IM611-B

October,2001

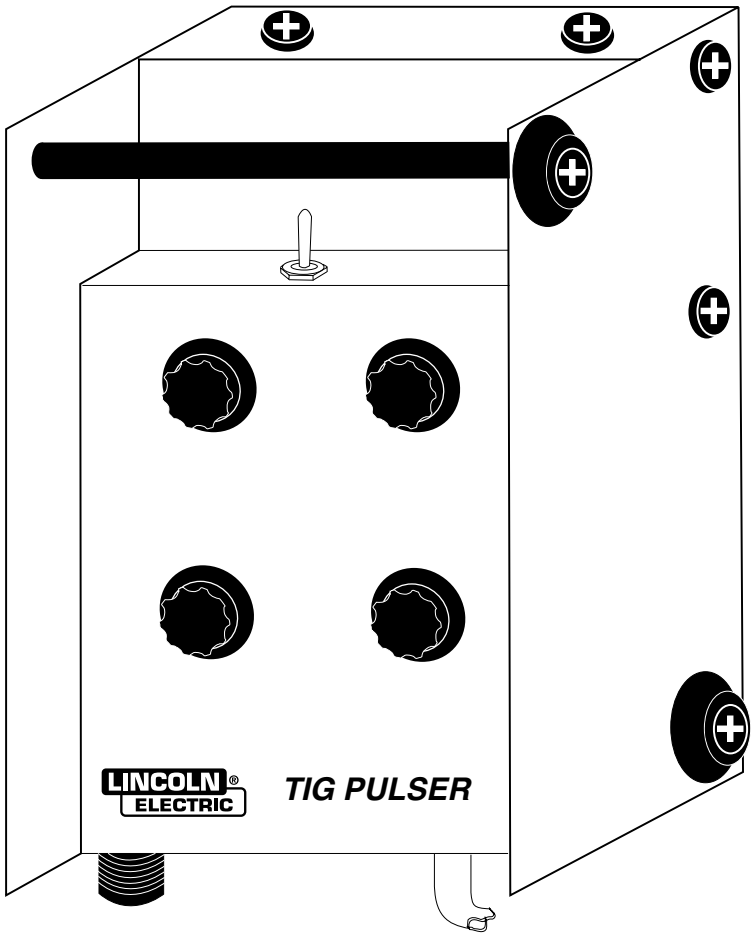
TIG PULSER

For use with machines having Code Numbers: **10472, 10606 10735**

This manual covers equipment which is no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

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.



Date of Purchase:_____
Serial Number:_____
Code Number:_____
Model:_____
Where Purchased:_____

OPERATOR'S MANUAL

ISO 9001

Designed and Manufactured Under a Quality Program Certified by ABS Quality Evaluations, Inc. to ISO 9001 Requirements.
CERTIFICATE NUMBER: 30273

LINCOLN ELECTRIC

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

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

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

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.

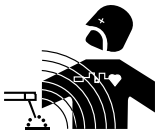
1.d. Keep all equipment safety guards, coversand devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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 below Threshold Limit Values (TLV) 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. 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.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.d. 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.e. Also see item 1.b.

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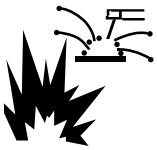


WELDING SPARKS can cause fire or explosion.

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

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

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

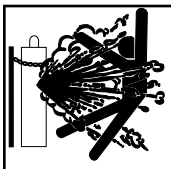
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been “cleaned”. For information, purchase “Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1 from the American Welding Society (see address above).

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

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

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

6.h. Also see item 1.c.



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-l, “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.

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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.

Mar. '93

Thank You —— for selecting a **QUALITY** product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product ••• as much pride as we have in bringing this product to you!

Please Examine Carton and Equipment For Damage Immediately

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

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠ WARNING

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

⚠ CAUTION

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

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TABLE OF CONTENTS

TECHNICAL SPECIFICATIONS - TIG PULSER

INPUT				
Model	**Description**	**Volts**	**mAmps**	**Frequency**
K1619-1	TIG Pulser	5 VDC	25 mA	DC

OUTPUT			
Output Frequency Range	**Peak Current Range**	**Background Current**	**Peak Pulse Width (% on Time)**
0.5 to 20 Hz	Min. to 90% Max. of Power Source Rating	0 to 100% of Peak Current Setting	10% to 90% of cycle

PHYSICAL DIMENSIONS			
HEIGHT	**WIDTH**	**DEPTH**	**WEIGHT**
3.5 in. 89(mm)	5.0 in. 127(mm)	8.0 in. 203(mm)	4.6 lbs (2.1 kg) (with cable)

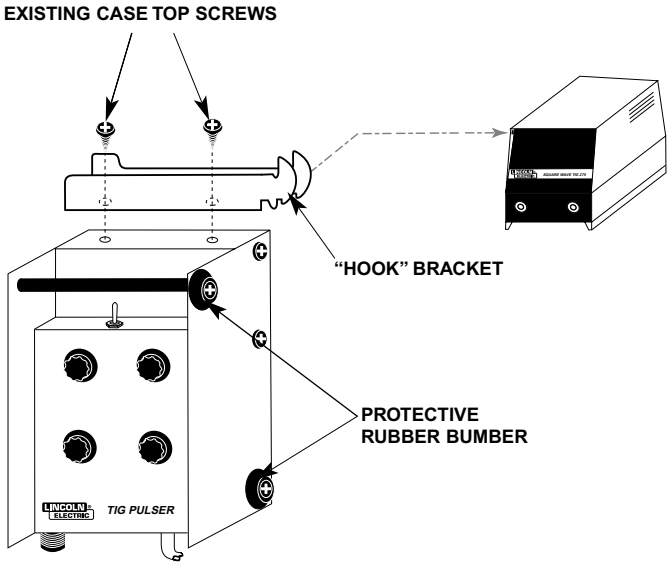


Figure A.1a - "Hook" Bracket Installation for mounting to a TIG Power Source.

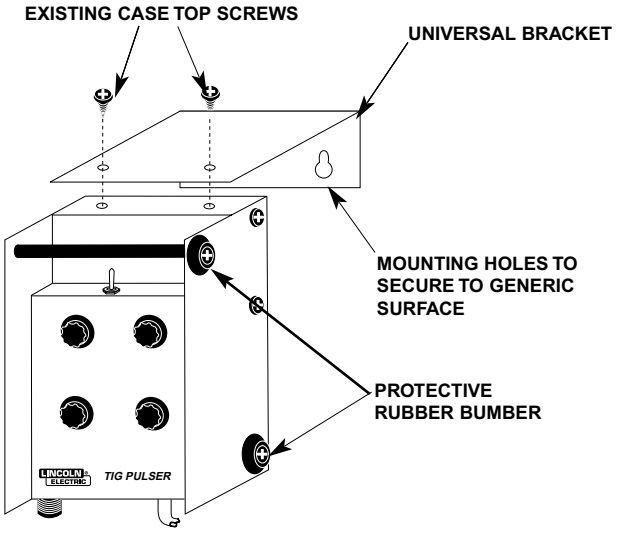


Figure A.1b - Universal Mounting Bracket Installation for mounting to a generic surface.

Read this entire installation section before you start installation.

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- Only qualified personnel should perform this installation.
- Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.
- Always connect the SW TIG 275 grounding terminal to a good electrical earth ground.

Only qualified personnel should install, use or service this equipment

LOCATION

The TIG Pulser can be used in the same locations and environments as the power source. It is rated for use in damp, dirty environments.

MOUNTING BRACKETS

The TIG Pulser has rubber feet that allow it to be set on top of the machine or any flat surface. Two mounting brackets are also provided for a more secure mounting.

Locate the two mounting brackets that are supplied with the TIG Pulser in the loose parts bag. To prevent accidentally dropping the unit, always secure the TIG Pulser to a stable surface with one of the brackets.

The first bracket is designed to hook onto the left side of a SW TIG 175, SW TIG 275 or like compatible power source, allowing the TIG Pulser to be located next to the machine control panel. Attach this bracket as shown in Figure A.1a by using the two screws from the top of the TIG Pulser. Tilt the Pulser to engage the hook of the bracket into the slots on the top left side of the power source then swing down so the rubber bumper is against the case side and hook slots drop over the bottom of the side slots. To remove; lift up and swing out to disengage the hook bracket.

The second bracket is a universal bracket that is designed to allow the TIG Pulser to be fastened to any secure surface. Attach the bracket to the desired surface. Then attach the TIG Pulser to the universal bracket using the two screws from the top of the TIG Pulser as shown in Figure A.1b.

HIGH FREQUENCY INTERFERENCE PROTECTION

A TIG Pulser is suitable for use near a high frequency arc starter because the circuitry in the TIG Pulser has been specially designed for this situation.

ELECTRICAL INPUT CONNECTIONS

MACHINE GROUNDING

The TIG Pulser is grounded to the power source by the ground lead carried inside the Control Cable. Ground the power source according to all local and national electrical codes. Also refer to the power source operator's manual for any other grounding considerations.

SUPPLY CONNECTIONS

The TIG Pulser receives its input power from the power source through the Control Cable.

CONNECTION TO A POWER SOURCE

⚠ WARNING

Turn the Power switch on the power source "OFF" before connecting or disconnecting input power lines, output cables or control cables.

CONTROL CABLE CONNECTION

Refer to Figure A.2.

1. Connect the 6-pin cable plug of the TIG Pulser to the Amptrol receptacle of the power source. If the optional 25 foot Control Cable Extension is used, it should be plugged into the Amptrol receptacle of the power source and then into the TIG Pulser cable. Only one control cable should be used; do not series multiple extensions together. Using 50 foot or longer control cables may lead to poor welding performance.

2. Connect a foot Amptrol (shown), hand Amptrol or an Arc Start Switch to the Tig Pulser see Figure A.2 Control cable connection.

3. Set the AMPERAGE control knob on the power source to MAX position. **Note: The pulser won't properly function if the Amperage control is not set at maximum.**

4. Set the mode switch on power source to 2-step or 4-step TIG depending on the process being used. **Note: If the mode switch is set at Stick, the Pulser won't have any control on the power source and the power source will give maximum output.**

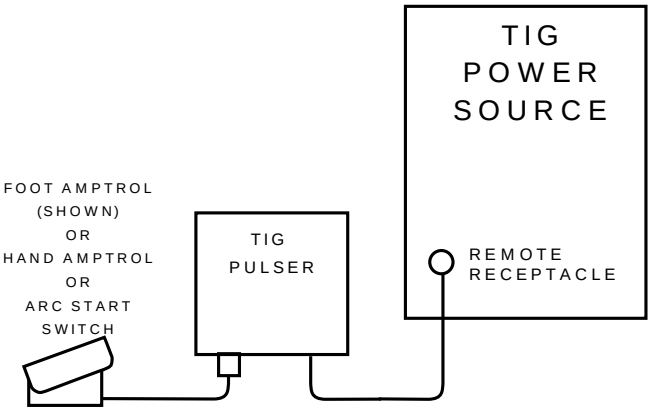


Figure A.2 Control Cable Connection.

OUTPUT CABLES FOR PULSE WELDING

Pulse welding generates high peak currents, which in turn cause large voltage drops in welding cables. It is essential that large cables (2/0 minimum) are used and that all connections are clean and tight.

Because of voltage drops, the total length of the welding leads (work lead length plus electrode lead length) should not exceed 50 feet. If longer cables are used, the welding performance may be degraded.

NOTE: Do not coil the output cables around any metal object.

SAFETY PRECAUTIONS

Read this entire section before operating the unit. Additionally, read the power source operator's manual before operating this unit.

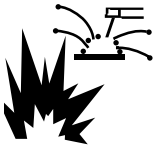
⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- Insulate yourself from the 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 containers that have held combustibles.

ARC RAYS can burn.

- Wear eye, ear and body protection.

Observe additional Safety Guidelines detailed in the beginning of this manual.

GENERAL DESCRIPTION

The TIG Pulser is a "pendant" type GTAW Pulsing option for the SW TIG 175, SW TIG 275, or like compatible power source. It is a simple, easy-to-use unit, with a minimum of controls. It supports the GTAW-P (pulse TIG) process on mild steel, stainless steel, and aluminum. The TIG Pulser features a 12 foot (3.7 m) cable with plug and is supplied with brackets for mounting. A receptacle is provided for use with an optional Amptrol or Arc Start Switch.

RECOMMENDED PROCESSES AND EQUIPMENT

At the time of printing, the TIG Pulser is only recommended for use with the SW TIG 175 and the SW TIG 275 power source for GTAW-P (pulse TIG) procedures within the capacity of the TIG power source.

The TIG Pulser may be used with an optional Hand (K963) or Foot (K870) Amptrol or Arc Start Switch (K814) for either 2-Step or 4-Step trigger mode. The 4-step trigger mode or the Tig Pulser only works with power source equipped with 4-step fiunction such as the SW TIG 275.

OPERATIONAL FEATURES AND CONTROLS

The TIG Pulser has the following controls as standard: Peak Current, Background Current, % on Time (Peak Pulse Width), and Pulses per Second (Frequency). All are continuously adjustable thru control ranges.

DESIGN FEATURES AND ADVANTAGES

- Simple controls make this unit easy to set up and adjust.
- Operating power provided through the remote control cable receptacle eliminating the need for an independent power supply.
- Accomodates Amptrol or Arc Start Switch in 2-step or 4-step trigger mode.
- Designed to the IEC-974-1 standard.
- Attractive, rugged case includes carrying handle and rubber feet.
- Unit is supplied with one bracket for hanging on the power source, and one “universal” bracket for mounting to vertical or horizontal surfaces.

WELDING CAPABILITY

The TIG Pulser provides GTAW-P capability for the SW TIG power source up to 90% of the maximum current capacity of the machine.

LIMITATIONS

At the time of printing, the TIG Pulser is only recommended for use with the SW TIG 175 and the SW TIG 275 power source for GTAW-P (pulse TIG) procedures within the capacity of the TIG power source. Check power source Operator’s Manual before using with the TIG Pulser.

POWER SOURCE SETTINGS

The power source AMPERAGE control knob must be set at MAX. and the mode switch must be set at 2-step or 4-step TIG. The polarity switch and other control knobs on the power source can be set at any desired position and will have the same effect as being operated without the TIG Pulser.

TIG PULSER CONTROLS AND SETTINGS

Refer to Figure B.1.

MODE switch

Located on the top side of the TIG Pulser. Set this switch to one of the following three postitions:

- Set to Amptrol 2-step if welding in 2-step and want to remotely control the welding current with a hand Amptrol or a foot Amptrol.
- Set to Arc Start Switch 2-step if welding in 2-step with an Arc Start Switch. Welding may be performed in this mode with a hand Amptrol or a foot Amptrol, however the current will not be remotely controlled but controlled by the setting on the pulser
- Set to 4-step if welding in 4-step and the power source is set to 4-step. Either an Arc Start Switch or an Amptrol can be used, however current can only be controlled by the pulser setting. Refer to the power source instruction manual for 4-step TIG operation.

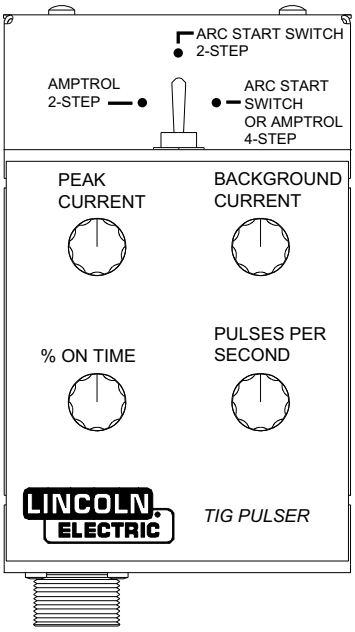


Figure B.1 TIG PULSER Controls

PEAK CURRENT knob

If the mode switch is set to Amptrol 2-step, the peak welding current can be controlled by an Amptrol from minimum up to the limit set by this knob.

If the mode switch is set to either the Arc Start Switch 2-step position or the 4-step position, the setting on this knob determines the peak welding current.

Note: The MAX position on this knob is equivalent to about 90% of the maximum output current of the power source.

This setting adjusts the wetting and bead shape during the peak pulse time of each cycle.

TIG PULSER PRESET

When using the TIG Pulser with a power source with the preset capability, the peak welding current can be preset with the Peak Current knob on the TIG Pulser.

- Preset in 2-step TIG mode:
  Adjust the Peak Current and read the preset on the power source display. For TIG Pulser code number 10472, when mode switch is set to Amptrol 2-step the power source will always display the minimum preset; to preset the peak current set the mode switch to Arc Start Switch 2-step and adjust the Peak Current then set to Amptrol 2-step if welding with an Amptrol.
- Preset in 4-step TIG mode:
  Set the Background Current to PULSER OFF position, adjust the Peak Current to preset, then set the Background Current to the desired level.
  In 4-step TIG mode the preset alternates between peak and background currents when the Background Current is not set at pulser off position, and therefore the power source display also alternates between peak and background currents.

The following table may be used as a guide line to preset the TIG Pulser when connecting to a SW TIG 175:

TIG PULSER PEAK CURRENT DIAL	SW TIG 175 OUTPUT CURRENT REFERENCE (AMPS)
MIN.	10
1	25
2	35
3	45
4	55
5	65
6	75
7	90
8	110
9	135
MAX.	160

BACKGROUND CURRENT knob

Use this knob to set the background current as a percentage of the peak current. If set at PULSER OFF position, the welding current will be normal as if welding without the TIG Pulser, that way non-pulsing welding can be done without having to disconnect the TIG Pulser.

- This setting is adjusted as low as will maintain the arc during the background current time. 40 - 60% is a typical starting point.

% ON TIME knob

This knob controls the duration of the peak current as a percentage of one pulse cycle. For instance if set at 40%, the welding current will remain at peak for 40% of one pulse cycle and at the background current for 60% of one pulse cycle.

- This setting controls the total heat of the weld as a balance between peak pulse and background times affecting distortion and burnthrough. 40 - 60% is a typical starting point.

PULSES PER SECOND knob

Use this knob to set the frequency or the number of pulses per second, from 0.5 pulse per second to 20 pulses per second.

- This setting adjusts bead shape to travel speed. Thinner plate with faster travel speed will require higher frequency than thicker plate with slower travel speed. 2 - 3 is a typical starting point.

GENERAL MAINTENANCE

No regular or periodic maintenance is required for the TIG Pulser. As with any welding equipment, occasionally clean the exterior of the unit with a low pressure airstream or a damp cloth. This keeps the front and rear nameplates in a readable condition. Replace any nameplates that become illegible.

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: engine problems, function problems and output 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

If you have exhausted all of the items in step 2. Contact your Local Lincoln Authorized Field Service Facility.

⚠ CAUTION

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

Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
GENERAL PROBLEMS		
No output.	1. The AMPERAGE knob on power source is not set at MAX. 2. Power source & Tig Pulser connection is wrong. 3. Defective Pulser PC board.	1. Set AMPERAGE knob at MAX. 2. See Installation & Connection section for proper connection. 3. Replace Pulser PC board.
Max. welding current and Tig Pulser has no control.	1. MODE switch on power source is set at STICK position. 2. Defective Pulser PC board.	1. Set MODE switch on power source to 2-step or 4-step TIG. 2. Replace Pulser PC board.
Remote hand or foot Amptrol has no control on welding current.	1. MODE switch on Tig Pulser is not set at Amptrol 2-step. 2. Defective Pulser PC board.	1. Set MODE switch on Tig Pulser to Amptrol 2-step. 2. Replace Pulser PC board.
Always has min. welding current when using Arc Start Switch.	1. MODE switch on Tig Pulser is set at Amptrol. 2. Wiring at Peak Current potentiometer is broken. 3. Defective Pulser PC board.	1. Set MODE switch on Tig Pulser to Arc Start Switch 2-step if welding in 2-step, or to 4-step if welding in 4-step. 2. Check wiring at Peak Current potentiometer. 3. Replace Pulser PC board.
Remote Amptrol has no control on the welding current in 4-step.	Nothing is wrong, in 4-step mode the welding current is controlled only by the Peak Current knob on Pulser.	
Welds but does not pulse.	1. Background current is set at PULSER OFF position. 2. Wring at Pulses per Second potentiometer is broken. 3. Defective Pulser PC board.	1. Set Background current to desired position. 2. Check wiring at Pulses per Second potentiometer. 3. Replace Pulser PC board.

⚠ CAUTION

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

Observe all Safety Guidelines detailed througout this manual

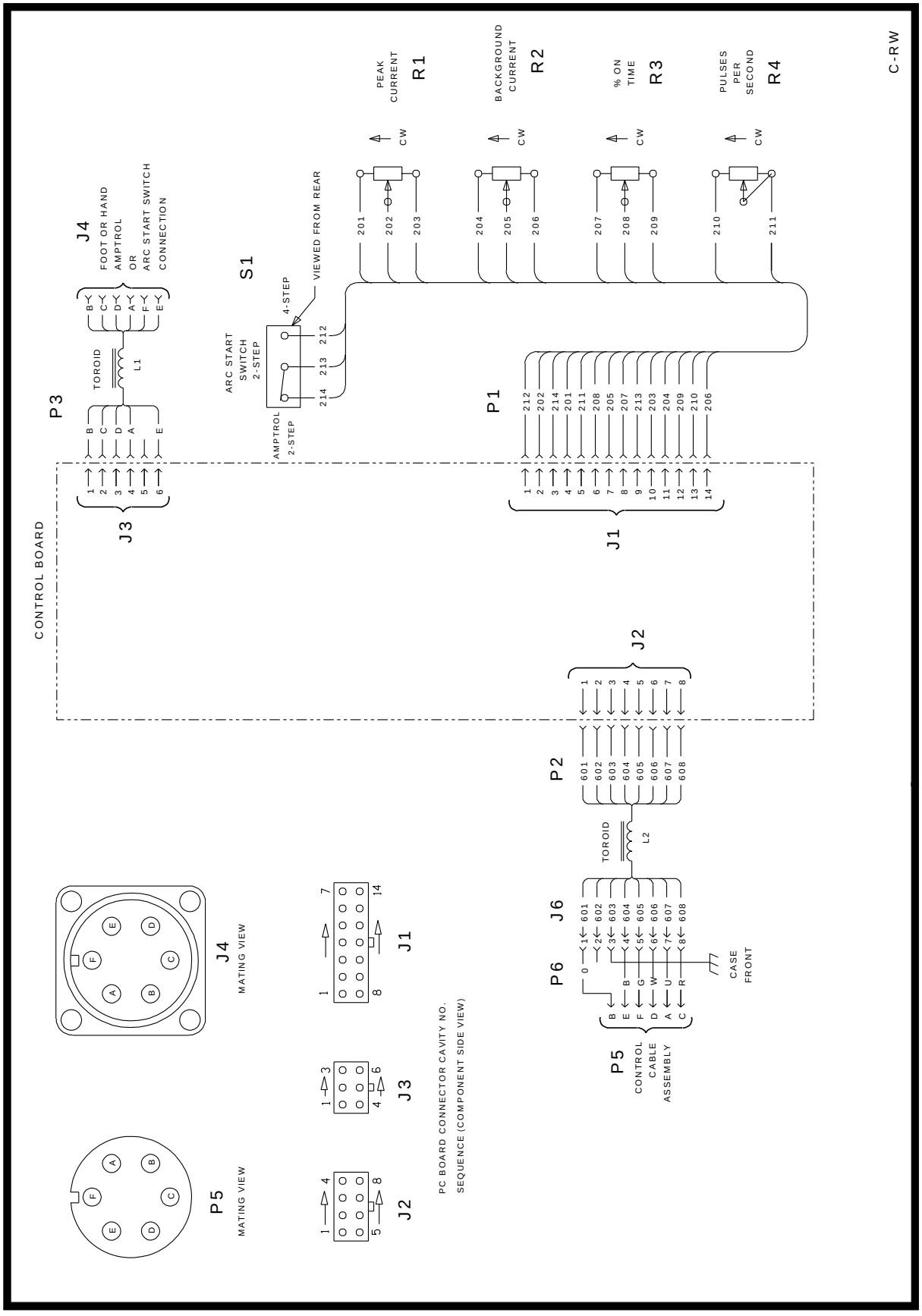
PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
2-STEP TIG WELDING PROBLEMS		
Hi-Freq kicking in and out while welding in DC.	1. Background Current is set too low. 2. Defective power source.	1. Set Background Current to desired position. 2. Check power source.
No Hi-Freq or no gas, can not start.	1. Power source & Tig Pulser connection is wrong. 2. Defective power source.	1. See Installation & Connection section for proper connection. 2. Check power source.
Low welding current.	1. Power source is set at 4-step Tig. 2. Defective Pulser PC board.	1. Set power source to 2-step TIG. 2. Replace Pulser PC board.
Does not pulse.	1. MODE switch on Tig Pulser is set at 4-step. 2. Defective Pulser PC board.	1. Set MODE switch on Tig Pulser to 2-step. 2. Replace Pulser PC board.

PROBLEMS (SYMPTOMS)	POSSIBLE AREAS OF MISADJUSTMENTS(S)	RECOMMENDED COURSE OF ACTION
4-STEP TIG WELDING PROBLEMS		
Does not pulse when trigger closed.	Nothing is wrong, only pulse during welding when trigger is open.	
Does not pulse when trigger open.	1. MODE switch on Tig Pulser is not set at 4-step. 2. Defective Pulser PC board.	1. Set MODE switch to 4-step. 2. Replace Pulser PC board.
No output.	1. Mode switch on power source is set at 2-step TIG. 2. Defective power source.	1. Set MODE switch on power source to 4-step. 2. Check power source.
Welding current goes off after starting.	1. Background Current and/or Peak Current set too low. 2. Defective power source.	1. Set Background Current and Peak Current to desired position. 2. Check power source.

⚠ CAUTION

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

WIRING DIAGRAM - TIG PULSER



Note: This diagram may not be totally applicable to every code covered by this manual.

NOTES

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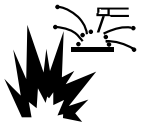	
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada.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

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

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

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

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

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

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

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

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

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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

LIMITED WARRANTY

STATEMENT OF LIMITED WARRANTY

The Lincoln Electric Company (Lincoln) warrants to the end user (purchaser) of all new welding and cutting equipment, electrode and flux (collectively called the "Goods") that it will be free of defects in workmanship and material.

This warranty is void if Lincoln or its Authorized Service Facility finds that the equipment has been subjected to improper installation, improper care or abnormal operations.

WARRANTY PERIOD [1] [2] [3]

Lincoln will assume both the parts and labor expense of correcting defects during the full warranty period. All warranty periods date from the date of purchase to the original end user and are as follows:

7 Years

- Main power rectifiers on all non-inverter low frequency (50 and 60 Hz) type welders.

3 Years

- All Lincoln welding machines, wirefeeders and plasma cutting machines unless listed below.

2 Years

- Power Arc 5000
  Ranger 10, Ranger 10-LX
  Weldanpower 125, Weldanpower 150

1 Year

- AC-100
  Invertec V100-S, Invertec V130-S, Invertec V200-T
  Power Arc 4000
  Pro-Cut 20
- All water coolers (internal or external models)
- All stick electrode, welding wire and flux.
- Arc welding and cutting robots and robotic controllers
- All Environmental Systems equipment, including portable units, central units, gun and cable assemblies and accessories. (Does not include consumable items listed under 30 day warranty.)
- All welding and cutting accessories including gun and cable assemblies, TIG and plasma torches, spool guns, wire feed modules, undercarriages, field installed options that are sold separately, unattached options, welding supplies, standard accessory sets, replacement parts, and Magnum products. (Does not include expendable parts listed under 30 day warranty)

30 Days

- All consumable items that may be used with the environmental systems described above. This includes hoses, filters, belts and hose adapters.
- Expendable Parts - Lincoln is not responsible for the replacement of any expendable part that is required due to normal wear.

CONDITIONS OF WARRANTY

TO OBTAIN WARRANTY COVERAGE:

The purchaser must contact Lincoln or Lincoln's Authorized Service Facility about any defect claimed under Lincoln's warranty.

Determination of warranty on welding and cutting equipment will be made by Lincoln or Lincoln's Authorized Service Facility.

WARRANTY REPAIR:

If Lincoln or Lincoln's Authorized Service Facility confirms the existence of a defect covered by this warranty, the defect will be corrected by repair or replacement at Lincoln's option.

At Lincoln's request, the purchaser must return, to Lincoln or its Authorized Service Facility, any "Goods" claimed defective under Lincoln's warranty.

FREIGHT COSTS:

The purchaser is responsible for shipment to and from the Lincoln Authorized Service Facility.

WARRANTY LIMITATIONS

Lincoln will not accept responsibility or liability for repairs made outside of a Lincoln Authorized Service Facility.

Lincoln's liability under this warranty shall not exceed the cost of correcting the defect of the Lincoln product.

Lincoln will not be liable for incidental or consequential damages (such as loss of business, etc.) caused by the defect or the time involved to correct the defect.

This written warranty is the only express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the warranty of merchantability are limited to the duration of this limited warranty for the equipment involved.

This warranty gives the purchaser specific legal rights. The purchaser may also have other rights which vary from state to state.

[1] Equipment manufactured for the Lincoln Electric Company is subject to the warranty period of the original manufacturer.

[2] All engines and engine accessories are warranted by the engine or engine accessory manufacturer and are not covered by this warranty.

[3] SAE400 WELD N' AIR compressor is warranted by the compressor manufacturer and not covered by this warranty.

Dec, '97