

! IMPORTANT !
-FOR YOUR SAFETY-
READ THIS MANUAL BEFORE
INSTALLING OR USING EQUIPMENT

OPERATION MANUAL



200SM

THANK YOU!!!

. . . for purchasing **PowCon Incorporated** products. Our commitment to you is to provide an ever expanding family of quality welding and welding/cutting power sources, arc positioning equipment and accessories. Please take a moment to read the following pages as they contain important information regarding proper welding/cutting safety and procedures.

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SAFETY

! IMPORTANT !

THIS MANUAL HAS BEEN DESIGNED FOR EXPERIENCED WELDING AND CUTTING 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 AND CUTTING 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.

DEFINITIONS

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 service personnel 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

Safety is a combination of good judgement and proper training. Operation and maintenance of any arc welding and cutting equipment involves potential hazards. Individuals who are unfamiliar with cutting and welding equipment, use faulty judgement or lack proper training, may cause injury to themselves and others. Personnel should be alerted to the following potential hazards and the 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



THE VOLTAGES PRESENT IN THE WELDING AND CUTTING ENVIRONMENT CAN CAUSE SEVERE BURNS TO THE BODY OR FATAL SHOCK. THE SEVERITY OF ELECTRICAL SHOCK IS DETERMINED BY THE PATH AND THE AMOUNT OF CURRENT THROUGH THE BODY.

A) Install and continue to maintain equipment according to USA Standard C1, National Electric Code.

B) Never allow live metal parts to touch bare skin or any wet clothing. Use only dry gloves.

C) When welding or cutting in a damp area, or when standing on metal, make sure you are well insulated by wearing dry gloves, rubber soled shoes, and by 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/cutting, turn equipment OFF. Accidental grounding can cause overheating and create a fire hazard. Do not coil or loop the cable around parts of the body.

SAFETY

F) The ground cable should be connected to the workpiece as close to the work area as possible. Grounds connected to building framework or other locations remote to the work area reduce efficiency and increase the potential hazard of electric shock. Avoid the possibility of the cutting current passing through lifting chains, crane cables or other electrical paths.

G) Keep everything dry you might touch, including clothing, the work area, welding gun, torch and welding or cutting machines. Fix water leaks immediately. Do not operate equipment standing in water.

H) Never use a cutting torch or welding gun which is damaged or contains cracks in its housing.

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

PERSONAL PROTECTION



SKIN AND EYE BURNS RESULTING FROM BODY EXPOSURE TO ELECTRIC-ARC WELDING AND CUTTING 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 the sparks and rays of the cutting/welding arc when cutting/welding or observing cutting/welding. Warn bystanders not to watch the arc and not to expose themselves to the cutting/welding arc rays or to hot metal.

B) Wear flameproof gauntlet-type gloves, a 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 cutting or welding area. Use safety glasses with side shields or goggles when chipping slag or grinding. Chipped slag is hot and may travel a considerable distance. Bystanders should also wear safety glasses or goggles.

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

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

FIRE SAFETY



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

A) Move all combustible materials well away from the cutting area or completely cover materials with a non-flammable covering. Combustible materials include but are not limited to wood, clothing, sawdust, gasoline, kerosene, paints, solvents, natural gases, acetylene, propane, and similar 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. There must be no substances in the container which might produce flammable or toxic vapors.

C) For fire protection, have suitable extinguishing equipment handy for instant use.

SAFETY

VENTILATION



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

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

B) Do not weld or cut in locations close to chlorinated hydrocarbon vapors coming from degreasing or spraying operations. The heat of 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 or cutting, it is an indication that the ventilation is not adequate. Stop work and take the necessary steps to improve ventilation in the welding or cutting area. Do not continue to weld or cut 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. Welding or cutting gases containing 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 the gas supply at its source.

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

SAFETY REFERENCES

The following publications provide additional information on important welding safeguards.

A) ANSI/ASC Z49.1-1988, 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, DC 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. EW1-1989, Electric Arc-Welding Apparatus, approved as ANSI C87.1-1989. Available from National Electrical Manufacturers Association, 155 E. 44th Street, New York, NY 10017.

IMPORTANT!

CE MANUEL A ETE CONCU A L'INTENTION D'OPERATEURS AYANT DE L'EXPERIENCE AVEC DES APPAREILS DE SOUDAGE ET DECOUPAGE. IL DOIT ETRE LU INTEGRALEMENT AVANT L'UTILISATION DE CE MATERIEL. SI VOUS MANQUEZ D'EXPERIENCE ET N'ETES PAS FAMILIARISES AVEC LES METHODES ET LE FONCTIONNEMENT SANS RISQUES DE MATERIEL DE SOUDAGE ET DECOUPAGE, VEUILLEZ CONSULTER VOTRE CONTREMAITRE. N'ESSEYER PAS D'INSTALLER, DE FAIRE FONCTIONNER OU D'EFFECTUER L'ENTRETIEN DE CET EQUIPEMENT A MOINS QUE VOUS NE SOYEZ QUALIFIE ET QUE VOUS AYEZ LU ET COMPRIS CE MANUEL. EN CAS DE DOUTE QUANT A L'INSTALLATION ET AU FONCTIONNEMENT DE CET EQUIPEMENT, CONTACTEZ VOTRE DISTRIBUTEUR OU LE DEPARTEMENT SERVICE A LA CLIENTELE DE PowCon.

DEFINITIONS

Des mots tels que AVIS, ATTENTION, AVERTISSEMENT ET DANGER figurent tout au long de ce manuel pour attirer votre attention sur des informations particulières. Les méthodes utilisées pour les mettre en évidence et le but poursuivi à cet égard sont les suivants:

AVIS

Information de base concernant le fonctionnement, les procédés qui aident l'opérateur dans l'utilisation de la machine, aide le personnel responsable de la révision à effectuer l'entretien et empêche tout dommage à l'équipement.

ATTENTION

Un procédé de fonctionnement qui, s'il n'est pas suivi, risque de causer une blessure légère à l'opérateur, au personnel d'entretien et/ou à des observateurs.

AVERTISSEMENT

Un procédé de fonctionnement qui, s'il n'est pas suivi, risque de causer une blessure grave à l'opérateur, au personnel d'entretien ou à d'autres personnes à proximité.

DANGER



Un procédé de fonctionnement qui, s'il n'est pas suivi, risque de causer une blessure grave ou même la mort de l'opérateur, du personnel d'entretien ou d'observateurs.

INFORMATIONS SUR LA SECURITE

La sécurité se base à la fois sur un bon jugement et une formation adéquate. Le fonctionnement et l'entretien de tout équipement destiné au soudage à l'arc et au découpage comporte des risques potentiels. Des personnes qui ne sont pas familiarisées avec l'équipement de découpage et de soudage font des appréciations erronées ou manquent d'une formation adéquate et sont susceptibles de se blesser et de blesser les autres. Le personnel devrait être averti des dangers potentiels énumérés ci-après tout en ayant connaissance des mesures de sécurité nécessaires pour éviter toute blessure éventuelle. En outre, avant d'utiliser cet équipement, vous devriez connaître les règles de sécurité de votre employeur.

VEUILLEZ A LIRE ET A SUIVRE TOUTES LES REGLES DE SECURITE A VOTRE DISPOSITION AVANT D'UTILISER CET EQUIPEMENT.

CHOC ELECTRIQUE



DES TENSIONS PRESENTES DANS LA ZONE DU SOUDAGE ET DU DECOUPAGE SONT SUSCEPTIBLES DE CAUSER DES BRULURES GRAVES SUR LE CORPS OU UN CHOC FATAL. LA GRAVITE DU CHOC ELECTRIQUE EST DETERMINEE PAR LE TRAJET ET LA QUANTITE DE COURANT TRAVERSANT LE CORPS.

A) Installer et poursuivre l'entretien de l'équipement selon "USA Standard C1, National Electric Code." (Norme USA C1).

B) Eviter tout contact de pièces métalliques sous tension avec la peau nue ou un vêtement mouillé. N'utiliser que des gants secs.

C) Lorsque vous procédez à une opération de découpage ou de soudage dans une zone humide, veillez à une isolation adéquate en revêtant des gants secs, des chaussures avec semelles en caoutchouc et en vous plaçant sur une planche ou une plate-forme sèche.

D) N'utilisez pas de câbles de chalumeau usés ou endommagés. Evitez toute surcharge des câbles. N'utilisez que du matériel bien entretenu.

E) Lorsque vous êtes à l'arrêt, éteindre le courant de votre équipement. Une mise à la terre accidentelle est susceptible de causer une surchauffe et un risque d'incendie. Ne pas enrouler ou torsader le câble autour de parties du corps.

F) Veillez à ce que le câble de mise à la terre soit relié à l'instrument de travail le plus près possible de la zone de travail. Les terres reliées à la charpente d'un bâtiment ou à tout autre espace éloigné du lieu de travail présentent une efficacité réduite et augmentent le danger d'un choc électrique. Eviter que tout courant de découpage ne passe à travers des chaînes de levage, des câbles de grue ou d'autres trajets de lignes électriques.

G) Veillez à ce que tout ce que vous touchez soit sec, notamment les vêtements, l'espace de travail, pistolet à souder, chalumeau, machine à découper et à souder. Réparer toute fuite d'eau immédiatement. Ne pas utiliser d'instruments se trouvant dans l'eau.

H) Ne jamais utiliser un chalumeau à couper endommagé ou dont la structure présente des fissures.

I) Reportez-vous à la norme AWS-Z49.1 pour ce qui concerne les recommandations de mise à la terre.

PROTECTION DES PERSONNES



DES BRULURES A LA PEAU ET AUX YEUX APRES S'ETRE EXPOSE AUX RAYONS DU SOUDAGE ET DECOUPAGE A L'ARC ELECTRIQUE OU AU METAL CHAUD PEUVENT ETRE PLUS GRAVES QU'UN COUP DE SOLEIL.

A) Utilisez un écran protecteur pour le visage avec un filtre correct (no. 8 ou plus élevé) ainsi que des plaques pour protéger les yeux, le visage, le cou et les oreilles contre les étincelles et les rayons du découpage à l'arc, soit pendant que vous procédez au découpage soit pendant que vous observez. Avertissez les observateurs de ne pas regarder l'arc et de ne pas s'exposer aux rayons de découpage à l'arc ou à du métal chaud.

B) Mettez des gants à crispin ininflammables, une chemise à manches longues épaisse, des pantalons sans revers, des chaussures fermées, et une casquette (pour protéger les cheveux) afin de protéger la peau contre les rayons de l'arc, les étincelles ou le métal chauds.

C) Protégez d'autres membres du personnel se trouvant à proximité des rayons de l'arc et des étincelles brûlantes au moyen d'une cloison adéquate ininflammable.

D) Portez toujours des lunettes de sécurité lorsque vous trouvez dans une zone de soudage ou découpage. Utilisez des lunettes de sécurité avec écrans latéraux lorsque vous taillez des scories ou lorsque vous broyez. Des scories taillées sont chaudes et risquent de se déplacer sur des distances considérables. Les personnes qui observent doivent également porter des lunettes de sécurité.

E) Des cylindres de gaz comprimé présentent un danger potentiel. Adressez-vous aux fournisseurs pour les procédures de manutention.

F) Portez des boules Quilès ou tout autre système de protection pour les oreilles lorsque vous utilisez du matériel de découpage.

PROTECTION ANTI-INCENDIES



DES SCORIES CHAUDES OU DES ETINCELLES PEUVENT CAUSER UN INCENDIE GRAVE AU CONTACT DE SOLIDES, LIQUIDES OU GAZ COMBUSTIBLES.

A) Eloignez tout matériel combustible à une bonne distance de la zone de découpage, ou bien couvrez complètement ce matériel au moyen d'une couverture ininflammable. Citons parmi les matériaux inflammables: bois, vêtements, sciure de bois, essence, kérosène, peintures, solvants, gaz naturels, acétylène, propane et d'autres articles combustibles similaires.

B) N'effectuez pas de soudage, ou découpage ou tout autre travail à chaud sur des tonneaux, cylindres, réservoirs ou autres récipients avant qu'ils n'aient été complètement nettoyés et ce, afin d'éliminer toute substance dans le récipient susceptible de produire des vapeurs inflammables ou toxiques.

C) Comme protection contre l'incendie, ayez un système d'extinction à portée de la main pour utilisation immédiate.

VENTILATION



LES GAZ ET EMANATIONS PROVENANT DE SOUDAGE ET DECOUPAGE, EN PARTICULIER DANS DES ENDROITS FERMES, PEUVENT CAUSER UN MALAISE OU UN DOMMAGE PHYSIQUE S'ILS SONT INHALES PENDANT UNE PERIODE PROLONGEE.

A) Prévoyez une ventilation adéquate dans la zone de soudage et de découpage au moyen d'une ventilation naturelle ou mécanique. Ne découpez pas des matériaux galvanisés tels que du zinc, plomb, béryllium, ou cadmium à moins qu'une ventilation mécanique positive ne soit en place pour éviter que les émanations et gaz provenant de ces matériaux ne soient inhalés.

B) Ne procédez pas à du découpage à proximité de vapeurs d'hydrocarbure chloré provenant d'opérations de dégraissage ou de pulvérisation. La chaleur des rayons de l'arc pourrait réagir avec les vapeurs des solvants pour former du phosgène, un gaz très toxique, ainsi que d'autres gaz irritants.

C) Si vous ressentez une irritation momentanée aux yeux, au nez ou à la gorge, c'est un signe que la ventilation n'est pas adéquate. Arrêtez votre travail et prenez les mesures nécessaires pour améliorer la ventilation dans la zone de découpage. Ne continuez pas le découpage si le malaise persiste.

D) Utilisez un appareil respiratoire avec approvisionnement en air si la ventilation ne suffit pas à éliminer toutes les émanations et les gaz.

E) Faites attention aux fuites de gaz. Les gaz de découpage contenant de l'argon sont plus denses que l'air et remplacent celui-ci dans des espaces fermés. Ne placez pas de cylindres de gaz dans des espaces fermés. **FERMEZ** le gaz à la source lorsqu'il n'est pas utilisé.

F) Reportez-vous à la norme AWS Z49.1 en ce qui concerne les recommandations de ventilation.

REFERENCES DE SECURITE

Les publications suivantes fournissent des informations supplémentaires concernant des mesures de sécurité importantes pour le soudage:

A) ANSI/ASC Z49.1-1988, American National Standard "Safety in welding and cutting" (Norme nationale américaine "Sécurité en matière de soudage et découpage).

B) Bulletin No. F4-1. "Recommended safe practices for the preparation for Welding and Cutting Containers and Piping that have held Hazardous Substances". (Méthodes pratiques de sécurité recommandées pour la préparation du soudage et découpage de récipients et conduits ayant contenu des substances dangereuses.)

C) OSHA Safety and Health Standards, 29CFR 1910 à obtenir auprès du "United States Department of Labor", Washington, DC 20210. (Normes de Sécurité et Hygiène OSHA 29CFR 1910).

D) NFPA Standard 51B "Fire prevention in Use of Cutting and Welding Processes", à obtenir auprès du "National Fire Protection Association", 470 Atlantic Avenue, Boston, MA 00210. (Mesures de prévention d'incendies utilisées dans les procédés de découpage et soudage).

E) NEMA Standards Publication/No. EW1-1989, Electric Arc Welding Apparatus, approuvé sous la mention ANSI C87.1-1989. A obtenir auprès du "National Electrical Manufacturers Association", 155 E.44th Street, New York, N.Y 10017 (Appareil de soudage à l'arc).

GENERAL INFORMATION

DESCRIPTION OF EQUIPMENT

Traditionally, constant potential (voltage) welding power sources have been used for GMAW and constant current (drooper) welding power sources have been used for SMAW. The unique feature of the constant power converter system used in the PowCon 200SM is that both welding processes can be accomplished using one power source. By means of electronic control, the PowCon 200SM portable welding power source comes with a 9 foot (2.75M) primary cable.

SPECIFICATIONS

PowCon 200SM Welding Power Source.

- A) Power Input and Output (see Table 1)
- B) Open Circuit Voltage - 80V maximum
- C) Current Range - adjustable from 10 to 250 amps

- D) 24 VAC transformer for operating wirefeeder
- E) Weight56 pounds (25.5 Kg)
- F) DimensionsHeight 17" (43 cm),
.....Width 10" (26 cm),
.....Depth 19" (49 cm)

Accessories:

- A) Remote GMAW pulser.
- B) Remote, foot-operated and hand-operated contactor and current control.
- C) Remote control cable extension - 12 ft (3.7M) or 25 ft (7.6M) or 50 ft (15.2M) lengths.
- D) Output weld cable connectors (DINSE or TWECO).

**TABLE 1
SPECIFICATIONS OF PowCon 200SM**

Model 200SM	Rated Welding Current Amperes	Open Circuit Voltage	Amperes Input at Rated Load Output 50 / 60 Hz	KVA	KW	Dimensions	Weight	
							Net	Ship
Single Phase	80% Duty Cycle 200 amps @ 28V	80 max	45	10.3	8.0	Height: 17" (43 cm) Width: 10" (26 cm)	56 lb (25.5 kg)	65 lb (29.5kg)
	100% Duty Cycle 160 amps @ 28.4V		33	7.5	5.8	Depth: 19" (49 cm)		

THEORY OF OPERATION

The PowCon Welding 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 (2) smaller size.

For the PowCon, the input alternating current (AC) primary power is passed through a circuit breaker to a 4 pulse full wave bridge rectifier, where the input is transformed to DC power. The DC current output of the rectifier is fed to an inverter of series capacitor switching type. Using SCR's (thyristors), the DC current is switched alternately ON and OFF. The action of charging and discharging the SCR's creates a new alternating current (AC). The frequency of the firing of the SCR's varies from 800 Hz to 10,000 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 weld power dial setting.

The new alternating current, with its higher frequency provided by the switching devices (SCR's), is fed into the main transformer. One advantage of higher frequency alternating current is a significantly reduced transformer size. The PowCon main transformer weighs 6 pounds, versus approximately 150 pounds used in the conventional transformer rectifier. The transformer takes the higher voltage of the switching SCR's and transforms it to the welding voltage range.

The final step in the production of weld current is the AC output of the transformer which is rectified by diodes into direct current (DC) for welding. The whole sequence of operations from the primary (AC) input to the weld output (DC), is regulated by the main PC board through control logic feedback.

GENERAL INFORMATION

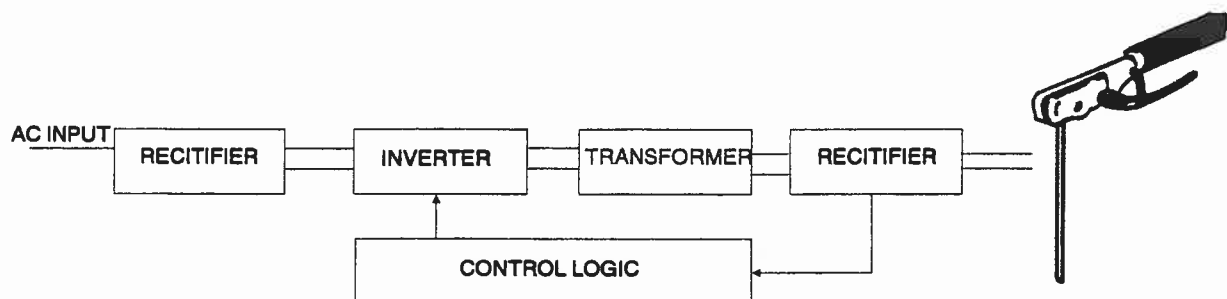


Figure 1, Electronic Block Diagram of Converter Principle

SPECIAL SAFEGUARDS FOR USE WITH THE PowCon 200SM

Individuals using this equipment should give the following safeguards their special attention.

- A) Install the PowCon 200SM welding power source in accordance with OSHA and National Electrical Code Standards, or other applicable standards.
- B) Locate the unit so that air flow into the front and out of the back is not obstructed.
- C) Provide access to all controls on both the front and back panel for operator manipulation.
- D) Never drag, pull or lift the unit by either the primary or secondary electrical cable.
- E) Never place the unit in a location where the unit's weight cannot be supported, especially when the unit is above ground level.
- F) Do not allow the unit, or its input and output cables, to impede or block foot traffic.
- G) Move and lift the unit in accordance with OSHA job site standards.
- H) Servicing of the unit should be done only by personnel factory trained by PowCon.
- I) When servicing the unit, the first operation, once the case is removed from the source of primary input, is to discharge the capacitors.
- J) Periodically blow or vacuum out dirt build-up in the unit.
- K) Do not operate unit if the circuit breaker must be forced or repeatedly held in the ON position.
- L) Never lift or move the unit when the circuit breaker is ON.
- M) Follow the recommendations for fuse and cable sizing when connecting the unit.
- N) Always turn the unit OFF when it is not in use.
- O) Primary quick disconnects, etc., must be suitably rated for current demand at primary voltage.
- P) Read entire manual prior to performing operations using the power source.

INSTALLATION

UNPACKING NEW EQUIPMENT

(Receiving and Handling)

Remove the PowCon welding 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 200SM Operation Manual is packed with each PowCon 200SM 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 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.

EQUIPMENT INSTALLATION

(Input Power Requirements)

The PowCon 200SM is manufactured for use on 220 volt, 50/60 hertz, single phase power.



DANGER

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

FUSE SIZE

The PowCon 200SM is equipped with a 9 foot (2.75M) power cord. The power cord size is 10 AWG for 220 volt operation. For proper fuse size see Table 2.

TABLE 2
RECOMMENDED FUSE SIZES BASED ON
NATIONAL ELECTRICAL CODE
REQUIREMENTS

Input Voltage	Maximum* Amperage	Recommended Fuse Capacity	Recommended Plug Capacity
220V, 1Ø	48A	50A	40A

*Maximum current demand is based on an output of 30 VDC and 250A.

PRIMARY WIRE SIZE

Additional lengths of primary cable are to be considered as extension cords. To maintain the necessary degree of safety, the use of suitably rated U.L. recognized male/female connector plugs is required (see recommended fuse capacity shown in Table 1). Extension primary cord lengths must be of the same grade wire for their entire length, as shown in Table 3.

TABLE 3

RECOMMENDED PRIMARY CABLE SIZE
BASED ON NATIONAL ELECTRIC CODE
REQUIREMENTS

Extension Cable Length*	Required Primary Cable Size
250 feet or less (78M)	6 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 4 AWG cables 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 ON THE REAR PANEL. THE PRIMARY SUPPLY LINE SHOULD ALWAYS BE OFF DURING INSTALLATION.



DANGER

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

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.

THREE PHASE INSTALLATION

The PowCon 200SM may be connected to 208V or 230V three phase power. To do this follow these steps:

- A) First connect the green wire to ground connection.
- B) Connect white and black leads to any two of the three "HOT" legs on the wiring box.

INSTALLATION

NOTE

DO NOT CONNECT THE GREEN WIRE TO A NEUTRAL

ENGINE DRIVEN GENERATOR USE

Failure to take special precautions with the PowCon welding power sources and engine driven generators will result in damage to equipment. The following special startup procedure **MUST** be followed to prevent damage to both the unit and the generator.

CAUTION

NEVER START UP THE GENERATOR WITH THE CIRCUIT BREAKER ON THE PowCon UNIT IN THE UP/ON POSITION. THE PowCon UNIT MAY BE SWITCHED ON AT THE CIRCUIT BREAKER ONLY AFTER THE GENERATOR IS STARTED AND RUNNING STEADILY (AT LEAST TEN SECONDS).

With the generator OFF, perform the following steps on the factory equipped primary:

- A) Check if engine driven generator has a 208-230 volt primary voltage.
- B) Connect green wire to ground.
- C) Follow the single phase installation as required.

LOCATION OF EQUIPMENT

NEMA Standard EW1-2.02 approved as ANSI C87.1-1976 outlines both usual and unusual service conditions for a welding power sources. The PowCon 200 series of welding power source has 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.

The size and unique design of the PowCon 200 series of welding power sources requires the operator be aware of certain safeguards regarding the proper procedure for movement and placement of the unit. Good judgement and compliance with your particular job site safety requirements are essential. The following safeguards are recommended for the movement and placement of the unit.

COOLING

Locate the PowCon Welding Power Source 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.

ACCESS

Locate the PowCon Welding Power Source where there is room for the operator to manipulate the controls or change the connections on either the front or back panel. Avoid placing the unit in a hallway or other area where foot traffic might be impeded.

LIFTING

A minimum of two people are required to lift and/or carry the PowCon. 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.

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.

WARNING

DO NOT LEAVE THE UNIT OPERATING WHEN LIFTING OR MOVING IT.



DANGER

DO NOT DRAG OR LIFT THE UNIT BY THE PRIMARY OR WELDING CABLES. EXERCISE CARE IN THE HANDLING OF ALL CABLES TO AVOID EXCESSIVE WEAR AND LOSS OF ELECTRICAL INSULATION.



DANGER

DO NOT LIFT THE UNIT UNLESS ALL 10 FLANGE SCREWS AND NUTS HOLDING THE HINGED TOP AND BOTTOM CASES ARE TIGHT.

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

OUTPUT CONNECTIONS

WELDING CABLE

Use electrode and ground cables of the appropriate size as shown in Table 4. To avoid excessive heat losses during welding, 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 ground leads have to be assembled using customer supplied welding cable and cable connectors. After the cables are assembled, connect the electrode lead to the negative (-) jack and the ground lead to the positive (+) jack for straight polarity operation. For reverse polarity operation, the electrode lead is connected to the positive (+) jack and the ground lead is connected to the negative (-) jack.

INSTALLATION

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 4

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

0' to 150' (45.7M)	150' to 200' (61M)	200' to 250' (76M)
2	1	1/0

*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.

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 (3.7 M) of control 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.

If longer remote cables are required, both 25' and 50' cables are available.

WIREFEEDER CONTROL CABLE - POWER DRIVE I

The control cable for the Power Drive I 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.

NOTE

THE GROUND WIRE IS USED FOR OTHER ACCESSORIES SUCH AS A PULSER UNIT OR FOOT CONTROL UNIT.

UNLESS OTHERWISE SPECIFIED, THE PowCon 200SM IS SHIPPED FROM THE FACTORY WITH ON/OFF CONTROL RESPONSIVE TO CONTACT CLOSURE ONLY.

INSTALLATION

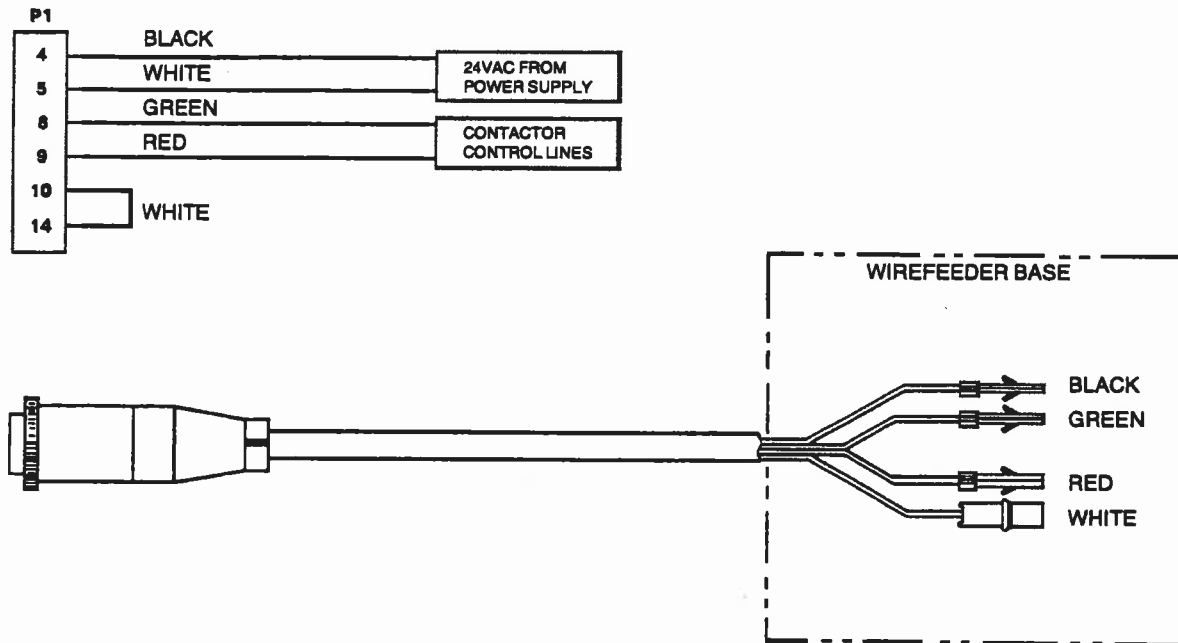


FIGURE 2, POWER DRIVE I WIREFEEDER CONTROL CABLE WITH SCHEMATIC

A breakdown of the control cable is as follows:

Pins 3, 4, 5 The auxiliary power for the wirefeeder is provided via these connections. The wire on Pin 3 is the ground, and the wires on Pins 4 and 5 are the 24V supply lines.

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

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

THE **PowCon 200SM** POWER SOURCE SUPPLIES 24V AC AUXILIARY POWER FOR WIREFEED PURPOSES. IT IS DESIGNED FOR THE **PowCon** POWER DRIVE I WIREFEEDER. THIS AUXILIARY POWER IS NOT SUITABLE FOR USE WITH A 115 VOLT OPERATED WIREFEEDER.

NOTE

THE GREEN WIRE ON PIN #3 IS THE EARTH GROUND. BECAUSE OF ITS LOW VOLTAGE 24 VAC OPERATION WITH NO EXPOSED METAL PARTS, THE POWER DRIVE I WIREFEEDER DOES NOT USE EARTH GROUND.

OPERATION

FUNCTION OF OPERATING CONTROLS AND CONNECTIONS

1. Indicator Lamp

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

2. Digital Voltmeter

Available only as a user installed option. Gives display of welding volts and amps. Can be manually switched between the two functions.

3. Weld Power Control Dial

Adjusts the output of the unit. It is graduated in 10% increments and adjusts from a minimum of 10 amps @ 20V, to a maximum of 250 amps @ 30V. The weld power can be adjusted while the unit is under load.

4. Process Selection Switch

- I GTAW/SAW
- II GMAW (Short Circuit) - Use for low current GMA short-arc welding.
- III GMAW (Spray) FCAW & SMAW - Use for either high current GMA Short-Arc, GMA spray transfer or FCAW.

NOTE

DO NOT USE PROCESS SWITCH UNDER LOAD

5. Puddle Control Dial

This controls the amount of penetration and wetting of the weld puddle.

"Colder" settings for out of position welding.

"Hotter" settings for flat position welding.

NOTE

THIS CONTROL IS OPERATIVE ONLY WHEN THE PROCESS SELECTION SWITCH IS IN THE GMAW (SHORT) MODE. THE PUDDLE CONTROL CAN BE ADJUSTED WHILE THE UNIT IS UNDER LOAD.

6. Circuit Breaker

The circuit breaker acts as a switch to turn the incoming primary power on and off and also protects the semiconductors in the power source in case of fault in the control 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.

WARNING

IN THE SMAW POSITION ON THE PROCESS SWITCH, THE CONTACTOR IS ALWAYS CLOSED. THIS MEANS THAT IF THE CIRCUIT BREAKER IS ON AND THE PROCESS SWITCH IS IN SMAW, THE ELECTRODE IS ALWAYS LIVE. AVOID AN ELECTRIC SHOCK BY ACCIDENTAL CONTACT OR CARELESSNESS.

7. Remote Terminal

Connection for remote contact closure and auxiliary power connection for wirefeeder. Also can be used with Remote Current Control Device.

8. Primary Cable

Unit comes from factory with 9 feet (2.75 meters) of primary lead connected to the circuit breaker through the strain relief. See INSTALLATION Section for recommended cable size and fuse requirements.

9. Output Terminals

Quick connect female output receptacle with polarity as marked. User must supply cable and connector fittings. See INSTALLATION Section for recommended cable size.

OPERATION

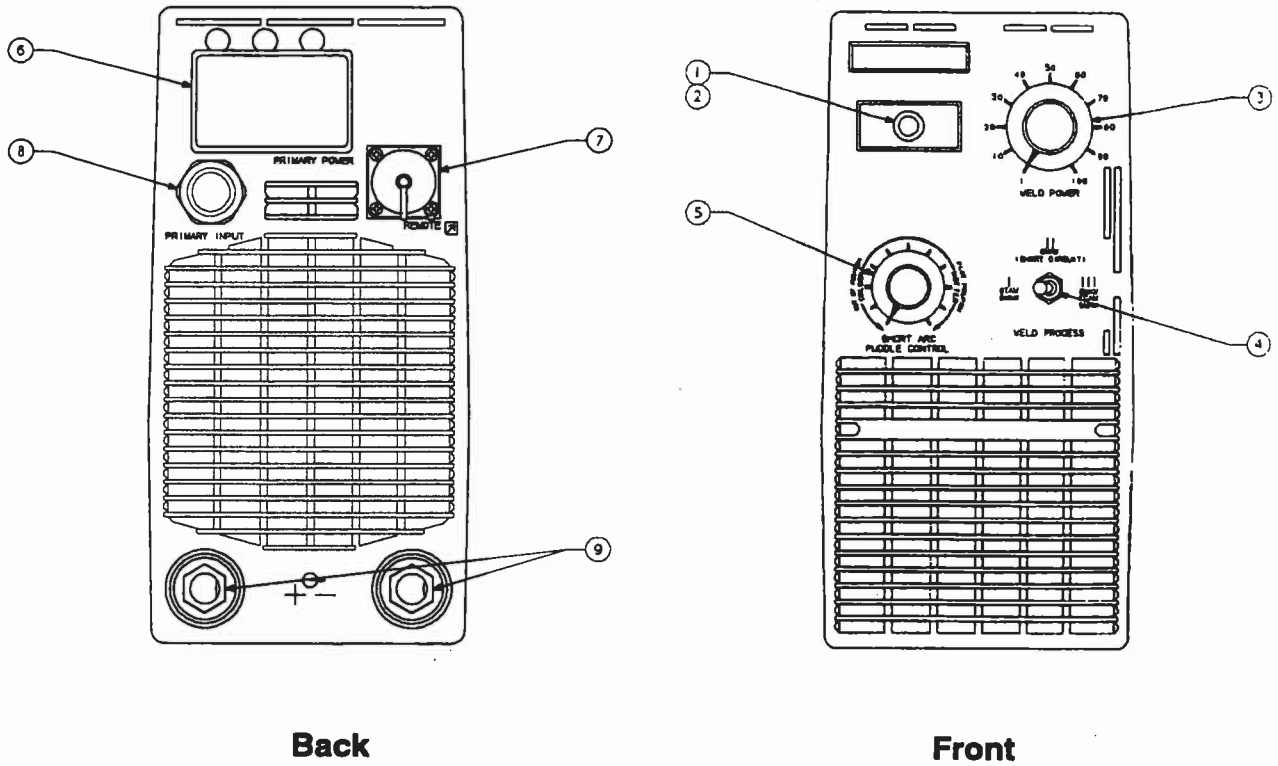


Figure 3
Front and Back Panel Controls and Connection Locations

OPERATION

SEQUENCE OF OPERATION

GENERAL

The open circuit voltage displayed depends upon the process mode selected. The approximate open circuit voltage displayed under each condition are shown in Table 5.

TABLE 5
OPEN CIRCUIT VOLTAGE RANGE

MODE		
SMAW	GMAW/SPRAY	GMAW/SHORT
73-75	62-65	62-65

It is not necessary to adjust the open circuit voltage to obtain a desired operating point. This is a characteristic of the constant power inverter circuitry. The power source is dynamically adjusted during welding, by using the weld power knob.

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 section.
- B) Choose the applicable welding process on the process selection switch.
- C) Adjust the Weld 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 or if the wirefeeder is not connected or not triggered). 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 A FOOT OR HAND OPERATED REMOTE DEVICE IS CONNECTED TO THE POWER SOURCE, THE "TICKING" SOUND WILL NOT OCCUR. HOWEVER, THE INDICATOR LAMP AND FAN WILL REMAIN ON. THE EXCEPTION TO THIS IS THE SMAW MODE. IN THIS MODE, THE TICKING WILL ALWAYS OCCUR.

- 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 source prior to turning the unit off.

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 successful use of the PowCon with a variety of electrode types and diameters.

OPERATING IN THE SMAW MODE

The weld process switch should be in the SMAW mode. The volt ampere characteristic curves for the PowCon 200SM in the SMAW mode are shown in Figure 4. Some typical electrodes and recommended machine settings are shown in Table 6.

TABLE 6
RECOMMENDED POWER AND RANGE
SETTINGS FOR SMAW DCRP WITH
PowCon 200SM

COVERED ELECTRODE SMAW*			
		E8011	E6013
3/32	Weld Process	I	I
	Weld Power	18 (80A)	20 (85A)
1/8	Weld Process	I	I
	Weld Power	30 (100A)	32 (150A)
5/32	Weld Process	I	I
	Weld Power	42 (140A)	45 (150A)

* These suggested power settings represent the manufacturer's best estimate and are intended as guidelines for the user of the PowCon 200SM.

These weld power percentages represent the position of the front panel knob on the the power source.

OPERATION

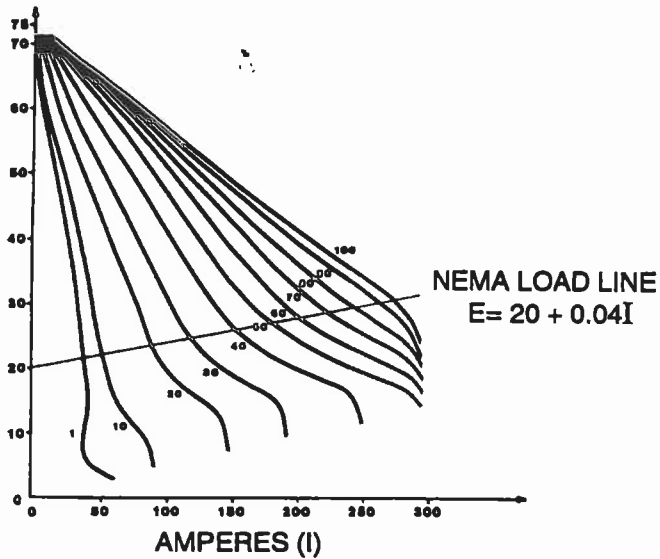


FIGURE 4

VOLT/AMP CHARACTERISTIC CURVES, SMAW MODE

OPERATING IN THE GMAW/SPRAY MODE

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 7. The volt/ampere characteristic curves for the PowCon in the regular GMAW spray mode are shown in Figure 5.

TABLE 7

RECOMMENDATIONS FOR E70S-3 SPRAY TRANSFER USING 98/2 AR/O₂ 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	350-400	25-28

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

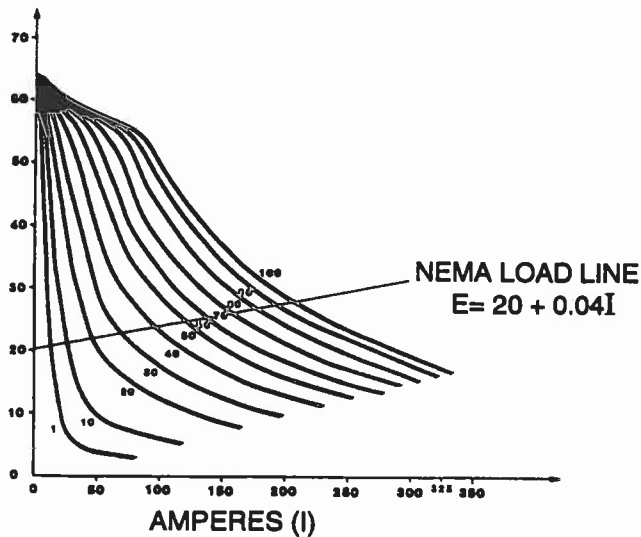


FIGURE 5

VOLT/AMP CHARACTERISTIC CURVES, GMAW SPRAY MODE

OPERATION

OPERATING IN THE SHORT ARC MODE

Short circuiting transfer GMA welding is distinguished from other transfer modes by the use of small diameter wires with relatively low currents. In the Short Circuit mode, the filler metal is transferred to the base material during an instantaneous short circuit between the filler metal wire and the base material.

INTRODUCTION

The 200SM achieves the short circuit transfer by precisely controlling the instantaneous power output during alternating arcing and shorting periods (See Figure 6).

An internal control circuit monitors the output voltage to detect the shorted condition (time 'A' in the figure) and reacts to increase the arc current during the shorted time. This heats the filler metal in contact with the base material to the melting point; the molten filler flows into the base, the short circuit condition ends (times 'B' and 'C') and a period of arcing begins again (times 'C' and 'D').

During arcing the increase in arc voltage is detected by the internal control which acts to limit the arc current at times 'E' and 'F' until a short circuit is once again detected, beginning another cycle.

THE WELD POWER CONTROL

The average power supplied to the weld is set with this control while operating GMAW (Short Circuit).

THE PUDDLE CONTROL

Use this adjustment to control the weld puddle characteristics to suit your application; generally speaking, the colder settings are for out of position welds and the hotter settings are for flat welding. The weld puddle control regulates both the rate and the amount of power delivered during each mode of the short circuit transfer. As more puddle control is added, the arc becomes hotter, due to the increase in power delivered during the arcing period. Decreasing the puddle control causes a colder arc by reversing the power delivery schedule outlined above. Another result of changing the puddle control is the weld droplet size increase for hotter settings and decrease for colder settings. The larger the droplet size, the lower the frequency of drops. Figure 6 illustrates the effects of weld puddle control over weld power, current and voltage.

SELECTING AN OPERATING POINT

Obtaining an operating point requires a balanced selection of gas, wire diameter, proper wirefeed speed, and weld power. The weld puddle control should remain at the mid-point during the initial adjustment. Once a suitable combination of weld power and wirefeed speed is obtained, an adjustment to the weld puddle control can be made. Some typical operating parameters are shown in Table 8 and Figures 6 and 7.

For some higher current short circuit 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, excellent crisp short-arcing can be performed on a variety of plate thicknesses and current levels.

TABLE 8

SOLID ELECTRODE (STEEL), GMAW SHORT CIRCUIT (II)

AMPS	SETTING	.023		.030		.035	
		ArCo ₂	Co ₂	ArCo ₂	Co ₂	ArCo ₂	Co ₂
30	Weld Power	1	1				
	Wire Speed	2.5	2.5				
60	Weld Power	1	1	1	1		
	Wire Speed	3.2	3.2	2.4	2.4		
70-80	Weld Power	20	35	20	25	10	5
	Wire Speed	4.2	4.2	3.2	3.2	2.3	2.3
90-100	Weld Power	45	65	25	32	30	35
	Wire Speed	6.3	6.3	3.8	3.8	2.8	2.8
120-130	Weld Power			30	40	50	60
	Wire Speed			4.2	4.2	3.2	3.2
150	Weld Power					65	90
	Wire Speed					4.1	4.1

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.

OPERATION

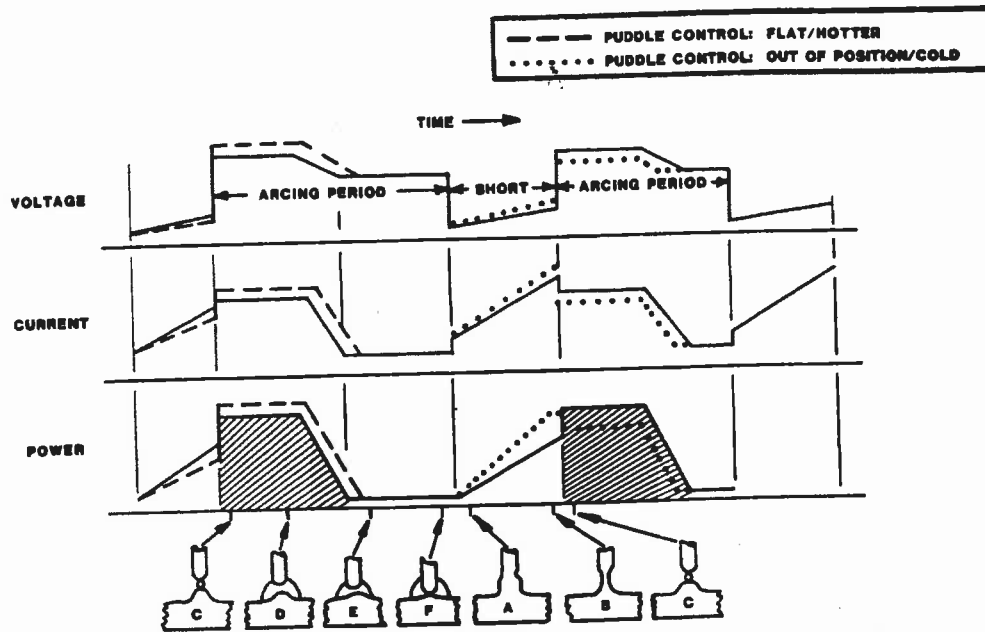


Figure 6, Voltage Current and Power Relationships for GMAW Short Circuit Transfer

Short Arc GMAW, CO₂ Shielding with E70 S-6 wire, .375 inch visible stick-out, 18 inches/min. travel speed, puddle control set to 50%

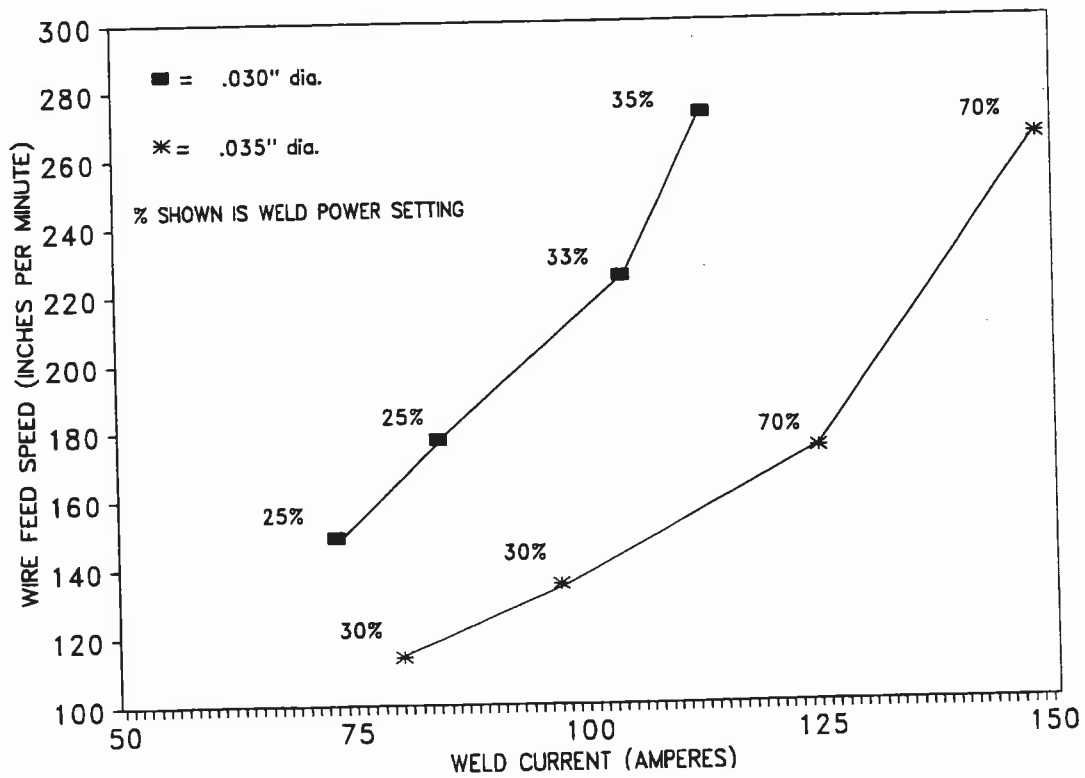


Figure 7, Short Circuit GMAW, CO₂ Shielding

OPERATION

DUTY CYCLE

The duty cycle of a welding power supply is a measure of the capacity of the unit. The PowCon 200 has a duty cycle based on a 10 minute time period. The duty cycle is the percent of that time period the unit can produce the specified output.

The PowCon 200 can operate for 6 minutes out of a 10 minute period at an output of 200 amperes and 28 volts. To assure the

safe operation of the unit the remaining 4 minutes must be spent idling to permit proper cooling. The duty cycle at this output is 60%.

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

MAINTENANCE

SERVICE

Unauthorized service to this unit by anyone other than a PowCon trained and authorized technician will void the limited warranty.

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.

EXTERNAL TROUBLESHOOTING

If the PowCon power source 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 the primary power cable is properly connected.

- B) Make sure 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 and the remote connector disconnected, turn the unit on. A "ticking" sound should be heard.

GENERAL TROUBLESHOOTING

Trouble	Possible Cause	Remedy
Welding current too low for power setting.	Primary voltage too low.	Check primary connections.
Unit shuts down while welding. Fan still rotates and INDICATOR light working.	Unit overheated due to: a. Running too high amperage. b. Improper cooling of unit.	Wait 20 minutes. Reduce the welding current and duty cycle. Make sure the air vents are not obstructed.
No wirefeed 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 weld power setting.	Change as required.

INTERNAL TROUBLESHOOTING

Internal troubleshooting must be performed by a factory trained and authorized technician.



DANGER

THE CAPACITORS IN THIS UNIT CAN HOLD A DANGEROUS CHARGE EVEN WHEN THE PRIMARY POWER IS DISCONNECTED.

DRAWINGS & PARTS LIST

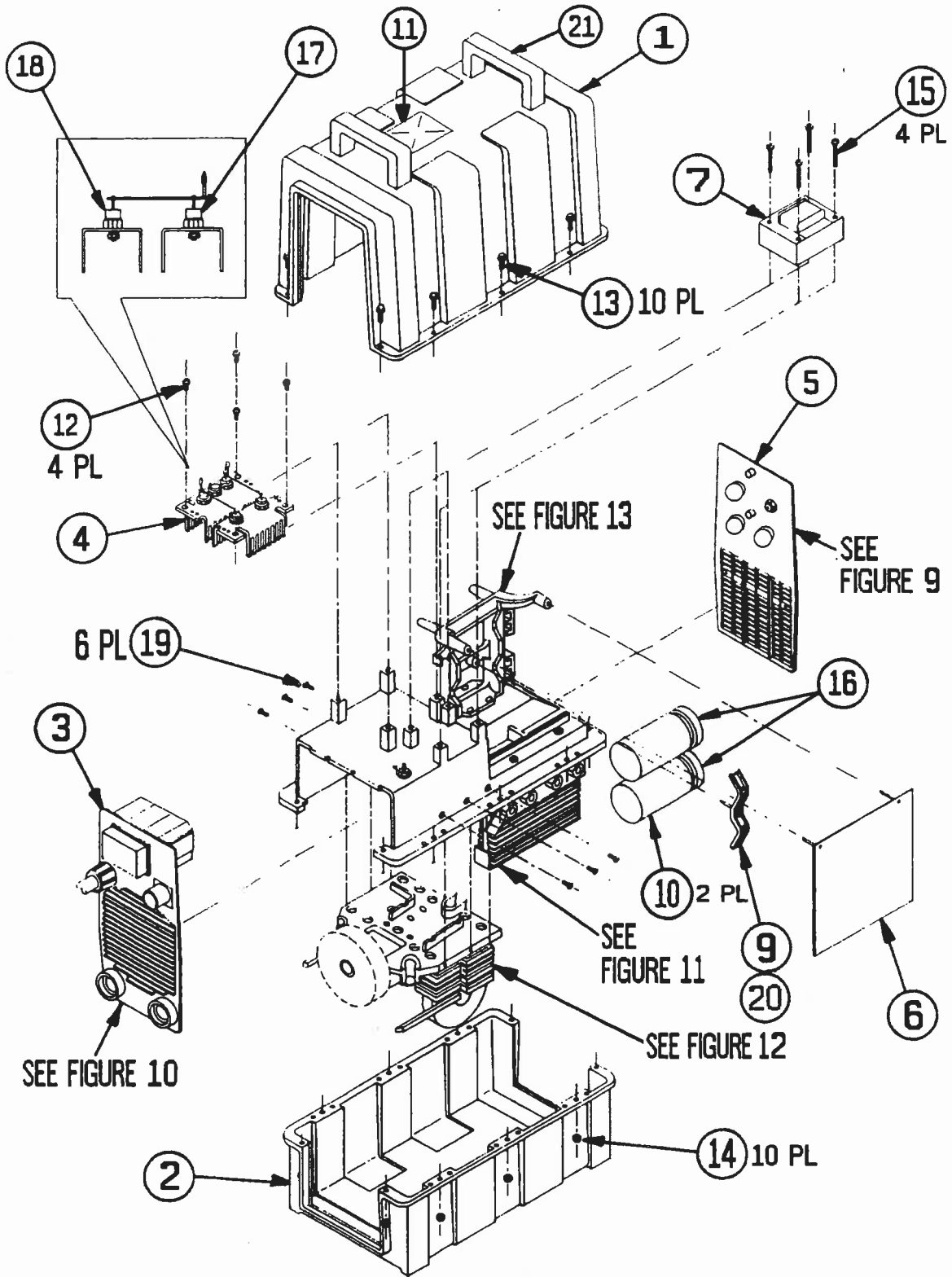


Figure 8, Final Assembly 230V 200SM

DRAWINGS & PARTS LIST

Item No.	Quantity	Part Number	Description	Reference Designation
1	1	250018-001	Case, Top Kit	
2	1	100006-001	Case, Bottom	
3	1	105008-001	Assy, Rear Panel, 200Amp	
4	1	105028-001	Assy, Input Rectifier, Bussed	
5	1	105185-001	Assy, Front Panel, 200SM	
6	1	105180-001	Assy, Control PCB 200SM	
7	1	105120-001	Assy, Aux XFMR 230V / 24V	T1
9	1	105038-002	Capacitor Clamp	
10	2	900000-001	Input Capacitor	
11	1	100320-001	Data Label 200SM	
12	4	970025-506	Plaston Screw #10-10 X 1/2	
13	10	970006-614	Scr, Flanged HexHd Machined	
14	10	972001-006	Nut, Flanged Hex, Self-Locking	
15	4	970002-520	Screw, Panhead, Supadrive	
16	2	100234-001	Buss Wire, Input Caps	
17	2	912000-002	Input Diode Cathode Stud	CR1, CR2
18	3	912000-001	Input Diode Anode Stud	CR3, CR4, CR5
19	6	970011-506	Screw, Flathead, Supadrive	
20	1	970002-518	Screw, 10-32 X 1.50	
21	1	250017-001	Handle Kit	

DRAWINGS & PARTS LIST

Parts List for Figure 9, 200SM Front Panel Assembly (P/N 105185-001)

Item No.	Qty	Part Number	Description	Reference Designators
1	1	105184-001	Front Panel 200SM Silkscreened	
Opt	1	105184-002	Panel W/DVM	
2	2	903000-002	Potentiometer 5K	R1, R2
3	1	941006-001	Indicator Light LED Yellow 250067-001/ DS1	
4	2	100256-001	Shaft Lock	
5	1	940000-002	Control Knob, Small	
6	1	940000-001	Large Knob	

7 1 92004003

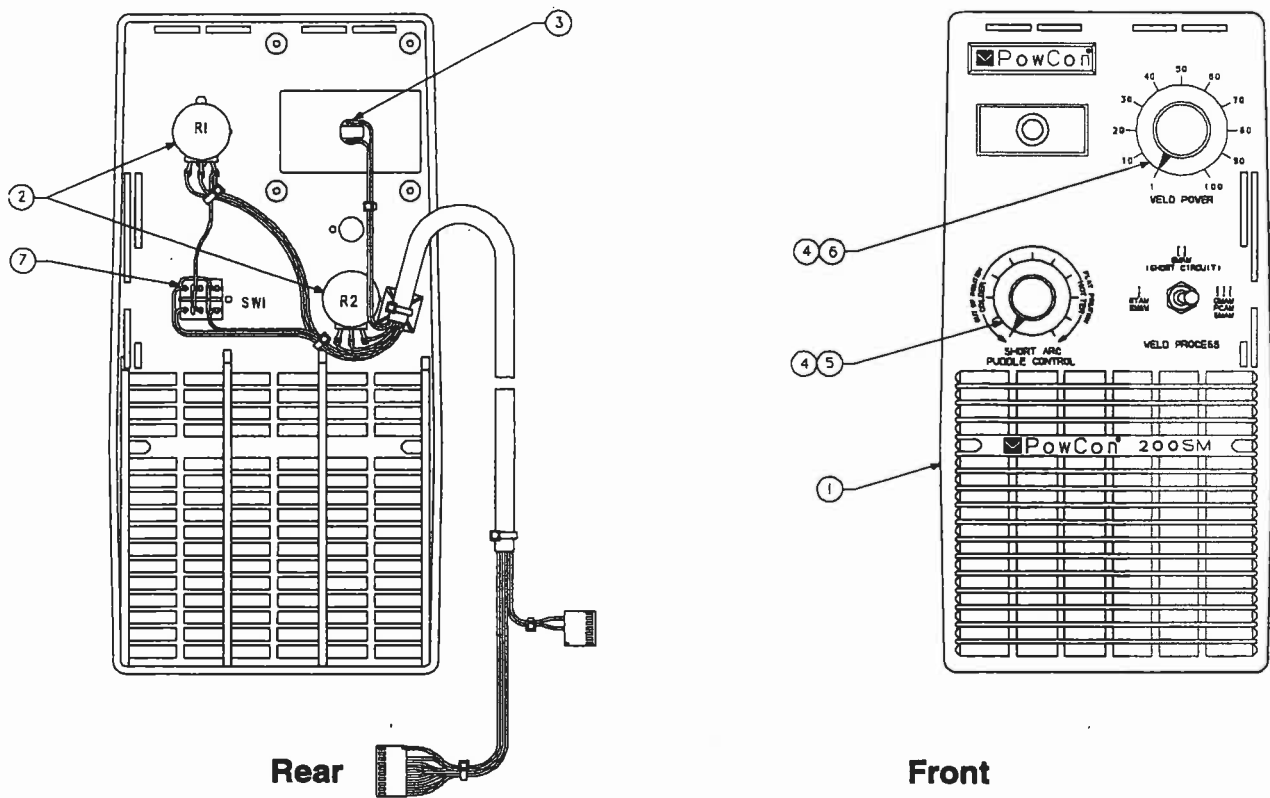
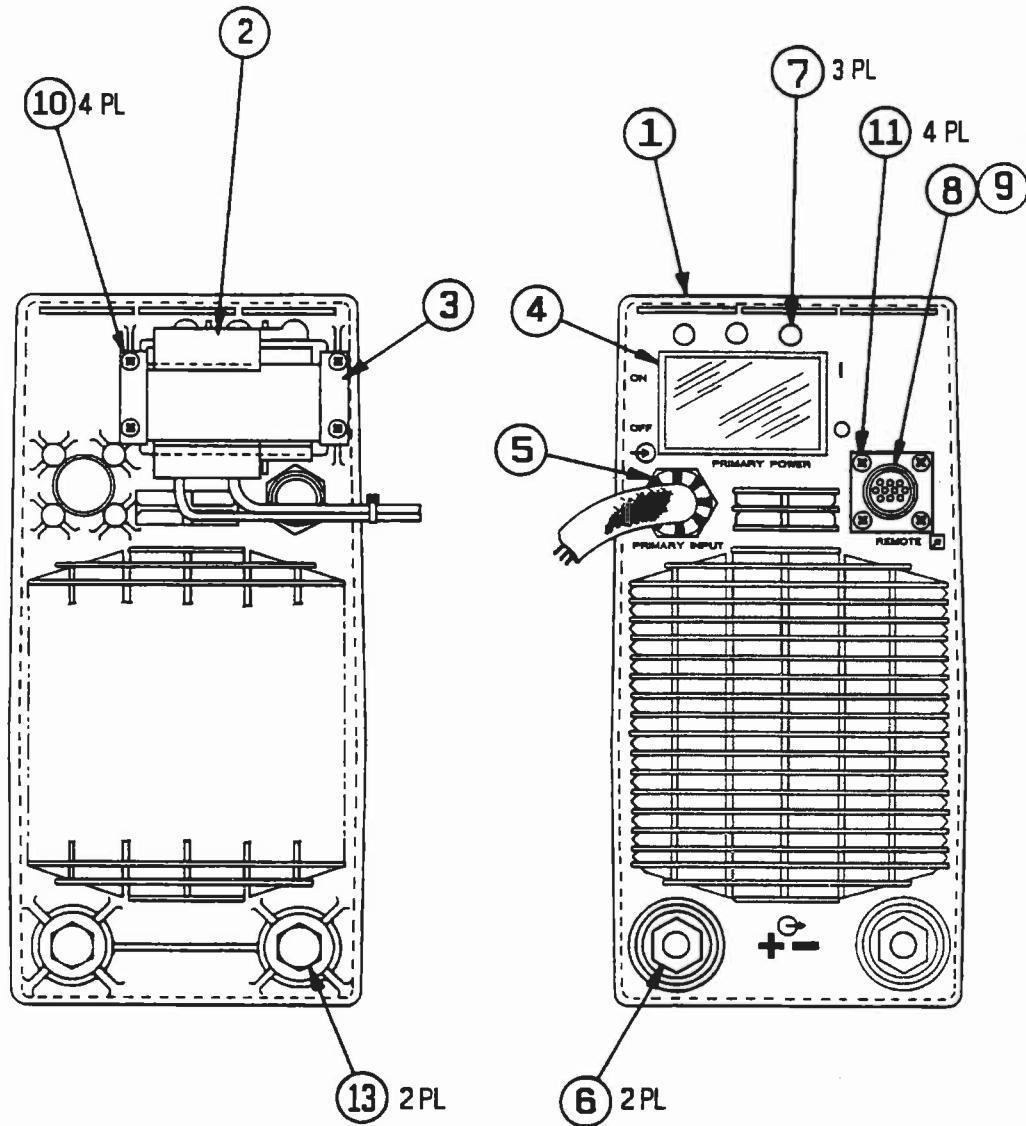


Figure 9, 200SM Front Panel Assembly

DRAWINGS & PARTS LIST



Rear

Front

Figure 10, 200SM Rear Panel Assembly

DRAWINGS & PARTS LIST

Parts List for Figure 10, 200SM Rear Panel Assembly (P/N 105008-001)

Item	Quantity	Part Number	Description	Reference Designation
1	1	100022-002	Rear Panel Silkscreened	
2	1	921000-002	Circuit Breaker, 2 Pole	CB1
3	1	100030-001	Bracket, Circuit Breaker	
4	1	100005-001	Boot, Circuit Breaker	
5	1	940015-003	Strain Relief - 21 with Nut	
6	2	100025-001	Output Jack, TWECO, Female	J11, J12
Opt	2	100028-001	Output Jack, DINSE, Female	
7	3	940002-001	Hole Plug, Panel	
8	1	100124-001	Assy, Harness, Remote Jack	J10
9	1	930000-002	Sealing Cap	
10	4	970025-506	Scr, Supadrive, Plaston #10 - 10 X 1/2	
11	4	970025-304	Scr, Supadrive, Plaston #6 - 10 X 3/8	
13	2	972005-008	Nut, Brass 3/8 X 16	

DRAWINGS & PARTS LIST

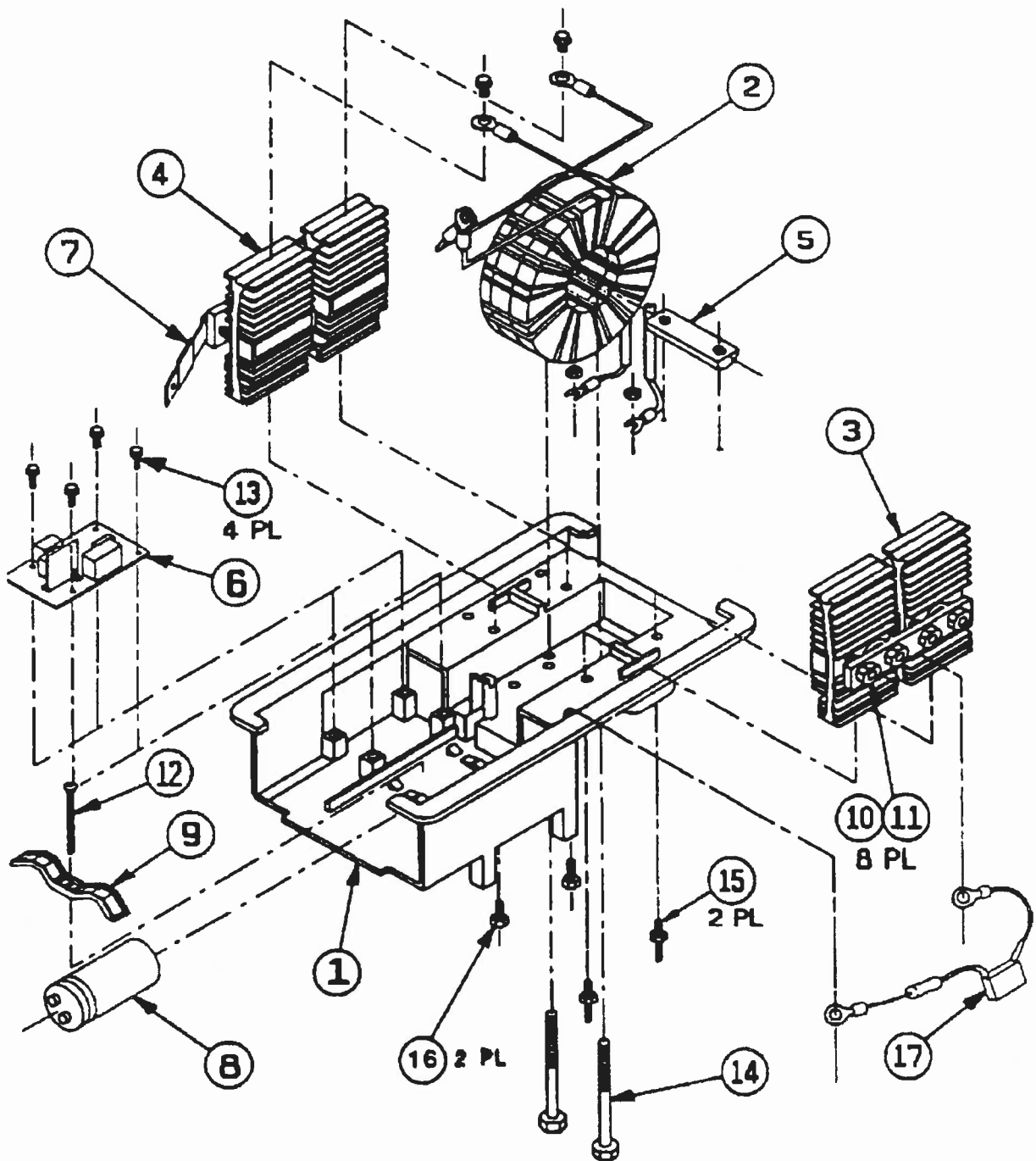


Figure 11, Main Transformer and Chassis Plate Assembly

DRAWINGS & PARTS LIST

Parts List for Figure 11, Main Transformer and Chassis Plate Assembly

Item	Quantity	Part Number	Description	Reference Designators
1	1	105036-001	Assy, Chassis Plate 200Amp	
2	1	105002-001	Assy, Main Transformer 200Amp	T2
3	1	105021-001	Assy, SCR Heatsink, 200Amp	Q1, Q2
4	1	105020-002	Assy, WR Heatsink, 200Amp	CR11, CR12
5	1	100183-001	XFMR Mounting Bracket	
6	1	100241-005	Output PCB 200SM	
	1	902004-002	Res, WW 3.3K OHM \pm 10% 5W	R8
	1	901000-002	Capacitor, .1UF 700V	C11
	1	902007-001	Resistor Wire Wound 12 OHM	R6
	1	901000-001	Capacitor .022UF	C12
	2	901003-002	Capacitor, MET POLYEST, "X", .68UF, 300V	C15, C16
	1	902002-042	Resistor, MF 47 OHM \pm 5% 2W	R7
	1	902001-084	Resistor, CF 2.2K OHM \pm 5% 1/2W	R9
	1	902004-013	Resistor, WW 22 OHM \pm 5% 5W	R10
7	1	105027-002	Assembly, Shunt	SH1
8	1	900001-001	Output Capacitor	C14
9	1	105038-001	Assy, Output Capacitor Brkt	
10	8	970006-623	Screw, Hex, 1/4 - 20 X 2 - 1/4	
11	8	972001-006	Nut, Flanged, Hex, Self-Locking	
12	1	970002-520	Screw, Pnh, Supadrive, #10-32 X 1 - 3/4	
13	4	970025-506	Screw, Plaston, #10 - 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 Head	
17	1	105115-001	Snubber Assy, Main XFMR	

DRAWINGS & PARTS LIST

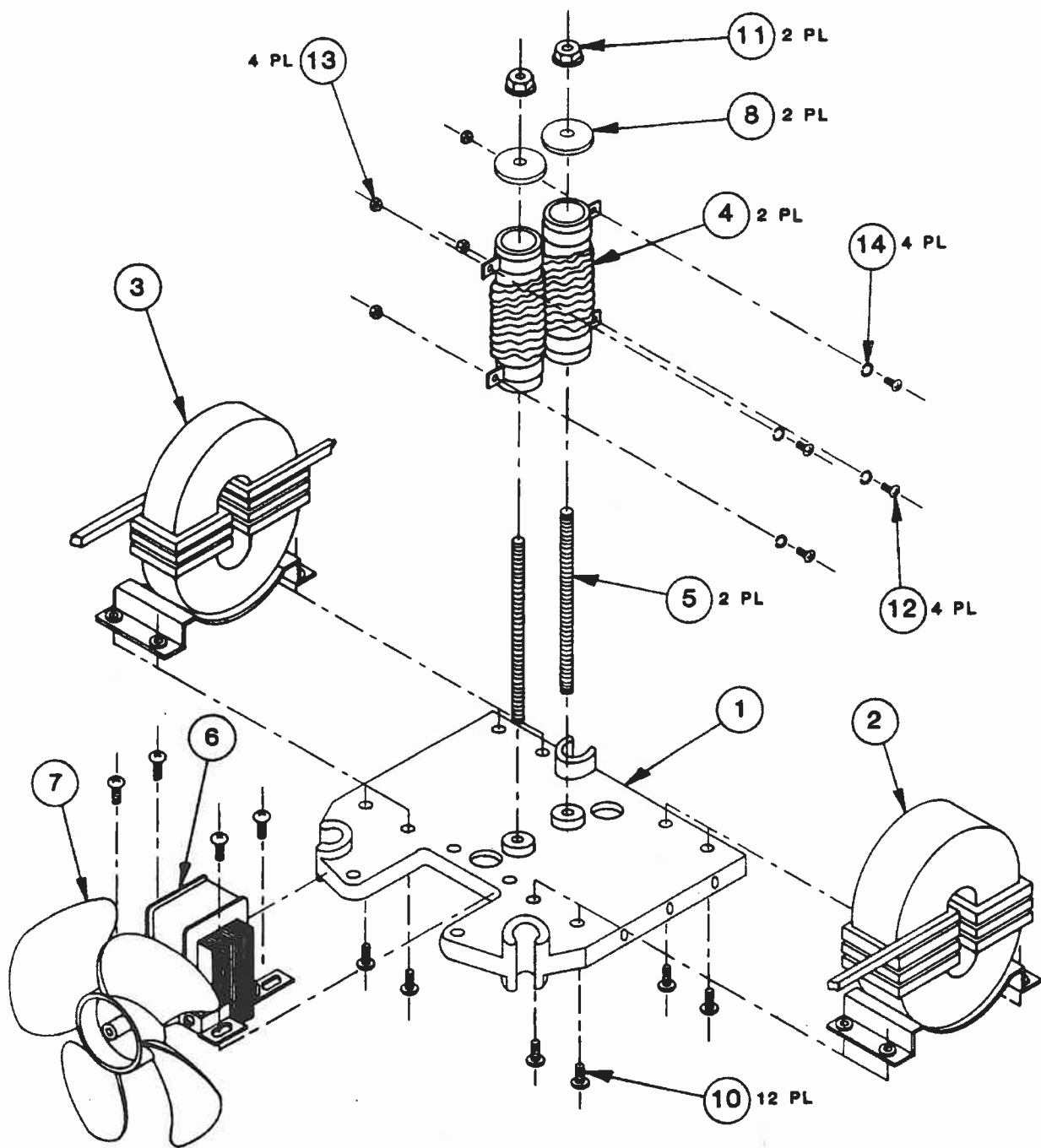


Figure 12, Inductor Plate Assembly with Fan

DRAWINGS & PARTS LIST

Parts List for Figure 12, Inductor Plate Assembly with Fan (P/N 105004-001)

Item No.	Qty.	Part Number	Description	Reference Designator
1	1	100179-002	Inductor Plate with Inserts	
2	1	105005-001	Assembly, Main Inductor, 200Amp	L4, RT2
3	1	105048-001	Assembly, Output Inductor, 200Amp	L5
4	2	902006-001	Surge Resistor	R1, R2
5	2	100128-001	Threaded Rod	
6	1	105010-001	Assembly, Fan Motor, 200V	FAN
7	1	922001-004	Fan Blade 6"	
8	2	100205-001	Washer, Locating Ryton	
10	12	970028-506	Screw, Hex, 10 - 32 X 1/2	
11	2	972001-005	Nut, Flanged, Hex, Self-Locking	
12	4	970001-403	Screw, Pnh, Supadrive, 8 -32 X 5/16	
13	4	972000-004	Nut, Hex, 8 - 32	
14	4	974010-004	Washer, Split Ring, Steel #8	

DRAWINGS & PARTS LIST

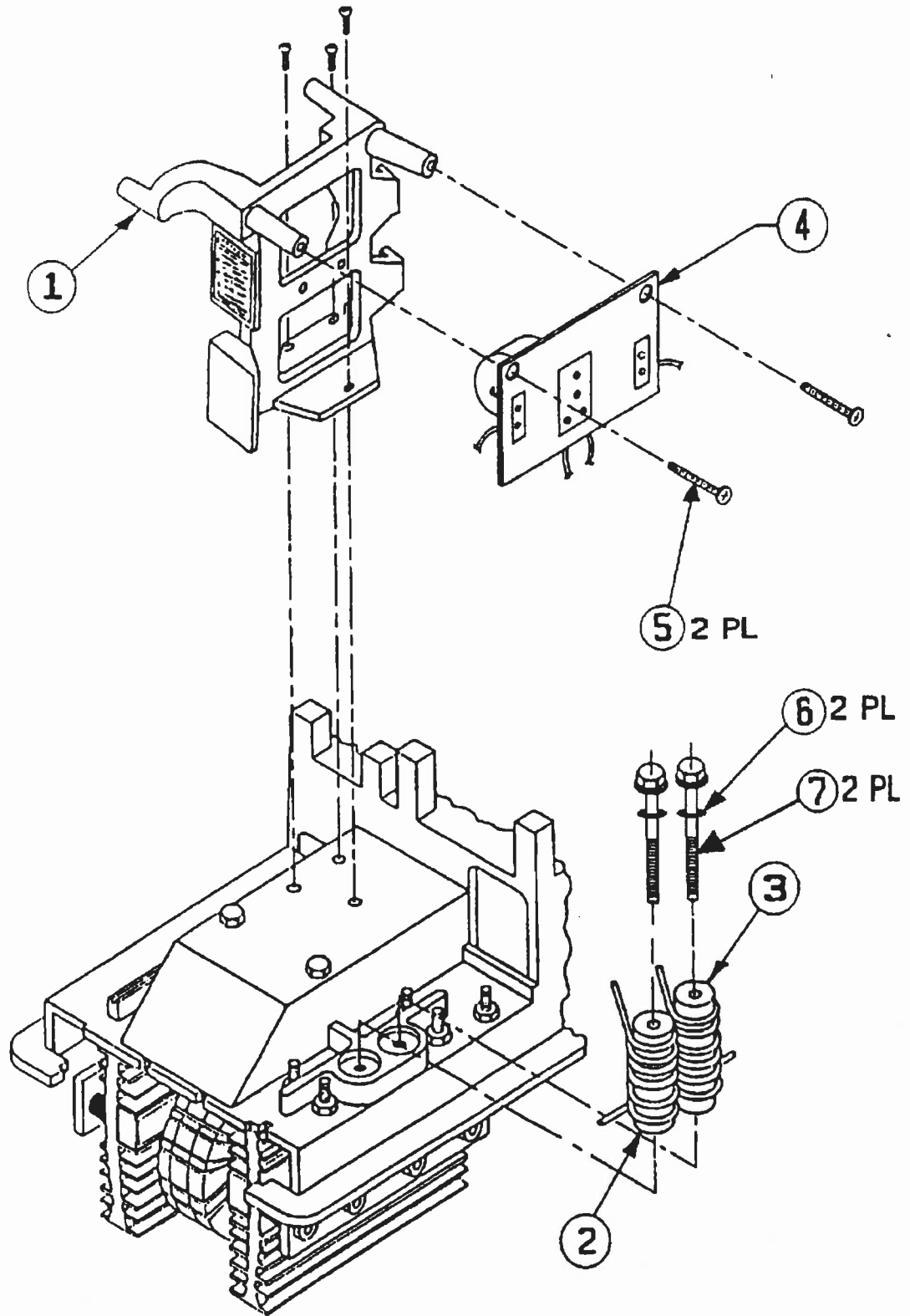


Figure 13, Chassis Capacitor and Coil Assembly

DRAWINGS & PARTS LIST

Parts List for Figure 13, Chassis Capacitor and Coil Assembly

Item No.	Quantity	Part Number	Description	Ref. Designator
1	1	100177-002	Chassis, Capacitor	
2	1	105029-001	Coil, Comm, Front, 200Amp	L2
3	1	105030-001	Coil, Comm, Rear, 200Amp	L3
4	1	100364-001	Assy, Add On Capacitor PCB	C7, C8
5	2	970002-506	Screw #10 - 32 X 1/2 LG	
6	2	974000-005	Washer Flat #10	
7	2	970004-001	Screw #10 - 32 X 3.25	

DRAWINGS & PARTS LIST

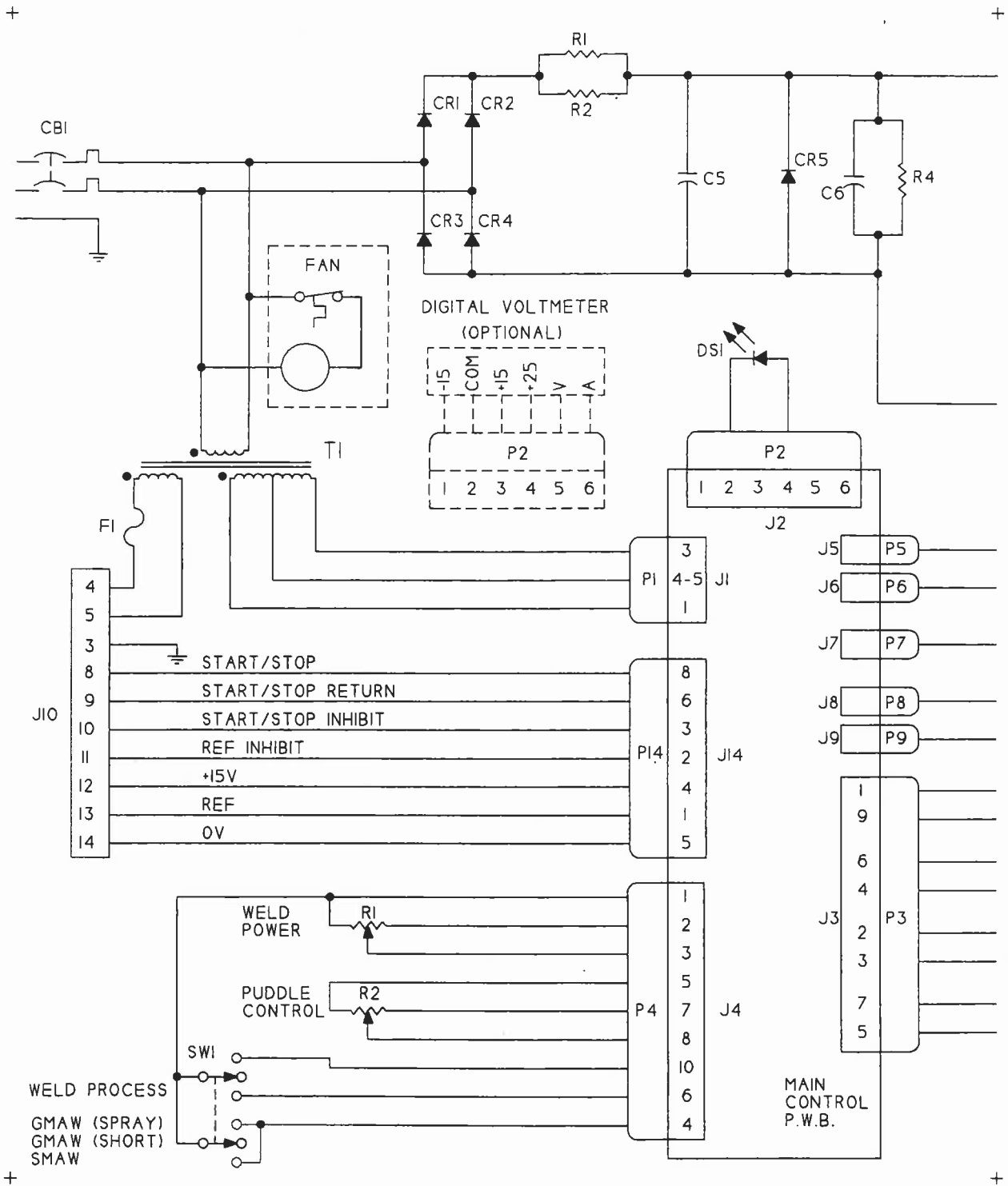


Figure 14, Schematic PowCon 200SM 230V

DRAWINGS & PARTS LIST

