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PowCon®

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

OPERATION MANUAL

630SMP
230/460V

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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.

TABLE OF CONTENTS

OPERATION

LIST OF TABLES

MAINTENANCE

DRAWINGS & PARTS LISTS

LIST OF FIGURES

! 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.

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.

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'ESSAYEZ 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.

VEILLEZ 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 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 Quiès 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 remplacerons 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** 630SMP is that both welding processes can be accomplished using one power source. By means of electronic control, the **PowCon** 630SMP adjusts the output for a given welding process.

The **PowCon** 630SMP contains an integral (built in) MIG Pulser which extends the versatility of the welding power source by giving the end user an additional welding process. Pulsed GMAW combines the advantages of GMAW spray with the advantages of GMAW short arc to meet a variety of rigid standards. The **PowCon** 630SMP portable welding power source comes with a 12 foot (3.7M) primary cable.

SPECIFICATIONS

PowCon 630SMP Welding Power Source.

A) Power Input and Output (see Table 1)

B) Open Circuit Voltage - 80V maximum

C) Current Range - adjustable from 30 to 630 amps, in two ranges

D) 30VAC/115VAC 300VA transformer or 30VAC/42VAC 300VA transformer for operating wirefeeder

E) Integral (built in) MIG Pulser

F) Weight - 189 pounds (85.7 Kg)

G) Dimensions - Height 24: (61 cm), Width 18" (46 cm), Depth 34" (86 cm)

H) Digital Volt/Amp Meter

Accessories:

A) Remote foot-operated and hand-operated contactor and current control.

B) Remote control cable extension lengths-12 ft (3.7M) or 25 ft (7.6M) or 50 ft (15.2M).

C) Dual Cylinder Cart

D) Wirefeeder and Remote TIG Units

E) Relay Kit 115 VAC Return Contactor

F) 115 VAC fused duplex rated @ 10 Amp - Option

TABLE 1

Power Input and Output

OUTPUT RANGE	⎓ DC	60A/22.4V... 630A/44V			
DUTY CYCLE		X	35	60	100	%
RATED OUTPUT @ 3 PHASE PRIMARY INPUT	(U_1 3~) 50/60 HZ	I_2	630	550	450	A
		U_2	44	42	38	V
RATED OUTPUT @ 1 PHASE PRIMARY INPUT	(U_1 1~) 50/60 HZ	I_2	---	375	300	A
		U_2	---	35	32	V
MAXIMUM CURRENT DRAW AT INDICATED PRIMARY INPUT AND MAXIMUM RATED OUTPUT	U_1 SUPPLY	I_1 MAX	/	X	
	230V 3 ~	98	A/	35	%
	460V 3 ~	49	A/	35	%
	230V 1 ~	91	A/	60	%
	415V 3 ~	54	A/	35	%

THEORY OF OPERATION

The **PowCon** 630SMP 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 size, and (2) increased electrical efficiency.

For the **PowCon** 630SMP, the input alternating current (AC) primary power is passed through a circuit breaker to a 6 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 working capacitor's creates a new alternating current (AC). The frequency of the firing of the SCR's varies from 400 Hz to 5000 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 range.

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 that the size of the transformer can be significantly reduced. The **PowCon** 630SMP main transformer weighs 30 pounds, versus approximately 350 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 PC board through control logic feedback.

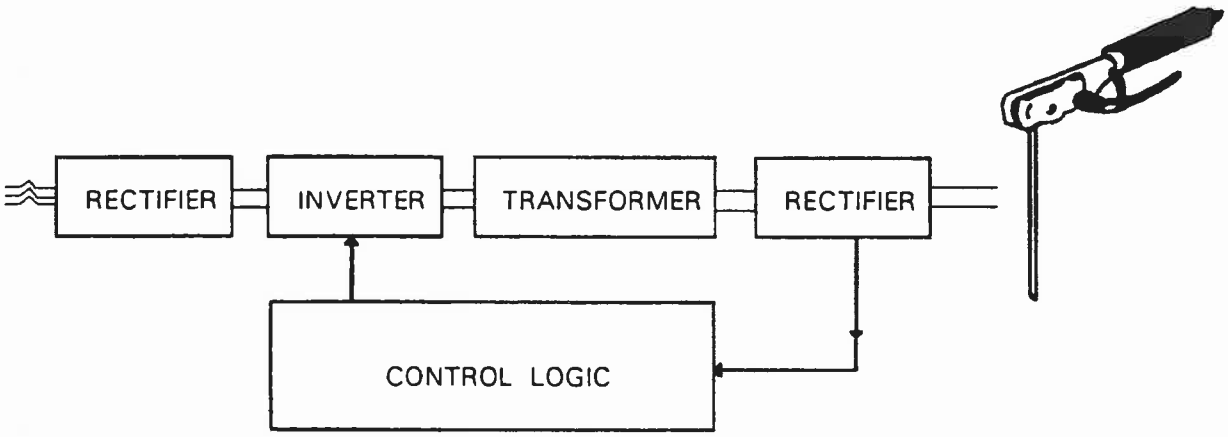


Figure 1, Electronic Block Diagram of Converter Principle

UNPACKING NEW EQUIPMENT (Receiving and Handling)

Remove the **PowCon** 630SMP 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** Operation Manual is packed with each **PowCon** 630SMP 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.

NOTE

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

EQUIPMENT INSTALLATION

The **PowCon** 630SMP is manufactured for use on 230 or 460 volt, 50/60 hertz, three phase power and 230 volt, 50/60 hertz, single phase power (with optional kit required for single phase power).

The **PowCon** 630SMP comes from the factory wired for 440 to 480 VAC input. To perform a voltage change-over, be sure to review and understand the voltage change-over procedure found in Input Voltage Change-Over Section.

Only a qualified electrician should perform the installation of the **PowCon** 630SMP unit to primary power. All installations of this type must conform to the regulations of the National Electric Code and any other local codes which may be applicable.

The **PowCon** 630SMP is equipped with a 12 foot (3.7M) power cord attached. The primary cable supplied consists of conductor colors black, red, white and green.

When wiring to a field connection or wiring box the regulations include, but are not limited to, using the proper ampacity primary cord, properly phasing the connection to three phase power with respect to the ground line (green), and providing the proper strain relief between the primary cable and the field connection box or wiring box.

When an attachment plug cap is installed, it must be U.L. Listed, complying with paragraph 9.10 of U.L. 551, Transformer-Type Arc Welding Machines. Make sure that the chosen pin configuration is appropriate for the primary voltage you are using.

The green lead on the primary cable is the ground lead. This must be connected to the indicated terminal on the plug cap. The remaining three phases may be connected in any order to the other terminals on the plug. In the case of a screw connection care should be taken to ensure that the stranded leads on the primary cable are properly seated before tightening. There should be no loose strands protruding from the sides or back of the terminal after tightening.

After connecting the leads, perform the attachment of the plug casing and the strain relief. The strain relief should grip at least 1/2" of the primary cable's outer jacket. Under no circumstances should the strain relief be connected only to the individual leads of the primary cable. This will result in a shortened cable life and an unsatisfactory strain relief.

Before connecting the unit to the primary power, check to see that the unit is wired for the proper voltage. Refer to Input Voltage Change-Over section of this manual for the proper voltage change-over procedure.

DANGER

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

FUSE SIZE

For proper fuse size see Table 2.

TABLE 2 - Recommended Fuse Sizes

Input Voltage	Maximum* Amperage	Recommended Fuse Capacity	Recommended Plug Capacity
230V, 3PH	98A	100A	75A
460V, 3PH	49A	50A	38A
230V, 1PH	91A	100A	75A

*Maximum current demand is based on an output of 42 VDC and 550A for three phase input. For single phase input, maximum current demand is based on an output of 35VDC and 375A @ 60% Duty Cycle.

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 recommended fuse capacity shown in Table 2). 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

Extension Cable Length*	Required Primary Cable Size	
250 feet or less (76M)	230V	460V
	4 AWG	6 AWG
250 feet to 400 feet (122M)	2 AWG	4 AWG
400 feet to 650 feet (198M)	2 AWG	2 AWG

*The entire extension cable length must be made of the required cable size. For example, a 500 foot extension would be made of 2 AWG cables with appropriate attachment plugs to connect to the factory provided 12 foot primary.

INSTALLATION

DANGER

NEVER CONNECT/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.

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:

1) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure). Units come from the factory wired for 460VAC.

2) Connect green wire to ground.

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

4) Electrically isolate red wire.

NOTE

DO NOT CONNECT THE RED OR GREEN WIRE TO A NEUTRAL.

THREE PHASE INSTALLATION

Perform the following steps on the factory equipped primary:

1) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure). Units come from the factory wired for 460VAC.

2) Connect green wire to ground.

3) Connect white, black and red wires to "HOT" legs.

It is not necessary ot check the phasing of the power lines, except for the green ground lead, as indicated above.. The **PowCon** 630SMP will work properly on any phase sequence.

ENGINE DRIVEN GENERATOR USE

Failure to take special precautions with the **PowCon** 630SMP 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.

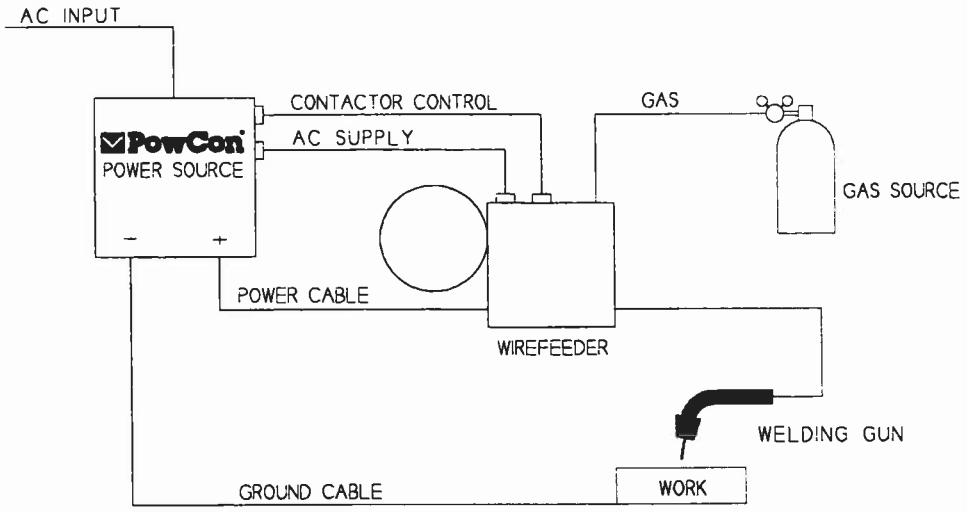


Figure 2, Typical GMAW Equipment Schematic

INSTALLATION

CAUTION

NEVER START UP THE GENERATOR WITH THE CIRCUIT BREAKER ON THE **PowCon** 630SMP UNIT IN THE UP/ON POSITION. THE **PowCon** 630SMP UNIT MAY BE SWITCHED ON AT THE CIRCUIT BREAKER ONLY AFTER THE GENERATOR IS STARTED AND RUNNING STEADILY (AT LEAST TEN SECONDS).

Perform the following steps on the factory equipped primary:

1) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure).

2) Connect green wire to ground.

3) Follow either single phase or three phase installation as required.

LOCATION OF EQUIPMENT

SERVICE OPERATING CONDITIONS

NEMA Standard EW1-2.02 approved as ANSI C87.1-1976 outlines both usual and unusual service conditions for a welding power source. The **PowCon** 630SMP 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** 630SMP welding power source 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.

COOLING

Locate the **PowCon** 630SMP 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** 630SMP 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** 630SMP. 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.

DO NOT DRAG OR LIFT THE UNIT BY PRIMARY OR SECONDARY CABLE. EXERCISE CARE IN THE HANDLING OF PRIMARY AND SECONDARY CABLE TO AVOID WEARING OUT OR LOSS OF ELECTRICAL INSULATION.
DO NOT LIFT THE UNIT UNLESS THE HINGED TOP COVER IS COMPLETELY CLOSED AND TIGHTLY SECURED BY THE HARDWARE PROVIDED.

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

OUTPUT CONNECTIONS

WELDING CABLE

Run 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 work leads have to be assembled using customer supplied welding cable and ball-point 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.

NOTE

LOCATE THE **PowCon** 630SMP 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 50' (15.2M)	50' to 100' (30.5M)	100' to 150' (45.7M)
2/0	3/0	4/0

*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 CONTACTOR CONTROL/WIREFEED POWER CONNECTIONS

The remote control devices come with a 17-pin connector plug which connects to the remote terminal on the panel of the **PowCon** unit.

To connect the remote control device, insert the 17-pin plug from the control cable of the device fully into the receptacle on the front panel. Ensure that the plug keyways align with the receptacle keys. Rotate the threaded collar of the plug clockwise, as far as possible onto the receptacle threaded body to secure the plug in the receptacle.

WIREFEEDER CONTROL CABLE

The control cable for the wirefeeder and **PowCon** 630SMP interface comes with a 17-pin connector designed to mate with the remote receptacle on the panel. The wiring schematic for the control cable is shown in Figure 3.

NOTE

UNLESS OTHERWISE SPECIFIED, THE **PowCon** 630SMP IS SHIPPED FROM THE FACTORY WITH ON/OFF CONTROL RESPONSIVE TO CONTACT CLOSURE ONLY.

The wirefeeder control cable can be adapted for use with the **PowCon** 630SMP and any manufacturer's wirefeeder. The specific pin numbers are shown in Figure 3. A breakdown of the control cable is as follows:

Pins S, J, H: The auxiliary power for the wirefeeder is provided via these connections.

Pin S: 30VAC protected by 10 Amp circuit breaker.

Pin H: 115VAC protected by 5 Amp circuit breaker, or 42VAC protected by 10 Amp circuit breaker.

Pin J: 30VAC/42VAC and 115VAC return.

Pin E,T: These pins with corresponding wires are used to provide remote contactor control for a wirefeeder wired for contact closure as follows:

Pin E: Contact closure povides a path to Pin T.

Pin T: Control circuit board common

Pin P to B: Enable remote contactor control.

NOTE

FOR WIREFEEDERS WHICH RETURN A 115VAC SIGNAL TO THE POWER SOURCE FOR CONTACTOR CLOSURE, A SINGLE POLE DOUBLE THROW RELAY MUST BE USED. THE UNIT IS AVAILABLE FROM **PowCon**. Part Number 600103-001

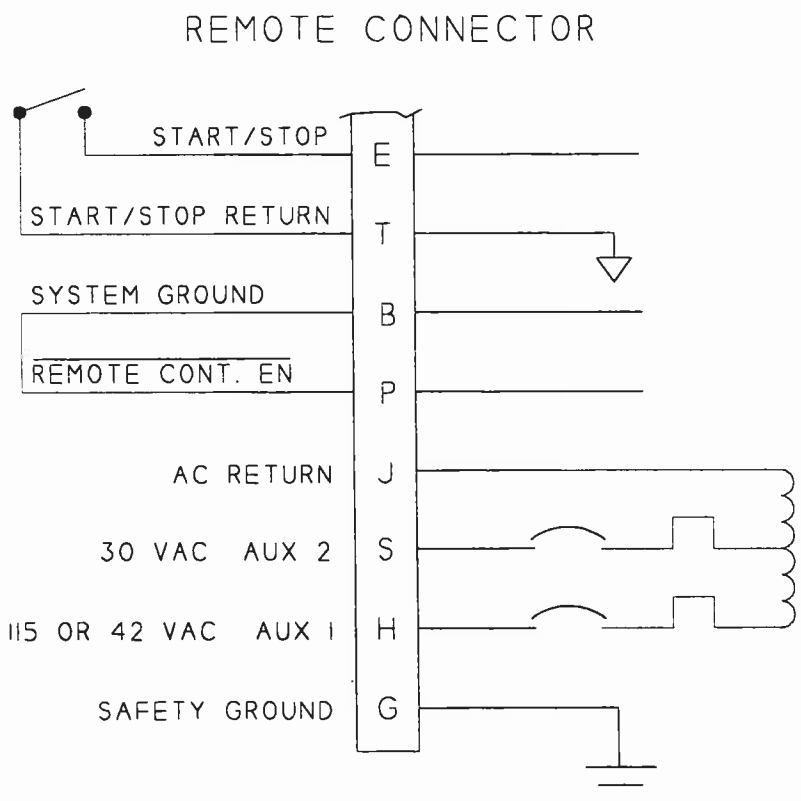


Figure 3, Wirefeeder Control Cable with Schematic

CAUTION

DO NOT ATTEMPT TO OPERATE A WIREFEEDER WITH A 115VAC RETURN WITH THE **PowCon** 630SMP UNLESS THE RELAY OPTION HAS BEEN INSTALLED, OR DAMAGE TO THE UNIT MAY RESULT.

PROCEDURE FOR INPUT VOLTAGE CHANGE-OVER

There are two (2) voltage change-over locations and both must be connected for the same primary voltage. The two voltage change-over locations are as follows:

A) Upper change-over bracket positions 1 through 12 (copper buss bars).

B) Lower change-over bracket positions 13 through 24 (copper buss bars).

NOTE

READ ENTIRE PROCEDURE PRIOR TO PERFORMANCE OF VOLTAGE CHANGE OVER.

IN ORDER TO AVOID AN ELECTRICAL SHOCK,

DANGER

THE UNIT MUST BE TURNED OFF AND DISCONNECTED FROM THE INPUT CIRCUIT PRIOR TO PERFORMING THE VOLTAGE CHANGE-OVER PROCEDURE.

A) Open the top enclosure from the bottom enclosure as follows:

1) Unfasten and remove the 8 bolts and nuts holding the enclosure together.

2) Grab the top half handles firmly and gently pivot the top enclosure open.

3) Perform Capacitor High Voltage Discharge Procedure outlined in Discharge Resistor Assembly Section.

WARNING

THE CAPACITORS IN THE **PowCon** 630SMP WELDING POWER SOURCE 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 ENCLOSURE IS OPENED, THE CAPACITORS MUST BE DISCHARGED BY THE USE OF A BLEEDER RESISTOR ASSEMBLY, DESCRIBED IN BLEEDER RESISTOR ASSEMBLY SECTION.

B) Identify the voltage change-over instruction labels for the copper buss bars as shown in Figure 4.

LOCATION 1: TOP ENCLOSURE CHANGE-OVER BRACKET ASSEMBLY

A) Locate and read the instructions located on the cover of the upper change-over bracket assembly (shown in location 1, Figure 4).

B) To gain access to the buss bars, perform the following:

1) Remove the four cover screws.

2) Remove the cover from the bracket.

C) Perform the required operation on the copper buss bars for the proper primary voltage as shown on the cover.

D) To cover the change-over bracket perform the following:

1) Replace the cover in the recessed area of the upper change-over bracket.

2) Fasten the four screws in the cover.

LOCATION 2: BOTTOM ENCLOSURE CHANGE-OVER BRACKET ASSEMBLY

A) Locate and read the instructions located on the cover of the lower change-over bracket assembly (shown in location 2, Figure 5).

B) To gain access to the buss bars, perform the following:

1) Remove the four cover screws.

2) Remove the cover from the bracket.

C) Perform the required operation on the copper buss bars for the proper primary voltage.

D) To cover the change-over bracket perform the following:

1) Replace the cover in the recessed area of the lower change-over bracket.

2) Fasten the four screws in the cover.

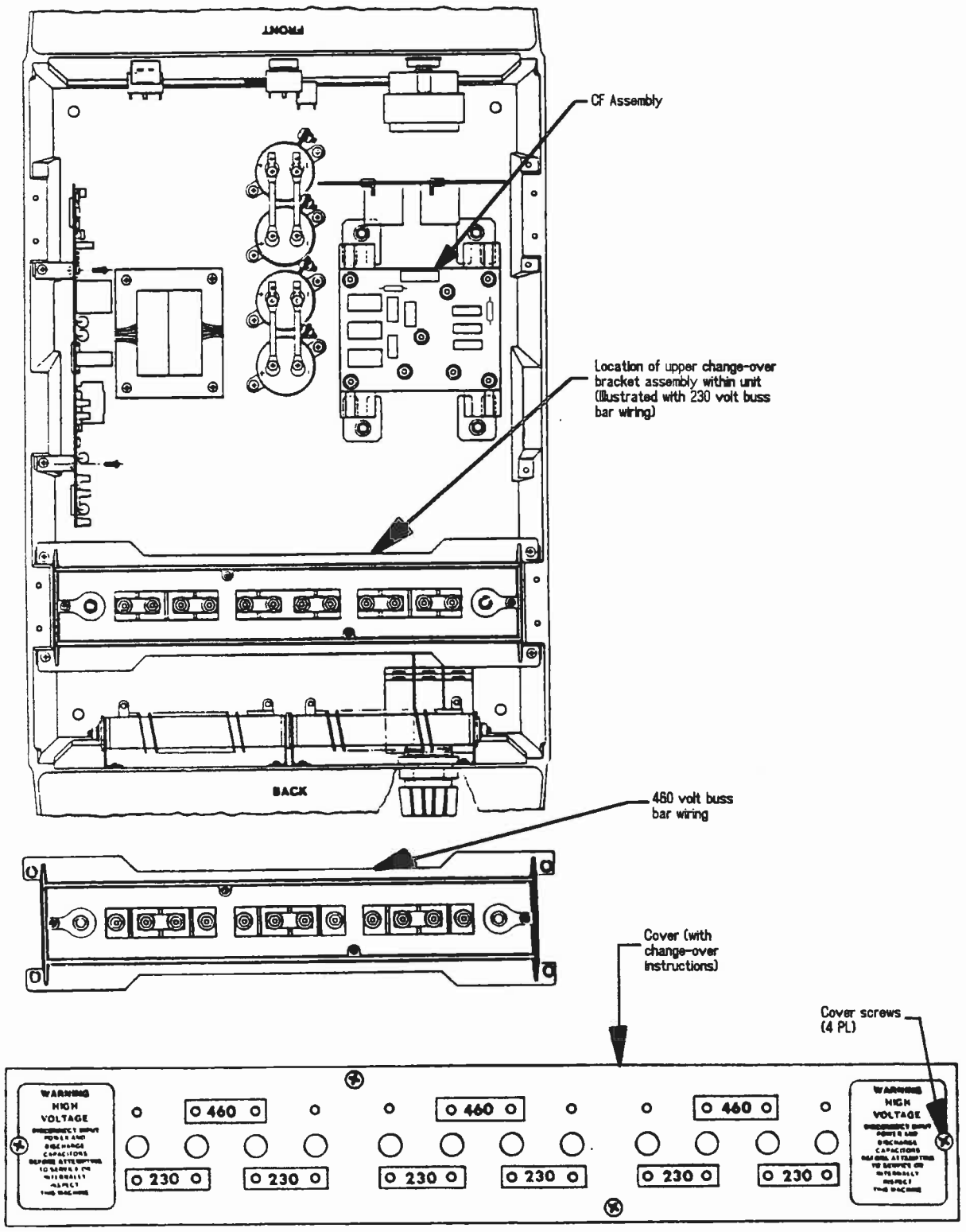
E) Close the top enclosure on the bottom as follows:

1) Check for loose wire and potential pinch points.

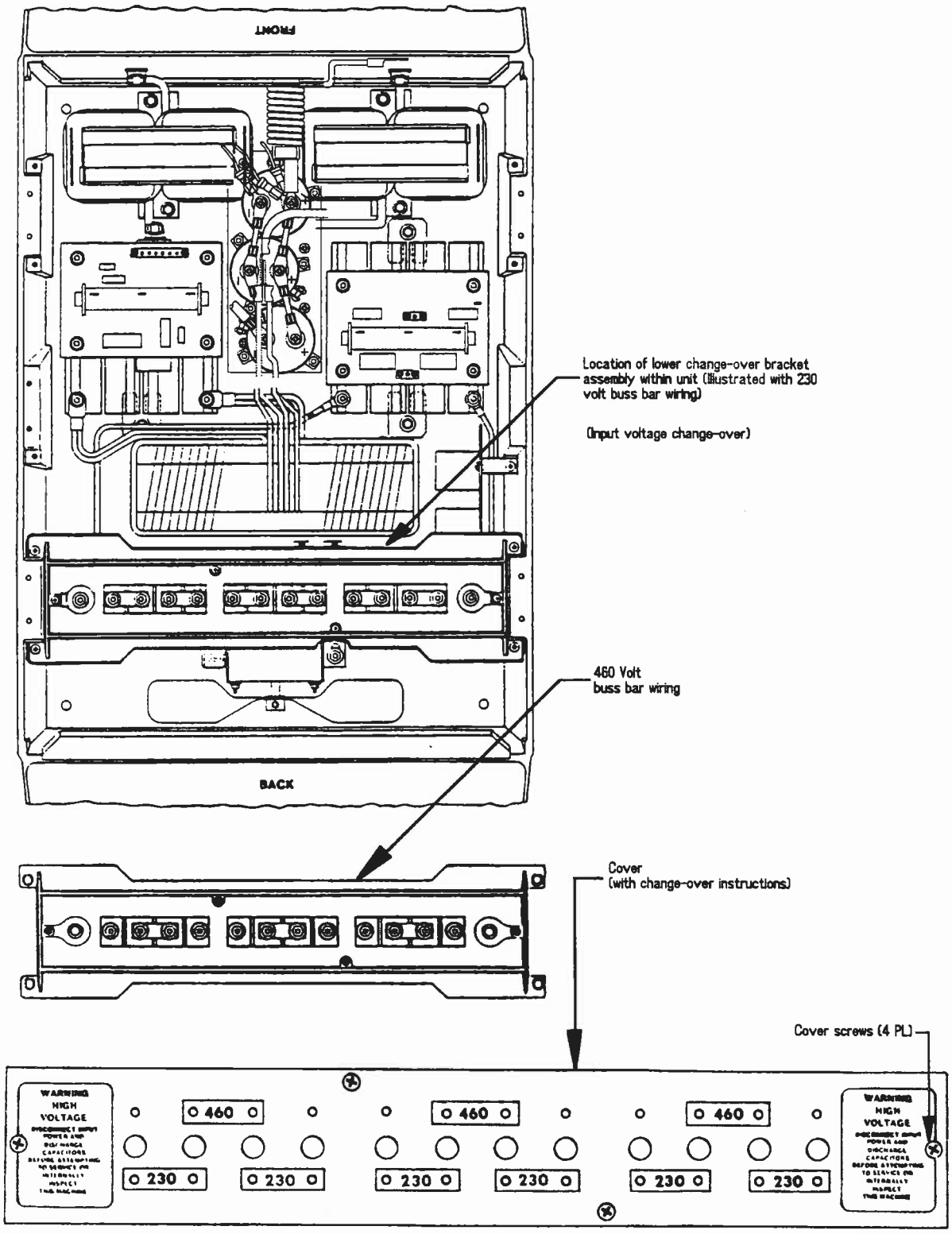
2) Pivot top half and shut on bottom.

3) Install nuts and bolts in the four flange holes, and four handle holes and tighten firmly.

F) Check for correct input voltage of primary source and insure the fuse and plug are UL approved for the rated primary load (shown in Table 2).



Location 1, Upper Voltage Change-Over
Figure 4



Location 2, Lower Voltage Change-Over
Figure 5

BLEEDER RESISTOR ASSEMBLY

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 1000 VDC Insulation rating

CLIPS: . . . . . #16 AWG 1000 VDC Insulation rating

All connections must be hard wired (soldered). Conductors should be approximately six (6) inches in length.

The entire resistor body and soldered connections to the resistor must be encapsulated with 1000 VDC rated "heat-shrink" insulation.

A discharge resistor assembly is available from PowCon, P/N 250040-001. Contact your local distributor or the factory if you wish to obtain it.

USE

Once an acceptable discharge device (as described above) 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.

A) Turn Range Switch to highest range.

CAUTION

FAILURE TO TURN RANGE SWITCH TO HIGHEST RANGE WILL PREVENT DISCHARGE OF ALL THE CAPACITORS.

B) Locate the C.F. assembly inside the unit as shown in Figure 4. The C.F. assembly can be identified by two aluminum heatsinks which contain three diodes each set beneath a circuit board.

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

NOTE

A SPARK DISCHARGE MAY BE NOTICED.

D) Leave the Discharge Resistor assembly connected for at least 10 seconds.

E) Remove the Discharge Resistor assembly from the unit and continue with the voltage change-over.

WARNING

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

FUNCTION OF OPERATING CONTROLS AND CONNECTIONS

See Figure 6 for location of the control and indicator items as described below.

1) Volt/Amp Digital Meter and Switch

Indicates output (secondary) load voltage or amperage. Selection of volts or amps is controlled by the toggle switch on the front of the meter.

NOTE

WHEN REMOTE IS CONNECTED, METER FLASHES RESIDUAL VOLTS AND AMPS, NOT TRUE OPEN CIRCUIT CONDITIONS.

Toggle switch UP: . . . . . Indicates load voltage.

Toggle switch DOWN: . . . . . Indicates load current.

2) Weld Power/Pulse Width Control

Adjusts the output of the unit. Its dial is graduated in 10% increments and adjusts from a minimum in low range of 30 amps @ 20V, to a maximum in the high range of 630 amps @ 45V. The weld power can be adjusted while the unit is under load.

When the Pulser switch is in the ON position, this knob controls the Pulse Width. It is continuously variable from about 0% (no pulse) to 100% (full output).

3) Range Switch

Used to select between a high (100-630 amp) range and a low (30-300 amp) range.

CAUTION

DO NOT SWITCH UNDER LOAD

4) Process Selection Switch

SMAW - Use for SMAW or GTAW.

GMAW (short) circuit - Use for GMAW short arc welding

FCAW/GMAW (spray) - Use for either GMAW spray transfer or FCAW. High current short-arc welding can also be performed in this mode.

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.

CAUTION

DO NOT SWITCH UNDER LOAD

NOTE

BOTH SMAW AND GMAW/FCAW PROCESS MODES CAN BE USED FOR PULSED MIG

5) Short Arc Puddle Control

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.

⚠ DANGER

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

7) Remote Terminal (17 PIN)

Connection for remote contact closure and auxiliary power connection for wirefeeder can also be used with other Remote Control Devices.

8) Primary Cable

Unit comes from factory with 12 feet (3.7M) of primary lead connected to the circuit breaker through the strain relief. See INSTALLATION, for recommended cable size and fuse requirements.

9) Output Terminals (not shown)

Stud type, 1/2" - 13UNC output terminals with polarity as marked. User must supply cable and connector fittings. See INSTALLATION, for recommended cable size.

10) Pulser On/Off Switch

Turns the built in Pulser on or off. In the OFF position, all front panel controls are activated except for pulses per second. In the ON position, this control is activated, and the Weld Power/Pulse Width Control adjusts pulse width.

11) Pulses Per Second

Controls the number of pulses per second between 3 and 150. It is only operable when the Pulser ON/OFF switch is in the ON position.

12) AUX 1 Circuit Breaker

5 Amp circuit breaker protects 115VAC auxiliary power or 10AMP circuit breaker protects 42VAC auxiliary power to remote connector Pin H.

AUX 2 Circuit Breaker

10 Amp circuit breaker protects 30VAC auxiliary power on Pin S remote connector.

13) OPTIONAL Auxiliary

1 KVA/115VAC duplex with 10A fuse.

SEQUENCE OF OPERATION

GENERAL

The **PowCon** 630SMP is equipped with a Digital Volt/Amp meter which indicates the unit's output. Either volts or amps can be selected by using the Toggle switch on the face of the meter.

The open circuit voltage displayed depends upon the process mode and the range used. The approximate open circuit voltage displayed under each condition are shown in table below.

TABLE 5

Open Circuit Voltage Range *			
Range	Mode		
	SMAW	GMAW/SPRAY	GMAW/SPRAY
Low	73-74	62-63	62-63
High	74-75	64-65	64-65

*Without remote terminal connection.

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) Select the appropriate weld power range for the application.

C) Choose the applicable welding process on the Process Selection switch.

D) Adjust the Weld Power Control to the power level needed for your application.

E) Lift the handle of the Automatic Circuit Breaker to its "UP" position. The Digital Volt/Amp meter will come on and the fan will start. A "ticking" sound will be heard (if the machine is not under load). 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 DIGITAL VOLT/AMP METER AND FAN WILL REMAIN ON.

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.

SMAW TECHNIQUES

The Weld Process switch should be in the SMAW mode. Either the Low Range or High Range can be used dependent upon the desired output. The Volt/Ampere Characteristic Curves for the **PowCon** 630SMP in the SMAW mode are shown in Figures 7 and 8. Some typical electrodes and recommended machine settings are shown in the next table.

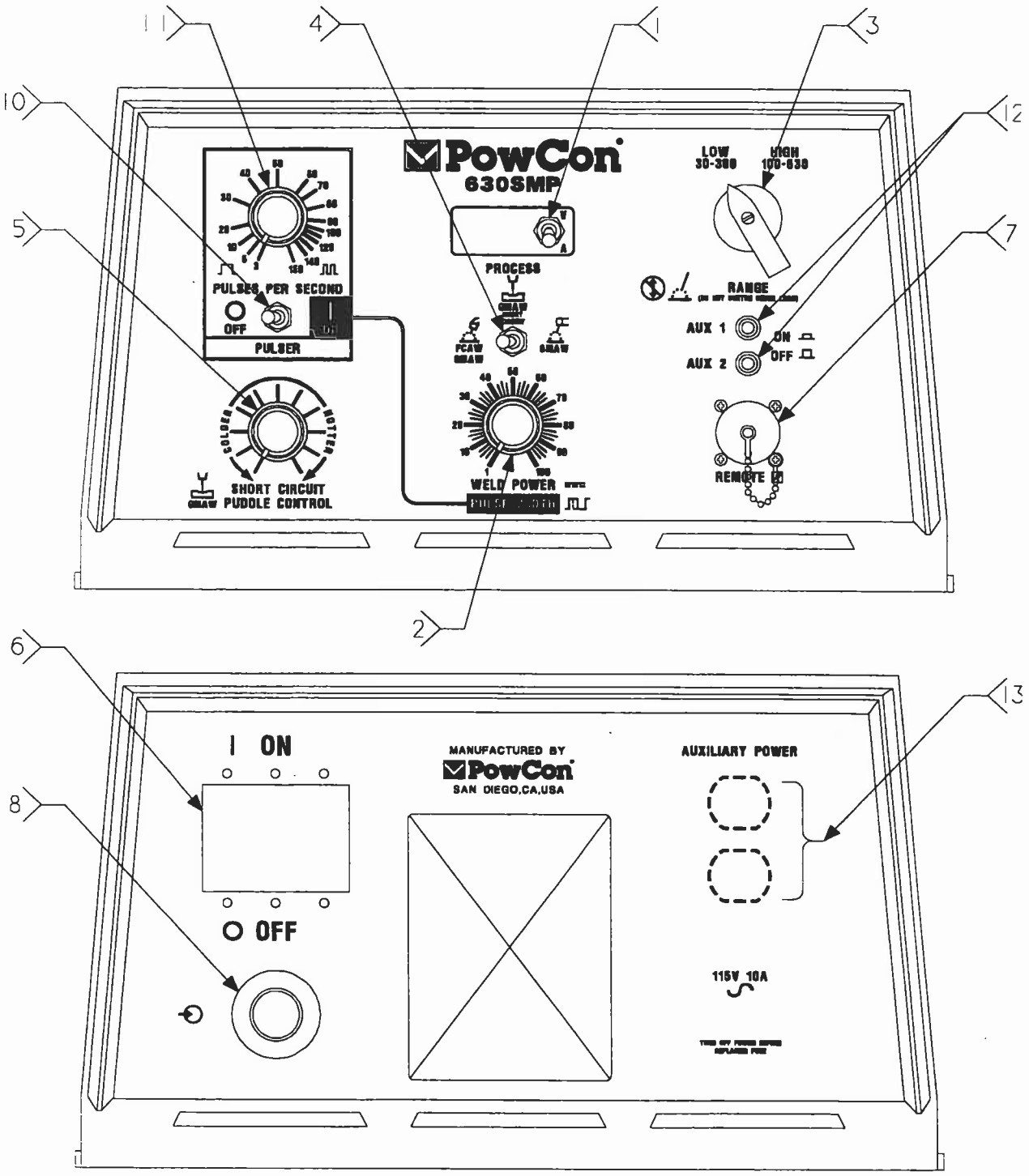
TABLE 6

Recommended Power & Range Settings for SMAW DCRP with PowCon 630SMP *		
Electrode Diameter	Electrode Type	
	E7018	E309-16
3/32" (2.36mm)	Low Range 17%	Low Range 10%
1/8" (3.18mm)	Low Range 25%	Low Range 15%

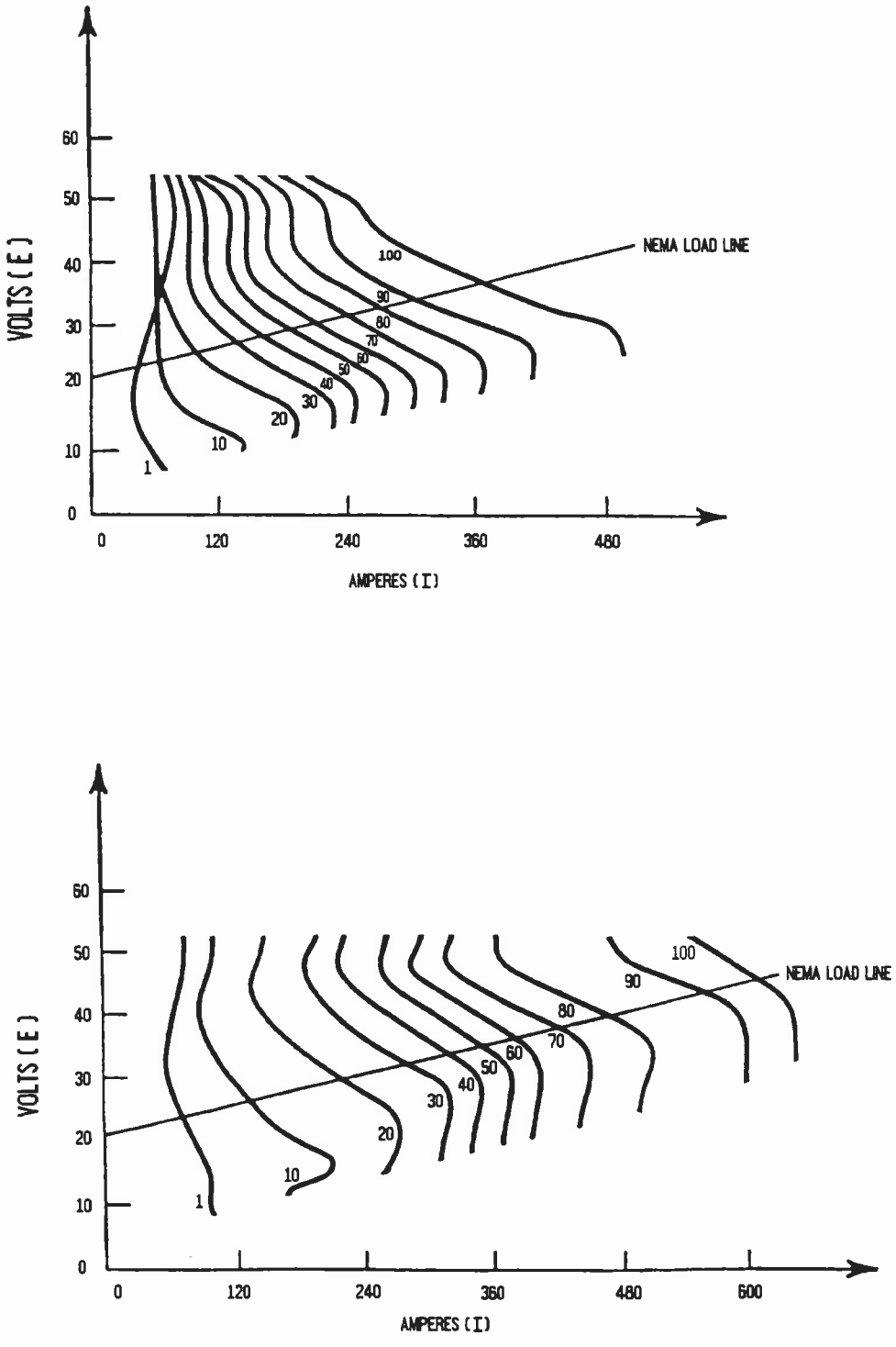
*These suggested power and range settings represent the manufacturer's best estimate and are intended as guidelines for the user of the **PowCon** 630SMP.

The **PowCon** 630SMP has a special compensation circuit for welding E6010-5P covered electrodes in the SMAW mode. This circuit is activated by using the Dip switch located on the Control PWB inside the unit.

This Dip switch also controls the Hot Start function in the SMAW and GMAW/spray mode. See "User Adjustable Functions", pages 27 - 29.



Front and Back Panel Controls and Connection Locations
Figure 6



Volt/Amp Characteristic Curves, High Range, SMAW
Figure 8

GMAW SPRAY TECHNIQUES

High current densities used for GMAW spray transfer and FCAW usually requires use of High Range. When unit is switched to regular GMAW spray mode, the Puddle Control is non-operational, therefore not needing adjustment. For guidelines in establishing operating points, see Table 7. For Volt/Ampere Characteristic Curves for the **PowCon** 630SMP in the regular GMAW Spray mode, see Figures 9 and 10.

TABLE 7

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

Wire Diameter (Inches)	High Range Power Setting	Current A	Wirefeed Speed IPM	Voltage
.045	20-40	220-340	250-460	25-29
.062	30-80	280-550	165-480	26-38

*The recommended power and range settings represent the manufacturer's best estimate and are intended only as guidelines for the user of the **PowCon** 630SMP.

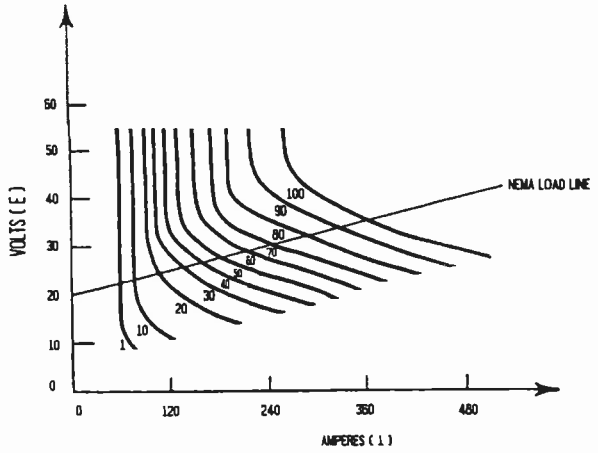
The **PowCon** 630SMP has a special compensation circuit for controlling deposition rates and spatter in the spray process. This circuit is activated by using the Dip switch located on the Control PWB inside the unit. (See "User Adjustable Functions", pages 27 - 29)

This Dip switch also controls the Hot Start function in the SMAW and GMAW/spray mode.

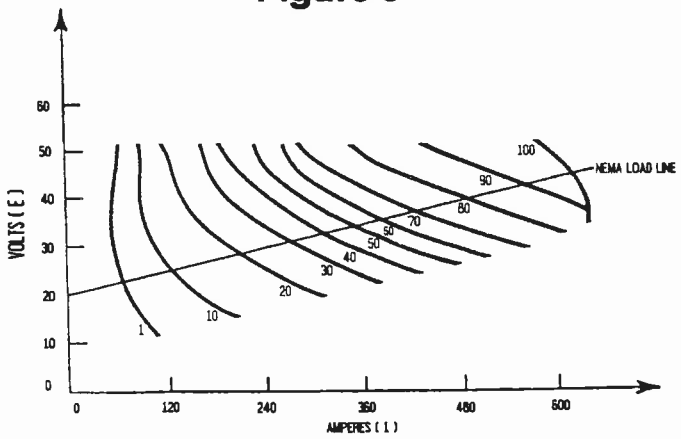
GMAW SHORT ARC TECHNIQUES

Short Circuiting Transfer GMAW 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 after the short circuit when the welding voltage goes to near ZERO.

The **PowCon** 630SMP 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 senses between the two modes by monitoring the arc voltage. When a predetermined minimum voltage is reached,



Volt Amp Characteristic Curves, Low Range, GMAW
Figure 9



Volt/Amp Characteristic Curves, High Range, GMAW
Figure 10

GMAW PULSED SPRAY TECHNIQUES

THEORY

Unlike continuous or steady current used for conventional GMAW, pulsing varies the current between a minimum and maximum value. The maximum or peak current value must be above the spray transition point, and the minimum or base current value should be just enough to sustain arcing. During the peak current period, when the most weld power is available, metal transfer takes place.

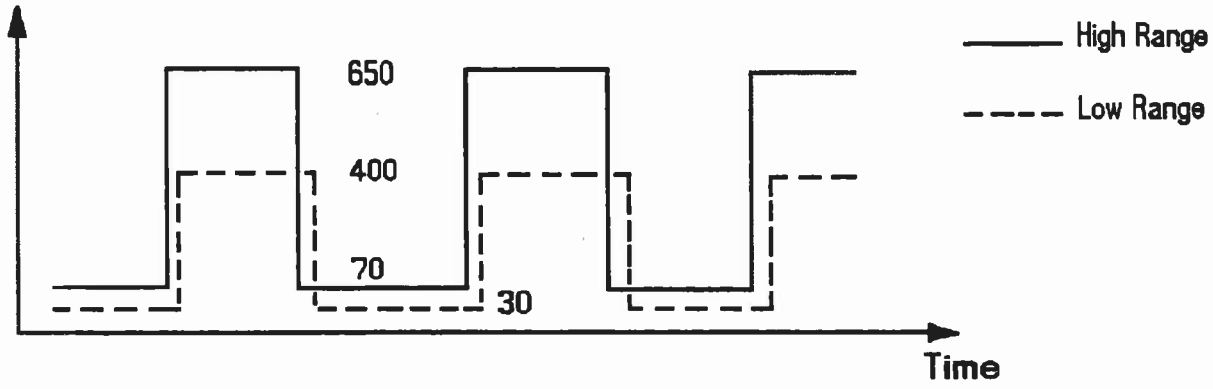
Only small droplets are transferred during the peak period and the preferred droplet rate is one per peak period. The droplets, which are sized less than the diameter of the wire, require a certain amount of power during the peak period to be transferred across the arc. The peak pulse width can be changed with the overall effect of increasing the amount of power delivered during metal transfer. To ensure one droplet per peak period, the frequency (pulses per second) can be adjusted to an optimum value. In general, as the wire feed speed is increased, more drops per second must occur thus an increase in frequency is necessary.

OPERATION AND CONTROLS

The four variables used to control pulsed MIG welding are wirefeed speed, background current, peak current, pulses per second, and pulse width. Pulse width effects heat input to the weld and therefore is the most critical control.

PEAK AND BACKGROUND CURRENT

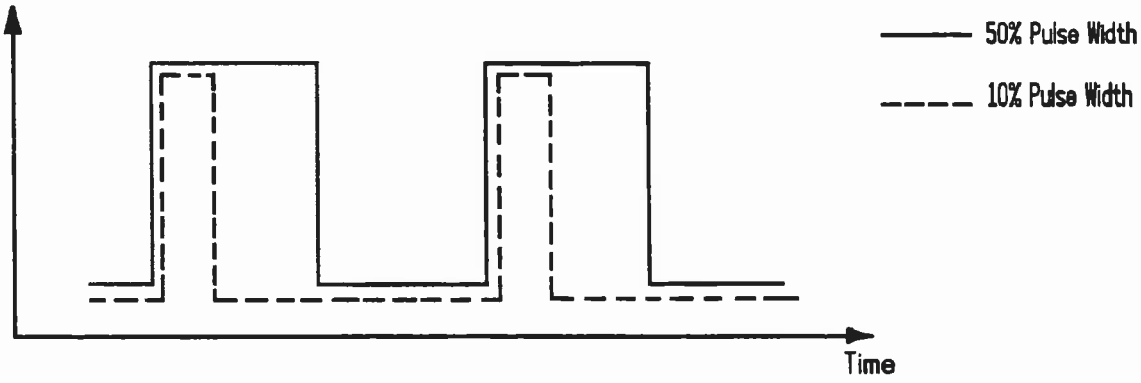
The two settings for peak and background current are as follows: In the Low Range, Background Current is 30 amps and Peak Current is 400 amps. In the High Range, Background Current is 70 amps and Peak Current is 650 amps as shown in Figure 12.



Background Current/Peak Current
Figure 12

PULSE WIDTH

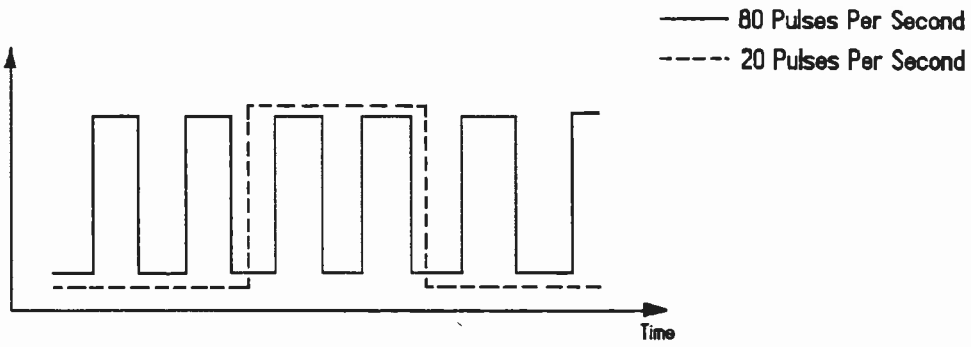
The Pulse Width control sets the Peak Current time as a percent of total pulse cycle time. A setting of 10 on the dial sets a Peak Current period of 10%; a setting of 50 on the dial sets a Peak Current period of 50% as shown in Figure 13. A 50% setting puts approximately 5 times the heat input to the weld as a 10% setting.



Pulse Width Control
Figure 13

PULSES PER SECOND

The Pulses Per Second control sets the frequency of pulses. Generally, as the wirefeed speed is increased, more drops per second from the end of the wire must occur to keep arc length consistent and thus an increase in frequency is necessary. Pulses Per Second is adjustable from 3 to 150 pulses per second as shown in Figure 14.



Pulses Per Second
Figure 14

HOW TO SET UP FOR PULSING

A) Be sure all power source wirefeeder and workpiece connections are made and gas is connected.

B) Set Pulser switch to the ON position.

C) Set the Weld Process switch to FCAW/GMAW. The Weld Process switch may also be in the SMAW mode for higher deposition, flat position, and some out of position applications requiring higher power.

D) Select the proper Range, Pulses Per Second, and Pulse Width for your application. Puddle Control is not activated in this mode. When first setting up a weld, it is advisable to start with lower than expected Pulse Width and adjust up. In this manner, excess heat input for a given wire speed and tip burn back will be avoided.

E) Tune in arc by adjusting Wirefeed Speed or Pulse Width. Use Pulses Per Second Control to fine adjust for smooth arc and bead appearance.

SETTINGS

Wirefeed speed, pulse width and pulses per second settings are shown in the following representative applications for various wire diameters, materials and shielding gases.

SETTINGS FOR CARBON STEEL

Material: ..... Carbon Steel

Shielding Gas:..... Argon + 2% CO_2

Flow Rate:..... 35 C.F.H.

TABLE 10

.035" Diameter				
Weld Current (A)	70	80	90	95
Wire Feed Speed (IPM)	105	140	175	200
% Pulse Width	20	25	30	35
Pulses Per Second	50	50	50	50
NOTE: Use Range	Low	Low	Low	Low

TABLE 11

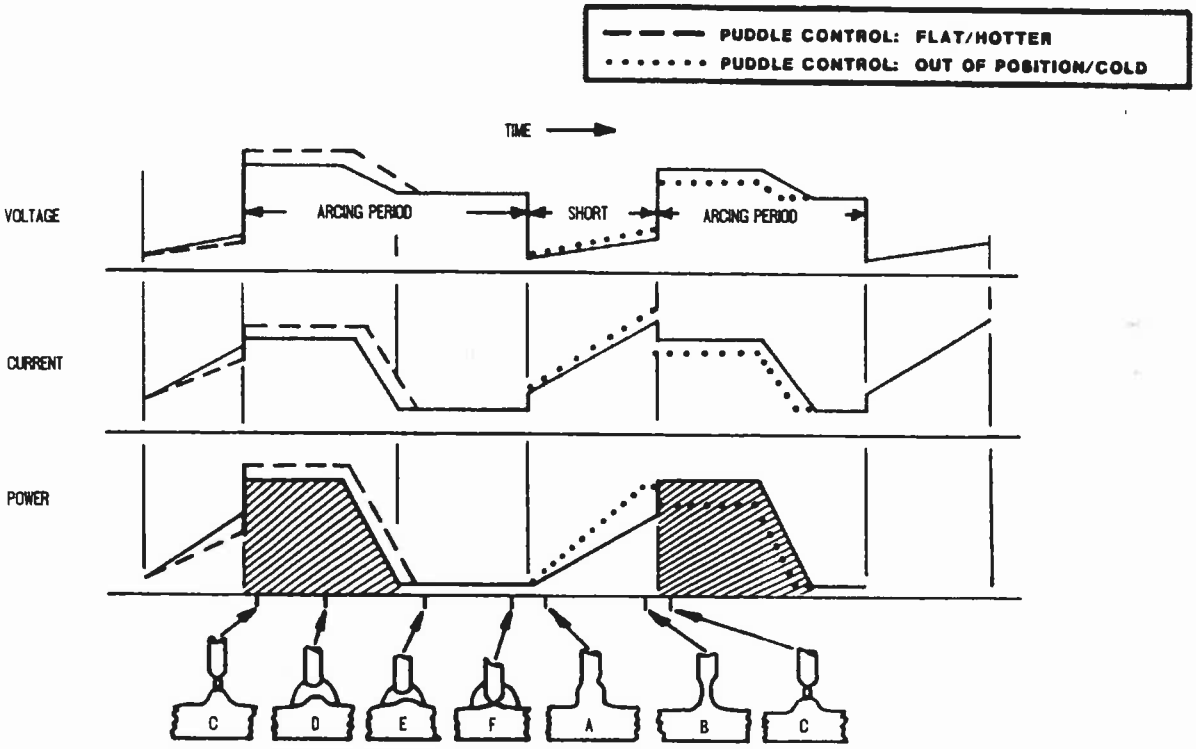
.045" Diameter				
Weld Current (A)	95	115	150	200
Wire Feed Speed (IPM)	100	125	160	200
% Pulse Width	20	25	48	70
Pulses Per Second	50	50	65	65
NOTE: Use Range	Low	Low	Low	Low

the unit senses a short 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.

Another control feature incorporated into the **PowCon** 630SMP is the Weld Puddle Control. The Weld Puddle Control regulates both the rate and the amount of power delivered during the short circuit transfer. As more puddle control is added, the arc becomes hotter. Decreasing the puddle control causes a colder arc.

Another result of changing the puddle control is the weld droplet size which is increased for hotter settings and decreased for colder settings. The larger the droplet size, the lower the frequency of drops for a given wire speed. The Oscillographs and arc diagrams for the short arc process are shown in Figure 11. This also illustrates the effects of weld puddle control or weld power, current and voltage.

Obtaining an operating point requires a selection of both proper wire feed speed and weld power. The weld puddle control should remain at mid-point during the initial adjustment. Once a suitable combination of weld power and wire feed speed is obtained, an adjustment to the weld puddle control can be made. Some typical operating parameters are shown in Tables 8 and 9.



Oscillographs of GMAW Short-Arc Transfer
Figure 11

Amps	80		100		130		150	
Gas	ArCO_2	CO_2	ArC02	CO_2	ArC02	CO_2	ArC02	CO_2
Volts	17	21	18	21	19	22	20	24
Wire Speed	220	220	270	220	320	320	360	360
Weld Power	1	20	16	60	40	80	20	40
Puddle Control	40-80	20-60	40-80	20-60	40-80	40-80	20-60	20-60
Range	Low	Low	Low	Low	Low	Low	High	High

Table 8,
.035 Solid Steel Electrode Weld Parameters

Amps	120		150		180		200	
Gas	ArCO_2	CO_2	ArC02	CO_2	ArC02	CO_2	ArC02	CO_2
Volts	20	24	21	24	22	24	24	26
Wire Speed	100	100	150	150	200	200	235	235
Weld Power	22	30	25	35	15	20	25	25
Puddle Control	40-80	20-60	40-80	20-60	40-80	20-60	40-80	20-60
Range	Low	Low	Low	Low	High	High	High	High

Table 9,
.045 Solid Steel Electrode Weld Parameters

SETTINGS FOR STAINLESS STEEL E-308

Material: ..... Stainless Steel E-308

Shielding Gas:..... Argon + 2% Oxygen

Flow Rate:..... 35 C.F.H.

TABLE 12

.035" Diameter				
Weld Current (A)	60	65	75	85
Wire Feed Speed (IPM)	120	150	170	190
% Pulse Width	15	17	20	30
Pulses Per Second	50	50	50	50
NOTE: Use Range	Low	Low	Low	Low

SETTINGS FOR ALUMINUM A 5356

Material: ..... Aluminum A 5356

Shielding Gas:..... 100% Argon

Flow Rate:..... 35 C.F.H.

TABLE 13

3/64" Diameter				
Weld Current (A)	70	80	95	110
Wire Feed Speed (IPM)	150	180	195	220
% Pulse Width	25	30	35	40
Pulses Per Second	55	70	90	100
NOTE: Use Range	Low	Low	Low	Low

TABLE 14

1/16" Diameter				
Weld Current (A)	100	130	155	190
Wire Feed Speed (IPM)	120	150	170	210
% Pulse Width	22	30	20	35
Pulses Per Second	50	50	50	50
NOTE: Use Range	Low	Low	High	High

USER ADJUSTABLE FUNCTIONS

The **PowCon** 630SMP is a multi-process power source, and is capable of performing high quality welds in a variety of different operating environments. In order to more adequately respond to these conditions, several special user adjustable functions have been included on the 630SMP which are not available on the model 300SM or 400SM welder. These special features are adjusted by the end user through a unique switch on the control PC board (called a DIP switch – standing for "Dual In-line Package"), or by a variable potentiometer (called a "TRIMPOT"), also located on the main PCB.

The DIP switch and the TRIMPOT control the following functions: GMAW spray mode compensation, variable hot start, and SMAW 6010 5P electrode compensation.

GMAW spray mode compensation allows you to achieve flatter V-I characteristic output for a given setting of the Weld Power knob when the Process switch on the front panel is in the GMAW/FCAW position. This may be beneficial when attempting high current, high deposition welds. For example, if you are attempting to perform a spray mode weld at the high end, and you don't seem to be getting proper arc characteristics, enabling the GMAW spray mode compensation may give you the results that you need. This user adjustable function is controlled by using position number 1 on the DIP switch.

Hot start refers to an extra surge of power which occurs at the beginning of a weld. This helps the wire start more accurately, and also preheats the metal for better deposition and wetting in the first few seconds. The **PowCon** 630SMP comes with a hot start preset at the factory. However, through the use of the DIP switch and TRIMPOT, this value may be adjusted to suit your specific requirements, if necessary. This user adjustable function is controlled by using positions 2 and 3 on the DIP switch, and by using the TRIMPOT.

6010 5P electrode compensation gives you better control of arc outage on those brands of 6010 5P which are prone to extinguish during a weld cycle. This compensation is used only in the SMAW mode (when the Process switch on the front panel is in the SMAW position). Two types of compensation are built in to the 630SMP: static compensation and dynamic compensation. These two circuits work together to help control arc outages. Since the 630SMP was fine tuned by design to perform most efficiently using the GMAW process, you will find that your SMAW welding will be enhanced by taking advantage of the 6010 5P compensation. This user adjustable function is controlled by using positions 4 and 5 on the DIP switch.

THE DUAL IN-LINE PACKAGE (DIP) SWITCH

The DIP switch is located on the control PCB of the 630SMP, in the middle of the board near the top of the case. See figure 15 for the basic location.

The DIP switch has 6 positions, or "elements." Each of these elements is independent of the other, and functions as its own separate switch. It is like having 6 different toggle switches in one package mounted on one PC board. We will use the terms "position" and "element" interchangeably throughout this discussion.

The switches are adjusted by moving the switch elements (numbered 1-6) into the UP or DOWN position. This is most easily done using a small flatblade screwdriver. A flashlight may be used to illuminate the switch for better visibility.

The dip switch has clearly marked position numbers for the switch elements, and a clearly marked open (UP or OFF) position.

The function for each individual position is ON when the switch element is in the DOWN position and is OFF when the switch element is in the UP position as shown in Figure 15. Position number one is closest to the FRONT of the unit. Once you have located the appropriate switch position, GENTLY move the switch element to either the UP or DOWN position, as required. Make sure that each element is completely in the UP or DOWN position before closing and buttoning up the 630 case.

The following switch elements on the DIP switch control the following functions.

Position 1: GMAW Spray Mode Compensation

As mentioned earlier, this switch may be used to obtain flatter V-I characteristic output for a given Weld Power knob setting when you are performing high current spray welding.

Let's say, for example, that you are attempting to weld 500 Amps using 3/32" flux cored wire. You have the Process switch (on the front panel) set to the GMAW/FCAW position. The Weld Power knob is set at 90%. You seem to be able to get the required output current, but the weld seems "mushy" or "sluggish."

By moving DIP switch position number 1 DOWN, you will enable the spray mode compensation and will improve your sluggish weld. Your Weld Power knob will still be set at 90%, but you will have better arc characteristics at the output.

The spray mode compensation only has an effect on the output of the welder when the Process switch on the front panel is in the GMAW/FCAW position. Thus, position number 1 may be left in the position you desire without affecting your weld performance in either the GMAW Short Arc or SMAW positions.

Position 2: Variable Hot Start ON/OFF

Sometimes when welding on thin sections of material, the factory supplied hot start may be excessive for your application. Or, when welding on thicker material, the factory hot start may not be enough for your application. In either case, by using the adjustable function of Variable Hot Start, you can compensate for these differences.

When Variable Hot Start is ON (switch element down), the value of the hot start is proportional to the value of the output current. This means that when the Weld Power knob is at 10% (for welding at low currents on thin materials), the hot start power delivered to the weld is much lower than when the Weld Power knob is at 70%, etc.

When Variable Hot Start is OFF (switch element UP), the value of the hot start power delivered to the weld is fixed, and is independent of the position of the Weld Power knob.

This DIP switch position allows you to control the AMPLITUDE of the hot start output. You may also find a need to control the TIME DURATION of the hot start, making it either longer or shorter. This adjustment is accomplished by using the TRIMPOT, which will be discussed in the next section.

The Variable Hot Start has an effect on the welder in both the GMAW/FCAW and SMAW modes. It does not have any effect on the welder when the Process switch is in the GMAW Short Arc position.

Position 3: Hot Start ON/OFF (Master)

This switch position is a master switch which controls ALL Hot Start functions. When this switch is ON (switch element down), the unit will have hot start capability. This Hot Start capability can be either fixed or variable, as discussed for position number 2.

When this position is OFF (switch element up), ALL Hot Start functions will be OFF, regardless of the position of switch number 2. For some applications, having no Hot Start is the optimum situation. This switch position allows you to accomplish that objective.

The master Hot Start has an effect on the welder in both the GMAW/FCAW and SMAW modes. It does not have any effect on the welder when the Process switch is in the GMAW Short Arc position.

Position 4: 6010 5P Static Compensation ON/OFF

When using certain brands of 6010 5P electrode, arc outages may be common. This can especially be true when using a constant power machine like the 630SMP. This is because the magnetic elements in the output filter have been fine tuned for GMAW welding processes.

To help alleviate this difficulty, two types of electronic compensation are offered for welding with this electrode type. Position number 4 on the DIP switch controls the static compensation. Position number 5, discussed in the next section, controls the dynamic compensation.

The static compensation performs a similar function to the GMAW spray mode compensation (DIP switch position number 1) discussed earlier. For any position of the Weld Power knob, a little extra boost is added over what would normally be available. This keeps the weld puddle hotter and helps alleviate arc outages. It is important to note that both the static and dynamic compensation switch elements MUST be used together to achieve optimum performance.

The 6010 5P static compensation is active when the unit is in either the GMAW/FCAW or SMAW modes. It is not active when the unit is in the GMAW Short Arc mode. Since the static compensation is "alive" when welding GMAW processes, it is important to realize that your GMAW performance may be slightly different when the compensation is ON than when it is not. Thus, for critical applications or procedures, you may wish to turn this compensation OFF (switch element up) before performing your GMAW process.

Also, when discussing general SMAW performance, there may be a noticeable difference in 7018 (or other popular electrodes) welding when the compensation is ON. This compensation was designed primarily for those users who perform a large portion of their welding in the 6010 5P environment. Therefore, you should be careful in using it with other electrodes. Experimentation in your own workplace will yield the best combination for you.

Position 5: 6010 5P Dynamic Compensation ON/OFF

As discussed above, positions 4 and 5 deal with 6010 5P electrode compensation. Position 5 controls the dynamic compensation.

In addition to the extra "boost" added to the weld puddle when the static compensation is turned ON (switch element down), the dynamic compensation adds an extra impulse of power when the arc voltage starts to climb (indicating an arc outage). This impulse only lasts for several milliseconds, and is imperceptible to the welder. Its function is to re-ignite the failing arc before the welder notices that it has extinguished.

As the previous paragraphs indicate, both the static and dynamic compensation are active when the unit is in either the GMAW/FCAW or SMAW modes, but not when the unit is in the GMAW Short Arc mode. Thus, there is the possibility that having these two 5P compensation elements active may affect other processes, including other SMAW processes. Results vary from

operation to operation. The most optimum combination is best determined by experimentation at your facility.

Position 6: Not Used.

NOTE

BOTH OF THE 6010 5P COMPENSATION SWITCHES, POSITION 4 AND POSITION 5, MUST BE OPERATED TOGETHER FOR PROPER COMPENSATION TO TAKE PLACE. BOTH SWITCHES SHOULD BE TURNED ON OR OFF TOGETHER.

NOTE

THE 6010 5P COMPENSATION SWITCHES, WHEN IN THE ON POSITION (SWITCH ELEMENT DOWN), MAY HAVE AN AFFECT ON OTHER PROCESSES BOTH IN SMAW AND GMAW/FCAW WELDING. WHEN USING 5P COMPENSATION, YOU SHOULD EXPERIMENT WITH YOUR OTHER PROCESSES TO ENSURE COMPATIBLE PERFORMANCE.

Summary of switch configurations:

When the 630SMP is configured in the factory, the switches are in the following positions:

TABLE 15

Switch Position	Switch Element	Function
1	DOWN	GMAW spray mode compensation ON
2	DOWN	Variable hot start ON
3	DOWN	Hot start master control ON
4	UP	5P static compensation OFF
5	UP	5P dynamic compensation OFF
6	DOESN'T MATTER	Not connected

For most applications, changes will not be necessary, but if you do need to take advantage of this feature, you have the capability.

THE VARIABLE POTENTIOMETER (TRIMPOT)

The variable hot start provided with the 630SMP has two distinct parts: the amplitude adjustment, which is controlled by using position 2 on the DIP switch, and the time base adjustment.

The time base adjustment is controlled by the variable potentiometer (TRIMPOT). This TRIMPOT is located on the main control board, and is designated R83. Refer to Figure 15 for its exact location.

Turning this TRIMPOT in either the clockwise (CW) or counterclockwise (CCW) direction produces a change in the length of time which the hot start power delivered to the weld is active before normal power levels are again reached.

When the TRIMPOT is moved in a fully CCW direction, its resistance is at a minimum, and the hot start power will consist of a short time period, between approximately .2 and .5 seconds. When the TRIMPOT is in its fully CW position, its resistance is at a maximum, and the hot start power will consist of a longer time period, between approximately .5 and 1.0 seconds

Shorter period hot starts (TRIMPOT fully CCW) are most useful when you need a large amount of power delivered in a short amount of time, for quick heating. Longer hot starts (TRIMPOT fully CW) are most useful when a more gradual heating of the weldment is desired. Experimentation with the TRIMPOT will yield the results correct for your application.

It should be noted that the TRIMPOT is factory adjusted to the most acceptable compromise for most processes. Therefore, it should only need to be altered for a minimum number of end users. It is advisable to weld with the factory setting before attempting to adjust the TRIMPOT. Once the factory setting is altered, it may be difficult to reconstruct.

To make an adjustment to the TRIMPOT, you will need a small flatblade screwdriver and a flashlight. If you cannot find a screwdriver short enough to get into the crowded area between the PC board and the case, you will need to lift the PCB out of its slot. This is accomplished by removing the two screws which secure it to the case, and lifting it gently toward you.

Once you have exposed the TRIMPOT, turn the small screw either CCW or CW, depending on whether you want to shorten or lengthen the time, respectively. You will know when you have come to the end of each direction because the TRIMPOT will make a clicking sound on each revolution past the end point. It takes ten full turns to move the TRIMPOT from fully CCW to fully CW, so a wide range of adjustment is possible. When you have completed your adjustments, make sure to replace the PCB in its slot and secure it with the two screws provided.

Remember that the TRIMPOT is designed to work in conjunction with the variable Hot Start feature. When you make an adjustment in your time base, make sure that position 2 of the DIP switch is ON for best results.

Table 16, Summary of DIP Switches

PROBLEM	SOLUTION[1]	ACTIVE PROCESS(S)[2]
Sluggish GMAW spray at high currents	Position #1 ON	GMAW/FCAW
Too much hot start at low currents	Position #2 OFF	GMAW/FCAW, SMAW
Not enough hot start at low currents	Position #2 ON	GMAW/FCAW, SMAW
No hot start desired for any process [3]	Position #3 OFF	GMAW/FCAW, SMAW
Hot start too long	Adjust Trimpot CCW	GMAW/FCAW, SMAW
Hot start too short	Adjust Trimpot CW	GMAW/FCAW, SMAW
Sluggish 6010 5P performance	Position #4 ON Position #5 ON	GMAW/FCAW, SMAW
Unpredictable welds in either GMAW/FCAW or SMAW for non 6010 5P electrodes [4]	Position #4 OFF Position #5 OFF	GMAW/FCAW, SMAW

FOOTNOTES

1. "POSITION" refers to setting of dip switch position indicated either on or off.

2. The adjustments indicated in the "SOLUTION" column will operate in the processes listed, as determined by the process switch on the front panel.

3. Position #3 overrides position #2. If position #3 is off ALL hot start, variable or otherwise, will be disabled.

4. See the discussion in the paragraphs dealing with position 4 and position 5 for more details.

If you have any further questions about the operation of either the DIP switch or the TRIMPOT, please consult the Technical Service department at **PowCon** for assistance.

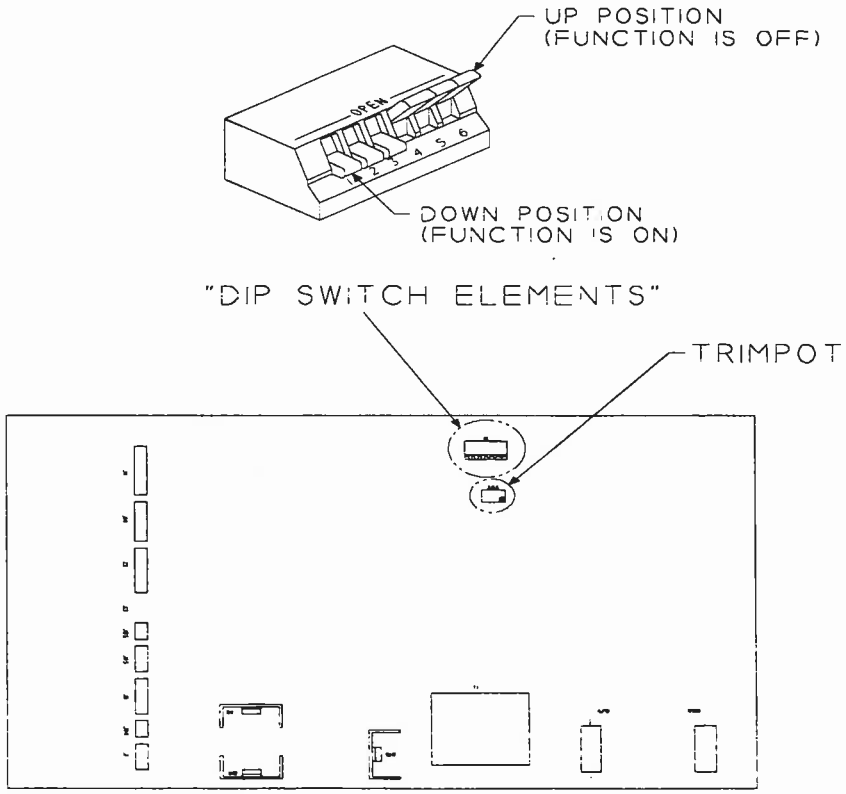


Figure 15, Location of Dip Switch and Trimpot

DUTY CYCLE

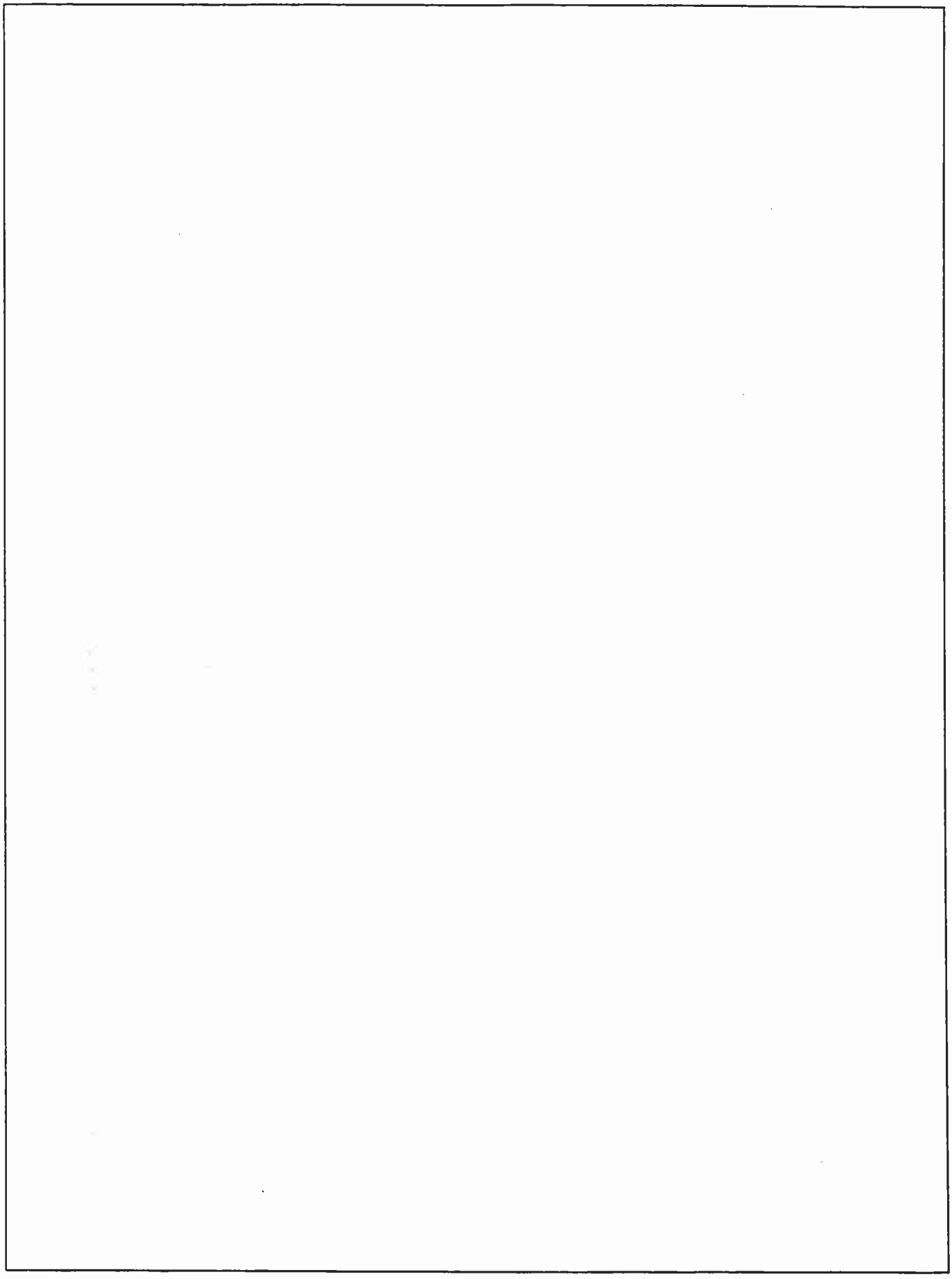
The duty cycle of a welding power source is a measure of the capacity of the unit. The **PowCon** 630SMP has a duty cycle based on a 10 minute time period. The duty cycle is the percent of that time period the unit can produce the specified output.

The **PowCon** 630SMP can operate for 3.5 minutes out of a 10 minute period at an output of 630 amperes and 44 volts. To assure the safe operation of the unit the remaining 6.5 minutes must be spent idling to permit proper cooling. The duty cycle at this output is 35%.

Lowering the output current allows increases in the duty cycle. The 630SMP can operate for 6 minutes at 550 AMPS and 42 volts, this is the 60% duty cycle output. The 100% duty cycle (weld output continuous) is 450 amperes and 38 volts.

NOTE

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



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** 630SMP 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** 630SMP power source malfunctions, the 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 and switch between all the output ranges. A "ticking" sound should be heard.

TABLE 17, General Troubleshooting

TROUBLE	POSSIBLE CAUSE	REMEDY
Welding current too low for power setting.	Phase missing primary power.	Check primary connections.
Unit shuts down while welding, fan rotates and digital volt/amp meter still illuminated.	Overheating due to: 1) Running too high amperage. 2) Improper cooling of unit.	Wait 20 minutes then reduce the welding current and duty cycle. 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** 630SMP and wirefeeder. Check auxiliary circuit breakers.
No weld current for SMAW.	Remote for wirefeeder still engaged.	Disconnect remote.
Weld control erratic for application.	Wrong mode on process switch. Wrong range. Wrong weld power setting.	Change as required.

INTERNAL TROUBLESHOOTING

Input voltage change-over and main PC board process configuration are the only internal service that can be performed by anyone other than a **PowCon** trained and authorized technician. These procedures are detailed in another section of this manual. It is recommended that factory authorized personnel only perform any internal service or troubleshooting.

DANGER

BEFORE PERFORMING INPUT VOLTAGE CHANGE-OVER, AN UNDERSTANDING OF THE PROCEDURE OUTLINED IN THIS MANUAL IS REQUIRED. THE CAPACITORS IN THIS UNIT CAN HOLD A DANGEROUS CHARGE EVEN WHEN THE PRIMARY POWER IS DISCONNECTED. TO DISCHARGE THESE CAPACITORS, USE THE BLEEDER TYPE RESISTOR ASSEMBLY OUTLINED FOR INPUT VOLTAGE CHANGE-OVER.

NOTE

BEFORE CHANGING THE CONFIGURATION OF THE MAIN PC BOARD BY USING THE DIP SWITCH OR TRIMMER RESISTOR READ AND UNDERSTAND THE SECTION OF THIS MANUAL WHICH DETAILS THEIR OPERATION. ERRATIC OPERATION MAY OTHERWISE RESULT.

Table18, Parts List for Final Assembly, Upper Enclosure

Item	Qty	Part Number	Description	Reference Designator
1	1	104052-001	Enclosure, Machined Upper Assembly	
2	2	104137-001	Bezel, Case, 630A	
3	1	104520-001	Overlay, Front Panel, 630SMP	
4	1	104522-001	Overlay, Rear Panel, 630SMP	
5	1	104077-002	Cover, Upper Change Over	
6	1	104080-001	Cap PWB Mounting Bracket	
7	6	970000-304	Screw, Pan Head 6 – 32 X 3/8	
8	4	970002-506	Screw, Pan Head 10 – 32 X ½	

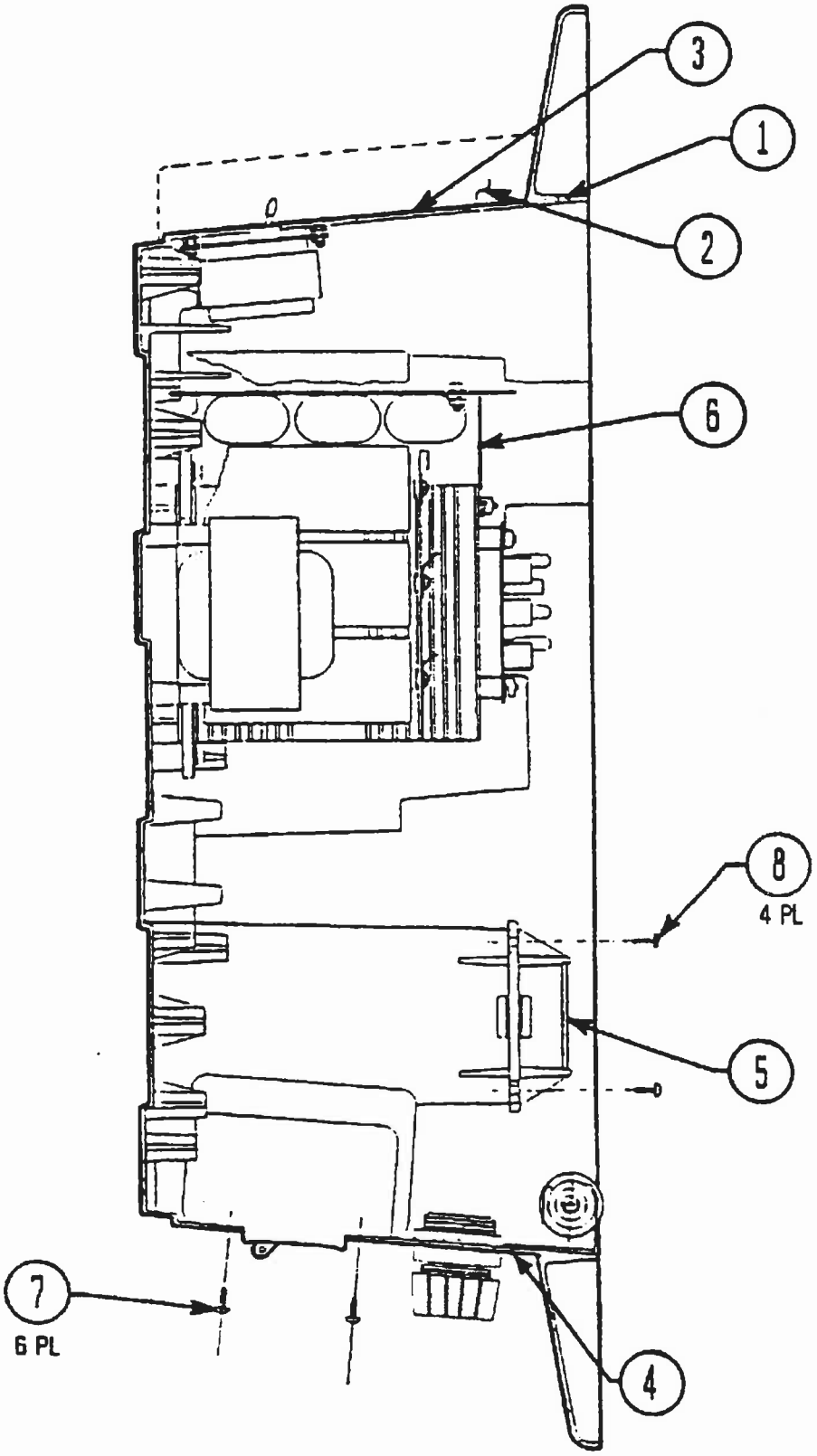


Figure 16, Final Assembly, Upper Enclosure

Table 19, Parts List for Final Assembly, Upper Enclosure

Item	Qty	Part Number	Description	Reference Designator
1	2	902006-002	Surge Resistor	R1, R2
2	6	100151-004	Buss Bar, Voltage Change-Over	
3	1	104070-001	Upper Change-Over Assembly	
4	1	104045-001T	Control PWB	
5	1	104511-001	AUX Transformer Assembly, 230/460/30 -115	T2
6	1	104187-001	Circuit Breaker 100 Amp	CB1
7	1	940006-001	Clamp, Strain Relief	
8	2	104095-001	Bleeder Resistor Assembly	R3, R4
9	4	900000-001	Input Capacitor	C1-C4
10	4	104067-001	Buss Bar Capacitor	
11	1	104085-001	Capacitor PWB, Upper	C1-C6
12	4	989010-001	Clamp, Capacitor	
13	4	970006-608	Screw, Hex $\frac{1}{4}$–20 X $\frac{5}{8}$	
14	4	104021-001	Clamp Heatsink Hold Down	
15	1	104091-001	CF PWB	
16	3	912003-002	Diodes, Cathode to stud	CR1-CR3
17	3	912003-001	Diodes, Anode to stud	CR4-CR6
18	4	970000-304	Screw, Pan Head 6–32 X $\frac{3}{8}$	
19	6	902011-007	Varistor	RV1-RV6
OPT	NS	104081-001	1 KVA AUX Transformer (Optional)	
20	1	100436-001	Varistor Assembly (CB)	
21	1	104360-001	Blowout Deflector	
22	1	100436-002	Varistor Assembly (CF)	

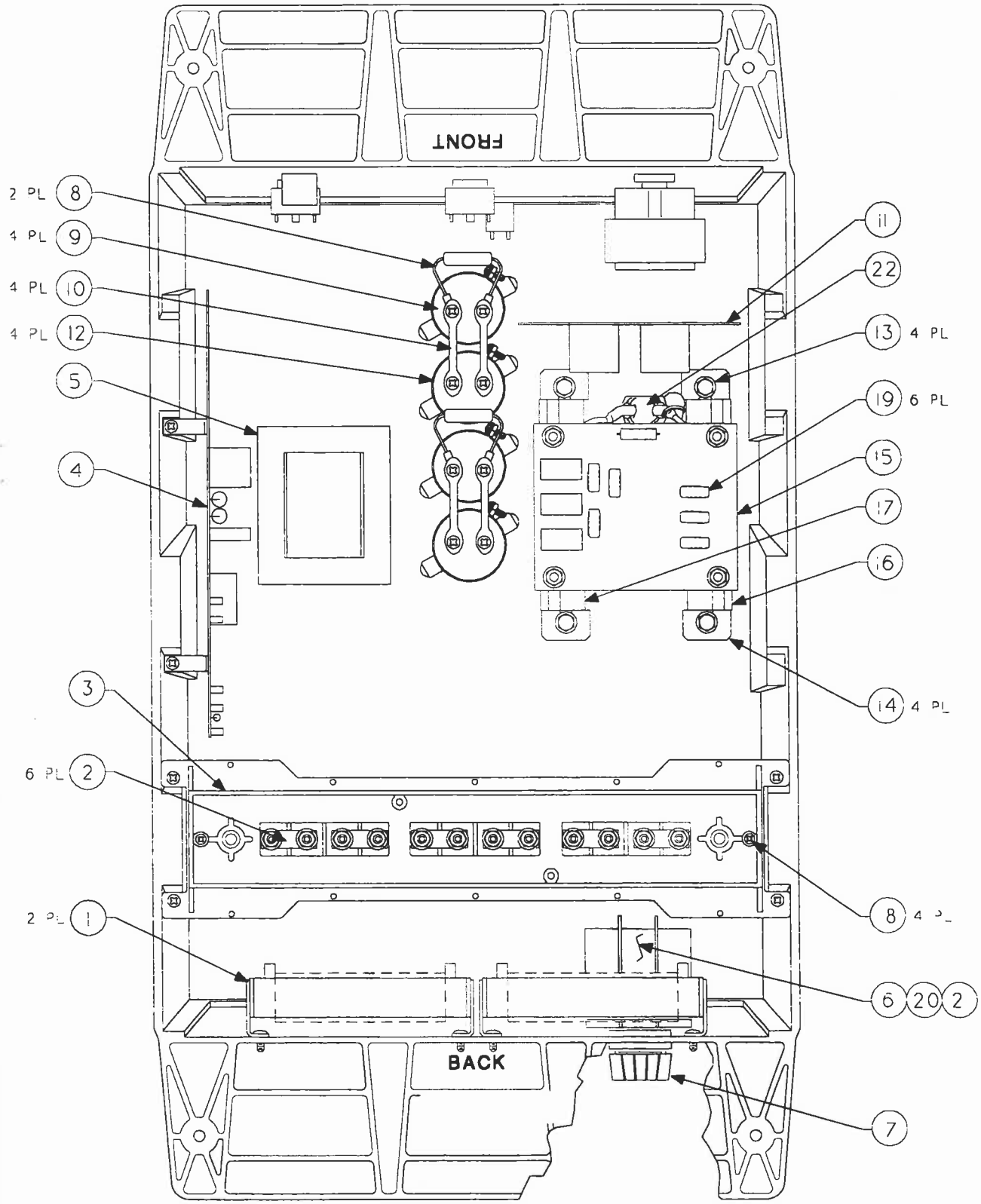


Figure 17, Final Assembly, Upper Enclosure

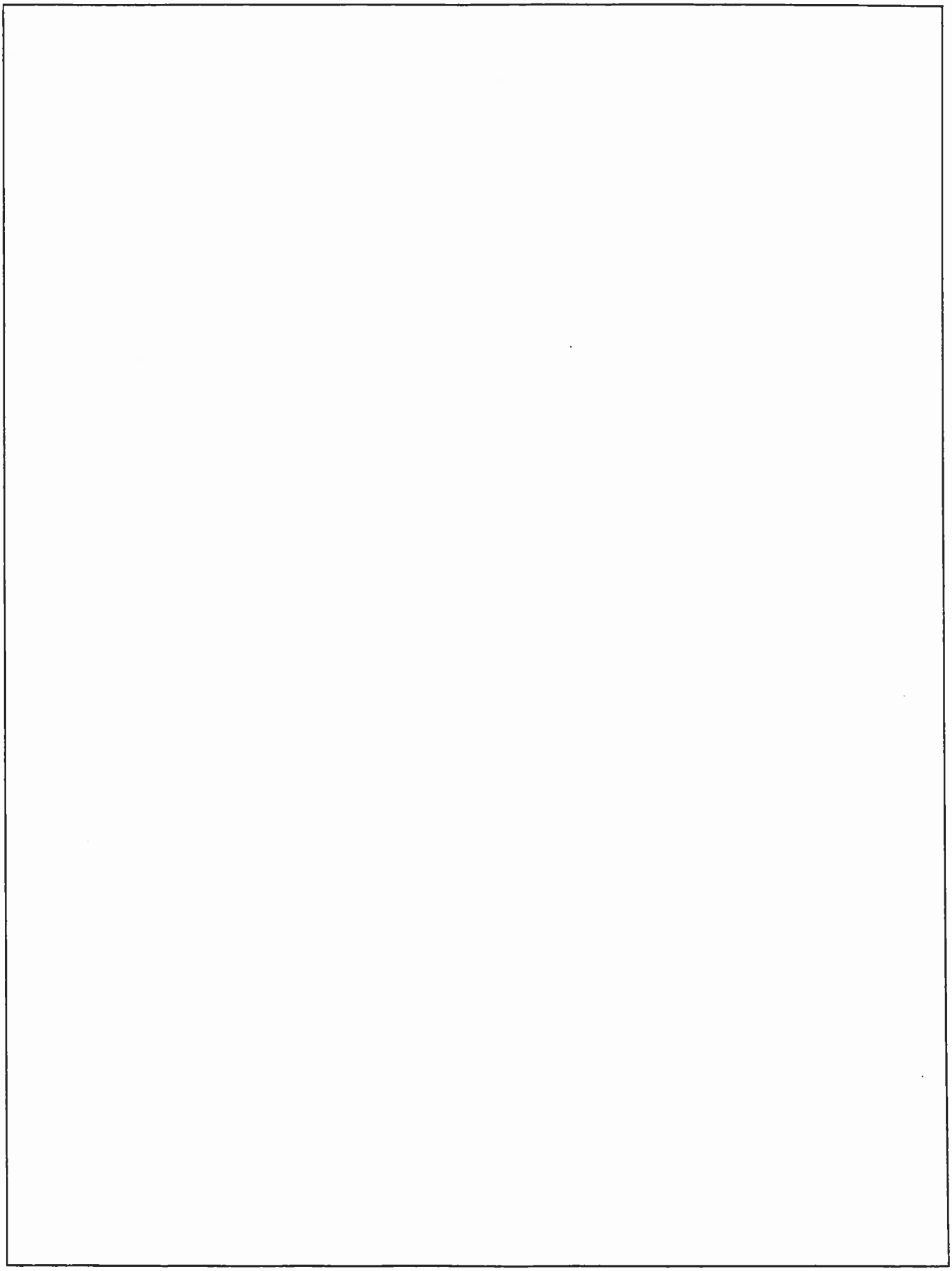


Table 20, Parts List for Front Panel Parts

Item	Qty	Part Number	Description	Reference Designator
1	1	903000-004	Potentiometer 500K	R3
2	1	920004-002	Switch, Toggle (DPST)	S3
3	2	920001-020	Sleeve, Switch	
4	3	940024-101	Knob, Large	
5	2	903000-002	Potentiometer 5K	R1, R2
6	1	920004-003	Switch, Toggle (DPDT 3 Position)	S2
7	1	600020-002	Meter, Digital V/A	
8	1	920000-100	Knob, Range Switch	
9	1	921013-001	Circuit Breaker, AUX 1	AUX 1
10	1	921013-002	Circuit Breaker, AUX 2	AUX 2
11	1	104518-001	Assy, Remote Connector Harness	J10
12	1	930014-502	Sealing Cap	
13	1	104520-001	Front Panel Overlay	
14	1	920003-001	Switch, Range	

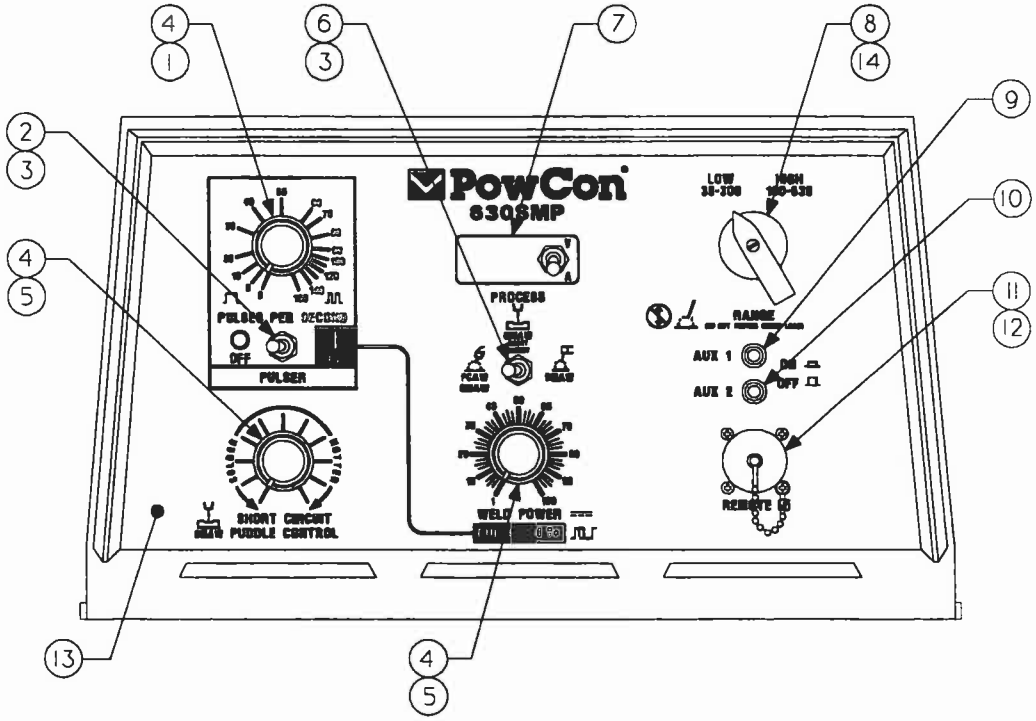


Figure 18, Front Panel Parts

Table 21, Parts List for Final Assembly, Lower Enclosure

Item	Qty	Part Number	Description	Reference Designator
1	1	104051-001	Case, Lower Enclosure	
2	2	104135-001	Grille	
3	2	104039-001	Output Stud ½–13	
4	1	104028-001	Bracket, Transformer Holddown	
5	2	970006-629	Screw, Flanged Head, ¼–20 X 3¾	
6	1	104020-001	Main Transformer	T1
7	1	905000-001	Shunt	SH1
8	1	970009-806	Screw, Brass, ⅜–16 X ½	
9	1	104077-003	Cover, Lower Change-Over	
10	1	104075-001	Commutating Inductor	L2
11	1	104076-001	Commutating Inductor	L3
12	1	104042-001	Fan Motor	
13	4	970006-608	Screw, Flanged Head, ¼–20 X ⅝	

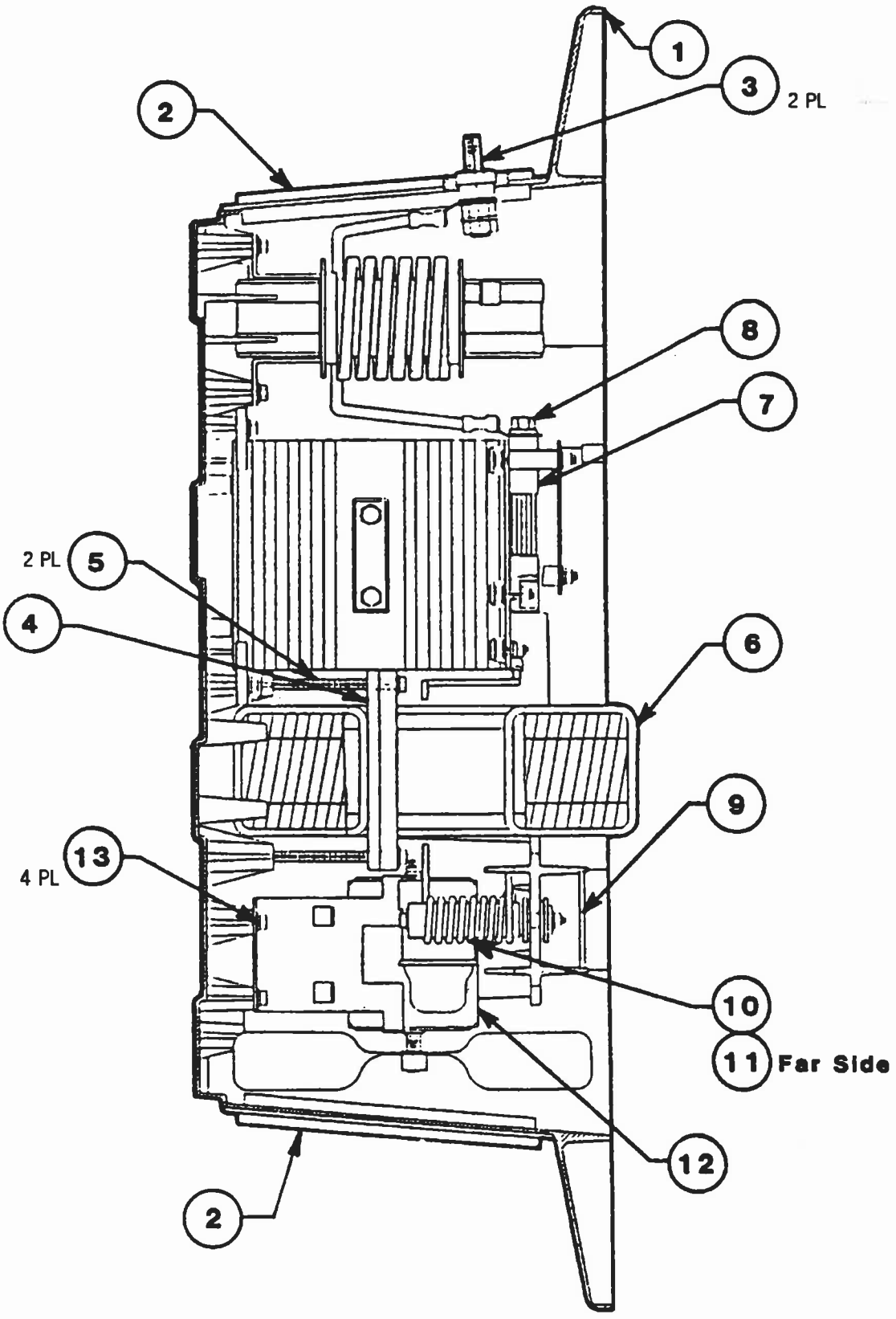


Figure 19, Final Assembly, Lower Enclosure

Table 22, Parts List for Final Assembly, Lower Enclosure

Item	Qty	Part Number	Description	Reference Designator
1	1	104030-001	Inductor, Main	L1
2	1	104031-001	Inductor, Output	L2
4	4	104021-001	Heatsink Holddown Clamp	
5	12	970006-608	Screw, Flanged Head, ¼–20 X ⅝	
6	3	900001-004	Capacitor Output	C5-C7
7	4	104258-001	Buss Bar, Cap	
8	1	104060-001	PWB, WR Snubber	R1, C1, R5, C2
9	1	104086-001	PWB, SCR Snubber	C1, R1, C2
10	5	970006-614	Screw, Hex Head, ¼–20 X 1	
11	9	972001-006	Nut, Flanged Hex Locking ¼–20	
12	5	982005-001	Spacer, SCR	
13	4	982005-002	Spacer, WR	
14	2	104018-001	Heatsink Assembly, WR	CR7, CR8
15	1	104017-001	Heatsink Assembly, SCR OB230/460V	Q1
16	1	104017-002	Heatsink Assembly, SCR INB 230/460V	Q2
17	4	970006-620	Screw, Flanged Head, ¼–20 X 1¾	
18	4	974010-006	Washer ¼ SL	
19	1	104066-001	PWB Cap Board, Lower	C1-C4
20	1	104079-001	Bracket Cap Board	
21	1	104069-001	Change-Over Assembly, Lower	
22	1	922007-001	Fan Blade	
23	4	972000-006	Nut ¼ - 20	
24	6	970001-006	Screw, Pan Head ¼-28 X ½	
25	1	104259-001	Assembly, Inductor	L6
26	6	100151-004	Buss Bar, Voltage Change-Over	

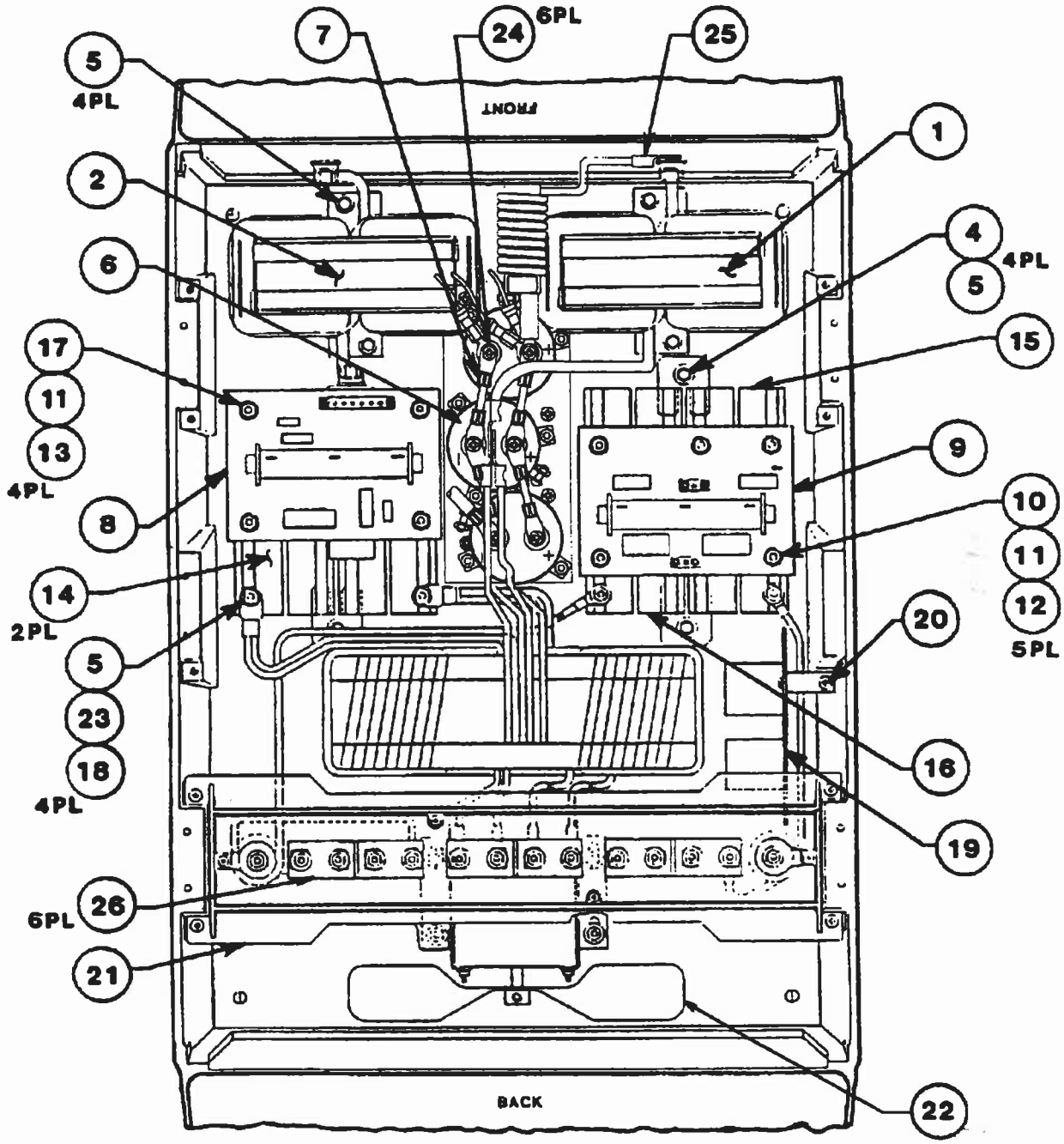


Figure 20, Final Assembly, Lower Enclosure

Table 23, Parts List for Final Assembly, Upper & Lower Enclosure

Item	Qty	Part Number	Description
NS	2	104032-001	Case Hinge
NS	8	970011-506	Screw, Flat Head 10-32 (Hinge)
NS	12	972008-013	Nut, Acorn (Hinge)
NS	4	970002-510	Screw, Pan Head 10-32 X ¾ (Hinge)
1	4	970006-614	Screw, Hex Head Locking ¼–20 X 1
2	4	972001-006	Nut Hex Locking ¼–20
3	1	100108-001	Label, Warning, H.V.
4	2	100096-001	Label, Warning, H.V.
5	2	100146-001	Label, **PowCon**

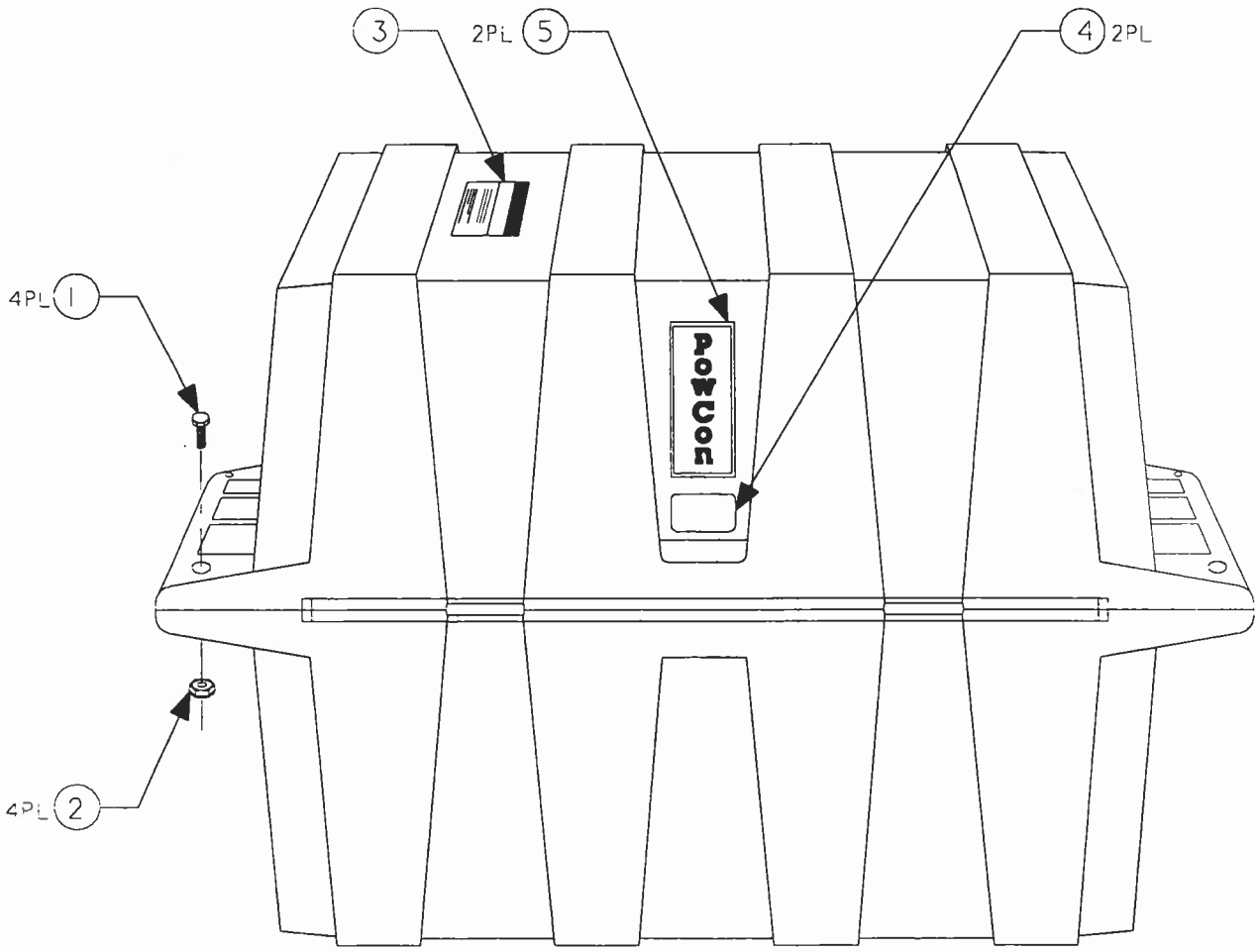


Figure 21, Final Assembly, Upper & Lower Enclosure

SCHEMATIC

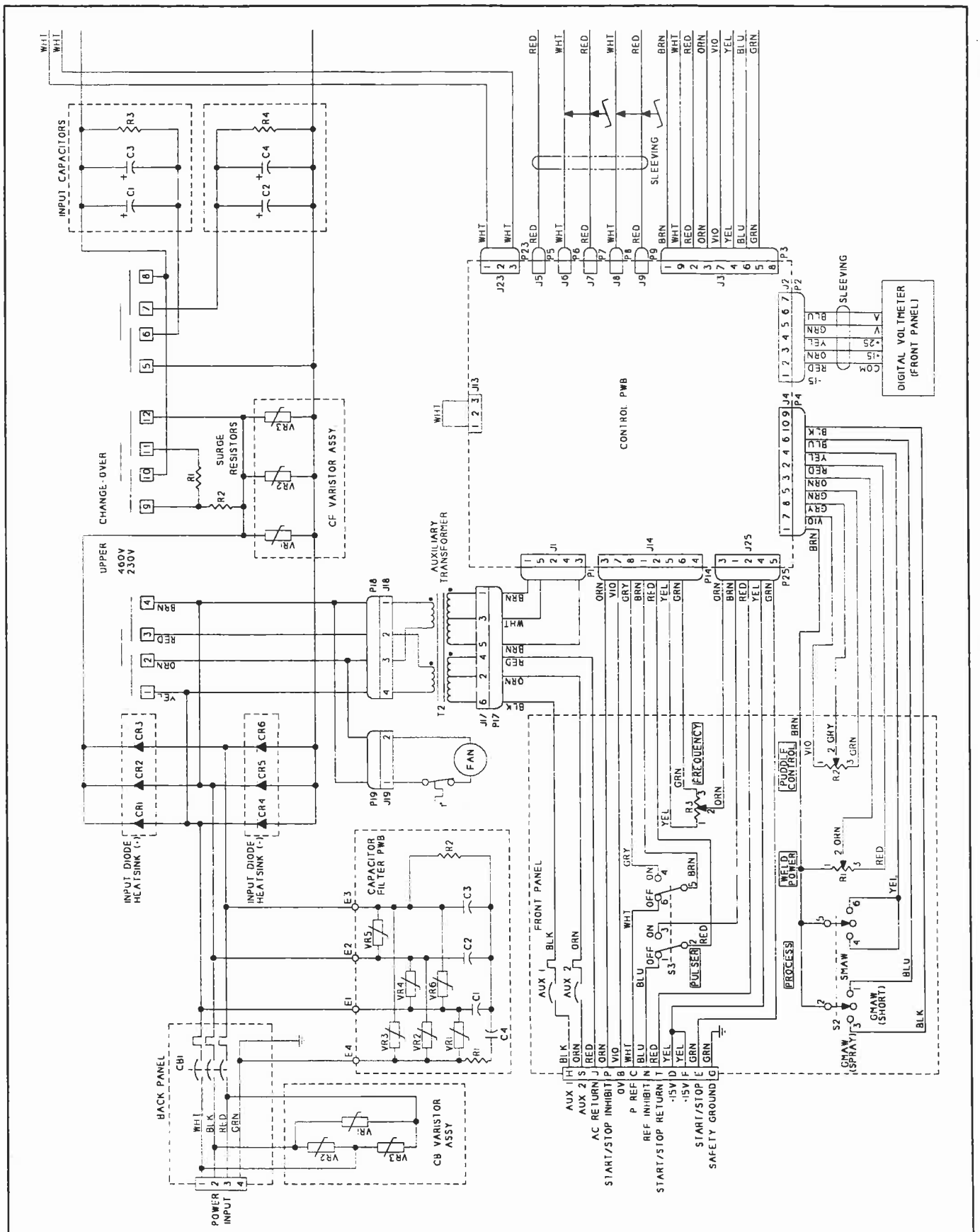
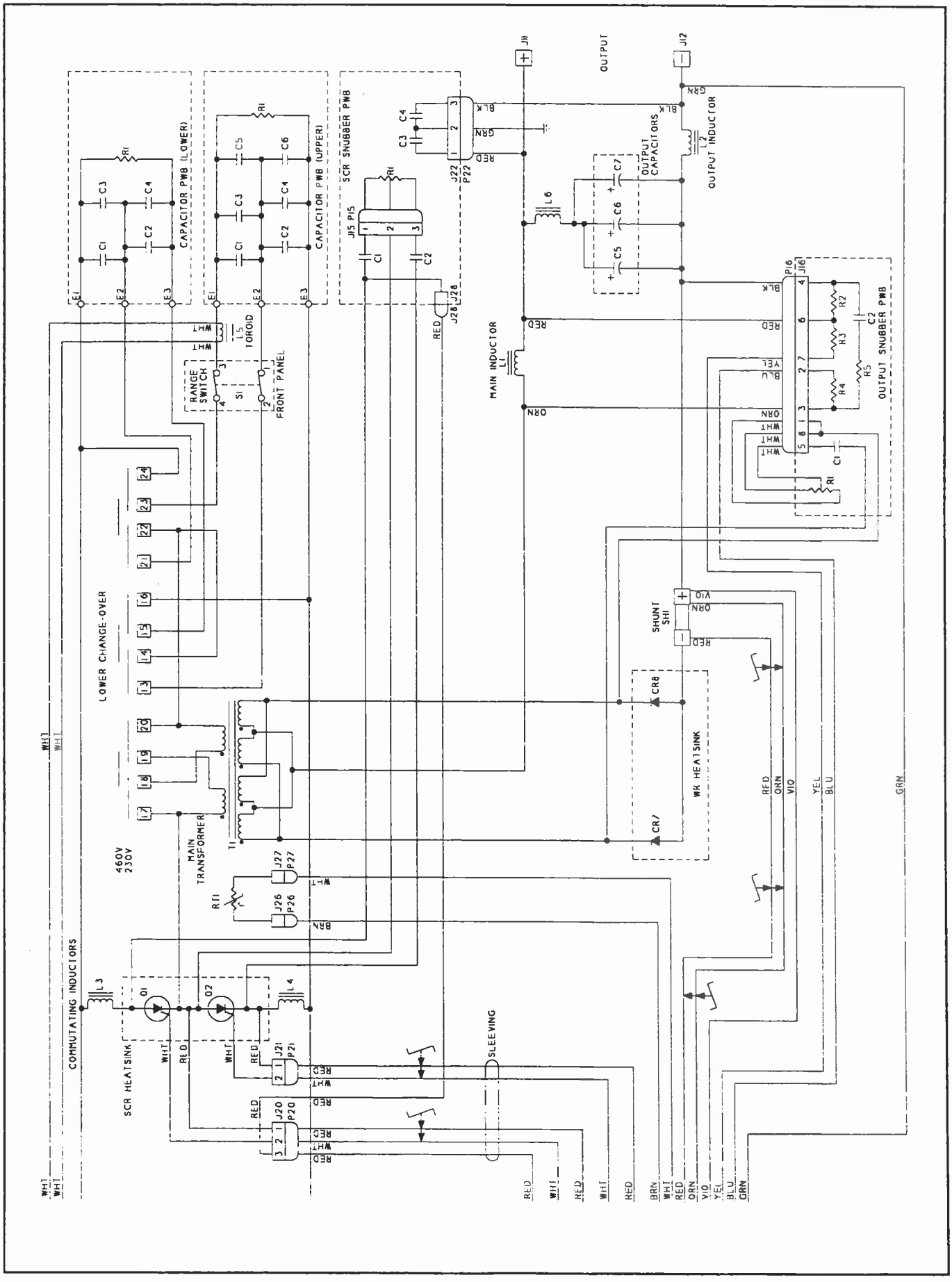


Figure 22, 630SMP 230/460V Schematic

SCHEMATIC


CAPACITOR PWB (LOWER)
CAPACITOR PWB (UPPER)
SCR SNUBBER PWB
OUTPUT
OUTPUT CAPACITORS
OUTPUT INDUCTOR
OUTPUT SNUBBER PWB
MAIN INDUCTOR
RANGE SWITCH
FRONT PANEL
TOROID
LOWER CHANGE-OVER
MAIN TRANSFORMER
460V
230V
COMMUTATING INDUCTORS
SCR HEATSINK
WR HEATSINK
SHUNT
SLEEVING

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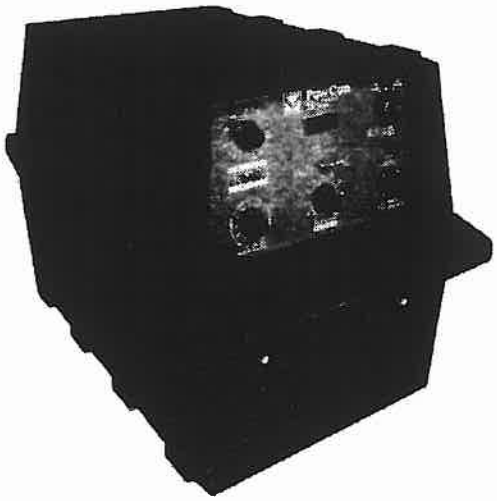
550SMP and 630SMP



Prior to troubleshooting or working on equipment, refer to applicable Operations Manual especially:

Safety Section

Maintenance Procedures

Electrical Procedures

Parts Lists and Schematics

LIST OF COMPONENTS FOR 550/630SMP

List of Components for 550/630SMP

(Description common to all models)

Reference Designator	Description
CB1	**CIRCUIT BREAKER** Via primary cable, connects the power supply to the (3) three phase or single phase primary power. Incorporates an extremely fast trip time to protect internal components during a fault situation. This component does not eliminate the need for a standard input power protection (fuse box).
CR1-3 Cathode to stud **CR4-6 Anode to stud**	**INPUT DIODES** Rectifies the (3) three phase or single phase primary power to supply DC power to the inverter. This DC voltage is later switched by the SCR (Q1 and Q2) to get the high welding frequency AC voltage.
CR7, CR8	**RECTIFIER DIODES** Rectifies the AC output of the main transformer T1 to DC for the welding process. These diodes are a full wave rectifying bridge since the transformer T1 has a center tap.
Q1, Q2	**SCRs** Controlled switching devices used to switch on and off the primary DC voltage to the inverter. This will give an AC voltage of high frequency (400-5000 Hz).
L3, L4	**COMMUTATING INDUCTOR** Limits di/dt or rate of rise of current through Q1 and Q2 when they start conducting.
L1	**MAIN INDUCTOR** Part orf an LC network to filter the output current to give a low ripple output that maintains a smooth welding arc.
L2	**OUTPUT INDUCTOR** Part of an LC network to filter the output current as described in L1 above.
T1	**MAIN TRANSFORMER** Steps down the primary AC voltage created by the inverter and provides the necessary insulation between primary (input) and secondary (welding) of the unit.

LIST OF COMPONENTS FOR 550/630SMP

List of Components for 550/630SMP, continued

(Description common to all models)

Reference Designator	Description
C1, C2, C3, C4	**INPUT CAPACITORS** Filter the DC ripple from the output of the primary diode rectifying circuit in order to get a smooth DC voltage for the inverter.
C1-4/Lower/Range 1 and 2 C1-C6/Upper/Range 2 only	**POWER CAPACITORS (Working Capacitors)** Switching capacitors in the inverter circuit. They are used for storing energy during switching.
C1, C2, On SCR Snubber Board	**PROTECTION CAPACITORS** They are a part of an RC network over Q1 and Q2 to limit the dv/dt or rate of voltage rise across the SCRs in the inverter circuitry. This is to prevent the SCRs from misfiring.
C5, C6, C7	**OUTPUT FILTER CAPACITORS** Part of the LC network to filter the output current to give a low ripple output that maintains a smooth welding arc.
Fan	**FAN MOTOR** Draws air through the case to cool the components.
RT1	**THERMAL OVERLOAD RESISTOR (PTC)** Protects the main transformer from overheating by turning off the converter when the temperature on the main transformer reaches a specified temperature.
Control PWB	**CONTROL PC-BOARD** Control the triggering frequency of the converter which, in turn, controls the output power. It also controls the welding characteristics of the machine. It does this by comparing the signals from the front panel (or remote control) with the feedback signal from the secondary of the unit.
Capacitor Filter PWB	**INPUT CAPACITOR FILTER BOARD** Filters radio noise from (3) phase primary and high frequency switching of the SCRs.
Output Snubber PWB	**OUTPUT BOARD** Filters radio noise from welding output. Also houses R1/C1 and R5/C2 Snubbers for CR7 and CR8 plus R2 for bleeding off C5-C7 and R3, R4 for feedback to PC-board.

LIST OF COMPONENTS FOR 550/630SMP

List of Components for 550/630SMP, continued

(Description common to all models)

Reference Designator	Description
R1, C1 on output snubber PWB	**RC PROTECTION CIRCUIT** Filters out hi-frequency noise of ringing caused by the switching of CR7 and CR8.
R5, C2 on output snubber PWB	**RC PROTECTION CIRCUIT** Limits the dv/dt or rate of voltage rise across the output diodes. (CR7 or CR8)
R1, R2 Surge Resistors	**CURRENT LIMITING RESISTORS** Limits current through converter circuitry when Q1 and Q2 fire at the same time. R1 and R2 in series circuit for 460 VAC. R1 and R2 in parallel for 230 VAC.
R2, R3	**BLEEDER RESISTORS** Discharge C1 thru C4 when primary power is shut off. **NOTE:** When 440/460 VAC is used as primary, these resistors act as a voltage divider network to balance the DC voltage across C1 thru C4.
R1, on SCR Snubber board	**PROTECTION RESISTOR** Part of RC network to limit the dv/dt or rate of voltage rise across the SCRs in the inverter circuitry (Q1 and Q2).
R2	**BLEEDER RESISTOR** Discharges output capacitors C5-C7 when primary power is shut off. During OCV determines SCR firing rate or frequency.
R4	**LIMITING RESISTOR (LOCATED ON OUTPUT SNUBBER PWB)** Part of the line voltage compensation circuit on the control PC-board.
R3	**LIMITING RESISTOR (LOCATED ON OUTPUT SNUBBER PWB)** Part of the line voltage regulating circuit on the control PC-board.

LIST OF COMPONENTS FOR 550/630SMP

List of Components for 550/630SMP, continued

(Description common to all models)

Reference Designator	Description
SH1	**SHUNT (500Amps @ 50mV)** Measures output current and feeds this information to the control PC-board. This signal will be compared there with the signal from the front panel.
T2	**AUXILIARY TRANSFORMER** Provides remote auxiliary power for wirefeeder or arc starter via J10. Rated for 300 VA and thermally protected also provides a 48VAC center tapped supply to control PC board via J1. For 550SMP single remote AUX voltage available. For 630SMP dual AUXvoltage available from remote.
Note: Several different auxiliary voltages available from factory.	
L5	**RANGE SENSING COIL** Senses the Range (2) the unit is switched to and sends reference signal to control PC Board to regulate current limiting control for the 2nd range.
J11, J12	**OUTPUT CONNECTIONS** J11 (positive), J12 (negative). Both are 1/2" - 13UNC stud.
J10	**REMOTE 17 PIN METAL CONNECTOR (630SMP ONLY)** **REMOTE 14 PIN PLASTIC CONNECTOR (550SMP only)** Connection for remote current control and contactor control. For MIG units, it contains auxiliary voltage required for wire feeders.
S1	**RANGE SWITCH** Multi-position switch which switches the power capacitors to obtain desired power output.
Digital V-A Meter	**DIGITAL VOLT/AMP METER** Controls circuit for Digital Volt/Amp Meter. The board receives the signal for output current and voltage from the control board and displays them. This meter displays output volts or output amps depending on setting of the two position switch.

LIST OF COMPONENTS FOR 550/630SMP

List of Components for 550/630SMP, continued

(Description common to all models)

Reference Designator	Description
S2	**PROCESS SWITCH** Three position process switch that electronically segregates the SMAW, GMAW spray and GMAW short arc processes from each other.
R1	**WELD POWER REFERENCE POTENTIOMETER** Sets the preferred welding output by dividing the 15V and feeding this back to the PC-board. When S3 pulse switch on regulates percent pulse width.
R2	**PUDDLE CONTROL** This control is operative only when the process switch is in the GMAW short arc mode. Lower settings are for out-of-position welding and higher setting for flat position welding.
Note: Local control only, cannot be controlled from a remote location	
R3	**FREQUENCY CONTROL** This control is operative only when pulser S3 switch on.
Note: Local control only, cannot be controlled from a remote location	
AUX 1	**AUXILIARY CIRCUIT BREAKER (630SMP only)** Remote voltage fault protection (High Voltage)
AUX 2	**AUXILIARY CIRCUIT BREAKER (630SMP only)** Remote voltage fault protection (Low Voltage)
F1	**FUSE (550SMP only)** Remote voltage fault protection.
S3	**PULSER ON/OFF SWITCH**
VR1 - VR6	**VARISTORS** Provide voltage surge protection to unit when exposed to excessive line voltage spikes.

INDEX OF FAULTS FOR TROUBLESHOOTING

INDEX OF FAULTS FOR TROUBLESHOOTING

A. Circuit Breaker (CBI) trips and/or input fuses (not in unit) blown.

B. Circuit Breaker (CB1) trips.

C. Circuit Breaker CB1 trips 1 or 2 seconds after unit is turned on.

D. Fan rotates, no welding output or open circuit voltage (O.C.V.).

E. Fan rotates, no welding current, unit fires (ticks) once.

F. Fan rotates, unit ticks, arc "sputters" in all ranges (very, very low output).

G. Unit "ticks" very slowly or very rapidly in all ranges O.C.V.

H. Unit "ticks" erratically in any or all ranges and welds intermittently.

I. Reduced output in upper limits of the high range.

J. Unit has no O.C.V. or output in Range 1 only.

K. Unit at maximum output in all ranges.

L. Output current unstable (arc fluctuation) in all ranges.

M. Unit shuts down. CB1 must be reset to intiate O.C.V. when switching between ranges or when intiating or breaking arc.

N. Unit has low output in one or more ranges.

O. Loud arc noise in all ranges, varies with potentiometer setting.

P. Fan not working.

Q. Welding current too high or too low when remote control is being used.

R. Unit shut down while welding fan runs, digital V.A. meter.

S. Fan rotates, digital V.A. meter is lit. No O.C.V. No output under load when using remote hand/foot control.

T. No auxiliary voltage present for wire feeder or arc starter.

FAULTS FOR TROUBLESHOOTING

A. Circuit Breaker (CB1) trips and/or input fuses (not in unit) blown.	
Probable Cause	**Solution**
1. Faulty input diodes CR1-3 (+ heatsink) or CR4-6 (- heatsink).	Measure with ohmeter Rx1 resistance scale and replace if shorted.
Note: Circuit breaker must also be replaced if diodes are shorted and the circuit breaker has tripped several times.	

B. Circuit Breaker (CB1) trips.	
Probable Cause	**Solution**
1. Faulty C1, C2, C3 or C4 input filter capacitor.	Measure with ohmeter on Rx1 and replace all four capacitors if one is shorted. Measure R2 and R3 bleeder resistosr on the input capacitors. Each resistor is 45 kilohms, for 460 VAC resistors in series and for 230 VAC resistors in parallel. Replace if open.
Note: C1-4 very often read OK on V-A meter but one or more may break down when voltage is applied. To check this, remove and electrically isolate the wires to the C1, C2, C3, and C4 input capacitors. Turn on the unit in OPEN CIRCUIT VOLTAGE mode only. If CB1 does not trip, replace all four input capacitors	
Note: The unit can NOT weld or be hooked up to a load bank when C1-4 input capacitors are disconnected.	
2. Faulty SCR's Q1 or Q2.	Measure with ohmeter on Rx1 scale and replace SCR assembly if shorted. (also check steps C2, C4, and C5 and read Notes 1 and 3)

FAULTS FOR TROUBLESHOOTING

C. Circuit Breaker CB1 trips 1 or 2 seconds after unit is turned on.	
Probable Cause	**Solution**
1. Shorted SCR's Q1 or Q2.	Measure with ohmeter on Rx1 scale and replace SCR assembly if shorted. (Also check steps, C2, C5, and read Notes 1 and 3)
2. Faulty Q1 or Q2 RC filter (voltage "snubber" circuit).	On SCR snubber PCB measure R1 resistors for open condition. Check C1 and C2 for shorted condition.
3. Weak SCR's Q1 or Q2.	Disconnect P6 and P7 from Control PC-Board and make sure they don't touch anything. Turn on CB1 and if it still trips Q1 is weak. Replace SCR assembly. If CB does not trip go to B. Disconnect P8 and P9 from control PC-Board and make sure they don't touch anything. Turn on CB1 and if it trips Q2 is weak. Replace SCR assembly.
4. Faulty output diodes CR7 and/or CR8.	Measure with ohmeter on Rx1 scale for shorted condition (both diodes will read shorted even if only one is in shorted condition). Replace Output Diode Heatsink Assembly. Also check steps C5.
5. Faulty output diode RC filter (voltage "snubber" circuit) located on output filter PC board.	Measure resistor R5 (47 ohm and R1 (2 X 20 ohm)for open condition. Check C2 (.022μ) and C1 (0.1μ) for open or shorted condition. Replace output board if necessary.
6. Faulty control PC board	After you have done tests C1 through C5 and they tested out okay do the following: Remove P1 from control PC board and turn on CB1. If CB1 does trip replace PC board after checking R201 and R215 on PC board. R201 and R215 should read 5.1 ohm 1W. If one is open replace and turn on CB again.
7. Main transformer T1 faulty.	Visually check main transformer for "arc" marks on windings. Remove the voltage change over buss bars and check for continuity. Measure with ohm-meter on Rx1 scale for open condition between 17 and 18, and between 19 and 20 on lower change over. (See schematic) If shorted, replace main transformer.

FAULTS FOR TROUBLESHOOTING

D. Fan rotates, no welding output or open circuit voltage (O. C. V.).

Probable Cause	Solution
1. Unit disabled by remote foot or hand control.	Disconnect remote control from J10 terminal. If unit operates normally check wiring of remote control. If problem still exists with remote disconnected check D:6.
2. PTC resistors RT1 faulty or engaged.	The duty cycle has been exceeded or there is not suffficient air flow through the unit so RT1 shuts down the unit because of over temperature. Wait 5 minutes to let unit cool down, to see if unit starts working (ticking) again. Reduce duty cycle and/or make sure there is air flow through the unit. May need to clean the unit from dust. If proper duty cycle cannot be maintained, allow unit to cool completely to ambient (room) temperature. With CB1 in OFF position and unit completely discharged, measure resistance with ohmeter between PC board connections P3 pins 1 and 9 (reading should be approximately 200 ohms). If open, replace RT1.
3. No DC voltage available at SCR's Q1 and Q2.	The voltage across the SCR's is as follows: Operating Input (3ø) / SCR Reading 220-230 VAC / 300-315 VDC 380 VAC / 500-525 VDC 415 VAC / 575-590 VDC 440-460 VAC / 600-630 VDC 575 VAC / 800-850 VDC These measurements should be made between P5/J5 and P9/J9 on the control PC board. VDC+ on Q1, P5/J5 and VDC- on Q2 P9/J9. If voltage is not present at SCR's, trace back through circuits to the main bridge rectifier to locate the problem.
4. No AC voltage present at PC board.	With an AC voltmeter check voltage between P1, pins 1 and 5 or P1, pins 3 and 5 for 24 VAC +or- 20%. If voltage is not present, trace back to secondary side of CB1 secondary, to make sure the auxiliary transformer T2 is being supplied with AC voltage. Replace transformer assembly.

FAULTS FOR TROUBLESHOOTING

D. continued

Probable Cause	Solution
5. Faulty gate leads to SCR's Q1 and Q2.	Measure with ohmeter between P6 and P7 and/or P8 and P9 for open condition. Normal reading is 5 to 40 ohms. If open is noted, replace SCR assembly.
6. Faulty control PC board.	Check PC board resistors R201 and R215 for open condition. Replace with 5.1ohms, 1 watt if open. If R201 and R215 are proper value, replace PC board.

E. Fan rotates, no welding current, unit fires (ticks) once.

Probable Cause	Solution
1. Faulty P5 connection on control PC board.	Check P5 for mechanical integrity.
2. Faulty control PC board.	See step D:6
3. Faulty gate leads to SCR's Q1 and Q2.	See step D:3
4. Faulty output capacitors C5, C6, C7.	Replace them, if any one open.

F. Fan rotates, unit ticks, arc "sputters" in all ranges (very, very low output).

Probable Cause	Solution
1. Faulty P5 connection on control PC board.	See step E:1
2. Faulty Potentiometer (R1)	See step K:1
3. Faulty PC board.	Replace
4. Faulty Mode Switch (S2)	Replace
5. Faulty working capacitor PC board.	Check, replace if necessary upper C1-C6 or lower C1- C4.

G. Unit "ticks" very slowly or very rapidly in all ranges O. C. V.

Probable Cause	Solution
1. R2 resistor on Output snubber board.	Measure with ohmeter (3.3 Kohm). Replace Output Filter Board.

FAULTS FOR TROUBLESHOOTING

H. Unit "ticks" erratically in any or all ranges and welds intermittently.

Probable Cause	Solution
1. Faulty connection at R1 or R2 surge resistors.	Check for mechanical integrity of all connections made at resistor terminals.
2. Faulty gate leads (Q1 or Q2).	See step D:3
3. Faulty PTC resistors RT1.	See step D:2
4. Faulty connection at power capacitors or power capacitor boards.	Check all connections that lead to and from power capacitors. Replace capacitor board.

I. Reduced output in upper limits of the high range.

Probable Cause	Solution
1. One phase of three phase primary input missing.	Check for 3 phase on primary side of circuit breaker. Check for each phase on secondary side of breaker by measuring between the studs of the positive side input rectification diodes. If three phase is on primary but not on secondary, replace Circuit Breaker.
2. Faulty control PC board.	See step D:6
3. One or more power capacitors (lower and upper capacitor board) doesn't have right capacitance value.	Measure capacitors. Replace capacitor board if value is low or open.
4. Faulty range switch.	Check connections replace if necessary.

J. Unit has no O. C. V. or output in Range 1 only.

Probable Cause	Solution
1. Faulty Range Switch connections.	Check connections and replace S1 if necessary.
2. Power capacitors (lower capacitor board) in Range 1 are open.	Measure capacitors, replace if the value is low or open.

FAULTS FOR TROUBLESHOOTING

K. Unit at maximum output in all ranges.

Probable Cause	Solution
1. Faulty potentiometer (R1)	With CB1 in OFF position, use ohmeter to measure between P4 pins 1 and 3 for 5 kohms at minimum pot position going to zero ohms at maximum position. Check P4, Pins 2 and 3 for opposite condition.
2. Faulty control PC board.	See step D:6
3. Faulty connection of control PC board shunt cable.	Reverse connection at shunt and check again only if someone has worked on the unit.
4. Feedback from output circuit is bad.	Check continuity from output to P3 on control PC board.

L. Output current unstable (arc fluctuation) in all ranges.

Probable Cause	Solution
1. Fluctuating 3 phase primary/unbalanced 3 phase primary. Since unit is line voltage compensated there must be large fluctuations to notice it.	Check unit on stable 3 phase primary.
2. Faulty mechanical connection in unit.	Check all connections.
3. Open or weak C5, C6, or C7 output capacitors.	Replace
4. Open or weak C1, C2, C3, or C4 input filter capacitor.	Replace
5. Faulty control PC board.	See step D:6

M. Unit shuts down. CB1 must be reset to initiate OCV when switching between ranges or when initiating or breaking arc.

Probable Cause	Solution
1. High OCV (over 80VDC) causes safety circuit on control PC board to activate.	Measure OCV and replace control PC board if over 80VDC. If voltage bleeds down (not necessarily over 80V) replace board if output caps are good.
2. Output capacitors open.	Measure and replace if low value or open.

FAULTS FOR TROUBLESHOOTING

N. Unit has low output in one or more ranges.

Probable Cause	Solution
1. Faulty working capacitor associated with respective range.	Replace capacitor.
2. Faulty output capacitor C5, C6, or C7.	Replace capacitors.
3. One phase of 3 phase primary missing.	See step I:1a and 1b.
4. Faulty interconnection between working capacitors through range switch (S1).	Check continuity through switch in all ranges. Replace SW100 if faulty.
5. Faulty potentiometer.	See step K:1.
6. Faulty control PC board.	See step D:6.
7. Faulty main transformer (T1).	Replace T1. See step C:3

O. Loud arc noise in all ranges, varies with potentiometer setting.

Probable Cause	Solution
1. Faulty output capacitor C5, C6, and C7.	Replace
2. Bad connection at range switch S1.	See step N:4.

P. Fan not working.

Probable Cause	Solution
1. Overheated	Allow unit to cool for 10 minutes, reduce output or duty cycle.
2. Connection from primary source to fan open.	Check connections.
3. Fan faulty.	Using ohm-meter check continuity between pins 1 and 2 of P19 connector. If open replace fan.

Q. Welding current too high or low when remote control is being used.

Probable Cause	Solution
1. Remote control potentiometer faulty.	Check wiring. Repair or replace. @ check panel remote J10 wire harness to PC board connection J14.
2. Faulty control PC Board.	See step D:6.

FAULTS FOR TROUBLESHOOTING

R. Unit shuts down while welding. Fan runs, digital V-A meter on.

Probable Cause	Solution
1. Unit overheated due to:	
exceeding duty cycle	Allow unit to cool for 10 minutes, reduce output or duty cycle.
inadequate flow of cooling air	Make sure that intake and exhaust vents are not blocked. (In heavy dust area, clean unit out once per month with compressed air.)
2. PTC resistor RT1 faulty or engaged.	See step D:2
3. Low value on output capacitors. CB1 needs to be reset to get power back.	Measure and replace if low value or open.

S. Fan rotates, digital V-A meter or lit. No OCV. No output under load when using remote hand/foot control.

Probable Cause	Solution
1. Normally open switch on remote hand/foot control inoperable due to faulty wiring.	Check wiring, repair or replace. See Q:1

T. No auxiliary voltage present for wirefeeder or arc starter.

Probable Cause	Solution
1. F1 fuse on 550 blown. CB AUX 1 or AUX 2 off on 630SMP.	Check, reset or replace as necessary.
2. Auxiliary transformer (T2) overheated due to faulty wire feeder. (T2 is rated at 300VA, check in line fuse or auxiliary circuit breaker)	Check wire feeder for bound up motor, improper drive roll adjustment, etc.
3. Faulty connection at J10 remote connector, or J17 auxiliary transformer.	Turn unit off and check for continuity. If open and connections are okay, replace transformer.

The auxiliary transformer provides 24 VAC to power the control PC board via pins 1 and 5 and pins 3 and 5 on J1. Several different auxiliary transformers are available:

Part Number	Primary Voltage	Remote Voltage Available
145015-001	230/460 VAC	30/115 VAC
145016-001	380 VAC	30/115 VAC
145017-001	575 VAC	30/115 VAC
145027-001	230/460 VAC	30/42 VAC
145018-001	380 VAC	30/42 VAC

* Remote voltage available via J17 pins 6 and 4 and pins 2 and 4 for 630SMP. For 550SMP check J17 pins 6 and 4.

COMPONENT TEST PROCEDURES

Use of Test Equipment	
Capacitor Check	1. Power source must be disconnected from primary power. 2. Perform capacitor discharge procedure as outlined in voltage changeover. 3. Use highest resistance scale of ohm-meter. 4. To insure accurate reading make sure capacitor being tested is isolated from other circuit components. 5. Check resistance of capacitor in both directions by connecting test leads for one polarity and then reversing test lead polarity and connecting again.
Capacitor Test Results	1. Correct/O. K. reading or indication: The needle of the meter will move then fall back to infinity in one of the two directions the test leads are connected to the capacitor's terminals. 2. Faulty reading: The needle fails to move regardless of test lead direction.
NOTE: Perform test several times to make sure findings are reliable.	

COMPONENT TEST PROCEDURES

Use of Equipment, continued	
Semiconductor Checks	1. Power source must be disconnected from primary power. 2. Perform capacitor discharge procedure as outlined in voltage changeover. 3. Use lowest resistance scale Rx1 with ohmeter. 4. Check resistance in both directions by connecting and then reversing the meter leads across the test points.
Diode Test Results	1. Correct/O. K. reading or measurement is: a) Open resistance in one direction of test leads. b) Low resistance in other direction of test leads. 2. Faulty reading is : Short reading in both directions.
SCR Test Results	1. Correct/O. K. reading or measurement is: Open resistance in both directions of test leads. 2. Faulty reading is: Short reading in either direction.
SCR Gate Checks	1. ? 2. ? 3. ? 4. Disconnect P6, P7, P8, and P9 from control PC board. 5. Check resistance in both directions between P6 and P7, and P8 and P9 (measure on leads, not on PC board).
SCR Gate Test Result	1. Correct 10k measurement to 5-40 ohm. 2. Fauty measurement outside the limits. (most likely open)

COMPONENT TEST PROCEDURES

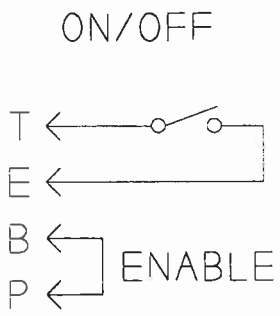
Use of Equipment, continued	
Varistor Check	1. Power source must be disconnected from primary power. 2. Perform capacitor discharge procedure as outlined in voltage changeover. 3. Visually inspect each varistor for pin holes or burn marks. 4. Use highest resistance scale of ohm-meter. 5. Check resistance in both directions by connecting and then reversing the meter leads across the test points.
Varistor Test Results	1. Correct/O. K. reading or measurement is: Open resistance in both directions of test leads.

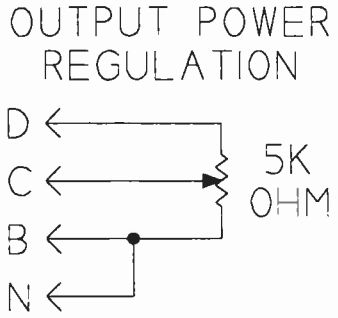
REMOTE CONTROL WIRINGS (630SMP ONLY)

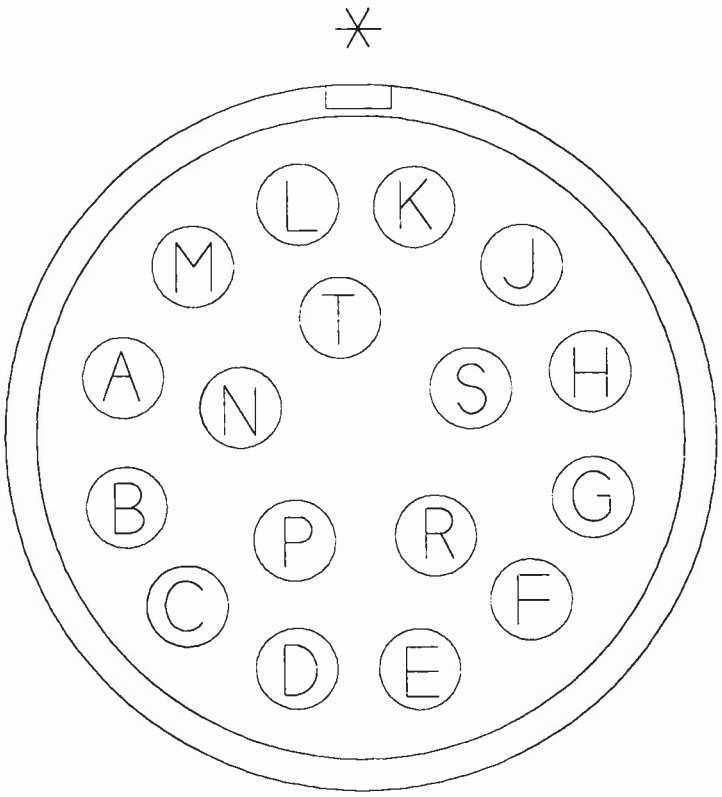
REMOTE CONTROL WIRINGS (630SMP ONLY)

17 PIN PANEL REMOTE RECEPTACLE

Pin designations shown as actual when facing panel mounted receptacle of PowCon Power Sources.







NOTE: Key at twelve o'clock position

REMOTE CONTACTOR CONTROL/WIREFEED POWER CONNECTIONS FOR THE 630SMP

The remote control devices come with a 17-pin connector plug which connects to the remote terminal on the panel of the **PowCon** unit.

To connect the remote control device, insert the 17-pin plug from the control cable of the device fully into the receptacle on the front panel. Ensure that the plug keyways align with the receptacle keys. Rotate the threaded collar of the plug clockwise, as far as possible onto the receptacle threaded body to secure the plug in the receptacle.

WIREFEEDER CONTROL CABLE

The control cable for the wirefeeder and **PowCon** 630SMP interface comes with a 17-pin connector designed to mate with the remote receptacle on the panel. The wiring schematic for the control cable is shown in Figure 3.

NOTE

UNLESS OTHERWISE SPECIFIED, THE **PowCon** 630SMP IS SHIPPED FROM THE FACTORY WITH ON/OFF CONTROL RESPONSIVE TO CONTACT CLOSURE ONLY.

The wirefeeder control cable can be adapted for use with the **PowCon** 630SMP and any manufacturer's wirefeeder. The specific pin numbers are shown in Figure 3. A breakdown of the control cable is as follows:

Pins S, J, H: The auxilliary power for the wirefeeder is provided via these connections.

Pin S: 30VAC protected by 10 Amp circuit breaker.

Pin H: 42VAC protected by 10 Amp circuit breaker or 115VAC protected by 5 Amp circuit breaker.

Pin J: 30VAC/42VAC and 115VAC return.

Pin E,T: These pins with corresponding wires are used to provide remote contactor control for a wirefeeder wired for contact closure as follows:

Pin E: Contact closure povides a path to Pin T.

Pin T: Control circuit board common.

Pin P to B: Enable remote contactor control.

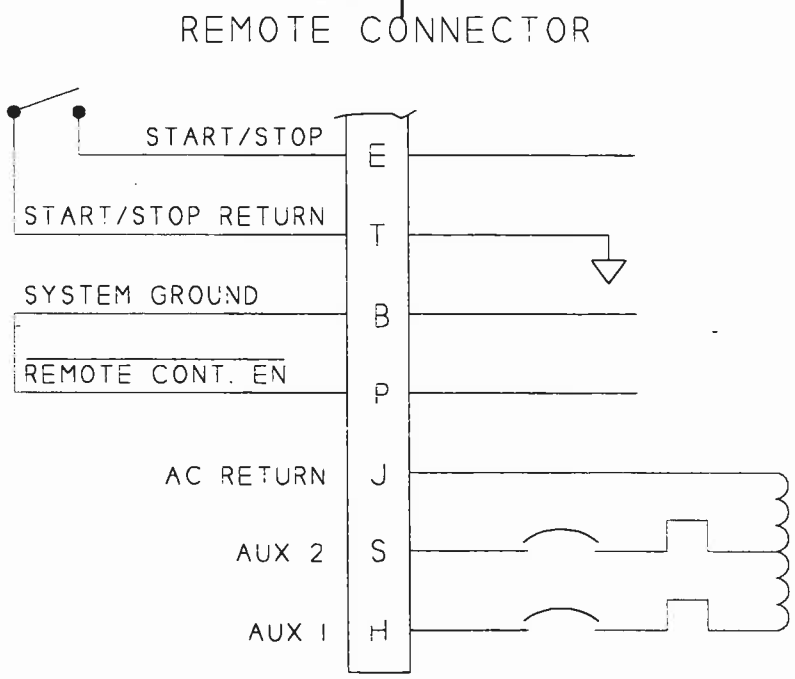


Figure 4 - Wirefeeder Control Cable with Schematic

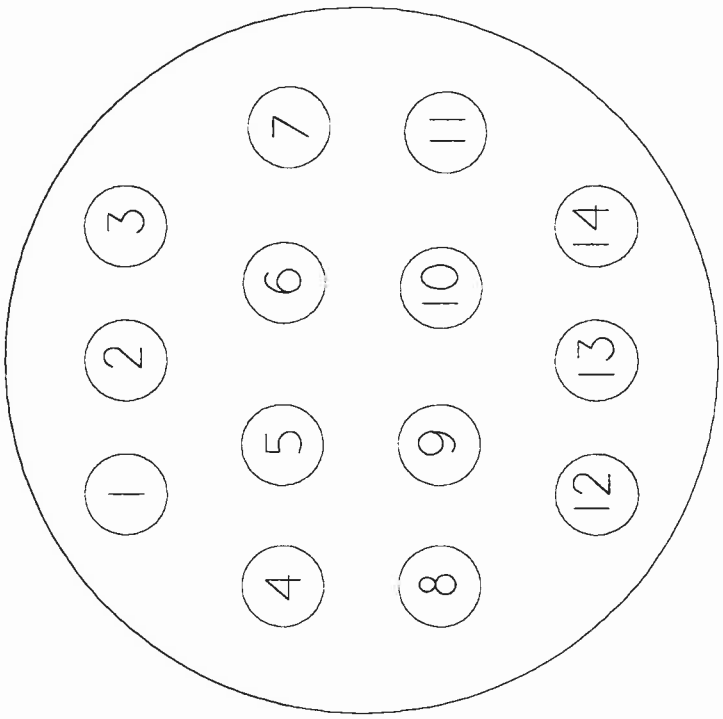
NOTE

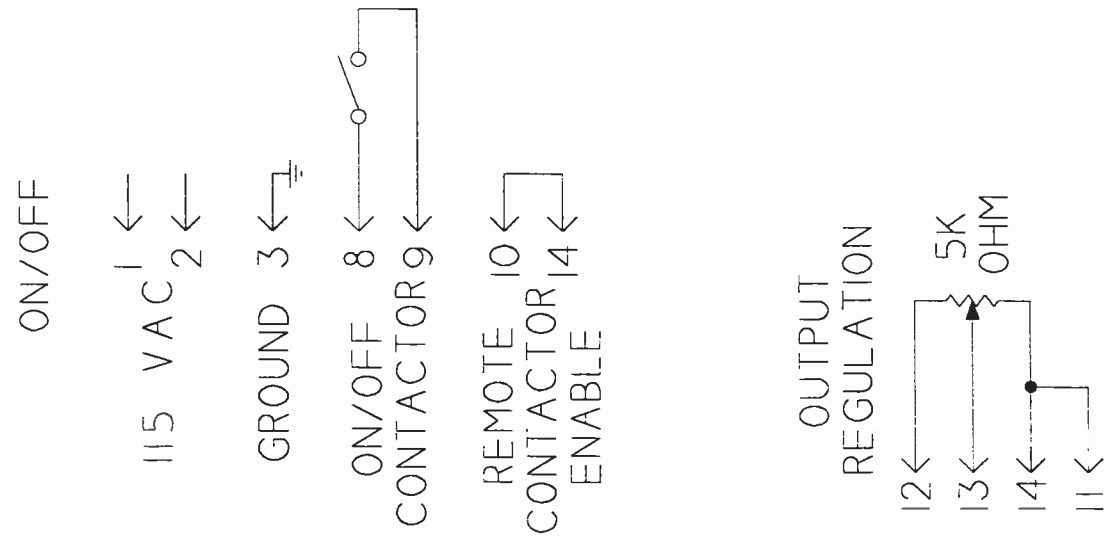
FOR WIREFEEDERS WHICH RETURN A 115VAC SIGNAL TO THE POWER SOURCE FOR CONTACTOR CLOSURE, A SINGLE POLE DOUBLE THROW RELAY MUST BE USED. THE UNIT IS AVAILABLE FROM **PowCon**. Part Number 600103-001

CAUTION

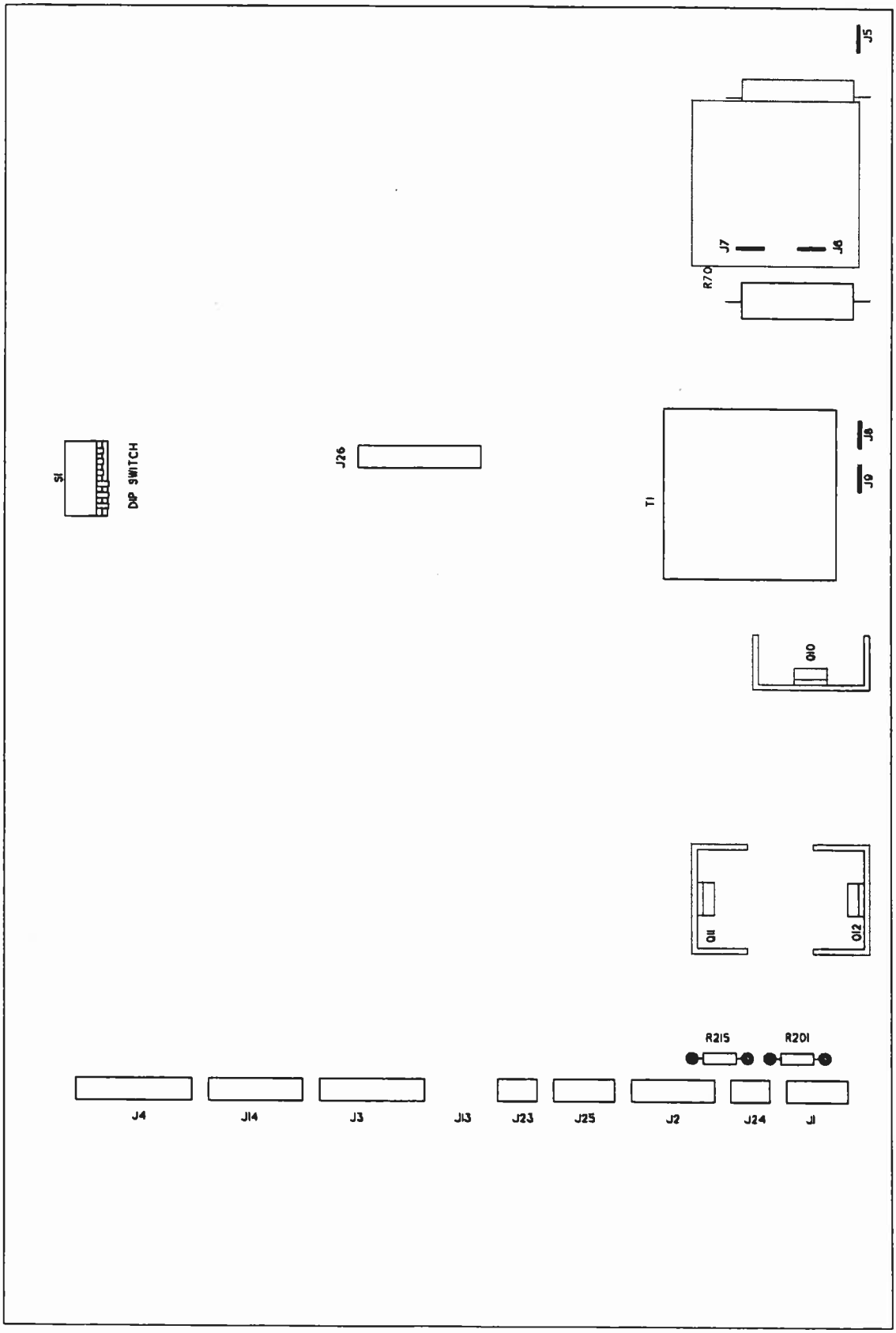
DO NOT ATTEMPT TO OPERATE A WIREFEEDER WITH A 115VAC RETURN WITH THE **PowCon** 630SMP UNLESS THE RELAY OPTION HAS BEEN INSTALLED, OR DAMAGE TO THE UNIT MAY RESULT.

14-PIN PLASTIC PANEL REMOTE PLUG PIN LOCATION FOR 550SMP





4-PIN PLASTIC PANEL REMOTE PLUG PIN LOCATION FOR 550SMF



550/630SMP Printed Circuit Board Layout