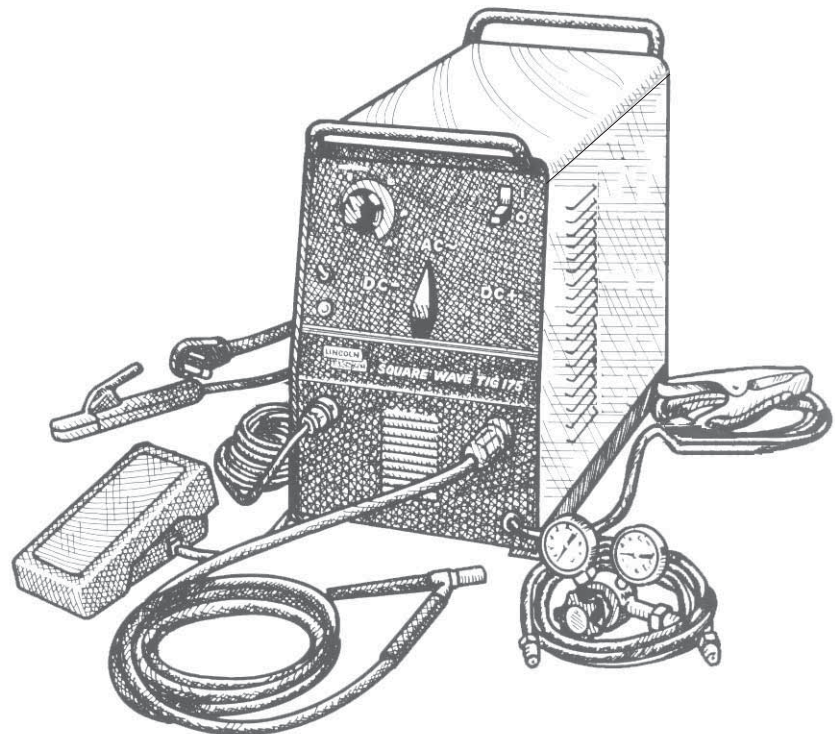


# SQUARE WAVE™ TIG 175

For use with machines having Code Numbers: **11691,11826**

## 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.



## OPERATOR'S MANUAL



**LINCOLN**®  
**ELECTRIC**

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

Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: [www.lincolnelectric.com](http://www.lincolnelectric.com)

# THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

## PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

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

## SAFETY DEPENDS ON YOU

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

### **WARNING**

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

### **CAUTION**

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



## KEEP YOUR HEAD OUT OF THE FUMES.

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

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

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

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

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

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



## WEAR CORRECT EYE, EAR & BODY PROTECTION

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

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

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

**IN SOME AREAS**, protection from noise may be appropriate.

**BE SURE** protective equipment is in good condition.

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



## SPECIAL SITUATIONS

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

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

## Additional precautionary measures

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

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

**REMOVE** all potential fire hazards from welding area.

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



## SECTION A: WARNINGS



### CALIFORNIA PROPOSITION 65 WARNINGS



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

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

For more information go to [www.P65warnings.ca.gov/diesel](http://www.P65warnings.ca.gov/diesel)

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



**WARNING:** Cancer and Reproductive Harm  
[www.P65warnings.ca.gov](http://www.P65warnings.ca.gov)

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

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. 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.



## 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 hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**
- 5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
- 5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.
- 5.f. Also see item 1.b.



## WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.
- 6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.
- 6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- 6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 6.h. Also see item 1.c.
- 6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.
- 6.j. Do not use a welding power source for pipe thawing.



## CYLINDER MAY EXPLODE IF DAMAGED.



- 7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.
- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.c. Cylinders should be located:
  - Away from areas where they may be struck or subjected to physical damage.
  - A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.



## FOR ELECTRICALLY POWERED EQUIPMENT.



- 8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.
- 8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.
- 8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

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

## 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 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 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 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 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.

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## TECHNICAL SPECIFICATIONS - SQUARE WAVE™ TIG 175 (K1478-5)

INPUT - SINGLE PHASE ONLY				
<b>Standard Voltage</b> 208/230/1/60	<b>Input Current at Rated Output</b> 58/52 AC/DC Stick & DC TIG - 64/57 AC TIG		<b>Code Number</b> 11691 11826	
RATED OUTPUT				
<b>Duty Cycle</b>	<b>Amps</b>	<b>Volts at Rated Amperes</b>		
GTAW 25% Duty Cycle	150	15.0 V AC/DC		
40% Duty Cycle	125	14.7 V AC/DC		
60% Duty Cycle	110	14.3 V AC/DC		
100% Duty Cycle	90	14.1V AC/DC		
SMAW 25% Duty Cycle	150	26.0 V AC/DC		
40% Duty Cycle	125	25.0 V AC/DC		
60% Duty Cycle	110	25.0 V AC/DC		
100% Duty Cycle	90	24.0 V AC/DC		
OUTPUT				
<b>Output Current Range</b> 10-175 Amps AC and DC	<b>Maximum Open Circuit Voltage</b> (STICK AND TIG) AC OCV: 74 DC OCV: 59		<b>Type of Output</b> CC (Constant Current) AC/DC	
RECOMMENDED FUSE SIZES				
<b>Wiring and Protection based on the 2008 National Electric Code.</b>				
Use a <b>Super Lag</b> type <b>Fuse</b> or <b>Circuit Breaker</b> with a delay in tripping action. Models with <b>NEMA 6-50P</b> plug may be used with a <b>50 amp</b> protected <b>6-50R</b> receptacle, or with a maximum <b>70 amp</b> protected <b>6-50R</b> receptacle if dedicated for the welder.				
PHYSICAL DIMENSIONS				
Power Source	<b>Height</b> 19.53 in. 496 mm	<b>Width</b> 13.72 in. 349 mm	<b>Depth</b> 24.94 in. 633 mm	<b>Weight</b> Approx. 200 lbs. 90.9 kgs.

SQUARE WAVE™ TIG 175





## SAFETY PRECAUTIONS

Read entire installation section before starting installation.



### WARNING



**ELECTRIC SHOCK** can kill.

- Only qualified personnel should perform this installation.
- Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.
- Always connect the SQUARE WAVE™ TIG 175 to a power supply grounded per the National Electrical Code and any local codes.

## SELECT SUITABLE LOCATION

Place the welder where clean cooling air can freely circulate in through the rear louvers or brickwork and out through the front and side 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 shut-downs.

## GRINDING

Do not direct grinding particles towards the welder. An abundance of conductive material can cause maintenance problems.

## STACKING

SQUARE WAVE™ TIG 175's **cannot** be stacked.

## LIFTING AND MOVING

The SQUARE WAVE™ TIG 175 should be lifted by two or more people or with a hoist. (It weighs approximately 200 lbs./90.9 kg.) Its lifting handles are designed to make lifting more convenient. An optional undercarriage is available to easily move the unit. Refer to the Accessories section of this manual.

## TILTING

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

## ENVIRONMENTAL RATING

The SQUARE WAVE™ TIG 175 power source carries an IP21 environmental rating. It may be used in normal indoor industrial and commercial environments. Avoid using it in environments which have falling water such as rain. Read and follow "Electric Shock Warnings" in the Safety section if welding must be performed under electrically hazardous conditions such as welding in wet areas or on or in the work-piece.

## MACHINE GROUNDING AND HIGH FREQUENCY INTERFERENCE PROTECTION

The welder must be grounded. See your local and national electrical codes for proper grounding methods.

The high frequency generator, being similar to a radio transmitter, can be blamed for radio, TV and electronic equipment interference problems. These problems may be the result of radiated interference. Proper grounding methods can reduce or eliminate radiated interference.

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 feedback into the power lines.
4. Interference from re-radiation of "pickup" 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 enclose as much of them as possible in rigid metallic conduit or equivalent shielding for a distance of 50 feet (15.2m). There should be good electrical contact between this conduit and the welder case ground. 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 ft (7.6m). 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.
4. Keep the torch in good repair and all connections tight to reduce high frequency leakage.
5. The work piece must be connected to an earth ground close to the work clamp, using one of the following methods:

SQUARE WAVE™ TIG 175



- a) A metal underground water pipe in direct contact with the earth for ten feet or more.
- b) A 3/4" (19mm) galvanized pipe or a 5/8" (16mm) solid galvanized iron, steel or copper 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.

6. Keep cover and all screws securely in place.
7. Electrical conductors within 50 ft (15.2m) of the welder should be enclosed in grounded rigid metallic conduit or equivalent shielding, wherever possible. Flexible metallic conduit is generally not suitable.
8. When the welder is enclosed in a metal building, the metal building should be connected to several good earth driven electrical grounds (as in 5 (b) above) around the periphery of the building.

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

## INPUT CONNECTIONS

Be sure the voltage, phase, and frequency of the input power is as specified on the rating plate, located on the rear of the machine.

208/230 volt models have a NEMA 6-50P plug attached to the input power cord.

Have a qualified electrician provide input power supply to the receptacle or cord in accordance with all local and national electrical codes. Use a single phase line or one phase of a two or three phase line. Choose an input and grounding wire size according to local or national codes. Refer to the **Technical Specifications** page at the beginning of this section. Fuse the input circuit with the recommended super lag fuses or delay type<sup>1</sup> circuit breakers. Using fuses or circuit breakers smaller than recommended may result in "nuisance" shut-offs from welder inrush currents even if not welding at high currents.

<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.

## INPUT RECONNECT PROCEDURE

On multiple input voltage welders, be sure the machine 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.**

Multiple voltage models are shipped connected for the highest voltage. To change this connection refer to the following instructions.

### ⚠ WARNING



**ELECTRIC SHOCK can kill.**

- Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.

**For the lowest rated voltage connection** (Refer to figure A.1):

1. Remove the sheet metal cover.(Code 11691)
  - 1a. Remove the right case side.(Code 11826)
2. Disconnect lead H3 from the power switch and insulate with the insulation from the H2 lead.
3. Connect lead H2 to the power switch where H3 was connected.
4. Tighten connections.
5. Replace sheet metal cover and all screws.(Code 11691)
  - 5a. Replace right case side and all screws.(Code 11826)

**For the highest rated voltage connection** (Refer to figure A.1): The machine is normally shipped connected for the highest rated voltage, however verify the following:

1. Remove the sheet metal cover.(Code 11691)
  - 1a. Remove the right case side.(Code 11826)
2. Disconnect lead H2 from the power switch and insulate with the insulation from the H3 lead.
3. Connect lead H3 to the line switch where H2 was connected.
4. Tighten connections.
5. Replace sheet metal cover and all screws.(Code 11691)
  - 5a. Replace right case side and all screws.(Code 11826)

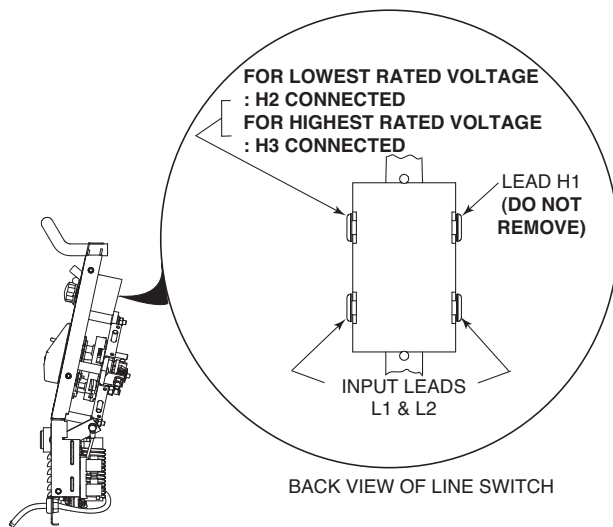


FIGURE A.1 Reconnect Leads

## OUTPUT CONNECTIONS

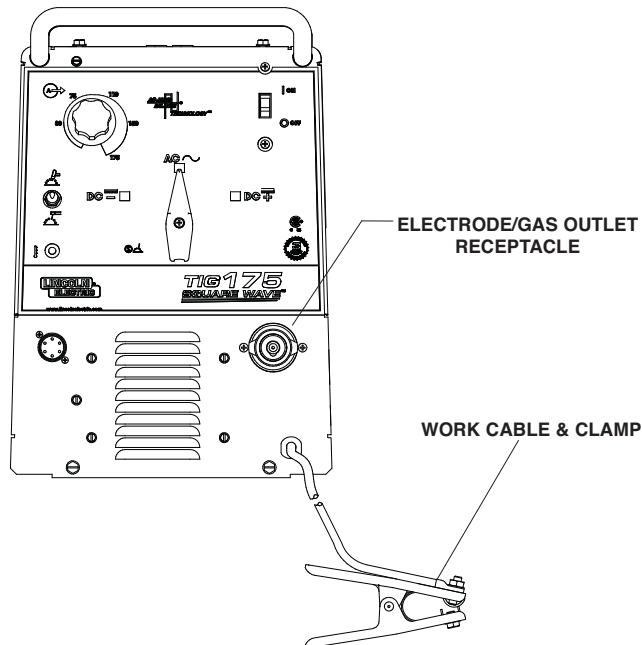


FIGURE A.2 Location of Output Connections

## CONNECTIONS FOR TIG (GTAW) WELDING

### TIG TORCH CONNECTION

Refer to **Included Equipment** in the Operation Section of this manual for TIG welding equipment which is included with the SQUARE WAVE™ TIG 175.

A TIG welding torch with cable and connector is supplied with the welder. Turn the Power Switch "OFF". Connect the torch cable quick connect plug into the Electrode/Gas Output Receptacle on the front of the welder and turn it clockwise until it is tight. This is a quick connect terminal and also provides the gas connection for the shielding gas to the torch.

### ⚠ WARNING

To avoid receiving a high frequency shock, keep the TIG torch and cables in good condition.

### WORK CABLE CONNECTION

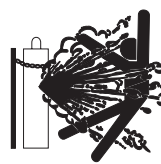
A work cable with attached work clamp is factory connected to the SQUARE WAVE™ TIG 175. To minimize high frequency interference, refer to **Machine Grounding and High Frequency Interference Protection** section of this manual for the proper procedure on grounding the work clamp and work piece.

### SHIELDING GAS CONNECTION

An adjustable gas pressure regulator and flow gage is supplied with the SQUARE WAVE™ TIG 175. Obtain the necessary inert shielding gas (usually argon). Connect the cylinder of gas with the pressure regulator and flow gage. Install the gas hose between the regulator and gas inlet (located on the rear of the welder). The gas inlet has a 5/16-18 right hand female thread; CGA #032.

The optional undercarriage features a pivoting platform that simplifies loading and unloading of gas cylinders.

### ⚠ WARNING



**CYLINDER** could explode if damaged.

- Keep cylinder upright and chained to a support.
- Keep cylinder away from areas where it could be damaged.
- Never allow the torch to touch the cylinder.
- Keep cylinder away from live electrical circuits.
- Maximum inlet pressure 150 psi.

A cylinder is loaded by leaning it slightly sideways and rolling it toward the platform. The cylinder's weight will push the platform downward against the floor, forming a ramp. At this point, the cylinder may be rolled up the platform into its final position. **Secure the cylinder in place with the provided chain.** Unload by following these steps in reverse.

## REMOTE CONTROL CONNECTION

A remote control receptacle is provided on the case front of the welder for connecting a remote control to the machine. A Foot Amptrol<sup>™</sup>, foot activated remote control, is included with the SQUARE WAVE<sup>™</sup> TIG 175. Refer to the Optional Accessories section of this manual for other available remote controls.

## CONNECTIONS FOR STICK (SMAW) WELDING

### STICK ELECTRODE CABLE AND WORK CABLE CONNECTION

Refer to **Included Equipment** in the Operation Section of this manual for STICK welding equipment which is included with the SQUARE WAVE<sup>™</sup> TIG 175.

An electrode holder with cable is supplied with the SQUARE WAVE<sup>™</sup> TIG 175. Turn the Power Switch "OFF". Connect the cable quick connect plug into the Electrode/Gas Output Receptacle and turn it clockwise until it is tight. The work cable and work clamp are factory connected.

## SAFETY PRECAUTIONS

Read and understand this entire section before operating the machine.

### WARNING



#### ELECTRIC SHOCK

can kill.

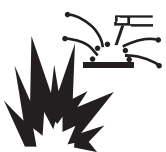
- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground.
- Always wear dry insulating gloves.
- Read and follow “Electric Shock Warnings” in the Safety section if welding must be performed under electrically hazardous conditions such as welding in wet areas or on or in the workpiece.



#### 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.

## PRODUCT DESCRIPTION

The SQUARE WAVE™ TIG 175 is a constant current, single range AC/DC TIG (GTAW) arc welding power source with built-in arc starter / stabilizer. It also has stick welding (SMAW) capability.

The SQUARE WAVE™ TIG 175 is recommended for the TIG (GTAW) and stick (SMAW) welding processes within its output capacity of 10 to 175 amps, on both AC and DC polarity.

### INCLUDED EQUIPMENT

- Work Cable and Clamp.
- Input Cord with NEMA 6-50P Input Plug.

#### For GTAW (TIG Welding):

- TIG torch, (17 Series) with:
  - 12.5 ft (3.8m) one-piece cable.
  - 3/32” Collet body.
  - 3/32” Collet.
  - 3/32” x 7” 2% ceriated Tungsten Electrode.
  - Long backcap.
  - 7/16” Diameter Alumina gas Nozzle.

- Adjustable argon gas pressure regulator and flow gage.
- Gas hose.
- Foot Amptrol™ remote current control with 15ft (4.6m) cable.

#### For SMAW (Stick Welding):

- Electrode holder with cable and quick connect plug.

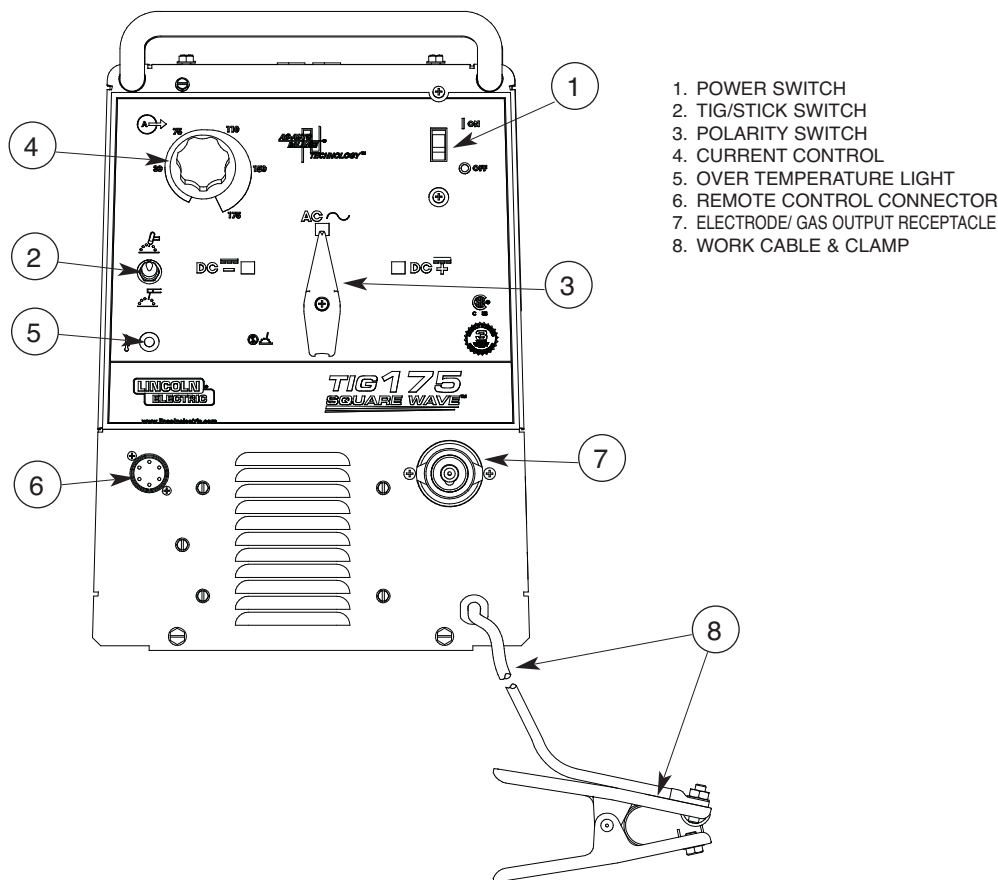
### WELDING CAPABILITY

The SQUARE WAVE™ TIG 175 is rated at 150 amps, 15 volts, at 25% duty cycle on a ten minute basis. It is capable of higher duty cycles at lower output currents. It is capable of 175 amps, 27 volts at a lower duty cycle. If the duty cycle is exceeded, a thermal protector will shut off the output until the machine cools.

## CONTROLS AND SETTINGS

All operator controls and adjustments are located on the front of the SQUARE WAVE™ TIG 175. Refer to Figure B.1 and corresponding explanations.

FIGURE B.1 - CONTROL PANEL



**1. POWER SWITCH** - Turns power on **I** or off **O** to the welder. When switched “ON”, the cooling fan runs.

**2. TIG/STICK SWITCH** - Selects the mode of output, either TIG (GTAW) or Stick (SMAW). Refer to **Welding in TIG Mode and Welding in Stick Mode** later in this chapter for information on how the machine functions in each of these modes.

**3. POLARITY SWITCH** - Allows you to select between welding in AC  $\sim$ , DC -  $\equiv$ , or DC+  $\equiv$  polarity. In DC + polarity the electrode is positive and the work clamp is negative. Use DC + for most stick welding. In DC - the electrode is negative and the work clamp is positive. Use DC - for TIG welding stainless steel and mild steel. AC polarity is recommended for TIG welding aluminum.

**CAUTION**  
Do not switch the polarity switch while welding or damage may result to the machine.



**4. CURRENT CONTROL** - This control is active in both TIG and Stick modes. In Stick mode the current control sets the welding current. In TIG mode this control sets the maximum current. The Amptrol™ will adjust the welding current from the machine minimum to this maximum setting.

**5. OVER TEMPERATURE LIGHT** -  $\text{⏏}$  If the welder overheats due to blocked air flow, high ambient air temperature, or exceeded duty cycle, an internal thermostat will open disabling the welding output and this yellow light will illuminate. The cooling fans will continue to run to cool the unit during this time. The light will go out when the unit cools and the thermostat resets.

SQUARE WAVE™ TIG 175

- 6. REMOTE CONTROL CONNECTOR** - This connector provides connection for a remote control. See **Remote Control Operation** in this section of the manual.
- 7. ELECTRODE/GAS OUTPUT RECEPTACLE** - This quick connect receptacle provides electrical connection to the electrode holder and cable for Stick welding and a combined electrical and gas connection for the TIG torch when TIG welding.
- 8. WORK CABLE** - This work cable is factory connected to the welder and is connected to the work piece to complete the welding circuit. Refer to **Machine Grounding and High Frequency Interference Protection** in the Installation section of this manual for the proper procedure on grounding the work clamp and work piece to minimize high frequency interference.

## OPERATING STEPS

### WELDING IN TIG MODE

1. Connect the TIG torch and cable quick connect plug to the Electrode/Gas output receptacle. This receptacle also contains an integral gas connection for the torch. Connect the work clamp to the work piece.
2. Set the TIG/STICK switch to "TIG".
3. Set the Polarity Switch to DC- for welding steel or stainless steel; or to AC for welding aluminum.
4. Connect the Foot Amptrol to the Remote Control Connector.
5. Turn on the cylinder gas valve and adjust the flow regulator to obtain desired flow.
6. Turn the power switch to "ON". **NOTE:** There will be a 15 second gas flow when the power is turned on.
7. Set the Current Control on the control panel to the maximum desired amps.
8. Depress the Foot Amptrol to energize the torch and establish an an arc with the work piece.

**NOTE:** When the TIG/STICK switch is set to "TIG", depressing the remote control will start a 0.5 second gas pre-flow before energizing the TIG torch. When the remote control is released the TIG torch is de-energized and gas flow will continue for a 15 second post flow. When the polarity switch is set to DC, the TIG Arc Starter will turn on and off automatically to start and stabilize the arc. In AC the TIG Arc Starter will turn on with the output and remain on continuously until the remote control is released.

### REMOTE CONTROL OPERATION

A Foot Amptrol™ is included with the SQUARE WAVE™ TIG 175 for remote current control while TIG welding. An optional Hand Amptrol may also be used. An optional Arc Start Switch may be used to start and stop the welding if no remote control of the current is desired. Refer to the Accessories section of this manual.

Both the Hand and Foot Amptrol work in a similar manner. For simplicity, the following explanation will refer only to "Amptrols", meaning both Foot and Hand models. The term "minimum" refers to a foot pedal in the "up" position, as it would be with no foot pressure, or a Hand Amptrol in the relaxed position, with no thumb pressure. "Maximum" refers to a fully depressed Foot Amptrol, or a fully extended Hand Amptrol.

When the welder is in TIG mode activating the Amptrol energizes the electrode terminal and varies the output welding current from its minimum value of 10 amps, to the maximum value set by the Current Control on the control panel. This helps eliminate accidental high current damage to the work piece and/or tungsten, and gives a fine control of the current. When the welder is in the stick mode a remote control has no effect and is not used.

It is important to note that, in some cases, the tungsten will not start an arc at the minimum current because the tungsten may be too large or cold. To start an arc reliably, it is important to depress the Amptrol far enough so that the machine output current is near the tungsten operating range. For example, a 3/32" tungsten may be used on DC- to weld the full range. To start the weld, the operator may have to turn the current control up and depress the Amptrol approximately 1/4 of the way down. Depressing the Amptrol to its minimum position may not start the arc. Also if the current control is set too low, the arc may not start. In most cases, a large or cold tungsten will not readily establish an arc at low currents. This is normal. In DC-, the SQUARE WAVE™ TIG 175 will start a 3/32, 2% thoriated tungsten electrode at 15 amperes provided the electrode tip is properly grounded and not contaminated.

### BENEFITS OF THE SQUARE WAVE™ DESIGN

In AC TIG welding of aluminum, the positive portion of the AC wave provides cleaning (removal of aluminum oxide) of the work piece. This is desirable on materials with a heavy oxide coating such as aluminum. However the positive portion may also cause the electrode to overheat at high currents causing "tungsten spitting". The negative portion of the AC wave offers no cleaning action but concentrates more heat on the work.

The AC waveform of the SQUARE WAVE™ TIG 175 optimizes cleaning and heating of the work. The result is the capability to weld through the complete range of 10 to 175 amperes in AC TIG or DC- TIG requiring only one electrode, a 3/32" 2% ceriated tungsten

**WELDING IN STICK MODE**

1. Put the electrode holder and cable quick connect plug into the electrode output receptacle. Turn clockwise until tight. Connect the work clamp to the work piece.
2. Set the TIG/STICK switch to "STICK".
3. Set the Polarity Switch for the type of electrode being used (most commonly DC+).
4. Place the electrode in the electrode holder.
5. Turn the power switch to "ON".

**⚠ WARNING**



In Stick Mode the output terminal and electrode will be electrically hot whenever the power switch is turned on.

6. Adjust the Current Control to the desired amps.
7. Strike an arc and weld.

**NOTE:** When the TIG/STICK switch is set to "STICK" the output is always on when the power switch is on. A remote control has no effect on the welding current and the gas flow and high frequency TIG arc starter are disabled.

**RECOMMENDED ELECTRODE AMPERAGE RANGES - SQUARE WAVE™ TIG 175**

The SQUARE WAVE™ TIG 175 is rated from 10-175 Amps.

**SMAW Process**

ELECTRODE	POLARITY	3/32"	1/8"	5/32"
Fleetweld 5P, Fleetweld 5P+	DC+	40 - 70	75 - 130	90 - 175
Fleetweld 180	DC+	40 - 80	55 - 110	105 - 135
Fleetweld 37	DC+	70 - 95	100 - 135	145 - Max
Fleetweld 47	DC-	75 - 95	100 - 145	135 - Max
Jet-LH MR	DC+	85 - 110	110 - 160	130 - Max
Blue Max Stainless	DC+	40 - 80	75 - 110	95 - 110
Red Baron Stainless	DC+	40 - 70	60 - 100	90 - 140

Mild steel procedures are based on recommended procedures listed in C2.10 8/94 and the maximum rating of the SQUARE WAVE™ TIG 175  
 Jet-LH MR procedures are based on Jet-LH 78 MR  
 Blue Max procedures are based on C6.1 6/95  
 Red Baron Procedure are based on ES-503 10/93

**GTAW Process**

Electrode Polarity		DC-		AC		Approximate Argon Gas Flow Rate C.F.H. (l/min.)	
Electrode Tip Preparation		Sharpened		Balled			
Electrode Type		EWTh-1, EWCe-2 EWTh-2, EWLa-1 EWG		EWP	EWZr EWTh-1, EWTh-2 EWCe-2, EWLa-1 EWG	Aluminum	Stainless Steel
Electrode Size (in.)							
.010		Up to 15 A.		Up to 10 A.	Up to 15 A.	3-8 (2-4)	3-8 (2-4)
.020		Up to 15 A.		Up to 15 A.	Up to 20 A.	5-10 (3-5)	5-10 (3-5)
.040		Up to 80 A.		Up to 40 A.	Up to 60 A.	5-10 (3-5)	5-10 (3-5)
1/16		Up to 150 A.		Up to 100 A.	Up to 130 A.	5-10 (3-5)	9-13 (4-6)
3/32		Up to MAX. A.		Up to 160 A.	Up to MAX. A.	13-17 (6-8)	11-15 (5-7)
1/8		X		Up to MAX. A.	X	15-23 (7-11)	11-15 (5-7)

Tungsten electrodes are classified as follows by the American Welding Society (AWS):

- Pure .....EWP.....green
- +1% Thoria .....EWTh-1...yellow
- +2% Thoria .....EWTh-2...red
- +2% Ceria.....EWCe-2...orange
- +1.5% Lanthana .....EWLa-1...black
- +0.15 to 0.40% Zirconia ...EWZr.....brown

Ceriated Tungsten is now widely accepted as a substitute for 2% Thoriated Tungsten in AC and DC applications.

**SQUARE WAVE™ TIG 175**





## OPTIONAL EQUIPMENT

**K964-1 Undercarriage with Pivoting Single Gas Cylinder Platform** - This undercarriage features a pivoting platform to easily load and unload the gas cylinder without lifting. It was designed specifically for the SQUARE WAVE™ TIG 175 power source, and accommodates 7" to 9 1/4" diameter gas cylinders. The undercarriage comes completely assembled and mounts directly to the power source.

**K963-3 Hand Amptrol™** - A Lincoln Foot Amptrol is included with the SQUARE WAVE™ TIG 175 for remote current control while TIG welding. The K963-3 Hand Amptrol may be used in place of the Foot Amptrol if a thumb operated remote control is desired.

**K814 Arc Start Switch** - The Arc Start Switch may be used instead of the Foot Amptrol included with the SQUARE WAVE™ TIG 175. It allows on/off TIG welding at the current set by the Current Control on the control panel. The Arc Start Switch does not provide remote current control.

**Magnum® PTA-9 and PTA-17 TIG Torches** - The following standard Magnum® TIG torches with one-piece cable may be used with the SQUARE WAVE™ TIG 175.

- **K1781-1 PTA-9** 12.5 ft medium back cap.
- **K1781-3 PTA-9** 25 ft medium back cap.
- **K1781-9 PTA-9F** 12.5 ft Flex Head Torch Package with Ultra-Flex™ cable<sup>(1)</sup>.
- **K1782-1 PTA-17** 12.5 ft long back cap.
- **K1782-3 PTA-17** 25 ft long back cap.
- **K1782-12 PTA-17** 12.5 ft long with Ultra-Flex™ cable.

<sup>(1)</sup> **K1781-9** includes Twist-Mate adapter, 1/16" gas lens collet Body, Collet and Gas lens.

**NOTE:** Each torch requires a Twist-Mate adapter (one is included with the torch that comes with the machine). Collets, collet bodies, and nozzles are not included and must be ordered separately.

See Lincoln Publication **E12.150** for a full listing of TIG Torches and Torch Expendable parts.

**Twist-Mate Torch Adapter K1622-1** - One is shipped with the welder torch. If you do not care to interchange this part between torches (one is required to connect Magnum PTA-9 or PTA-17 TIG torches with one-piece cable to the SQUARE WAVE™ TIG 175) you may order an additional adapters. The quick connect plug provides connection for both gas and welding current.

**TIG Torch Parts Kits** - Parts kits are available for the PTA-9 and PTA-17 TIG torches. These kits include back cap, collets, collet bodies, nozzles and tungstens.

**Order KP507** for PTA-9 torches

**Order KP508** for PTA-17 torches

See publication E12.150 for parts kits breakdown.

**Cut Length Consumables** - TIG welding filler metals are available for welding stainless steel, mild steel, aluminum and copper alloys. See publication C9.10.

- **K2374-1 Stick Electrode Holder and Cable (Included with the machine)** - 200 amp Electrode Holder with 10 ft.(3.1m) cable and Twist-Mate connector.

## SAFETY PRECAUTIONS

**⚠ WARNING**

**ELECTRIC SHOCK can kill.**

- Only qualified personnel should perform this maintenance.
- Turn the input power **OFF** at the disconnect switch or fuse box before working on this equipment.
- Do not touch electrically hot parts.

**⚠ WARNING**

To avoid receiving a high frequency shock, keep the TIG torch and cables in good condition.

## ROUTINE AND PERIODIC MAINTENANCE

1. Disconnect power supply lines to machine before performing periodic maintenance.
2. Periodically clean the inside of the machine with a low pressure air system. Be sure to clean the following components thoroughly.
  - Main Transformer
  - Electrode/Gas Output Receptacle
  - Polarity Switch
  - Rectifier Assembly
  - Arc Starter/Spark Gap Assembly
  - PC Boards
  - Fan Blades
3. Inspect welder output and control cables for fraying, cuts, and bare spots.
4. Keep TIG torch and cables in good condition.
5. Clean air louvers or brickwork to ensure proper air flow and cooling.
6. The fan motor has sealed ball bearings which require no maintenance.
7. **SPARK GAP ADJUSTMENT**

The spark gap is set at the factory to a gap of 0.015 inches (0.4mm) See Figure C.1. This setting is adequate for most applications. Where less high frequency is desired, the setting can be reduced to 0.008 inches (0.2mm).

**⚠ WARNING**

Use extreme caution when working with circuit of the high frequency. The high voltages developed can be lethal. Turn the input power off using the disconnect switch or fuse box before working inside machine. This is particularly important when working on the secondary circuit of the high voltage transformer (T3) because the output voltage is dangerously high.

Refer to figure C.1. Note in highly dirty environments where there is an abundance of conductive contaminants, use a low pressure air stream or a firm piece of paper to clean the spark gap. Do not disturb the factory setting.

To check the spark gap:

- Turn off input power as specified above.
- Remove the (wraparound Code 11691) or (right case side Code 11826) from the machine, the spark gap is located on the lower right side.
- Check the spark gap with a feeler gauge.

If adjustment is needed:

- Adjust the gap by loosening the allen head screw in one of the aluminum blocks, and tighten the screw in the new position.

If the gap is correct:

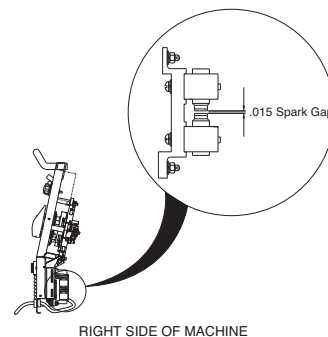
- Replace the (wraparound Code 11691) or (right case side Code 11826).

8. Inspect gas hose and inlet fitting for cracks or leaks.

9. Replace any unreadable labels or decals.

10. Verify that the machine and welding circuit is properly grounded.

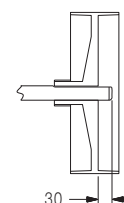
**FIGURE C.1 SPARK GAP**



RIGHT SIDE OF MACHINE

**FAN MOTOR OR FAN BLADE REPLACEMENT**

When installing a new fan blade or fan motor be sure to maintain proper shaft spacing per Figure C.2 below.



**Figure C.2**

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## HOW TO USE TROUBLESHOOTING GUIDE

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### WARNING

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

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

***Step 1. LOCATE PROBLEM (SYMPTOM).***

Look under the column labeled “PROBLEM (SYMPTOMS)”. This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

***Step 2. POSSIBLE CAUSE.***

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

***Step 3. RECOMMENDED COURSE OF ACTION***

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

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

### CAUTION

**DO NOT** use a volt-ohm meter to measure output voltages in TIG mode. The High Frequency Arc Starter voltage can damage the meter.

### 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.

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
Machine is Dead - No Output - No Fan	<ol style="list-style-type: none"> <li>1. Make certain that the input power switch is in the "ON" position and machine is plugged in.</li> <li>2. Check the input voltage at the machine. Input voltage must match the rating plate and voltage connection. Refer to Reconnect Procedure in the Installation section of this manual.</li> <li>3. Blown or missing fuses in input line.</li> </ol>	Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.
Fan runs - No output from machine in either Stick or TIG modes.	<ol style="list-style-type: none"> <li>1. Check for proper input voltages per nameplate and voltage reconnection.</li> <li>2. Check to make sure polarity switch is not in between two positions.</li> </ol>	
Fan runs - No output from machine in either Stick or TIG modes and the yellow light on the control panel is on.	<ol style="list-style-type: none"> <li>1. Welding application may have exceed the recommended duty cycle. Allow the unit to run until the fan cools the unit and the yellow light goes out.</li> </ol>	
Machine does not respond (no gas flow, no high frequency and no open circuit voltage) when arc start switch or Amptrol is activated - fan is working.	<ol style="list-style-type: none"> <li>1. Machine MUST be in the TIG Mode.</li> <li>2. The Amptrol may be defective. Check for continuity between pins "D" and "E" on cable connector when Amptrol is depressed.</li> </ol>	

**⚠ 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.

**SQUARE WAVE™ TIG 175**



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>OUTPUT PROBLEMS</b>		
<p>Machine regularly over heats - thermostat opens, Yellow light on front panel glows. The fan runs but machine has no output.</p>	<ol style="list-style-type: none"> <li>1. Welding application may exceed recommended duty cycle. Reduce the duty cycle.</li> <li>2. Dirt and dust may have clogged the cooling channels inside the machine. Blow out unit with clean, dry low pressure air.</li> <li>3. Air intake, brickwork and exhaust louvers may be blocked due to inadequate clearance around machine.</li> </ol>	<p>Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.</p>

 **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.

SQUARE WAVE™ TIG 175



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>TIG MODE PROBLEMS</b>		
Machine output is intermittently lost. Gas flow and high frequency are also interrupted.	<ol style="list-style-type: none"> <li>1. Problem may be caused by high frequency interference. Make sure that the machine is grounded properly according to the installation instructions. If there are other high frequency sources in the area, make certain that they are grounded properly.</li> <li>2. Check Amptrol for proper operation and loose connections.</li> <li>3. Check for proper input voltage and proper voltage reconnection.</li> </ol>	Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.
Arc "Flutters" when TIG welding.	<ol style="list-style-type: none"> <li>1. Tungsten electrode may be too large in diameter for the current setting.</li> <li>2. Tungsten not "sharp" when welding in DC - mode.</li> <li>3. Gas shielding may be insufficient. Increase gas flow; reduce tungsten stickout beyond gas cup.</li> <li>4. Check for contaminated gas or leaks in the gas line, torch, or connections</li> <li>5. If a helium blend is used as a shielding gas, then reduce the percentage of helium.</li> </ol>	
Arc "Pulsates" when AC TIG welding.	<ol style="list-style-type: none"> <li>1. Micro Switch mounted on Polarity Switch is not opening in "AC" mode.</li> </ol>	

**⚠ CAUTION**

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**SQUARE WAVE™ TIG 175**

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>TIG WELDING PROBLEMS</b>		
Black areas along weld bead.	<ol style="list-style-type: none"> <li>1. Clean any oily or organic contamination from the work piece.</li> <li>2. Tungsten electrode may be contaminated. Replace or sharpen.</li> <li>3. Check for contaminated gas or leaks in the gas line, torch, or connections</li> <li>4. Gas shielding may be insufficient. Increase gas flow; reduce tungsten stickout beyond gas cup.</li> </ol>	Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.
Weak high frequency - machine has normal welding output.	<ol style="list-style-type: none"> <li>1. Check for poor connections in the welding circuit.</li> <li>2. Gas shielding may be insufficient. Increase gas flow; reduce tungsten stickout beyond gas cup.</li> <li>3. Check for work and electrode cables in poor condition allowing high frequency to "Leak Off".</li> <li>4. Keep cables as short as possible.</li> <li>5. Check Spark Gap operation and setting (0.015")</li> </ol>	
High frequency "spark" is present at tungsten electrode, but operator is unable to establish a welding arc. Machine has normal open circuit voltage (refer to <b>Technical Specifications</b> in the Installation Chapter).	<ol style="list-style-type: none"> <li>1. The tungsten electrode may be contaminated. Replace or sharpen.</li> <li>2. The current control may be set too low.</li> <li>3. The tungsten electrode may be too large for the process.</li> <li>4. If a helium blend is used as a shielding gas, then reduce the percentage of helium.</li> </ol>	

 **CAUTION**

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SQUARE WAVE™ TIG 175



Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>TIG WELDING PROBLEMS</b>		
No high frequency. Machine is in the TIG Mode and has normal output.	1. If the machine location is in a highly dirty environment with conductive contaminants, check and clean the spark gap with a low pressure air stream per the maintenance instructions.	Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.
No gas flow when Amptrol is activated in the TIG Mode. Machine has output - fan runs. A "Click" can be heard indicating that the gas solenoid valve is operating.	<ol style="list-style-type: none"> <li>1. Gas supply is empty or not turned on.</li> <li>2. Flow regulator may be set too low.</li> <li>3. Gas hose may be pinched.</li> <li>4. Gas flow may be blocked with dirt. Check filter screen inside gas inlet fitting to solenoid valve. Use filters to prevent recurrence.</li> <li>5. Consult your local welder/gas distributor.</li> </ol>	
When AC TIG welding, the arc is erratic and there is a loss of "cleaning" of the work piece.	<ol style="list-style-type: none"> <li>1. Tungsten electrode may be too small for process. Use a larger diameter tungsten or a pure tungsten.</li> <li>2. If a helium blend is used as a shielding gas, then reduce the percentage of helium.</li> </ol>	
The end of the tungsten electrode melts away.	1. The welding current is too high for the electrode type and/or size. See the Table B.1 in the Operation Section of this manual.	

 **CAUTION**

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**SQUARE WAVE™ TIG 175**





Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
<b>STICK WELDING PROBLEMS</b>		
Stick electrode "Blasts Off" when arc is struck.	1. Weld current may be set too high for electrode size. Reduce current control setting, or use a larger diameter electrode.	Contact your <b>Local Lincoln Authorized Field Service Facility</b> for technical troubleshooting assistance.
Stick electrode "sticks" in the weld puddle.	1. The weld current may be set too low. Increase the current control setting or use a smaller diameter electrode.	

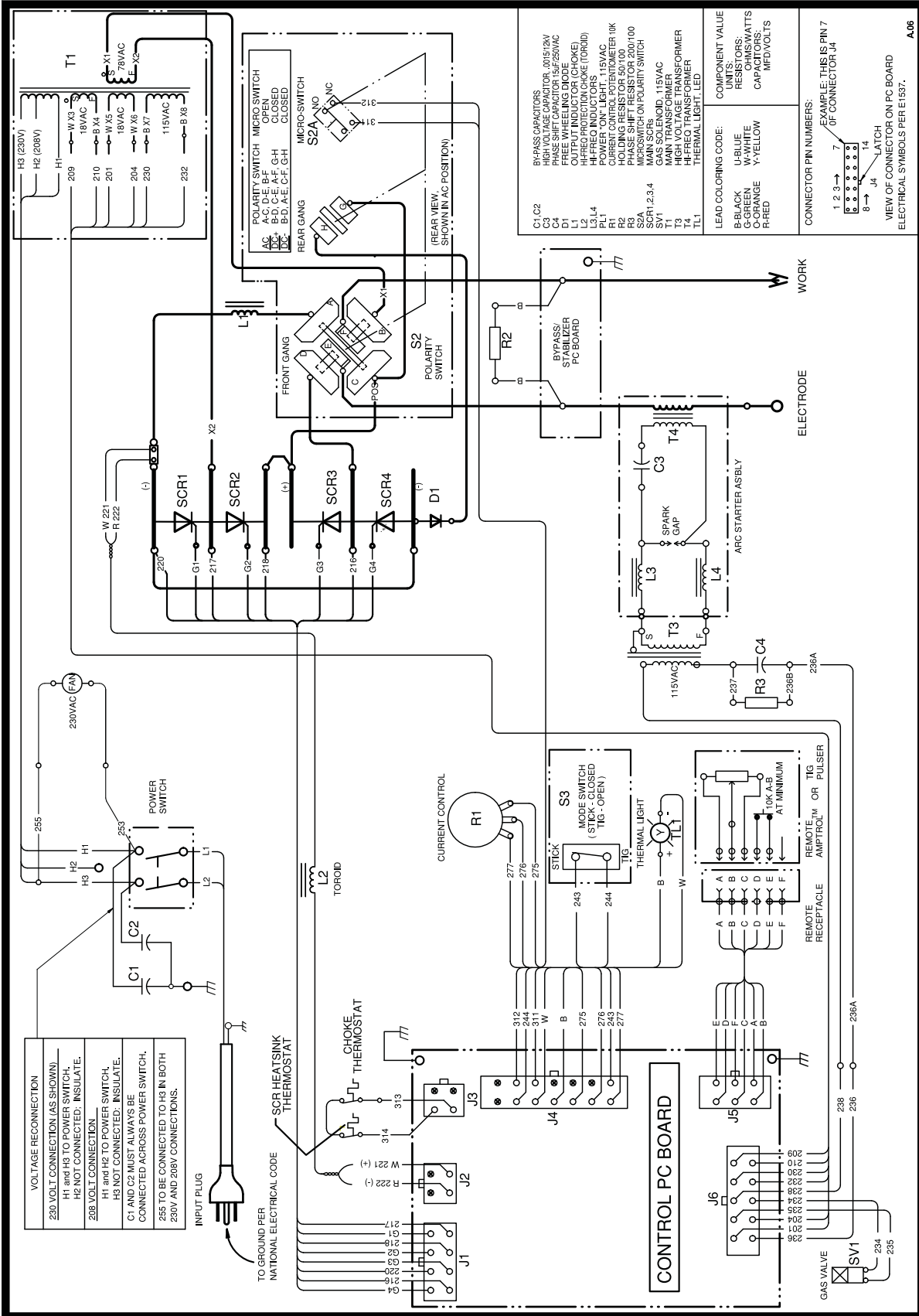
 **CAUTION**

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SQUARE WAVE™ TIG 175



## WIRING DIAGRAM - SQUARE WAVE TIG 175 FOR CODE 11691

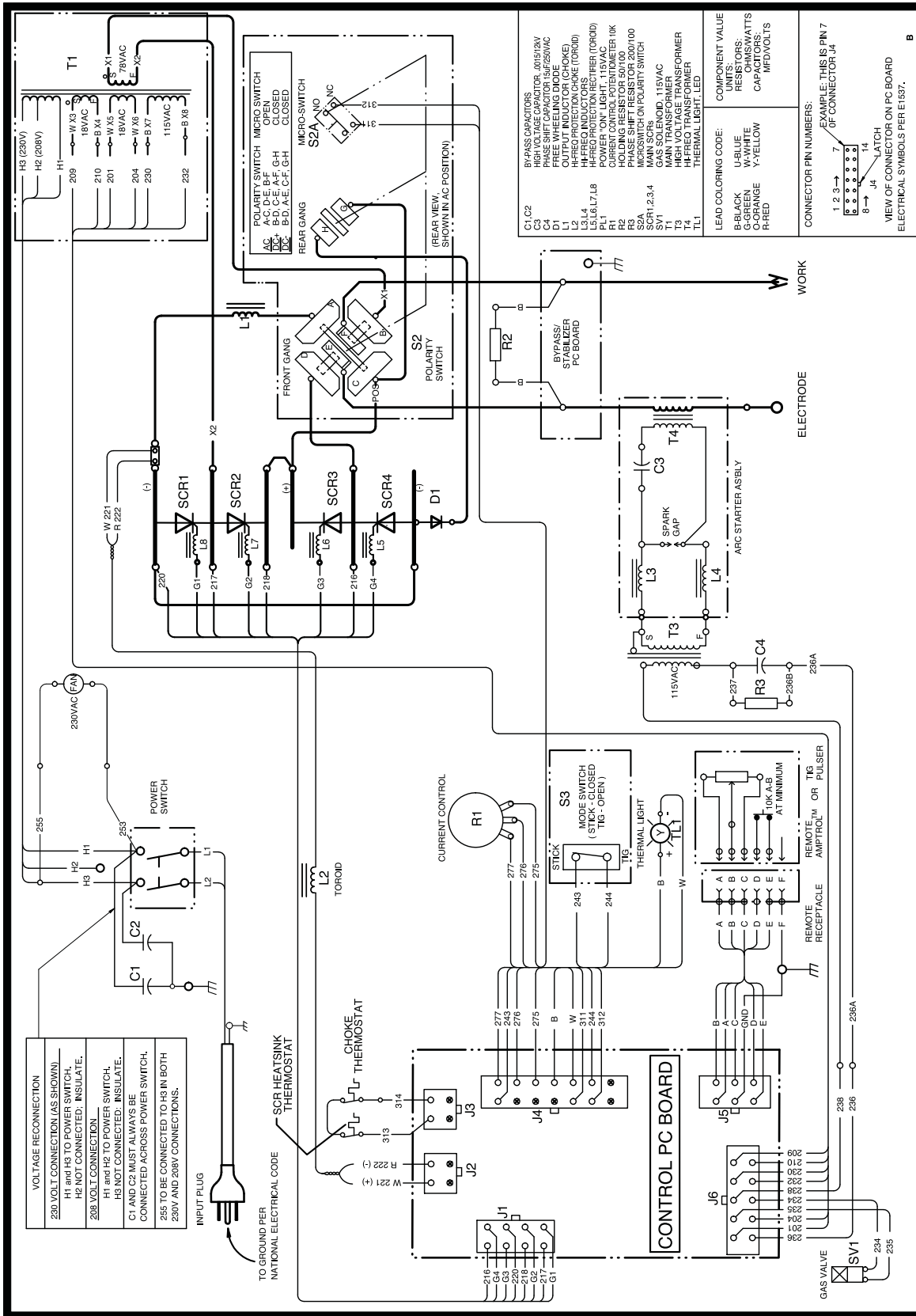


**L15798**

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



WIRING DIAGRAM - SQUARE WAVE TIG 175 FOR CODE 11826



L15798-1

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

SQUARE WAVE™ TIG 175



			
<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>● ヒュームから頭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で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>● 儀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>● ابعد 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>● اقطع التيار الكهربائي قبل القيام بأية صيانة.</li> </ul>	<ul style="list-style-type: none"> <li>● لا تشغيل هذا الجهاز اذا 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.

			
<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>● Aíslese 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>● Protéjase 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触带电部件及焊条。</li> <li>● 使你自已与地面和工作件绝缘。</li> </ul>	<ul style="list-style-type: none"> <li>● 把一切易燃物品移离工作场所。</li> </ul>	<ul style="list-style-type: none"> <li>● 佩戴眼、耳及身体劳动保护用具。</li> </ul>
Korean <b>위험</b>	<ul style="list-style-type: none"> <li>● 전도체나 용접봉을 젖은 형갑 또는 피부로 절대 접촉치 마십시오.</li> <li>● 모재와 접지를 접촉치 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 인화성 물질을 접근시키지 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 눈, 귀와 몸에 보호장구를 착용하십시오.</li> </ul>
Arabic <b>تحذير</b>	<ul style="list-style-type: none"> <li>● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسدك 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.



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