LINCOLN® WELDERS

IM-244-B

Lincwelder 225 IM244
February, 1988
4940; 5212; 5213; 5214; 5231; 5232; 5233; 5234; 5349; 5350; 5351; 5352; 5425; 5426; 5433; 5507; 5573; 5574; 6620; 6621; 6622; 6623; 6626; 6629; 6630; 6631; 6931; 6966; 6996; 6997; 6999; 7019; 7136; 7182; 7183; 7184; 7185; 7259; 7260; 7261; 7262; 7283; 7284; 7285; 7303; 7373; 7374; 7375; 7376; 7377; 7378; 7379; 7380; 7441; 7442; 7443; 7444; 7445; 7446; 7447; 7448; 7679; 7680; 7681; 7682; 7706; 7707; 7717; 7718; 7719; 7720; 7888; 7889; 7902; 7903; 7914; 8571; 8572; 8573; 8574

OPERATING MANUAL

LINCWELDER® 225

225 Ampere DC Arc Welding Power Source with AC Auxil'ary Power

MODEL CCKA
DC-225/3-AS Onan Engine

Shown with optional electric start and undercarriage

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

SAFETY FIRST...

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Company. Specifications and the availability of optional features may have changed. Replacement parts for your machine are available through your local Lincoln Field Service Shop.

Please carefully read all of the updated safety cautions and warnings on the following pages. Thoughtful operation of this machine after reviewing these modern warnings will increase your overall safety and that of those around you.

LINCOLN® ELECTRIC

THE LINCOLN ELECTRIC COMPANY
World's Largest Manufacturer of Arc Welding Products
Sales and Service Worldwide
Cleveland, Ohio 44117-1199 U.S.A.

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.

PRODUCT DESCRIPTION

The Lincwelder 225 is an Onan aircooled engine driven combination welder/power generator. This machine supplies 40-225 amperes of DC welding current and 3 KW of either 115 or 230 volt, 50 hertz AC auxiliary power, depending upon the model ordered.

The 1981 National Electrical Code does not require this machine to be grounded under normal operating circumstances.

Some state, local or other codes or unusual operating circumstances may require the machine frame to be grounded. It is recommended that you determine the extent to which such requirements may apply to your particular situation and follow them explicitly. A machine grounding stud marked with the symbol ⏚ is provided on the welder *control panel*.

In general, if the machine is to be grounded it should be connected with a #8 or larger copper wire to a solid earth ground such as a metal water pipe going into the ground for at least ten feet and having no insulated joints, or to the metal framework of a building which has been effectively grounded. The National Electrical Code lists a number of alternate means of grounding electrical equipment.

EXHAUST SPARK ARRESTER

Some federal, state or local laws may require that gasoline engines be equipped with exhaust spark arresters when they are operated in certain locations where unarrested sparks may present a fire hazard. The standard mufflers included with these welders do not qualify as spark arresters. When required by local regulations, suitable spark arresters must be installed and properly maintained.

CAUTION: An incorrect arrester may lead to damage of the engine or its performance. Contact the engine manufacturer for specific recommendations.

ENGINE OPERATION

WARNING: Operate internal combustion engines in open, well ventilated areas or vent engine exhaust fumes outdoors.

Preparation

Before starting the engine, be sure the crank case is filled to the proper level with oil. Also, fill the gas tank and open the shut-off valve in the fuel line. Be sure any welding or auxiliary power loads are turned off or disconnected.

See the Onan engine operating instructions supplied with the welder, detailed engine starting, operating and maintenance instructions, safety precautions and parts lists.

Available Starters

Your engine may be equipped with either the standard manual rope pull starter or the optional factory installed electric starter.

This electric starter includes a starter button and ammeter located on the control panel and a battery charger circuit. Battery charger circuit information is given on page 4.

These machines are furnished with wet batteries.

WARNING: When servicing batteries, use caution — the electrolyte is a strong acid that can burn skin and damage eyes.

Starting the Engine

1. Turn the ignition switch on.
2. Choke per instructions in the Onan engine operator's manual.
3. a. **Machines with optional engine idler** — normally, start with the automatic engine idler lever swinging freely so the engine slows to low idle speed upon starting.

   b. **Machines without optional engine idler** — normally, start the engine with the "Hi-Lo" lever on the engine shroud set in the "Lo" or slow engine speed position.
4. Start the engine using either the starter button (machines equipped with an electric starter) or the starter rope.

Engine and Idler Operation

Machines with engine idler — For welding, let the automatic engine idler lever swing freely. Upon striking the arc, the engine automatically increases to full speed. When welding is stopped, the idler slows the engine to idle speed after a preset time delay to reduce engine wear and conserve fuel. For AC power output, lock the idler lever in the full speed position using the cotter pin connected to the idler.

NOTE: Full idler operation and maintenance instructions are included in IM-179 supplied with the machine. The carburetor and governor adjusting instructions in IM-179 were written primarily for Lincoln water cooled engine driven welders. See the Onan engine operator's manual for the corresponding instructions for this machine.

Machines with an engine idler but built before March 1973 (below code 7250) — These machines have a "Hi-Lo" Engine speed control lever on the engine shroud. Always set this lever on "Hi" for proper idler operation.

Machines without engine idler — Engine speed is controlled by the "Hi-Lo" lever on the engine shroud. Set the lever on "Hi" when welding or using the AC power output. Move it to "Lo" to slow the engine to idle speed.

Stopping the Engine

Stop the engine by turning the ignition switch off.

WELDER OPERATION

(Turn engine off before connecting cables.)

OUTPUT CABLE SIZES

Use #3 electrode and work cables when welding up to 30 feet from the welder. If welding at a substantially longer distance from the machine, use #2 or larger cable. Long cables of small diameter reduce the output at the point of welding

Polarity Control

One output stud is marked "Positive" and the other stud is marked "Negative". If you want to weld with the electrode positive (Reverse Polarity), connect the electrode cable to the positive stud and the work cable to the negative stud. If you want to weld with electrode negative (Straight Polarity), reverse the two cables. Tighten the stud nuts with a wrench.

'Current Range'

The 'Current Range' selector is the coarse current adjustment for your welder. There are five positions indicated on the control dial. The numerical value assigned to each position is the center of the current range available at that particular setting. For each setting there is a maximum and minimum current available through the adjustment of the 'Fine Adjustment'.

'Fine Adjustment'

The 'Fine Adjustment' control is the fine current control of your welder. Through this control, you can obtain the exact current you desire. With this control it is also possible to vary the open circuit voltage and thereby change the arc characteristics to suit different welding applications.

There is sufficient overlapping of the current ranges obtained with the 'Current Range' so the 'Fine Adjustment' may be used to vary the arc characteristics. High voltage for a soft arc. Low voltage for a forceful digging arc.

For 175 amps and the preferred soft arc, set the 'Current Range' to 150 and turn the 'Fine Adjustment' up towards 10 to get 175 amps. To obtain 175 amps and a forceful arc, set the 'Current Range' at 200 and turn the 'Fine Adjustment' down towards 1 to get 175 amps.

For most welding you will get the best welding characteristics by using a lower setting on the 'Current Range' and a higher setting on the 'Fine Adjustment'. This will give you a soft arc and high open circuit voltage to prevent pop outs. However, for vertical or overhead welding, a low open circuit voltage is often desired to give a snappy digging arc.

Welding Duty Cycle

This machine has a 30% duty cycle at the rated output of 225 amperes. Duty cycle is based on a 10 minute period. Therefore, the welder can be loaded at 225 amperes for 3 minutes out of every 10 minute period. You can use higher duty cycles at lower currents. See the nameplate.

Pipe Thawing

WARNING: Pipe thawing, if not done properly, can result in fire, explosion, damage to wiring which may make it unsafe, damage to pipes, burning up the welder, or other hazards. Do not use a welder to thaw pipe before reviewing Lincoln bulletin E-695.1 (dated December '76 or later).

AUXILIARY POWER

(Duty Cycle — Continuous)

Grounding of Power Tools

Power tools should always be grounded to the machine frame unless protected by an approved system of double insulation. The Lincwelder is equipped with 3-prong grounded receptacles.

CAUTION: This 115 or 230 volt, 50 Hertz auxiliary power should not be used for equipment such as fluorescent lights, radios or other electronic devices and motors, appliances or tools designed *only* for 60 Hertz input. For specific information about the operation of 60 Hertz equipment on 50 Hertz power, contact the equipment manufacturer.

115 Volt Models

Most of these welders are equipped to produce 115 volt, 50 Hertz, single-phase AC power. This power is suitable for operating incandescent lights and power tools with either universal or 50 Hertz motors.

Set the 'Fine Adjustment' rheostat on 10 and start the engine. If the optional engine idler is installed, it must be latched in the full speed position. After the engine is running, plug the load into the receptacles on the nameplate.

A maximum of 15 amps can be drawn from each side of the duplex receptacles. Attempting to draw more current may damage the receptacles.

A maximum total of 26 amps can be drawn from the two receptacles. Attempting to draw more may result in a serious voltage drop causing lights to dim, driven motors to overheat, and may damage the generator. Normally, power tools cannot be run at the same time the machine is used for welding. It is possible to weld at low currents with lights plugged in.

230 Volt Models

This welder is available equipped to produce 230 volt, 50 Hertz, single-phase AC power rather than 115 volt power. This power is suitable for operating lights, power tools and 50 Hertz motors.

Set the 'Fine Adjustment' rheostat to 10 and start the engine. If the the optional engine idler is installed, it must be latched in the full speed position. After the engine is running, plug the load into the 3-prong receptacles in the nameplate.

A maximum of 13 amps can be drawn from the receptacles. It can be drawn from one or split between the two receptacles. Attempting to draw more than 13 amps results in a serious voltage drop causing lights to dim, driven motors to overheat, and may damage the generator.

BATTERY CHARGING CIRCUIT

Operation

This circuit is part of the optional electric starter. Current for charging the battery is taken from the welding generator. The circuit includes resistors to limit the charging current and a silicon diode to prevent the battery from discharging back through the generator when the machine is not running. The charging circuit wiring diagram is pasted to the inside of the machine cover.

If you are undercharging the battery, it cranks the engine slower at each start. If you are overcharging the battery, you have to add water frequently. Overcharging tends to shorten battery life.

The nameplate on the welder control panel identifies the electric start controls. Included with the electric start controls is a battery charge rate switch. Units below code 8000 have a two-position switch. It provides a "high" charge rate of approximately 4 to 5 amps or a "low" charge rate of 1.5 to 2 amps. Units above code 8000 have a three-position charge rate switch. It provides a "high" charge rate of approximately 3 amps, a "medium" charge rate of approximately 1.5 amps, and a "trickle" charge rate of approximately 0.5 amps. All charge rates are with the unit running at high idle and the fine adjustment control set for max. O.C.V. The nameplate also gives a guide for the setting of the charge rate switch: "high" for cold weather or frequent starts, "medium" for normal use, and "trickle" for hot weather or long operating periods.

If you operate the welder with the batteries disconnected, tape the battery leads to avoid damaging the charging circuit.

The ammeter is the best indicator of any trouble in the charging circuit. The ammeter should indicate the charging current when the engine is running and should read zero with the engine stopped. Any other combination of readings indicates trouble.

Meter Readings		
Engine Operating	Engine Stopped	Possible Causes
Charge	Discharge	1. Shorted diode.
Zero	Zero	1. Diode blown open. 2. Open lead in circuit. 3. Welder generator output polarity reversed (Rare). Call nearest Field Service Shop to correct.
Charge	Charge	1. Battery connected backwards.

MAINTENANCE

WARNING: Have qualified personnel do the maintenance and trouble shooting work. Turn the engine off before working inside the machine.

Periodic Maintenance

1. Blow out the welder and controls with low pressure air periodically. In particularly dirty locations, this may be required once a week.
2. Replace the engine crankcase oil every 50 hours of operation.
3. Inspect the air filter every 50 hours of normal operation. Replace element if dirty.
4. Governor and carburetor joints and the throttle shaft must be kept clean and lubricated.
5. The generator bearing is sealed and has its own lubricant. It does not require lubricant except during overhaul.
6. Refer to the Onan engine manual for engine maintenance and trouble shooting instructions.
7. Periodically check the battery water level.

Commutator and Brushes

The generator brushes are properly adjusted when the welder is shipped. They require no particular attention. DO NOT SHIFT THE BRUSHES or adjust the rocker setting.

Periodically inspect the commutator and brushes by removing the commutator cover. DO NOT remove or replace this cover while the machine is running.

Commutators require little attention. However, if they are black or appear uneven, have them cleaned by an experienced maintenance man using fine sandpaper or a commutator stone. Never use emery cloth or paper for this purpose.

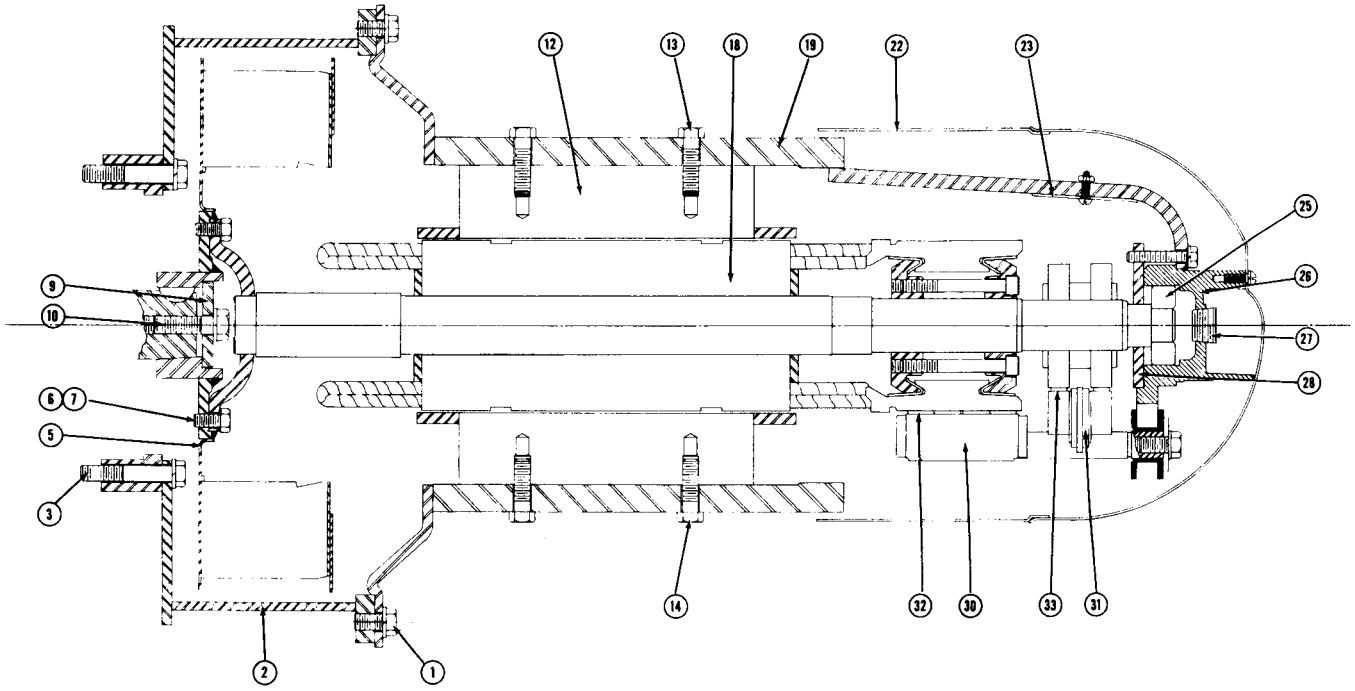
Replace brushes when they wear within ¼" of the pigtail. A complete set of replacement brushes should be kept on hand. Lincoln brushes have a curved face to fit the com-

mutator. Have an experienced maintenance man seat these brushes by lightly stoning the commutator as the armature rotates at full speed until contact is made across the full face of the brushes. After stoning, blow out the dust with low pressure air.

WARNING: Uncovered rotating equipment can be dangerous. Use care so your hands, hair, clothing or tools do not catch in the rotating parts. Protect yourself from particles that may be thrown out by the rotating armature when stoning the commutator.

The rotor slip rings and brushes are virtually maintenance free. Brushes should be changed only during overhaul by a trained mechanic.

GENERATOR AND COUPLING



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

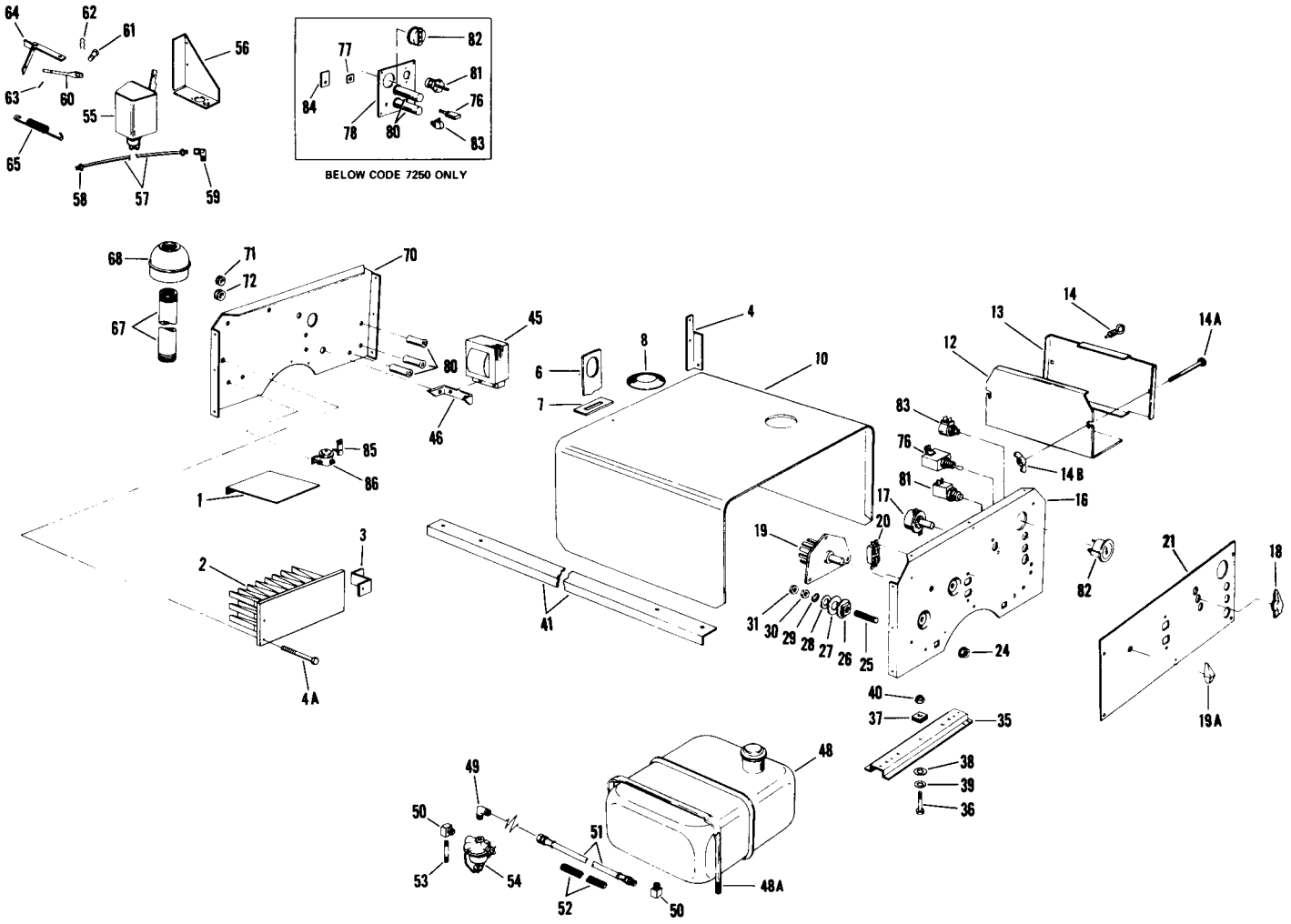
Parts List P-72-D

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Hex Head Screw	4
2	Connecting Ring Assembly	7
3	Hex Head Screw	4
5	Coupling Disc and Blower Assembly	1
6	Hex Head Screw	6
7	Coupling Screw Clip	3
9	Coupling Washer	1
10	Hex Head Screw	1
12	Shunt and Series Coil Set	1
	Pole Piece	2
	Pole Piece Insulation	2
13	Hex Head Screw	2
14	Hex Head Screw	2
18+	Armature, Includes	1
	Armature Coils	
19	Frame	1
22	End	1
23	Insulation	1
25	Bearing	1
26	Bearing Cage	1
27	Pipe Plug	1
28	Rocker Clamping Ring	1
30	Positive Brushholder	1
	Brushholder Parts — See	P-72-E
30	Negative Brushholder, Includes	1
	Brushholder Parts — See	P-72-E
31	Slip Ring Brushholder	1
	Slip Ring Brushholder Parts — See	P-72-F
32	Generator Brushes	8
33	Slip Ring Brushes	2

THE LINCOLN EXCHANGE PLAN gives you fast repairs at modest cost. Here's how:

Factory remanufactured replacements for the major parts indicated by + are available. These exchange parts are available only through the local authorized Field Service Shops. To get your welder back into operation quickly, replace the faulty part with a rebuilt part — often from the service shop's stock. The cost is less than a normal rewinding job.

The service shop will ship the removed part to the factory for inspection. If it can be rebuilt, a credit will be issued to the shop. They, in turn, will pass this credit to you, thus further reducing the net cost of the repair. And all exchange parts carry the same one year guarantee as new welders. For more information, contact your local Lincoln authorized Field Service Shop.


BELOW CODE 7250 ONLY

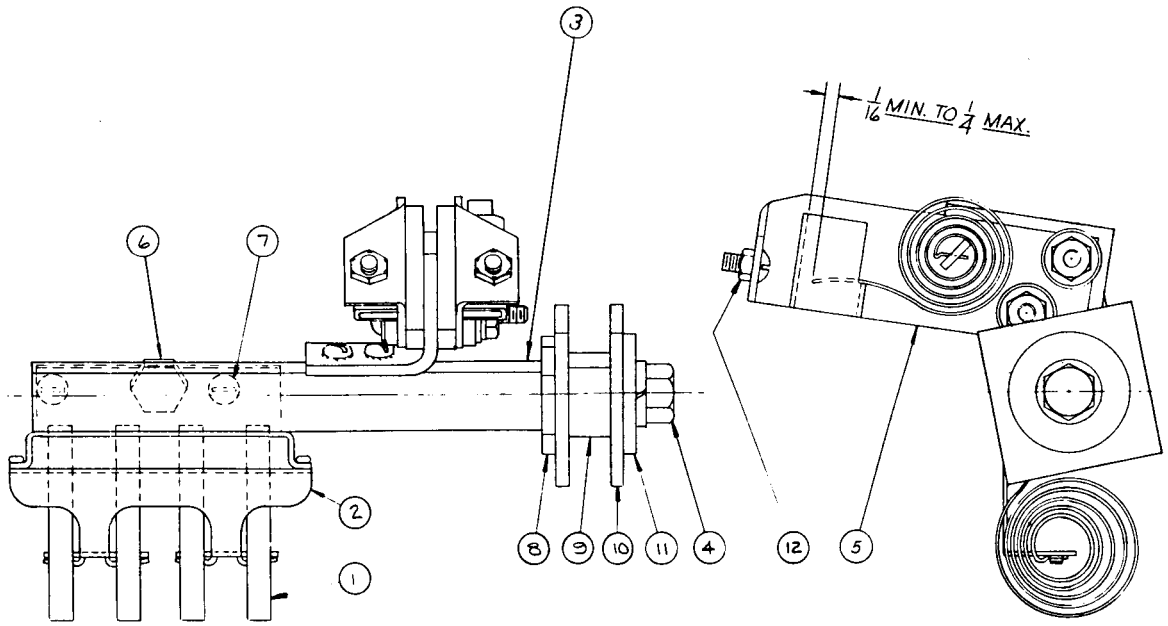
ASSEMBLY

Parts List P-72-C

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
1	Radiation Shield	1
	Self Tapping Screw, Shield to Rear Panel	1
2	Grid Assembly	1
4	Grid Support	1
4A	Grid Mounting Bolt	1
6	Lift Bail Assembly	1
7	Cover Seal	1
8	Filler Neck Gasket	1
10	Roof	1
	Self Tapping Screws, Roof to Panels	18
12*	Battery Case	2
13*	Battery Case Front	2
13*	Battery Case Cover	2
14*	Fastener Assembly	4
14A*	Carriage Bolt	4
14B*	Wing Nut	4
16	Front Panel	1
	Sems Screw, Rheostat Mounting	2
17	Rheostat	1
18	Rheostat Handle	1
19	Selector Switch Assembly, Includes:	1
19A	Selector Switch Handle	1
	Selector Switch Shield (Not Illustrated)	1
20	Duplex Receptacle 115 Volt	1
20	Duplex Receptacle 230 Volt	1
21	Nameplate	1
	Self Tapping Screw, Nameplate Mounting	6
24	Flanged Nut, Brass	2
25	Output Stud	2
26	Insulator	2
27	Insulating Washer	2
28	Plain Washer Output Stud, Old Style	2
29	Lockwasher	2
30	Brass Nut	2
31	Hex Jam Nut, Steel	2
35	Mounting Rail	2
36	Hex Head Screw	3
37	Rubber Washer	3
38	Rubber Washer	3
39	Plain Washer	3
40	Jam Nut	6
41	Base Side Rail	2
45	Stabilizer	1
48	Gas Tank, Includes Filler Cap	1
48A	U-Bolt	2
	Tank Strap Cushion	4
	Tank Rail Cushion	4
	Tank Cushion (Mounts Between Tank & Frame)	2
	Brace, Gas Tank, Not Illustrated	1

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
49	Elbow	1
50	Elbow	2
50	Elbow (Gas Tank to Gas Line)	1
50	Elbow (Gas Filter to Fuel Pump Gas Line)	1
51	Fuel Line (Filter to Gas Tank)	1
53	Nipple	1
53	Fuel Line (Filter to Fuel Pump)	1
54	Fuel Filter	1
55	Idler	1
	Idler Parts	
56	Mounting Bracket	1
56	Rubber Washer, Idler Mounting	4
57	Vaccum Line	1
58	Inverted Nut	1
59	Elbow Idler Option Only	1
60	Throttle Rod	1
61	Pivot Pin	1
62	Spring Clip	1
63	Roll Pin	1
64	Governor Idling Arm	1
65	Idler Return Spring	1
67	Exhaust Pipe	2
68	Muffler	2
70	Rear Panel	1
71	Grommet, Switch Lead	1
72	Grommet, Fuel Line	1
76	Ignition Switch	1
77	Switch Nameplate	1
78	Cover Plate, Without Electric Starter	1
78*	Cover Plate, With Electric Starter	1
	Self Tapping Screw, Plate to Panel	4
80	Resistor	1
81*	Starter Switch	1
82*	Ammeter	1
83*	Charge Rate Switch	1
84*	Charge Rate Switch Plate	1
85*	Diode Assembly	1
86*	Solenoid	1
	Items Not Illustrated:	
	Auxiliary Power Plug (115V)	As Req'd
	Auxiliary Power Plug (230V)	As Req'd
	Molded Output Terminal	2
	Output Stud Nut	2
	Self Tapping Screw	4
	Hex Head Screw	2
*	Battery	2
*	Used with Optional Electric Starter Only	

GENERATOR BRUSHHOLDER



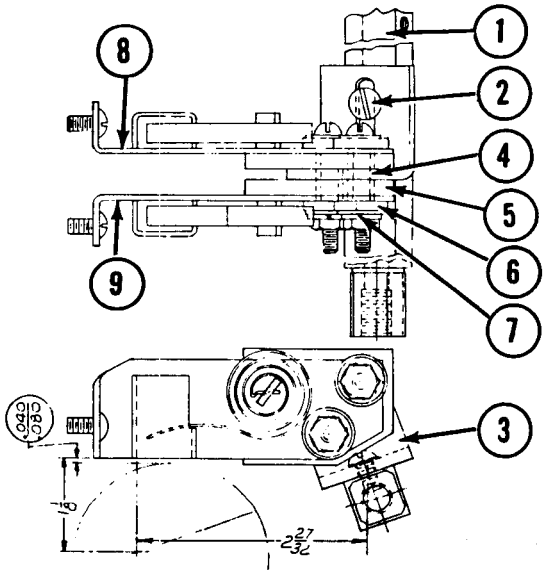
Parts List P-72-E

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Positive Brushholder Assembly, Includes All Below Except Items 5 and 12	1
	Negative Brushholder Assembly, Includes All Below	1
1	Spring	4
2	Brushholder Plate	1
3	Brushholder Stud	1
4	Sems Screw	1
5	Slip Ring Brushholder Assembly	1
	Slip Ring Brushholder Parts See	P-72-F
6	Hex Head Screw	1

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
6	Hex Head Screw	1
7	Round Head Screw	2
8	Stud Washer	1
9	Square Tubing	1
10	Insulation	2
11	Washer	1
12	Hex Nut	2

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

SLIP RING BRUSHHOLDER



Parts List P-72-F

ITEM	PART NAME AND DESCRIPTION	NO. REQ'D.
	Slip Ring Brushholder, Includes:	1
1	Brushholder Stud	1
2	Sems Screw	2
3	Bracket	1
4	Spacer	2
5	Brushholder Insulator	2
6	Insulating Washer	4
7	Plain Washer	4
8	Brushholder Plate	1
9	Brushholder Plate	1
10	Spring	2

LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com