

Operator's Manual

TCV400



For use with machines having Code Numbers:

11727, 11838



Register your machine:

www.lincolnelectric.com/register

Authorized Service and Distributor Locator:

www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

**Be sure this information reaches the operator.
You can get extra copies through your supplier.**

IM10063-B | Issue Date Jul-17

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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.

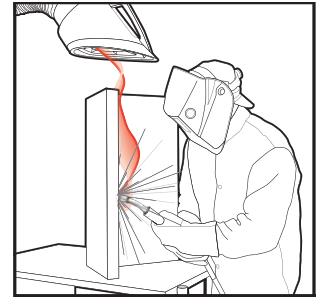
READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

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



WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to
www.P65warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.*)



WARNING: Cancer and Reproductive Harm
www.P65warnings.ca.gov

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 Z87.1 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.



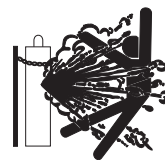
WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



- 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 02269-9101.
- 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-1, "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.

Electromagnetic Compatibility (EMC)

Conformance

Products displaying the CE mark are in conformity with European Community Council Directive of 15 Dec 2004 on the approximation of the laws of the Member States relating to electromagnetic compatibility, 2004/108/EC. It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

Installation and Use

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to assess whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

- a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;
- b) radio and television transmitters and receivers;
- c) computer and other control equipment;
- d) safety critical equipment, e.g., guarding of industrial equipment;
- e) the health of the people around, e.g., the use of pacemakers and hearing aids;
- f) equipment used for calibration or measurement
- g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;
- h) the time of day that welding or other activities are to be carried out.

Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturer's instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications¹.

¹ Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

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TECHNICAL SPECIFICATIONS – TCV400

RATED OUTPUTS							
Duty Cycle		Volts		Amps			
50%		39V		500A			
60%				450A			
100%				400A			
Output Range 60A 17V (Minimum) 500A 39V (Maximum)							
RATED INPUTS							
Rated Current 45A @ 400A 34V (380V/50 Hz)		MAX OCV: 46		Standard Voltage 50/60 Hz			
Efficiency 70% @ 400A 34V (50 Hz)		Input kVA 29.6 @ 400A 34V (50 Hz)		200/230/400/460			
MISC. INFORMATION							
Idle Power 1.0 KW (50 Hz)		Power Factor .65 @ 400A 34V (50 Hz)		Idle Current - Amps 3.2A (380V 50 Hz)			
RECOMMENDED INPUT WIRE AND FUSE SIZES							
INPUT VOLTAGE / FREQUENCY	HERTZ	INPUT AMPERE RATING ON NAMEPLATE**	TYPE 75°C COPPER WIRE IN CONDUIT* AWG(IEC-MM²) SIZES 30°C (86°F) Ambient	TYPE 75°C GROUND WIRE IN CONDUIT AWG(IEC-MM²) SIZES	TYPE 75°C OR BREAKER SIZE (AMPS)¹	SUPER LAG Catalog Number	Limitron Catalog Number
200	50/60	78	3 (27)	6 (14)	125 Amp	Disc	KTN-R-125
230		75	4 (21)	6 (14)	125 Amp	Disc	KTN-R-125
400		43	8 (8.4)	8 (8.4)	70 Amp	Disc	KTN-R-70
460		39	8 (8.4)	10 (5.3)	60 Amp	RES-80	KTN-R-60

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

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

PHYSICAL DIMENSIONS			
Height	Width	Depth	Weight
27.5 in. 699 mm	23.28 in. 591 mm	32.0 in. 813 mm	383 lbs (174 kg)

Operating Temperature -40°C to +40°C

TCV400



SAFETY PRECAUTIONS

WARNING



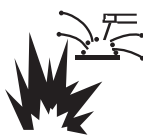
ELECTRIC SHOCK can kill.

- 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 shut-down of the machine.

APPLICATION LIMITATIONS

There are no provisions on the TCV400 for paralleling, and outdoor operations without rain sheltering is not recommended.

STACKING

WARNING



FALLING EQUIPMENT can cause injury.

- 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 TCV400 on top of any other machine.

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

- Make sure the first or bottom unit is setting on a level, well supported surface.
- 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.
- 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. Also see TECHNICAL SPECIFICATIONS section for proper installation.



CAUTION

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

OUTPUT CABLE CONNECTIONS

The output leads are connected to the output terminals marked “+” and “-” (low inductance) or “-” (high inductance). They are located at the lower right and lower left corners of the front panel. The TCV400 provides Tweco weld cable connector receptacles.

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 mm ²	2/0 67 mm ²
50 to 100 ft (15-30 m)	3/0 85 mm ²	2/0 67 mm ²
100-150 ft (30-46 m)	3/0 85 mm ²	3/0 85 mm ²
150-200 ft (46-61 m)	3/0 85 mm ²	3/0 85 mm ²
200-250 ft (67-76 m)	4/0 107 mm ²	4/0 107 mm ²

FIELD INSTALLED OPTIONS



WARNING



ELECTRIC SHOCK can kill.

- Turn the power switch of the power source “OFF” before installing plugs on cables or when connecting or disconnecting plugs to power source.

WHEEL KIT

For easy moving of the machine an optional platform Wheel Kit **601547** is available.

Install per instructions provided with Wheel Kit.

METER KIT

Ammeter and Voltmeter Kit **610706** is available.

SAFETY PRECAUTIONS

Read this entire section of operating instructions before operating the machine.



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.
- Always wear dry insulating gloves.
- Do not use AC welder if your clothing, gloves or work area is damp or if working on, under or inside workpiece.



Use the following equipment:

- Semiautomatic DC constant voltage (wire) welder.
- DC manual (stick) welder.
- AC welder with reduced voltage control.

- Do not operate with panels removed.
- Disconnect input power before servicing.



READ THIS WARNING, PROTECT YOURSELF & OTHERS.

FUMES AND GASES can be dangerous.

- Keep your head out of fumes.
- Use ventilation or exhaust at the arc, or both, to keep fumes and gases from your breathing zone and general area.



WELDING SPARKS can cause fire or explosion.

- Do not weld near flammable material.
- Do not weld, cut or gouge on containers which have held flammable material.



ARC RAYS can burn.

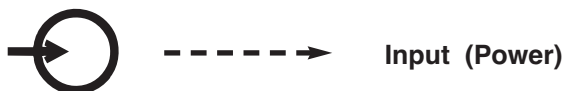
- Wear eye, ear, and body protection.

Observe additional Safety Guidelines detailed in the beginning of this manual.

MEANINGS OF GRAPHIC SYMBOLS

The TCV400 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



CIRCUIT BREAKER



THERMAL PROTECTION LIGHT



RATING PLATE

IP21S -----> Degree of protection provided by the enclosure.

IEC 60974-1 -----> Designates welder complies with International Electrotechnical commission requirements 974-1.

3  -----> Three Phase Power

RATING PLATE



Rectifier



Rectified DC Output



Constant Voltage Characteristic



Line Connection

WARNING IDENTIFICATION



Warning Identification

EARTH GROUND CONNECTION



Signifying the Earth (Ground) Connection

CHASSIS GROUND CONNECTION



Signifying the Chassis (Ground) Connection

MACHINE DESCRIPTION

The TCV400 is an SCR controlled three phase constant voltage DC power source. It complies with IEC 60974-1 requirements.

TCV400

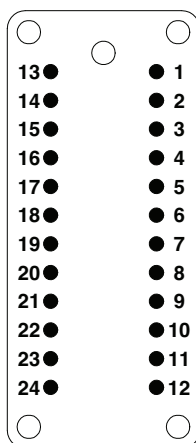


WELDING CONTROLS

(See Figure B.2)

1. 24-PIN CONNECTOR RECEPTACLE

FIGURE B.1



PIN	LEAD NO.	FUNCTION
1	32	115 VAC
2	---	---
3	31A	115 VAC
4	---	---
5	GND	Chassis Connection
6	24	24 VAC
7	41B	24 VAC
8	225B	Voltage Feedback
9	77	Output Control
10	76	Output Control
11	75	Output Control
12	215B	Voltage Feedback
13	---	---
14	---	---
15	32B	Power Supply Enabled (115 VAC)
16	---	---
17	---	---
18	41A	Power Supply Enabled (24 VAC)
19	474A	24 VDC
20	474A	24 VDC
21	476A	24 VDC
22	476A	24 VDC
23	216A	Current Feedback, 100mV=750A
24	215A	Current Feedback, 100mV=750A

AUXILIARY POWER CONNECTIONS

The power source is equipped to furnish nominally **115 volt AC**, **24 volt AC** and **24 volt DC** auxiliary power for operating wire feeding equipment, etc. The auxiliary power is available at the 24-pin 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 1 and 3, terminals 31 and 32. A 10A circuit breaker protects this circuit.
- 24V AC** is available only at receptacle pins 6 and 7. A 5A circuit breaker protects this circuit.
- 24V DC** is available only at receptacle pins 19, 20, 21 and 22. A 15A circuit breaker protects this circuit.

The **115V AC** and the **24V AC** are isolated circuits.

5. POWER SUPPLY LIGHT

A red light on the machine control panel indicates when the tigger is enabled. This means auxiliary power is being used.

6. 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.

7. 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.

8. 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 "O" is off.

9. OUTPUT CONNECTIONS

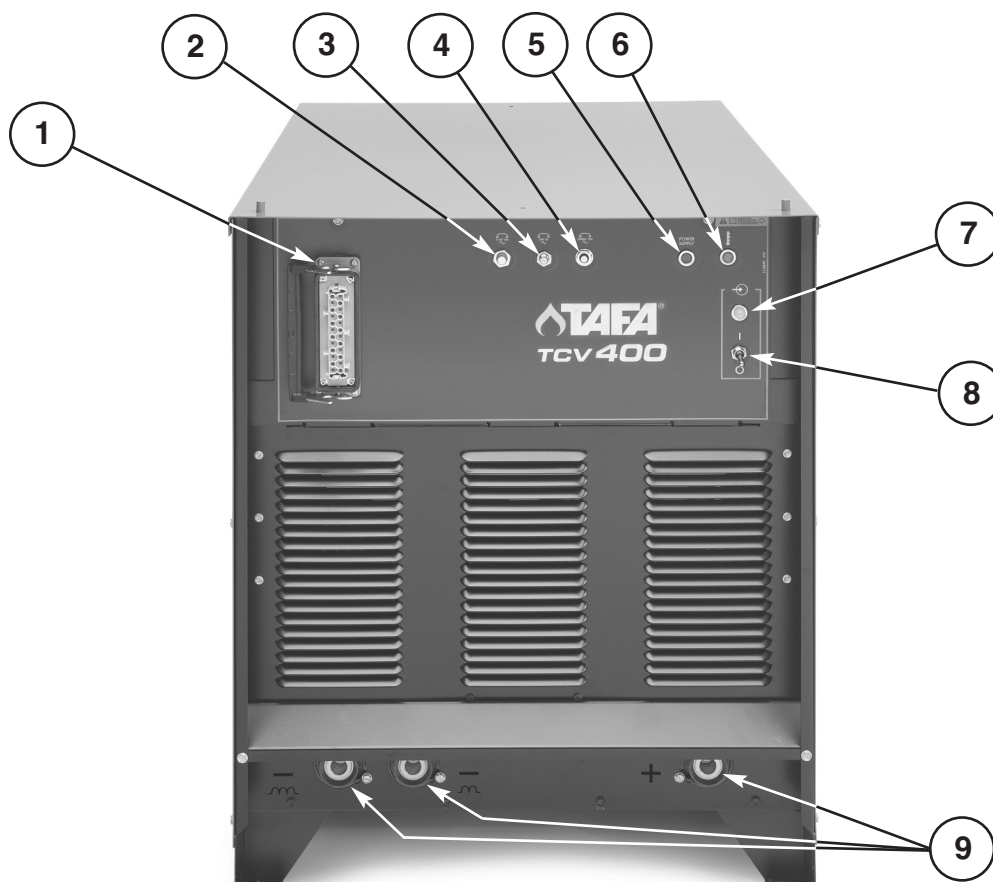
The output terminals are recessed on the case front. The TCV400 provides Tweco connector receptacles.

Connect the positive output lead to the terminal marked "+". The negative output lead can be hooked to either the low inductance terminal (marked "—") or the high inductance terminal (marked "—").

POLARITY SELECTION

Polarity selection is made by appropriately connecting the electrode and work welding cables to either the "+" stud or to one of the "-" studs.

FIGURE B.2



OPERATIONAL FEATURES & CONTROLS

INPUT CONTACTOR

The power source is equipped with an input contactor.

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 $\pm 10\%$ 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 Printed Circuit Board is mounted on the back of the Front Panel.

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.

TCV400



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 environments, the transformer and choke assembly are dipped in a special corrosion resistant epoxy paint.

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 24-pin connector.

Terminal strip TS1 also located behind the hinged control panel allows for connecting of a remote control to terminals 75, 76, and 77. These are also available on the 24-pin connector.

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 machine nameplate. Tilt panel forward so it rests in a horizontal position. See Table above for lead number functions.

POWER SOURCE OPERATION

DUTY CYCLE AND TIME PERIOD

The TCV400 is rated at the following duty cycles:

Duty Cycle*	Amps	Volts
100%	400	39
60%	450	
50%	500	

* 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.

PARALLELING

There are no provisions on the TCV400 to permit paralleling.

METER OPTION

Ammeter and Voltmeter Kit **610706** may be installed.

OPERATION WITH WIRE FEEDERS

When using a TCV400 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 the arc can restart if the electrode touches the work or ground during these several seconds.

MACHINE AND 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 series with the trigger 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 trip, preventing any machine damage. After the ground is cleared, the fuses automatically reset within a few seconds.

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.

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.
-

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 TAFE 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 TAFE Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local TAFE 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 TAFE Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
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.	1. Circuit between 41B (7) and 41A (18) 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 <u>positive</u> 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 <u>negative</u> 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.

CAUTION

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

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
Machine has low output and no control.	1. Open in feedback circuitry. 2. Faulty Control PC Board.	1. Check wiring and control PC Board wiring harness plugs. 2. Replace. See Procedure for Replacing PC Boards.
Machine does not have maximum output.	1. One input fuse blown. 2. One phase of main transformer open. 3. Faulty Control PC Board.	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.
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.
Erratic Current.	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.

CAUTION

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

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
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.

 CAUTION

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

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⚠ 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.

PROCEDURE FOR REPLACING PC BOARDS

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:
 - Check the PC board harness plug and PC board plug for contamination, corrosion or oversize.
 - Check leads in the harness for loose connections.

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 Front Panel.

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

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.

⚠ 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.

POWER RECTIFIER BRIDGE ASSEMBLY CHECKING PROCEDURE

1. Bridge and Device Isolation

Disconnect the following, shown in Figure E.1:

- Unplug P3 (G1, G2, G3, and 204) from the Control PC Board.
- Unplug P5 from the Snubber PC Board.
- Secondary leads X1, X2, and X3 from the anodes of the SCR's and cathodes of the diodes.
- Disconnect positive bridge lead from shunt and positive capacitor bank lead and from lug with dual 204 leads.
- 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

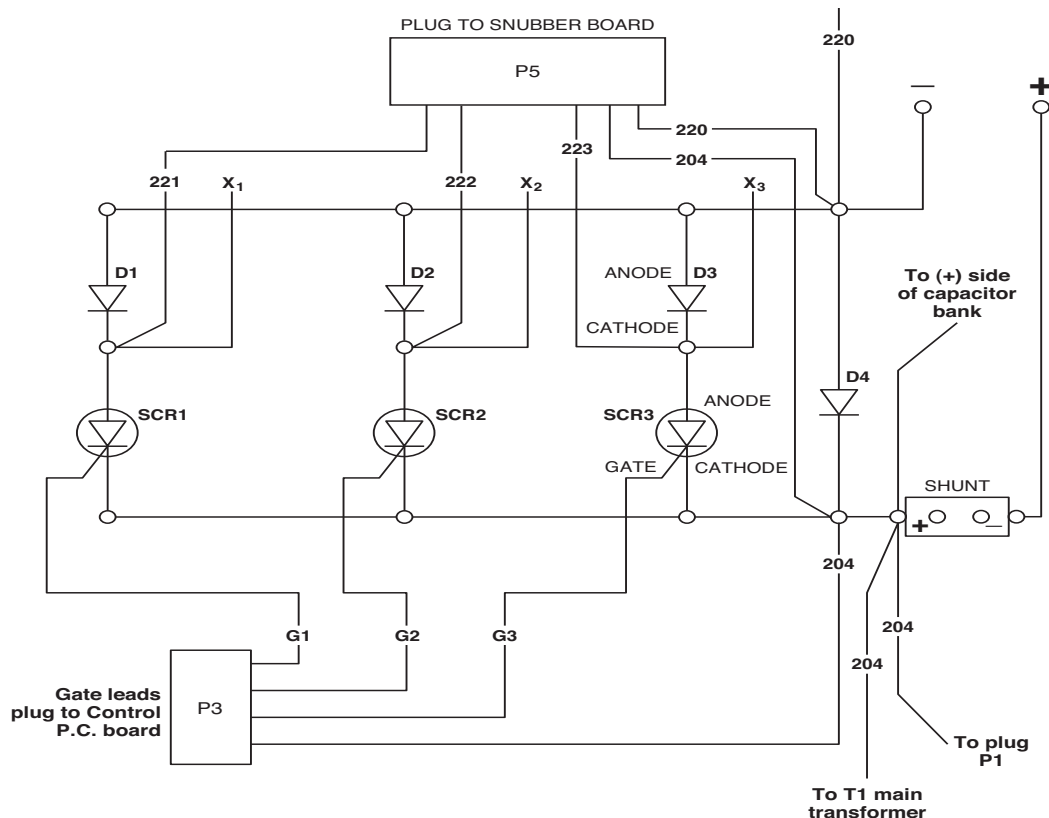
- Establish the polarity of the ohmmeter leads and set to X10 scale.
- Connect the ohmmeter positive lead to anode and negative lead to the cathode.
- Reverse the leads of the ohmmeter from Step b.
- A shorted diode will indicate zero or an equally low resistance in both directions. An open diode will 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.

- Connect the ohmmeter (set to the X10 scale) leads to the anode and cathode.
- Reverse the leads of the ohmmeter from Step a.
- A shorted SCR will indicate zero or an equally low resistance in one or both directions.
- Establish the polarity of the ohmmeter. Connect the positive lead to the gate and the negative lead to the cathode.
- 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.

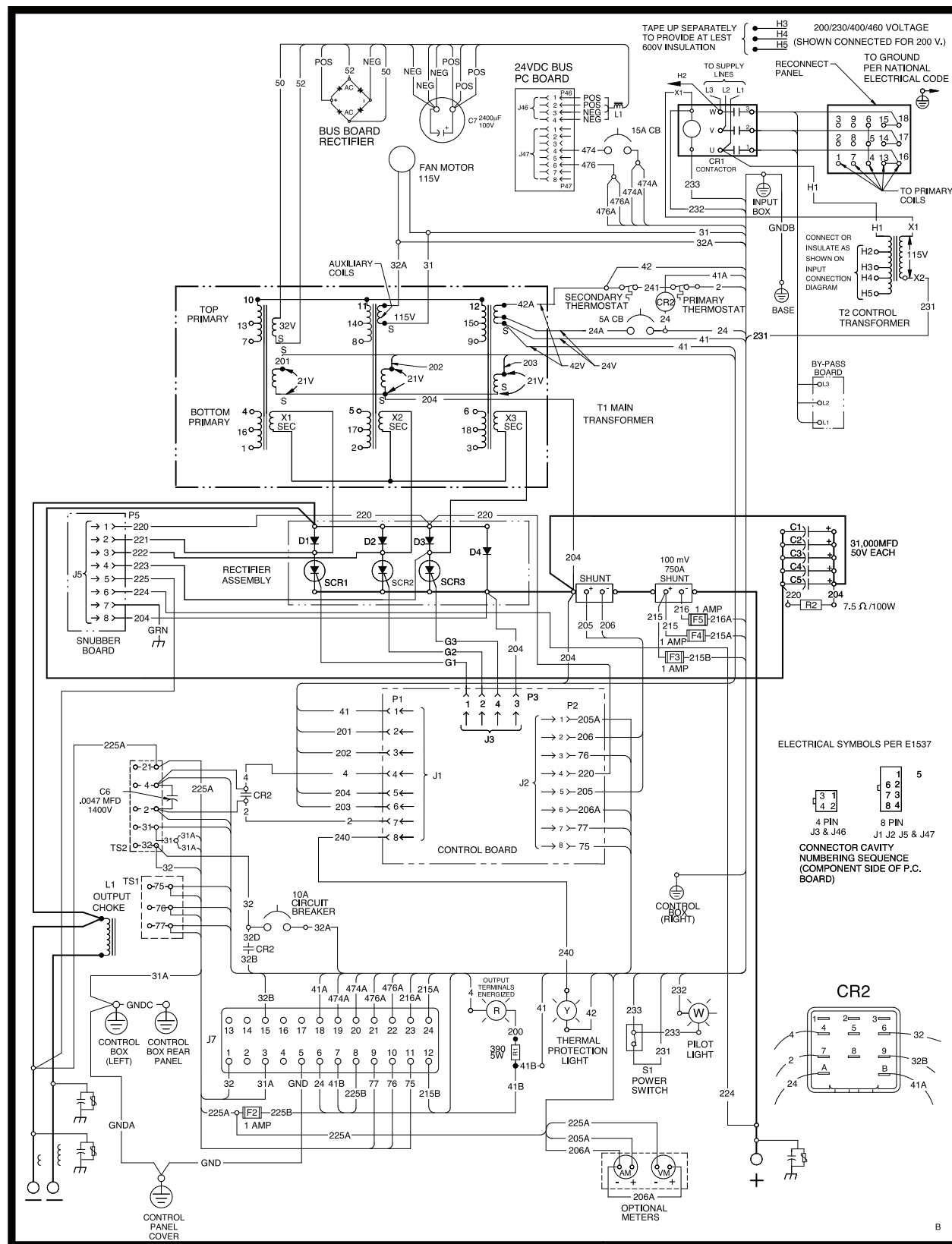
FIGURE E.1



TCV400



WIRING DIAGRAM



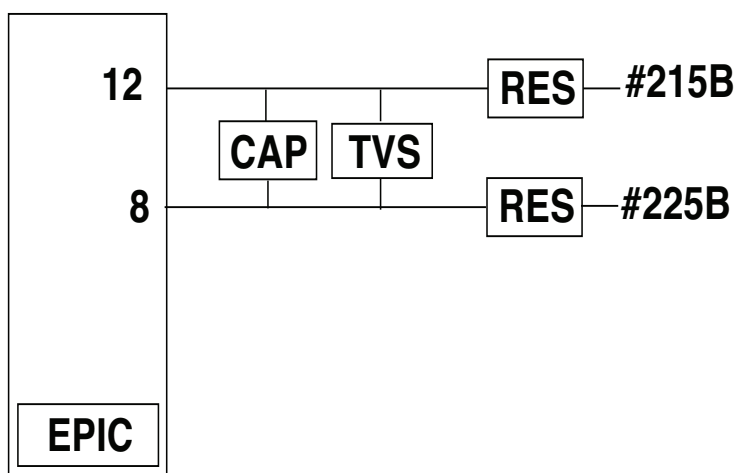
NOTE: This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels. If the diagram is illegible, write to the Service Department for a replacement. Give the equipment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

L9269-2



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.

FILTER CIRCUIT SCHEMATIC



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.

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. - Aíslese 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 brennbares 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	- 皮肤或湿衣物切勿接触带电部件及焊条。 - 使你自己与地面和工件绝缘。	把一切易燃物品移离工作场所。	佩戴眼、耳及身体劳动保护用具。
Korean 위험	- 전도체나 용접봉을 젖은 형갑 또는 피부로 절대 접촉치 마십시오. - 모재와 접지를 접촉치 마십시오.	인화성 물질을 접근시키지 마십시오.	눈, 귀와 몸에 보호장구를 착용하십시오.
Arabic تحذير	- لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الألكترود بجسد الجسم أو بالملابس المبللة بالماء. - ضع عازلا على جسمك خلال العمل.	ضع المواد القابلة للاشتعال في مكان بعيد.	ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

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

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

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

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

			
● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	WARNING
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish AVISO DE PRECAUCION
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French ATTENTION
● Vermeiden Sie das Einatmen von Schweißrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German WARNUNG
● Mantenha seu rosto da fumaça. ● Use ventilação e exaustão 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 painéis 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して下さい。	● 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 멀리하십시오. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시오.	● 보수전에 전원을 차단하십시오.	● 판넬이 열린 상태로 작동치 마십시오.	Korean 위험
● 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 تشغيل 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說明以及應該使用的銀焊材料，並請遵守貴方的有關勞動保護規定。

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.

