HI-FREQ™

IM362-A

January,2000

For use with HI-FREQ units with Code Numbers above: **9000**

For Codes 8001 through 8999 see IM298-A
For Codes below 8000 see IM238-B

IM362
January 2000
Hi-Freq Kit
9286; 10331; 10367

HIGH FREQUENCY GENERATOR FOR TIG WELDING APPLICATIONS

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This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

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

OPERATOR'S MANUAL

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

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

FOR ENGINE powered equipment.

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

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

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

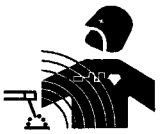
1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

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

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

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

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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

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

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

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ELECTRIC SHOCK can kill.

3.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

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

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

ARC RAYS can burn.

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

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

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

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

5.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.e. Also see item 1.b.

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WELDING SPARKS can cause fire or explosion.

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

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

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

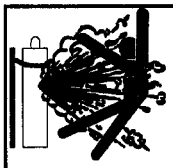
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe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

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

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

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

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

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

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

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Mar. '93

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

Please Examine Carton and Equipment For Damage Immediately

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

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

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

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

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

⚠ WARNING

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

⚠ CAUTION

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

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SPECIFICATIONS

Model	Hi-Freq
Type	K799-[ ]
Output Rating @ 60 Cy. Amperes Volts Duty Cycle	50/60 Hz 250 AC & DC 80%
Max. O.C.V. (from welding power source)	60-100 V
Input Power Standard Voltages	115/1/50/60
Rated Current Input (115 V)	1.3 amp.
Net Weight	23 lbs. (10.5 kg)

PRODUCT DESCRIPTION

The purpose of the Hi-Freq Unit is to provide high frequency and shielding gas control for GTAW (TIG) welding applications. It can be used with any AC or AC/DC constant current welding power source rated 250 amps or higher, and having an open circuit voltage of 60 volts or greater. This makes possible the joining of aluminum, stainless steel, copper, and other alloys through the TIG welding process, using power sources normally designed for SMAW welding.

RECOMMENDED PROCESSES AND EQUIPMENT

Recommended for TIG welding with AC or AC/DC constant current welding power sources rated 250 amps or higher, and having an open circuit voltage of 60 volts or greater, excluding inverter power sources. This includes transformer, transformer/rectifier, and engine driven power sources with constant current output capability.

NOTE: See the "For Safety and High Frequency Interference Protection" section below for the installation recommendations needed for safety and high frequency interference protection.

FOR SAFETY AND HIGH FREQUENCY INTERFERENCE PROTECTION

This Hi-Freq unit has been tested and found to comply with the F.C.C. tentatively allowable limits. However, since the spark gap oscillator in the unit is similar to a radio transmitter, improper 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 Hi-Freq, (2) direct interference radiated from the welding leads, (3) direct interference radiated from feedback 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 power source input 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 retard high frequency leakage.

5. The work terminal must be connected to a ground within 10 feet of the welder, using one of the following methods:

   a. A metal underground water pipe in direct contact with the earth for 10 feet or more.

   b. A 3/4" galvanized pipe or conduit or a 5/8" solid iron or steel rod driven at least 8 feet into the ground.

The ground connection 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 or a long pipe system can result in re-radiation, effectively making these members radiating antennas.

NOTE: The welder frame **MUST** also be grounded. The work terminal ground does not ground the welder frame.

6. When the Hi-Freq is in operation, keep all covers securely fastened in place to minimize radiated interference.

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 building enclosing the welding area is metallic, several good electrical driven grounds 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. A certificate is shipped with each Hi-Freq for the convenience of owners who are required to obtain a certification of compliance to the F.C.C. limits.

INSTALLATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Turn the power source input power off at the disconnect switch or stop the engine before installation.**
- **Only qualified personnel should perform this installation.**
- **Connect the Hi-Freq unit grounding terminal located on the rear of the case to a good electrical earth ground.**

INPUT CONNECTION

When the Hi-Freq is to be used for DC TIG welding only, the 20' (6m) input cord can be plugged into any 115 volt grounding type receptacle. If it is to be used for AC TIG welding with a transformer welder, the input cord should be connected to the same phase as the welding power supply. Although the Hi-Freq will operate on a different phase, the AC TIG welding arc will be less stable. The best way to assure this in-phase relationship is to have a qualified electrician connect the input cord, properly fused, to a 115 volt source within the welder. In all Lincoln AC transformer welders 250 ampere and larger, this would be the supply leads to the fan motor.

When used for AC TIG welding with Lincoln Weldanpower and Ranger units, the Power Source Matching Switch on the rear of the Hi-Freq unit must be set to the proper position, Position "A," as noted on the decal on the rear of the unit. Use Position "B" with Lincoln transformer welders. The switch may be set to Position "A" or "B" for DC TIG welding.

The Hi-Freq enclosure must be connected to a driven ground by means of a grounding lead connection screw provided on the rear side of the enclosure.

OUTPUT CONNECTIONS

⚠ WARNING

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

⚠ CAUTION

The high frequency bypass network supplied with each Hi-Freq must be installed in the welding power source per instructions provided. Failure to do this may result in malfunction or damage to the welding power source.

The customer is responsible for providing a cable to run between the rear output terminal on the Hi-Freq unit and the electrode terminal of the power source. The recommended cable size for 250 amps, 80% duty cycle is #1 (50 mm2) or larger.

The power source work terminal, the "work terminal voltage sensing lead" from the Hi-Freq unit, and the workpiece should all be connected together. The voltage sensing lead can be connected to either the power source or the workpiece. Again, a #1 or larger work cable is recommended. The work connection, along with the cases of the Hi-Freq unit and the power source, should be connected to a driven ground rod, as described in the section "For Safety and High Frequency Interference Protection".

TIG TORCH CONNECTION

TIG torches come with 12.5 ft. (3.8 m) and 25 ft. (7.6 m) cables. Use the shorter length whenever possible to minimize possible high frequency interference problems. With the Hi Freq unit, power source (or engine) off, connect the TIG torch to the front output terminal on the Hi-Freq unit.

TIG torches include the necessary gas, and, when designed for water cooling, water hoses. Connect the fittings to those on the Hi-Freq unit. Any torch conforming to Compressed Gas Association (CGA) standards can be connected. The fittings have the following threads: Gas valve, inlet and outlet, 5/8-18 right-hand female; optional valve water inlet and outlet, 5/8-18 left hand female.

⚠ WARNING

Observe the safety precautions necessary for handling and using compressed gas containers. Contact your supplier for specific information.

The cylinder of inert shielding gas must be equipped with a pressure regulator and flowmeter. Install a hose between the flowmeter and the gas inlet on the Hi-Freq unit.

DO NOT operate a water cooled TIG torch unless water is flowing. Install the optional K844-1 Water Valve Kit if using a water-cooled torch. Installation instructions are included with the K844-1.

If using a water-cooled torch with a Magnum water cooler, connect the cooler water outlet to the water valve inlet. Connect the TIG torch water inlet to the water valve outlet.

If using a water-cooled torch with a free-running water supply, install a strainer in the water supply line to prevent dirt particles from obstructing 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. Connect the torch water inlet to the water valve outlet. Use a non-metallic drain hose from the electrode connection to the drain.

INSTALLATION OF REQUIRED EQUIPMENT

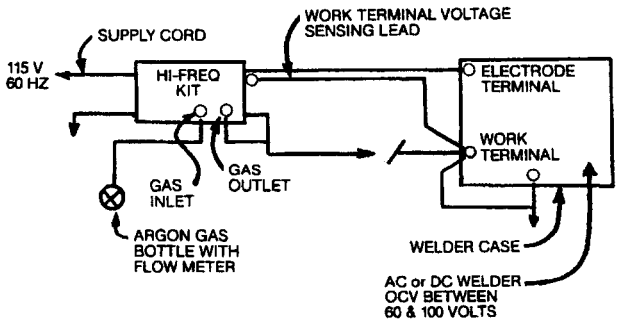
The Hi-Freq unit requires an Arc Start Switch (included with the Hi-Freq) for proper operation. The Arc Start Switch can be plugged directly into the front panel receptacle on the Hi-Freq.

INSTALLATION OF OPTIONAL EQUIPMENT

When used with power sources having remote current control capability, an Amptrol remote current control can be used to operate both the Hi-Freq unit as well as to control the power source output.

Use of an Amptrol requires either a K843 or a K915-1 Amptrol Adapter. The K843 Adapter is for power sources having terminal strip connections, while the K915-1 is for sources having a 6 pin remote control receptacle. Hook-up instructions are included with each adapter.

CONNECTION DIAGRAM



OPERATION

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**
- **Always wear dry insulating gloves.**

FUMES AND GASES can be dangerous.

- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

WELDING SPARKS can cause fire or explosion.

- **Keep flammable material away.**
- **Do not weld on containers that have held combustibles.**

ARC RAYS can burn.

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

OPERATING CONTROLS AND ADJUSTMENTS

Operating controls on the front of the Hi-Freq include the Power switch, Spark switch, and Afterflow timer. The power switch turns the input power to the Hi-Freq on and off. The Pilot Light will illuminate when the power is on.

The Spark switch is used to select from high frequency Off, Start Only, or Continuous. The Off position is used for scratch start TIG welding. Start Only is used for DC- TIG welding, when the high frequency is only needed to initially establish the arc. Continuous is used for AC TIG welding, when the high frequency is used to both the establish the arc and to stabilize the arc during welding.

The Afterflow timer controls how long the gas and optional water valves remain open after the weld is stopped. The dial is calibrated according to tungsten size. Match the dial setting with the tungsten diameter for proper cooling of the tungsten and TIG torch.

WELDING OPERATION

Turn on both the power source and the Hi-Freq unit. The power source output terminals must be "hot", or energized at all times when using the Hi-Freq. If the power source has a secondary contactor, it must be closed at all times.

Set the afterflow timer to correspond with the tungsten size being used and set the spark switch in the position desired. Position the torch to the workpiece and depress the Arc Start Switch. Gas will flow and approximately .5 seconds later the high frequency is turned on if the spark switch is in the "on" or "start only" positions. Once the welding arc is established, the Arc Start Switch button can be released. To break the welding arc, the torch must be withdrawn from the work. The gas will continue to flow until the preset afterflow time has elapsed.

Some transformer type welders have an AC stick welding arc stabilizer circuit. This is a capacitor and resistor connected in series across the welder output. When using a welder equipped with this stabilizer, the AC TIG welding arc may be rough. It is recommended that this stabilizer be disconnected when the welder is used for AC TIG welding.

OPERATION WITH K843 OR K915-1 AMPTROL ADAPTERS

When properly installed, the Amptrol Adapters allow remote adjustment of the power source output and operation of the Hi-Freq at the same time. When the Hand Amptrols are slightly extended, or the Foot Amptrol is slightly depressed, the arc start switches inside the Amptrols cause the Hi-Freq to operate, just as if an Arc Start Switch were connected. Further movement of the Amptrols will then increase the power source output. The arc must be broken by pulling the torch away from the work. Allow the Amptrols to return to their "resting", or minimum positions after each weld. This cycles the Hi Freq, preparing it for the next weld. Consult the Power Source Instruction Manual for the proper switch and control settings needed for remote output control.

TABLE 3
TYPICAL CURRENT RANGES [1] FOR TUNGSTEN ELECTRODES [2]

Tungsten Electrode Diameter in. (mm)	DCEN (-)	DCEP (+)	AC				Approximate Argon Gas Flow Rate C.F.H. (1/min.)		TIG Torch Nozzle Size [4], [5]
			Unbalanced Wave		Balanced Wave				
	1%, 2% Thoriated Tungsten	1%, 2% Thoriated Tungsten	Pure Tungsten	1%, 2% Thoriated Tungsten Zirconiated	Pure Tungsten	1%, 2% Thoriated Tungsten Zirconiated	Aluminum	Stainless Steel	
.010 (.25)	2-15	[3]	2-15	2-15	2-15	---	3-8 (2-4)	23-27 (11-13)	13-17 (6-8)
0.020 (.50)	5-20	[3]	5-15	5-20	10-20	5-20		28-32 (13-15)	18-22 (8-10)
0.040 (1.0)	15-80	[3]	10-60	15-80	20-30	20-60	5-10 (3-5)	3-8 (2-4)	23-27(11-13)
1/16 (1.6)	70-150	10-20	50-100	70-150	30-80	60-120	5-10 (3-5)	5-10 (3-5)	#4, #5, #6
3/32 (2.4)	150-250	15-30	100-160	140-235	60-130	100-180	5-10 (3-5)	5-10 (3-5)	
1/8 (3.2)	250-400	25-40	150-210	225-325	100-180	160-250	13-17 (6-8)	9-13 (4-6)	#5, #6
5/32 (4.0)	400-500	40-55	200-275	300-400	100-240	200-320	15-23 (7-11)		
3/16 (4.8)	500-750	55-80	250-350	400-500	190-300	290-390	21-25 (10-12)	11-15 (5-7)	#6, #7, #8
1/4 (6.4)	750-1000	80-125	325-450	500-630	250-400	340-525		11-15 (5-7)	

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

(2) 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.

(3) DCEP is not commonly used in these sizes.

(4) TIG torch nozzle "sizes" are in multiples of 1/16ths of an inch:
#4 = 1/4 in. (6 mm)
#5 = 5/16 in. (8 mm)
#6 = 3/8 in. (10 mm)
#7 = 7/16 in. (11 mm)
#8 = 1/2 in. (12.5 mm)
#10 = 5/8 in. (16 mm)

(5) TIG torch nozzles are typically made from alumina ceramic. Special applications may require lava nozzles, which are less prone to breakage, but cannot withstand high temperatures and high duty cycles.

OPTIONAL ACCESSORIES

K844-1 WATER VALVE KIT — Field installed kit which includes solenoid valve and fittings. If using a water-cooled torch with a free-running water supply, install the optional Water Valve Kit. Install a water line between the Hi-Freq water inlet and the supply. 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. Connect the torch water line to the Hi-Freq "Water Outlet" fitting. Use a nonmetallic drain line from the electrode connection to the drain or water recirculating pump.

DO NOT operate a water cooled TIG torch unless water is flowing. Install the optional K844-1 Water Valve Kit if using a water-cooled torch. Installation instructions are included with the K844-1.

When using a Magnum water cooler, the K844-1 Water Valve Kit should be installed for maximum life and performance from the Magnum cooler. See the instructions included with the Magnum cooler for hookup details.

If using a water-cooled torch with a water recirculator other than a Magnum cooler, connect the recirculator water outlet directly to the torch water hose. Do not install the optional Water Valve Kit; the Hi-Freq water valve would unnecessarily stop the recirculator water flow, possibly damaging the recirculator pump.

DO NOT operate a water-cooled torch unless water is flowing.

K902-1 or K902-2 Mounting Bracket kits - Contain all the necessary mounting parts to mount the Hi-Freq to various Lincoln engine welders. Consult your distributor for the correct kit to order for your application.

AMPTROL ADAPTERS

Note: When using an R3R, DC-250, DC-400, or WP-250 D10 (units with remote option) with the Hi-Freq kit plus an Amptrol, the K843 Amptrol Adapter is required.

A K775 remote control may be used in conjunction with the amptrol as a current limiter. Connection diagrams are included with the amptrol adapter.

K843 Amptrol Adapter Kit - Adapts amptrol's 6 pin MS-type (Amphenol) plug connection to power sources with terminal strip connection.

K915-1 Amptrol Adapter Kit - ("Y" Cable) Allows an amptrol to operate a Hi-Freq unit while remotely controlling the output current of a Lincoln power source. Consists of a 6 pin MS-type (Amphenol) receptacle which splits into 6 pin and 5 pin MS-type (Amphenol) plugs which connect to power source and Hi-Freq respectively.

AMPTROLS

Hand Amptrol (K963) — Fastens to the torch for fingertip control.

Foot Amptrol (K870) — Depress pedal to increase current.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Have qualified personnel install and service this equipment.**
- **Disconnect the Hi-Freq Kit input cord from its supply, and turn the power source input power off at the fuse box, or turn off the engine welder before working on the Hi-Freq Kit.**
- **Do not touch electrically hot parts.**

Maintenance required involves the spark gap. If the spark intensity drops to a level too low for satisfactory performance, most likely the air gap between the spark gap electrodes is too large. Before removing the Hi-Freq cover to do any work within the unit, disconnect the supply cord from the 115 volt source and turn off the welding power source. The air gap between the spark gap electrodes should be reset for .015" and the surfaces should be parallel to produce a uniform spark of the proper intensity.

⚠ WARNING

Disregarding the supply power disconnect recommendations can be hazardous with approximately 5,000 volts across the high voltage transformer secondary.

PROTECTIVE CIRCUITRY

The Hi-Freq unit contains protective circuitry which prevents the loss of shielding gas when the power source is turned off.

If the Hi-Freq unit does not respond when the Arc Start Switch is depressed (no gas flows, no high frequency is present) first check to see if the power source is on and that there are between 60 and 100 open circuit volts present at the power source output studs. If there is OCV present, next check that the "work terminal voltage sensing lead" from the Hi-Freq is connected to the workpiece. Lastly, check the entire gas system, from the bottle to the Hi-Freq, for leaks or obstructions.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause.

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

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically hot parts.**
- **Have qualified personnel install and service this equipment.**
- **Disconnect the Hi-Freq Kit input cord from its supply, and turn the power source input power off at the fuse box, or turn off the engine welder before working on the Hi-Freq Kit.**

⚠ CAUTION

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

Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
Hi-Frequency weak, not present, or intermittent.	Spark gap too large.	Set for .015" (.4 mm) air gap.
	H.F. being internally grounded in unit.	Check H.F. circuit for grounds and check bypass capacitors and leads.
	Spark switch in wrong position.	Check switch position.
	Faulty 115V supply.	a. Check input voltage. b. Check wiring to "Power Source Matching Switch" and high voltage transformer primary.
	Faulty PC board.	Replace PC board.
	High voltage transformer failure.	Check transformer primary and secondary for open or short condition.
Gas not turning on or off properly or no gas.	Hi-Freq not properly connected to welder.	Check connections and check for break in work voltage sensing lead.
	Afterflow timer set incorrectly.	Adjust timer for proper setting.
	Faulty gas valve.	Check voltage at valve and replace valve if necessary.
	No gas.	Check gas bottle for pressure and replace bottle if empty.
	Timer or arc voltage sensing circuit inoperative.	Check connections to PC board and, if OK, replace PC board.
Hi-Frequency set at "start only" but remains on for entire weld.	Faulty arc voltage sensing circuit.	Check connections to PC board and, if OK, replace PC board.
Hi-Frequency set for "on" but goes off when the arc start switch on the torch is released while welding.	Faulty interlock circuit.	Check connections to PC board and, if OK, replace PC board.

⚠ CAUTION

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

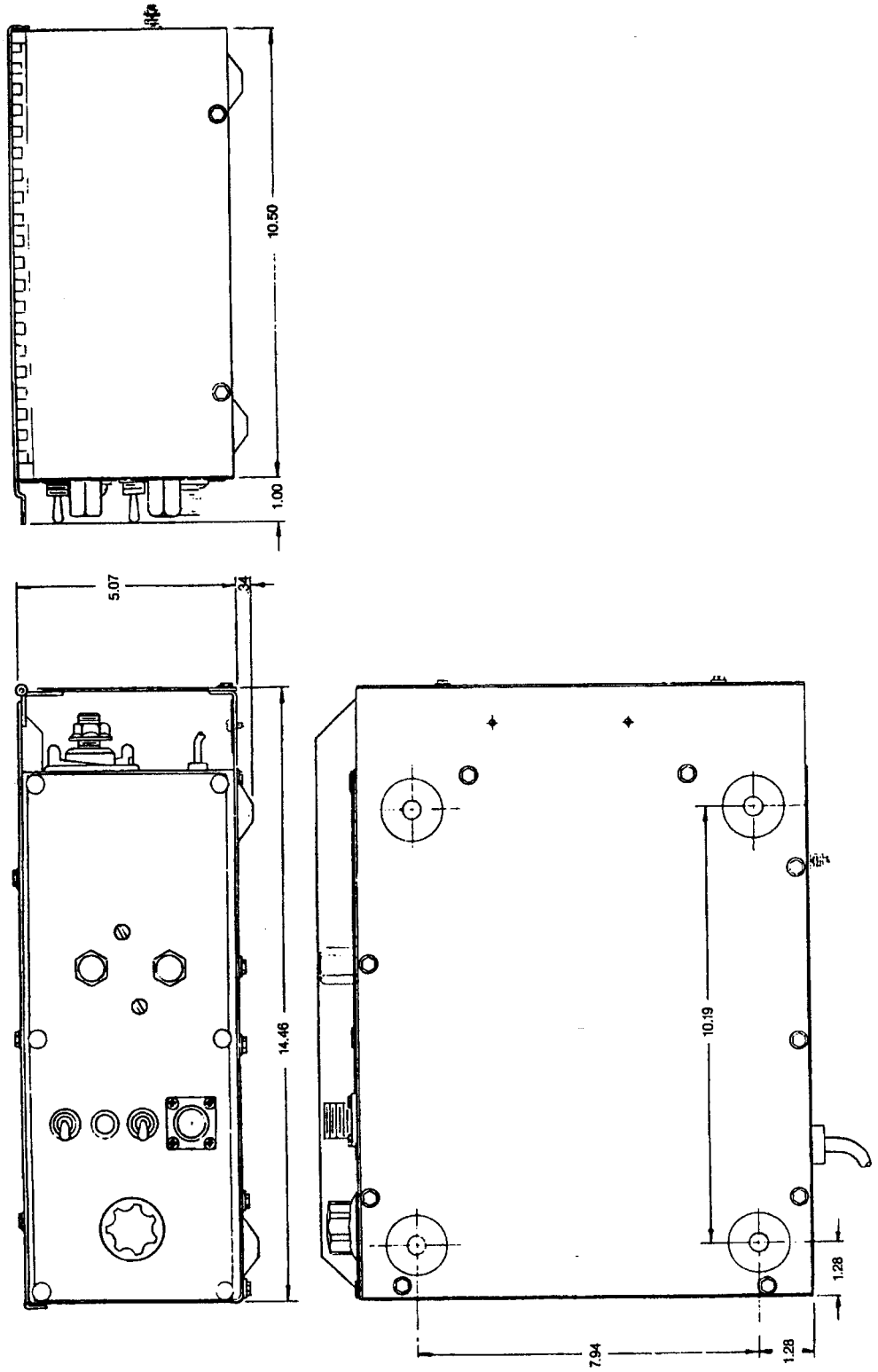
Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
No gas preflow.	Faulty preflow timer.	Check connections to PC board and, if OK, replace PC board.
Excessive tungsten erosion, arc is unstable (AC only) or unsatisfactory weld "cleaning".	Wrong phase relationship between welder output and Hi-Freq input.	a. Check for proper position of "Power Source Matching Switch." b. Connect 115 volt supply lead to 115 volt source within welder.
	Stabilizer capacitor or resistor is faulty or circuit is open.	Check.
When attempting to weld high frequency spark jumps from electrode to work but arc does not establish.	Improper tungsten type or size.	Use a thoriated tungsten of proper size and adjust gas flow to proper value. (See operating manual for information.)
	Contaminated tungsten.	Clean or dress tip of tungsten properly.

⚠ 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.

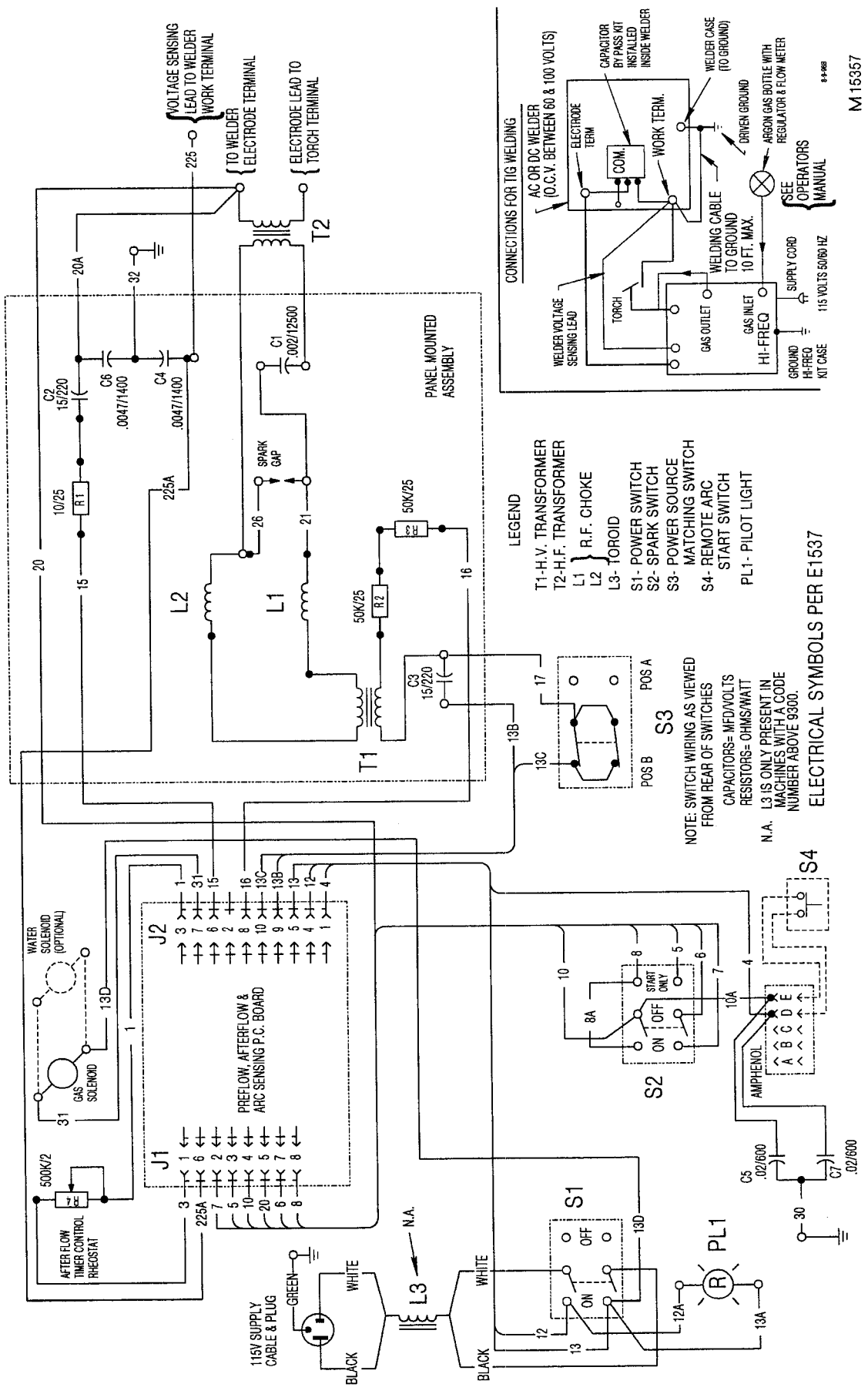
HI-FREQ DIMENSION PRINT



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.

LINCOLN ELECTRIC

HI-FREQ WIRING DIAGRAM



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

LINCOLN ELECTRIC

PARTS LISTS FOR

HI-FREQ™

High Frequency Generator for TIG Welding Applications

This parts list is provided as an informative guide only.

This information was accurate at the time of printing. However, since these pages are regularly updated in Lincoln Electric's official Parts Book (BK-34), always check with your Lincoln parts supplier for the latest parts information.

LINCOLN ELECTRIC

P-128-A.1

K-799-1
(Above Code 8000)
For Codes: 8001 to 10367
Model Index

NUMBERS IN THE TABLE BELOW INDICATE WHICH COLUMN TO USE IN EACH PARTS LIST FOR EACH INDIVIDUAL CODE NUMBER

DO NOT attempt to use this Parts List for machine if its code number is not listed. Contact the Service Department for any code numbers not listed. (Only those suffixes which require distinction form the basic codes are shown.)

PARTS LIST TITLES	OPTIONAL EQUIPMENT	MISCELLANEOUS ITEMS	GENERAL ASSEMBLY (CODES 8001 & 8326 ONLY)	SPARK GAP PANEL ASSEMBLY	GENERAL ASSEMBLY (BETWEEN CODE 8600 & 9000)	GENERAL ASSEMBLY (ABOVE CODE 9000)	PANEL MOUNTED ASSEMBLY	FOOT AMPTROL (K-772-FA)	HAND AMPTROL (K-771-HA)		
PARTS LIST NO. →	P-128-B.1	P-128-B.2	P-128-C	P-128-D	P-128-E	P-128-F	P-128-G	P-66-J #	P-66-K		
CODE NO. ↓											
8001			1	1	•	•	•	SEE P-66-J.2 Note 3	SEE P-66-K Note 3		
8326			1	1	•	•	•				
8634			•	•	1	•	•				
8769			•	•	1	•	•				
8769-X			•	•	1	•	•				
9286			•	•	•	1	1				
10367			•	•	•	1	1				

P-128-B.1

OPTIONAL EQUIPMENT LISTING

(Miscellaneous Options Available for your machine are listed below)

(R3R-300 Welders Only)

Hi-Freq. with Remote Amptrol Capability
(Must be ordered with hand or foot amptrol) . . . . . Order K-799-AA
Hand Amptrol . . . . . Order K771-HA
Foot Amptrol . . . . . Order K-772-FA

(R3R, DC-250 & DC-400 Welders)

Hand Amptrol . . . . . Order K812
Foot Amptrol . . . . . Order K813
Amptrol Adapter Kit . . . . . Order K843

Water Valve (Tig 250 Only) . . . . . Order K801
Water Valve (Other Machines) . . . . . Order K844
Arc Start Switch (Below Code 9000 & 10367) . . . . . Order K773 #
Arc Start Switch (Above Code 9000) . . . . . Order K814

# Indicates a Change This Printing

P-128-B.2

MISCELLANEOUS ITEMS

(These Items Are Not Illustrated)

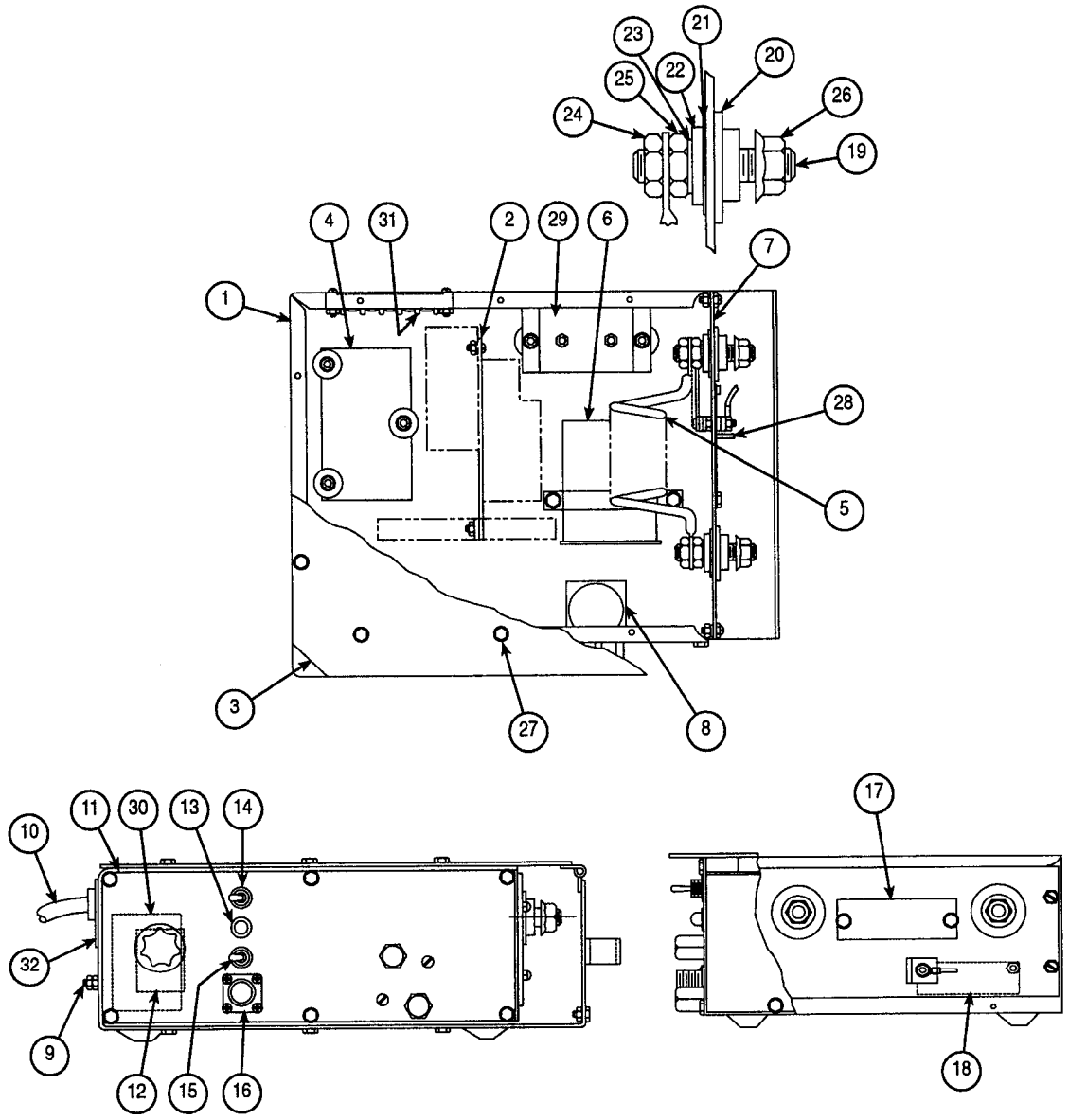
# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9	
	Arc Start Switch Assembly	K773	1	X									#
	By-Pass Capacitor (Below Code 8700 & 8769-X Only)	T11577-52A	1	X									#
	Suppressor Assembly (Code 8769-X Only)	S17452	1	X									
	RF Bypass Capacitor Kit	T12246	1	X									
	Mounting Bracket	M14101-1	1	X									
	Mounting Bracket	M14101-1	1	X									
	Wiring Diagram (Code 8001)	M13651	1	X									
	Wiring Diagram (Code 8326)	M14061	1	X									
	Wiring Diagram (Code 8634, 8769, 8769-X)	M14348	1	X									
	Wiring Diagram (Code 9286, 10367)	M15357	1	X									

P-128-C

GENERAL ASSEMBLY
(Codes 8001 & 8326 Only)



L6368
9-29-81

P-128-C.1

# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

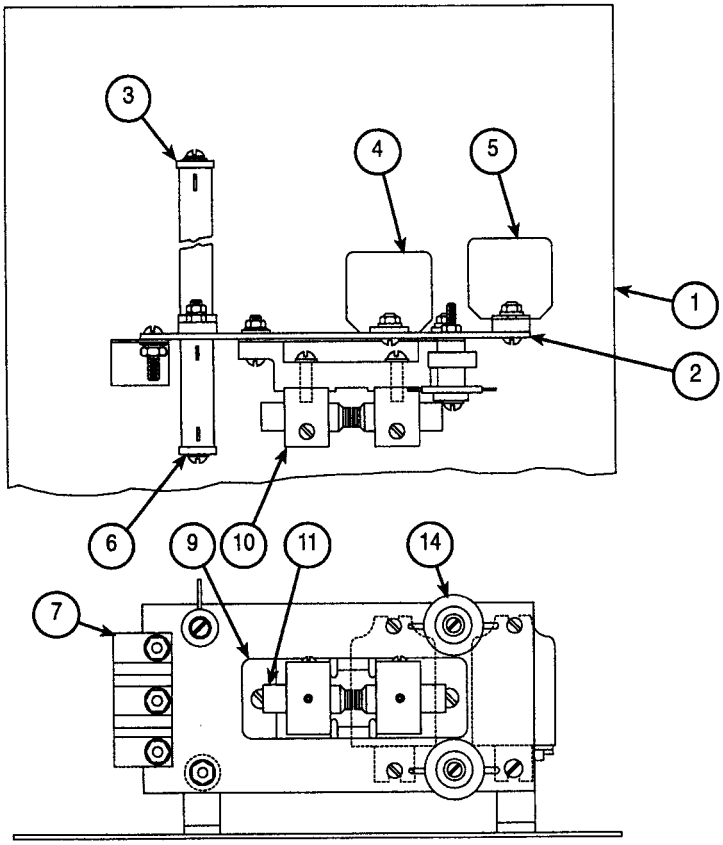
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9	
1	Case Wraparound (Code 8001)	L6366	1	X									
1	Case Wraparound (Code 8326)	L6021	1	X									
2	Spark Gap Panel Assembly	See P-128-D	1	X									
3	Top and Cover Assembly	M13648	1	X									
4	High Voltage Transformer (Code 8001)	S16324-2 Δ	1	X									#
4	High Voltage Transformer (Code 8326)	S16324-1	1	X									
5	High Frequency Transformer	S16328	1	X									
6	Capacitor	S10191	1	X									
	Mounting Strap	S10238-1	1	X									
7	Output Panel	S16334	1	X									
	Nylon Screw	T11545-3	4	X									
8	Gas Solenoid Valve Assembly	M11675-A	1	X									
	Female Connector (Right Hand Thread)	T11591-1	2	X									
10	Switch Lead and Plug	S15254-4	1	X									
11	Nameplate	M13612	1	X									
12	Insulation	T12792-1	1	X									
13	Pilot Light	T13486	1	X									
14	Power Switch	T10800-2	1	X									
15	Spark Switch	T10800-12	1	X									
16	Arc Start Amphenol	S13100-59	1	X									
17	Nameplate	T14262	1	X									
18	P.C. Board	S16370	1	X									
19	Stud	S11111	2	X									
20	Insulator	S10958-3	2	X									
21	Plain Washer	S9262-10	2	X									
22	Plain Washer	S9262-80	2	X									
23	Lock Washer	T9695-8	2	X									
24	Hex Jam Nut	1/2-13	2	X									
25	Brass Nut	T10114	2	X									
26	Output Stud Nut	S3960	2	X									
28	Terminal shield	T14321	1	X									
29	Capacitor	S11180	1	X									
30	After Flow Timer	M13782	1	X									
	Knob	T10491	1	X									
31	Terminal Strip (Code 8326)	S8542-9	1	X									
	Number Plate	S16888	1	X									
32	Plug Button (Code 8326)	T10397-6	1	X									

Δ **Contact DPNI (Dealer Parts Network Inc.) 1-800-558-1848**

LINCOLN ELECTRIC

P-128-D

SPARK GAP PANEL ASSEMBLY



L6045
6-29-79

P-128-D.1

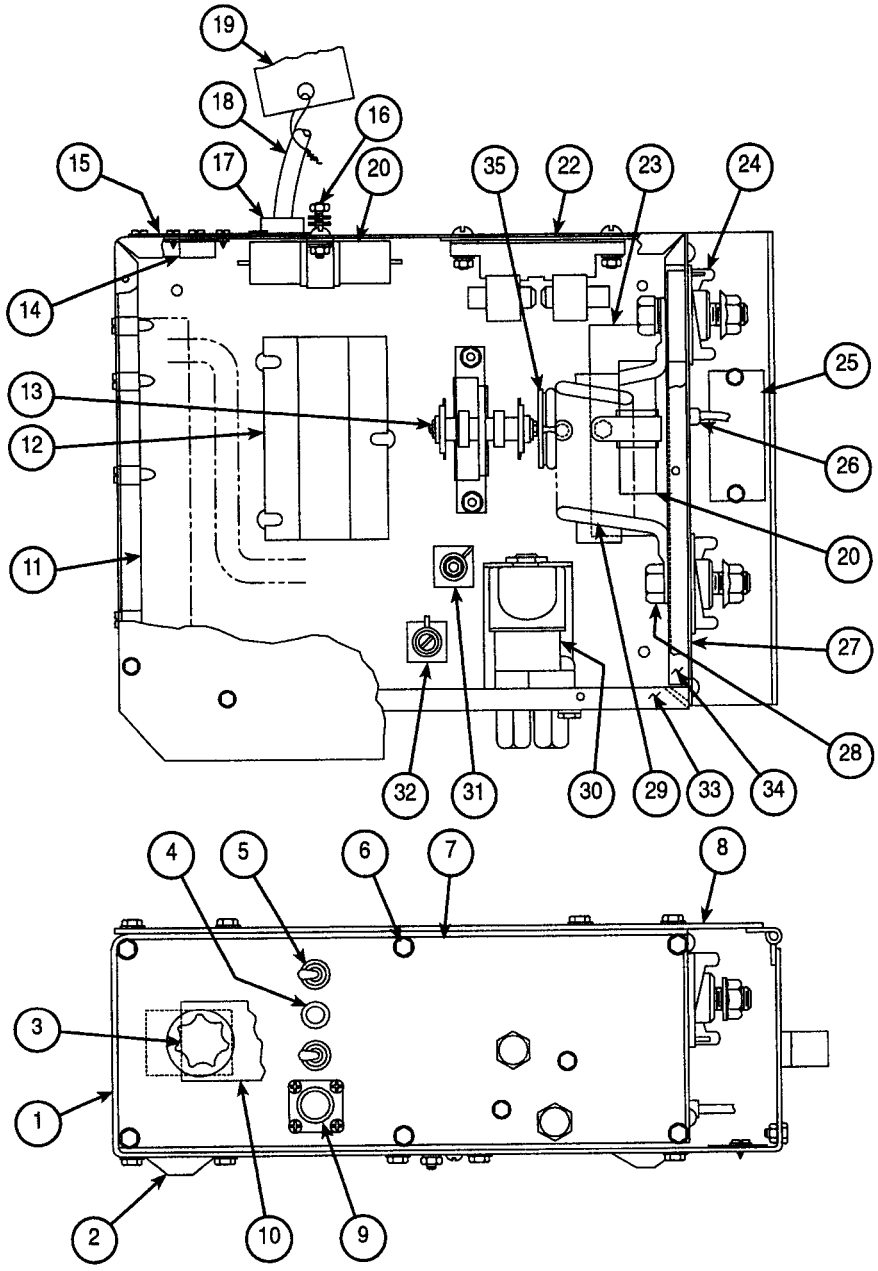
# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Spark Gap Panel Assembly, Includes:	L6045	1	X								
1	Base Welded Assembly	M13664	1	X								
2	Spark Gap Mounting Panel	S16337	1	X								
3	Resistor	S10404-53	1	X								
	Round Head Screw	#10-24 x 5.00	1	X								
4	Pilot Relay	S16322	1	X								
5	Interlock Relay	S16323	1	X								
6	Resistor	S10404-19	1	X								
	Round Head Screw	#8-32 x 2.75	1	X								
7	Terminal Barrier	S16340	1	X								
9	Spark Gap Base	M13724	1	X								
10	Spark Gap Support	T14264	2	X								
11	Electrode	T11236	2	X								
14	Radio Frequency Choke	T12218-1	2	X								

P-128-E

GENERAL ASSEMBLY
(Between Code 8600 & 9000)



L6681
10-25-83

P-128-E.1

# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Case Assembly	M14339	1	X								
2	Base	M14340	1	X								
3	Potentiometer - After Flow Timer (R3)	T1081293	1	X								
	Insulation	T12792-1	1	X								
	Knob	T10491	1	X								
4	Pilot Light	T13486	1	X								
5	Power Switch (SW1)	T10800-2	1	X								
6	Spark Switch (SW2)	T10800-22	1	X								
7	Nameplate	M13612	1	X								
	Self Tapping Screw	S8025-12	6	X								
8	Top and Cover Assembly (Code 8634)	M13648-1	1	X								
8	Shroud	G1808	1	X								
	Self Tapping Screw	S8025-70	9	X								
9	Amphenol (Below Code 8700 & 8769-X Only)	S12021-16	1	X								
9	Amphenol Assembly (Above Code 8700 Except 8769-X)	M14655	1	X								
	Amphenol	S12021-16	1	X								
	Capacitor	T11577-38	2	X								
	Self Tapping Screw	S8025-71	4	X								
10	Tag (Smoking)	T11590-90	1	X								
11	P.C. Board Assembly (Below Code 8700)	L6684	1	X								
11	P.C. Board Assembly (Above Code 8700)	L6684-3	1	X								
12	High Voltage Transformer Assembly (T1)	S16324-4	1	X								
	Round Head Screw	#10-24 x 1.00	3	X								
	Standoff	T14539	3	X								
	Lock Washer	E106-A1	3	X								
	Lock Washer	T9695-1	3	X								
	Hex Nut	#10-24	3	X								
13	Capacitor & R.F. Assembly, Includes:	S17572	1	X								
	Capacitor Assembly	S17571	1	X								
	R.F. Choke	T12218-1	2	X								
	Round Head Screw	#10-24 x .50	2	X								
	Plain Washer	S9262-27	2	X								
	Lock Washer	E106-A1	2	X								
	Hex Nut	#10-24	6	X								
14	Slide Switch	T14711-1	1	x								
	Self Tapping Screw	S8025-13	2	X								
15	Instruction Plate	S17223	1	X								
	Self Tapping Screw	S8025-13	3	X								
	Blind Rivet	T12584-3	1	X								
16	Thread Cutting Screw	S9225-36	1	X								
	Lock Washer	T9695-1	1	X								
	Plain Washer	S9262-27	2	X								
	Hex Nut	#10-24	2	X								
17	Grommet	T9274-3	1	X								
	Plain Washer	S9262-10	1	X								
18	Input Cable	S15254-6	1	X								
20	Capacitor (C2 & C3)	T11577-64	2	X								
	Clamp	T12563-14	2	X								
	Round Head Screw	#10-24 x .50	2	X								
	Plain Washer	S9262-27	2	X								

P-128-E.2

# Indicates a Change This Printing
* Recommended Spare Part

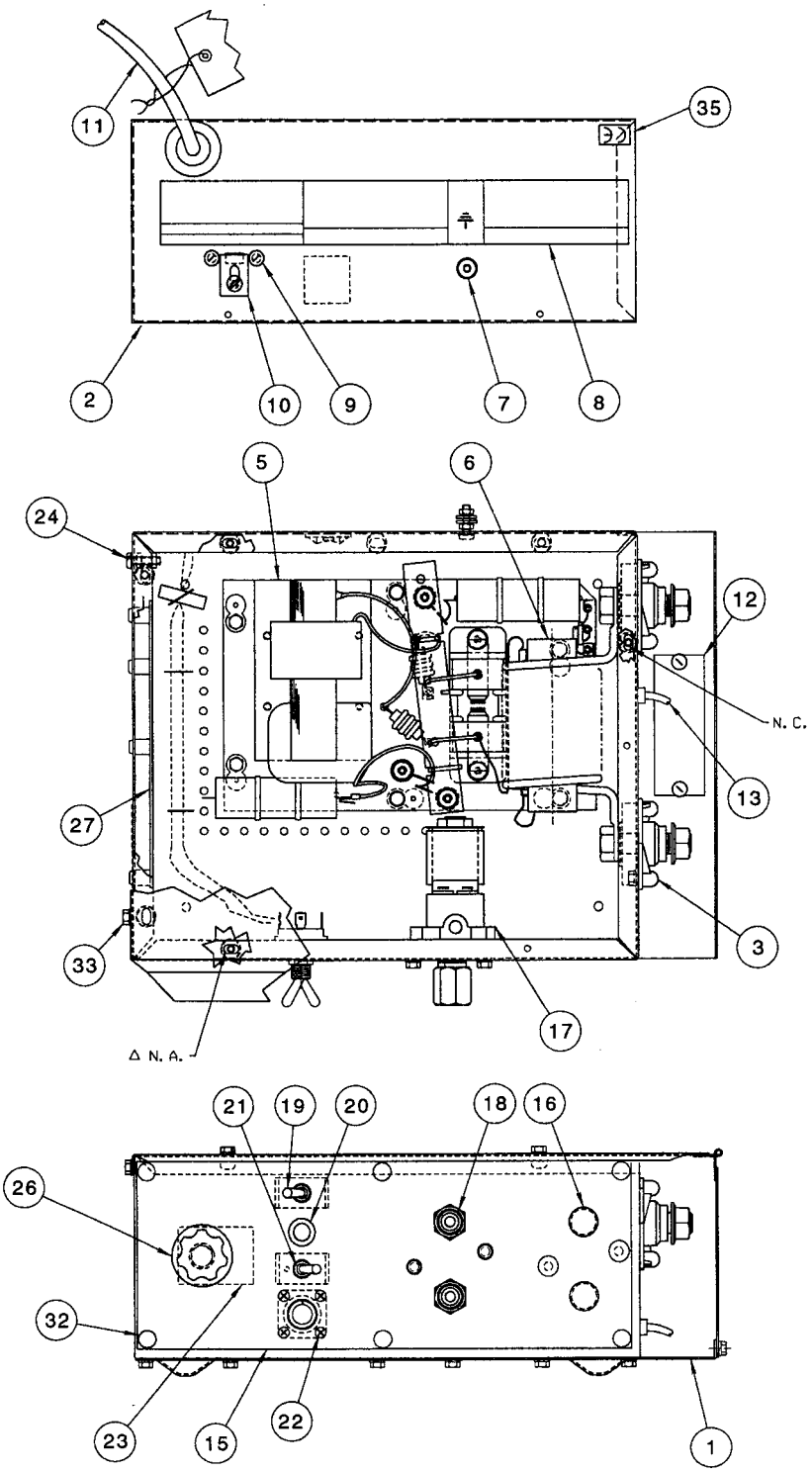
Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9	
	Lock Washer	E106A-1	2	X									
	Hex Nut	#10-24	2	X									
22	Spark Gap Assembly, Includes:	S16876	1	X									
	Spark Gap Base	M13724	1	X									
	Spark Gap Support	T14264	2	X									
	Electrode	T11236	2	X									
	Insulation	T8477-38	1	X									
	Round Head Screw	#10-24 x .75	2	X									
	Lock Washer	T9695-1	2	X									
	Plain Washer	S9262-27	2	X									
	Hex Nut	#10-24	2	X									
23	Insulation	T11472-23	1	X									
24	Output Terminal	T14166-9	2	X									#
25	Output Terminal Plate	T14709	1	X									
	Self Tapping Screw	S8025-20	2	X									
26	Grommet	T9274	1	X									
27	Output Terminal Insulation	S17218	1	X									
	Fastener Button	T14659	4	X									
28	Hex Head Cap Screw	1/2-13 x .625	2	X									
29	High Frequency Transformer (T2)	See Winding Specs	1	X									
30	Gas Solenoid Assembly	M14698-1	1	X									
	Sems Screw	S8025-55	2	X									
	Female Connector	T11591-1	2	X									
31	Resistor (R1)	S10404-19	1	X									
	Round Head Screw	#10-24 x 2.75	1	X									
	Insulating Washer	S10773-7	1	X									
	Insulating Washer	T4479-A	1	X									
	Plain Washer	S9262-27	1	X									
	Lock Washer	T9695-1	1	X									
	Hex Nut	#10-24	1	X									
32	Resistor (R2)	S10404-53	1	X									
	Round Head Screw	#10-24 x 5.00	1	X									
	Insulating Screw Washer	S10773-7	3	X									
	Insulating Washer	T4479-A	1	X									
	Lock Washer	T9695-1	1	X									
	Plain Washer	S9262-27	1	X									
	Hex Nut	#10-24	1	X									
33	Rubber Seal	E1852-.125-.500-12.50	2	X									
34	Rubber Seal	E1852-.125-.500-9.50	2	X									
35	By-Pass Assembly (C4) (C6)	T14725	1	X									
	Thread Cutting Screw	S9225-36	1	X									
	Plain Washer	S9262-27	1	X									
	Lock Washer	E106A-1	1	X									
	Hex Nut	#10-24	2	X									

NOTES

P-128-F

GENERAL ASSEMBLY
(Above Code 9000 Only)



L10505
8-9-96

P-128-F.1

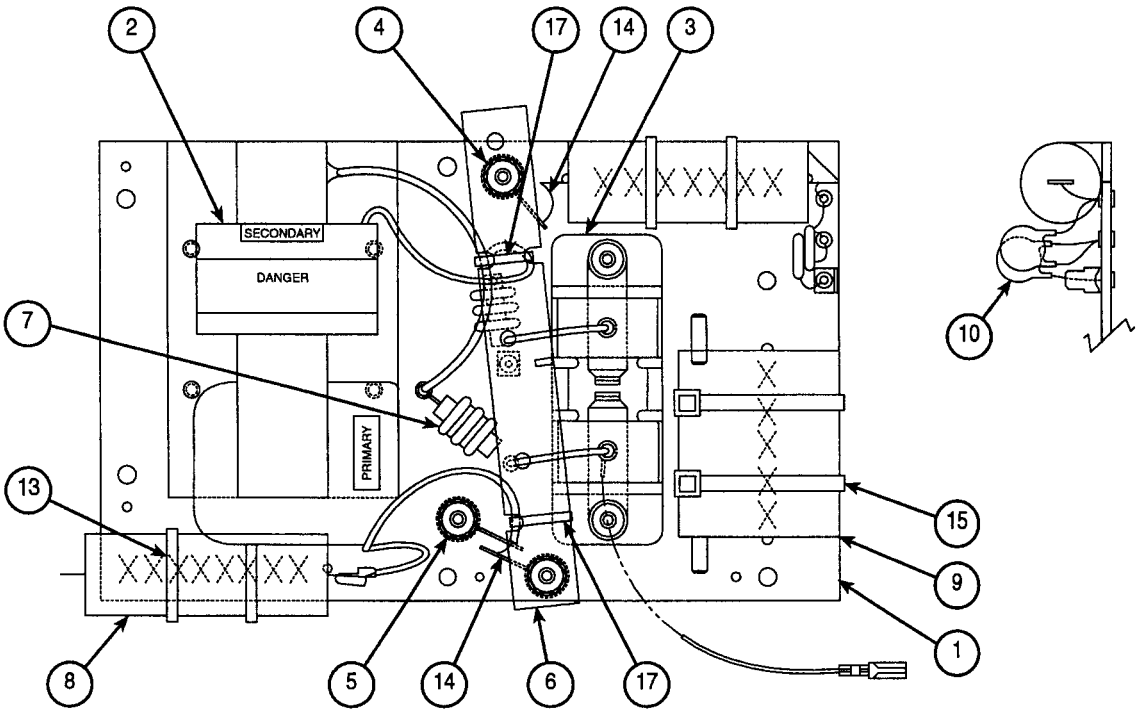
# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Base	M15344	1	X								
2	Case Welded Assembly	M15345	1	X								
3	Output Terminal Assembly	M13900-3	2	X								
	Self Tapping Screw	S8025-65	4	X								
5	Panel and Wiring Harness assembly	See P-128-G	1	X								
	Insulated Standoff	S18302	6	X								
	Self Tapping Screw	S8025-70	6	X								
6	Hi-Freq. Transformer (T2)	M15353	1	X								
	Hex Head Cap Screw	1/2-13 x .625	2	X								
7	Thread Forming Screw	S9225-36	1	X								
	Lock Washer	T9695-1	1	X								
	Plain Washer	s9262-27	2	X								
	Hex Nut	#10-24	2	X								
8	Instruction Decal	M15355	1	X								
9	Self Tapping Screw	S8025-13	2	X								
10	Switch Cover	T15173	1	X								
	Self Tapping Screw	S8025-55	1	X								
11	Input Cable (20 Foot Cord)	S15254-7	1	X								
11	Input Cable (42" Cord)	S15254-9	1	X								
	Plain Washer	S9262-10	1	X								
	Grommet	T9274-3	1	X								
12	Output Terminal Plate	T14709	1	X								
	Self Tapping Screw	S8025-20	2	X								
15	Nameplate	M15247	1	X								
16	Plug Button	T10397-7	2	X								
17	Solenoid Valve Assembly	M15222-1	1	X								
	Self Tapping Screw	S8025-55	2	X								
18	Female Connector	T11591-1	2	X								
19	Power Switch (SW1)	T10800-2	1	X								
20	Pilot Light	T13486	1	X								
21	Spark Switch (SW2)	T10800-22	1	X								
22	Self Tapping Screw	S8025-73	4	X								
23	Insulation	T12792-1	1	X								
24	Thread Forming screw	S9225-36	1	X								
	Hex Nut	#10-24	2	X								
26	Knob	T10491	1	X								
27	Control Printed Circuit Board Assembly	L7475-1	1	X								
	Self Tapping screw	S8025-71	6	X								
30	Top and Cover Assembly (all machines except WP-250-D10)	M15351	1	X								
30	Shroud (WP-250-D10 Only)	G1808	1	X								
	Self Tapping Screw	S8025-70	As Req'd	X								
32	Fastener Button	T14659-1	8	X								

P-128-G

PANEL MOUNTED ASSEMBLY



L7465
5-19-89B

P-128-G.1

# Indicates a Change This Printing
* Recommended Spare Part

Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Mounting Panel	M15352	1	X								
2	High Voltage Transformer Assembly (T1)	S18309	1	X								
3	Spark Gap Assembly, Includes:	S18310	1	X								
	Spark Gap Base	M13724	1	X								
	Spark Gap Support	T15171	2	X								
	Electrode	T11236	2	X								
	Round Head screw	#10-24 x .75	2	X								
	Plain Washer	S9262-27	2	X								
	Lock Washer	T9695-1	2	X								
	Hex Nut	#10-24	2	X								
4	Resistor (R1)	S10404-19	1	X								
	Round Head Screw	#10-24 x 2.50	1	X								
	Plain Washer	S9262-27	1	X								
	Lock Washer	T9695-1	1	X								
	Hex Nut	#10-24	1	X								
5	Resistor (R2 & R3)	T9560-4	2	X								
	Round Head Screw	#10-24 x 2.50	2	X								
	Plain Washer	S9262-27	2	X								
	Lock Washer	T9695-1	2	X								
	Hex Nut	#10-24	2	X								
6	Lead Stabilizer	S18307	1	X								
7	RF Choke	T12218-8	2	X								
8	Capacitor	T11577-64	2	X								
9	Capacitor (C1)	S11180-1	1	X								
10	Capacitor (C4 & C6)	T11577-52A	2	X								
	Items Not Illustrated - Part of Harness:											
	Slide Switch (S3)	T14711-1	1	X								
	Potentiometer (R4)	T10812-93	1	X								
	Amphenol & Lead Assembly, Includes:	M15364	1	X								
	Amphenol Connector	S12021-16	1	X								
	Capacitor	T11577-38	2	X								

NOTES

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

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

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

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

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

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