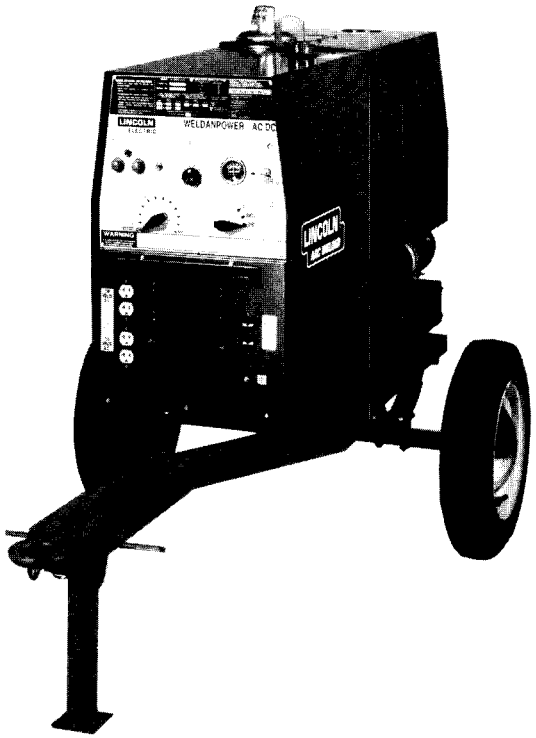
LINCOLN® WELDERS

IM-354

IM354
Weldanpower
225/210
(Yanmar)
9111; 9166;
9334
February, 1989

OPERATING MANUAL

WELDANPOWER® AC/DC WATER COOLED YANMAR DIESEL



Unit shown with optional K768 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This manual covers equipment which is obsolete and no longer in production by The Lincoln Electric Co. Specifications and availability of optional features may have changed.

SHIPPING DAMAGE CLAIMS

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

SAFETY DEPENDS ON YOU

Lincoln 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 THE INSIDE FRONT COVER. And, most importantly, think before you act and be careful.

LINCOLN® ELECTRIC

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

ARC WELDING SAFETY PRECAUTIONS

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

ELECTRIC SHOCK can kill.

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

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

   c. Insulate yourself from work and ground using dry insulation. When welding in damp locations, on metal framework such as floors, gratings or scaffolds, and when in positions such as sitting or lying, make certain the insulation is large enough to cover your full area of physical contact with work and ground.

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

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

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

   g. Never dip the electrode in water for cooling.

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

   i. When working above floor level, protect yourself from a fall should you get a shock.

   j. Also see Items 4c and 6.

ARC RAYS can burn.

2. a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87.1 standards.

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

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

FUMES AND GASES can be dangerous.

3. a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. When welding on galvanized, lead or cadmium plated steel and other metals which produce toxic fumes, even greater care must be taken.

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

   c. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

   d. Read and understand the manufacturer's instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer's safety practices.

   e. Also see item 7b.

WELDING SPARKS can cause fire or explosion.

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

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

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

   d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned." For information purchase "Recommended Safe Practices for the Preparation for

Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1-80 from the American Welding Society (see address below).

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

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

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

h. Also see item 7c.

CYLINDER may explode if damaged.

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

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

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

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

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

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

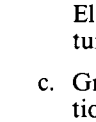
g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

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

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

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



FOR ENGINE powered equipment.

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

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

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

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

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

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

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

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

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

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

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INSTALLATION

⚠ 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.)**

SAFETY PRECAUTIONS

Spark Arrester

Some federal, state or local laws may require that diesel engines be equipped with exhaust spark arresters when they are operated in certain locations where unarrested sparks may present a fire hazard. The standard 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 of the engine or its performance. Contact the engine manufacturer for specific recommendations.

Location/Ventilation

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

Machine Grounding

The United States National Electric Code requires that this machine be grounded under certain operating circumstances.

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

In general, if the machine is to be grounded it should be connected with a #10 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 United States National Electrical Code lists a number of alternate means of grounding electrical equipment.

⚠ WARNING

FALLING EQUIPMENT can cause injury.

- **Do not lift this machine using lift bale 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.**

Undercarriage

The recommended undercarriage for use with this equipment for in-plant and yard towing by a vehicle[1] is Lincoln's K-768. 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:

Design capacity of undercarriage vs. weight of Lincoln equipment and likely additional attachments.

Proper support of, and attachment to, the base of the welding equipment so there will be no undue stress to the framework.

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.

Typical conditions of use, i.e., travel speed; roughness of surface on which the undercarriage will be operated; environmental conditions; likely maintenance.

INSTALLATION OF EQUIPMENT REQUIRED FOR RECOMMENDED PROCESSES

TIG Welding

The K-799-WP2 Hi-Freq Unit includes an R.F. by-pass capacitor kit, which **must** be installed, for power source protection. Installation instructions are in the kit. (When using the Weldanpower AC/DC with any other high frequency equipment, an R.F. by-pass capacitor **must** be installed. Order Kit T-12246.) To provide protection the welder grounding stud must be connected to ground. Also follow the grounding instructions given in the Hi-Freq Instruction Manual (IM-298). The K-799-WP2 includes mounting hardware for mounting to the Weldanpower AC/DC.

Standby Power Connections

Suitable for temporary, standby or emergency power using engine manufacturer's recommended maintenance schedule.

The Weldanpower AC/DC can be permanently installed as a standby power unit for a 220 volt-3 wire, 27 ampere service. Connections must be made by a licensed electrician who can determine how the 110/220 volt Weldanpower 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 Figure 1.)

1. Install a double pole, double throw switch between the power company meter and the premises disconnect. Switch rating must be the same as or greater than the customer's premises disconnect and service over-current protection.
2. With the engine off remove the Weldanpower cover and make permanent connections from the Weldanpower 220 volt receptacle terminals to the switch installed in step 1. Replace the Weldanpower cover after making the connections. An access hole should be made in the cover to bring out the conductors to the switch. Use caution to protect the leads from any sharp corners.
3. Properly ground the Weldanpower frame to the premises system ground.
4. Take necessary steps to assure load is limited to the capacity of the Weldanpower. Maximum rated load for the 220 volt auxiliary is 27 amperes. Load-

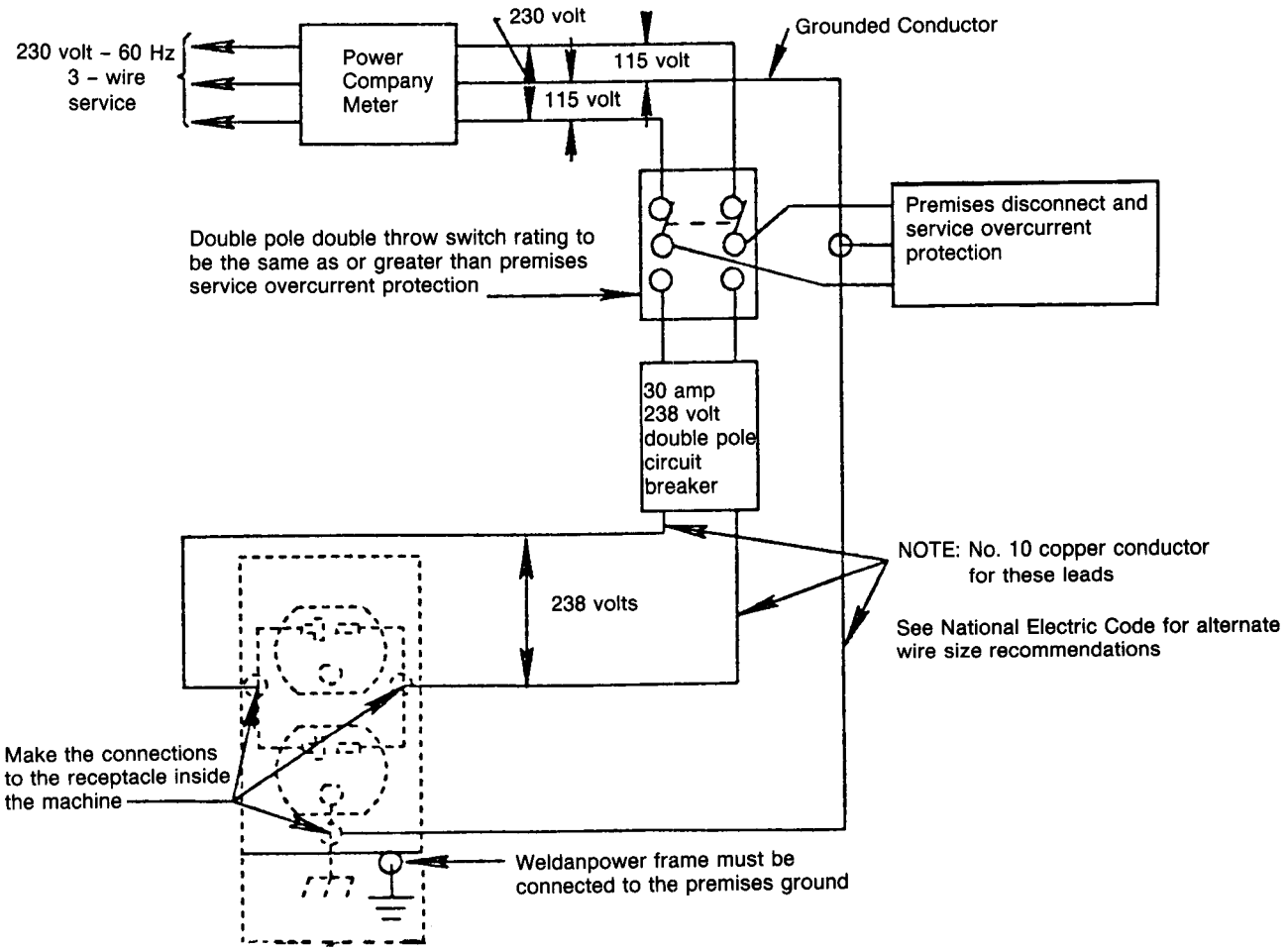


FIGURE 1
Connection of W/P AC/DC to Premises System.

ing above 27 amperes will reduce output voltage below the allowable -10% of rated voltage which may damage appliances or other motor-driven equipment.

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. When welding at a considerable distance from the welder, be sure you use ample size welding cables.

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

Amps	% Duty Cycle	Cable Sizes for Combined Lengths of Electrode and Work Cables				
		0-50 ft.	50-100 ft.	100-150 ft.	150-200 ft.	200-250 ft.
225	40	3	3	2	1	1/0
225	100	1	1	1	1	1/0

PRE-OPERATION MAINTENANCE

Do not start the engine until you perform the following services.

Oil

Upon receipt of the welder, fill the crankcase with oil to the "full" mark on the dipstick. Use the weight and type oil recommended by the engine manufacturer in the Engine Operator's Manual. Do **not** overfill.

Engine Coolant

The engine is shipped without coolant. Be sure the cooling system drain plug is tight. Fill the radiator with the following premixed cooling solution:

a. 1.5 qts (1.4 L) **low silicate** ethyl glycol type antifreeze.

b. 1.8 qts (1.7 L) clean water.

The total coolant capacity is 3.3 qts (3.1 L). The above concentration results in protection to approximately −22°F (−30°C). See antifreeze container and Table A for additional information.

CAUTION: High silicate type antifreeze may cause engine damage.

When antifreeze with high silicate levels is used in cooling systems along with supplemental cooling additives, there may develop a point when the solution becomes overconcentrated with silicate. At this point, the excess silicate will separate out and form a gel. This gel will rapidly build in cooling system passages, greatly impairing the heat transfer ability of the fluid and could potentially cause serious engine damage. You can minimize this problem by using a low silicate antifreeze.

TABLE A

Ambient Temperature Range	Coolant Concentration	
	Antifreeze	Clean Water
Down to −10°F (−23°C)	25% (1 Part) (1)(.8 Qts) (.75 L)	75% (3 Parts) (2.5 Qts) (2.35 L)
Down to −34°F (−37°C)	50% (1 Part) (1)(1.65 Qts) (1.55 L)	50% (1 Part) (1.65 Qts) (1.55 L)
Freezing to −76°F (−60°C)	66% (2 Parts) (1)(2.2 Qts) (2.1 L)	34% (1 Part) (1.1 Qts) (1.0 L)

(1) Required quantities to fill cooling system of a completely drained WP AC/DC (Yanmar).

CAUTION: Never exceed a solution greater than 66% antifreeze. The freezing point of concentrations **over** 66% rises toward zero degrees. A 66% concentration must not be used at temperatures above freezing.

It is best to use the minimum concentration of antifreeze (25%) when freezing protection is not required. This mixture results in the best heat transfer from the engine to the coolant and provides a corrosion inhibitor.

It is recommended that the coolant be premixed to the desired ratio prior to filling the coolant system.

WARNING: Hot coolant can burn skin. Do not remove cap if radiator is hot.

Fuel

Fill the fuel tank with the grade of diesel fuel recommended in the Engine Operator's Manual. Make sure fuel valve on the fuel filter is in the open position. (With the handle in the down position, the fuel valve is open.)

WARNING

GASOLINE fuel can cause fire or explosion.

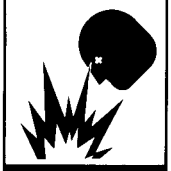
- Stop engine when fueling
- Do not smoke when fueling
- Remove cap slowly to release pressure
- Do not overfill tank
- Wipe up spilled fuel and allow fumes to clear before starting engine
- Keep sparks and flame away from tank
- Shut fuel off at tank when moving machine

Battery

Remove the insulating cap from the negative battery terminal. Replace 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.

WARNING: Gases from battery can explode.

⚠ 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.

OPERATING 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.

SAFETY PRECAUTIONS

Pipe Thawing

Although not specifically designed for the work, the output of arc welding machines is sometimes used to thaw frozen water pipes by electrical resistance heating of the pipe metal. Pipe thawing, if not done properly, can result in fire, explosion, damage to wiring which may make it unsafe, damage to pipes, damage to the welder, or other hazards.

Use only AC setting on the Weldanpower AC/DC for thawing pipe. Do not use the max. tap or the CV tap settings for pipe thawing.

⚠ WARNING

PIPE THAWING can result in fire or explosion.

- Only connect welder across FROZEN section of CONTINUOUS METAL PIPE.
- While thawing, remove any ground leads connected to frozen pipe.
- Turn welder on AFTER cables are connected to pipe. Turn off when done.

IMPORTANT:

DO NOT USE A WELDER TO THAW A PIPE BEFORE REVIEWING LINCOLN BULLETIN E695.1 (dated December 1976 or later). This bulletin may be obtained from your local Lincoln distributor or by writing directly to Lincoln Electric at the address on the back of this manual.

Location/Ventilation

The welder should be located to provide an unrestricted flow of clean, cool air to the cooling ari inlets and to avoid heated air coming out of the welder recirculating back to the cooling air inlet. Also, locate the welder so that engine exhaust fumes are properly vented to an outside area.

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 Yanmar engine is 25° 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 5 gallons.

High Altitude Operation

Welder output derating is necessary at altitudes above sea level. As a rule of thumb, derate the welder output 0.4% for every 100 ft (30 m) above sea level.

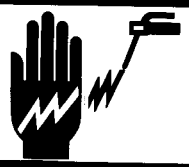
Additional Safety Precautions

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

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

ENGINE OPERATION

⚠ WARNING



ELECTRIC SHOCK can kill.

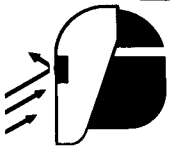
- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground.

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.

Engine Control Function/Operation

"Glow Plug" Pushbutton — Depress to activate glow plugs to preheat engine for starting. (See Starting Instructions.)

WARNING: Do not use ether or other starting fluids with the glow plugs. Explosion may result.

"Glow Plug" Light — Turns on when the Glow Plug Button is depressed. Start engine when light turns off.

"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.

Manual Shut Off Rod — When this rod is pulled out and turned clockwise the flow of fuel is stopped and the engine shuts down.

"Idler Control" Switch — Has two positions as follows:

1. In the "High Idle" position, the idler is off and the engine runs at the high idle speed controlled by the governor.
2. In the "Automatic Idle" position, the idler operates as follows:
   a. When welding or drawing power for lights or tools (approximately 100-150 watts minimum) from the receptacles, the engine operates at full speed.
   b. When welding ceases or the power load is turned off a preset time delay of about 15 seconds starts. This time delay cannot be adjusted.
   c. If the welding or power load is not re-started before the end of the time delay, the idler reduces the engine to low idle speed.
   d. The engine will automatically return to high idle speed when the welding load or power load is re-applied.

NOTE: When welding on the "Constant Voltage" tap or with the K-799 Hi-Freq., the Idler Control switch must be placed in the "high idle" position. The idler does not function properly when "Constant Voltage" welding or TIG welding.

Battery Charging Ammeter — Displays the current going from the battery charging alternator into the battery. It is normal for the charging current to be high after starting or when the battery is "low" on charge.

Starting/Shutdown Instructions

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

Remove all loads connected to the AC power receptacles to start the engine, set the "Idler Control" switch in the "Automatic Idle" position. Push the manual shut off rod all the way in. Press the "Glow Plug" pushbutton until Glow Plug light goes out and then press the "Start" button. Release both buttons when the engine starts.

NOTE: Extreme cold weather may require longer glow plug operation.

If engine fails to start in 20 seconds, wait 30 seconds before repeating above procedure.

Allow engine to warm up for 5-10 minutes on "Automatic Idle" before switching to "High Idle".

When an engine is started for the first time, some of the oil will be needed to fill the passages of the lubricating system. Therefore, on initial starting, run the engine for about five minutes and then stop the engine and recheck the oil. If the level is down, fill to the full mark again.

Cold Weather Starting

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

Starting below + 10°F may require winter grade diesel fuel and longer glow plug operation.

If the engine must be started below – 5°F, heaters may be necessary.

WARNING: Do not use ether or other starting fluids with the glow plugs. Explosion may result.

Stopping the Engine

Remove all welding and auxiliary power loads and allow engine to run at low idle speed for a few minutes.

Stop the engine by pulling the manual shut off rod out and turning it clockwise to lock it in this position.

⚠ WARNING

Shut off fuel sediment bowl when transporting on undercarriage, trailer, back of truck, etc.

WELDER OPERATION

Duty Cycle

The Weldanpower AC/DC is rated at 100% duty cycle on all welding taps and auxiliary power.

Control Function/Operation

"Output Selector" Switch — A twelve position switch with designated welding currents as follows: CV, 50, 60, 70, 80, 95, 110, 130, 150, 170, 190 and MAX. (The MAX. tap provides 225 Amps AC and 210 Amps DC, the CV tap provides a maximum of 200 Amps DC for constant voltage welding.)

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

"Electrode Polarity" Switch — A three position switch with designated welding polarities as follows: AC, DC(+) and DC(–).

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

"Output Control" — Provides welding current adjustment between the Output Selector Switch settings in the CC mode and welding voltage control with the Output Selector in the CV mode.

Procedure Adjustment

Constant Current (Manual) Welding

With the engine off, 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". The following electrode guide will show the recommended electrodes and settings for this machine. (See Table I.)

TABLE I
ELECTRODE GUIDE[1]

ELECTRODE TYPE	ELECTRODE POLARITY	ELECTRODE SIZE			
		3/32	1/8	5/32	3/16
Fleetweld 5P	DC(+)	50-75	75-130	90-175	140-210
Fleetweld 35	AC	50-85	75-120	90-160	120-200
Fleetweld 37	AC	80-105	110-150	160-200	205-225[2]
Fleetweld 57	AC		110-150	150-200	200-225
Fleetweld 180	AC	40-90	60-120	115-150	
LH-70	DC(+)	70-100	90-150	120-190	170-210
LH-73	AC	70-90	95-135	140-200	
LH-75	DC(+)	70-110	95-160	120-190	180-210[2]
LH-78	DC(+)	85-110	110-160	130-200	180-210[2]
Jetweld 1	AC	65-120	115-175	180-210[2]	
Jetweld 3	AC	65-120	115-175	180-210[2]	

[1] See latest Weldirectory M120 for other electrodes which may be satisfactory.

[2] Limited current range due to rating of machine.

It is recommended that the "Output Selector" switch be set for the closest desired CC welding current and then a find adjustment be made with the "Output Control". In this way, the "Output Control" will be towards its maximum setting (10) and will give the best arc stability and maximum auxiliary power. Some arc instability may be experienced when the "Output Control" is set towards the low end of its control (1).

Semiautomatic Welding (CV)

Connection of the Weldanpower AC/DC to the LN-22/ LN-25

a. Shut the welder off.

b. Connect the electrode cable from the LN-22/ LN-25 to the electrode terminal of the welder. Connect the work lead to work terminal of the welder.

c. Position the welder "Electrode Polarity" switch to the desired polarity, either DC(–) or DC(+).

d. Position the "Output Selector" switch to the CV position.

e. Place the idler switch in the high idle position. The engine idling device does not function when welding in the CV mode.

f. Attach the single lead from the LN-22/LN-25 control box to the work using the spring clip on the end of the lead. This is only a control lead — it carries no welding current.

g. Adjust wire feed speed at the LN-22/LN-25 and adjust the welding voltage with the "Output Control" at the welder.

NOTE: The welding electrode is energized at all times unless an LN-25 with built-in contactor is used.

Connection of the Weldanpower AC/DC to the LN-7 with K-240 Contactor Kit

a. Shut the welder off.

b. Connect the LN-7 and the K-240 Contactor Kit per instructions on the appropriate connection diagram (S17742).

c. Place the idler switch in the high idle position. The engine idling device does not function when welding in the CV Mode.

d. The welding range is limited to the recommended processes below. If the "Output Control" is adjusted to obtain lower welding voltages outside the recommendations, the Contactor Kit or the LN-7 may malfunction due to the auxiliary power voltage falling below 98 volts.

When used with the LN-22 or LN-7/K-240 and .068 NR-211-MP, welding can be done with wire feed rates of 60 to 90″/min. No shielding gas is required. A number of GMAW welding procedures using .030 L-50 or .035 L-50/L-56 can also be done with the LN-7/K-240 combination, at wire feed speeds up to 400″/min. Consult your local Lincoln distributor for a recommendation on the proper shielding gas.

Auxiliary Power

Start the engine and set the idler control switch to the desired operating mode. Voltage is now at the receptacles for auxiliary power.

110 Volt Circuit: Up to 54 Amps can be drawn in combination from two 20 Amp duplex receptacles.

220 Volt Circuit: 27 Amps can be drawn from a 15 Amp duplex receptacle.

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 220 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 220 volt 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 following Table II. The permissable currents shown assume that current is being drawn from either the 110 volt or 220 volt supply (not both at the same time). Also, that the "Output Control" is set at "10" for maximum auxiliary power.

TABLE II

Welding Output AC/DC	Permissable Power, Watts (Unity Power Factor)	Permissable Auxiliary Current in Amperes @ 110 V or @ 220 V	
150-MAX, CV[1]	None[1]	0	0
130	1600	14.5	7.25
110	2500	22.5	11.25
80-95	3300	30	15
60-70	4000	36	18
50	5000	45	22.5
None	6000	54	27

[1] When LN-7 and K-240 are being used on the CV tap, sufficient power is available for these two units.

See Standby Power Connection Section for installation as a standby power unit.

Operation of Options/Accessories

TIG Welding

The Weldanpower AC/DC may be used with the K-799-WP2 High Frequency Generator (Code Numbers above 8400). The combined package will permit AC or DC TIG Welding up through 170 Amps.

The K-799-WP2 should be used with the Weldanpower AC/DC on high idle to maintain satisfactory operation. See K-799 Operating Manual (IM-298) for details on the K-799's operation.

BREAK-IN PERIOD

The engine used to supply power for your welder is a heavy-duty, industrial engine. It is designed and built for rugged use. It is very normal for any engine to use small quantities of oil until the break-in is accomplished. We suggest checking the oil level twice a day during the break-in period (about 50 running hours).

IMPORTANT: In order to accomplish this break-in, the unit should be subjected to moderate loads, within the rating of the machine. Avoid long idle running periods. Remove loads and allow engine to cool before shut down.

MAINTENANCE

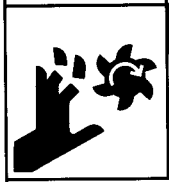
⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts such as output terminals or internal wiring**

ENGINE EXHAUST can kill.

- **Use in open, well ventilated areas or vent exhaust outside**



MOVING PARTS can injure.

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

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

WARNING: Engine coolant is hot and under pressure — allow to cool before removing radiator cap.

Read the Safety Precautions in 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 equipment.

ROUTINE MAINTENANCE

1. At the end of each day's welding, refill the fuel tank to minimize moisture condensation in the tank. Also, running out of fuel tends to draw dirt into the fuel system. Check the crankcase oil level.
2. If the fuel supply runs out while the fuel pump is operating, air may be entrapped in the fuel distribution system. If this happens, bleeding of the fuel system may be necessary. See the engine Operator's manual.
3. Refer to the engine maintenance section in the engine Operator's manual for routine engine maintenance.
4. Air Filter - The air filter canister is located underneath the radiator on the right side of the welder.

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

   Inspect for holes and tears by looking through the element toward a bright light. Check for damaged gaskets or dented metal parts. Do not re-use damaged elements. Protect element from dust and damage during drying and storage.
5. Both English and metric fasteners are used on this welder.

PERIODIC MAINTENANCE

1. Blow out the welder and controls with low pressure air periodically. In particularly dirty locations this may be required once a week.
2. Throttle Control parts must be kept clean and lubricated.
3. Refer to engine Operator's manual for periodic engine maintenance.
4. 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.
5. When replacing, jumping or otherwise connecting the battery to the battery cables, the proper polarity must be observed. Failure to observe the proper polarity could result in damage to the charging circuit. The positive battery cable is designated with a "P" stenciled on the terminal lug and the negative battery cable has an "N" stenciled on the terminal lug.
6. Nameplates — Whenever periodic maintenance is performed on this machine — or at least yearly — inspect all nameplates and labels for legibility. Replace those which are no longer clear. Refer to the parts list for replacement item number.

TROUBLESHOOTING

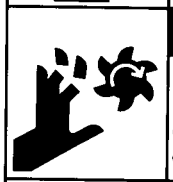
⚠ WARNING

ELECTRIC SHOCK can kill.

- **Do not touch electrically live parts such as output terminals or internal wiring**

ENGINE EXHAUST can kill.

- **Use in open, well ventilated areas or vent exhaust outside**



MOVING PARTS can injure.

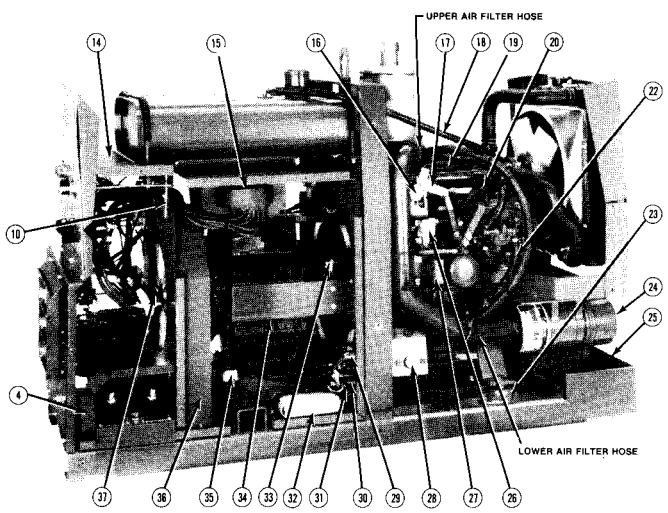
- **Do not operate with doors open or guards off**
- **Stop engine before servicing**
- **Keep away from moving parts**

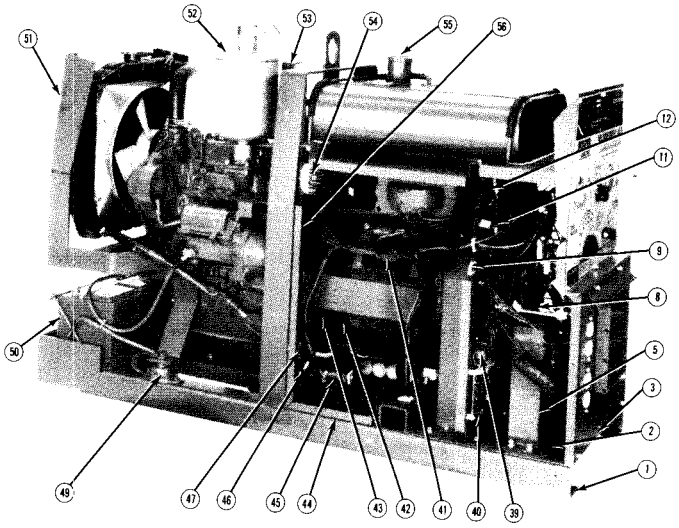
- **Remove guards only when necessary and replace when work requiring removal is complete.**
- **Only qualified personnel should install, use, or service this equipment.**

Trouble	Causes	What To Do
No welder or power output	a. Flashing circuit fuse blown.	a. Replace with a new 8 amp "Slow-Blow" fuse.
	b. Open lead in flashing or field circuit.	b. Check for opens in leads #224, #227, #228, #219, #200, #201, #5 and #4 in field and flashing circuits.
	c. Faulty rotor.	c. Lift brushes and check rotor continuity between slip rings. (Approx. 4-5Ω)
	d. Faulty rheostat (R4).	d. Rheostat resistance should be approx. 10 ohms when set at 1".
	e. Faulty stator field winding.	e. Disconnect lead #4 at D2 and check for continuity between leads #4 and #5.
	f. Faulty field rectifier (D2).	f. Replace with known good one.
	g. Faulty flashing diode (D3).	g. Replace with known good one.
	h. Open in misc. leads.	h. Refer to wiring diagram & check related leads.
	i. Faulty oil pressure switch.	i. Check operation of oil pressure switch and replace if necessary
Battery does not stay charged.	a. Faulty battery.	a. Replace with new battery.
	b. Faulty charging system.	b. Refer to engine Operator's Manual for charging system service.

Trouble	Causes	What To Do
Engine will not idle down to low speed.	a. Idler switch on High Idle.	a. Set switch on Automatic Idle.
	b. External load on welder or auxiliary power.	b. Remove all external loads and short circuits.
	No voltage present between terminals #213 & #5. (Voltage should be 12 VDC.)	Check for broken leads #213, #5 and #224.
	Battery disconnected.	Battery must be connected for idler operation.
	c. No open circuit voltage on the auxiliary power receptacles	c. Check for generator buildup
	d. No voltage present between terminals #3 & #5. (Voltage should be 110 VAC.)	d. Check for broken leads #3 and #5.
	e. K-799-WP2 Hi-Freq Kit connected to Weldanpower.	e. Use K-799-WP2 with Weldanpower on high idle.
	f. Idler solenoid fuse blown.	f. Replace with a new 8 Amp "Slow-Blow" fuse.
	g. Faulty wiring in solenoid circuit.	g. Check for broken leads #222, #221, #229, #215 and #5.
	h. Idler solenoid position out of adjustment.	h. Adjust solenoid as necessary. The solenoid **must** be adjusted so that the solenoid shaft seats **fully,** otherwise the solenoid will be damaged.
	i. Idler relay (CR2) faulty.	i. Check and replace relay if faulty.
	j. Faulty idler solenoid.	j. Check idler solenoid and replace if faulty.
	k. Faulty idler P.C. board.	k. Replace P.C. board with known good one.
Engine will not go to high idle when attempting to weld.	a. No voltage signal from the idler transformer.	a. Check idler transformer operation. Check for broken leads #217, #216, R2 and #2.
	b. No open circuit voltage on output studs.	b. Check generator output.
	c. Welding on CV tap.	c. Use on high idle only.
	d. Faulty idler P.C. board.	d. Replace P.C. board with known good one.
Engine will not go to high idle when using auxiliary power.	a. No voltage signal from the idler current transformer.	a. Check idler current transformer operation. Check for broken leads #218, #3, and #5 on the idler current transformer.
	b. Auxiliary power load less than 1 Amp.	b. Idler will not function with less than 1 Amp load. Set idler switch to high idle.
	c. Faulty idler P.C. board.	c. Replace P.C. board with known good one.
Engine goes to low idle but does not stay at low idle.	a. Idle speed set too low.	a. Adjust solenoid linkage to set speed at 1600 RPM.
	b. Idler solenoid not seating properly.	b. Adjust solenoid as necessary. The solenoid **must** be adjusted so that the solenoid shaft seats **fully,** otherwise the solenoid will be damaged.
	c. Faulty solenoid.	c. Replace solenoid with known good one.

GENERAL ASSEMBLY





G1739
8-29-86

Parts List P-174-C

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Base Battery Pan & Lift Bail Assembly	1
2	Front Pan	1
3	Case Front Assembly	1
4	Output Stud Assembly	1
5	Choke Assembly	1
8	Rectifier Assembly, Includes:	1
	Left Rectifier Half	1
	Right Rectifier Half	1
	Diode (Positive) - Order Matched Set	2
	Diode (Negative) - Order Matched Set	2
9	Grommet	2
10	Air Baffle & Suppressor Assembly	1
11	Relay (CR2)	1
12	Glow Plug Timer	1
14	Drip Pan	1
15	Reactor Assembly	1
16	Idler Solenoid Assembly, Includes:	1
	Solenoid	1
	Idler Solenoid Mounting Bracket	1
	Idler Arm	1
	Pivot Pin	1
	Spring Clip	1
	Spring	1
17	Shutoff Arm Assembly	1
	Shutoff Linkage	1
	Pivot Pin	2
	Spring Clip	2
	Shutoff Arm	1
18	Fuel Return Line	1
	Sleeving	1
	Hose Clamp	2
19	Fuel Line - Tank to Lift Pump	1
	Sleeving	1
	Hose Clamp - Fuel Tank End	1
	Hose Clamp - Lift Pump End	1
20	Fuel Line - Filter to Injection Pump	1
	Hose Clamp	2
22	Fuel Line - Lift Pump to Filter	1
	Sleeving	1
	Hose Clamp	2
23	Engine Mounting - Right Side	1
24	Air Filter	1
	Mounting Band	2
	Air Filter Hose - Upper	1
	Air Filter Tube	1
	Air Filter Hose - Lower	1
	Hose Clamp	4
25	Battery Cover	1
26	Fuel Filter	1
27	Door Stop (Code 9111 Only)	1
27	Door Stop (Above Code 9150)	1
	Door Bumper (Above Code 9150)	1
28	Remote Water Valve Drain	1
	Water Drain Bracket	1
	Hose - Radiator to Drain	1
	Sleeving - Covers Radiator to Drain Hose	1
	Hose - Block to Drain	1
	Sleeving - Covers Block to Drain Hose	1
	Hose Clamp	4
29	Full Wave Bridge	1
30	Resistor (R3)	1
	Round Head Screw	1
	Insulating Washer	2
	Plain Washer	1

3-10-87

Continued

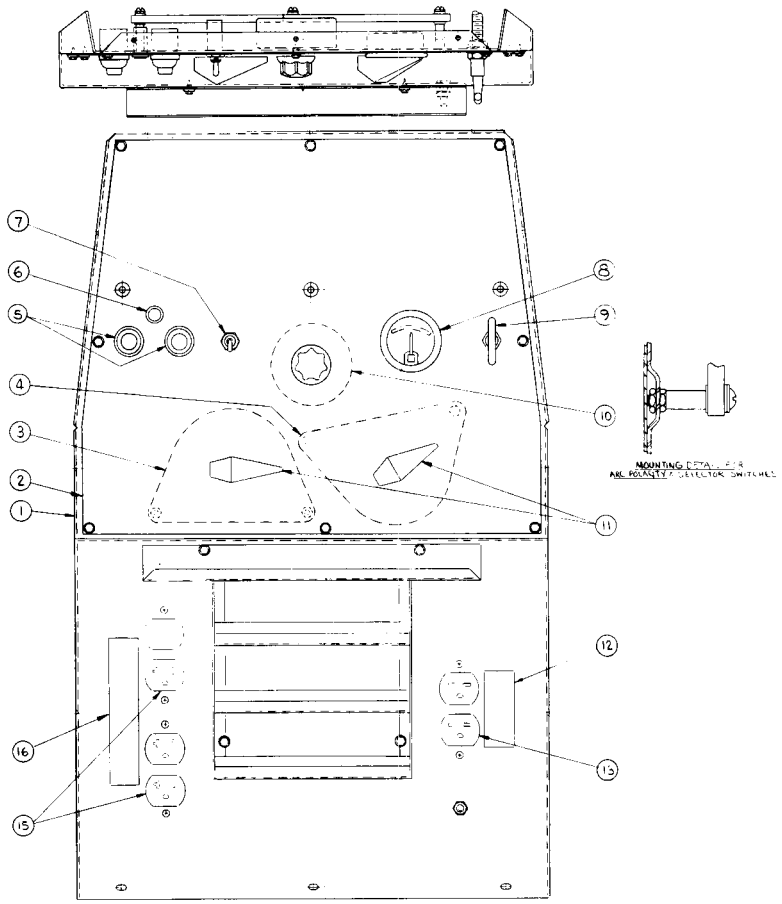
Parts List P-174-C (Continued)

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
	Lock Washer	1
	Hex Nut	1
31	Terminal Strip Assembly	1
	Insulation	1
32	Capacitor	4
	Capacitor Jumper	2
	Mounting Clamp	1
33	Brushholder Assembly (Set of 2)	1
	Brushes	2
34	Frame Assembly	1
35	Generator Mounting	1
36	Baffle & Shroud Assembly	1
37	Blower	1
	Key	1
	Bearing	1
	Hex Head Cap Screw	1
	Plain Washer	1
	Lock Washer	1
	Bearing Cartridge	1
	Flat Head Screw	4
39	Transformer	1
40	Idler P.C. Board	1
	Plastic Expansion Nut	4
	Self Tapping Screw	4
41	Current Transformer	1
42	Rotor Assembly	1
43	Rotor Coupling, Includes:	
	Disc Clamping Bar	3
	Metric Hex Head Screw Flywheel Side	6
	Lock Washer	6
	Coupling Disc	1
	Rotor Clamping Ring	1
	Hex Head Cap Screw Rotor Side	4
	Lock Washer	4
44	Case Back and Bottom	1
45	Resistor (R5)	1
	Round Head Screw	1
	Insulating Washer	2
	Plain Washer	1
	Lock Washer	1
	Hex Nut	1
46	Fuse Holder	2
	Fuse	2
47	Terminal Strip Assembly	1
	Insulation	1
49	Engine Mounting - Left Side	1
50	Battery	1
	Battery Clamp Bracket	1
	Clamp Hook	2
	Lock Washer	2
	Hex Nut	2
	Battery Cable (Positive)	1
	Battery Cable (Negative)	1
51	Radiator Support	1
52	Muffler	1
	Rain Cap	1
53	Engine Cover Support	1
54	Regulator	1
55	Fuel Tank Assembly	1
	Fuel Tank Strap	2
	Tank Rail Cushion	2
	Loom	4

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
56	Bushing	1
	Items Not Illustrated:	
	Engine Cover	1
	Engine Cover Door	1
	Door Prop	1
	Retaining Clip (Prop Pivot) Code 9111 Only	1
	Retaining Clip (Prop Hook)	1
	Door Latch	1
	Door Chain	1
	Engine Cover Door	1
	Door Support Guide	1
	Door Support Rod	1
	Insulator	1
	Insulator Above Code 9150	1
	Retaining Ring	1
	Roll Pin	1
	Compression Spring	1
	Door Hook	1
	Case Wraparound	1
	Filler Neck Gasket	1
	Lift Bail Cover Seal	1
	Lincoln Decal	2
	Radiator Shroud Assembly	1
	Oil Pressure Switch (S6)	1
	Hour Meter (Optional)	1

3-10-87

GENERAL ASSEMBLY

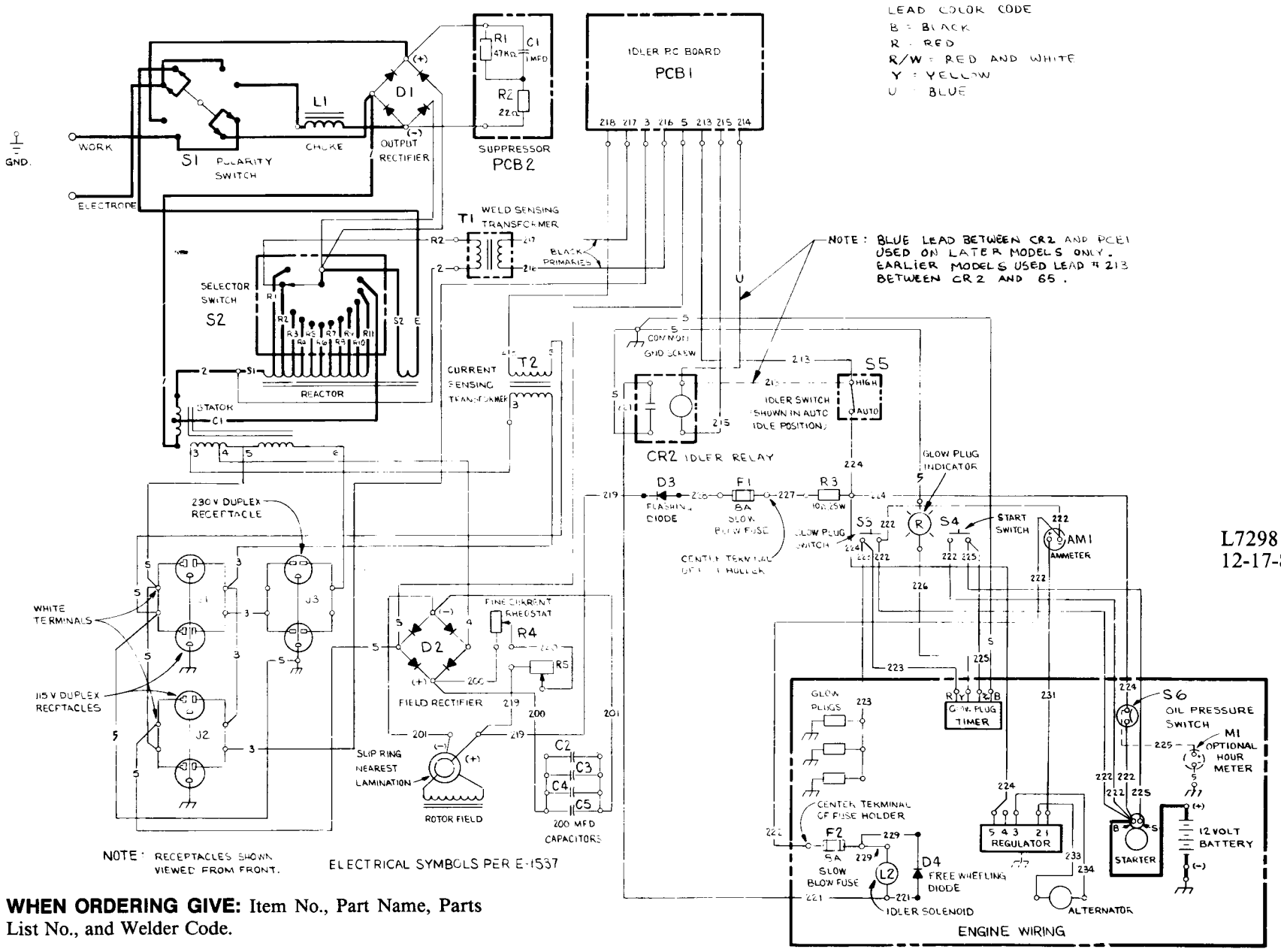


L7296
8-29-86

Parts List P-174-D

ITEM	PART NAME & DESCRIPTION	NO. REQ'D
1	Case Front	1
2	Nameplate	1
3	Selector Switch (S2)	1
	Round Head Screw	2
	Plain Washer	6
	Hex Nut	4
	Spacer	2
4	Arc Polarity Switch (S1)	1
	Round Head Screw	2
	Plain Washer	6
	Hex Nut	4
	Spacer	2
5	Start Button (S3 & S4)	2
6	Pilot Light	1
7	Idler Switch (S5)	1
8	Ammeter (AMI)	1
9	Shuf OFF Cable	1
10	Rheostat (R4)	1
	Knob	1
11	Handle	2
12	Decal	1
13	Duplex Receptacle (230V)	1
15	Duplex Receptacle (115V)	2
16	Decal	1

9-5-86



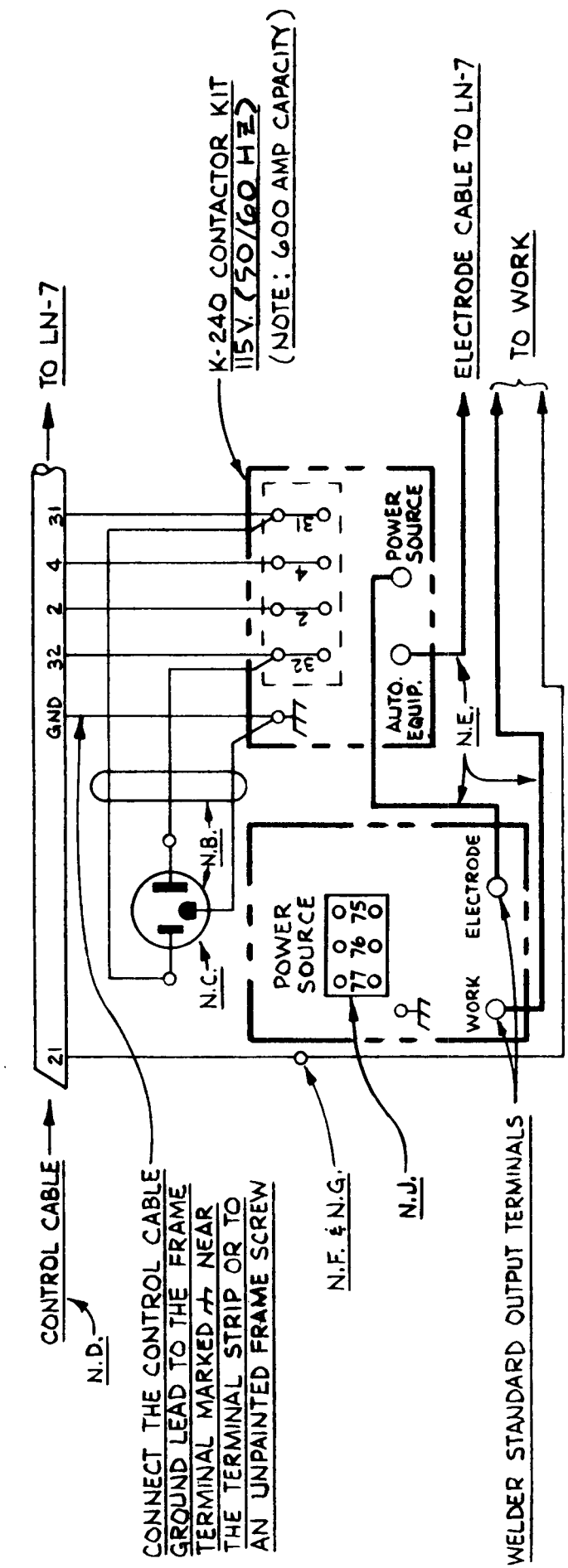
NOTE: RECEPTACLES SHOWN VIEWED FROM FRONT.

ELECTRICAL SYMBOLS PER E-1537

L7298
12-17-83

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

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.



S17742
4-15-88F

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.

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