUXILIARY TRANSFORMER LEADS LOCATION



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500
2. Perform the ***Case Cover Removal Procedure***
3. Locate the Auxiliary Transformer. See Figure F.18.
4. Unplug leads both of primary and secondary:

For machine code 76075: 1 and 2, 4 and 5

For machine code 76074: 1 and 2; 4 and 5; 6 and 7.
Note: The winding numbers of #4 and #5 is same.

⚠ WARNING

Electric Shock can kill. High voltage is present at primary of Auxiliary Transformer.

AUXILIARY TRANSFORMER TEST *(CONTINUE)*

TABLE F.7.1 – AUXILIARY TRANSFORMER TEST (FOR MACHINE CODE 76075)

LEAD IDENTIFICATION	NORMAL EXPECTED RESISTANCE
1 and 2	4.3±0.2Ω
4 and 5	0.2±0.2Ω
1 and 4(or 2 and 4)	∞

TABLE F.7.2 – AUXILIARY TRANSFORMER TEST(FOR MACHINE CODE 76074)

LEAD IDENTIFICATION	NORMAL EXPECTED RESISTANCE
1 and 2	4.3±0.2Ω
4 and 5	0.2±0.2Ω
1 and 4(OR 2 and 4)	∞
1 and 5(OR 2 and 5)	∞
1 and 6(OR 2 and 6)	∞
1 and 7(OR 2 and 7)	∞

5. Power 380V AC on Aux transformer.

6. Using digital multi-meter to test the voltage between point 4 and 5. The acceptable value is 38 ± 0.5V (input 380V).

Perform Step 8 if value missing or low.

7. **For machine code 76075**: Replug connecting wire 1 and 2. See Figure F.18

For machine code 76074: Replug connecting wire 7 and 8. See Figure F.18

8. Using digital multi-meter in resistor mode to perform the test detailed in table:

For machine code 76075: Table F.7.1

For machine code 76075: Table F.7.2

9. If correct resistance is present, the auxiliary transformer is functioning properly. If any of the resistance is missing or low, the auxiliary transformer may be faulty.

10. If the auxiliary transformer is faulty, replace.

Note: Fuse inside is probably blowout while the primary of auxiliary transformer opening. Do not disassembly the auxiliary transformer.

CONTACTOR TEST PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

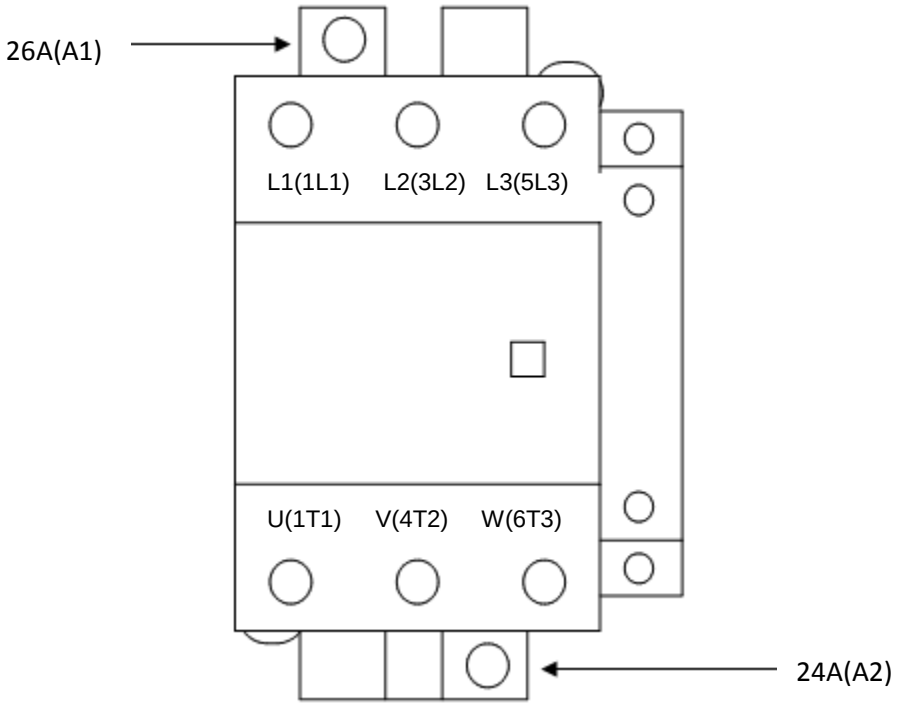
This procedure will help determine if contactor is functioning properly.

MATERIALS NEEDED

8mm Metric ratchet socket key
Cross Screwdriver
Wiring diagram
FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

CONTACTOR TEST *(CONTINUE)*

FIGURE F.10 CONTACTOR LEADS LOCATION



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500
2. Perform the ***Case Cover Removal Procedure***
3. Remove contactor cover, and locate contactor. See Figure F.10.
4. Disconnect the leads as following:
   L1, L2, L3, T1, T2, T3 See Figure F.10.
   wrap the whole terminals with insulation tape to keep the terminals insulated.
5. Power 36V AC on points A1 and A2. See Figure F.10. Perform Step 7 if contact is no action.
6. Using digital multi-meter in resistor mode to test resistance for following points:
   L1 and T1, L2 and T2, L3 and T3 See Figure F.10.

Note: All of acceptable resistance should be 0 Ω. If there is any resistance value missing, the contactor probably failed then.

7. Remove A1 and A2
8. Using digital multi-meter to test coil resistance of contactor. The acceptable resistance is 9 Ω. If there's any resistance value missing or low, then contactor is probably failed.
9. If contactor is faulty, then replace it.

⚠WARNING

Electric Shock can kill. High voltage is present at contactor coil.

RESISTANCE OF OUTPUT TERMINAL TEST PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if function of major loop and latching resistor is properly.

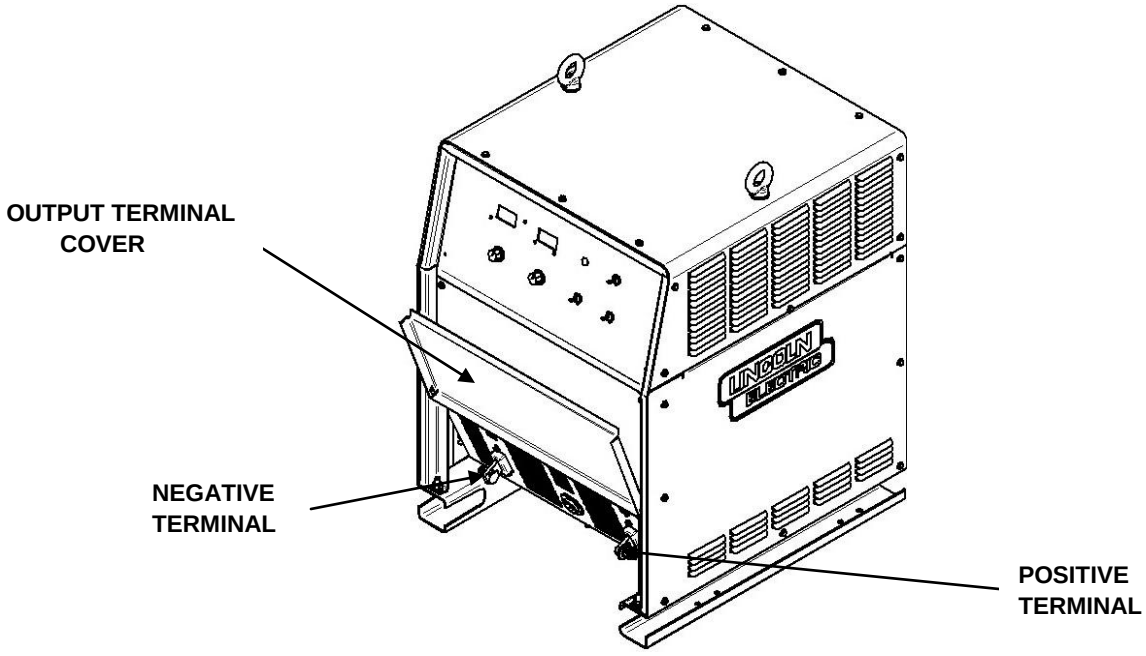
MATERIALS NEEDED

Wiring diagram

FLUK B15 Digital Multi-meter (**Note: The values listed in this manual are verified with FLUK B15 Multi-meter. Different brand meters could cause value change.)**

RESISTANCE OF OUTPUT TERMINAL TEST *(CONTINUE)*

FIGURE F.19 OUTPUT TERMINAL LOCATION



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500
2. Remove output terminal cover. See Figure F.19.
3. Locate negative and positive terminal. Disconnect the power cables to both terminals. See Figure F.19.
4. Using digital multi-meter to test resistance of output terminals.

NOTE: The acceptable resistance is 75 Ω. If the value is low, perform ***SCR Module Test Procedure***.

FUNCTION TEST AND ERROR CODE SHOWN

⚠ WARNING

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If for any reason you do not understand these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help detect if the whole system is functioning proper.

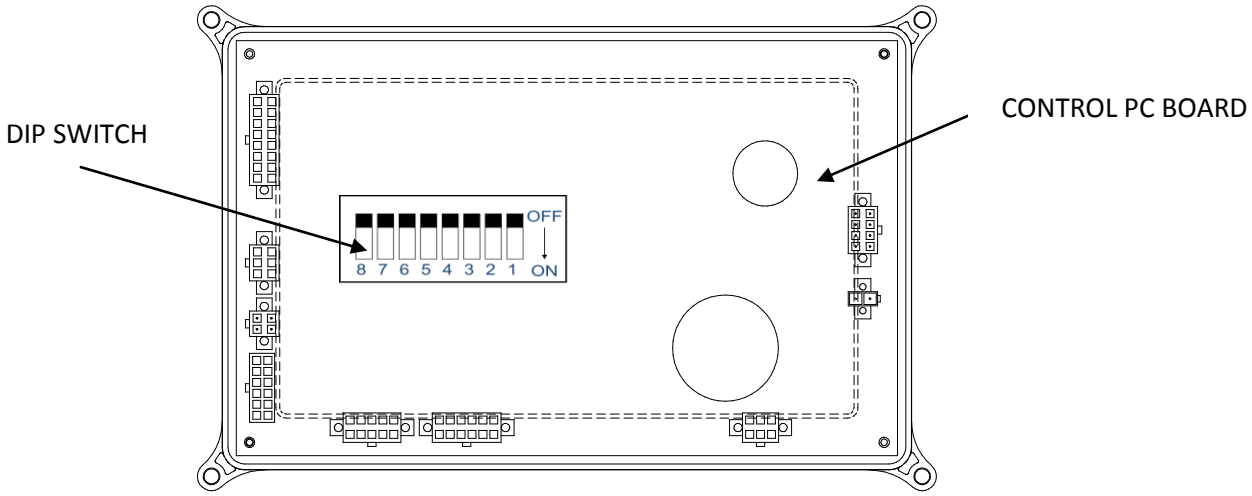
MATERIALS NEEDED

8mm metric ratchet socket key

NOTE: This function is related with software and applicable for machine installed control board S26900 or S28483.

FUNCTION TEST AND ERROR CODE SHOWN (*CONTINUE*)

FIGURE F.20 – DIP SWITCH LOCATION AND SETTING



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500

2. Perform the front panel removal procedure

3. Locate DIP switch on control PC board. See Figure F.20

4. Set DIP switch #2 、#3、#4、#5、#6、#7 和#8 on "ON", all the others are on "OFF"

Note： Note down the DIP switch's original setting before changing.

5. The crater switch must be in the OFF position, WELD/GAS switch in the WELD position.

Note: Do not change any setting of DIP switch randomly.

Note: The crater switch will be used to step through the functional test steps. To step forward a step, the crater switch is switched to the up position and then back to the down position.

FUNCTION TEST AND ERROR CODE SHOWN (*CONTINUE*)

FIGURE F.21 – DIP SWITCH SETTING - TEST MODE

6. Both of displays must read “888” while turning power on. Then turn to software version. After two seconds, both if displays must read “---”.
7. **Step1: Crater current potentiometer test**.
   The left display reads “1” (for test step #1), and the right display reads a number from 0~100 representing the position of the potentiometer. When the crater current potentiometer is fully counter-clockwise, the right display must read “0”. When the crater current potentiometer is fully clockwise, the right display must read “100”. The display should change smoothly from 0 to 100 as the knob is rotated.
8. **Step 2. Crater voltage potentiometer test**.
   The left display reads “2” (for test step #2), and the right display reads a number from 0 to 100 representing the position of the potentiometer. When the crater voltage potentiometer us fully counter-clockwise, the right display must read “100”. The display should change smoothly from 0 to 100 as the knob is rotated.
9. **Step 3: feeder “volts” potentiometer test**.
   The left display reads “3” (for test step #3), and the right display reads a number from 0 to 100 representing the position of the potentiometer. When the feeder “volts” potentiometer is fully counter-clockwise, the right display must read “0”. When the feeder “volts” potentiometer is fully clockwise, the right display must read “100”. The display should change smoothly from 0 to 100 as the knob is rotated.
10. **Step 4: feeder “WFS” potentiometer test**.
    The left display reads “4 (for test step #4), and the right display reads a number from 0 to 100 representing the position of the potentiometer. When the feeder “WFS” potentiometer is fully counter-clockwise, the right display must read “0”. When the feeder “WFS” potentiometer is fully clockwise, the right display must read “100”. The display should change smoothly from 0 to 100 as the knob is rotated.
11. **Step 5: SWITCH / BUTTON TEST**
    With the crater switch “4-STEP (CRATER-ON) / 2-STEP (CRATER-OFF) on “4-STEP (CRATER-ON)”, the left display must read “5”, the right display must read “18”.
    With the crater switch “4-STEP (CRATER-ON) / 2-STEP (CRATER-OFF) on “2-step (crater-off), the right display must read “16”.
    With only the trigger input closed, the right display must read “17”. Open the trigger input, the right display must read “16” again.
    With only the “GAS PURGE” button pressed, the right display must read “80”. Release the “GAS PURGE” button, the right display must read “16” again.
    With only the “COLD INCH” button pressed, the right display must read “144”. Release the “COLD INCH” button, the right display must read “16” again.
    With the “GAS ADJUST/WELD” switch in the “GAS ADJUST” position, the right display must read “20”. Switch the “GAS ADJUST/WELD” switches back to the “WELD” position, the right display must read “16” again.
12. **Step 6: LED test**
    The displays read “8.8.8” “8.8.8”. The led below the “VOLTS” display must be ON. The thermal led is ON.
13. **Step 7: Jumper test.**
    POWERPLUS™ II 500 displays “3”.
14. **Step 8: control PC board software version display：1.01 or higher versions(S28483)**
15. **Step 8: control PC board software version display：2.02 or higher versions (S28483)**
16. **Step 8: control PC board software version display：6.01 or higher versions (S28483)**

FUNCTION TEST AND ERROR CODE SHOWN (*CONTINUE*)

FIGURE F.22 – DIP SWITCH SETTING - ERRO CODE DISPLAY MODE

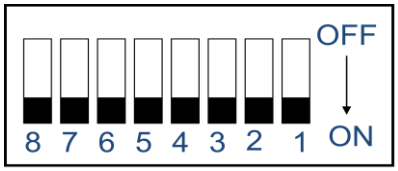


TABLE F.8 – ERRO CODE

Erro code	Thermal led status	Failure description
Err 059	2s ON，1s OFF	Zero cross harness erro
Err 049	2s ON，0.5s OFF	Phase detection erro
Err 041	Solid ON	Over current protection
Err 036	Solid ON	Temperature protection
Err 081	0.5s ON，0.5s OFF	Motor over current error
Err 039	0.5s ON，2s OFF	Power supply frequency is out of range
Err 032	No response	Under input voltage 340V
Err 034	No response	Over input voltage 460V

PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500.
2. Toggle “4-STEP (CRATER-ON) / 2-STEP (CRATER-OFF) switch to “2-STEP (CRATER-OFF), “WELD/ GAS ADJUST” to “WELD”.
3. Switch all DIP switches to the ON. See Figure.22.
4. Turn power on。
5. There are 15 memory slots for logging errors. E00 represents the most recent error and E14 would be the oldest.

Note: When the switch is toggled back to the welding position, the error logs will have been cleared and the display will go back to normal error log display operation.

THE CALIBRATION PROCEDURE OF WFS

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

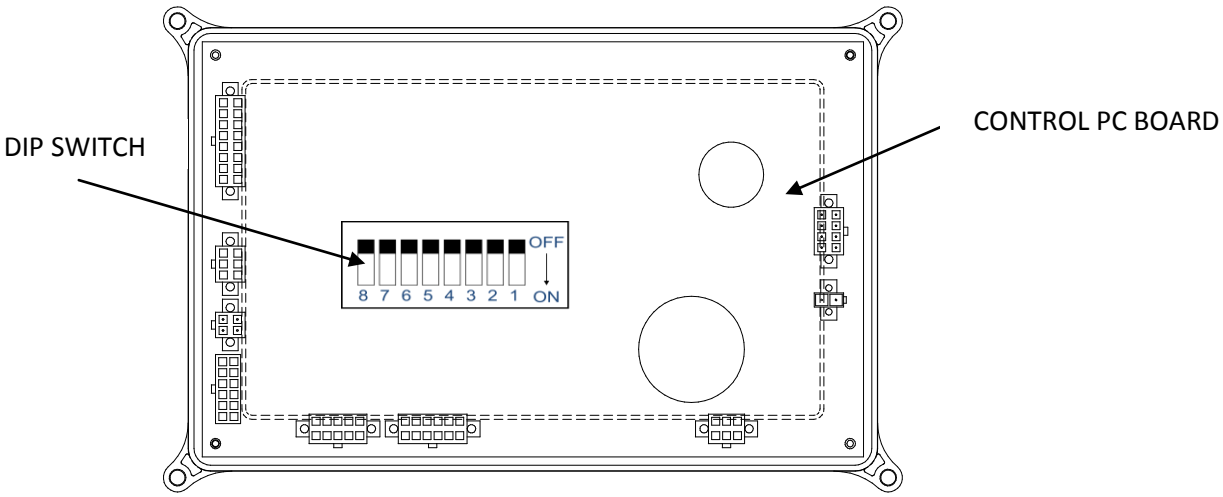
This procedure will help calibrate wire feeder speed to acceptable range.

MATERIALS NEEDED

Tachometer
8mm metric ratchet socket key
Wiring Diagram

THE CALIBRATION PROCEDURE OF WFS *(CONTINUE)*

FIGURE F.23 – DIP SWITCH LOCATION AND SETTING



PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500.

2. Perform front panel removal procedure**.**

3. Locate DIP switch on control PC board. See Figure F.23.

4. Set DIP switch#2 ， #3 and #8 to the ON position and all other DIP switches to the OFF position.

5. The crater switch must be in the OFF position. WELD/GAS switch in the WELD position.

Note: Note down the DIP switch's original setting before changing. It would be used while recovering.
Note: Do not change any setting of DIP switch randomly.

THE CALIBRATION PROCEDURE OF WFS *(CONTINUE)*

FIGURE F.24 –DIP SWITCH SETTING

6. Turn on power to the machine.

7. Turn the main WFS knob at the feeder fully counter-clockwise.

8. While feeding wire (gun trigger closed), adjust the crater current pot until the wire feeder speed matches 1.5m/min.

9. Release the gun trigger. Switch the crater switch to the ON position and then back to the OFF position. The minimum wire feeder speed is now recorded.

10. Turn the main WFS knob at the feeder fully clockwise.

11. While feeding wire (gun trigger closed), adjust the crater current pot until the wire feeder speed matches 20m/min.

12. Release the gun trigger. Switch the crater switch to the ON position and then back to the OFF position. The maximum wire feeder speed is now recorded.

13. Turn off power to the machine.

14. Rest all DIP switches to their initial setting which noted down as mentioned.

Note: During calibration, holding down the gas purge button on the feeder for 5 seconds will cause the machine to reset the wire feeder speed range to default values.
For field adjustment, the same procedure can be used, but the minimum and maximum wire feeder speed can be set as desired.

VOLTAGE AND CURRENT CALIBRATION PROCEDURE

⚠ 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 these procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 86-21-6673-4530.

TEST DESCRIPTION

This procedure will help determine if the machine is capable of producing welding output and to check and adjust, if necessary, the voltage and or current calibration.

MATERIALS NEEDED

Resistive Load Bank
Calibrated Test Voltmeter
Calibrated Test Ammeter
8mm metric ratchet socket key
Leads (connect with #1 and #7)

VOLTAGE AND CURRENT CALIBRATION PROCEDURE *(CONTINUE)*

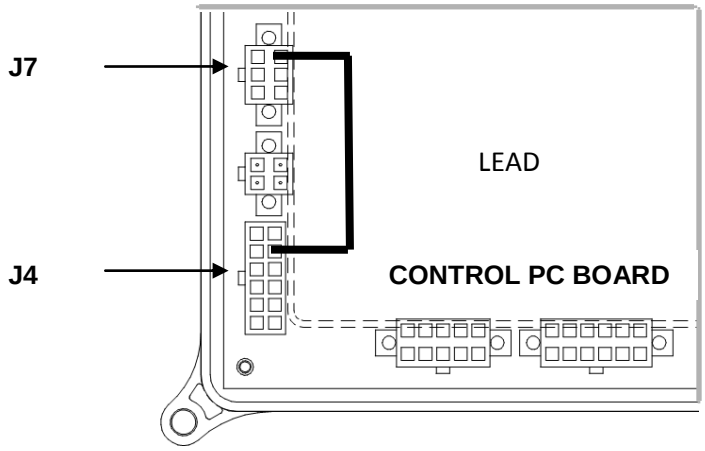
PROCEDURE

1. Disconnect power to the POWERPLUS™ II 500
2. Perform the front panel removal procedure
3. Locate socket J4 and J7 on control PC board. Connect position#1 of socket J4 and position#2 of J7 with jumper wire.
4. Rotate both of crater current and voltage knobs to the Toggle crater mode switch to the OFF, WELD/GAS ADJUST switch to the welding position.

Note: Before calibrating, adjust the Amperage set point to 200A & 400A ±4A, Voltage to 24V&34V±0.4V. Process the calibration procedure if tolerance is out of range.

11. While gun trigger closing, switch crater switch to the ON position and then back to the OFF position. The maximum voltage is recorded. The left display must read CAL; the right display must read DUN.
12. Toggle "WELD/GAS ADJUST" switches to the "GAS ADJUST", then the left display must read a valid value and right display must read "Lo".
13. While gun trigger closing, adjust feeder voltage pot until current matches 150A, and voltage should be around 15V.
14. Adjust crater voltage pot until voltage display value matches actual value.

FIGURE F.25 – CONNECTION PATH FOR J4-1 AND J7-2



5. Turn power on. The left display reads "Lo", the right display reads valid value.
6. Close gun trigger, and then adjust voltage pot on wire feeder until current matches 150A while load voltage is 15V.
7. Adjust crater voltage pot until voltage display value matches actual voltage value.
8. While gun trigger closing, switch crater switch to the ON position and then back to the OFF position. The minimum voltage is recorded. The left display must read HI; the right display must read a valid value.
9. While gun trigger closing, adjust feeder voltage pot until voltage matches 35V, and current should be around 350A.
10. Adjust crater voltage pot until voltage display value matches actual value.
15. While gun trigger closing, switch crater switch to the ON position and then back to the OFF position. The minimum current is recorded. The left display must read a valid value. The right display must read HI.
16. While gun trigger closing, adjust feeder voltage pot until current matches 350A, and voltage should be around 35V.
17. Adjust crater voltage pot until current display value matches actual value.
18. While gun trigger closing, switch crater switch to the ON position and then back to the OFF position. The maximum current is recorded. The left display must read CAL; the right display must read DUN.
19. Release gun trigger，have switch to original setting.
20. Turn off the power to machine, removal the jumper wire.

Note: After calibrating, adjust the Amperage set point to 200A at 24V, 400A at 34V. Process the calibration procedure again if tolerance is still out of range.

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, testing as following must be retested.

i. Measure the resistance between two output studs, the resistance value should be 75 Ω ±3.8Ω.

ii. OCV Reading

MODE	INPUT VOLTAGE/FREQUENCY	OPEN CIRCUIT VOLTAGE
POWERPLUS™ II 500	380V/50/60HZ	Min.= 33±5V
		Max.= 65.5±1V
Auxiliary Output (4# -5#)	380V/50/60HZ	38.5±1V
Auxiliary Output (6# -7#)	380V/50/60HZ	230±3V
Receptacle (27# -29#)	380V/50/60HZ	36V (Machine code 76075)
		230±3V (Machine code 76074)

iii. Idle Current Measurement

Turn on power to the machine, quickly push and release trigger, to make contactor close. Measure the input current on each phase, record the idle current, which must not exceed 6A, error between phase to phase should be lower than 3A.

iv. Measurement the output current and voltage.

MODE	Min. Output	Max. Output
WELDING	50 -60A / 16.5 -17V	550 -570A / 41.5 -42.5V
CRATER		

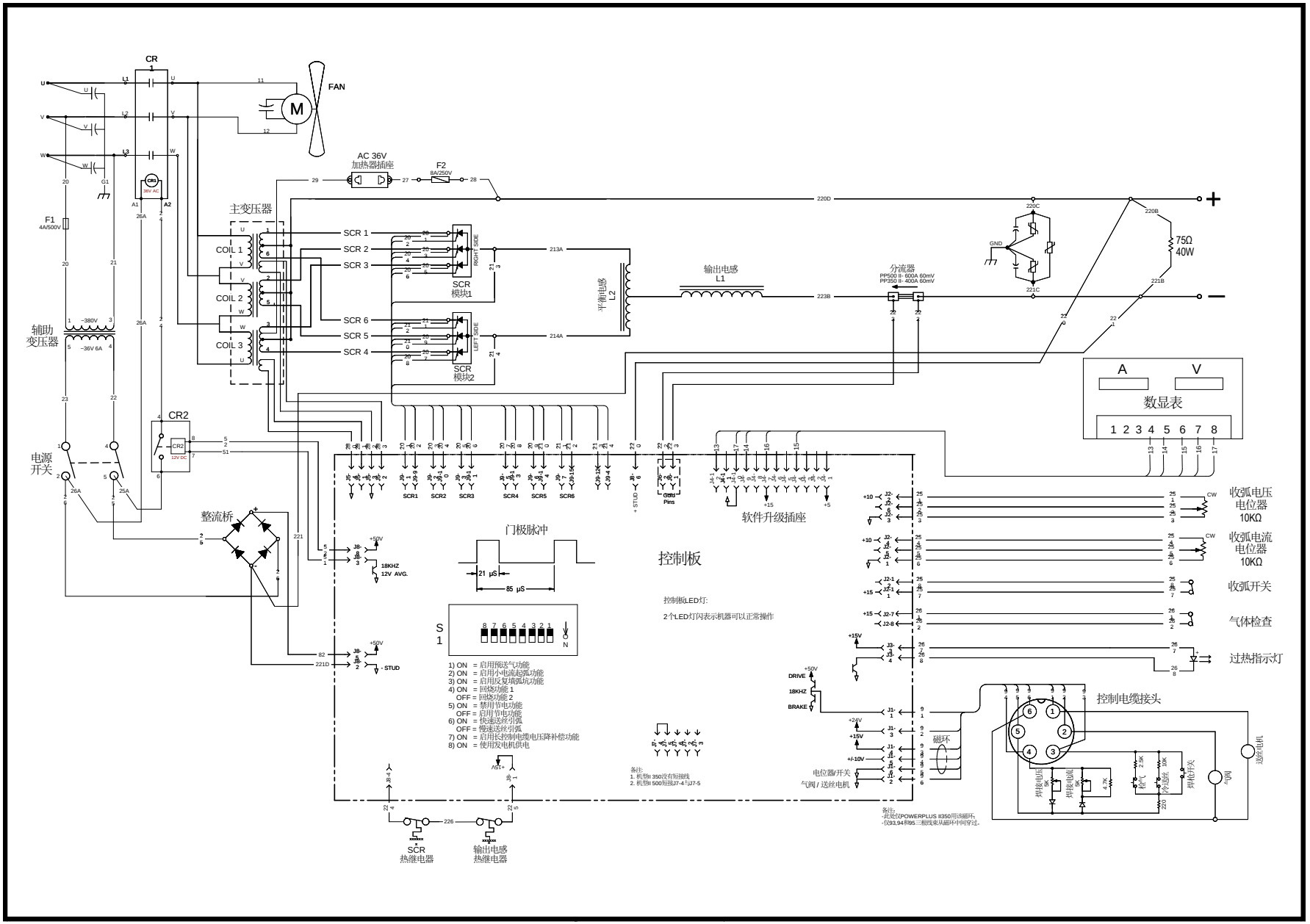
v. Calibration for Wire Feed Speeds

Wire Feeder	WFS
PWF-2/-2plus PWF-4/-4plus PWF-4GS	1.5 -20m/min
PWF-4SS	1.5 -11m/min

vi. Function Inspection

1. Gas Purge. On power source, turn the "welding/gas purge" switch to "gas purge" position. The sound of click from solenoid can be heard. On wire feeder, press the bottom of "gas purge", the click can be heard also.
2. Cold Inch. Press the "cold inch" button on wire feeder, driving roll must start rotate. Change the setting WFS knob, the wire feeding speed will vary accordingly.
3. Crater Mode. Set the crater mode switch to two steps; apply the load across output terminal. Close the trigger, machine should have output. Release trigger, the output must be turned off. Turn the crater mode switch to four steps, close trigger the output should be turned on and after release trigger, output is still existed. Pushes trigger again and hold it, output should be switched to crater mode, and the value is in accordance to the setting of crater voltage. Release trigger, output should go out.

WIRING DIAGRAM FOR POWERPLUS™ II 500 MACHINE CODE 76075



POWERPLUS™ Ⅱ500

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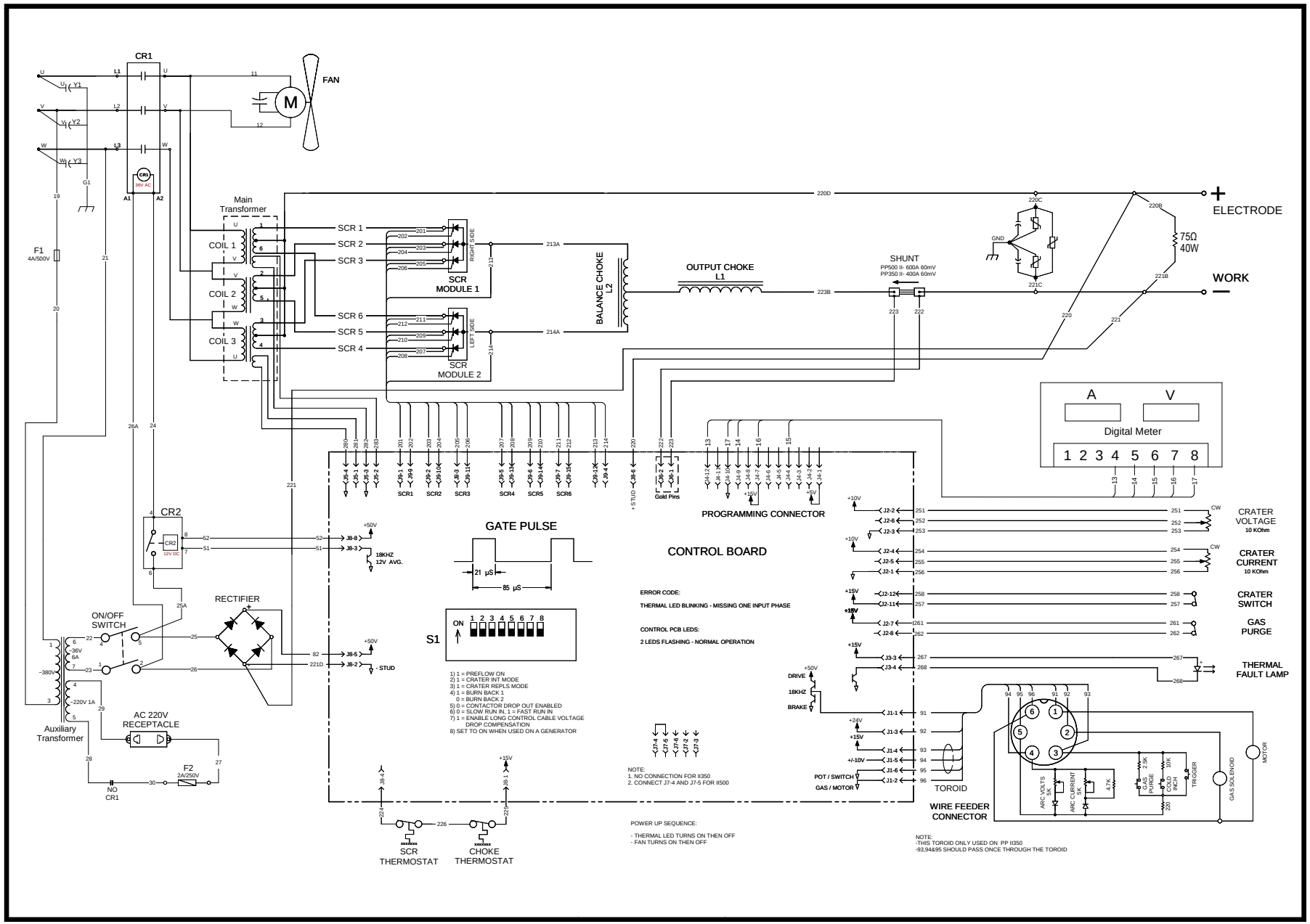
WIRING DIAGRAM FOR POWERPLUS™ II 500 MACHINE CODE 76074



POWERPLUS™ II 500

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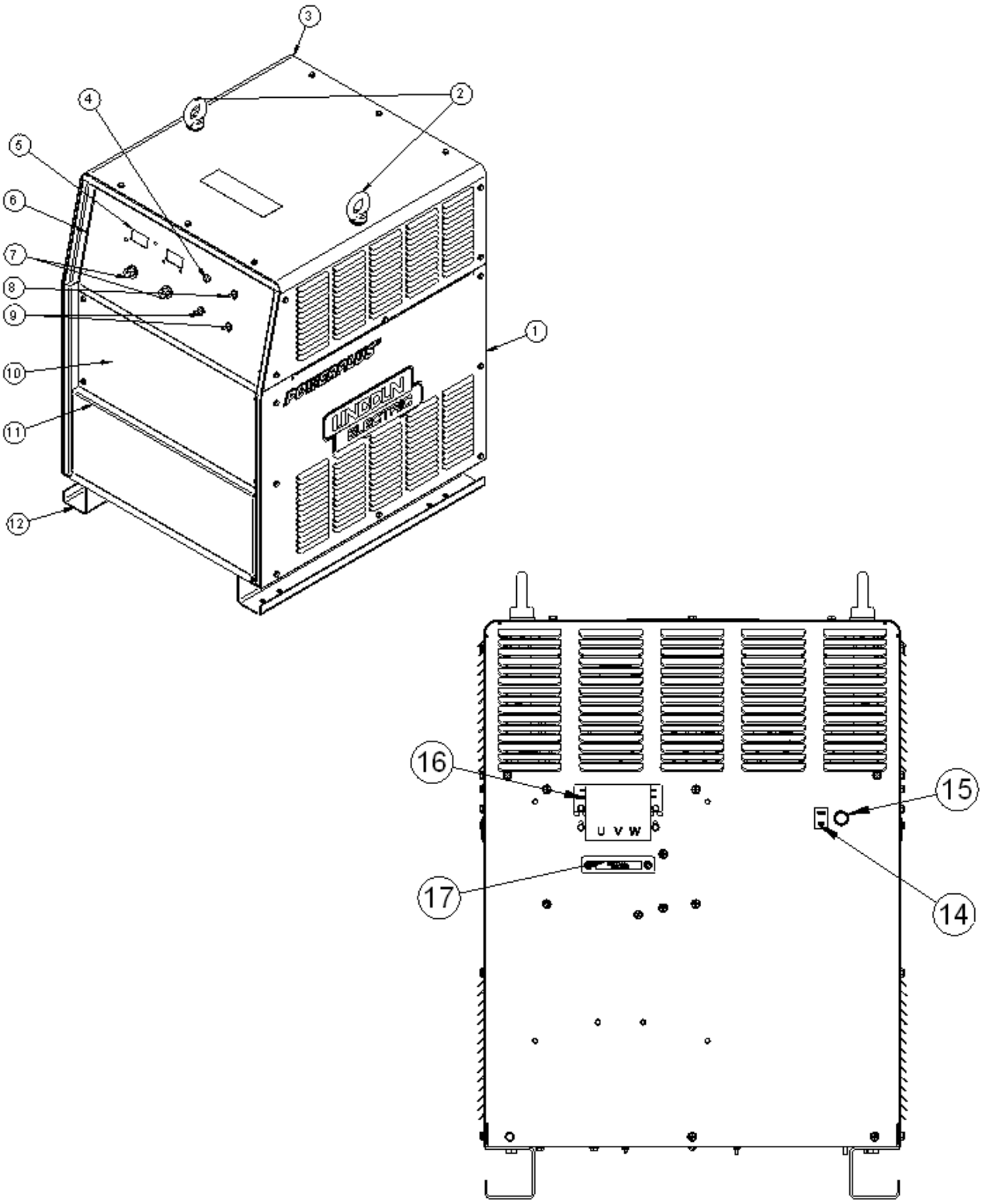
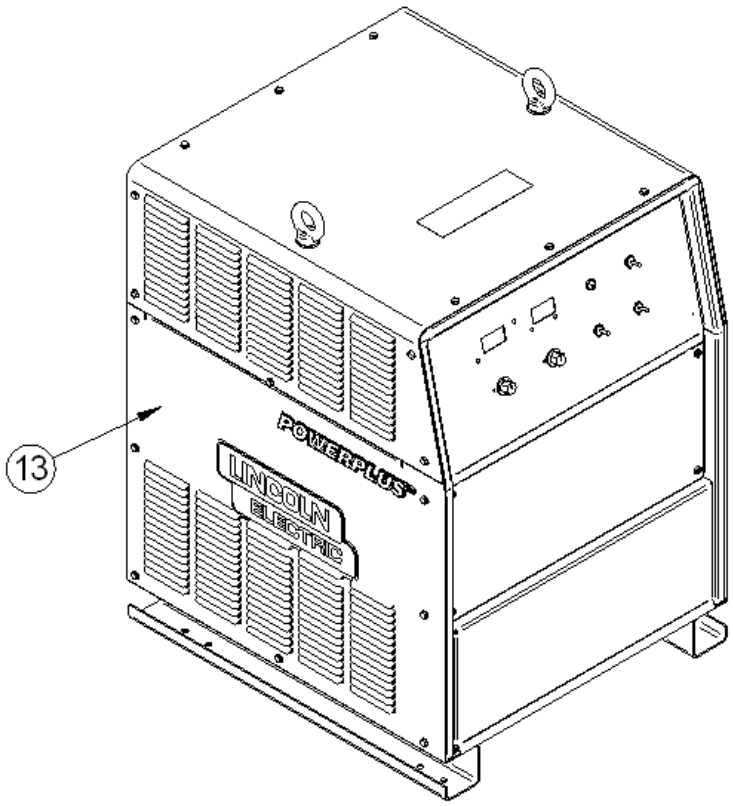
FIGURE H.1 MAIN PARTS LIST

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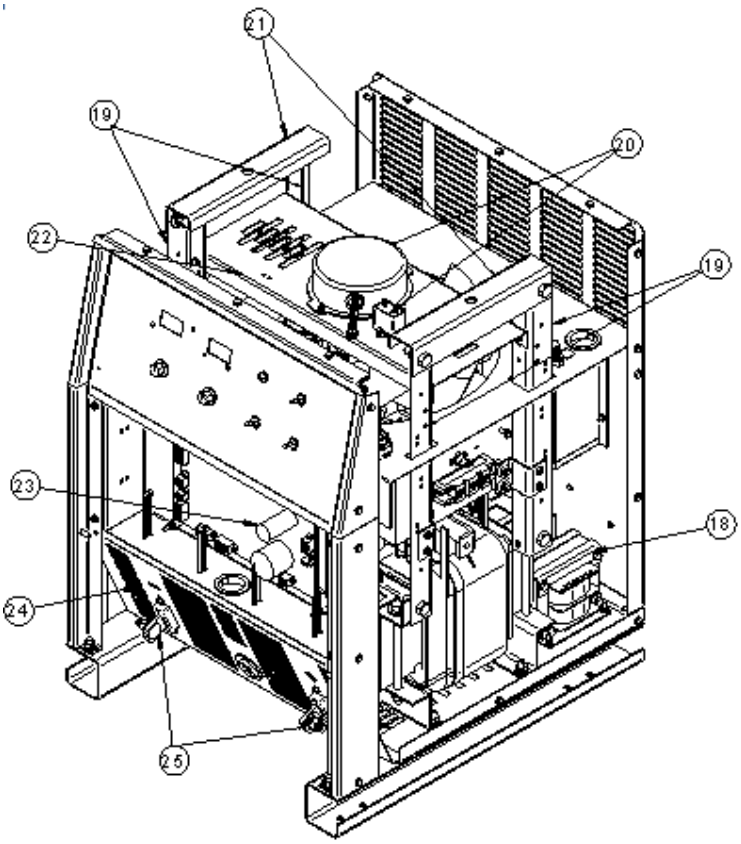
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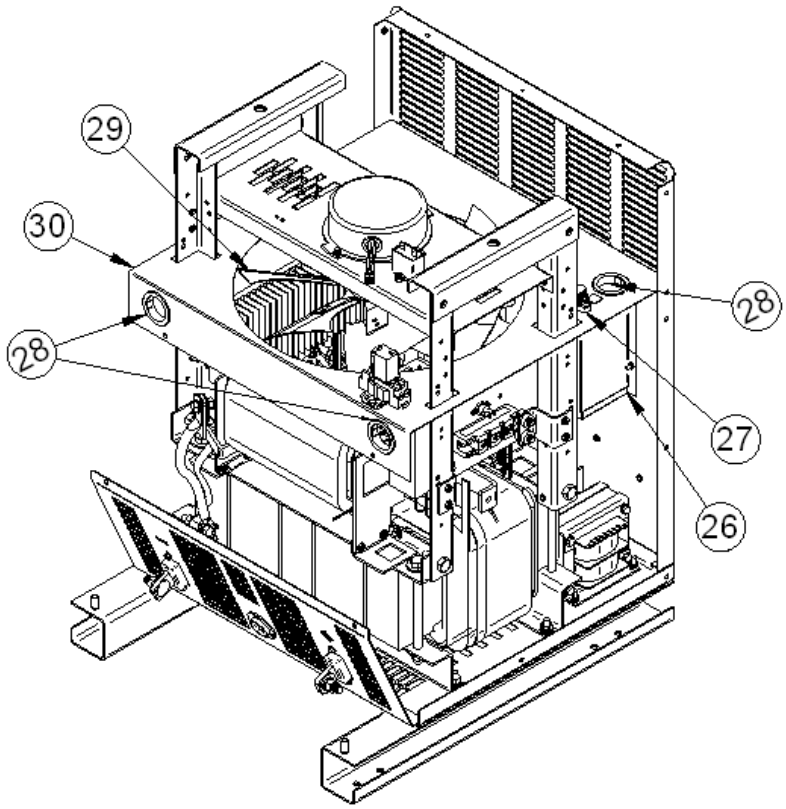
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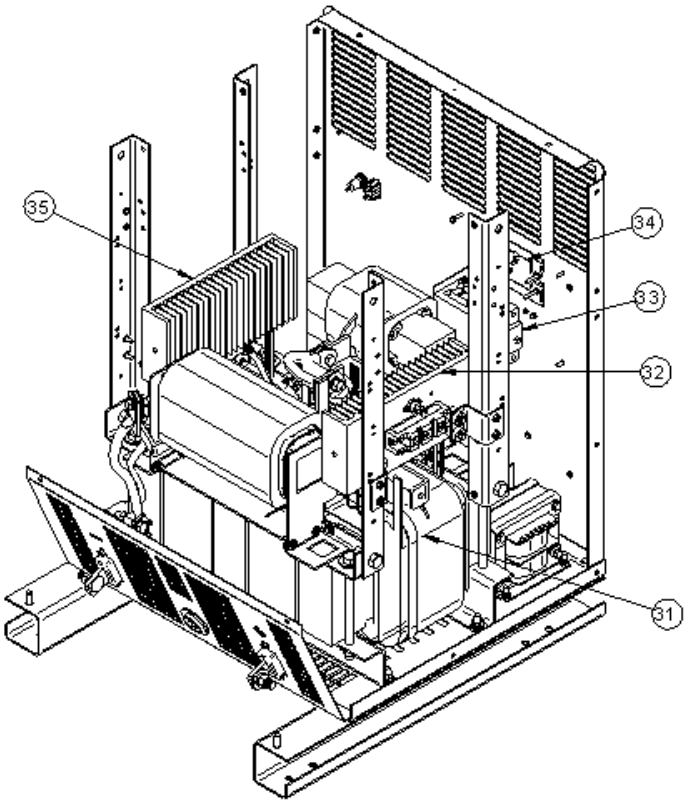
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TABLE H.1 MAIN PARTS LIST

ITEM	DESCRIPTION	PART NUMBER	QTY USED PER PRODUCTION UNIT
1	RIGHT SIDE PANNEL	L13195	1
2	EYEBOLT	S26786	2
3	TOP ROOF	L13196-1	1
4	SIGNAL LAMP ASSEMBLY	S27278-1	1
5	METER BOARD ASSEMBLY	9EL10952-1	1
6	CASE FRONT WELDED ASSEMBLY	G5894-1	1
7A	POTENTIOMETER ASSEMBLY	G6235-3	1
7B	KNOB	T13639-6	2
7C	POTENTIOMETER SPACER	S18280	2
7D	POTENTIOMETER O-RING	T13483-34	2
8	TOGGLE SWITCH	T10800-47	1
9	TOGGLE SWITCH	T10800-4	2
10	MID. PANNEL	L13197	1
11	OUTPUT STUD COVER	G5896	1
12	BASE WELDED ASSY	G5891	1
13	LEFT SIDE PANNEL	L13194	1
14	RECEPTACLE	S26506-2	1
15	FUSE HOLDER PLASTIC HEX NUT FUSE CARRIER	T12386-6	1
Not Shown	FUSE 8A (FOR MACHINE CODE 76075)	T10728-55	1
Not Shown	FUSE 2A(FOR MACHINE CODE 76074)	T10728-20	1
16	INPUT SUPPLY BOX	M20720-2	1
17A	CABLE HOLDER B	M20720-5	1
17B	CABLE HOLDER A	M20720-4	1

ITEM	DESCRIPTION	PART NUMBER	QTY USED PER PRODUCTION UNIT
18A	AUXI. TR (FOR MACHINE CODE 76075)	M21437-4	1
18B	AUXI. TR (FOR MACHINE CODE 76074)	M21437-5	1
19	TRANS. LIFT BRACKET A	G6001-2	4
20A	FAN MOTOR	M20713	1
20B	CAPACITOR (SUPPLIED WITH MOTOR)	S27301	1
21	TRANS. LIFT BRACKET B	M21478-2	2
22	FAN BRACKET WELD ASSY	L13199-1	1
23	CONTROL P.C. BOARD ASSEMBLY	S28483	1
24	OUTPUT STUD PLATE	G5897	1
25A	OUTPUT TERMINAL	M20710-1	2
25B	ROUND HEAD SQUARE NECK BOLT M10X22	S27072-1	2
25C	HEX NUT M10	S26640-6	2
25D	PLAIN WASHER M10	S26638-6	2
25E	LOCK WASHER M10	S26639-6	2
26	CONTACTOR BOX INSERT ASSY	M21798-1	1
27	FUSE HOLDER	T12386	1
Not Shown	FUSE 4A, 500V	T10728-61	1
28	GROMMET	T12380-1	3
29	FAN	L13328-1	1
30	FAN BAFFLE	L13203	1
31	TRANSFORMER & CHOKE ASSEMBLY	G6105	1
32	HEATSINK AND SCR ASSEMBLY (WITH THERMOSTAT AND BRACKET)	L13326-1	1
Not Shown	HEATSINK	L13200	1
Not Shown	SCR MODULE	M20714-1	1
Not Shown	THERMOSTAT	T13359-26	1

ITEM	DESCRIPTION	PART NUMBER	QTY USED PER PRODUCTION UNIT
33	CONTACTOR ASSEMBLY	L13325-2	1
34	INPUT CABLE BRACKET	M20720-6	1
35	HEATSINK AND SCR ASSEMBLY (WITH BRACKET)	L13326-2	1
Not Shown	WIRE FEEDER CONTROL CABLE ASSEMBLY	G6235-6	1
Not Shown	SCR HARNESS	G6235-4	1
Not Shown	HIGH VOLTAGE HARNESS (FOR CONNECTING WITH CONTACTOR, POWER SWITCH AND FAN MOTOR)	G6235-2	1
Not Shown	ZERO CROSS HARNESS (FOR CONNECTING WITH CONTROL PC BOARD AND ZERO CROSS WINDING OF MAIN TRANSFORMER)	G6235-1	1

NOTE

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