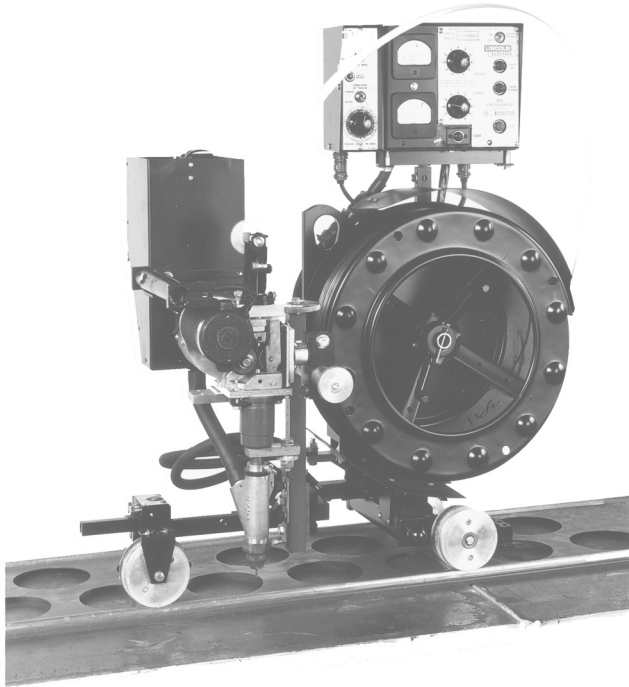




Operator's Manual

LT-7 Lightweight Tractor



For use with machines having Code Numbers:
K227, K395 and K395-1



Register your machine:
www.lincolnelectric.com/register
Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

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

SAFETY DEPENDS ON YOU

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



WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.



CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.



KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

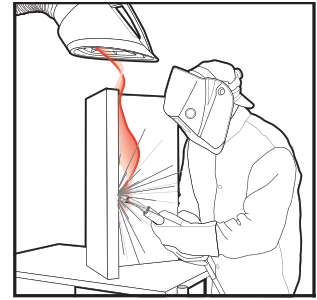
READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.



WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**



SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.



SECTION A: WARNINGS



CALIFORNIA PROPOSITION 65 WARNINGS

Diesel Engines

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

Gasoline Engines

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

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

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

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



FOR ENGINE POWERED EQUIPMENT.

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



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

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



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



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

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

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

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



ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS



- 2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines
- 2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.
- 2.c. Exposure to EMF fields in welding may have other health effects which are now not known.
- 2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:
- 2.d.1. Route the electrode and work cables together - Secure them with tape when possible.
- 2.d.2. Never coil the electrode lead around your body.
- 2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.
- 2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.
- 2.d.5. Do not work next to welding power source.



ELECTRIC SHOCK CAN KILL.



- 3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.
- 3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
 - DC Manual (Stick) Welder.
 - AC Welder with Reduced Voltage Control.
- 3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.
 - 3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.
 - 3.e. Ground the work or metal to be welded to a good electrical (earth) ground.
 - 3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
 - 3.g. Never dip the electrode in water for cooling.
 - 3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.
 - 3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.
 - 3.j. Also see Items 6.c. and 8.



ARC RAYS CAN BURN.



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



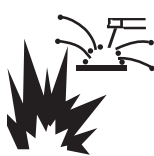
FUMES AND GASES CAN BE DANGEROUS.



- 5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**
- 5.b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.
- 5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.
- 5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.
- 5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.
- 5.f. Also see item 1.b.




WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.
- 6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.
- 6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.
- 6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).
- 6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.
- 6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.
- 6.h. Also see item 1.c.
- 6.i. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 02269-9101.
- 6.j. Do not use a welding power source for pipe thawing.



CYLINDER MAY EXPLODE IF DAMAGED.

- 7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition. 
- 7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 7.c. Cylinders should be located:
 - Away from areas where they may be struck or subjected to physical damage.
 - A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.
- 7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.
- 7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- 7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.
- 7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.



FOR ELECTRICALLY POWERED EQUIPMENT.



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

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

LT-7 TRACTOR OPERATING MANUAL

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SEC. M2 — INSTALLATION

CAUTION: A common mistake when installing these automatic wire feeders is to allow an electrically conductive path between the welding head and ground. This can happen accidentally and unknowingly, as for example if a piece of wire or an extra metal washer forms a "bridge" across an insulator or if something gets bent and touches something it should not touch. If this occurs the wire may not inch down. Another common occurrence is for leads #67 or #21 to be misconnected (or broken). In this case the wire will inch up (back up) when the start button is pushed.

To avoid these situations, be sure to use ALL insulators provided. After installation, test per table below and obtain indicated resistances. If the test results are different than the expected resistances consult the Troubleshooting Guide in the appropriate IM manual. Before consulting the manual first examine the installed wirefeeders to see if there is some conducting path between the head and the work fixture.

Test Points	Expected Resistances	Comments and Conditions
Lead #67 (#667 in NA-5 Control Box) to Electrode Wire	Zero or less than 1 ohm	Electrode wire must be in contact with assembly tip
Lead #21 (#621 in NA-5 Control Box) to work piece	Zero or less than 1 ohm	Polarity switches must be in the correct position
Lead #67 (#667 in NA-5 Control Box) to Lead #21 (#621 in NA-5 Control Box)	Greater than 15K ohms Greater than 1K ohms (NA-3, 4, LT-7)	Before testing using a 3/4" wrench disconnect the welding cable(s) from the contact assembly

Sec. M2.2.1

Mechanical Installation

The LT-7 is shipped assembled (except for the installation of the contact nozzle assembly) ready to feed 3/32" (2.4 mm) thru 3/16" (4.8 mm) diameter electrode at travel speeds from 6 to 70 in./min.

Install the contact nozzle assembly ordered separately per instructions in Sec. M2.2.6 or M2.2.7 as appropriate. Depending upon the specific joint to be welded, install the needed accessories or optional features and re-arrange the head and tractor configuration per the operating instructions in Sec. M3.

March 1978

Sec. M2.2.3

Electrical Installation

NOTE: The term constant current (CC) was formerly variable voltage (VV).

1. The LT-7 requires 350 volt-amperes of 115 volt single phase 60 or 50 Hz power. Additional power is needed

when a light (120 v-a max.) is plugged into the outlet on the bottom of the control box. This AC power is available from the recommended SAM-650, SA-800, SAF-600, DC-600, DC-1000, DC-1500, R3S-600 and R3S-800 power sources.

2. When the LT-7 is shipped, the CV-CC switch inside the control box is set to CC so it is ready to operate with a constant current power source. Be sure multi-process (SAM, SAF-600, SA-800, DC-600, DC-1000, DC-1500) power sources are set for constant current per the instructions in the power source operating manual. If using a CV power source, set the CV-CC switch to CV.

NOTE: A pigtail jumper was added to constant current boards made after the third quarter of 1976. When DC-400 or R3S type power source is used, the jumper should be connected to pin L. When another recommended Lincoln power source is used, the jumper is placed on pin H. When using these new boards the electrode will automatically stop when it touches the work while inching down on all power sources except the DC-400 or R3S machines.

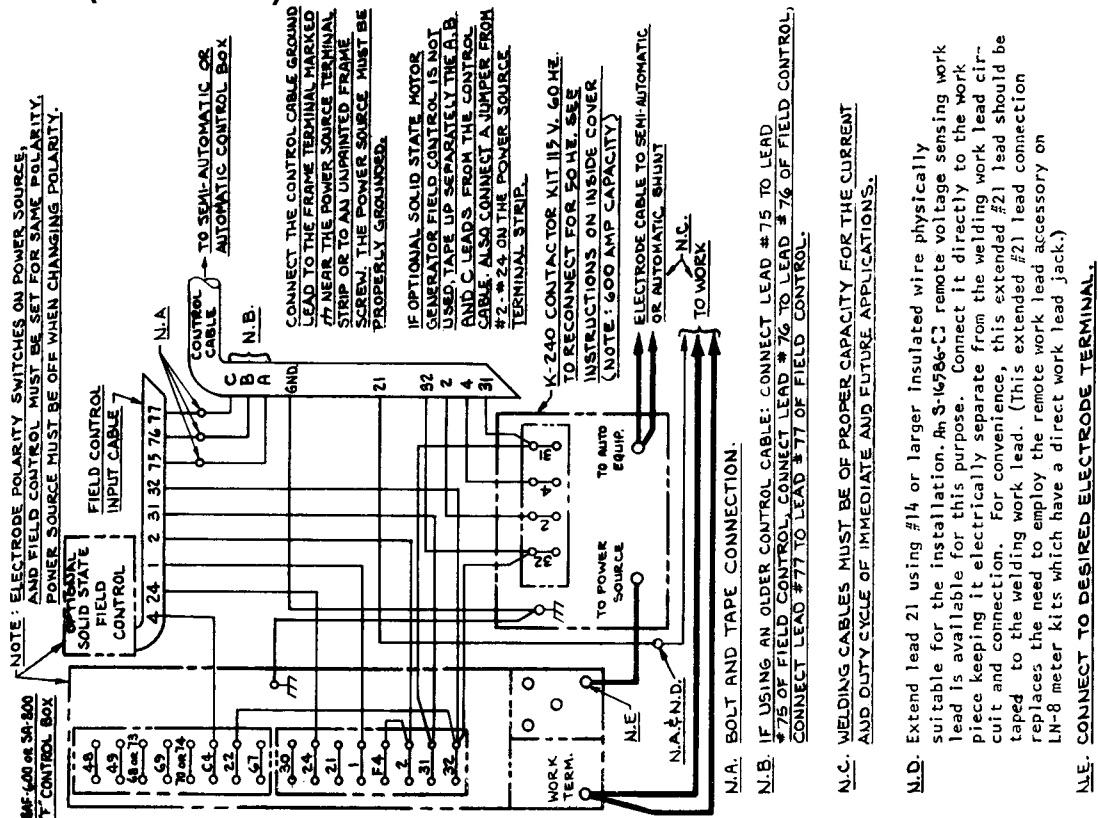
DC-400 with diode option kit K826 allows for cold starting.

3. Connect the input cable to the power source exactly as specified on the appropriate connection wiring diagram (see Sec. M2.2.4). Include all jumpers on the terminal strips as shown on the welding diagram, but do not add any jumpers not shown. If using a SAF-600 or SA-800 motor-generator power source, also include the K224 solid-state field control as shown in the diagram. To connect to other power sources, consult the factory giving full nameplate information for the power source and LT-7.
4. Thread the input cable assembly up through the strain relief ring at the rear of the tractor. Connect the polarized plug on the control cable to the mating receptacle below the control box. Connect the electrode cables to the rear tab extending out of the shunt box using the bolt and nut provided.
5. Connect the short length of electrode cable between the front tab extending out of the tractor shunt box to the contact nozzle assembly. Route this cable under the reel shield and around the right side of the mast (looking at front of tractor) over the crossbeam. See

ELECTRICAL INSTALLATION — CONT'D

Sec. M2.2.4-B

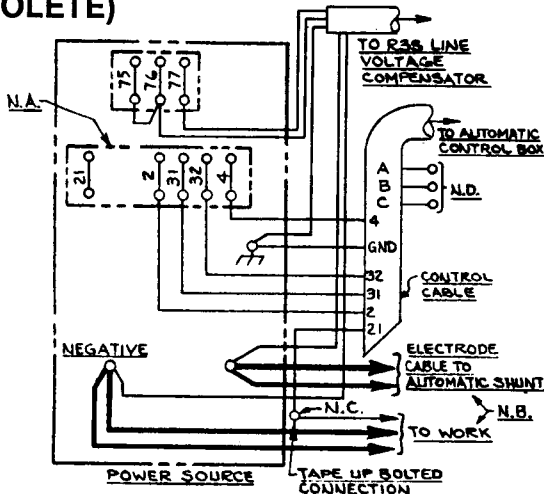
Connection of LT-7 to an SAF-600 or SA-800, "-F" With Solid-State Field Control and K240 Contactor Kit (OBSOLETE)



S15481
1-25-80

Sec. M2.2.4-C

Connection of LT-7 to an R3S-400, R3S-600 or R3S-800 With Line Voltage Compensator (OBSOLETE)



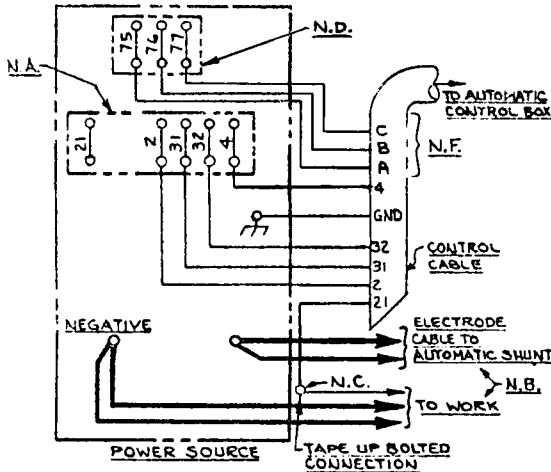
ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE
TO CHANGE POLARITY, TURN POWER OFF, REVERSE
THE ELECTRODE AND WORK LEADS AT THE POWER
SOURCE AND REVERSE THE "CONTROL SWITCH" AT THE POWER
SOURCE.

CONNECT THE CONTROL CABLE GROUND LEAD TO THE
FRAME TERMINAL MARKED #77 NEAR THE POWER
SOURCE TERMINAL STRIP OR TO AN UNPAINTED
FRAME SCREW. THE POWER SOURCE MUST BE
GROUNDED PROPERLY.

S15990
1-25-80

Sec. M2.2.4-D

Connection of LT-7 to an R3S-400, R3S-600 or R3S-800 Without Line Voltage Compensator (OBSOLETE)



N.A. ON EARLIER R3S-400, 600 & 800 MACHINES, #67 & #71 TERMINALS WERE ALSO ON THE TERMINAL STRIP.

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

N.C. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD.

N.D. UPPER TERMINAL STRIP DOES NOT APPEAR ON OLDER R3S MACHINES. LEADS A, B AND C SHOULD THEN BE TAPED UP. THERE WILL BE NO ADJUSTMENT OF VOLTAGE BY THE AUTOMATIC CONTROL BOX VOLTAGE CONTROLS.

N.E. IF A VARIABLE VOLTAGE BOARD IS PRESENT IN THE AUTOMATIC CONTROLS THE JUMPER LEAD ON THE V.V. BOARD MUST BE CONNECTED TO PIN "L".

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

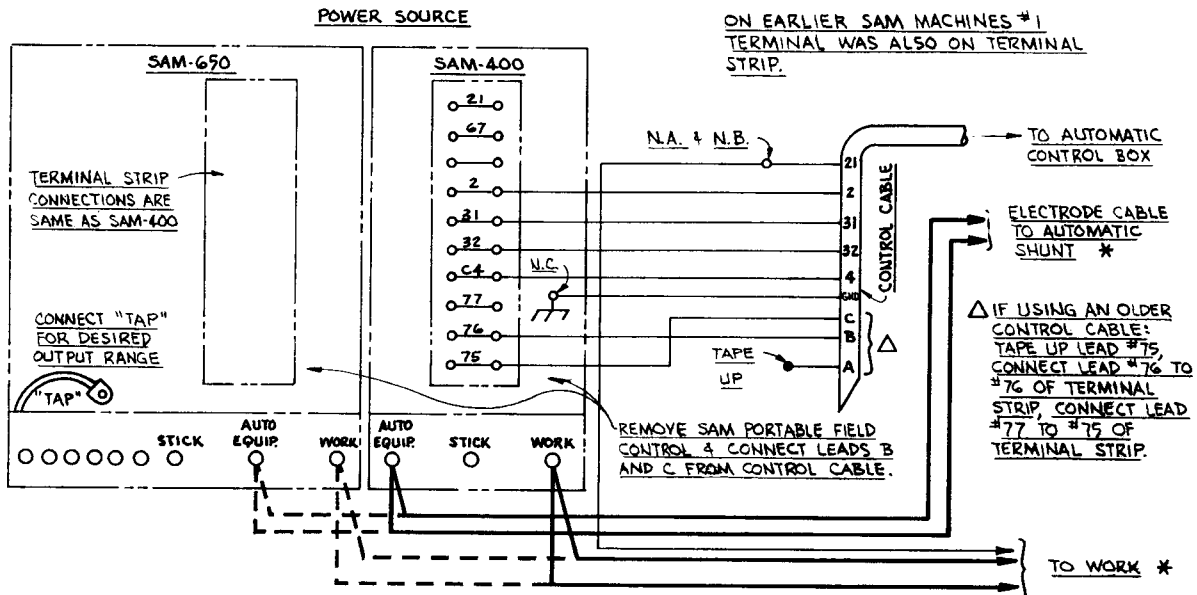
ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE TO CHANGE POLARITY, TURN POWER OFF, REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND REVERSE THE "CONTROL SWITCH" AT THE POWER SOURCE.

CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ∇ NEAR THE POWER SOURCE TERMINAL STRIP OR TO AN UNPAINTED FRAME SCREW. THE POWER SOURCE MUST BE GROUNDED PROPERLY.

S15991
1-25-80

Sec. M2.2.4-F

Connection of LT-7 to a SAM Motor-Generator (OBSOLETE) or Engine Driven Welder



ON EARLIER SAM MACHINES #1 TERMINAL WAS ALSO ON TERMINAL STRIP.

N.A. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16586-[] REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION FOR CONVENIENCE THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD.

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

N.B. TAPE UP BOLTED CONNECTION.

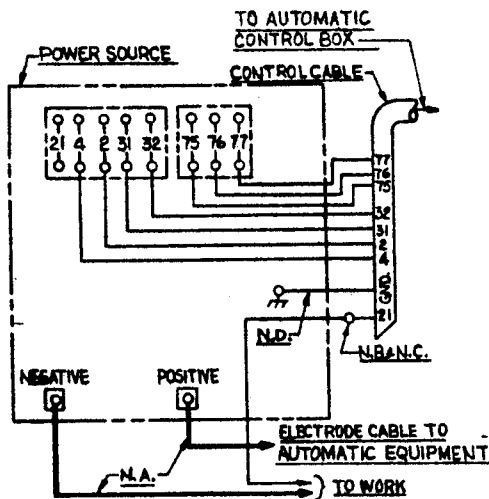
* WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.

S15265
3-28-80J

Sec. M2.2.4-J

Connection of LT-7 to DC-400 (Limited to 400 amperes)

K826 Diode Kit is required for "cold" starting applications.



ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE TO CHANGE POLARITY TURN POWER OFF. REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND POSITION THE SWITCH ON POWER SOURCE TO PROPER POLARITY. REVERSE THE LEADS ON THE BACK OF THE AMMETER AND VOLTMETER IN THE AUTOMATIC CONTROL BOX.

NOTES

- N.A. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS.
- N.B. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S-16596-C3 REMOTE VOLTAGE SENSING WORK LEAD IS AVAILABLE FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE KEEPING IT ELECTRICALLY SEPARATE FROM THE WELDING WORK LEAD CIRCUIT AND CONNECTION. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD. (IF THE LENGTH OF WORK LEAD CIRCUIT IS SHORT, AND CONNECTIONS CAN BE EXPECTED TO BE RELIABLE, THEN CONTROL CABLE LEAD #21 DOES NOT NEED TO BE EXTENDED AND CAN BE DIRECTLY CONNECTED TO TERMINAL #21 ON THE TERMINAL STRIP.)
- N.C. TAPE UP BOLTED CONNECTION.
- N.D. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED \perp NEAR THE POWER SOURCE TERMINAL STRIP. THE POWER SOURCE MUST BE PROPERLY GROUNDED.
- N.E. IF A VARIABLE VOLTAGE BOARD IS PRESENT IN THE AUTOMATIC CONTROLS AND THE DC-400 DIODE KIT IS NOT USED, THE JUMPER LEAD ON THE VV BOARD MUST BE CONNECTED TO PIN "L" TO PERMIT THE INCH DOWN BUTTON TO OPERATE. THIS JUMPER, HOWEVER, WILL DISABLE THE COLD STARTING/AUTO-STOP FEATURE OF THE AUTOMATIC CONTROLS, PERMITTING ONLY HOT STARTING TECHNIQUES TO BE USED.

SEC. M2.2.6 — K231 CONTACT NOZZLE ASSEMBLY

(Also see Sec. L2.2.7 of IM-278 for the K148 nozzle when using high currents or Linc-Fill long stickout procedures.)

Sec M2.2.6.1

For submerged arc welding using currents generally under 600 amps. Higher currents can be used but result in somewhat faster tip wear. The outer flux cone deposits flux right around the arc for full coverage with minimum flux consumption.

Contact tips for the electrode diameter specified on the order are shipped with each nozzle. A different contact tip is required for each electrode diameter used.

Installation — Nozzles ordered for 3/32" (2.4 mm) electrodes include a liner and a contact tip adjuster. Screw the adapter into the end of the nozzle and the contact tip into the adapter. Do **not** use the liner with the LT-7.

Insert the outgoing wire guide from the wire feed mechanism into the top of the nozzle and install the nozzle in position on the bottom of the wire feed mechanism. Lock it in position using the two clamps provided with the head.

Use the rubber flux hose shipped connected to the valve tube below the flux hopper. Fit the short copper tube in the other end of the rubber hose then insert the copper tube into the hole in the flux cone body. **CAUTION:** Do not push the

copper tube fully into the flux cone body because it may cause an electrical short between the cone and nozzle if the cone touches the work.

Connect the lug on the electrode cables from the tractor shunt box to the tab on the contact nozzle and tighten the bolt and nut.

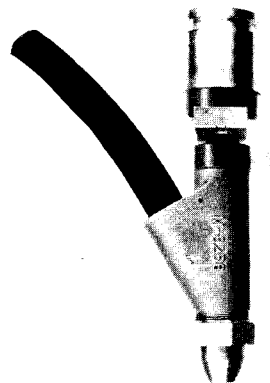
Operation — Do NOT completely straighten the electrode. A slight curvature is required in the electrode to insure good electrical contact inside the contact tip.

Maintenance — Replace the contact tip when it no longer provides accurate wire location or good electrical contact. Rusty and dirty wire or excessively high currents increase tip wear. Always keep replacement tips in stock.

To replace the contact tip, first loosen the retaining wing nut and remove the flux cone. Then unscrew the tip and replace it.

A special socket head screw holds the nozzle body to the insulator. If the nozzle body becomes loose, remove the nozzle from the head, tighten the screw and reassemble the nozzle.

March 1978



FOR SUBMERGED ARC AND WELDING WITH INNERSHIELD® ELECTRODES

K148 Contact Nozzle and K149 Linc-Fill™ Long Stickout Extension

Sec. M2.2.7

This nozzle can be used with the NA-1, NA-2, NA-3, NA-4, NA-5, LAF-3, LAF-4, LAF-5 and LT-3 wire feeders. K148-A is designed for 3/32" (2.4 mm) and 1/8" (3.2 mm) wire sizes. K148-B is designed for 5/32" (4.0 mm) and 3/16" (4.8 mm) wire. K148-C is designed for .062" (1.6 mm) to 5/64" (2.0 mm) wire.

Current Ratings

A. Without Linc-Fill Attachment

Innershield welding:

- 600 amps, 100% duty, no water cooling
- 1100 amps, 100% duty, with water cooling

Submerged arc welding:

- 1100 amps, 100% duty, no water cooling

B. With K149 Linc-Fill Attachment

Innershield or Submerged Arc Welding:

- 1100 amps, 100% duty, no water cooling

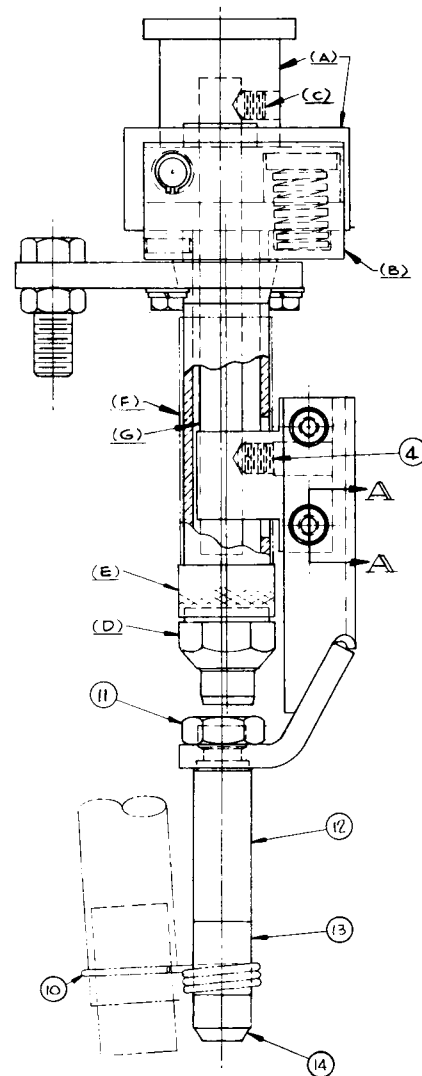
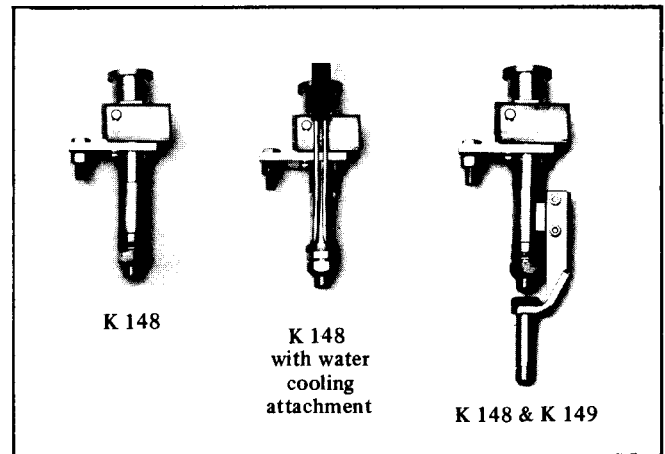
Water Cooling Attachment

When using currents over 600 amperes at high duty cycles water cooling always increases contact tip life. The cooling attachment is ordered as a separate item, Part No. T12928. Installation instructions are included in the kit.

Connect the attachment to the water supply and the drain with rubber tubing obtained locally. Water flow should be between 1/2 – 1 gallon (1.9 – 3.8 L) of tap water per minute.

K149 Installation

1. Install the K149 attachment before mounting the K148 nozzle on the welder.
2. Place a small C-clamp on the spring supporting members (A) and (B) in such a manner that the spring can be compressed. Look up the hole in the end of contact tip and tighten the C-clamp until the backup tang lifts off the surface.
3. Remove the 3/8" (9.5 mm) set screw (C) in the body (A).
4. Remove the contact tip clamping nut (D) and the contact tip.
5. Remove the brass thread protecting collar (E).
6. Remove the window cover (F) from unit.
7. Slide the center guide (G) up out of the pivot body until the tang is above the window.
8. Place the Linc-Fill guide assembly into the nozzle window, and then lower the center guide tube (G) back down to its original position.
9. Line up the spot at the top of the center guide tube (G) with the 3/8" (9.5 mm) tapped hole in the upper pivot block (A) and put the 3/8" (9.5 mm) set screw (C) back into the hole and tighten securely.



Sec. M2.2.7 (Continued)

10. Line up the lower spot in the center guide tube (G) with the 3/8" (9.5 mm) set screw (Item 4) and tighten this securely.
11. Replace the brass thread protecting collar (E). It is important that this protecting collar be pulled up against its locating shoulder, otherwise the tip locking nut will not clamp the tip securely.
12. Replace the contact tip and its clamping nut (D) and tighten securely.
13. Assemble the proper combination of extension guides (Items 12, 13 and 14) with locking nut (Item 11) for the welding procedure to be used.
14. If Submerged Arc welding is being used, screw the flux hose clamp (Item 10) onto the extension housing.

K148 Nozzle Installation

To install the nozzle on the head, insert the outgoing wire guide from the head into the nozzle assembly. Place the combined assembly in position on the bottom of the wire feed roll box. Clamp it in place using the two clamps supplied with the head.

Before pulling the clamps up tight the nozzle must be positioned relative to the travel direction as shown in Figure 1. This position is set so accidental contact between the work and the nozzle will not compress the contact pressure spring. If positioned otherwise, such accidental contact may cause arcing inside the contact tip.

After the nozzle is positioned in the proper relationship with the travel direction, the connector tab for the electrode cables can be moved to any of four positions 90° apart. To change the tab, remove the two 1/4-20 hex head screws. Tap the connector tab to loosen it from the tapered collar on the nozzle body. Turn the tab to the desired position. Replace and tighten the 1/4-20 screws.

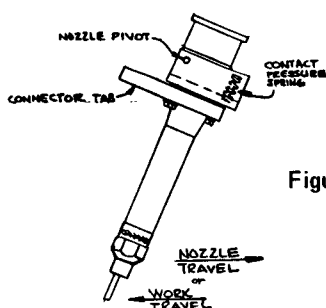


Figure 1

Operation

The same contact tip, S13763, is used for 3/32" (2.4 mm) through 3/16" (4.8 mm) diameter electrodes. S16388 is used for .062 (1.6 mm) and 5/64" (2.0 mm) electrode.

Loading of Wire

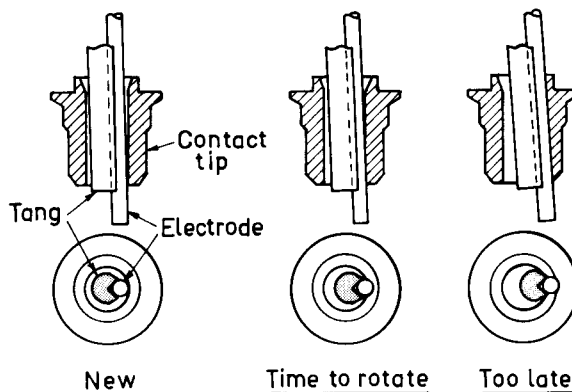
Straighten the start end of the coil for at least eight inches, pass the end down through the appropriate wire straightener. Inch the wire through the wire feeder and the nozzle. When using .062 (1.6 mm) or 5/64" (2.0 mm) Innershield electrode with a K148-C nozzle, make sure that the wire is in the "vee" groove of the pressure tang. Idle roll pressure

settings should be made per marks on the idle roll arm, except for the smaller diameter electrodes. For the .062 (1.6 mm) and 5/64" (2.0 mm) wire sizes, back off on the idle roll pressure so that there is little or no flattening of the wire.

Because the electrode is held against one point of the contact tip, it wears a groove at that point. When the groove is about one half the diameter of the electrode, rotate the contact tip to a new position per the instructions below. Careful positioning of the contact tip will provide four to six wear spots depending upon the electrode size.

When welding with the small diameter electrodes, it will be necessary to change contact position more frequently since the amount of tip wear that can be tolerated is much less. The tang should never be allowed to touch the I.D. of the contact tip. To do so will allow welding current to go through the tang, causing electrical wear and overheating of the tang and contact tip.

If the groove is allowed to wear until the tang touches the I.D. of the contact tip, welding current passes through the tang. This causes electrical wear and overheating of the tang and contact tip.



To rotate the tip, clip the end of the electrode and inch it up until it is free of the contact tip. Loosen the locking nut about one-half turn and pull the nozzle body to relieve the pressure of the tang against the inside of the contact tip hole. At this moment rotate the tip the proper amount and then retighten the locking nut.

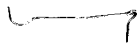
To install a new contact tip proceed as follows:

1. Clip the end of the electrode and inch it up until it is free of the tip.
2. Remove the contact tip locking nut.
3. Relieve the spring pressure of the contact tip against the steel tang in the hole of the contact tip. To do this, push the nozzle body so the steel tang is approximately centered in the 3/8" (9.5 mm) hole in the contact tip. Under these conditions the contact tip can be easily removed from the nozzle body.
4. a. Before installing the new tip, make sure the threads and the bottom surface of the nozzle are clean and bright. These surfaces are current carrying areas and must be clean.

Sec. M2.2.7 (Continued)

- b. Push the nozzle body to one side and insert the new contact tip.
5. a. Check the locking ring threads making sure they are free of any foreign material. A small application of high temperature anti-sieze compound on these threads insure a longer thread life of the two mating parts. Suggested anit-sieze compounds are Graphite grease, "Go-go No-Lok" made by Gojer Corporation, Akron, Ohio, and "Anti-Sieze and Lub. Compound" made by Never Seez Compound Corporation, 2910 A. 18th Ave., Broadview, Illinois.
b. Replace the locking ring and tighten securely.
6. Check the contact tip to be certain it is tight in the nozzle body. If the tip is not tight, arcing will take place between the tip contact surface and the nozzle contact surface which will damage the nozzle body.

February 1980



FOR SUBMERGED ARC WELDING K277 TINY TWINARC® KIT

Sec. M2.2.8

The optional K277-1 and K277-2 Tiny Twinarc kits provide the parts required to convert the LT-7 tractor, in conjunction with its optional accessories, to a tractor capable of welding all joint configurations, using Tiny Twinarc welding procedures employing either two 5/64" (2.0 mm) or two 3/32" (2.4 mm) electrodes.

The parts included in these two kits are as follows:

Kit K277-1 (For butt welds. For lap welds and horizontal fillets, also order K232.) See P-117-P for parts.

1. Double wire reel mounting frame.
2. A second five-foot reel take-off guide tube.
3. Straightener modification parts, slide bushing and guide tube support.
4. Pivot type idle roll arm.
5. Outgoing guide tube, incoming guide tube and M11609 Tiny Twinarc nozzle.
6. Flux hose and clamp.
7. Extended rear wheel support arm (for horizontal fillets).
8. Front stabilizer wheel attachment (for butts and horizontal fillets).
9. Head spring extender (for horizontal fillets and laps).
10. Drive rolls, nozzle guide tubes, and tips for 5/64" (2.0 mm) and 3/32" (2.4 mm) electrode.
11. A second wire reel.

Kit K277-2 (For 45° flat fillets and butt welds. For horizontal fillets and laps, also order K232.) See P-117-P for parts.

This kit includes all of the items mentioned in the K277-1 kit, plus the following items:

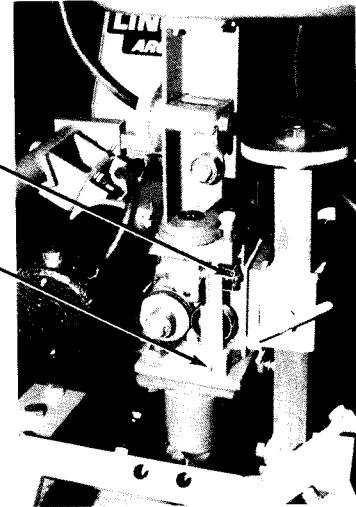
12. Travel motor lead extension cord.
13. Flat fillet wire reel frame extension bracket.
14. 45° flat fillet front wheel support assembly.
15. Rear "flat fillet" wheel support assembly.

A. Conversion of the Wire Feed Head for Tiny Twinarc (See Photo 1)

1. Straightener modification (see Figure A). Proceed as follows:
 - a. Remove the standard single wire straightener from the LT-7 tractor.
 - b. Remove and save roll pin (Item 6).

A. PRESSURE SCREW AND SPRING

B. PIVOT PIN SET SCREW AND REMOVE THE PIVOT PIN.



Twinnarc Wire Straightener and Drive Roll Assembly K277-1 and K277-2.

- c. Remove the screw bushing (Item 5).
- d. Remove the slide screw assembly (Item 4) from the single hole slide bushing (Item 8).
- e. Re-assemble the slide screw assembly (Item 4) into the unit using the new double hole slide bushing that came with the kit. (See drawing for proper orientation.)
- f. Replace the step bushing (Item 5); screw onto threads with the small end first. Tighten it back into the straightener frame until the roll pin holes in the bushing and the screw are lined up. Replace the roll (Item 6) removed in Step (b). Apply a little grease to the screw threads.
- g. Remove the nut and lockwasher from the bearing mounting screw (Item 9).
- h. Remove the 10-24 screw, lockwasher, and nut from the wire guide support (Item 2) which came with the kit, mount the support to the straightener body using the hex nut and lockwasher removed in Step (g).
- i. Install the 10-24 screw, lockwasher, and nut as shown. [Earlier straightener bodies will not have a hole to receive the screw. Use a 13/64 (.203) diameter drill bit and provide a hole for the screw.]
- j. Remove the single hole incoming guide tube from the wire feed unit and install the two hole incoming guide tube which came with the kit. Snug up the set screw into the indent of the guide tube. Do not overtighten the set screw.

Sec. M2.2.8 (Continued)

k. Install the new straightener assembly to the wire feed unit.

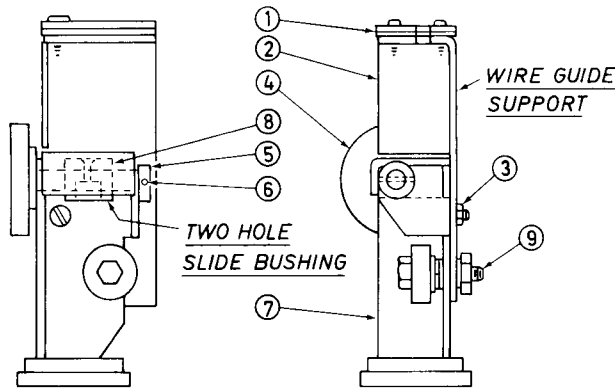


FIG. A

2. Remove the entire head assembly from the clamp block on the cross seam adjuster.
3. Remove the head mounting pivot plate and its insulation by removing the two hex bolts (See Figure B).
4. Remove the idle roll arm assembly:
 - a. Remove arm pressure screw and spring.
 - b. Loosen arm pivot pin set screw and remove the pivot pin.
5. Remove the single wire drive rolls and replace them with the Tiny Twinarc drive rolls. Install the three-roll assembly with the narrow roll sandwiched between the two wider rolls. (See Figure B.)
6. Install the kit pivot idle roll arm using the same method and parts as used on the removed idle roll arm.
7. Remount the head mounting pivot plate with its insulation which was removed in step (3). (See Figure B.)
8. Remove nozzle and hold down clamps and screws.
9. Remove the single wire outgoing guide tube by loosening its set screw and replace it with the Tiny Twinarc kit outgoing tube, being sure that the set screw seats into the relief provided in the guide tube.
10. Mount the Tiny Twinarc nozzle using the socket head screws and lockwashers supplied in the kit.
11. After making all frame modifications required in following steps (B) and (C), re-install the head assembly into the cross seam adjuster clamp block.
12. Store all parts that are removed for future use.

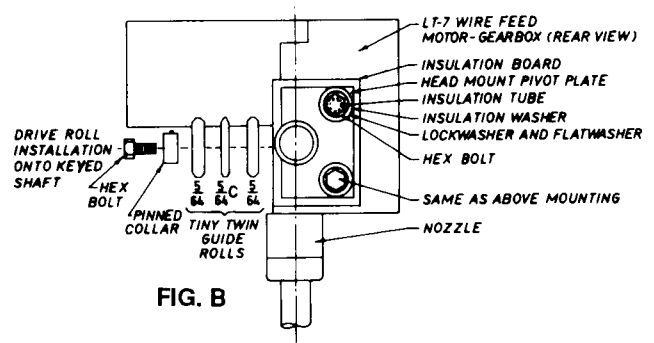
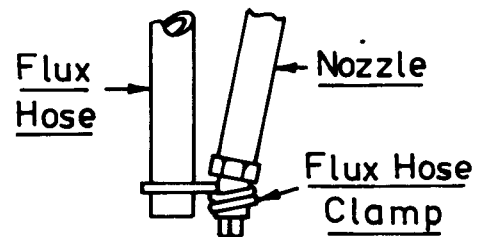


FIG. B

B. Frame Modifications for Butt Welds and Horizontal Fillet-Lap Welds

Other than the following modifications, the Tiny Twinarc LT-7 tractor is set up in the same manner as the single arc LT-7 tractor to weld the same joint configuration. (See Sec. M3.2.3, IM-279.)

1. **Frame Conversion** (for butt welds and horizontal fillets)
 - a. Remove the single wire reel frame by removing the two hex bolts and nuts securing it to the main frame of the tractor.
 - b. Mount the kit's double wire reel frame to the main frame using the same mounting method and hardware as used to secure the removed single reel frame.
2. **Butt Welds**
 - a. The flux hose tube and tip are to be replaced with the kit's flux hose without tip. The flux hose clamp is installed over the O.D. of the nozzle tip. (Make certain the tips are the proper size for the wire to be used.)



- b. The longer, 5 ft (1.5 m), kit wire guide tube is used in conjunction with the 4 ft (1.2 m) tube to guide the wire off the left reel for right side butts, and vice versa.
- c. Install the stabilizer wheel attachment to the front mast mounting arm by clamping it onto the mounting arm just behind the cross arm and extending to the left side when facing the front of the tractor. The wheel side is to be down and

Sec. M2.2.8 (Continued)

when it is clamped into place the wheel will be approximately 1/8" (3.2 mm) off the work surface. (See Figure C.)

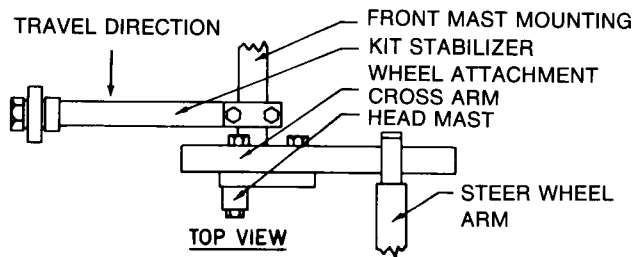
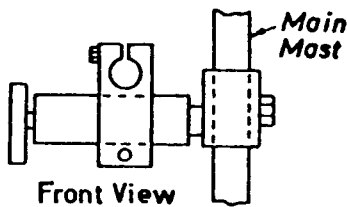


FIG. C

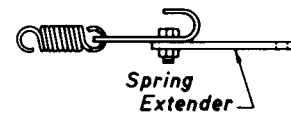
- d. For welding slightly open butt joints or prepared butt joints, the use of the K230 vee butt weld guide is recommended. See Sec. M3.2.3, IM-279, for proper installation and usage. Instructions for bar and channel tracking are also covered in Sec. M3.2.3.

3. Horizontal Fillet-Lap Welds

- a. The longer, 5 ft (1.5 m), kit wire guide tube should be used in conjunction with the 4 ft (1.2 m) tube to guide the wire off the right reel for right side fillet-laps, and vice versa.
- b. Install the kit stabilizer wheel attachment as described in Section B:2.c above.
- c. See Sec. M3.2.4 and M3.2.5, IM-279, for mounting instructions of the K232 fillet-lap guide.
- d. Right side fillet-laps are set up the same as single wire right side fillet-laps (see exception 3-e-4).
- e. Left side fillet-laps require the following modifications to the single wire set procedure:
 1. Remove the entire head assembly from the clamp block on the cross seam adjuster.
 2. Reverse the mounting of the cross seam adjuster on the LT-7 mast so it extends toward the left with the clamp block hole above the cross seam adjuster barrel. Then re-install the head assembly.



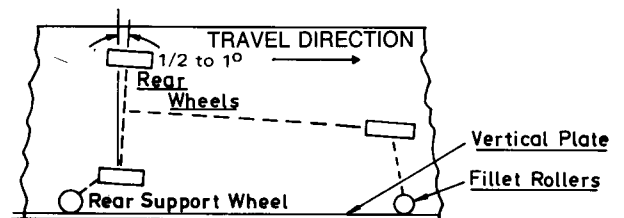
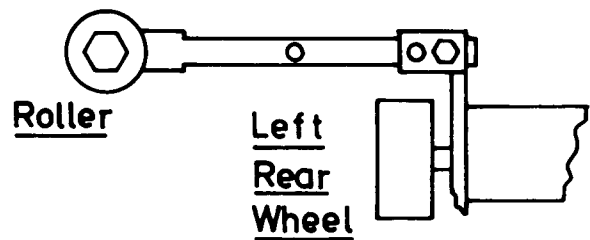
3. Bolt the kit head spring extender to the "L" hole on the LT-7 head spring hook and use the hole on the far end when installing the head spring attachment.



4. Remove the bearing roller from the rear support wheel assembly (S15280) from the K232 fillet kit. Transfer this roller to the extended rear wheel support arm which is part of the K277-1 or -2 horizontal fillet kits.

Adjust the head position with the cross seam adjuster until the rear wheels are "toed" into the vertical plate approximately 1/2 to 1 degree.

For left horizontal fillets install arm as shown below:

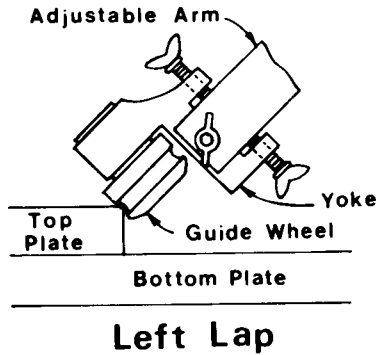


4. Horizontal Lap Welds

Left and right lap welds are set up with the same procedures and equipment used for horizontal fillets, except:

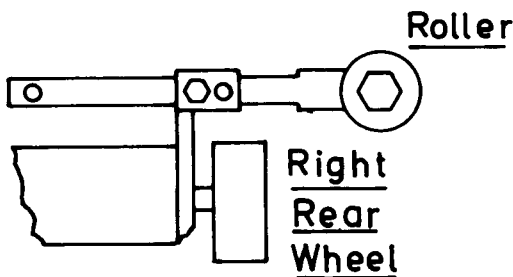
- a. The fillet wheel yoke is replaced by the lap wheel yoke (single grooved wheel) — part of the K232 kit.
 1. Lap wheel yoke mounts with the wheel on the right of yoke for left laps (vice versa for right laps).

Sec. M2.2.8 (Continued)

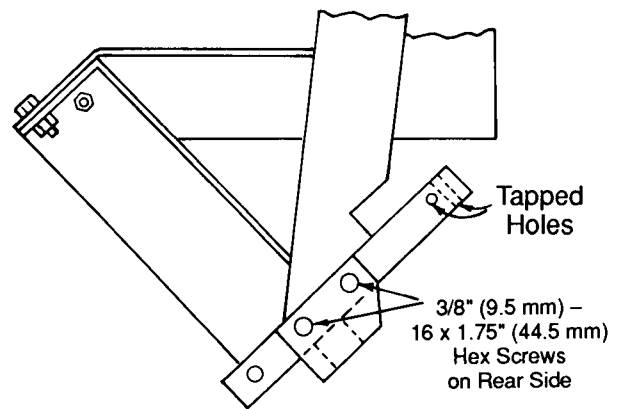


2. The lap wheel rides on the corner of the top plate of the lap joint.
- b. The rear fillet support wheel attachment is not required. For left laps the left rear wheel should be approximately 8" (2.4 m) from the seam, and for right laps the right rear wheel should be 5" (1.5 m) from the seam.

For right horizontal fillets install arm as shown below:



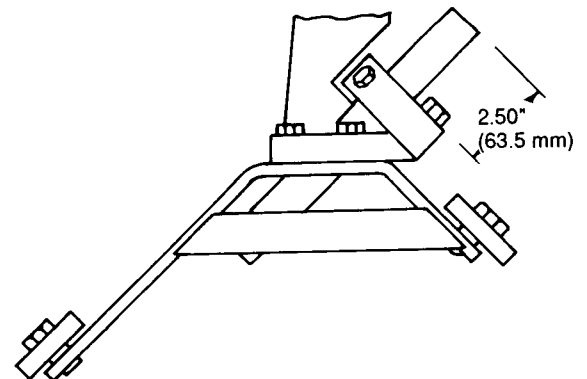
8. Remove the cross beam.
9. See Figure D and install the Twinarc wire reel extender bracket M13396 to the tractor frame using the mounting hardware from Item (4). Assemble the nuts and bolts but leave them relatively loose at this stage.
10. Take the cross beam and sandwich it between the notched vertical support arm of the bracket and the mast mounting plate of the tractor frame. The end of the cross beam with the tapped holes should be to the right and the two holes that are closest to the center of the cross beam should be used as the mounting holes. Install and tighten the 3/8" (9.5 mm) x 1.75" (44.5 mm) hex head screws that were taped to the bracket, and also tighten the two bracket mounting screws of Item (9).
11. Remove the front wheel assembly and spacer pad from the clamp arm. Install the 45° front wheel beam. The exposed end of the cross beam should be 2.50 inches (63.5 mm) for the proper positioning of the wheels with respect to work piece.



C. Frame Conversion for 45° Flat Fillets. See photos 2, 3 and 4.

Installation Procedure:

1. Shut the power off and disconnect the input cables to the LT-7 tractor.
2. Disconnect the travel drive motor and wire feed motor from the control box and then remove the control box from its mounting socket and lay the box on the floor.
3. Remove wire reel.
4. Remove the single wire reel frame by removing the two hex bolts and nuts securing it to the main frame of the tractor. (Save the mounting hardware; it will be used to remount the new wire reel extender bracket.)
5. Remove the wire feeder, flux hopper assembly and cross seam adjuster from the main mast.
6. Remove the front wheel clamp arm and front wheel assembly from the cross beam.
7. Reposition the main mast to the 45° position. (See Sec. M3.2.6, IM-279, for mast position.)



Sec. M2.2.8 (Continued)

12. See Section (A) — Conversion of the Wire Feed Head.
13. Mount the cross seam adjuster to the left of the mast with the hole in the clamp block down as shown. Centrally locate the clamp arm on the cross seam barrel within $\pm 1/4$ inch (6.4 mm).

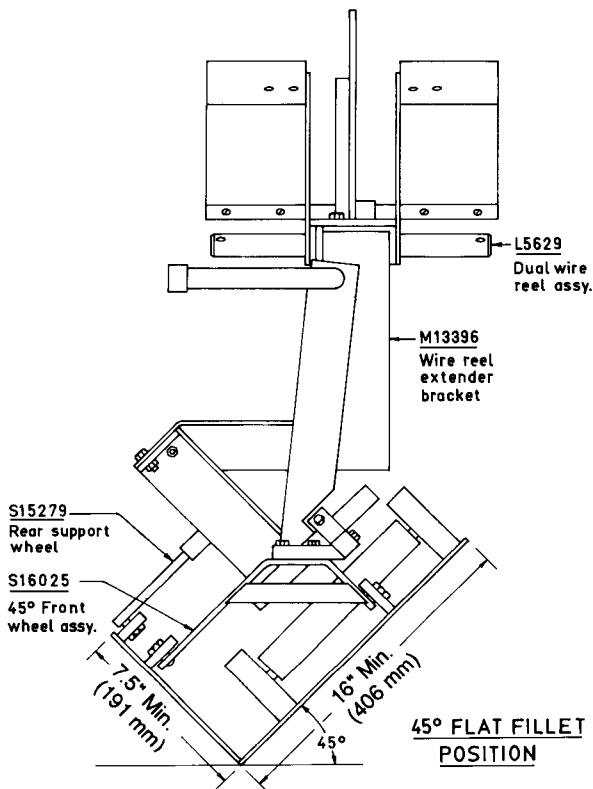
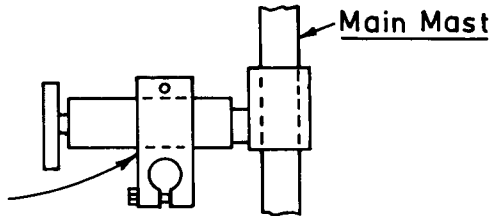
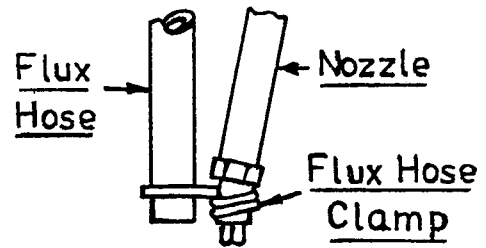
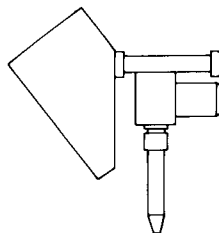


FIG. D

14. Mount the wire feeder into the clamp block.
15. Mount the flux hopper to the left side of the bumper handle as shown.
16. Screw the flux hose clamp onto the O.D. of the nozzle tip. (Make certain the tips are the proper size for the wire to be used.)



17. Install the flux tube from the hopper to the flux hose clamp. (Cut flux hose length to suit.)
18. Install the rear support wheel (S15279) with the roller down and the curved arm pointing to the rear of the tractor into the mounting socket which is on the tractor frame just in front of the travel motor.
19. Mount Twinarc dual wire reel assembly, L5629, to the wire reel extender arm. (See Figure D.) Use the two 3/8" (9.5 mm) x .875" (22.2 mm) hex head screws that come with the bracket.
20. Mount the control box into the socket which is on the end of the curved arm of the reel extender. Face of the control box should be to the left.
21. Reconnect wire feed unit to the control box.
22. Install the travel motor extension cord and connect it to the control box.
23. Reconnect the input cables to the LT-7 tractor. Retape the cable group in such a manner that any pulling strain is put onto the welding cables and not the control cable.
24. Install the two nylon wire guides (the short one to the left reel, the long guide to the right side reel).
25. Adjust the head to the proper position over the joint to be welded. (Check welding procedure parameters for proper settings.)
26. Store all parts that were removed from the tractor and that are not being used for the flat fillet welding for future use.

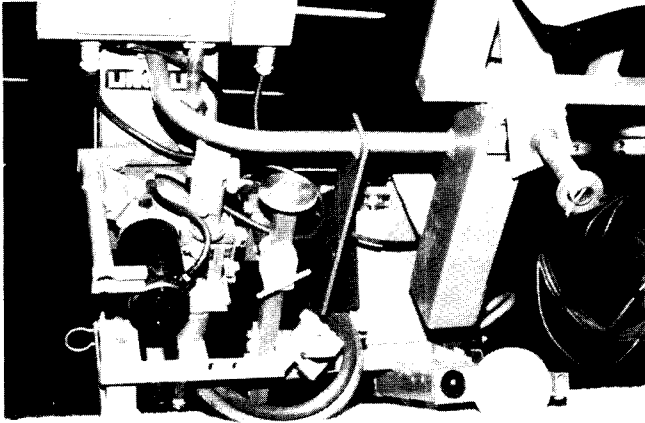
D. Making the Tiny Twinarc Weld

1. Loading the wire.
 - a. Install contact tips of the proper size into the Twinarc nozzle.
 - b. Apply a small amount of grease to each of the wire reel shafts before mounting the loaded reels to the unit.
 - c. The reels must be loaded so the right side wire uncoils with a counter clockwise rotation, while the left side wire uncoils with a clockwise rotation.
 - d. Thread the wires through their respective side of the take-off arm and through their nylon guide tubes.
 - e. Being careful not to cross the wires, pass each

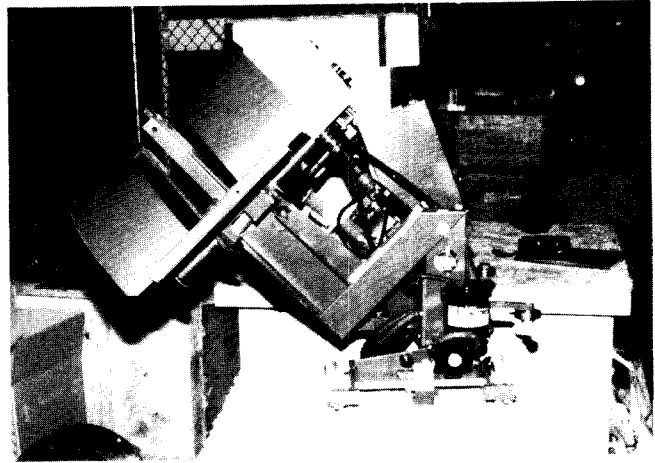
Sec. M2.2.8 (Continued)

wire through its respective hole in the straightener slide bushing and then through the incoming guide tube.

2. The Tiny Twinarc LT-7 operation is the same as that described for the single arc LT-7 operation.

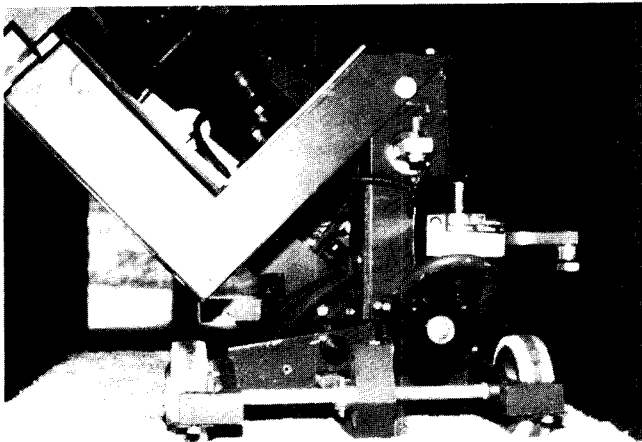


LT-7 side view with K277-2 installed.



LT-7 rear view with K277-2 set for 45° flat fillets.

February 1982



LT-7 rear view with K277-2 set for 45° flat fillets.

VERTICAL HEAD LIFT ADJUSTER

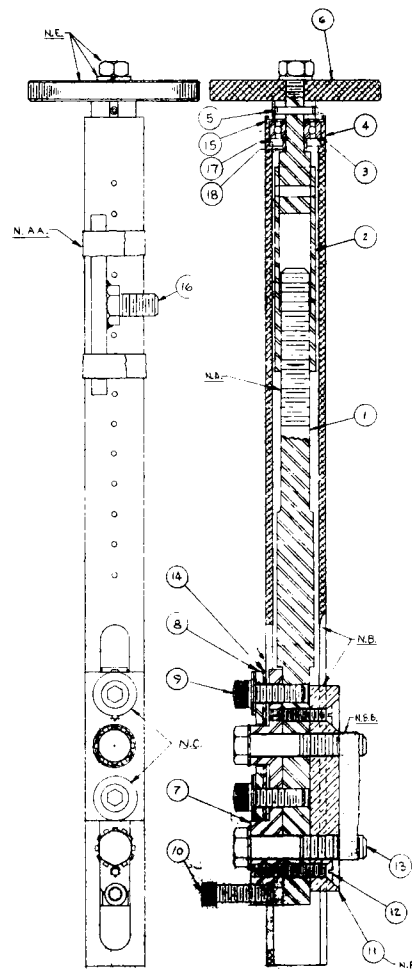
(Standard Equipment on LT-7 Tractors Above Code 7948)

Sec. M2.2.9

The vertical head lift adjuster provides 1.50 inches (38.1 mm) of travel by turning the adjusting wheel on the top of the mast. Major adjustment can be quickly made by loosening the hand operated "T" locking screw, moving the head to the required position and tightening the "T" locking screw.

1. Remove the complete wire feeder/flux hopper assembly from the vertical mast clamping screw and slide the entire assembly up and off the mast.
2. Remove the vertical mast from the tractor frame by removing the two hex head bolts which fasten the mast to the frame.
3. Remove the paper tape that is holding the two mounting screws in the vertical adjusting mast.
4. Mount the mast to the tractor frame and tighten the two mounting bolts securely.
5. Remove the hex head cross seam adjuster mast clamping screw and replace it with the "T" locking screw which is taped to the vertical lift mast.
6. Remount the complete wire feeder flux hopper assembly onto the new vertical lift mast. Lock at the desired height using the "T" locking screw.
7. Mount the hand adjusting knob, the lock washer and tighten the hold-on nut securely.
8. Store the vertical mast and hardware that was removed for future use.

December 1985



M-13334
4-8-88

Sec. M2.2.10

K395 Track Model LT-7 Tractor

Description

The K395 Track Model LT-7, or standard K227 LT-7 installed with the K400 track conversion kit (see section C), is equipped for use on the K396 Track sections. Either version permits complete use of the off-track versatility and capability of the standard K227 LT-7. See Section M2.2.11 for details on K396 track.

The Track model provides precise track guidance and positive traction for single submerged arc, or Tiny Twinarc®, welding of butt or horizontal fillet-lap joints using standard LT-7 accessories or kits (refer to appropriate sections of this Operating Manual).

FEATURES

The Track Model LT-7 provides the following assembly features not included on the standard K227 LT-7 Tractor (unless K400 Track Conversion Kit is installed).

- a. Three combination wheel assemblies:
 1. One side of each wheel assembly consists of a canvas cushion tread, as used on the standard LT-7 which permits normal “off-track” traveling.
 2. The second side of two of the wheel assemblies consists of a hardened steel grooved wheel to precisely guide on the Track rail. The front rail wheel assembly has nylon bushings and the rear rail wheel assembly does not.
 3. The second side of the gear wheel assembly consists of a hardened steel spur gear, to provide positive travel traction on the Track gear rack.
- b. A Mast Pad Extension Arm assembly and Longer Nozzle Cable, to extend the location of the head outside the right or left sides of the tractor.
- c. A Travel Control Box nameplate with dual Travel speed scales.
 1. The inside scale is calibrated for “on-track” Travel Speeds.
 2. The outside scale is calibrated for “off-track” Travel Speeds.

Control Box Mounting

The control box can be mounted so as to face forward or right using the Control Box Extension Post, or left with or without the extension post, as desired.

On-Track Setup Configuration

The Track Model tractor can be configured for left or right side welding to over 7.5 inches (191 mm) outside the right or left sides of the track sections with forward or reverse travel directions.

NOTE: Right side of tractor welding is recommended when using the K277 Tiny Twinarc® Kit to provide opti-

mum tractor stability. Left and right throughout these instructions refer to left or right when facing the front of the tractor.

The K395 LT-7 is shipped set up for right side welding as per Figure 1. If left side welding is desired, or for left or right conversion, proceed per the following instructions:

- a. Rear Wheel Configuration (refer to Figure 1)

For Left side welding, install the rail wheel assembly, without the nylon bushings, on the left side of the tractor with the grooved wheel on the outside of the combination wheel assembly. Install the gear wheel assembly on the right side of the tractor with the gear on the inside of the combination wheel assembly.

For Right side welding, install the rail wheel assembly, without the nylon bushings, on the right side of the tractor with the grooved wheel on the outside of the combination wheel assembly. Install the gear wheel assembly on the left side of the tractor with the gear on the inside of the combination wheel assembly.

NOTE: Be sure the axle keys are properly installed, and only one flatwasher should be between each wheel and its retaining snapping.

- b. Front Frame Configuration (refer to Figure 1)

1. Mount the front rail wheel assembly, with nylon bushings, to the steering assembly with the grooved wheel on the right for right side welding, or on the left for left side welding.
2. Configure the converted front steering wheel assembly so it's mounted on the right side of the clamp arm for right side welding, or on the left for left side welding. Check that the steering assembly is set for straight guidance.
3. Mount the converted front wheel clamp arm assembly to the Mast Pad Extension Arm so the clamp is about 1/4” (6.4 mm) from the forward-facing Mast pad of the arm. The mast pad should be to the right side for right side welding, or to the left for left side welding.
4. Mount the Mast pad extension arm to the rear of the tractor frame Mast pad with the extension Mast pad on the right side of the tractor for right side welding, using the two arm mounting holes furthest away from the Mast pad. For left side welding, mount the Mast pad on the left side of the tractor using the two arm mounting holes nearest to the mast pad.
5. Adjust the front wheel clamp arm so the front groove wheel aligns with the rear groove wheel.
6. Bolt the LT-7 vertical head lift adjuster to the Extension Arm Mast pad with the LT-7 head assembly mounted to the right of the Vertical head lift adjuster for right side welding, or to the left for left side welding. (See Sec. M3.2.3 and M2.2.9.)
7. Except for Horizontal Fillet-lap joint configurations (Sec. M3.2.4), the flux hopper should be mounted on the side of the head closest to Track center.

Sec. M2.2.10 (Continued)

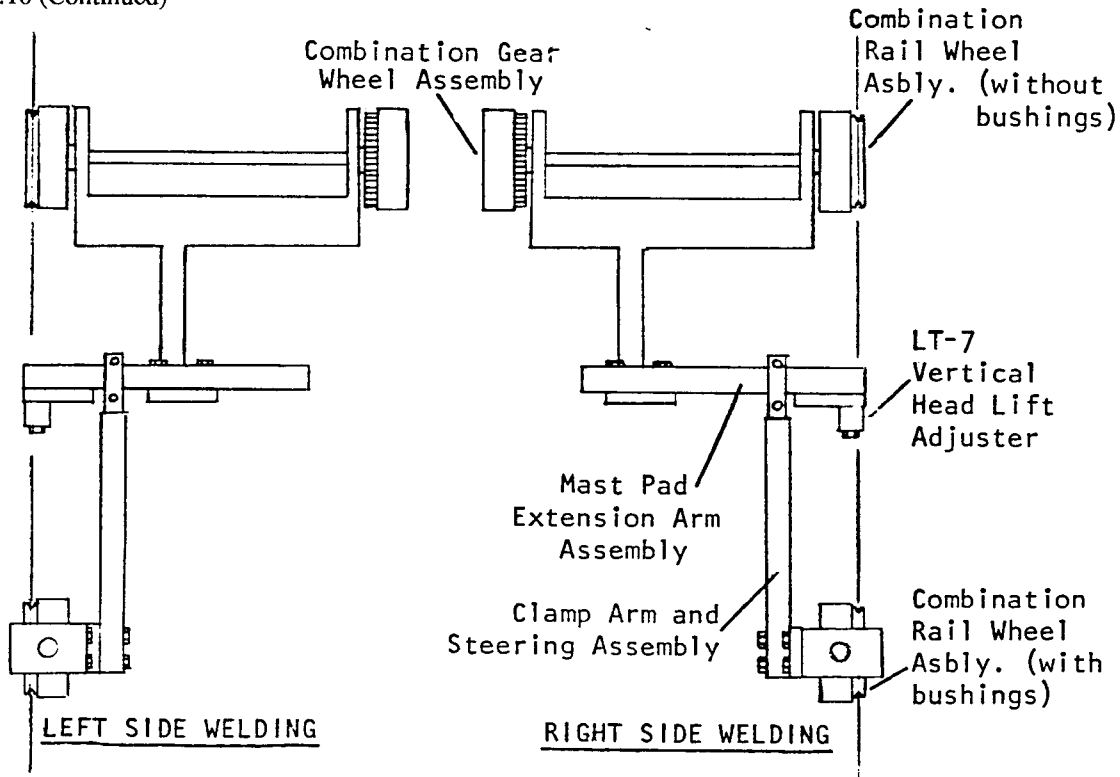


Figure 1

Off-Track Setup Configuration

The K395 Track Model LT-7 can be setup for any configuration, with any accessory, of the standard K227 LT-7 simply by:

- a. Remounting the vertical head lift adjuster to the LT-7 frame Mast pad.
- b. Unbolting the extension Mast pad from its crossarm.

Major Component Parts List

Listed below are the new part numbers used by the K395 Track Model LT-7.

Part	Part Number	Qty./Tractor
Gear Wheel Assembly:	S17632	1
Gear Wheel	S17631	1
Wheel	S17635	1
Rail Wheel Assembly:		
Rear	S17634-1	1
Front	S17634-2	
Rail Wheel	S17633	2
Wheel	S17635	2
Mast Pad Extension Arm Assembly:	S17630	1
Mast	S15808-1	1
Arm	M12673	1
Travel Box Nameplate	M13469-5	1
Control Box Extension Post	S15184-1	1
Nozzle Weld Cable Assembly	M12700-2	1

K400 LT-7 Track Conversion Kit

The Kit allows field conversion of any code K227 standard LT-7 Tractor to a track model tractor, comparable to the K395 LT-7, for use with the K396 Track Sections.

Kit Parts and Installation Instructions

Refer to Section M2.2.10 for track model features and set up configurations.

1. S17632 Gear Wheel Assembly
 - a. Replaces a standard LT-7 rear wheel using the snapping, washer and key removed with the standard wheel.
 - b. See "On-Track Setup Configuration" paragraph "a" for installation configuration.
2. S17634-1 Rail Wheel Assembly (without nylon bushings).
 - a. Replaces a standard LT-7 rear wheel using the snapping, washer and key removed with the standard wheel.
 - b. See Section "On-Track Setup Configuration" paragraph "a" for installation configuration.
3. S17634-2 Rail Wheel Assembly (with nylon bushings).
 - a. Replaces a standard LT-7 front wheel using the hardware removed from the standard wheel.

Sec. M2.2.10 (Continued)

- b. See Section “On-Track Setup Configuration” paragraph “b” for installation configuration.
4. S17630 Mast Pad Extension Arm Assembly.
 - a. Replaces the standard LT-7 Cross Arm using the removed bolts and washers.
 - b. See Section “On-Track Setup Configuration” paragraph “b” for installation configuration.
 5. M13469-5 Travel Box Nameplate.
 - a. Remove the LT-7 Travel Control box speed control knob and the two phillips head screws securing the nameplate.
 - b. Mount the kit’s dual-scale nameplate over, or replacing, the standard nameplate and re-secure the screws and knob.
 6. S15184-1 Control Box Extension Post.
 - a. See Section titled “Control Box Mounting”.
 - b. Older standard LT-7 Tractors, with a shorter head cable, may not permit mounting the control box facing the right side, but will permit forward facing controls.
 7. M12700-2 Nozzle Weld Cable Assembly, 24 in. (.6 m).
 - a. Replaces the standard 18 inch (.45 m) nozzle weld cable for applications requiring a further reach to the nozzle.

May 1989

Sec. M2.2.11

K396 Track Sections




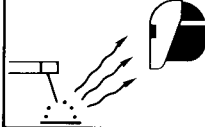
The Track Sections are designed for use with a K395 Track Model LT-7 Tractor, or with a K227 LT-7 Tractor with K400 LT-7 Track Conversion Kit installed.

Each 70 inch (1.7 m) track section is made of a 13.3” (338 mm) wide 14 gauge sheet metal channel with .36” (9.1 mm) legs which sit on the floor. A rack and an L-shaped rail are fastened near opposite sides of the top surface. The Track should be laid so all welding is performed on the L-shaped rail side of the Track.

The lightweight, 16.5 lbs (7.4 kg), Track sections smoothly slide together and provide self-aligned coupling and uncoupling without the use of any tools. “Leap-frogging” of Track sections for any desired welding length can be accomplished quickly and precisely.

May 1989

SEC. M3 — OPERATION

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

Sec. M3.2.1

Major Machine Components and Their Function

Before attempting to reset the tractor for each specific type of joint, review the following four illustrated pages.

NOTE: Left and Right throughout these instructions refers to left or right when facing the tractor as it comes toward you.

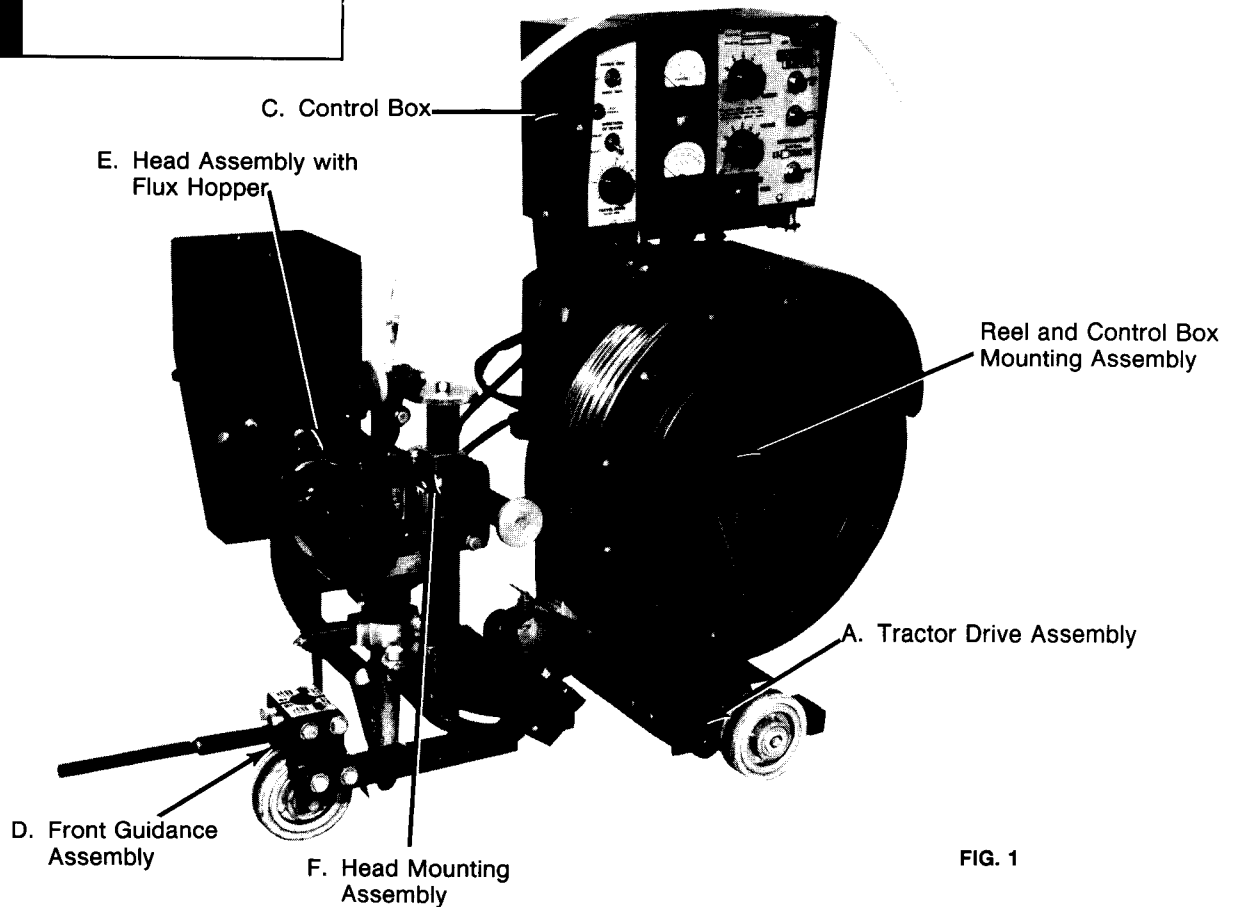
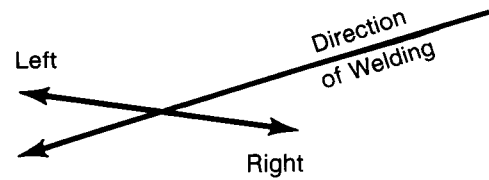
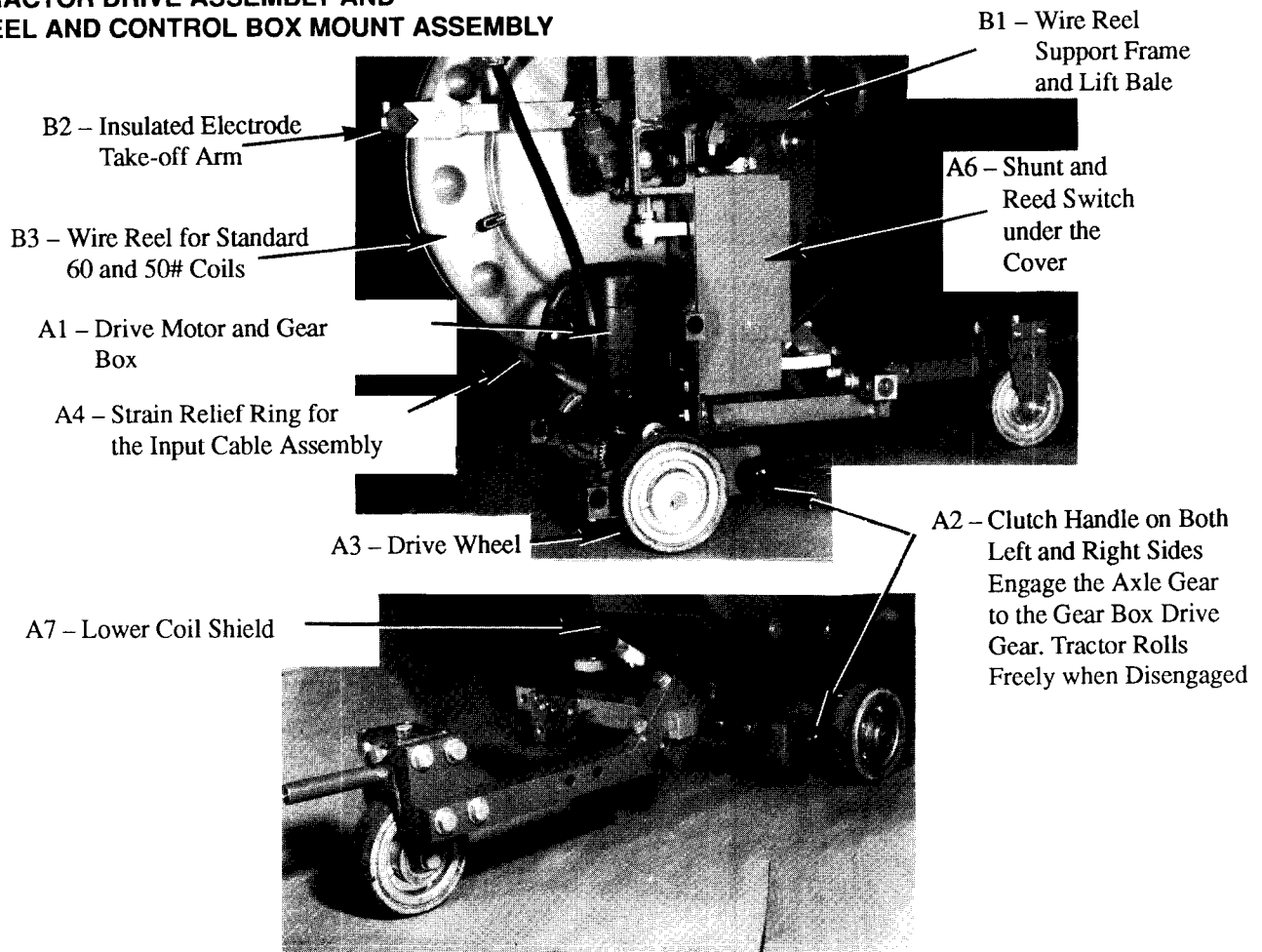
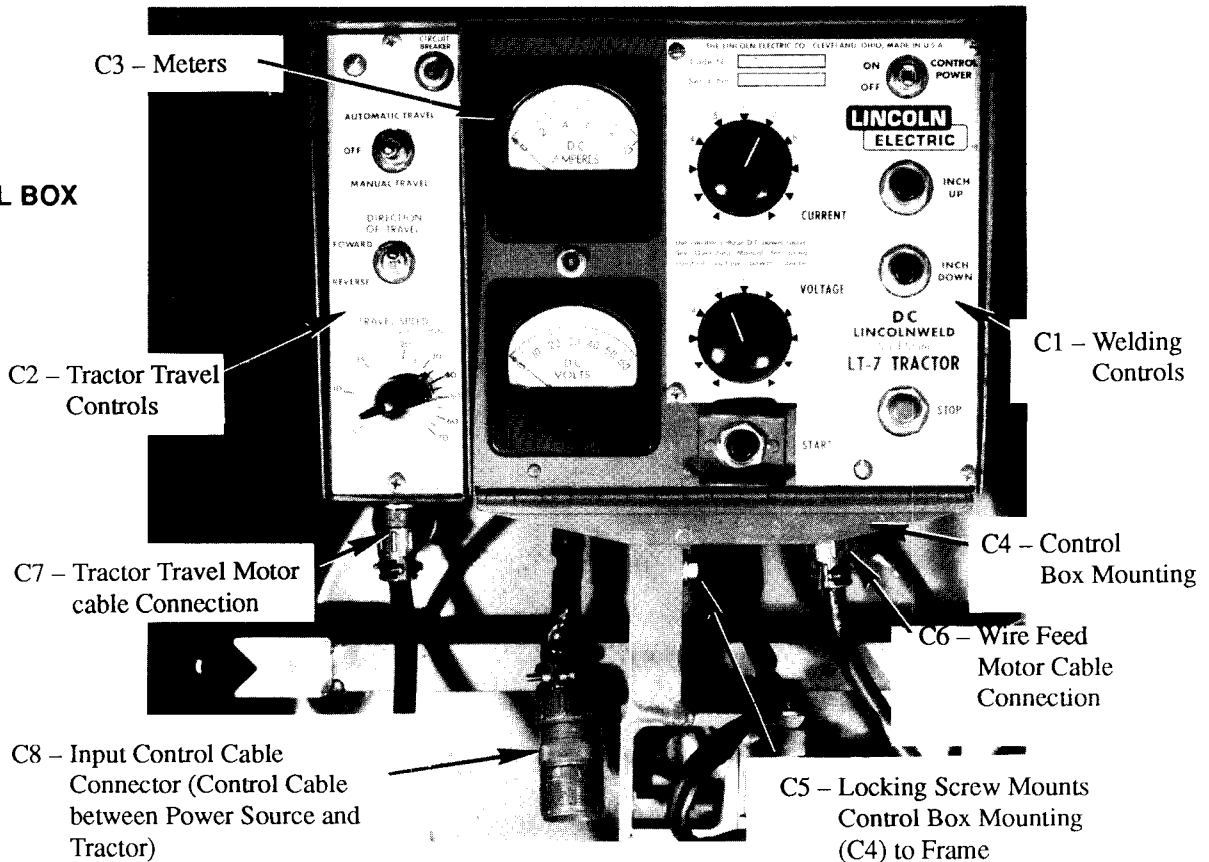


FIG. 1

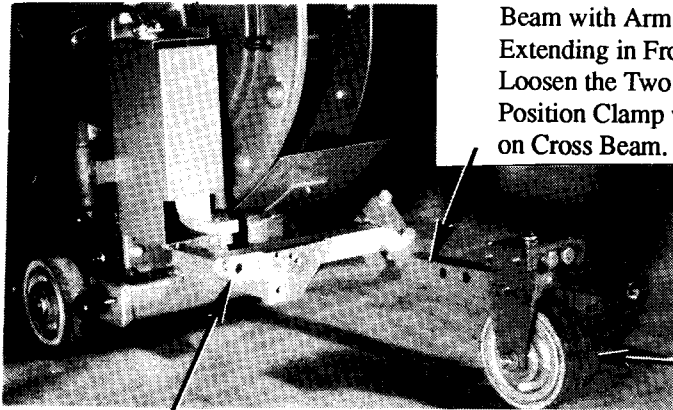
**A. TRACTOR DRIVE ASSEMBLY AND
B. REEL AND CONTROL BOX MOUNT ASSEMBLY**



C. CONTROL BOX



D. FRONT GUIDANCE ASSEMBLY

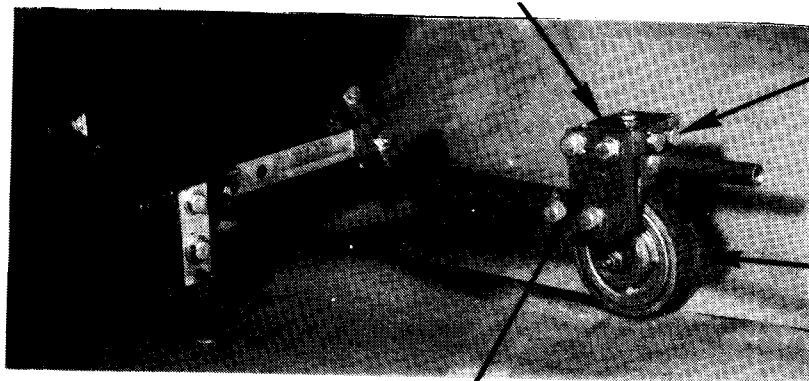


D2 – **Clamp Arm** – Slips Over Cross Beam with Arm Below and Extending in Front of Cross Beam. Loosen the Two Bolts to Position Clamp where Desired on Cross Beam.

Wheel on Left Side of Clamp Arm (D2)

D1 – **Cross Beam** – Mounts Behind Head Mounting Mast Extending either to Right (as shown) or Left Using Two Bolts and any Two of the Three Holes Provided

D4 – **Steer Wheel Housing** – Bolts to the Top Edge of the Spacer Pad (D3). Both Spacer Pad and Steer Wheel Housing Must be on the Same Side (Left or Right) of Clamp Arm (D2).



D5 – **Steering Adjustment Bolts** – (See Sec. M3.4.2 for Instructions)

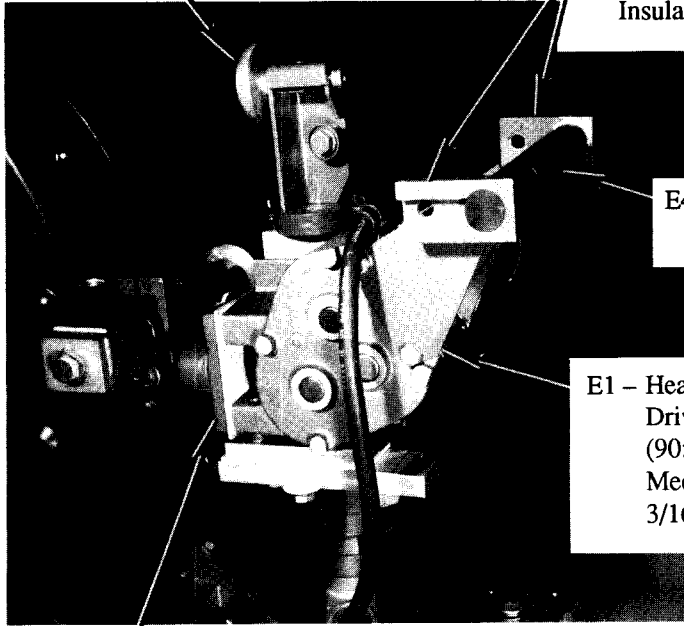
Wheel on Right Side of Clamp Arm (D2)

D3 – **Spacer Pad** – Bolts to Either Side of Clamp Arm (D2) Using Either Front (as shown) or Rear Pair of Holes with Pad Extending Upward.

E. HEAD ASSEMBLY WITH FLUX HOPPER

E3 – Wire Straightener
for 3/32 (2.4 mm) thru 3/16" (4.8 mm)
Solid Wire.

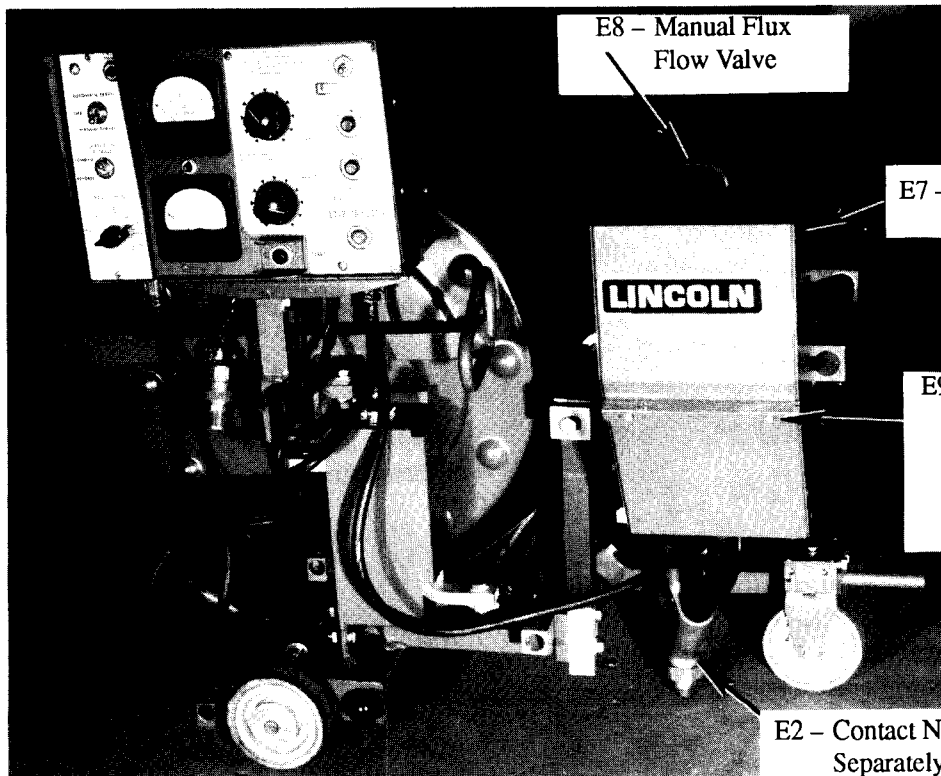
E5 – Flux Hopper Mounting
Channels (Two Available).
Insulated from Head.



E4 – Insulated Bumper
and Handle

E1 – Head Assembly Consists of
Drive Motor, Gear Box
(90:1 ratio) and Drive
Mechanism for 3/32" (2.4 mm) thru
3/16" (4.8 mm) Diameter Electrode

E6 – Head Mounting Pivot Plate.
Insulated from Head



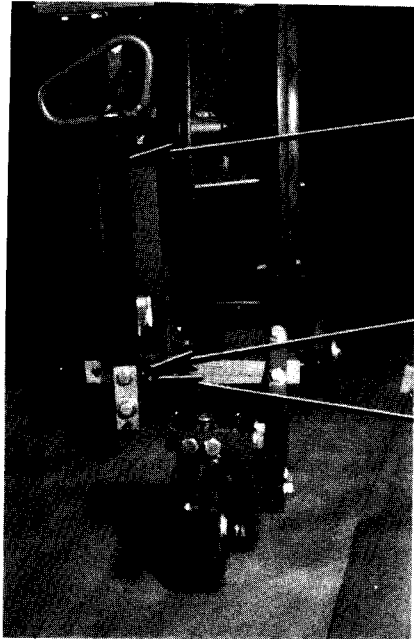
E8 – Manual Flux
Flow Valve

E7 – Flux Hopper.
15 lb. (6.8 kg) capacity.

E9 – Flux Hopper Mounting
Holes. Also Two on
other side — Four
Total

E2 – Contact Nozzle. Order
Separately. Choose
Either K231 (shown)
or K148.

F. HEAD MOUNTING AND ADJUSTING ASSEMBLY



F1 – Head Mounting Mast – Provides Angular Adjustment for Flat (or Positioned) Fillet Welds. Loosen the Lower Screw and Remove Upper Screw to Move Mast to Preset Holes for 60° and 45° Right Positions.

60°

45°

F2 – Clamp Block – Provides Coarse Cross Seam, Drag Angle and Weld Angle Adjustments. Pivot Plate Barrel (E6) can be Below (as shown) or Above Cross Seam Assembly.

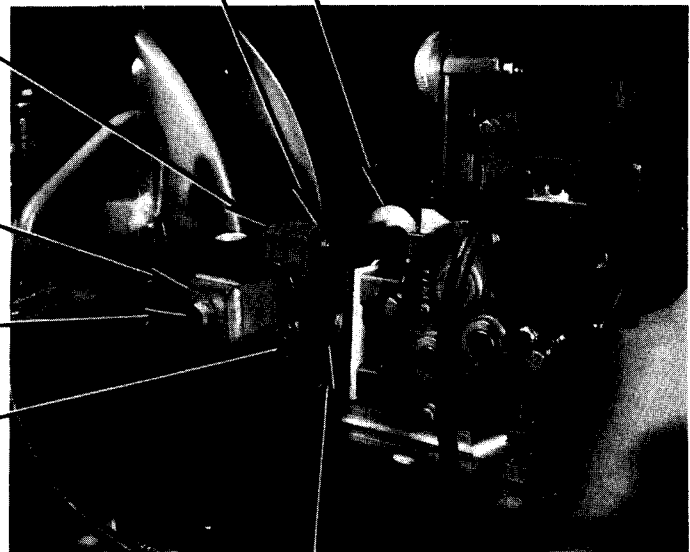
F2a – Loosen Lock Bolt to (1) Slide Clamp Block on Cross Seam Adjuster Barrel for 3-1/8" (79.4 mm) Coarse Cross Seam Adjustment and (2) Rotate Head around Barrel to Change Electrode Drag Angle.

F3 – Cross Seam Assembly – Provides Fine Cross Seam and the Head Height (Electrode Stickout) Adjustments.

F3b – Loosen Lock Bolt to Slide Head Up and Down on Mast

F2b – Loosen Lock Bolt on Other Side to Rotate Pivot Plate (E6) to Change Weld Angle. Back Thumb Screw out of Groove in Pivot Plate barrel to Remove Head from Clamp Block.

F3a – Turn Hand Wheel for Fine Cross Seam Adjustment. 2-1/2" (63.5 mm) Travel. Can be Adjusted While Welding.



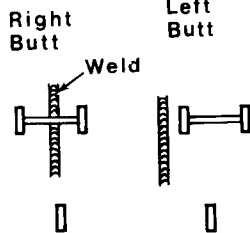
E6 – Pivot Plate Barrel

Sec. M3.2.3

Set Up for Butt Welding

Depending upon the joint design, welding procedures and clearance available on both sides of the joint, decide:

1. Whether to make "right butt" or "left butt" welds.
2. The amount of electrical stickout required by the procedures.



3. Which steering method (K230 Butt Guide, self-steering or track guiding) is best.
4. Whether the pointer assembly or control box extension are needed.

Then arrange the head mounting and guidance system as appropriate per the following instructions.

RIGHT OR LEFT BUTTS AND SHORT OR LONG STICKOUT

Mount the cross seam adjuster (F3) on the mast to the right of the mast for right butts [from tractor centerline to 5-5/8" (143 mm) to the right] or to the left for left butts [from 4" (101.6 mm) to 9-5/8" (244.5 mm) to left of tractor centerline].

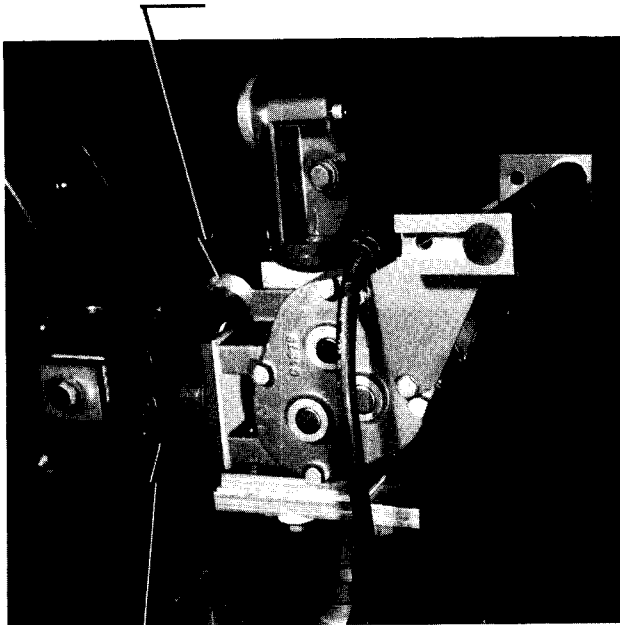
Position the clamp block (F2) below the cross seam adjuster for standard short stickout procedures. Position it above the adjuster for Linc-Fill long stickout procedures using the K148 nozzle and K149 extension assembly.

CAUTION: When making a right butt the clamping block should be clamped on the cross seam assembly (F-3) in a position so the electrode will not be in line with the shield protecting the drive gear on the rear axle.

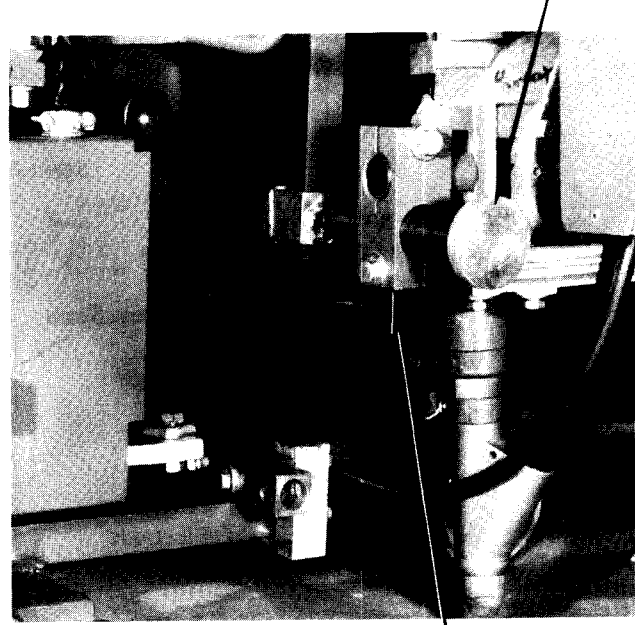
Install the reel take-off tube to prevent contact with the electrically "hot" electrode. Insert the nylon tube into the take-off arm coupling. Thread the electrode thru the tube and into the wire straightener.

CROSS SEAM ADJUSTER MOUNTED FOR:

Right Butts



Left Butts

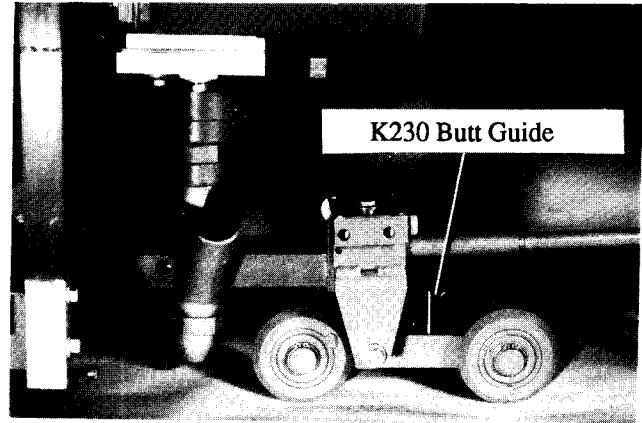
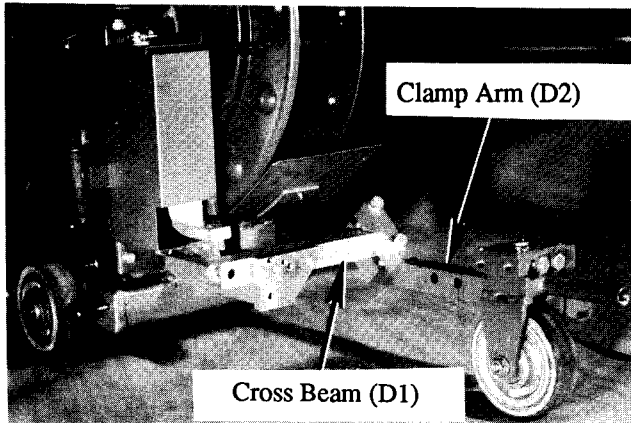


CLAMP BLOCK (F2) MOUNTED FOR:

Standard Short Stickout

Linc-Fill Long Stickout

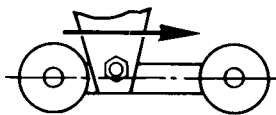
Sec. M3.2.3 (Continued)



AVAILABLE STEERING METHODS

Mount the steer wheel housing (D4) to the right (see photo) or to the left of the clamp arm (D2) as needed for the specific application. There are three guiding methods as follows:

1. **The Self-Steering Method**, using the standard front guidance assembly, is recommended for most multiple-pass and single-pass butt joints without a gap. When properly set per Sec. M3.4.2, the tractor follows a straight seam with only occasional corrections by the operator. The pointer assembly should be installed.
2. **Optional K230 Butt Guide** provides positive tracking for single pass V-groove and square edge butt welds with a gap of about 1/16" (1.6 mm) to 1/4" (6.4 mm) wide.



To install, remove the standard front wheel. Using the sleeve, axle bolt and nut from the front wheel, mount the

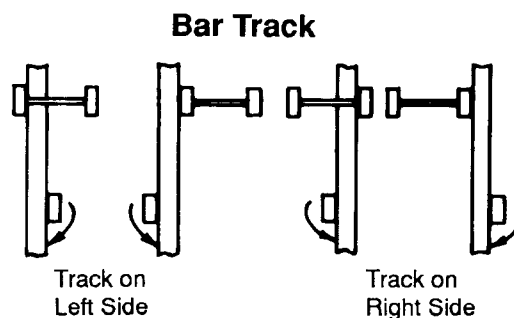
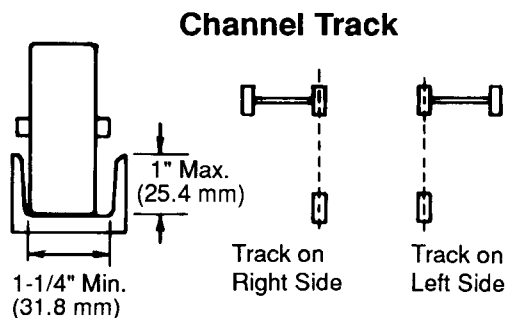
guide as shown in the photograph with the axle bolt above the guide wheel shafts. Do not overtighten the axle bolt.

Loosen the bolts holding the clamp arm (D2) and slide the clamp arm over the cross beam (D1) to position the guide wheels in the seam.

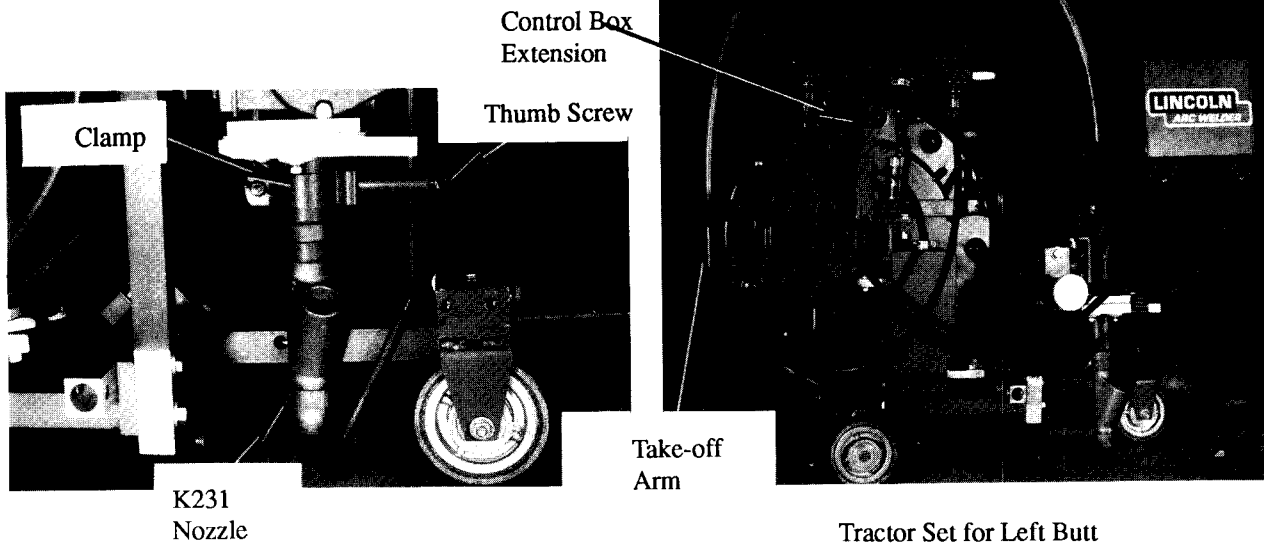
3. **A Bar or Channel Track** clamped or tack welded to the work provides positive guiding when appropriate.

Channel Track — Use a straight channel with a minimum 1-1/4" (31.8 mm) web and maximum 1" (25.4 mm) flange. Line the front wheel up with either the right or left rear wheel, as appropriate, so the front and one drive wheel ride in the channel. Set the standard steering system toe-in slightly against one side of the channel.

Bar Track — Use a straight bar 1/2" (12.7 mm) to 1" (25.4 mm) thick by approximately 1-1/4" (31.8 mm) wide. Set the tractor so the front wheel is on one side and the drive wheel on the other side of the bar. There are four arrangements as shown in the sketches. Set the standard steering system to toe-in slightly against the bar.



Sec. M3.2.3 (Continued)



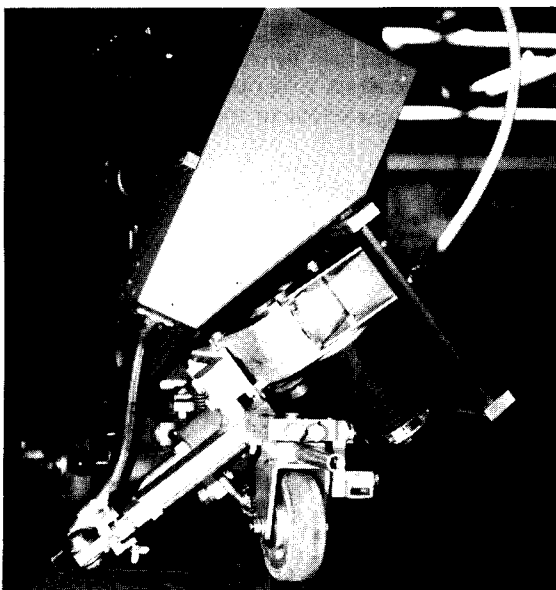
INSTALLATION OF STANDARD ACCESSORIES

Pointer Assembly — Position the clamp around the nozzle insulator and tighten the clamp. Use the 2" (50.8 mm) ID clamp on the K231 nozzle (see photo) or the 1-1/2" (38.1 mm) ID clamp with the K148 nozzle. Loosen the thumb screw and position the pointer in line with the electrode and close to the work. Tighten the screw.

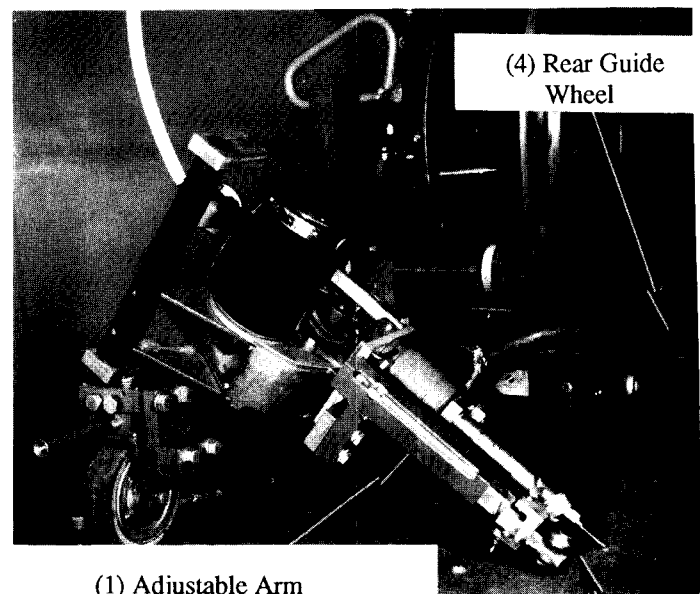
Control Box Extension — Required when the control box must face to the right over the wire reel. Remove the control box. Insert the stud end of the extension into the control box mounting socket and mount the control box on top of the extension. Tighten both screws.

October 1976

I For Left Fillets



II For Right Fillets

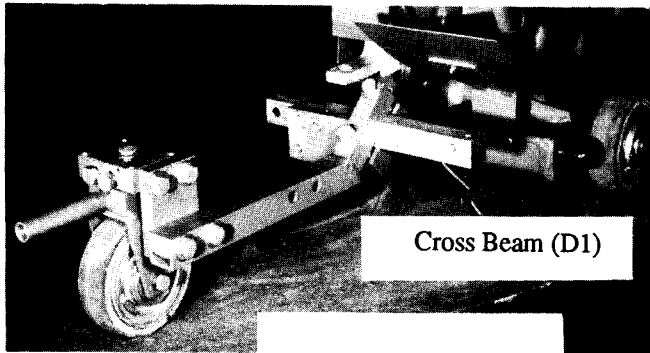


K232 Fillet-Lap Guide Includes: (1) Adjustable Arm, (2) Front Guide Wheels, (3) Head Tension Spring and (4) Rear Guide Wheel.

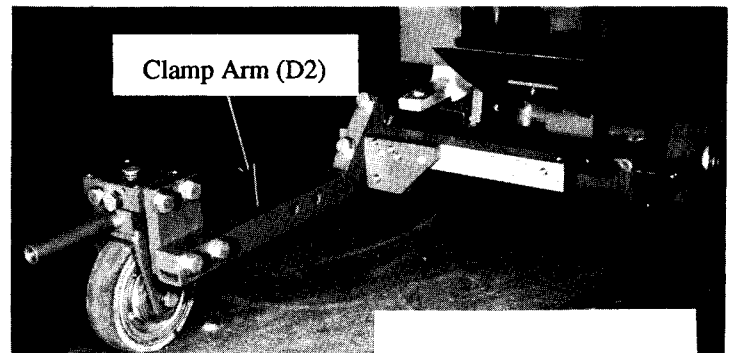
(2) Front Guide Wheel

Sec. M3.2.4

Set Up For Horizontal Fillet Welding



For Left Fillets



For Right Fillets

Installation of the optional K232 Fillet-Lap Guide is recommended for welding horizontal fillet joints. Depending upon the welding procedures and clearances around the joint, decide:

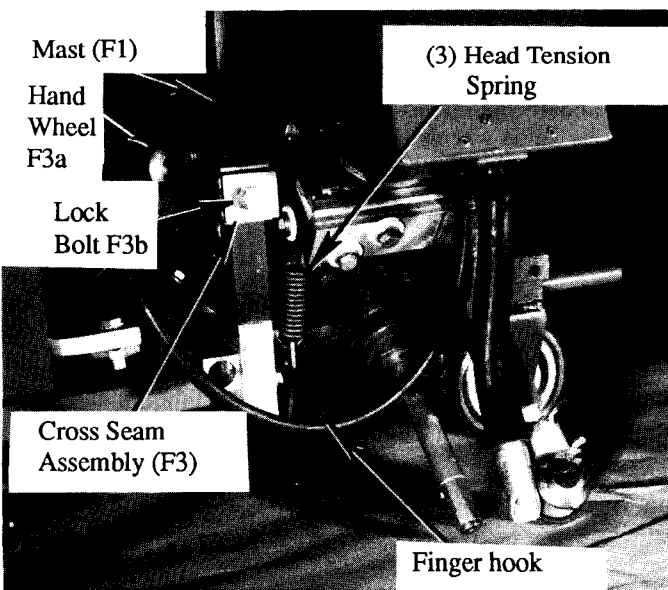
1. Whether to weld to the left side or right side of the tractor.
2. What electrical stickout is required by the procedures.

Then rearrange the head mounting and guidance system as appropriate per the following instructions:

FRONT GUIDANCE ASSEMBLY

- 1a. Mount mast (F1) to the cross beam (D1). See Fig. F.
1. Mount the cross beam (D1) extending to the right of the mast (F1) using the center and right mounting holes.
2. Mount the spacer pad (D3) and steer wheel housing (D4) to the left side of the clamp arm (D2). See Fig. II.

III

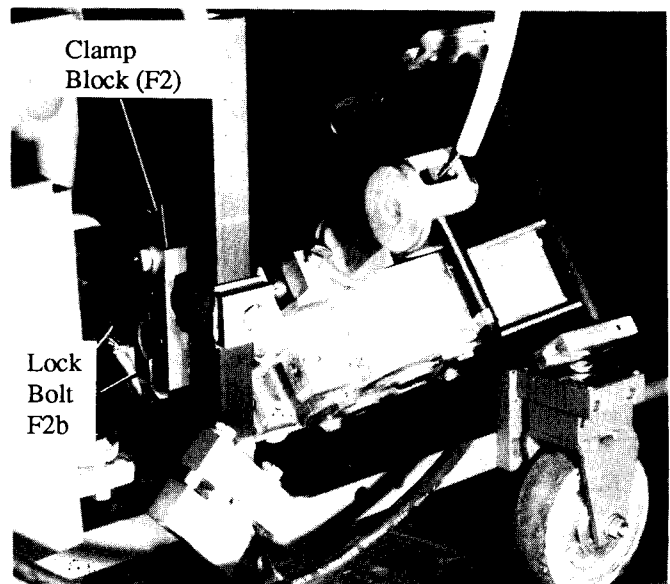


↑ For Left Fillets

HEAD MOUNTING

1. Mount the cross seam assembly (F3) on the mast (F1) near the top so it extends to the right. Move the clamp block (F2) as close to the mast (F1) as possible. Turn the cross seam adjuster hand wheel (F3a) for full left position (i.e. completely closed).
2. Position the clamp block (F2) with the head mounting hole below the cross seam barrel. Install the head. Rotate the clamp block so the nozzle is 90° to the joint. Tighten the clamp.

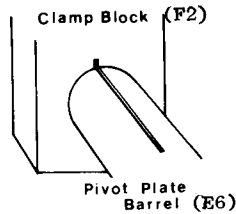
IV



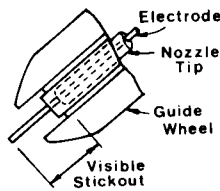
↑ For Right Fillets

Sec. M3.2.4 (Continued)

3. Rotate the head pivot plate barrel (E6) to position the head to the left or right as desired with the proper weld angle — usually 40° from horizontal. The 40° left or right positions are easily set by aligning the grooves in the pivot plate barrel (E6) with the groove in the clamp block (F2). Tighten the clamp.



4. Install either a K148 nozzle or a K231 nozzle with the external flux jacket removed. If using Linc-Fill long stickout procedures, install the K149 extension and the parts for the desired stickout on the K148 nozzle.
5. Install the reel take-off tube to prevent contact with the electrically “hot” electrode. Insert the nylon tube into the take-off arm coupling. Thread the electrode thru the tube and thru the wire straightener to the drive rolls. Inch the electrode down thru the nozzle.
6. While inching the electrode out of the nozzle, adjust the straightener for properly straightened wire. Cut the wire off and set the electrode stickout as specified in the procedures.



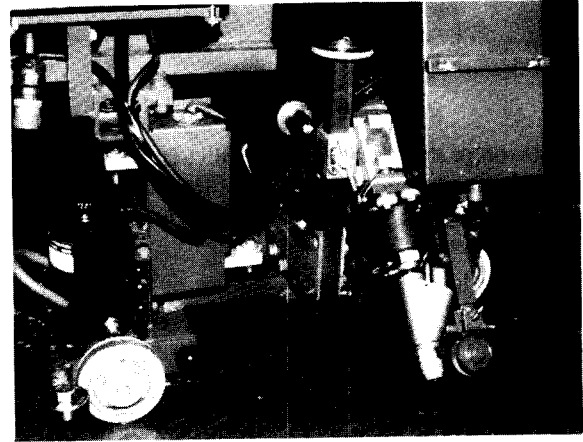
7. If the control box must face to the right over the reel for left fillets, remove the control box from the standard mounting socket. Insert the stud end of the extension tube into the mounting socket and mount the control box on the extension. Tighten both lock screws. The control box interferes with the reel take-off tube if the extension is used for right fillets.

K232 FILLET-LAP GUIDE (See Photo 1)

1. The K232 consists of four parts (see photos on previous two pages) — (1) Adjustable arm, (2) Front guide wheels, (3) Head tension spring, and (4) Rear guide wheel.
2. Mount the adjustable arm (1) to the head directly in front of the nozzle using the two bolts and washers provided. (Be sure the arm is square with its mounting.) Lock the slide in the full up position. See Photos I & II.
3. The front guide wheels (2) are assembled to the fork at the end of the adjustable arm (1). Be sure the flux hose

loop extends to the left for left side fillets and vice versa.

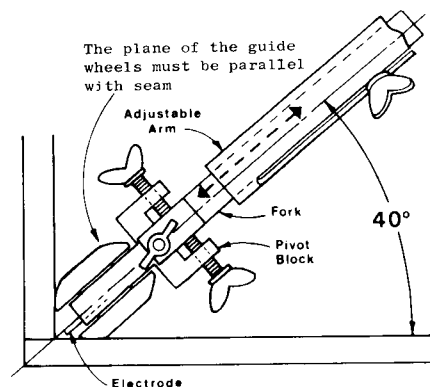
4. Install the rear guide wheel (4) into the socket above the rear drive wheel scraper with the guide wheel above the arm. Use the socket by the left rear wheel for left side fillets and vice versa. Use the three tapped holes in the guide wheel arm and the *outside* hole in the tractor frame socket for 3/4" (19.1 mm) — 1" (25.4 mm), 3" (76.2 mm) or 5" (127 mm) electrical stickout. Use two of the tapped holes and the *inside* hole in the tractor frame socket for 2" (50.8 mm) and 4" (101.6 mm) electrical stickout.



LT-7 with K232 fillet — lap guide installed.

ALIGNMENT IN THE JOINT

1. Set the electrode stickout as specified in the procedures. Place the tractor with the end of the electrode almost touching the vertical plate and the rear guide wheel against the vertical plate.
2. Slightly loosen the cross seam assembly lock bolt (F3b). Lower the head assembly down the mast and position the front of the tractor until the tip of the electrode is properly positioned in the joint per the following sketch. Tighten the lock bolt.
3. Loosen the thumb screw on the adjustable arm. Lower the guide wheels to the joint and adjust the pivot block thumb screws until the wheel assembly rides properly in the joint as shown in the sketch. Tighten the thumb screw.



Sec. M3.2.4 (Continued)

4. Loosen the lock bolt (F2b) allowing the pivot plate barrel (E6) to be free to rotate. Install the head tension spring assembly (3) shipped with the K232 kit. Place the loop on the spring over the cap screw on the head and place a hole in the fingerhook over the cap screw at the bottom of the mast. Use the farthest hole from the end of the fingerhook for right side fillets and the closer hole for left side fillets.
5. Lift the end of the nozzle so the pivot plate barrel (E6) rotates beyond the 40° position and tighten the lock bolt (F2b). Then loosen the lock bolt just enough to permit the tension spring to pull the head down to its proper welding position.
6. Install the flux hopper (E9) on the right side of the bumper handle (E4) for right side fillets or vice versa. Use the bracket (E9) on the sloping surface of the hopper.
7. Insert the copper tube in the end of the flux hose thru the loop behind the front guide wheel and position the copper tube so the chamfer is about parallel to and 3/16" (4.8 mm) from the vertical plate. Lock this position by tightening the wing nut. Be sure the tube does not interfere with the wheel.
8. Check the position of the electrode in the joint and adjust as necessary by using the two thumb screws which position the pivot block of the guide wheels. Loosen one and tighten the other until the electrode location is proper, then tighten both screws. The weld angle should remain close to 40°.
9. Set the steering adjustment bolts (D5) to toe-in 2° to 5° into the joint. The opposing action of the steering and spring-loaded guide wheels maintain positive alignment along the joint while welding.

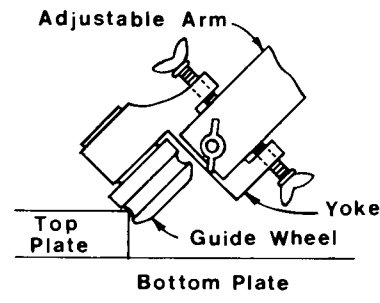
October 1976

Sec. M3.2.5

Set Up For Lap Welding

Set the tractor for left and right lap welding using the same equipment and instructions used for horizontal fillet welding except:

1. Replace the fillet guide wheel and yoke of the K232 kit with the lap welding guide wheel and yoke.
2. Mount the yoke on the adjustable arm with the wheel on the right side for left laps and vice versa.
3. The guide wheel rides on the corner of the top plate of the lap joint.



Left Lap

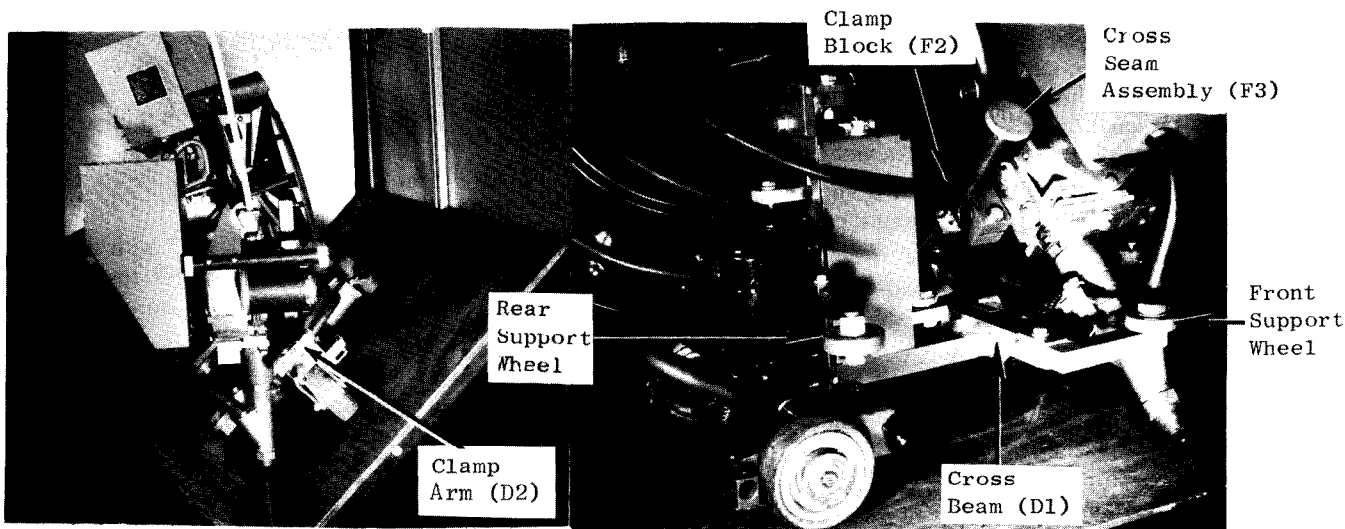
4. Do not use the rear guide wheel of the K232 kit. Set the rear wheel the proper distance from the joint for the desired stickout — about 2" (50.8 mm) for 3/4" (19.1 mm) to 1" (25.4 mm) stickout.

October 1976

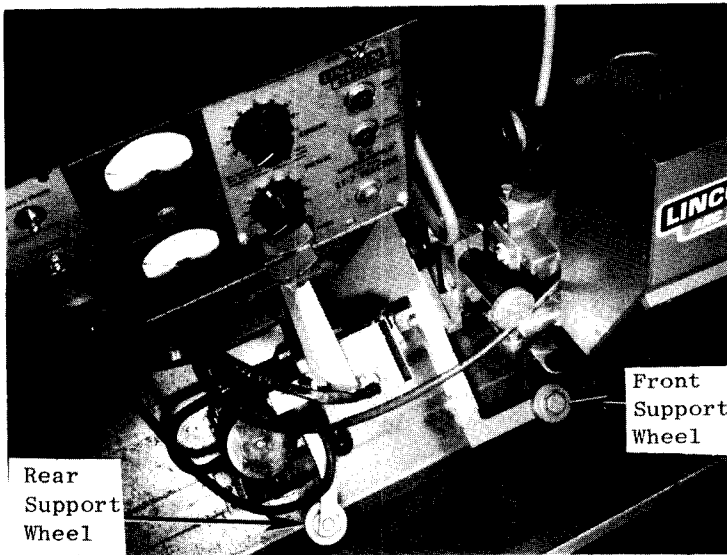
Sec. M3.2.6

Set Up For Flat Fillet Welding

Install the K229 Flat Fillet Kit required for making flat fillet welds. Depending upon the procedures and the weldment and clearances, decide:

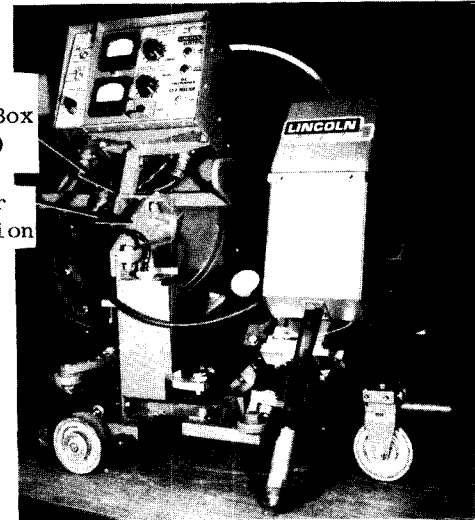


K229 Flat Fillet Kit includes: (1) Front Support Wheel, (2) Rear Support Wheel and (3) Angular Extension.

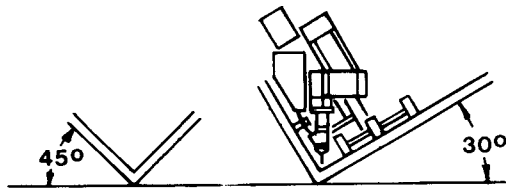


Reel and Control Box Mount (B)

Angular Extension



1. Whether to position the plates at a 45° or 30° angle with horizontal. When positioned at 30° the tractor must ride on the more horizontal plate. The vertical plate must be a minimum of 7.50" (190.5 mm) min. and the horizontal plate a minimum of 16" (406.4 mm).



2. Remove the reel and control box mount assembly (B) from the tractor frame by removing the two screws.
3. Install the angular extension (3) from the K229 kit to the tractor frame using the reel and control box mount assembly mounting holes.
4. Install the reel and control box mount assembly (B) to the end of the angular extension.
5. If the control box must face to the right over the wire reel, remove the control box from the standard mounting socket. Insert the stud end of the extension tube into the mounting socket and mount the control box on the extension.

2. What electrical stickout is desired.

Then arrange the guidance system and head mounting per the following instructions:

FRONT GUIDANCE ASSEMBLY

1. Find the two tapped holes on the end of the cross beam (D1). Position the cross beam at the mast (F1) so these tapped holes are to the left of the mast with one facing to the rear and the other up. Mount the cross beam to the mast using the center and left mounting holes.
2. Install the front support wheel from the K229 kit to the left end of the cross beam using the two tapped holes so the wheel extends forward.
3. Mount the clamp arm (D2) with the front wheel installed to the short right extension of the cross beam.

REAR SUPPORT WHEEL

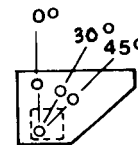
Insert the rear support wheel from the K229 kit into the mating socket in front of the tractor drive motor.

REEL AND CONTROL BOX MOUNTING

1. Remove the reel from the tractor.

HEAD MOUNTING

1. Install the mast (F1) leaning to the right using the lower pivot hole and the upper hole for 45° or 30° fillets as appropriate.



2. Mount the cross seam assembly (F3) on the mast extending to the left side.
3. Position the clamp block (F2) with the head mounting hole below the cross seam barrel. Install the head. Rotate the clamp block (F2) to set the desired drag angle — usually 90° to the joint.
4. Mount the flux hopper (E9) to the flux hopper mounting (E5) using the bracket (E9) on the vertical surface of the hopper. For 30° fillets, install the hopper to the left side of the bumper handle. For 45° fillets, install the hopper either on the left or right side but the right side provides better tracking stability.
5. Install the K231 or K148 nozzle. If using the Linc-Fill long stickout procedures, install the K149 extension and

Sec. M3.2.6 (Continued)

parts needed for the desired stickout onto the K148 nozzle. Move the cross seam assembly (F3) up or down the mast (F1) to set the stickout.

ALIGNMENT IN THE JOINT

1. Tighten all mounting and locking bolts and nuts.
2. Set the tractor in the joint with the tractor wheels on one plate and the two K229 kit support wheels on the other.
3. Set the steering mechanism to steer straight or turned slightly to the left.
4. Line the electrode up with the joint using the cross seam adjuster.

October 1976

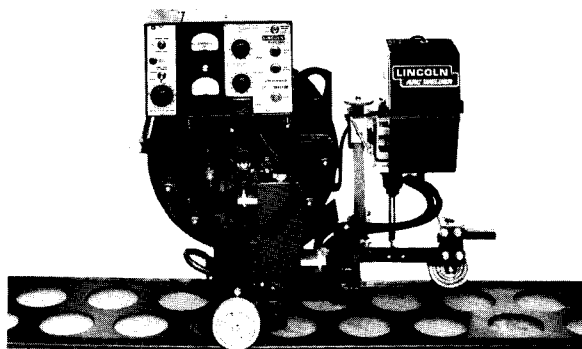
Sec. M3.2.7

A. Track Model LT-7 Tractor

1. Description

The K395 Track Model LT-7, or standard K227, LT-7 installed with the K400 track conversion kit (See section B), is equipped for use on the K396 Track sections. Either version permits complete use of the off-track versatility and capability of the standard K227 LT-7. See Supplement B for details on K396 track.

The Track model provides precise track guidance and positive traction for single submerged arc, or Tiny Twinarc® welding of butt or horizontal fillet-lap joints using standard LT-7 accessories or kits (refer to appropriate sections of IM-279 LT-7 Operating Manual).



K395 LT-7⁽¹⁾ and K396 Track Section.

⁽¹⁾ The K400 LT-7 Track Conversion Kit allows the field conversion of any standard K227 LT-7 tractor to a track model tractor.

2. Features

The Track Model LT-7 provides the following assembly features not included on the standard K227 LT-7 Tractor (unless K400 Track Conversion Kit is installed.)

- a. Three combination wheel assemblies:

1. One side of each wheel assembly consists of a canvas cushion tread, as used on the standard LT-7 wheels, which permits normal "off-track" traveling.
2. The second side of the two rail wheel assemblies consists of a hardened steel grooved wheel, to precisely guide on the Track rail. The front rail wheel assembly has nylon bushings and the rear rail wheel assembly does not.
3. The second side of the gear wheel assembly consists of a hardened steel spur gear, to provide positive travel traction on the Track gear rack.
- b. A mast Pad Extension Arm assembly and Longer Nozzle Cable, to extend the location of the head outside the right or left sides of the tractor.
- c. A Travel Control Box nameplate with dual Travel speed scales.
 1. The inside scale is calibrated for "on-track" Travel Speeds.
 2. The outside scale is calibrated for "off-track" Travel Speeds.

3. Control Box Mounting

The control box can be mounted so as to face forward or right using the Control Box Extension Post, or left with or without the extension post, as desired.

4. On-Track Setup Configuration

The Track Model tractor can be configured for left or right side welding to over 7.5 inches (190.5 mm) outside the right or left sides of the track sections with forward or reverse travel directions.

Note: Right side of tractor welding is recommended when using the K227 Tiny Twinarc® Kit to provide optimum tractor stability. Left and Right throughout these instructions refer to left or right when facing the front of the tractor.

The K395 LT-7 is shipped set up for right side welding as per Figure 1. If left side welding is desired, or for left to right conversion, proceed per the following instructions:

a. Rear Wheel Configuration (refer to Fig. 1)

For Left side welding, install the rail assembly, without the nylon bushings, on the left side of the tractor with the grooved wheel on the outside of the combination wheel assembly. Install the gear wheel assembly on the right side of the tractor with the gear on the inside of the combination wheel assembly.

For Right side welding, install the rail wheel assembly, without the nylon bushings, on the right side of the tractor with the grooved wheel on the outside of the combination wheel assembly. Install the gear wheel assembly on the left side of the tractor with the gear on the inside of the combination wheel assembly.

Note: Be sure the axle keys are properly installed, and only one flatwasher should be between each wheel and its retaining snapping.

Sec. M3.2.7 (Continued)

b. Front Frame Configuration (refer to Fig. 1)

1. Mount the front rail wheel assembly, with nylon bushings, to the steering assembly with the grooved wheel on the right for right side welding, or on the left for left side welding.
2. Configure the converted front steering wheel assembly so it's mounted on the right side of the clamp arm for right side welding, or on the left for left side welding. Check that the steering assembly is set for straight guidance.
3. Mount the converted front wheel clamp arm assembly to the Mast Pad Extension Arm so the clamp is about 1/4" (6.4 mm) from the forward-facing Mast pad of the arm. The mast pad should be to the right of the clamp arm for right side welding, or to the left for left side welding.
4. Mount the Mast pad extension arm to the rear of the tractor frame Mast pad with the extension Mast pad on the right side of the tractor for right side welding, using the two arm mounting holes furthest away from the Mast pad. For left side welding, mount the Mast pad on the left side of the

tractor using the two arm mounting holes nearest to the mast pad.

5. Adjust the front wheel clamp arm so the front groove wheel aligns with the rear groove wheel.
6. Bolt the LT-7 vertical head lift adjuster to the Extension Arm Mast pad with the LT-7 head assembly mounted to the right of the Vertical head lift adjuster for right side welding, or to the left for left side welding. (See, Sec. M3.2.3 and M2.2.9.)
7. Except for Horizontal Fillet-lap joint configurations (see, Sec. M3.2.4), the flux hopper should be mounted on the side of the head closest to Track center.

5. Off Track Setup Configuration.

The K395 Track Model LT-7 can be set up for any configuration, with any accessory, of the standard K227 LT-7 simply by:

- a. Remounting the vertical head lift adjuster to the LT-7 frame Mast Pad.
- b. Unbolting the extension Mast pad from its crossarm.

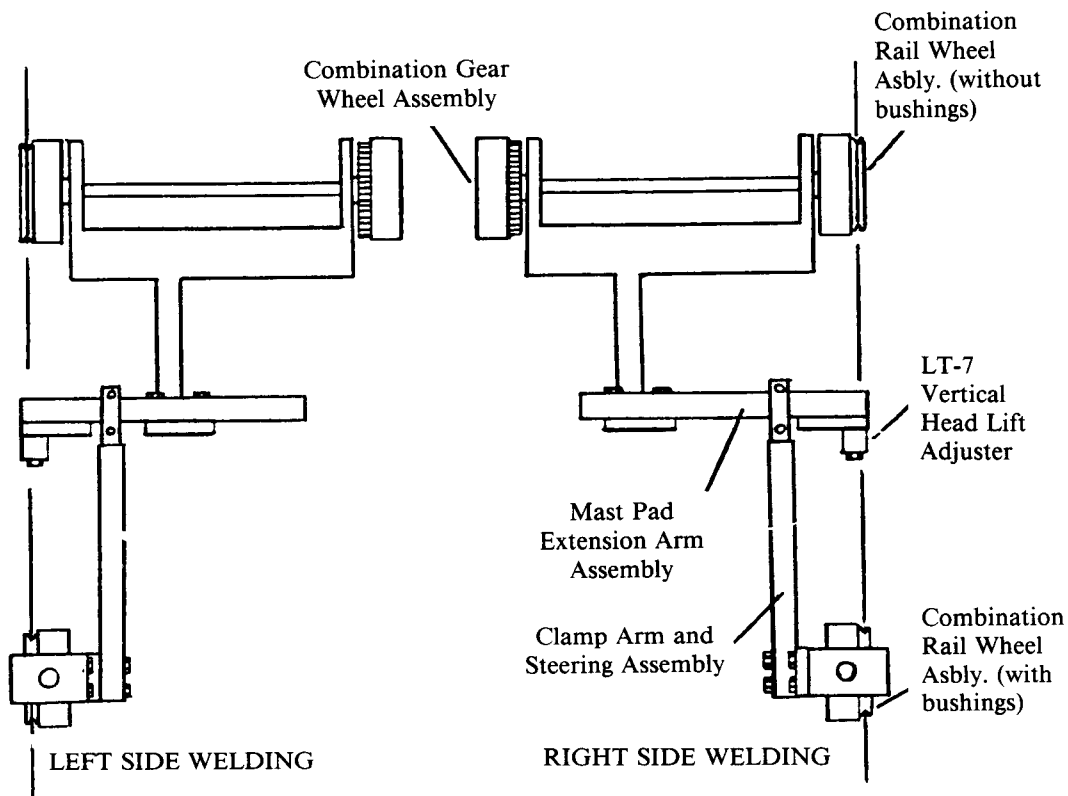


Figure 1

Sec. M3.2.7 (Continued)

B. K400 LT-7 TRACK CONVERSION KIT

The Kit allows field conversion of any code K227 standard LT-7 Tractor to a track model tractor, comparable to the K395 LT-7, for use with the K396 Track Sections.

Kit Parts and Installation Instructions

Refer to Section A for track model features and set up configurations.

1. S17632 Gear Wheel Assembly
 - a. Replaces a standard LT-7 rear wheel using the snapping, washer and key removed with the standard wheel.
 - b. See Section M3.2.7 A.4.a. for installation configuration.
2. S17634-1 Rail Wheel Assembly (without nylon bushings)
 - a. Replaces a standard LT-7 rear wheel using the snapping, washer and key removed with the standard wheel.
 - b. See Section M3.2.7 A.4.a for installation configuration.
3. S17634-2 Rail Wheel Assembly (with nylon bushings)
 - a. Replaces the standard LT-7 front wheel using the hardware removed from the standard wheel.
 - b. See Section M3.2.7 A.4.b for installation configuration.
4. S17630 Mast Pad Extension Arm Assembly
 - a. Replaces the standard LT-7 Cross Arm using the removed bolts and washers.
 - b. See Section M3.2.7 A.4.b for installation configuration.

5. M13469-5 Travel Box Nameplate
 - a. Remove the LT-7 Travel Control box speed control knob and the two phillips head screws securing the nameplate.
 - b. Mount the kit's dual-scale nameplate over, or replacing, the standard nameplate and re-secure the screws and knob.
6. S15184-1 Control Box Extension Post
 - a. See Section A.3 for control box mounting.
 - b. Older standard LT-7 Tractors, with a shorter head cable, may not permit mounting the control box facing the right side, but will permit forward facing controls.
7. M12700-2 Nozzle Weld Cable Assembly [24 in. (.6 m)]
 - a. Replaces the standard 18 in. (.45 m) nozzle weld cable for applications requiring a further reach to the nozzle.

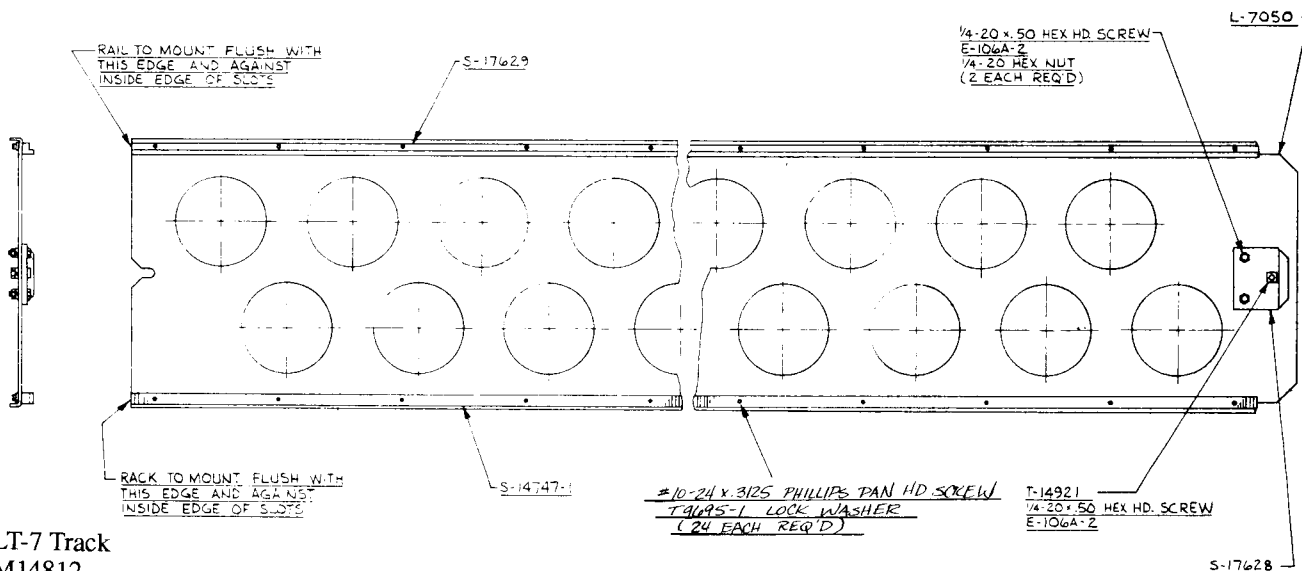
K396 Track Sections

The Track Sections are designed for use with a K395 Track Model LT-7 Tractor, or with a K227 LT-7 Tractor with K400 LT-7 Track Conversion Kit installed.

Each 70 inch (177.8 mm) track section is made of a 13.3" (337.8 mm) wide 14 gauge sheetmetal channel with .36" (9.1 mm) legs which sit on the floor. A rack and an L-shaped rail are fastened near opposite sides of the top surface. The Track should be laid so all welding is performed on the L-shaped rail side of the Track.

The lightweight [16.5 lbs (7.4 kg)] Track sections smoothly slide together and provide self-aligned coupling and uncoupling without the use of any tools. "Leap-frogging" of Track sections for any desired welding length can be accomplished quickly and precisely.

December 1985



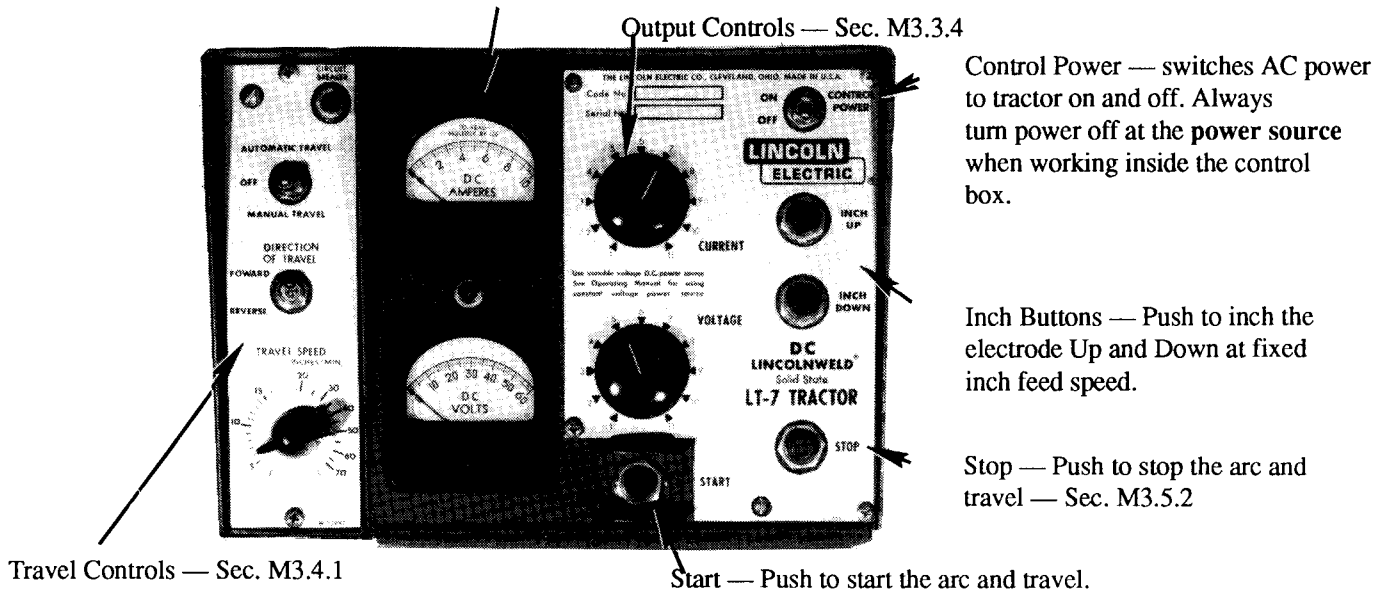
The Lincoln Electric Company
Cleveland, Ohio 44117-1199

SEC. M3.3 WELDING CONTROLS

Sec. M3.3.1

The Control Box

Meters indicate current and voltage only when welding.



Sec. M3.3.2

Constant Current Versus Constant Voltage Power Sources

NOTE: The term constant current (CC) was formerly variable voltage (VV).

The LT-7 is shipped ready to weld with the constant current type power source recommended for most submerged arc applications. If it is to be used with a constant voltage power source, see Sec. M2.2.3 for instructions.

May 1989

Sec. M3.3.3

Setting The Polarity

Polarity is controlled by the power source. If the polarity is changed, reverse the lead connections to both LT-7 meters so they read up-scale. The LT-7 is shipped with the meters connected for positive polarity.

When using the SAF-600 or SA-800, turn the power source off, wait until rotation stops, and switch the polarity setting on both the power source and the "Solid-State Remote Field Control".

Sec. M3.3.4

Setting Current And Voltage

CONSTANT CURRENT POWER SOURCE

Set the power source and the wire feeder current and voltage controls for the outputs specified by the procedure as follows:

SAF-600 AND SA-800 WITH "SOLID-STATE REMOTE FIELD CONTROL" (OBSOLETE)

- Set the "Voltage Range" switch on the power source to "High".
- Set the power source "Voltage" rheostat to maximum.
- Set the arc voltage with the "Voltage Control" on the LT-7. For initial test welds set it at about 6.
- Connect the cable from the power source or K240 contactor box to the power source sub-arc stud with the lowest current range that still permits welding at the current specified in procedures. For example, if you want 500 amperes welding current, use the "300-375" stud and not the "450-Max" stud.
- Make final current adjustments with the LT-7 "Current Control". This control varies the current over the entire range controlled by the stud connection. For initial test welds set it at about 6.

Sec. M3.3.4 (Continued)

IDEALARC DC- "TYPE" SUBMERGED ARC POWER SOURCES

- A. Set the toggle switch on the front of the welder to "Output Control Remote".
- B. Set the arc voltage with the LT-7 "Voltage Control". For initial test welds set it at about 6.
- C. Set the current with the LT-7 "Current Control". For initial test welds set it at about 4.

Sec. M3.3.5

Setting Current And Voltage

CONSTANT VOLTAGE POWER SOURCE

- 1. Set the wire feed speed (WFS) specified by the procedures using the LT-7 "Current Control". For initial test welds, choose the setting from the following table:

Approx. WFS (in./min.)	Setting
100	3-1/2
200	5-1/2
300	7-1/2
400	9-1/2

- 2. Set the power source and the wire feeder for the voltage specified by the procedures as follows:
- 3. Set Toggle Switch on Variable Voltage P.C. Board to "VV" Position.

Idealarc® R3S

- a. Set the power source for the voltage range desired per instructions in the R3S operating manual. The OCV is fixed.
- b. Make the final voltage adjustments using the "Voltage Control" on the LT-7. This control varies the voltage over the range set by the power source.

SAM Motor-Generator or Engine Welder

- a. Set the power source "Constant Voltage Control" to "High".
- b. Set the arc voltage using the "Voltage Control" on the LT-7. For initial test welds, choose the setting from the following table:

Approx. Voltage	Setting
18-22	1
28-32	5
38-42	10

May 1989

SEC. M3.4 TRACTOR OPERATION

Sec. M3.4.1

Travel Controls

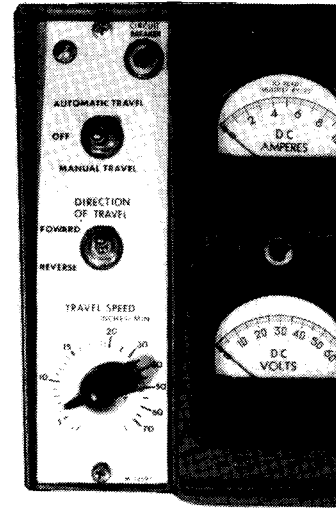
Engage the drive gears by pushing the clutch in from the right side of the tractor or pulling it out from the left side. If the gears do not engage easily, roll the tractor slightly while operating the clutch. When the gears are not engaged, the tractor rolls freely.

Set the speed of travel in inches per minute using the "Travel Speed" control.

The tractor can be power driven in both directions. Set the "Direction of Travel" switch in the "Forward" position for welding.

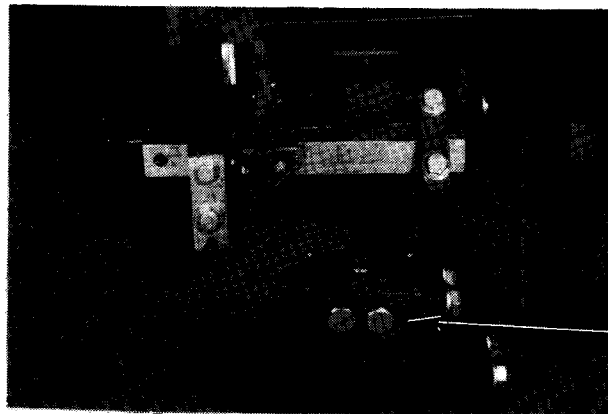
With the "Automatic Travel" control in the "Off" position, the tractor drive motor is off. When set for "Manual Travel" the tractor drive operates continuously. When set for "Automatic Travel" the tractor drive starts and stops with the welding controls.

March 1978



Sec. M3.4.2

Tractor Steering



Steering
Adjustment
Bolts (D5)

The standard front guidance system can be set for automatic tracking in a straight line or a fixed curve using the two bolts (D5) above the wheel:

1. To turn further left, loosen the right bolt (B) and tighten the left (A).
2. To turn further right, loosen the left bolt (A) and tighten the right (B).

When the tracking is set, be sure both bolts (D5) are snug.

To manually adjust the direction while welding, simply push the steering lever in the direction desired momentarily and let it snap back into its preset position. An extension arm shipped with each tractor can be screwed into the steering arm when desired.

October 1976

SEC. M3.5 MAKING THE WELDS

Sec. M3.5.1

Loading The Wire Reel

- A. Remove the wire reel from its shaft.
- B. Lay the reel flat on the floor and remove the cover plate.
- C. Place a coil of wire on the reel so it unwinds as the reel rotates *counterclockwise*.
 1. Be sure the coil is placed so the spring loaded arms will not interfere with the later removal of the coil tie wires.
 2. Put the cover plate on the reel so the four arms of the cover straddle the spring loaded arms of the reel properly.
- D. Tighten the cover as much as possible by hand. Do NOT hammer on the spinner nut arms.
- E. 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.
- F. Replace the reel on the shaft and then place the large washer and cotter pin in place to hold the reel.
- G. Feed the electrode through the insulated electrode take off arm (B2 in Sec. M3.2.2) and through the white nylon take-off tube. Leave enough electrode sticking out of the end of the tube to reach through the wire straightener to the drive rolls. Press the "Inch Down" button until the electrode feeds down into the nozzle. Insert the end of the take-off tube into the coupling in the take-off arm (B2).

NOTE: Always install the nylon take-off tube. If not used while welding, the electrically "hot" electrode may touch the control box or tractor and cause the machine to stop welding.

December 1975

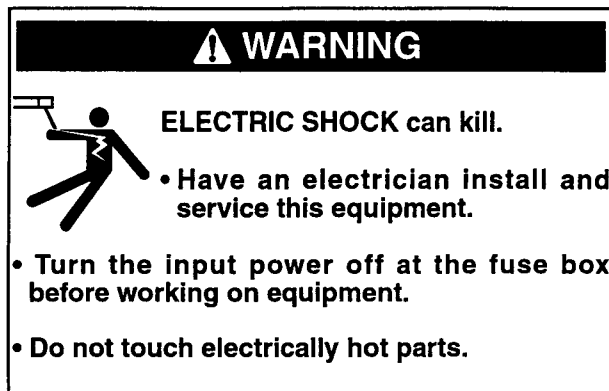
Sec. M3.5.2

Submerged Arc Welding

1. Arrange the tractor head mounting and guidance configuration for the joint per instructions in Sec. M3.2.
2. Load the wire reel and flux hopper. All re-used flux must be screened 100% through a screen with 3/32" (2.4 mm) maximum openings (8 mesh).
3. Place the tractor on the joint. Adjust the electrode stick-out, steering, and the lineup for proper welding. Set the travel switch to "Automatic Travel" and the "Direction of Travel" to "Forward". Set the travel speed, welding current and voltage about as required by the procedures.
4. Cut the end of the electrode to a sharp point.
5.
 - a. For *cold* starting at a precise location, inch the electrode down until it touches the work and stops automatically.
 - b. For *hot* starting, stop inching the electrode before it touches the work. Cut electrode to a sharp point before each weld.
6. Open the manual flux valve.
7. Press the "Start" button to start the wire feed and tractor drive motors.
8. While welding, adjust the LT-7 "Voltage" and "Current" settings for the proper weld procedure. Also adjust the flux flow valve to deposit just enough flux to prevent excessive visible arcing.
9. At the end of the weld, press the "Stop" button to stop the wire feed and tractor drive motors. A fixed time delay holds the output contactor in to burn the electrode back from the puddle preventing crater sticking.
10. Turn the flux valve off.

October 1976

SEC. M6 MAINTENANCE



Sec. M6.1.1

Wire Drive Motor And Gear Box

Every year inspect the gear box and paint the gear teeth with graphite grease.

Every six months check the motor brushes. Replace them if they are less than 1/4" (6.4 mm) long.

March 1974

Sec. M6.1.2

Drive Rolls And Guide Tubes

Periodically inspect the drive roll section. Clean it as necessary. Do not use solvents for cleaning the idle roll because it may wash the lubricant out of the bearing. The drive roll, idle roll and guide tubes are stamped with the wire sizes they will feed.

The drive rolls have a double set of teeth so they can be reversed for additional life.

September 1975

Sec. M6.1.3

Contact Nozzle Assembly

The nozzle contact tip must be replaced when it no longer provides accurate wire location or good electrical contact. See Sec. M2.2.6 or M2.2.7 for instructions.

March 1974

Sec. M6.1.4

Wire Straightener

Periodically inspect the slide bushing at the top of the straightener and the ingoing wire guide at the bottom of the straightener for signs of wire milling. If necessary, rotate the guide to present an unworn surface. To reverse the slide bushing for a fresh wear surface, remove the cross adjustment screw and turn the bushing over.

March 1974

Sec. M6.1.5

Wire Reel Mounting — 50 And 60 Pound Coils

To prolong the life of the reel shaft, periodically coat it with a thin layer of grease.

March 1974

Sec. M6.1.8

Axle Drive Gear

For proper clutch operation, occasionally lubricate the gear and sliding surfaces of the axle with a *dry* lubricant, such as moly disulfide powder. The tractor drive motor gear box requires no routine maintenance.

Every six months check the motor brushes. Replace them if they are less than 1/4" (6.4 mm) long.

March 1978

Sec. M6.2.1

Control Box

The Control Box requires no routine maintenance except to occasionally remove dirt by blowing with *low* pressure dry air.

Defective P.C. boards must be returned to the factory. Attempts to repair the P.C. boards void the guarantee.

March 1978

Sec. M6.2.2

Circuit Protection

The AC input line is protected by the circuit breaker mounted between the LT-7 meters. It protects the LT-7 from shorts and from overloads, usually caused by excessive wire drag or other wire feeding problems. To reset the circuit breaker, push the red button. If it opens again, determine the cause of the overload. The LT-7 light outlet is *not* protected by this circuit breaker.

In earlier models, if a short occurs in the field circuit of either the wire feed or travel motors, or if there is a defect on the P.C. board, a 1/2 amp slow-blow type fuse will blow. This field circuit fuse is mounted on the control P.C. board inside the respective weld or travel control box. Before replacing the fuse, check the motor field for a shorted condition.

In earlier models, if a P.C. board component fails and overloads the 24 volt DC power supply to the control circuit, the 2/10 amp fuse on the control P.C. board inside the control box will blow.

NOTE: The LT-7 (earlier models only) is shipped with spare fuses taped to the left side of the control box inside.

October 1976

On the latest models all fuses on the control board have been replaced with PTC Resettable Fuses. These devices will shutdown the circuit if overloaded, but will automatically reset after the overload condition has been removed. Should one of these devices trip, turn off the power to the unit and remove the source of the overload (See possible suggestions above for fuse blowing). Allow a few minutes for the device to cool down before restoring power.

September 1998

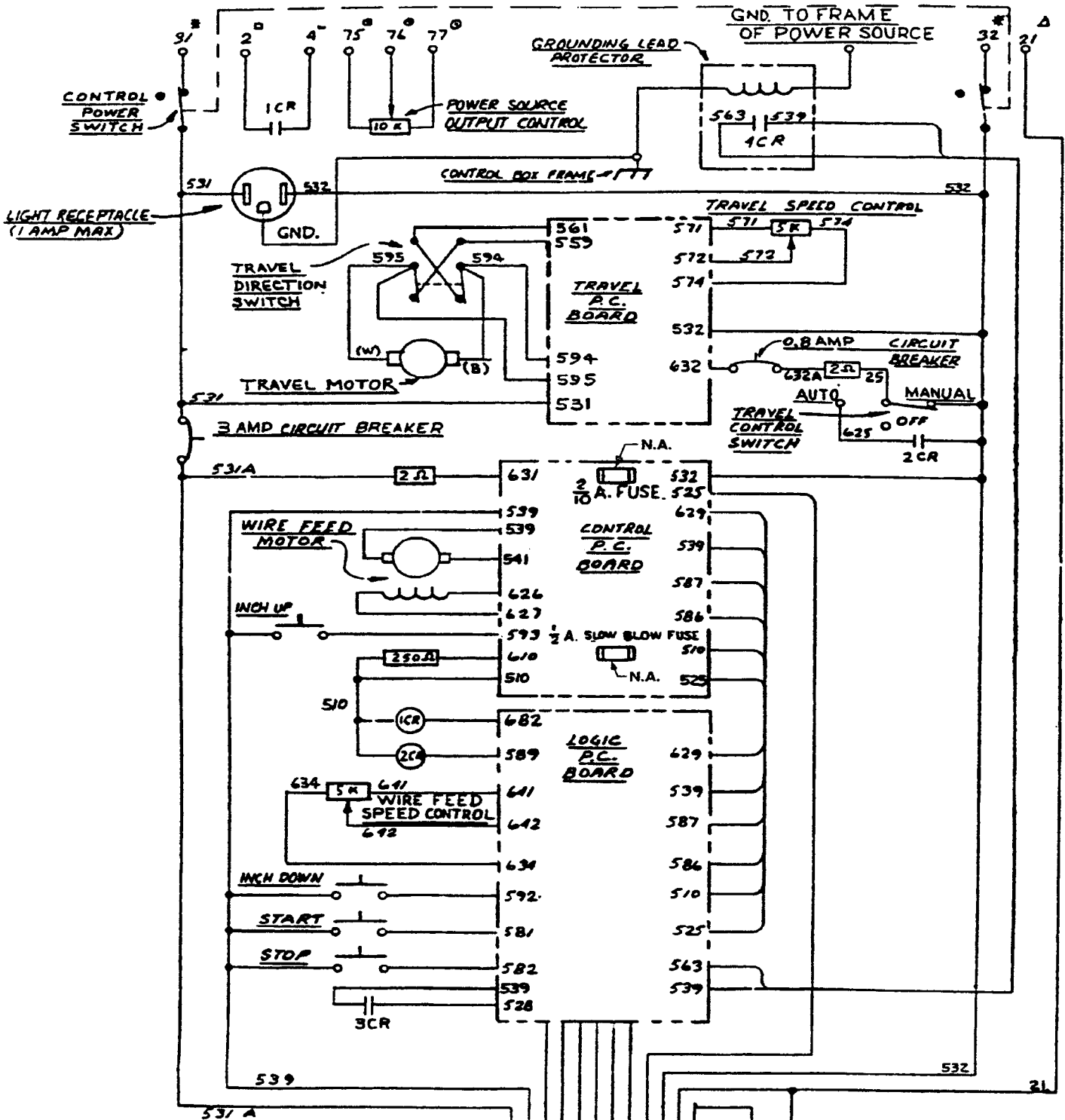
Sec. M6.2.3

Grounding Lead Protector

The frame of the LT-7 is grounded to the frame of the power source by a lead in the control cable. An overload protector prevents welding current from damaging this lead if the electrode or head touches the LT-7 frame or control housing by shutting down the welding operation. The machine cannot be restarted until the fault is cleared and the grounding lead protector circuit is reset as follows:

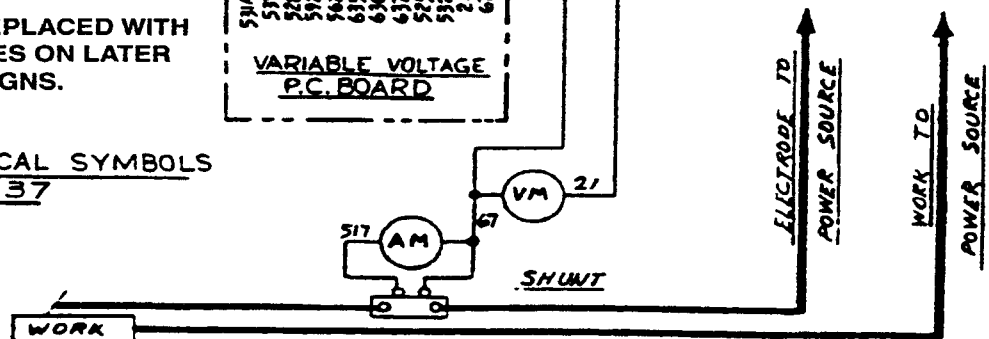
1. Clear fault by eliminating source of frame contact.
2. Turn the LT-7 input power switch off and then back on.
3. The unit is now ready for operation.

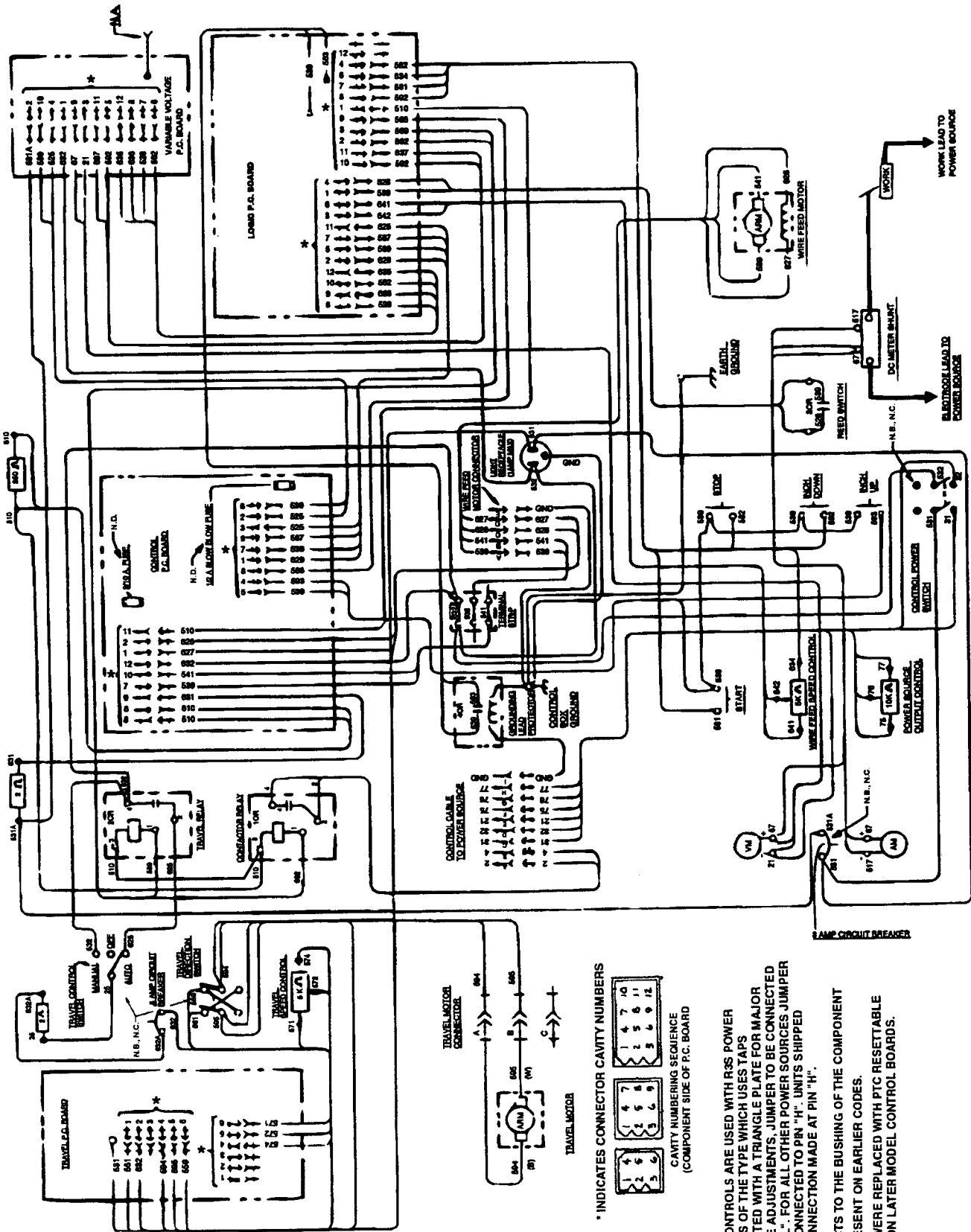
September 1976



N.A. THESE FUSES WERE REPLACED WITH PTC RESETTABLE FUSES ON LATER CONTROL BOARD DESIGNS.

ELECTRICAL SYMBOLS PER E1537



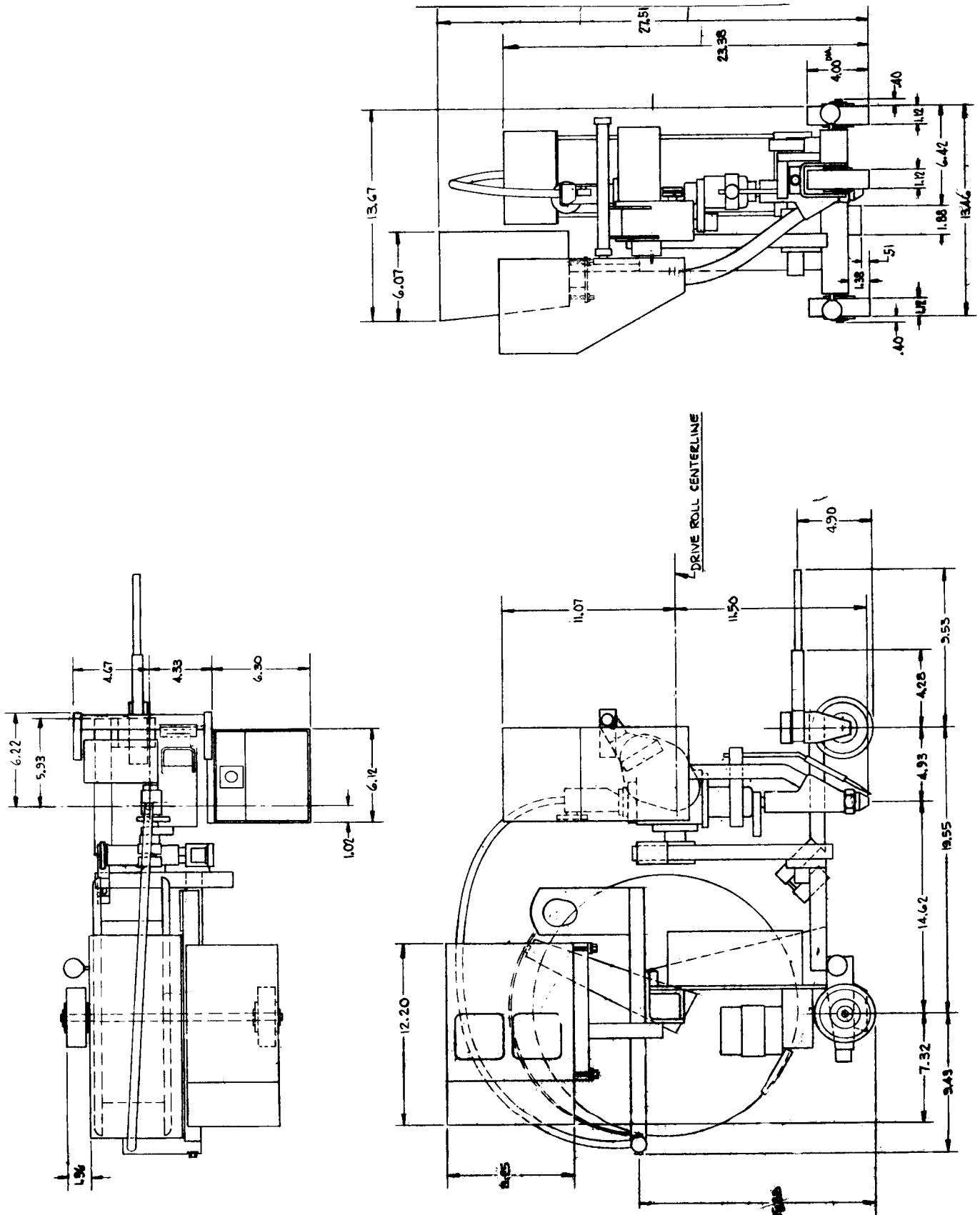


* INDICATES CONNECTOR CAVITY NUMBERS
 CAVITY NUMBERING SEQUENCE
 (COMPONENT SIDE OF P.C. BOARD)

1	4	7	10
2	5	8	11
3	6	9	12

- N.A. WHEN CONTROLS ARE USED WITH RRS POWER SOURCES OF THE TYPE WHICH USES TAPS CONNECTED WITH A TRIANGLE PLATE FOR MAJOR VOLTAGE ADJUSTMENTS, JUMPER TO BE CONNECTED TO PIN "L". FOR ALL OTHER POWER SOURCES JUMPER TO BE CONNECTED TO PIN "H". UNITS SHIPPED WITH CONNECTION MADE AT PIN "H".
- N.B. CONNECTS TO THE BUSHING OF THE COMPONENT
- N.C. NOT PRESENT ON EARLIER CODES.
- N.D. FUSES WERE REPLACED WITH PTC RESETTABLE FUSES ON LATER MODEL CONTROL BOARDS.

LT-7 DIMENSIONS
 (Shown With Optional K231 Contact Nozzle Assembly)



SHOWN WITH OPTIONAL CONTACT NOZZLE ASSEMBLY

CUSTOMER ASSISTANCE POLICY

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