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PowCon

MODEL 225 SMC
OPERATION MANUAL

PlasmA PLUS™

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Telex # 350-226

CAUTION

READ THIS ENTIRE MANUAL
BEFORE OPERATING EQUIPMENT

IMPORTANT

THIS MANUAL HAS BEEN DESIGNED FOR EXPERIENCED WELDING EQUIPMENT OPERATORS AND MUST BE READ COMPLETELY BEFORE USING THIS EQUIPMENT. IF YOU LACK EXPERIENCE OR ARE UNFAMILIAR WITH THE PRACTICES AND SAFE OPERATION OF WELDING EQUIPMENT, PLEASE CONSULT YOUR FOREMAN. DO NOT ATTEMPT TO INSTALL, OPERATE, OR PERFORM MAINTENANCE ON THIS EQUIPMENT UNLESS YOU ARE QUALIFIED AND HAVE READ AND UNDERSTOOD THIS MANUAL. IF IN DOUBT ABOUT INSTALLING OR OPERATING THIS EQUIPMENT, CONTACT YOUR DISTRIBUTOR OR THE CUSTOMER SERVICE DEPARTMENT OF POWCON INDUSTRIES.

DEFINITIONS

NOTE CAUTION WARNING DANGER

Throughout this manual, NOTE, CAUTION, WARNING and DANGER are inserted to call attention to particular information. The methods used to identify these highlights and the purpose for which each is used, are as follows:

NOTE

OPERATIONAL, PROCEDURAL, AND BACKGROUND INFORMATION WHICH AIDS THE OPERATOR IN THE USE OF THE MACHINE, HELPS THE SERVICEMAN IN THE PERFORMANCE OF MAINTENANCE, AND PREVENTS DAMAGE TO THE EQUIPMENT.

CAUTION

AN OPERATIONAL PROCEDURE WHICH, IF NOT FOLLOWED, MAY CAUSE MINOR INJURY TO THE OPERATOR, SERVICE PERSONNEL AND/OR BYSTANDERS.

WARNING

AN OPERATIONAL PROCEDURE WHICH, IF NOT FOLLOWED, MAY CAUSE SEVERE INJURY TO THE OPERATOR, SERVICE PERSONNEL, OR OTHERS IN THE OPERATING AREA.

DANGER

AN OPERATIONAL PROCEDURE WHICH, IF NOT FOLLOWED, WILL CAUSE SEVERE INJURY OR EVEN DEATH TO THE OPERATOR, SERVICE PERSONNEL OR BYSTANDERS.

SAFETY INFORMATION

Important Occupational Safeguards For Arc Welding

Safety is a combination of good judgment and proper training. Operation and maintenance of any arc welding equipment involves potential hazards. Individuals who are unfamiliar with welding equipment, use faulty judgment or lack proper training, may cause injury to themselves and others. Personnel should be alerted to the following potential hazards and those safeguards necessary to avoid possible injury. In addition, before operating this equipment, you should be aware of your employer's safety regulations. BE SURE TO READ AND FOLLOW ALL AVAILABLE SAFETY REGULATIONS BEFORE USING THIS EQUIPMENT.

Electric Shock

WARNING

VOLTAGES OF 115 VOLTS OR LESS CAN CAUSE SEVERE BURNS TO THE BODY OR FATAL SHOCK. SEVERITY OF ELECTRICAL SHOCK IS DETERMINED BY THE PATH AND AMOUNT OF CURRENT THROUGH THE BODY.

A) Install and continue to maintain equipment according to USA Standard CI, National Electric Code.

B) Never allow live metal parts to touch bare skin or any wet clothing. Be sure gloves are dry.

C) When standing on metal or welding in a damp area, make certain that you are well insulated by wearing dry gloves and rubber soled shoes and are standing on a dry board or platform.

D) Do not use worn or damaged welding or torch cables. Do not overload the cables. Use well maintained equipment.

E) When not welding, turn off the equipment. Accidental grounding can cause overheating and create a fire hazard. Do not coil or loop the welding cable around parts of the body. Turn unit OFF when left unattended.

F) Be sure the ground cable is connected to the workpiece as close to the welding area as possible. Grounds connected to building framework or other remote locations from the welding area reduce efficiency and increase the potential electric shock hazard. Avoid the possibility of the welding current passing through lifting chains, crane cables or various electric paths.

G) Keep everything dry that you might touch, including clothing, work area, welding gun, torch and welding machine. Fix water leaks immediately. Do not operate equipment sitting in water.

H) Never use welding guns or torches which are damaged or contain cracks in their housings.

I) Refer to AWS-Z49.1 for grounding recommendations.

Personal Protection

WARNING

SKIN AND EYE BURNS RESULTING FROM BODY EXPOSURE TO THE ELECTRIC-ARC WELDING RAYS OR HOT METAL CAN BE MORE SEVERE THAN SUNBURN.

A) Use a proper face shield fitted with the correct filter (#10 or greater) and cover plates to protect your eyes, face, neck and ears from sparks and rays of the welding-arc when welding or observing welding. Warn bystanders not to watch the arc and not to expose themselves to the welding-arc rays or to hot metal.

B) Wear flameproof gauntlet-type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap (for hair protection) to protect the skin from arc rays and hot sparks or hot metal.

C) Protect other nearby personnel from arc rays and hot sparks with a suitable non-flammable partition.

D) Always wear safety glasses or goggles when in a welding area. Use safety glasses with side shields or goggles when chipping slag or grinding. Chipped slag is hot and may travel considerable distances. Bystanders should also wear safety glasses or goggles.

E) Compressed gas cylinders are potentially dangerous - refer to suppliers for proper handling procedures.

F) Wear ear plugs or other ear protection devices when operating welding equipment.

Fire Safety

WARNING

HOT SLAG OR SPARKS CAN CAUSE A SERIOUS FIRE WHEN IN CONTACT WITH COMBUSTIBLE SOLIDS, LIQUIDS OR GASES.

A) Remove all combustible materials well away from the welding area or completely cover materials with a non-flammable covering. Such combustible materials include wood, clothing, sawdust, gasoline, kerosene, paints, solvents, natural gases, acetylene, propane, and similar combustible articles.

B) Do not weld, cut or perform other hot work on used barrels, drums, tanks or other containers until they have been completely cleaned, so there are no substances in the container which might produce flammable or toxic vapors.

C) For fire protection, have fire extinguishing equipment handy for instant use, such as portable fire extinguisher or garden hose, water pail or sand bucket.

Ventilation

WARNING

WELDING FUMES AND GASES, PARTICULARLY IN CONFINED SPACES, CAN CAUSE DISCOMFORT AND PHYSICAL HARM IF BREATHED OVER AN EXTENDED PERIOD OF TIME.

A) At all times, provide adequate ventilation in the welding area by means of either natural or mechanical ventilation. Do not weld on galvanized, zinc, lead, beryllium or cadmium materials unless positive mechanical ventilation is provided to prevent breathing fumes and gases from these materials.

B) Do not weld in locations close to chlorinated hydrocarbon vapors coming from degreasing or spraying operations. The heat or arc rays can react with solvent vapors to form phosgene, a highly toxic gas, and other irritant gases.

C) If you develop momentary eye, nose or throat irritation during welding, this is an indication that ventilation is not adequate. Stop work and take the necessary steps to improve ventilation in the welding area. Do not continue to weld if physical discomfort persists.

D) Use an air supplied respirator if ventilation is not adequate to remove all fumes and gases.

E) Beware of gas leaks. Shielding gases such as argon are more dense than air and will replace air when used in confined spaces. Do not locate gas cylinders in confined spaces. When not in use, shut OFF gas supply at source.

F) Refer to AWS Standard Z49.1 for specific ventilation recommendations.

Location of Equipment (Service Operating Conditions)

WARNING

THE SMALL SIZE AND UNIQUE DESIGN OF POWCON'S PRODUCT LINE REQUIRES THE OPERATOR BE AWARE OF CERTAIN SAFEGUARDS REGARDING THE PROPER PROCEDURE FOR PLACEMENT OF THE EQUIPMENT. GOOD JUDGMENT AND COMPLIANCE WITH YOUR PARTICULAR JOB SITE SAFETY REQUIREMENTS ARE ESSENTIAL. THE FOLLOWING SAFEGUARDS ARE RECOMMENDED.

NEMA Standard EW1-2.02 approved as ANSI C87.1-1976 outlines both usual and unusual service conditions for a welding power source. PowCon products have been designed and manufactured to meet the usual service conditions as well as conform to the other NEMA standards. If an unusual service condition is required, PowCon should be consulted.

A) INSTALLATION Install the equipment in accordance with OSHA and National Electrical Code Standards, or other applicable standards.

B) COOLING Locate the PowCon Welding equipment so that air flow into the front and out of the back is not obstructed. Avoid placing the unit where dust or grinding particles will be directed into the unit.

C) ACCESS — Locate the PowCon equipment where there is room for the operator to manipulate the controls or change the connections on either the front or the rear. Avoid placing the unit in a hallway or other area where foot traffic might be impeded.

D) SECURITY — Locate the unit where it can be secured to a platform, deck or other structure which is capable of safely supporting the unit and any other potential load.

Portability

WARNING

THE SMALL SIZE AND UNIQUE DESIGN OF POWCON'S PRODUCT LINE REQUIRE THAT THE OPERATOR BE AWARE OF CERTAIN SAFEGUARDS CONCERNING THE MOVEMENT OF THE EQUIPMENT. GOOD JUDGMENT AND COMPLIANCE WITH YOUR PARTICULAR JOB SITE SAFETY REQUIREMENTS ARE ESSENTIAL. THE FOLLOWING SAFEGUARDS ARE RECOMMENDED:

A) In lifting and carrying a power source it is recommended that two people be used. The unit is designed to be lifted using a suitably rated and inspected choker (made of rope or nylon) run through both handles. Refer to the applicable OSHA standards or contact PowCon for any questions regarding the lifting of this unit. Accessory units of less than 25 lbs. may be safely lifted by one individual.

B) Never drag, pull or lift the unit by the cables. Always lift the unit using the handles provided.

C) Never move the unit to a position that would allow its input and output cables to impede or block foot traffic.

D) Move and lift the unit in accordance with OSHA job site standards.

E) Do not allow the unit to remain operating when lifting or moving it.

F) Never move a power source unless all 10 flange screws and nuts holding the top and bottom cases are tight.

G) Do not lift a power source/wirefeeder combination when the wirefeeder is mounted to the power source handles. Always disassemble the wirefeeder from the power source before lifting.

DANGER

ANY TIME POWCON EQUIPMENT IS PLACED ABOVE GROUND LEVEL, THE POTENTIAL HAZARD OF FALLING EXISTS.

Safety Precautions Around Arc Positioning Systems

PowCon Automation equipment employs the use of moving electromechanical components to position the weldhead and torch. Operators should exercise caution when working with moving equipment. Care should be taken not to allow loose clothing, jewelry or hair to get caught in the equipment causing injury. All automated systems should be turned off and have AC power positively disconnected before maintenance or repair.

Safety References

The following publications provide additional information on important welding safeguards.

A) ANSI Z49.1-1973, American National Standard "Safety in Welding and Cutting".

B) Bulletin No. F4-1, "Recommended Safe Practices for the Preparation for Welding and Cutting Containers and Piping that have held Hazardous Substances".

C) OSHA Safety and Health Standards, 29CFR 1910, available from the United States Department of Labor, Washington, D.C. 20210.

D) NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 00210.

E) NEMA Standards Publication/No. EW1-1971, Electric Arc-Welding Apparatus, approved as ANSI C87.1-1976. Available from National Electrical Manufacturers Association, 155 E. 44th Street, New York, NY 10017.

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1.1 DESCRIPTION OF EQUIPMENT

The PowCon Model 225SMC is a lightweight, portable combination welder/plasma cutter. This combination provides welding capability along with metal cutting ability ranging from thin gauge to 1/2" material. For cutting, the unit features an open torch architecture, allowing several popular cutting torches to be attached.

Traditionally, constant potential (voltage) welding power supplies have been used for GMAW and constant current (drooper) welding power supplies have been used for SMAW. The unique feature of the constant power converter system used in the PowCon Model 225SMC is that both welding processes in addition to plasma cutting may be accomplished using one power source. By means of electronic control, the PowCon Model 225SMC adjusts the output for a given welding process or cutting.

1.2 SPECIFICATIONS (Subject to change without notice)

PowCon Model 225SMC Welding Power Source/Plasma Cutter:

A) Power Input and Output (see Table 1.1).

B) Open Circuit Voltage

Welding - 80V maximum

Cutting - 185V maximum

C) Current Range

Welding - adjustable from 10 to 250 amperes

Cutting - adjustable from 20 to 55 amperes

D) 24VAC transformer for operating wirefeeder.

E) Weight - 87 pounds (39.5 Kg).

F) Dimensions - Height 22" (56 cm), Width 10" (26 cm), Depth 19" (49 cm).

Accessories:

A) Remote GMAW pulser.

B) Remote, hand-operated or foot-operated contactor and current control.

C) Remote control cable extension - available in lengths from 5 to 150 feet (1.5 to 45.7M). See table 2.4 for part number information.

D) Output cable connections (DIX or TWECO).

E) Plasma cutting torches:
- 25 or 50 foot Thermal Dynamics PCH51 or RTH40S
- 25 or 50 foot Hypertherm MAX40

TABLE 1.1

SPECIFICATIONS OF POWCON MODEL 225SMC

SPECIFICATIONS

	Primary Input	Rated Current Amps	Amperage Range	Open Circuit Voltage	Amperes Input At Rated Load Output 50/60 Hz	KVA	KW	Eff.	Dimensions	Weight Net	Ship
WELDING	Single Phase	50% Duty Cycle 225 Amps @ 29V	10-275	80 Max	48	11	8.55	78%	Height 43" (110 cm) Width 17 1/2" (44.5cm) Depth 22" (56 cm)	87 lbs. 37.3 kg.	92 lbs. 41.8 kg.
		100% Duty Cycle 160 Amps @ 26.4V			33	7.5	5.8	77%			
CUTTING	Single Phase	50% Duty Cycle 50 Amps @ 110V	15-55	185 Max	36	8.2	5.5	67%			

Max Air/Gas Inlet Pressure	140 psi
Min Air/Gas Inlet Pressure	65 psi
Flow Rate	240 SCFH, 4SCFM
Approximate Air Compressor Capacity (without tank)	1 1/2 HP

Air must be clean, dry, and oil-free.

1.3 THEORY OF OPERATION

PowCon Welding/Cutting Power Sources use the frequency converter principle to produce direct current DC power. In contrast to the conventional transformer rectifier, the frequency converter design offers two main advantages (1) lower weight and size, and (2) increased electrical efficiency.

For the PowCon, the input alternating current (AC) primary power is passed through a circuit breaker to full wave bridge rectifier, where the input is transformed to DC power. The DC current output of the rectifier is fed to an inverter (series capacitor switching device). Using SCR's (thyristors), the DC current is switched alternately ON and OFF. The action of charging and discharging the capacitors creates a new alternating current (AC). The frequency of the firing of the SCR's varies from 400 Hz to 6000 Hz, dependent upon the output demand; i.e., the greater the output power required, the higher the frequency. The output power is determined by the cut/weld power setting knob.

The alternating current at frequency provided by the switching devices (SCR's), is fed thru the main transformer primary winding. One advantage of high frequency alternating current is that the size of the transformer can be significantly reduced. The PowCon main transformer weighs 12 pounds, versus approximately 200 pounds used in the conventional transformer/rectifier. The transformer takes the higher primary voltage of the switching SCR's and transforms it to either the cutting or welding voltage range.

The AC output of the transformer is rectified by diodes into direct current (DC). The whole sequence of operations from the primary (AC) input to the cut or weld output (DC), is controlled by several PC boards and control logic.

Multi-process flexibility and simplicity of inverter design are the cornerstones of the PowCon product line. The PowCon Model 225SMC proves once again that PowCon is the industry leader in inverter technology.

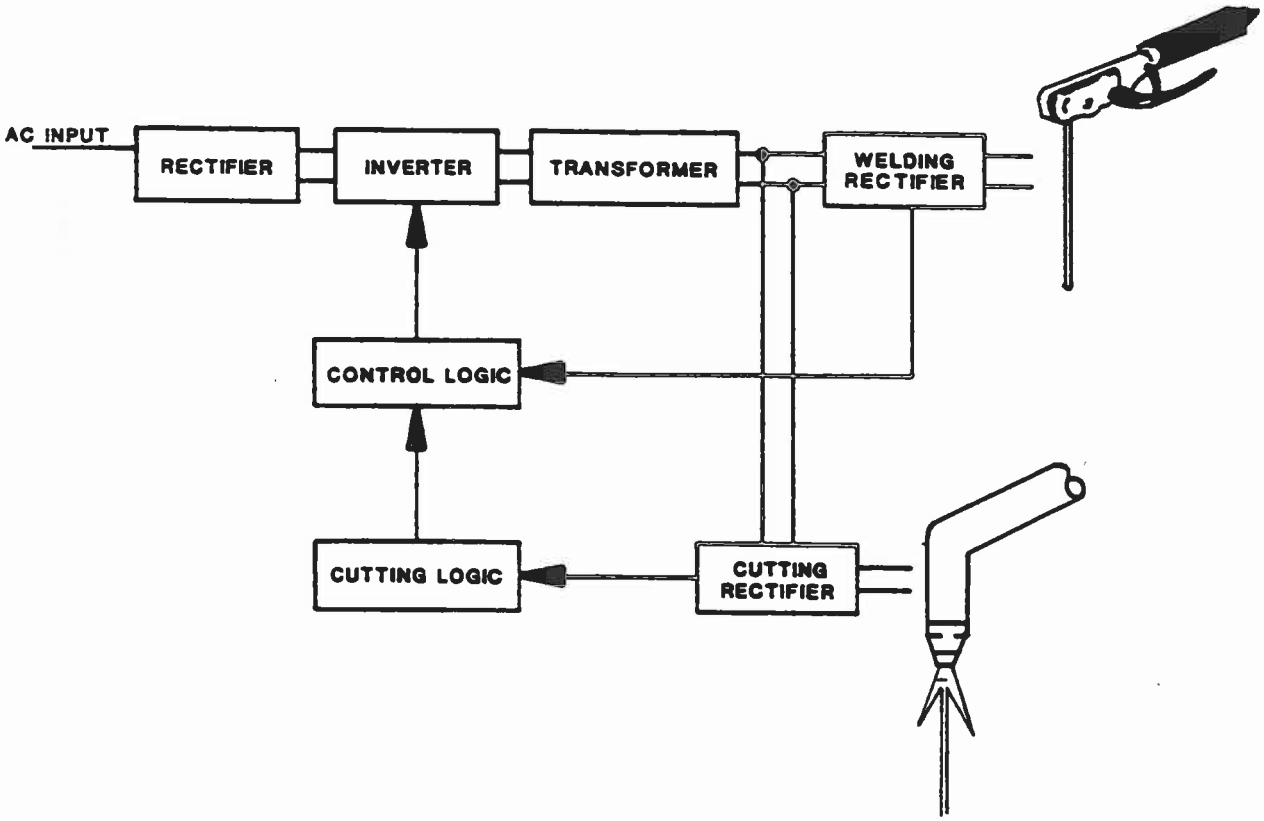


FIG. 1.1, ELECTRONIC BLOCK DIAGRAM OF CONVERTER PRINCIPLE

.1 UNPACKING NEW EQUIPMENT (RECEIVING AND HANDLING)

Remove the PowCon Welding/Cutting Power Source from its shipping carton and inspect for any possible damage that might have occurred during shipping. Make sure that all items on the packing list are accounted for and identified. One copy of the PowCon Model 225SMC Operation Manual is packed with each PowCon Model 225SMC unit.

Any claims for loss or damage that may have occurred in transit must be filed by the PURCHASER with the CARRIER. Copies of the bill of lading and freight bill will be furnished by the carrier on request, if the need to file a claim arises. When requesting information concerning this equipment, it is essential that model description, serial number and/or part number of the equipment be supplied.

NOTE

TO ASSURE A VALID WARRANTY, YOU MUST COMPLETE AND RETURN THE WARRANTY CARD (ENCLOSED WITH ALL PRODUCTS) WITHIN 10 DAYS OF PURCHASE DATE.

2.2 EQUIPMENT INSTALLATION (INPUT POWER REQUIREMENTS)

The PowCon Model 225SMC is manufactured for use on 220V, 50/60 hertz, single phase power.

NOTE

TO ASSURE RELIABLE CUTTING OPERATION, A MINIMUM PRIMARY VOLTAGE OF 208VAC IS RECOMMENDED.

DANGER

AN ELECTRICAL GROUND MUST ALWAYS BE PROVIDED TO CONNECT TO THE GREEN WIRE ON THE FACTORY INSTALLED PRIMARY CABLE.

2.2.1 FUSE SIZE

The PowCon Model 225SMC is equipped with a 9 foot (2.75 M) power cord attached. The power cord size is 10 AWG for 220 volt operation. For proper fuse see Table 2.1.

TABLE 2.1

RECOMMENDED FUSE SIZES BASED ON NATIONAL ELECTRICAL CODE REQUIREMENTS

INPUT VOLTAGE	MAX* AMP	RECOMMENDED FUSE CAPACITY	RECOMMENDED PLUG CAPACITY
220V, 10	46A	50A	40A

*Maximum current demand is based on an output of 30 VDC and 250A welding or 55 amps 110 VDC cutting.

2.2.2 PRIMARY WIRE SIZE

Additional lengths of primary cable are to be considered extension cords to the factory supplied power cord. To maintain the necessary degree of safety, the use of suitably rated U.L. recognized male/female connector plugs is required (see fuse sizes shown in Table 2.1). Extension primary cord lengths must be of the same grade wire for their entire length, as shown in Table 2.2.

TABLE 2.2

RECOMMENDED PRIMARY CABLE SIZE BASED ON NATIONAL ELECTRICAL CODE REQUIREMENTS

EXTENSION CABLE LENGTH*	REQUIRED PRIMARY CABLE SIZE
250 FEET OR LESS (76M)	8 AWG
250 FEET TO 400 FEET (122M)	6 AWG
400 FEET TO 650 FEET (198M)	4 AWG

*The entire extension cable length must be made of the required cable size. For example, a 500 foot extension would be made of 6 AWG cable with appropriate U.L. recognized plugs to connect to the factory provided 9 foot primary.

DANGER

NEVER CONNECT OR DISCONNECT THE PRIMARY UNLESS THE UNIT IS TURNED OFF AT THE CIRCUIT BREAKER LOCATED ON THE REAR PANEL. THE PRIMARY SUPPLY LINE SHOULD ALWAYS BE SWITCHED OFF DURING INSTALLATION.

A GROUND MUST ALWAYS BE PROVIDED TO CONNECT TO THE GREEN WIRE ON THE FACTORY INSTALLED PRIMARY.

2.2.3 SINGLE PHASE INSTALLATION

Perform the following steps on the factory equipped primary:

A) Connect green wire to ground.

B) Connect both white and black wires to "HOT" legs.

2.2.4 ENGINE DRIVEN GENERATOR USE

The small size and portability of PowCon products make them ideally suited for use with engine driven generator equipment. However, failure to take several special precautions with this equipment may result in damage to your PowCon.

Please use the following guidelines when choosing engine driven generator equipment for use with PowCon products:

A) Check to ensure that the primary output of the generator you are using is between 208 and 240VAC. A generator with a regulated output is preferred. Many generator units have no load voltages upwards of 300VAC. This can cause damage to your PowCon.

B) When the generator is running, especially in the case of an unregulated unit, do not "rev" the throttle with the circuit breaker in the PowCon in the UP/ON position. This creates an undesirable overvoltage situation. Use the preset throttle/governor position which is supplied with the generator.

Once you have chosen an appropriate engine driven generator, the PowCon should be installed by following the single-phase installation procedure outlined in section 2.2.3.

NOTE

SOME ENGINE DRIVES WHEN FIRST TURNED ON WILL "OVERSHOOT" THEIR NOMINAL PRIMARY OUTPUT VOLTAGE. IF THIS IS THE CASE WITH YOUR EQUIPMENT, NEVER START THE GENERATOR WITH THE CIRCUIT BREAKER ON THE POWCON IN THE UP/ON POSITION. SWITCH THE POWCON ON ONLY AFTER THE GENERATOR HAS BEEN RUNNING STEADILY FOR AT LEAST 10 SECONDS.

2.2.5 REGULATOR INSTALLATION

To complete the installation of your PowCon Model 225SMC unit, you must supply compressed air to the regulator assembly which is located on the rear of the unit. Connect your shop air supply to the 90 degree elbow provided.

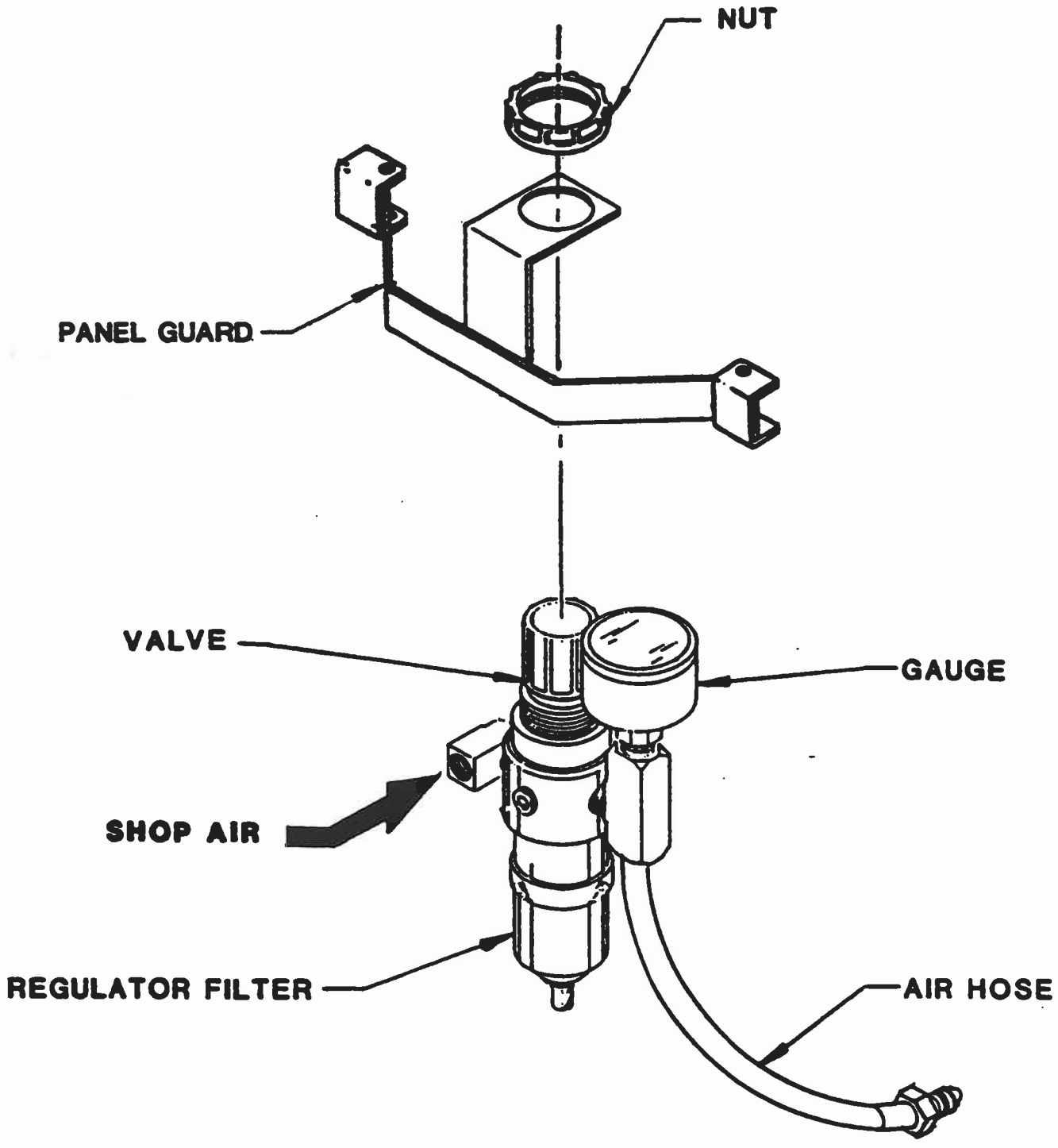
NOTE

FOR RELIABLE OPERATION AND EXTENDED PARTS LIFE, IT IS NECESSARY TO USE AN AIR FILTER ON YOUR COMPRESSED AIR SUPPLY TO REMOVE ANY OIL OR MOISTURE IN THE LINE.

If your shop air supply is not filtered, you may obtain filter assemblies from PowCon, P/N 951018-001. Replacement filter elements are available separately as P/N 951018-002.

WARNING

THE POWCON MODEL 225SMC IS DESIGNED TO OPERATE ON COMPRESSED AIR ONLY. DO NOT HOOK UP AN OXYGEN SERVICE TO THE REGULATOR ASSEMBLY.



201150-001 FIG. 2.1, AIR REGULATOR MOUNTING BRACKET

2.3 OUTPUT CONNECTIONS

2.3.1 WELDING OUTPUT

Run electrode and ground cables of the appropriate size as shown in Table 2.3. To avoid excessive heat losses during operation, all output connections, lugs and cables should be secure and well insulated. Failure to use proper cable sizes contributes to lost efficiency of the power source and excessive consumption of electrical power.

The electrode and work leads have to be assembled using customer supplied welding cables and cable connectors. After the cables are assembled, connect the electrode lead to the negative (-) jack and the work lead to the positive (+) jack for straight polarity operation. For reverse polarity operation, the electrode lead is connected to the positive (+) jack and the work lead is connected to the negative (-) jack, see figure 2.2.

NOTE

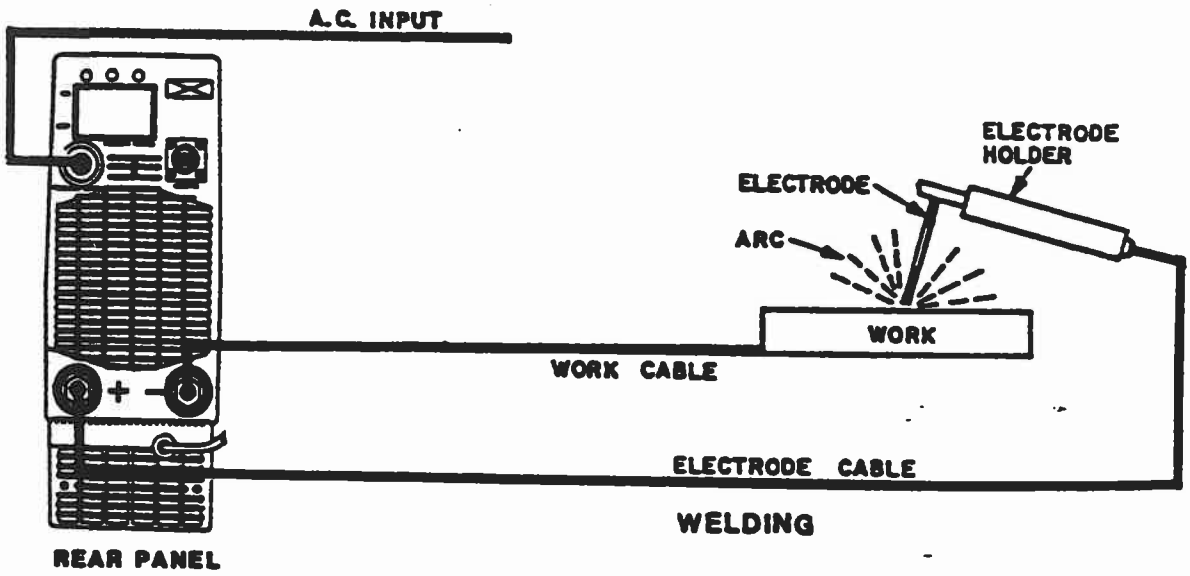
LOCATE THE POWCON UNIT SO THAT THE AIR FLOW INTO THE FRONT AND OUT OF THE BACK OF THE UNIT IS NOT OBSTRUCTED.

TABLE 2.3

RECOMMENDED COPPER WELDING CABLE SIZES BASED ON 60% DUTY CYCLE AND COMBINED LENGTH OF ELECTRODE GROUND CABLE*

0'-50' (15.2M)	UP TO 100' (30.5M)	100'-150' (30.5M-47.7M)	150'-200' (45.7M-61M)	200'-250' (61M-76.2M)
1/0	1/0	1/0	2/0	3/0

*Use of aluminum cable requires increase by two AWG sizes over recommended copper cable size. Recommended cable sizes for other duty cycles and output currents can be found in Volume 2, WELDING HANDBOOK, 7th Edition, published by the American Welding Society.



201150-001 FIG. 2.2, TYPICAL WELDING CONNECTIONS 2-7

2.4 REMOTE CONNECTOR

2.4.1 REMOTE CURRENT AND CONTACTOR CONTROL CONNECTIONS

Both the remote control devices (hand and foot) come with a 14-pin connector plug which connects to the remote terminal on the rear panel of the PowCon unit. The remote control devices come with a pre-wired plug and 12 feet (3.65 M) of cable. When a remote control device is plugged into the rear panel receptacle, certain front panel controls are overridden by the remote device.

To connect the remote control device, insert the 14-pin plug from the control cable of the device fully into the receptacle on the rear panel. Ensure that the plug keyways align with the receptacle keys. Rotate the plug threaded collar clockwise as far as possible into the receptacle threaded body to secure the plug in the receptacle.

Should you wish to mount your remote device further away from the Welder/Cutter, you may order additional lengths of remote cable as indicated in Table 2.4.

TABLE 2.4

OPTIONAL REMOTE CABLE ASSEMBLIES

PART NUMBER	LENGTH (FT)
603014-006	5
603014-003	12
603014-001	25
603014-002	50
603014-004	100
603014-005	150

Many PowCon Model 225SMC systems come with either a Power Drive I (PDI, 24VAC) or a Power Drive I/E (PDI/E, 115VAC in pins 1 & 2 or 24VAC in pins 4 & 5) wire feeder system. The control cable for each of these wirefeeders also connects to the remote connector on the rear panel of the unit.

NOTE

PLASMA CUTTING DOES NOT USE THE SAME CONTACTOR CIRCUIT AS AN ATTACHED WIREFEEDER WOULD. THEREFORE, THE OPERATION OF THE STANDARD POWCON REMOTE DEVICES WILL BE ALTERED SLIGHTLY IN THE CUT MODE. IN THIS MODE, THE DEVICES CAN BE USED AS REMOTE CURRENT CONTROL DEVICES ONLY AND THE PLASMA CONTACTOR IS OPERATED FROM THE TORCH TRIGGER.

2.4.2 WIREFEEDER CONTROL CABLE

Many PowCon Model 225SMC systems come with either a Power Drive I (PDI, 24VAC) or a Power Drive I/E (PDI/E, 115VAC in pins 1 & 2 or 24VAC in pins 4 & 5) wire feeder system. The control cable for each of these wirefeeders also connects to the remote connector on the rear panel of the unit.

NOTE

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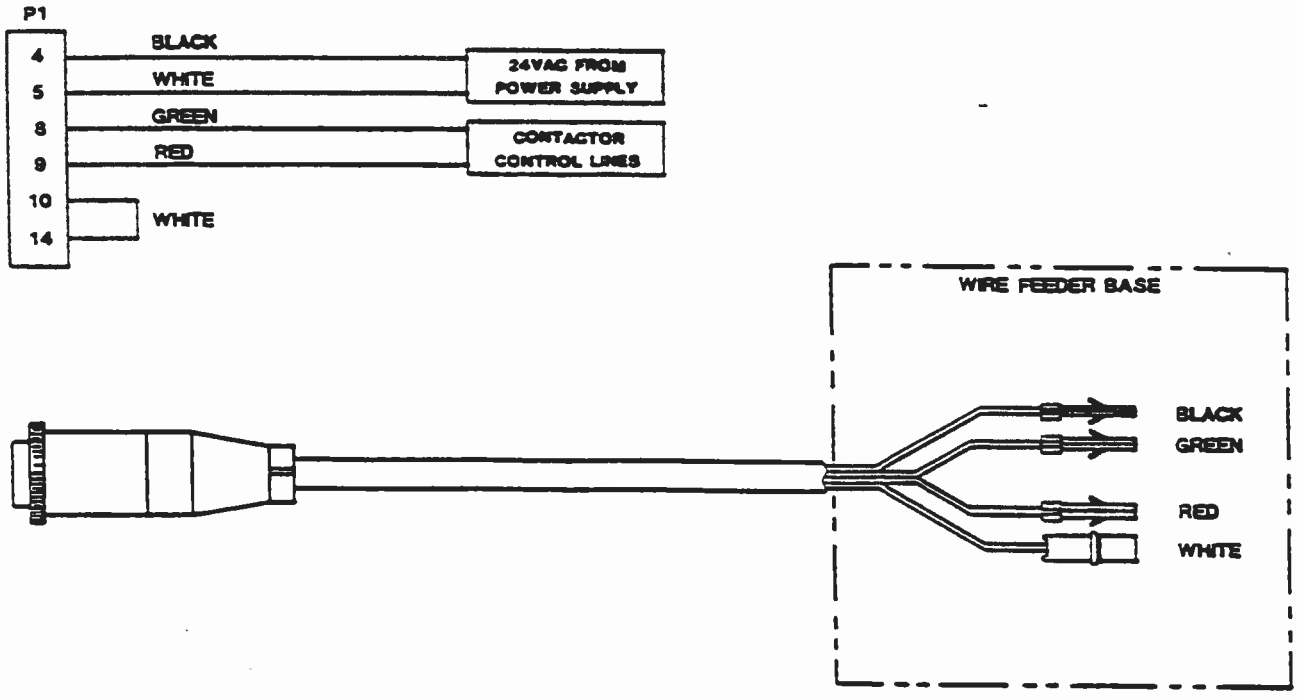
The control cable for the wirefeeder and PowCon 225SMC interface comes with a 14 pin connector designed to mate with the remote receptacle on the rear panel. The wiring schematic for the control cable is shown in Figure 2.3.

NOTE

UNLESS OTHERWISE SPECIFIED, THE POWCON 225SMC IS SHIPPED FROM THE FACTORY WITH ON/OFF CONTROL RESPONSIVE TO CONTACT CLOSURE ONLY.



201150-001 FIGURE 2.3, WIREFEEDER CONTROL CABLE W/SCHEMATIC

The wirefeeder control cable can be adapted for use with the PowCon and any other manufacturer's wirefeeder. The specific pin numbers and individual wire colors are shown in Figure 2-3. A breakdown of the control cable is as follows:

NOTE

THE GREEN WIRE ON PIN #3 IS THE GROUND.

Pins 4, 5 — Use with transformer 24VAC output to PDI or PDI/E wirefeeder systems.

Pins 8, 9 — These pins, with corresponding wires, are used to provide remote contactor control for a wirefeeder wired for contact closure as follows:

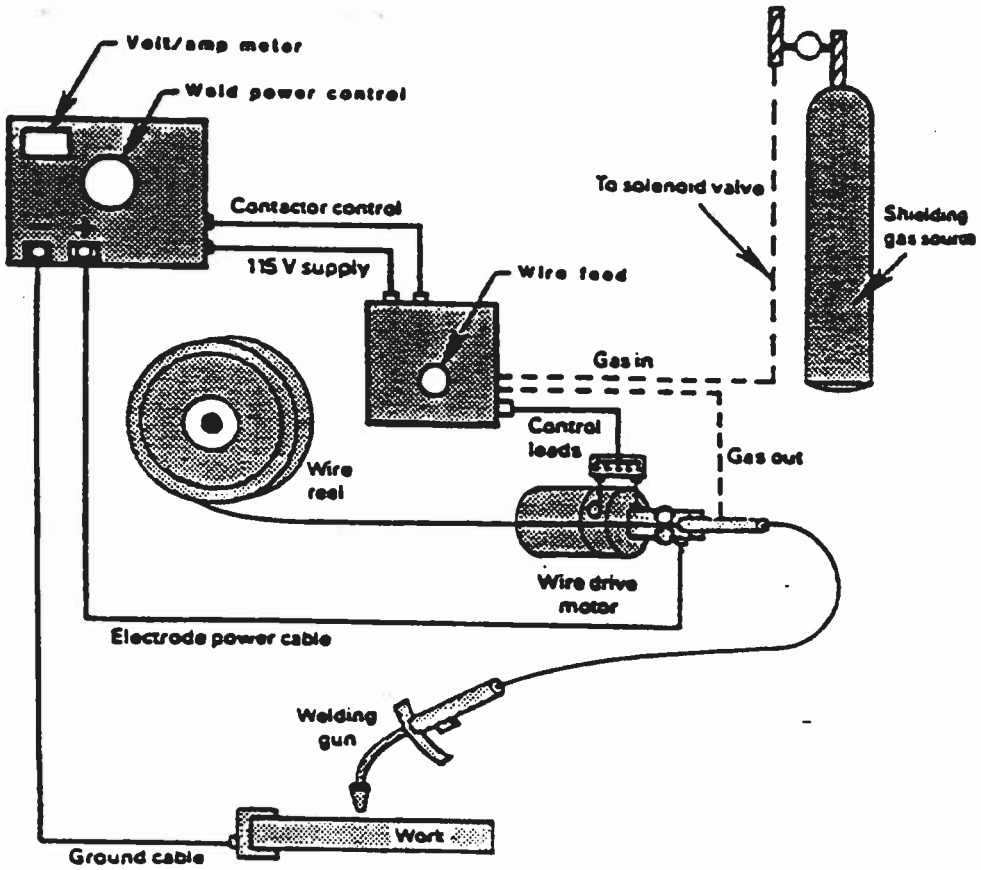
A) Connect the wire from pin 9 (orange) to the return side of the wirefeeder.

B) Connect the wire from pin 8 (blue) to the incoming terminal of the contactor.

Pins 10,14 — These pins have been connected together by a jumper wire in the connector shell at the factory. The purpose of this interconnection is to enable remote contactor control.

NOTE

FOR WIREFEEDERS WHICH RETURN A 115 VAC SIGNAL TO THE POWER SUPPLY FOR CONTACTOR CLOSURE, A SINGLE POLE DOUBLE THROW RELAY MUST BE USED. A RELAY KIT FOR INSTALLATION INSIDE THE UNIT IS AVAILABLE FROM POWCON INCORPORATED.



201150-001 FIGURE 2.4, TYPICAL GMAW EQUIPMENT SCHEMATIC

2.5 CUTTING OUTPUT

One of the unique features of the PowCon Model 225SMC is its open torch architecture. This allows your unit to be connected with several popular cutting torches on the market without investing in expensive additional hardware. The PowCon Model 225SMC has been factory tuned to operate properly with each one of these torches.

At present, PowCon offers compatibility with the Hypertherm MAX40 torch or the Thermal Dynamics (TDC) PCH51/RTH40S torches. These torches are available in either a PowCon proprietary version or their standard versions. They also come in either a 25 foot (7.6M) or 50 foot (15.2M) length.

If you purchase your Powcon Model 225SMC with a torch, the torch is installed and tested at the factory. Should you purchase a unit without a torch, or change torches later, you will need to perform a torch installation.

The following sections explain and illustrate the proper connections for installing each of these torch configurations.

DANGER

HIGH VOLTAGE IS PRESENT IN THE CONNECTOR BRACKET. DISCONNECT THE PRIMARY INPUT TO THE UNIT BEFORE PERFORMING ANY TORCH INSTALLATION STEPS.

NOTE

THE PLASMA CUTTING OPERATION REQUIRES STRAIGHT POLARITY CONNECTION. SEE FIGURE 2.5.

NOTE

THE PROPER OPERATION OF YOUR TORCH DEPENDS ON THE PILOT ARC AND MAXIMUM CUTTING POWER DIP SWITCH SETTINGS. SEE SECTION 2.5.5 FOR A COMPLETE EXPLANATION OF THE PROPER PROCEDURE.

NOTE

THE CONNECTOR BRACKET HAS AN INTERLOCK CIRCUIT TO PREVENT THE TORCH FROM OPERATING UNLESS IT IS FULLY CLOSED. AFTER TORCH INSTALLATION, MAKE SURE THAT THE DRAWER IS FULLY CLOSED AND THAT THE CAPTIVE PANEL SCREWS ARE SECURED BEFORE OPERATING.

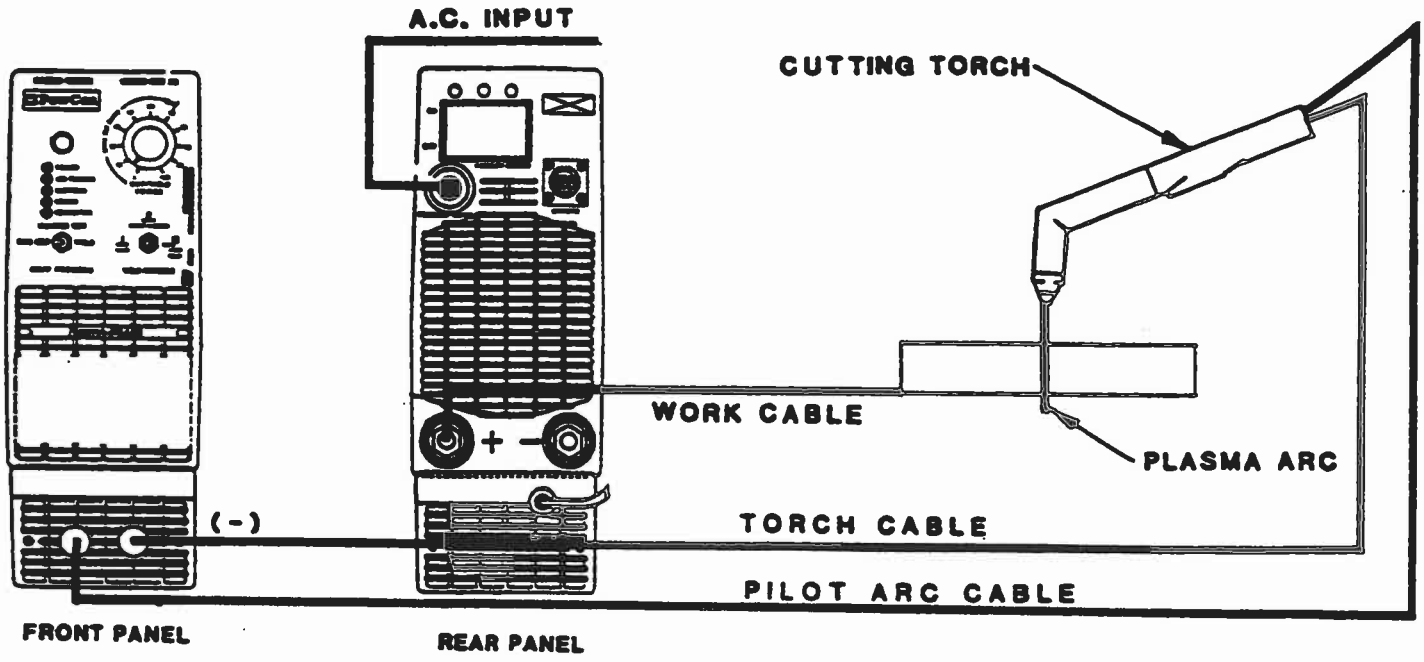
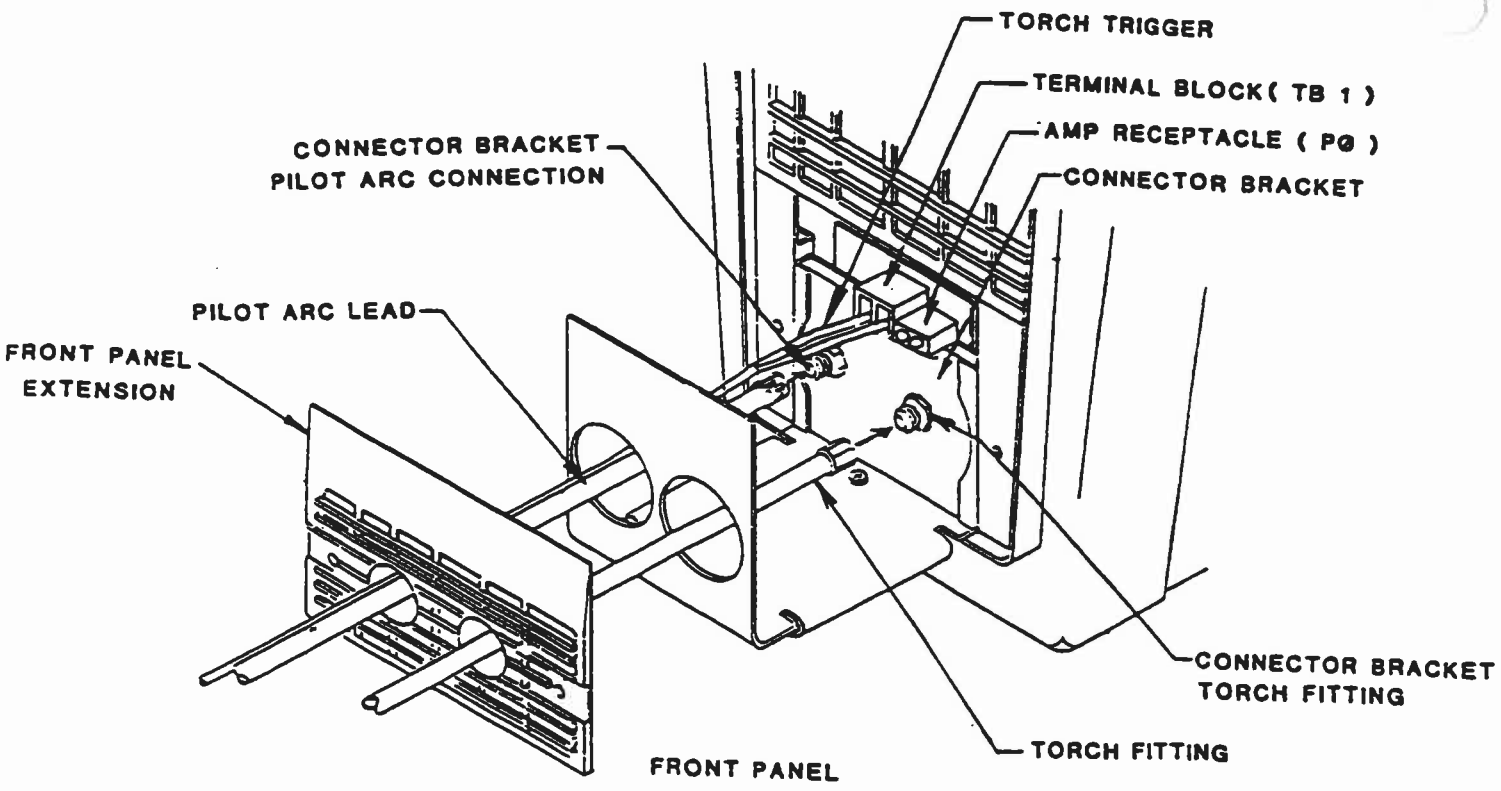


FIGURE 2.5, TYPICAL WELDING & PLASMA CUTTING DIAGRAM

When ordering additional torches, refer to the following table for part number (P/N) information. Each torch is ordered in the form of a "kit," which includes the torch, a supply of consumable spare parts, and an instruction sheet. Should you need to order individual torch pieces, refer to Section 5 for more information.

TABLE 2.5, TORCH KIT ORDERING INFORMATION

HYPERTHERM MAX40		
LENGTH	POWCON VERSION	HYPERTHERM STANDARD
25'	250046-001	250046-101
50'	250046-003	250046-103
TDC PCH51		
LENGTH	POWCON VERSION	TDC STANDARD
25'	250047-001	250047-101
50'	250047-003	250047-103
TDC RTH40S*		
LENGTH	POWCON VERSION	TDC STANDARD
25'	250048-001	250048-101
50'	250048-003	250048-103



HYPERTHERM MAX40 STANDARD TORCH

FIG. 2.6, TORCH INSTALLATION

*The TDC RTH40S is identical to the TDC PCH51 with the exception that the RTH40S has an installed parts in place circuit, and the PCH51 does not.

2.5.1 Hypertherm MAX40 Standard Torch

To connect your MAX40 Standard torch to your PowCon Model 225SMC, you must attach the Torch Fitting, Pilot Arc, and Torch Trigger leads by performing the following steps while referring to FIG. 2.6.

A) Rotate quarter turn Panel Fasteners which hold the Front Panel Extension to the tray assembly. Do not try to remove them completely. These fasteners are captivated in the plastic so they will not be lost.

B) Slide the Connector Bracket out from the tray, exposing the enclosed fittings.

C) Pass the torch leads through the holes in the Front Panel Extension. The Torch Fitting (dark blue hose) goes through the right hole (as you are facing the panel), and the Pilot Arc (gray hose) and Torch Trigger go through the left hole.

D) Tighten the Torch Fitting and Pilot Arc leads securely.

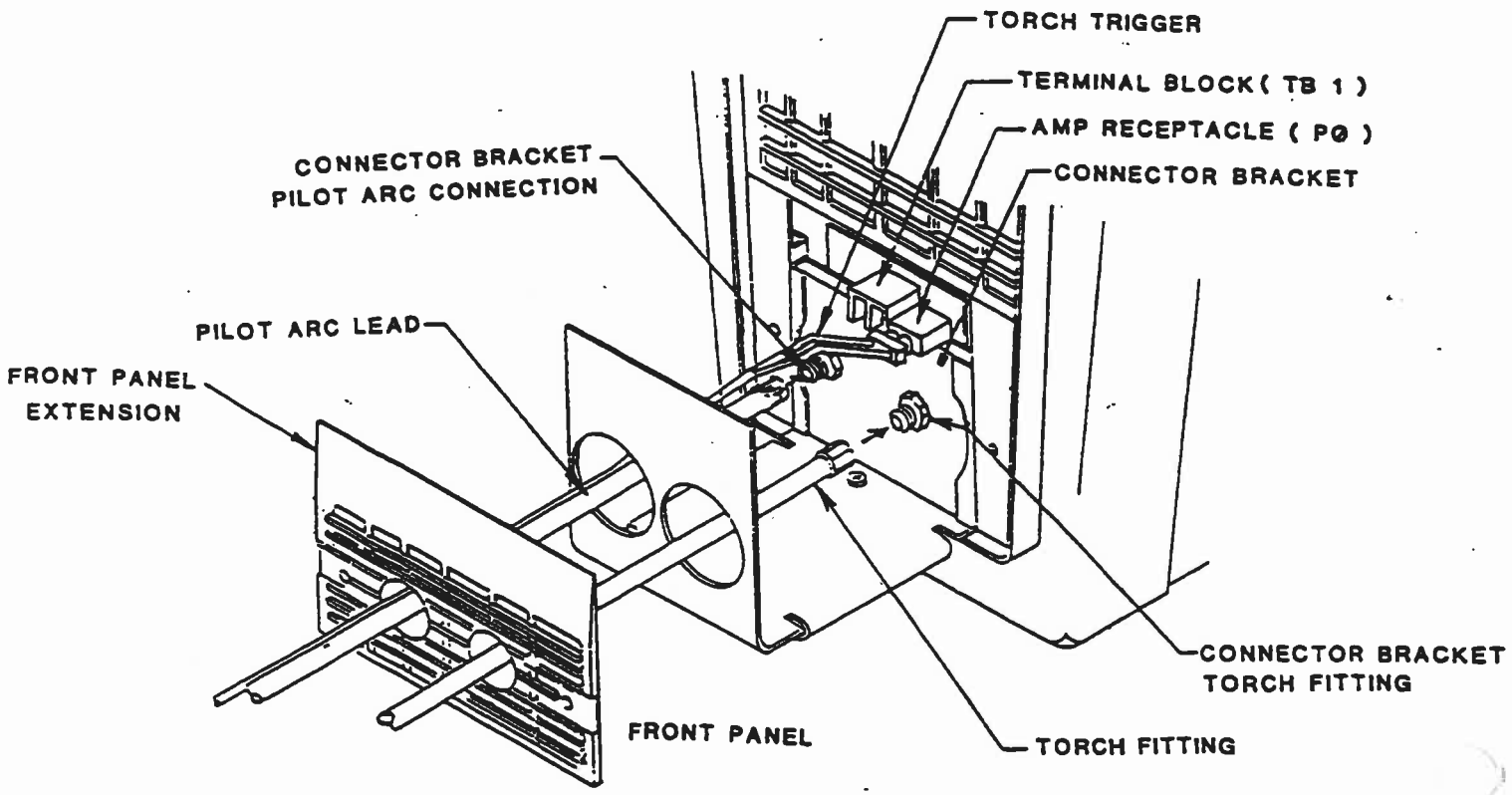
E) Attach the two spade lugs in the Torch Trigger cable to the black Terminal Block (TB1) on the Trigger Board. Place the lug under the screw head and tighten each one securely.

F) Slide the Connector Bracket back into place and re-tighten the Captive Panel Fasteners.

The installation of your Hypertherm MAX40 Standard torch is now complete. Verify proper pilot arc and cutting power levels are correct per paragraph 2.5.5

2.5.2 Hypertherm MAX40 PowCon Torch

To connect your MAX40 PowCon torch to your PowCon Model 225SMC, you must attach the Torch Fitting, Pilot Arc, and Torch Trigger leads by performing the following steps while referring to FIG. 2.7.



HYPERTHERM MAX40 POWCON TORCH

FIG. 2.7, TORCH INSTALLATION CONT'D.

A) Rotate quarter turn Panel Fasteners which hold the Front Panel Extension to the tray assembly. Do not try to remove them completely. These fasteners are captivated in the plastic so that they will not be lost.

B) Slide the Connector Bracket out from the tray, exposing the enclosed fittings.

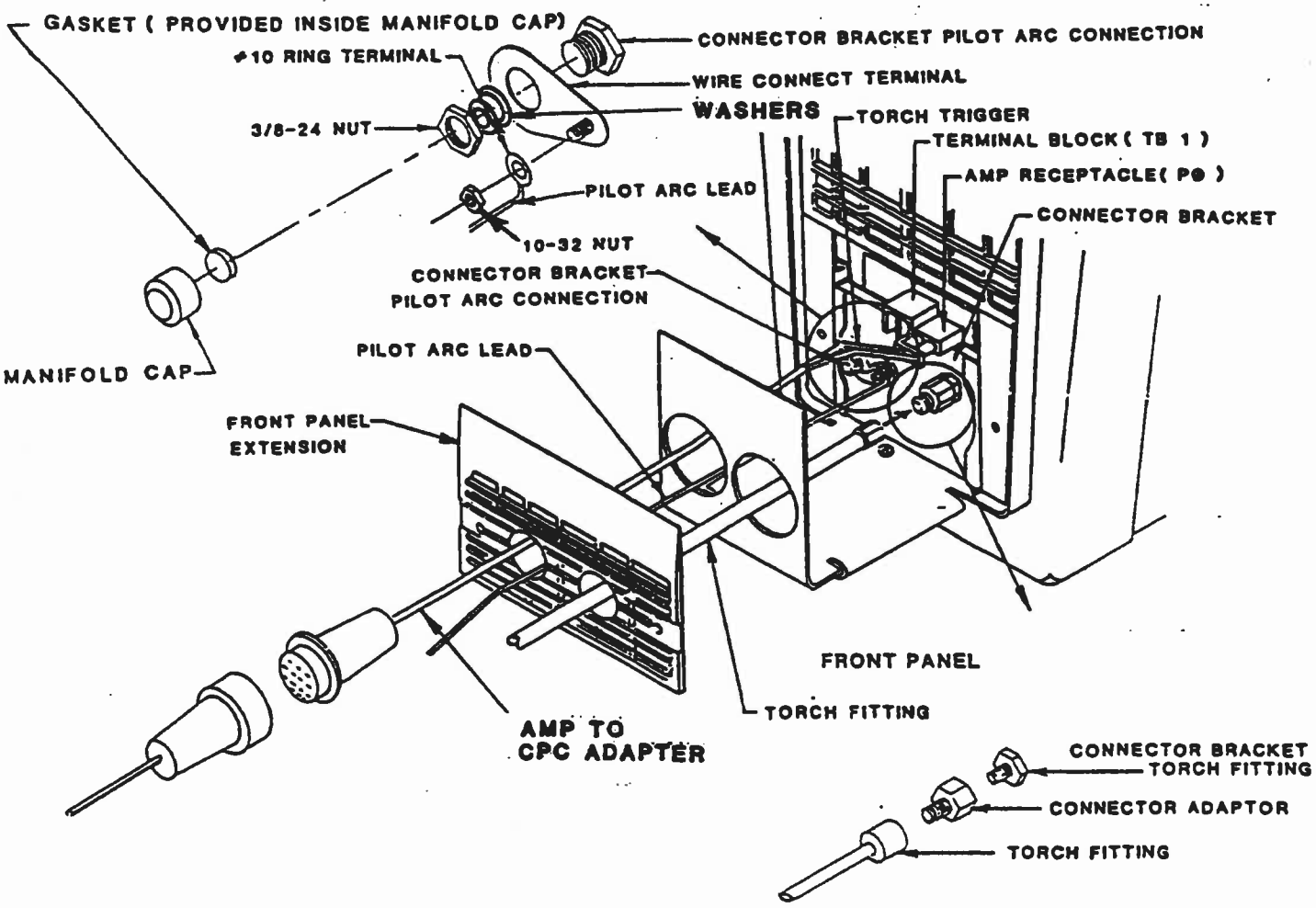
C) Pass the torch leads through the holes in the Front Panel Extension. The Torch Fitting (dark blue hose) goes through the right hole (as you are facing the panel), and the Pilot Arc (gray hose) and Torch Trigger go through the left hole.

D) Tighten the Torch Fitting and Pilot Arc leads securely.

E) Plug the Torch Trigger 2 pin AMP connector into its mating receptacle (P0) on the Trigger Board. Make sure the plug is fully seated.

F) Slide the Connector Bracket back into place and re-tighten the Captive Panel Fasteners.

The installation of your Hypertherm MAX40 PowCon torch is now complete. Verify proper pilot arc and cutting power levels are correct per paragraph 2.5.5.



TDC PCH51/RTH40S STANDARD TORCH

2.5.3 TDC PCH51/RTH40S Standard Torch

To connect your PCH51/RTH40S Standard torch to your Powcon Model 225SMC, you must attach the Torch Fitting, Pilot Arc, and Torch Trigger leads by performing the following steps while referring to FIG. 2.8.

NOTE

CONNECTION OF EITHER THE TDC STANDARD TORCH OR THE TDC POWCON TORCH REQUIRES THE USE OF THE PCH51 TORCH ADAPTER KIT, P/N 107093-001 OR -002. THIS ADAPTER KIT IS INCLUDED WITH YOUR TORCH KIT PURCHASE.

NOTE

THE PCH51 AND RTH40S TDC TORCHES ARE FUNCTIONALLY IDENTICAL EXCEPT FOR THE PRESENCE OF A PARTS IN PLACE CIRCUIT ON THE RTH40S. THE INSTALLATION PROCEDURE IS THE SAME FOR BOTH TORCHES.

A) Rotate quarter turn Panel Fasteners which hold the Front Panel Extension to the tray assembly. Do not try to remove them completely. These fasterners are captivated in the plastic so that they will not be lost.

B) Slide the Connector Bracket out from the tray, exposing the enclosed fittings.

C) Pass the Torch Fitting and the Pilot Arc lead through the holes in the Front Panel Extension. The Torch Fitting (dark gray hose) goes through the right hole (as you are facing the panel), and the Pilot Arc (black wire with ring terminal) goes through the left hole. The Torch Trigger is too large to pass through the opening so the CPC connector should remain on the outside of the panel.

D) Open the PCH51 Torch Adapter Kit (P/N 107093-002) which was supplied with your Torch Kit. Remove the Connector Adapter and attach it securely to the Connector Bracket Torch Fitting as shown in the illustration. Next, attach the Torch Fitting lead (dark gray hose) to the Connector Adapter and tighten securely.

E) Place the Wire Connect Terminal and the washers over the Pilot Arc Connector Bracket connection and secure with the 3/8-24 Nut supplied in the PCH51 Torch Adapter Kit. Then attach the Pilot Arc lead (black wire with #10 ring terminal) to the #10 stud

on the Wire Connect Terminal. Secure it with the nut provided in the kit. Finally, attach the Manifold Cap securely to the Pilot Arc Connector Bracket connection to seal it.

NOTE

THE MANIFOLD CAP CONTAINS A GASKET WHICH KEEPS THE SEALED CONNECTION FROM LEAKING. BEFORE INSTALLING THE CAP, CHECK TO MAKE SURE THAT THIS GASKET HAS NOT BECOME SEPARATED FROM THE CAP DURING SHIPMENT. IF THE GASKET IS MISSING, A LEAK MAY RESULT, CAUSING A GAS/TORCH FAULT.

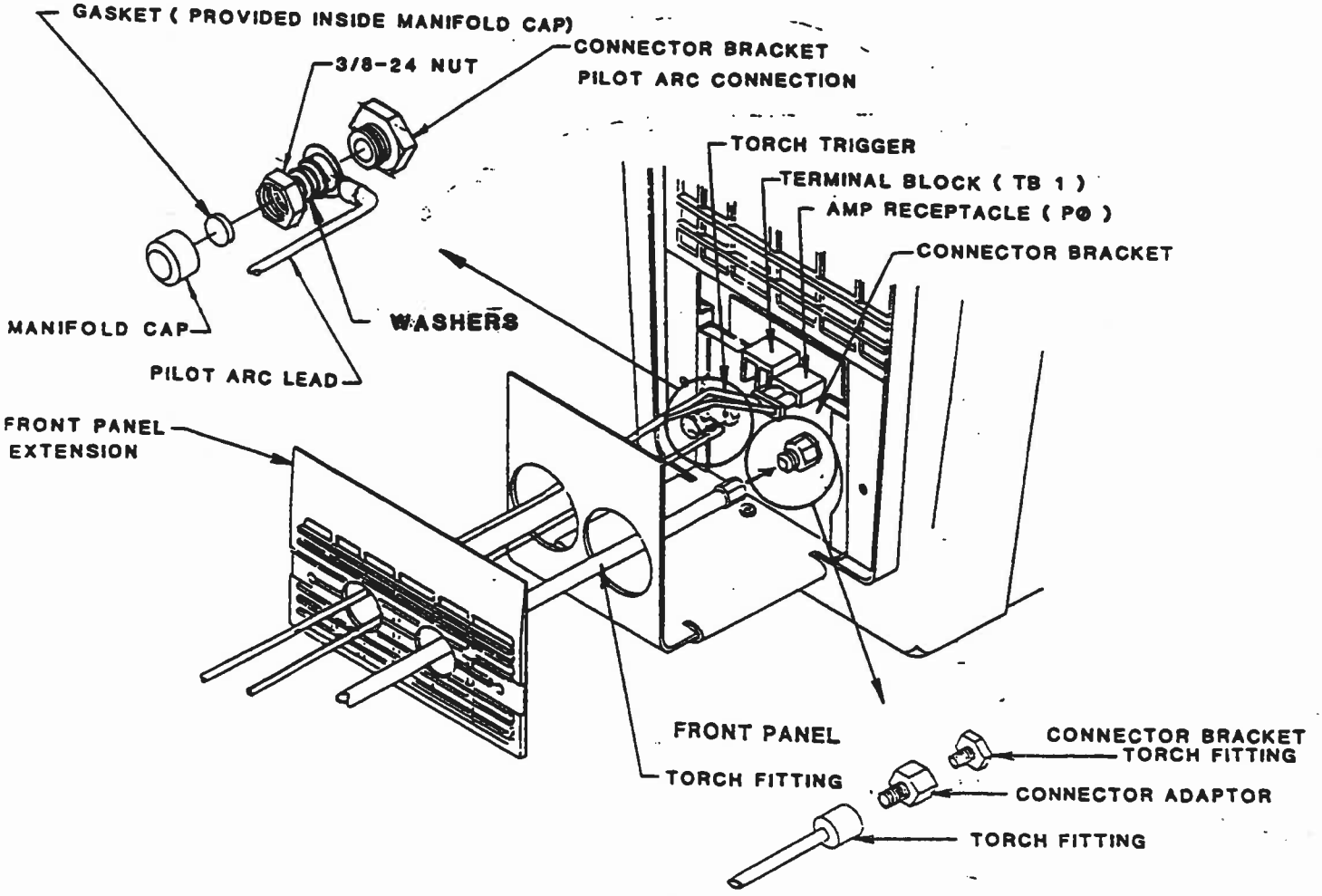
F) Thread the AMP to CPC Adapter from the PCH51 Torch Adapter Kit through the Front Panel Extension and plug the 2 pin AMP connector (P0) into its mating receptacle on the Trigger Board. Make sure the plug is fully seated. Then connect the CPC connector to the Torch Trigger connector on the torch.

G) Slide the Connector Bracket back into place and re-tighten the Captive Panel Fasteners.

The installation of your TDC PCH51/RTH40S Standard torch is now complete. Verify proper pilot arc and cutting power levels are correct per section 2.5.5.

2.5.4 TDC PCH51/RTH40S PowCon Torch

To connect your PCH51/RTH40S PowCon torch to your Powcon Model 225SMC, you must attach the Torch Fitting, Pilot Arc, and Torch Trigger leads by performing the following steps while referring to FIG. 2.9.



TDC PCH51/RTH40S POWCON TORCH

NOTE

CONNECTION OF EITHER THE TDC STANDARD TORCH OR THE TDC POWCON TORCH REQUIRES THE USE OF THE PCH51 TORCH ADAPTER KIT, P/N 107093-001 OR -002. THIS ADAPTER KIT IS INCLUDED WITH YOUR TORCH KIT PURCHASE.

NOTE

THE PCH51 AND RTH40S TDC TORCHES ARE FUNCTIONALLY IDENTICAL EXCEPT FOR THE PRESENCE OF A PARTS IN PLACE CIRCUIT ON THE RTH40S. THE INSTALLATION PROCEDURE IS THE SAME FOR BOTH TORCHES.

A) Rotate quarter turn Panel Fasteners which hold the Front Panel Extension to the tray assembly. Do not try to remove them completely. These fasteners are captivated in the plastic so that they will not be lost.

B) Slide the Connector Bracket out from the tray, exposing the enclosed fittings.

C) Pass the torch leads through the holes in the Front Panel Extension. The Torch Fitting (dark gray hose) goes through the right hole (as you are facing the panel), and the Pilot Arc (black wire with ring terminal) and Torch Trigger go through the left hole.

D) Open the PCH51 Torch Adapter Kit (P/N 107093-001) which was supplied with your Torch Kit. Remove the Connector Adapter and attach it securely to the Connector Bracket Torch Fitting as shown in the illustration. Next, attach the Torch Fitting lead (dark gray hose) to the Connector Adapter and tighten securely.

E) Place the Pilot Arc lead (black wire with ring terminal) and washers over the Pilot Arc Connector Bracket connection and secure with the 3/8-24 Nut supplied in the PCH51 Torch Adapter Kit. Then attach the Manifold Cap securely to the Pilot Arc Connector Bracket connection to seal it.

NOTE

THE MANIFOLD CAP CONTAINS A GASKET WHICH KEEPS THE SEALED CONNECTION FROM LEAKING. BEFORE INSTALLING THE CAP, CHECK TO MAKE SURE THAT THIS GASKET HAS NOT BECOME SEPARATED FROM THE CAP DURING SHIPMENT. IF THE GASKET IS MISSING, A LEAK MAY RESULT, CAUSING A GAS/TORCH FAULT.

F) Plug the Torch Trigger 2 pin AMP connector into its mating receptacle (P0) on the Trigger Board. Make sure the plug is fully seated.

G) Slide the Connector Bracket back into place and re-tighten the Captive Panel Fasteners.

The installation of your TDC PCH51/RTH40S PowCon torch is now complete. Verify proper pilot arc and cutting power levels are correct per section 2.5.5.

2.5.5 PILOT ARC AND MAXIMUM CUTTING POWER LEVEL SETTINGS

NOTE

THE TDC AND HYPERTHERM TORCHES REQUIRE DIFFERENT PILOT ARC AND MAXIMUM CUTTING POWER SETTINGS FOR PROPER CUTTING OPERATION. POOR PERFORMANCE MAY RESULT IF YOUR UNIT IS SET IMPROPERLY. REFER TO THE FOLLOWING PROCEDURE FOR SETTING THESE PARAMETERS.

The TDC torch uses a lower power level for the pilot arc and a higher power level for the maximum cutting power than its Hypertherm counterpart. For proper cutting operation, the correct power levels must be selected for each torch. This selection is made via a 2 position DIP (Dual In-Line Package) switch located on the Cutter Control PCB.

This switch is shown in Figure 2.10. Each position is called a "rocker," as indicated in the illustration. To change the setting for either pilot arc or maximum cutting power you must change the position of the rockers. You may use a small screwdriver, toothpick, or your fingernail to change the rocker position.

When you are instructed to push the rockers toward the numbered side, that means that the rockers should be flush with the switch surface on the side marked "1" or "2". This is illustrated by looking at the Hypertherm Torch setting in Figure 2.10. When you are instructed to push the rockers toward the OPEN side, the rockers should be flush with the switch surface on the side marked "OPEN". This is illustrated by looking at the Thermal Torch setting in Figure 2.10.

Rocker 1 controls the pilot arc power setting. Low power (normally used with the TDC torch) occurs when rocker 1 is pushed toward the OPEN position. High power (normally used with the Hypertherm torch) occurs when it is pushed toward the "1".

Rocker 2 controls the maximum cutting power setting. Low power (approximately 50A, normally used with the Hypertherm torch) occurs when rocker 2 is pushed toward the "2". High power (approximately 65A, normally used with the TDC torch) occurs when it is pushed toward the OPEN position.

Table 2.6 summarizes these switch positions.

TABLE 2.6

SUMMARY OF DIP SWITCH SETTINGS

ROCKER 1		ROCKER 2	
POSITION	PILOT ARC POWER	POSITION	MAXIMUM CUTTING POWER
1	HIGH	2	LOW
OPEN	LOW	OPEN	HIGH

If you purchased your Powcon Model 225SMC as a system from the factory (torch supplied) this switch has been set for your torch by a PowCon factory technician. If you purchased a system without a torch, you will need to make sure that this switch is set properly before performing cutting operations.

To check which way the factory set this switch, refer to the tag attached either to the handle of the power supply or the unit process switch on the front panel. There is a box on this tag which has been checked with the current switch setting.

Since the PowCon Model 225SMC provides an open torch architecture, you may change the setting of this switch at any time to accomodate a different torch. To change your settings, perform the following steps:

A) Remove the 10 bolts and nuts holding the top cover on the unit.

B) Remove the panel guards and top cover.

C) Locate the Cutter Control PCB. Refer to FIG. 2.10.

D) Locate the 2 position DIP switch, rockers 1 and 2. Place these switch positions in either the TDC or Hypertherm position as indicated in FIG 2.5. Make sure that each rocker is firmly in either the OPEN position (as indicated on the switch) or CLOSED position (indicated by the numbers 1 and 2 on the switch).

E) Replace the top cover and panel guards and secure them with the 10 case bolts and nuts.

The Pilot Arc and maximum cutting power setting is now complete.

TOP OF UNIT SHOWN WITH COVER REMOVED

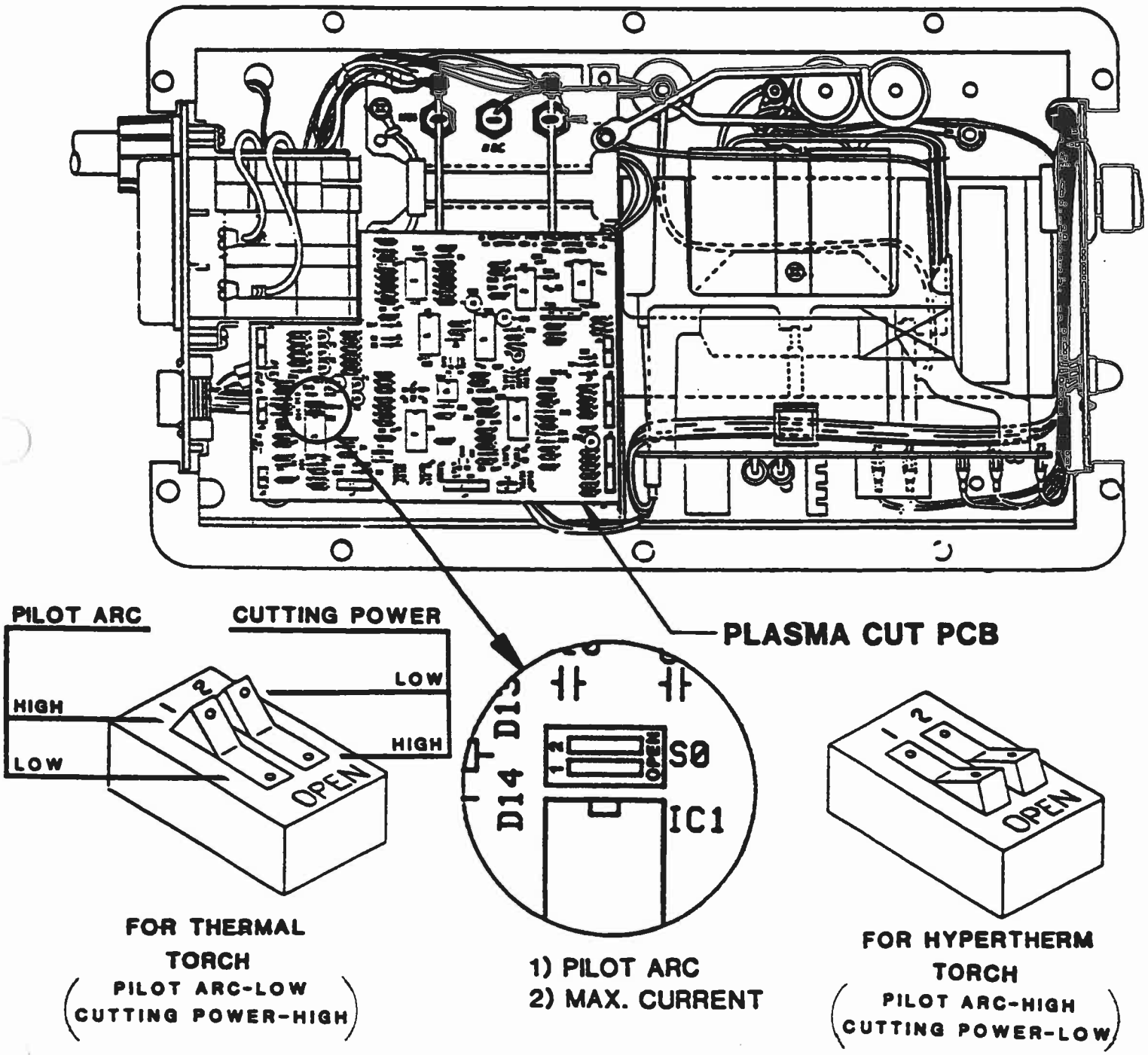


FIG. 2.10,STANDARD PILOT ARC & MAX. CUTTING POWER SETTINGS

3.1 FUNCTION AND LOCATION OF WELDER CONTROLS AND CONNECTIONS (See Figure 3.1)

1. Circuit Breaker
The circuit breaker acts as a switch to turn the incoming primary power on and off and also trips in case of fault in the power circuits.

WARNING

IN ORDER TO AVOID AN ELECTRICAL SHOCK, POTENTIAL FIRE OR EQUIPMENT MALFUNCTION, THE CIRCUIT BREAKER MUST NEVER BE FORCIBLY HELD CLOSED IN THE ON POSITION.

ONCE THE CIRCUIT BREAKER IS TURNED ON, DC CURRENT IS PRESENT IN THE WELD MODE AT THE OUTPUT OF THIS POWER SOURCE. THIS MEANS THAT THE ELECTRODE IS LIVE AT ALL TIMES. AVOID AN ELECTRIC SHOCK.

2. Indicator Lamp
Indicates that the circuit breaker is closed and primary power is being supplied to unit.

3. Cut/Weld Power Control Dial
Adjusts the output of the unit. It is graduated in 10% increments and adjusts from a minimum of 30 amps @ 21.2V to 250 amps @ 30V with single phase 220VAC input. When plasma cutting this control adjusts the output current from a minimum of 20 amps to a maximum of 55 amps.

4. Remote Connector
Connection for remote current control device. When connected, control of the welding power is automatically switched to remote device. The indicator lamp remains on when the remote is connected and the circuit breaker on.

NOTE

PLASMA CUTTING USES A SEPARATE INDEPENDANT CONTACTOR CIRCUIT. THEREFORE, THE OPERATION OF THE STANDARD POWCON REMOTE DEVICES WILL BE ALTERED SLIGHTLY IN THE CUT MODE. IN THIS MODE, THE DEVICES CAN BE USED AS REMOTE CURRENT CONTROL DEVICES ONLY. THE PLASMA CONTACTOR IS OPERATED FROM THE TORCH TRIGGER.

5. Primary Cable
Unit comes from factory with 9 feet (2.7M) of primary lead connected to the circuit breaker through the strain relief. See INSTALLATION, Section 2, for recommended cable size and fuse requirements.

6. Output Terminals
Quick connect female output receptacle with polarity as marked. User must supply cable and male connect plugs. See Table 2.3 for recommended cable size.

7. Weld Process Selection Switch

I GTAW/SMAW - Used for scratch start GTAW or SMAW.

II GMAW (Short Circuit) - Use for low current GMA short-arc transfer

III GMAW FCAW & SMAW - Use for either high current GMA Short-Arc, GMA spray transfer or FCAW.

NOTE

DO NOT CHANGE PROCESS SWITCH UNDER LOAD.

3.2 FUNCTION AND LOCATION OF CUTTER CONTROLS AND CONNECTIONS

8. INDICATOR LIGHTS
TRIGGER (Green Indicator Lamp) - ON when unit process switch is in cut mode and trigger is depressed.

ARC TRANSFER (Green Indicator Lamp) - ON when cutting current is produced and arc is transferring.

GAS/TORCH (Red Indicator Lamp) - ON if insufficient gas, if torch connections are loose, or a gas leak exists.

GROUND (Red Indicator Lamp) - ON if ground work piece connected to negative terminal or not connected.

TEMPERATURE (Red Indicator Lamp) - ON when cutting inductor is overheated.

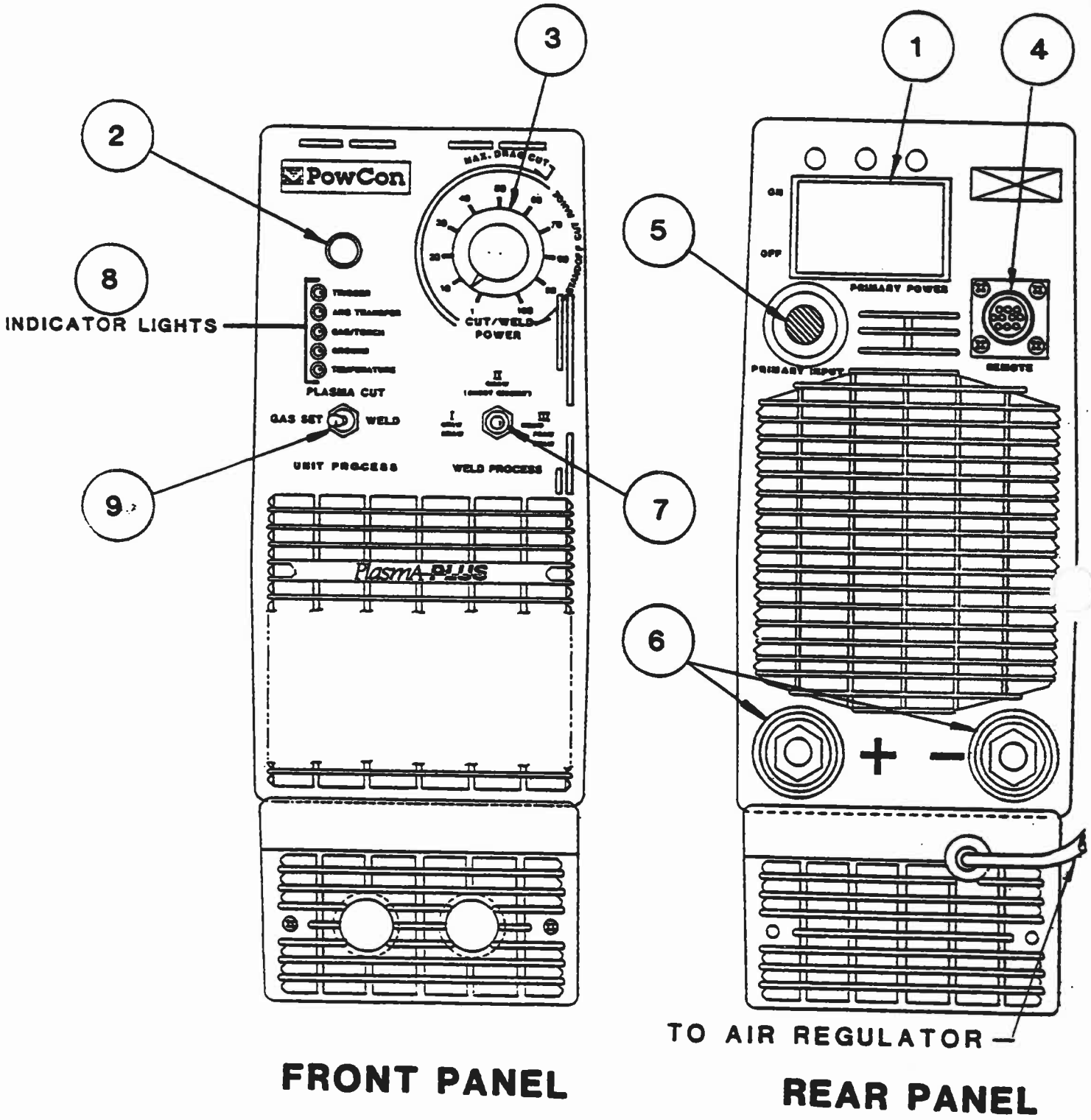
NOTE

THE INDICATOR LAMPS REFERRED TO ABOVE ARE ONLY FUNCTIONAL WHEN UNIT PROCESS SWITCH IS IN PLASMA CUT MODE. GREEN LIGHTS INDICATE A NORMAL MACHINE FUNCTION, WHEREAS RED LIGHTS INDICATE A FAULT.

9. UNIT PROCESS SWITCH
Gas Set - To purge gas lines and set pressure on external regulator. Set proper pressure settings for each torch.

Plasma Cut - Cutting may be done in this mode only. Weld Process switch is inactive in this mode.

Weld - Welding may be done in this position only. Activates weld process mode switch.



201150-001 FIGURE 3.1, FRONT AND REAR PANELS 3-4

3.3 WELDING

Prior to performing any welding, go through the following procedure:

A) Inspect the unit to make sure it is set up properly according to the equipment installation in section 2.

B) Choose the applicable welding process on the process selection switch.

C) Adjust the WELD/CUT POWER Control to the desired power level needed for your application.

D) Lift the handle of the automatic circuit breaker to its "UP" position. At this time the pilot light will come on and the fan will start. A "ticking" sound will be heard (if the machine is not under load). This indicates that the rectifier is coming on about once per second for a very short time to provide the open circuit voltage.

NOTE

WHEN EITHER A FOOT OR HAND OPERATED REMOTE DEVICE IS CONNECTED TO THE POWER SUPPLY, THE "TICKING" SOUND WILL NOT OCCUR. HOWEVER, THE DIGITAL DISPLAY AND FAN WILL REMAIN ON.

E) After the ticking has been observed, you may commence welding.

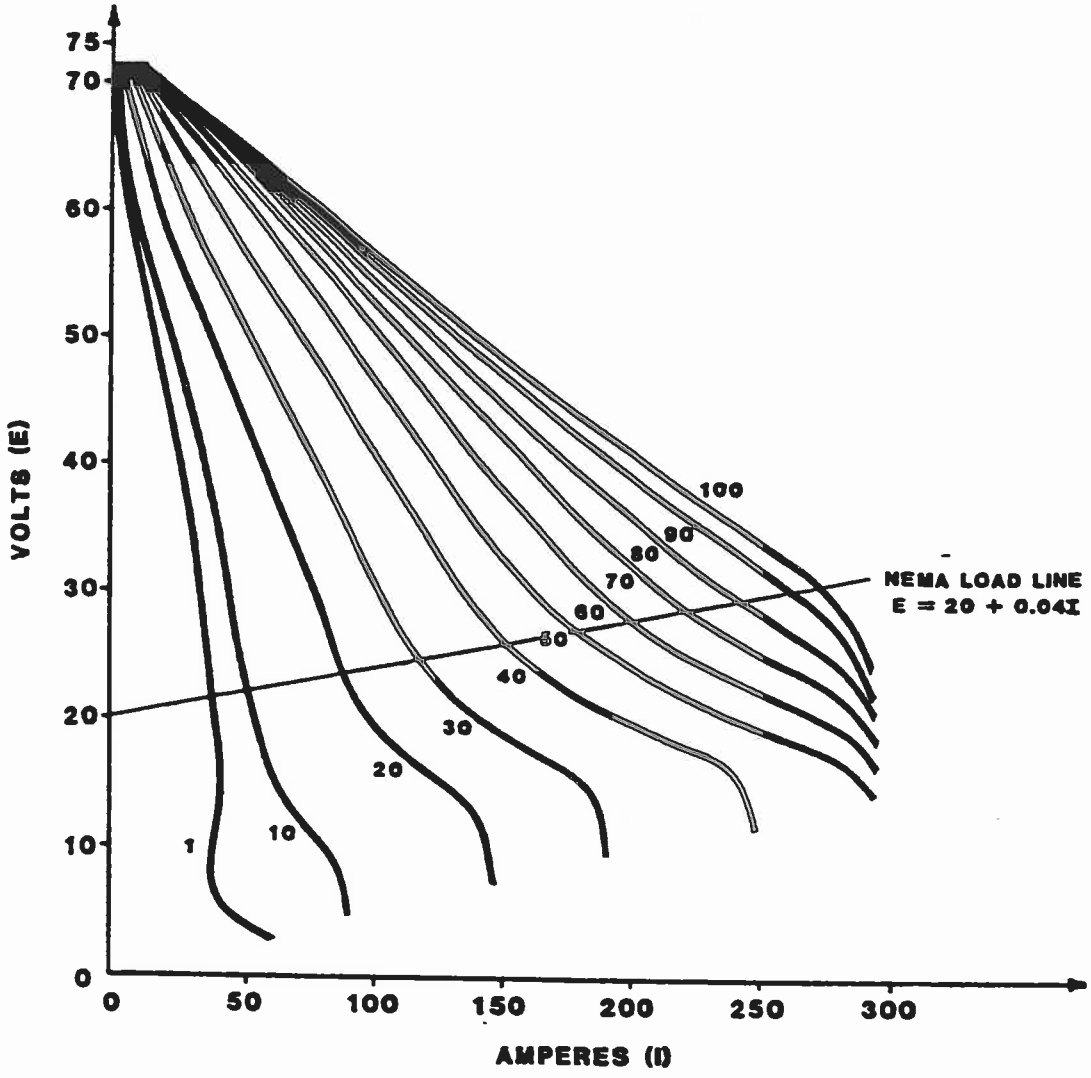
F) After welding has been completed, allow the fan in the unit to run for a few minutes to remove the heat from the power supply prior to turning the unit off.

3.3.1 WELDING TECHNIQUES

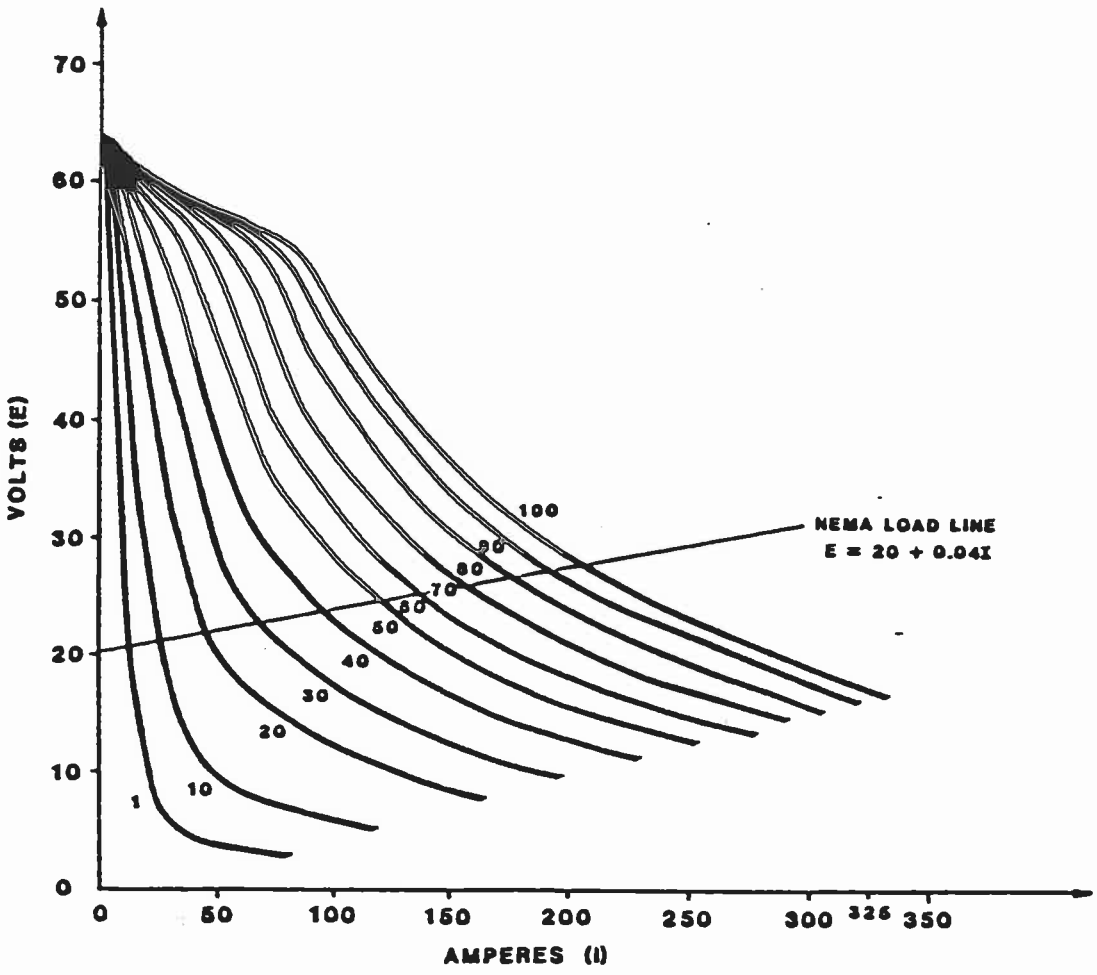
Welding techniques vary as a function of both the individual performing the operation and the code requirements of the applicable welding procedure. Laboratory tests and industrial users have demonstrated the use of the PowCon with a variety of electrode types and diameters. Some typical electrodes and recommended machine settings are shown in Table 3.1.

3.3.2 OPERATING IN THE SMAW MODE (POSITION I)

The weld process switch should be in the SMAW mode. The volt ampere characteristic curves for the PowCon Model 225SMC in the SMAW mode are shown in Figure 3.2.



201150-001 FIG. 3.2, VOLT/AMP CURVES, SMAW MODE


70
60
50
40
30
20
10
0
VOLTS (E)
0
50
100
150
200
250
300
325
350
AMPERES (I)
NEMA LOAD LINE
E = 20 + 0.04I
100
90
80
70
60
50
40
30
20
10
1

3.3.3 OPERATING IN THE GMAW MODE (POSITION III)

The high current densities used for GMAW spray transfer and FCAW usually require higher settings of weld power. General guidelines for the establishing of operating points are shown in Table 3.1. The volt/ampere characteristic curves for the PowCon in position III are also shown in Figure 3.3.

TABLE 3.1

RECOMMENDATIONS FOR E70S-3 SPRAY TRANSFER
USING 98%/2% AR/O SHIELDING GAS*

WIRE DIAMETER (INCHES)	POWER SETTING %	CURRENT (A)	WIREFEED SPEED (IPM)	VOLTAGE (V)
.030	40-100	145-220	400-650	25-28
.035	50-100	180-250	250-400	25-28

*The recommended power settings represent the manufacturer's best estimate and are intended only as guidelines for the use of the PowCon.

3.3.4 OPERATING IN THE SHORT ARC MODE (POSITION II)

Short circuiting transfer GMA welding is distinguished from other transfer modes by the use of small diameter wires with relatively low currents and the ability to be used for out of position welding. The filler metal is transferred to the base material during the short circuit when the welding voltage goes to near zero.

The PowCon controls the short-arc transfer by switching between two modes, delivering a programmed amount of power for (1) the arcing period and (2) the short period. The unit alternates between the two modes by monitoring the output voltage. When a predetermined minimum voltage is reached, the unit senses a short is occurring and delivers the appropriate amount of power. The weld power control dial regulates the amount of power delivered during both the short and arcing period of the process.

To obtain an operating point requires a selection of both proper wire feed speed and weld power. The selection of welding wire and gas is also very important to this process. Once a suitable combination of weld power and wirefeed speed is obtained, minor adjustments to the wire feed speed can be made and the power source will compensate its output accordingly.

The short-arc mode in the PowCon Model 225SMC has been designed with the low current user in mind. High quality welds can be made on thin plate with a current of 20-30 amps. Electronic control assures a smooth, steady arc up to 150 amps.

For some higher current short-arc applications, the process switch can be placed in the GMAW spray position. This switches the power supply out of the low current electronic control mode, and into a dynamic response mode. As a result, at operating points several amps before the spray transition current occurs, excellent, crisp short-arc can be performed on a variety of plate thicknesses and current levels.

3.4 CUTTING

After all primary and secondary connections have been completed and the torch consumables are in place, follow the start-up and operating sequence of events:

A) Turn power circuit breaker at the rear of unit to the on position to energize input power to the system.

B) Turn on the air to the welder/cutter and adjust pressure with the UNIT PROCESS switch in the GAS SET position. Set air pressure as follows:

1. Lift adjusting knob on top of regulator to release from locked position.

2. Turn knob clockwise to increase and counterclockwise to decrease pressure.

NOTE

THE THERMAL DYNAMICS PCH51 TORCH OPERATES AT 55 PSI AND THE HYPERTHERM MAX40 AT 60 PSI.

C) Select a weld/cut power percentage depending on the work to be done. Refer to Figure 3.4 for the relationship between material thickness, cutting speed, and weld/cut power settings.

D) Push and hold down the start switch on the torch to energize the plasma start. The following should occur:

1) Two-second gas preflow starts and simultaneously the green torch indicator illuminates.

2) After the two-second preflow the pilot arc initiates.

3) Transferred arc will occur if the torch is near or touching the workpiece. (Within approximately .15").

4) Releasing the button shuts off the pilot and transfer.

5) Postflow of gas will continue for 10 seconds after the pilot is transferred.

NOTE

IF THE TORCH START SWITCH IS PUSHED DURING THE 10 SECOND POSTFLOW, THE PILOT ARC WILL INITIATE IMMEDIATELY.

3.4.1 TORCH OPERATION/CUTTING TECHNIQUES

Preparation:

A) Operator must be equipped with the proper safety protection, i.e., shaded welding hood or goggles, gloves, flame retardant clothing, etc.

B) Material to be cut must be free of solvents or other potentially toxic substances.

C) Work must be properly grounded to the positive terminal of the PowCon Model 225SMC.

D) Operator should position self to be comfortable for best cutting results.

Piercing:

A) Place the torch nozzle against the workpiece at an angle so that hot metal will be directed away from the operator or those people in the immediate area.

B) Push torch start button. After the pilot arc and transferred arc have established, slowly rotate the torch to the vertical position as the arc penetrates the work.

C) After piercing is complete, proceed to drag the torch nozzle along the predetermined cut path.

Cutting:

A) Transferred arc will occur if the pilot arc is within approximately 1/8 inch of the workpiece.

B) Adjust the current and the cutting speed according to Figure 3.4 for each material and thickness. For best results, use the maximum current possible for each thickness.

C) The retaining cap insulated edge can be used as a guide for templates

NOTE

USING EXCESSIVE CURRENT WILL LIMIT PARTS LIFE. REFER TO SECTION 2.5.5 FOR MORE INFORMATION ON MAXIMUM CUTTING POWER SETTINGS.

3.5 DUTY CYCLE

The duty cycle of a welding power supply is a measure of the capacity of the unit. In the United States the PowCon Model 225SMC has a duty cycle based on a 10 minute time period. In certain other countries the duty cycle is based on a 5 minute time period. The duty cycle is the percent of that time period the unit can produce the specified output.

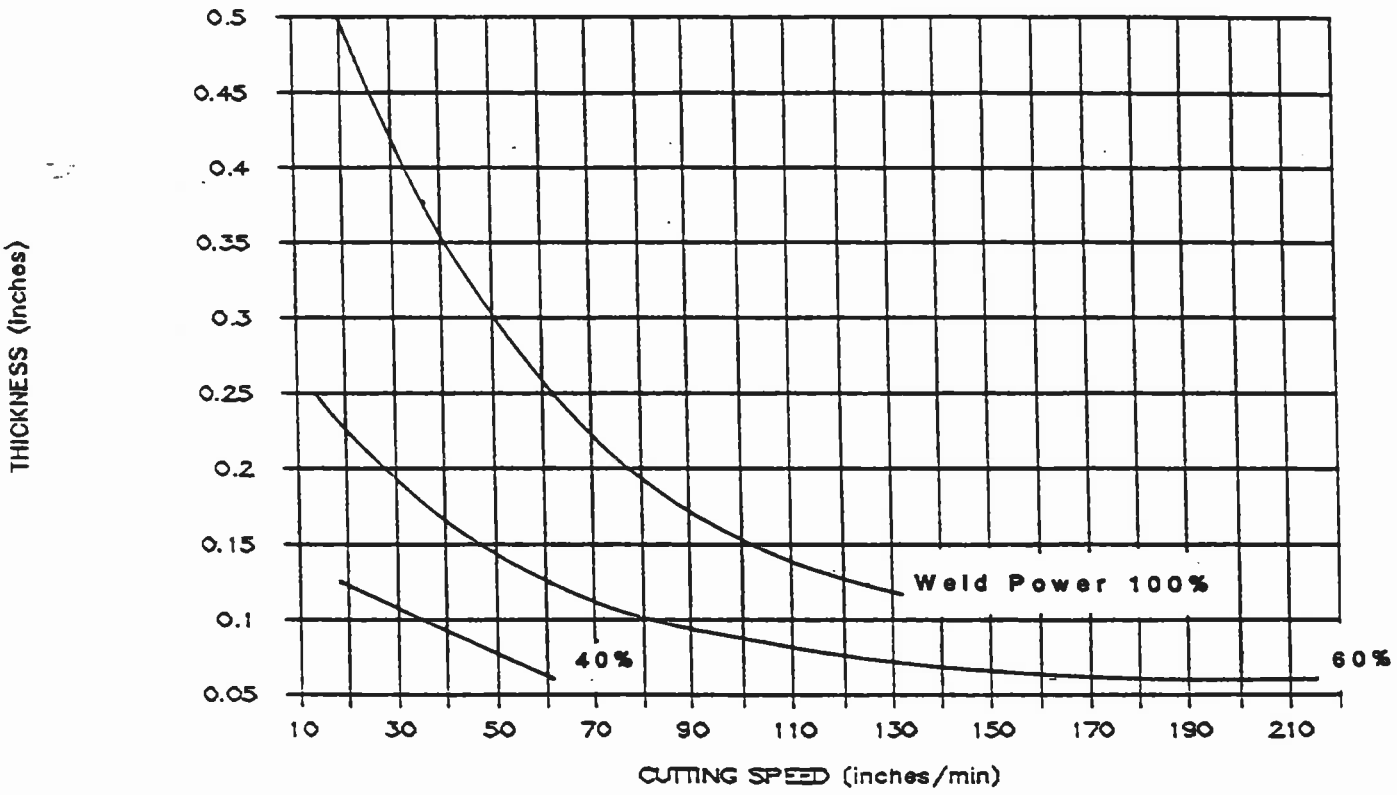
In the welding mode the PowCon Model 225SMC can operate for 5 minutes out of a 10 minute period at an output of 225 amperes and 29 volts. To assure the safe operation of the unit the remaining 5 minutes must be spent idling to permit proper cooling. The duty cycle at this output is 50%.

Lowering the output current allows increases in the duty cycle. Thus the 100% duty cycle (weld output continuous) is 160 amperes and 26 volts.

The duty cycle for the welder/cutter in the plasma cutting operation is 50% at 50 amperes on a five minute time period. Hence, cutting may be done at 50A for 2.5 minutes, and idle for remaining 2.5 minutes of the five minute period.

NOTE

FAILURE TO ALLOW UNIT TO IDLE FOR REQUIRED PERIOD OF DUTY CYCLE WILL ACTIVATE THERMAL OVERLOAD DEVICES. IF THESE DEVICES ARE ACTIVATED, UNIT WILL SHUT DOWN UNTIL COMPONENTS ARE NATURALLY COOLED.



201150-001 FIG. 3.4, MATERIAL THICKNESS -VS- CUTTING SPEED

4.1 SERVICE

Unauthorized service on this unit by anyone other than a PowCon trained and authorized technician will void the warranty. If technical problems arise with your unit, please call your Weld Distributor or the Technical Service Department at PowCon.

4.2 INTERNAL CLEANING

The use of a PowCon unit in an environment containing airborne dust and dirt requires occasional blowing out or vacuuming of the unit. The frequency of the cleaning operation should be done dependent upon the severity of the environment. Use only clean, dry air or a vacuum suction to clean the unit. Do not open the case; just direct cleaning through the vents while the unit is turned off and disconnected from the primary power source.

4.3 EXTERNAL TROUBLESHOOTING

If the PowCon power supply malfunctions, this Troubleshooting Guide will be helpful in locating the problem. This guide covers only malfunctions that can be located and corrected without opening the unit.

A) Before doing anything else, make sure that the unit is connected to the correct voltage and that all three legs of the three phase power are connected.

B) Make sure that the unit is properly grounded.

C) The circuit breaker on the rear panel is intended to trip in the event of a fault or component failure in the unit. It does not trip if the unit overheats; the control circuit automatically turns the output off until it cools down.

If the circuit breaker trips it is probable that a fault has occurred. It may be reset ONCE to see if it was a momentary fault.

NOTE

REPEATED RESETTING OF THE CIRCUIT BREAKER ONLY INCREASES THE CHANCE OF CAUSING ADDITIONAL FAILURES TO THE UNIT.

D) With no load connected turn the unit on , a "ticking" sound should be heard in weld mode.

4.4 TROUBLESHOOTING, WELDING

TROUBLE	POSSIBLE CAUSE	REMEDY
Welding current too low for power setting	Primary voltage too low.	Check primary connections
Unit shuts down while welding, fan rotates and READY light on	Overheating due to:	
	1) Running too high amperage	Wait 20 minutes then reduce the welding current and duty cycle.
	2) Improper cooling of unit	Make sure the air vents are not obstructed.
No wire feed when gun trigger engaged	Poor contactor connection. Lack of auxiliary power to wirefeeder	check remote connections on both PowCon and wirefeeder.
Weld control erratic for application.	Wrong mode on process switch. Wrong range. Wrong weld power setting.	Change as required.

4.5 TROUBLESHOOTING, CUTTING

TROUBLE	POSSIBLE CAUSE	REMEDY
Lack of total penetration.	Current too low.	Increase weld/ cut power.
	Cut speed too high.	Decrease as required.
	Worn torch parts.	Inspect/replace as required.
Transferred arc stops.	Speed too slow.	Increase as required.
	Current too high.	Decrease weld/ cut power.
	Torch standoff too great.	Reduce arc length.

TROUBLE	POSSIBLE CAUSE	REMEDY
	Safety interlock not satisfied.	Check connector bracket, ensure it is closed.
	Ground connection broken.	Inspect and replace as required.
Dross formed on bottom of work.	Speed too slow.	Increase as required.
	Worn or damaged torch parts.	Inspect and replace as required.
	Current too high.	Decrease weld/ cut power.
Limited Max Output. Setting section 2.5	Primary below 208VAC.	Attach unit to higher voltage source. Dip switch.
No Pilot or Eratic Pilot. Setting section 2.5.	Drawer not secure.	Check connector bracket, ensure it is closed. Dip Switch
Cutting capacity low. Torch body & tip very hot.	Electrode burned back too far.	Measure & replace if necessary.
	Cutting tip orifice too small.	Measure & replace.
	Short circuit inside torch.	Change body.
	Water in line.	Purge.
	Tip or electrode loose.	Tighten.
Cutting capacity low quality insufficient	Bad ground.	Clean surface.
	Missing phase.	Check input voltage.
	Cutting tip orifice washer out.	Replace tip.
	Gas flow too high or low.	Check flow.
	Cutting tip orifice too big.	Replace with correct size.

TROUBLE	POSSIBLE CAUSE	REMEDY
Short consumables life.	Dirty air.	Replace filter cartridge.
	Cutting speed too fast/slow.	Adjust travel speed.
	Parts incorrectly fitted, not tight.	Check & replace
	Cooling gas insufficient.	Check and clean parts.
	Mishandling of torch.	Replace damaged parts.
	Too many starts.	Replace consumables.
	Improper piercing procedure.	See proper procedures.

4.6 INTERNAL TROUBLESHOOTING

Internal troubleshooting must be performed by a PowCon trained and authorized technician or authorized repair station.

4.7 AUTHORIZED REPAIR STATIONS

Figure 4.1 shows the sequence for opening the unit and accessing the tray assembly. This allows you to perform internal service on your unit. This must only be performed by an authorized repair station. Evidence of internal service by other than PowCon authorized repair centers will void your warranty.

WARNING

THE CAPACITORS IN THE POWCON UNIT ARE CHARGED WITH HIGH VOLTAGE. THE CAPACITORS WILL DISCHARGE OVER A LONG PERIOD OF TIME UNDER NORMAL SHUTDOWN PROCEDURES. HOWEVER, IN ORDER TO AVOID AN ELECTRICAL SHOCK WHEN THE CASE IS REMOVED, THE CAPACITORS MUST BE DISCHARGED BY THE USE OF A BLEEDER RESISTOR ASSEMBLY, DESCRIBED IN THE NEXT SECTION.

4.8 BLEEDER RESISTOR ASSEMBLY

4.8.1 CONSTRUCTION

This assembly must consist of the following components to be considered acceptable for capacitor bleed-off:

RESISTOR : Minimum requirements - 50 watts, 5 ohm.

CONDUCTOR: #16 AWG 600 VDC insulation rating.
CLIPS: #16 AWG 600 VDC insulation rating.

All connections must be hard wired (soldered). Conductors should be approximately three (3) inches in length.

Resistor body and soldered connections to resistor must be encapsulated with 600VDC rated "heat shrink" insulation.

A discharge resistor assy is available at PowCon, 250040-001.

4.8.2 USE

Once an acceptable discharge device (as described in the previous section) is available, perform the following:

NOTE

READ ENTIRE PROCEDURE PRIOR TO PERFORMING VOLTAGE BLEEDING PROCEDURE.

DANGER

DO NOT ATTEMPT TO PERFORM THIS PROCEDURE WITHOUT THE POWER SUPPLY BEING TURNED OFF AND DISCONNECTED FROM THE PRIMARY INPUT.

B) Locate the C.F. assembly inside the unit as shown in Figure 5-1.

C) Connect one end of the bleeder resistor assembly to one of the heatsinks and attach the other end of the bleeder assembly to the other heatsink. This action will bleed the capacitors.

NOTE

A SPARK DISCHARGE MAY BE NOTICED.

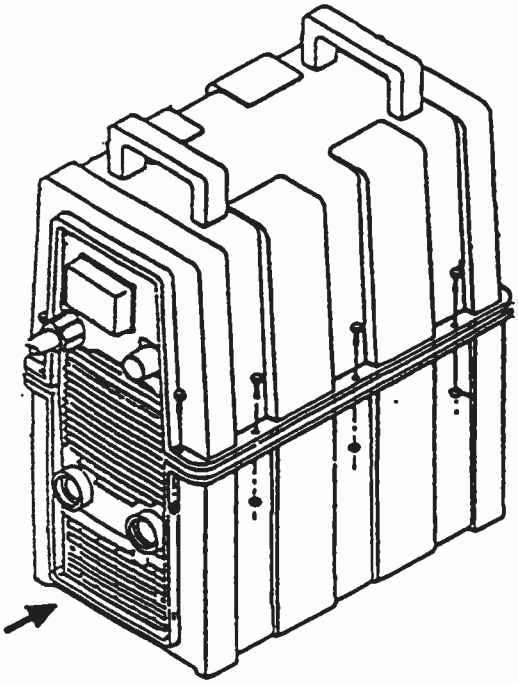
D) Leave the bleeder resistor assembly connected for at least 10 seconds.

E) Remove the bleeder resistor assembly from the unit and continue with the voltage change-over.

WARNING

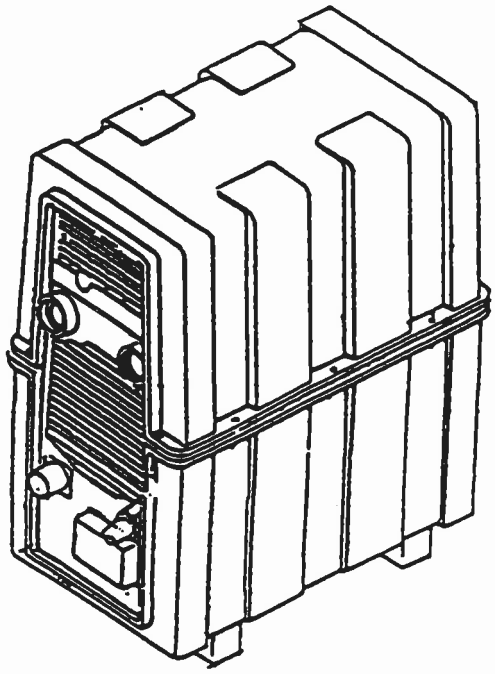
DO NOT ATTEMPT TO DISCHARGE THIS POWER SUPPLY BY ANY OTHER MEANS THAN THAT DESCRIBED ABOVE.

. REMOVE 10 MOUNTING NUTS AND BOLTS AROUND UNIT.

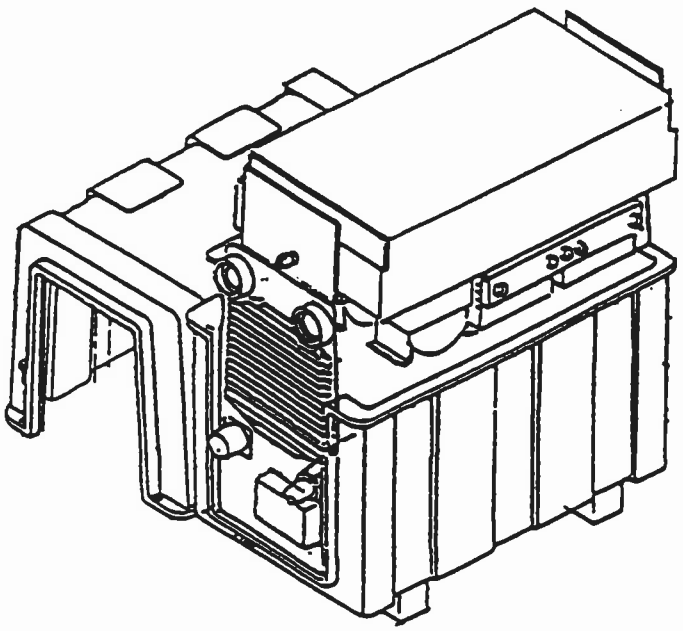


REAR
F UNIT

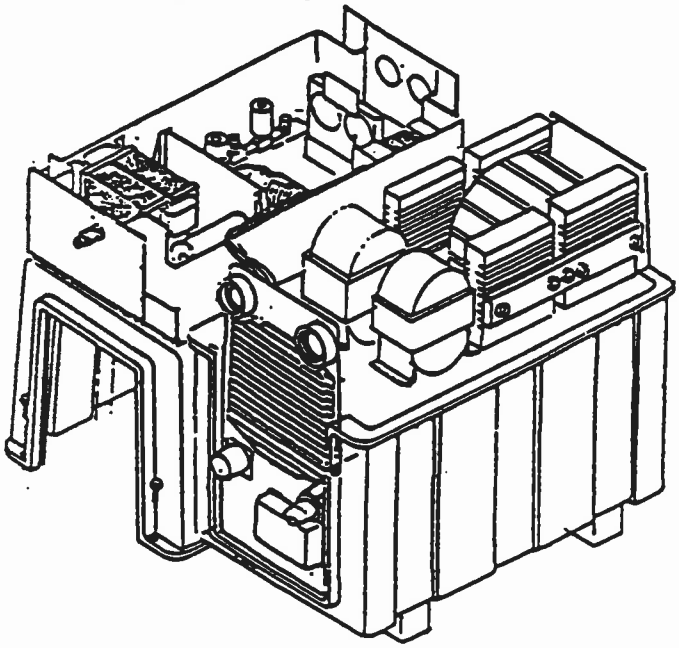
2. TURN UNIT UPSIDE DOWN.



3. REMOVE BOTTOM COVER AND PLACE IT ON FARSIDE.



4. TURN TRAY OVER TO REST IT ON BOTTOM COVER. (DO NOT LIFT TRAY . TURN IT OVER TO AVOID PULLING WIRE CONNECTIONS.)

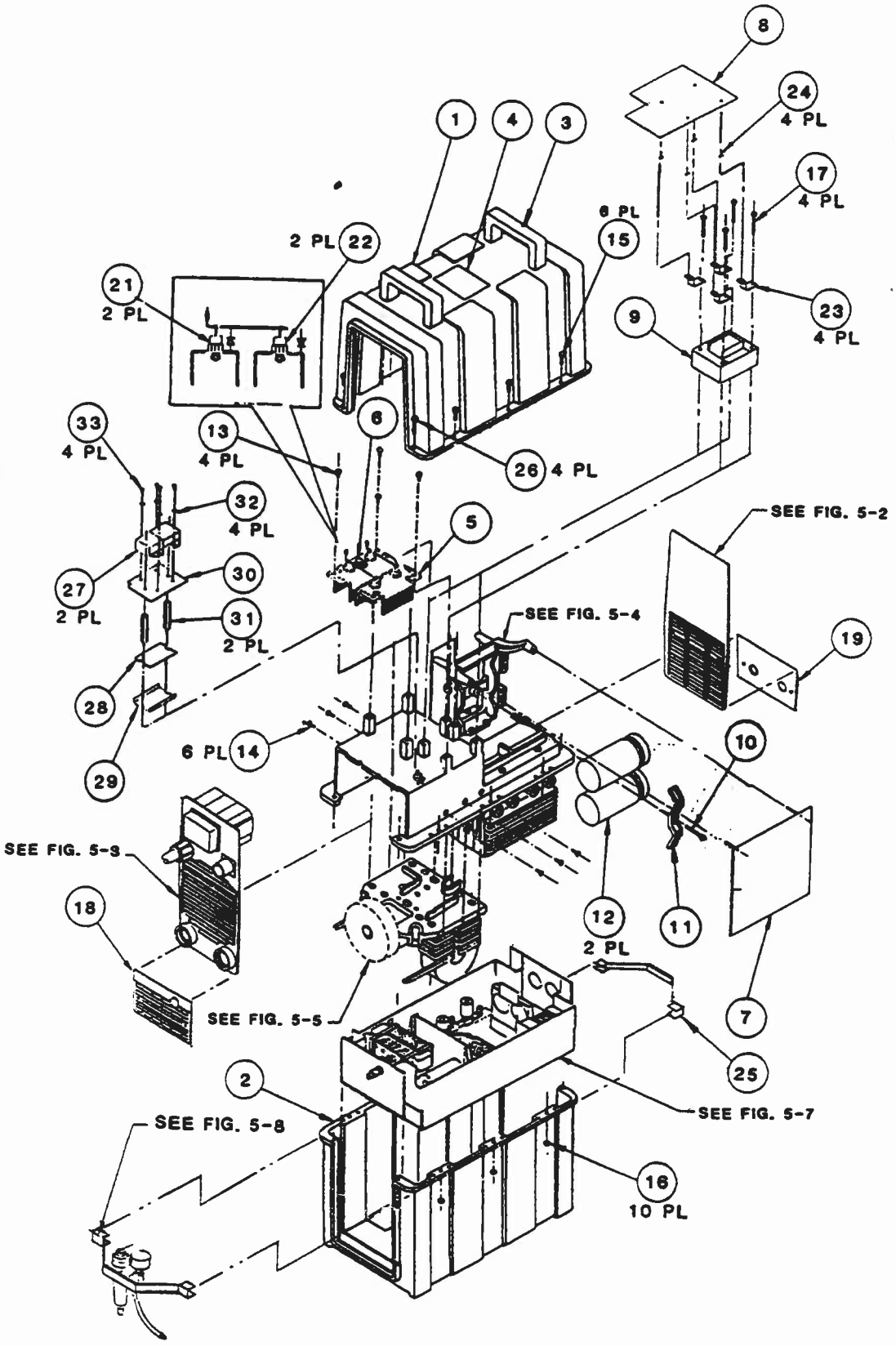


NOTE: TO PUT UNIT BACK INTO PLACE , REVERSE PROCESS SHOWN.

TABLE 5.1

PARTS LIST FOR FINAL ASSEMBLY, MODEL 225SMC

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION
1	1	250018-001	TOP CASE KIT
2	1	100007-001	BOTTOM CASE
3	2	250017-001	HANDLE KIT
4	1	107079-001	DATA TAG
5	1	105028-001	NPUT RECTIFIER ASSY
6	1	912000-001	OVP DIODE
7	1	107015-011	CONTROL PC BOARD
8	1	107002-001	CUTTER PC BOARD
9	1	107096-001	AUX XFMR, MODEL 225SMC
10	1	970002-520	SCR,PNH,SUPADRV 10/32X1 3/4
11	1	100167-001	CAPACITOR CLAMP
12	2	900000-001	INPUT CAPACITOR
13	4	970025-506	SCR,PLASTON #10 X 1/2
14	6	970011-506	SCR,FLAT HD SUPADRIVE
15	6	970006-614	SCR,FLANGED HEX HD MACH.
16	10	972001-006	NUT,FLANGED HEX, SELF-LOCKING
17	4	970002-520	SCREW, PAN HEAD,SUPADRI'
18	1	107013-001	BACK EXTENSION PANEL
19	1	107112-001	FRONT EXTENSION PANEL
20	2	100234-001	CAPACITOR CROSSOVER BUSSWIRE
21	2	912000-001	INPUT DIODE ANODE TO STUD
22	2	912000-002	INPUT DIODE CATHODE TO STUD
23	4	107011-001	PCB SUPPORT
24	4	2040-0617	SPACER PCB MOUNT
25	1	100314-002	PANEL GUARD
26	4	970006-616	SCR,FLANGED HEX HD MACH.
27	2	923009-001	POWER, 30A RELAY
28	1	604070-001	FILTER, PC BOARD
29	1	100279-001	FILTER BOARD INSULATOR
30	1	107207-001	RELAY MOUNTING PLATE
31	2	981002-003	M/F THREADED HEX STANDOFF
32	4	974000-003	WASHER, #6 FLAT
33	4	970000-304	SCR,PANHEAD #6 X 3/8

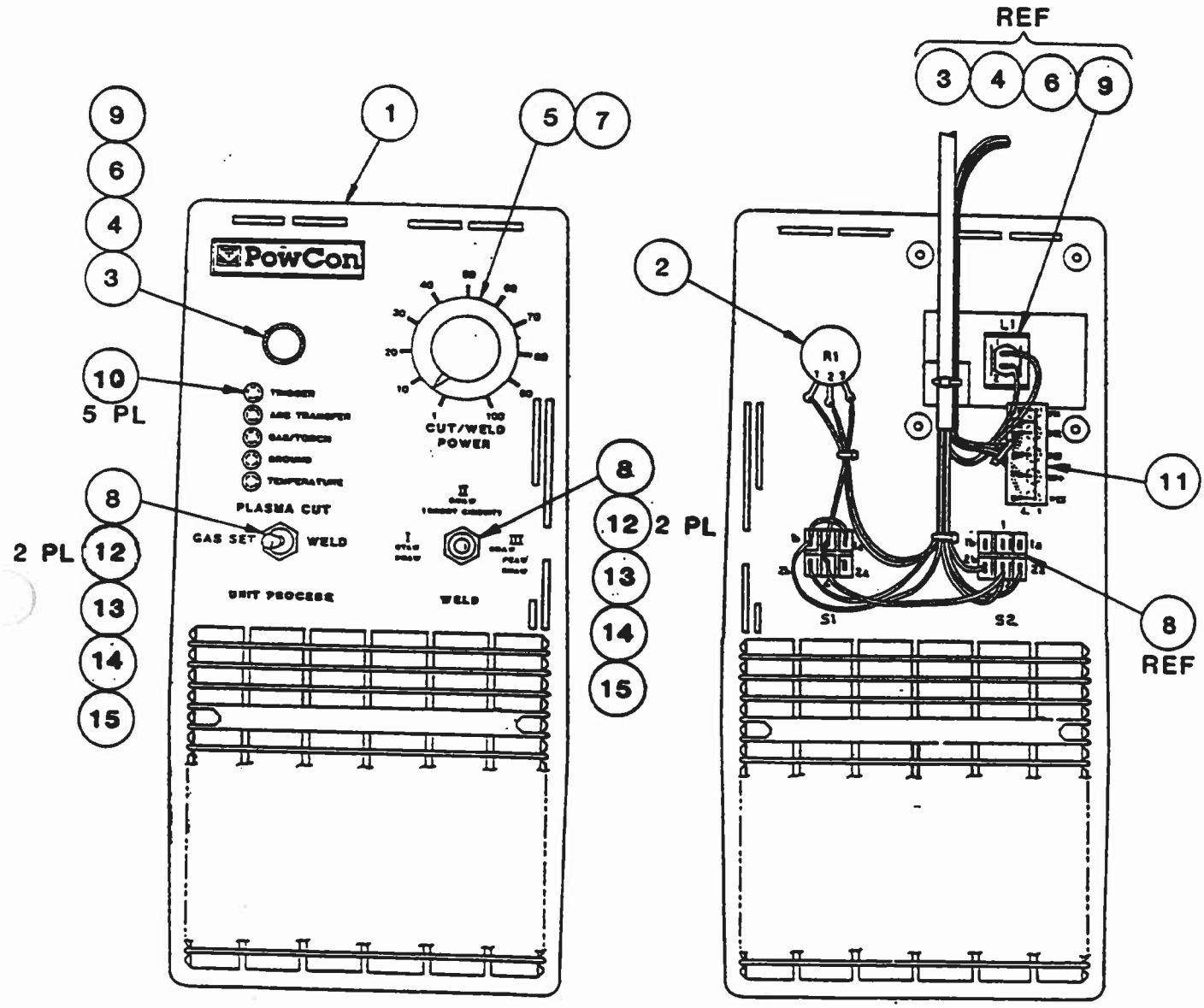


201150-001 FIG. 5.1, FINAL ASSY, MODEL 225SMC

TABLE 5.2

PARTS LIST FOR FRONT PANEL ASSY, MODEL 225SMC, 107040-001

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	107039-001	FRONT PANEL, SILKSCREENED	
2	1	903000-002	POTENTIOMETER, 5K	
3	1	941001-030	PILOT LIGHT SOCKET BODY	
4	1	941001-010	PILOT LIGHT LAMP	
5	1	100256-001	SHAFT LOCK	
6	1	941001-020	PILOT LIGHT LENS	
7	1	940000-001	LARGE KNOB	
8	2	920004-003	TOGGLE SWITCH - 3 POSITION	
9	1	941001-040	PILOT LIGHT AND SUPERDRIVE NUT	
10	5	941004-004	LED MOUNT T-1 3/4	
11	1	107088-001	LED BD, MODEL 225SMC	
12	2	920001-010	FACE NUT	
13	2	920001-020	SWITCH, SLEEVE	
14	2	920001-030	LOCKING RING	
15	2	920001-040	LOCK WASHER	


REF
3
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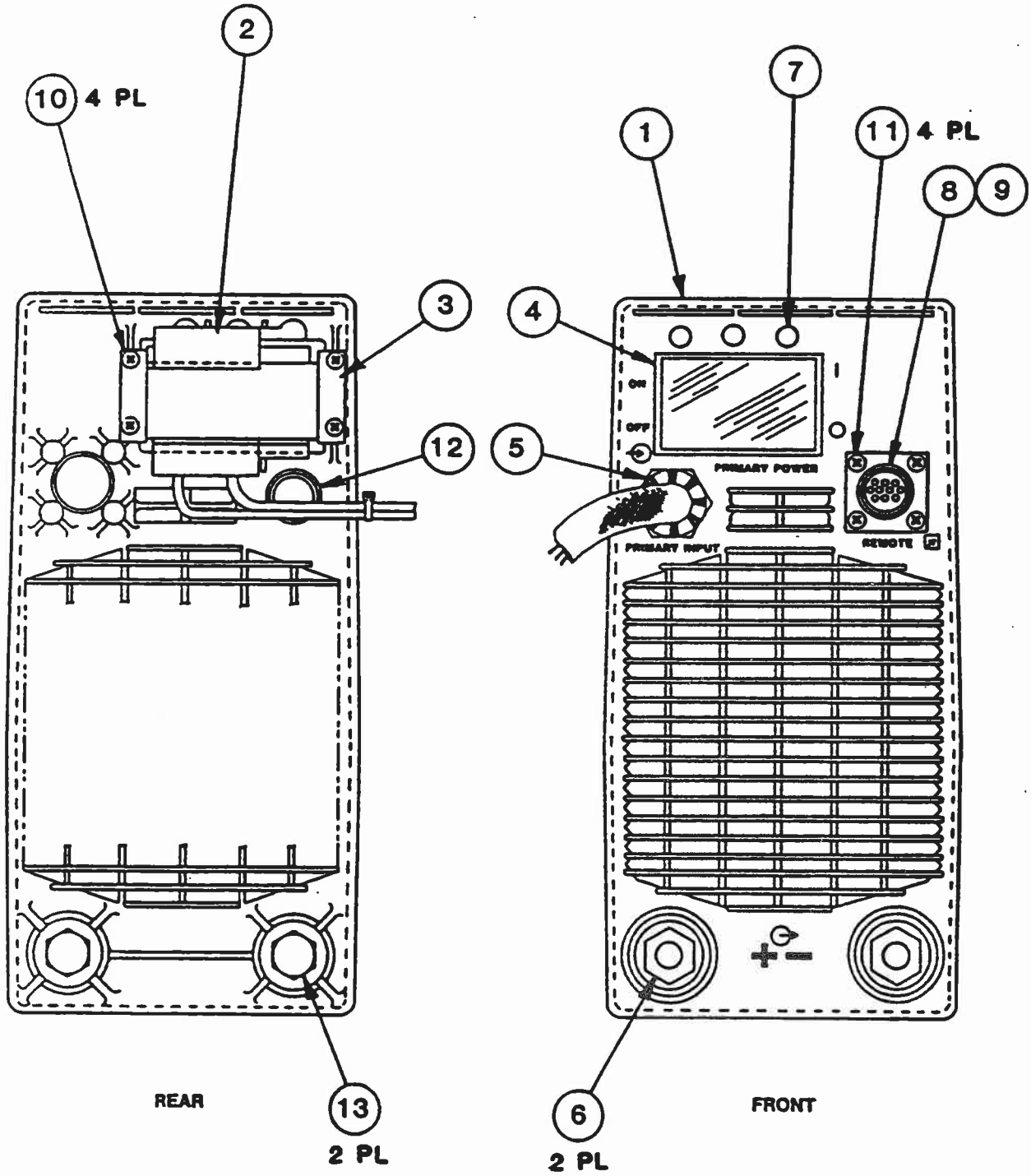
5 PL
8
2 PL
12
13
14
15
PowCon
CUT/WELD POWER
PLASMA CUT
GAS SET
WELD
UNIT PROCESS
WELD
8
12
2 PL
13
14
15
2
R1
L1
11
8
REF
S1
S2
FRONT
REAR

TABLE 5.3

PARTS LIST FOR REAR PANEL ASSY, 107091-001

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	100022-002	REAR PANEL, SILKSCREENED	
2	1	921000-002	CIRCUIT BREAKER, 2 POLE	
3	1	100030-001	CIRCUIT BREAKER BRACKET	
4	1	100005-001	CIRCUIT BREAKER BOOT (MOISTURE SEAL)	
5	1	940003-001	INPUT CABLE CLAMP	
6	2	100025-001	OUTPUT JACK, TWECO, FEMALE	
OPT	2	100028-001	OUTPUT JACK, DIX, FEMALE	
7	1	250001-001	HOLE PLUG, (10 PIECES)	
8	1	930000-001	CIRCULAR CONNECTOR SYSTEM	
9	1	930000-002	SEALING CUP	
10	4	970025-506	SCREW, SUPADRIVE, PLASTN #10 X 1/2	
11	4	970025-304	SCREW, SUPADRIVE, PLASTN #6 X 3/8	
12	1	940003-010	LOCKNUT, 3/4 CONDUIT	
13	1	250002-001	OUTPUT JACK, HARDWARE KIT	

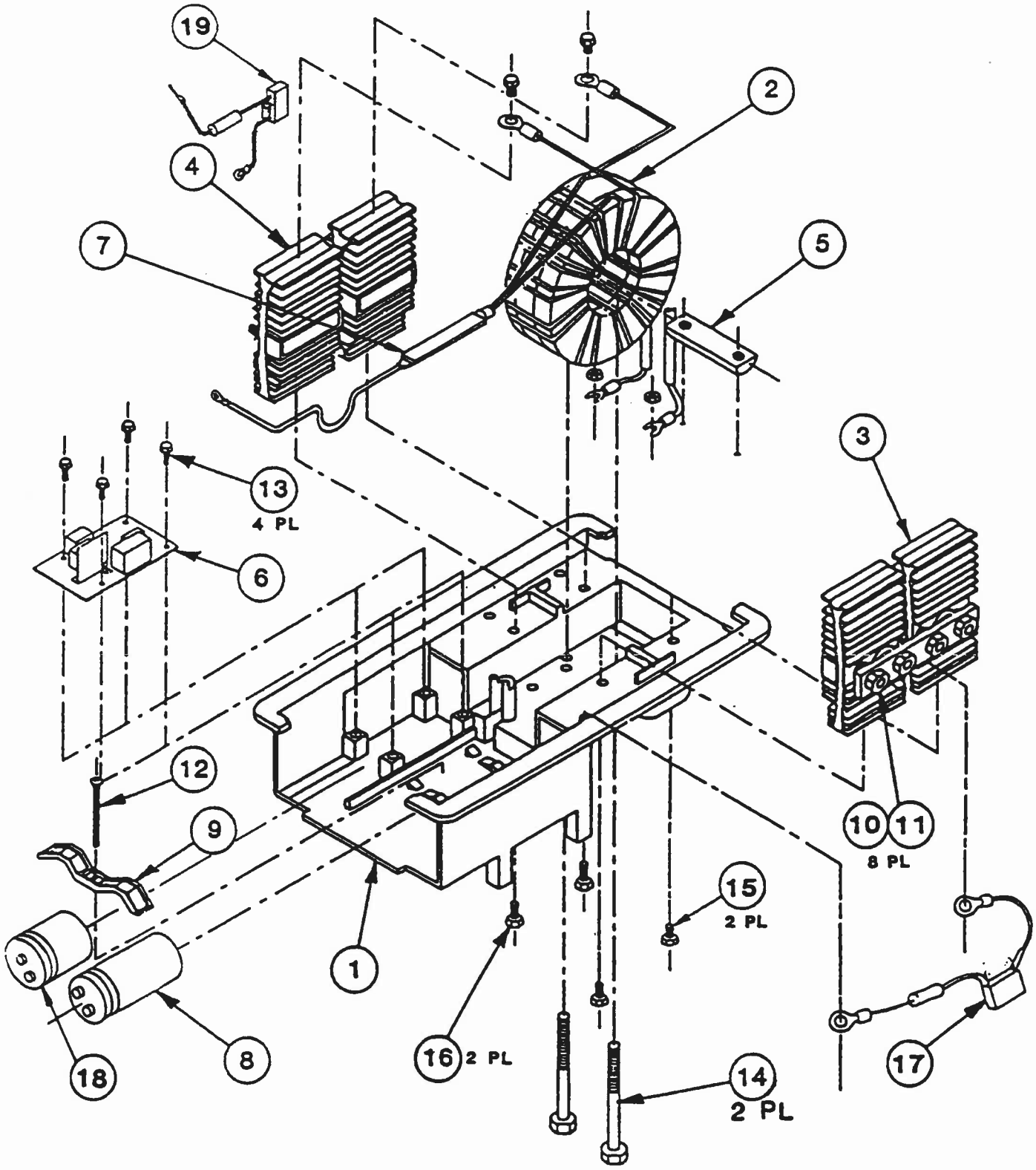


201150-001 FIG. 5.3, REAR PANEL ASSY, MODEL 225SMC, 107091-001

TABLE 5.4

PARTS LIST FOR MAIN TRANSFORMER & CHASSIS PLATE ASSY

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	107053-001	CHASSIS PLATE MODEL 225SMC	
2	1	107057-001	MAIN TRANSFORMER MODEL 225SMC	
3	1	105021-001	SCR HEATSINK, 200AMP	
4	1	107035-001	WR HEATSINK, 200AMP	
5	1	100183-001	TRANSFORMER MOUNTING BRACKET	
6	1	107031-001	OUTPUT PCB MODEL 225SMC	
7	1	105027-002	SHUNT	
8	1	900001-001	OUTPUT CAPACITOR	
9	1	100167-001	CAPACITOR CLAMP	
10	8	970005-623	SCREW, MACH, HEX, 2-1/4 LG	
11	8	972001-006	NUT, FLANGED, HEX, SELF-LKG	
12	1	970002-518	SCR, 10-32 X 1.50 1-1/2	
13	4	970025-506	PLASTON SCREW #10 X 1/2	
14	2	970006-628	BOLT, HEX HEAD, 1/4 X 3.5 LG	
15	2	100117-001	SCREW, SPECIAL SHOULDER	
16	2	970006-606	SCREW, FLANGED, HEX HD	
17	1	105115-001	SNUBBER ASSY, MAIN TRANSFORMER	
18	1	900001-003	CUTTING CAPACITOR	
19	1	107095-001	SNUBER ASSY, CUTTER DIODES	

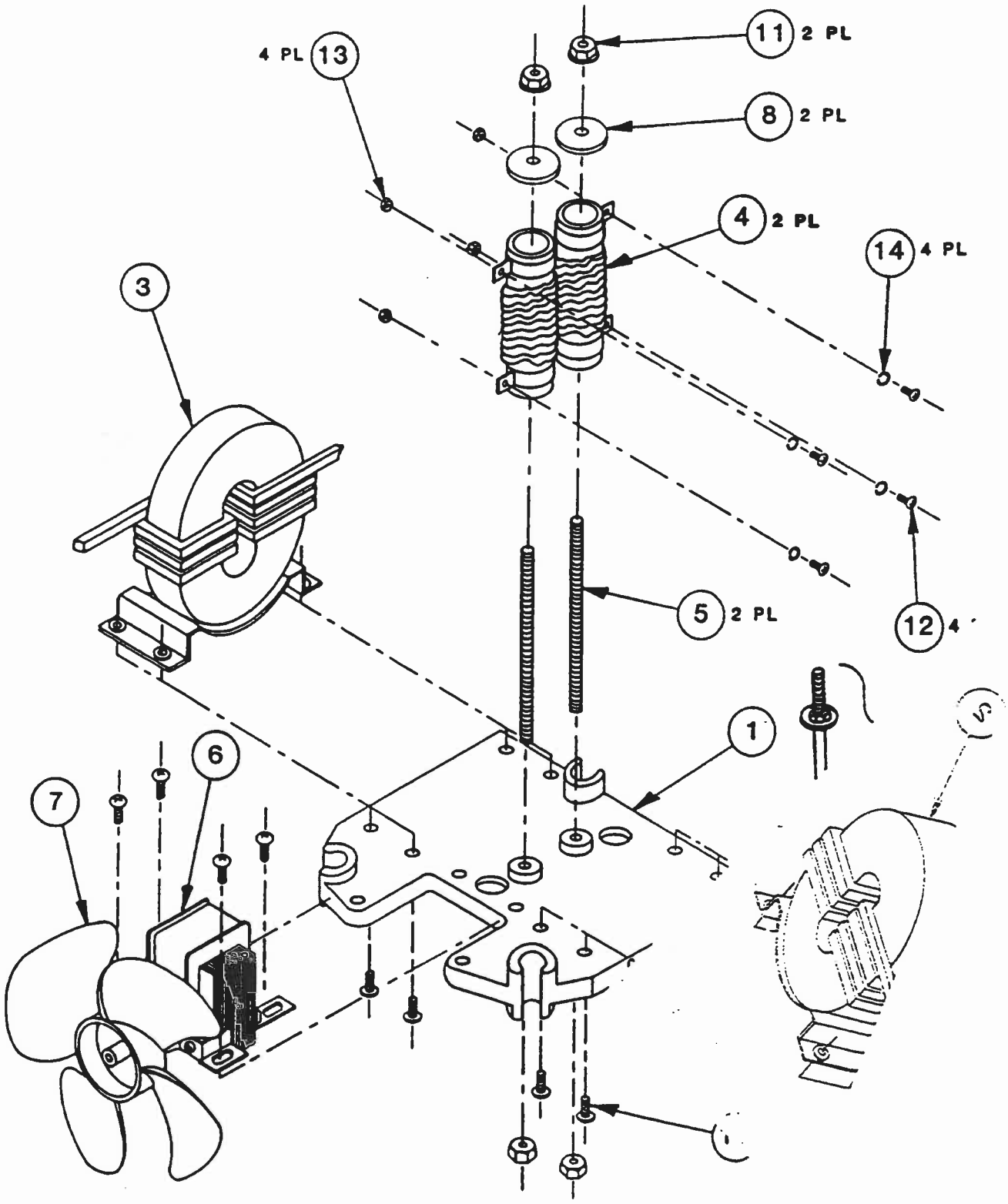


201150-001 FIG. 5.4, MAIN TRANSFORMER & CHASSIS PLATE ASSY

TABLE 5.5

PARTS LIST FOR FAN AND INDUCTOR PLATE ASSY, 107054-001

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	100179-001	INDUCTOR PLATE, MODEL 225SMC	
2	1	107056-001	MAIN INDUCTOR, MODEL 225SMC	L4,RT
3	1	107055-001	OUTPUT INDUCTOR, MODEL 225SMC	L5
4	2	902006-001	SURGE RESISTOR, 200A	R1,R2
5	2	100128-001	THREADED ROD	
6	1	105010-001	FAN MOTOR, 200A	FAN
7	1	922001-004	FAN BLADE 6"	
8	2	100205-001	WASHER, LOCATING RYTON	
10	12	970028-506	SCREW, THREAD, HEX, WASHER HEAD	
11	2	972001-005	NUT, FLANGED, HEX SELF-LOCKING	
12	4	970001-403	SCREW, PNH, SUPADRV, 8-32 X 5/16	
13	4	972000-004	NUT, HEX, 8-32	
14	4	974010-004	WASHER, SPLIT RING, STEEL #8	
15	1	250007-001	SURGE RESISTOR KIT INCLUDES LIST BELOW	
	1	100128-001	THREADED ROD 10-32 x 5"	
	1	974020-002	WASHER FIBER	
	1	972001-005	NUT, FLANGED HEX, SELF LOCKING 10-32	



201150-001 FIG. 5.5, FAN & INDUCTOR PLATE ASSY, 107054-001 5-10

TABLE 5.6

CHASSIS CAPACITOR AND COIL ASSY

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	100177-003	CAPACITOR CHASSIS	
2	1	107097-001	COMM. COIL, FRONT, MODEL 225SMC	
3	1	107098-001	COMM. COIL, REAR, MODEL 225SMC	
4	1	100364-001	ADD ON CAPACITOR, PWB	
5	2	970004-001	SCREW, MACH PANHD CRES, CROSS	
6	2	974000-005	WASHER, FLAT #10	

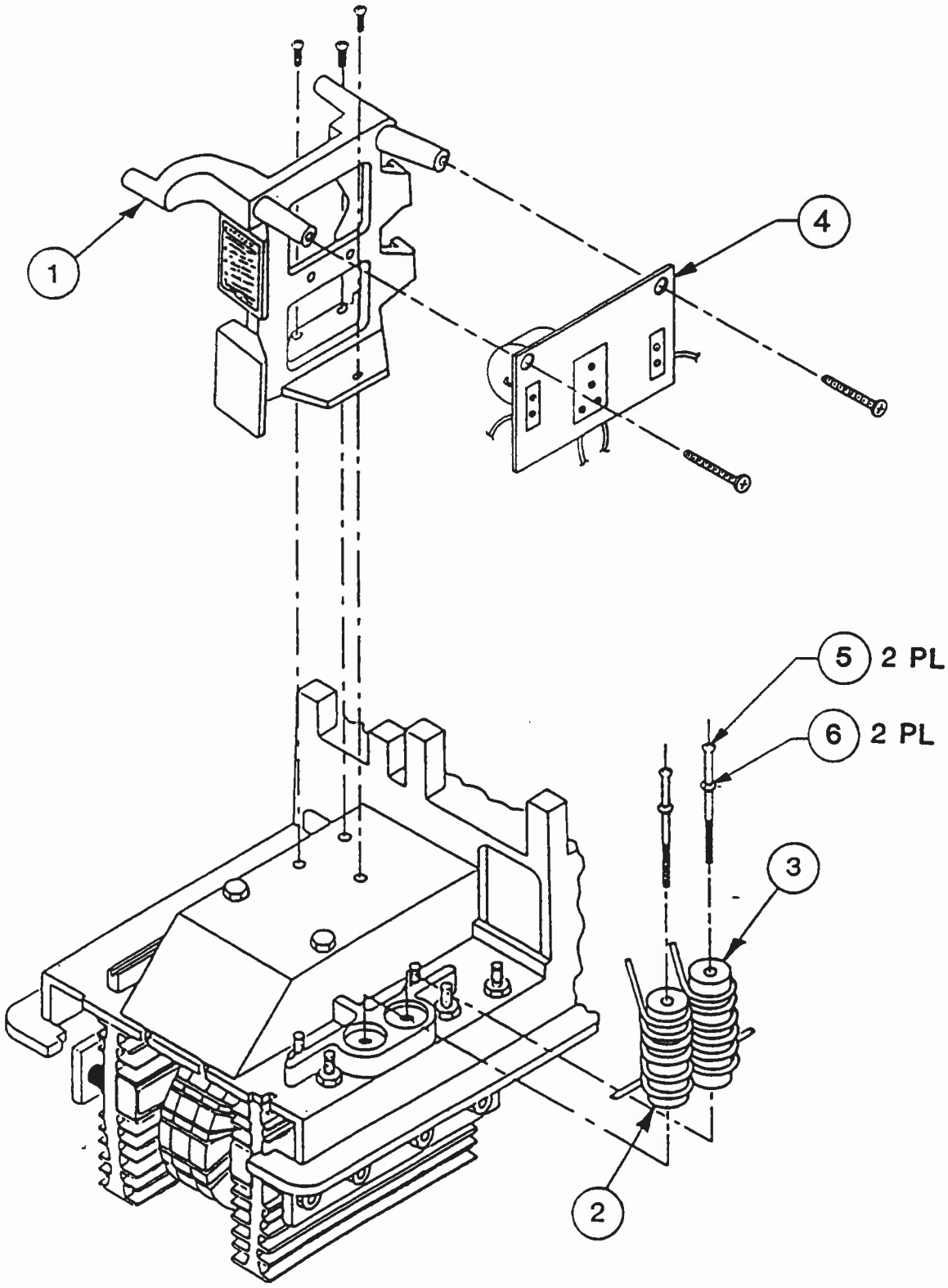

1
4
5 2 PL
6 2 PL
3
2

TABLE 5.7

PARTS LIST FOR TRAY ASSY, 107036-001

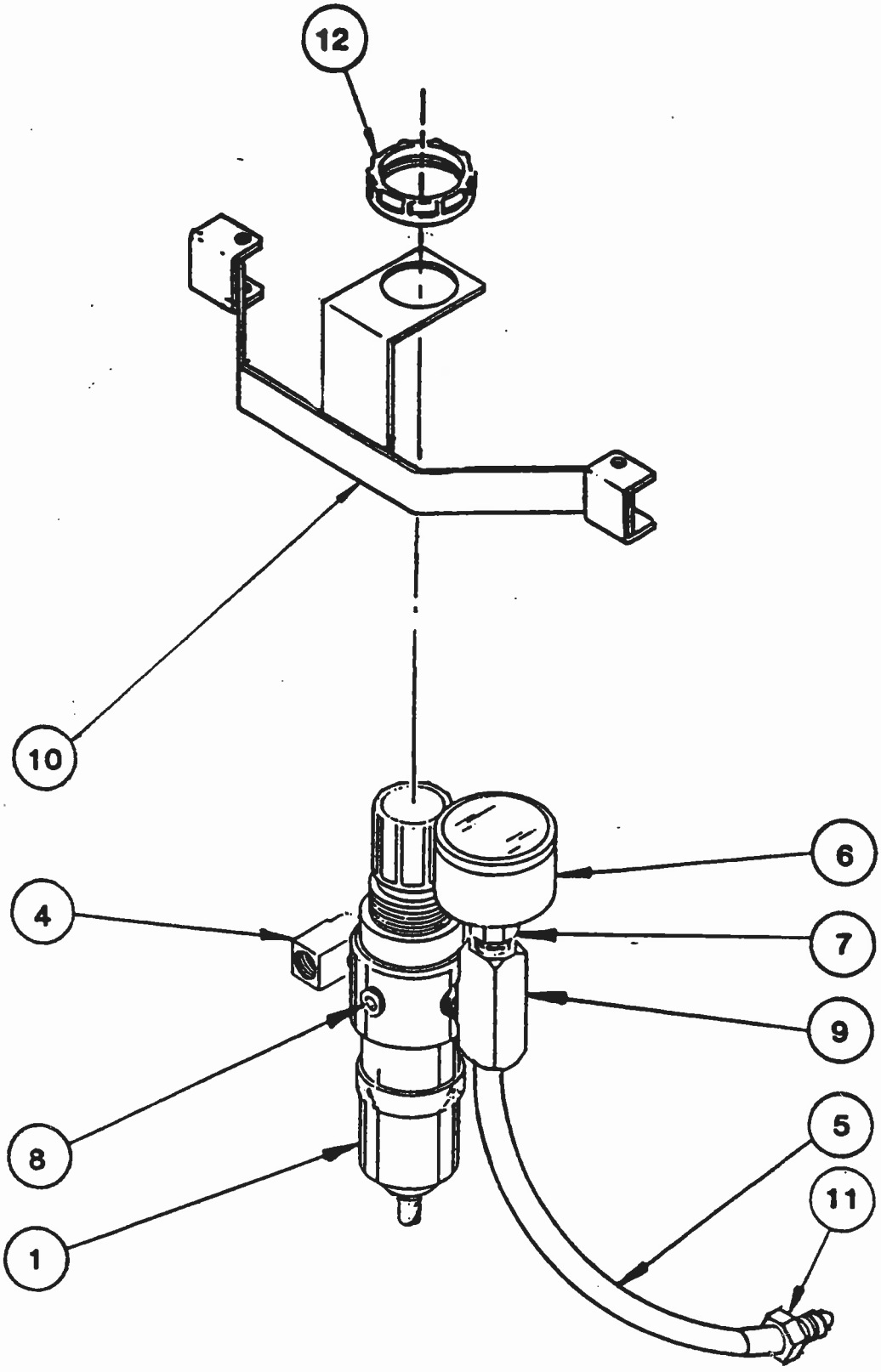
ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	REF.DESIG.
1	1	107009-001	MTG TRAY MODEL 225SMC	
2	1	107010-001	CONNECTOR BRACKET	
3	1	107022-001	MANIFOLD, PILOT ARC	
4	1	107021-001	CUTTING HOSE CONN	
5	2	924002-001	FEMALE CONN 1/8 NPT	
6	1	107024-001	CONNECTOR PLATE	
7	1	107006-001	TRIGGER PCB,225SMC	
8	1	107206-001	CONN BRKT Z INSULATOR	
9	2	972010-025	NUT,HEX JAM 1/2 - 20	
10	1	970025-304	SCR SUPADRIVE PLASTON	
11	1	974010-004	WASHER, SPLIT RING	
12	2	974011-001	WSR,LOCK,INTERNAL TOOTH	
14	1	107047-001	AIR FLOW GASKET	
15	1	107064-001	RELAY MOUNTING PLATE	
16	1	107065-001	ARC STARTER XFMR	
17	1	107209-001	DIODE MTG PLATE	
18	1	912002-001	OVP DIODE	
19	1	923009-001	30A RELAY	
20	4	970000-304	SCREW,PNHD #6 X 3/8	
21	2	974010-003	WASHER, LOCK #6	
22	4	972007-003	NUT,HEX,KEPS, #6-32	
23	1	107044-001	PLASMA MAIN INDUCTOR	
24	1	107049-001	INDUCTOR ASSY INSULATOR	
25	1	107045-001	CUTTER OUTPUT INDUCTOR	
26	1	107027-001	ARC STARTER PCB MODEL 225SMC	
27	2	2340-0511	CARD GUIDE	
28	2	2340-0561	CARD GUIDE BRACKET	
29	1	107048-001	ARC STARTER INSULATOR	
30	1	104078-001	MTG BRACKET R.H.	
31	1	104078-002	MTG BRACKET L.H.	
32	1	902006-001	SURGE RESISTOR	R2
33	1	902015-001	POWER RESISTOR WW	R1
34	4	100205-001	WSR-LOCATING RYTON	
35	2	100128-001	THREADED ROD	

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION
36	5	972001-005	NUT,FLANGED HEX
37	2	974004-009	WASHER,FLAT 7/8
38	2	974000-006	WASHER,FLAT 1/4
39	2	104082-001	SNUBBER MOUNTING BRACKET
40	1	963000-001	ADAPTER,INERT, GAS
41	1	974011-002	WASHER,LOCK,INTERNAL TOOTH
42	4	972000-003	NUT,HEX
43	4	974000-003	WASHER,FLAT
44	4	970002-404	SCREW,PANHEAD PH
45	1	981007-001	THREADED STANDOFF
46	7	970011-404	SCREW,FLAT HEAD SUPADRIVE
47	4	970028-506	SCREW,HEX WASHER HEAD
48	1	107115-001	FINGER GUARD
50	1	107023-001	SWITCH BRACKET
51	1	920002-001	MICRO-SWITCH
52	2	970000-106	SCREW 2-56 X 1/2
53	2	974010-001	WASHER,LOCK
54	1	104082-001	MTG BRACKET
55	2	932028-001	3-WAY TERMINAL
57	1	107150-001	SNUBBER ASSY

TABLE 5.8

PARTS LIST FOR REGULATOR FILTER, G/A ASSY, 107061-001

ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	923008-001	REGULATOR, FILTER	
4	1	924007-001	90 DEGREE STREET ELBOW	
5	1	107212-001	ASSY, AIR HOSE	
6	1	923008-003	GAUGE, 0-160-PSI	
7	1	936009-001	FITTING, BUSHING	
8	1	936010-001	FITTING, CTSK HEX-HEAD PLUG	
9	1	936011-001	FITTING, MALE BRANCH TEE	
10	1	100315-001	PANEL GUARD	
11	1	924009-001	MALE GAS FITTING	
12	1	920008-006	REGULATOR BRACKET NUT	

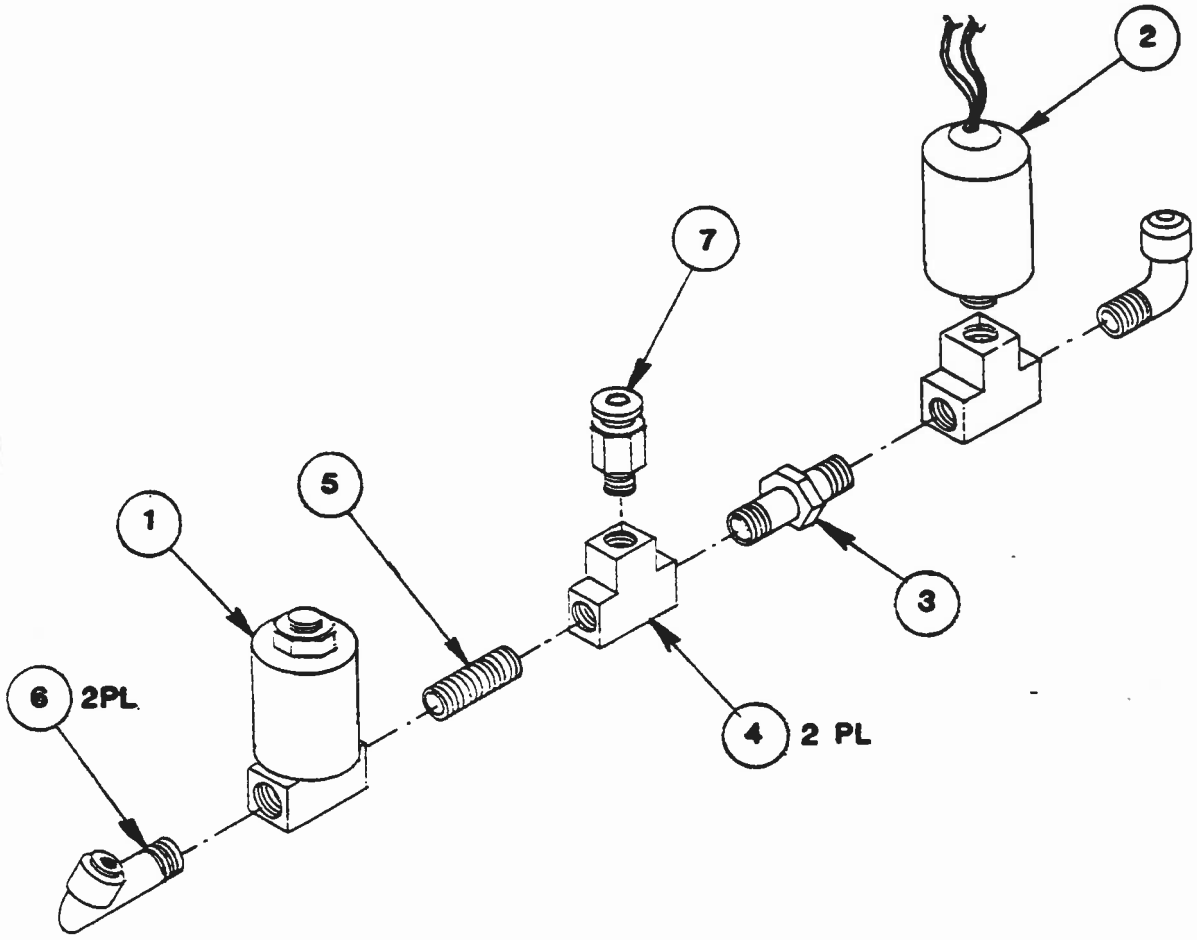


201150-001 FIG. 5.8, REGULATOR FILTER, G/A ASSY, 107061-001

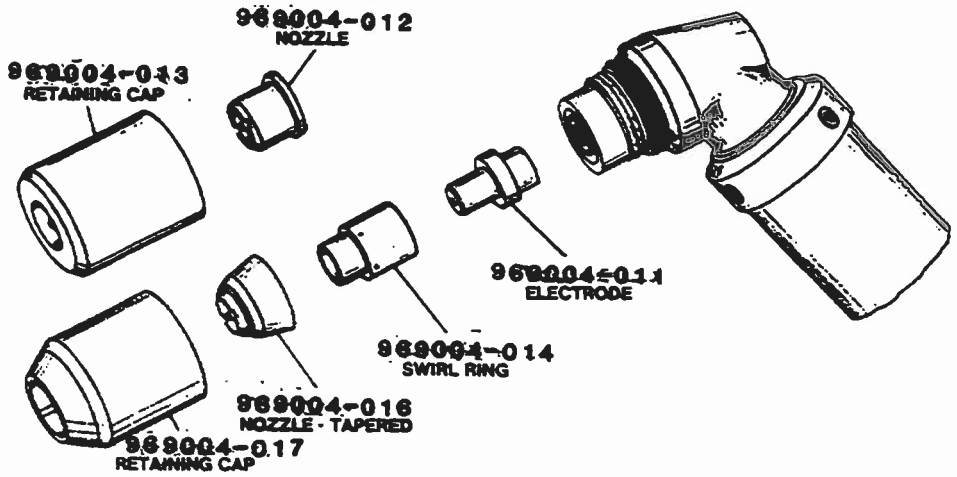
TABLE 5.9

PARTS LIST FOR AIR FLOW ASSY, 107026-001

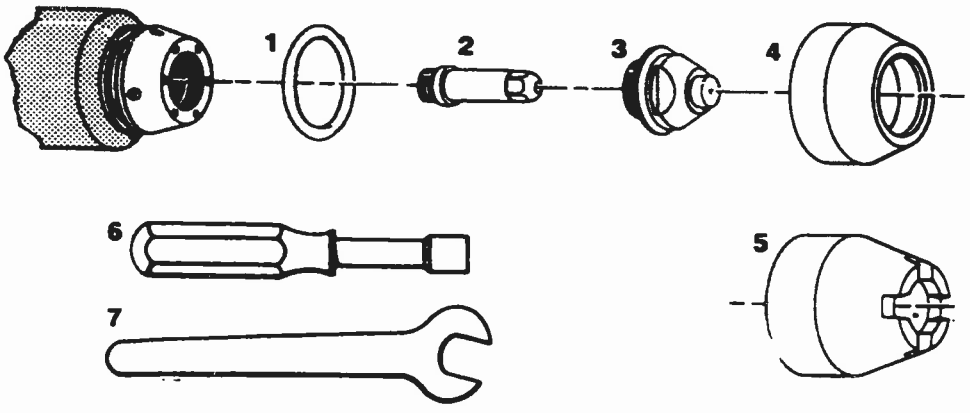
ITEM NO	QTY REQ	PART NO.	DESCRIPTION	REF DESIG
1	1	923000-002	SOLENOID VALVE, 24V	
2	1	923006-001	PRESSURE SEN SWITCH	
3	1	107019-001	PRESSURE REDUCER, NUT	
4	2	924003-001	TEE FEMALE PIPE 1/8 NPT	
5	1	924004-001	CLOSE NIPPLE 1/8 NPT	
6	2	924005-001	MALE ELBOW 90 1/4 OD TUBE	
7	1	924006-001	MALE CONNECTOR, 1/4 OD TUBE	


2
7
1
5
3
6 2PL
4 2 PL

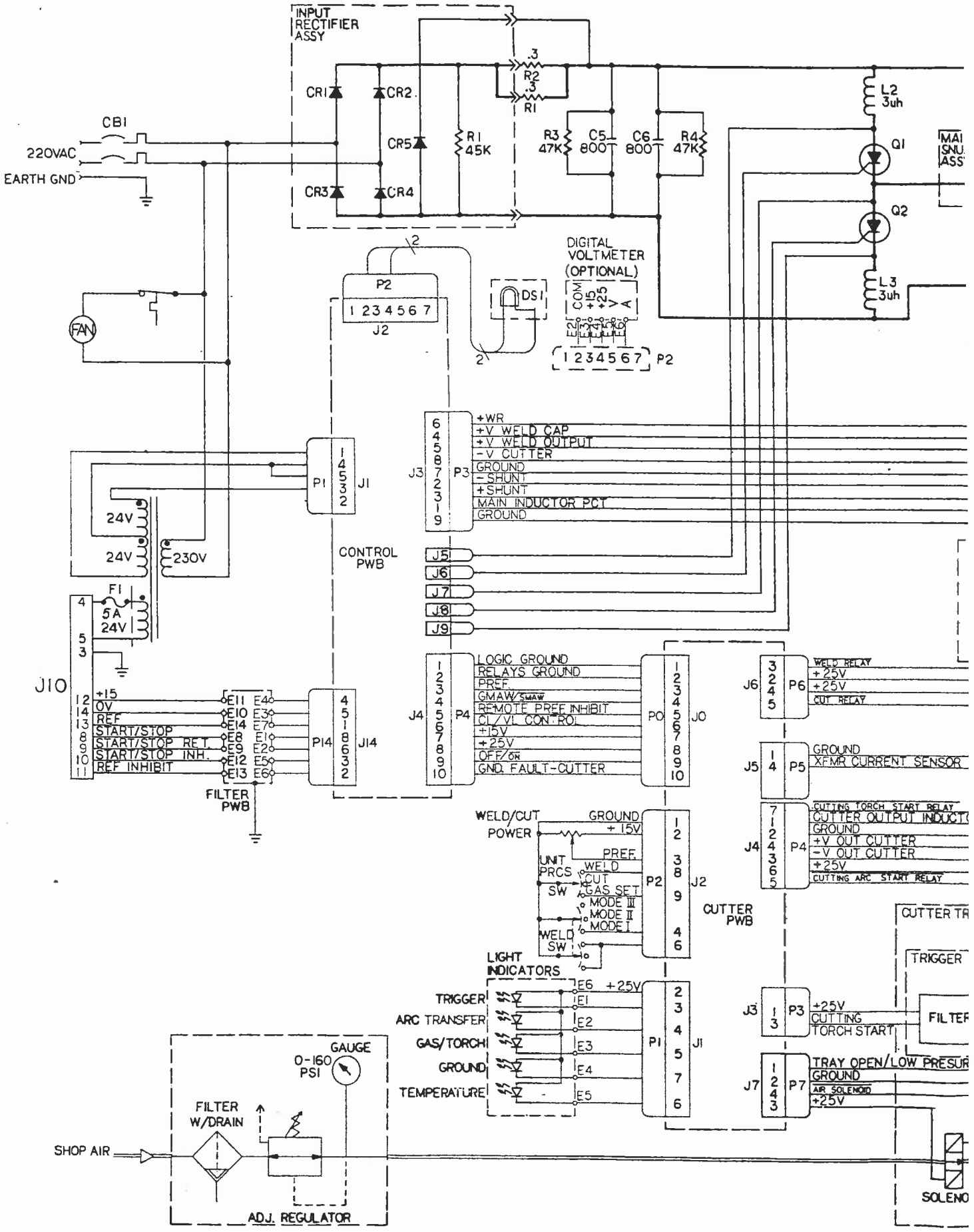
MAX 40

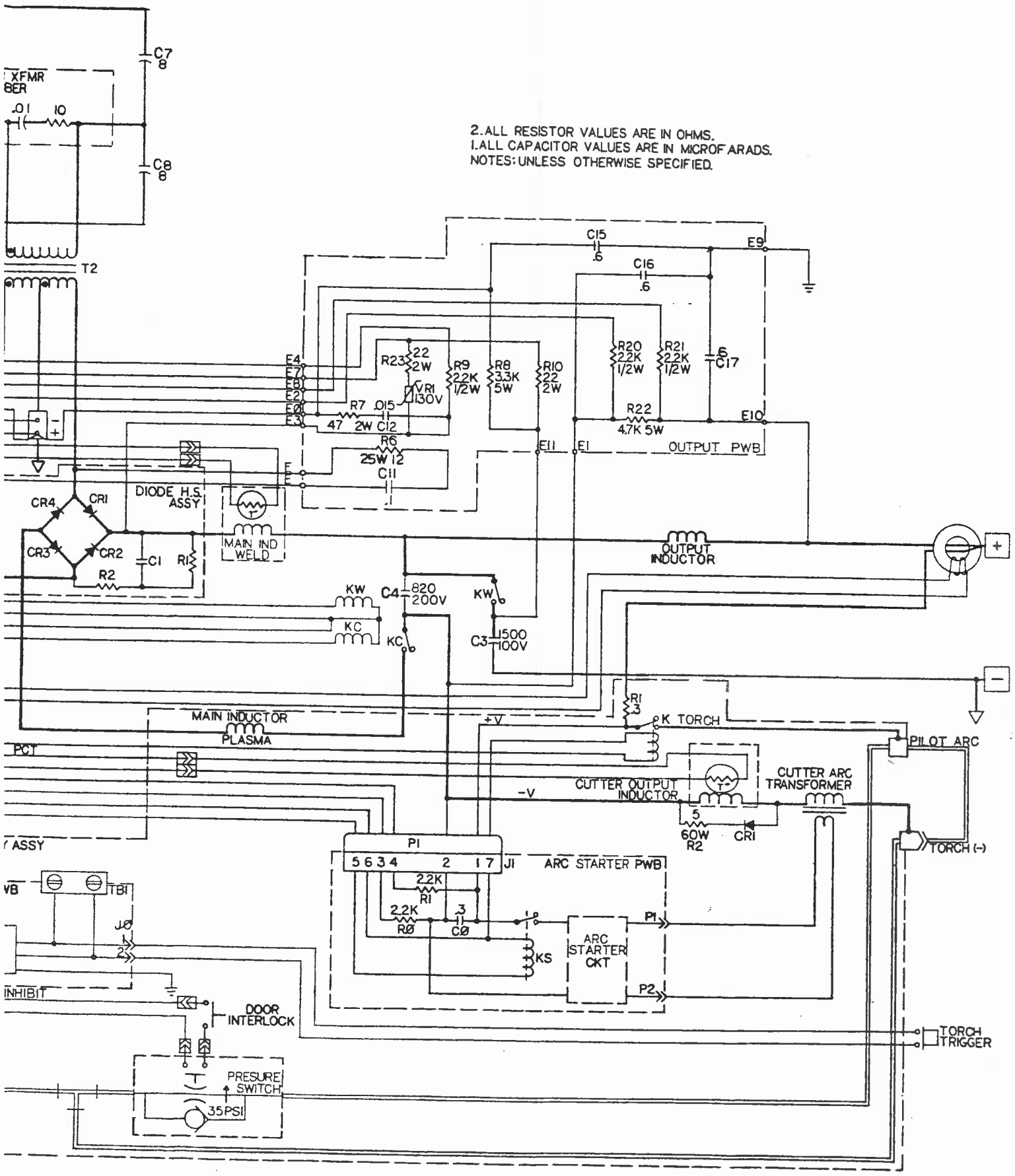


PCH-51

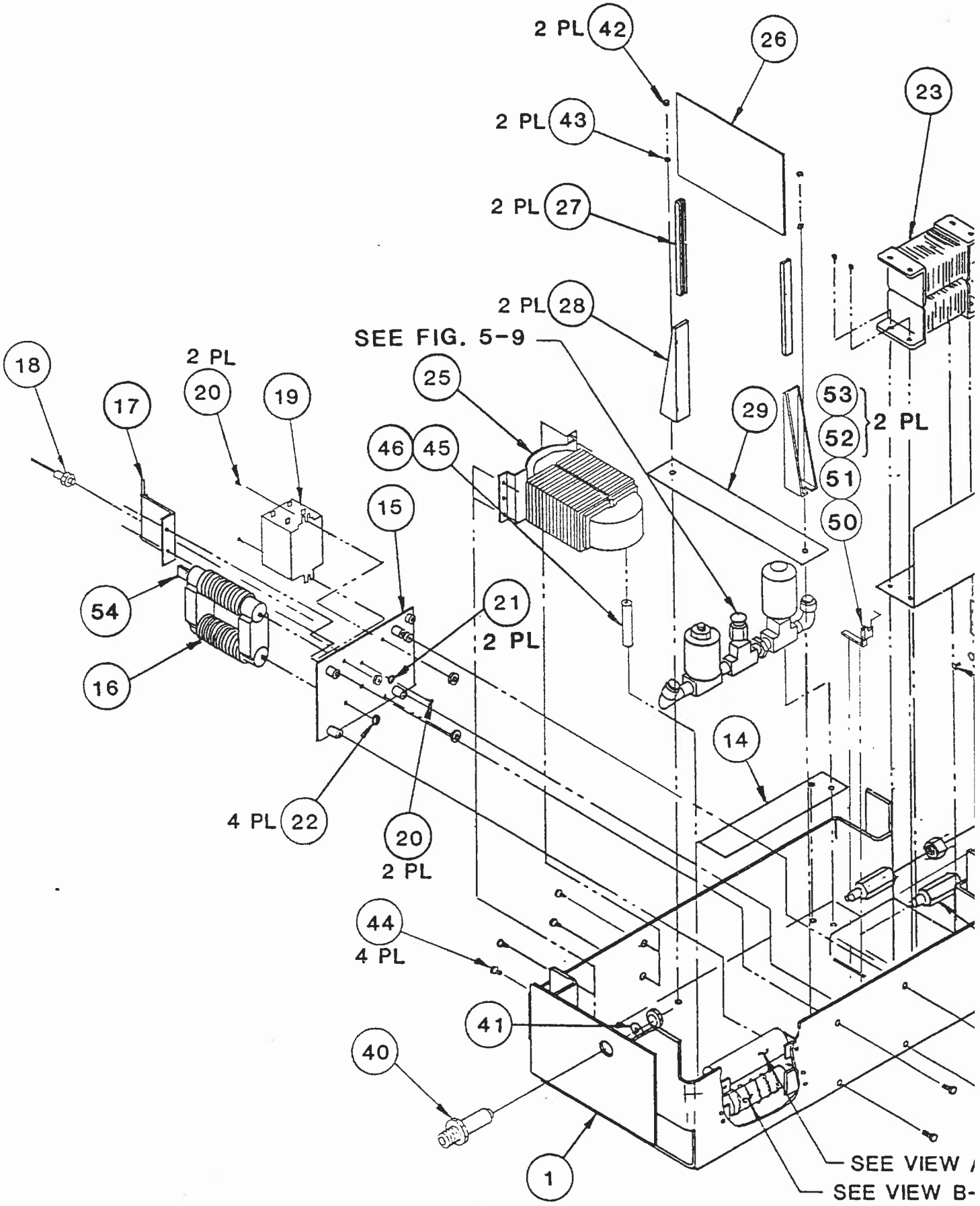


1. O-RING	969003-010
2. ELECTRODE	969003-011
3. TIP	969003-012
4. SHIELD CUP	969003-013
5. CASTLE CUP	969003-014
6. NUT DRIVER	969003-016
7. TIP WRENCH	969003-017


INPUT RECTIFIER ASSY
CR1
CR2
CR3
CR4
CR5
R1 45K
R2 .3
R3 47K
C5 800
C6 800
R4 47K
L2 3uh
L3 3uh
Q1
Q2
CB1
220VAC
EARTH GND
FAN
DIGITAL VOLTMETER (OPTIONAL)
COM +15 +25 V A
P2
J2
DS1
1 2 3 4 5 6 7
P1 J1
J3 P3
+WR
+V WELD CAP
+V WELD OUTPUT
-V CUTTER
GROUND
-SHUNT
+SHUNT
MAIN INDUCTOR PCT
GROUND
24V
24V
230V
CONTROL PWB
J5
J6
J7
J8
J9
F1
5A 24V
J10
+15
0V
REF
START/STOP
START/STOP RET.
START/STOP INH.
REF INHIBIT
P14 J14
FILTER PWB
J4 P4 PO JO
LOGIC GROUND
RELAYS GROUND
PREF
GMAW/SMAW
REMOTE PREF INHIBIT
CL/VL CONTROL
+15V
+25V
OFF/ON
GND FAULT-CUTTER
J6 P6
WELD RELAY
+25V
+25V
CUT RELAY
J5 P5
GROUND
XFMR CURRENT SENSOR
J4 P4
CUTTING TORCH START RELAY
CUTTER OUTPUT INDUCT
GROUND
+V OUT CUTTER
-V OUT CUTTER
+25V
CUTTING ARC START RELAY
WELD/CUT POWER
GROUND
+15V
PREF
UNIT PRCS SW
WELD
CUT
GAS SET
MODE III
MODE II
MODE I
WELD SW
P2 J2
CUTTER PWB
LIGHT INDICATORS
TRIGGER
ARC TRANSFER
GAS/TORCH
GROUND
TEMPERATURE
E6 +25V
E1
E2
E3
E4
E5
P1 J1
J3 P3
+25V
CUTTING TORCH START
J7 P7
TRAY OPEN/LOW PRESUR
GROUND
AIR SOLENOID
+25V
CUTTER TR
TRIGGER
FILTER
SOLENO
GAUGE
0-160 PSI
FILTER W/DRAIN
SHOP AIR
ADJ. REGULATOR



201150-001 FIG. 5.11, SCHEMATIC, MODEL 225SMC, 107083-001 5-21


2 PL 42
26
23
2 PL 43
2 PL 27
2 PL 28
SEE FIG. 5-9
18
2 PL
20
17
19
25
29
53
52
2 PL
51
46
45
50
15
54
21
2 PL
16
14
4 PL 22
20
2 PL
44
4 PL
41
40
1
SEE VIEW A
SEE VIEW B-

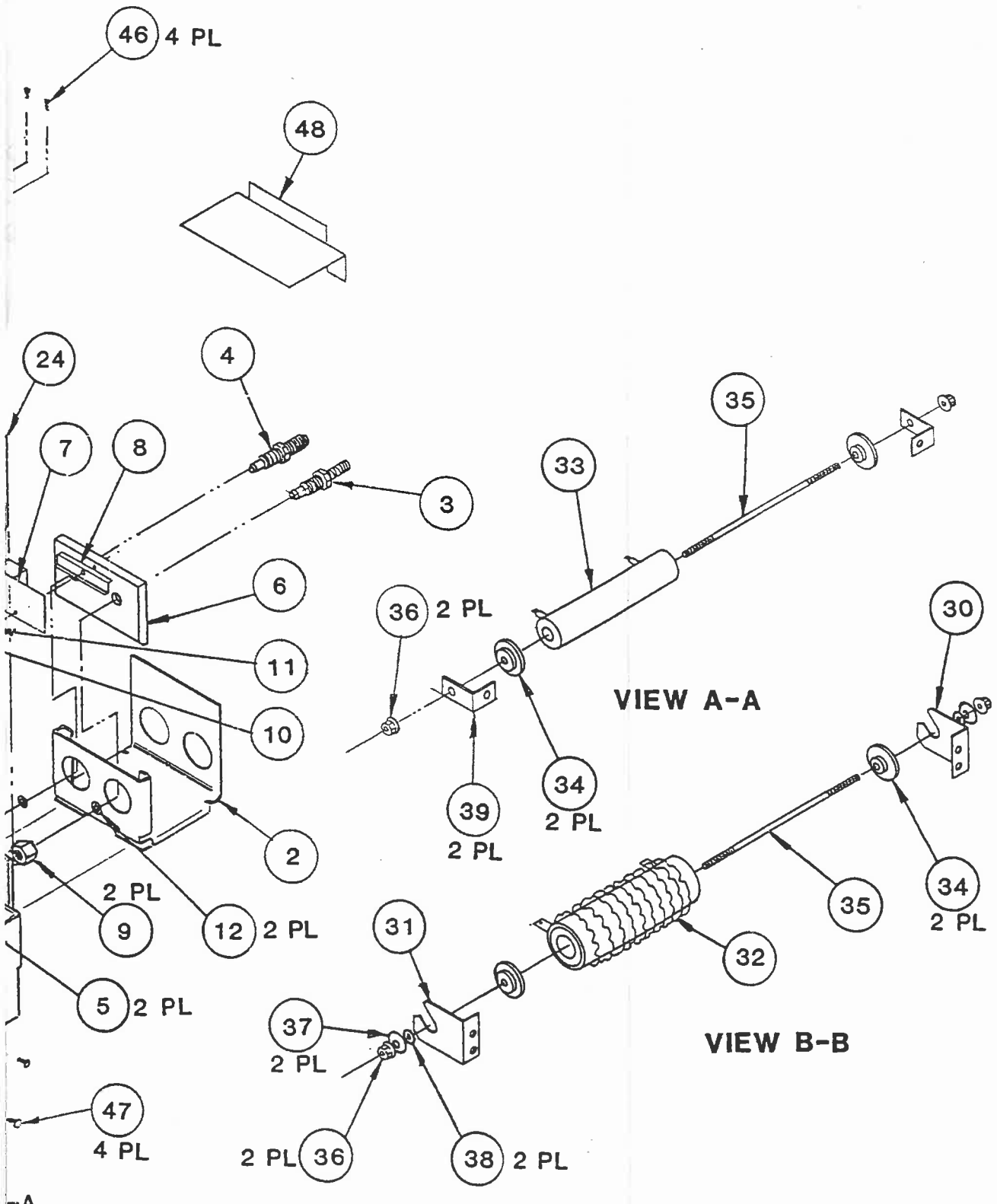


FIG. 5.7, TRAY ASSY, 107036-001