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SP 100-I
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9687; 9727

OPERATING MANUAL

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

SP 100-I

DAMAGE CLAIMS

When this equipment is purchased, 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 equipment is received.

SAFETY DEPENDS ON YOU

Lincoln welders are 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.

THE LINCOLN ELECTRIC COMPANY
World's Leader in Welding and Cutting Products • Premier Manufacturer of Industrial Motors
Sales and Service through Subsidiaries and Distributors Worldwide
Cleveland, Ohio 44117-1199 U.S.A.

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.

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.

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

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.

SP 100-I (K476-1)
COMBINATION WIRE FEEDER/POWER SOURCE
PORTABLE ARC WELDER

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PART A

1. PRODUCT DESCRIPTION

The SP 100-I is a complete semiautomatic constant voltage DC portable arc welder. Included is a tap switch controlled, single phase constant voltage transformer/rectifier power source and a wire feeder for feeding .023" (0.6mm) through .030" (0.8mm) solid steel electrode and .035" (0.9mm) Innershield® NR®-211-MP.

It is ideally suited for individuals having access to 220 volt 50 Hz AC input power and want the ease of use, quality and dependability of both gas metal arc welding or GMAW (also known as MIG welding) and the Innershield process (self-shielded flux-cored or FCAW). A convenient chart is mounted inside the wire feed section door for setting welding procedures for 24 gauge (.60mm) through 12 gauge (2.5mm) mild steel. The SP 100-I is rugged and reliable and has been designed for dependable service and long life.

2. RECOMMENDED PROCESSES AND EQUIPMENT

The SP 100-I can be used for welding mild steel using the GMAW, single pass process which requires a supply of shielding gas or can be used for the self-shielded, Innershield process (FCAW).

The recommended gases and electrode for GMAW are welding grade CO_2 gas or an argon-CO_2 blended gas (75 to 80% argon and 25 to 20% CO_2) and .025" (0.6mm) diameter Lincoln L-56 mild steel welding wire, supplied on 12-1/2 lb. (5.67kg) spools. The blended gas is recommended for welding on heavier gauge steel, 14 gauge (2.0mm), for example.

The recommended electrode for the self-shielded process is .035" (0.9mm) diameter Innershield NR-211-MP on 10 lb. (4.5kg) spools. This electrode can be used for all position welding of 18 gauge (1.2mm) through 5/16" (7.9mm) thick steel. Multiple passes are required for 1/4" (6.4mm) and 5/16" (7.9mm). The .035" (0.9mm) NR-211-MP can also be used for the welding of galvanized coated sheet metal.

A comparison of the two processes follows:

	.025" (0.6mm) Dia. L-56 (GMAW)	.035" (0.9mm) Dia. NR-211-MP Innershield (FCAW)
Shielding Gas	CO_2 or Blended	None (self-shielded)
Electrode Polarity	Positive (+)	Negative (-)
Minimum Gauge	24 ga. (.60mm)	18 ga. (1.2mm) - requires more skill to use than is required with .025" (0.6mm) L-56.
Maximum Gauge	14 ga. (2.0mm)[1]	Can be used to weld 1/4" (6.4mm) and 5/16" (7.9mm) thick steel with multiple passes.
Penetration Into Base Metal	Good	Excellent
Smoke Level	Low	High
Amount of Slag	Low, little or no cleaning required	Slag must be removed.

[1] Use of the GMAW process on thicker materials than recommended may result in poor welds. The welds may "look" good, but may just be "sitting" on top of the plate. This is called "cold casting" and will result in weld failure.

3. SPECIFICATIONS

SP 100-I (K476-1)	
Input Power (AC only) at Maximum Rated DC Output	220 volts 50 hertz 15 amps
Rated DC Output	100A, 19V, 20% duty cycle, Maximum 60A, 17V, 60% duty cycle 50A, 15V, 100% duty cycle
Maximum Open Circuit Voltage	32 volts
Wire Speed Range	50 to 300 in/min (1.3 to 7.6 m/min.)
Wire Sizes	.023" (0.6mm) thru .030" (0.8mm) Solid Steel .035" (0.9mm) Flux-Cored ●
Spool Sizes	8" OD x 2" ID x 2.2" wide (203mm OD x 51mm ID x 56mm wide) 4" OD x 5/8" ID x 1.7" wide (102mm OD x 16mm ID x 43mm wide)
Weight	50 lbs. (22.6kg)
Dimensions, HxWxD (Less handle)	12" x 9-3/4" x 16-1/2" (305mm x 248mm x 419mm)

● Requires optional K464 Innershield Welding Kit.

PART B

1. Installation

1.1 Safety Precautions

* Read "ARC WELDING SAFETY PRECAUTIONS" on page 2 and 3 of Operating Manual before proceeding.

* Only personnel that have read and understood the Operating Manual should install and operate this equipment.

* Machine must be connected to system ground per the U.S. National Electrical Code Code and any applicable local codes.

* The power switch is to be in the off position (marked "O") when installing work cable and gun and when connecting power cord to input power.

1.2 Unpacking

Open the carton and remove the following loose items:

a) Gun and cable assembly - ready to feed .025" (0.6mm) diameter wire (also .023" and .024" diameter wire).

b) Literature package envelope which contains the operating manual, a separate contact tip for .030" (0.8mm) diameter wire, and a 5/64" (2.0mm) hex key wrench for removal of the drive roll.

c) 10 ft. (3.0m) work cable.

d) Work clamp.

1.3 Location

Locate the welder in a dry location where there is free circulation of clean air into the louvers in the back and out the front. A location that minimizes the amount of smoke and dirt drawn into the rear louvers reduces the chance of dirt accumulation that can block air passages and cause overheating.

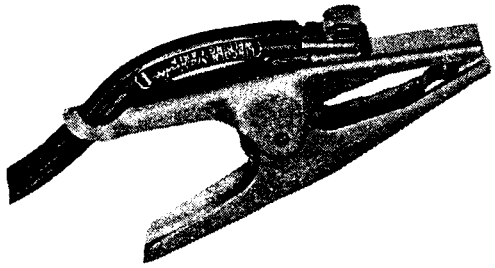
1.4 Work Cable and Clamp Installation

1.4.1 Work Clamp Installation

Attach the work clamp to the work cable per the following:

1. Insert the work cable terminal lug with the larger hole through the strain relief hole in the work clamp as shown below.

2. Fasten securely with the bolt and nut provided.



1.4.2 Work Cable Installation

Open the wire feed section door on the right side of the machine. Pass the end of the work cable that has the terminal lug with the smaller hole through the hole next to the louvers in the case front. Remove screw securing cable clamp to center panel. Open up cable clamp and slide over cable. Reattach cable clamp using same screw, and adjust cable position so that cable is routed below and around back of wire drive assembly.

Using provided wing nut, connect the terminal lug to the negative (-) output terminal located above the wire feed unit (make certain that both wing nuts are tight). (This connection gives the correct electrode polarity for the GMAW process. If using Innershield, see Output Polarity Connection Section for negative electrode polarity connection). Tighten cable clamp screw.

1.5 Output Polarity Connection

The welder, as shipped, is connected for positive electrode polarity.

To connect for negative electrode polarity (required for the Innershield process), connect the short cable attached to the gun connector block to the negative (-) output terminal and the work cable to the positive (+) terminal using the provided wing nuts (make certain that both wing nuts are tight).

1.6 Gun Installation

As shipped from the factory, the gun is ready to feed .023", .024", or .025" (0.6mm) wire. If .030" (0.8mm) is to be used, install the .030" (0.8mm) contact tip. The .023"-.025" contact tip is stenciled .6 mm and .030" contact tip is stenciled .8 mm. See Maintenance Section for instructions to change contact tip.

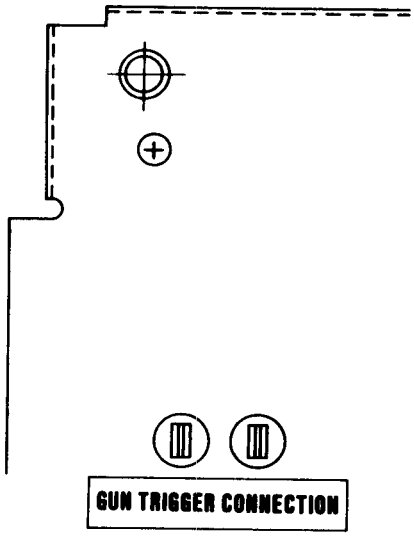
Connect the gun cable to the machine per the following:

1. Pass the insulated terminals of the gun trigger control leads, one at a time, through the rectangular "keyhole" opening in the case front. The leads are to be routed up the inside of the case front and behind the gas line.

2. Insert the connector on the gun conductor cable through the large hole in the case front. Connector must be all the way in the metal connector block to obtain proper gas flow. Rotate the connector so control leads are on the underside and tighten the wing screw in the connector block.

3. Connect the insulated control lead terminals to the two insulated 1/4 inch (6.4mm) tab connector bushings located above the "Gun Trigger Connection" decal in the wire feed section. Either lead can go to either connector.

CAUTION:
The gun trigger switch must be a normally open, momentary switch. The switch terminals and leads must be insulated from the welding circuit. Malfunction of the welder will result if the gun trigger circuit shorts to the welding output circuit or is common to any electrical circuit other than the trigger circuit.



1.7 Wire Drive Roll

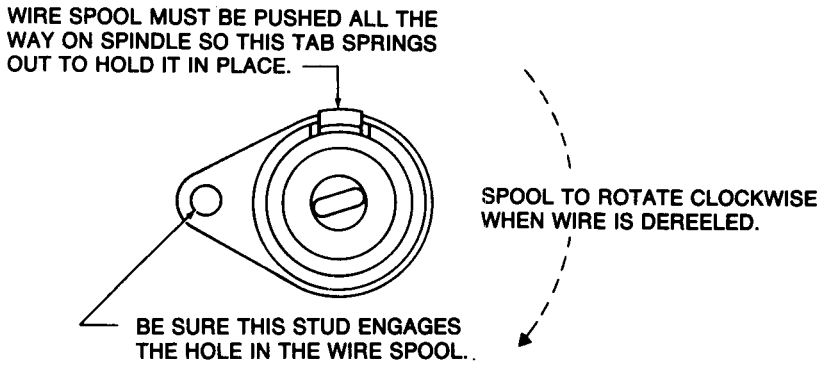
The drive roll has two grooves; one for .023"-.025" (0.6mm) solid steel electrode and a larger groove for .030" (0.8mm) solid and .035" (0.9mm) flux-cored steel electrode. As shipped, the drive roll is installed in the .023/.025" (0.6mm) position.

If .030"-.035" (0.8 - 0.9mm) wire is to be used, the drive roll must be reversed as follows:

1. Make certain the power switch is off (marked "O").
2. Push the spring loaded pressure arm back and lift up the idle roll arm.
3. Loosen the drive roll set screw with the hex wrench supplied.
4. Remove the drive roll, flip over and install with the .030"/.035" (0.8 - 0.9mm) groove (the larger groove) closest to the gearbox. Feed a length of straightened welding wire through the wire feeder guide tubes and adjust the position of the drive roll so that the groove is centered on the wire. Make certain the set screw is located on the flat portion of the shaft and tighten.

1.8 Welding Wire Loading

The welder is shipped from the factory ready to feed 8 inch (203mm) diameter spools - 2.2 inch (56mm) max. width. These spools fit on a 2 inch (51mm) diameter spindle that has a built in, nonadjustable friction brake to prevent overrun of the spool and excess slack in the wire. The thumb screw at the end of the shaft is not intended to be loosened; it should be tightened full clockwise.



To use 4 inch (102mm) diameter spools, the 2 inch (51mm) diameter spindle must be removed. Remove the thumb screw at the end of the shaft and remove the spindle. It can be stored in the wire feed compartment. A 4 inch (102mm) diameter spool is mounted directly on the 5/8 inch (16mm) diameter shaft and held in place with the previously removed thumb screw. Make certain that the end of the wire which may protrude through the side of the spool does not contact any metallic part.

Thread the welding wire through the wire feeder guide tubes per the following instructions:

a) Release the spring loaded pressure arm and lift the idle roll arm away from the drive roll. (Check that groove on drive roll matches wire size being used - See Wire Drive Roll Section.)

b) Detach the end of the wire from the spool. To prevent the spool from unwinding, do <u>not</u> release the wire.

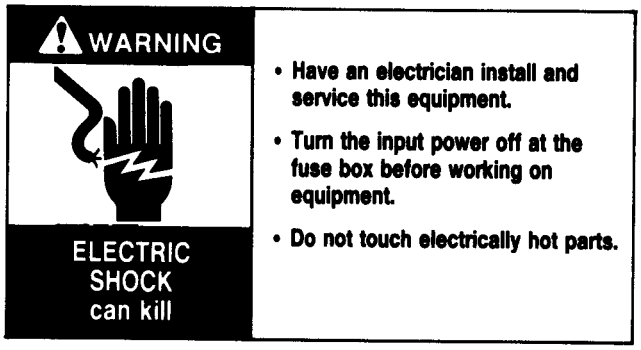
c) Cut the bent portion of wire off and straighten the first 4 inches (102mm).

d) Thread the wire through the ingoing guide tube, over the drive roll, and into the outgoing guide tube.

e) Close the idle roll arm and latch the pressure arm in place.

f) The idle roll pressure adjustment wing nut is normally set for full pressure (full clockwise). If feeding problems occur because the wire is flattened excessively, turn the pressure adjustment counterclockwise to reduce distortion of the wire.

1.9 Electrical Input Connection for Rated Output (K476-1)



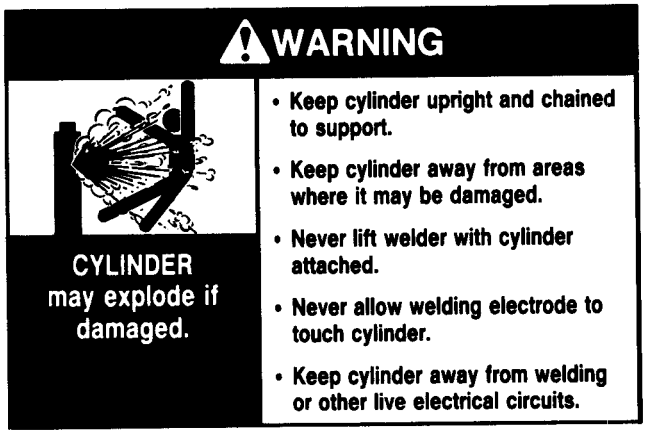
1.9.1 Line Cord Connection

A line cord is factory installed. Connect this to a 220V, 50 Hz branch circuit with adequate capacity.

If there is any question about the installation meeting local code requirements, consult a qualified electrician.

1.10 Shielding Gas

Customer must provide cylinder of carbon dioxide CO_2 or argon-carbon dioxide mixed shielding gas, and an inlet gas hose when using the GMAW process.



WARNING:
GAS UNDER PRESSURE IS EXPLOSIVE. ALWAYS KEEP GAS CYLINDERS IN AN UPRIGHT POSITION AND ALWAYS KEEP CHAINED TO UNDERCARRIAGE OR STATIONARY SUPPORT. SEE AMERICAN NATIONAL STANDARD Z-49.1, "SAFETY IN WELDING AND CUTTING" PUBLISHED BY THE AMERICAN WELDING SOCIETY.

1. Chain the cylinder to a wall or other stationary support to prevent the cylinder from falling over.

2. With the cylinder securely installed, remove the cylinder cap. Stand to one side away from the outlet and open the cylinder valve very slightly for an instant. This blows away any dust or dirt which may have accumulated in the valve outlet.

> **WARNING:**
> BE SURE TO KEEP YOUR FACE AWAY FROM THE VALVE OUTLET WHEN "CRACKING" THE VALVE.

3. Attach the flow regulator to the cylinder valve and tighten the union nut securely with a wrench. Flow regulator for carbon dioxide must have plastic washer seated in the fitting that attaches to the cylinder.

4. Attach one end of inlet gas hose to the outlet fitting of the flow regulator and tighten the union nut securely with a wrench. Connect the other end to the inlet gas fitting (5/8-18 female threads - for CGA-032 fitting). Make certain the gas hose is not kinked or twisted.

5. Open the cylinder valve slowly.

> **WARNING:**
> NEVER STAND DIRECTLY IN FRONT OF OR BEHIND THE FLOW REGULATOR WHEN OPENING THE CYLINDER VALVE. ALWAYS STAND TO ONE SIDE.

6. If using a regulator with an adjustable flowmeter, close the gun trigger and adjust the flow to give 15-20 cubic feet per hour (7-9 cubic liters per minute). Use 20-25 cubic feet per hour (9-12 cubic liters per minute) when welding out of position or in a drafty location.

7. Keep the cylinder valve closed, except when using the welder. When finished welding, close the cylinder valve and then close the gun trigger briefly to release the pressure. Then turn off the welder.

2. Optional Features Installation

2.1 K464 Innershield Welding Kit

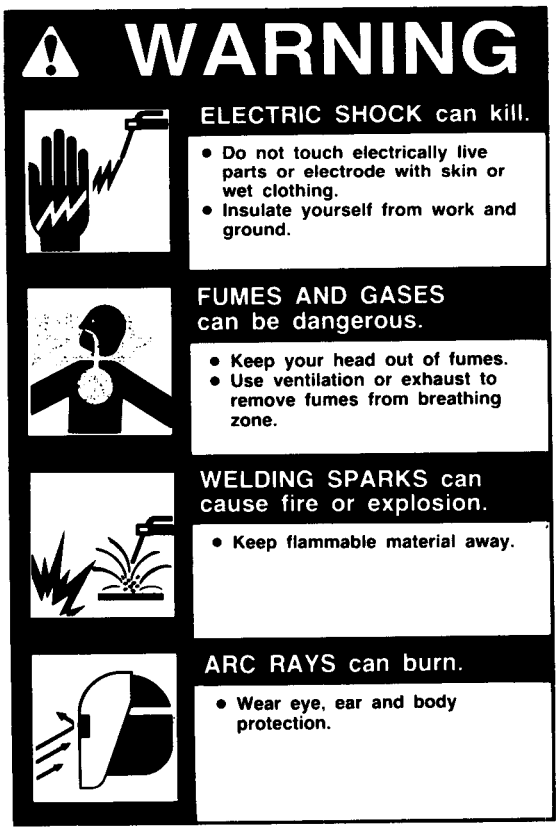
Includes a .035" (0.9mm) contact tip and a .035" (0.9mm) cable liner to permit the gun and cable to use .035" (0.9mm) diameter flux-cored electrode. Also included is a spool of .035" (0.9mm) Innershield NR-211-MP.

The end of the brass fitting on the end of the liner of .035" (0.9mm) wire is color coded green. The .023"-.030" (0.6mm - 0.8mm) factory installed liner is color coded orange.

See Maintenance and Troubleshooting Section for instructions on installing liner and contact tip in gun.

3. Operating Instructions

3.1 Safety Precautions



WARNING: Electric shock can kill. Fumes and gases can be dangerous to your health. Arc rays can injure eyes and burn skin. See additional warning information under "Arc Welding Safety Precautions" on inside of front cover of operating manual. When inching, the electrode and drive mechanism are always electrically energized and remain energized several seconds after the gun trigger is released.

3.2 Duty Cycle and Rated Output

TYPE K476-1, SP 100-I		
Duty Cycle*	Amps	Volts
20%	100	19

* Based upon 10 minute time period (i.e. for 20% duty cycle it is 2 minutes on and 8 minutes off).

3.3 Description of Controls

Power Switch - Place the lever in the on position marked "1" when welding output is desired. When the power is on, the fan motor will run and air will be exhausted out the louvers in the front of the machine.

Voltage Control - A 4-position tap switch control that gives full range adjustment of power source output voltage. Do not adjust while welding. This control is marked "U".

Wire Speed - Controls the wire speed from 50-300 inches per minute (1.3 - 7.6 m/min.). The control can be preset on the dial to the approximate setting specified on the Welding Chart on the inside of the wire feed section door. This control is marked "$\frac{o}{O}$".

3.4 Feeding Welding Wire

> **WARNING:**
> When inching the welding wire, the drive rolls, the gun connector block, and the gun contact tip are always energized relative to work and ground and remain energized several seconds after the gun trigger is released.

1. Turn the machine on (marked "1").
2. Close the gun trigger switch and inch welding wire through the contact tip.
3. Cut the wire off 1/4 to 3/8 inch (6.4 - 9.5mm) from the end of the tip. You are now ready to weld.

3.5 Making a Weld

1. See Part A, Sec. 2, "Recommended Processes and Equipment" for selection of welding wire and shielding gas and for range of metal thicknesses that can be welded.
2. See the welding chart on the inside of wire feed section door for information on setting the controls.
3. Set the "Voltage" and "Wire Speed" controls to the settings suggested for the welding wire and base metal thickness being used. (Voltage control is marked "U", and wire feed speed is marked "$\frac{o}{o}$".)
4. Check that the polarity is correct for the welding wire being used and that the gas supply, if required, is turned on.
5. When using Innershield electrode, remove the gas nozzle cone from the end of the gun. This will give improved visibility and eliminate the possibility of the cone overheating.
6. Connect work clamp to metal to be welded. Work clamp must make good electrical contact to the workpiece. The workpiece must also be grounded as stated in "Arc Welding Safety Precautions".

> **WARNING:**
> WHEN USING AN OPEN ARC PROCESS, IT IS NECESSARY TO USE CORRECT EYE, HEAD, AND BODY PROTECTION.

7. Position gun over joint. End of wire may be lightly touching the work.

8. Lower welding helmet, close gun trigger, and begin welding. Hold the gun so the contact tip to work distance is about 3/8 inch (9.5mm).

9. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.

10. When no more welding is to be done, close valve on gas cylinder (if used), momentarily operate gun trigger to release gas pressure, and turn off the machine.

3.6 Overload Protection Shutdown

CAUTION:
EXCEEDING THE RATING CAN REDUCE THE LIFE OF THE MACHINE.

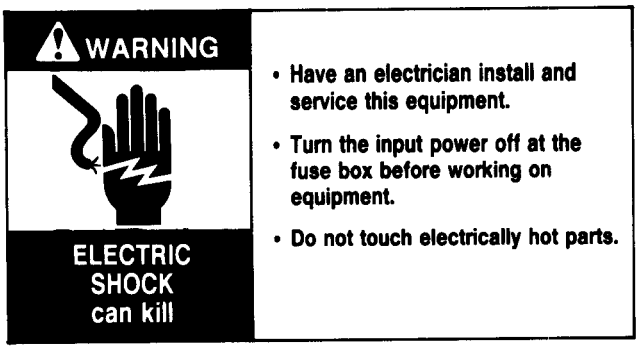
3.6.1 K476-1 Protection

The K476-1 has a thermostat to protect the machine from damage if the rated output is exceeded. If the device is tripped, the yellow "thermal protection" lamp will turn on, and there will be no wire feed or output voltage when the gun trigger is pressed. (The fan will continue to run.) The thermostat will automatically reset after several minutes of cooling.

If the machine does not operate and the fan does not run with the machine on, the power supply branch circuit protection (circuit breaker or fuse) has tripped.

4. Maintenance & Troubleshooting

4.1 Safety Precautions



4.2 Routine Maintenance

4.2.1 General Maintenance

In extremely dusty locations, dirt may clog the air passages causing the welder to run hot. Blow dirt out of the welder with low pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

4.2.2 Wire Feed Section

a) When necessary, vacuum accumulated dirt from gearbox and wire feed section.

b) Occasionally inspect the incoming guide tube and clean inside diameter if necessary.

c) Motor and gearbox have lifetime lubrication and require no maintenance.

4.2.3 Fan Motor

Has lifetime lubrication - requires no maintenance.

4.2.4 Wire Reel Spindle

Requires no maintenance. Do not lubricate shaft.

4.3 Gun and Cable Maintenance

4.3.1 Routine Gun and Cable Maintenance

Dirt can accumulate in the contact tip hole and restrict wire feeding. After each spool of wire is used, remove the contact tip and push a short piece of wire through the tip repeatedly by hand. Use the wire as a reamer to remove dirt that may be adhering to the wall of the hole through the tip.

A dirty cable liner can cause rough and erratic wire feeding. Clean the liner after running 50 lbs. (23kg) of welding wire as follows:

a) Remove liner from the gun and cable assembly per Section 4.3.3.

b) Lay the liner out straight and blow it out with compressed air. Work the cable by bending it back and forth and then blow it out again. Repeat this procedure until no more dirt comes out.

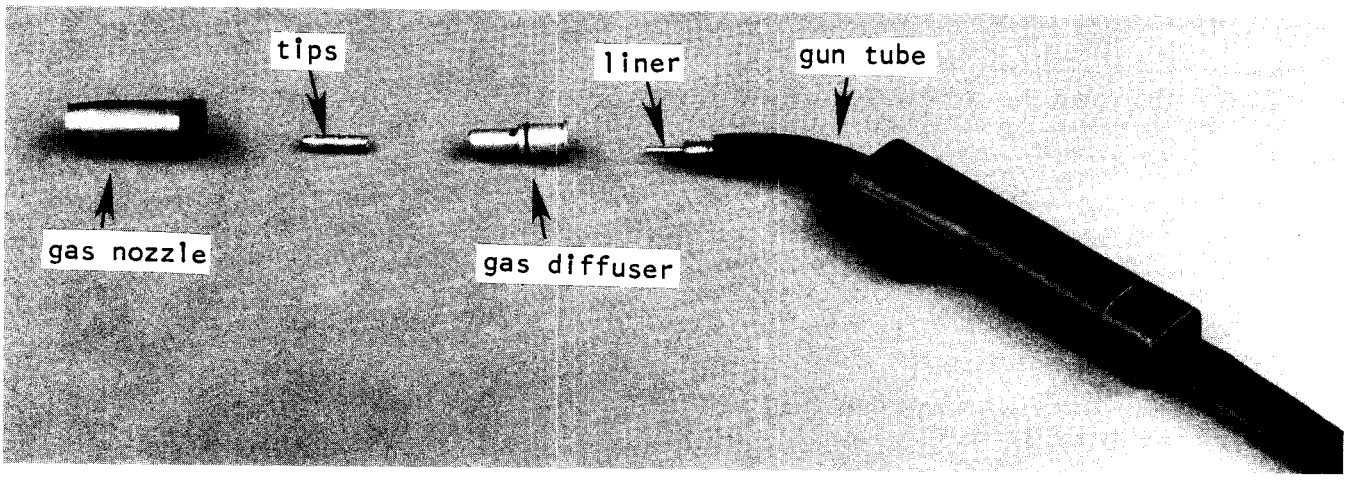
4.3.2 Contact Tip Replacement

The gun and cable assembly shipped with the unit uses a quick-change, cam lock tip. Because the tip has no threads, changeover is fast and easy.

Before removing tip, remove gas nozzle by pulling it off gas diffuser (threadless slip-fit). Loosen tip by gripping with pliers and twisting counterclockwise. Tip will now slip off.

To replace tip, slip tip into gas diffuser. Grip with pliers, push tip into gas diffuser until it bottoms, then twist clockwise to tighten.

NOTE: It is important that tip is bottomed in gas diffuser.



4.3.3 Liner Replacement

a) Remove gun and cable assembly.

b) Remove gas nozzle, contact tip, and gas diffuser from gun end.

c) Lay the gun and cable assembly in a straight line. Loosen the slotted set screw in brass connector at the feeder end. Grasp the brass liner stop protruding from the end of the brass connector and pull the liner from the cable.

NOTE: The end of the liner stop is color coded orange for .023"-.030" ((0.6 - 0.8mm) wire and green for .035" (0.9mm) wire.

d) Insert the new liner into the brass connector and push all the way in until the liner stop is fully seated. A twisting motion may be necessary to seat the 'O' ring in the connector. Tighten the set screw.

e) Cut and deburr the liner so that 5/8 inch (16.0mm) protrudes from the end of the body tube at the gun end.

NOTE: Measure the 5/8 inch (16.0mm) dimension while pushing the liner into the gun and cable assembly.

f) Reinstall gas diffuser, tip, and gas nozzle. Reconnect gun to welder.

PARTS LIST

Part Description	SP 100-I, Code 9431 Part No.
Major Internal Components	
Transformer, Choke and Switch Assembly	L7867-1
Switch	M15750
Capacitor	S13490-109
Rectifier Assembly	M15447-2
PC Board	L7836-1
On-Off Switch	T10800-31
Wire Feed Control	T10812-109
Wire Feed Control Knob	S18425-1
Voltage Control Knob	M15796
Fan Motor	M15787-2
Fan Blade	M15432
Fan-Heat Sink Bracket	G1839
Gas Solenoid	S18902
Gas Line	T10642-113
Case Parts	
Case Back and Bottom	G1837
Center Panel	L7826
Case Side	L7554-1
Case Door	L7555
Door Hinge (2 required)	M15451
Case Front	A464
Wire Feeder	
Wire Drive Assembly (Includes)	M15759
Motor Gearbox	L7801
Drive Roll (with set screw)	M15758
Set Screw	S11604-47
Idle Roll Assembly	M9300-55
Guide Tubes (2 required)	S18685-6
Wire Drive Fastener (2 required)	T14659-3
Wire Drive Screw (1 required)	S8025-70
Optional Knurled Drive Roll (for use with .035" (0.9mm) Innershield only	M16049
Input Cord	S15254-12
Spindle	M15445
Thumb Screw for Spindle	S18438
Work Cable	B-8-120-203-204
Work Clamp	M12033
Polarity Stud (2 required)	S18432
Joint Compound	T12837

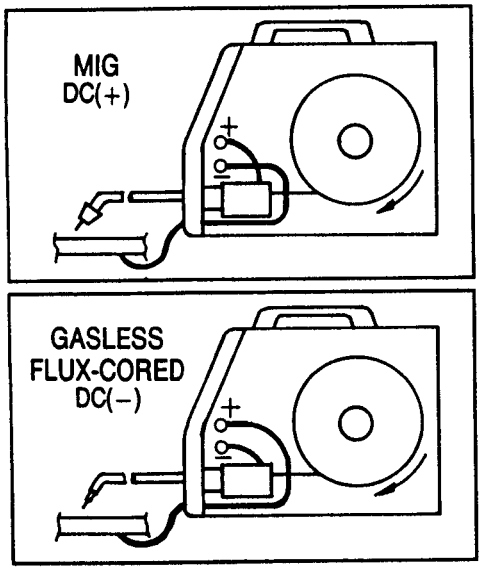
Part Description	SP 100-I, Code 9431 Part No.
Gun and Cable	
Gun and Cable Assembly (Complete)	L7538
Contact Tip, .025" (0.6mm) Above contact tip feeds .023"-.025" (0.6mm) wire sizes	S18704-1
Contact Tip, .030" (0.8mm)	S18704-2
Contact Tip, .035" (0.9mm)	S18704-3
Liner, .023" through .030" (0.6 - 0.8mm)	S18704-4
Liner, .035" (0.9mm)	S18704-5
Gas Diffuser	S18704-6
Gas Nozzle	S18704-7
Gasless Nozzle (Innershield® only)	S18704-14
K464, .035" (0.9mm) Innershield Kit	
10 lb. (4.5kg) Spool of .035" (0.9mm) NR-211-MP Wire	NR-211-MP (.035-10 lb. Spool)
Liner Tip Package	S18476
Above item includes:	
Contact Tip	S18704-3
Liner	S18704-5

SUGGESTED SETTINGS FOR WELDING

ADJUST FOR OPTIMUM WELDING

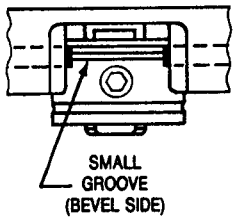
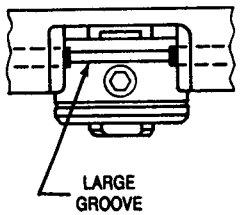
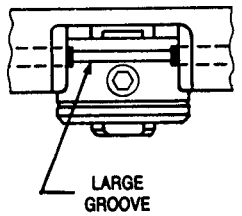
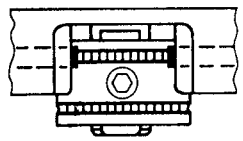
PROCESS	WELDING WIRE	SHIELDING GAS	STEEL THICKNESS						
			24 ga/ .024 in. 0.60 mm	22 ga/ .030 in. 0.80 mm	20 ga/ .036 in. 1.0 mm	18 ga/ .048 in. 1.2 mm	16 ga/ .060 in. 1.6 mm	14 ga/ .075 in. 2.5 mm	12 ga/ .105 in. 2.5 mm
MIG DC(+)	.025 in. (0.6 mm) DIA. SOLID STEEL WIRE	CO_2	A-3	A-3	B-4	B-5	C-6	D-7	
		C20 or C25 (75-80% Argon 25-20% CO_2)		A-3	A-3	B-5	C-7.5	D-10	
	.030 in. (0.8 mm) DIA. SOLID STEEL WIRE	CO_2			B-3.5	C-4.5	D-5.5	D-5.5	
		C20 or C25 (75-80% Argon 25-20% CO_2)			A-3	B-4	C-5	D-6	
GASLESS FLUX-CORED DC(−)	.035 in. (0.9 mm) DIA. INNERSHIELD® NR-211-MP	NONE				A-2	B-2	C-3.5	D-4

OUTPUT POLARITY



DRIVE ROLL ORIENTATION

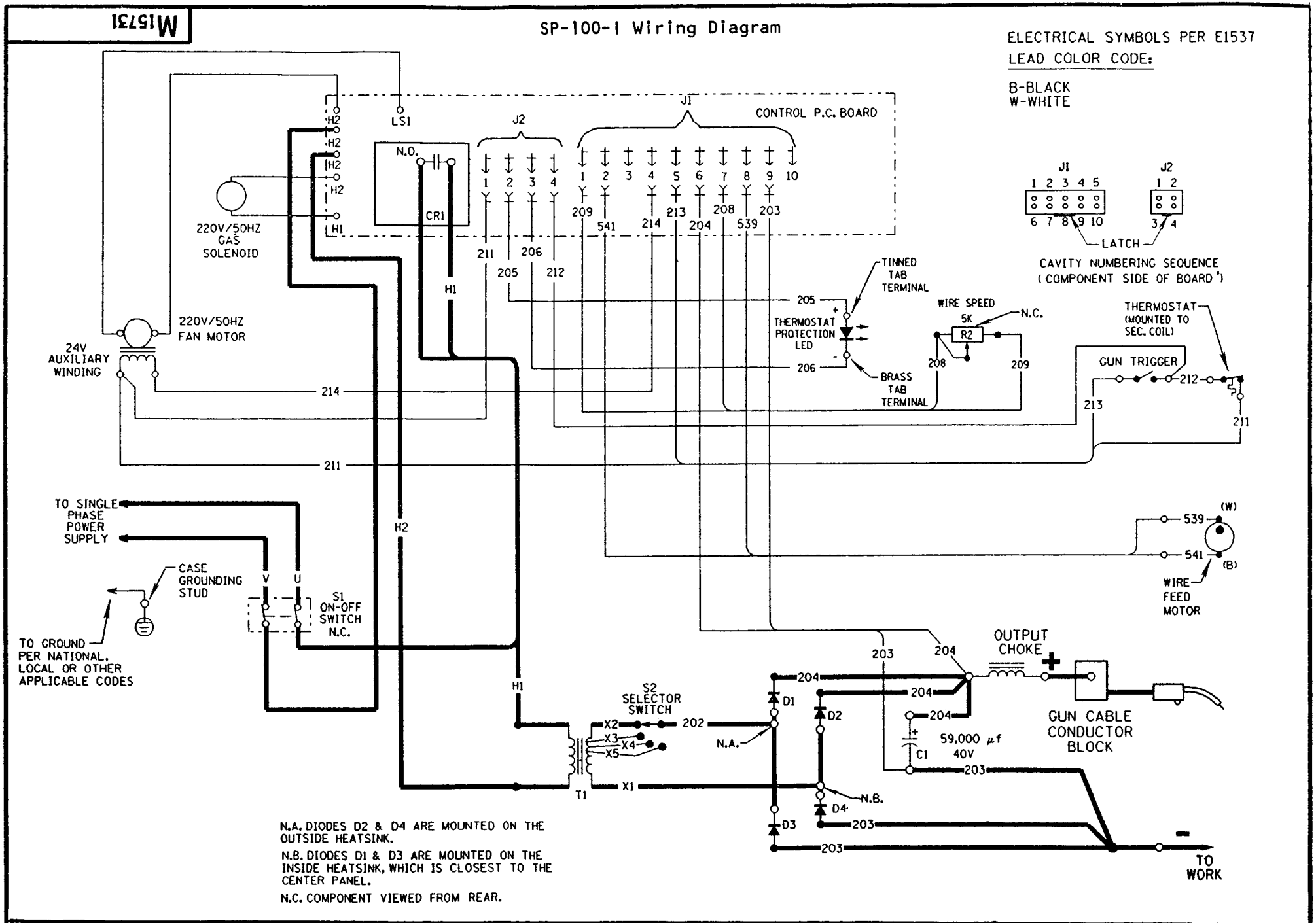
ALIGN GROOVE WITH CENTER OF GUIDE TUBES, SECURE DRIVE ROLL WITH SET SCREW CENTERED ON FLAT

MIG DC(+)		GASLESS FLUX-CORED DC(−)	
.025 (0.6 mm) DIA. SOLID STEEL WIRE	.030 (0.8 mm) DIA. SOLID STEEL WIRE	.035 (0.9 mm) DIA. INNERSHIELD® NR-211-MP	
		 - OR -  Optional knurled drive roll.	
		.035 LINER (COLOR CODED GREEN) MUST BE INSTALLED IN GUN. LINER IS INCLUDED IN K464 .035 INNERSHIELD® KIT	

Be sure to read and understand the warnings on this welding machine and the section on ARC WELDING SAFETY PRECAUTIONS in the Operating Manual. Because design, fabrication, assembly and welding variables affect the results obtained in applying this type of information, the serviceability of a product or assembly is the responsibility of the builder/user.

L7865

SP-100-I 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 welder code number.

LIMITED WARRANTY

STATEMENT OF WARRANTY:

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

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

WARRANTY PERIOD:

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

Three Years:
Transformer Welders
Motor-generator Welders
Semiautomatic Wire feeders
Plasma-cutting power source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

Two Years:
Engine Driven Welders (except engine and engine accessories) with operating speed over 2,000 RPM

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

Equipment not listed above such as guns and cable assemblies, automatic wire feeders and field-installed optional equipment is warranted for one year.

TO OBTAIN WARRANTY COVERAGE:

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

WARRANTY REPAIR:

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

WARRANTY COSTS:

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

IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting the defect.
- This written warranty is the **only** express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the Warranty of Merchantability are limited to the duration of this limited warranty for the equipment involved.

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