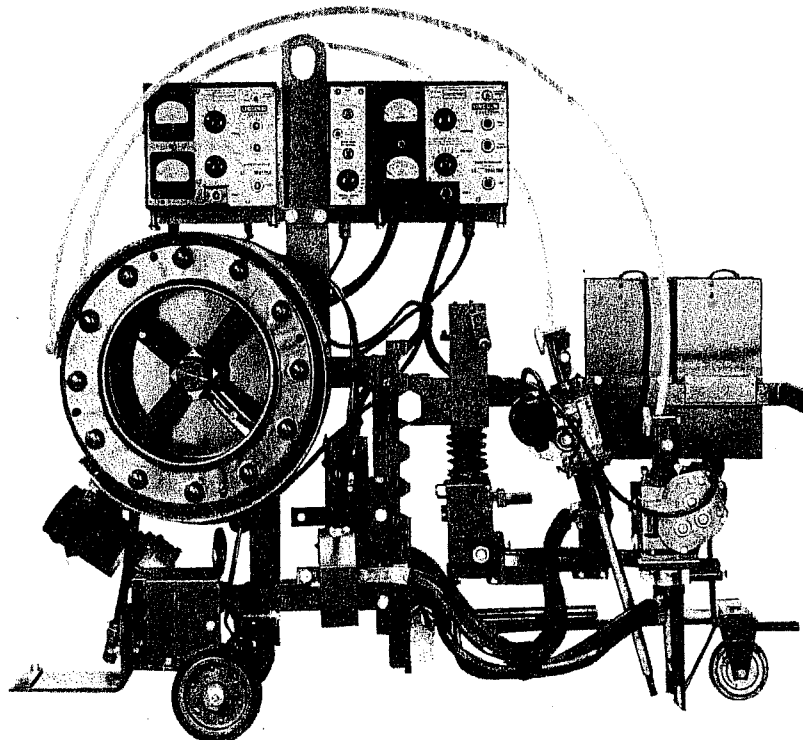


OPERATING MANUAL

LT-56

TANDEM ARC TRACTOR FOR SUBMERGED ARC WELDING



SHIPPING 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.

SAFETY DEPENDS ON YOU

Lincoln arc welding 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 OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON THE INSIDE FRONT COVER.** And, most importantly, think before you act and be careful.

ARC WELDING SAFETY PRECAUTIONS



WARNING: PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH.



ELECTRIC SHOCK can kill.

1. 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.
- b. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".
- c. Insulate yourself from work and ground using dry insulation. When welding in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.
- 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.
- e. Ground the work or metal to be welded to a good electrical (earth) ground.
- f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.
- g. Never dip the electrode in water for cooling.
- 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.
- i. When working above floor level, protect yourself from a fall should you get a shock.
- j. Also see Items 4c and 6.



ARC RAYS can burn.

2. 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.
- b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.
- 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.

3. 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 on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.
- b. 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.
- c. 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.
- d. 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.
- e. Also see item 7b.



WELDING SPARKS can cause fire or explosion.

4. 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. Have a fire extinguisher readily available.
- 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.
- 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.
- 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 F4.1-80 from the American Welding Society (see address below).

- e. Vent hollow castings or containers before heating, cutting or welding. They may explode.
- 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.
- 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.
- h. Also see item 7c.



CYLINDER may explode if damaged.

- 5. 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.
- b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.
- 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.
- d. Never allow the electrode, electrode holder, or any other electrically "hot" parts to touch a cylinder.
- e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.
- f. Valve protection caps should always be in place and handtight except when the cylinder is in use or connected for use.
- 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.

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



FOR ENGINE powered equipment.

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



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



- 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.



- 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.

- 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.

- 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.

- 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.



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

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

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

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GENERAL DESCRIPTION AND FEATURES

The LT-56 tractor is a tandem arc unit for DC-AC submerged arc operation.

Main features of the LT-56 are as follows:

1. Solid state DC and AC controls similar to LT-7. Easy adjustment of both current and voltage at tractor with no remote control boxes at the power source. Input power — 115 volts AC, 50 or 60 hertz.
2. Very versatile rugged steel frame construction.
3. Height, 45.5 inches; width, 17.5 inches; length, 54.0 inches or 59.5 inches (with front arm extended); weight, 390 pounds with empty reels and empty flux hoppers.
4. Wire size capability — $\frac{3}{32}$ through $\frac{3}{16}$ (both wire feeders).
5. 1500 amp rating (both DC and AC).
6. Travel — heavy duty drive with a calibrated dial for speeds of 6 to 100 inches per minute. Clutch (operated from either side) allows easy positioning of the tractor.
7. Vertical adjustment — 4.00 inches of continuous travel as an integral part of tractor. Fixed major height adjustments provided for longer electrical stickouts.
8. Horizontal adjustment — 2.00 inches of continuous travel as an integral part of the tractor. Fixed major horizontal adjustments so electrodes can weld between or outside the line made by either rear wheel.
9. Flux capacity — 30 pounds with manually controlled discharge rate from two separate LT-7 type hoppers.
10. Joint versatility
 - a. **Butt Welds** — in line or on either side of the tractor.
 1. prepared deep groove
 2. tight butts
 3. open joint — unprepared butts
 - b. **Horizontal Fillets or Laps** — Both right and left with electrode to joint angles between 40° and 50°.
 - c. **Flat Fillets** — Unit may be positioned for either the 30° and 45° flat fillet with minimum flange height of 5.5 and minimum web height of 18.75.
11. Troubleshooting lights on the P.C. boards allow unit to be quickly repaired and returned to service.
12. P.C. boards used in both the AC and DC controls are the same as used in the LT-7.
13. Many parts are common with the NA-3 or 4 or LT-7.
14. All the positioning adjustments on the tractor are so designed that they can be locked tight. This eliminates any movement of these adjustments when the tractor is moved about the shop.

LT-56 EQUIPMENT REQUIREMENTS FOR TANDEM WELDING

- | | | | |
|-----------------------------------|--|-----------------------------------|--|
| 1. LT-56 Tractor | K286 — ($\frac{3}{32}$ thru $\frac{3}{16}$ wire) | 5. Power Requirements | |
| 2. Control and Power Input Cables | K215 — (30', 50', 75' and 100') 2 required | DC | Suitable Power Sources
DC 1500 and DC 1000 |
| 3. Ground Cable | See 6403 of Price Book | AC | AC 1200 |
| 4. Optional Features | K230 — Allows guiding from a prepared "V" or a slightly open seam. | 6. Motor Generator Remote Control | K224 — (Required to have current control at wire feeder when using SAF-600 or SA-800.) |
| Butt Seam Guide Kit | | 7. Welding Materials | See 6322, 6323, 6327, & 6331 in Price Book. |
| Horizontal Fillet Lap Kit | K288 — Attachments required for making left or right horizontal fillets or laps. | | |
| Flat Fillet Kit | K287 — Attachment required for making flat fillets. | | |

DESCRIPTION AND OPERATION OF MAIN COMPONENTS

The LT-56 is made up of Integral assemblies.

- I. A. DC Wire Feeder (Lead Arc)
B. DC Control
- II. A. AC Wire Feeder (Trail Arc)
B. AC Control
- III. Travel
 - A. Travel Control
 - B. Travel Carriage
- IV. Wire Feeder Mountings and Adjusters
 - A. Vertical Adjustment
 - B. Horizontal Adjustment
 - C. Main Head Pivot
 - D. Wire Feeder Mountings
- V. Main Frame, Control Box and Wire Reel Mounting
- VI. Flux Hoppers

- I. A. The DC wire feeder is similar to the LT-7 and consists of the following:

- 1. DC shunt motor.
- 2. 90:1 gear box using helical-spur gears, non-fluid lubrication, and needle-ball bearing construction for high efficiency and long life.
- 3. Wire straightener for solid wire.
- 4. Hardened-knurled drive rolls — driving teeth on both sides so that they can be turned to double life.
- 5. Ball bearing type idle roll — fixed setting for all wire diameters.
- 6. Accurately aligned ingoing and outgoing guide tube for quick loading of new electrode.
- 7. K231 type nozzle (minus the concentric flux cone).

- B. The DC control box assembly is similar to the LT-7 and consists of:

- 1. Power Switch — turns power on to all controls and resets the grounding lead protector.
- 2. Built in “ground lead protective circuit”.
- 3. Inch up and inch down buttons — with a fixed inching speed of “cold” electrode.
- 4. Start and stop buttons — to initiate and terminate welding.
- 5. Weld voltage and current control rheostats.

- 6. Weld voltage and current meters. Note: Leads on the rear of the meters must be reversed with a change in arc polarity.

- 7. Constant Current (CC) and Constant Voltage (CV) selector switch (located inside the control box on the upper center of the front P.C. board). Switch should be in the CC position when the equipment is used with a constant current power source.

A constant voltage nameplate (L5283-1) is mounted under the constant current nameplate on the DC control box. If the tractor is to be used on constant voltage type operation the mode selector switch should be placed into the CV position and the constant voltage nameplate then should be mounted on top of the constant current nameplate which is on the control box.

- 8. Circuit breaker — for the overload protection of the equipment.
- 9. One-half amp Slo-blow (replaceable) field fuse (inside of control box at lower right side of the back P.C. board).
- 10. Two-tenths amp fuse for short circuit protection (inside of control box at the top center of the back P.C. board).
- 11. Arc — can be started either “hot” or “cold”.
- 12. Linc Fill starting built in.
- 13. 115 Volt AC receptacle on the bottom rear of the control box (up to a 120 watt capacity) for use of extension lights.
- 14. Travel relay — for starting and stopping the travel unit.

- II. A. AC wire feeder (trail arc) same as DC wire feeder except the nozzle requires an extension.

- B. AC Control — same as the DC control box, except:

- 1. No travel relay — or tie in with travel control circuit.
- 2. Weld voltage and current meters are AC.

- III. Travel

- A. Travel Control Box is similar to that used on the LT-7. It consists of:

- 1. Solid state circuitry packaged in its own control box and is physically and electri-

cally attached to the DC wire feed control box.

2. Travel Mode Switch

- a. Automatic position — travel starts and stops with the arc start and stop buttons.
 - b. Off — no travel.
 - c. Manual position — travel on (clutch in).
3. Travel direction switch — forward and reverse travel.
 4. Travel speed control — calibrated in inches per minute on dial (6 to 100" min).
 5. Circuit breaker — for overload protection of circuit.
 6. One-half amp Slo-blow field fuse (inside travel control box on the P.C. board).

B. Travel Carriage

1. The unit is propelled by two six inch diameter canvas-tired wheels. Both wheels are driven by a common axle.
2. The travel gear box is an NA-3 type with a special adapter gear box between the motor and gear box proper. The assembly is a helical-spur-bevel type unit driven by a DC shunt motor. Lubrication is of a non-fluid type. Gear box ratio is 640/1. Total ratio from motor shaft to axle shaft is 1344/1.
3. Travel carriage has a built in clutch which can be operated from either side of the tractor. When the gears are engaged the travel unit drives the tractor; when the gears are disengaged the tractor can be moved forward or backward manually.
4. The front support wheel is attached to a telescoping arm which is clamped to the lower cross arm. The arm can be mounted so that it is either on the left or right of the center mast depending upon the mode of operation. The front wheel yoke is mounted to a spring loaded cam shaft, so that it will return to its original position after releasing the turning force. The front wheel can be adjusted so that the tractor will travel in a straight line or "toe" either left or right.

IV. Wire Feeder Mountings and Adjusters

A. Vertical Adjustment

The vertical lift is a standard feature and is capable of a total continuously adjustable

movement of four inches. In conjunction with this there are five different fixed mounting positions on the main mast so that major vertical movements can be made. The wire feeders can be mounted so that any of the Linc Fill procedures can be used (electrical stickouts up to 5").

B. Horizontal Adjustment

A continuous horizontal adjuster (K96) is a standard feature and is capable of a total horizontal movement of two inches. In addition, the vertical lift adjuster clamps on an upper cross arm which allows the heads to be positioned anywhere between a line formed by the two rear wheels to 3.5 inches outside the wheels on either side of the tractor.

C. Main Head Pivot

The telescoping arm housing which supports both wire feeders is fastened to the main pivot housing. At this pivot point the housing can be positioned to one of three positions. The center position is the vertical fixed position. The other two positions are the floating positions, which allow the welding heads to pivot between angles of 40° to 50° on either side of the tractor. When the heads are in one of the floating positions they are spring loaded so that the horizontal fillet or lap guide rollers are forced downward against the horizontal plate.

D. Wire Feeder Mountings

1. DC wire feeder (front head) — is mounted on a telescoping arm, so that electrode spacing from $\frac{5}{8}$ to 5" is attainable. Since the arm is not keyed, the two welding heads can be set to the angle differential desired and then locked into position. The DC wire feeder is mounted in a vertical position and can be raised and lowered independent of the other vertical head lift adjustments. This feature is necessary so that the proper electrical stick-out can be maintained when the trail head push angles are changed.
2. AC wire feeder — is mounted to the telescoping arm housing. The mounting is of the pivot type so that push angle positions from 5° to 20° can be made.

V. Main Frame Assembly

The main frame is a rugged steel tube fabrication which is fastened to the travel carriage base. The frame can be mounted in a vertical, a 30°, or a 45° position. The frame also provides three positions for mounting the lower cross arm to which the front wheel is attached. The lower

cross bar position should be in the corresponding position of the main mast so that all three wheels are in the same plane.

There are five clamping slots cut into the front of the main mast. These slots are used for mounting the upper cross arm and provide the major vertical position changes of the wire feeder mountings and adjusters.

From the top of the main frame is welded the tractor lift bar with a hole at the top to take a crane hook. The control boxes are mounted on this lift bar and can face either to the left or to the right. Each box is clamp-mounted to the control box support bar. The desired direction in which the control box faces can be accomplished by loosening the set of clamps on the bottom of the control box. The unit can be slid off the end of the bar and then rotated 180° and slid back onto the bar and reclamped.

The wire reel mountings are also mounted on the main frame. Insulated wire reel housings are provided for wire containment and protection. Nylon wire guides for each electrode from the reel to the heads are provided to protect the wire from accidental grounding.

VI. Flux Hoppers

The unit has two flux hoppers, each having a 15 pound capacity and individual flux control valves. They are attached to a bracket which is clamped on the upper cross arm and can be mounted either to the right or left of the heads. Both hoppers feed flux into a "Y" connection and thereby discharge through one opening at the arc.

INSTALLATION

I. SET UP FOR DIFFERENT TYPES OF WELDS

Determine the type of weld to be made and arrange the tractor per the following instructions. Throughout these instructions, when right or left is used it is when facing the front of the tractor.

A. Butt Welds

Follow instructions in either section 1 or 2 and then section 3.

1. Tractor configuration for butt welds on **right side** (see Figure 2 for left side butts) of tractor. See Figure 1 and proceed as follows.
 - a. Raise the front wheel support arm of tractor and place a wooden block or blocks (approximately 3⁵/₈ height required) directly under the main mast, so the front wheel will be up off the surface.
 - b. Using the two middle mounting holes, mount the lower cross arm so that the long end extends toward the right side of the tractor.
 - c. Clamp the front wheel support arm on the right side of the lower cross arm.
 - d. Front wheel assembly may be mounted on the right or left side of

the front wheel supporting arm as required. Install the butt weld guide wheels if they are to be used.

- e. The wooden block or blocks can now be removed.
- f. Remove the flux hopper arm assembly from the upper cross arm. Remove the vertical lift and head assembly from the upper cross arm.
- g. Place the upper cross arm into the fourth slot from the bottom and let it extend to the left of the mast by 2.00". Tighten the locking clamp.
- h. Clamp the vertical head lift assembly on the right side of the upper cross bar.
- i. Place the flux hopper support arm, (with the bent portion toward the left) between the vertical lift assembly and the main mast. Tighten the locking clamp. Mount the flux hoppers to the left side of this arm and forward, approximately an inch and a half from the bent arm. When making butt welds inside the right wheel it may be necessary to remove the hopper support arm from the right side of the cross arm and shift it to the left side of cross arm.

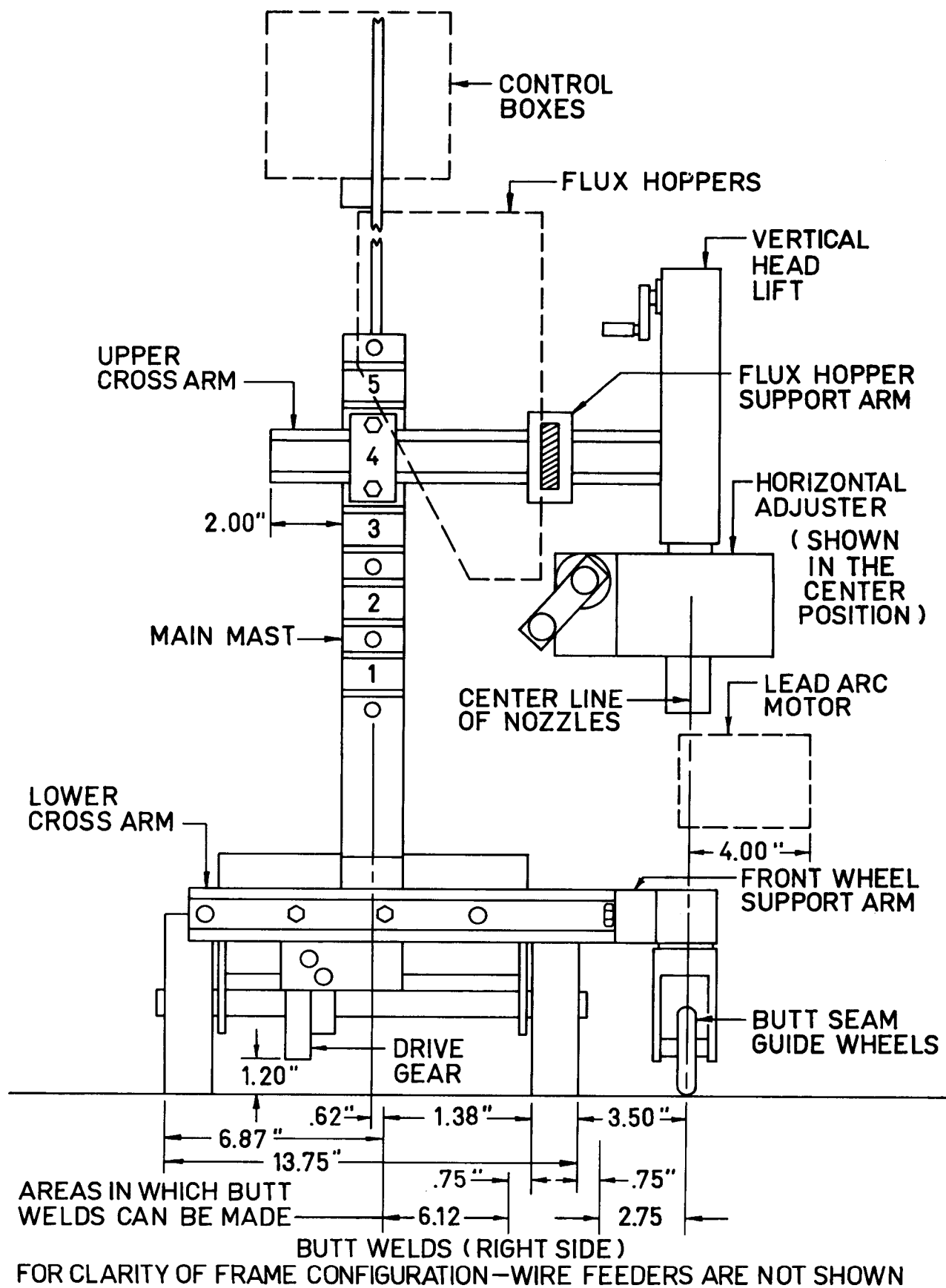
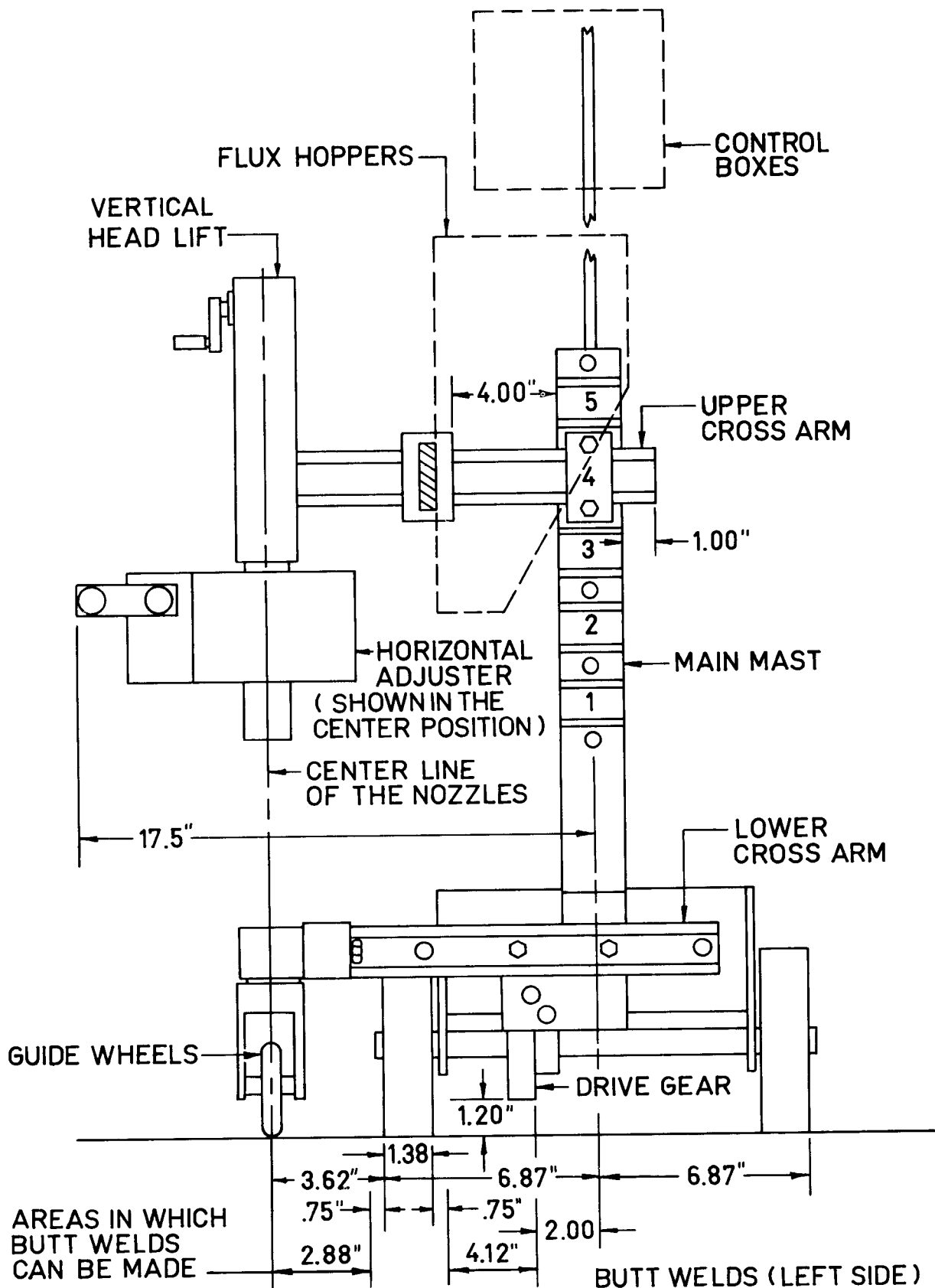


FIGURE 1



FOR CLARITY OF FRAME CONFIGURATION—WIRE FEEDERS ARE NOT SHOWN

FIGURE 2

2. Tractor configuration for butt welds on left side of tractor.

See Figure 2 and proceed as follows.

- a. Raise the front wheel support arm of the tractor and place a wooden block or blocks (approximately $3\frac{3}{8}$ " height required) directly under the main mast, so the front wheel will be up off the surface.
- b. Using the two middle mounting holes, mount the lower cross arm so that the long end of the bar extends toward the left side of the tractor.
- c. Clamp the front wheel support arm on the left side of the lower cross arm.
- d. The front wheel assembly may be mounted to the left or right side of the front wheel supporting arm as required. Install the butt weld guide wheels if they are to be used.
- e. The wooden block or blocks can now be removed.
- f. Remove the flux hopper arm assembly from the upper cross arm. Remove the vertical lift and head assembly from the upper cross arm.
- g. Place the upper cross arm into the fourth slot from the bottom and let it extend to the right of the mast by 1.00 inch.
- h. Clamp the vertical head lift assembly on the left side of the upper cross bar.
- i. Place the flux hopper support arm, (with the bent portion toward the right) between the vertical lift assembly and the main mast. Tighten the locking clamp. Mount the flux hoppers to the right side of this arm and forward on the arm, approximately an inch and a half from the bent arm.

3. General Information

- a. With the tractor set in these configurations the maximum electrical stickout is 2.25 inches (AC head set at a 5° push angle). If longer ESO are desired then the upper cross arm should be positioned into the top notch in the main mast.
- b. Do not make butt welds which are in line with either rear wheel. The life of the rear wheel is increased if the welds are made far enough outside or inside to prevent the tire from becoming too hot.

c. The tractor in Figures 1 and 2 is shown with the K230 seam butt weld guiding rolls in place of the standard front wheel. The tractor is self-guiding when these wheels are being used.

d. When using the standard front wheel, the tractor as it is shipped from the factory, has the front wheel guidance set so that the tractor will follow a straight line. If this position has been moved for other modes of operation it will be necessary to reset the front wheel position. Follow the instructions on the nameplate which is on the front wheel assembly, for the resetting of the front wheel tracking. When properly set, the tractor should travel with only an occasional correction by the operator. This is easily done since the front wheel is spring loaded and will snap back into straight line travel after corrections are made. The position of the standard wheel with respect to the seam to be welded will be different than the seam guiding wheels, since the wheel must be riding on a flat surface. The wheel position can be either to the right or left of the weld.

e. The tractor is shipped with the cable support bracket located on the left side of the tractor as shown in Sketch A. When using tractor for butt welds made between the left wheel and center line of tractor, locate the cable support bracket on right side of the tractor as shown in Sketch B. Two $\frac{3}{8}$ " \times $1\frac{1}{4}$ " bolts, two $\frac{3}{8}$ " nuts and two $\frac{3}{8}$ " lockwashers must be supplied by the user to make this change. This will give greater clearance between the weld and the input cable assembly.

When mounted in either the left or right position, the long side of the L-shaped bracket can be positioned close to the plate or turned over so it is spaced away. See Sketch C.

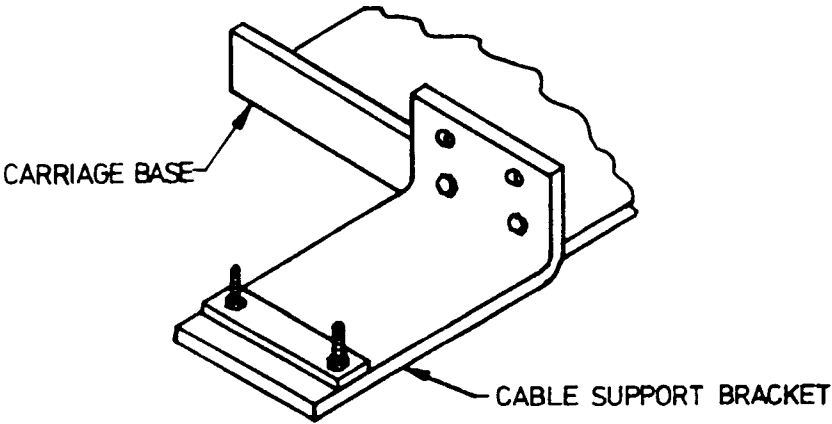
B. Horizontal Fillets or Lap Welds

Follow instructions in section 1 or 2 and then 3. For lap welds also see section 4.

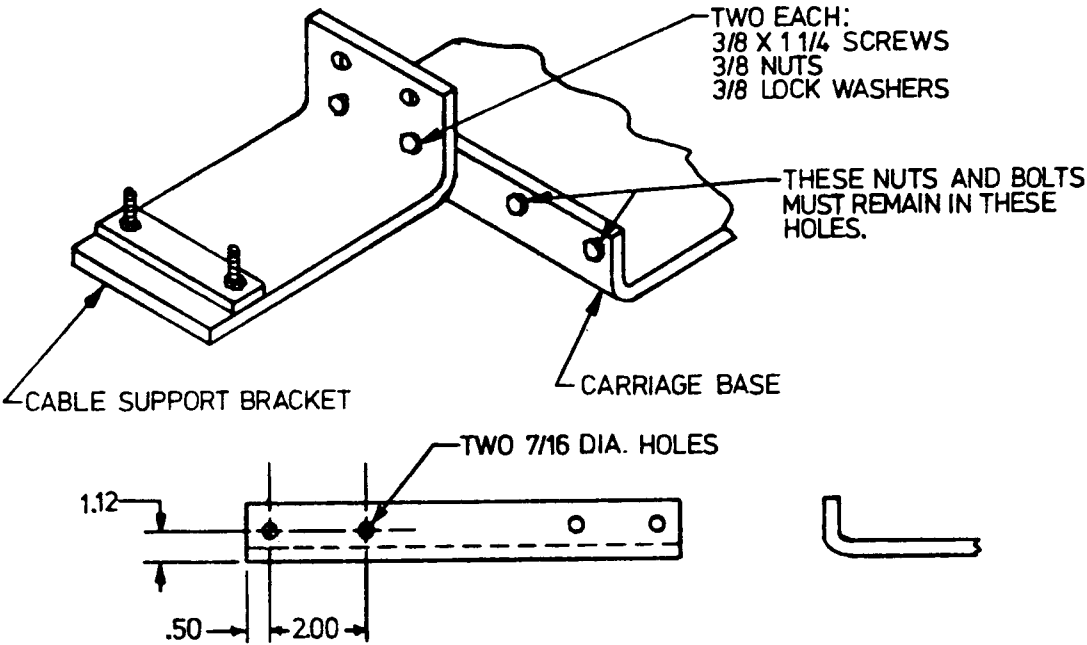
1. Tractor frame configuration for right side horizontal fillets (see section 2 for left side fillets). See Figure 3 and proceed as follows.

- a. Raise the front wheel support arm of the tractor and place a wooden block

SKETCH A

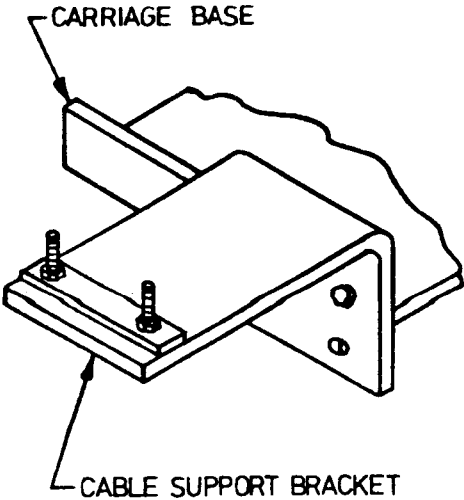


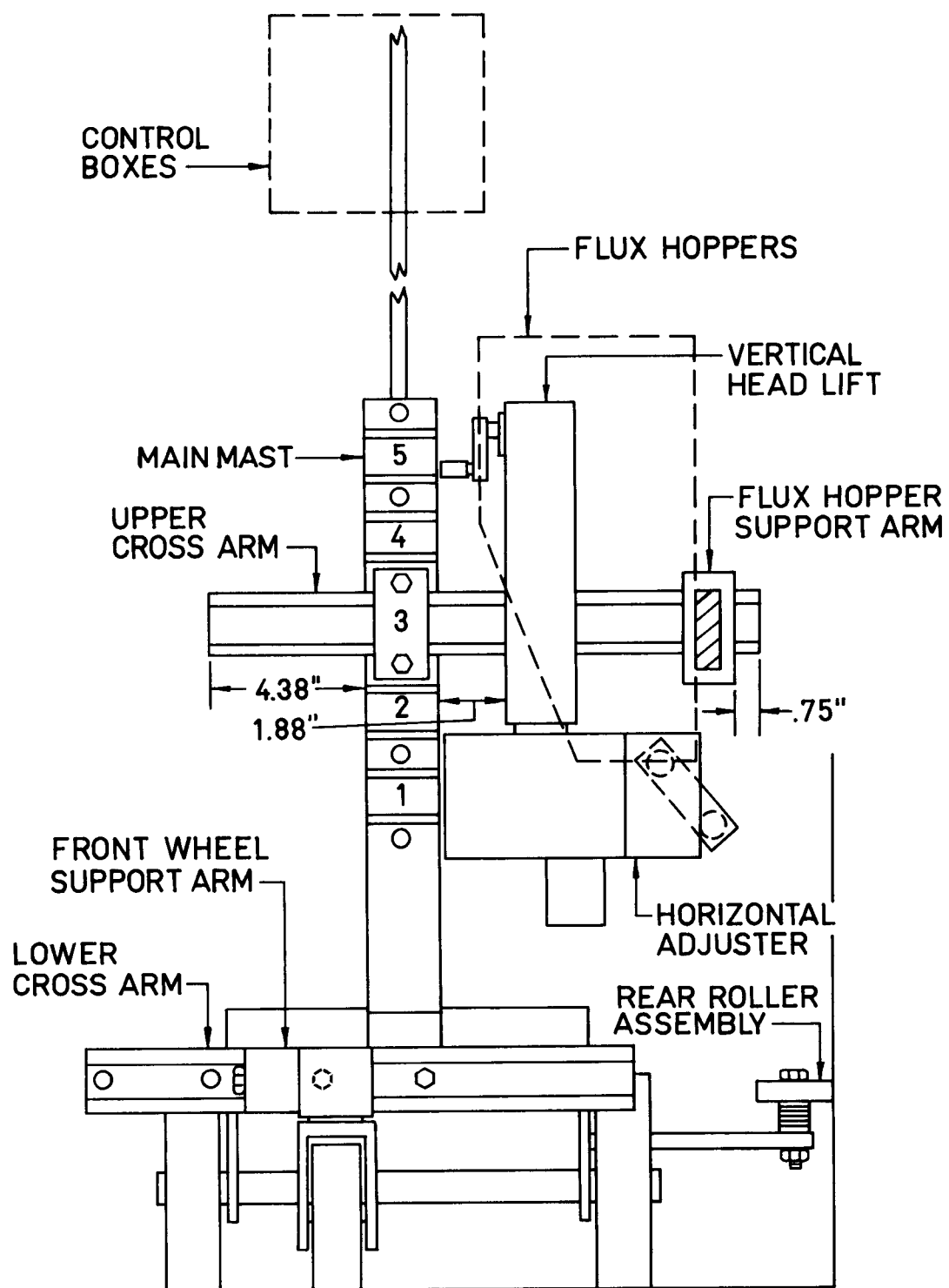
SKETCH B



IF THE TWO HOLES ARE NOT IN THE LEFT SIDE OF THE CARRIAGE BASE,
DRILL TWO 7/16 DIA HOLES AS SHOWN.

SKETCH C



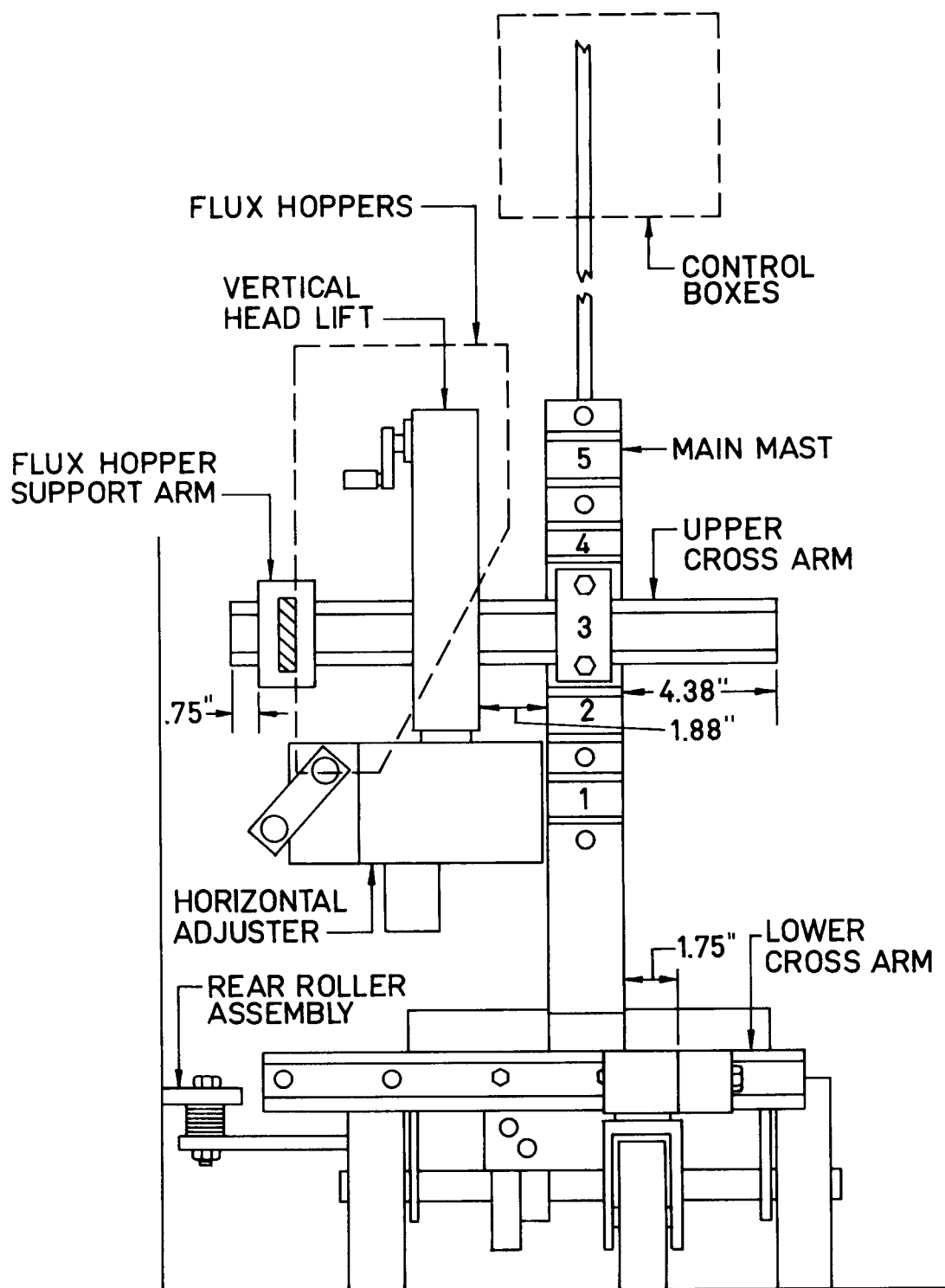


FOR CLARITY OF FRAME CONFIGURATION—
WIRE FEEDERS ARE NOT SHOWN

RIGHT FILLET

FIGURE 3

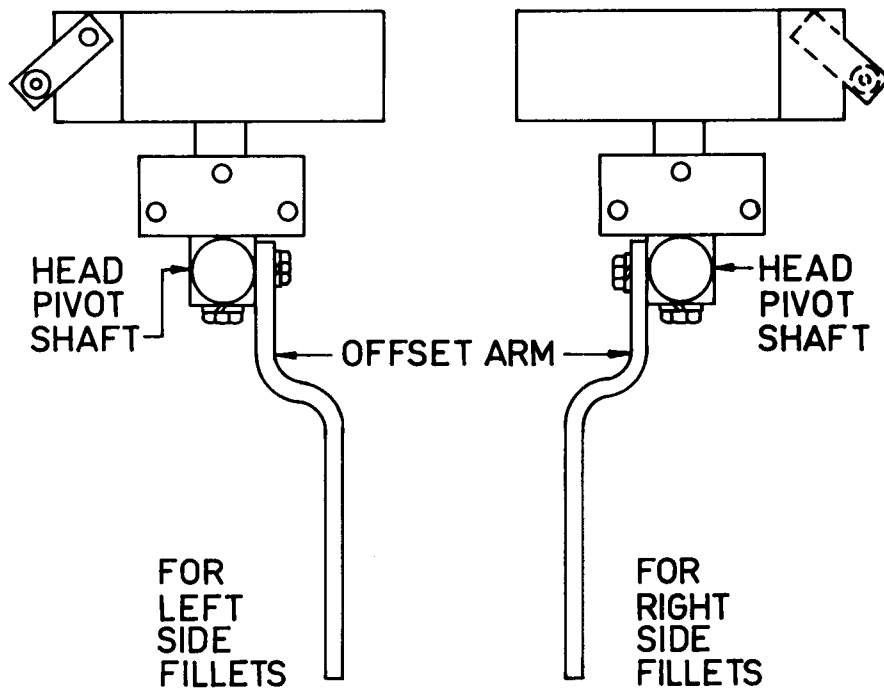
- or blocks (approximately 3.62" in height) directly under the main mast, so the front wheel will be up off the surface.
- b. Mount the lower cross arm to the main mast using the two holes nearest to the center of the cross bar. (See Figure 3).
 - c. Mount the front wheel support arm onto the left side of the lower cross arm, slide it as far to the right as possible and then clamp it securely.
 - d. Mount the front wheel housing and wheel assembly to the right side of the wheel support arm.
 - e. Remove the blocks from under the center mast.
 - f. Remove the flux hopper arm assembly from the upper cross arm. Remove the vertical lift and head assembly from the upper cross arm. Detach the head assembly from the head pivot shaft.
 - g. Mount the upper cross arm into the third slot up from the bottom in the main mast, allowing one end to stick out $4\frac{3}{8}$ inches to the left of the mast. Clamp the bar securely to the mast.
 - h. Mount the vertical head lift and wire feed assembly onto the right side of the upper cross bar at a position $1\frac{7}{8}$ inches away from the main mast. Clamp the assembly securely to the cross arm. Mount the head assembly onto the pivot shaft. Set the heads into the 45° position.
 - i. Mount the flux hopper support arm (with bent arm pointing left) onto the upper cross arm at a distance of $\frac{3}{4}$ of an inch from the right end. Clamp the assembly to the cross bar securely.
 - j. Mount the flux hoppers as shown. They should be forward on the bar (within $1\frac{1}{2}$ inches of the bent end).
 - k. Loosen the large draw bolt nut on the horizontal adjuster and the draw bolt nut on the mounting block below the horizontal adjuster. Rotate the entire housing so that the hand crank is on the back right-hand side of the horizontal adjuster. Make sure the adjuster is parallel with the cross bars, and the head support arm is perpendicular to the cross bar. Tighten both of the draw bolt nuts securely.
1. Position the control boxes so that they face left.
2. Tractor frame configuration for left side horizontal fillets (See Figure 4) and proceed as follows.
 - a. Raise the front wheel support arm of the tractor and place a wooden block or blocks (approximately 3.62" in height) directly under the main mast, so the front wheel will be up off the surface.
 - b. Mount the lower cross arm to the main mast using the two holes nearest to the center of the cross bar.
 - c. Mount the front wheel support arm onto the right side of the lower cross arm at a distance of $1\frac{3}{4}$ inches to the right of the main mast. Tighten the clamp securely.
 - d. Mount the front wheel housing and wheel assembly to the left side of the wheel support arm.
 - e. Remove the blocks from under the center mast.
 - f. Remove the flux hopper arm assembly from the upper cross arm. Remove the vertical lift and head assembly from the upper cross arm. Detach the head assembly from the head pivot shaft.
 - g. Mount the upper cross arm into the third slot up from the bottom in the main mast, allowing one end to stick out 4.38 inches to the right of the mast. Clamp the bar securely to the mast.
 - h. Mount the vertical head lift and the horizontal adjuster assembly onto the upper cross arm at a position $1\frac{7}{8}$ inches to the left of the mast. Clamp the assembly securely to the cross arm. Mount the head assembly onto the head pivot shaft. Set heads into the 45° position.
 - i. Mount the flux hopper support arm (with the bent arm pointing right) onto the upper cross arm at a distance of $\frac{3}{4}$ of an inch from the left end. Clamp the assembly securely.
 - j. Mount the flux hoppers as shown. They should be forward on the bar (within $1\frac{1}{2}$ " of the bent end).



FOR CLARITY OF FRAME CONFIGURATION—
WIRE FEEDERS ARE NOT SHOWN

LEFT FILLET

FIGURE 4



SKETCH D

- k. The position of the horizontal adjuster should be as shown with the hand crank to the left and to the front side of the unit. If this is not the case, loosen the large draw bolt nut on the horizontal adjuster and the draw bolt nut on the mounting block below the horizontal adjuster. Rotate the adjuster 180° to the correct position. Make sure the adjuster is parallel with the cross bars, and the head support arm is perpendicular to the cross bar. Tighten both the draw bolt nuts securely.
- l. Position the control boxes so that they face to the right.
3. K288 Horizontal Fillet and Lap Welding Kit (Installation).

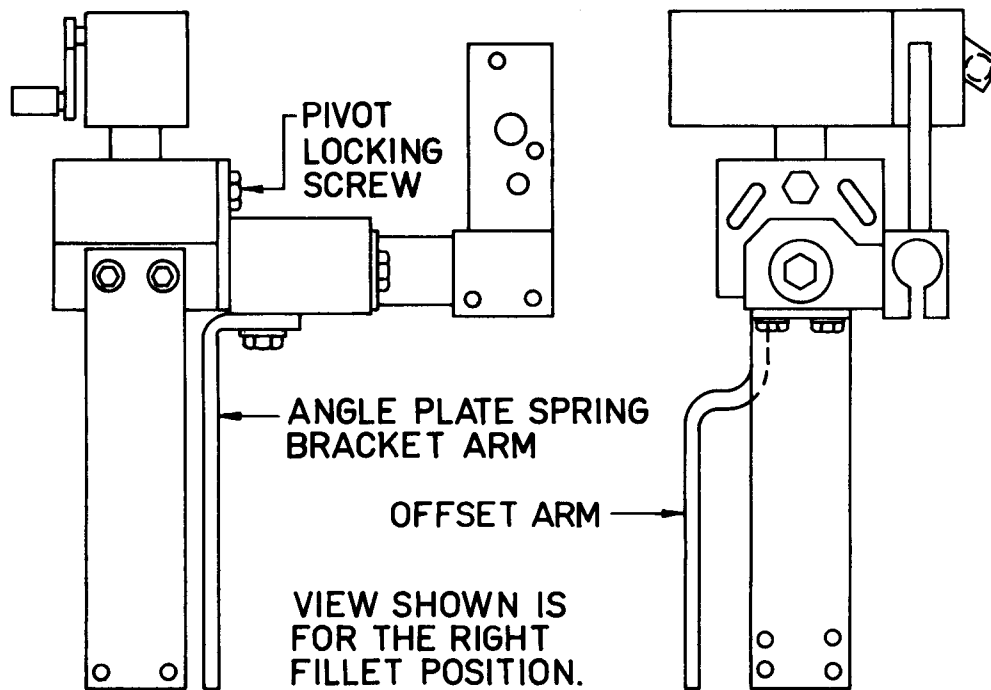
The kit consists of the following items:

- Fillet wheel yoke for 90° horizontal fillet welds
- Lap wheel yoke assembly for the lap welding
- A telescoping arm which fastens to the lead arc head and supports either of the above yoke assemblies

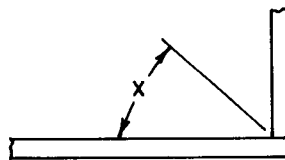
- A set of brackets and a spring
- A rear roller guide assembly
- A set of flux hoses

After setting the tractor into the frame configuration required per section 1 or 2, install the kit components as follows.

- a. Install the offset arm spring bracket arm to the head pivot shaft bar per sketch using the two $\frac{1}{4}$ -20 \times .75 hex head screws and lockwashers. (See Sketch D.)
- b. Mount the angle plate spring bracket arm to the bottom of the head pivot housing using the two $\frac{1}{4}$ -20 \times .50 long hex head screws and lockwashers. (See Sketch E.)
- c. Remove the pivot locking screw, swing the head assembly so that the nozzles are pointing towards the fillet to be welded. Determine what electrode angle (X) the procedure dictates. (See Sketch F.) Engage one end of the spring into the hole at the bottom end of the offset arm. Engage the other end of the spring into the lower hole of the angle plate arm for elec-

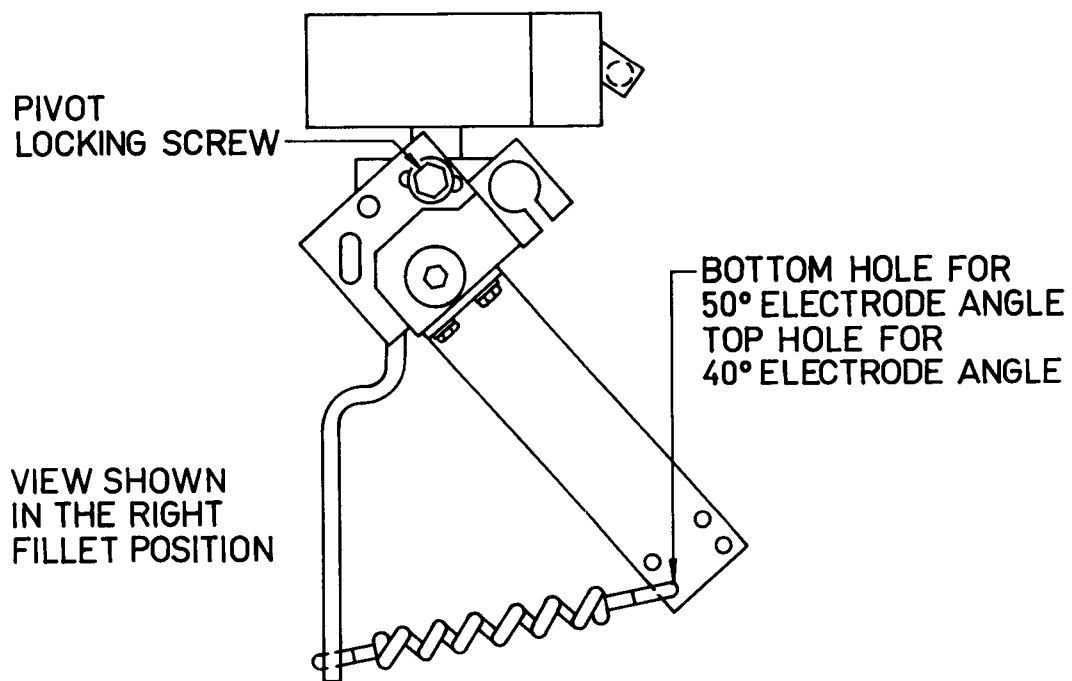


SKETCH E

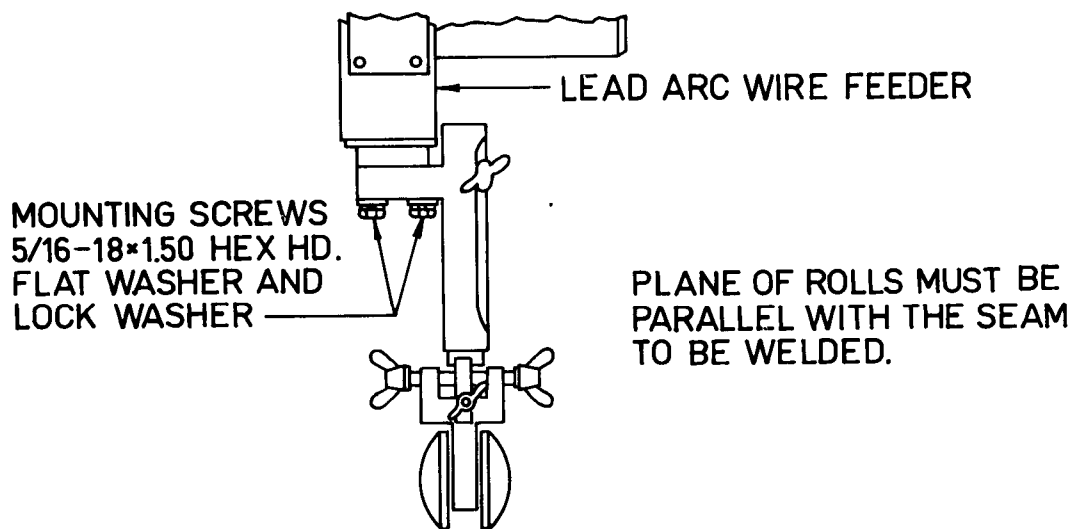


SKETCH F

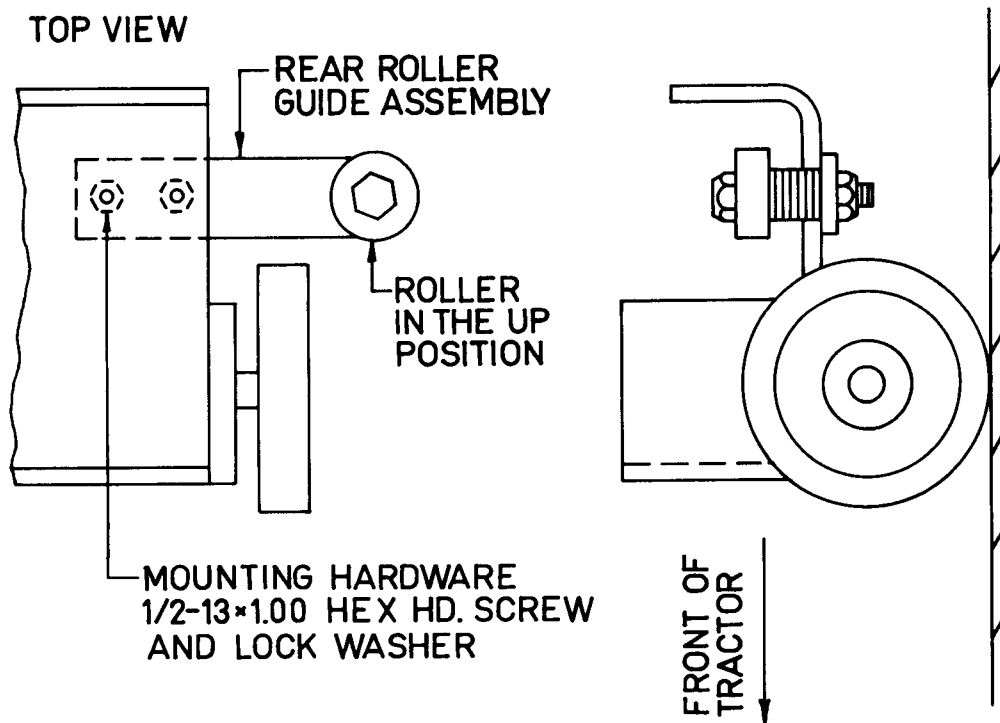
- trode angle of 50° . For electrode angle of 40° place the end of spring into the upper hole (see Sketch G.) Continue to swing the head assembly until the spring is under tension. Insert the pivot locking screw removed previously into the slot. Set the head position to the correct angle per the procedure and then temporarily tighten the pivot locking screw.
- d. Mount the fillet guide wheel telescoping arm to the bottom of the lead arc head (with the hardware supplied). The wing screws should be loosened and the arm made as short as possible. Correct length will be set later. (See Sketch H.)
 - e. Install the rear roller guide assembly to the bottom of the travel drive carriage frame. It should extend to right from the frame for right side fillets, and from the left side of the frame for left fillets. The mounting holes are just slightly behind the large driving wheels. The arm should be mounted so the guide roller is on the top side. (See Sketch I.)
 - f. Loosen the two screws in the lead arc clamping block which lock the back and forth movement of the lead arc head and move the head assembly forward several inches. Temporarily re-tighten one of the screws. Loosen the two hex head screws which mount the



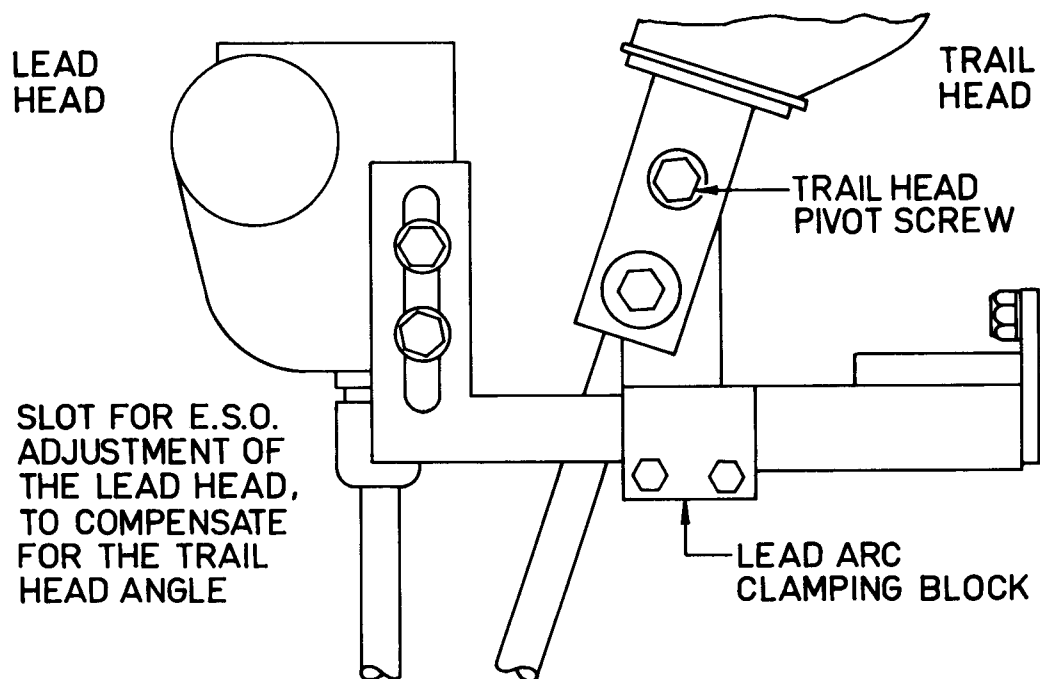
SKETCH G



SKETCH H



SKETCH I



SKETCH J

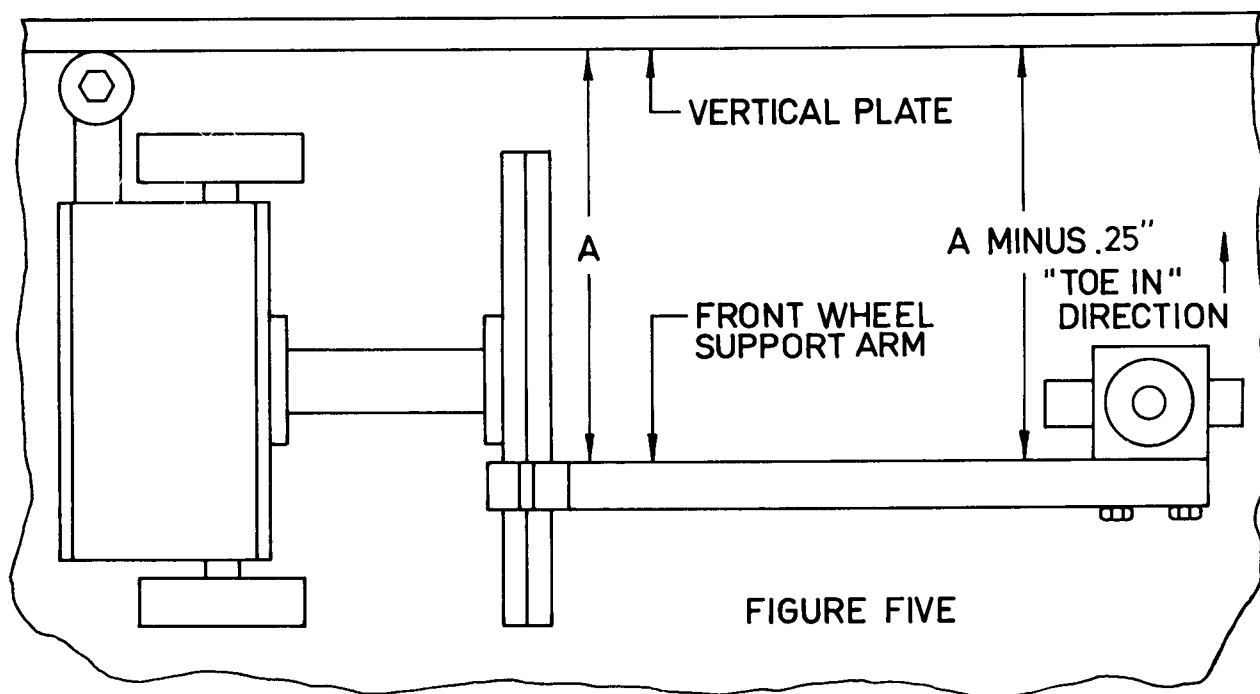


FIGURE 5

trail arc head; this will allow the head to pivot on the top screw. Tilt the head to the proper push angle as specified in the procedures and retighten the two locking screws. (See Sketch J.)

- g. Set the tractor into the welding position with the rear guide roller up against the vertical member to be welded (see Figure 5).

Toe the entire frame into the vertical plate approximately $\frac{1}{2}^{\circ}$ - 1° . To do this, set the rear roller against the plate. Measure the distance to the front wheel support arm at the two positions shown. Shift the front until the measurement at the front end is .25 of an inch less than that at the rear position. Front wheel should be adjusted so that it also toes into the vertical plate slightly.

- h. Loosen the large hex draw bolt locking nut which is **below** the horizontal adjuster, swing the head mounting boom so that it is parallel to the vertical member to be welded. Retighten the locking nut. (This is to compensate for the above $\frac{1}{2}^{\circ}$ - 1° setting of the tractor frame.)

- i. Adjust the vertical head lift and the horizontal adjuster until the end of the contact tip is so located with respect to the seam to give the correct electrical stickout on the trail arc head.
- j. Adjust the lead arc head for proper electrical stickout, electrode spacing, and electrode alignment. Lock the position securely.
- k. Loosen the thumb screw which is on the telescoping arm of the fillet guide roll attachment; this will allow the rollers to come down and rest in the corner to be welded. Tighten the thumb screw when the wheels are down in position.
- l. Loosen the head pivot locking screw; this will allow the head mounting arm to be free to pivot, and with the spring tension applied to this arm the fillet guide wheel will be pushed down against the plate. It is important that this action is functioning properly for accurate following of the seam.

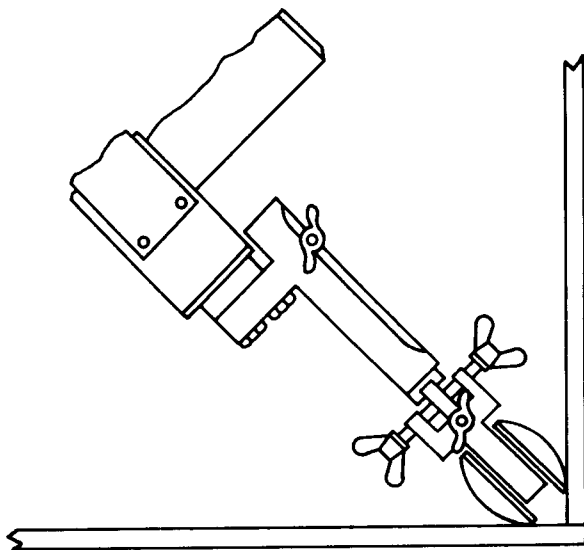
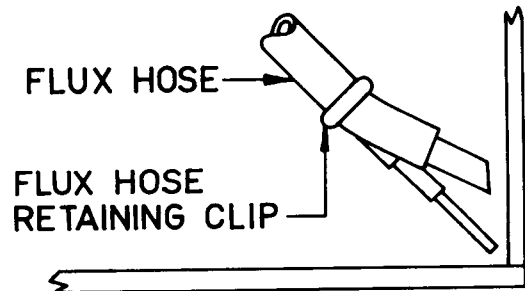
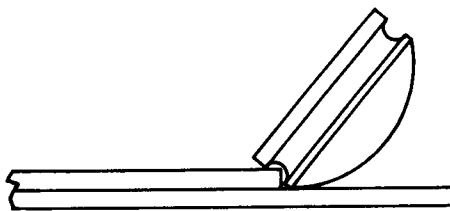


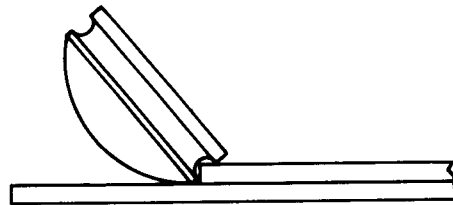
FIGURE 6



SKETCH K



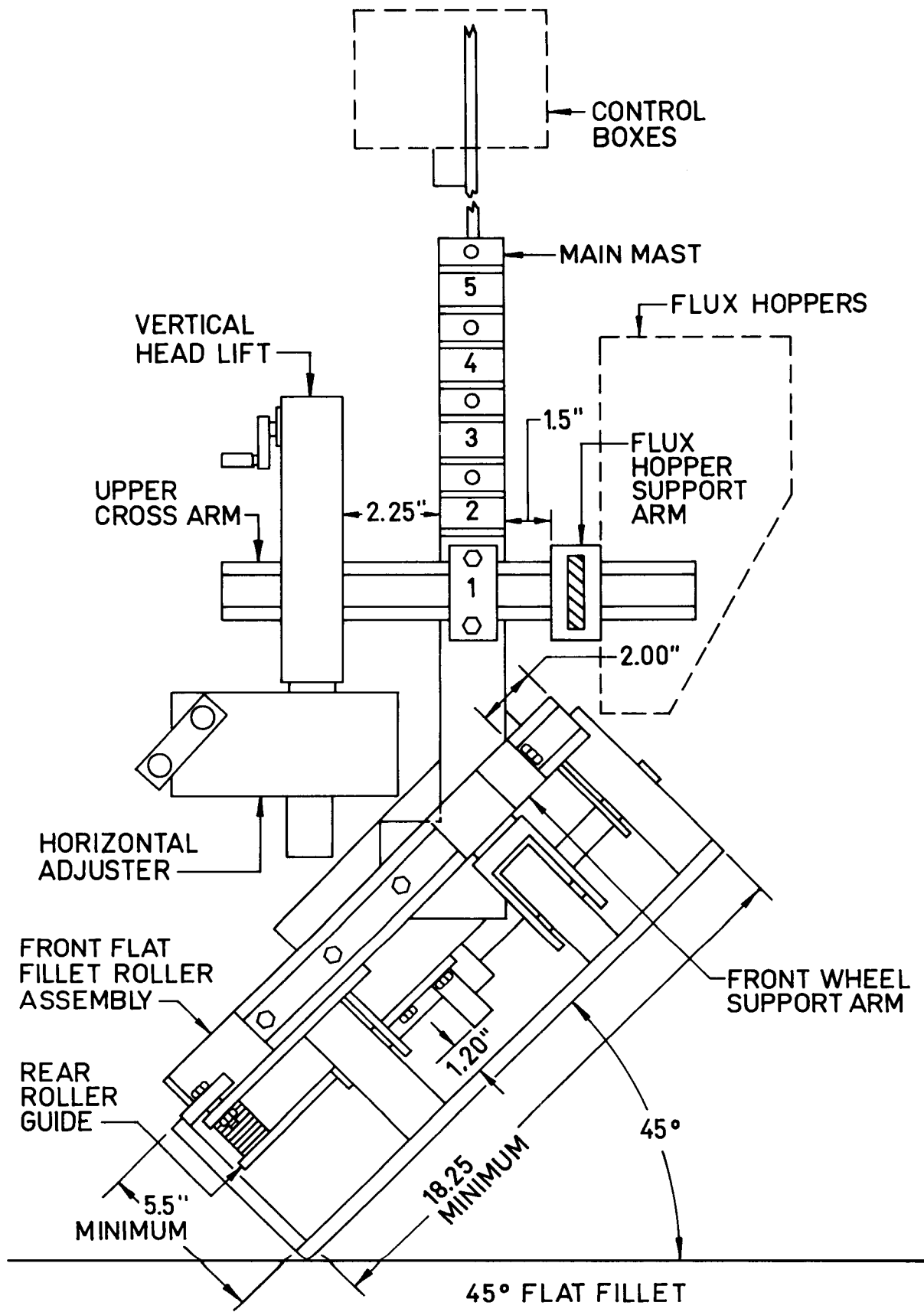
LEFT LAPS



RIGHT LAPS

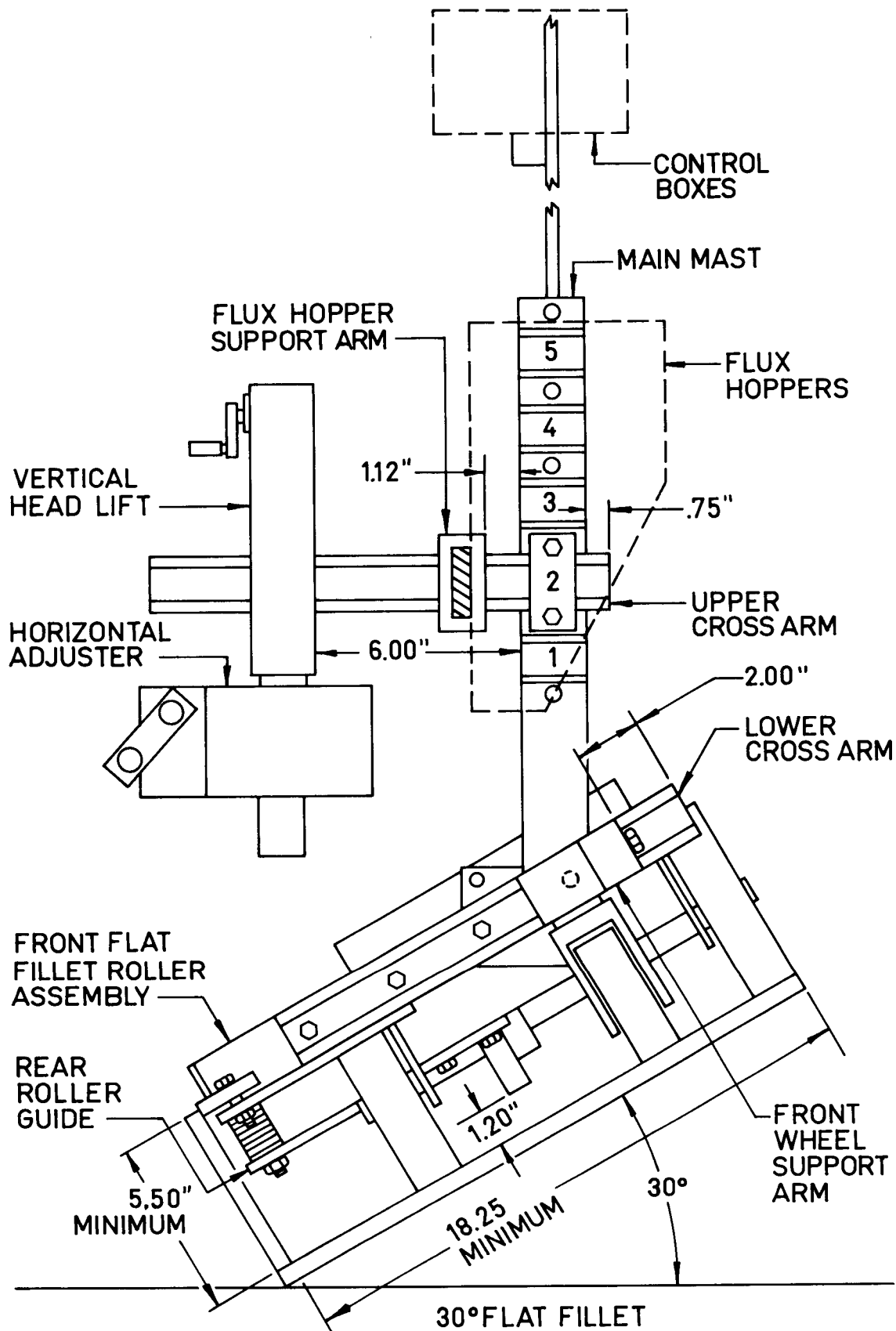
SKETCH L

- m. The thumb screws on either side of the pivot are adjustments to accurately position the electrode with respect to the seam. When making this adjustment, one of the screws has to be loosened and the other one tightened. After the electrode has been positioned, lock both screws. (See Figure 6.)
 - n. Set the flux hose retaining clip on the front nozzle in such a manner to allow the flux to be discharged ahead of the lead arc and up against the vertical member. (See Sketch K.)
4. Lap Welds (K288 Kit)
- The tractor configurations and head adjustments are the same as for the fillet welds. There are only two minor changes to be made.
- a. The fillet wheel yoke must be changed to the lap wheel yoke. Remove the fillet wheel yoke by removing the pivot screw. Slide the assembly out of the slot. Put the lap wheel yoke into the slot and replace the pivot screw. The correct position of the grooved roller is shown in Sketch L.
 - b. Since there is no vertical member for the rear roller guide wheel to ride against, the position of the O.D. of this roller should be directly above the lap weld. It is important that the tractor frame and front wheel angle is set approximately 2° so that it will always crowd the unit toward the joint, thus insuring good pressure on the guide wheels at all times.



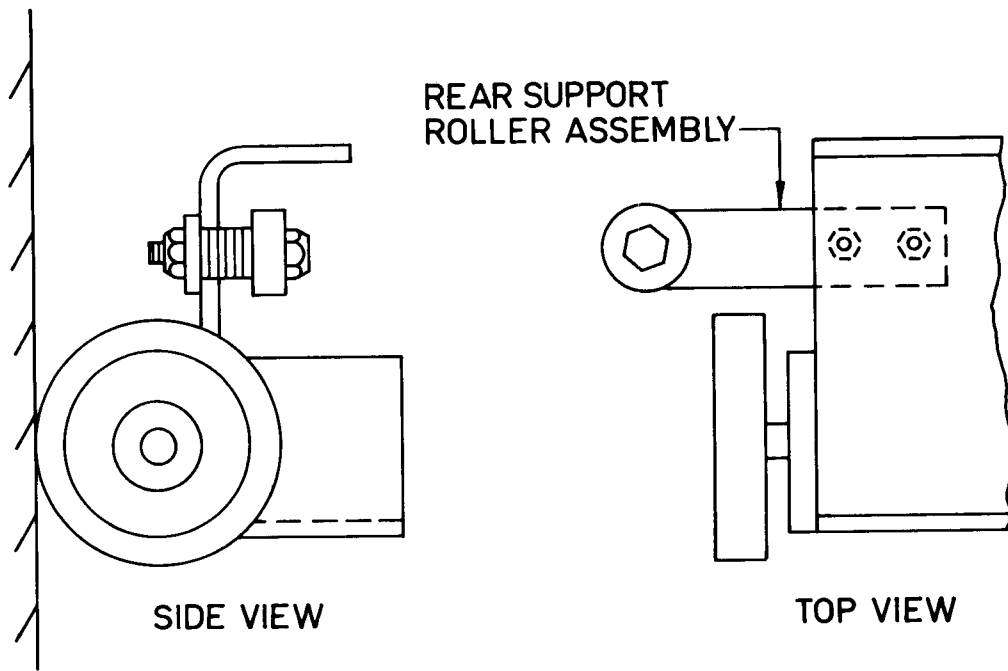
FOR DRAWING CLARITY WIRE FEEDERS ARE NOT SHOWN

FIGURE 7



FOR DRAWING CLARITY WIRE FEEDERS ARE NOT SHOWN

FIGURE 8



SKETCH M

C. Flat Fillets (K287 Kit)

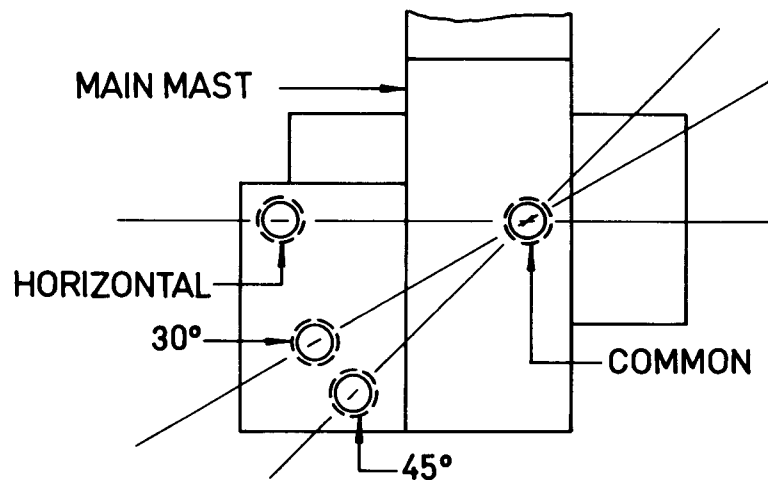
Tractor configuration for 30° and 45° flat fillets. See Figure 7 for 45° and proceed as follows.

The tractor setup as shown in Figures 7 and 8 is not a self standing unit on a flat surface and therefore it must be placed into a "parking platform" or into the weld structure that is going to be welded.

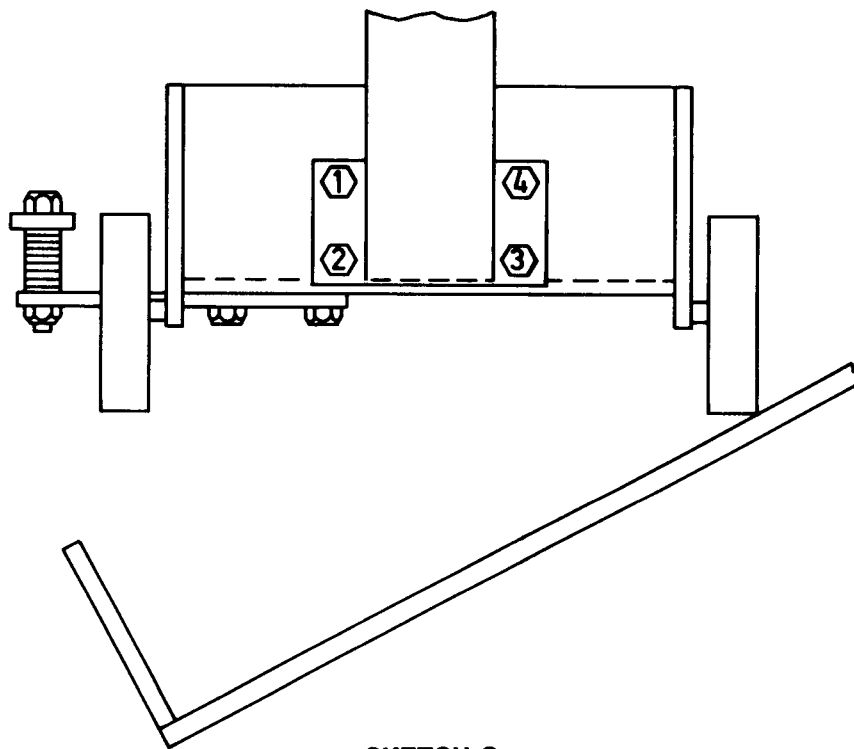
When converting the tractor into either the 30° or the 45° flat position it is advisable to have an overhead hoist or jib crane above the unit.

1. Remove the flux hopper arm assembly from the upper cross bar.
2. Remove wire reels from the tractor.
3. Unplug the wire feed motors from their respective control boxes. Disconnect the electrode leads at each of the nozzle flags.
4. As a unit, remove the vertical head lift, the cross seam adjuster and the two wire feeders. Loosen the clamp which fastens the vertical head lift to the upper cross arm and then slide the entire assembly off the end of the cross bar.
5. With the aid of the hoist, lift the tractor by its lift bale.

- a. Remove the front wheel mounting arm from the lower cross bar. The front wheel can remain attached to the arm.
- b. Install the rear support roller assembly (part of the flat fillet kit) to the bottom of the travel unit frame with the two $\frac{1}{2} \times 13 \times 1.00$ hex head screws and lockwasher. The roller should be on the top side of the arm as shown in Sketch M.
- c. Remove the lower cross arm from the tractor frame. Remount the bar (at the desired angle) so that all the holes are to the left side, use the third and fourth hole from the left end to mount the bar. There are three mounting positions on the main mast — (1) horizontal, (2) 30° position, and (3) 45° position. (See Sketch N.)
- d. Install the front flat fillet roller assembly (part of the flat fillet kit) to the left end of the lower cross bar. See Figure 7 or 8 for proper installation.
- e. Install the front wheel and arm assembly to the lower cross arm at a distance of 2.00 inches from the right end of the bar. The front wheel and steering housing should be bolted to the left side of the support arm.

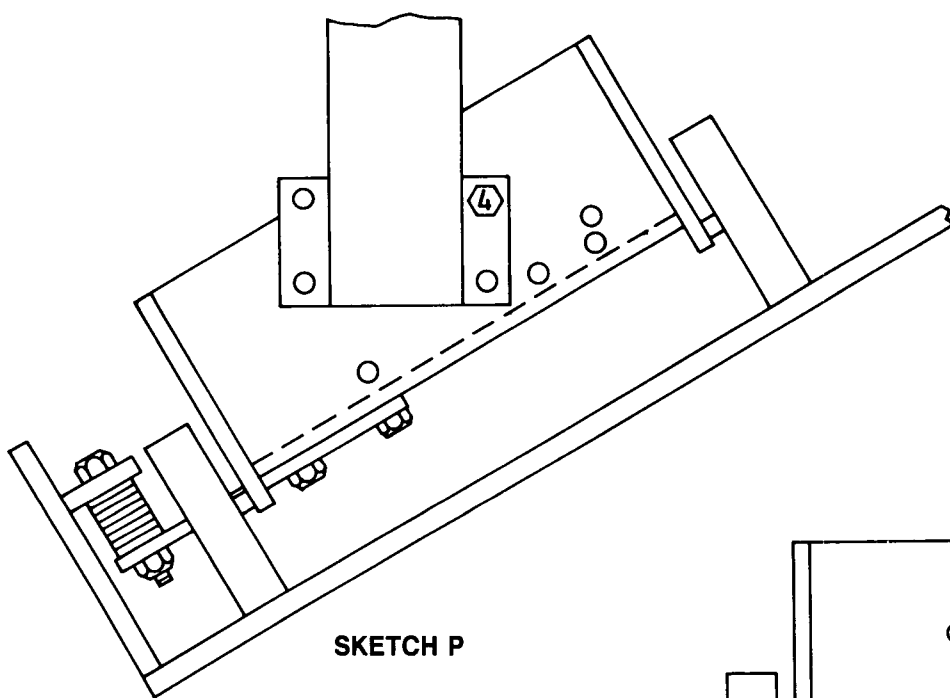


SKETCH N

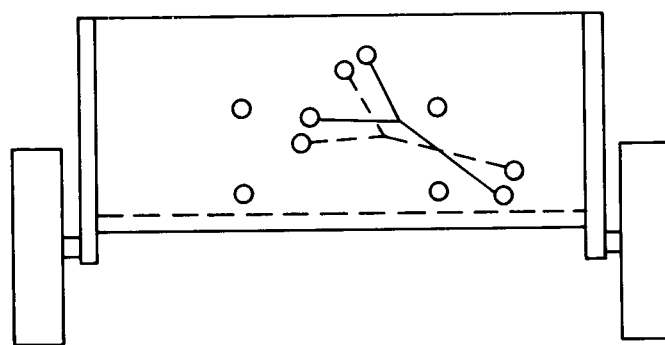


SKETCH O

6. Lower the unit into the “angular parking platform” or into flat fillet segment to be welded. Lower the unit until the right rear wheel of the travel carriage touches the 30° or 45° inclined plane. (This will normally be the widest plate of the plates being welded.)
 - a. Remove three of the four ½” screws which mount the mast to the carriage frame. (See Sketch O.) Remove screws numbered 1, 2, and 3.
 - b. **Carefully** loosen the fourth screw; this will allow the travel carriage to pivot



SKETCH P



SKETCH Q

and come to rest on the inclined plane so that both wheels are now supporting the carriage frame. Remove the screw. (See Sketch P.)

7. On the front of the drive carriage mounting surface there are three sets of mounting holes. One set for the 90° position (four holes); one set of three holes for 30° position (shown connected by the dotted line); and one set of three holes for the 45° position (shown connected by the solid line). (See Sketch Q.)

Move the main mast into position and fasten it to the drive carriage frame using the proper set of holes for the mode of operation desired. Use three of the screws taken out in Step 6; the fourth screw can be put into one of the unused holes so that it does not get lost.

8. Remove the hoist from the lift bale; the tractor should be self supporting at this stage.
9. Remount the upper cross arm and the complete heads and head mounting assembly.

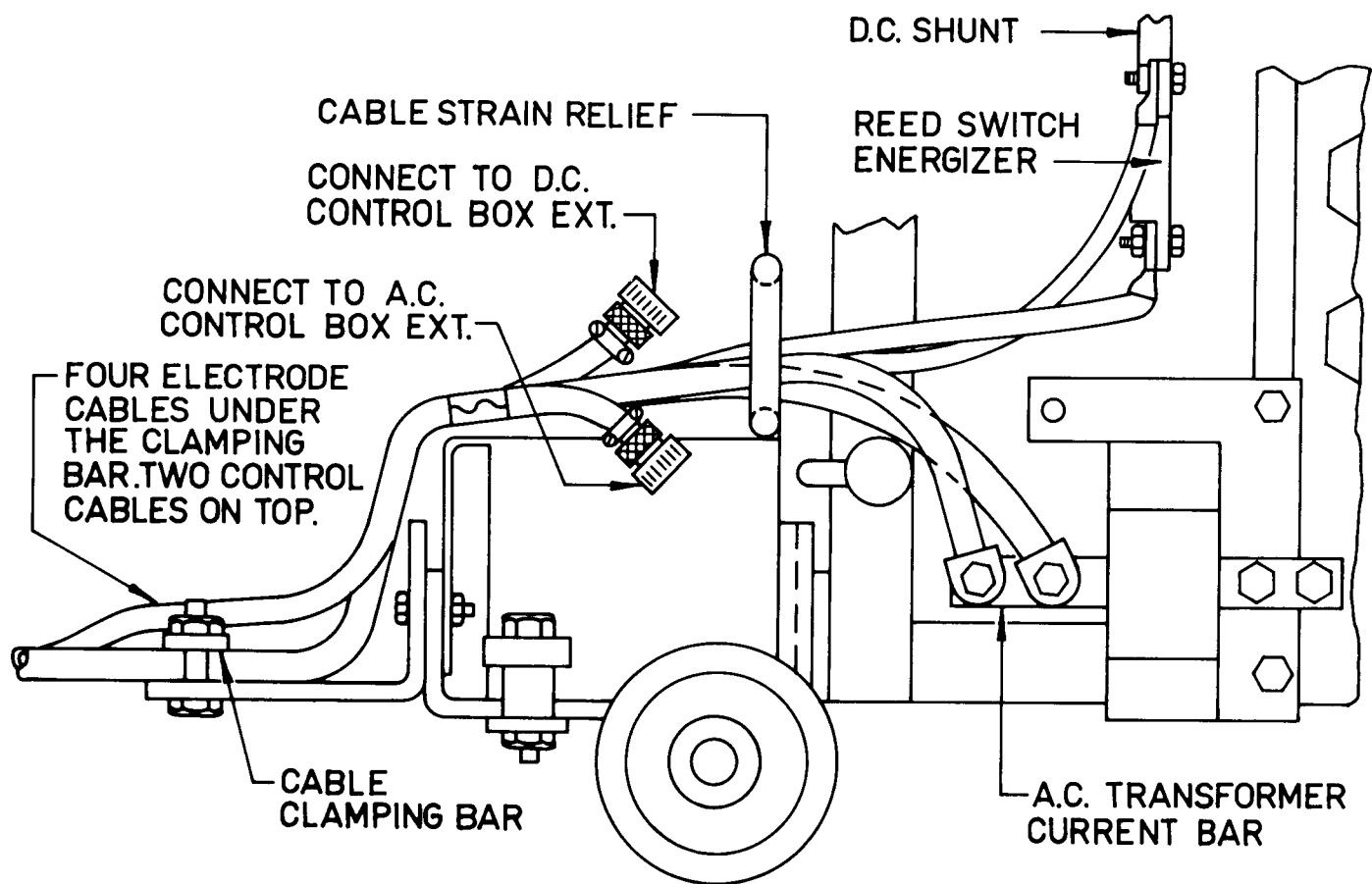
- a. **30° mode of operation.** See Figure 8 for the proper positioning of the upper cross arm, vertical head lift, and the flux hopper support arm.

With the upper cross arm in the No. 2 slot of the mast the maximum electrical stickout is 3.5 inches. If longer stickouts are desired the upper cross should be shifted to the No. 3 slot in the mast.

- b. **45° mode of operation.** See Figure 7 for proper component positions.

With the upper cross arm in the No. 1 slot of the mast the maximum electrical stickout is 3.00 inches. For longer stickout move the upper cross arm into the No. 2 slot.

10. Control boxes should face to the left or toward the short leg of the weldment.
11. Plug in both the wire feeders and reconnect the electrode cables to the nozzles.
12. Set the heads for their proper stickouts, spacing, and electrode angles which are dictated by the procedure.



SKETCH R

II. INPUT CABLE INSTALLATION INSTRUCTIONS

A. Connection to the Power Source.

DC Head and Controls — See appropriate connection diagrams for power source.

AC Head and Control — See appropriate connection diagrams for power source.

B. Input Control Cable and Electrode Cable Connection to Tractor

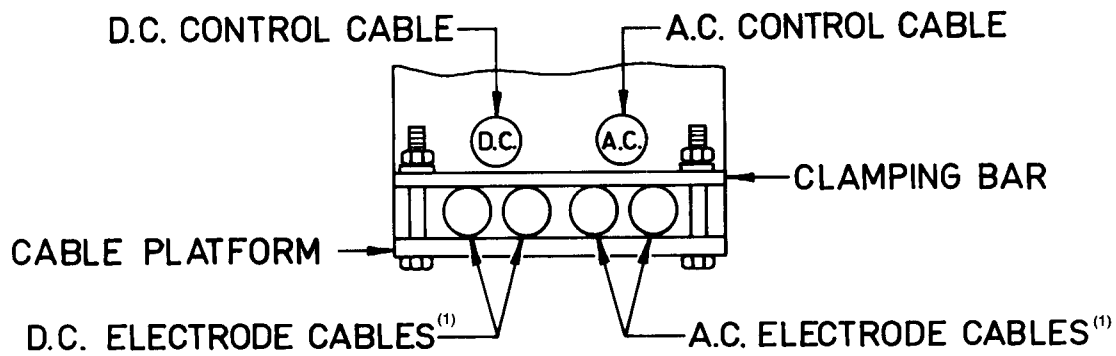
NOTE: AC welding current through the AC electrode cables can induce undesirable voltages into the control cable leads when bundled together. To avoid this problem, the control cables of **both** K215 cable assemblies must be separated from the electrode cable leads, then routed from the power sources to the tractor in a bundle separated by at least 2 feet from the electrode cable bundle.

Care must be taken to be certain the cables connected to the DC power source are connected to the DC shunt and DC control box on the tractor.

1. Remove the cable clamping bar from the rear cable support platform. (See Sketch

R.) **NOTE:** Cable support bracket can have alternate positions for making butt welds. See Section I.A.3.e.

2. Starting with the DC input cables, feed the two electrode cables through the strain relief eyelet. Fasten one cable to each side of the reed switch energizer bar (lower flag). Make sure to clamp the flat side of the electrode cable lug against the conductor bar in each case. Tighten the bolt securely. For high current procedures, the additional electrode cables should be connected to the upper reed switch energizer flag.
3. Plug the DC control cable connector into the receptacle from the DC control box. Tighten the collar by hand securely, making sure that the plug is fully inserted.
4. Pass the two AC electrode cables through the strain relief eyelet. Fasten one cable to each side of the AC transformer current bar (see Sketch R.) Here again, make sure that the flat side of the lug is against the bar in each case. Tighten the bolt securely.







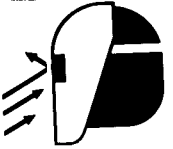
⁽¹⁾ When more than four electrode cables are being used, clamp two each of the AC and DC system as shown. All other electrode leads will be above the clamping bar and securely taped to the other cables.

SKETCH S

- For high current procedures, the additional electrode cables should be connected to the second mounting hole on the AC current bar.
5. Plug the AC control cable connector into the receptacle from the AC control box. Tighten the collar securely by hand, making sure that the plug is fully inserted.

6. Bend the cable assemblies so that they conform to the rear support; allow a couple of inches of slack cable at the top bend. Slide the cable clamping bar under both the AC and DC control cables and over the four electrode cables (see Sketch S.) Tighten the clamping bar to secure the four electrode cables. Do not over-tighten.

OPERATION

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

I. POWER SOURCE SETTINGS

A. At the DC power source

Machine settings at the DC power source: (use information that is applicable to the type equipment installed).

DC-1500 or DC-1000

- Set the toggle switch into the CC submerged arc position. (LT-56 tractor is shipped with its "mode" switch in the "CC" position.)
- Set the output control switch into the "remote" position.
- Set the "Electrode Polarity Switch" to the same polarity as the electrode cable connection.

B. At the AC power source

- Set the toggle switch into the "remote" position.
- Connect the AC electrode cable to the output studs of the desired current range.

C. At the LT-56

- On each of the control boxes, turn the power "on-off" switch to the "on" position.
- Loading the electrode.

- Load the reels with the proper size electrode; one reel must be loaded for clockwise dereeling and the other for counter-clockwise dereeling.

NOTE: Cut and remove electrode tie wires in such a fashion as to cut the tie wire which holds the start end of the coil last, while holding the starting end of the coil. This will prevent wire "crossovers" and wire "tangling". Anchor the start end of the coil in one of the wire cover holes.

- Slip the reel which has the CCW coil onto the wire reel shaft on the right side of the tractor. Slip the other reel on the left side. Carefully secure the reels to their respective shafts with the flat washer and cotter pin provided.
- Thread the start end of each wire through the reel take-off arm and through the nylon wire guides.
- Straighten each wire end for approximately a foot; feed the wire down through the wire straightener, until the end touches the drive rolls. (Either reel can be fed to either head.)
- Press the inch button and feed the wire through the nozzle which has been equipped with the proper size tip.
- Inch the electrode through the system and set the wire straightener so that the wire coming out of the nozzle tip has a slight bow in it (approximately bow $\frac{1}{8}$ to $\frac{1}{4}$ " in a 12" length). This insures good contact and longer tip life.

3. Locate the tractor at the weld starting point, and fill both flux hoppers.
4. Fully engage the travel clutch. (A slight forward movement of the tractor during the clutch engagement will ease the meshing of the drive gears.)
5. Make travel control box settings.
 - a. Set the travel mode switch to "automatic".
 - b. Set the travel switch to "forward".
 - c. Set the rheostat dial to desired inches per minute.
6. DC and AC control box settings (for $\frac{5}{32}$ or $\frac{3}{16}$ wire).
 - a. DC — Set current rheostat to Number 6 position; Set voltage rheostat to Number 7 position.
 - b. AC — Set current rheostat to Number 5 position; Set voltage rheostat to Number 7 position.

The above positions are approximate settings. Adjust controls to desired values after arc has been established.

7. Check that no part of the LT-56 gear boxes, nozzles, electrode wire reel, or cable terminals are touching any other part of the LT-56 frame. If so, undesired grounding will take place. Both the DC and the AC control boxes are equipped with a grounding lead protector to protect the tractor grounding lead should it carry welding current. This can occur if either of the wire feeders or either of the electrodes come in contact with the tractor frame. When this occurs, the grounding lead protector of the faulted unit will trip and that unit will shut down. If the DC unit shuts down, the travel will also stop. In the event of a shutdown of one unit of the LT-56 tractor, the stop button of the other unit should be pushed. The shut down unit **cannot** be restarted until the fault is cleared and the grounding lead protector circuit is reset as described below.
 - a. Clear fault by eliminating source to frame.
 - b. Turn the "control power" of the faulted unit to the "off" position and then back to the "on" position.
 - c. The unit is now ready for operation.
8. Weld starting mode. (Cut the electrode to a sharp point for best starts.)

a. Cold Start

1. Inch electrode down until it touches the work and then stops. (Work contact area must be clean.)
2. Weld bead will start at the contact point.

b. Hot Start

1. Do not inch the electrode all the way down.
2. Weld bead will start a little beyond initial location.
9. Open the flux valves and allow the flux to flow. Cover the arc start area.
10. Push the DC start button. After the DC arc has been established and the travel has started, press the AC start button. (If the DC meter polarity is wrong, push the stop buttons. Tractors, as shipped from the factory, are connected for positive polarity. Recheck all electrode lead connections and polarity switches at the power source. If they are correct, shut power sources off and then reverse the leads at the DC meter terminals.) Adjust the current and voltage controls on each box to the desired values.
11. Adjust the flux flow valve so that the flux covering the arc is light enough to permit slight arcing to break through the top of the flux pile.
12. During the welding operation, the input cables should be moved along with the tractor so that the unit is not pulling more than 10 to 15 foot of the cable assemblies. **The control cable bundle (two cables) should be kept away from the electrode bundle by at least 2 feet.** This will prevent stray voltage pickup and erroneous meter readings.
13. At the end of the weld, push both stop buttons and the weld will stop and the electrodes will burn back.
14. Shut the flux valves off.

MAINTENANCE INSTRUCTIONS

WIRE FEED MOTORS AND GEAR BOXES

Once a year, recoat all the gear teeth with a non-fluid moly grease, such as a "Non Fluid Oil Corp.", lubricant A29 Special/MS. Check the motor brushes every six months. Replace the brushes if they are less than 1/4" long. For high usage applications, check the motor brushes more often.

WIRE DRIVE ROLLS

Check the sharpness of the driving teeth on the drive rolls periodically. When the rolls no longer put indentations into the wire surface, it is time to reverse them. Each drive roll has two driving surfaces so that maximum life can be obtained from each roll. After both sets of teeth are worn, then replace the set. The wire guide tubes should be periodically inspected for signs of milling in which case they should be rotated or replaced.

CONTROL BOXES

Every three months, inspect and blow out the control boxes with "dry" low pressure air. No other maintenance is required.

WIRE STRAIGHTENER

The top slide bushing and the incoming guide should be inspected periodically for signs of milling. The slide bushing can be reversed. Remove the cross adjustment screw, flip the slide bushing over and reassemble the adjustment screw. Add a drop of machine oil to each of the adjustment screw threads.

VERTICAL HEAD LIFT

Periodically add several drops of SAE 90 grade oil into the oil cup which is on the back side of the vertical adjuster.

HORIZONTAL ADJUSTER

Once a year, recoat the acme screw thread and the slide ways with a good grade of grease.

WIRE REEL MOUNTING

To prolong the life of the wire reel shafts, periodically coat them with a thin layer of grease.

TRAVEL DRIVE GEARS

Periodically blow the gear surfaces clean, relube the intermediate gear shaft and all gear surfaces with a dry lubricant such as a moly-disulfide powder (Lincoln E1281).

TRAVEL MOTOR — GEAR BOX

Check the brushes periodically and replace them when 3/16 of an inch or shorter.

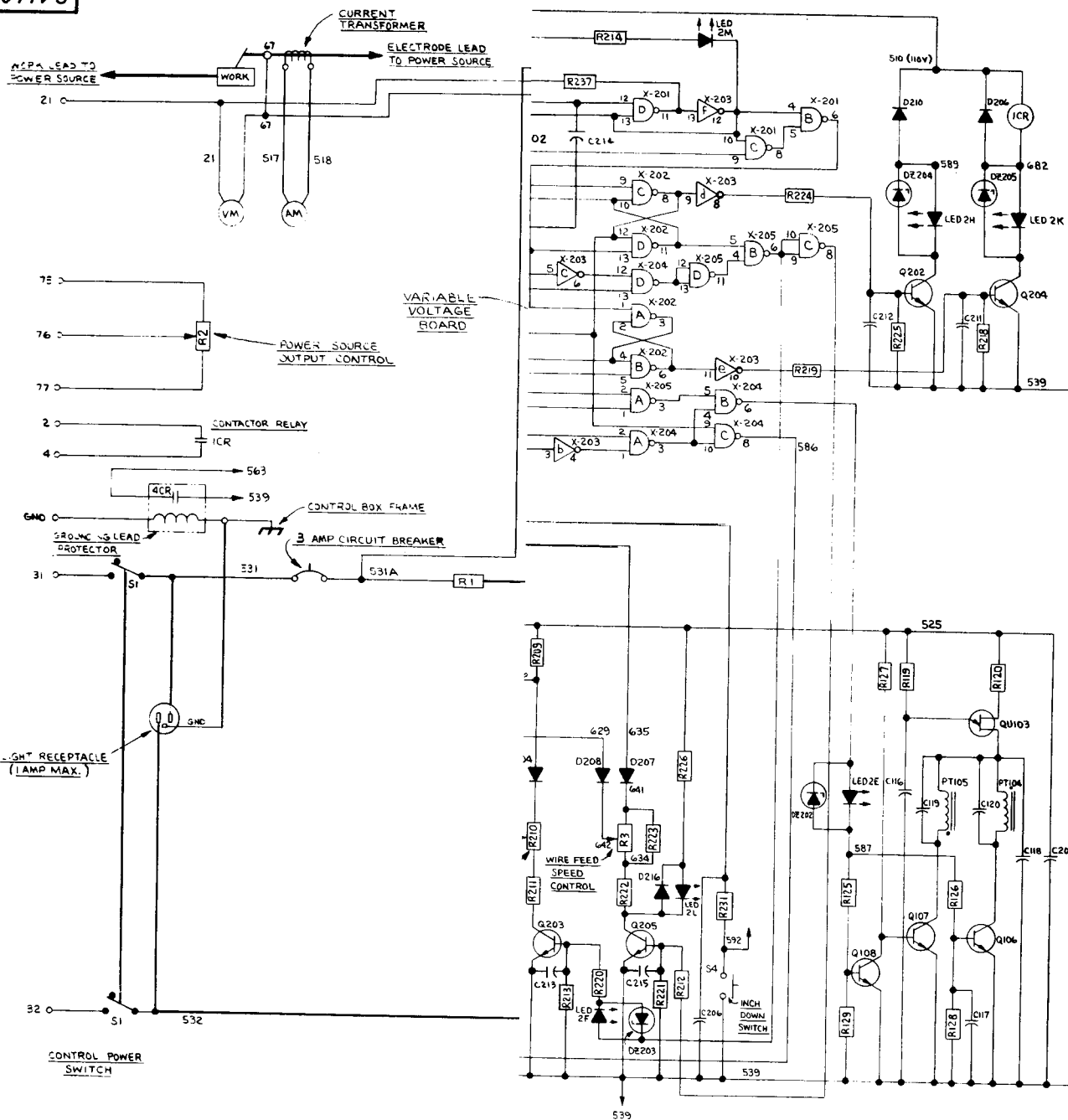
The gear box gear teeth should be recoated with a layer of graphite grease (Lincoln E708) after each 2000 hours of operation.

CONTACT NOZZLE

The life of the contact nozzle tips depends largely on the size, surface condition of the wire and the welding current. The wire straightener should be set so the electrode is not completely straight. Rusty or dirty wire is especially bad for contact wear.

The nozzle tip should be replaced when it no longer provides accurate wire location or when arcing between the wire and the tip becomes excessive. Should the tip end become fused over due to a poor start, remove the tip and redrill per the following table.

Wire Size	Tip Part No.	Drill Size
1/8	S-10125-1/8	#29 (.136)
5/32	S-10125-5/32	#20 (.161)
3/16	S-10125-3/16	#10 (.193)



CONTROL CIRCUIT

C101	.47 MFD	R101	80 Ω , 12W	R128	47 K Ω L
C102	50 MFD	R102	68 K Ω L	R129	47 K Ω L
C103	.047 MFD	R104	10 K Ω L, 2W	R131	10 K Ω L, 2W
C104	.047 MFD	R105	39 K Ω L	R132	10 K Ω L
C106	.047 MFD	R106	4.7 K Ω L	R133	27 K Ω L
C107	.1 MFD	R107	15 K Ω L	Q101	2N5655
C108	1 MFD	R108	22 K Ω L	Q102	MJ 3029
C110	1 MFD	R109	10 K Ω L	Q103	2N 4123
C113	.15 MFD	R110	1.5 K Ω L	Q104	2N 4123
C114	.15 MFD	R111	5 K Ω L TRIMMER	Q105	2N 4123
C116	.047 MFD	R112	4.7 K Ω L	Q106	2N5816
C117	.02 MFD	R113	22 K Ω L	Q107	2N 5816
C118	.02 MFD	R114	10 K Ω L	Q108	2N 4123
C119	.02 MFD	R115	100 Ω L	Q101	2N 6027
C120	.02 MFD	R117	47 Ω L	Q103	UJT
C121	1 MFD				
C122	.02 MFD	R118	6.8 K Ω L	LED1A	RED LIGHT EMITTING DIODE
		R119	6.8 K Ω L	LED1B	
D101	16 A	R120	680 Ω L	LED1C	
D102	16 A	R121	2.7 K Ω L	LED1D	
D103	16 A	R122	47 K Ω L	LED1E	
D104					
THRU	1A	R123	100 Ω L	SCR101	8A. 600 V.
D114		R124	100 Ω L	SCR102	8A. 600 V.
D116		R125	10 K Ω L	SCR103	12A. 400 V.
D117		R126	680 Ω L	SCR104	12A. 400 V.
D2101	25V.	R127	4.7 K Ω L		
D2102	3V.				
TP101	TRANSIENT PROTECTOR	PT101	PULSE	TRANSFORMER	
F101	1/2 A SLOW BLOW FUSE	PT104	PULSE	TRANSFORMER	
F102	2/10 A FUSE	PT105	PULSE	TRANSFORMER	

AC CURRENT SENSOR CIRCUIT

[illegible]

ELECTRICAL SYMBOLS PER E-1537

N.A. TO OPERATE UNIT WITHOUT VARIABLE VOLTAGE BOARD
JUMPER 637 TO 539 & 635 TO 636

N.B. X201 THRU X205 - PIN 7 CONNECTED TO 539
PIN 14 CONNECTED TO 515

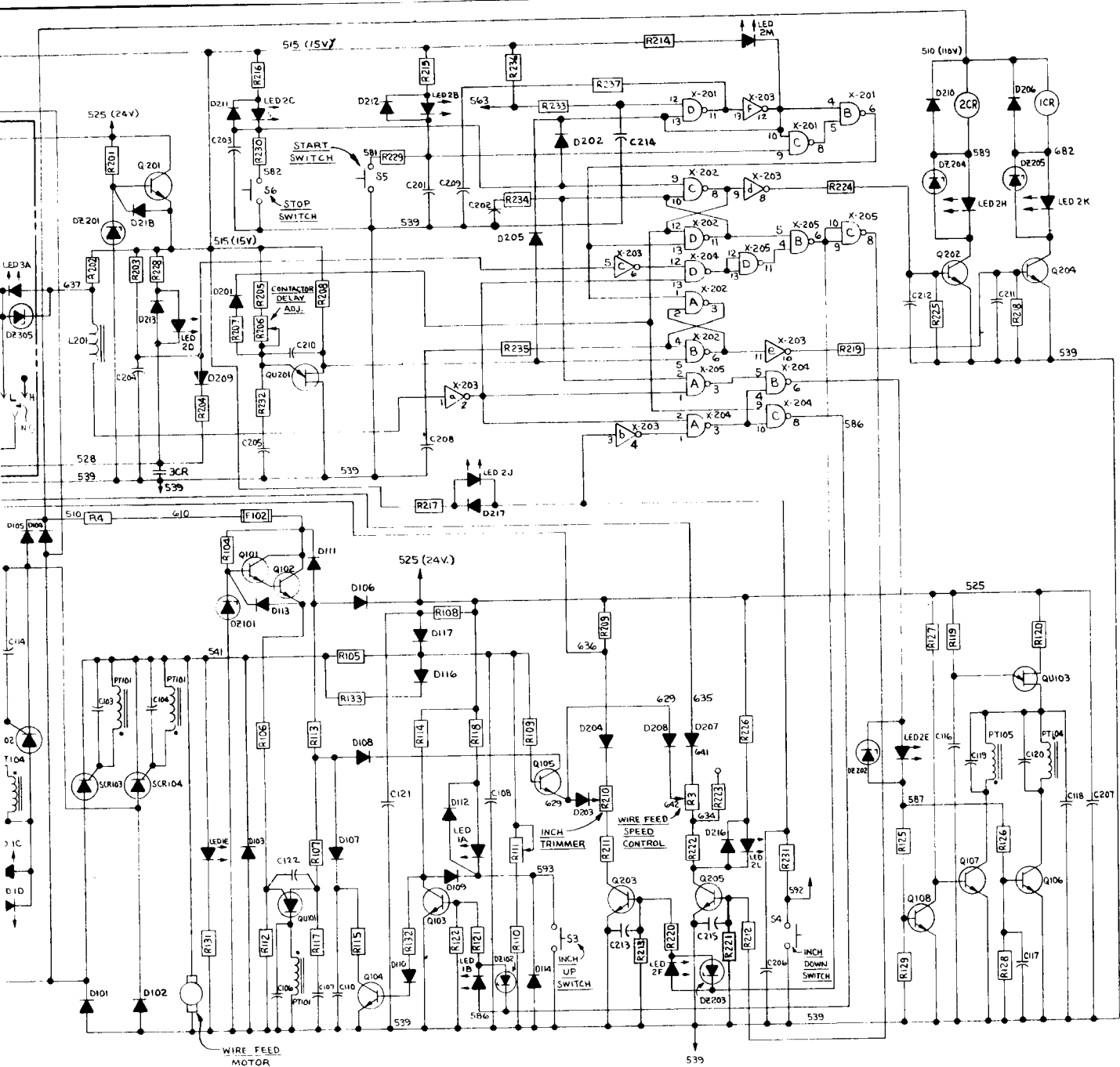
N.C. WHEN CONTROLS ARE USED WITH R35 POWER SOURCES OF THE TYPE WHICH USES TAPS CONNECTED WITH TRIMMABLE PLATE FOR MAJOR VOLTAGE ADJUSTMENTS, JUMPER TO BE CONNECTED TO PIN "L". FOR ALL OTHER POWER SOURCES JUMPER TO BE CONNECTED TO PIN "H".

NOTE: SINCE COMPONENTS OR CIRCUITRY ON A PRINTED CIRCUIT BOARD MAY CHANGE WITHOUT AFFECTING THE INTERCHANGEABILITY OF A COMPLETE BOARD, THIS DIAGRAM MAY NOT SHOW THE EXACT COMPONENTS OR CIRCUITRY OF CONTROLS HAVING A COMMON CODE NUMBER.

TYPE LT-56 TRACTOR

SUBJECT A.C. OPERATING SCHEMATIC

SUP'D (G-1359) OR 7/28/68 CHN. J SHEET NO. G-1448



TRAVEL CIRCUIT

C401 18 MFD	R419 40 Ω , 12W
C402 1.8 MFD	R420 470 Ω
C403 .005 MFD	
C404 1 MFD	
C405 .1 MFD	
C406 .01 MFD	D401 1A.
C407 .047 MFD	D402 1A., 1000 V.
C408 .047 MFD	D403 1A., 1000 V.
C409 39 MFD	D404 16A.
C410 50 MFD	D405 16A.
C411 .02 MFD	
C412 .005 MFD	D406 16A
C413 .02 MFD	D407 1A., 1000V
	D408 1A., 1000V
	D409 1A.
	D410 1A.
	D411 1A.
R401 10K Ω	SCR TRAVEL REVERSING RELAY
R402 10K Ω	
R403 4.7K Ω	TP401 TRANSIENT PROTECTOR
R404 3.9K Ω	TP402 TRANSIENT PROTECTOR
R405 27K Ω	PT401 1:1 PULSE TRANSFORMER
R406 15K Ω	
R407 4.7K Ω	DZ401 20V
R408 4.7K Ω , 5W	DZ402 10V
R409 4.7K Ω	SCR401 12A. 400V. SCR
R410 2K Ω TRIMMER	SCR402 12A. 400V. SCR

COMPONENTS NOT ON P.C. BOARD

R1 2 Ω , 50W
R2 10K Ω , 2W POWER SOURCE OUTPUT CONTROL
R3 5K Ω , 2W WIRE FEED SPEED CONTROL
R4 250 Ω , 25W
R5 2 Ω , 25W
R6 5K Ω , 2W TRAVEL SPEED CONTROL
R7 1.3 Ω , 10W
S1 DPST CONTROL POWER SWITCH
S2 SPDT TRAVEL CONTROL SWITCH
S3 SPST INCH UP SWITCH
S4 SPST INCH DOWN SWITCH
S5 SPST START SWITCH
S6 SPST STOP SWITCH
S7 DPDT (REV.) TRAVEL DIRECTION SWITCH
1CR SPST, 110VDC COIL
2CR SPST, 110VDC COIL
3CR REED SWITCH ACTUATED BY WELDING CURRENT
4CR REED SWITCH ACTUATED BY FAULT CURRENT THRU GROUNDING LEAD TO POWER SOURCE FRAME.

ELECTRICAL SYMBOLS PER E-1537

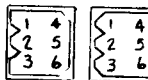
N.A. TO OPERATE UNIT WITHOUT VARIABLE VOLTAGE BOARD JUMPER 637 TO 539 & 635 TO 636.

N.B. X201 THRU X205: PIN 7 CONNECTED TO 539 PIN 14 CONNECTED TO 515.

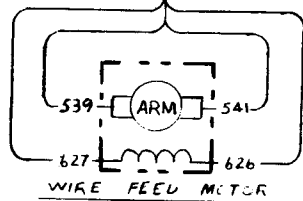
N.C. WHEN CONTROLS ARE USED WITH R35 POWER SOURCES OF THE TYPE WHICH USES TAPS CONNECTED WITH TRIMMER PLATE FOR MAJOR VOLTAGE ADJUSTMENTS JUMPER TO BE CONNECTED TO PIN 14. FOR ALL OTHER POWER SOURCES JUMPER TO BE CONNECTED TO PIN "H".

2985-71 TIN: DEPT 77

* INDICATES COI



CAVITY NUMB
(COMPONENT SI



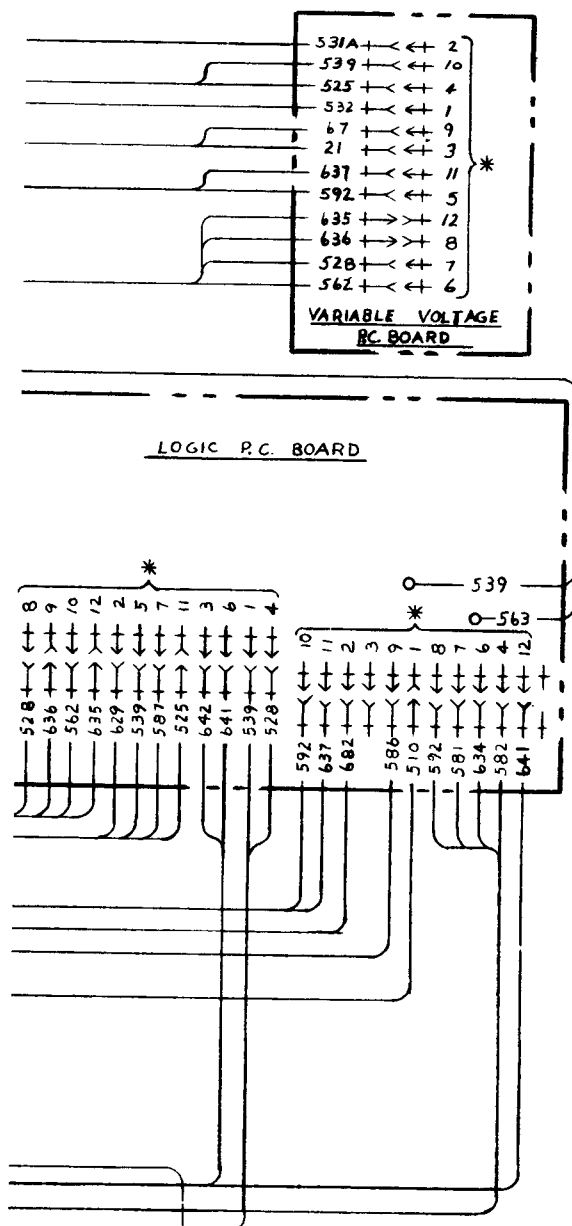
CURRENT SENSOR
PC BOARD

517
67

ELE
R SOURCE

WORK

WORK TO POWER SOURCE

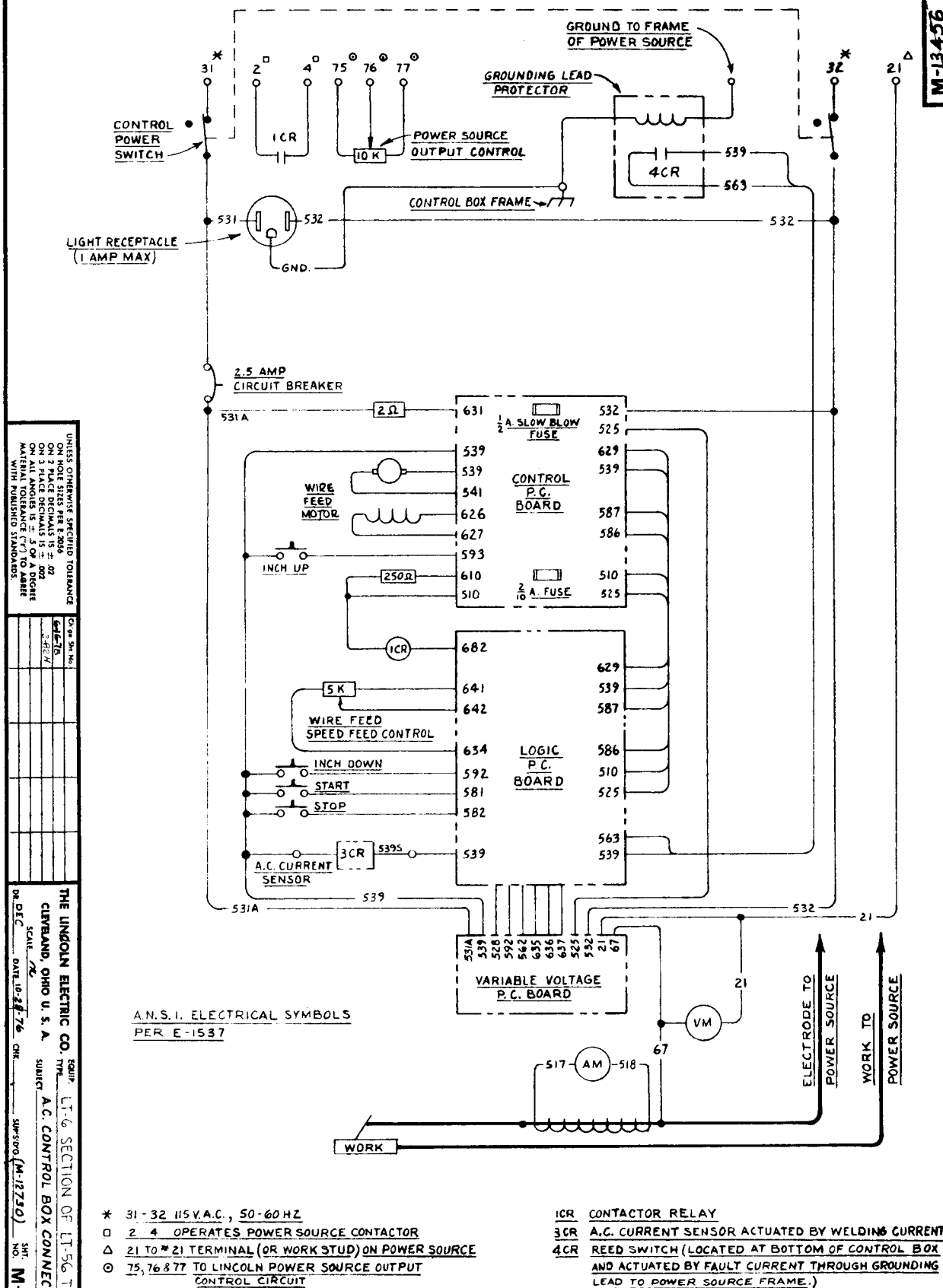


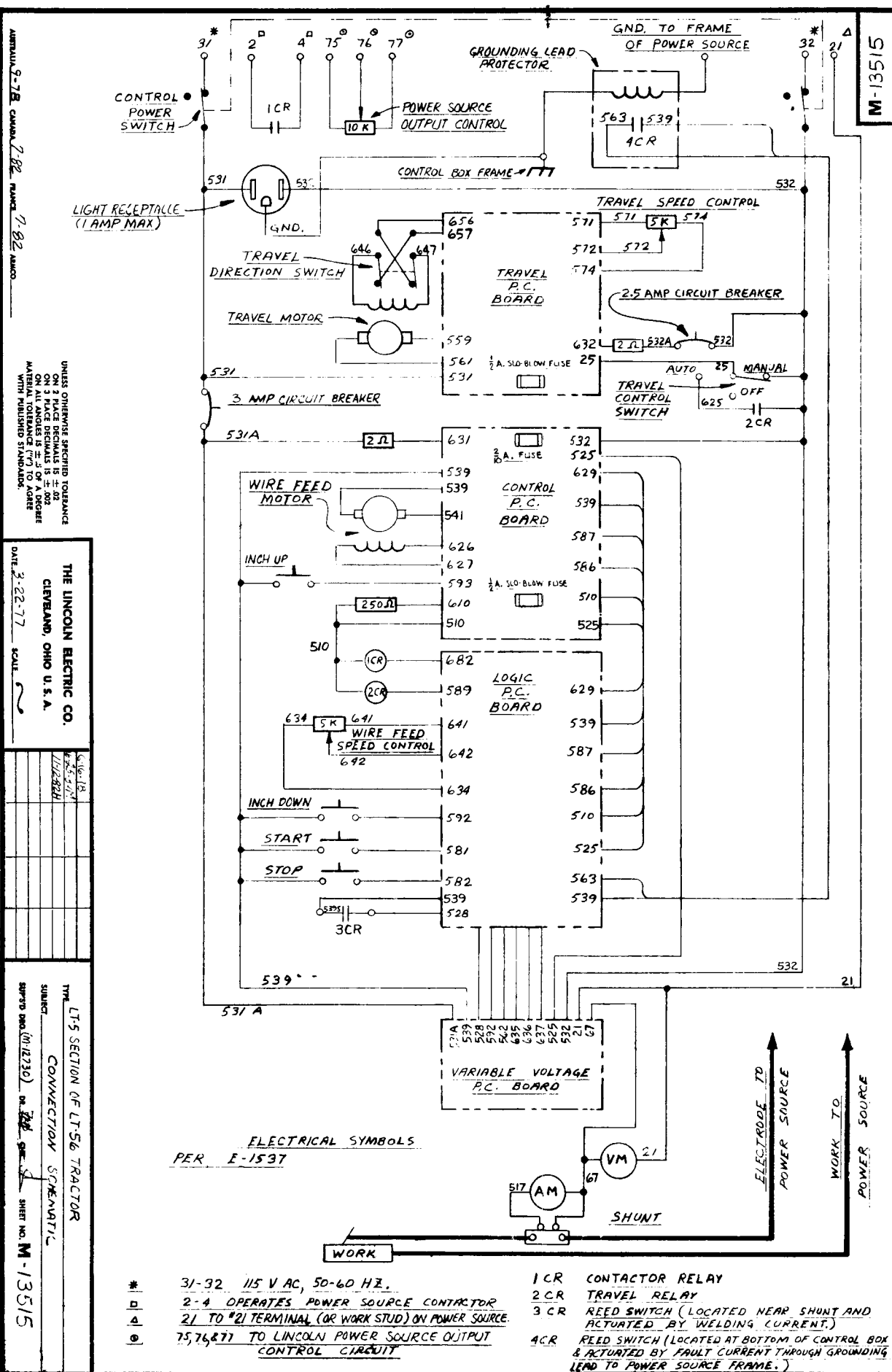
UNLESS OTHERWISE SPECIFIED TOLERANCE
ON HOLE SIZES PER E248
ON 2 PLACE DECIMALS IS $\pm .02$
ON 3 PLACE DECIMALS IS $\pm .002$
MATERIAL TOLERANCE IS TO BE
WITH PUBLISHED STANDARDS.

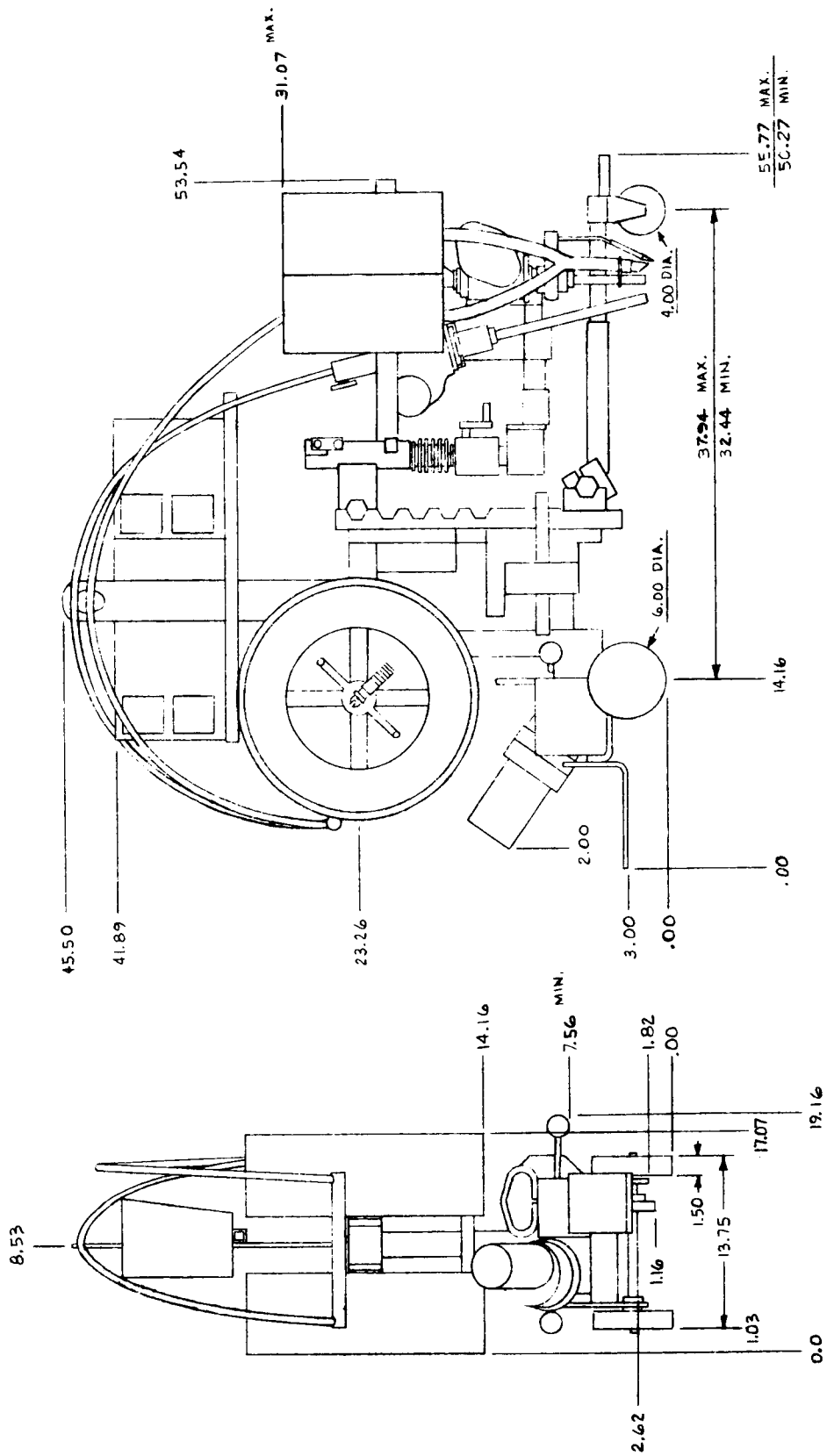
DATE 10-27-76
BY L-5862

THE LINCOLN ELECTRIC CO. INC.
CLEVELAND, OHIO U. S. A.
DATE 10-27-76
BY L-5862

LT-56 TRACTOR
A.C. CONTROL BOX WIRING DIAGRAM
NO. L-5862







UNLESS OTHERWISE SPECIFIED TOLERANCE
ON HOLE SIZES PER 1.500
ON PLACES DECIMALS IS $\pm .005$
ON 3 PLACE DECIMALS IS $\pm .002$
ON ALL ANGLES IS $\pm .5$ OF A DEGREE
MATRIAL TOLERANCE (17) TO ADHERE
WITH PUBLISHED STANDARDS.

Ch. No. 616-76
Rev. No. 1/17/76
Date 5-11-76

THE LINCOLN ELECTRIC CO. EQUIP. LT-56 TRACTOR
CLEVELAND, OHIO U. S. A. DIMENSION PRINT
SCALE 1" = 1" DATE 5-11-76 SHEET NO. M-13765

S-15534

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

TO AUTOMATIC CONTROL BOX

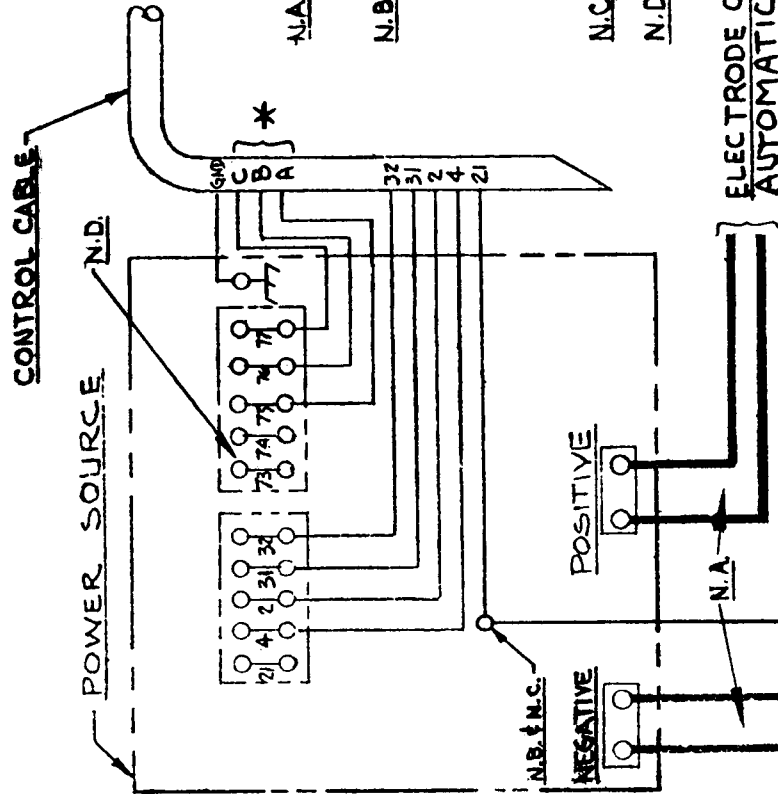
* IF USING AN OLDER CONTROL CABLE: CONNECT LEAD #75 TO #75 ON TERMINAL STRIP, CONNECT LEAD #76 TO #76 ON TERMINAL STRIP, CONNECT LEAD #77 TO #77 ON TERMINAL STRIP.

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-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.

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.

UNLESS OTHERWISE SPECIFIED TOLERANCE		Ch. op. Shi. No.		1/25-80	
ON HOLE SIZES PER E-2035		2-28-75		5-23-80	
ON 2 PLACE DECIMALS IS $\pm .02$		10-10-75N		2-16-82B	
ON 3 PLACE DECIMALS IS $\pm .002$		6-18-76			
ON ALL ANGLES IS $\pm .5$ OF A DEGREE		2-24-78			
MATERIAL TOLERANCE ("P") TO AORLE WITH PUBLISHED STANDARDS.		1-20-74			
THE LINCOLN ELECTRIC CO. EQUIP. CONNECTION OF NA-3, LT-5 OR LT-7 TO CLEVELAND, OHIO U.S.A.					
SUBJECT IDEALARC DC-1000 & DC-1500					
SCALE					
DR GWR		DATE 6-10-81		CHK	
SHEET		3-13-79		NO. S-15534	

WARNING: Turn power source off before making these connections.

Connect the control cable ground lead to the frame terminal marked **77** near the power source terminal strip. The power source grounding terminal (marked and located near the power source input power connections) must also be connected to electrical ground per the power source Operating Manual.

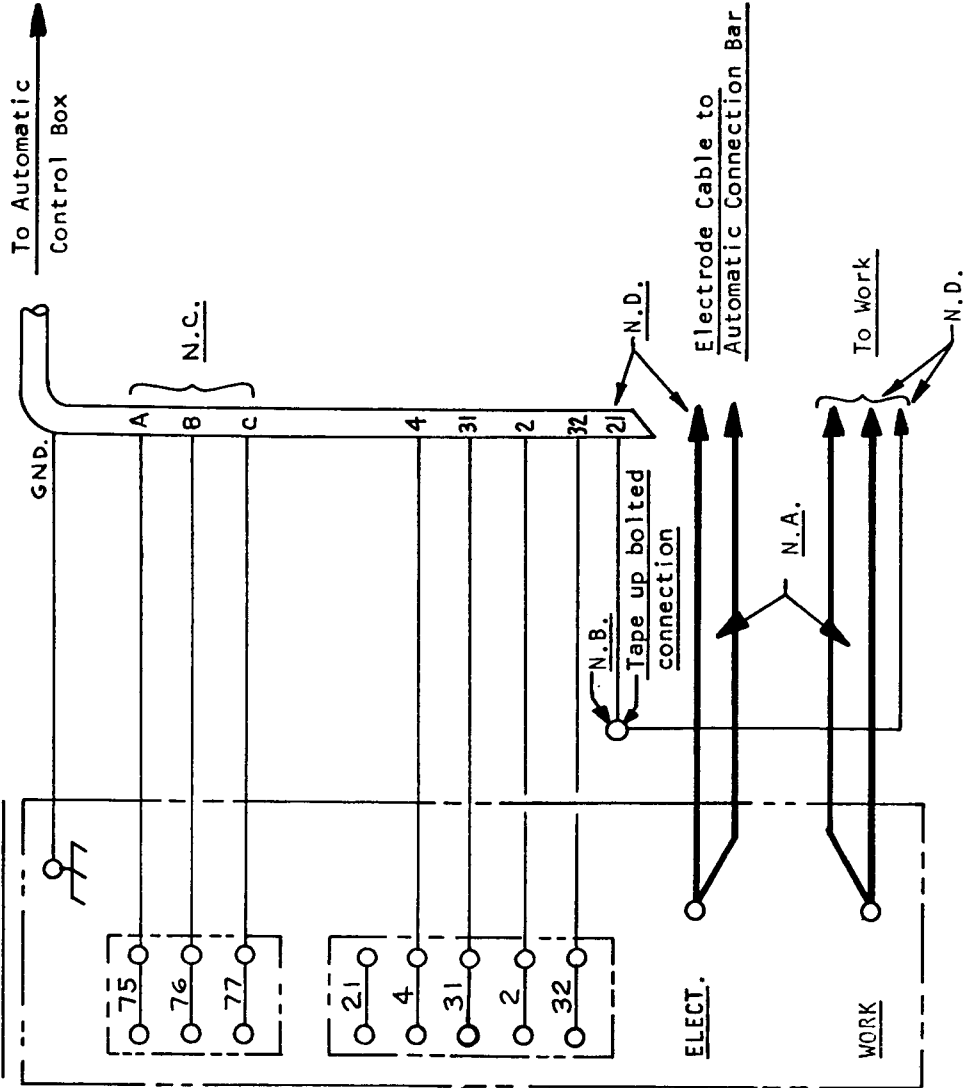
N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications. See the Operating Manual for proper sizes.

N.B. Extend lead 21 using #14 or larger insulated wire physically suitable for the installation. An S-16586-~~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.

N.C. 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.D. To avoid possible induced NA-4 or LT-6 meter reading error; keep the control leads, including the extended #21 lead separated from the A.C. welding cables by at least 12 inches.

AC-1200



UNLESS OTHERWISE SPECIFIED TOLERANCE ON HOLE SIZES PER E-2056 ON 2 PLACE DECIMALS IS $\pm .02$ ON 3 PLACE DECIMALS IS $\pm .002$ ON ALL ANGLES IS $\pm .5$ OF A DEGREE MATERIAL TOLERANCE ("V") TO AGREE WITH PUBLISHED STANDARDS.

Ch'ge. Sht. No.	16-22-84H
3-7-75	
6-18-76A	
6-16-78A	
4-20-79	
1-25-80	

THE LINCOLN ELECTRIC CO. EQUIP. TYPE Connection of NA-4 (Which has rheostat CLEVELAND, OHIO U.S.A. SUBJECT for current control) or LT-6 to AC-1200

SCALE

DR TJP

DATE 9-22-83

CHK *YAB*

SUP'D/G 3-13-79

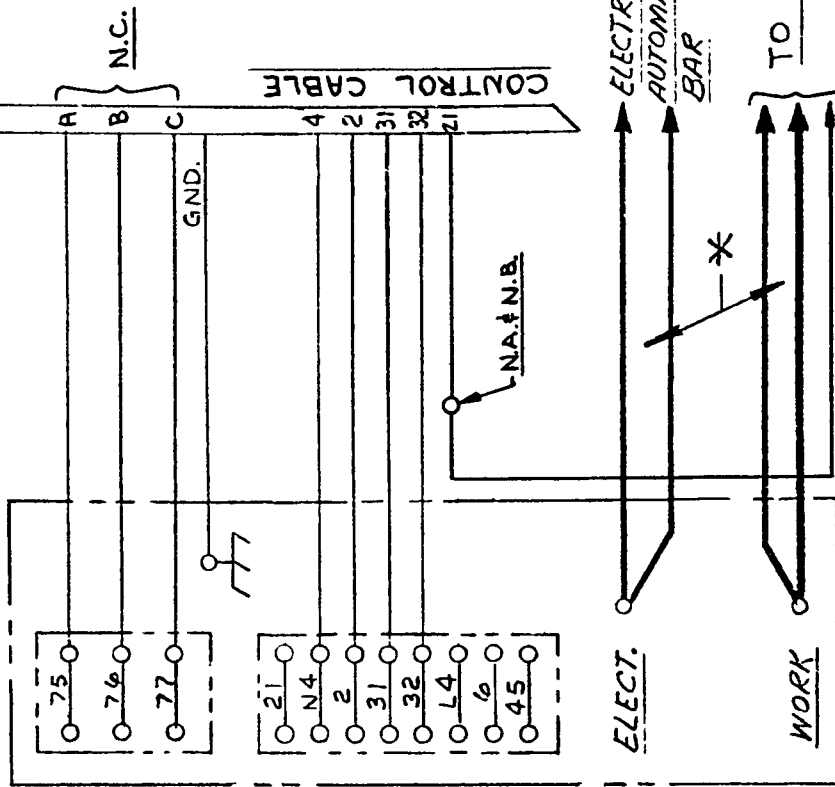
SHT. S-15602

NO.

EO 751-S

AC-1200

TO AUTOMATIC
CONTROL BOX



CONNECT THE CONTROL CABLE
GROUND LEAD TO THE FRAME
TERMINAL MARKED Π NEAR
THE POWER SOURCE TERMINAL
STRIP.

THE POWER SOURCE MUST
BE PROPERLY GROUNDED

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

N.C. 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. EXTEND LEAD 21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY
SUITABLE FOR THE INSTALLATION. AN S-16586-53 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 CONNECTIONS.

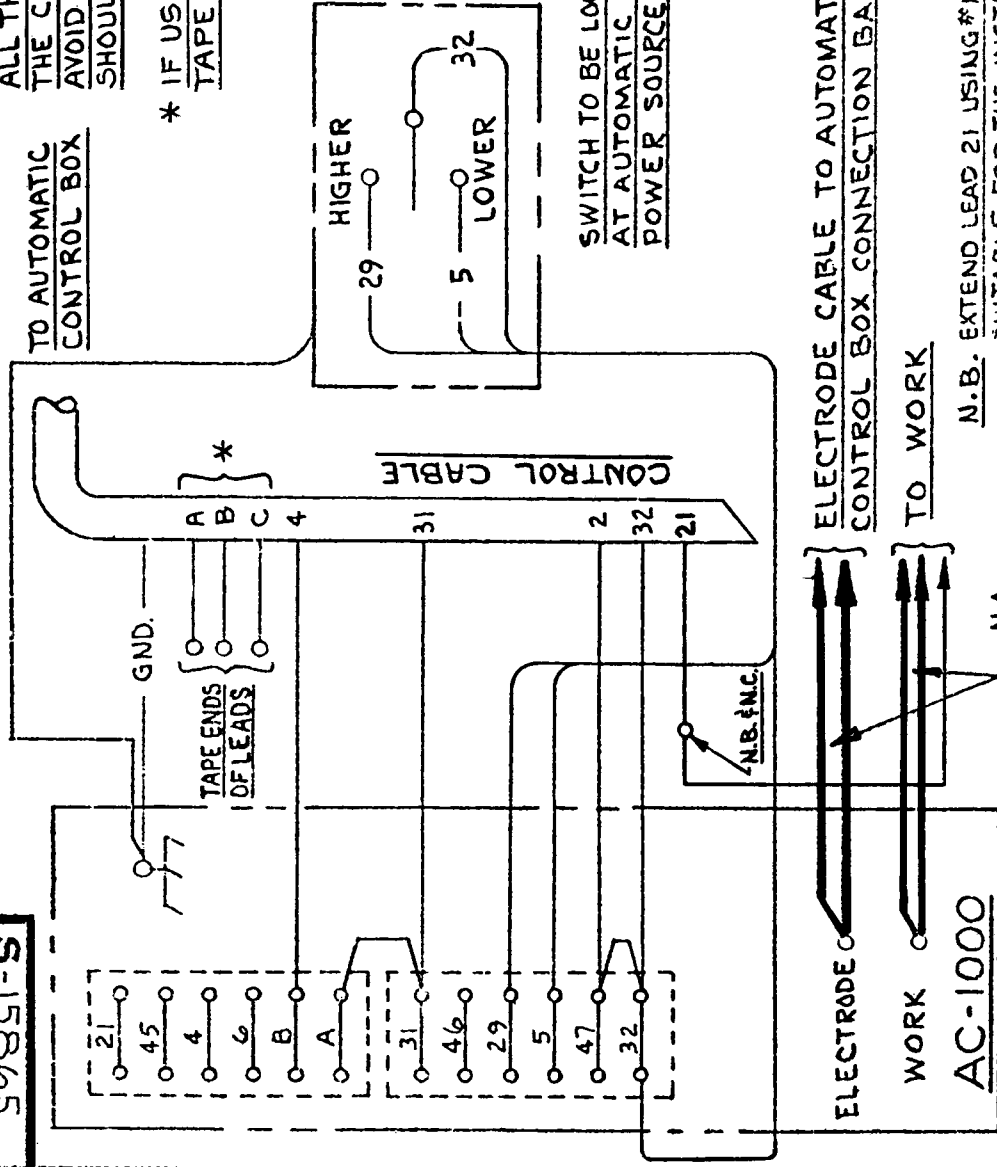
UNLESS OTHERWISE SPECIFIED TOLERANCE
ON HOLE SIZES PER E-2056
ON 2 PLACE DECIMALS IS $\pm .02$
ON 3 PLACE DECIMALS IS $\pm .002$
ON ALL ANGLES IS $\pm .5$ OF A DEGREE
MATERIAL TOLERANCE ("M") TO AGREE
WITH PUBLISHED STANDARDS.

Ch'ge. Sh't. No.
3-7-75
6-18-76A
6-16-78A
4-20-79
1-25-80

THE LINCOLN ELECTRIC CO. EQUIP CONNECTION OF NA-4 (WHICH HAS
CLEVELAND, OHIO U.S.A. TYPE RHEOSTAT FOR CURRENT CONTROL) OR
SUBJECT LT-6 TO AC-1200 WITH LT-34 & LAF 4 OPTIONS
SCALE
DR GWR DATE 3-13-79 CHK
SHT. NO. S-15603
SUPPLY NO. 11-6-74

ALL THE CURRENT CONTROL RHEOSTATS ON
THE CONTROL BOX WILL BE INOPERATIVE. TO
AVOID OPERATOR CONFUSION THE KNOBS
SHOULD BE REMOVED.

* IF USING AN OLDER CONTROL CABLE
TAPE ENDS OF LEADS #75, #76 AND #77.



NA. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT & 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-16586-13 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 TIED
TO THE WELDING WORK LEAD.

N.C. TAPE LIP BOLTED CONNECTION.

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

UNLESS OTHERWISE SPECIFIED TOLERANCE
ON HOLE SIZES PER E-2036
ON 2 PLACE DECIMALS IS $\pm .02$
ON 3 PLACE DECIMALS IS $\pm .002$
ON ALL ANGLES IS $\pm .5$ OF A DEGREE
MATERIAL TOLERANCE ("M") TO AGREE
WITH PUBLISHED STANDARDS.

Ch'ge. Shi. No.	125.80
12-12-75B	
6-10-76A	
6-16-78A	
4-20-79A	
8-31-79U	

THE LINCOLN ELECTRIC CO. EQUIP. CONNECTION OF NA-4 (WHICH HAS RHEOSTAT TYPE) FOR CURRENT CONTROL OR LT-6 TO AC100000
CLEVELAND, OHIO U.S.
8

DR GWR DATE 3-13-79

5-15865

Sec. P7
LT-56
SUBMERGED ARC TRACTOR

These parts lists cover machines
thru Code 7943. For Codes above
7943 contact Service Dept.

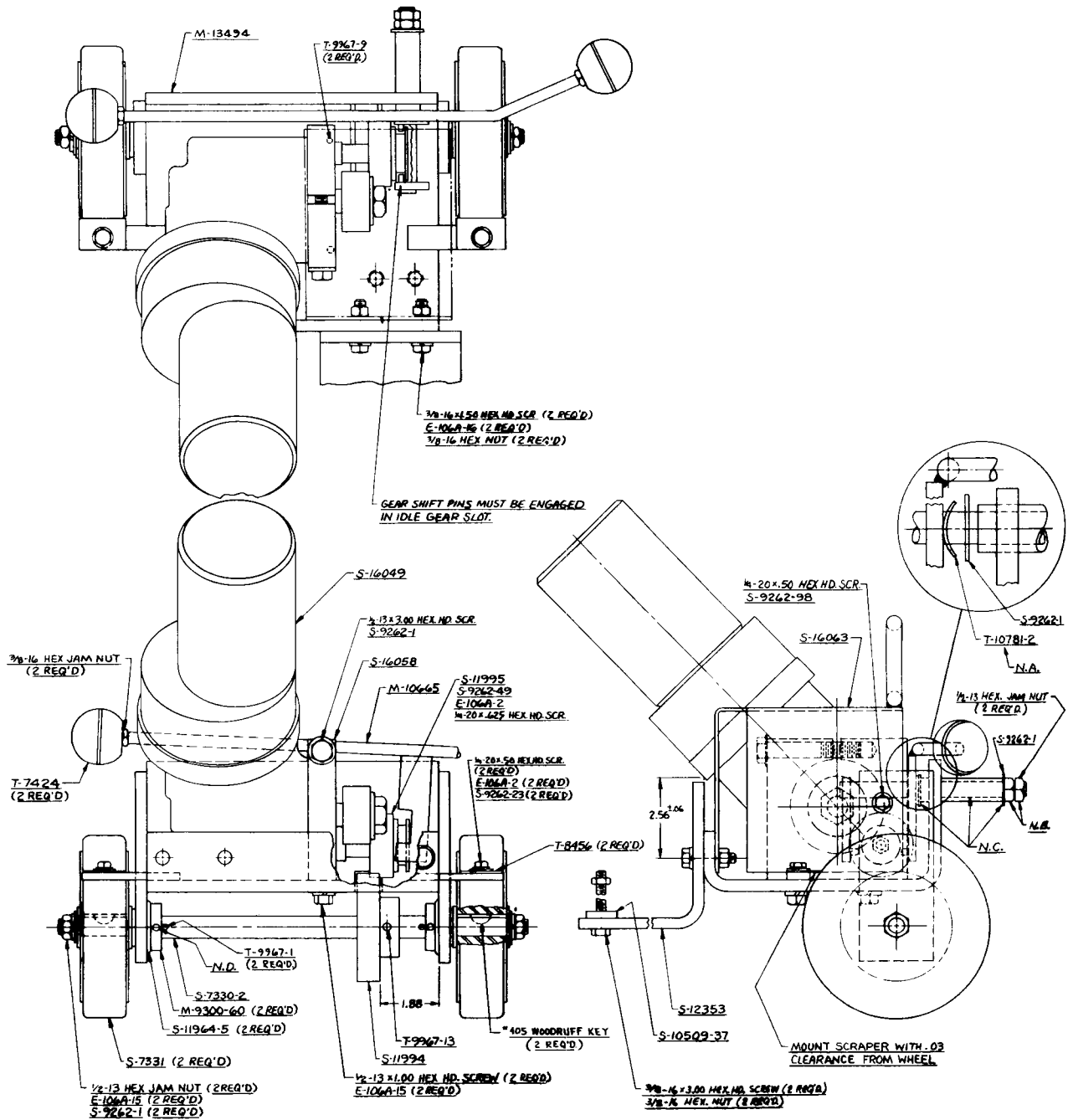
Parts Lists Index

General Assembly	P-129-C
Front Wheel Assembly	P-117-G
Cross Adjustment Assembly	P-101-E
Wire Straightener	P-117-F
Travel Carriage and Motor	P-129-D
Travel Motor and Gear Box Assembly	P-129-E
Gear Case Assembly	P-129-F
Wire Reel Shaft Assembly	P-129-G
AC Control Box	P-129-H
DC Control Box	P-129-J
Internal Control Box Assembly	P-129-K
Vertical Head Lift Assembly	P-129-L
AC Head Assembly	P-129-M
DC Head Assembly	P-129-N
AC and DC Nozzles and Tips	P-129-O
Flux Tube Assembly	P-129-P
Miscellaneous Options:	
K-230 Butt Seam Guide Kit	P-117-J
K-287 Flat Fillet Guide Kit	P-129-R
K-288 Horizontal Fillet-Lap Guide Kit	P-129-R

3-8-82

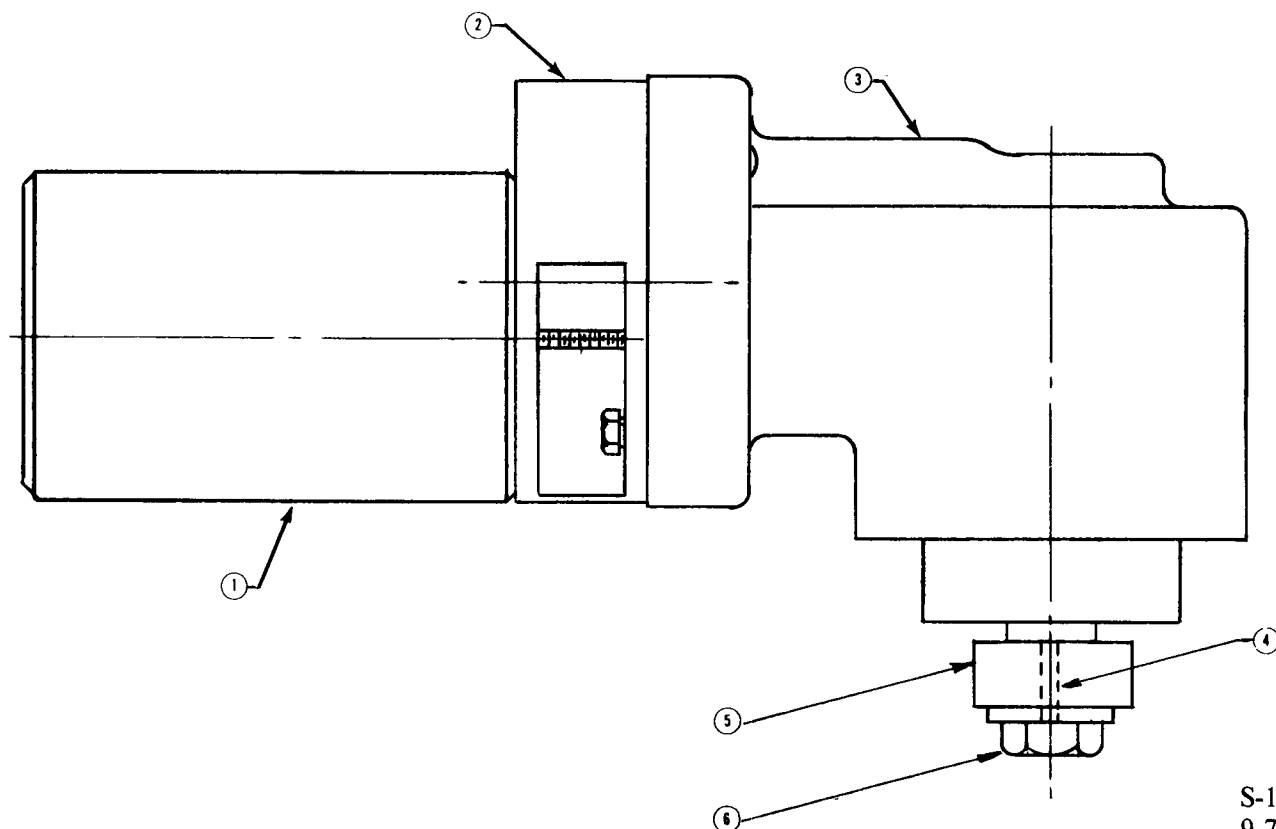
Indicates a Change This Printing

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9
1	Travel Carriage & Motor	See P-129-D	1			
2	Frame Assembly	L-5858	1			
4	Slide Arm Housing	S-16054	1			
	Clamp Bar	S-16061-1	1			
5	Slide Arm	S-16051	1			
6	Front Wheel Assembly	See P-117-G	1			
7	Wire Reel Shaft Assembly	See P-129-G	2			
8	Current Transformer Cover	M-13451	1			
	Box Connector	T-9639-2	1			
9	Lower Cross Arm	S-16065	1			
	Clamp Bar	S-16061-3	2			
18	Wire Reel Housing Assembly (Right)	S-16108-2	1			
19	Wire Reel Housing Assembly (Left)	S-16108-1	1			
20	Wire Reel Support Bracket	S-16099-2	1			
21	Insulating Tube	T-7028-181	6			
22	Hex Head Screw	1/4-20 x 1.25	6			
23	Insulating Washer	S-10773-41	18			
24	Plain Washer	S-9262-98	12			
25	Lockwasher	E-106A-2	6			
26	Hex Nut	1/4-20	6			
27	Take-Off Arm	M-13160	1			
28	Wire Reel Assembly	L-4604	2			
29	A.C. Control Box	See P-129-H	1			
30	D.C. Control Box	See P-129-J	1			
31	Control Box Mounting Arm	S-16068	1			
	Mounting Plate	S-10509-83	4			
32	Upper Cross Arm	S-16065	1			
	Clamp Bar	S-16061-1	1			
33	Vertical Head Lift	See P-129-L	1			
	Clamp Bar	S-16061-1	1			
34	Flux Hopper Support Arm	S-16062	1			
	Clamp Bar	S-16061-1	1			
35	Tubing	S-14004-3	1			
36	Tubing	S-14004-4	1			
37	Flux Hopper, Includes:	M-12691	2			
	Warning Label	S-16722-3	1	#		
	Mounting Clamp	S-16059	2			
38	Conduit Clip	T-8666-1	1			
39	Shunt Cover	S-12683	2			
40	Shunt & Reed Switch Assembly, Includes:	M-13592	1			
	Shunt Assembly	M-8254	1			
	Reed Switch Assembly	S-12334-19	1			
42	Current Transformer Assembly, Includes:	L-5225-1	1			
	Transformer Coil	S-10216	1			
	Current Sensor P.C. Board	M-12650	1			
45	Cross Adjustment Assembly or Horizontal Adjuster	See P-101-E	1			
46	Pivot Block	M-10215-1	1			
	Roll Pin	T-9967-29	1			
	Draw Bolt	T-4893-3	1			
	Hex Nut	3/4-10	1			
47	Head Pivot Shaft	S-16048	1			
48	Head Pivot Arm Assembly	M-13435	1			
49	D.C. Head Mounting Arm	S-16074	1			
50	A.C. Head Assembly	See P-129-M	1			
51	A.C. Nozzle & Tips	See P-129-O	1			
52	Wire Straightener	See P-117-F	2			
53	D.C. Head Assembly	See P-129-N	1			
54	D.C. Nozzle & Tips	See P-129-O	1			
55	Pointer Assembly	S-15287	1			
56	Flux Tube Assembly	See P-129-P	1			
	Clamp	T-12929	1			
57	Hex Head Screw	1/2-13 x 1.75	2			
58	Plain Washer	S-9262-1	2			
59	Insulating Washer	S-10773-9	6			
60	Insulating Tube	T-7305-15	2			
61	Lockwasher	E-106-A15	2			
62	Hex Nut	1/2-13	2			
63	Clamp	T-10207	1			

TRAVEL CARRIAGE AND MOTORL-5854
2-19-82D

Indicates A Change This Printing

[illegible]

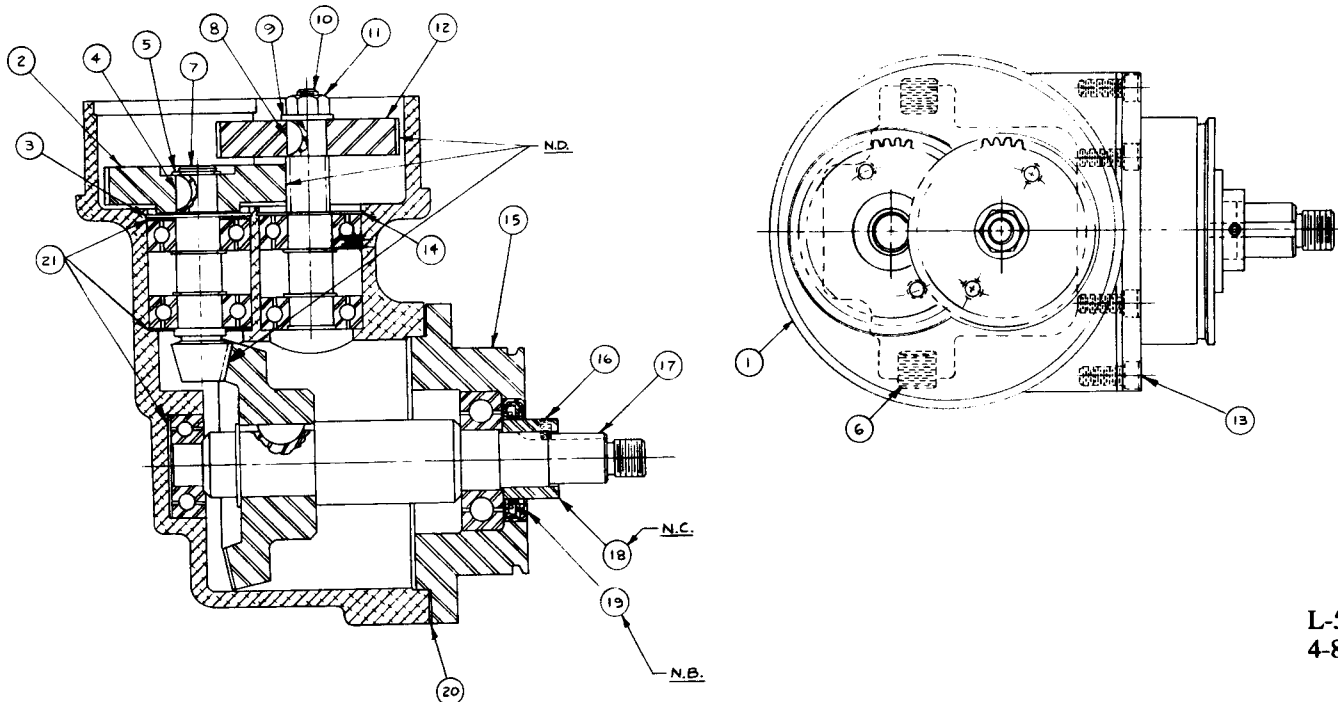
TRAVEL MOTOR AND GEAR BOX ASSEMBLYS-16049
9-7-79F

Indicates A Change This Printing

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4	5	6
1	Motor Assembly, Includes: Motor, Includes:	L-5198-7 M-12254-2	1 1						
	Brush & Spring Assembly (Universal Motor) Brush & Spring Assembly (Stature Motor) Brush Cap (Universal Motor) Early Design 7/8-27 THD	M-12254-1F M-12254-12 M-9655-7A	2 2 2			#			
	Brush Cap (Universal Motor) Present Design 3/4-27 THD Brush Cap (Stature Motor) Pinion Gear	M-9655-7B M-13312-13 S-15013-3	2 2 1			#			
2	Adapter Assembly, Includes: Gear Box Adapter Helical Gear	G-1324 S-15008-1	1 1						
3	Gear Case Assembly	See P-129-F	1						
4	Key	M-8776-6	1						
5	Drive Output Gear	T-11800	1						
6	Hex Nut	T-10552	1						

GEAR CASE ASSEMBLY

(GEAR RATIO IS STENCILED ON THE SIDE OF GEAR CASE AND ON TOP OF ITEM 12.)

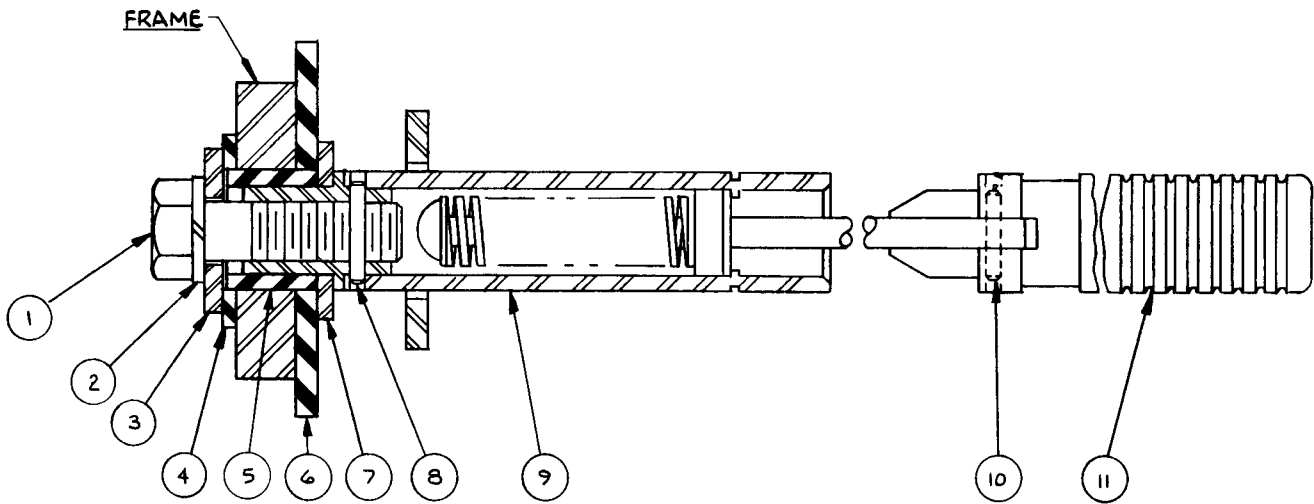


L-5199
4-8-82

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3
	Gear Case Assembly (95/1 Ratio)	L-5199-6	1	
1	Gear Box	G-1328	1	
2	Gear	S-12504	1	
3	Snap Ring	S-9776-23	1	
4	Woodruff Key	#304	1	
5	Snap Ring	S-9776-16	1	
6	Set Screw	S-11604-26	2	
7	Bevel Shaft Assembly	S-12511	1	
8	Woodruff Key	#304	1	
9	Plain Washer	S-9262-121	1	
10	Spur Shaft Assembly	S-12510	1	
11	Hex Nut	5/16-18	1	
12	Helical Gear (95/1 Ratio)	S-12503	1	
13	Socket Head Screw	T-9447-28	6	
14	Snap Ring	S-9776-23	2	
15	Rear Case Collar	M-10256	1	
17	Output Shaft Assembly	S-12509	1	
18	Drive Roll Spacer (95/1 Ratio)	T-12146-1	1	
19	Oil Seal	S-7611-15	1	
20	Gasket	T-12119-1 & 2	As Req'd.	
21	Spacer Washer	S-9262-110 & 111	As Req'd.	

April 1980

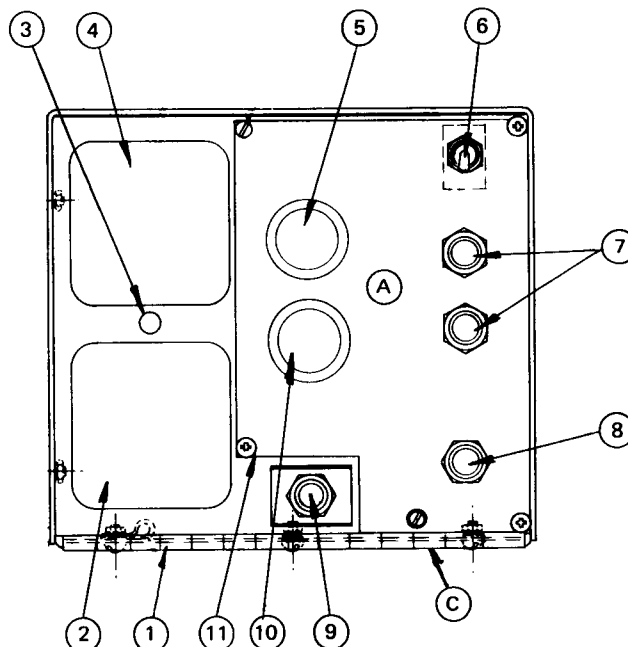
WIRE REEL SHAFT ASSEMBLY



M-13748
6-16-78

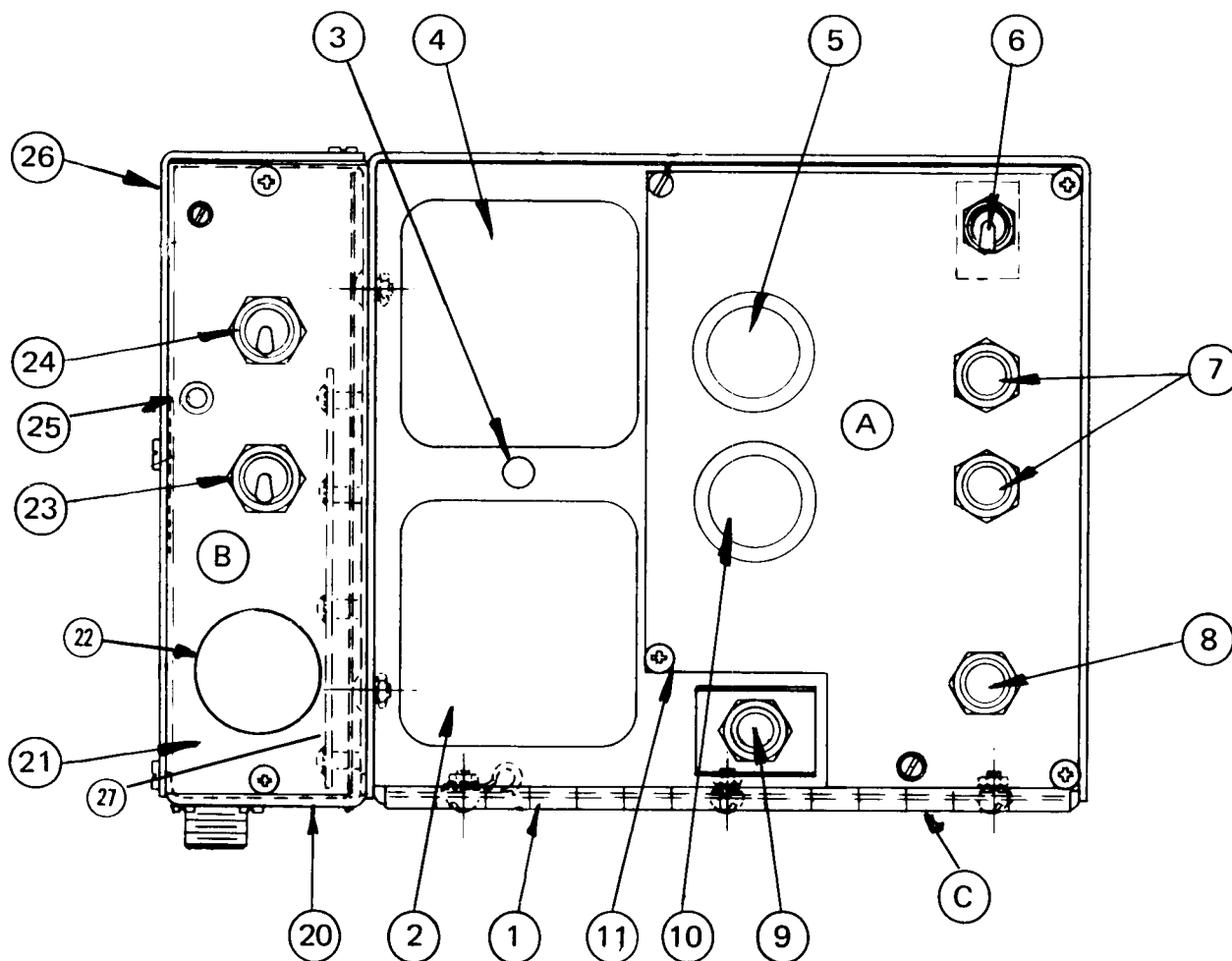
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6
1	Hex Head Screw	1/2-13 x 1.75	1		
2	Lockwasher	E-106A-15	1		
3	Plainwasher	S-9262-105	1		
4	Insulating Washer	S-10773-47	1		
5	Insulating Tube	T-12478-4	1		
6	Insulating Washer	S-10773-52	1		
7	Plainwasher	S-9262-26	1		
8	Roll Pin	T-9967-9	1		
9	Wire Reel Shaft	S-15492-1	1		
10	Roll Pin	T-9967-9	1		
11	Pull Knob	S-11038	1		

AC CONTROL BOX



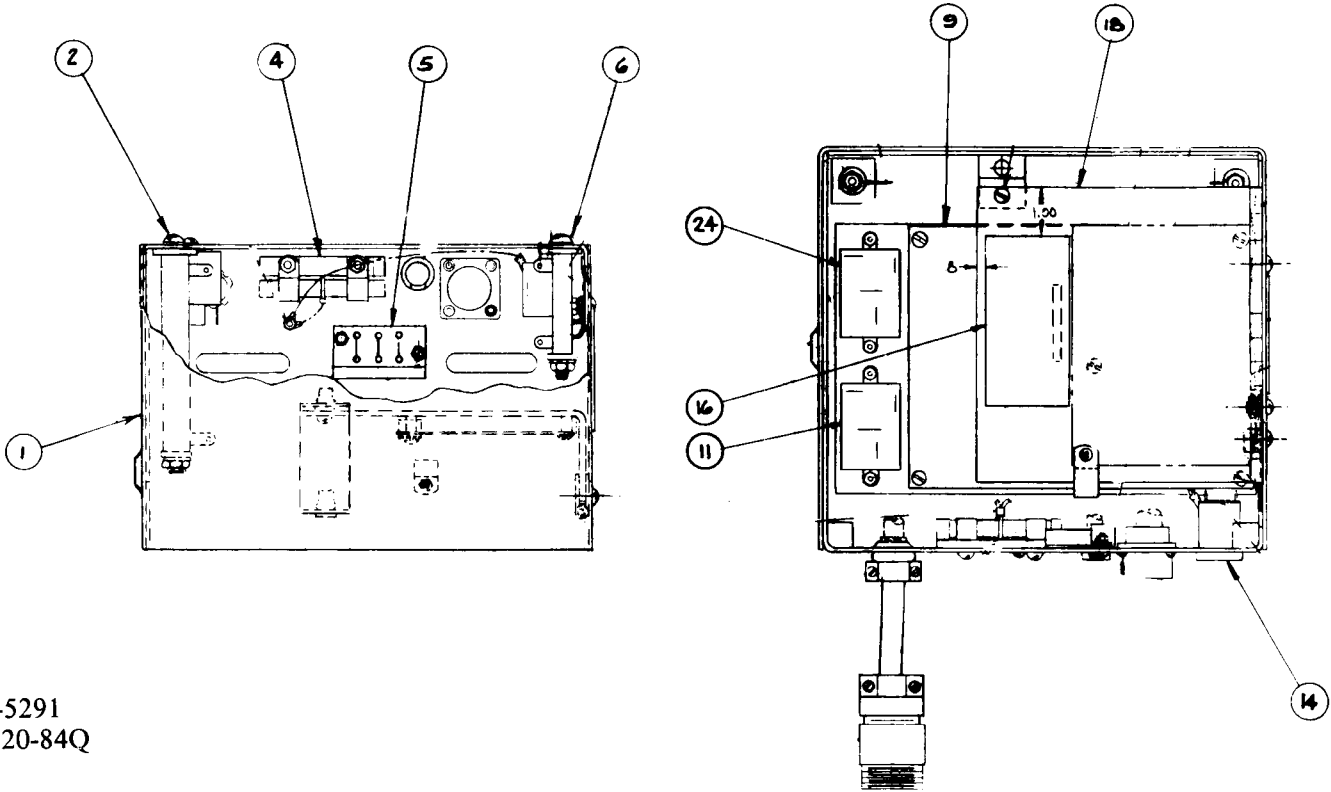
L-5861
10-19-79

# Indicates A Change This Printing									
ITEM	PART NAME & DESCRIPTION			PART NO.	NO. REQ'D	1	2	3	4 5 6
	Complete A.C. Control Box, Includes: (LT-56)			L-5861-1	1				
	Complete A.C. Control Box, Includes: (LT-5T6)			L-5861-2	1				
A	Front Panel Assembly, Includes: (LT-56)			M-13453	1				
A	Front Panel Assembly, Includes: (LT-5T6)			M-13453-1	1				
1	Panel			S-15245	1				
2	Ammeter			M-10485-12	1				
3	Circuit Breaker			T-12287-8	1				
4	Voltmeter			M-10486-8	1				
5-P	Potentiometer			T-10812-40	1				
5-K	Knob			T-10491	1				
6	Control Power Switch			T-13111	1				
7	Inch Switch			T-13541-2	2				
8	Stop Switch			T-13541-1	1				
9	Start Switch			T-13541-2	1				
10-P	Potentiometer			T-10812-37	1				
10-K	Knob			T-10491	1				
11	Nameplate (LT-56)			L-5867-2	1				
11	Nameplate (LT-5T6)			L-5867-3	1				
C	Internal Control Box Assembly			See P-129-K	1				

DC CONTROL BOXL-5878-1
7-13-84L

# Indicates A Change This Printing									
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4	5	6
	Complete D.C. Control Box, Includes: (LT-56) Complete D.C. Control Box, Includes: (LT-5T6)	L-5878-1 L-5878-3	1 1						
A A 1	Front Panel Assembly, Includes: (LT-56) Front Panel Assembly, Includes: (LT-5T6) Panel	M-12698-1 M-12698-3 S-15245	1 1 1						
2 3 4	Ammeter Circuit Breaker Voltmeter	M-10485-14 T-12287-8 M-10486-3	1 1 1						
5-P 5-I 5-K	Potentiometer Insulation Knob	T-10812-40 T-12792-1 T-10491	1 1 1						
6 7 8	Control Power Switch Inch Switch Stop Switch	T-13111 T-13541-2 T-13541-1	1 2 1						
9 10-P 10-I	Start Switch Potentiometer Insulation	T-13541-2 T-10812-37 T-12792-1	1 1 1						
10-K 11 11	Knob CC Nameplate (LT-56) CC Nameplate (LT-5T6)	T-10491 L-5867-2 L-5867-3	1 1 1			# #			
B 20	CV Nameplate (LT-56 & LT-5T6) Mounts under CC plate Travel Control Box Assembly, Includes: Box	L-5283-1 M-13473-1 S-16128	1 1 1			#			
21	Nameplate Resistor (Not Illustrated) 2.0 OHM Resistor (Not Illustrated) 1.3 OHM	M-13469-1 S-10404-73 S-10404-78	1 1 1						
22-P 22-I 22-K	Travel Speed Potentiometer Insulation Knob	T-10812-71 T-12792-1 T-10491	1 1 1						
23 24 25	Direction of Travel Switch Travel Switch Circuit Breaker	T-10800-7 T-13543 T-12287-8	1 1 1						
26 27	Travel Box Cover Travel P.C. Board, Includes: Fuse, 1/2 Amp Slo-Blo	S-15238-1 L-6944-1 T-10728-14	1 1 1						
	Travel P.C. Board Insulation (Not Illustrated) D.C. Relay-In Travel Box (Not Illustrated) Warning Decal (Not Illustrated)	T-14189 S-13929-2 T-13470	1 1 1						
C	Internal Control Box Assembly	See P-129-K	1						

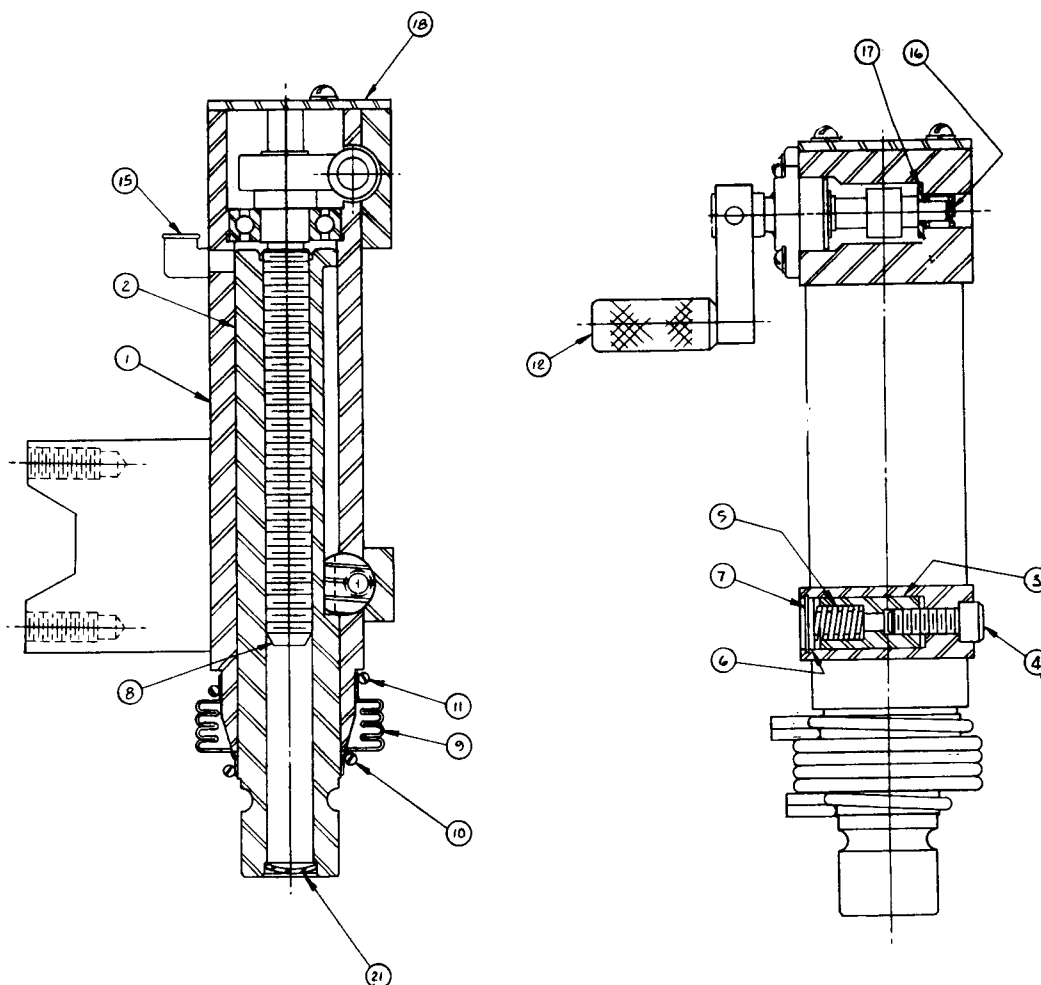
INTERNAL CONTROL BOX ASSEMBLY



L-5291
7-20-84Q

# Indicates A Change This Printing						
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3 4 5 6
C	A.C. Internal Control Box Assembly, Includes:	L-5291-2	1			
C	D.C. Internal Control Box Assembly, Includes:	L-5291-3	1			
1	Control Box	M-12685-1	1			
2	Resistor, 2 OHM	S-10404-75	1			
4	Reed Switch Assembly, (4CR), Includes:	T-13708	1			
5	Reed Switch	S-12334-20	1			
	Terminal Strip	S-13323-5	1			
	Number Plate	T-10726-89	1			
6	Resistor, 250 OHM	S-10404-76	1			
9	Control P.C. Board, Includes:	L-6959-1	1			
	Fuse, 1/2 Amp Sio-Blo	T-10728-14	1			
10	Fuse, 2/10 Amp	T-10728-27	1			
11	Control P.C. Board Insulation (Not Illustrated)	T-13707	1	#		
	Relay, (1CR)	S-13605	1			
14	Auxiliary Power Outlet	T-13698	1			
16	Warning Decal	T-13470	1			
18	Inner Panel Assembly	S-15235-1	1			
	Panel	S-15244	1			
	Variable Voltage P.C. Board	L-5394-1	1			
	Variable Voltage P.C. Board Insulation	T-13705	1			
24	Logic P.C. Board	L-5927	1			
	Logic P.C. Board Insulation	T-13706	1			
	Relay (2CR) D.C. Box Only	S-13605	1			

VERTICAL HEAD LIFT ASSEMBLY

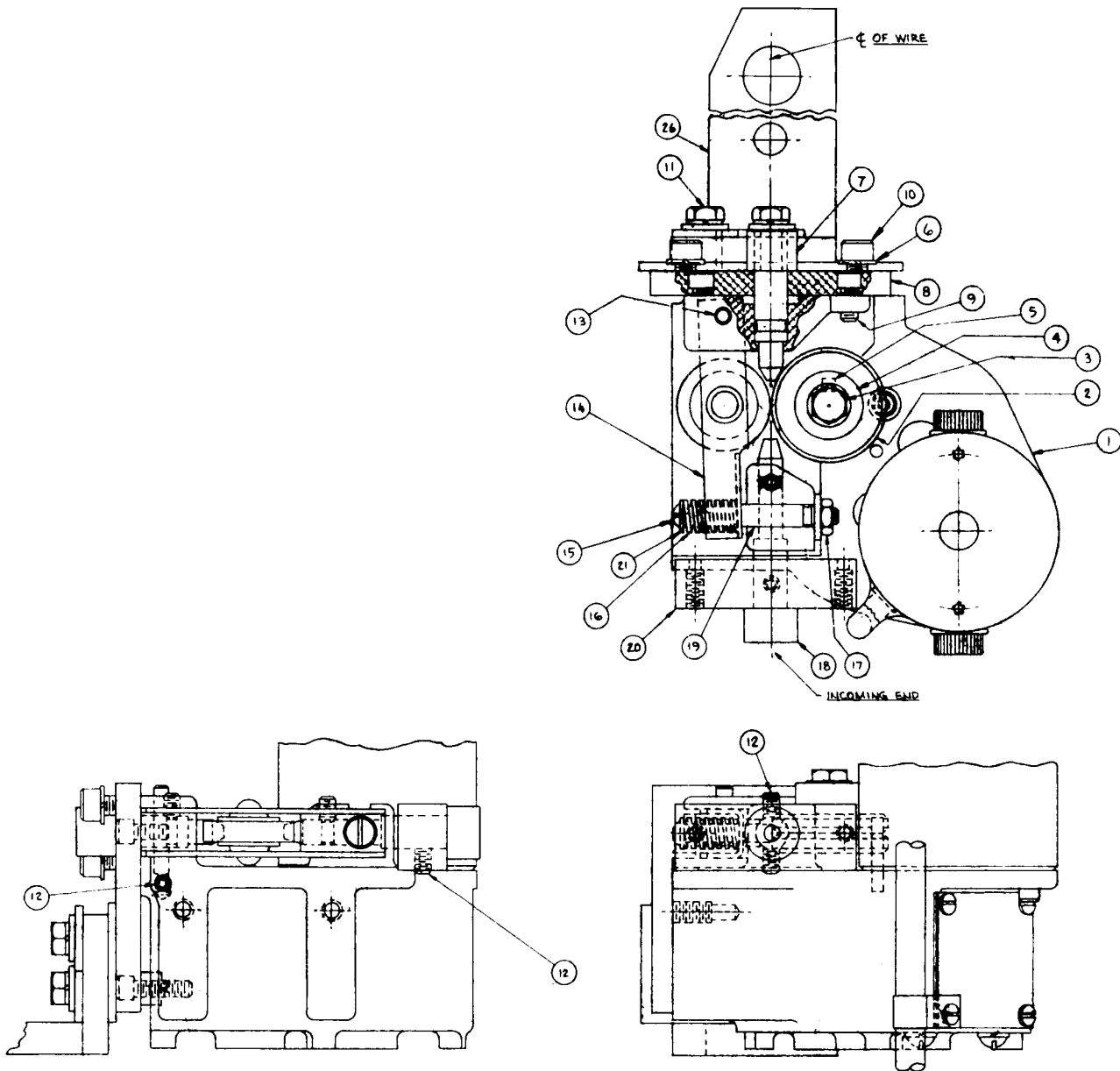


L-5848
4-30-82A

Indicates A Change This Printing

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4	5	6
1	Vertical Head Lift Assembly, Includes: Head Lift	L-5848 L-5847	1 1						
2	Head Lift Tube	M-8228-1	1						
3	Head Lift Lock Pin	S-16067	1						
4	Socket Head Cap Screw	T-9447-32	1						
5	Spring	T-10247-11	1						
6	Spring Retainer	S-11295-5	1						
7	Snap Ring	S-9776-14	1						
8	Head Lift Screw Assembly	S-10114	1						
9	Boot	S-10442	1						
10	Clamp	S-10888-11	1						
11	Clamp	S-10888-8	1						
12	Adjustment Shaft Assembly	S-10097	1						
15	Oil Cup	T-10643	1						
16	Needle Bearing	S-10116-1	1						
17	Thrust Washer	S-9262-37	1						
18	Cover Plate	T-14606	1						
21	Expansion Plug	T-10542-1	1						

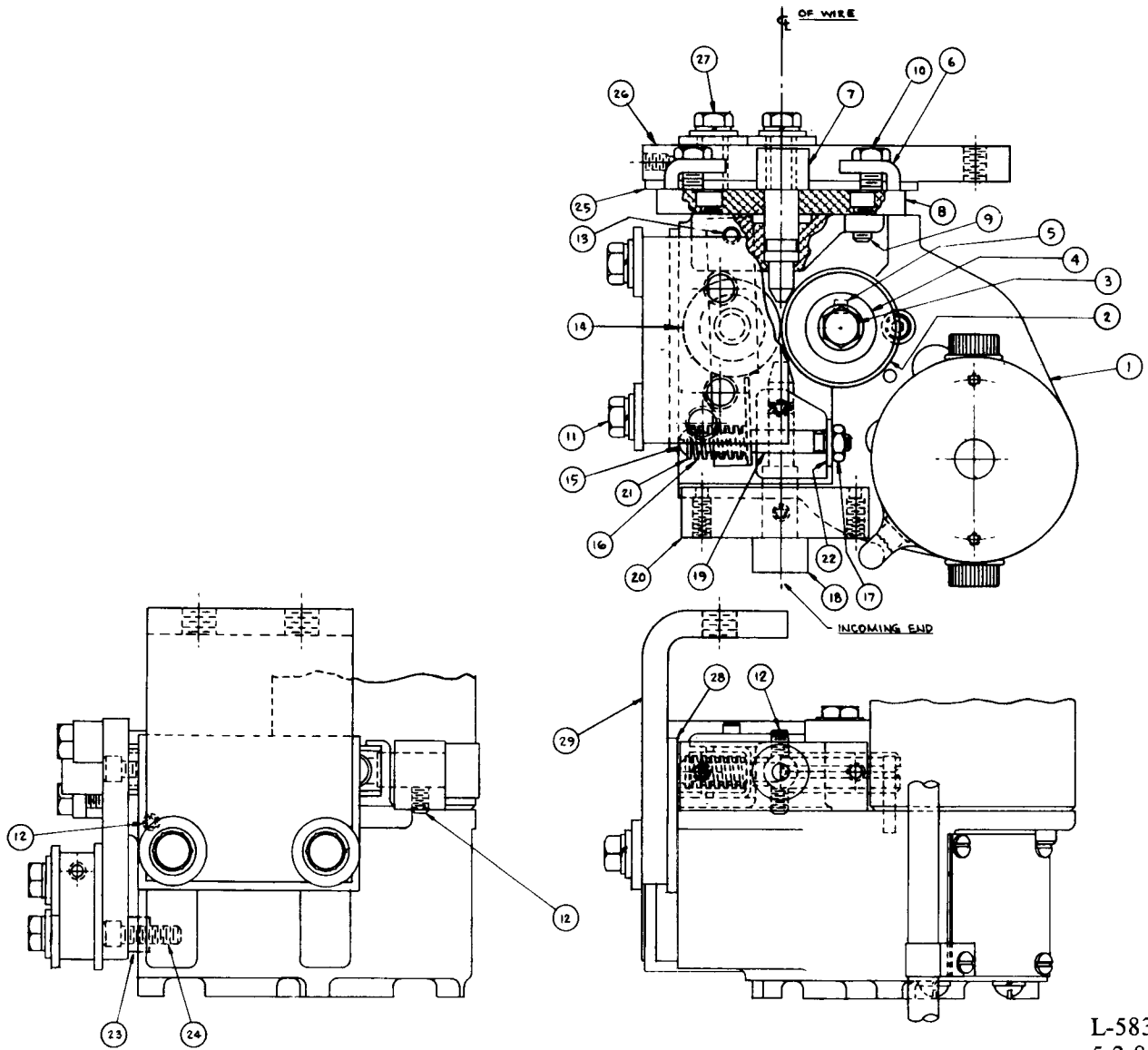
AC HEAD ASSEMBLY



L-5832-2
5-2-86B

# Indicates A Change This Printing						
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3 4 5 6
1	Gear Box Assembly, Includes: Assembly without Motor	L-5504-2 L-5504-2A Less Motor	1 1			
	Drive Motor Assembly, Includes: Drive Motor, Includes: Brush & Spring Assembly	M-12711-1 M-11933-A M-11933-6	1 1 2			
	Brush Cap Pinion Gear Roll Pin	M-11933-7 T-13183 T-9967-33	2 1 1			
	Polarized Plug Cable Clamp Groove Pin, Motor to Gear Box	S-12020-15 S-12024-4 T-10580-6	1 1 1			
2	Socket Head Screw, Motor to Gear Box	T-9447-42	3			
3	Drive Roll	S-14541-3/16	2			
	Sems Screw	T-10082-26	1			
4	Collar Assembly	T-12341	1			
5	Key	M-8776-82	1			
6	Lock Washer	E-106A-14	2			
7	Outgoing Guide Tube	S-15230-3/16	1			
8	Nozzle Mount Pad	S-15209	1			
9	Socket Head Cap Screw	T-9447-9	2			
10	Socket Head Cap Screw	T-9447-19	2			
11	Hex Head Screw	5/16-18 x 1.25	2			
	Insulating Washer	S-10773-58	2			
12	Insulating Tube	T-7305-43	2			
13	Socket Set Screw	S-11604-8	4			
	Pivot Pin	T-13271-1	1			
14	Idle Roll Assembly	S-16666-1	1	#		
15	Round Head Screw	#10-24 x .50	1			
16	Spring	T-10247-11	1			
17	Hex Nut	5/16-18	1			
18	Incoming Guide Tube	S-15229-3/16	1			
19	Idle Roll Pull Arm	S-14533	1			
20	Straightener Mounting Block	T-13672	1			
21	Idle Roll Arm Bracket	T-14443	1			
22	Plain Washer	S-9262-121	1			
23	Spacer	S-10153-37	1			
24	Socket Head Cap Screw	T-9447-10	1			
25	Insulation	T-13695	1			
26	AC Head Mounting Bracket	S-16072	1			

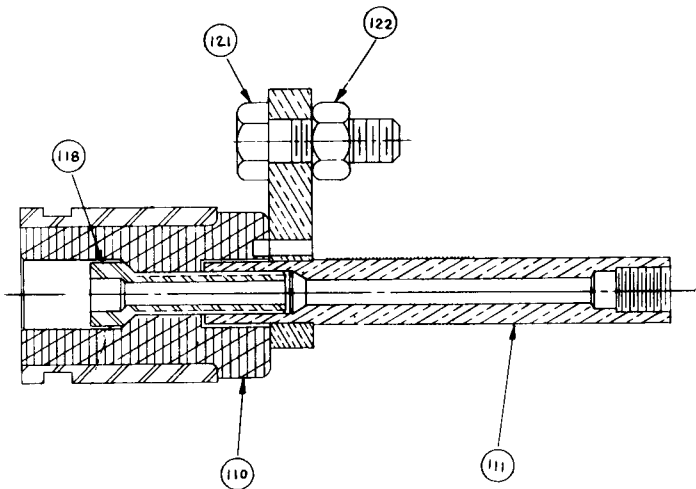
DC HEAD ASSEMBLY



L-5832-1
5-2-86B

# Indicates A Change This Printing									
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4	5	6
1	Gear Box Assembly, Includes: Assembly without Motor	L-5504-2 L-5504-2A Less Motor	1 1						
	Drive Motor Assembly, Includes: Drive Motor, Includes: Brush & Spring Assembly	M-12711-1 M-11933-A M-11933-6	1 1 2						
	Brush Cap Pinion Gear Roll Pin	M-11933-7 T-13183 T-9967-33	2 1 1						
	Polarized Plug Cable Clamp Groove Pin	S-12020-15 S-12024-4 T-10580-6	1 1 1						
2	Socket Head Screw, Motor to Gear Box	T-9447-42	3						
3	Drive Roll	S-14541-3/16	2						
	Sems Screw	T-10082-26	1						
4	Collar Assembly	T-12341	1						
5	Key	M-8776-82	1						
6	Nozzle Clip	T-13715	2						
7	Outgoing Guide Tube	S-15230-3/16	1						
8	Nozzle Mount Pad	S-15209	1						
9	Socket Head Cap Screw	T-9447-9	2						
10	Hex Head Screw	5/16-18 x 1.00	2						
11	Hex Head Screw	5/16-18 x 1.25	2						
	Insulating Washer	S-10773-58	2						
12	Insulating Tube	T-7305-43	2						
13	Socket Set Screw	S-11604-8	4						
	Pivot Pin	T-13271-1	1						
14	Idle Roll Assembly	S-16666-1	1		#				
15	Round Head Screw	#10-24 x .50	1						
16	Spring	T-10247-11	1						
17	Hex Nut	5/16-18	1						
18	Incoming Guide Tube	S-15229-3/16	1						
19	Idle Roll Pull Arm	S-14533	1						
20	Straightener Mounting Block	T-13672	1						
21	Idle Roll Arm Bracket	T-14443	1						
22	Plain Washer	S-9262-121	1						
23	Spacer	S-10153-37	1						
24	Socket Head Cap Screw	T-9447-10	1						
25	Insulation	T-13695	1						
26	Fillet Lap Attachment Mounting Plate	S-15398	1						
27	Hex Head Screw	5/16-18 x 1.25	2						
	Insulating Washer	S-10773-58	2						
28	Insulating Tube	T-7028-134	2						
	Insulation	T-8477-22	1						
29	DC Head Support	S-16070	1						

AC AND DC NOZZLES AND TIPS



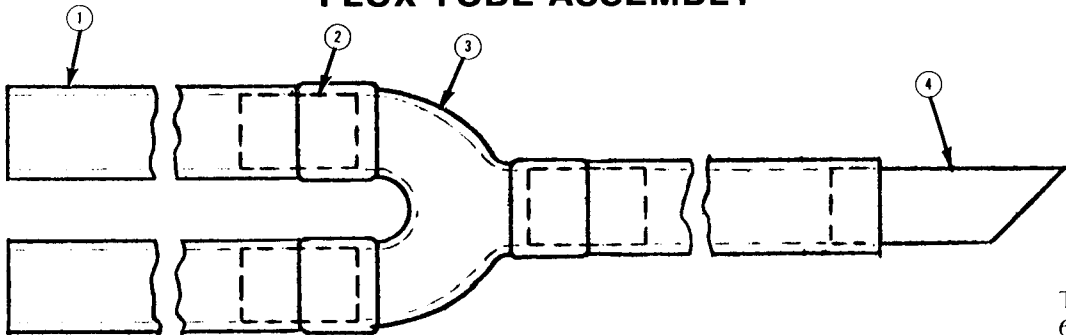
M-8241
5-9-80D

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18
	D.C. Nozzle Assembly, Includes:	M-8241-1	1						
	A.C. Nozzle Assembly, Includes:	M-8241-2	1						
110	D.C. Nozzle Insulator	S-10493	1						
110	A.C. Nozzle Insulator	S-15956-1	1						
111	D.C. Nozzle Body	S-10157	1						
111	A.C. Nozzle Body	S-10157-2	1						
118	Socket Head Screw	T-10570	1						
121	Hex Head Screw	1/2-13 x 1.50	1						
122	Hex Nut	1/2-13	1						
	Nozzle Tips								
	3/32 Nozzle Tip	S-10125-3/32	As Req'd.						
	1/8 Nozzle Tip	S-10125-1/8	As Req'd.						
	5/32 Nozzle Tip	S-10125-5/32	As Req'd.						
	3/16 Nozzle Tip	S-10125-3/16	As Req'd.						

March 1979

FLUX TUBE ASSEMBLY

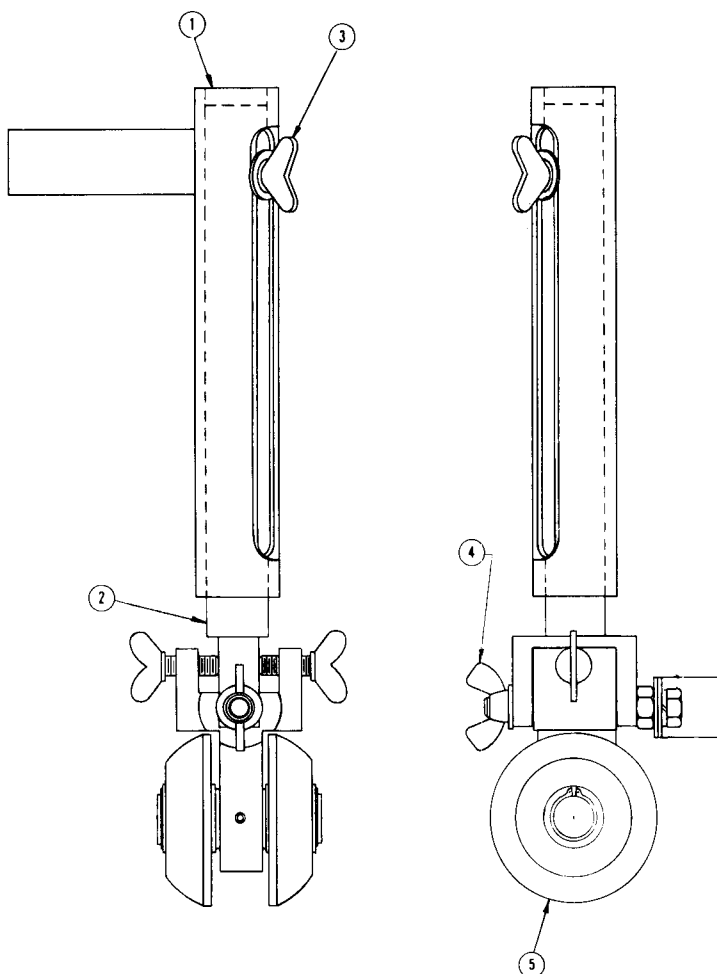
P-129-P



T-14185
6-16-78

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6	7 8 9	10 11 12	13 14 15	16 17 18
	Flux Tube Assembly, includes:	T-14185	1						
1	Flux Tube	T-10642-2	3						
2	Tubing	T-6996-9	3						
3	Flux Tube Connector	S-16124	1						
4	Flux Tip	S-15294	1						

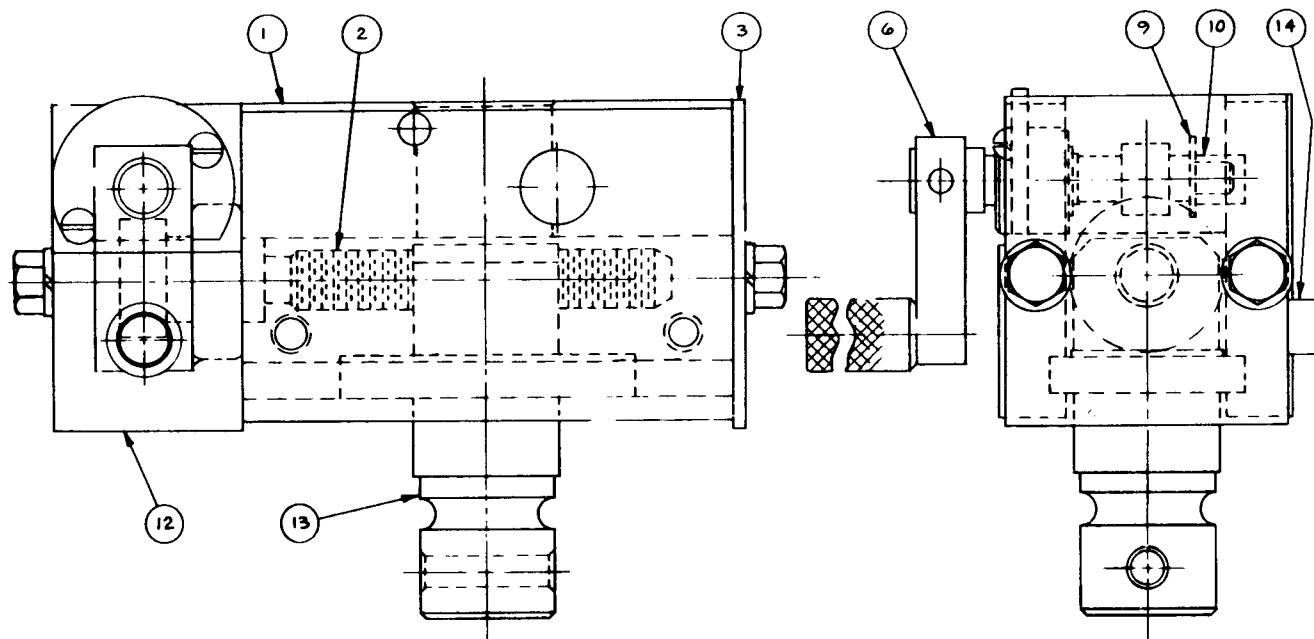
March 1979

OPTIONAL GUIDESM-13958
9-21-79H

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3	4 5 6
	Butt Guide Kit (K-230)	See P-117-J	1		
	Flat Fillet Guide Kit, Includes:	K-287	1		
	Flat Fillet Support Assembly, Includes:	S-16116	1		
	Support Arm	S-16115	1		
	Wheel	T-14494	1		
	Roller Support Arm Assembly, Includes:	S-16106	1		
	Support Arm	S-16101	1		
	Wheel	T-14494	1		
	Horizontal Fillet - Lap Guide Kit, Includes:	K-288	1		
	Fillet - Lap Guide Assembly, Includes	M-13958	1		
1	Attachment Arm	S-15248	1		
2	Slide Arm and Yoke Pivot	S-15251	1		
3	Wing Screw	T-9078	1		
4	Wing Nut	T-9968-1	1		
5	Fillet Guide Wheel Assembly	S-16743	1		
	Roller	S-16740	2		
	Wing Screw	T-9078	2		
	Lap Guide Wheel Assembly	S-15285	1		
	Wing Screw	T-9078	2		
	Stationary Arm	S-16117	1		
	Swinging Arm	S-16118	1		
	Spring	T-5338	1		
	Flux Tube	T-10642-1	3		
	Roller Support Arm Assembly, Includes:	S-16106	1		
	Support Arm	S-16101	1		
	Wheel	T-14494	1		

April 1980

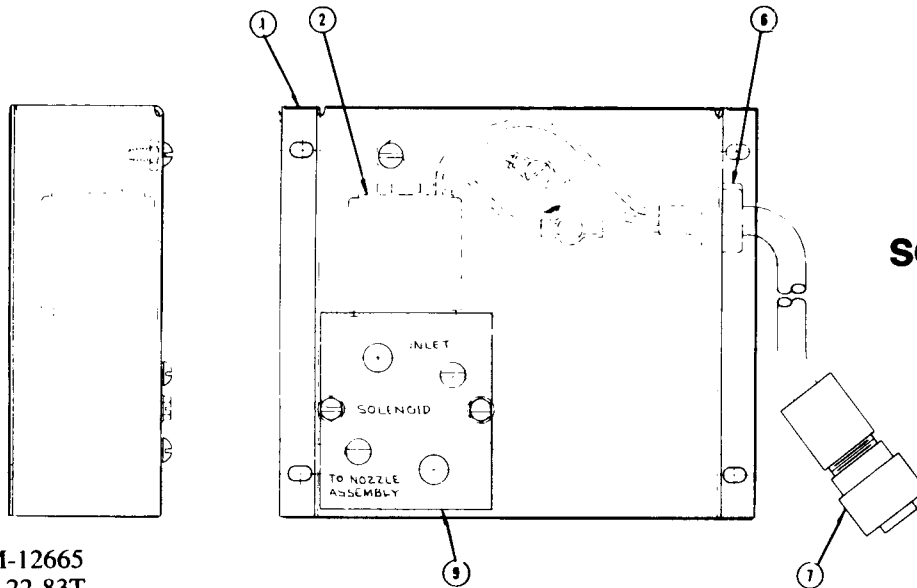
K-96 HORIZONTAL ADJUSTER



M-10224
6-16-78B

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1 2 3
1	Horizontal Adjuster, Includes all Below	K-96	1	
	Cross Adjustment Block	M-13663	1	
2	Cross Adjustment Screw Assembly	S-12734	1	
3	End Cover Plate	S-10509-38	1	
6	Head Lift Adjustment Shaft Assembly	S-10097	1	
9	Thrust Washer	S-9262-37	1	
10	Needle Bearing	S-10116-1	1	
12	Crank Housing	M-10223	1	
13	Cross Slide Assembly	S-12491	1	
14	Socket Head Cap Screw	T-9447-31	2	
	Roll Pin	T-9967-29	1	
	Draw Bolt	T-4893-4	1	
	Hex Nut	3/4-10	1	

May 1980



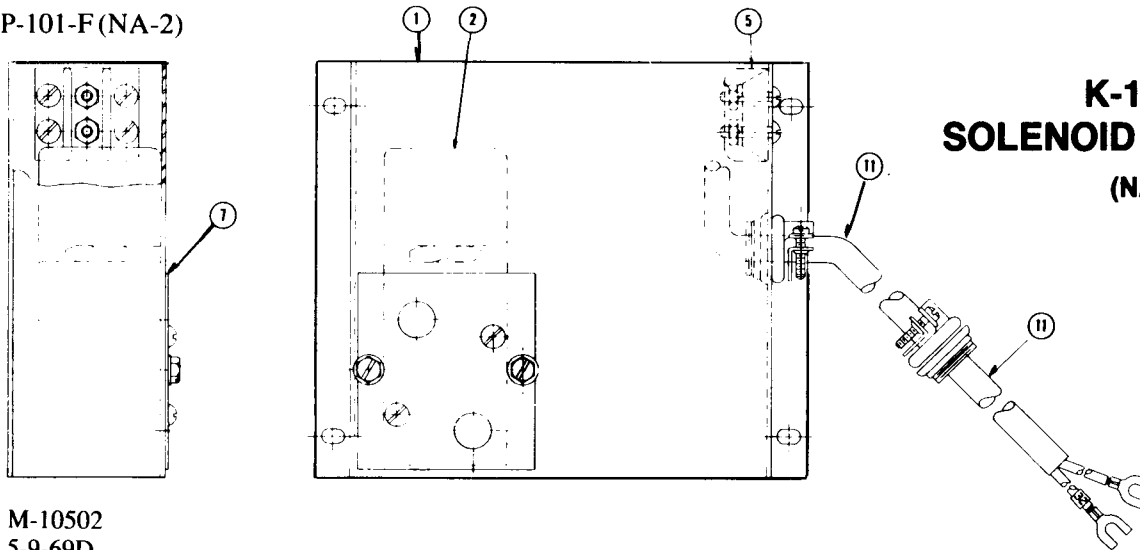
K-223
SOLENOID ASSEMBLY
(NA-3, NA-4 and NA-5)

M-12665
7-22-83T

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Solenoid Assembly, Includes: Solenoid Mounting Bracket	K-223 L-5276	1 1
2	Solenoid and Valve Assembly	M-11675-11	1
6	Strain Relief Grommet	T-9274-3	1
7	Cable Assembly	M-12664	1
9	Name Plate	S-13246	1

P-101-F(NA-2)

7-23-84



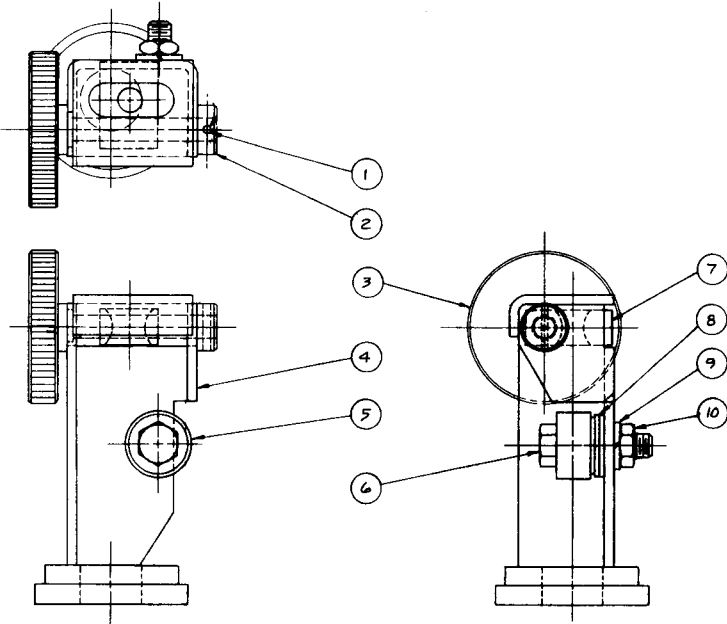
K-120-1
SOLENOID ASSEMBLY
(NA-2)

M-10502
5-9-69D

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Solenoid Assembly Kit, Single Solenoid, Includes: Solenoid Mounting Bracket	K-120-1 L-4222	1 1
2	Solenoid Valve Assembly	M-11675-4	1
5	Terminal Strip	T-10951	1
7	Name Plate	S-13246	1
11	Solenoid Cable Assembly	S-12780	1

May 1980

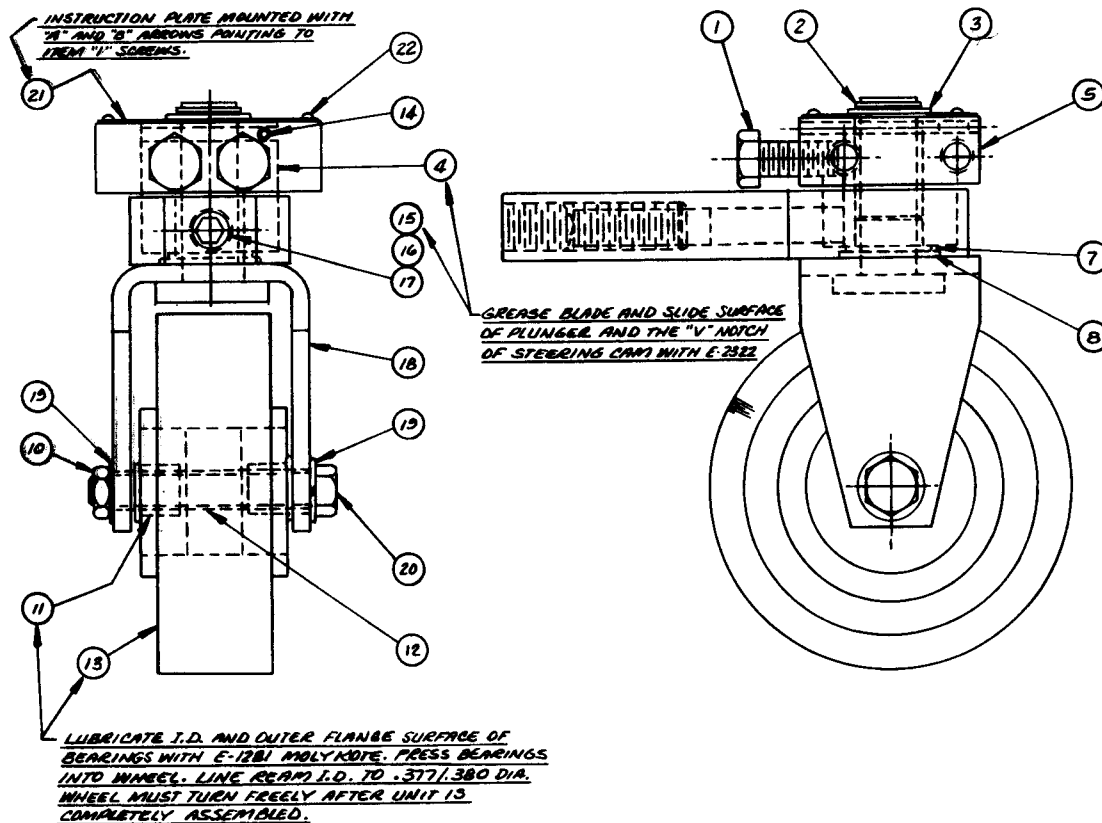
WIRE STRAIGHTENER



M-12680
3-28-75P

# Indicates A Change This Printing						
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3
1	Wire Straightener, Includes All Below: Roll Pin	M-12680 T-9967-5	1 1			
2	Screw Bushing	T-10585	1			
3	Slide Screw Assembly	S-10159	1			
4	Body Assembly	M-12679	1			
5	Wire Guide Wheel	M-9300-26	1			
6	Hex Head Bolt	5/16-18 x 1.25	1			
7	Slide Bushing	T-10584	1			
8	Flat Washer	S-9262-18	2			
9	Lock Washer	E-106-A-14	1			
10	Hex Nut	5/16-18	1			

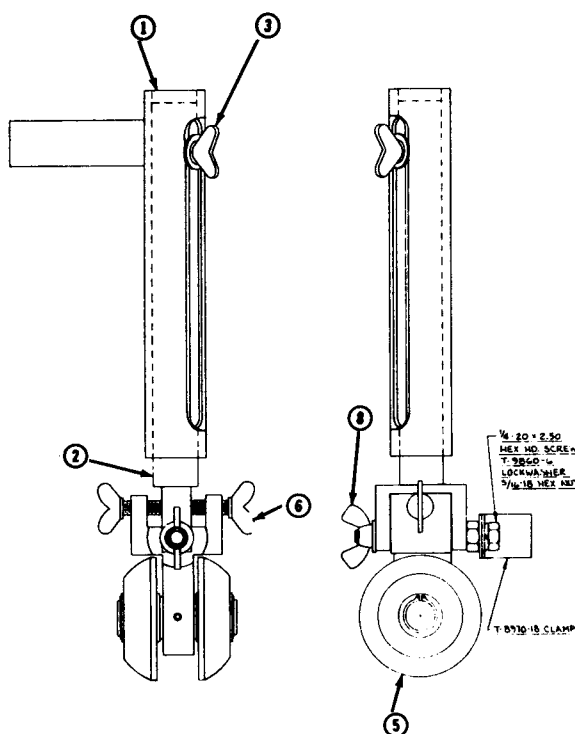
FRONT WHEEL ASSEMBLY



M-12669
6-18-82M

# Indicates A Change This Printing							
ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4 5 6
	Front Wheel Assembly, Includes: (Std. Tractor)	M12669	1				
	Front Wheel Assembly, Includes: (Track Model Only)	M14813	1				
1	Hex Head Screw	3/8-16 x .875	2				
2	Retaining Ring	S9776-7	1				
3	Bearing	S11099-2	1				
4	Steerage Cam	S15162	1				
5	Cam Block (Upper)	S15163	1				
7	Bearing, Bronze	S11099-2	1				
8	Plain Washer	S9262-41	1				
10	Hex Nut	5/16-18	1				
11	Bearing (Std. Tractor Only)	S11099-5	2				
12	Sleeve	S10918-52	1				
13	Wheel (Std. Tractor)	S15191	1				
13	Wheel (Track Model Only) Includes:	S17634-2	1				
	Rail Wheel	S17633	1				
	Wheel	S17635	1				
	Bearing	S11099-5	2				
14	Roll Pin	T9967-31	1				
15	Steerage Plunger	T13665	1				
16	Compression Spring	T11862-27	1				
17	Set Screw	S11604-26	1				
18	Plunger & Wheel Housing Assembly	S15186	1				
19	Lock Washer	E106A-14	2				
20	Hex Head Screw	5/16-18 x 2.75	1				
21	Instruction Plate	S15292	1				
22	Drive Screw	S8025-51	4				

OPTIONAL GUIDES



M-13958
9-21-79H

Indicates A Change This Printing

ITEM	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D	1	2	3	4	5	6
	Butt Guide Kit, Includes: Guide Wheel Bracket	K230 S15259	1 1						
	Guide Wheel Retaining Ring	S7393 S9776-49	2 2						
	Flat Fillet Guide Kit, Includes: Reel Adaptor Bracket	K229 M12709	1 1						
	Rear Support Assembly, Includes: Bracket Wheel	S15279 M12704 T14494	1 1 1						
	Front Support Assembly, Includes: Bracket Wheel	S15278 S15232 T14494	1 1 1						
	Horizontal Fillet-Lap Guide Kit, Includes: Front Guide Assembly, Includes:	K232 M13958	1 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	#					
8	Wing Nut	T9968-1	1						
	Lap Guide Wheel Assembly	S15285	1						
	Wing Screw	T9078	2						
	Tension Spring and Hook	T13731	1						
	Rear Support, Includes: Arm Wheel	S15280 S15231 T14494	1 1 1						

LIMITED WARRANTY

STATEMENT OF WARRANTY:

The Lincoln Electric Company (Lincoln) warrants to the original purchaser (end-user) of new equipment that it will be free of defects in workmanship and material.

This warranty is void if Lincoln finds that the equipment has been subjected to improper care or abnormal operation.

WARRANTY PERIOD:

All warranty periods date from the date of shipment to the original purchaser and are as follows:

Three Years:

Transformer Welders
Motor-generator Welders
Semiautomatic Wire feeders
Plasma-cutting power source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

Two Years:

Engine Driven Welders (except engine and engine accessories) with operating speed over 2,000 RPM

All engine and engine accessories are warranted by the engine or engine accessory manufacturer and are not covered by this warranty.

Equipment not listed above such as guns and cable assemblies, automatic wire feeders and field-installed optional equipment is warranted for one year.

TO OBTAIN WARRANTY COVERAGE:

You are required to notify Lincoln Electric, your Lincoln Distributor, Lincoln Service Center or Field Service Shop of any defect within the warranty period. Written notification is recommended.

WARRANTY REPAIR:

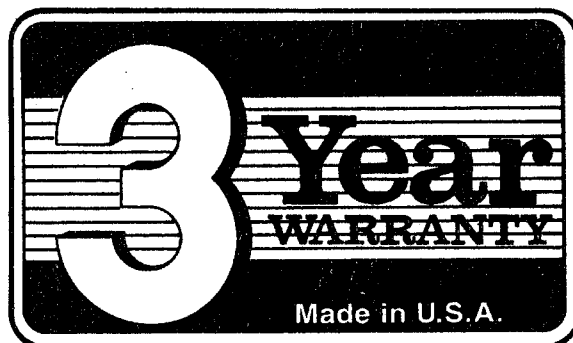
If Lincoln's inspection of the equipment confirms the existence of a defect covered by this warranty, the defect will be corrected by repair or replacement at Lincoln's option.

WARRANTY COSTS:

You must bear the cost of shipping the equipment to a Lincoln Service Center or Field Service Shop as well as return shipment to you from that location.

IMPORTANT WARRANTY LIMITATIONS:

- Lincoln will not accept responsibility for repairs made without its authorization.
- Lincoln shall not be liable for consequential damages (such as loss of business, etc.) caused by the defect or reasonable delay in correcting the defect.
- Lincoln's liability under this warranty shall not exceed the cost of correcting the defect.
- This written warranty is the **only** express warranty provided by Lincoln with respect to its products. Warranties implied by law such as the Warranty of Merchantability are limited to the duration of this limited warranty for the equipment involved.



THE LINCOLN ELECTRIC COMPANY

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Sales and Service Worldwide
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