

# MAGNUM™ SG

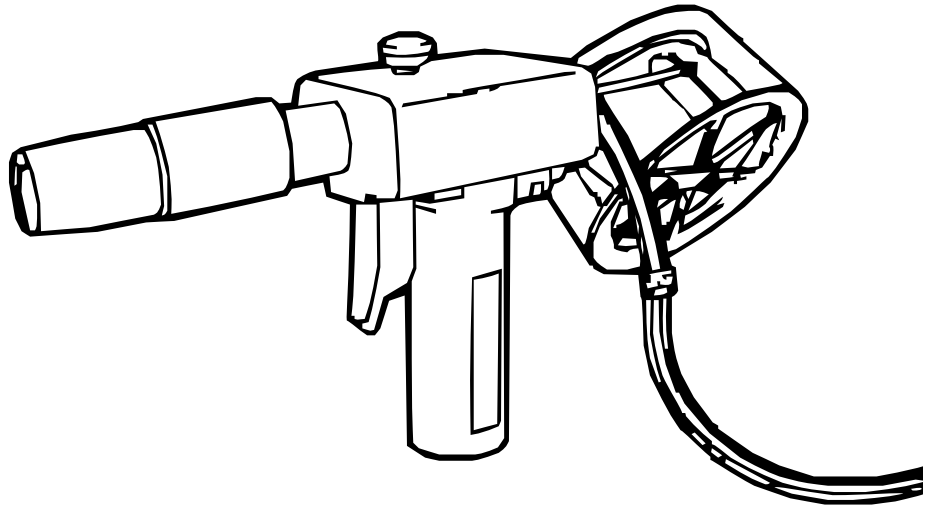
## SPOOL GUN

IM408

February, 2005

### Safety Depends on You

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



## OPERATOR'S MANUAL

**LINCOLN**®  
**ELECTRIC**

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## ! WARNING

### ! CALIFORNIA PROPOSITION 65 WARNINGS !

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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



### FOR ENGINE powered equipment.

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



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



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

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

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



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

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



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



### ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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## ELECTRIC SHOCK can kill.

- 3.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- 3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:**
- Semiautomatic DC Constant Voltage (Wire) Welder.
  - DC Manual (Stick) Welder.
  - AC Welder with Reduced Voltage Control.
- 3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".
- 3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
- 3.e. Ground the work or metal to be welded to a good electrical (earth) ground.
- 3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- 3.g. Never dip the electrode in water for cooling.
- 3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
- 3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.
- 3.j. Also see Items 6.c. and 8.



## ARC RAYS can burn.

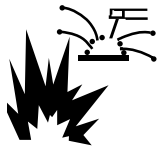
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. 1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.



## FUMES AND GASES can be dangerous.

- 5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**
- 5.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices. MSDS forms are available from your welding distributor or from the manufacturer.
- 5.e. Also see item 1.b.

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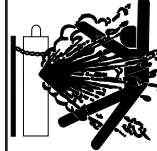


### WELDING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire.

Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

- 6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.
- 6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- 6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 6.h. Also see item 1.c.



### CYLINDER may explode if damaged.

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

- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.c. Cylinders should be located:
  - Away from areas where they may be struck or subjected to physical damage.
  - A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.



### FOR ELECTRICALLY powered equipment.

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

Mar '95

## PRÉCAUTIONS DE SÛRETÉ

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

### Sûreté Pour Soudage A L'Arc

1. Protégez-vous contre la secousse électrique:
  - a. Les circuits à l'électrode et à la pièce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vêtements mouillés. Porter des gants secs et sans trous pour isoler les mains.
  - b. Faire très attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher métallique ou des grilles métalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
  - c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état de fonctionnement.
  - d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
  - e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
  - f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'appliquent aussi au pistolet de soudage.
2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas où on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.
3. Un coup d'arc peut être plus sévère qu'un coup de soleil, donc:
  - a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
  - b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
  - c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.
4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.
5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans latéraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.
7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidentel peut provoquer un échauffement et un risque d'incendie.
8. S'assurer que la masse est connectée le plus près possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaînes de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'échauffement des chaînes et des câbles jusqu'à ce qu'ils se rompent.
9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particulièrement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumées toxiques.
10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgène (gas fortement toxique) ou autres produits irritants.
11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le châssis du poste conformément au code de l'électricité et aux recommandations du fabricant. Le dispositif de montage ou la pièce à souder doit être branché à une bonne mise à la terre.
2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.
3. Avant de faire des travaux à l'intérieur de poste, la débrancher à l'interrupteur à la boîte de fusibles.
4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Mar. '93

# Thank You

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

## **Please Examine Carton and Equipment For Damage Immediately**

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

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

Product \_\_\_\_\_

Model Number \_\_\_\_\_

Code Number or Date Code \_\_\_\_\_

Serial Number \_\_\_\_\_

Date Purchased \_\_\_\_\_

Where Purchased \_\_\_\_\_

Whenever you request replacement parts or information on this equipment, always supply the information you have recorded above. The code number is especially important when identifying the correct replacement parts.

## **On-Line Product Registration**

- Register your machine with Lincoln Electric either via fax or over the Internet.
- For faxing: Complete the form on the back of the warranty statement included in the literature packet accompanying this machine and fax the form per the instructions printed on it.
- For On-Line Registration: Go to our **WEB SITE at [www.lincolnelectric.com](http://www.lincolnelectric.com)**. Choose "Quick Links" and then "Product Registration". Please complete the form and submit your registration.

**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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# PART A

## PRODUCT DESCRIPTION

The K487 Magnum™ SG spool gun is a lightweight, hand-held combined semiautomatic wire feeder and welding gun, designed primarily for aluminum welding using argon shielding gas. The feeding distance of the self-contained wire supply to the arc is only several inches, eliminating the wire feeding problems normally associated with feeding soft aluminum electrode through a conventional gun and cable assembly. The cable included with the Magnum SG allows welding up to 25 feet (7.6 m) from the power source.

The gun is intended for use with a wide variety of constant voltage (CV) power sources through the use of the K488 Magnum SG Control Module (see **Connection to K488 ...** for CV source requirements). It may also be adapted to the Lincoln Idealarc® SP-150, SP-200 and SP-250 single phase wire feeder power sources or similar welders (see **Installation to Similar Welders...** for requirements).

The Magnum SG is ideal for aluminum fabrication in industrial shops, automobile body shops, marinas and for the advanced hobbyist.

## SPECIFICATIONS

Model	Magnum SG Spool Gun with Remote Wire Speed Control
Type	K487
Gun Weight (empty)	2.75 pounds (1.25 kg)
Cable Length	25 feet (7.6 m)
Spool Weight, aluminum wire	1 pound (.45 kg)
Spool Size	4 inch (102 mm) diameter
Reversible Wire Drive Roll	Narrow groove for .023 to .035" (.6-.9 mm) dia. aluminum wire Wide groove for 3/64" (1.2 mm) dia. aluminum wire
Wire Speed	50 to 650 ipm (1.3-16.5 m/min)
Current Rating Welding Current @ 60% Duty Cycle <sup>(1)</sup>	250 Amps

<sup>(1)</sup> Duty Cycle based on 10 minute time period.

## RECOMMENDED PROCESSES AND EQUIPMENT

The spool gun can be used to weld aluminum and aluminum alloys using Gas Metal Arc Welding or GMAW (also known as MIG) process, which requires a supply of shielding gas. Argon is normally used due to its smooth, stable arc, good metal transfer, and low cost. Positive polarity gives good penetration and affords a base metal cathode cleaning effect.

The spool gun should be used with a constant voltage (CV) type power source, and requires control of wire feed, gas solenoid valve, and welding power, either external or internal to the power source (see **Connection to K488 ...** and **Installation to Similar Welders...** for specific requirements).



## PART B

### INSTALLATION

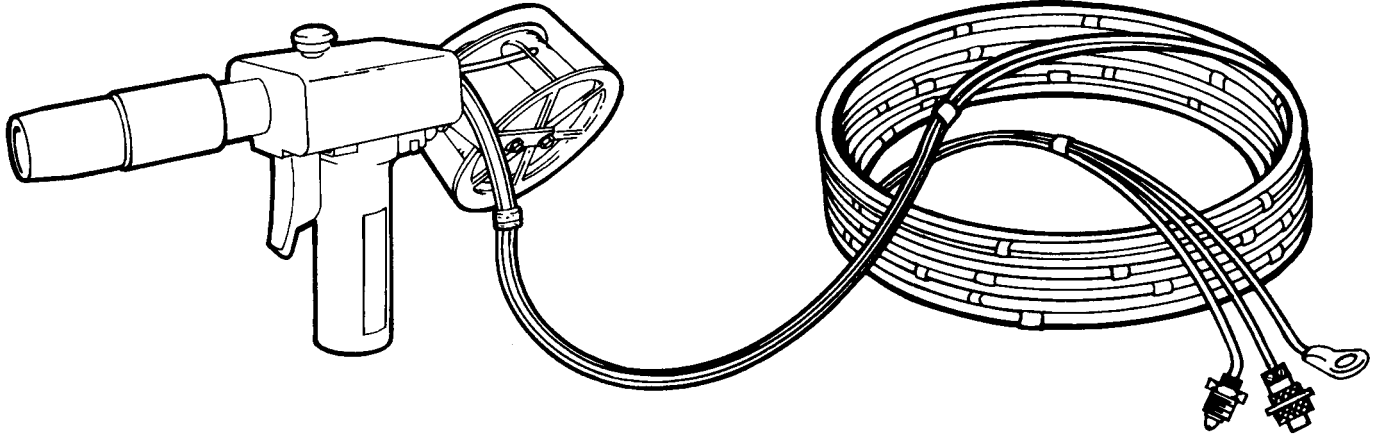
#### Safety Precautions

- Read “Arc Welding Safety Precautions” in the Operating Manual before proceeding. Only personnel that have read and understood the Operating Manual should install and operate this equipment.
- Power source must be connected to system ground per the National Electrical Code and any applicable

— Power source must be turned “OFF” and power leads disconnected when installing this unit.

#### Unpacking the Spool Gun

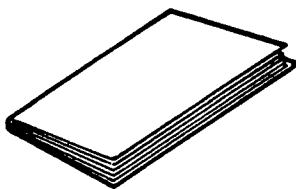
Carefully unpack the Magnum K487 Spool Gun, and make sure you have all of the parts shown below.



#### SPOOL GUN

.035" (0.9 mm) Contact  
Tip Installed

#### CABLE ASSEMBLY



#### OPERATING MANUAL



#### PACKAGE OF 6 TIPS

For .030, .035, and 3/64"  
(0.8, 0.9 and 1.2 mm)  
Wire Sizes. 3/64" contact  
tip is stamped .045"



#### 5/64" (2.0 mm) Allen Wrench

#### Spool Gun Familiarization

Become familiar with your spool gun before connecting to welder. For features described below, refer to Figure on the next page.

1. Nonslip handle. Gun can be used in either right or left hand.
2. Trigger operates welding power, gas flow, and wire feed.
3. Remote wire speed control, located in bottom of gun handle, controls the speed of the drive motor when used in conjunction with the Magnum SG Control Module.
4. Spool gun body has see-through cover so you can see wire feed through rollers and see which groove is active on the drive roller. Remove body cover by unscrewing knob and observe the following:

- a. Wire drive release lever up position moves pressure roller away from drive roll to stop wire feed. Down position moves pressure roller to wire. Operate wire drive release lever and see pressure roller move.
  - b. Drive roll with two wire grooves. Narrow groove feeds .023 through .035 inch (.6-.9 mm) diameter wire. Wide groove feeds 3/64 inch (1.2 mm) diameter wire. Gun is shipped with narrow groove in operating position (toward handle). Reverse roller for 3/64 inch (1.2 mm) diameter wire.
5. Gas nozzle directs gas flow around arc. Gas cone can be pulled off about 1/4 inch (6 mm) if user needs more shielding around arc. Pull off gas cone to see contact tip and gas diffuser. Spool gun is shipped with .035 inch (.9 mm) contact tip installed.
  6. Electrode wire spool cover. Remove by unscrewing knob. Electrode wire goes into gun through rear plastic tube. Knurled nut adjusts wire spool braking.
  7. Cable assembly for power, control, and gas.

Reassemble gun with spool of wire in spool holder. Hold gun and become familiar with gun's weight and balance.

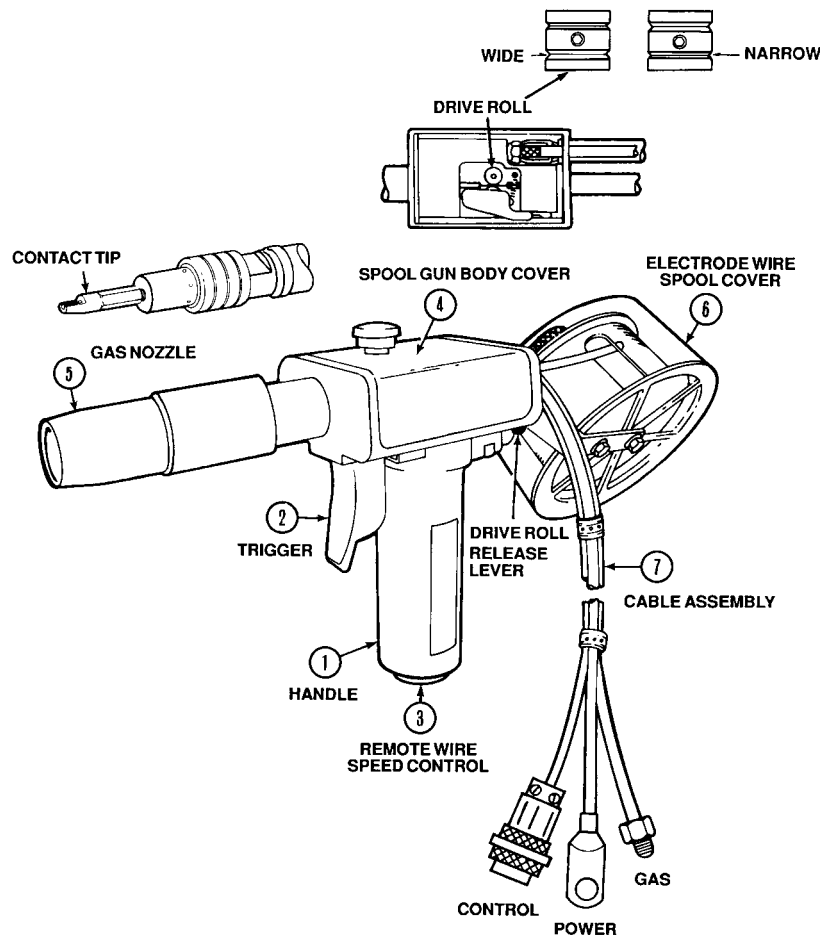
## Spool Gun Installation

The spool gun attaches easily to CV type welders through the Magnum SG Control Module. The spool gun also attaches easily to Lincoln models SP-150, SP-200 and SP-250 power sources and may be adapted to other similar welders.

## Connection to K488 Magnum SG Control Module

1. The K487 Spool Gun connects directly to the K488 Control Module. With this connection, the remote wire speed control, in the gun handle, becomes active. For further details regarding the connection, consult the K488 Control Module Operating Manual (IM398).
2. The control module allows the spool gun to be used with any welder possessing the following characteristics:
  - a. A constant voltage type welding output.
  - b. A 115 VAC control circuit output.
  - c. An output contactor internally or externally energized with closure or 115 VAC, respectively.

**NOTE:** A constant voltage welder without a contactor may be used, but the electrode wire will always be electrically "hot", even when gun trigger is not activated.




## SPOOL GUN FAMILIARIZATION

### Installation to Lincoln SP-250

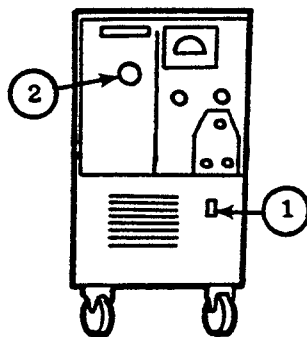
The K487 Spool Gun connects directly to the SP-250 with either a K531-1 or K531-2 Spool Gun Module Kit. The K531-1 kit is for SP-250's with a S19636-1 (or earlier) ROM and the K531-2 kit is for S19636-2 ROM (or later). To see which kit you need, turn the SP-250 on and watch the display. If the display reads S19636-2 (or higher) you can use the K531-2 kit; if not, you need the K531-1 kit with the new ROM assembly. For further details regarding the installation and operation of the Spool Gun with the SP-250, see the SP-250 Operating Manual (IM397) or the M16393 Installation and Operation Sheet provided with the kit.

### Installation to Lincoln SP-150

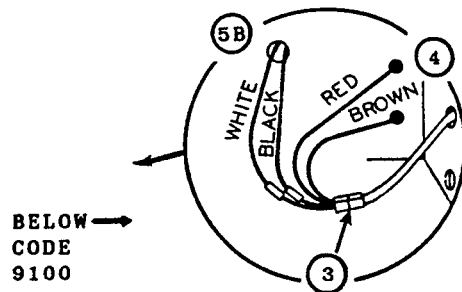
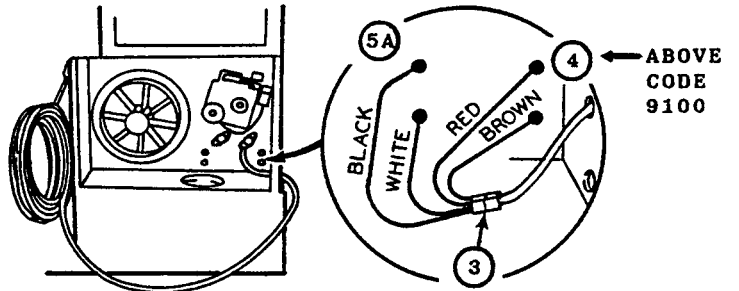
**NOTE:** Remote wire speed control will not be functional when K487 Spool Gun is connected to SP-150. Installation of K487 to SP-150 requires K516 Adapter Assembly.

<b>⚠ WARNING</b>	
	<ul style="list-style-type: none"> <li>• Do not operate with covers removed.</li> <li>• Disconnect input power from welder before installing gun.</li> <li>• Do not touch electrically hot parts.</li> </ul>
	<b>ELECTRIC SHOCK can kill.</b>

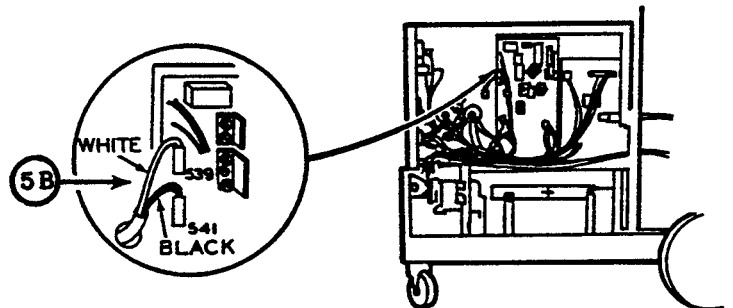
1. Turn off and disconnect electrical power to welder.
2. Open left side door. Remove trigger wires from connectors on center panel. If welder is above Code 9100, remove motor wires from connectors (marked "Motor") on center panel; if welder is below Code 9100, remove right side cover and remove motor control wires from motor control circuit board and pull wires through hole in center panel to left side of unit. Loosen clamping screw on connector block and remove gun cable and control wires through hole in front panel. See SP-150 Operating Manual (IM340) for details.



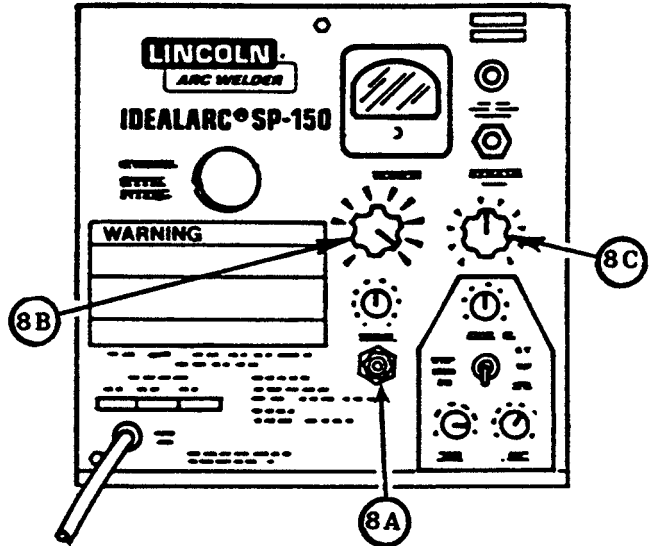
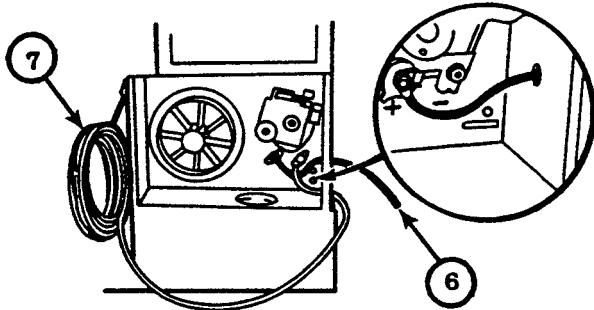
3. Route end of spool gun control through hole in front panel and attach to mating connector of K516 Spool Gun Adapter assembly.
4. Connect red and brown wires of adapter assembly to trigger connectors on center panel. These wires are from the trigger switch and are interchangeable.



5. Connect the black and white motor leads as follows. Refer to the appropriate illustration as needed.
  - 5A. Above Code 9100: Connect black and white wires of adapter assembly to corresponding terminals on center panel.
  - 5B. Below Code 9100: Connect black and white extension wires to matching color wires of adapter assembly and route through hole in center panel to right side of welder. Connect white wire to pin 539 and black wire to pin 541 of motor control circuit board. Reinstall right side cover.



6. Connect spool gun power cable to (+) stud terminal on SP-150. Disconnect any lead already attached there.
7. Connect work lead to (-) stud terminal on SP-150 if not already connected there. Close left side door.

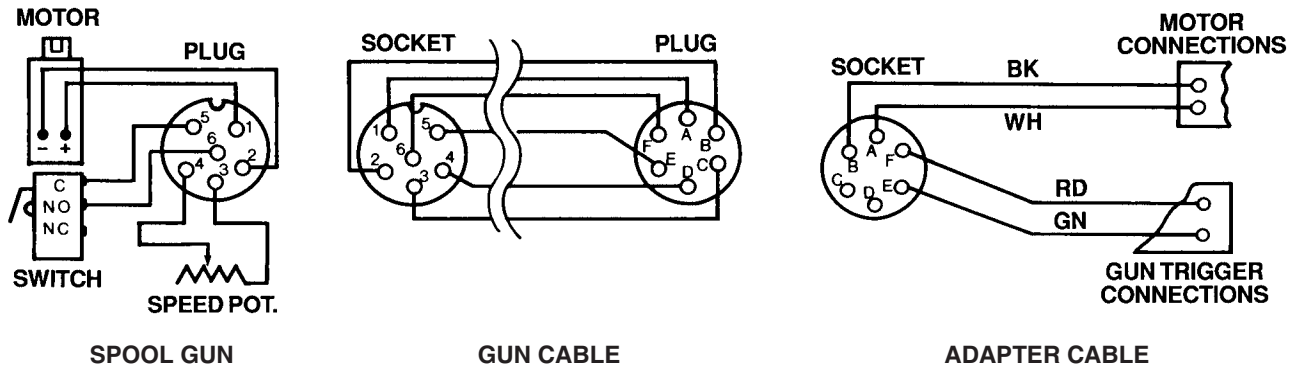


8. On front control panel of SP-150:
  - 8A. Connect spool gun gas line to gas outlet fitting.
  - 8B. Set welding voltage.<sup>(1)</sup>
  - 8C. Set wire feed speed.<sup>(1)</sup>

9. Connect regulated argon gas supply to gas inlet fitting on rear panel of SP-150.

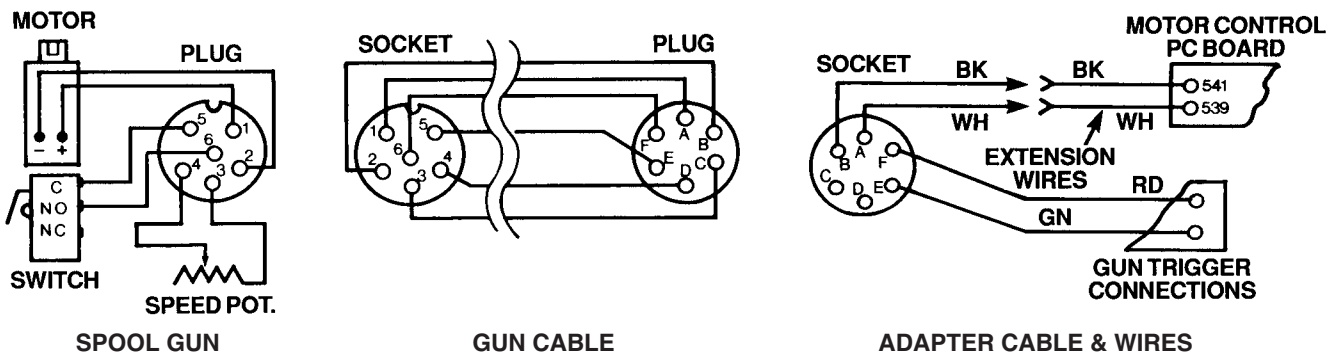
<sup>(1)</sup>See Part B, "Test Weld Settings".

**NOTE:** Connector pinouts show view of mating connector sides.



**CONTROL CIRCUIT DIAGRAM (ABOVE CODE 9100) FOR SP-150**

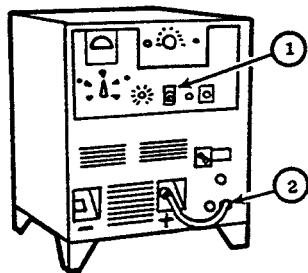
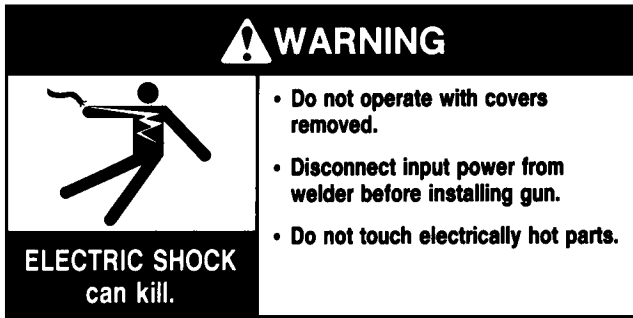
**NOTE:** Connector pinouts show view of mating connector sides.



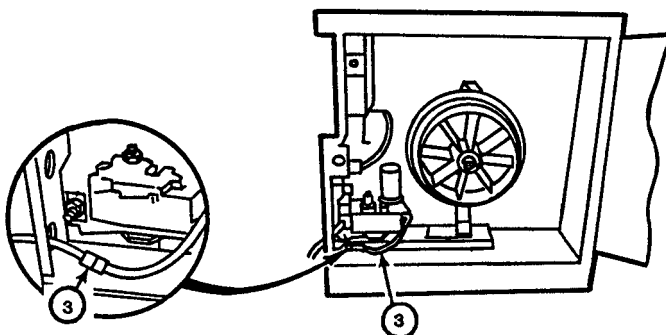
**CONTROL CIRCUIT DIAGRAM (BELOW CODE 9100) FOR SP-150**

## Installation to Lincoln SP-200

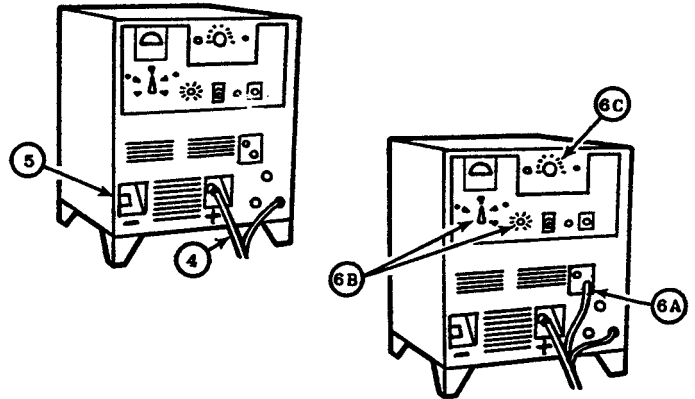
**NOTE:** Remote wire speed control will not be functional when K487 Spool Gun is connected to SP-200. Installation of K487 to SP-200 requires K517 Adapter Assembly.



1. Turn off and disconnect electrical power to welder.
2. Open right side door. If standard gun is installed, disconnect gas fitting and Amphenol connector on front panel, loosen clamping bolt on contact block of wire feed unit, and remove gun cable assembly.
3. Loosen clamp and disconnect internal control cable (4-prong connector) from wire feed chassis. Route spool gun control cable through hole in front panel and connect to mating end of K517 Adapter Assembly. Plug 4-prong connector on adapter assembly into internal control cable. Close door.



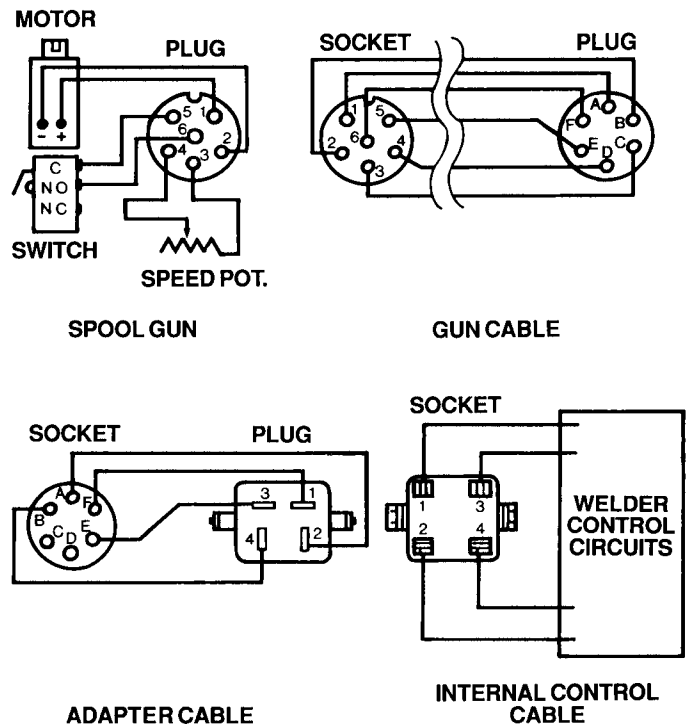
4. Disconnect any cables attached to (+) stud terminal on front panel and connect spool gun power cable to same.
5. Connect work cable to (-) stud terminal, disconnecting any leads already attached there.



6. On front control panel of SP-200:
  - 6A. Connect spool gun gas line to gas outlet fitting. Connect regulated argon gas supply to gas inlet fitting.
  - 6B. Set coarse and fine welding voltage controls.<sup>(1)</sup>
  - 6C. Set wire feed speed.<sup>(1)</sup>

<sup>(1)</sup>See Part B, "Test Weld Settings".

**NOTE:** Connector pinouts show view of mating connector sides.



**CONTROL CIRCUIT DIAGRAM**

## Installation to Similar Welders with Wire Feed

### Control

**NOTE:** Remote wire speed control will not be functional when K487 Spool Gun is connected to welders with internal wire feed control circuitry. K516 Adapter assembly required.

Installation to other welders is possible as long as the welder meets the following requirements:

1. Must be a constant voltage (CV) type power source.
2. Must have a low voltage trigger control circuit ( $\leq 24$  VAC) which operates power and gas flow.
3. Must have a wire feed motor control circuit with approximately 5-24 VDC output range.
4. Must have a solenoid-operated gas handling system capable of supplying argon at flow rates of 20-40 cubic feet per hour (cf/h) (9-19 l/min) and a 5/8"-18 RH thread gas fitting for connection to the spool gun.

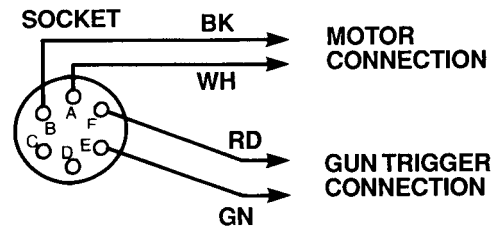
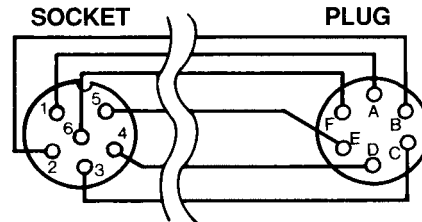
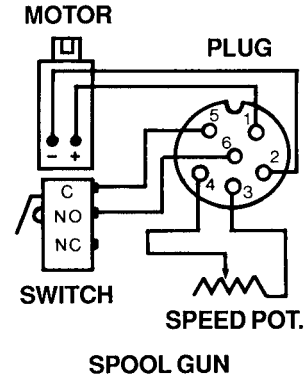
The general procedure to install the spool gun is as follows:

1. Have a qualified serviceman make the installation.
2. Make sure power source is turned off and disconnected from supply.
3. Gain access to wire feed compartment and disconnect and remove wire feed cable and gun assembly, if installed.
4. Install spool gun power lead to (+) output terminal of power source. Connect work lead to (-) output terminal.
5. Connect spool gun gas line to mating output connector on power source. Connect regulated argon gas supply to input connector on power source.
6. Connect black lead from K516 Adapter assembly to positive connection of motor control circuit. Similarly, connect white lead to negative connection of same. Refer to control circuit diagram on this page for connector pinouts.
7. Connect brown and red leads (interchangeable) from adapter assembly to trigger circuit input connection.
8. Connect spool gun control cable to adapter assembly.

9. Set wire feed speed and welding voltage controls.<sup>(1)</sup>

<sup>(1)</sup>See Part B, "Test Weld Settings".



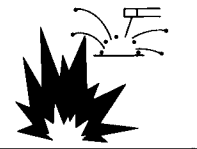

**NOTE:** Connector pinouts show view of mating side of connectors.



**CONTROL CIRCUIT DIAGRAM**

# OPERATING INSTRUCTIONS

## Safety Precautions

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

**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.

## Setup Procedure

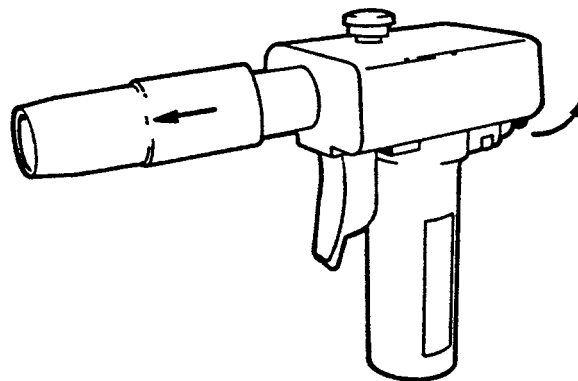
### Selecting Electrode Wire

Several alloy types of filler metals are available, and the best choice depends on the type of base metals and the desired characteristics of the weldment, such as ductility and strength, corrosion resistance, sustained service temperature, and anodic treatment color

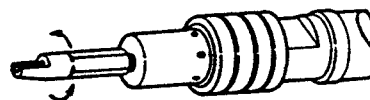
matching. In addition, several wire sizes are available, and the choice here will depend upon several factors, including base metal thickness and the arc transfer process used. Consult your local dealer or appropriate AWS publication for help in selecting an appropriate alloy type and wire size. Also refer to Part B, “Procedure Settings”, for wire sizes used with typical base metal thicknesses and procedure settings.

### Loading Electrode Wire

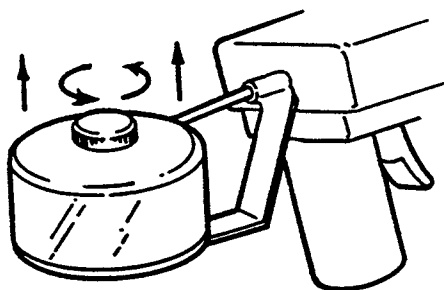
1. Pull off gas cone and push idle roller pressure release lever up.



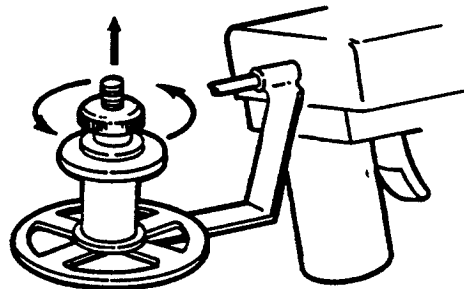
2. Unscrew and remove contact tip.



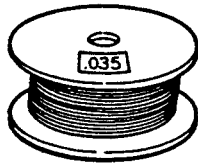
3. Unscrew spool cover knob and remove spool cover.



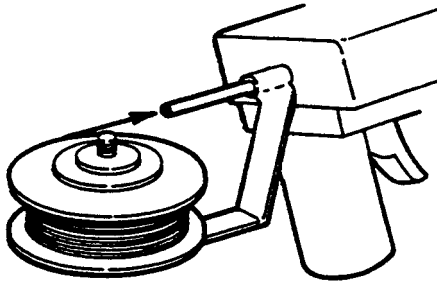
4. Unscrew and remove knurled spool brake nut.



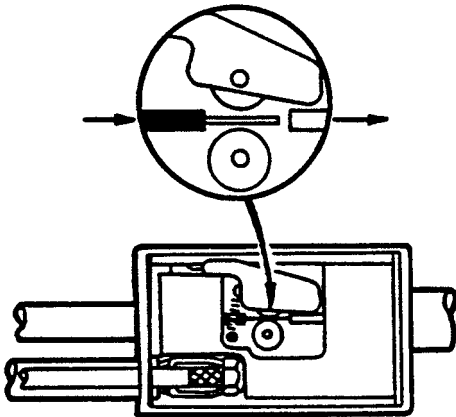
5. Select wire of size and type needed. Wire must be straight, with no kinks or bends. Check drive roller for the correct groove positioning for the size wire selected. See Part B, "Drive Roll Groove Selection", for details.



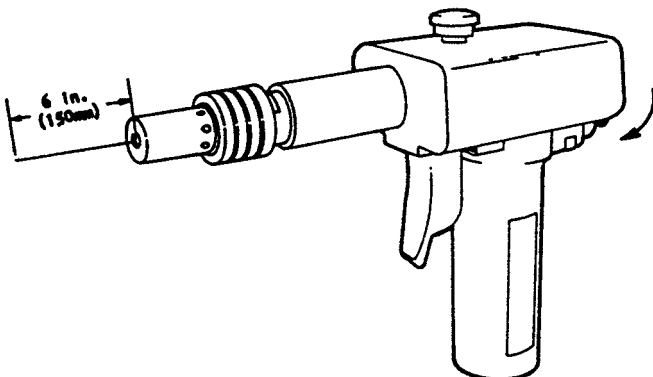
6. Put wire spool on shaft and route wire into plastic tube.



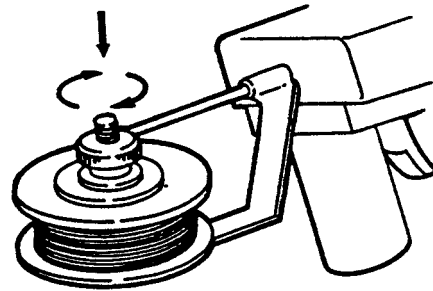
7. Push wire until end of wire exits back tube and enters front tube.



8. Push wire until wire end extends approximately 6" (150 mm) past end of gas diffuser. Re-engage idle roll pressure by pushing release lever down.



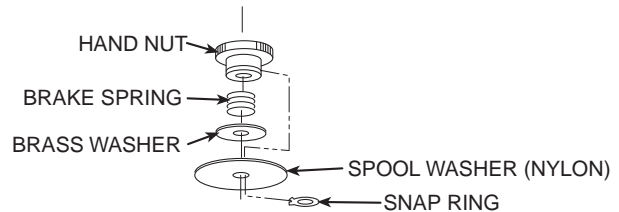
9. Screw on spool brake tension nut and adjust for slight wire spool braking action.



#### FITTING THE ELECTRODE WIRE

- Replace the spool brake assembly.

**Note:** The spool brake assembly must bottom out against the spool hub nut when installed. The spring in the spool brake assembly provides the proper tension on the wire spool.



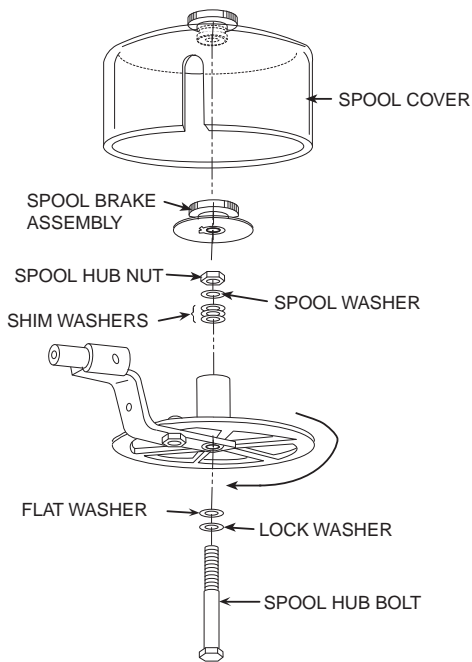
#### SPOOL BRAKE ADJUSTMENT

The specifications for the 4 inch spool allow a variation in the width of the spool of up to 1/16 inch ( $\pm 1/32$  inch tolerance). The spool brake spring will handle most spool width variations. The following adjustments can be made if required.

If the spool brake is not applying enough tension on the spool:

- Remove the spool brake assembly and the spool of wire.
- Remove the spool hub nut and the lock washer.
- Remove shim washer(s) as needed.
- Remove the spool hub bolt and place the removed shim washers under the bolt head.
- Reassemble all components except for the spool cover.



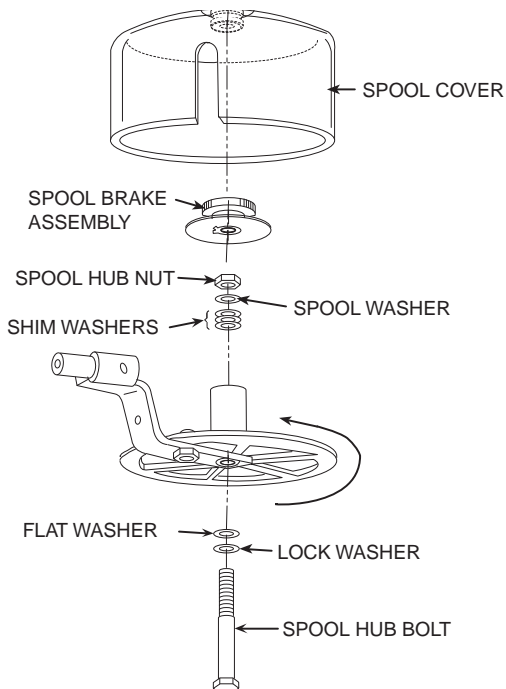


INCREASING BRAKE TENSION ON THE SPOOL

**FITTING THE ELECTRODE WIRE (Cont.)**

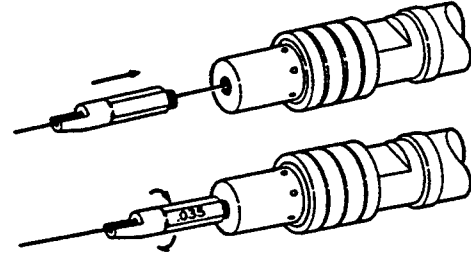
If the spool brake is applying too much tension on the spool :

- Remove the spool brake assembly and the spool of wire.
- Remove the spool hub nut and the lock washer.
- Remove the spool hub bolt.
- Remove the lock washer from under the bolt head.
- Place the removed lock washer under the spool hub nut.
- Reassemble all components except for the spool cover.



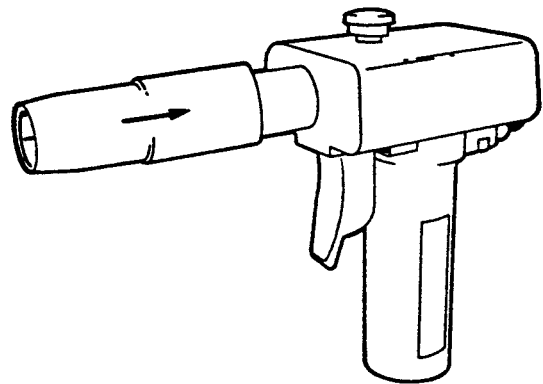
DECREASING BRAKE TENSION ON THE SPOOL

10. Obtain contact tip sized to match wire selected. Slip contact tip over wire and screw into diffuser. Tighten securely.

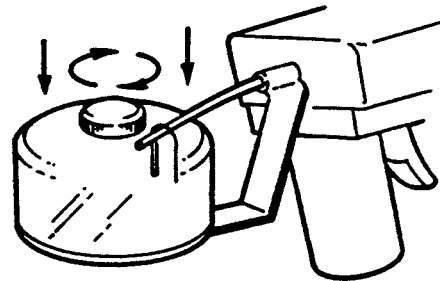


11. Push on gas cone and cut off wire close to end of contact tip.

**CAUTION:** BE CAREFUL WHEN PUSHING ON GAS CONE. WIRE END COULD PUNCTURE YOUR HAND.



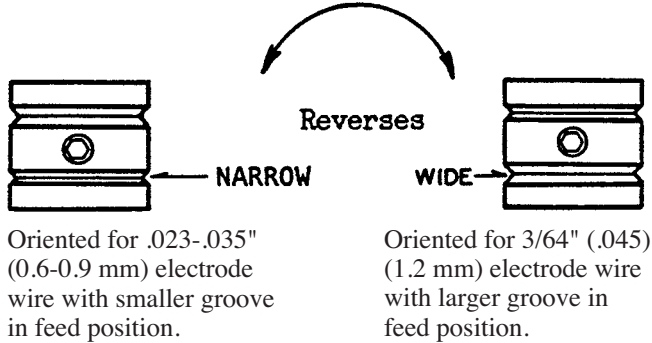
12. Reinstall spool cover with cover slot over plastic tube and secure.



### Drive Roll Groove Selection

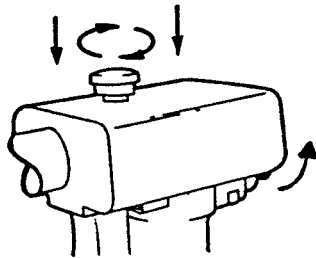
The drive roll has two grooves, a wider and a narrower one, to accommodate changes in wire size used. Changing between the grooves simply requires reversing the drive roll. The following information is to be used to determine proper groove positioning and to change it, if necessary, for the wire size selected.

#### A. Drive Roll Orientation

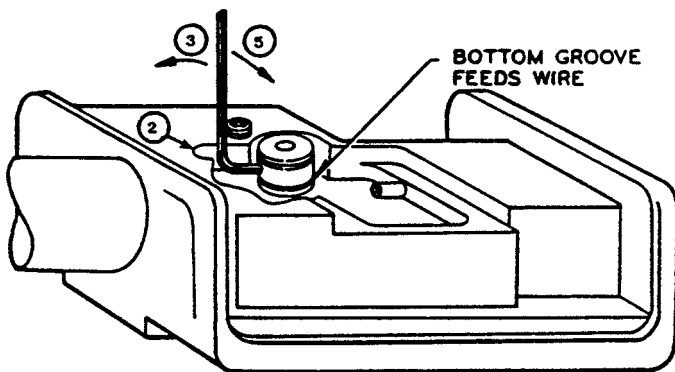


#### B. Changing Drive Roll Orientation

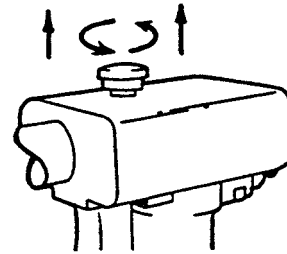
1. Move release lever to up position and remove see-through body cover.



2. Rotate drive roll by jogging drive motor with trigger switch and/or rotating with fingertips until set screw lines up with slot in body.
3. Insert 5/64" Allen wrench in set screw and turn set screw just enough to loosen roller.



4. Slide drive roll off motor shaft. Turn roller over, end for end.
5. Slide drive roll back on motor shaft and tighten set screw. Make sure set screw is on flat part of motor shaft.
6. Remove Allen wrench and reinstall see-through cover.



### Setting Gas Flow Rate

Gas handling systems having adjustable flow valves should be set for the following argon flow rates, depending on base metal thickness and welding position.

#### ARGON SHIELDING GAS FLOW RATES

Material Thickness in inches and (mm)	Welding Position	Flow Rates in cf/hr (l/min)
1/16 (1.6 mm)	Flat	25 cf/hr (11.8 l/min)
3/32 to 3/16 (2.4 to 4.8 mm)	Flat, Vertical, Horizontal, Overhead	30 (14)
1/4 to 3/8 (6.3 to 9.5 mm)	Flat Vertical, Horizontal Overhead	30 (14) 35 (16.5) 40 (18.9)
3/4 (19 mm)	Flat Vertical, Horizontal, Overhead	35 (16.5) 40 (18.9)

### Test Weld Settings

For test weld procedures with other power sources, refer to Part B, Section 2.4, "Procedure Settings", or use the following approximate settings:

Welding Voltage	22-23V
Wire Feed Speed	250-350 ipm (6.3 - 8.9 m/min)

The procedure settings below can be used to make a test weld when the spool gun is used with a Lincoln model SP-150, SP-200 or SP-250 power source:

Wire Size in. (mm)	SP-150		SP-200			SP-250	
	Wire Speed Dial Setting <sup>(1)</sup>	Arc Voltage Setting	Wire Speed Dial Setting <sup>(1)</sup>	Arc Voltage		Wire Speed Percentage	Arc Voltage Setting
				Coarse	Fine		
.030 (.8 mm)	325	6.5	375	18-23	2.5	42%	15
.035 (.9mm)	300	7.0	350	18-23	2.5	39%	16
3/64 (1.2 mm)	225	7.5	250	18-23	2.5	32%	21

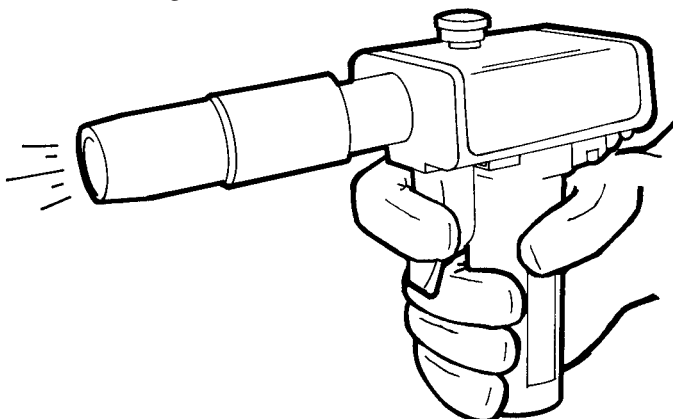
<sup>(1)</sup>Dial not calibrated when used with spool gun.

## Making A Weld

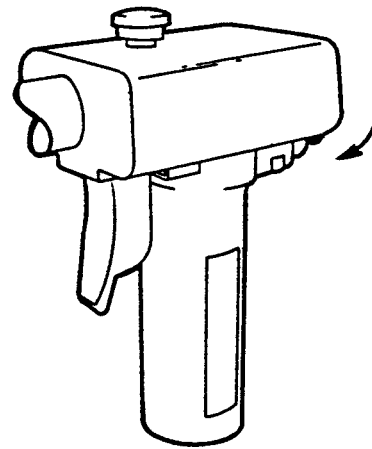
1. Check that the spool gun power, control, and gas connections are correct for the power source being used. Check that the gas supply is turned on. Check wire spool for an adequate supply of wire.
2. See Part B, "Test Weld Setting", or "Procedure Settings", for wire feed speed and voltage settings. Set these controls depending on the welding wire and base metal thickness being used.
3. Connect work clamp to metal being welded. Work clamp must make good electrical contact to the workpiece. The workpiece must also be grounded as stated in "Arc Welding Safety Precautions".
4. Connect power to welder and turn "ON".
5. Prepare to purge gas line by first releasing wire drive. Push wire drive release lever to the UP position.

**WARNING: Gun body and contact tip become electrically energized when gun trigger is pressed and remain so for several seconds after trigger is released.**

6. Press and hold gun trigger for about 5 seconds to purge gas line. If adjustable regulator or metering valve is installed, adjust gas flow per Part B, "Setting Gas Flow Rate".



Release wire feed and purge gas line.

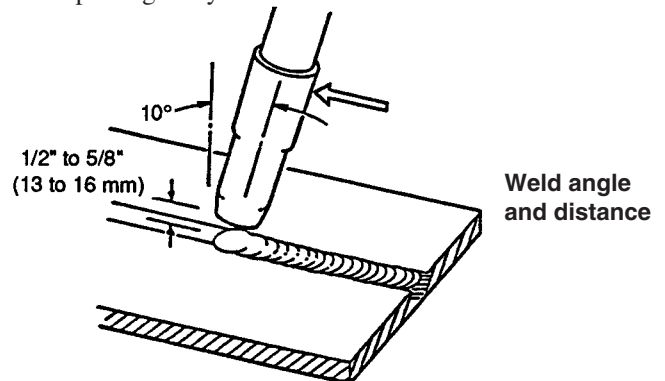


Unlock wire feed release

7. Re-engage wire drive by pushing release lever to down position.
8. Momentarily squeeze trigger and verify that wire feeds properly. Trim wire to approximately 1/4" (6 mm) from end of contact tip.

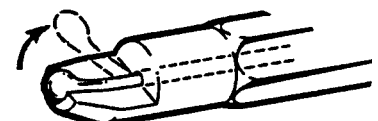
**WARNING: When using an open arc process, it is necessary to use correct eye, ear, head, and body protection.**

9. Position gun over joint at 10° pushing angle. End of wire may be lightly touching the work.
10. Lower welding helmet, close gun trigger, and begin welding. Hold the gun so that the contact tip to work distance is about 1/2 inch (13 mm).
11. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.
12. When no more welding is to be done, close valve on gas cylinder, momentarily operate trigger to release gas pressure in line and turn off power source.
13. Note that clogged tips can often be salvaged by peeling away melted wire.



Weld angle and distance

Salvaging clogged tips



## Procedure Settings

The following procedure settings for aluminum wire and argon gas can be used as starting points for developing specific welding procedures:

Wire Size in. (mm)	Metal Thickness		Arc Volts	Wire Speed ipm (mpm)	Amps DC (+)
	ga.	in. (mm)			
.030 (0.8)	22	.030 (0.8)	13-14 <sup>(1)</sup>	200 (5.1)	40
	20	.036 (1.0)	13-14 <sup>(1)</sup>	240 (6.1)	40
	18	.048 (1.2)	14-15 <sup>(1)</sup>	290 (7.4)	50
	16	.060 (1.6)	15-16 <sup>(1)</sup>	340 (8.6)	60
	14	.075 (2.0)	16-17 <sup>(1)</sup>	370 (9.4)	70
	12	.105 (2.5)	16-18 <sup>(1)</sup>	430 (10.9)	90
	10	.135 (3.5)	24-26	460 (11.7)	110
	3/16	(5.0)	24-26	500 (12.7)	150
	1/4	(6.0)	28-29	560 (14.2)	180
	3/8	(10.0)	28-30	600 (15.2)	200
.035 (0.9)	22	.030 (0.8)	13-14 <sup>(1)</sup>	150 (3.8)	40
	20	.036 (1.0)	13-14 <sup>(1)</sup>	175 (4.4)	40
	18	.048 (1.2)	13-14 <sup>(1)</sup>	215 (5.5)	50
	16	.060 (1.6)	14-16 <sup>(1)</sup>	250 (6.4)	60
	14	.075 (2.0)	14-16 <sup>(1)</sup>	270 (6.9)	70
	12	.105 (2.5)	16-18 <sup>(1)</sup>	320 (8.1)	90
	10	.135 (3.5)	24-26	410 (10.4)	110
	3/16	(5.0)	24-26	450 (11.4)	150
	1/4	(6.0)	26-28	530 (13.5)	180
	3/8	(10.0)	26-29	560 (14.2)	200
3/64 (1.2)	10	.135 (3.5)	20-21 <sup>(1)</sup>	180 (4.6)	110
	3/16	(5.0)	20-21 <sup>(1)</sup>	220 (5.6)	150
	1/4	(6.0)	27-28	250 (6.4)	180
	3/8	(10.0)	25-30	260 (6.6)	200
	1/2	(12.0)	25-31	270 (6.9)	220
	3/4	(20.0)	25-31	290 (7.4)	250

<sup>(1)</sup>Short arc transfer.

## MAINTENANCE

### Safety Precautions



**WARNING**

- Do not operate with covers removed.
- Disconnect input power from welder before installing gun.
- Do not touch electrically hot parts.
- Only qualified persons should install, use or service this machine.

**ELECTRIC SHOCK can kill.**

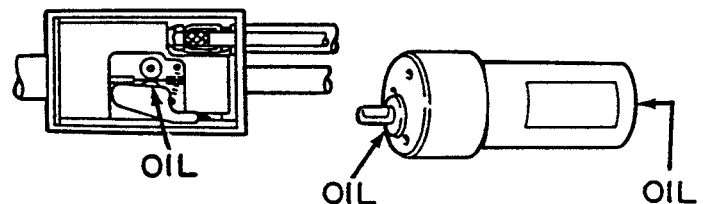
When finished welding, be sure to turn power source off and close valve on gas cylinder.

### Routine Maintenance

**NOTE:** Oil and spray cleaners can contaminate electrode wire and cause bad welds. They could also

make wire drive rollers slip. Be careful when using any of these liquids on spool gun.

After 500 hours operation or 24 months time, whichever comes first, oil motor with light lubricating oil. Apply oil to pressure roller bearing on the end of a toothpick so oil will not contaminate drive surface of wire drive rollers.



Carefully clean gun with a cleaner that is safe for plastic. Apply cleaner to rag and wipe gun. Do **NOT** spray cleaner on gun. Keep cable clean. Oil, grease, gasoline, paint, and solvents degrade cable insulation.

## Troubleshooting Guide

PROBLEM	SYMPTOMS	REMEDY
No arc, wire feed, or gas flow.	<ol style="list-style-type: none"> <li>1. Cable connections loose.</li> <li>2. Trigger switch loose or defective.</li> <li>3. Welder not turned on.</li> <li>4. Welder not plugged in.</li> <li>5. Cable or adapter cable damaged.</li> <li>6. Adapter (if used) not connected.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check all power connections.</li> <li>2. Fix switch or replace.</li> <li>3. Turn on welder power.</li> <li>4. Plug in.</li> <li>5. Inspect and replace.</li> <li>6. Connect adapter.</li> </ol>
No arc, weak arc.	<ol style="list-style-type: none"> <li>1. Poor ground connection to work.</li> <li>2. Power cable connection loose.</li> <li>3. Voltage set too low.</li> <li>4. Tip too large for wire size.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check ground connection.</li> <li>2. Check connections; if defective, replace cable or connectors.</li> <li>3. Adjust to proper voltage.</li> <li>4. Change tip size.</li> </ol>
No wire feed.	<ol style="list-style-type: none"> <li>1. Feeding small diameter wire with large groove on drive roller.</li> <li>2. Wire drive release open.</li> <li>3. Wire welded to tip.</li> <li>4. Wire spool empty.</li> <li>5. Tip too small for wire.</li> <li>6. Kink or bend in wire.</li> <li>7. Spool tension too tight.</li> <li>8. Spool cover binding.</li> <li>9. Control cable loose.</li> <li>10. Drive roller worn.</li> <li>11. Pressure roller stuck.</li> <li>12. Roller spring loose or broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Change position of wire drive roller.</li> <li>2. Close wire drive release.</li> <li>3. Peel wire off tip or use new tip.</li> <li>4. Insert new spool.</li> <li>5. Insert correct tip.</li> <li>6. Pull wire through tip or start new wire end.</li> <li>7. Loosen spool tension nut.</li> <li>8. Rotate spool cover slot to proper position.</li> <li>9. Check all connections.</li> <li>10. Replace.</li> <li>11. Replace or lubricate.</li> <li>12. Replace.</li> </ol>
Wire feed too fast or too slow.	<ol style="list-style-type: none"> <li>1. Wrong wire speed set for work.</li> </ol>	<ol style="list-style-type: none"> <li>1. Adjust wire feed speed at welder's control panel, or at remote wire speed control in spool gun handle (where applicable).</li> </ol>
Wire feed rollers go backward.	<ol style="list-style-type: none"> <li>1. Electrical connections reversed in adapter cable (or wires).</li> </ol>	<ol style="list-style-type: none"> <li>1. Check all gun (and adapter) cable connections.</li> </ol>
Low or no gas flow. Oxidation of work.	<ol style="list-style-type: none"> <li>1. Gas flow not set right.</li> <li>2. Cylinder out of gas.</li> <li>3. Cylinder valve closed.</li> <li>4. Leak in gas line.</li> <li>5. Leak in gun.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set proper flow rate.</li> <li>2. Get new cylinder of gas.</li> <li>3. Open cylinder valve.</li> <li>4. Inspect and replace.</li> <li>5. Check for missing gun tubes and/or missing gun body cover.</li> </ol>
Oxidized work, arc unstable.	<ol style="list-style-type: none"> <li>1. Wrong welding polarity.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check polarity.</li> </ol>
Gas cone wobbles.	<ol style="list-style-type: none"> <li>1. Insulator loose.</li> </ol>	<ol style="list-style-type: none"> <li>1. Tighten insulator, but not enough to damage threads.</li> </ol>
Contact tip extension.	<ol style="list-style-type: none"> <li>1. Gas cone positioned incorrectly.</li> </ol>	<ol style="list-style-type: none"> <li>1. Slide gas cone in or out to position needed for work.</li> </ol>

## DISASSEMBLY AND ASSEMBLY HINTS

Numbers in parentheses refer to Parts List page number and Item Number.

When applying torque on nozzle parts (P198-D,#1 through #8), hold gun by molded base (P198-D,#27) or body block (P198-D#43), not by handle (P198-D,#13) or motor(P198-D,#42).

When assembling handle to molded base, make sure switch wires (P198-D,#19) are not pinched between handle and motor. Pinched wires could cause welding voltage to short to control circuit.

To remove gas power connector (P198-F,#72) from gun body, remove handle so bottom plate can move away from body.

To install woven insulating sheath (P198-D,#6), put one end halfway into steel sleeve (P198-D,#5) and put other end over barrel(P198-D,#8). Then push both sleeves over barrel together.

When replacing brass barrel, first put antiseizing compound on threads that go into aluminum body.

When reinstalling Teflon lin (P198-D,#9), put O-ring (P198-D,#10) over narrow part of tubing.

Gas passage seal, set screw(P198-D,#24) [front], is sealed with Teflon tape.

<b>WARNING</b>	<ul style="list-style-type: none"> <li>● Do not touch electrically live parts or electrode with skin or wet clothing.</li> <li>● Insulate yourself from work and ground.</li> </ul>	<ul style="list-style-type: none"> <li>● Keep flammable materials away.</li> </ul>	<ul style="list-style-type: none"> <li>● Wear eye, ear and body protection.</li> </ul>
Spanish <b>AVISO DE PRECAUCION</b>	<ul style="list-style-type: none"> <li>● No toque las partes o los electrodos bajo carga con la piel o ropa mojada.</li> <li>● Aíslese del trabajo y de la tierra.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenga el material combustible fuera del área de trabajo.</li> </ul>	<ul style="list-style-type: none"> <li>● Protéjase los ojos, los oídos y el cuerpo.</li> </ul>
French <b>ATTENTION</b>	<ul style="list-style-type: none"> <li>● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension.</li> <li>● Isolez-vous du travail et de la terre.</li> </ul>	<ul style="list-style-type: none"> <li>● Gardez à l'écart de tout matériel inflammable.</li> </ul>	<ul style="list-style-type: none"> <li>● Protégez vos yeux, vos oreilles et votre corps.</li> </ul>
German <b>WARNUNG</b>	<ul style="list-style-type: none"> <li>● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung!</li> <li>● Isolieren Sie sich von den Elektroden und dem Erdboden!</li> </ul>	<ul style="list-style-type: none"> <li>● Entfernen Sie brennbares Material!</li> </ul>	<ul style="list-style-type: none"> <li>● Tragen Sie Augen-, Ohren- und Körperschutz!</li> </ul>
Portuguese <b>ATENÇÃO</b>	<ul style="list-style-type: none"> <li>● Não toque partes elétricas e electrodos com a pele ou roupa molhada.</li> <li>● Isole-se da peça e terra.</li> </ul>	<ul style="list-style-type: none"> <li>● Mantenha inflamáveis bem guardados.</li> </ul>	<ul style="list-style-type: none"> <li>● Use proteção para a vista, ouvido e corpo.</li> </ul>
Japanese <b>注意事項</b>	<ul style="list-style-type: none"> <li>● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。</li> <li>● 施工物やアースから身体が絶縁されている様にして下さい。</li> </ul>	<ul style="list-style-type: none"> <li>● 燃えやすいものの側での溶接作業は絶対にしてはなりません。</li> </ul>	<ul style="list-style-type: none"> <li>● 目、耳及び身体に保護具をして下さい。</li> </ul>
Chinese <b>警告</b>	<ul style="list-style-type: none"> <li>● 皮膚或濕衣物切勿接觸帶電部件及鎢條。</li> <li>● 使你自已與地面和工件絕緣。</li> </ul>	<ul style="list-style-type: none"> <li>● 把一切易燃物品移離工作場所。</li> </ul>	<ul style="list-style-type: none"> <li>● 佩戴眼、耳及身體勞動保護用具。</li> </ul>
Korean <b>위험</b>	<ul style="list-style-type: none"> <li>● 전도체나 용접봉을 젖은 형갑 또는 피부로 절대 접촉치 마십시오.</li> <li>● 모재와 접지를 접촉치 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 인화성 물질을 접근시키지 마십시오.</li> </ul>	<ul style="list-style-type: none"> <li>● 눈, 귀와 몸에 보호장구를 착용하십시오.</li> </ul>
Arabic <b>تحذير</b>	<ul style="list-style-type: none"> <li>● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسد الجسم أو بالملابس المبللة بالماء.</li> <li>● ضع عازلا على جسمك خلال العمل.</li> </ul>	<ul style="list-style-type: none"> <li>● ضع المواد القابلة للاشتعال في مكان بعيد.</li> </ul>	<ul style="list-style-type: none"> <li>● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.</li> </ul>

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

**SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.**

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

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

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

**LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.**

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的說明以及應該使用的銀焊材料，並請遵守貴方的有閣勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.





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