

# LT-7 Lightweight Tractor

## K227, K395 and K395-1

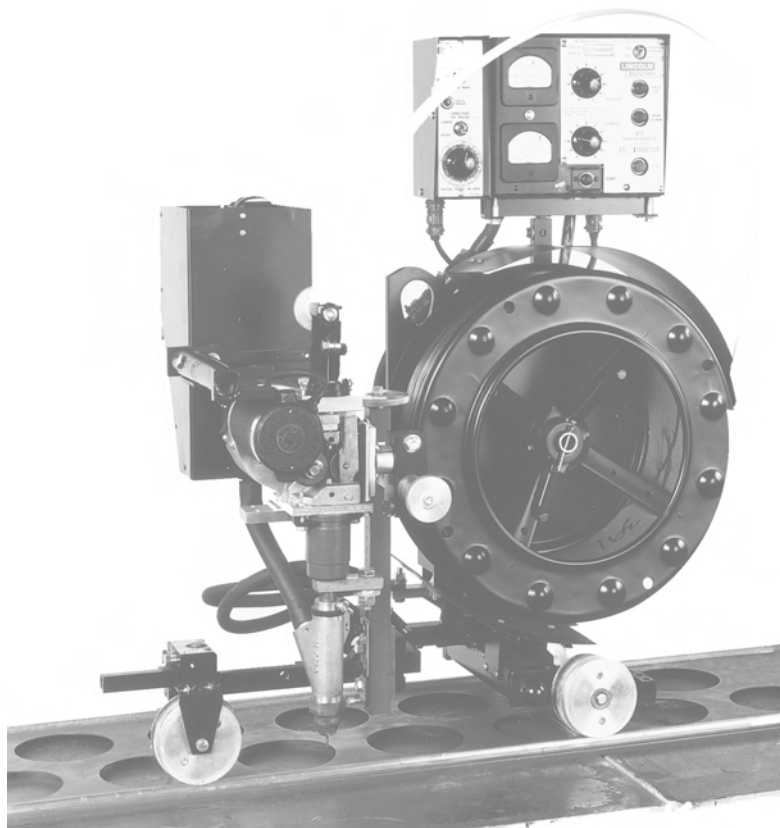
A Complete Automatic DC Submerged Arc  
Wire Feeder on a Self-Propelled Trackless Carriage

### 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.

### Damage Claims

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



## OPERATOR'S MANUAL



**LINCOLN**<sup>®</sup>  
**ELECTRIC**

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## ⚠ WARNING

### ⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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



### FOR ENGINE powered equipment.

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



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



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

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

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



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

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



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



### ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

Mar '95



## ELECTRIC SHOCK can kill.

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



## ARC RAYS can burn.

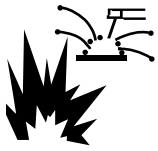
- 4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.
- 4.b. Use suitable clothing made from durable flame-resistant material to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



## FUMES AND GASES can be dangerous.

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

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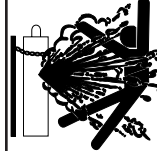


### WELDING SPARKS can cause fire or explosion.

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

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

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



### CYLINDER may explode if damaged.

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

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



### FOR ELECTRICALLY powered equipment.

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

Mar '95

## PRÉCAUTIONS DE SÛRETÉ

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

### Sûreté Pour Soudage A L'Arc

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

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

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

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

# Thank You

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

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

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

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

Product \_\_\_\_\_

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

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

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

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

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

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

## **On-Line Product Registration**

- Register your machine with Lincoln Electric either via fax or over the Internet.

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

**Read this Operators Manual completely** before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

### **⚠ WARNING**

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

### **⚠ CAUTION**

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

# 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



**RECOMMENDED COPPER CABLE SIZES FOR ARC WELDING**

Machine Size in Amperes	Duty Cycle %	Combined Lengths of Electrode and Work Cable			
		0-100' (0-30 m)	100-150' (30-45 m)	150-200' (45-60 m)	200-250' (60-75 m)
600	60	#3/0	#3/0	#4/0	(2) #3/0
600	80	(2) #1/0	(2) #1/0	(2) #2/0	(2) #3/0
600	100	(2) #1/0	(2) #1/0	(2) #2/0	(2) #3/0
650	60	#3/0	#4/0	(2) #2/0	(2) #3/0
650	80	(2) #1/0	(2) #1/0	(2) #2/0	(2) #3/0
800	80	(3) #1/0	(3) #1/0	(2) #3/0	(2) #4/0
800	100	(2) #3/0	(2) #3/0	(2) #3/0	(2) #4/0
1000	80	(2) #4/0	(2) #4/0	(2) #4/0	(4) #2/0

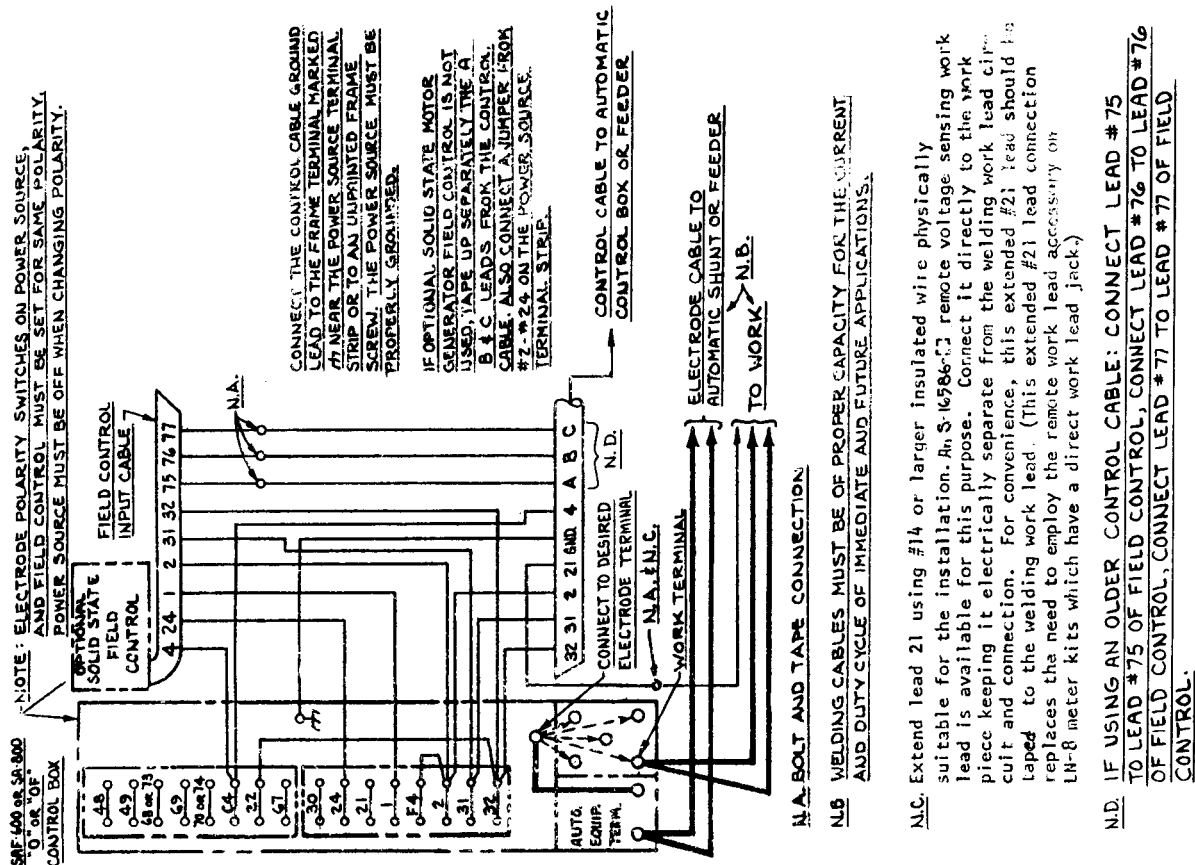
first picture of Sec. M3. Be sure the cable does not interfere with the wire reel rotation and the connections do not make contact with any part of the tractor frame.

6. Connect a work lead of sufficient size and length (refer to following table) between the "To Work" stud on the power source and the work. Be sure the connection to the work makes a tight and clean metal-to-metal contact.

May 1999

Sec. M2.2.4-A

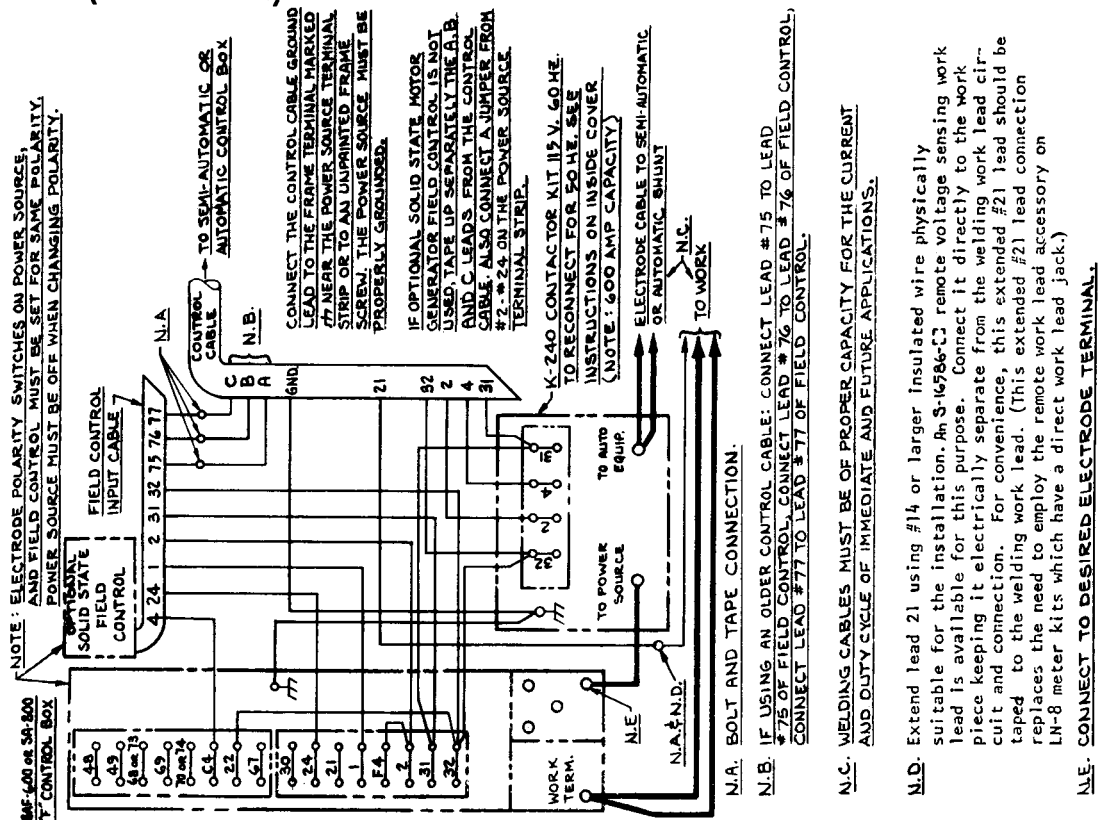
**Connection of LT-7 to an SAF-600 or SA-800, Types "-O" or "-OF" (OBSOLETE)**



## ELECTRICAL INSTALLATION — CONT'D

Sec. M2.2.4-B

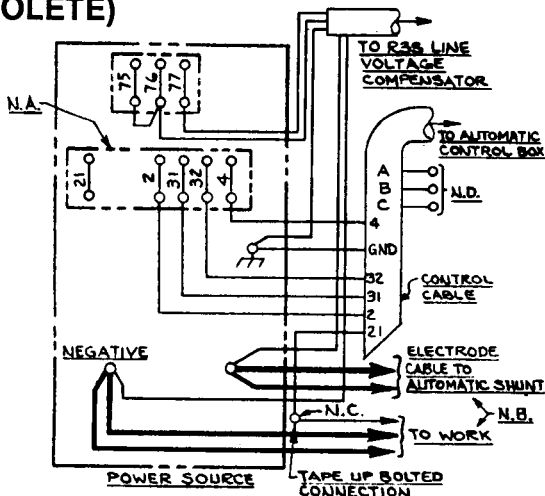
### Connection of LT-7 to an SAF-600 or SA-800, "-F" With Solid-State Field Control and K240 Contactor Kit (OBSOLETE)



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)



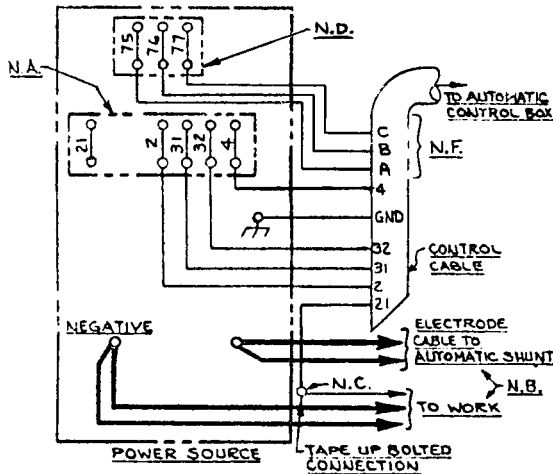
ABOVE DIAGRAM SHOWS ELECTRODE CONNECTED POSITIVE TO CHANGE POLARITY, TURN POWER OFF, REVERSE THE ELECTRODE AND WORK LEADS AT THE POWER SOURCE AND REVERSE THE "CONTROL SWITCH" AT THE POWER SOURCE.

CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED  $\Delta$  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)**



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.

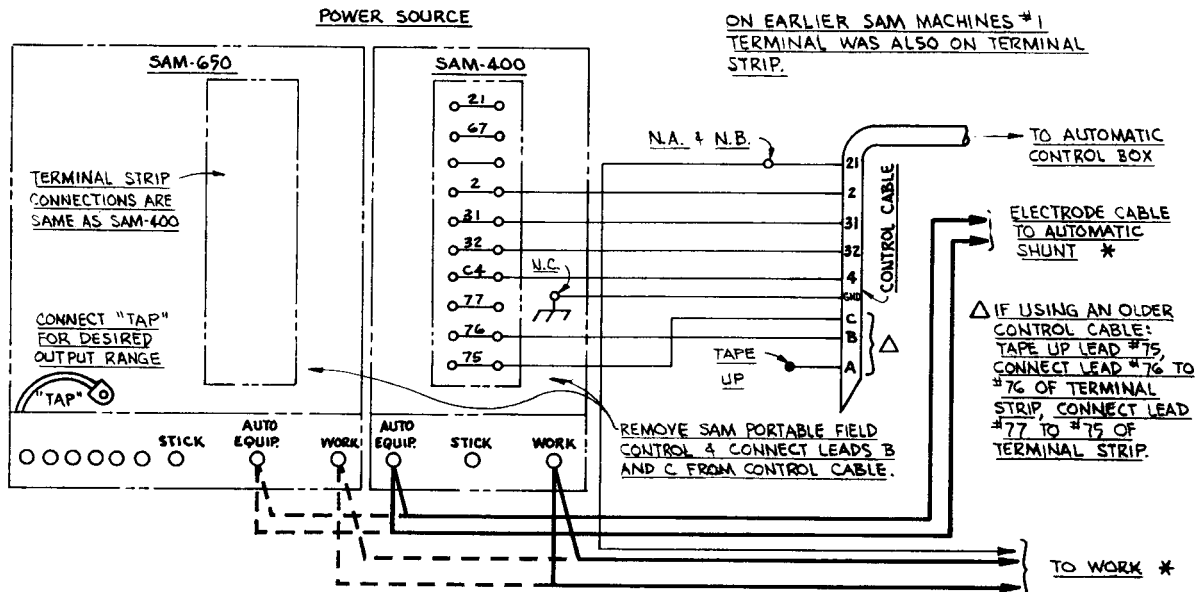
CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARKED ⚡ NEAR THE POWER SOURCE TERMINAL STRIP OR TO AN UNPAINTED FRAME SCREW. THE POWER SOURCE MUST BE GROUNDED PROPERLY.

- N.A. ON EARLIER R3S-400, 600 & 800 MACHINES, #67 & #1 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.

S15991  
1-25-80

Sec. M2.2.4-F

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



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.B. TAPE UP BOLTED CONNECTION.

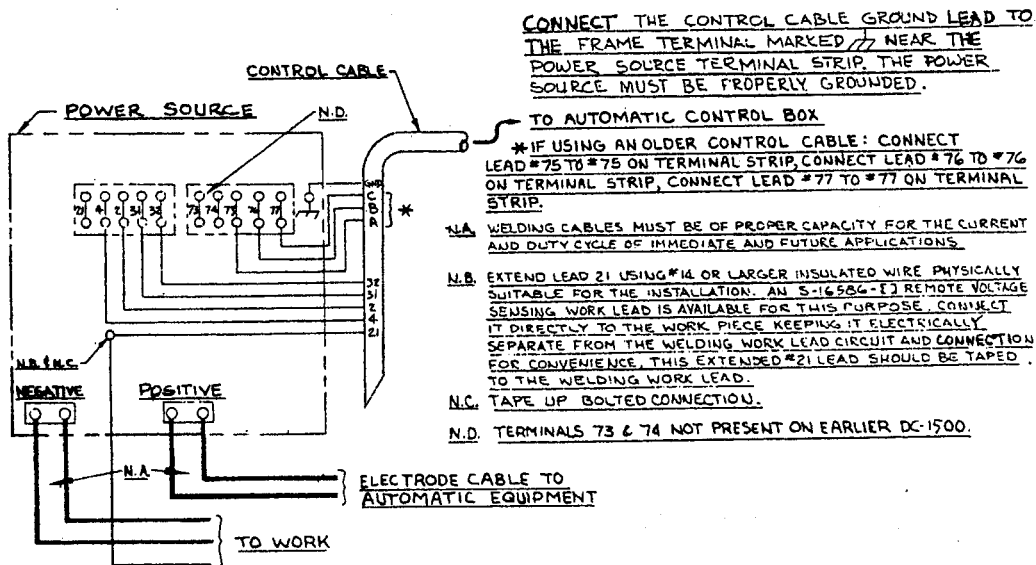
N.C. CONNECT THE CONTROL CABLE GROUND LEAD TO THE FRAME TERMINAL MARK ⚡ NEAR THE POWER SOURCE TERMINAL STRIP OR TO AN UNPAINTED FRAME SCREW. THE POWER SOURCE MUST BE PROPERLY GROUNDED.

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

S15265  
3-28-80

## ELECTRICAL INSTALLATION — CONT'D

### Sec. M2.2.4-G Connection of LT-7 to DC-1500



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.

TO AUTOMATIC CONTROL BOX  
\*IF USING AN OLDER CONTROL CABLE: CONNECT LEAD #75 TO #75 ON TERMINAL STRIP, CONNECT LEAD #76 TO #76 ON TERMINAL STRIP, CONNECT LEAD #77 TO #77 ON TERMINAL STRIP.

N.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-16586-[E] 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.

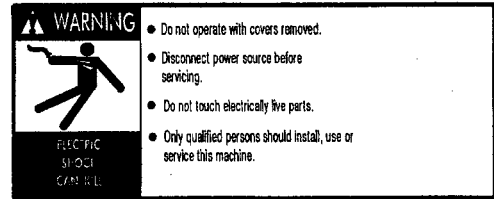
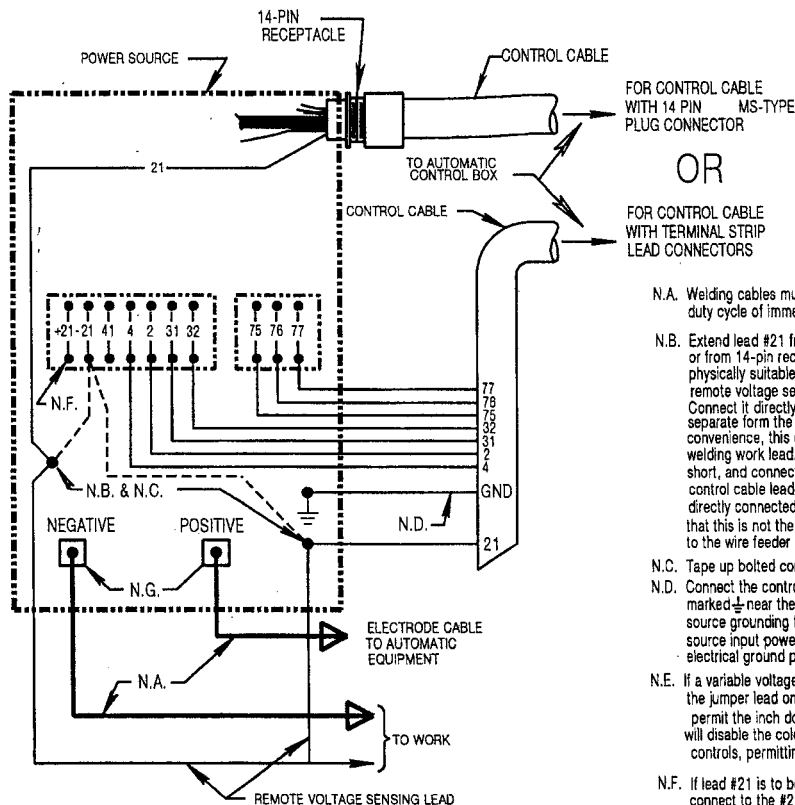
N.C. TAPE UP BOLTED CONNECTION.

N.D. TERMINALS 73 & 74 NOT PRESENT ON EARLIER DC-1500.

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

S15534  
2-26-82B

### Sec. M2.2.4-H Connection of LT-7 to CV-655, DC-655 OR DC-600



FOR CONTROL CABLE WITH 14 PIN MS-TYPE PLUG CONNECTOR

OR

FOR CONTROL CABLE WITH TERMINAL STRIP LEAD CONNECTORS

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 from control cable with terminal strip connectors or from 14-pin receptacle using #14 AWG or larger insulated wire physically suitable for the installation. An S16586-[LENGTH] remote voltage sensing work lead may be ordered 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. Note that this is not the preferred connection because it adds error to the wire feeder voltmeter reading.)

N.C. Tape up bolted connection if lead #21 is extended.

N.D. Connect the control cable ground lead to the frame terminal marked  $\perp$  near the power source terminal strip. The power source grounding terminal (marked  $\perp$  and located near the power source input power connections) must be properly connected to electrical ground per the power source operating manual.

N.E. If a variable voltage board is present in the automatic controls, 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/autostop feature of the automatic controls, permitting only hot starting techniques to be used.

N.F. If lead #21 is to be connected to the terminal strip, connect to the #21 terminal that matches work polarity. This connection must be changed whenever the electrode polarity is changed.

N.G. Illustration does not necessarily represent actual position of appropriate output studs. Refer to power source operating manual for more information.

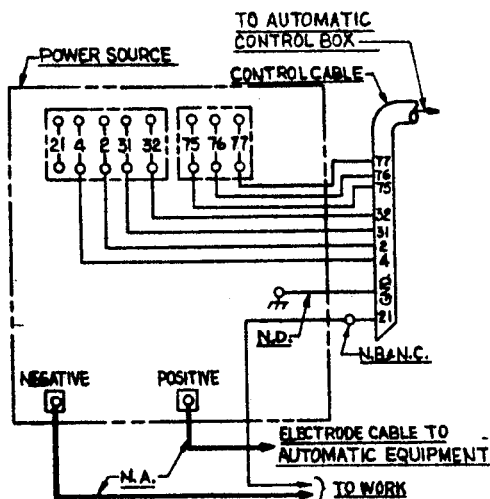
Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source. Reverse the leads on the back of the ammeter and voltmeter in the automatic control box. Also refer to note N.F.

For proper setting of switches on power source, see power source operating manual.

10-30-98F  
S22978

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  $\text{h}$  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.

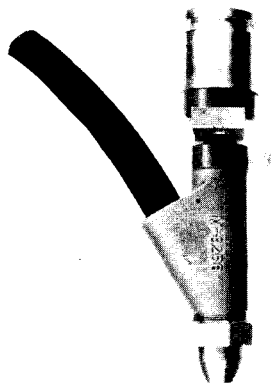
**Operation** — Do **NOT** completely straighten the electrode. A slight curvature is required in the electrode to insure good electrical contact inside the contact tip.

**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

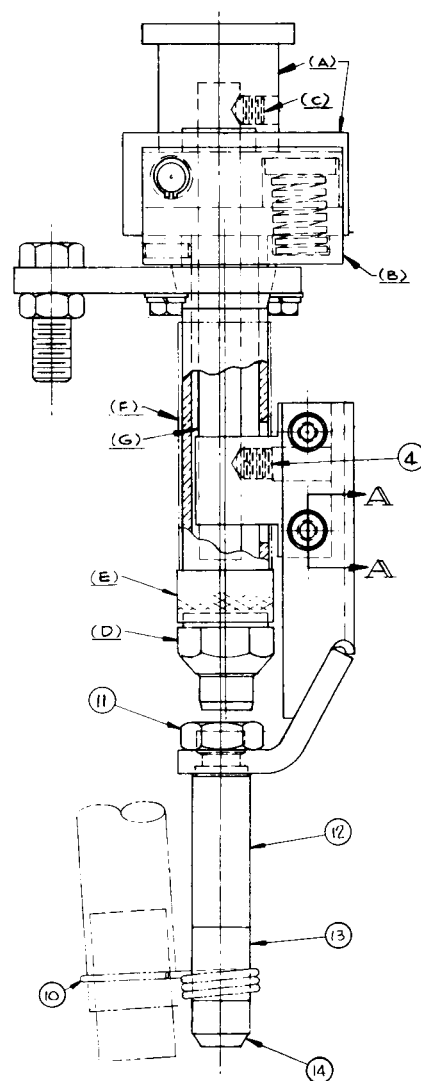
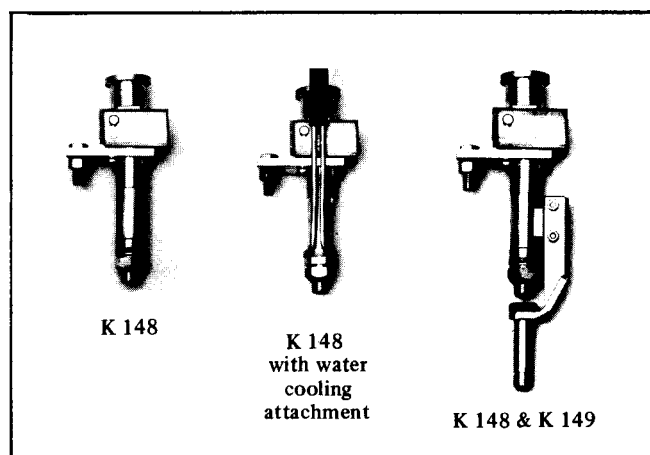
#### Water Cooling Attachment

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.

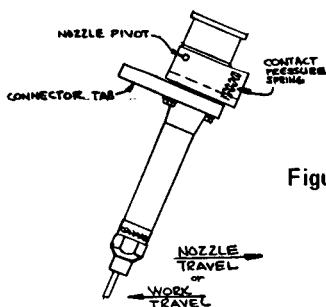


Figure 1

**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**

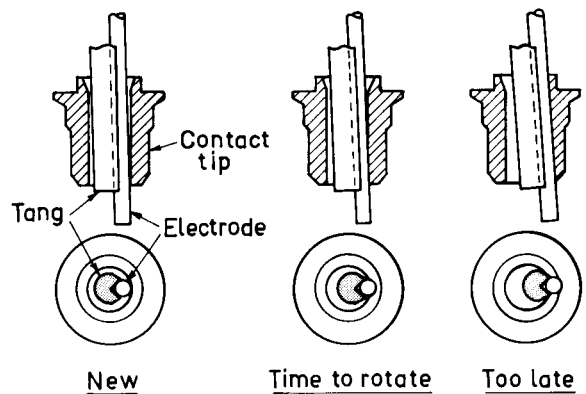
Straighten the start end of the coil for at least eight inches, pass the end down through the appropriate wire straightener. Inch the wire through the wire feeder and the nozzle. When using .062 (1.6 mm) or 5/64" (2.0 mm) Innershield electrode with a K148-C nozzle, make sure that the wire is in the "vee"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

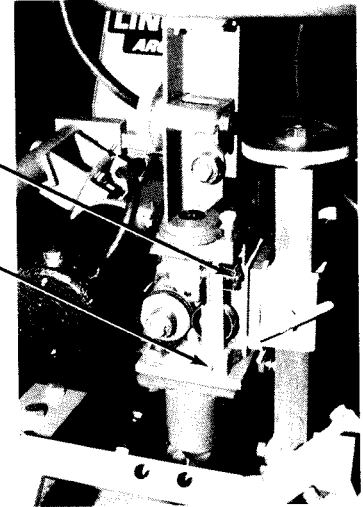
12. Travel motor lead extension cord.
13. Flat fillet wire reel frame extension bracket.
14. 45° flat fillet front wheel support assembly.
15. Rear "flat fillet" wheel support assembly.

### 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.



**Twinarc 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 ingoing 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.

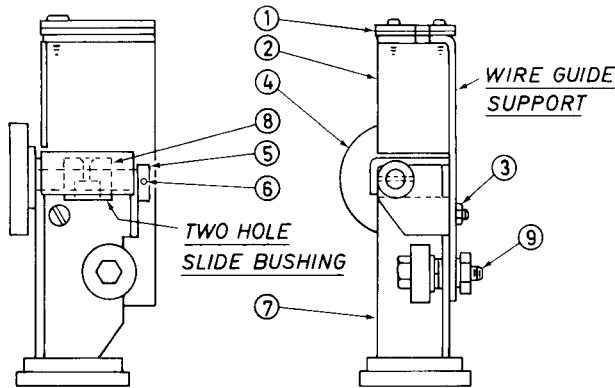


FIG. A

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.

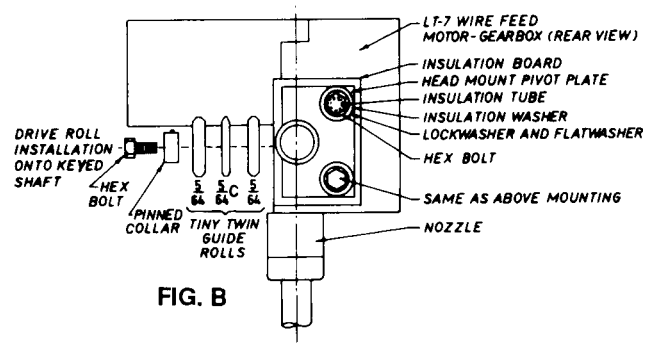
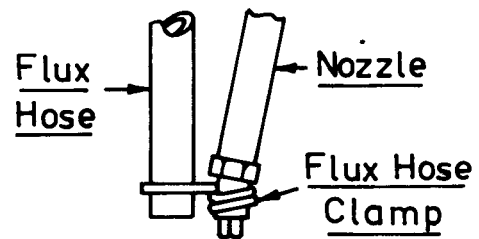


FIG. B

**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.)

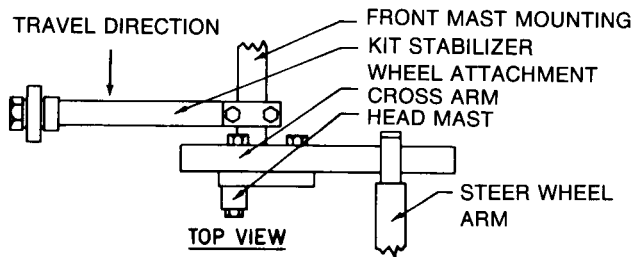
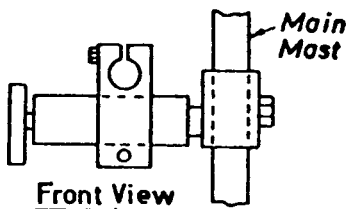


FIG. C

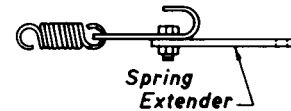
- d. For welding slightly open butt joints or prepared butt joints, the use of the K230 vee butt weld guide is recommended. See Sec. M3.2.3, IM-279, for proper installation and usage. Instructions for bar and channel tracking are also covered in Sec. M3.2.3.

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.



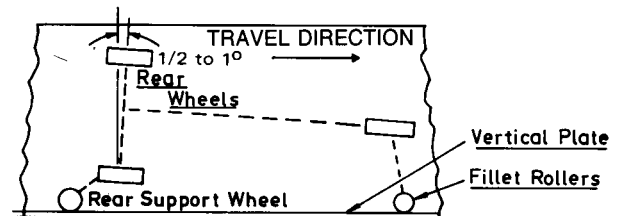
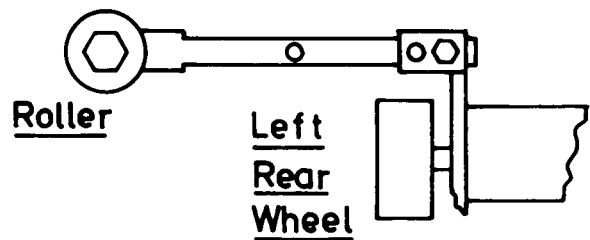
3. Bolt the kit head spring extender to the "L" hole on the LT-7 head spring hook and use the hole on the far end when installing the head spring attachment.



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:

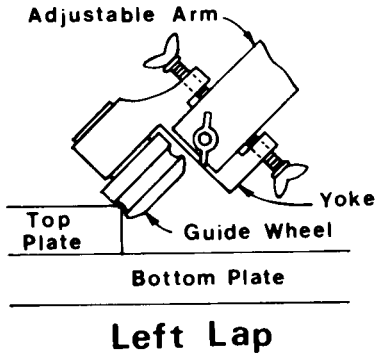


4. Horizontal Lap Welds

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

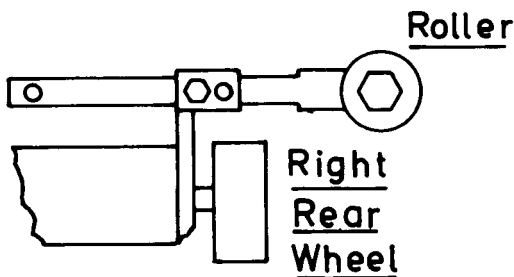
- a. The fillet wheel yoke is replaced by the lap wheel yoke (single grooved wheel) — part of the K232 kit.
  1. Lap wheel yoke mounts with the wheel on the right of yoke for left laps (vice versa for right laps).

Sec. M2.2.8 (Continued)

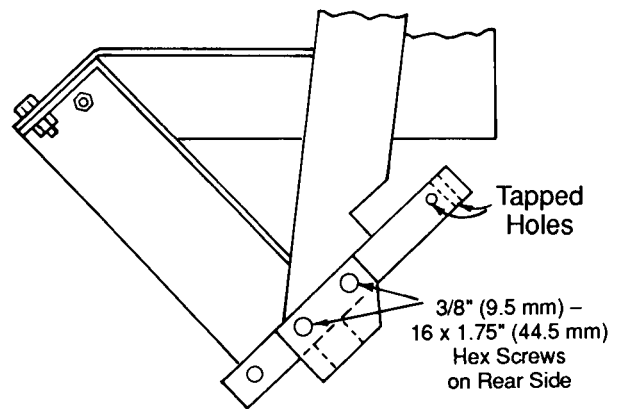


2. The lap wheel rides on the corner of the top plate of the lap joint.
- b. The rear fillet support wheel attachment is not required. For left laps the left rear wheel should be approximately 8" (2.4 m) from the seam, and for right laps the right rear wheel should be 5" (1.5 m) from the seam.

For right horizontal fillets install arm as shown below:



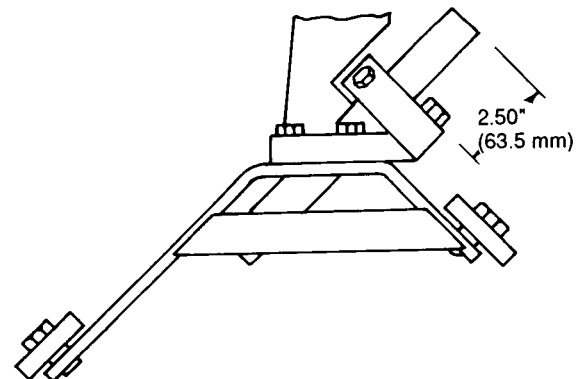
8. Remove the cross beam.
9. See Figure D and install the Twinarc wire reel extender bracket M13396 to the tractor frame using the mounting hardware from Item (4). Assemble the nuts and bolts but leave them relatively loose at this stage.
10. Take the cross beam and sandwich it between the notched vertical 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).

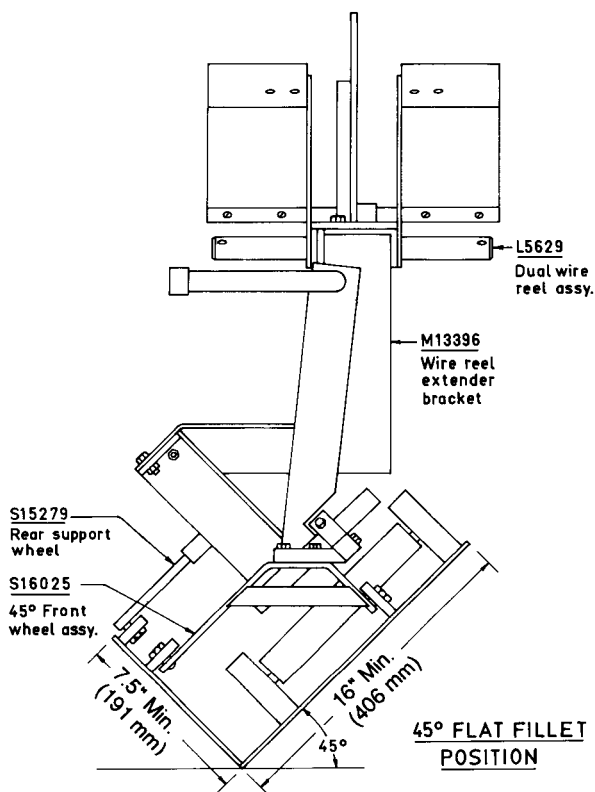
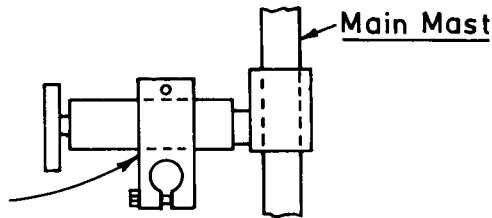
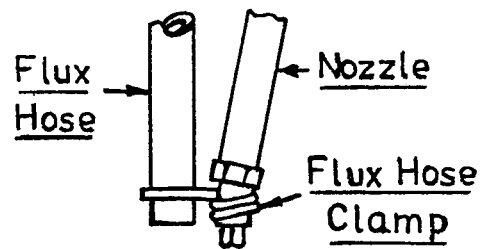
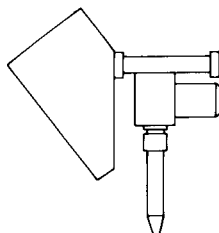


FIG. D

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.

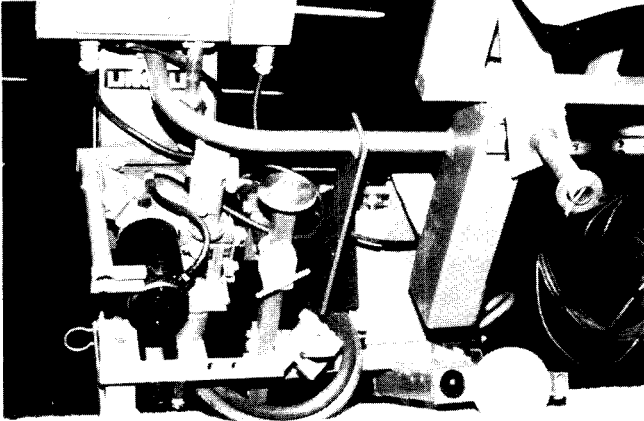
D. Making the Tiny Twinarc Weld

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

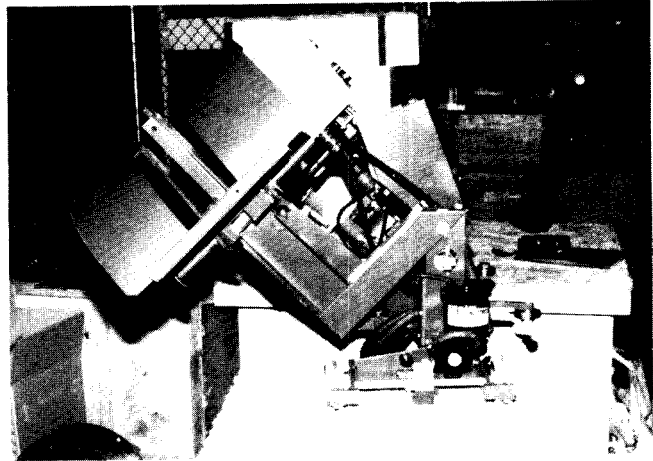
Sec. M2.2.8 (Continued)

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.

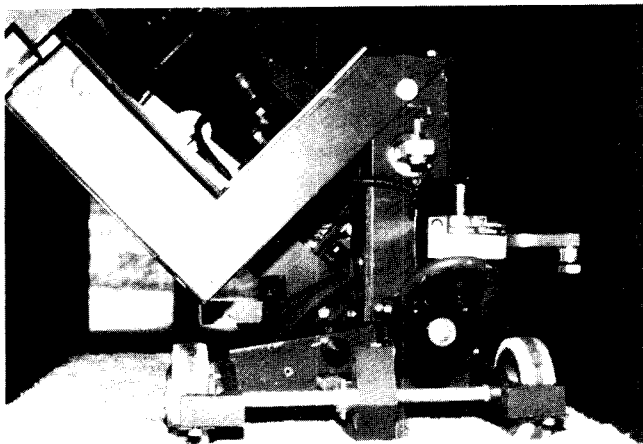


LT-7 side view with K277-2 installed.



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

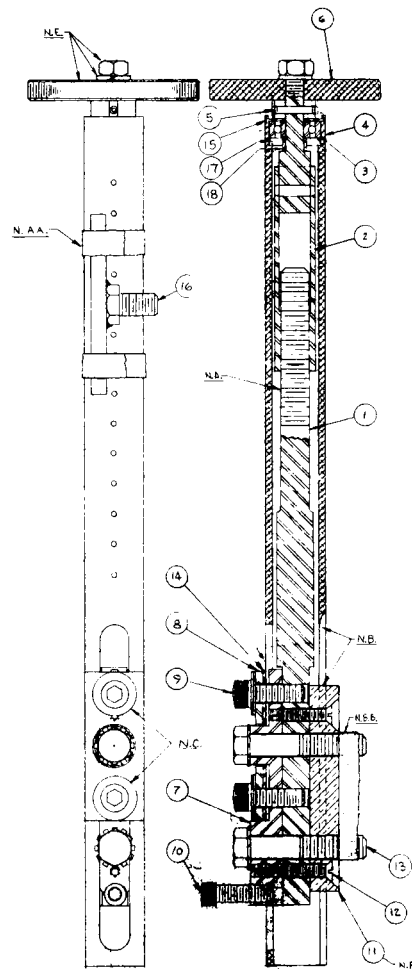
(Standard Equipment on LT-7 Tractors Above Code 7948)

### 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)

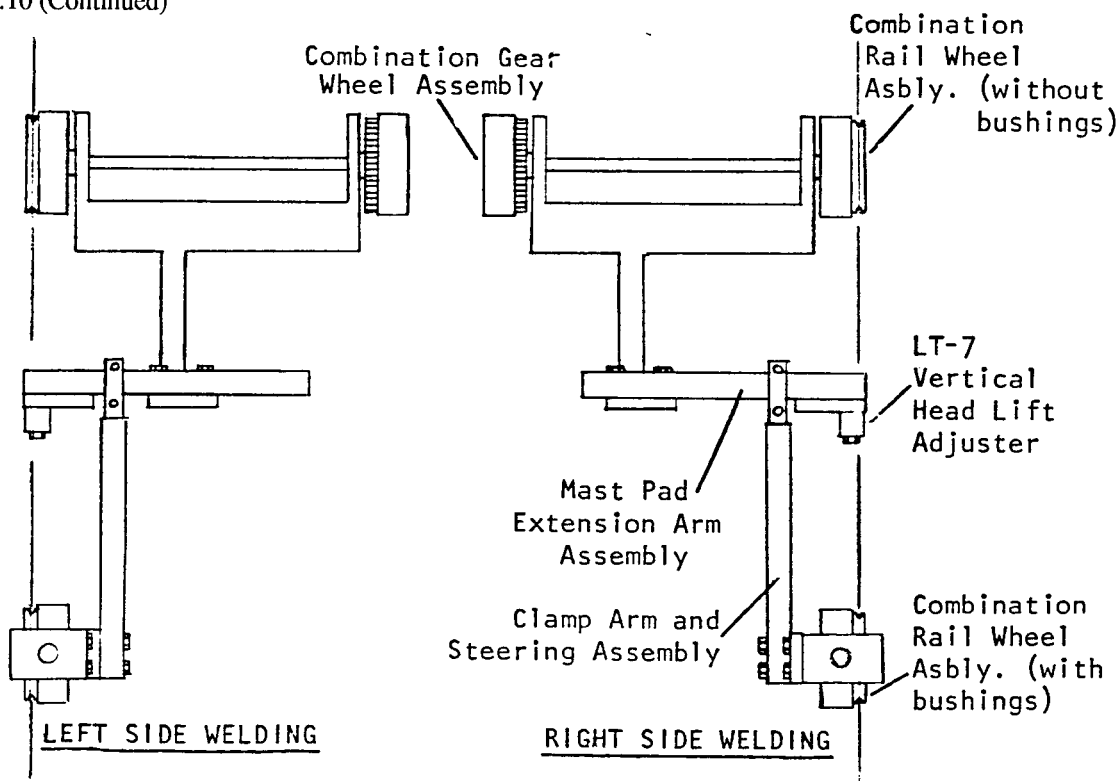


Figure 1

**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

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

### 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.

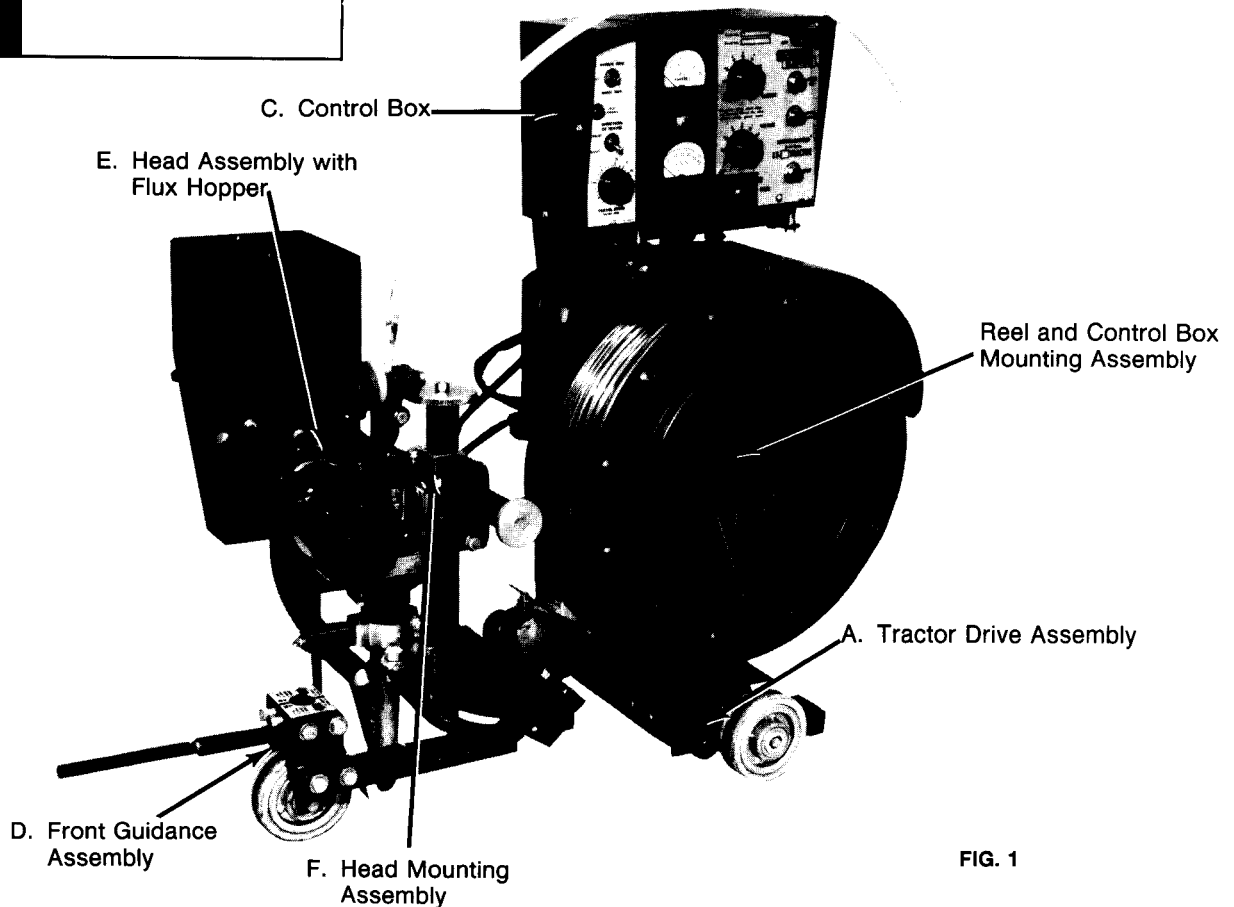
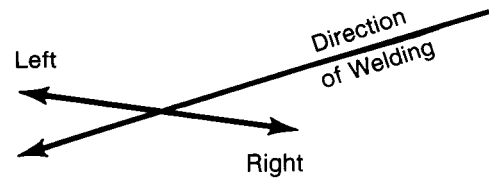
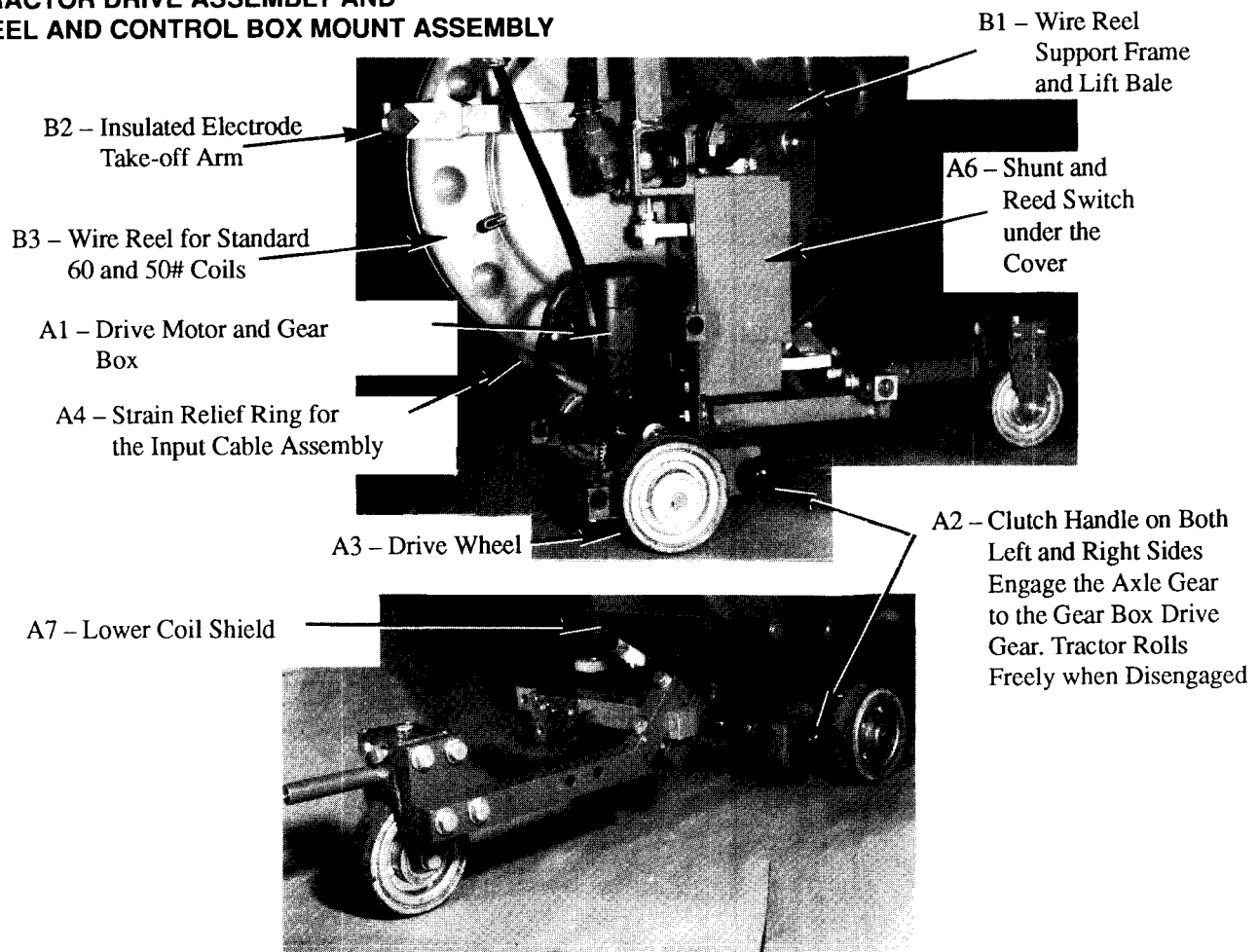
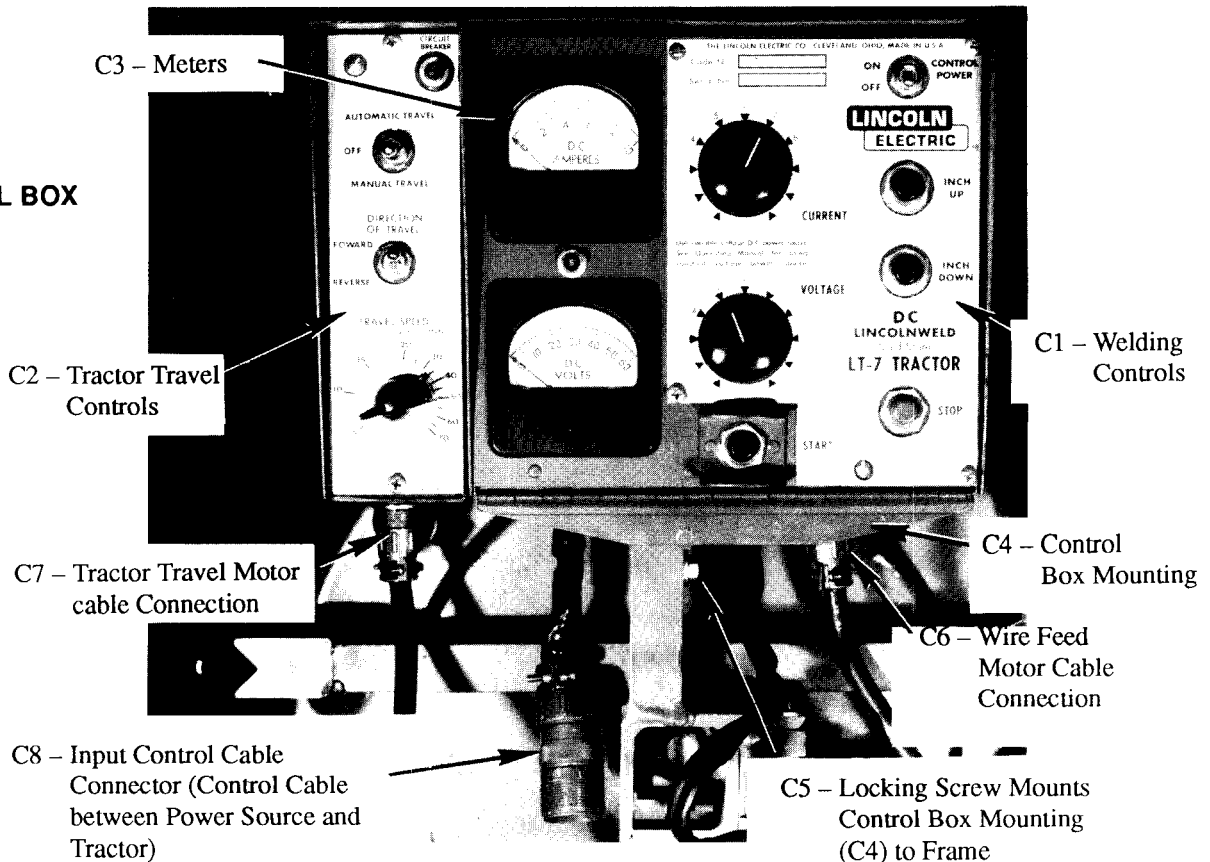


FIG. 1

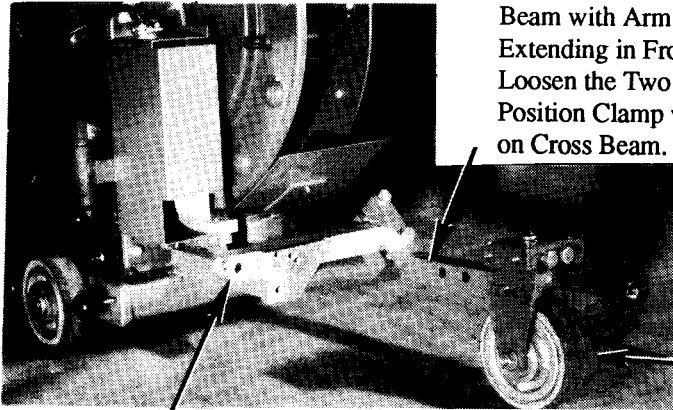
**A. TRACTOR DRIVE ASSEMBLY AND  
B. REEL AND CONTROL BOX MOUNT ASSEMBLY**



**C. CONTROL BOX**



### D. FRONT GUIDANCE ASSEMBLY

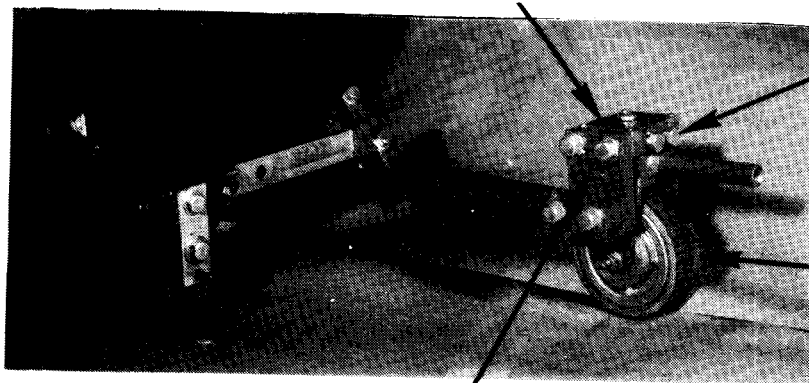


**D2 – Clamp Arm** – Slips Over Cross Beam with Arm Below and Extending in Front of Cross Beam. Loosen the Two Bolts to Position Clamp where Desired on Cross Beam.

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)

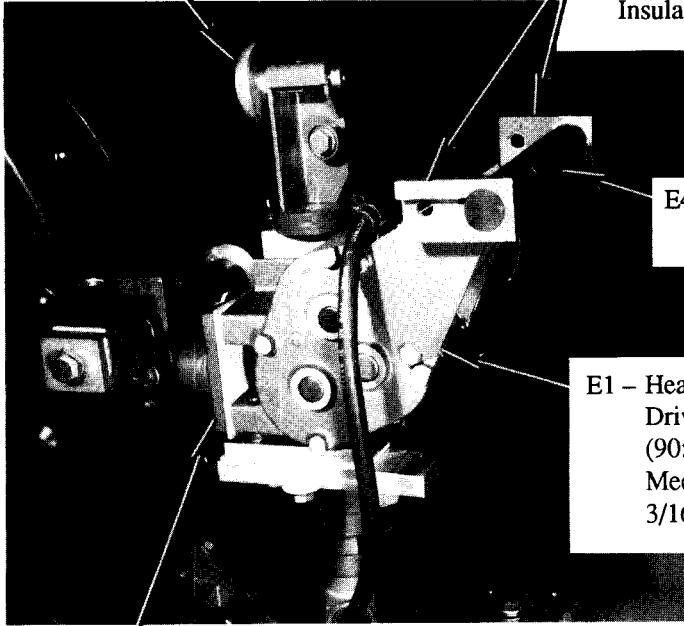
Wheel on Right Side of Clamp Arm (D2)

**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.

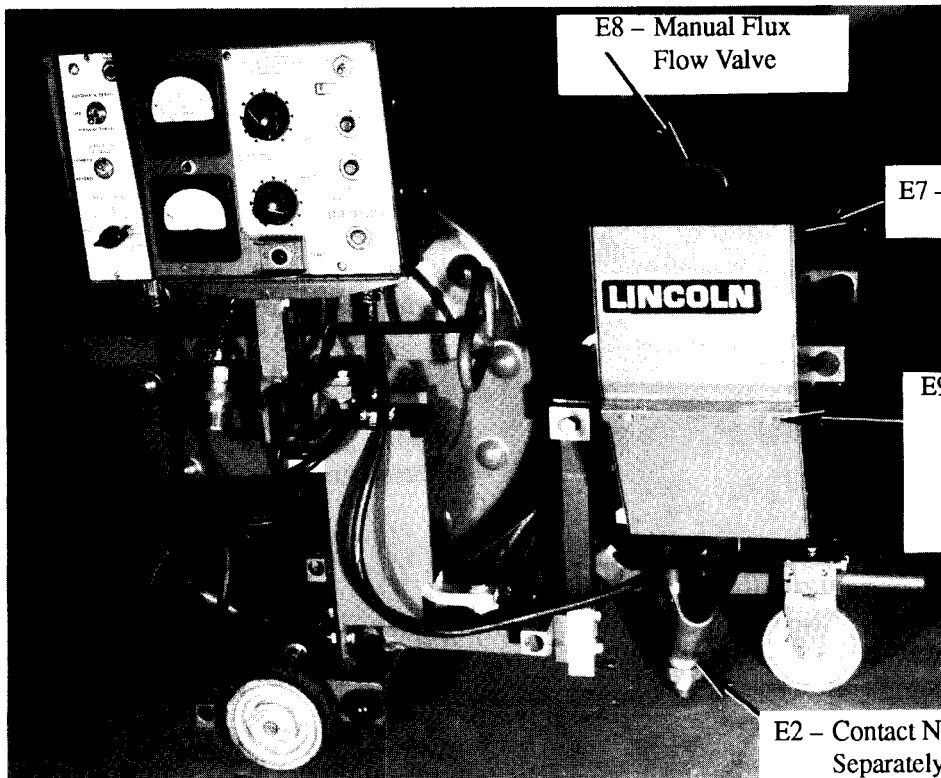
E5 – Flux Hopper Mounting  
Channels (Two Available).  
Insulated from Head.



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

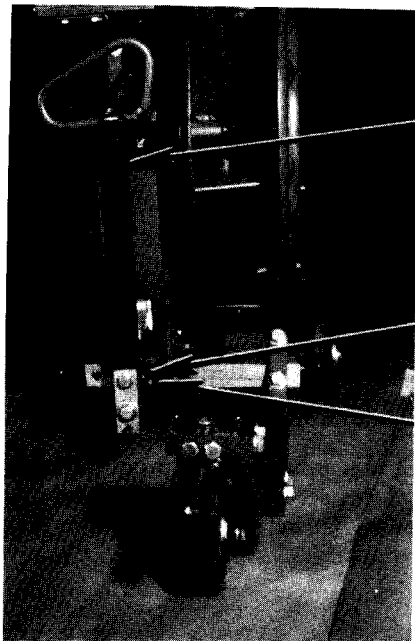
E7 – Flux Hopper.  
15 lb. (6.8 kg) capacity.

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.

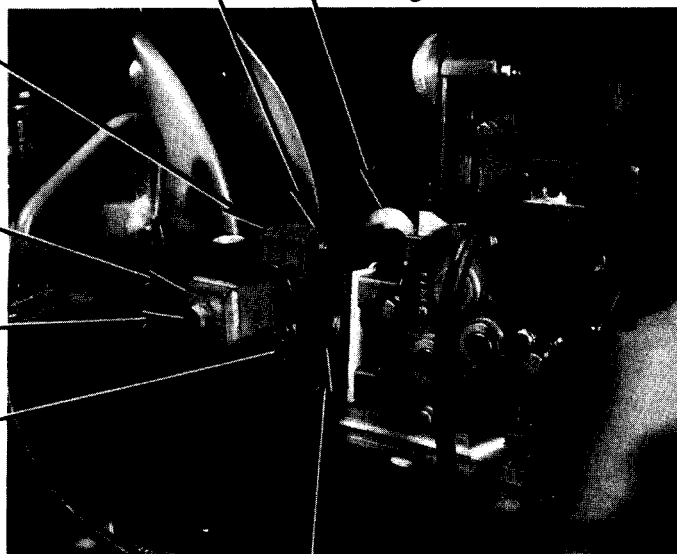
**F2a** – Loosen Lock Bolt to (1) Slide Clamp Block on Cross Seam Adjuster Barrel for 3-1/8" (79.4 mm) Coarse Cross Seam Adjustment and (2) Rotate Head around Barrel to Change Electrode Drag Angle.

**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.



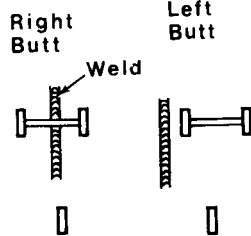
E6 – Pivot Plate Barrel

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].

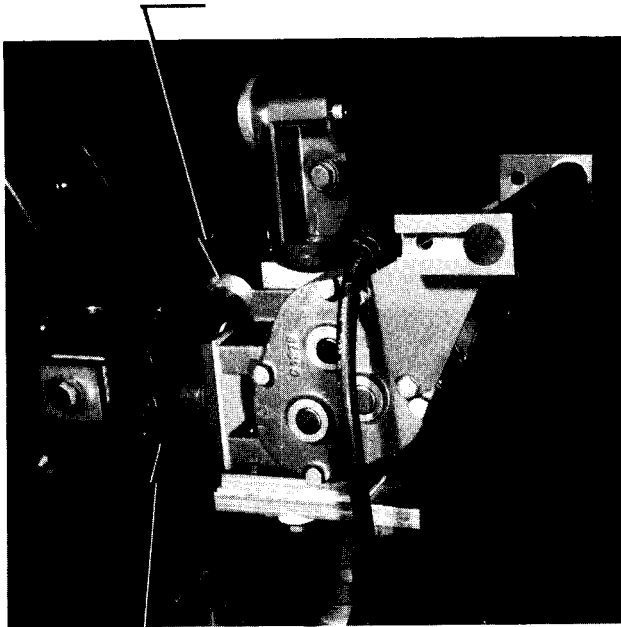
Position the clamp block (F2) below the cross seam adjuster for standard short stickout procedures. Position it above the adjuster for Linc-Fill long stickout procedures using the K148 nozzle and K149 extension assembly.

**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.

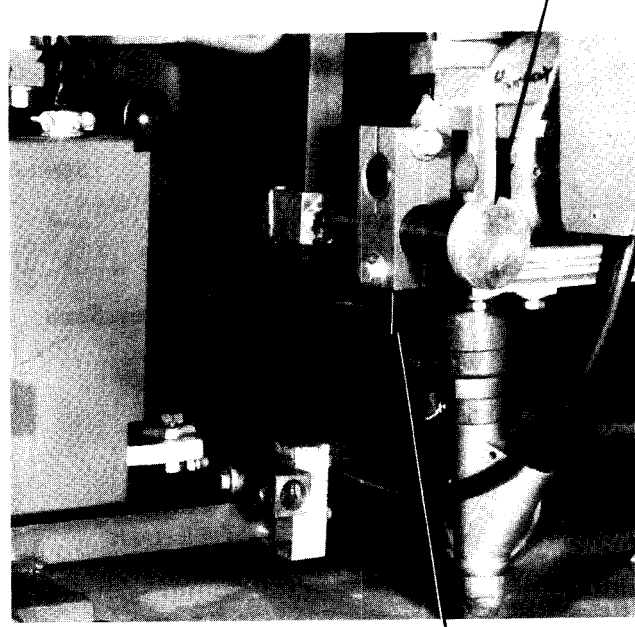
Install the reel take-off tube to prevent contact with the electrically "hot" electrode. Insert the nylon tube into the take-off arm coupling. Thread the electrode thru the tube and into the wire straightener.

**CROSS SEAM ADJUSTER MOUNTED FOR:**

Right Butts



Left Butts

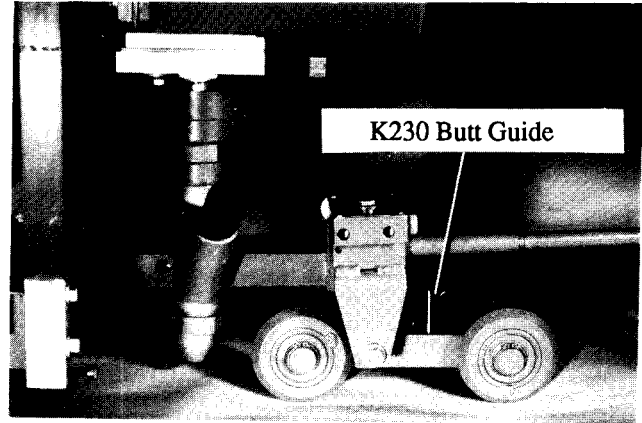
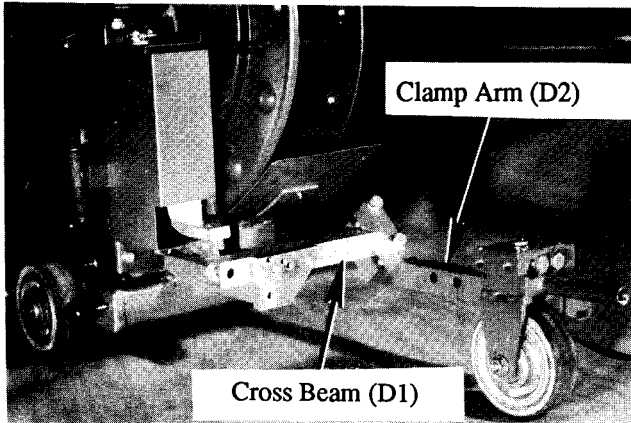


**CLAMP BLOCK (F2) MOUNTED FOR:**

Standard Short Stickout

Linc-Fill Long Stickout

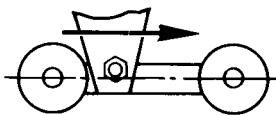
Sec. M3.2.3 (Continued)



**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

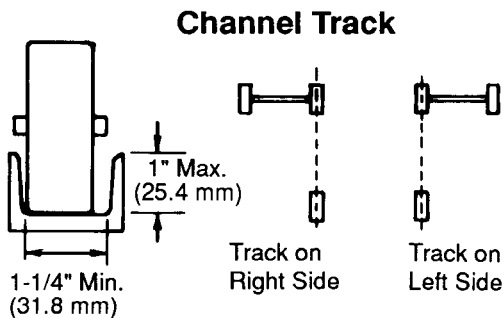
guide as shown in the photograph with the axle bolt above the guide wheel shafts. Do not overtighten the axle bolt.

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.

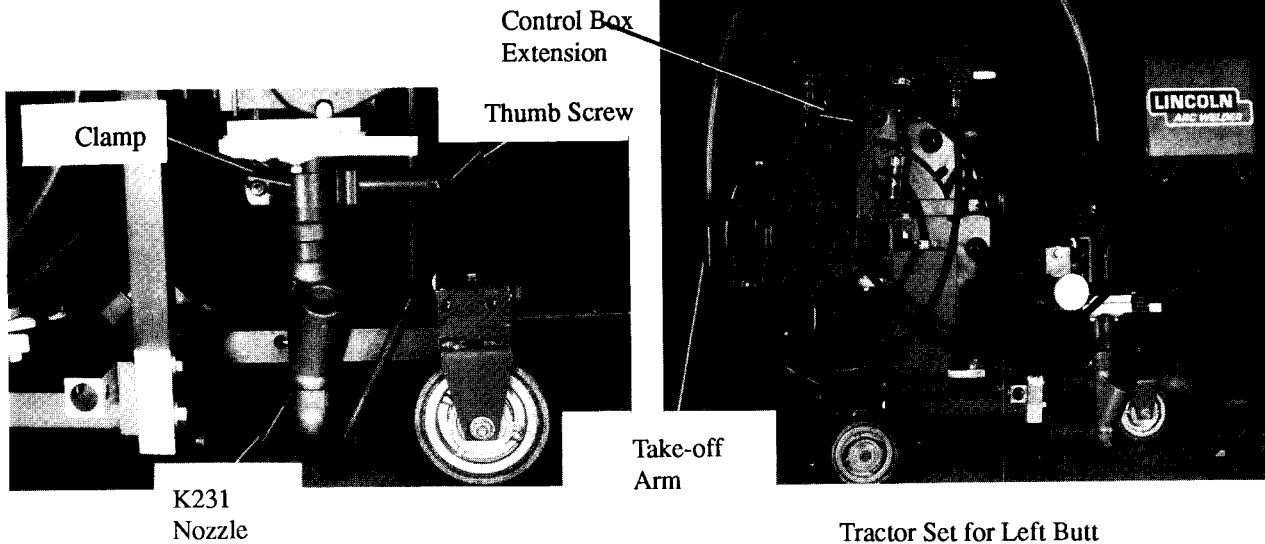
3. **A Bar or Channel Track** clamped or tack welded to the work provides positive guiding when appropriate.

**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)



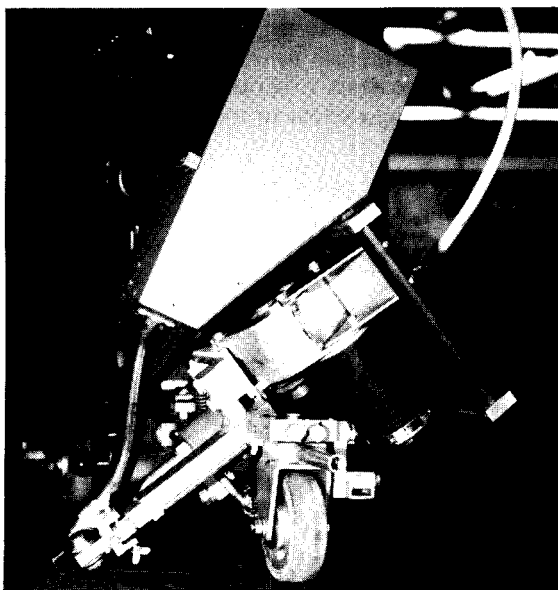
**INSTALLATION OF STANDARD ACCESSORIES**

**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.

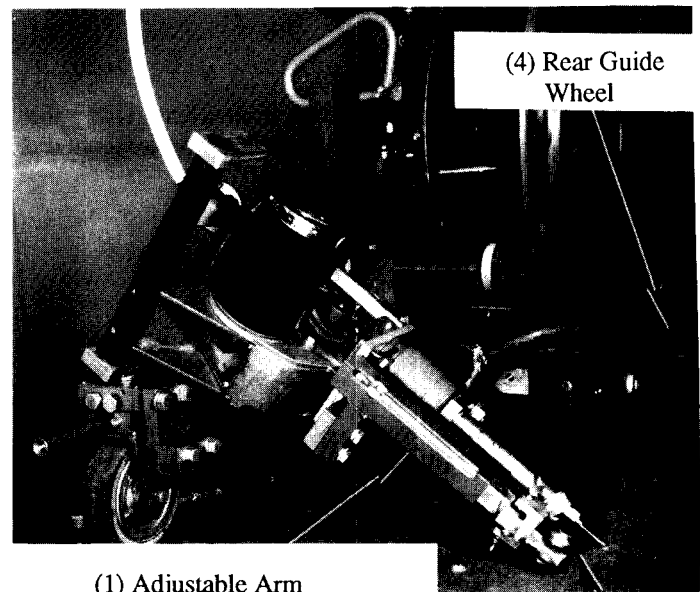
**Control Box Extension** — Required when the control box must face to the right over the wire reel. Remove the control box. Insert the stud end of the extension into the control box mounting socket and mount the control box on top of the extension. Tighten both screws.

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**I** For Left Fillets



**II** For Right Fillets

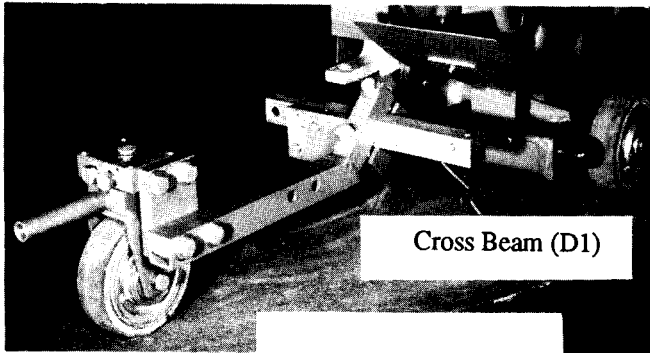


K232 Fillet-Lap Guide Includes: (1) Adjustable Arm, (2) Front Guide Wheels, (3) Head Tension Spring and (4) Rear Guide Wheel.

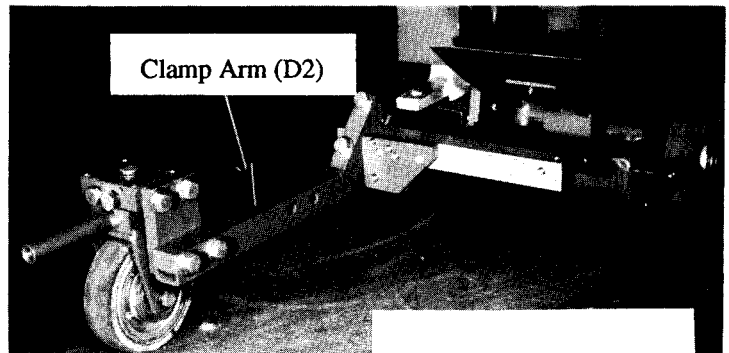
(2) Front Guide Wheel

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:

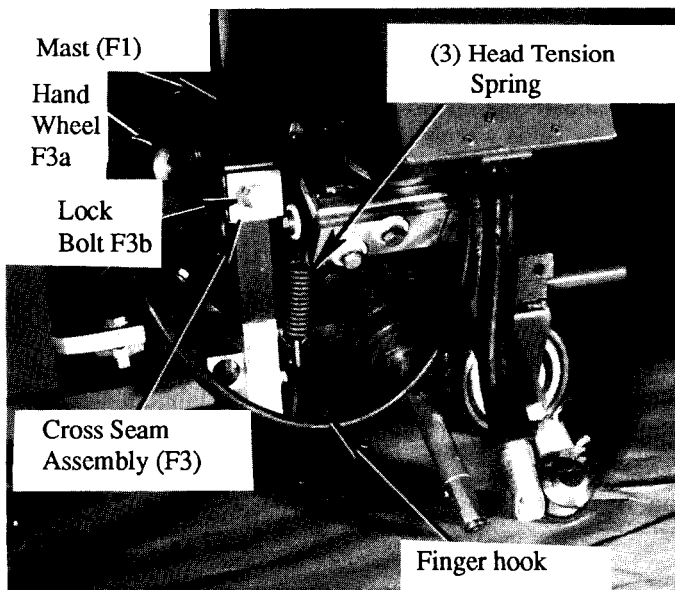
1. Whether to weld to the left side or right side of the tractor.
2. What electrical stickout is required by the procedures.

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**

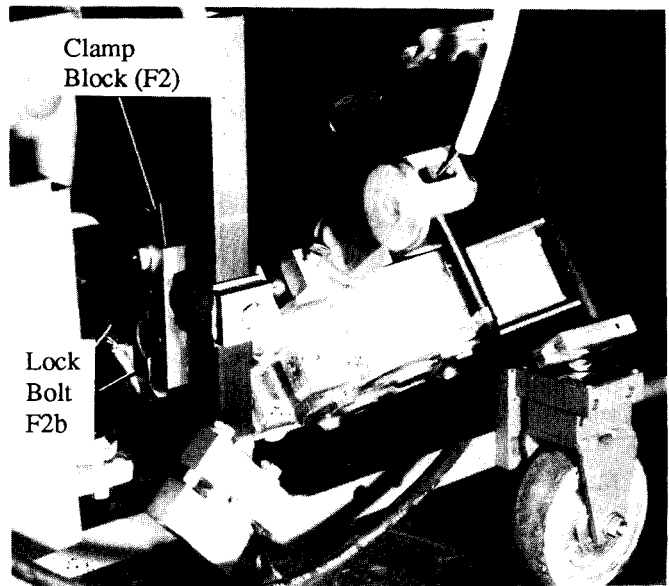


↑ For Left Fillets

**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.

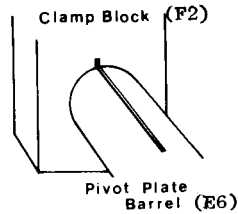
**IV**



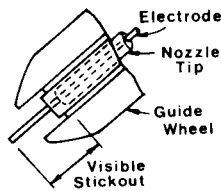
↑ For Right Fillets

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.



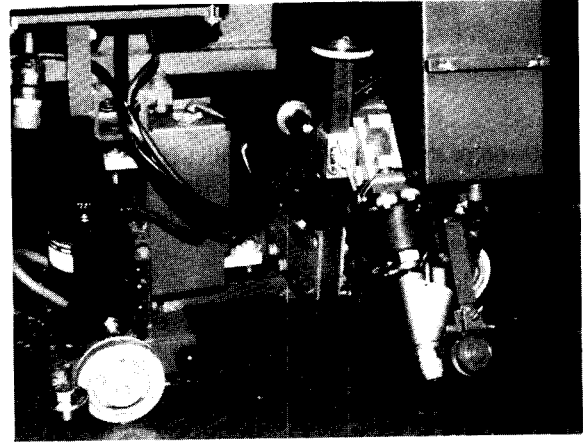
7. If the control box must face to the right over the reel for left fillets, remove the control box from the standard mounting socket. Insert the stud end of the extension tube into the mounting socket and mount the control box on the extension. Tighten both lock screws. The control box interferes with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

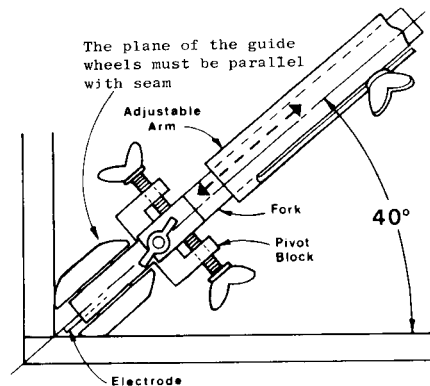
4. Install the rear guide wheel (4) into the socket above the rear drive wheel scraper with the guide wheel above the arm. Use the socket by the left rear wheel for left side fillets and vice versa. Use the three tapped holes in the guide wheel arm and the *outside* hole in the tractor frame socket for 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.

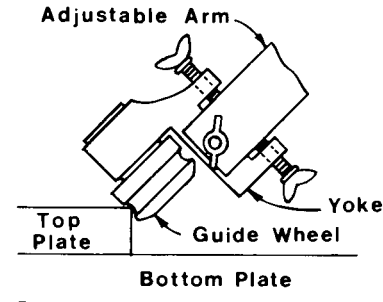
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Sec. M3.2.5

**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**

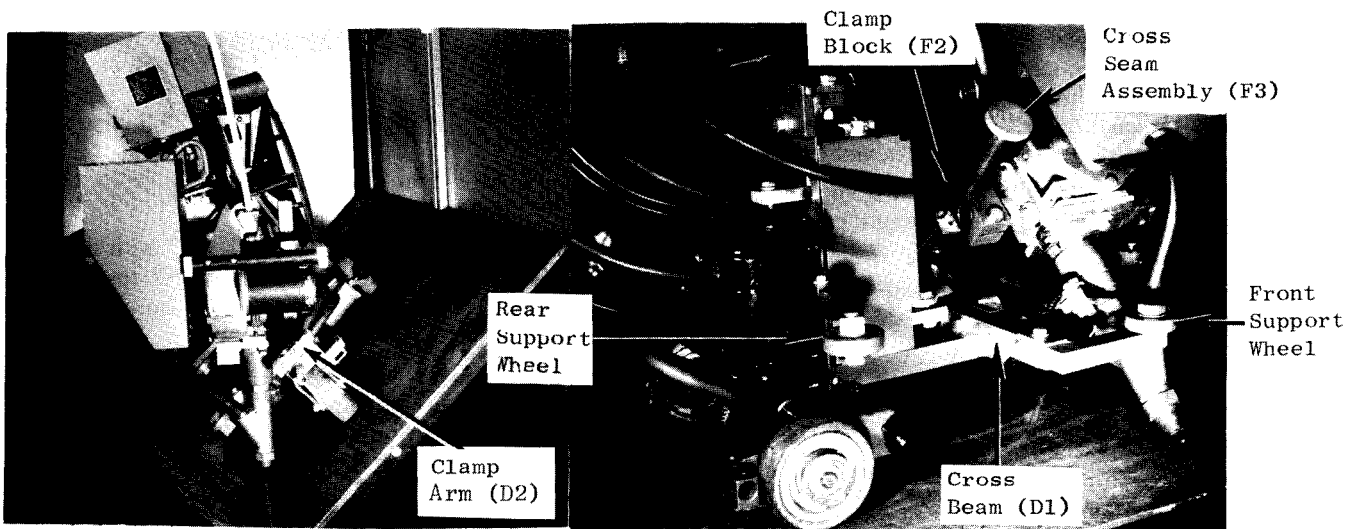
4. Do not use the rear guide wheel of the K232 kit. Set the rear wheel the proper distance from the joint for the desired stickout — about 2" (50.8 mm) for 3/4" (19.1 mm) to 1" (25.4 mm) stickout.

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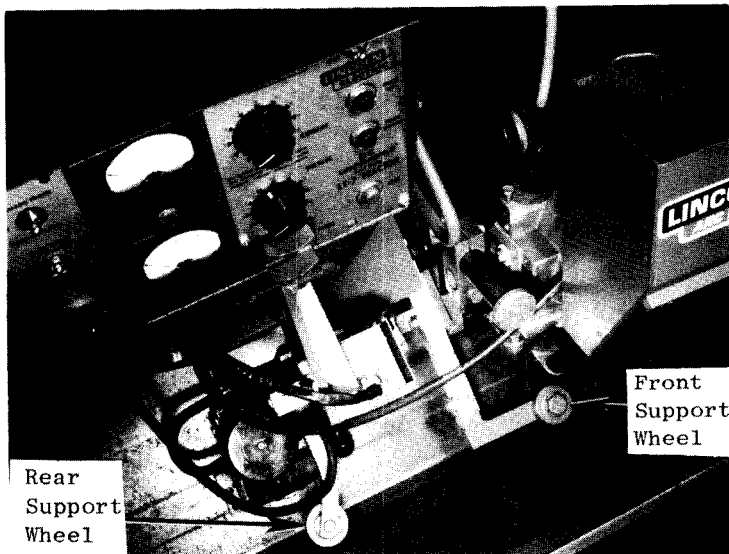
Sec. M3.2.6

**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:

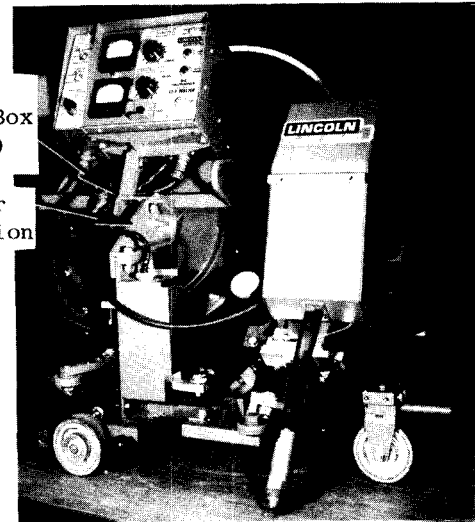


**K229 Flat Fillet Kit includes: (1) Front Support Wheel, (2) Rear Support Wheel and (3) Angular Extension.**

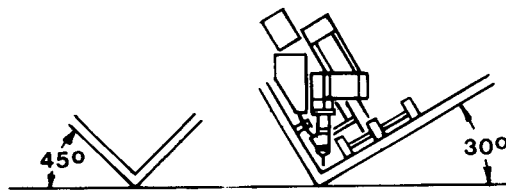


Reel and Control Box Mount (B)

Angular Extension



- 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).



- Remove the reel and control box mount assembly (B) from the tractor frame by removing the two screws.
- Install the angular extension (3) from the K229 kit to the tractor frame using the reel and control box mount assembly mounting holes.
- Install the reel and control box mount assembly (B) to the end of the angular extension.
- 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.

- What electrical stickout is desired.

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

### FRONT GUIDANCE ASSEMBLY

- 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.
- 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.
- Mount the clamp arm (D2) with the front wheel installed to the short right extension of the cross beam.

### REAR SUPPORT WHEEL

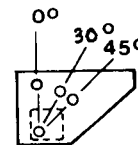
Insert the rear support wheel from the K229 kit into the mating socket in front of the tractor drive motor.

### REEL AND CONTROL BOX MOUNTING

- Remove the reel from the tractor.

### HEAD MOUNTING

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



- Mount the cross seam assembly (F3) on the mast extending to the left side.
- 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.
- 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.
- 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.

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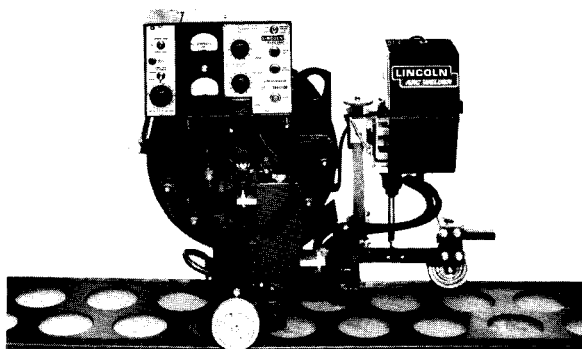
Sec. M3.2.7

**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<sup>(1)</sup> and K396 Track Section.**

<sup>(1)</sup> 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.

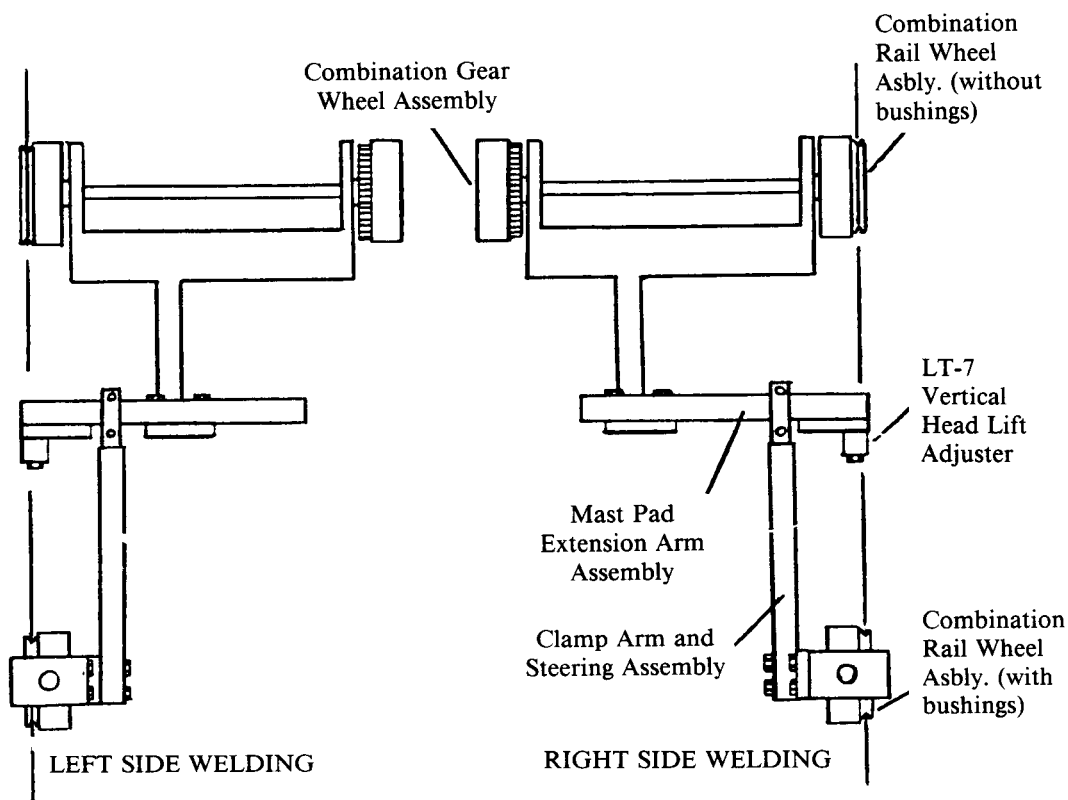


Figure 1

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.

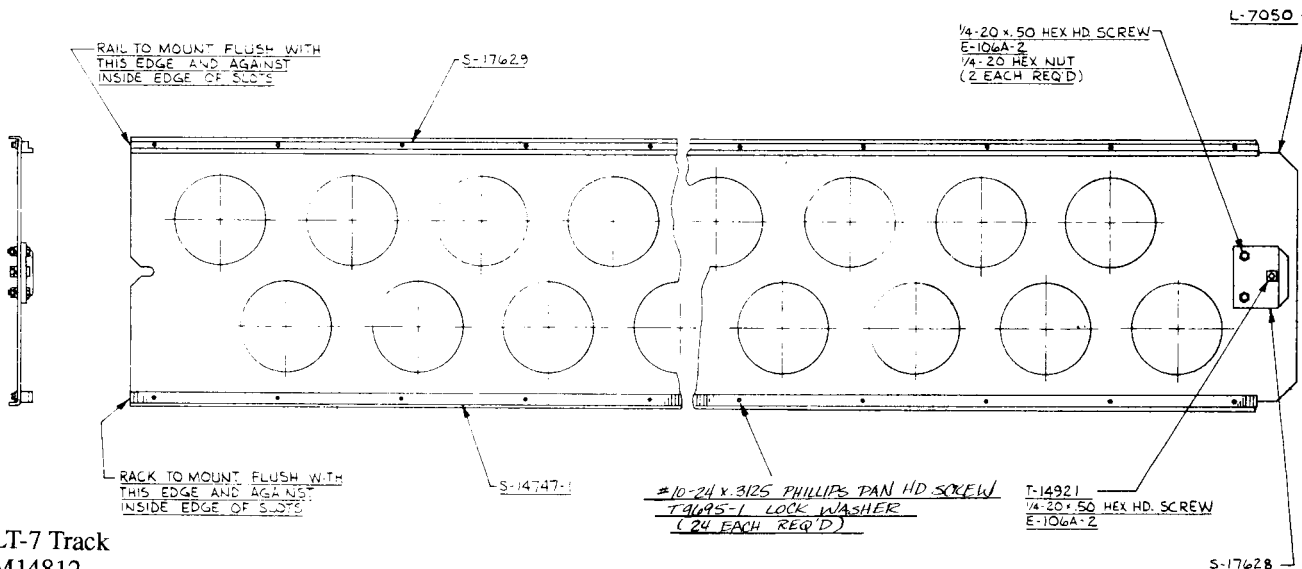
**K396 Track Sections**

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



LT-7 Track  
M14812  
7-28-88  
92Jy

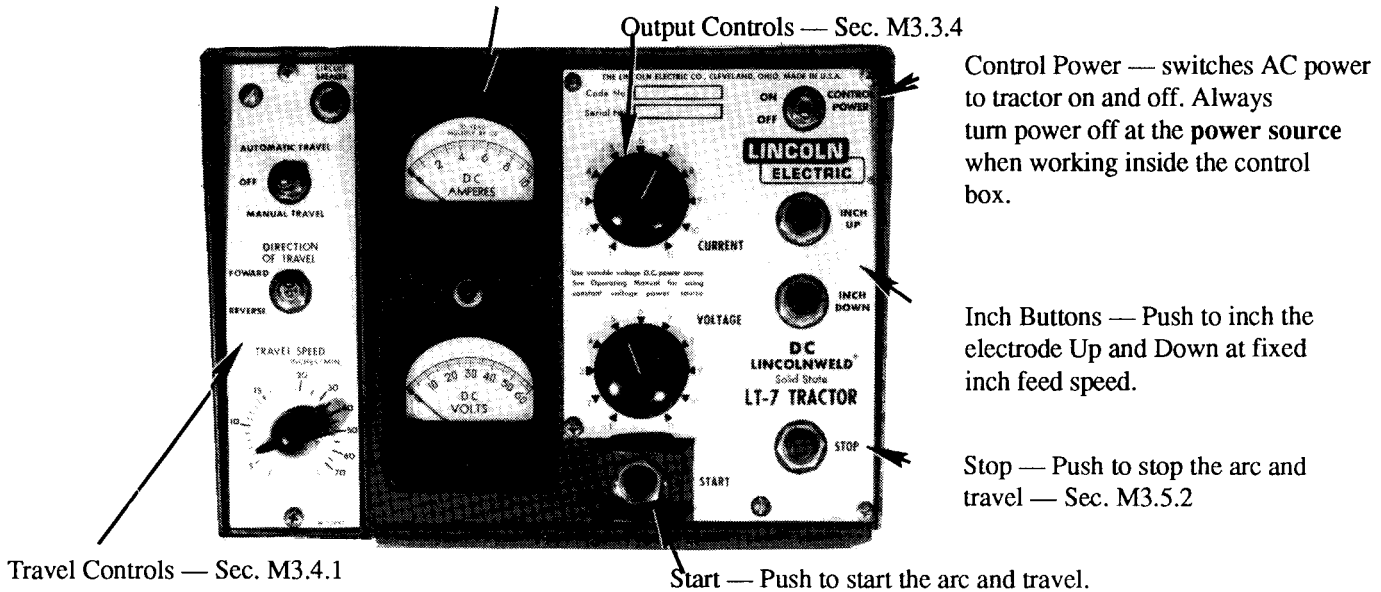


## SEC. M3.3 WELDING CONTROLS

### 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

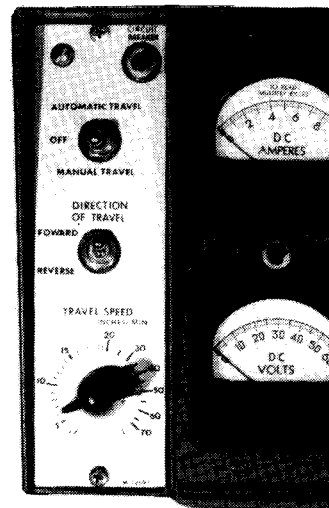
Engage the drive gears by pushing the clutch in from the right side of the tractor or pulling it out from the left side. If the gears do not engage easily, roll the tractor slightly while operating the clutch. When the gears are not engaged, the tractor rolls freely.

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.

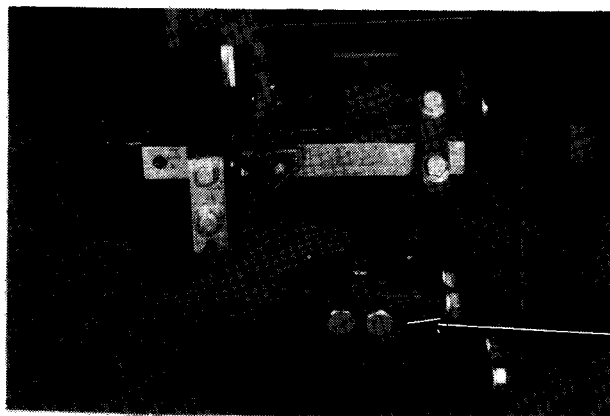
With the "Automatic Travel" control in the "Off" position, the tractor drive motor is off. When set for "Manual Travel" the tractor drive operates continuously. When set for "Automatic Travel" the tractor drive starts and stops with the welding controls.

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

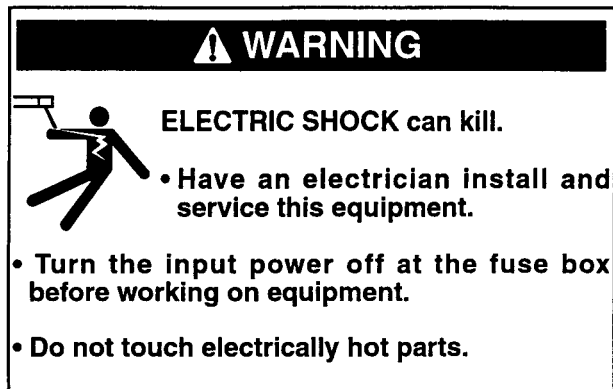
#### Submerged Arc Welding

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.

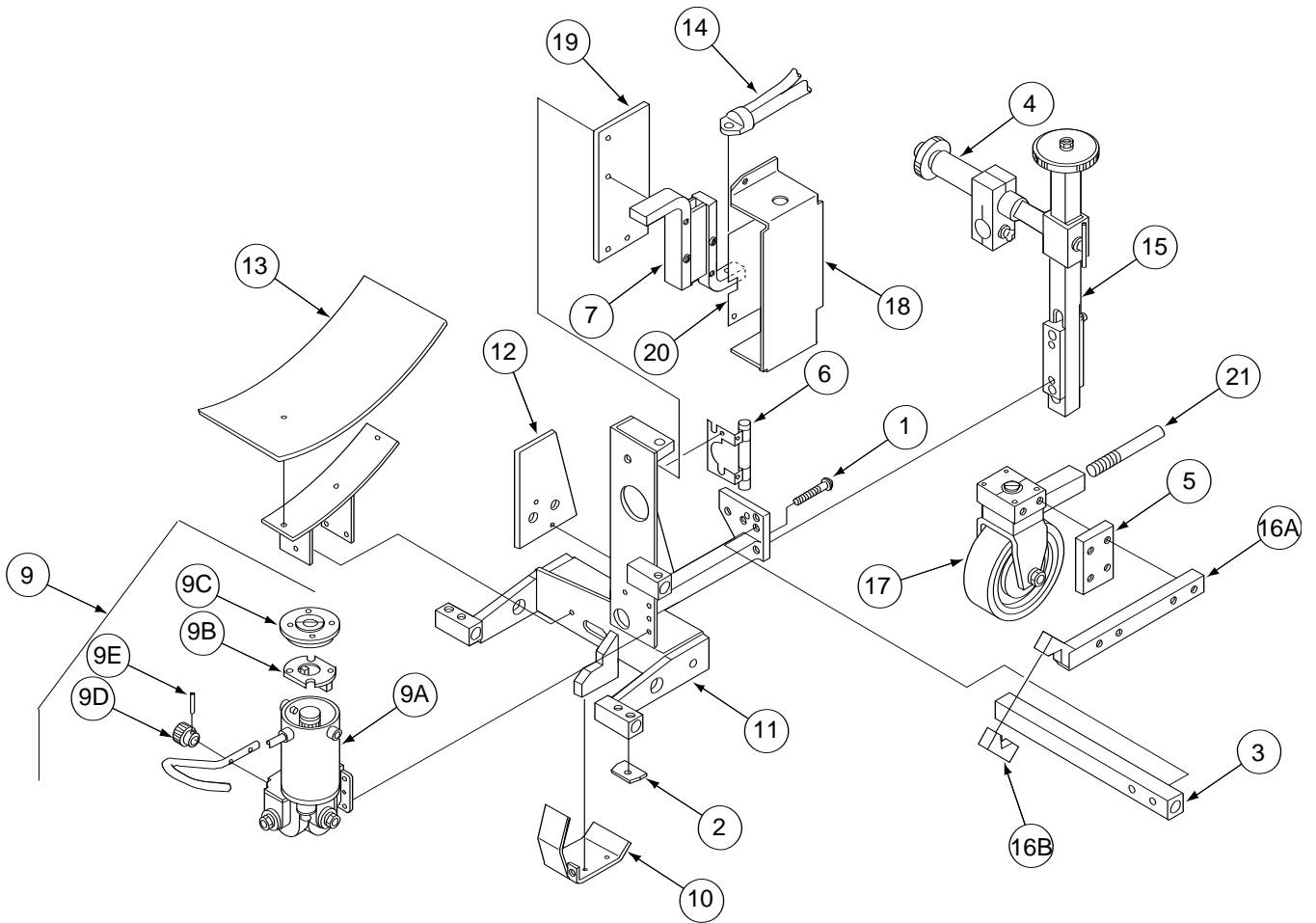
September 1976

**SEC. M7  
LT-7  
K227 OR K395  
LIGHTWEIGHT TRACTOR  
PARTS LIST  
Model Index**

General Assembly .....	P-117-C
Head Assembly .....	P-117-D
Wire Straightener .....	P-117-F
Front Wheel Assembly .....	P-117-G
K229, K230 & K232 Optional Guide Kits .....	P-117-J
Control Box .....	P-117-L
Internal Controls Assembly .....	P-117-M
Vertical Head Lift Adjuster .....	P-117-O
K277-1 and -2 Tiny Twinarc Adapter Kits .....	P-117-P
K285 Concentric Flux Cone .....	P-114-J
K231 Nozzle Assembly .....	P-101-M
K148 Fully Automatic Nozzles and Extensions .....	P-101-K
K224 Solid-State Remote Field Control .....	P-114-H
K129 Sub-Arc Twinarc .....	P-101-G
K281 Wire Straightener .....	P-101-G.2
K396 Track Sections .....	P-117-R
Conversion Kit (To convert K227 Tractor to Track Model) .....	Order K400

# GENERAL ASSEMBLY

(ONE OF THREE)

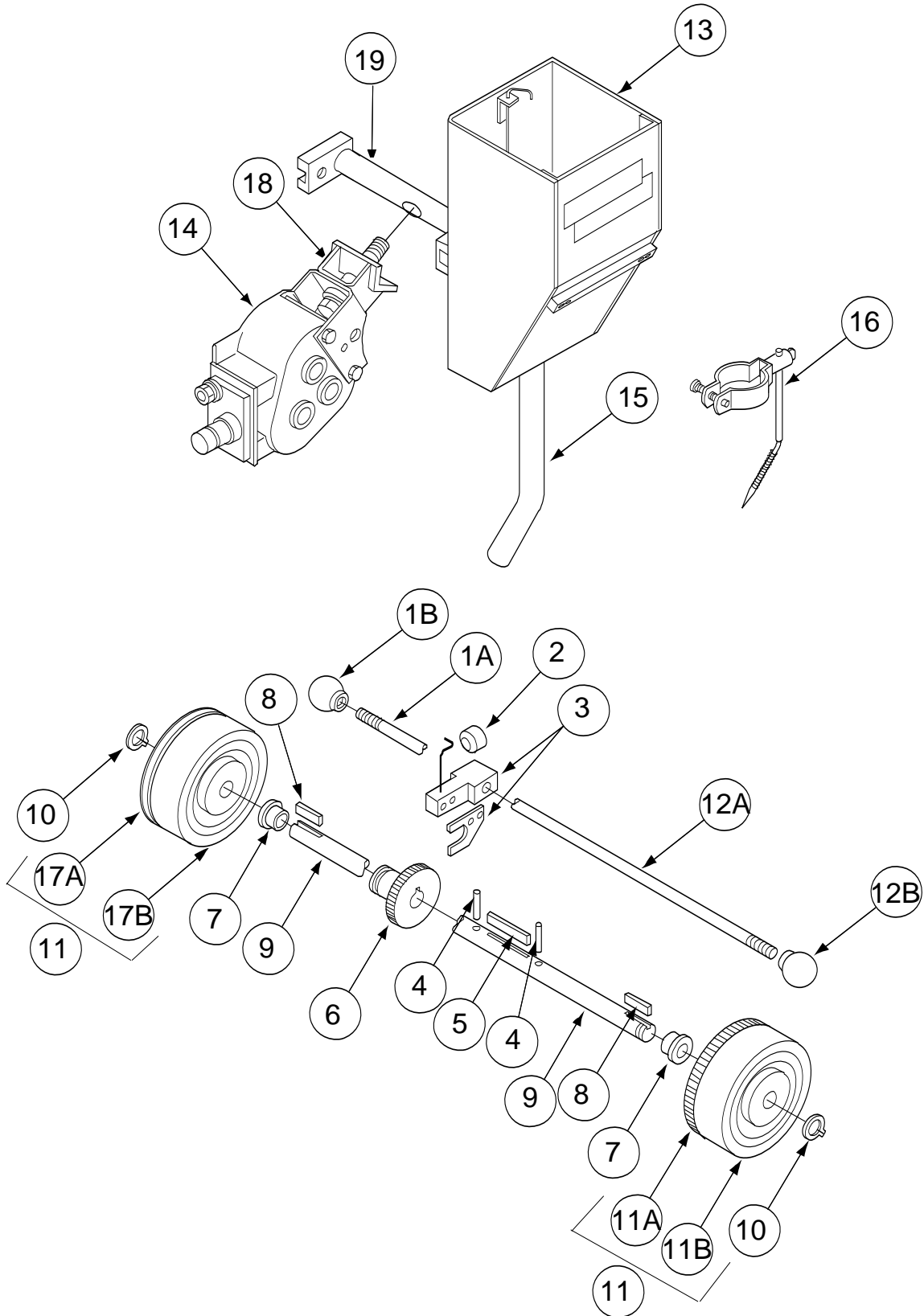


# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Button Head Socket Screw	T11551-2	1	X								
2	Wheel Scraper	T8456	2	X								
3	Cross Beam (D1) (Std. Tractor)	M12673	1	X								
3	Cross Beam Assembly, Includes: (Track Model Only)	S17630	1	X								
	Mast Pad	S15808-1	1	X								
	Arm	M12673	1	X								
4	Cross Seam Assembly (F3)	M12671	1	X								
5	Cam Block Spacer Pad	T13673	1	X								
6	Reed Switch Assembly (3CR), Includes:	S13920-1	1	X								
	Reed Switch	S12334-15	1	X								
	Energizer	M11688	1	X								
7	Shunt	M12667	1	X								
8	Cable Strain Relief Ring (A4) (Not Shown)	S15181	1	X								
9	Tractor Drive Assembly, Includes: (A1) (Below Code 9100)	M12682	1	X								
9	Tractor Drive Assembly, Includes: (A1) (Above Code 9100)	M15341	1	X								
9A	Drive Motor and Gear Box (Below Code 9100)	M12348-1 Ø	1	X								
9B	Brush and Spring Assembly	M12348-1B	2	X								
9C	Brush Cap	M12348-1C Ø	2	X								
9A	Drive Motor and Gear Box (Above Code 9100)	M15340	1	X								
9B	Brush and Spring Assembly	M15340-B	2	X								
9C	Brush Cap	M15340-C	2	X								
9D	Pinion Gear	S15208	1	X								
9E	Roll Pin	T9967-3	1	X								
10	Drive Gear Guard	M12865	1	X								
11	Frame Assembly (Below Code 7675)	L5279	1	X								
11	Frame Assembly (Above Code 7675)	L5685	1	X								
12	Reel Side Shield	S15210	1	X								
13	Reel Bottom Shield (A7)	S15216	1	X								
14	Nozzle Cable (Std. Tractor)	M12700-1	1	X								
14	Nozzle Cable (Track Model Only)	M12700-2	1	X								
15	Mast (F1) (Below Code 8000)	S15814	1	X								
15	Vertical Head Lift Adjuster (F1) (Above Code 8000)	M13334-1	1	X								
	Vertical Head Lift Adjuster Parts	See P-117-O										
16	Clamp Arm (D2), Includes:Hardware (Not Shown)	S15194	1	X								
16A	Upper Jaw and Arm	M12672	1	X								
16B	Lower Jaw	S15193	1	X								
17	Front Wheel Assembly (D) (Std. Tractor)	M12669	1	X								
17	Front Wheel Assembly (D) (Track Model Only)	M14813	1	X								
	Wheel Assembly Parts	See P-117-G										
18	Shunt Cover	L5278	1	X								
19	Shunt Insulation	S15170	1	X								
20	Shunt Shield	S15430	1	X								
21	Steering Extension Arm	T13733	1	X								

#

# General Assembly

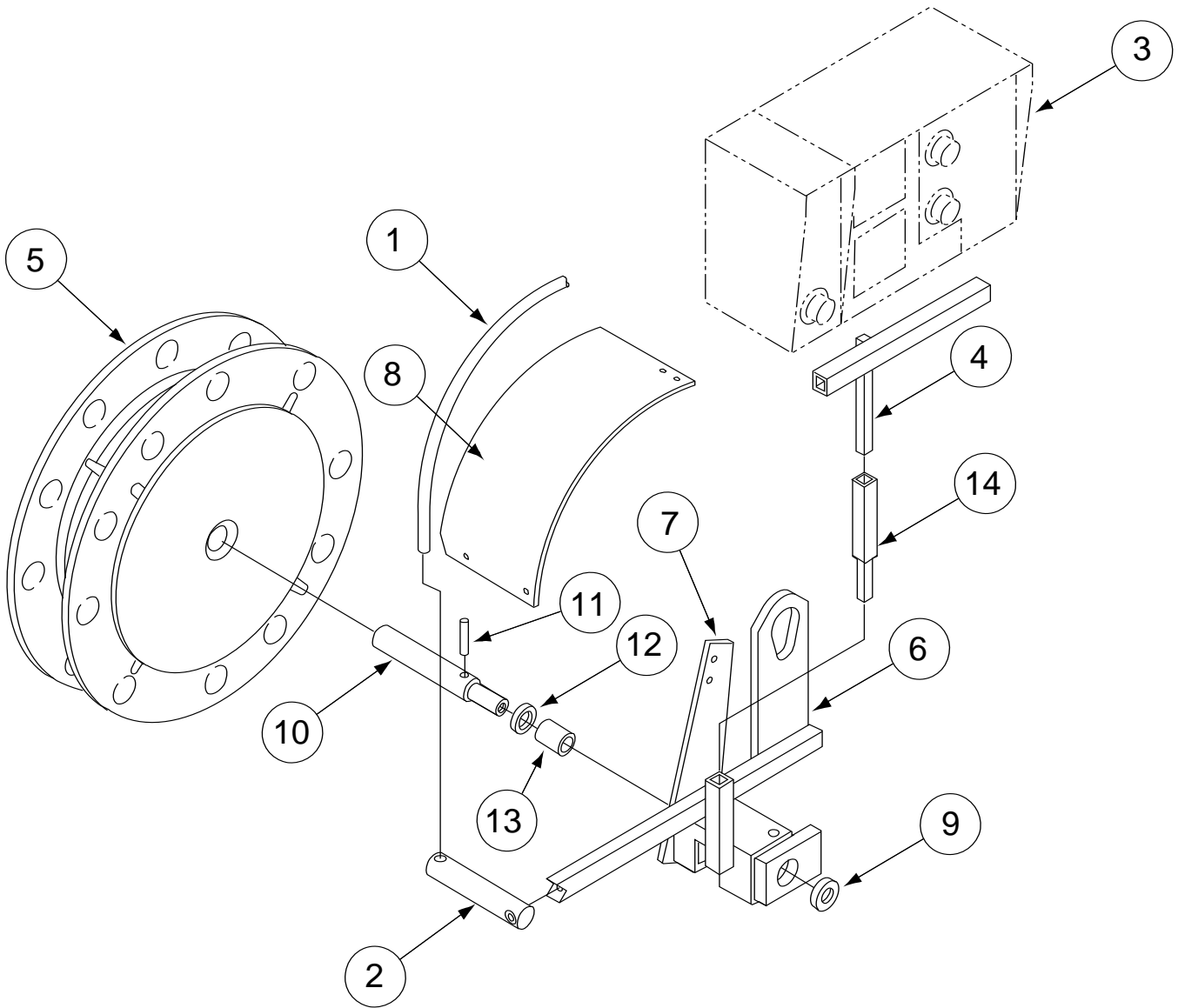
(TWO OF THREE)



# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1A	Clutch Handle (A2)	T9781-43	1	X								
1B	Knob	T10889	1	X								
2	Clutch Spring Cam	T13728	1	X								
3	Clutch Fork Assembly	S15164	1	X								
4	Roll Pin	T9967-6	2	X								
5	Drive Gear Key	M8776-83	1	X								
6	Drive Gear	S15172	1	X								
7	Bearing	S16645-2	2	X								
8	Wheel Key	M8776-84	1	X								
9	Axle	S15171	1	X								
10	Retaining Ring	S9776-16	2	X								
11	Rear Wheel (A3) (Std. Tractor)	S15191	2	X								
11	Gear Wheel Assembly, Includes: (Track Model Only)	S17632	1	X								
11A	Gear Wheel	S17631	1	X								
11B	Wheel	S17635	1	X								
12A	Clutch Handle (A2)	T9781-44	1	X								
12B	Knob	T10889	1	X								
13	Flux Hopper Assembly, Includes: (E7)	M12691	1	X								
	Flux Flow Valve	S15223	1	X								
14	Wire Straightener (E3) & Wire Straightener Parts	See P-117-F	1	X								
15	Flux Tube and Tip	T13835	1	X								
16	Pointer Assembly	S15287	1	X								
	Pointer Clamp for K148 Nozzle (Not Shown)	S15286-2	1	X								
17	Rail Wheel Assembly, Includes: (Track Model Only)	S17634-1	1	X								
17A	Rail Wheel	S17633	1	X								
17B	Wheel	S17635	1	X								
18	Bumper Handle Assembly, Includes:	M13051	1	X								#
19	Handle	S15659	1	X								#

# General Assembly

Three of Three





Use only the parts marked "X" in the column under the heading number called for in the model index page.

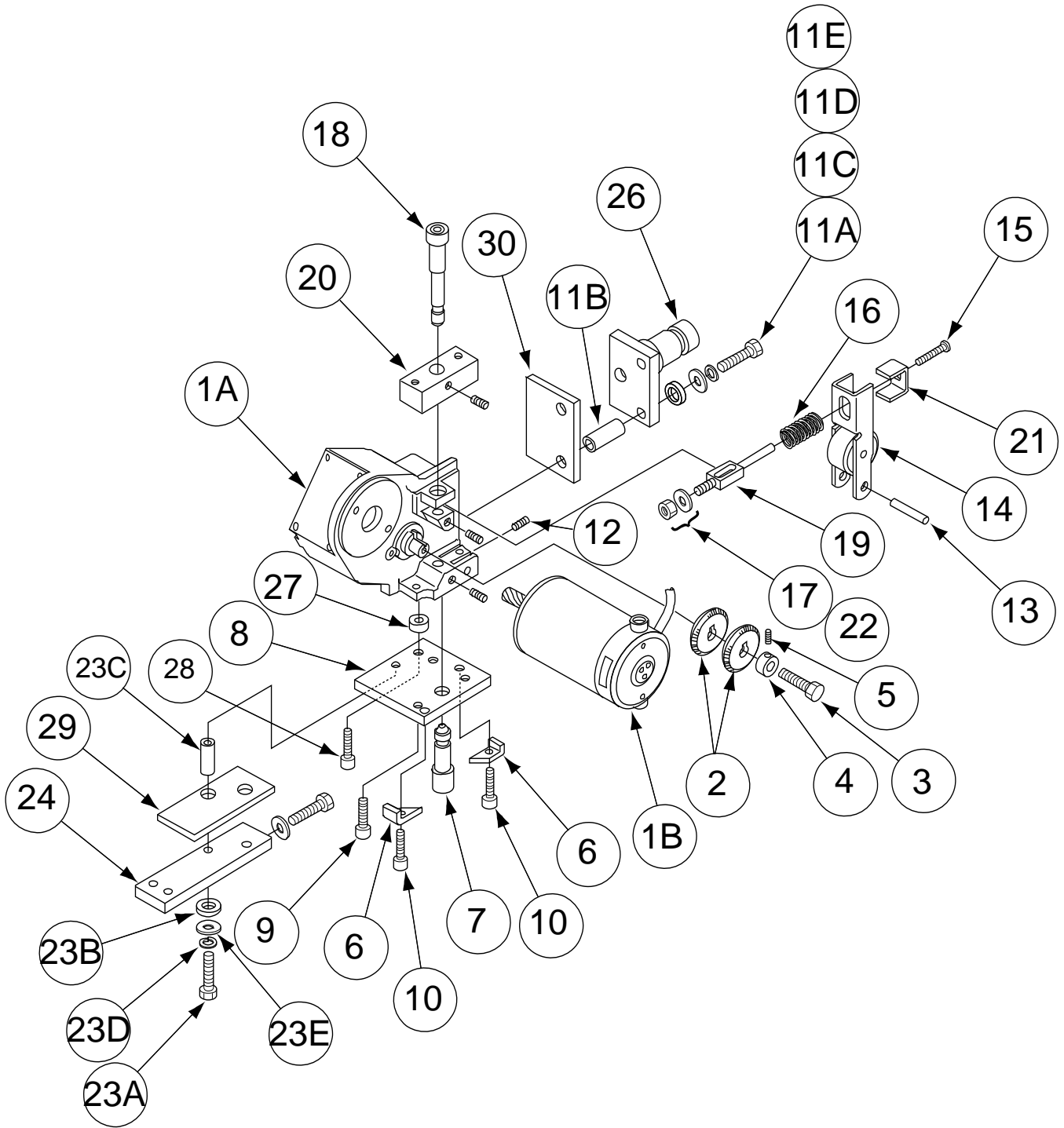
# Indicates a Change This Printing

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Electrode Feed Tube	S14004-2	1	X								
2	Electrode Take-Off Arm	S15195	1	X								
3	Control Box (C)	See P-117-L	1	X								
4	Control Box Support (C4) (Below Code 7675)	S15242	1	X								
4	Control Box Support (C4) (Above Code 7675)	S15820	1	X								
5	Wire Reel (B3)	L4604	1	X								
6	Reel Mount Assembly (B1) (Below Code 7675)	M12787 $\emptyset$	1	X								
6	Reel Mount Assembly (B1) (Above Code 7675)	M13255	1	X								
7	Reel Top Shield Support	S15446	1	X								
8	Reel Top Shield (Below Code 7675)	T13811	1	X								
8	Reel Top Shield (Above Code 7675)	T14021	1	X								
9	Insulating Washer	S10773-47	1	X								
10	Wire Reel Shaft	S15199	1	X								
11	Roll Pin	T9967-9	1	X								
12	Plain Washer	S9262-26	1	X								
13	Insulating Tube	T12478-5	1	X								
14	Control Box Mount Extension	S15184-1	1	X								

#

$\emptyset$  This part is obsolete and no longer available.

# HEAD ASSEMBLY



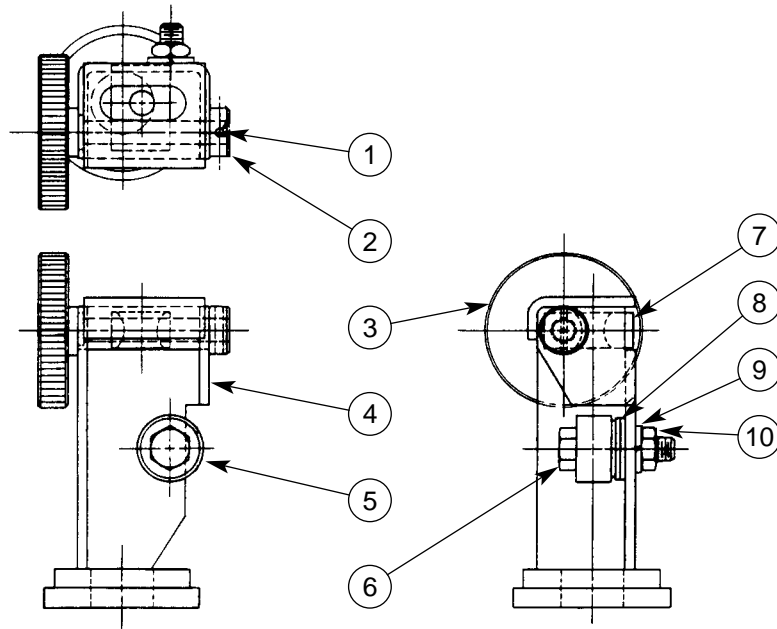
# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1A	Gear Box Assembly, Includes: Assembly without Motor	L5504-1 L5504-1A	1 1	X X								
1B	Drive Motor Assembly, Includes: Drive Motor Brush 8 Spring Assembly Brush Cap Pinion Gear Roll Pin Groove Pin, Motor to Gear Box Socket Head Screw, Motor to Gear Box	M12711 <b>NSS</b> M13274-6 M13274-7 T13183 T9967-33 T10580-6 T9447-7	1 1 2 2 1 1 1 2	X X X X X X X X								
2	Drive Roll	S14541-3/16	2	X								
3	Sems Screw	T10082-26	1	X								
4	Collar Assembly	T12341	1	X								
5	Key	M8776-82	1	X								
6	Nozzle Clip	T13715	2	X								
7	Outgoing Guide Tube	S15230-3/16	1	X								
8	Nozzle Mount Pad	S15209	1	X								
9	Socket Head Cap Screw	T9447-9	2	X								
10	5/16-18 x 1.00 Hex Head Screw	CF000062	2	X								
11A	Hex Head Screw	5/16-18 x 1.25	2	X								
11B	Insulating Tube, Pivot Arm Mounting (Code 7429 Only)	T7305-41 Ø	2	X								
11B	Insulating Tube, Pivot Arm Mounting	T7305-43	2	X								
11C	Insulating Washers, Pivot Arm Mounting (Code 7429 Only)	S10773-41	2	X								
11C	Insulating Washers, Pivot Arm Mounting	S10773-58	2	X								
11D	Flat Washer	S9262-121	2	X								
11E	Lock Washer	E106A-14	2	X								
12	Socket Set Screw	S11604-8	4	X								
13	Pivot Pin	T13271-1	1	X								
14	Idle Roll Assembly	S16666-1	1	X								
15	Thread Forming Screw	S9225-21	1	X								
16	Spring	T10247-11	1	X								
17	Hex Nut	5/16-18	1	X								
18	Incoming Guide Tube	S15229-3/16	1	X								
19	Idle Roll Pull Arm	S14533	1	X								
20	Straightener Mounting Block	T13672	1	X								
21	Idle Roll Arm Bracket	T14443	1	X								
22	Flat Washer	S9262-121	1	X								
23A	Hex Head Screw	5/16-18 x 1.25	2	X								
23B	Insulating Washer	S10773-58	2	X								
23C	Insulating Tube	T7028-134	2	X								
23D	Lock Washer	E106A-14	2	X								
23E	Flat Washer	S9262-121	2	X								
24	Fillet-Lap Attachment, Mounting Plate	S15398	1	X								
26	Pivot Plate and Arm Assembly (Code 7429 Only)	S15220 Ø	1	X								
26	Pivot Plate and Arm Assembly	S15220-1	1	X								
27	Spacer	S10153-37	1	X								
28	Socket Head Cap Screw	T9447-10	1	X								
29	Insulation	T13695	1	X								
30	Insulation, Pivot Arm Mounting (Code 7429 Only)	S15217 Ø	1	X								
30	Insulation, Pivot Arm Mounting	S15217-1	1	X								

#

Ø This part is obsolete and no longer available.

NSS - Not sold separately

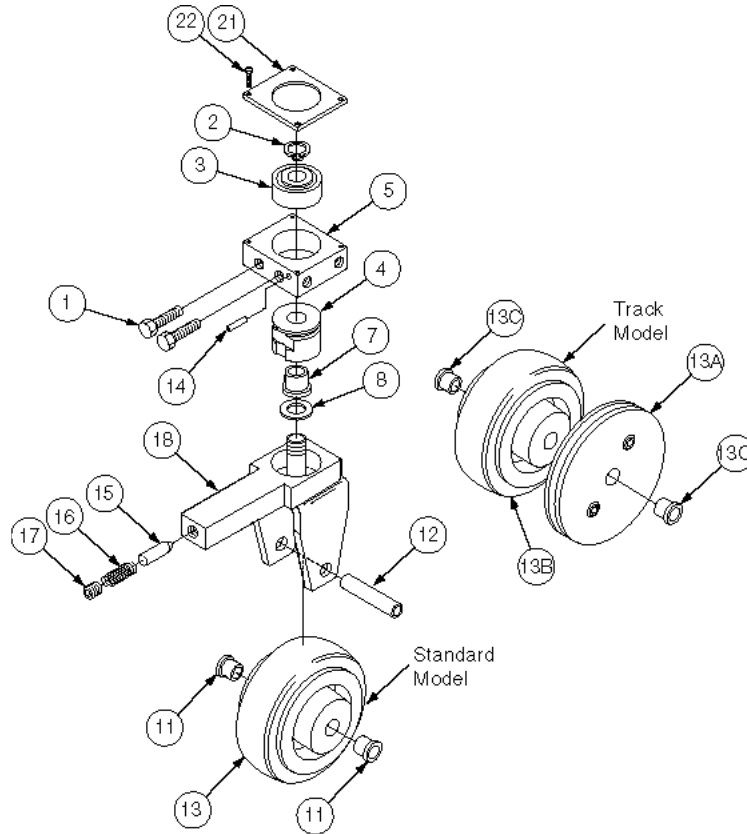
### WIRE STRAIGHTENER



M12680  
3-28-75P

# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Wire Straightener, Includes All Below:	M12680	1									
1	Roll Pin	T9967-5	1									
2	Screw Bushing	T10585	1									
3	Slide Screw Assembly	S10159	1									
4	Body Assembly	M12679	1									
5	Wire Guide Wheel	M9300-55	2									#
6	Hex Head Bolt	5/16-18 x 1.25	1									
7	Slide Bushing	T10584	1									
8	Flat Washer	S9262-140	2									#
9	Lock Washer	E106A-14	1									
10	Hex Nut	5/16-18	1									

### FRONT WHEEL ASSEMBLY

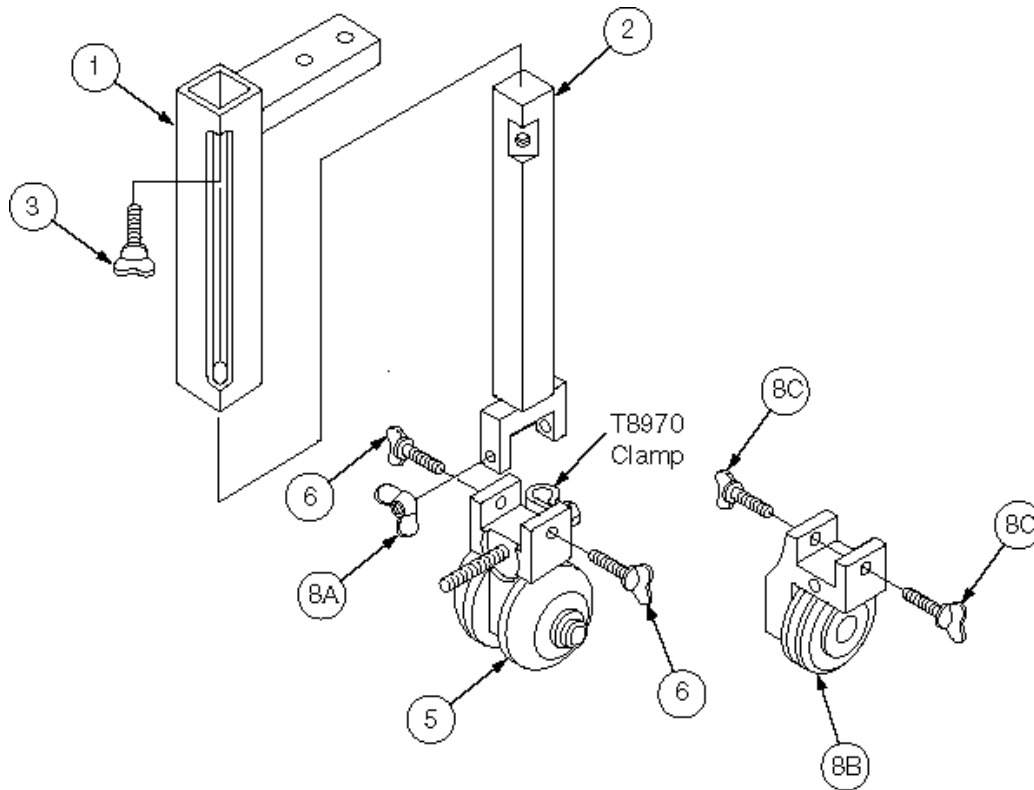


# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Front Wheel Assembly, Includes: (Std. Tractor)	M12669	1	X								
	Front Wheel Assembly, Includes: (Track Model Only)	M14813	1	X								
1	Hex Head Screw	3/8-16 x .875	2	X								
2	Retaining Ring	S9776-7	1	X								
3	Bearing	S11099-2	1	X								
4	Steerage Cam	S15162	1	X								
5	Cam Block (Upper)	S15163	1	X								
7	Bearing, Bronze	S11099-2	1	X								
8	Plain Washer	S9262-41	1	X								
10	Hex Nut (Not Shown)	5/16-18	1	X								
11	Bearing (Std. Tractor Only)	S11099-5	2	X								
12	Sleeve	S10918-52	1	X								
13	Wheel (Std. Tractor)	S15191	1	X								
13	Wheel (Track Model Only) Includes:	S17634-2	1	X								
13A	Rail Wheel	S17633	1	X								
13B	Wheel	S17635	1	X								
13C	Bearing	S11099-5	2	X								
14	Roll Pin	T9967-31	1	X								
15	Steerage Plunger	T13665	1	X								
16	Compression Spring	T11862-27	1	X								
17	Set Screw	S11604-26	1	X								
18	Plunger & Wheel Housing Assembly	S15186	1	X								
19	Lock Washer (Not Shown)	E106A-14	2	X								
20	Hex Head Screw (Not Shown)	5/16-18 x 2.75	1	X								
21	Instruction Plate	S15292	1	X								
22	Drive Screw	S8025-51	4	X								

# NOTES

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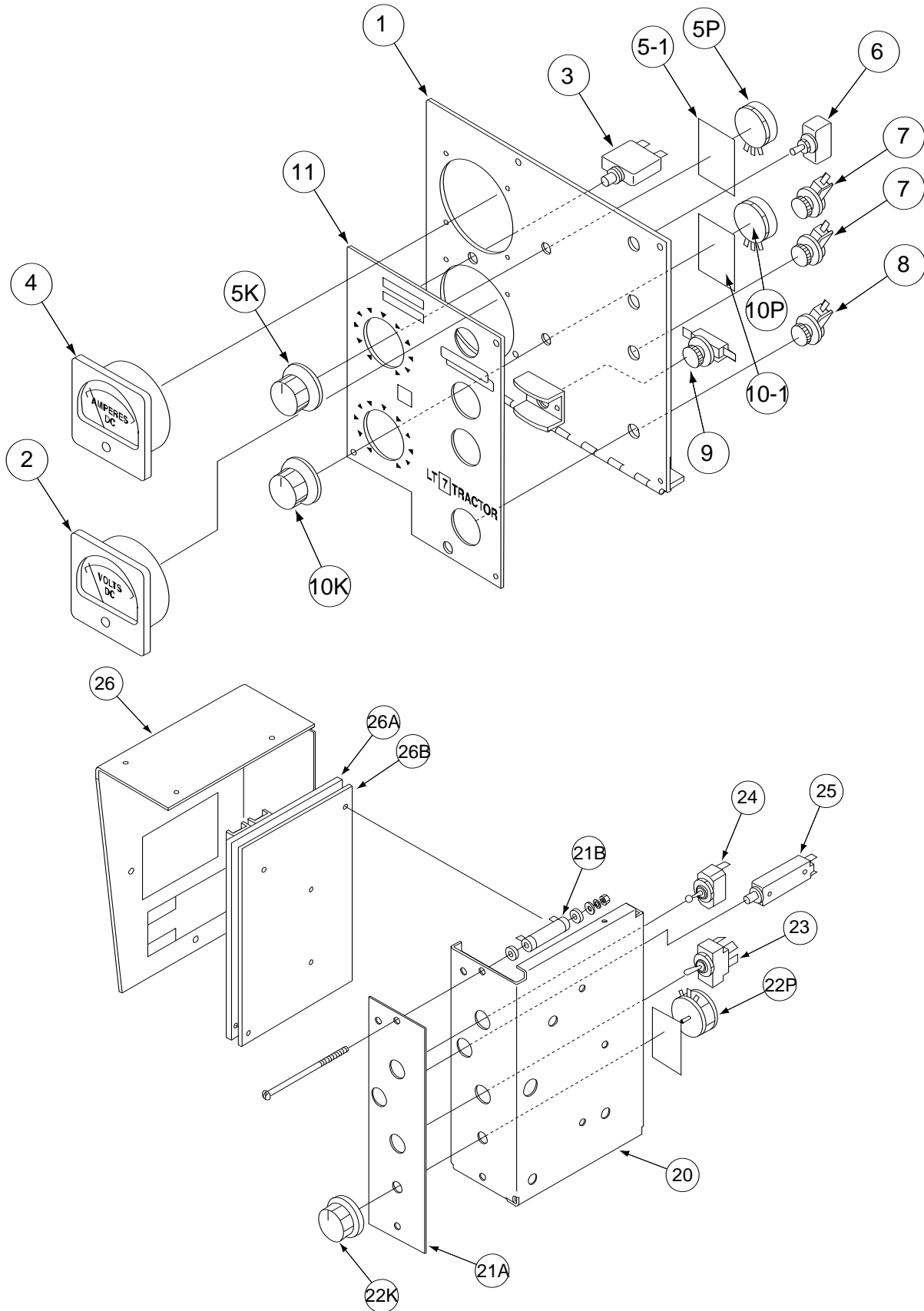
### OPTIONAL GUIDES



# Indicates a Change This Printing

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Butt Guide Kit, Includes:	K230	1									
	Guide Wheel Bracket	S15259	1									
	Guide Wheel	S7393	2									
	Retaining Ring	S9776-49	2									
	Flat Fillet Guide Kit, Includes:	K229	1									
	Reel Adapter Bracket	M12709	1									
	Rear Support Assembly, Includes:	S15279	1									
	Bracket	M 12704	1									
	Wheel	T14494	1									
	Front Support Assembly, Includes:	S15278	1									
	Bracket	S15232	1									
	Wheel	T14494	1									
	Horizontal Fillet-Lap Guide Kit, Includes:	K232	1									
	Front Guide Assembly, Includes:	M13958	1									
1	Attachment Arm	S15248	1									
2	Slide Arm and Yoke Pivot	S15251	1									
3	Wing Screw	T9078	1									
5	Fillet Guide Wheel Assembly	S16743	1									
6	Wing Screw	T9078-1	2									
8A	Wing Nut	T9968-1	1									
8B	Lap Guide Wheel Assembly	S15285	1									
8C	Wing Screw	T9078	2									
	Tension Spring and Hook (Not Shown)	T13731	1									
	Rear Support, Includes: (Not Shown)	S15280	1									
	Arm	S15231	1									
	Wheel	T14494	1									

# CONTROL BOX

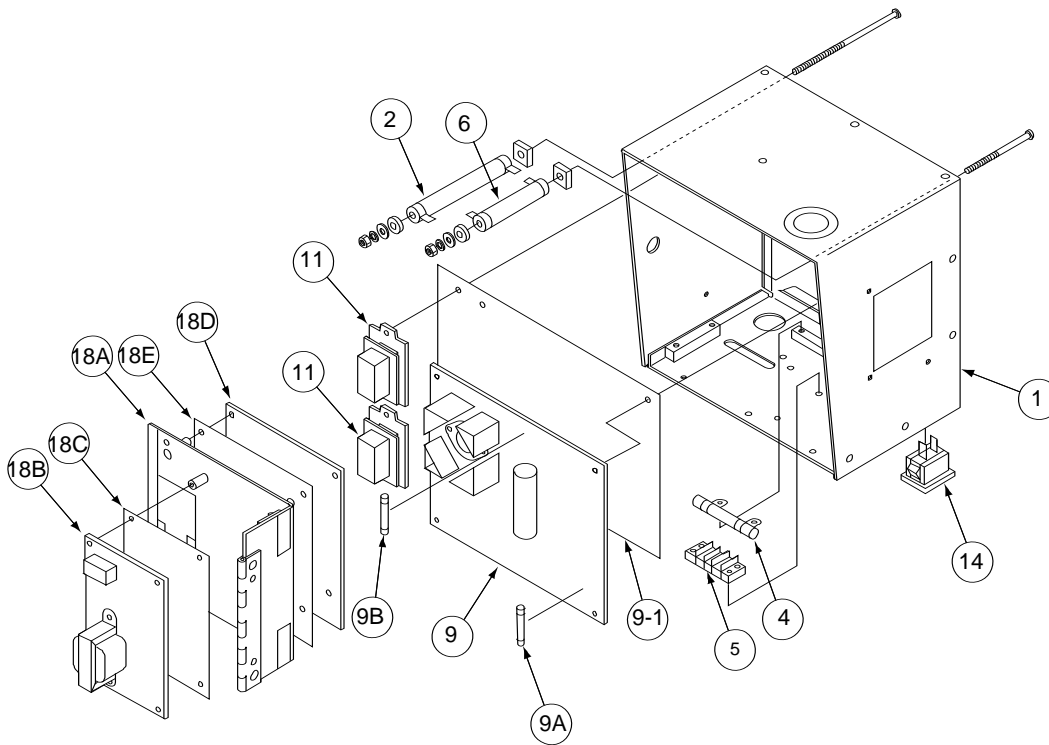




For Codes Below 7900 use Column 1. For Codes 7900 to 9100 use Column 2. For Codes 9100 to 13000 use Column 3.		For Codes Above 11300 use Column 4.			# Indicates a Change This Printing								
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9	
	Complete Control Box Assembly, Includes: (Code 7429 Only)	L5292	1	X	•	•	•						
	Complete Control Box Assembly, Includes:	L5292-1 $\emptyset$	1	X	•	•	•						
	Complete Control Box Assembly, Includes: (Std. Tractor)	L5878-2	1	•	X	•	•						
	Complete Control Box Assembly, Includes: (Track Model Only)	L5878-4	1	•	X	•	•						
	Complete Control Box Assembly, Includes: (Std. Tractor)	L5878-5	1	•	•	X	X						
	Complete Control Box Assembly, Includes: (Track Model Only)	L5878-6	1	•	•	X	X						
A	Front Panel Assembly, Includes:	M12698 $\emptyset$	1	X	•	•	•						
A	Front Panel Assembly, Includes:	M12698-2	1	•	X	X	X						
1	Panel	S15245	1	X	X	X	X						
2	Voltmeter	M10486-3	1	X	X	X	•						
2	Voltmeter	M21002-1	1	•	•	•	X						
3	Circuit Breaker	T12287-8	1	X	X	X	X						
4	Ammeter	M10485-7	1	X	X	X	•						
4	Ammeter	M21003-2	1	•	•	•	X						
5-P	Potentiometer	T10812-40	1	X	X	X	X						
5-K	Knob	T10491	1	X	X	X	X						
5-1	Insulation	T12792-1	1	X	X	X	X						
6	Control Power Switch	T13111	1	X	X	X	X						
7	Inch Switch	T13541-2	2	X	X	X	X						
8	Stop Switch	T13541-1	1	X	X	X	X						
9	Start Switch	T13541-2	1	X	X	X	X						
10-P	Potentiometer	T10812-37	1	X	X	X	X						
10-K	Knob	T10491	1	X	X	X	X						
10-1	Insulation	T12792-1	1	X	X	X	X						
11	Nameplate - VV	L5867-1 $\emptyset$	1	X	X	X	X						
11	Nameplate - CV (Mounts under VV Nameplate)	L5283-1	1	•	X	X	X						
B	Travel Control Box Assembly, Includes:	M12696	1	X	•	•	•						
B	Travel Control Box Assembly, Includes: (Std. Tractor)	M13473-2	1	•	X	X	X						
	Travel Control Box Assembly, Includes: (Track Model Only)	M13473-3	1	•	X	X	X						
20	Box	S15239	1	X	•	•	•						
20	Box	S16128	1	•	X	X	X						
21	Nameplate (Std. Tractor)	M12697	1	X	•	•	•						
21	Nameplate (Std. Tractor)	M13469-2	1	•	X	X	X						
21	Nameplate (Track Model Only)	M13469-5	1	•	X	X	X						
	Resistor (Not Illustrated)	S10404-73	1	X	X	X	X						
22-P	Travel Speed Potentiometer	T10812-71	1	X	X	X	X						
22-K	Knob	T10491	1	X	X	X	X						
23	Direction of Travel Switch	T13111	1	X	•	•	•						
23	Direction of Travel Switch	T10800-7	1	•	X	X	X						
24	Travel Switch	T13543	1	X	X	X	X						
25	Circuit Breaker	T12287-7	1	X	X	X	X						
26	Travel Box Cover	S15238	1	X	•	•	•						
26	Travel Box Cover	S15238-1	1	•	X	X	X						
	Travel P.C. Board (Not Illustrated) Includes:	L5302 $\emptyset$	1	X	•	•	•						
	Travel P.C. Board (Not Illustrated) Includes:	L8731-1	1	•	X	•	•						
	Travel P.C. Board (Not Illustrated) Includes:	L7454-1	1	•	•	X	X						
	Fuse, 1/2 Amp Slo-Blo	T10728-14	1	X	X	•	•						
	Travel P.C. Board Insulation	T13711	1	X	•	•	•						
	Travel P.C. Board Insulation	T14189	1	•	X	X	X						
C	Internal Control Box Assembly	See P-117-M	1	X	X	X	X						

$\emptyset$  This part is obsolete and no longer available.

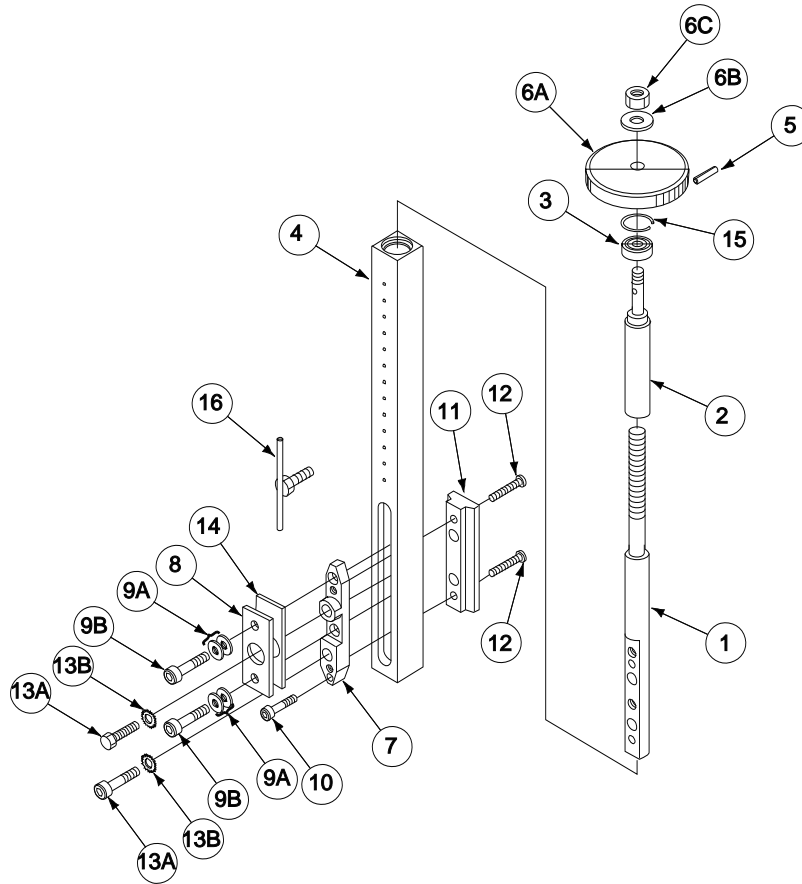
# INTERNAL CONTROLS ASSEMBLY



			For Codes Below 7900 use Column 1. For Codes Above 7900 use Column 2.									
# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
C	Internal Control Box Assembly, Includes: (Code 7429 Only)	L5291	1	X	•							
C	Internal Control Box Assembly, Includes:	L5291-1	1	X	•							
C	Internal Control Box Assembly, Includes:	L5291-4	1	•	X							
1	Control Box	M12685	1	X	•							
1	Control Box	M12685-1	1	•	X							
2	Resistor, 2 OHM	S10404-75	1	X	X							
4	Reed Switch Assembly, (4CR) Includes: Reed Switch	T13708	1	X	X							
5	Terminal Strip	S13323-5	1	X	X							
5	Number Plate	T10726-89	1	X	X							
6	Resistor, 250 OHM	S10404-76	1	X	X							
9	Control P.C. Board, Includes: (Code 7429 Only)	L6958-2	1	X	•							
9	Control P.C. Board Includes:	L6959-2	1	X	X							#
9A	Fuse, 1/2 Amp Slo-Blo	T10728-14	1	X	X							
9B	Fuse, 2/10 Amp	T10728-27	1	X	X							
9-1	Control P.C. Board Insulation (Not Shown)	T13707	1	X	X							
11	Relay, (1 CR and 2 CR)	S22182	2	X	X							#
14	Auxiliary Power outlet	T13698	1	X	X							
18	Inner Panel Assembly, Includes:	S15235	1	X	•							
18	Inner Panel Assembly, Includes:	S15235-1	1	•	X							
18A	Panel	S15244	1	X	X							
18B	Variable Voltage P.C. Board	L5394-2 (Note A)	1	X	X							
18C	Variable Voltage P.C. Board Insulation	T13705	1	X	X							
18D	Logic P.C. Board	L5927-1	1	X	•							
18D	Logic P.C. Board	L5927-2	1	•	X							#
18E	Logic P.C. Board Insulation	T13706	1	X	X							
	Insulation (Mounts Under Lead Clamp) (Not Shown)	T11472-11	1	X	X							
	Note A: L5394 may be used.											

# K280 VERTICAL HEAD LIFT ADJUSTER

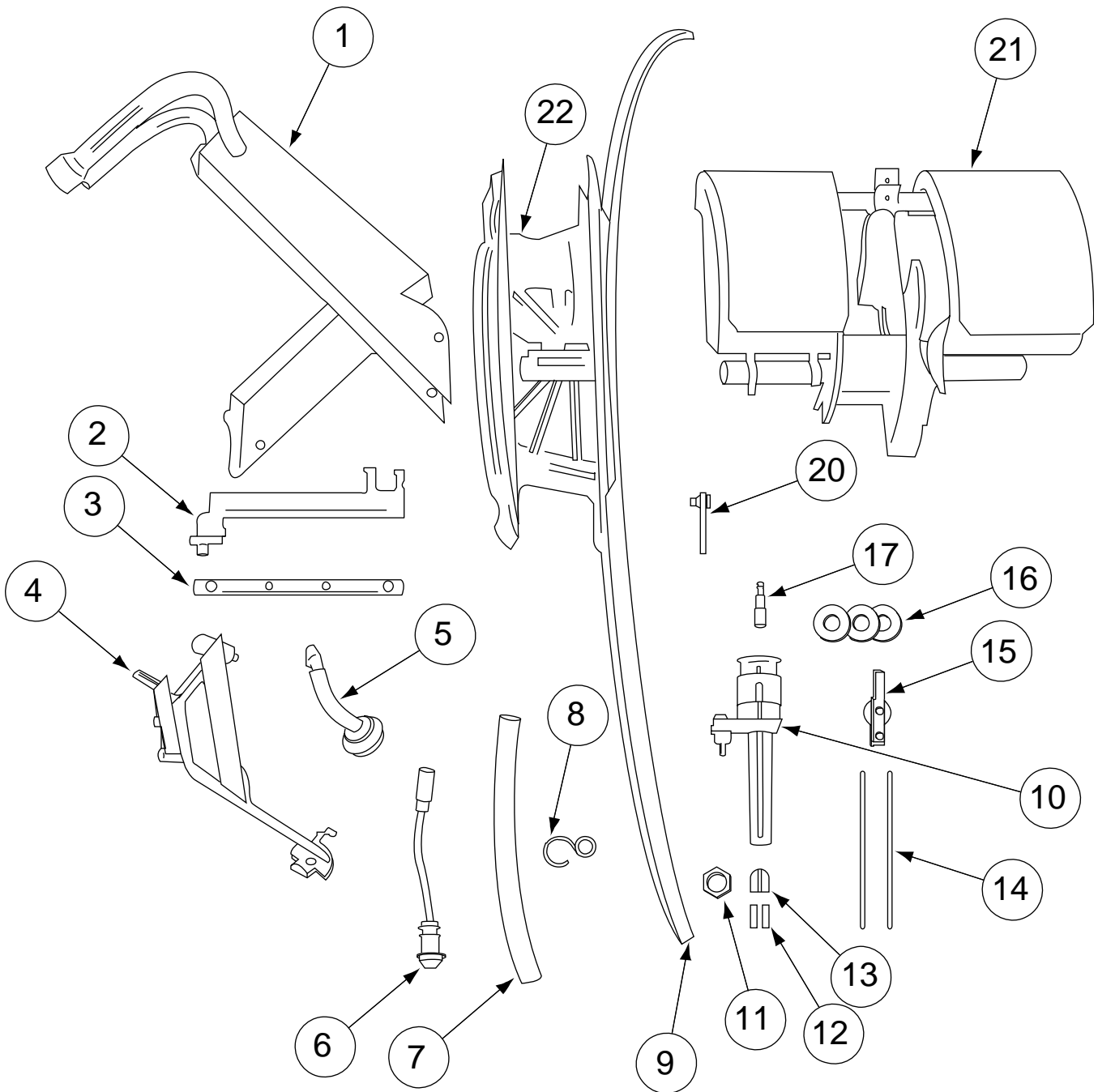
(Standard Equipment on LT-7 Tractors Above Code 7948)



# Indicates a Change This Printing

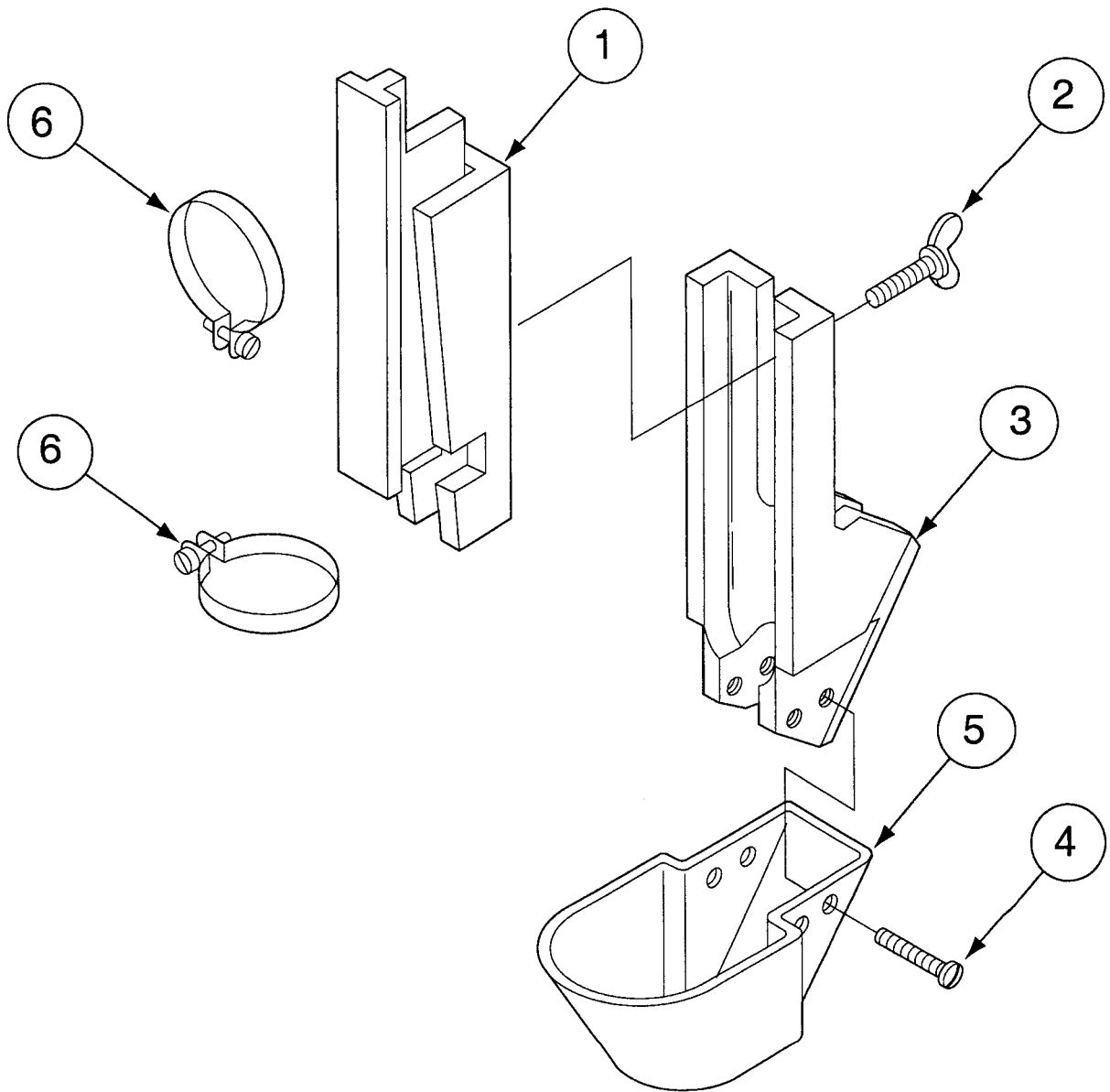
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Vertical Head Lift Adjuster, Includes All Below:	M13334-1	1	X								
1	Mast Core	S15931	1	X								
2	Barrel and Shaft Assembly	S15930	1	X								
3	Bearing	M9300-97	1	X								
4	Mast	M13333	1	X								
5	Roll Pin	T9967-6	1	X								
6A	Adjusting Knob	S15928	1	X								
6B	Lock Washer	E106A-14	1	X								
6C	5/16-18 HN	CF000029	1	X								
7	Mounting Plate	S15929	1	X								
8	Pressure Plate	T14077-1	1	X								
9A	Bow Washer	T10781-5	4	X								
9B	Socket Head Cap Screw	T9447-27	2	X								
10	Torx Button Head Screw	S25930-1	1	X								
11	Slide Pad	S15927	1	X								
12	#8-32 x 1.00 Slotted Flat Head Screw	CF000037	2	X								
13A	3/8-16 x 2.00 HHCS	CF000071	2	X								
13B	Lock Washer	T9860-4	2	X								
14	Pressure Slide	T14077-2	1	X								
15	Retaining Ring	S11964-2	1	X								
16	"T" Locking Screw	T14078	1	X								

### K277-1 AND -2 TINY TWINARC ADAPTER KITS



# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Reel Adapter <sup>(1)</sup>	M13396	1									
2	Front Stabilizer Wheel Attachment	S15857	1									
3	Rear Wheel Support Arm	S15744	1									
4	Front Support Wheel (45° Flat Fillet)	S16025	1									
5	Rear Support Wheel (Flat Fillet) <sup>(1)</sup>	S15279										
6	Travel Motor Extension Cable <sup>(1)</sup>	S15965	1									
7	Flux Tube	T10642-34	1									
8	Hose Clamp	T12929	1									
9	Wire Guide Tube (5 Ft. Length)	S14004-3	1									
	Nozzle Assembly, Includes Items 10 & 11	M11609	1									
10	Nozzle Body	S13164	1									
11	Nozzle Collar	S13157	1									
12	Contact Tip (5/64) (Note A)	T14050-5/64	2									
12	Contact Tip (3/32)	T14050-3/32	2									
13	Tip Holder, Includes:	S15954	1									
	Nozzle Insert	T12576-5	2									
14	Guide Tube (5/64 & 3/32)	T12507-5/64	2									
15	Idle Roll Arm	S15769	1									
16	Drive Roll (Outside)	S15742-2	2									
16	Drive Roll (Center)	S15742-1	1									
17	Outgoing Guide Tube	S15770	1									
18	Incoming Guide Tube (Not Illustrated)	S16464	1									
19	Wire Guide Support (Not Illustrated)	T14683	1									
20	Head Spring Extender	T14145	1									
21	Twin Reel Mounting Assembly	L5629	1									
22	Wire Reel	L4604	1									
23	Slide Bushing (Not Illustrated)	S16461	1									
	Note A: When tip life is limited by tip being fused over, the use of T14726-5/64 tips may result in lower overall cost.											
	<sup>(1)</sup> The K277-1 Kit contains all items except 1, 4, 5 and 6. The K277-2 Kit contains all items shown.											

# K285 CONCENTRIC FLUX CONE



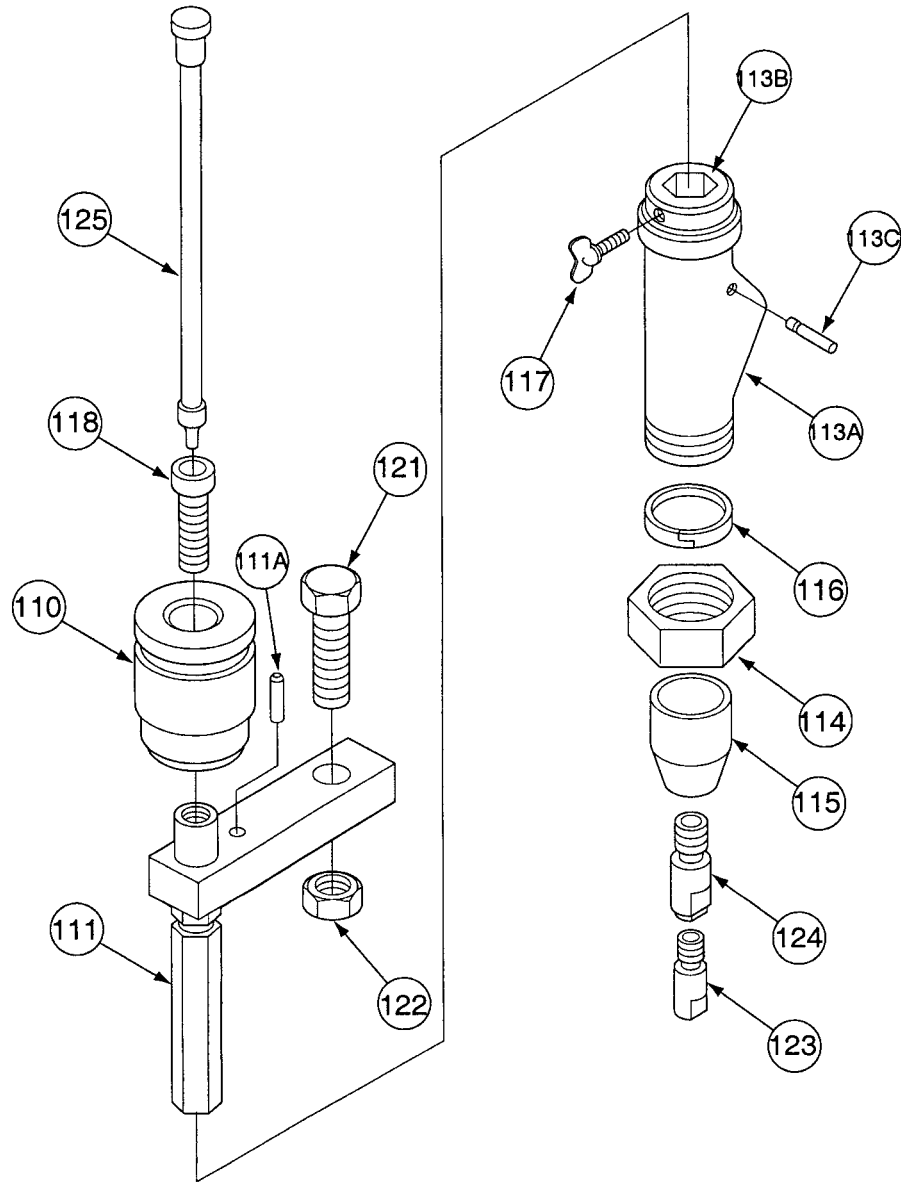
# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Concentric Flux cone, Includes:	K285	1	X								
1	Side Plate	T14177	1	X								
2	Thumb Screw	T9078-1	1	X								
3	Support Arm	M13455	1	X								
4	Sems Screw	T10082-4	4	X								
5	Flux Cone	M13454	1	X								
6	Hose Clamp	S10888-31	2	X								
	<b>Items Not Illustrated</b>											
	Flux Hose	T10642-10	1	X								
	Flux Hose Tube	T6996-9	1	X								

# NOTES

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# K231 (and K31\*) CONTACT NOZZLE ASSEMBLY

\* For K31, order K231 assembly.  
All parts are interchangeable.





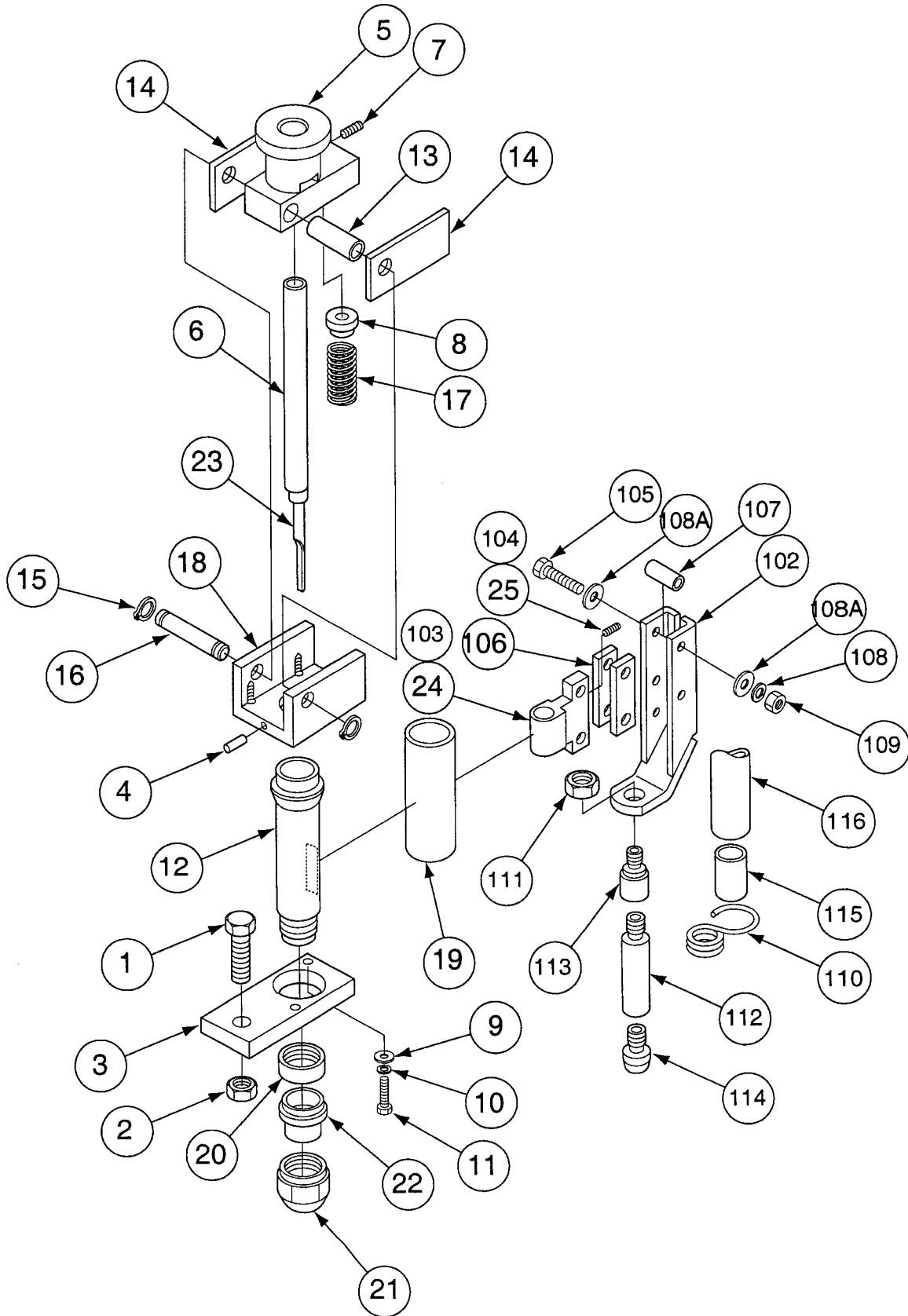
Use only the parts marked "X" in the column under the heading number called for in the model index page.

# Indicates a Change This Printing

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Nozzle Assembly, Includes Items 110 thru 125 as appropriate for wire size specified	K231*	1	X	•							
	Nozzle Assembly, for LT34 ONLY, Includes Items 110, 111, 118, 121 and 122; Order Items 119, 120, 123, 124 and 125 separately for the desired wire size	M8241-1	2	•	X							
110	Nozzle Insulator	S10493-1	1	X	X							
111	Nozzle Body	S10157	1	X	X							
111A	Roll Pin	T9967-10	1	X	X							
113A	Cone Body Assembly, Includes:	M8249	1	X	•							
113B	Flux Cone Plug	S10138	1	X	•							
113C	Roll Pin	T9967-30	1	X	•							
114	Retaining Nut	S10147	1	X	•							
115	Flux Cone	T10575	1	X	•							
116	Locking Ferrule	T10574	1	X	•							
117	Thumb Screw	T9078-1	1	X	•							
118	Special Socket Head Screw	T10570	1	X	•							
119	Rubber Flux Tube (Not Shown)	T10642-1	1	X	•							
119	Rubber Flux Tube, LT34 Only (Not Shown)	T10642-11	1	•	X							
120	Steel Flux Tube (Not Shown)	T6996-9	1	X	•							
120	Steel Flux Tube, LT34 Only (Not Shown)	S10487	1	•	X							
121	Hex Head Screw - Lead to Nozzle	1/2-13 x 1.50	1	X	X							
122	Hex Nut - Lead to Nozzle	1/2-13	1	X	X							
123	Contact Tip - 7/32 Wire Size	S10125-7/32	1	X	X							
123	Contact Tip - 3/16 Wire size	S10125-3/16	1	X	X							
123	Contact Tip - 5/32 Wire Size	S10125-5/32	1	X	X							
123	Contact Tip - 1/8 Wire Size	S10125-1/8	1	X	X							
123	Contact Tip - 3/32 Wire Size; (3/8-24 Thread) Old Style	S8087-3/32	1	X	X							
123	Contact Tip - 3/32 Wire Size; (5/16-18 Thread)	T14050-3/32	1	X	X							
123	Contact Tip - 5/64 Wire Size; (3/8-24 Thread) Old Style	S8087-5/64	1	X	X							
123	Contact Tip - 5/64 Wire Size; (5/16-18 Thread) See Note 1	T14050-5/64	1	X	X							
124	Adapter for 3/32 and 5/64 S8087 Tips (With 3/8-24 Female Thread)	See Note 2	1	X	X							
124	Adapter for 3/32 and 5/64 T14050 Tips (With 5/16-18 Female Thread)	S16844	1	X	X							
125	Nozzle Insert for 3/32 and 5/64 Wire (For NA)	S15106-3/32	1	X	•							
125	Nozzle Insert for 5/64 Wire (For LAF & LT)	S12773-3/32	1	X	X							
	Mounting Clip (For Mounting Nozzle on LAF2)	T10714 ø	2	X	•							
	Nozzle Extension (5.38" long) (For 3/32 & Larger Wire)	S12003	As Req'd	X	•							
*	Specify Wire Size											
<b>Note 1</b>	When tip life is limited by tip being fused over, the use of T14726-5/64 Tips may result in a lower overall cost.											
<b>Note 2</b>	This adapter is no longer available, order Adapter S16844 and the appropriate T14050 Tips or T14726-5/64 Tip.											

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# K148 CONTACT NOZZLE ASSEMBLY K149 LINC-FILL EXTENSION ASSEMBLY

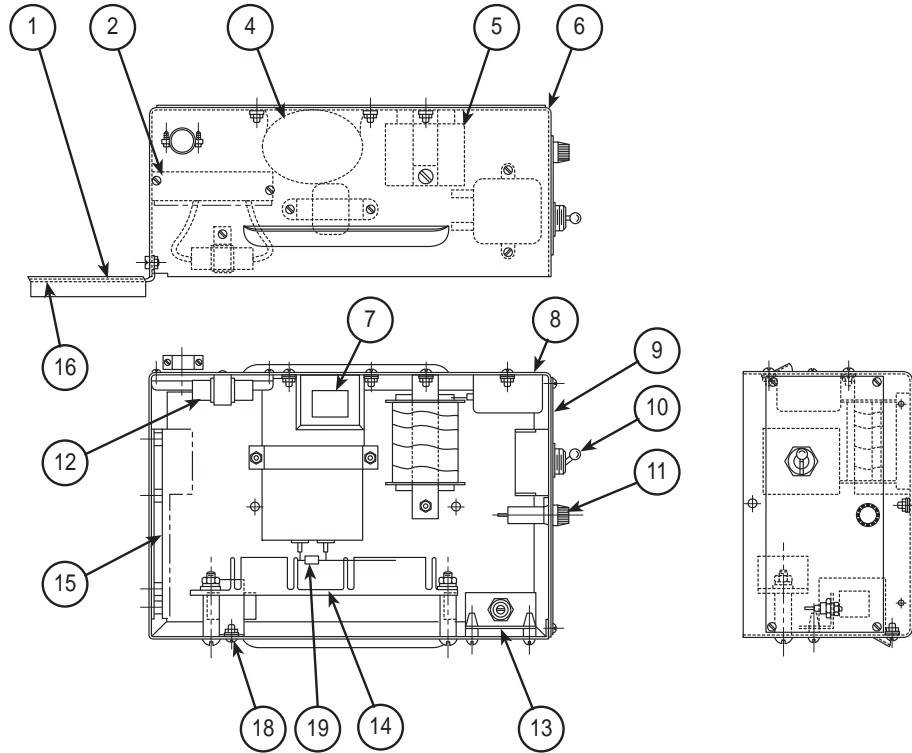


Use Columns 1, 2 & 3 for Standard K148 Nozzles. Use Columns 4 & 5 for Modified Series Arc Equipment Nozzles. Use appropriate column for K149 Extensions based on wire size for standard extensions or Part No. for Modified Series Arc Equipment.

# Indicates a Change This Printing

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Nozzle Assembly (Wire Size 3/32 - .120-1/8), Includes:	K148A	1	X	•	•	•	•				
	Nozzle Assembly (Wire Size 5/32 - 3/16), Includes:	K148B	1	•	X	•	•	•				
	Nozzle Assembly (Wire Size .068 - 5/64), Includes:	K148C	1	•	•	X	•	•				
	Nozzle Assembly (Wire Size 5/32 - 3/16), Includes:	L4621-4 & -6	1	•	•	•	X	•				
	Nozzle Assembly (Wire Size 3/32 - .120-1/8), Includes:	L4621-5	1	•	•	•	•	X				
1	Hex Head Screw	1/2-13 1 1/2	1	X	X	X	X	X				
2	Hex Nut	1/2-13	1	X	X	X	X	X				
3	Cable Connector	S12576	1	X	X	X	X	X				
4	Roll Pin	T9967-35	1	X	X	X	X	X				
5	Pivot Body	M10340-1	1	X	X	X	X	X				
6	Guide Tube Assembly, 3/32, .120, 1/8 Wire	S13769-1	1	X	•	•	•	X				
6	Guide Tube Assembly, 5/32, 3/16 Wire	S13769-2	1	•	X	•	X	•				
6	Guide Tube Assembly, .068, 5/64 Wire	S13769-3	1	•	•	X	•	•				
7	Set Screw	S11604-19	1	X	X	X	X	X				
8	Insulating Spacer	T12157	1	X	X	X	X	X				
9	Flat Washer	S9262-23	2	X	X	X	X	X				
10	Lock Washer	E106-A2	2	X	X	X	X	X				
11	Hex Head Screw	1/4-20 x 1	2	X	X	X	X	X				
12	Nozzle Body	M11327	1	X	X	X	X	X				
13	Insulating Tube	T7028-51	1	X	X	X	X	X				
14	Insulation	S12579	2	X	X	X	X	X				
15	Snap Ring	S9776-25	2	X	X	X	X	X				
16	Pivot Pin	T12158	1	X	X	X	X	X				
17	Spring	T10247-8	1	X	X	X	X	X				
18	Nozzle Holder	S13762	1	X	X	X	X	X				
19	Window Cover	S7748-64	1	X	X	X	•	•				
20	Thread Protecting Collar	S13805	1	X	X	X	X	X				
21	Nozzle Collar	S13804	1	X	X	X	X	X				
22	Nozzle Tip	S13763	1	X	X	•	X	X				
22	Nozzle Tip	S16388	1	•	•	X	•	•				
23	Inner Guide	S14360-1	1	•	•	X	•	•				
24	Extension Support Arm Mounting Bracket	S13758	1	•	•	•	X	X				
25	Set Screw	S11604-19	1	•	•	•	X	X				
	Water Cooling Tube Assembly (Not Illustrated)	T12928	1	X	X	X	•	•				
	K149 Linc-Fill Extension Assembly, Includes:	K149-3/32 Wire	1	X	•	•	•	•				
	K149 Linc-Fill Extension Assembly, Includes:	K149-.120 Wire	1	•	X	•	•	•				
	K149 Linc-Fill Extension Assembly, Includes:	K149-1/8 Wire	1	•	•	X	•	•				
	K149 Linc-Fill Extension Assembly, Includes:	K149-5/32 Wire	1	•	•	•	X	•				
	K149 Linc-Fill Extension Assembly, Includes:	K149-3/16 Wire	1	•	•	•	•	X				
	Linc-Fill Extension Assembly & L4621-6 Nozzle, Includes:	M13868	1	•	•	•	•	•	X			
102	Extension Arm Assembly	S13757	1	X	X	X	X	X	X			
103	Mounting Block	S13758	1	X	X	X	X	X				
104	Set Screw	S11604-19	1	X	X	X	X	X				
105	Hex Head Screw	1/4-20 x 1 3/8	2	X	X	X	X	X	X			
106	Insulation	T8477-16	2	X	X	X	X	X	X			
107	Insulating Tube	T11851-3	2	X	X	X	X	X	X			
108	Lock Washer	E106-A2	2	X	X	X	X	X	X			
108A	Plain Washer	S9262-23	2	X	X	X	X	X	X			
109	Hex Nut	1/4-20	2	X	X	X	X	X	X			
110	Flux Hose Clamp	T12929	1	X	X	X	X	X	•			
111	Hex Jam Nut	5/8-11	1	X	X	X	X	X	X			
112	Extension Tube - 2" Long	S13785-2	1	•	•	X	X	X	•			
113	Extension Tube - 1" Long	S13785-1	1	•	X	•	•	•	X			
114	Extension Tube End (2 3/4 Electrical Stickout)	S13786-3/32	1	X	•	•	•	•	•			
114	Extension Tube End (2 1/4 Electrical Stickout)	S16167-3/32	1	X	•	•	•	•	•			
114	Extension Tube End	S13786-.120	1	•	X	•	•	•	•			
114	Extension Tube End	S13786-5/32	1	•	•	•	X	•	•			
114	Extension Tube End	S13786-3/16	1	•	•	•	•	X	X			
115	Flux Hose	T10642-34	1	X	X	X	X	X	•			
116	Flux Hose	S7748-35	1	X	X	X	X	X	•			
	Nozzle Assembly (L4621-6)	See Above List	1	•	•	•	•	•	X			

## K224 SOLID-STATE REMOTE FIELD CONTROL (DISCONTINUED)



L5297  
10-2-81Q

# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Solid State Remote Field Control, Includes:	K224	1									
1	Top Door	M10639-4	1									
2	Terminal Strip	S14530-1	1									
	Number Plate	T10726-90	1									
4	Capacitor	S10593	1									
5	Auto Transformer	M12702 Ø	1									
6	Box Assembly	M12706 Ø	1									
7	Transformer	S15257 Ø	1									
8	Capacitor	T11079	1									
9	Nameplate	M12688	1									
10	Polarity Switch	S13417 Ø	1									
11	Fuse Holder	S10433	1									
	Fuse	T10728-8	1									
12	Capacitor	S13490-1	1									
13	Diode	T12705-15	1									
14	SCR and Heat Sink	M13342 Ø	1									
15	Control P.C. Board (Code 7359 Only)	L5316	1									
15	Control P.C. Board (Code 7683 & Above)	L5759-1	1									
16	Caution Decal	T13470	1									
18	Choke	S14644	1									
19	Resistor (Code 7742 & Above)	T12731-42F	1									
	K224 Mounting Angles	S12995-1 & S13709	1 ea									

Ø This part is obsolete and no longer available.

# NOTES

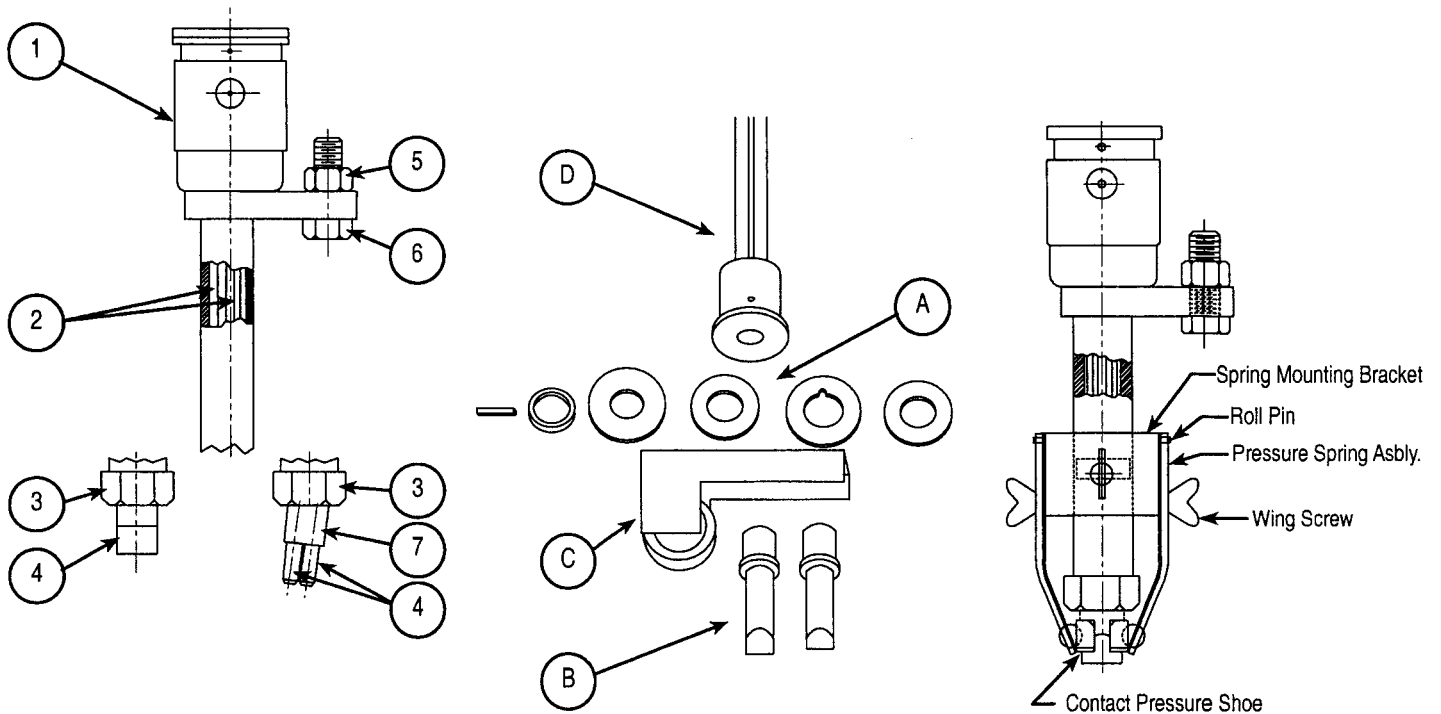
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## K129 SUBMERGED ARC TINY TWINARC®

**NOTES:**

Nozzles with spring loaded contact shoes (illustrated below, right) should be converted to the newer design by discarding items named below and using the appropriate contact tip holder and tips or correct one piece contact tip, depending on wire size.

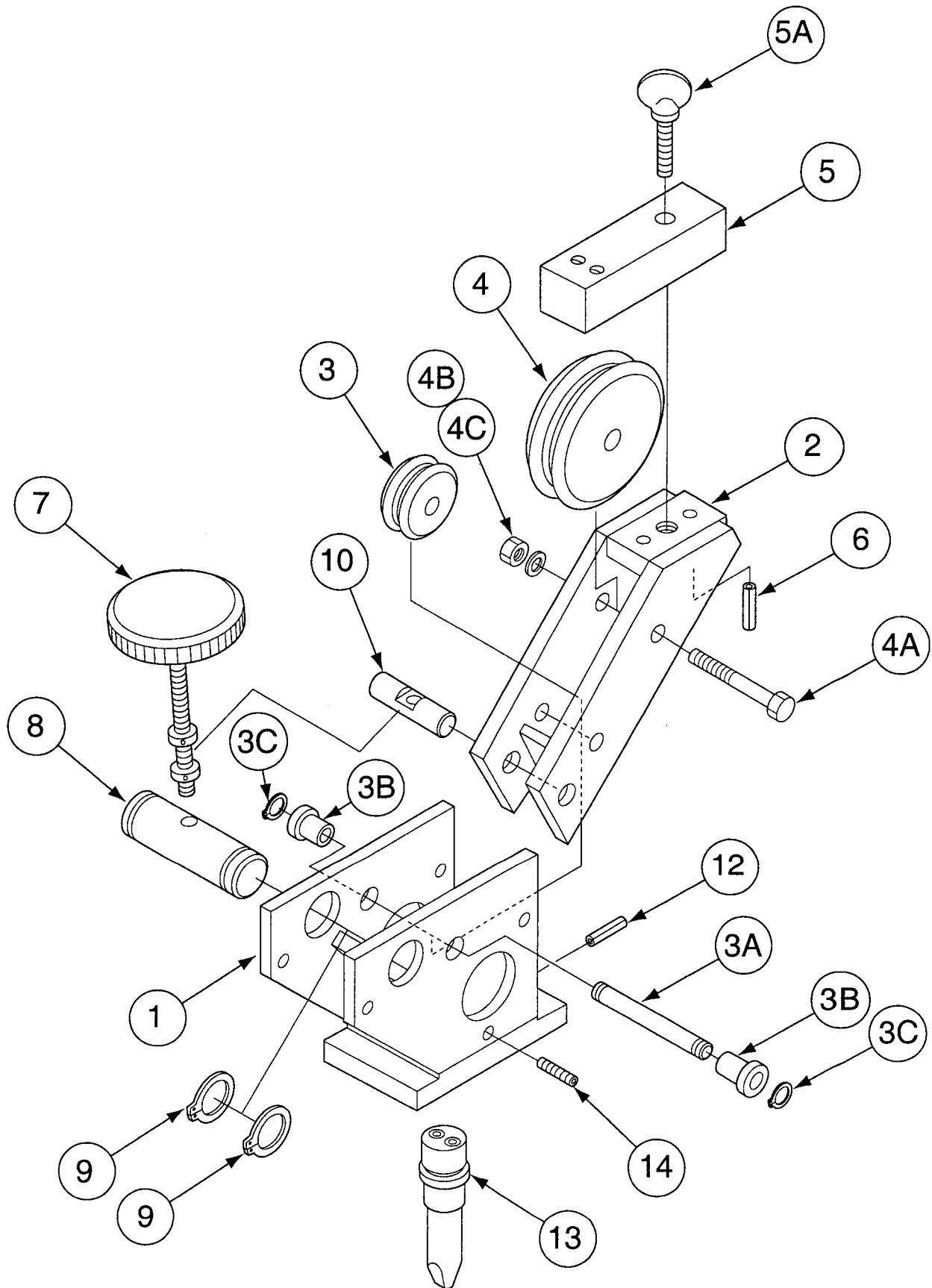
Intermediate design (one piece) contact tips for 1/16 and 5/64 wire should be converted to the new (lower replacement cost) contact tip holder and contact tips design by ordering the appropriate contact tips and tip holder from the parts list below.



M11609  
4-16-76J

• Specify Wire Size # Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Twinarc - Complete - Includes All Below	K129*	1									
	Nozzle Assembly - Stripped - Includes Items 1, 3, 5 & 6	M11609	1									
	.045 Wire Kit - Includes Items 2, 4, A & B	T14705-.045	1									
	1/16 Wire Kit - Includes Items 2, 4, 7, A & B	T14705-1/16	1									
	5/64 Wire Kit - Includes Items 2, 4, 7, A & B	T14705-5/64	1									
	3/32 Wire Kit - Includes Items 2, 4, 7, A & B	T14705-3/32	1									
1	Nozzle Body Assembly	S13164	1									
2	Guide Tube - .045 & .052 Wire	T12507-.045	2									
2	Guide Tube - 1/16, 5/64 & 3/32 Wire	T12507-5/64	2									
3	Nozzle Collar	S13157	1									
4	Contact Tip - .045 Wire	S14033-.045	1									
4	Contact Tip - .052 Wire	S14033-.052	1									
4	Contact Tip - 1/16 Wire	T14050-1/16	2									
4	Contact Tip - 5/64 Wire (See Note AA)	T14050-5/64	2									
4	Contact Tip - 3/32 Wire	T14050-3/32	1									
5	Hex Nut	1/2-13	1									
6	Hex Head Screw	1/2-13 x 1.50	1									
7	Tip Holder - 1/16, 5/64 & 3/32 Wire (Std.), Includes Nozzle Insert	S15954	1									
7	Tip Holder - (Special Side-by-Side Wire)	T12576-5 S17728	2 As Req'd									
Note AA	When Tip Life is limited by tip being fused over, the use of T14726-5/64 Tips may result in a lower overall cost.											
A	Drive Roll - .045 & .052 Wire	S13161-.052	1									
A	Drive Roll - 1/16 & 5/64 Wire	S13161-5/64	1									
A	Drive Roll Assembly - 3/32 Wire, Includes:											
	Outer Drive Rolls	S14904	2									
	Center Drive Rolls	S14905	1									
	Drive Roll Spacer	T12146-1	1									
	Drive Roll Key	M8776-6	1									
B	Wire Guides - .045 & .052 Wire	S13162-.045	2									
B	Wire Guides - 1/16, 5/64 & 3/32 Wire	S13162-5/64	2									
C	Idle Roll Assembly, Includes:											
	Idle Roll	S13165	1									
		S18583	1									
D	Incoming Wire Guide Assembly	S13166	1									
	Second Wire Reel & Mountings	See P-100-G	1									

# K281 WIRE STRAIGHTENER FOR TINY TWINARC®



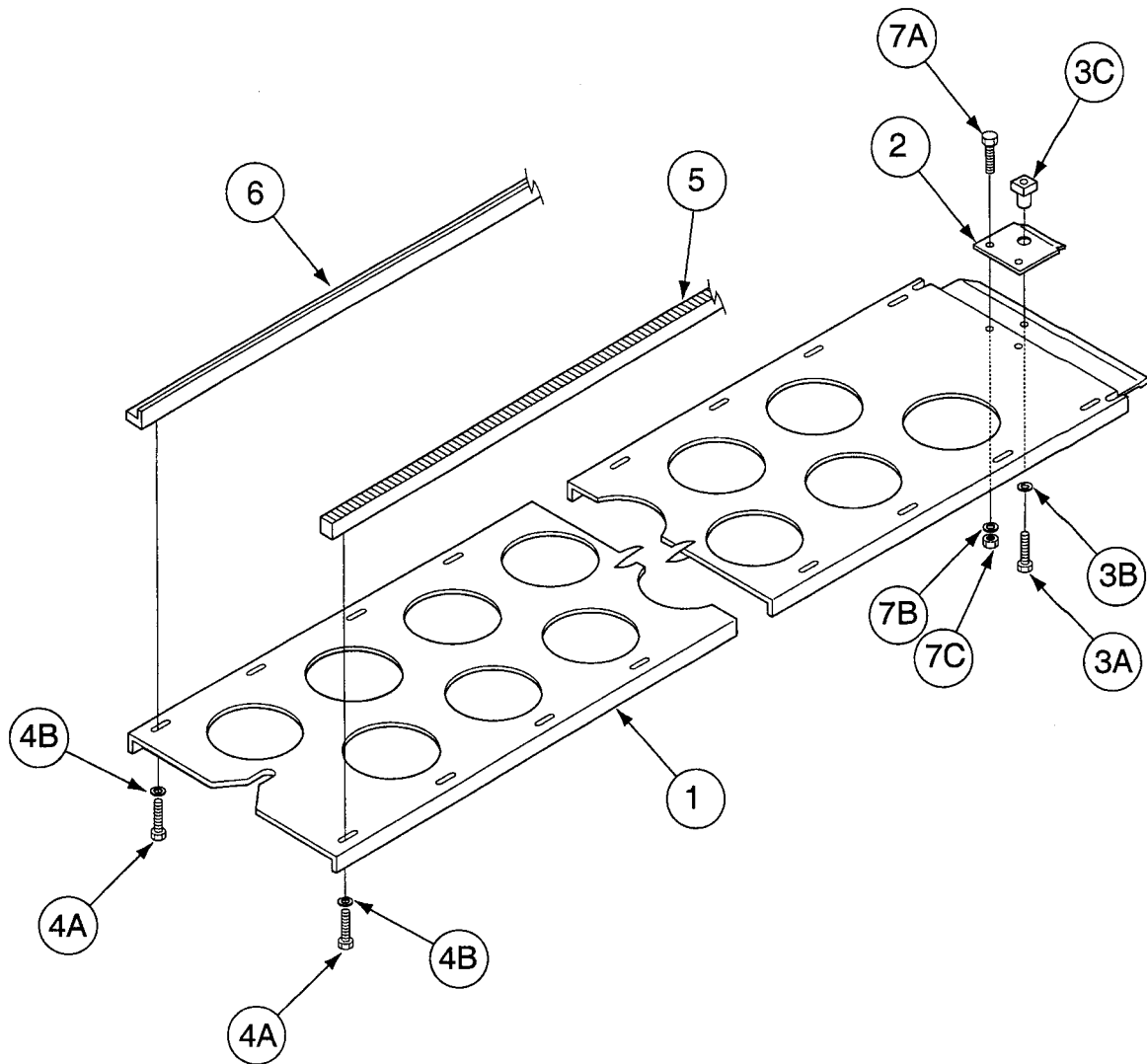


USE COLUMN ONE FOR TINY TWINARC  
 USE COLUMN TWO FOR TWIN MIG TORCH

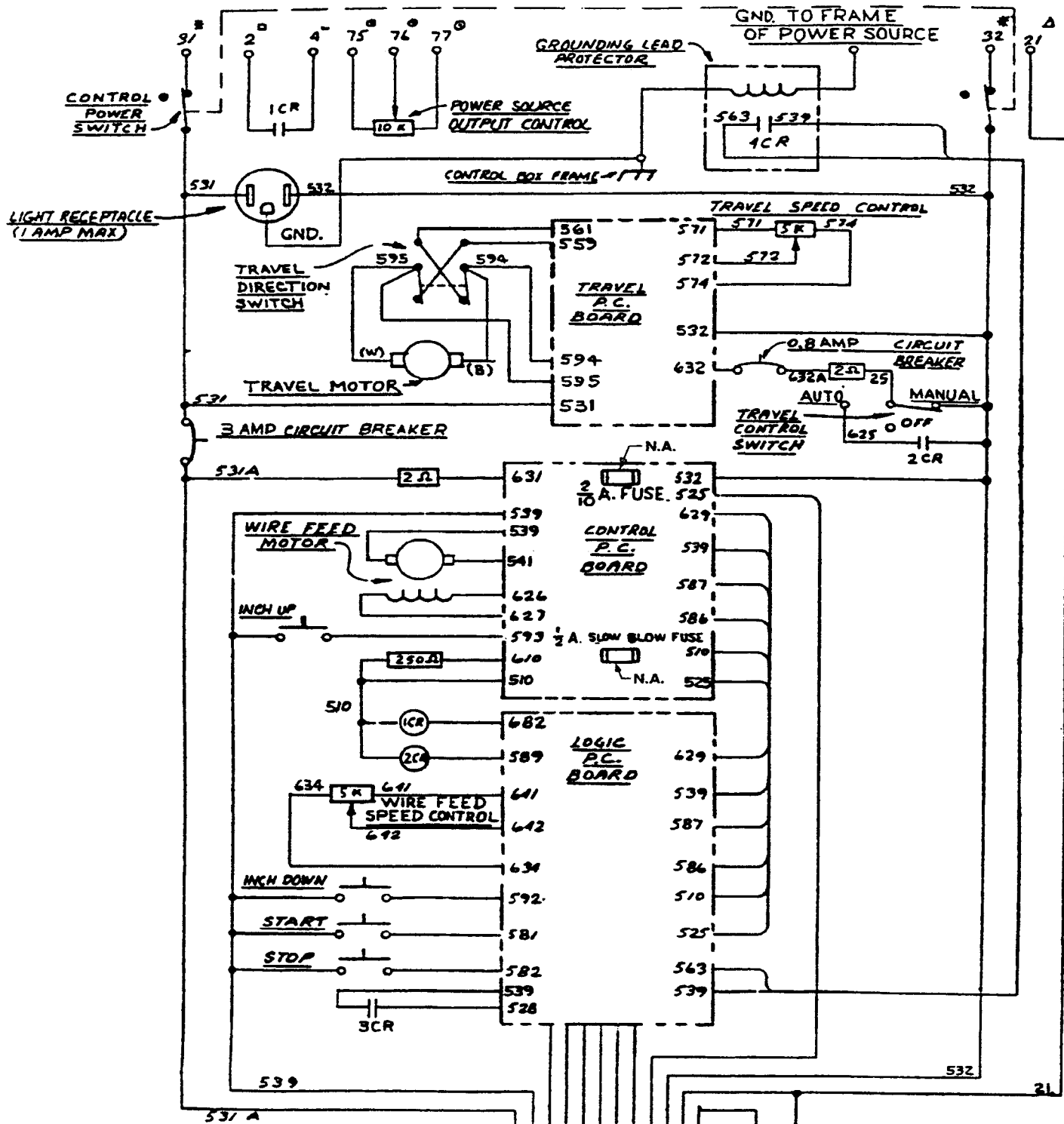
- Specify Wire Size
- # Indicates a Change This Printing

ITEM	DESCRIPTION	PART NO.	QTY.	# 1	# 2	3	4	5	6	7	8	9
1	Base	S15943	1	X	X							
2	Tension Arm	S15946	1	X	X							
3	Roller Assembly, Includes: Roller Shaft (2 1/4" Shaft) Retaining Ring	S15953-1 T14099 S9776-1	1 1 2	X X X	• • •							
3	Roller Assembly, Includes: Roller Shaft (2 1/2" Shaft)	S15953-3 S18729	1 1	X X	X X							
3A	Roller Shaft	S18729	1	X	X							
3B	Bushing	S18728	2	X	X							
3C	Retaining Ring	S9776-4	2	X	X							
4	Roller Assembly Includes: Roller Bearing Shaft Retaining Ring Bearing	S15953-2 S15950 S18727-1 S11964-7 M9300-83	1 1 1 2 2	X X X X X	X X X X X							
4A	Hex Head Cap Screw	5/16-18 x 2.00	1	X	X							
4B	Lock Washer	E106-A3	1	X	X							
4C	Hex Nut	5/16-18	1	X	X							
5	Incoming Guide Assembly, Includes: Thumb Screw Nozzle Insert (Not Shown)	T14090 T14088 T12576-3	1 1 4	X X X	X X X							
6	Roll Pin	T9967-38	2	X	X							
7	Adjusting Screw Assembly	T14092	1	X	X							
8	Large Pivot	T14086	1	X	X							
9	Retaining Ring	S9776-12	2	X	X							
10	Small Pivot Shaft	T14087	1	X	X							
12	Roll Pin	T9967-8	1	X	X							
13	Wire Guide Assembly	T14093	1	X	•							
14	Set Screw	S11604-21	1	X	X							

### K396 TRACK SECTIONS

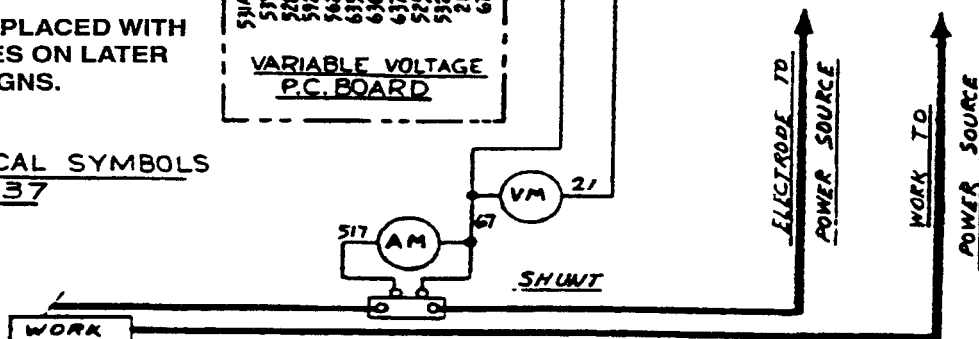


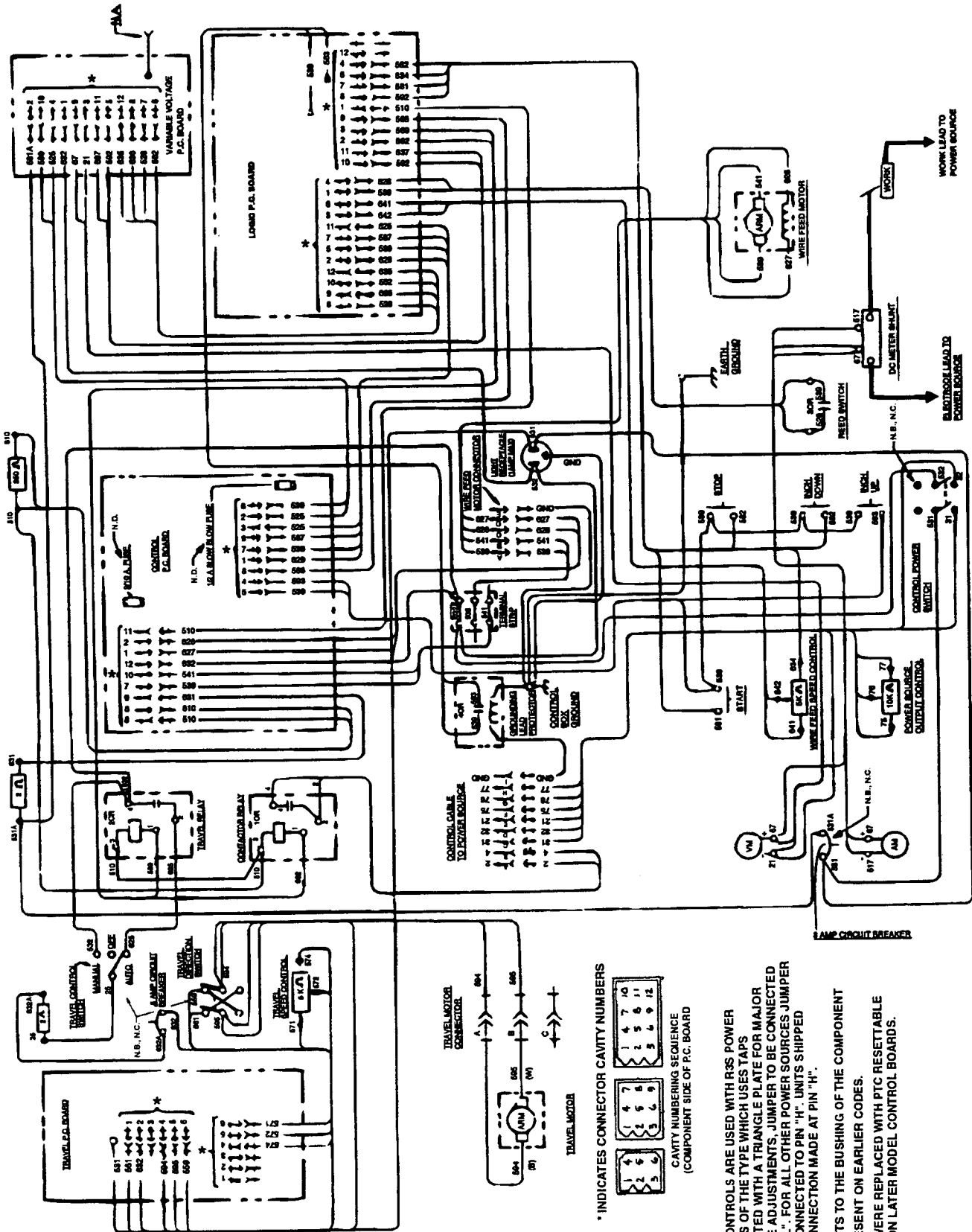
# Indicates a Change This Printing												
ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Track Bed	L7050	1	X								
2	Coupling Clip	S17628	1	X								
3A	Hex Head Screw	1/4-20 x .500	1	X								
3B	Lock Washer	E106A-2	1	X								
3C	Coupling Pin	T14921	1	X								
4A	Phillips Pan Head Screw	#10-24 x .312	24	X								
4B	Lock Washer	T9695-1	24	X								
5	Gear Rack	S14747-1	1	X								
6	Guide Rail	S17629	1	X								
7A	Hex Head Screw	1/4-20 x .500	2	X								
7B	Lock Washer	E106A-2	2	X								
7C	Hex Nut	1/4-20	2	X								
8	Sems Screw (Not Shown)	T10082-6	24	X								



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

ELECTRICAL SYMBOLS  
PER E1537





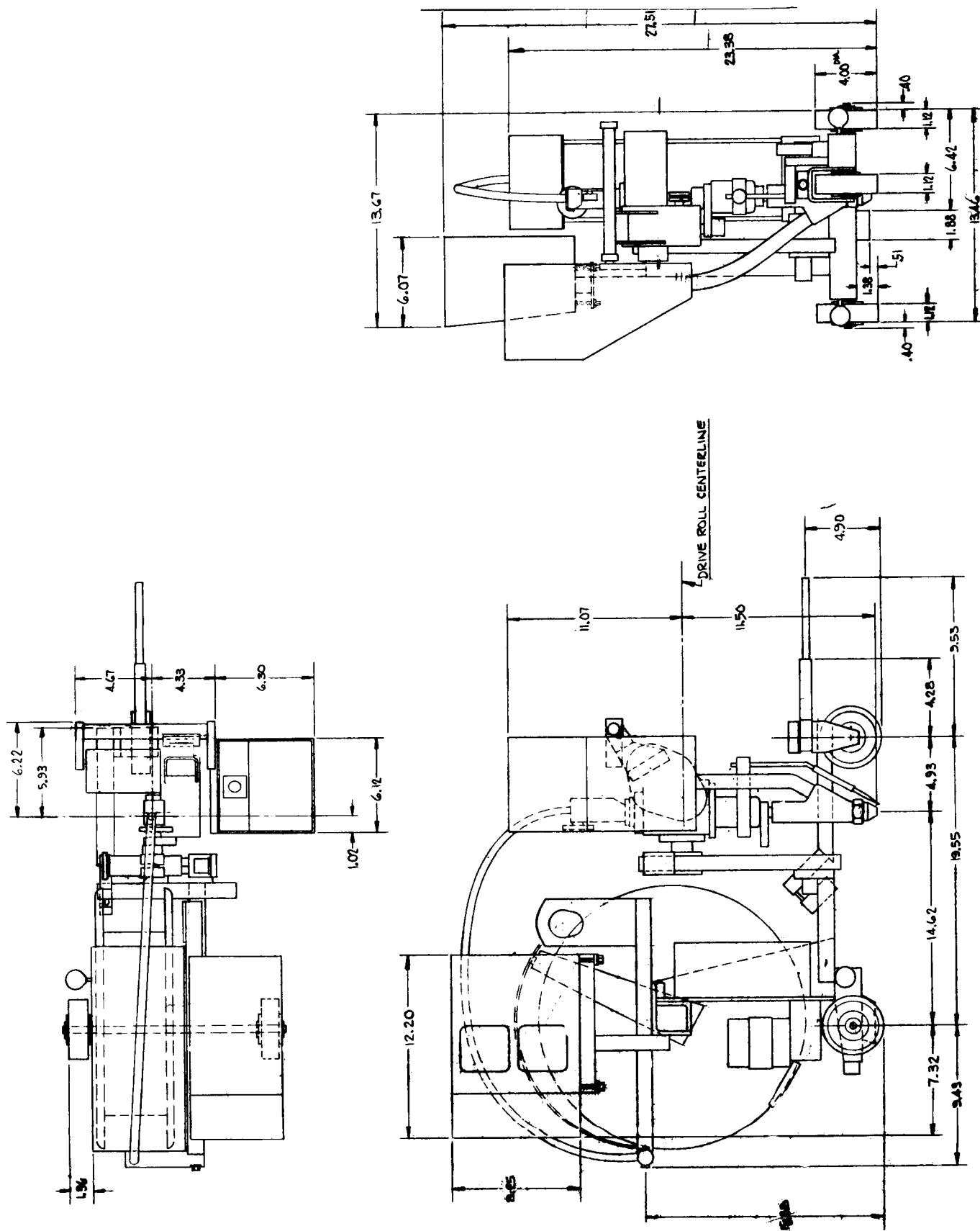
\* INDICATES CONNECTOR CAVITY NUMBERS  
 CAVITY NUMBERING SEQUENCE  
 (COMPONENT SIDE OF P.C. BOARD)

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





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

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

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

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

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

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

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

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

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

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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



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