

# IDEALARC® TIG-300/300

*300 Ampere AC/DC Arc Welding Power Source  
For Tungsten Inert Gas and Stick Electrode Welding*

**IM353**

May, 1997

(Code 9104 and Higher)

IM353

Idealarc TIG 300/300

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## **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.

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.



Shown with optional Digital Meters.

## OPERATOR'S MANUAL

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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 Z87.1 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-1, "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 spécifiques qui paraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

### Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
  - a. Les circuits à l'électrode et à la pièce 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 vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
  - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, 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 de fonctionnement.
  - 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 précautions pour le porte-électrode s'appliquent 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 où 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 soleil, 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 latéraux 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 un endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près 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 chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées 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 phosgène (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 conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce 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 faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte 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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## INTRODUCTION



### PRODUCT DESCRIPTION

The Idealarc TIG-300/300 is NEMA rated at 300 amperes, 32 volts, 60% duty cycle for AC and DC stick electrode and TIG welding. This machine also has Lincoln's "Plus Rating" of 300 amperes, 40 volts, at 60% duty cycle.



## INSTALLATION

 <b>WARNING</b>	
	<ul style="list-style-type: none"><li>• Have an electrician install and service this equipment.</li><li>• Turn the input power off at the fuse box before working on equipment.</li><li>• Do not touch electrically hot parts.</li></ul>
<b>ELECTRIC SHOCK</b> can kill.	

 <b>WARNING</b>	
	<ul style="list-style-type: none"><li>• Do not lift this machine using lift bale if it is equipped with a heavy accessory such as trailer or gas cylinder.</li><li>• Lift only with equipment of adequate lifting capacity.</li><li>• Be sure machine is stable when lifting.</li></ul>
<b>FALLING</b> EQUIPMENT can cause injury.	

### LOCATION/VENTILATION

Place the welder where clean, cooling air can freely circulate in through the front louvers and out through the rear louvers. Dirt, dust or any foreign material that can be drawn into the welder should be kept at a minimum.

Failure to observe these precautions can result in excessive operating temperatures and nuisance welder trips off the line. Before planning the installation, read the section entitled "High Frequency Interference Protection".

**WARNING:** To prevent possible bodily injury from high frequency voltage, keep the TIG torch and cables in good repair.

### HIGH FREQUENCY INTERFERENCE PROTECTION

This welder has been tested under recommended installation conditions and has been found to comply with the F.C.C. tentatively allowable limits. A certificate is shipped with each welder for the convenience of machine owners who are required to obtain a certification of compliance to the F.C.C. limits. However, since the spark gap oscillator in the welder is similar to a radio transmitter, improper welder installation can result in radio and TV interference or problems with nearby electronic equipment.

Radiated interference can develop in the following four ways:

- (1) direct interference radiated from the welder,
- (2) direct interference radiated from the welding leads,
- (3) direct interference radiated from feed-back into the power lines, and
- (4) interference from re-radiation of "pick-up" by ungrounded metallic objects.

Keeping these contributing factors in mind, installing equipment per the following instructions should minimize problems.

1. Keep the welder power supply lines as short as possible and completely enclose them in rigid metallic conduit or equivalent shielding for a minimum distance of 50 feet (15.2 m). There should be good electrical contact between this conduit and the welder. Both ends of

the conduit should be connected to a driven ground and the entire length should be continuous.

2. Keep the work and electrode leads as short as possible and as close together as possible. Lengths should not exceed 25 feet (7.6 m). Tape the leads together when practical.
3. Be sure the torch and work cable rubber coverings are free of cuts and cracks that allow high frequency leakage. Cables with high natural rubber content, such as Lincoln Stable-Arc® better resist high frequency leakage than neoprene and other synthetic rubber insulated cables.
4. Keep the torch in good repair and all connections tight to reduce high frequency leakage.
5. The work terminal must be connected to a ground within ten feet of the welder, using one of the following methods:
  - a. A metal underground water pipe in direct contact with the earth for ten feet or more.
  - b. A 3/4" (19 mm) galvanized pipe or conduit or a 5/8" (16 mm) solid iron or steel rod driven at least eight feet into the ground.

The ground should be securely made and the grounding cable should be as short as possible using cable of the same size as the work cable, or larger. Grounding to the building frame electrical conduit or a long pipe system can result in

re-radiation, effectively making these members radiating antennas.

**NOTE:** The welder frame **MUST** also be grounded — see paragraph under “Input Connection”. The work terminal ground does not ground the welder frame.

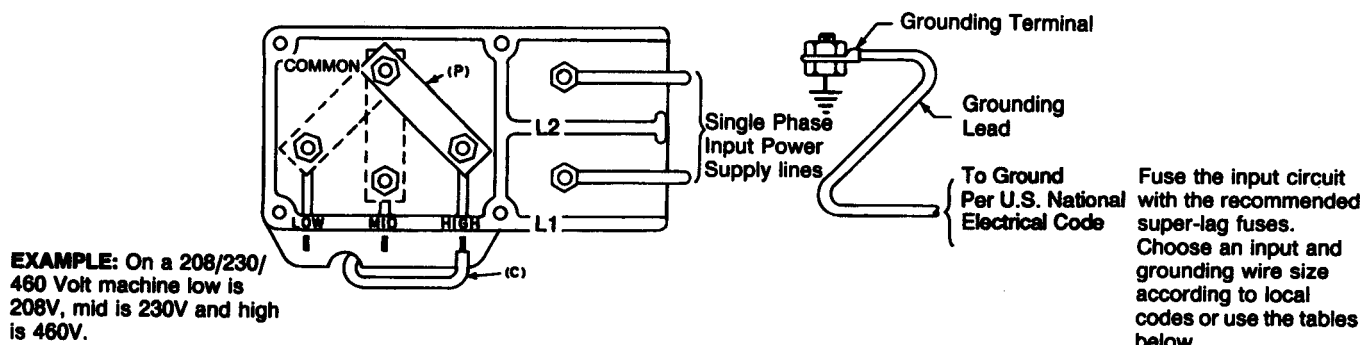
6. Keep all access panels and covers securely in place to minimize radiated interference and to assure proper cooling of the welder.
7. All electrical conductors within 50 feet (15.2 m) of the welder should be enclosed in grounded rigid metallic

conduit or equivalent shielding. Flexible helically-wrapped metallic conduit is generally not suitable.

8. When the welder is enclosed in a metal building, several good earth driven electrical grounds (as in paragraph 5b. pg. 3) around the periphery of the building are recommended.

Failure to observe these recommended installation procedures can cause radio or TV interference problems, and result in unsatisfactory welding performance resulting from lost high frequency power.

INPUT CONNECTION DIAGRAM (ALL VOLTAGES)



**TABLE 1**  
**RECOMMENDED INPUT WIRE SIZES**  
For Stick, DC TIG, and AC TIG 230 Amps & Below

Based on the 1990 U.S. National Electrical Code

60% Duty Cycle

Input Volt/Freq	Input Ampere Rating on Nameplate		Type 75°C Wire in Conduit (AWG) Copper Cond.		Grounding Wire (AWG Size) Copper Cond.		Fuse Size (Super Lag)	
	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor
208/60	93	124	4	3	6	6	150	200
230/60	84	112	4	3	6	6	125	175
460/60	42	56	8	8	10	8	60	90
200/50	101	125	4	3	6	6	150	200
220/50	92	114	4	3	6	6	125	175
440/50	46	57	8	8	8	8	70	90


**TABLE 2**  
**RECOMMENDED INPUT WIRE SIZES**  
For AC TIG Above 230 Amps

Based on the 1990 U.S. National Electrical Code

60% Duty Cycle

Input Volt/Freq	Input Ampere Rating		Type 75°C Wire in Conduit (AWG) Copper Cond.		Grounding Wire (AWG Size) Copper Cond.		Fuse Size (Super Lag)	
	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor	With Capacitor	Without Capacitor
208/60	110	159	3	1	6	4	175	250
230/60	100	144	4	2	6	4	150	225
460/60	50	72	8	6	8	6	70	100
200/50	121	161	3	1	6	4	200	250
220/50	110	146	3	2	6	4	175	225
440/50	55	73	8	6	8	6	80	100

## INPUT CONNECTION

<b>! WARNING</b>	
 <b>ELECTRIC SHOCK</b> 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.

Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate.

Welder supply line entry provision is in the case rear panel with a small removable cover over the input connection panel area.

Per the Input Connection Diagram shown on page 4, have a qualified electrician connect the input leads to L1 and L2 of the input connection panel in accordance with the U.S. National Electrical Code, all local codes and the wiring diagram located inside the machine. Use a single phase line or one phase of a two or three phase line.

### Grounding

The frame of the welder *must be grounded*. A stud marked with the symbol  $\equiv$  located at the bottom of the input connection panel box is provided for this purpose. See the U.S. National Electrical Code for details on proper grounding methods. Follow other grounding instructions per paragraph under “High Frequency Interference Protection”.

### Multiple Input Voltage Models

On multiple input voltage welders, be sure the reconnect panel is connected per the following instructions for the voltage being supplied to the welder.

**CAUTION:** Failure to follow these instructions can cause immediate failure of components within the welder.

Welders are shipped connected for the highest nameplated input voltage. To change this connection for a different input voltage, reconnect both power strap (P) and control lead (C) to their respective terminals corresponding to the input voltage used.

Designations in reconnect panel, low, mid and high correspond to the nameplate input voltages of a triple voltage welder. Dual voltage welders use only low and high. Single voltage machines do not include power strap (P) or control lead (C).

**CAUTION:** Be sure the voltage, phase and frequency of the input power is as specified on the welder nameplate.

When AC TIG welding, a DC current is generated in the arc. This DC current feeds back into the welder secondary raising the saturation of the transformer iron and resulting in about 30% higher input currents than those obtained when DC TIG or stick electrode welding. The welder transformer is designed for these higher input currents. Where AC TIG welding *above 230 amps* is planned, higher input currents require larger input wire sizes and fuses per Table 2.

“Delay type” circuit breakers<sup>(1)</sup> may be used in place of fuses. Using fuses or circuit breakers smaller than recommended may result in “nuisance” tripping from welder inrush currents even if not welding at high currents.

## OUTPUT CONNECTIONS

**WARNING:** To prevent possible bodily injury from high frequency voltage keep the TIG torch and cables in good order.


### TIG Torch Connections

#### Electrical Connection

TIG welding torches come with 12.5' (3.8 m) and 25' (7.6 m) cables. Use the shorter length whenever possible to minimize possible radio interference problems.

1. *With power source off*, connect the torch cable to the “Electrode” stud on the welder.
2. Connect a separate work cable to the “To Work” stud of the welder.
3. Both work and electrode cables should be routed through the cable strain relief hole provided in the base directly below the welding output terminals.

### Gas Supply Connection

<b>! WARNING</b>	
 <b>CYLINDER</b> 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.

<sup>(1)</sup> Also called “inverse time” or “thermal / magnetic” circuit breakers; circuit breakers which have a delay in tripping action that decreases as the magnitude of the current increases.

TIG torches include the necessary gas hoses and, when designed for water cooling, water hose. One gas hose must be routed from the cylinder of inert shielding gas to the Gas Inlet fitting located at the bottom left corner of the front of the machine. The second gas hose is routed from the Gas Outlet fitting on the machine to the TIG torch. Any torch conforming to Compressed Gas Association (CGA) standards can be connected to the Idealarc TIG. The fittings have the following threads:

Gas Inlet: 5/8" — 18 right-hand female (English)

Gas to Electrode: 5/8" — 18 right-hand female (English)

1. Connect one end of the cylinder hose to the Gas Inlet fitting on the machine.
2. Connect one end of the torch hose to the Gas Outlet fitting on the machine.
3. Connect the other end of the cylinder hose to the inert gas cylinder.

The cylinder of inert shielding gas must be equipped with a pressure regulator and flow meter. The gas flow volume setting depends upon the procedures used.

**WARNING:** Observe the safety precautions necessary for handling and using compressed gas containers. See the Safety Precautions concerning gas cylinders in the front of this manual. Contact your supplier for specific information.

#### Water Cooling Connection

If using a water-cooled torch with a free-running water supply, the Idealarc TIG must be equipped with the optional Water Valve Kit. These fittings have the following threads:

Water Inlet: 5/8" — 18 left-hand female (English)

Water to Electrode: 5/8" — 18 left-hand female (English)

1. Install a water line between the welder water inlet and the supply.
2. *Include a strainer in the water supply line* to prevent dirt particles from obstructing water flow in the valve and cooling chamber of the TIG torch. Failure to do so could result in water valve malfunction and overheating of the water-cooled torch.

3. Make certain that the drain water from the torch comes out along the electrode cable and that the water into the torch goes up a separate tube in the torch assembly.
4. Use a non-metallic drain line from the electrode connection to the drain.
5. DO NOT operate a water-cooled torch unless water is flowing.
6. If using a water-cooled torch with a water recirculator, connect the recirculator water outlet directly to the torch water hose. Do not use the water valve kit, it would unnecessarily stop the recirculator water flow, possibly damaging the recirculator pump.

A **waterflow safety switch** can be used with the TIG welder by altering the operation of the water solenoid valve. The valve is reconnected to provide continuous water flow when the welder mode control is set for Inert Gas. The purpose of the waterflow safety switch is to protect water-cooled equipment against damage due to failure of the cooling water supply. It can be used in conjunction with a contactor to interrupt the welding current, or it can be used to operate an alarm. Write to the factory for installation instructions if they are not included with the water-flow safety switch.

#### Stick Electrode Cable Connection

1. Select cable size according to the following Table 3:

**TABLE 3 — Cable Sizes for Combined Lengths of Copper Electrode and Work Cable**

Machine Size	Lengths up to 100 ft. (30.5 mm)	100 to 200 ft. (30.5 to 61 mm)	200 to 250 ft. (61 to 76 mm)
300A/60%	#1 AWG (50 mm <sup>2</sup> )	1/0 AWG (50 mm <sup>2</sup> )	2/0 AWG (70 mm <sup>2</sup> )

2. Turn the power source off.
3. Route the electrode and work cables through the grommeted strain relief hole below the welding output terminals, connect the cables to the proper terminals. This strain relief prevents damage to the welding output terminals if the cables are pulled excessively.

**CAUTION:** Do not leave stick electrode welding cables connected to the TIG 300/300 when TIG welding as they will be energized when TIG welding.

## OPERATION

### CONTROLS

#### Current Range Selector Switch

Current control is accomplished by setting the “Current Range Selector” switch to the desired range and then adjusting the “Current Control” to the desired current. The five-position “Current Range Selector” switch provides overlapping ranges from 2 to 375 amps.

The Current Ranges are designated in TIG values. The Current Range should be chosen for best welding performance, not to a similar range used for other welders.

**CAUTION:** Do not change the “Current Range Selector” switch while welding.

Doing so can cause arcing between the contacts which may result in immediate failure or, most certainly, shortened switch life.

#### Fine Adjustment

##### Current Control

When stick electrode welding or TIG welding using an arc start switch (see “Operation of Optional Features” on pg. 8), the “Current Control” rheostat raises and lowers the output current within the range set on the “Current Range Selector”. With this control, the operator dials the exact current desired.

The Current Control should be set for best welding performance, not to a similar setting used for other welders.

See the “Ampctrl” and “Arc Fade Control” sections (under Operation of Optional Features on pgs 8 & 9) for instructions on the operation of the “Fine Adjustment Current Control” when these options are installed.

#### Electrode Polarity Switch

The “Electrode Polarity” switch gives the operator a choice of AC, DC(–) or DC (+) welding as required for the particular application.

**CAUTION:** Do not change the polarity switch while welding. Doing so can cause arcing between the contacts and result in immediate failure or, most certainly, shortened switch life.




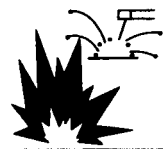

#### Remote Control

The remote control receptacle and switch provide for adaptation of the various remote control options available (see “Operation of Optional Features” on pg.8).

If no remote output control options are used, set the switch in the “Current Control at TIG-300” position.

#### Spark Switch

The three-position “Spark Switch” enables the operator to turn 1 — the spark “Off”, 2 — have it “On” continuously while TIG welding or, 3 — in the “Start Only” position where the spark automatically turns off once the TIG arc is established.

 <b>WARNING</b>	
	<ul style="list-style-type: none"><li>• Do not touch electrically live parts or electrode with skin or wet clothing.</li><li>• Insulate yourself from work and ground.</li></ul>
<b>ELECTRIC SHOCK</b> can kill.	
	<ul style="list-style-type: none"><li>• Keep your head out of fumes.</li><li>• Use ventilation or exhaust to remove fumes from breathing zone.</li></ul>
<b>FUMES AND GASES</b> can be dangerous.	
	<ul style="list-style-type: none"><li>• Keep flammable material away.</li></ul>
<b>WELDING SPARKS</b> can cause fire or explosion.	
	<ul style="list-style-type: none"><li>• Wear eye, ear and body protection.</li></ul>
<b>ARC RAYS</b> can burn.	

### DUTY CYCLE

This welder is rated for 60% duty cycle. Since duty cycle is based on a ten-minute period, this welder can be operated at the nameplate rated output for six minutes out of every ten minute period without overheating.

### FRONT PANEL

All control switches, receptacles, rheostat, etc. are located within the nameplated area on the recessed case front panel. The spark gap is also accessible for required gap adjustment under a cover plate at bottom right front of machine.

The **Gas and Water Solenoid Valves** are located within the recessed area at the bottom of the case front adjacent to the output terminals.

The **Printed Circuit Boards** are in an enclosure and are accessible by removal of the cover located in the case front directly below the nameplated area.

### Soft Start Switch

The "Soft Start Switch" provides a low weld starting current to prevent burn through of light gauge metals when TIG welding. Within a fixed time interval after striking the arc, the current automatically increases to the level set by the Current Control.

### Welding Mode Switch

The "Welding Mode Switch" should be in the "Inert Gas Welding" position when TIG welding and in the "Stick Welding" position when stick welding.

This switch closes the contractor, removes power from the timers, arc sensing and high frequency circuits when in the "Stick Welding" position.

In TIG welding, the contactor, gas and water valves, high frequency and arc sensing circuit are all controlled by the remote current control or arc start switch accessories.

### Preflow and Afterflow Timers

A fixed time *Preflow* timer provided assures gas and water flow *before* welding and prevents any possible weld contamination.

When the Arc Start Switch or either of the Amptrols is depressed, the *Preflow Timer* becomes energized and in turn the gas and water valves are closed for a fixed time of approximately .5 seconds before high frequency becomes available and welding can be started. With the "Spark Switch" in the "Start Only" position, the *Arc Voltage Sensing* circuit cuts off the high frequency approximately .5 seconds after a welding arc has been established.

The *Afterflow Timer* controls the length of time the water and gas flow after welding is stopped. The object of the gas afterflow is to cool the tungsten to a point where oxidation will be kept to a minimum. A darkening of the tungsten indicates inadequate duration of gas afterflow and could result in tungsten contamination of the weld. The timer control knob is set for the recommended gas and water afterflow time indicated on the nameplated calibration for the electrode size used.

If welding is re-started before the afterflow timer times out, high frequency becomes available immediately (without the preflow time delay of approximately .5 seconds).

The electronic Preflow and Afterflow Timers and an arc voltage sensing circuit are all mounted on one printed circuit board. These functions are only required for TIG welding and are, therefore, in operation only when the "Welding Mode Switch" is in the "Inert Gas Welding" position.

### Spark Intensity Control

The "Spark Intensity" rheostat provides control of the intensity of the high frequency desired at the welding arc. To minimize possible radio frequency interference (R.F.I.), the control should be set to the lowest setting which still provides satisfactory high frequency intensity.

### Auxiliary Power

Auxiliary 115 volts 8 amps AC power receptacle fused for 15 amps is provided by a fused duplex receptacle. This power is available when the power switch is "On".

## OPERATION OF OPTIONAL FEATURES

### Amptrol™

The "Amptrol" remote current control is used for most TIG welding applications with the Idealarc TIG. It is available in either hand (K963) or foot (K870) operated models.

Both plug into the Remote Control Receptacle located on the case front panel which in turn is controlled by the "Remote Control Switch". With the "Remote Control Switch" in the "Control at TIG 300" position, the output current is controlled by the "Fine Adjustment Current Control" on the front panel of the welder. With the "Remote Control Switch" in the "Current Control Remote" position, the output current is controlled by the Amptrol. *The range of control by the Amptrol is limited by the current control settings on the welder. The Amptrol will control from minimum of the range set by the "Current Range Selector" switch to the output determined by the welder "Fine Adjustment Current Control" setting.* The remote controls also contain a switch which closes the contactor, starts the high frequency generator, and starts the flow of gas and water to the torch.

Both hand and foot controls are designed for use with a 25-ft. TIG torch. It is recommended that this cable be taped alongside the work or electrode cables between the welder and the work table with the excess length tucked under the welder. This will minimize the possibility of accidental cut-through of the control cable by using the heavier cables as a buffer.

Slightly depress the FOOT OPERATED AMPTROL to close the contactor and start gas and water flow. Depressing the pedal increases the current. Raise the foot to reduce the current. Fully raising the pedal opens the contactor and starts the water and gas "Afterflow Timer".

Tape the HAND OPERATED AMPTROL to the TIG torch in a position so the control can be extended conveniently by the operator's thumb. A slight movement closes the contactor and starts the gas and the water flow. Extending the control raises the current. Extend the control fully to get the maximum set current. Reducing thumb pressure allows the springloaded control to return, reducing the current. Completely returning to the start position opens the contactor and starts the water and gas "Afterflow Timer".

**CAUTION:** Since the full output of the tap setting is available when the FOOT AMPTROL is fully depressed or HAND AMPTROL is fully extended, care must be taken not to select a tap which will exceed the current carrying capacity of the tungsten. When in doubt use a lower rather than a higher tap setting.

### **Arc Start Switch (K814)**

This "Arc Start Switch", complete with 25ft. (7.5 m) cable, is available if Remote Current Control for TIG welding is not desired. It plugs into the Remote Control Receptacle and serves the purpose of closing the contactor, starting the high frequency generator, and starting the flow of gas and water to the torch. The "Remote Control Switch" should be in the "Control at TIG 300" position.

Tape the "Arc Start Switch" to the TIG torch where it can be conveniently pressed by the operator's thumb when holding the torch in position for welding.

**NOTE:** Either an Arc Start Switch (K814) or an "Amptrol" (K963 or K870) must be used for TIG welding, to activate contactor circuitry.

### **Automatic Arc Fade Control (K820)**

This control affords remote current control as well as the arc fade-out and cut-off level controls and does not disable the Line Voltage Compensation of the welder. The range of current fade-out is approximately one to 20 seconds.

To use the "Arc Fade Control", it must be plugged into the remote control receptacle; switch to "Current Control Remote" and "Inert Gas Welding"; set the welder "Fine Adjustment Current Control" rheostat at maximum and control the current at the "Arc Fade Unit"; plug the Arc Start Switch (which is part of this accessory) into the "Arc Fade Unit"; set all other welding controls for desired performance.

The arc is started when the "Arc Start Switch" is depressed. When the "Arc Start Switch" is released, the current will start to fade at a rate determined by the setting of the current fade-out rate control. The current cut-off level control setting determines the level of welding current at which the welder contactor drops out. It can be set to drop out slightly below the welding current level or at the minimum output of the selected range. Total time for contactor drop-out is determined by the settings of both the fade-out rate and cut-off level controls. The "Arc Start Switch" cable is not to be extended beyond 25 feet (7.5 m) for proper operation of the arc fade unit.

### **Pump Mounting Platform (K827)**

Formed metal platform which fits on top of welder; provides mounting surface suitable for certain water recirculating pumps.

### **Digital Voltmeter and Ammeter**

These are available only as a factory installed option. The meters display in one volt/one ampere increments. The meters accurately display both AC and DC stick and TIG welding currents and voltages. Set the toggle switch on the left of the displays to "AC" or "DC" to match the electrode polarity switch setting; no damage will occur to the machine if this is not done, however, the meter reading will be inaccurate. The ammeter is accurate within  $\pm 3\%$  of the

maximum current of the range selected or  $\pm 2$  amps, whichever is greatest. The voltmeter is accurate within  $\pm 3\%$  of reading or  $\pm 1$  volt, whichever is greatest.

The digital meters on the TIG 300/300 display RMS current and voltage. (RMS measurements are the actual "heating value" of the arc.)

**NOTE:** Some types of ammeters will not accurately read true RMS values, particularly when AC TIG welding aluminum; AC only ammeters may read as much as 40% low when measuring AC TIG welding currents.

### **Power Factor Capacitors**

Power factor capacitors are now standard equipment. For older models contact the Lincoln Electric Service Department for field installation.

### **Undercarriages (K817 or K841)**

Two models are available for field installation only.

**K817 or K817R** — Provides three wheeled shop running gear. Heavy duty handle assembly mounts to front of unit and is spring loaded to rest in "Up" position. The K87R substitutes rubber tires for steel wheels.

**K841** — A platform undercarriage with the addition of a rear Gas Cylinder Mounting Platform capable of securing two gas cylinders. Includes two front casters and an axle with two wheels for the rear of the unit.

**NOTE:** The lift bail is restricted from use on the K841 with the parts provided for securing cylinders.

## **TIG WELDING INFORMATION**

Recommended tungsten electrode sizes, stickouts, currents, cup or nozzle sizes and gas flow are shown in Table 4.

**NOTE:** Since TIG applications can vary, this table is intended as a guide only and deviations can be justified.

### **Aluminum**

For aluminum welding, set the "Electrode Polarity" switch on "AC", "Spark Switch" to "On" and the "Welding Mode Switch" to "Insert Gas Welding". All other control settings will be made to suit the size tungsten and current. In general, pure tungsten electrode is best for aluminum and should have a "balled" end not exceeding the diameter. A buzzing sound will occur in the arc when AC TIG welding aluminum. This indicates greater "Cleaning Action".

### **Stainless Steel**

For stainless steel welding, the "Electrode Polarity" switch should be set on "DC(-)", the "Spark Switch" to "Start Only", and the "Welding Mode Switch" to "Inert Gas Welding". When electrodes of the proper size are used, it is more desirable to have a square end. However, if the arc has a tendency to "wander", a common practice to overcome this is to grind the end to a point or use the next smaller size tungsten.

**TABLE 4**  
**Typical Current Ranges<sup>(1)</sup> for Tungsten Electrodes<sup>(2)</sup>**

Tungsten Electrode Diameter In. (mm)	DCEN (–)	DCEP (+)	AC				Approximate Argon Gas Flow Rate C.F.H (l/min)		TIG Torch Nozzle Size
			Balanced Wave		Unbalanced Wave		Aluminum	Stainless Steel	
	1%, 2% Thoriated Tungsten	1%, 2% Thoriated Tungsten	Pure Tungsten	1%, 2% Thoriated Tungsten Zirconiated	Pure Tungsten	1%, 2% Thoriated Tungsten Zirconiated			
0.010 (.25)	2-15	(3)	2-15	2-15	2-15	—	3-8 (2-4)	3-8 (2-4)	4,5,6
0.020 (.50)	5-20	(3)	5-15	5-20	10-20	5-20	5-10 (3-5)	5-10 (3-5)	
0.040 (1.0)	15-80	(3)	10-60	15-80	20-30	20-60	5-10 (3-5)	5-10 (3-5)	
1/16 (1.6)	70-150	10-20	50-100	70-150	30-80	60-120	5-10 (3-5)	9-13 (4-6)	5,6
3/32 (2.4)	150-250	15-30	100-160	140-235	60-130	100-180	13-17 (6-8)	11-15 (5-7)	6,7,8
1/8 (3.2)	250-400	25-40	150-210	225-325	100-180	160-250	15-23 (7-11)	11-15 (5-7)	
5/32 (4.0)	400-500	40-55	200-275	300-400	100-240	200-320	21-25 (10-12)	13-17 (6-8)	
3/16 (4.8)	500-750	55-80	250-350	400-500	190-300	290-390	23-27 (11-13)	18-22 (8-10)	8, 10
1/4 (6.4)	750-1000	80-125	325-450	500-630	250-400	340-525	28-32 (13-15)	23-27 (11-13)	

<sup>(1)</sup> When used with argon gas. The current ranges shown must be reduced when using argon/helium or pure helium shielding gasses.

<sup>(2)</sup> Tungsten electrodes are classified as follows by the American Welding Society (AWS):

Pure .....EWP

1% Thoriated .....EWTh-1

2% Thoriated .....EWTh-2

Though not yet recognized by the AWS, Ceriated Tungsten is now widely accepted as a substitute for 2% Thoriated tungsten in AC and DC applications.

<sup>(3)</sup> DCEP is not commonly used in these sizes.

## TIG WELDING SEQUENCE OF OPERATION

**WARNING: DO NOT LEAVE STICK ELECTRODE WELDING CABLE CONNECTED AS IT WILL BE ELECTRICALLY HOT WHEN TIG WELDING.**

1. Turn the welder, water supply (if so equipped) and gas supply on. The pilot light on the front panel indicates when the power is on.
2. Set the "Current Range Selector".
3. Set the "Current Control".
4. Set the "Afterflow Timer".
5. Set the "Electrode Polarity" and "Spark Switch" as appropriate. See Table 5.
6. Turn the "Welding Mode Switch" to "Insert Gas Welding". This opens the gas and water valves purging the lines of air. The valves shut off after completing the time cycle set on the "Afterflow Timer".
7. Press the "Arc Start Switch" or operate the Amptrol and set the inert gas flowmeter according to the procedure recommendations. See Table 4. The welder is now ready for welding.
8. Position the tungsten electrode at the start of the weld at a 65° to 75° angle with the horizontal so that the

electrode is approximately 1/8" (3.2 mm) above the work piece. Press the "Arc Start Switch" or operate the Amptrol. This opens the gas and water valves to automatically purge air from the hose and torch and closes the contactor. After the preflow time of about .5 seconds, the high frequency becomes available to strike the arc.

9. Hold the "Arc Start Switch" down to operate the Amptrol until the weld is completed. Release the "Arc Start Switch" or the Amptrol to stop the arc. When the "Afterflow Timer" completes the preset cycle, the gas and water valves close. To make another weld repeat steps 8 and 9.

**TABLE 5**  
**Recommended Settings for TIG Welding**


Type of Welding	Electrode Polarity	Spark Switch
Stainless Steel	DC (-)	Start Only
Aluminum and Magnesium	AC	On
Other Metals	DC (-)	Start Only

## STICK ELECTRODE WELDING SEQUENCE OF OPERATION

1. Turn the welder on. The pilot light on the front of the machine indicates when the power is on.
2. Set the "Welding Mode Switch" to "Stick Welding".
3. Set the polarity and adjust the "Current Range Selector" and the "Current Control" for the desired output. The welder is now ready for welding.



## MAINTENANCE



**WARNING**

**ELECTRIC SHOCK**  
can kill.

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

### OVERLOAD PROTECTION

The welder has thermostats secured to the transformer secondary and primary coils.

When the welder is subjected to overload, the thermostats will open and result in the line contactor dropping out, the pilot light will go out, and control voltage will be removed from the remote control receptacle and solenoid valves. The fan motor will continue to run as long as the welder power switch is in the "On" position.

Depending on the amount of welder overload, the thermostats should reset within five minutes with the fan motor operating.

### CAPACITOR

When a power factor correction capacitor fails, it is not always apparent from the appearance of the capacitor. To check the capacitors, operate the welder at rated input voltage drawing rated output current. The input current should correspond to nameplate amperes. If the input current is 10% or 20% higher, one or more of the capacitors have failed.

### ROUTINE MAINTENANCE

**WARNING:** To prevent possible bodily injury from high frequency voltage, keep the TIG torch and cables in good repair.

1. Periodic blowing out of dust and dirt accumulated within the welder using an air stream.
2. Inspection of welder output and control cables for fraying, cut, and bare spots. Also see "High Frequency Interference Protection" on pg. 3.
3. Inspection of spark gap spacing at regular intervals to maintain .015" (.38 mm) air gap. If more intensity is needed than is available with the "Spark Intensity" set to "MAX", the spark gap may be increased to .020" (0.5 mm) max. (Smallest possible air gap consistent with good welding is desirable to minimize R.F.I. problems.) Removal of the nameplate located on the lower right section of the output panel provides access

to the spark gap. Dressing or any re-finishing of the "points" of the spark gap contacts is not recommended. If the point surfaces become irregular or completely eroded, replacement of both electrodes is recommended.

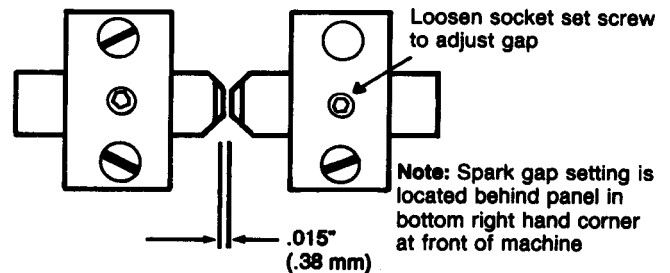
4. The fan motor has sealed ball bearings which require no maintenance.




### NAMEPLATES


Whenever routine maintenance is performed on this machine — or at least yearly — inspect all nameplates and labels for legibility. Replace those which are no longer clear. Refer to the parts list for the replacement item number.

**WARNING:** Use extreme caution when working with the secondary circuit of the high voltage transformer. The output voltage of this transformer is dangerously high. Be certain the power to the welder is off when working on it.



## TROUBLESHOOTING

 **WARNING**



- 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.

**ELECTRIC SHOCK**  
can kill.

TROUBLE	CAUSES	WHAT TO DO
1. Contactor chatters	A. Low line voltage. B. Faulty contactor.	A. Check with power company. B. Repair or replace.
2. Welder will not start (Contactor not operating)	A. Supply line fuse blown. B. Open power lead. C. Wrong voltage. D. Contactor or power switch jammed or broken. E. Contactor coil open. F. Thermostat tripped (welder overheated).	A. Replace (look for reason for blown fuse first). B. Repair. C. Check voltage against instructions. D. Remove obstruction or repair.  E. Replace. F. Let welder cool. Make sure fan operates freely and there is no obstruction to air flow. Operate at rated current and duty cycle.
3. Welder will not weld (Contactor operating)	A. Electrode or work lead loose or broken. B. Open transformer. C. Range and/or polarity switches not seated properly on contacts.	A. Tighten and repair connections.  B. Replace transformer coil. C. Center switch on contact.
4. Welder welds, but soon stops welding (thermostat tripped)	A. Proper ventilation hindered.  B. Overloading — welding in excess of rating. C. Fan motor inoperative.	A. Make sure all case openings are free for proper circulation of air. B. Operate welder at rated load and duty cycle.  C. Check leads and connections. Check voltage at transformer coil, should be 115 volts. Check motor on 115 V line.
5. Polarity or Range Switch won't turn	A. Arced by switching under load.	A. Replace switch.
6. Variable or sluggish welding arc	A. Current too low.  B. Poor work, electrode, or control circuit connections.	A. Check recommended currents for electrode type and size being used. B. Check all connections. Clean and repair as required.
7. Welder welds only on minimum — no control	A. Remote control switch in wrong position.  B. Current Control Rheostat faulty. C. Open Control Circuit. D. Control P.C. board plug disconnected. E. Control P.C. board components failed. F. Diodes or SCR's in control rectifier failed. G. Open sat. reactor control coil. H. Control P.C. board fuse open.  I. Faulty timer P.C. board.	A. Switch to "Current Control at TIG 300" for welder rheostat control and "Current Control Remote" for other. B. Replace. C. Repair broken leads or connections. D. Plug in properly. E. Replace P.C. board (determine cause first). F. Replace control P.C. board (determine cause first). G. Replace control coil. H. Check SCR-diode bridge and replace P.C. board and bridge assembly if faulty. Replace fuse if bridge and P.C. board assembly OK. I. Replace P.C. board.

TROUBLE	CAUSES	WHAT TO DO
8. Welder welds only on maximum — no control.	A. Diodes or SCR's in control rectifier failed. B. Free wheeling diode open or disconnected. C. P.C. board components failed. D. Welder not properly grounded. E. Current control rheostat faulty. F. Output By-Pass capacitors open or disconnected. G. Control current sensing resistor or lead broken.	A. Replace Control P.C. board (determine cause first). B. Reconnect or replace Control P.C. board. C. Replace P.C. board (determine cause first). D. Ground per recommended installation instructions. E. Replace rheostat. F. Replace or reconnect. G. Repair/replace resistor and/or lead.
9. Amptrol does not control output and panel control OK	A. Remote control switch in wrong position. B. Amptrol plug not securely plugged into welder. C. Amptrol rheostat open. D. Open connections or broken leads in Amptrol or cable. E. Open connections or broken leads at remote control receptacle. F. Remote control switch failure.	A. Switch to "Current Control Remote". B. Secure plug with locking ring. C. Replace. D. Repair. E. Repair. F. Replace.
10. Gas and Water Valves not turning on or off properly	A. No gas. B. No water. C. Faulty timer P.C. board.	A. Check cylinder for gas pressure. Check valve or gas line for obstructions. B. Check water line pressure. Check water line and valve for obstructions. C. Replace P.C. board.
11. High Frequency weak, intermittent, or not present.	A. Spark switch in "Off" position. B. "Welding Mode Switch" in "Stick Welding" position. C. Open lead or connection in H.F. input circuit. D. H.F. being internally grounded in welder. E. Torch connection wrong. F. Spark gap out of adjustment or bad points. G. Bare or cut electrode cable with H.F. lead to ground. H. Faulty timer P.C. board.	A. Switch to "On" or "Start Only". B. Switch to "Inert Gas Welding". C. Repair. D. Check electrode circuit in welder for H.F. grounds; check output, by-pass capacitor and leads. E. Connect to "electrode" terminal. F. Set gap to .015" (.38 mm) (or .020" (0.5 mm) MAX.) or replace complete electrodes as required. G. Repair or replace cable. H. Replace P.C. board.
12. Arc "wandering"; lacking control of arc; difficulty in establishing arc	A. Tungsten electrode too large for welding current. B. Tungsten electrode contamination. C. Air draft. D. Weak High Freq. E. Arc too long. F. Contaminated gas cylinder. G. Tungsten electrode stickout too long. H. Using pure tungsten electrode. I. Gas cup size too large. J. Using helium gas.	A. Refer to Table 4 for recommended sizes or grind to a point for DC welding. B. Remove contamination by grinding end of electrode clean. C. Shield arc from draft. D. Check H.F. circuit in welder for leaks to ground; check spark gap and reset to .015" (.38 mm) [or .020" (0.5 mm) MAX.] E. Shorten length of arc. F. Replace with new gas cylinder. G. Shorten to extend beyond end of gas cup, a distance approx. equal to electrode diameter. H. Change to thoriated tungsten electrode. I. Refer to table for recommended cup size. J. Use argon or mixture of helium-argon gas for better starting and stability.
13. Tungsten electrode oxidizing.	A. Not enough gas or water. B. Drafts blowing gas away from Tungsten.	A. Increase afterflow time; check for loose fittings or line leak and repair. B. Provide shield from drafts.
14. Intermittent control — High Frequency off	A. Loose or improperly connected P.C. board plug. B. Short (intermittent) in saturable reactor control coil. C. Diodes or SCR's in control rectifier bridge failed.	A. Check plug connection. B. Replace control coil. C. Replace Control P.C. board.

TROUBLE	CAUSES	WHAT TO DO
15. Improper Digital Meter Reading	A. Meter switch not in proper position. B. If shunt leads are reversed, AC TIG welding amperes indicated will be significantly lower than actual value. C. Faulty meter P.C. Board.	A. Set meter switch to agree with electrode polarity switch, either DC or AC. B. Correct wiring.  C. Replace board.
16. Digital Meter Displays do not illuminate.	A. Faulty meter display module. B. Faulty digital meter P.C. board. C. Faulty supply P.C. board. D. Faulty supply transformer.	A. Replace module. B. Replace board. C. Replace board. D. Replace transformer.
17. Tungsten "spit" or inclusion in TIG welds.	A. Contact of electrode tip with molten weld pool or spatter. B. Contact of filler metal with hot tip of electrode. C. Electrode is too small or too large for the current used.  D. Electrode stickout too long — results in overheating. E. Inadequate shieldings gas flow rate or air draft. F. Defective tungsten electrode. G. Improper shielding gas. H. Loose electrode holding collet — results in overheating. I. Using pure tungsten electrode. J. Tungsten electrode tip contamination.	A. Hold longer arc to avoid contact and do not "touch start". B. Avoid contact.  C. Refer to Table 4 for recommended electrode size. [A good approximation for electrode size for AC TIG is .001" (.025 mm) dia. for each 1.25 amperes.] D. Shorten stickout to a distance approx. equal to electrode diameter beyond cup. E. Refer to Table for recommended gas flow rate and shield from drafts. F. Replace. G. Use argon, argon-helium mixture, or helium. H. Tighten collet.  I. Change to thoriated or zirconiated tungsten electrode. J. Increase gas and water afterflow time.
18. Crater at end of weld.	A. Rapid breaking of the arc.	A. Finish welding with a decreasing current using a Foot or Hand Amptrol.  — Back track or overlap weld before breaking arc.  — Extend arc length and decrease current simultaneously to allow molten metal to solidify as crater is being filled.  — Select range with the lowest minimum for the welding current required.

## PROCEDURE FOR CHECKING DIODES

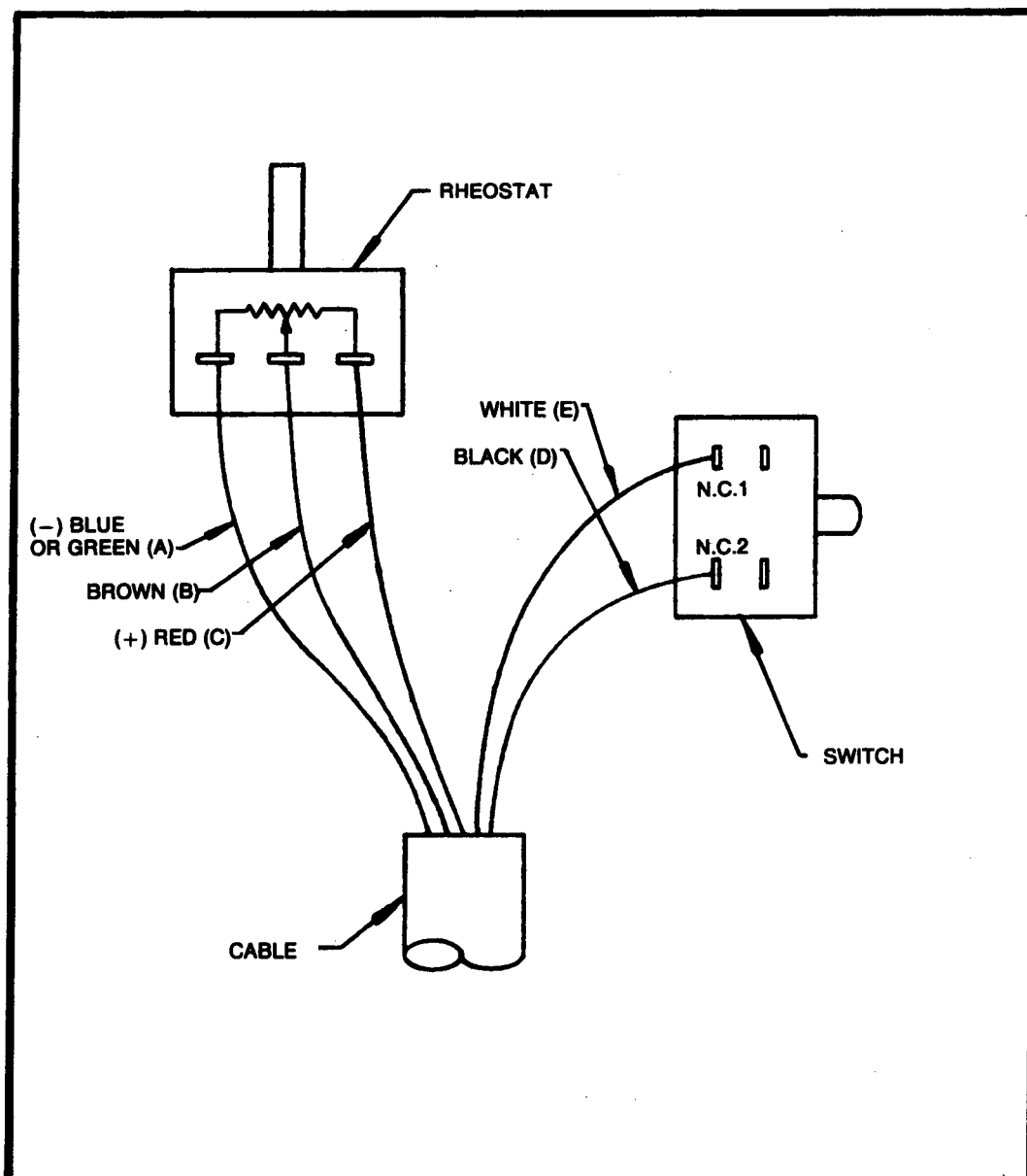
- A. Isolate the diode in question. (Electrically disconnect from other circuits.)
- B. Use an ohmmeter X10 scale. Connect the meter across the diode and note the resistance value. Reverse the ohmmeter leads and note the resistance value.

*Shorted diode* — Low resistance readings in both directions.

*Open diode* — High or infinite resistance in both directions.

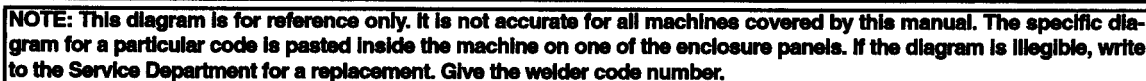
*Good diode* — One reading will be high or infinite and the other reading will be low.

## AMPTROL® WIRING DIAGRAM



T13194  
2-12-82K

L7281  
9-9-88J



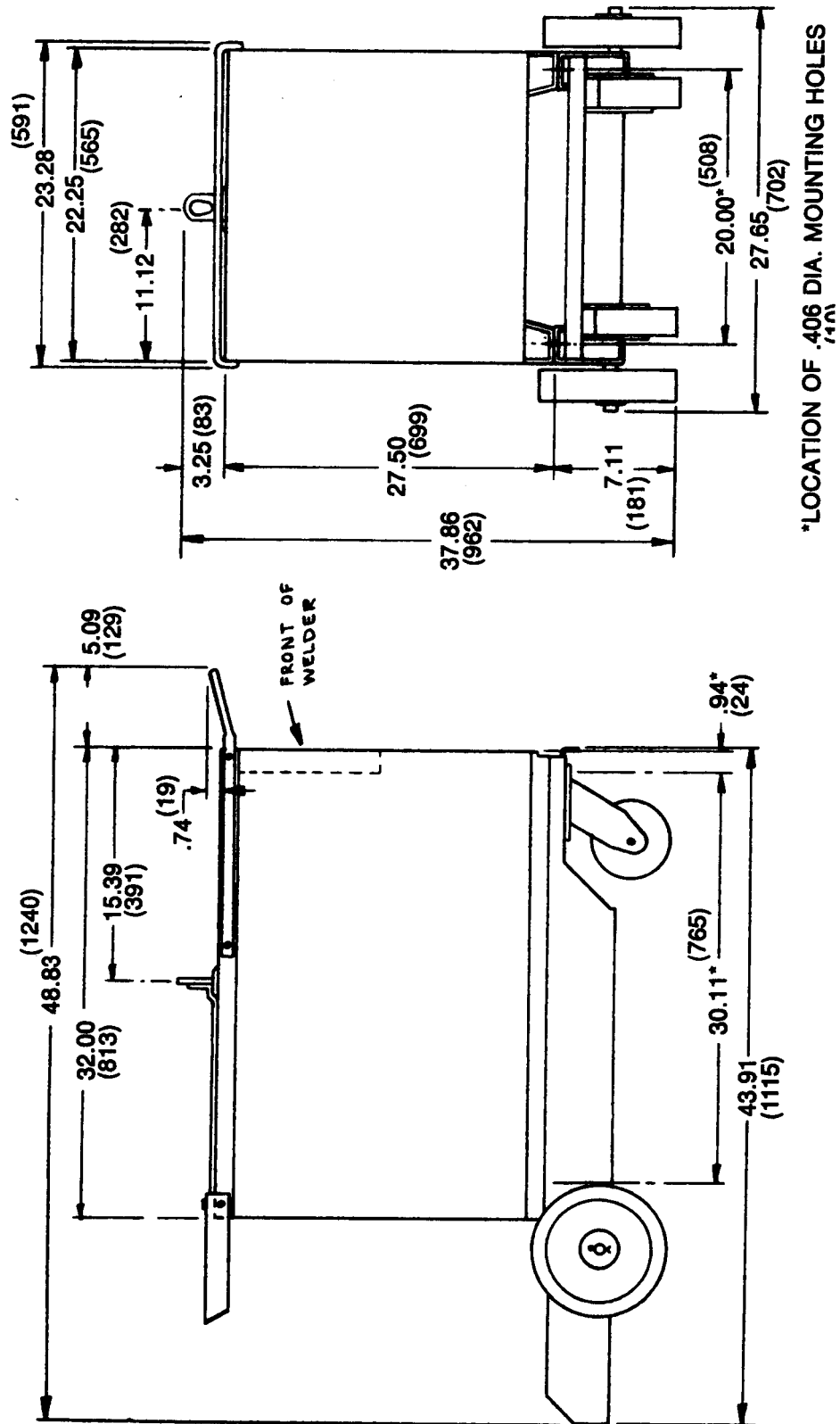
### Shown with K817 Undercarriage



**All dimensions in inches and (millimeters)**

**M12244**  
**1-20-89A**

**DIMENSION DIAGRAM**  
**IDEALARC® TIG 300/300**  
 Shown with K841 Undercarriage



M15200  
 1-20-89B



### **EQUIPMENT MANUFACTURER'S CERTIFICATION**

Type of Equipment \_\_\_\_\_  
Model Number \_\_\_\_\_  
Code Number \_\_\_\_\_  
Serial Number \_\_\_\_\_  
Operating Instruction Manual Number \_\_\_\_\_

This certificate indicates manufacturer's conformity to FCC Rules & Regulations. User's compliance with these regulations requires he fill out this certificate and attach to equipment or other location where it will be conveniently available for inspection.

The High Frequency Generator of the above identified equipment has been tested under field test condition standards recommended by the Joint Industry Committee on High Frequency Stabilized Arc Welding Machines. It was found to comply with the Federal Communications Commission established maximum allowable R.F. energy radiation limit of 10 micro volts per meter at a distance of 1 mile.

If this equipment is installed, operated and maintained as recommended in the accompanying operating manual, it may reasonably be expected to meet the Federal Communications Commission established R.F. energy radiation limitation.

**The Lincoln Electric Company**

### **EQUIPMENT INSTALLATION CERTIFICATION**

The above identified equipment has been installed and will be operated and maintained in compliance with manufacturer's recommendations made in the accompanying operating manual.

Certifying Signature and Title \_\_\_\_\_

Date \_\_\_\_\_

THE LINCOLN ELECTRIC CO. CLEVELAND, OHIO U.S.A.

S-14929

9-2-83E

## NOTES

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With over 500,000 copies of previous editions published since 1933, the Procedure Handbook is considered by many to be the "Bible" of the arc welding industry.

The hardbound book contains over 750 pages of welding information, techniques and procedures. Much of this material has never been included in any other book.

**\$15.00 postage paid U.S.A. Mainland**

**\$4.50 postage paid U.S.A. Mainland**

**\$5.00 postage paid U.S.A. Mainland**



**Lincoln Welding School**  
22801 St. Clair Ave.  
Cleveland, Ohio 44117-

**\$700.00**

\$5.00	For order value up to \$49.99
\$10.00	For order value between \$50.00 & \$99.99
\$15.00	For order value between \$100.00 & \$149.00

<b>Titles:</b>	<b>Price</b>	<b>Code</b>	<b>Quantity</b>	<b>Cost</b>
New Lessons in Arc Welding	\$5.00	L		
Procedure Handbook "Twelfth Edition"	\$15.00	PH		
How to Read Shop Drawings	\$4.50	H		
Incentive Management	\$5.00	IM		
A New Approach to Industrial Economics	\$5.00	NA		
The American Century of John C. Lincoln	\$5.00	AC		
Welding Preheat Calculator	\$3.00	WC-8		
Pipe Welding Charts	\$4.50	ED-89		
			<b>SUB TOTAL</b>	
			Additional Shipping Costs if any	
			<b>TOTAL COST</b>	

<b>WARNING</b>	<ul style="list-style-type: none"> <li>● Do not touch electrically live parts or electrode with skin or wet clothing.</li> <li>● Insulate yourself from work and ground.</li> </ul>	<ul style="list-style-type: none"> <li>● Keep flammable materials away.</li> </ul>	<ul style="list-style-type: none"> <li>● Wear eye, ear and body protection.</li> </ul>
Spanish <b>AVISO DE PRECAUCION</b>	<ul style="list-style-type: none"> <li>● No toque las partes o los electrodos bajo carga con la piel o ropa mojada.</li> <li>● Aislense del trabajo y de la tierra.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenga el material combustible fuera del área de trabajo.</li> </ul>	<ul style="list-style-type: none"> <li>● Protégase los ojos, los oídos y el cuerpo.</li> </ul>
French <b>ATTENTION</b>	<ul style="list-style-type: none"> <li>● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension.</li> <li>● Isolez-vous du travail et de la terre.</li> </ul>	<ul style="list-style-type: none"> <li>● Gardez à l'écart de tout matériel inflammable.</li> </ul>	<ul style="list-style-type: none"> <li>● Protégez vos yeux, vos oreilles et votre corps.</li> </ul>
German <b>WARNUNG</b>	<ul style="list-style-type: none"> <li>● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung!</li> <li>● Isolieren Sie sich von den Elektroden und dem Erdboden!</li> </ul>	<ul style="list-style-type: none"> <li>● Entfernen Sie brennbares Material!</li> </ul>	<ul style="list-style-type: none"> <li>● Tragen Sie Augen-, Ohren- und Körperschutz!</li> </ul>
Portuguese <b>ATENÇÃO</b>	<ul style="list-style-type: none"> <li>● Não toque partes elétricas e electrodos com a pele ou roupa molhada.</li> <li>● Isole-se da peça e terra.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenha inflamáveis bem guardados.</li> </ul>	<ul style="list-style-type: none"> <li>● Use proteção para a vista, ouvido e corpo.</li> </ul>
Japanese <b>注意事項</b>	<ul style="list-style-type: none"> <li>● 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。</li> <li>● 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。</li> </ul>	<ul style="list-style-type: none"> <li>● 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。</li> </ul>	<ul style="list-style-type: none"> <li>● 目、耳及び身体に保護具をして下さい。</li> </ul>
Chinese <b>警告</b>	<ul style="list-style-type: none"> <li>● 皮肤或湿衣物切勿接觸帶電部件及錫條。</li> <li>● 使你自已與地面和工件絕緣。</li> </ul>	<ul style="list-style-type: none"> <li>● 把一切易燃物品移離工作場所。</li> </ul>	<ul style="list-style-type: none"> <li>● 佩戴眼、耳及身體勞動保護用具。</li> </ul>
Korean <b>위험</b>	<ul style="list-style-type: none"> <li>● 전도체나 용접봉을 젖은 형집 또는 피부로 절대 접촉치 마십시오.</li> <li>● 모재와 접지를 접촉치 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 인화성 물질을 접근 시키지 마시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 눈, 귀와 물에 보호장구를 착용하십시오.</li> </ul>
Arabic <b>تحذير</b>	<ul style="list-style-type: none"> <li>● لا تلمس الاجزاء التي يمرى فيها التيار الكهربائي أو الإلكترود بجلد الجسم أو بالملابس المبللة بالماء.</li> <li>● ضع عازلا على جسمك خلال العمل.</li> </ul>	<ul style="list-style-type: none"> <li>● ضع المواد القابلة للاشتعال في مكان بعيد.</li> </ul>	<ul style="list-style-type: none"> <li>● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.</li> </ul>

**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.**

			
<ul style="list-style-type: none"> <li>● Keep your head out of fumes.</li> <li>● Use ventilation or exhaust to remove fumes from breathing zone.</li> </ul>	<ul style="list-style-type: none"> <li>● Turn power off before servicing.</li> </ul>	<ul style="list-style-type: none"> <li>● Do not operate with panel open or guards off.</li> </ul>	<b>WARNING</b>
<ul style="list-style-type: none"> <li>● Los humos fuera de la zona de respiración.</li> <li>● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.</li> </ul>	<ul style="list-style-type: none"> <li>● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.</li> </ul>	<ul style="list-style-type: none"> <li>● No operar con panel abierto o guardas quitadas.</li> </ul>	Spanish <b>AVISO DE PRECAUCION</b>
<ul style="list-style-type: none"> <li>● Gardez la tête à l'écart des fumées.</li> <li>● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.</li> </ul>	<ul style="list-style-type: none"> <li>● Débranchez le courant avant l'entretien.</li> </ul>	<ul style="list-style-type: none"> <li>● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.</li> </ul>	French <b>ATTENTION</b>
<ul style="list-style-type: none"> <li>● Vermeiden Sie das Einatmen von Schweißrauch!</li> <li>● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!</li> </ul>	<ul style="list-style-type: none"> <li>● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)</li> </ul>	<ul style="list-style-type: none"> <li>● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!</li> </ul>	German <b>WARNUNG</b>
<ul style="list-style-type: none"> <li>● Mantenha seu rosto da fumaça.</li> <li>● Use ventilação e exaustão para remover fumo da zona respiratória.</li> </ul>	<ul style="list-style-type: none"> <li>● Não opere com as tampas removidas.</li> <li>● Desligue a corrente antes de fazer serviço.</li> <li>● Não toque as partes elétricas nuas.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenha-se afastado das partes moventes.</li> <li>● Não opere com os painéis abertos ou guardas removidas.</li> </ul>	Portuguese <b>ATENÇÃO</b>
<ul style="list-style-type: none"> <li>● ヒュームから顔を離すようにして下さい。</li> <li>● 換気や排煙に十分留意して下さい。</li> </ul>	<ul style="list-style-type: none"> <li>● 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して下さい。</li> </ul>	<ul style="list-style-type: none"> <li>● パネルやカバーを取り外したまま機械操作をしないで下さい。</li> </ul>	Japanese <b>注意事項</b>
<ul style="list-style-type: none"> <li>● 頭部遠離煙霧。</li> <li>● 在呼吸區使用通風或排風器除煙。</li> </ul>	<ul style="list-style-type: none"> <li>● 維修前切斷電源。</li> </ul>	<ul style="list-style-type: none"> <li>● 盤表板打開或沒有安全罩時不準作業。</li> </ul>	Chinese <b>警告</b>
<ul style="list-style-type: none"> <li>● 얼굴로부터 용접가스를 멀리하십시오.</li> <li>● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 보수전에 전원을 차단하십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 판넬이 열린 상태로 작동치 마십시오.</li> </ul>	Korean <b>위험</b>
<ul style="list-style-type: none"> <li>● ابتعد رأسك بعيداً عن الدخان.</li> <li>● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.</li> </ul>	<ul style="list-style-type: none"> <li>● قطع التيار الكهربائي قبل القيام بأية صيانة.</li> </ul>	<ul style="list-style-type: none"> <li>● لا تشغيل هذا الجهاز إذا كانت الاغطية الحديدية الواقية ليست عليه.</li> </ul>	Arabic <b>تحذير</b>

**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焊材料，並請遵守貴方的有關勞動保護規定。

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 WARRANTY:

The Lincoln Electric Company (Lincoln) warrants to the original purchaser (end-user) of new equipment that it will be free of defects in workmanship and materials.

This warranty is void if Lincoln finds that the equipment has been subjected to improper care or abnormal operation.

### WARRANTY PERIOD:

All warranty periods date from the date of shipment to the original purchaser and are as follows:

#### Three Years:

Transformer Welders, Motor Generator Welders, Inverter Welders, Automatic Wire Feeders, Semiautomatic Wire Feeders, Plasma-cutting Power Sources, Engine Driven Welders (except engine and engine accessories with operating speed under 2,000 RPM), all Ranger Series Engine Welders with operating speed over 2,000 RPM.

#### Two Years:

Engine Driven Welders with operating speed over 2,000 RPM (except engine, engine accessories, Power-Arc 4000 generator/welders and Ranger Series Engine Welders).

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

#### One Year:

Equipment not listed above such as gun and cable assemblies, water coolers, FAS TRAK or MIG-TRAK equipment, air compressor on the SAE400 WELD'N AIR, Power-Arc 4000 generator/welders, Wire Feed Module (Factory Installed), Load Banks and field-installed optional equipment.

### TO OBTAIN WARRANTY COVERAGE:

You are required to notify Lincoln Electric, your Lincoln Distributor, Lincoln Service Center or Field Service Shop of any defect within the warranty period. Written notification is recommended.

### WARRANTY REPAIR:

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

### WARRANTY COSTS:

You must bear the cost of shipping the equipment to a Lincoln Service Center or Field Service Shop as well as return shipment to you from that location.

### IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting 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.

June, '97

**LINCOLN**  
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