



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

# OPERATION MANUAL

**550SMP**  
**230/460V 3PH**

## **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 safety and procedures.**

# TABLE OF CONTENTS

## SAFETY

Definitions .....	1
Safety Information .....	1
Electric Shock .....	1
Personal Protection .....	2
Fire Safety .....	2
Ventilation .....	2
Safety References .....	3
Safety Section in French .....	4 - 7

## GENERAL INFORMATION

Description of Equipment .....	8
Specifications .....	8
Theory of Operation .....	8
Special Safeguards for use with the PowCon 550SMP .....	9

## INSTALLATION

Unpacking New Equipment .....	10
Equipment Installation .....	10
Fuse Size .....	10
Primary Wire Size .....	10
Single Phase Installation .....	11
Three Phase Installation .....	11
Engine Driven Generator Use .....	11
Location of Equipment .....	12
Cooling .....	12
Access .....	12
Lifting .....	12
Security .....	12
Output Connections .....	12
Welding Cable .....	12
Remote Current and Contactor Control Connections .....	12
Wirefeeder Control Cable .....	12
Procedure for Input Voltage Change-Over .....	13
Location 1: Top Enclosure Change-Over Bracket Assembly .....	14
Location 2: Bottom Enclosure Change-Over Bracket Assembly .....	14
Discharge Resistor Assembly .....	17
Construction .....	17

## OPERATION

Function of Operating Controls and Connections .....	18
Sequence of Operation .....	19
General .....	19
SMAW Techniques .....	19
GMAW Spray Techniques .....	22
GMAW Short Arc Techniques .....	22
GMAW Pulsed Spray Techniques .....	25
Theory .....	25
Pulse Width .....	25
Operation and Controls .....	25
Peak and Background Current .....	25
Pulses Per Second .....	26
How To Set Up for Pulsing .....	26
Settings .....	26
Setting for Carbon Steel .....	26
Setting for Stainless Steel E-308 .....	27
Settings for Aluminum A 5356 .....	27
User Adjustable Functions .....	27
The Dual In-Line Package (Dip) Switch .....	27
The Variable Potentiometer (Trimpot) .....	29
Duty Cycle .....	30

## LIST OF TABLES

Specifications of PowCon 550SMP .....	8
Recommended Fuse Sizes Based on National Electrical Code Requirements .....	10
Recommended Primary Cable Size Based on National Electric Code Requirements .....	10
Recommended Copper Welding Cable Sizes Based on 60% Duty Cycle and Combined Length of Electrode Ground Cable .....	12
.035 Solid Steel Electrode Weld Parameters .....	24
.045 Solid Steel Electrode Weld Parameters .....	24
Background Current/Peak Current .....	25
Pulse Width Control .....	25
Summary of Dip Switches .....	30

## MAINTENANCE

Service .....	31
Internal Cleaning .....	31
External Troubleshooting .....	31
General Troubleshooting .....	31
Internal Troubleshooting .....	31

## DRAWINGS & PARTS LISTS

Parts List for PowCon 550SMP 230/460V Final Assembly, Upper Enclosure .....	32
PowCon 230/460V Final Assembly, Upper Enclosure .....	33
Parts List for Front Panel Parts .....	34
Front Panel Parts .....	34

Parts List for PowCon 550SMP 230/460V Final Assembly, Lower Enclosure .....	35
PowCon 550SMP 230/460V Final Assembly, Lower Enclosure .....	36
Parts List for PowCon 550SMP 230/460V Final Assembly, Upper & Lower Enclosure Final Assembly .....	37
PowCon 550SMP 230/460V, Upper & Lower Enclosure Final Assembly .....	37
PowCon 550SMP 230/460V, Schematic .....	38

## LIST OF FIGURES

Electronic Block Diagram of Converter Principles .....	9
Typical GMAW Equipment Schematic .....	11
Wirefeeder Control Cable Schematic .....	13
Location 1, Upper Voltage Change-Over .....	15
Location 2, Lower Voltage Change-Over .....	16
Front and Back Panel Controls and Connection Locations .....	20
Volt/Amp Characteristic Curves, Range 1, SMAW .....	21
Volt/Amp Characteristic Curves, Range 2, SMAW .....	21
Volt/Amp Characteristic Curves, Range 1, GMAW .....	22
Volt/Amp Characteristic Curves, Range 2, GMAW .....	22
Oscillographs of GMAW Short-Arc Transfer .....	23
Pulses Per Second .....	26
Location of Dip Switch .....	30

# SAFETY

## ! IMPORTANT !

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

## DEFINITIONS

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

### NOTE

Operational, procedural, and background information which aids the operator in the use of the machine, helps the service personnel in the performance of maintenance, and prevents damage to the equipment.

### CAUTION

An operational procedure which, if not followed, may cause minor injury to the operator, service personnel and/or bystanders.

### WARNING

An operational procedure which, if not followed, may cause severe injury to the operator, service personnel, or others in the operating area.

### DANGER



An operational procedure which, if not followed, will cause severe injury or even death to the operator, service personnel or bystanders.

## SAFETY INFORMATION

Safety is a combination of good judgement and proper training. Operation and maintenance of any arc welding and cutting equipment involves potential hazards. Individuals who are unfamiliar with cutting and welding equipment, use faulty judgement or lack proper training, may cause injury to themselves and others. Personnel should be alerted to the following potential hazards and the safeguards necessary to avoid possible injury. In addition, before operating this equipment, you should be aware of your employer's safety regulations.

BE SURE TO READ AND FOLLOW ALL AVAILABLE SAFETY REGULATIONS BEFORE USING THIS EQUIPMENT.

## ELECTRIC SHOCK



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

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

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

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

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

E) When not welding/cutting, turn equipment OFF. Accidental grounding can cause overheating and create a fire hazard. Do not coil or loop the cable around parts of the body.

# SAFETY

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

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

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

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

## PERSONAL PROTECTION



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

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

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

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

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

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

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

## FIRE SAFETY



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

A) Move all combustible materials well away from the cutting area or completely cover materials with a non-flammable covering. Combustible materials include but are not limited to wood, clothing, sawdust, gasoline, kerosene, paints, solvents, natural gases, acetylene, propane, and similar combustible articles.

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

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

# SAFETY

## VENTILATION



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

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

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

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

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

E) Beware of gas leaks. Welding or cutting gases containing argon are more dense than air and will replace air when used in confined spaces. Do not locate gas cylinders in confined spaces. When not in use, shut OFF the gas supply at its source.

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

## SAFETY REFERENCES

The following publications provide additional information on important welding safeguards.

A) ANSI/ASC Z49.1-1988, American National Standard "Safety in Welding and Cutting".

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

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

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

E) NEMA Standards Publication/No. EW1-1989, Electric Arc-Welding Apparatus, approved as ANSI C87.1-1989. Available from National Electrical Manufacturers Association, 155 E. 44th Street, New York, NY 10017.



## IMPORTANT!

CE MANUEL A ETE CONCU A L'INTENTION D'OPERATEURS AYANT DE L'EXPERIENCE AVEC DES APPAREILS DE SOUDAGE ET DECOUPAGE. IL DOIT ETRE LU INTEGRALEMENT AVANT L'UTILISATION DE CE MATERIEL. SI VOUS MANQUEZ D'EXPERIENCE ET N'ETES PAS FAMILIARISES AVEC LES METHODES ET LE FONCTIONNEMENT SANS RISQUES DE MATERIEL DE SOUDAGE ET DECOUPAGE, VEUILLEZ CONSULTER VOTRE CONTREMAITRE. N'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.

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

## CHOC ELECTRIQUE



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

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

B) Éviter 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. Évitez 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. Éviter 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 crêpe 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 chaud.

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 maintenance.

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 remplacent celui-ci dans des espaces fermés. Ne placez pas de cylindres de gaz dans des espaces fermés. **FERMEZ** le gaz à la source lorsqu'il n'est pas utilisé.

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

## REFERENCES DE SECURITE

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

A) ANSI/ASC Z49.1-1968, 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 550SMP is that both welding processes can be accomplished using one power source. By means of electronic control, the PowCon 550SMP adjusts the output for a given welding process.

The PowCon 550SMP 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 550SMP portable welding power source comes with a 12 foot (3.7M) primary cable.

## SPECIFICATIONS

PowCon 550SMP 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) 115 VAC 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) Caster Kit
- D) Lifting Eye Bolt Kit
- E) Relay Kit 115 VAC Return Contactor
- F) 115 VAC fused duplex rated @ 10 Amp

TABLE 1  
SPECIFICATIONS OF PowCon 550SMP

Model 550SMP	Rated Welding Current Amperes	Welding Amp Range	Open Circuit Voltage	Amperes Input at Rated Load Output 50 / 60 Hz				KVA	KW	EFF.	Dimensions	Weight	
				230	380	480	575					Net	Ship
3 Phase	100% Duty Cycle 450 amps @ 38V	30 - 450	80 max	69	41.7	34.5	27.6	27.5	23.3	73%	Height: 24" 61 cm	189 lb	213 lb
	60% Duty Cycle 550 amps @ 42V	100 - 630		91	55	45.5	36.4	36.3	30.8	75%	Width: 18" 46 cm		
1 Phase	60% Duty Cycle 375 amps @ 35V	30 - 375		41	—	—	—	—	—	—	—	Depth: 34" 86 cm	71.6 Kg

## THEORY OF OPERATION

The PowCon 550SMP 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 550SMP, 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 550SMP main transformer weighs 30 pounds, versus approximately 350 pounds used in the conventional transformer rectifier. The transformer takes the

# GENERAL INFORMATION

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.

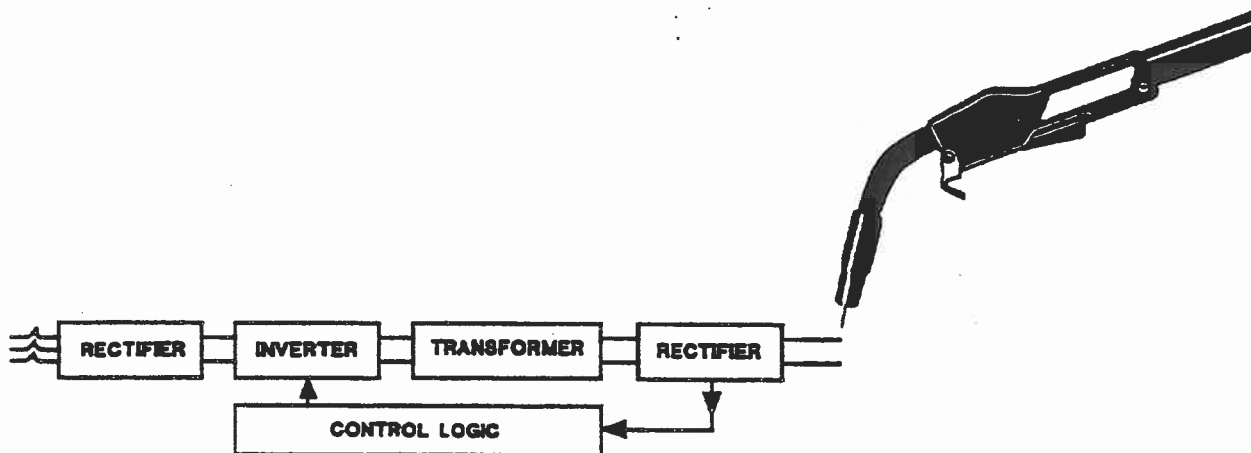


Figure 1, Electronic Block Diagram of Converter Principle

## SPECIAL SAFEGUARDS FOR USE WITH THE PowCon 550SMP

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

- A) Install the PowCon 550SMP welding power source in accordance with OSHA and National Electrical Code Standards, or other applicable standards.
- B) Locate the unit so that air flow into the front and out of the back is not obstructed.
- C) Provide access to all controls on both the front and back panel for operator manipulation.
- D) Never drag, pull or lift the unit by either the primary or secondary electrical cable.
- E) Never place the unit in a location where the unit's weight cannot be supported, especially when the unit is above ground level.
- F) Do not allow the unit, or its input and output cables, to impede or block foot traffic.
- G) Move and lift the unit in accordance with OSHA job site standards.
- H) Servicing of the unit should be done only by personnel factory trained by PowCon.
- I) When servicing the unit, the first operation, once the case is removed from the source of primary input and opened, is to discharge the input and output capacitors.
- J) Periodically blow or vacuum out dirt build-up in the unit.
- K) Do not operate unit if the circuit breaker must be forced or repeatedly held in the ON position.
- L) Never lift or move the unit when the circuit breaker is ON.
- M) Follow the recommendations for fuse and cable sizing when connecting the unit.
- N) Always turn the unit OFF when it is not in use.
- O) Primary quick disconnects, etc., must be suitably rated for current demand at primary voltage.
- P) Read entire manual prior to performing operations using the power source.

# INSTALLATION

## UNPACKING NEW EQUIPMENT

Remove the PowCon 550SMP 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 550SMP unit.

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

## EQUIPMENT INSTALLATION

The PowCon 550SMP is manufactured for use on 230 or 480 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 550SMP 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 550SMP 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.

These 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.

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.

It is not necessary to check the phasing of the power lines, except for the green ground lead, as indicated above. The PowCon 550SMP will work properly on any phase sequence.



## DANGER

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

## FUSE SIZE

The PowCon 550SMP is equipped with a 12 foot (3.7M) power cord attached. The power cord size is 6 AWG for 230 volt and 460 volt operation. For proper fuse size see Table 2.

## TABLE 2

RECOMMENDED FUSE SIZES BASED ON NATIONAL ELECTRICAL CODE REQUIREMENTS

Input Voltage	Maximum Amperage	Recommended Fuse Capacity	Recommended Plug Capacity
230V, 3PH	91A	100A	75A
460V, 3PH	46A	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 BASED ON NATIONAL ELECTRIC CODE REQUIREMENTS

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



## 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.**

# INSTALLATION

## SINGLE PHASE INSTALLATION

Perform the following steps on the factory equipped primary:

- A) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure). Units come from the factory wired for 460VAC.
- B) Connect green wire to ground.
- C) Connect both white and black wires to "HOT" legs.
- D) 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:

- A) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure). Units come from the factory wired for 460VAC.
- B) Connect green wire to ground.
- C) Connect white, black and red wires to "HOT" legs.

## ENGINE DRIVEN GENERATOR USE

Failure to take special precautions with the PowCon 550SMP welding power sources and engine driven generators will result in damage to equipment. The following special startup procedure **MUST** be followed to prevent damage to both the unit and the generator.

## CAUTION

**NEVER START UP THE GENERATOR WITH THE CIRCUIT BREAKER ON THE PowCon 550SMP UNIT IN THE UP/ON POSITION. THE PowCon 550SMP 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:

- A) Check if unit is internally wired for required primary voltage (see Voltage Change-Over Procedure).
- B) Connect green wire to ground.
- C) Follow either single phase or three phase installation as required.

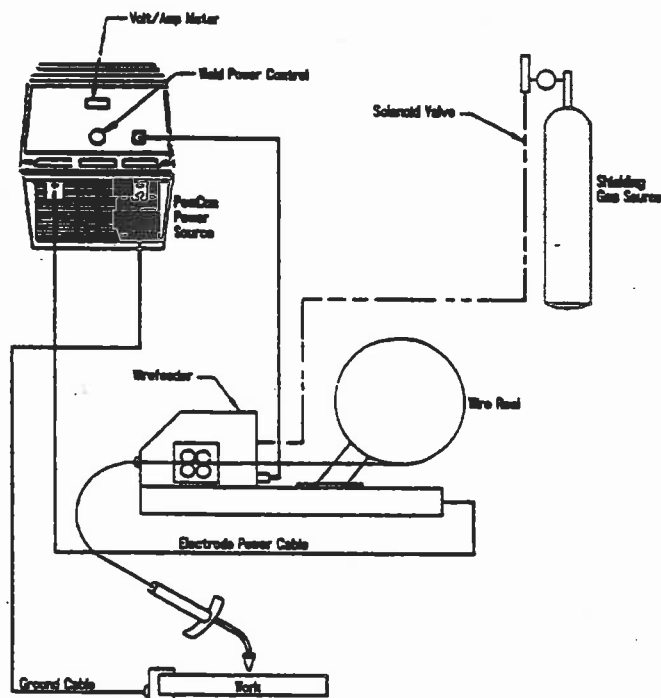


Figure 2, Typical GMAW Equipment Schematic



# INSTALLATION

## LOCATION OF EQUIPMENT

NEMA Standard EW1-2.02 approved as ANSI C87.1-1976 outlines both usual and unusual service conditions for a welding power source. The PowCon 550SMP 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 550SMP 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 550SMP 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 550SMP 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 550SMP. The unit is designed to be lifted using a suitably rated and inspected choker (made of rope or nylon) run through both handles. Refer to the applicable OSHA standards or contact Powcon for any questions regarding the lifting of this unit.

## SECURITY

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

## WARNING

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



## DANGER

**DO NOT DRAG OR LIFT THE UNIT BY 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 550SMP 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 CURRENT AND CONTACTOR CONTROL CONNECTIONS

Both the remote control devices (hand and foot) come with a 14-pin connector plug which connects to the remote terminal on the front panel of the PowCon 550SMP unit. The remote control devices come with a pre-wired plug and 12 1/2 feet (3.8 M) of control cable. When a remote control device is plugged into the front panel receptacle, certain front panel controls are overridden by the remote device.

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

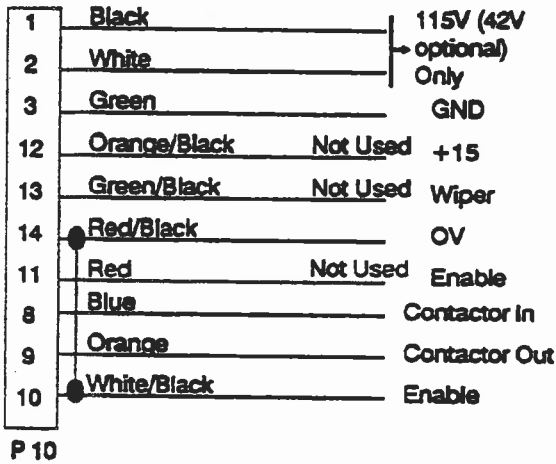
### WIREFEEDER CONTROL CABLE

The control cable for the wirefeeder and PowCon 550SMP interface comes with a 14 pin connector designed to mate with the remote receptacle on the front panel. The wiring schematic for the control cable is shown in Figure 3.

# INSTALLATION

## NOTE

UNLESS OTHERWISE SPECIFIED, THE PowCon 550SMP IS SHIPPED FROM THE FACTORY WITH ON/OFF CONTROL RESPONSIVE TO CONTACT CLOSURE ONLY.



**Figure 3, Wirefeeder Control Cable Schematic**

The wirefeeder control cable can be adapted for use with the PowCon 550SMP or any other manufacturer's wirefeeder. The specific pin numbers and individual wire colors are shown in Figure 3. A breakdown of the control cable is as follows:

### Pins 1, 2, 3

The auxiliary power for the wirefeeder is provided via these connections.

## NOTE

THE GREEN WIRE ON PIN #3 IS THE GROUND.

### Pins 8, 9

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

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

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

### Pins 10,14

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

## NOTE

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

## CAUTION

DO NOT ATTEMPT TO OPERATE A WIREFEEDER WITH A 115VAC RETURN WITH THE PowCon 550SMP 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.



## DANGER

IN ORDER TO AVOID AN ELECTRICAL SHOCK, 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.

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

# INSTALLATION

## WARNING

THE CAPACITORS IN THE PowCon 550SMP 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 REMOVED, THE CAPACITORS MUST BE DISCHARGED BY THE USE OF A BLEEDER RESISTOR ASSEMBLY, DESCRIBED IN THE FOLLOWING SECTION.

C) 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).

# INSTALLATION

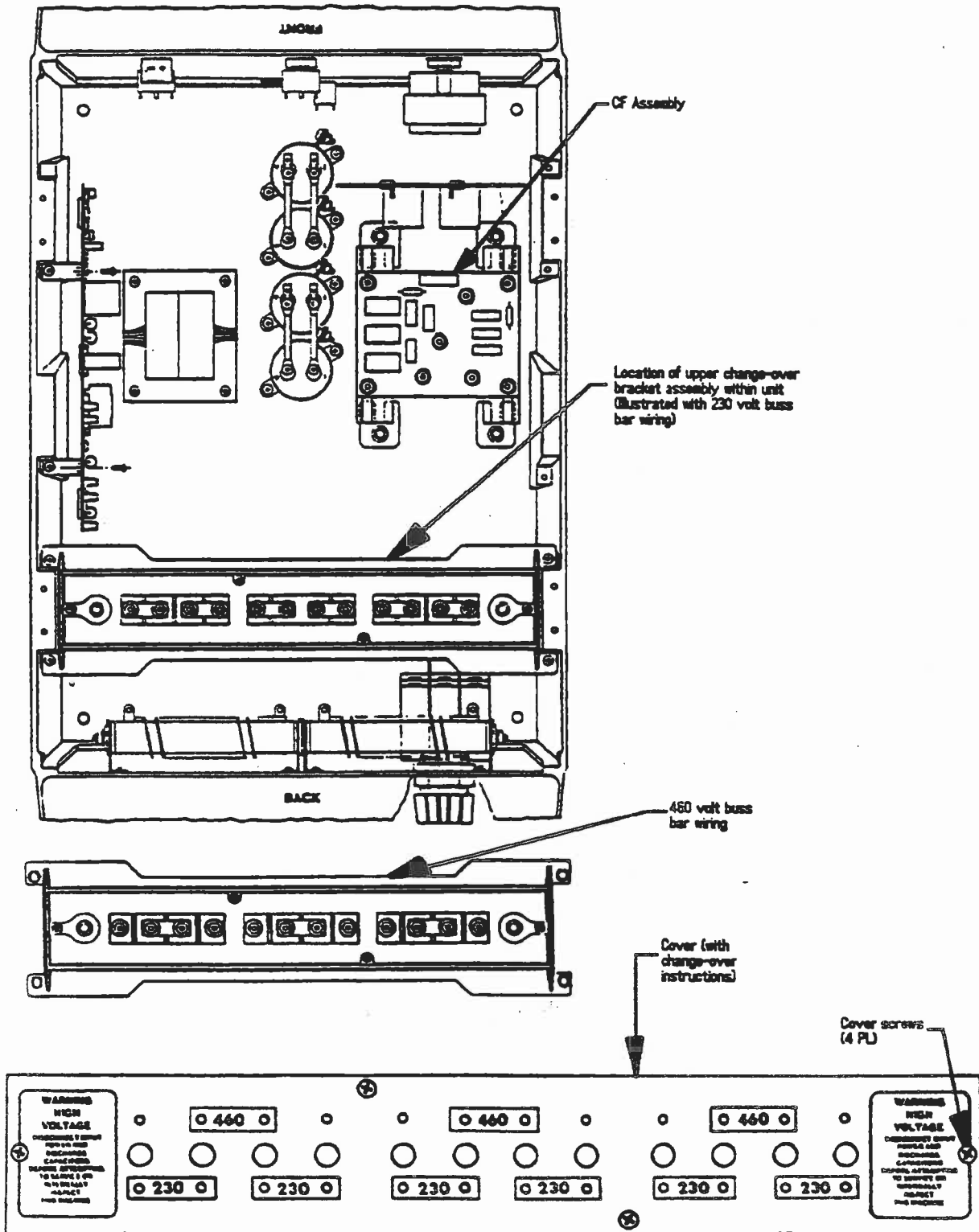


Figure 4, Location 1, Upper Voltage Change-Over

# INSTALLATION

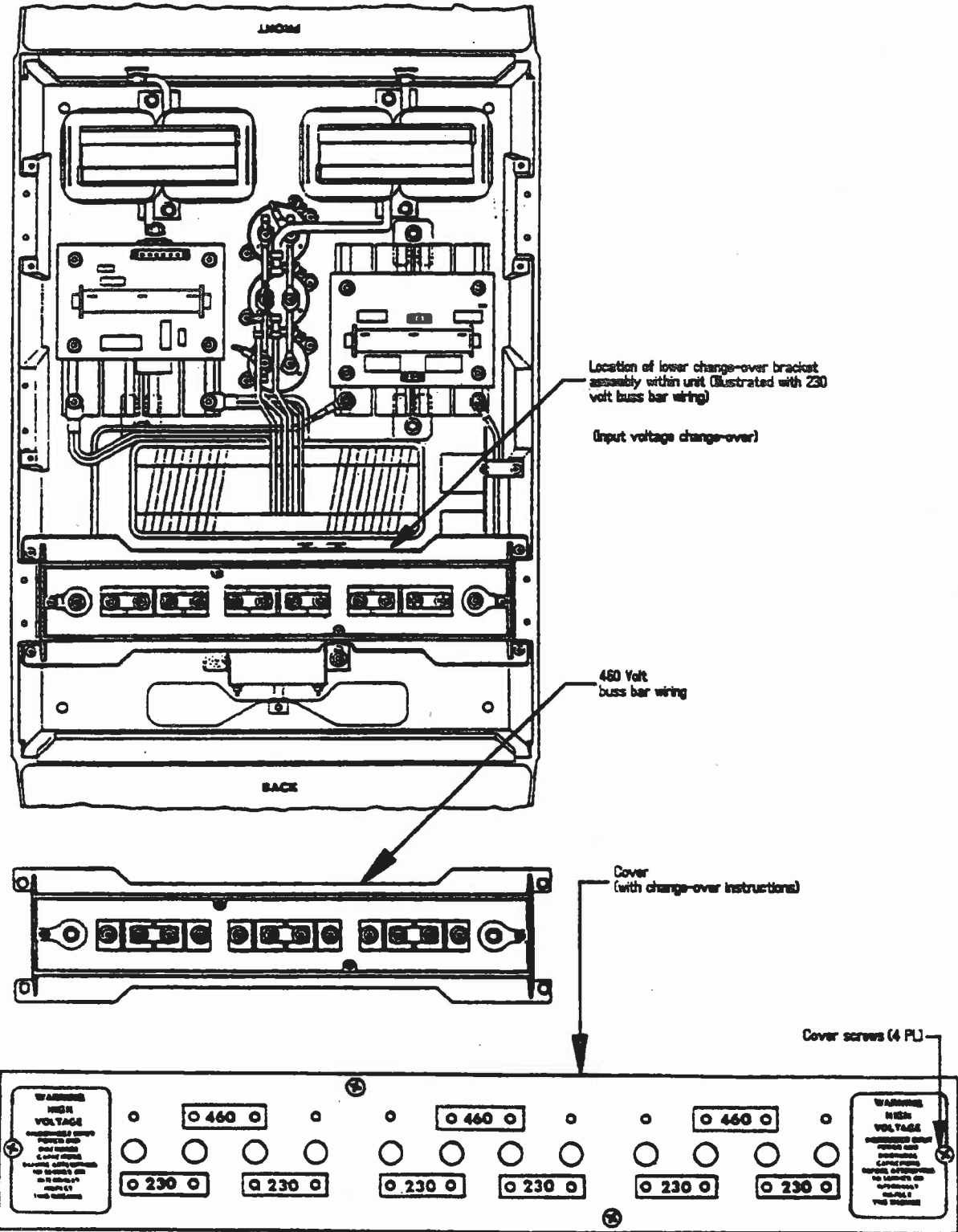


Figure 5, Location 2, Lower Voltage Change-Over

# INSTALLATION

## DISCHARGE RESISTOR ASSEMBLY CONSTRUCTION

This assembly must consist of the following components to be considered acceptable for capacitor discharge:

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.

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

### USE

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

### NOTE

READ ENTIRE PROCEDURE PRIOR TO PERFORMING VOLTAGE DISCHARGE 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 DESCRIBED ABOVE.

# OPERATION

## 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

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

Adjusts the output of the unit. Its Width Control 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.

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

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

### 8) Primary Cable

Unit comes from factory with 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.

# OPERATION

## SEQUENCE OF OPERATION

### GENERAL

The PowCon 550SMP 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.

Open Circuit Voltage Range *			
Range	Mode		
	SMAW	GMAW/SPRAY	GMAW/SPRAY
RI	73-74	62-63	62-63
RII	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 Range 1 or 2 can be used dependent upon the desired output. The Volt Ampere Characteristic Curves for the PowCon 550SMP in the SMAW mode are shown in Figures 7 and 8. Some typical electrodes and recommended machine settings are shown in the next table.

Recommended Power & Range Settings for SMAW DCRP with PowCon 550SMP *			
Electrode Diameter	Electrode Type		
	E7018		E308-16
3/32" (2.36mm)	R1, 12%		R1, 10%
1/8" (3.18mm)	R1, 15% R2, 7%		R1, 13%
5/32" (3.96mm)	R1, 22% R2, 10%		R1, 18%

\*These suggested power and range settings represent the manufacturer's best estimate and are intended as guidelines for the user of the PowCon 550SMP.

The PowCon 550SMP has a special compensation circuit for welding E6010-SP 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.



# OPERATION

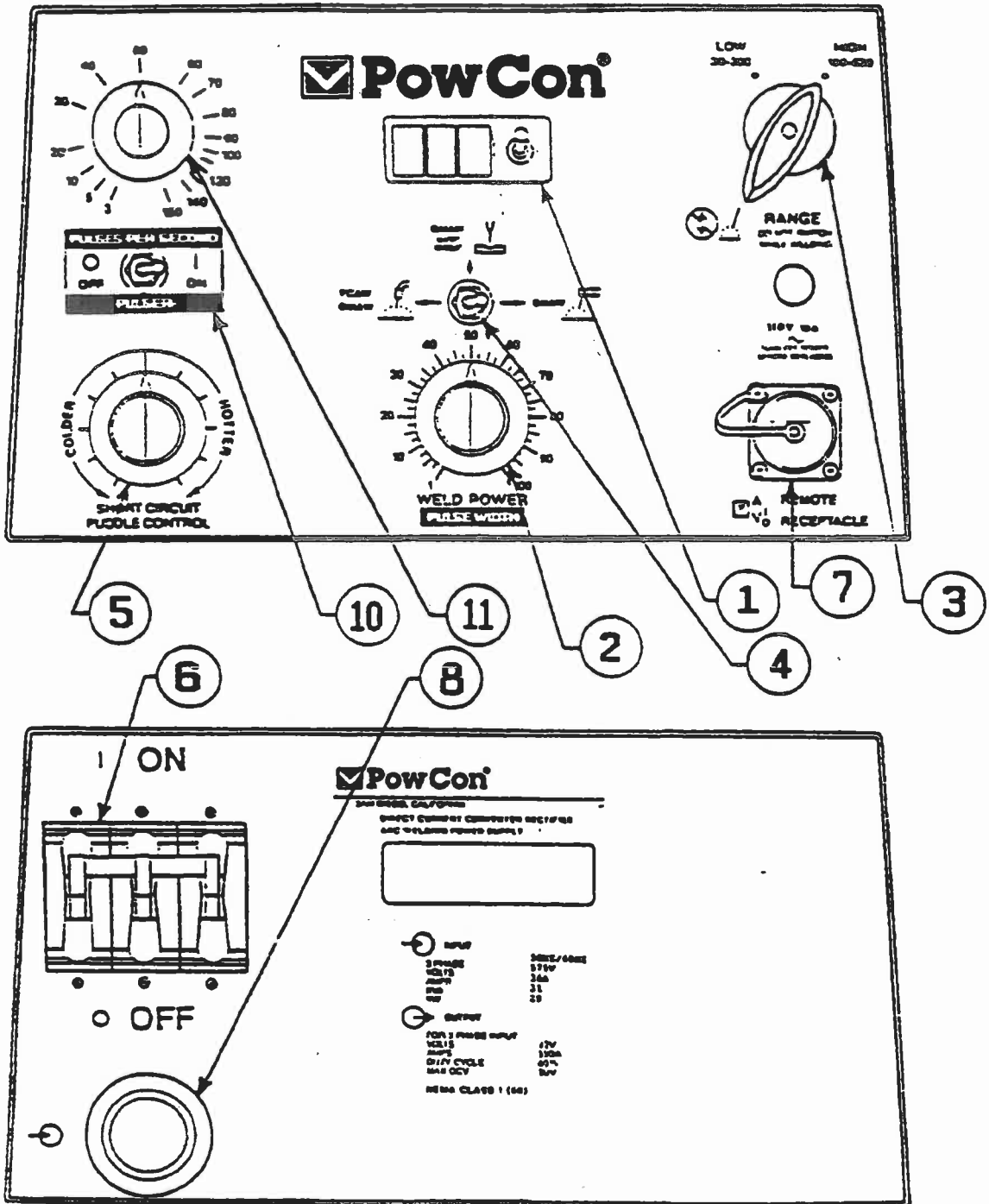


Figure 6, Front and Back Panel Controls and Connection Locations

# OPERATION

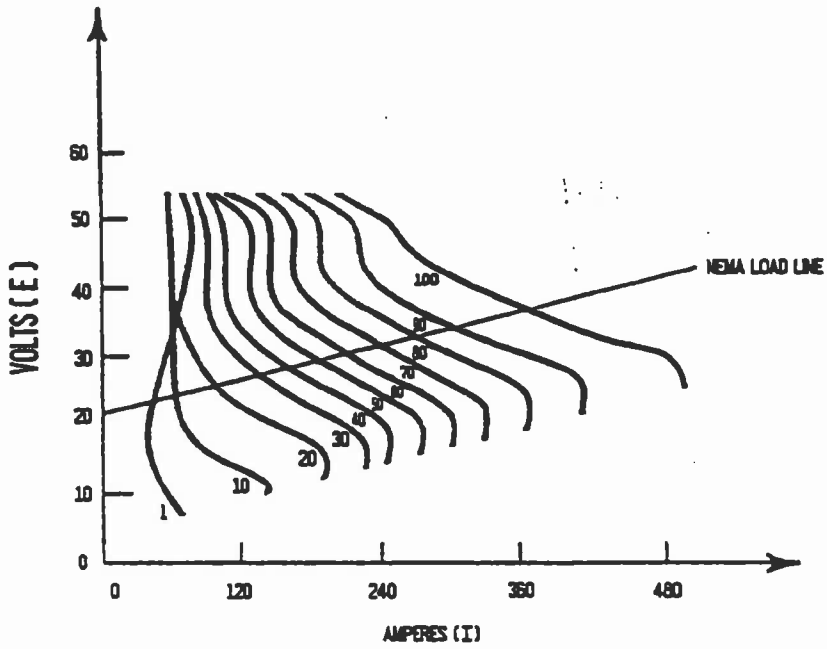


Figure 7, Volt/Amp Characteristic Curves, Range 1, SMAW

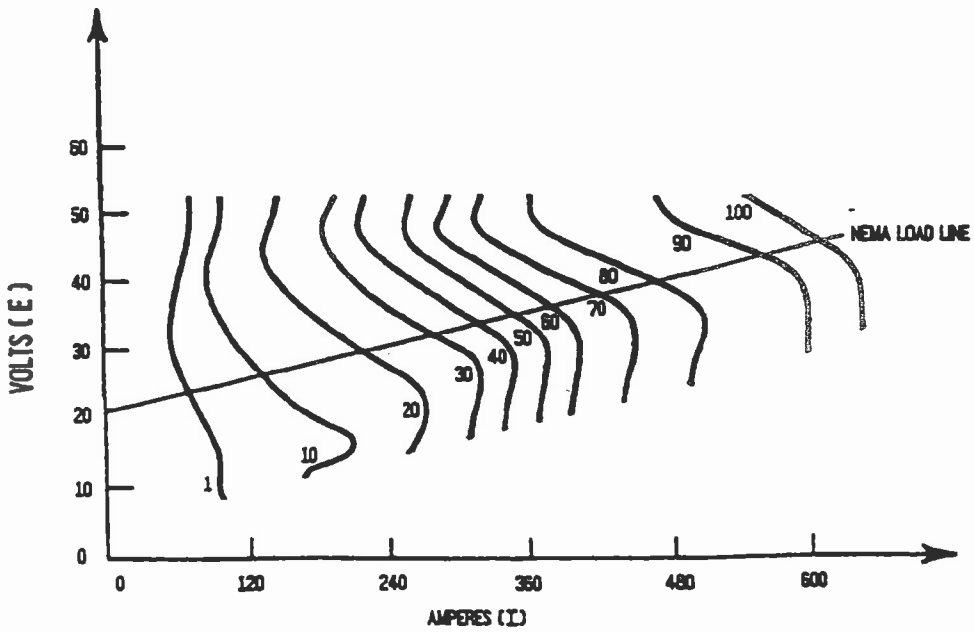


Figure 8, Volt/Amp Characteristic Curves, Range 2, SMAW

# OPERATION

## GMAW SPRAY TECHNIQUES

High current densities used for GMAW spray transfer and FCAW usually requires use of Range 2. 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 5. For Volt/Ampere Characteristic Curves for the PowCon 550SMP in the regular GMAW Spray mode, see Figures 9 and 10.

**TABLE 5**

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

Wire Diameter (Inches)	Range 2 Power Setting	Current (A)	Wirefeed Speed (FPM)	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 550SMP.

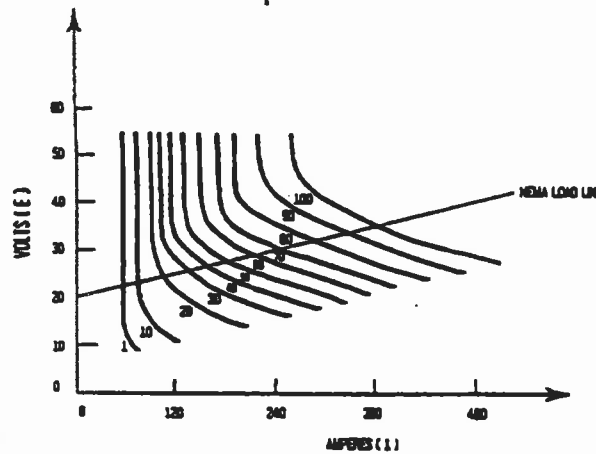
The PowCon 550SMP has a special compensation circuit for controlling deposition rates and spatter in the spray process. This circuit is activated by using the Dip switch located on the Control PWB inside the unit.

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

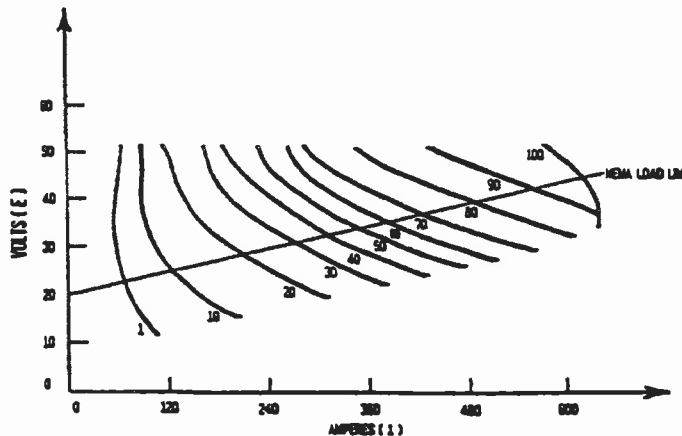
## GMAW SHORT ARC TECHNIQUES

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 550SMP 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, 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.



**Figure 9, Volt/Amp Characteristic Curves, Range 1, GMAW**



**Figure 10, Volt/Amp Characteristic Curves, Range 2, GMAW**

# OPERATION

Another control feature incorporated into the PowCon 550SMP 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 6 and 7.

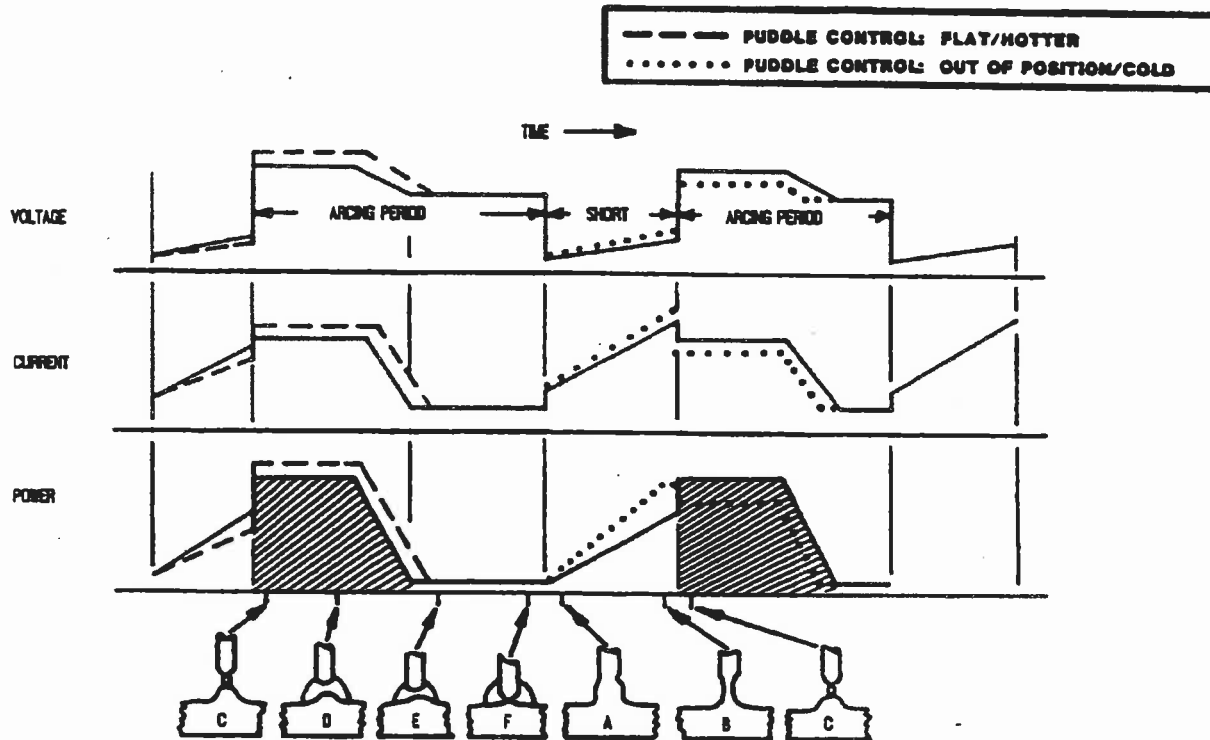


Figure 11, Oscillographs of GMAW Short-Arc Transfer

# OPERATION

Amps	80		100		130		150	
Gas	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>
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	I	I	I	I	I	I	II	II

**Table 6,  
.035 Solid Steel Electrode Weld Parameters**

Amps	120		150		180		200	
Gas	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>	ArCO <sub>2</sub>	CO <sub>2</sub>
Volts	20	24	21	24	22	24	24	28
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	I	I	I	I	II	II	II	II

**Table 7,  
.045 Solid Steel Electrode Weld Parameters**

# OPERATION

## 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 Range I, Background Current is 30 amps and Peak Current is 400 amps. In Range II, Background Current is 70 amps and Peak Current is 650 amps as shown in Figure 12.

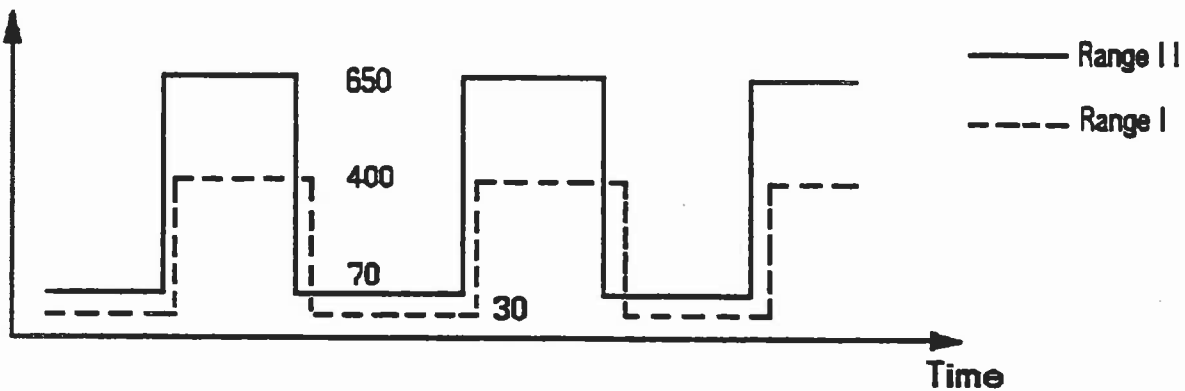


Figure 12, Background Current/Peak Current

### 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.

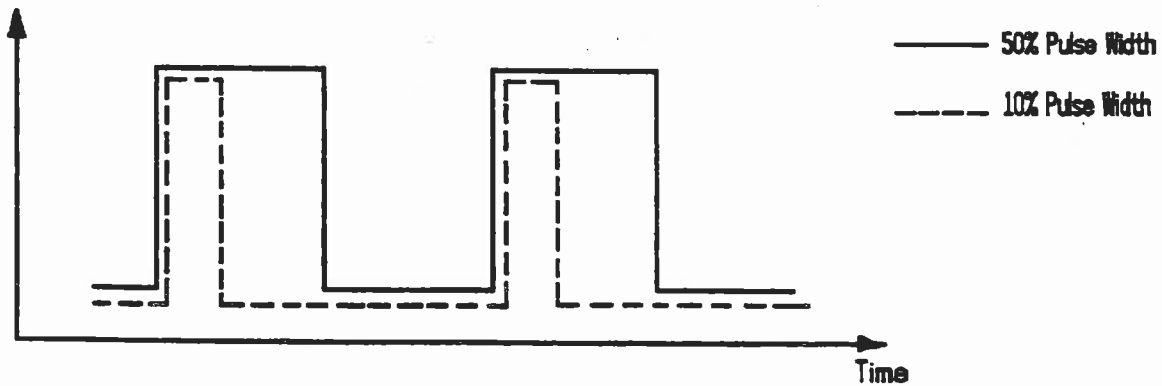


Figure 13, Pulse Width Control

# OPERATION

## 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.

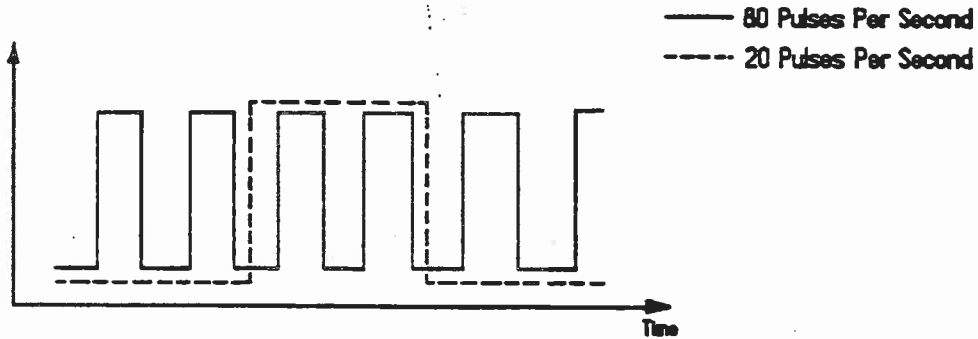


Figure 14, Pulses Per Second

## HOW TO SET UP FOR PULSING

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

B) Set Pulsar 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% Oxygen

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

0.35" 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	I	I	I	I

0.45" Diameter				
Weld Current (A)	95	115	130	150
Wire Feed Speed (IPM)	100	125	155	200
% Pulse Width	20	25	12	20
Pulses Per Second	50	50	50	50
NOTE: Use Range	I	I	II	II

# OPERATION

## SETTINGS FOR STAINLESS STEEL E-308

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

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

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

3/32" Diameter				
Weld Current (A)	60	65	70	84
Wire Feed Speed (IPM)	120	150	170	190
% Pulse Width	70	25	30	40
Pulses Per Second	50	50	50	50
NOTE: Use Range	I	I	I	I

## SETTINGS FOR ALUMINUM A 5356

Material: ..... Aluminum A 5356

Shielding Gas: ..... 100% Argon

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

3/64" Diameter				
Weld Current (A)	70	80	95	110
Wire Feed Speed (IPM)	150	180	195	220
% Pulse Width	25	30	40	50
Pulses Per Second	50	50	50	50
NOTE: Use Range	I	I	I	I

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	I	I	II	II

## USER ADJUSTABLE FUNCTIONS

The PowCon 550 SMP 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 550 SMP which are not available on the model 300SM 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 greater power 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 enough output power, enabling the GMAW spray mode compensation may give you the extra boost 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 550 SMP 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 550 SMP: static compensation and dynamic compensation. These two circuits work together to help control arc outages. Since the 550 SMP 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 550 SMP, 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.

Two styles of switches are used in the 550 SMP. One is called a "piano" switch, because the switch elements are mounted in an enclosure that makes them somewhat resemble the keys on a piano, and the other is a rectangular style. These two styles are shown in figures 10 a) and b) respectively. Check your 550 to see which style you have.

The switches are adjusted by moving the switch elements (numbered 1-6) into the ON or open position. This is most easily accomplished through the judicious use of a small straight slot screwdriver. A flashlight may be used to illuminate the switch for better visibility.

The piano switch has clearly marked position numbers for the switch elements, and a clearly marked open position. These same positions on the rectangular style switch, however, are more difficult to determine. If you have trouble determining



# OPERATION

which positions are which, use the next paragraph and figure 14 as a guide.

When adjusting the switch, the ON or open position is the position closest to the top of the case, as shown in figure 10. Position number one is always closest to the REAR of the unit. Again, please refer to the figure for clarification. Once you have located the appropriate switch position, GENTLY move the switch element to either the ON (open) or OFF (closed) position, as required. Make sure that each element is completely in the ON or open position (fully pushed to the other side of the switch body) before closing and buttoning up the 550 case.

The following switch elements on the DIP switch control the following functions. A brief explanation of the function of each switch element is then given.

## Position 1: GMAW Spray Mode Compensation

As mentioned earlier, this switch may be used to obtain a higher output power 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 turning DIP switch position number one OFF, you will enable the spray mode compensation and will "perk up" your sluggish weld. Your Weld Power knob will still be set at 90%, but you will have more power available at the output.

Please do not be confused about the operation of this switch, because it seems backwards. When you turn the switch position OFF, the compensation goes ON (is enabled). This is the only DIP switch position which operates in a "backwards" fashion.

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 with thin sections of material, the factory supplied hot start may be excessive for your application. Or, conversely, when welding with 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, the value of the hot start is proportional to the value of the output current. So, 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, 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, the unit will have hot start capability. This hot start capability can be either fixed or variable, as discussed when talking about position number 2.

On the other hand, when this position is OFF, 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 550 SMP. 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 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, it should be used judiciously by other parties. Experimentation in your own workplace will yield the best combination for you.

# OPERATION

## 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, 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 reignite 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. Reserved for Future Use

This switch element is not tied to anything on the control PCB, but is simply there for future use. It is equivalent to having a single-pole, single throw (SPST) switch for another function. Consult the Technical Service department should you wish to use this switch element for a proposed modification.

## 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 THEREFORE BE TURNED ON OR OFF TOGETHER.**

## NOTE

**THE 6010 5P COMPENSATION SWITCHES, WHEN IN THE ON POSITION, 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 550 SMP is configured in the factory, the switches are in the following positions:

- Position 1: . ON . . GMAW spray mode compensation OFF (Remember, this is the "backwards" switch position)
- Position 2: . ON . . Variable hot start ON
- Position 3: . ON . . Hot start master control ON
- Position 4: . OFF . . 5P static compensation OFF
- Position 5: . OFF . . 5P dynamic compensation OFF
- Position 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 550 SMP 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 10 for its exact location.

Moving 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. On the other hand, 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. Figure 10 shows this difference in a graphical manner.

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 flathead 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.

# OPERATION

**Table 8, Summary of DIP Switches**

PROBLEM	SOLUTION	ACTIVE PROCESS(S)
Sluggish GMAW spray at high currents	Position #1 OFF	GMAW/FCAW
Too much hot start at low currents	Position #2 OFF	GMAW/FCAW, SMAW
Not enough hot start at low currents	Position #2 OFF	GMAW/FCAW, SMAW
no hot start desired for any process <sup>3</sup>	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 <sup>4</sup>	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 be operative 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.

## DUTY CYCLE

The duty cycle of a welding power source is a measure of the capacity of the unit. In the United States the PowCon 550SMP has a duty cycle based on a 10 minute time period. In other

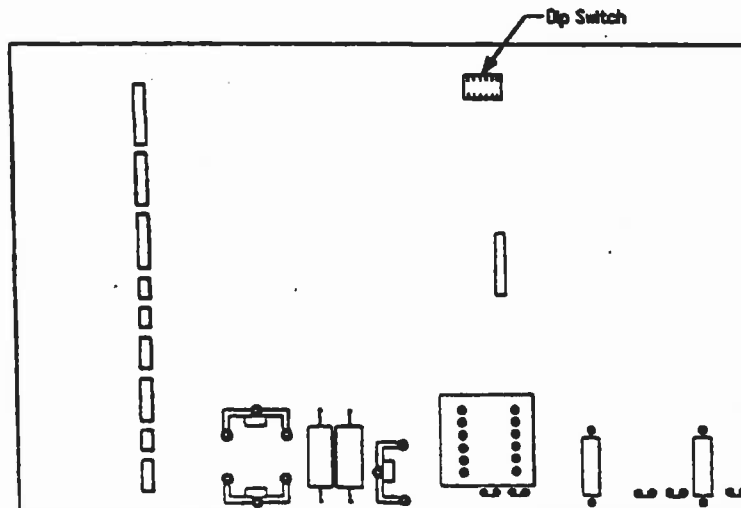
countries including Europe the duty cycle is based on a 5 minute time period. The duty cycle is the percent of that time period the unit can produce the specified output.

The PowCon 550SMP can operate for 6 minutes out of a 10 minute period at an output of 550 amperes and 42 volts. To assure the safe operation of the unit the remaining 4 minutes must be spent idling to permit proper cooling. The duty cycle at this output is 60%.

Lowering the output current allows increases in the duty cycle. Thus the 100% duty cycle (weld output continuous) is 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.**



**Figure 15,  
Location of  
Dip Switch**

# 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 550SMP 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 550SMP 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.

## GENERAL TROUBLESHOOTING

TRUBLE	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 550SMP and wirefeeder.
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 POWR IS DISCONNECTED. TO DISCHARGE THESE CAPACITORS, USE THE BLEEDER TYPE RESISTOR ASSEMBLY OUTLINED FOR INPUT VOLTAGE CHANGE-OVER.

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.

## 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.

# DRAWINGS & PARTS LISTS

**Table 9, Parts List for PowCon 550SMP 230/460V Final Assembly, Upper Enclosure**

Item	Qty	Part Number	Description
1	1	104052-001	Enclosure, Machined Upper Assembly
2	2	104137-001	Bezel, Case, 550A
3	1	104055-001	Overlay, Front Panel, 550A
4	1	104057-001	Overlay, Rear Panel, 550A
5	1	104077-002	Cover, Upper Change-Over
6	1	104080-001	Cap PWB Mounting Bracket
7	2	104041-001	Surge Resistor
8	6	100151-004	Bus Bar, Voltage Change-Over
9	1	104070-001	Upper Change-Over Assembly
10	1	104045-001	Control PWB
11	1	104023-001	AUX Transformer Assembly, 230/460/110 <i>104511-001</i>
12	1	<del>923002-001</del>	Circuit Breaker 100 Amp <i>104187-001</i>
13	1	940006-001	Clamp, Strain Relief
14	2	104095-001	Bleeder Resistor Assembly
15	4	900000-001	Input Capacitor
16	4	104067-001	Bus Bar Capacitor
17	1	104085-001	Capacitor PWB, Upper
18	4	989010-001	Clamp, Capacitor
19	4	970006-608	Screw, Hex 1/4-20 X 5/8
20	4	104021-001	Clamp Heatsink Hold Down
21	1	104091-001	CF PWB
22	1	104019-001	Input Diode Heatsink Assembly, Positive
23	1	104019-002	Input Diode Heatsink Assembly, Negative
24	6	970000-304	Screw, Pan Head 6-32 X 3/8
25	4	970002-506	Screw, Pan Head 10-32 X 1/2
26	4	970000-304	Screw, Pan Head 6-32 X 3/8
27	3	902011-007	Varistor
28	1	104081-001	1 KVA AUX Transformer (Optional)

# DRAWINGS & PARTS LISTS

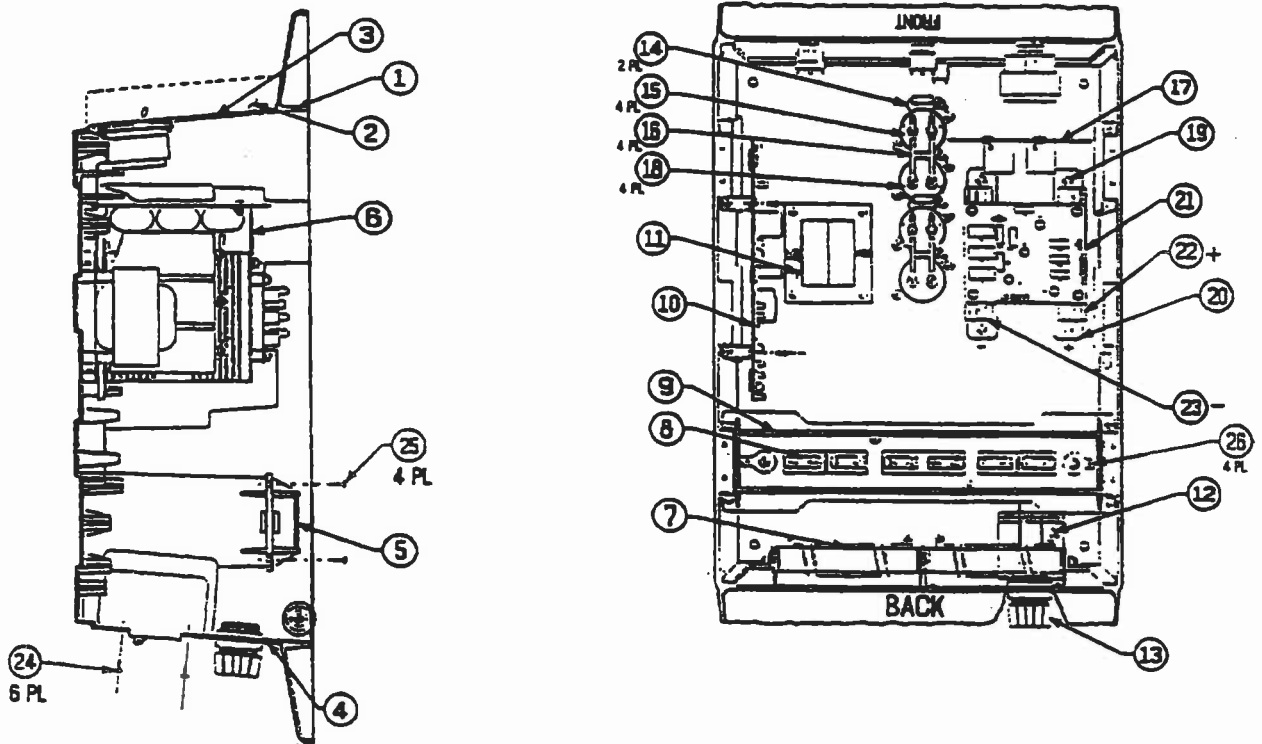


Figure 16, PowCon 230/460V Final Assembly, Upper Enclosure

# DRAWINGS & PARTS LISTS

Table 10, Parts List for Front Panel Parts

Item	Qty	Part Number	Description
1	1	940000-002	Knob, Small
2	1	903000-004	Potentiometer 500K
3	1	920004-002	Switch, Toggle (DPST)
4	1	920001-020	Sleeve, Switch
5	1	940000-001	Knob, Large
6	1	903000-002	Potentiometer 5K
7	1	920004-003	Switch, Toggle (DPDT 3 Position)
8	1	920001-020	Sleeve, Switch
9	1	940000-001	Knob, Large
10	1	903000-002	Potentiometer 5K
11	1	600020-002	Digital V/A Meter
12	1	920003-001	Switch, Range
13	1	940000-002	Knob
14	1	921004-003	Fuse
15	1	921005-001	Fuse Holder
16	1	930000-001	Connector
17	1	930000-002	Sealing Cap
18	1	104055-001	Front Panel Overlay

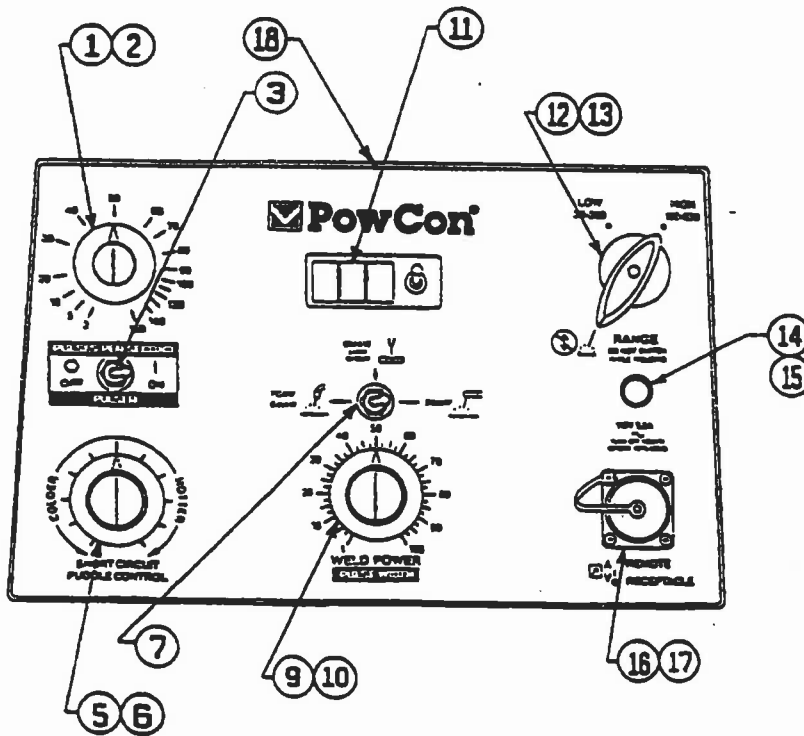


Figure 17, Front Panel Parts

# DRAWINGS & PARTS LISTS

**Table 11, Parts List for PowCon 550SMP 230/460V Final Assembly, Lower Enclosure**

Item	Qty	Part Number	Description
1	1	104051-001	Case, Lower Enclosure
2	2	104135-001	Grille
3	2	104039-001	Output Stud 1/2-13
4	1	104028-001	Bracket, Transfer Holddown
5	2	970006-628	Screw, Flanged Head, 1/4-20 X 3 1/2
6	1	104020-001	Main Transformer
7	1	905000-001	Shunt
8	1	970009-806	Screw, Brass, 3/8-16 X 1/2
9	1	104077-001	Cover, Lower Change-Over
10	1	104075-001	Commutating Inductor
11	1	104076-001	Commutating Inductor
12	1	104042-001	Fan Motor
13	4	970006-606	Screw, Flanged Head, 1/4-20 X 1/2
14	1	104030-001	Inductor, Main
15	1	104031-001	Inductor, Output
16	4	970006-606	Screw, Flanged Head, 1/4-20 X 1/2
17	1	104021-001	Heatsink Holddown Clamp
18	4	970006-608	Screw, Flanged Head, 1/4-20 X 5/8
19	3	900001-001	Capacitor Output
20	4	104067-001	Bus Bar, Cap
21	1	104060-001	PWB, WR Snubber
22	1	104066-001	PWB, SCR Snubber
23	8	970006-614	Screw, Hex Head, 1/4-20 X 1
24	12	972001-006	Nut, Flanged Hex Locking 1/4-20
25	4	104068-001	Spacer, SCR
26	4	104068-002	Spacer, WR
27	2	104018-001	Heatsink Assembly, WR
28	1	104017-001	Heatsink Assembly, SCR OB 230/460V
29	1	104017-002	Heatsink Assembly, SCR INB 230/460V
30	4	970006-620	Screw, Flanged Head, 1/4-20 X 1 1/4
31	4	974001-005	Washer Brass
32	1	104066-001	PWB Cap Board, Lower
33	1	104079-001	Bracket Cap Board
34	1	104069-001	Change-Over Assembly, Lower
35	6	100151-004	Bus Bar, Voltage Change-Over
36	1	922007-001	Fan Blade

\* \* \*



# DRAWINGS & PARTS LISTS

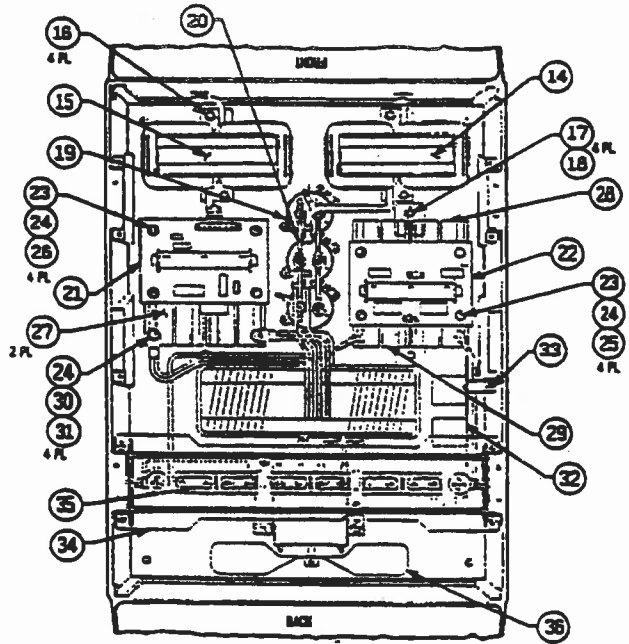
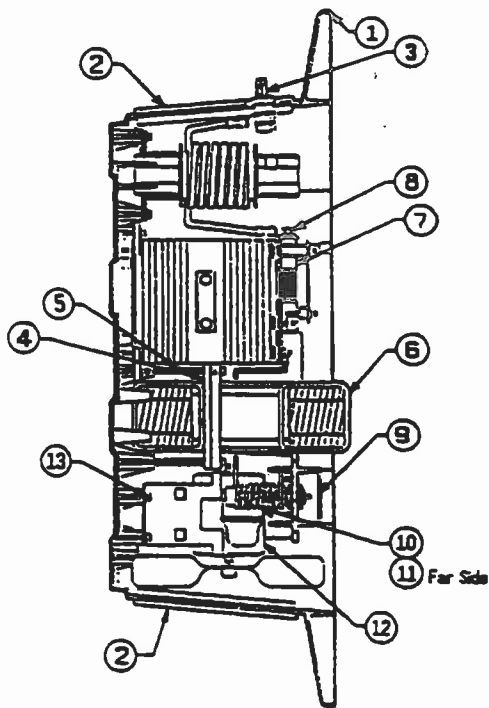
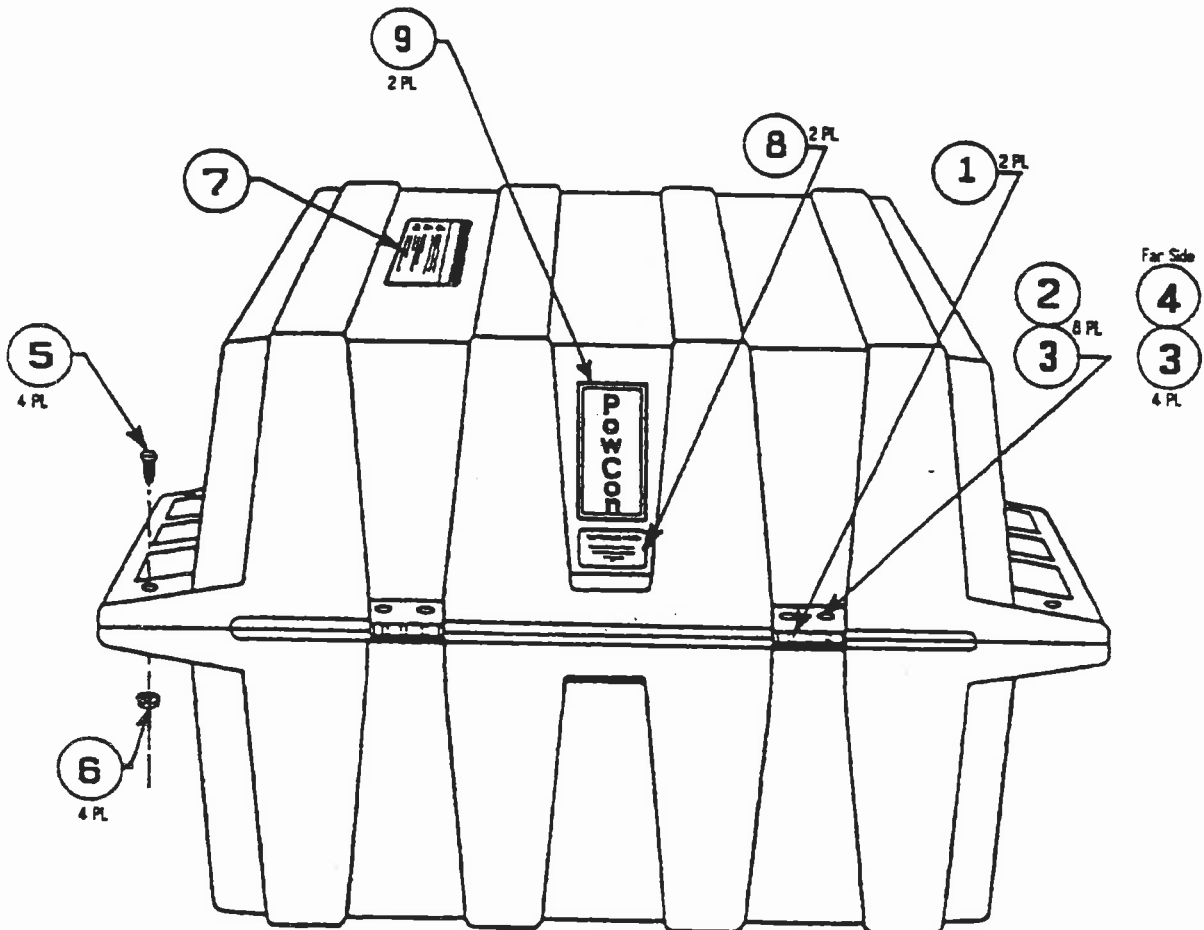


Figure 18, PowCon 550SMP 230/460V Final Assembly, Lower Enclosure

# DRAWINGS & PARTS LISTS

**Table 12, Parts List for PowCon 550SMP 230/460V Final Assembly, Upper & Lower Enclosure Final Assembly**

Item	Qty	Part Number	Description
1	2	104032-001	Hingew
2	8	970011-506	Screw, Flat Head 10-32
3	12	972008-013	Nut, Acom
4	4	970002-510	Screw, Pan Head 10-32 X 3/4
5	4	970006-614	Screw, Hex Head Locking 1/4-20 X 1
6	4	972001-006	Nut Hex Locking 1/4-20
7	1	100108-001	Label, Warning, H.V.
8	2	100096-001	Label, Warning, H.V.
9	2	100146-001	Label, PowCon



**Figure 19, PowCon 550SMP 230/460V, Upper & Lower Enclosure Final Assembly**

