

# OPERATING MANUAL

## Hi-Freq<sup>™</sup> High Frequency Generator For TIG Welding Applications

IM298-A  
Hi-Freq  
8001;  
8326;  
8634;  
8769



Code 8001 to 8999  
(For older codes see IM-238-B.)  
(For codes 9000 and higher see IM-362)

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and the availability of optional features may have changed.

### DAMAGE CLAIMS

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 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 OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON THE INSIDE FRONT COVER.** And, most importantly, think before you act and be careful.

# ARC WELDING SAFETY PRECAUTIONS



**WARNING: PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.**



## **ELECTRIC SHOCK can kill.**

1. 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.
- b. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".
- c. Insulate yourself from work and ground using dry insulation. When welding in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- 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.
- e. Ground the work or metal to be welded to a good electrical (earth) ground.
- f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- g. Never dip the electrode in water for cooling.
- 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.
- i. When working above floor level, protect yourself from a fall should you get a shock.
- j. Also see Items 4c and 6.



## **FUMES AND GASES can be dangerous.**

3. 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 on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.
- 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.
- 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.
- 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.
- e. Also see item 7b.



## **WELDING SPARKS can cause fire or explosion.**

4. 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. Have a fire extinguisher readily available.
- 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.
- 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.
- 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



## **ARC RAYS can burn.**

2. 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.
- b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 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.

Welding and Cutting of Containers and Piping That Have Held Hazardous Substances”, AWS F4.1-80 from the American Welding Society (see address below).

- e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 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.
- 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.
- h. Also see item 7c.



### CYLINDER may explode if damaged.

- 5. 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.
- b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 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.
- d. Never allow the electrode, electrode holder, or any other electrically “hot” parts to touch a cylinder.
- e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- f. Valve protection caps should always be in place and handtight except when the cylinder is in use or connected for use.
- g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, “Precautions for Safe Handling of Compressed Gases in Cylinders,” available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



### FOR ELECTRICALLY powered equipment.

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



### FOR ENGINE powered equipment.

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



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



- 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.



- 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.

- 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.

- 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.

- 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.



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

**HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK performed by qualified people.**

For more detailed 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.

## **PROPER GROUNDING DURING INSTALLATION**

Some State, local or other codes or unusual operating circumstances may require the machine frame to be grounded. It is recommended that you determine the extent to which such requirements may apply to your particular situation and follow them explicitly.

In general, if the machine is to be grounded, it should be connected with a #8 or larger copper wire to a solid earth ground such as a metal pipe going into the ground for at least ten feet and having no insulated joints, or to the metal framework of a building which has been effectively grounded. The National Electrical Code lists a number of alternate means of grounding electrical equipment. (If an older portable welder does not have a grounding stud, connect the ground to an unpainted frame screw or bolt.)

## **INSTALLATION, CONNECTION, AND MAINTENANCE OF BATTERY**

To prevent **EXPLOSION** when:

- a) Installing a new battery — disconnect the negative cable from the old battery first and connect the negative cable to the new battery last.
- b) Connecting a battery charger — remove the battery from the welder by disconnecting the negative cable first, then the positive cable and battery clamp. When reinstalling, connect the negative cable last.
- c) Using a booster — connect the positive lead to the battery first then connect the negative lead to the copper strap on the engine foot.

To prevent **ELECTRICAL DAMAGE** when:

- a) Installing a new battery.
- b) Using a booster.

Use correct polarity — Negative Ground.

To prevent **BATTERY DISCHARGE**, if you have an ignition switch, turn it off when the engine is not running.

To prevent **BATTERY BUCKLING**, tighten nuts on battery clamp only until snug.

(S-17851)

## **OPERATION OF ENGINE WELDERS**

**WARNING:** Operate internal combustion engines in open, well ventilated areas or vent engine exhaust fumes outdoors.

## **OPERATION OF ALL WELDERS**

**DO NOT TURN THE “CURRENT RANGE SELECTOR” WHILE WELDING** because the current may arc between the contacts and damage the switch.

## **MAINTENANCE AND TROUBLESHOOTING WARNINGS**

**WARNING:** Have qualified personnel do the maintenance and troubleshooting work. Turn the engine (or electrical power at the switchbox) off before working inside the machine. 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.

## **ATTENTION OWNERS OF ENGINE WELDERS**

**WARNING:** 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. If a problem cannot be corrected by following the instructions, take the machine to the nearest Lincoln Field Service Shop.

## **CAUTION WHEN INSPECTING THE COMMUTATOR AND BRUSHES**

**WARNING:** Uncovered rotating equipment can be dangerous. Use care so your hands, hair, clothing or tools do not catch in the rotating parts. Protect yourself from particles that may be thrown out by the rotating armature when stoning the commutator.

## **NAMEPLATES**

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

## TABLE OF CONTENTS

INTRODUCTION	
Damage Claims . . . . .	1
Safety . . . . .	1
Arc Welding Safety Precautions . . . . .	2
Table of Contents . . . . .	5
INSTALLATION . . . . .	6
General . . . . .	6
Input Power . . . . .	6
Safety and High Frequency Interference Protection . . . . .	6
Grounding the Hi-Freq . . . . .	7
Connection to the Welder . . . . .	7
Duty Cycle . . . . .	7
Output Connections . . . . .	7
OPERATION . . . . .	7
Power Switch . . . . .	7
Power Source Matching Switch . . . . .	8
“Spark” Switch . . . . .	8
“Gas Afterflow” Timer . . . . .	8
“Prewflow” Timer . . . . .	8
Arc Start Switch . . . . .	8
Sequence of Operation . . . . .	8
Optional Features — Water Valve (K-801) . . . . .	9
MAINTENANCE AND TROUBLESHOOTING . . . . .	9
PARTS LISTS AND DIAGRAMS	
General Assembly — P-128-E, Drawing L-6681-1 . . . . .	12-13
Hi-Freq Assembly — P-128-C, Drawing L-6368 . . . . .	14
Spark Gap Panel Assembly — P-128-D, Drawing L-6045 . . . . .	15
Foot Amptrol — P-66-J.1, Drawing L-3963 . . . . .	16
Hand Amptrol — P-66-K . . . . .	16
Dimension Print — M-14341 . . . . .	17
Wiring Diagram — M-14348 . . . . .	18
Equipment Manufacturer’s Certification — S-14929 . . . . .	19
TABLES	
I. Recommended Tungsten Sizes and Gas Flow . . . . .	8
II. Switch Positions for Various Types of TIG Welding . . . . .	8

# INSTALLATION

**WARNING:** Have qualified personnel do all installation work. Turn the input power off at the fuse box before working inside the machine.

## GENERAL

See the "FOR SAFETY AND HIGH FREQUENCY INTERFERENCE PROTECTION" section for the installation recommendations needed for safety and high frequency interference protection.

The Hi-Freq is designed for use with any AC or DC welder with an open circuit voltage range with the spread of 60 to 100 volts. Its nameplate rating is 80% duty cycle at 250 amperes.

## INPUT POWER

The Hi-Freq operates on 115 volt 50/60 Hz AC input power. Current draw is 1.3 amps.

When the Hi-Freq is to be used for DC welding only, the 20' input cord can be plugged into any 115 volt AC (50/60 Hz) grounding type receptacle.

If the Hi-Freq is to be used for AC welding with a transformer-type power source, connect the 20' input cord *to the same phase as the welder*. (Although it will operate on a different phase, the arc may be unstable.) The best way to be sure the Hi-Freq is on the same phase is to have a qualified electrician connect the input cord, properly fused, to the 115 volt fan motor leads inside the welder. When used for AC TIG welding with the Lincoln Weldonpower® units, the "Power Source Matching Switch" must be set in accordance with the instruction plate. This will produce the proper phase relationship between the Hi-Freq and the AC welder output.

## 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 welder power supply lines as short as possible and completely enclose them in rigid metallic conduit or equivalent shielding for a minimum distance of 50 feet. 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. Tape the leads together when practical.
3. Be sure the rubber covering of torch and work cables are free of cuts and cracks that allow high frequency leaking. 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 1/4" galvanized pipe or conduit or a 3/8" 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.

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 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.

## GROUNDING THE HI-FREQ

A grounding screw provided on the frame of the Hi-Freq must be connected to a driven ground. See the National Electrical Code for full details on proper grounding methods.

If the black and white leads of the input plug are connected to the fan leads of the welder for proper phase balance when AC TIG welding, the green lead of the input cord must be grounded to the frame of the welder. The frame of the welder must be connected to a driven ground to properly ground the Hi-Freq.

Follow other grounding instructions found in the "FOR SAFETY AND HIGH FREQUENCY INTERFERENCE PROTECTION" section.

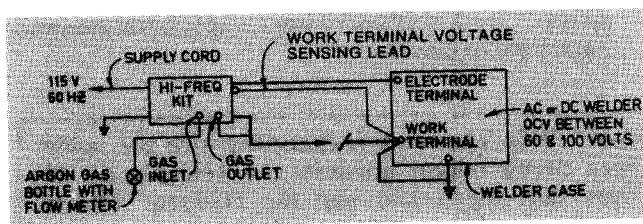
## CONNECTION TO THE WELDER

### Welder Duty Cycle

When a transformer welder is used for AC TIG welding, the duty cycle of the welder must be reduced by about half to avoid overheating the welder transformer primary. When used for DC TIG welding, the welder can be used at its full duty cycle. Change electrode polarity for DC welding with the welder polarity switch. The AC-225-S is *not* recommended for TIG welding.

Refer to diagram below when making connections per the following instructions. Output cable size required for the 250 amp, 80% duty cycle rating of the Hi-Freq is #1. Customer provides the cable connecting the Hi-Freq rear electrode terminal to the welding power source electrode terminal. The TIG welding torch is connected to the Hi-Freq front electrode terminal. The Hi-Freq "Work Terminal Voltage Sensing Lead" provided should be connected to the welding power

Connection Diagram



## POWER SWITCH

The "Power" switch turns the Hi-Freq AC input power on and purges the torch gas hose with a fresh supply of gas.

**NOTE (For Codes below 8634):** When the Hi-Freq input cord is connected to a 115 volt supply other than a source within the welder, gas will flow if the Hi-

source work terminal which in turn should be connected to the work table as well as driven ground with a welding cable. It is recommended that the welder and Hi-Freq cases also be connected to this ground with all leads being as short as possible to minimize the effects of high frequency.

**CAUTION:** A by-pass capacitor Kit (T-12246) shipped with each Hi-Freq must be installed in the welding power source per instructions included with the Kit. This capacitor protects the welder used with the Hi-Freq from any high frequency voltage feedback through the welding cables. Failure to install this Kit may damage the welder.

Some welders, such as the Idealarc 250, have a "stabilizer" for stick electrode welding. This stabilizer is a series resistor-capacitor circuit connected across the welder output. For smooth arc characteristics when TIG welding with AC, turn off the input power to the welder and have a qualified person disconnect this circuit. Refer to the welder wiring diagram to locate the stabilizer lead connection. The Hi-Freq unit has the correct stabilizer for inert gas welding. The original welder stabilizer circuit should be re-connected for stick welding.

High frequency can damage meter unless they are specially protected. Therefore, if the welder is equipped with meters, disconnect them if they are not properly protected.

## OUTPUT CONNECTIONS

Insert the plug of the separate Arc Start Switch into the "Arc Start Switch Receptacle". Tape the Arc Start Switch to the torch in position so it can be easily pressed by the thumb when the torch is held in the welding position.

Connect the TIG torch and gas supply hoses to the gas outlet and inlet connectors provided in the front nameplated area of the Hi-Freq. Any torch conforming to International Acetylene Association standards can be connected to the Hi-Freq without adapters. The connectors have the following threads:

- Gas Inlet — 5/8-18 Right hand female
- Gas Outlet — 5/8-18 Right hand female

The gas tank should be equipped with a pressure regulator and flowmeter.

## OPERATION

Freq power switch is on and the welding power source is off. To prevent the flow of gas, either the Hi-Freq should be turned off or the welder should be turned on. This cannot happen if the welder is used as a source for the 115 volt supply for the Hi-Freq. Welding power sources with output contactors should have the contactor by-passed to avoid the aforementioned problem.

**POWER SOURCE MATCHING SWITCH (Codes 8634 and Higher)** — Located on the back panel of the Hi-Freq, behind the instruction nameplate.

**Position “A”** — Provides the proper phase relationship between the Hi-Freq AC input, when plugged into Lincoln Weldanpower units, and AC TIG welding with the same welder.

**Position “B”** — Provides the proper phase relationship for AC TIG welding using transformer type units. Refer to other installation instructions within this manual.

### “SPARK” SWITCH

The “Spark” switch determines the type of high frequency operation. This switch has no effect on the welding current or the gas valve. With the “Spark” switch “On”, the high frequency operates continuously when welding. With this switch “Off”, the high frequency is off at all times. With the “Spark” switch set on “Start Only”, the high frequency operates to start the arc, but turns off automatically when the arc is established. The spark intensity is fixed and suitable for all TIG welding within the rating of the Hi-Freq.

### “GAS AFTERFLOW” TIMER

The “Gas Afterflow” Timer determines the length of time gas (and water) will flow after the arc is interrupted. This gas afterflow provides a shield for the tungsten electrode as it cools. The time is set according to the size tungsten being used. See Table I for recommended tungsten size and gas flow.

### “PRE-FLOW” TIMER

The “Pre-flow” Timer allows gas flow approximately .5 seconds before high frequency becomes available to help establish a welding arc.

Table I  
RECOMMENDED TUNGSTEN SIZES  
AND GAS FLOW

Electrode Diameter (inches)	Current-Amperes		Approx. Argon Gas Flow C.F.H. at 20 PSI	
	Pure Tungsten	Thor. Tungsten	Aluminum	Stainless Steel
.010	0-8	0-8	3-8	3-8
.015	5-12	5-12	5-10	5-10
.020	8-20	8-20	5-10	5-10
.040	20-50	20-50	5-10	5-10
1/16	40-120	50-150	13-17	9-13
3/32	100-160	140-250	15-19	11-15
1/8	150-210	220-350	19-23	11-15
5/32	190-270	300-450	21-25	13-17
3/16	250-350	400-550	23-27	18-22
1/4	300-490	500-800	28-32	23-27

**Arc Start Switch** — This switch is used to start the flow of gas and provides high frequency to the torch electrode. Once the welding arc is established the switch can be released and the arc continues until it is broken by withdrawing the torch from the work.

### SEQUENCE OF OPERATION

1. Turn on the welding power source.
2. Set the “Gas Afterflow” Timer.
3. Turn the “Power” switch “On” and depress the arc start switch momentarily. This opens the gas valve purging the line of air. The valve shuts off after a time determined by the setting on the “Gas Afterflow” Timer.
4. With the gas flowing set gas tank pressure regulator and flowmeter according to the manufacturer’s instructions and the procedures being used (refer to Table I).

Table II  
SWITCH POSITIONS

Type of Welding	“Power” Switch	“Spark” Switch
TIG — no high frequency	On	Off
TIG — high frequency start	On	Start Only
TIG — with high frequency	On	On
Other types of welding	Off	—

5. Turn the “Spark” switch to the appropriate setting.
6. Press the Arc Start Switch taped to the torch. This opens the gas (and water) valve and, .5 seconds later, energizes the high frequency generator if it is being used. Strike the arc. After the arc is established, release the Arc Start Switch. Complete the weld.
7. To stop the arc, pull the torch from the work. When the arc is broken, a circuit automatically de-energizes the high frequency. When the time set on the “Gas Afterflow” Timer elapses, the gas (and water) valve closes.

**WARNING:** The torch is energized with the welder open circuit voltage whenever the welder is on. Always turn the welder and the Hi-Freq “Power” switch off before working on the torch.

**NOTE:** Be sure the tungsten electrode never touches the material being welded. This is particularly important in welding aluminum. Even a slight amount of aluminum causes contamination of the electrode which results in poor arc characteristics and formation of a black deposit on the bead. If the tungsten becomes contaminated, break or grind the end off until pure tungsten is again exposed. Reposition the tungsten in the torch. An electrode which has been



used on AC for aluminum or magnesium will demonstrate very poor arc starting when used on DC negative. Use a new tungsten electrode.

### OPTIONAL FEATURES

**Water Valve (K-801)** — Optional feature, for field installation only. It is operated by the same circuit as the gas valve and has the same afterflow period for

cooling of the tungsten electrode. Include a strainer in the water input line to avoid valve malfunction due to any dirt particles.

**Additional Options** — R3R Welders (Code 8587 and Higher)

K-799-AA Hi-freq (has remote Amptrol capability) — must be ordered for use with the K-771-HA (Hand) or K-772-FA (Foot) Amptrol.

## MAINTENANCE AND TROUBLESHOOTING

**WARNING:** Have a qualified electrician do the maintenance and troubleshooting work. Disconnect Hi-Freq from input power and welding power source before removing cover for any reason. To prevent possible bodily injury from high frequency voltage, keep the TIG torch and cables in good repair.

**WARNING:** Use extreme caution when working with the secondary circuit of the high frequency unit transformer. The output voltage of this transformer is dangerously high. Turn both the Hi-Freq and welder input power off when working on either machine. (Disconnect Hi-Freq input supply cord if the 115V source is other than the welder).

1. Inspect the spark gaps monthly to maintain the setting (.040").
2. If the electrode is oxidized and the arc is hard to start, adjust the "Gas Afterflow" Timer for a longer flow of gas after the arc is broken.
3. If the machine is not operating properly, refer to the Troubleshooting Chart.
4. Do not use a standard voltmeter on any circuit having high frequency. The high frequency will burn out the meter.

TROUBLE	CAUSE	WHAT TO DO
1. Hi-Freq weak, not present, or intermittent.	A. Spark gap too large. B. Hi-Freq being internally grounded in unit.  C. Spark switch in wrong position. D. Faulty 115V supply.  E. Faulty P.C. board. F. High voltage transformer failure.	Set for .040" air gap. Check High-Freq circuit for grounds, and check by-pass capacitors and leads. Check switch position. a. Check input voltage. b. Check wiring to "Power Source Matching Switch" and High Voltage Transformer Primary. Replace P.C. board. Check Transformer Primary and Secondary for open or short condition.
2. Gas not turning on or off properly or no gas.	A. Hi-Freq not properly connected to welder. B. Afterflow timer set incorrectly. C. Faulty gas valve.  D. No gas.  E. Timer or arc voltage sensing circuit inoperative.	Check connections and check for break in work voltage sensing lead. Adjust timer for proper setting. Check voltage at valve and replace valve if necessary. Check gas bottle for pressure and replace bottle if empty. Check connections to P.C. board and, if O.K., replace P.C. board.

TROUBLE	CAUSE	WHAT TO DO
3. Hi-Freq set at "Start Only" but remains on for entire weld.	A. Faulty arc voltage sensing circuit.	Check connections to P.C. board and, if O.K., replace P.C. board.
4. Hi-Freq set for "On" but goes off when the arc start switch on the torch is released while welding.	A. Faulty interlock circuit.	Check connections to P.C. board and, if O.K., replace P.C. board.
5. No gas pre-flow.	A. Faulty pre-flow timer.	Check connections to P.C. board and, if O.K., replace P.C. board.
6. Excessive tungsten erosion, arc is unstable (AC only), or unsatisfactory weld "cleaning".	<p>A. Wrong phase relationship between welder output and Hi-Freq input.</p> <p>B. Stabilizer capacitor or resistor is faulty or circuit is open.</p>	<p>a. Check for proper position of "Power Source Matching Switch".</p> <p>b. Connect 115 volt supply lead to 115 volt source within welder.</p> <p>Check.</p>
7. When attempting to weld, high frequency spark jumps from electrode to work but arc does not establish.	<p>A. Improper tungsten type or size.</p> <p>B. Contaminated tungsten.</p>	<p>Use a 1 or 2% thoriated tungsten of proper size and adjust gas flow to proper value. (See Operating Manual for information).</p> <p>Clean or dress tip of tungsten properly.</p>

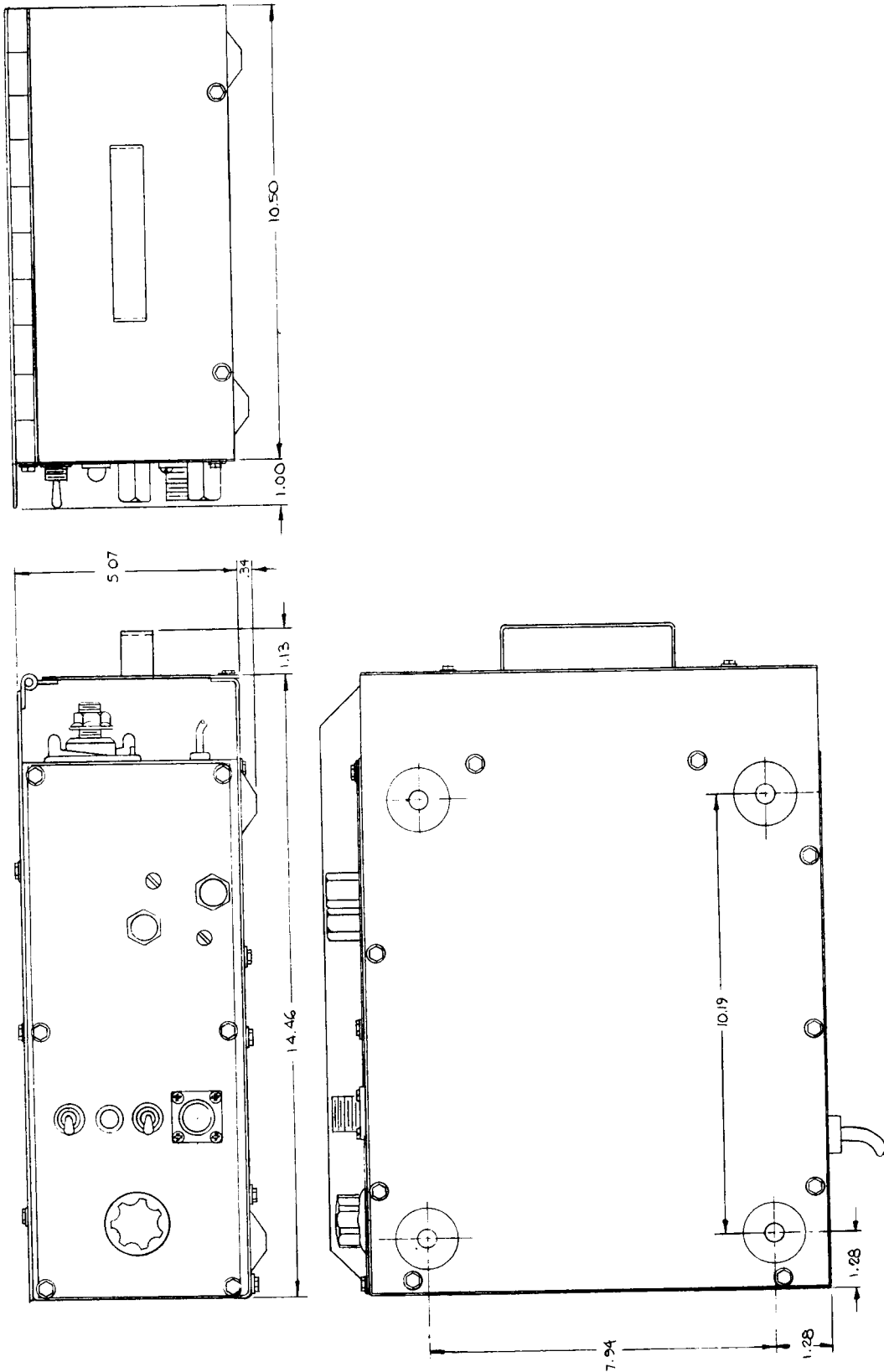
## **Need Welding Training?**

The Lincoln Electric Company operates the oldest and most respected Arc Welding School in the United States at its corporate headquarters in Cleveland, Ohio. Over 60,000 students have graduated. Tuition is low and the training is "hands on".

For details write: Lincoln Welding School  
22801 St. Clair  
Cleveland, Ohio 44117

and ask for bulletin ED-80 or call 216-481-8100 and ask for the Welding School Registrar.

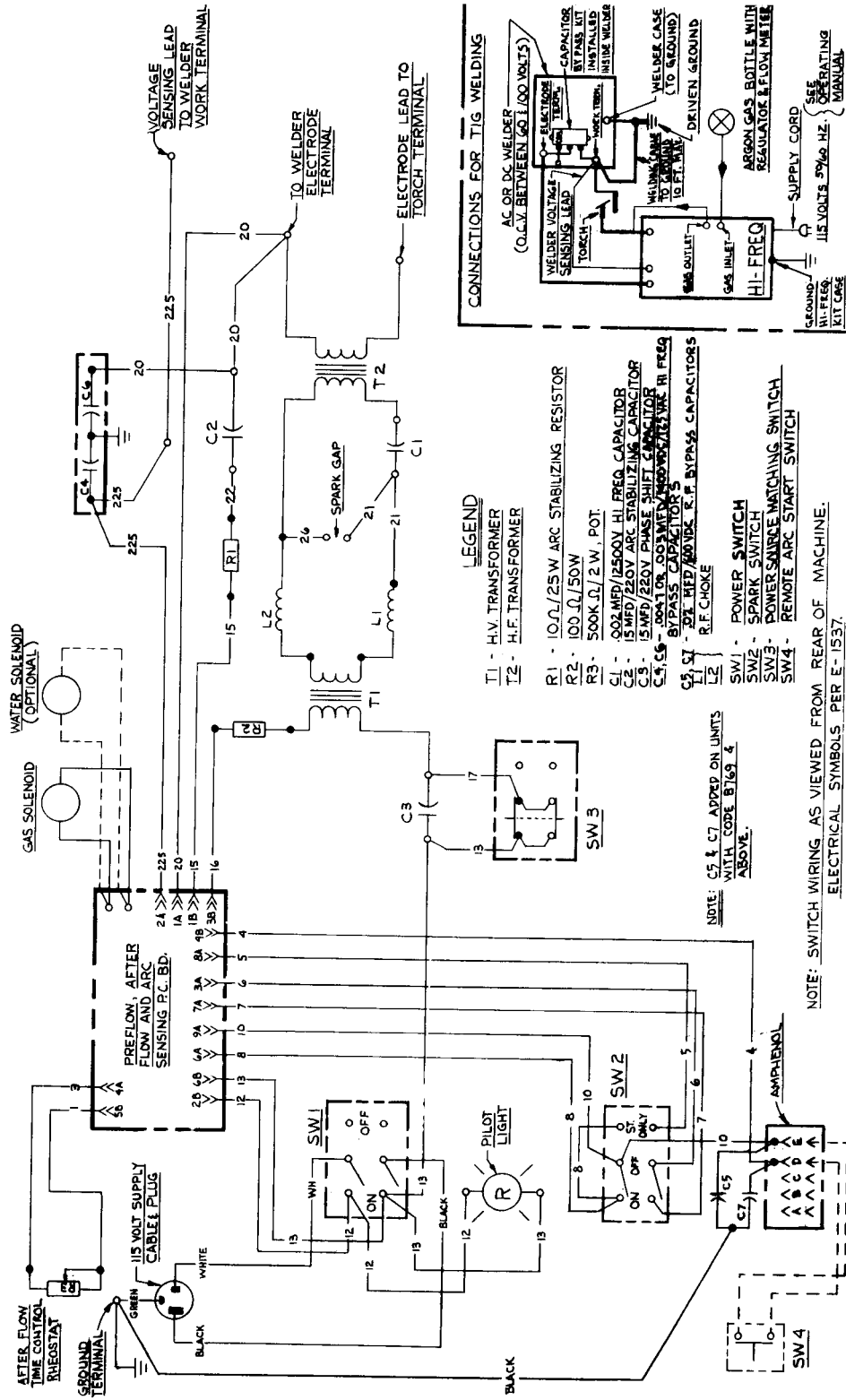
# DIMENSION PRINT



M-14341  
11-20-81G

# WIRING DIAGRAM

**NOTE:** This diagram is for reference only. It is not 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 machine code number.



PRINT TO SIZE 6.00 x 9.00

M-14348  
8-30-85G

### EQUIPMENT MANUFACTURER'S CERTIFICATION

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

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

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

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

**The Lincoln Electric Company**

### EQUIPMENT INSTALLATION CERTIFICATION

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

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

Date \_\_\_\_\_

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

S-14929

## HOW TO ORDER REPLACEMENT PARTS

Order parts only from Lincoln offices or from the Authorized Field Service Shops listed in the "Service Directory". Give the following information:

- (a) From the nameplate — machine model, code and serial numbers.
- (b) From this manual — complete part name and description, item number, quantity required and the number of the list used to get this information.

Any items indented in the "Parts Name" column are included in the assembly under which they are listed. The indented items may be ordered separately. If the entire assembly is needed, do **not** order the indented parts.

## GUARANTEE

The Lincoln Electric Company, the Seller, warrants all new equipment except engines and accessories thereof against defects in workmanship and material for a period of one year from date of shipment, provided the equipment has been properly cared for, and operated under normal conditions. Engines and engine accessories are warranted free from defects for a period of ninety days from the date of shipment.

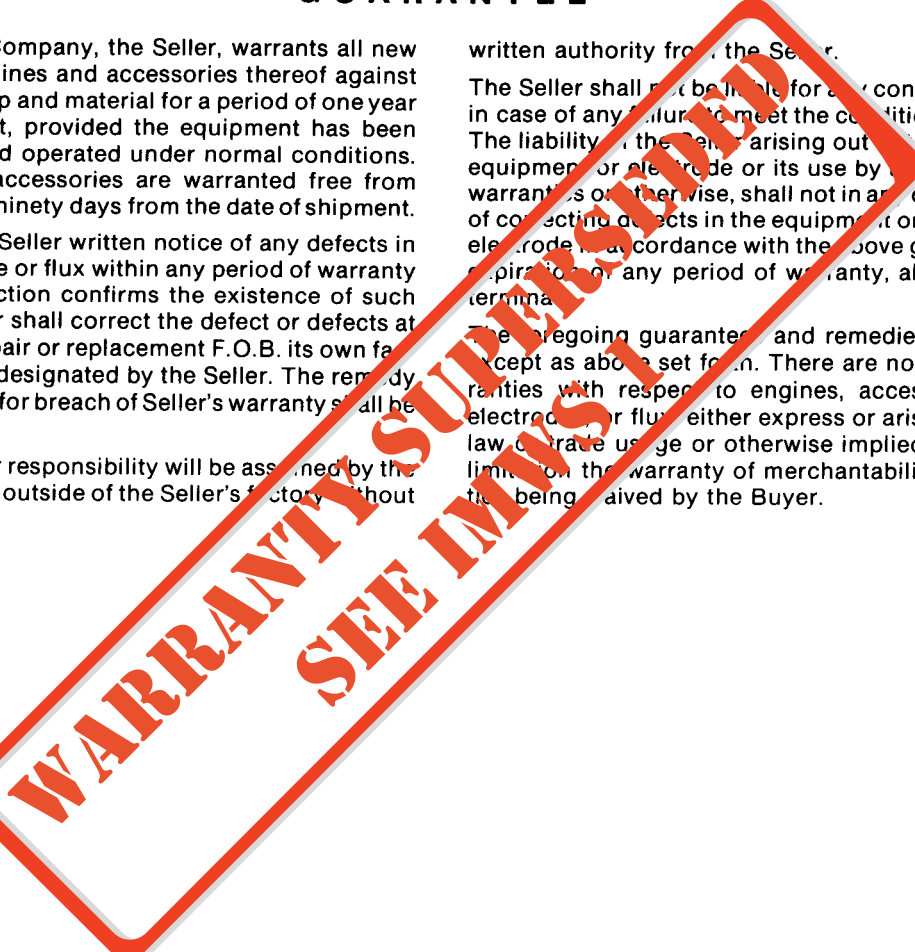
If the Buyer gives the Seller written notice of any defects in equipment or electrode or flux within any period of warranty and the Seller's inspection confirms the existence of such defects, then the Seller shall correct the defect or defects at its option, either by repair or replacement F.O.B. its own factory or other place as designated by the Seller. The remedy provided Buyer herein for breach of Seller's warranty shall be exclusive.

No expense, liability or responsibility will be assumed by the Seller for repairs made outside of the Seller's factory without

written authority from the Seller.

The Seller shall not be liable for any consequential damages in case of any failure to meet the conditions of any warranty. The liability of the Seller arising out of the supplying of said equipment or electrode or its use by the Buyer, whether on warranty or otherwise, shall not in any case exceed the cost of correcting defects in the equipment or replacing defective electrode in accordance with the above guarantee. Upon the expiration of any period of warranty, all such liability shall terminate.

The foregoing guarantee and remedies are exclusive and except as above set forth. There are no guarantees or warranties with respect to engines, accessories, equipment, electrode or flux either express or arising by operation of law or trade usage or otherwise implied, including without limitation the warranty of merchantability, all such warranties being waived by the Buyer.



## THE LINCOLN ELECTRIC COMPANY

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Sales and Service Worldwide  
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