4900

LINCOLN® WELDERS

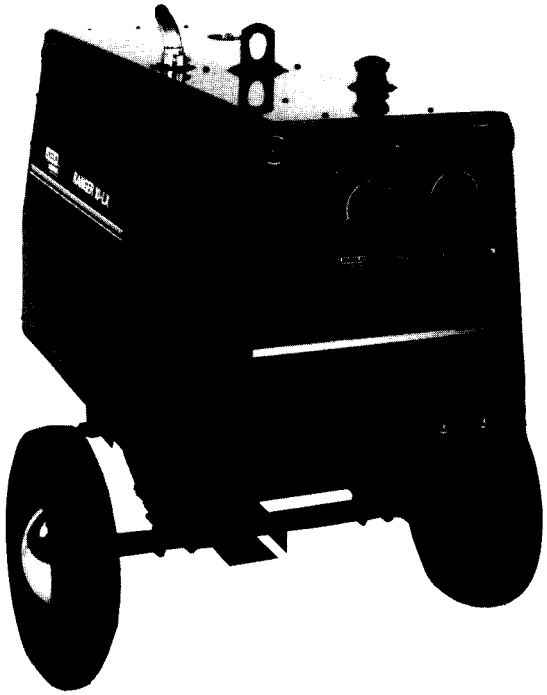
IM-455

IM455
Ranger 10-LX (Kubota)
July, 1992
9815; 9816; 9821;
10296

OPERATING MANUAL

RANGER 10 and RANGER 10-LX

Multiprocess Diesel Engine Driven Welder and Power Generator



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This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

DAMAGE CLAIMS

When this equipment is purchased, 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 equipment is received.

SAFETY DEPENDS ON YOU

Lincoln welders are designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS OPERATING MANUAL AND THE ARC WELDING SAFETY PRECAUTIONS ON PAGES 2, 3 AND 4. And, most importantly, think before you act and be careful.

LINCOLN® ELECTRIC

THE LINCOLN ELECTRIC COMPANY
World's Leader in Welding and Cutting Products • Premier Manufacturer of Industrial Motors
Sales and Service through Subsidiaries and Distributors 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. Insulate yourself from workpiece 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 Welder
   - DC Manual (Stick) Welder.
   - AC Welder with Reduced Voltage Control.

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

   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 U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

c. Ground the equipment in accordance with the U.S. 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 or CSA Standard W117.2-1974.

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 vètements 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 de fonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces précautions pour le porte-électrode s'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 protèger 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 èchauffement 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 particulièrement 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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PART D

PARTS LIST

IMPORTANT SAFETY NOTE: EMF CONSIDERATIONS

Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF 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 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 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 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.

PART A

General Description

The Ranger 10 and Ranger 10-LX are diesel engine driven alternator power sources for multi-process AC and DC welding and for 115/230 VAC auxiliary and standby power. They are housed in an insonorized case for extremely quiet operation.

Machine Specifications

	K1408-1 Ranger 10	K1408-2 and -3 Ranger 10-LX
Welding Output AC Constant Current DC Constant Current DC Constant Voltage Duty Cycle Max. OCV @ 3700 RPM	 250 Amps, 25 Volts 250 Amps, 25 Volts 200 Amps, 19 Volts 100% 80 Volts RMS	 250 Amps, 25 Volts 250 Amps, 25 Volts 250 Amps, 30 Volts 100% 80 Volts RMS
Auxiliary Power[1] Output Voltage Duty Cycle Receptacles	 10,000 Watts, 60 Hz 115/230 Volts 100% 2-115 Volt Duplex (5-20R) 1-115/230 Volt Dual Voltage Full KVA (6-50R)	 10,000 Watts, 60 Hz 115/230 Volts 100% 2-115 Volt Duplex (5-20R) LX (5-15R) LX CSA 1-115/230 Volt Dual Voltage Full KVA (6-50R)
Remote Control Capability	Standard	Standard
Output Contactor for Wire Feed (CV) Welding	—	Standard
Receptacle for Wire Feed Connections	—	Standard
Fuel Level Gauge	Standard	Standard
Engine Hour Meter	Standard	Standard
Dimensions H x W x L Inches (mm)	 37.38 x 24.75 x 60.5 (949.4 x 628.7 x 1528.6)	 37.38 x 24.75 x 60.5 (949.4 x 628.7 x 1528.6)
Net Weight Lbs (kg)	 1060 (480.8)	 1100 (499.0)

[1]Output rating in watts is equivalent to volt-amperes at unity power factor. Output voltage is within ± 10% at all loads up to rated capacity. When welding, available auxiliary power will be reduced.

Engine Specifications

Make	Kubota
Model	DH850B-88 Diesel Engine
Cylinders	3 with Spherical Combustion Chambers
Bore & Stroke, Inch (mm)	2.83 x 2.76 (72 x 70)
Displacement, Cu. In. (cc)	52.17 (855)
Horsepower (SAEJ1349 Gross)	23.0 at 3600 rpm
Lube Oil Capacity: Qts (L)	3.9 (3.7)
Lubrication	Forced Feed, Full Flow Oil Filter, 100 Hour Service Interval
Cooling System	Liquid Cooled (50% Ethylene Glycol – 50% water)
Coolant Capacity: Qts (L)	5.4 (5.1)
Fuel System	Indirect Injection, Fuel Filter with Integral Fuel Shutoff; Lift Pump; Bypass Valve for Easy Bleeding
Fuel Capacity: Gal (L)	10 (38)
Governor	Mechanical
Air Cleaner	Heavy Duty Two Stage Dry Cartridge Type
Starting System	12V Battery & Starter; Pushbutton Start Switch; Glow Plugs; Alternator and Regulator Battery Charger
Engine Idler	Automatic Idler
Muffler	Low Noise Muffler, Outlet can be Rotated
Engine Protection	Shutdown on High Water Temp. or Low Oil Pressure
Indicator Lights	Low Oil Pressure, High Temperature, Battery Charger Low Output
Operating Speed	High Idle: 3750 RPM Low Idle: 2150 RPM Full Load: 3600 RPM
Battery	Group 45; 495 Amps Cold Cranking
Engine Warranty	2 Years or 2,000 Hours Parts and Labor 3 Years or 3,000 Hours Major Parts See Engine Manufacturer Warranty Statement for Details

Optional Field Installed Accessories

K802R Power Plug Kit
Provides a plug for each receptacle.

K768 Undercarriage
For in-plant and yard towing only. Two 4.80 x 12 inch (122 x 305 mm) four-ply tubeless tires. Has stand for tow bar and grips for hand pulling. Overall width 43.06 inches (1.09 meters).

K702 Accessory Set
Includes 35 feet (10 meters) of electrode cable and 30 feet (9 meters) of work cable, headshield, work clamp and electrode holder. Cable rated at 250 amps, 40% duty cycle.

K799 Hi Freq™
High frequency unit with gas valve for TIG welding. Rating is 250 amps at 80% duty cycle.

K902-1 Mounting Kit
For mounting the K799 High Freq unit on the Ranger 10 and Ranger 10-LX

K857 Remote Control
Portable control provides same dial range as the output control on the welder from a location up to 25 ft (7.6 m) from the welder. Has convenient plug for easy connection to the welder.

K896-1 GFCI 115V Receptacle Kit
Includes two ground fault circuit interrupter duplex receptacles. Each receptacle of a duplex outlet is rated at 15 amps, 115 volts. The current draw from each duplex outlet is limited to 20 amps.

K903-1 Spark Arrester Kit
Includes a heavy gage steel, approved spark arrester, clamp and adapter for mounting to muffler exhaust pipe.

PART B

INSTALLATION INSTRUCTIONS

⚠ 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 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 muffler included with this welder does not qualify as a spark arrester. When required by local regulations, a suitable spark arrester must be installed and properly maintained.

CAUTION: An incorrect arrester may lead to damage to the engine or adversely affect performance.

Location/Ventilation

⚠ 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 inlets and to avoid heated air coming out of the back of the welder recirculating back to the cooling air inlets below the exhaust. Also, locate the welder so that the engine exhaust fumes are properly vented to an outside area.

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:

a) be grounded to the frame of the welder using a grounded type plug, or

b) be double insulated.

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

When 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. See further connection instructions in the section entitled "Standby Power Connections" as well as the article on grounding in the latest U. S. National Electrical Code and the local 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 U.S. 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 front of the welder.

Undercarriage

The recommended undercarriage for use with this equipment for in-plant and yard towing by a vehicle[1] is Lincoln's K768. 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 nor 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. [1]

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

⚠ WARNING

FALLING EQUIPMENT can cause injury.

- **Do not lift this machine using lift bail if it is equipped with a heavy accessory such as trailer or gas cylinder.**
- **Lift only with equipment of adequate lifting capacity.**
- **Be sure machine is stable when lifting.**

High Frequency Generator for TIG Welding Applications

The Hi-Freq Unit includes a mounting shroud for attaching the unit to the Ranger 10 or Ranger 10-LX roof. The Hi-Freq Unit includes an R.F. bypass capacitor which **must** be installed inside the Ranger case for proper R.F. operation and for protection of components in the Ranger. The capacitor does not affect the operation of other welding processes. If the Ranger is used with any other high frequency equipment, the bypass capacitor must be installed – order kit T12246.

The Ranger and the Hi-Freq Unit must be properly grounded. The Hi-Freq Unit must have the Power Source Matching Switch set to position "A". See the Hi-Freq Operating Manual for complete instructions on installation, operation, and maintenance of the K799 Hi-Freq Unit.

Standby Power Connections

The Ranger 10 and Ranger 10-LX are suitable for temporary, standby or emergency power using the engine manufacturer's recommended maintenance schedule.

The Ranger can be permanently installed as a standby power unit for 230 volt-3 wire, 43 ampere service. Connections must be made by a licensed electrician who can determine how the 115/230 volt power can be adapted to the particular installation and comply with all applicable electrical codes. The following information can be used as a guide by the electrician for most applications (refer also to the connection diagram shown in FIG. 1).

1. Install the double pole, double throw switch between the power company meter and the premises disconnect.

   Switch rating must be the same or greater than the customer's premises disconnect and service overcurrent protection.

2. Take necessary steps to assure load is limited to the capacity of the Ranger by installing a 45 amp, 230 volt double pole circuit breaker. Maximum rated load for the 230 volt auxiliary is 43 amperes. Loading above 43 amperes may reduce output voltage below the allowable -10% of rated voltage which may damage appliances or other motor-driven equipment, as well as the Ranger.

3. Install a 50 amp 115/230 volt plug (NEMA Type 14-50) to the Double Pole Circuit Breaker using No.6,4 conductor cable of the desired length. (The 50 amp 115/230 plug is available in the optional plug kit.)

See "Auxiliary Power" on page 18 for additional information

NOTE: When the Ranger is connected to 230 volt 3-wire load, the Idler Switch should be set to the "HIGH" position to avoid load sensing problems. Only one line of the 230V/115V receptacle senses the load and if 115V power is drawn from only one side of the receptacle, the Ranger may not accelerate to high idle when operated in "AUTO".

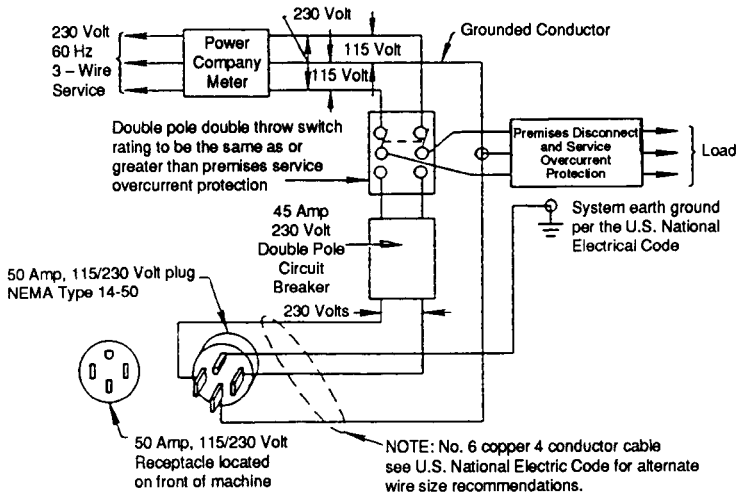


Figure 1

Connection of Lincoln Electric Wire Feeders

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not operate with covers removed.**
- **Disconnect welding power source before servicing.**
- **Do not touch electrically live parts.**
- **Only qualified persons should install, use or service this machine.**

Connection of the LN-25 to the Ranger 10

The LN-25 with or without an internal contactor may be used with the Ranger 10. See the appropriate connection diagram in section 4. NOTE: The LN-25 (K431) Remote Control Module and (K432) Remote Cable are not recommended for use with the Ranger 10.

a. Shut the welder off.

b. Connect the electrode cable from the LN-25 to the electrode terminal of the welder. Connect the work lead to work terminal of the welder.

c. Attach the single lead from the front of the LN-25 to work using the spring clip on the end of the lead. This is a control lead to supply current to the wire feeder motor; it does not carry welding current.

d. Set the "POLARITY" switch to either DC– or DC+, matching the process being used.

e. Set the "RANGE" switch to the "WIRE FEED" position.

f. "IDLER" Switch: See Below

LN-25 without a contactor

CAUTION: Electrode is always energized with this wire feeder.

Set the "IDLER" switch to the "AUTO" position. When not welding, the Ranger 10 will be at low idle speed. Momentarily scratch the electrode work. The engine will accelerate to high idle and welding can now be started when the electrode is touched to the work. Electrode starts feeding when the gun trigger is pressed.

LN-25 with a contactor

Set the "IDLER" switch to HIGH idle. Electrode is energized and starts feeding when the gun trigger is pressed.

Connection of the LN-25 to the Ranger 10-LX

The LN-25 with or without an internal contactor may be used with the Ranger 10-LX. The LN-25 Remote Box and Remote Control Cable cannot be used with the installation on the Ranger 10-LX. See the appropriate connection diagram.

a. Shut off the welder.

b. Connect the electrode cable from the LN-25 to the electrode stud of the welder. Connect the work cable to the work stud of the welder.

c. Attach the single lead from the front of the LN-25 to work using the spring clip on the end of the lead. This is a control lead to supply the current to the wire feeder motor; it does not carry welding current.

d. Set the "POLARITY" switch to either WIRE FEED DC+ or WIRE FEED DC– as required by the electrode being used.

e. Set the "RANGE" switch to either HIGH, MED. HIGH, MED. LOW or LOW as required by the process.

f. Set the "WIRE FEEDER" switch to the NO CONTROL CABLE position.

g. Set the IDLER switch to the HIGH position if using a LN-25 **with** an internal contactor.

h. Set the "IDLER" switch to the "AUTO" position if using a LN-25 **without** an internal contactor. When not welding, the Ranger 10-LX will be at low idle speed and the Ranger 10-LX output contactor will be open (electrode not energized). To close the contactor before starting the welding process, momentarily touch the electrode to work but do not close the gun trigger. The low energy sensing circuit will cause the engine to go to high idle speed and the contactor to close. The gun trigger can now be closed and the welding process be started. After welding is stopped, the contactor remains closed for approximately 12 seconds. Do not allow the electrode to touch work until the engine returns to low idle speed unless welding is to be resumed.

Connection of the LN-7 with K240 Contactor Kit to the Ranger 10

a. Shut the welder off.

b. Connect the LN-7 and the K240 Contactor Kit per instructions on the appropriate connection diagram starting on page 26.

c. Set the "POLARITY" switch to either DC+ or DC–, depending on process being used.

d. Set the "RANGE" switch to the "WIRE FEED" position.

e. Set the "IDLER" switch to the HIGH idle position.

Connection of the LN-7 or LN-8 to the Ranger 10-LX

a. Shut the welder off.

b. Connect the LN-7 or LN-8 per the instructions on the appropriate connection diagram starting on page 26.

c. Set the output control toggle switch to appropriate position: "OUTPUT CONTROL REMOTE" for LN-8 and LN-7 with K857 attached; "OUTPUT CONTROL AT WELDER" for LN-7 with no remote voltage control.

d. Set "POLARITY" switch to either "WIRE FEED DC+" or "WIRE FEED DC–", depending on process being used.

e. Set the "RANGE" switch to the appropriate "WIRE FEED" position.

f. Set the "WIRE FEEDER" switch to the "WITH CONTROL CABLE" position.

g. Set the "IDLER" switch to either the "HIGH" or "AUTO" idle position.

In the "AUTO" idle position, the engine is initially in low idle. Momentarily touch the electrode to the work **without** closing the gun trigger. A low energy sensing circuit will cause the engine to go to high idle and allow the gun trigger to control the output contactor. When welding is stopped, the engine will return to low idle speed after approximately 12 seconds.

⚠ WARNING

ELECTRIC SHOCK can kill.

- **When welding must be performed in electrically hazardous conditions such as wet areas or confined spaces, an LN-25 with the K443 Internal Contactor kit or LN-7 with the K240 Contactor kit is strongly recommended.**

Remote Output Control

The Ranger 10 has a 6-pin Amphenol connector and the Ranger 10-LX has a 6-pin and a 14-pin Amphenol connector. These connectors are located above the output studs. The 6-pin connector is intended to be used with the optional K857 Remote Output Control or in the case of TIG welding applications, with the Foot or Hand Amptrol. The 14-pin connector is used to connect a wire feeder control cable. If the wire feeder has a built-in power source output control, do not connect a remote output control to the 6-pin connector. When remote output control is used, the output control toggle switch is to be set at "OUTPUT CONTROL REMOTE".

Welding 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.

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 cable voltage drop.

AMPS	Duty Cycle	Total Combined Length of Electrode & Work Cable				
		0-50 Ft	0-100 Ft	100-150 Ft	150-200 Ft	200-250 Ft
250	40	2 AWG	2 AWG	1 AWG	1 AWG	1/0 AWG
250	100	1 AWG	1 AWG	1 AWG	1 AWG	1/0 AWG

Pre-Operation Service

READ the engine operating and maintenance instructions supplied with the machine.

Oil

The Ranger is shipped with the engine crankcase filled with SAE 10W-30 oil (API class CC/CD). Check the oil level before starting the engine. If it is not up to the full mark on the dip stick, add oil as required. Check the oil level every four hours of running time during the first 35 running hours. Refer to the engine Operator's Manual for specific oil recommendations and break-in information.

Fuel USE DIESEL ONLY

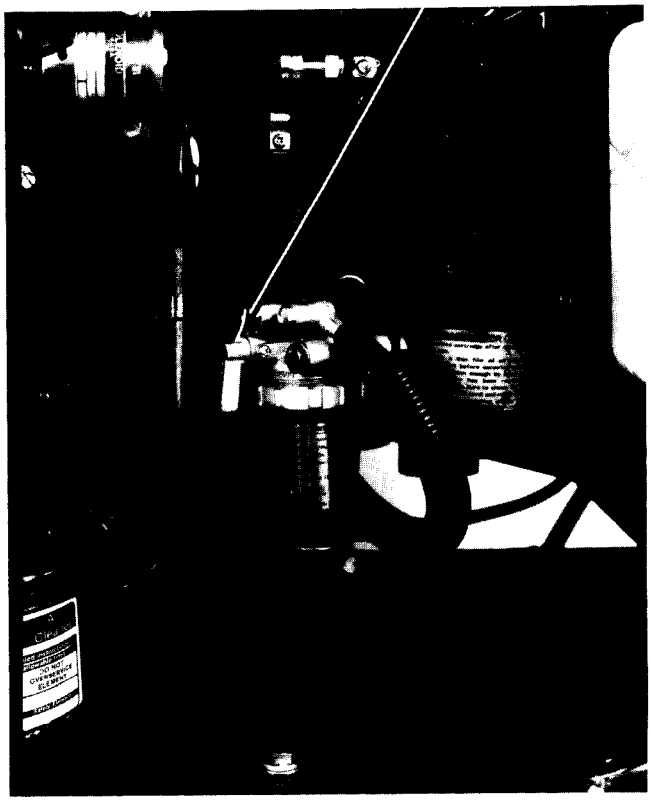
⚠ WARNING

DIESEL fuel can cause fire or explosion.

- **Stop engine when fueling.**
- **Do not smoke when fueling.**
- **Remove cap slowly to release pressure.**
- **Do not overfill tank.**
- **Wipe up spilled fuel and allow fumes to clear before starting engine.**
- **Keep sparks and flame away from tank.**

Fill the fuel tank with clean, fresh diesel fuel. The capacity is 10 gallons (38 liters). See engine Operator's Manual for specific fuel recommendations. **DO NOT ALLOW THE RANGER TO RUN OUT OF FUEL. THIS NECESSITATES BLEEDING THE INJECTOR SYSTEM.**

NOTE: Before starting the engine, open the fuel shutoff valve (lever to be in vertical position) located above the clear plastic fuel filter housing.



Engine Coolant

⚠ WARNING

HOT COOLANT can burn skin.

- **Do not remove cap if radiator is hot.**

The welder is shipped with the engine and radiator filled with a 50% mixture of ethylene glycol and water. The recovery bottle should be partially filled. See Maintenance Section, page 20, and engine Operator's Manual for more information on coolant.

Battery Connection

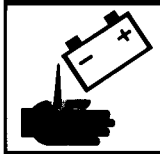
⚠ WARNING

GASES FROM BATTERY can explode.

- **Keep sparks, flame and cigarettes away from 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 clamp. 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.

- **Wear gloves and eye protection and be careful when working near battery.**
- **Follow instructions printed on battery.**

Attach 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 careful to charge the battery with the correct polarity.

Angle of Operation

Engines are designed to run in the level condition which is where the optimum performance is achieved. The maximum angle of operation for the Kubota engine is 20 degrees continuously in any direction. If the engine is to be operated at an angle, provisions must be made for checking and maintaining the oil level at the normal (FULL) oil capacity in the crankcase.

When operating the welder at an angle, the effective fuel capacity will be slightly less than the specified 10 gallons.

High Altitude Operation

At higher altitudes, output derating may be necessary. As a rule of thumb, derate the welder output 0.4% for every 100 ft (30 m) above 500 ft (150 m).

Contact a Kubota Service Representative for any engine adjustments that may be required.

PART C

OPERATING INSTRUCTIONS

Additional Safety Precautions

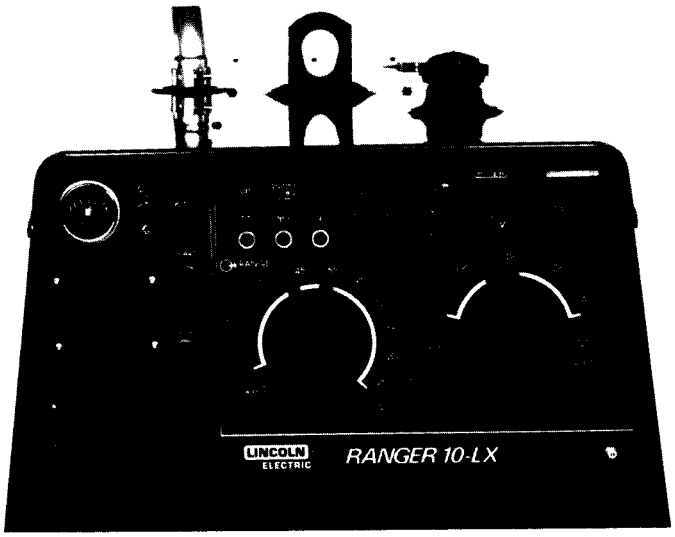
IMPORTANT SAFETY NOTE: In Constant Voltage mode the Ranger 10 provides "COLD" electrode when gun trigger is released if used with an LN-25 wire feeder equipped with K443 internal contactor, or if welder is equipped with K240 contactor and used with LN-7 wire feeder. The Ranger 10-LX has a built-in contactor. This feature and DC Constant Voltage output provide an added margin of safety when welding must be performed under electrically hazardous conditions such as:

- Damp Locations
- While Wearing Wet Clothing
- On Metal Structures, or
- In Cramped Positions (sitting, kneeling or lying) if there is a high risk of unavoidable or accidental contact with the workpiece or ground.

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

Read carefully the Safety Precautions pages in this 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 OPERATION



Engine Controls – Function and Operation

"Glow" Plug Pushbutton

Depress to activate glow plugs to preheat engine for starting.

WARNING: Under no conditions should ether or other starting fluids be used with this engine.

"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.

"Engine" On-Off Switch

When placed in the "ON" position, this switch energizes the fuel solenoid and other electric accessories. When placed in the "STOP" position, the flow of fuel to the injection pump is stopped to shut down the engine.

Oil Pressure Light

The red oil pressure light remains off with proper oil pressure. If light turns on, the engine protection system will stop the engine. The light will go on when the "Engine" switch is switched to the "ON" position with engine not running. It will go off after one minute if the engine is not started.

Water Temperature Light

The red water temperature light remains off under normal operating temperatures. If light turns on, the engine protection system will stop the engine. Check for restrictions at the cooling air inlets (on control panel end and engine end of machine), the hot air exhaust and the engine cooling system (consult the engine Operator's Manual). Check engine radiator fan and fan belt. Also, check to be sure that the welder loads are within the rating of the welder. The light will remain on when the engine is over temperature and the "Engine" switch is in the "ON" position (engine not running).

⚠ WARNING

HOT COOLANT can burn skin.

- **Do not remove cap if radiator is hot.**

Battery Charger Light

The red battery charger light is off when battery charging system is functioning normally. If light turns on while the engine is running, the fan belt may be broken or the alternator or the voltage regulator may be defective.

⚠ WARNING

MOVING PARTS can injure.

- **Have qualified personnel do maintenance and troubleshooting work.**
- **If possible, turn the engine off and disconnect the battery before working inside the machine.**
- **Remove guards only when necessary to perform maintenance, and replace them when the maintenance requiring their removal is complete.**
- **If fan guards are missing from a machine, obtain replacements from a Lincoln Distributor. (See Operating Manual Parts List.)**

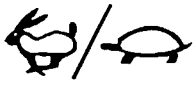
"Fuel Level" Gauge

Displays the level of diesel fuel in the 10-gallon fuel tank.

"Idler" Switch (Ranger 10)

Has two positions as follows:

1) In the "High"  position, the engine runs at the high idle speed controlled by the governor.

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

   a. When welding or drawing power for lights or tools (approximately 100 watts minimum) from the 115V receptacles, the engine operates at full speed.

   b. When welding ceases or the power load is turned off, a fixed time delay of approximately 12 seconds starts.

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

   d. The engine will automatically return to high idle speed when the welding load or power load is reapplied.

"Idler" Switch (Ranger 10-LX)

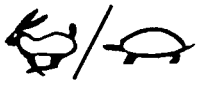
The idler switch has two positions, "High" and "Auto".

When in "High" () idle position, the unit operates as follows:

The engine will run continuously at high idle. In the constant voltage mode:

a) Contactor will be closed when the "Wire Feeder" switch is in the "No Control Cable" position. This is for wire feeders which have no control cable (LN-25).

b) The output contactor will be controlled remotely when the "Wire Feeder" switch is in "With Control Cable" position. This is for wire feeders with a control cable (LN-7) and the contactor is closed by depressing the gun trigger at the wire feeder.

When in "Auto" () idle position, the idler operates as follows:

a) **Auxiliary Power:** With the engine running at low idle and a load (approximately 100 watts) is drawn from the 115V receptacles, the engine will accelerate to high idle. The welder output terminals will be "hot" when in CC mode and when in CV mode with "WIRE FEEDER" switch in NO CONTROL CABLE position. When in CV mode with the "WIRE FEEDER" switch in WITH CONTROL CABLE position, the output terminals will be "cold" until the gun trigger of the wire feeder is depressed.

b) **Welding in constant current mode:** With the engine running at low idle and the electrode touches the work, the engine accelerates to high idle. NOTE: The CV output contactor is bypassed and therefore full voltage is at the output terminals whenever the engine is at high idle. When welding ceases (and no auxiliary power is being drawn), a preset time delay of approximately 12 seconds starts. If welding is not restarted within that time delay, the idler reduces the engine speed to low idle.

c) **Welding in constant voltage mode:** (Using a wire feeder that **does not** have a control cable connected to the welder. "WIRE FEEDER" switch in NO CONTROL CABLE position.) With the engine running at low idle and the electrode is touched to work, the engine will accelerate to high idle and one second later the contactor will close. NOTE: Contactor will be closed whenever unit is in high idle. When welding ceases (and no auxiliary power is being drawn), a preset time delay of approximately 12 seconds starts. If welding is not restarted within that time delay, the contactor opens and the idler reduces the engine speed to low idle. **CAUTION**: if **also** using auxiliary power when welding ceases, the contactor will remain closed and the engine will stay at high idle.

STARTING AND STOPPING THE ENGINE

Starting

1. Open the engine compartment door and check that the fuel shutoff valve located above the clear plastic fuel filter housing is in the open position (lever to be in vertical position.

2. Check for proper level of coolant in the plastic reserve overflow tank.

3. Check for proper oil level on the oil dipstick. Close engine compartment door.

4. Remove all plugs connected to the AC power receptacles.

5. Set "IDLER" switch to "AUTO".

6. Set the "ENGINE" switch to "ON". Observe that both the oil pressure light and battery charging light are on. Check the fuel gauge to make sure that there is an adequate fuel level (NEVER ALLOW THE RANGER TO RUN OUT OF FUEL).

7. Press the "GLOW PLUG" button for 15 seconds (30 seconds if below 0°C/32°F) and then press the "START BUTTON".

8. Release both buttons when the engine starts.

9. Check that the indicator lights are off. If not, immediately stop the engine and investigate the indicated problem.

10. Allow the engine to warm up at low idle speed for several minutes before applying a load and/or switching to high idle. Allow a longer warm up time in cold weather.

If the engine fails to start in 60 seconds or stops running, the "ENGINE" switch must be switched to "OFF" and then switched back to "ON" before attempting to restart the engine. This resets the engine protection circuit.

Stopping

1. Switch the "ENGINE" switch to "OFF". This turns off the voltage supplied to the fuel solenoid. A backup shutdown can be accomplished by shutting off the fuel valve located on the fuel filter housing.

Typical Fuel Consumption

	Kubota DH850B-88 23 HP Diesel
Low Idle – No Load 2150 RPM	0.3 gallons/hour (1.0 liters/hour)
High Idle – No Load 3750 RPM	0.6 gallons/hour (2.2 liters//hour)
AC CC Weld Output 250 Amps @ 25 Volts	1.1 gallons/hour (4.2 liters/hour)
DC CC Weld Output 250 Amps @ 25 Volts	1.2 gallons/hour (4.6 liters/hour)
DC CV Weld Output 200 Amps @ 19 Volts	0.9 gallons/hour (3.6 liters/hour)
Auxiliary Power 10,000 VA	1.3 gallons/hour (4.9 liters/hour)

WELDER OPERATION

⚠WARNING

ELECTRIC SHOCK can kill.

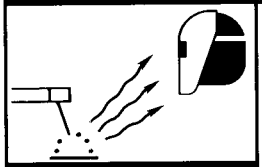
- **Do not touch electrically live parts or electrode with skin or wet clothing.**
- **Insulate yourself from work and ground.**

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.**

WELDER OUTPUT

	Ranger 10	Ranger 10-LX
Constant Current	250 Amps AC @ 25 Volts 250 Amps DC @ 25 Volts	250 Amps AC @ 25 Volts 250 Amps DC @ 25 Volts
Constant Voltage	200 Amps DC @ 19 Volts	250 Amps DC @ 30 Volts

- Maximum Open Circuit Voltage at 3700 RPM is 80 volts RMS.
- Duty Cycle: 100% for both welding and auxiliary power.

WELDER CONTROLS – FUNCTION AND OPERATION

Polarity Switch (Ranger 10)

Three polarity settings: DC+, DC– and AC

Polarity Switch (Ranger 10-LX)

Three **STICK/TIG** (constant current) polarity settings: DC+, DC– and AC

Two wire feed (constant voltage) settings: DC+ and DC–

NOTE: The setting of this switch must match the color band setting of the Range Switch (both switches must be set for the same welding process).

CAUTION: Never change the "Polarity" switch setting while welding. This will cause severe damage to the switch.

Range Switch

	Ranger	Ranger 10-LX
STICK/TIG (Constant Current) Range Settings	7	7
WIRE FEED (Constant Voltage) Range Settings	1	4

CAUTION: Never change the "RANGE" switch setting while welding. This will cause severe damage to the switch.

Output Control

Provides a fine welding current adjustment within the "RANGE" switch settings in the STICK/TIG mode and welding voltage control with the "RANGE" switch set in the wire feed mode.

Output Control Switch

The toggle switch on the control panel labeled "Output Control at Welder" and "Output Control Remote" gives the operator the option of controlling the constant voltage output at the welder control panel or at a remote station. Remote connections are made at the 6-pin amphenol connector on the Ranger 10 and the 6-pin or 14-pin amphenol connector on the Ranger 10-LX.

For remote control the toggle switch is set in the OUTPUT CONTROL REMOTE position.

For control at the welder control panel, the toggle switch is set in the OUTPUT CONTROL at WELDER position.

Wire Feeder Switch (Ranger 10-LX)

The toggle switch labeled "Wire Feeder No Control Cable" and "Wire Feeder With Control Cable" is used to control the operation of the Welder Output Contactor in the wire feed mode when using a wire feeder.

With the switch in the NO CONTROL CABLE position, the contactor is open at low idle and closed at high idle.

With the switch in the WITH CONTROL CABLE position, the contactor is open in low idle and high idle until a control cable is attached to the welder amphenol connector from a wire feeder. Under this condition, the contactor closes when the wire feeder trigger is depressed and opens when the trigger is released.

Amphenol Connector(s)

The Ranger 10 has one 6-pin amphenol connector and the Ranger 10-LX has one 6-pin amphenol and one 14-pin amphenol, each located above the output terminals of the welder.

The 6-pin connector is for connecting remote control devices and the 14-pin connector is for interfacing wire feeders. The 14-pin connector also supplies 42 VAC or 115 VAC to certain wire feeders and allows the welder output to be controlled at the wire feeder.

STICK/TIG (CONSTANT CURRENT) WELDING

Connect welding cables to the "TO WORK" and "ELECTRODE" studs. Start the engine and set the idler switch to the desired operating mode. Set the output selector switch to the desired welding current, the electrode polarity switch to the desired polarity and the machine is ready for welding. A fine adjustment of the welding current can be made with the "Output Control" or a "Remote Output Control" using K857 Remote Control Kit.

It is recommended that the "Output" control be initially set to maximum setting (10) and then the "Range" switch be set to the lowest possible tap for the desired current, and then adjust the "Output" control. Some arc instability may occur if the "Range" switch tap is set to a higher position than required. Also, if using a K799 High Frequency Generator for TIG Welding, it may not operate properly in the "Output" control is set too low.

Stick Welding

The Ranger 10 and Ranger 10-LX can be used with a broad range of AC and DC stick electrodes. See "Welding Tips 1" included with the operating manual for the electrodes within the rating of this unit.

TIG Welding

The Ranger 10 and Ranger 10-LX can be used in a wide variety of AC and DC Tungsten Inert Gas (TIG) welding applications with the K799 High Frequency Generator. The combined package will permit AC TIG welding up to 200 amps and DC TIG welding up to 250 amps.

When using the Ranger for AC TIG welding of aluminum, it is recommended that 1% Thoriated tungsten (EWTh-1), 2% Ceriated tungsten (EWCe-2), or Zirconiate tungsten (EWZr) electrodes be used for most applications. Pure tungsten electrodes (EWP) may also be used when more cleaning action is desired and the welding current is 100 amps or less. Recommended "RANGE" switch settings for AC TIG welding are shown in the following table:

Tungsten Diameter	"RANGE" switch Settings for AC TIG Welding	Approximate Current Range
1/8	65, 90 or 120[1]	100 to 200 Amps
3/32	45, 65 or 90	50 to 150 Amps
1/16	45, 65 or 90	45 to 150 Amps

[1]The welding current will be approximately 200 amps with the "RANGE" switch set at "120" and the "OUTPUT CONTROL" set at 10. Do **not** use a "RANGE" setting higher than the "120" setting for AC TIG welding.

The Ranger should be used on high idle for proper operation. A bypass capacitor included with the K799 must be installed inside the Ranger for proper operation. (see Page 10, "High Frequency Generator for TIG Welding Applications".)

WIRE FEED (CONSTANT VOLTAGE) WELDING

Ranger 10

Connect a wire feeder that does not require a control cable such as the LN-25 to the Ranger 10.

If using an LN-25 with an internal contactor, the Ranger 10 should be set for HIGH idle.

The only Innershield® electrode recommended for use with the Ranger 10 is NR-211MP. The electrode sizes and welding ranges that can be used with the Ranger 10 are shown in the following table:

Diameter	Wire Speed In./Min	Approx. Current Range
.035	70-110	60A to 120A
.045	70-130	120A to 170A
.068	40-90	125A to 210A

The Ranger 10 is recommended for limited "MIG" welding (GMAW – Gas Metal Arc Welding). The recommended electrodes are .030 and .035 L-50 and L-56. They must be used with a blended shielding gas such as C25 (75% Argon – 25% CO_2). The welding ranges that can be used with the Ranger 10 are shown in the following table:

Diameter	Wire Speed In./Min	Approx. Current Range
.030	150-450	80A to 170A
.035	100-350	80A to 190A

NOTE: The above Innershield and "MIG" welding ranges apply to an LN-25 wire feeder. When using an LN-7 wire feeder, the minimum "output" control setting is limited. Settings below 3" can result in the auxiliary voltage being too low which can cause improper operation of the LN-7 and/or contactor kit.

Ranger 10-LX

Connect a wire feeder to the Ranger 10-LX and set welder controls according to the instructions starting on Page 10.

The Ranger 10-LX, with its CV taps, permits it to be used with a broad range of flux-cored wire (Innershield® and Outershield®) electrodes and solid wires for gas metal arc welding.

The recommended Innershield electrodes are: NR®-211MP, NR-311, NR-203 series, Lincore® 33 and 55, small diameters up to and including 5/64" (2.0 mm). 5/64" (2.0 mm) NS-3M can be welded in limited applications. Cable length and other conditions can affect the ultimate results of this application.

Recommended Outershield electrodes are: .045 (1.1 mm), .052 (1.3 mm) and 1/16" (1.6 mm) Outershield 71 and 1/16" (1.6 mm) Outershield 70.

Some recommended solid wires for gas metal arc welding are: .030 (0.8 mm), .035 (0.9 mm) and .045 (1.1 mm) L-50 and L-56.

For any electrodes, including the above recommendations, the procedures should be kept within the rating of the machine. For additional electrode information, see Lincoln publications N-675, GS-100 and GA-210.

AUXILIARY POWER

Start the engine and set the "IDLER" control switch to the desired operating mode. Set the "Output Control" to 10. Voltage is now available at the receptacles for auxiliary power.

NOTE: When the Ranger is connected to 230 volt 3-wire load, the Idler Switch should be set to the "HIGH" position to avoid load sensing problems. Only one line of the 230V/115V receptacle senses the load and if 115V power is drawn from only one side of the receptacle, the Ranger may not accelerate to high idle when operated in "AUTO".

The auxiliary power plant of the Ranger consists of two 125V duplex receptacles (rated 20 amps) and one 230V heavy duty receptacle (rated 50 amps). The 230 volt receptacle can be split for single phase 115 volt operation.

The auxiliary power capacity is 10,000 watts of 60 Hz, single phase power. The auxiliary power capacity rating in watts is equivalent to volt-amperes at unity power factor. The maximum total permissible current at 115V is 87 amperes or at 230V is 43.5 amperes. Output voltage is within ± 10% at all loads up to rated capacity.

The auxiliary power receptacles should only be used with three wire grounded type plugs or approved double insulated tools with two wire plugs.

The current rating of any plug used with the system must be at least equal to the current load through the associated receptacle. Do not attempt to connect power receptacles in parallel.

Most 1.5 HP motors can be started if there is no load on the motor or other load connected to the machine, since the full load current rating of a 1.5 HP motor is approximately 20 amperes (10 amperes for 230 volt motors). The motor may be run at full load when plugged into only one side of the duplex receptacle. Larger motors through 2 HP can be run provided the receptacle rating as previously stated is not exceeded. This may necessitate 230V operation only.

It must be noted that the above auxiliary power ratings are with no welding load. Simultaneous welding and power loads are permitted by the following Tables. The permissible currents shown assume that current is being drawn from either the 115 volt or 230 volt supply (not both at the same time).

NOTE: Voltage and permissible watts decrease as "Output Control" is adjusted to settings less than 10. It is recommended that at settings less than 10, only incandescent lighting loads be connected to the auxiliary power receptacles.

TABLE 1

RANGER 10 Simultaneous Welding and Power Loads (Output Control Set at 10)

Output Selector Setting	Permissible Power Watts (Unity Power Factor)	Permissible Auxiliary Current in Amperes @ 115V or 230V	
250	NONE	0	0
200	3000	26	13
160	3500	30	15
120	5500	48	24
90	6500	56	28
65	7500	65	32.5
45	8500	74	37
CV[1]	3000	26	13

[1] When LN-7 and K240 are being used on the CV tap, sufficient power is available for these two units provided auxiliary power voltage remains above 98 volts.

TABLE 2

RANGER 10-LX Simultaneous Welding and Power Loads (Output Control Set at 10)

Output Selector Setting	Welding Output	Permissible Power Watts (Unity Power Factor)	Permissible Auxiliary Current in Amperes @ 115V or 230V	
250	250	NONE	0	0
200	200	3000	26	13
160	160	3500	30	15
120	120	5500	48	24
90	90	6500	56	28
65	65	7500	65	32.5
45	45	8500	74	37
CV LOW	200 40	7000 9500	60 82	30 41
CV MED. LOW	250 60	5500 8500	48 74	24 37
CV MED. HIGH	250 80	3500 7000	30 60	15 30
CV HIGH	250 100	1500 6000	13 52	6.5 26

PART D

MAINTENANCE

Safety Precautions

⚠ WARNING

MOVING PARTS can injure.

- **Have qualified personnel do maintenance and troubleshooting work.**
- **If possible, turn the engine off and disconnect the battery before working inside the machine.**
- **Remove guards only when necessary to perform maintenance, and replace them when the maintenance requiring their removal is complete.**
- **If fan guards are missing from a machine, obtain replacements from a Lincoln Distributor. (See Operating Manual Parts List.)**

Read the Safety Precautions in the front of this manual and the engine Instruction Manual before working on this machine.

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 the equipment.

Routine Maintenance

1. At the end of each day's welding, refill the fuel tank to minimize moisture condensation in the tank and check the crankcase oil level.

   If the engine runs out of fuel, air will be entrapped in the fuel distribution system. If this happens, bleeding of the fuel system is necessary. See the engine Operator's Manual for bleeding instructions.

2. Blow out the welder with low pressure air periodically. In particularly dirty locations, this may be required once a week.

3. Refer to the "Periodic Checks" section of the engine Operator's Manual for the recommended maintenance schedule of the following:

   a) Engine Oil and Filter
   b) Air Cleaner
   c) Fuel Filter and Delivery System
   d) Fan Belt
   e) Battery
   f) Cooling System

Air Filter

CAUTION: EXCESSIVE AIR FILTER RESTRICTION WILL RESULT IN REDUCED ENGINE LIFE.

1. Service air cleaner regularly according to the engine Operator's Manual.
2. Stop engine after 100 hours of running time and replace or clean filter element.

The air filter canister is located behind the engine door on the right side of the welder.

The air filter element is a dry cartridge type. It can be cleaned and reused; however, damaged elements should not be washed or reused. Remove loose dirt from element with compressed air or water hose directed from inside out. Compressed Air: 100 psi maximum with nozzles 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 reuse with warm air at less than 160°F (71°C). Do not use a light bulb to dry the element.

Replace air filter after six cleanings. A cleaned filter will have approximately 70% of the life of a new filter element. A restricted filter element may not appear excessively dirty.

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

Cooling System

WARNING: DO NOT REMOVE RADIATOR CAP WHILE ENGINE IS HOT.

Check the coolant level by observing the level in the plastic reserve overflow tank. Add 50/50 antifreeze/water solution if the level is close to or below the "LOW" mark. Do not fill above the "FULL" mark. Remove radiator cap and add coolant to radiator if overflow tank is empty.

To drain the coolant, open the petcock at the bottom of the radiator and the petcock on the engine block which is located above and to the left of the oil filter. Open the radiator cap to allow complete drainage. (Tighten the petcocks and refill with a 50/50 antifreeze/water solution.) Use an automotive grade (low silicate) ethylene glycol antifreeze. The cooling system capacity is 5.4 quarts (5.1 L). Replace and tighten the radiator cap.

IMPORTANT: Always premix the antifreeze and clean tap or distilled water before adding to the radiator or the overflow tank. It is very important that a precise 50/50 solution be used with this engine year round. This gives proper cooling during hot weather and freezing protection to -34°F (-37°C).

CAUTION: Cooling solution exceeding 50% ethylene glycol can result in engine overheating and damage to the engine. Coolant solution **must** be premixed before adding to radiator or overflow tank.

Periodically remove the dirt from the radiator fins.

Periodically check the fan belt and radiator hoses. Replace if signs of deterioration are found.

Slip Rings

A slight amount of darkening and wear of the slip rings and brushes is normal. Brushes should be inspected when a general overhaul is necessary.

Hardware

Both English and Metric fasteners are used in this welder.

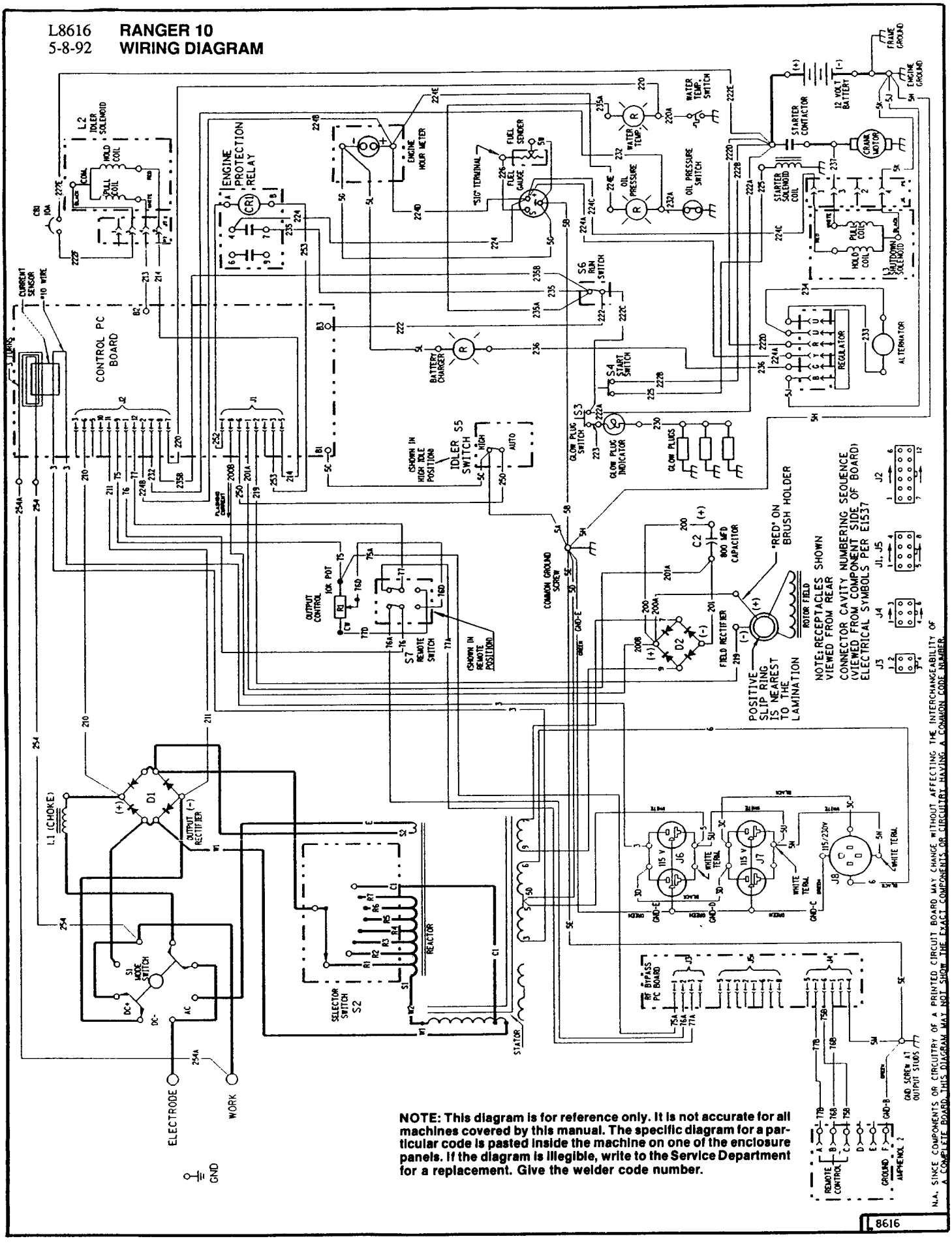
TROUBLESHOOTING

TROUBLE	CAUSE	WHAT TO DO
A. Engine will not start	1. Fault in engine fuel system	1. Repair
	2. Engine protection relay CR1 faulty	2. Repair or replace
	3. Open lead in engine protection system	3. Refer to wiring diagram and check related leads
	4. Engine protection solenoid faulty	4. Repair or replace
	5. Faulty PC board	5. Replace
B. No welder or power output	1. Open lead in flashing or field circuit	1. Refer to wiring diagram and check related leads
	2. Faulty rotor	2. Lift brushes and check rotor continuity between slip rings. Should be approximately 5.5 ohms.
	3. Faulty stator field	3. Disconnect lead #7 at D2 and check for continuity between leads #7 and #9
	4. Faulty field rectifier	4. Replace with known good one
	5. Open in misc. leads	5. Refer to wiring diagram and check related leads
	6. Output contactor does not pull in	6. See Troubleshooting item H
	7. Faulty PC Board	7. Replace
C. Battery does not stay charged	1. Faulty battery	1. Replace with new battery
	2. Faulty charging system	2. Refer to engine Operator's Manual for charging system service
	3. Loose connection or broken lead in charging circuit	3. Refer to wiring diagram and check related leads
D. Engine will not idle down to low speed	1. Idler switch in high idle	1. Set switch to automatic idle
	2. External load on welder or auxiliary power	2. Remove all external loads
	3. Mechanical problem in idler solenoid linkage	3. Repair
	4. Idler solenoid position out of adjustment	4. Adjust solenoid as necessary
	5. No voltage present at 222E (solenoid common). Should be 12 VDC	5. Check for broken #222E lead
	6. K799 Hi-Freq Kit connected to welder auxiliary	6. Use K799 with welder at high idle
	7. Faulty wiring in solenoid circuit	7. Check leads #213, #214 and #222 from PC board. Check #5C lead from PC board. Refer to wiring diagram.
	8. Circuit Breaker Tripped	8. Check CB1. Check for wiring short to ground
	9. Faulty idler solenoid	9. Check and replace solenoid if faulty
	10. Faulty PC board	10. Replace PC board with known good one
E. Engine will not go to high idle when attempting to weld in CC mode of Ranger 10 and Ranger 10-LX or Ranger 10 CV mode	1. No open circuit voltage at output studs	1. Check generator output
	2. Broken wire in current sensor wiring	2. Check for broken #254 lead
	3. Faulty PC board	3. Replace PC board with known good one

TROUBLE	CAUSE	WHAT TO DO
F. Engine will not go to high idle when attempting to weld in CV mode of Ranger 10-LX	1. No voltage present between terminals 240 and 242 (voltage should be open circuit voltage of welder, DC+ with 242 as reference 2. No open circuit voltage at auxiliary output receptacles 3. Faulty PC board	1. Check for broken leads #240 and #242 2. Check generator output 3. Replace PC board with known good one
G. Engine will not go to high idle when using auxiliary power	1. Auxiliary power less than 1 amp 2. Broken wire in current sensor wiring 3. Using 115/230 volt receptacle for 115V power	1. Idler will not function with less than 1 amp. Set idler switch to high idle 2. Check for broken #3 lead 3. Idler current is sensed on only one 115 volt side of this receptacle. Use other side of receptacle for 115 volt power
H. Engine goes to low idle but does not stay at low idle	1. Idler solenoid linkage misadjusted 2. Open in hold coil circuitry 3. Faulty PC board	1. Adjust linkage 2. Check CR1 and lead #214 3. Replace PC board with known good one
I. Engine shuts down due to overtemperature of coolant (temperature indicator light will be on until engine cools down)	1. Low coolant level 2. Radiator fins blocked with dirt	1. Follow instructions in Part D, Cooling System 2. Clean radiator by blowing compressed air through radiator towards engine
J. Contactor does not pull in (Ranger 10-LX only)	1. Welding in CC mode 2. Incorrect setup a) Wire feeders with no control cable b) Wire feeders with control cable 3. Faulty wiring in contactor circuit 4. Wire feeders with no control cable; no voltage present between #240 and #242 (voltage should be open circuit voltage of machine, DC+ with #242 as reference) 5. Faulty contactor 6. Faulty PC board	1. Contactor is only used for CV welding 2. a) Wire feeders switch must be in "No Control Cable" position b) Wire feeder switch must be in "With Control Cable" position 3. Check for broken leads #224F, #2C, #2D, #244, #243 and wires to amphenol connector 4. Check for broken leads #240 and #242 5. Replace contactor with known good one 6. Replace PC board with known good one

TROUBLE	CAUSE	WHAT TO DO
K. Contactor does not drop out	1. Faulty wiring	1. Check that lead #2C is not grounded
	2. Wire feeders with control cables a) Wire feeder switch (S8) in wrong position b) Faulty control cable c) Faulty wire feeder	2. a) Switch must be in "With Control Cable" position b) Replace with known good one c) Replace with known good one
	3. Wire feeder with no control cable; faulty PC board	3. Replace with known good one
L. Output control on welder not functioning	1. Output control switch in wrong position	1. Place switch in "Output Control at Welder"
	2. Output control switch defective	2. Check and replace switch if faulty
	3. Output control potentiometer defective	3. Check and replace potentiometer if faulty
	4. Faulty wiring	4. Check for broken leads #75, #76 and #77 from PC board and #75A, #76D and #77D from potentiometer to remote switch
	5. Faulty PC board	5. Replace PC board with known good one
M. Output control or remote not functioning	1. Output control switch in wrong position	1. Place switch in "Remote" position
	2. Leads #75, #76, #77 broken at PC board or S7	2. Repair
	3. Leads #75A, #76A, #77A broken at S7 or amphenol	3. Repair
	4. Remote control leads broken in control cable	4. Repair
	5. Faulty wire feeder	5. Replace wire feeder with known good one
	6. Faulty PC board	6. Replace PC board with known good one
N. Wire feeder does not work when connected to welder amphenol (LX models only)	1. Wire feeder circuit breaker open or faulty	1. Reset or replace
	2. Broken #31, #32 or #42 lead at amphenol	2. Repair
	3. No 115 volt or 42 volt output from stator	3. Check continuity on #31, #32 and #42 at stator. Check for O.C.V. If OK, stator may be faulty. Replace
	4. Faulty wiring in control cable	4. Repair or replace cable
	5. Faulty wire feeder	5. Replace with known good one

L8616 **RANGER 10**
5-8-92 **WIRING DIAGRAM**

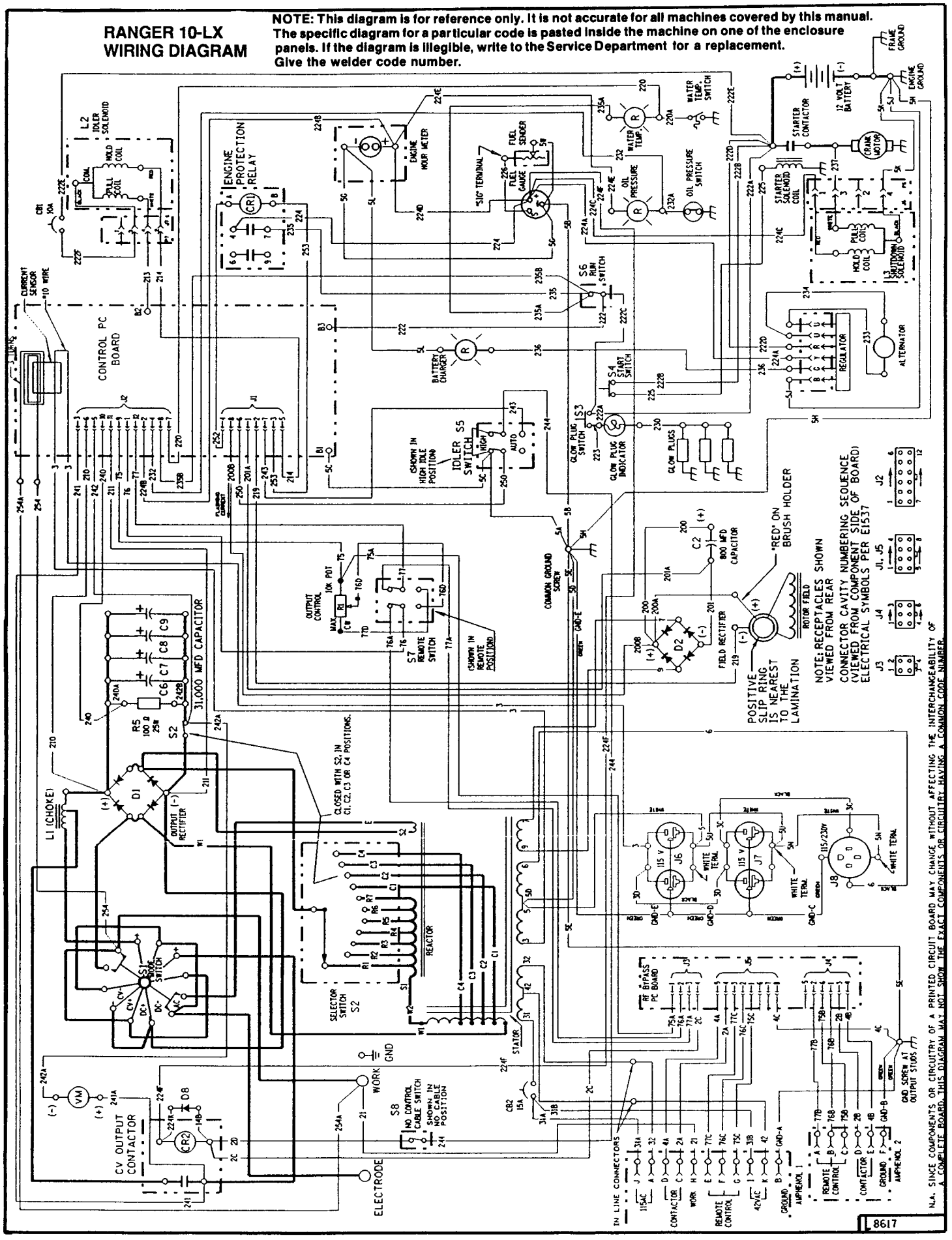


NOTE: This diagram is for reference only. It is not accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the welder code number.

L8616

RANGER 10-LX WIRING DIAGRAM

NOTE: This diagram is for reference only. It is not 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. If the diagram is illegible, write to the Service Department for a replacement. Give the welder code number.



RANGER 10–LX / K867 / K775 / LN–7 CONNECTION DIAGRAM

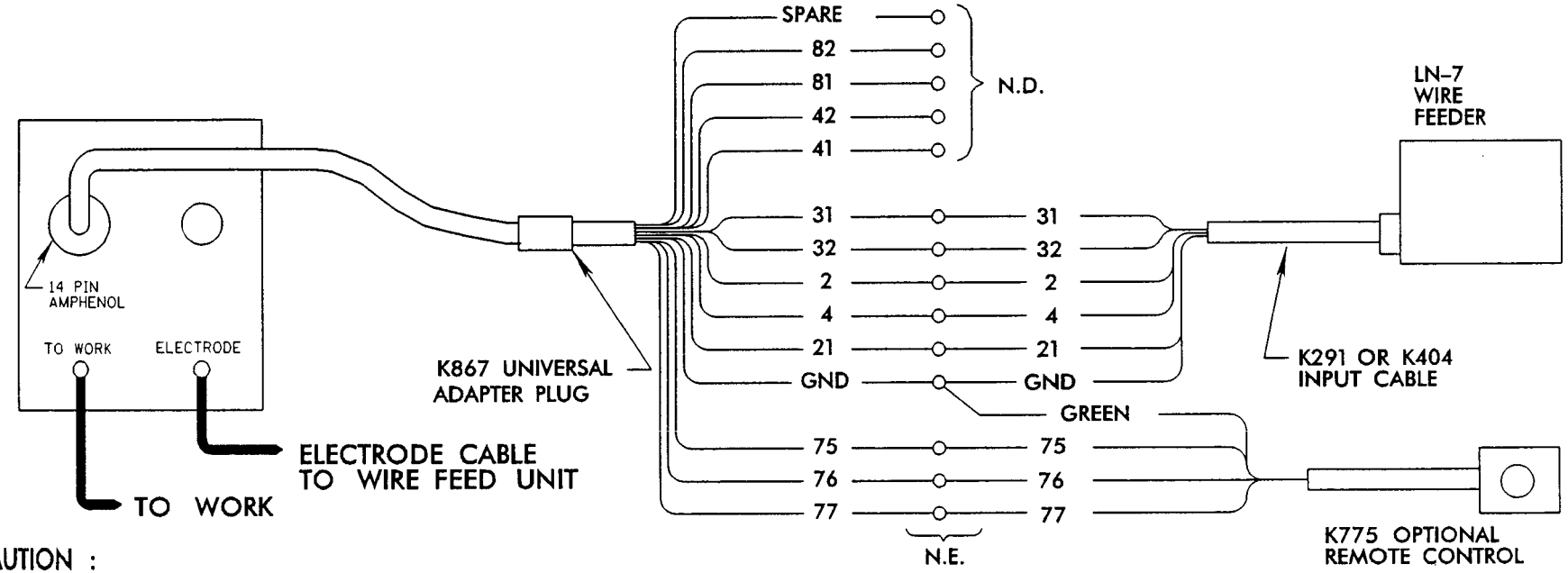
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (–) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install, use or service this equipment.



CAUTION :

ANY INCREASE OF THE HIGH IDLE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES OVER 140 VOLTS, WIRE FEEDER CONTROL CIRCUITS MAY BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY - DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN THE ENGINE WELDER OPERATING MANUAL.

N.A. WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.
N.B. USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION. PLACE WIRE FEEDER SWITCH TO "WIRE FEEDER WITH CONTROL CABLE POSITION.
N.C. IF OPTIONAL REMOTE OUTPUT CONTROL IS USED, PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION.
N.D. INSULATE EACH UNUSED LEAD INDIVIDUALLY.
N.E. SPLICE LEADS AND INSULATE.

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S20309

RANGER 10–LX TO K867 ADAPTER CONNECTION DIAGRAM

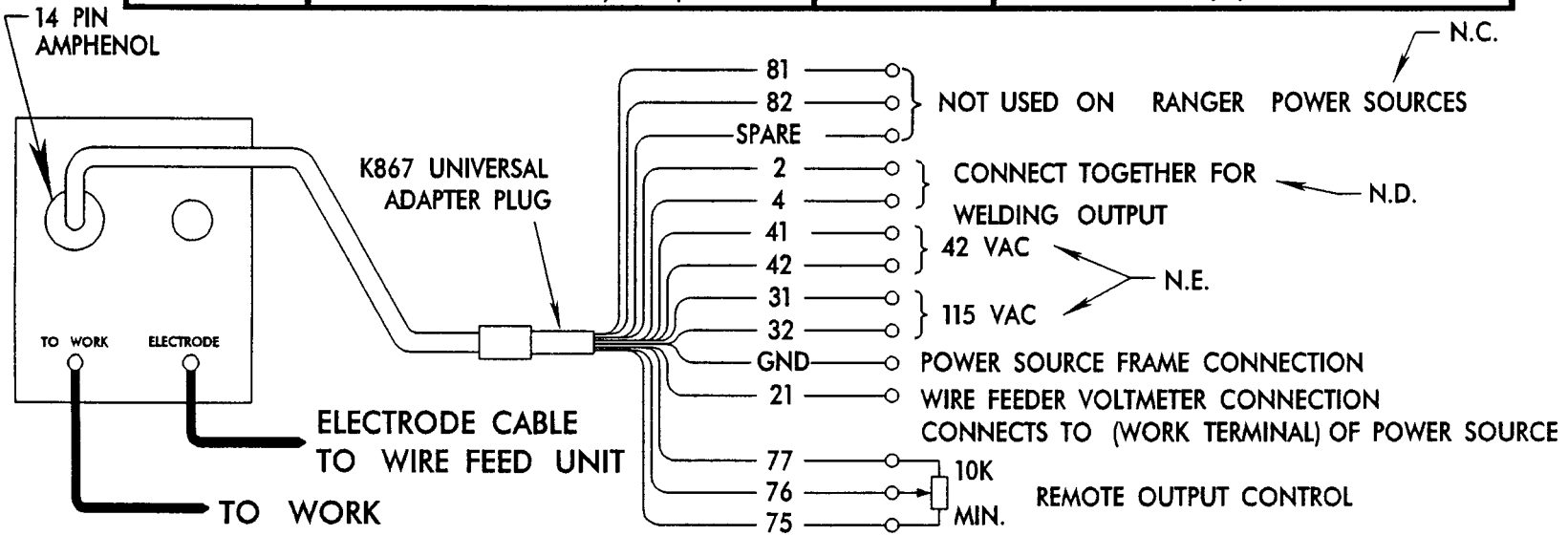
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (–) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install,use or service this equipment.



CAUTION :

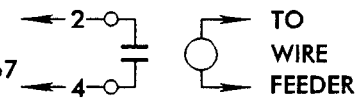
ANY INCREASE OF THE HIGH IDLE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES OVER 140 VOLTS, WIRE FEEDER CONTROL CIRCUITS MAY BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY – DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN THE ENGINE WELDER OPERATING MANUAL.

N.A. WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.

N.B. USE POLARITY SWITCH TO SET DESIRED POLARITY, POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION.

N.C. INSULATE EACH UNUSED LEAD INDIVIDUALLY.

N.D. FOR WIRE FEEDERS THAT RETURN A SIGNAL FOR WELDING OUTPUT, USE ISOLATION RELAY TO CLOSE LEADS 2 & 4.



N.E. REFER TO POWER SOURCE INSTRUCTION MANUAL FOR MAXIMUM AUXILIARY CURRENT DRAW.

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S20310

RANGER 10 & 10–LX / LN–25 ACROSS THE ARC CONNECTION DIAGRAM

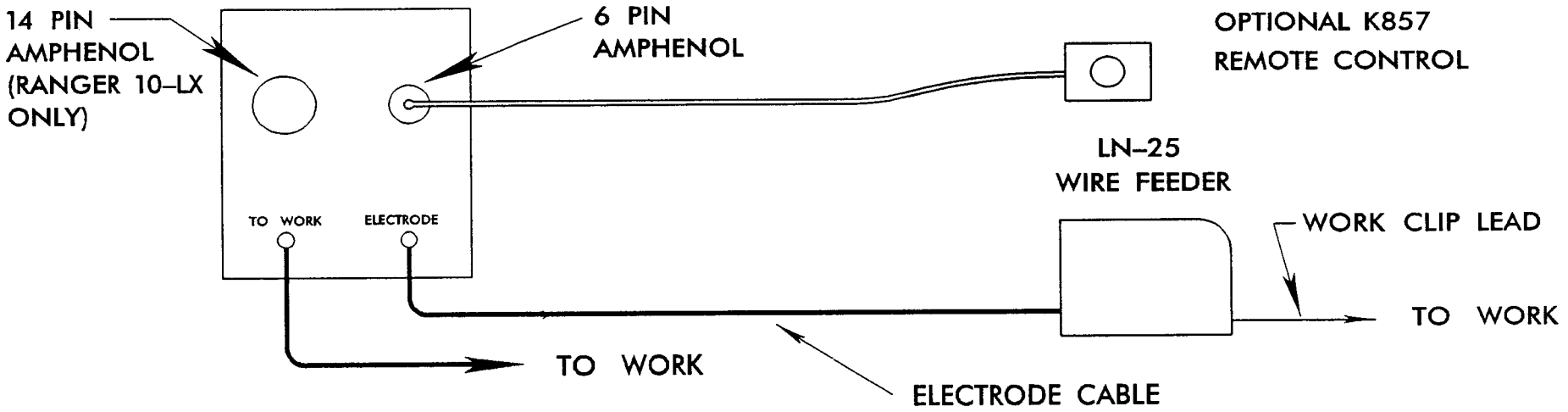
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (–) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install,use or service this equipment.



N.A. WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.
N.B. USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION.
N.C. IF OPTIONAL REMOTE OUTPUT CONTROL IS USED, PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION.
N.D. ON RANGER 10–LX, THE WIRE FEED SWITCH MUST BE PLACED IN "NO CONTROL CABLE POSITION" .
N.E. IF CONTACTOR IS INSTALLED IN LN–25, IDLER SWITCH MUST BE PLACED IN HIGH IDLE POSITION.

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RANGER 10-LX / K867 / LN-8 CONNECTION DIAGRAM

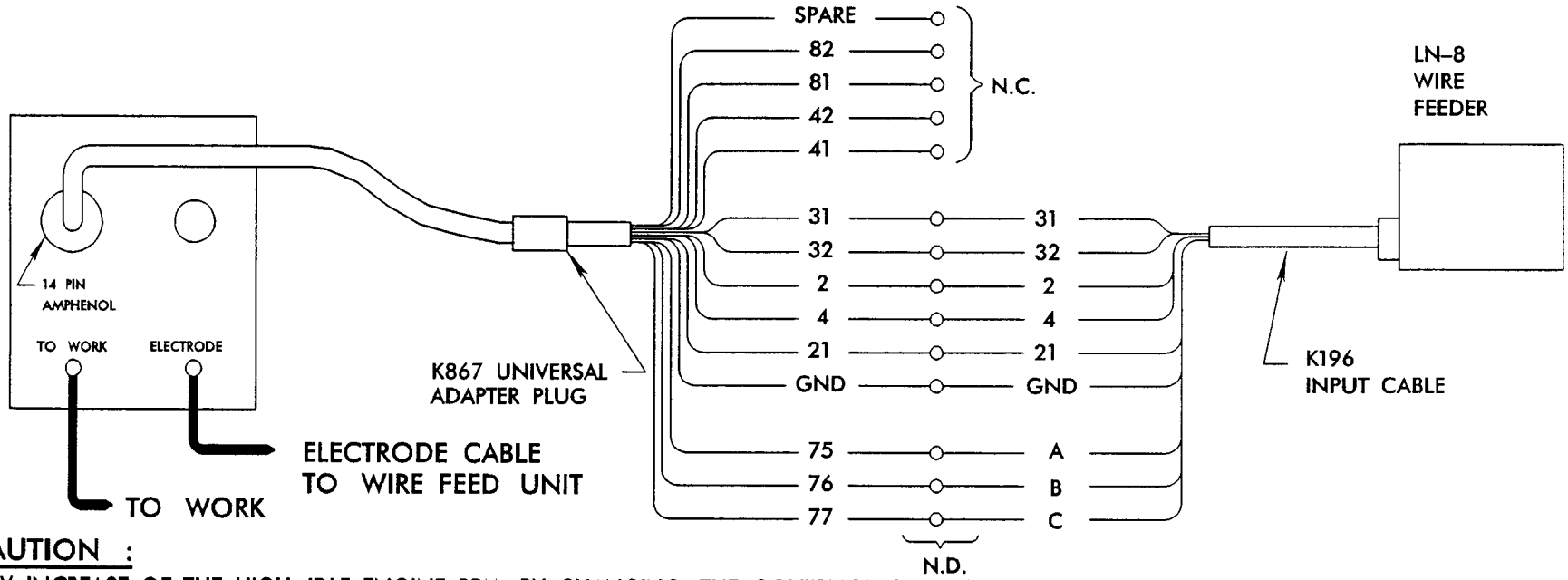
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (-) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install, use or service this equipment.



CAUTION :

ANY INCREASE OF THE HIGH IDLE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES OVER 140 VOLTS, WIRE FEEDER CONTROL CIRCUITS MAY BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY - DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN THE ENGINE WELDER OPERATING MANUAL.

N.A. WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.
N.B. USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION. PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION. PLACE WIRE FEEDER SWITCH TO "WIRE FEEDER WITH CONTROL CABLE" POSITION.
N.C. INSULATE EACH UNUSED LEAD INDIVIDUALLY.
N.D. SPLICE LEADS AND INSULATE.

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RANGER 10-LX / LN-7 CONNECTION DIAGRAM

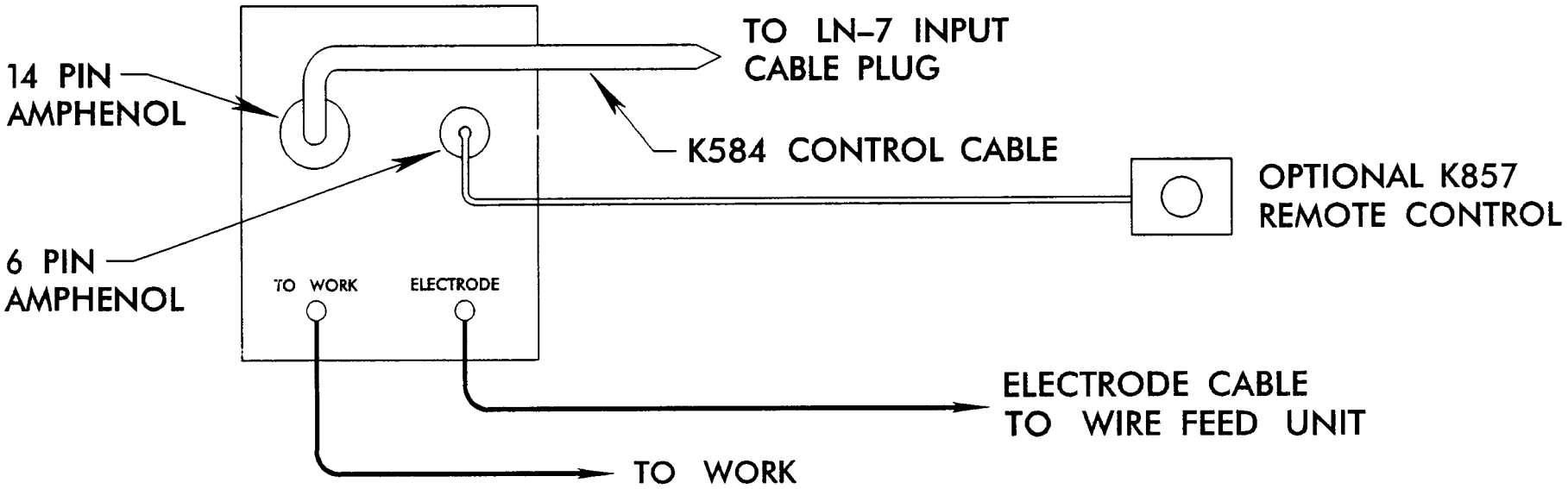
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (-) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install,use or service this equipment.



CAUTION :

ANY INCREASE OF THE HIGH IDLE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES OVER 140 VOLTS, WIRE FEEDER CONTROL CIRCUITS MAY BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY - DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN THE ENGINE WELDER OPERATING MANUAL.

N.A. USE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH TO A CV POSITION. PLACE WIRE FEEDER SWITCH TO "WIRE FEEDER WITH CONTROL CABLE" POSITION.

N.B. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS. SEE OPERATING MANUAL.

N.C. IF OPTIONAL REMOTE OUTPUT CONTROL IS USED, PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITIION.

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S20308

RANGER 10 / LN-7 / K240 CONTACTOR KIT

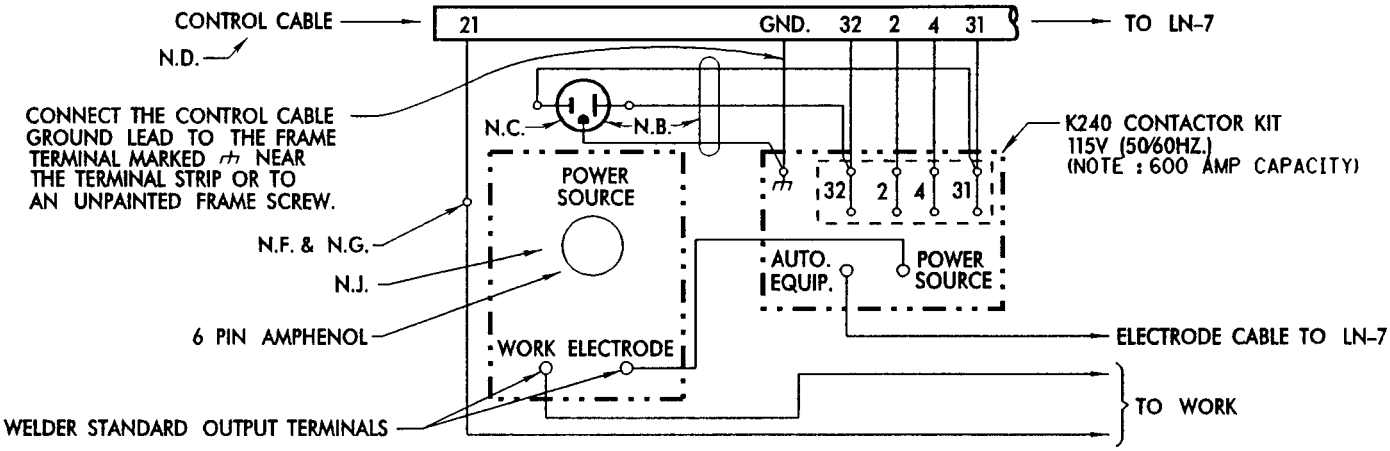
⚠ WARNING

ELECTRIC SHOCK can kill

- Do not operate with panels open.
- Disconnect NEGATIVE (-) BATTERY LEAD before servicing.
- Do not touch electrically live parts.

MOVING PARTS can injure

- Keep guards in place.
- Keep away from moving parts.
- Only qualified personnel should install, use or service this equipment.



N.A. USE POWER SOURCE POLARITY SWITCH TO SET FOR DESIRED ELECTRODE POLARITY. POSITION THE OUTPUT SELECTOR SWITCH ON THE POWER SOURCE TO THE CV POSITION.

N.B. 3 CONDUCTOR #16 POWER CORD PHYSICALLY SUITABLE FOR THE INSTALLATION AND PLUG RATED AT 115 VOLTS 15 AMPERES AC.

N.C. PLUG INTO 115 VOLT AC RECEPTACLE ON WELDER CONTROL PANEL OR OTHER 115 VOLT AC SUPPLY RATED AT A MINIMUM OF 500 VOLT AMPERES.

N.D. LEADS #21 AND GND. DO NOT APPEAR ON LN-7'S WITH CODES BELOW 7026.

N.E. WELDING CABLES MUST BE OF PROPER CAPACITY FOR THE CURRENT AND DUTY CYCLE OF IMMEDIATE AND FUTURE APPLICATIONS. (SEE OPERATOR'S MANUAL.)

N.F. IF LN-7 IS EQUIPPED WITH A METER KIT, EXTEND LEAD #21 USING #14 OR LARGER INSULATED WIRE PHYSICALLY SUITABLE FOR THE INSTALLATION. AN S16586-"LENGTH" REMOTE VOLTAGE SENSING WORK LEAD MAY BE ORDERED FOR THIS PURPOSE. CONNECT IT DIRECTLY TO THE WORK PIECE INDEPENDENT OF THE WELDING WORK CABLE. FOR CONVENIENCE, THIS EXTENDED #21 LEAD SHOULD BE TAPED TO THE WELDING WORK LEAD.

N.G. TAPE UP BOLTED CONNECTION WHERE LEAD #21 IS EXTENDED.

N.H. IDLER SWITCH ON POWER SOURCE MUST BE IN HIGH IDLE POSITION.

N.J. IF AN OPTIONAL K857 REMOTE OUTPUT CONTROL IS USED, CONNECT IT TO THE RANGER 10 AMPHENOL CONNECTOR. NOTE: PLACE OUTPUT CONTROL SWITCH IN "OUTPUT CONTROL REMOTE" POSITION WHEN REMOTE OUTPUT CONTROL IS USED.

CAUTION: ANY SPEED UP OF THE ENGINE RPM BY CHANGING THE GOVERNOR SETTING OR OVERRIDING THE THROTTLE LINKAGE WILL CAUSE AN INCREASE IN THE AC AUXILIARY VOLTAGE. IF THIS VOLTAGE GOES ABOVE 140 VOLTS, THE LN-7 CONTROL CIRCUIT WILL BE DAMAGED. THE ENGINE GOVERNOR SETTING IS PRE-SET AT THE FACTORY - DO NOT ADJUST ABOVE RPM SPECIFICATIONS LISTED IN ENGINE WELDER OPERATING MANUAL.

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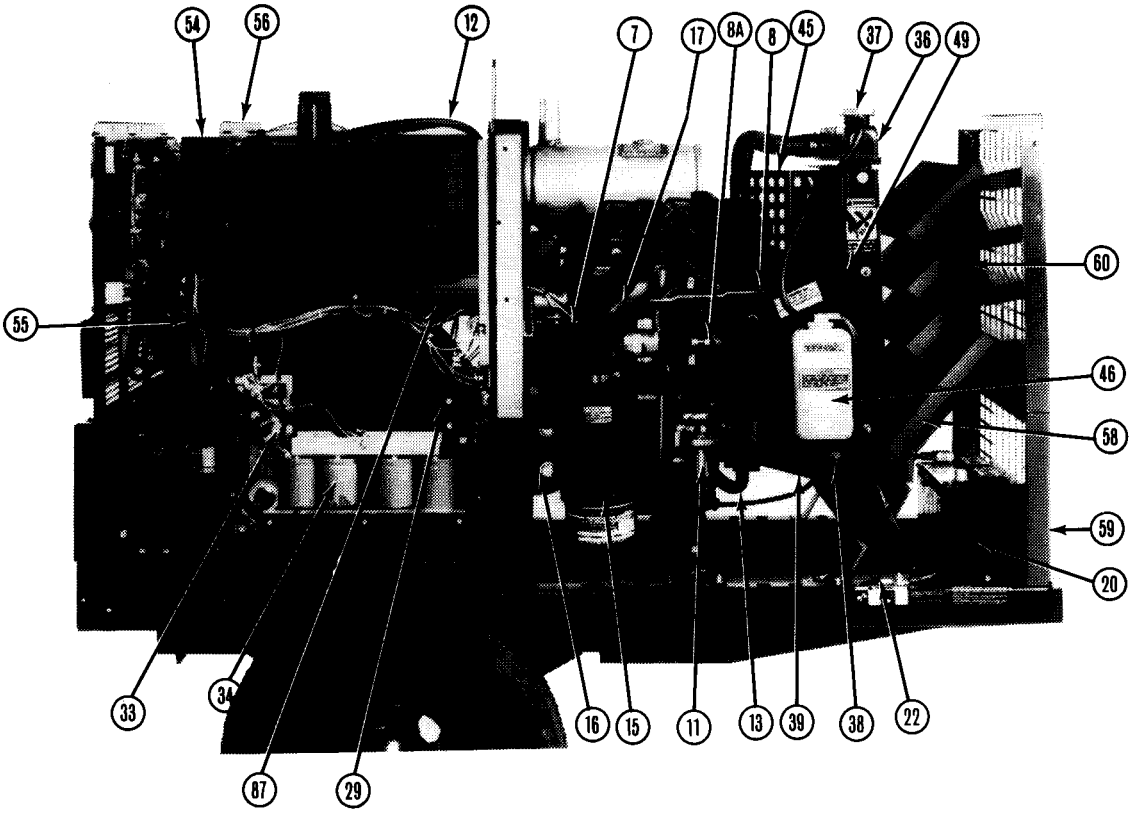
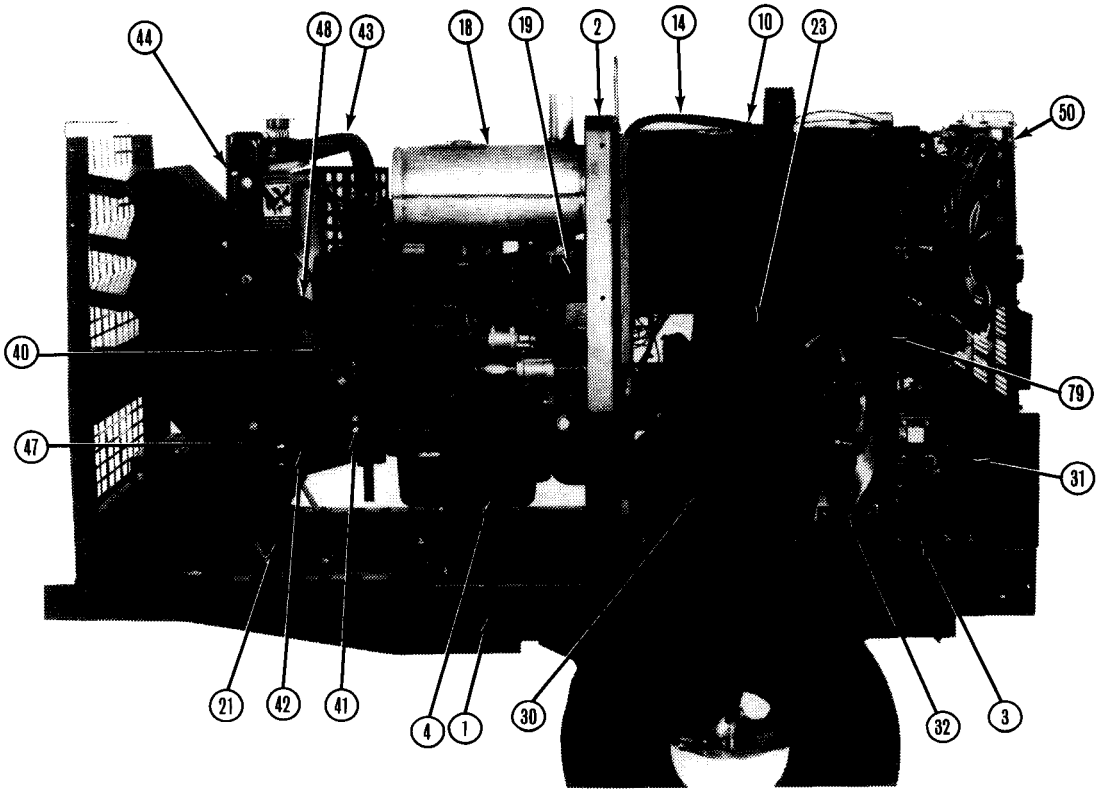
S20303

GENERAL ASSEMBLY





G2336
1-6-92

* Items With * Not Illustrated

Parts List P-217-C

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Base Welded Assembly	L8577	1
2	Lift Bail Welded Assembly	See Pg. 37	1
*	Hex Head Screw	T8833-1	4
*	Plain Washer	S9262-12	4
*	Lock Washer	E106A-8	4
*	#7/16 — 14 Hex Nut	CF000305	4
3	Base Floor	L8621	1
4	Engine	M16580	1
7	Shut Off & Idler Assembly	L8614	1
*	Solenoid Bracket	L8615	1
*	Idler Solenoid	S20140	1
*	Shutdown Solenoid	S20141	1
*	Solenoid Pivot Post	S20181	1
*	Idler Rod	T14942-1	1
*	Pivot Linc Assembly	S19817-1	1
*	Bow Washer	T10781-7	4
*	Retaining Ring	S9776-62	4
*	Idler Connector Arm Assembly	S19817-2	1
*	Throttle Linc.	S20182	1
*	Swivel Connector	S20139	1
*	Brace (Idler)	T11862-3	1
*	Brace	S20367	1
*	Metric Hex Head Cap Screw	T14731-30	1
*	Lock Washer	S17400-1	1
*	Plain Washer	S9262-2	1
*	Thread Forming Screw	S9225-8	2
*	Plain Washer	S9262-98	2
*	#1/2-13 x .75 Hex Hd. Cap Screw	CF000020	2
*	Plain Washer	S9262-1	2
*	Lock Washer	E106A-5	2
8	Bow Washer	T10781-7	1
*	Throttle Pin	S20183	1
	Retaining Ring	S9776-62	1
8A	Bow Washer	T10781-11	1
*	Cotter Pin	S10750-8	1
10	Fuel Tank	G1969-1	1
*	Thread Forming Screw	S9225-26	4
11	Fuel Filter (Supplied with Engine)	M16580-1	1
*	Fuel Filter Mounting Bracket	M16661	1
*	#5/16-18 x 2.50 Hex Hd. Cap Screw	CF000187	1
*	Lock Washer	E106A-14	1
*	#5/16-18 Hex Nut	CF000029	1
12	Fuel Line (Tank to Filter)	T10642-174	1
*	Hose Clamp	T13777-1	2
*	Clamp	T8970-11	1
*	Self Tapping Screw	S8025-77	1
13	Fuel Line (Filter to Pump)	T10642-175	1
*	Hose Clamp	T13777-1	2
14	Fuel Return Line	T10642-176	1
*	Hose Clamp	T13777-6	2
15	Air Filter	M15026	1
*	Mounting Band	S17919	2
*	#5/16-18 x .72 Hex Hd. Cap Screw	CF000040	4
*	Lock Washer	E106A-3	4
*	#5/16-18 Hex Nut	CF000029	4
16	Air Filter Mounting Bracket	M16659	1
*	#1/2-13 x .75 Hex Hd. Cap Screw	CF000020	2
*	Plain Washer	S9262-1	2
*	Lock Washer	E106A-5	2
17	Air Filter Hose (Out)	M16618	1
*	Clamp	S10888-29	2
18	Muffler	M16554	1

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
19	Muffler Mounting Bracket	M16703	1
*	#5/16-18 x 1.00 Hex Hd. Cap Screw	CF000062	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
*	#5/16-18 Hex Nut	CF000029	1
*	#1/2-13 x .75 Hex Hd. Cap Screw	CF000020	1
*	Plain Washer	S9262-1	1
*	Lock Washer	E106A-5	1
20	Battery	M9399-10	1
*	Battery Mounting Bracket	M16701	1
*	Thread Forming Screw	S9225-8	1
21	Battery Cable (Positive)	S8070-48	1
22	Battery Cable (Negative	S8070-28	1
*	Cap	T14654	1
23	Frame Assembly (Generator) (Ranger 10)	L7465-5	1
23	Frame Assembly (Generator) Ranger 10-LX)	L7464-6	1
*	#3/8-16 x 1.25 Hex Hd. Cap Screw	CF000185	8
*	Lock Washer	E106A-16	8
29	Brush Holder Assembly	M16158	1
*	Bracket (Brush Holder)	S20458	1
*	Self Tapping Screw	S8025-65	2
*	#1/4-20 x 1.00 Hex Hd. Cap Screw	CF000015	2
*	Plain Washer	S9262-98	2
*	Lock Washer	E106A-2	2
*	#1/4-20 Hex Nut	CF000017	2
30	Reactor Assembly	M15320	1
*	Thread Forming Screw	S9225-26	3
31	Choke Assembly (Form Tap Lead) (Ranger 10)	M15296-4	1
31	Choke Assy. (Ranger 10-LX)	M15296-3	1
*	Thread Forming Screw	S9225-26	4
32	Rectifier Assy. Ref. (Neg.)	L7457-1	1
*	Self Tapping Screw	S8025-79	2
33	Rectifier Assy. Ref. (Pos.)	L7457-2	1
*	Self Tapping Screw	S8025-79	2
34	Capacitor Bank Assembly (Ranger 10-LX and CSA)	M15339	1
*	Self Tapping Screw	S9225-8	2
36	Radiator Assembly	G2245	1
37	Radiator Cap	S9970-2	1
38	Drain Cock	T9956-1	1
39	Radiator Mount Welded Assy.	M16619	1
40	Hose (Supplied with Engine)	M16580-8	1
*	Pipe (Supplied with Engine)	M16580-9	1
*	Clamp (Supplied with Engine)	M16580-10	2
41	Radiator Hose Support Bracket	S20189	1
*	Self Tapping Screw	S8025-65	1
*	Thread Forming Screw	S9225-8	2
42	Hose (Bottom)	M16617	1
*	Clamp	S10888-16	2
43	Hose (Upper)	M16616	1
*	Clamp	S10888-16	2
44	Left Radiator	M16662	1
*	#5/16-18 x .75 Hex Hd. Cap Screw	CF000040	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
45	Right Radiator Baffle	L8633	1
*	#5/16-18 x .75 Hex Hd. Cap Screw	CF000040	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
46	Reserve Tank (Supp. with Eng.)	M16580-7	1
47	Radiator Mount Ref. Assy.	M16408	2
48	Left Radiator Support	S11797-24	1

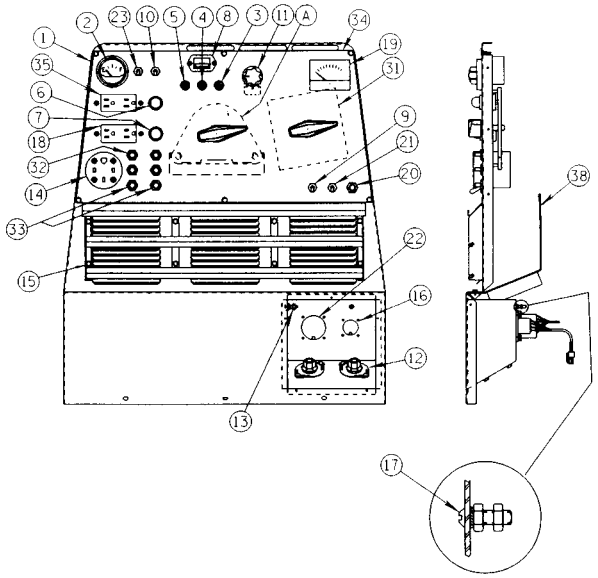
Parts List P-217-C.1

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
*	#1/2-13 x .75 Hex Hd. Cap Screw	CF000020	1
*	Plain Washer	S9262-1	1
*	Lock Washer	E106A-5	1
*	Rubber Mount	T12065	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
*	#5/16-18 Hex Nut	CF000029	1
49	Right Radiator Support	M16620	1
*	Metric Hex Head Screw	T14731-3	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
*	Rubber Mount	T12065	1
*	Plain Washer	S9262-121	1
*	Lock Washer	E106A-14	1
*	#5/16-18 Hex Nut	CF000029	1
50	Case Front Assy. (Ranger 10)	See Pg. 35	1
50	Case Front Assy. (Ranger 10-LX)	See Pg. 35	1
*	Self Tapping Screw	S8025-92	3
54	Cover (P.C. Board)	L8632	1
*	Self Tapping Screw	S8025-70	2
55	Mounting Bracket	S18229	2
*	Self Tapping Screw	S8025-70	4
56	Air Baffle and Component Assembly	See Pg. 36	1
*	Self Tapping Screw	S8025-65	3
58	Air Intake Baffle Assembly	M16442	1
*	Self Tapping Screw	S8025-91	3
*	Thread Forming Screw	S9225-8	2
59	Case Back Assembly	M16615	1
*	Thread Forming Screw	S9225-8	2
60	Exhaust Baffle Assembly	M16702	3
*	Support Bracket	S20264	2
*	Self Tapping Screw	S8025-91	14
63 *	Thread Forming Screw	S8025-94	16
64 *	Self Tapping Screw	S8025-91	13
79	Lead Restrainer	T15068	1
87	Full Wave Bridge	T13637-1	1
	#8-32 x .875 Round Head Screw	CF000059	1
	Items Not Illustrated:		
	Protective Cap	T13837-1	1
	Protective Cap (Ranger 10-LX & CSA)	T13837-4	1
	Brush Holder Cartridge	G2114	1
	Brush Assembly	S19480	2
	Brush Assembly Retainer	M16157	1
	Warning Decal	T13086-26	1
	Warning Decal	T13086-62	1
	Logo Decal	S11893-1	2
	Decal (Engine Coolant)	S18331	1
	Warning Decal	M15525	1
	Warning Decal	M16599	1
	Warning Decal	M16679	1

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
	Warning Decal	T13086-26	1
	Side Decal (Ranger 10-LX)	M16752-1	1
	Side Decal (Ranger 10)	M16752-2	1
	Engine Mounting Reference (Right Side)	M8859-61	1
	Engine Mounting Reference (Left Side)	M8859-62	1
	Generator Mtg. Ref. Assy.	M8859-36	1
	Coupling Reference Assembly	M15013	1
	Roof Assembly	L8620	1
	Double Door Assembly	L8685	1
	Clip	T10838-1	4
	Door Latch Assembly	T15077	4
	Door Support Rod	S18095-1	1
	Retaining Clip	T15085	1
	Insulation	S18122	2
	Rotor Assembly	L7382-3	1
	Bearing	M9300-85	1
	Tolerance Ring	S18044-5	1
	Plain Washer	S9262-70	2
	Thread Forming Screw	S9225-8	2
	Blower	M11881-9	1
	Key	M8776-31	1
	#3/8-16 x .75 Hex Hd. Cap Screw	CF000034	1
	Plain Washer	S9262-113	1
	Lock Washer	T9860-4	1
	Plain Washer	S9262-3	1
	Case Side (Left)	L8636	1
	Case Side (Right)	M16581	1
	Clamp (Supplied With Engine)	M16554-A	1
	Elbow (Supplied With Engine)	M16654-B	1
	Bushing	T12380-8	2
	Terminal Block (P7)	T15145	1
	Terminal Block (P6)	T15145-1	1
	Protective CAD	T13837-6	1
	Lock Washer	T4291-A	1
	#8-32 Hex Nut	CF000042	1
	Field Installed Options:		
	Accessory Package	K702	
	Two Wheeled Trailer	K768	
	Hi-Freq. Unit	K799	
	Aux. Power Plug Kit	K802R	
	Water Valve Kit	K844	
	Remote Control	K857	
	GFCI Receptacle Kit	K896-1	
	Hi-Freq. Mounting Bracket	K902-1	
	Spark Arrester Kit	K903-1	

4-24-92

CASE FRONT ASSEMBLY



L8580
3-2-92

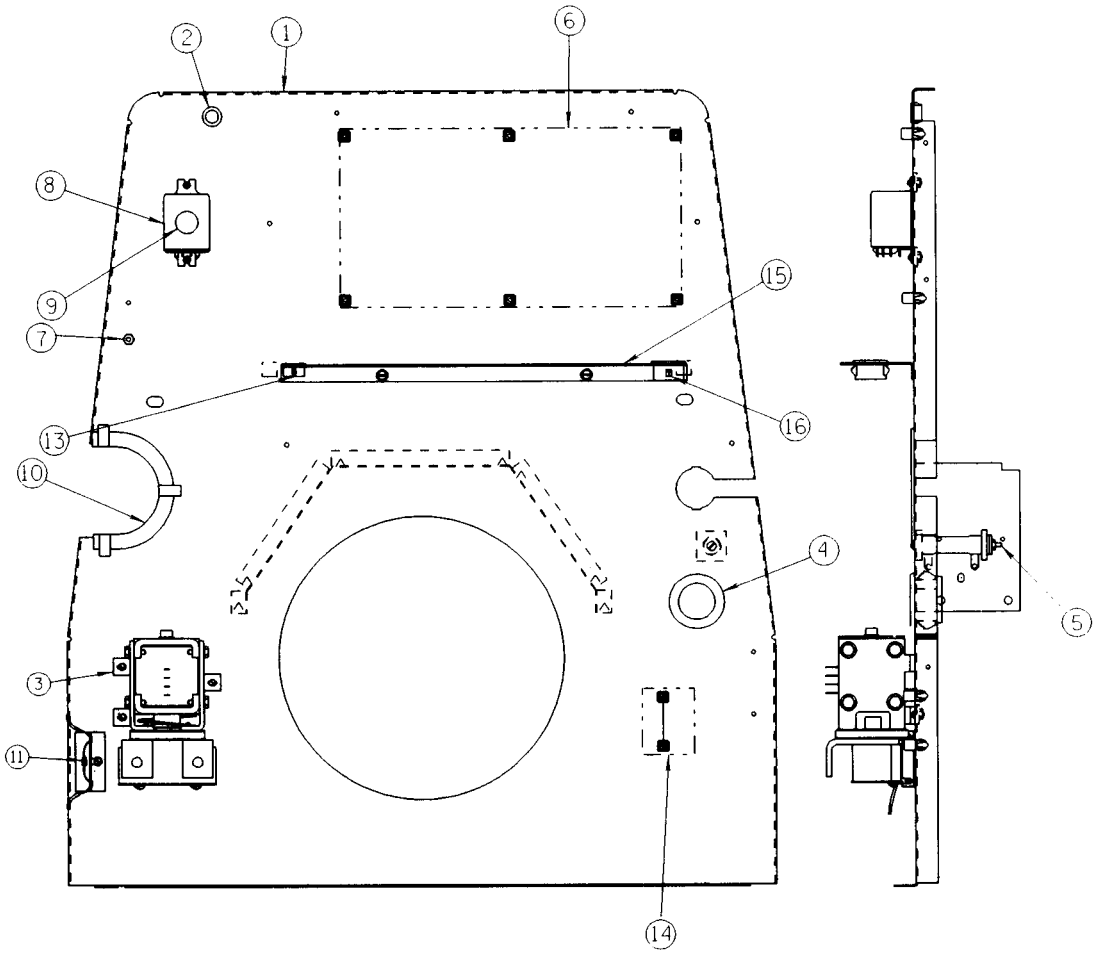
*** Items With * Not Illustrated**

Parts List P-217-D

ITEM #	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Case Front Welded Assembly	M16605-1	1
1	Case Front Welded Assembly	M16605-2	1
2	Fuel Gauge	S17585	1
3	Water Temperature Light	T13534-3	1
4	Oil Pressure Light	T13534-3	1
5	Battery Charge Light	T13534-3	1
6	Start Button	S13146-1	1
7	Button Switch	S13146-4	1
8	Hour Meter	S17475-1	1
9	Remote Switch	T10800-24	1
10	Run/Stop Switch	T10800-30	1
11	Potentiometer Spacer	S18280	1
*	Knob	T10491-1	1
12	Output Terminal	M13900	2
*	Self Tapping Screw	S8025-65	4
13	1/4-20 Hex Nut	CF000017	2
14	Receptacle (115/230V)	S18907-2	1
*	Spacer	S19020	2
*	Lock Washer	T9695-3	4
*	#8-32 x .75 Round Head Screw	CF000096	4
*	#8-32 Hex Nut	CF000042	4
15	Louver Assembly	M14782-1	1
*	Self Tapping Screw	S8025-1	8
16	Connector and Lead Assembly	S13100-130	1
*	Pan Head Screw	S8025-73	4
17	Thread Forming Screw	S9225-36	1
*	Lock Washer	T9695-1	1
*	#10-24 Hex Nut	CF000010	2
18	Duplex Receptacle	S20184	1
18	Duplex Receptacle (CSA Only)	S20143	1
*	Sems Screw	T10082-27	2
*	#8-32 Hex Nut	CF000042	2
19	Voltmeter	M16501-3	1
20	Circuit Breaker 15A	T12287-22	1
21	Cable/No. Cable Switch	T10800-30	1
22	Connector & Lead Assembly	S13100-129	1
*	Pan Head Screw	S8025-73	4
23	Idler Switch	T10800-30	1

ITEM #	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
23	Idler Switch	T10800-24	1
31	Polarity Switch	M14032-7	1
31	Polarity Switch	M16621	1
*	Lock Nut (1/4-20)	T9187-1	2
*	1/4-20 Hex Nut	CF000017	2
*	Switch Handle	S20241	1
*	Self Tapping Screw	S8025-78	1
32	Circuit Breaker (15A) (CSA Only)	T12287-22	4
33	Circuit Breaker (50A) (CSA Only)	T12287-19	2
34	Nameplate	G2321	1
34	Nameplate	G2322	1
34	Nameplate (CSA Only)	G2334	1
*	Self Tapping Screw	S8025-91	6
35	Duplex Receptacle	S20184	1
35	Duplex Receptacle (CSA Only)	S20143	1
38	Baffle Assembly	S20318	1
*	Self Tapping Screw	S8025-91	3
	Items Not Illustrated:		
	Earth Ground Connection Decal	T13260-4	1
	Not Part of Assembly:		
A	Selector Switch	M10830-16	1
	Selector Switch (10-LX)	M15304-4	1
	Switch Handle	S20241	1
	Self Tapping Screw	S8025-78	1
	Lock Nut #10-24	T9187-9	2
	#10-24 x 1.50 Round Hd. Screw	CF000122	2
	Plain Washer	S9262-27	4
	Spacer	S10918-79	2
	#10-24 Hex Nut	CF000010	2

AIR BAFFLE AND COMPONENT ASSEMBLY



L8587
10-23-91

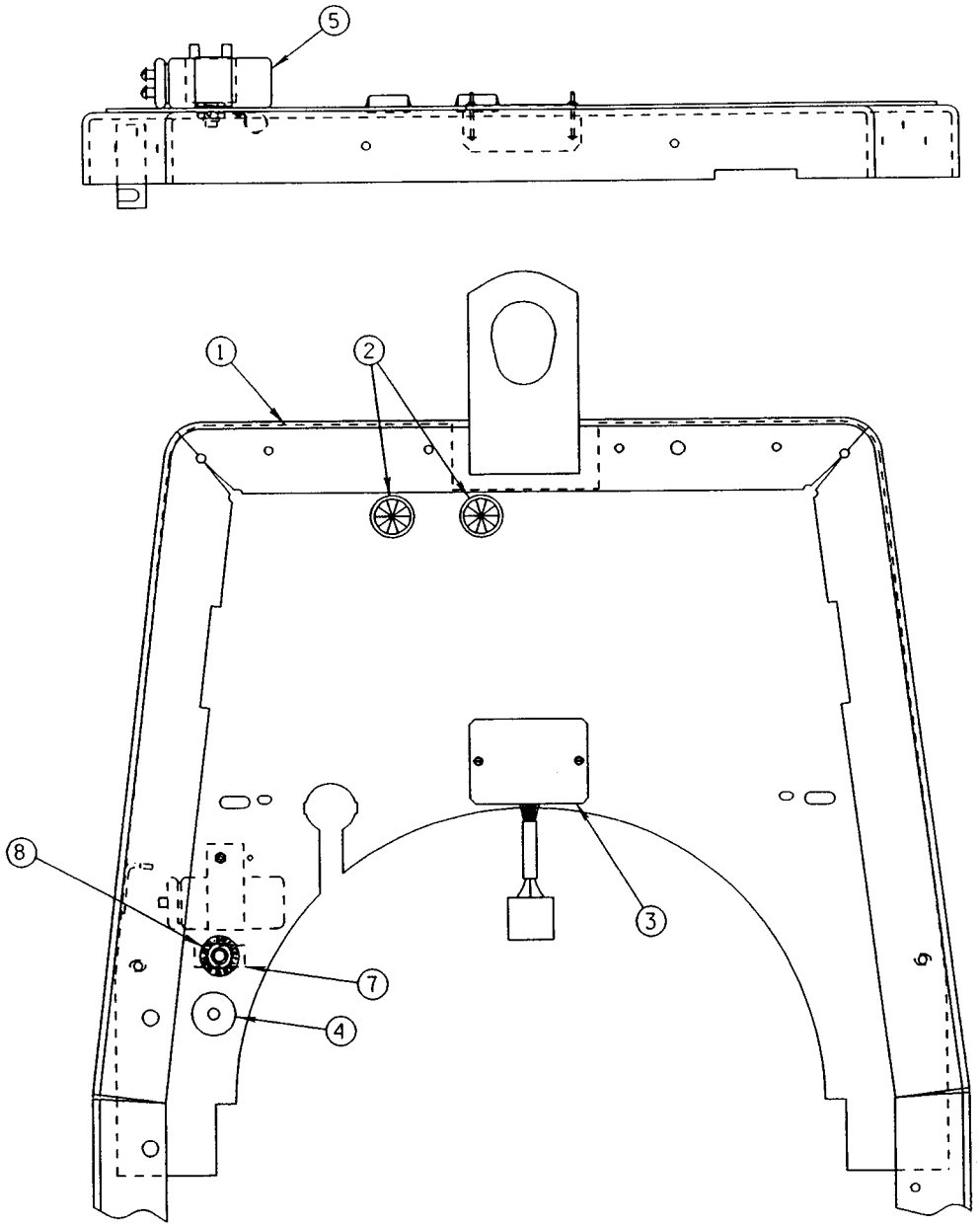
*** Items With * Not Illustrated**

Parts List P-217-E

ITEM #	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Air Baffle and Shroud Assembly	M16613	1
2	Bushing	T12380-3	1
3	Contactor	M15308	1
*	#10-24 x .50 Round Head Screw	CF000047	3
*	Plain Washer	S9262-27	3
*	Lock Washer	E106A-1	3
*	#10-24 Hex Nut	CF000010	3
4	Bushing	T12380-1	1
5	Resistor (R5)	S10404-12	1
*	#10-24 x 2.75 Round Head Screw	CF000049	1
*	Insulating Washer	T4479-A	2
*	Plain Washer	S9262-27	1
*	Lock Washer	E106A-1	1
*	#10-24 Hex Nut	CF000010	1
6	Control P.C. Board	G2318-1	1
*	Expansion Nut	S14020-3	6
*	Self Tapping Screw	S8025-75	6
7	Thread Forming Screw	S9225-36	1
*	Lock Washer	T9695-1	1
*	#10-24 Hex Nut	CF000010	1

ITEM #	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
8	Relay (1CR)	S14293-14	1
*	#6-32 x .375 Round Head Screw	CF000003	2
*	Plain Washer	S9262-3	2
*	Lock Washer	E106A-13	2
*	#6-32 Hex Nut	CF000005	2
9	Identification Sticker	T14798-1	1
10	Rubber Channel	T11019-5	1
11	Diode Assembly	T13622-5	1
*	Insulation	T11472-4	1
*	#10-24 x .50 Round Head Screw	CF000047	1
*	Lock Washer	E106A-1	1
*	#10-24 Hex Nut	CF000010	1
13	Bushing	T12380-3	1
14	RF Bypass P.C. Board	M16675-1	1
*	Expansion Nut	S14020-3	2
*	Self Tapping Screw	S8025-75	2
15	P.C. Box Bottom	M16704	1
*	Self Tapping Screw	S8025-70	2
16	Bushing	T12380-4	1

LIFT BAIL BAFFLE ASSEMBLY



L8584
4-23-92

*** Items With * Not Illustrated**

Parts List P-217-F

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
1	Lift Bail Baffle	M16606	1
2	Bushing	T14614-1	2
3	Engine Regulator	M16580-2	1
*	1/4-20 x 1.00 Round Head Screw	CF000150	2
*	Plain Washer	S9262-98	2
*	Lock Washer	E106A-2	2
*	1/4-20 Hex Nut	CF000017	2
4	Glow Plug Indicator	M16580-3	1

ITEM#	PART NAME & DESCRIPTION	PART NO.	NO. REQ'D
5	Capacitor (C2)	S13490-114	1
*	Clamp	S18517	1
*	Self Tapping Screw	S8025-65	1
7	Circuit Breaker (10A)	T12287-20	1
8	Nameplate (Circuit Breaker)	S19804	1

4-24-92

			
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絕緣。	● 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 INSTRUCT ION 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 servico. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os painels 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捍材料，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.

LIMITED WARRANTY

STATEMENT OF WARRANTY:

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

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

WARRANTY PERIOD:

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

Three Years:
Transformer Welders
Motor-generator Welders
Semiautomatic Wire Feeders
Plasma-cutting Power Source
Engine Driven Welders (except engine and engine accessories) with operating speed under 2,000 RPM

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

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

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

TO OBTAIN WARRANTY COVERAGE:

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

WARRANTY REPAIR:

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

WARRANTY COSTS:

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

IMPORTANT WARRANTY LIMITATIONS:

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

WARRANTY SUPERSEDED
SEE NEWS 1

PERFORMANCE PLUS PROTECTION
3 YEAR WARRANTY PARTS & LABOR
LINCOLN® ELECTRIC

LINCOLN® ELECTRIC

THE LINCOLN ELECTRIC COMPANY

World's Leader in Welding and Cutting Products • Premier Manufacturer of Industrial Motors
Sales and Service through Subsidiaries and Distributors Worldwide
Cleveland, Ohio 44117-1199 U.S.A.

Eff. July '92 Ram

Litho in U.S.A.