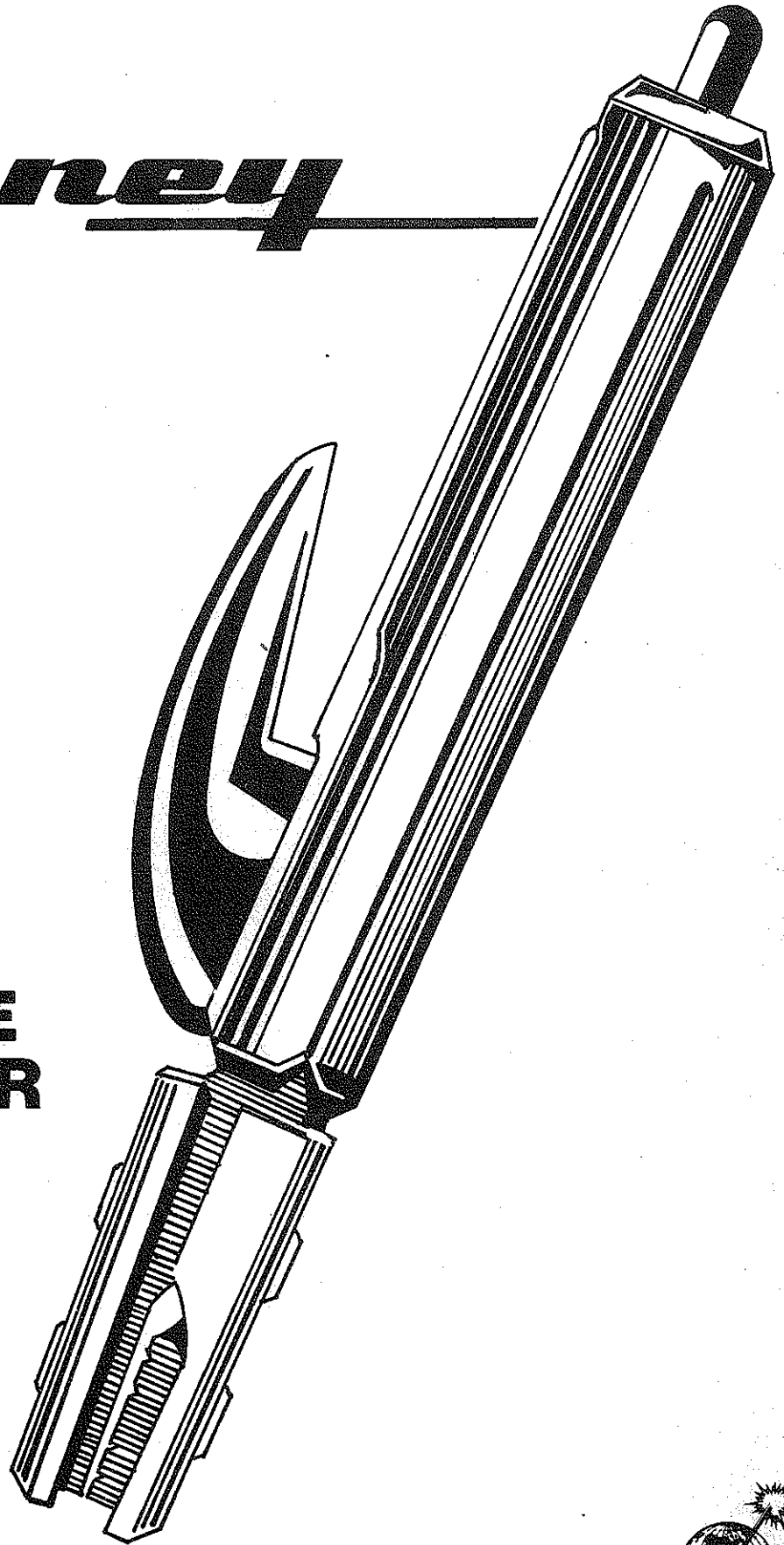


# **Forney**

**Operating  
and  
Service  
Instructions  
FORNEY  
SHUNT-TYPE  
ARC WELDER**



**Forney**

**Industries, Inc.** U.S.A.  
Box 563 Fort Collins, Colo. 80521 U.S.A. ●

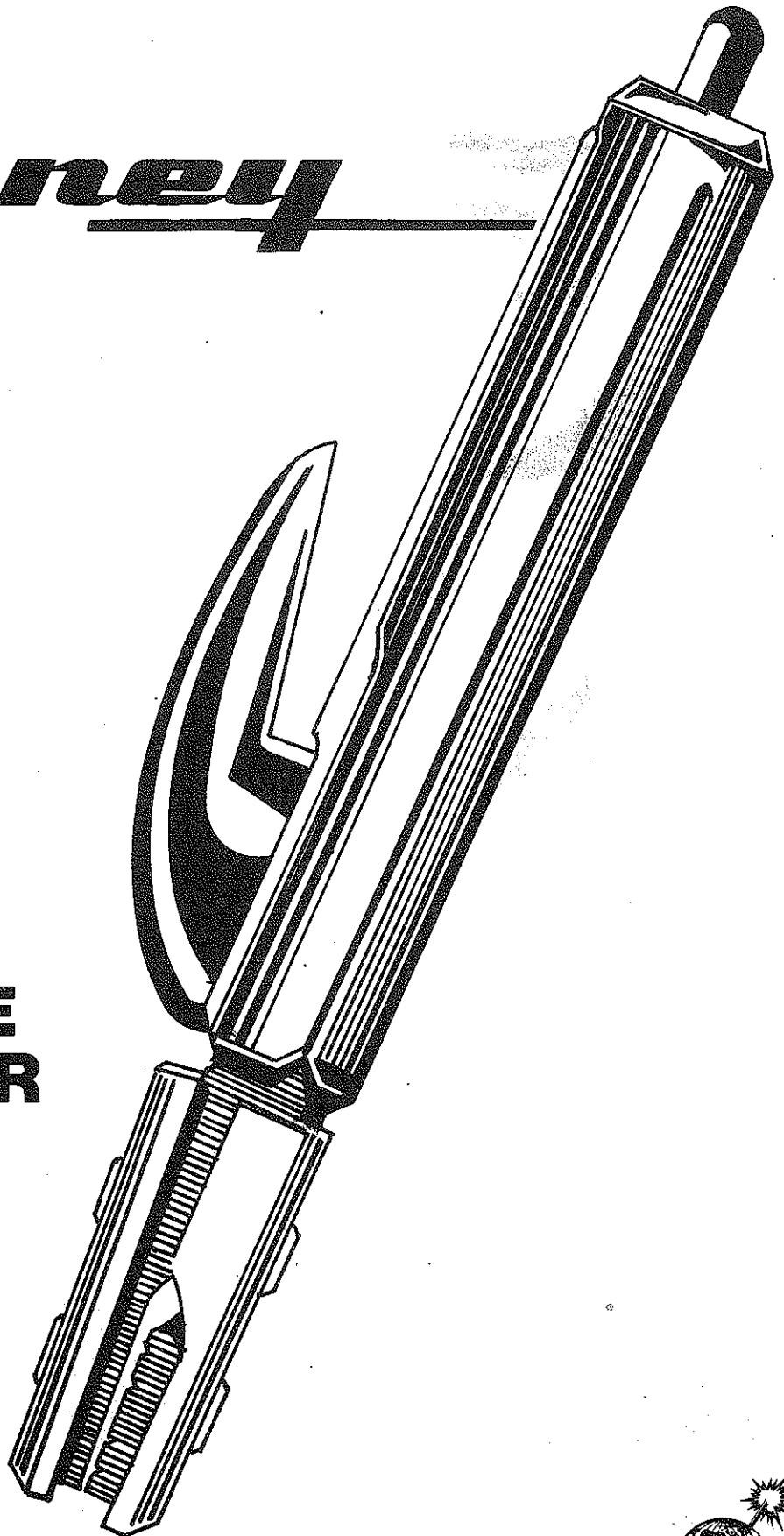
**Arc Welders Ltd.** CANADA  
Box 1040, Regina, Sask. Canada ●



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VERTICAL SHUNT WELDER  
MODEL 235 AC/DC  
GENERAL INFORMATION & PARTS LIST #31600

This arc welder is a precision engineered, quality manufactured machine designed for long life and dependable service. It is an easy - to - use practical welder for general repair--especially designed for filling station and garage work--light manufacturing -- farm repair -- body and sheet metal work.

The unit has AC and DC output welding ranges with infinite amperage settings within each range. The indicator arm (visible through slot in front panel) indicates at a glance the amperage you have selected.

SPECIFICATIONS

Transformer - Heavy Duty - Limited Input		Welding Range AC-Amps LO 20-170, HI 30-235	
Primary Voltage	230	Welding Range DC-Amps	20-150
Primary Input	53	Secondary Load Volts	25
Phase Single.	Frequency 60 Hz	Temp. Rise	115° C
Max. Open Circuit Voltage	80	Duty Cycle	20-100 %

ACCESSORIES ARE OPTIONAL

Electrode Holder and Cable- The electrode holder is a fully insulated heavy duty holder allowing a full range of welding rod diameters and has four positions to hold welding rod. The cable is extra flexible fine strand welding cable. The plug is machined brass with a molded rubber integral insulation and grip.

Ground Clamp and Cable- The ground clamp is heavy duty and will clamp to a wide variety of shapes and sizes to be welded. Cable quality and plug-in the same as electrode cable.

Helmet- The helmet is molded rugged fiberglass with semi-flexible headband fully adjustable for comfort fit. Its main features besides the rugged quality are its light weight and snug size. It is especially advantageous to repair around machines, under cars and trucks and other confining repair jobs. Comes complete with Government approved welding arc filter lens and special spatter resistant clear cover lens.

Electric Arc Torch- A very useful accessory for brazing, heavy soldering, pre-heating, bending, paint and scale removing. Plugs into welding stages and gives up to 9000° F flame. Easy to use.

Welding Rod-Flux-Brazing Rod-Hardsurfacing Materials-Extension Cables-Many other Welding Supplies and Equipment.

INSTALLATION

Location - The location you pick for your arc welder is quite important and certain factors should be considered. Among them are the following:

1. Place your welder in an area that is free of any volatile liquids, excessive dust, or any other easy inflammable items that sparks from welding may ignite.
2. An open area with adequate floor space is important as many things to be welded need to be laid out on the floor or on a large bench for easier operation.
3. Location of your welder should be free from damp or wet floor or ground.
4. If it is intended to weld on large equipment that cannot be brought inside the building, it is best to locate the welder near the door or provide a power receptacle near the door so that your welder can be used both outside and inside.

5. Your welder should be located where there is adequate power supply. The unit requires a 50 amp fuse or breaker. A power supply wire size for the welder only over a short distance can be a size #8. If longer distances are required, a #6 wire is recommended to eliminate any excessive voltage drop. If other electrical equipment is to be operated at the same time you are welding, increasingly larger wire size will be necessary and can be figured by your electrician.

NOTE

DO NOT connect this welder to a 3-phase supply as a 3-phase machine. If no 230 volt single phase power is available, the welder can be used by connecting to only two of the 3-phase connections. However, care must be taken that the third ground safety wire is properly connected to a separate approved ground.

OPERATING INSTRUCTIONS

WELDING--Good strong welds can be easily attained by following these easy instructions.

1. Prepare the joint to be welded making certain that the metal is clean of all foreign material.
2. Select the correct rod type and size to properly weld the joint.
3. Connect the electrode holder and ground clamp cables to the proper output jacks, turn the crank so that the output amperage is matched to the amperage requirements of the rod used.
4. Turn the welder on and proceed to weld using accepted welding procedures.

BRAZING--With the carbon arc torch it is very easy to do. You simply use the regular amperage plugs and grounds with the torch. The torch is designed to use 1/4", 5/16", 3/8", and 1/2" copper coated carbon rods. The most popular sizes for regular work are 5/16" and 3/8" diameters.

3/16" carbon . . . . not more than 30 amps	1/4" carbon . . . . not more than 50 amps
5/16" carbon . . . . not more than 90 amps	3/8" carbon . . . . not more than 120 amps

MAINTENANCE--The welder requires little maintenance other than normal care. Keep the welder case clean and waxed to preserve the original finish. The electrode holder, ground clamp, and plugs SHOULD BE KEPT CLEAN to give BEST PERFORMANCE!

Caution: Do not force the crank at the end of the welding ranges; observe the indicator arm through slot on front panel. Some increase in transformer hum may be noted at some amperage settings more than others. This is normal, however, wear on the shunt locks or guides may cause hum to become excessive. This can be corrected by unplugging supply cable, removing case top, lift air baffles, locate shunt lock pressure plates on the side of transformer, tighten each nut equally (not over 1/4 turn at a time). Under each nut is a special "spring" washer--this washer should never be tightened completely flat. Tension can be checked by turning crank to determine if it cranks too hard. The locks should not be tightened beyond a comfortable turning of the crank with the fingers. A paste-type silicone grease may be added to the shunt locks and to shunt lead screw. Place Air Baffles back in their proper location.

Before each operation of the welder check to see if the fan is turning properly after turning welder switch on. The fan has sealed lubricated bearings; however, dirt may accumulate on the fan blades or armature causing decreased air flow or fan stoppage. THE WELDER MUST NOT BE OPERATED IF THE FAN IS NOT RUNNING PROPERLY.

The fan can easily be removed for cleaning or checking by unplugging supply cord. Remove case top, lift air baffles, loosen screws on fan motor straps allowing motor and fan assembly to be removed from shroud. The leads are to be disconnected at the switch. Apply 230 volts AC to fan on bench checking.

# OPERATING AND SERVICE INSTRUCTIONS FOR FS235 AC-DC AMP WELDERS

## DC WELDING

To weld on DC locate the two DC output jacks on the front of the machine. You will notice the positive jack as a Red insulator; the negative jack has a Black insulator. When the electrode plug is inserted into the Black Negative jack and the Red ground plug is plugged into the Red Positive jack, you will be welding on "STRAIGHT POLARITY" (electrode negative). For "REVERSE POLARITY" (electrode positive) switch the plugs so that ground plug is in the NEGATIVE jack.

Generally, REVERSE POLARITY gives deeper penetration. STRAIGHT POLARITY gives higher melt-off rate of electrode.

**WARNING - BE SURE BOTH CABLES ARE PLUGGED IN THE DC SECTION FOR DC WELDING OR INTO THE AC SECTION FOR AC WELDING. DO NOT OPERATE WITH ONE CABLE IN DC AND ONE IN AC.**

In order to vary amperage on the machine, crank shunt up or down to desired setting. See "DC" rate setting to the left of indicator slot.

## WELDING INSTRUCTIONS

With the advance of new and special welding electrodes, more emphasis has been placed on utilizing both AC and DC for all-around welding operations.

AC is generally better suited for high speed High Amperage: to overcome "Arc Blow" encountered with DC for most of the iron powder electrodes.

DC is generally better for stainless, some hard facing, sheet metal and nonferrous welding; also for use with the electrodes sensitive to polarity such as "STRAIGHT POLARITY" and "REVERSE POLARITY" welding rods.

The DC section is made up of four large Silicon Diodes mounted on heavy aluminum heat sinks. A fan cools both the diodes, the DC-choke, and the welding transformer.

## SERVICE

For service or troubleshooting, consult attached electrical schematic DWG. #31601, as well as special parts pictorial DWG. #31600. For ease of service, the front panel has a separate upper and lower section.

**CAUTION:** Be sure welder is disconnected from powerline before service work is attempted.

## SERIAL NUMBER REGISTRATION

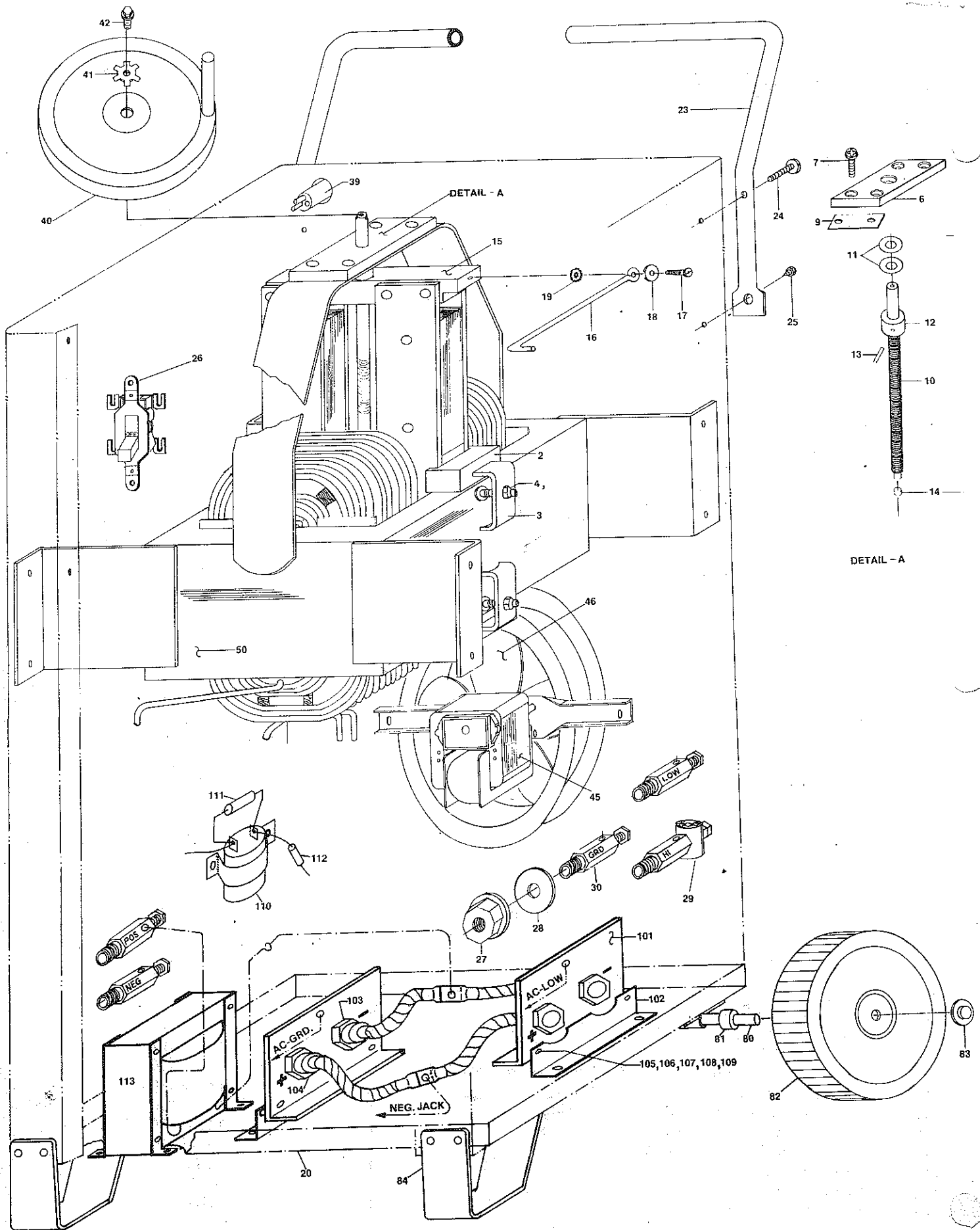
Be sure to mail in the serial number card attached to your repair unit to register your guarantee with the factory. This will help prevent any delays in rendering fast factory service should the need arise.

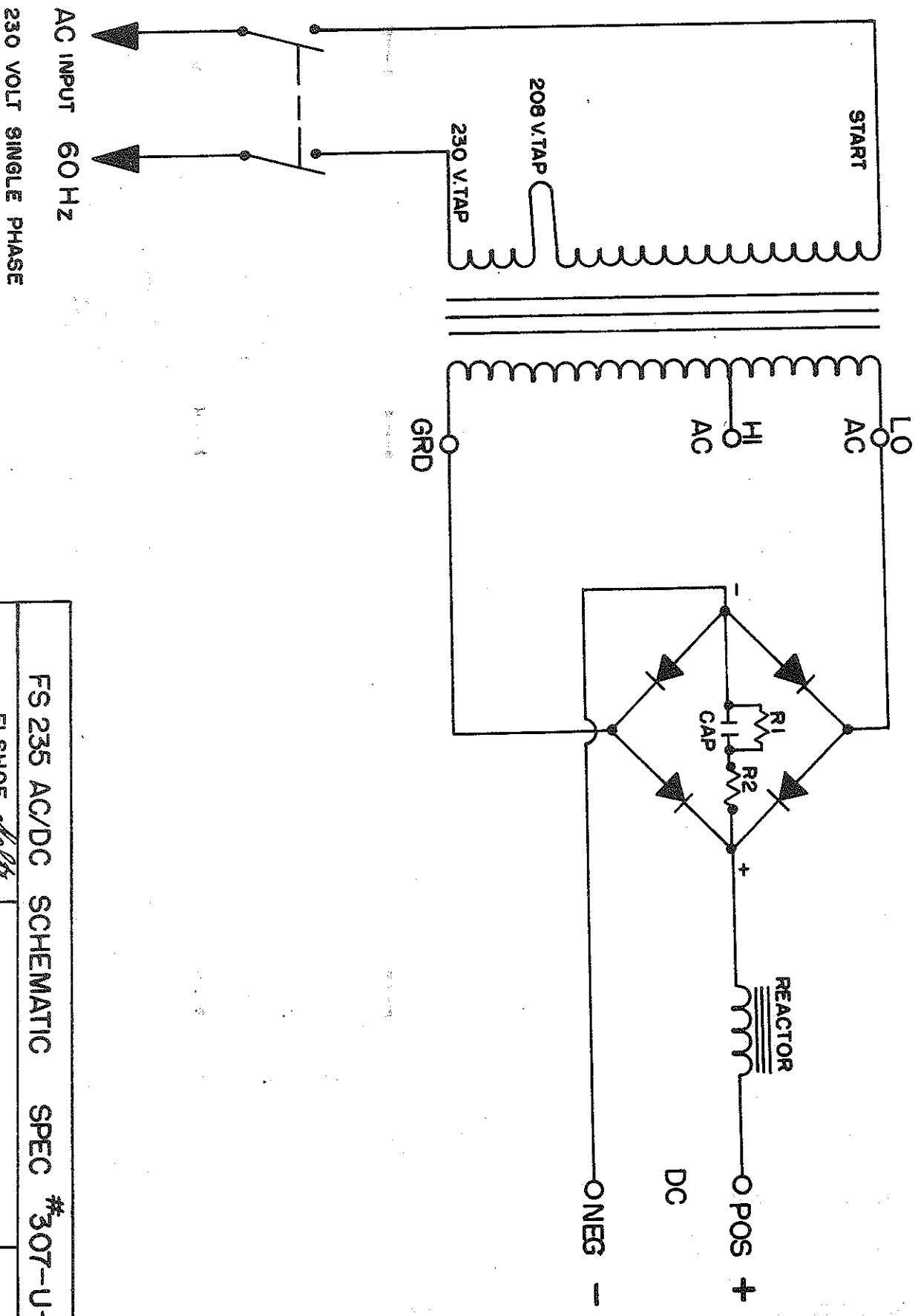
Write to the Service Department at the factory for authorization before sending your FORNEY WELDER in for repair. Always give serial number, model and specification number in your correspondence.

All transportation costs to and from the factory are the responsibility of the owner, and must be paid by him.

PARTS LIST FOR VERTICAL SHUNT WELDER  
MODEL FS 235 AC/DC #31600 Serial # 399 & Up

ITEM #	DESCRIPTION	# REQ.	PART #
50	X-former Ass'y for 230 Volts, Spec. #252-U-3	1	24950
02	Shuntlock	4	20033
03	Pressure Clip for Shuntlocks (Single)	4	20030
04	Spring Washer	4	134-5321
05	Nut, Self-Locking	4	135-4332
06	Front Plate	1	12726
07	Screws, Pan Hd. Ph. 1/4-20 x 5/8" lg.	4	131-62502
09	Speed-Nut, 1/4-20 (Dual)	2	135-63313
10	Lead Screw	1	12725 B
11	Washer Thrust (Nylon)	2	134-7762
12	Bushing	1	24944
13	Drive Pin (1/8 dia.)	1	136-3815
14	Thrust Disk	1	12729
15	Shunt Sub Ass'y	1	20020
16	Indicator Arm	1	24919
17	Screw (Ind. Arm) 10-16 x 3/4 (Type 25)	1	130-2665
18	Washer, Terminal Cup	1	134-6330
19	Washer, Double Serrated	1	134-5321
20	Case Ass'y (Sides-Rear-Bottom)	1	24910
22	Case Top (Not Shown)	1	24913
23	Handle	1	24916
24	Screw, Self Tapping # 14 x 1-1/8 (Type AB)	2	132-2369
25	Screw, Self Tapping # 14 x 1/2 (Type AB)	2	132-2764
26	Switch, Toggle, DP, ST	1	151-7329
27a	Insulator, Molded (Green)	1	57503-0
27b	Insulator, Molded (Black)	3	57501-0
27c	Insulator, Molded (Red)	1	57502-0
28	Insulator Washer (1/8 thick)	5	57404-0
29	Wire Clamp Set (2 Half)	1	06063
30	Jack, w/Screw	5	57500-0
31	Air Baffle	2	24957
39	Lead-in-Cordset	1	173-0807
40	Crank-Disc Ass'y	1	14420
41	Washer, Lock (Dished Type) to attach Crank	1	134-9324
42	Screw, Mach., 1/4-20 x 3/8, to attach Crank	1	131-70501
45	Fan Motor Ass'y (230V, 60 Hz) w/Mtg. Bracket	1	14430
46	Fan Blade, 6-5/8" dia. (Molded Nylon)	1	151-5011
80	Axle (18" long)	1	24917
81	Spacer	2	14415
82	Wheel (5-1/2 x 1-3/16)	2	148-8406
83	Pushnut	2	135-7504
84	Leg	2	24923
85	Screw, Self Tapping 10-24 x 1/2	8	132-1744
DC SECTION			
101	Heatsink	2	31622
102	Bracket	2	31621
103	Diode Neg. 200 Piv. <i>ST930N - 153-1506</i>	2	153-1514
104	Diode Pos. 200 Piv. <i>ST930P - 153-1507 1505</i>	2	153-1513
105	Screw 1/4-20 x 1" ST. CP.	4	131-00505
106	Nut, Hex. 1/4-20 ST. CP.	4	135-1331
107	Washer, Nylon Insulator Upset	4	134-9561
108	Washer, Fibre Insulator Flat 1/16 x 3/8 x 3/4	4	134-7956
109	Insulator Spacer	4	186-2840
110	DC Filter Capacitor, 236 Vac, 4 mfd.	1	153-1000
111	Resistor R1, 1000 ohm, 12 W.	1	153-6839
112	Resistor R2, 27 ohm, 2 W.	1	153-6838
113	Reactor Ass'y Spec. # 307-3	1	31620
114	Front Panel, Upper	1	31611
115	Front Panel, Lower	1	31616





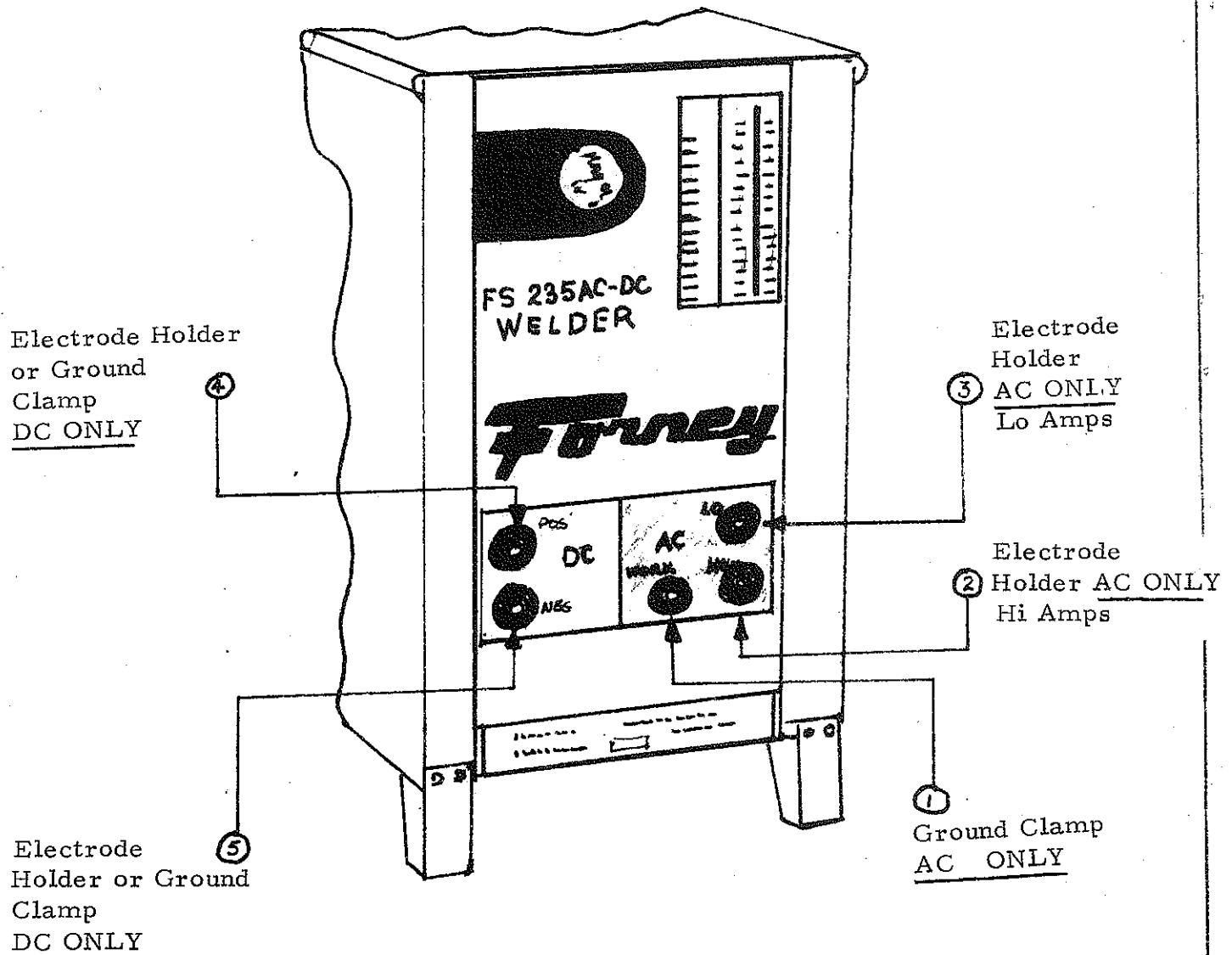
FS 235 AC/DC SCHEMATIC SPEC #307-U-3	
ELSHOF <i>elshof</i>	
6-2-82	
NONE	
	31601



For DC STRAIGHT polarity, plug electrode holder into NEG. and ground clamp into POS.

For DC REVERSE polarity, plug electrode holder into POS. and ground clamp into NEG.

Generally, reverse polarity gives deeper penetration. Straight polarity gives higher melt-off rate of electrode.



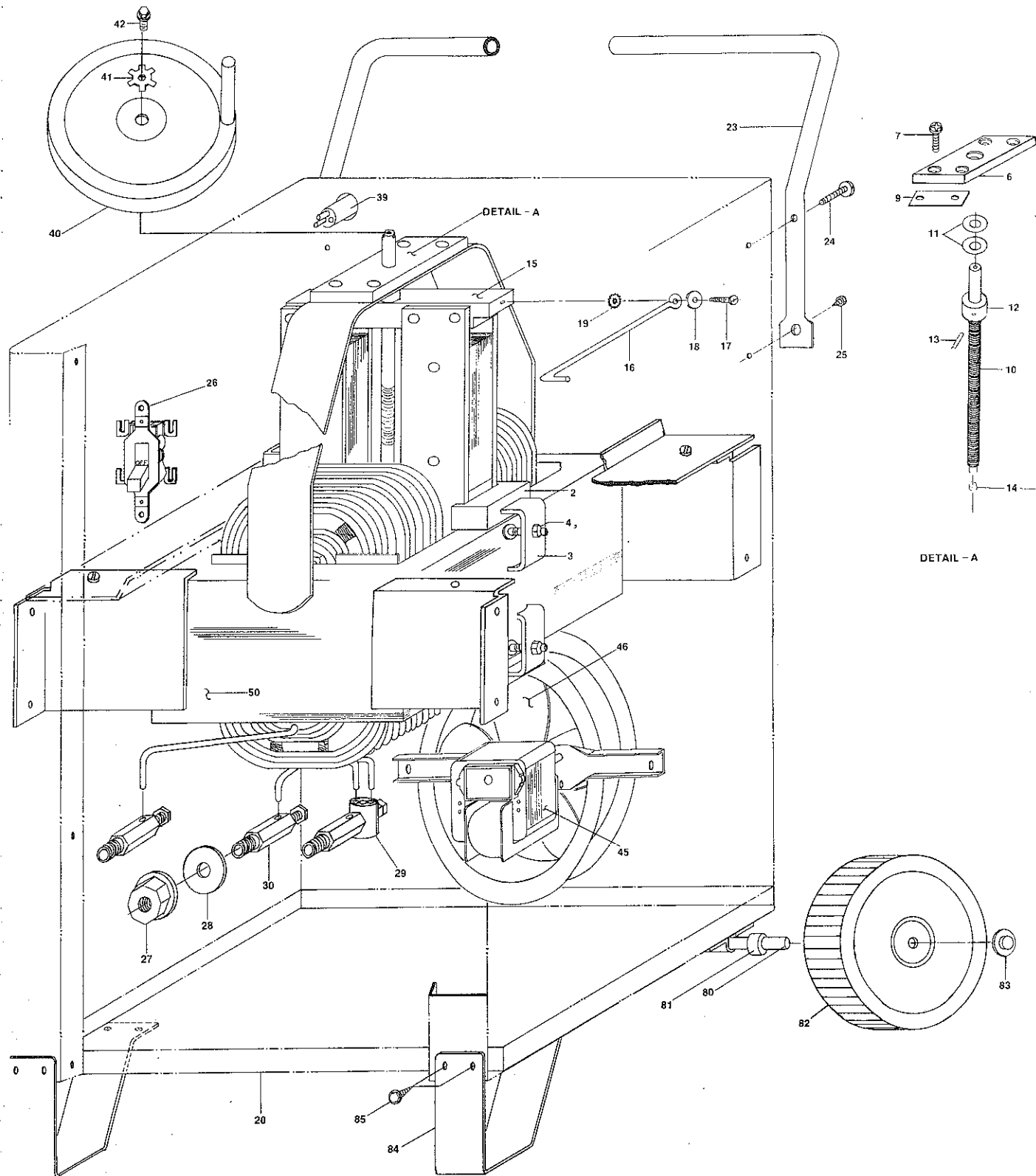
**WARNING: BE SURE BOTH CABLES ARE PLUGGED INTO THE DC SECTION FOR DC WELDING, OR INTO THE AC SECTION FOR AC WELDING.**

**DO NOT OPERATE WITH ONE CABLE IN THE DC SECTION AND ONE IN THE AC SECTION!**

PARTS LIST  
FORNEY VERTICAL SHUNTWELDERS  
MODEL FS-235 (24900)

ITEM NO.	NAME	NUMBER REQUIRED	PART NO.
50	X-former Ass'y (w/Windings & Mtg. Brackets) wound for 230 Volt, Spec. # 252-U-3	1	24950
02	Shuntlock	4	20033
03	Pressure Clip for Shuntlocks (Single)	4	20030
04	Spring Washer	4	134-5321
05	Nut, Self-Locking	4	135-4332
06	Front Plate	1	12726
07	Screws, Pan Hd. Ph. 1/4-20 x 5/8" lg.	4	131-62502
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25	Screw, Self Tapping # 14 x 1/2 (Type AB)	2	132-2764
26	Switch, Toggle, DP, ST	1	151-7329
27	Insulator, Molded (Green)	1	57503-0
	Insulator, Molded (Black)	2	57501-0
28	Insulator Washer (1/8 thick)	3	57404-0
29	Wire Clamp Set (2 Half)	1	06063
30	Jack, w/Screw	3	57500-0
39	Lead-in-Cordset	1	173-0807 ✓
40	Crank-Disc Ass'y	1	14420
41	Washer, Lock (Dished Type) to attach Crank	1	134-9324
42	Screw, Mach., 1/4-20 x 3/8, to attach Crank	1	131-70501
45	Fan Motor Ass'y (230V, 60 Hz) w/Mtg. Bracket	1	14430
46	Fan Blade, 6-5/8" dia. (Molded Nylon)	1	151-5011
80	Axle (18" long)	1	24917
81	Spacer	2	14415
82	Wheel (5-1/2 x 1-3/16)	2	148-8406
83	Pushnut	2	135-7504
84	Leg	2	24923
85	Screw, Self Tapping 10-24 x 1/2	8	132-1744
			O-124

*4/5/91*  
*DLR RTH*  
*4.73/6-65*



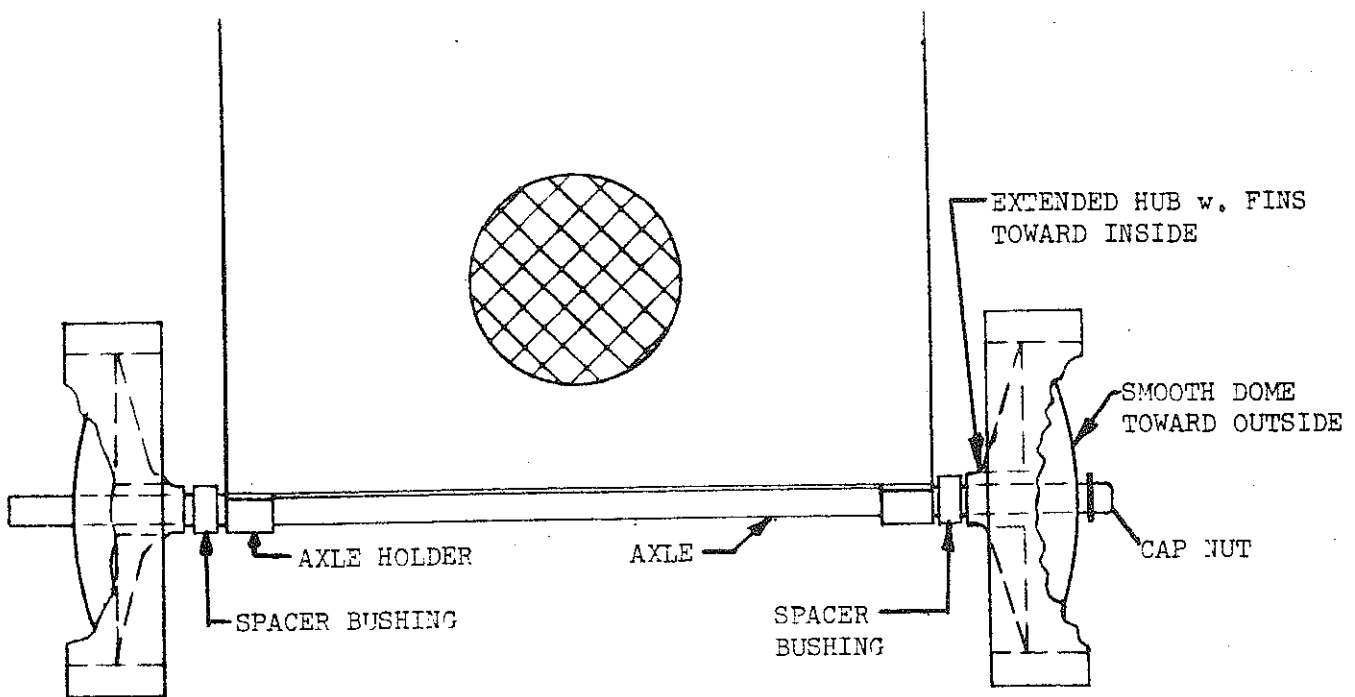
DETAIL - A

3-1-79

PARTS PICTORIAL FORNEY VERTICAL SHUNT WELDER

24900

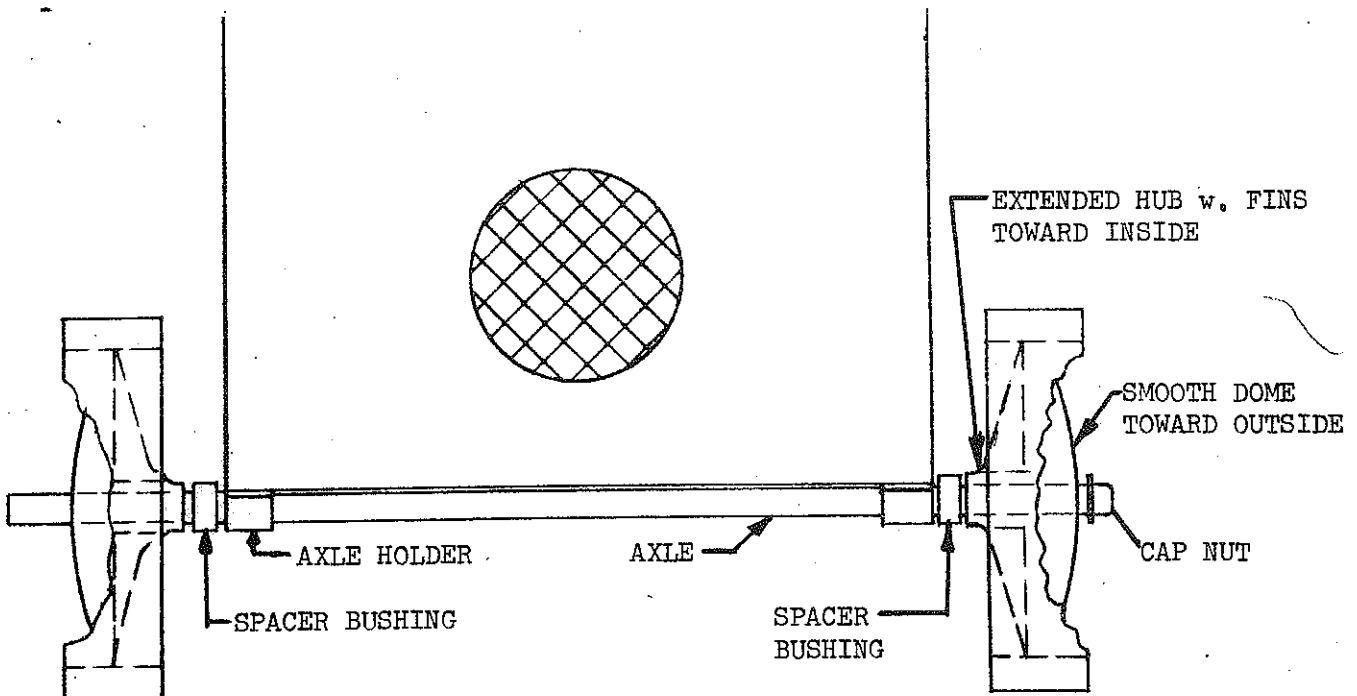
CAP NUT



INSTALLATION INSTRUCTIONS for AXLE & WHEELS

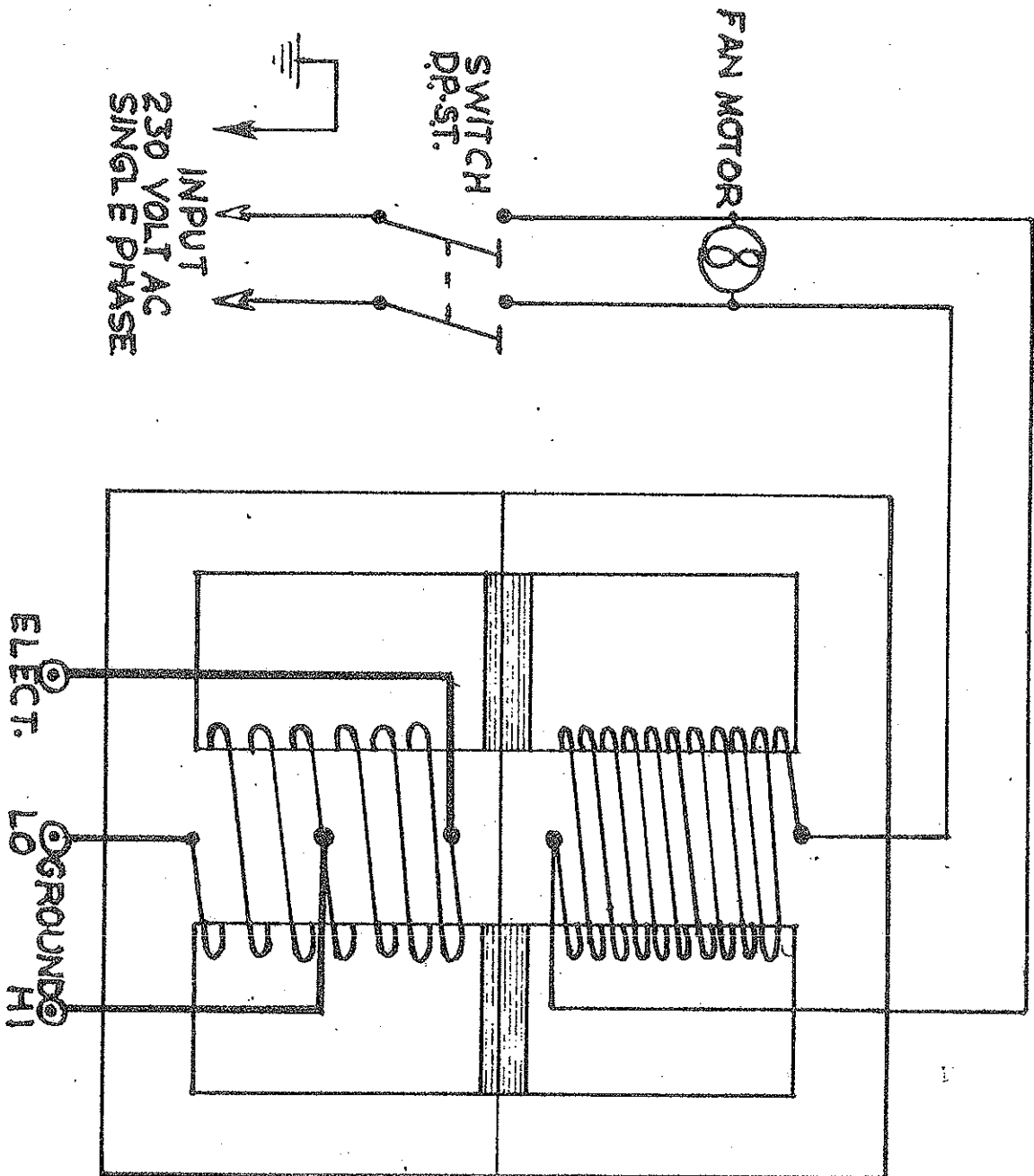
- 1.) Lay machine face down (using carton as cushion).
- 2.) Slide one Wheel and Spacer Bushing onto Axle (at end where Cap Nut is already installed on Axle).
- 3.) Push axle thru both axle holders.
- 4.) Slide Spacer Bushing & Wheel onto axle from other side and drive Cap Nut onto axle.

CAP NUT



INSTALLATION INSTRUCTIONS for AXLE & WHEELS

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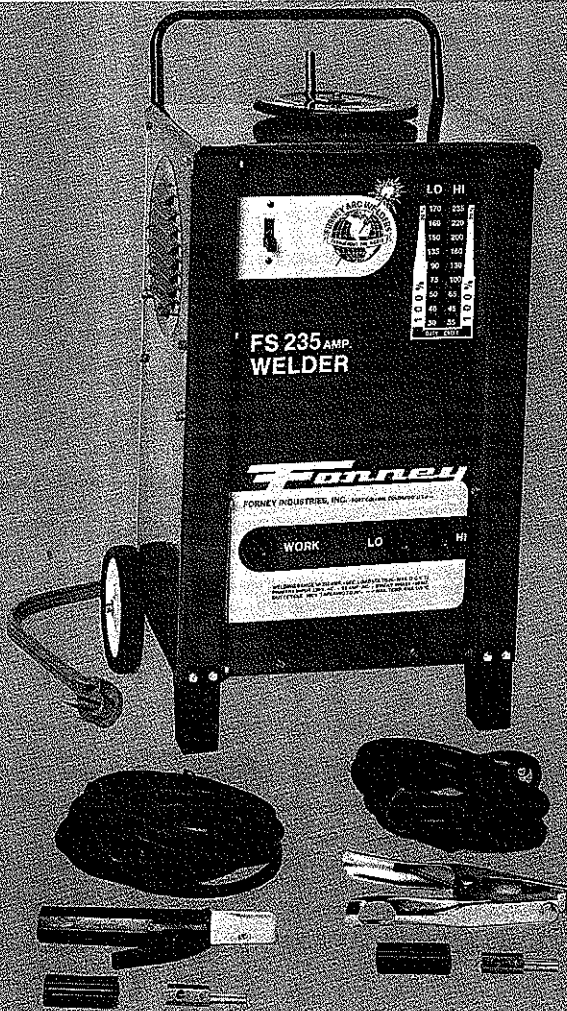


SCHMATIC 252-U-3  
 SHUNTWELDER MODEL "FS 235"

DRAWN	S. S.
DATE	4-1-78
SCALE	NONE
TOL	± .002

FORNEY MANUFACTURING CO.  
 DIV OF FORNEY INDUSTRIES, INC  
 FORT COLLINS, COLORADO

DWG NO.  
 24901



# Forney

## MODEL FS 235Vw ALL PURPOSE WELDER For General Repair and Maintenance on Farms, in Schools, Body Shops, and Vocational Training, etc.

CATALOG NUMBER 360-E

Precision engineered and quality manufactured for long life and dependable service. Excellent for low hydrogen and hardfacing electrodes. May be used for all types of electrodes and for arc cutting, gouging, and brazing.

### FEATURES

1. Direct reading amperage settings with stepless control for infinite amperage selection.
2. Positive amperage control mechanism "holds" at preset amperages selected.
3. Equipped with handle and 5½" wheels for easy portability.
4. Self-tightening all-brass tapered jacks are used on front for sure and tight fit for ground and electrode holder leads.
5. Designed for very quiet operation with little transformer or fan noise.
6. Insulation and windings are double-dipped and double-baked for long-lasting life of the welder.
7. Large size transformer dissipates more heat, requiring less dependence on forced air cooling.
8. Case designed to provide excellent convection ventilation throughout the machine increasing efficiency of the fan.
9. Heavy duty brackets, welded to shrouded transformer, are bolted to the sides. This provides exceptional damage resistance, for continued operation even if some case damage is experienced.
10. Engineered and designed for hours of continuous use and years of service!

### SPECIFICATIONS

#### WELDING

Range ..... Hi 30 - 235 Amps  
 ..... Lo 20 - 170 Amps  
 Maximum open circuit volts ..... 78  
 Duty Cycle ..... 20 to 100%  
 Temperature Rise ..... 115°C  
 Secondary Load ..... 25 Volts

#### PRIMARY

AC Input ..... 230 Volts  
 Fuse @ 250V ..... 50 Amperes  
 Phase ..... 1  
 Hz (Cycles) ..... 60

#### SIZE

Width 15" — Depth 13"  
 Height 28½" (including crank)  
 Weight ..... 101 lbs.

### WARRANTY

All parts are warranted against defects in workmanship and material for a period of one year and transformer is guaranteed against burn-out for 3 years from date of purchase by the original owner.