RETURN TO MAIN MENU

SVM189-B

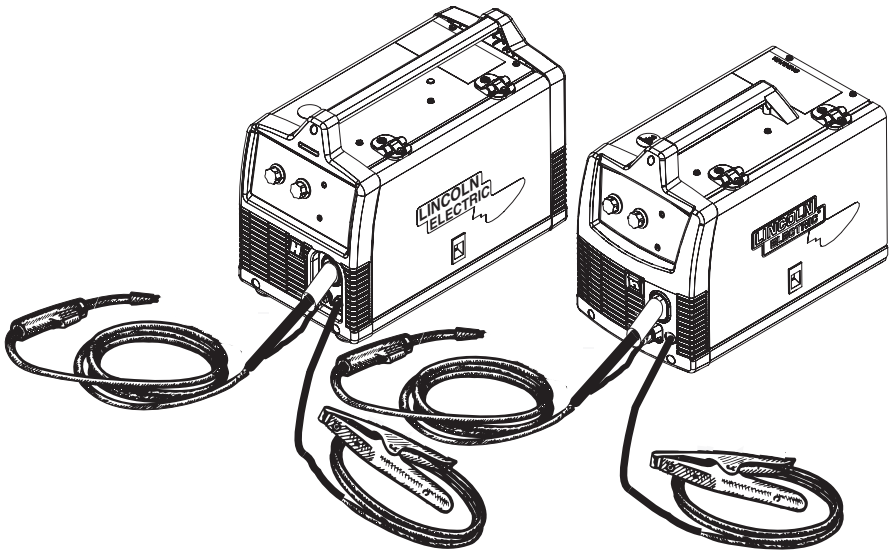
January, 2011

COMPACT WIRE WELDERS

For use with machines having Code Numbers: **11173 Thru 11506 and 11646 Thru 11650**

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.



SERVICE MANUAL

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •

Cleveland, Ohio 44117-1199 U.S.A. TEL: 888=935=3877 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

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⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

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 W117.2-1974. 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.

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.

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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 with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may 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 material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

Return to Master TOC
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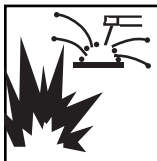

WELDING and CUTTING SPARKS can cause fire or explosion.

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 adjcent 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 1235 Jefferson Davis Highway, Arlington, VA 22202.

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.

PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

- MASTER TABLE OF CONTENTS FOR ALL SECTIONS -

RETURN TO MAIN MENU

TABLE OF CONTENTS - INSTALLATION SECTION

MACHINES COVERED BY THIS MANUAL

CODE	K-NUMBER	PRODUCT NAME
11173	K2480-1	PRO-MIG 140T
11175	K2481-1	PRO-MIG 180T
11254	K2470-1	POWER MIG 140T *
11255	K2471-1	POWER-MIG 140C
11256	K2472-1	POWER MIG 180T *
11257	K2473-1	POWER MIG 180C
11300	K2479-1	PRO-CORE 125T
11302	K2513-1	WELD-PAK 125HD
11303	K2514-1	WELD-PAK 140HD
11304	K2515-1	WELD-PAK 180HD
11440	K2658-1	MIG-PAK 140
11441	K2659-1	MIG-PAK180
11442	K2661-1	POWER-MIG 180C
11444	K2668-1	POWER-MIG 180C
11501	K2688-1	SP140T
11502	K2689-1	SP180T
11503	K2696-1	EASY-CORE 125
11504	K2697-1	EASY-MIG 140
11505	K2698-1	EASY-MIG 180
11506	K2699-1	WORK-PAK 125
11646	K2481-1	PRO MIG 180
11647	K2515-1	WELD-PAK 180HD
11648	K2659-1	MIG PAK 180
11649	K2689-1	SP180T
11650	K2698-1	EASY-MIG180

* Discontinued Models

Return to Master TOC
Return to Master TOC
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Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
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Return to Master TOC

TECHNICAL SPECIFICATIONS 180 Amp units

INPUT – SINGLE PHASE ONLY	
Standard Voltage/Frequency	**Input Current**
230 V 60 Hz	20 Amps @ rated output
208 V 60 Hz	20 Amps @ rated output

RATED OUTPUT		
Voltage/Duty Cycle	**Current**	**Voltage at Rated Amperes**
230 V 30%	130 Amps	20
208 V 30%	130 Amps	17

OUTPUT		
Welding Current Range	**Open Circuit Voltage**	**Wire Speed Range**
30-180 Amps	34 V	50 - 500 in/min. (1.3 - 12.7 m/min.)

RECOMMENDED INPUT CABLE AND FUSE SIZES			
Input Voltage/Frequency	**Fuse or Breaker Size[1]**	**Input Amps**	**Power Cord**
230 V 60 Hz	40 Amp Super Lag	20	50 Amp, 250 V, Three Prong Plug (NEMA Type 6-50P)

PHYSICAL DIMENSIONS			
Height	**Width**	**Depth**	**Weight**
14.0 in	10.15 in	18.6 in	66 lbs
357 mm	258 mm	472 mm	30 kg

[1] If connected to a circuit protected by fuses use Time Delay Fuse marked "D".

TECHNICAL SPECIFICATIONS 140 Amp units

INPUT – SINGLE PHASE ONLY	
Standard Voltage/Frequency	**Input Current**
120 V / 60 Hz	20 Amps @ rated output

RATED OUTPUT		
Duty Cycle	**Current**	**Voltage at Rated Amperes**
20% Duty Cycle	90 Amps	19.5

OUTPUT		
Welding Current Range	**Open Circuit Voltage**	**Wire Speed Range**
30-140 Amps	33 V	50 - 500 in/min. (1.3 - 12.7 m/min.)

RECOMMENDED INPUT CABLE AND FUSE SIZES				
Input Voltage/Frequency	**Fuse or Breaker Size[1,2]**	**Input Amps**	**Power Cord**	**Extension Cord**
120 V 60 Hz	20 Amp	20	15 Amp, 125 V, Three Prong Plug (NEMA Type 5-15P)	3 Conductor # 12 AWG ($4mm^2$) or Larger up to 50 ft.(15.2m)

PHYSICAL DIMENSIONS			
Height	**Width**	**Depth**	**Weight**
14.0 in	10.15 in	18.6 in	58 lbs
357 mm	258 mm	472 mm	26.3 kg

[1]If connected to a circuit protected by fuses use Time Delay Fuse marked "D".

Return to Section TOC
Return to Master TOC

TECHNICAL SPECIFICATIONS 125 Amp units

INPUT – SINGLE PHASE ONLY	
Standard Voltage/Frequency	**Input Current**
120 V / 60 Hz	20 Amps @ rated output

RATED OUTPUT		
Duty Cycle	**Current**	**Voltage at Rated Amperes**
20% Duty Cycle	90 Amps	19

OUTPUT		
Welding Current Range	**Maximum-Open Circuit Voltage**	**Wire Speed Range**
30-125 Amps	33 V	50 - 500 in/min. (1.3 - 12.7 m/min.)

RECOMMENDED INPUT CABLE AND FUSE SIZES				
Input Voltage / Frequency	**Fuse or Breaker Size[1,2]**	**Input Amps**	**Power Cord**	**Extension Cord**
120 V 60 Hz	20 Amp	20	15 Amp, 125 V, Three Prong Plug (NEMA Type 5-15P)	3 Conductor #12 AWG ($4mm^2$) or Larger up to 50 ft.(15.2m)

PHYSICAL DIMENSIONS			
Height	**Width**	**Depth**	**Weight**
13.7 in 347 mm	10.15 in 258 mm	17.9 in 454 mm	48 lbs 21.7 kg

[1] If connected to a circuit protected by fuses use Time Delay Fuse marked “D”.

[2] **Requirements For Maximum Output**
In order to utilize the maximum output capability of the machine, a branch circuit capable of 25 amps at 120 volts, 60 Hertz is required.

Read entire installation section before starting installation.

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Only personnel that have read and understood the machine’s Operating Manual should install and operate this equipment.**
- **Machine must be plugged into a receptacle which is grounded per any national, local or other applicable electrical codes.**
- **The Machine power switch is to be in the OFF (“O”) position when installing work cable and gun and when connecting power cord to input power.**

SELECT SUITABLE LOCATION

Locate the welder in a dry location where there is free circulation of clean air into the louvers in the back and out the front of the unit. A location that minimizes the amount of smoke and dirt drawn into the rear louvers reduces the chance of dirt accumulation that can block air passages and cause overheating.

STACKING

Compact Wire Welders cannot be stacked.

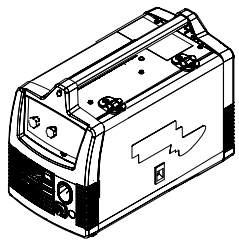
TILTING

Each machine must be placed on a secure, level surface, directly or on recommended cart. The machine may topple over if this procedure is not followed.

IDENTIFY AND LOCATE COMPONENTS

NOTE: Not all components are in every model. Check the Operator's Manual for items included with a specific machine.

• Wire Feeder Welder.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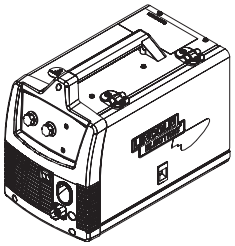
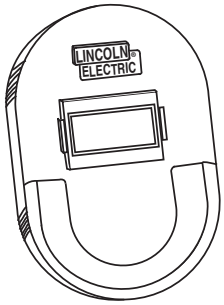
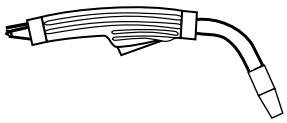


• Work Cable & Clamp.

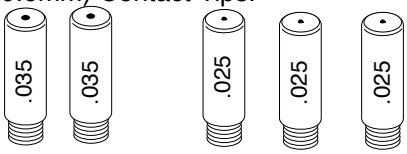
• Handshield



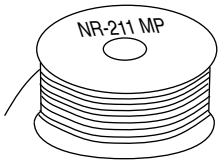
• Magnum 100L Welding Gun.

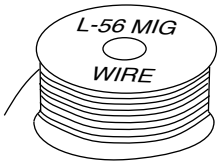


• 3 .035" (0.9mm) Contact Tips (1 installed on the welding gun).
• 3 .025" (0.6mm) Contact Tips.

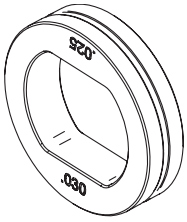


• Spool of .035" (0.9 mm) diameter NR-211MP Innershield Flux-cored Wire.
• Spool of .025" (0.6 mm) diameter L-56 MIG Wire.

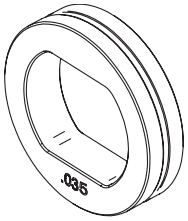




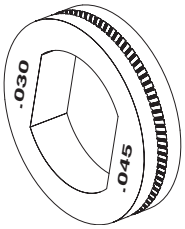
• .025"-.030" (0.6 - 0.8mm) Smooth Drive Roll



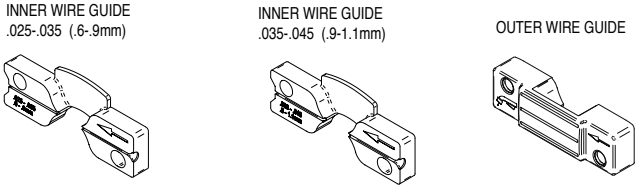
• .035" (0.9mm) Smooth Drive Roll



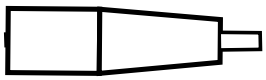
• .030" -.045" (0.8 - 1.1mm) Knurled Drive Roll (Installed on Machine)



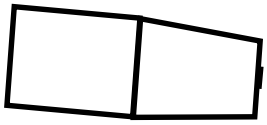
• .025" -.035" (0.6 - 0.9mm) Inner Wire guide
• .035" -.045" (0.9 - 1.1mm) Inner Wire Guide (Installed on Machine)
• Outer Wire Guide (Installed on Machine)



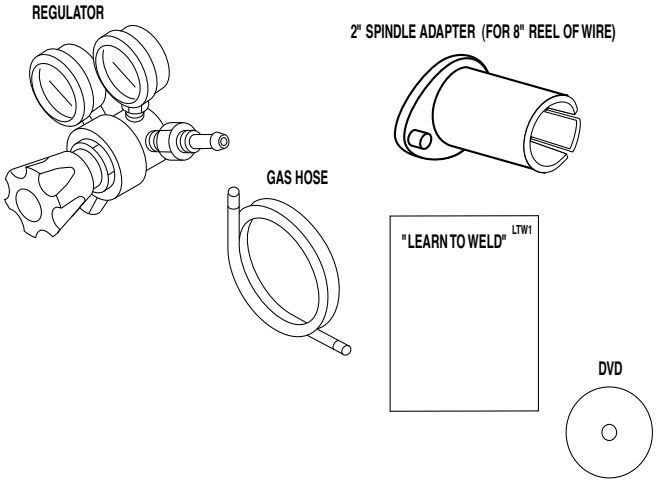
• Black Flux-cored Gasless Gun Nozzle (Installed on Welding Gun)



• Brass MIG Gas Gun Nozzle



• 2"(51mm) Spindle Adapter (For 8"(203mm) Reel of wire)
• Regulator
• Gas Hose
• Learn to Weld (LTW1 Manual)
• DVD



Return to Section TOC
Return to Master TOC

TABLE OF CONTENTS - OPERATION SECTION

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

Read entire operation section before operating the Compact Wire Welder.

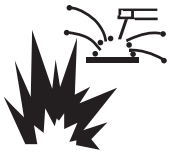
⚠ WARNING

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.

PRODUCT DESCRIPTION (PRODUCT CAPABILITIES)

These small portable wire feed welders are capable of MIG welding on steel, stainless steel, and aluminum. They are also capable of flux-cored welding on mild steel.

The term “MIG” stands for Metal Inert Gas welding and requires a separate bottle of shielding gas to protect the weld until it cools. Appropriate shielding gas based on the type of material you are welding can be purchased separately from your local welding gas distributor. MIG welding is ideal for welding on thinner and clean materials when a very clean excellent cosmetic looking weld is required. An example would be automotive body panels.

Flux-cored Welding does not require separate shielding gas to protect the weld since the welding wire has special additives known as flux to protect the weld until it cools. Flux-cored welding is ideal for medium to thicker material and if welding on painted or rusty steel. Flux-cored welding is also ideal in outdoor applications where windy conditions might blow the MIG shielding gas away from the weld. Flux-cored welding produces a good looking weld but does not produce an excellent weld appearance as MIG welding does.

Most machines include the necessary items to weld with either the MIG or the flux-cored welding process on steel. The 125 amp units will require the addition of a ‘MIG Conversion Kit’ (K2526-1) for welding gas shielded processes. To weld on stainless steel optional stainless steel welding wire can be purchased separately. This machine can weld aluminum using .035”(0.9mm) diameter 4043 aluminum welding wire. Since aluminum welding wire is soft an optional aluminum spool gun is recommended for best results. A welding Procedure Decal is located inside machine door to help provide suggested settings for welding.

COMMON WELDING ABBREVIATIONS

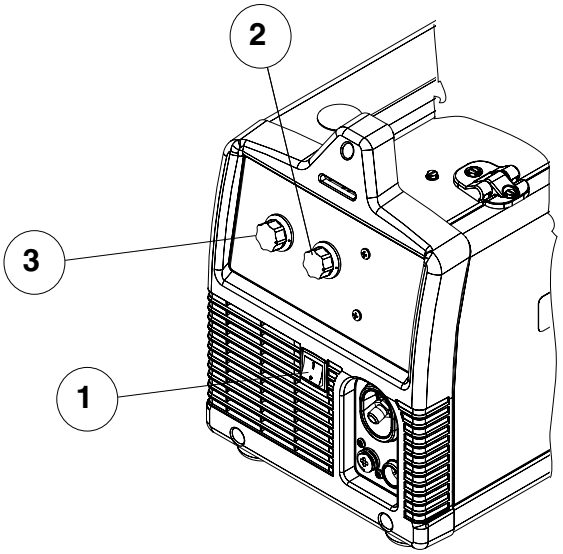
GMAW (MIG)
- Gas Metal Arc Welding

FCAW (Innershield or Outershield)
- Flux Core Arc Welding

CONTROLS AND SETTINGS

See Figure B.1

FIGURE B.1



1. **POWER SWITCH** – Turns power on and off to the machine.

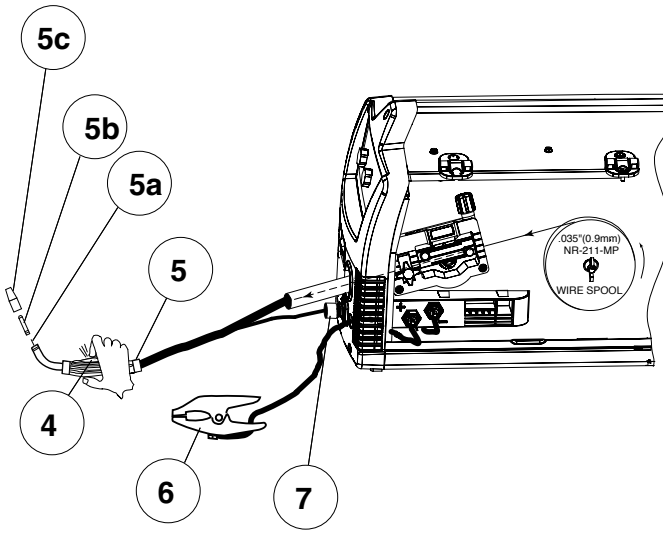
2. **ARC VOLTAGE CONTROL –** This knob sets the output voltage of the machine. Along with wire feed speed (WFS) this control sets a weld procedure. Refer to the procedure decal on the inside wire drive compartment door to set a correct welding procedure based on type of material and thickness being welded.

NOTE: The Arc Voltage Control will be either a continuous control or a multi-position switch depending on the model.

3. **WIRE FEED SPEED CONTROL (WFS) –** The knob sets the speed that the machine feeds wire. Along with arc voltage control this control sets a weld procedure. Refer to the procedure decal on the inside wire drive compartment door to set a correct welding procedure based on type of material and thickness being welded.

See Figure B.2

FIGURE B.2



4. **GUN TRIGGER –** Depress the trigger to activates the wire drive to feed wire and energizes the output of the machine. Depress the trigger to weld and release the trigger to stop welding.

5. **WELDING GUN –** Delivers wire and welding current to the weld.
   a. Gun Liner – wire travels through the liner from the wire drive. The gun liner will feed .025" to .035" (0.6mm to 0.9mm) wire. The 180A machine can weld with .045"(1.1mm) wire if an optional .045"(1.1mm) liner is installed in the gun.

   b. Contact Tip – provides electrical contact to the wire.

   c. Nozzle – When flux-cored welding the black nozzle protects the mounting threads on the gun. When MIG welding the brass nozzle funnels the shielding gas to the weld.

6. **WORK CLAMP & CABLE –** Clamps to the work piece being welded and completes the electrical welding circuit.

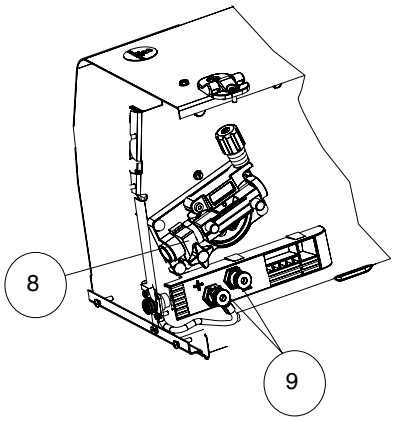
7. **GUN TRIGGER CONNECTOR RECEPTACLE –** Plug the 4 pin gun trigger connector into this receptacle.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

See Figure B.3

FIGURE B.3

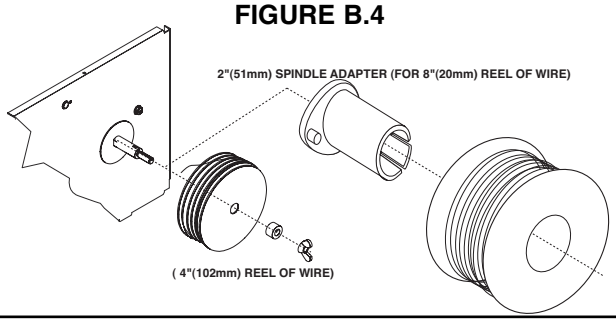


8. **WELDING GUN CONNECTOR BUSHING & THUMBSCREW –** Provides electrical power to the welding gun. The thumbscrew holds the welding gun into the connector block. (Front of Machine, Side Door and Wire Drive Cover have been removed for clarity of Items 8 and 9).

9. **OUTPUT TERMINALS –**These connections allow for changing the output polarity of the machine depending on whether you are MIG welding (+) or flux-cored welding (-)-.

See Figure B.4

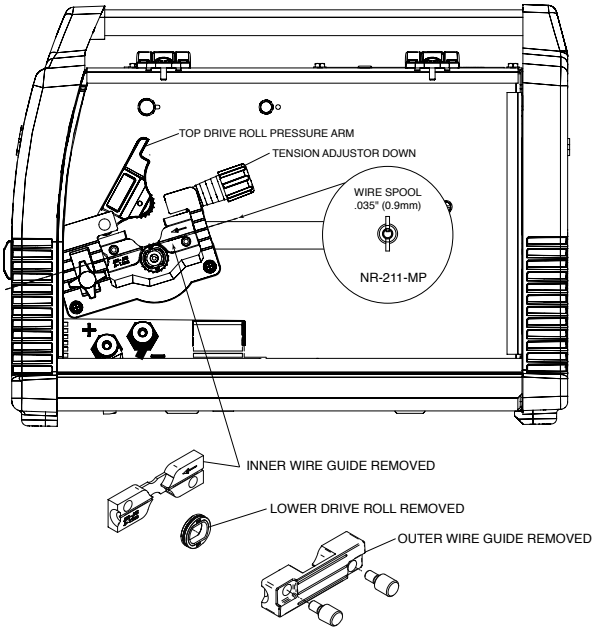
FIGURE B.4



10. **WIRE SPOOL SPINDLE AND BRAKE –** Holds a 4”(102mm) diameter spool. Use the 2”(51mm) spindle adapter included with the machine to use 8”(203mm) diameter spools. The wing nut sets the brake friction to prevent the spool from over rotating when the trigger is released.

See Figure B.5

FIGURE B.5



11. **WIRE DRIVE & COMPONENTS (ALUMINUM DRIVE HOUSING) –** Feeds wire from the wire spool through the drive and through the welding gun to the weld.

    a. **Top and Bottom Drive Roll –** Drives the wire through the drive system. The drive roll has a groove to match the specific wire type and diameter. Refer to Table B.1 for available drive rolls.
    b. **Inner & Outer Wire Guide –** Guides the wire between the Top and Bottom Drive Roll and through the wire drive. The inner guide has a groove to match a particular wire diameter. Refer to Table B.1 for available wire guides.
    c. **Drive Roll Tension Thumbscrew –** Turning clockwise increases the force on the drive rolls and turning counterclockwise decreases the force.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

See Figure B.5a

FIGURE B.5a

11a. WIRE DRIVE & COMPONENTS (MOLDED DRIVE HOUSING) – Feeds wire from the wire spool through the drive and through the welding gun to the weld.

a. Drive Roll – Drives the wire through the drive system. The drive roll has a groove to match the specific wire type and diameter. Refer to Table B.1 for available drive rolls.

b. Liner & Outgoing Guide – The liner guides the wire between the bearing on the Pivot Arm Assembly and Drive Roll and through the outgoing guide.

c. Drive Roll Tension Thumbscrew – Turning clockwise increases the force on the drive roll and turning counterclockwise decreases the force.

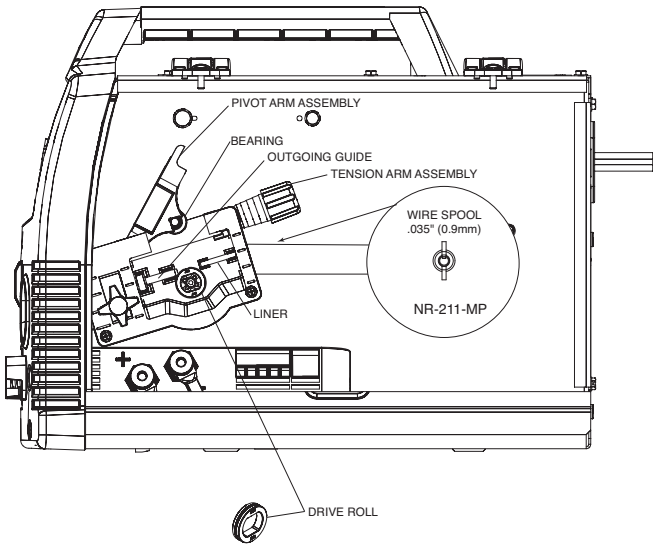


TABLE B.1

DRIVE ROLL AND WIRE GUIDES

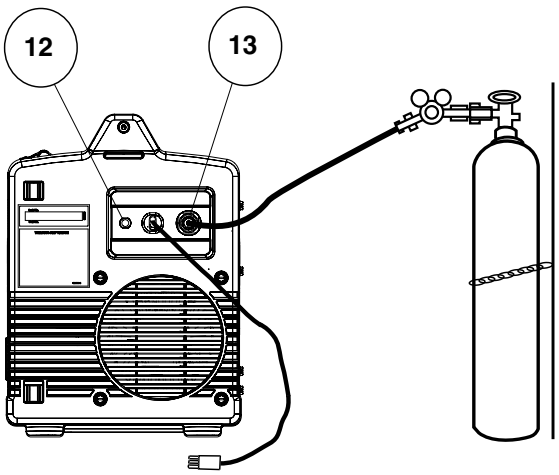
Wire Diameter & Type	Drive Roll	Drive Roll Part Number	Inner Wire Guide	Inner Wire Guide Part Number
.025"(0.6mm) MIG wire	.025"/.030" (0.6mm/0.8mm) Smooth Drive Roll	KP2529-1	.025"-.035" (0.6mm-0.9mm) Steel Wire Guide	KP2531-1
.030"(0.8mm) MIG wire				
.035"(0.9mm) MIG wire	.035"(0.9mm) Smooth Drive Roll	KP2529-2		
.030"(0.8mm) flux-cored	.030"/.045" (0.8mm/1.1mm) Knurled Drive Roll	KP2529-3		
.035"(0.9mm) flux-cored				
.045"(1.1mm) flux-cored	.030"/.045" (0.8mm/1.1mm) Knurled Drive Roll	KP2529-3	.045"(1.1mm) Steel Wire Guide	KP2531-2

See Figure B.6

FIGURE B.6

12. CIRCUIT BREAKER – If the rated input current of the machine is exceeded this circuit breaker will trip. Press to reset.

13. GAS INLET – Shielding gas connects to this inlet.
NOTE: Only on 125 amp machines that have added the MIG Conversion Kit (K2525-1)

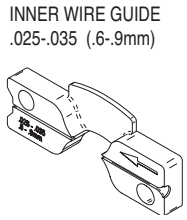


SETTING UP AND MAKING A FLUX-CORED WELD

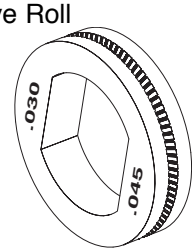
A. ITEMS NEEDED FOR FLUX CORED WELDING

1. 035”(0.9mm) Contact Tip

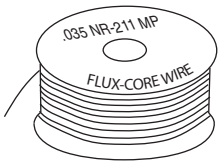
2. .025”-.035”(0.6mm-0.9mm) wire guide



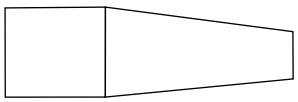
3. Knurled Drive Roll



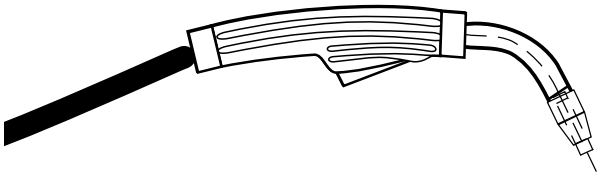
4. .035”(0.9mm) NR-211MP Flux-Cored Wire



5. Black Flux Cored gun nozzle



6. Welding Gun



7. Work Cable & Clamp

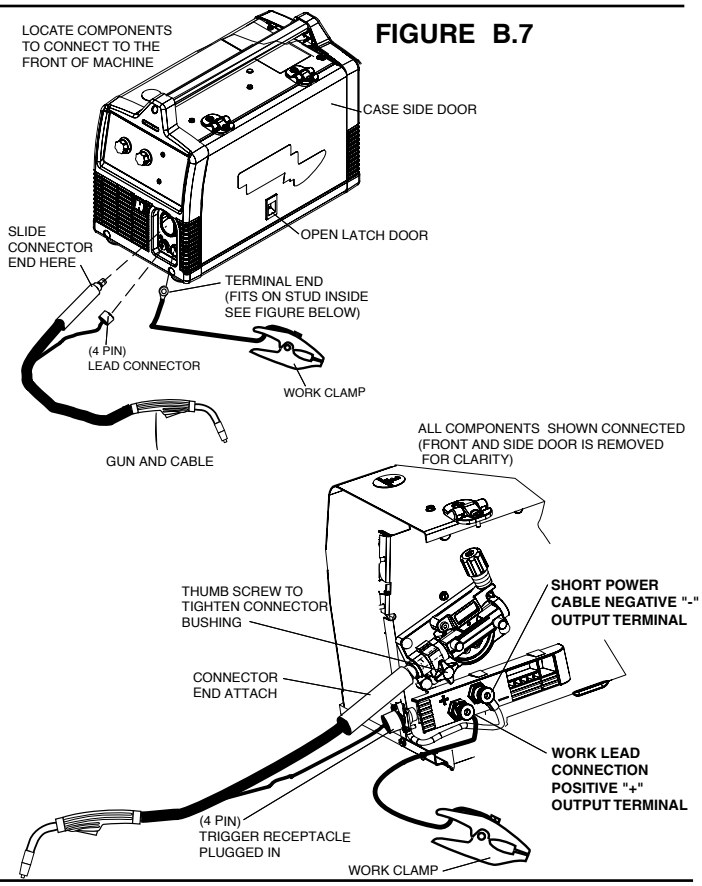
NOTE:125 amp units come set up for flux cored wire welding.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

B. CONNECT LEADS AND CABLES ON THE MACHINE

FIGURE B.7

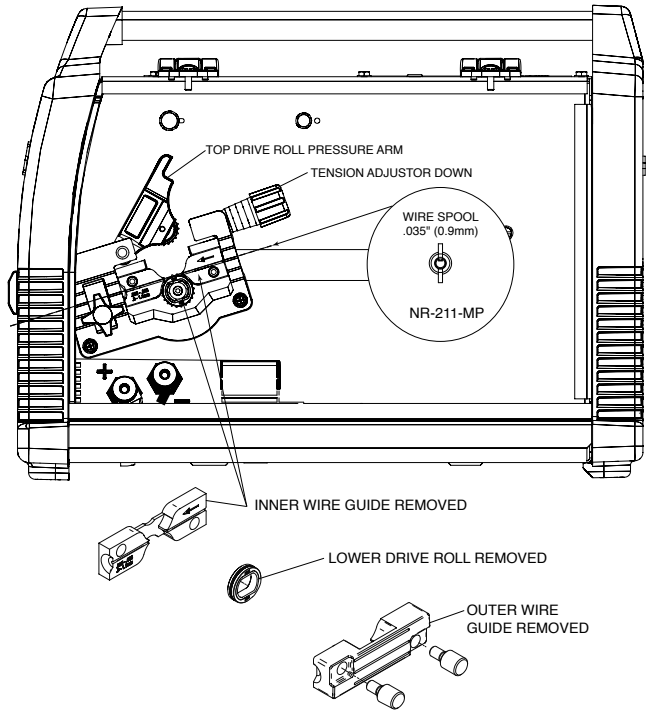


(See Figure B.7)

1. Open the case side door
2. Slide the connector end of the gun and cable through the hole in the machine front and into the gun connector bushing on the wire drive.
3. Make sure the gun connector end is seated fully into the wire drive and tighten the thumbscrew to secure the gun connector.
4. Plug the gun trigger lead connector into the 4 pin gun trigger receptacle on the machine front.
5. Wire Drive Polarity. Flux cored welding requires negative (-) polarity. Connect the short power cable from the wire drive to the negative (-) output terminal and tighten the thumbscrew.
6. Work Lead Connection. Slide the lugged end of the work cable through the hole in the machine front and place on the positive (+) output terminal and tighten thumbscrew.

C. LOAD WIRE SPOOL

FIGURE B.8



(See Figure B.8)

1. Locate the blue labeled 4"(102mm) diameter spool of .035”(0.9mm) NR-211MP flux-cored wire and place onto wire spool spindle. Orient the spool so that the wire feeds off the top of the spool.
2. Secure spool in place by tightening the wing nut against the against the spacer that holds the wire spool on the spindle.
3. Open the top drive roll pressure arm by rotating the tension adjustor arm down and pivoting the drive roll pressure arm up.
4. Remove the outer wire guide.

4a. Slide gun out of drive slightly.

5. Remove the lower drive roll and inner wire guide.
6. Install the .025”-.035”(0.6mm-0.9mm) inner wire guide.
7. Install the .030”/.045”(0.8mm/1.1mm) knurled lower drive roll.
8. Carefully unwind and straighten the first six inches of welding wire from the spool. Do not let the end of the wire go to prevent the wire from unspooling.

(See Figure B.9)

9. Feed the wire through the wire drive inlet along the inner wire guide groove and into the wire drive outlet on the gun side.

10. Close the top drive roll pressure arm and secure by pivoting the tension adjustor back to the up position.

11. Re-install the outer wire guide.

(See Figure B.10)

12. Remove the nozzle from the gun and contact tip and straighten the gun out flat.

13. Turn the machine power to on and depress the gun trigger to feed the wire through the gun liner until the wire comes out of the threaded end of the gun several inches. (See figure B.11)

14. When trigger is released spool of wire should not unwind. Adjust wire spool brake accordingly.

⚠ WARNING

MOVING PARTS AND ELECTRICAL CONTACT CAN CAUSE INJURY OR BE FATAL.

- **When the gun trigger is depressed drive rolls, spool of wire and electrode are ELECTRICALLY LIVE (HOT).**
- **Keep away from moving parts and pinch points.**
- **Keep all Doors, Covers, panels and guards securely in place.**

DO NOT REMOVE OR CONCEAL WARNING LABELS.

15. Install the .035”(0.9mm) contact tip

16. Install the black flux cored welding nozzle to the gun.

17. Trim the wire stickout to 3/8”(9.5mm) from the contact tip. (See Figure B.12)

18. Close the case side door. The machine is now ready to weld.

19. Read "Learn to Weld" (LTW1) that is included with the machine or watch the "How to Weld" DVD included with the machine.

20. Based on the thickness of the material you are going to weld and the type and diameter of the welding wire set the voltage and the wire feed speed per the procedure decal attached to the inside of the wire drive compartment door.

FIGURE B.9

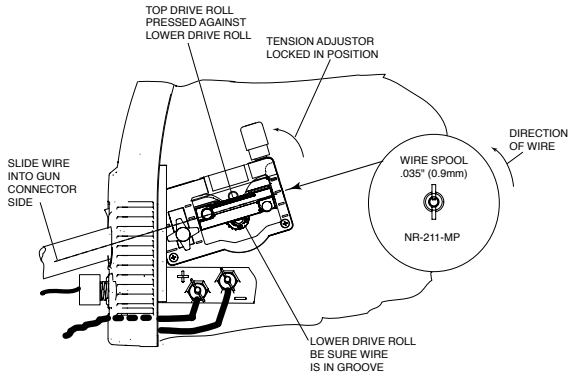


FIGURE B.10

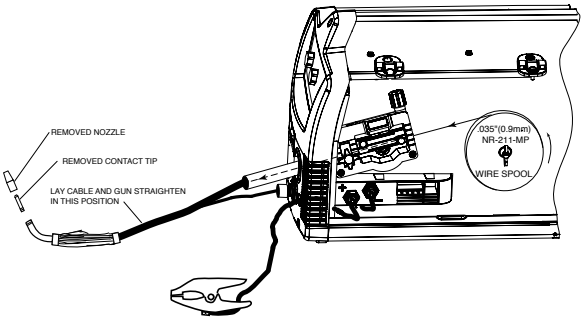


FIGURE B.11

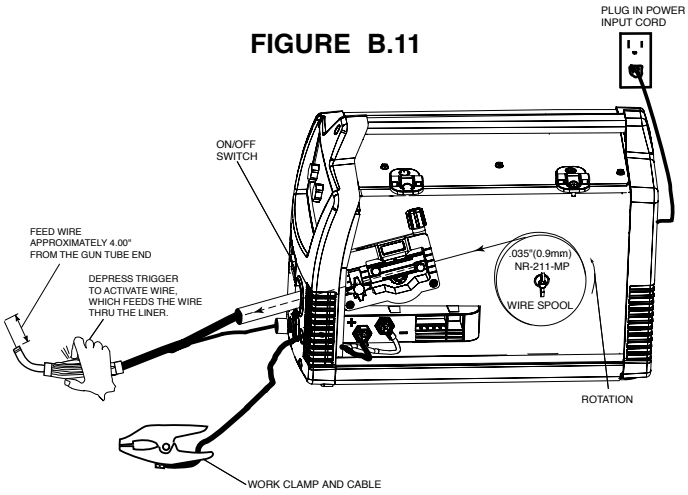
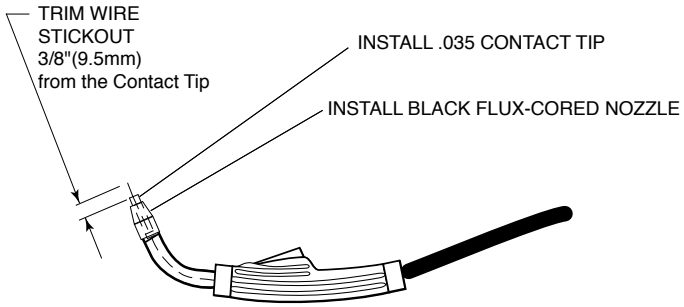


FIGURE B.12



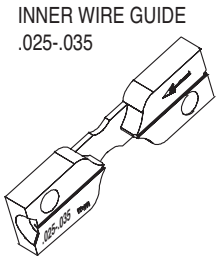
Return to Section TOC
Return to Master TOC

SETTING UP AND MAKING A MIG WELD

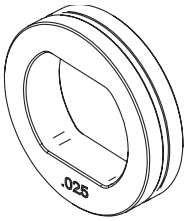
A. ITEMS NEEDED FOR MIG WELDING

1. 025”(0.6mm) Contact Tip

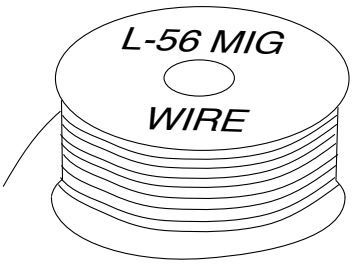
2. 025”-035”(0.6mm-0.9mm) Inner wire guide (140 180 amp machines)



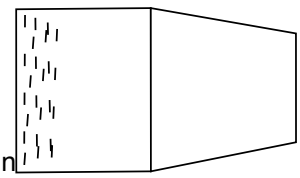
3. .025”(0.6mm) Drive Roll



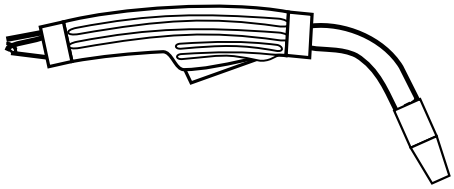
4. .025”(0.6mm) SuperArc L-56 Solid MIG Wire



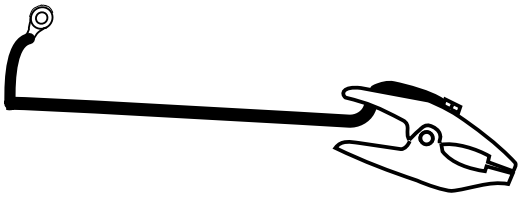
5. Brass gun nozzle



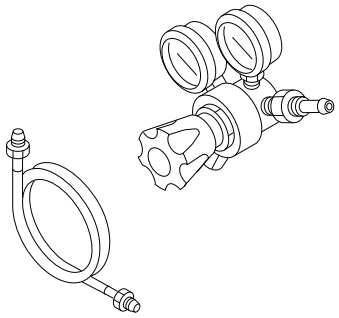
6. Welding Gun



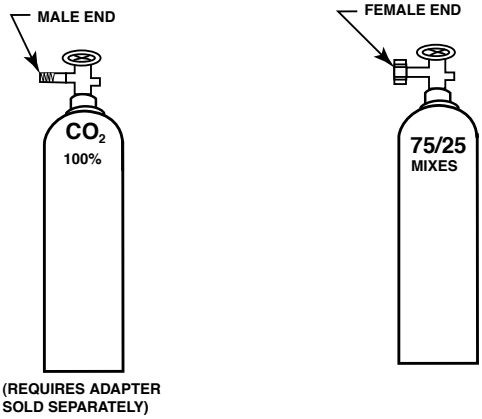
7. Work Cable & Clamp



8. Gas Regulator & Gas Line



9. Bottle of 75/25 Ar/CO_2 shielding gas (or 100% CO_2 shielding gas) (note this requires a CO_2 regulator adapter which is sold separately.



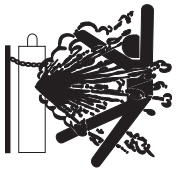
NOTE:125 amp units must be upgraded with a MIG Conversion Kit (K2526-1).

Return to Section TOC
Return to Master TOC

B. INSTALL SHIELDING GAS

MIG welding requires an appropriate bottle of shielding gas. For mild steel either a cylinder bottle of Ar/CO_2 or 100% CO_2 can be used refer to the following instructions to properly connect shielding gas to the machine.

⚠ WARNING



CYLINDER may explode if damaged. Keep cylinder upright and chained to support

- **Keep cylinder away from areas where it may be damaged.**
- **Never lift welder with cylinder attached.**
- **Never allow welding electrode to touch cylinder.**
- **Keep cylinder away from welding or other live electrical circuits.**

⚠ WARNING

BUILDUP OF SHIELDING GAS may harm health or kill.

- **Shut off shielding gas supply when not in use.**

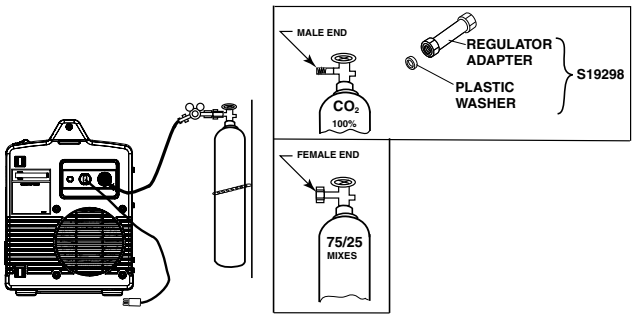
1. Secure the cylinder to a wall or other stationary support to prevent the cylinder from falling over. Insulate the cylinder from the work circuit and earth ground. Refer to Figure B.13.

2. With the cylinder securely installed, remove the cylinder cap. Stand to one side away from the outlet and open the cylinder valve very slightly for an instant. This blows away any dust or dirt which may have accumulated in the valve outlet.

⚠ WARNING

BE SURE TO KEEP YOUR FACE AWAY FROM THE VALVE OUTLET WHEN "CRACKING" THE VALVE. Never stand directly in front of or behind the flow regulator when opening the cylinder valve. Always stand to one side.

FIGURE B.13



3. Attach the flow regulator to the cylinder valve and tighten the union nut securely with a wrench.

   NOTE: If connecting to 100% CO_2 cylinder, a CO_2 regulator adapter (S19298) is required and must be purchased separately. When using the CO_2 adapter be sure to install plastic washer included in the fitting on the bottle side.(See Figure B.13)

4. Refer to Figure B.13. Attach one end of inlet gas hose to the outlet fitting of the flow regulator and tighten the union nut securely with a wrench. Connect the other end to the machine Solenoid Inlet Fitting (5/8-18 female threads — for CGA — 032 fitting). Make certain the gas hose is not kinked or twisted.

SHIELDING GAS

1. For CO_2, open the cylinder very slowly. For argon-mixed gas, open cylinder valve slowly a fraction of a turn. When the cylinder pressure gauge pointer stops moving, open the valve fully.

2. Set gas flow rate for 30 to 40 cubic feet per hour (14 to 18 l/min.) under normal conditions, increase to as high as 40 to 50 CFH (18 to 23.5 l/min.) under drafty (slightly windy) conditions.

3. Keep the cylinder valve closed, except when using the machine.

Return to Section TOC
Return to Master TOC

C. CONNECT LEADS AND CABLES ON THE MACHINE

(See Figure B.14)

1. Open the case side door.

2. Slide the connector end of the gun and cable through the hole of the machine front and into the gun connector bushing on the wire drive.

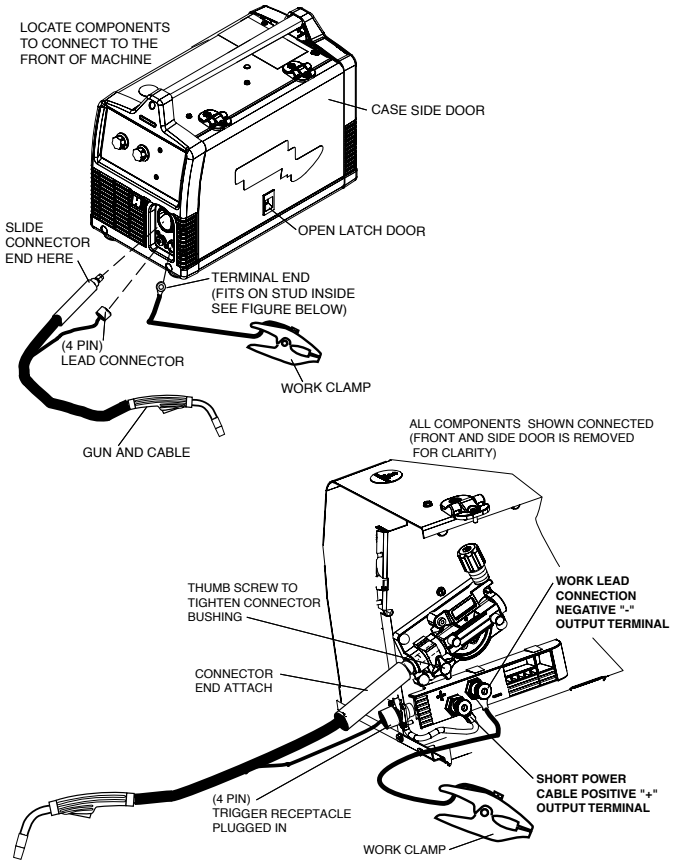
3. Make sure the gun connector end is seated fully into the wire drive and tighten the thumbscrew to secure the gun.

4. Plug the gun trigger lead connector into the 4 pin gun trigger receptacle on the machine front.

5. Wire Drive Polarity. MIG welding requires Positive (+) polarity. Connect the short power cable from the wire drive to the positive (+) output terminal and tighten the thumbscrew.

6. Work Lead Connection. Slide the lugged end of the work cable through the hole in the machine front and place on the negative (-) output terminal and tighten thumbscrew.

FIGURE B.14



D. LOAD WIRE SPOOL

(See Figure B.15)

1. Locate the green labeled 4"(102mm) diameter spool of .025”(0.6mm) L-56 solid MIG wire and place onto wire spool spindle. Orient the spool so that the wire feeds off the top of the spool.

2. Secure spool in place by tightening the wing nut against the against the spacer that holds the wire spool on the spindle.

3. Open the top drive roll pressure arm by rotating the tension adjustor arm down and pivoting the idle roll pressure arm up.

4. Remove the outer wire guide.

4a. Slide gun out of drive slightly.

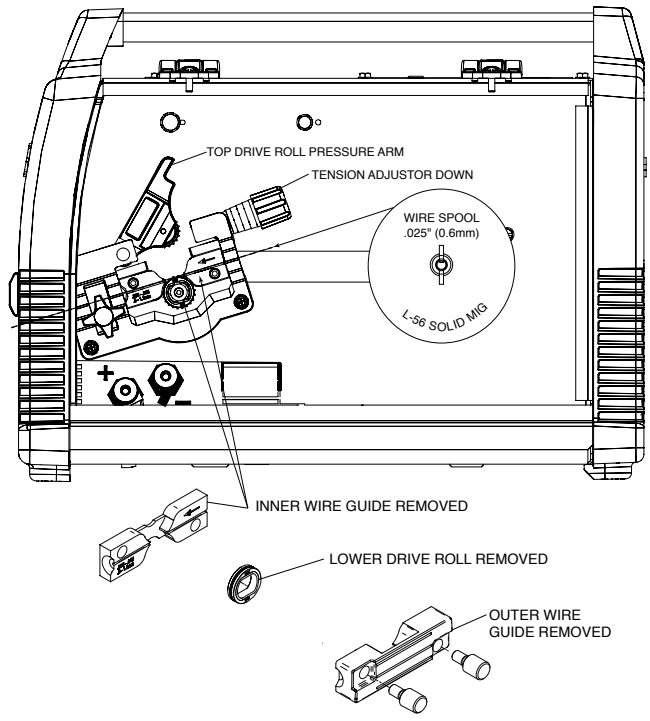
5. Remove the lower drive roll and inner wire guide.

6. Install the .025”-.035”(0.6mm-0.9mm) inner wire guide.

7. Install the .025”(0.6mm) smooth grooved lower drive roll.

8. Carefully unwind and straighten the first six inches of welding wire from the spool. Do not let the end of the wire go to prevent the wire from unspooling.

FIGURE B.15



(See Figure B.16)

9. Feed the wire through the wire drive inlet along the inner wire guide groove and into the wire drive outlet on the gun side.

10. Close the top drive roll pressure arm and secure by pivoting the tension adjustor back to the up position.

11. Re-install the outer wire guide.

(See Figure B.17)

12. Remove the nozzle and contact tip from the gun and straighten the gun cable out flat.

13. Turn the machine power to on and depress the gun trigger to feed the wire through the gun liner until the wire comes out of the threaded end of the gun several inches. (See Figure B.18)

14. When trigger is released the spool of wire should not unwind. Adjust wire spool brake accordingly.

⚠ WARNING

MOVING PARTS AND ELECTRICAL CONTACT CAN CAUSE INJURY OR BE FATAL.

- **When the gun trigger is depressed drive rolls, spool of wire and electrode are ELECTRICALLY LIVE (HOT).**
- **Keep away from moving parts and pinch points.**
- **Keep all Doors, Covers, panels and guards securely in place.**

DO NOT REMOVE OR CONCEAL WARNING LABELS.

---

15. Install the .025”(0.6mm) contact tip.

16. Install the brass gas MIG welding nozzle to the gun.

17. Trim the wire stickout to 3/8”(9.5mm) from the nozzle end. (See Figure B.19)

18. Close the case side door. The machine is now ready to weld.

19. Read "Learn to Weld" (LTW1) that is included with the machine or watch the "How to Weld" DVD included with the machine.

20. Based on the thickness of the material you are going to weld and the type and diameter of the welding wire set the voltage and the wire feed speed per the procedure decal attached to the inside of the wire drive compartment door.

FIGURE B.16

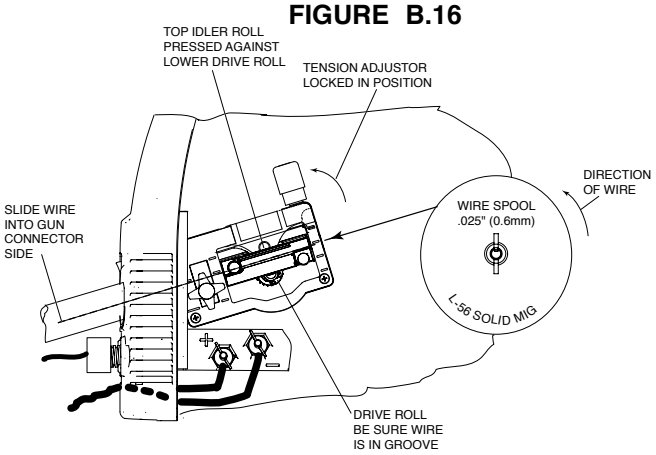


FIGURE B.17

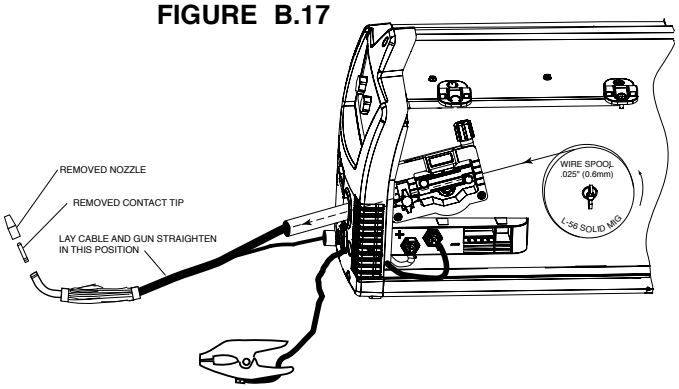


FIGURE B.18

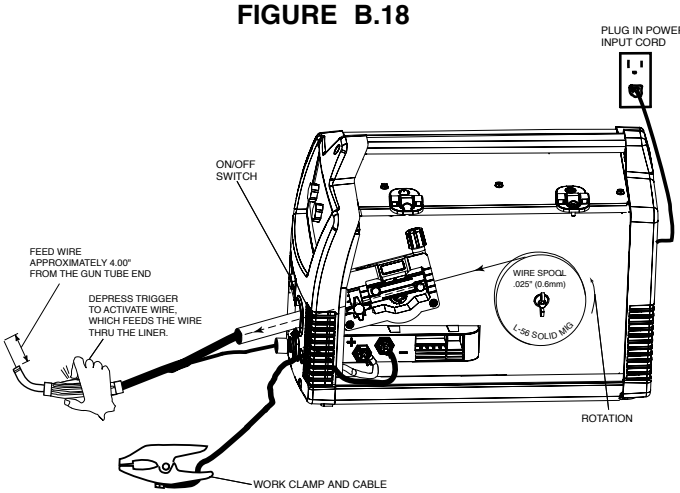
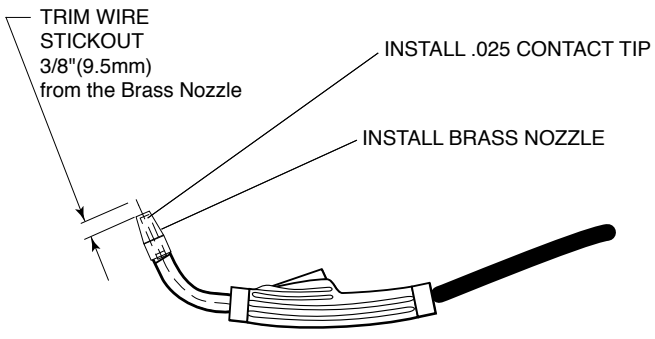


FIGURE B.19



Return to Section TOC
Return to Master TOC

SETTING UP AND MAKING AN ALUMINUM WELD USING THE OPTIONAL SPOOL GUN

1. Follow the MIG welding steps in the previous section.

2. Connect a bottle of 100% Argon shielding Gas per previous section.

3. Disconnect Magnum 100L Gun.

4. Install optional K2532-1 Magnum 100SG spool gun per instructions included with gun.

5. Set Gun selector toggle switch to Spool Gun position. (See Figure B.20)

FIGURE B.20

6. Turn machine on and make weld per recommended settings on the Procedure Decal inside machine door.

NOTES

TABLE OF CONTENTS - ACCESSORIES SECTION

Return to Master TOC
Return to Master TOC
Return to Master TOC

ACCESSORIES

K2525-1 - Spot Timer Kit
Timer kit, when turned on, allows you to set a fixed weld time so that when the gun trigger is pulled the machine will weld for a fixed time period up to 10 seconds. Ideal for making consistent spot welds when welding on thin sheet metal

K2528-1 - 045 Innershield Kit (For 230V models)
Includes everything needed to weld with .045”(1.1mm) diameter Innershield wire. Includes an .035”/.045”(0.9mm/1.1mm) Magnum™ 100L gun liner, .045”(1.1mm) Contact Tip, gasless nozzle, knurled drive roll, .045”(1.1mm) inner wire guide, and a 10 lb. (4.5kg) spool of .045"(1.1mm) Innershield® NR®-212 wire.

K2532-1 - Magnum 100SG Spool Gun
Designed to easily feed small 4"(102mm0 diameter (1lb.-.5kg spools of) .030”(0.8mm) or .035”(0.9mm) aluminum wire. Includes gun, adapter kit, three extra .035”(0.9mm) contact tips, gas nozzle, and spool of Superglaze 4043 .035"(0.9mm) diameter welding wire. Packaged in a convenient carry case.

K2377-1 - Small Canvas Cover
Protect your machine when not in use. Made from attractive red canvas that is flame retardant, mildew resistant and water repellent. Includes a convenient side pocket to hold welding gun.

For additional Optional and Miscellaneous Parts
(See Parts Pages)

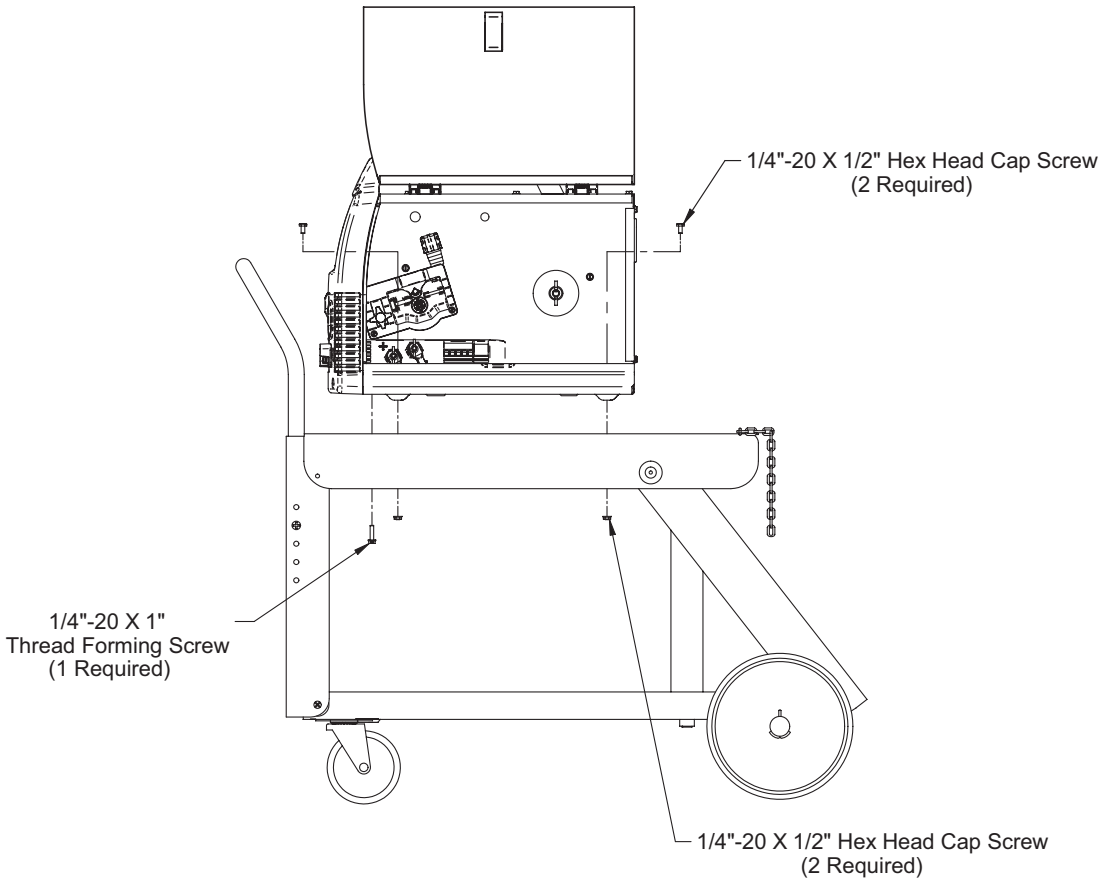
Return to Section TOC
Return to Master TOC

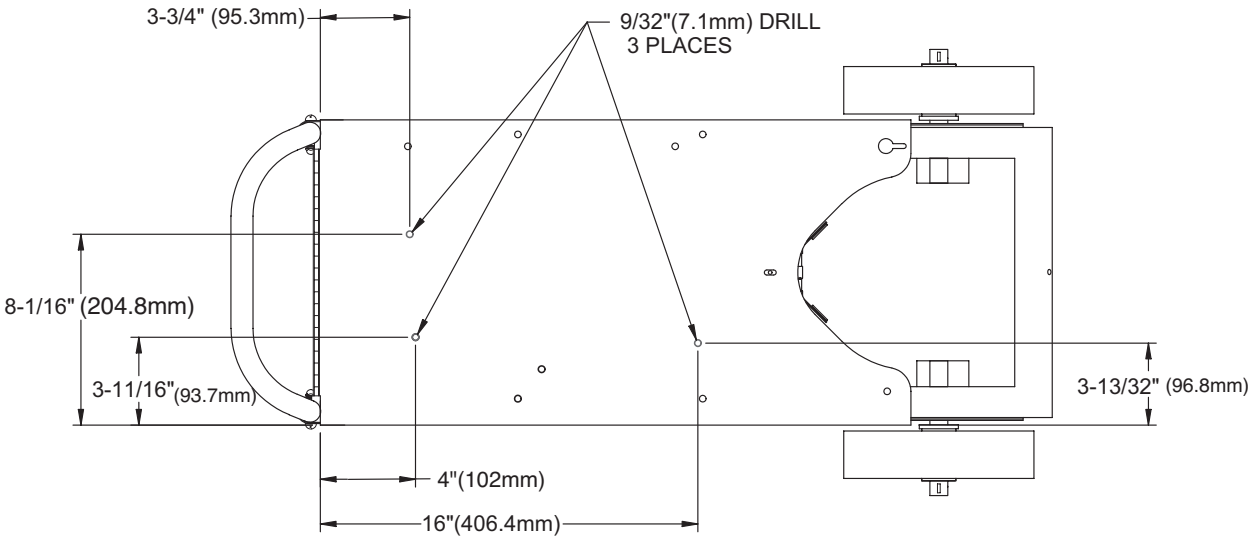
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

K520—Utility Cart

Heavy duty cart stores and transports welder, 150 cubic foot shielding gas cylinder, welding cables and accessories. Includes stable platforms for welder and gas bottle platform, lower tray for added storage capacity and adjustable height handle.

For mounting welding machines to K520 carts that do not have slotted mounting holes, Drill 9/32" holes (3 places) into the cart top as shown and attach the welding machine to the cart with the proper hardware shown.

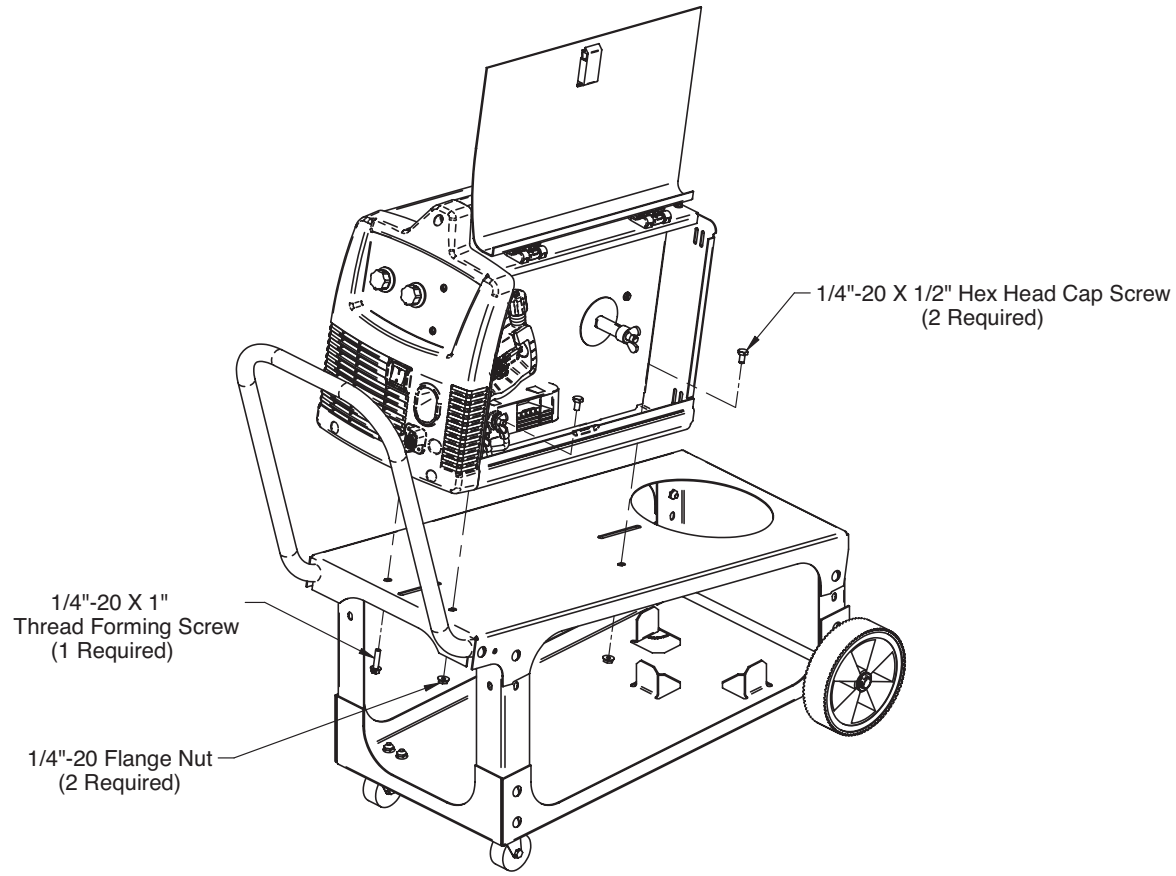


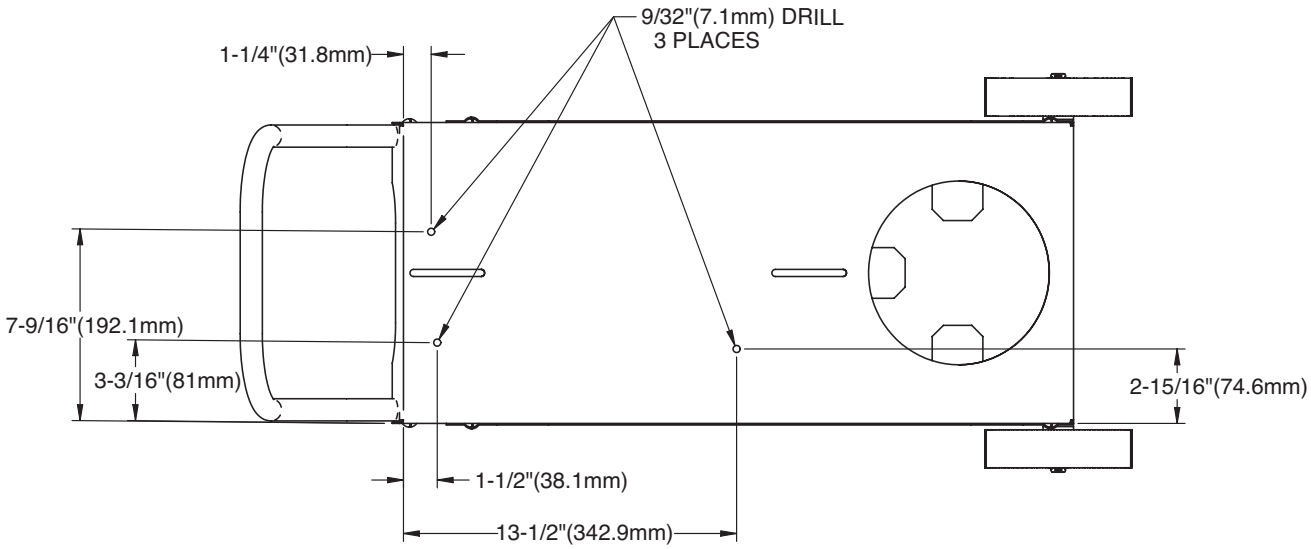


K2275-1 - Welding Cart

Lightweight cart stores and transports welder, 80 cubic foot shielding gas cylinder, welding cables and accessories. Includes an angled top shelf for easy access to controls, lower tray for added storage capacity, a sturdy fixed handle and convenient cable wrap hanger.

For mounting welding machines to K2275 carts that do not have slotted mounting holes, Drill 9/32" holes (3 places) into the cart top as shown and attach the welding machine to the cart with the proper hardware shown.





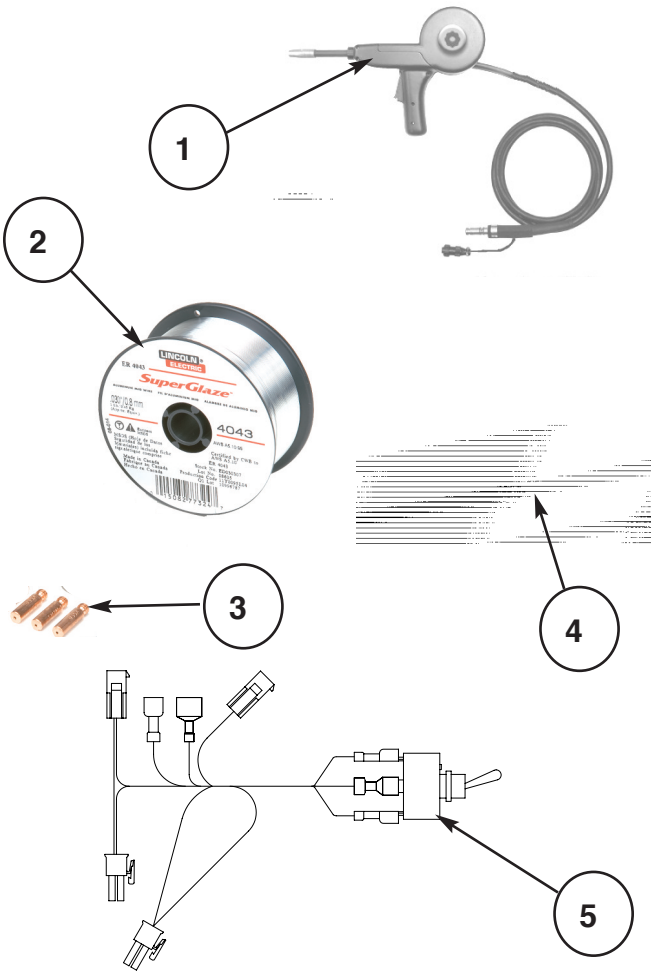
TECHNICAL SPECIFICATIONS - MAGNUM 100SG SPOOL GUN K2532-1

MODEL	K2532-1 Magnum 100SG Spool Gun
WELDING PROCESS	Aluminum GMAW (MIG), DC electrode positive polarity with 100% argon welding shielding gas.
WIRE ALLOYS	Aluminum only: alloys 4043 or 5356
WIRE SIZES (DIAMETERS)	Solid wire 0.030 or 0.035 inches (0.8 or 0.9 mm)
SPOOL SIZE	1 lb. weight, nominal 4 inch diameter spool
RATED WELDING CURRENT AND DUTY CYCLE	130 amps at 30% for 10-minute basis
OVERALL WEIGHT	3.5 lbs. with cable but without case or spool
CABLE LENGTH	10.0±0.2 feet
OVERALL SIZE (BOUNDING BOX)	In inches: 15.75 long x 10.50 high x 4.25 thick max., without case or gun cable.
METHOD OF GUIDANCE	Semiautomatic (manually-guided)
METHOD OF COOLING	Air-cooled

UNPACKING THE SPOOL GUN

The spool gun is factory-assembled and tested, and then packed in its own cushioned carrying case. It is shipped fully-equipped to weld with 0.035 inch diameter aluminum wire. After opening the case, check that it contains the following items:

1. One fully assembled K2532-1 spool gun with (1) T11862-65 Conical Compression Spring for use with alloy 5356 wire; wire spool not installed.
2. One spool of 0.035 aluminum alloy 4043 wire
3. Three S19726-3 contact tips
4. One instruction manual (IM913)
5. One M21182 electrical harness with toggle switch.



Return to Section TOC
Return to Master TOC

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

- **Turn the input power OFF at the welding power source before installation or changing drive rolls and/or guides.**
- **Do not touch electrically live parts.**
- **When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground and could remain energized several seconds after the gun trigger is released.**

LOCATING SPOOL GUN COMPONENTS AND FEATURES

(See Figure C.1 for Items 1 thru 6)

1. Gas Cone Assembly and Contact Tip.

2. Straightened Gun Tube Assembly.

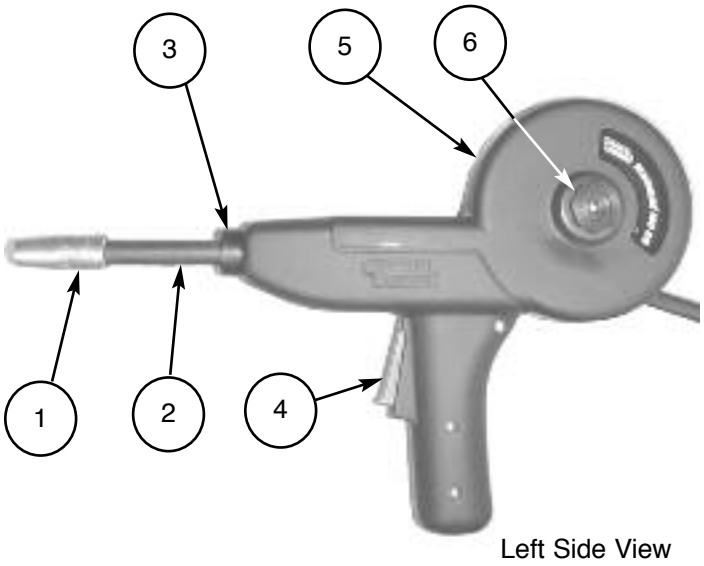
3. 1/4-Turn Locking Collar.

4. Trigger Assembly.

5. Spool Cover: Provides easy, wide-open access to spool and wire drive.

6. Locking Knob: Captive in spool cover.

FIGURE C.1



Left Side View

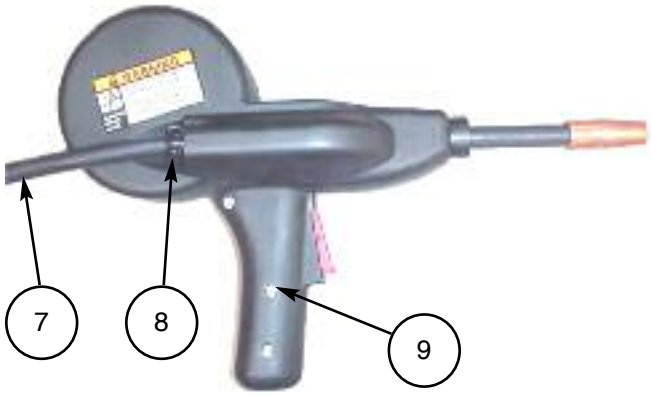
(See Figure C.2 for these following items)

7. Integrated Single-Piece Cable: The Magnum design provides neat and clean appearance; simplifies cable management and reduces entanglements.

8. Standard Durable Strain Relief Clamp.

9. Three Captive Hex Nuts.

FIGURE C.2

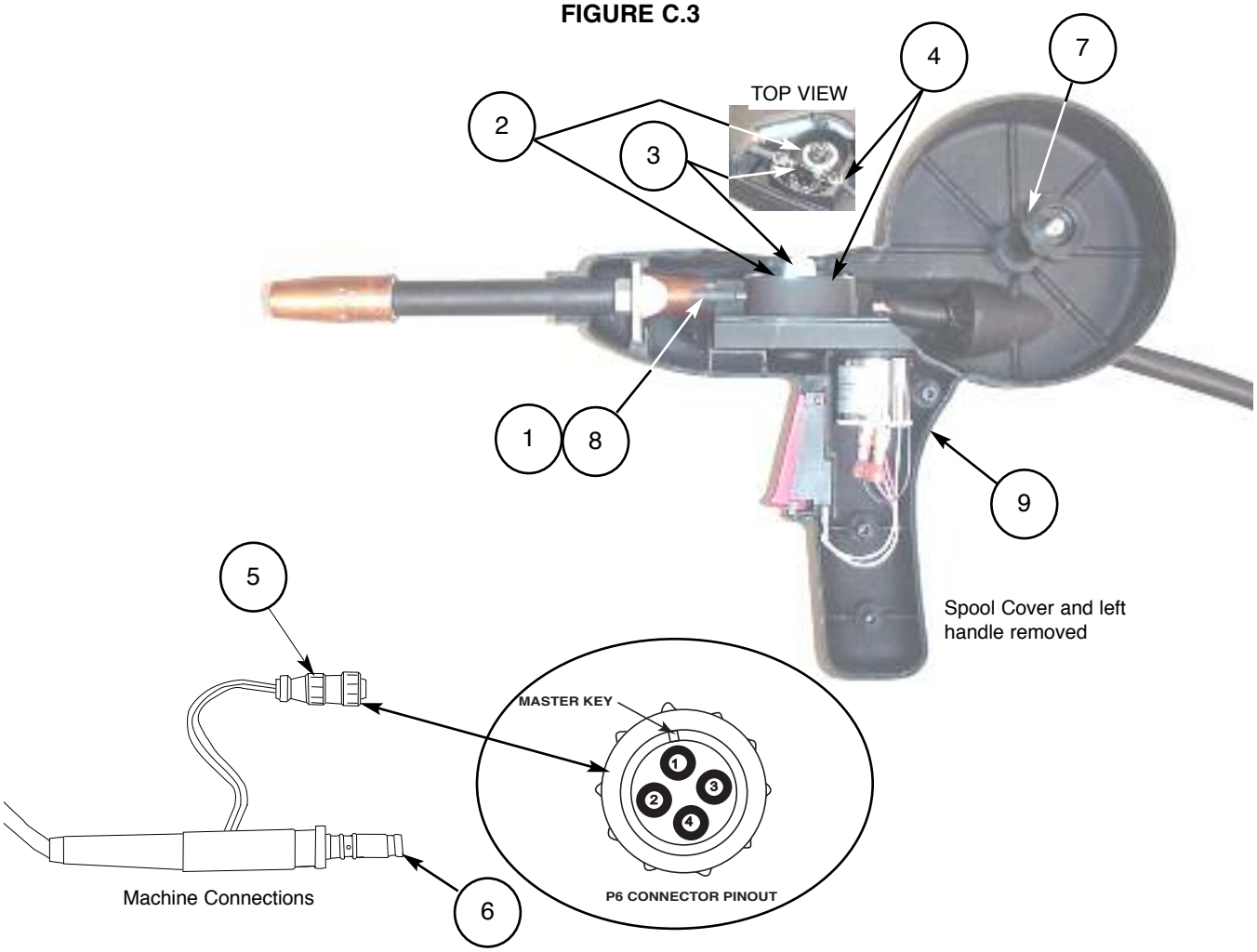


Right Side View

Return to Section TOC
Return to Master TOC

ASSEMBLY OF ITEMS INSIDE THE MAGNUM SPOOL GUN

FIGURE C.3



1. Liner Assembly feeds all specified wire.

2. Drive Roll: This Drive Roll feeds all specified wires.

3. Idle Roll Assembly: Non-adjustable tension setting for all specified wires

4. Incoming Wire Guide: Highly wear-resistant.

5. P6 Connector Control Leads: Motor Power and Trigger. (See ***Maintenance Section*** for more details)

6. Welding Power and Shielding Gas Machine connection (Sealed with 2 o-rings).

7. Locking Knob: Independently retains the wire spool on the spindle.

8. Liner Assembly: Includes a gas seal with the cable connector and is the outgoing wire guide.

9. Only 4 sub-assemblies: gun tube; cable; wire drive; trigger.

10. Conical spring (not shown) serves as the spool brake (use only with aluminum alloy 5356).

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

SAFETY PRECAUTIONS

WELDING MACHINES

⚠ CAUTION

- **Read and understand the welding machine's instruction manual and all hazard warnings on equipment and in the manual.**
- **Wear the proper personal protective equipment for welding, including but not limited to, safety glasses, hearing protection, welding helmet, welding gloves, and welding leathers.**

SPOOL GUN

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

- **The spool of wire may fall out of the gun if the locking knob is not installed.**
- **Metal parts may be at welding voltage (electrically "hot").**
- **Metal parts remain at welding voltage for several seconds after trigger is released. Read warning label on gun.**
- **This product shall not be used in precipitation, or in wet or damp locations.**

RECOMMENDED WELDING MACHINES

The MAGNUM 100XL Spool Gun can be installed in all machines covered by this Manual.

Machines that are not equiped with a gas solenoid from the factory must have the K2526-1 MIG Conversion Kit added before installing the MAGNUM 100XL Spool Gun.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

SPOOL GUN / WIRE DRIVE SELECTOR SWITCH INSTALLATION

1. Install the M21182 electrical adapter harness that came with the spool gun per the following instructions.

⚠ WARNING

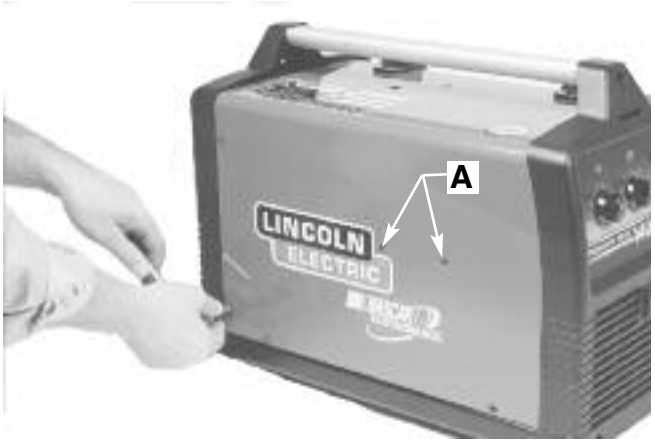
ELECTRIC SHOCK CAN KILL.

2. Disconnect input power from the machine.

OPEN THE MACHINE

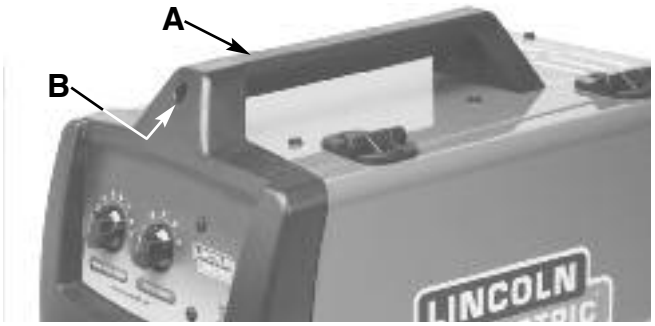
3. Remove two 5/16“ hex hinge screws from door.

4. Remove ten 5/16“ hex screws from cover.



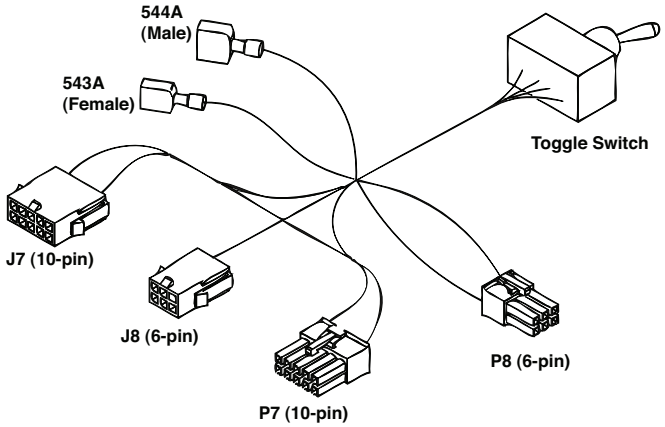
5. Remove screws from cover.
(**A)** is the location of two 3/4” long screws.

6. Remove cover.

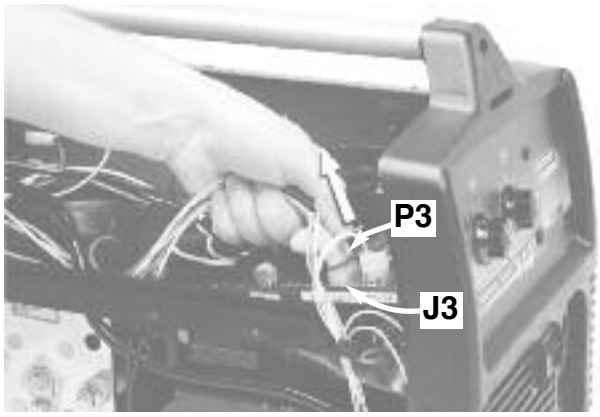


7. If machine has a plastic handle **(A)**, then remove screw **(B)**.

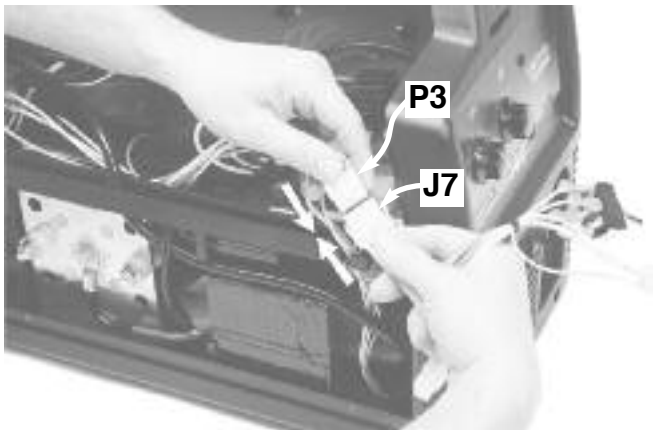
ELECTRICAL CONNECTIONS



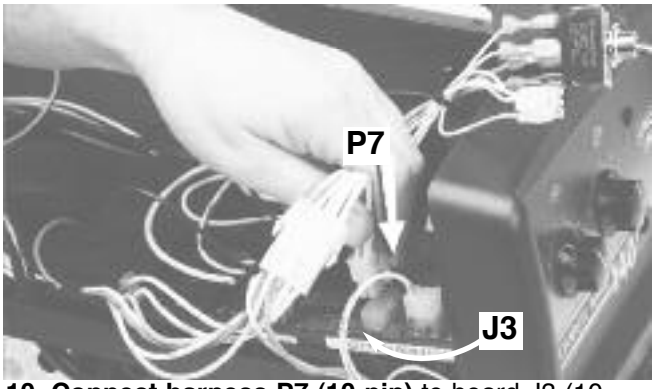
8. Adapter harness. All 6 connections shown are used, and each one is unique. (Proceed as follows)



9.A. **Remove P3 (10-pin)** from board J3 (10-pin).

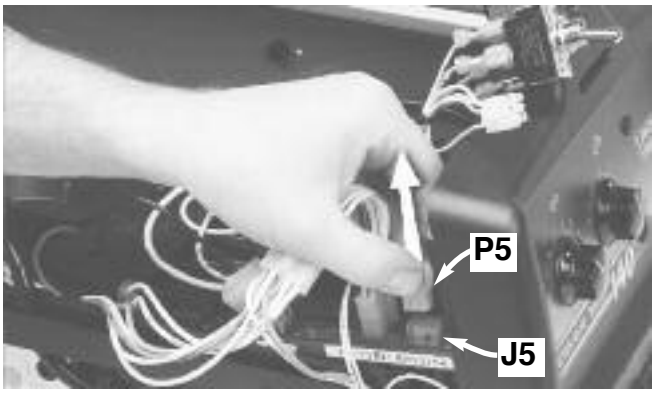


9.B. **Connect P3 (10-pin)** to harness J7 (10-pin).

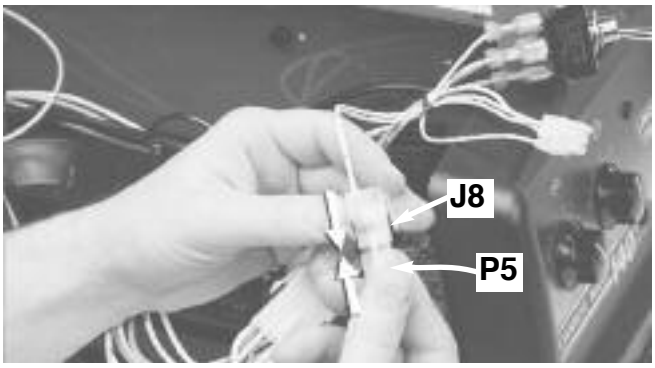


10. Connect harness P7 (10-pin) to board J3 (10-pin).

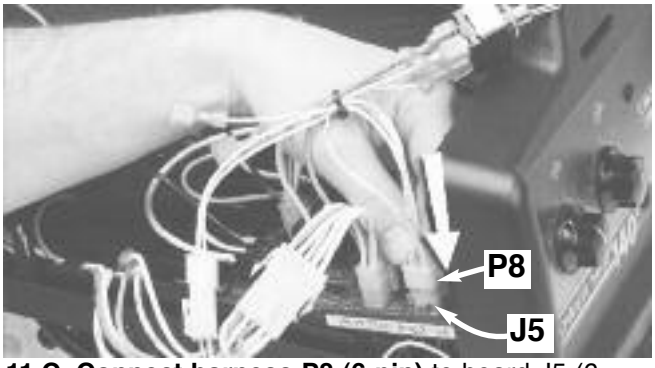
IF MACHINE DOES NOT HAVE OPTIONAL SPOT TIMER. (11.A. thru 11.D.)



11.A. Remove P5 (6-pin) from board J5 (6-pin).

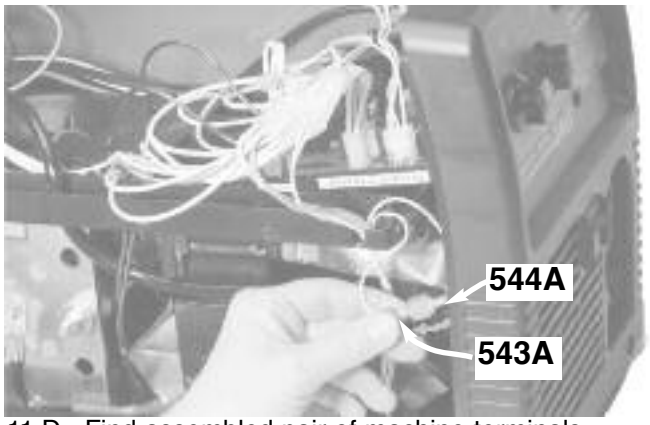


11.B. Connect P5 (6-pin) to harness J8 (6-pin).



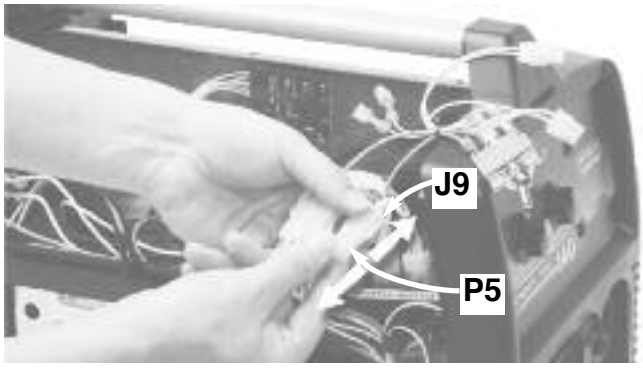
11.C. Connect harness P8 (6-pin) to board J5 (6-pin).

Return to Section TOC
Return to Master TOC

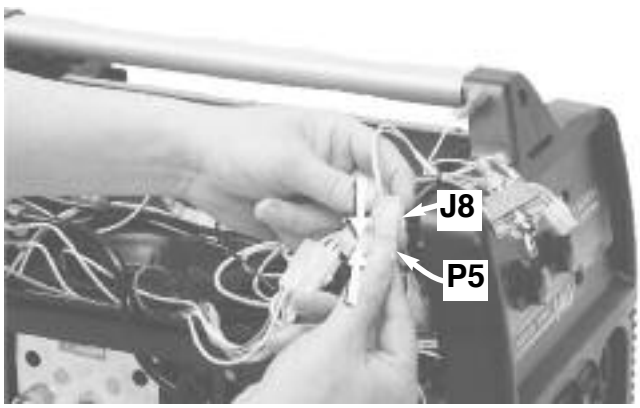


11.D. Find assembled pair of machine terminals (leads 543A & 544A) and disconnect. Go to step 13.

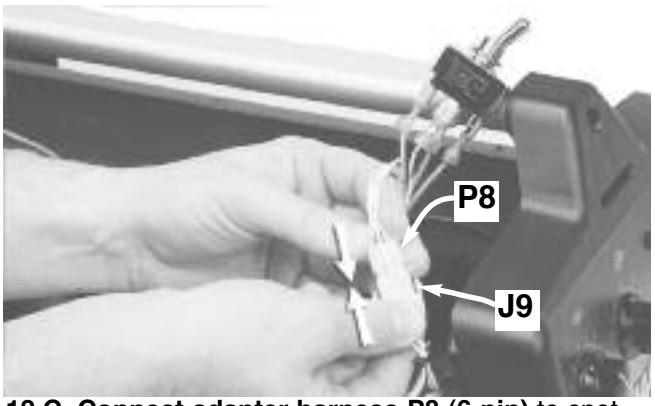
IF MACHINE DOES HAVE OPTIONAL SPOT TIMER. (12.A. thru 12.D.)



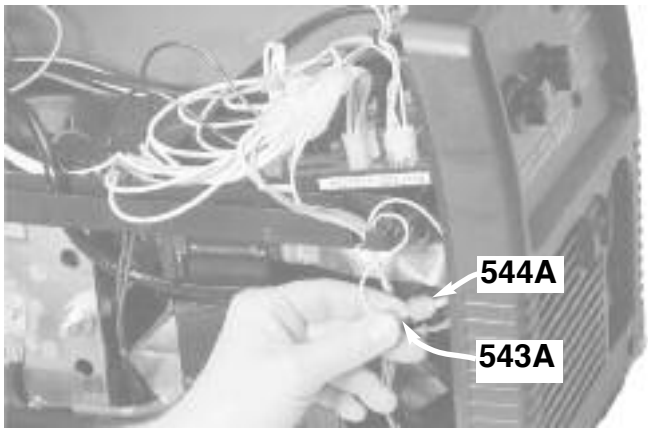
12.A. Remove P5 (6-pin) from spot timer harness J9 (6-pin).



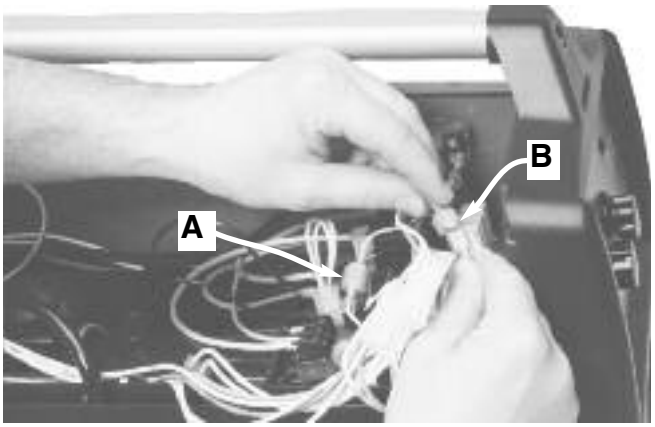
12.B. Connect P5 (6-pin) to adapter harness J8 (6-pin).



12.C. Connect adapter harness P8 (6-pin) to spot timer harness J9 (6-pin).



12.D. Find assembled pair of machine terminals (leads 543A & 544A) and disconnect.



13. Connect terminals:
(A) connect machine male (lead 543A) to adapter harness female (lead 543A).

(B) connect machine female (lead 544A) to adapter harness male (lead 544A).

14. Ensure that the locking tabs on all connectors are latched closed.

MOUNTING THE SWITCH

15. Remove the plug button from the panel hole.

16. Plug button is no longer needed. Discard.

17, Remove mounting nut from switch. Keep mounting nut for installation.
18. Install switch into panel hole. Ensure washer tab

is fully seated into smaller hole.

19. Reinstall mounting nut onto switch.

Wrench tighten.

RE-ASSEMBLE MACHINE AS FOLLOWS:

20. Reinstall screw into plastic handle (if so equipped).
21. Reinstall cover.
22. Reinstall door.
23. Reconnect input power to the machine

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

ROUTINE WELDING MACHINE PREPARATION

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

1. Disconnect input power to the machine.

2. Machine polarity setting: Set to DC electrode positive polarity per the machine's Instruction Manual.

3. Gas selection and flow rate: Connect 100% welding grade argon gas supply to the machine's gas solenoid valve. Set the supply regulator to deliver a gas flow rate of 20 to 50 SCFH thru the spool gun.]

4. Flip the machine's wire drive selector switch (behind the access door) to "Magnum 100SG". (See Figure C.4)

FIG**URE C.4**

PREPARING THE SPOOL GUN

⚠ WARNING

ELECTRIC SHOCK CAN KILL.

1. Disconnect input power to the machine.

2. The Conical Spring is used as the spool brake only when feeding the stronger and harder aluminum alloy 5356. The Conical Spring must be removed from the spool gun whenever using the softer aluminum alloy 4043.

LOADING ALUMINUM WIRE

1. Remove gas cone and contact tip. Remove spool cover by unscrewing captive locking knob.

FIGURE C.5

2. Remove locking knob from spindle bolt by unscrewing it.

FIGURE C.6

3. Select wire alloy and diameter needed. Alloy 4043 and 0.035 wire size shown. Remove packaging and data sheet from wire spool.

FIGURE C.7

4. Extend approximately 12 inches of wire from spool. Straighten it out by back-bending it. Use care to prevent the wire from dereeling.

FIGURE C.8

5. Cut off bent end of wire, leaving straight section.

FIGURE C.9

6. Gently pull open the idle roll assembly to expose the drive roll groove.

FIGURE C.10

Return to Section TOC
Return to Master TOC

7. Guide straightened wire through inlet wire guide and toward drive roll groove.

FIGURE C.11

8. While holding open the idle roll, slide end of wire through drive roll's groove and toward gun tube liner.

FIGURE C.12

9. Slide the wire into the liner until it extends approximately 1 inch beyond the end of the gas diffuser. Release idle roll tab without snapping it.

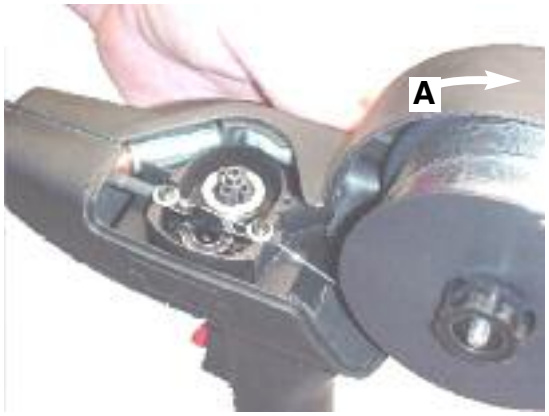
FIGURE C.13

10a. Alloy 4043: Roll up remaining wire back onto spool and place spool onto gun spindle. Install locking knob and finger-tighten. Go to step 11.

FIGURE C.14

10b. Alloy 5356: Install Conical Spring, small end first, onto gun spindle (**A**). Roll up remaining wire back onto spool and place spool onto gun spindle. Install locking knob and finger-tighten. Go to step 11.

FIGURE C.15



11. Grasp the free end of the wire at the gas diffuser and slowly pull approximately 12 to 24 inches of wire through the spool gun. There should only be 1 to 2 lbs. of resistance. If force is greater than 2 lbs. wire is binding in the gun (also see Troubleshooting guide).

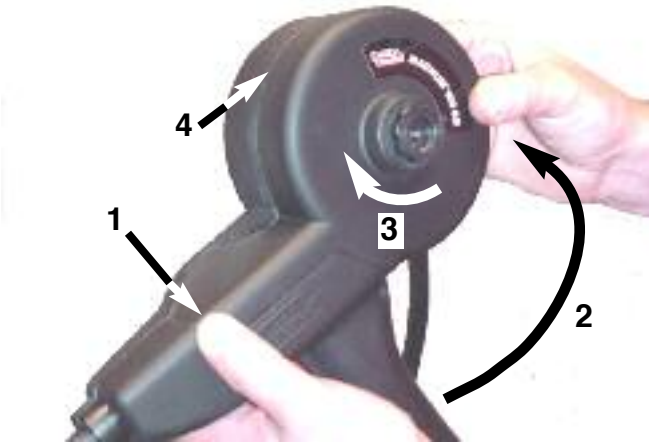
FIGURE C.16

12. Cut off excess wire 1 to 2 inches from gas diffuser. Install properly-sized contact tip slightly past hand-tight. Install gas cone and hand-tighten.

FIGURE C.17

13. Reinstall spool cover. 1: tuck cover's tab in place at arrow and hold with thumb. 2: swing cover closed. 3: finger-tighten locking knob. 4: check for uniform fit all around cover.

FIGURE C.18



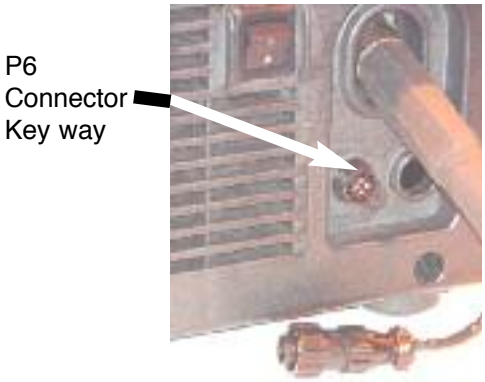
CONNECTING THE GUN TO THE WELDING MACHINE

1. Disconnect input power to the machine.

2. Make sure that the gun locking knob is loosened. (See Figure C.20).

3. Fully insert gun cable connection (welding power and gas supply) into machine. Note that the master Key way for P6 connector is located at the arrow.

FIGURE C.19



4. Check that the cable connector's end is flush with insulator at A. Tighten gun locking knob (B) onto cable connector.

FIGURE C.20

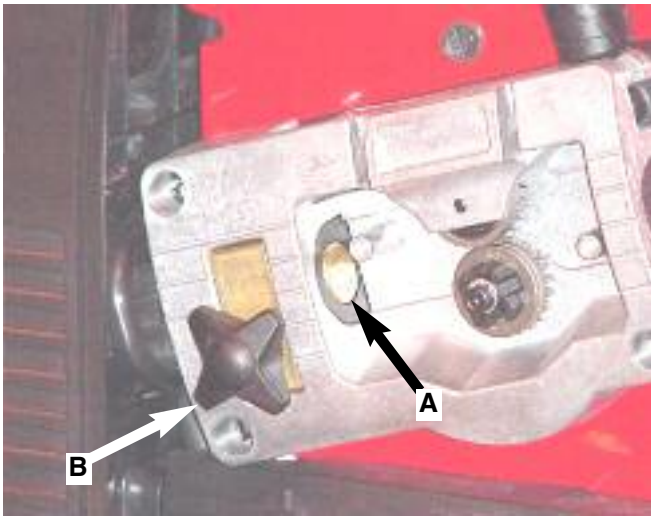


TABLE OF CONTENTS - MAINTENANCE SECTION

MAINTENANCE

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Disconnect input power by removing plug from receptacle before working inside thr Compact Wire Welders. Use only grounded receptacle. Do not touch electrically "hot" parts inside the machine.**
- **Have qualified personnel do the maintenance and trouble shooting work.**

ROUTINE MAINTENANCE

POWER SOURCE COMPARTMENT

No user serviceable parts inside! Do not attempt to perform service in the power source (fixed) side of the COMPACT EIRE WELDERS. Take the unit to an authorized Lincoln Service Center if you experience problems.

TYPCALLY, No regular maintenance is required. In extremely dusty locations, dirt may clog the air passages causing the welder to run hot with premature tripping of thermal protection. If so, blow dirt out of the welder with low pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

WIRE FEED COMPARTMENT

1. When necessary, vacuum accumulated dirt from gearbox and wire feed section.
2. Occasionally inspect the wire guides and keep grooves clean.
3. Motor and gearbox have lifetime lubrication and require no maintenance.

FAN MOTOR

Has lifetime lubrication — requires no maintenance.

WIRE REEL SPINDLE

Requires no maintenance. Do **not** lubricate shaft.

Return to Section TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC

GUN AND CABLE MAINTENANCE

FOR MAGNUM™ 100L GUN

Gun Cable Cleaning

Clean cable liner after using approximately 300 lbs (136 kg) of solid wire or 50 lbs (23 kg) of flux-cored wire. Remove the cable from the wire feeder and lay it out straight on the floor. Remove the contact tip from the gun. Using low pressure air, gently blow out the cable liner from the gas diffuser end.

⚠ CAUTION

Excessive pressure at the start 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.

Contact Tips, Nozzles, and Gun Tubes

1. Dirt can accumulate in the contact tip hole and restrict wire feeding. After each spool of wire is used, remove the contact tip and clean it by pushing a short piece of wire through the tip repeatedly. Use the wire as a reamer to remove dirt that may be adhering to the wall of the hole through the tip.

2. Replace worn contact tips as required. A variable or "hunting" arc is a typical symptom of a worn contact tip. To install a new tip, choose the correct size contact tip for the electrode being used (wire size is stenciled on the side of the contact tip) and screw it snugly into the gas diffuser.

3. Remove spatter from inside of gas nozzle and from tip after each 10 minutes of arc time or as required.

4. Be sure the gas nozzle is fully screwed onto the diffuser for gas shielded processes. For the Innershield® process, the gasless nozzle should screw onto the diffuser.

5. To remove gun tube from gun, remove gas nozzle or gasless nozzle and remove diffuser from gun tube. Remove both collars from each end of the gun handle and separate the handle halves. Loosen the locking nut holding the gun tube in place against the gun end cable connector. Unscrew gun tube from cable connector. To install gun tube, screw the locking nut on the gun tube as far as possible. Then screw the gun tube into the cable connector until it bottoms. Then unscrew (no more than one turn) the gun tube until its axis is perpendicular to the flat sides of the cable connector and pointed in the direction of the trigger. Tighten the locking nut so as to maintain the proper relationship between the gun tube and the cable connector. Replace the gun handle, trigger and diffuser. Replace the gas nozzle or gasless nozzle.

OVERLOAD PROTECTION

Output Overload

The Compact Wire Welders are equipped with a circuit breaker and a thermostat which protects the machine from damage if maximum output is exceeded. The circuit breaker button will extend out when tripped. The circuit breaker must be manually reset.

Thermal Protection

The Compact Wire Welders have a rated output duty cycle as defined in the Technical Specification pages. If the duty cycle is exceeded, a thermal protector will shut off the output until the machine cools to a reasonable operating temperature. This is an automatic function of the machine and does not require user intervention. The fan continues to run during cooling.

Electronic Wire Drive Motor Protection

The Compact Wire Welders have built-in protection against wire drive motor overload. If the motor current limit is exceeded the trigger circuit is interupted and the weld stops.

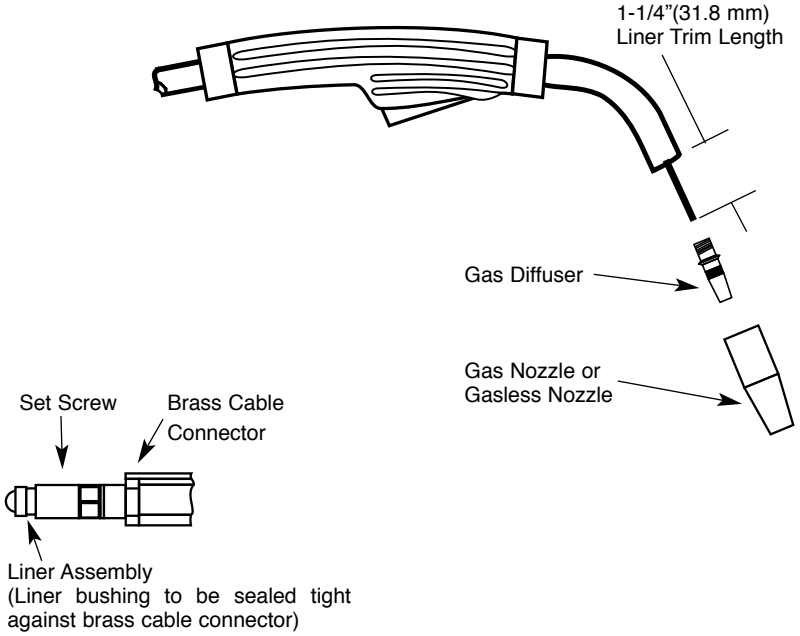


FIGURE D.2
Liner trim length

CHANGING LINER

NOTICE: The variation in cable lengths prevents the interchangeability of liners. 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. Refer to Figure D.2.

1. Remove the gas nozzle from the gun by unscrewing counter-clockwise.

2. Remove the existing 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.

GUN HANDLE PARTS

The gun handle consists of two halves that are held together with a collar on each end. To open up the handle, turn the collars approximately 60 degrees counter-clockwise until the collar reaches a stop. Then pull the collar off the gun handle. If the collars are difficult to turn, position the gun handle against a corner, place a screwdriver against the tab on the collar and give the screwdriver a sharp blow to turn the collar past an internal locking rib. See Figure D-3.

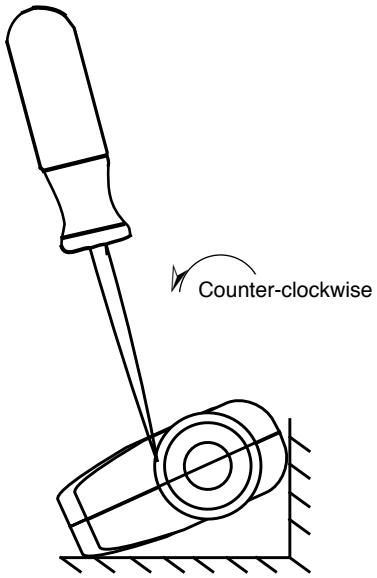
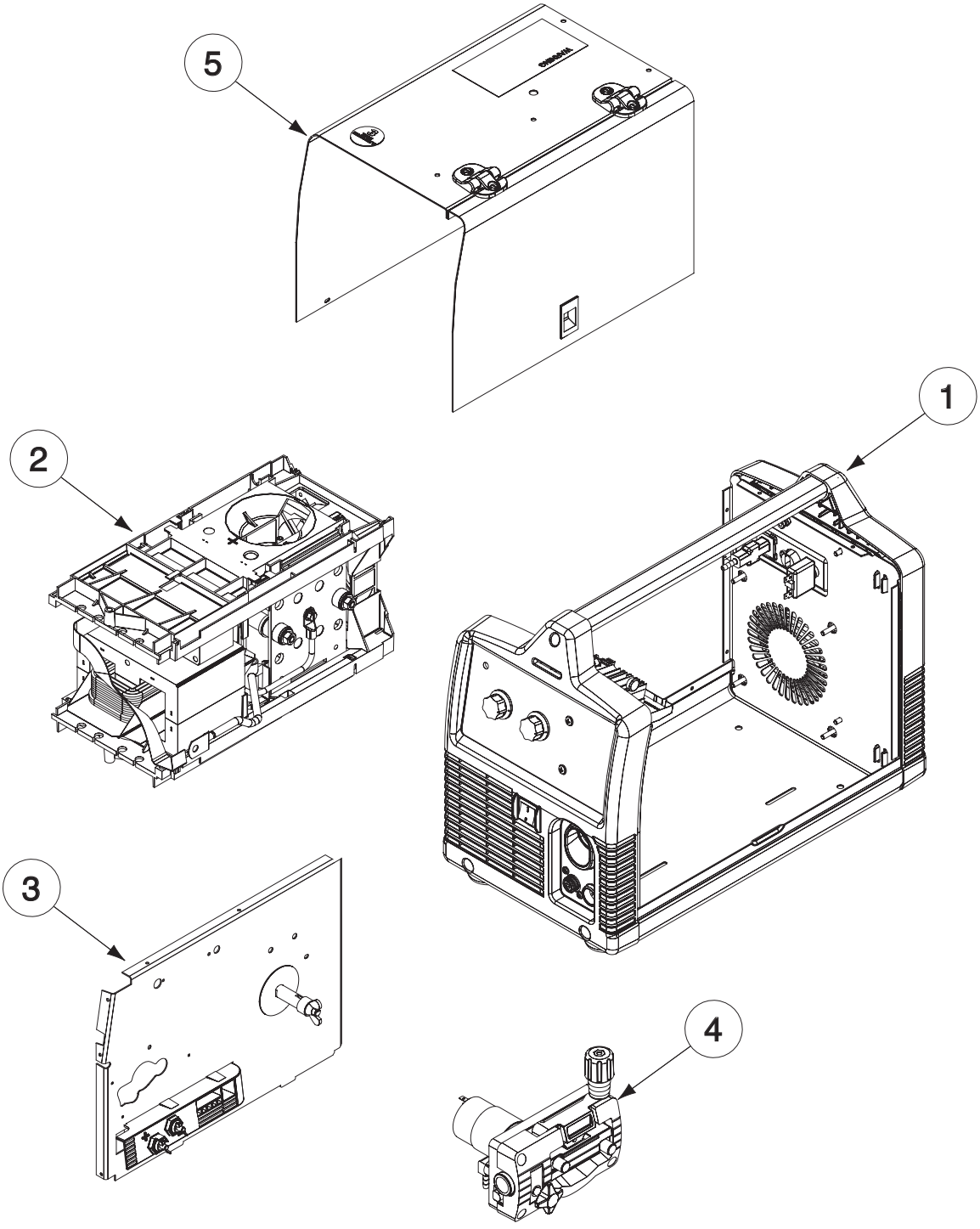


FIGURE D.3

MAJOR COMPONENT LOCATIONS

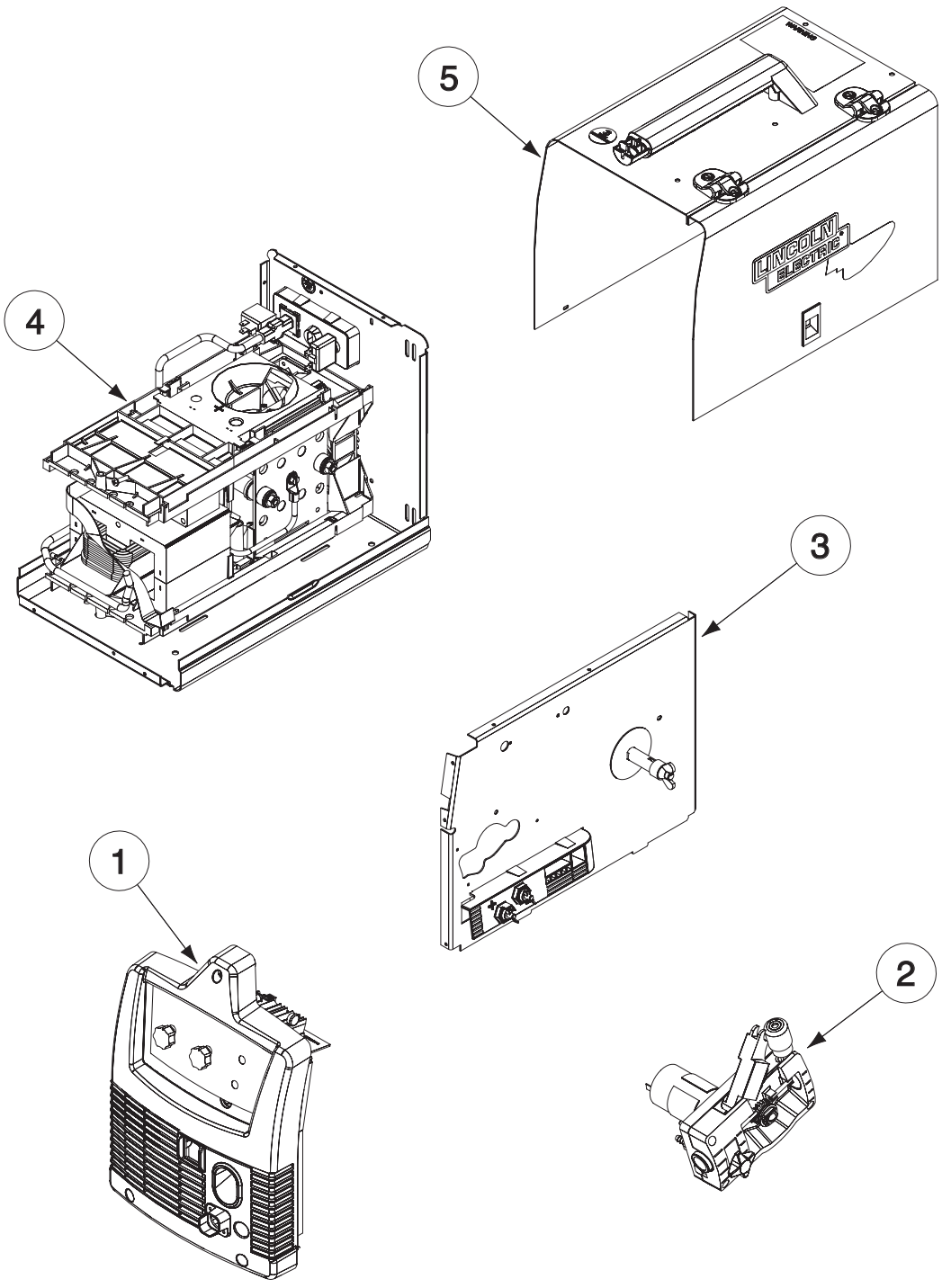
1. **Case Front, Back and Bottom Assembly**
2. **Power Module Assembly**
3. **Center Panel Assembly**
4. **Wire Drive Assembly**
5. **Wraparound & Door Assembly**



Return to Section TOC
Return to Master TOC

MAJOR COMPONENT LOCATIONS

1. **Case Front Assembly**
2. **Wire Drive Assembly**
3. **Center Panel Assembly**
4. **Power Module and Base Assembly**
5. **Wraparound & Door Assembly**



Return to Section TOC
Return to Master TOC

TABLE OF CONTENTS-THEORY OF OPERATION SECTION

FIGURE E.1 — BLOCK LOGIC DIAGRAM.

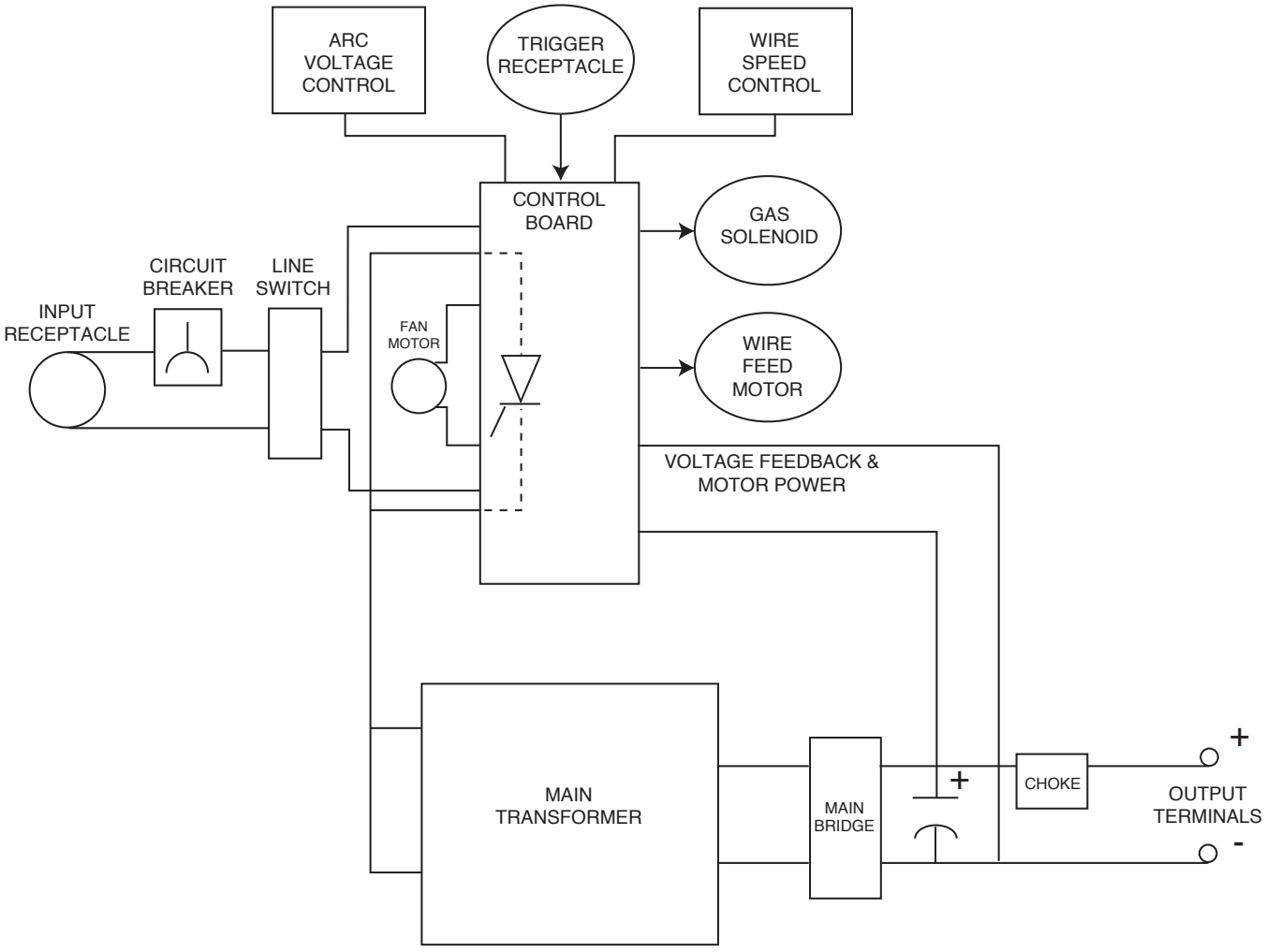
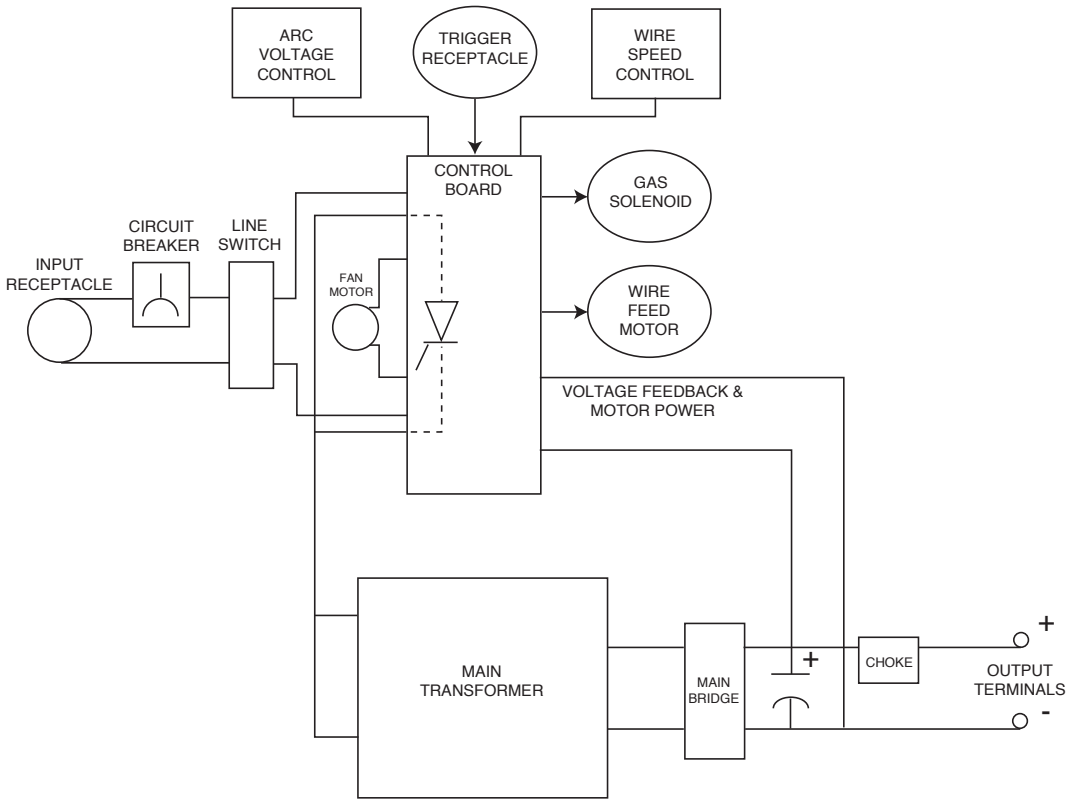


FIGURE E.2 — GENERAL DESCRIPTION

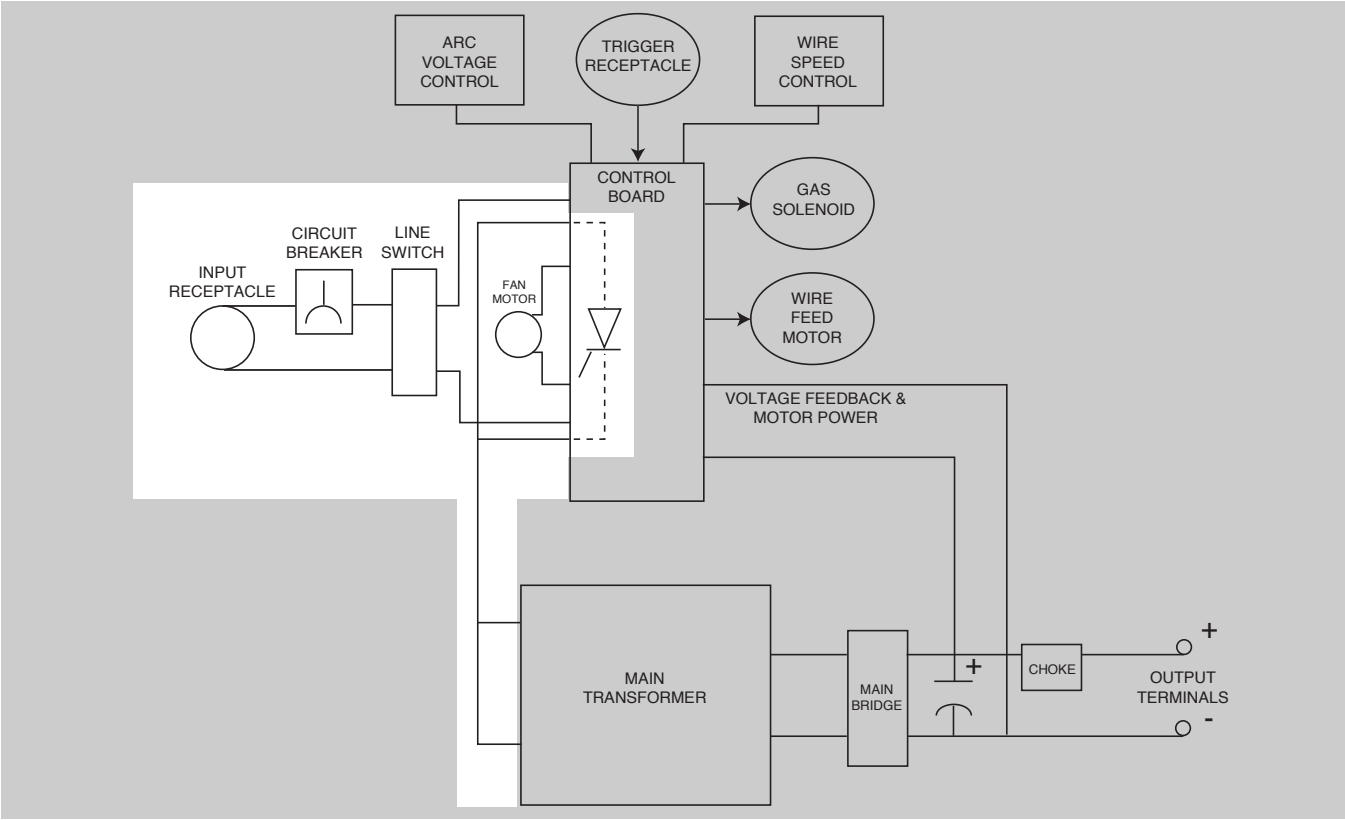


GENERAL DESCRIPTION

The Compact Wire Welders that are covered by this manual are Constant Voltage (CV) DC welders that can be used for MIG or Flux-Core process . The 120 VAC machines are rated for 90 amps, 19.5 volts, at 20% duty cycle. The 208 / 230 VAC machines are rated for 130 amps, 17 / 20 volts, at a 30% duty cycle. All are equipped with a 4-pin trigger connector to allow operation of an optional spool gun for Aluminum MIG Welding.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

FIGURE E.3 — INPUT POWER CIRCUITS



INPUT LINE VOLTAGE, FAN MOTOR & MAIN TRANSFORMER

A circuit breaker is incorporated in the circuit to protect the unit from current overloads.

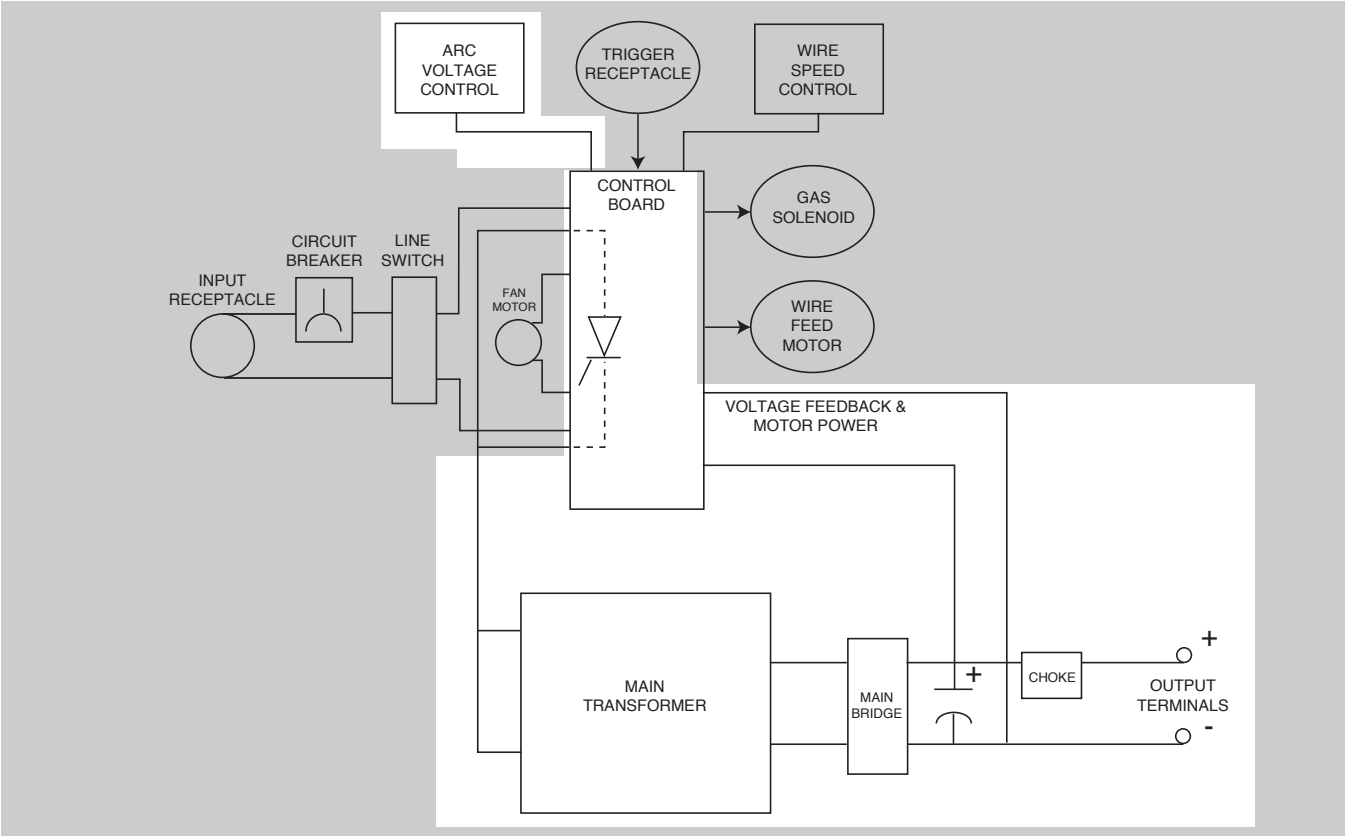
The main transformer receives the primary voltage from the Control Board and changes that high voltage and low current input power to a low voltage and high current output suitable for welding.

The fan motor is rated for the same AC Voltage as the welder and should run whenever the machine is Power Switch is turned ON.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

FIGURE E.4 — OUTPUT CIRCUITS



OUTPUT CONTROL, RECTIFICATION & VOLTAGE FEEDBACK

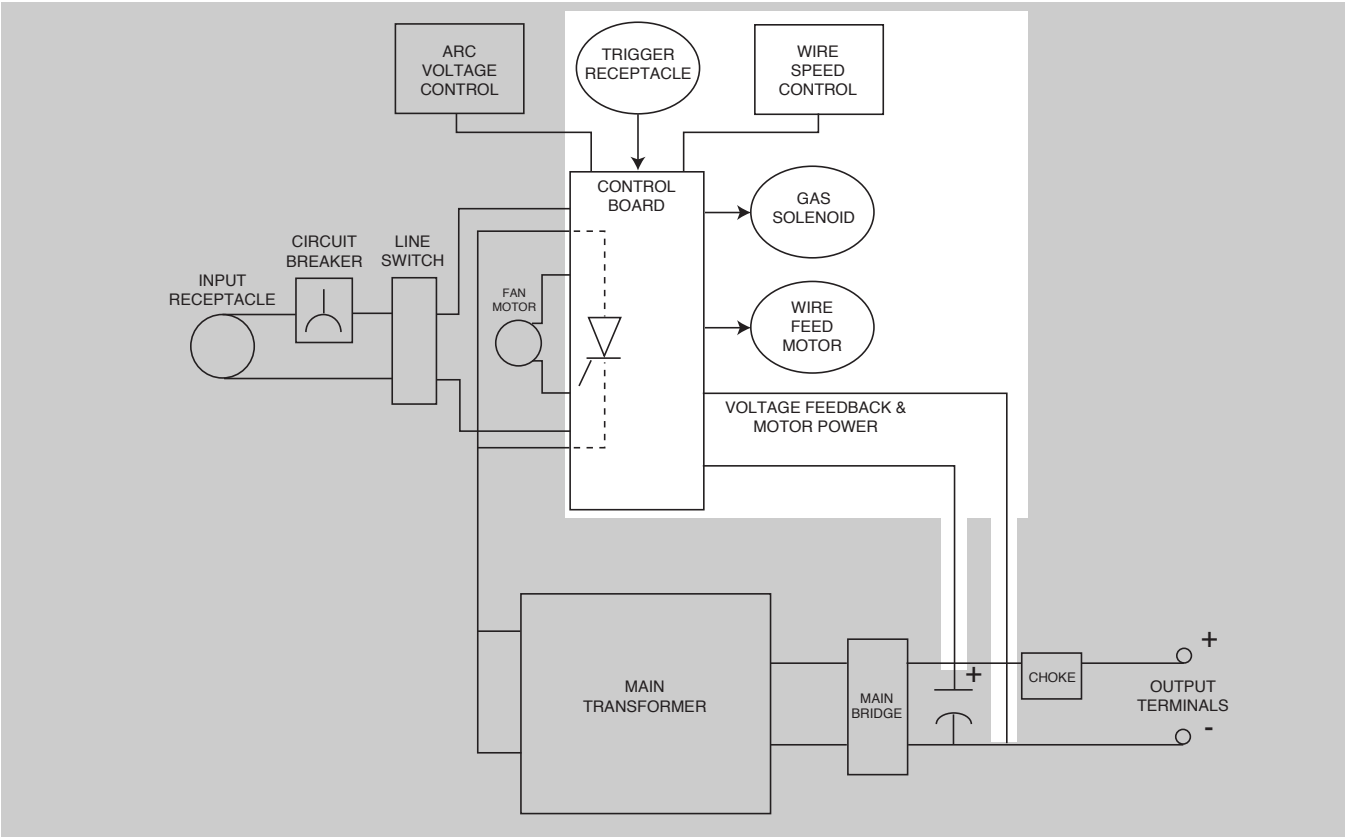
The AC voltage that is applied to the main transformer primary is controlled at the control board by two SCRs (Silicon Controlled Rectifiers). The SCRs are controlled by a pulse signal developed on the control board. The control board compares the commands of the arc voltage control with the voltage feedback signal. (The Arc Voltage Control may be either a continuous control or a selector switch, depending on the model of the machine).

The board circuitry then sends a pulse to turn on the SCRs. In this manner, the voltage applied to the primary of the transformer is varied and controlled. This controlled voltage is reflected at the transformer secondary winding and is applied to the rectifier diode bridge. This rectified DC voltage is filtered by the output capacitor and choke circuit and is applied to the machine's output terminals.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC

FIGURE E.5 — TRIGGER, GAS SOLENOID & WIRE DRIVE



TRIGGER, GAS SOLENOID AND WIRE DRIVE

Closure of the trigger circuit (pulling the gun trigger) signals the control board to start several functions. A DC is applied to the gas solenoid (if present) to allow shielding gas to flow if required. The SCRs are activated and voltage is applied to the main transformer.

The output voltage that is developed at the output terminals is also fed back to the control board to facilitate control of the output and also to power the Wire feed Motor circuitry.

The voltage that powers the wire drive motor is varied and controlled on the control board in response to the setting of the Wire Speed Control. The control board monitors the drive motor armature current and voltage and compares the feedback information with the commands sent from the wire speed control to maintain a constant wire speed.

The Control Board also has an automatic protection circuit, which shuts off the trigger circuit in the event of a wire drive motor overload.

NOTE: Unshaded areas of Block Logic Diagram are the subject of discussion

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

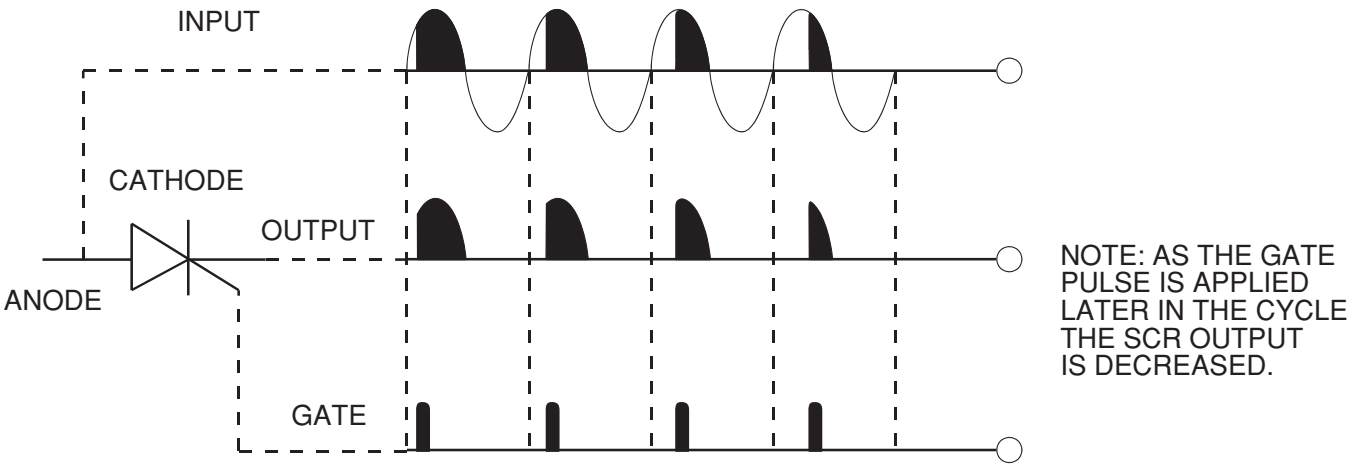
SCR OPERATION

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

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

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

FIGURE E.6 — SCR OPERATION



Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

THERMAL PROTECTION

The Compact Wire Welders have a rated output duty cycle as defined in the Technical Specification page. If the duty cycle is exceeded, a thermal protector will shut off the output until the machine cools to a reasonable operating temperature. This is an automatic function of and does not require user intervention. The fan continues to run during cooling. If the fan is not turning or the air intake louvers become obstructed, the input power must then be removed and the fan problem or air obstruction corrected.

OUTPUT OVERLOAD

The Compact Wire Welders are equipped with a circuit breaker which protects the machine from damage if maximum output is exceeded. The circuit breaker must be manually reset.

ELECTRONIC WIRE DRIVE MOTOR PROTECTION

The Compact Wire Welders built-in protection for wire drive motor overload.

NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

TABLE OF CONTENTS - TROUBLESHOOTING & REPAIR

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

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. Symptoms are grouped into the following categories: output problems, function problems, wire feeding problems, and welding problems.

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

Step 3. RECOMMENDED COURSE OF ACTION
The last column labeled "Recommended Course of Action" lists the most likely components that may have failed in your machine. It also specifies the appropriate test procedure to verify that the subject component is either good or bad. If there are a number of possible components, check the components in the order listed to eliminate one possibility at a time until you locate the cause of your problem.

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

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

PC BOARD TROUBLESHOOTING PROCEDURES

⚠ WARNING

ELECTRIC SHOCK can kill.

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

⚠ CAUTION

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

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

PC board can be damaged by static electricity.

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

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

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

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

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

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

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

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

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

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

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

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

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT PROBLEMS		
Major physical or electrical damage is evident.	1. Contact your local Lincoln Authorized Field Service Facility.	1. Contact the Lincoln Electric Service Dept. 1-888-935-3877.
Machine is dead - no open circuit voltage, wire feed, gas flow when trigger is pulled and fan does not operate.	1. Make sure correct voltage is applied to the machine. 2. Make certain that the power switch is in the “on” position. 3. Blown fuses in the input line. Check circuit breaker on the machine.	1. Check input power switch (S1) it may be faulty. See ***Wiring Diagram***. 2. Check lead connection and correct function of circuit breaker. See ***Wiring Diagram***. 3. The Control P.C. Board may be faulty
No weld output, wire feed, gas flow when the trigger is pulled. Fan does run.	1. The thermostat may be open due to machine overheating. If machine operates normal after a cooling off period then check for proper fan ventilation, remove any obstructions. Make certain that the machine’s duty cycle is not being exceeded. 2. Gun trigger may be faulty.	1. Check thermostat and associated leads for loose or broken connections. See wiring diagram. 2. Remove main power supply to the machine. With the gun trigger pulled check for continuity at pins 6 and 3 on plug J5 on the control board. 3. Perform the ***Transformer Test***. 4. Check all heavy current carrying leads. Check for loose or broken connections at the transformer, choke and rectifier. 5. Make sure identity plug is not missing on control board. See ***Wiring Diagram***. 6. Possible bad control board. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
OUTPUT/FEEDING PROBLEMS		
The machine has output, wire feed, gas flow but NO fan.	1. Possible faulty fan motor. 2. Possible faulty Control P.C. Board.	1. Perform the ***Fan Motor Test***. 2. Check for continuity between #6 to Fan or #1 to Fan on Control P.C. Board. Replace.
The machine has output, gas flow and fan but **does not** have wire drive.	1. Possible bad drive motor. 2. Possible bad Control P.C. Board.	1. Perform the ***Wire Drive Test***. 2. If 3 - 30 vdc is not at the drive motor check for OCV at the board on pins 1 and 10 on J3. If OCV is present possible faulty Control P.C Board. Replace. If OCV is not present check continuity of wires CAP- and CAP+.
No wire feed when gun trigger is pulled. Fan runs, gas flows and machine has correct open circuit voltage. (33 vdc maximum) - weld output.	1. If the wire drive motor is running, make sure that the correct drive roll and wire guide is installed in the machine. 2. Check for clogged cable liner or contact tip. 3. Check for proper size cable liner and contact tip.	1. Perform the ***Wire Drive Test***. 2. If wire drive test is OK, then check for OCV at CAP- and CAP+ on the control board. If correct voltage is present, possible faulty Control P.C. Board. Replace. 3. If open circuit voltage is **not** present at CAP- and CAP+ on control board check continuity of leads.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Return to Section TOC
Return to Master TOC

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
FEEDING PROBLEMS		
The machine stops feeding wire with trigger pulled. Re-trigger and machine starts feeding wire again.	1. Check for adequate wire supply. 2. Check for mechanical restrictions in the wire feeding path. The gun may be clogged. 3. Make sure the gun liner and tip are correct for the wire size being used. 4. Check spindle for ease of rotation.	1. Check the motor armature current. If high (over 2.5 amps) and there are no restrictions in the wire feeding path, then the motor or gear box may be faulty. Replace. 2. If motor armature current is below 2.5 amps. The Control P.C. board may be faulty. Replace.
1. Wire drive speed stays on one speed. No wire speed control.	1. Possible faulty drive motor. 2. Possible faulty Control board.	1. Remove main supply power to the machine. Disconnect plug J3 from the control board. Test the resistance from lead MOT- in the harness plug to the wire feed motor case. If resistance is below 500,000 ohms, replace the drive motor. 2. If no voltage charge is seen on MOT+ and MOT- when turning wire speed potentiometer, the Control P.C. Board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Return to Section TOC
Return to Master TOC

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
WELDING PROBLEMS		
The arc is unstable - poor starting.	1. Check for correct input voltage to the machine. 2. Check for proper electrode polarity for process. 3. Check gun tip for wear or damage-Replace. 4. Check for proper gas and flow rate for process. 5. Check work cable for loose or faulty connections. 6. Check gun for damage or breaks	1. Check for 17 to 33 VDC (dependent on Arc Voltage Control Setting) at the machine's output terminals. If present check gun and work cable. 2. If OCV is low, check output capacitor and output diodes. 3. Check for loose connections at the output terminals, the choke and all heavy current carrying leads. See ***Wiring Diagram.*** 4. The Control P.C. Board may be faulty. Replace.
GAS FLOW PROBLEMS		
Low or no gas flow when gun trigger is pulled. Wire feed, weld output and fan operate normally.	1. Check gas supply, flow regulator and gas hoses. 2. Check gun connection to machine for obstruction or leaky seals.	1. Check the gas solenoid by disconnecting it from the control board and applying a 12 vdc external supply to the gas solenoid. If solenoid does **not** activate it may be faulty. Replace. 2. The control P.C. board may be faulty. Replace.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
SPOOL GUN PROBLEMS		
No wire feed occurs when Spool Gun trigger is pulled.	1. Machine is switched off or unplugged. 2. Spool gun is out of wire 3. Contact tip burnback. 4. Fully or partially blocked gun tube liner. 5. Bird nest. 6. Machine's toggle selector switch is not set to spool gun mode. 7. Defective trigger. (contacts open) 8. Defective trigger circuit in gun. 9. Damaged spool gun motor. 10. No motor voltage or current from machine. 11. Contact tip size too small for wire diameter used.	1. Switch on or plug in machine. 2. Install full spool of specified wire. 3. Replace contact tip. 4. Replace and clean or replace gun tube liner. (See ***Maintenance Section***) 5. Cut out birds nest, reload wire, and check for proper wire alignment and wire's mechanical resistance. 6. Flip switch to proper operating position. 7. Replace trigger. (See ***Maintenance Section***). 8. Disconnect gun from machine and check trigger for continuity. 9. Contact LASF for possible motor replacement. 10. See Troubleshooting section in welding machine's instruction manual. 11. Replace contact tip with one that is the right size.
Sluggish wire feed when the Spool Gun trigger is pulled.	1. Drive roll is worn or galled with aluminum. 2. Machine's wire feed speed setting is too low. 3. Wire is obstructed somewhere along the wire feed path in the gun. 4. Low motor voltage.	1. Clean drive roll of all aluminum or replace drive roll. 2. Increase wire feed speed. 3. Check for obstructions: remove any wire shavings; remove kinked wire; remove and clean or replace gun tube liner (See ***Maintenance Section***). 4. See Troubleshooting section in welding machine's instruction manual.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Return to Section TOC
Return to Master TOC

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
SPOOL GUN PROBLEMS		
Intermittent wire feed when the Spool Gun trigger is pulled.	1. Wire is mechanically binding along its feed path inside gun. 2. Drive roll has become loose on hub and output shaft. 3. Drive roll has become galled with aluminum. 4. Wire has become kinked along its feed path. 5. Liner assembly is shaving wire.	1. Check that wire is properly aligned inside gun. 2. Check that drive roll is securely fastened in place by SHCS (socket head cap screw); replace hub and twist-lock if worn. 3. Remove and then clean or replace drive roll. (See ***Maintenance Section***). 4. Manually pull wire slowly thru gun until unkinked wire emerges. 5. Check that wire is properly aligned at liner inlet; realign gun tube with wire drive. (See Correcting Wire Shaving Issues ***Maintenance Section***)
Frequent occurrences of contact tip burnback when using the Spool Gun.	1. Improper welding parameters or technique. (Example: CTWD (Contact Tip to Work Distance) is incorrect. 2. Wire may be feeding intermittently.	1. See ***Operation Section*** for proper Welding information. 2. See symptoms on intermittent or sluggish wire feed.
Poor weld bead appearance (porosity or dull grey oxidized surface) When using the Spool Gun.	1. No gas flow. 2. Low gas flow. 3. Improper or contaminated shielding gas. 4. Welding in a windy environment. 5. Improper electrode polarity. 6. Improper welding parameters or technique.	1. See symptom “Low or no gas flow” 2. See symptom “Low or no gas flow” 3. Check that the gas supply’s labeling reads 100% argon. Temporarily use alternate, known gas supply and check for appearance improvement. 4. Erect a wind shield or move to a non-windy location before welding. 5. Reconnect machine’s welding output to electrode positive polarity. 6. See ***Operation Section*** for information.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENT(S)	RECOMMENDED COURSE OF ACTION
SPOOL GUN PROBLEMS		
Low or no shielding gas flow.	1. Out of gas. 2. Gas supply is turned off or disconnected. 3. Gas supply flow regulator is improperly set. 4. Machine's gas solenoid valve has malfunctioned. 5. Blockage in gun along gas path. 6. Gun cable kinked or flattened. 7. Blockage due to excessive spatter accumulation on gas cone or gas diffuser. 8. Excessive gas leakage from supply. 9. Gas leakage in gun between liner assembly and cable connector. 10. Gas leakage at gun-to-feeder connection.	1. Check that an adequate gas supply is available. 2. Check that all gas supply valves are open. 3. Check that all gas flow is set between 20 to 50 SCFH. 4. See machine's instruction manual. 5. Gently blow out debris from core tube. 6. Attempt to straighten out cable, or replace cable. (See ***Maintenance Section***). 7. Clean or replace gas cone or gas diffuser. 8. Find and repair all leaks. 9. Replace liner assembly. (See ***Maintenance Section***). 10. Damaged o-rings: replace both seals. Gun connector not fully inserted into machine. (See ***Installation Section***)
Spool Gun runs or begins feeding wire without pulling the gun trigger.	1. Defective trigger. (contacts closed). 2. Defective (closed) trigger circuit in the welding machine. 3. Trigger lead(s) inside gun cable are shorted together or commonly shorted to either welding or motor circuits.	1. Replace trigger. (See ***Maintenance Section***) 2. See machine's instruction manual. 3. Damaged control leads between machine's P6 connector and cable; repair if possible. Otherwise, replace gun cable. (See ***Maintenance Section***) for both.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact the Lincoln Electric Service Department for technical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Return to Section TOC
Return to Master TOC

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

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

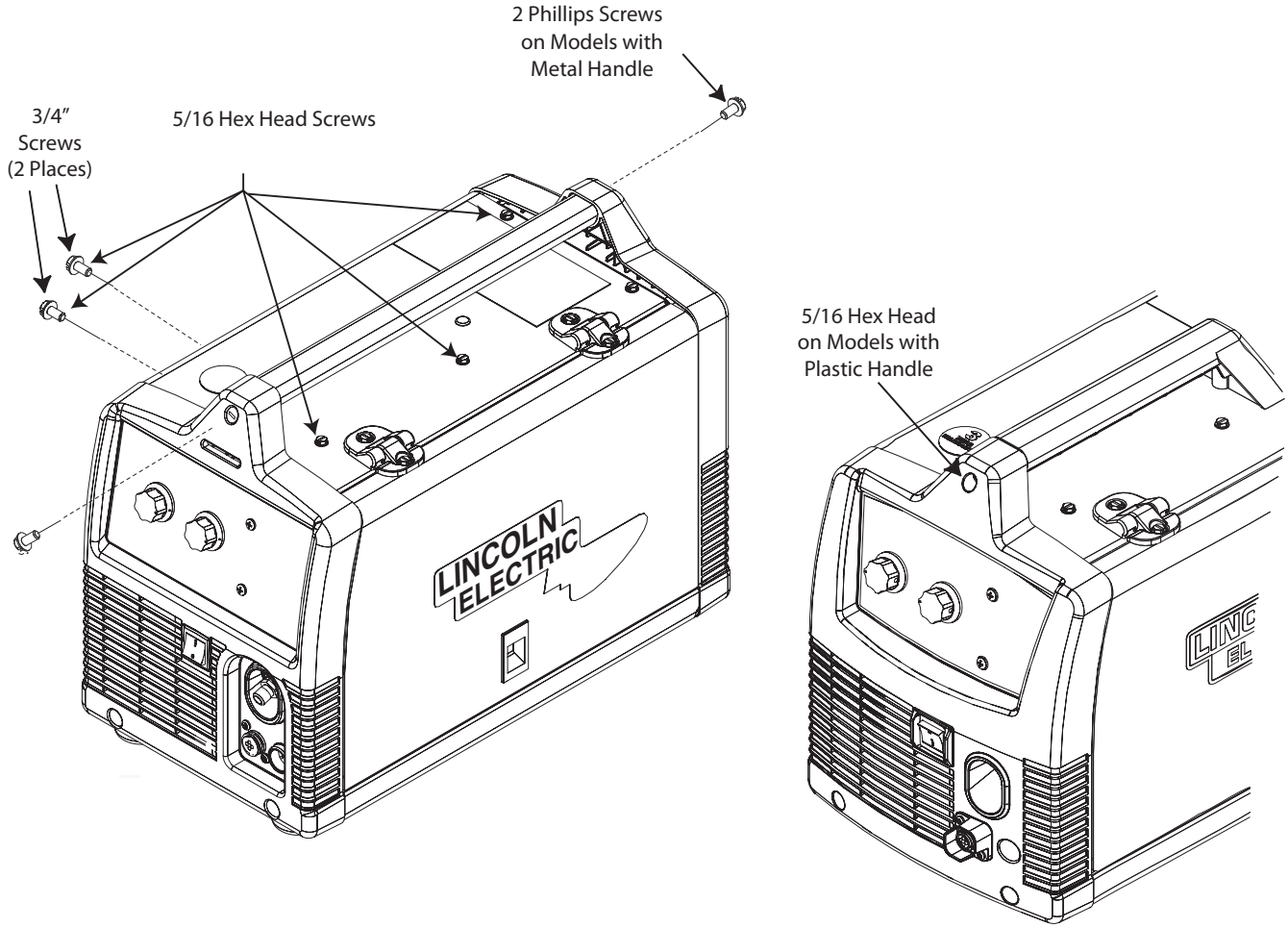
MATERIALS NEEDED

Misc. Hand Tools

Return to Section TOC
Return to Master TOC

CASE COVER REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.1 – CASE REMOVAL



PROCEDURE

1. Disconnect power to the machine.
2. Remove the two(2) 5/16 hex-head screws from the top of the door and remove the door
3. Remove the ten(10) hex-head screws from the top and left side of the machine. Note the position of the two(2) longer screws. See Figure F.1

NOTE: If the machine has a plastic handle, remove the 5/16 hex-head screw from the front and remove the handle.

4. Carefully lift and remove case cover from the machine.

NOTE: Depending on what needs to be done, it may be desirable to remove the handle on machines with the metal handle. See Figure F.1

Return to Section TOC
Return to Master TOC

GAS SOLENOID TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

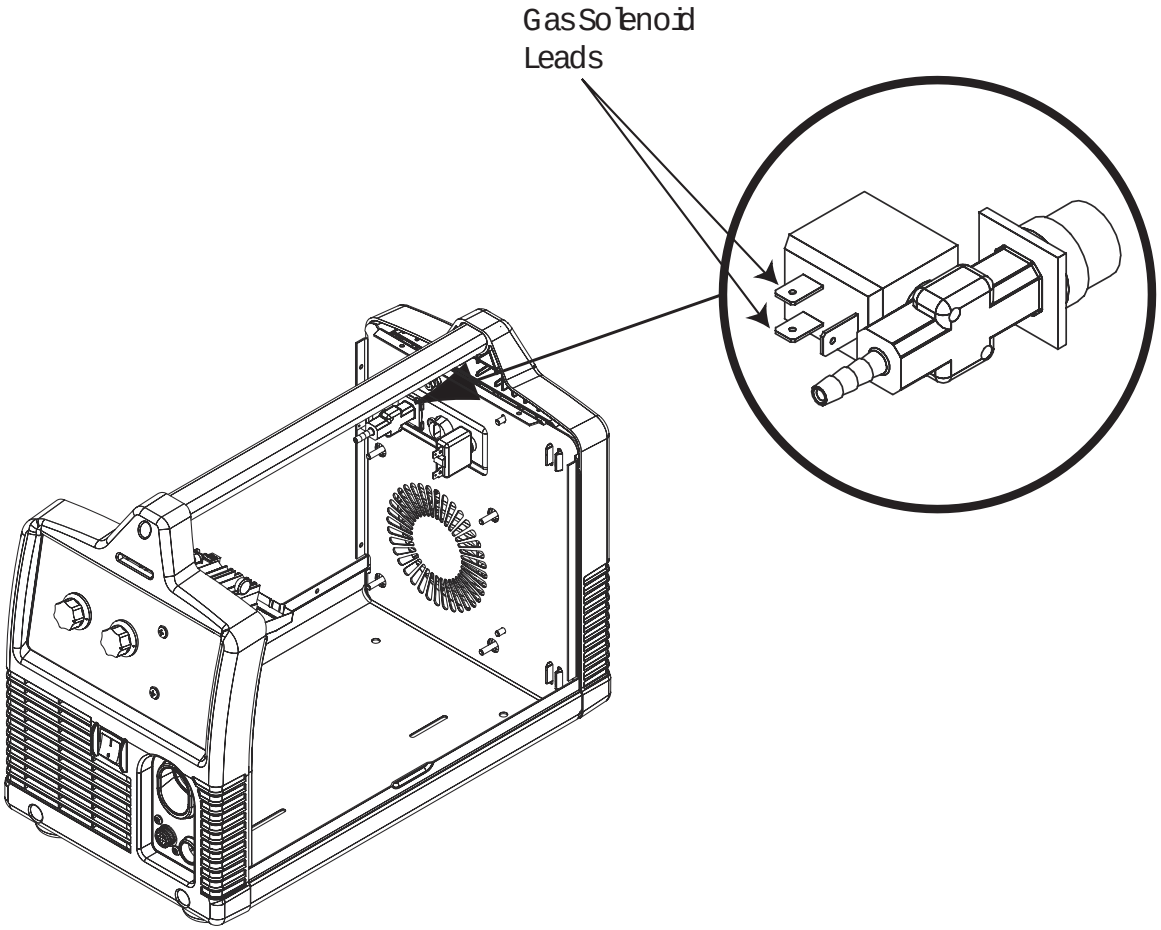
This test will determine if the gas solenoid is receiving the correct voltage and if the solenoid is functional.

MATERIALS NEEDED

Misc. Hand Tools
Volt-Ohmmeter

GAS SOLENOID TEST *(CONTINUED)*

FIGURE F.2 – GAS SOLENOID LOCATION & LEADS



PROCEDURE

1. Remove input power to the machine.
2. Perform the ***Case Cover Removal Procedure.***
3. Locate the gas solenoid and lead connections. Do not disconnect the leads. See Figure F.2.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

4. Turn the machine on and pull the gun trigger to conduct the voltage test.
5. There should be approximately 6.5 VDC at the solenoid.
6. If the 6.5 VDC is missing or is low, check the leads and connections between the solenoid and the control board. ***See Wiring Diagram***.
7. If the leads and connections are good to the board, verify the correct supply voltage 9 -33 VDC at pins 1 and 10 at P3 on the control board. ***See Wiring Diagram***.
8. If voltage is correct at P3, the control board may be faulty. Replace the control board.
9. If the 6.5 VDC is present at the solenoid leads and the solenoid does not activate, the solenoid may be faulty. Normal solenoid coil resistance is approximately 22 ohms.
10. The solenoid can be further checked by disconnecting the solenoid leads and applying 12VDC directly to the terminals. If the solenoid does not activate, the solenoid is faulty.
11. Replace all disconnected leads and replace the previously removed case cover.

WIRE DRIVE MOTOR TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the wire drive motor circuit is functioning properly.

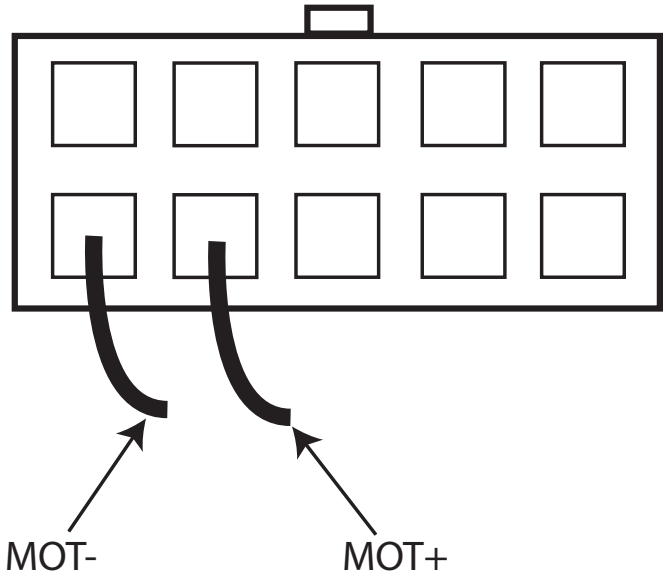
MATERIALS NEEDED

Misc. Hand Tools
Volt-Ohmmeter

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR TEST *(CONTINUED)*

FIGURE F.3 – PLUG P3



TEST PROCEDURE

NOTE: POLARITY MUST BE OBSERVED FOR THESE TESTS.

Test for correct wire drive motor armature voltage.

1. Disconnect main input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate plug P3 on the wiring harness. ***See Wiring Diagram***. Plug P3 is inserted into J3 on the Control Board.
4. Locate the MOT+ and MOT- armature leads on Plug P3. See ***Figure F.2***.
5. Make the following voltage tests:

⚠ WARNING

ELECTRIC SHOCK can kill.

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

a) Turn the machine off between each test.

b) Carefully insert the meter probes into the lead side of plug P3. See Figure F.3

c) Turn the machine ON and pull the gun trigger to conduct the voltage test.

FROM LEAD	TO LEAD	
MOT+	MOT-	1.5-12.5 VDC

6. If the voltage to the wire drive motor armature is zero, check the wires between plug P3 and the wire drive motor.
7. If the leads and connections are good to the board, verify the correct supply voltage 9-33 VDC at pins 1 and 10 at P3 on the control board. See ***Wiring Diagram***.
8. If voltage is correct at P3, the control board may be faulty. Replace the control board.

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the correct voltages are being applied.

a. Applied to the primary windings of the main transformers.

b. Induced on the secondary windings of the main transformer.

MATERIALS NEEDED

Misc. Hand Tools
Volt-ohmmeter

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST (CONTINUED)

1. Remove the input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate H1 and H2 on the control board terminal strips. ***See Wiring Diagram.***
4. Place the voltage control to maximum.
5. Turn machine on and close trigger switch.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

Turn the machine OFF between each test.

---

6. On **120 Volt machines** you should see 120 VAC or input voltage at H1 and H2 on the terminal strips.
7. On **230 Volt machines** you should see 230 VAC or input voltage at H1 and H2 on the terminal strips.
8. If the correct input voltage is not at H1 and H2, check for correct input voltage at 1 and 6 and not at H1 and H2, possible bad Control Board.
9. If the correct voltage is being applied at 1 adn 6 and not at H1 and H2, possible bad Control Board.

Secondary Test Procedure

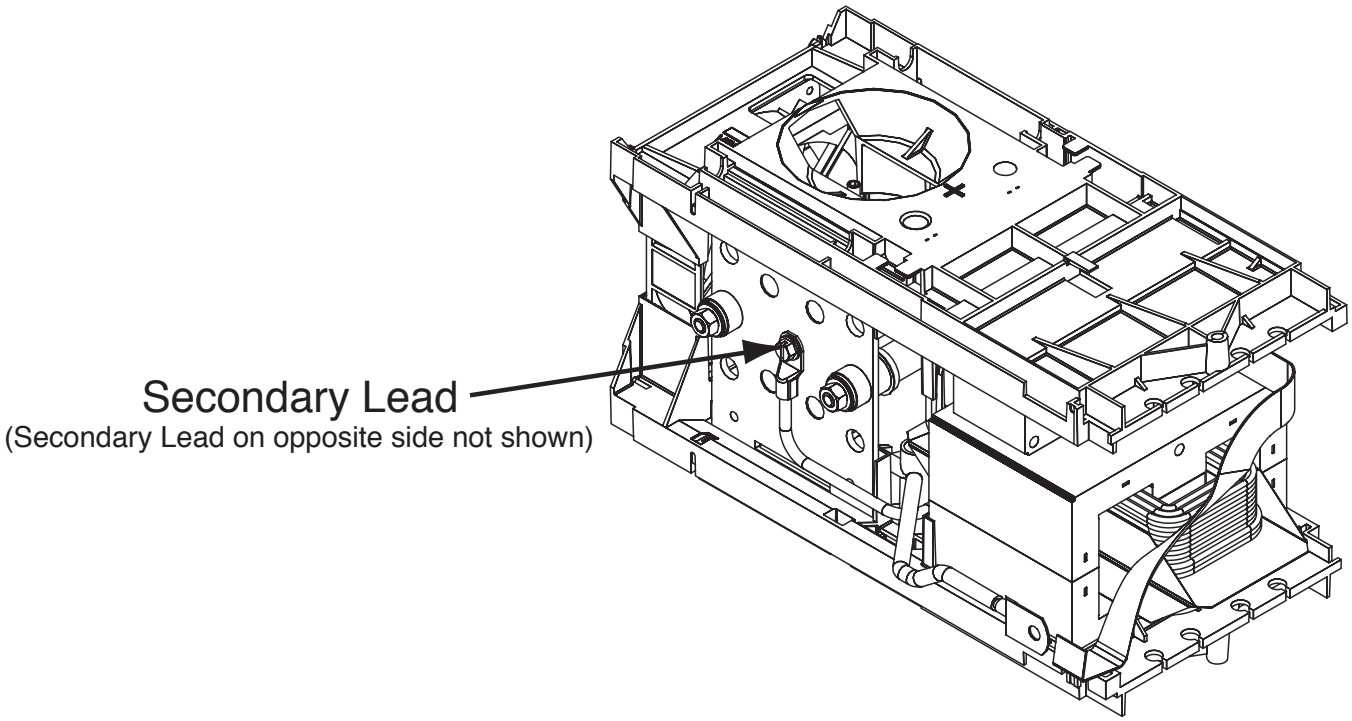
Note: Secondary voltages will vary proportionately with primary input voltage. For this test, place voltage control potentiometer to maximum.

1. Locate X1 and X2. ***See Wiring Diagram***. ***See Figure F.4.***
2. Isolate the two secondary leads located in the Rectifier. Turn the machine on and close the gun trigger.
3. On 120 Volt Machines we should see 21 VAC at X1 and X2.
4. On 230 Volt machines we should see 25 VAC at X and X2.
5. If any of the voltages are incorrect or missing, check for loose or broken connections. Possible bad transformer.

Return to Section TOC
Return to Master TOC

MAIN TRANSFORMER TEST *(CONTINUED)*

FIGURE F.4. – X1 & X2 LOCATION



Return to Section TOC
Return to Master TOC

NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
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Return to Section TOC
Return to Master TOC

FAN MOTOR TEST

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This test will determine if the fan motor is receiving the correct voltage

MATERIALS NEEDED

Misc. Hand Tools
Volt-Ohmmeter

Return to Section TOC
Return to Master TOC

FAN MOTOR TEST (CONTINUED)

1. Remove the input power to the machine.
2. Perform the ***Case Cover Removal Procedure***.
3. Locate the fan terminals on the Control board on terminal strip 1 and terminal strip 2. ***See Wiring Diagram***. See Figure F.5.
4. Turn machine on to conduct voltage test.

⚠ WARNING

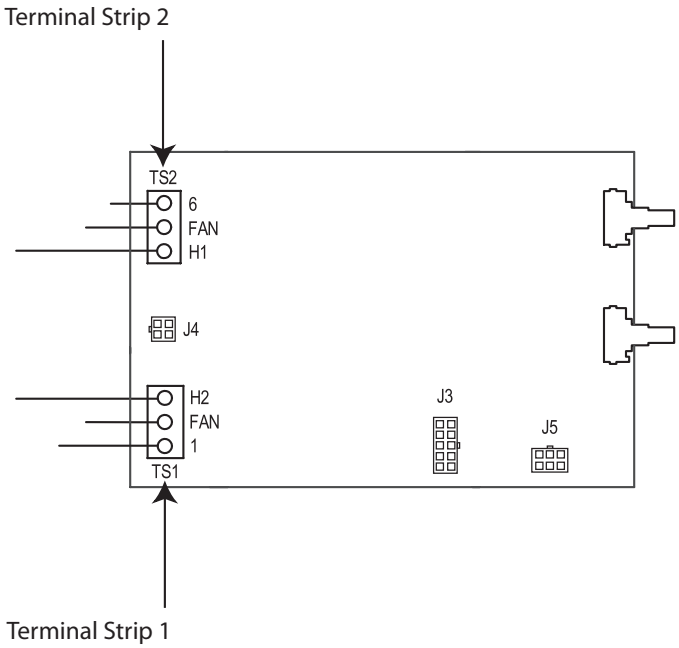
ELECTRIC SHOCK can kill.

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

Turn the machine OFF between each test.

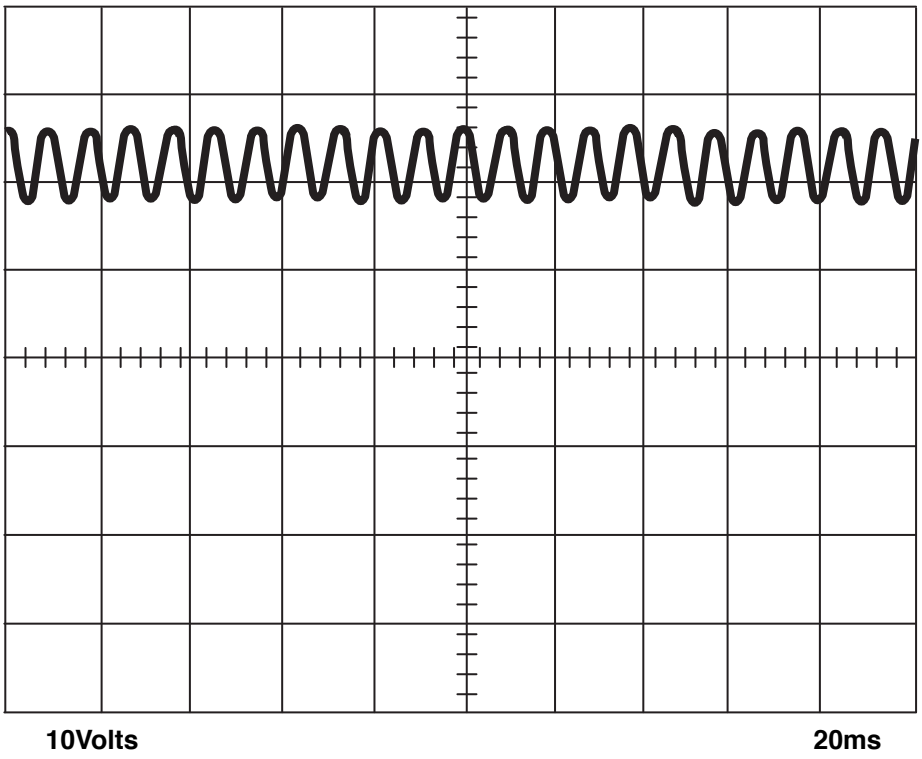
5. On **120 Volt Machines**, at the FAN terminals on terminal strip 1 and 2, there should be **120 VAC**. ***See Wiring Diagram***.
6. On **230 volt machines**, at the FAN terminals on terminal strip 1 and 2, there should be **230 VAC**. ***See Wiring Diagram***.
7. If the correct voltages are not there, check for correct input voltages at terminal strip 1 and 2 on terminals 1 and 6. ***See Wiring Diagram***. See Figure F.5.
8. If correct voltages are at terminals 1 and 6 and not at FAN terminals, possible faulty Control Board.
9. If the correct voltages are at the FAN terminals, then check for correct voltages at the fan motor. ***See Wiring Diagram***.
10. If the correct voltages are at the fan motor, possible bad motor.
11. the correct voltages are at the fan motor, check for bad or broken leads or terminals.

FIGURE F.5. – CONTROL BOARD LEAD LOCATION(S)



Return to Section TOC
Return to Master TOC

TYPICAL OUTPUT VOLTAGE WAVEFORM - MACHINE LOADED



This is the typical auxiliary output voltage generated from a properly operating machine. Note that each vertical division represents 50 volts and that each horizontal division represents 5 milliseconds in time.

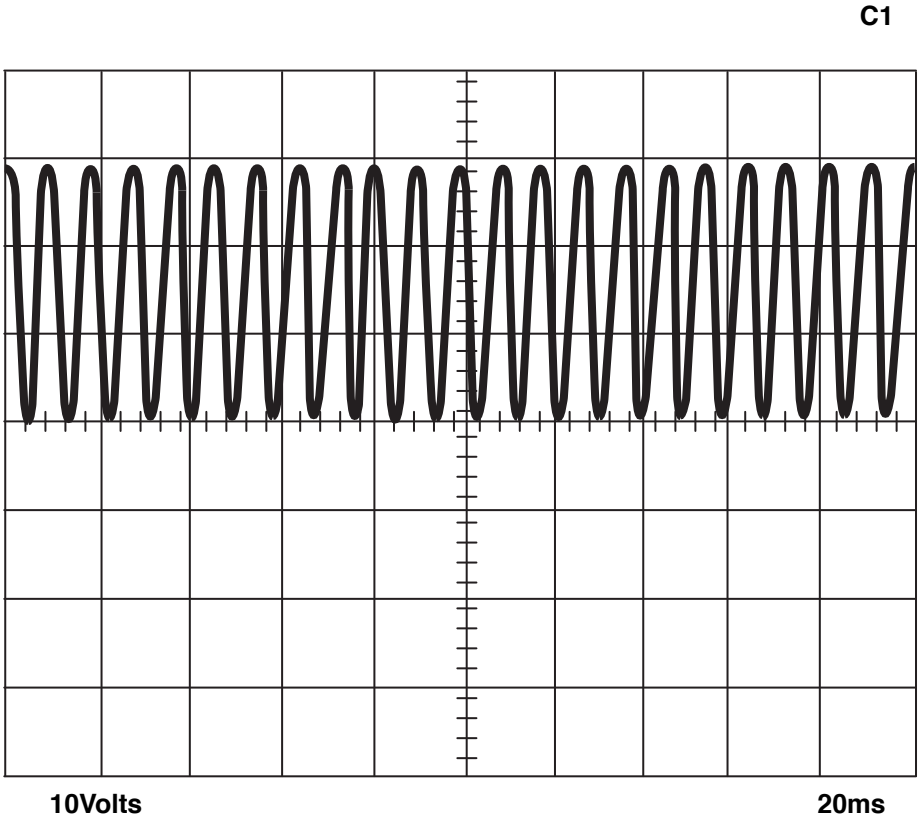
Note: Scope probes connected at machine output terminals. Positive probe to (=) terminal, negative probe to (-) terminal.

SCOPE SETTINGS

Volts/Div	10V/Div.
Horizontal Sweep	20 ms/Div.
Coupling	DC
Trigger	Internal

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

ABNORMAL OPEN CIRCUIT VOLTAGE WAVEFORM



This is NOT the typical voltage waveform. The output capacitor was disconnected from the circuit. Note the increased ripple in the waveform. This condition simulates the faulty output filter capacitor. Each vertical division represents 10 volts and that each horizontal division represents 20 milliseconds in time.

Note: Scope probes connect at the machine output terminals. Positive probe to (+) terminal, negative probe to (-) terminal.

SCOPE SETTINGS

Volts/Div	10V/Div.
Horizontal Sweep	20 ms/Div.
Coupling	DC
Trigger	Internal

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

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

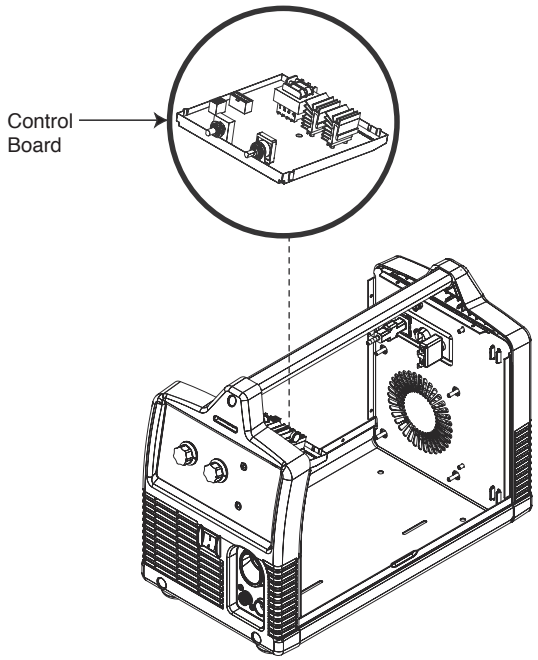
MATERIALS NEEDED

5/64" Allen Key
1/2” Nutdriver
Phillips Screwdriver
Flathead Screwdriver

Return to Section TOC
Return to Master TOC

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.6 – CONTROL BOARD LOCATION



1. Remove the input power to the machine.

⚠ WARNING

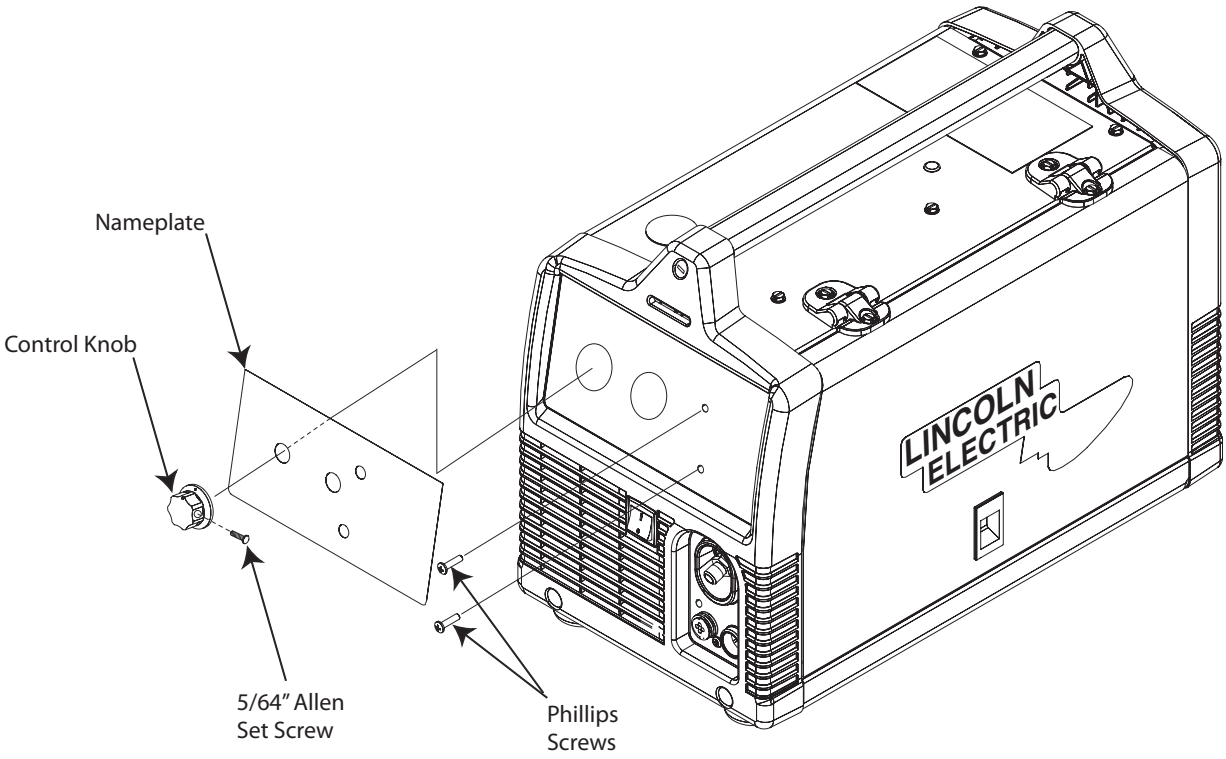
ELECTRIC SHOCK can kill.

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

2. Perform the ***Case Cover Removal Procedure***.
3. Locate the Control Board. See Figure F.6.
4. Remove the two set screws from the voltage and wire speed knobs using a 5/64” allen key. Remove the two nuts and washers using a1/2” Nutdriver. ***See Figure F.7.***
5. Remove the two phillips head screws from the nameplate of the machine. ***See Figure F.7.***
6. Gently pull the case front forward about an inch to gain access to the Control Board.
7. Label and disconnect all plugs and leads connected to the Control Board.
8. Remove and Replace the Control Board.
9. Connect all previously removed leads and plugs to the new Control Board.
10. Install all previously removed mounting hardware.
11. Install case wraparound cover.

CONTROL BOARD REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.7 – SCREW/NUT LOCATION(S)



NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
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Return to Master TOC
Return to Section TOC
Return to Master TOC

POWER MODULE REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

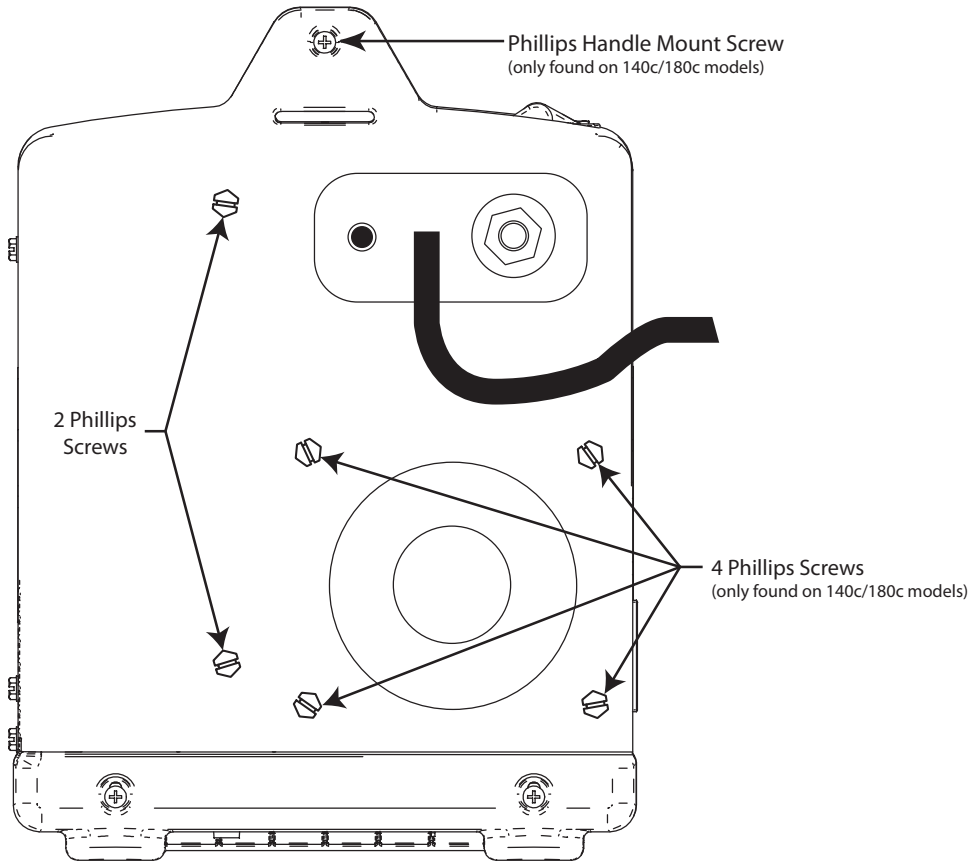
This procedure will aid the technician in the removal and replacement of the Power Module.

MATERIALS NEEDED

Misc. Hand Tools

POWER MODULE REMOVAL AND REPLACEMENT PROCEDURE (CONTINUED)

FIGURE F.8 – CASEBACK MOUNTING SCREWS



VIEWED FROM REAR OF MACHINE

1. Disconnect main input power to the machine.

2. Perform the ***Case Cover Removal Procedure***.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

3. Perform the ***Control Board Removal Procedure.***

4. Remove the two flathead mounting screws on the caseback and depress the two locking tabs to remove. See Figure F.8.

Note: On machines 140C & 180C, a total of four flat-head screws must be removed from the case-back prior to depressing locking tabs.

5. Label and remove the appropriate wiring and gas hose from the top of the Power Module Chasis.

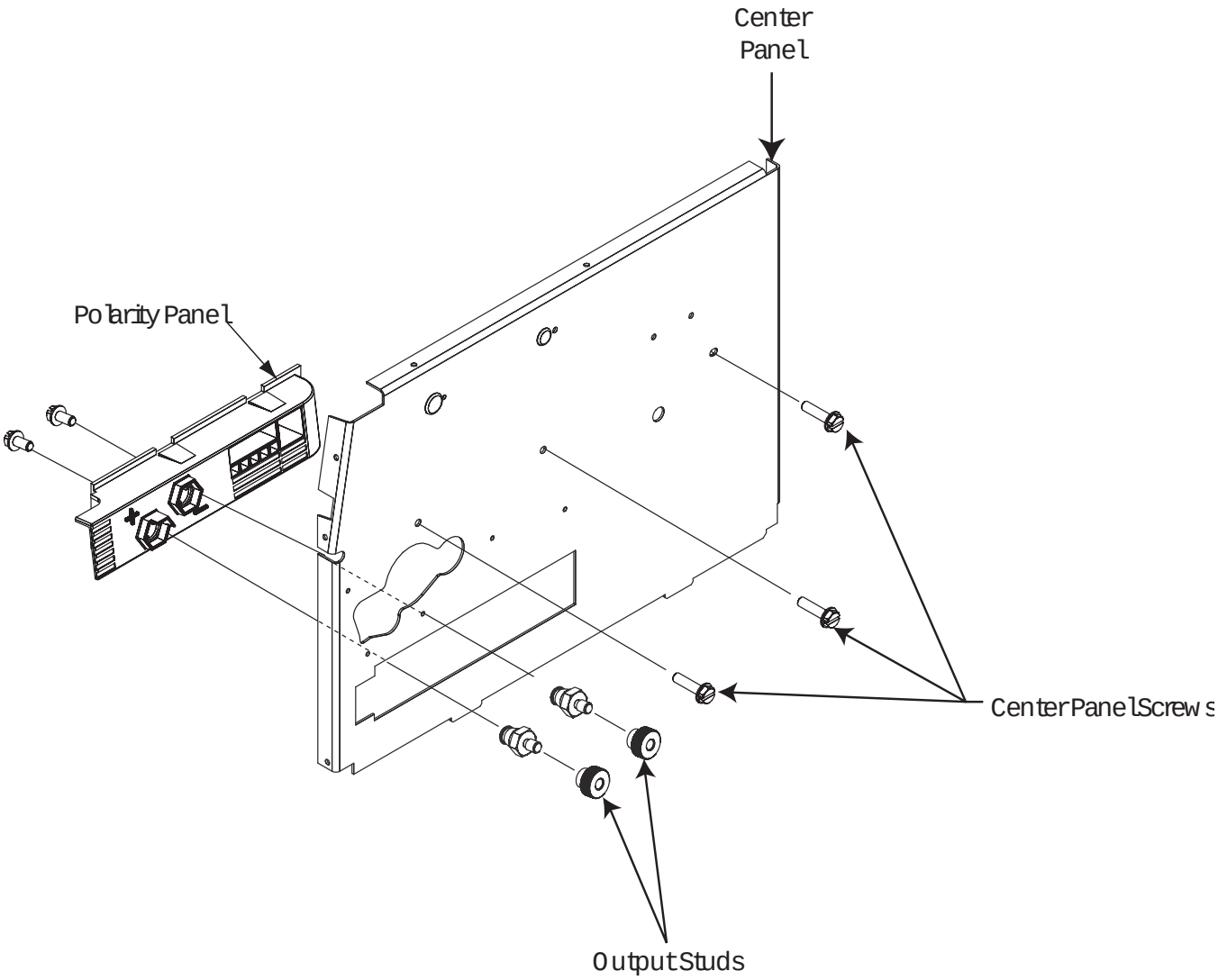
6. Remove the two flathead screws from the center panel on right side of the machine. ***See Figure F.9***

7. Note position and remove bolts on the Choke & Rectifier.

8. The Power Module may now be removed from the machine as a single unit.

POWER MODULE REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.9 – CENTER PANEL SCREW REMOVAL



Return to Section TOC
Return to Master TOC

NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
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Return to Master TOC
Return to Section TOC
Return to Master TOC

RECTIFIER, TRANSFORMER, CHOKE ASSEMBLY & CAPACITOR REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

⚠ WARNING

The liquid electrode in the capacitors is toxic. Do not touch the capacitors with any part of your body.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the components in the Power Module Assembly.

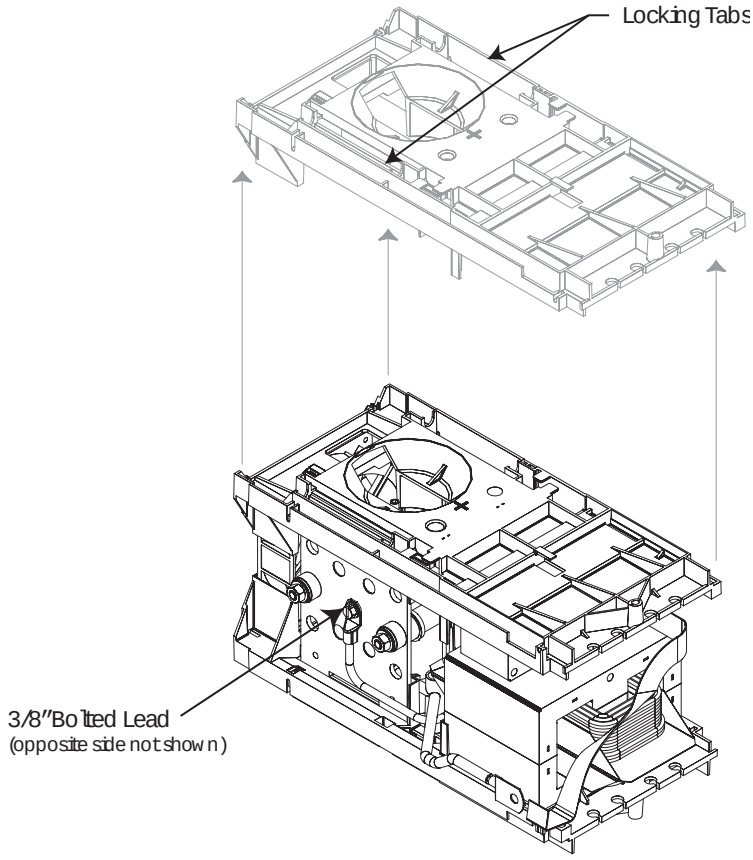
MATERIALS NEEDED

Misc. Hand Tools
Dow Corning 340
Fine Steel Wool

Return to Section TOC
Return to Master TOC

RECTIFIER, TRANSFORMER, CHOKE ASSEMBLY & CAPACITOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.10 – LOCKING TABS



1. Remove the input power to the machine.

2. Perform the ***Case Cover Removal Procedure***.

3. Perform the ***Power Module Removal Procedure***.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

4. With the Power Module removed from the machine, depress locking tabs and remove the top chassis of the module. See Figure F.10.

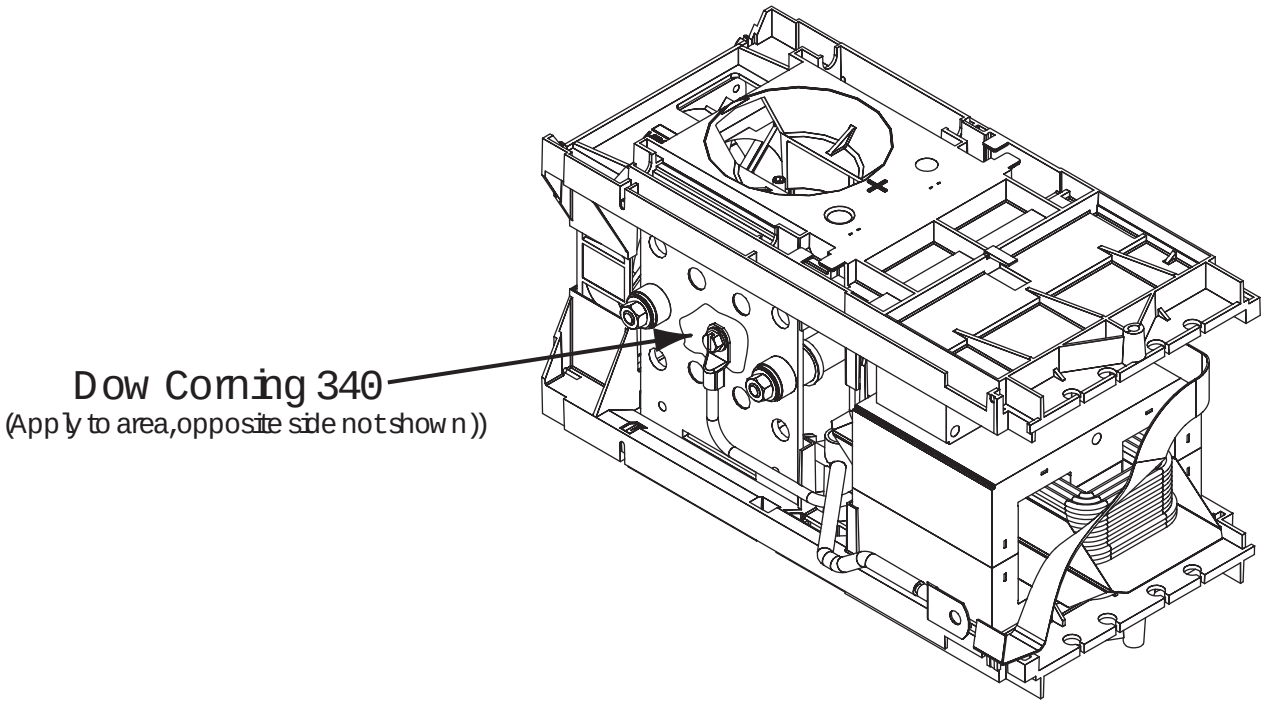
5. Using a 3/8" nutdriver, remove the two bolted leads from the sides of the Rectifier. See Figure F.10.

6. Label and disconnect any associated leads.

7. Remove Rectifier and Capacitor from the machine. ***See Figure F.12.***

RECTIFIER, TRANSFORMER, CHOKE ASSEMBLY & CAPACITOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.11 – DOW CORNING 340



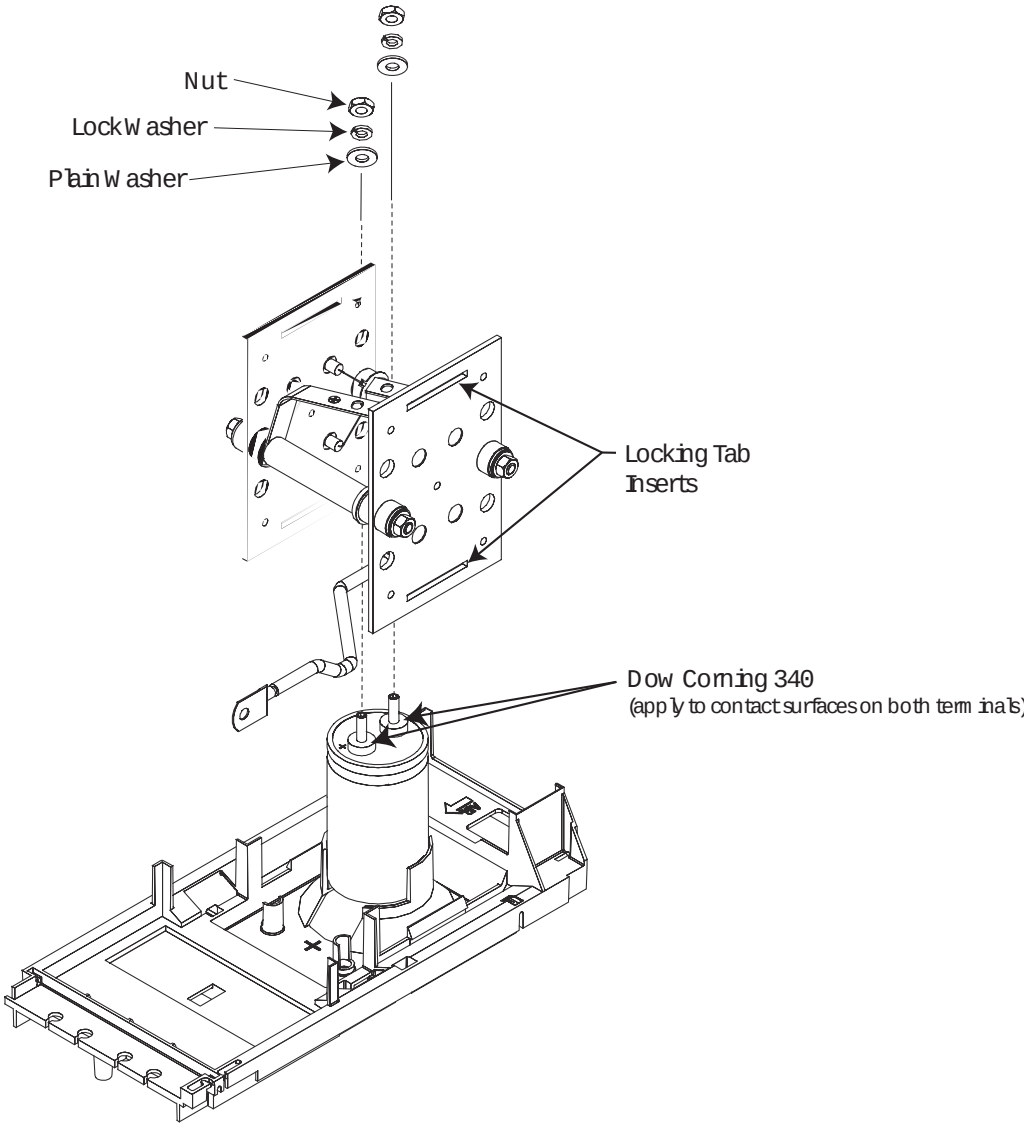
8. When re-installing the capacitor, make sure that the polarity is **NOT** reversed. ***See Figure F.12.***

9. Clean the terminal surface of the capacitor with fine steel wool and apply a thin coating of Dow Corning 340. ***See Figure F.12.***

10. On the rectifier, clean the terminal surface with fine steel wool and apply a thin coating of Dow Corning 340 on the Rectifier and re-install. See Figure F.11.

RECTIFIER, TRANSFORMER, CHOKE ASSEMBLY & CAPACITOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.12 – DOW CORNING APPLICATION AREAS



TRANSFORMER AND CHOKE

11. With the Power Module removed from the machine, remove the top chassis on the Module.

12. Remove the two bolted leads from the sides of the rectifier using a 3/8" nutdriver.

Note: This step may already be complete.

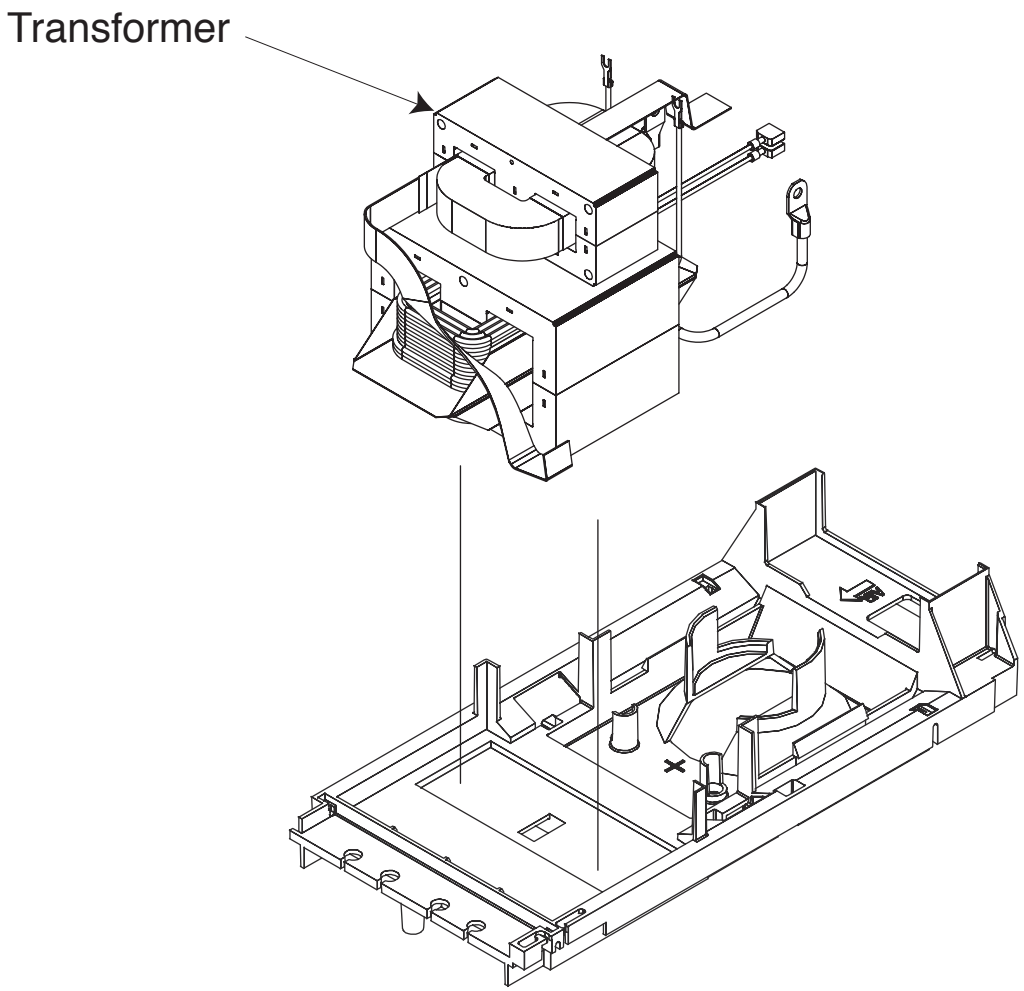
13. Label and disconnect any additional necessary leads.

14. Remove the Transformer. ***See Figure F.13.***

15. When re-installing the Transformer, clean the terminal surface and apply Dow Corning 340 to the rectifier assembly leads. ***See Figure F.11.***

RECTIFIER, TRANSFORMER, CHOKE ASSEMBLY & CAPACITOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.13 – DOOR REMOVAL



NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
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Return to Master TOC

WIRE DRIVE MOTOR REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

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

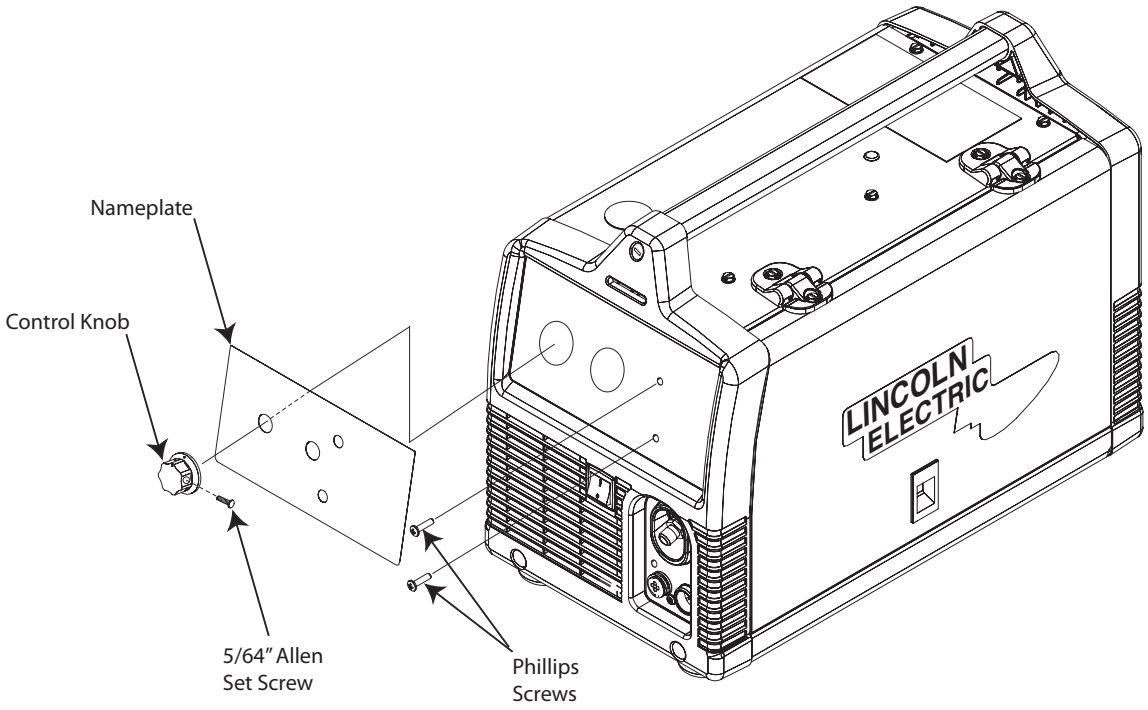
MATERIALS NEEDED

Misc. Hand Tools

Return to Section TOC
Return to Master TOC

WIRE DRIVE MOTOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.14 – CASEFRONT KNOB REMOVAL



1. Remove the input power to the machine.

2. Perform the ***Case Cover Removal Procedure***.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

3. Remove the two phillips screws from the gun trigger receptacle.

4. Remove the two set screws from the voltage and wire speed knobs using a 5/64" allen key. Remove the two nuts and washers using a 1/2" Nutdriver. See Figure F.14.

5. Remove the two phillips head screws from the nameplate of the machine. See Figure F.14.

6. Gently pull the case front forward about an inch to gain access.

7. Disconnect the air line from the wire drive motor. Pliers may be necessary.

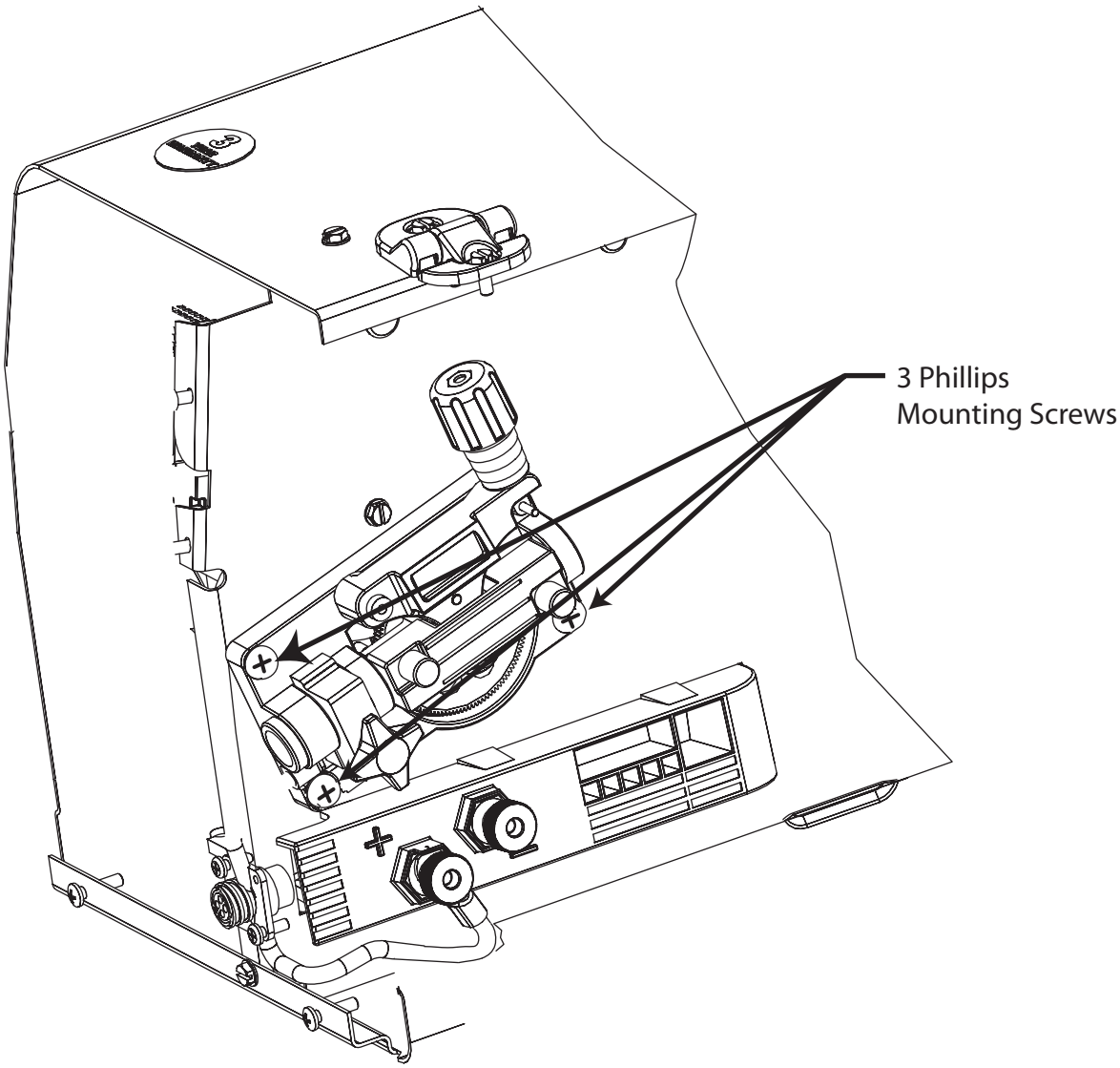
8. Label and disconnect any necessary leads. The number of leads may vary depending upon the machine's model number.

9. Remove the three phillips mounting screws from the right side of the machine. ***See Figure F.15.***

10. Remove the Wire Drive Motor and replace.

WIRE DRIVE MOTOR REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.15 – WIRE DRIVE MOTOR



Return to Section TOC
Return to Master TOC

NOTES

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
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Return to Section TOC
Return to Master TOC

FAN MOTOR ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE

⚠ WARNING

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

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

TEST DESCRIPTION

This procedure will aid the technician in the removal and replacement of the Fan Motor Assembly.

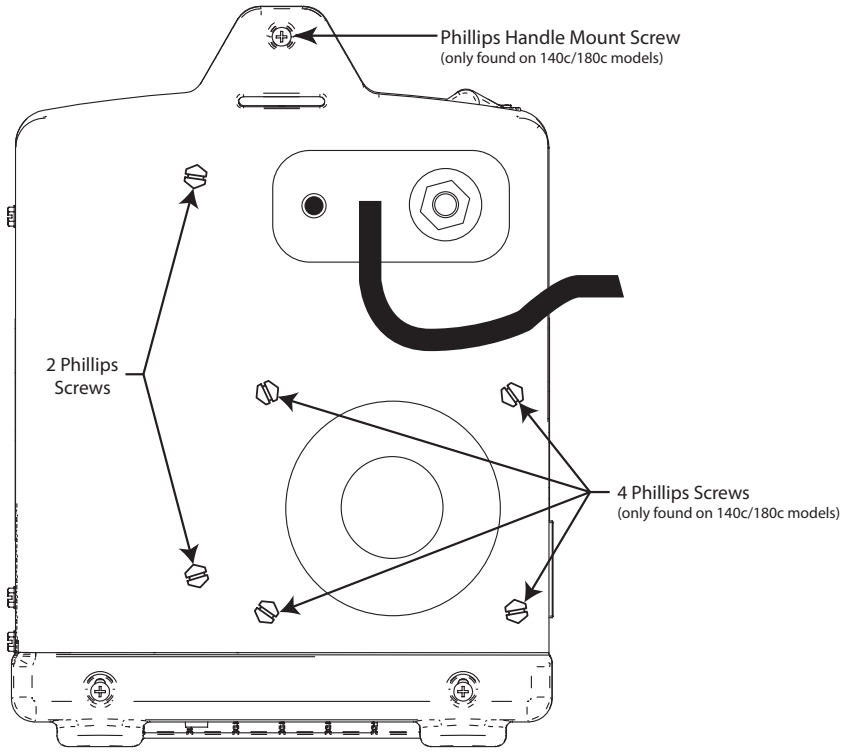
MATERIALS NEEDED

5/16” Nut Driver
5/64” Allen Key
1/2” Nut Driver
Phillips Screwdriver
Flathead Screwdriver
Pliers

Return to Section TOC
Return to Master TOC

FAN MOTOR ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.16 – CENTER PANEL/FAN MOUNTING SCREW LOCATION



VIEWED FROM REAR OF MACHINE

1. Remove the input power to the machine.

2. Perform the ***Case Cover Removal Procedure***.

⚠ WARNING

ELECTRIC SHOCK can kill.

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

3. Perform the ***Control Board Removal Procedure.***

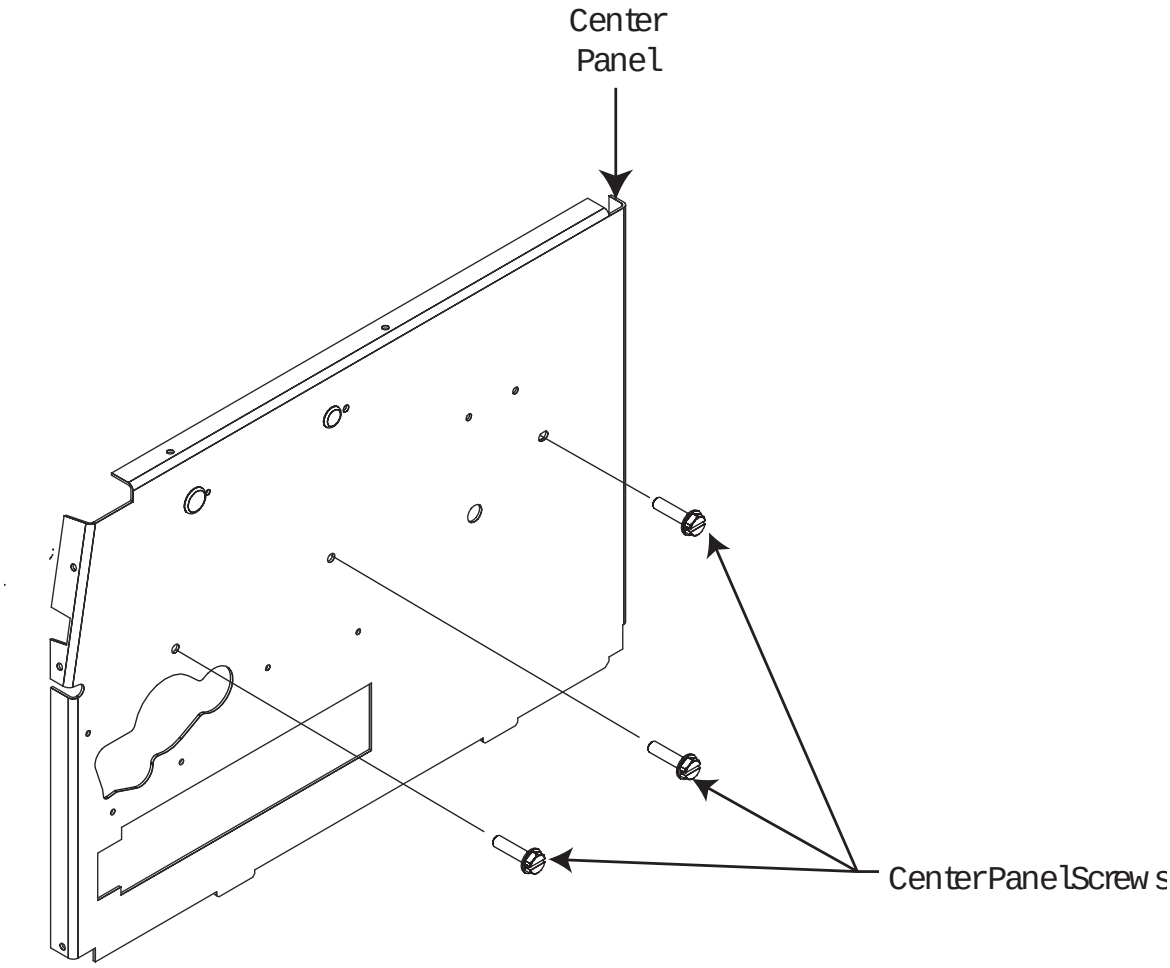
4. Using a flathead screwdriver, remove the center panel mounting screws and the fan mounting screws (depending upon model) located on the back of the machine. See Figure F.16.

5. Depress any necessary locking tabs on rear of machine.

Return to Section TOC
Return to Master TOC

FAN MOTOR ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.17 – CENTER PANEL MOUNTING SCREWS

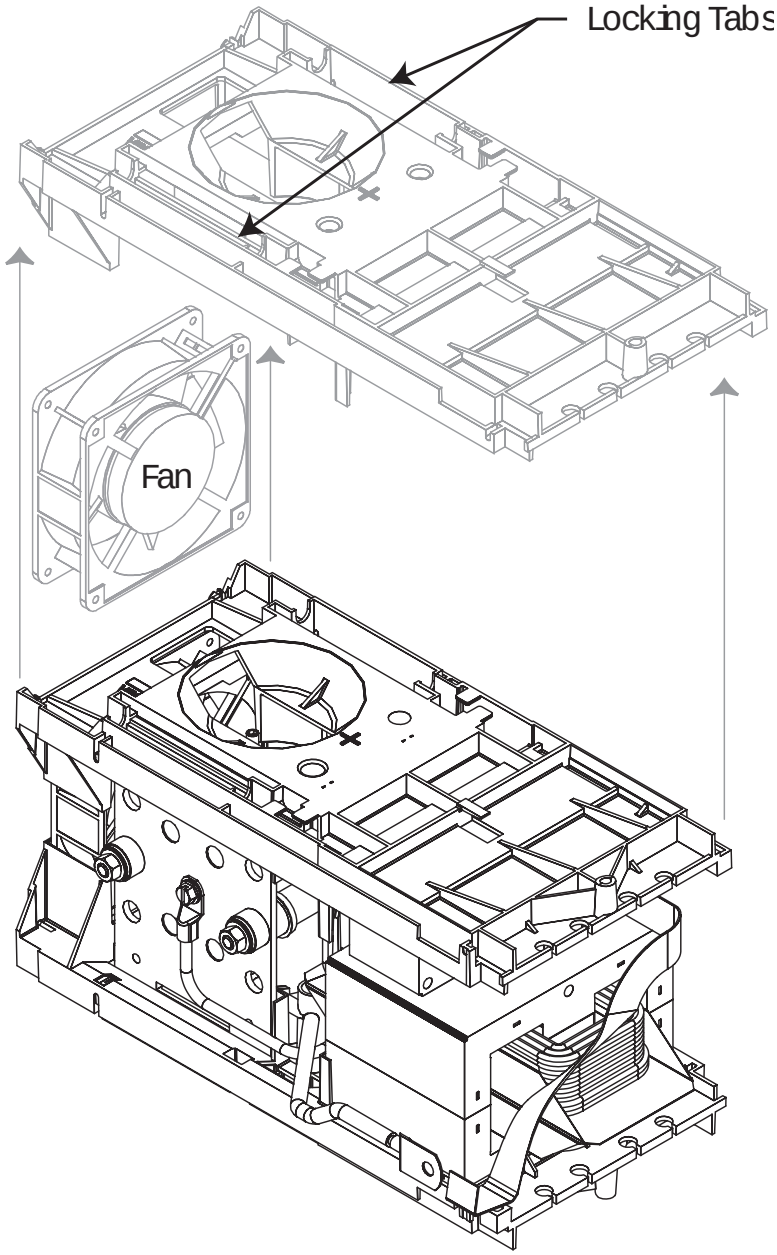


6. Remove the appropriate wiring and gas hose from the top of the Power Module Chassis. Pliers may be necessary.

7. Remove the flathead mounting screws from the center panel. See Figure F.17.

FAN MOTOR ASSEMBLY REMOVAL AND REPLACEMENT PROCEDURE *(CONTINUED)*

FIGURE F.18 – LOCKING TABS & FAN



8. Depress the locking tabs and remove the top Power Module Chassis. See Figure F.18.

9. Label and disconnect any necessary leads attached to the Fan.

10. Remove the fan from the machine.

11. Upon installation of the new fan motor, make sure that the rotation arrow is pointing up and the flow arrow is pointing toward the front of the machine.

Note: Fan should spin counter clockwise when viewed from the **rear** of the machine.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

RETEST AFTER REPAIR (125 AMP UNITS)

INPUT IDLE AMPS & WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
120/60	3.00	200

OPEN CIRCUIT VOLTAGE

9-33 VDC

WIRE SPEED RANGE

50-500 in./min. (1.3-12.7 m/min)

RETEST AFTER REPAIR (140 AMP UNITS)

INPUT IDLE AMPS & WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
120/60	4.50	325

OPEN CIRCUIT VOLTAGE

9-33 VDC

WIRE SPEED RANGE

50-500 in./min. (1.3-12.7 m/min)

Return to Section TOC
Return to Master TOC

RETEST AFTER REPAIR (180 AMP UNITS)

INPUT IDLE AMPS & WATTS

Input Volts/Hertz	Maximum Idle Amps	Maximum Idle Watts
230/60	2.50	275

OPEN CIRCUIT VOLTAGE

9-33 VDC

WIRE SPEED RANGE

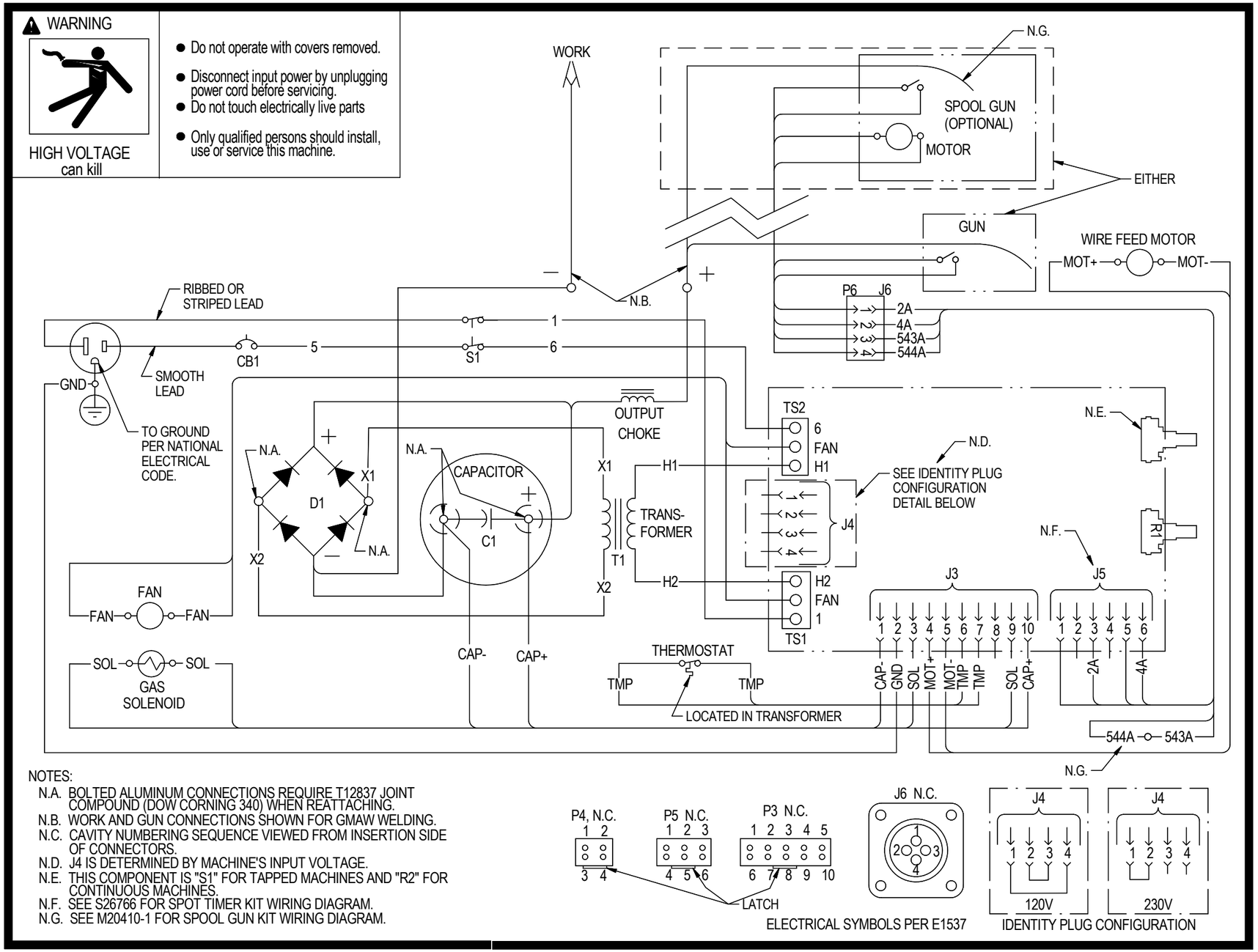
50-500 in./min. (1.3-12.7 m/min)

TABLE OF CONTENTS - DIAGRAM SECTION

*** NOTE:** Many PC Board Assemblies are now totally encapsulated, surface mounted and or multi-layered and are therefore considered to be unserviceable. Assembly drawings of these boards are no longer provided.

Return to Master TOC
Return to Master TOC
Return to Master TOC
Return to Master TOC

WIRING DIAGRAM



NOTES:

N.A. BOLTED ALUMINUM CONNECTIONS REQUIRE T12837 JOINT COMPOUND (DOW CORNING 340) WHEN REATTACHING.
N.B. WORK AND GUN CONNECTIONS SHOWN FOR GMAW WELDING.
N.C. CAVITY NUMBERING SEQUENCE VIEWED FROM INSERTION SIDE OF CONNECTORS.
N.D. J4 IS DETERMINED BY MACHINE'S INPUT VOLTAGE.
N.E. THIS COMPONENT IS "S1" FOR TAPPED MACHINES AND "R2" FOR CONTINUOUS MACHINES.
N.F. SEE S26766 FOR SPOT TIMER KIT WIRING DIAGRAM.
N.G. SEE M20410-1 FOR SPOOL GUN KIT WIRING DIAGRAM.

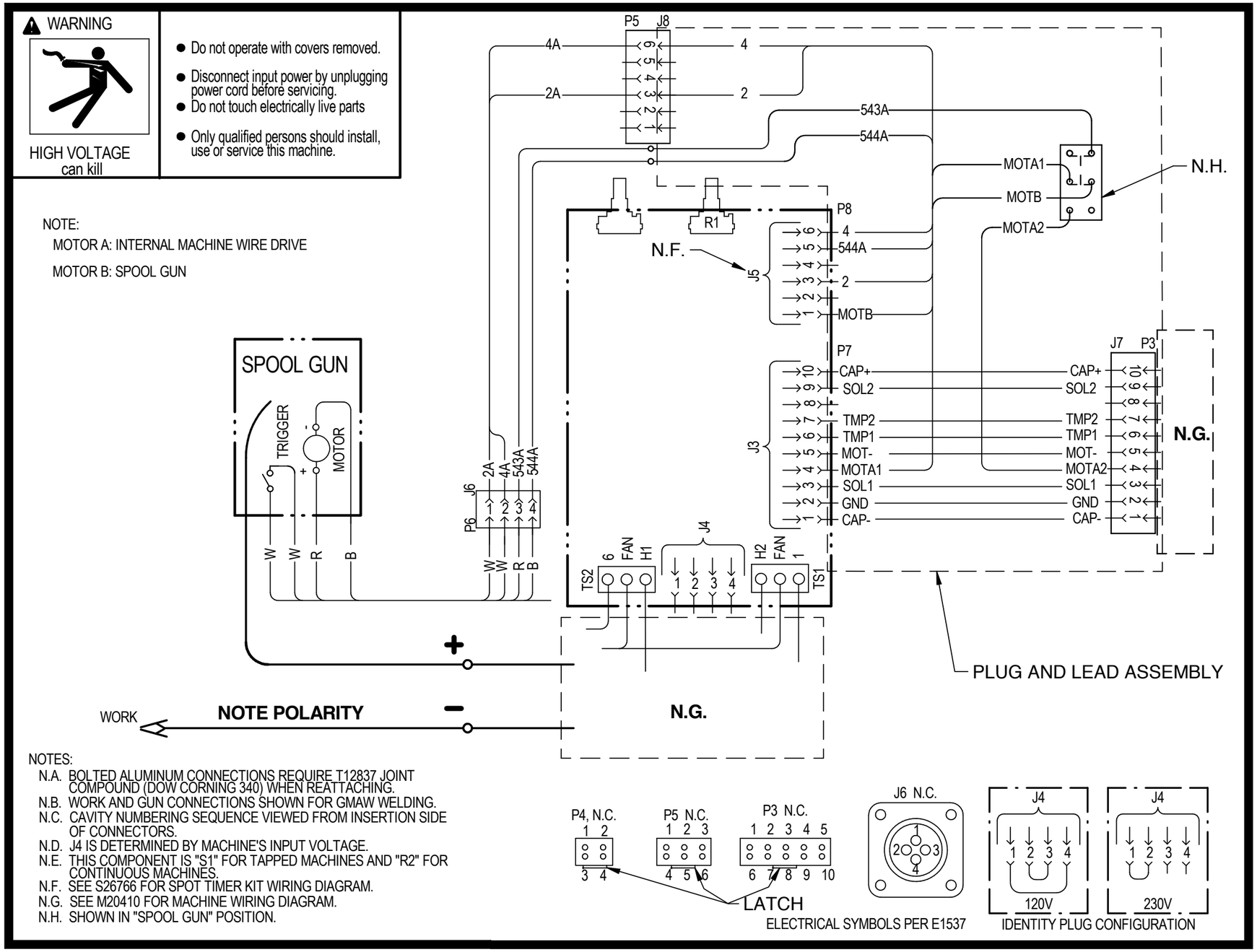
M20410 **B**

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC
Return to Section TOC
Return to Master TOC

WIRING DIAGRAM - SPOOL GUN INTERFACE OPTION - (M20410-1)

SPOOL GUN INTERFACE - WIRING DIAGRAM

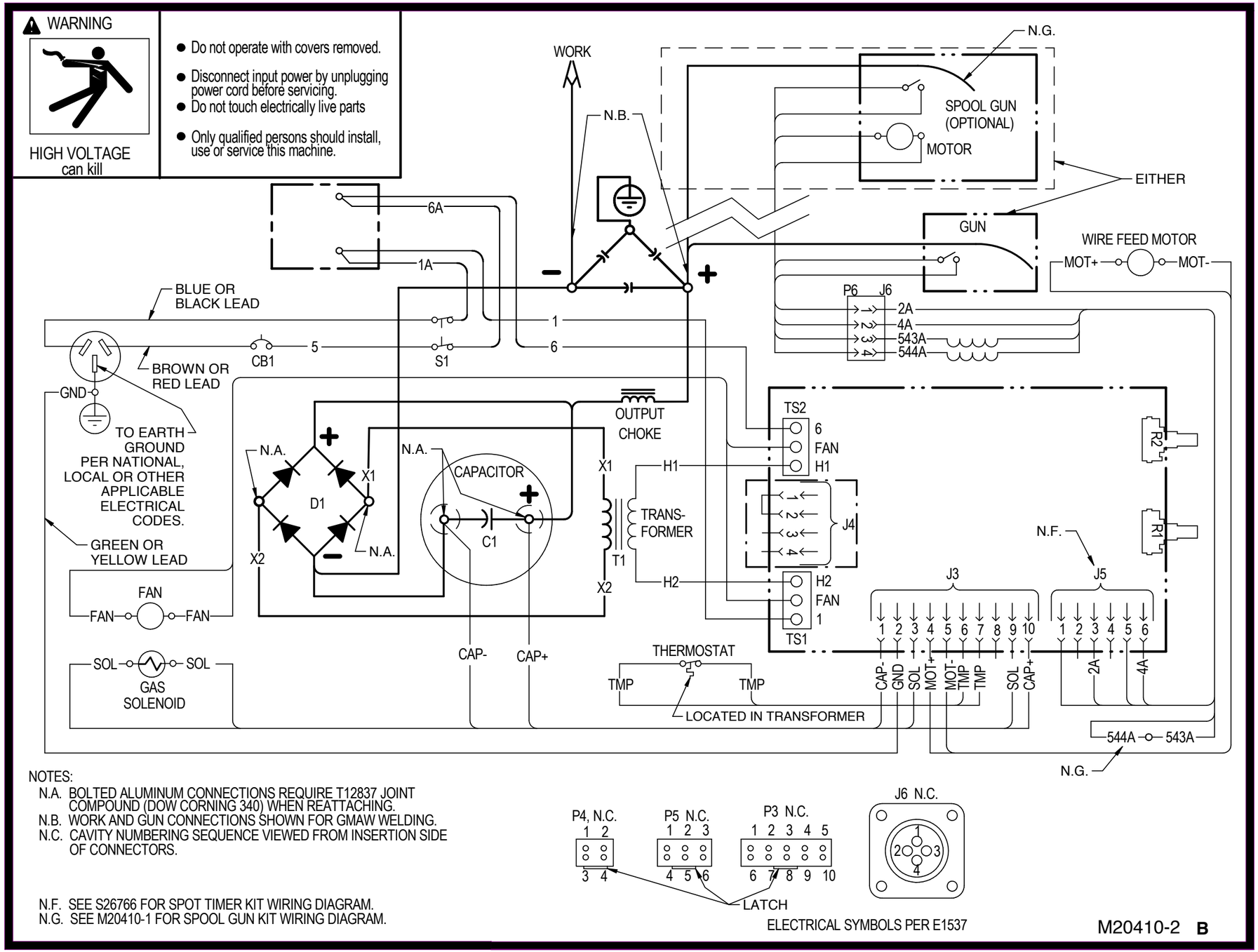


M20410-1 **B**

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

Return to Section TOC
Return to Master TOC

WIRING DIAGRAM



NOTES:
- N.A. BOLTED ALUMINUM CONNECTIONS REQUIRE T12837 JOINT COMPOUND (DOW CORNING 340) WHEN REATTACHING.
- N.B. WORK AND GUN CONNECTIONS SHOWN FOR GMAW WELDING.
- N.C. CAVITY NUMBERING SEQUENCE VIEWED FROM INSERTION SIDE OF CONNECTORS.

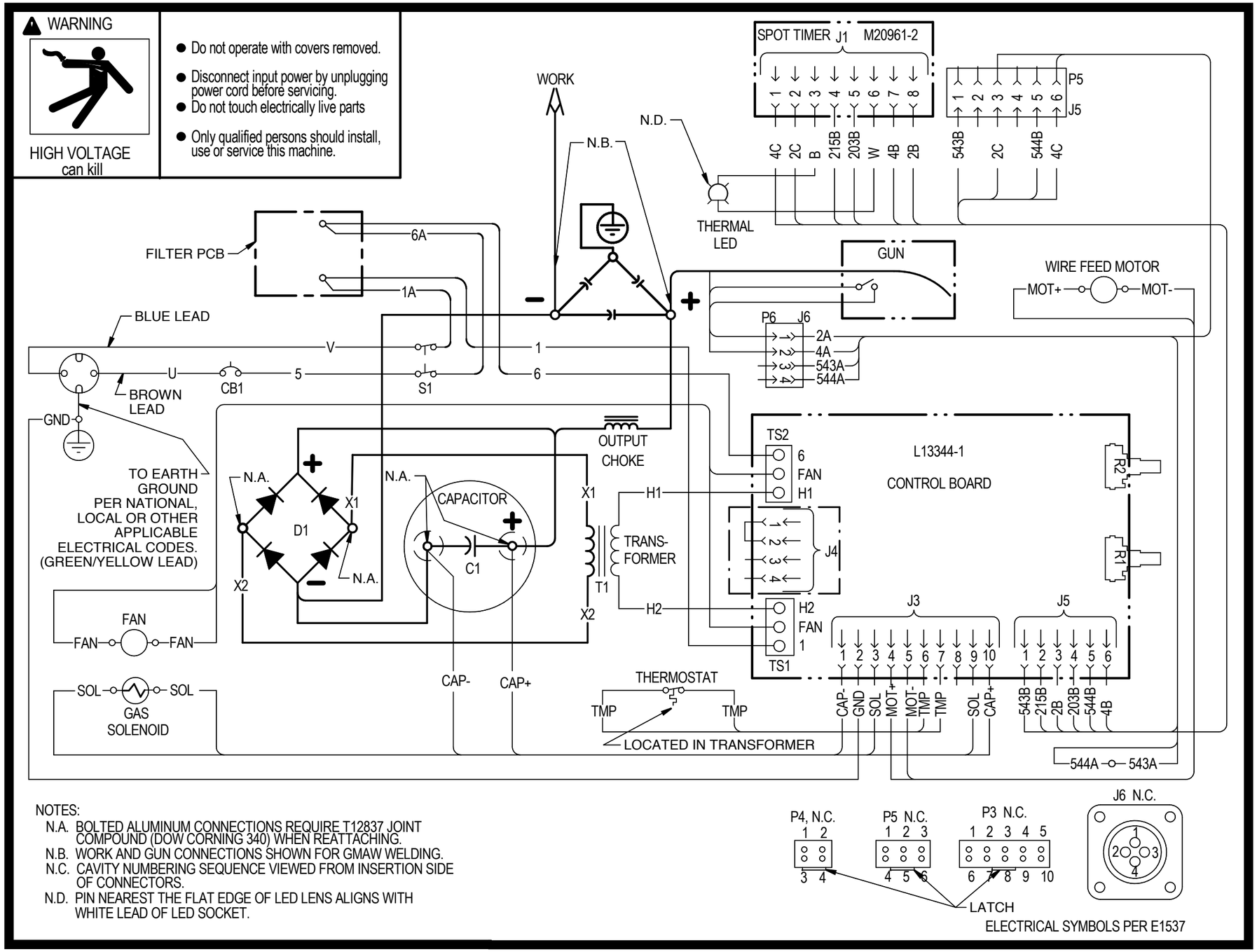
N.F. SEE S26766 FOR SPOT TIMER KIT WIRING DIAGRAM.
N.G. SEE M20410-1 FOR SPOOL GUN KIT WIRING DIAGRAM.

ELECTRICAL SYMBOLS PER E1537

M20410-2 **B**

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

WIRING DIAGRAM

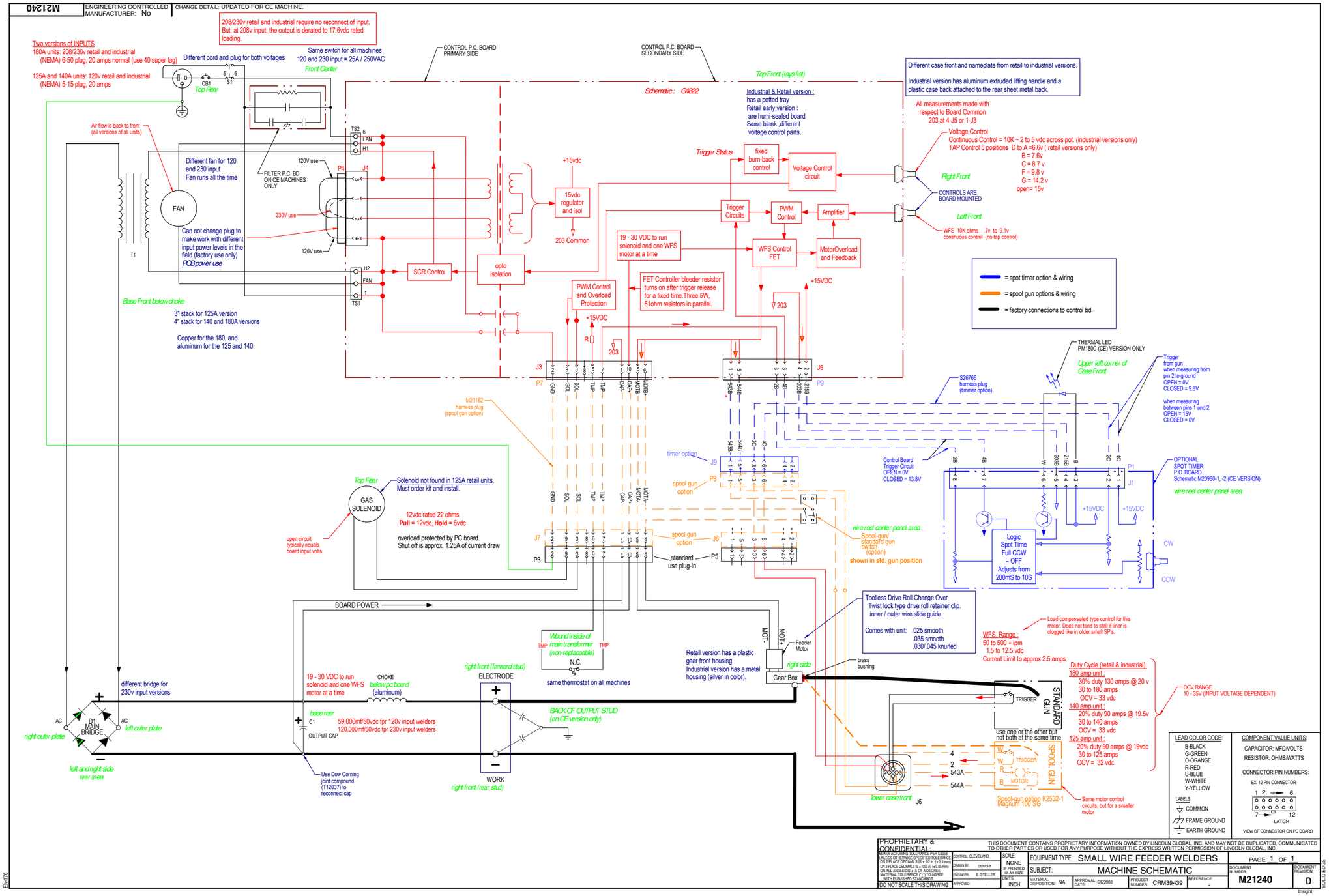


M20410-3 A

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The wiring diagram specific to your code is pasted inside one of the enclosure panels of your machine.

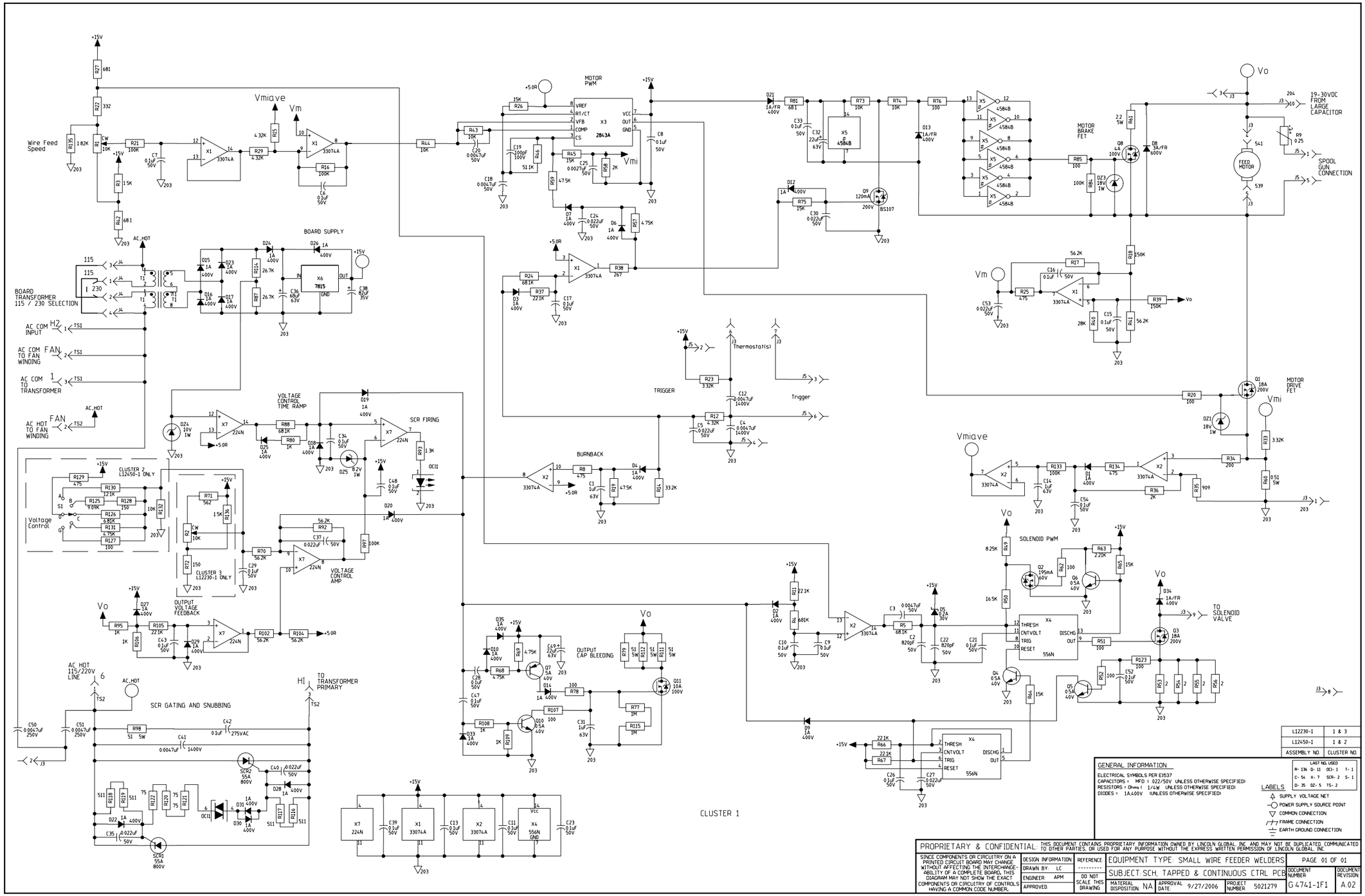
Return to Section TOC
Return to Master TOC

SCHEMATIC - COMPLETE MACHINE M21240



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - MACHINES WITH VOLTAGE CONTROL SWITCH - (G4741-1)



L12230-1	1 & 3
L12450-1	1 & 2
ASSEMBLY NO.	CLUSTER NO.

GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)
DIODES = 1A,400V (UNLESS OTHERWISE SPECIFIED)

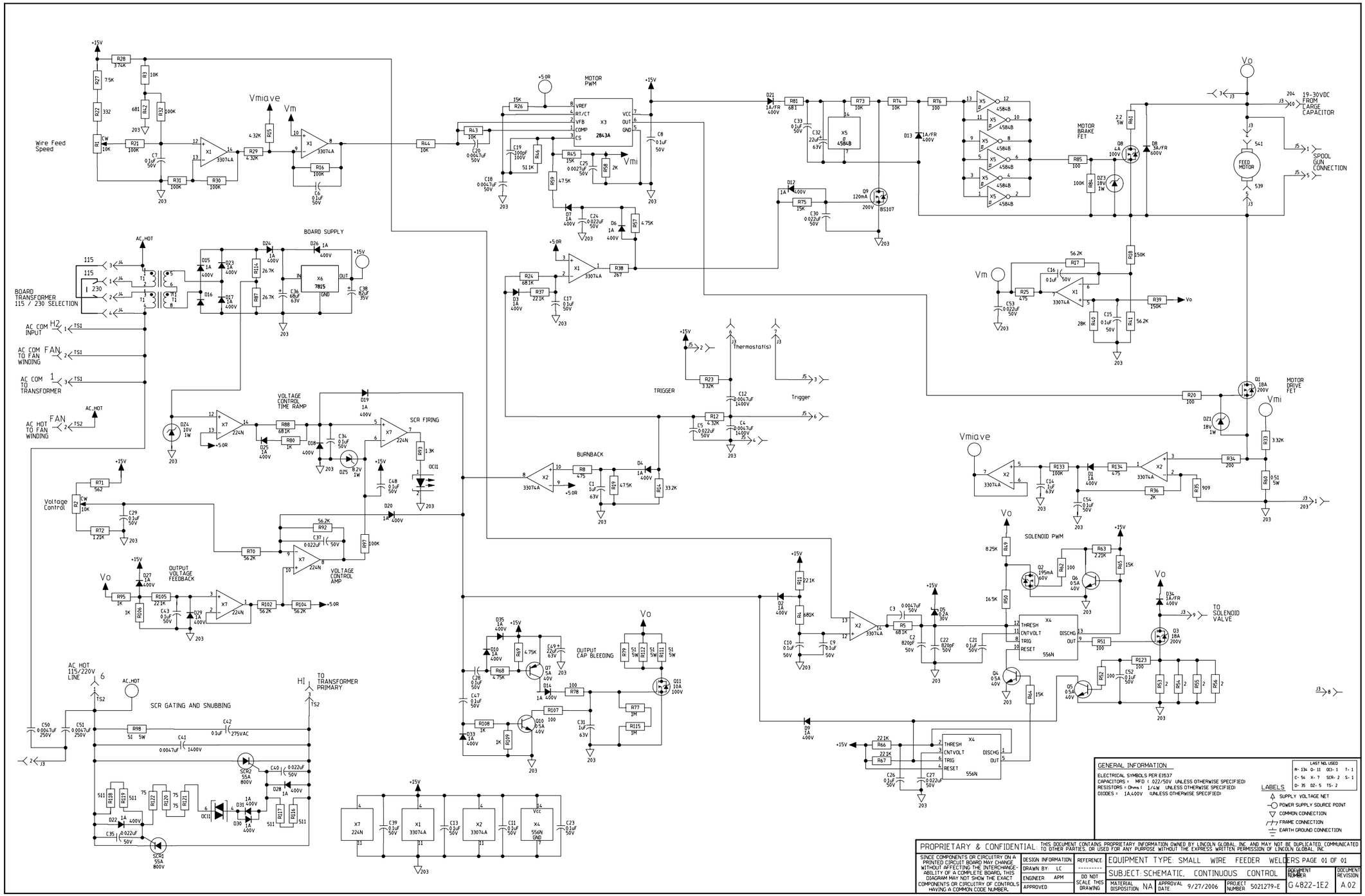
LAST NO. USED
R- 136 Q- 11 OCI- 1 T- 1
C- 54 X- 7 SCR- 2 S- 1
D- 35 DZ- 5 TS- 2

LABELS
- SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- FRAME CONNECTION
- EARTH GROUND CONNECTION

DESIGN INFORMATION	REFERENCE	EQUIPMENT TYPE: SMALL WIRE FEEDER WELDERS	PAGE 01 OF 01
DRAWN BY: LC	---------	SUBJECT: SCH, TAPPED & CONTINUOUS CTRL PCB	
ENGINEER APM	DO NOT SCALE THIS DRAWING	DOCUMENT NUMBER: G4741-1F1	DOCUMENT REVISION: A.02
APPROVED	MATERIAL DISPOSITION: NA	APPROVAL DATE: 9/27/2006	PROJECT NUMBER: 5021279

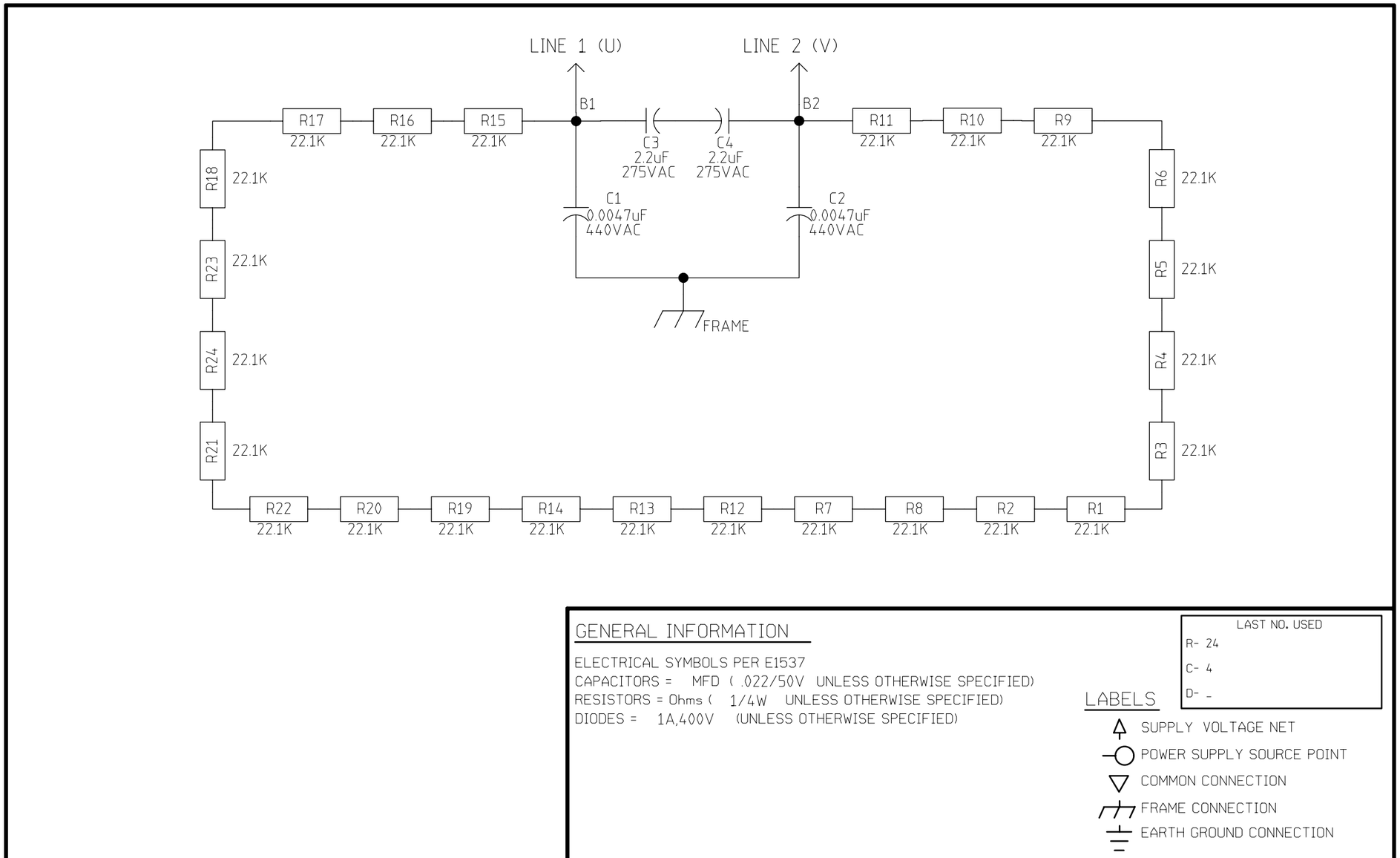
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - MACHINES WITH CONTINUOUS VOLTAGE CONTROL (G4822-1)



NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

SCHEMATIC - FILTER PC BOARD ASSEMBLY - (S24206-2)



GENERAL INFORMATION

ELECTRICAL SYMBOLS PER E1537
CAPACITORS = MFD (.022/50V UNLESS OTHERWISE SPECIFIED)
RESISTORS = Ohms (1/4W UNLESS OTHERWISE SPECIFIED)
DIODES = 1A,400V (UNLESS OTHERWISE SPECIFIED)

LAST NO. USED
R- 24
C- 4
D- -

LABELS

- SUPPLY VOLTAGE NET
- POWER SUPPLY SOURCE POINT
- COMMON CONNECTION
- FRAME CONNECTION
- EARTH GROUND CONNECTION

SINCE COMPONENTS OR CIRCUITRY ON A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGE-ABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY OF CONTROLS HAVING A COMMON CODE NUMBER.	DESIGN INFORMATION DRAWN BY: MAB ENGINEER: TN APPROVED:	REFERENCE: --------- DO NOT SCALE THIS DRAWING	EQUIPMENT TYPE: SW TIG 175, PT 275/375 SUBJECT: SCHEMATIC, BYPASS PCB MATERIAL DISPOSITION: NA / APPROVAL DATE: 7/27/2006 / PROJECT NUMBER: CRM38150	PAGE 01 OF 01	DOCUMENT NUMBER: S 24206-2C0	DOCUMENT REVISION: A

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual.

Return to Section TOC
Return to Master TOC