450 SAE F3L-912 DEUTZ DIESEL ENGINE DRIVEN DC ARC WELDING POWER SOURCE

IM345-B

July 1995

For use with machines having Code Numbers: **10147**

(Type K1325-3K)

Internationally Rated

This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.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

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

450 SAE F3L-922
K1325-3K
IM345
July, 1995
10147

OPERATOR'S MANUAL

World's Leader in Welding and Cutting Products

LINCOLN® ELECTRIC

Premier Manufacturer of Industrial Motors

Sales and Service through Subsidiaries and Distributors Worldwide

22801 St. Clair Ave. Cleveland, Ohio 44117-1199 U.S.A. Tel. (216) 481-8100

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

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

The Above For Diesel Engines

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

The Above For Gasoline Engines

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

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

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

FOR ENGINE powered equipment.

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

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

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

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

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

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

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

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

ELECTRIC AND MAGNETIC FIELDS may be dangerous

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

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

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

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

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

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

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

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

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

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ELECTRIC SHOCK can kill.

3.a. The electrode and work (or ground) circuits are electrically "hot" when the welder is on. Do not touch these "hot" parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

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

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically "hot".

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically "hot" parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

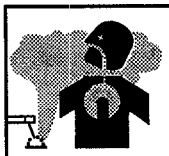
3.j. Also see Items 6.c. and 8.

ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

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

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.



FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases.When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and below Threshold Limit Values (TLV) using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

5.b. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.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.

5.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. MSDS forms are available from your welding distributor or from the manufacturer.

5.e. Also see item 1.b.

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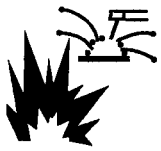


WELDING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

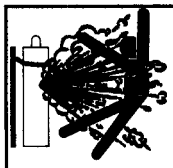
6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.



CYLINDER may explode if damaged.

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

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

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PRÉCAUTIONS DE SÛRETÉ

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

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

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

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

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

Please Examine Carton and Equipment For Damage Immediately

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

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

Model Name & Number _____

Code & Serial Number _____

Date of Purchase _____

Whenever you request replacement parts for or information on this equipment always supply the information you have recorded above.

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

⚠ WARNING

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

⚠ CAUTION

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

IMPORTANT SAFETY NOTE: EMF CONSIDERATIONS

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding. Exposure to EMF fields in welding may have other health effects which are now not known.

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

1. Route the electrode and work cables together. Secure them with tape when possible.
2. Never coil the electrode lead around your body.
3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side the work cable should also be on your right side.
4. Connect the work cable to the workpiece as close as possible to the area being welded.
5. Do not work next to welding power source.

PRODUCT DESCRIPTION

This machine was developed to provide a NEMA Class I variable voltage (constant current) welding generator with AC auxiliary power driven by the three cylinder air-cooled Deutz F3L-912 diesel engine. Within its rated current range and duty cycle, this welder can be used for DC stick electrode welding, air carbon-arc cutting, and other variable voltage (constant current) processes.

⚠ WARNING

Do not attempt to use this equipment until you have thoroughly read the engine manufacturer's manual supplied with your welder. It includes important safety precautions, detailed engine starting, operating and maintenance instructions, and parts lists.

Spark Arrester

Some federal, state or local laws may require that diesel 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.

Machine Grounding

Because this portable engine driven welder or generator creates its own power, it is not necessary to connect its frame to an earth ground, unless the machine is connected to premises wiring (your home, shop, etc.)

To prevent dangerous electric shock, other equipment to which this engine driven welder supplies power must:

1. be grounded to the frame of the welder using a ground type plug, or
2. be double insulated.

Where this welder is mounted upon a truck or trailer, its frame must be securely connected to the metal frame of the vehicle.

Where this engine driven welder is connected to premises wiring such as that in your home or shop, its frame must be connected to the system earth ground. For more information consult the local National Electrical Code.

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. A machine grounding stud marked with the symbol ⏚ is provided on the welder control panel.

UNDERCARRIAGE

The recommended undercarriage for use with this equipment for in-plant and yard towing by a vehicle is Lincoln's K769. If the user adapts a non-Lincoln undercarriage, he must assume responsibility that the method of attachment and usage does not result in a safety hazard or damage the welding equipment. Some of the factors to be considered are as follows:

1. Design capacity of undercarriage vs. weight of Lincoln equipment and likely additional attachments.
2. Proper support of, and attachment to, the base of the welding equipment so there will be no undue stress to the framework.
3. Proper placement of the equipment on the undercarriage to insure stability side to side and front to back when being moved and when standing by itself while being operated or serviced.
4. Typical conditions of use, i.e., travel speed; roughness of surface on which the undercarriage will be operated; environmental conditions; likely maintenance.
5. Conformance with federal, state and local laws.*

* Consult applicable federal, state and local laws regarding specific requirements for use on public highways.

INSTALLATION OF ACCESSORIES AND FIELD INSTALLED KITS

See the instructions included with each accessory or kit.

PRE-OPERATION SERVICE

Oil: Upon receipt of the welder, fill the crankcase with oil to the "full" mark on the dipstick. Use the weight oil recommended by the engine manufacturer.

Fuel: Fill the fuel tank with the grade of diesel fuel recommended in the engine Instruction Manual. Open the fuel feed valve on the sediment bowl by turning the handle counterclockwise.

Battery: Remove the insulating cap from the negative battery terminal. Connect and tighten negative battery cable terminal. NOTE: This machine is furnished with a wet charged battery; if unused for several months, the battery may require a booster charge. Be sure to use the correct polarity when charging the battery.

⚠ WARNING

GASES FROM BATTERY can explode.
- **Keep sparks, flame and cigarettes away from battery.**
- **Wear gloves and eye protection and be careful when boosting, charging, or working near battery.**
- **Follow instructions printed on battery.**

To prevent EXPLOSION when:
- **INSTALLING A NEW BATTERY - disconnect negative cable from old battery first and connect to new battery last.**
- **CONNECTING A BATTERY CHARGER - remove battery from welder by disconnecting negative cable first, then positive cable and battery damp. When reinstalling, connect negative cable last. Keep well ventilated.**
- **USING A BOOSTER – connect positive lead to battery first then connect negative lead to copper strap on engine , foot.**

BATTERY ACID can burn eyes and skin.

IMPORTANT: To prevent ELECTRICAL DAMAGE WHEN:
a) Installing a new battery.
b) Using a booster.
Use correct polarity – Negative Ground.

To prevent BATTERY DISCHARGE, if you have an ignition switch, turn it off when engine is not running.

To prevent BATTERY BUCKLING, tighten nuts on battery clamp until snug.

Muffler: Screw the muffler into the exhaust flange and tighten.

The engine and welder controls were properly set at the factory and should require no adjusting when received.

OUTPUT CABLES

With the engine off, connect the electrode and work cables to the studs provided. These connections should be checked periodically and tightened if necessary. When welding at a considerable distance from the welder, be sure you use ample size welding cables.

Listed below are copper cable sizes recommended for the rated current and duty cycle. Lengths stipulated are the distance from the welder to work and back to the welder again. Cable sizes are increased for greater lengths primarily for the purpose of minimizing voltage drop in the cable.

Cable Sizes for Combined Lengths of Electrode and Work Cables
450 amps, 40% duty cycle

0 - 50 ft.	1/0
50 - 100 ft.	2/0
100 -150 ft.	2/0
150 - 200 ft.	3/0
200 - 250 ft.	4/0

WELDER LOCATION

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts such as output terminals or internal wiring.**

ENGINE EXHAUST can kill.
- **Use in open, well ventilated areas or vent exhaust outside.**

MOVING PARTS can injure.
- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**

- **Only qualified personnel should install, use or service this equipment.**

The welder should be located to provide an unrestricted flow of clean, cool air to the cooling air inlet (louvered door) and to avoid heated air coming out of the top of the welder recirculating back to the cooling air inlet. Also, locate the welder so that engine fumes are properly exhausted.

OPERATING INSTRUCTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**

FUMES AND GASES can be dangerous.
- **Keep your head out of fumes.**
- **Use ventilation or exhaust to remove fumes from breathing zone.**

WELDING SPARKS can cause fire or explosion.
- **Keep flammable material away.**

ARC RAYS can burn.
- **Wear eye, ear and body protection.**

Pipe Thawing

⚠ WARNING

Although not specifically designed for the work, the output of arc welding machines is sometimes used to thaw frozen water pipes by electrical resistance heating of the pipe metal. Pipe thawing, if not done properly, can result in fire, explosion, damage to wiring which may make it unsafe, damage to pipes, damage to the welder, or other hazards. *Do not use a welder to thaw pipe before reviewing Lincoln bulletin E695. 1 (dated December, 1976 or later).*

For protection of the welder from overloads, use of a device called the Linc-Thaw™ as described in bulletin E695. 1 is recommended.

Additional Safety Precautions

Always operate the welder with the hinged door closed and the side panel in place as these provide maximum protection from moving parts and insure proper cooling air flow.

Read carefully the Safety Precautions page in the Instruction Manual before operating this machine. Always follow these and any other safety procedures included in this manual and in the engine instruction manual.

ENGINE CONTROLS: FUNCTION/ OPERATION

"START" Pushbutton

Energizes the starter motor to crank the engine. Push and hold in to crank the engine; release as the engine starts. Do not press while engine is running since this can cause damage to the ring gear and/or starter motor.

"STOP" Pull Knob

Moves the stop lever on the fuel injection pump to cut off fuel injection to the cylinders to shut down the engine by fuel starvation. To stop the engine, pull the "STOP" knob all the way out and hold until the engine stops turning. When starting the engine, be sure the "STOP" knob is pushed all the way in.

Oil Pressure Gauge

Displays the oil pressure to the engine. When the engine starts running, watch for the oil pressure to build up. If no pressure shows within 30 seconds, stop the engine and consult the engine instruction manual.

Battery Charging Ammeter

Displays the current going from the charging alternator into the battery. It is normal for charging current to be high (above 15 amps) after starting or when the battery is "low" on charge.

"Idler Control" Switch

Has two positions as follows:

1. In the "High Idle" position, the idler is off and the engine runs at the high idle speed controlled by the governor.

2. In the "Automatic Idle" position, the idler operates as follows:

a.. When welding or drawing power for lights or tools (approximately 100-150 watts minimum) from the receptacles located below the welder nameplate, the engine operates at full speed.

b. When welding ceases or the power load is turned off, a preset time delay of about 15 seconds starts. This time delay cannot be adjusted.

c. If the welding or power load is not re-started before the end of the time delay, the idler reduces the engine to low idle speed.

Engine Hour Meter (Optional Feature)

The optional engine hour meter records the total running time on the engine in hours. It can be used to keep record of maintenance of the welder.

WELDER CONTROLS: FUNCTION OPERATION

Purpose of Controls

The continuous "Current Control" is the main current adjuster. The "Job Selector" is both a fine current adjuster and the continuous Open Circuit Voltage adjuster. Open Circuit Voltage (OCV) controls the arc characteristics. The "Electrode Polarity" switch controls the polarity of the output terminals.

Job Selector

The "Job Selector" dial is divided into four colored sections providing different OCV ranges as follows:

Color	Title	OCV Range
White	Large Electrodes	High OCV
Black	Normal Welding Range	Medium-High OCV
Red	Overhead & Vertical	Medium-Low OCV
Grey or Aluminum	Special Applications	Low OCV

The "Job Selector" is usually set in the black range because it provides a soft "buttering" arc desired for most welding. Some operators prefer to set the "Job Selector" in the red range for a snappy "digging" arc when welding vertical up or overhead.

"Current Control"

⚠ CAUTION

Do not adjust the "Current Control" while welding because this can damage the control.

The "Current Control" dial is calibrated in amperes on three separate colored dials corresponding to the white, black and red ranges of the "Job Selector" dial. For example: when the "Job Selector" is set on the black range, the approximate welding current is indicated on the black scale of the "Current Control" dial.

"Electrode Polarity" Switch

The "Electrode Polarity" switch has three positions. The center position is "Off — no useful welding current is available in this position. The other two positions are "Positive" (DC+ or electrode positive) and "Negative" (DC- or electrode negative).

How to Set the Controls

Assume you want a normal soft arc and about 135 amps, using a 5/32" electrode on electrode positive (DC+):

1. Be sure the "Electrode Polarity" switch is in the "Positive" position.
2. Set the "Job Selector" at the center of the black range.
3. Set the "Current Control" to read 135 amps on the black dial.
4. Start to weld.
5. If you want a little more current, turn the "Job Selector" up (counterclockwise) to increase current. If you want a little less current, turn the "Job Selector" down (clockwise) to decrease current.
6. If dialing the desired current with the "Job Selector" moves the setting outside the black range causing undesirable arc characteristics, turn the "Job Selector" back to the center of the black range. Then turn the "Current Control" up or down a little as needed. Readjust the "Job Selector" for the exact characteristics and current desired.

Remote Control (Factory Installed Optional Feature)

The optional Remote Control can be used to provide the function of the "Job Selector" control at the welding site. A control box with 25 feet of three-conductor cord and three-prong twist-lock plug is provided. A twist-lock receptacle and remote control toggle switch are supplied and installed in the control panel.

The remote control switch has two positions: "Control at 450-SAE", when the "Job Selector" on the welder control panel will be used, and "Control Remote", when the optional remote control box will be used.

⚠ CAUTION

Do not switch to "Remote" unless Remote Control is connected. Do not insert or remove plug with switch in "Remote" position.

Welding Volt-Ammeter (Factory Installed Optional Features)

The optional Welding Volt-Ammeter displays the welding voltage or the welding current at the output terminals. The meter is supplied installed in the control panel. The normal display is the voltage. The current is displayed when the button on the face of the meter is pressed and held in.

Constant Voltage (CV) Adapter (Factory Installed Optional Feature)

With the optional CV adapter, the 450-SAE can be used with a wire feeder.

AUXILIARY POWER

115/230 volt, single phase, 60 hertz power is available with 3 KVA maximum output. The output circuit is protected with fuses. One duplex 115 volt receptacle and one duplex 230 volt receptacle are provided. Use grounding-type plugs.

A maximum of 13 amps may be drawn from the 230V receptacle or 26 amps total from both halves of the 115V receptacle. The 115V receptacle is designed to permit drawing up to 20 amps from one-half of the duplex and the balance from the other half. The total combined current draw from all receptacles must not exceed 3 KVA continuous duty.

If auxiliary power is used simultaneously with welding, the current which can be used and still maintain voltage regulation (within 10%) is as follows:

Welding Current, Amps	Using Only 115V Circuit, Amps	Using Only 230V Circuit, Amps	Total Aux. KVA
0	26	13	3.0
100	19.5	9.75	2.25
200	13	6.5	1.5
300	6.5	3.25	0.75
400	0	0	0

DUTY CYCLE

Duty cycle is based on a ten minute period and operation in an ambient temperature of 40°C (104°F).

The International unit is rated for 40% duty cycle. Therefore, the welding current can be 450 amps for 4 minutes out of every 10 minutes without overheating the generator. The welder can be used continuously (100% duty cycle) at 280 amps or less.

The auxiliary power can be used continuously (100% duty cycle) within its rated current capacities.

STARTING INSTRUCTIONS

Be sure all Pre-Operation Maintenance has been performed. (See Pre-Operation Service).

To start the engine, set the "Idler Control" switch in the "High Idle" position. Be sure the "Stop" knob is pushed all the way in. Engage the starter button. When the engine starts running, observe the oil pressure. (If no pressure shows within 30 seconds, stop the engine and consult the engine instruction manual. To stop the engine, pull the "Stop" knob out all the way and hold until the engine stops). When the engine is firing smoothly, switch the "Idler Control" to the "Automatic Idle" position. When an engine is started for the first time, some of the oil will be needed to fill the passages of the lubricating system. Therefore, on initial starting, run the engine for about five minutes and then stop the engine and recheck the oil. If the level is down, fill to the full mark again.

Cold Weather Starting

With a fully charged battery and the proper weight oil, the engine will start satisfactorily down to +10°F.

If the engine must be frequently started below +10°F, it may be desirable to install the factory recommended automatic ether start kit. Installation and operating instructions are included in the kit. With the ether kit, the engine will start satisfactorily down to –15°F.

If the engine must be started below –15°F, other starting aids (such as heaters) may be necessary.

BREAK-IN PERIOD

The engine used to supply power for your welder is a heavy duty, industrial engine. It is designed and built for rugged use. It is very normal for any engine to use small quantities of oil until the break-in is accomplished. Check the oil level twice a day during the break-in period (about 200 running hours).

IMPORTANT — IN ORDER TO ACCOMPLISH THIS BREAK-IN, THE UNIT SHOULD BE SUBJECTED TO HEAVY LOADS, WITHIN THE RATING OF THE MACHINE. AVOID LONG IDLE RUNNING PERIODS.

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts such as output terminals or internal wiring.**

ENGINE EXHAUST can kill.
- **Use in open, well ventilated areas or vent exhaust outside.**

MOVING PARTS can injure.
- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**

- **Only qualified personnel should install, use or service this equipment.**
- **Remove guards only when necessary and replace when work requiring removal is complete.**

ROUTINE MAINTENANCE

At the end of each day's welding, refill the fuel tank to minimize moisture condensation in the tank. Also, running out of fuel tends to draw dirt into the fuel system. Check the crankcase oil level.

If the fuel supply runs out while the engine is running, air may be entrapped in the fuel distribution system. If this happens, bleeding of the fuel system may be necessary. See the engine instruction manual.

Refer to the colored engine maintenance sticker on the inside of the door for routine engine maintenance requirements. This same information is inside the back cover of the engine instruction manual. Refer to the engine instruction manual for more detailed engine maintenance information.

Air Filter

The air filter canister is located behind the louvered door at the end of the welder. Turn the slotted head of the latch (at the bottom of the door) 90° in either direction to open.

The air filter element is a dry cartridge type. It can be cleaned and re-used; however, damaged elements should not be washed or re-used. Remove loose dirt from element with compressed air or water hose directed from inside out. Compressed air: 100 psi maximum with nozzle at least one inch away from element. Water hose: 40 psi maximum without nozzle.

Soak element in a mild detergent solution for 15 minutes. Do not soak more than 24 hours. Swish element around in the solution to help remove dirt. Rinse elements from inside out with a gentle stream of water (less than 40 psi) to remove all suds and dirt. Dry element before re-use with warm air at less than 160°F. Do not use a light bulb to dry the element.

Inspect for holes and tears by looking through the element toward a bright light. Check for damaged gaskets or dented metal parts. Do not re-use damaged elements. Protect element from dust and damage during drying and storage.

PERIODIC MAINTENANCE

1. Blow out the welder and controls with an air hose at least once every two months. In particularly dirty locations, this cleaning may be necessary once a week. Use low pressure air to avoid driving dirt into the insulation.
2. The current control reactor brushes are self- lubricating and should not be greased. Keep the contacts clean. This control should be moved from maximum to minimum daily to prevent the contacts from sticking.
3. See the engine instruction manual for periodic engine maintenance information.
4. Belts tend to loosen after the first 30 or 40 hours of operation. Check the cooling blower belt and tighten if necessary. DO NOT OVER TIGHTEN.

Bearing Maintenance

This welder is equipped with a double-shielded ball bearing having sufficient grease to last indefinitely under normal service. Where the welder is used constantly or in excessively dirty locations, it may be necessary to add one-half ounce of grease per year. A pad of grease one inch wide, one inch long and one inch high, weighs approximately one-half ounce. Overgreasing is far worse than insufficient greasing.

When greasing the bearings, keep all dirt out of the area. Wipe the fittings completely clean and use clean equipment. More bearing failures are caused by dirt introduced during greasing than from insufficient grease.

Brush Maintenance

The generator and exciter 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 brushes by removing the commutator covers. DO NOT remove or replace these covers while the machine is running.

⚠ 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.

Replace brushes when they wear within 1/4" of the pigtail. A complete set of replacement brushes should be kept on hand. Lincoln brushes have a curved face to fit the commutator. Have an experienced technician seat these bushes 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.

Commutator Maintenance

Periodically check the commutator surface to determine if the surface is dirty and in need of cleaning. Note that a dark brown color is normal. Intermittent light areas indicate an uneven surface requiring stoning or turning.

If the commutator needs cleaning, follow the procedure below:

1. Obtain a commutator stone or fix a piece of fine sandpaper (220 grit) on the end of a board about 2" x 3" x 1". Ensure no fasteners are exposed on the sandpaper surface.
2. Remove any covers necessary to allow access to the commutator.
3. Place the Polarity Switch handle in the "off" position.

⚠ WARNING

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

4. Start the engine.
5. While standing beside the machine (with the direction of rotation away from you), place the stone or sandpaper board against the commutator surface and apply even moderate pressure while sliding it along the entire commutator length until the surface is bright. Do not gouge the surface. Never attempt to clean the commutator while it is not rotating.
6. Blow out the dust with low pressure air.
7. Replace covers removed in Step (2.)

Engine Protection System

The engine protection system shuts down the engine by allowing the fuel solenoid valve to close and starve the engine of fuel. The types of protection are:

1. (Standard) Breakage of the belt driving the engine cooling blower will shut down the engine. The battery charging alternator is driven by the same belt that drives the cooling blower. If the belt breaks, the alternator output voltage goes to zero, thus there is no power to keep the fuel solenoid valve open. Loss of alternator output for other reasons will also do this. A blocking diode prevents reverse current flow from the battery to the fuel solenoid valve.
2. (Optional) The following two features are combined in the optional engine protection feature:
   a. High engine cylinder head temperature will shut down the engine. A normally closed thermostat mounted in a hole in cylinder #1 (nearest the flywheel) opens at 300°F, opening the circuit to the fuel solenoid valve. Conditions under which this type of shutdown could occur are loss of cooling air for long periods of time due to the cooling air being totally blocked off, operation in extremely hot ambient temperatures (above 50°C) with high duty cycles, and blockage of the engine cylinder cooling fins by dirt or other foreign matter.
   b. Low engine oil pressure will shut down the engine. A normally open oil pressure switch closes at 20 psig. If oil pressure falls below this point, the oil pressure switch opens, opening the circuit to the fuel solenoid valve.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact you local Lincoln Authorized Field Service Facility.

⚠ WARNING

ELECTRIC SHOCK can kill.
- **Do not touch electrically live parts such as output terminals or internal wiring.**

ENGINE EXHAUST can kill.
- **Use in open, well ventilated areas or vent exhaust outside.**

MOVING PARTS can injure.
- **Do not operate with doors open or guards off.**
- **Stop engine before servicing.**
- **Keep away from moving parts.**
- **Remove guards only when necessary and replace when work requiring removal is complete.**
- **Only qualified personnel should install, use or service this equipment.**

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
1. Machine fails to hold the "heat" constantly.	A. Rough or dirty commutator.	A. True and clean commutator.
	B. Brushes may be worn down to limit of life.	B. Replace brushes.
	C. Brush springs may be broken.	C. Replace brush springs.
	D. Field circuit may have variable resistance connections or intermittent open circuit, due to loose connections or broken wire.	D. Check field current with ammeter to discover varying current. This applies to both the main generator and exciter.
	E. Electrode or work lead connections may be poor.	E. Tighten all connections.
	F. Wrong grade of brushes may have been installed on generator.	F. Use only the recommended Lincoln brushes.
	G. Field rheostat may be making poor contact and overheating.	G. Inspect and clean the rheostat.
	H. "Current Control" may not be operating properly.	H. Check for loose or missing set screw in control handles.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
2. Machine fails to hold the heat constantly.	A. "Current Control" brushholder contact springs may be worn out or missing. Contact surface may be dirty, rough and pitted.	A. Inspect. Replace needed parts. Clean internal contact surface of control device. Do not lubricate. Smooth rough surfaces.
	B. "Current Control" brushholder support stud and mating contact surfaces may be dirty or pitted and burned.	B. If brushholder internal contact surface is pitted and burned, replace the brushholder and support stud. If the contact surface is dirty, clean off the brushholder stud and internal contact surface. Apply mixture of three parts silicone grease and one part of zinc powder (by weight) to stud.
	C. Engine running at varying speeds.	C. Set welder controls for maximum output and weld. Then, while welding, check engine rpm. The engine should be running at full speed. If indicator shows a significant difference, consult your engine manual.
3. Welder runs but fails to generate current.	A. Generator or exciter brushes may be loose or missing.	A. Be sure that all brushes bear on the commutator or slip rings and have proper spring tension.
	B. Exciter may not be operating.	B. Check exciter output voltage with voltmeter or lamp.
	C. Field circuit of generator or exciter may be open.	C. Check for open circuits in rheostat, field leads and field coils. Also check rectifier bridge.
	D. Polarity reversing switch may be in the neutral position.	D. Put handle in positive or negative position.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

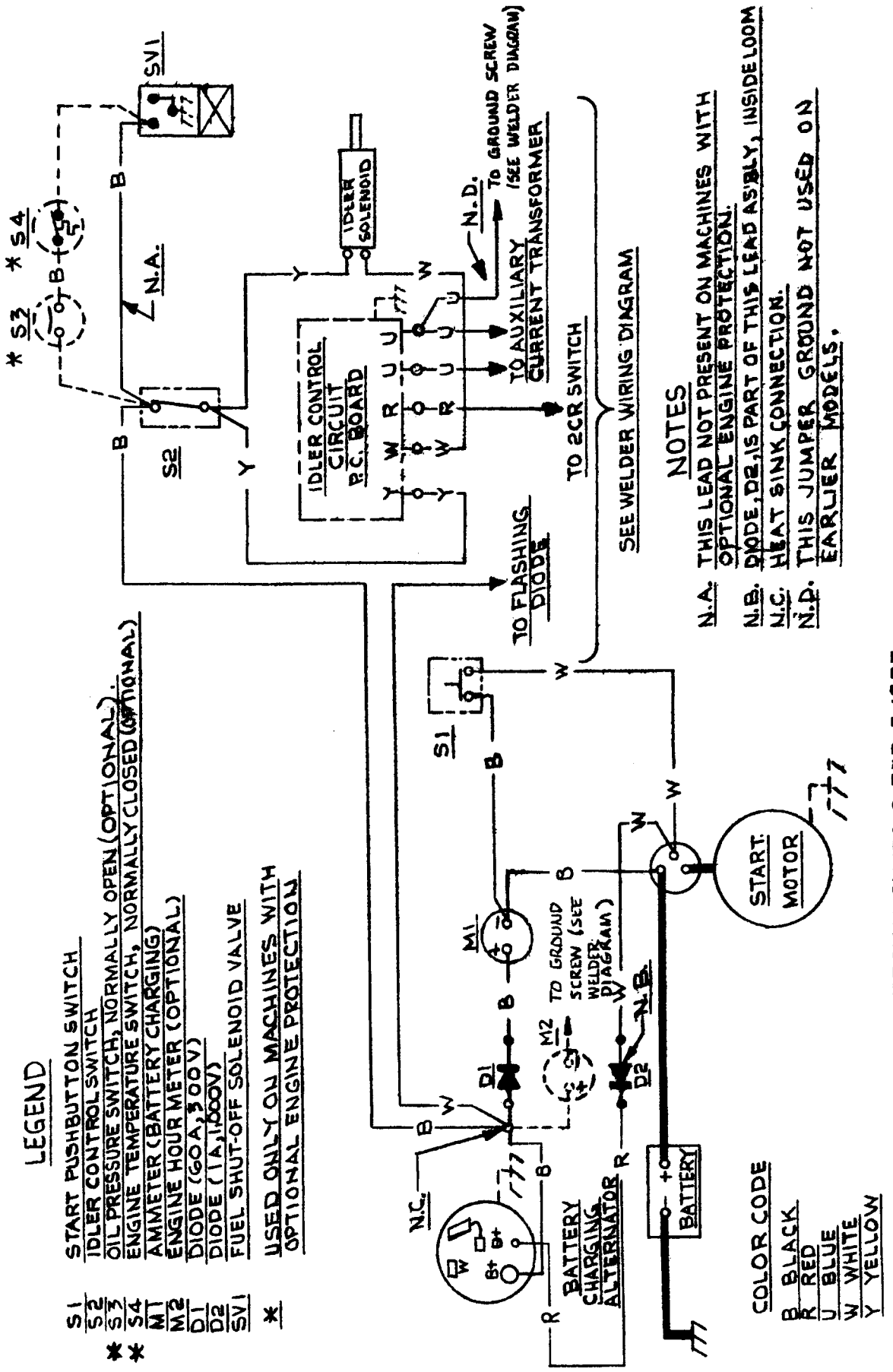
Observe all Safety Guidelines detailed througout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
FUNCTION PROBLEMS		
4. Welding arc is loud and spatters excessively.	A. Series field circuit may be open circuited.	A. Check circuit with ringer or voltmeter.
	B. Current setting may be too high.	B. Check setting and current output with ammeter.
	C. Polarity may be wrong.	C. Check polarity. Try reversing polarity or try an electrode of the opposite polarity.
5. Welding current too great or too small compared to indication on the dial.	A. "Current Control" shaft and handle may have turned slightly in the insulated bushing of the current control brushholder caused by turning handle too hard against one of the stops.	A. With current control against the minimum stop, set the pointer to within 1/8" of last scale division.
	B. Exciter output low causing low output compared to dial indication.	B. Check for shorts or open in exciter rotor; also check condition of exciter brushes and slip rings.
	C. "Current Control" set to minimum and welder output so great that engine stalls when arc is struck.	C. Check to see that series field is properly connected and not shorted.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

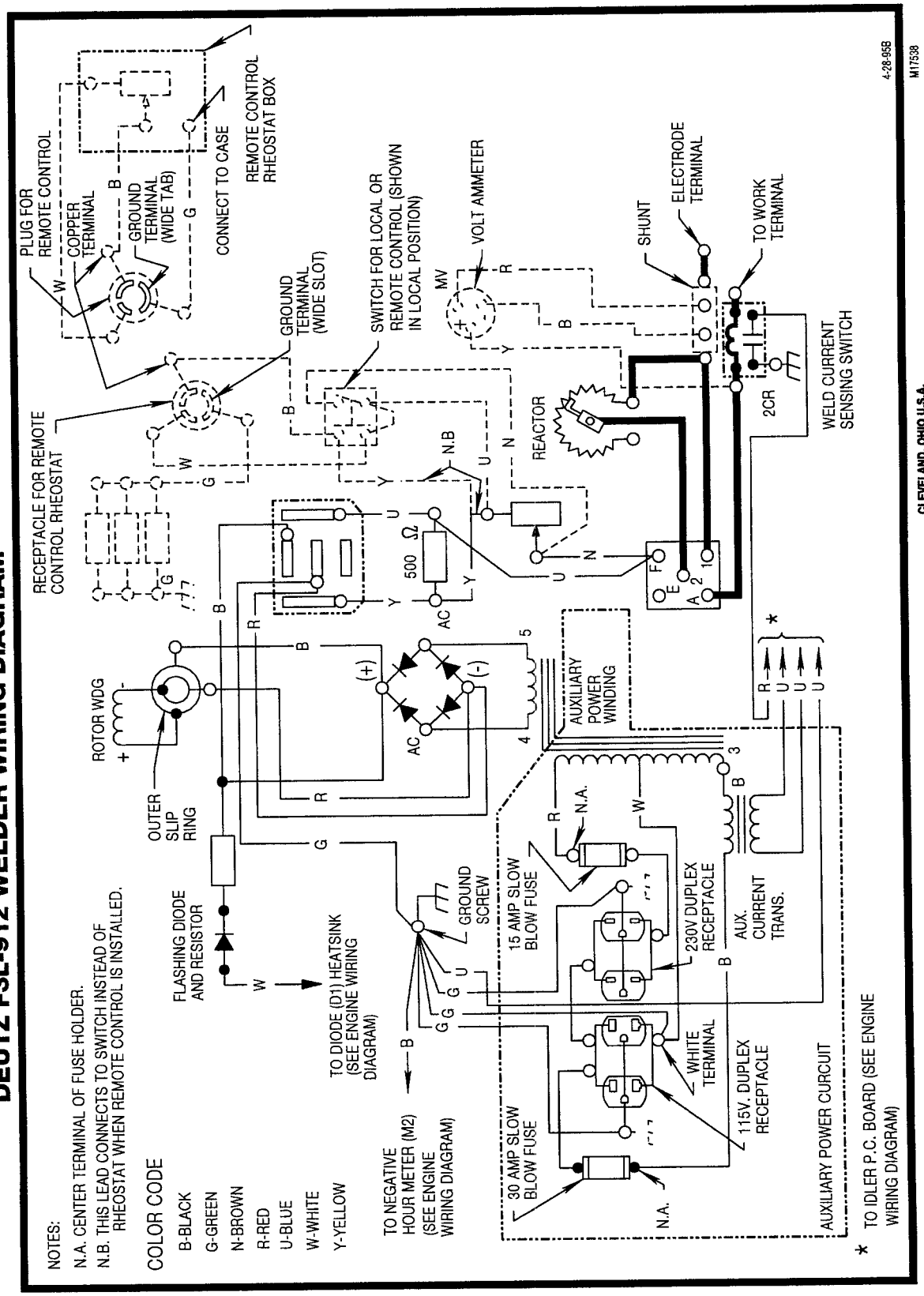
ENGINE WIRING DIAGRAM



S17488
4-28-95B

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

LINCOLN ELECTRIC



M17538
4-15-94F

NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

LINCOLN ELECTRIC

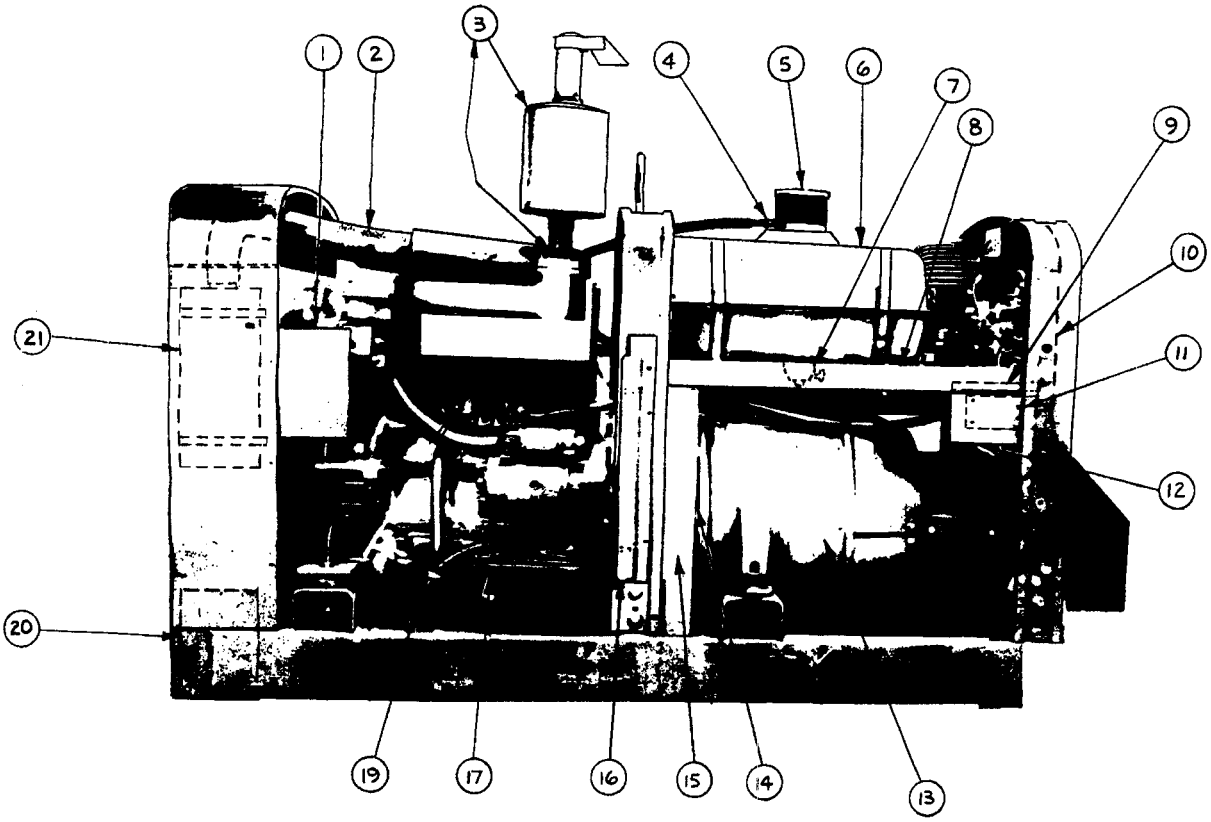
NOTES

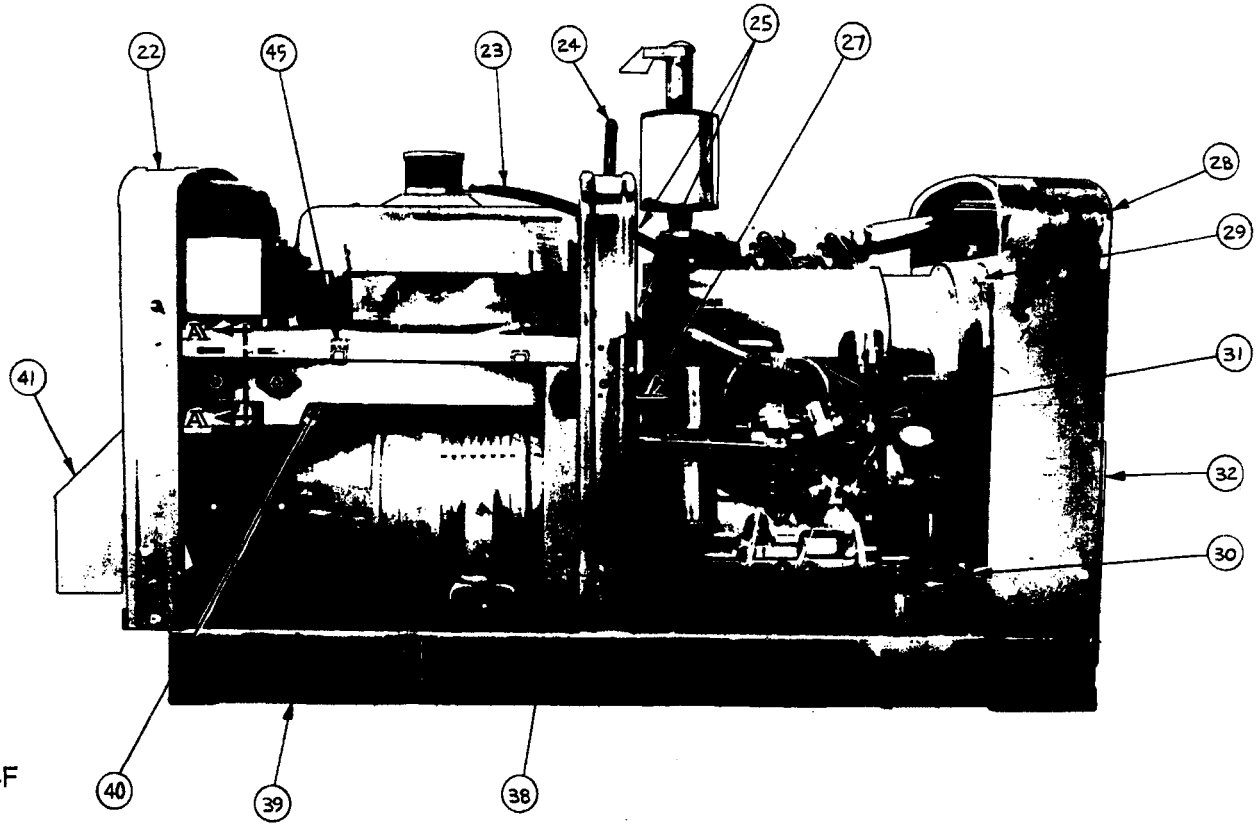
PARTS LISTS FOR

450 SAE F3L-912 DEUTZ DIESEL ENGINE DRIVEN DC ARC WELDING POWER SOURCE

LINCOLN ELECTRIC

MISCELLANEOUS ASSEMBLY





G2751
4-15-94F

LINCOLN ELECTRIC

# Indicates a change this printing.

* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	ALTERNATOR FAN GUARD	S17474	1	X								
2	INTAKE AIR HOSE	M14629	1	X								
	HOSE CLAMP — ENGINE END	S10888-33	2	X								
3	MUFFLER	M14648-1	1	X								
	EXHAUST FLANGE	S17476	1	X								
	GASKET	S17478	1	X								
	METRIC HEX HEAD SCREW	T14731-4	4	X								
4	HOSE CONNECTOR	T13595-1	1	X								
	HOSE CLAMP	T13777-1	2	X								
	FUEL RETURN LINE (WITHOUT ENGINE PROTECTION)	T10642-91	1	X								
	FUEL RETURN LINE (CHECK VALVE TO TANK – WITH ENGINE PROTECTION ONLY)	T10642-153	AS REQ'D	X								
	FUEL RETURN LINE (ENGINE TO CHECK VALVE – WITH ENGINE PROTECTION ONLY)	T10642-134	1	X								
	CHECK VALVE (WITH ENGINE PROTECTION ONLY)	T14908	1	X								
	HOSE CONNECTOR (WITH ENGINE PROTECTION ONLY)	T15097-1	2	X								
5	FUEL TANK CAP (PART OF FUEL TANK)	S10149	1	X								
	FUEL TANK CAP GASKET	S10437-A	1	X								
6	FUEL TANK	L3398-17	1	X								
7	FUEL STRAINER	S6185	1	X								
	HOSE CONNECTOR	T13595	1	X								
	HOSE CLAMP	T13777-1	2	X								
	FUEL FEED LINE	T10642-103	1	X								
8	FUEL TANK RAIL	M14619	1	X								
9	CURRENT TRANSFORMER	M13695-5	1	X								
10	CONTROL PANEL	SEE P-154-D	1	X								
11	IDLER P.C. BOARD	M13708-1	1	X								
	SPACER	S10918-48	3	X								
12	P.C. BOARD MOUNTING BRACKET	M14630	1	X								
13	WELDING GENERATOR ASSEMBLY	SEE P-154-F	1	X								
14	ACOUSTICAL FOAM	S17490-1	1	X								
15	LEFT SIDE BAFFLE	M14620-1	1	X								
16	LIFT BAIL BAFFLE	M14645	2	X								
17	ENGINE ASSEMBLY (NOT SHOWN)	L6951	1	X								
18	STARTER (CONTACT ENGINE DISTRIBUTOR)											
19	BATTERY CABLE (POSITIVE)	S8070-31	1	X								
	LOOM	E1054-.750-40.00	1	X								
20	BATTERY	M9399-9	1	X								
	BATTERY CLAMP BRACKET	S12471-2	1	X								
	HOOK	T8818-7	2	X								
21	AIR CLEANER	M12408	1	X								
	AIR CLEANER MOUNTING BRACKET	M12407	2	X								
22	REAR SUPPORT	M8237-12	1	X								
23	LOOM – COVERS FUEL RETURN LINE	E1054-.625-20.00	1	X								
24	LIFT BAIL ASSEMBLY	L6921	1	X								
25	BUSHING	T12380-1	1	X								
27	ENGINE SHUT-OFF ROD	S17479	1	X								
	SPRING	T9284	1	X								
	LOCK NUT	T9187-6	1	X								
	KNOB	T10889	1	X								

4-21-94

# Indicates a change this printing.

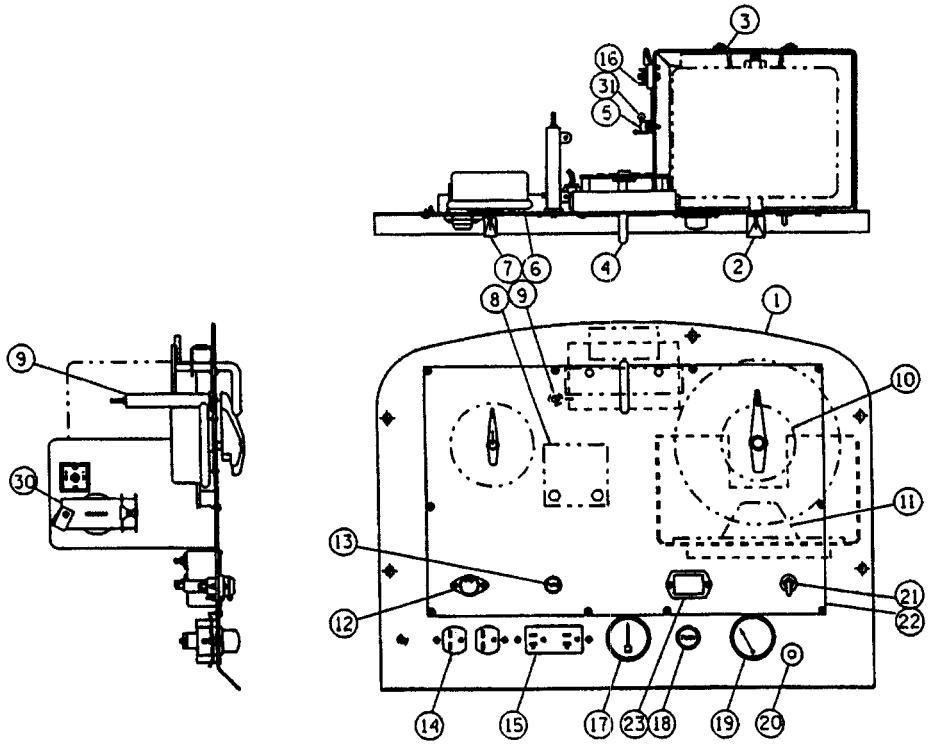
* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
28	AIR INTAKE ASSEMBLY	L6929	1	X								
29	RUBBER STRIP	S17471	1	X								
	BAND CLAMP	S17480	1	X								
30	GROUND STRAP	S15017-7	1	X								
31	LOOM – FUEL FEED LINE	E1054-.625-36.00	1	X								
32	AIR INTAKE DOOR ASSEMBLY	L6935	1	X								
	DOOR LATCH	T14838	1	X								
38	RIGHT SIDE BAFFLE	M14620-2	1	X								
39	BASE WELDED ASSEMBLY	L6916-1	1	X								
40	OUTPUT RAIL ASSEMBLY	M14637	1	X								
41	LOWER REAR COVER	L6923	1	X								
42	METER SHUNT – USED WITH OPT. VOLT-AMMETER ONLY (BELOW CODE 10100)	S6602-6	1	X								
45	CONDUIT CLAMP	T8666-7	1	X								
	ITEMS NOT ILUSTRATED:											
	BATTERY CABLE (NEGATIVE)	S8070-28	1	X								
	FEMALE ELBOW – OIL LINE TO PRESSURE GAUGE	T11661	1	X								
	ROOF, INCLUDES:	L6937	1	X								
	DOOR BUMPERS	T15154	1	X								
	ROOF MOUNTING ANGLE (REAR)	T9428	2	X								
	ROOF MOUNTING ANGLE (FRONT)	S13593	2	X								
	DOOR	M14646	1	X								
	DOOR HOOK (LEFT)	S10656-1	1	X								
	DOOR HOOK (RIGHT)	S10656-2	1	X								
	SIDE PANEL	L6939	1	X								
	TEMPERATURE PROBE – WITH ENGINE PROTECTION ONLY	T14840	1	X								
	STREET TEE – MOUNTS IN OIL GAUGE WITH ENGINE PROTECTION ONLY	T14130	1	X								
	PRESSURE SWITCH – ENGINE PROTECTION ONLY	S14446-2	1	X								
	OIL LINE	S8133-8	1	X								
	FRONT ENGINE MOUNT ASSEMBLY	M8859-35	2	X								
	DISCHARGE AIR BOX ASSEMBLY	L6936	1	X								
	IDLER SPRING BRACKET	S17482	1	X								
	IDLER SPRING	T11862-3	1	X								
	IDLER SOLENOID ASSEMBLY	M14644	1	X								
	GENERATOR MOUNT ASSEMBLY	M8859-34	2	X								
	FUEL CHECK VALVE – ENGINE PROTECTION ONLY	T14908	1	X								
	CV ADAPTER	G1643-5	1	X								
	CV ADAPTER PARTS	SEE P-154-G										
	GOVERNOR SEAL (BELOW CODE 10100)	T8628	1	X								
	DIODE & LEAD ASSEMBLY	T14848	1	X								
	FUEL RETURN LINE (450 SAE)	T10642-91										
	HOSE CLAMP (450 SAE)	T13771-1	1	X								

5-21-92

CONTROL PANEL ASSEMBLY



G2753
4-21-94

# Indicates a change this printing.

* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	COMPLETE CONTROL PANEL ASSEMBLY SAE 350 & 450 SAE INCLUDES: INDICATE WHICH OPTIONAL EQUIPMENT IS ON MACHINE TO RECEIVE CORRECT ASSEMBLY (HOUR METER, VOLT-AMMETER, REMOTE CONTROL) (ABOVE CODE 10100)	G2753-[ ]	1	X								
	COMPLETE CONTROL PANEL ASSEMBLY, SAE-350 INCLUDES: INDICATE WHICH OPTIONAL EQUIPMENT IS ON MACHINE TO RECEIVE CORRECT ASSEMBLY (HOUR METER, VOLT-AMMETER, REMOTE CONTROL) (BELOW CODE 10100)	G1645-[ ]	1	X								
	COMPLETE CONTROL PANEL ASSEMBLY, 450-SAE, INCLUDES: INDICATE WHICH OPTIONAL EQUIPMENT IS ON MACHINE TO RECEIVE CORRECT ASSEMBLY (HOUR METER, VOLT-AMMETER, REMOTE CONTROL) (BELOW CODE 10100)	G1645-[ ]	1	X								
1	REACTOR BOX AND PANEL ASSEMBLY (BELOW CODE 10100)	M14628	1	X								
1	REACTOR BOX AND PANEL ASSEMBLY (ABOVE CODE 10100)	M17539	1	X								
2	SELECTOR HANDLE	S16664-16	1	X								
3	BRUSHHOLDER STUD	T7852	1	X								
4	REVERSING SWITCH (NOT USED WITH CV ADAPTER)	M7057-1	1	X								
5	DIODE ASSEMBLY	T13622-1	1	X								
6	RHEOSTAT	M5090-C	1	X								
7	RHEOSTAT HANDLE	S16664-13	1	X								
8	DIODE AND HEATSINK ASSEMBLY	S17473-1	1	X								
9	RESISTOR	T8280	1	X								
	ROUND HEAD SCREW (NOT USED WITH CV ADAPTER)	#10-24 x 5.00	1	X								
	INSULATING WASHER (NOT USED WITH CV ADAPTER)	T4479-A	1	X								
	LOCK WASHER (NOT USED WITH CV ADAPTER)	E106A-1	1	X								
	HEX NUT (NOT USED WITH CV ADAPTER)	#10-24	1	X								
10	BRUSHHOLDER ASSEMBLY, INCLUDES:	M6277	1	X								
	BRUSHHOLDER	M6264	1	X								
	COIL SPRING	T6985	4	X								
	CONTACT	T7494	4	X								
	SHAFT	T8218	1	X								
	INSULATING TUBE	T8219	1	X								
	REACTOR SPRING CLIP	S7297	1	X								
	SPRING	T8236	1	X								
11	REACTOR ASSEMBLY	L2036-B	1	X								
12	FUSE HOLDER (230V)	T12386	1	X								
	FUSE	T10728-21	1	X								
13	FUSE HOLDER (115V)	S10433	1	X								
	FUSE	T10728-36	1	X								
14	RECEPTACLE (230V)	S14377	1	X								
15	RECEPTACLE (115V) (BELOW CODE 10100)	S15767	1	X								

1-9-95

# Indicates a change this printing.

* Recommended Spare Part.

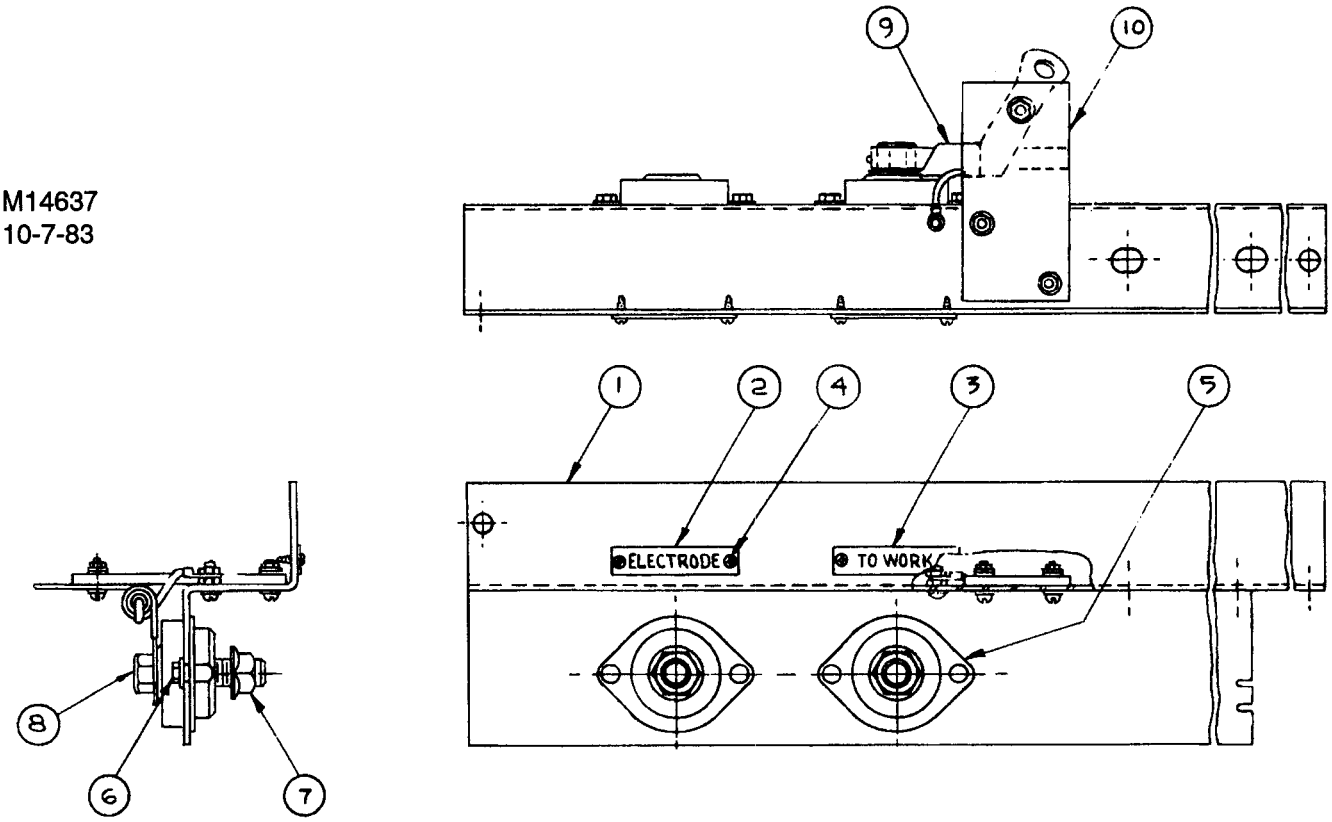
Use only the parts marked "X" in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
15	RECEPTACLE (115V) (ABOVE CODE 10100)	S20184	1	X								
16	SILICON BRIDGE ASSEMBLY	T13637	1	X								
	ROUND HEAD SCREW	#8-32 x .875	1	X								
	PLAIN WASHER	S9262-3	2	X								
	INSULATOR	T11267-A	1	X								
	INSULATING PAD	T13650	1	X								
	LOCK WASHER	T4291-A	1	X								
	HEX NUT	#8-32	1	X								
17	AMMETER	S7514-4	1	X								
18	START SWITCH	S13146-1	1	X								
19	OIL GAUGE	S7599-1	1	X								
20	GROMMET	S10255-6	1	X								
21	IDLER SWITCH	T10800-4	1	X								
22	NAMEPLATE SAE-350 — SPECIFY OPTIONAL EQUIPMENT TO OBTAIN CORRECT NAMEPLATE (BELOW CODE 10100)	G1644-[ ]	1	X								
22	NAMEPLATE 450-SAE — SPECIFY OPTIONAL EQUIPMENT TO OBTAIN CORRECT NAMEPLATE	G1690-[ ]	1	X								
22	NAMEPLATE SAE-350 (ABOVE CODE 10100)	G2754-[ ]	1	X								
22	NAMEPLATE 450-SAE (ABOVE CODE 10100)	G2757-[ ]	1	X								
23	HOUR METER — OPTIONAL (BELOW CODE 10100)	S17475-3	1	X								
24	VOLT AMMETER — (BELOW CODE 10100)	S4934-2	1	X								
26	REMOTE CONTROL SWITCH — OPTIONAL (BELOW CODE 10100)	S7959	1	X								
27	REMOTE CONTROL RECEPTACLE — OPTIONAL (BELOW CODE 10100)	S7709-1	1	X								
28	RESISTOR — USED W/OPTIONAL REMOTE CONTROL ONLY (BELOW CODE 10100)	S10404-22	3	X								
	ROUND HEAD SCREW	#10-24 x 5.00	3	X								
	INSULATING WASHER	T4479-A	6	X								
	PLAIN WASHER	S9262-66	3	X								
	LOCK WASHER	E106A-1	3	X								
	HEX NUT	#10-24	3	X								
29	DECAL (BELOW CODE 10100)	T13339	1	X								
30	REACTOR LEAD INSULATION	T10576	1	X								
31	RESISTOR ASSEMBLY	T14894	1	X								
32	FASTENER BUTTON	T14659	1	X								

1-9-95

OUTPUT RAIL ASSEMBLY

M14637
10-7-83



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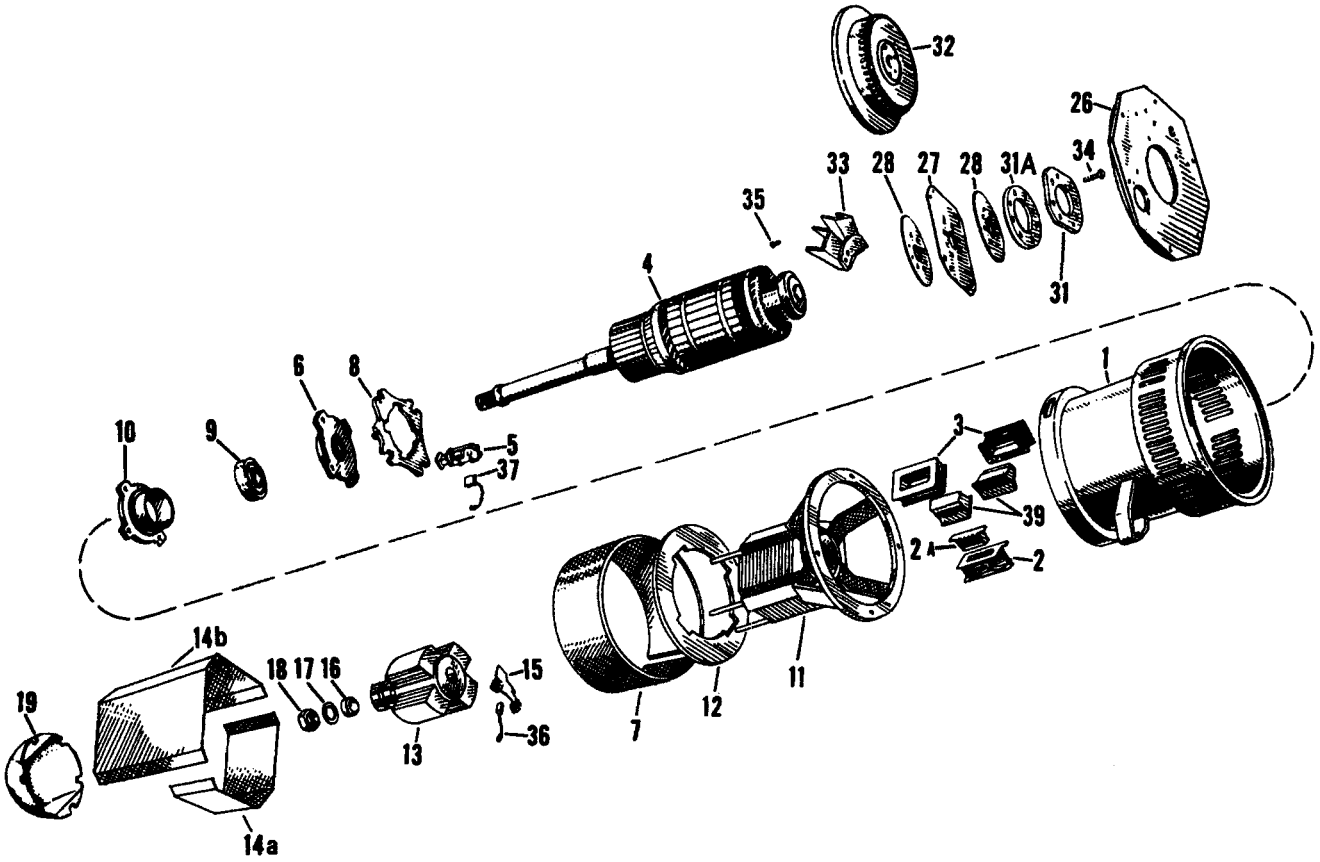
* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	OUTPUT RAIL	M14618	1	X								
2	"ELECTRODE" MARKER	T3961	1	X								
3	"TO WORK" MARKER	T3962	1	X								
4	SELF TAPPING SCREW	S8025-60	4	X								
5	MOLDED OUTPUT TERMINAL	M13900	2	X								
6	SELF TAPPING SCREW	S8025-65	4	X								
7	OUTPUT STUD NUT	T3960	2	X								
8	HEX HEAD SCREW	1/2-13 X .625	1	X								
9	REED SWITCH AND LEAD ASSEMBLY	S17472	1	X								
10	REED SWITCH SUPPORT PANEL	T14835	1	X								

LINCOLN ELECTRIC

WELDING GENERATOR AND COUPLING



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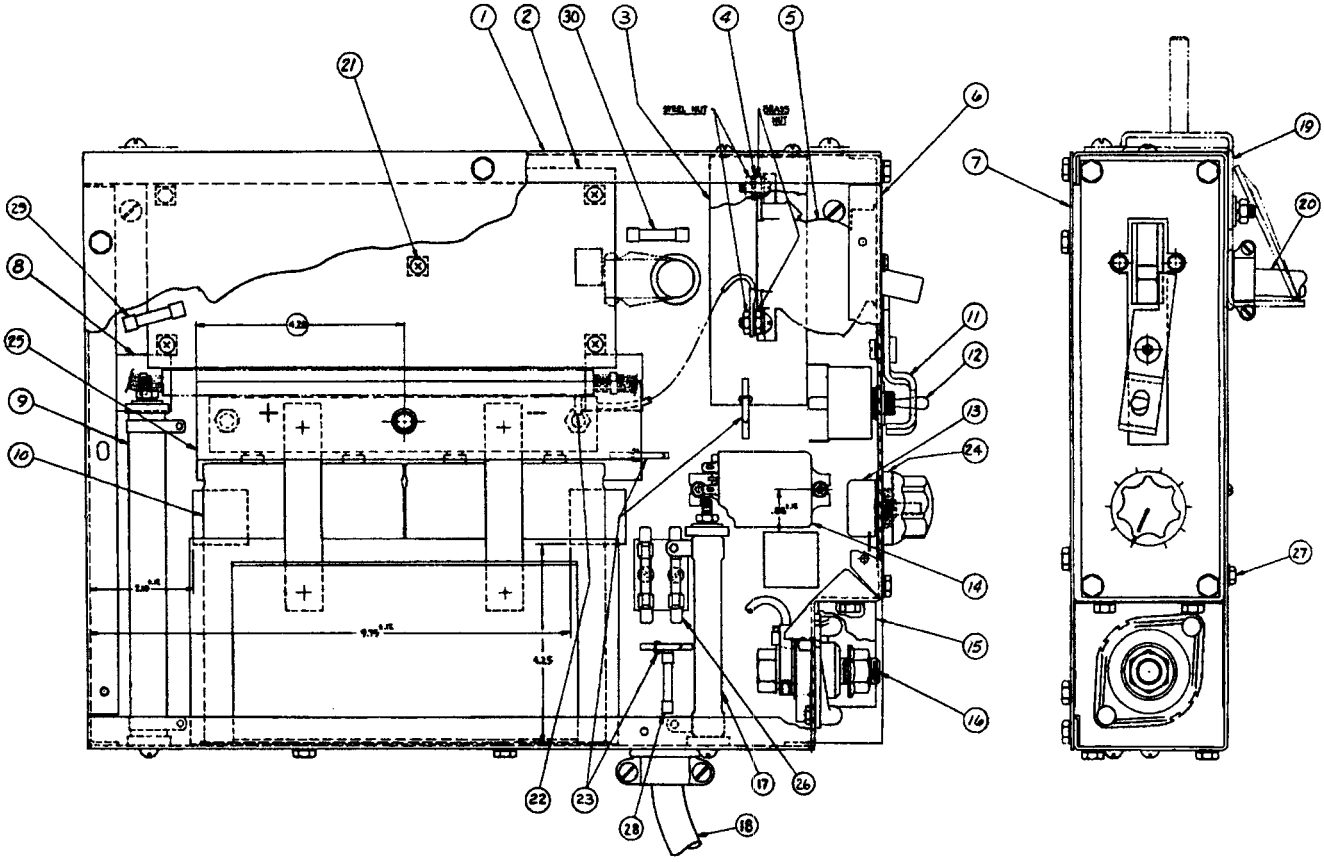
* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	FRAME	L5143-9	1	X								
	INTERPOLE COIL & POLE (SET OF 4) INCLUDES:	S12261-3	1	X								
2	INTERPOLE COIL (SET OF 4)	S12261-3A	1	X								
2A	INTERPOLE POLE PIECE	S12260-3	4	X								
3	SHUNT AND SERIES FIELD COIL	SEE WINDING SPECS	1	X								
4	ARMATURE	L2667-27	1	X								
5	BRUSH HOLDER	M6964-10A	4	X								
	BRUSH HOLDER PARTS	SEE P-25-L										
7	BRACKET COVER	M5583	2	X								
8	ROCKER	S5960	1	X								
9	BEARING	M9300-22	1	X								
	ITEMS 11 THROUGH 18 ARE PART OF ALTERNATOR ASSEMBLY											
26	HOUSING PLATE	L6840	1	X								
	METRIC HEX HEAD SCREW (HOUSING PLATE TO ENGINE)	T14731-5	9	X								
	METRIC LOCK WASHER (HOUSING PLATE TO ENGINE)	S17400-1	9	X								
27	COUPLING DISC	M6730	1	X								
28	DISC BACKING PLATE	S8042	2	X								
29	ENGINE COUPLING	PART OF ENGINE	1	X								
30	COUPLING STUD	T14846	4	X								
31	COUPLING RING (OUTSIDE – CLOSEST TO ENGINE)	S14232	1	X								
31	COUPLING RING (INSIDE)	S14233	1	X								
33	BLOWER SEGMENT (NOTE: 4 REQ'D FOR COMPLETE BLOWER)	M10840	4	X								
34	HEX HEAD SCREWS (COUPLING RINGS TO ARMATURE HUB)	T8833-2	8	X								
35	HEX HEAD SCREWS (BLOWER SEGMENTS TO ENGINE COUPLING)	T8833-1	8	X								
36	ALTERNATOR BRUSH	SEE P-121-H	2	X								
37	GENERATOR BRUSH	T344	8	X								
39	MAIN POLES	S10745-1	4	X								

5-21-92

CV ADAPTER



G1643
6-20-86T

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* Recommended Spare Part.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	CONTROL BOX	M14614	1	X								
2	PRINTED CIRCUIT BOARD	G1642-2	1	X								
3	SWITCH INSULATOR	S17460	1	X								
4	LINE SWITCH JUMPER	S11012-38	2	X								
5	LINE SWITCH (S2)	S17499	1	X								
6	NAMEPLATE	M14612-3	1	X								
7	CONTROL BOX COVER	S17463	1	X								
8	CABLE TIE MOUNT	T13941	5	X								
	CABLE TIE	T13770-2	5	X								
9	RESISTOR (R3)	S10404-79	1	X								
	ROUND HEAD SCREW	#10-24 X 7.50	1	X								
	PLAIN WASHER	S9262-27	1	X								
	LOCK WASHER	E106A-1	1	X								
	INSULATING WASHER	T4479-A	2	X								
	HEX NUT	#10-24	1	X								
10	CAPACITORS, JUMPERS & MOUNTING STRAP ASSEMBLY, INCLUDES:	S17459	1	X								
	CAPACITORS	S13490-89	4	X								
11	SWITCH LEVER	S17454	1	X								
	LEVER AXLE	T14828	1	X								
	BOW WASHER	T10781-5	1	X								
	SEMS SCREW	T10082-4	1	X								
12	TOGGLE SWITCH (S1) (BELOW CODE 9100)	T10800-14	1	X								
12	TOGGLE SWITCH (S1) (ABOVE CODE 9100)	T10800-28	1	X								
13	POTENTIOMETER (R2)	T10812-40	1	X								
	INSULATION	T12792-1	1	X								
	KNOB	T10491	1	X								
14	DC RELAY	T13845-7	1	X								
15	TERMINAL INSULATOR	S17461	1	X								
16	OUTPUT TERMINAL KIT, INCLUDES:	T14166-9	1	X								
	OUTPUT TERMINAL	M13900	1	X								
	OUTPUT STUD NUT	T3960	1	X								
17	RESISTOR (R1)	S10404-53	1	X								
	ROUND HEAD SCREW	#10-24 X 5.00	1	X								
	PLAIN WASHER	S9262-27	1	X								
	LOCK WASHER	E106A-1	1	X								
	INSULATING WASHER	T4479-A	2	X								
	HEX NUT	#10-24	1	X								
18	POWER CABLE ASSEMBLY	S17867	1	X								
19	CONTROL BOX SUPPORT	S17871	1	X								
20	CONTROL CABLE ASSEMBLY	S17865	1	X								
21	PLASTIC EXPANSION NUT	S14020-3	5	X								
	SELF TAPPING SCREW	S8025-71	5	X								
22	CABLE TIE	T13770-2	1	X								
23	CABLE TIE	T13770-3	3	X								
24	RUBBER WASHER	T11135-16	1	X								
25	PROTECTION INSULATOR	T14901	1	X								
29	SPARE FUSE	T10728-9	1	X								
30	SPARE FUSE	T10728-5	1	X								

4-29-86

NOTES

NOTES

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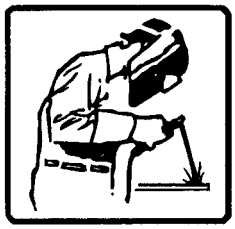

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LINCOLN ELECTRIC

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絶緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

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

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

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

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



● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
● 頭部遠離煙霧。 ● 在呼吸區使用通風或排風器除煙。	● 維修前切斷電源。	● 儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

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

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

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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

LINCOLN ELECTRIC

PERFORMANCE PLUS PROTECTION

3 YEAR WARRANTY PARTS & LABOR

LINCOLN® ELECTRIC

LIMITED WARRANTY

WARRANTY SUPERSEDED
SEE IMWS 1

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
Inverter Welders
Automatic Wire Feeders
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, engine accessories and Power-Arc generator/welders) 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.

One Year:

Equipment not listed above such as gun and cable assemblies, water coolers, FAS TRAK or MIG-TRAK equipment, Power-Arc generator/welders, Wire Feed Module (Factory Installed) and field-installed optional equipment.

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.

August, '94