LINCOLN ELECTRIC

Operator's Manual

Idealarc® CV500-I

For use with Product Numbers:

10088; 10089; 10090; 10091; 10092; 10277; 10278; 10279; 11356; 11837

GENUINE LINCOLN PARTS™

Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
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Serial: (ex: U1060512345)

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IM481-D | Issue Date Jul-17

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

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

SAFETY DEPENDS ON YOU

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

⚠ WARNING

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

⚠ CAUTION

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

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

Diesel Engines

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

Gasoline Engines

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

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

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

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

FOR ENGINE POWERED EQUIPMENT.

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

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

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

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

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

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

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

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

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

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

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

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

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

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

ELECTRIC SHOCK CAN KILL.

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

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

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

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

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

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

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

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

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

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

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

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

ARC RAYS CAN BURN.

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

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

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

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

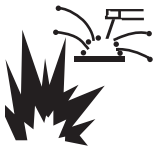
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

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

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



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

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

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

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

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

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

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

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

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

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

7.c. Cylinders should be located:

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

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

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

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

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

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

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

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

Refer to http://www.lincolnelectric.com/safety for additional safety information.

TABLE OF CONTENTS

MEANINGS OF GRAPHIC SYMBOLS

The CV 500-I nameplate has been designed to use international symbols in describing the function of the various components. Below are the symbols used.

POWER ON-OFF SWITCH

Input (Power)

On

Off

OUTPUT CONTROL DIAL

Output Voltage Control (Export Model)

Output Voltage Control (European Model)

Increase / Decrease of Output Voltage

OUTPUT CONTROL "LOCAL-REMOTE" SWITCH

Remote Output Voltage Control

Local Output Voltage Control

CIRCUIT BREAKER

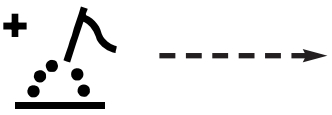
Circuit Breaker

THERMAL PROTECTION LIGHT

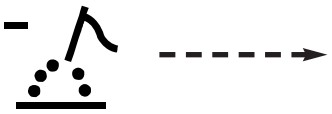
High Temperature

VOLTMETER SWITCH

Voltmeter



Positive Electrode



Negative Electrode

RATING PLATE

NEMA EW 1 ------→ **Designates welder complies with National Electrical Manufacturers Association requirements EW 1. (Export Model only)**

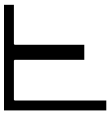
IEC 974-1 ------→ **Designates welder complies with International Electrotechnical commission requirements 974-1. (European model only)**

------→ **Three Phase Power**


------→ **Transformer**


------→ **Rectifier**


------→ **Rectified DC Output**


------→ **Constant Voltage Characteristic**


------→ **Line Connection**


------→ **Shielded Metal Arc Welding**


------→ **Flux Cored Arc Welding**

------→ **Designates Welder can be used in environments with increased hazard of electric shock. (European model only)**

IP21 ------→ **Degree of protection provided by the enclosure**

WARNING IDENTIFICATION

Warning Identification

EARTH GROUND CONNECTION

Signifying the Earth (Ground) Connection

CHASSIS GROUND CONNECTION

Signifying the Chassis (Ground) Connection

GENERAL MACHINE DESCRIPTION

The CV 500-I is an SCR controlled three phase DC power source. It is designed with a single range potentiometer control.

The CV500-I has two models - an Export model and a European model. The Export model complies with NEMA EW 1 requirements and the European model complies with IEC 974-1 requirements.

RECOMMENDED PROCESSES & EQUIPMENT

The CV 500-I is supplied as a constant voltage power source only. It is designed for all Innershield®, Outershield® and all solid wire and gas procedures within the capacity of the machine. The output characteristics have been optimized for these CV processes without use of a variable arc control.

The CV 500-I is designed to be used with the LN-7*, LN-7 GMA*, LN-8*, LN-9*, LN-9 GMA*, LN-22, LN-23P**, LN-25, or LN-742 semiautomatic wire feeders, the NA-3*,NA-5* and NA-5R* automatics within the capacity of the machine. The CV 500-I Diode option is required to utilize the cold start and cold electrode sensing features of the NA-3, NA-5 and NA-5R.

* The 14 pin receptacle of the European model does not provide 115 VAC for these feeders..

** Use K350 Adapter Kit.

DESIGN SUMMARY

Operational Features & Controls

ARC CHARACTERISTICS

Through the unique combination of the transformer, three phase semiconverter rectifier, capacitor bank, and output choke design, in conjunction with the solid state control system, an outstanding constant voltage welding performance is achieved with a fixed pinch setting optimized for the most popular arc characteristics.

OUTPUT VOLTAGE CONTROL

The OUTPUT voltage control, a small 2 watt potentiometer, is calibrated from 1 to 10.

MACHINE OUTPUT CONTROL SWITCH “LOCAL” OR “REMOTE”

The machine output voltage can be controlled by either the “OUTPUT CONTROL” on the machine control panel, the output control on the wire feed unit, or an optional “remote control” that is available. This switch selects the mode of control, either “LOCAL” or “REMOTE”.

POLARITY SELECTION

Polarity selection is made by appropriately connecting the electrode and work welding cables to either the “**+**” stud or to the “**-**” stud. Select “VOLTMETER” switch for “**+**” or “**-**” electrode, for the remote (#21) work sensing lead.

VOLTMETER SWITCH “+” ELECTRODE OR “-” ELECTRODE

This switch selects electrode polarity for the remote (#21) work sensing lead of automatic or semiautomatic equipment.

115 VOLT POWER SWITCH

The power input contactor operates from an auxiliary 115 volt transformer that is energized through the POWER toggle switch on the machine control panel. “ **I** ” is on and “**0**” is off.

PILOT LIGHT

A white light on the machine control panel indicates when the power source input contactor is closed. This means the main power transformer and all auxiliary and control transformers are energized.

THERMAL PROTECTION LIGHT

An amber light on the machine control panel indicates when either of the two protective thermostats have opened. Output power will be removed but input power will still be applied to the machine.

INPUT CONTACTOR

The power source is equipped with an input contactor.

AUXILIARY POWER CONNECTIONS

The power source is equipped to furnish nominally 115 volt AC and 42 volt AC auxiliary power for operating wire feeding equipment, etc. The auxiliary power is available at the 14-pin MS-style connector receptacle on the control panel and/or at a terminal strip behind the hinged control panel on the front of the power source. 115V AC is available at receptacle pins A and J, (except on European model), and terminals 31 and 32. 42V AC is available only at receptacle pins I and K. The 115V AC and the 42V AC are isolated circuits and each is protected by a 10 amp circuit breaker.

REMOTE CONTROL CONNECTIONS

Remote control connections are available both at a 14-pin connector receptacle located on the control panel, and on terminal strips with screw connections located behind the hinged control panel on the front of the power source.

WATER COOLER CONNECTOR

A Continental European receptacle (220V Schuko type) is located on the rear panel for supplying 220VAC to a water cooler. A 2 amp circuit breaker which is also located on the rear panel protects this circuit.

OUTPUT CONNECTIONS

The output terminals are recessed on the case front and labeled "**+**" and "**-**". The CV 500-I provides Twist-Mate™ European connector receptacles.

K852 Twist-Mate European connector plugs are available for the cable size to be used. The Export model includes two Twist-Mate plugs for 2/0 - 3/0 (70-95mm^2) cable and S18737 installation instructions.

INPUT CONNECTIONS

The three input lines are brought in through the rear panel of the power source and attached to the input contactor. Removal of the removable access panel makes the contactor accessible for the input cable connections.

INPUT LINE VOLTAGE COMPENSATION

The power source is equipped with input line voltage compensation as standard. For a line voltage fluctuation of ±10% the output will remain essentially constant. This is accomplished through the feedback network in the control circuit.

SOLID STATE OUTPUT CONTROL

The output of the welder is electronically controlled by SCR's instead of mechanical contactors, providing extra long life for highly repetitive welding applications.

SOLID STATE CONTROL SYSTEM

The Control PC Board is located behind the control panel which hinges down for easy access to the board. The Snubber PC Board is mounted on the back of the case front.

MACHINE COOLING

The fan pulls air in through the louvered front of the machine over the internal parts and exhausts out the louvered rear of the machine. The fan motor is fully enclosed, has sealed ball bearings, requires no lubrication, and operates when the power switch is turned on.

CASE FEATURES

The machine uses a 32" (813mm) long base. The low profile case facilitates installation of the machine under a workbench and stacking the machines three high to conserve floor space.

The case front incorporates a recessed hinged control panel where all the machine controls are mounted. This recessed panel protects the controls and minimizes the possibilities of accidental contact. This control panel can be easily opened to permit access to the enclosed section which contains the terminal strips, PC board, etc.The output lead terminals are also recessed to avoid any object or person accidentally coming in contact with an output terminal.

The individual case sides are removable for easy access for internal service or inspection. These are removable even though the machines are stacked three high.

The case rear, top section, is equipped with a removable access panel. This provides easy access to the input contactor, easy connection and reconnection of input leads, and easy access for service or inspection.

Although the machine is designed for use in rain-sheltered environemnts, the transformer and choke assembly are dipped in a special corrosion resistant epoxy paint.

A permanent lifting hook is located at the top of the machine and is positioned so that it acts as nearly as possible through the center of gravity. This lift hook is so positioned that it fits without interference under the base of the second machine when stacking.

PARALLELING

There are no provisions on the CV 500-I to permit paralleling.

DIODE OPTION (Factory installed only)

The CV 500-I Diode option is required to utilize the cold start and cold electrode sensing features of the NA-3, NA-5 or NA-5R. When this option is not used with an NA-3, NA-5 or NA-5R, see the CV 500-I / NA-3, CV 500-I / NA-5 or CV 500-I / NA-5R connection diagram for instructions on how to disable this circuit. If the circuit is not disabled, the wire cannot be inched down.

METER OPTION

Factory installed Ammeter and Voltmeter

Machine & Circuit Protection (Thermal Protection Light)

The power source is thermostatically protected with proximity thermostats against overload or insufficient cooling. One thermostat is located on the nose of the center bottom primary coil and a second thermostat is attached to the lead connecting the secondaries. Both thermostats are connected in a series with the 2-4 circuit. If the machine is overloaded, the primary thermostat will open, the output will be zero, and the thermal protection light will be on; the fan will continue to run. The secondary thermostat will open either with an excessive overload or insufficient cooling. The output will be zero and the protection light will be on; the fan will continue to run. When the thermostats reset the protection light will be off.

The power source is also protected against overloads on the SCR bridge assembly through an electronic protection circuit. This circuit senses an overload on the power source and limits the output to 550 amps by phasing back the SCR's.

Protection is provided to protect the circuitry from accidental grounds. If the customer accidentally "grounds" 75, 76, or 77 to the positive output lead, the output will be reduced to a low value, thus preventing any damage to the machine. If the ground occurs between 75, 76, 77 and the negative output lead, one of the PC board "self-restoring" fuses will blow, preventing any machine damage. After the ground is cleared, the fuses automatically reset within a few seconds.

TECHNICAL SPECIFICATIONS

Model	CV 500-I
Type	K1347
Frequency	50/60 Hz
Output Rating Amperes Volts NEMA EW1 IEC 974-1 Duty Cycle	DC 500 450 400 40 38 36 39 36.5 34 50% 60% 100%
Output Range (Min.) (Max.)	60A 12V 500A 42V
Max. O.C.V.	46
Input Ratings Standard Voltages Single Voltages (Available) Rated Current Input kVA Power Factor Efficiency Idle Current Idle Power	220/440 220/380/440 230/460 Yes 45A @ 400A 34V (380V/50 Hz) 29.6 @ 400A 34V (50 Hz) .65 @ 400A 34V (50 Hz) 70% @ 400A 34V (50 Hz) 3.2A (380V 50 Hz) 1.0 KW (50 Hz)
Optional Features Remote Control Adapter Cable 115V Starter Circuit Suitable Undercarriages Remote output Control Other Features	 Yes Standard Yes Yes Stackable Case
Net Weight	383 Lbs (174 kg)
Dimension Print	M12244-7
Wiring Diagram	L9269
Standards Compliance	IEC 974-1, [S] Rated (230/400V only) NEMA EW1 (All others) IP21 (All)
Operating Temperature	-40°C to +40°C

INSTALLATION

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.
• Do not touch electrically live parts or electrode with skin or wet clothing.
• Insulate yourself from work and ground.
• Always wear dry insulating gloves.

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.
• Do not weld on closed containers.

ARC RAYS can burn eyes and skin.
• Wear eye, ear and body protection.

See additional warning information at front of this operator's manual.

LOCATION

The machine should be located in a clean, dry place where there is free circulation of clean air such that air movement in through the front and out through the back will not be restricted. Dirt and dust that can be drawn into the machine should be kept to a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shutdown of the machine.

APPLICATION LIMITATIONS

There are no provisions on the CV 500-I for paralleling, and outdoor operations without rain sheltering is not recommended.

STACKING

⚠ 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.
• Do not stack more than three high.
• Do not stack the CV 500-I on top of any other machine.

The units may be stacked three high by observing the following safety precautions.

1. Make sure the first or bottom unit is setting on a level, well supported surface.
2. The units must be stacked with their fronts flush, making sure the two holes in the base rails of the unit being stacked on top are over the two holes located on the top front corners of the unit it is being stacked on. Fasten the units together with 5/16 bolts, nuts and lockwashers through these holes.
3. Remove fastening bolts before lifting unit off stacks.

Input Power Connections

By removing the rear access panel the three phase input power is connected to the three line terminals on the input contactor, and the earth grounding lead to the grounding terminal on the input box floor marked with the ⏚ symbol. Install the reconnect panel jumper links for the proper input voltage per the diagram pasted inside the access panel cover.

See Installation Data below:

INSTALLATION DATA

Input Rating			Recommended input wire and fuse sizes for maximum rated output. In addition, follow latest National Electrical Code and Local Code.				
Voltage	Hertz	Amperes** on Nameplate	Input Wire Size* (Type 75°C Copper Conductors in Conduit) AWG	Minimum Grounding Wire Size (Copper Conductors) AWG	FUSE SIZE	BUSSMANN SUPER-LAG CATALOG NUMBER	LIMITRON CATALOG NUMBER
220		78	3 (27mm²)	8 (10mm²)	100	Disc	KTN-R-100
230		75	4 (21mm²)	8 (10mm²)	100	Disc	KTN-R-100
380	50/60	45	6 (13mm²)	10 (5.3mm²)	60	RES-60	KTS-R-60
400		43	8 (8.4mm²)	10 (5.3mm²)	60	RES-60	KTS-R-60
440		39	8 (8.4mm²)	10 (5.3mm²)	50	RES-50	KTS-R-50

* Ambient temperature of 40°C (104°F).

** At rated output of 400A, 100% duty cycle.

*** **Use only Bussmann Super-Lag or Limitron fuses specified. Other fuses may not protect the welder and may cause overheating and possible fire damage.**

⚠ CAUTION

Failure to follow these instructions can cause immediate failure of components within the machine.
When powering welder from a generator be sure to turn off the welder first, before generator is shut down in order to prevent damage to welder.

Output Cable Connections

The output leads are connected to the output terminals marked "**+**" and "**-**". They are located at the lower right and lower left corners of the front panel. The CV 500-I provides Twist-Mate European weld cable connector receptacles.

K852 Twist-Mate European connector plugs are available for the cable size to be used. The Export model includes two Twist-Mate plugs for 2/0 - 3/0 (70-95mm2) cable and S18737 installation instructions. This information is also located at the rear of this manual.

Output Cables

CABLE SIZES FOR COMBINED LENGTH OF ELECTRODE AND WORK CABLE

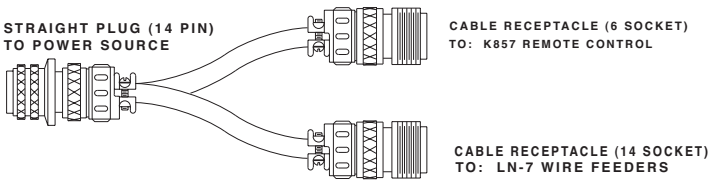
CABLE LENGTHS	MACHINE LOAD	
	400A (100% DUTY CYCLE)	500A (50% DUTY CYCLE)
UP TO 50 ft (15m)	3/0 85 mm²	2/0 67 mm²
50 to 100 ft (15-30 m)	3/0 85 mm²	2/0 67 mm²
100-150 ft (30-46 m)	3/0 85 mm²	3/0 85 mm²
150-200 ft (46-61 m)	3/0 85 mm²	3/0 85 mm²
200-250 ft (67-76 m)	4/0 107 mm²	4/0 107 mm²

Installation of Field Installed Options

REMOTE OUTPUT CONTROL
(K857 WITH K864 ADAPTER OR K775)

The K857 has a 6-pin MS-style connector. The K857 requires a K864 adapter cable which connects to the 14-pin connector on the machine.
The K775 consists of a control box with 28 ft (8.5m) of four conductor cable. This connects to terminals 75, 76, and 77 on the terminal strip and the case grounding screw so marked with the symbol ⏚ on the machine. These terminals are located behind the control panel on the front of the power source. This control will give the same control as the output control on the machine.

REMOTE CONTROL ADAPTER CABLE (K864)



A "V" cable 12" (.30m) long to connect a K857 Remote Control (6 pin connector) with a wire-feeder (14-pin connector) and the machine (14-pin connector). If a remote control is used alone the wire-feeder connection is then not used.

⚠ WARNING

ELECTRIC SHOCK can kill.
• Turn the power switch of the welding power source "**OFF**" before installing plugs on cables or when connecting or disconnecting plugs to welding power source.

CAPACITOR DISCHARGE CIRCUIT (K828-1)

Circuit that mounts inside the CV 500-I. Recommended when:

1) CV 500-I is used in conjunction with any LN-23P or older LN-8 or LN-9 semiautomatic wire-feeder. Eliminates possible arc flash re-start of weld when trigger interlock is used. Not required with current LN-8 (above Code 8700), or LN-9's with serial numbers above 115187 (manufactured after 12/83), or any LN-9 having an L6043-1 Power PC Board.

2) CV 500-I is used with an LN-22 equipped with an older K279 Contactor-Voltage Control Option. Eliminates electrode overrun when gun trigger is released. Not required when later K279 (above Code 8800) is used.

3) CV 500-I is used with any semiautomatic wire-feeder and possible small spark, if electrode touches work just after gun trigger is released, is objectionable.

Install per M17060 instructions included with the Kit.

UNDERCARRIAGES (K817P, K841)

For easy moving of the machine, optional undercarriages are available with polyolefin wheels (K817P) or a platform undercarriage (K841) with mountings for two gas cylinders at rear of welder.

Install per instructions provided with undercarriage.

Installation of Equipment Required for Recommended Processes

WIRE FEEDER CONTROL CABLE CONNECTIONS

For control cable with 14-pin connector:

Connect control cable to 14-pin connector on the front panel of the machine. See the appropriate connection diagram for the exact instructions for the wire feeder being used. Refer to “115VAC and 42VAC Auxiliary Power and Control Connections” section for connector pin functions.

A cover (Lincoln Electric Part Number S17062-3) is available for the unused 14-pin connector to protect it against dirt and moisture.

For control cable with terminal strip connectors:

The control cable from the wire feeding equipment is connected to the terminal strips behind the control panel. A strain relief box connector is provided for access into the terminal strip section. A chassis ground screw is also provided below the terminal strip marked with the symbol ⏚ for connecting the automatic equipment grounding wire. See the appropriate connection diagram for the exact instructions for the wire feeder being used. Refer to “115VAC and 42VAC Auxiliary Power and Control Connections” section for access to terminal strips.

CONNECTION OF CV 500-I TO LN-22 OR LN-25

a) Turn off all power.

b) Connect a jumper from “2 to 4” on terminal strip TS2 or jumper pins “C to D” in 14-pin connector plug (a K484 14-pin jumper plug is available).

c) Connect the electrode cable to the output terminal of polarity required by electrode. Connect the work lead to the other terminal.

d) Place the OUTPUT CONTROL Switch at “LOCAL” position unless a Remote Control is connected to the CV 500-I.

NOTE: The output terminals are energized at all times.

OPERATING INSTRUCTIONS

Safety Precautions

⚠ WARNING

ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.
- Do not touch electrically hot parts.
- This next section applies to CV 500-I's without the Capacitor Discharge Option:

When using a CV 500-I power source with wire feeders, there will be a small spark if the electrode contacts the work or ground within several seconds after releasing the trigger.

When used with some wire feeders with the electrical trigger interlock in the ON position, the arc can restart if the electrode touches the work or ground during these several seconds.

POWER SOURCE OPERATION

Duty Cycle and Time Period

The CV 500-I is rated at the following duty cycles:

Duty Cycle*	Amps	Volts
100%	400	36
60%	450	38
50%	500	40

* Based upon a 10 minute time period. (i.e., for 60% duty cycle, it is 6 minutes on and 4 minutes off).

Overloading the power source may result in opening of an internal protective thermostat as indicated by the amber thermal protection light turning on.

STARTING THE MACHINE

The POWER toggle switch at the extreme right side of the control panel in the " **I** " position energizes and closes the three phase input contactor from a 115 volt auxiliary transformer. This in turn energizes the main power transformer.

The machine is de-energized when the POWER switch is in the "**0**" position.

The white light next to the POWER switch indicates when the input contactor is energized.

CONTROL SETTINGS & DESCRIPTIONS

OUTPUT VOLTAGE CONTROL DIAL

The Output control dial at the right of the control panel is a continuous control of the machine output voltage. The control may be rotated between minimum and maximum to adjust the machine output, even while welding.

The machine is equipped with line voltage compensation as a standard feature. This will hold the output constant except at maximum output of the machine, through a fluctuation of ±10% input line voltage.

OUTPUT CONTROL "LOCAL-REMOTE" SWITCH

The Output Control toggle switch on the control panel labeled "Local-Remote" gives the operator the option of controlling the output at the machine control panel or at a remote station. For remote control, the toggle switch is set in the "Remote" position and controlled at the wire feed unit control, or by connecting a K775 control to terminals 75, 76, and 77 on the terminal strip at the front of the machine, or by connecting a K857 control with a K864 adapter to the 14-pin connector on the front of the machine. For control at the machine control panel (Output Voltage control dial), the toggle switch is set in the "Local" position.

(Exception: When used with an LN-9, LN-9 GMA or NA-5 wire feeder, the Output Control switch must be in the "Remote" position or automatic shutdown of the LN-9 or NA-5 may occur.)

POLARITY SELECTION

Polarity selection is made by appropriately connecting the electrode and work welding cables to either the "**+**" terminal or to the "**-**" terminal. Select "Voltmeter" switch for "**+**" or "**-**" electrode for the remote (#21) work sensing lead.

VOLTMETER SWITCH

Select "**+**" for positive electrode or "**-**" for negative electrode. This switch selects electrode polarity for the remote (#21) work sensing lead of automatic or semiautomatic equipment.

THERMAL PROTECTION LIGHT

The amber thermal protection light will be lit if either of the two protective thermostats have opened. The output power will be disabled but input power will still be applied to the welder.

115 VAC and 42 VAC AUXILIARY POWER AND CONTROL CONNECTIONS

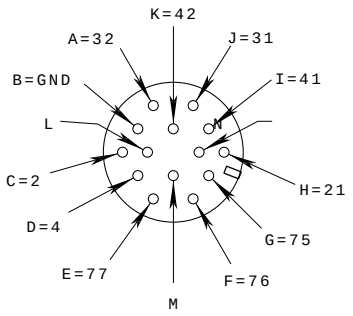
14-Pin Connector

The 14-pin connector receptacle (type MS-3102A-20-27SX) supplies auxiliary power.

42 VAC is available at receptacle pins I and K. A 10 amp circuit breaker protects this circuit.

115 VAC is available at receptacle pins A and J (except on the European model). A 10 amp circuit breaker protects this circuit. Note that the 42 VAC and 115 VAC circuits are electrically isolated from each other.

FRONT VIEW OF 14-PIN CONNECTOR RECEPTACLE



PIN	LEAD NO.	FUNCTION
A	32	115 VAC (Export Model Only)
B	GND	Chassis Connection
C	2	Trigger Circuit
D	4	Trigger Circuit
E	77	Output Control
F	76	Output Control
G	75	Output Control
H	21	Work Connection
I	41	42 VAC
J	31	115 VAC (Export Model Only)
K	42	42 VAC
L	---	---
M	---	---
N	---	---

Terminal Strip Connections

Terminal strip TS2 located behind the hinged control panel on the front of the power source supplies 115 VAC. A 10 amp circuit breaker protects this circuit. This 115 VAC is also available in the 14-pin connector (except on the European model).

Terminal strip TS1 also located behind the hinged control panel allows for connecting of a K775 remote control to terminals 75, 76, and 77.

A chassis ground screw is provided below the terminal strips marked with the symbol ⏚ for connecting the automatic equipment grounding wire or remote control grounding wire.

To gain access to the terminal strips simply remove the two #10 sheet metal screws from the top of the welder nameplate. Tilt panel forward so it rests in a horizontal position. See Table above for lead number functions.

220 VAC AUXILIARY POWER FOR WATER COOLER

A Continental European receptacle (220V Schuko type) is located on the rear panel for supplying 220VAC to a water cooler. A 2 amp circuit breaker which is also located on the rear panel protects this circuit from excessive overloads or short circuits.

MACHINE AND CIRCUIT PROTECTION

The power source is thermostatically protected with proximity thermostats against overload or insufficient cooling. One thermostat is located on the nose of the center bottom primary coil and a second thermostat is attached to the lead connecting the secondaries. Both thermostats are connected in series with 2-4 circuit. If the machine is overloaded, the primary thermostat will open, the output will be zero, the amber thermal protection light will be on and the fan will continue to run. The secondary thermostat will open either with an excessive overload or insufficient cooling. The output will be zero, the amber protection light will be on and the fan will continue to run. When the thermostats reset the protection light will be off.

The power source is also protected against overloads on the SCR bridge assembly through the solid state fault protection circuit. This circuit senses an overload on the power source and limits the output to approximately 550 amps by phasing back the SCR's.

Protection is provided to protect the circuitry from accidental grounds. If leads 75, 76, or 77 are accidentally "grounded" to the positive output lead, the output will be reduced to a low value, thus preventing any damage to the machine. If the ground occurs between 75, 76, 77 and the negative output lead, one of the PC board electronic "self-restoring" fuses will blow, preventing any machine damage. After the ground is cleared, the fuses automatically reset within a few seconds.

MAINTENANCE

⚠ WARNING

ELECTRIC SHOCK can kill.

- Have an electrician install and service this equipment.
- Turn the input power off at the fuse box before working on equipment.
- Do not touch electrically hot parts.

Routine Maintenance

1. The fan motor has sealed bearings which require no service.

2. In extremely dusty locations, dirt may clog the air channels causing the welder to run hot. Blow out the machine at regular intervals.

3. In extremely dusty locations, dirt may accumulate on the remote control terminal strip. Wipe or blow this terminal strip off at regular intervals. This is particularly important in damp locations.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

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

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

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

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

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

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

⚠ CAUTION

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

TROUBLESHOOTING GUIDE

Trouble	Cause	What To Do
Input contactor (CR1 chatters).	1. Faulty input contactor (CR1). 2. Low line voltage.	1. Repair or replace. 2. Check input power.
Machine input contactor does not operate.	1. Supply line fuse blown. 2. Contactor power circuit dead. 3. Broken power lead. 4. Wrong input voltage. 5. Open input contactor coil. 6. POWER "**I/O**" switch (S1) not closing.	1. Replace if blown - look for reason first. 2. Check control transformer T2 and associated leads. 3. Check input voltage at contactor. 4. Check voltage against instructions. 5. Replace coil. 6. Replace switch.
Machine input contactor operates, but no output when trying to weld.	1. Circuit between #2 (C) and #4 (D) is not being closed. 2. Electrode or work lead loose or broken. 3. Open main transformer (T1) primary or secondary circuit. 4. Defective Control PC Board. 5. Primary or secondary thermostats open.	1. Make sure trigger circuit is being closed. 2. Repair connection. 3. Repair 4. Replace. See Procedure for Replacing PC Boards. 5. Amber thermal protection light is on: Check for overheating; make sure fan is operating and there is no obstruction to free air flow.
Machine has minimum output and no control.	1. Terminals 75, 76, or 77 grounded to positive output.	1. Check 75, 76, or 77 for ground to positive output circuit. Nearly zero ohms to ground indicates a grounded circuit. A value greater than a few thousand ohms is normal. Self-restoring fuses on PC Board automatically reset within a few seconds after ground is cleared.
Machine has high output and no control.	1. Terminals 75, 76, or 77 grounded to negative output.	1. Check 75, 76, or 77 for ground to negative output circuit. Nearly zero ohms to ground indicates a grounded circuit. A value greater than a few thousand ohms is normal. Self-restoring fuses on PC Board automatically reset within a few seconds after ground is cleared.

Trouble	Cause	What To Do
Machine has low output and no control.	1. Output Control "Local-Remote" switch (S2) in wrong position. 2. Output Control switch faulty. 3. Open in feedback circuitry. 4. Faulty Control PC Board. 5. Output control potentiometer circuit open (Lead 75).	1. Check position of switch. 2. Check switch and replace if faulty. 3. Check wiring and control PC Board wiring harness plugs. 4. Replace. See Procedure for Replacing PC Boards. 5. Check and replace potentiometer if faulty. Check wiring of Lead #75.
Machine does not have maximum output.	1. One input fuse blown. 2. One phase of main transformer open. 3. Faulty Control PC Board. 4. Output control potentiometer defective. 5. Output control potentiometer Leads 210, 211, or 75 open.	1. Check and replace if blown after checking for reason for blown fuse. 2. Check for open and repair. 3. Replace. See Procedure for Replacing PC Boards. 4. Check and replace if faulty. 5. Check and repair broken leads.
Machine will not shut off.	1. Input contactor contacts frozen. 2. Defective Power "**I/O**" switch, (S1).	1. Check and replace if necessary. 2. Replace.
Variable or sluggish welding arc.	1. Poor work or electrode connection. 2. Welding leads too small. 3. Welding current or voltage too low. 4. Defective main SCR bridge.	1. Check and clean all connections. 2. Check table in instruction manual. 3. Check procedures for recommended settings. 4. Check and replace if defective.
Output control not functioning on the machine.	1. Output Control "Local-Remote" switch (S2) in wrong position. 2. Faulty Output Control switch. 3. Faulty Output Control potentiometer. 4. Leads or connections open in control circuit. 5. Faulty Control PC Board.	1. Place switch in "Local". 2. Check and replace if found faulty. 3. Check and replace if found faulty. 4. Check lead continuity and connections for an open and repair if necessary. 5. Replace. See Procedure for Replacing PC Boards.

Trouble	Cause	What To Do
Output control not functioning on “Remote” control.	1. Output Control switch in wrong position. 2. Faulty Output Control switch. 3. Faulty remote control potentiometer. 4. Leads or connections open in control circuit. 5. Faulty Control PC Board.	1. Place switch in “Remote”. 2. Check and replace if found faulty. 3. Check and replace if found faulty. 4. Check all leads and connections, internal or remote, for continuity; repair if necessary. 5. Replace. See Procedure for Replacing PC Boards.
Poor arc striking with semiautomatic or automatic wire feeders.	1. Poor work connection. 2. Improper procedures. 3. Defective Control PC Board.	1. Work connection must be adequate for application. 2. Adjust procedures for improved starting. 3. Replace. See Procedure for Replacing PC Boards.
Poor arc characteristics.	1. Defective Control PC Board. 2. Capacitor(s) in output circuit failed. A failure is indicated if the small vent plug on top of a capacitor is raised or blown out.	1. Replace. See Procedure for Replacing PC Boards. 2. Replace entire bank of capacitors. Do not replace individual capacitors. WARNING: The liquid electrolyte in these capacitors is toxic. Avoid contact with any portion of your body. Clean up vented electrolyte using rubber gloves and a water dampened cloth. Any electrolyte which gets on skin, clean with soap and water.

Procedure for Replacing PC Boards

⚠ WARNING

ELECTRIC SHOCK can kill.
• Have an electrician install and service this equipment.
• Turn the input power off at the fuse box before working on equipment.
• Do not touch electrically hot parts.

When a PC board is suspected to be defective, the following procedure must be followed:

1. Visually inspect the PC board. If the board has fuses, check to see if any are blown. Are any of the components damaged? Is a conductor on the back side of the board damaged? If electrical damage is visible on the PC board, inspect the machine wiring for grounds or shorts to avoid damaging a new PC board. Install a new PC board only after a visual inspection of the PC board and machine wiring is satisfactory.

2. If the problem is remedied by a new PC board, install the old PC board and see if the problem still exists. If the problem does not return with the old board:

   a. Check the PC board harness plug and PC board plug for contamination, corrosion or oversize.

   b. Check leads in the harness for loose connections.

CONNECTING THE REMOTE CONTROL TO THE MACHINE

Extreme caution must be observed when installing or extending the wiring of a remote control. Improper connection of this unit can lead to loss of control and/or poor welding. Only the green lead can and should be grounded to the machine case. When extending the standard remote control, make sure the leads are the same and the splice is waterproof. Be very careful not to ground the cable when in use and don't let the lugs touch against the case.

OUTPUT VOLTAGE

The open circuit voltage of the machine should be adjustable from 10 to 46 volts. If any other condition exists, refer to the Troubleshooting Guide.

FAULT PROTECTION OPERATION

The overload protection circuit, in the Control Board, will limit the welding current (heat) to approximately 550 amps if a short or overload is applied to the machine.

CHECKING SNUBBER PC BOARD

In case of an SCR malfunction or failure, the Snubber PC Board should be checked. Turn the machine off and remove the sides of the machine. Board is mounted on back of the case front.

1. Visually inspect the Board for overheated components or damaged components.

CHECKING OUTPUT CONTROL RHEOSTAT ON MACHINE

Turn machine off ("0" position).

Remove the screws from the hinged control panel and open the panel.

Turn the Output Control switch to "Remote".

Disconnect the harness plug from the Control PC Board.

With an ohmmeter on X1K, connect it to lead 210 and 75 on R4.

Exercise caution to avoid damaging rheostat tabs.

Rotate the Output control rheostat. The resistance reading should be from around zero to 10K ohms. Check the resistance reading between 77 and 75 on the terminal strip. The reading must be 10K ohms. No reading will indicate an open rheostat and a low reading will indicate a shorted or partially shorted rheostat; in either case, replace.

POWER " I/O " SWITCH CHECK

1. Turn off the machine input power ("**0**" position). S1 has 115 volts across it when the input power is connected.

2. Isolate the switch to be tested by removing all connecting leads.

3. Check to make sure the switch is making open and closed connections with a V.O.M. meter. Put ohmmeter on X1 scale. The meter should read zero resistance with switch "**I**" and infinite with switch "**0**".

4. Put the ohmmeter on X1K scale and measure the resistance between the terminal and the case of the machine (touch a self-tapping screw). Reading should be infinite.

5. If either step (3) or step (4) fails, replace the switch.

REMOTE CONTROL CHECK

Disconnect the remote output control and connect an ohmmeter across 75 and 76 and rotate the rheostat in the remote control. The resistance reading should go from zero to 10K ohms. Repeat with ohmmeter across 77 and 76 with same results. Connect ohmmeter across 75 and 77. The reading should be 10K ohms. A lower reading will indicate a shorted or partially shorted rheostat. A very high reading will indicate an open rheostat. In either of the last two cases, replace rheostat. Check cable for any physical damage.

POWER RECTIFIER BRIDGE ASSEMBLY CHECKING PROCEDURE

⚠ WARNING

ELECTRIC SHOCK can kill.

• Have an electrician install and service this equipment.

• Turn the input power off at the fuse box before working on equipment.

• Do not touch electrically hot parts.

---

1. Bridge and Device Isolation

Disconnect the following, shown in Diagram 1:

a. Unplug P3 (G1, G2, G3, and 204) from the Control PC Board.

b. Unplug P5 from the Snubber PC Board.

c. Secondary leads X1, X2, and X3 from the anodes of the SCR's and cathodes of the diodes.

d. Disconnect positive bridge lead from shunt and positive capacitor bank lead and from lug with dual 204 leads.

e. Perform following steps 2 and 3. If diodes and SCR's are not shorted, bridge test is completed. If any device appears shorted, disconnect the cathode lead of each diode (4 total) and repeat steps 2 and 3.

2. Power Diode Test

a. Establish the polarity of the ohmmeter leads and set to X10 scale.

b. Connect the ohmmeter positive lead to anode and negative lead to the cathode.

c. Reverse the leads of the ohmmeter from Step b.

d. A shorted diode will indicate zero or an equally low resistance in both directions. An open diode will have an infinite or high resistance in both directions and a good diode will have a low resistance in Step b. and a much higher resistance in Step c.

3. Power Silicon Controlled Rectifier Test

The SCR must be mounted in the heat sink when making this test.

a. Connect the ohmmeter (set to the X10 scale) leads to the anode and cathode.

b. Reverse the leads of the ohmmeter from Step a.

c. A shorted SCR will indicate zero or an equally low resistance in one or both directions.

d. Establish the polarity of the ohmmeter. Connect the positive lead to the gate and the negative lead to the cathode.

e. An open gate circuit will have an infinite or high resistance. A good gate circuit will read a low resistance, but not zero ohms. If gate circuit reads zero ohms, check gate harness for shorts between gate leads and 204 before replacing SCR.

TWIST-MATE WELDING CABLE PLUG INSTALLATION INSTRUCTIONS

⚠ WARNING: **ELECTRIC SHOCK CAN KILL**

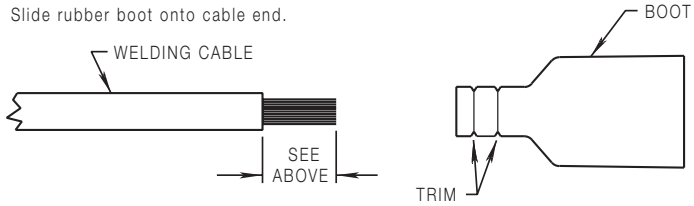
TURN THE POWER SWITCH OF THE WELDING POWER SOURCE "OFF" BEFORE INSTALLING PLUGS ON CABLES OR WHEN CONNECTING OR DISCONNECTING PLUGS TO WELDING POWER SOURCE.

1. CHECK THAT THE CONNECTOR BOOT IS MARKED FOR THE APPROPRIATE CABLE SIZE PER TABLE BELOW; AND SKIN CABLE JACKET TO LENGTH SPECIFIED:

BOOT MARKING	AMERICAN (EUROPEAN) RANGE CABLE SIZE	CABLE SKIN LENGTH
35-50	#2-#1 (35-50 mm^2)	1 INCH (25.4mm)
50-70	1/0-2/0 (50-70 mm^2)	1 INCH (25.4mm)
70-95	2/0-3/0 (70-95 mm^2)	1.5 INCH (38.1mm)

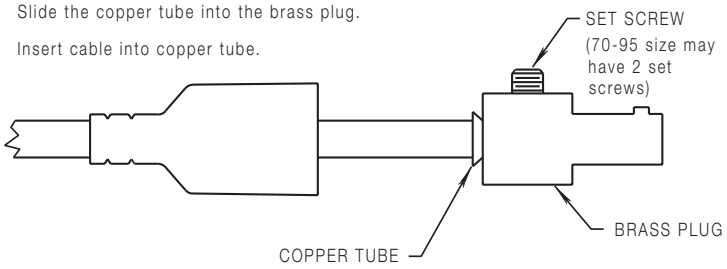
2. If necessary, trim cable end of boot at groove(s) to match cable diameter. Boot must fit tightly enough to seal around outside diameter of cable. NOTE: Some boots are designed to accommodate different cable diameters without trimming. These boots do not have grooves at the cable end. Soap or other non petroleum based lubricant will help to slide the boot over the cable.

3. Slide rubber boot onto cable end.



4. Slide the copper tube into the brass plug.

5. Insert cable into copper tube.



6. Tighten set screw(s) to collapse copper tube. Screw(s) must apply firm pressure against welding cable. The top of the set screw(s) will be nearly flush or below the surface of the brass plug after tightening.

7. Slide rubber boot over brass plug. The rubber boot must be positioned to completely cover all electrical surfaces after the plug is locked into the receptacle.

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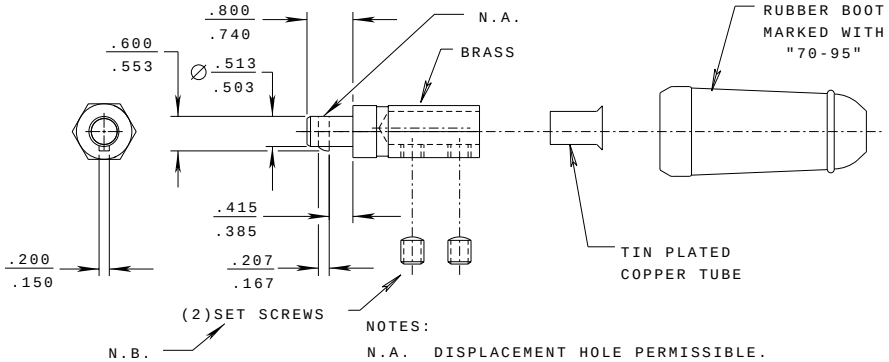

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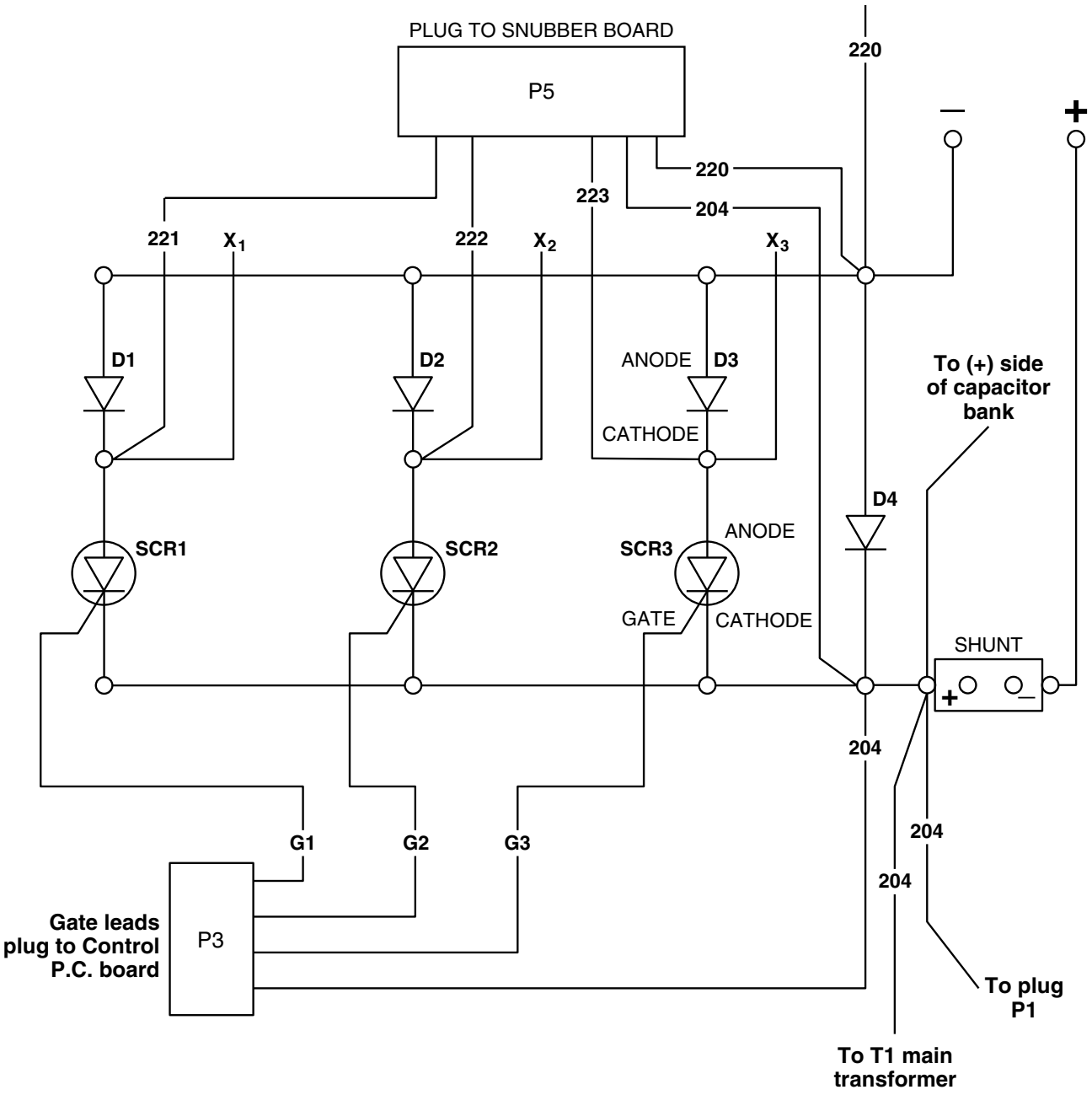
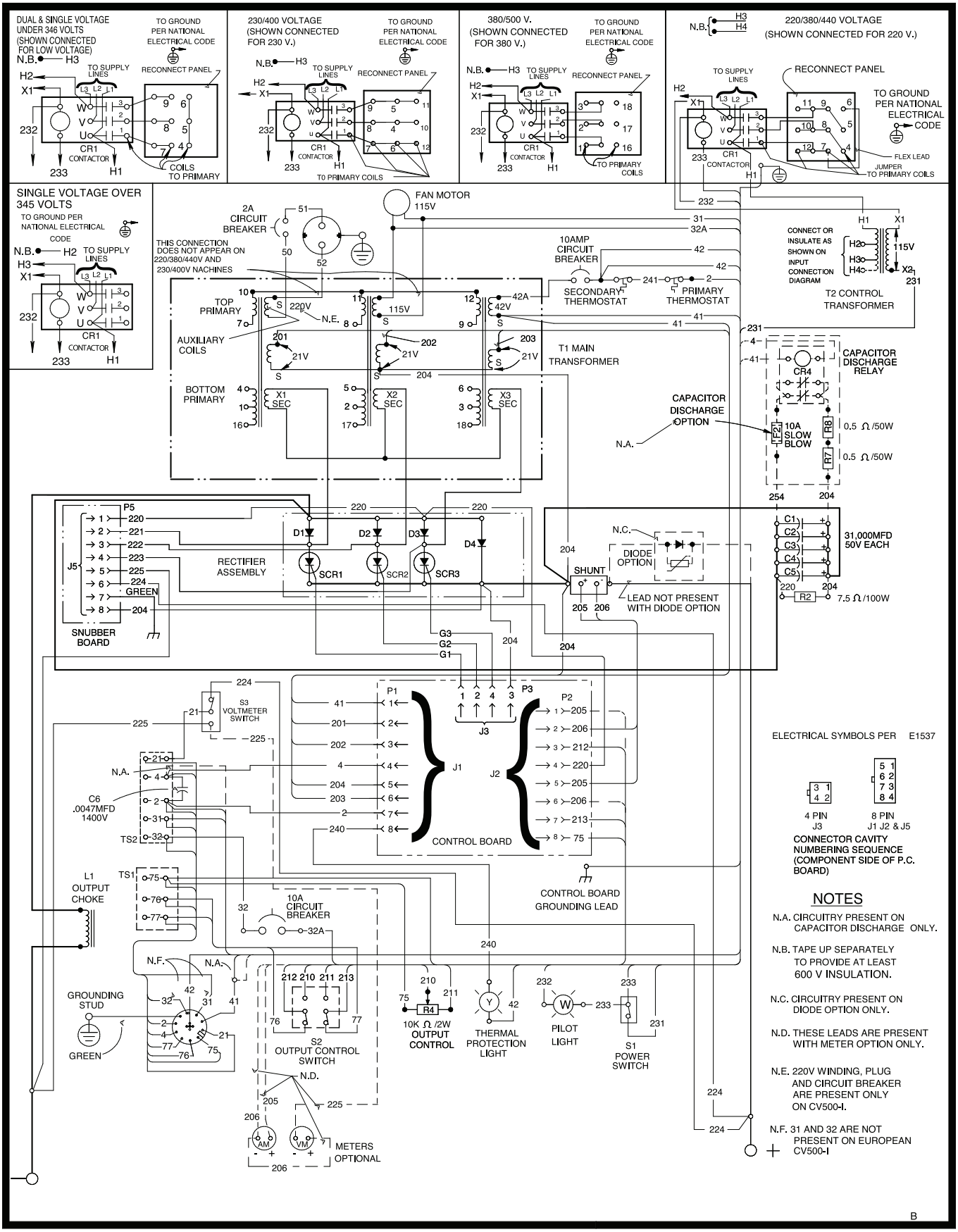
POWER RECTIFIER BRIDGE
DIAGRAM 1



CV- 400 / CV 500 - I WIRING DIAGRAM



L9269

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

RETURN TO MAIN INDEX

P-236

Index of Sub Assemblies
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Illustration of Sub Assemblies

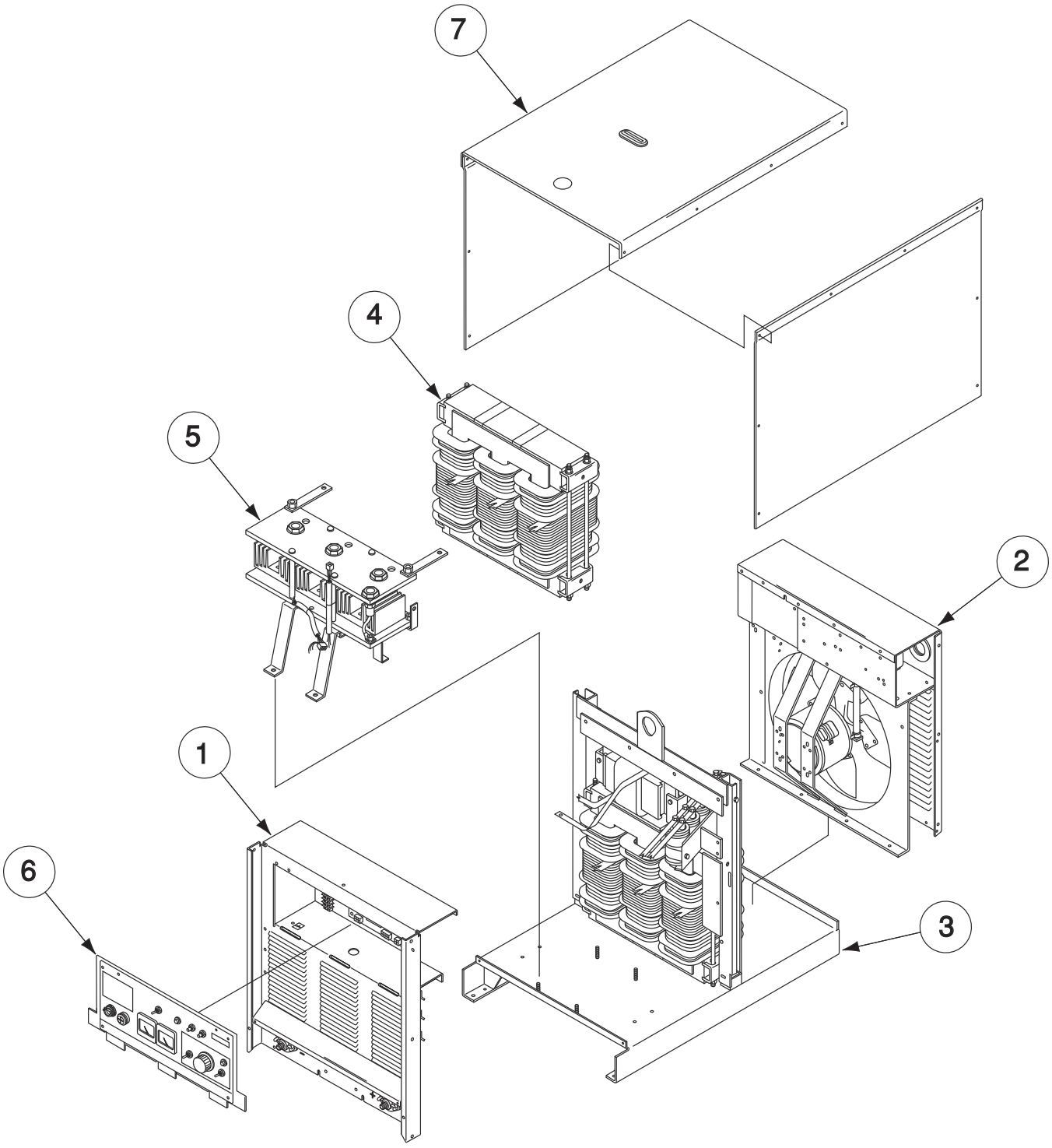
PARTS LIST FOR

CV400 & CV500-I

LINCOLN® ELECTRIC

P-236-A

ILLUSTRATION OF SUB-ASSEMBLIES



CV400 & CV500-I

For Codes: 10084 to 11837

Do Not use this Parts List for a machine if its code number is not listed. Contact the Service Department for any code numbers not listed.

Use the Illustration of Sub-Assemblies page and the table below to determine which sub assembly page and column the desired part is located on for your particular code machine.

Sub Assembly Item No. →			1	2	3	4	5	6	7
SUB ASSEMBLY PAGE NAME →	Optional Equipment	Miscellaneous Items	Case Front Assembly	Input Box & Fan Assembly	Base & Lift Bale Assembly	Transformer Assembly	Rectifier Bridge Assembly	Control Box Cover Assembly	Covers
PAGE NO. →	P-236-B.1	P-236-B.2	P-236-C	P-236-D	P-236-E	P-236-F	P-236-G	P-236-H	P-236-J
CODE NO. ↓									
10084 (CV400) (230/460/3/60)		1	2	1	1	1	1	1	1
10085 (CV400) (208/3/60)		1	2	1	1	1	1	1	1
10086 (CV400) (575/3/60)		1	2	1	1	1	1	1	1
10087 (CV400) (230/460/575/3/60)		1	2	1	1	1	1	1	1
10088 (CV500-I) (220/380/440/3/50/60)		1	1	1	1	1	1	1	1
10089 (CV500-I) (380/500/3/50/60)		1	1	1	1	1	1	1	1
10090 (CV500-I) (415/3/50/60)		1	1	1	1	1	1	1	1
10091 (CV500-I) (200/400/3/50/60)		1	1	1	1	1	1	1	1
10092 (CV500-I) (230/400/3/50-/60)		1	1	1	1	1	1	1	1
10277 (CV500-I) (220/380/440)		1	1	1	1	1	1	1	1
10278 (CV500-I) (220/380/440)		1	1	1	1	1	1	1	1
11087 (CV400) (230/460/575/3/60)		1	2	1	1	1	1	1	1
11088 (CV400) (230/460/575/3/60)		1	2	1	1	1	1	1	1
11089 (CV400) (230/460/575/3/60)		1	2	1	1	1	1	1	1

CV400 & CV500-I

For Codes: 10084 to 11837

Do Not use this Parts List for a machine if its code number is not listed. Contact the Service Department for any code numbers not listed.

Use the Illustration of Sub-Assemblies page and the table below to determine which sub assembly page and column the desired part is located on for your particular code machine.

Sub Assembly Item No. →									
SUB ASSEMBLY PAGE NAME →	Diode Option								
PAGE NO. →	P-234-K								
CODE NO. ↓									
10084 (CV400) (230/460/3/60)	1								
10085 (CV400) (208/3/60)	1								
10086 (CV400) (575/3/60)	1								
10087 (CV400) (230/460/575/3/60)	1								
10088 (CV500-I) (220/380/440/3/50/60)	1								
10089 (CV500-I) (380/500/3/50/60)	1								
10090 (CV500-I) (415/3/50/60)	1								
10091 (CV500-I) (200/400/3/50/60)	1								
10092 (CV500-I) (230/400/3/50-/60)	1								
10277 (CV500-I) (220/380/440)	1								
10278 (CV500-I) (220/380/440)	1								
11087 (CV400) (230/460/575/3/60)	1								
11088 (CV400) (230/460/575/3/60)	1								
11089 (CV400) (230/460/575/3/60)	1								

CV400 & CV500-I

For Codes: 10084 to 11837

Do Not use this Parts List for a machine if its code number is not listed. Contact the Service Department for any code numbers not listed.

Use the Illustration of Sub-Assemblies page and the table below to determine which sub assembly page and column the desired part is located on for your particular code machine.

Sub Assembly Item No. →			1	2	3	4	5	6	7
SUB ASSEMBLY PAGE NAME →	Optional Equipment	Miscellaneous Items	Case Front Assembly	Input Box & Fan Assembly	Base & Lift Bale Assembly	Transformer Assembly	Rectifier Bridge Assembly	Control Box Cover Assembly	Covers
PAGE NO. →	P-236-B.1	P-236-B.2	P-236-C	P-236-D	P-236-E	P-236-F	P-236-G	P-236-H	P-236-J
CODE NO. ↓									
11354 (CV400) (230/460)		1	2	1	1	1	1	2	1
11355 (CV400) (230/460/575)		1	2	1	1	1	1	2	1
11356 (CV500-I) (220/380/440) (w/Meters)		1	1	1	1	1	1	3	1
11835 (CV400) (230/460)		1	2	2	1	1	1	2	1
11836 (CV400) (230/460/575		1	2	2	1	1	1	2	1
11837 (CV500-I) (220/380/440) (w/Meters)		1	1	2	1	1	1	3	1

CV400 & CV500-I

For Codes: 10084 to 11837

Do Not use this Parts List for a machine if its code number is not listed. Contact the Service Department for any code numbers not listed.

Use the Illustration of Sub-Assemblies page and the table below to determine which sub assembly page and column the desired part is located on for your particular code machine.

Sub Assembly Item No. →									
SUB ASSEMBLY PAGE NAME →	Diode Option								
PAGE NO. →	P-234-K								
CODE NO. ↓									
11354 (CV400) (230/460)	1								
11355 (CV400) (230/460/575)	1								
11356 (CV500-I) (220/380/440) (w/Meters)	1								
11835 (CV400) (230/460)	1								
11836 (CV400) (230/460/575)	1								
11837 (CV500-I) (220/380/440) (w/Meters)	•								

OPTIONAL EQUIPMENT LISTING

P-236-B.1

Miscellaneous Options Available for your machine are listed below:

# Indicates a change this printing.

DESCRIPTION	PART NUMBER
Remote Output Control	Order K775
Undercarriage (Twin Gas Cylinder)	Order K841
Remote Output Control	Order K857
Capacitor Discharge Option	Order K828-1
Remote Control Adapter	Order K864
Undercarriage (3 Polyolefin Wheels) (CV400)	Order K817-P
Undercarriage (3 Wheels) (CV500-I)	Order K817
Undercarriage (3 Rubber Wheels) (CV500-I)	Order K817-R
Welding Cable Plug (1/0-2/0 or 50-70MM ^{2}) (CV500-I)	Order K852-70
Welding Cable Plug (2/0-3/0 or 70-95MM ^{2}) (CV500-I)	Order K852-95

MISCELLANEOUS ITEMS
(THESE ITEMS ARE NOT ILLUSTRATED)

P-236-B.2

# Indicates a change this printing.

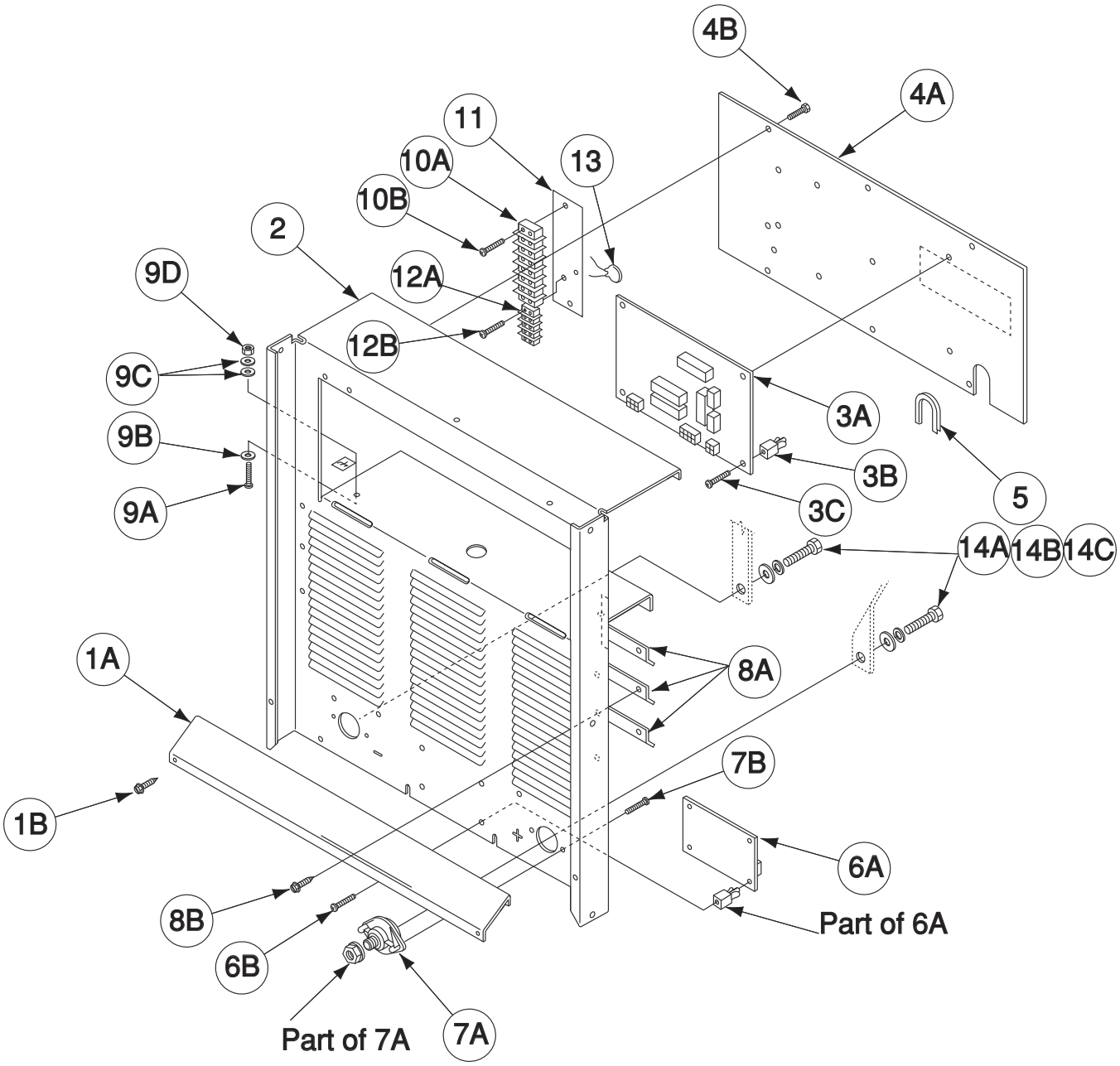
Use only the parts marked “x” in the column under the heading number called for in the model index page.

DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
Input Connection Diagram (Codes 10084, 10085, 10091, 11354 & 11835)	M15009	1	X								
Input Connection Diagram (Codes 10086, 10090, 10278)	S17894	1	X								
Input Connection Diagram (Codes 10087, 11087, 11088, 11089, 11355 & 11836)	M15666	1	X								
Input Connection Diagram (Codes 10088, 10277, 11356 & 11837)	M15010	1	X								
Input Connection Diagram (Code 10089)	M15530	1	X								
Input Connection Diagram (Code 10092)	M17037	1	X								
Ground Decal (Rear of Machine)	T13259	1	X								
Ground Decal	T13260-4	1	X								
Identification Sticker (CR1)	T14798-1	1	X								
Caution Decal	S13504	1	X								
Warning Decal (Domestic)	M16196	1	X								
Warning Decal (Europe)	L8064-1	1	X								
Decal (Chassis Ground)	T13260-3	1	X								

NOTES

P-236-C

Case Front Assembly



# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	Case Front Asbly, Includes: (CV500-I) (1A thru 13)	L9265-1	1	X	•							
	Case Front Asbly, Includes: (CV400) (1A thru 13)	L9265-2	1	•	X							
1A	Guard	M15475-1 ø	1	X	X							
1B	Self Tapping Screw	S8025-70	4	X	X							
2	Front Panel	G1854	1	X	X							
3A	Control P.C. Board	G2629-[ ]	1	X	X							
3B	Expansion Nut	S14020-3	5	X	X							
3C	Self Tapping Screw	S8025-71	5	X	X							
4A	Control Box Back Panel	M17207	1	X	X							
4B	Self Tapping Screw	S8025-70	6	X	X							
5	Grommet Strip	T12823-10	1	X	X							
6A	Snubber P.C. Board	M15370-[ ]	1	X	X							
6B	Self Tapping Screw	S8025-71	4	X	X							
7A	Output Terminal Assembly (CV500-I)	M13896-3	2	X	•							
7A	Output Terminal Assembly (CV400)	T14166-14	2	•	X							
7B	Self Tapping Screw	S8025-65	4	X	X							
8A	Air Deflector	S17353	3	X	X							
8B	Self Tapping Screw	S8025-76	6	X	X							
9A	Thread Forming Screw	S9225-36	1	X	X							
9B	Lock Washer	T9695-1	1	X	X							
9C	Plain Washer	S9262-27	2	X	X							
9D	#10-24 HN	CF000010	2	X	X							
10A	Terminal Strip (TS2)	S8542-7	1	X	X							
10B	Self Tapping Screw	S8025-15	2	X	X							
11	Number Plate	S18378-1	1	X	X							
12A	Terminal Strip (TS1)	S14530-12	1	X	X							
12B	Self Tapping Screw	S8025-62	2	X	X							
13	Capacitor Assembly (C6)	T14824	1	X	X							
14A	1/2-13 x .75 HHCS	CF000020	2	X	X							
14B	Plain Washer	S9262-1	2	X	X							
14C	Lock Washer	E106A-15	2	X	X							

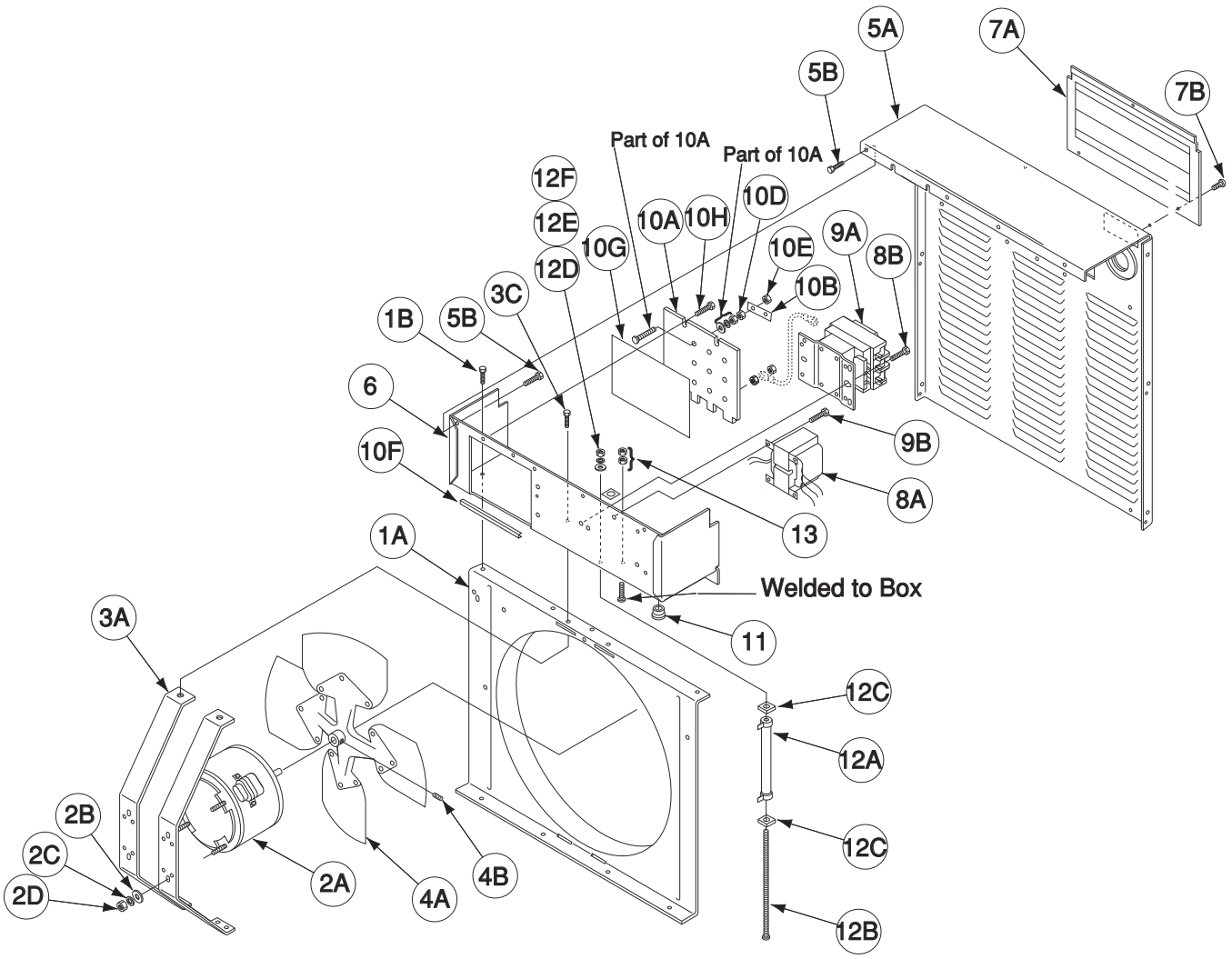
Note: When ordering new printed circuit boards indicate the dash number [ ] of the "Old" board that is to be replaced. This will aid Lincoln in supplying the correct and latest board along with any necessary jumpers or adapters. The dash number brackets [ ] have purposely been left blank so as to eliminate errors, confusion and update.

Ø This part is obsolete and no longer available.

LINCOLN ELECTRIC

P-236-D

Input Box & Fan Assembly



# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1A	Fan Baffle	L6247 Ø	1	X	X							
1B	Self Tapping Screw	S8025-65	3	X	X							
1C	Self Tapping Screw (to Base) (Not Shown)	S8025-70	4	X	X							
2A	Fan Motor	M9983-4	1	X	X							
2B	Plain washer	S9262-27	4	X	X							
2C	Lock Washer	E106A-1	4	X	X							
2D	#8-32 HN	CF000042	4	X	X							
3A	Fan Mounting Bracket	M15627	2	X	X							
3B	Self Tapping Screw (to Base) (Not Shown)	S8025-70	4	X	X							
3C	Self Tapping Screw	S8025-65	4	X	X							
4A	Fan Blade	M6819-9	1	X	X							
4B	Hexagon Socket Set Screw (Supplied w/Blade)	1/4-28 x .3125	1	X	X							
5A	Rear Panel	S16816-6	1	X	X							
5B	Self Tapping Screw	S8025-65	12	X	X							
6	Input Box	S17978-1	1	X	X							
7A	Input Access Door	M13998-2	1	X	X							
7B	Self Tapping Screw	S8025-65	3	X	X							
8A	Control Transformer (Codes 10084, 11354 & 11835)	M12390-31	1	X	X							
8A	Control Transformer (Codes 10085, 10090, 10091,10278)	M12390-33	1	X	•							
8A	Control Transformer (Code 10086)	M12390-51	1	X	•							
8A	Control Transformer (Codes 10087 & 11836)	M12390-67	1	X	X							
8A	Control Transformer (Codes: 10088, 10277 & 11837)	M13471-2	1	X	X							
8A	Control Transformer (Code 10089)	M12390-34	1	X	•							
8A	Control Transformer (Codes 11087, 11088, 11089, 11355 & 11356)	M12390-67	1	X	•							
8A	Control Transformer (Code 10092)	M12390-69	1	X	•							
8B	Self Tapping Screw	S8025-91	3	X	X							
9A	Contactor	M12161-80	1	X	•							
9A	Contactor	M12161-93	1	•	X							
9B	Self Tapping Screw	S8025-65	3	X	X							
10	Reconnect Panel Assembly, Includes: (220/380/440)	L7219-1	1	X	•							
10A	Reconnect Panel	M15002-1	1	X	•							
10B	Reconnect Panel Link	T14190-1	6	X	•							
10C	Reconnect Panel Link (Not Shown)	T14190-2	2	X	•							
10D	1/4-20 BR HN	CF000300	12	X	•							
10E	Heavy Hex Nut	T10940-5	12	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Asbly, Includes: 208, 200/400, 230/460	L7219-2	1	X	•							
10A	Reconnect Panel	M15002-2	1	X	•							
10B	Reconnect Panel Link	T14190-1	5	X	•							
10D	1/4-20 BR HN	CF000300	9	X	•							
10E	Heavy Hex Nut	T10940-5	9	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Assembly, Includes: (380/500)	L7219-3	1	X	•							
10A	Reconnect Panel	M15002-2	1	X	•							
10B	Reconnect Panel Link	T14190-1	5	X	•							
10D	1/4-20 BR HN	CF000300	9	X	•							
10E	Heavy Hex Nut	T10940-5	6	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							

NSS - Not Sold Separately

Ø This part is obsolete and no longer available.

# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
10	Reconnect Panel Assembly, Includes: (415, 575)	L7219-4	1	X	•							
10A	Reconnect Panel	M15002-2	1	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Asbly, Includes: 380/500 or 460/575	L7219-5	1	X	•							
10A	Reconnect Panel	M15002-3	1	X	•							
10D	1/4-20 BR HN	CF000300	3	X	•							
10E	Heavy Hex Nut	T10940-5	6	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Asbly, Includes: 230/460/575	L7219-6	1	X	•							
10A	Reconnect Panel	M15002-3	1	X	•							
10D	1/4-20 BR HN	CF000300	3	X	•							
10E	Heavy Hex Nut	T10940-5	6	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Assembly, Includes: 230/400	L7219-7	1	X	•							
10A	Reconnect Panel	M15002-3	1	X	•							
10B	Reconnect Panel Link	T14190-1	6	X	•							
10D	1/4-20 BR HN	CF000300	9	X	•							
10E	Heavy Hex Nut	T10940-5	9	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Assembly, Includes: Single Below 346V. & Dual Voltage	L7219-8	1	X	•							
10A	Reconnect Panel	M15002-2	1	X	•							
10B	Reconnect Panel Link	T14190-1	5	X	•							
10D	1/4-20 BR HN	CF000300	9	X	•							
10E	Heavy Hex Nut	T10940-5	9	X	•							
10F	Grommet Strip	T12823-13	1	X	•							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	•							
10	Reconnect Panel Asbly (230/460) (Code 11835), Includes:	L7219-11	1	X	X							
10A	Reconnect Panel	M15002-5	1	X	X							
10B	Reconnect Panel Link	T14190-1	5	X	X							
10D	1/4-20 BR HN	CF000300	9	X	X							
10E	Heavy Hex Nut	T10940-5	9	X	X							
10F	Grommet Strip	T12823-13	1	X	X							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	X							
10	Reconnect Panel Asbly (Code 11836), Includes: (230/460/575)	L7219-12	1	X	X							
10A	Reconnect Panel	M15002-3	1	X	X							
10D	1/4-20 BR HN	CF000300	3	X	X							
10E	Heavy Hex Nut	T10940-5	6	X	X							
10F	Grommet Strip	T12823-13	1	X	X							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	X							
10	Reconnect Panel Asbly (Code 11837), Includes: (220/380/440)	L7219-10	1	X	X							
10A	Reconnect Panel	M15002-1	1	X	X							
10B	Reconnect Panel Link	T14190-1	6	X	X							
10C	Reconnect Panel Link (Not Shown)	T14190-2	2	X	X							
10D	1/4-20 BR HN	CF000300	12	X	X							

NSS - Not Sold Separately

LINCOLN ELECTRIC

P-236-D.3

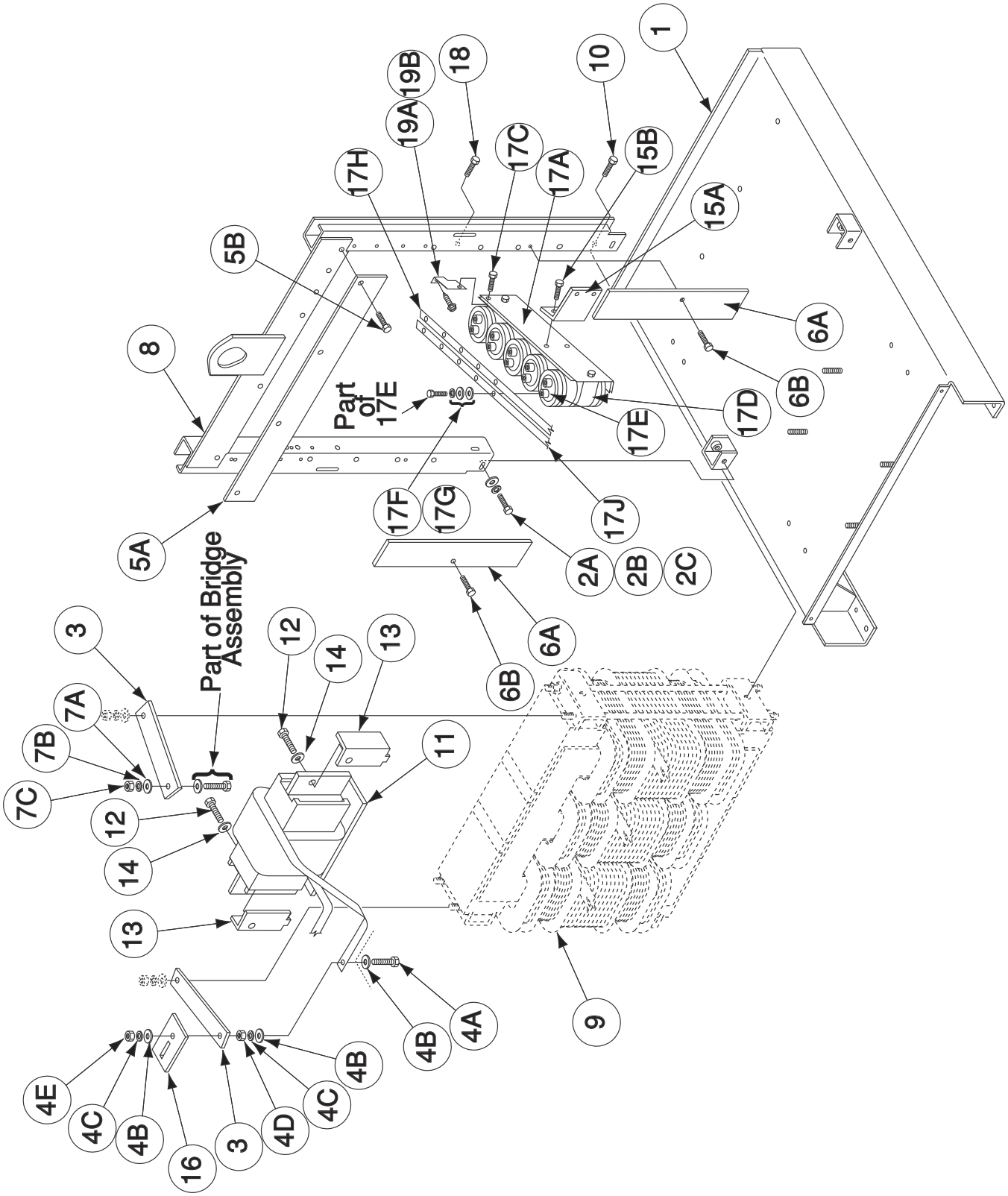
# Indicates a change this printing.

Use only the parts marked “x” in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
10E	Heavy Hex Nut	T10940-5	12	X	X							
10F	Grommet Strip	T12823-13	1	X	X							
10G	E2521/1-.010-5.13-7.20	**NSS**	1	X	X							
10H	Self Tapping Screw	S8025-91	2	X	X							
11	Bushing	T12380-2	1	X	X							
12A	Resistor (R2)	S10404-94	1	X	X							
12B	#10-24 x 7.50 RHS	CF000191	1	x	X							
12C	Insulating Washer	T4479-A	2	X	X							
12D	Lock Washer	E106A-1	1	X	X							
12E	Plain Washer	S9262-27	1	X	X							
12F	#10-24 HN	Cf000010	1	X	X							
13	5/16-18 HJN	CF000130	2	X	X							
14	Circuit Breaker (CV-500-I) (Not Shown)	T12287-25	1	X	X							
15A	Receptacle & Lead Asbly (CV500-I) (Not Shown)	S19655	1	X	X							
15B	Self Tapping Screw (CV500-I) (Not Shown)	S8025-62	2	X	X							
15C	Plain Washer (CV500-I) (Not Shown)	S9262-3	2	X	X							
16	220V-2A Decal (CV500-I) (Not Shown)	T13086-95	1	X	X							

P-236-E

Base & Lift Bale Assembly



P-236-E.1

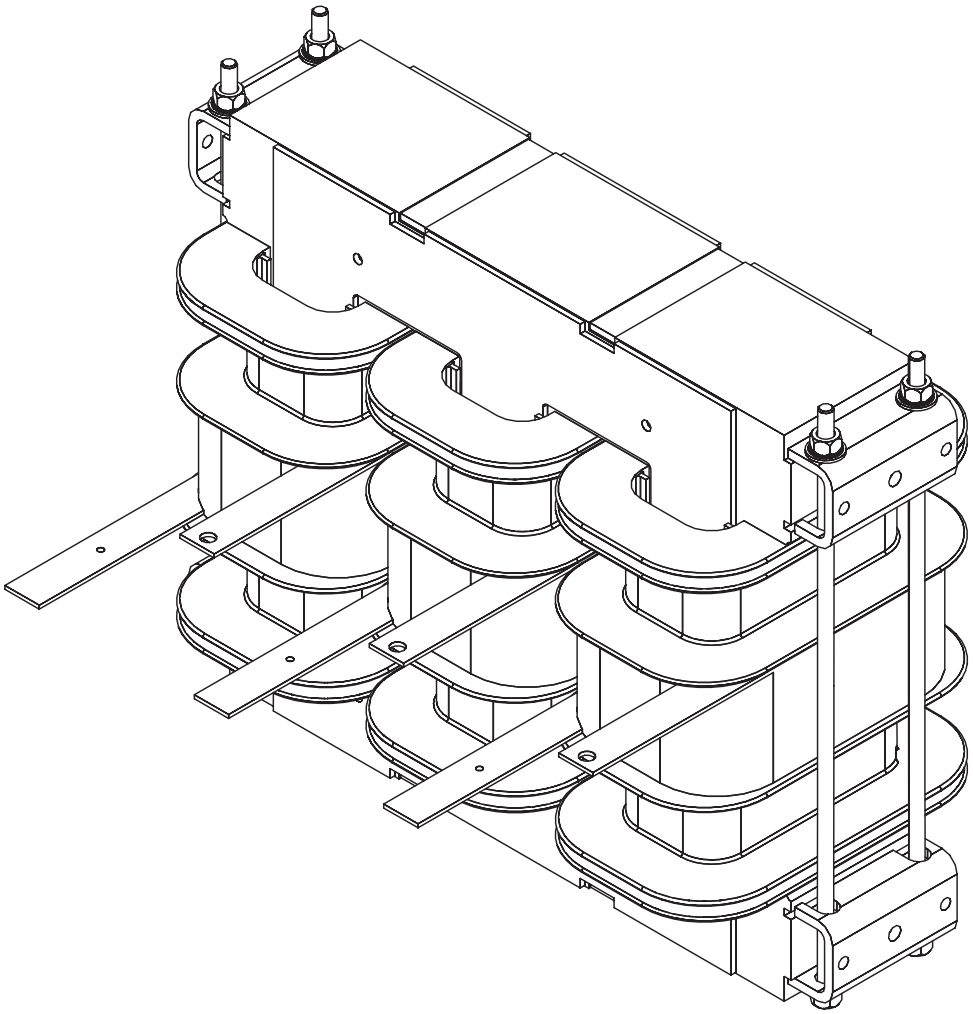
# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Base Assembly	L7587	1	X								
2A	3/8-16 x .75 HHCS	CF000034	4	X								
2B	Lock Washer	E106A-16	4	X								
2C	Plain Washer	S9262-120	4	X								
3	Brace	T8477-40	2	X								
4A	5/16-18 x 1.75 HHCS	CF000075	1	X								
4B	Plain Washer	S9262-30	3	X								
4C	Lock Washer	E106A-14	2	X								
4D	5/16-18 HN	CF000029	1	X								
4E	5/16-18 HJN	CF000130	1	X								
5A	Air Baffle	M15463	1	X								
5B	Thread Forming Screw	S9225-8	4	X								
6A	Insulation (Baffle)	T11472-24	2	X								
6B	Thread Forming Screw	S9225-8	2	X								
7A	Plain Washer	S9262-30	1	X								
7B	Lock Washer	E106A-14	1	X								
7C	5/16-18 HN	CF000029	1	X								
8	Lift Bale Assembly	L6485	1	X								
9	Transformer Assembly	See P-236-D	1	X								
10	Thread Forming Screw	S9225-28	4	X								
11	Choke Assembly	M15584	1	X								
12	Thread Forming Screw	S9225-22	2	X								
13	Choke Mounting Bracket	S18784	2	X								
14	Lock Washer	E106A-3	2	X								
15A	Capacitor Mounting Bracket	S17355	1	X								
15B	Thread Forming Screw	S9225-8	1	X								
16	Lead Insulating Panel	S18666	1	X								
17	Capacitor Assembly, Includes: (17A thru 17J)	M14495-3	1	X								
17A	Capacitor Bracket	S17354	1	X								
17B	Insulation	S17359	1	X								
17C	Self Tapping Screw	S8025-108	2	X								
17D	Strap Assembly	S17365	1	X								
17E	Capacitor	S13490-148	5	X								
17F	Plain Washer	S9262-23	20	X								
17G	Lock Washer	E106A-2	10	X								
17H	Positive Lead	S17361	1	X								
17J	Negative Lead	S18761-1	1	X								
18	Thread Forming Screw	S9225-8	3	X								
19A	Capacitor Brace	S17356	1	X								
19B	Self Tapping Screw	S8025-65	2	X								

P-236-F

Transformer Assembly



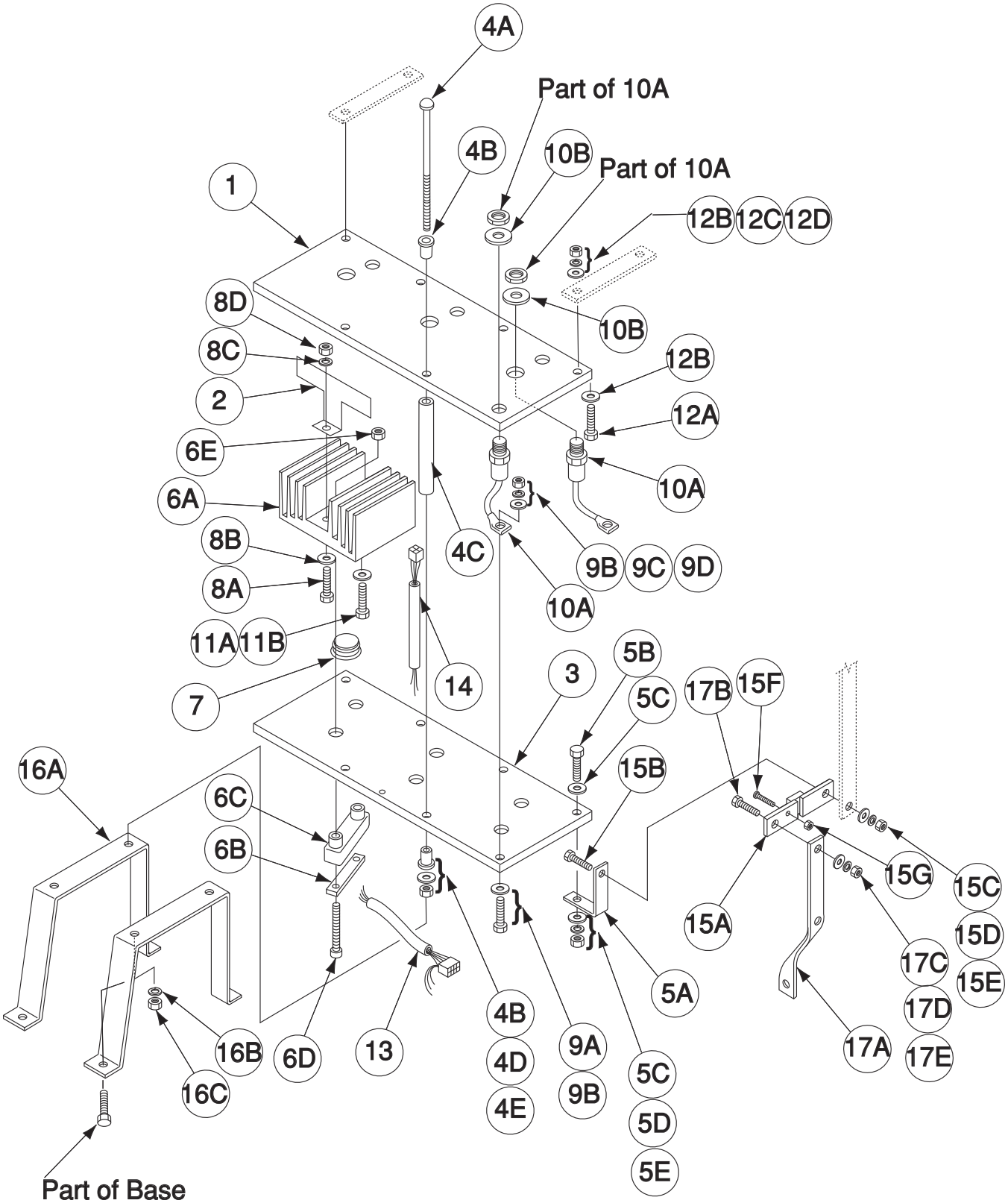
P-236-F.1

# Indicates a change this printing.

Use only the parts marked “x” in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1	Transformer Asbly (230/460/3/60) (Codes 10084 & 11354)	G2589-1/9847	1	X								
1	Transformer Asbly (208/3/60) (Code 10085)	G2589-1/9847	1	X								
1	Transformer Asbly (575/3/600) (Code 10086)	G2589-7/9849	1	X								
1	Transformer Asbly (230/460/575/3/60) (Codes 10087,11087,11088, 11089, 11355, 11356 & 11836)	G2589-2/9850	1	X								
1	Transformer Asbly (220/380/440/3/50/60) (Code 10088)	G2589-3/9852	1	X								
1	Transformer Asbly (380/500/3/50/60) (Code 10089)	G2589-5/9855	1	X								
1	Transformer Asbly (415/3/50/60) (Code 10090)	G2589-6/9857	1	X								
1	Transformer Asbly (200/400/3/50/60) (Code 10091)	G2589-4/9854	1	X								
1	Transformer Asbly (230/400/3/50/60) (Code 10092)	G2589-3/9852	1	X								
1	Transformer Asbly (220/380/440/3/50/60) (Code 10277)	G2589-3/9852	1	X								
1	Transformer Asbly (415/3/50/60) (Code 10278)	G2589-6/9857	1	X								
1	Transformer Asbly (230/460) (Code11835)	M12390-31	1	X								
1	Transformer Asbly (220/380/440) (Code11837)	G2589-16	1	X								
4	Primary Thermostat (Not Shown)	T14542-1	1	X								
5	Thermostat (Not Shown)	T13359-2	1	X								

Rectifier Bridge Assembly



P-236-G.1

# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
	3 Phase Rectifier Bridge Asbly, Includes: (1 thru 14)	L7520	1	X								
1	Heat Sink (D.C. Neg.)	L7519 Ø	1	X								
2	Baffle	S18366	3	X								
3	Heat Sink (D.C. Pos.)	L7518	1	X								
4A	Carriage Bolt	CF000409	4	X								
4B	Insulating Bushing	S16860	8	X								
4C	Insulating Tube	T7028-141	4	X								
4D	Plain Washer	S9262-98	8	X								
4E	1/4-20 HN	CF000017	4	X								
4F	Lock Washer (Not Shown)	E106A-2	4	X								
5A	Shunt Strap	S11109-6	1	X								
5B	5/16-18 x 1.25 HHCS	CF000028	1	X								
5D	Lock Washer	E106A-14	1	X								
5E	5/16-18 HN	CF000029	1	X								
6A	Heat Sink	M12314-7	3	X								
6B	SCR Spring	S14724-A	3	X								
6C	SCR Clamp	S14724-B	3	X								
6D	Socket Head Cap Screw	T9447-35	6	X								
6E	1/4-28 HN	CF000198	6	X								
7	SCR	M12283-10	3	X								
8A	5/16-18 x 1.50 HHCS	CF000081	3	X								
8B	Plain Washer	S9262-30	3	X								
8C	Lock Washer	E106A-14	3	X								
8D	5/16-18 HN	CF000029	3	X								
9A	5/16-18 x 1.25 HHCS	CF000028	1	X								
9B	Plain Washer	S9262-30	2	X								
9C	Lock Washer	E106A-14	1	X								
9D	5/16-18 HN	CF000029	1	X								
10A	Rectifier Diode	M9661-42	4	X								
10B	Spring Washer	T12735	4	X								
11A	5/16-18 x 1.50 HHCS	CF000081	3	X								
11B	Plain Washer	S9262-30	3	X								
12A	5/16-18 x 1.50 HHCS	CF000081	1	X								
12B	Plain Washer	S9262-30	2	X								
12C	Lock Washer	E106A-14	1	X								
12D	5/16-18 HN	CF000029	1	X								
13	Snubber Harness	S18250-24	1	X								
14	SCR Gate Harness	S18250-23	1	X								
15A	Shunt	S6602-25	1	X								
15B	3/8-16-16 x 1.25 HHCS	CF000105	1	X								
15C	Plain Washer	S9262-4	1	X								
15D	Lock Washer	E106A-16	1	X								
15E	3/8-16 HN	CF000067	1	X								
15F	Sems Screw	T10082-4	2	X								
15G	#10-24 HN	CF000010	2	X								
16A	Rectifier Mounting Bracket	M15476	2	X								
16B	Lock Washer	E106A-14	4	X								
16C	5/16-18 HN	CF000018	4	X								
17A	Lead (Shunt to Positive Terminal) (Not Used with Diode Option)	M15641 Ø	1	X								

Ø This part is obsolete and no longer available.

P-236-G.2

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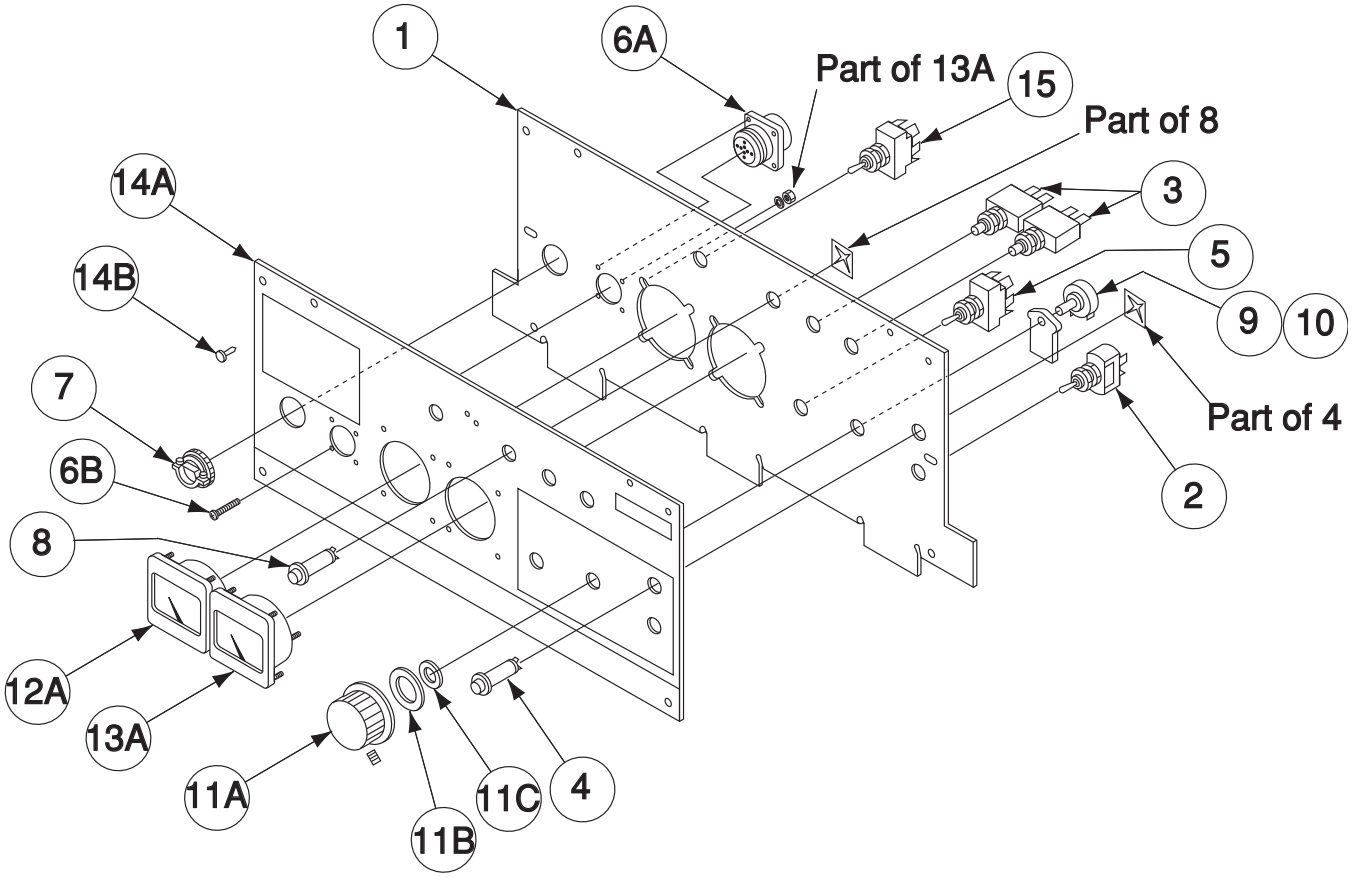
Use only the parts marked “x” in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
17B	3/8-16 x 1.00 HHCS	CF000019	1	X								
17C	Plain Washer	S9262-4	1	X								
17D	Lock Washer	E106A-16	1	X								
17E	3/8-16 HN	CF000067	1	X								

NOTES

P-236-H

Control Box Cover Assembly



P-236-H.1

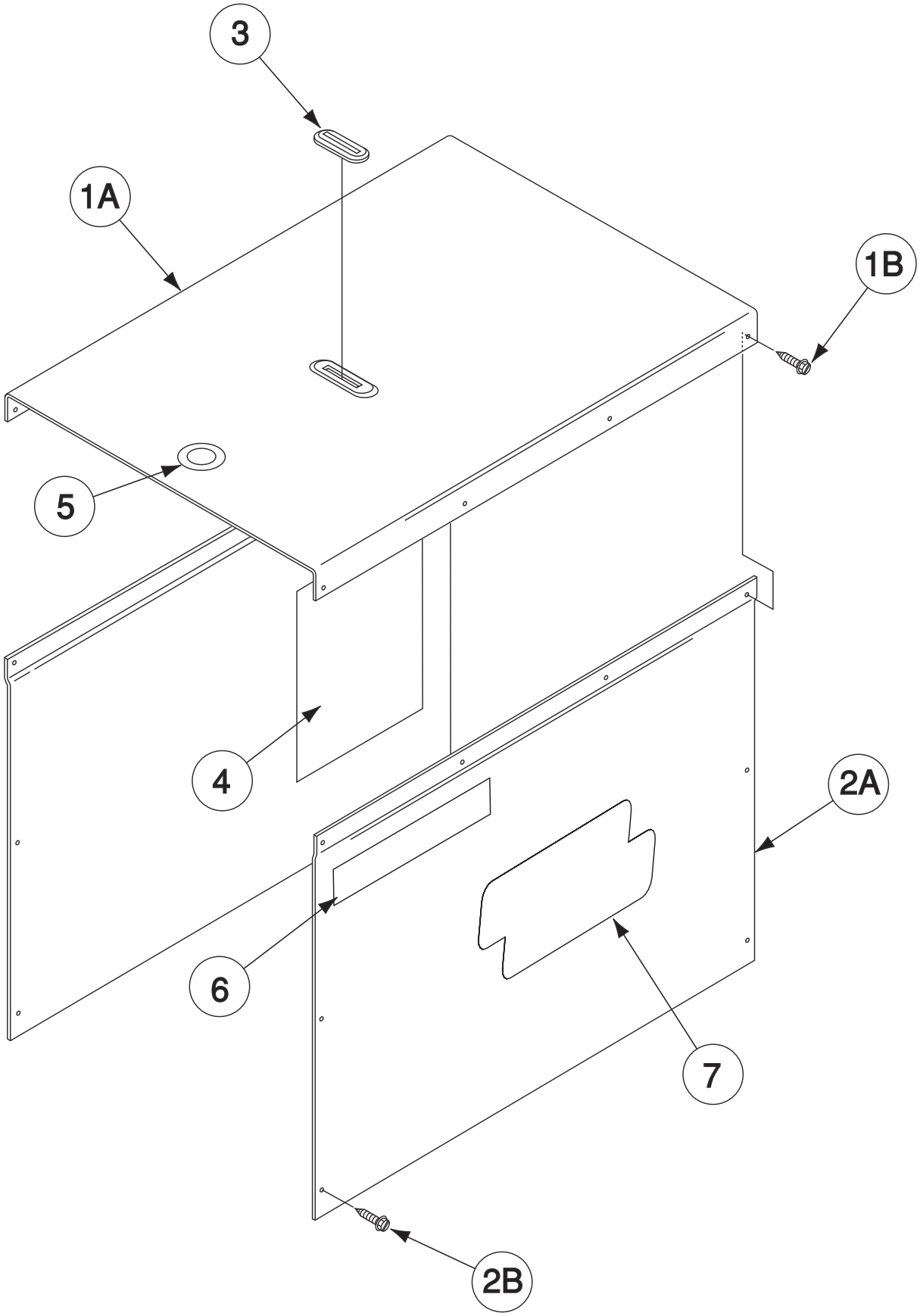
# Indicates a change this printing.

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

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9	
.													
	Control Box Cover Asbly, Includes:	L9258-1	1	X	•	•							
	Control Box Cover Asbly, Includes:	L9258-7	1	•	X	•							
	Control Box Cover Asbly, Includes:	L9258-8	1	•	•	X							
1	Control Box Cover	M17206	1	X	•	•							
1	Control Box Cover	M17206-1	1	•	X	X							
2	Switch (S1) (On, Off)	T10800-4	1	X	X	X							
3	Circuit Breaker	T12287-20	2	X	X	X							
4	Pilot Light	T13486-4	1	X	X	X							
5	Switch (S2) (Local Remote) (Local Remote)	T10800-39	1	X	X	X							
6A	Connector Lead Asbly	S13100-144	1	X	X	X							
6B	Self Tapping Screw	S8025-96	4	X	X	X							
7	Box Connector	T9639-1	1	X	X	X							
8	Thermal Protection Light	T13534-11	1	X	X	X							
9	Potentiometer Spacer	S18280	1	X	X	X							
10	Potentiometer (R4)	T10812-122	1	X	X	X							
11A	Knob	T10491-1	1	X	X	X							
11B	Felt Washer	T14034	1	X	X	X							
11C	Spacer	T7028-241	1	X	X	X							
12A	D.C. Ammeter (with Meters)	M15539-2	1	X	•	•							
12A	D.C. Ammeter	M21003-1	1	•	X	X							
12B	Plain Washer (Not Shown)	S9262-39	4	X	X	X							
12C	#4-40 HN (Not Shown)	CF000002	4	•	X	X							
12D	Lock Washer (Not Shown)	T4291-B	4	•	X	X							
13A	D.C. Voltmeter (with Meters)	M15538-1	1	X	•	•							
13A	D.C. Voltmeter	M21002-1	1	•	X	X							
13B	Plain Washer (Not Shown)	S9262-39	4	X	X	X							
13C	#4-40 HN (Not Shown)	CF000002	4	•	X	X							
13D	Lock Washer (Not Shown)	T4291-B	4	•	X	X							
14A	Nameplate (Domestic, without Meters)	L9173	1	X	•	•							
14A	Nameplate (Domestic, w/Meters)	L9173-1	1	X	•	•							
14A	Nameplate (Europe, without Meters)	L9171	1	X	•	•							
14A	Nameplate (Europe, w/Meters)	L9171-1	1	X	•	•							
14A	Nameplate (Export, without Meters)	L9172	1	X	•	•							
14A	Nameplate (Export, w/Meters)	L9172-1	1	X	•	•							
14A	Nameplate (Codes 11354, 11355, 11835 & 11836)	L13513-1	1	•	X	•							#
14A	Nameplate (Codes 11356 & 11837)	L13512-1	1	•	•	X							#
14B	Fastener Buttons	T14659-1	3	X	•	•							
15	Switch (S3)	T13562-1	1	X	X	X							

P-236-J

Covers



P-236-J.1

# Indicates a change this printing.

Use only the parts marked “x” in the column under the heading number called for in the model index page.

ITEM	DESCRIPTION	PART NO.	QTY.	1	2	3	4	5	6	7	8	9
1A	Roof	M12352-19	1	X								
1B	Self Tapping Screw	S8025-91	2	X								
2A	Side Panel	M14065-11	2	X								
2B	Self Tapping Screw	S8025-91	12	X								
2C	Self Tapping Screw (to Case Front) (Not Shown)	S8025-92	6	X								
3	Cover Seal	S12934	1	X								
4	Wiring Diagram (Codes 11354, 11356, 11835 & 11837)	L9269	1	X								
4	Wiring Diagram (Codes 10087,11087,11088,11089 11355 & 11836)	L9270	1	X								
5	Warranty Decal (Domestic)	S22127-2	1	X								
6	Decal, Product Name	M21954-2	1	X								
7	Decal, LECO Logo	S27368-3	1	X								

NOTES

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

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

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

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

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

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

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

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

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

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

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

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