

MAGNUM[®] 200FM

Fast-Mate[™] Gun and Cable Assemblies

IM435-A

March, 2008

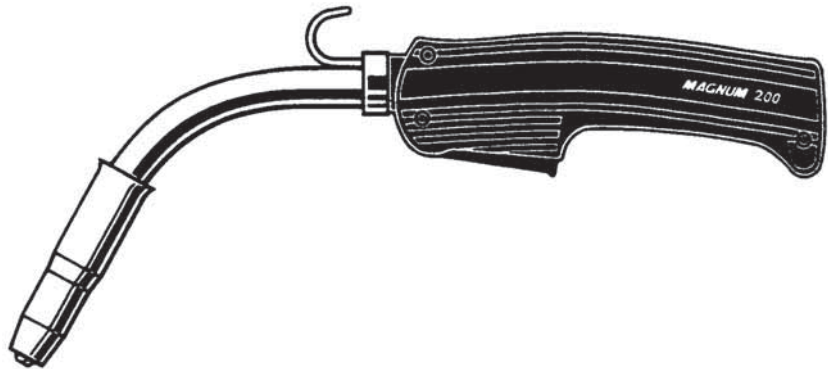
Models **K498**



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

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.



LINCOLN[®]
ELECTRIC

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Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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



FOR ENGINE powered equipment.

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



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



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

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

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

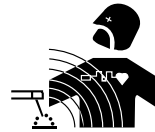


1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

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



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



ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

Mar '95



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.

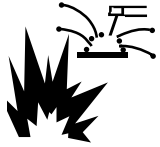
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to 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. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
- 5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the 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.f. Also see item 1.b.

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WELDING and CUTTING SPARKS can cause fire or explosion.

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

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

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



CYLINDER may explode if damaged.

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

Jan, 07

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!

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

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**. 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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| <hr/> | |
| Parts Pages | P202-G,-G.1, P202-D.2,-D.3,-D.4 |
| <hr/> | |

Read this entire installation section before you start installation.

SAFETY PRECAUTIONS

WARNING



ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.
- Do not touch electrically hot parts.
- Be sure to discharge capacitors with the procedure outlined in the Maintenance Section of this manual before working in that area of the equipment.

LINER INSTALLATION

LINER INSTALLATION

NOTE: FM models, using Fast-Mate connector, are shipped with factory installed liner. To change liner in these models, see maintenance section.

CONTACT TIP AND GAS NOZZLE INSTALLATION

NOTE: FM models are shipped ready to weld with the proper tip and gas nozzle installed. If you choose to change the contact tip or nozzle, see the instructions below.

- a. Choose the correct size contact tip for the electrode being used (wire size is stenciled on the side of the contact tip) and screw it snugly into the gas diffuser.
- b. Be sure the nozzle insulator is fully screwed onto the diffuser and does not block the gas holes in the diffuser.
- c. Slip the appropriate gas nozzle onto the nozzle insulator. Either a .62" (15.9 mm) or .50" (12.7 mm) I.D. slip-on gas nozzle may be used and should be selected based on the welding application.

Choose the gas nozzle as appropriate for the GMAW process to be used. Typically, the contact tip end should be flush to .12" (3.0 mm) extended for the short-circuiting transfer process and .12" (3.0 mm) recessed for spray transfer. For the Outershield (FCAW) process, 1/4" (6.4 mm) recess is recommended.

CONNECTION TO FAST-MATE COMPATIBLE FEEDERS

FM model gun cable assemblies will connect easily to any feeder equipped with a European style gun connector or any Lincoln wire feeder equipped with a K489 Series FastMate Adapter Kit. To install an optional K489 Series kit see the instructions provided with the kit. (See Table A.1)

- a. Check that the feeder outgoing guide, as well as the drive roll, are appropriate for the electrode size being used. When using a Fast-Mate Adapter Kit, be certain the adapter guide tube is also properly sized.
- b. Align and fully engage the brass connector end of the gun cable into the mating connector on the outgoing side of the feeder wire drive. Secure the cable connection by snuggling the Fast-Mate connector collar nut.

TABLE A.1

| WIRE FEEDER ADAPTER KITS FOR (FM) | |
|-----------------------------------|---|
| PRODUCT NO. | WIRE FEEDER TYPE |
| K489-1 | Lincoln LN-7 Series, LN-8, LN-9 |
| K489-2 | Lincoln LN-25 |
| K489-3 | Miller |
| K489-4 | Turbo Adapter |
| K489-5 | Hobart |
| K489-6 | L-Tec |
| K489-7 | LN-10, DH-10,STT-10 Power Feed 10, LN-15 |

Read and understand this entire section before operating your machine.

SAFETY PRECAUTIONS

WARNING



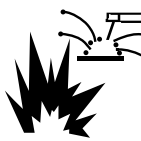
ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- Insulate yourself from the work and ground.
- Always wear dry insulating gloves.



FUMES AND GASES can be dangerous.

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



WELDING, CUTTING and GOUGING SPARKS can cause fire or explosion

- Keep flammable material away.
- Do not weld, cut or gouge on containers that have held combustibles.



ARC RAYS can burn.

- Wear eye, ear and body protection.

Only qualified personnel should operate this equipment. Observe all safety information throughout this manual.

GENERAL DESCRIPTION

The MAGNUM® 200FM amp GMA gun and cable assembly has been designed to meet NEMA specification EW3 for welding with steel electrode using the GMAW (gas metal arc welding) and gas-shielded FCAW (flux-cored arc welding) processes:

The K498 MAGNUM® 200FM gun is factory installed with a Fast-Mate (European style) wire feeder connector for “all-in-one” GMAW feeder connection. A single connector attaches welding current, wire liner, welding gas, and trigger control leads to feeder. An optional K489-1 MAGNUM® Fast-Mate Adapter allows the use of these guns with any Lincoln LN-7, LN-8, LN-9 and SP200 wire feeder. An optional K489-2 MAGNUM® Fast-Mate Adapter is required for the LN-25.

For best results when welding mild and alloy steels, it is recommended that L-50 or Super Arc L-56 Lincoln solid wire electrodes be used for the GMAW process and OS70 or OS71 Lincoln Outershield® cored electrodes for the gas-shielded FCAW process.

MAGNUM® 200FM
200 AMPS AT 60% DUTY CYCLE WITH CO₂ GAS
150 AMPS AT 60% DUTY CYCLE WITH MIXED GAS
(TABLE B.1)

| Description Product Number | Gun Cable Length (m) | Wire Size in. (mm) | Contact Tips Standard Duty | Gas Diffuser Assembly | Gas Nozzle | Insulator | Cable Liner | Gun Tube 60° |
|-------------------------------|----------------------|--------------------------|----------------------------|-----------------------|------------|-----------|--------------|--------------|
| K498-1 | 15 ft. (4.5) | .035 (0.9) .045 (1.2) | KP14-35 -45 | KP52 | KP22-50 | KP32 | KP42-4045-15 | KP2028-1 |
| K498-2 | 10 ft. (3.0) | .035 (0.9) .045 (1.2) | KP14-35 -45 | KP52 | KP22-50 | KP32 | KP42-4045-15 | KP2028-1 |
| K498-3 | 15 ft. (4.5) | .025 (0.6) .030 (0.8) | KP14-25 -30 | KP52-23 | KP22-50 | KP32 | KP42-25-15 | KP2028-1 |
| K498-4 | 10 ft. (3.0) | .025 (0.6) .030 (0.8) | KP14-25 -30 | KP52-23 | KP22-50 | KP32 | KP42-25-15 | KP2028-1 |
| K498-5 | 12 ft. (3.6) | .025 (0.6) .030 (0.8) | KP14-25 -30 | KP52-23 | KP22-50 | KP32 | KP42-25-15 | KP2028-1 |
| K498-6 | 12 ft. (3.6) | .035 (0.9) .045 (1.2) | KP14-35 -45 | KP52 | KP22-50 | KP32 | KP42-4045-15 | KP2028-1 |

MAGNUM® 200FM



ELECTRODES AND EQUIPMENT

The MAGNUM® 200FM gun and cable has been designed for use with Lincoln L-50 and L-56, solid steel wire electrodes for the GMAW process and Lincoln Outershield® cored electrodes for the gas-shielded FCAW process. Refer to the appropriate Lincoln Process and Procedure Guidelines for the electrode used for information on recommended electrical and visible stickouts.

MAKING A WELD

- a. Check that the welding power source is on and that the shielding gas supply is set for the proper flow rate.
- b. Position electrode over joint. End of the electrode should be slightly off the work.
- c. Lower welding helmet, close gun trigger and begin welding. Hold the gun so the contact tip to work distance gives the correct electrical stickout as required for the procedure being use.
- d. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out. Follow wire feeder instruction manual if using a trigger interlock circuit.

AVOIDING WIRE FEEDING PROBLEMS

Wire feeding problems can be avoided by observing the following gun handling procedures:

- a. Do not kink or pull cable around sharp corners.
- b. Keep the electrode cable as straight as possible when welding or loading electrode through cable.
- c. Avoid wrapping excess cable around handle or front of wire feeder.
- d. Do not allow dolly wheels or trucks to run over cables.
- e. Keep cable clean by following maintenance instructions.
- f. Use only clean, rust-free electrode. The Lincoln electrodes have proper surface lubrication.
- g. Replace contact tip when the arc starts to become unstable or the contact tip end is fused or deformed.

REMOVAL, INSTALLATION AND TRIMMING INSTRUCTIONS FOR MAGNUM® LINERS

NOTICE: The variation in cable lengths prevents the interchangeability of liners. Once a liner has been cut for a particular gun, it should not be installed in another gun, unless it can meet the liner cut off length requirement. Liners are shipped with the jacket of the liner extended the proper amount.

- Remove the gas nozzle and nozzle insulator. Loosen the set screw located in the side of the diffuser with 5/64" (2.0 mm) Allen wrench (provided with the gun).
- Remove the gas diffuser from gun.
- Lay gun and cable out straight on a flat surface. Remove the liner nut from the connector end of the cable and pull liner out of cable.
- Insert a new untrimmed liner into the connector end of the cable. Be certain that the liner bushing is stenciled appropriately for the wire size being used.
- Fully seat the liner bushing into the connector. Finger tighten the liner nut onto the cable connector.
- With the cable straight, trim liner to 1-1/4" (31.8 mm). Remove any burrs from the end of the liner.

- Screw the gas diffuser onto the end of the gun tube and securely tighten.
- Tighten the set screw in the side of the gas diffuser against the cable liner using a 5/64" (2.0 mm) Allen wrench.

⚠ CAUTION

This screw should be gently tightened. Over-tightening will split or collapse the liner and cause poor wire feeding.

GUN TUBES AND NOZZLES

- Replace worn contact tips as required.
- Remove spatter from inside of gas nozzle and from tip after each 10 minutes of arc time or as required.
- To remove gun tube from gun, loosen socket-head clamping screw in handle with 3/16" (4.8 mm) Allen wrench. Remove gas nozzle and nozzle insulator and also loosen small set screw in the diffuser using 5/64" (2.0 mm) Allen wrench.

NOTE: Small set screw in the diffuser **must** be loosened, otherwise liner could be damaged when attempting to remove gun tube.

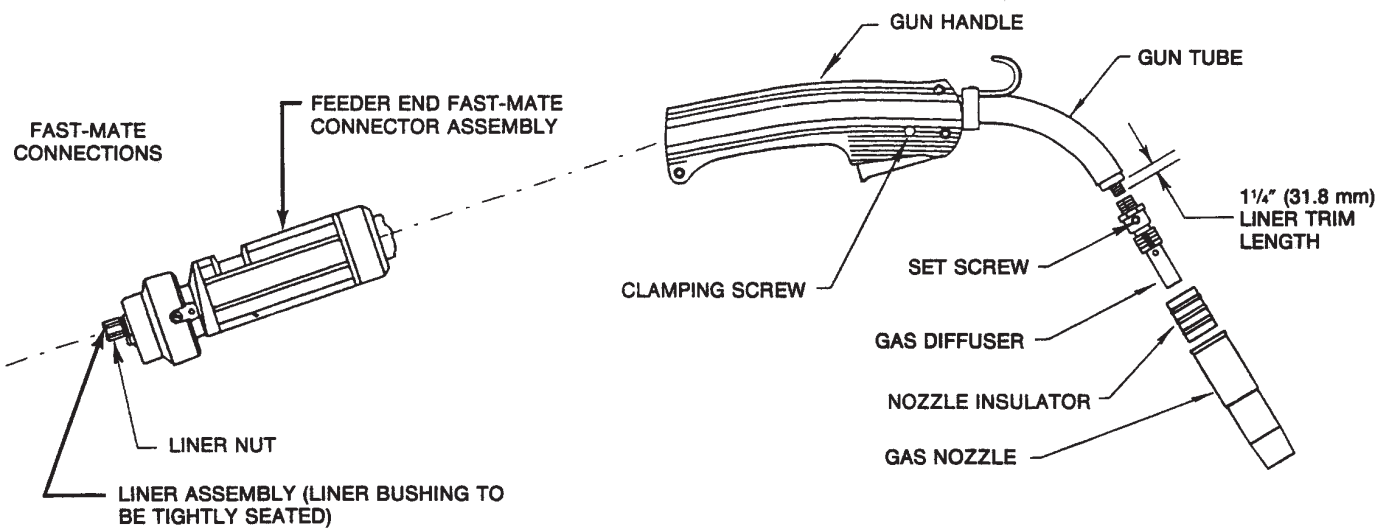


FIGURE 1

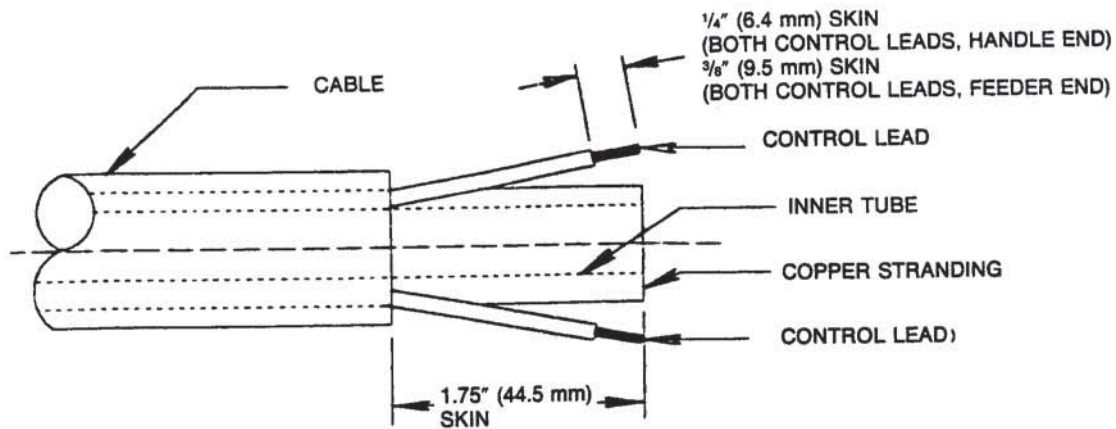


FIGURE 2

Pull gun tube out from gun handle. To reinstall, insert the gun tube, push in as far as possible, and retighten screws.

GUN CABLES

CABLE CLEANING

Clean cable liner after using approximately 300 pounds (136 kg) of electrode. Remove the cable from the wire feeder and lay it out straight on the floor. Remove the contact tip from the gun. Using an air hose and only partial pressure, gently blow out the cable liner from the gas diffuser end.

⚠ CAUTION

Excessive pressure at the start may cause the dirt to form a plug.

Flex the cable over its entire length and again blow out the cable. Repeat this procedure until no further dirt comes out.

CABLE REPAIR

The MAGNUM® 200FM gun features the use of repairable cable connectors. If the cable ever gets severely damage, it may be cut shorter and repaired by the user. Repair cables as follows:

GUN TUBE END REPAIR (Requires 2 S19492-2 Terminals)

- Remove the cable liner per Removal, Installation and Trimming Instructions on page D-1.
- Remove the gun tube per Gun Tubes and Nozzles Section of pages D-1 and D2.
- Remove three #6 screws from the gun handle, separate the two halves, and remove the cable from the handle along with the trigger assembly.
- Remove gun tube connector from cable by unscrewing connector nut from gun tube connector. If the cable inner tube is difficult to remove from the connector assembly, carefully slit it lengthwise with a knife up to the brass connector.
- Uncouple the strain relief by pushing its outer housing toward the middle of the cable. Move the strain relief and the cable boot toward the middle of the cable, past the damaged section.
- Cut off the damaged section of cable and strip off the outer jacket as shown in Figure 2. Be careful not to cut the insulation on the control wires while stripping jacket. Strip the red and white control leads 1/4 inch (6.4 mm) from the end and crimp a new S19492-2 terminal to each lead.

NOTE: The cable contains three control leads. Any two control leads can be used, provided the two colors used are the same at both ends. The extra lead is a spare that can be used if one of the other leads breaks.

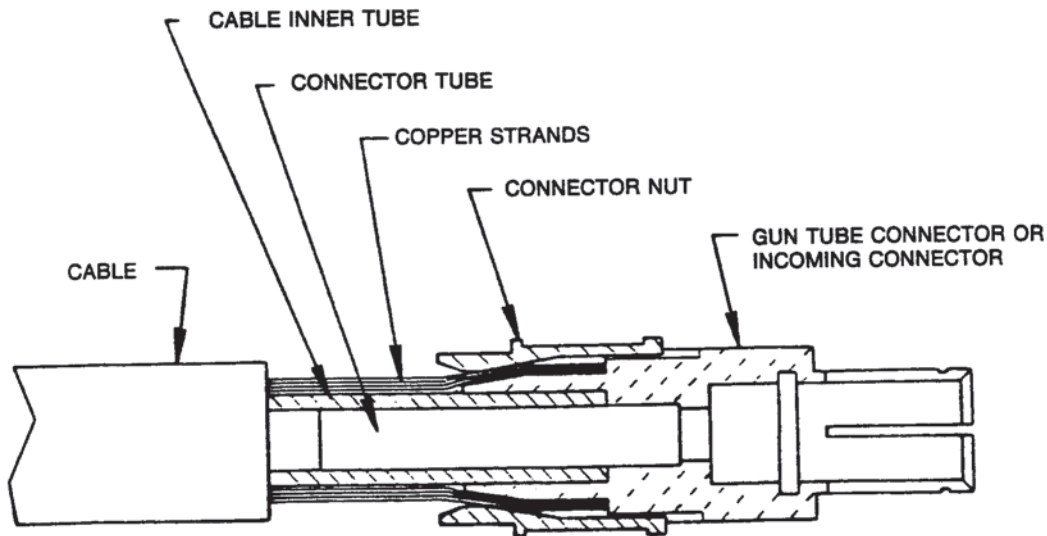


FIGURE 3

- g. Check that the cable boot and both halves of the strain relief are on the cable. Slip the connector nut over the copper strands with the thread end out. Orient gun tube connector so machined flat is on the same side of the cable as the red and white control leads. Assemble gun tube connector to cable by forcing the steel tube of the connector into the inside diameter of the cable inner tube until the copper strands are butted against the gun tube connector shoulder. Keeping the copper strands against the shoulder, pull the connector nut over the copper strands, engage the gun tube connector threads, and tighten in place. Refer to Figure 3.

NOTE: For best results, insert a .175"/.197" (4.5-5.0 mm) diameter rod through the connector and into core of cable approximately 5.00" (127 mm) when pushing the connector tube into the cable core tube. To tighten, hold the connector in place while turning the nut. Then remove the rod from the core. This procedure ensures the inner core does not kink while assembling or tightening.

- h. Pull the cut-off lead terminals off the trigger assembly and connect the replacement control lead terminals.

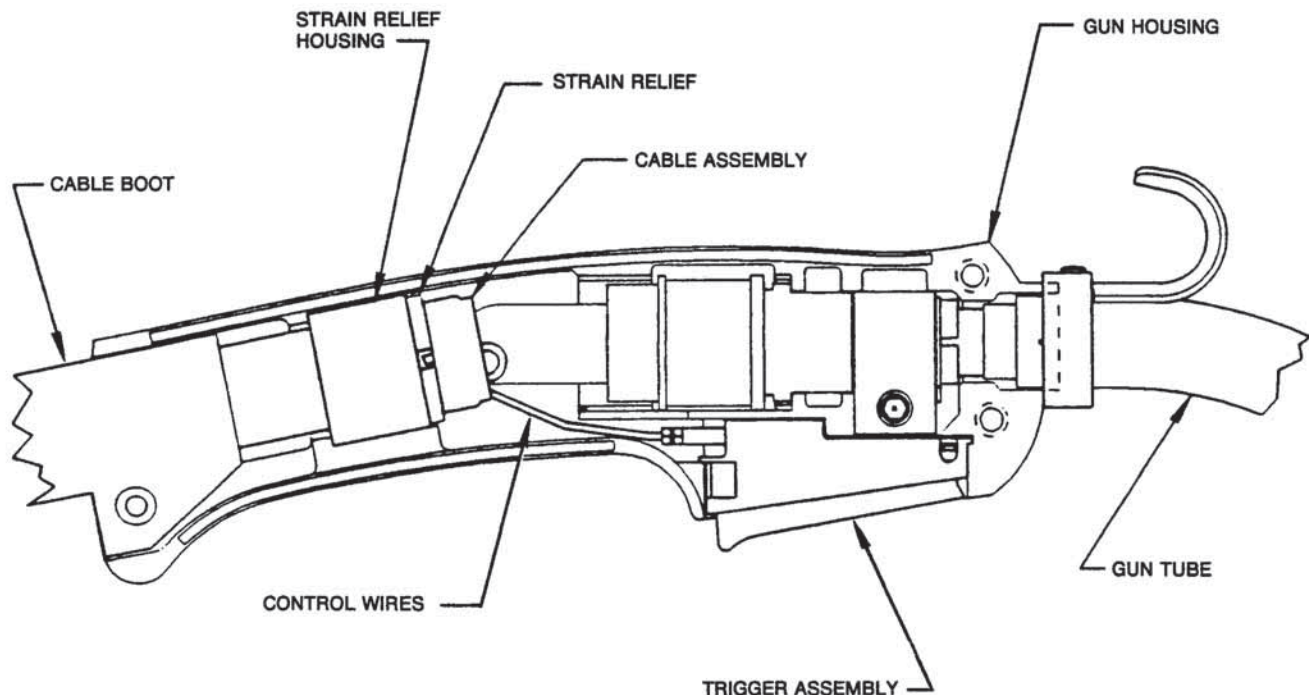


FIGURE 4

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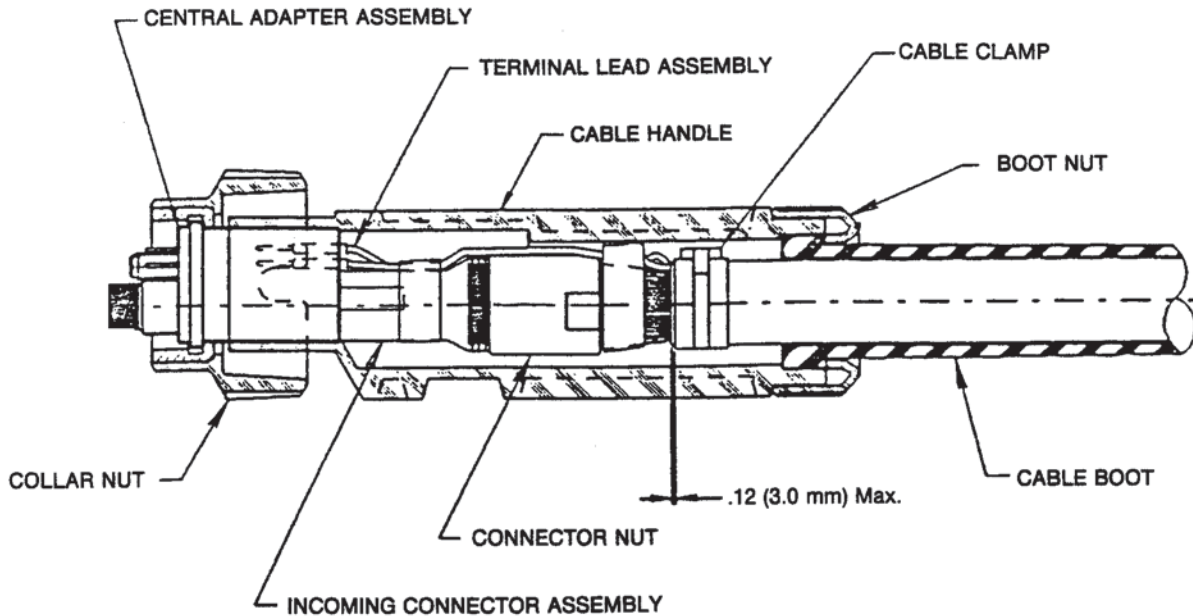


FIGURE 5

- i. Position the cable boot and strain relief on the cable so it fits in cable handle cavity and lock the strain relief in place by pushing the two halves together.
- j. Assemble cable in left side of gun handle. Assemble trigger into the proper handle cavity. Assemble right side of gun handle and tighten the three screws that hold the handle together. Refer to Figure 4.
- k. Install gun tube per Gun Tubes and Nozzles Section on page D-1.
- l. Install and trim liner per Removal, Installation and Trimming Instructions on page D-1.
- d. Slide the cable handle and collar nut toward the middle of the cable past the damaged section. Remove and save the cable clamp.

NOTE: If sliding the cable handle becomes difficult, try rotating it 180°.

- e. Remove incoming connector from cable by unscrewing connector nut from incoming connector. If the cable inner tube is difficult to remove from the connector assembly, carefully slit it lengthwise with a knife up to the brass connector.
- f. Cut the cable control wires where they meet the cable jacket or else unsolder the connection where they connect to the terminal lead assembly. If you cut the wires, strip the cut end 3/8" (9.5 mm) from the end.

WIRE FEEDER END REPAIR

- a. Remove the cable liner per Removal, Installation, and Trimming Instructions on page D-1.
- b. Loosen the boot nut. Slide the boot nut and boot toward the middle of the cable past the damaged section.
- c. Rotate the collar nut until the screw anchoring the cable handle is visible. Remove the screw and save it.
- g. Cut off the damaged section of cable and strip off the outer jacket as shown in Figure 2. Be careful not to cut the insulation on the control wires while stripping jacket. Strip red and white control leads 3/8" (9.5 mm) from the end.

NOTE: The cable contains three control leads. Any two control leads can be used, provided the two colors used are the same at both ends. The extra lead is a spare that can be used if one of the other leads breaks.

h. Check that the cable boot, boot nut, cable handle, and collar nut are on the cable. Slip the connector nut over the copper strands with the threaded end out. Orient the connector assembly so the red and white control leads will have the straightest possible routings to the sockets on the back side of the connector. Assemble the incoming connector to the cable by forcing the steel tube of the connector into the inside diameter of the cable inner tube until the copper strands are butted against the incoming connector solder. Keeping the copper strands against the shoulder, pull the connector nut over the copper strands, engage the incoming connector threads, and tighten in place. Refer to Figure 3.

NOTE: For best results, insert a .175"/.197" (4.5-5.0 mm) diameter rod through the connector and into core of cable approximately 5.00" (127 mm) when pushing the connector tube into the cable core tube. To tighten, hold the connector in place while turning the nut. Then remove the rod from the core. This procedure assures the inner core does not kink while assembling or tightening.

- i. Solder the terminal lead assemblies from step (f) to the control leads stripped in step (g). Insulate both soldered connections using either heat shrink tubing or electrical tape.
- j. Fully insert the two control lead pins into the sockets on the incoming connector. Tape the leads in place in the necked down area of the connector. Keeping the leads as close to the connector and nut as possible, tape the insulated, soldered connections and the spare lead to the cable in the area between the cable jacket and connector nut. This must be done neatly and kept as low as possible or the cable handle will not slide over this area.
- k. Install the cable clamp on the cable jacket within 1/8" (3.2 mm) from the end of the jacket and tighten.
- l. Slide the collar nut and cable handle over the connection and into place. Anchor the cable handle with the screw removed in step (c). Slide the boot and boot nut into place and tighten.

NOTE: If the cable handle becomes difficult to slide over connection, try rotating it.

m. Install and trim liner per Removal, Installation and Trimming Instructions on page D-1.

WARNING



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.

HOW TO USE TROUBLESHOOTING GUIDE

WARNING

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

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

Step 1. LOCATE PROBLEM (SYMPTOM).

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

Step 2. POSSIBLE CAUSE.

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

Step 3. RECOMMENDED COURSE OF ACTION

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

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

CAUTION

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

Observe all Safety Guidelines detailed throughout this manual

| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENTS | RECOMMENDED COURSE OF ACTION |
|--|--|---|
| Drive rolls turn, but wire will not feed or wire feeding is rough. | <ul style="list-style-type: none"> a. Gun cable kinked and/or twisted. b. Wire jammed in gun and cable. c. Incorrect drive rolls and guide tubes. d. Gun cable liner dirty. e. Worn drive rolls. f. Electrode rusty and/or dirty. g. Worn or improper size cable liner. h. Partially flashed, melted or improper size contact tip. | <ul style="list-style-type: none"> a. Keep as straight as possible. Inspect cable and replace if necessary. b. Remove wire from gun and cable – feed in new wire. Note any obstruction. Replace liner if necessary. c. Be sure the wire diameter being used is stamped on drive rolls and guide tubes. Replace if necessary. d. Clean liner or replace. e. Replace or reverse split drive roll type. f. Replace the electrode if it is rusty. g. Replace cable liner. h. Replace the contact tip. |
| Variable or “hunting” arc. | <ul style="list-style-type: none"> a. Contact tip worn or incorrect size. b. Worn or undersize ground cables or poor ground connections. c. Loose electrode connections. | <ul style="list-style-type: none"> a. Replace contact tip. b. Inspect – repair or replace as necessary. c. Be sure the following connections are tight: electrode cable to wire feeder and power source, work cable to power source and work, gun cable to wire feeder contact block, gun nozzle to body and contact tip to nozzle. |

 **CAUTION**

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

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Observe all Safety Guidelines detailed throughout this manual

| PROBLEMS (SYMPTOMS) | POSSIBLE AREAS OF MISADJUSTMENTS | RECOMMENDED COURSE OF ACTION |
|--|---|--|
| <p>Poor arc striking with sticking or "blast-offs", weld porosity, narrow and ropy looking bead, or electrode stubbing into plate while welding.</p> | <p>a. Improper procedures or techniques. b. Improper gas shielding.</p> | <p>a. See "Gas Metal Arc Welding Guide" (GS-100). b. Clean gas cone. Make certain that gas diffuser is not restricted. make certain that gas cylinder is not empty or turned off. Make certain gas solenoid valve is operating and gas flow rate is proper.</p> <p>Remove gun liner and check rubber seal for any sign of deterioration or damage. Be sure set screw in brass connector is in place and tightened against the liner bushing.</p> |
| <p>Tip seizes in diffuser.</p> | <p>a. Tip overheating due to prolonged or excessive high current and/or duty cycle welding.</p> | <p>a. Do not exceed current and duty cycle rating of gun.</p> <p>A light application of high temperature antiseize lubricant (such as Lincoln E2607 Graphite Grease) may be applied to tip threads.</p> |

 **CAUTION**

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

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NOTES

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| | | | |
|--|---|---|---|
|  |  |  |  |
| WARNING | <ul style="list-style-type: none"> 1 Do not touch electrically live parts or electrode with skin or wet clothing. 1 Insulate yourself from work and ground. | <ul style="list-style-type: none"> 1 Keep flammable materials away. | <ul style="list-style-type: none"> 1 Wear eye, ear and body protection. |
| Spanish AVISO DE PRECAUCION | <ul style="list-style-type: none"> 1 No toque las partes o los electrodos bajo carga con la piel o ropa mojada. 1 Aislese del trabajo y de la tierra. | <ul style="list-style-type: none"> 1 Mantenga el material combustible fuera del área de trabajo. | <ul style="list-style-type: none"> 1 Protéjase los ojos, los oídos y el cuerpo. |
| French ATTENTION | <ul style="list-style-type: none"> 1 Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. 1 Isolez-vous du travail et de la terre. | <ul style="list-style-type: none"> 1 Gardez à l'écart de tout matériel inflammable. | <ul style="list-style-type: none"> 1 Protégez vos yeux, vos oreilles et votre corps. |
| German WARNUNG | <ul style="list-style-type: none"> 1 Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! 1 Isolieren Sie sich von den Elektroden und dem Erdboden! | <ul style="list-style-type: none"> 1 Entfernen Sie brennbares Material! | <ul style="list-style-type: none"> 1 Tragen Sie Augen-, Ohren- und Körperschutz! |
| Portuguese ATENÇÃO | <ul style="list-style-type: none"> 1 Não toque partes elétricas e electrodos com a pele ou roupa molhada. 1 Isole-se da peça e terra. | <ul style="list-style-type: none"> 1 Mantenha inflamáveis bem guardados. | <ul style="list-style-type: none"> 1 Use proteção para a vista, ouvido e corpo. |
| Japanese 注意事項 | <ul style="list-style-type: none"> ● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。 | <ul style="list-style-type: none"> ● 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。 | <ul style="list-style-type: none"> ● 目、耳及び身体に保護具をして下さい。 |
| Chinese 警告 | <ul style="list-style-type: none"> ● 皮肤或湿衣物切勿接触带电部件及焊条。 ● 使你自已与地面和工作件绝缘。 | <ul style="list-style-type: none"> ● 把一切易燃物品移离工作场所。 | <ul style="list-style-type: none"> ● 佩戴眼、耳及身体劳动保护用具。 |
| Korean 위험 | <ul style="list-style-type: none"> ● 전도체나 용접봉을 젖은 형갑 또는 피부로 절대 접촉치 마십시오. ● 모재와 접지를 접촉치 마십시오. | <ul style="list-style-type: none"> ● 인화성 물질을 접근시키지 마시오. | <ul style="list-style-type: none"> ● 눈, 귀와 몸에 보호장구를 착용하십시오. |
| Arabic تحذير | <ul style="list-style-type: none"> ● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسدك أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل. | <ul style="list-style-type: none"> ● ضع المواد القابلة للاشتعال في مكان بعيد. | <ul style="list-style-type: none"> ● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك. |

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

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"> 1 Keep your head out of fumes. 1 Use ventilation or exhaust to remove fumes from breathing zone. | <ul style="list-style-type: none"> 1 Turn power off before servicing. | <ul style="list-style-type: none"> 1 Do not operate with panel open or guards off. | WARNING |
| <ul style="list-style-type: none"> 1 Los humos fuera de la zona de respiración. 1 Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases. | <ul style="list-style-type: none"> 1 Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio. | <ul style="list-style-type: none"> 1 No operar con panel abierto o guardas quitadas. | Spanish AVISO DE PRECAUCION |
| <ul style="list-style-type: none"> 1 Gardez la tête à l'écart des fumées. 1 Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail. | <ul style="list-style-type: none"> 1 Débranchez le courant avant l'entretien. | <ul style="list-style-type: none"> 1 N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés. | French ATTENTION |
| <ul style="list-style-type: none"> 1 Vermeiden Sie das Einatmen von Schweißrauch! 1 Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes! | <ul style="list-style-type: none"> 1 Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!) | <ul style="list-style-type: none"> 1 Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen! | German WARNUNG |
| <ul style="list-style-type: none"> 1 Mantenha seu rosto da fumaça. 1 Use ventilação e exaustão para remover fumo da zona respiratória. | <ul style="list-style-type: none"> 1 Não opere com as tampas removidas. 1 Desligue a corrente antes de fazer serviço. 1 Não toque as partes elétricas nuas. | <ul style="list-style-type: none"> 1 Mantenha-se afastado das partes moventes. 1 Não opere com os painéis abertos ou guardas removidas. | Portuguese ATENÇÃO |
| <ul style="list-style-type: none"> ● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。 | <ul style="list-style-type: none"> ● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切して下さい。 | <ul style="list-style-type: none"> ● 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。 | Japanese 注意事項 |
| <ul style="list-style-type: none"> ● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風器除煙。 | <ul style="list-style-type: none"> ● 維修前切斷電源。 | <ul style="list-style-type: none"> ● 儀表板打開或沒有安全罩時不準作業。 | Chinese 警告 |
| <ul style="list-style-type: none"> ● 얼굴로부터 용접가스를 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오. | <ul style="list-style-type: none"> ● 보수전에 전원을 차단하십시오. | <ul style="list-style-type: none"> ● 판넬이 열린 상태로 작동치 마십시오. | Korean 위험 |
| <ul style="list-style-type: none"> ● ابعاد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها. | <ul style="list-style-type: none"> ● أقطع التيار الكهربائي قبل القيام بأية صيانة. | <ul style="list-style-type: none"> ● لا تشغيل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه. | Arabic تحذير |

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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