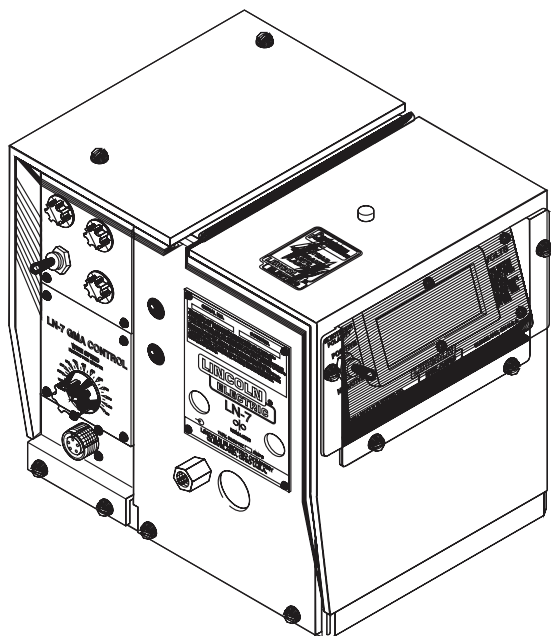


Operator's Manual

LN-7 & LN-7 GMA WIRE FEEDER



For use with machines having Code Numbers:

**9100; 9168; 9386; 9484; 9641; 9643;
9644; 9796; 9928; 9929; 9930; 9931;
10223; 10225; 10323; 10325; 10363;
10364; 10737; 12037**



Register your machine:

www.lincolnelectric.com/register

Authorized Service and Distributor Locator:

www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

⚠ 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.



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 within applicable OSHA PEL and ACGIH TLV limits 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.**

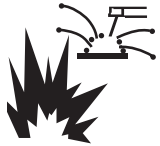
5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically 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.



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.

Refer to <http://www.lincolnelectric.com/safety> for additional safety information.

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 reçoit 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 un 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.

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**.

LN-7 & LN-7 GMA



TABLE OF CONTENTS

	Page
Safety	i-iv
Installation	Section A
Technical Specifications	A-1
Mounting Location	A-2
Machine Grounding	A-2
Input Cable Connections	A-2
Work Cable	A-21
Gun and Cable Assemblies	A-21
Gun Cable Connections	A-21
Water Connections (For Water Cooled Guns)	A-22
Shielding Gas Hookup	A-23
Operation	Section B
Safety Precautions	B-1
General Description	B-1
Recommended Processes and Equipment	B-2
Controls and Settings	B-2
Circuit Protection	B-3
Avoiding Ground Lead Protector (GLP) Activation	B-3
Drive Roll Installation (2 Roll)	B-3
Drive Roll Installation (4 Roll)	B-5
Idle Roll Pressure Setting	B-7
Wire Loading	B-8
Acceleration Setting	B-12
Wire Speed and Voltage Adjustment	B-12
Making a Weld	B-13
Wire Reel Changing	B-13
K417 Digital Voltmeter Kits	B-13
Optional Flux Tank Loading	B-14
Accessories	Section C
General	C-1
Auxiliary Equipment Connection	C-2
Options/Accessories	C-2
Attaching the Wire Reel Stand	C-4
Maintenance	Section D
Routine Maintenance	D-1
Periodic Maintenance	D-1
Sequence of Operation	D-4
Troubleshooting	Section E
Wiring Diagram	Section F
Parts Pages	P-283, P-744 Series

TECHNICAL SPECIFICATIONS – LN-7 and LN-7 GMA

INPUT VOLTAGE					
Supplied by power source: 115 VAC, 50/60 Hz, 2.5 Amps					
WIRE FEED SPEED					
LN-7 GMA		75 to 700 in. per minute (1.90 to 17.8 m/min)			
LN-7		50 to 500 in. per minute (1.27 to 12.7 m/min)			
WIRE DIAMETERS					
LN-7 GMA	0.023 in. through 1/16 in. (0.6 through 1.6 mm)			solid electrode	
	0.045 in. through 5/64 in. (1.2 through 2.0 mm)			cored electrode	
LN-7	0.023 in. through 3/32 in. (0.6 through 2.4 mm)			solid electrode	
	0.045 in. through 7/64 in. (1.2 through 2.8 mm)			cored electrode	
PHYSICAL DIMENSIONS					
		LENGTH	WIDTH	HEIGHT	TOTAL WEIGHT LESS ELECTRODE
TWO ROLL FEEDER	WITHOUT WIRE STAND	9.62 in. (244 mm)	9.76 in. (247 mm)	10.89 in. (277 mm)	24 lbs (10.9 kg)
	WITH WIRE STAND (K377)	20.68 in. (525 mm)	9.76 in. (247 mm)	17.00 in. (432 mm)	36 lbs (16.3 kg)
FOUR ROLL FEEDER	WITHOUT WIRE STAND	9.70 in. (246 mm)	11.60 in. (295 mm)	11.11 in. (282 mm)	30.5 lbs (13.8 kg)
	WITH WIRE STAND (K377)	20.76 in. (527 mm)	11.60 in. (295 mm)	17.00 in. (432 mm)	42.5 lbs (19.3 kg)

DUTY CYCLE: The amount of welding performed in a 10 minute period, expressed as a percentage.

MOUNTING LOCATION

The LN-7 and LN-7 GMA wire feeder can be mounted directly on top of the power source providing that it is secure and level. It can also be mounted to an undercarriage when portability is required.

MACHINE GROUNDING

The LN-7 and LN-7 GMA wire feeders are ground to the power source through the input cable. The power source grounding terminal must be properly connected to electrical ground per the power source operating manual.

INPUT CABLE CONNECTIONS

Various input cable assemblies are available for the LN-7 GMA wire feeder. Refer to the **Accessories** section for complete descriptions

WARNING

Turn input power off before connecting the LN-7 GMA wire feeder.

For connecting an LN-7 GMA to a specific Lincoln power source follow steps 1 through 6, and refer to the connection diagrams in Figure A.3 through A.17 for the specific power source. Table A.1 lists each figure number with its corresponding power source.

TABLE A.1 - LN-7 GMA CONNECTION DIAGRAMS

Figure #	Power Source
A.3	LN-7 GMA To DC-400, DC-250 and CV/CVI Power Sources With Terminal Strip - Connection Diagram
A.4	LN-7 GMA To Pulsed Power 500 - Connection Diagram
A.5	LN-7 GMA To CV/CVI Power Sources With 14 Pin Amphenol Connector - Connection Diagram
A.6	LN-7 GMA To CV/CVI Power Sources With Twist-Mate Connector and 14 Pin Amphenol/Remote Control - Connection Diagram
A.7	LN-7 GMA To CV/CVI Power Source (K867/K775) - Connection Diagram
A.8	LN-7 GMA To R3S-250 or R3S-325 - Connection Diagram
A.9	LN-7 GMA To SAM Motor Generator or Engine Welder - Connection Diagram
A.10	LN-7 GMA To DC-600 - Connection Diagram
A.11	LN-7 GMA To R3S-400, 600, or 800 - Connection Diagram
A.12	LN-7 GMA To Most Lincoln Motor Generators - Connection Diagram
A.13	LN-7 GMA To WP250 or G9 PRO - Connection Diagram
A.14	LN-7 GMA To Ranger 9 - Connection Diagram
A.15	LN-7 GMA To Ranger 10-LX - Connection Diagram
A.16	LN-7 GMA To Power Sources With No Output Contactor - Connection Diagram
A.17	LN-7 GMA To Power Sources With Contactor and No Terminal Strip - Connection Diagram
A.18	LN-7 GMA To FLEXTEC 650 - Connection Diagram

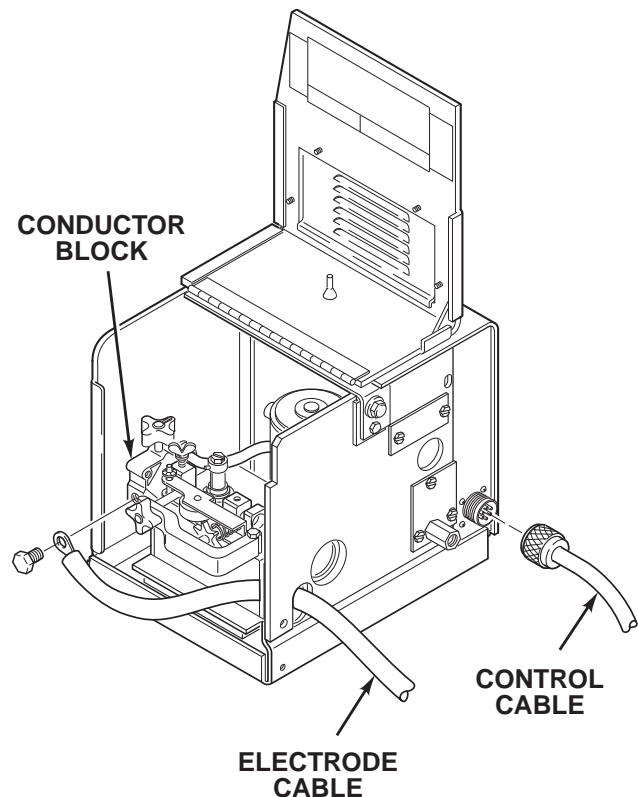
- For K291 and K404 cables, connect the end of the control cable with the lugged leads to the power source. If lead #21 is extended to work, do not connect leads to terminal #21 on terminal strip. For K584, K594 or K480 cables connect the 14 pin amphenol connector to the power source. Include any jumpers called for on the connection diagram. Do not add any other jumpers or connections.
- Referring to Figure A.1, route the end of the electrode cable through the large hole in the back panel of the LN-7 case. Connect the electrode cable to the brass conductor block on the front of the gearbox using the 1/2-13 x .75 bolt provided. **Be sure the cable is placed to allow easy access and clearance for the idle roll arm pressure adjustment and to allow the drive roll section cover to close.**

⚠ WARNING

Never operate a Lincoln power source that has a jumper from #2 to #4 on the terminal strip, or a power source without a contactor, with this wire feeder. To do so would defeat the purpose of the grounding lead protector circuit and could result in the overheating of the electrical ground circuit to the wire feeder.

- For constant voltage power sources with an output contactor but no terminal strip or 14-pin control receptacle, see Figure A.17. For constant voltage power sources without an internal output contactor, and requiring a K240 Contactor Kit, see Figure A.16.
- If input cables longer than the standard length must be used, K292 extension cables (50 ft/15.2 m) can be installed. These have polarized plugs on each end of the control cable and include a 4/0 (107 mm²) electrode cable. Install the extensions between the standard input cable and the wire feeder. Total input cable length should not exceed 400 ft (122 m). When using longer lengths of extension cables, it may be necessary to add parallel electrode cables to minimize the voltage drop in the cable.

FIGURE A.1 – INPUT CONTROL CABLE AND ELECTRODE CABLE CONNECTIONS.



5. Connect the input control cable polarized Amphenol plug into the mating 6-pin receptacle on the rear of the control section.
6. Referring to Figure A.2, install the input cable under the wire reel mounting stand strain relief

clamp. Remove the screws holding the clamp to the base of the wire reel mounting assembly, put the input cable assembly under the clamp and reinstall the screws.

FIGURE A.2 – STRAIN RELIEF CLAMP.

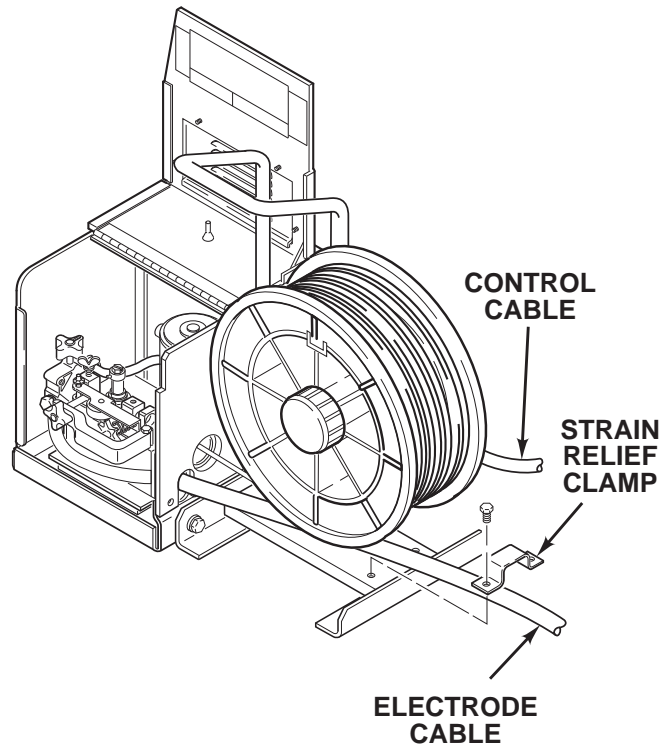
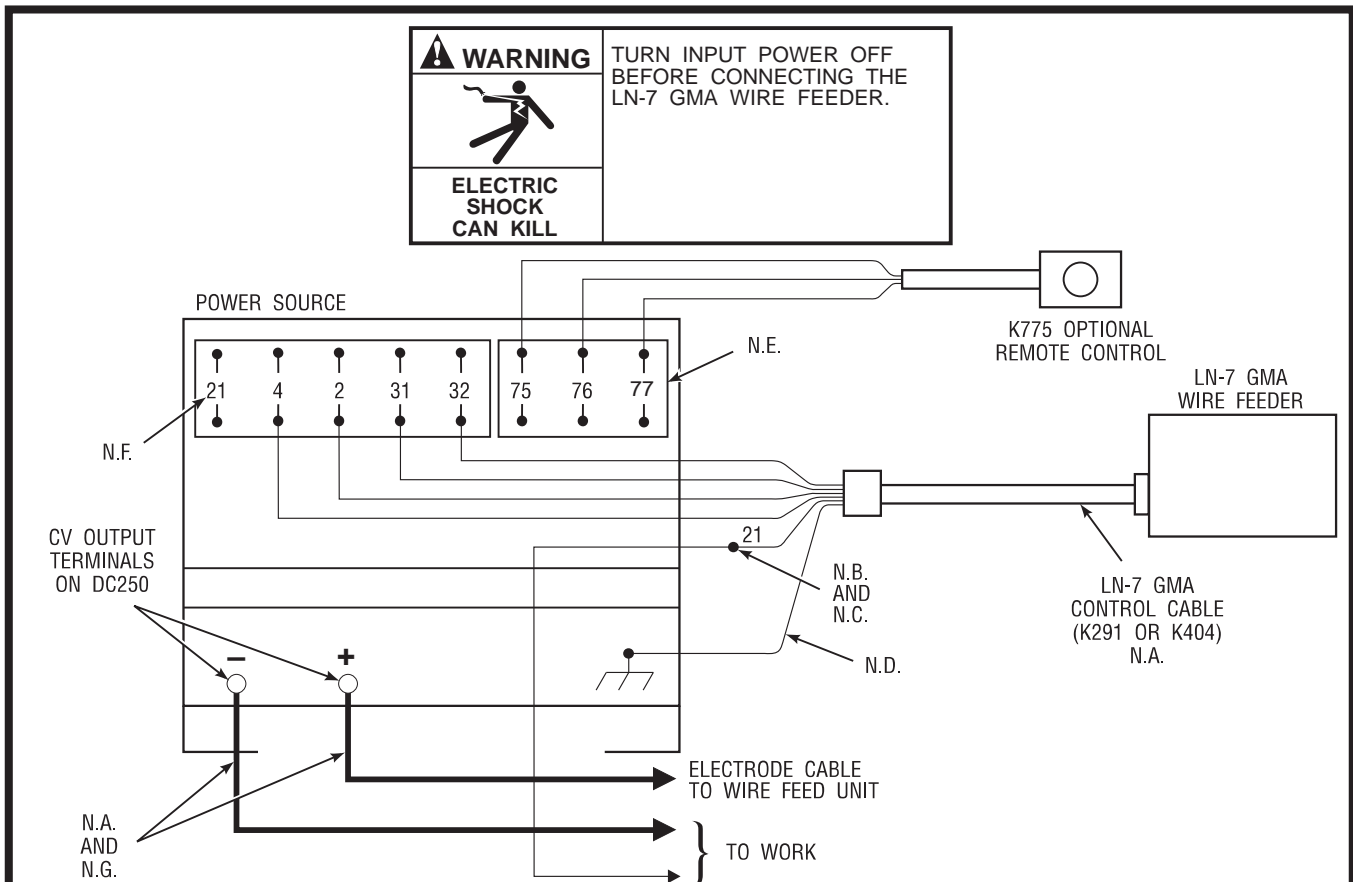


FIGURE A.3 – LN-7 & LN-7 GMA TO DC-400, DC-250 AND CV/CVI POWER SOURCES WITH TERMINAL STRIP - CONNECTION DIAGRAM.



N.A. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.

N.B. IF LEAD #21 IS EXTENDED TO THE WORK PIECE, DO NOT CONNECT LEADS TO TERMINAL #21 ON TERMINAL STRIP. IF LN-7 GMA IS EQUIPPED WITH A METER KIT, EXTEND LN-7 GMA CONTROL CABLE LEAD #21 USING 14 AWG OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[LENGTH] REMOTE VOLTAGE SENSING WORK LEAD MAY BE ORDERED FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE INDEPENDENT OF THE WELDING WORK CABLE CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (IF THE LENGTH OF WELDING WORK CABLE IS SHORT, LESS THAN 25 FEET (7.6 M), AND CONNECTIONS CAN BE EXPECTED TO BE RELIABLE, THEN CONTROL CABLE LEAD #21 DOES NOT NEED TO BE EXTENDED AND CAN BE DIRECTLY CONNECTED TO TERMINAL #21 ON THE TERMINAL STRIP. NOTE THAT THIS IS NOT THE PREFERRED CONNECTION BECAUSE IT ADDS ERROR TO THE LN-7 GMA VOLTMETER

N.C. TAPE UP BOLTED CONNECTION IF LEAD #21 IS EXTENDED.

N.D. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ⏏ NEAR THE POWER SOURCE TERMINAL STRIP. THE POWER SOURCE GROUNDING TERMINAL (MARKED ⏏ AND LOCATED NEAR THE POWER SOURCE INPUT POWER CONNECTIONS) MUST BE PROPERLY CONNECTED TO ELECTRICAL GROUND PER THE POWER SOURCE OPERATING MANUAL.

N.E. IF AN OPTIONAL REMOTE VOLTAGE CONTROL IS USED, CONNECT IT TO THIS TERMINAL STRIP.

N.F. DC-400 CODE 9200 AND LATER: IF LEAD #21 OF THE CONTROL CABLE IS TO BE CONNECTED TO THE TERMINAL STRIP, CONNECT IT TO THE #21 TERMINAL THAT MATCHES THE WORK POLARITY. THIS CONNECTION MUST BE CHANGED WHENEVER THE ELECTRODE POLARITY IS CHANGED.

N.G. DIAGRAMS SHOW ELECTRODE POSITIVE. TO CHANGE POLARITY, TURN POWER OFF AND REVERSE ELECTRODE AND WORK CABLE LEADS AT POWER SOURCE.

LINCOLN[®]
ELECTRIC

CLEVELAND, OHIO U.S.A.

LN-7 & LN-7 GMA

LINCOLN[®]
ELECTRIC

FIGURE A.4 – LN-7 & LN-7 GMA TO PULSED POWER 500 - CONNECTION DIAGRAM.

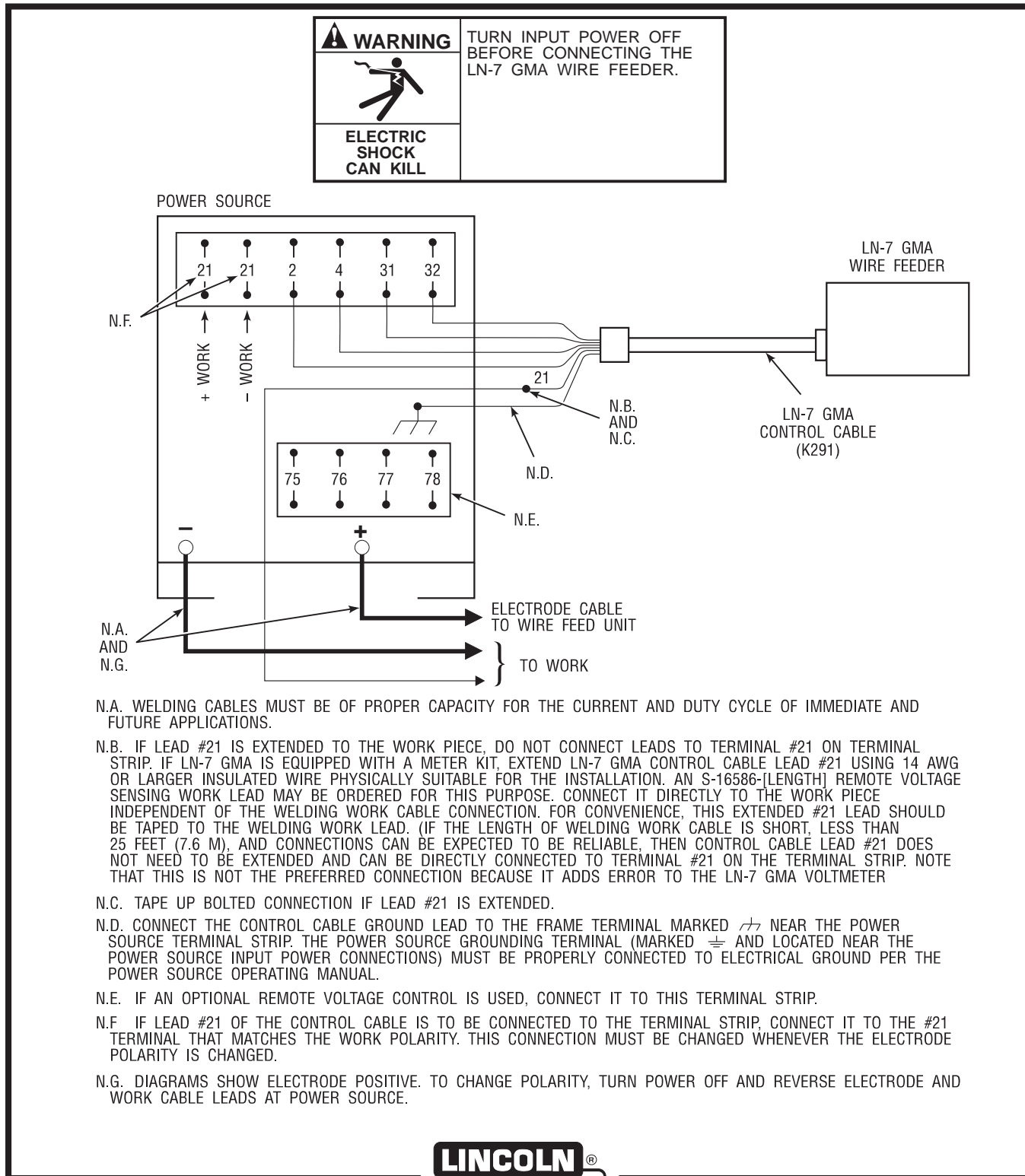
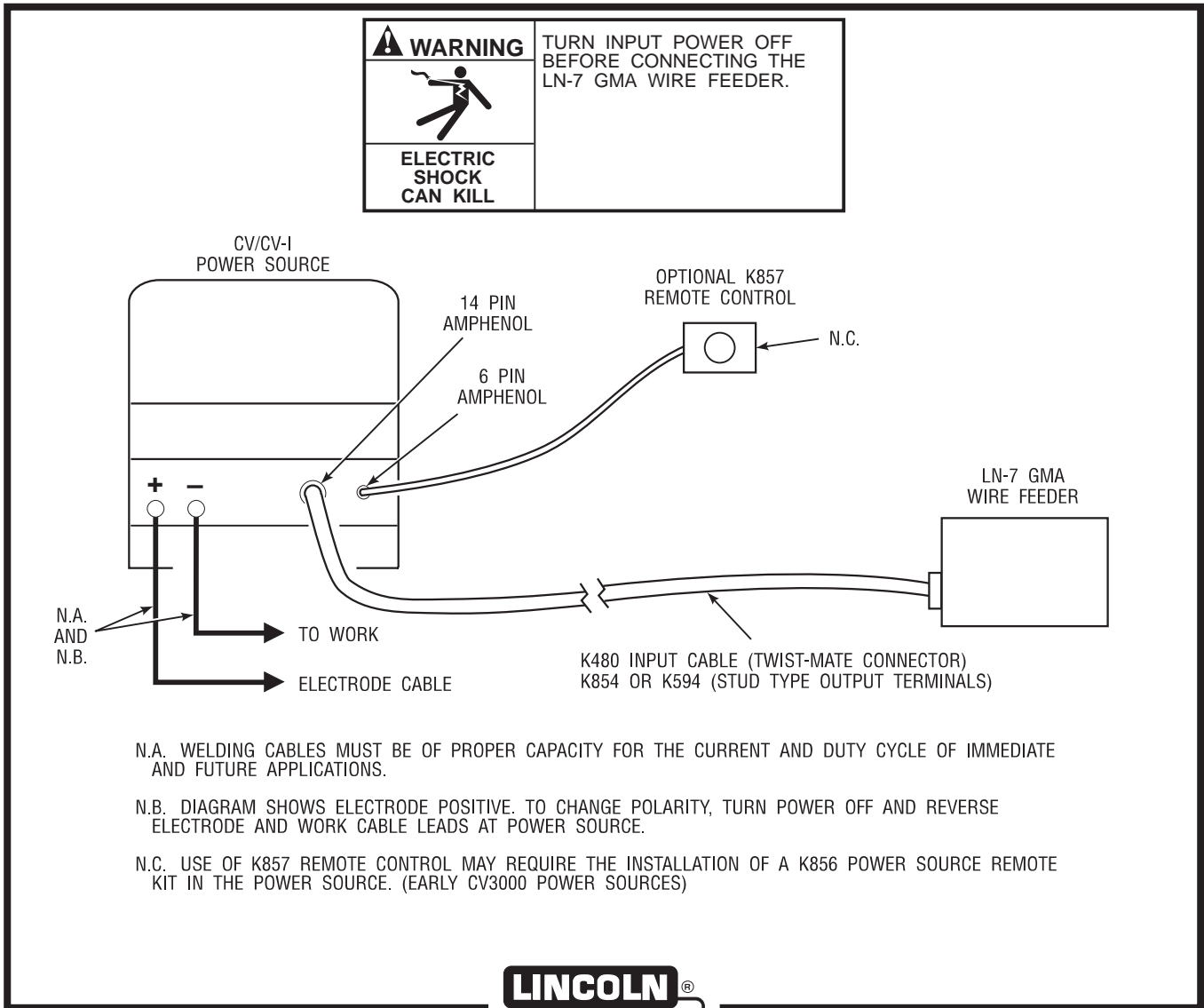


FIGURE A.5 – LN-7 & LN-7 GMA TO CV/CVI POWER SOURCES WITH 14 PIN AMPHENOL CONNECTOR - CONNECTION DIAGRAM.



CLEVELAND, OHIO U.S.A



FIGURE A.6 – LN-7 & LN-7 GMA TO CV/CVI POWER SOURCES WITH TWIST-MATE CONNECTOR AND 14 PIN AMPHENOL/REMOTE CONTROL - CONNECTION DIAGRAM.

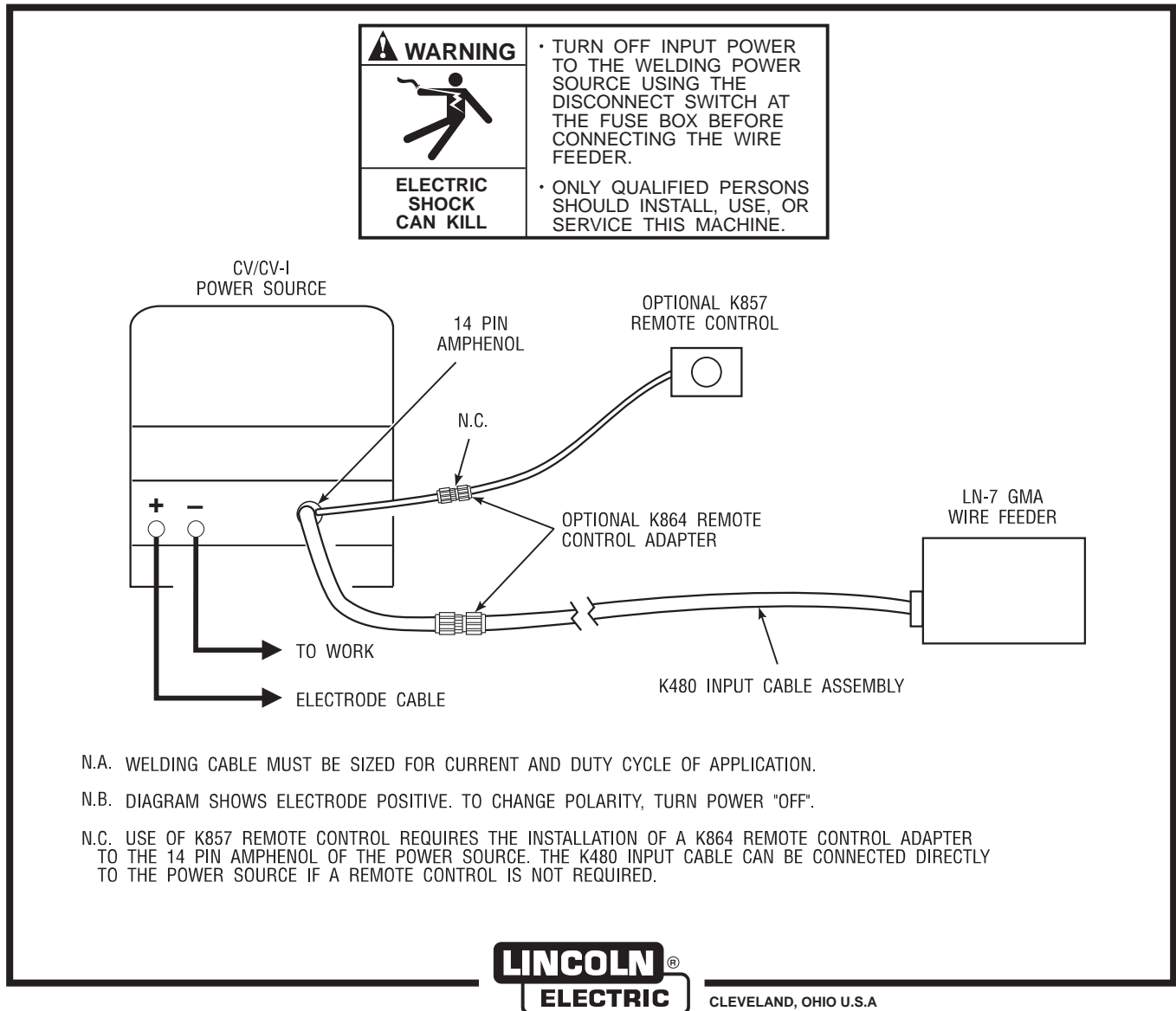


FIGURE A.7 – LN-7 & LN-7 GMA TO CV/CVI POWER SOURCE (K867/K775) - CONNECTION DIAGRAM.

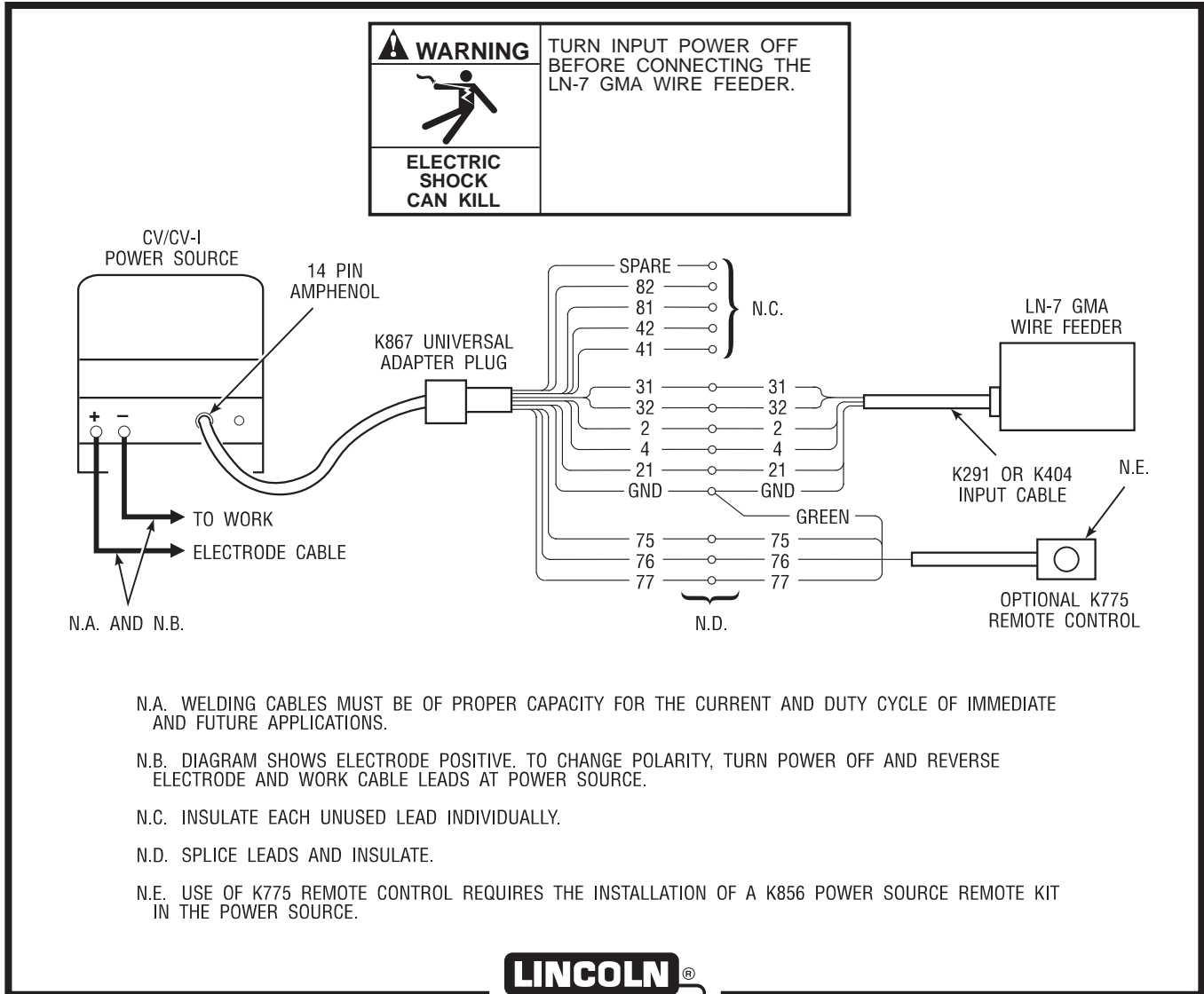


FIGURE A.8 – LN-7 & LN-7 GMA TO R3S-250 OR R3S-325 - CONNECTION DIAGRAM.

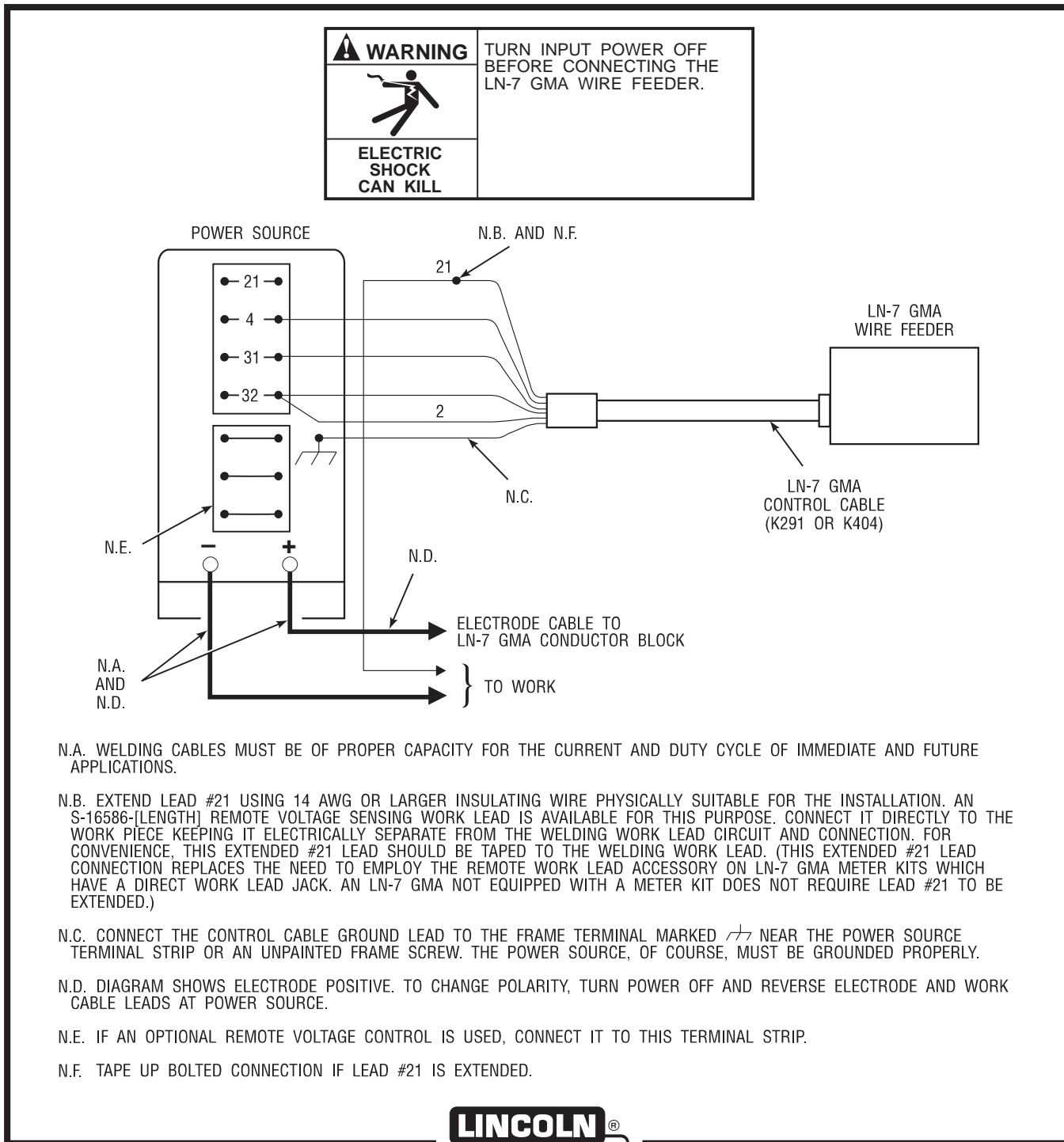


FIGURE A.9 – LN-7 & LN-7 GMA TO SAM MOTOR GENERATOR OR ENGINE WELDER - CONNECTION DIAGRAM.

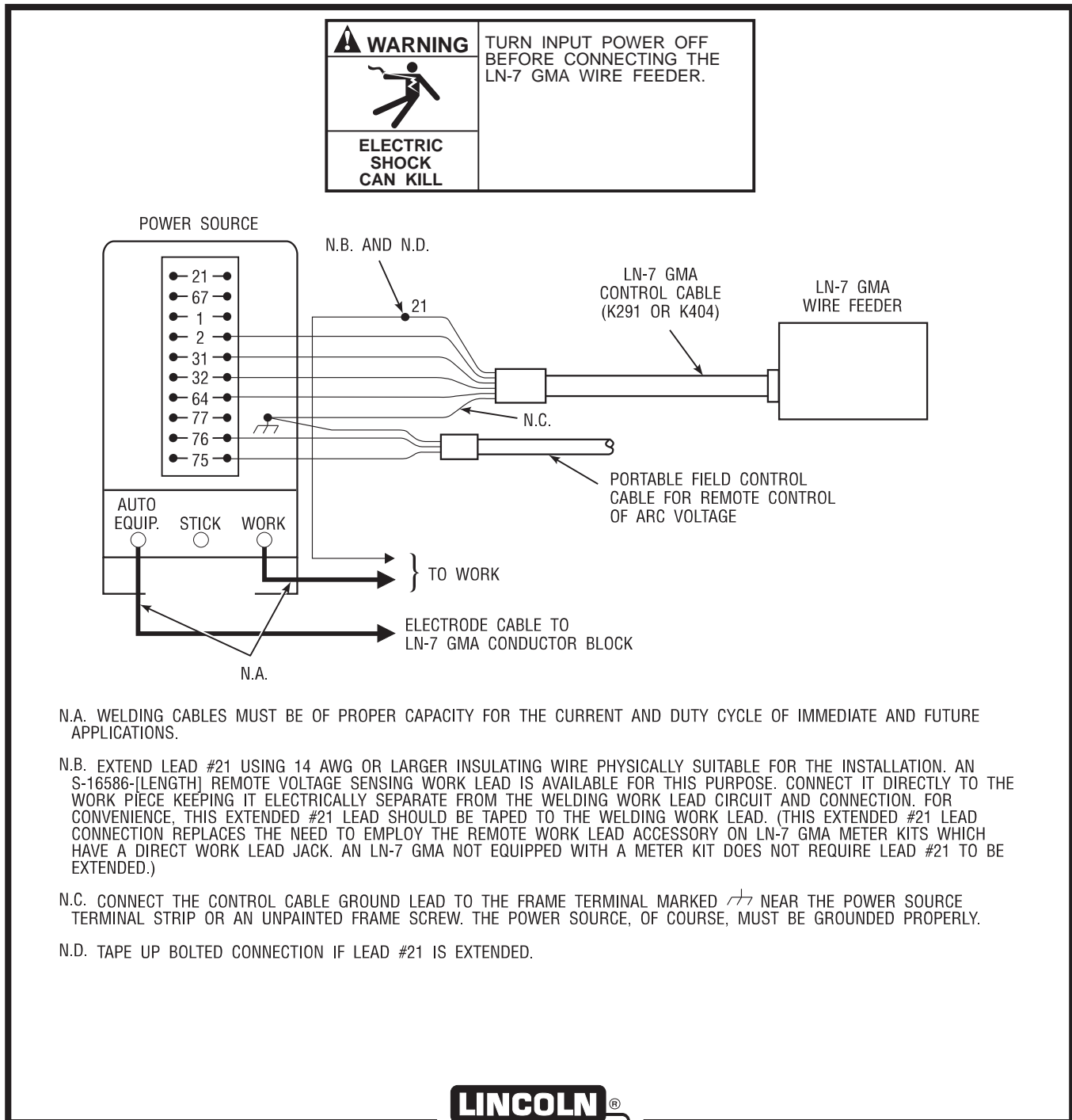
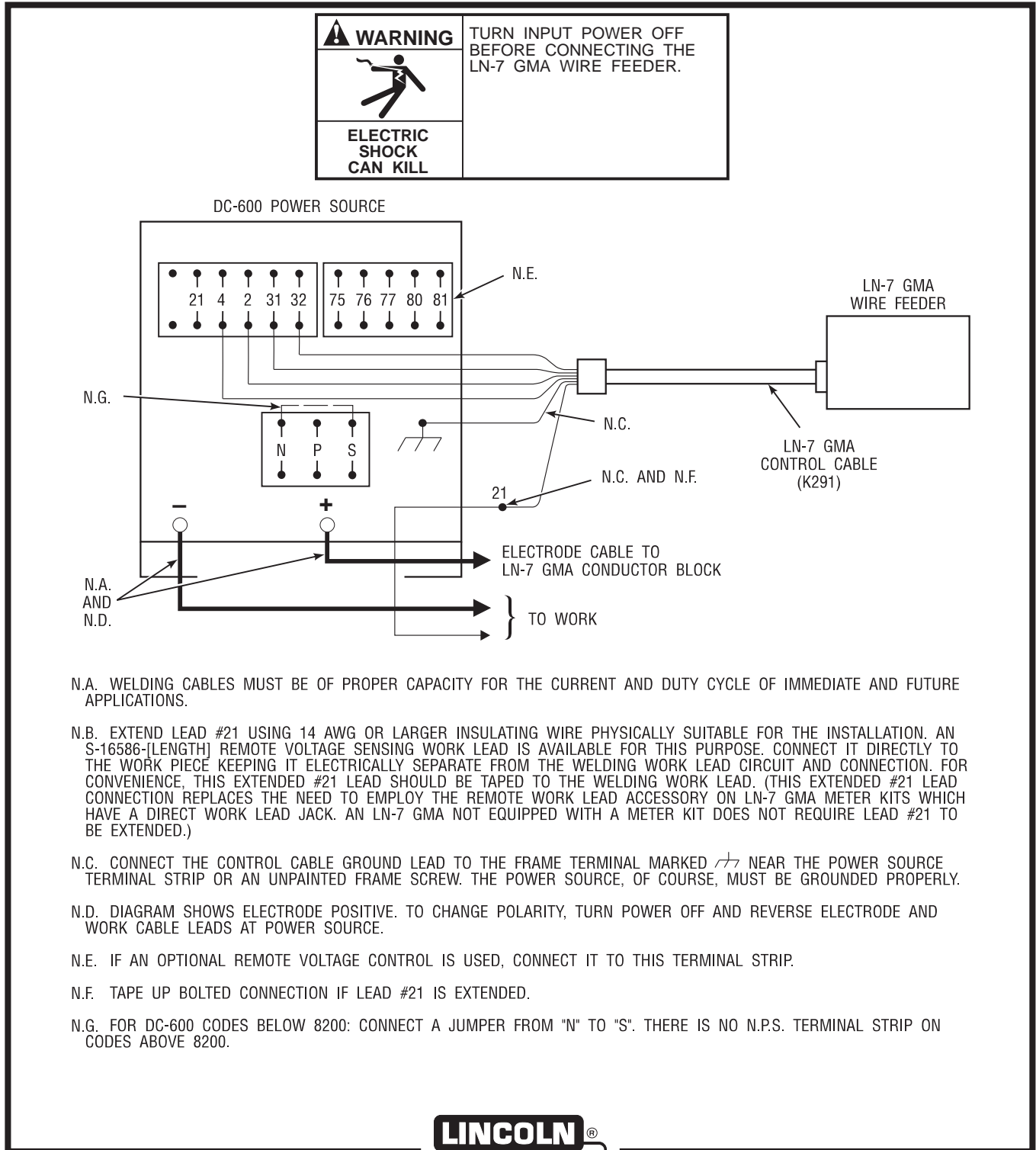


FIGURE A.10 – LN-7 & LN-7 GMA TO DC-600 - CONNECTION DIAGRAM.



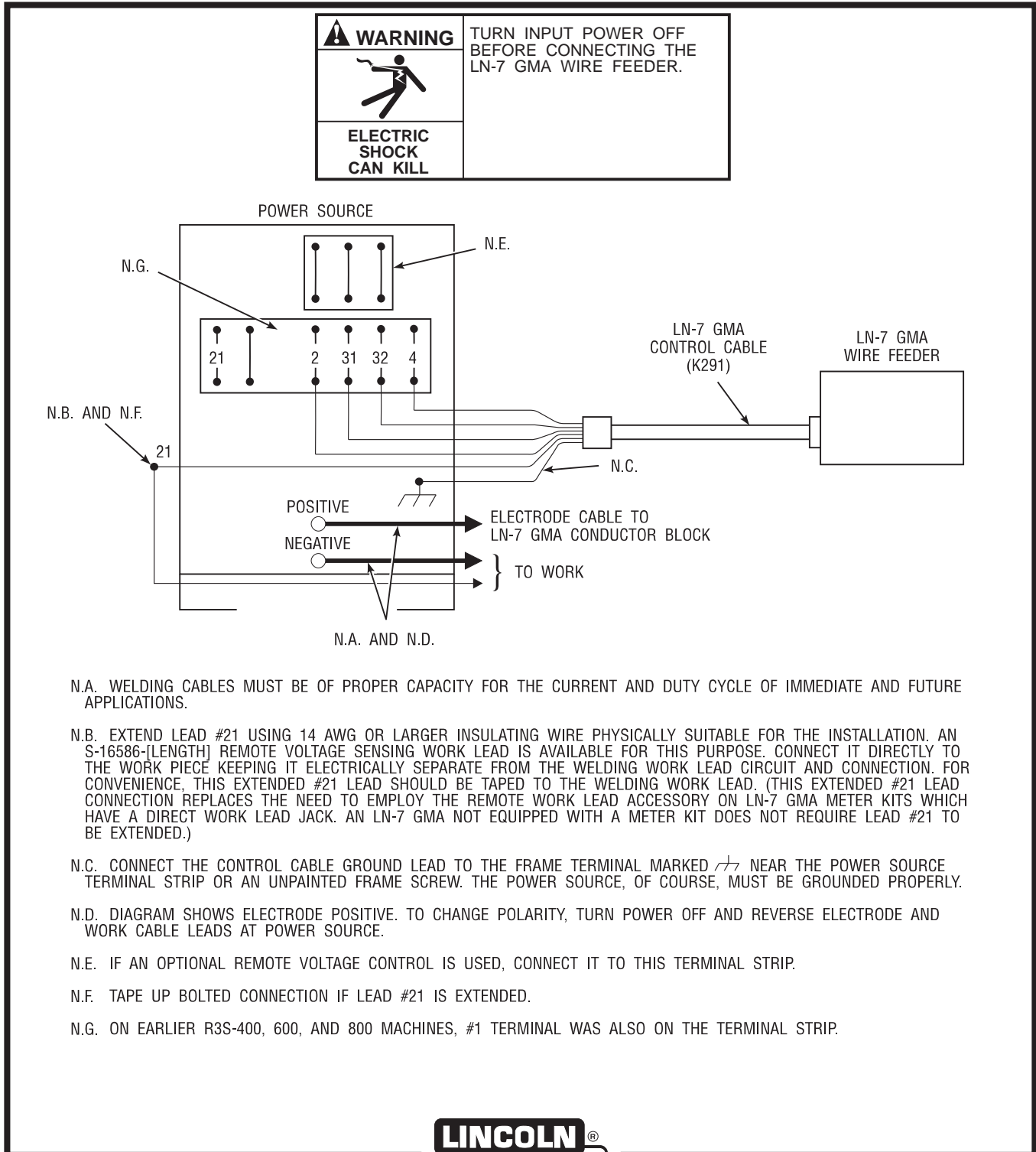
LINCOLN[®]
ELECTRIC

CLEVELAND, OHIO U.S.A

LN-7 & LN-7 GMA

LINCOLN[®]
ELECTRIC

FIGURE A.11 – LN-7 & LN-7 GMA TO R3S-400, 600, OR 800 - CONNECTION DIAGRAM.



N.A. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.

N.B. EXTEND LEAD #21 USING 14 AWG OR LARGER INSULATING WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[LENGTH] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (THIS EXTENDED #21 LEAD CONNECTION REPLACES THE NEED TO EMPLOY THE REMOTE WORK LEAD ACCESSORY ON LN-7 GMA METER KITS WHICH HAVE A DIRECT WORK LEAD JACK. AN LN-7 GMA NOT EQUIPPED WITH A METER KIT DOES NOT REQUIRE LEAD #21 TO BE EXTENDED.)

N.C. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED  NEAR THE POWER SOURCE TERMINAL STRIP OR AN UNPAINTED FRAME SCREW. THE POWER SOURCE, OF COURSE, MUST BE GROUNDED PROPERLY.

N.D. DIAGRAM SHOWS ELECTRODE POSITIVE. TO CHANGE POLARITY, TURN POWER OFF AND REVERSE ELECTRODE AND WORK CABLE LEADS AT POWER SOURCE.

N.E. IF AN OPTIONAL REMOTE VOLTAGE CONTROL IS USED, CONNECT IT TO THIS TERMINAL STRIP.

N.F. TAPE UP BOLTED CONNECTION IF LEAD #21 IS EXTENDED.

N.G. ON EARLIER R3S-400, 600, AND 800 MACHINES, #1 TERMINAL WAS ALSO ON THE TERMINAL STRIP.

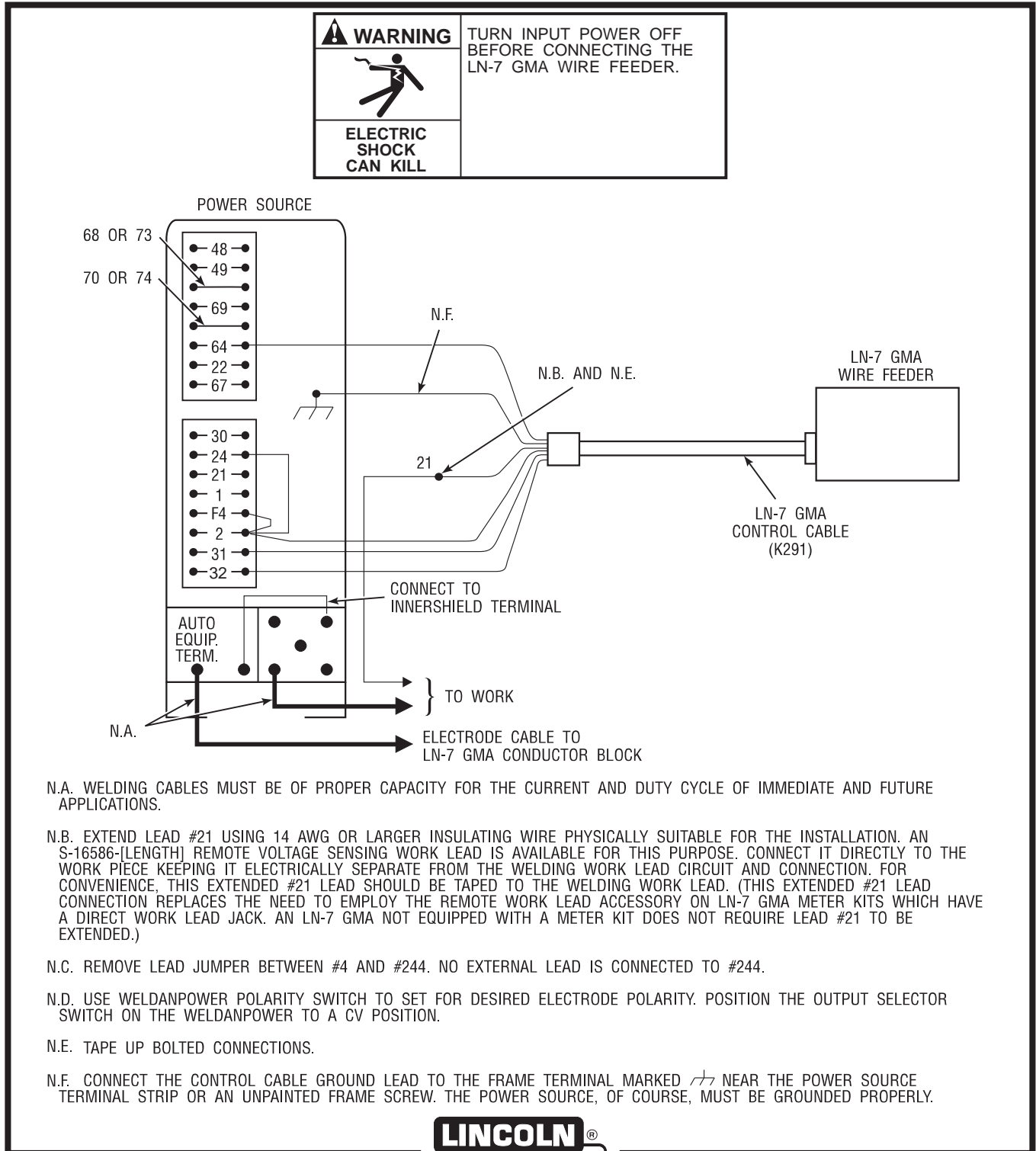
LINCOLN[®]
ELECTRIC

CLEVELAND, OHIO U.S.A

LN-7 & LN-7 GMA

LINCOLN[®]
ELECTRIC

FIGURE A.12 – LN-7 & LN-7 GMA TO MOST LINCOLN MOTOR GENERATORS - CONNECTION DIAGRAM.



LINCOLN[®]
ELECTRIC

CLEVELAND, OHIO U.S.A

LN-7 & LN-7 GMA

LINCOLN[®]
ELECTRIC

FIGURE A.13 – LN-7 & LN-7 GMA TO WP250 OR G9 PRO - CONNECTION DIAGRAM.

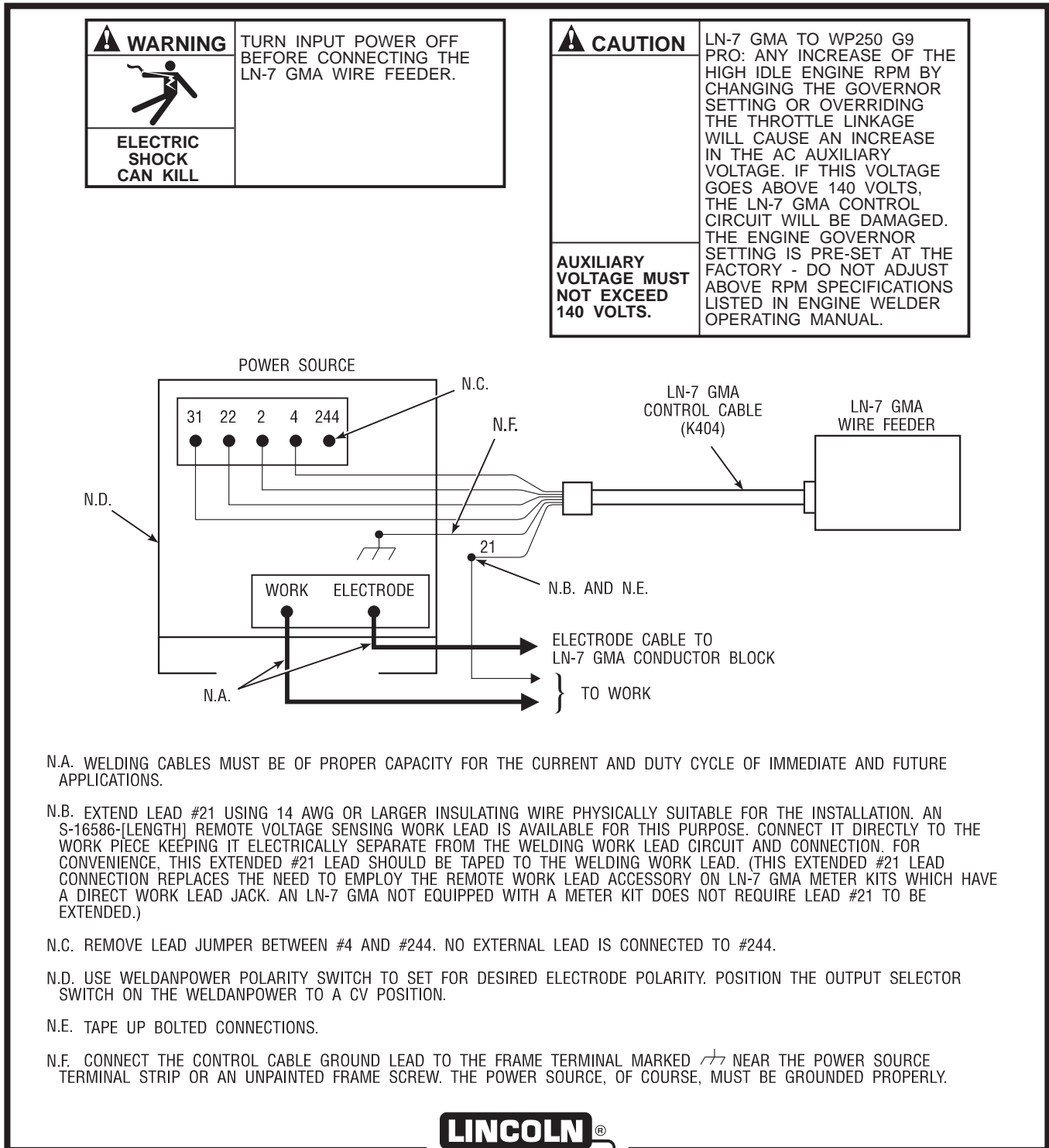


FIGURE A.14 – LN-7 & LN-7 GMA TO RANGER 9 – CONNECTION DIAGRAM.

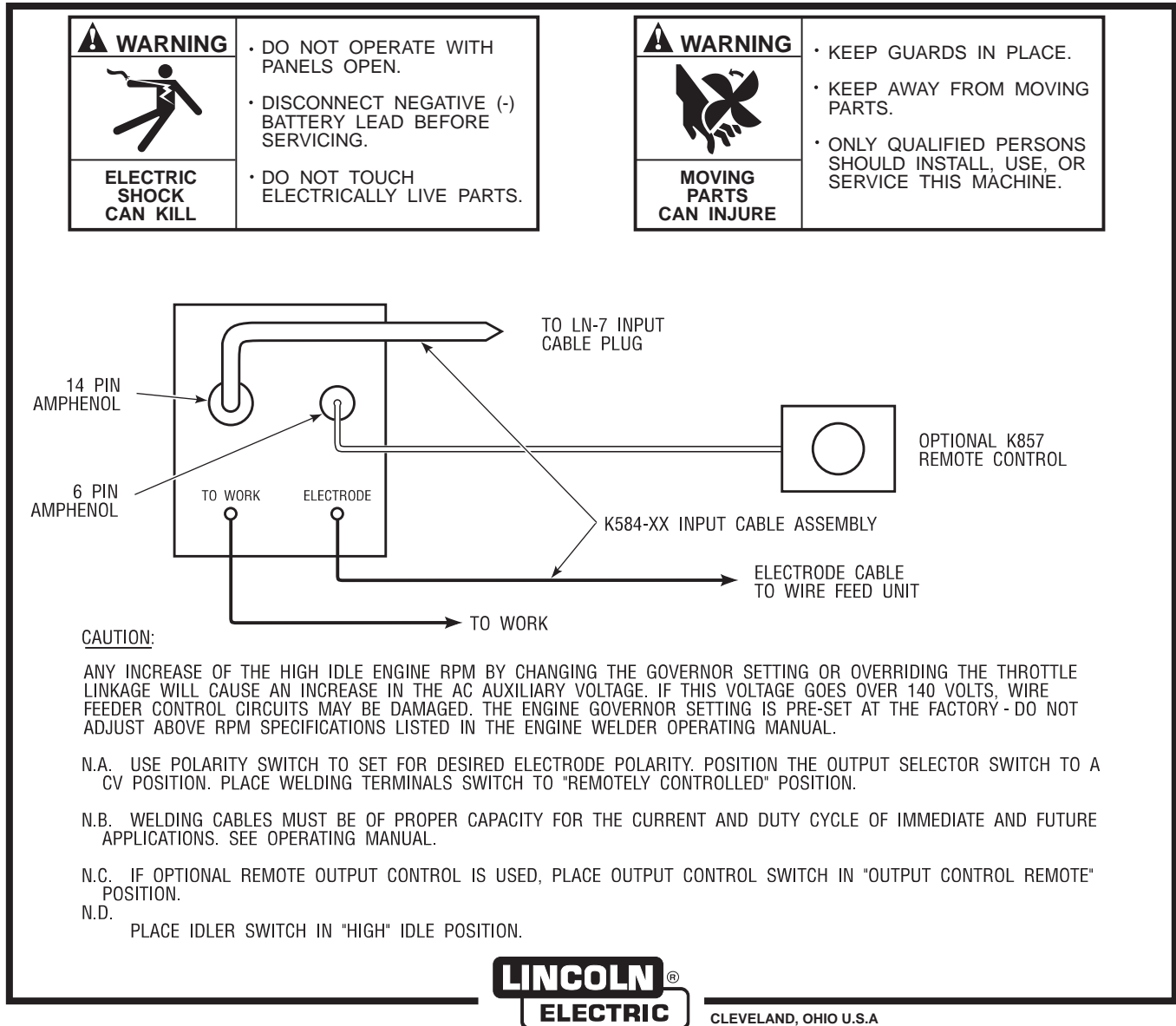


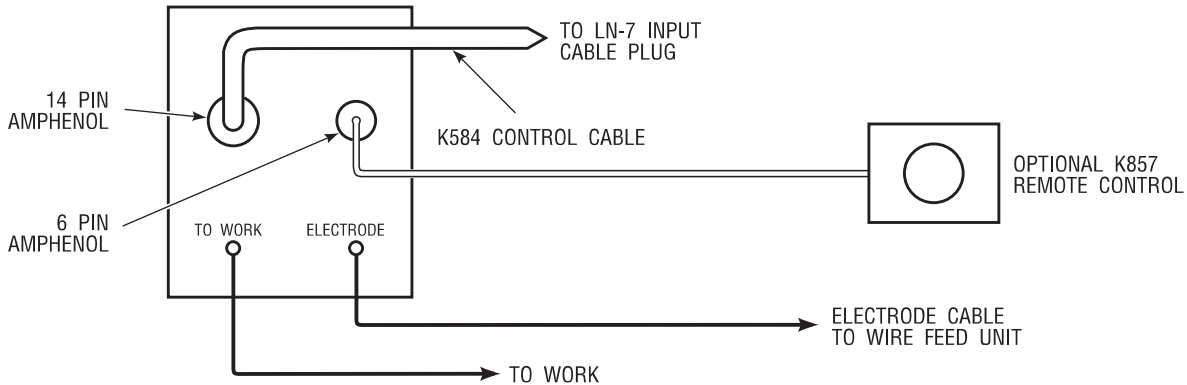


FIGURE A.15 – LN-7 & LN-7 GMA TO RANGER 10-LX – CONNECTION DIAGRAM.

	<p>WARNING</p> <ul style="list-style-type: none"> • DO NOT OPERATE WITH PANELS OPEN. • DISCONNECT NEGATIVE (-) BATTERY LEAD BEFORE SERVICING. • DO NOT TOUCH ELECTRICALLY LIVE PARTS.
<p>ELECTRIC SHOCK CAN KILL</p>	

	<p>WARNING</p> <ul style="list-style-type: none"> • KEEP GUARDS IN PLACE. • KEEP AWAY FROM MOVING PARTS. • ONLY QUALIFIED PERSONS SHOULD INSTALL, USE, OR SERVICE THIS MACHINE.
<p>MOVING PARTS CAN INJURE</p>	

**CAUTION:**

ANY INCREASE OF THE HIGH IDLE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES OVER 140 VOLTS, WIRE FEEDER CONTROL CIRCUITS MAY BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY - DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN THE ENGINE WELDER OPERATING MANUAL.

N.A. USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION. PLACE WIRE FEEDER SWITCH TO "WIRE FEEDER WITH CONTROL CABLE" POSITION.

N.B. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS. SEE OPERATING MANUAL.

N.C. IF OPTIONAL REMOTE OUTPUT CONTROL IS USED, PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION.

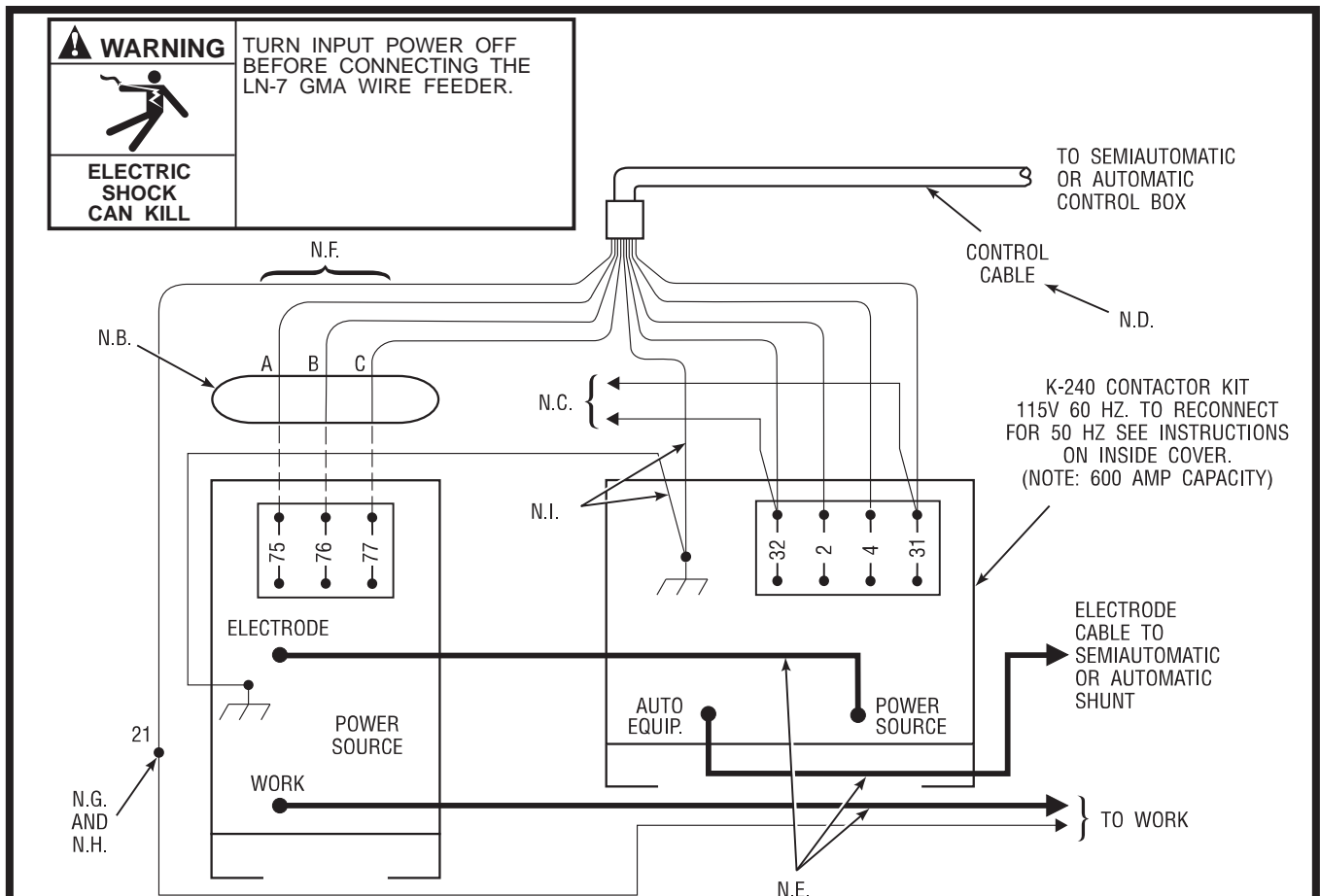
LINCOLN[®]
ELECTRIC

CLEVELAND, OHIO U.S.A

LN-7 & LN-7 GMA

LINCOLN[®]
ELECTRIC

FIGURE A.16 – LN-7 & LN-7 GMA TO POWER SOURCES WITH NO OUTPUT CONTACTOR - CONNECTION DIAGRAM.



N.A. 115V AC WILL NOT BE TURNED OFF WHEN POWER SOURCE IS TURNED OFF. CONTACTOR KIT AND SEMIAUTOMATIC OR AUTOMATIC EQUIPMENT WILL STILL HAVE 115V CONTROL POWER SUPPLIED UNTIL POWER SUPPLIED TO TERMINALS #31 AND #32 IS TURNED OFF.

N.B. ON LINCOLN POWER SOURCES WITHOUT A REMOTE CONTROL TERMINAL STRIP HAVING THESE NUMBERS, OR WHEN USING NON-LINCOLN POWER SOURCES, TAPE UP THESE LEADS SEPARATELY.

N.C. TO 115V AC 500 V.A. PLUS 250 V.A. ADDITIONAL IF LINCOLN TRAVEL CARRIAGE IS USED.

N.D. LEADS #75, #76, #77, A, B, AND C DO NOT APPEAR ON LN-7 GMAS WITH CODES ABOVE 7026.

N.E. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.

N.F. IF USING AN OLDER CONTROL CABLE: CONNECT LEAD #75 TO #75 ON TERMINAL STRIP, CONNECT LEAD #76 TO #76 ON TERMINAL STRIP, CONNECT LEAD #77 TO #77 ON TERMINAL STRIP.

N.G. EXTEND LEAD #21 USING 14 AWG OR LARGER INSULATING WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[LENGTH] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (THIS EXTENDED #21 LEAD CONNECTION REPLACES THE NEED TO EMPLOY THE REMOTE WORK LEAD ACCESSORY ON LN-7 GMA METER KITS WHICH HAVE A DIRECT WORK LEAD JACK. AN LN-7 GMA NOT EQUIPPED WITH A METER KIT DOES NOT REQUIRE LEAD #21 TO BE EXTENDED.)

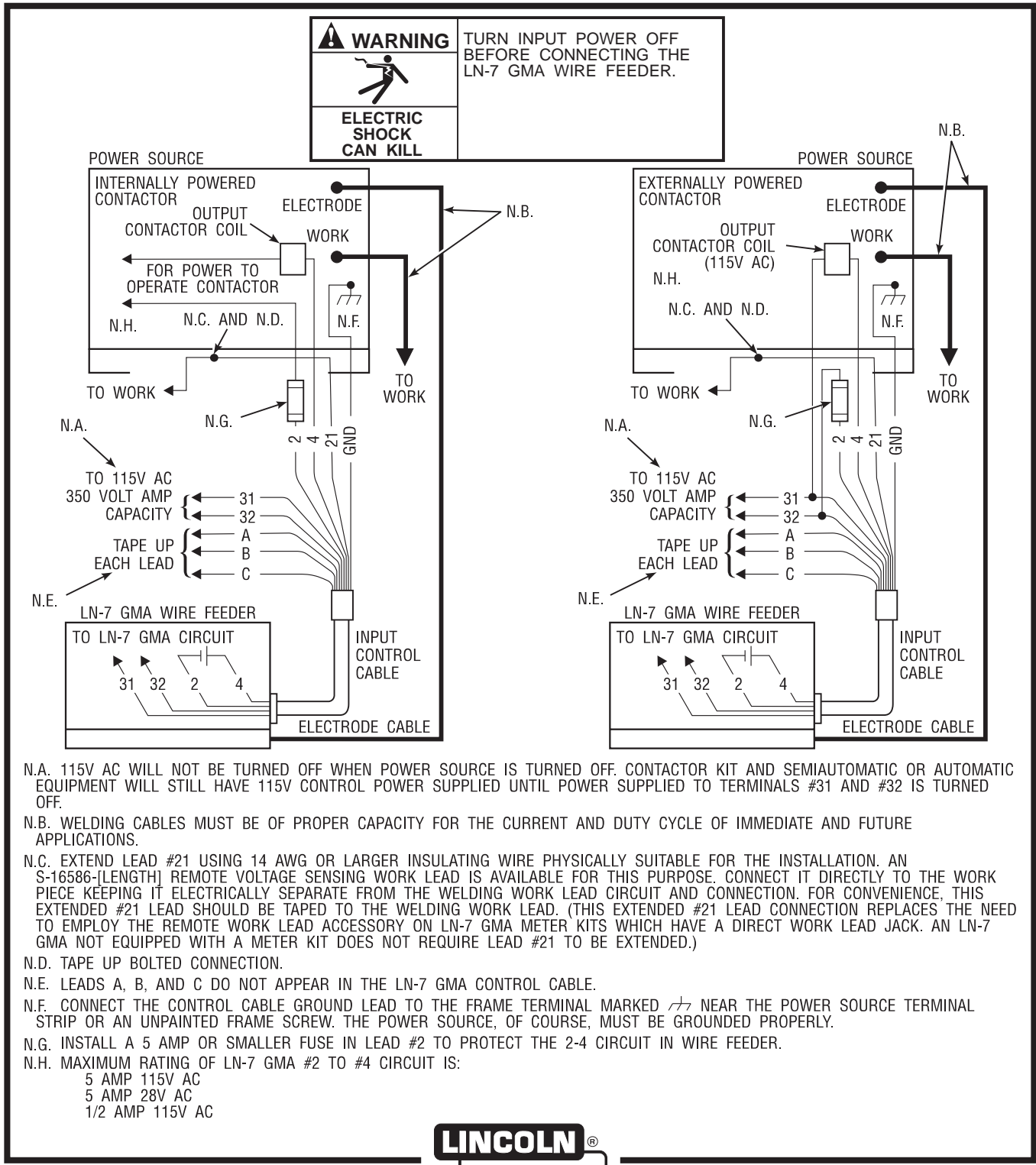
N.H. TAPE UP BOLTED CONNECTION.

N.I. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ⏏ NEAR THE POWER SOURCE TERMINAL STRIP OR AN UNPAINTED FRAME SCREW. THE POWER SOURCE, OF COURSE, MUST BE GROUNDED PROPERLY.



CLEVELAND, OHIO U.S.A

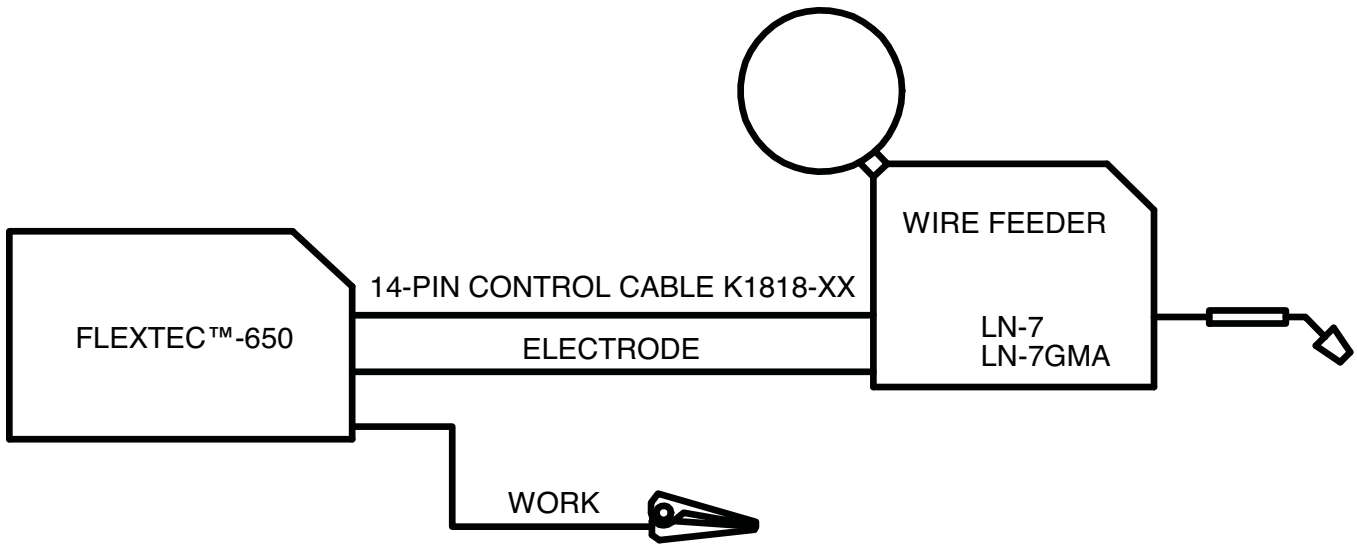
FIGURE A.17 – LN-7 & LN-7 GMA TO POWER SOURCES WITH CONTACTOR AND NO TERMINAL STRIP - CONNECTION DIAGRAM.



CLEVELAND, OHIO U.S.A.



FIGURE A.18 – LN-7 & LN-7 GMA TO FLEXTEC 650 - CONNECTION DIAGRAM.



CONTROL SETTING	
WELD MODE	CV, CV-INNERSHIELD
WELD TERMINALS	OFF
REMOTE/LOCAL	LOCAL
VOLTMETER POLARITY	PROCESS DEPENDENT

WORK CABLE

Connect a work lead of sufficient size and length (Table A.2) between the proper output stud on the power source and the work. Be sure the connection to the work makes tight metal-to-metal electrical contact. Poor work lead connections can result in the grounding lead protector being activated.

TABLE A.2 – WORK LEAD SPECIFICATIONS

Current 60% Duty Cycle	Copper Work Cable Size, AWG	
	Up To 50 Ft (15.2 m ²)	50 Ft-100 Ft (15.2-30.4 m ²)
300 Amps	0 (53 mm ²)	00 (67 mm ²)
400 Amps	00 (67 mm ²)	000 (85 mm ²)
500 Amps	00 (67 mm ²)	000 (85 mm ²)
600 Amps	000 (85 mm ²)	0000 (107 mm ²)

GUN AND CABLE ASSEMBLIES

The LN-7 and LN-7 GMA can be used with several guns. In most cases, Lincoln guns and cables are shipped assembled, ready to weld. Use the gun and cable assembly for the electrode type (solid, Outershield, or Innershield) and electrode size to be used. Refer to the **Accessories Section** for different gun types.

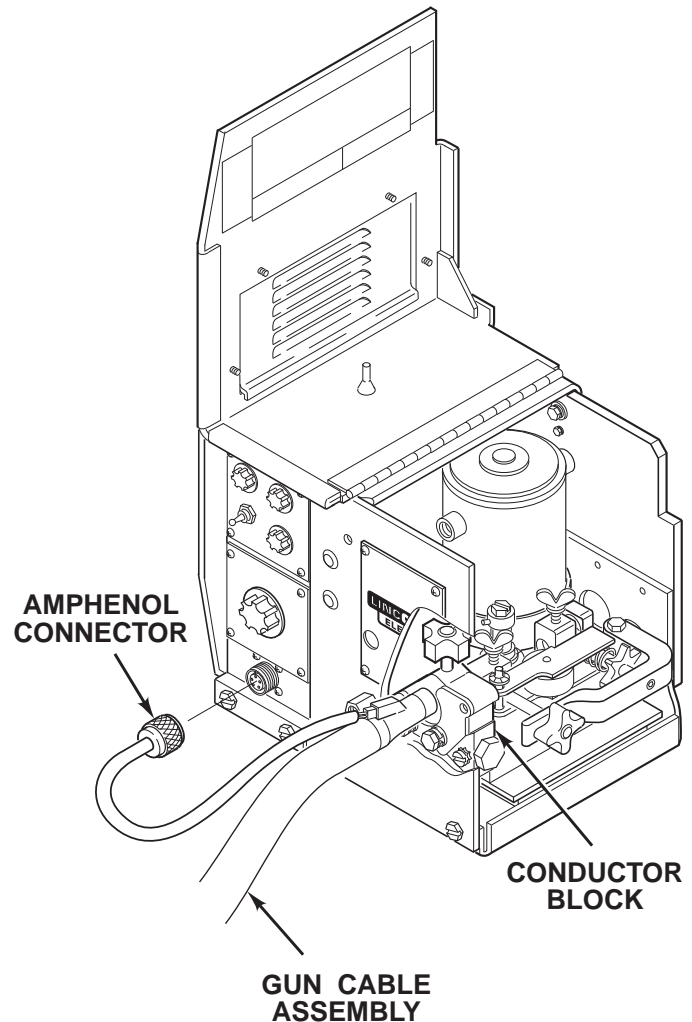
GUN CABLE CONNECTIONS

Lay the cable out straight. Insert the connector on the welding conductor cable through the large hole in the front panel of the LN-7 and into the brass conductor block on the front of the gearbox. Refer to Figure A.19. Make sure it is all the way in and tighten the hand wheel. Keep this connection clean and bright. Connect

the control cable amphenol plug into the mating 5-cavity receptacle on the front of the control section below the nameplate.

If using the K489-1 Fast-Mate Adapter, install per the S19389 instructions included with the kit.

FIGURE A.19 – GUN CABLE CONNECTIONS.



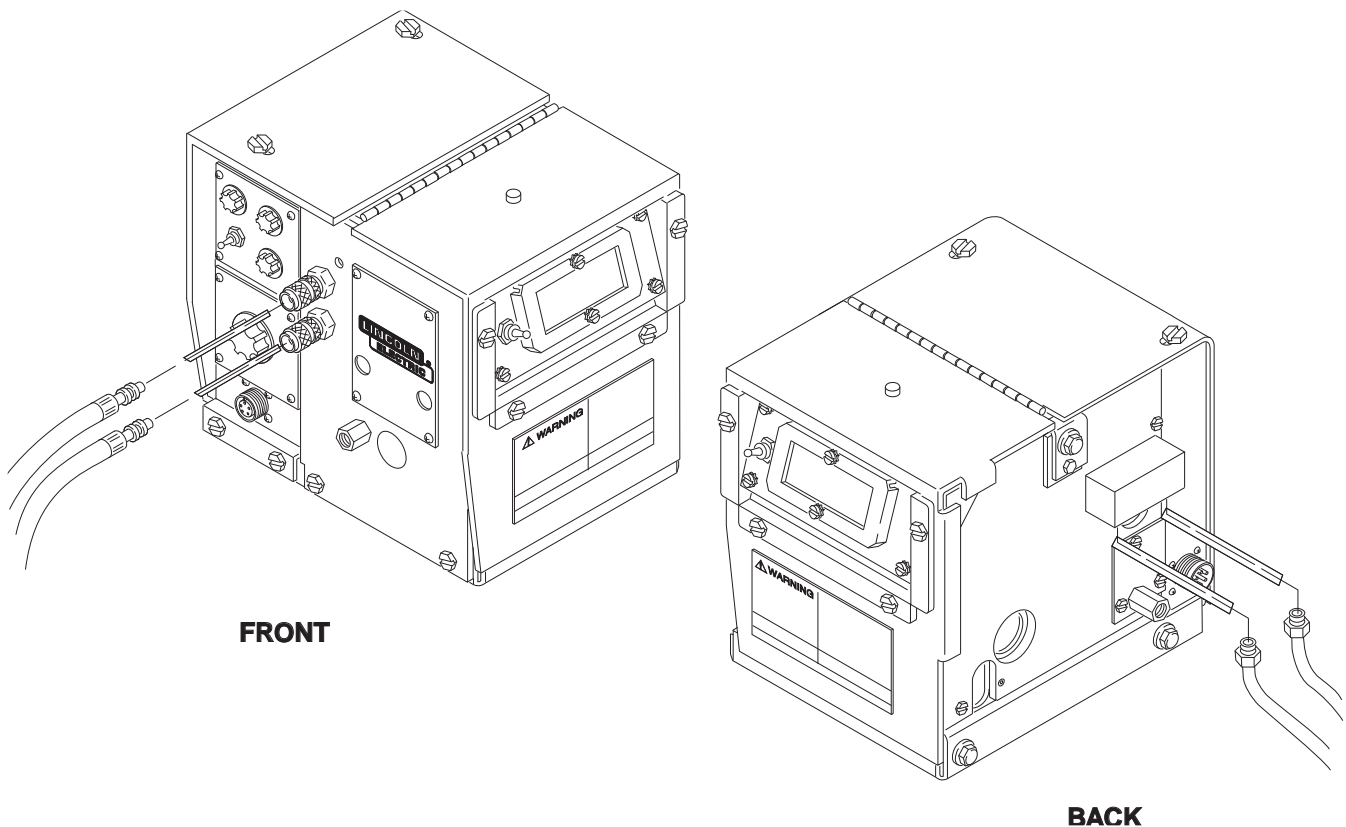
WATER CONNECTIONS (FOR WATER COOLED GUNS)

The LN-7 or LN-7 GMA must have a K527 Water Solenoid Kit installed (see the **Accessories** Section). The K440-1 LN-7 GMA model already has a water solenoid installed. Refer to Figure A.20 and perform the following steps:

NOTE: If not using a Lincoln water cooler, and if your water cooling device is not designed for use with a waterline solenoid valve, you may remove the solenoid and screw the male fitting (after applying sealant) directly into the brass manifold block.

1. Using male 5/8-18 UNF left-hand thread fittings, connect appropriate water hoses to the coolant inlet and outlet on the back of the LN-7. Connect the other ends of these hoses to the appropriate ports on your water cooling units.
2. In the event the water line fittings on your water cooled gun are incompatible with the female quick connects on the front of the LN-7, male quick connects are provided for installation on 3/16 in. I.D. hose (customer to provide appropriate clamps). The feeder connectors self seal when disconnected.

FIGURE A.20 – WATER CONNECTIONS.



SHIELDING GAS HOOKUP (LN-7 GMA or LN-7 with Optional K494 Gas Solenoid Installed)

⚠ WARNING

Gas under pressure is explosive. Always keep gas cylinders in an upright position and to the undercarriage or a stationary support. See American National Standard Z-49.1, "Safety In Welding And Cutting", published by the American Welding Society.

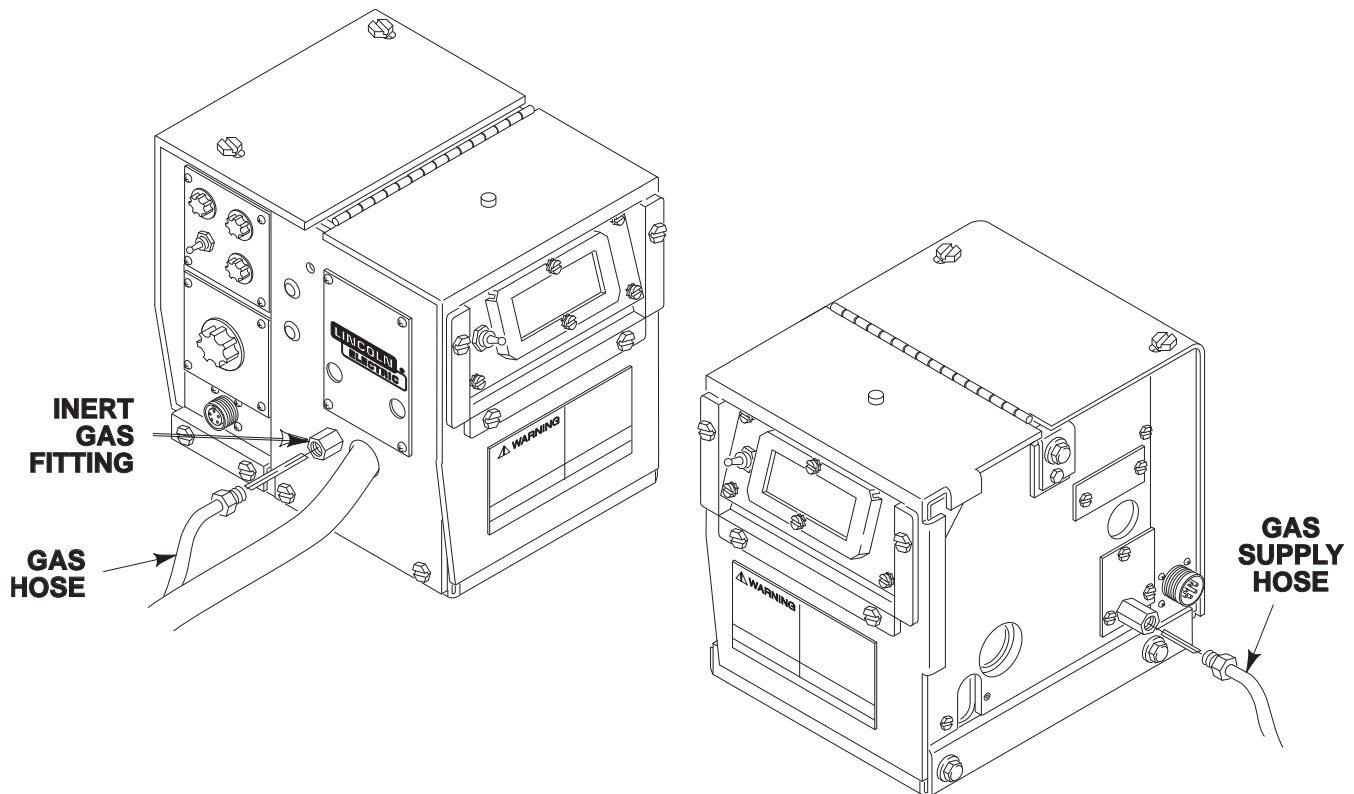
Customer must provide a cylinder of shielding gas, a pressure regulator, a flow control valve, and a hose

from the flow valve to the gas inlet fitting of the LN-7 GMA or the K494 Gas Solenoid Valve Kit installed on the LN-7. Install per Figure A.21 and the following:

1. Connect the supply hose from the gas cylinder flow valve outlet to the 5/8-18 female inert gas fitting on the back panel of the LN-7.
2. Install the barbed fitting and union nut to the 5/8-18 female inert gas fitting on the front of the LN-7. Connect 3/16 in. (4.8 mm) I.D. gas hose from the gun to the barbed fitting.

When the gun is to be removed, this fitting can be easily detached by loosening the union nut.

FIGURE A.21 – SHIELDING GAS HOOKUP.



Read and understand this entire section before operating your machine.

SAFETY INSTRUCTIONS

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 K440 LN-7 GMA semiautomatic constant speed wire feeder is specifically equipped for gas metal arc welding using flux-cored Outershield electrodes and solid wire. The LN-7 GMA is also suitable for self-shielded flux-cored Innershield electrodes, submerged arc welding (if constant voltage is satisfactory), and other open arc welding. It has been factory assembled with the following features:

- Wire feed dial [75 to 700 in./min (1.9 to 17.8 m/min)].
- Factory installed gas solenoid valve and gas fittings.
- Wire drive uses a permanent magnet motor and includes tool-less “quick- release” idle roll pressure arm, outgoing guide tube and gun cable fastening.
- Optional factory installed water solenoid and fittings for use with water cooled welding guns.

The K567-1 LN-7 GMA 4-Roll is designed to provide the additional feeding force required when using gun cables over 15 ft (4.6 m) long or when the wire is pulled long distances (such as when bulk packages are used). Because the four-roll feeder has twice the contact surface, it can also help when feeding softer wires by delivering the same or more feeding force as the two-roll with less overall wire deformation. Wire size range, speed and features are the same as other LN-7 GMA models.

The K521 LN-7 semiautomatic constant speed wire feeder is recommended for self-shielded flux-cored Innershield® electrodes, submerged arc welding, and other open arc welding. It has the following features:

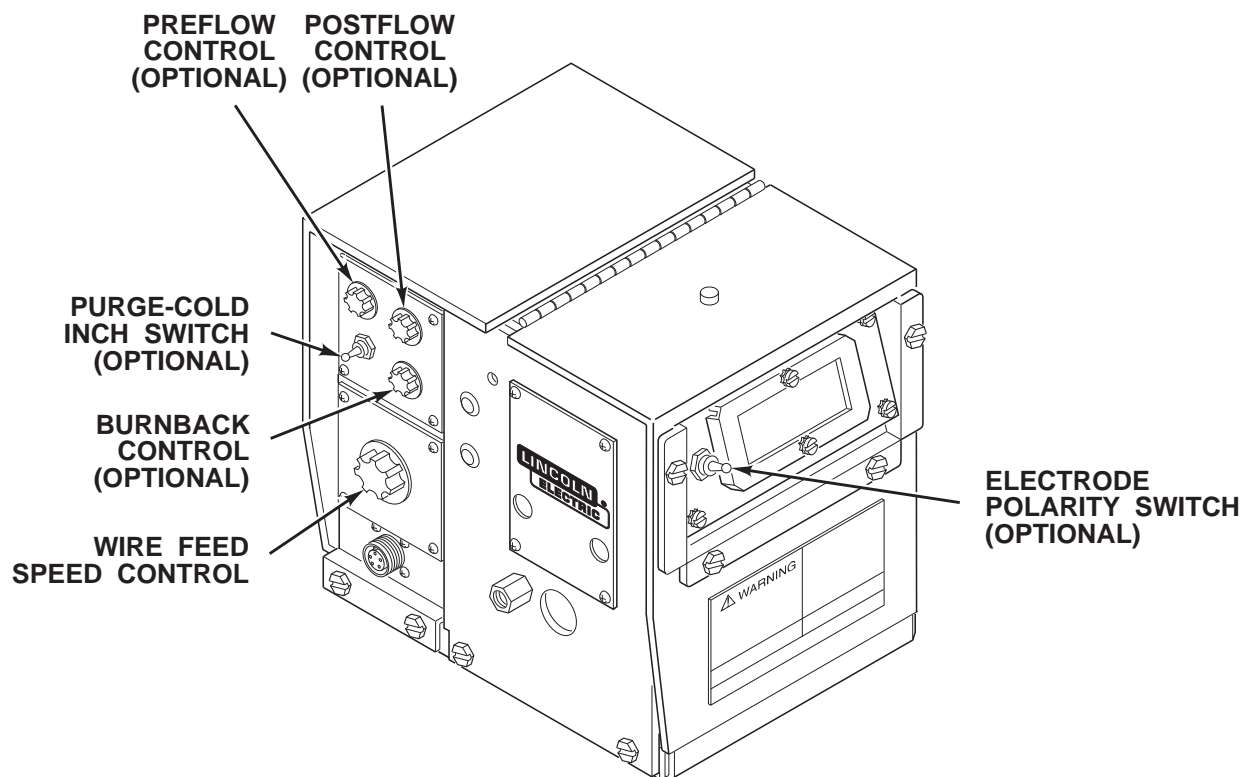
- Wire feed dial [50 to 500 in./min (1.27 to 12.7 m/min)].
- Wire drive uses a permanent magnet motor and includes tool-less “quick- release” idle roll pressure arm, outgoing guide tube and gun cable fastening.
- Optional factory installed water solenoid and fittings for use with water cooled welding guns.

RECOMMENDED PROCESSES AND EQUIPMENT

The LN-7 GMA is recommended for use in MIG and Innershield welding applications, the LN-7 is recommended for Innershield welding applications. Both are recommended for use with constant voltage power sources such as the Idealarc DC-250, 400, or 600, or CV types. The LN-7 GMA is capable of feeding

wires ranging from 0.023 in. through 1/16 in. (0.6 through 1.6 mm) solid, 0.045 in. through 5/64 in. (1.2 through 2.0 mm) Innershield, and 0.062 in. through 5/64 in. (1.6 through 2.0 mm) Outershield electrodes. The LN-7 is capable of feeding wires ranging from 0.023 in. through 3/32 in. (0.6 through 2.4 mm) solid and 0.045 in. through 7/64 in. (1.2 through 2.8 mm) cored.

FIGURE B.1 – WIRE FEEDER CONTROLS.



CONTROLS AND SETTINGS

Operator controls are illustrated in Figure B.1. Refer to the figure and the following explanations of the controls.

WIRE FEED SPEED CONTROL. This control sets the feed speed of the wire feeder. Turn the knob to the left for slower speeds and to the right for higher speeds. The control is calibrated. The nameplate shows the wire speed for the given setting of the control.

BURNBACK CONTROL (OPTIONAL). This control, located on the optional K419 Burnback Timer and K418 GMA Timer Kits, provides a precise time delay that allows the wire to be burned off at the end of the weld. This is useful for those applications where higher speed, fine wire feeding is used and there is a tendency for the electrode to overrun at the end of the

weld and cause “sticking” in the crater. The delay is adjustable for optimum burnback depending on wire size, process, procedure, etc.

PREFLOW CONTROL (OPTIONAL). This control, located on the optional K418 GMA Timer Kit, provides flow of shielding gas to the work before the arc is established. The gas solenoid valve is energized immediately when the gun trigger is closed, but the time delay before the wire feeder is energized is adjustable from 0 to 1.5 seconds. Turn the knob to the left for shorter delays and to the right for longer delays.

POSTFLOW CONTROL (OPTIONAL). This control, located on the optional K418 GMA Timer Kit, provides flow of shielding gas to the work after welding has stopped. Delay for the gas solenoid valve shutoff is adjustable from 0 to 1.5 seconds. Turn the knob to the left for shorter delays and to the right for longer delays.

LN-7 & LN-7 GMA



PURGE - COLD INCH SWITCH (OPTIONAL). This control, located on the optional K418 GMA Timer Kit, provides control of some wire feeder functions without energizing the welding power source. The momentary up position energizes the gas solenoid but not the wire feeder or welding power source. The momentary down position energizes the wire feeder but not the gas solenoid or the welding power source.

ELECTRODE POLARITY SWITCH (OPTIONAL). This switch, located on the optional K416 Digital and K417 Analog Meter Kits, controls the polarity of the meter. Set this switch to the same polarity as the electrode lead to allow correct operation of the meter.

CIRCUIT PROTECTION

A manual reset circuit breaker protects the AC supply line and the wire feeder from overloads, usually caused by excessive wire drag or other wire feed problems. To reset the circuit breaker, raise the cover of the wire drive compartment and push the white button on the side of the control box above the drive rolls.

The LN-7 and LN-7 GMA also include a Ground Lead Protector (GLP) circuit and fuse in the 2-4 contactor circuit.

The frame of the LN-7 wire feed unit is grounded to the frame of the power source by a lead in the control cable. The GLP circuit prevents welding current from damaging this lead if the electrode circuit touches the wire feeder frame while the gun trigger is pressed. When the protector circuit is tripped, the wire feed rolls will not turn and the welding contactor in the power source will not close when the gun trigger is pressed. To reset the protector circuit, press the red button above the drive rolls and to the left of the circuit breaker. There is no visual indication when the protector circuit is tripped.

AVOIDING GROUND LEAD PROTECTOR (GLP) ACTIVATION

DO NOT allow the electrode to contact the case of the wire feeder or the uninsulated part of the wire reel stand when the gun trigger is activated.

Be sure that all work lead connections to the work make tight metal-to-metal contact.

DO NOT allow excess input cable or work cable to be placed closer than three feet from the wire feeder.

DO NOT coil excess input cable assembly or use a coiled assembly as shipped from the factory. Instead, loop the excess cable length back and forth in three to six foot straight lengths. Coiling the input cable results in a transformer action between the electrode conductor cable and the ground lead in the multiconductor control cable. This transformer action can cause a current to flow in the ground lead which will falsely activate the GLP circuit.

To reset the GLP circuit, press the red button above the drive rolls and to the left of the circuit breaker.

DRIVE ROLL INSTALLATION

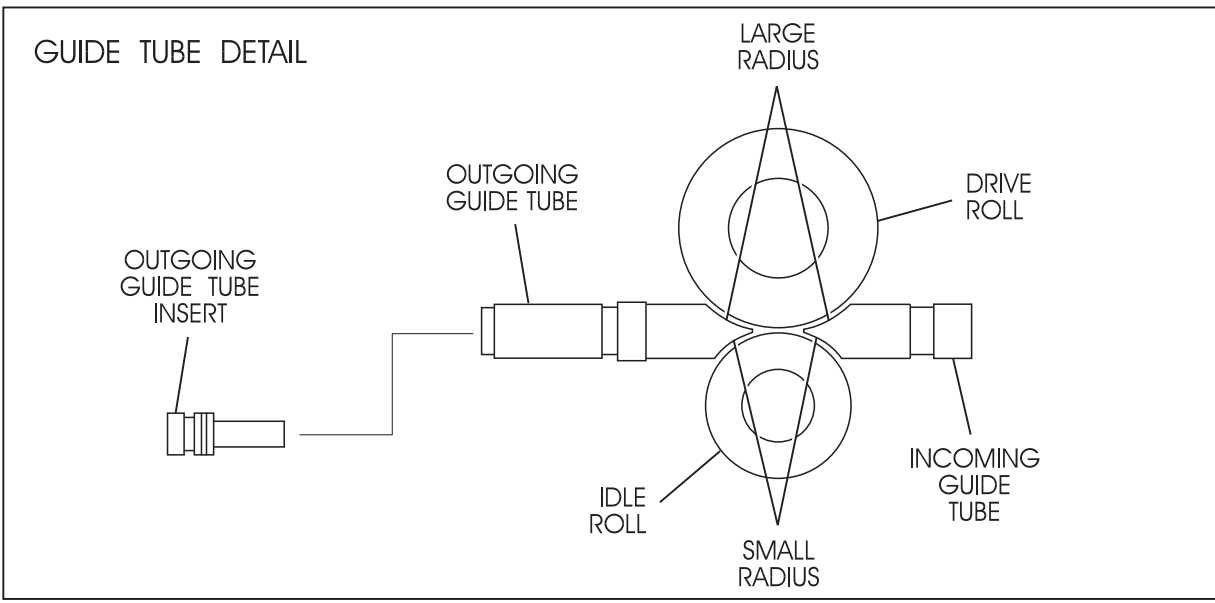
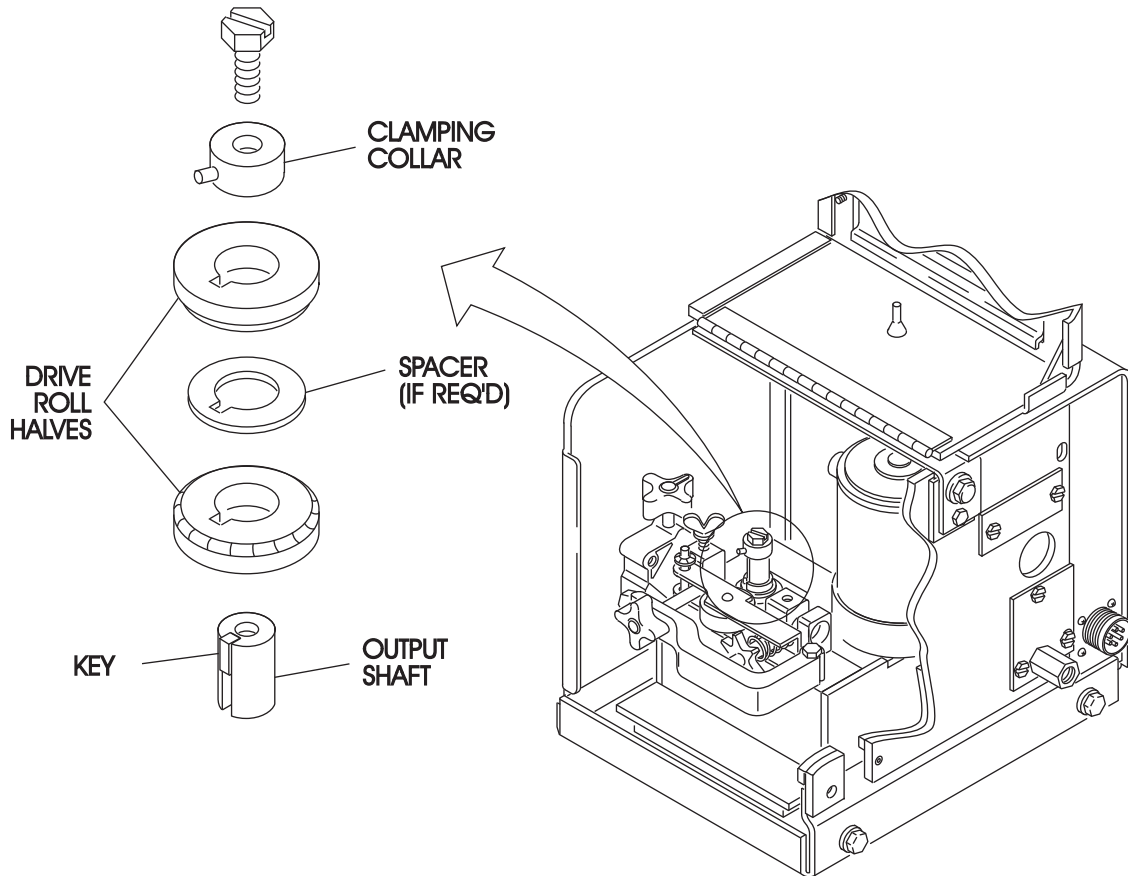
CHANGING DRIVE ROLLS FOR TWO-ROLL WIRE FEEDERS:

To change drive rolls on a two-roll wire feeder, refer to Figure B.2 and perform the following steps:

1. Rotate the latch knob on the quick release arm.
2. Remove the hex head screw and clamping collar. Remove the drive roll from the shaft.
3. The new roll to be installed is stamped for the size to be fed. An "A" after the size indicates aluminum wire. Remove the rolls from the kit and wipe them clean. Wipe the output shaft and locating shoulder clean.
4. Use the drive key, clamping collar, and hex head screw to install the roll on the output shaft. Certain size drive rolls consist of two roll halves, and may contain a spacer. If the drive roll you are installing contains a spacer, the spacer fits between the two halves of the drive roll. Tighten the hex head screw.
5. Back out the guide tube clamping screws. Remove the old guide tubes, if installed.
6. Insert the outgoing guide tube (the one with the plastic insert) into the front hole. If the guide tube has a non-symmetrical chisel end, the larger radius must face the drive roll. See Figure B.2. Push the guide tube back as far as it will go and tighten the clamping screw. Insert the incoming guide tube as far back as it will go and tighten the clamping screw. The clamping screws are dog points. When the guide tubes are properly installed these dog points will lock into the annular grooves in each of the guide tubes.
7. Set the idle roll pressure as detailed in the Idle

Roll Pressure Setting procedure detailed later in this section.

FIGURE B.2 – INSTALLING DRIVE ROLLS ON A TWO-ROLL FEEDER.

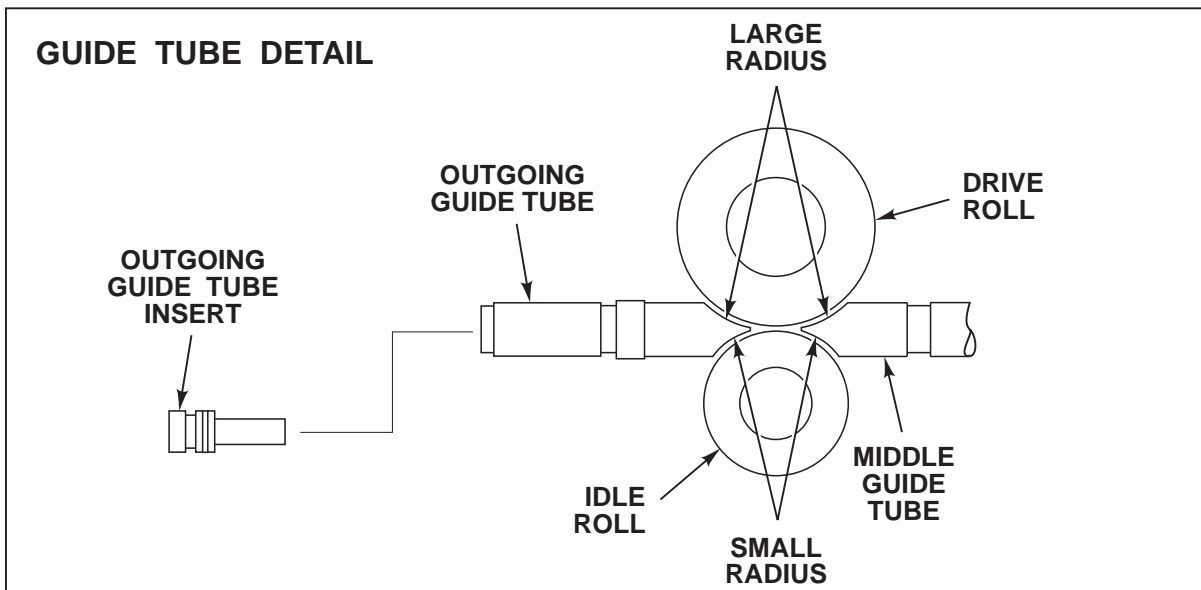
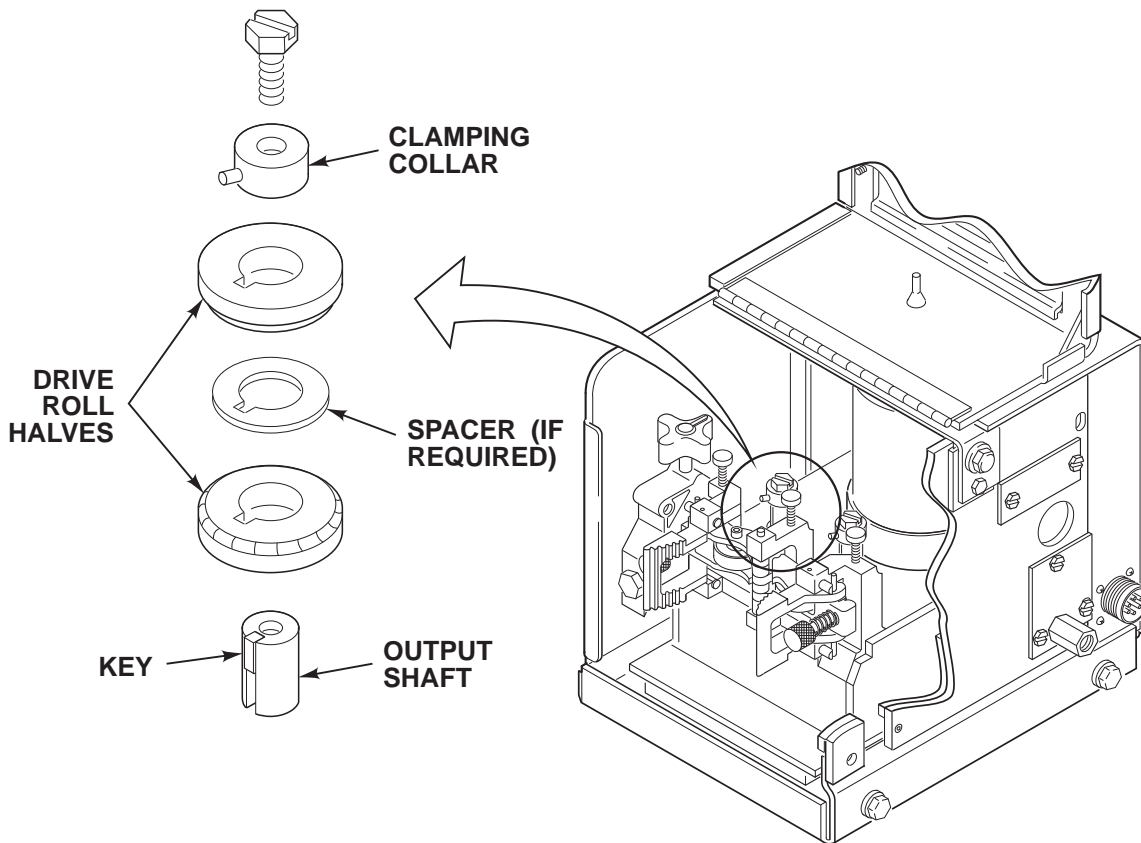


CHANGING DRIVE ROLLS FOR FOUR-ROLL WIRE FEEDERS:

To change drive rolls on a four-roll wire feeder, refer to Figure B.3 and perform the following steps:

1. Remove the gun and cable from the conductor block on the feeder by loosening the hand screw and pulling the gun straight out of the block.
2. Open both quick release levers by moving the levers outward and pulling them toward you.
3. Loosen the thumb screws holding the guide tubes in place. Remove the incoming and outgoing guide tubes, if installed.
4. Remove the hex head screws and clamping collars from the output shafts. Remove the drive rolls and middle guide tube, if installed.
5. The new rolls to be installed are stenciled with the wire size that will be fed. An "A" after the number indicates aluminum wire. Remove the rolls from the kit and wipe them clean. Wipe the output shafts and locating shoulders clean.
6. Install one roll onto either output shaft using the drive key, clamping collar, and hex head screw. Certain size drive rolls consist of two roll halves, and may contain a spacer. If the drive roll you are installing contains a spacer, the spacer fits between the two halves of the drive roll. Tighten the hex head screw.
7. Install the middle guide tube, but do not tighten at this time. When installing a 0.035" middle guide tube the larger radius should be aligned towards the drive roll. Slide the guide tube up against the drive roll.
8. Install the second drive roll on the remaining shaft the same way as the first. Center the middle guide tube between the rolls and tighten the thumbscrews holding it in place.
9. Close and latch both quick release levers.
10. Slide the incoming guide tube into the rear hole of the gearbox until it almost touches the drive roll and guide tube. Tighten the thumbscrew to hold it in place.
11. Install the outgoing guide tube into the front hole of the gearbox (through the conductor block) and tighten the thumb screw. The 0.035 in. outgoing guide tube should have the larger radius oriented toward the drive roll. For proper installation of the outgoing guide tube insert, refer to Figure B.3.
12. Be certain that the guide tubes do not touch the drive rolls or idle rolls. If they do touch, readjust them and tighten in place.

FIGURE B.3 – INSTALLING DRIVE ROLLS ON A FOUR-ROLL FEEDER.



IDLE ROLL PRESSURE SETTING

The idle roll pressure is set at the factory. Two-roll feeders are set with the pressure adjustment knob backed out two turns from full pressure, and four-roll feeders are set backed out three turns. This is an approximate setting. For small wire sizes and aluminum wire the optimum idle roll pressure varies with type of wire, surface condition, lubrication, and hardness. The optimum idle roll setting can be determined as follows:

Two-roll wire feeders:

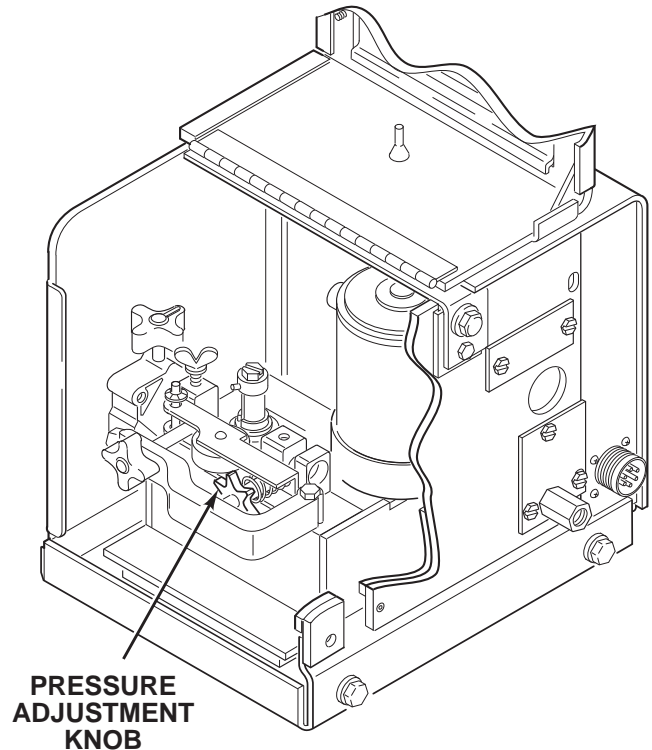
1. Press the end of the gun against a solid object that is electrically isolated from the welder output and press the trigger for several seconds.
2. If the wire “birdnests”, jams, or breaks at the drive roll, the idle roll pressure is set too high. Back the pressure adjustment knob, Figure B.4, out 1/2 turn. Run new wire through the gun and repeat step 1.
3. If the only result is drive roll slippage, loosen the gun cable clamping screw on the conductor block and pull the gun cable forward about six inches. There should be a slight waviness in the exposed wire. If there is no waviness, the pressure is too low. Increase the pressure setting 1/4 turn. Lock the gun cable in place and repeat steps 1 and 2.

Four-roll wire feeders:

1. Release the incoming idle roll and perform the pressure setting procedure for two roll feeders to set outgoing idle roll pressure.

2. After outgoing pressure is set, determine how many turns away from full pressure the setting is.
3. Set both idle roll tensions to this setting. Engage both idle rolls before welding. For most applications, best wire feeding will occur when both idle roll pressures are set the same.

FIGURE B.4 – IDLE ROLL PRESSURE SETTING.



WIRE LOADING

WIRE REEL LOADING – READI-REELS AND SPOOLS

TO MOUNT A 30 LB READI-REEL PACKAGE USING THE MOLDED PLASTIC K363-P TYPE ADAPTER:

1. Make certain that the threaded locking collar is tight and securely locks the adapter on the spindle. See Figure B.5.
2. Rotate the spindle and adapter so the retaining spring is at the 12 o'clock position.
3. Position the Read-Reel so that it will rotate in a clockwise direction when feeding (wire is to be de-reeled from the bottom of the coil).
4. Set one of the Read-Reel inside cage wires on the slot in the retaining spring tab.

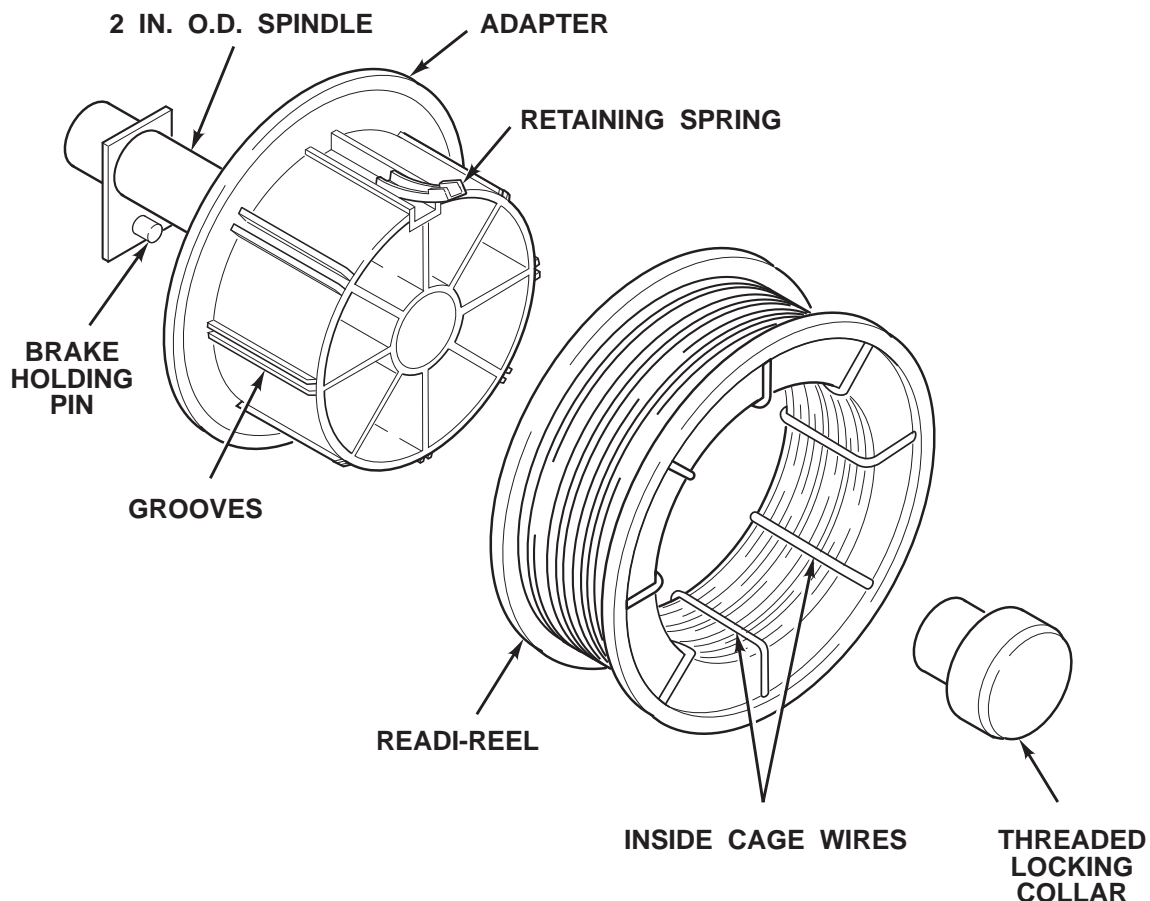
5. Lower the Read-Reel to depress the retaining spring and align the other inside cage wires with the grooves in the adapter.
6. Slide the cage all the way onto the adapter until the retaining spring “pops up” fully.

⚠ WARNING

Check to be sure the retaining spring has been fully returned to the locking position and has SECURELY locked the Read-Reel cage in place. Retaining spring must rest on the cage, not the welding electrode.

7. To remove the Read-Reel from the adapter, depress the retaining spring with thumb while pulling the Read-Reel cage from the adapter with both hands. Do not remove the adapter from the spindle.

FIGURE B.5 – INSTALLING A 30 LB READI-REEL PACKAGE.



TO MOUNT 10 TO 30 LB SPOOL (12" DIAMETER):
(For 8 in. spools a K468 spindle adapter must be used.)

1. Remove the locking collar and Read-Reel adapter shipped on the 2 in. diameter spindle (adapter is not required).
2. Place the spool on the spindle making certain the brake holding pin enters one of the holes in the back side of the spool. Be certain the wire comes off the reel in a clockwise direction when de-reeled from the bottom of the coil.
3. Replace and tighten the locking collar.

ELECTRODE FEEDING AND BRAKE ADJUSTMENT

1. Turn the REDI-Reel or spool until the free end of the electrode is accessible.
2. While tightly holding the electrode, cut off the bent end and straighten the first six inches. Cut off the first inch. (If the electrode is not properly straightened, it may not feed or may not go into the outgoing guide tube, causing a "birdnest".)

3. Insert the free end through the incoming guide tube.
4. Press the gun trigger and push the electrode into the drive roll.

WARNING



ELECTRIC SHOCK can kill.

- Do not touch electrically live parts such as output terminals or internal wiring.
- When inching with the gun trigger, electrode and drive mechanism are "hot" to work and ground.

-
5. Inch the electrode through the gun.
 6. Adjust the brake tension with the thumbscrew on the spindle hub until the reel turns freely but with little or no overrun when wire feeding is stopped. Do not overtighten.

WIRE REEL LOADING – 50 AND 60 LB COILS (K303 OR K376 WIRE REEL STAND)

ADJUSTABLE WIRE REEL BRAKE

The mount for standard 50 and 60 pound electrode coils includes a two-position brake assembly. Generally the brake should be at the inner position (nearest to the wire reel shaft) for wire feed speeds below 400 in./min (10 m/min). It should be at the outer position for the faster wire speeds often used when feeding smaller diameter electrode.

To adjust the brake position, remove the wire reel. Pull the cotter pin that holds the brake shoe to the arm, move the shoe and replace the cotter pin. Do not bend the cotter pin - it is held in place by a friction fit.

TO MOUNT A 50 OR 60 LB COIL:

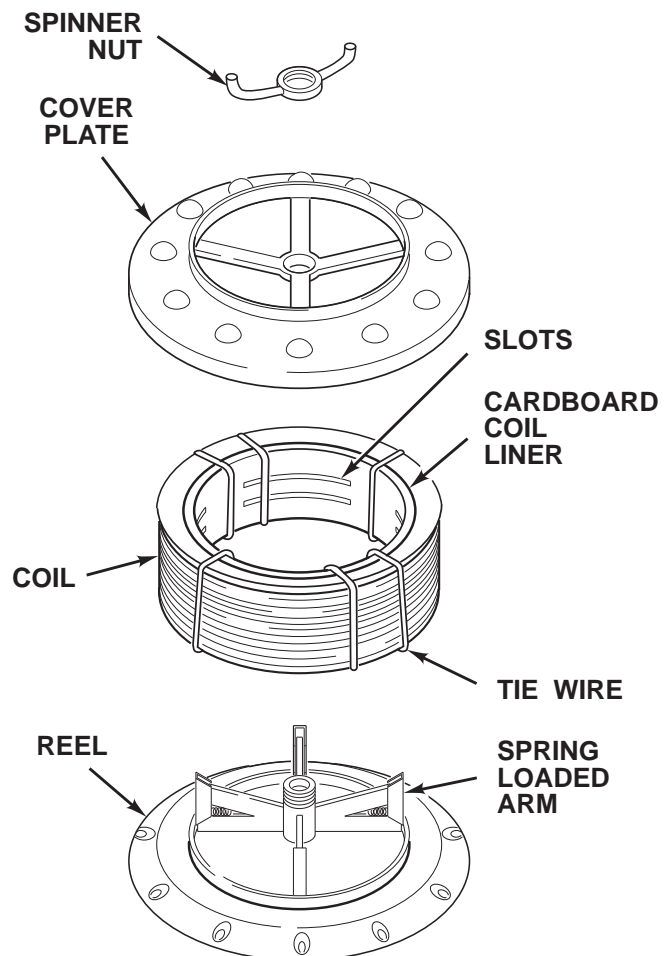
1. To remove the wire reel from its shaft, grasp the spring loaded knob and pull out. This straightens the knob so it seats into the shaft when released. Remove the reel.
2. Lay the reel flat on the floor. Loosen the spinner nut and remove the cover plate. See Figure B.6.
3. Place the coil of electrode on the reel so it unwinds as the reel rotates clockwise. DO NOT cut the tie wires at this time.
4. Be sure the coil is placed so the spring loaded arms will not interfere with the later removal of the coil tie wires.
5. When loading 0.030, 0.035, and 0.045" electrode, be certain the coil is placed on the reel so the spring loaded arms are at the center of the slots in the cardboard coil liner. This provides the positive compression of the coil sides needed for trouble-free wire feeding.
6. Put the cover plate on the reel so the four arms of the cover plate straddle and are in line with the spring loaded arms of the reel.
7. Tighten the cover as much as possible by hand. DO NOT hammer on the spinner nut arms.

⚠ CAUTION

Always be sure the free end of the coil is securely held while the tie wires are being cut and until the wire is feeding through the drive rolls. Failure to do this will result in "back lashing" of the coil, which may tangle the wire. A tangled coil will not feed. It must be untangled or discarded.

8. Cut and remove **only** the tie wire holding the free end of the coil. Insert the free end into one of the holes in the cover and secure it by bending it back. Cut and remove the remaining tie wires.
9. Replace the reel on the wire feeder. Grasp the shaft knob, pull it out and swing it across the reel hub, locking the reel in place.

FIGURE B.6 – LOADING A 50 OR 60 LB COIL.



FEEDING ELECTRODE

1. Turn the reel until the free end of the electrode is accessible.
2. While tightly holding the electrode, cut off the bent end and straighten the first six inches. Cut off the first inch. (If the electrode is not properly straightened, it may not feed or may not go into the outgoing guide tube causing a “birdnest”.)
3. Insert the free end through the incoming guide tube.
4. Press the gun trigger and push the electrode into the drive roll.


WARNING
**ELECTRIC SHOCK
can kill.**

- Do not touch electrically live parts such as output terminals or internal wiring.
- When inching with the gun trigger, electrode and drive mechanism are “hot” to work and ground.

5. Inch the electrode through the gun.

**WIRE LOADING – 13-14 LB INNERSHIELD
COILS**

The K378 small mounting stand for the 14 lb Innershield coil does not have an adjustable brake. It has a fixed drag built into the reel spindle.

To load a 14 lb coil:

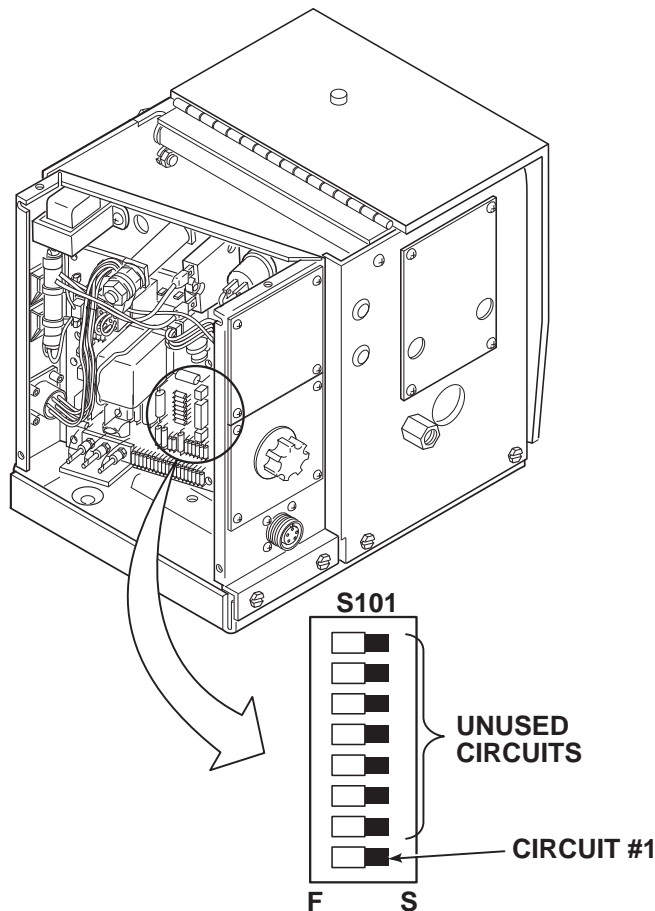
1. Remove the snap-on lid from the plastic canister.
2. Remove the center clamping nut and the cover plate from the wire reel.
3. Unpack the 14 lb coil of wire. Be sure not to bend the side tangs of the liner. Straighten any tangs that may have been bent.
4. Remove the start end of the coil from its holding slot in the coil liner. Cut off the bent end, straighten the first six inches, and cut off the first inch. (If the electrode is not properly straightened, it may not feed or may not enter the outgoing tube, causing a “birdnest”.)
5. Thread the end through the canister wire feed liner until about four inches of electrode are exposed.
6. Place the coil onto the disc support.
7. Replace the front reel cover and center clamping nut. Keep the reel from turning and tighten the center clamping nut securely.
8. Thread the exposed end of the electrode into the wire feeder until it touches the drive rolls. Actuate the gun trigger and feed the electrode through the system.

ACCELERATION SETTING

The LN-7 and LN-7 GMA can be configured for optimum starting for different procedures by selecting between two speeds of controlled wire acceleration. As shipped from the factory, the LN-7 and LN-7 GMA models are set for fast acceleration. Fast acceleration is typically the best for most smaller wire procedures. Slow acceleration may be more desirable for long stickout applications, or if a larger diameter electrode is being used.

Acceleration is set on the control PC board. To gain access to the control PC board, make certain the input power is off and remove the side cover on the control side of the LN-7 or LN-7 GMA. To change the acceleration on earlier control PC boards, reconnect the jumper to "F" (Fast) or "S" (Slow). Later control PC boards use a DIP switch (S101). S101 has 8 circuits (switches); only circuit #1 is used. Set circuit #1 in the "F" position for fast acceleration or in the "S" position for slow acceleration. See Figure B.7.

FIGURE B.7 – ACCELERATION SETTING (LATER CONTROL PC BOARDS).



WIRE SPEED AND VOLTAGE ADJUSTMENT

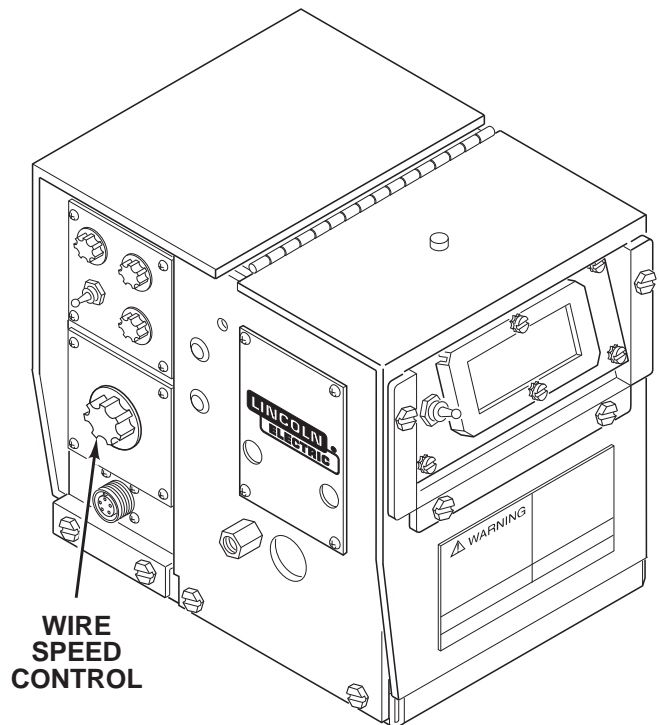
Use only constant voltage power type sources. If using a multiple process power source, be sure it is set for constant voltage output per instructions in the manual for the power source.

Set the power source polarity switch or properly connect the electrodes and work leads for the correct electrode polarity. If the wire feeder is equipped with an optional meter kit, set the meter polarity switch to the proper working polarity.

Set the voltage using the control on the power source or the optional remote voltage control, if used. Set the open circuit voltage to approximately 2 volts higher than the desired procedure voltage. The final setting must be made according to the arc voltage while welding.

The wire speed control on the front of the wire feeder, Figure B.8, has a dial that is calibrated directly in inches per minute. Set the control for the desired procedure wire speed.

FIGURE B.8 – SETTING WIRE SPEED.



MAKING A WELD

1. Inch the electrode through the gun and cable. For solid wire, cut the electrode within approximately 3/8 in. of the end of the contact tip. If using cored wire, cut the electrode within 3/4 in. of the extension guide.
2. Connect the work cable to the metal to be welded. The work cable must make good electrical contact with the work. The work must also be grounded.

⚠ WARNING

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

3. Position the electrode over the joint. The end of the electrode may be lightly touching the work.
4. Lower your welding helmet. Close the 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 used.
5. To stop welding, release the gun trigger and then pull the gun away from the work after the arc goes out.

WIRE REEL CHANGING

At the end of a coil, remove the last of the old electrode from the conductor cable. Either pull it out at the nozzle, or use the following procedure.

1. Cut off the end of the electrode at the gun end. Do not break it off by hand. Breaking by hand puts a slight bend in the wire, making it difficult to pull it back through the nozzle.
2. Uncouple the gun conductor cable from the conductor block on the wire feeder drive unit and lay the gun cable out straight.
3. Using pliers, grip the wire and pull it out of the cable from the connector end.
4. After the electrode has been removed, connect the gun conductor back to the wire feeder.
5. Load a new reel of electrode per the instructions for the specific reel type given previously in this section.

K417 DIGITAL VOLTMETER KITS

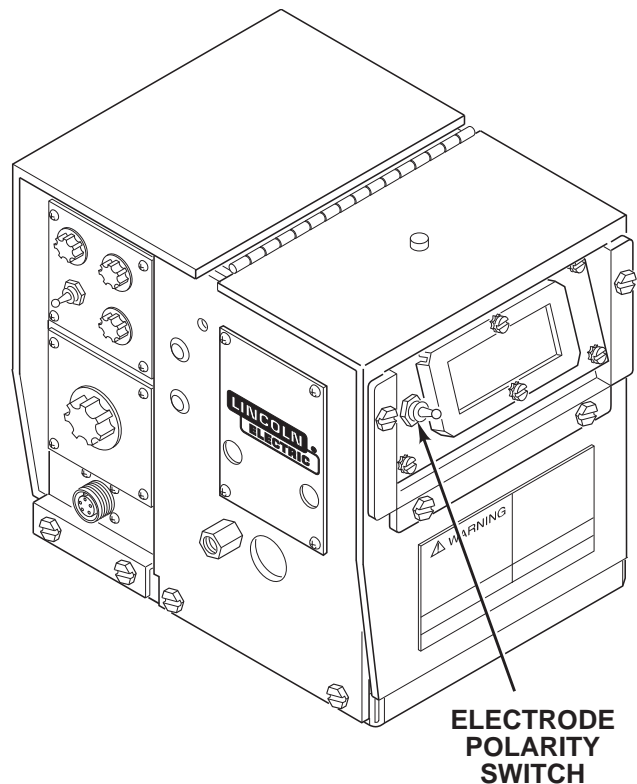
Lincoln Specified Procedures give voltmeter readings taken between the work and the gun cable brass connection block inside the LN-7. To match these voltage readings, the #21 lead should be extended directly to the work per the instructions on the wire feeder to power source connection diagrams given in the *Installation* Section.

To read volts, set the “Electrode Polarity” switch, Figure B.9, to the same polarity as the electrode lead connection to the power source.

The K417 Digital Voltmeter Kit has a hold feature that will freeze the last arc voltage reading at the moment the trigger is released to stop welding. This feature allows the welding operator to easily check the arc voltage and make adjustments if necessary to match procedures. **For accuracy, it is important to release the gun trigger and the lift the gun away from the work.**

The hold circuit automatically releases about six seconds after the gun trigger is released. It is also released when the trigger is closed again to begin welding.

FIGURE B.9 – ELECTRODE POLARITY SWITCH.



FLUX TANK LOADING

K320 FLUX TANK (OPTIONAL)

Either turn off the incoming air line or remove the quick disconnect if one has been installed. Slightly loosen the tank cap and let the air in the tank escape in the holes in the side of the cap. After pressure has been released, remove the cap from the tank. Using the funnel provided, put 100 pounds of flux in the tank. It is very important that only new or properly reclaimed flux be put in the tank. Coarse particles and/or magnetic particles will stop the flux feeding process. New Lincoln flux is properly screened at the factory. All reclaimed flux must be separately screened through a vibrating screen with 0.065 in. to 0.075 in. openings and be put through a magnetic separator. The K310 vibrated screen and K58 magnetic separator are available for this purpose. The screen in the funnel supplied with the tank has much larger openings and its only purpose is to keep paper and slag out of the tank.

There will always be a small amount of air and possible drops of water coming out of the end of the tube coiled under the tank. This is an automatic disposal system in case the plant air has water and dirt in it.

K310 FLUX SCREEN (OPTIONAL)

The unit was designed to fit the top of either the standard fill funnel or a K58 magnetic separator. The unit has a steel screen with 0.065 to 0.075 in. openings and an air vibrator attached to the frame. The vibrator can be used with air line pressures ranging from 20 through 100 psi.

For ease of handling, the user should connect the incoming air line to the 1/8 in. pipe elbow with the aid of a quick disconnect type air coupling.

It is very important that reclaimed flux to be used in the continuous flux feeding system be passed through the K310 screen or its equivalent.

K58 MAGNETIC SEPARATOR (OPTIONAL)

The K58 is a permanent magnet type separator designed to fit the top of the standard fill funnel of the continuous flux feeding system.

The purpose of the separator is to remove magnetic materials such as mill scale and any other extraneous magnetic materials which may have been recovered along with the flux to be processed.

It is important to remove these magnetic particles from the flux which is to be used in the continuous flux feeding systems. If the magnetic material is not removed it will gather around the nozzle of the gun and impede or shut off the flux flow when making relatively long welds or welding continuously. The magnetic particles can also cause porosity in the weld.

GENERAL

The following is a list of the accessories that can be used with the LN-7 GMA wire feeder.

TABLE C.1 – LN-7 GMA ACCESSORIES.

Product Number	Name
K162-1**	Spindle Kit-Two inch Hub
K163**	Undercarriage
K419**	Burnback timer kit
K418**	GMA Timer Kit
K417**	Digital voltmeter kit
K320**	Flux tank
K303**	50-60 lb Wire reel mounting stand
M-11514	Wire reel dust shield door for K303
	Weld Power Cables:
K1840-10	Twist-Mate to Lug- 1/0, 350A, 60% Duty Cycle, 25 ft.
K1841-25	Twist-Mate to Twist Mate- 1/0, 350A, 60% Duty Cycle, 25 ft.
K1841-50	Twist-Mate to Twist Mate- 2/0, 350A, 60% Duty Cycle, 25 ft.
K1842-10	Lug to Lug-3/0, 600A, 60% Duty Cycle, 10 ft.
K1842-35	Lug to Lug-3/0, 600A, 60% Duty Cycle, 35 ft.
K1842-60	Lug to Lug-3/0, 600A, 60% Duty Cycle, 60 ft.
K1842-110	Lug to Lug-4/0, 600A, 60% Duty Cycle, 110 ft.
	Welding Guns:
K126**	Innershield gun - 350 Amps
K115**	Innershield welding gun - 450 Amps
K112**	Submerged arc welding gun - 500 Amps
K113**	Submerged arc welding gun - 600 Amps
K497*	Magnum GMA welding gun - 200 Amps
K470*	Magnum GMA welding gun - 300 Amps
K471*	Magnum GMA welding gun - 400 Amps
K527**	Water solenoid kit
K494**	Gas solenoid valve kit (Included on LN-7 GMA)
K1818-10	Wire Feeder Control Cable - 10 ft.
K1797-25	Wire Feeder Control Cable Extensions Requires K1818-10
K1797-50	Wire Feeder Control Cable Extensions Requires K1818-10
K1798	Adapter Cable for Control Cable to Terminal Strip Power Source
K1803-1	Work and Wire Feeder Power Cables Package

*Magnum GMA welding guns require a K466-1 connector for use with the LN-7 GMA wire feeder.

**A detailed description of each item is given later in this section.

LN-7 & LN-7 GMA



AUXILIARY EQUIPMENT CONNECTION

The power for 115 volt AC auxiliary equipment can be obtained from the 7 and 32A terminals inside the control box. The 7 and 32A circuit is energized when the gun trigger circuit is closed.

NOTE: The LN-7 GMA already has the factory installed gas solenoid valve leads attached to terminals 7 and 32A. Additional auxiliary equipment connection is not recommended.

Install 1/4" quick connect terminals to the leads from the auxiliary equipment. Route the leads through the same hole that the motor leads pass through to the inside of the control box and connect the terminals to #32A and #7 on the control PC Board. Route the leads so that they are .50" or greater away from the chassis mounted power resistor. The current draw must NOT exceed 1/4 ampere.

CAUTION

Do not connect the power source contactor to these terminals.

NOTE: The auxiliary equipment contacts open when the trigger is released. When the optional K418 GMA Timer Kit is installed, the auxiliary contacts open after the postflow time delay.

K162-1 SPINDLE

The K162-1 spindle is used for mounting Readi-Reels and 2 in. I.D. spools with a 60 lb capacity on a K303 Wire Reel Stand. When used with Read-Reels, a Read-Reel Adapter is required. For 8 in. O.D. spools, a K468 Spindle Adapter is available.

The K162-1 is a high capacity design which replaces the original K162 30 lb spindle. The K162-1 spindle has a white spacer and has part no. M-14587-1 molded on. The original K162 spindle has a black spacer and the part no. M14587. Parts may not be exchanged from one design to the other.

WARNING

Do not use coils or spools heavier than 30 lbs on the original K162 spindle.

To mount the 2 in. spindle kit for Readi-Reels and 10 through 60 lb spools, remove the shaft for the standard 50-60 pound wire coils from the mounting framework. Install the spindle per the instructions (M15241) shipped with the spindle kit.

K163 UNDERCARRIAGE

The undercarriage includes casters, wheels, a handle, and related hardware. Casters are mounted at the front and wheels at the rear of the platform. The handle is bolted to the front of the platform so the wire feeder can be tilted back and wheeled like a two-wheel truck. Installation sheet M13424 is provided with the undercarriage.

K419 BURNBACK TIMER KIT

The kit is available for those applications where the LN-7 or LN-7 GMA is used for higher speed, fine wire feeding (0.023 in. to 0.045 in. wire sizes) where there is a tendency for the electrode to overrun at the end of the weld causing "sticking" in the crater. The kit provides a precise time delay that allows the wire to be burned off at the end of the weld. The delay is adjustable for optimum burnback depending on wire size, process, procedure, etc. This kit also includes a cold inch switch.

The K419 Burnback Kit is also useful for those installations where the gun is clamped in a fixture and cannot be lifted from the work at the end of the weld.

Installation and operation instructions (M15060) are included with the kit.

K418 GMA TIMER KIT

This kit is available to provide the following functions:

1. Preflow Control – Provides flow of shielding gas to the work before the arc is established. The solenoid valve is energized immediately when the gun trigger is closed, but the time delay before the wire feeder is energized is adjustable to between 0 and 1.5 seconds.
2. Postflow Control – Provides flow of shielding gas to the work after welding is stopped. Solenoid valve shutoff delay after the trigger is released is adjustable from 0.5 to 4.5 seconds.
3. Burnback Control – Provides a precise time delay that allows the wire to be burned off at the end of the weld. The delay is adjustable for optimum burnback depending on the wire size, process, procedure, etc.
4. Purge - Cold Inch Switch – Momentary Up position energizes the gas solenoid but not the wire feeder or welding power source. Momentary down position energizes the wire feeder but not the welding power source or the gas solenoid valve.

Installation and operation instructions (M15059) are included with the kit.

K417 DIGITAL VOLTMETER KIT

Includes a three digit LED display and a polarity switch. Also includes a hold feature that freezes the display for approximately six seconds at the reading just prior to stopping welding. This feature allows the operator to easily check his procedure at the end of the weld and make adjustments if required. Installation instructions (M15080) are included with the kit.

K320 FLUX TANK

The K320 flux tank is available to permit the LN-7 or LN-7 GMA to be used for submerged arc welding.

Install per the instructions shipped with the kit.

WIRE REEL DUST SHIELD DOOR FOR K303

In extremely dusty and dirty locations this door kit can be added to those units having the dust shield kit (S-14543). This door kit includes a hinged door and sliding bottom seal. When these parts are attached to the reel support per the instructions included, the unit becomes a completely enclosed housing. Order part no. M11514.

POWER INPUT CABLES

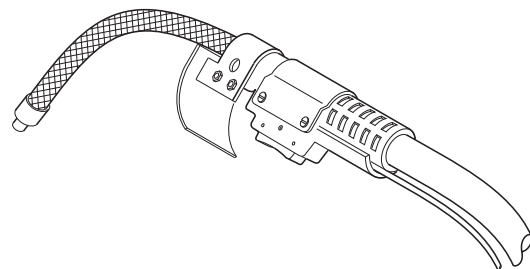
A variety of power input cable assemblies are available for various current ratings and power source connection types. All provide a polarized control cable plug (MS-3106A-18-12S) and a lugged electrode cable for connection to the wire feeder.

WELDING GUNS

INNERSHIELD GUNS

The K126 gun and cable assembly is recommended for most welding with 0.062 in. through 3/32 in. Innershield electrodes at up to 350 amps. Install the insulated nozzle extension (or thread protector) and the nozzle contact tip for the stickout and electrode size being used. (See Figure C.1.)

FIGURE C.1 – THE K126 GUN.

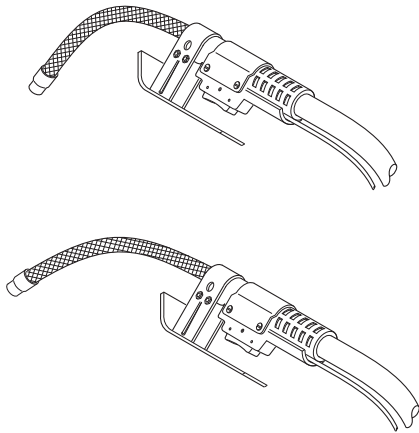


For heavy duty welding at up to 450 amps and with 0.068 in. through 3/32 in. Innershield electrode, use an appropriate K115 or K115-45 gun and cable assembly (See Figure C.2). Install the proper insulated nozzle extension and contact tip for the stickout and electrode size being used.

For welding with 7/64 in. Innershield electrode, use a K115-3/32 with an M11474-120 nozzle or a K115-45-3/32 with an M11510-120 nozzle. Also install a 7/64 in. contact tip and install the insulated nozzle extension for the stickout being used.

NOTE: Linconditioner™ guns are recommended for locations where smoke accumulation is a problem and conventional exhaust systems are ineffective. The available smoke removal type Innershield guns and vacuum units can be used in these locations. Instructions are shipped with the equipment.

FIGURE C.2 – THE K115 and K115-45 GUNS.



SUBMERGED ARC GUNS

The K112 gun and cable assembly is recommended for welding with 1/16 in. solid steel electrode at up to 500 amps. The K113 gun and cable is recommended for 5/64 in. and 3/32 in. (2.0 and 2.4 mm) solid steel electrodes (types L50, L60, L61, and L70) for use up to 600 amps.

GMAW GUNS

An expanding line of Magnum GMA gun and cable assemblies are available to allow welding with solid and cored electrodes using the GMAW process. See the appropriate Magnum literature for descriptions of the 100-500 ampere air cooled gun and cables that are available. Gun cable lengths range from 10 to 25 ft. (3.0 to 7.5 m) and feed electrode sizes 0.023 in. to 3/32 in. (0.6 to 2.4 mm).

NOTE: Magnum GMA welding guns require a K466-1 connector for use with an LN-7 GMA wire feeder.

K527 WATER SOLENOID KIT

Install and connect per the instructions (M16261) shipped with the kit.

This kit is factory installed on the K440-1 LN-7 GMA.

K494 LN-7 GAS SOLENOID KIT (Standard on LN-7 GMA)

Install per the instructions (M16057) shipped with the kit.

K303 50 TO 60 LB WIRE REEL MOUNTING STAND

The K303 60 lb Wire Reel Mounting Stand includes a dust shield. The assembly includes a framework to which is attached the 50 to 60 lb wire reel, a mounting spindle, a lift bale, and a cable clamp for fastening the input cable assembly. It is easily mounted to the basic wire feed unit by following the Attaching the Wire Reel Stand procedure at the end of this section.

ATTACHING THE WIRE REEL STAND

The mounting hardware for mounting the stands is included with the LN-7 and LN-7 GMA. Screws and washers are inserted in their respective mounting holes. To connect:

1. Remove the three 3/8 in. hex head bolts from the back of the wire feed unit.
2. Place the wire reel mounting stand mounting bracket in position against the back of the wire feed unit.
3. Replace and tighten the hex head bolts. The long screw and plain washer go into the top hole.

ROUTINE MAINTENANCE

DRIVE ROLLS AND GUIDE TUBES

After feeding every coil of wire, inspect the drive roll section. Clean the assembly as necessary. Do not use solvent to clean the drive roll assembly as it may wash the lubricant out of the bearings. The drive rolls and guide tubes are stamped with the wire sizes they will feed. If a wire size other than that stamped on the rolls is to be used, the rolls and guide tubes must be changed.

The drive rolls for 0.045 and 0.052 cored electrode and 1/16, 0.068, 5/64, 3/32, and 7/64 electrode have a double set of teeth so they can be reversed for additional life. Between the two knurled rolls (except 1/16 and smaller rolls) is a shim washer which limits the damage to the electrode if wire feeding problems occur. Drive rolls for 0.023 through 0.052 solid electrodes have no teeth.

Refer to the instructions included with the drive roll kit for installation and replacement of the drive rolls on the wire feeder.

WIRE REEL MOUNTING

To prolong the life of the reel shaft on the 50 to 60 lb coils, periodically coat it with a thin layer of grease. No maintenance to the two position brake is required. If the brake shoe wears through to metal, replace the brake assembly.

No routine maintenance is required for Readi-Reels and 10 to 30 lb spools. Do not lubricate the 2 in. spindles.

CONTACTOR CIRCUIT FUSE

The 2 amp, 250 volt fuse (F1) on the control P.C. Board protects the contactor circuit (leads #4 and #2) from overloads or shorts which can be caused by a wrong connection at the power source.

PERIODIC MAINTENANCE

WIRE DRIVE MOTOR AND GEARBOX

Every year inspect the gearbox and coat the gear teeth with a moly-disulfide filled grease. Do not use graphite grease.

Every six months check the motor brushes. Replace them if they are less than 1/4 in. long.

GUN AND CABLE MAINTENANCE

For instructions on periodic maintenance for the welding gun and cables, refer to the manual for your specific model of welding gun.

Gun Nozzles (All)

1. Replace worn contact tips as required.
2. On Innershield guns, remove spatter from tip or extension guide after each ten minutes of arc time or as required.
3. Replace worn spring liners in nozzles. The life of the liner can be doubled by rotating liner 180°. The liner can be pulled out the back end of the nozzle by wedging the blade of a small screwdriver in the I.D. and pulling.
4. Inner parts of nozzles can be removed and replaced by removing the internal hollow-lock set screw from the contact tip end of the nozzle with a 5/32 or 3/32 Allen wrench.

The insert and retainer will normally fall out the end of the nozzle but if they do not, gently drive the spring liner towards the outgoing end of the nozzle.

When re-assembling nozzle, make certain the ceramic nozzle insert (if used) is placed next to the spring liner. The hollow-lock set screw is to be tightened to give the dimension specified below as measured from the end of the nozzle to the hollow-lock set screw.

GUN	DIMENSION
K112 (500)	.38 IN.
K113	.38 IN
K114	.38 IN
K115	.75 IN
K116	.75 IN
K126	.38 IN
K206	.38 IN
K289-5/64	.44 IN
K289-3/32 & .120	.75 IN
K309	.38 IN

Gun Cables (All)

A dirty gun cable can cause rough and erratic wire feeding. Therefore, the cable liner must be cleaned periodically. Clean Innershield gun cables after using approximately 300 pounds of electrode; clean submerged arc gun cables after using approximately 600 pounds of electrode.

Remove the cable from the wire feeder. Lay it out straight on the floor. Remove the contact nozzle tip from the gun. Using an air hose and only partial pressure, gently blow out the cable. Work the full length of the cable by bending it back and forth and then blow it out again. Repeat this procedure until no more dirt comes out.

AUTOMATIC FLUX FEEDING SYSTEM (K320)

The only maintenance required on the flux feeding system is cleaning the water and sludge trap sump. Do this every six months or whenever air no longer escapes from the coiled tube under the flux tank.

TO CLEAN:

Turn off the incoming air and release the tank pressure. Remove the coiled aluminum tubing from the bottom of the filter unit. Remove the pinched copper end piece from the end of the aluminum tube. Wash all the material out of the aluminum tube. Clean out

the short pinched section; this should have a gap of between .005 to .050 in. to allow a small amount of air to escape when the equipment is being used. If this end piece is badly corroded, replace it with a new piece.

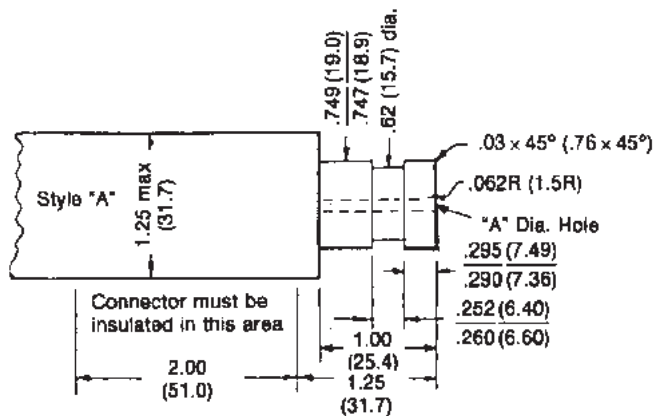
Loosen the collar on the 2-1/8 inch steel filter tube and take the filter tube off the machine. Wash out completely. Fit steel tube back into its bottom. Fill the steel tube to within two inches of the top with any clean Lincoln submerged arc welding flux.

Raise the steel tube into place and tighten the collar. When the air pressure is turned on again, part of the flux in the steel tube will be forced into the coiled tube. Be certain a small amount of air is escaping from the pinched end of the copper tube.

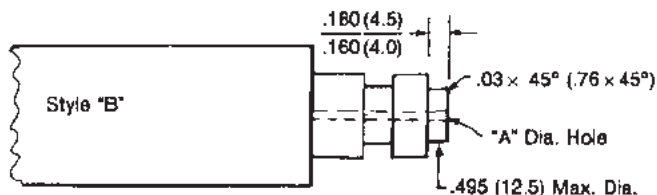
GUN CABLE CONNECTOR REQUIREMENTS TO PERMIT PROPER CONNECTION TO LINCOLN LN-7 GMA AND LN-7 WIRE FEEDER

The following Figures D.1 and D.2 should serve as a guide to determine if a particular gun or switch can be connected to the LN-7 GMA and LN-7.

FIGURE D.1 – LN-7 CONNECTORS



LN-7 CONNECTOR FOR 1/16-7/64" (1.6-2.0 MM) WIRE)



LN-7 CABLE CONNECTOR FOR .023-.052" (0.6-1.3 mm) WIRE (FOR ALL OTHER DIMENSIONS, SEE ABOVE).

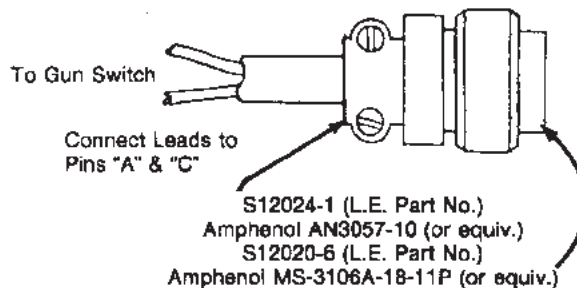
NOTE: Connector part with .7459/.747 (19.0/18.9) diameter should be made from brass if it is to be part of the welding current carrying circuit.

Wire Size in. (mm)	"A" Diameter Hole to be Concentric to .749/.747 (19.0/18.9) Diameter Within .008 (.20) F.I.M.
7/64	.152 [#24 Drill]
0.68-5/64 (1.7-2.0)	.125 [1/8" (3.2 mm) Drill]
1/16-0.062 (1.6)	.078 [5/64" (2.0 mm) Drill]
.045 & .052 (1.1 & 1.3)	.062 [1/16" (1.6 mm) Drill]
.023-.035 (0.6-0.9)	.055 [(1.4 mm) #54 Drill]

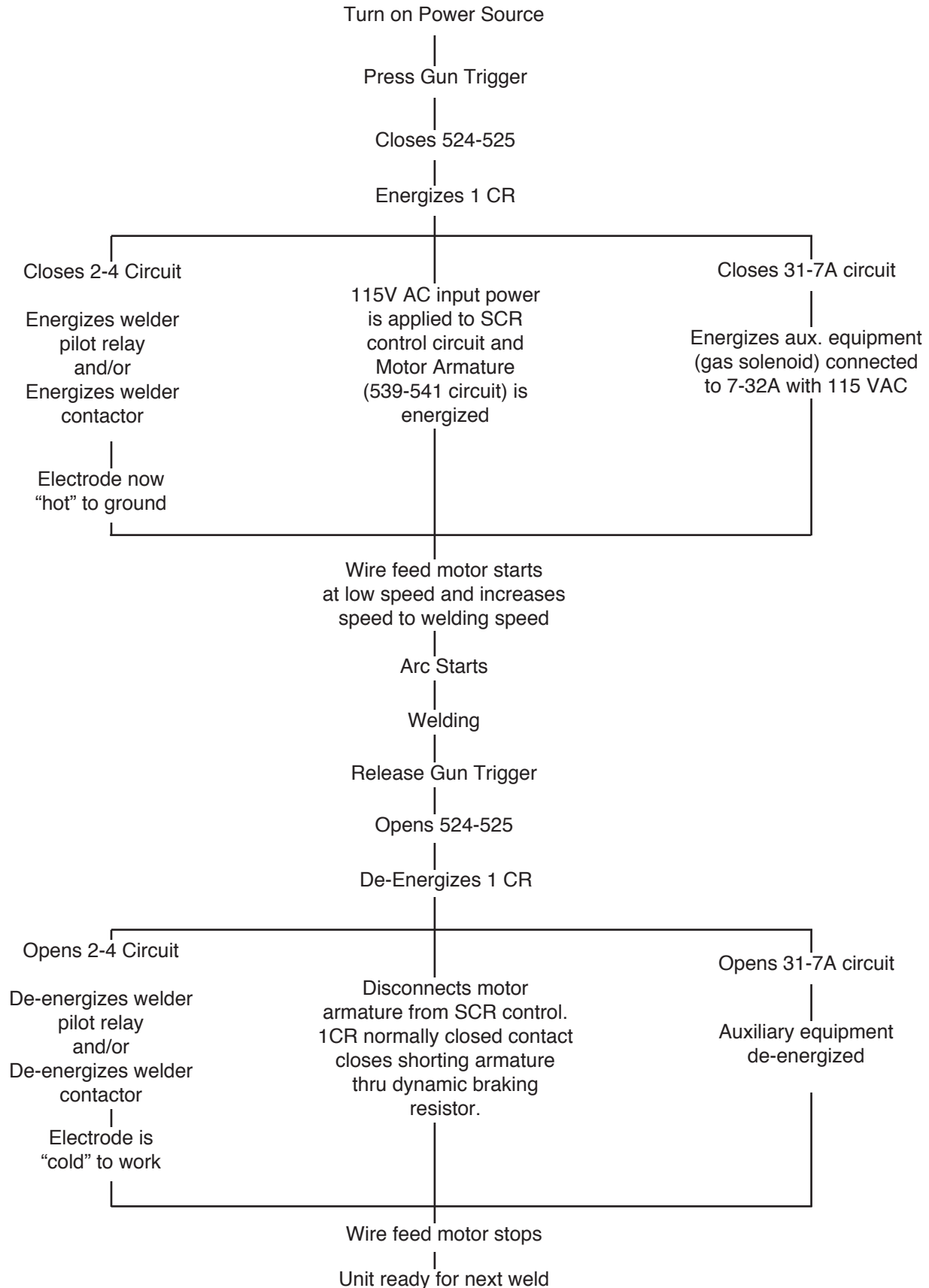
All dimensions in inches and (millimeters).

FIGURE D.2 – SWITCH REQUIREMENTS

1/2 Amp AC 24 Volts — Inductive
1/2 Amp DC 24 Volts — Inductive



LN-7 SEQUENCE OF OPERATION (Optional Timer Kit not Installed)



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 CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Rough wire feeding or wire not feeding but drive rolls are turning.	<ol style="list-style-type: none"> 1. Gun cable kinked and/or twisted. 2. Wire jammed in gun and cable. 3. Incorrect size or installation of drive rolls and guide tubes. 4. Drive roll loose. 5. Gun cable dirty. 6. Worn drive rolls. 7. Electrode rusty and/or dirty. 8. Worn nozzle or cable liner. 9. Partially flashed or melted contact tip. 10. Incorrect idle roll pressure. 11. Wire reel brake tension set too high. 	<ol style="list-style-type: none"> 1. Inspect gun cable and replace if necessary. 2. Remove wire from gun and cable - feed in new wire. Note any obstructions in gun and cable. Replace gun and cable if necessary. 3. Refer to Operation Section for proper installation of drive rolls and guide tubes. 4. Remove, clean, install and tighten. 5. Clean cable or replace liner. 6. Replace. 7. Replace. 8. Replace. 9. Replace contact tip. 10. Set idle roll pressure see Operation Section of manual. 11. Tension should be just high enough to prevent overrun.
Variable or hunting arc.	<ol style="list-style-type: none"> 1. Worn and/or melted contact tip. 2. Worn work cable or poor work connection. 3. Loose electrode connections. 4. Wrong polarity. 	<ol style="list-style-type: none"> 1. Replace tip - remove any spatter on end of tip 2. Inspect - repair or replace as necessary. 3. Be sure electrode lead is tight, gun cable tight in wire feeder contact block, gun nozzle and gun tip tight. 4. Check connection at output studs for polarity required by welding process.

 **CAUTION**

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

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Weld porosity, narrow and ropey bead, or electrode stubbing into plate when welding.	<ol style="list-style-type: none"> 1. Contaminated weld joint or improper procedures. 2. Lack of shielding gas. 	<ol style="list-style-type: none"> 1. Clean welded joint. Check that controls are set correctly for procedure. 2. Obtain proper gas flow.
LN-7 circuit breaker trips while welding.	<ol style="list-style-type: none"> 1. See problem 1. 2. High ambient temperature (causing circuit breaker to trip). 3. Electrical problems in power source or LN-7 	<ol style="list-style-type: none"> 1. Correct problems. 2. Provide better ventilation for LN-7. Make sure ventilation louvers and clean and un-obstructed. 3. See problem 5.
<p>LN-7 or power source electrical problems such as:</p> <ul style="list-style-type: none"> • Power source fuse blowing. • LN-7 circuit breaker tripping. • No control of wire feed motor. • Wire feed motor not running. • Auxiliary equipment connected to 32A and 7 not working. • Power source contactor not working but LN-7 feeds wire. 	<ol style="list-style-type: none"> 1. Loose connections or broken lead. 2. Grounding lead protector tripped. 3. Electrical component has failed. 4. Contactor circuit fuse on motor control P.C. board blown. 	<ol style="list-style-type: none"> 1. Turn power source and LN-7 off and check leads and connections. 2. Push reset button. 3. Replace blown fuses or reset circuit breaker and try to weld. If trouble reoccurs, contact your local authorized field service shop. 4. Correct problem and replace fuse (2A-250V)

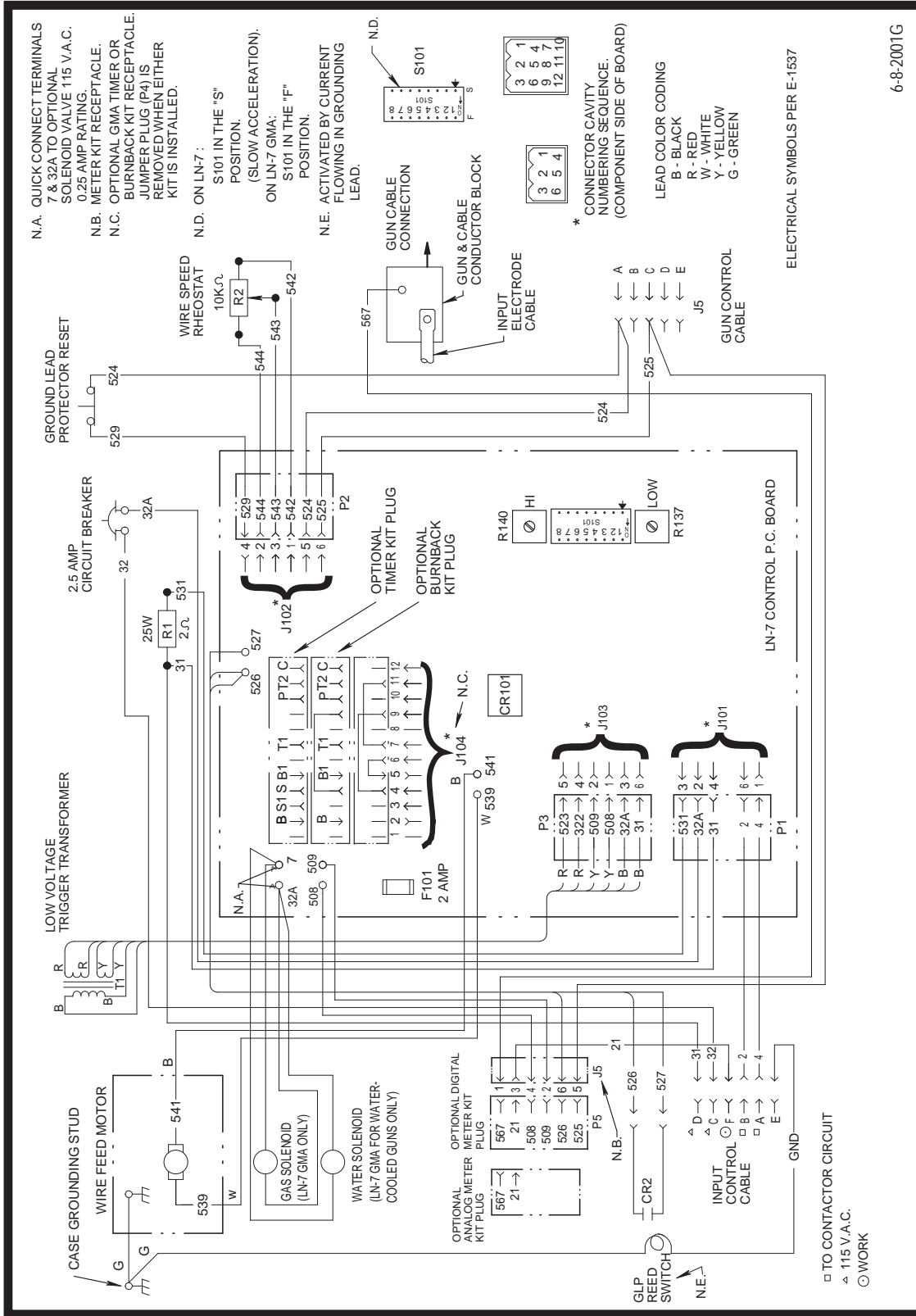
 **CAUTION**

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

LN-7 & LN-7 GMA



WIRING DIAGRAM



This wiring diagram is typical for this unit but is not exact for all codes. If an exact diagram is needed, specify the code number and contact the Lincoln Electric Service Department.

NOTES

LN-7 & LN-7 GMA



NOTES

LN-7 & LN-7 GMA



NOTES

LN-7 & LN-7 GMA



			
WARNING	<ul style="list-style-type: none"> Do not touch electrically live parts or electrode with skin or wet clothing. Insulate yourself from work and ground. 	<ul style="list-style-type: none"> Keep flammable materials away. 	<ul style="list-style-type: none"> Wear eye, ear and body protection.
Spanish AVISO DE PRECAUCION	<ul style="list-style-type: none"> No toque las partes o los electrodos bajo carga con la piel o ropa mojada. Aíslese del trabajo y de la tierra. 	<ul style="list-style-type: none"> Mantenga el material combustible fuera del área de trabajo. 	<ul style="list-style-type: none"> Protéjase los ojos, los oídos y el cuerpo.
French ATTENTION	<ul style="list-style-type: none"> Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. Isolez-vous du travail et de la terre. 	<ul style="list-style-type: none"> Gardez à l'écart de tout matériel inflammable. 	<ul style="list-style-type: none"> Protégez vos yeux, vos oreilles et votre corps.
German WARNUNG	<ul style="list-style-type: none"> Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! Isolieren Sie sich von den Elektroden und dem Erdboden! 	<ul style="list-style-type: none"> Entfernen Sie brennbares Material! 	<ul style="list-style-type: none"> Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese ATENÇÃO	<ul style="list-style-type: none"> Não toque partes elétricas e electrodos com a pele ou roupa molhada. Isole-se da peça e terra. 	<ul style="list-style-type: none"> Mantenha inflamáveis bem guardados. 	<ul style="list-style-type: none"> 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、又は溶材にヒブ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"> 取扱或湿衣物切勿接觸帶電部件及鉗條。 使你自已與地面和工作件絕緣。 	<ul style="list-style-type: none"> 把一切易燃物品移離工作場所。 	<ul style="list-style-type: none"> 須戴眼、耳及身體勞動保護用具。
Korean 위험	<ul style="list-style-type: none"> 전도체나 물질복을 갖춘 형질 또는 피부로 절대 접촉치 마십시오. 모재와 접지를 정확히 마십시오. 	<ul style="list-style-type: none"> 인화성 물질을 접근시키지 마십시오. 	<ul style="list-style-type: none"> 눈, 귀의 일에 보호장구를 착용하십시오.
Arabic تحذير	<ul style="list-style-type: none"> لا تلمس الاجزاء التي يمرى فيها التيار الكهربي أو الأقطاب بجلك الجسم أو بالملابس الرطبة بالماء. ضع عازل 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"> ● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone. 	<ul style="list-style-type: none"> ● Turn power off before servicing. 	<ul style="list-style-type: none"> ● Do not operate with panel open or guards off. 	WARNING
<ul style="list-style-type: none"> ● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases. 	<ul style="list-style-type: none"> ● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio. 	<ul style="list-style-type: none"> ● No operar con panel abierto o guardas quitadas. 	Spanish AVISO DE PRECAUCION
<ul style="list-style-type: none"> ● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail. 	<ul style="list-style-type: none"> ● Débranchez le courant avant l'entretien. 	<ul style="list-style-type: none"> ● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés. 	French ATTENTION
<ul style="list-style-type: none"> ● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes! 	<ul style="list-style-type: none"> ● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!) 	<ul style="list-style-type: none"> ● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen! 	German WARNUNG
<ul style="list-style-type: none"> ● Mantenha seu rosto da fumaça. ● Use ventilação e exaustão para remover fumo da zona respiratória. 	<ul style="list-style-type: none"> ● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas. 	<ul style="list-style-type: none"> ● Mantenha-se afastado das partes moventes. ● Não opere com os painéis abertos ou guardas removidas. 	Portuguese ATENÇÃO
<ul style="list-style-type: none"> ● ヒュームから顔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って下さい。 	<ul style="list-style-type: none"> ● パネルやカバーを取り外したままで機械操作をしないで下さい。 	Japanese 注意事項
<ul style="list-style-type: none"> ● 头部遠離煙霧。 ● 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"> ● 儀表面板打開或沒有安全罩時不準作業。 	Chinese 警告
<ul style="list-style-type: none"> ● 얼굴로부터 불꽃가스를 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 분풍기를 사용하십시오. 	<ul style="list-style-type: none"> ● 보수전에 전원을 차단하십시오. 	<ul style="list-style-type: none"> ● 관념이 밀린 상태로 작업치 마십시오. 	Korean 위험
<ul style="list-style-type: none"> ● بعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للمطبخ لكي تبعد الدخان عن المنطقة التي تتنفس فيها. 	<ul style="list-style-type: none"> ● قطع التيار الكهربائي قبل القيام بأية صيانة. 	<ul style="list-style-type: none"> ● لا تظن هذا الجهاز إذا كانت الاغطية العادية الوافية 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鍍焊材料，並請遵守貴方的有關勞動保護規定。

이 제품에 동반된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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



• World's Leader in Welding and Cutting Products •

• Sales and Service through Subsidiaries and Distributors Worldwide •

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