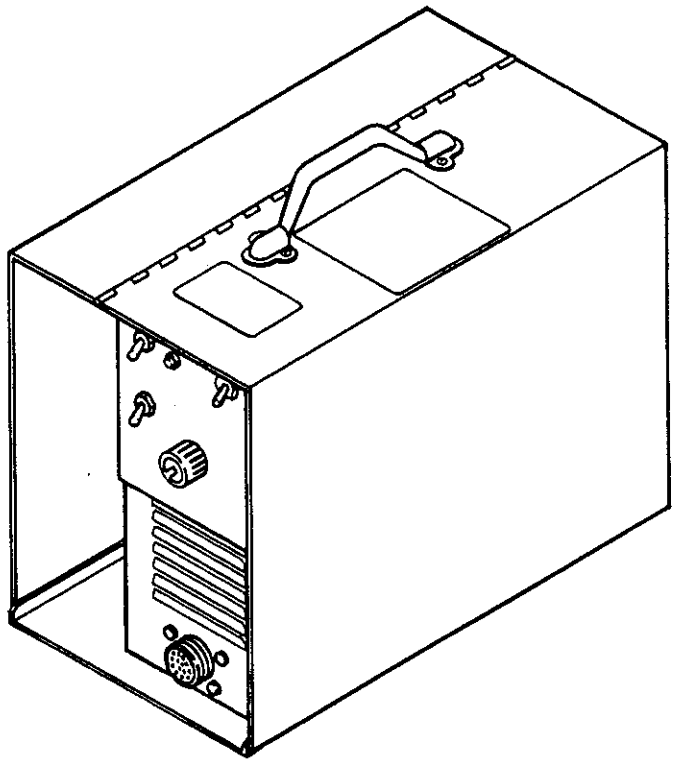
Miller

April 1990	FORM: OM-611C
Effective With Serial No. JK697875	

MODEL: HF-251D-1
HF-251-2



OWNER'S MANUAL

IMPORTANT: Read and understand the entire contents of both this manual and the power source manual used with this unit, with special emphasis on the safety material throughout both manuals, before installing, operating, or maintaining this equipment. This unit and these instructions are for use only by persons trained and experienced in the safe operation of welding equipment. Do not allow untrained persons to install, operate, or maintain this unit. Contact your distributor if you do not fully understand these instructions.

MILLER ELECTRIC Mfg. Co.
A Miller Group Ltd., Company

P.O. Box 1079
Appleton, WI 54912 USA
Tel. 414-734-9821

PRINTED IN U.S.A

LIMITED WARRANTY

EFFECTIVE: MARCH 15, 1989

This warranty supersedes all previous MILLER warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY – Subject to the terms and conditions hereof, Miller Electric Mfg. Co., Appleton, Wisconsin warrants to its Distributor/Dealer that all new and unused Equipment furnished by Miller is free from defect in workmanship and material *as of the time and place of delivery by Miller. No warranty is* made by Miller with respect to engines, trade accessories or other items manufactured by others. Such engines, trade accessories and other items are sold subject to the warranties of their respective manufacturers, if any. All engines are warranted by their manufacturer for one year from date of original purchase, except Tecumseh and Onan engines which have a two year warranty.

Except as specified below, Miller's warranty does not apply to components having normal useful life of less than one (1) year, such as spot welder tips, relay and contactor points, MILLER-*MATIC parts that come in contact with the welding wire includ*ing nozzles and nozzle insulators where failure does not result from defect in workmanship or material.

Miller shall be required to honor warranty claims on warranted Equipment in the event of failure resulting from a defect within the following periods from the date of delivery of Equipment to the original user:

1. Arc welders, power sources, robots, and components ..... 1 year
2. Load banks ..... 1 year
3. Original main power rectifiers ..... 3 years (labor – 1 year only)
4. All welding guns, feeder/guns and torches .... 90 days
5. All other Millermatic Feeders ..... 1 year
6. Replacement or repair parts, exclusive of labor . 60 days
7. Batteries ..... 6 months

provided that Miller is notified in writing within thirty (30) days of the date of such failure.

As a matter of general policy only, Miller may honor claims submitted by the original user within the foregoing periods.

In the case of Miller's breach of warranty or any other duty with respect to the quality of any goods, the exclusive remedies therefore shall be, at Miller's option (1) repair or (2) replacement or, where authorized in writing by Miller in appropriate cases, (3) *the reasonable cost of repair or replacement at an authorized* Miller service station or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at Customer's risk and expense. MILLER's option of repair or replacement will be F.O.B., Factory at Appleton, Wisconsin, or F.O.B. at a MILLER authorized service facility, therefore, no compensation for transportation costs of any kind will be allowed. Upon receipt of notice of apparent defect or failure, Miller shall instruct the claimant on the warranty claim procedures to be followed.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

EXCEPT AS EXPRESSLY PROVIDED BY MILLER IN WRITING, MILLER PRODUCTS ARE INTENDED FOR ULTIMATE PURCHASE BY COMMERCIAL/INDUSTRIAL USERS AND FOR OPERATION BY PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT AND *NOT* FOR CONSUMERS OR CONSUMER USE. MILLER'S WARRANTIES DO NOT EXTEND TO, AND NO RESELLER IS AUTHORIZED TO EXTEND MILLER'S WARRANTIES TO, ANY CONSUMER.

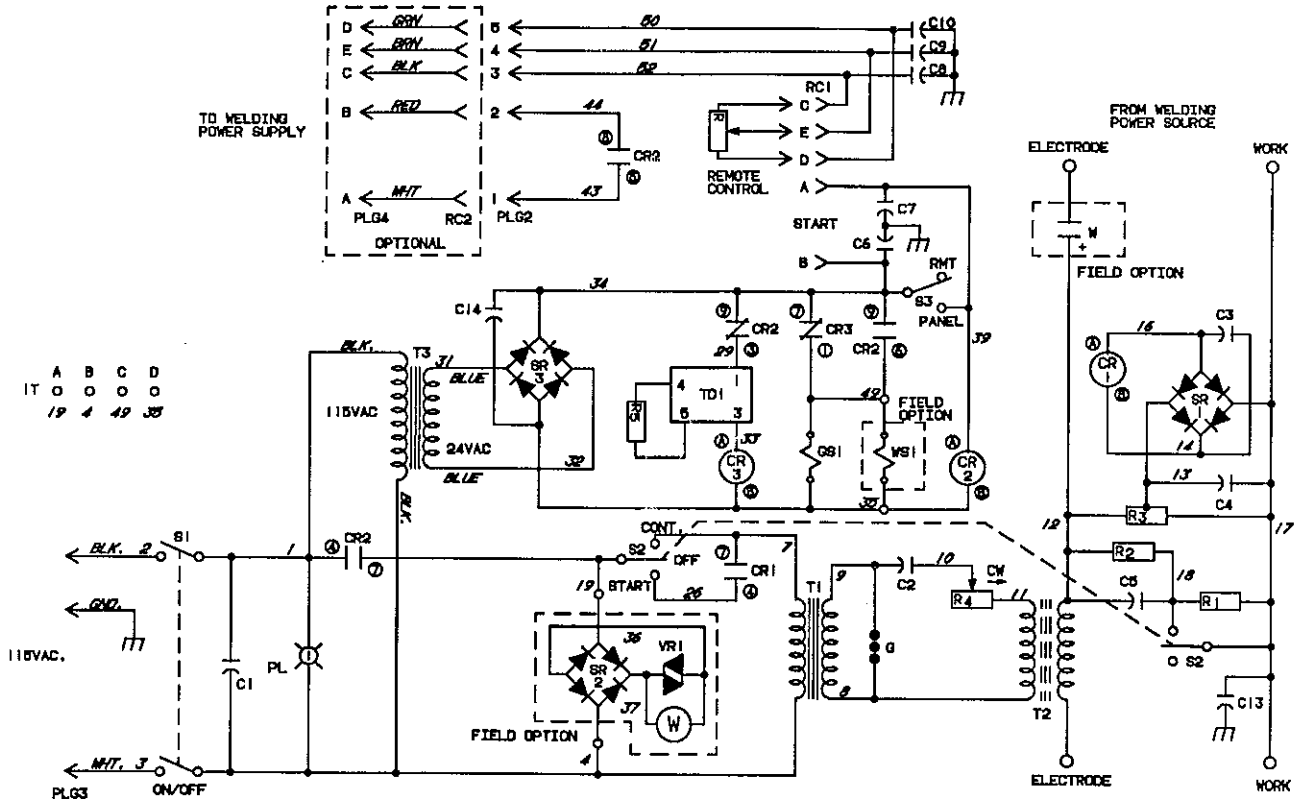
August 23, 1990 FORM: OM-611C

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

AMENDMENT TO SECTION 8 – ELECTRICAL DIAGRAMS

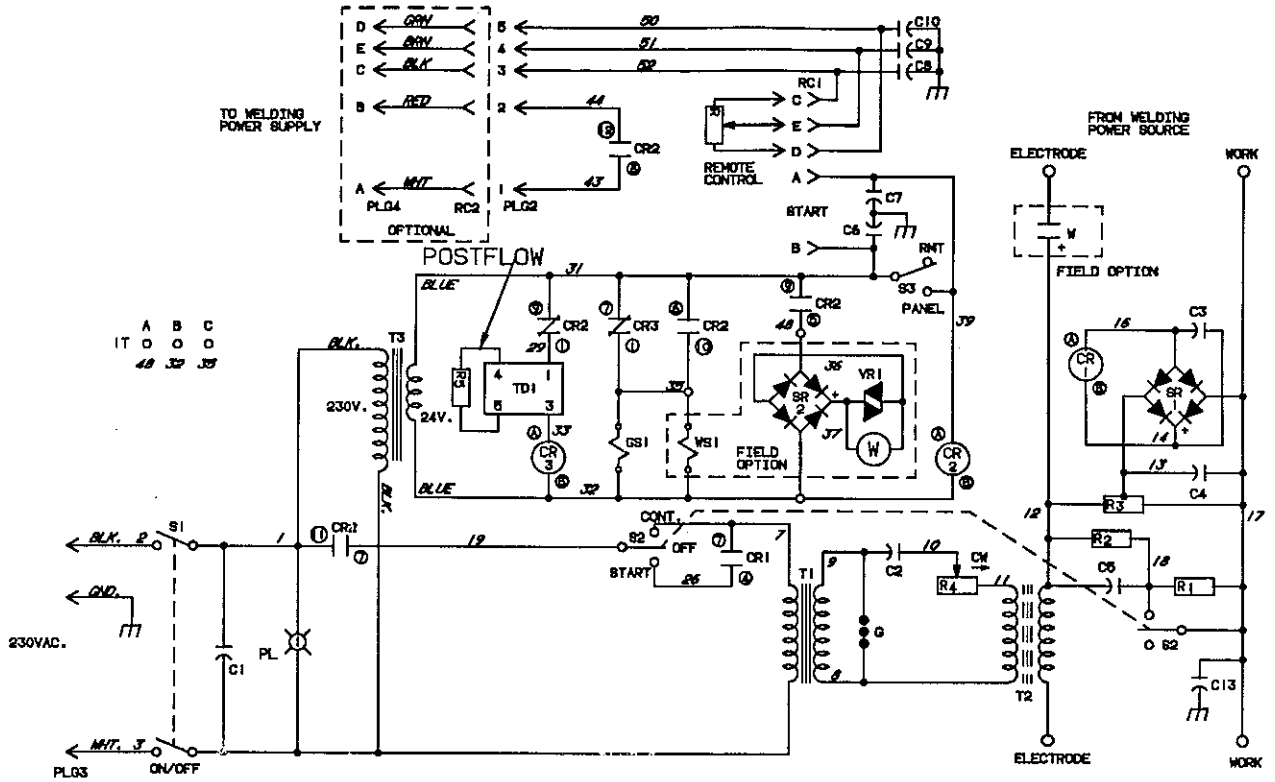
Amend Diagram 8-1. Circuit Diagram For HF-251D-1 Models



Circuit Diagram No. SB-130 555-A

Diagram 8-1. Circuit Diagram For HF-251D-1 Models

Amend Diagram 8-2. Circuit Diagram For HF-251-2 Models



Circuit Diagram No. SB-130 543-A

Diagram 8-2. Circuit Diagram For HF-251-2 Models

January 24, 1991 FORM: OM-611C

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

AMENDMENT TO SECTION 3 – INTRODUCTION

Add the following to Section 3-1. Description

The 115 volts models are also for use with engine driven welding generators and can use 100 Hz power.

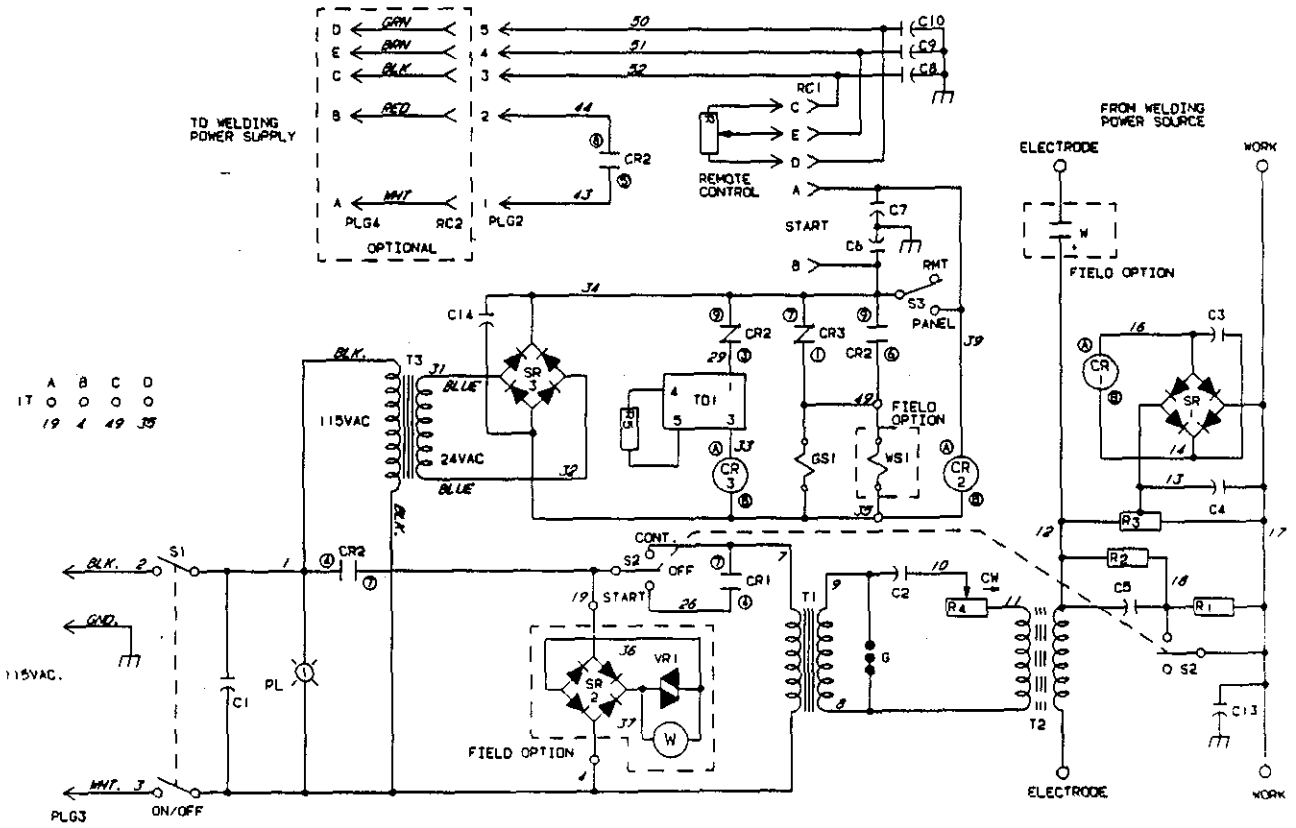
AMENDMENT TO SECTION 4 – INSTALLATION OR RELOCATION

Add the following Important block at the beginning of Section 4-3A. Power Source Receptacle Connections.

IMPORTANT: *The supplied cord with plugs is for use with CC or CC/CV welding power sources having the proper, matching 14-pin receptacle. Do not use cordset on machines without the 14-pin receptacle.*

AMENDMENT TO SECTION 8 – ELECTRICAL DIAGRAMS

Amend Diagram 8-1. Circuit Diagram For HF-251D-1 Models

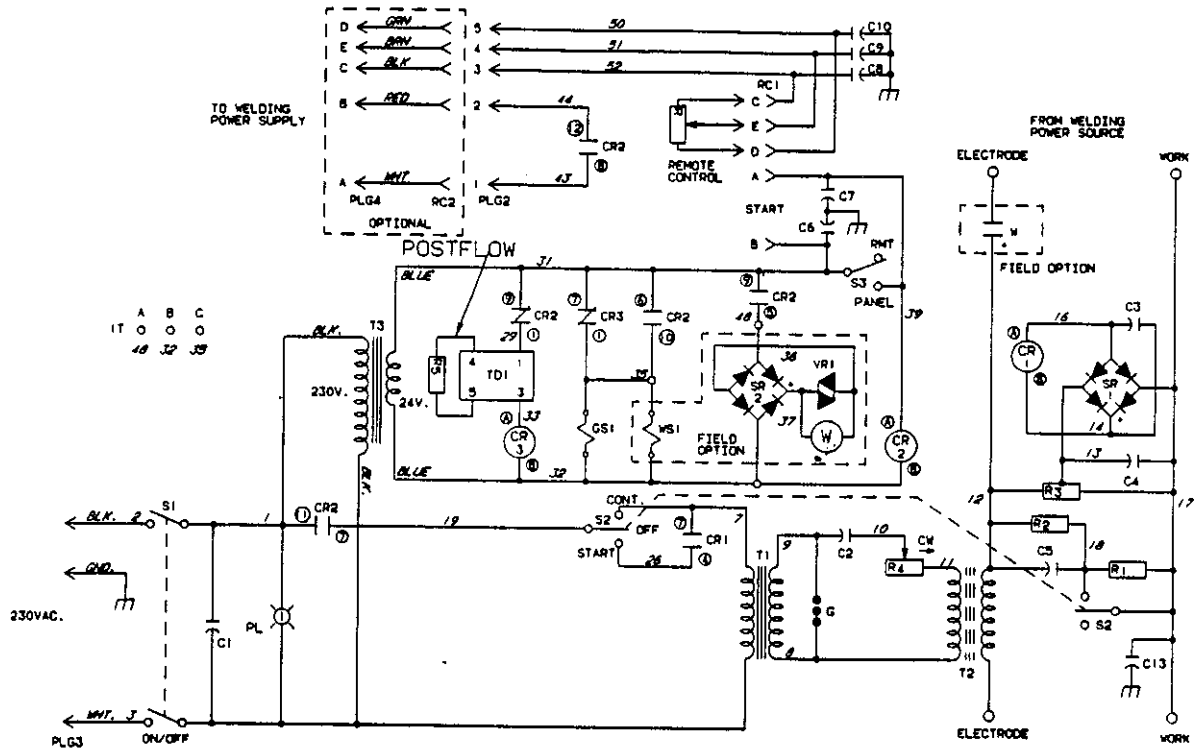


Circuit Diagram No. SB-130 555-A

Diagram 8-1. Circuit Diagram For HF-251D-1 Models

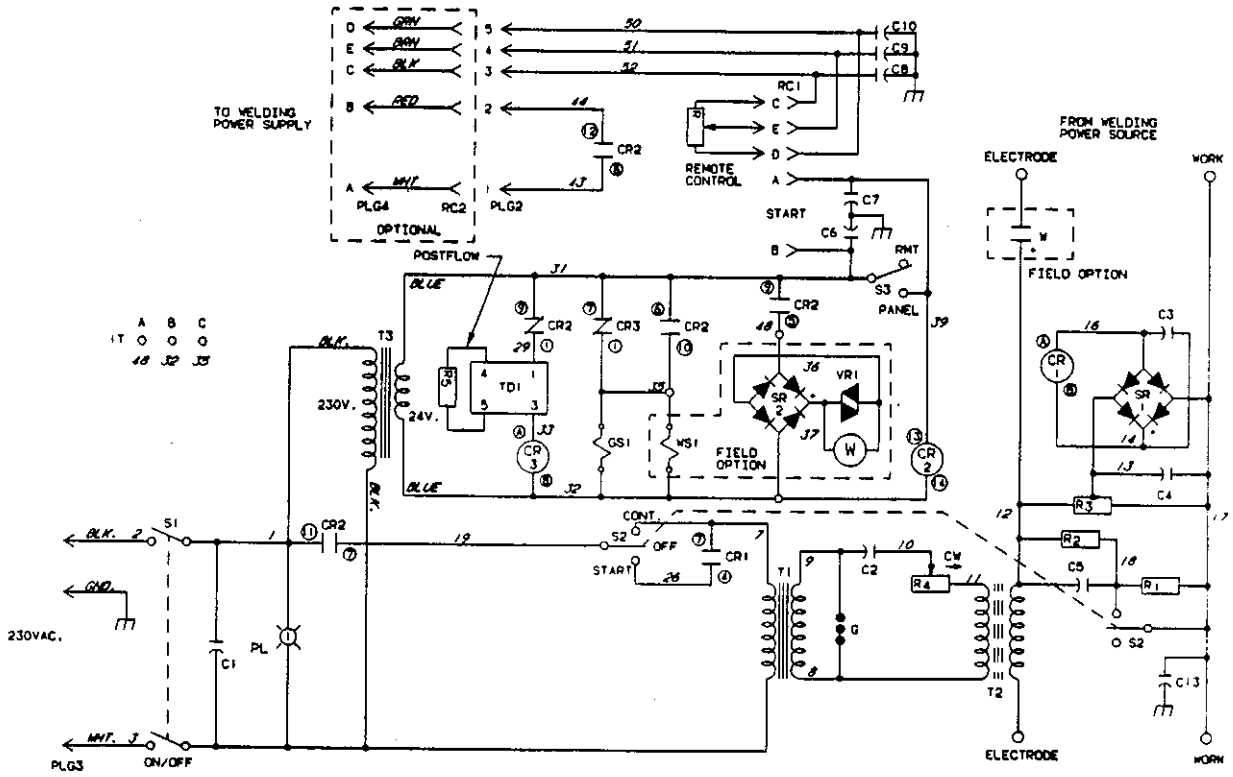
Amend Diagram 8-2. Circuit Diagram For HF-251-2 Models

IMPORTANT: *Use Serial Number of unit to select appropriate Diagram 8-2.*



Circuit Diagram No. SB-130 543-A

Diagram 8-2. Circuit Diagram For HF-251-2 Models Effective With Serial No. JK697875 Thru KA903427



Circuit Diagram No. SB-140 903

Diagram 8-2. Circuit Diagram For HF-251-2 Models Effective With Serial No. KA903428

Amend Diagram 8-4. Wiring Diagram For HF-251-2 Models

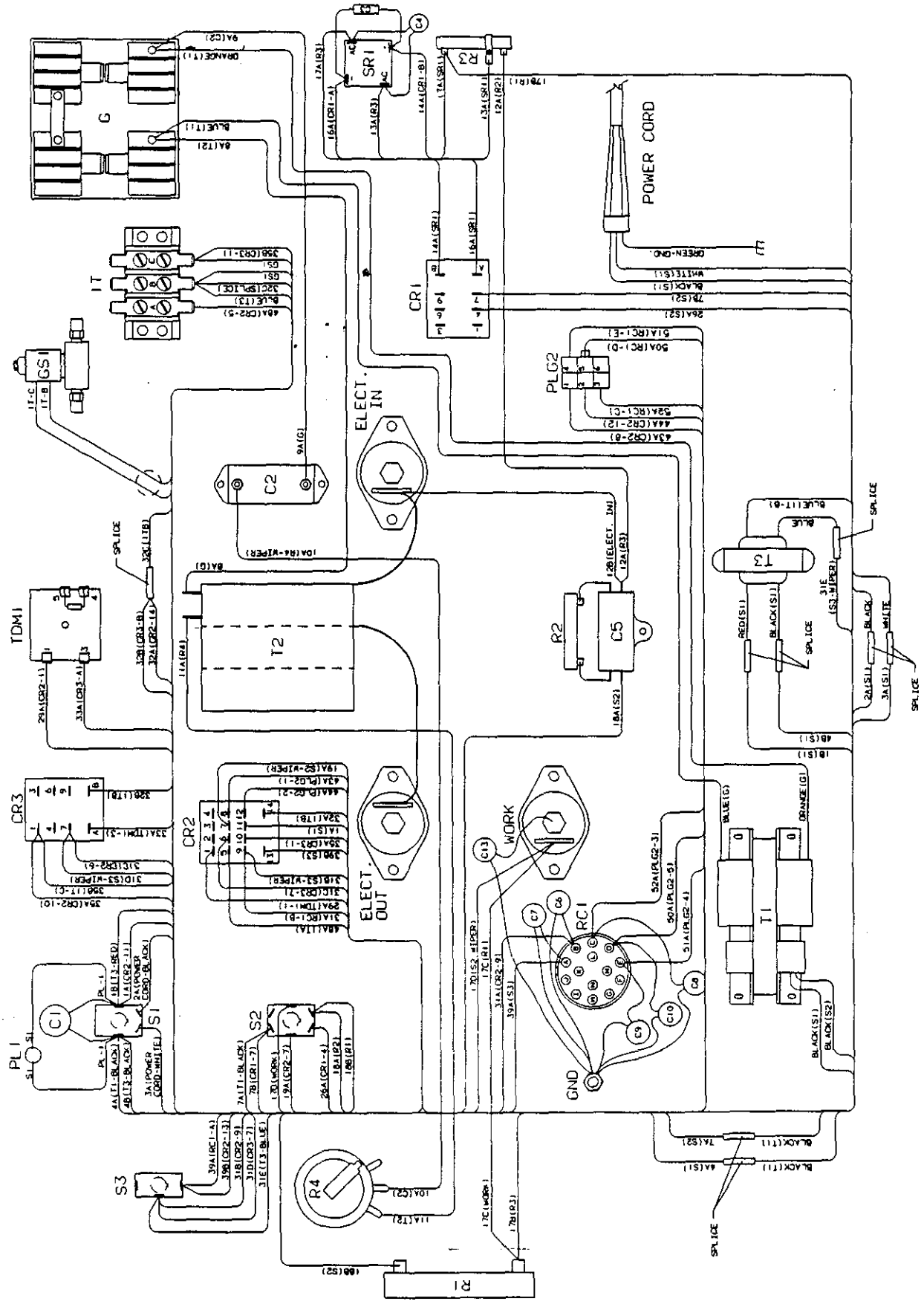


Diagram 8-4. Wiring Diagram For HF-251-2 Models Effective With Serial No. KA903428

Wiring Diagram No. SC-140 905

AMENDMENT TO SECTION 10 – PARTS LIST

Amend Parts List as follows:

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
32-52	RC1	109 769	143 976	RECEPTACLE w/TERMINALS, (consisting of) (Eff w/KA903428)	1
			079 534	· TERMINAL, female 1skt 18-14 wire	14
		109 766	134 734	HOUSING, term plug plstc 14 cont Amp, 213571-2 (Eff w/KB014663)	
		109 970	134 731	TERMINAL, male 1skt 18-14 wire Amp, 66358-6 (Eff w/KB014663)	
		039 734	079 739	CLAMP, cable strain relief sz 17 Amp, 206322-2 (Eff w/KB014663)	
32-59	CR2	049 181	140 772	RELAY, encl 24VAC 4PDT (Eff w/KA903428)	1

**First digit represents page no – digits following dash represent item no.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

CERTIFICATE

NAME OF EQUIPMENT:_____ MODEL NO._____

SERIAL NO._____ DATE:_____

This equipment has been type-tested under standardized field test conditions as recommended by the Joint Industry Committee on High Frequency Stabilized Arc Welding Machines found to radiate less than 10 microvolts per meter at a distance of one mile, the maximum allowable limit established by the Federal Communications Commission for equipment of this type.

Installations using this equipment on the basis of these tests, may reasonably be expected to meet the radiation limitations established by the Federal Communications Commission, only when installed, operated and maintained as specified in the instruction book provided.

USER'S CERTIFICATION

The welding equipment identified above has been installed in accordance with the specific instructions applicable to this model as outlined in the instruction book furnished. It is being used only for the purpose for which it was intended and is being maintained and operated in accordance with the manufacturer's instructions.

Date Installed _____ Signed _____

RECEIVING-HANDLING

Before unpacking equipment, check carton for any damage that may have occurred during shipment. File any claims for loss or damage **with the delivering carrier.** Assistance for filing or settling claims may be obtained from the distributor and/or the equipment manufacturer's Transportation Department.

When requesting information about this equipment, always provide the Model Description and Serial or Style Number.

Use the following spaces to record the Model Designation and Serial or Style Number of your unit. The information is located on the data card or the nameplate.

Model _____

Serial or Style No. _____

Date of Purchase _____

TABLE OF CONTENTS

Section No. Page No.

LIST OF CHARTS AND TABLES

SECTION 1 - SAFETY RULES FOR OPERATION OF ARC WELDING POWER SOURCE
SECTION 1 - RÈGLES DE SÉCURITÉ POUR LE FONCTIONNEMENT DU POSTE DE SOUDAGE À L'ARC

1-1. INTRODUCTION - We learn by experience. Learning safety through personal experience, like a child touching a hot stove is harmful, wasteful, and unwise. Let the experience of others teach you.

Safe practices developed from experience in the use of welding and cutting are described in this manual. Research, development, and field experience have evolved reliable equipment and safe installation, operation, and servicing practices. Accidents occur when equipment is improperly used or maintained. The reason for the safe practices may not always be given. Some are based on common sense, others may require technical volumes to explain. It is wiser to follow the rules.

Read and understand these safe practices before attempting to install, operate, or service the equipment. Comply with these procedures as applicable to the particular equipment used and their instruction manuals, for personal safety and for the safety of others.

Failure to observe these safe practices may cause serious injury or death. When safety becomes a habit, the equipment can be used with confidence.

These safe practices are divided into two Sections: 1 - General Precautions, common to arc welding and cutting; and 2 - Arc Welding (and Cutting) (only).

Reference standards: Published Standards on safety are also available for additional and more complete procedures than those given in this manual. They are listed in the Standards Index in this manual. ANSI Z49.1 is the most complete.

The National Electrical Code, Occupational Safety and Health Administration, local industrial codes, and local inspection requirements also provide a basis for equipment installation, use, and service.

1-2. GENERAL PRECAUTIONS

Different arc welding processes, electrode alloys, and fluxes can produce different fumes, gases, and radiation levels. In addition to the information in this manual, be sure to consult flux and electrode manufacturers for specific technical data and precautionary measures concerning their material.

A. Burn Prevention

Wear protective clothing - gauntlet gloves designed for use in welding, hat, and high safety-toe shoes. Button shirt collar and pocket flaps, and wear cuffless trousers to avoid entry of sparks and slag.

Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a MUST for welding or cutting, (and chipping) to protect the eyes

1-1. INTRODUCTION - Contrairement à l'apprentissage de la vie, l'apprentissage de la sécurité par expérience personnelle, comme l'enfant qui touche un poêle chaud, est dangereux, imprudent et inutile. Instruisez-vous donc de l'expérience d'autrui.

Des méthodes de sécurité issues de l'expérience du soudage et du coupage sont décrites dans le manuel. La recherche, le progrès et l'expérience dans ce domaine ont développé un matériel fiable et des méthodes de sécurité pour l'installation, le fonctionnement et l'entretien. Des accidents se produisent lorsque le matériel est inadéquatement utilisé ou entretenu. La raison de ces méthodes de sécurité peut ne pas être toujours donnée. Certaines sont fondées sur le sens commun, d'autres demanderont à être expliquées par des livres techniques. Il est plus sage de suivre les règles.

Lisez et comprenez ces méthodes de sécurité avant d'essayer d'installer, de faire fonctionner ou de réparer l'appareil. Pour votre sécurité personnelle et celle d'autrui, conformez-vous à ces règles et aux manuels d'instructions.

Manquer d'observer ces méthodes de sécurité pourrait entrainer des blessures graves ou mème la mort. Quand la sécurité devient une habitude, le matériel peut alors être utilisé en toute confiance.

Ces méthodes de sécurité sont divisées en deux sections: 1 - Précautions générales, communes au soudage et au coupage à l'arc, et 2 - Soudage à l'arc (et coupage) (uniquement).

Normes de référence: Des publications des normes américaines de sécurité sont aussi à votre disposition pour d'autres modes opératoires plus complets que ceux du présent manuel. Elles sont données dans l'Index des Normes de ces règles de sécurité. ANSI Z49-1 est la plus complète.

Les codes de l'ACNOR, les codes provinciaux et municipaux donnent aussi les exigences pour une installation, une utilisation et un entretien sûrs.

1-2. PRÉCAUTIONS GÉNÉRALES

Plusieurs procédés du soudage à l'arc, des électrodes alliés, et les flux peuvent produire des vapeurs, gaz, et niveaux de rayonnement différents. Pour tout renseignement supplémentaire à ce manuel, consultez aussi les fabricants des électrodes et des flux afin d'obtenir les renseignements techniques spécifiques et les mesures de précaution concernant leurs matériaux.

A. Prévention des brûlures

Portez des vêtements de protection - des gants à crispin spécialement désignés pour le soudage, un casque et des chaussures de sécurité. Boutonnez le col de votre chemise et les pattes de vos poches, et portez des pantalons sans revers pour éviter que des étincelles et du laitier ne s'y introduisent.

Portez un masque avec lunettes de sécurité ou avec écrans laté-raux de protection, des lunettes filtrantes ou des couvre-lentilles (protégés par un verre clair). Pour le soudage ou le coupage (et le burinage), il est

from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered. See 1-3A.2.

Avoid oily or greasy clothing. A spark may ignite them.

Hot metal such as electrode stubs and workpieces should never be handled without gloves.

Medical first aid and eye treatment. First aid facilities and a qualified first aid person should be available for each shift unless medical facilities are close by for immediate treatment of flash burns of the eyes and skin burns.

Ear plugs should be worn when working on overhead or in a confined space. A hard hat should be worn when others work overhead.

Flammable hair preparations should not be used by persons intending to weld or cut.

B. Toxic Fume Prevention

Severe discomfort, illness or death can result from fumes, vapors, heat, or oxygen enrichment or depletion that welding (or cutting) may produce. Prevent them with adequate ventilation as described in ANSI Standard Z49.1 listed 1 in Standards index. NEVER ventilate with oxygen.

Lead -, cadmium -, zinc -, mercury -, and beryllium - bearing and similar materials, when welded (or cut) may produce harmful concentrations of toxic fumes. Adequate local exhaust ventilation must be used, or each person in the area as well as the operator must wear an air-supplied respirator. For beryllium, both must be used.

Metals coated with or containing materials that emit toxic fumes should not be heated unless coating is removed from the work surface, the area is well ventilated, or the operator wears an air-supplied respirator.

Work in a confined space only while it is being ventilated and, if necessary, while wearing an air-supplied respirator.

Gas leaks in a confined space should be avoided. Leaked gas in large quantities can change oxygen concentration dangerously. Do not bring gas cylinders into a confined space.

Leaving confined space, shut OFF gas supply at source to prevent possible accumulation of gases in the space if downstream valves have been accidently opened or left open. Check to be sure that the space is safe before re-entering it.

Vapors from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a highly toxic gas, and other lung and eye irritating products. The ultraviolet (radiant) energy of the arc can also decompose trichloroethylene and perchloroethylene vapors to form phosgene. DO NOT WELD or cut where solvent vapors can be drawn into the welding or cutting atmosphere or where the radiant

OBLIGATOIRE de protéger ses yeux contre l'énergie de rayonnement et les éclats de métal. Remplacez le verre protecteur lorsqu'il est brisé, piqué ou qu'il a reçu des projections. Voir 1.3A.2.

Évitez de porter des habits imprégnés d'huile ou de graisse. Une étincelle pourrait les enflammer.

Ne manipulez jamais sans gants un métal chaud tel que des chutes d'électrode et des pièces à souder.

Premiers soins et traitement des yeux: Tout atelier devrait avoir à sa disposition un poste de premiers soins ainsi qu'une personne compétente, à moins qu'ur, service médical ne soit à proximité pour soigner immédiatement les brûlures des yeux et de la peau.

Portez des bouche-oreilles lorsque vous travaillez au plafond ou dans un espace restreint. Portez un casque lorsque d'autres personnes travaillent au plafond.

Les personnes devant souder ou couper ne doivent pas employer des préparations inflammables pour leurs cheveux.

B. Prévention des gax toxiques

Les gaz, les vapeurs, la chaleur, un enrichissement ou un manque d'oxygène peuvent entraîner un malaise, une maladie ou même la mort. Remédiez-y par la ventilation décrite dans la Norme ANSI Z49.1 paragraphe 1 de l'Index des Normes. NE ventilez JAMAIS à l'oxygène.

En soudant ou en coupant, les plomb, cadmium, zinc, mercure et béryllium ou autres matériaux semblables peuvent créer des concentrations nocives de gaz toxiques. On doit avoir recours à une ventilation aspirante adéquate du local, ou alors toute personne sur les lieux, de même que le soudeur, doit porter un masque à adduction d'air. On doit employer les deux pour le béryllium.

Les métaux enrobés ou composés de matériaux émettant des gaz toxiques ne doivent pas être chauffés à moins que l'enrobage ne soit ôté de la surface à travailler, que le local ne soit bien ventilé, ou que le soudeur ne porte un masque à adduction d'air.

Ne travaillez dans un espace restreint que s'il est bien ventilé et, si nécessaire, portez un masque à adduction d'air.

On doit éviter les fuites de gaz dans un espace restreint. Les fuites de gaz en grande quantité peuvent transformer dangereusement la concentration d'oxygène. N'amenez pas de bouteilles de gaz dans un espace restreint.

En quittant un espace restreint, FERMEZ le robinet d'alimentation de gaz de la bouteille. Ainsi on pourra rentrer en toute sécurité dans la pièce, même si les robinets "aval" ont été ouverts par accident, ou si on les a laissés ouverts.

Les vapeurs de dissolvants chlorés peuvent être décomposées par la chaleur de l'arc (ou de la flamme) et former du PHOSGÈNE, gaz très toxique, et d'autres produits irritant les poumons et les yeux. L'énergie ultra-violette de l'arc peut aussi décomposer les vapeurs de trichloroéthylène et de perchloroéthylène pour former du phosgène. NE SOUDEZ PAS ou ne coupez pas dans des endroits où les vapeurs de dissolvants peuvent être attirées dans l'atmosphère de soudage ou de

energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C. Fire and Explosion Prevention

Causes of fire and explosion are: combustibles reached by the arc, flame, flying sparks, hot slag or heated material; misuse of compressed gases and cylinders; and short circuits.

BE AWARE THAT flying sparks or falling slag can pass through cracks, along pipes, through windows or doors, and through wall or floor openings, out of sight of the goggled operator. Sparks and slag can fly 35 feet.

To prevent fires and explosion:

Keep equipment clean and operable, free of oil, grease, and (in electrical parts) of metallic particles that can cause short circuits.

If combustibles are in area, do NOT weld or cut. Move the work if practicable, to an area free of combustibles. Avoid paint spray rooms, dip tanks, storage areas, ventilators. If the work cannot be moved, move combustibles at least 35 feet away out of reach of sparks and heat; or protect against ignition with suitable and snug-fitting, fire-resistant covers or shields.

Walls touching combustibles on opposite sides should not be welded on (or cut). Walls, ceilings, and floor near work should be protected by heat-resistant covers or shields.

Fire watcher must be standing by with suitable fire extinguishing equipment during and for some time after welding or cutting if:

a. appreciable combustibles (including building construction) are within 35 feet
b. appreciable combustibles are further than 35 feet but can be ignited by sparks
c. openings (concealed or visible) in floors or walls within 35 feet may expose combustibles to sparks
d. combustibles adjacent to walls, ceilings, roofs, or metal partitions can be ignited by radiant or conducted heat.

Hot work permit should be obtained before operation to ensure supervisor's approval that adequate precautions have been taken.

After work is done, check that area is free of sparks, glowing embers, and flames.

An empty container that held combustibles, or that can produce flammable or toxic vapors when heated, must never be welded on or cut, unless container has first been cleaned as described in AWS Standard A6.0, listed 7 in Standards index.

This includes: a thorough steam or caustic cleaning (or a solvent or water washing, depending on the com-

coupage et où l'énergie de rayonnement peut pénétrer dans des atmosphères contenant des quantités même minuscules de trichloroéthylène ou de perchloroéthylène.

C. Prévention des incendies et des explosions

Les causes d'incendie et d'explosion sont les combustibles atteints par l'arc, la flamme, les étincelles, le laitier chaud ou les matériaux chauffés, le mauvais emploi des gaz comprimés et des bouteilles ainsi que les courts-circuits.

Sachez que les éclats d'étincelles ou la chute du laitier peuvent s'infiltrer dans les fissures, le long des tuyauteries, par les fenêtres et les portes et par les couvertures des murs ou du sol, sans que le soudeur portant des lunettes ne les voie. Les étincelles et les scories peuvent voler jusqu'à 35 pieds.

Pour prévenir les incendies et les explosions: Veillez à ce que votre appareil soit propre et en état de marche, dénué d'huile et de graisse, et de particules de métal sur les pièces électriques qui pourraient entraîner des courts-circuits.

Si des combustibles se trouvent à proximité, ne soudez pas, ne coupez pas. Si possible, déplacez votre travail loin des combustibles. Évitez les ateliers de peinture au pistolet, les cuves d'immersion, les entrepôts, les ventilateurs. Si cela n'est pas possible, placez les combustibles à au moins 35 pieds des étincelles et de la chaleur et protégez-les des étincelles avec des couvertures ou des écrans protecteurs adéquats, bien ajustés et ignifugés.

On ne doit pas souder (ou couper) le côté opposé des murs touchant les combustibles. Les murs, plafonds et planchers proches du travail doivent être protégés par des couvertures ou écrans protecteurs ignifugés.

Un surveillant doit se tenir à proximité avec un matériel de lutte contre l'incendie adéquat, pendant et quelque temps après le soudage ou le coupage si:

a. Des quantités appréciables de combustibles (y compris une construction en chantier) se trouvent à moins de 35 pieds.
b. Des quantités appréciables de combustibles sont à plus de 35 pieds mais peuvent être enflammées par des étincelles.
c. Des ouvertures (cachées ou visibles) sur les planchers ou les murs à moins de 35 pieds peuvent exposer des combustibles aux étincelles.
d. Les combustibles adjacents aux murs, plafonds, toits ou cloisons métalliques peuvent être enflammés par une chaleur rayonnante ou transmise.

Avant de commencer, avisez le contremaître pour qu'il s'assure que les précautions adéquates soient prises.

Une fois le travail terminé, vérifiez qu'il n'y ait pas d'étincelles, de cendres ardentes ou de flammes dans le local.

On ne doit jamais souder ni couper sur un récipient ayant contenu des combustibles, ou pouvant produire des vapeurs inflammables ou toxiques à la chauffe, à moins que le récipient n'ait été lavé au préalable, comme décrit dans la Norme AWS A6.0, figurant au paragraphe 7 de l'Index des Normes.

Cela comprend: un nettoyage à fond à la vapeur ou au caustique (ou un lavage avec dissolvant ou eau selon la solubilité du combustible) suivi d'une purge et d'une in-

bustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment as recommended in A6.0. Waterfilling just below working level may substitute for inerting.

A container with unknown contents should be cleaned (see paragraph above). Do NOT depend on sense of smell or sight to determine if it is safe to weld or cut.

Hollow castings or containers must be vented before welding or cutting. They can explode.

Explosive atmospheres. Never weld or cut where the air may contain flammable dust, gas, or liquid vapors (such as gasoline).

D. Compressed Gas Equipment

Standard precautions. Comply with precautions in this manual, and those detailed in CGA Standard P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, listed 11 in Standards index.

1. Pressure Regulators

Regulator relief valve is designed to protect only the regulator from overpressure; it is not intended to protect any downstream equipment. Provide such protection with one or more relief devices.

Never connect a regulator to a cylinder containing gas other than that for which the regulator was designed.

Remove faulty regulator from service immediately for repair (first close cylinder valve). The following symptoms indicate a faulty regulator:

Leaks - if gas leaks externally.
Excessive Creep - if delivery pressure continues to rise with downstream valve closed.
Faulty Gauge - if gauge pointer does not move off stop pin when pressurized, nor returns to stop pin after pressure release.

Repair. Do NOT attempt repair. Send faulty regulators for repair to manufacturer's designated repair center, where special techniques and tools are used by trained personnel.

2. Cylinders

Cylinders must be handled carefully to prevent leaks and damage to their walls, valves, or safety devices:

Avoid electrical circuit contact with cylinders including third rails, electrical wires, or welding circuits. They can produce short circuit arcs that may lead to a serious accident. (See 1-3C.)

ICC or DOT marking must be on each cylinder. It is an assurance of safety when the cylinder is properly handled.

jection d'azote ou de gaz carbonique, en utilisant un équipement de protection comme recommandé dans l'A6-0. L'atmosphère inerte peut être remplacée par un niveau d'eau arrivant au-dessous du travail à effectuer.

Vous devez laver un récipient dont la nature de contenu est inconnue (voir paragraphe ci-dessus). NE vous fiez PAS à l'odorat ou à la vue pour dire si l'on peut le souder ou le couper en toute sécurité.

Vous devez pratiquer un évent sur les pièces ou récipients creux avant de les souder ou couper: ils peuvent exploser.

Atmosphères explosives: Ne soudez ni ne coupez jamais dans des lieux où l'air peut contenir des poussières, gaz ou vapeurs liquides inflammables (tels que l'essence).

D. Gaz comprimé

Précautions générales: Suivez les précautions de ce manuel, et celles décrites à la Norme CGA P-1 (Précautions de sécurité pour la manipulation de gaz comprimés en bouteilles), paragraphe 11 de l'Index des Normes.

1. Détendeurs de pression

La soupape de sûreté d'un détendeur est destinée à protéger seulement le détendeur de la surpression. Elle n'a pas pour but de protéger les boyaux et le chalumeau: on protège ceux-ci par des soupapes de retenue conçues spécialement pour cette fonction.

Ne montez jamais un détendeur sur une bouteille contenant un gaz différent de celui pour lequel le détendeur a été conçu.

Enlevez immédiatement un détendeur défectueux pour le faire réparer (d'abord, fermez le robinet de la bouteille). Les symptômes suivants dénotent la défectuosité du détendeur:

Fuites - si le gaz fuit extérieurement.
Ascension excessive - si la pression de débit continue à monter, le robinet du chalumeau étant fermé.
Manomètre défectueux - si l'aiguille du manomètre ne s'écarte pas de la goupille de butée lors de la mise en pression, ou ne revient pas sur la goupille après l'échappement de la pression.

Réparation. N'ESSAYEZ PAS de réparer vous-mêmes. Envoyez les détendeurs défectueux à réparer aux ateliers de réparation agréés du fabricant, où des techniques et des outils spéciaux sont utilisés par un personnel formé.

2. Bouteilles

Les bouteilles doivent être manipulées avec soin pour prévenir les fuites ou dégâts à leurs parois, robinets ou systèmes de sûreté. Évitez qu'un circuit électrique soit en contact avec les bouteilles, y compris les rails de contact, les fils électriques ou les circuits de soudage. Cela pourrait créer des arcs courts-circuits pouvant entraîner des accidents graves (Voir 1.3C.).

Chaque bouteille doit porter les inscriptions ICC ou DOT. C'est un gage de sécurité pourvu que la bouteille soit bien manipulée.

Identifying gas content. Use only cylinders with name of gas marked on them; do not rely on color to identify gas content. Notify supplier if unmarked. NEVER DEFACE or alter name, number, or other markings on a cylinder. It is illegal and hazardous.

Empties: Keep valves closed, replace caps securely; mark MT; keep them separate from FULLS and return promptly.

Prohibited use. Never use a cylinder or its contents for other than its intended use, NEVER as a support or roller.

Locate or secure cylinders so they cannot be knocked over.

Passageways and work areas. Keep cylinders clear of areas where they may be struck.

Transporting cylinders. With a crane, use a secure support such as a platform or cradle. Do NOT lift cylinders off the ground by their valves or caps, or by chains, slings, or magnets.

Do NOT expose cylinders to excessive heat, sparks, slag, and flame, etc. that may cause rupture. Do not allow contents to exceed 130°F. Cool with water spray where such exposure exists.

Protect cylinders particularly valves from bumps, falls, falling objects, and weather. Replace caps securely when moving cylinders.

Stuck valve. Do NOT use a hammer or wrench to open a cylinder valve that can not be opened by hand. Notify your supplier.

Mixing gases. Never try to mix any gases in a cylinder.

Never refill any cylinder.

Cylinder fittings should never be modified or exchanged.

3. Hose

Prohibited use. Never use hose other than that designed for the specified gas. A general hose identification rule is: red for fuel gas, green for oxygen, and black for inert gases.

Use ferrules or clamps designed for the hose (not ordinary wire or other substitute) as a binding to connect hoses to fittings.

No copper tubing splices. Use only standard brass fittings to splice hose.

Avoid long runs to prevent kinks and abuse. Suspend hose off ground to keep it from being run over, stepped on, or otherwise damaged.

Coil excess hose to prevent kinks and tangles.

Protect hose from damage by sharp edges, and by sparks, slag, and open flame.

Examine hose regularly for leaks, wear, and loose connections. Immerse pressured hose in water; bubbles indicate leaks.

Identification du gaz: N'utilisez que les bouteilles indiquant la nature du gaz; ne vous fiez pas à la couleur pour reconnaître la nature du gaz. Adressez-vous à votre fournisseur si cela n'est pas indiqué.

N'EFFACEZ ou ne modifiez JAMAIS les noms, numéros ou autres indications sur une bouteille. Cela est illégal et dangereux.

Vides: Maintenez les robinets fermés, replacez bien les chapeaux; inscrivez "Vides"; séparez-les des "Pleines" et retournez-les rapidement.

Emploi interdit: N'utilisez une bouteille ou son contenu que pour ce à quoi elle est destinée, mais JAMAIS comme support ou rouleau.

Placez les bouteilles pour qu'elles ne tombent pas. Lorsqu'un détendeur (et un boyau) est monté sur elles, placez les ou attachez-les debout.

Passages et lieux de travail. Enlevez les bouteilles d'un endroit où l'on pourrait les frapper.

Transport des bouteilles. Avec une grue, utilisez un support fiable tel qu'une plate-forme ou un cadre. NE SOULEVEZ PAS des bouteilles du sol par leur robinet ou chapeau, ou avec des chaînes, élingues ou aimants.

N'EXPOSEZ PAS les bouteilles à une chaleur excessive, aux étincelles, au laitier et aux flammes, etc., pouvant causer leur rupture. Le contenant ne doit jamais dépasser 55°C. Refroidissez en pulvérisant de l'eau si nécessaire.

Protégez les bouteilles et particulièrement les soupapes contre les chocs, les chutes, les chutes d'objets et la température. Remettez bien les chapeaux lorsque vous déplacez les bouteilles.

Robinet coincé. N'UTILISEZ PAS un marteau ou une clé métallique pour ouvrir un robinet de bouteille que l'on ne peut pas ouvrir à la main. Avisez votre fournisseur.

Mélange de gaz. N'essayez jamais de mélanger des gaz dans une bouteille.

Ne rechargez jamais une bouteille. Les éléments de la bouteille ne doivent jamais être modifiés ou remplacés.

3. Boyau

Utilisation interdite. N'utilisez jamais un boyau autre que celui approprié au gaz indiqué. La règle générale d'identification est: rouge pour les gaz combustibles, vert pour l'oxygène, et noir pour les gaz inertes.

Utilisez des bagues ou colliers appropriés au boyau (et non du fil ordinaire ou autre substitution) pour brancher les boyaux à l'appareillage.

N'utilisez pas des raccords en cuivre. N'utilisez que des accessoires standard en laiton pour raccorder un boyau.

Utilisez une petite longueur de boyau. Cela évitera les noeuds et l'usure prématurée. Suspendez le boyau au-dessus du sol pour éviter qu'il ne soit écrasé, piétiné ou endommagé.

Enroulez le surplus de boyau pour éviter les noeuds et emmêlements. Évitez que le boyau ne soit endommagé par des tranchants, étincelles, laitier et flamme nue.

Repair leaky or worn hose by cutting area out and splicing (1-2D3). Do NOT use tape.

4. Proper Connections

Clean cylinder valve outlet of impurities that may clog orifices and damage seats before connecting regulator. Except for hydrogen, crack valve momentarily, pointing outlet away from people and sources of ignition. Wipe with a clean lintless cloth.

Match regulator to cylinder. Before connecting, check that the regulator label and cylinder marking agree, and that the regulator inlet and cylinder outlet match. NEVER CONNECT a regulator designed for a particular gas or gases to a cylinder containing any other gas.

Tighten connections. When assembling threaded connections, clean and smooth seats where necessary. Tighten. If connection leaks, disassemble, clean, and retighten using properly fitting wrench.

Adapters. Use a CGA adapter (available from your supplier) between cylinder and regulator, if one is required. Use two wrenches to tighten adapter marked RIGHT and LEFT HAND threads.

Regulator outlet (or hose) connections may be identified by right hand threads for oxygen and left hand threads (with grooved hex on nut or shank) for fuel gas.

5. Pressurizing Steps:

Drain regulator of residual gas through suitable vent before opening cylinder (or manifold valve) by turning adjusting screw in (clockwise). Draining prevents excessive compression heat at high pressure seat by allowing seat to open on pressurization. Leave adjusting screw engaged slightly on single-stage regulators.

Stand to side of regulator while opening cylinder valve.

Open cylinder valve slowly so that regulator pressure increases slowly. When gauge is pressurized (gauge reaches regulator maximum) leave cylinder valve in following position: For oxygen, and inert gases, open fully to seal stem against possible leak. For fuel gas, open to less than one turn to permit quick emergency shutoff.

Use pressure charts (available from your supplier) for safe and efficient, recommended pressure settings on regulators.

Check for leaks on first pressurization and regularly there-after. Brush with soap solution (capful of Ivory Liquid* or equivalent per gallon of water). Bubbles indicate leak. Clean off soapy water after test; dried soap is combustible.

E. User Responsibilities

Remove leaky or defective equipment from service immediately for repair. See User Responsibility statement in equipment manual.

*Trademark of Proctor & Gamble

Vérifiez régulièrement les fuites, l'usure et les raccordements lâches. Plongez le boyau sous pression dans de l'eau; les bulles indiqueront les fuites.

Réparation. Coupez la partie percée ou usée, et raccordez (1-2D3). N'UTILISEZ JAMAIS de ruban adhésif.

4. Branchements corrects

Avant de brancher le détendeur, nettoyez la sortie du robinet de la bouteille des impuretés qui peuvent obstruer les orifices et endommager les sièges. Sauf pour l'hydrogène, ouvrez momentanément le robinet, en éloignant la sortie des personnes et des sources inflammables. Essuyez avec un tissu propre et non graisseux.

Appareillez le détendeur à la bouteille. Avant de brancher, vérifiez que la marque du détendeur et la description de la bouteille concordent, et que l'orifice d'entrée du détendeur et l'orifice de sortie de la bouteille aillent ensemble. NE BRANCHEZ JAMAIS un détendeur conçu pour un gaz spécial (ou des gaz spéciaux) à une bouteille contenant d'autres gaz.

Serrez les branchements. Lorsque vous assemblez des branchements filetés, nettoyez et polissez les sièges où c'est nécessaire. Serrez. Si les branchements perdent, démontez-les, nettoyez et resserez avec une clef adéquate.

Adaptateurs. Placez, si besoin est, un adaptateur CGA (en vente chez votre fournisseur) entre la bouteille et le détendeur. Avec deux clefs, serrez l'adaptateur fileté À DROITE et À GAUCHE.

On peut reconnaître les branchements de sortie du détendeur (ou boyau) à l'aide du filetage à droite pour l'oxygène et à gauche (identifié par un écrou cannelé) pour les gaz combustibles.

5. Démarches de mise en pression

Purgez le détendeur de résidu de gaz avant d'ouvrir la bouteille (ou le robinet de canalisation) en serrant la vis de réglage (dans le sens des aiguilles d'une montre). Cette opération permet au siège de haute pression de s'ouvrir à la mise en pression, supprimant ainsi toute surchauffe de compression. Maintenez la vis de réglage des détendeurs à simple détente légèrement engagée. Avant d'ouvrir le robinet de la bouteille, assurez-vous que les boyaux sont branchés et que les soupapes aval sont fermées.

Tenez-vous latéralement au détendeur en ouvrant le robinet de la bouteille. Ouvrez-le lentement pour que la pression du détendeur monte progressivement. Lorsque le manomètre est mis sous pression (indique le maximum) le robinet de la bouteille de gaz inerte ou d'oxygène devra être ouvert à fond pour assurer l'étanchéité et celui de la bouteille de gaz combustible ouvert de moins d'un tour pour pouvoir le refermer rapidement en cas d'urgence.

Référez-vous aux tableaux de pression (distribués par votre fournisseur) pour un réglage recommandé de pression sûr et efficace sur les détendeurs. Vérifiez les fuites à la première mise en pression puis régulièrement, brossez avec une solution savonneuse (un bouchon d'Ivory Liquid* ou semblable par gallon d'eau). Les bulles indiquent une fuite. Enlevez l'eau savonneuse après examen; le savon sec est inflammable.

*Marque de Commerce de Proctor & Gamble

F. Leaving Equipment Unattended

Close gas supply at source and drain gas.

G. Rope Staging-Support

Rope staging-support should not be used for welding or cutting operation; rope may burn.

1-3. ARC WELDING - Comply with precautions in 1-1, 1-2, and this section. Arc Welding, properly done, is a safe process, but a careless operator invites trouble. The equipment carries high currents at significant voltages. The arc is very bright and hot. Sparks fly, fumes rise, ultraviolet and infrared energy radiates, weldments are hot, and compressed gases may be used. The wise operator avoids unnecessary risks and protects himself and others from accidents. Precautions are described here and in standards referenced in index.

A. Burn Protection

Comply with precautions in 1-2.

The welding arc is intense and visibly bright. Its radiation can damage eyes, penetrate lightweight clothing, reflect from light-colored surfaces, and burn the skin and eyes. Skin burns resemble acute sunburn, those from gas-shielded arcs are more severe and painful. DON'T GET BURNED; COMPLY WITH PRECAUTIONS.

1. Protective Clothing

Wear long-sleeve clothing (particularly for gas-shielded arc) in addition to gloves, hat, and shoes (1-2A). As necessary, use additional protective clothing such as leather jacket or sleeves, flame-proof apron, and fire-resistant leggings. Avoid outergarments of untreated cotton.

Bare skin protection. Wear dark, substantial clothing. Button collar to protect chest and neck and button pockets to prevent entry of sparks.

2. Eye and Head Protection

Protect eyes from exposure to arc. NEVER look at an electric arc without protection.

Welding helmet or shield containing a filter plate shade no. 12 or denser must be used when welding. Place over face before striking arc.

Protect filter plate with a clear cover plate.

Cracked or broken helmet or shield should NOT be worn; radiation can pass through to cause burns.

Cracked, broken, or loose filter plates must be replaced IMMEDIATELY. Replace clear cover plate when broken, pitted, or spattered.

E. Responsabilités de l'usager

Ôtez immédiatement les parties percées ou défectueuses. Voir les Responsabilités de l'Usager du manuel de l'appareil.

F. Appareil laissé sans surveillance

Fermez l'alimentation de gaz à la source et purgez.

G. Liens et supports temporaires

Pour vos travaux de soudage ou de coupage, n'utilisez pas de la corde comme soutien, elle est inflammable.

1-3. SOUDAGE À L'ARC - Conformez-vous aux précautions des paragraphes 1.1 et 1.2 de cette section. Le soudage à l'arc bien exécuté est sûr, mais un soudeur négligent est un danger. Le poste de soudage transporte des courants élevés sous de fortes tensions. L'arc est très vif et chaud. Les étincelles volent, les vapeurs montent, l'énergie ultra-violette et infrarouge rayonnent, les soudures sont chaudes, et des gaz comprimés peuvent être utilisés. Le soudeur prudent évite les risques inutiles, se protège et protège autrui contre les accidents. Les précautions sont décrites ici et dans les normes données dans l'Index.

A. Protection contre les brûlures

Conformez-vous aux précautions du paragraphe 1.2. L'arc de soudage est intense et visiblement vif. Son rayonnement peut blesser les yeux, traverser les habits légers, se réfléchir sur les surfaces claires, et brûler la peau et les yeux. Les brûlures de la peau ressemblent à un gros coup de soleil. Celles d'arcs sous gaz protecteur sont plus graves et plus douloureuses. NE VOUS BRÛLEZ PAS - SUIVEZ LES PRÉCAUTIONS.

1. Vêtements de protection

Portez des vêtements à manches longues (surtout pour l'arc en atmosphère inerte) avec gants, masque et chaussures (1.2A.).

Si nécessaire portez en plus une veste ou des manches en cuir, un tablier et des guêtres ignifugés. De préférence ne portez pas de vêtements en coton non traité.

Protection de la peau. Portez des vêtements épais foncés. Boutonnez le col pour protéger la poitrine et le cou, et boutonnez les poches pour prévenir l'infiltration d'étincelles.

2. Protection des yeux et de la tête

Évitez que vos yeux soient exposés à l'arc. NE regardez JAMAIS un arc électrique sans protection.

Lorsque vous soudez, portez un écran ou masque avec verre filtrant teinté N° 12 ou plus foncé. Mettez-le sur le visage avant d'amorcer l'arc.

Protégez le verre filtrant d'un couvre-verre clair. NE PORTEZ PAS un masque fendu ou brisé; le rayonnement peut s'infiltrer et causer des brûlures.

Les verres filtrants fendus, brisés ou lâches doivent être remplacés IMMÉDIATEMENT. Remplacez un couvre-verre brisé, piqué ou taché par des projections.

Flash goggles with side shields MUST be worn under the helmet to give some protection to the eyes should the helmet not be lowered over the face before an arc is struck. Looking at an arc momentarily with unprotected eyes (particularly a high intensity gas-shielded arc) can cause a retinal burn that may leave a permanent dark area in the field of vision.

3. Protection of Nearby Personnel

Enclosed welding area. For production welding, a separate room or enclosed bay is best. In open areas, surround the operation with low-reflective, non-combustible screens or panels. Allow for free air circulation, particularly at floor level.

Viewing the weld. Provide face shields for all persons who will be looking directly at the weld.

Others working in area. See that all persons are wearing flash goggles.

Before starting to weld, make sure that screen flaps or bay doors are closed.

B. Toxic Fume Prevention

Comply with precautions in 1-2B.

Generator engine exhaust must be vented to the outside air. Carbon monoxide can kill.

C. Fire and Explosion Prevention

Comply with precautions in 1-2C.

Equipment's rated capacity. Do not overload arc welding equipment. It may overheat cables and cause a fire.

Loose cable connections may overheat or flash and cause a fire.

Never strike an arc on a cylinder or other pressure vessel. It creates a brittle area that can cause a violent rupture or lead to such a rupture later under rough handling.

D. Compressed Gas Equipment

Comply with precautions in 1-2D.

E. Shock Prevention

Exposed hot conductors or other bare metal in the welding circuit, or in ungrounded, electrically-HOT equipment can fatally shock a person whose body becomes a conductor. DO NOT STAND, SIT, LIE, LEAN ON, OR TOUCH a wet surface when welding, without suitable protection.

Vous devez portez des lunettes à écrans latéraux sous le masque pour protéger les yeux dans le cas où le masque ne serait pas abaissé sur le visage avant l'amorçage de l'arc. Regarder momentanément un arc sans protection (principalement un arc en atmosphère inerte à haute intensité) peut brûler la rétine et laisser un point sombre permanent dans le champ de vision.

3. Protection du personnel à proximité

Local de soudage fermé. Pour le soudage de production, il vaut mieux utiliser une salle séparée ou une baie fermée. Dans les locaux ouverts, entourez les travaux d'écrans ou panneaux peu réfléchissants et ininflammables. Laissez l'air circuler librement, particulièrement au niveau du sol.

Donnez des masques aux personnes qui regarderont directement la soudure.

Autres personnes travaillant sur les lieux. Veillez à ce que toutes les personnes portent les lunettes de protection.

Avant d'attaquer la soudure, assurez-vous que les rebords d'écran ou les portes soient fermés.

B. Prévention des gaz toxiques

Suivez les précautions du paragraphe 1.2B. L'échappement du moteur de la génératrice doit être ventilé à l'air extérieur. L'oxyde de carbone peut tuer.

C. Prévention des incendies et des explosions

Suivez les précautions 1.2C. Puissance nominale de l'appareil. Ne surchargez pas le poste de soudage à l'arc. Cela peut surchauffer les câbles et causer un incendie.

Les branchements lâches de câble peuvent surchauffer ou faire des étincelles et causer un incendie.

N'amorcez jamais un arc sur une bouteille ou autre récipient sous pression. Cela créerait un point de rupture entraînant à plus ou moins longue échéance l'explosion du réservoir.

D. Gaz comprimé

Suivez les précautions 1.2D.

E. Prévention des décharges électriques

Des conducteurs chargés ou métal nu incorporés au circuit de soudage ou à un appareil chargé sans mise à la terre peuvent donner une décharge fatale à la personne dont le corps devient conducteur. NE SOUDEZ PAS DEBOUT, ASSIS, COUCHÉ, PENCHÉ sur une surface humide ni en contact avec une telle surface sans protection appropriée.

To protect against shock:

Keep body and clothing dry. Never work in damp area without adequate insulation against electrical shock. Stay on a dry duckboard, or rubber mat when dampness or sweat can not be avoided. Sweat, sea water, or moisture between body and an electrically HOT part - or grounded metal - reduces the body surface electrical resistance, enabling dangerous and possibly lethal currents to flow through the body.

1. Grounding the Equipment

When arc welding equipment is grounded according to the National Electrical Code, and the work is grounded according to ANSI Z49.1 "Safety In Welding And Cutting," a voltage may exist between the electrode and any conducting object. Examples of conducting objects include, but are not limited to, buildings, electrical tools, work benches, welding power source cases, workpieces, etc. **Never touch the electrode and any metal object unless the welding power source is off.**

When installing, connect the frames of each unit such as welding power source, control, work table, and water circulator to the building ground. Conductors must be adequate to carry ground currents safely. Equipment made electrically HOT by stray current may shock, possibly fatally. Do NOT GROUND to electrical conduit, or to a pipe carrying ANY gas or a flammable liquid such as oil or fuel.

Three-phase connection. Check phase requirements of equipment before installing. If only 3-phase power is available, connect single-phase equipment to only two wires of the 3-phase line. Do NOT connect the equipment ground lead to the third (live) wire, or the equipment will become electrically HOT - a dangerous condition that can shock, possibly fatally.

Before welding, check ground for continuity. Be sure conductors are touching bare metal of equipment frames at connections.

If a line cord with a ground lead is provided with the equipment for connection to a switchbox, connect the ground lead to the grounded switchbox. If a three-prong plug is added for connection to a grounded mating receptacle, the ground lead must be connected to the ground prong only. If the line cord comes with a three-prong plug, connect to a grounded mating receptacle. Never remove the ground prong from a plug, or use a plug with a broken off ground prong.

2. Electrode Holders

Fully insulated electrode holders should be used. Do NOT use holders with protruding screws.

3. Connectors

Fully insulated lock-type connectors should be used to join welding cable lengths.

Pour vous protéger contre les décharges électriques, maintenez votre corps et vêtements secs. Ne travaillez jamais dans un endroit humide sans isolation adéquate contre les décharges électriques. Lorsque vous ne pouvez éviter l'humidité ou la sueur, placez-vous sur un caillebotis sec ou un tapis en caoutchouc. La sueur, l'eau de mer, ou l'humidité entre le corps et une pièce CHARGÉE, ou une pièce de métal à la masse, réduisent la résistance électrique de la surface du corps, permettant l'entrée de courants dangereux, voire mortels.

1. Mise à la terre de l'appareil

Lorsque l'appareil de soudage à l'arc est mise à la terre suivant la norme National Electrical Code, et la masse est mise à la terre suivant la norme ANSI Z49.1 "Safety in Welding and Cutting," une tension peut exister entre l'électrode et un objet conducteur. Certaines de ces objets sont par exemple (mais pas seulement), des bâtiments, des outils électriques, des établis, des châssis de postes de soudure, des pièces d'ouvrage, etc. **Ne jamais touchez l'électrode ou des objets en métal avant d'avoir mis le poste de soudure à l'arrêt.**

À l'installation, branchez les châssis de chaque élément (source de courant, commande, établi et circuit d'eau) à la terre. Les conducteurs doivent pouvoir conduire les courants telluriques en toute sécurité. L'appareil chargé par les courants vagabonds peut donner une décharge risquant d'être mortelle. NE BRANCHEZ PAS VOTRE PRISE DE TERRE à une conduite électrique, ou à un tuyau de gaz ou de liquide inflammable tel que l'huile ou un combustible.

Connexion triphasée. Avant l'installation vérifiez la phase nécessaire à l'appareil. Si seul le triphasé est disponible, ne branchez l'appareil monophasé qu'à deux des fils de la ligne triphasée. NE BRANCHEZ PAS le conducteur de terre de l'appareil au troisième fil (sous tension), autrement l'appareil serait chargé: condition dangereuse pouvant donner une décharge fatale.

Avant le soudage, vérifiez si la prise de terre est uniforme. En branchant, assurez-vous que les conducteurs touchent le métal nu du châssis de l'appareil.

Lorsqu'un appareil doit être alimenté à partir d'un coffret d'alimentation, le conducteur de terre doit être relié à celui-ci.

Si vous avez en plus une fiche à trois broches pour la terre, ne branchez le conducteur de terre qu'à la broche de terre. Si le cordon d'alimentation a une fiche à trois broches, reliez-le à une prise femelle tripolaire reliée à la terre. N'enlevez jamais la broche de terre d'une fiche ou n'utilisez jamais une fiche dont la broche de terre serait brisée.

2. Pince-électrodes

Utilisez des pince-électrodes bien isolées. N'UTILISEZ PAS des pince-électrodes avec vis saillantes.

3. Connecteurs

Utilisez des connecteurs à verrouillage bien isolés pour assembler de longs câbles.

4. Cables

Frequently inspect cables for wear, cracks and damage. IMMEDIATELY REPLACE those with excessively worn or damaged insulation to avoid possibly - lethal shock from bared cable. Cables with damaged areas may be taped to give resistance equivalent to original cable.

Keep cable dry, free of oil and grease, and protected from hot metal and sparks.

5. Terminals And Other Exposed Parts.

Terminals and other exposed parts of electrical units should have insulating covers secured before operation.

6. Electrode

a. Equipment with output on/off control (contactor)

Welding power sources for use with the gas metal arc welding (GMAW), gas tungsten arc welding (GTAW) and similar processes normally are equipped with devices that permit on-off control of the welding power output. When so equipped the electrode wire becomes electrically HOT when the power source switch is ON and the welding gun switch is closed. Never touch the electrode wire or any conducting object in contact with the electrode circuit unless the welding power source is off.

b. Equipment without output on/off control (no contactor)

Welding power sources used with shielded metal arc welding (SMAW) and similar processes may not be equipped with welding power output on-off control devices. With such equipment the electrode is electrically HOT when the power switch is turned ON. Never touch the electrode unless the welding power source is off.

7. Safety Devices

Safety devices such as interlocks and circuit breakers should not be disconnected or shunted out.

Before installation, inspection, or service, of equipment, shut OFF all power and remove line fuses (or lock or red-tag switches) to prevent accidental turning ON of power. Disconnect all cables from welding power source, and pull all 115 volts line-cord plugs.

Do not open power circuit or change polarity while welding. If, in an emergency, it must be disconnected, guard against shock burns, or flash from switch arcing.

Leaving equipment unattended. Always shut OFF and disconnect all power to equipment.

Power disconnect switch must be available near the welding power source.

4. Câbles

Vérifiez fréquemment l'usure, les fissures et l'altération des câbles. REMPLACEZ IMMÉDIATEMENT ceux dont l'isolation serait trop usée ou altérée pour prévenir les décharges mortelles provoquées par un câble dénudé. Vous pouvez enrouler les parties endommagées de ruban adhésif en épaisseur suffisante pour donner une résistance de câble neuf. Maintenez les câbles secs, dépourvus d'huile et de graisse et mettez-les à l'abri du métal chaud et des étincelles.

5. Têtes de câbles et autres parties dénudées

Avant la mise en marche, les têtes de câbles et autres parties dénudées d'un appareil électrique doivent être munies de leurs couvrefils isolants.

6. Électrode

a . Appareil équipé d'une commande marche/arrêt (contacteur)

En général, les postes de soudure utilisés pour le soudage à l'arc sous protection gazeuse avec électrode fusible (GMAW), ou avec électrode tungstène (GTAW) et des procès semblables sont équipés d'une commande marche/arrêt de la puissance de sortie. Lorsque l'interrupteur est en position "MARCHE" et l'interrupteur du pistolet est fermé, le fil d'électrode devient chargé. Ne touchez jamais le fil électrode ou tout autre objet conducteur faisant contact avec le circuit d'électrode sans couper le courant au poste de soudure.

b . Appareil non-équipé d'une commande marche/arrêt (sans contacteur)

Les postes de soudure utilisés pour le soudage à l'arc avec électrode enrobée (SMAW) et des procès semblabes peuvent être non-équipés d'une commande marche/arrêt de la puissance de sortie. Lorsque l'interrupteur est en position "MARCHE" l'électrode devient chargé. Ne touchez jamais l'électrode sans couper le courant au poste de soudure.

7. Dispositif de sécurité

Le dispositif de sécurité-verrouillage et coupe-circuit ne doit pas être débranché ou déshunté.

Avant l'installation, l'inspection ou la réparation de l'appareil, mettez l'alimentation sur ARRÊT et enlevez les fusibles généraux (ou verrouillez les interrupteurs) pour éviter une remise en MARCHE accidentelle. Débranchez tous les câbles de la source de courant ainsi que les prises des cordons d'alimentation en 115 volts.

Lors du soudage, n'ouvrez pas le circuit d'alimentation et ne changez pas la polarité. S'il est débranché au cours d'une urgence, faites attention aux brûlures de décharge ou aux jaillissements d'étincelles.

Appareil laissé sans surveillance. Mettez toujours sur ARRÊT et débranchez l'appareil.

F. Protection For Wearers Of Electronic Life Support Devices (Pacemakers)

Magnetic fields from high currents can affect pacemaker operation. Persons wearing electronic life support equipment (pacemaker) should consult with their doctor before going near arc welding, gouging, or spot welding operations.

1-4. STANDARDS BOOKLET INDEX - For more information, refer to the following standards or their latest revisions and comply as applicable:

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 550 Le Jeune Rd, P.O. Box 351040, Miami, FL 33135.
2. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
3. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY -TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135.
8. NFPA Standard 51, OXYGEN - FUEL GAS SYSTEMS FOR WELDING AND CUTTING obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
9. NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.

L'interrupteur d'arrêt doit toujours se trouver à proximité de la source de courant.

F. Protection pour toute personne portant des appareils électroniques de sauvetage (appareil pour le règlement de battement de coeur)

Inducteurs de courant élevé peuvent nuire le fonctionnement d'un appareil pour le "règlement de battement de coeur." Toute personne portant un appareil électronique de sauvetage (appareil pour le règlement de battement de coeur), devrait consulter un docteur avant d'approcher toute opération de soudage à l'arc, à la gouge ou à point.

1-4. INDEX DES NORMES - Pour plus de renseignements, référez-vous aux normes de l'ACNOR ou aux normes américaines suivantes:

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING distribué par l'American Welding Society, 550 Le Jeune Rd., P.O. Box 351040 Miami, FL 33135
2. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING distribué par le Superintendent of Documents, U.S. Government Printing Office, Washington D.C. 20402
3. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, distribué par U.S. Department of Labor, Washington D.C. 20210
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION distribué par l'American National Standards Institute, 1430 Broadway, New York, NY 10018
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY - TOE FOOTWEAR distribué par l'addresse donnee en 4.
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES distribué par l'addresse donnee en 4.
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE COMBUSTIBLES distribué par l'addresse donnee en 1.
8. NFPA Standard 51, OXYGEN - FUEL GAS SYSTEMS FOR WELDING AND CUTTING distribué par la National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210
9. NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE distribué par l'addresse donnée en 8
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES distribué par l'addresse donnée en 8

11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.

14. American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135.

15. ANSI Standard Z88.2 "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS distribué par la Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.

12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING distribué par la Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.

13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY distribué par la National Welding Supply Association, 1900 Arch Street Philadelphia, PA 19103.

14. American Welding Societe Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", distribué par l'American Welding Societe, 550 Le Jeune Rd., P.O. Box 351040, Miami, FL 33135

15. ANSI Standard Z88.2 "Practice For Respiratory Protection" distribué par l'American National Standards Institute, 1430 Broadway, New York, NY 10018.

SECTION 2 – SAFETY PRECAUTIONS AND SIGNAL WORDS

2-1. GENERAL INFORMATION AND SAFETY

A. General

Information presented in this manual and on various labels, tags, and plates on the unit pertains to equipment design, installation, operation, maintenance, and troubleshooting which should be read, understood, and followed for the safe and effective use of this equipment.

B. Safety

The installation, operation, maintenance, and troubleshooting of arc welding equipment requires practices and procedures which ensure personal safety and the safety of others. Therefore, this equipment is to be installed, operated, and maintained only by qualified persons in accordance with this manual and all applicable codes such as, but not limited to, those listed at the end of Section 1 – Safety Rules For Operation Of Arc Welding Power Source.

2-2. SAFETY ALERT SYMBOL AND SIGNAL WORDS

The following safety alert symbol and signal words are used throughout this manual to call attention to and identify different levels of hazard and special instructions.

This safety alert symbol is used with the signal words WARNING and CAUTION to call attention to the safety statements.

WARNING statements identify procedures or practices which must be followed to avoid serious personal injury or loss of life.

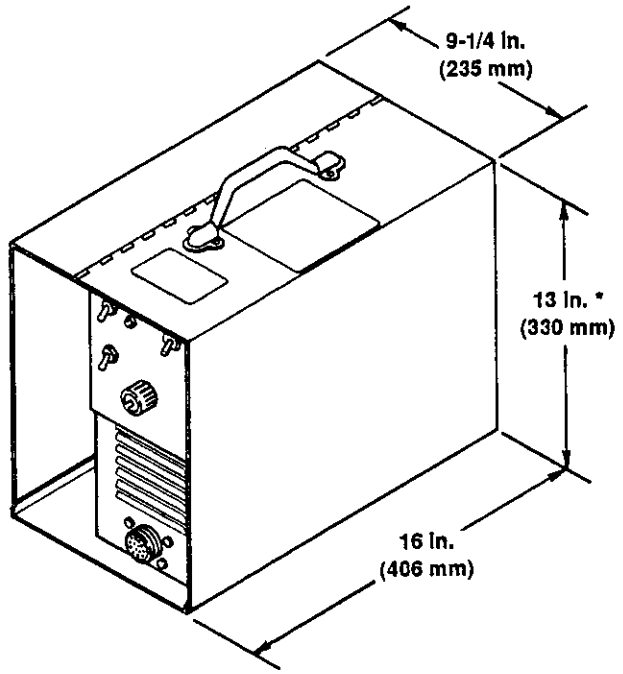
CAUTION statements identify procedures or practices which must be followed to avoid minor personal injury or damage to this equipment.

IMPORTANT *statements identify special instructions necessary for the most efficient operation of this equipment.*

SECTION 3 – INTRODUCTION

Table 3-1. Specifications

Model And Input Voltage	Amperes Input At Rated Load	Input Phase And Frequency	Rated Welding Amperes At 60% Duty Cycle	Watts	Weight	
					Net	Ship
115V	1.5	Single-Phase 50/60/100 Hz	250	90	34 lbs. (15 kg)	37 lbs. (16.8 kg)
230V	.75	Single-Phase 50/60 Hz			36 lbs. (16 kg)	39 lbs. (17.7 kg)



*Add 2 in. (50.8 mm) for handle.

TB-098 957-B

Figure 3-1. Overall Dimensions

3-1. DESCRIPTION

This unit is a high-frequency arc stabilizer which superimposes high-frequency energy on either ac or dc power supply weld outputs. It is designed primarily for use with the Gas Tungsten Arc Welding (GTAW) process. However it can also be used for other processes requiring arc initiation and stabilization such as Submerged Arc Welding (SAW) and Plasma Arc Cutting (PAC) processes.

CAUTION: HIGH-FREQUENCY ENERGY can damage equipment.

- *Check with manufacturer of equipment to be used with this unit to ensure that damage will not occur.*

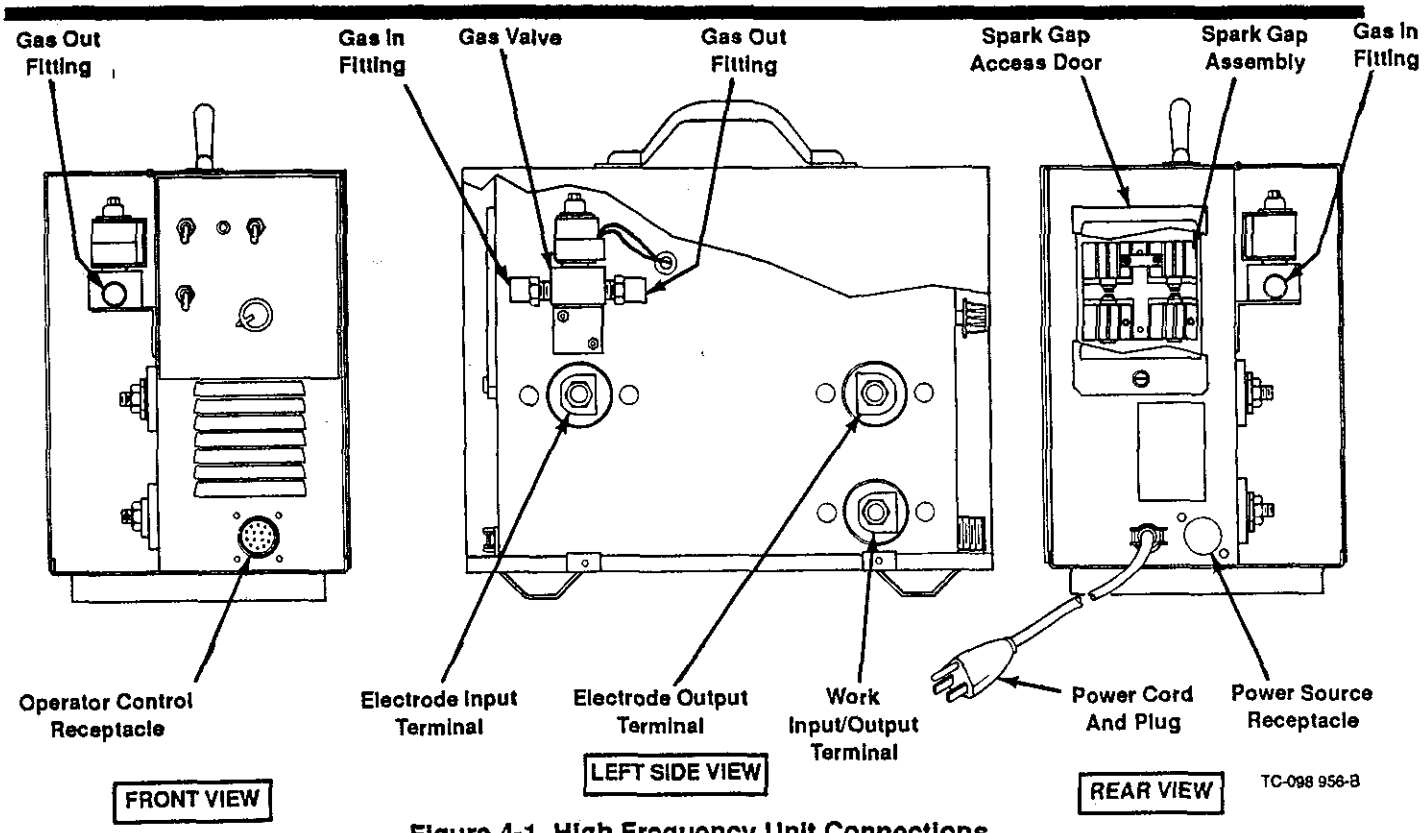


Figure 4-1. High Frequency Unit Connections

4-1. LOCATION

IMPORTANT: *Read entire Section 9 regarding high-frequency equipment location and installation requirements before beginning installation.*

Locate the high-frequency unit close to the work station. This will allow the electrode and work cables to be kept as short as possible, thereby minimizing high-frequency radiation and losses.

The location should allow room to open the side panels for installation and maintenance procedures.

The service life and efficiency of this unit are reduced when the unit is subjected to high levels of dust, dirt, moisture, corrosive vapors, and extreme heat.

4-2. SHIELDING GAS CONNECTIONS (Figure 4-1)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before making shielding gas connections*

Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

The gas valve is located behind the left side panel. The GAS IN and GAS OUT fittings have 5/8-18 right hand threads. To make gas connections, proceed as follows:

1. Open left side access panel.
2. Route and connect a hose of suitable length and construction from the shielding gas supply to the GAS IN fitting.
3. Route and connect the torch shielding gas hose to the GAS OUT fitting.
4. Close and secure left side access panel.

The gas flow must be accurately controlled with a regulator and flowmeter. Recommendations for rate of gas flow should be obtained from the torch manufacturer.

4-3. REMOTE AMPERAGE AND/OR CONTACTOR CONTROL AND INTERCONNECTING RECEPTACLES (Figure 4-1, Figure 4-2 And Figure 4-3)

A. POWER SOURCE Receptacle Connections

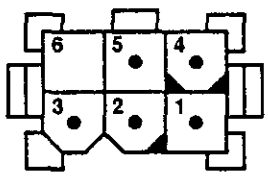


Figure 4-2. Front View Of 6-Pin Block Plug With Pin Locations

To make connections, proceed as follows:

The six-pin POWER SOURCE block plug PLG2 located inside the high-frequency unit is used to connect the control circuitry of the high-frequency unit to the welding power source.

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before making connections*

Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

1. Remove wrapper.
2. Remove snap-in blank from POWER SOURCE receptacle hole located on rear of unit.
3. Install strain relief clamp located near one end of the supplied interconnecting cord where snap-in blank was removed.
4. Locate 6-pin block plug PLG2 in wiring harness.
5. Route the 6-socket block receptacle RC2 on the end of the cord through bottom of unit to the 6-pin block plug.
6. Align and insert 6-pin plug into the 6-socket receptacle, and push together until connectors are locked in place.
7. Reinstall wrapper.
8. Align keyway, insert plug PLG4 on remaining end of cord into the REMOTE 14 receptacle on the front of the welding power source, and rotate threaded collar fully clockwise.

The following pin information is included in case the supplied cord is not suitable, and it is necessary to wire a receptacle to interface with the POWER SOURCE plug.

Pin 1: Output/contactor control connection.

Pin 2: Output/contactor control connection.

Pin 3: Amperage control connection - maximum side.

Pin 4: Amperage control connection - wiper contact.

Pin 5: Amperage control connection - minimum side.

IMPORTANT: *The remaining socket in the receptacle is not used.*

B. OPERATOR CONTROL Receptacle Connections

The 14-socket OPERATOR CONTROL Amphenol receptacle RC1 on the front of the high-frequency unit is used to connect an optional Amperage Control and/or a remote start switch to the control circuitry of the high-frequency unit.

If this unit is used with the HF/OUTPUT control switch in the REMOTE position, an optional remote start switch must be connected to the OPERATOR CONTROL receptacle in order to operate the unit (see Section 5-3).

To connect the optional Amperage Control and/or the remote start switch, proceed as follows: Align keyway, insert five-pin plug from Amperage Control and/or remote start switch into OPERATOR CONTROL receptacle, and rotate threaded collar fully clockwise.

The following socket information is included in case the supplied cord is not suitable, and it is necessary to wire a plug or cord to interface with the OPERATOR CONTROL receptacle.

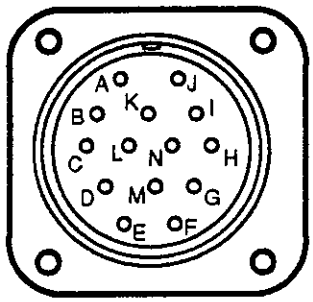
Socket A: High-frequency remote start switch connection.

Socket B: High-frequency remote start switch connection.

Socket C: Amperage control connection - maximum side.

Socket D: Amperage control connection - minimum side.

Socket E: Amperage control connection - wiper contact.



S-0004

Figure 4-3. Front View Of 14-Socket Amphenol Receptacle With Socket Locations

4-4. OPTIONAL OUTPUT (CONTACTOR) CONTROL

This unit can be field equipped with Output (Contactor) Control for use with welding units without a contactor. If Output (Contactor) Control is desired, contact your distributor/dealer.

4-5. WELD INPUT/OUTPUT CONNECTIONS (Figure 4-1)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before making connections*

Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

IMPORTANT: *Refer to the welding power source Owner's Manual for proper weld cable sizes.*

Three terminals are provided behind the left side panel for weld input/output connections. Connect the welding cables from the welding power source to the ELECTRODE and WORK terminals located behind the left side panel as follows:

1. Open left side access panel.
2. Connect electrode cable from welding power source to the ELECTRODE IN terminal.
3. Connect torch cable or connector to the ELECTRODE OUT terminal.
4. Connect work cable from welding power source and work cable from workpiece to WORK input/output terminal.
5. Close and secure left side access panel.

4-6. ELECTRICAL INPUT CONNECTIONS (Figure 4-1 And Figure 4-4)

IMPORTANT: *Read and comply with entire Section 9 regarding high-frequency equipment location and installation requirements before making electrical input connections.*

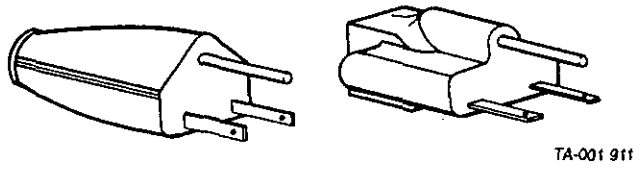
WARNING: ELECTRIC SHOCK can kill.

- *Do not cut off ground terminal from plug.*
- *Ground in accordance with the National Electrical Code, state, and local codes.*

CAUTION: DIRECT CURRENT (DC) will damage the unit.

- *Connect unit only to alternating current (AC) supply.*

The 115 volts ac models are equipped with a 3-prong parallel plug. The 230 volts ac models are equipped with a 3-prong tandem plug. Connect the plug to a matching, grounded receptacle.



TA-001 911

Parallel Plug On 115 Volts AC Models

Tandem Plug On 230 Volts Ac Models

Figure 4-4. Electrical Input Connection Plugs

SECTION 5 – OPERATOR CONTROLS

5-1. HIGH-FREQUENCY SWITCH (Figure 5-1)

WARNING: USING HIGH FREQUENCY WITH THE SHIELDED METAL ARC WELDING (SMAW) PROCESS can result in serious personal injury.

- *Place the HIGH-FREQUENCY switch in the OFF position before doing Shielded Metal Arc Welding (SMAW).*

The attempted use of high frequency to establish an arc with a stick electrode could cause an arc to form between the electrode holder and operator.

The HIGH-FREQUENCY switch is a three-position toggle switch which allows the operator to choose whether high frequency will be used or not and for how long. Normally, the switch is in the START position when the unit is connected to a dc weld output or in the CONTINUOUS position when connected to an ac weld output.

A. START Position

When the HIGH-FREQUENCY switch is placed in the START position and the HF/OUTPUT control switch is in the PANEL position, high frequency is present if open-circuit voltage is present until an arc is established. Once an arc is established, high frequency is no longer present. High frequency is present any time the arc is broken to aid in restarting the arc.

When the HF/OUTPUT control switch is in the REMOTE position and the optional remote start switch is closed, high frequency is present if open-circuit voltage is present until an arc is established, or the optional remote start switch is opened.

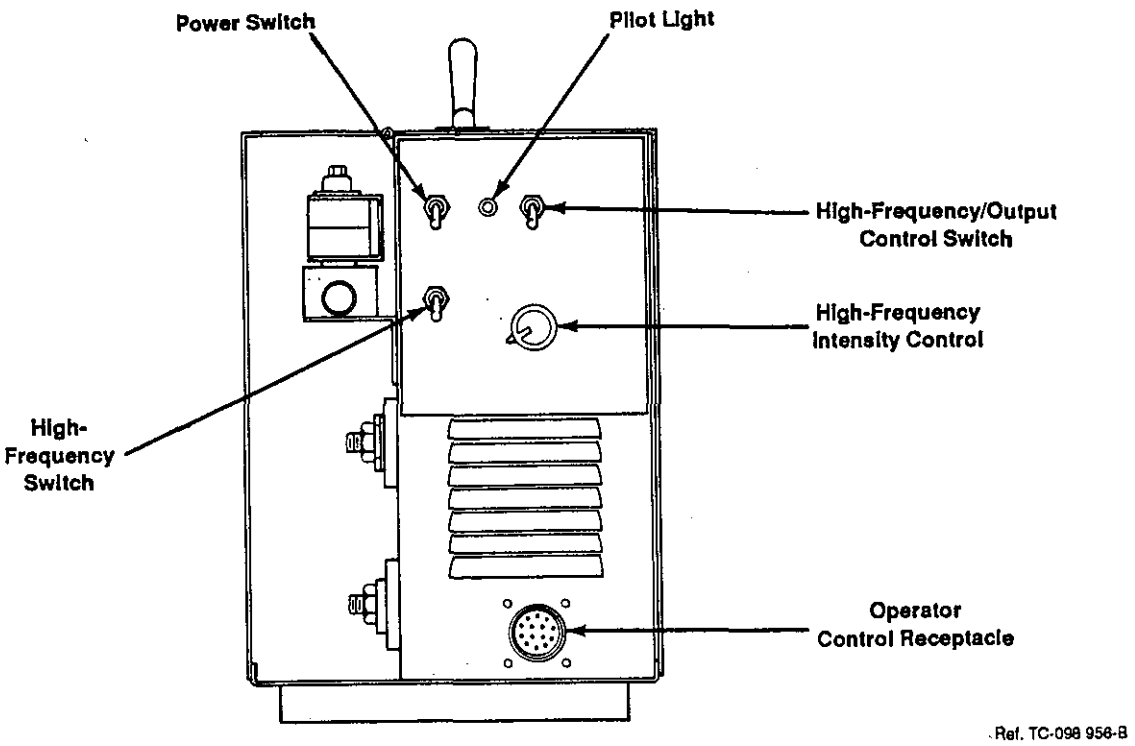


Figure 5-1. Front Panel View

B. CONTINUOUS Position

When the HIGH-FREQUENCY switch is placed in the CONTINUOUS position and the HF/OUTPUT control switch is in the PANEL position, high frequency is present continuously.

When the HF/OUTPUT control switch is in the REMOTE position, high frequency is present from the time the optional remote start switch is closed until the time the optional remote start switch is opened.

C. OFF Position

When the HIGH-FREQUENCY switch is placed in the OFF position, high frequency is not present. The HIGH-FREQUENCY switch should be in the OFF position when high frequency is not desired.

5-2. POWER SWITCH AND PILOT LIGHT (Figure 5-1)

Placing the POWER switch in the ON position energizes the high-frequency unit. The pilot light comes on whenever the POWER switch is in the ON position and indicates that the unit is receiving input power.

Placing the POWER switch in the OFF position shuts down the unit and turns off the pilot light.

5-3. HIGH-FREQUENCY/OUTPUT CONTROL SWITCH (Figure 5-1)

When the HF/OUTPUT control switch is in the PANEL position, high frequency is available without the need for a remote start switch. When the HF/OUTPUT control switch is in the REMOTE position, a remote start switch must be connected to the OPERATOR CONTROL receptacle to initiate high frequency (see Sections 4-3 and 5-1).

5-4. HIGH-FREQUENCY INTENSITY CONTROL (Figure 5-1)

The HIGH-FREQUENCY INTENSITY control provides a means of adjusting the intensity of high-frequency energy available to initiate and/or maintain an arc. The scale surrounding the control reads from 0 to 100 and should be used for reference only. Rotating the control clockwise increases the intensity of the high-frequency energy. Normally the control needs to be adjusted only initially.

IMPORTANT: *As the high-frequency intensity is increased, the possibility of causing interference with local radio and television receivers also increases. Set the HIGH-FREQUENCY INTENSITY control to as low a position as practical while still maintaining a satisfactory welding operation to avoid such interference.*

5-5. POSTFLOW TIMER

A fixed 15 second Postflow Timer controls the period of time shielding gas flows after the arc is extinguished.

SECTION 6 – SEQUENCE OF OPERATION

WARNING: ELECTRIC SHOCK can kill; MOVING PARTS can cause serious injury; IMPROPER AIRFLOW AND EXPOSURE TO ENVIRONMENT can damage internal parts.

- *Do not touch live electrical parts.*
- *Keep all covers and panels in place while operating.*

Warranty is void if the welding power source is operated with any portion of the outer enclosure removed.

ARC RAYS, SPARKS, AND HOT SURFACES can burn eyes and skin; NOISE can damage hearing.

- *Wear correct eye, ear, and body protection.*

FUMES AND GASES can seriously harm your health.

- *Keep your head out of the fumes.*
- *Ventilate to keep from breathing fumes and gases.*
- *If ventilation is inadequate, use approved breathing device.*

HOT METAL, SPATTER, AND SLAG can cause fire and burns.

- *Watch for fire.*
- *Keep a fire extinguisher nearby, and know how to use it.*
- *Do not use near flammable material.*
- *Allow work and equipment to cool before handling.*

MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

- *Wearers should consult their doctor before going near arc welding, gouging, or spot welding operations.*

See Section 1 - Safety Rules For Operation Of Arc Welding Power Source for basic welding safety information.

6-1. GAS TUNGSTEN ARC WELDING (GTAW)

1. Install and connect unit according to Section 4.
2. Wear dry insulating gloves and clothing, and wear welding helmet with proper filter lens according to ANSI Z49.1.
3. Prepare for welding as follows:
   a. Connect work clamp to clean, bare metal at workpiece.
   b. Select proper tungsten electrode (see Table 7-1)
   c. Prepare tungsten electrode according to Section 7-4, and insert into torch.
4. Turn on shielding gas supply.
5. Energize the welding power source.
6. Place the HIGH-FREQUENCY switch in the desired position (see Section 5-1).
7. Rotate the HIGH-FREQUENCY INTENSITY control to the desired position (see Section 5-4).
8. Place the POWER switch in the ON position.
9. Begin welding.

6-2. SHUTTING DOWN

1. Stop welding.
2. Shut down the welding power source and the high-frequency unit.
3. Turn off shielding gas at source.

WARNING: HIGH CONCENTRATION OF SHIELDING GAS can harm health or kill.

- *Shut off gas supply when not in use.*

IMPORTANT: *Every six months inspect the labels on this unit for legibility. All precautionary labels must be maintained in a clearly readable state and replaced when necessary. See Parts List for part number of precautionary labels.*

7-1. INTERNAL CLEANING

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before inspecting, maintaining, or servicing.*

  Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

Annually blow out or vacuum dust and dirt from around high-frequency unit internal components. If dirty or dusty conditions are present, clean unit monthly. If using compressed air, be sure it is clean and dry.

7-2. INTERCONNECTING CORDS

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before inspecting, maintaining, or servicing.*

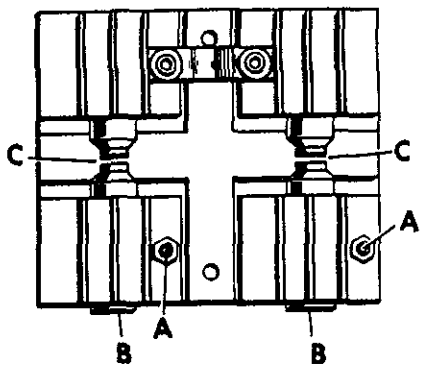
  Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

Every three months inspect all interconnecting cords for damage to or breaks in the insulation jacket, particularly at the plugs. Repair or replace the cord(s) as necessary.

7-3. SPARK GAPS (Figure 7-1 And Figure 7-2)

It is necessary to readjust the spark gaps every three to four months or when intermittent operation occurs. Normal spark gap setting is 0.008 in. (0.203 mm).

IMPORTANT: *Spark gaps widen with normal operation. At regular inspections, check and maintain the 0.008 inch (0.203 mm) spark air gap to ensure consistent welding results and compliance with FCC radiation regulations.*



TA-020 623-A2

Figure 7-1. Spark Gap Adjustment

IMPORTANT: *Do not clean or dress points since the material at the tips is tungsten and impossible to file. The entire should be replaced when the tungsten section has completely disappeared.*

The spark gap assembly is located behind an access door on the rear of the unit (see Figure 7-2). To adjust spark gaps, proceed as follows:

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before inspecting, maintaining, or servicing.*

  Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

1. Open rear panel access door.
2. Loosen screws A on both sides.
3. Place feeler gauge of proper thickness between points C.
4. Apply slight pressure against points B so feeler gauge is held firmly in gap.
5. Tighten screws A.
6. Close and secure rear panel access door.

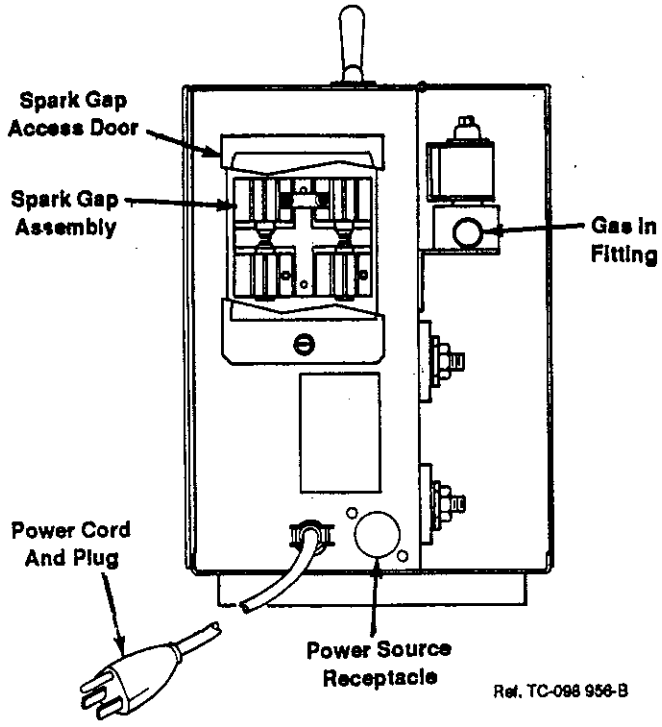


Figure 7-2. Rear View Of High-Frequency Unit

7-4. TUNGSTEN ELECTRODE (Table 7-1, Figure 7-3 And Figure 7-4)

Use Table 7-1 to select the correct size and type tungsten electrode. Prepare the tungsten electrode using the following guidelines. A properly prepared tungsten electrode is essential in obtaining a satisfactory weld.

A. For AC or DC Electrode Positive Welding (Figure 7-3)

Ball the end of tungsten electrodes used for ac or dc electrode positive welding before beginning the welding operation. Weld amperage causes the tungsten electrode to form the balled end. The diameter of the end should not exceed the diameter of the tungsten electrode by more than 1-1/2 times. For example, the end of a 1/8 in. (3.2 mm) diameter tungsten electrode should not exceed a 3/16 in. (4.8 mm) diameter end.

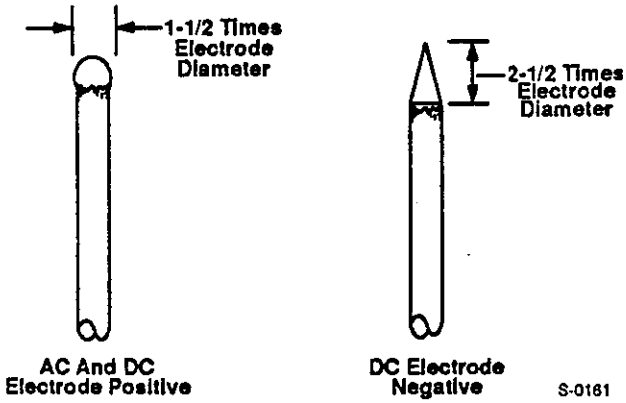


Figure 7-3. Properly Prepared Tungsten Electrodes

B. For DC Electrode Negative Welding (Figure 7-3 And Figure 7-4)

CAUTION: HOT FLYING METAL PARTICLES can injure personnel, start fires, and damage equipment; TUNGSTEN CONTAMINATION can lower weld quality.

- *Shape tungsten electrode only on grinder with proper guards in safe location wearing proper face, hand, and body protection.*
- *Do not use same wheel for any other job or the tungsten will become contaminated.*

Shape tungsten electrodes on a fine grit, hard abrasive wheel used only for tungsten shaping. Grind tungsten electrodes so that grinding marks run lengthwise with the electrode. These procedures reduce the possibility of the tungsten electrode transferring foreign matter into the weld and help reduce arc wander.

Grind the end of the tungsten electrode to a taper for a distance of 2 to 2-1/2 electrode diameters in length. For example, the ground surface for a 1/8 in. (3.2 mm) diameter tungsten electrode should be 1/4 to 5/16 in. (6.4 to 8.0 mm) long.

For additional information, see your distributor for a handbook on the Gas Tungsten Arc Welding (GTAW) process.

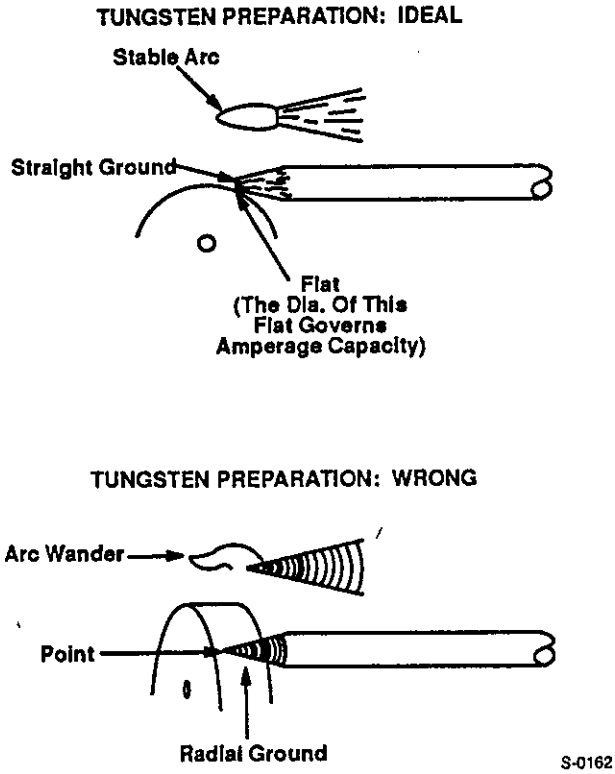


Figure 7-4. Tungsten Preparation

Table 7-1. Tungsten Size

Electrode Diameter	Amperage Range - Polarity - Gas Type			
Pure Tungsten (Green Band)	**DC-Argon Electrode Negative/Straight Polarity**	**DC-Argon Electrode Positive/Reverse Polarity**	**AC-Argon Using High Frequency**	**AC-Argon Balanced Wave Using High Freq.**
.010"	Up to 15	*	Up to 15	Up to 10
.020"	5-20	*	5-20	10-20
.040"	15-80	*	10-60	20-30
1/16"	70-150	10-20	50-100	30-80
3/32"	125-225	15-30	100-160	60-130
1/8"	225-360	25-40	150-210	100-180
5/32"	360-450	40-55	200-275	160-240
3/16"	450-720	55-80	250-350	190-300
1/4"	720-950	80-125	325-450	250-400
2% Thorium Alloyed Tungsten (Red Band)				
.010"	Up to 25	*	Up to 20	Up to 15
.020"	15-40	*	15-35	5-20
.040"	25-85	*	20-80	20-60
1/16"	50-160	10-20	50-150	60-120
3/32"	135-235	15-30	130-250	100-180
1/8"	250-400	25-40	225-360	160-250
5/32"	400-500	40-55	300-450	200-320
3/16"	500-750	55-80	400-500	290-390
1/4"	750-1000	80-125	600-800	340-525
Zirconium Alloyed Tungsten (Brown Band)				
.010"	*	*	Up to 20	Up to 15
.020"	*	*	15-35	5-20
.040"	*	*	20-80	20-60
1/16"	*	*	50-150	60-120
3/32"	*	*	130-250	100-180
1/8"	*	*	225-360	160-250
5/32"	*	*	300-450	200-320
3/16"	*	*	400-550	290-390
1/4"	*	*	600-800	340-525

*NOT RECOMMENDED
The figures listed are intended as a guide and are a composite of recommendations from American Welding Society (AWS) and electrode manufacturers.

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7-5. TROUBLESHOOTING (Table 7-2)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit and welding power source (stop and disable engine on engine driven equipment).*
- *Disconnect input power employing lockout/tagging procedures before inspecting, maintaining, or servicing.*

Lockout/tagging procedures consist of removing plug from receptacle, padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

MOVING PARTS can cause serious injury.

- *Keep away from moving parts.*

HOT SURFACES can cause severe burns.

- *Allow cooling period before servicing.*

Troubleshooting to be performed only by qualified persons.

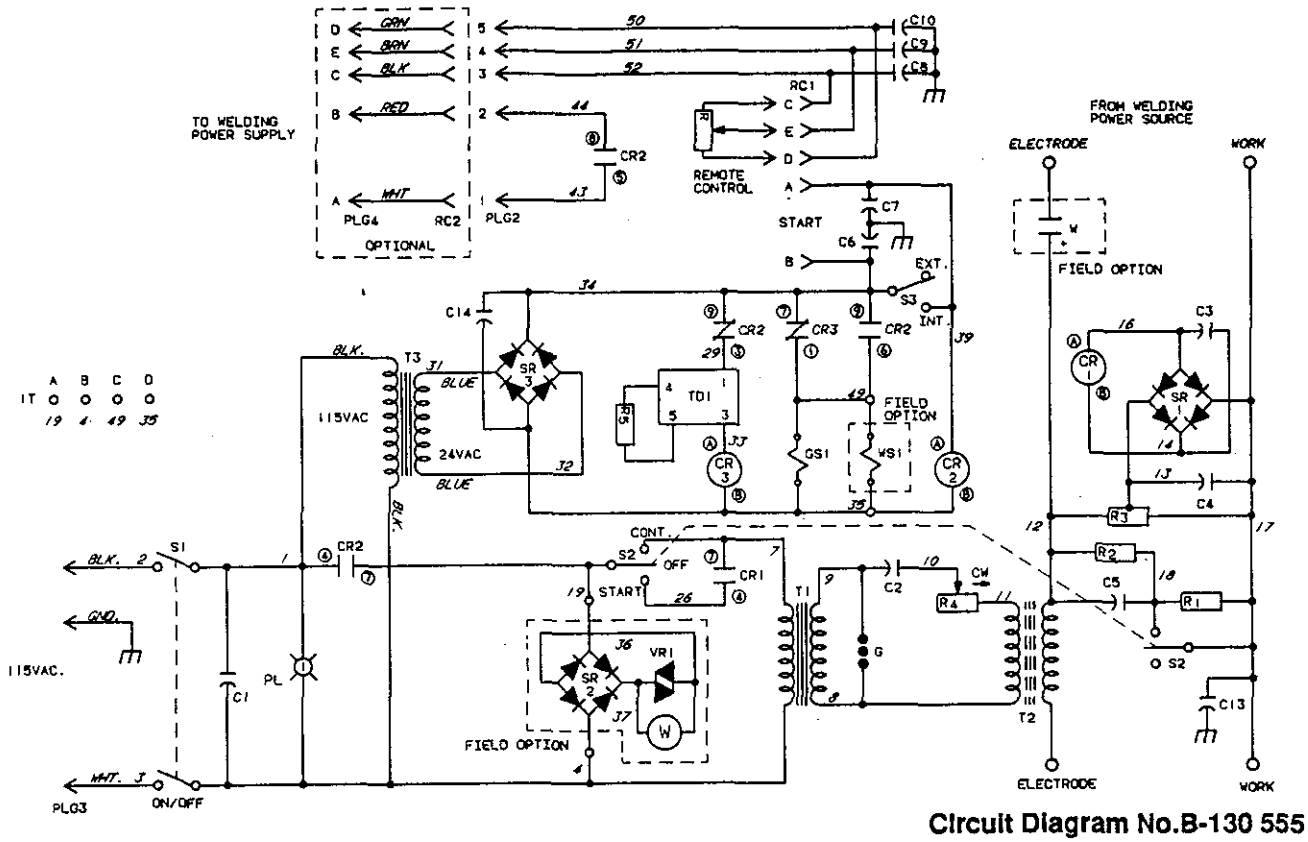
It is assumed that the unit was properly installed according to Section 4 of this manual, the operator is familiar with the function of controls, the high-frequency unit was working properly, and that the trouble is not related to the welding process.

The following table is designed to diagnose and provide remedies for some of the troubles that may develop in this high-frequency unit.

Use this table in conjunction with the circuit diagram while performing troubleshooting procedures. If the trouble is not remedied after performing these procedures, contact the nearest Factory Authorized Service Station. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly followed.

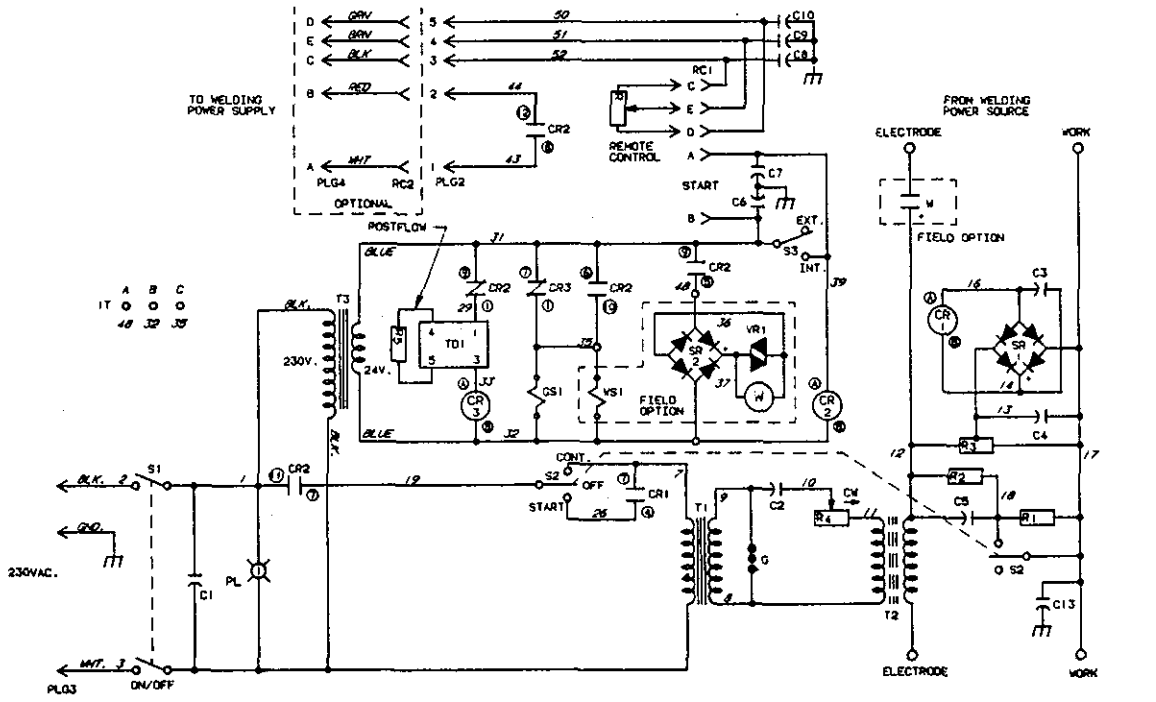
Table 7-2. Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Unit completely inoperative; pilot light PL1 not on.	Input power cord plug not secure in receptacle.	Secure power cord plug in receptacle.
Lack of high frequency; difficulty in establishing an arc.	HF/OUTPUT control switch S3 in REMOTE position with no remote start switch connected to receptacle RC1.	Place S3 in PANEL position, or connect an optional remote start switch to RC1 (see Sections 4-3 and 5-3).
	Dissipation of high frequency from torch cable.	Be sure that torch cable is not near any grounded metal.
	Weld cable leakage.	Check cables and torch for cracked or deteriorated insulation or bad connections. Repair or replace necessary parts.
	Improper spark gap.	Check spark gaps C and adjust if necessary (see Section 7-3).
	HIGH-FREQUENCY INTENSITY control R4 setting too low.	Increase setting of HIGH-FREQUENCY/ INTENSITY Control (see Section 5-4).
	Use of tungsten larger than recommended for welding amperage.	Use proper size tungsten for welding amperage (see Table 7-1).
Wandering arc - poor control of arc direction.	Use of tungsten considerably larger than recommended.	Use proper size tungsten (see Table 7-1).
	Improperly prepared tungsten.	Prepare tungsten as instructed in Section 7-4.
Tungsten electrode oxidizing and not remaining bright after conclusion of weld.	Water in torch.	Refer to torch parts list for part(s) requiring replacement and repair torch as necessary.
	Loose gas fittings on regulator or gas line. This will siphon oxygen into the weld zone.	Check and tighten all gas fittings.
	Insufficient gas flow.	Increase gas flow setting.
	Drafts blowing gas shield away from tungsten.	Shield weld zone from drafts.
	Insufficient high frequency.	Increase setting of HIGH-FREQUENCY INTENSITY control R4 (see Section 5-4).



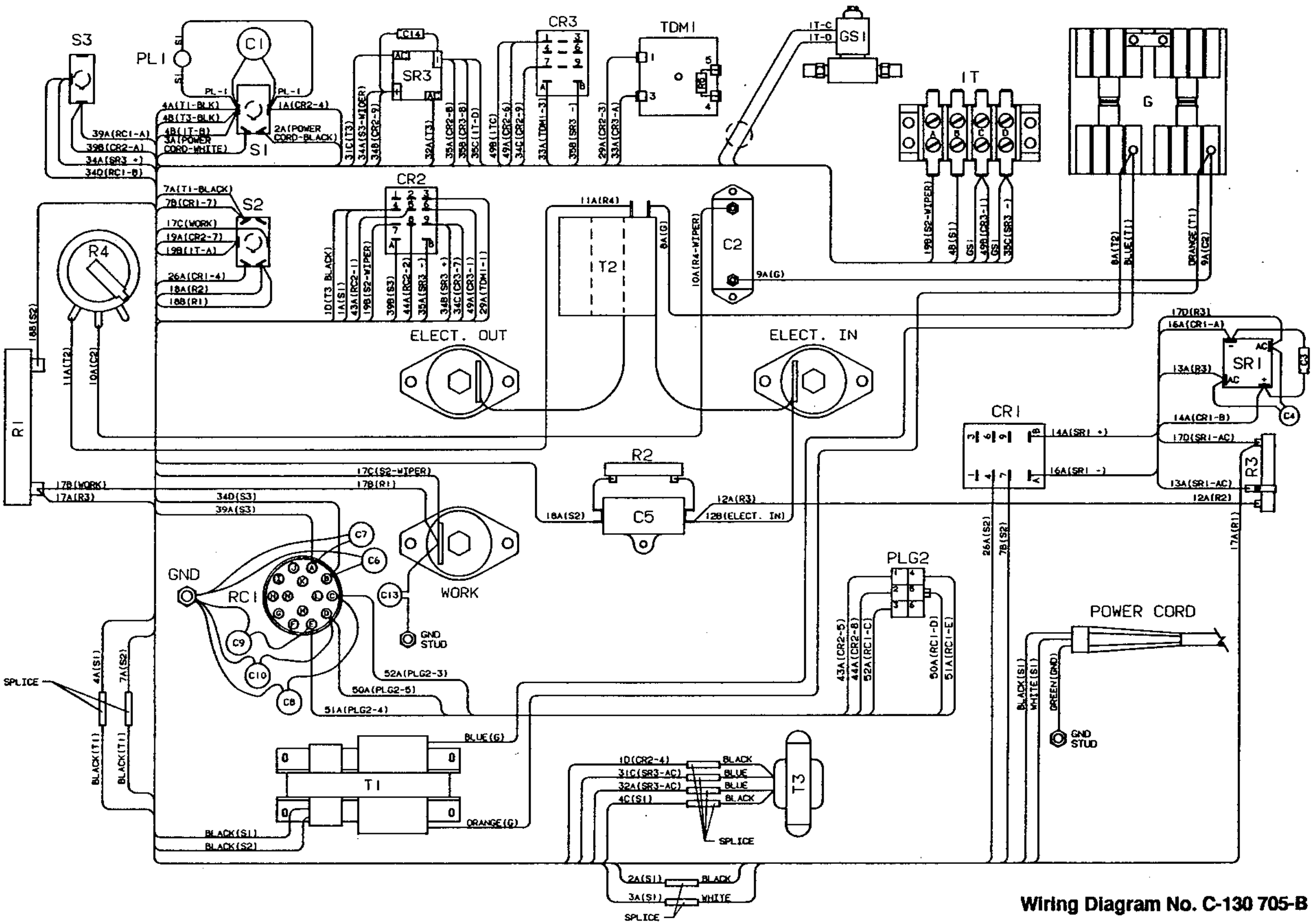
Circuit Diagram No.B-130 555

Diagram 8-1. Circuit Diagram For HF-251D-1 Models



Circuit Diagram No. B-130 543

Diagram 8-2. Circuit Diagram For HF-251-2 Models



Wiring Diagram No. C-130 705-B

Diagram 8-3. Wiring Diagram For HF-251D-1 Models

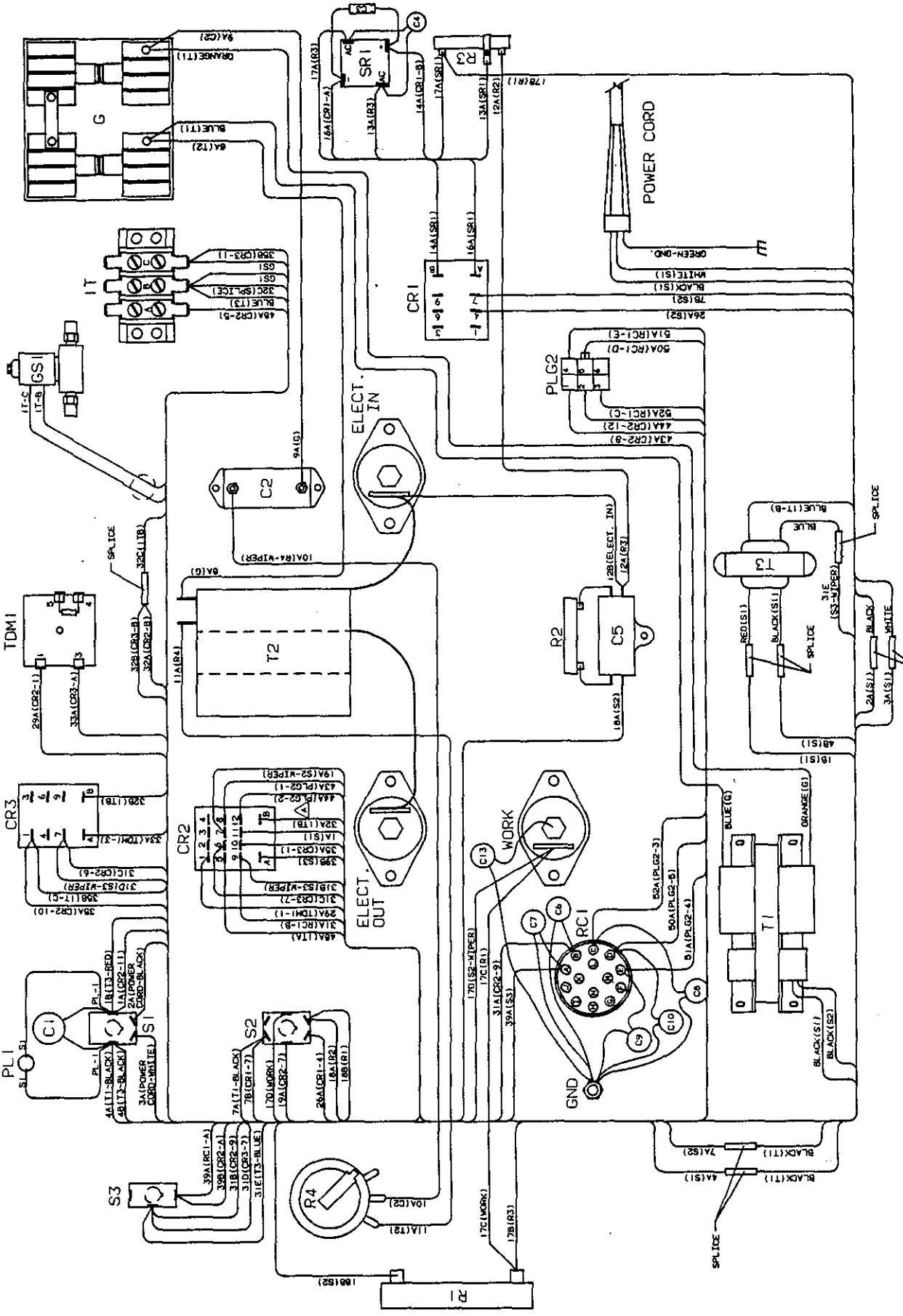


Diagram 8-4. Wiring Diagram For HF-251-2 Models

Wiring Diagram No. C-130 417-B

SECTION 9 – CERTIFICATION FOR HIGH FREQUENCY ARC WELDING EQUIPMENT

9-1. GENERAL

The following information is necessary to make a proper installation of the high-frequency arc welding equipment described in this instruction manual. In order to comply with Part 18 of the Rules and Regulations of the Federal Communications Commission (FCC), the certificate in the front of this manual must be filled in completely and signed after the unit has been correctly installed. The certificate must be kept WITH THE EQUIPMENT AT ALL TIMES to comply with the regulation. The manufacturer of the equipment covered herein has conducted approved field tests and certifies that the radiation can be expected to be within the legal limits if the correct installation procedures, as outlined, are followed. The importance of a correct installation cannot be overemphasized since case histories of interference due to high-frequency stabilized arc welding equipment have shown that in most cases, an inadequate installation was at fault. In the event that interference with authorized FCC services occurs, the user is required to take suitable steps to clear the situation. The Factory Service Department personnel will assist the user by supplying technical information.

Instead of complying with the installation requirements and the certification of each individual installation, the user may elect to certify the entire plant by having a qualified engineer make a plant radiation survey. In such cases, these instructions could serve as a guide in minimizing interference that might be caused by the high-frequency arc welding equipment.

Many processes and applications of processes require open-circuit voltages sufficient to jump from the electrode to the work without making direct contact. The maximum open-circuit voltage (OCV) of a welding power source is not sufficient for this. In the Submerged Arc Welding (SAW) process, granules of flux often get between the electrode and the workpiece making starting of the arc difficult at normal open-circuit voltages. A higher voltage is also required to start and maintain a stable arc in processes like the Gas Tungsten Arc Welding (GTAW) process. In these cases it will take several thousand volts to cause an electrical spark to jump this gap between the electrode and the work, creating an initial path of ionization that the arc current can follow without the hazards that would be present at power frequency.

In order to provide these higher voltages, it is common practice to superimpose a high open-circuit voltage on the output of a welding power source by using high-frequency techniques. The high-frequency voltage can be a source of interference and will be discussed in this section.

9-2. DEFINITIONS

A. High-Frequency Assisted Arc Welding Power Sources

In the arc welding process, high frequency may be used for initiating an arc or stabilizing the arc once it is struck, or for both functions.

The energy from the high-frequency source must flow to the welding electrode via a good quality, low impedance, and well insulated connecting cable.

B. Welding Circuit

The welding circuit consists of all attachments connected to the welding terminals.

C. Welding Terminals

Welding terminals are the terminals which provide welding power and high-frequency energy to the arc.

D. Electrode Terminal

The electrode terminal is the terminal to which the electrode cable or welding torch is connected.

E. Welding Torch

A device used in the Gas Tungsten Arc Welding (GTAW) process to control the position of the electrode, to transfer current to the arc, and to direct the flow of shielding gas.

F. Work Terminal

The work terminal is the terminal to which the welding workpiece is connected.

G. Welding Zone

The welding zone is the space within 50 ft. (15 m) in all directions from the midpoint between the power source and the welding arc (see Figure 9-6).

H. Bonding

Bonding refers to connecting metallic objects together to cause the objects to be at the same potential regardless of any current flow between them (see Figure 9-3 and Figure 9-4).

I. Grounding (Earthing)

Depending on the practices within jurisdictions, one of these terms is commonly used to indicate the connection, or bonding, of parts of the apparatus to the earth.The terms may be used interchangeably.

J. Receiver

A receiver is any device normally used for receiving electromagnetic energy and converting it to useful communications purposes.

K. Conduction

Conduction is the transmission of high-frequency energy via an electrical conductor or conducting medium.

L. High Frequency

High frequency is radio frequency energy, either continuous or pulsed, used to start or stabilize a welding arc.

M. High-Frequency Assisted Arc Welding

High-frequency assisted arc welding refers to any of the arc welding processes requiring high frequency.

N. Interference

Interference is the unwanted and problematic reception of high-frequency energy.

O. Radiation

Radiation is the transmission of high-frequency energy through space.

9-3. HIGH-FREQUENCY RADIATION

Installations using high frequency, either as an integral part of the power source or as an accessory unit, will produce some high-frequency radiation. Such radiation, if the signal strength is sufficient at the receiving device, can cause an inconvenience or disruption of communications or can cause malfunction in sensitive electronic controls and systems. The four major causes of high-frequency radiation are as follows:

A. Direct Radiation From The Power Source Or High-Frequency Accessory Unit

Direct radiation is that radiation emanating directly from the power source or accessory unit. Radiation from the power line and welding power source accessories is not considered to be direct radiation from the power source or accessory unit.

B. Direct Radiation From The Welding Circuit

Any attachment to the output terminals of the high-frequency source is capable of acting as an antenna and radiating high-frequency energy. Attachments include weld cables, torches, worktables, etc. Since direct radiation from the welding circuit is the major source of radiation, it is important to keep attachments to a minimum.

C. Conduction And Radiation From The Power Line

Most power lines are capable of conducting high-frequency energy which may cause interference directly or by reradiation from these power lines. Normally such radiation is small when compared to that caused by radiation from the weld cables.

D. Reradiation

Radiation from the welding circuit can be picked up by ungrounded metal objects or unshielded wiring in the immediate vicinity, conducted some distance, and reradiated. This can be a troublesome source of interference.

9-4. LOCATION

Locate the high-frequency power source as close to the welding process as possible. Also consider the nearness of a suitable ground connection when selecting a site for the installation of the power source. Ideally, the high-frequency power source should be located in an area where there is a limited amount of miscellaneous wiring (lighting, power, telephone, communications, and other unshielded conductors) located within the welding zone. Ungrounded, metallic conductors in the welding zone can act as antennas which will pick up, conduct, or reradiate the high-frequency energy transmitted by the welding circuit. All miscellaneous wiring in the welding zone should be enclosed in grounded, rigid metallic conduit, copper braid, or some other material having an equivalent shielding efficiency, and grounded at 50 ft. (15 m) intervals (see Figure 9-1).

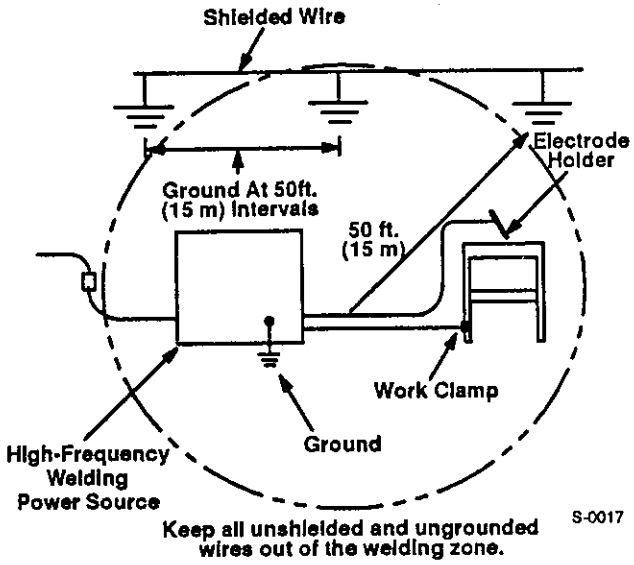


Figure 9-1. Requirements To Minimize Reradiation Pickup In The Vicinity Of The Welding Zone

9-5. GENERAL INSTALLATION PROCEDURES

A. Weld Cables

Keep the weld cables as short as possible and do not exceed 25 ft. (8 m) in length. Position the cables as close together and as close to the floor or ground plane as possible.

If the welding operation must be carried out at a point farther than 25 ft. (8 m) from the welding power source, use a portable high-frequency source and locate the portable unit within 25 ft. (8 m) of the welding electrode.

B. High-Frequency Assisted Arc Welding Power Sources

When the high-frequency assisted arc welding power source is in operation, all service doors and covers must be closed, securely fastened, and adequately bonded to ensure good contact around the entire perimeter of the opening. Except for changes and adjustments allowed by the manufacturer, the high-frequency assisted arc welding power source should not be modified.

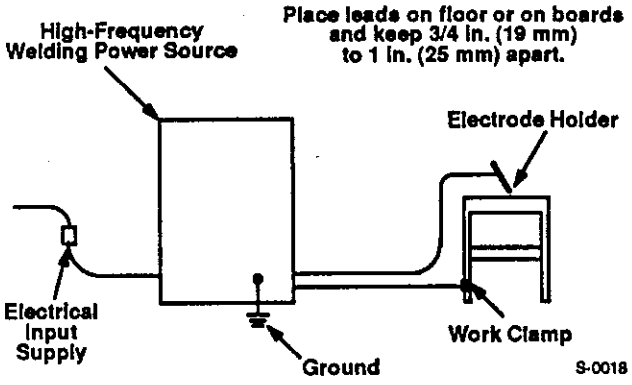


Figure 9-2. General Rules For Welding Leads

C. Grounding (Earthing) The Weld Cables

Be sure that the enclosure of the high-frequency power source is firmly grounded to the WORK terminal. If the high-frequency power source is not labeled as being internally high-frequency grounded, then this ground must be made by grounding the enclosure to the WORK terminal with No. 12 AWG gauge or smaller wire. Connect the ground wire to a driven ground rod or to a water pipe which enters the earth within 10 ft. (3 m) of the high-frequency power source.

D. Metal Buildings

Installation of a high-frequency power source within a suitably bonded and grounded (earthed) metal building can be an effective means of reducing high-frequency radiation. Wherever possible, install high-frequency power sources in such places.

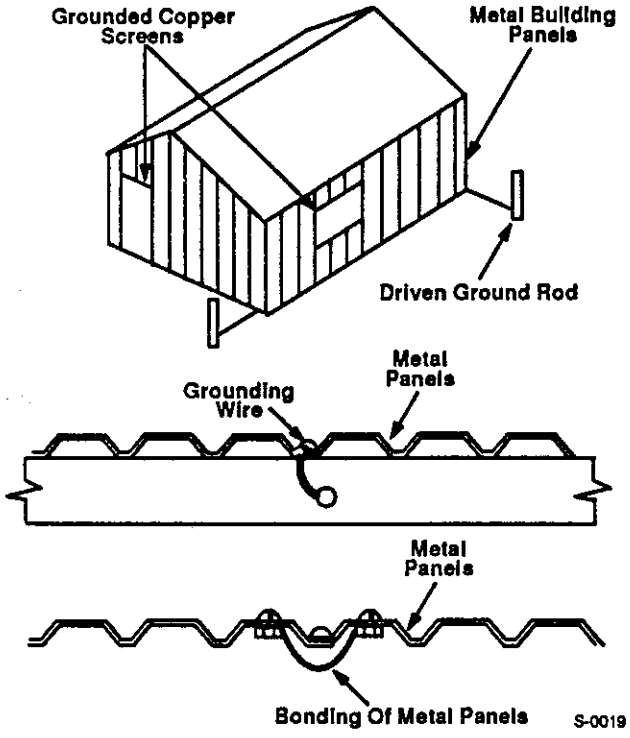


Figure 9-3. Grounding And Bonding Panels Of Metal Building

However, when the high-frequency power source is installed within a metal building, precautions must be taken to be sure that the building is properly bonded and grounded (earthed). This can be accomplished by placing several good electrical ground rods around the periphery of the building. During the construction of a new building of any type having metal in the structure, be sure that all the reinforcing and structural steel is bonded together (as by welding each piece of metal to all other adjacent pieces). For metal buildings, adjacent metal panels should be bolted or welded together at frequent intervals. All windows and doorways should be covered with grounded copper screen or galvanized hardware cloth of not more than 1/4 in. (6.4 mm) mesh.

E. Shielding Of Miscellaneous Wiring In The Welding Zone

Ungrounded, metallic conductors in the welding zone can act as antennas which will pick up, conduct, and/or reradiate the high-frequency energy transmitted by the welding circuit located within or near the welding zone. This means that all ungrounded water pipes must be grounded, and that all lighting, power, telephone, communications, and other conductors within the welding zone must be enclosed in grounded, rigid metallic conduit, copper braid, or some other material having an equivalent shielding capability (spirally wound, flexible, metallic conduit is not suitable). Shielding of the miscellaneous wiring in the welding zone must be grounded at 50 ft. (15 m) intervals. Excellent low resistance electrical connections must be maintained between conduit sections (see Figure 9-4).

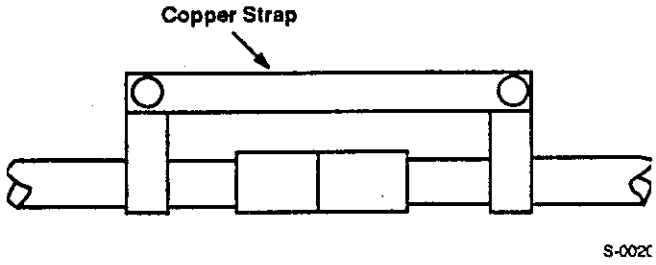


Figure 9-4. Bonding Method For Poor Conductors

F. Power Service

The high-frequency power source should be connected to the line input power supply as instructed in this manual. If the unit is equipped with a power cord, the supply conductors serving the high-frequency power source should be completely enclosed in solid metallic conduit, or in equivalent shielding, up to the point of connection with the power cord. The solid, metallic conduit, or equivalent shielding, should extend the entire distance from the power entrance location in the building to the high-frequency power source. Shielding should be electrically continuous throughout its length and should be connected so that good electrical contact is provided between the shield and the high-frequency power source.

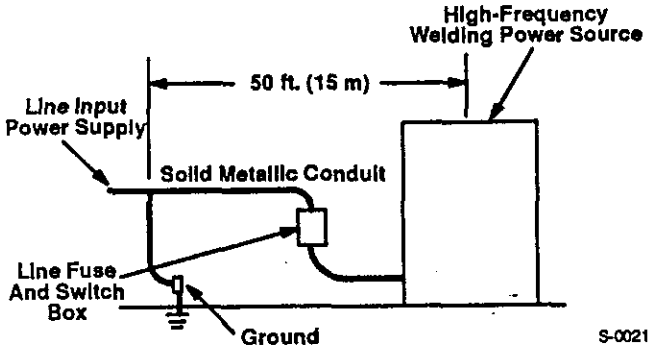


Figure 9-5. Installation Of High-Frequency Stabilized Arc Welding Power Source

9-6. GUIDELINES FOR INSTALLATION OF HIGH-FREQUENCY ASSISTED ARC WELDING POWER SOURCES

1. Locate the equipment so that the ground wire of the high-frequency power source can be kept as short as possible.
2. Shield the line input power leads up to the point of connection with the enclosure of the high-frequency power source as specified by the manufacture's requirements (see Section 9-5F).
3. Be sure that there is good electrical contact made at the enclosure of the high-frequency welding power source, through the conduit, and back to the service box. Be sure that the conduit system is continuous to a point at least 50 ft. (15 m) from the equipment, and that the conduit system is one complete run within the high-frequency zone. If rigid, metallic conduit is not used, be sure that the shielding used has equivalent shielding efficiency. Copper sleeving, lead covered cable, or the equivalent, is satisfactory. Spirally wound, flexible, metallic conduit is not suitable.
4. Keep WORK and ELECTRODE cables as short and straight as possible.
5. Keep weld cables to a maximum length of 25 ft. (8 m).
6. Keep weld cables as close together and as close to the ground plane as possible.
7. Adjust spark gap setting to the minimum setting given in this manual.
8. Secure all service and access doors before operating.
9. Visualize the welding zone as a sphere with a 50 ft. (15 m) radius centered on a point between the power source and the electrode holder (see Figure 9-6), and proceed as follows:
   a. Have all unshielded power, lighting, and communication wires within the welding zone placed in grounded shields or relocated outside the welding zone.
   b. Ground all large metallic objects, long guy wires, or support wires within the welding zone.
   c. Be sure that there are no external power or telephone wires, which may be off the immediate premises, within the welding zone.

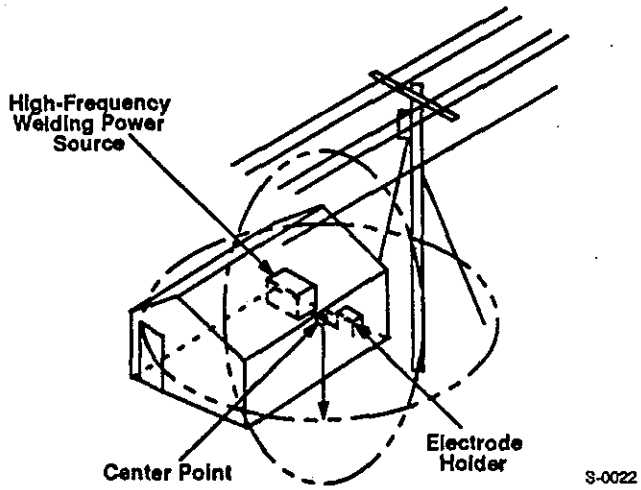


Figure 9-6. Welding Zone

10. Use driven ground rods which enter the ground 10 ft. (3 m) or less from the ground connection, or cold water pipes, as the ground for the high-frequency welding power source.
11. Be sure that all ground connections are clean and tight.
12. If the high-frequency welding power source is operated within a metal building, be sure that the building is properly grounded.

9-7. INSTALLATION GUIDELINES CHECKLIST

All items may not be necessary or practical for each installation. Complete the necessary items to eliminate interference with authorized FCC services.

1. Is equipment properly located?
   (See Sections 9-4, 9-5D, 9-5E, 9-6.1, and 9-6.9.)
2. Are ac input power connections properly made?
   (See Sections 9-5B, 9-6.2, and 9-6.3.)
3. Are weld cables and equipment properly installed?
   (See Sections 9-5A, 9-6.4, 9-6.5, and 9-6.6.)
4. Are ground connections properly made?
   (See Sections 9-5C, 9-6.1, 9-6.6, 9-6.11, and 9-6.12.)
5. Is equipment properly set up and adjusted?
   (See Sections 9-6.7 and 9-6.8.)

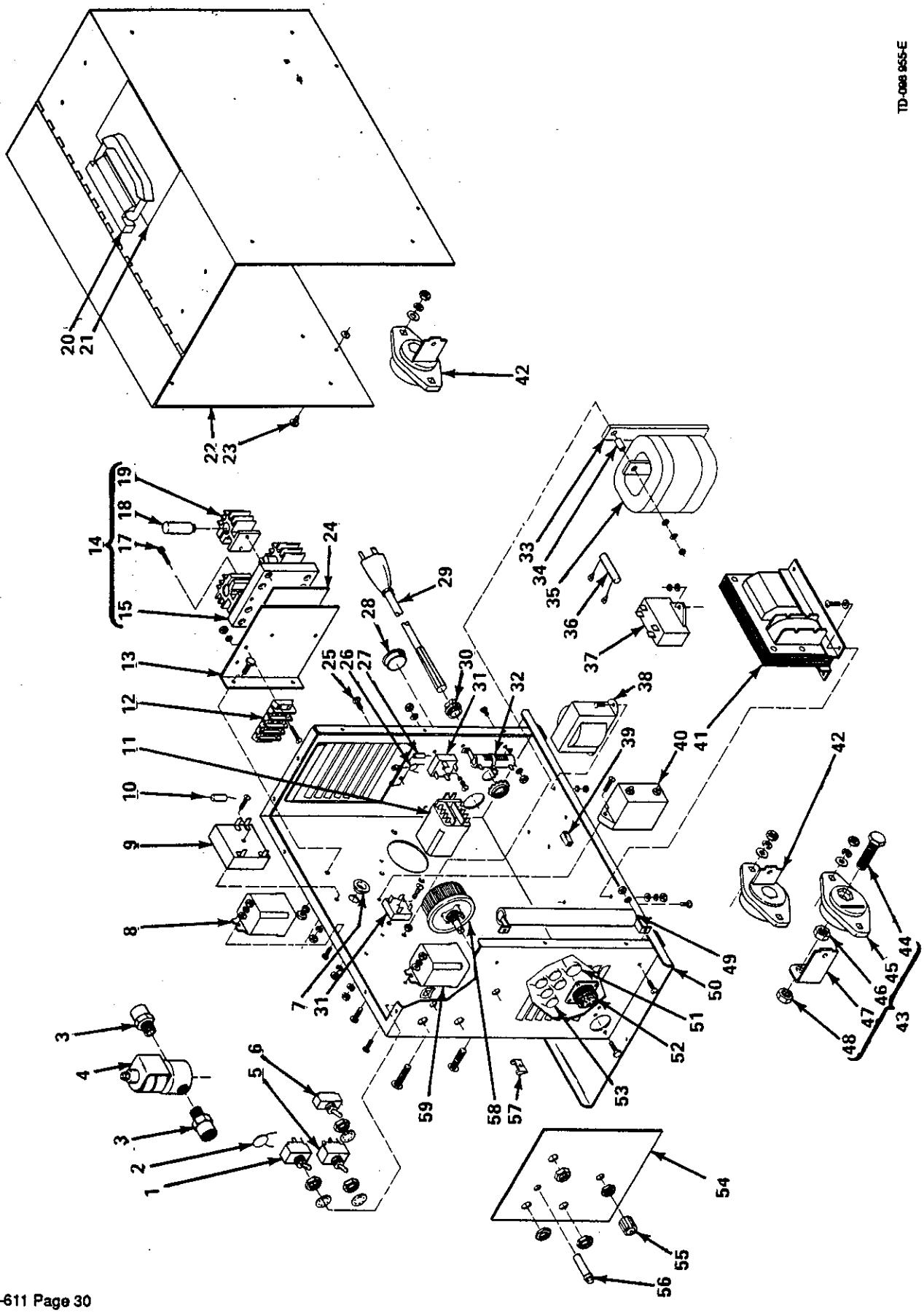


Figure 10-1. Complete Assembly (HF-251D-1 Illustrated)

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 115V	Quantity Model 230V
			Figure 10-1. Complete Assembly		
1	S1	028 111	SWITCH, tgl DPST 20A 250V	1	1
2	C1	106 601	CAPACITOR, cer .01 uf 500V	1	1
3		010 604	FITTING, hose brs bushing 1/4 NPT x 5/8 -18 RH	2	2
4	GS1	109 293	VALVE, 24VDC 2 way 1/4 IPS port 1/8 orf	1	
4	GS1	035 630	VALVE, 24VAC 6VDC 2 way 1/4 IPS port 1/8 orf		1
5	S2	088 409	SWITCH, tgl 2PDT 15A 125VAC	1	1
6	S3	089 085	SWITCH, tgl SPST 20A 125VAC	1	1
7		010 116	GROMMET, 3/8 ID x 1/2 mtg hole	2	2
		601 157	BLANK, snap - in 1/2 mtg hole	2	2
8	CR3	052 964	RELAY, encl 24VDC DPDT	1	
8	CR3	006 393	RELAY, encl 24VAC DPDT		1
9	TDM-1	114 494	TIMER, delay	1	1
10	R5	072 561	RESISTOR, CF .25W 270K ohm	1	1
11	CR1	059 267	RELAY, encl 12VDC DPDT w/flange	1	1
12	1T	038 081	BLOCK, term 20A 4P	1	
12	1T	038 861	BLOCK, term 20A 3P		1
		098 923	CONNECTOR, block 20A	4	3
13		097 612	BRACKET, mtg spark gap	1	1
14		020 623	SPARK GAP, (consisting of)	1	1
15		095 621	· BASE	1	1
17		602 023	· SCREW, cap skt hd 10-24 x 3/4	4	4
18	G	*020 603	· POINT	4	4
19		020 622	· HOLDER, point	4	4
20		126 416	HANDLE, chest	1	1
		126 415	CLAMP, saddle alum ally #380-3	1	1
21		121 316	LABEL, warning general precautionary	1	1
22		+129 366	WRAPPER	1	1
23		010 853	FASTENER, screw No. 2	2	2
		010 855	RETAINER, screw No. 2	3	3
24		097 712	STRIP, insulator	1	1
25		078 034	FASTENER, screw .736 lg	1	1
26	C4	080 894	CAPACITOR, cer .01uf 1000VDC	1	1
27	C3,14	031 630	CAPACITOR, elctlt 22uf 50VDC	2	
27	C3	031 630	CAPACITOR, elctlt 22uf 50VDC		1
28		000 527	BLANK, snap-in nyl .875 mtg hole	1	1
29	PLG3	023 618	CORD SET, 115V 16 ga 3/c	1	
29	PLG3	023 625	CORD SET, 230V 16 ga 3/c		1
30		115 104	CONNECTOR, clamp cable 1/2 inch	1	1
31	SR1,3	035 704	RECTIFIER, integrated 30A 600V	2	
31	SR1	035 704	RECTIFIER, integrated 30A 600V		1
32	R3	030 601	RESISTOR, WW adj 25W 1K ohm	1	1
33		133 845	STRIP, mtg - HF coil	2	2
34		126 888	TUBING, fbr vulc .250 ID x .312 OD	1	1
35	T2	126 901	COIL, HF coupling	1	1
36	R2	030 603	RESISTOR, WW fxd 10W 10K ohm	1	1
37	C5	106 935	CAPACITOR, poly film 10uf 250V	1	1
38	T3	036 135	TRANSFORMER, control 115-24VAC	1	
38	T3	099 002	TRANSFORMER, control 75 VA 230V		1
39	PLG2	131 059	HOUSING PLUG & SOCKETS, (consisting of)	1	1
		114 656	· TERMINAL, male 1 pin 18-24 wire	6	6
40	C2	096 761	CAPACITOR, mica .002uf 10000V	1	1
41	T1	074 398	TRANSFORMER, high voltage 115V	1	
41	T1	098 966	TRANSFORMER, high voltage 230V		1
42	ELEC	099 255	TERMINAL, power output neutral (consisting of)	2	2
43	WORK	039 047	TERMINAL, power output red (consisting of)	1	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity Model 115V	230V
			Figure 10-1. Complete Assembly (Continued)		
44		601 976	· SCREW, cap hex hd 1/2 x 1-1/2	1	1
45		039 040	· TERMINAL BOARD, neutral	1	1
45		039 049	· TERMINAL BOARD, red	1	1
46		601 880	· NUT, hex - jam 1/2-13	1	1
47		039 044	· BUS BAR	1	1
48		601 879	· NUT, hex - full 1/2-13	1	1
49	R1	083 784	RESISTOR, WW fxd 100W 10 ohm	1	1
50		+131 097	CASE	1	1
		128 230	LABEL, warning electric shock etc (on rear case)	1	1
		105 368	FOOT, case	2	2
51	C13	087 209	CAPACITOR, cer .003uf 2000V	1	1
52	RC1	109 769	RECEPTACLE, 14skt 97-4102A-20-27S	1	1
		109 766	PLUG, 14 pin 97-4106A-20-27P		
		109 970	TERMINAL, male 1 pin sz 45 16-22w		
		039 734	CLAMP, cable AN-3057-12		
53	C6-10	044 176	CAPACITOR, cer .01uf 1000VDC	5	5
54			NAMEPLATE, (order by model & serial number)	1	1
55		097 922	KNOB, indicator	1	1
56	PL1	027 645	LIGHT, indicator red lens 125VAC	1	
56	PL1	099 001	LIGHT, indicator red lens 250VAC		1
57		010 357	NUT, speed No. 2 clip on	3	3
58	R4	605 828	RHEOSTAT, WW 50W 1.5 ohm	1	1
59	CR2	116 592	RELAY, encl 24VDC 3PDT	1	
59	CR2	049 181	RELAY, encl 24VAC 4PDT		1
		130 336	CABLE, interconnecting (consisting of)	1	1
	PLG4	111 122	· HOUSING PLUG & PINS, (consisting of)	1	1
		109 770	· · TERMINAL, male 1 pin sz 45 16-22w	14	14
		116 964	· CLAMP, cable 97-3057-1012	1	1
		052 246	· CABLE, pwr No. 20ga 5/c (order by ft)	6ft	6ft
		115 104	· CONNECTOR, clamp cable .500	1	1
	RC2	115 093	· HOUSING PLUG & SOCKETS, (consisting of)	1	1
		113 746	· · TERMINAL, female 1skt 18-24w	6	6

*Recommended Spare Parts.
+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.