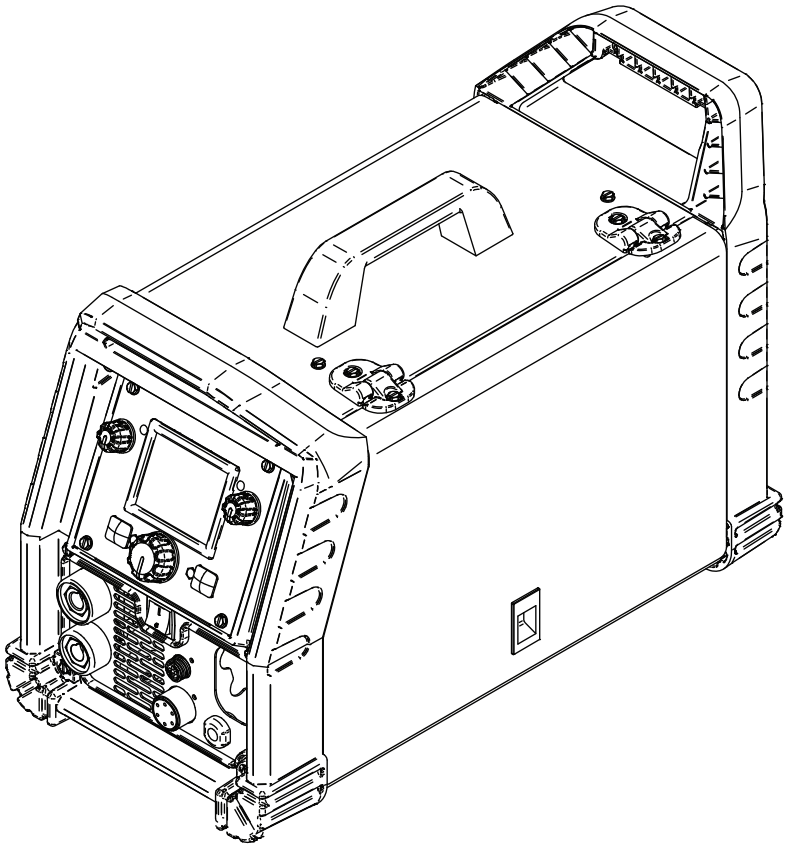
Service Manual

POWER MIG® 215 MPi™

For use with machines having Code Numbers:
13088



Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

SVM10604 | Issue Date Feb - 23

PRODUCT REGISTRATION

Registering your product only takes a few minutes, ensures your qualification for available warranties and allows you to receive updates and information on your product.

K4876-1

Follow the QR code below to register.

https://lered.info/product_registration-8

Need Help? Call 1.888.935.3877
to talk to a Service Representative

Hours of Operation:
8:00 AM to 6:00 PM (ET) Mon. thru Fri.

After hours?
Use “Ask the Experts” at lincolnelectric.com
A Lincoln Service Representative will contact you no later than the following business day.

For Service outside the USA:
Email: globalservice@lincolnelectric.com

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

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 your 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.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.)*

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

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

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

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

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

1.i. Using a generator indoors CAN KILL YOU IN MINUTES.

1.j. Generator exhaust contains carbon monoxide. This is a poison you cannot see or smell.

1.k. NEVER use inside a home or garage, EVEN IF doors and windows are open.

1.l. Only use OUTSIDE and far away from windows, doors and vents.

1.m. Avoid other generator hazards. READ MANUAL BEFORE USE.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

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

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

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

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

2.d.2. Never coil the electrode lead around your body.

2.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.

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

2.d.5. Do not work next to welding power source.

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 hands.

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, gratings or scaffolds; when in cramped 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 holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

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

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

4.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.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

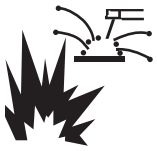
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. 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.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING 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 welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

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

6.d. 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 substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

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. Cylinders 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.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

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

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

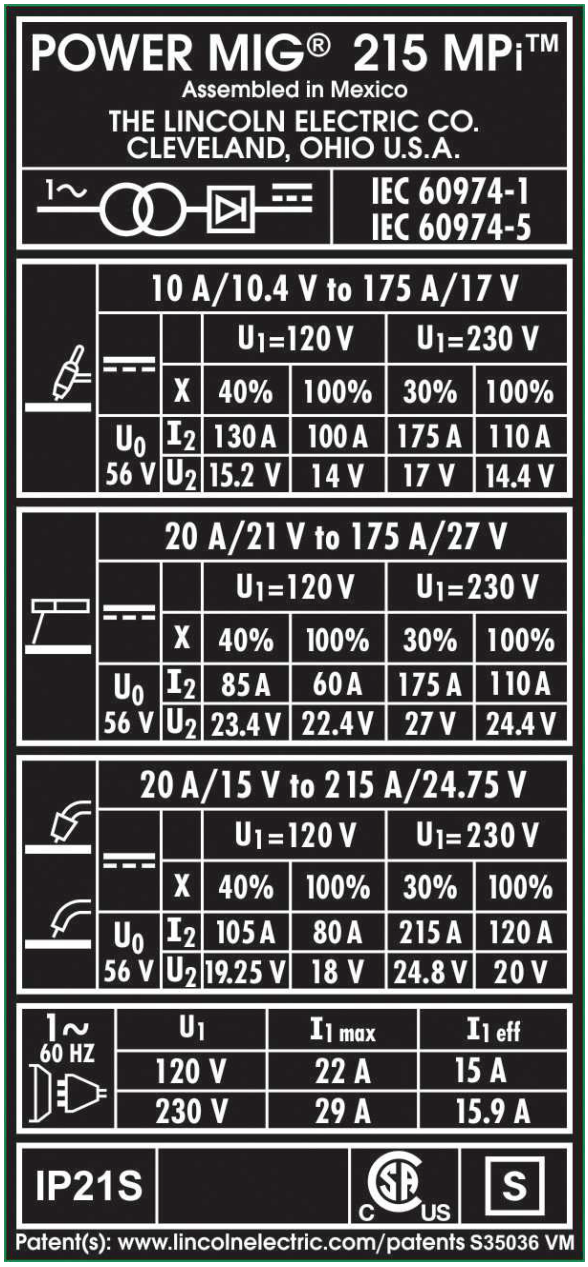
Page

Content/details may be changed or updated without notice. For most current Instruction Manuals, go to parts.lincolnelectric.com.

PRODUCT DESCRIPTION

PRODUCT SUMMARY

The Power MIG® 215 MPi™ is a multi-process CC/CV DC inverter rated for 215 amps, 25 volts at a 30% duty cycle. The Power MIG® units are intended for fabrication, maintenance, home, and autobody shops. The unit features a portable and rugged case. The user interface features a 3.5 inch color TFT LCD display for selecting weld processes and adjusting parameters. The user will have the ability to adjust; inductance, run-in, spot time, arc force, hot start, preflow, and post flow. The machine also features a cast aluminum based wire drive system and an integrated switch for activating a Magnum Pro 100SG spool gun. The Power MIG® 215 MPi™ is designed for the North American market and operates on 120 or 230 single phase 60 Hz power. An overview of the machines input and output capabilities are listed on the rating plate shown at right.



- The Power MIG® 215 MPi™ is Magnum Pro 100SG spool gun ready; the spool gun switch is preinstalled from the factory and an option is present within the user interface which permits activating the spool gun wire drive. Both items must be selected to activate the spool gun.
- The Power MIG® 215 MPi™ is TIG ready, with a TIG foot pedal connector, gas pass through output receptacle, and dedicated TIG gas solenoid.
- The machine comes with a plethora of accessories including:
  - Magnum Pro 175L gun
  - Work cable with clamp
  - Spare contact tips
  - Gas regulator and gas hose
  - Gas and gasless nozzle
  - 120V to 230V Input Adapter
  - Electrode holder and cable
  - Sample spool of MIG wire
  - Spindle adapter
  - Quick setup guide and literature

RECOMMENDED PROCESSES AND EQUIPMENT

RECOMMENDED PROCESSES

The Power MIG® 215 MPi™ is recommended for GMAW, FCAW, GTAW, and SMAW processes. The machine can support 4 inch and 8 inch spools of wire for GMAW and FCAW welding. The machine is intended for the following wire diameters and composition; Innershield NR-211® .030 - .045 self-shielding electrode and NR-212® .045 self shielding electrode, .035 Outershield 71M FCAW-GS, SuperArc L-56 .025" through .035" solid steel, .030 & .035" stainless MIG wires, and SuperGlaze .030" through .035" aluminum. The machine is also intended for GTAW welding with 1/16 and 3/32 tungsten and SMAW welding with 3/32, 1/8 and 5/32 electrode.

PROCESS LIMITATIONS

Welding aluminum requires use of the Magnum® Pro 100SG Spool Gun.

EQUIPMENT LIMITATIONS

The Power MIG® 215 MPi™ is capable of MIG welding up to 215 amperes of current at 24.8 VDC, this output can be achieved at a 30% duty cycle based on a ten minute cycle time with the machine connected to 230VAC input. The machine is capable of higher duty cycles at lower output currents or higher amperages at lower duty cycles. The machine can be connected to either 230VAC @60Hz or 120VAC @ 60Hz. The output of the machine is limited when the machine is connected to 120VAC input, details regarding the rating when the machine is connected to 120VAC can be seen on the rating plate.

Locate the welder in a dry location with free circulation of clean air into the back. A location that minimizes the amount of smoke and dirt drawn into the rear louvers, will reduces the probability of dirt accumulating and blocking air passages which can cause overheating.

TEMPERATURE RANGES	
OPERATING TEMPERATURE	-4°F TO 104°F (-20C TO 40C)
STORAGE TEMPERATURE	-40°F TO 185°F (-40C TO 85C)

COMMON EQUIPMENT PACKAGES

BASIC PACKAGE: CODE 13088	DETAILS
K4876-1	• WIRE-FEEDER-WELDER • GROUND CABLE AND CLAMP • ELECTRODE HOLDER AND CLAMP • SAMPLE SPOOL OF WIRE • MAGNUM PRO 175L GUN • GAS REGULATOR AND HOSE • SPARE CONTACT TIP • DRIVE ROLL AND WIRE GUIDES • SPINDLE ADAPTER

OPTIONAL KITS		
TYPE	PRODUCT NUMBER	DETAILS
GENERAL	K520	UTILITY CART (150 CU FT. BOTTLE CAPACITY)
	K3071-1	CANVAS ACCESSORY BAG
	K2528-1	INNERSHIELD WELDING KIT
	KP4140-1	REPLACEMENT SCREEN SHIELD
SPOOL- GUN	K3269-1	MAGNUM PRO 100SG SPOOL GUN
TIG *	**K1782-1**	**Magnum PTA-17 TIG Torch**
	K1622-1	**Twist mate adapter kit**
	KP508	**Parts kit for LA-17**
	K870	Foot Amptrol

* All three items required for TIG Welding

** Purchase K4878-1 for a PM 215 MPi™ that includes everything required to start TIG welding.

DESIGN

SPECIFICATIONS

POWER SOURCES - INPUT VOLTAGE AND CURRENT			
DUTY CYCLE (OUTPUT)	INPUT VOLTAGE	INPUT AMPERES MAX	IDLE AMPS
30% (215A / 24.8V)	230	29A	.55A
40% (105A / 19.3V)	120	23A	.55A

WELDING PROCESSES			
PROCESS	ELECTRODE DIAMETER RANGE	OUTPUT RANGE (AMPERES)	WIRE FEED SPEED RANGE
GMAW	.025-.035" (0.6-1.0MM)	20-220	50-500 IPM
FCAW	.030-.045" (0.8-1.2MM)	20-220	50-500 IPM
GTAW	1/16, 3/32 IN (1.59, 2.38MM)	10-175	NA
SMAW*	3/32, 1/8, 5/32 IN (2.38, 3.18, 3.97MM)	20-175	NA

*Note: The Power MIG 215MPi is not capable of running E6010 electrode.

POWER SOURCES - RECOMMENDED INPUT WIRE AND FUSE SIZES[1]			
VOLTAGE/ PHASE FREQUENCY	INPUT AMPERES EFFECTIVE	FUSE (SUPER LAG) OR BREAKER SIZE[2]	TYPE 75C COPPER WIRE IN CONDUIT AWG (IEC) SIZES 40C (104°F) AMBIENT
230/1/60	15.9A	40	12
120/1/60	15A	20	12

2 Also called 'inverse time' or 'thermal/magnetic' circuit breakers; circuit breakers that have a delay in tripping action that decreases as the magnitude of current increases.

PHYSICAL DIMENSIONS				
MODEL	HEIGHT	WIDTH	DEPTH	WEIGHT
K4876-1	15.10IN (383MM)	10.90IN (276MM)	23.1 IN (570MM)	48 LBS 20.2 KG

1 Cord and Fuse Sizes based upon the U.S. National Electric Code and maximum output

REGULATORY REQUIREMENTS

MODEL	MARKET	CONFORMITY MARK	STANDARD
K4876-1	US AND CANADA	cCSA$_{us}$	IEC 60974-1 IEC 60974-5

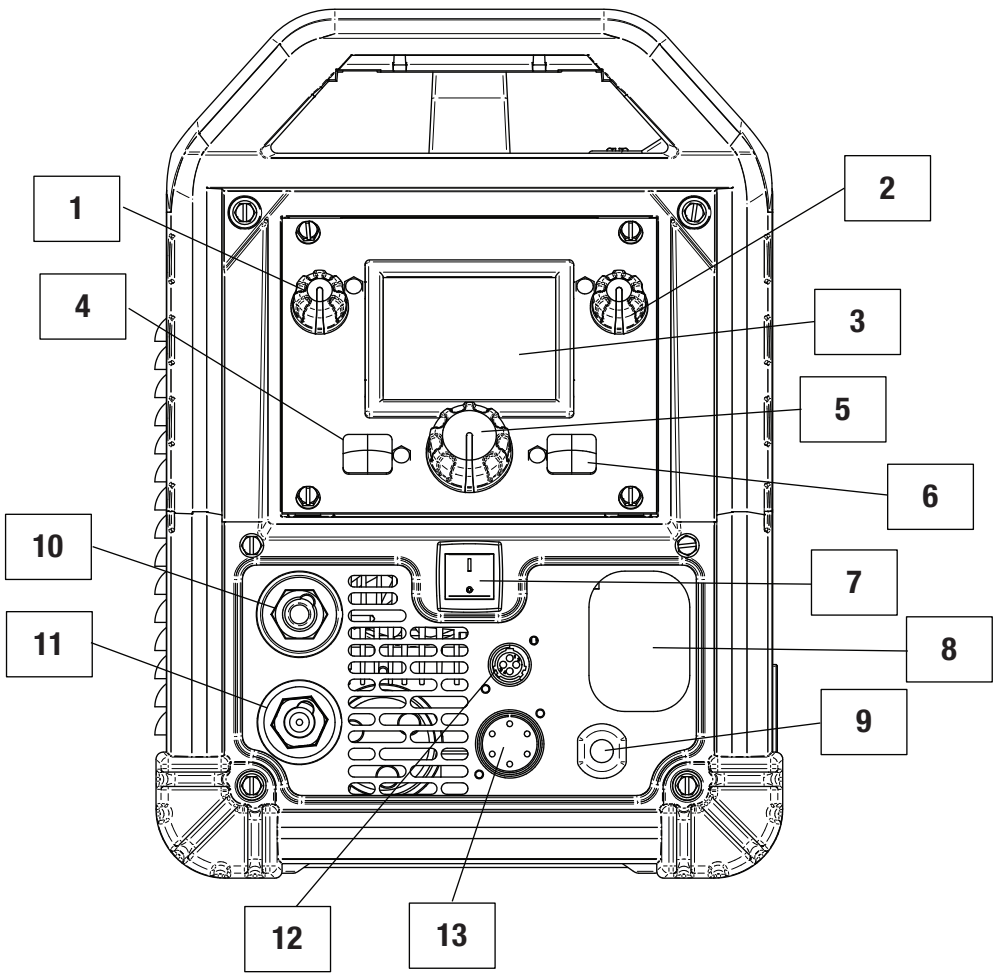
IP RATING	INTENDED USE
IP21S	For Internal Use Only

DESIGN FEATURES

- **3.5-Inch Color TFT LCD Display** –with 320x240 resolution facilitates adjusting weld processes and parameters.
- **Efficient Inverter power topology**- reduces power consumption and reduces the mass of the unit when compared with traditional SCR based machines.
- **High Power Factor**- The Power MIG® 215 MPi™ features active power factor correction (>.98) which greatly reduces the unit's current draw.
- **Multi-process**- The unit is capable of FCAW, SMAW, Aluminum-MIG with a spool gun, Stainless MIG, Steel-MIG, and TIG welding
- **120 or 230V Capable**- Easily connect the unit to 120V or for higher loads connect to 230V. The unit includes a hardwired 230V cord and a 120V to 230V input adapter for easily switching between the two input voltages.
- **Portability:** The unit features three handles for carrying in multiple orientations; single hand or two hand carry.
- **Full line of Accessories:** Each unit will include a stinger with cable for SMAW welding, Magnum® Pro Gun for MIG welding, Work clamp and cable, sample spool and tip, spindle adapter for loading 8 inch spools, gas regulator and gas hose.
- **Compact, Durable Case** –IP21S enclosure rating ensures the Power MIG® 215 MPi™ will withstand the intended welding environments.
- **Adjustable Hot Start** – reduces the difficulties related to establishing an arc during SMAW welding.
- **Adjustable Inductance and Arc Force** – Permits fine-tuning the welding arc for SMAW and MIG welding
- **Adjustable Run-In Speed:** Adjust the run-in speed from 50-100%to facilitate starting especially on thin materials.
- **Spot Timer** – For precise short welds
- **2 Step / 4 Step** - Changes the operation of the gun trigger.
- **Preflow and Postflow** - Adjust gas flow rates for optimal protection and gas retention.
- **Integrated Cast-Aluminum Wire Drive** - for reliable feeding of MIG and FCAW wires
- **Integrated Gas Solenoids** – Dedicated gas solenoids for TIG and wire processes for easy switch over.
- **3 Year Warranty on Parts and Labor**
- **Dual Fans With Fan On Demand** - Second fan will only run when needed to reduce shop noise.
- **6-pin TIG foot pedal connector included standard.**
- **25-amp resettable protector**

CASE FRONT CONTROLS

FIGURE A.1

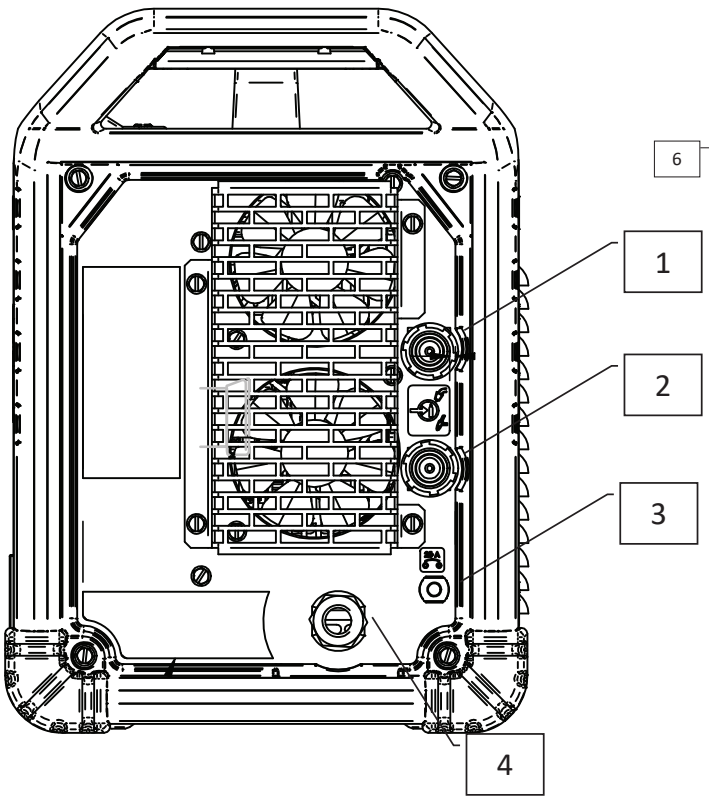


CASE FRONT CONTROL DESCRIPTIONS

1. **Adjustment Knob** – Permits selecting wire feed speed for MIG & FCAW welding, or output current for SMAW & GTAW welding.
2. **Adjustment Knob** – Permits selecting voltage for MIG & FCAW welding, or activates output for SMAW & GTAW welding.
3. **Color LED Screen** – Permits visualization of welding process and parameters. The screen features a replaceable screen shield for protecting against dust & dirt.
   - **Replacement Shield: KP4140-1**
4. **Home Button** – Returns the user to the Home Screen. At the Home Screen, the user can select a welding process or the display settings can be configured.
5. **Center Adjustment Knob** – Permits selecting items by rotating the knob to the desired icon. Pressing the knob will select an item.
6. **Back Button** – Permits returning to the previous screen.
7. **Power Switch** - Permits turning the machine on or off.
8. **Gun Connection** - Permits attachment of a MIG welding gun. Ensure the gun is fully seated into the brass receptacle.
9. **Wire Drive Polarity Lead** - Permits configuring the wire drive to positive or negative polarity by inserting into the positive or negative stud. Ensure connector is tightly locked into place by rotating clockwise.
10. **Positive Output Receptacle** - Permits attaching a work lead, electrode stinger or the center wire drive polarity lead to DC positive polarity. Rotate clockwise to lock into place.
11. **Negative Output Receptacle** - Permits attaching a work lead, electrode stinger, or the center wire drive polarity lead to DC negative polarity. Rotate connector clockwise to lock into place.
12. **Four Pin Trigger Receptacle** - Permits triggering the machine for MIG/FCAW or aluminum MIG. Connect the 4-pin connector present on the welding gun to the receptacle.
13. **Six Pin Foot Amptrol Receptacle** - Permits triggering the machine for TIG with a foot amptrol. Connect the 6-pin connector present on the foot amptrol and enable the foot amptrol on the UI.

CASE BACK

FIGURE A.2

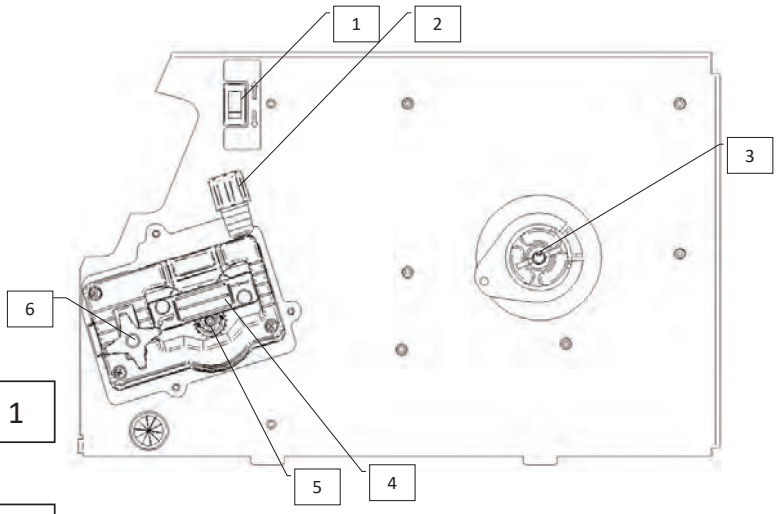


CASE REAR COMPONENTS DESCRIPTION

1. **MIG Gas Solenoid Connector** - Connection for the gas hose of the MIG shielding gas.
2. **TIG Gas Solenoid Connector** - Connection for the gas hose of the TIG shielding gas.
3. **Thermal Breaker** - The Power MIG® 215 MPi™ features a resettable 25 amp thermal breaker. If the current conducted through the breaker exceeds 25 amps for an extended period of time, the breaker will open and require manual reset.
4. **230V Input Cord** – Hardwired 230V input cord. 120V to 230V input adapter included for easy 120V compatibility.

INTERNAL CONTROLS

FIGURE A.3



INTERNAL CONTROLS DESCRIPTION

1. **Spool Gun Switch** – Permits toggling between standard push gun welding with the Magnum® Pro 175L or aluminum welding with the Magnum® Pro 100SG Spool Gun.
2. **Wire Drive Tension Pressure Adjustment** – Permits increasing or decreasing the pressure applied to the top drive roll.
3. **Wire Drive Spindle** – Supports a 4-inch or 8-inch spool of wire. The center wing-nut can be adjusted to increase tension on the wire.
4. **Replaceable Wire Guide** – Select the correct inner wire guide for the desired wire diameter. The outer wire guide provided can be used for any wire diameter.
5. **Replaceable drive roll** – Select the correct drive roll for the wire diameter and composition being fed.
6. **Gun Connector Block** – Permits securing a welding gun to the wire drive by ensuring the gun connector is fully seated, then tightening the large knob

INSTALLATION

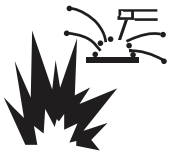
WARNING

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 skin.

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

Observe all safety information throughout this manual.

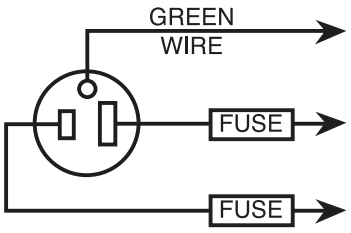
INPUT AND GROUND CONNECTIONS

1. Before starting the installation, check with the local power company if there are any questions about whether your power supply is adequate for the voltage, amperes, phase, and frequency specified on the welder rating plate. Also be sure the planned installation will meet the U.S. National Electrical Code and local code requirements. This welder may be operated from a single phase line or from one phase of a two or three phase line.
2. The following warning decal is adhered to the input panel located on the back of the machine. The power cords supplied with the unit shall only be used with the Power MIG® 215 MPi™ unit.

FIGURE B.1

3. The Power MIG® 215 MPi™ is shipped with a hardwired 230V cord and a 120V to 230V input adapter.
4. Using the instructions in Figure B.2, have a qualified electrician connect a receptacle (Customer Supplied) or cable to the input power lines and the system ground per the U.S. National Electrical Code and any applicable local codes. For cords over 100 foot, larger copper wires should be used. Fuse the two hot lines with super lag type fuses as shown in the following diagram. The center contact in the receptacle is for the grounding connection. A green wire in the input cable connects this contact to the frame of the welder. This ensures proper grounding of the welder frame when the welder plug is inserted into a grounded receptacle.

FIGURE B.2



CONNECT TO A SYSTEM GROUNDING WIRE. SEE THE UNITED STATES NATIONAL ELECTRICAL CODE AND/OR LOCAL CODES FOR OTHER DETAILS AND MEANS FOR PROPER GROUNDING. CONNECT TO HOT WIRES OF A THREE-WIRE, SINGLE PHASE SYSTEM.

IMPORTANT NOTES

The Power MIG 215MPi should be connected to a dedicated breaker, especially when connected to 120VAC.

The Power MIG 215MPi is not recommended for use with extensions cords. If an extension cord must be used, ensure it is constructed with a minimum of 12 gage wires.

LOCATION AND MOUNTING

The Power MIG® 215 MPi™ will operate in harsh environments. Even so, it is important that preventative measures are followed in order to assure long life, reliability, and safe operation.

- The Power MIG® 215 MPi™ must be located in an area with circulation of clean air such that air movement in the back and out the front louvers.
- Dirt and dust that can be drawn into the Power MIG® 215 MPi™ should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance thermal trips.

HIGH FREQUENCY PROTECTION

During operation, distance the Power MIG® 215 MPi™ from radio controlled machinery. The normal operation of the Power MIG® 215 MPi™ may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

CONNECTION DIAGRAM(S), SYSTEM

GUN AND CABLE INSTALLATION

The Magnum® PRO 175L gun and cable provided with the Power MIG® 215 MPi™ is factory installed with a liner for .025-.035" (0.9-1.2 mm) wire and an .035" (0.9mm) contact tip. The user should ensure that the contact tip, liner, and drive rolls match the size of the wire being used.

⚠ WARNING

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

1. **Lay the cable straight.**
2. **Unscrew the bolt which is threaded into the brass connecting block (inside wire feed compartment).**
3. **Insert the male end of gun into the female casting through opening in front panel. Ensure the connector is fully inserted, and then tighten the knurled screw.**
4. **Connect the gun trigger connector from the gun and cable to the mating receptacle located on the machine case front. Make sure that the keyways are aligned, insert and tighten the retaining ring.**

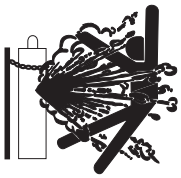
SHIELDING GAS

(For Gas Metal Arc Welding Processes)

Customer must provide cylinder of appropriate type shielding gas for the process being used.

A gas flow regulator, for Argon blend gas, and an inlet gas hose are factory provided with the Power MIG® 215 MPi™. When using 100% CO2 an additional adapter will be required to connect the regulator to the gas bottle.

⚠ 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. See American National Standard Z-49.1. "Safety in Welding and Cutting" published by the American Welding Society.

Install shielding gas supply as follows:

1. Set the gas cylinder on a flat surface and secure the cylinder to a sturdy structure to prevent the cylinder from falling over.

⚠ WARNING

2. **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.

3. Stand to one side away from the outlet and open the cylinder valve for an instant. This will eradicate any dust or dirt which may have accumulated in the valve outlet.

⚠ WARNING

The user should distance his or her body from the valve outlet when "cracking" the valve.

4. Attach the flow regulator to the cylinder valve and tighten the union nut(s) securely with a wrench.

NOTE: If connecting to 100% CO2 cylinder, an additional regulator adapter must be installed between the regulator and cylinder valve. If adapter is equipped with a plastic washer, be sure it is seated for connection to the CO2 cylinder.

5. Attach one end of the inlet gas hose to the outlet fitting of the flow regulator, the other end to the Power MIG® 215 MPi™ rear fitting, and tighten the union nuts with a wrench.

6. Before opening the cylinder valve, turn the regulator adjusting knob counterclockwise until the adjusting spring pressure is released.

7. While 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 one side.

8. The flow regulator is adjustable. Adjust the regulator to the flow rate recommended for the procedure and process being used.

ELECTRODE AND WORK CONNECTIONS

OUTPUT POLARITY CONNECTIONS

The Power MIG® 215 MPi™ features a short lead protruding from the front of the machine, the lead can be used to configure the wire drive
polarity. For SMAW and GTAW welding the short lead does not need to be connected and this lead will not be electrically hot. For FCAW and GMAW welding this lead can be connected to either the positive output stud or negative output stud. Connecting the lead to the positive stud will electrically connect the wire drive to positive polarity; the work clamp would then connect to the negative stud. Ensure connector is tightly locked into place by rotating clockwise.

Figure B.3 Wire drive connected for positive polarity

PROCEDURE FOR CHANGING DRIVE AND IDLE ROLL SETS

1. Turn off the power source.

2. Release the pressure on the idle roll by swinging the adjustable pressure arm down toward the back of the machine. Lift the cast idle roll assembly and allow it to sit in an upright position.

3. Remove the outside wire guide retaining plate by loosening the two large knurled screws.

4. Twist the drive roll retaining mechanism to the unlocked position as shown below and remove the drive roll.

5. Remove the inside wire guide plate.

6. Replace the drive roll and inside wire guide with a set marked for the new wire size.

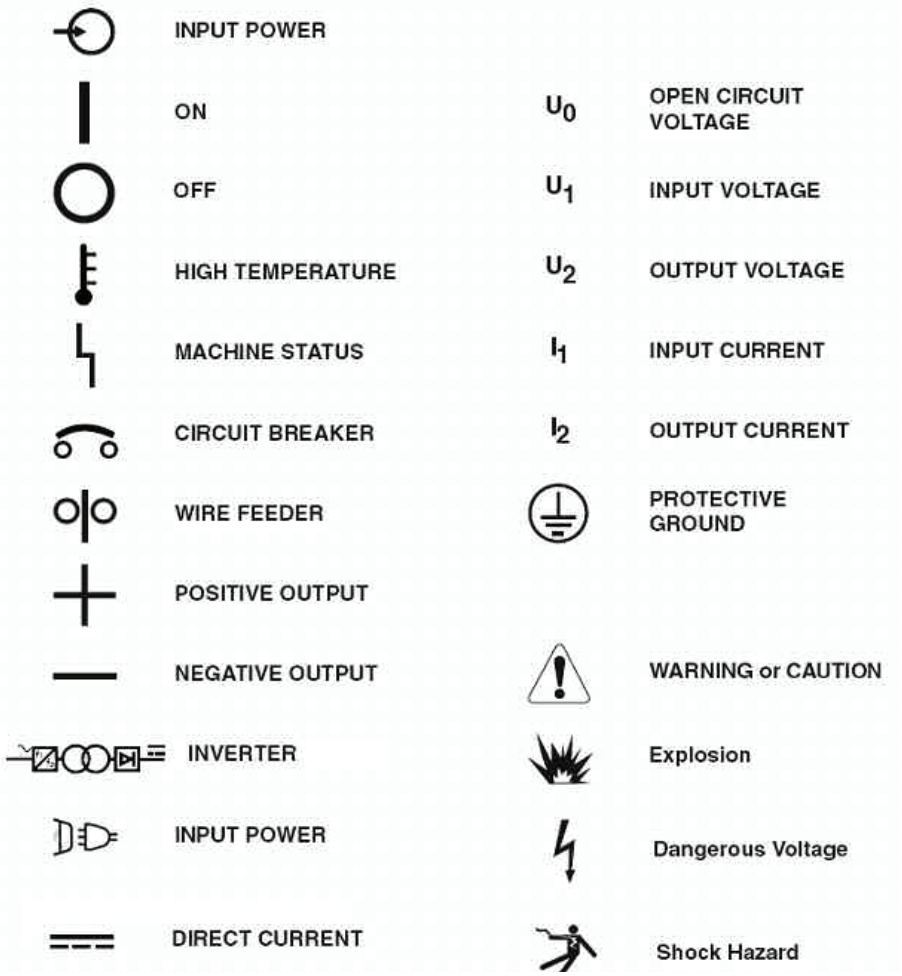
NOTE: Be sure that the gun liner and contact tip are also sized to match the selected wire size.

7. Manually feed the wire from the wire reel, over the drive roll groove and through the wire guide and then into the brass bushing of the gun and cable assembly.

8. Replace the outside wire guide retaining plate by tightening the two large knurled screws. Reposition the adjustable pressure arm to its original position to apply pressure. Adjust pressure as necessary.

OPERATION

GRAPHIC SYMBOLS USED IN THIS MANUAL OR BY THIS MACHINE



POWER-UP SEQUENCE

1. Check that the electrode polarity is correct for the process being used, then turn the power switch ON. The fan will come on and stay on until power to the machine is removed.

2. Configure the machine for the desired process and application. Selecting the home button will take the user to the home screen. At the home screen the user can select one of the desired processes. After the process is selected, the user will encounter a brief page which displays the required output polarity setup for the chosen process. By selecting continue, the user will encounter the diameter select page which will permit the user to choose the diameter of the electrode they have chosen. After the diameter select page, the user will have an opportunity to select the thickness of material they intend to weld. With these inputs the interface will determine the best settings for the selected input values.

3. Press the trigger to feed the wire electrode through the gun and cable and then cut the electrode within approximately 3/8" (10 mm) from the end of the contact tip.

4. If shielding gas is to be used, turn on the gas supply and set the required flow rate (typically 25-35 CFH; 12-16 liters/min).

5. When using an Innershield electrode, the gas nozzle may be removed and replaced with the gasless nozzle. This will provide increased visibility and eliminate the possibility of the gas nozzle overheating.

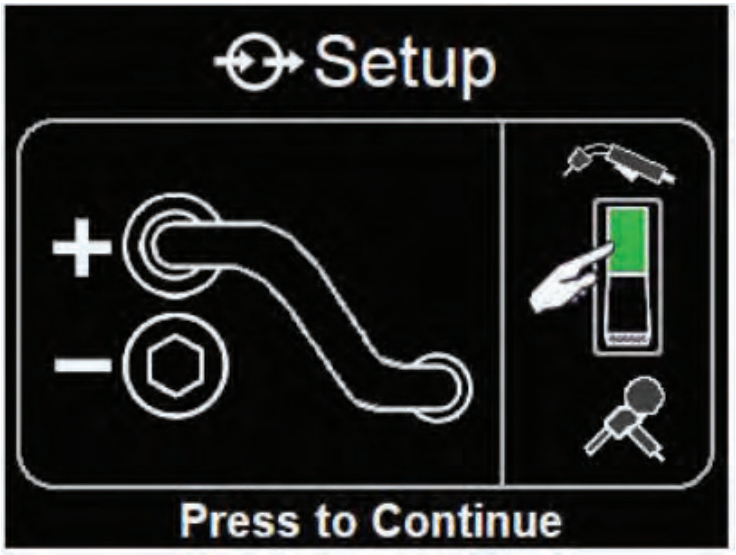
6. Connect the work cable to the metal to be welded. The work clamp must make a good electrical contact with the work. The work must also be grounded as stated in “Arc Welding Safety Precautions.”

The following images help indicate the machine setup process.

Figure C.1

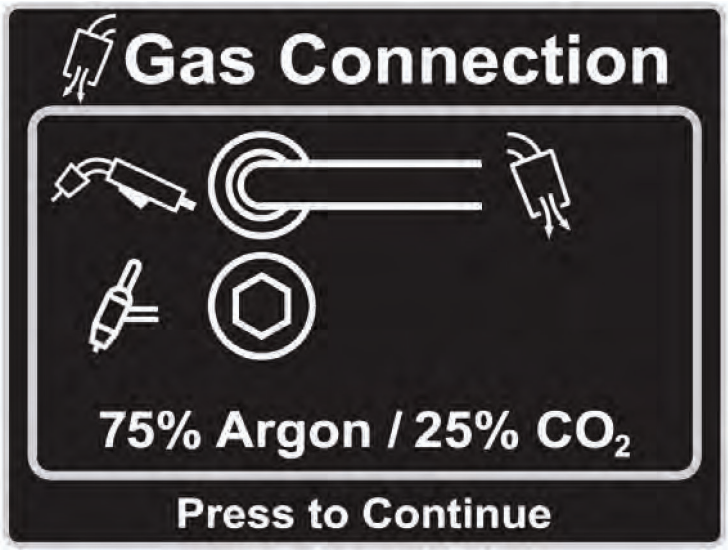
Rotate knob to selection.
Press knob to select.

Figure C.2



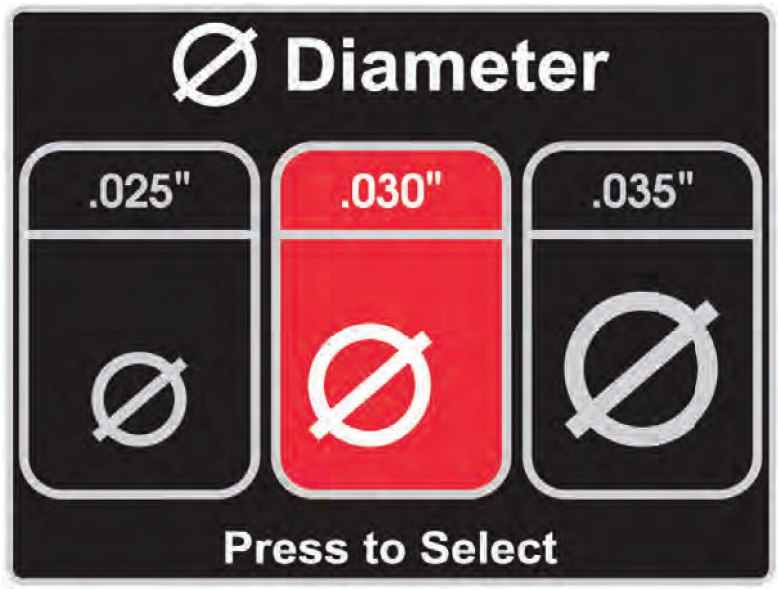
Verify polarity configuration and spool gun switch position. Then press the knob to continue.

Figure C.3



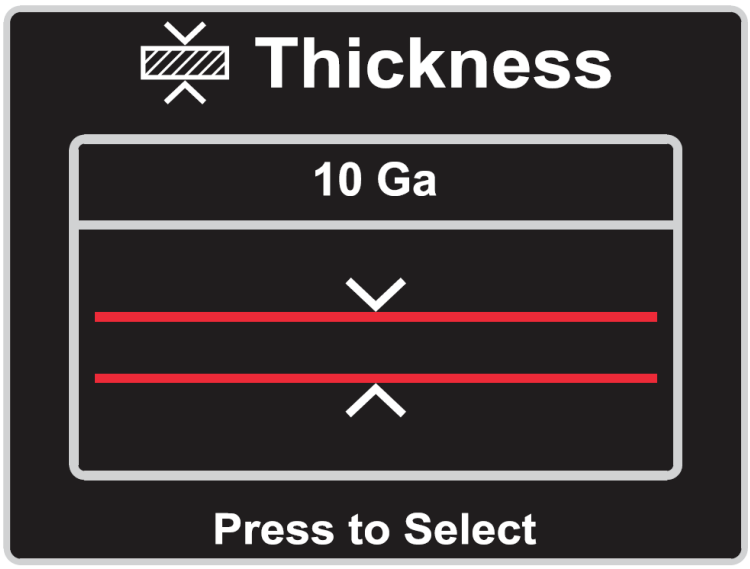
Verify gas configuration and gas mix. Then press the knob to continue.

Figure C.4



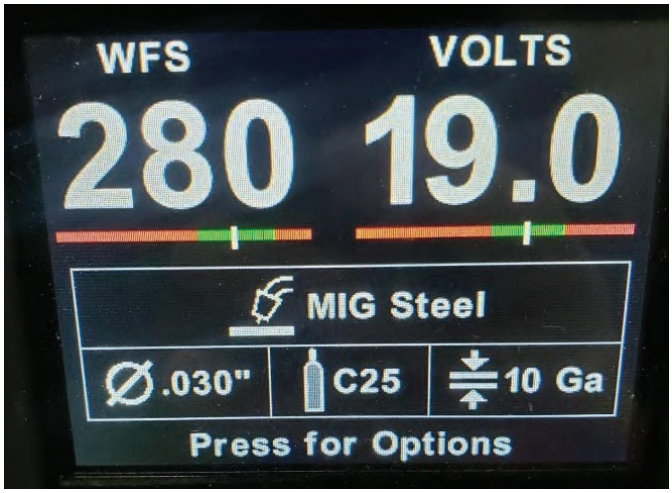
Rotate knob to selection.
Depress knob to select.

Figure C.5



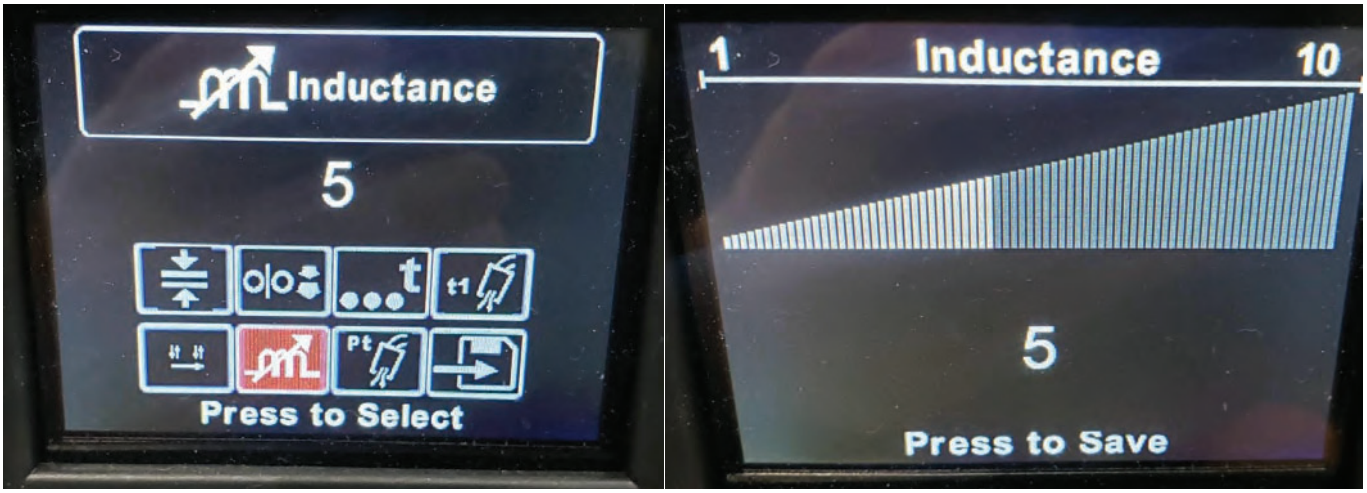
Rotate knob to selection.
Depress knob to select.

Figure C.6



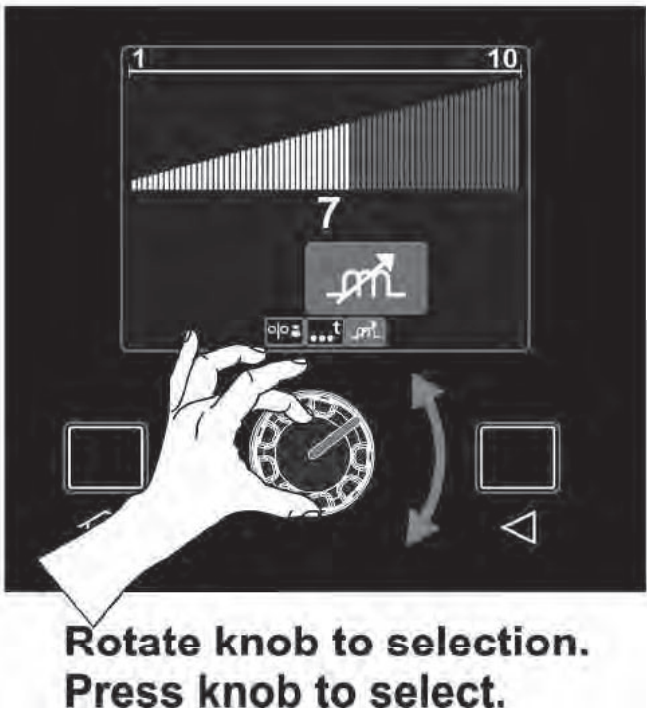
Press knob for options menu.

Figure C.7



Rotate knob to selection.
Depress knob to select.

Figure C.8



DUTY CYCLE

RATED OUTPUT			
INPUT VOLTAGE	DUTY CYCLE	AMPS	VOLTS
230 VAC	30%	215 A	24.8 VDC
	100%	120 A	20 VDC
120VAC	40%	105 A	19.25 VDC
	100%	80 A	18 VDC

For additional output ratings reference the S35036 rating plate.

The duty cycle is the "on" time (based on a 10 minute interval) the user can weld with the machine at a specific output without causing a thermal trip.

Example: 30% duty cycle means welding at the specified output for 3 constant minutes and needing 7 minutes of "off" time before welding again.

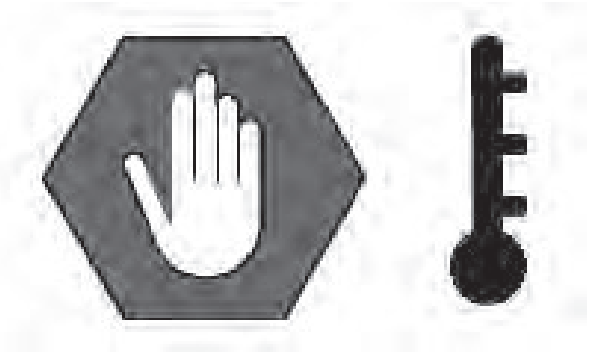
INPUT LINE VOLTAGE VARIATIONS

High Line Voltage/ Low Line Voltage — The Power MIG® 215 MPi™ will operate between 100 and 250 VAC 60Hz.

WIRE FEED OVERLOAD PROTECTION

The Power MIG® 215 MPi™ features overload protection of the wire drive motor. If the motor becomes overloaded, the protection circuitry turns off the wire feed unit. Check for the proper size tip, liner, and drive rolls, for any obstructions or bends in the gun cable, and any other factors that would impede the wire feeding. To resume welding, simply pull the trigger. There is no circuit breaker to reset.

Figure C.9



If the duty cycle of the machine is exceeded, then the machine will thermally trip and the image shown will be displayed on the user interface. The machine must cool down before welding can be performed.

OPTIONS AND SETTINGS

MIG OPTIONS

The inductance option permits adjusting the arc performance, this option can be used to help with starting and the weld bead profile. A higher inductance setting provides a softer arc and a lower inductance setting provides a crisper arc.

The spot time option permits adjusting the duration of the welding arc. This is used for tack welds or spot welds. The spot-time option is available in GMAW and FCAW modes.

The run-in option permits adjusting the wire feed speed prior to the arc being established. A lower run-in speed permits smooth arc starts. After the arc is established the run-in value is inactive and the set wire feed speed is present. The run-in option is available in GMAW and FCAW modes.

SMAW OPTIONS

The arc force option permits the user to control the penetration profile. A high arc force value creates a crisp arc while a low arc force value creates a soft arc. The arc force option is available in SMAW mode.

The hot start option permits adjusting the amperage during arc initialization. After the arc is established the welding current will decrease to the output current set by the user. The hot start option is available in SMAW mode.

SETTINGS

The brightness of the display can be adjusted within the settings option.

The user interface software settings can be reset to the original factory settings.

Information regarding the software revision of the user interface and the software revision of the inverter board is present in the information section.

The language of the text present in the user interface software can be modified. The available language options are English, French and Spanish. The default language is English.

The units of measure can be chosen by the user. The units can be selected as metric or English. The default units are English.

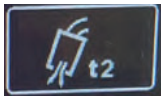
AVAILABLE EQUIPMENT OPTIONS

The Power MIG 215® MPi™ is Magnum® PRO 100SG spool gun ready. To permit welding with a spool gun, the user must configure the switch located above the wire drive to the spool gun position. The spool gun is recommended for aluminum welding.

Reference the options page present within the manual for more information regarding the available TIG torches and adapters.

To permit adjusting welding current with a foot pedal during TIG welding, the TIG foot pedal icon must be selected within the user interface. The output of the machine can be activated and de-activated with the foot pedal.

The preflow option permits adjusting the time gas flows before initiation of the arc (0-2 seconds).



The postflow option permits adjusting the time gas flows after the arc is exstinguished (0-30 seconds).

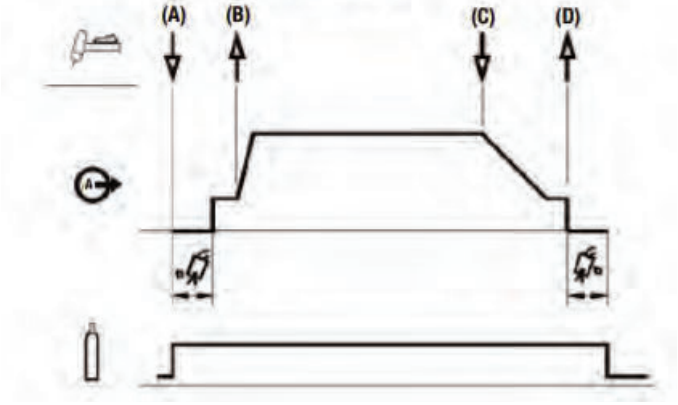
The gas purge option permits the user to purge air through the machine for a predetermined amount of time without output becoming electrically live (10 seconds max).

The 2 Step/4 Step option permits adjusting how the machine responds to a trigger pull. 2 step will make the machine start the arc on trigger pull and extinguish the arc on trigger release. 4 Step will allow the machine to start the arc on the trigger pull, allow the trigger to be released for longer welds, and then extinguish the arc on the release of the second trigger pull.

4-Step Functionality

(See Figure B.10)

FIGURE B.10



A. Press and hold the TIG torch trigger to start the sequence. The machine will open the gas valve to start the flow of shielding gas according to the set preflow time. After the preflow, the output of the machine is turned ON. The arc is started with a starting current of 25 amps. The starting current will be held until the torch trigger is released.

B. Releasing the trigger starts the initial slope function. This function increases the output current to the preset operating current in .3 seconds. The operating current is held until the next trigger interaction.

C. When the main weld is complete, push and hold the torch trigger to start the final down slope. The machine will decrease the operating current to the finishing current of 25 amps in .5 seconds.

D. The finished current will be maintained for as long as the torch trigger is held. Upon releasing the torch trigger, output will be switched OFF and the set post flow time will start.

COMMON WELDING PROCEDURES:

Figure C.10

Recommended W eld Settings

WELD PROCESS	WIRE TYPE	WIRE DIA. (In.)	METAL THICKNESS 24 ga .024 in o|o/V	22 ga .030 in o|o/V	20 ga .036 in o|o/V	18 ga .048 in o|o/V	16 ga .060 in o|o/V	14 ga .075 in o|o/V	12 ga .105 in o|o/V	1/8" (10 ga) .125 in o|o/V	3/16" .187 in o|o/V	1/4" .250 in o|o/V	5/16" .312 in o|o/V	3/8" .375 in o|o/V
	Steel MIG C25 ER70S-6 (DC+)	0.025	95/14.5	100/15	120/15	140/16	190/16	260/17	330/18	345/20*				
		0.030		70/15	80/15	90/15.5	130/16	180/17	230/18	280/19	330/19*			
		0.035			80/15	90/16	120/16	160/16	200/17	240/18	280/18*	320/19*	360/20*	
	Steel MIG C1 00 ER70S-6 (DC+)	0.025	105/15	110/15.5	120/16	140/17	190/18	260/18	330/19	350/21*				
		0.030			80/17	90/18	130/18	180/19	230/20	280/21	330/21*			
		0.035				90/19	120/19	160/19	200/20	240/21	280/21*	320/23*	360/24*	
	Stainless S teel ER308L / ER316L (DC+)	0.035			135/19	155/19	190/20	230/20	300/21	350/22	400/24*	450/25*	475/25*	
	Steel Self Shielded E71T-11 (DC-)	0.035				50/15	70/16	110/17	150/18	200/19	275/21*	320/21*		
		0.045				70/15	80/16	90/16	100/17	110/17	120/18*	130/18*	140/19*	
	Aluminum ER4043 (DC+)	0.035				240/14.5	280/15.5	280/16	335/18	375/20*	590/23*			
	Aluminum ER5356 (DC+)	0.035				350/15	380/15	440/19	570/19	580/19*	590/22*			
WELD PROCESS	ELECTRODE TYPE	ELECTRODE DIA. (IN")	A	A	A	A	A	A	A	A	A	A	A	A
	Steel E6011 / E6013 (DC+)	3/32				40-60	40-70	40-80	40-90	50-110				
		1/8						60-85	60-95	65-105	80-120	105-145*	120-150*	
		5/32							80-120	105-145*	120-160*	140-175*	160-175*	
	Steel E7014 / E7018 E7024 (DC+)	3/32					40-80	50-90	60-100	70-110	80-120			
		1/8							85-120	95-135	105-145*	130-170*	140-175*	
		5/32							110-135	110-145*	130-170*	155-175*		
	Steel & Stainless S teel (DC-)	1/16	20-40	25-45	30-50	30-50	40-60	55-75	75-95	90-110	110-130*			
		3/32				40-60	45-65	55-75	75-95	90-110	110-130*	140-160*		

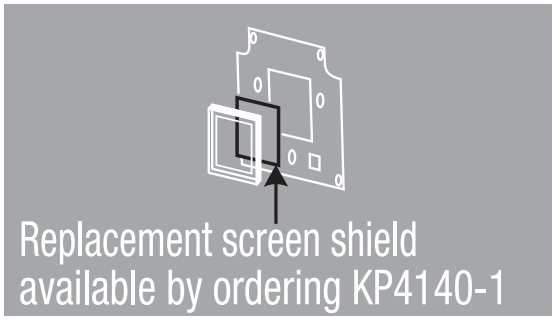
* Indicat es 230 V in put needed f or this range.

GENERAL OPTIONS / ACCESSORIES

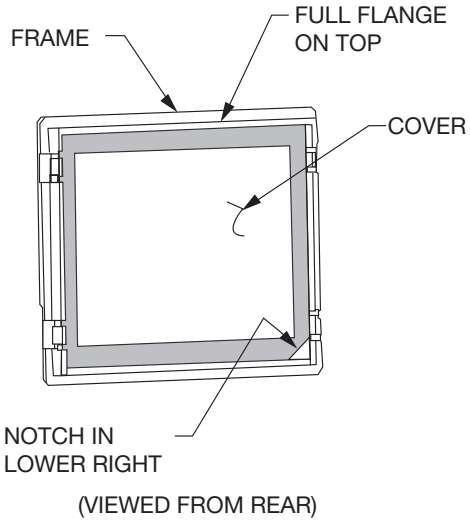
DRIVE ROLL KITS

WIRE	SIZE	DRIVE ROLL KIT
SOLID	.023" - .030" (0.6 - 0.8 MM)	KP2529-1
	.035" (0.9 MM)	KP2529-2
CORED	.030- .045" (0.9 MM)	KP2529-3

KITS AND OPTIONS



Slots are present on the sides of the black frame. Use a small flat head screw driver to remove the frame.



(VIEWED FROM REAR)

ROUTINE MAINTENANCE

⚠ WARNING

Before carrying out service, maintenance and/or repair jobs, fully disconnect power to the machine.

Use Personal Protective Equipment (PPE), including safety glasses, dust mask and gloves to avoid injury. This also applies to persons who enter the work area.

MOVING PARTS can injure.
- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**

Have qualified personnel do all maintenance and troubleshooting work.

GENERAL MAINTENANCE

In extremely dusty locations, dirt may clog the air passages causing the welder to run hot. Blow dirt out of the welder with low-pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

The fan motor has a sealed bearing, which requires no service.

DRIVE ROLLS AND GUIDE PLATES

After every coil of wire, inspect the wire drive mechanism. Clean it as necessary by blowing with low pressure compressed air. Do not use solvents for cleaning the idle roll because it may wash the lubricant out of the bearing. All drive rolls are stamped with the wire sizes they will feed. If a wire size other than that stamped on the roll is used, the drive roll must be changed.

GUN TUBES AND NOZZLES

1. Replace worn contact tips as required.
1. Remove spatter from inside of gas nozzle and from tip after each 10 minutes of arc time or as required.

GUN CABLE CLEANING

To help prevent feeding problems, clean cable liner after using approximately 300 pounds (136 kg) of electrode. Remove the cable from the wire feeder and lay it out straight on the floor. Remove the contact tip from the gun. Using an air hose and only partial pressure, gently blow out the cable liner from the gas diffuser end.

Excessive pressure at the beginning of the cleaning procedure may cause the dirt to form a plug.

Flex the cable over its entire length and again blow out the cable. Repeat this procedure until no further dirt comes out. If this has been done and feed problems are experienced, replace the liner.

⚠ CAUTION

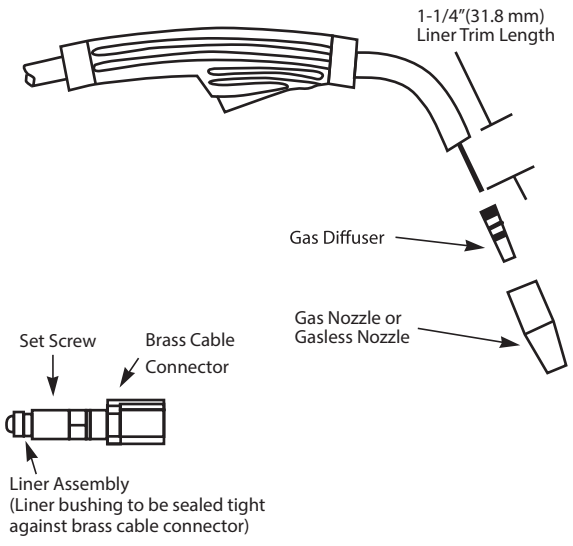
PERIODIC MAINTENANCE

LINER REMOVAL, INSTALLATION AND TRIMMING INSTRUCTIONS FOR MAGNUM PRO 175L

NOTE: The variation in cable lengths prevents interchanging of liners between guns. Once a liner has been cut for a particular gun, it should not be installed in another gun unless it can meet the liner cutoff length requirement.

1. Remove the gas nozzle from the gun by unscrewing counter-clockwise
2. Remove the contact tip from the gun by unscrewing counter-clockwise
3. Remove the gas diffuser from the gun tube by unscrewing counter clockwise.
4. Lay the gun and cable out straight on a flat surface. Loosen the set screw located in the brass connector at the wire feeder end of the cable. Pull the liner out of the cable.
5. Insert a new untrimmed liner into the connector end of the cable. Be sure the liner bushing is stenciled appropriately for the wire size being used.
6. Fully seat the liner bushing into the connector. Tighten the set screw on the brass cable connector. At this time, the gas diffuser should not be installed onto the end of the gun tube.
7. With the gas nozzle and diffuser removed from the gun tube, be sure the cable is straight, and then trim the liner to the length shown in the Figure D.2. Remove any burrs from the end of the liner.
8. Screw the gas diffuser onto the end of the gun tube and securely tighten.
9. Replace the contact tip and nozzle.

FIGURE E.1



Liner Trim Length

If for any reason you do not understand the procedures or are unable to perform the maintenance or repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.

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PRODUCT DESCRIPTION

The Power MIG 215MPi is an inverter based, multi- process, wire feeder welder. The machine's circuitry features "auto connect" technology, which allows it to be powered from different input voltages without any manual reconnections (120-230VAC single phase). The machine also has a built-in wire feeder and two separate gas solenoids for MIG and TIG welding processes. The PM215MPi has Process Memory, several output control options and an LCD display.

The Power MIG 215MPi is made up of four main components. They are as follows:

- The Power Control Board
- The LCD (User Interface) Board
- The Output Choke
- The Wire Drive Motor Assembly

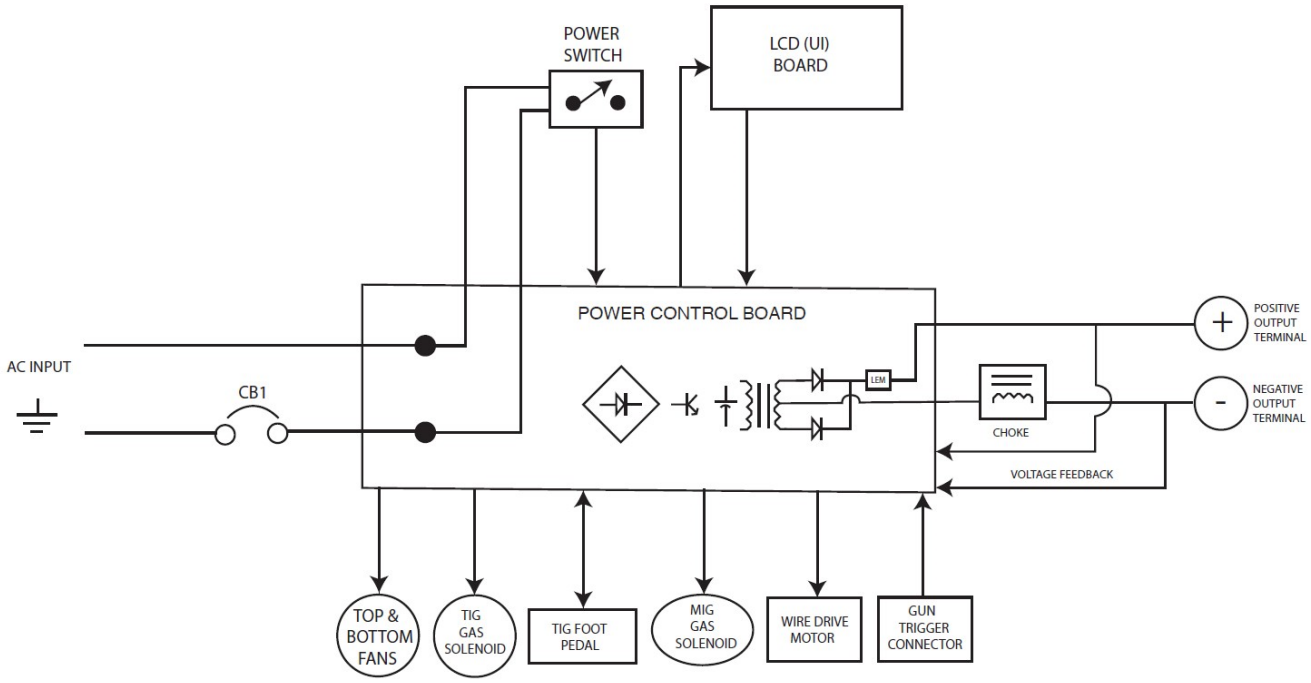

Figure E.1

POWER UP

Power Switch, and Power Control Board

When the machine is connect to an external power source (110-230VAC) the input voltage is applied to the machine's Power Switch via the Power Control board. When the Power Switch is turned "ON" the majority of the initial input power will be used to create the supplementary voltages for the machine's controls. After the supplementary voltages have been created (1-3 seconds) the first relay will close to apply a pre-charge voltage to the bus capacitors and also 24VDC will be applied to the LCD (User Interface) Board. The LCD (UI) Board will light up and begin the power-up sequence. About 3-5 seconds after the first relay closes the second relay will be activated. The input voltage will then be applied to the Boost circuit that will charge the bus capacitors to approximately 400VDC. Both fans will also turn on at this time and the top fan should turn off after 5 seconds. The two input relays are incorporated within the Power Control Board.

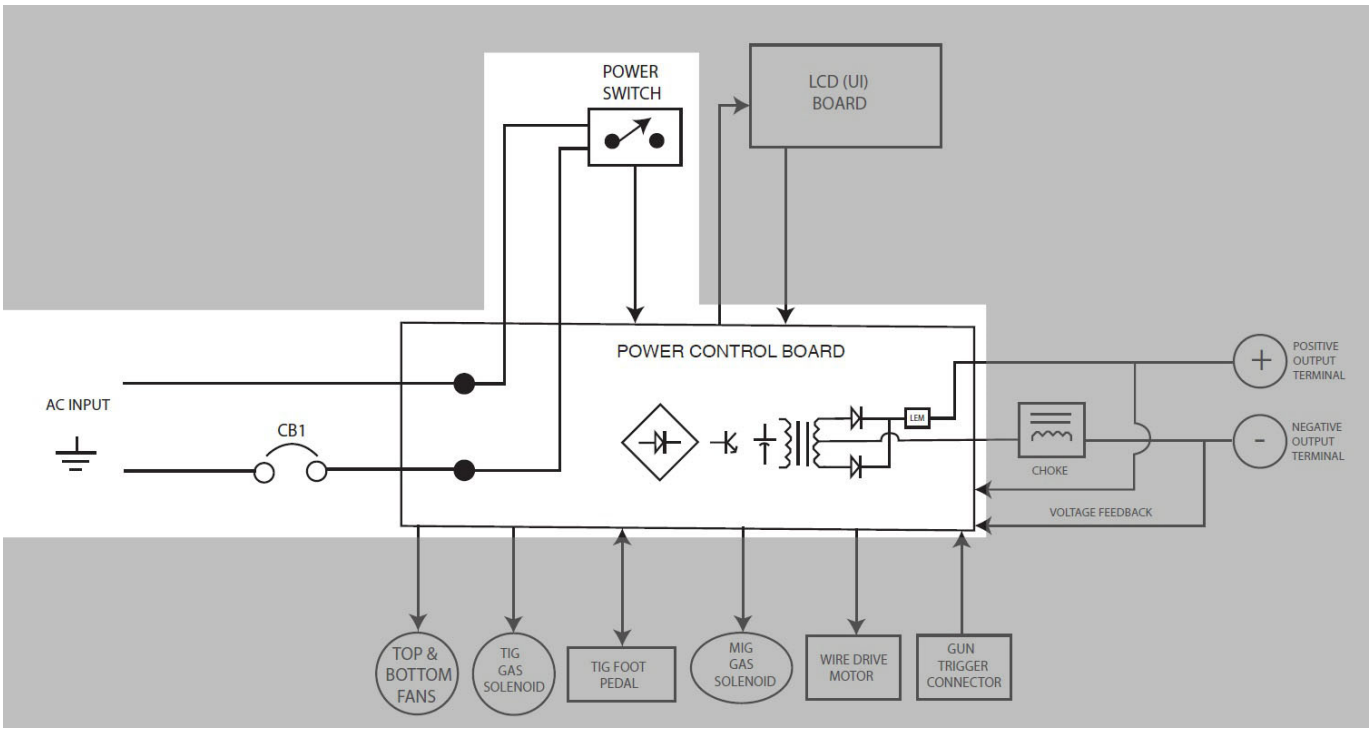

Figure E.2

WELDING OUTPUT AND CONTROL

Power Control Board, LCD (User Interface Board), Output Choke, Wire Drive Motor, Fans, LEM, and Gas Solenoids.

Power Control Board and Output Choke:

When the machine is "triggered" to produce welding output the inverter switches, located on the Power Control Board, send a PWM 400VDC signal to the primary winding of the on-board step-down transformer. See ***Pulse Width Modulation*** in this section. The AC voltage induced on the center-tapped secondary winding of the step-down transformer is rectified to a DC voltage and sent through the on-board LEM to the positive output terminal. The secondary center tap is connected to the off-board Output Choke and through the Output Choke to the negative output terminal. The Output Choke filters the welding current to provide a smooth and stable welding arc.

LCD (User Interface Board):

The LCD (UI) Board receives 24VDC (operating voltage) from the Power Control Board. The LCD (UI) Board allows the user to select a variety of welding processes, and applications. It will display these selections and also send these commands to the Power Control Board for processing.

Wire Drive Motor:

When the machine is 'triggered" to produce welding output the Wire Drive Motor is also energized by the Power Control Board. The Wire Drive Motor will run at a speed determined by the user settings on the LCD (User Interface Board) and the resultant DC voltage supplied to the Wire Drive Motor by the Power Control Board.

LEM (Current Sensor):

When output welding current is drawn from the output terminals the current is sensed by the on-board LEM. This current feedback information is processed on the Power Control Board along with the output voltage feedback information. The Power Control Board then regulates the welding output according to the user commands set forth from the LCD Board.

Fans, and Gas Solenoids:

When output welding current is sensed the top Fan will turn on (the bottom Fan should already be on). While welding both Fans will be on. The top Fan will turn off approximately 7 minutes after welding has ceased.
There are 2 Gas Solenoids. Depending upon the process being utilized (MIG or TIG) the appropriate Gas Solenoid will be activated.

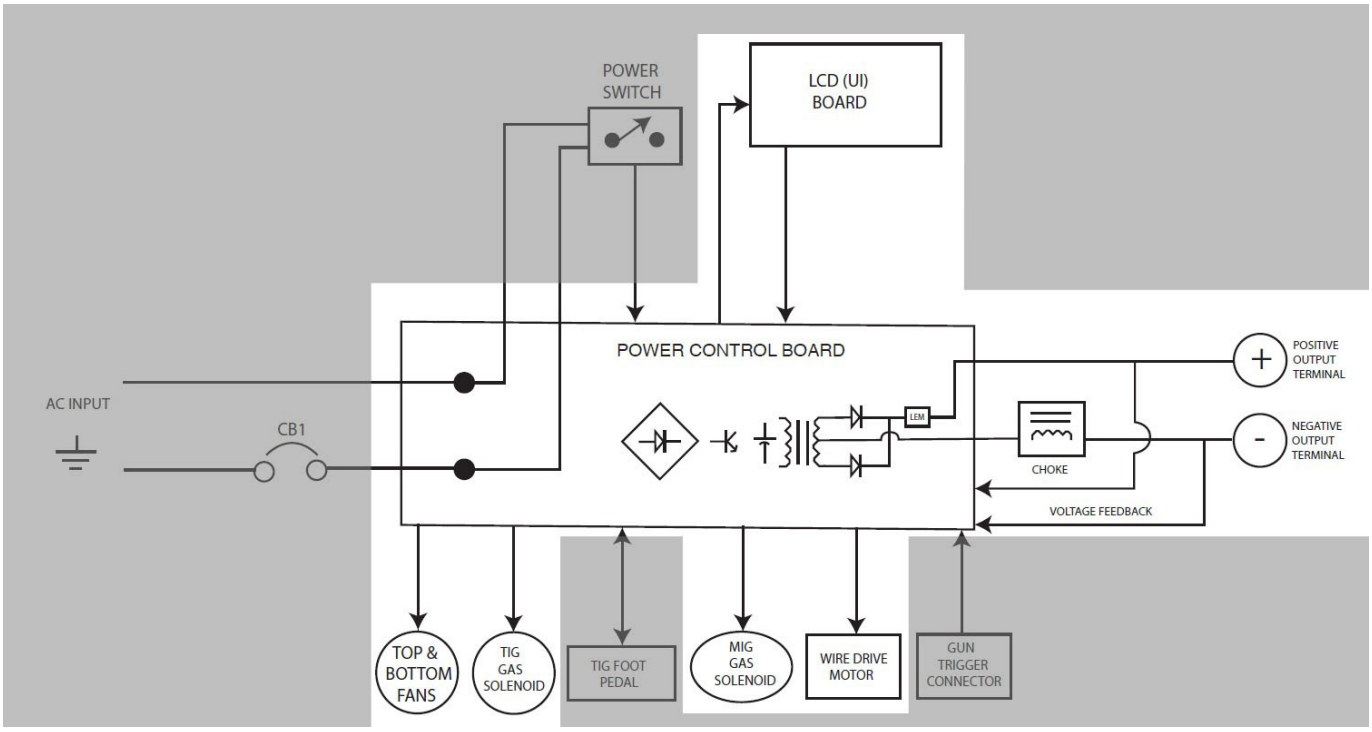

Figure E.3

PROTECTION

Input Current:

If the input current to the Power MIG 215MPi exceeds 34 Amps the output of the machine will be turned off.

Thermal Limits:

If the temperature on the Boost IGBTs, located on the Control Power Board, exceeds 71 degrees Centigrade the output of the machine will be turned off.

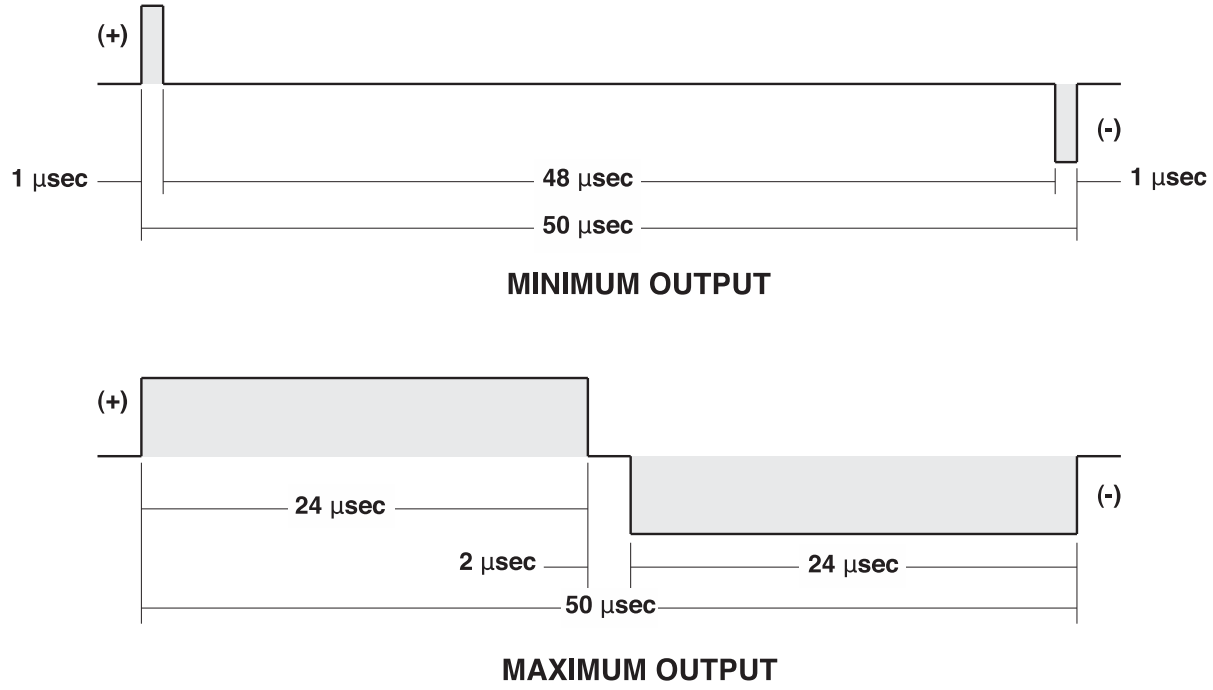

Figure E.3

PULSE WIDTH MODULATION

The term PULSE WIDTH MODULATION is used to describe how much time is devoted to conduction in the positive and negative portions of the cycle.

Changing the pulse width is known as MODULATION. Pulse Width Modulation (PWM) is the varying of the pulse width over the allowed range of a cycle to affect the output of the machine.

MINIMUM OUTPUT

By controlling the duration of the gate signal, the IGBT is turned on and off for different durations during a cycle. The top drawing above shows the minimum output signal possible over a 50-microsecond time period.

The positive portion of the signal represents one IGBT group conducting for 1 microsecond. The negative portion is the other IGBT group. The dwell time (off time) is 48 microseconds (both IGBT groups off). Since only 2 microseconds of the 50-microsecond time period is devoted to conducting, the output power is minimized.

MAXIMUM OUTPUT

By holding the gate signals on for 48 microseconds each and allowing only 2 microseconds of dwell time (off time) during the 50-microsecond cycle, the output is maximized. The darkened area under the top curve can be compared to the area under the bottom curve. The more dark area under the curve, the more power is present.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
OUTPUT AND WIRE FEEDING PROBLEMS		
Major physical or electrical damage is evident.	1. N/A.	1. Contact the Lincoln Electric Service Department at 1-888-935-3877.
There is no welding output or wire feeding when the gun trigger is activated. The fans are not running.	1. Make sure the correct single phase input voltage is being applied to the Power Mig 215MPi. (120-240VAC) 2. Make sure the Power Switch is turned ON. 3. Check the CB1 circuit breaker. Reset if tripped.	1. Perform the ***Power Switch Test.*** 2. Perform the ***Power Control Board Test.***
There is no welding output or wire feed when the gun trigger is activated. The fan(s) are operating normally.	1. Make sure the gun trigger is functioning normally. 2. The machine may be over heated. 3. Make sure the machine is in the correct process for wire feeding.	1. Check the connections and wiring between the gun trigger receptacle and the Power Control Board. See the wiring diagram. 2. Perform the ***Power Control Board Test.*** 3. Perform the ***LCD (UI) Display Board Test.***
There is no wire feed when the gun trigger is activated. The fan(s) operate normally, the gas solenoid(s) operate normally and the machine has normal welding open circuit voltage.	1. If the wire feed motor is running check the drive rolls and tension. 2. Check for a clogged gun liner and proper sized liner and contact tip. 3. Make sure the spool gun switch is set for the desired process. 4. Make sure the machine is in the correct process for wire feeding.	1. Perform the ***Wire Feed Motor Test.*** 2. Perform the ***Power Control Board Test.*** 3. Perform the ***LCD (UI) Display Board Test.***
There is no welding output when the gun trigger is activated. The wire feeds normally, the gas solenoid(s) operate normally, and the fan(s) operate normally. There is no welding open circuit voltage. (54VDC)	1. Make sure the correct single phase input voltage is being applied to the Power Mig 215MPi. (120-240VAC)	1. Check the internal connections between the output welding receptacles, the Output Choke, and the Power Control Board. See the wiring diagram. 2. Perform the ***Power Control Board Test.***
When a spool gun is connected to the machine it does not feed wire. All other machine functions operate normally.	1. Make sure the Motor Spool Gun Switch is in the correct position. 2. The Spool Gun may be faulty.	1. Perform the ***Motor Spool Gun Switch Test.***

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The Arc is unstable and the starting is poor.	1. Make sure the correct single phase input voltage is being applied to the Power Mig 215MPi. (120-240VAC) 2. Make sure all of the welding cable connections are tight. 3. Make sure the correct gas and gas flow are correct for the process being used. 4. Check the wire drive rolls and wire tension. 5. Check the gun liner and contact tip. 6. Make sure the electrode polarity is correct for the process being used.	1. Perform the ***Output Choke Test.*** 2. Perform the ***Power Control Board Test.***
FUNCTION PROBLEMS		
One of the gas solenoids does not activate.	1. Make sure the welding process selected requires a shielding gas.	1. Perform the appropriate gas solenoid test. Either the ***MIG Gas Solenoid Test*** or the ***TIG Gas Solenoid Test.*** 2. Perform the ***Power Control Board Test.*** 3. Perform the ***LCD (UI) Display Board Test.***
The fans do not function correctly.	1. When the machine is first powered-up both fans (top and bottom) should run for about 5 seconds. Then the top fan will shut off until a welding arc is sensed. When a welding arc is sensed the top fan will run and will remain running for approximately 7 minutes after welding has ceased.	1. Perform the ***FanTest.*** 2. Perform the ***Power Control Board Test.***
One or more of the following Error Codes are displayed on the LCD (UI) Display Board screen. 003,010,013	1. The may be a communication problem between the LCD (UI) Display Board and the Power Control Board. 2. Turn the machine off and recycle input power.	1. Check the wiring between the LCD (UI) Display Board and the Power Control Board. See the wiring diagram. 2. Perform the ***Power Control Board Test.*** 3. Perform the ***LCD (UI) Display Board Test.***
When the machine is in the TIG mode the TIG foot pedal does not function correctly.	1. Make sure the “foot pedal” selection is “YES” on the Display Screen. 2. Make sure an appropriate Lincoln foot pedal is connected to the six pin receptacle.	1. Check the wiring between the six pin receptacle and the Power Control Board. See the wiring diagram. 2. Perform the ***Power Control Board Test.***

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

TEST PROCEDURES

HOW TO USE THE TEST REFERENCE CHART

⚠ WARNING

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

The Test Reference Chart is a nonspecific, operations based troubleshooting aide intended to identify components involved in a particular machine function. The left side of the chart consists of a listing of all major components in the machine. Across the top of the chart the three main machine functions are listed. This chart is provided to help you quickly identify possible faulty components, simply identify the particular function and refer to its specified column for a list of its related components. Simply follow the steps below.

Step 1. IDENTIFY MACHINE FUNCTION

There will be three columns with a "MACHINE FUNCTION" listed at the top. You can choose from "POWER UP", "PRIMARY OUTPUT" or 'AUXILIARY OUTPUT". Choose the column that best describes the symptom that the machine is exhibiting a problem with. Examples are as follows:

- POWER UP - machine wont turn on, blows fuses, no display
- WELDING OUTPUT - no welding output, no wire feed, cannot control output, poor welding characteristics
- AUXILIARY OUTPUT - does not power feeder, no power from 120V receptacle,

Step 2. IDENTIFY RELATED COMPONENTS

If a component is used in a particular "MACHINE FUNCTION" it will be marked in the corresponding column. These components serve a purpose for the identified "MACHINE FUNCTION" and could be related to the symptom identified as a possible faulty component.

RELATED COMPONENT LIST	MACHINE FUNCTION POWER MIG® 215 MPi™		
	POWER UP	WELDING OUTPUT	AUXILIARY OUTPUT
Power Control Board	X	X	
User Interface Board	X	X	
Main Solenoid		X	
Spoolgun Solenoid		X	
MIG Motor		X	
Main Switch	X		
Fan Motor		X	
Choke		X	
Remote Amphenol		X	
Trigger Amphenol		X	
Spoolgun Switch		X	

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
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Refer to Safety pages for explanation of hazards:

CHOKE TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Choke using Static tests.

MATERIALS NEEDED:
3/8" nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Choke refer to Figure F.1.

Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Label and disconnect the following connections, refer to Figure F.2.

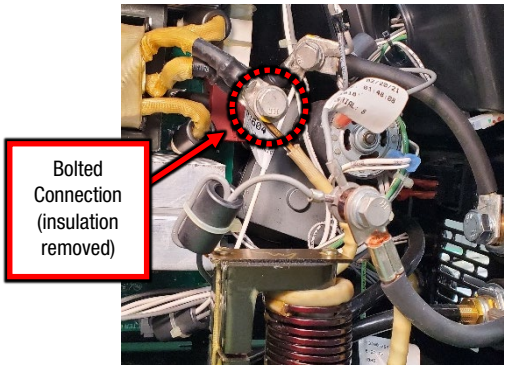


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations.

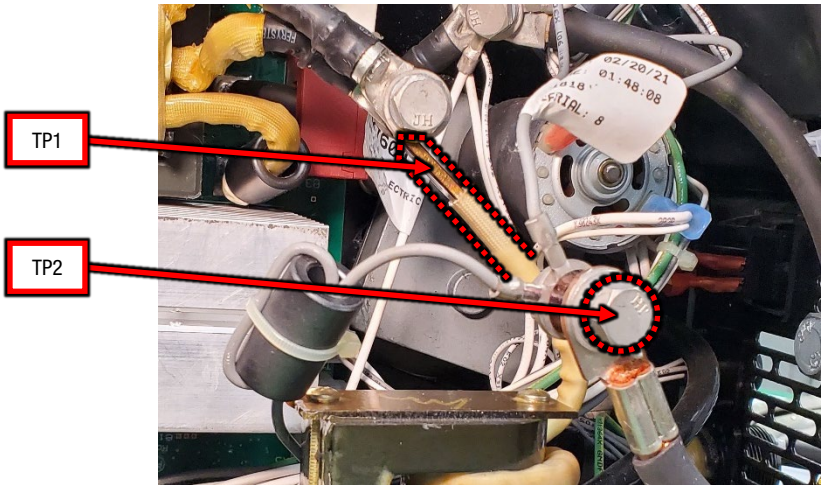


Figure F.3

Choke Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Choke	Bolted Connection Removed	TP1	TP2	<1Ω
		TP1	Chassis Ground	>500KΩ

Table 1

A.4. If measurements are correct reconnect all connections removed in step A.2" and proceed to step 4.

A.5. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

FAN TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Fans using Active tests.

MATERIALS NEEDED:
3/8' nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Fans refer to Figure F.1.

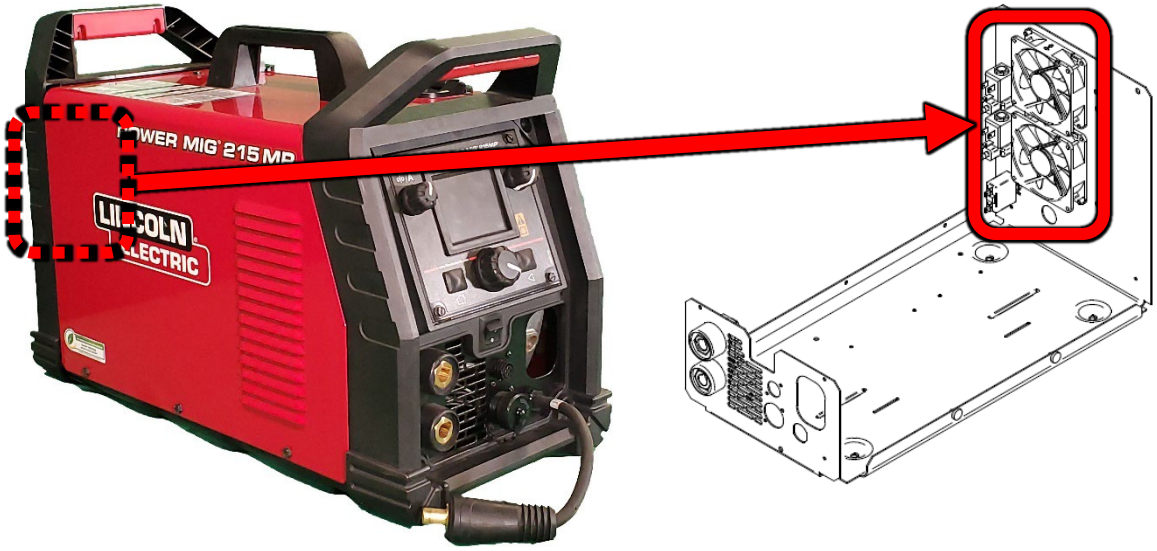


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Active Testing.

A. ACTIVE TESTING

A.1. Ensure the machine is plugged into external power and turned on, connect appropriate welding gun and trigger the output when directed. NOTE: ENSURE NO WELDING WIRE/GAS ARE INSTALLED WHEN TRIGGERING THE OUTPUT.

A.2. Perform the measurements identified in Test Table 1 below, refer to Figure F.2 for test point locations.

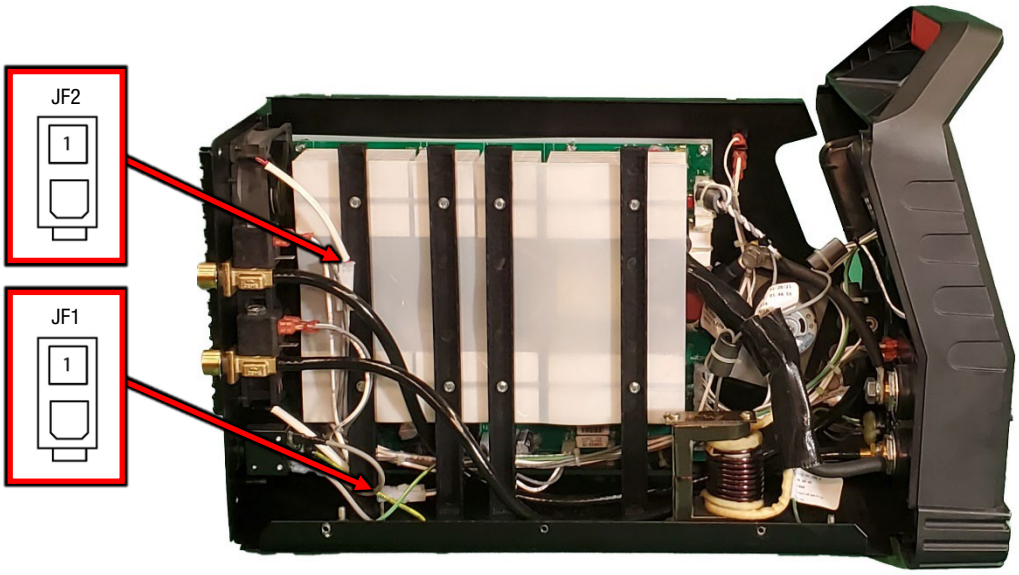


Figure F.2

Fans Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Bottom Fan input voltage	Machine On	JF1 pin 1	JF1 pin 2	~24VDC, Bottom Fan On
Top Fan input voltage	Machine On, Output Triggered	JF2 pin 1	JF2 pin 2	~24VDC, Both Fans On

Table 1

A.3. If the input measurements are correct and the fan(s) do not run the component(s) may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

MIG SOLENOID TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the MIG Solenoid using Static and Active tests.

MATERIALS NEEDED:
3/8" nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the MIG Solenoid refer to Figure F.1.

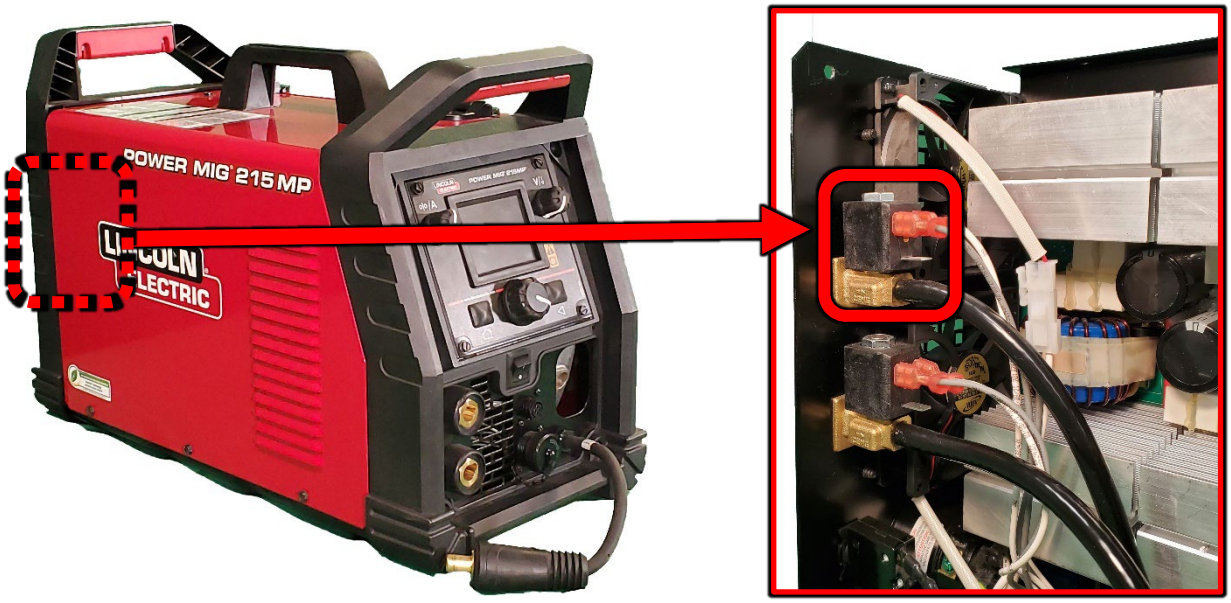


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Label and disconnect the following connections, refer to Figure F.2.

A.3. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

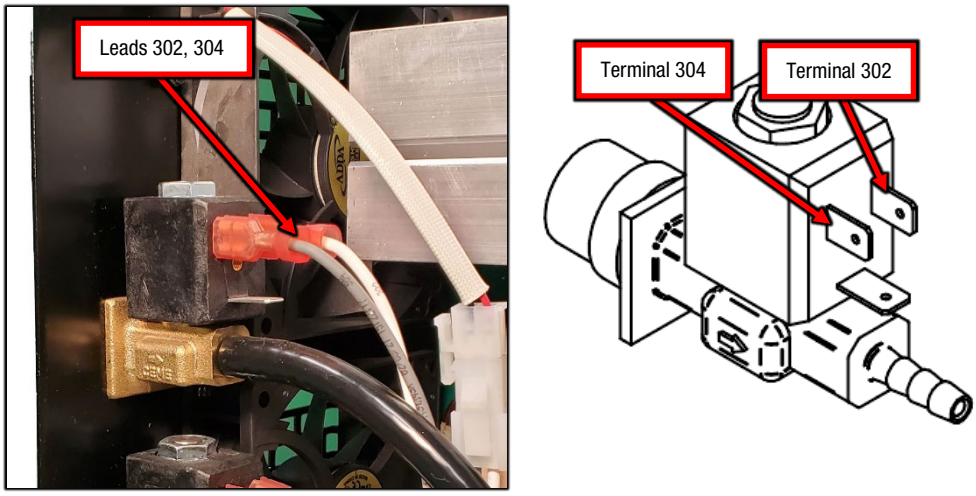


Figure F.2

MIG Solenoid Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
MIG Solenoid	Leads 302, 304 disconnected	Terminal 302	Terminal 304	~55Ω

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the machine is plugged into external power and turned on, connect appropriate welding gun and trigger the output when directed. NOTE: ENSURE NO WELDING WIRE/GAS ARE INSTALLED WHEN TRIGGERING THE OUTPUT.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

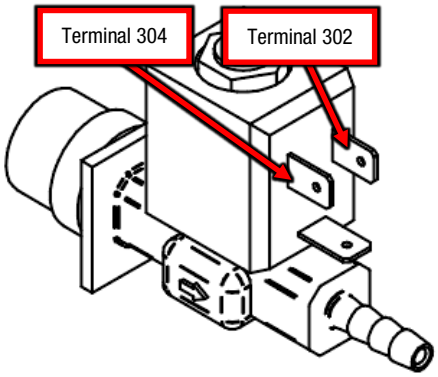


Figure F.3

MIG Solenoid Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input voltage	Output Triggered	Terminal 302	Terminal 304	~24VDC

Table 2

B.3. If the input measurement is correct and the solenoid does not operate this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

POWER CONTROL BOARD TEST PROCEDURE

TEST DESCRIPTION:

This procedure will determine the proper function of the Power Control Board using Static and Active tests. This procedure will not test all circuits in the Power Control Board.

MATERIALS NEEDED:

3/8" nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:

1. For location of the Power Control Board refer to Figure F.1.

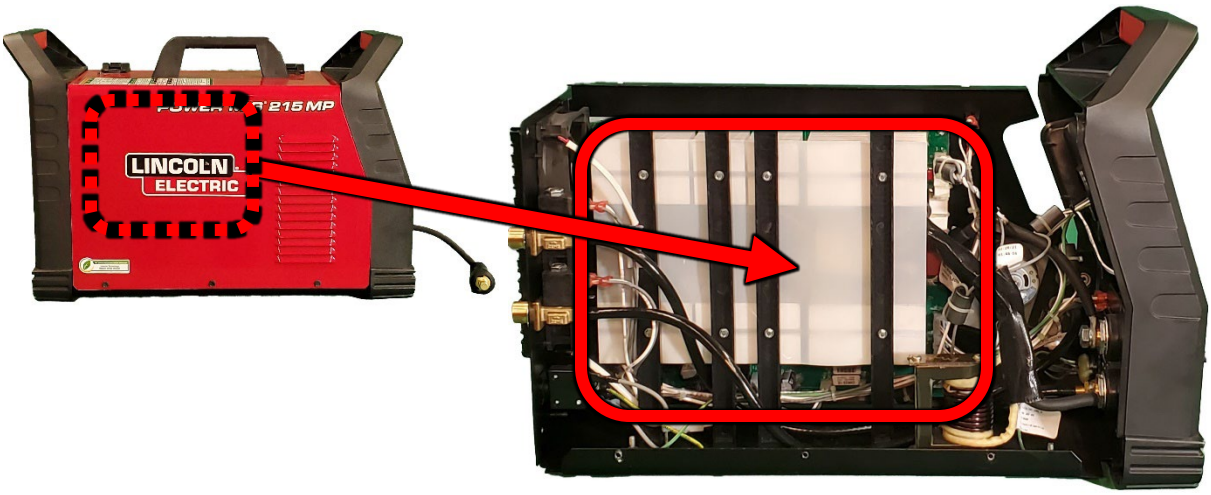


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

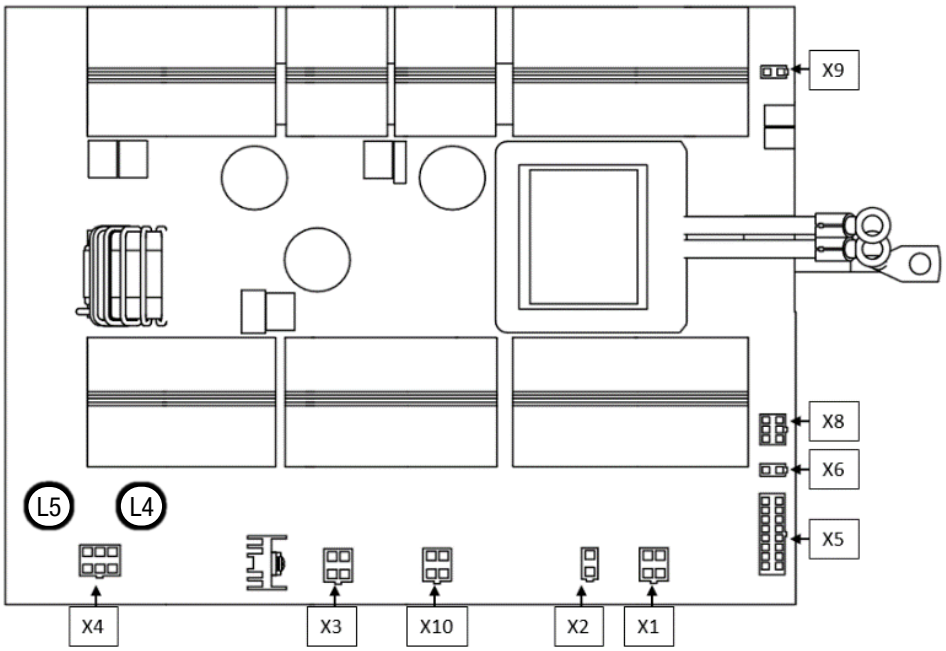


Figure F.2

Power Control Board Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Power Control Board	No power applied Machine turned OFF	L4	L5	~4.1MΩ
		Electrode	Work	~46KΩ

Table 1

A.3. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.4. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the machine is plugged into external power and turned on, connect appropriate welding gun and mode, trigger the output when directed. NOTE: ENSURE NO WELDING WIRE/GAS ARE INSTALLED WHEN TRIGGERING THE OUTPUT.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

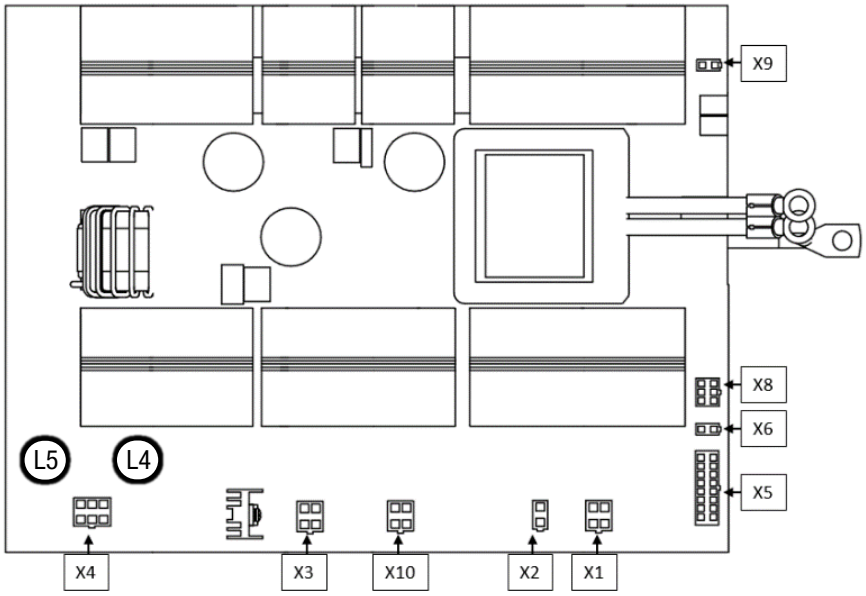


Figure F.3

Power Control Board Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input	Machine ON	L4	L5	~120 or 230VAC
Line Switch (Line)		X4 pin 3	X4 pin 1	~120 or 230VAC
Line Switch (Load)		X4 pin 6	X4 pin 4	~120 or 230VAC
UI Power Output		X8 pin 4	X8 pin 6	~24VDC
Output	MIG Mode, Output Triggered	Electrode	Work	~54VDC
Voltage Feedback Input		X1 Pin 4	X1 pin 2	~54VDC
Trigger Output	Machine ON	X6 pin 1	X6 pin 2	~15VDC
Wire Drive Output	MIG Mode, Output Triggered	X2 pin 1	X2 pin 2	~3-23VDC
Wire Drive Output	SPOOLGUN Mode, Output Triggered	X2 pin 1	X2 pin 2	~13-22VDC
Remote Amphenol	Machine On	X5 pin2	X5 pin 1	~3.3VDC
		X5 pin2	X5 pin 11	~1VDC
		X5 pin 11	X5 pin 1	0VDC
		X5 pin 15	X5 pin 6	~4.5VDC
MIG Solenoid Output	MIG Mode, Output Triggered	X3 pin 2	X3 pin 4	~24VDC
Bottom Fan Output	Machine On	X3 pin 1	X3 pin 3	~24VDC
TIG Solenoid Output	TIG Mode, Output Triggered	X10 pin 2	X10 pin 4	~24VDC
Top Fan Output	MIG Mode, Output Triggered	X10 pin 1	X10 pin 3	~24VDC

Table 2

B.3. If the input measurements are correct and the output measurements are not this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

TIG SOLENOID TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the TIG Solenoid using Static and Active tests.

MATERIALS NEEDED:
3/8" nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the TIG Solenoid refer to Figure F.1.

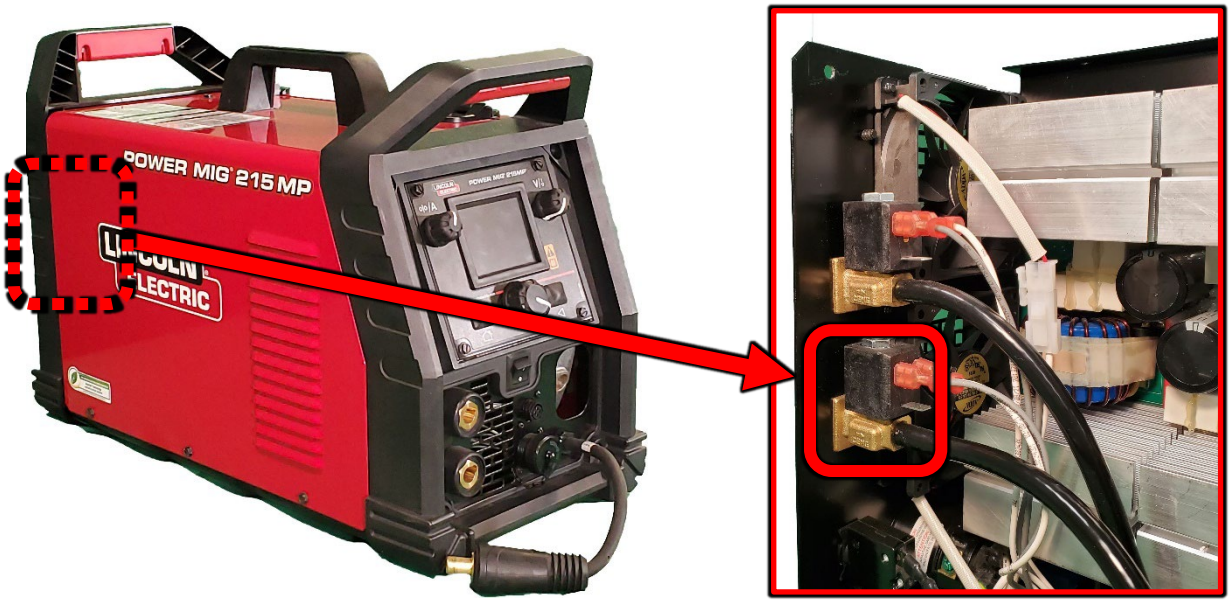


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Label and disconnect the following connections, refer to Figure F.2.

A.3. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

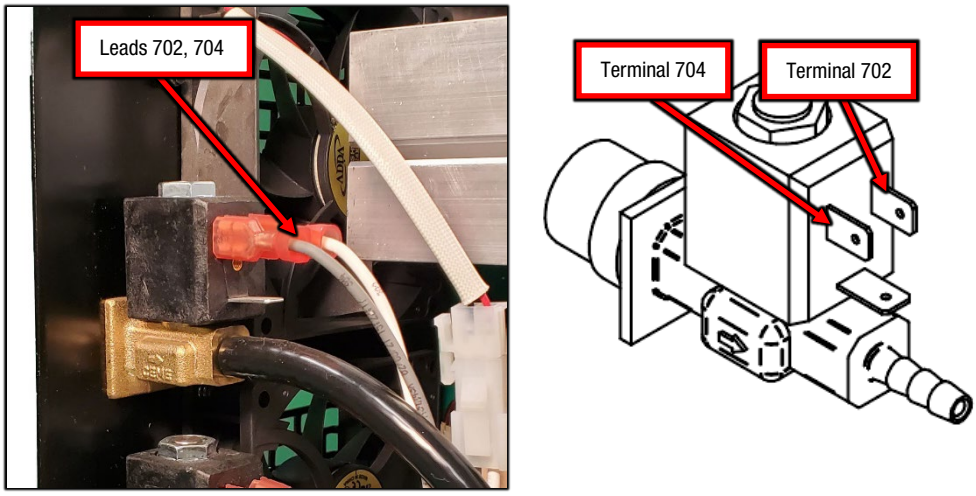


Figure F.2

TOG Solenoid Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
TIG Solenoid	Leads 702, 704 disconnected	Terminal 702	Terminal 704	~55Ω

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the machine is plugged into external power and turned on, connect appropriate welding gun and trigger the output when directed. NOTE: ENSURE NO WELDING WIRE/GAS ARE INSTALLED WHEN TRIGGERING THE OUTPUT.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

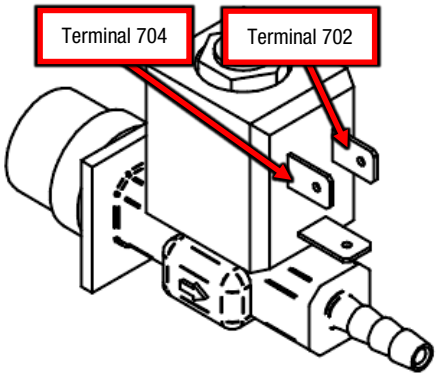


Figure F.3

TIG Solenoid Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input voltage	Output Triggered	Terminal 702	Terminal 704	~24VDC

Table 2

B.3. If the input measurement is correct and the solenoid does not operate this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

USER INTERFACE BOARD TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the User Interface Board using Active tests. This procedure will not test all circuits in the Power Control Board.

MATERIALS NEEDED:
(TOOLS)
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the User Interface Board refer to Figure F.1.

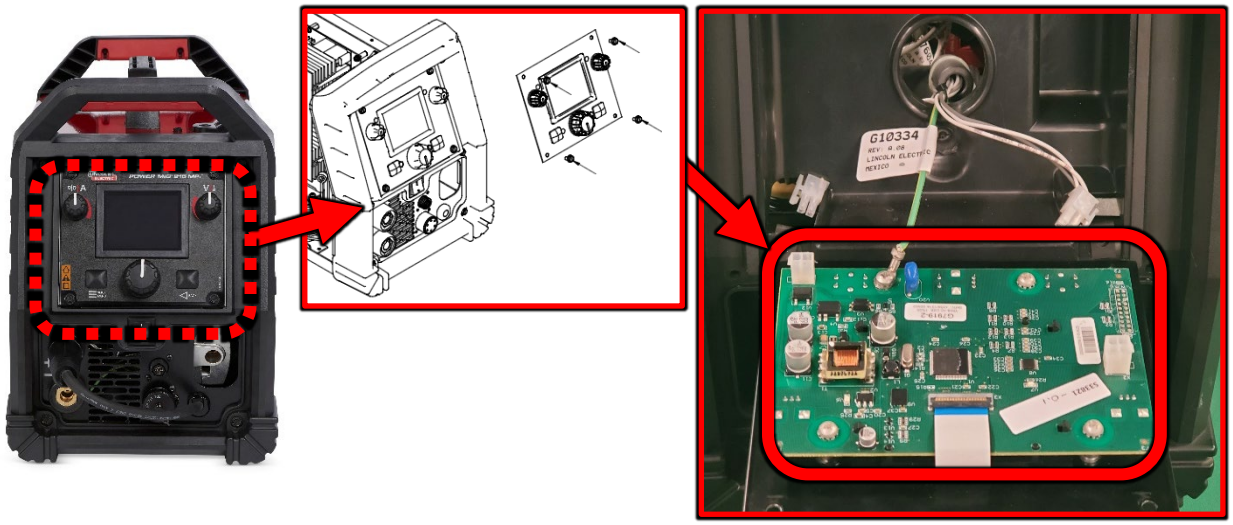


Figure F.1

2. Remove the four panel mounting screws to gain access for testing. NOTE: CONNECTORS X1 AND X2 REMOVED FOR PHOTO REFERENCE ONLY.

3. Perform the Active Testing.

A. ACTIVE TESTING

A.1. Ensure the machine is plugged into external power and turned on.

A.2. Perform the measurements identified in Test Table 1 below, refer to Figure F.2 for test point locations. NOTE: CONNECTORS X1 AND X2 REMOVED FOR PHOTO REFERENCE ONLY.

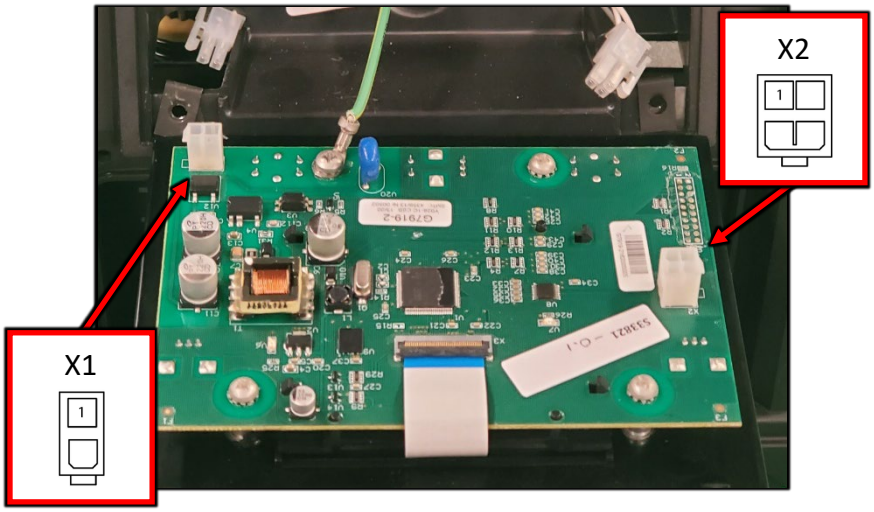


Figure F.2

User Interface Board Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input Voltage	Machine ON	X1 pin 1	X1 pin 2	~24VDC
Output CAN Voltage		X2 pin 2	X2 pin 4	~5VDC

Table 1

A.3. If the input measurements are correct and the output measurements are not correct this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

WIRE FEED MOTOR TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Wire Feed Motor using Static and Active tests.

MATERIALS NEEDED:
3/8" nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Wire Feed Motor refer to Figure F.1.

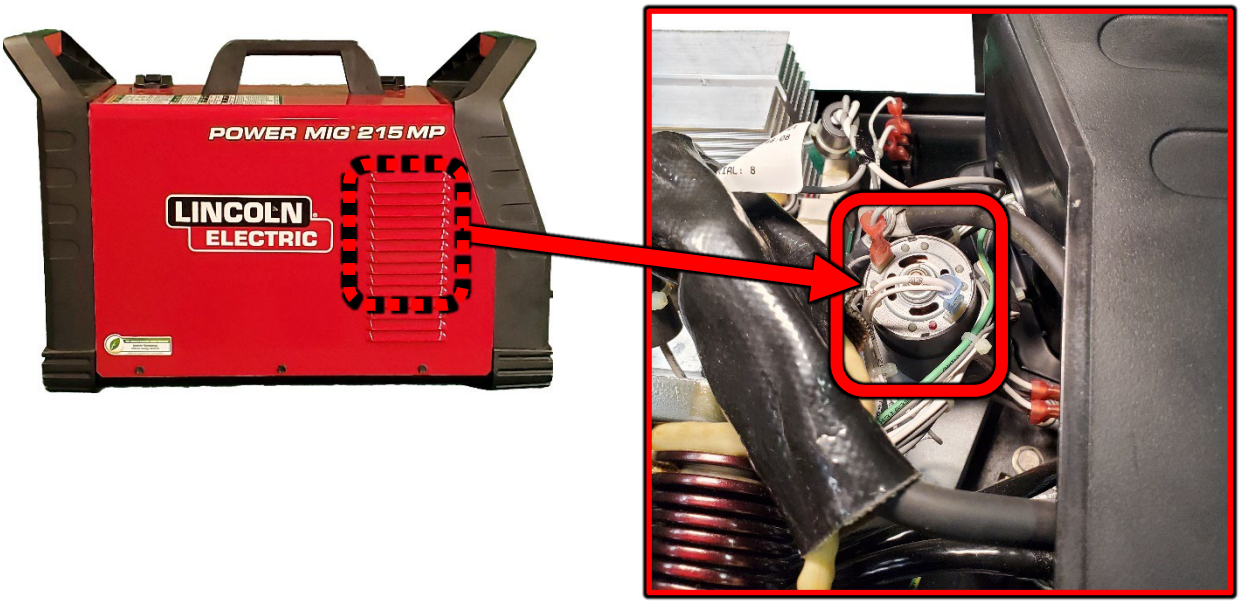


Figure F.1

2. Perform the "Case Cover Removal" to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Label and disconnect the following connections, refer to Figure F.2.

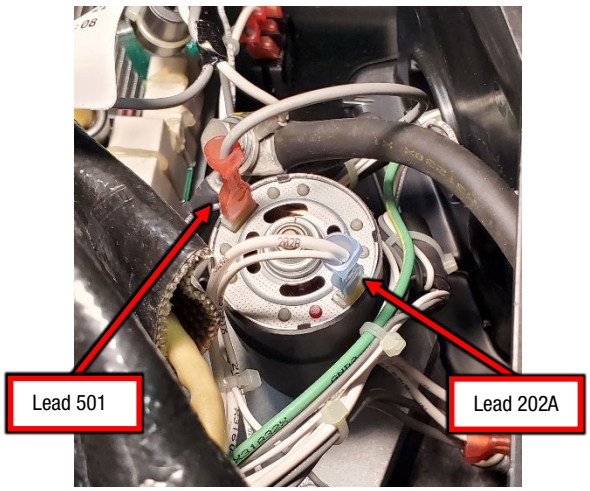


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations. NOTE: MEASUREMENTS ARE MADE ON THE TERMINALS WITH THE LEADS REMOVED.

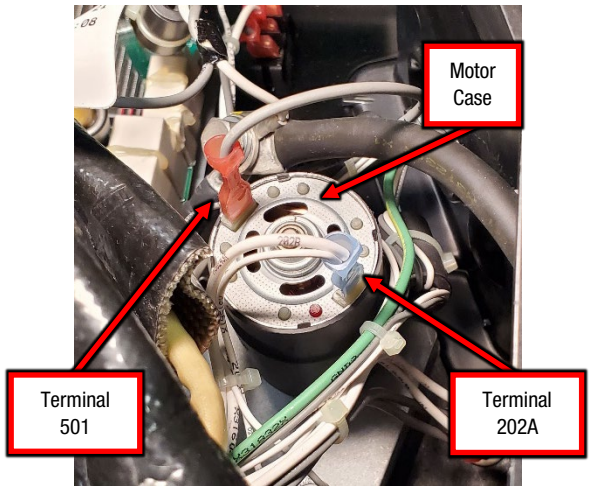


Figure F.3

Wire Feed Motor Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Wire Feed Motor	Machine OFF	Terminal 501	Terminal 202A	~6Ω
		Terminal 501	Motor Case	>500KΩ

Table 1

A.4. If measurements are correct reconnect anything disconnected in previous steps and proceed to “B. ACTIVE TESTING”.

A.5.. Any failed measurement indicates a defective component.

B. ACTIVE TESTING

B.1. Ensure the machine is plugged into external power and turned on, machine set to MIG mode. Motor Spoolgun Switch set to “Magnum PRO 175L”, connect appropriate welding gun and trigger the output when directed. NOTE: ENSURE NO WELDING WIRE/GAS ARE INSTALLED WHEN TRIGGERING THE OUTPUT.

B.2. Perform the measurements in Test Table 2 below, refer to Figure F.3 for test point locations.

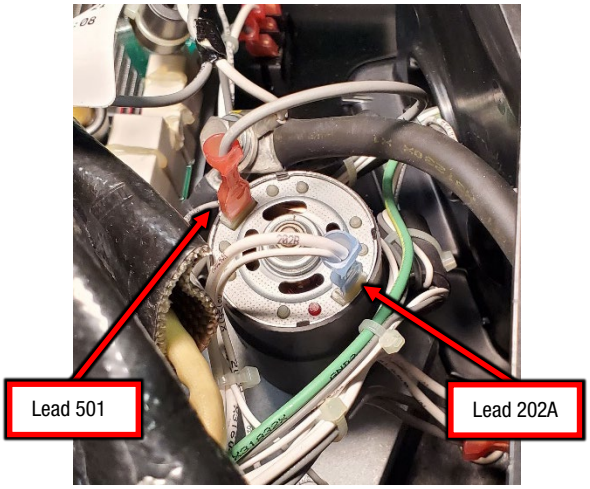


Figure F.3

Wire Feed Motor Active Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Input voltage MIN	Output Triggered, Wire Feed Speed set to MIN	Lead 501	Lead 202A	~3VDC
Input voltage MAX	Output Triggered, Wire Feed Speed set to MAX	Lead 501	Lead 202A	~23VDC

Table 2

B.3. If the input measurement is correct and the motor does not operate this component may be faulty.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

POWER SWITCH TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Power Switch using Static tests.

MATERIALS NEEDED:
3/8” nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Power Switch refer to Figure F.1.

Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power.

A.2. Label and disconnect the following connections, refer to Figure F.2..

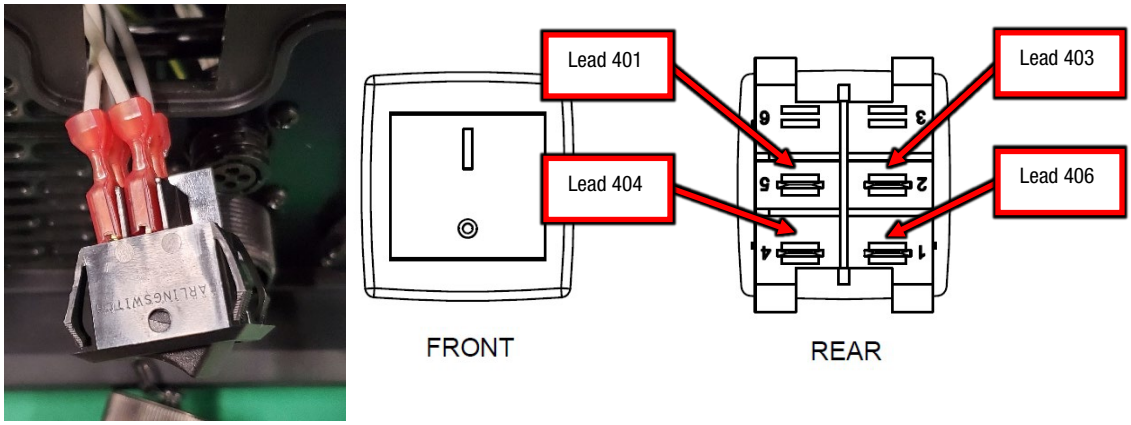


Figure F.2

A.3. Perform the static measurements in Test Table 1, refer to Figure F.3 for test point locations..

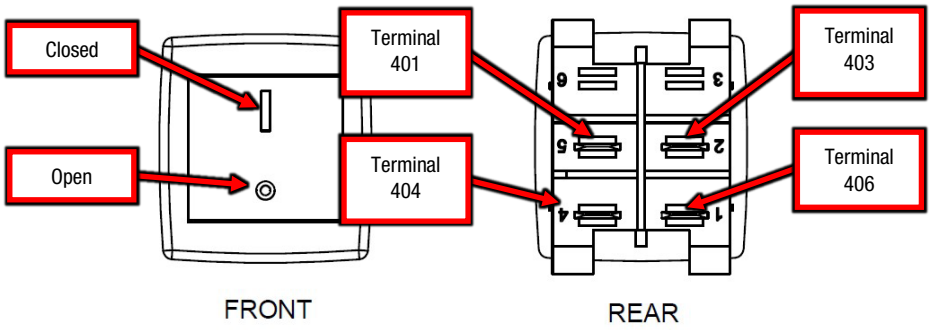


Figure F.3

Power Switch Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Power Switch	Switch Closed	Terminal 401	Terminal 404	<1Ω
		Terminal 403	Terminal 406	<1Ω
	Switch Open	Terminal 401	Terminal 404	>500KΩ
		Terminal 403	Terminal 406	>500KΩ

Table 1

A.4. If measurements are correct reconnect all connections removed in step A.2" and proceed to step 4.

A.5. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the "Test Reference" chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Refer to Safety pages for explanation of hazards:

SPOOLGUN SWITCH TEST PROCEDURE

TEST DESCRIPTION:
This procedure will determine the proper function of the Spoolgun Switch using Static tests.

MATERIALS NEEDED:
3/8” nut driver
Digital Multi-Meter
Wiring Diagram
Machine Schematic
Required P.P.E.

TEST PROCEDURE:
1. For location of the Spoolgun Switch refer to Figure F.1.

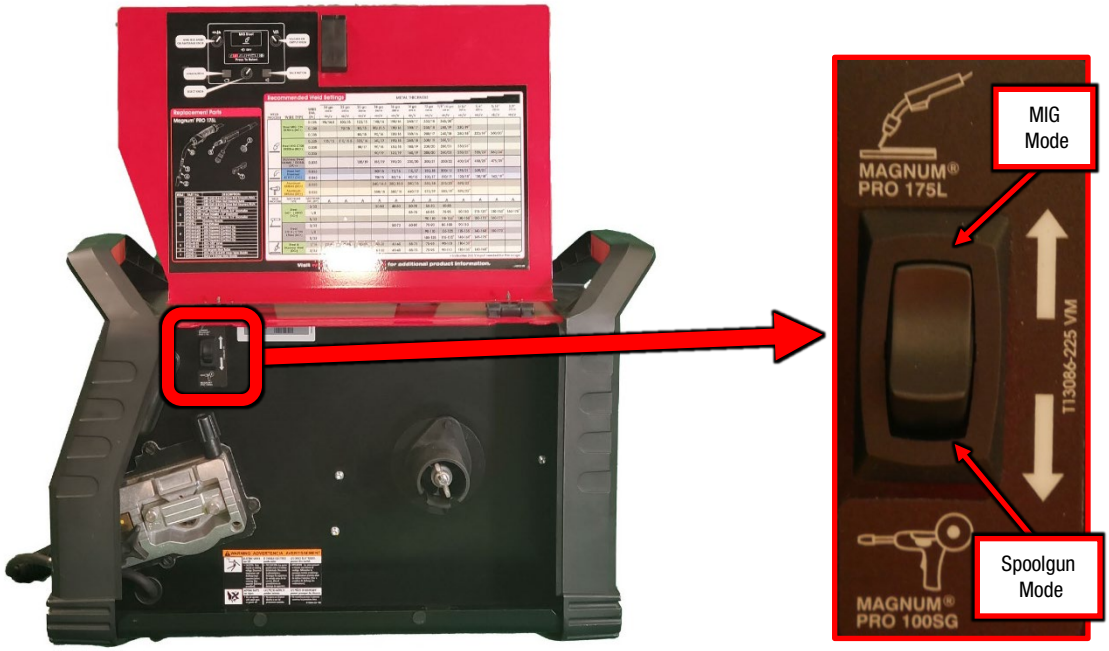


Figure F.1

2. Perform the “Case Cover Removal” to gain access for testing.

3. Perform the Static Testing.

A. STATIC TESTING

A.1. Ensure the machine is off, not plugged in or connected to external power and set to MIG or SPOOLGUN Mode as directed. Label and disconnect the X2 connector, refer to Figure F.2.

A.2. Perform the static measurements in Test Table 1, refer to Figure F.2 for test point locations.

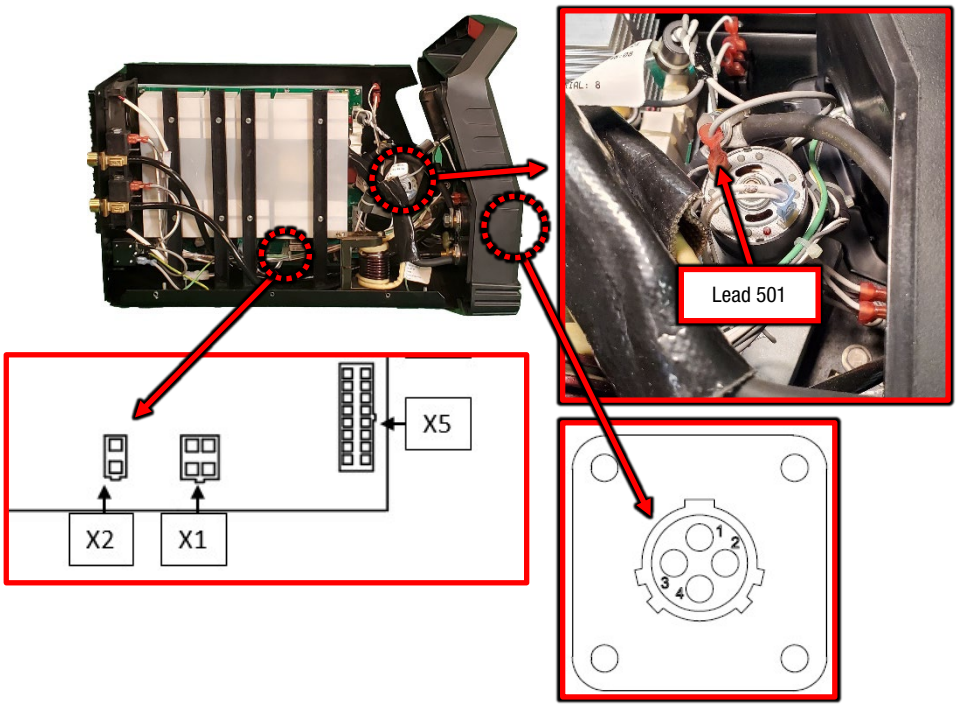


Figure F.2

Spoolgun Switch Static Test				
Component/Circuit Tested	Condition(s)	+Meter Lead	-Meter Lead	Expected Value
Spoolgun Switch	SPOOLGUN Mode	X2 pin 1	Lead 501	>500KΩ
		X2 pin 1	J1 pin 3	<1Ω
	MIG Mode	X2 pin 1	Lead 501	<1Ω
		X2 pin 1	J1 pin 3	>500KΩ

Table 1

A.3. If measurements are correct proceed to step 4.

A.4. Any failed measurement indicates a defective component.

4. If problems with the machine persist, refer to the “Test Reference” chart for other possible faulty components. Reconnect anything disconnected in previous steps.

Removal And Replacement Procedures

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Case Wrap Around Cover.

MATERIALS NEEDED

5/16” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Using a 5/16” nutdriver, remove the five screws (three on the side and two on the top) securing the case wrap around to the machine. See ***Figure F.1***. Note the longer screws are located on the top of the machine.
3. Using a 5/16” nutdriver, remove the two screws securing the case wrap around to the rear of the machine. See ***Figure F.2***.
4. Using a 5/16” nutdriver, remove the screw securing the case wrap around to the front panel. See ***Figure F.3***.
5. The case wrap around can now carefully be removed from the machine.
6. Perform any tests / replacement procedure.

REPLACEMENT PROCEDURE

1. Position the case wrap around onto the machine.
2. Using a 5/16” nutdriver, attach the screw securing the case wrap around to the front panel.
3. Using a 5/16” nutdriver, attach the two screws securing the case wrap around to the rear of the machine.
4. Using a 5/16” nutdriver, attach the five screws (three on the side and two on the top) securing the case wrap around to the machine. **NOTE:** Use the longer screws on the top of the machine.

Figure F.1 – Case wrap around mounting screw locations

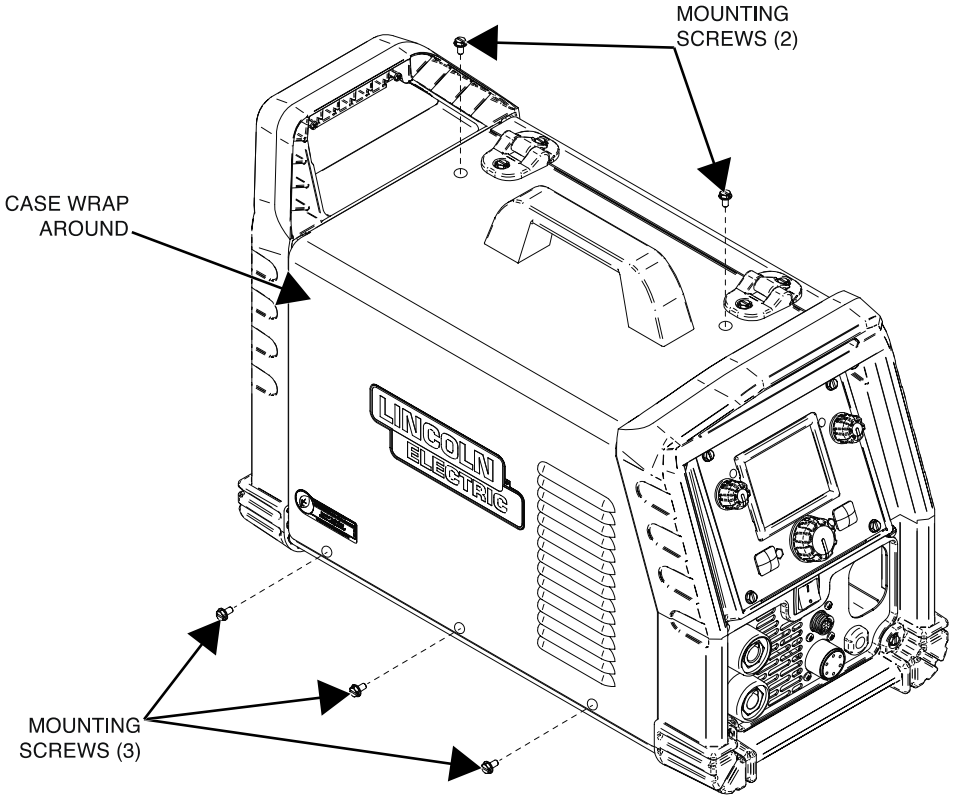


Figure F.2 – Case wrap around mounting screw locations

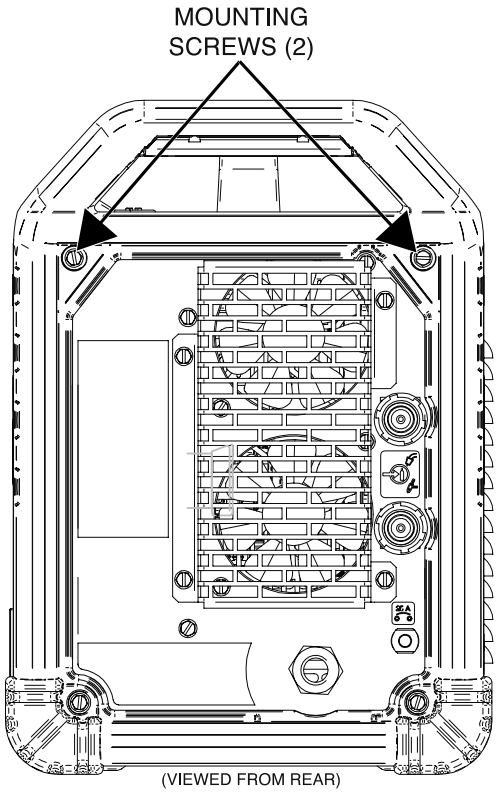
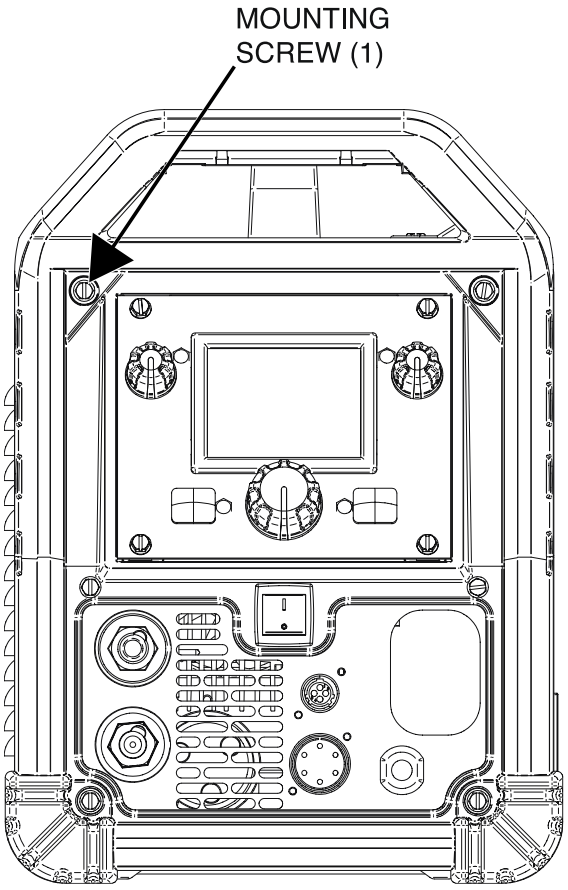


Figure F.3 – Case wrap around mounting screw location



FAN(S) REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Top and/or Bottom Fans.

MATERIALS NEEDED

5/16” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Using a 5/16” nutdriver, remove the four screws securing the fan shroud to the rear of the machine. See ***Figure F.1***. See Wiring Diagram.
4. Using a 5/16” nutdriver, remove the two screws securing each fan to the rear panel of the machine. See ***Figure F.2***.
5. Label and disconnect the associated fan plug (JF1/JF2) from each fan. See Wiring Diagram. Cut cable ties as necessary.
6. The fan(s) can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new fan(s) into the machine.
2. Connect the associated fan plug (JF1/JF2) to each fan. See Wiring Diagram. Replace cable ties as necessary.
3. Using a 5/16” nutdriver, attach the two screws securing each fan to the rear panel of the machine.
4. Using a 5/16” nutdriver, attach the four screws securing the fan shroud to the rear of the machine.
5. Perform the ***Case Cover Replacement Procedure***.
6. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Fan shroud mounting screw locations

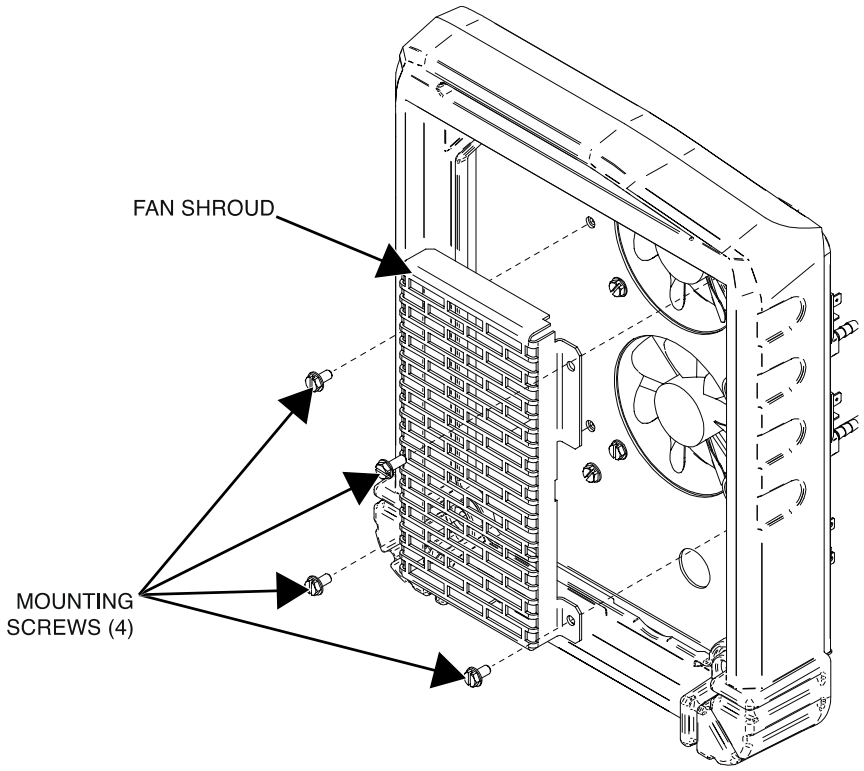
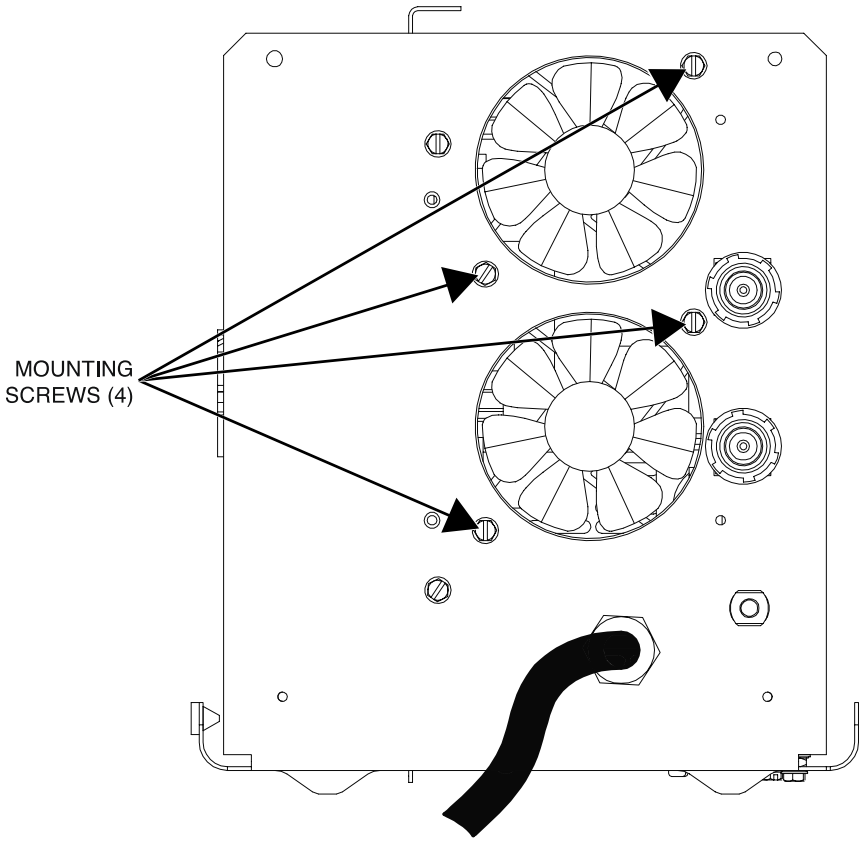
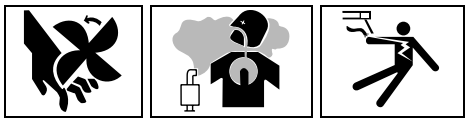


Figure F.2 – Fan mounting screw locations



USER INTERFACE BOARD REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the User Interface Board.

MATERIALS NEEDED

5/16” Nutdriver
Phillips Screwdriver
5/64” Allen Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Using a 5/16” nutdriver, remove the four screws securing the user interface board assembly to the machine. See ***Figure F.1***.
4. Using a Phillips screwdriver, remove the screw and washer securing lead GND2 to the user interface board. See ***Figure F.2***. See Wiring Diagram.
5. Label and disconnect plugs X1 and X2 from the user interface board. See ***Figure F.2***. See Wiring Diagram.
6. The user interface assembly can now be removed from the machine.
7. Using a 5/64” Allen nutdriver, loosen the set screw securing each of the three knobs to the user interface board. See ***Figure F.3***.
8. Remove the three knobs from the user interface board. Retain the knobs for reassembly.
9. Using a Phillips screwdriver, remove the three screws and washers securing the user interface board to the front panel. See ***Figure F.4***.
10. The user interface board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Using a Phillips screwdriver, attach the three screws and washers securing the new user interface board to the front panel.
2. Carefully position the three previously removed knobs onto the shafts of the user interface board.
3. Using a 5/64” Allen nutdriver, tighten the set screw securing each of the three knobs to the user interface board.
4. Carefully position the user interface board assembly into the machine.
5. Connect plugs X1 and X2 to the user interface board. See Wiring Diagram.
6. Using a Phillips screwdriver, attach the screw and washer securing lead GND2 to the user interface board. See Wiring Diagram.
7. Using a 5/16” nutdriver, attach the four screws securing the user interface board assembly to the machine.
8. Perform the ***Case Cover Replacement Procedure***.
9. Perform the ***Retest After Repair Procedure***.

Figure F.1 – User interface board mounting screw locations

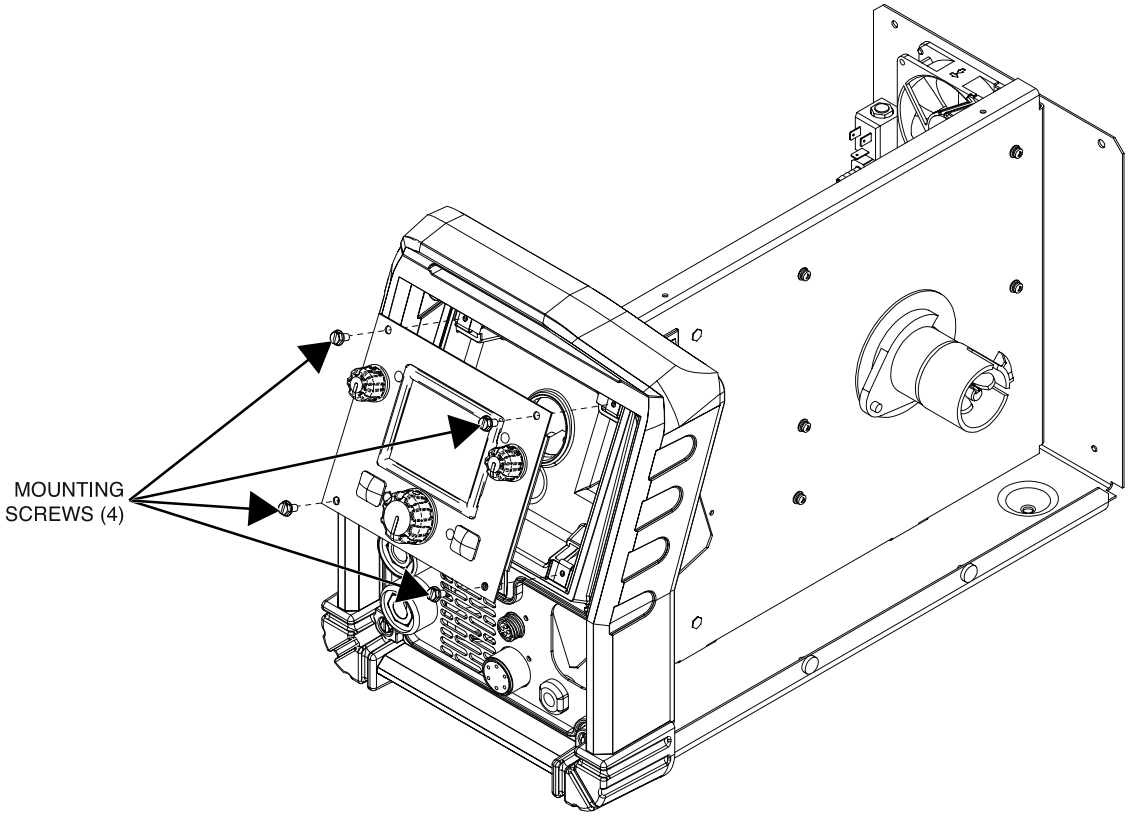


Figure F.2 – User interface board plug and lead locations

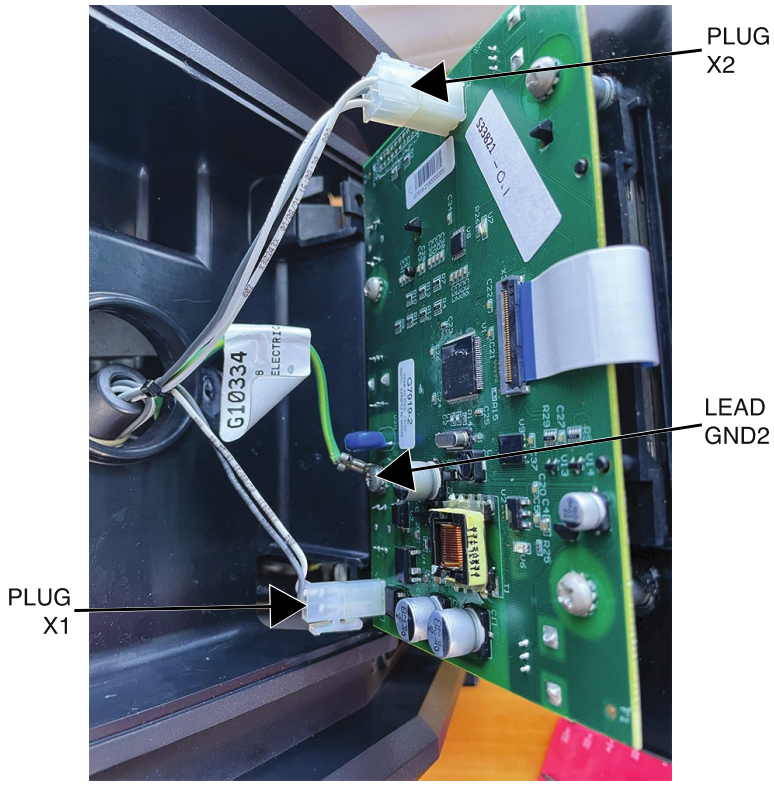


Figure F.3 – User interface board knob locations

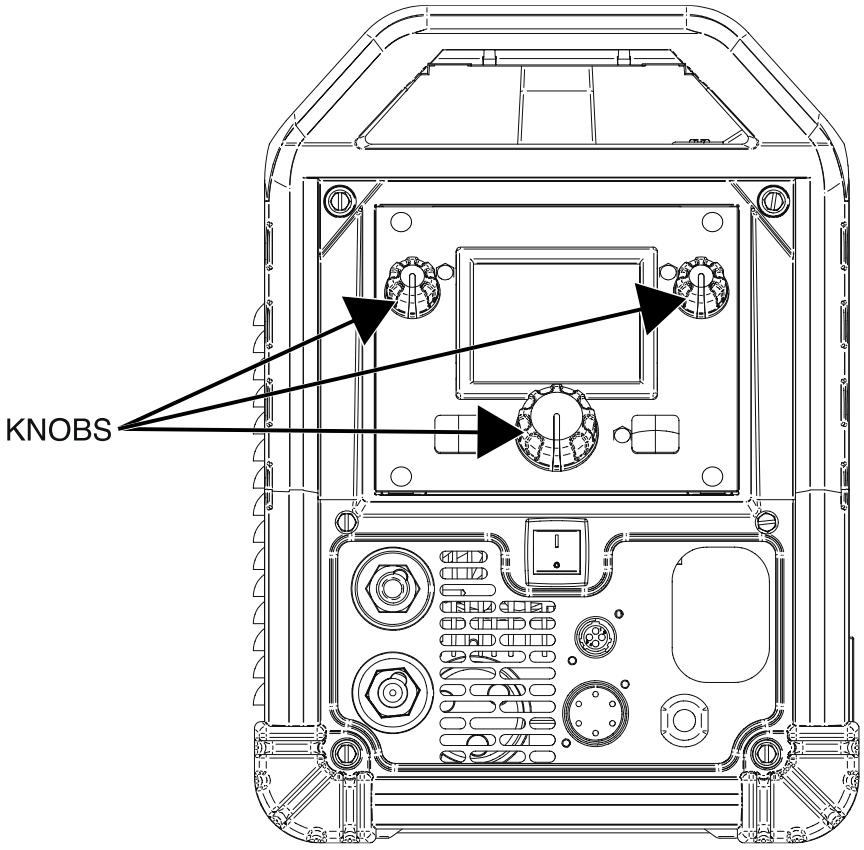
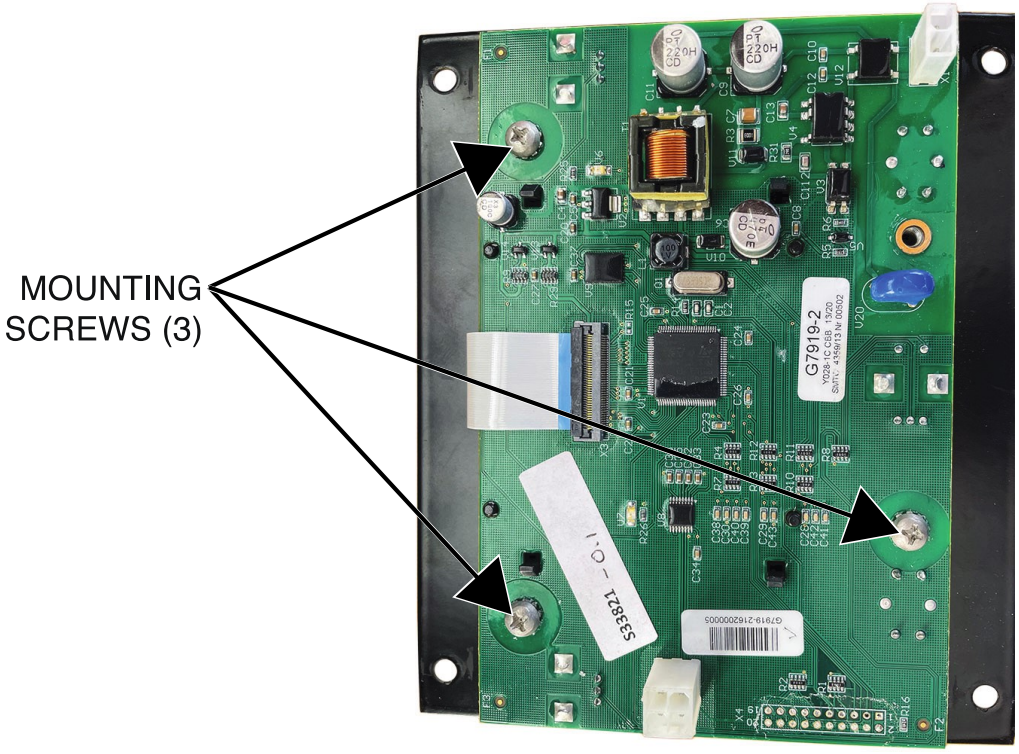
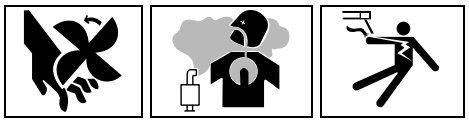


Figure F.4 – User interface board mounting screw locations



OUTPUT CHOKE REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

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

MATERIALS NEEDED

Two 1/2” Open-End Wrenches
5/16” Nutdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Using two 1/2” open-end wrenches, remove the bolt, nut, lock washer, and two flat washers securing lead TX2 to the output choke terminal. See ***Figure F.1***. See Wiring Diagram. Label and disconnect lead.
4. Using two 1/2” open-end wrenches, remove the bolt, nut, lock washer, and two flat washers securing leads 102A, 901, and NEG lead to the output choke terminal. See ***Figure F.1***. See Wiring Diagram. Label and disconnect leads.
5. Carefully position the machine on its side to gain access to output choke mounting screws.
6. Using a 5/16” nutdriver, remove the two screws securing the output choke to the base of the machine. See ***Figure F.2***.
7. The output choke can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the machine on its side.
2. Using a 5/16” nutdriver, attach the two screws securing the new output choke to the base of the machine.
3. Carefully maneuver the machine back into the standard position.
4. Using two 1/2” open-end wrenches, attach the bolt, nut, lock washer, and two flat washers securing leads 102A, 901, and NEG lead to the output choke terminal. See Wiring Diagram.
5. Using two 1/2” open-end wrenches, attach the bolt, nut, lock washer, and two flat washers securing lead TX2 to the output choke terminal. See Wiring Diagram.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Output choke lead connection locations

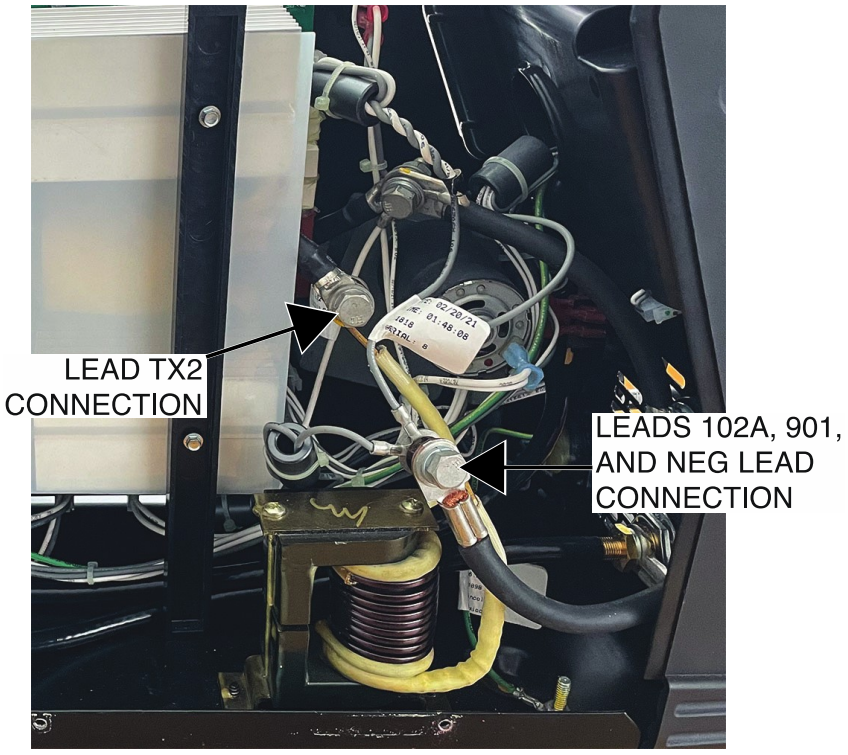
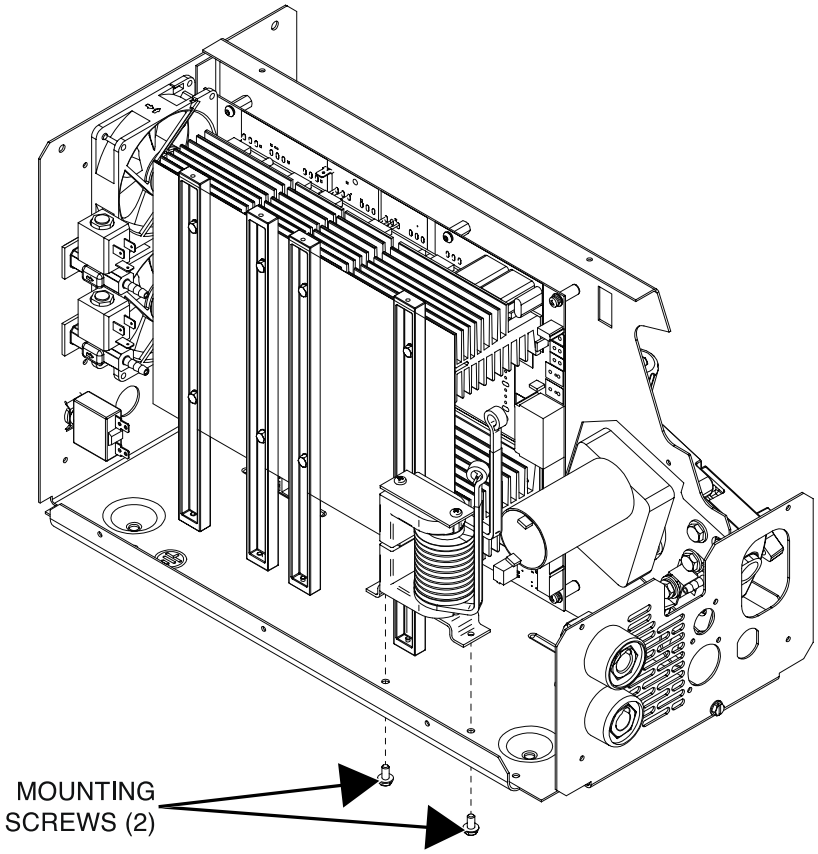
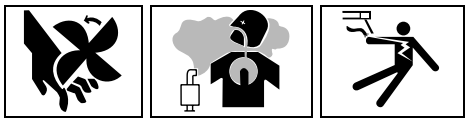


Figure F.2 – Output choke mounting screw locations



MIG/TIG GAS SOLENOID REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the MIG/TIG Gas Solenoid.

MATERIALS NEEDED

Needle-Nose Pliers
Slotted Screwdriver
Hammer
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect leads 304 & 302 from the MIG gas solenoid and/or leads 704 and 702 from the TIG gas solenoids. See ***Figure F.1***. See Wiring Diagram.
4. Using needle-nose pliers and a slotted screwdriver, loosen the hose clamp and carefully pry the gas hose from the rear of the solenoid to be replaced. See ***Figure F.1***.
5. Using a hammer and slotted screwdriver, carefully loosen the nut on the rear of the machine securing each gas solenoid to the case back. Note washer placement for reassembly. See ***Figure F.2***.
6. The gas solenoid(s) can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new gas solenoid into the case back of the machine.
2. Using a hammer and slotted screwdriver, carefully tighten the nut and washer on the rear of the machine securing each gas solenoid to the case back.
3. Carefully position the gas hose onto the rear of the gas solenoid.
4. Using needle-nose pliers, attach the hose clamp securing the gas hose onto the rear of the gas solenoid.
5. Connect leads 304 & 302 to the MIG gas solenoid and/or leads 704 and 702 to the TIG gas solenoids. See Wiring Diagram.
6. Perform the ***Case Cover Replacement Procedure***.
7. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Gas solenoid leads and gas hose connection locations

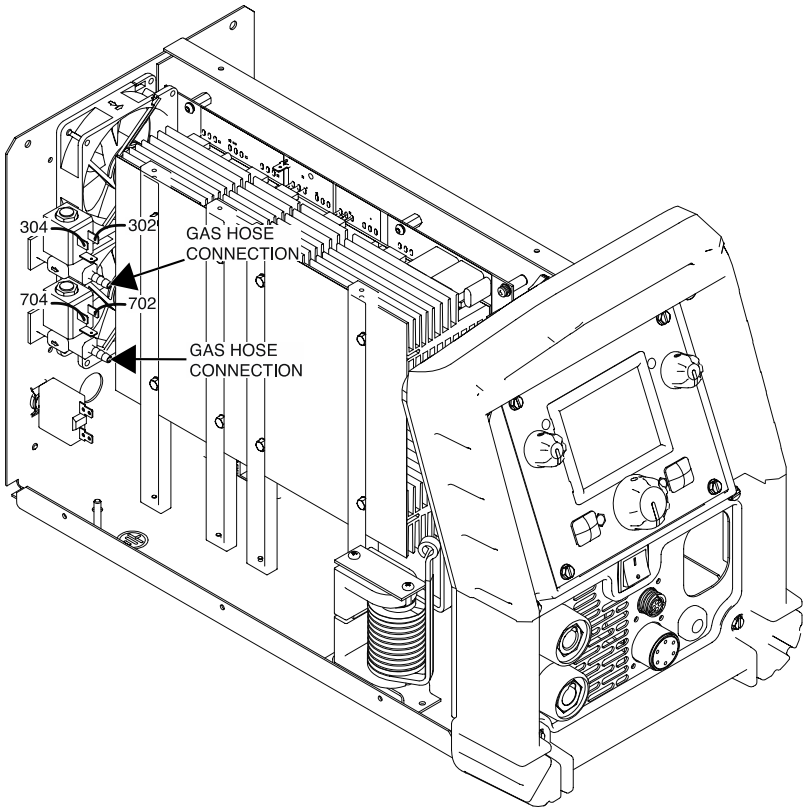
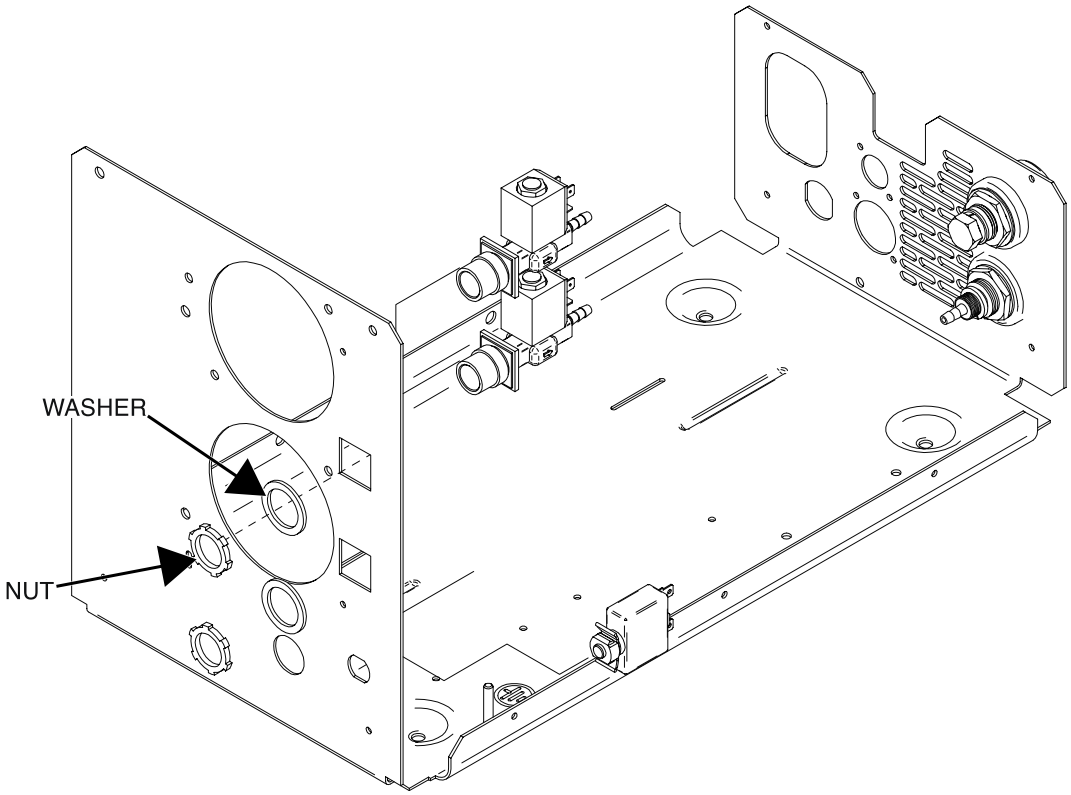


Figure F.2 – Gas solenoid mounting hardware locations



POWER SWITCH REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:

TEST DESCRIPTION

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

MATERIALS NEEDED

Wiring Diagram

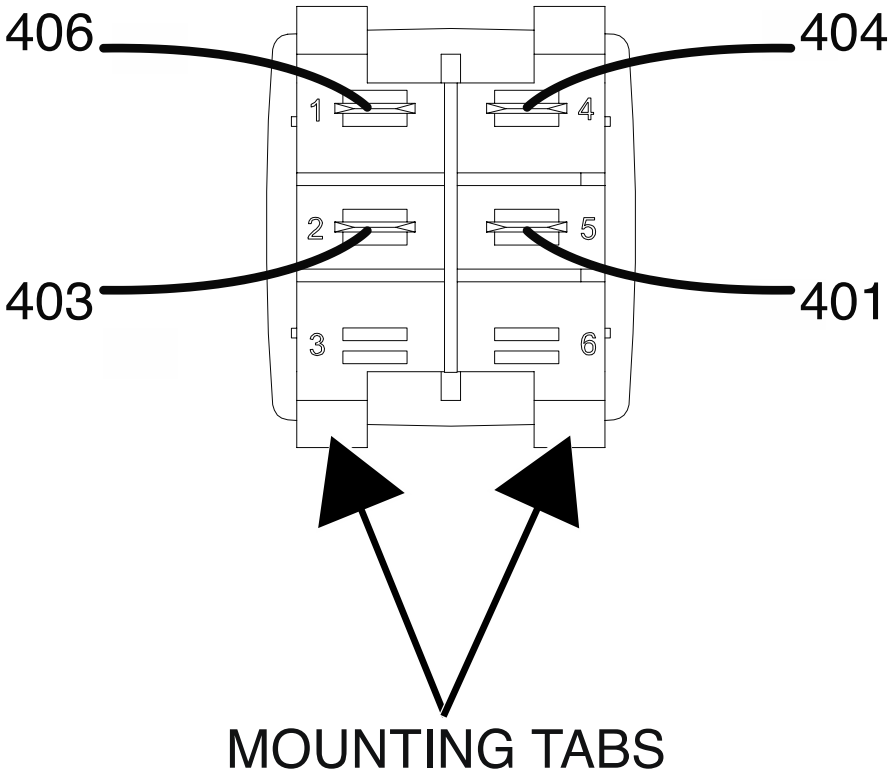
REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect leads 406, 404, 403, and 401 from the terminals of the power switch. See ***Figure F.1***. See Wiring Diagram.
4. Squeeze the upper and lower mounting tabs of the power switch and push the power switch outward and away from the machine. See ***Figure F.1***.
5. The power switch can now be removed and replaced.

REPLACEMENT PROCEDURE

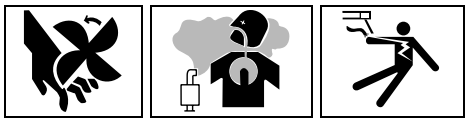
1. Carefully position the new power switch into the machine and press firmly to seat the power switch in it's mount.
2. Connect leads 406, 404, 403, and 401 to the terminals of the power switch. See Wiring Diagram.
3. Perform the ***Case Cover Replacement Procedure***.
4. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Power switch lead and mounting tab locations



SPOOL GUN SWITCH REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Spool Gun Switch.

MATERIALS NEEDED

Wiring Diagram

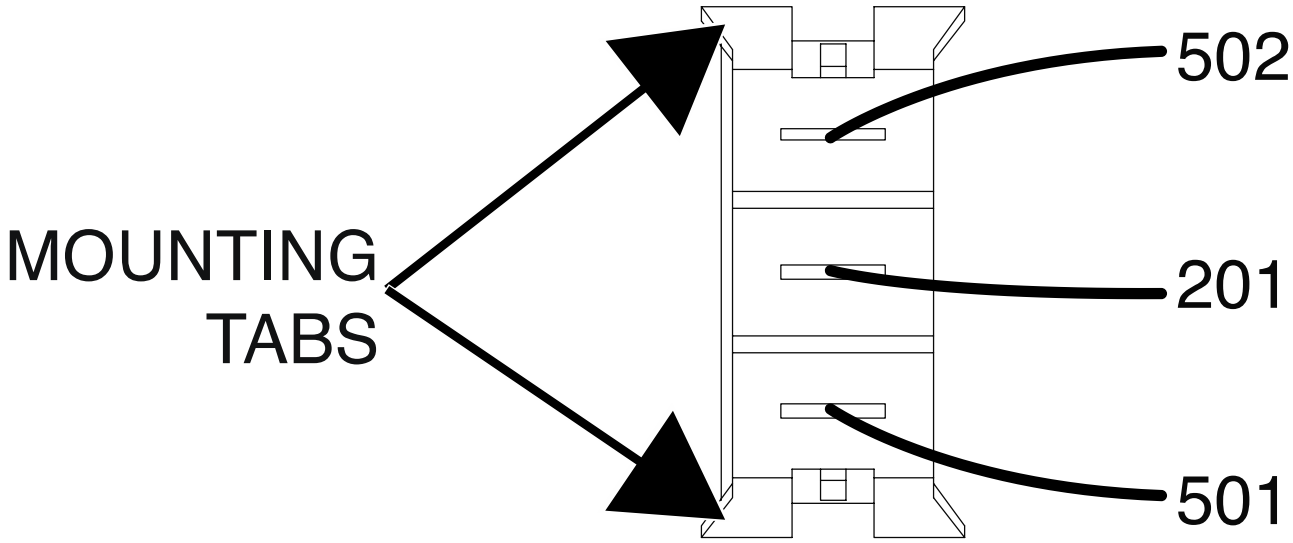
REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect leads 502, 201, and 501 from the terminals of the spool gun switch. See ***Figure F.1***. See Wiring Diagram.
4. Squeeze the upper and lower tabs of the spool gun switch and push the spool gun switch outward and away from the machine. See ***Figure F.1***.
5. The spool gun switch can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new spool gun switch into the machine and press firmly to seat the spool gun switch in it's mount.
2. Connect leads 502, 201, and 501 to the terminals of the spool gun switch. See Wiring Diagram.
3. Perform the ***Case Cover Replacement Procedure***.
4. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Spool gun switch lead and mounting tab locations



THERMAL BREAKER REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:

TEST DESCRIPTION

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

MATERIALS NEEDED

Needle-Nose Pliers
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Label and disconnect leads 797 and the black lead from the rear terminals of the thermal breaker. See ***Figure F.1***. See Wiring Diagram.
4. Using needle-nose pliers, carefully squeeze the tabs around the reset button to release the thermal breaker from the rear panel. See ***Figure F.2***.
5. Carefully maneuver the thermal breaker out of the rear panel.
6. The thermal breaker can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new thermal breaker into the rear panel until it is fully seated.
2. Connect leads 797 and the black lead to the rear terminals of the thermal breaker. See Wiring Diagram.
3. Perform the ***Case Cover Replacement Procedure***.
4. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Thermal breaker lead locations

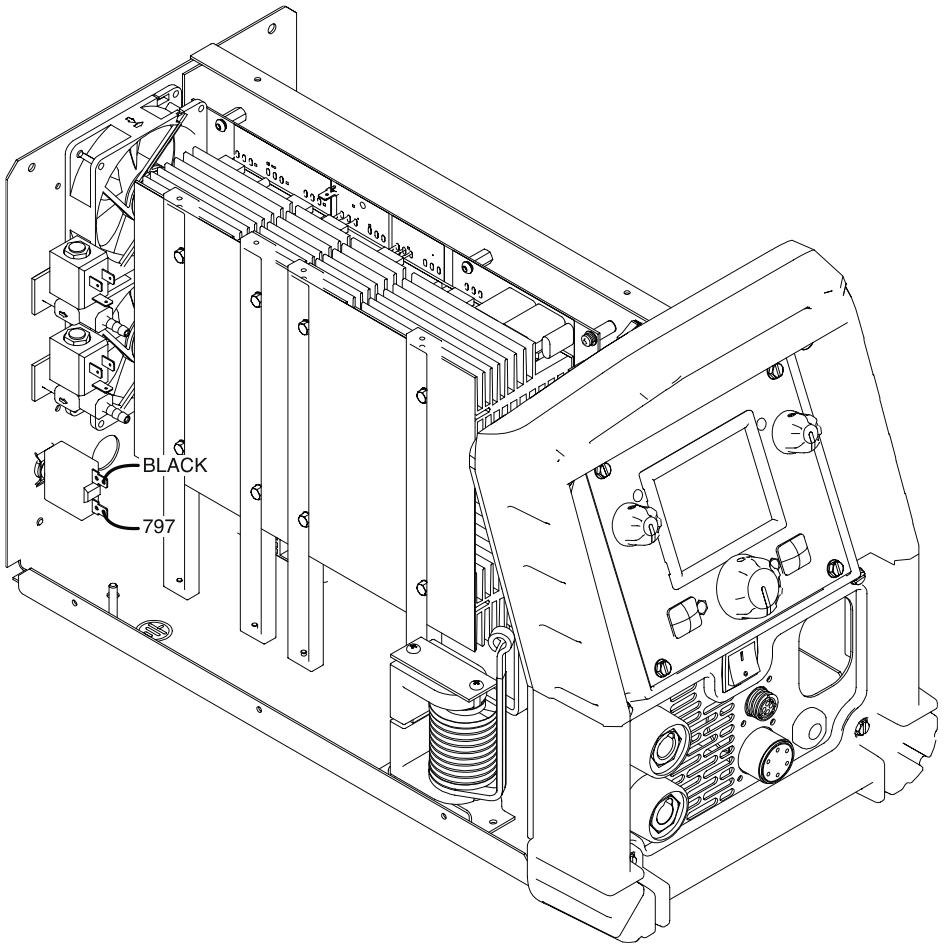
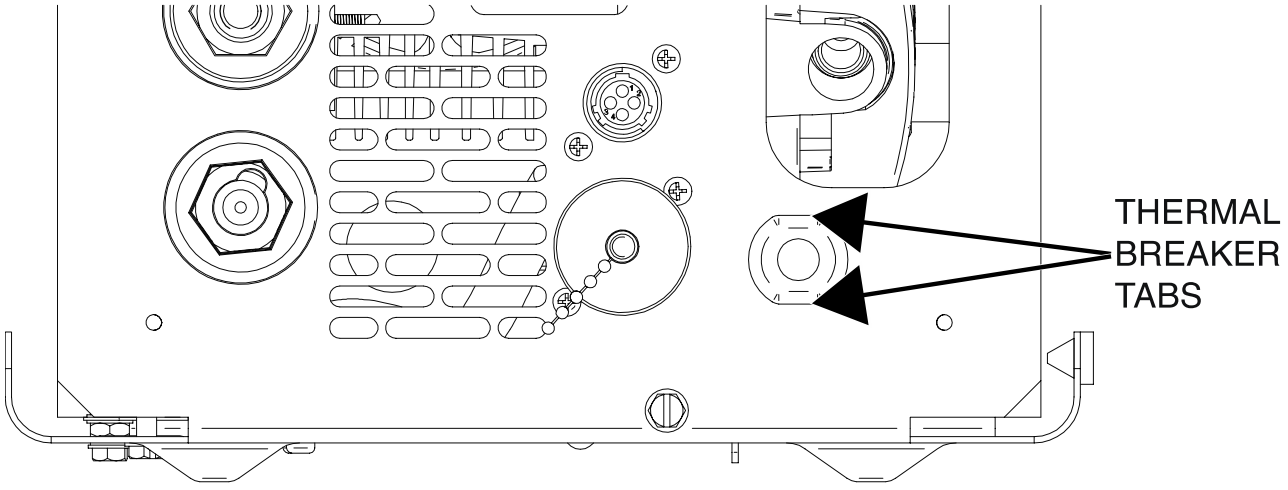
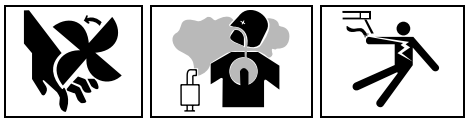


Figure F.2 – Thermal breaker mounting tab locations



WIRE DRIVE MOTOR REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Wire Drive Motor.

MATERIALS NEEDED

5/16” Nutdriver
Slotted Screwdriver
7/16” Nutdriver With An Extension
Torx Nutdriver (Size T-15)
Phillips Screwdriver
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Power Switch Removal Procedure***.
4. Perform the ***User Interface Board Removal Procedure***.
5. Carefully route the user interface board leads through the front panel.
6. Using a 5/16” nutdriver, remove the four remaining case front mounting screws securing the front panel to the machine. See ***Figure F.1***.
7. Carefully remove the case front away from the machine to gain access to the wire drive mounting screws, gas hose and leads.
8. Label and disconnect leads 202A, 202B and 501 from the wire drive motor. See ***Figure F.2***. See Wiring Diagram.
9. Using a slotted screwdriver, carefully pry the gas hose from the wire drive. See ***Figure F.2***. See Wiring Diagram.
10. Using a 7/16” nutdriver with an extension, remove the bolt, lock washer, and flat washer securing the heavy lead to the rear of the wire drive motor. See ***Figure F.2***. See Wiring Diagram.
11. Using a 5/16” nutdriver, remove the three screws securing the wire drive panel into the machine. See ***Figure F.3***.
12. Carefully remove the wire drive assembly out of the machine.
13. Carefully unscrew the molded hand screw and remove from the wire drive assembly. See ***Figure F.4***. Retain the molded hand screw for reassembly.
14. Lower the tension arm and raise the pivot arm assembly. See ***Figure F.4***.
15. Loosen the wire guide knobs and remove the outer wire guide assembly. See ***Figure F.4***.
16. Carefully remove the inner wire guide assembly. See ***Figure F.4***.
17. Using a Torx nutdriver (size T-15), remove the screw securing the hub and drive roll gear to the machine. See ***Figure F.4***. Remove the hub and drive roll gear.
18. Using a Phillips screwdriver, remove the three screws securing the cover assembly to the wire drive. See ***Figure F.4***.
19. Using a Phillips screwdriver, remove the three screws securing the wire drive motor to the wire drive base. See ***Figure F.5***.
20. The wire drive motor can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Using a Phillips screwdriver, attach the three screws securing the wire drive motor to the wire drive base.
2. Using a Phillips screwdriver, attach the six screws securing the cover assembly to the wire drive.
3. Carefully attach the drive roll gear and hub.
4. Using a Torx nutdriver (size T-15), attach the screw securing the hub and drive roll gear to the machine.
5. Carefully attach the inner wire guide assembly and the outer wire guide assembly.
6. Tighten the wire guide knobs.
7. Lower the pivot arm assembly and raise the tension arm.
8. Carefully screw the molded hand screw into the machine.
9. Carefully position the wire drive assembly into the machine.
10. Using a 5/16” nutdriver, attach the three screws securing the wire drive panel into the machine.
11. Using a 7/16” nutdriver with an extension, attach the bolt, lock washer, and flat washer securing the heavy lead to the rear of the wire drive motor. See Wiring Diagram.
12. Carefully attach the gas hose to the wire drive.
13. Connect leads 202A, 202B and 501 to the wire drive motor. See Wiring Diagram.
14. Carefully position the case front onto the machine.
15. Using a 5/16” nutdriver, attach the four case front mounting screws securing the front panel to the machine.
16. Carefully route the user interface board leads through the front panel.
17. Perform the ***User Interface Board Replacement Procedure***.
18. Perform the ***Power Switch Replacement Procedure***.
19. Perform the ***Case Cover Replacement Procedure***.
20. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Front panel mounting screw locations

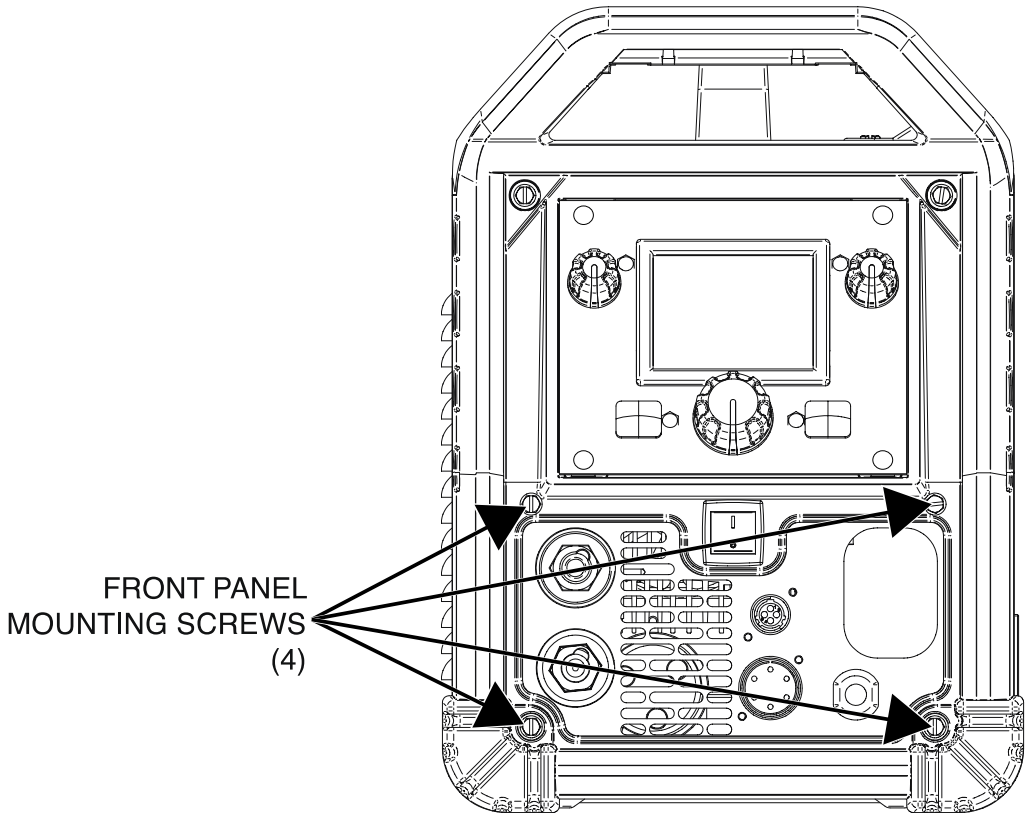


Figure F.2 – Gas hose and wire drive lead locations

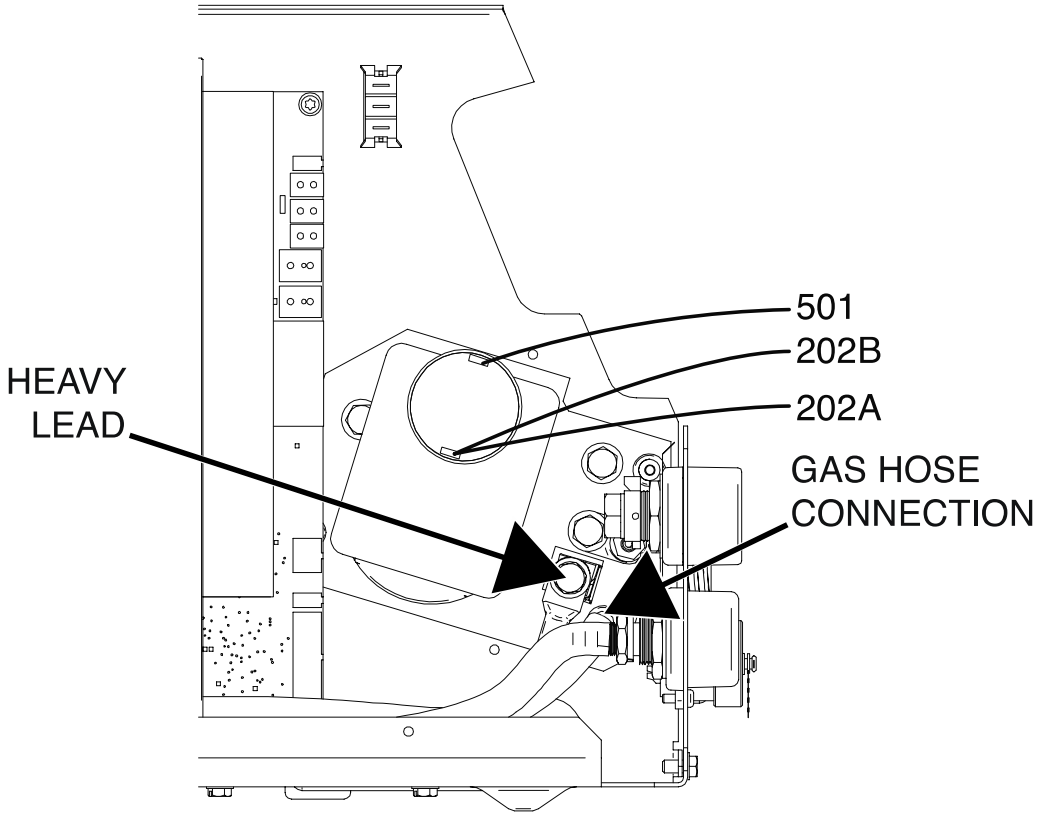


Figure F.3 – Wire drive panel mounting screw locations

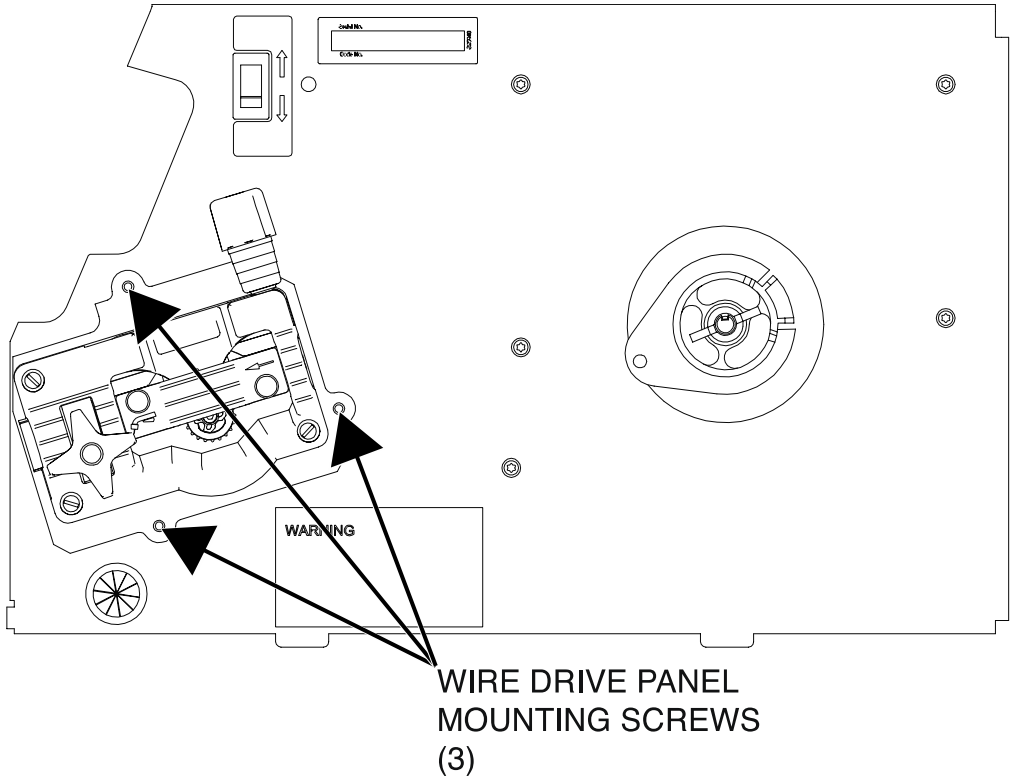


Figure F.4 – Wire drive assembly component locations

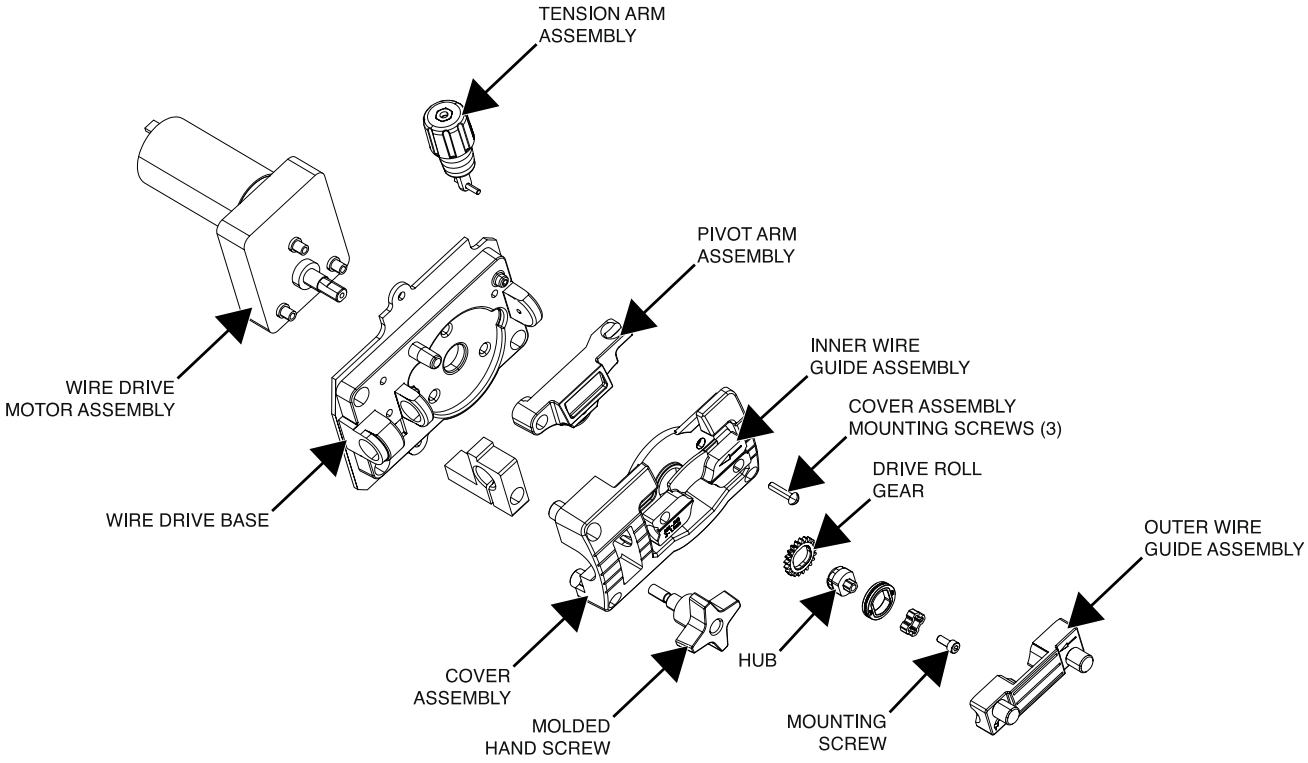
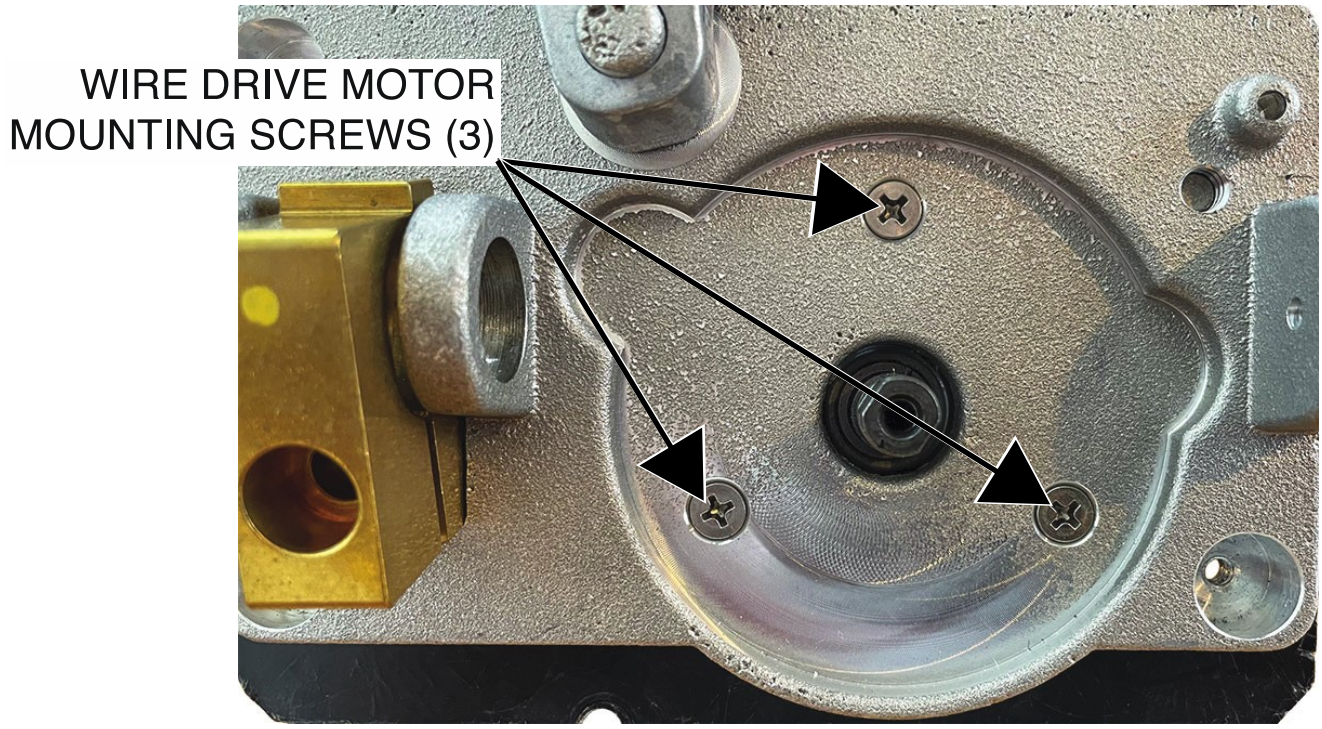
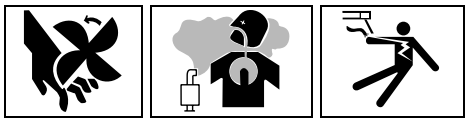


Figure F.5 – Wire drive motor mounting screw locations



POWER CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

Refer to Safety pages for explanation of hazards:



TEST DESCRIPTION

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

MATERIALS NEEDED

Phillips Screwdriver
Two 1/2” Open-End Wrenches
Torx Nutdriver (Size T-20)
Wiring Diagram

REMOVAL PROCEDURE

1. Carefully remove input power from the Power MIG 215 MPi machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Perform the ***Fan(s) Removal Procedure***.
4. Label and disconnect lead 797 from the lower terminal of the thermal breaker. See ***Figure F.1***. See Wiring Diagram.
5. Carefully place the machine on its side to gain access to the mounting screws.
6. Using a Phillips screwdriver, remove the four screws securing the heat sink support posts to the base of the machine. See ***Figure F.2***.
7. Carefully return the machine to the upright position.
8. Using two 1/2” open-end wrenches, remove the bolt, nut, lock washer, and two flat washers securing lead TX2 to the output choke. See ***Figure F.3***. See Wiring Diagram.
9. Using two 1/2” open-end wrenches, remove the bolt, nut, lock washer, and two flat washers securing leads 104A, 902, and the POS lead to lead TX1 on the power control board. See ***Figure F.3***. See Wiring Diagram. Label and disconnect leads.
10. Using a Torx nutdriver (size T-20), remove the five screws, lock washers, and flat washers securing the power control board to the center panel. See ***Figure F.4***.
11. Using a Torx nutdriver (size T-20), remove the two screws, lock washers and flat washers securing the upper and lower right corners of the power control board to the center panel. See ***Figure F.4***.
12. Using a Torx nutdriver (size T-20), remove the two screws, lock washers and flat washers securing lead 797 and the white lead to the power control board. See ***Figure F.2***. See Wiring Diagram.
13. Label and disconnect plugs X6, X1, X2, X9, X4, X8, X5, X10, and X3 from the power control board. See ***Figure F.5***. See Wiring Diagram.
14. Carefully remove the PCB insulation and retain for reassembly. See ***Figure F.4***.
15. Carefully remove the power control board assembly from the machine.
16. The power control board can now be removed and replaced.

REPLACEMENT PROCEDURE

1. Carefully position the new power control board into the machine.
2. Carefully position the PCB insulation to the rear of the power control board.

3. Connect plugs X6, X1, X2, X9, X4, X8, X5, X10, and X3 to the power control board. See Wiring Diagram.
4. Using a Torx nutdriver (size T-20), attach the two screws, lock washers and flat washers securing lead 797 and the white lead to the power control board. See Wiring Diagram.
5. Using a Torx nutdriver (size T-20), attach the two screws, lock washers and flat washers securing the upper and lower right corner of the power control board to the center panel.
6. Using a Torx nutdriver (size T-20), attach the five screws, lock washers, and flat washers securing the power control board to the center panel.
7. Using two 1/2" open-end wrenches, attach the bolt, nut, lock washer, and two flat washers securing leads 104A, 902, and the POS lead to lead TX1 on the power control board. See Wiring Diagram.
8. Using two 1/2" open-end wrenches, attach the bolt, nut, lock washer, and two flat washers securing lead TX2 to the output choke. See Wiring Diagram.
9. Carefully place the machine on its side to attach the mounting screws.
10. Using a Phillips screwdriver, attach the four screws securing the heat sink support posts to the base of the machine.
11. Carefully return the machine to the upright position.
12. Connect lead 797 to the lower terminal of the thermal breaker. See Wiring Diagram.
13. Perform the ***Fan(s) Replacement Procedure***.
14. Perform the ***Case Cover Replacement Procedure***.
15. Perform the ***Retest After Repair Procedure***.

Figure F.1 – Thermal breaker lead locations

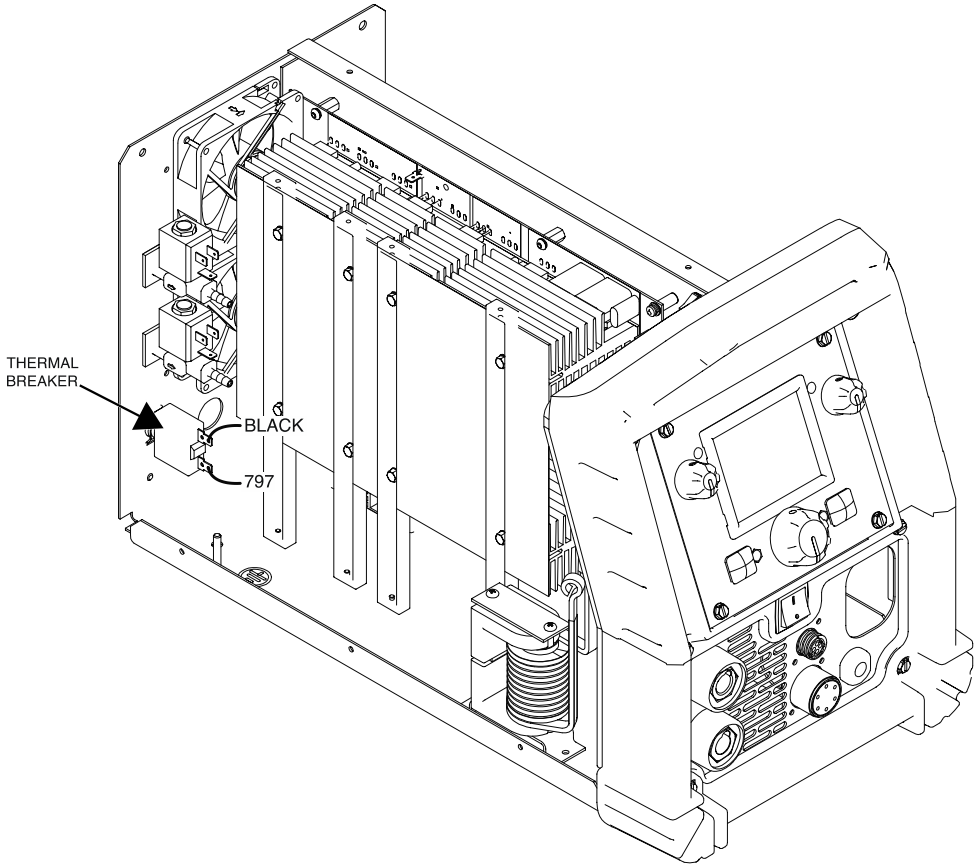


Figure F.2 – Heat sink mounting post screws and lead 797 and the white lead locations

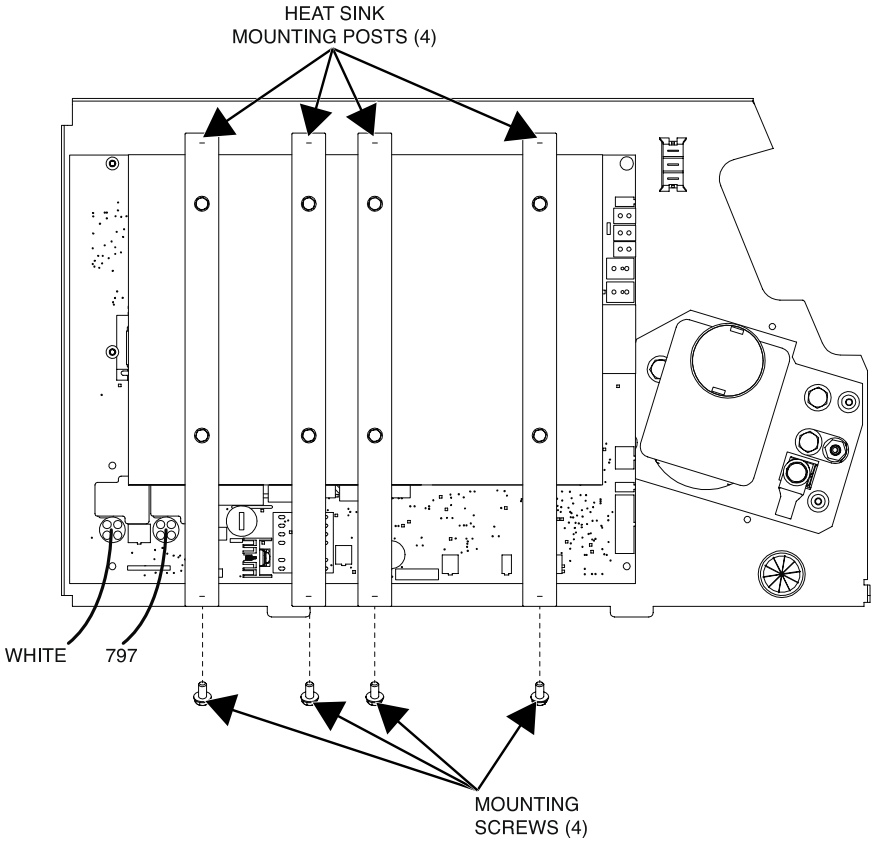


Figure F.3 – Power control board lead connection locations

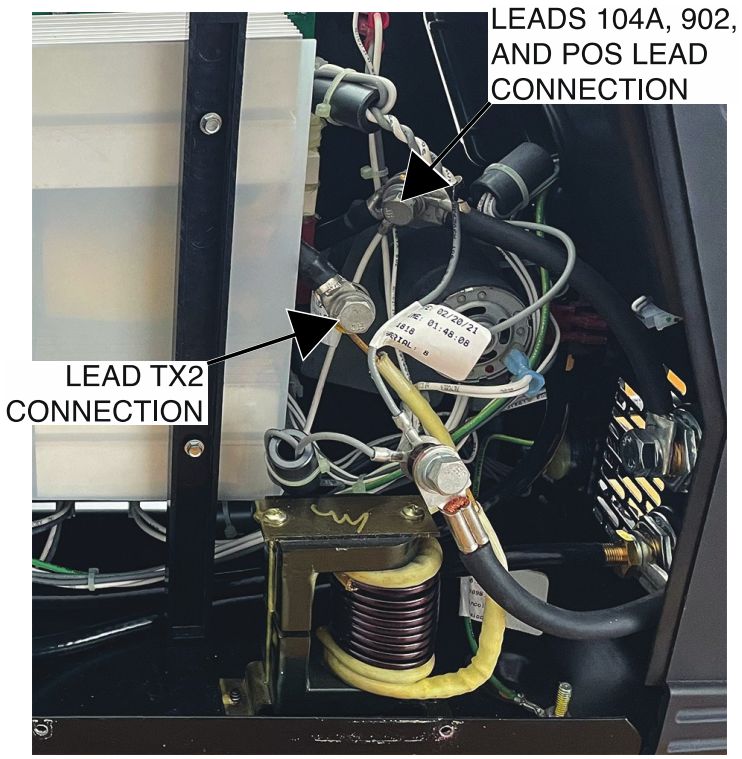


Figure F.4 – Power control board mounting screw and PCB insulation locations

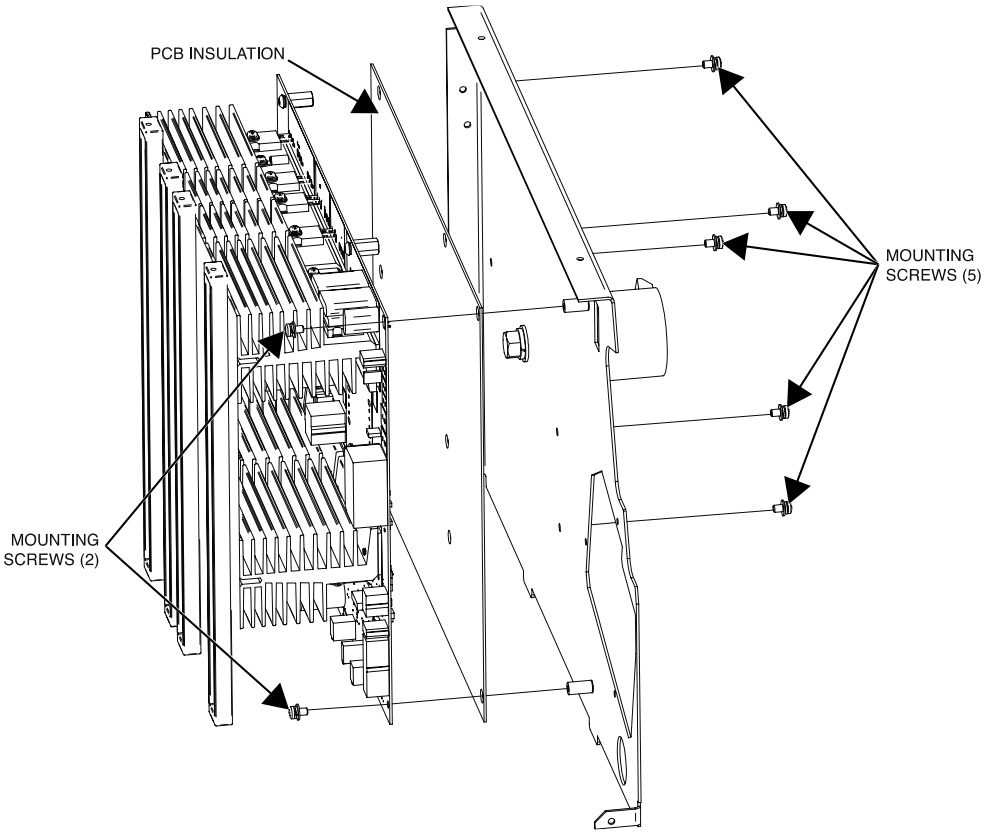
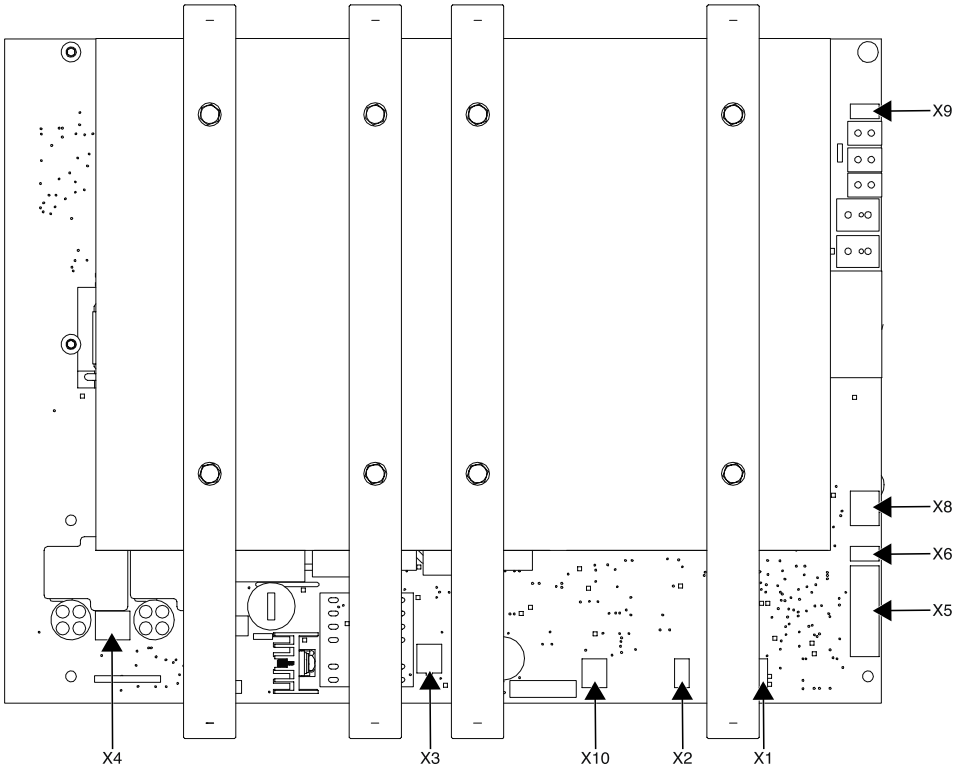


Figure F.5 – Power control board plug locations



RETEST AFTER REPAIR
POWER MIG 215MPi

Retest a machine:

- If it is rejected under test for any reason that requires you to remove any mechanical part which could affect the machine's electrical characteristics.

OR

- If you repair or replace any electrical components.

INPUT VOLTAGE, AMPERES, AND CURRENT

Input Voltage	Maximum Amperes	Idle Amperes
120VAC – Single Phase	23 Amps	0.55 Amps
230VAC – Single Phase	29 Amps	0.55 Amps

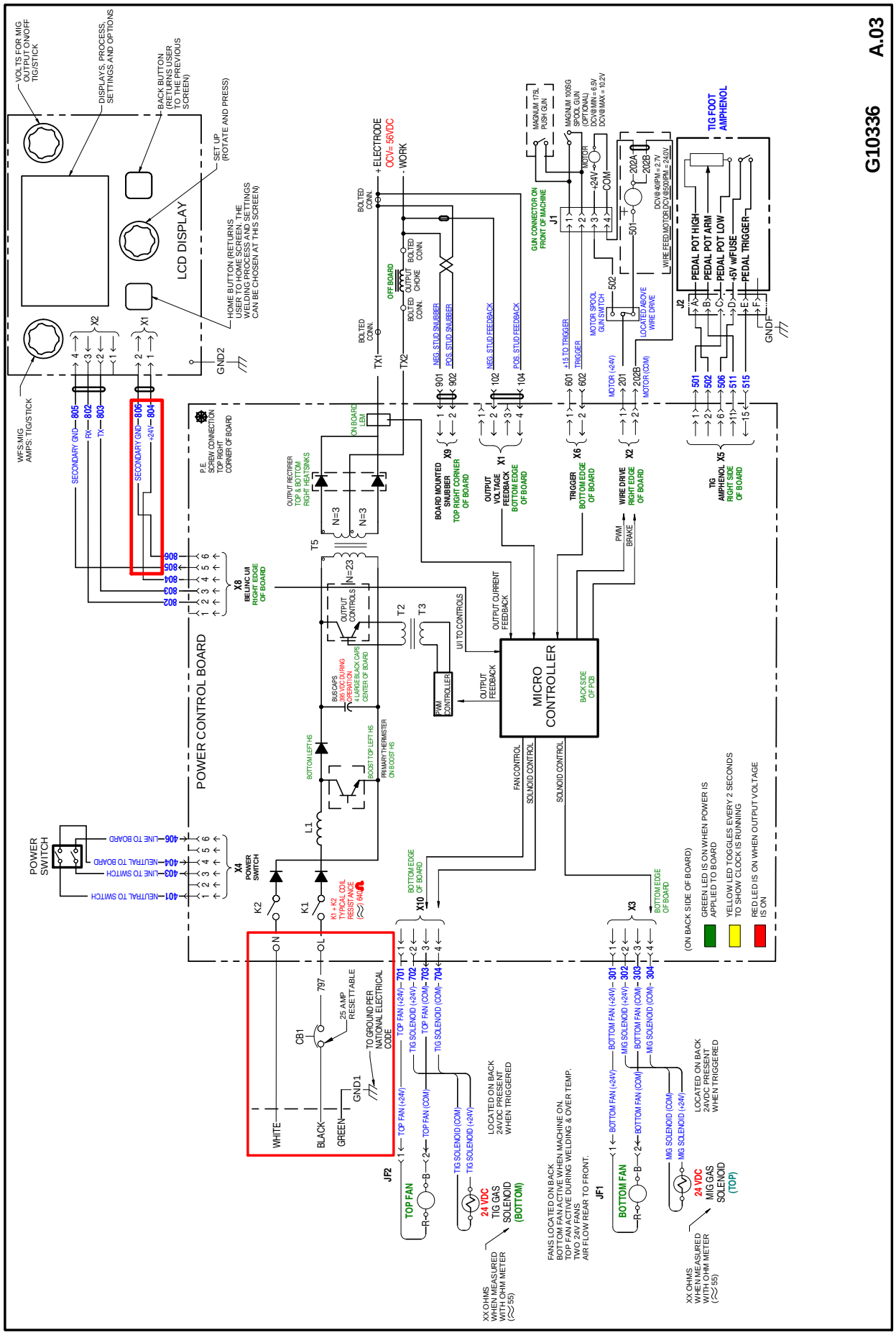
OPEN CIRCUIT VOLTAGE

53.0 – 56.0VDC

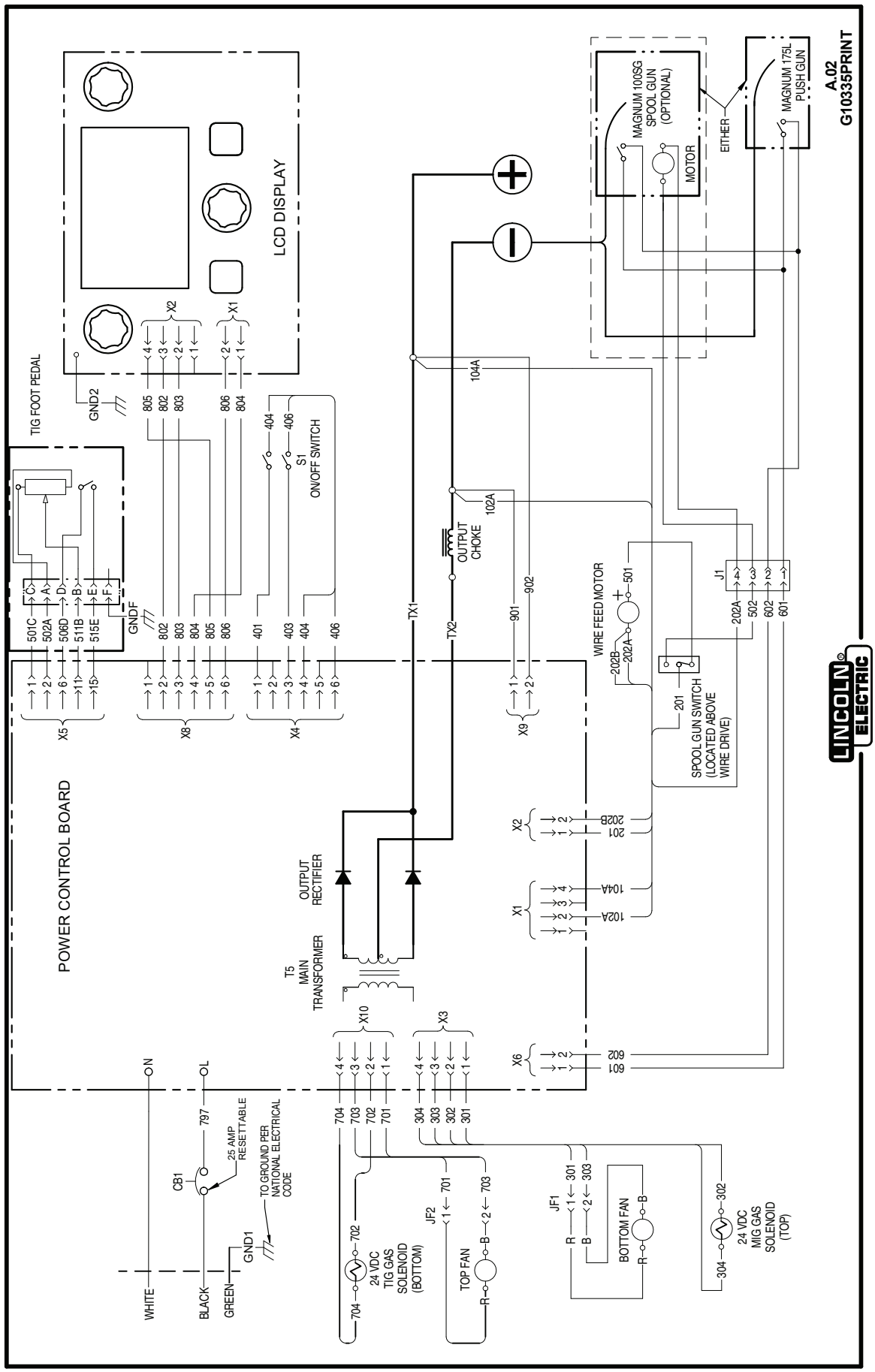
WELDING PROCESSES

Process	Electrode Diameter Range	Output Range Amperes	Wire Feed Speed Range
GMAW	.025" - .035" (0.6mm - 1.0mm)	20-220 Amps	50 - 500 IPM
FCAW	.030" - .045" (0.8mm - 1.2mm)	20-220 Amps	50 - 500 IPM
GTAW	1/16" - 3/32" (1.59mm – 2.38mm)	10-175 Amps	N/A
SMAW	3/32", 1/8", 5/32" (2.38mm, 3.18mm, 3.97mm)	20-175 Amps	N/A

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your Lincoln Authorized Service Facility for technical troubleshooting assistance before you proceed.
WWW.LINCOLNELECTRIC.COM/LOCATOR

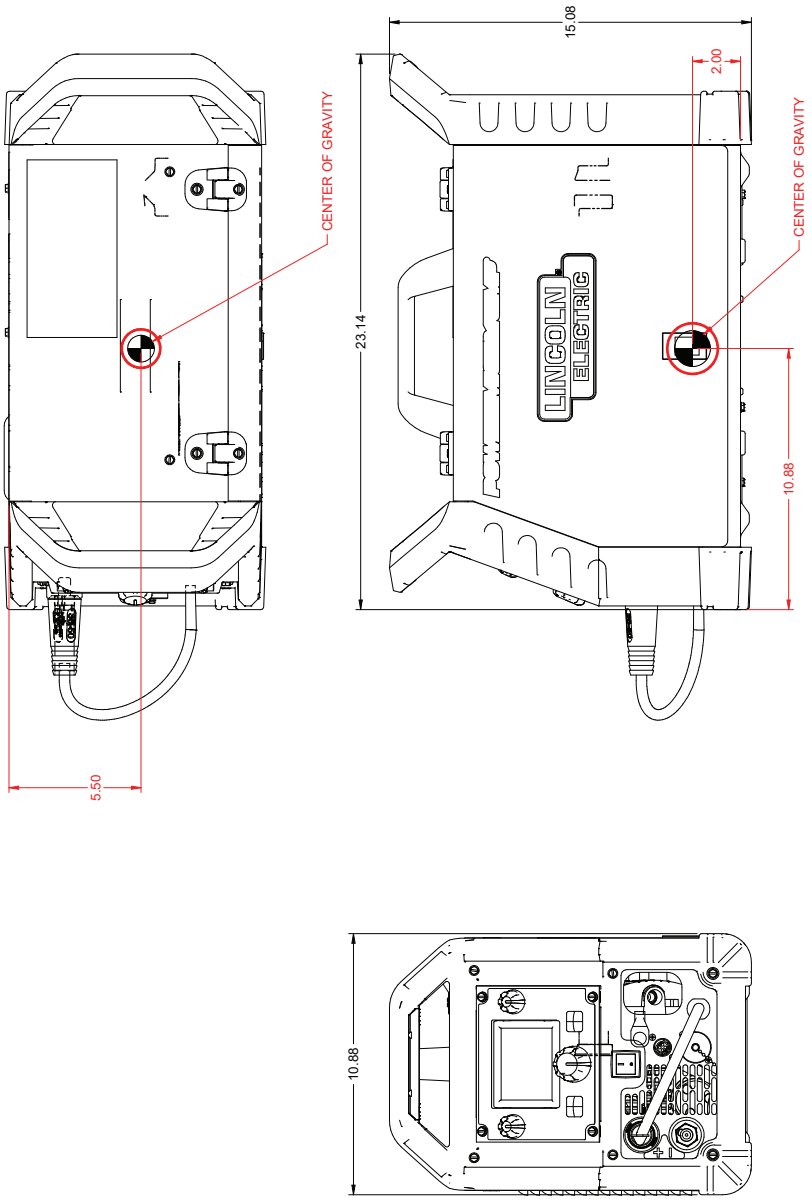

POWER MIG 215 MP® i™ MACHINE SCHEMATIC
G10336 A.03
POWER CONTROL BOARD
MICRO CONTROLLER
LCD DISPLAY
VOLTS FOR MIG OUTPUT ON/OFF TIG/STICK
DISPLAYS, PROCESS, SETTINGS AND OPTIONS
BACK BUTTON (RETURNS USER TO THE PREVIOUS SCREEN)
SET UP (ROTATE AND PRESS)
HOME BUTTON (RETURNS USER TO HOME SCREEN. THE WELDING PROCESS AND SETTINGS CAN BE CHOSEN AT THIS SCREEN)
WFS:MIG AMPS: TIG/STICK
SECONDARY GND 805
RX 802
TX 803
SECONDARY GND 806
+24V 804
X2
X1
GND2
P.E. SCREW CONNECTION TOP RIGHT CORNER OF BOARD
X8 BELLING UI RIGHT EDGE OF BOARD
806
805
804
803
802
POWER SWITCH
406 LINE TO BOARD
402 LINE TO SWITCH
404 NEUTRAL TO BOARD
401 NEUTRAL TO SWITCH
X4 POWER SWITCH
K2
K1
K1 + K2 TYPICAL COIL RESISTANCE (≈ 64Ω)
L1
CB1
797
25 AMP RESETTABLE
TO GROUND PER NATIONAL ELECTRICAL CODE
GND1
WHITE
BLACK
GREEN
BOTTOM LEFT HS
BOOST TOP LEFT HS
PRIMARY THERMISTER ON BOOST HS
BUS CAPS 390 VDC DURING OPERATION 4 LARGE BLACK CAPS CENTER OF BOARD
OUTPUT RECTIFIER TOP & BOTTOM RIGHT HEATSINKS
ON BOARD LEM
T5
N=3
N=3
N=23
OUTPUT CONTROLS
T2
T3
U/I TO CONTROLS
OUTPUT CURRENT FEEDBACK
PWM CONTROLLER
OUTPUT FEEDBACK
FAN CONTROL
SOLENOID CONTROL
SOLENOID CONTROL
BACK SIDE OF PCB
PWM
BRAKE
BOTTOM EDGE OF BOARD
X10
BOTTOM EDGE OF BOARD
X3
JF2
TOP FAN
TOP FAN (+24V) 701
TIG SOLENOID (+24V) 702
TOP FAN (COM) 703
TIG SOLENOID (COM) 704
TOP FAN (+24V)
TOP FAN (COM)
TIG SOLENOID (COM)
TIG SOLENOID (+24V)
24 VDC TIG GAS SOLENOID (BOTTOM)
LOCATED ON BACK 24VDC PRESENT WHEN TRIGGERED
XX OHMS WHEN MEASURED WITH OHM METER (≈ 55)
FANS LOCATED ON BACK
BOTTOM FAN ACTIVE WHEN MACHINE ON.
TOP FAN ACTIVE DURING WELDING & OVER TEMP.
TWO 24V FANS
AIR FLOW REAR TO FRONT.
JF1
BOTTOM FAN
BOTTOM FAN (+24V) 301
MIG SOLENOID (+24V) 302
BOTTOM FAN (COM) 303
MIG SOLENOID (COM) 304
BOTTOM FAN (+24V)
BOTTOM FAN (COM)
MIG SOLENOID (COM)
MIG SOLENOID (+24V)
24 VDC MIG GAS SOLENOID (TOP)
LOCATED ON BACK 24VDC PRESENT WHEN TRIGGERED
XX OHMS WHEN MEASURED WITH OHM METER (≈ 55)
+ ELECTRODE OCV= 56VDC
- WORK
BOLTED CONN.
OFF BOARD
OUTPUT CHOKE
TX1
TX2
NEG. STUD SNUBBER
POS. STUD SNUBBER
NEG. STUD FEEDBACK
POS. STUD FEEDBACK
BOARD MOUNTED SNUBBER TOP RIGHT CORNER OF BOARD
X9
901
902
OUTPUT VOLTAGE FEEDBACK BOTTOM EDGE OF BOARD
X1
102
104
GUN CONNECTOR ON FRONT OF MACHINE
J1
MAGNUM 175L PUSH GUN
MAGNUM 106G SPOOL GUN (OPTIONAL)
DCV@MIN = 6.5V DCV@MAX = 10.2V
MOTOR
+24V
COM
1
2
3
4
202A
202B
501
DCV@ 40IPM = 2.7V DCV@300IPM = 24.0V
WIRE FEED MOTOR
MOTOR SPOOL GUN SWITCH
502
LOCATED ABOVE WIRE DRIVE
+15 TO TRIGGER
TRIGGER
601
602
TRIGGER BOTTOM EDGE OF BOARD
X5
MOTOR (+24V)
201
MOTOR (COM)
202B
WIRE DRIVE RIGHT EDGE OF BOARD
X2
TIG AMPHENOL X5 RIGHT SIDE OF BOARD
501
502
506
511
515
J2
PEDAL POT HIGH
PEDAL POT ARM
PEDAL POT LOW
+5V w/FUSE
PEDAL TRIGGER
GNDF
TIG FOOT AMPHENOL
(ON BACK SIDE OF BOARD)
GREEN LED IS ON WHEN POWER IS APPLIED TO BOARD
YELLOW LED TOGGLES EVERY 2 SECONDS TO SHOW CLOCK IS RUNNING
RED LED IS ON WHEN OUTPUT VOLTAGE IS ON

POWER MIG 215 MP® i™ WIRING DIAGRAM



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment code number.

M25229



POWER MIG 215 MP® iT™ DIMENSION PRINT

2 Step – When the gun trigger is pulled, the welding system cycles through the arc starting sequence and into the main welding parameters. The welding system will continue to weld as long as the gun trigger is activated. Once the trigger is released, the welding system cycles through the arc ending steps.

3 Phase voltage – Three AC voltage sources that are phase shifted 120° with respect to each other.

4 Step – The 4 step trigger adds to the welder's comfort when making long welds by allowing the trigger to be released after an initial trigger pull. When the gun trigger is pulled, the welding system cycles through the arc starting sequence and into the main welding parameters. Welding stops when the trigger is pulled a second time and then released and the welding system cycles through the arc ending steps.

A-lead – The single wire used to configure the machine reconnect for various input Voltages.

AC (Alternating Current) – Voltage or current that changes polarity or direction, respectively, over time.

Active Condition – The machine is energized either by connection to a power source or has some kind of mechanical motion within the unit.

Alternator – An electric generator that produces alternating current. The main function of this device is to change mechanical energy into electrical energy. The mechanical energy can be supplied by either a motor or engine.

Ampere (Amp) – The standard measurement unit of current flow. Symbol: A

Anode – The positively charged electrode of a device.

Arc Control (Pinch) – Adjusts how quickly the current will rise when the wire is shorted to the work resulting in a soft or crisp arc.

Arc Force – A temporary increase of the output current during SMAW welding when the arc is too short.

Arc Length – The physical gap between the end of the electrode and the weld puddle.

Across the Arc – The device is electrically connected to the welding terminals. This device is powered by the same voltage that is used for welding.

Arc-link cable – Used between the power source and wire feeder in a bench system and between the power source, control box and wire drive in a boom system. This 5 pin cable supplies voltage from the power source to power the feeder and also transmits digital signals between the two.

Armature – The part of an electric device that includes the main current-carrying winding and in which the electromotive force is induced.

Armature Reaction – A force set up by the current induced in the armature of a generator that results in altering as to both magnitude and direction the flux due to the field magnet.

Asynchronous Welder Generator – An alternator that utilizes an air-gap rotating magnetic-field between a stator and a rotor to interact with an induced current in a rotor winding. It is sometimes called an induction generator.

Auxiliary Windings – Stator winding used to power the auxiliary connections.

Battery – A combination of two or more cells electrically connected to work together to produce electric energy.

Block Diagram – visual representation of a machine that utilizes simplified blocks to represent the principal parts or functions of the machine.

Boost Converter – The boost converter increases applied voltage to a higher level. This circuitry only applies to DC voltage and is only active if the applied voltage is below a predetermined value.

Bridge Rectifier – A type of full wave rectifier which uses four or more diodes in a bridge circuit configuration to efficiently convert the Alternating Current (AC) into Direct Current (DC).

Brushes – An electrical contact which conducts current between stationary wires and moving parts, most commonly in a rotating shaft.

Buck Converter – The buck converter decreases applied voltage to a lower level. This circuitry only applies to DC voltage and is only active if the applied voltage is above a predetermined value.

Buck/Boost Converter – The combined buck/boost circuitry is utilized to increase or decrease an applied voltage to a predetermined value.

CAN communication – Controller Area Network (CAN bus) is a robust vehicle bus standard designed to allow microcontrollers and devices to communicate with each other's applications without a host computer. It broadcasts messages to the nodes presented in a network.

Cathode – The negatively charged electrode of a device.

Capacitance – The ability of a body to store an electrical charge.

Capacitor – A device used to store an electric charge, consisting of one or more pairs of conductors separated by an insulator. Capacitance is measured in Farad's (F) and some capacitors are polarity sensitive which is typically noted on the device as such.

Circuit Breaker – A device to prevent excessive current flow in a circuit that may be caused by a short circuit or heavy loads. The circuit breaker will stop the flow of current (open) if such a situation occurs.

Collector – The positively charged electrode of a transistor device.

Commutator – A cylindrical ring or disk assembly of conducting members, individually insulated in a supporting structure with an exposed surface for contact with current-collecting brushes and mounted on the armature shaft, for changing the frequency or direction of the current in the armature windings.

Conductor – A type of material that allows the flow of charge (**electrical** current) in one or more directions

Connectors – Various devices for connecting one object to another.

Constant Current – A process where the power source keeps the current as constant as possible even when the operator varies the arc length. The voltage varies, formerly known as "variable voltage". Mainly used for Stick and TIG welding.

Constant Voltage – A process where the power source keeps the voltage as constant as possible and allows amperage to vary considerably. Mainly used for MIG and Flux core welding using wire feeders.

Contactor – A mechanically or electrically operated switch used in high current applications.

Control cable – A multistrand cable used for transmission of power, command and feedback information.

Crosslinc – A welding system communication technology. When using a Crosslinc enabled power source and wire feeder, welding voltage can be controlled remotely, through the welding cable without the use of an additional control cable.

Current – The flow of electrons through a conductor.

Current Transducer – A device used to detect DC current flow.

Cycle – One complete wave of alternating current or voltage.

DC (Direct Current) – A voltage or current that never crosses zero and maintains current flow in one direction.

Diode – A device used in a circuit that allows current to flow in one direction only. Typically current flow will occur if the diode's anode is more positive than its cathode. Typical configurations used can be: blocking, flashing, free-wheeling, full wave bridge rectifier, half wave rectifier.

Display – An electronic device with a screen used for displaying information.

Duty Cycle – The percentage of a ten (10) minute period that a power source can operate its rated load before exceeding its thermal limit.

Efficiency – The ratio of the output power divided by the input power.

Electrical Interference (noise) – Unwanted noise or other effects from electromagnetic radiation.

Electricity – The flow of electrons through a conductor from the source to a ground.

Electrode Negative – When the electrode is connected to the negative output terminal.

Electrode Positive – When the electrode is connected to the positive output terminal.

Electromagnetism – Magnetism developed by a current of electricity.

Emitter – The negatively charged electrode of a transistor device.

Encoder – An electro-mechanical device that converts the angular position or motion of a shaft or axle to digital output signals.

Excitation – The process of generating a magnetic field by means of an electric current. The source of this can be from a magnet or an external voltage source.

Excitation Windings – Stator winding that powers the excitation process in an alternator or generator.

Farads – The standard measurement unit of capacitance. Symbol: f

Feedback – To provide actual output information to a control circuit so as to maintain a constant output.

Feeder Winding – Stator winding that powers the wire feeders.

Field Windings – The stationary windings of a generator.

Field Current – The current flow through the Field Windings

Light Emitting Diode (LED) – A semiconductor device that emits light when an electric current passes through it.

Flashing – A generic term referring to the initial excitation of an electrical magnetic field.

Forward Biased – When voltage is applied to a semiconductor device in the direction that allows current to flow.

Frequency – The number of occurrences of a repeating event (cycles) per unit of Time.

Full Wave – A rectifier that converts alternating current into continuous current and that utilizes both halves of each cycle of the alternating current.

Fuse – An electrical safety device that operates to provide overcurrent protection of an electrical circuit. Its essential component is a metal wire or strip that melts when too much current flows through it, thereby interrupting current flow.

Gate – Is the control terminal in a semiconductor device. Typically a small voltage is applied to the Gate to trigger or latch the device.

Generator – An electric generator that produces direct current. The main function of this device is to change mechanical energy into electrical energy. The mechanical energy can be supplied by either a motor or engine.

GFCI (Ground Fault Circuit Interrupter) – A device which interrupts current flow when it senses an imbalance between the outgoing and incoming current.

Ground Connection – A safety connection from a welding machine frame to an earth ground.

Half Wave - A rectifier that utilizes one half cycle of alternating current and suppresses the other.

Henry – The standard measurement unit of inductance. Symbol: H

Hertz – The standard measurement unit of electrical frequency. Symbol: Hz

High Frequency – A high frequency used for arc ignition and stabilization when TIG welding.

Hot Start – Increases the output amperage for a designated amount of time at the start of a weld.

Insulated Gate Bipolar Transistor (IGBT) – A high speed solid state switching device that can be turned on by applying a voltage signal to the gate. When the gate signal is removed the IGBT will turn off. An IGBT will operate on DC voltage only.

Inductance – The tendency of an electrical conductor to oppose a change in the electric current flowing through it.

Inductor – A passive component which stores the electrical energy in a magnetic field when the electric current passes through it.

Interpole Coils – Utilized in generators. They counteract the effects of armature reaction.

Inverter – circuitry that changes direct current (DC) to alternating current (AC).

Life Cycle – The length of time a product is introduced to consumers until it's removal from the shelves.

Motor – An electrical device that converts electrical energy into mechanical energy.

Magnetic Field – The area around a magnet or coil in which there is magnetic force.

Magnetic Flux – The measurement of the total magnetic field lines that pass throug a given surface area.

Magnetism – The force that arises from the motion of electric charges.

MOLEX – Is the vernacular term for a two-piece pin and socket interconnection that was pioneered by Molex Connector Company.

Negative Temperature Co-efficient (NTC) – A type of thermistor in which the resistance decreases in relation to a rise in temperature.

OCV (Open Circuit Voltage) –The potential voltage in the welding circuit before the arc is initiated or a load applied; measured in volts.

Ohms – The standard measurement unit of electrical resistance. Symbol: Ω

Ohm's Law – current passing through a conductor is proportional to the voltage over the resistance. I = V / R.

Parallel Circuit – a circuit that has multiple current paths.

Peak Value – The maximum value attained by the current during one cycle. There is a positive and negative peak.

Peak to Peak Value – The maximum value attained by both peaks during one cycle.

Phase – A relative variation or change of state or a cycle.

Phaseback (foldback) – A current limiting feature (a type of overload protection).

Pilot Arc – The electrical pathway between the torch nozzle and electrode tip. This function aids in the transfer of current from the electrode tip to the work piece.

Polarity – The polarity of the electrode as compared to the polarity of the work piece.

Positive Temperature Co-efficient (PTC) – A type of thermistor in which the resistance increases in relation to a rise in temperature.

Potentiometer – It is a variable resistor with three terminals. The middle terminal is adjustable. The potential at the third terminal can be adjusted to give any fraction of the potential voltage across the two outer terminals.

Power – The rate, over time, in which electrical energy is transferred within an electrical circuit.

Power Factor – The ratio of the real power that is used to do work to the apparent power that is supplied to the circuit.

Printed Circuit Boards – A physical device that houses one or more electrical circuits.

Pulsating DC – A periodic current which changes in value but never changes direction.

Rated Load – The average amperage and voltage the power source is designed to produce for a given specific duty cycle time period. For example, 400 amps, 36 load volts, at 60 percent duty cycle.

RCBO (Residual Current Breaker with Over-current) – A combination of a RCD and Circuit Breaker.

RCD (Residual Current Device) – Detects imbalance in the currents of the supply and return conductors of a circuit. Does not protect against shorts.

Reactor – An electrical magnetic component used to maintain current at constant levels by resisting any changes in the current.

Reconnect Panel – Used to configure the machine's internal components for various input power voltages

Rectification – The process of converting alternating current to direct current.

Relay – An electrically operated switch used in low current applications.

Resistance – The opposition to the passage of an electric current through a conductor. Measured in Ohms (Ω) and is not polarity sensitive.

Resistor – Used to regulate voltage and current levels in a circuit.

Reverse Biased – When voltage is applied to a semiconductor device in the direction that does not allows current to flow.

Rheostat – A two terminal adjustable resistor that may have its resistance value changed without opening the circuit in which it is connected, thereby controlling the current through the circuit.

Ripple – The residual periodic variation of the DC voltage within a power supply which has been derived from an alternating current source.

RMS (Root Means Squared) – The same amount of heat dissipation across a resistor as Direct Current.

Rotor – A rotating component of an electromagnetic system in an electric motor, or alternator.

RPM (Revolutions per minute) – A unit of rotational speed or the frequency of rotation around a fixed axis.

Saturation – The state reached when an increase in applied external magnetic field cannot increase the magnetization of the material further.

Saw Tooth Wave Form – A non-sinusoidal waveform. It is so named based on its resemblance to the teeth of a plain-toothed saw.

Schematic Diagram – A representation of the electronic components of a machine utilizing graphic symbols rather than realistic pictures.

Schematic Symbols – A standardized pictogram used to represent various electrical and electronic devices or function.

Series Circuit – a circuit that has only one current path.

Series - Parallel Circuit – a circuit that has both a single current path and multiple current paths.

Silicon Controlled Rectifier (SCR) – Very similar to a Diode in which it allows current to flow when the anode is more positive than the cathode. However, current flow will occur only if a small signal is applied to its Gate and will stop flowing when the voltage drops to zero or goes negative.

Shunt – A type of low value resistance used to detect circuit current.

Sinusoidal Wave Form – A curve that describes a smooth repetitive oscillation of a waveform.

Slip Rings – An electromechanical device that allows the transmission of electrical power from a stationary to a rotating structure. Normally a copper or brass circular device attached to a rotating member.

Solenoid – An electromechanical device that when energized acts like a magnet so that a movable core is drawn into the coil when a current flows and that is used especially as a switch or control for a mechanical device (such as a valve).

Source – Provides the electrical potential that is required for electricity to flow.

Spark Gap Generator – Used to initiate and maintain the arc in a TIG machine.

Square Wave Form – A type of waveform where the signal has only two levels. The signal transitions between these levels at regular intervals and the switching time is very rapid.

Standard Units of Measurement – Is a quantifiable language that helps everyone understand the association of the object with the measurement.

Static Condition – The machine is not connection to a power source and has no mechanical motion.

Stator – The stationary part of a rotary system, found in electric alternators, generators and electric motors.

Switch – A mechanical device used to interrupt the flow of current in a circuit. Switches are essentially binary devices: they are either completely on (closed) or completely off (open).

Tachometer – A device or circuit used to measure the rotations of a mechanical device.

Thermistor – A type of resistor in which resistance changes due to temperature, two main types: Positive Temperature Co-efficient (PTC), Negative Temperature Co-efficient (NTC).

Thermostat – A mechanical device that interrupts or closes a circuit when a pre-determined temperature limit is reached.

Toroid – A device used to filter unwanted electrical noise.

Trigger Interlock – The gun trigger will stay closed (activated) as long as welding current is flowing and will open (deactivate) when welding current stops.

Transformer – A device with a group of mutually-inductive coils used to magnetically induce AC power from one coil to the other. Typical examples are as follows:

> ***Isolation Transformer*** – A transformer usually used for circuit protection.
>
> ***Step Down Transformer*** – A transformer where the secondary voltage is lower than the primary voltage.
>
> ***Step Up Transformer*** – A transformer where the secondary voltage is higher than the primary voltage.
>
> ***Current Transformer*** – A type of transformer used as a current monitoring device.
>
> ***Power Transformer*** – A transformer that contains multiple primary windings to accommodate a variety of input voltages.

Twisted Pair – A cable consisting of two wires of a single circuit twisted around each other for the purposes of improving electromagnetic compatibility.

Voltage – The pressure or difference in electrical potential between two points in a circuit that causes current to flow.

Volts – The standard unit of measurement for Voltage. Symbol: V

User Interface – A device where interactions between operators and machines occur.

Watts – The standard measurement unit of electrical power. Symbol: W

Watts Law – power of an electrical circuit is the product of its voltage and current. P = I x V.

Weld Winding – Stator winding that provides the power for the welding components.

Welding Electrode – A consumable component of the welding circuit through which current is conducted between the electrode holder and the arc that becomes part of the weldment.

Welding Gun – In semi-automatic or automatic welding, a device to transfer current and guide the electrode wire into the arc puddle.

Wire Harness – A system of insulated conducting wires bound together with insulating materials.

Wiring Diagram – a simple visual representation of the physical connections and physical layout of the electrical system of the machine.

WFS (Wire Feed Speed) – The speed at which the consumable wire is fed into the weld joint puddle.

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絕緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したまゝで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

CUSTOMER ASSISTANCE POLICY

The business of Lincoln Electric is manufacturing and selling high quality welding equipment, automated welding systems, consumables, and cutting equipment. Our challenge is to meet the needs of our customers, who are experts in their fields, and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for information or technical information about their use of our products. Our employees respond to inquiries to the best of their ability based on information and specifications provided to them by the customers and the knowledge they may have concerning the application. Our employees, however, are not in a position to verify the information provided or to evaluate the engineering requirements for the particular weldment, or to provide engineering advice in relation to a specific situation or application. Accordingly, Lincoln Electric does not warrant or guarantee or assume any liability with respect to such information or communications. Moreover, the provision of such information or technical information does not create, expand, or alter any warranty on our products. Any express or implied warranty that might arise from the information or technical information, including any implied warranty of merchantability or any warranty of fitness for any customers' particular purpose or any other equivalent or similar warranty is specifically disclaimed.

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WELD FUME CONTROL EQUIPMENT

The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

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