

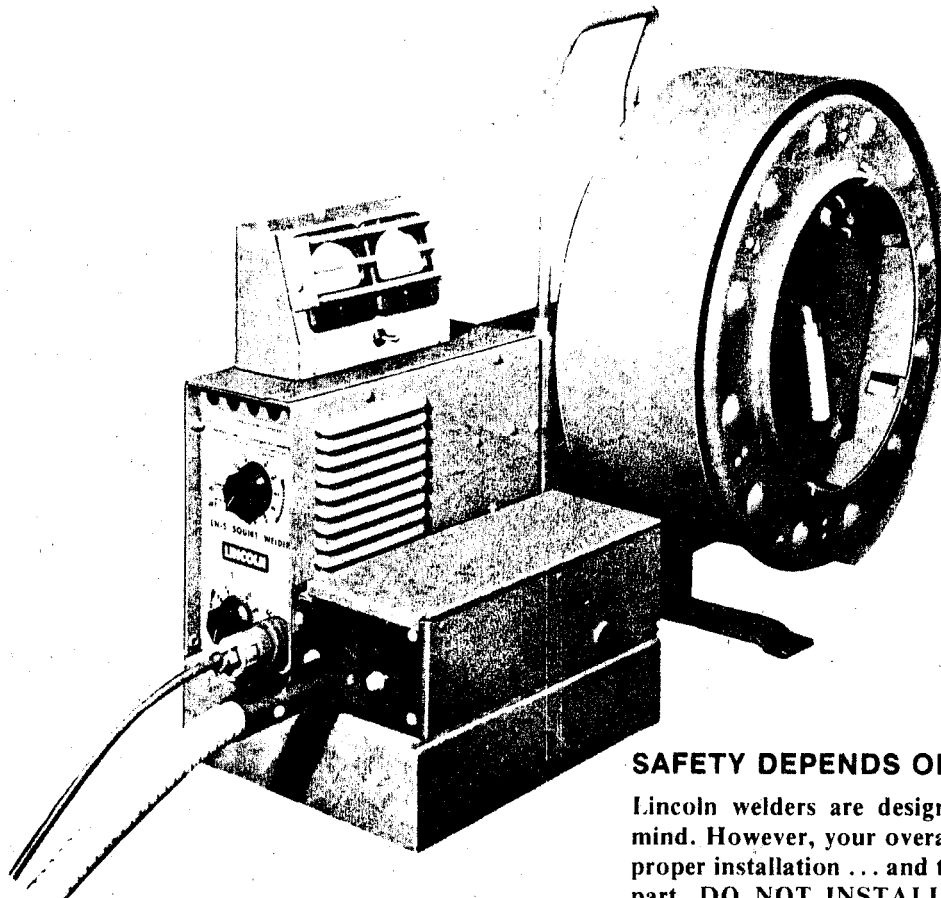
# OPERATING MANUAL

## LN-5 SQUIRT® WELDER

For Submerged Arc, Innershield® and other  
Open Arc Semiautomatic Arc Welding Processes.

Operates with either Constant Voltage or  
Variable Voltage Power Sources

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equipment which is  
obsolete and no longer  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



IM249  
LN-5 SQUIRT Welder  
November, 1982  
5430; 5474; 5490; 5550; 5551; 5552;  
5845; 5922; 5923; 5931; 6145; 6146;  
6188; 6247; 6388; 6389; 6390

### SAFETY DEPENDS ON YOU

Lincoln welders are designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON THE INSIDE FRONT COVER.** And, most importantly, think before your act and be careful.

# ARC WELDING SAFETY PRECAUTIONS

**PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. READ AND UNDERSTAND BOTH THE SPECIFIC INFORMATION GIVEN IN THE OPERATING MANUAL FOR THE WELDER AND/OR OTHER EQUIPMENT TO BE USED AS WELL AS THE FOLLOWING GENERAL INFORMATION.**

## 1. HAVE ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR WORK performed only by qualified people

## 2. ELECTRIC SHOCK can kill.

Protect yourself from possible dangerous electrical shock:

- The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Never permit contact between "hot" parts of the circuits and bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- Always insulate yourself from the work and ground by using dry insulation. When welding in damp locations, on metal floors, gratings or scaffolds, and when in positions (such as sitting or lying), make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition.
- Never dip the electrode holder in water for cooling.
- 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.
- If using the welder as a power source for mechanized welding, the above precautions also apply for the automatic electrode, electrode reel, welding head, nozzle or semiautomatic welding gun.
- When working above floor level, protect yourself from a fall should you get a shock.
- Ground the work or metal to be welded to a good electrical ground.
- Also see Item 7.

## 3. FUMES AND GASES can be dangerous to your health.

- Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.
- 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.
- Also see Item 8b.

## 4. ARC RAYS can injure eyes and burn skin.

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

## 5. FIRE OR EXPLOSION can cause death or property damage.

- Remove fire hazards well away from the area. If this is not possible cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Have fire extinguisher readily available.
- 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.

- 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.
- Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1-80 from the American Welding Society (see address below).
- Vent hollow castings or containers before heating, cutting or welding. They may explode.
- Also see Items 6c and 8c.

## Additional Safety Precautions

### 6. For Welding in General.

- Droplets of molten slag and metal are thrown or fall from the welding arc. Protect yourself with 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 when in a welding area. Use glasses with side shields when near slag chipping operations.
- 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.
- Be sure the work cable is connected to the work as close to the welding area as practical. Work cables connected to the building framework or other locations some distance 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.

### 7. For Electrically Powered Equipment.

- Turn off the input power using the disconnect switch at the fuse box before working on the equipment.
- Make the electrical installation in accordance with the National Electrical Code, all local codes and the manufacturer's recommendations.
- Properly ground the equipment in accordance with the National Electrical Code and the manufacturer's recommendations.

### 8. For Engine Powered Equipment.

- Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.
- Operate internal combustion engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.
- Do not add the fuel near an open flame, welding arc or when the engine is running. Stop the engine and, if possible, allow it to cool to prevent spilled fuel from igniting on contact with hot engine parts or electrical sparks. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.
- 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.
- To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

**For more detailed information it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting" — ANSI Standard Z49.1 from the American Welding Society, P.O. Box 351040 Miami, Florida 33135.**

**SEC.G1 — INDEX**

Assembly and Installation .....	Sec. G2
Standard Equipment .....	Sec. G2.2
Damage Claims .....	Sec. G2.2.1
Sequence of Installation .....	Sec. G2.2.2
Connection of LN-5 to Various Power Sources .....	Sec. G2.2.3
Remote Control Box Mounting .....	Sec. G2.2.4
Wire Reel Mounting and Input Cable Installation .....	Sec. G2.2.5
LN-5E Wire Reel Housing and Input Cable Installation .....	Sec. G2.2.6
Optional Features .....	Sec. G2.3
Continuous Flux Feed .....	Sec. G2.3.1
Meter Kit .....	Sec. G2.3.3
10 and 25 Pound Wire Reel .....	Sec. G2.3.4
Mechanized Travel Equipment .....	Sec. G2.3.7
Converting the LN-5 .....	Sec. G2.4
Changing Wire Sizes .....	Sec. G2.4.1
Operating Instructions .....	Sec. G3
Control Adjustments and Loading the Machine .....	Sec. G3.1
Introduction .....	Sec. G3.1.1
Adjusting Current and Voltage .....	Sec. G3.1.2
Circuit Protection .....	Sec. G3.1.3
Making Test Welds .....	Sec. G3.1.6
Wire Reel Loading — 60 and 50 Pound Reels .....	Sec. G3.1.7
Wire Reel Loading — 25 and 10 Pound Spools .....	Sec. G3.1.8
Wire Reel Changing .....	Sec. G3.1.9
Flux Tank Loading — Magnetic Separator .....	Sec. K3.1.10
Maintenance .....	Sec. G6
Wire Drive and Controls .....	Sec. G6.1
Wire Drive Motor and Gear Box .....	Sec. G6.1.1
Drive Rolls and Guide Tubes .....	Sec. G6.1.2
Wire Reel Assembly .....	Sec. G6.1.3
Control Box and Remote Control Box .....	Sec. G6.1.4
Gun Cable and Gun .....	Sec. G6.2
Gun Cable .....	Sec. G6.2.1
Gun Disassembly .....	Sec. G6.2.2
Flux System .....	Sec. K6.3
Flux Feeding System .....	Sec. K6.3.1
Electrical Sequence of Operation .....	Sec. G6.7.1
Parts List .....	Sec. G7
Wiring Diagrams .....	See back of this manual.

## SEC. G2 ASSEMBLY AND INSTALLATION

### SEC. G2.2 STANDARD EQUIPMENT

#### Sec. G2.2.1

##### Damage Claims

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

October 1964

#### Sec. G2.2.2

##### Sequence of Installation

###### a. 60 or 50 Cycle Input

When shipped the LN-5 is wired for 60 cycle operation. For 50 cycle input connect the red leads from the wire feed mag-amp coil per the wiring diagram for the machine. Tape the lugs on the unused leads.

###### b. Power Source Connection

Connection of the LN-5 to the power source varies depending upon the type power source. See the appropriate page in Sec. G2.2.3 for instructions covering the specific power source to be used.

For connecting to power sources not covered in Sec. G2.2.3, write to the factory. Give the code number for the equipment to be used.

The LN-5 control circuit requires the following power to operate:

1. An isolated source of 115 volt AC, 350V.A. capacity.
2. An isolated supply of 115 volt DC, 1 amp capacity.

This power is supplied by most current Lincoln power sources. But, as indicated in Sec. G2.2.3, some power sources require installation of a separate Power/Contactor Kit (K-124 or K-130).

Do not connect more than one LN-5 or any leads other than those shown on the connection diagrams in Sec. G2.2.3 to the terminal strip on the power source or the Power Pack/Contactor Kit. If other equipment must be connected to this terminal strip, consult the factory giving full information.

###### c. Constant and Variable Voltage Settings

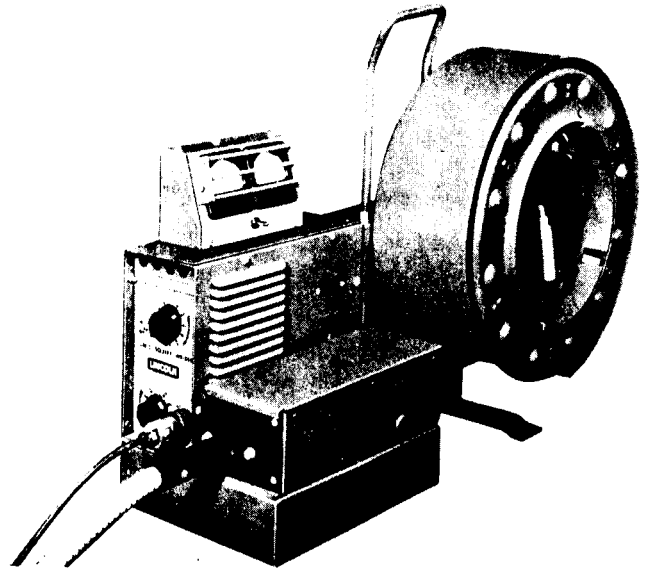
There are two nameplates on the front of the wire feeder unit, one mounted on top of the other. When using a variable voltage (constant current) power source as is usually used with the submerged arc welding, be sure the 'Variable Voltage Power Source' nameplate is on top. When connected to a constant voltage (constant potential) power source as is usually used with 'Innershield' and other open arc processes, be sure the 'Con-

stant Voltage Power Source' nameplate is on top.

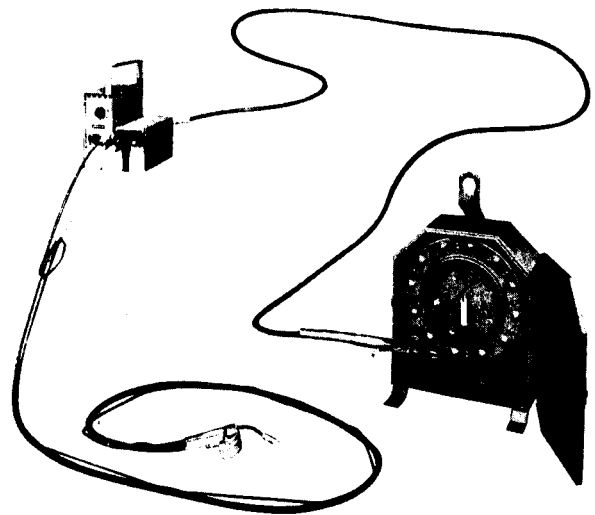
Be sure the toggle switch inside the remote control box is set for variable or constant voltage power source as appropriate.

###### d. Wire Reel and Input Cable Installation

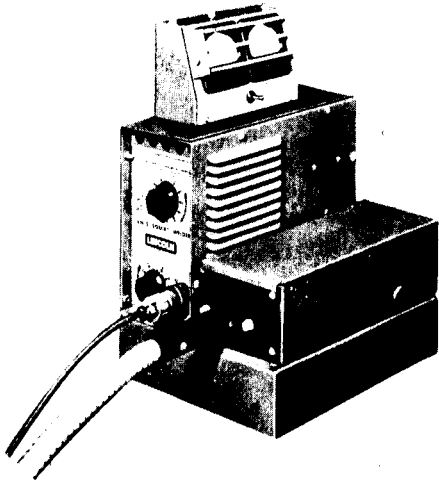
Machines above code 6000 are shipped with different wire reel mountings as shown in the photographs. Install each as follows:



1. LN-5 (Standard 50-60 pound reels or optional 10-25 pound spools) - Install per Sec. G2.2.5.



2. LN-5E (25' or 45' extension unit) - Install per Sec. G2.2.6



3. LN-5F (No wire reel Mounting) - Customer to design wire reel or Speed Feed Drum mountings for his specific needs.

e. Gun and Gun Cable

**GENERAL**

The LN-5 is used with various guns. In all cases the gun is shipped connected to the cable ready-to-weld. Use the gun recommended for the wire type (solid or 'Innershield') and size to be used.

NOTE: The guns described below were available at the time this sheet was printed. They may not be today. See Lincoln Specification literature for up-to-date information.

**SUBMERGED ARC GUNS**

For 5/64" wire, use Squirtgun K-113.  
For 1/16" wire, use Squirtgun K-112.

Squirtgun K-114 can be used for 5/64 or 3/32" wire. However, it is not generally used with the LN-5 because it is designed for use with the mechanized travel unit. The LN-5 cannot operate the mechanized travel unit.

Both Squirtguns can be used with the continuous flux feed system. If the flux tank is not used, attach the optional gravity feed flux cone (K-119) to either gun with the screws provided. The cone also includes a new clamp to be used to hold the trigger pod to the gun. Use it in place of the clamp shipped with the gun.

**INNERSHIELD GUNS**

Squirtgun K-126 is recommended for most welding with 3/32 and 5/64" wire. Install the nozzle contact tip for the wire size being used.

For heavy duty welding with 3/32" wire use either Squirtgun K-115-3/32 or K-116-3/32. K-116 has an adjustable handle for greatest versatility. K-115 is lighter.

For welding with .120" wire, use either K-115-120 or K-116-120.

**GUN CABLE: LN-5 TO GUN**

(Submerged Arc and 'Innershield')

Lay the cable out straight. Insert the male end of the welding conductor cable into the coupling on the front of the LN-5. Make sure it is in all the way and tighten the locking screw with a 3/16" allen wrench. Keep this connection clean and bright. Insert the control cable polarized plug into the receptacle next to the coupling.

f. Wire Feed Rolls

Each LN-5 is shipped ready to feed a specific wire size. The drive rolls are stamped with the wire size. NOTE: Drive rolls stamped 3/32" will feed either 3/32 or 5/64" wire.

If a wire size other than that stamped on the drive roll is to be used, the drive rolls and guide tubes may have to be changed. See Parts List P-105-E for the necessary parts. See Sec. G2.4.1 for installation instructions.

Be sure the drive roll spring pressure is properly set for the wire type (solid or cored) and size to be used. A graduated nameplate is located next to the spring adjustment. With the appropriate size wire between the rolls, adjust the pressure spring screw until the spring side of the nut lines up with the wire type and size on the nameplate.

g. Optional Features

For installation instructions for the various optional features, see Sec. G2.3.

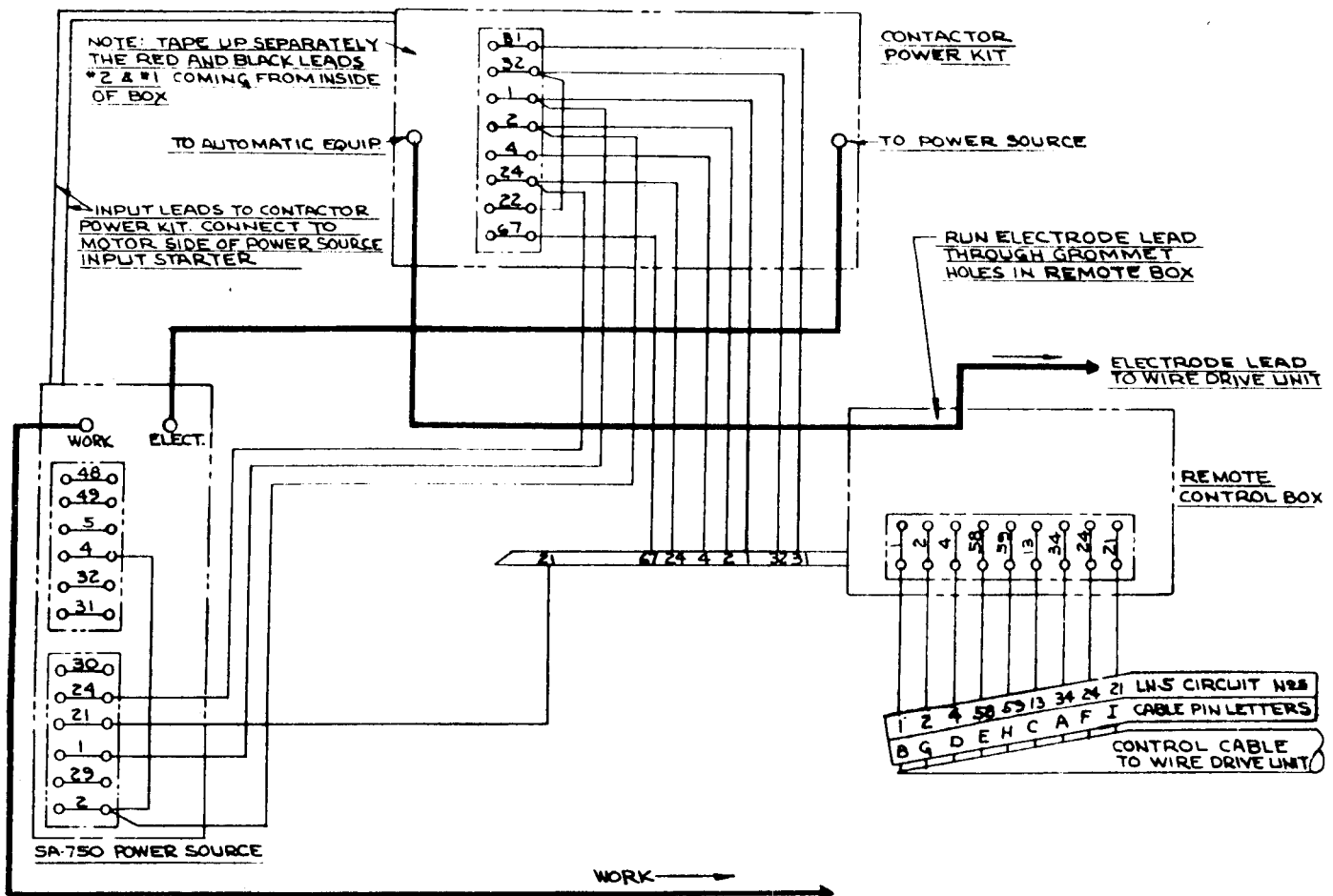
**Sec. G2.2.3-c**

**Connection of LN-5 to SA-750 (all codes) and Power Pack/Contactor Kit**

1. Turn off input power to power source at the disconnect switch. Place the Power Pack/Contactor Kit in its permanent location near the power source.
2. Remove the cover of the contactor box. Connect two #14 input voltage wires from the motor side of the power source input starter to the contactor box. Route these leads through the box connector provided. Make the proper connections in the contactor box to the transformer, pilot relay and contactor coil according to the power source input voltage and the connection table on the wiring diagram pasted inside the contactor box cover. These are high voltage leads and should be installed in a manner consistent with good electrical practice. Replace the cover on the contactor box leaving out top screws until step #3.
3. Mount the LN-5 remote control box on top of the contactor box per Sec. G2.2.4.
4. Remove jumper between #2 and 24 on power source terminal strip, if there is a jumper.
5. Make connections as specified on wiring diagram below. Use 3/0 cable for leads shown as heavy lines on the diagram. The cable to the 'To Automatic Equip.' stud is part of the standard LN-5 input cable. See Sec. G2.2.5 for connecting the input cable to the LN-5.
6. When used for submerged arc (variable voltage), open the remote control box. Place the switch in the position for variable voltage power sources. Be sure the 'Variable Voltage Power Source' nameplate is on top (see Sec. G2.2.2).
7. When used for Innershield (constant voltage) (SA-750 codes 5555 and above 5580 only) open the remote control box. Place the switch in the position for constant voltage power sources. Be sure the 'Constant Voltage Power Source' nameplate is on top (see Sec. G2.2.2).

October 1965

#9-81-71  
54201-W



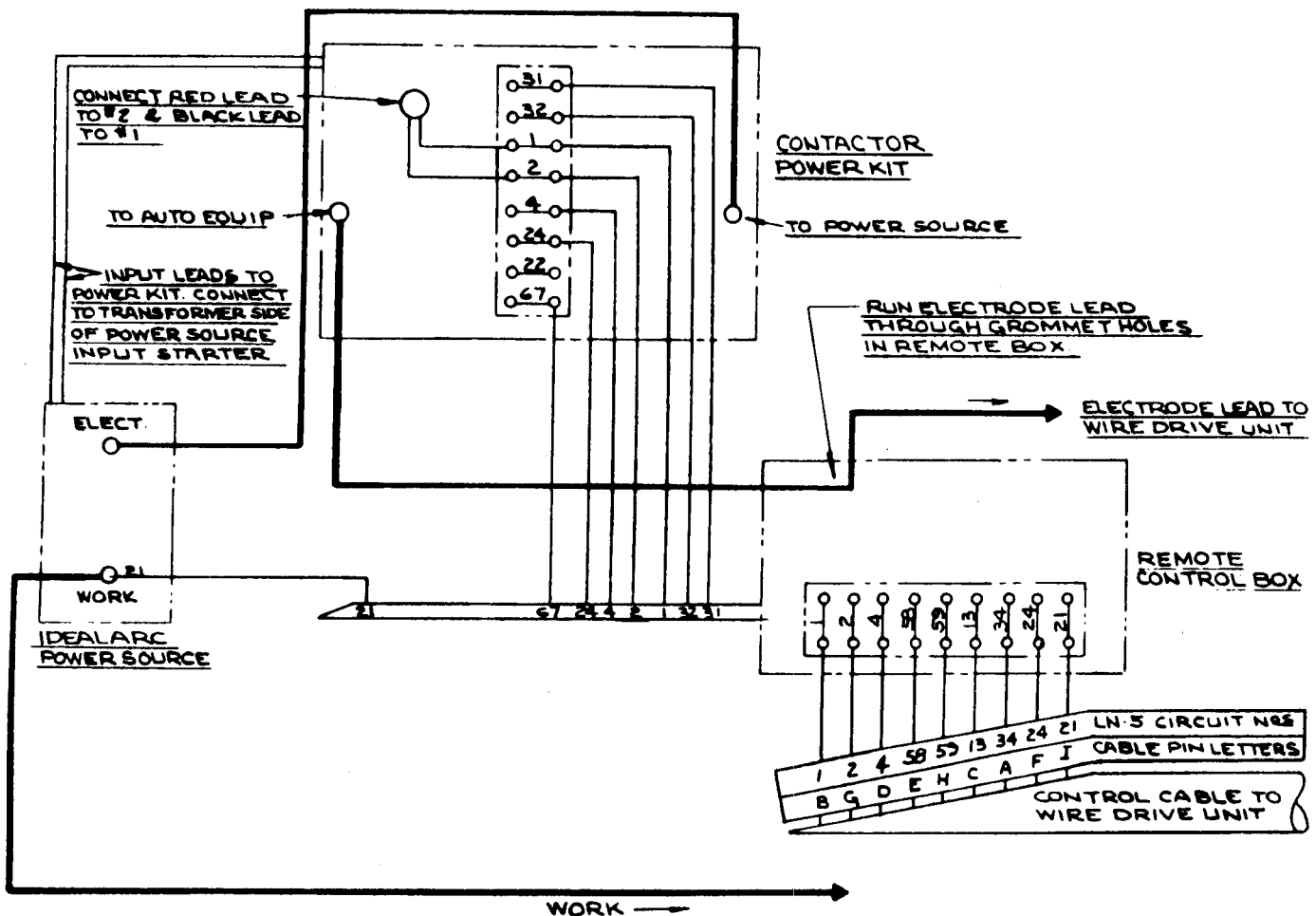
**Sec. G2.2.3-d**

**Connection of LN-5 to Idealarc TM or R3M and Power Pack/Contactor Kit**

1. Turn off input power to power source at the disconnect switch. Place the Power Pack/Contactor Kit in its permanent location near the welder.
2. Remove the cover of the contactor box. Connect two #14 input voltage wires from the transformer side of the power source input starter to the contactor box. Route these leads through the box connector provided. Make the proper connections in the contactor box to the transformer, pilot relay and contactor coil according to the welder input voltage and the connection table on the wiring diagram pasted inside the contactor box cover. These are high voltage leads and should be installed in a manner consistent with good electrical practice. Replace the cover on the contactor box leaving out top two screws until step #3.
3. Mount the LN-5 remote control box on top the contactor box per Sec. G2.2.4.
4. Make connections as specified on wiring diagram below. Use 3/0 cable for leads shown as heavy lines on the diagram. The cable to the 'To Automatic Equip.' stud is part of the standard LN-5 input cable. See Sec. G2.2.5 for connecting the input cable to the LN-5.
5. On the inside of the remote control box, place the switch in the position for variable voltage power sources. Be sure the 'Variable Voltage Power Source' nameplate is on top.
6. With this connection the 'Amps' control on the LN-5 is not in the circuit and has no function. Use the LN-5 'Volts' control and the power source current control to set procedures.

October 1965

F9-R1-21  
2F201-W

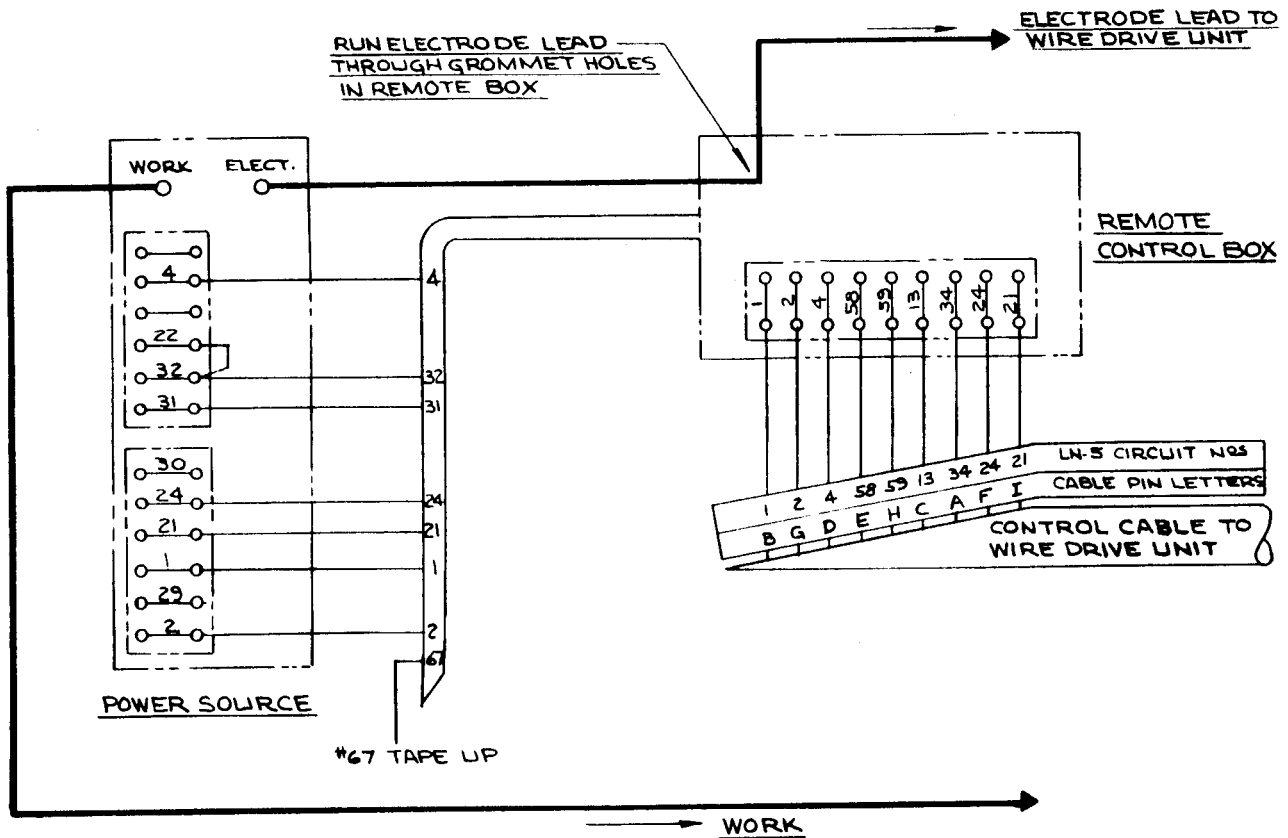


### Sec. G2.2.3-e Connection of LN-5 to SAN-600 or SAN-1000

1. Mount the LN-5 remote control box on top of the welder control box at the starter end per Sec. G2.2.4.
2. Make connections exactly as specified on wiring diagram below. Use the proper size welding cable for leads shown as heavy lines. The electrode lead is part of the standard LN-5 input cable. See Sec. G2.2.5 for connecting the input cable to the LN-5.
3. On the inside of the remote control box place the switch in the position for constant voltage power sources. Be sure the 'Constant Voltage Power Source' nameplate is on top (see Sec. G2.2.2).

December 1967

059-5-3  
 62029-M





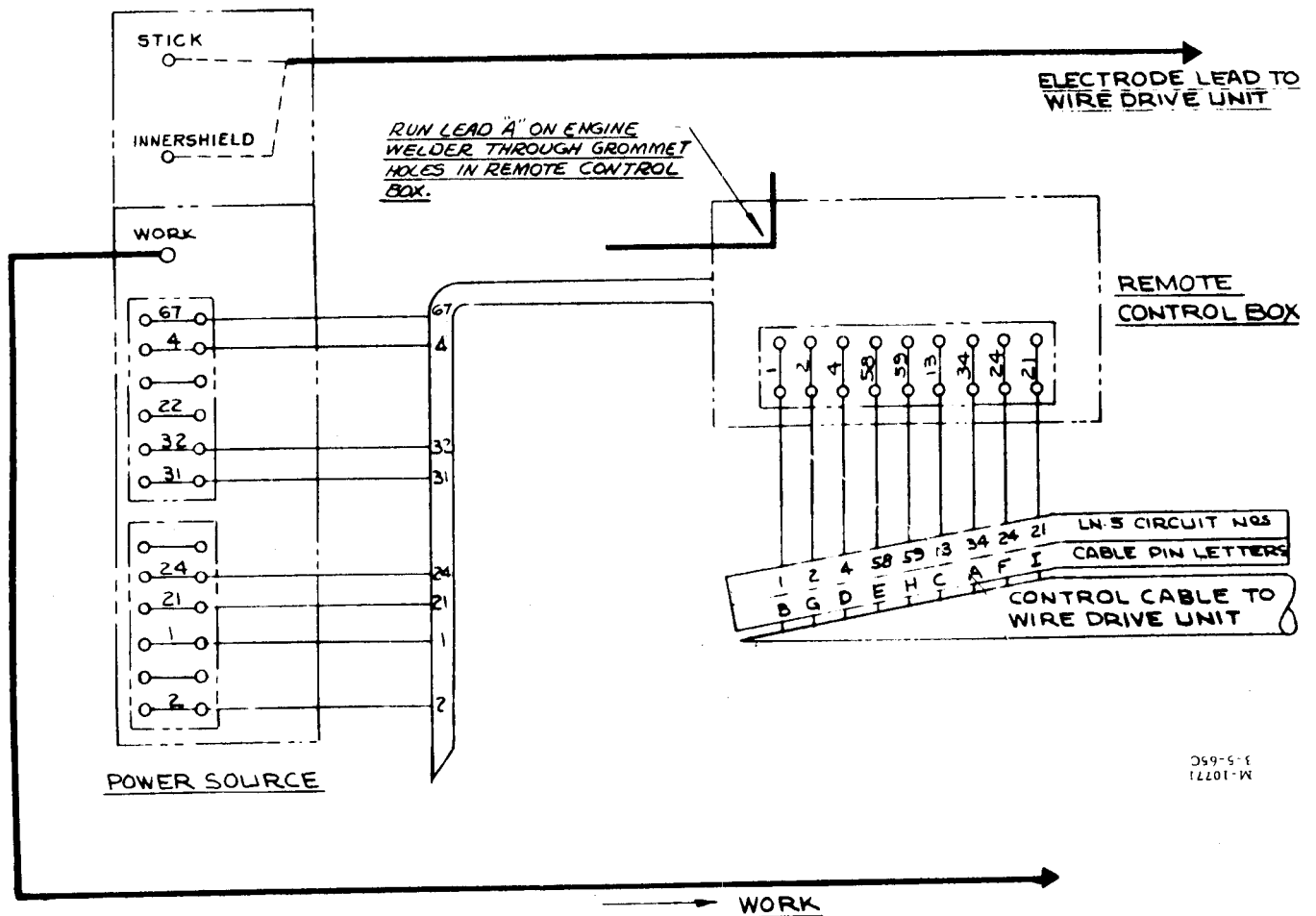
### Sec. G2.2.3-g

#### Connection of LN-5 to SAF-300-F162 and -F163

This welder is especially suited as a power source for the LN-5 squirt welder. Connection instructions are as follows:

1. A mounting panel for the LN-5 remote control box is located inside this power source. For access to this panel, open the door on the side where the oil fill pipe is located.
2. Locate the 1/0 lead "A" that passes through a clamp on the remote control box mounting panel.
3. Disconnect this lead at the 'Slope Selector' switch.
4. Mount the LN-5 remote control box to the panel using the two mounting holes provided in the panel.
5. Route lead "A" through the grommet in the corner of the LN-5 remote control box as shown in the sketch in Sec. G2.2.5. Reconnect the lead to the 'Slope Selector' switch. Make sure the connection is tight.
6. Make the connections exactly as specified on wiring diagram below. Use the proper size cables for the leads shown as heavy lines. The electrode lead is part of the LN-5 standard input cable. See Sec. G2.2.5 for connecting the input cable to the LN-5.
7. Route the input cable assembly under the doors of the SAF-300 power source and connect it to the LN-5 per Sec. G2.2.5.
8. The AC output of the SAF-300 is 50 cycle. Therefore, when using this power source, reconnect the LN-5 for 50 cycle operation per the LN-5 wiring diagram or the tag on the mag-amp box. Tape the unused leads.
9. On the inside of the remote control box place the toggle switch in the proper position (constant voltage or variable voltage) for the output stud to be used. Be sure the appropriate LN-5 nameplate is on top (see Sec. G2.2.2).

December 1967



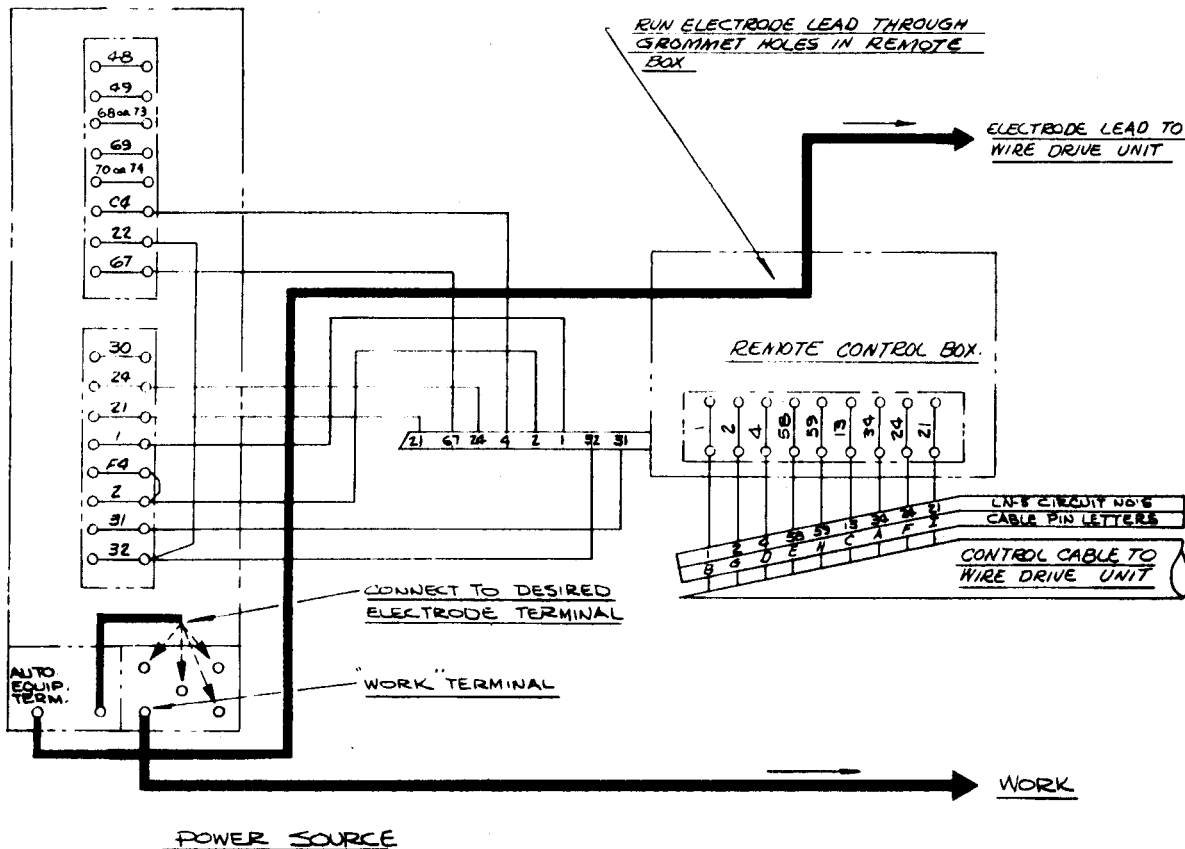
### Sec. G2.2.3-h

## Connection of LN-5 to SAF-600, SA-800 (Types "-0" or "-OF") or SAF-600-B (Belted Type "-AO") Equipped With Contactor

1. Mount the LN-5 remote control box on top of the power source control box at the starter end per Sec. G2.2.4.
2. Make connections exactly as specified on wiring diagram below. Use the proper size welding cable for leads shown as heavy lines. The electrode lead is part of the standard LN-5 input cable. Connect this lead to the contactor box stud as specified in the diagram. See Sec. G2.2.5 for connecting the input cable to the LN-5.
3. On the inside of the remote control box, place the switch in the proper position - constant voltage or variable voltage - for the power source stud to be used. Be sure the appropriate nameplate is on top (See Sec. G2.2.2).

December 1967

V19-3-8  
M-10789



**Sec. G2.2.3-m**  
**Connection of LN-5 to SAM**

Motor Generator Machines

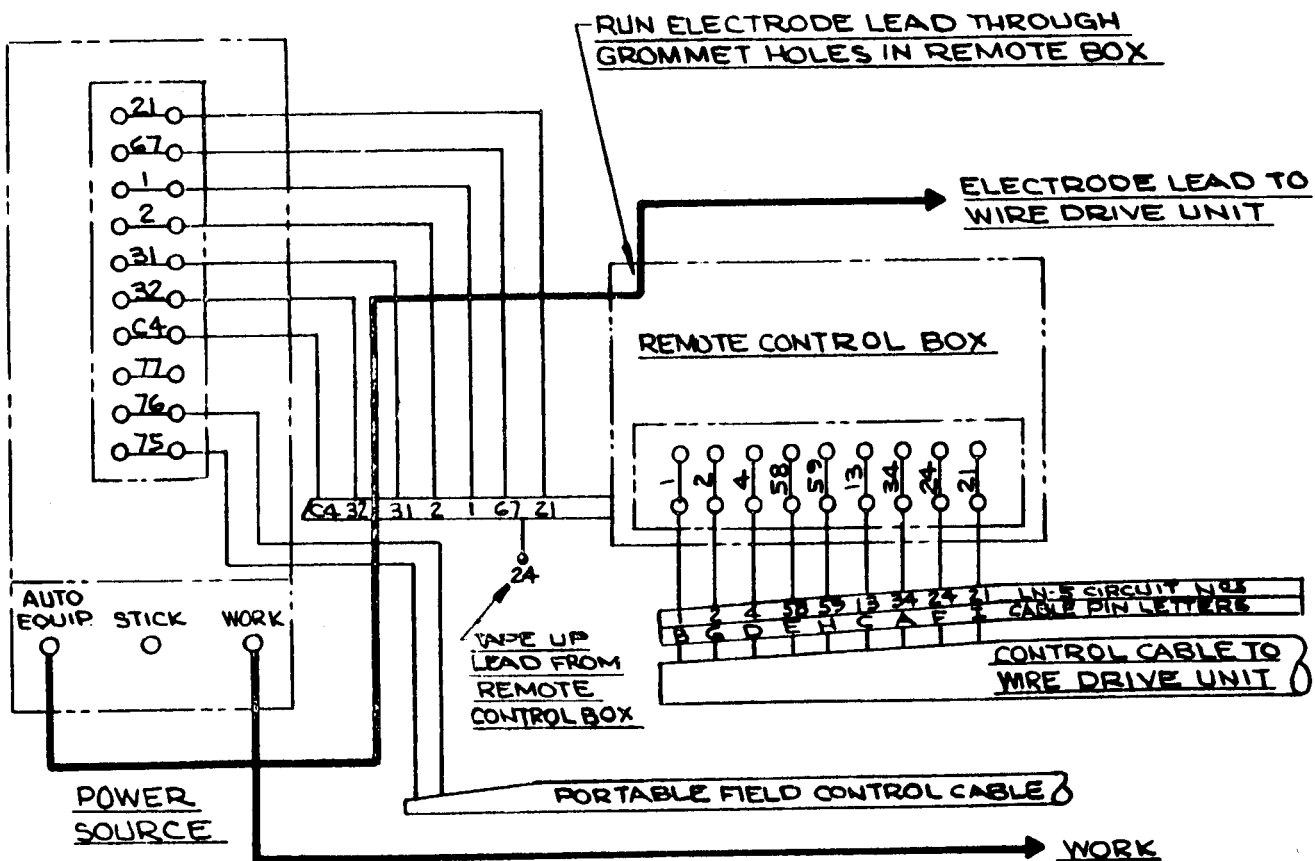
1. Mount the LN-5 remote control box on top of the power source control box per Sec. G2.2.4.
2. Make the connections exactly as specified on the connection wiring diagram below. Use the proper size welding cable for the leads shown as heavy lines on the diagram. See Sec. G2.2.5 or Sec. G2.2.6 for connecting the input cable to the LN-5.
3. Install the 'Portable Field Control' shipped with the SAM Power Source as specified in the instructions shipped with the control.
4. Set the toggle switch inside the remote control box for constant or variable voltage as appropriate. Be sure the LN-5 nameplate is set for constant or variable voltage as appropriate.

Engine Driven Machines Only

- a. A mounting panel for the LN-5 remote control box is located inside this power source. For access to this panel on SAM-300 and 400 machines, remove the 24" x 24" panel below the controls. On SAM-650 machines the mounting is by the idler on the gas tank mounting rail.
- b. Open the cover of the LN-5 remote control box. Mount the box to the two studs located on the mounting panel. The holes are already in the bottom of the box.
- c. Make the connections per steps 2 thru 4 above. Close the remote control box cover and replace the SAM-300 or 400 lower panel.

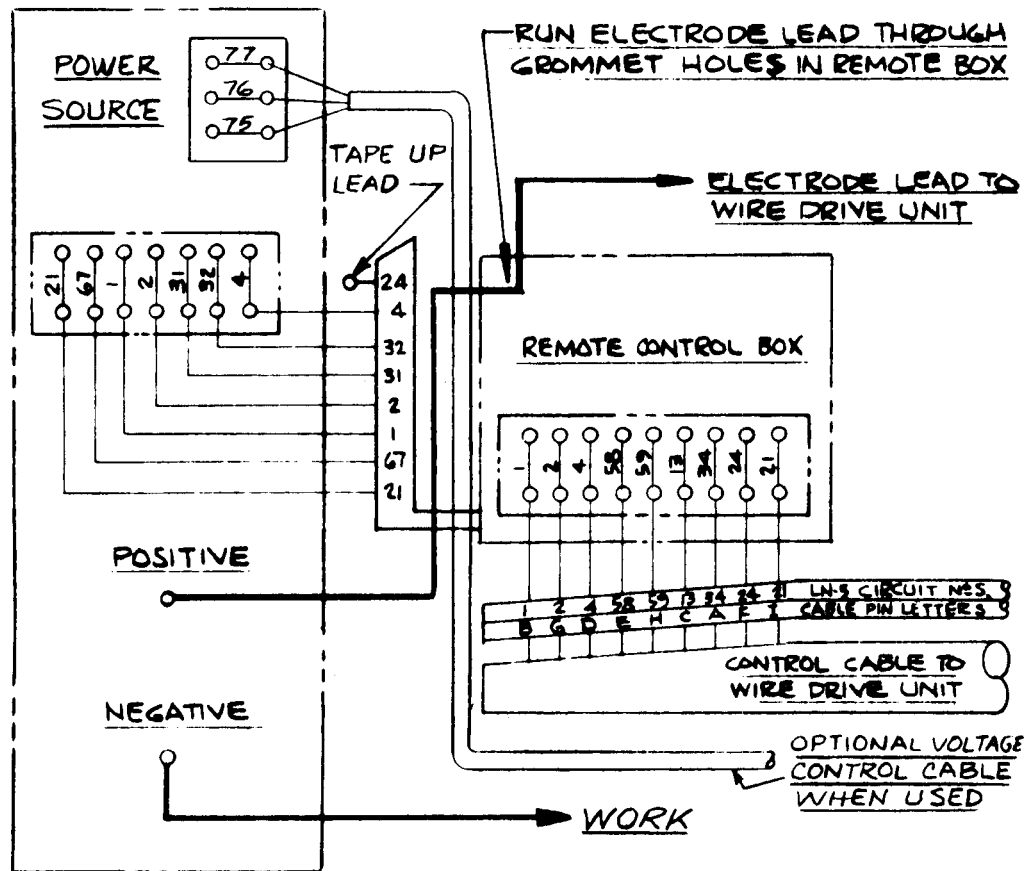
June 1968

V79-51-6  
 199E1-S



**Sec. G2.2.3-n**  
**Connection of LN-5 to Idealarc® R3S**

1. Mount the LN-5 remote control box to the R3S right side panel using the screws and threaded holes provided in the side panel.
2. Make connections exactly as specified on the wiring diagram below. Use the proper size welding cable for leads shown as heavy lines on the diagram. See Sec. G2.2.5 for connecting the input cable to the LN-5.
3. On the inside of the remote control box place the switch in the position for constant voltage power sources. Be sure the 'Constant Voltage Power Source' nameplate is on top (see Sec. G2.2.2).



002-13-11  
M-11344

Above diagrams show electrode connected positive.  
To change polarity, reverse the electrode and work leads at the power source and throw the toggle switch on the power source.

## STANDARD EQUIPMENT - CONT'D

### Sec. G2.2.4

#### Remote Control Box Mounting

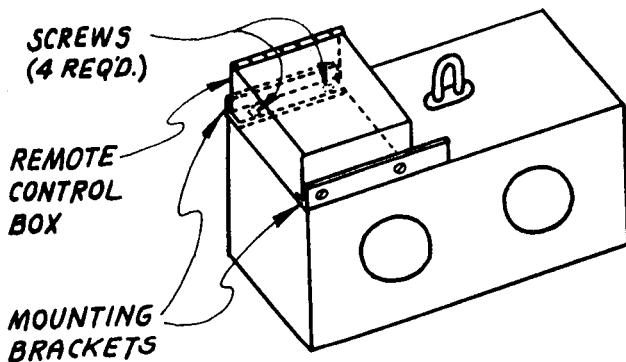
The mounting location of the remote control box varies depending upon the type of power source. Its usual locations are as follows:

1. On the control box of a motor-generator (see below)
2. Inside engine driven welders (see the appropriate page in Sec. G2.2.3).
3. On the Contactor/Power Pack Kit (see below)

Two holes are provided in the back of the case if it is to be mounted elsewhere.

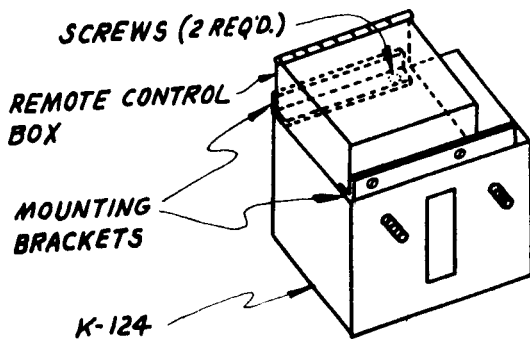
#### To mount on a motor generator control box:

1. Remove four of the screws holding top of control box per the sketch.
2. Put brackets supplied with the remote control box in place and replace screws.
3. Place remote box with the hinges toward the back of the power source control box. Mount it with screws provided.



#### To mount on the K-124:

1. Remove two screws holding top of contactor kit.
2. Put brackets supplied with the remote control box in place and replace screws.
3. Mount remote box with screws provided.



### Sec. G2.2.5

#### LN-5 Wire Reel Mounting and Input Cable Installation

(For installation of the wire reel and input cable of the LN-5E with the 25 and 45' extension unit, see Sec. G2.2.6).

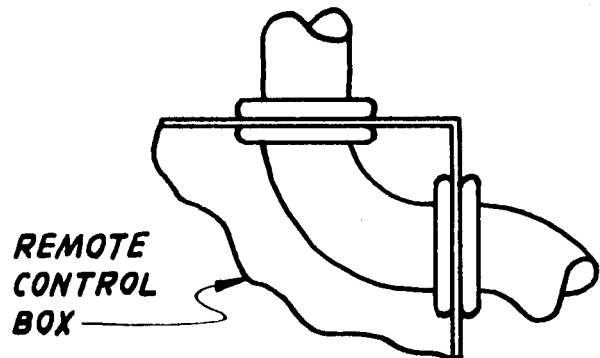
a. The wire reel mounting for machines above code 6000 is shipped separately. To install:

1. Remove the three 3/8" screws from the back of the wire drive unit.
2. Place the reel mounting bracket in position.
3. Replace and tighten the screws.

b. The input cable (all codes) consists of an electrode cable and a multiconductor control cable. The control cable has a polarized plug on the wire drive unit end and is lugged on the remote control box end.

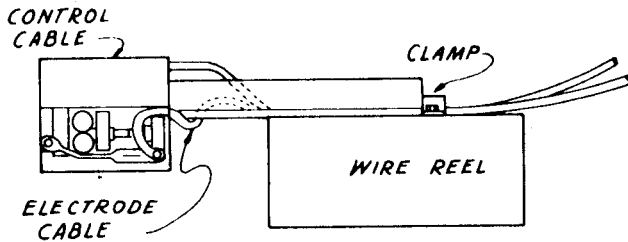
1. Run the control cable leads through the box connector into the remote control box. Connect the leads to their respective numbers on the terminal strip in the remote box. Tighten the connector clamp.

2. Run the electrode cable through the grommet holes in the remote control box. If the cable assembly has two or three electrode leads, only run one thru the grommets. Connect the lead to the electrode stud on the power source (or on the Power Pack/Contactor Kit if one is used).

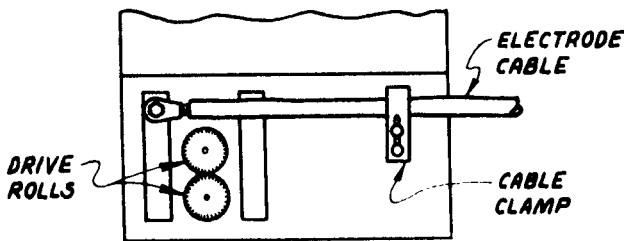


3. Connect the polarized plug on the control cable to the receptacle on the back of the LN-5.

4a. (Above Code 6000) loosen the clamp on the wire reel mounting and pass the electrode cable through the clamp. (On cables with more than one electrode lead, leave the junction between the two or more leads and the short 4/0 stub behind the clamp.) Then pass the single electrode cable through the oval slot in the drive roll cover and fasten it to the rear brass block (see sketch on next page).



4b. (Old Machines - Below Code 6000) connect the electrode cable to the brass gun connection block on the LN-5. Use the clamp provided to hold this cable close to the base. Position the cable so it does not touch the drive rolls.



September 1967

Sec. G2.2.6

**LN-5E Wire Reel Housing and Input Cable Installation (Above Code 6000)**

The LN-5E extension unit consists of a wire reel housing and either a 25 or 45' extension cable assembly. The extension electrode cable is rated at 450 amps, 50% duty cycle. For higher currents a parallel length of 1/0 cable is used. The 45' length is suitable for 3/32 and 5/64" tubular wire and 5/64" solid wire. The 25' length is suitable for 5/64 thru .120" tubular wire and 1/16 thru 3/32" solid wire.

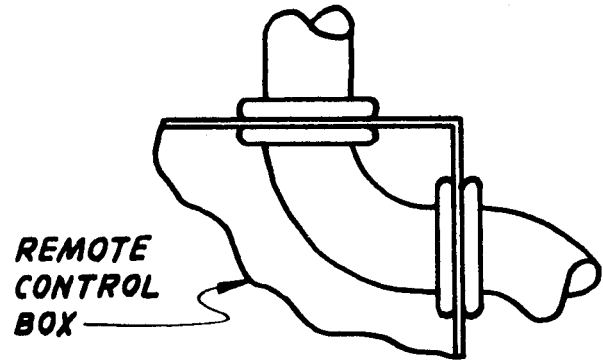
1. When shipped the hand crank in the wire reel housing is set to feed 3/32 - .120" wire. A roll for feeding 1/16 - 5/64" wire is shipped with the unit. The rolls are stenciled for identification. To change rolls remove the hand crank assembly from the housing and switch the rolls. Replace the assembly.

2. The multiconductor control cable of the input cable assembly has a polarized plug on one end and lugged leads on the other. Run the end with the lugged leads through the connector in the remote control box and connect the leads to their respective numbers on the terminal strip. Tighten the connector clamp.

3. Run the electrode cable of the input cable assembly through the grommets in the remote

control box. Connect it to the electrode stud on the power source (or to the Contactor/Power Pack if one is used).

If the cable assembly has two or three electrode leads, only run one thru the grommets.



4. Pass the other end of the input cable assembly through the hole in the back of the wire reel housing. (When using a cable with more than one electrode lead, leave the junction between the two or three cables and the short 4/0 stub outside the housing.)

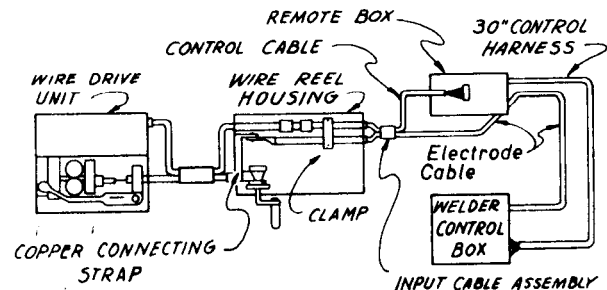
5. Connect the electrode cable to the copper connection strap inside the wire reel housing with the 1/2" screw and nut.

6. Position the 25' or 45' extension cable assembly so the polarized connector with the threads on its O.D. is at the wire reel housing.

7. Pass the polarized connector of the extension cable assembly through the hole in the front of the wire reel housing and connect it to the polarized connector of the input cable.

8. Place both the control and electrode cables of the input cable assembly under the clamp and fasten it to the bottom of the wire reel housing.

9. Insert the connector on the electrode cable of the extension assembly into the brass block of the hand crank assembly and tighten with a 3/16 hex allen wrench.



## STANDARD EQUIPMENT - CONT'D

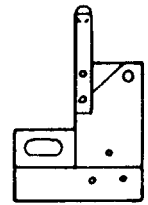
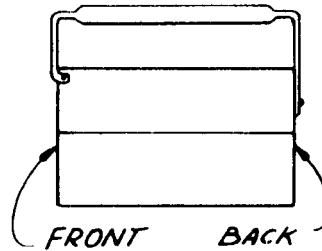
### Sec. G2.2.6 Continued

10. At the wire drive unit connect the polarized plug of the Extension's control cable to the receptacle on the back of the LN-5.

11. Remove the ingoing guide tube from the rear brass block and plug the connector of the conductor cable into the brass block. Tighten the locking screw with a 3/16 hex allen wrench. The guide tube removed is not used when the extension assembly is installed.

12. If using welding currents over 450 amperes, connect a length of 1/0 cable between the copper connecting strap in the wire reel housing and the rear brass block in the wire drive unit. Tape this cable to the extension assembly. Proper cable lengths are as follows:

- For 22-1/2 ft. extension use 23-1/2'
- For 45 ft. extension use 46'



13. To mount the handle provided with the Extension Unit, remove the 10-24 nut from the front top corner screw of the wire drive unit. Place the handle into the position shown. Put the 10-24 nut back onto the screw after the handle has been placed into position and re-tighten the screw. On the back of the wire drive unit insert the two 1/4-20 screws that came with the handle into the two tapped holes provided. Tighten the screws securely.

September 1967

NOTE 1: A 22-1/2' extension is available rather than the 25' extension. A 45' extension is also available for 120" tubular wire.

NOTE 2: LN-5E's with the enclosed wire reel housing assembled after May 1969 have a new wire reel housing. Rather than a basically rectangular housing incorporating the base, the new design consists of a round housing with a disc shaped door connected to the base by a stand. The instructions in Sec. G2.2.6 apply to the new design with the following differences:

1. The cable connections are made at the base below the housing rather than inside the housing.
2. The input electrode cable is connected to the end of the brass block in the hand crank assembly with the screw provided.

May 1969

## SEC. G2.3 OPTIONAL FEATURES

### Sec. G2.3.1

#### Continuous Flux Feed (Submerged Arc)

##### a. Flux Hose

Place the flux tank where convenient. Connect one end of the hose to the tube at the back end of the welding gun. If the hose is taped to the gun cable, be sure it is not collapsed or deformed because this could cause flux feeding problems. Slip the hose on to the tube extending out of the side of the pipe on the bottom of the flux tank. Tighten the hose clamps.

##### b. Input Air Connection

The air for the automatic flux feeding system is obtained from the regular plant compressed air system providing the plant system pressure is between 60 and 120 psi. The tank is equipped with a pressure regulator to reduce the input pressure to the 26 to 30 psi required for the flux feeding system. This pressure is set at the factory before the machine is shipped. Exact pressure is indicated on the pressure gage. Air consumption is normally less than 1.5 cubic feet per minute of welding.

Connect the input air hose to the street elbow located at the right side of the flux tank. A quick disconnect connector should be installed between the elbow and the input hose.

The tank air system is equipped with a water and dirt separator. Water separated from the input air feeds down through the long flux filled tube located at the input connection. It is exhausted from the system through the coiled copper tube below the flux tank. There is always a small amount of air and possibly water coming out of the end of this tube.

July 1964

### Sec. G2.3.3 Meter Kit

The meter kit includes a voltmeter, ammeter, voltmeter polarity switch and mounting parts. On machines above code 6000, this kit must be mounted on the wire feeder. If, on machines below code 6000, the kit is mounted on the remote control box or any place other than on the wire feeder, it may be necessary to add 1 or 2 volts to the meter voltage to get the proper arc voltage. Installation instructions are included with the kit.

September 1967

### Sec. G2.3.4

#### 10 and 25 Pound Wire Spools

##### a. Current Machines (above code 6000)

To mount the spindle kit for 10 and 25 pound spools, remove the shaft and cover assembly for the standard 50-60 pound wire reel from the mounting framework. Install the spindle per the instructions shipped with the kit.

A cover assembly to enclose the 10 and 25 pound spools is available. Installation instructions are shipped in the kit.

##### b. Older Design (below code 6000)

A shaft for 10 and 25 pound wire spools is available as an optional feature. Mounting instructions are given below.

A cover to protect small spools is available as an optional feature. Installation instructions are shipped with the cover assembly.

If desired, the standard 50 and 60 pound wire reel shaft and cover can be removed to lighten the machine. Just remove the screws which hold the assembly to the wire feed box. Put the screws back into the wire feed unit.

- See Figure 1. Remove nuts hand screws (1), (2), and (3).
- This will allow the removal of spacer (4).
- Remove the L shaped cover (5) on the control section of the wire drive unit.
- Remove the screws and washers in the 25 wire reel shaft and slip the shaft through the hole in the control housing from the drive roll side. The roll pin goes into the hole in the control housing.
- Assemble the screws and washers as shown in figure 2.
- Replace "L" shaped cover and screws.

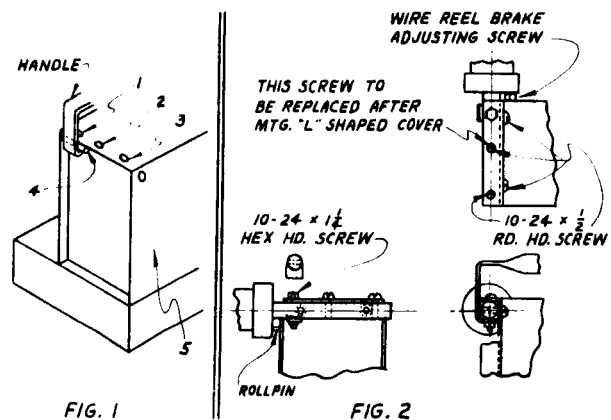


FIG. 1

FIG. 2

September 1967



Sec. G2.3.7

### Mechanized Travel Equipment

#### a. Squirtmobile® (Submerged Arc)

The LN-5 can be used with the 'Squirtmobile,' Two things are required.

1. A K-67 power pack is needed to drive the 'Squirtmobile'.
2. An adapter ring for Squirtguns K-113 and K-112 is shipped with the 'Squirtmobile'.

To install the adapter ring, remove the brass collar ring and flux cone from the Squirtgun. Screw the split adapter ring, shoulder end first, onto the threads of the gun housing.

Continue to screw until the adapter clears the threads. Line the slot in the adapter up with the

screw in the gun housing and slip the adapter up to the desired position. Reassemble the flux cone and brass collar ring to the gun. The gun can now be used with any of the standard Squirtmobile gun holders.

#### b. Kit to Delay Contactor Dropout

To prevent the electrode from sticking in the crater the gun is usually lifted from the work at the end of the weld. However, if the gun is mounted in a fixture or on the 'Squirtmobile' in such a manner that the gun cannot be lifted, a capacitor - resistor assembly is available to delay the dropout of the contactor to prevent sticking. This kit is shipped loose with all 'Squirtmobiles' in current production. Installation instructions are in the kit. Order kit T-12631 for other installations.

June 1966

## SEC. G2.4 CONVERTING THE LN-5

Sec. G2.4.1

### Changing Wire Sizes

#### a. Wire Feed Mechanism

Each LN-5 is shipped ready to feed a specific wire size. See Sec. G2.2.2f. Conversion kits are available to change the machine for feeding the following wire sizes: (1) .120", (2) 3/32" and 5/64" (3) 1/16" (4) .045" and (5) .035" .

Changing procedures are as follows:

1. Remove the electrode from the drive roll section.
2. Remove gun cable from its brass connection block.
3. Loosen the allen socket set screw which locates the outgoing guide tube. Remove the outgoing guide tube by pushing it out the front of the brass block.
4. (Above code 6000 only) loosen the allen socket set screw which locates the incoming guide (or the conductor cable of the LN-5E extension if it is being used). Remove the guide tube (or cable) from the brass block socket.
5. (Above code 6000 only) loosen the socket set screw which is in the plastic locking collar immediately behind the incoming brass block. Slide the steel tube back out of the incoming guide tube

socket. Remove tube and locking collar from unit.

6. Loosen the allen socket set screw which locates the incoming guide tube. Remove the incoming guide tube by pulling it out the back.

7. Release the tension on the outside drive roll pressure spring.

8. Remove the button head socket screw which serves as the shaft for the outside drive roll assembly. The outside drive roll can then be moved out the side of the yoke.

9. Remove the button head socket screw holding the inner drive roll assembly and remove the assembly. Do not lose the key.

10. Choose the proper set of rolls and guides for the wire size to be fed.

11. Install parts in the reverse order above. To insure proper location of the guide tubes be certain the dog point set screws fit in the grooves on the tubes.

12. With the chosen wire size in the machine tighten the pressure spring screw until the edge of the yoke block lines up with the proper wire size on the nameplate. Be certain this is done with the proper wire size between the drive rolls.

#### b. Gun

Use the gun and nozzle contact tip designed for the wire size to be fed.

September 1967

## SEC. G3.1 CONTROL ADJUSTMENTS AND LOADING THE MACHINE

Sec. G3.1.1

### Introduction

#### a. Variable Voltage or Constant Voltage

When using the LN-5 for submerged arc welding, a variable voltage power source is recommended. When it is used for Innershield® and other open arc processes, a constant voltage power source is used. See Sec. G2.2.3 for instructions for connecting the LN-5 to various Lincoln power sources.

Before starting to weld, be sure the LN-5 is properly set for variable voltage or constant voltage power source as appropriate (see Sec. G2.2.2c).

#### b. Meters (Optional)

Welding current is indicated on the ammeter on the LN-5 optional meter kit.

The LN-5 voltmeter indicates the total of the arc voltage plus other voltage drops in the system. To prevent false arc voltage readings, always be sure the ground connection is good. Do not use a ground cable of excessive length or small diameter. Or, if necessary, you can compensate for large voltage drops in the ground system by increasing the LN-5 'Volts' setting so the voltmeter indicates a higher total voltage.

Be sure the 'Voltmeter Polarity' switch is set so the voltmeter reads up scale.

#### c. 'Amps Range Switch'

This switch is located on the remote control box of LN-5's with code numbers 5490A, 5550A and higher. It is used with 3/32" and 5/64" 'Innershield' at low currents.

With the 'Amps Range Switch' set on 'Low', the wire feed speed range as controlled by the 'Amps' control is 0 to 175"/min. This permits easy setting of the 'Amps' control for fine adjustment of welding current for critical jobs.

For other applications, set the switch on 'High'. It is not in the circuit when the LN-5 is set for operation with a variable voltage power source.

#### d. Inching the Electrode

Inching speed is critical to good arc starting. Set the speed to a slow rate with the 'Inch Speed' rheostat on the remote control box (not included on machines below code 5555). If the arc flutters on and off, increase the speed. If the 'Inch Speed' is too fast, the electrode will tend to stub on starting.

Press the trigger on the gun to inch the electrode. Direction of inching is controlled by the 'Direction of Wire Feed' switch. If the electrode is inching in the wrong direction, reverse the position of the switch.

December 1967

Sec. G3.1.2

### Adjusting Current and Voltage

#### a. Submerged Arc Welding - Variable Voltage

Generally the current range is set at the power source. Adjust the welding current for each particular application with the 'Amps' control on the LN-5 (or 'Portable Field Control' used with SAM welders). Adjust the welding voltage for each particular application with the 'volts' control on the LN-5.

Adjustment of current and voltage varies depending upon which of the available power sources is being used. Basic instructions are given below. See the power source manual for more information.

1. If the power source is equipped with a toggle or voltage range switch, set it for the high or variable voltage range.
2. Set the voltage (or 'Output Control' or 'Job Selector') rheostat on the power source near maximum.
- 3a If equipped with a series of submerged arc output studs, connect the electrode lead from the contactor to the stud with the lowest current range that still permits welding at the desired current. (i.e. If you want 500 amps welding current use the '300-575' stud and not the '450-Max' stud.)
- 3b If equipped with a continuous current control (SAE or SAM), set the high current scale for a welding current a little higher than you expect to use.
4. If using an 'Idealarc' R3M or TM, set the power source current control for the current you want to use. The LN-5 'Amps' control does not work when connected to this power source. Set the arc voltage with the LN-5 'Volts' control.

#### b. Welding with 'Innershield' or Other Open Arc Processes

Adjustment of current and voltage varies depending upon which of the available power sources is being used. Basic instructions are given below. See the power source instruction manual for more information.

## Sec. G3.1.2 (Cont'd.)

1. If the power source is equipped with a toggle or voltage range switch, set the switch for the low or constant voltage range.
2. The 'Volts' control on the LN-5 (or 'Portable Field Control' used with SAM welders) is wired in series with the voltage (or 'Output Control' or 'Job Selector') control on the power source. Use the power source control to set the desired welding voltage. Use the LN-5 'Volts' control (or 'Portable Field Control' used with SAM welders) to make minor adjustments of welding voltage.

Exception 1: R3S Set the voltage at the power source. The LN-5 'Volts' control is not in the circuit.

3. If the power source is a combination variable voltage/constant voltage machine, be sure the electrode lead is connected to the 'Innershield' stud.

Exception 1: SAF-600 When a slightly drooping curve is needed (usually when welding with less than 30 volts) connect to the '450-Max' Sub-Arc stud.

Exception 2: SAM A common 'To Auto Equipment' stud is used for both constant and variable voltage.

4. Set the welding current with the 'Amps' control on the LN-5.

5. Note: If the power source is equipped with a continuous current control or a current range selector, this control is not in the circuit when connected for constant voltage welding.

Exception 1: SAM - When using this welder under 100 amps and 18 volts, set the 'Polarity Switch' to variable voltage and the 'Current Control' to 8-1 o'clock position.

6. When used for low current open arc processes, installation of a capacitor resistor assembly may be needed to prevent excessive sticking in the crater at the end of the weld. See Sec. G2.3.7(b.) for ordering and installation instructions.

May 1969

## Circuit Protection

## Sec. G3.1.3

## Circuit Protection

The mag-amp circuit and wire feed motor are protected by a circuit breaker. There can be several reasons for the circuit breaker to open. The most common are overloading the motor because of wire feeding problems or operating the gun trigger rapidly. To reset the circuit breaker allow a few minutes cooling time and press the red button on the remote control box.

June 1965

## CONTROL ADJUSTMENT - CONT'D.

Sec. G3.1.6

### Making Test Welds

#### a. With Variable Voltage Power Source (3/4" Stickout With 5/64" Wire)

1. Be sure the LN-5 nameplate and the switch in the LN-5 remote control box are properly set for variable voltage welding (see Sec. G2.2.2c).
2. Set the power source polarity switch for positive polarity.
3. Set the 'Direction of Wire Feed' switch so the wire feeds out the gun.
4. Set the 'Voltmeter Polarity' switch on the optional meter kit so the voltmeter reads up scale.
5. Set the power source for welding output of about 500 amps. See Sec. G3.1.2 for specific instructions for setting each type of power source.
6. Set the LN-5 'Volts' control to 5.
7. Set the LN-5 'Amps' control (or 'Portable Field Control' used with SAM welders) to 6. This control does not function when the LN-5 is connected to 'Idealarc' power sources.
8. Set the 'Inch Speed' control on the remote control box to about 6.
9. Ground a piece of 1/2" scrap for practice welding. Cut the wire at the gun to a sharp point using a pair of side cutters or diagonal cutters. Improperly clipped wire may produce poor starts and arcing of the contact tip. Do not let the clipped end of the wire fall back into the gun.
10. Hold the gun over the work, allow the mound of flux to form, press the trigger, and start the arc by scratching through the flux. See the appropriate Lincoln literature for additional operator techniques and procedures.
11. Adjust the actual arc current and the voltage with the LN-5 controls as needed for good weld quality.

#### b. With Constant Voltage Power Source (2-3/4" Electrical Stickout and 3/32" NS-3M Wire)

1. Be sure the LN-5 nameplate and the switch in the remote control box are properly set for constant voltage welding (see Sec. G2.2.2c).
2. Set the polarity switch on the power source for positive polarity. With the 'Idealarc' R3S connect the electrode cable to the 'Positive' stud.

3. Set the 'Voltmeter Polarity' switch on the optional meter kit so the voltmeter reads up scale.
4. Set the 'Direction of Wire Feed' switch so the wire feeds out the gun.
5. With the LN-5 'Volts' control (or 'Portable Field Control' used with SAM welders) set at about 6, adjust the power source for about 30-31 volts (see Sec. G3.1.1b). The LN-5 'Volts' control is not in the circuit when connected to an 'Idealarc' R3S.
6. Set the LN-5 'Amps' control to 4.
7. Set the 'Inch Speed' control on the remote control box to about 6.
8. Set up and ground a piece of 3/8 - 1/2" scrap steel. Inch the wire so it extends about 1-1/4" beyond the gun end.
9. Hold the gun with the wire just off or lightly touching the work. Do not push the wire into the work. Press the gun trigger to start to weld. See the appropriate Lincoln literature for additional operator techniques and procedures.
10. Adjust the actual current and voltage with the LN-5 controls as needed.

December 1967

## LOADING THE MACHINE - CONT'D.

Sec. G3.1.7

### Wire Reel Loading - 60 and 50 Pound Reels

- a. Be sure the drive roll pressure is properly set for the wire size being used. See Sec. G2.2.2.
- b. These instructions apply to the new reels (with the center spinner clamping nut) installed on machines assembled after February, 1968. For loading 5/64 thru 120" wire sizes on the older reels with the rim clamping lugs, use the following instructions, except ignore 3a, 3b, and 4. The old reels are not recommended for .035 thru 1/16" wire sizes.
  1. To remove the wire reel from its shaft, grasp the spring loaded knob and pull it out. This straightens the knob so it seats into the shaft when released.
  2. Lay the reel flat on the floor and remove the cover plate.
  3. Place a coil of wire on the reel so it unwinds as the reel rotates clockwise.
    - a. Be sure the coil is placed so the spring loaded arms will not interfere with the later removal of the coil tie wires.
    - b. With .035" and .045" wire, be sure the slots in the coil cardboard lining line-up with the spring loaded arms.
  4. Put the cover plate on the reel so the four arms on the cover straddle the spring loaded arms of the reel proper.
  5. Tighten the cover as much as possible by hand. Do NOT hammer on the spinner nut arms.
  6. Cut and remove 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.

NOTE: 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 and cause poor unreeling.
  7. Replace the reel on the wire feeder.

- c. Threading Wire into LN-5: 50-60# Reel Mounting

Turn the reel until the free end of the electrode is accessible. While tightly holding the electrode, cut off the bent end. Straighten the first six inches and insert it through the wire guide to the drive rolls. Press the gun trigger until the rolls pick up the wire and feed it through the gun cable.

**WARNING:** When inching, the electrode is "hot" to ground even when the optional Contactor/Power Kit is used.

- d. Threading Wire into LN-5E Using Extension Unit.

Slide the ingoing guide tube of the hand crank to the forward position.

Remove start end of coil from hole in wire reel cover, straighten the first six inches or so of the wire and then insert this end in the ingoing guide tube. Push a foot or so of wire thru.

Now pull the ingoing guide tube back to the rear position and rotate it 90° so that it will remain in this position during the cranking operation.

Pull the plastic hand crank handle to the out position in the arm.

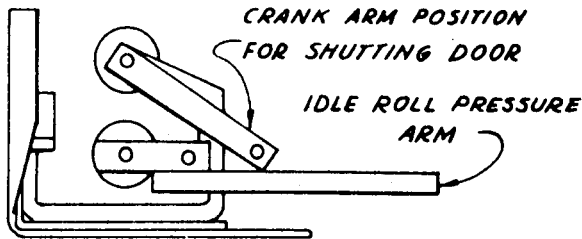
Pull the shaft and drive roll assembly to the out position with the left hand.

Apply a downward pressure to the idler roll pressure arm with the right hand. Maintain this pressure and start cranking the wire thru the system. Keep the conductor cable as straight as possible during the loading operation, this will make it much easier to crank the wire thru. Crank until the wire touches the drive roll and then pull the gun trigger and this will start the drive rolls and feed the wire the rest of the way through the cable and gun assembly.

**WARNING:** The electrode is "hot" to ground while inching with the gun trigger.

Push the plastic of the hand crank to the in position, also shift the ingoing guide tube to the forward position.

The proper position for the hand crank arm, when it is not being used is shown in the sketch below.

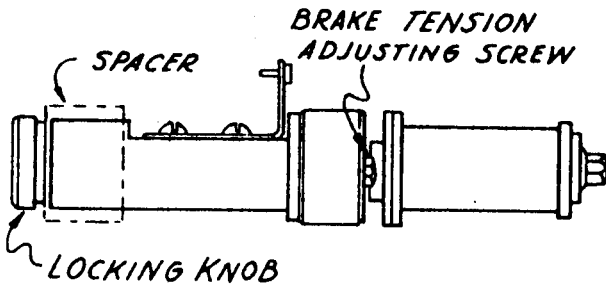


Close and lock the wire reel door.

February 1968

Sec. G3.1.8

**Wire Reel Loading - 25 and 10 Pound Spools**



Remove the locking knob and 10 lb. reel spacer from the shaft. Place the 25 lb. spool on the shaft making certain the brake driving pin enters one of the holes in the back side of the spool. Replace and tighten the locking knob. When 10 lb. spools are used place the spacer between the locking knob and the outside of the spool. Be certain the wire comes off the reel in a clockwise direction.

The spool should turn freely without any over run. Adjust the brake tension with the hex head screw on the back of the shaft hub. Backing the screw out increases the brake tension. Adjust until the reel turns freely but with little or no over run.

September 1967

Sec. G3.1.9

**Wire Reel Changing**

Generally with most LN-5 installations the end of the coil can be removed from the gun cable by simply reversing the wire feed direction and pressing the gun trigger.

With the LN-5E extension unit, use the following procedures to remove the end of the coil from the gun cable:

1. Cut the end of the electrode off at the gun end. Do not break it off because this puts a slight dent in the wire and makes it difficult or impossible to back it through the nozzle.
2. Uncouple the gun cable from the LN-5 wire drive unit.
3. Lay the cable out straight.
4. Grip the electrode with pliers and pull it out of the cable from the connector end. K-112 cables have a removable liner. This liner may tend to slide out with the electrode. If this happens, remove the electrode from the liner and replace the liner in the cable.
5. Load a new reel as described in Sec. G3.1.7 or G3.1.8.

February 1968

## LOADING THE MACHINE — CONT'D

Sec. K3.1.10

### Flux Tank Loading

#### 1. Flux Tank (Optional)

Turn off or disconnect the input air line. Loosen the flux tank cover just enough to permit the air pressure to escape. Open the tank. Using the funnel provided, fill the tank with 100 pounds of new or freshly screened flux. All reused flux must be screened 100% through a screen with 3/32" maximum openings (8 Mesh). The screens in the funnel and in the tank filler neck are not sufficiently fine to protect the feeding system. Their purpose is to remove large pieces of paper torn from the flux bag or large pieces of solid flux that may have gotten into the flux after it was screened. Do not remove the screen from the filler neck. When the tank is full, replace the cover and reconnect the air line. Tighten the top only hand tight. More pressure reduces the life of the gasket.

#### 2. Magnetic Separator (Optional)

When recovering used flux, you also pick up magnetic particles. These particles can clog the flux feeding sys-

tem at the gun tip when making long continuous welds. They can also cause porosity in the weld. The Lincoln magnetic separator removes these particles.

Fit the magnetic separator into the standard funnel. Pour the fully screened flux into the separator hopper. The separator is designed so the flux flows around three permanent magnets. The magnets remove all magnetic particles. When the magnets become covered with their full load, they automatically stop the flux flow. When the flux flow stops, remove the separator from the funnel. Turn it over and open the panel that covers the magnets. Remove the magnetic particles with brushing or an air blast. Be careful to protect yourself and others in the area from flying particles.

The magnetic separator is used with all Lincoln mild steel fluxes — 760, 761, 780, 781, 860 and 880. Do not use the magnetic separator with any stainless steel, alloy or hardsurfacing flux except H-535. The magnetic separator removes some of the alloying elements from these fluxes thus changing their characteristics.

August 1973

## SEC. G6.1 — WIRE DRIVE AND CONTROLS

**WARNING:** Have qualified personnel do the maintenance and trouble shooting work. Turn the power off before working inside the machine. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

### Sec. G6.1.1

#### Wire Drive Motor and Gear Box

Every year examine the gear box. Paint the gear teeth with graphite grease.

Check the motor brushes. Replace if they are less than 1/8" long.

If ordering feed motor brushes, give all information from the motor nameplate along with the serial number of the LN-5.

May 1978

### Sec. G6.1.2

#### Drive Rolls and Guide Tubes

After every coil of wire the drive rolls and guide tubes should be cleaned and inspected. The drive rolls can be brushed with a wire brush. Do not use a solvent on the top drive roll as it may wash the lubricant out of the drive roll needle bearing.

The inner drive rolls for .120, 3/32 and 5/64" wire have a double set of teeth so they can be reversed for additional life. When this is done leave the three socket head screws of the roll

assembly loose until it is re-assembled on the drive shaft. Then tighten all three. Be sure the roll faces and spacer faces are thoroughly cleaned before re-assembly.

All outer drive rolls and the inner rolls for 1/16, .045 and .035" wire have no teeth. They are not reversible.

September 1967

### Sec. G6.1.3

#### Wire Reel Housing

If the brake disc on the wire reel bracket adds too much drag or begins to squeak, *lightly* cover its surface with a thin grease.

November 1966

### Sec. G6.1.4

#### Control Box and Remote Control Box

Every six months open and inspect the control boxes. The accumulated dirt should be blown gently off all of the electrical components. Be sure the air that is being used is dry. Check relay contacts.

October 1964

## SEC. G6.2 — GUN CABLE AND GUN

### Sec. G6.2.1

#### Gun Cable

A dirty gun cable can cause rough and erratic wire feeding. Therefore, the cable liner must be cleaned periodically. Procedures differ depending upon whether the cable has a permanent core of removable liner.

##### a. Permanent Core Cables

Remove the cable from the LN-5. 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 from the gun end. Too much pressure at the start will cause the dirt to form a plug. Flex the cable over its entire length and again blow out the cable.

##### b. Cable With Removable Liner (K-112)

To clean the liner, first disconnect the cable from the LN-5 and remove the gun nozzle from the gun handle.

To remove the liner from the cable insert a 3/16" diameter rod about 18" long into the gun end. Push the liner out of the cable far enough that it can be pulled from the opposite end. If the liner does not pull out easily, do *not* force it. Continue to push the liner until it pulls freely.

To clean the liner soak it in degreasing solvent for one hour. Flex short lengths of the liner around a 3" diameter to spread the coil turns and blow compressed air across and between the turns at 90° to the liner axis. This is needed to remove particles from between the turns. **Do not blow compressed air through the master cable.**

Be sure the outside diameter of the liner is clean when inserting it into the cable. Insert by short sections about 3" in length. **Do not let the liner bend sharply because this may cause a permanent bend in the liner.**

October 1964

### Sec. G6.2.2

#### Gun Disassembly

##### 'Innershield' Squirtguns K-115 and K-126 and Submerged Arc Squirtguns K-113 and K-112

To remove the nozzle from the gun, loosen the Allen head screw in the gun handle and pull the nozzle straight out. To re-install insert the nozzle into the gun handle. Push it in as far as possible and tighten the Allen head screw.

To disassemble 'Innershield' Squirtguns K-115 and K-126, first loosen the screws which hold the heat shield in place. Remove the heat shield.

To disassemble the switch housing from all these guns, remove the four screws holding the saddle around the gun handle, then hold the gun with the cable toward the floor and look into the switch cavity. The tight side of the larger roll pins is to the right. Drive these pins to the left. They can be easily removed when they clear the right side of the casting. Do not remove the smaller roll pins unless the trigger is being replaced. The height of the Z spring controls the operating point of the switch with respect to the trigger movement. Set the spring so the switch operates at about the midpoint of the trigger travel.

To remove the handle from the cable, slip the spatter shield out of the front of the handle. Remove the 1/4-20 socket head screw through the hole in the side of the handle. Then pull the handle back on the cable. Remove the snap ring and connector clamp and the handle can then be slipped off the cable.

September 1967



Sec. G6.2.3

### **Gun Disassembly**

#### **'Innershield' Squirtgun K-116**

To remove the nozzle from the gun follow the instructions in Sec. G6.2.2.

Remove the pistol grip assembly from the gun by removing the four screws which clamp the assembly to the handle.

To disassemble the switch, remove the one screw which clamp the assembly to the handle.

To disassemble the switch, remove the one screw which holds the housing in the pistol grip handle. Slip the aluminum housing out of the handle. Hold the housing with the leads toward the

floor and look into the switch cavity. The tight side of the larger roll pins is to the right. Drive these pins to the left. They can be easily removed when they clear the right side of the casting. Do not remove the smaller roll pins unless the trigger is being replaced. The height of the Z spring controls the operating point of the switch with respect to the trigger movement. Set the spring so the switch operates at about the midpoint of the trigger travel.

To remove the handle from the cable follow the instructions in the last paragraph of Sec. G6.2.2.

September 1967

## SEC. K6.3 — FLUX SYSTEM

### Sec. K6.3.1

#### Flux Feeding System

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

Remove the coiled tube from the bottom of water trap tube. Remove the copper end fitting and clean the tube thoroughly. The flattened end should have a .005 to .010" gap so a small amount of air leaks through the end at all times. If the tube is fully sealed replace or rework end fitting.

(On obsolete LN-4 or LN-5's *without* the copper end fitting, remove the coiled copper tube from the bottom of

the trap tube. Saw about 3/4" off the pinched end. Wash all the material out of the copper tube. Squeeze the end of the tube closed again, but leave a .005 to .010" opening.)

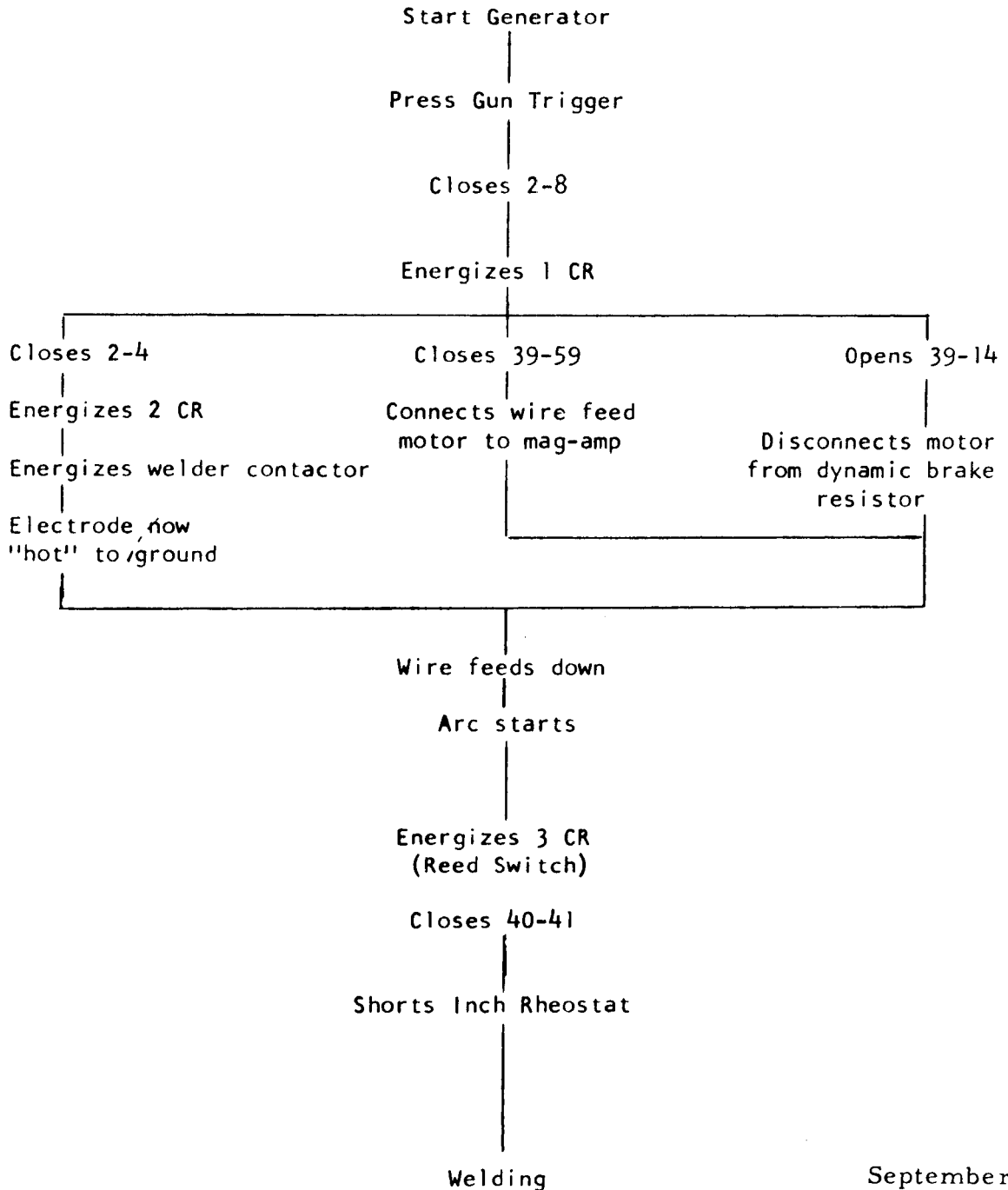
Loosen the collar on the 2-1/8 inch steel filter tube and take the filter tube off the machine. Wash out completely. Fit steel tube back into its bracket and attach the coiled tube to its bottom. Fill steel tube to within 2 inches of the top with any clean Lincoln submerged arc welding flux.

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.

August 1973

## SEC. G6.7 ELECTRICAL SEQUENCE OF OPERATIONS

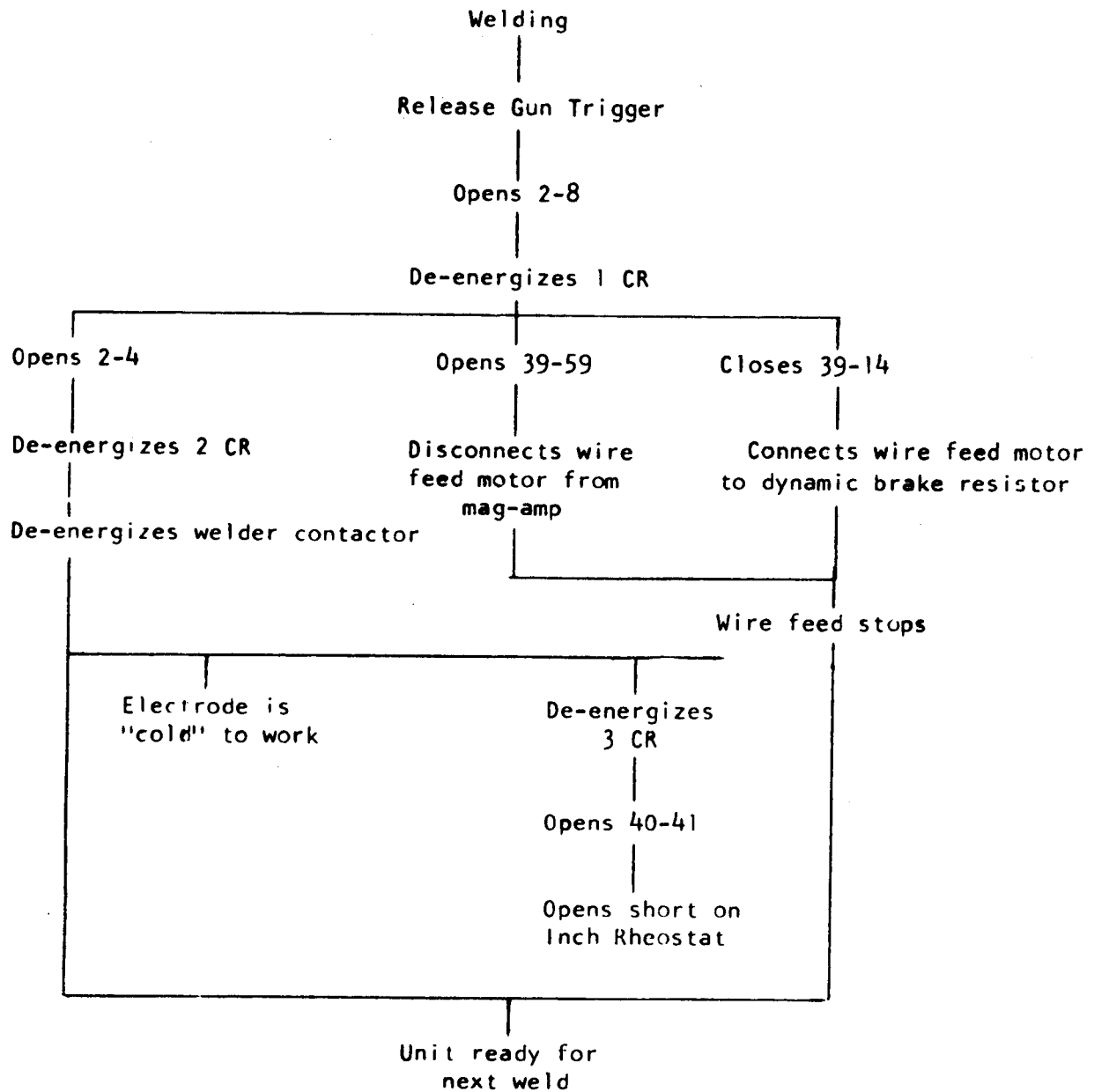
### LN-5 SEQUENCE OF OPERATION (CODE NUMBER 5551 & HIGHER)



September 1967

Continued on next page

Sec. G6.7 (Continued)



# LN-5 CONTROL CIRCUIT SCHEMATIC CONNECTED TO SAN-600 OR 1000

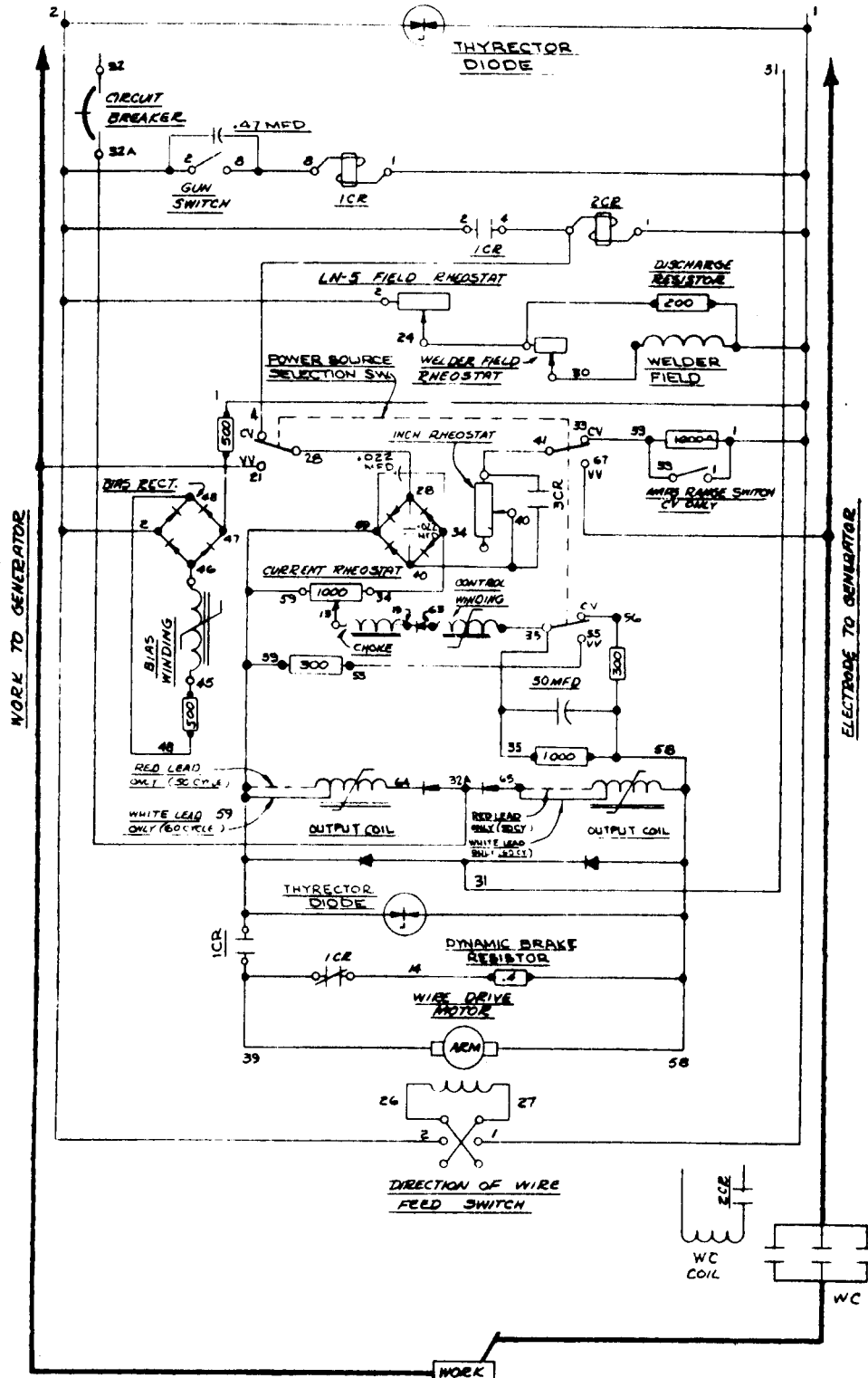


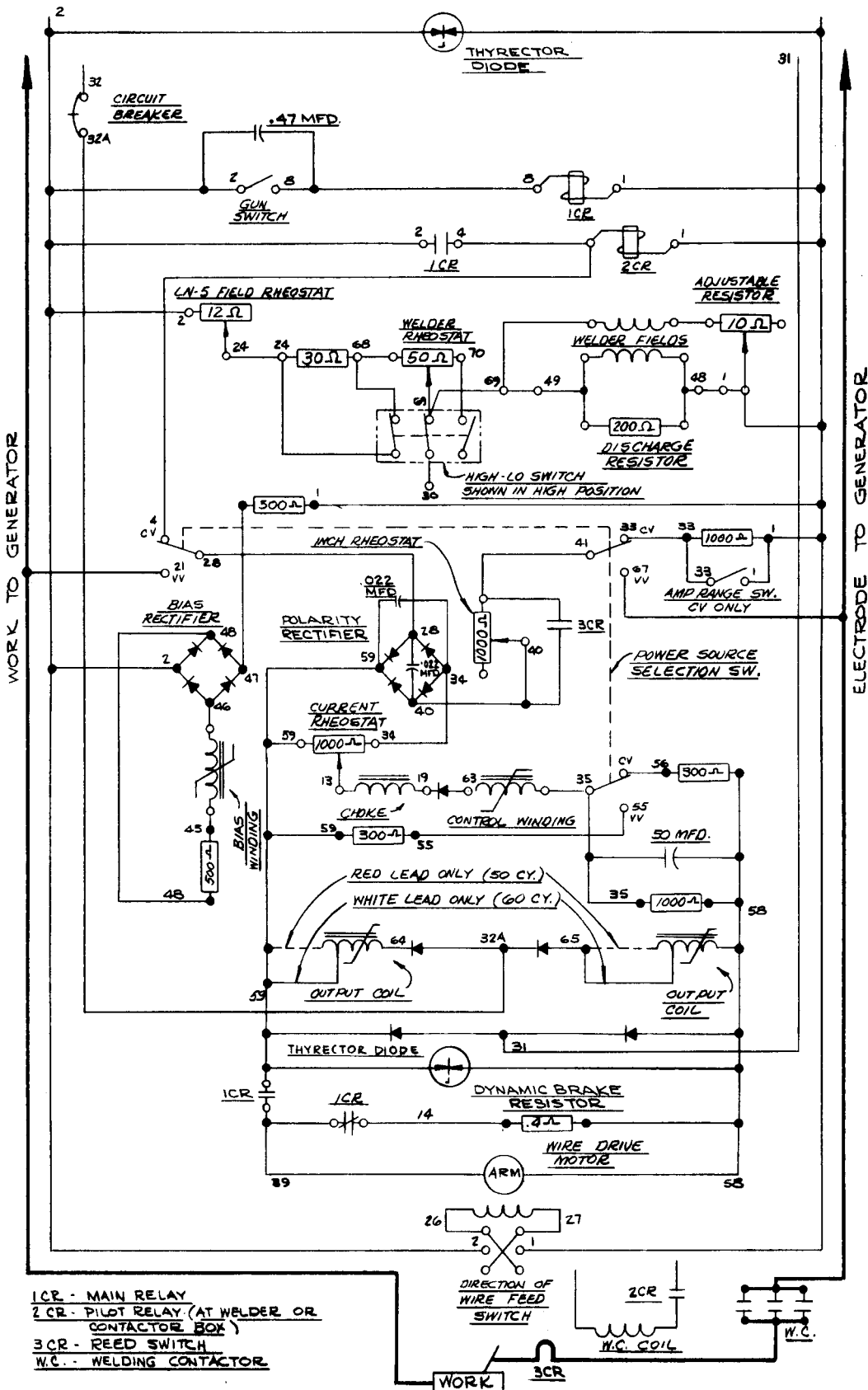
Diagram	Code
M-10601	5430
M-10589	5474, 90, 5550,
M-10763	5490A & AB, 5550A & AB
M-10762	5551 & 52 to 5900
M-11038	5900 to 6388, 89 & 90

This diagram is for machines in production at the time the manual was assembled. For earlier codes write for the appropriate diagram as listed in this table.

ICR - MAIN RELAY  
2CR - PILOT RELAY (AT WELDER OR CONTACTOR BOX)  
3CR - REED SWITCH  
WC - WELDING CONTACTOR

THIS DIAGRAM WITH THE EXCEPTION OF THE WELDER FIELD CIRCUIT AND/OR THE POSITION OF THE "POWER SOURCE SELECTION SW." IS CORRECT FOR OTHER POWER SOURCES ALSO.

## CONTROL CIRCUIT SCHEMATIC LN-5 CONNECTED TO SAF-600-0 OR SA-800-0

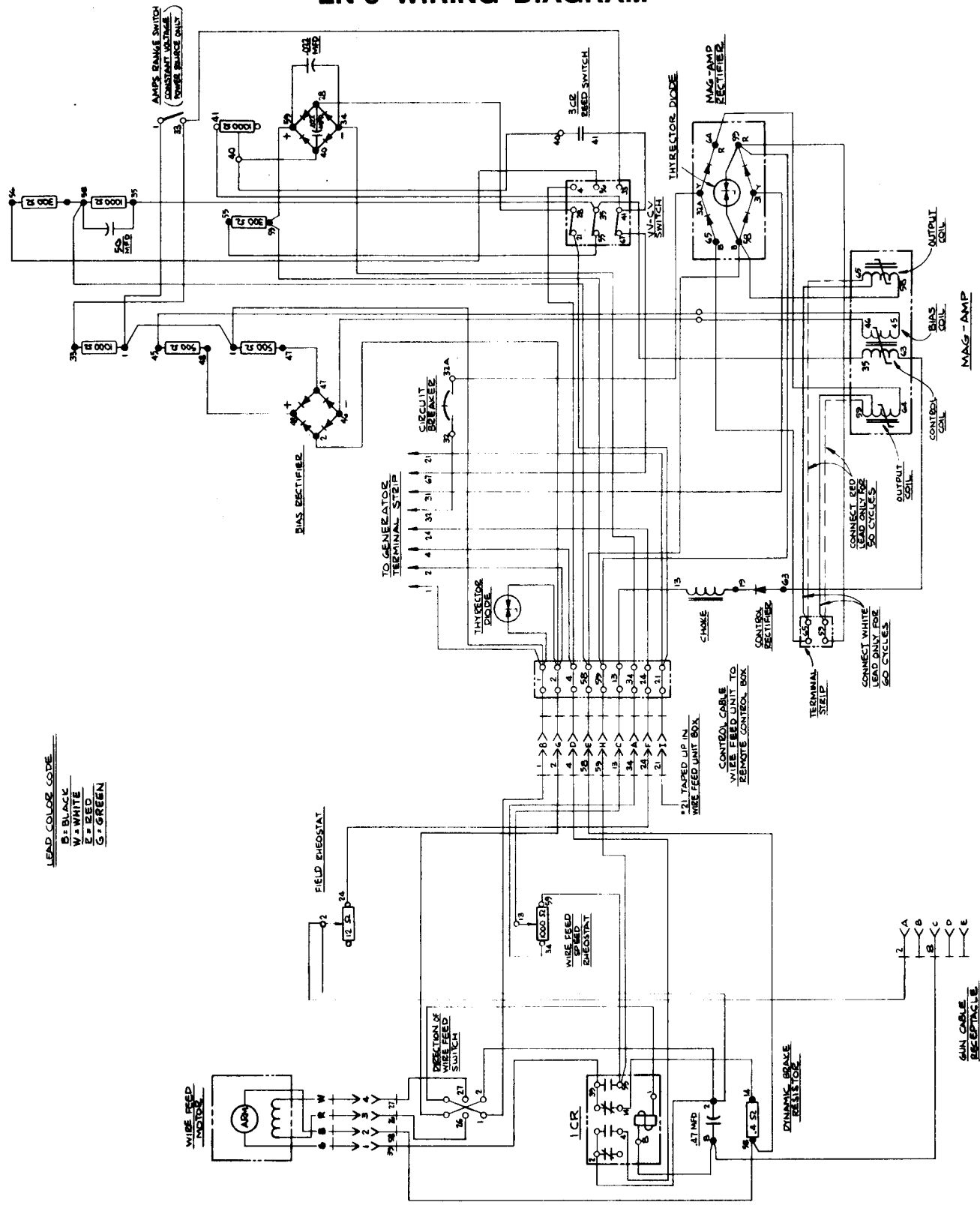


Code	Diagram
5550 AB & earlier	M-10791
5551 & 52 to 5900	M-11037
5900 to 6388, 89 & 90	

This diagram is for machines in production at the time the manual was assembled. For earlier codes write for the appropriate diagram as listed in this table.



### LN-5 WIRING DIAGRAM



**LEAD COLOR CODE**  
 B - BLACK  
 W - WHITE  
 R - RED  
 G - GREEN

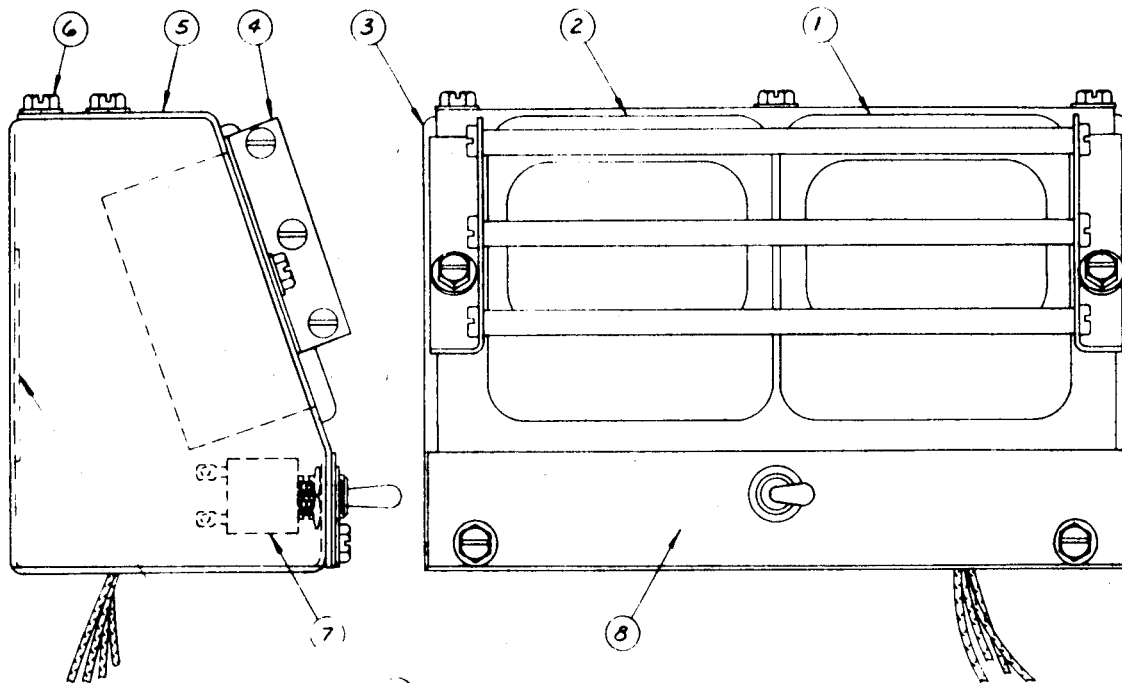
This diagram is for machines in production at the time the manual was assembled. For earlier codes write for the appropriate diagram as listed in this table.

Code	Diagram
5430	L-4272
5474, 90, 5550	L-4258
5490A & AB, 5550 A & AB	L-4343
5551 & 52 to 5900	L-4338
5900 to 6000	L-4462
6388, 6389 & 6390	L-4515





# METER KIT ASSEMBLY

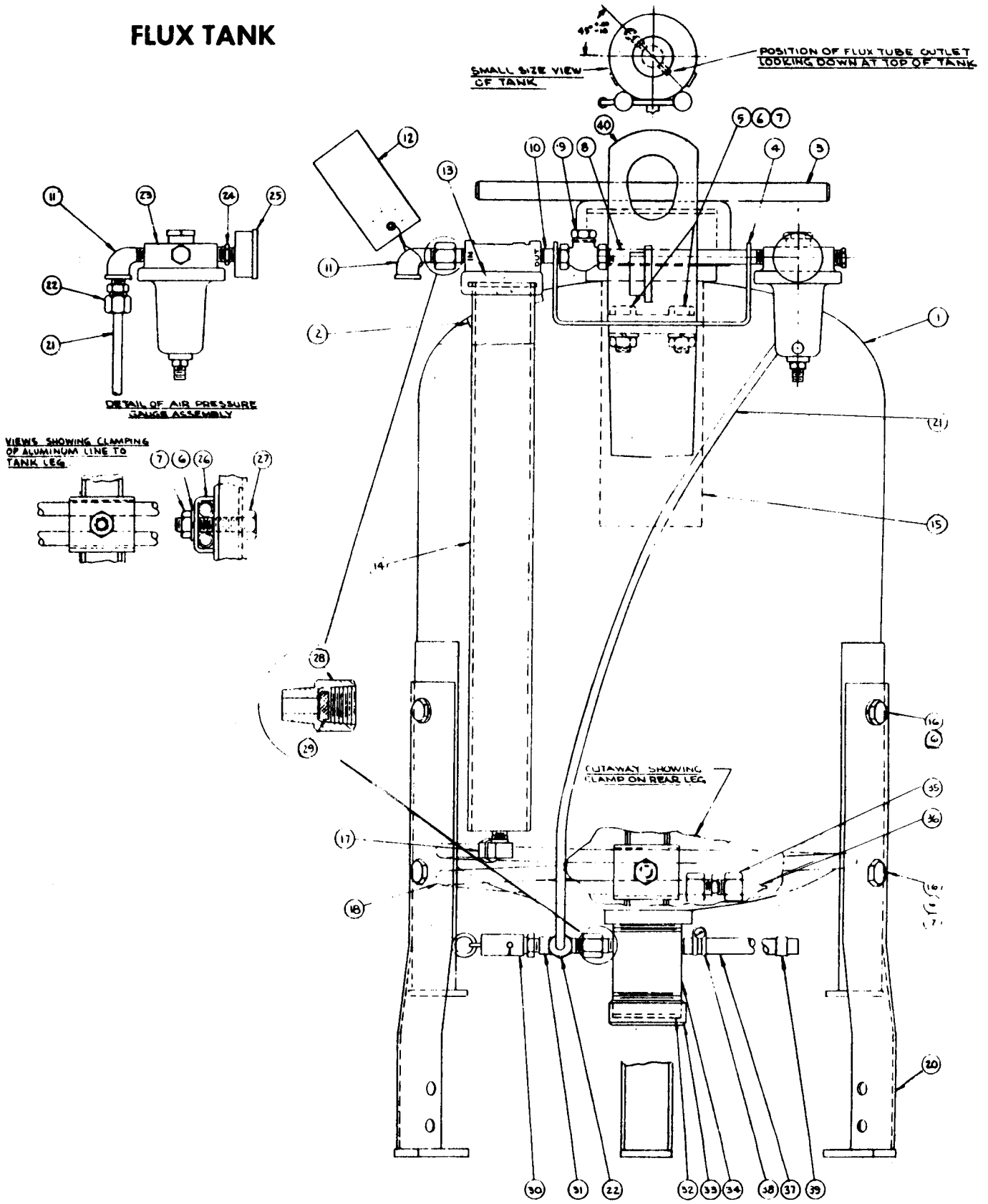


ATTACH ITEM (9) TO INSIDE SURFACE OF CASE

For Codes Below 6000, use the parts marked "x" in Column 1. For Codes Above 6000, use the parts marked "x" in Column 2.					
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6
1	Voltmeter	M-10486-1	1	x x	
2	Ammeter	M-10485-1	1	x x	
3	Case Assembly	S-13006	1	x .	
3	Case Assembly	S-13693	1	. x	
4	Meter Guard	S-13013	1	x x	
5	Panel Cover	M-10644	1	x x	
6	Self Tapping Screw	S-8025-12	5	x .	
6	Sems Screw	T-10082-3	2	x .	
6	Self Tapping Screw	S-8025-12	7	. x	
7	Switch	T-10800	1	x x	
8	Nameplate	S-13011	1	x x	
9	Wiring Diagram	T-12768	1	. x	
Codes below 6000 (and code 6188) also contained a meter shunt. For parts see below.					
	Shunt	S-13007	1	x .	
	Round Head Screw, Shunt Mounting	1/4-20 x 7/8	2	x .	
	Lockwasher, Shunt Mounting	E-106A-2	2	x .	
	Flatwasher, Shunt Mounting	S-9262-23	2	x .	
	Insulating Washer, Shunt Mounting	S-10773-12	2	x .	
	Insulating Tube, Shunt Mounting	T-7305-26	2	x .	
	Insulation, Shunt Mounting	T-11472-6	2	x .	
	Hex Nut, Shunt Mounting	1/4-20	2	x .	
	Hex Head Bolt, Connection Cable to Shunt	1/2-13 x 3/4	2	x .	

Parts List P-107-S		
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Flux Tank Assembly, Includes:	1
1	Flux Tank	1
2	Decal	1
3	Tank Cover	1
4	Instrument Mounting Bracket	1
5	Hex Head Screw	2
6	Lockwasher	8
7	Hex Nut	5
8	Pipe Nipple	1
9	Check Valve	1
10	Pipe Nipple	1
11	Street Ell	2
12	Caution Tag	1
13	Air Line Filter	1
14	Water Separator	1
15	Strainer	1
16	Hex Head Screw	5
17	Compression Elbow	1
18	Bleeder Line*	1
20	Flux Tank Support	3
21	Copper Line	1
22	Male Connector	2
23	Pressure Regulator	1
24	Reducing Bushing	1
25	Pressure Gauge	1
26	Clamp	1
27	Hex Head Screw	1
28	Adapter	2
29	Screen Cup	2
30	Safety Valve	1
31	Street Tee	1
32	Cap Gasket	1
33	Outlet Tube Cap	1
34	Outlet Assembly	1
35	Union	1
36	Flared Copper Tube	1
37	Flux Hose	1
38	Hose Clamp (Tank End)	1
39	Hose Clamp (Gun End)	1
40	Lift Bale Assembly	1
	Flux Funnel - Not Illustrated	1
*	Also order items 35 & 36	

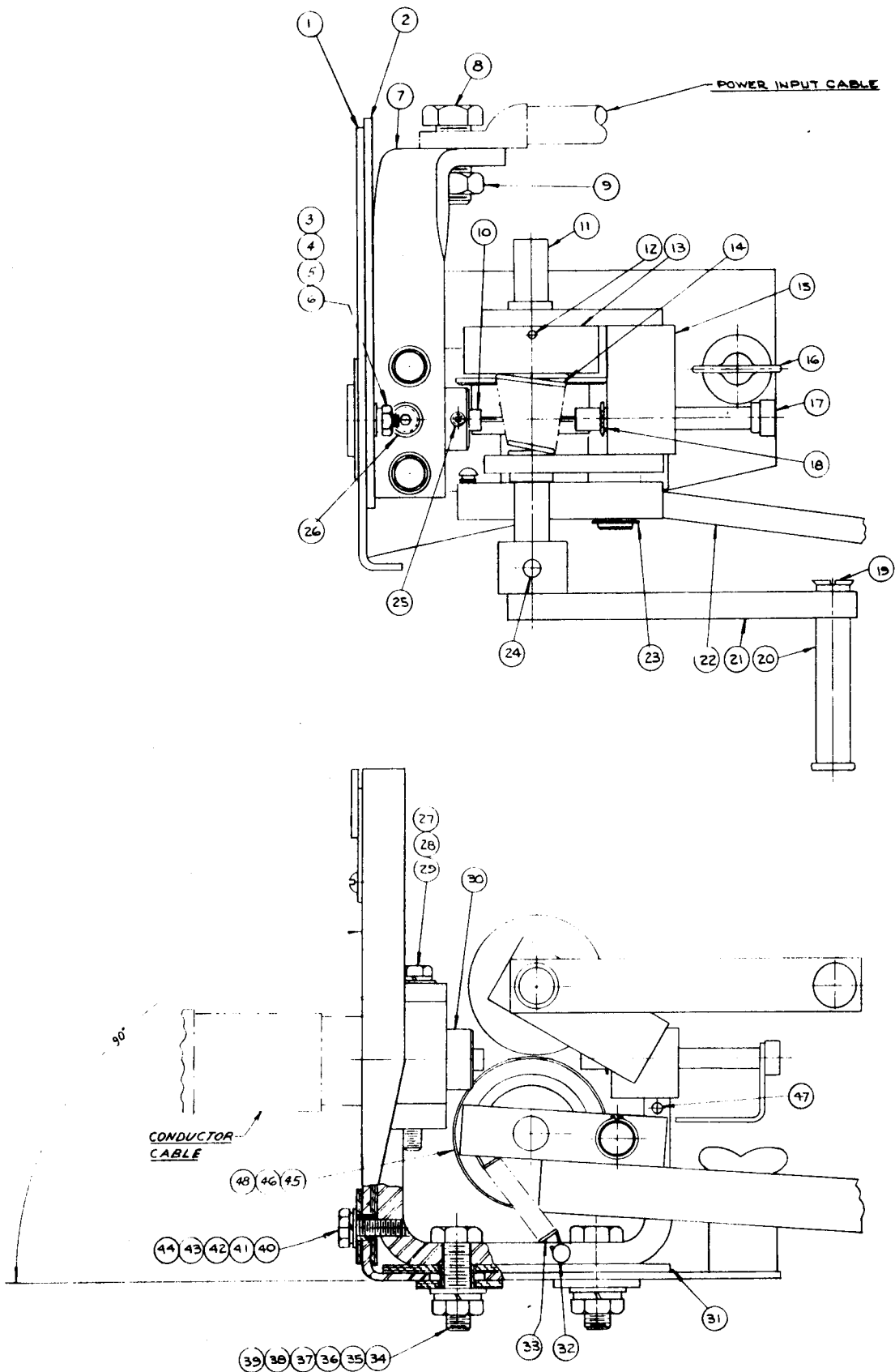
# FLUX TANK



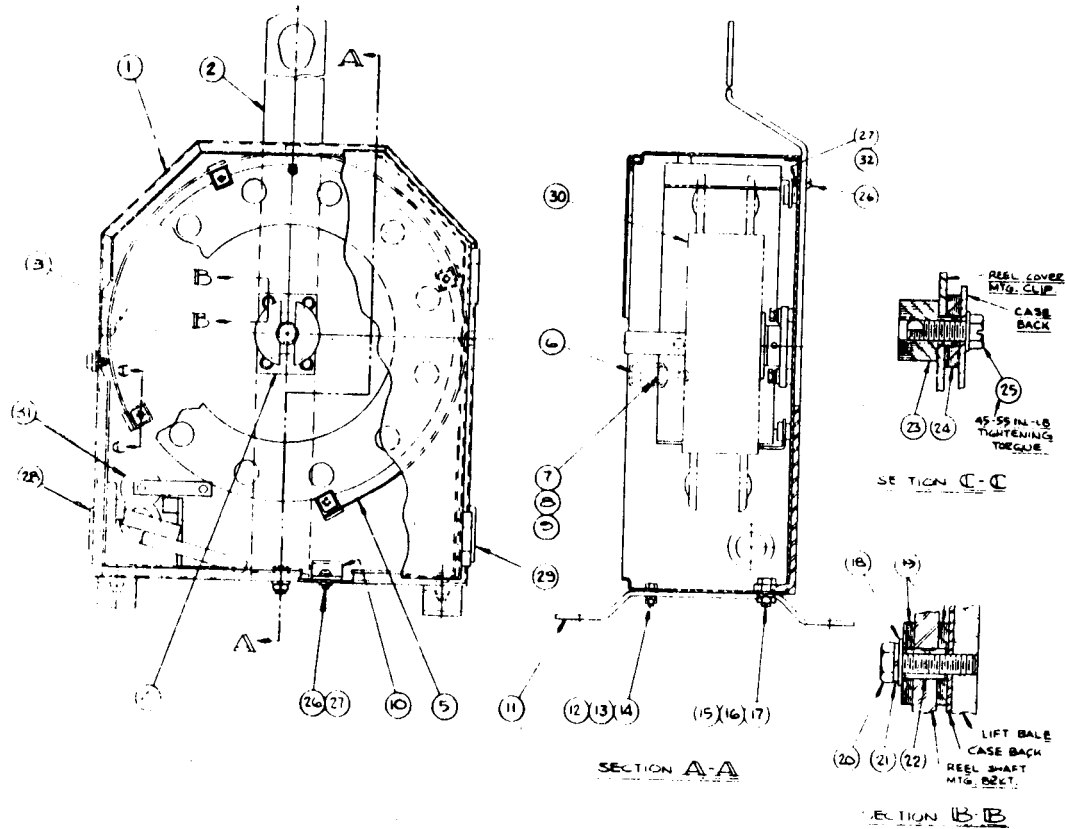


ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9
	Hand Crank Assembly (In Open Tubular Reel Housing) Includes:	L-4607	1	. x		
	Hand Crank Assembly (Closed Reel Housing), Includes:	L-4436	1	x .		
1	Frame Welded Assembly	M-10968	1	x .		
2	Insulating Panel	M-10957	1	x .		
3	Rd. Headscrew	#10-24 x 5/8	1	x .		
4	Flat Washer	S-9262-27	1	x .		
5	Lockwasher	E-106A-1	1	x .		
6	Hex Nut	#10-24	1	x .		
7	Lead Strap	M-10962	1	x x		
8	Hex Headscrew	1/2-13 x 1	1	x x		
9	Hex Nut	1/2-13	1	x x		
10	Guide Tube	T-11445-1	1	x x		
11	Shaft	T-12650-1	1	x x		
12	Roll Pin	T-9967-31	1	x x		
13	Drive Roll	S-12805	1	x x		
14	Conical Spring	T-12648	1	x x		
15	Bracket Assembly	M-10965	1	x x		
16	Locking Screw	T-12302	1	x .		
17	Incoming Guide Tube	T-12654	1	x x		
18	Retaining Ring	S-9776-1	1	x x		
19	Flat Headscrew	5/16-18 x 5/8	1	x x		
20	Handle	S-13397	1	x x		
21	Crank Arm Assembly	S-13392	1	x x		
22	Lever Arm Assembly	S-13404	1	x x		
23	Retaining Ring	S-9776-3	1	x x		
24	Fiber Pin	T-8433	1	x x		
25	Set Screw	S-11604-9	1	x x		
26	Set Screw	S-11604-11	1	x x		
27	Hex Headscrew	1/4-20 x 2-1/2	2	x x		
28	Lockwasher	E-106A-2	2	x x		
29	Flatwasher	S-9262-23	2	x x		
30	Conductor Block	S-13401	1	x x		
31	Insulating Pad	T-8477-12	1	x .		
32	Drive Screw	S-8025-7	2	x x		
33	Tension Spring	T-11514	1	x x		
34	Hex Headscrew	3/8-16 x 1-1/4	2	x .		
35	Insulating Tube	T-7305-4	2	x .		
36	Insulating Washer	S-10773-19	2	x .		
37	Flat Washer	S-9252-4	2	x .		
38	Lockwasher	E-106A-4	2	x .		
39	Hex Nut	3/8 - 16	2	x .		
40	Hex Headscrew	1/4-20 x 3/4	1	x .		
41	Insulating Tube	T-7028-54	1	x .		
42	Insulating Washer	S-10773-11	1	x .		
43	Flat Washer	S-9262-23	1	x .		
44	Lockwasher	L-106A-2	1	x .		
45	Idle Roll (.120" Wire)	T-12556-1	1	x x		
45	Idle Roll (1/16, 5/64 & 3/32" Wire)	T-12556-2	1	x x		
46	Hex Headscrew	3/8-16 x 1/2	1	x x		
47	Lever Arm Stop Pin	T-9967-4	1	x x		
48	Flat Washer	S-9262-4	1	x x		
	The following parts are not illustrated					
	Extension Cable Assembly,	M-11259	1	x x		
	Conductor Cable	L-4434	1	x x		
	Control Cable, Includes:	M-11258	1	x x		
	Polarized Plug (Female, Drive Unit End)	S-12020-11	1	x x		
	Polarized Plug (Male, Drive Unit End)	S-12023-3	1	x x		
	Polarized Plug (Female, Reel Case End)	S-12020-11	1	x x		
	Polarized Plug (Male, Reel Case End)	S-12023-3	1	x x		
	Cable Clamp (Secures Polarized Plugs)	S-12024-2	2	x x		

# LN-5E HAND CRANK ASSEMBLY



# LN-5E EXTENSION WIRE REEL CASE

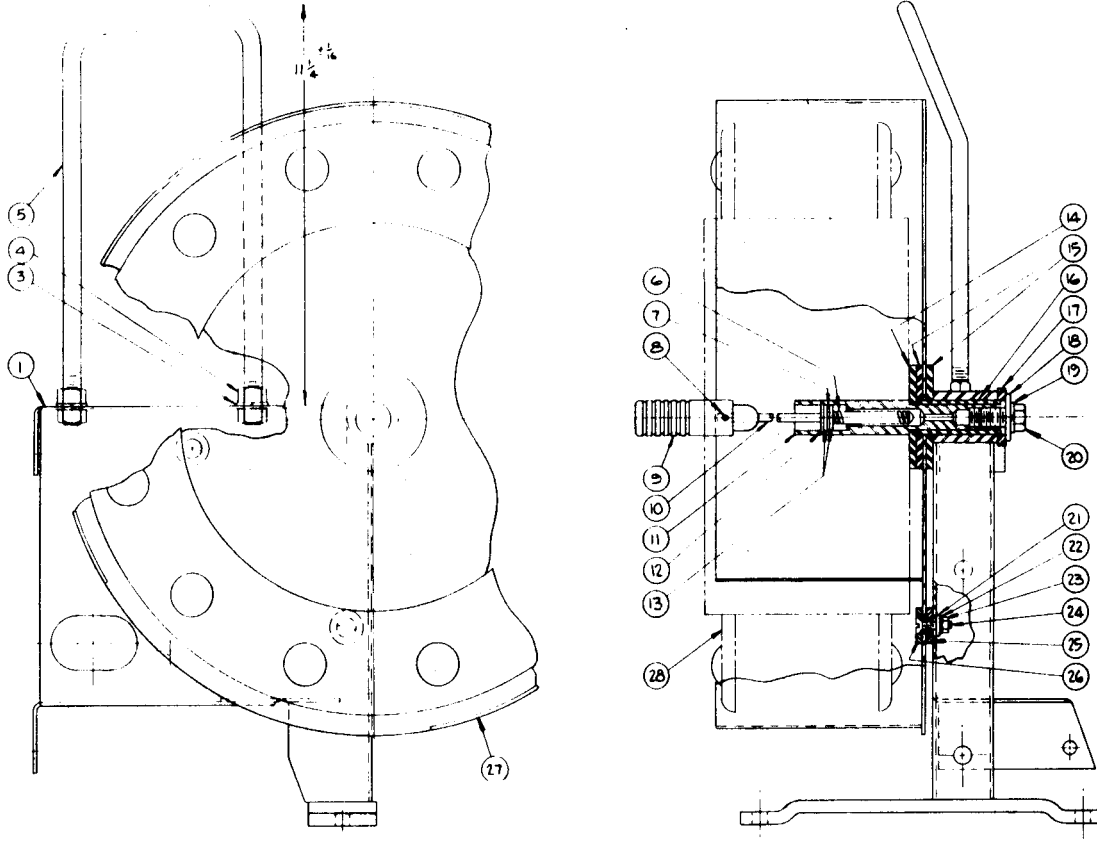


ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	123	456	789
	Open frame Mounting Tubular Welded Assembly	L-4610	1	x		
	Closed housing	L-4609	1	x		
1	Case Welded Assembly	M-11244	1	x		
2	Lift Bale	M-10955-1	1	x		
3	Bumper	M-10961	1	x		
4	Reel Mounting Shaft Assembly	T-11564	3	x		
5	Reel Cover Assembly	M-10487-1	1	x x		
6	Draw Pull Catch	M-10483	1	x		
7	Sems Screw	T-12652	1	x		
8	Flat Washer	T-10082-4	2	x		
9	Hex Nut	S-9262-22	2	x		
10	Cable Clamp	#10-24	2	x		
11	Foot	S-13546	1	x x		
12	Hex Head Screw	M-10952	2	x		
13	Lockwasher	3/8-16 x 3/4	4	x		
14	Hex Nut	E-106-A-4	4	x		
15	Hex Head Screw	3/8 - 16	4	x		
16	Lockwasher	1/2-13 x 3/4	1	x		
17	Hex Nut	E-106-A-5	1	x		
18	Flatwasher	1/2 - 13	1	x		
19	Insulating Washer	S-9262-23	4	x x		
20	Hex Head Screw	S-10773-11	8	x x		
20	Hex Head Screw	1/4-20 x 1	4	x		
21	Lockwasher	1/4-20 x 1-1/4	4	x		
22	Insulating Bushing	E-106-A-2	4	x x		
23	Insulating Bushing	T-7028-11	4	x x		
24	Insulating Washer	T-12270	4	x		
25	Thread Cutting Screw	T-11267-B	4	x		
26	Rd. Hd. Screw	S-9225-33	4	x		
27	Lockwasher	1/4-20 x 3/4	3	x x		
28	Grommet	E-106-A-2	3	x x		
29	Grommet	S-10255-15	1	x		
30	Wire Reel Assembly	S-10255-16	1	x		
		L-4604	1	x x		
31	Hand Crank Assembly					
32	Hex Nut	See P-105-L	1	x x		
		1/4 - 20	1	x		



# REEL AND MOUNTING ASSEMBLY

(Above Code 6000 Only)

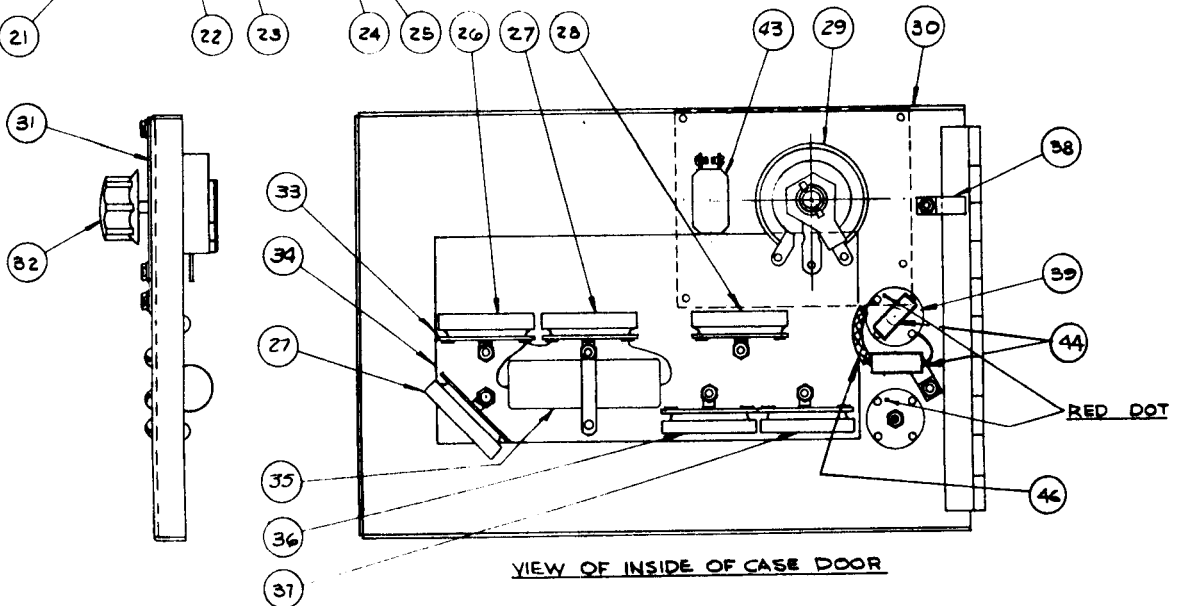
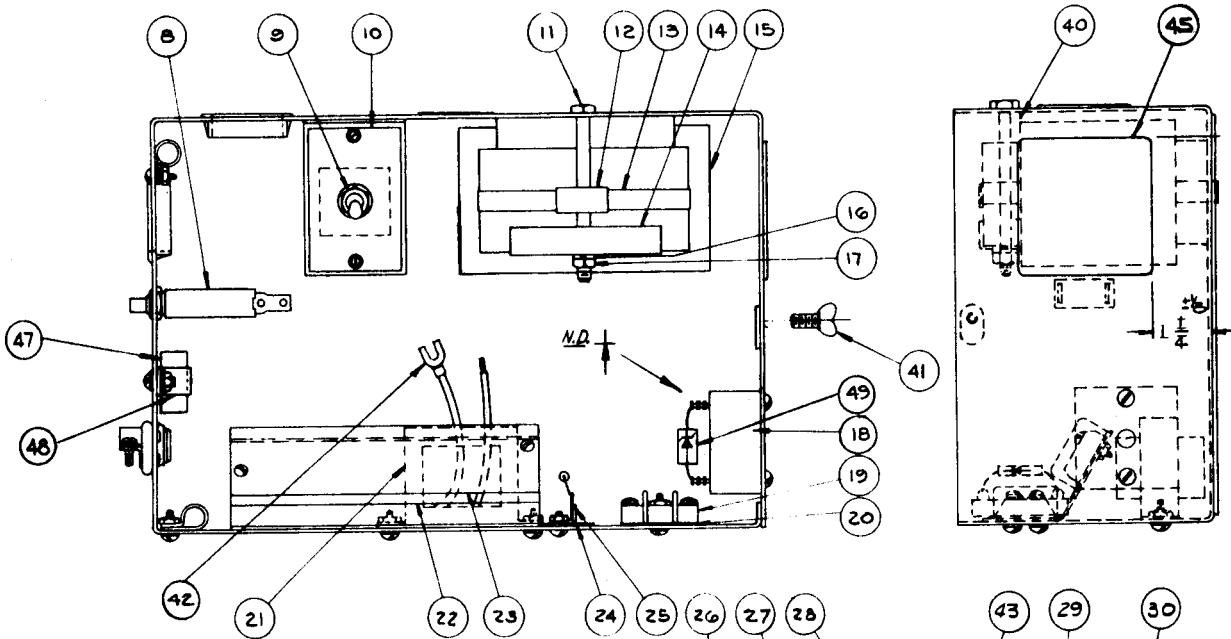
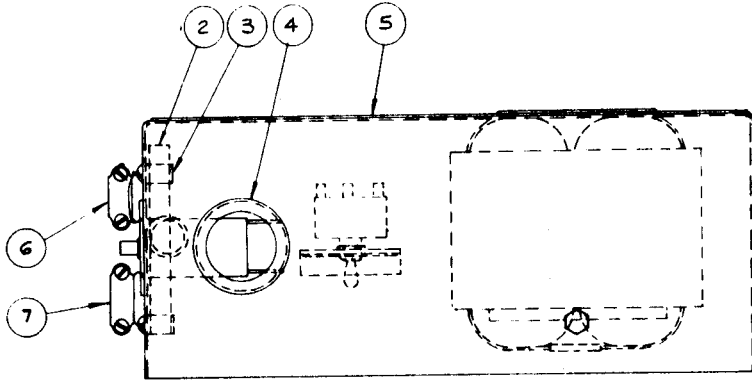


ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9
1	Wire Reel Mount Frame	M-11100	1	x		
3	Lockwasher	E-106-A-5	2	x		
4	Hex Nut	1/2 - 13	4	x		
5	Lift Bale	M-11101	1	x		
6	Spring	T-10247-4	1	x		
7	Flat Washer	S-9262-37	1	x		
8	Roll Pin	T-9967-1	1	x		
9	Pull Knob	S-11038	1	x		
10	Rivet	T-10548-2	1	x		
11	Wire Reel Shaft	S-13549	1	x		
12	Snap Ring	S-9776-9	1	x		
13	Flat Washer	S-9262-53	2	x		
14	Insulating Washer	S-10773-45	1	x		
15	Insulating Washer	S-10773-46	2	x		
16	Insulating Bushing	T-12478-3	1	x		
17	Insulating Washer	S-10773-47	1	x		
18	Flat Washer	S-9262-14	1	x		
19	Lockwasher	E-106-A-5	1	x		
20	Hex Head Screw	1/2-13 x 1	1	x		
21	Flatwasher	S-9262-23	2	x		
22	Lockwasher	E-106-A-2	2	x		
23	Hex Nut	1/4 - 20	2	x		
24	Flar Head Screw	1/4 - 20 x 7/8	2	x		
25	Insulator Washer	T-11267-B	2	x		
26	Insulator Bushing	T-12444	2	x		
27	Wire Reel Cover Assembly	S-13548	1	x		
28	Wire Reel Assembly	L-4604	1	x		

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6
2	Reed Switch	S-12942-2	1		
3	Clamp	T-8970-3	2		
4	Bushing	T-12380-1	2		
5	Case Assembly	M-10754	1		
6	<del>Box Connector</del>	<del>T-9639-1</del>	1		
7	Box Connector	T-9639-2	1		
8	Circuit Breaker	T-12287-2	1		
9	Switch	T-12419	1		
10	Nameplate	T-12418	1		
11	Hex Head Screw	1/4-20 x 3-1/4	1		
14	<del>Coil Support Bracket</del>	<del>T-9590-18</del>	1		
15	Wire Feed Coil and Core Assembly	M-10751-3	1		
16	Lockwasher	E-106-A-2	1		
17	Hex Nut	1/4-20	1		
18	Mag Amp Rectifier	S-13866	1		
19	Terminal Strip	T-10951	1		
20	Number Plate	T-10726-35	1		
21	Choke	S-13149	1		
22	Number Plate	T-10726-31	1		
23	Terminal Strip	S-8542-1	1		
24	Insulation	T-11472-4	1		
25	Rectifier Assembly	T-12201-1	1		
26	Resistor	T-12300-5	1		
27	Resistor	T-12300-6	2		
28	Resistor	T-12300-5	1		
29	Rheostat	T-10812-17	1		
30	Door and Hinge Assembly	M-10639-1	1		
31	Nameplate	S-13150	1		
32	Rheostat Knob	T-10491	1		
33	Terminal Strip	T-10358	6		
34	Insulation	S-13151	1		
35	Capacitor	T-11577-9	1		
36	Resistor	T-12300-1	1		
37	Resistor	T-12300-1	1		
38	<del>Lead Clamp</del>	<del>T-12563-9</del>	3		
39	Rectifier	T-12986	2		
40	Spacer	T-3996-B-53	1		
41	<del>Wing Screw</del>	<del>T-9078-3</del>	1		
42	Terminal	S-8053-54	1		
43	Switch	T-10616-1	1		
44	Capacitor	T-11577-5	1		
45	Decal	S-13232	1		
46	Sleeving, No longer included in circuit	Do Not Replace	1		
47	<del>Thyrector Diode Assembly</del>	<del>T-12714</del>	1		
48	Clamp	T-12563-9	1		
49	Zener Diode, No longer included in circuit 500 Ohm Resistor, Not Illustrated, Below Code 5920 Only	Do Not Replace S-10404-54	1		

# REMOTE CONTROL BOX

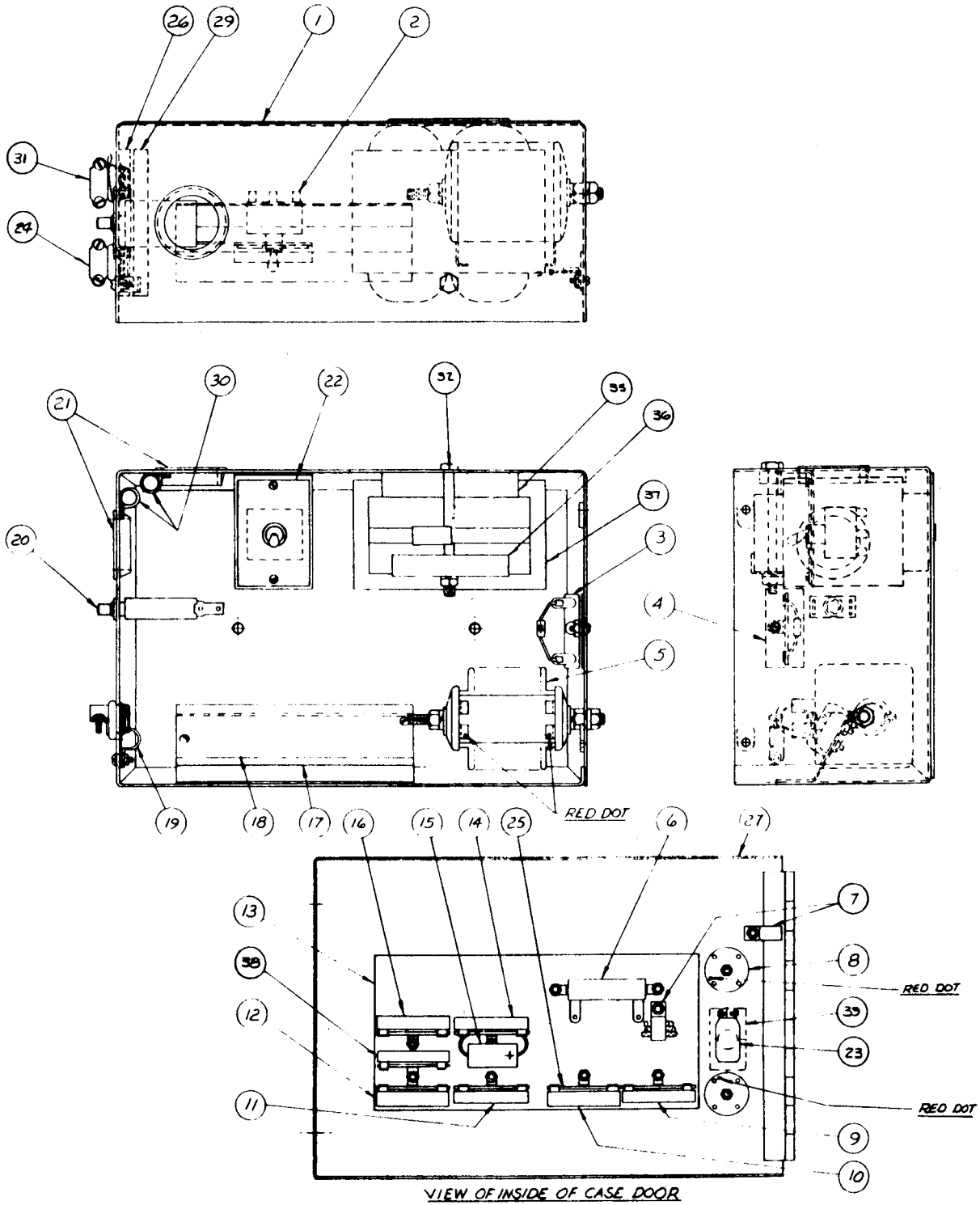
Code 5551 and Above



ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6
1	Case Assembly				
2	Switch	M-10641	1		
3	Rectifier Assembly	T-12419	1		
4	Insulation	T-12201-1	1		
5	Mag Amp Rectifier	T-11472-4	1		
6	Resistor	S-12815	1		
7	Lead Clamp	S-10404-54	1		
8	Rectifier	T-12563-7	2		
9	Resistor	T-12201-1	2		
10	Resistor	T-12300-1	1		
11	Resistor	T-12300-5	1		
12	Resistor	T-12300-1	1		
13	Insulation	T-12300-3	1		
14	Resistor	S-12993	1		
15	Capacitor	S-10404-38	1		
16	Resistor	T-10796	1		
17	Number Plate	T-12300-1	1		
18	Terminal Strip	T-10726-31	1		
19	Lead Clamp	S-8542-1	1		
20	Circuit Breaker	T-12563-7	1		
21	Bushing	T-12287-2	1		
22	Nameplate	T-12380-1	2		
23	Switch	T-12418	1		
24	Box Connector	T-10616-1	1		
25	Terminal Strip	T-9639-2	1		
26	Reed Switch	T-10358	7		
27	Door & Hinge Assembly	S-12942	1		
29	Reed Switch	M-10639	1		
30	Clamp	S-12942-1	1		
31	Box Connector	T-8970-3	4		
32	Hex Head Screw	T-9639-1	1		
35	Spacer	1/4-20 x 3-1/4	1		
36	Coil Support Bracket	T-3996-B-53	1		
37	Wire Feed Coil & Core Assembly	T-9590-18	1		
38	Resistor	M-10520-4	1		
39	Nameplate	T-12300-7	1		
		T-12517	1		
	* These parts not included on codes 5474, 5490 and 5550.				

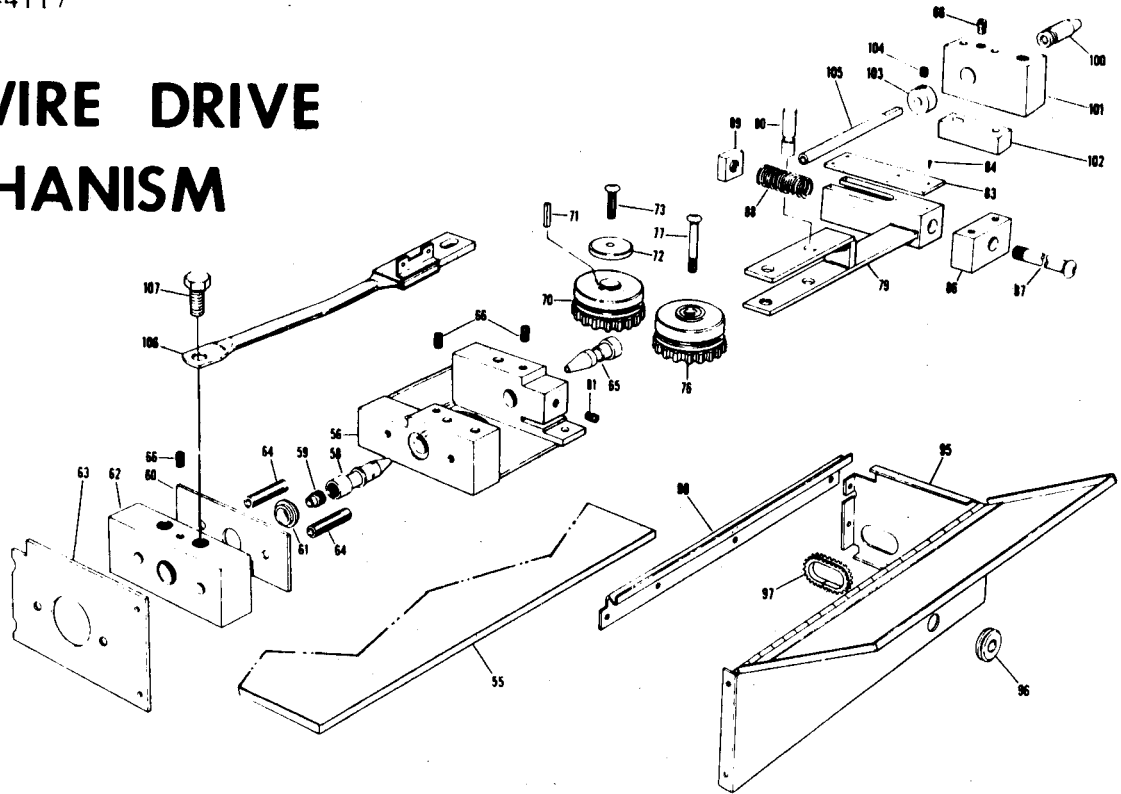
# REMOTE CONTROL BOX

Code 5550AB and Below



July 1965

# LN-5 WIRE DRIVE MECHANISM



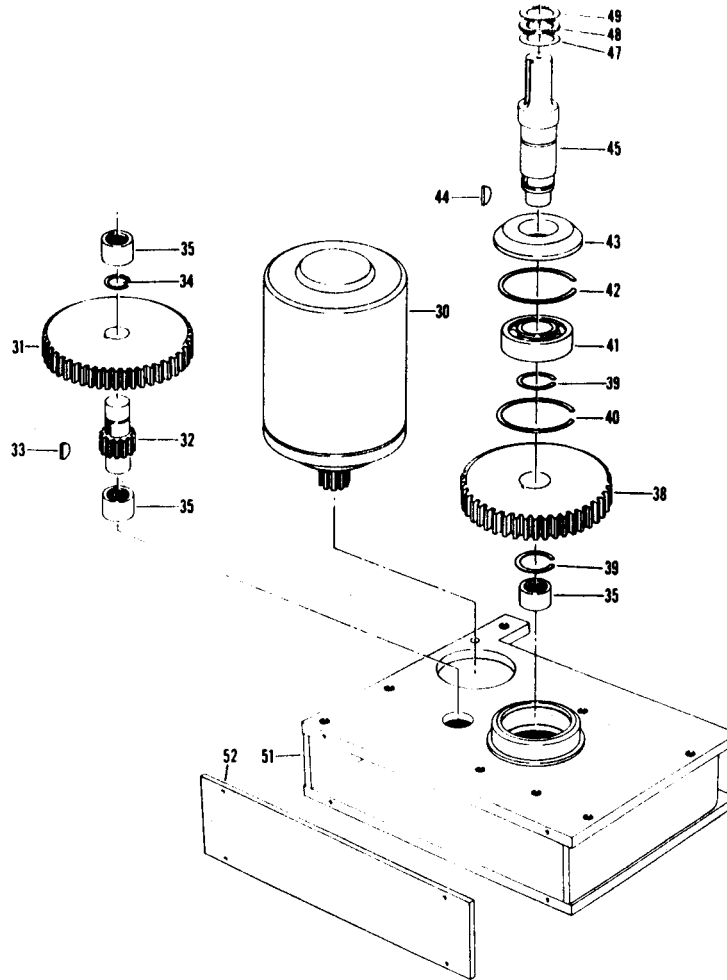
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18	19 20 21	22 23 24
55	Bakelite Panel	S-13102	1	x							
55	Bakelite Panel	S-13102-1	1	x							
56	Faceplate	M-10623	1	x							
58	Outgoing Guide	See Table	1	x							
55	Insert	See Table	1	x							
60	Insulation Plate	S-11027-7	1	x							
61	Bushing	T-12189	1	x							
62	Conductor Block	S-12908	1	x							
62	Conductor Block	S-12908-1	1	x							
63	Insulation Plate	S-11027-8	1	x							
63	Insulation Plate	See Table	1	x							
64	Bushing	M-10956	1	x							
65	Incoming Guide, 120 $\mu$ & 120 $\mu$ Wire	T-7305-28	2	x							
66	Set Screw	See Table	1	x							
70	Drive Roll	S-11604-11	4	x							
71	Key	T-12057-120	1	x							
72	Collar	M-8776-31	1	x							
73	Button Head Socket Screw	T-12341	1	x							
76	Drive Roll	T-11551-6	1	x							
77	Button Head Socket Screw	See Table	1	x							
79	Yoke Assembly	T-11551-5	1	x							
80	Pivot Pin	S-12981	1	x							
81	Set Screw	T-12206-2	1	x							
83	Set Screw	S-11604-1	1	x							
84	Nameplate	S-12982	1	x							
84	Drive Screw	S-8025-51	3	x							
86	Spring Block	T-12357	1	x							
87	Button Head Socket Screw	T-12357	1	x							
88	Spring	T-11551-7	1	x							
89	Nut	T-10247-7	1	x							
	Cable Clamp, Not Illustrated	T-12356-1	1	x							
	Clamp Mounting Block, Not Illustrated	T-12455	1	x							
95	Drive Roll Assembly, Lower	T-12404	1	x							
95	Drive Roll Assembly, Upper	S-12987	1	x							
96	Grommet	M-10960	1	x							
97	Caterpillar Grommet	S-10255-6	1	x							
98	Support	T-12873-1	1	x							
100	Incoming Guide	M-10958	1	x							
101	Contact Block	T-12272	1	x							
102	Spacer Block	S-11401	1	x							
103	Collar	S-10509-77	1	x							
104	Set Screw	T-12763	1	x							
105	Guide Tube	S-11604-19	1	x							
106	Shunt	S-13391	1	x							
107	Hex Head Screw	M-11285	1	x							
		1/2-13 x 1	2	x							

For Codes Below 6000, use the parts marked "X" in Column 1.  
For Codes Above 6000, use the parts marked "X" in Column 2.

Wire Size	Conversion Kit*	Item 58	Item 59	Item 65	Item 70	Item 76
.035	T-12382-.035	S-12548-.045	S-12553-.045	S-13465-.045	S-13343-.035	S-12722-.035
.045	T-12382-.045	S-12548-.045	S-12553-.045	S-13465-.045	S-13343-.045	S-12722-.045
1/16	T-12382-1/16	S-12548-1/16	S-12553-1/16	S-13465-1/16	S-13343-1/16	S-12722-1/16
.068	T-12382-3/32	S-12554-3/32	S-12725-3/32	S-13465-3/32	T-12057-3/32	S-12722-3/32
5/64	T-12382-3/32	S-12554-3/32	S-12725-3/32	S-13465-3/32	T-12057-3/32	S-12722-3/32
3/32	T-12382-3/32	S-12554-3/32	S-12725-3/32	S-13465-3/32	T-12057-3/32	S-12722-3/32
7/64	T-12382-.120	S-12554-.120	S-12725-.120	S-13465-.120	T-12057-.120	S-12722-.120
.120	T-12382-.120	S-12554-.120	S-12725-.120	S-13465-.120	T-12057-.120	S-12722-.120

\* Includes Items 58, 59, 65, 70 and 76

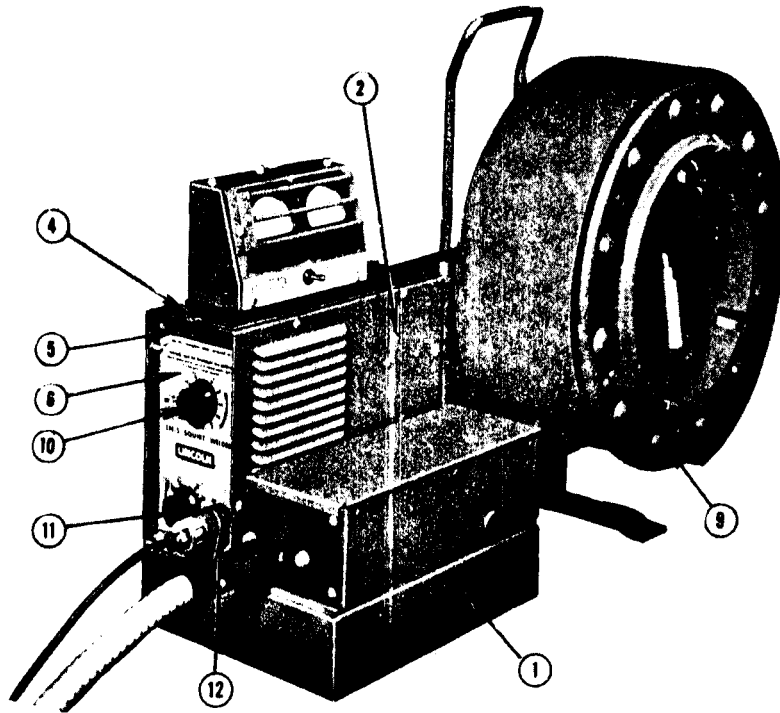
# LN-5 WIRE DRIVE MOTOR AND GEAR BOX



For Codes Below 6300, use the parts marked "X" in Column 1.  
For Codes Above 6300, use the parts marked "X" in Column 2.

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	
30	Drive Motor, Includes Pinion Gear	S-12988 <sup>a</sup>	1	x .	.				
	Drive Motor, Includes Pinion Gear	S-13766	1	. x					
	Pinion Gear (For S-12988 Motor Only)	S-12760	1	x .	.				
	Pinion Gear	S-13767	1	. x	.				
	Roll Pin, Gear to Shaft	T-9967-16	1	x x	.				
	Plug	T-10662	1	x x					
	Gear Box, Includes Items 31 Thru 52	G-1211	1	x x	.				
31	Helical Gear	S-12761	1	x x					
32	First Drive Shaft	S-13094	1	x x					
33	Woodruff	#304	1	x x					
34	Snap Ring	T-8856	1	x x					
35	Needle Bearing	S-10116-3	3	x x					
38	Drive Gear	S-8508-1	1	x x					
39	Snap Ring	T-9343	2	x x					
40	Snap Ring	T-8857	1	x x					
41	Bearing	M-9300-7	1	x x					
42	Snap Ring	S-11910-1	1	x x					
43	Slinger	S-11044-9	1	x x					
44	Woodruff Key	#404	1	x x					
45	Drive Shaft	S-12907	1	x x					
47	Flat Washer	S-9262-50	As Req'd	x x					
48	Flat Washer	S-9262-73	As Req'd	x x					
49	Spacer	T-11116-3	1	x x					
51	Gear Case	L-4280	1	x x					
52	Case Front Cover	T-12353	1	x x					
	<sup>a</sup> Order Newer S-137-6 Motor Assembly								

# LN-5 GENERAL ASSEMBLY



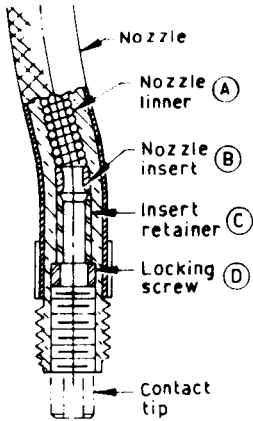
For Codes Below 6000, use the parts marked "X" in Column 1.  
For Codes Above 6000, use the parts marked "X" in Column 2.

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9	10 11 12
1	Base	M-10630	1	x .			
1	Base	M-10630-1	1	. x			
	Round Head Screws and Lockwasher; Panels, Drive Roll Cover and 60# Reel to Base						
2	Side Panel	T-10082-5	9	x x			
		M-10620	1	x .			
2	Side Panel	M-11096	1	. x			
	Side Panel Insulation	S-12932	1	x .			
	Side Panel Insulation	S-12932-2	1	. x			
	Handle, Not Illustrated	S-13010	1	x .			
	Handle Spacer	T-12474	1	x .			
4	Top and Side Cover Assembly	M-10689	1	x .			
4	Top and Side Cover Assembly	M-10689-1	1	. x			
	Plug Button, Fill Hole in Top Cover	T-10397-7	1	x .			
	Plug Button, Fill Hole in Top Cover	T-10397-3	1	. x			
5	Front Control Panel	S-12983-1	1	x x			
	Back Panel	S-12983-2	1	x .			
	Back Panel	S-12983-3	1	. x			
	Decal, Mounts on Back Panel	S-12896	1	x x			
6	Nameplate (Constant Voltage Power Sources)	M-10622-C	1	x x			
6	Nameplate (Variable Voltage Power Sources)	M-10622-V	1	x x			
	Self Tapping Screw, Nameplate Mounting	S-8025-12	4	x x			
9	60# Reel and Mounting Assembly, Includes 60# Reel Mounting Parts	L-4514	1	. x			
		See P-105-H	1	. x			
	Reel	L-4604	1	x x			
	LN-5E Wire Extension Parts	See P-105-K & L	1	. x			
10	Rheostat, Upper	T-10812-26	1	x x			
11	Rheostat, Lower	T-10812-17	1	x x			
	Rheostat Knob	T-10491	2	x x			
12	Polarized Receptacle, Front Panel	S-12021-3	1	x x			
	ELECTRICAL PARTS NOT ILLUSTRATED						
	Polarized Receptacle, Back Panel	S-12021-13	1	x x			
	Female Socket, Internal Leads to Motor	T-12393	1	x x			
	Toggle Switch, Direction of Wire Feed	T-11160	1	x x			
	Relay	S-12807	1	x x			
	Relay Mounting Bracket	S-13002	1	x .			
	Terminal Strip, Back of Relay	T-10358	1	x x			
	Insulation, Back of Relay	T-11472-4	1	x .			
	Insulation, Back of Relay	T-8477-13	1	. x			
	Resistor	T-9512-10	1	x x			
	Capacitor	S-13490-1	1	. x			

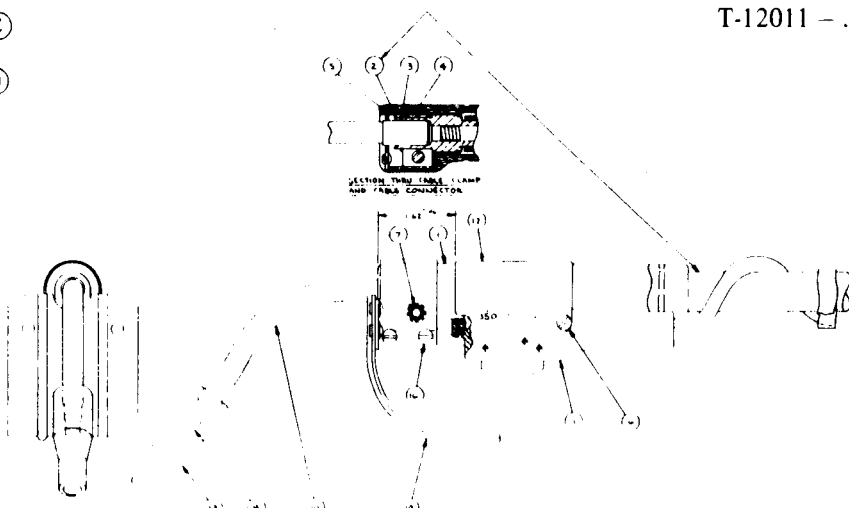




### K-126 SQUIRTGUN AND CABLE



NOTE 1: For old contact tips (length 7/8") used only with nozzles made before Fall 1968, order:  
 T-12011 - 5/64"  
 T-12011 - 3/32"  
 T-12011 - .068



NOTE: In 1977 the semiautomatic guns were redesigned to conform to NEMA standards. To identify a new design gun an ampere rating is stencilled on the "Clamp" (item 12).

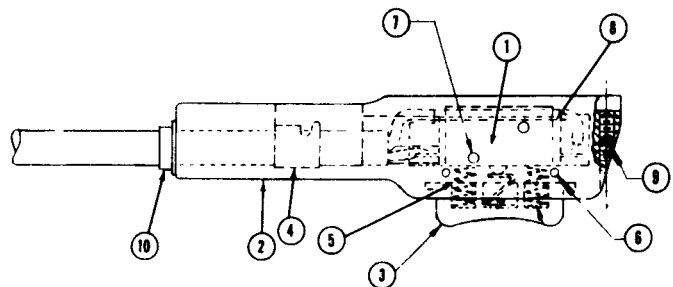
K-126 - Parts List P-103-J

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Gun & Cable Assembly	1
1	Handle	1
2	Conductor Cable, Includes:	1
2A	Handle & Stiffener, Wire Feeder End	1
2B	Connector, Wire Feeder End	1
2C	Connector, Gun End	1
2D	Clamping Tube, Both Ends	2
3	Snap Ring	1
4	Clamp	1
5	Spatter Shield	1
6	Pan Head Screw	4
7	Socket Head Cap Screw	1
8	Contact Tip, 5/64" Electrode (Length 1-1/8")	1
	Note 1	As Req'd.
8	Contact Tip, 3/32" Electrode (Length 1-1/8")	1
	Note 1	As Req'd.
8	Contact Tip, .068" Electrode (Length 1-1/8")	1
	Note 1	As Req'd.
10	Nozzle, Includes:	1
10A	Nozzle Liner, Tight Wound Steel Spring	1
10B	Nozzle Insert	1
10C	Nozzle Insert Retainer	1
10D	Liner Locking Screw	1
11	Trigger & Control Cable Assembly	1
	Assembly Parts	See P-103-K
12	Clamp	1
13	Insulated Guide, 2-3/4" Electrical Stickout	1
13	Thread Protector, 3/4 to 1-1/2" Stickout	1
14	Heat Shield Assembly	1
16	Round Head Screw	4
	Adapter Kit to Use K-126 with MN-1 or ML-3	1
	Adapter Kit to Use K-126 with ML-2	1

### TRIGGER AND CONTROL CABLE ASSEMBLY

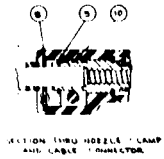
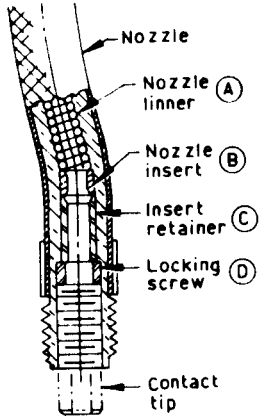
Cable Assembly - Parts List P-103-K

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Trigger & Control Cable Assembly, Includes:	1
1	Micro-Switch	1
2	Switch Pod	1
3	Trigger Assembly	1
4	Cord Clamp	1
5	Coil Spring	2
6	Roll Pin	2
7	Roll Pin	2
8	Insulating Sleeving	1
9	Set Screw	1
12	Polarized Plug, Wire Feeder End, Not illus.	1
12A	Clamp at Polarized Plug	1

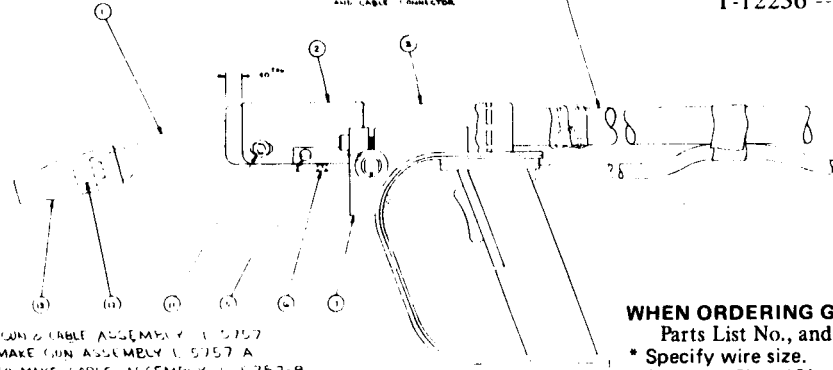


# K-116 SQUIRTGUN AND CABLE

(P-103-G)



NOTE 1: For old contact tips (length 7/8") used only with nozzles made before Fall 1968, order:  
T-12236 - .120  
T-12236 - 7/64"  
T-12236 - 3/32"



ASSEMBLE ALL PARTS TO MAKE GUN & CABLE ASSEMBLY L-5757  
ASSEMBLE ITEMS 3 THRU 20 TO MAKE GUN ASSEMBLY L-5757 A  
ASSEMBLE ITEMS 24 THRU 42 TO MAKE CABLE ASSEMBLY L-5757-B

WHEN ORDERING GIVE: Item No., Part Name, Parts List No., and Gun  
\* Specify wire size.  
† Specify 15' or 10' cable as appropriate.

NOTE: In 1977 the semiautomatic guns were redesigned to conform to NEMA standards. To identify a new design gun an ampere rating is stenciled on the handle of "Assembly" (item 7).

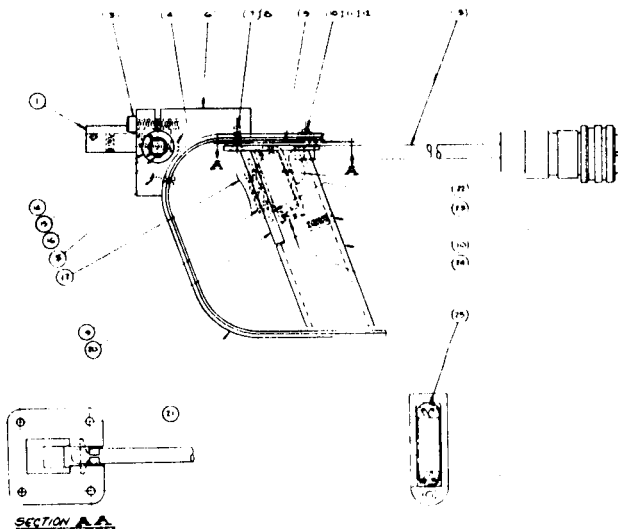
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Gun & Cable Assy. - .120" & 7/64" Electrode	1
	Gun & Cable Assy. - 3/32" Electrode	1
1	Nozzle, Includes:	1
1A	Nozzle Liner, Tight Wound Steel Spring	1
1B	Nozzle Insert	1
1C	Nozzle Insert Retainer	1
1D	Liner Locking Screw	1
2	Switch Housing Clamp	1
3	Handle	1
4	15' Conductor Cable, Includes:	1
4	10' Conductor Cable, Includes:	1
4A	Handle, Wire Feeder End	1
4B	Connector, Wire Feeder End	1
4C	Connector, Gun End	1
4D	Clamping Tube, Both Ends	2
5	Pan Head Screw	4
6	Socket Head Screw	2

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
7	Handle & Control Cable Assy. - 15' Length	1
7	Handle & Control Cable Assy. - 10' Length	1
	Assembly Parts See P-103-H	
8	Spatter Shield	1
9	Snap Ring	1
10	Clamp	1
11	Socket Head Cap Screw	1
12	Contact Tip (Length 1-1/8") Note 1	As Req'd.
13	Insulated Guide, 2-3/4" Electrical Stickout	1
13	Insulated Guide, 3-3/4" Electrical Stickout	1
13	Insulated Guide, 1-1/4" Electrical Stickout	1
	Adapter Kit to Use K-116 with MN-1 & ML-3 (Not Illustrated)	1
	Adapter Kit to Use K-116 with ML-2 (Not illus.)	1

March 1979

# K-116 SQUIRTGUN HANDLE AND CONTROL CABLE

(P-103-H)

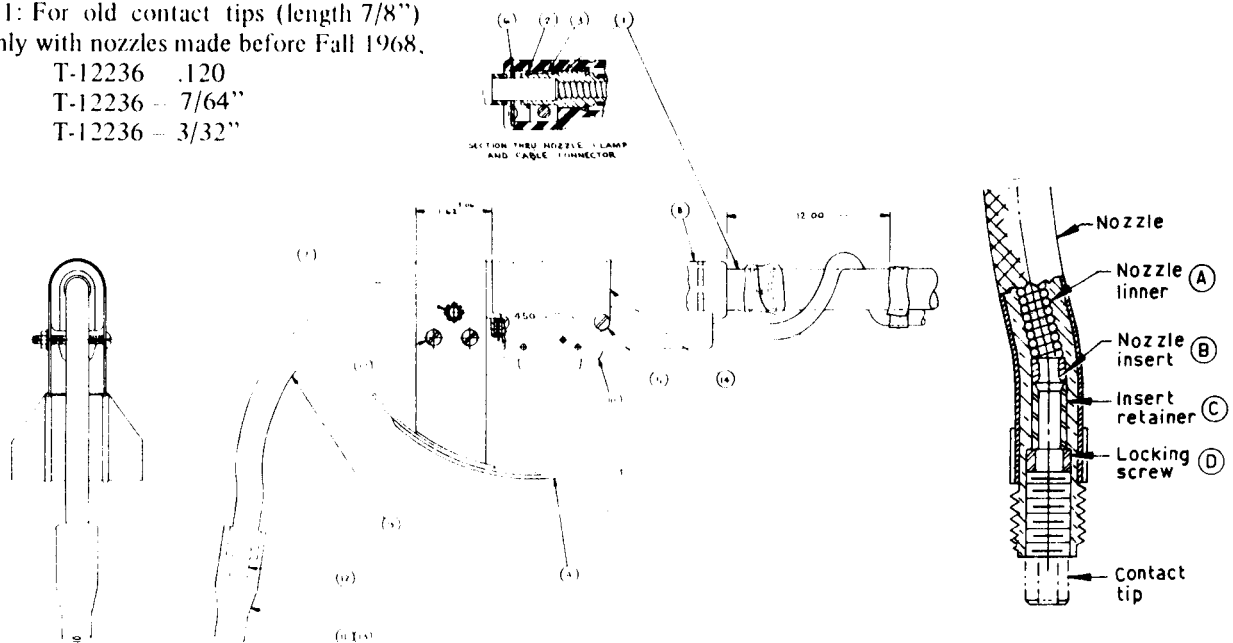


ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Handle & Control Cable Assy. - 15' Length	1
	Handle & Control Cable Assy. - 10' Length	1
1	Handle Mounting Bracket	1
3	Socket Head Cap Screw	1
4	Socket Head Cap Screw	2
5	Round Head Screw	2
6	Handle Pivot Block	2
7	Flat Head Screw	2
8	Lockwasher	2
9	Insulating Pad	1
10	Flat Head Screw	3
11	Lockwasher	2
12	Hex Nut	2
13	Control Cable Includes: 15' Length	1
13	Control Cable Includes: 10' Length	1
13A	Micro Switch	1
13B	Polarized Plug, Wire Feeder End	1
13C	Clamp at Plug	1
14	Friction Bushing	2
15	Handle Pivot Shaft	1
16	Snap Ring	2
17	Trigger Assembly	1
19	Spring	2
20	Trigger Mounting Block	1
21	Gun Shield	1
22	Roll Pin	2
23	Roll Pin	2
24	Handle	1
25	Switch Insulation	1

March 1979

## K-115 SQUIRTGUN AND CABLE

NOTE 1: For old contact tips (length 7/8")  
used only with nozzles made before Fall 1968,  
order:  
T-12236 .120  
T-12236 - 7/64"  
T-12236 - 3/32"



WHEN ORDERING GIVE: Item No.,  
Part Name, Parts List No., and Gun

\* Specify wire size.

† Specify 15' or 10' cable as appropriate.

NOTE: In 1977 the semiautomatic guns were redesigned to conform to NEMA standards. To identify a new design gun an ampere rating is stencilled on the "Switch Housing Clamp" (item 14).

Parts List P-103-F

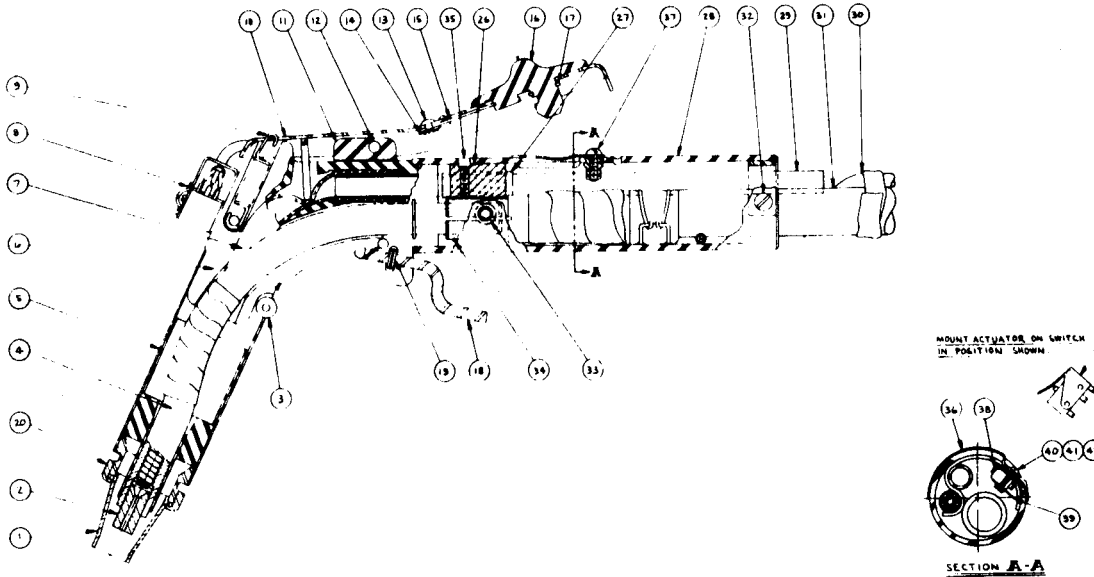
ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Gun & Cable Assy. (82° Nozzle) - .120 & 7/64" Wire	1
	Gun & Cable Assy. (82° Nozzle) - 3/32" Wire	1
	Gun & Cable Assy. (45° Nozzle) - .120 & 7/64" Wire	1
	Gun & Cable Assy. (45° Nozzle) - 3/32" Wire	1
1	Conductor Cable, Includes:	
1A	Handle, Wire Feeder End	1
1B	Connector, Wire Feeder End	1
1C	Connector, Gun End	1
1D	Clamping Tube, Both Ends	2
2	Snap Ring	1
3	Clamp	1
4	Heat Shield Assembly	1
5	Pan Head Screw	4
6	Splatter Shield	1
7	Socket Head Screw	1
8	Handle	1
9	Nozzle (82°), Includes:	1

Parts List P-103-F

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
9	Nozzle (45°), Includes:	1
9A	Nozzle Liner, Tight Wound Steel Spring	1
9B	Nozzle Insert	1
9C	Nozzle Insert Retainer	1
9D	Liner Locking Screw	1
10	Trigger & Control Cable Assembly	1
	Assembly Parts	
11	Insulated Guide, 2-3/4" Electrical Stickout	1
11	Insulated Guide, 3-3/4" Electrical Stickout	1
11	Insulated Guide, 1-1/4" Electrical Stickout	1
12	Contact Tip (Length 1-1/8") Note 1	As Req'd.
14	Switch Housing Clamp	1
15	Shield Mounting Block	1
17	Round Head Screw	4
	Adapter Kit to Use Squirtgun K-115 with MN-1 and ML-3 (Not Illustrated)	1
	Adapter Kit to Use Squirtgun K-115 with ML-2 (Not Illustrated)	1

March 1979

## K-114 SQUIRTGUN AND CABLE



WHEN ORDERING GIVE: Item No., Part Name, Parts List No., and Gun.

NOTE: In 1977 the semiautomatic guns were redesigned to conform to NEMA STANDARDS. To identify a new design gun an ampere rating is stencilled on the clamp of the "Clamp and Tube Assembly" (item 2).

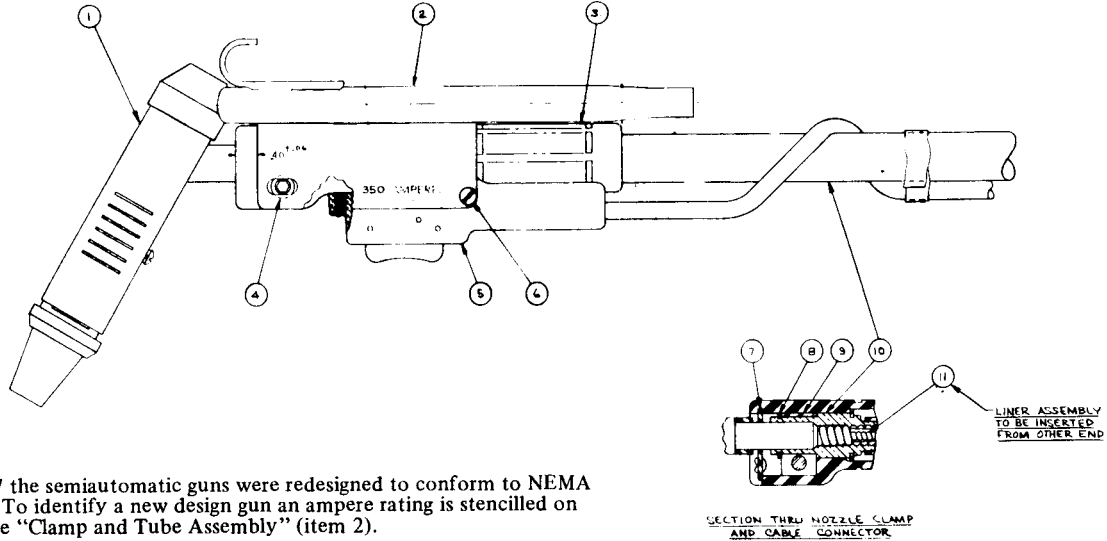
Parts List P-103-E

Parts List P-103-E

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Nozzle Flux Cone, 5/8" Opening (Standard)	1
1	Nozzle Flux Cone, 3/4" Opening (Optional)	1
1	Nozzle Flux Cone, 15/16" Opening (Optional)	1
2	Contact Tip Gun Assembly, Includes Item 3 Thru 20	As Req'd
3	Socket Head Cap Screw	1
4	Nozzle, Includes:	1
4A	Nozzle Liner, Tight Wound Steel Spring	1
4B	Liner Locking Screw	1
5	Gun Tube	1
6	Right Gun Mount	1
7	Flux Shut-Off Assembly	1
8	Receptacle Clamp	1
9	Spring	1
10	Lever	1
11	Left Gun Mount	1
12	Pivot Pin	1
13	Rivet	1
14	Rivet Burr	1
15	Spring Clip	1
16	Trigger	1
17	Snap Ring	1
18	Gun Hanger	1
19	Roll Pin	1
20	Collar Handle and Conductor Cable Assembly, Includes:	1
	Items 26 Thru 42	
26	Clamping Ring	1
27	Tube Insulator	1
28	Handle	1
29	Flux Tube	1
30	Control Cable	1

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Micro Switch	1
30A	3 Contact Receptacle, Gun End	1
30B	5 Contact Receptacle, Wire Feeder End	1
31	Conductor Cable, Includes:	1
31A	Handle and Stiffener, Wire Feeder End	1
31B	Connector, Wire Feeder End	1
31C	Connector, Gun End	1
31D	Clamping Tube, Both Ends	2
32	Flat Head Screw	2
33	Socket Head Screw	1
34	Snap Ring	1
35	Socket Head Screw	1
36	Switch Mounting Plate	1
37	Round Head Screw	3
38	Actuator	1
40	Insulation	3
40	Round Head Screw	2
41	Lockwasher	2
42	Hex Nut	2
	Nozzle Extension, 2-1/4" Stickout, Not Illus.	1
	Housing	1
	Insert	1
	Tip	1
	Nozzle Extension, 3-1/4" Stickout, Not Illus.	1
	Housing	1
	Insert	1
	Tip	1
	Adapter Kit to Use Squirtgun K-114 with MW-1 and ML-3 (Not Illustrated)	1
	Adapter Kit to Use Squirtgun K-114 with ML-2 (Not Illustrated)	1

## K-112 AND K-113 SQUIRTGUNS AND CABLES



**NOTE:** In 1977 the semiautomatic guns were redesigned to conform to NEMA STANDARDS. To identify a new design gun an ampere rating is stenciled on the clamp of the "Clamp and Tube Assembly" (item 2).

SECTION THRU NOZZLE CLAMP AND CABLE CONNECTOR

**WHEN ORDERING GIVE:** Item No., Part Name, Parts List No., and Gun (K-112 or K-113)  
K-112 is designed for 1/16" wire.  
K-113 is designed for 5/64" wire.

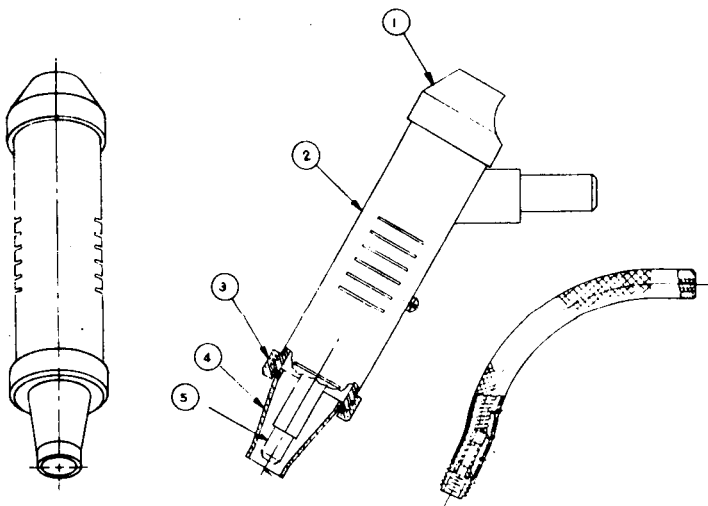
### Parts List P-103-C

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Gun Assembly (Stenciled 3/32) Gun Parts	1 See P-103-D
2	Clamp and Tube Assembly	1
3	Handle	1
4	Socket Head Cap Screw	1
5	Trigger and Control Cable Assembly Assembly Parts	1 See P-103-K
6	Pan Head Screw	4
7	Splatter Shield	1
8	Conductor Cable, Includes:	1
8A	Handle and Stiffener, Wire Feeder End	1
8B	Connector, Wire Feeder End	1
8C	Connector, Gun End	1
8D	Clamping Tube, Both Ends	2
9	Retaining Ring	1
10	Clamp	1
11	Cable Liner - For K-112 (1/16" Electrode, 350	1

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Amp Only)	
	Adapter Kit to use Squirtguns K-113 with MN-1 and ML-3 (Not Illustrated)	1
	Adapter Kit to use Squirtguns K-113 with ML-2 (Not Illustrated)	1
	Gun and Cable Assembly (5/64" Electrode) (No Electrode Size Stencil)	1
	Gun and Cable Assembly (5/64" Electrode) (Stenciled 5/64)	1
	Gun and Cable Assembly (3/32" Electrode) (Stenciled 3/32)	1
1	Gun Assembly (No Stencil)	1
1	Gun Assembly (Stenciled 5/64)	1

## GUN ASSEMBLY — SQUIRTGUNS K-112 AND K-113

### Parts List P-103-D



M-10614  
10-5-79C

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Cap	1
2	Housing & Nozzle Assembly, Includes: (5/64, No Stencil)	1
2	Housing & Nozzle Assembly, Includes: (5/64, Stenciled)	1
2	Housing & Nozzle Assembly, Includes: (3/32, Stenciled)	1
2A	Nozzle (5/64, No Stencil)	1
2A	Nozzle (3/32, Stenciled)	1
2A	Nozzle (5/64, Stenciled)	1
2A1	Nozzle Liner, Tight Wound Steel Spring (for 5/64, No Stencil)	1
2A1	Nozzle Liner, Tight Wound Steel Spring (for 5/64, Stenciled)	1
2A1	Nozzle Liner, Tight Wound Steel Spring (for 3/32, Stenciled)	1
2A2	Ceramic Insert	1
2A3	Insert Retainer	1
2A4	Hollow Lock Set Screw	1
2B	Housing	1
3	Collar	1
4	Nozzle Flux Cone	1
4	Chamfered 3/4" Nozzle Flux Cone	1
5	Contact Tip, 1/16" Electrode	1
5	Contact Tip, 5/64" Electrode	1
5	Contact Tip, 3/32" Electrode	1
	Nozzle Extension Parts	Contact Service Dept.
	* As Required	

March 1985

## HOW TO ORDER REPLACEMENT PARTS

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

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

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

## GUARANTEE

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

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

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

written authority from the Seller.

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

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

**WARRANTY SUPPLEMENT  
SEE MANUAL**



## THE LINCOLN ELECTRIC COMPANY

World's Largest Manufacturer of Arc Welding Products • Manufacturer of Industrial Motors  
Sales and Service Worldwide  
Toronto M4G 2B9 - Canada • Sydney 2211 - Australia • Rouen 76120 - France  
Cleveland, Ohio 44117-1199 U.S.A.