

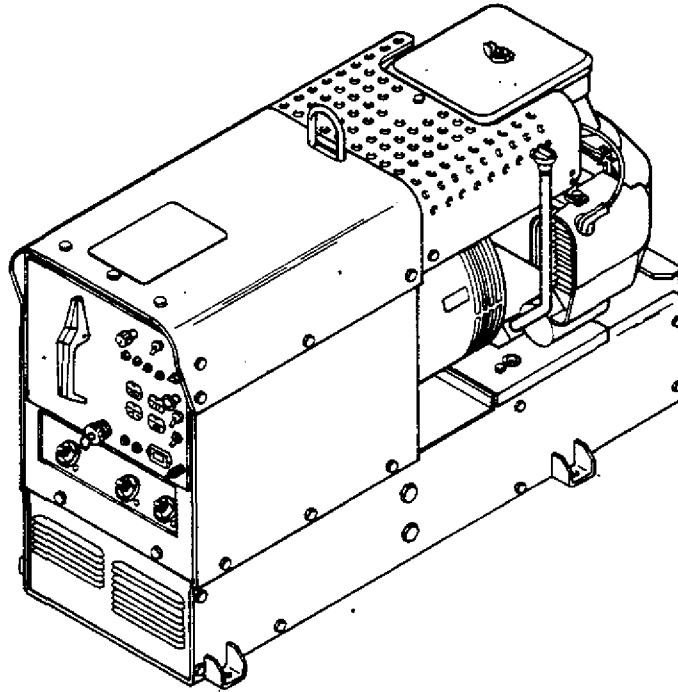
October 1986

FORM: OM-426

Effective With Serial No. JG018501

**IMPORTANT:** Read and understand the entire contents of this manual, with special emphasis on the safety material throughout the manual, 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.

MODEL  
TRAILBLAZER® 250G



# OWNER'S MANUAL



**MILLER ELECTRIC MFG. CO.**

718 S. BOUNDS ST, P.O. Box 1079  
APPLETON, WI 54912 USA

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PRINTED IN U.S.A.

# LIMITED WARRANTY

EFFECTIVE: JANUARY 2, 1986

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, MILLERMATIC parts that come in contact with the welding wire including 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 and components ..... 1 year
2. Original main power rectifiers ..... 3 years  
(labor - 1 year only)
3. All welding guns, feeder/guns and plasma torches ... 90 days
4. All other Millermatic Feeders ..... 1 year
5. Replacement or repair parts, exclusive of labor ... 60 days
6. 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.

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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.

# 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 - TROUBLESHOOTING

Amend Section 8 - 2. TROUBLESHOOTING CHART

Add the following to the Troubleshooting Chart:

TROUBLE	PROBABLE CAUSE	REMEDY
No weld output and no power output.	Exciter field shutdown.	Shut off IGNITION switch, check and tighten all weld and power connections, and restart engine (see Section 6-3). If condition persists, shut down unit and check condition of LED1 on PC3 according to Section 8-5 on this Errata Sheet.

Add Section 8 - 5. EXCITER FIELD SHUTDOWN INDICATOR LIGHT

In the event of an exciter field shutdown, indicator light LED1 on Exciter Field Shutdown Board PC3 turns on. In order to observe the condition of LED1 and confirm the shutdown condition, it is necessary to remove part of the outer enclosure and restart the engine. Proceed as follows:

**WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.

**MOVING PARTS** can cause serious injury.

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

**HOT ENGINE PARTS** can cause severe burns.

- Wear protective gloves and clothing when working near a hot engine.

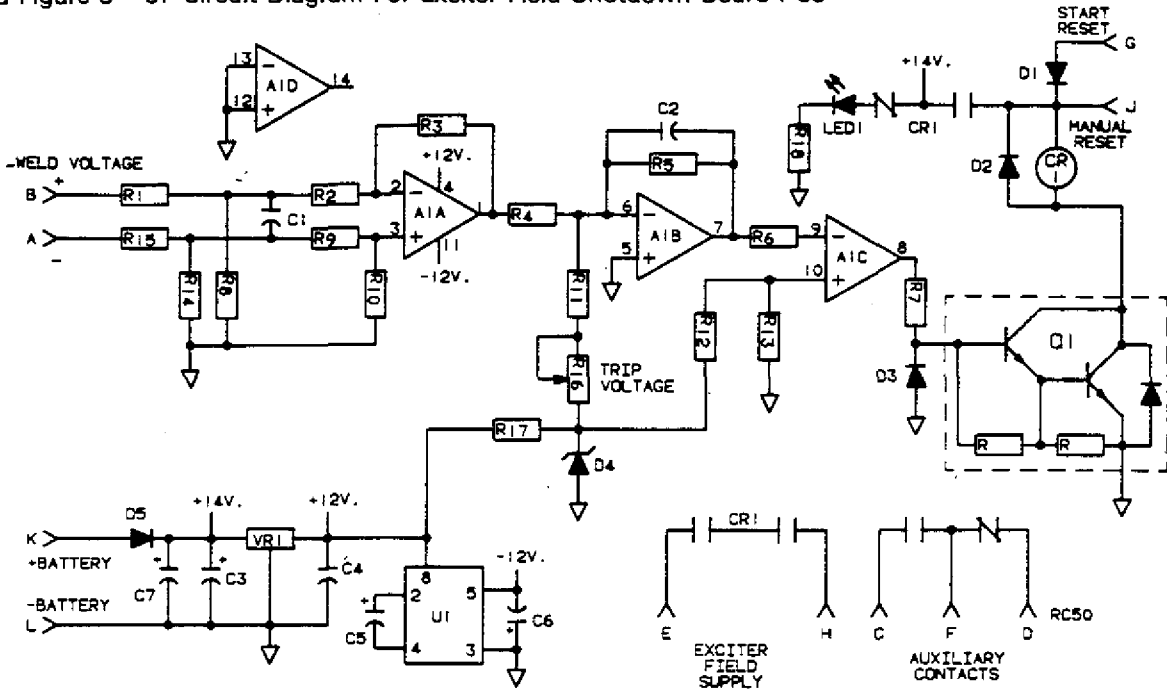
Only qualified persons are to perform this procedure.

1. Remove left side panel.
2. Locate Exciter Field Shutdown Board PC3 on control panel behind front panel. Indicator light LED1 is on the left edge of PC3.
3. Restart engine according to Section 6-3.
4. If LED1 is lit and the engine has been stopped and restarted, shut down the unit and contact the nearest Factory Authorized Service Station.
5. If LED1 is not lit and no weld or power output is available, shut down the unit and check the Troubleshooting Chart for other causes.
6. Reinstall the left side panel.

See Pages 2 and 3 for circuit diagrams.



Add Figure 8 - 5. Circuit Diagram For Exciter Field Shutdown Board PC3



Circuit Diagram No. A-112 555

Figure 8 - 5. Circuit Diagram For Exciter Field Shutdown Board PC3

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
2-15		061 441	070 217	STRIP, adjusting alternator	1
2-41	BAT	015 709	071 678	BATTERY, 12 volts 74 amp	1
6-12	S6	053 359	089 085	SWITCH, toggle SPST 20 amp 125 volts ac	1
7-2	PC3	107 268	112 593	BRACKET, mtg-components (Eff w/JG111773)	1
			112 542	CIRCUIT CARD, exciter field board (Eff w/JG111773)(consisting of)	1
	A1		096 275	IC, linear 324	1
	C1,2		073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	2
	C3		000 347	CAPACITOR, tantalum 0.33 uf 35 volts	1
	C4		000 340	CAPACITOR, ceramic 0.01 uf 50 volts	1
	C5,6		080 507	CAPACITOR, tantalum 22 uf 15 volts	2
	C7		097 358	CAPACITOR, electrolyte 2000 uf 16 volts dc	1
	CR1		094 935	RELAY, enclosed 12 volts dc 4PDT	1
	D1-3,5		026 202	DIODE, 1 amp 400 volts SP	4
	D4		037 203	DIODE, zener 6.8 volts 1 watt	1
	LED1		089 768	LED, 5053 1.7 volts 15MA	1
	Q1		005 274	TRANSISTOR, NPN 10 amp 80 volts	1
	R1,3,10,15		052 144	RESISTOR, carbon film 0.25 watt 240K ohm	4
	R2,4,9,11,13		093 037	RESISTOR, carbon film 0.25 watt 47K ohm	5
	R5		049 015	RESISTOR, carbon film 0.25 watt 10 meg ohm	1
	R6,12		000 885	RESISTOR, carbon film 0.25 watt 10K ohm	2
	R7,17,18		072 560	RESISTOR, carbon film 0.25 watt 1K ohm	3
	R16		009 172	POTENTIOMETER, cermet 25 turn 0.5 watt 50K ohm	1
			092 648	RESISTOR, carbon film 0.25 watt zero ohm	2
	RC50		112 544	TERMINAL, header 11 pin	1
	U1		110 325	IC, interface 7662	1
	VR1		047 272	IC, linear 78L12	1
			110 375	STAND-OFF SUPPORT, circuit card	4
			112 545	HOUSING, receptacle 11 contact	1
			113 724	BRACKET, support-cable choke (Eff w/HJ180255)	1

\*\*First digit represents page no - digits following dash represent item no.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



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## SECTION 1 - SAFETY RULES FOR OPERATION OF ARC WELDING POWER SOURCE

**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 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 accidentally 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 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 3 in Standards index.

This includes: a thorough steaming or caustic cleaning (or a solvent or water washing, depending on the combustible'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, PRECAUTIONS FOR SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, listed 6 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.

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.

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.

### **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 outer garments 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.

\*Trademark of Proctor & Gamble.

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.

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.

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.

### 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.

#### **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.
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.

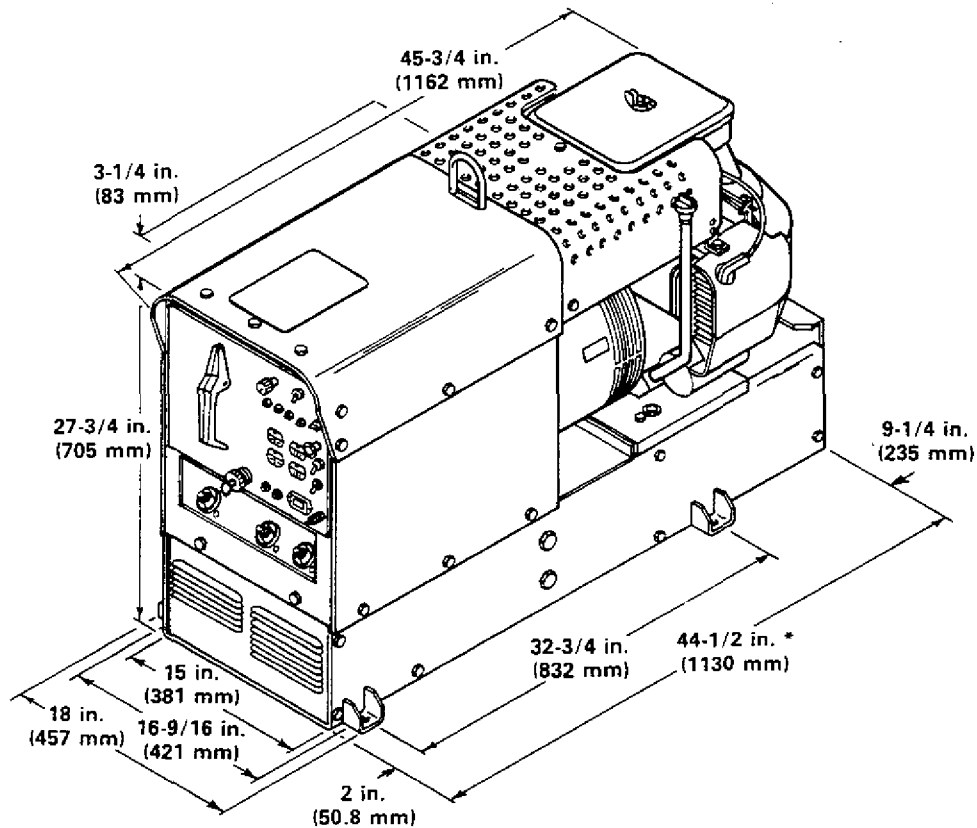
## SECTION 2 - INTRODUCTION

Rated Welding Current Amperes DC (Three-Phase Rectified)	Voltage Ranges In CV Mode (GMAW)	Current Ranges In CC Mode (SMAW)	Maximum Open-Circuit Voltage*	Amperage Voltage Adjustment	Single-Phase AC Auxiliary Power	Weight	
						Net	Ship
250 At 25 Volts, 60% Duty Cycle; 200 At 25 Volts, 100% Duty Cycle	18-36 Volts 23-46 Volts Open-Circuit Voltages	25-80 Amperes 35-115 Amperes 75-250 Amperes	46 Volts In CV Mode (GMAW) 95 Volts In CC Mode (SMAW)	Fine Adjustment In SMAW Amperage Ranges And GMAW Voltage Ranges	3 kva 60 Hz 1.0 Power Factor 120/240VAC 25/12.5 Amperes And 24VAC 10 Amperes While Welding†	550 lbs. (249 kg)	575 lbs. (261 kg)

\*Maximum OCV values may not be actual working values as shown on V-A curves.

†120 Volts AC is available at the duplex receptacle and 14-socket Amphenol receptacle; 24 Volts AC is available only at the Amphenol receptacle.

**Figure 2 - 1. Specifications**



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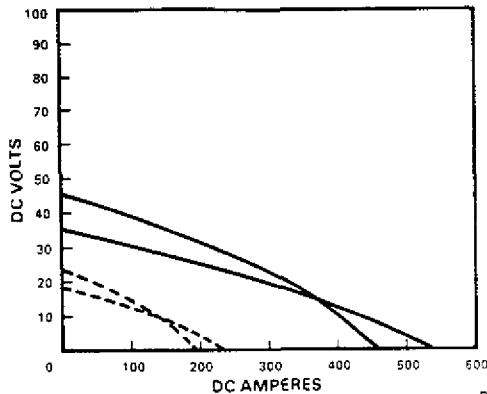
\*Add 2-1/2 in. (63.5 mm) for Range switch handle and 1-3/8 in. (35 mm) for battery box handle.

**Figure 2 - 2. Overall Dimensions And Base Mounting Hole Layout**

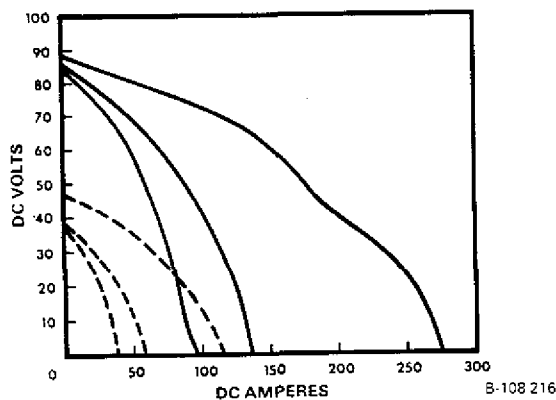
## 2 - 1. VOLT-AMPERE CURVES (Figure 2-3)



The volt-ampere curves show the voltage and amperage output capabilities of the welding generator.



Volt-Ampere Curves For CV Mode



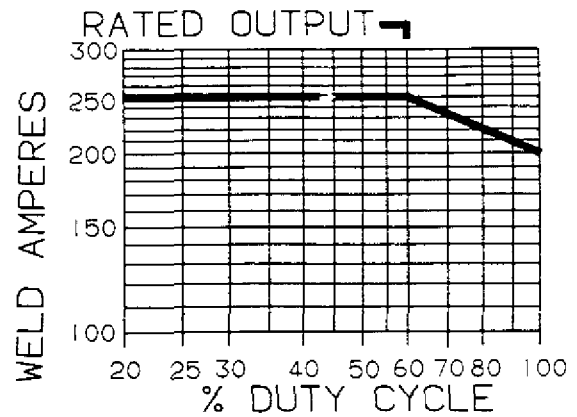
Volt-Ampere Curves For CC Mode

Figure 2 - 3. Volt-Ampere Curves

**2 - 2. DUTY CYCLE (Figure 2-4)** - The duty cycle of a welding generator is the percentage of a ten minute period that a welding generator can be operated at a given output current setting without causing overheating and damage to the unit. This welding generator has dual duty cycle ratings, each for a specific amperage output range. See Figure 2-1 for various amperage output ranges and associated duty cycles. If this unit is operated in the 250 ampere output range, the duty cycle of the unit is rated at 60 percent. This means that the unit can be operated at rated load for six minutes out of every ten. During the remaining four minutes, the unit should idle (no load) to permit proper cooling. If the welding amperes decrease, the duty cycle increases. When this unit is operated in the 200 ampere output range, the duty cycle of the unit is rated at 100 percent. This means that the welding generator can be operated continuously. Figure 2-4 shows the output of the unit at various duty cycles.

**CAUTION:** EXCEEDING DUTY CYCLE RATINGS will damage the welding generator.

- Do not exceed indicated duty cycles.



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Figure 2 - 4. Duty Cycle Chart

## 2 - 3. 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.

The nameplate of this unit uses international symbols for labeling the front panel controls. The symbols also appear at the appropriate section in the text.

### 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.

Safety instructions specifically pertaining to this unit appear throughout this manual highlighted by the signal words **WARNING** and **CAUTION** which identify different levels of hazard.

**WARNING** statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in serious personal injury or loss of life.

**CAUTION** statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in minor personal injury or damage to this equipment.

A third signal word, **IMPORTANT**, highlights instructions which need special emphasis to obtain the most efficient operation of this equipment.



**2 - 4. RECEIVING-HANDLING** - Before installing this equipment, clean all packing material from around the unit, and carefully inspect for any damage that may have occurred during shipment. Any claims for loss or damage that may have occurred in transit must be filed **by the purchaser with the carrier**. A copy of the bill of lading will be furnished by the manufacturer on request if occasion to file claim arises.

When requesting information concerning this equipment, it is essential that Model Description and Serial Number of the equipment be supplied.

**2 - 5. DESCRIPTION** - This unit is a gasoline engine-driven constant voltage/constant current (CV/CC)

three-phase rectified dc arc welding generator. In the constant voltage (CV) mode, the unit is designed for use with the Gas Metal Arc Welding (GMAW) process. In the constant current (CC) mode, the unit is designed for use with the Shielded Metal Arc Welding (SMAW) process.

In addition to welding capability, this unit can provide up to 3 kva of 120/240 volts (25/12.5 amperes) 60 Hz, ac auxiliary power while welding.

This unit is also equipped to provide 24 volts and 120 volts 60 Hz ac auxiliary power for optional accessories by means of the REMOTE RECEPTACLE.

## SECTION 3 - INSTALLATION

**3 - 1. LOCATION (Figure 2-2)** - A proper installation site should be selected for the welding generator if the unit is to provide dependable service and remain relatively maintenance free.

**WARNING: ENGINE EXHAUST GASES can kill.**

- Operate in open, well-ventilated areas or if operated indoors vent engine exhaust outside the building.
- Keep engine exhaust vent outlet away from building air intakes.

**CAUTION: RESTRICTED AIR FLOW causes overheating and possible damage to internal parts.**

- Maintain at least 18 inches (457 mm) of unrestricted space on all sides of unit and keep underside free of obstructions.
- Do not place any filtering device over the intake air passages of this welding generator.

Warranty is void if any type of filtering device is used.

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

### A. Lifting Of Equipment

**WARNING: FALLING EQUIPMENT can cause serious personal injury and equipment damage.**

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other heavy options, accessories, or devices.
- Use equipment of adequate capacity to lift the unit.
- If using lift forks to handle this unit, be sure the lift forks are long enough to extend out of the opposite side of the base.

Using lift forks too short will expose internal components to damage should the tips of the lift forks penetrate the bottom of the unit.

This welding generator is provided with a lifting eye for moving the unit.

### B. Mounting

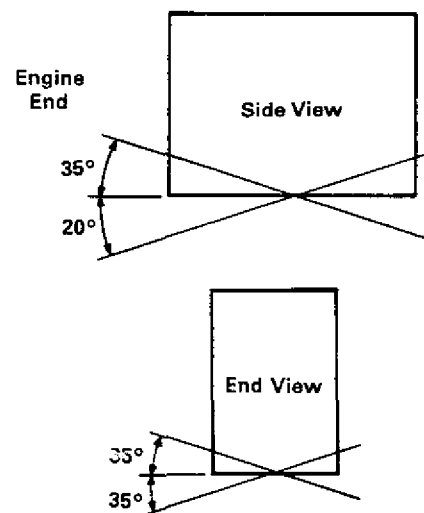
**CAUTION: UNCONTROLLED TILTING OF TRAILER can result in personal injury or equipment damage.**

- Distribute weight so that trailer tongue weight is approximately 10% of the gross trailer weight.
- Follow trailer manufacturer's instructions when mounting welding generator onto trailer.

**OPERATION ON UNLEVEL SURFACE can cause improper lubrication and result in severe engine damage.**

- Operate unit in an approximately level position.
- See Figure 3-1 for maximum allowable tilt for proper operation.
- Check crankcase oil level with unit on a level surface.

Exceeding these limits can cause severe engine damage and improper carburetor operation.



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**Figure 3 - 1. Allowable Tilt Angles**

Holes are provided in the base for securing the unit in a permanent location, or to a trailer, running gear, or transport vehicle. Figure 2-2 gives overall dimensions and base mounting hole layout.

The mounting location should allow sufficient room to remove the top cover, side panels, and battery box for maintenance and repair functions.

Use a properly fitting canvas cover (optional) over the welding generator when not in operation to protect the unit from the environment. Be sure unit is cool before installing any cover.

### C. Spark Arrestor Considerations

**WARNING:** ENGINE EXHAUST SPARKS can cause fire.

- Exhaust spark arrestor must be installed in accordance with local, state, and federal regulations.

The engine exhaust system on this welding generator is not equipped with a spark arrestor. A spark arrestor, maintained in effective working order, is mandatory if this welding generator is to be operated in a National Forest or on California Grasslands, brush, or forest covered land (see Section 4442 of California Public Resources Code). For other areas, check your state and local laws. If a spark arrestor (optional) is desired, contact your dealer/distributor.

### 3 - 2. CONNECTING THE BATTERY

**WARNING:** BATTERY ACID can burn eyes and skin and destroy clothing and other material.

- Wear a face shield and proper protective clothing when working with batteries.

**ABNORMAL VOLTAGE** can cause damage to engine electrical components.

- Do not operate engine without the battery connected.
- Do not disconnect the battery while the engine is running.

This unit is equipped with a maintenance-free battery. To place the unit in service, connect the negative (-) battery cable to the negative battery terminal. No other preparation should be required. If the battery does not supply enough power to crank the engine, the battery will require charging. See Section 7-12 for battery charging procedures.

### 3 - 3. FUEL

**WARNING:** ENGINE FUEL can cause fire or explosion.

- Stop engine before checking or adding fuel.
- Do not spill fuel; if spilled, wipe up.
- Do not refuel if engine is hot or running.
- Do not refuel near sparks or open flame.
- Do not smoke while refueling.
- Do not fill fuel tank to top; allow 1/2 in. (13 mm) from fuel to tank top for expansion.

**IMPORTANT:** Fill fuel tank up to 1/2 in. (13 mm) from top with fresh fuel before starting engine the first time. Rust and corrosion preventative was added to inside of fuel tank and engine at the factory and could cause rough engine running if not properly diluted with a full tank of fresh fuel.

The capacity of the fuel tank is 5 gallons U.S. Measure (18.9 liters). See the Engine Manufacturer's Manual for fuel recommendations.

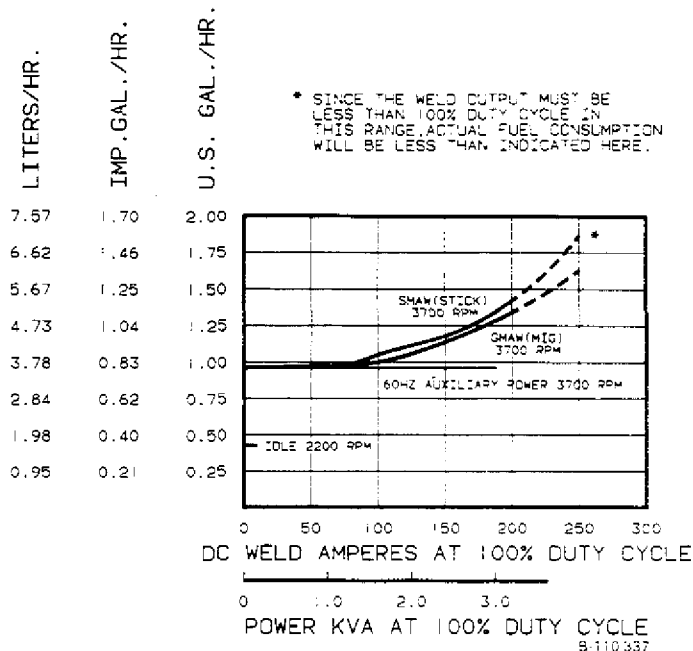


Figure 3 - 2. Fuel Consumption Chart

Figure 3-2 illustrates typical fuel consumption under specific load conditions. Fuel consumption varies from one engine to another. Different brands of fuel, operating conditions, condition of the engine, etc., also affect the fuel consumption level.

**CAUTION:** POOR QUALITY, LOW OCTANE FUEL can damage engine.

- Use clean, fresh, unleaded gasoline meeting engine manufacturer's specifications (see engine maintenance label for minimum octane rating).
- Do not mix oil with gasoline.
- Do not use gasohol.

Gasoline with a lower octane rating than specified may cause detonation (knocking) which could damage the engine. Regular gasoline may be used, however unleaded gasoline is preferred because it reduces pollution and combustion chamber deposits. See Engine Owner's Manual (B48G Engine) for complete fuel information.

**3 - 4. LUBRICATION** - The engine is shipped with its crankcase filled with SAE 20 break-in oil. If the oil level is not up to the full mark on the dipstick, add oil according to the recommendations in the Engine Owner's Manual (B48G engine) before starting the engine.

**3 - 5. EQUIPMENT GROUNDING TERMINAL (Figure 5-1)** - This unit is equipped with a grounding terminal for grounding the generator case. Since the generator neutral is connected to the frame, the equipment grounding terminal must be connected to a proper earth ground. Additionally, comply with all national, regional, and local codes concerning portable generators for the specific application.

For detailed grounding instructions consult your national, regional, and local codes. If additional informa-

tion regarding your particular operating circumstances and/or grounding requirements is needed, consult a qualified electrician or your dealer. After determining the extent to which any grounding requirements apply to your particular situation, follow them explicitly.

### 3 - 6. WELD OUTPUT CONNECTIONS (Figure 3-3)



To obtain the full rated output from this unit, it is necessary to select, install, and maintain proper welding cables. Failure to comply in any of these areas may result in less than satisfactory welding performance.

#### A. Welding Cables

If welding cables were not ordered with this unit, the steps listed should be followed to ensure the best welding performance:

1. Keep cables as short as possible, and place cables close together. Excessive cable length adds resistance which may reduce output or cause overloading of the unit.
2. Select adequate size welding cable for the anticipated maximum weld current. Use total length of welding cable in the circuit to determine cable size. For example: If the cable to the wire feeder, or electrode holder cable if applicable, is 25 feet (7.5 m) long and work cable is 25 feet (7.5 m) long, select the size cable recommended in Table 3-1 for 50 feet (15 m).

Table 3 - 1. Welding Cable Size

WELDING AMPERES	TOTAL LENGTH OF CABLE ( COPPER ) IN WELD CIRCUIT							
	50	100	150	200	250	300	350	400
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	2	2	1	1/0	2/0	3/0	4/0	4/0
250	1	1	1/0	2/0	3/0	4/0	4/0	2-2/0

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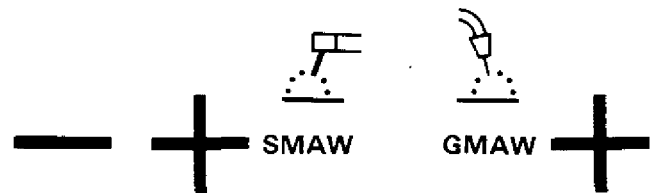
- NOTE
- \*A. 50 FEET OR LESS
  - \*B. CABLE SIZE IS BASED ON DIRECT CURRENT (DC), 60% DUTY CYCLE AND EITHER A 4 VOLTS OR LESS DROP OR A CURRENT DENSITY OF NOT OVER 300 CIRCULAR MILS PER AMP.
  - \*C. WELD CABLE INSULATION WITH A VOLTAGE RATING TO WITHSTAND THE OPEN CIRCUIT VOLTAGE (OCV) OF THE WELDING POWER SOURCE MUST BE USED. WHILE MOST WELDING POWER SOURCES HAVE AN OPEN CIRCUIT VOLTAGE OF LESS THAN 100 VOLTS, SOME WELDING MACHINES OF SPECIAL DESIGN MAY HAVE HIGHER OPEN CIRCUIT VOLTAGE

3. Do not use damaged or frayed cables.
4. Install correct size lugs of adequate amperage capacity onto ends of both cables for connecting to work clamp, wire feeder, electrode holder if applicable, and weld output terminals.
5. If applicable install electrode holder onto cable following manufacturer's instructions. An in-

sulated electrode holder must be used to ensure operator safety.

6. Install work clamp onto cable.

#### B. Installation (Figure 3-3)



#### **WARNING :** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable before making any weld output connections.

#### **MOVING PARTS** can cause serious injury.

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

1. For Gas Metal Arc Welding (GMAW) (Electrode Positive/Reverse Polarity):
  - a. Connect one weld cable to Positive (+) GMAW weld output terminal and remaining end to terminal on drive housing of wire feeder (see wire feeder Owner's Manual for location).
  - b. Connect one end of work cable to Negative (-) weld output terminal and remaining end to workpiece.

**IMPORTANT :** For Electrode Negative/Straight Polarity connections, reverse cable connections to weld output terminals; electrode becomes negative.

2. For Shielded Metal Arc Welding (SMAW) (Electrode Positive/Reverse Polarity):
  - a. Connect end of electrode holder cable to Positive (+) SMAW weld output terminal.
  - b. Connect one end of work cable to Negative (-) weld output terminal and remaining end to workpiece.

**IMPORTANT :** For Electrode Negative/Straight Polarity connections, reverse cable connections to weld output terminals; electrode becomes negative.

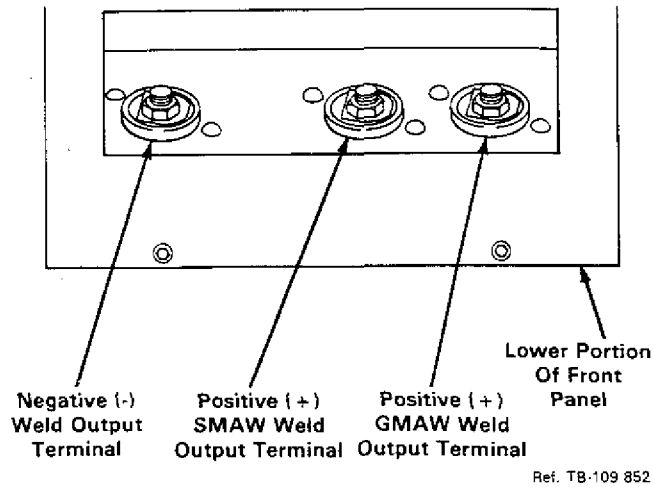


Figure 3 - 3. Weld Output Connections

### 3 - 7. REMOTE RECEPTACLE CONNECTIONS (Figures 3-4 And 5-1)



#### REMOTE RECEPTACLE

The 14-socket Amphenol REMOTE RECEPTACLE RC5 provides a junction point for connecting a Remote Amperage/Voltage Control and/or a Remote Contactor Control or a wire feeder providing switch closure for contactor control to the control circuitry of the welding generator. To make connections, insert plug fully into receptacle, and rotate threaded collar clockwise.

The command signals required and the output signals available at the sockets of receptacle RC5 by means of the welding generator control circuitry are, as follows:

**Socket A:** Up to 10 amperes of 24 volts ac 60 Hz with respect to socket G (circuit common), protected by circuit breaker CB6.

**Socket B:** Weld contactor control for 24 volts ac wire feeders providing contact closure to socket A.

**Socket C:** +10 volts dc with respect to socket D; reference voltage for output command signal.

**Socket D:** Control circuit common for remote control device.

**Socket E:** Output command signal to wiper of remote control potentiometer, 0 volts equals machine minimum; +10 volts equals machine maximum.

**Socket F:** Not used.

**Socket G:** 24 and 120 volts ac circuit common.

**Socket H:** Not used.

**Socket I:** Up to 10 amperes of 120 volts ac 60 Hz with respect to socket G (circuit common), protected by circuit breaker CB1.

**Socket J:** Weld contactor control for 120 volts ac wire feeders providing contact closure to socket I.

**Socket K:** Machine chassis.

**Socket L:** Not used.

**Socket M:** Not used.

**Socket N:** Not used.

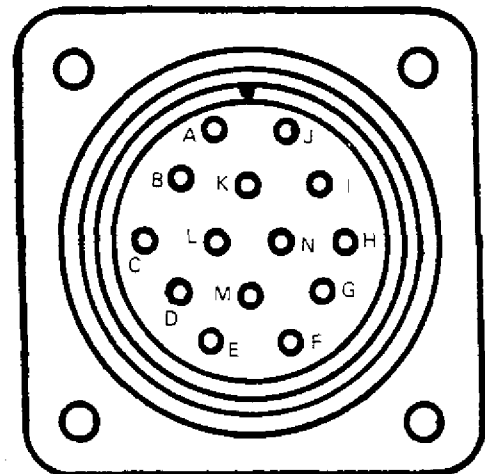


Figure 3 - 4. Front View Of 14-Socket Amphenol Receptacle With Socket Designations

## SECTION 4 - AUXILIARY POWER



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

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before making internal inspection.
- Keep clear of moving parts, i.e., fans, belts, rotors, etc.
- Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed.

- Ground generator as required by any applicable national and local electrical codes.
- Keep all covers and panels in place while operating.

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

**ELECTRIC SPARKS can cause fire.**

- Disconnect welding cables when using auxiliary power.
- Watch for fire.
- Have a fire extinguisher nearby and know how to use it.

The weld output terminals are electrically energized when the engine is running and the contactor is energized unless the CONTACTOR CONTROL switch is placed in the ON position.

**LOW VOLTAGE AND FREQUENCY** can damage electrical equipment.

- Turn off or unplug all electrical equipment connected to the auxiliary power receptacles before starting, stopping, or idling the engine.
- Place Auto Idle switch in the Off position if auxiliary equipment cannot tolerate low voltage and frequency.

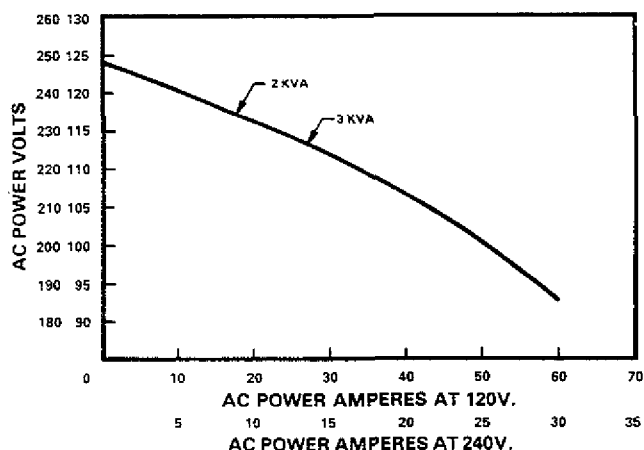
When starting, stopping, or idling, the engine has low speed which causes low voltage and frequency.

**IMPORTANT:** This unit is designed to supply single-phase 60 Hz ac auxiliary power when operating at weld/power rpm only.

**IMPORTANT:** Auxiliary power output is independent of the Range switch and Fine Amperage/Voltage Adjustment control positions.

**4 - 1. POWER WHILE WELDING (Figure 4-1)** – A total of 3 kva of auxiliary power is available from the auxiliary power duplex receptacles while welding.

The auxiliary power supplied by this welding generator is for operating single-phase, portable, cord-connected accessory equipment. The voltage at the receptacles varies according to the load current drawn. The voltage at various currents can be determined from Figure 4-1.



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Figure 4 - 1. AC Power Curves For 120 And 240 Volts Duplex Receptacles

**4 - 2. 120 VOLTS 25 AMPERES AC DUPLEX RECEPTACLE AND CIRCUIT BREAKERS (Figure 5-1)**

120V 25A  AC

Rated auxiliary power output is 3 kva of 120 volts ac 60 Hz at the 120V 25A duplex receptacle RC1. This duplex receptacle provides auxiliary power for operating cord-connected accessory equipment when the engine is operating at weld/power rpm. However, the power available is dependent on the amount of power being drawn from the 240 VOLTS AC duplex receptacle.

Up to 15 amperes can be drawn from either half of the 120 VOLTS AC duplex receptacle; however, total load on the duplex receptacle cannot exceed 25 amperes. The combined continuous load of all receptacles cannot exceed the kva rating of the generator.

Circuit breakers CB2 and CB3 are provided to protect each half of the 120V 25A duplex receptacle from overload and fault conditions. If either half of this duplex receptacle is overloaded, only the overloaded half becomes inoperative; the remaining portion is fully operational.

The circuit breakers are automatic-trip type and are not manually operable. When the circuit breaker button is in (ON position), the circuit breaker is functional. When the button is out (OFF position), the breaker is open and not functional.

If CB2 or CB3 trips when equipment use begins, a fault is probably present in the equipment. If a breaker trips after prolonged equipment use, an overload condition is probably present. Should CB2 or CB3 trip, proceed as follows:

**WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect equipment from deenergized receptacle before repairing a fault or overload.

1. Locate and repair fault or reduce receptacle load.
2. Reconnect equipment to receptacle and start engine.
3. Reset circuit breaker (depress button); it may be necessary to allow a cooling period before the breaker can be reset.
4. Resume operation.

**4 - 3. 240 VOLTS 12.5 AMPERES AC DUPLEX RECEPTACLE AND CIRCUIT BREAKERS (Figure 5-1)**

240V 12.5A  AC

Rated auxiliary power output is 3 kva of 240 volts ac 60 Hz at the 240V 12.5A duplex receptacle RC2. This duplex receptacle provides auxiliary power for operating cord-connected accessory equipment when the engine is operating at weld/power rpm. However, the power available is dependent on the amount of power being drawn from the 120 VOLTS AC duplex receptacle.

Up to 12.5 amperes can be drawn from either half of the 240 VOLTS AC duplex receptacle. The combined continuous load of all receptacles cannot exceed the kva rating of the generator.

Circuit breakers CB4 and CB5 are provided to protect the 240V 12.5A duplex receptacle from overload and fault conditions. If either half of this duplex receptacle is overloaded, the respective circuit breaker will trip and stop output to both receptacle halves.

The circuit breakers are automatic-trip type and are not manually operable. When the circuit breaker button is in (ON position), the circuit breaker is functional. When the button is out (OFF position), the breaker is open and not functional.

If CB4 or CB5 trips when equipment use begins, a fault is probably present in the equipment. If a breaker trips after prolonged equipment use, and overload condition is probably present. Should CB4 or CB5 trip, proceed as follows:

**WARNING: ELECTRIC SHOCK can kill.**

- Do not touch live electrical parts.
- Shut down the engine and disconnect equipment from deenergized receptacle before repairing a fault or overload.

1. Locate and repair fault or reduce receptacle load.
2. Reconnect equipment to receptacle and start engine.
3. Reset circuit breaker (depress button); it may be necessary to allow a cooling period before the breaker can be reset.
4. Resume operation.

**SECTION 5 - OPERATOR CONTROLS**

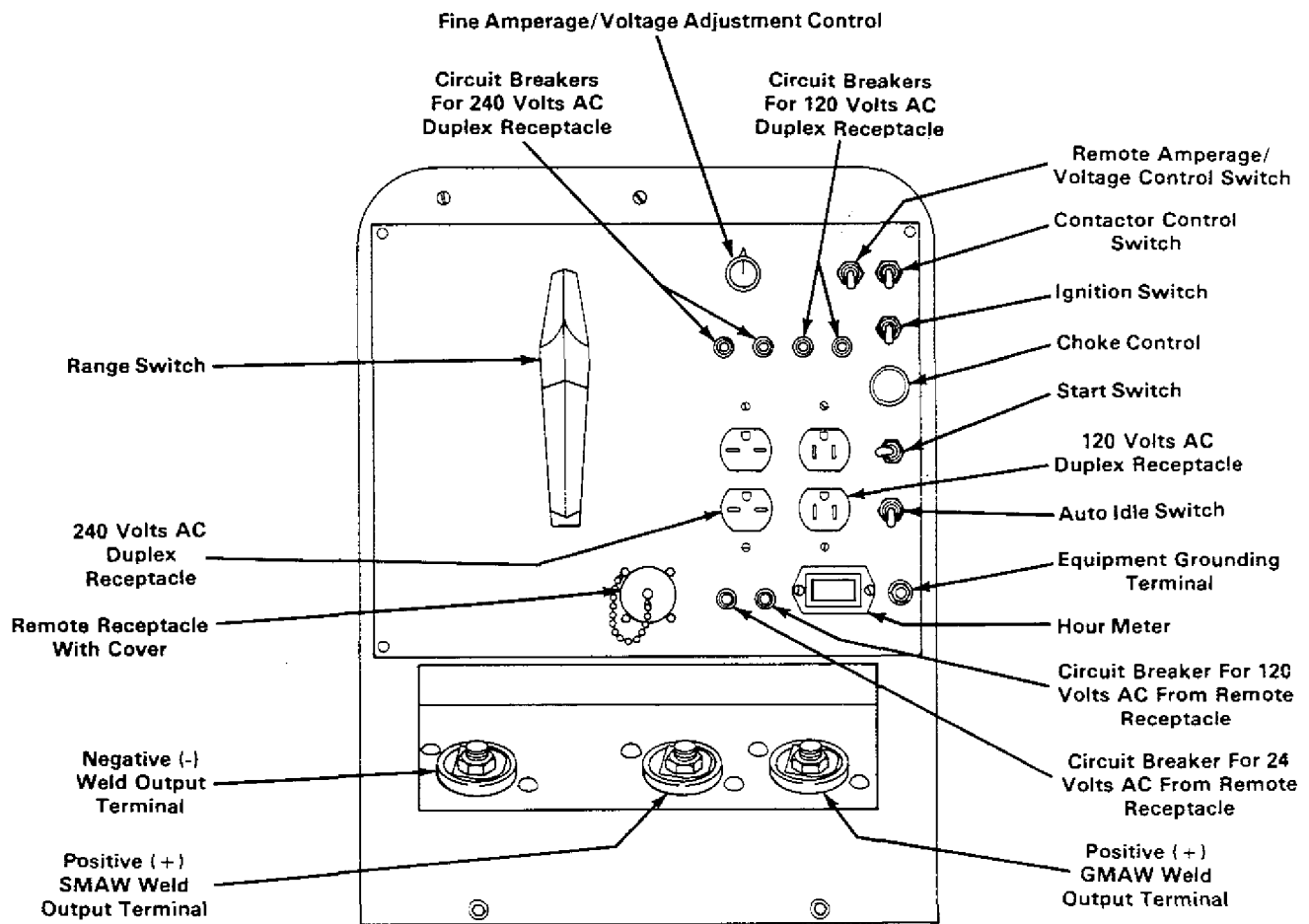


Figure 5 - 1. Front Panel Controls

TB-109 852

5 - 1. RANGE SWITCH (Figure 5-1)



The Range switch provides two coarse voltage ranges for Gas Metal Arc Welding (GMAW) and three coarse amperage ranges for Shielded Metal Arc Welding (SMAW). The range of each switch position is

displayed on the nameplate surrounding the Range switch handle.

**CAUTION: ARCING can damage switch contacts.**

- Do not change the position of the Range switch while welding or under load.
- Arcing causes the contacts to become pitted and eventually inoperative.

**5 - 2. FINE AMPERAGE/VOLTAGE ADJUSTMENT CONTROL (Figure 5-1)**

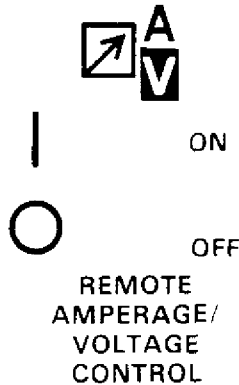


The Fine Amperage/Voltage Adjustment control permits the operator to select a welding current or voltage between the minimum and maximum values of the coarse range selected by the Range switch. The scale surrounding the control is calibrated from 0 to 100 percent in increments of ten. The scale represents a percentage of the coarse range selected, not an actual amperage or voltage value.

Auxiliary power output is independent of the Fine Amperage/Voltage Adjustment control setting.

**IMPORTANT:** *The Fine Amperage/Voltage Adjustment control may be adjusted while welding.*

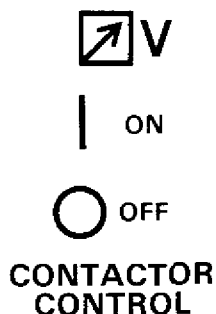
**5 - 3. REMOTE AMPERAGE/VOLTAGE CONTROL SWITCH (Figure 5-1)**



If remote amperage or voltage control is desired, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the ON position, and rotate the Fine Amperage/Voltage Adjustment control to the desired maximum output setting for the range selected on the Range switch. The Remote Amperage Control or Remote Voltage Control adjusts output up to this maximum in the selected range.

If remote amperage or voltage control is not desired, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the OFF position.

**5 - 4. CONTACTOR CONTROL SWITCH (Figure 5-1)**



**WARNING: ELECTRIC SHOCK can kill.**

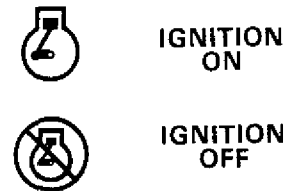
- Do not touch live electrical parts.
- Do not touch the weld output terminals when the contactor is energized.
- Do not touch electrode holder (or gun wire) and work clamp at the same time.

If the CONTACTOR CONTROL switch is in the OFF position, open-circuit voltage will be present at the weld output terminals whenever the engine is running.

If remote contactor control by means of a wire feeder or remote device is desired, place the CONTACTOR CONTROL switch in the ON position. Open-circuit voltage will be present at the weld output terminals whenever the gun switch or remote device is closed.

The ON position is normally used with the Gas Metal Arc Welding (GMAW) process. The OFF position is normally used with the Shielded Metal Arc Welding (SMAW) process.

**5 - 5. IGNITION SWITCH (Figure 5-1)**

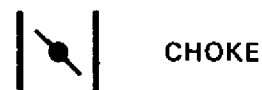


Placing the IGNITION switch in the ON position will energize the welding generator ignition circuitry and place the welding generator in a ready-to-start status. Placing the IGNITION switch in the OFF position will shut the welding generator down. If left in the ON position, it will discharge the battery.

**5 - 6. OIL PRESSURE SHUTDOWN SWITCH** - This unit is equipped with a low oil pressure shutdown switch S7. If oil pressure drops to the point where engine damage can occur, switch S7 will open thereby stopping the engine. Do not attempt to operate the engine until the trouble is corrected.

**IMPORTANT:** *If the engine starts and suddenly shuts down, see Section 8.*

**5 - 7. CHOKE CONTROL (Figure 5-1)**



A CHOKE control is provided for varying the fuel-air mixture to the engine. When the CHOKE control is pulled fully out, very little air will be admitted to the engine through the carburetor thereby supplying a richer mixture of fuel. This position is required if the engine is cold.

when started. As the engine warms up, push the CHOKE control inward slowly until it is pushed in as far as it will go. When the CHOKE control is fully in, the engine should be ready for load.

#### 5 - 8. START SWITCH (Figure 5-1)



START

The START switch is a spring-loaded toggle switch. Placing the switch in the START position will engage the starter. The switch must be released as soon as the engine has started to prevent damage to the starter.

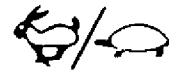
**5 - 9. AUTO IDLE SWITCH (Figure 5-1)** - The automatic idling device saves fuel by allowing the engine to idle when the welding generator is not loaded. The Auto Idle switch controls the operation of this device.

**CAUTION:** INCORRECT POSITION of Auto Idle switch can damage electrical equipment connected to REMOTE RECEPTACLE and auxiliary power receptacles.

- Place Auto Idle switch in the Off position if auxiliary equipment cannot tolerate low voltage and frequency.

Idling engine speed causes low voltage and frequency.

#### A. ON Position



When the Auto Idle switch is in the On position, the engine will remain at idle rpm ( $2200 \pm 100$ ) until an arc is struck or load applied to the Amphenol or duplex receptacles. When an arc is struck or load applied to the Amphenol or duplex receptacles, the engine speed will increase to weld/power rpm (3700). Approximately 10 seconds after the arc is broken or load is removed, the engine will return to idle rpm. This time delay is nonadjustable.

#### B. OFF Position



When the Auto Idle switch is in the Off position, engine speed remains at governed weld/power rpm (3700) when the generator is not loaded.

**5 - 10. HOUR METER (Figure 5-1)** - The meter, labeled TOTAL HOURS, registers the total hours of engine operation. This information is useful for routine maintenance on the engine.

## SECTION 6 - SEQUENCE OF OPERATION

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

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before inspecting or servicing.
- Keep clear of moving parts, i.e., fans, belts, rotors, etc.
- Keep all covers and panels in place while operating.

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

**ARC RAYS can burn eyes and skin; NOISE can damage hearing.**

- Wear correct eye, ear, and body protection.

**FUMES AND GASES can seriously harm your health.**

- Ventilate to keep from breathing fumes and gases.
- If ventilation is inadequate, use approved breathing apparatus.
- Use in open, well ventilated areas or vent exhaust out of doors.

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

- Watch for fire.
- Have a fire extinguisher nearby and know how to use it.
- Allow work and equipment to cool before handling.

**WELDING WIRE can cause puncture wounds.**

- Do not point gun toward any part of the body or other personnel.

**ENGINE FUEL can cause fire or explosion.**

- Stop engine before checking or adding fuel.
- Do not spill fuel; if spilled, wipe up.
- Do not refuel if engine is hot or running.
- Do not refuel near sparks or open flame.
- Do not smoke while refueling.
- Do not fill fuel tank to top; allow room for expansion.

**MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.**

- Wearers should consult with 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 METAL ARC WELDING (GMAW)

**WARNING:** Read and follow safety information at beginning of entire Sections 4 and 6 before proceeding.

1. Ensure that the unit has been installed and prepared as instructed in Section 3.
2. Install and prepare wire feeder according to its Owner's Manual.



3. Place the Range switch in one of the two Gas Metal Arc Welding (GMAW) positions (see Section 5-1).
4. Rotate the Fine Amperage/Voltage Adjustment control to the desired position (see Section 5-2).
5. If a remote amperage/voltage control is not used, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the OFF position. If a remote amperage/voltage control is to be used, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the ON position (see Section 5-3).
6. Place the CONTACTOR CONTROL switch in the ON position (see Section 5-4).
7. Turn on shielding gas supply at the source, if applicable.
8. Start the engine as instructed in Section 6-3.
9. Place the Auto Idle switch in the Off position (see Section 5-9).
10. Plug in desired auxiliary equipment to the 120 VOLTS AC and 240 VOLTS AC duplex receptacles (see Sections 4-2 and 4-3).
11. Energize the auxiliary equipment, if applicable.
12. Begin welding.

## 6 - 2. SHIELDED METAL ARC WELDING (SMAW)

**WARNING :** Read and follow safety information at beginning of entire Sections 4 and 6 before proceeding.

1. Ensure that the unit has been installed and prepared as instructed in Section 3.
2. Place the Range switch in one of the three Shielded Metal Arc Welding (SMAW) positions (see Section 5-1).
3. Rotate the Fine Amperage/Voltage Adjustment control to the desired position (see Section 5-2).
4. If a remote amperage/voltage control is not used, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the OFF position. If a remote amperage/voltage control is to be used, place the REMOTE AMPERAGE/VOLTAGE CONTROL switch in the ON position (see Section 5-3).
5. If a remote contactor control is not used, place the CONTACTOR CONTROL switch in the OFF position. If a remote contactor control is to be used, place the CONTACTOR CONTROL switch in the ON position (see Section 5-4).
6. Start the engine as instructed in Section 6-3.

## 6 - 3. STARTING THE ENGINE

**IMPORTANT :** Read entire engine Owner's Manual (B48G Engine) before operating engine.

### 1. Engine Prestart Checks

#### a. Oil Level

Check engine oil level. Fill to top mark on dipstick if necessary (see engine manual for oil selection specifications).

#### b. Fuel Level

Check fuel level. Fill tank with fresh, clean gasoline if necessary (see engine manual for fuel specifications).

2. Place the CHOKE control in the full choke position (see Section 5-7).
3. Place the Auto Idle switch in the Off position (see Section 5-9).

**IMPORTANT :** The START switch must be released as soon as the engine starts to prevent damage to the starter.

4. Place the IGNITION switch in the ON position (see Section 5-5).
5. Press and hold the START switch until engine starts (see Section 5-8).

**CAUTION :** REENGAGING STARTER MOTOR while flywheel is rotating or EXCEEDING RATED CRANKING TIME can damage starting components.

- Do not reengage starter motor until starter pinion and flywheel have stopped rotating.
- Do not exceed engine manufacturer's maximum cranking time of 20 seconds.

Allow two minutes cooling time before attempting to restart engine.

6. Once engine has started, slowly push the CHOKE control inward.
7. Allow the engine to run for a few minutes before applying a load. This is necessary to enable the engine to properly warm up and ensure proper lubrication.

## 6 - 4. SHUTTING DOWN

1. Stop welding and turn off or disconnect any auxiliary equipment.
2. Place the Auto Idle switch in the On position.
3. Turn off the shielding gas at the source, if applicable.

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

- Shut off gas supply when not in use.
4. Operate the engine at idle speed for a few minutes to allow internal engine temperature to equalize.
  5. Place the IGNITION switch in the OFF position.

## SECTION 7 - MAINTENANCE

**WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable before inspecting, maintaining, or servicing.

**MOVING PARTS can cause serious injury.**

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

**HOT ENGINE PARTS can cause severe burns.**

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

**7 - 1. GENERAL** - The service life of this welding generator can be prolonged and operating efficiency maintained under normal conditions by following the routine service and workshop maintenance procedures outlined in this section and in the Engine Owner's Manual (B48G Engine). Where operating conditions are severe, more frequent attention must be given to all routine service categories; however a special effort must be made to maintain clean internal and external engine surfaces.

### 7 - 2. PERIODIC CLEANING AND INSPECTION

**WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable before inspecting, maintaining, or servicing.

**MOVING PARTS can cause serious injury.**

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

**HOT ENGINE PARTS can cause severe burns.**

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

A schedule for cleaning and inspection should be set up, based on the type and conditions of service, to include the following:

Keep the inside of the unit clean by blowing out the unit with clean, dry compressed air.

Wipe oil and fuel spills from engine immediately to avoid accumulation of dust.

Check for fluid leaks indicating loose oil or fuel connections. Tighten loose connections and clean oil or fuel spills or leaks off engine surfaces.

**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 the Parts List for part number of precautionary labels.

**IMPORTANT:** See the Engine Owner's Manual (B48G Engine) for complete engine care.

**7 - 3. LUBRICATION** - The engine is equipped with a full-flow oil filter. Change the oil and filter according to instructions on unit maintenance label and in Engine Owner's Manual (B48G Engine). Use correct type and grade oil as listed in instructions for expected temperature range before next oil and filter change.

### 7 - 4. FUEL FILTER

**WARNING:** ENGINE FUEL can cause fire or explosion.

- Stop engine before working on fuel system.
- Do not spill fuel; if spilled, wipe up.
- Do not service fuel filter if engine is hot or running.
- Do not service fuel filter near sparks or open flame.
- Do not smoke while servicing fuel filter.
- Have a fire extinguisher nearby and know how to use it.

Maintenance to be performed only by qualified persons.

This unit is equipped with an in-line fuel filter located on top of flywheel blower housing near carburetor. The fuel filter should be replaced after every 200 hours of operation, or more often depending on the quality of gasoline used and how dusty and dirty the location is in which the engine is being used. To replace the in-line fuel filter, proceed as follows:

1. Allow engine to cool.
2. Release hose clamps, and remove filter and clamps.
3. Inspect fuel line for any cracks or deterioration, and replace if necessary.
4. Install new hose clamps and fuel filter.
5. Inspect fuel line connections for leaks; correct any leaks.
6. Wipe up any spilled fuel.

7. Start the engine as instructed in Section 6-3.
8. Reinspect fuel line connections for leaks.
9. Stop engine, and correct any leaks.
10. Wipe up any spilled fuel, and resume operation.

## 7 - 5. AIR CLEANER

### **CAUTION:** DIRTY AIR can damage engine.

- Do not operate engine with dirty air cleaner element in place.
- Do not operate engine without air cleaner element in place.

The air cleaner is one of the most important parts of the engine from the standpoint of engine life. If dirty air gets into the engine, it can wear out a set of piston rings within a few operating hours.

This engine is equipped with a dry paper type filter element and a washable foam pre-cleaner. Dry paper element type cleaners can be cleaned by removing the element and tapping lightly, causing loose dirt to fall off. The element should be replaced if dirt does not drop off easily.

The paper element should be handled with care to avoid perforations. Removing the dirt with compressed air can rupture the paper element. Check to ensure that gasket surfaces of the element are not bent or damaged in any way. Gasket surfaces must seal tightly at the top and bottom of the cleaner shell to prevent foreign matter from entering the carburetor.

Whenever the air cleaner is removed, cover the air intake hole to prevent dirt from falling into the carburetor. Service air cleaner and foam pre-cleaner according to maintenance label and Engine Owner's Manual (B48G Engine).

**7 - 6. GOVERNOR** - The governor has been set at the factory and should not require further adjustment. If the governor works loose or is disconnected, adjustments should be made by a Factory Authorized Service Station.

If the spring attached to the governor arm works loose or is disconnected, reattach the spring exactly as illustrated in Figure 7-1.

## 7 - 7. ENGINE SPEED ADJUSTMENTS (Figure 7-1)

### **WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.

### **MOVING PARTS** can cause serious injury.

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

### **HOT ENGINE PARTS** can cause severe burns.

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

**IMPORTANT:** Clean and gap points and plugs, and warm up engine before proceeding with the engine speed adjustments.

The engine speeds have been factory adjusted and should not require frequent readjustment. After tuning the engine, check the speeds with a tachometer. With no load applied, the idle speed should be 2200 rpm, and the weld/power speed 3700 rpm. If necessary, adjust the speeds as follows:

1. Start the engine as instructed in Section 6-3.
2. Loosen the two throttle solenoid position adjustment screws (see Figure 7-1).
3. Pull the governor arm away from the carburetor to cause the engine to idle. While holding the governor arm against spring tension, make the following adjustments:
  - a. Rotate idle speed adjustment screw until the engine runs at 2200 rpm.
  - b. Rotate idle mixture adjustment screw in or out to obtain maximum rpm with idle speed adjustment screw against stop ( $1 \pm 1/8$  turn open).
  - c. Readjust idle speed adjustment screw for 2200 rpm.
4. Place the Auto Idle switch in the On position to energize the throttle solenoid.
5. Slide solenoid forward or backward until the idle speed adjustment screw just touches the carburetor low speed stop.
6. Tighten the two solenoid position adjustment screws. Check solenoid linkage for any binding, and readjust throttle solenoid if necessary. The idle speed should be 2200 rpm  $\pm$  100.

### **CAUTION:** INCORRECT FUEL-AIR MIXTURE can damage engine.

- Ensure that the idle mixture adjustment screw is  $1 \pm 1/8$  turn open.

If engine surges (is running lean) or spark plugs foul (is running too rich), especially after long periods of idling, repeat Step 3.

7. Place the Auto Idle switch in the Off position.
8. Loosen locking nut on the weld/power speed adjustment rod, and rotate adjustment nut until the engine runs at 3700 rpm. Tighten locking nut.

**7 - 8. HIGH-ALTITUDE CARBURETOR MODIFICATION (Optional) (Figure 7-1)** - The carburetor can be equipped with an adjustable main jet for high-altitude operation (above 5000 ft. or 1524 m). Minor adjustment will be necessary for proper operation at a particular altitude. Whenever carburetor adjust-

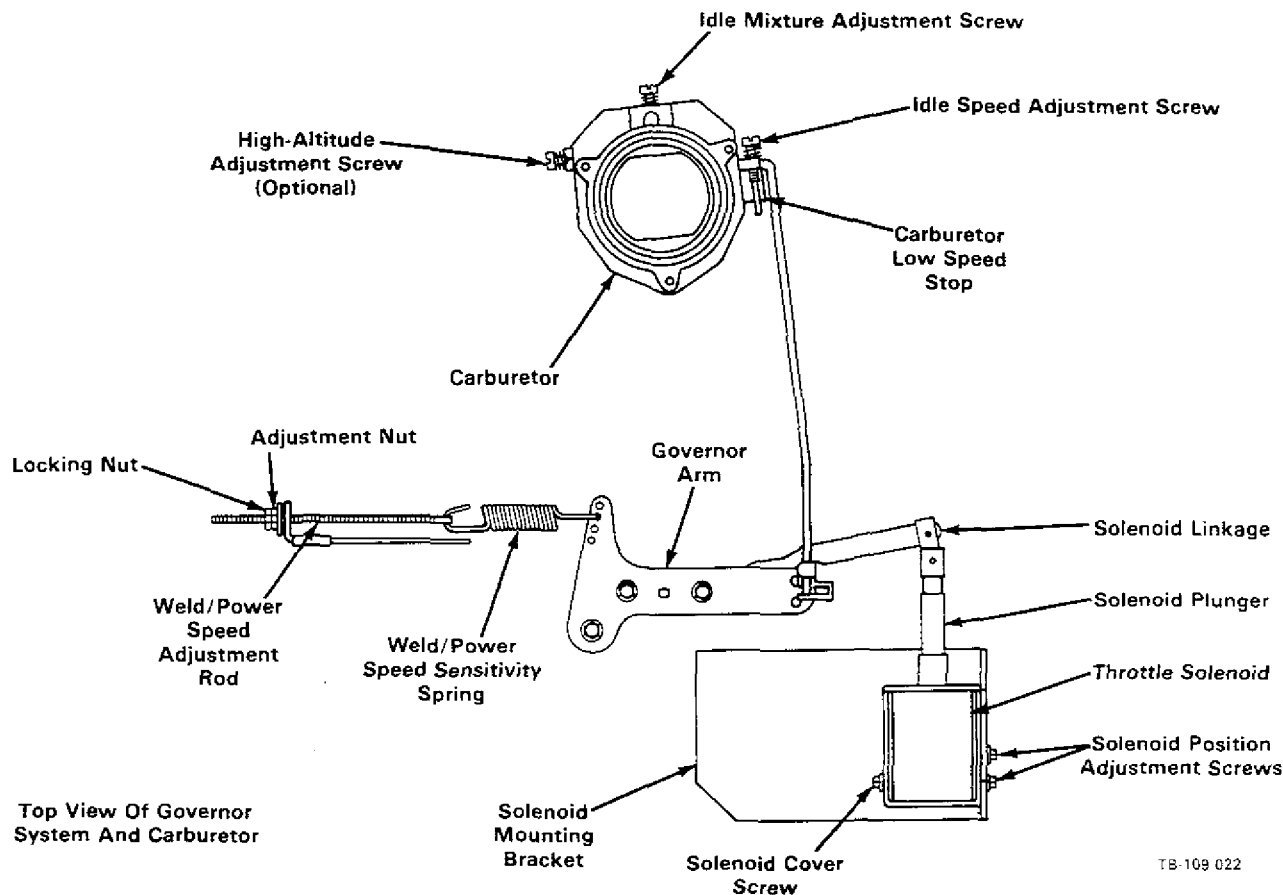


Figure 7 - 1. Engine Speed Adjustments And Components

ment is necessary, allow the engine to reach operating temperature and proceed as follows:

1. Place the Auto Idle switch in the Off position.
2. While applying a continuous load to the welding generator, rotate the high altitude adjustment screw for best output (see Figure 7-1).
3. Check weld/power speed (3700 rpm). Readjust if necessary.

### 7 - 9. SERVICING THE SPARK ARRESTOR (Optional)

**WARNING: ENGINE EXHAUST SPARKS can cause fire.**

- Exhaust spark arrestor must be installed in accordance with local, state, and federal regulations.
- Shut down engine before cleaning spark arrestor.
- Clean spark arrestor in a noncombustible environment.

**HOT ENGINE PARTS can cause severe burns.**

- The exhaust system must be cold when servicing the spark arrestor.

The engine exhaust system on this welding generator is not equipped with a spark arrestor. A spark arrestor, maintained in effective working order, is mandatory if this welding generator is to be operated in a National

Forest or on California Grasslands, brush, or forest covered land (see Section 4442 or California Public Resources Code). For other areas, check your state and local laws. If a spark arrestor (optional) is desired, contact your dealer/distributor.

Internal combustion engines operating in a highly combustible environment are a common fire hazard. Glowing carbon particles blown out with the exhaust can retain sufficient heat to ignite materials. While no practical spark arresting device will stop all sparks, this device will minimize fires hazards by removing and trapping most solid particles provided that it is properly maintained.

The carbon trap should be serviced weekly or every 50 operating hours, whichever occurs first. The entire spark arrestor should be inspected every 1000 operating hours or three times per season.

Removal of the device from the exhaust system is not necessary for servicing. Proceed as follows to service the spark arrestor:

1. Stop the engine and allow the exhaust system to cool.
2. Remove the cleanout plug from the bottom of the spark arrestor. If a crust has formed over the hole, break it loose with a screwdriver or similar tool.

3. Start the engine and run it at idle rpm to blow collected particles out the cleanout hole. If particles are slow to discharge, momentarily cover the end of the exhaust stack.
4. Stop the engine, and allow the exhaust system to cool.
5. Replace and secure the cleanout plug.

## 7-10. ELECTRICAL SYSTEM

### **WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before inspecting, maintaining, or servicing.

### MOVING PARTS can cause serious injury.

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

### HOT ENGINE PARTS can cause severe burns.

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

**IMPORTANT:** Inspect cables, wiring, and battery when performing routine oil changes at intervals specified on the engine maintenance label.

#### A. Cables And Wiring

Check interconnecting wiring and connections for tightness and flaws. Ensure that the weld output cable connections are clean and tight. Check the insulation for breaks or other signs of damage. Repair or replace cables or wiring as necessary.

#### B. Battery

### **WARNING:** BATTERY ACID can burn eyes and skin and destroy clothing and other materials.

- Wear correct eye and body protection.
- Inspect the battery for loose connections, damaged cables, corrosion, cracked case or cover, loose hold-downs, and loose or deformed terminal posts.

Clean and tighten connections, replace cables, or replace battery if necessary.

## 7-11. BRUSHES AND SLIP RINGS (Figure 7-2)

### **WARNING:** ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before inspecting, maintaining, or servicing.

### MOVING PARTS can cause serious injury.

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

### HOT ENGINE PARTS can cause severe burns.

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

Brush life is very good under most operating conditions. The brushes and slip rings should be inspected every six months or whenever excitation voltage is lost. Check

for cleanliness of the slip rings and freedom of motion of the brushes. If the welding generator has been operating under extremely dusty or dirty conditions, increase the frequency of inspection.

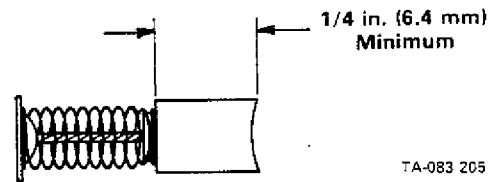


Figure 7 - 2. Brush Replacement

Under normal use the slip rings will discolor to a dark brown. If a buildup of brush material is noted, it may be necessary to clean the slip rings. Use a 3/0 or finer sandpaper followed by a crocus cloth. Never use emery cloth as part of the emery will embed itself into the rings and in turn destroy the carbon brushes.

Replace the brushes if they become chipped or broken or if less than 1/4 in. (6.4 mm) of brush material is left.

## 7-12. MAINTENANCE-FREE BATTERY CHARGING

### **WARNING:** CHARGING A FROZEN BATTERY can cause the battery to explode and result in serious personal injury or damage to equipment.

- Allow battery to warm up to 60°F (16°C) before charging if battery is frozen.

### **WARNING:** BATTERY ACID can burn eyes and skin and destroy clothing and other materials; BATTERY GASES can explode and shatter battery.

- Wear a face shield, proper protective clothing, and remove all metal jewelry.
- Do not spill or splash battery fluid.
- Do not apply pressure to walls of filled battery—use battery carrier or place hands on opposite corners when lifting battery.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries.
- Use enough ventilation to keep battery gases from building up during and for several hours after battery charging.
- Turn battery charger off before making connections to battery.
- Do not touch or move connections on battery while battery charger is on.
- Do not lean over battery when charging.
- Be sure battery charger connections to battery are clean and tight.
- Keep vent caps in place and cover top of battery with damp cloth.
- Be sure battery charger output matches battery voltage.
- Turn the battery charger off before disconnecting the charger from the battery.

1. Remove battery from unit, and place on a level worktable or other suitable surface.

2. If battery has removable vent caps, check the condition of the electrolyte as follows:
  - a. Check electrolyte temperature in one of the center cells with a battery thermometer. For each 10°F (6°C) increment above 80°F (27°C), a correction factor of 0.004 specific gravity must be added to the specific gravity reading taken in Step 2b. For each 10°F (6°C) increment below 80°F (27°C), 0.004 must be subtracted from the reading taken in Step 2b.
  - b. Check the specific gravity of each cell with a hydrometer. (Draw in and expel the electrolyte two or three times from the first cell to be tested to adjust the temperature of the hydrometer to that of the electrolyte.)
  - c. If a corrected specific gravity reading of 1.225 at 80°F (27°C) is not obtained, replace the vent caps and recharge the battery following the battery charger manufacturer's instructions.
3. If battery does not have removable vent caps, check the condition of the battery as follows:
  - a. Check the stabilized open-circuit voltage of the battery. For a 12 volt battery any reading below 12.4 volts indicates the battery needs charging. Disconnect both battery cables from the battery and allow battery voltage to stabilize for several hours.
  - b. If the stabilized open-circuit voltage is below 12.4 volts, charge the battery following the battery charger manufacturer's instructions.
4. Remove damp cloth from battery.
5. Reinstall battery in unit.
6. Replace battery holddown, and tighten securely. Do not overtighten.

7. Connect positive (+) battery cable to positive (+) battery terminal.
8. Connect negative (-) battery cable to negative (-) battery terminal.

**7-13. EXCITER EXCITATION AND AC MAIN FIELD WINDINGS PROTECTION** - The exciter excitation winding of this welding generator is protected by fuse F1, located at the rear of the front panel, immediately to the lower left of the Range switch. Should fuse F1 open, there would be no weld or auxiliary power output. The ac main field winding is protected by fuse F2, located in wiring harness leads 9 and 11 near fuse F1. Should fuse F2 open, there would be no weld output. Usually if either fuse opens, there are other problems to be corrected. If F1 or F2 open repeatedly, contact the nearest Factory Authorized Service Station. To replace fuse F1 or F2, proceed as follows:

**WARNING: ELECTRIC SHOCK can kill.**

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before inspecting, maintaining, or servicing.

**MOVING PARTS can cause serious injury.**

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

**HOT ENGINE PARTS can cause severe burns.**

- Wear protective gloves and clothing when working on a hot engine.

Maintenance to be performed only by qualified persons.

1. Remove left side panel.
2. Check F1 and F2, and replace if necessary.

**CAUTION: INCORRECT FUSE can damage unit.**

- Be sure replacement fuse is same size, type, and rating.

3. Reinstall left side panel.

## SECTION 8 - TROUBLESHOOTING

**8 - 1. GENERAL** - It is assumed that proper installation has been made, according to Section 3 of this manual, the operator is familiar with the function of controls, the welding generator was functioning properly, and that the trouble is not related to the welding process.

### 8 - 2. TROUBLESHOOTING CHART

**WARNING: ELECTRIC SHOCK can kill.**

- Do not touch live electrical parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before inspecting, maintaining, or servicing.

**MOVING PARTS can cause severe injury.**

- Keep clear of moving parts, i.e., fans, belts, rotors, etc.

**HOT ENGINE PARTS can cause serious burns.**

- Wear protective gloves and clothing when working on a hot engine.

**MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.**

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

Troubleshooting of internal parts to be performed only by qualified persons.

The following chart is designed to diagnose and provide remedies for some of the troubles that may develop in this welding generator.

Use this chart 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, strictly follow the manufacturer's procedures and instructions.

TROUBLE	PROBABLE CAUSE	REMEDY
No weld output.	REMOTE AMPERAGE/VOLTAGE CONTROL switch S4 in ON position without a remote amperage/voltage control connected.	Place S4 in the OFF position, or make remote control connection (see Section 3-7).
	CONTACTOR CONTROL switch S5 in ON position without a remote contactor control connected.	Place S5 in the OFF position, or make remote contactor control connection (see Section 3-7).
	Contactor control switch S5 was placed from ON to OFF while engine was at idle speed.	Place Auto Idle switch S6 from ON to OFF and then ON again.
	Fuse F1 or F2.	Check F1 and F2 and replace if necessary (see Section 7-13). If F1 or F2 repeatedly opens, contact nearest Factory Authorized Service Station.
	Contactor W.	Check W points for wear, and replace points if necessary.
	Loss of residual magnetism in revolving field.	Contact nearest Factory Authorized Service Station for field flashing procedure.
	Open or shorted winding in stator coil.	Contact nearest Factory Authorized Service Station.
	Field current regulator board PC2.	Contact nearest Factory Authorized Service Station.
Low weld output.	Engine running below required speed (3700 rpm).	Check air cleaner and foam pre-cleaner; clean or replace as necessary (see Section 7-5).
		Clean and adjust points and plugs; adjust carburetor (see Engine Owner's Manual, B48G engine).
		Adjust engine speed (see Section 7-7).
	Engine not developing proper horsepower.	Perform necessary engine maintenance (see Enging Owner's Manual, B48G engine).
Erratic welding arc.	Loose or dirty connections.	Check connections both inside and outside welding generator.
	Check leads and contacts of Range switch S1.	Discoloring of copper contacts could indicate heating caused by loose connection. Replace contact or switch plate; tighten connections.
	Damp or wrong type electrodes (SMAW).	Try different electrode.
	Incorrect wire or gas.	Contact your distributor.
	Improper connection to workpiece.	Check and tighten loose connections.

TROUBLE	PROBABLE CAUSE	REMEDY
Erratic weld and power output.	Dirty slip rings and/or worn brushes.	Clean slip rings and replace worn brushes (see Section 7-11).
Weld output can not be adjusted.	REMOTE AMPERAGE/VOLTAGE CONTROL switch S4 in wrong position.	Place S4 in correct position (see Section 5-3).
High weld voltage with Range switch in minimum (75-250A) or medium (35-115A) position during Shielded Metal Arc Welding (SMAW).	Field current regulator board PC2.	Contact nearest Factory Authorized Service Station.
Remote contactor control will not activate contactor.	Contact Control switch S5 in OFF position.	Place S5 in the ON position (see Section 3-7).
	Poor connections to REMOTE RECEPTACLE RC5.	Check and tighten loose connections (see Section 3-7).
	Remote contactor control device.	Check and repair if necessary.
	Contact W.	Check W points for wear, and replace if necessary.
No power output at REMOTE RECEPTACLE RC5.	Circuit breakers CB1 and CB6.	Reset CB1 or CB6 (see Section 8-4).
No power output at power receptacles.	Circuit breakers.	Reset CB2, CB3, CB4, or CB5 (see Section 4-2 or 4-3).
	Poor contact between slip rings and brushes.	Clean the slip rings with 3/0 sandpaper and if necessary, install new brushes (see Section 7-11).
	Fuse F1.	Check F1 and replace if necessary (see Section 7-13). If F1 repeatedly opens, contact nearest Factory Authorized Service Station.
	Loss of residual magnetism in revolving field.	Contact nearest Factory Authorized Service Station for field flashing procedure.
	Open or shorted winding in stator coil.	Contact nearest Factory Authorized Service Station.
Low power output at power receptacles.	Engine running below required speed.	Check air cleaner; clean or replace as necessary (see Section 7-5).
		Clean and adjust points and plugs; adjust carburetor (see Engine Owner's Manual, B48G engine).
		Adjust engine speed (see Section 7-7).
	Engine not developing proper horsepower.	Perform necessary engine maintenance (see Engine Owner's Manual, B48G engine).



TROUBLE	PROBABLE CAUSE	REMEDY
Engine will not start.	Battery problem.	Check engine battery charging system according to engine service manual (not supplied with engine).
		Inspect the electrical system (see Section 7-10). If the trouble is isolated to the battery, replace the battery.
		Jump start the engine using approved safety practices and booster battery (see Section 8-3).
	Ignition switch S2 and/or START switch S3.	Check S2 and S3, and replace if necessary.
	Engine problems.	See Engine Owner's Manual (B48G engine).
Battery discharges between uses.	Ignition switch S2 left in ON position.	Be sure that S2 is left in OFF position when unit is shut down.
	Buildup of acid on top of battery (white-grayish substance).	Clean battery with baking soda solution; rinse with clear water.
	Infrequent use.	Recharge battery approximately every 3 months (see Section 7-12).
	Battery.	Replace battery.
Engine starts and suddenly shuts down.	Low oil pressure shutdown switch S7.	Check oil level (see Engine Owner's Manual, B48G engine and Section 5-6).
Engine will not return to idle rpm.	Auto Idle switch S6 in the Off position.	Place S6 in the On position (see Section 5-9).
	Wire feeder or remote device drawing current with gun switch (or remote device) open.	Turn wire feeder power switch to OFF position so engine will idle.
	Relay CR2.	Contact nearest Factory Authorized Service Station.
	Automatic idle control board PC1.	Contact nearest Factory Authorized Service Station.
Engine will not remain at weld/power rpm when power or weld load is applied with Auto Idle switch in On position.	Insufficient load.	Place Auto Idle switch S6 in Off position.

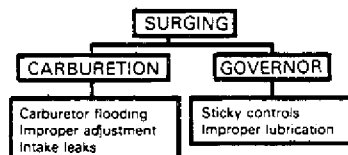
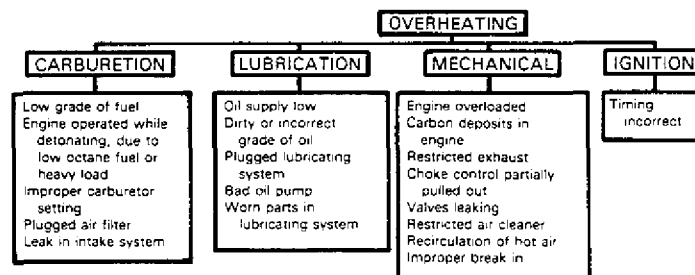
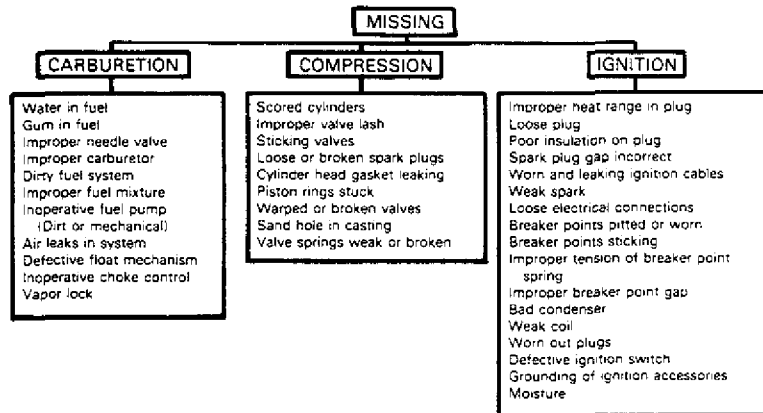
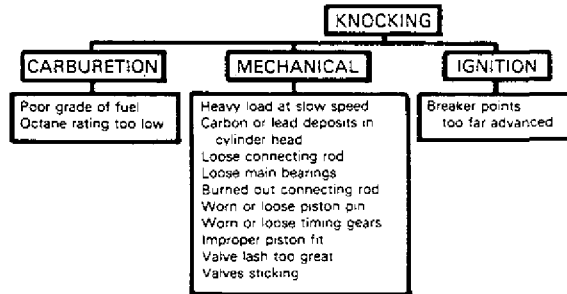
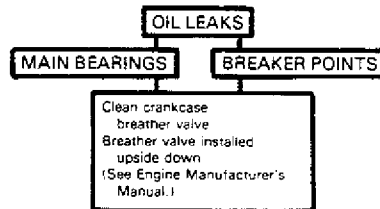
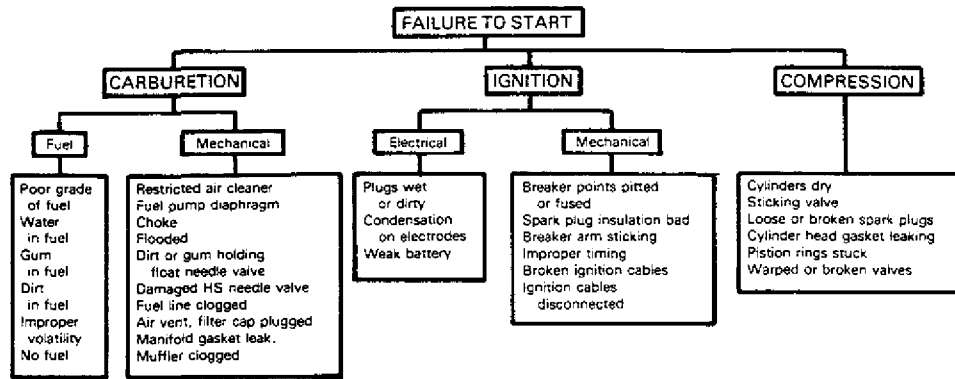


Figure 8 - 1. Engine Troubleshooting

**8 - 3. BOOSTER BATTERY JUMP STARTING** - If jump starting is attempted, use the following safety precautions and the step-by-step procedures in order of appearance.

**WARNING:** BATTERY GASES OR A DAMAGED BATTERY can explode thereby shattering the battery; BATTERY ACID can burn eyes, skin, destroy clothing, and damage other material; MOVING PARTS and IMPROPER CONNECTIONS can cause serious personal injury and damage equipment.

- *Keep sparks, flames, cigarettes, and other ignition sources away from batteries.*
- *Ensure that all personnel are a safe distance from batteries and clear of moving parts while starting.*
- *Do not jump start a frozen or completely discharged battery.*
- *Do not jump start a battery which has loose terminals or one having evidence of damage such as a cracked case or cover.*
- *Be sure that vent caps are tight and level on both batteries and cover both batteries with a damp cloth.*
- *Wear correct eye and body protection and remove all metal jewelry.*
- *Keep jumper cables clear of moving parts.*
- *Ensure that both batteries are the same voltage.*
- *Do not jump start a trailer mounted welding generator with the towing vehicle battery unless the trailer is completely disconnected from the towing vehicle.*
- *Do not jump start a vehicle mounted welding generator from the vehicle battery.*
- *If booster battery is installed in a vehicle, do not allow vehicle to make contact with welding generator case or frame.*
- *Do not jump start by applying power to weld output receptacles or terminals.*
- *Do not allow jumper cable clamps to contact any other metal while attaching or removing cables.*

1. Use properly insulated jumper cables of adequate size.
2. Connect ends of one cable to positive (+) terminals of each battery.
3. Connect one end of other cable to negative (-) terminal of booster battery.
4. Connect remaining end of cable to welding generator engine block at least 18 inches (457 mm) from battery (do not connect to welding generator case, frame, or equipment grounding terminal as damage to equipment can result).

5. Wait at least one minute after connecting cables before starting engine.
6. Start engine following procedures outlined in Section 6 (Sequence Of Operation) of this manual and allow engine to return to idle speed. If the unit does not start after cranking for thirty seconds, stop the jump starting procedure. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made.
7. Remove jumper cable from engine block.
8. Remove other end of same cable from booster battery negative (-) terminal.
9. Remove other jumper cable from welding generator battery positive (+) terminal.
10. Remove remaining end of cable from booster battery positive (+) terminal.
11. Discard damp cloths.

**8 - 4. RESETTING CIRCUIT BREAKERS (Figure 5-1)** - The circuit breakers are automatic-trip type and are not manually operable. When the circuit breaker button is in (ON position), the circuit breaker is functional. When the button is out (OFF position), the breaker is open and not functional.

If a circuit breaker trips when equipment use begins, a fault is probably present in the equipment. If a breaker trips after prolonged equipment use, an overload condition is probably present. Should a breaker trip, proceed as follows:

**WARNING:** ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
  - *Shut down the engine and disconnect equipment from deenergized receptacle before repairing a fault or overload.*
1. Locate and repair fault or reduce receptacle load.
  2. Reconnect equipment to receptacle and start engine.
  3. Reset circuit breaker (depress button); it may be necessary to allow a cooling period before the breaker can be reset.
  4. Resume operation.



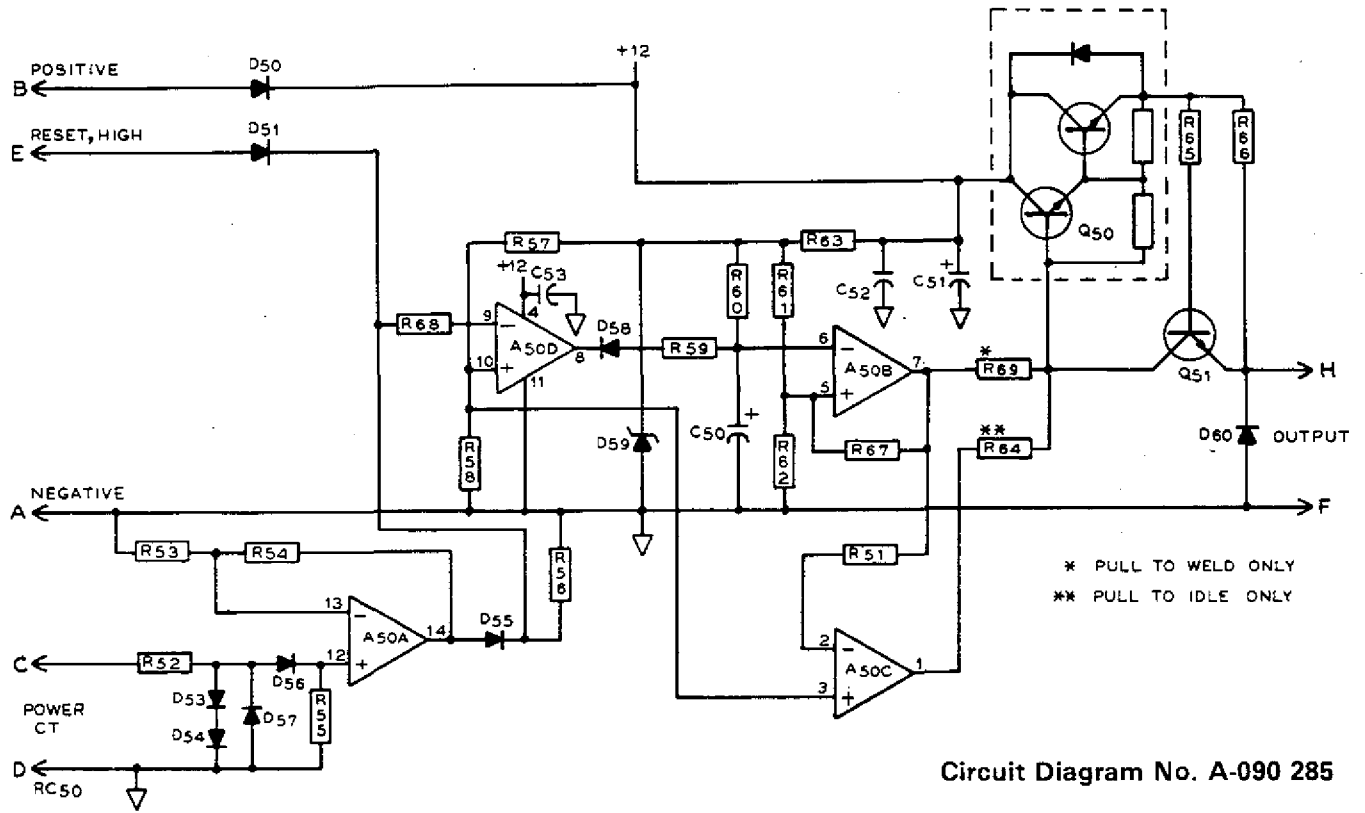


Figure 8 - 3. Circuit Diagram For Automatic Idle Control Board PC1

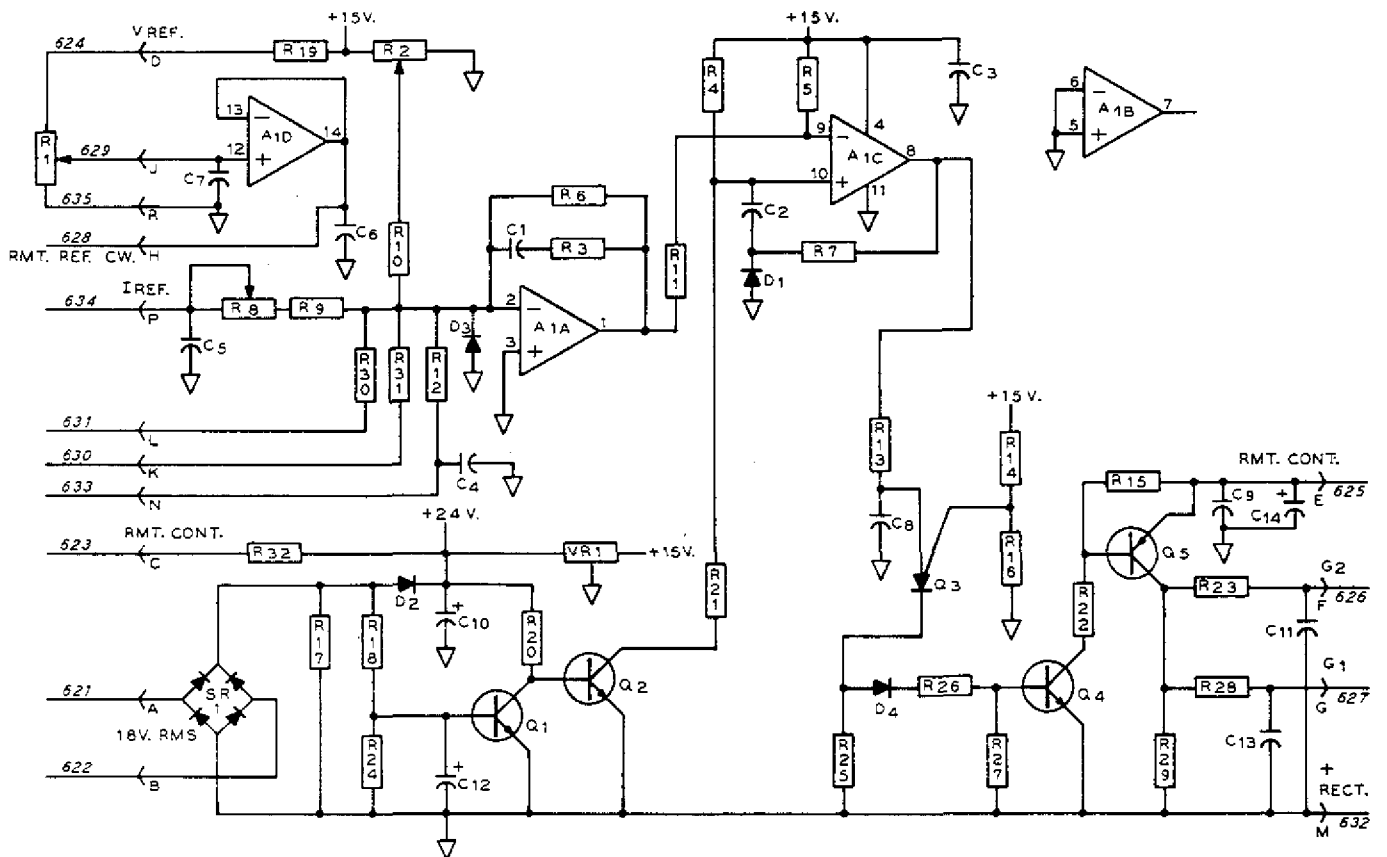
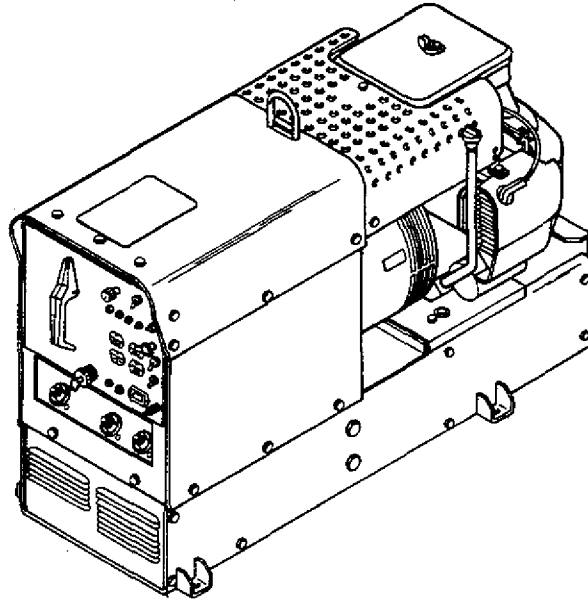
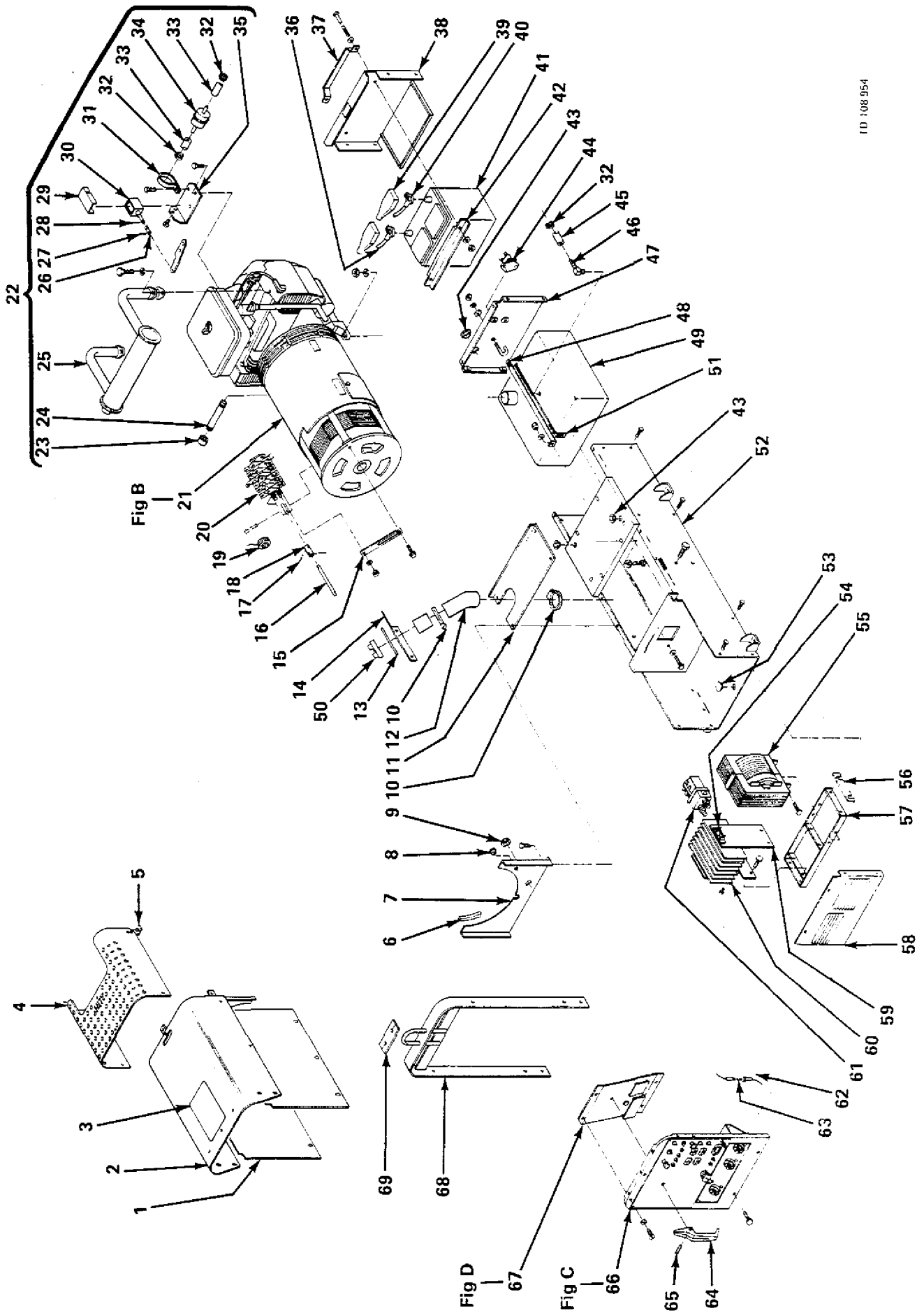


Figure 8 - 4. Circuit Diagram For Field Current Regulator Board PC2





# PARTS LIST



ID: 108954

Figure A - Main Assembly



Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure A Main Assembly</b>				
1		+ 107 307	PANEL, side	2
		109 994	LABEL, warning engine fuel can etc	1
		107 991	LABEL, use gasoline only	1
2		+ 107 272	WRAPPER	1
3		046 392	LABEL, general precautionary	1
		108 487	LABEL, warning use lifting eye	1
4		107 228	GUARD, muffler	1
5		107 321	BRACKET, mtg-muffler guard	2
6		095 970	STRIP, 18 inches	2
7		107 274	BAFFLE, air	1
8		015 713	GROMMET, 5/16 ID x 1/2 mtg hole	1
9		010 378	GROMMET, 9/16 ID x 3/4 mtg hole	1
10		010 863	CLAMP, hose 2-1/16 x 3 dia	2
11		107 323	COVER, fuel tank	1
12		107 346	HOSE, fuel tank	1
13		107 343	GROMMET, rubber-fuel filler neck	1
14		107 324	BRACKET, support-filler pipe	1
15		061 441	STRAP	1
16		107 340	SHAFT, extension-switch	1
17		010 651	PIN, spring 5/32 x 1	2
18		107 339	COUPLER, shaft-switch	1
19	CT1	105 370	TRANSFORMER, current	1
20	S1	107 296	SWITCH, range/changeover	1
21		Figure B	GENERATOR (Pg 4)	1
22		108 039	ENGINE, gas/electric (consisting of)	1
23		005 499	FITTING, pipe-cap 1/2 NPT	1
24		107 348	FITTING, pipe-nipple L 1/2 NPT x 5	1
25		107 297	MUFFLER, engine exhaust	1
26		108 303	LEVER, solenoid	1
		003 455	KEY, woodruff 1/4 x 3/4 SAE	1
	IGN		COIL (included w/engine-see engine parts list)	1
	S7		SWITCH, oil pressure (included w/engine-see engine parts list)	1
27		010 651	PIN, 5/32 x 1	1
28		076 762	PIN, 3/32 x 3/4	1
29		108 030	COVER, solenoid	1
30	TS1	005 373	SOLENOID, 14 volts dc .84 amp	1
31		108 020	CLAMP, cushion 1-5/8 dia x 9/32 dia	1
32		084 173	CLAMP, hose .460 x .545 dia	4
33		107 816	HOSE, SAE 1/4 ID (order by ft)	1ft
34		047 420	FILTER, fuel in line 1/4 w/hoses & clamps	1
35		108 032	BRACKET, mtg-solenoid	1
36		107 753	CABLE, battery-negative	1
37		107 320	HANDLE, battery door	1
38		107 270	DOOR, access-battery	1
39		108 081	TERMINAL PROTECTOR, battery post	2
40		088 577	CABLE, battery-positive	1
41	BAT	015 709	BATTERY, 12 volts 53 amp	1
42		107 308	HOLDDOWN, battery	1
43		057 358	BUSHING, snap ID x 1.37 mtg hole	3
44	CR1	070 109	CONTACTOR, solenoid 12 volts dc 400 amp	1
45		107 816	HOSE, SAE 1/4 ID (order by ft)	3ft
46		061 553	FITTING, pipe-brass elbow 1/8 NPT x 1/4	1
47		107 267	SUPPORT, center-engine mount	1
		070 010	BOLT, J 1/4-20 x 2-5/16 long	1
48		107 322	STRAP, holddown-fuel tank	1
49		107 344	TANK, fuel (consisting of)	1
50		015 603	CAP	1

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
<b>Figure A Main Assembly</b>				
51		097 507	STRIP, adhesive 1/8 x 1 x 20-1/2	3
52		107 279	BASE	1
53		057 360	BLANK, snap-in 1-3/8 mtg hole	1
54	R4, VR1	046 819	SUPPRESSOR	1
55	DC-Z	107 282	STABILIZER	1
56		107 314	SPACER, mtg-rectifier/stabilizer (when applicable)	1
57		107 276	FRAME, mtg-rectifier/stabilizer	1
58		107 271	PANEL, front-lower	1
59		107 325	STRIP, mtg-rectifier	2
60	SR1	099 286	RECTIFIER, silicon 3 ph 300 amp	1
61	W	099 027	CONTACTOR, 24 volts dc 1PST on-off	1
62		110 175	HOLDER, fuse	1
63	F2	*083 596	FUSE, miniature-ceramic 12 amp 250 volts	1
64		044 328	HANDLE, range switch	1
65		010 647	PIN, 5/32 x 1-1/4	1
66		Figure C	PANEL, front-w/components (Pg 6)	1
67		Figure D	CONTROL PANEL, w/components (Pg 7)	1
68		+ 107 278	UPRIGHT, base	1
		013 367	LABEL, caution compression release	1
69		107 342	SEAL, lift-eye	1
		110 583	CABLE, adapter-accessory (consisting of)	1
		039 618	. CAP, twistlock 2P2W 20 amp 250 volts	1
		056 442	. CONNECTOR BODY, twistlock grd 2P2W 15 amp 277 volts	1
		094 481	. PLUG, 14 pin MS3106A-20-27P	1
		073 296	. CLAMP, cable 97-3057-12-6	1
		604 825	. CORD, 18-3/c (order by ft)	1ft
		049 455	. CORD, 18-2/c (order by ft)	1ft

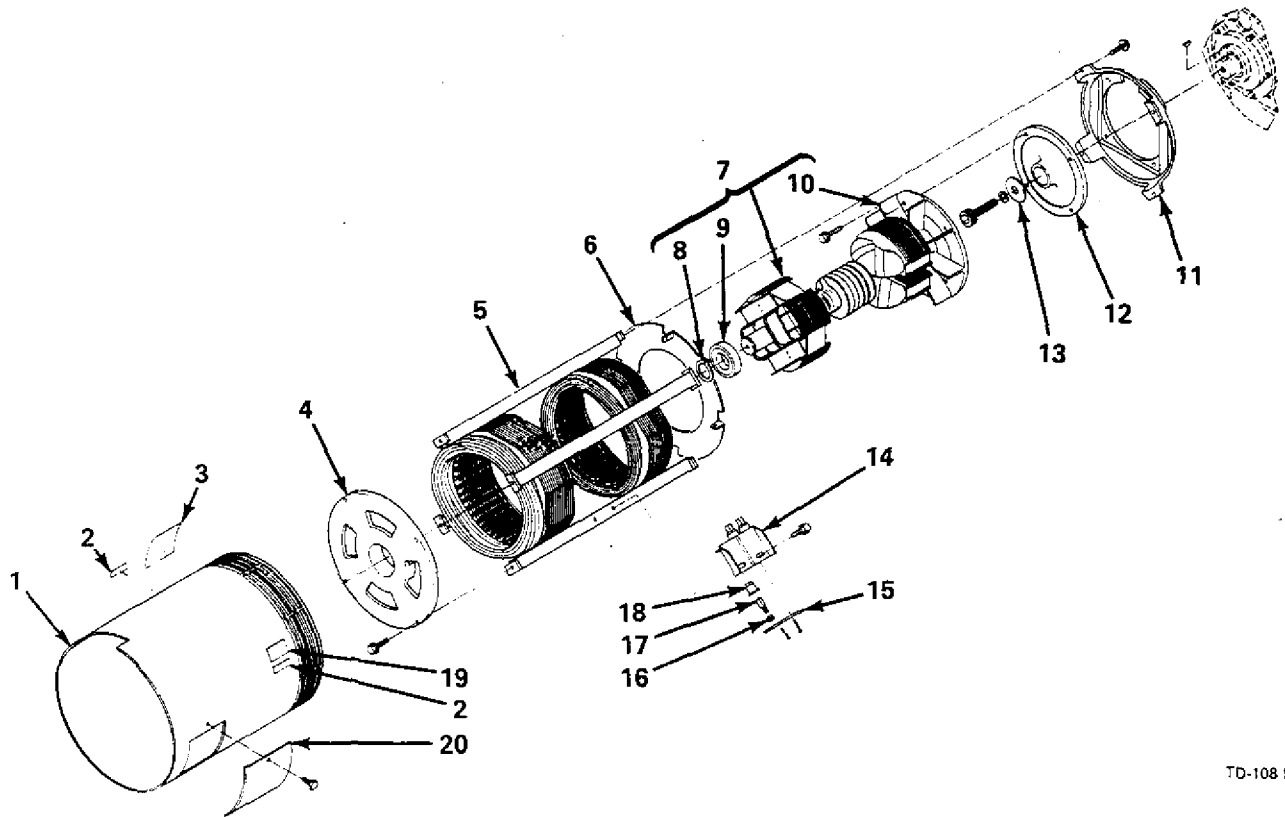
\*Recommended Spare Parts.

†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.**

Item No.	Part No.	Description	Quantity
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**Figure B Generator (Fig A Pg 2 Item 21)**

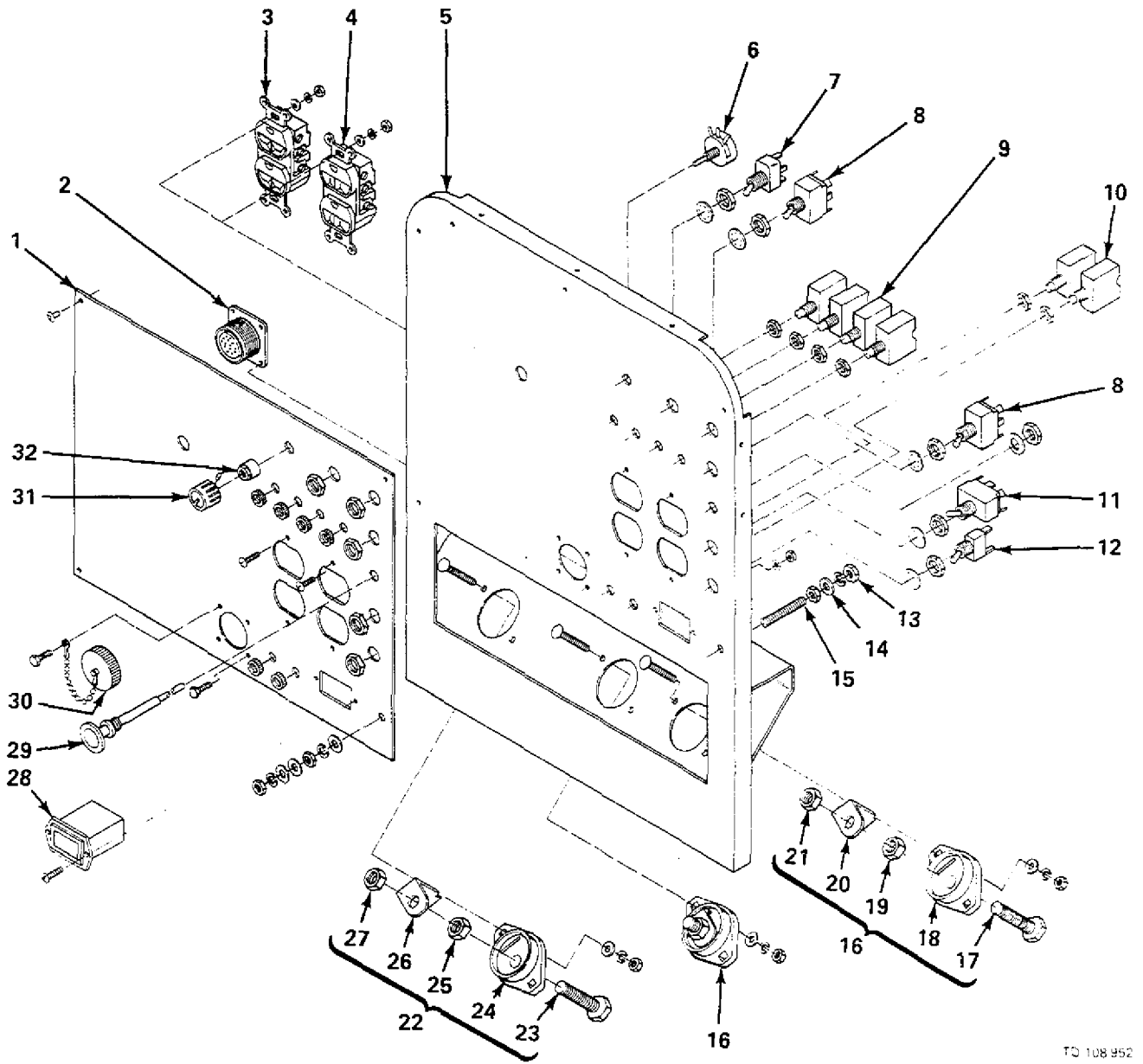
1	+107 266	SHROUD, generator	1
2	011 198	LABEL, danger fan	2
3	108 095	LABEL, engine maintenance	1
4	017 763	ENDBELL	1
5	107 293	STATOR	1
6	107 313	BAFFLE, air	1
7	107 283	ROTOR ASSEMBLY (consisting of)	1
8	024 617	. RING, retaining-external	1
9	053 390	. BEARING, ball	1
10	107 417	. FAN, rotor	1
11	017 702	ADAPTER, engine	1
12	021 934	ADAPTER, fan-rotor	1
13	008 917	WASHER, flat 2-1/4 OD x 11/32 ID x 3/16	1
14	007 250	BRACKET, mtg-brushholder	1
15	047 878	BAR, retaining-brushholder	1
16	047 885	CAP, brushholder	3
17	049 125	BRUSH W/SPRING	3
18	005 614	HOLDER, brush	3
19	013 367	LABEL, caution compression release	1
20	107 326	DOOR, access-brushes	1



TD-108 953

**Figure B - Generator**

+ 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.**



TD 108 952

Figure C - Panel, Front-W/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure C Panel, Front-W/Components (Fig A Pg 3 Item 66)**

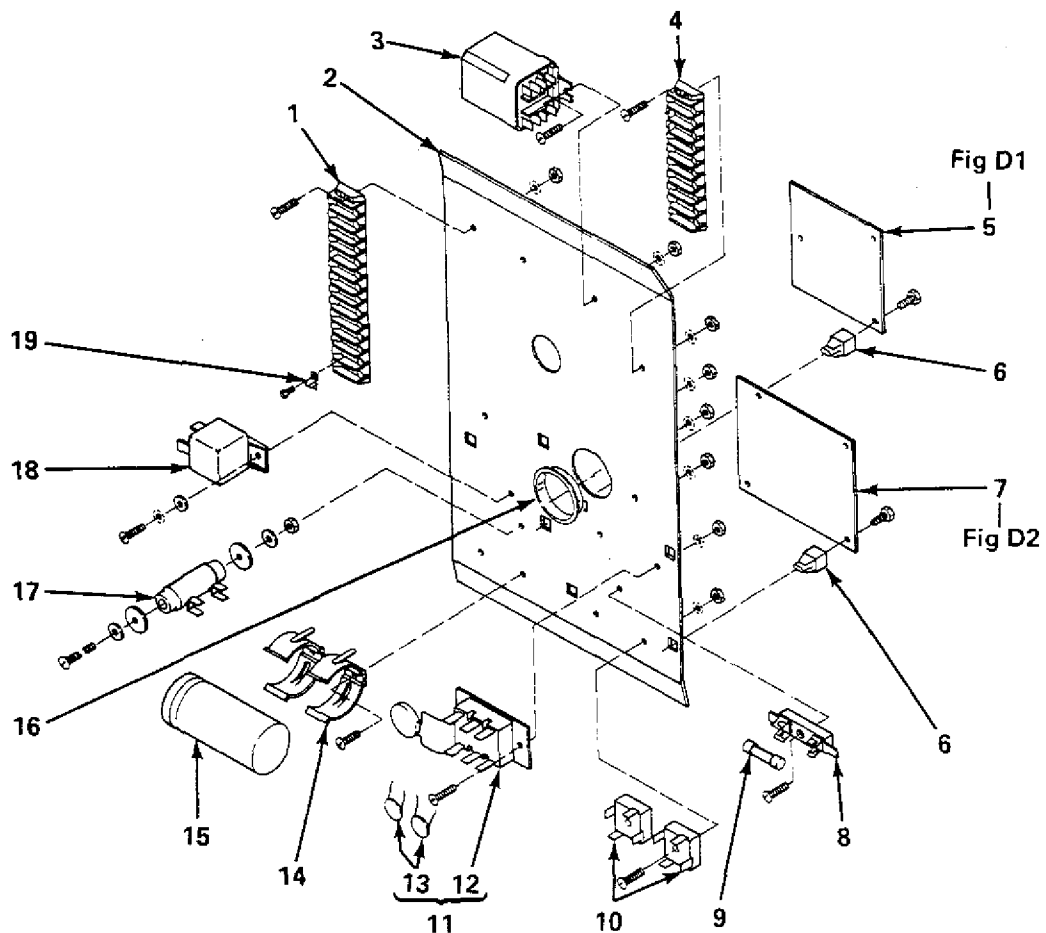
1			NAMEPLATE (order by model & serial number)	1
2	RC5	086 022	RECEPTACLE, 14 socket MS-3102A-20-27S	1
3	RC2	604 103	RECEPTACLE, straight-duplex grounded 2P3W 15 amp 250 volts	1
4	RC1	039 864	RECEPTACLE, straight-duplex grounded 2P3W 15 amp 125 volts	1
5		+ 107 336	PANEL, front	1
		027 657	LABEL, caution equipment ground terminal	1
6	R1	072 623	POTENTIOMETER, carbon 1 turn 2 watt 1000 ohm	1
7	S4	011 609	SWITCH, toggle SPDT 15 amp 125 volts	1
8	S2,5	011 611	SWITCH, toggle DPDT 15 amp 125 volts	2
9	CB2-5	093 995	CIRCUIT BREAKER, manual reset 1 pole 15 amp 250 volts	4
10	CB1,6	083 432	CIRCUIT BREAKER, manual reset 1 pole 10 amp 250 volts	2
11	S3	108 024	SWITCH, toggle DPST MC 15 amp 125 volts	1
12	S6	053 359	SWITCH, toggle 20 amp 125 volts ac	1
13		601 836	NUT, brass-hex 1/4-20	3
14		010 915	WASHER, flat-brass 1/4 ID x 5/8 OD	2
15		083 030	STUD, brass-grounded 1/4-20 x 1-3/4	1
16		039 047	TERMINAL, power-output (consisting of)	2
17		601 976	SCREW, cap-hex hd 1/2-13 x 1-1/2	1
18		039 049	TERMINAL BOARD, red	1
19		601 880	NUT, hex-pin 1/2-13	1
20		039 044	BUS BAR	1
21		601 879	NUT, hex-full 1/2-13	1
22		039 046	TERMINAL, power-output (consisting of)	1
23		601 976	SCREW, cap-hex hd 1/2-13 x 1-1/2	1
24		039 045	TERMINAL BOARD, black	1
25		601 880	NUT, hex-jam 1/2-13	1
26		039 044	BUS BAR	1
27		601 879	NUT, hex-full 1/2-13	1
28	HM	032 936	METER, hour 4-40 volts dc	1
29		108 029	CONTROL, push/pull	1
30		109 993	CAP, dust-connector	1
31		097 922	KNOB, pointer	1
32		072 590	LOCK, shaft-potentiometer	1

+ 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.**

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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**Figure D Control Panel, W/Components (Fig A Pg 3 Item 67)**

1	2T	107 298	BLOCK, terminal 10 amp 14 pole	1
2		107 268	BRACKET, mtg-components	1
3	CR3	059 266	RELAY, enclosed 120 volts ac DPDT	1
4	1T	098 828	BLOCK, terminal 10 amp 10 pole	1
5	PC1	099 749	CIRCUIT CARD, idle control (Fig D1 Pg 8)	1
6		080 509	GROMMET, SCR No. 8/10 panel hole	7
7	PC2	107 750	CIRCUIT CARD, field current (Fig D2 Pg 9)	1
8		012 571	HOLDER, fuse	1
9	F1	*083 596	FUSE, miniature-ceramic 12 amp 250 volts	1
10	SR3,4	035 704	RECTIFIER, integrated 30 amp 600 volts	2
11	SR2	110 174	DIODE/SCR/CAPACITOR (consisting of)	1
12		097 353	. DIODE/SCR, bridge	1
		109 995	. CAPACITOR (consisting of)	1
13		000 340	. CAPACITOR, ceramic 0.01 uf 50 volts	2
14		087 111	CLAMP, capacitor 1-3/8	2
15	C1	087 110	CAPACITOR, electrolyte 240 uf 200 volts dc	1
16		057 358	BUSHING, snap 1 ID x 1.37 mtg hole	1
17	R2	099 262	RESISTOR, WW fixed 25 watt 0.25 ohm	1
18	CR2	090 104	RELAY, enclosed 12 volts dc SPST 30 amp	1
19		108 023	LINK, jumper-terminal block 10 amp	1



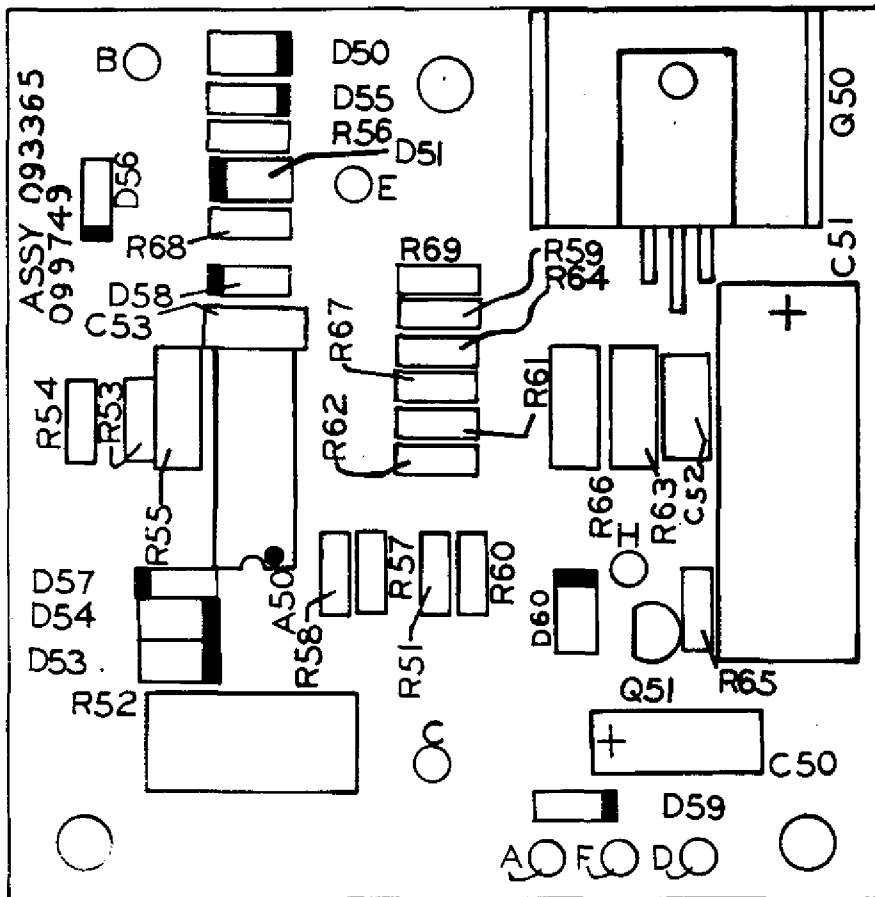
TC 108 235

**Figure D - Control Panel, W/Components**

\*Recommended Spare Parts.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
Figure D1	099 749	Circuit Card, Idle Control (Fig D Pg 7 Item 5)	
A50	096 275	IC, linear 324	1
C50	080 507	CAPACITOR, tantalum 22 uf 15 volts	1
C51	000 859	CAPACITOR, electrolyte 220 uf 35 volts dc	1
C52,53	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	2
D50,51,53,54,57,60	026 202	DIODE, 1 amp 400 volts SP	6
D55,56,58	028 351	DIODE, signal 0.020 amp 75 volts SP	3
D59	039 110	DIODE, zener 8.2 volts 0.5 watts	1
Q50	005 274	TRANSISTOR, NPN 10 amp 80 volts	1
Q51	037 200	TRANSISTOR, NPN 200MA 40 volts	1
R51,54,56,57	035 827	RESISTOR, carbon film 0.25 watt 10K ohm	4
R52	000 039	RESISTOR, carbon 2 watt 680 ohm	1
R53,61,64,68	035 825	RESISTOR, carbon film 0.25 watt 1K ohm	4
R55	074 056	RESISTOR, carbon 0.5 watt 390 ohm	1
R58	039 328	RESISTOR, carbon film 0.25 watt 1.5K ohm	1
R59	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	1
R60	003 272	RESISTOR, carbon film 0.25 watt 1 meg ohm	1
R62	044 633	RESISTOR, carbon film 0.25 watt 1.2K ohm	1
R63	030 038	RESISTOR, carbon 0.5 watt 220 ohm	1
R65	071 595	RESISTOR, carbon film 0.25 watt 22 ohm	1
R66	030 089	RESISTOR, carbon film 0.5 watt 2.7 ohm	1
R67	035 884	RESISTOR, carbon film 0.25 watt 100K ohm	1
	007 752	HEAT SINK, transistor	1



**COMPONENTS TO BE  
REPLACED BY QUALIFIED  
PERSONNEL ONLY**

Ref. B-093 366

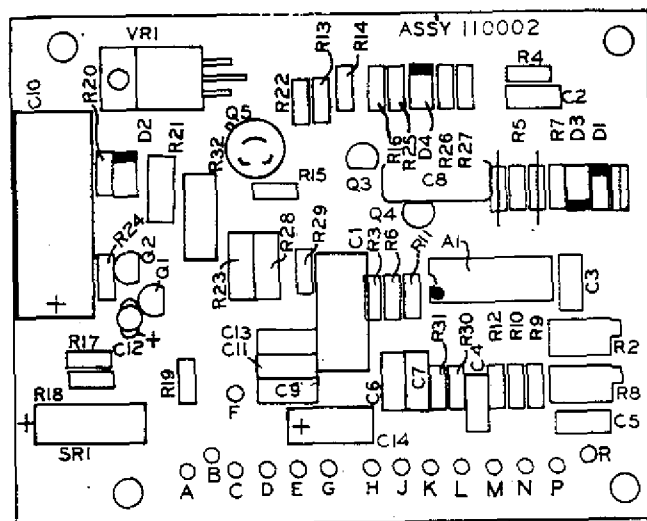
Figure D1 - Circuit Card, Idle Control

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
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**Figure D2 107 750 Circuit Card, Field Current (Fig D Pg 7 Item 7)**

A1	096 275	IC, linear 324	1
C1	035 834	CAPACITOR, metal-film 1.5 uf 100 volts	1
C2-7,9,11,13	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	9
C8	035 832	CAPACITOR, mylar 0.0015 uf 100 volts	1
C10	000 859	CAPACITOR, electrolyte 220 uf 35 volts dc	1
C12	072 130	CAPACITOR, tantalum 1 uf 35 volts dc	1
C14	007 742	CAPACITOR, electrolyte 10 uf 35 volts	1
D1	028 351	DIODE, signal 0.020 amp 75 volts SP	1
D2-4	026 202	DIODE, 1 amp 400 volts SP	3
Q1,2,4	037 200	TRANSISTOR, NPN 200MA 40 volts	3
Q3	039 355	TRANSISTOR, UJT 15MA 40 volts	1
Q5	035 842	TRANSISTOR, PNP 0.6 amp 40 volts	1
R2	035 848	POTENTIOMETER, cermet 25 turn 0.5 watt 10K ohm	1
R3	052 142	RESISTOR, carbon film 0.25 watt 120K ohm	1
R4	039 326	RESISTOR, carbon film 0.25 watt 68K ohm	1
R5	039 325	RESISTOR, carbon film 0.25 watt 82K ohm	1
R6	038 584	RESISTOR, carbon film 0.25 watt 470K ohm	1
R7	035 888	RESISTOR, carbon film 0.25 watt 2.2K ohm	1
R8	039 360	POTENTIOMETER, cermet 20 turn 0.5 watt 25K ohm	1
R9	053 572	RESISTOR, carbon film 0.25 watt 12K ohm	1
R10	039 332	RESISTOR, carbon film 0.25 watt 15K ohm	1
R11,14,16,17,20,24,25	035 827	RESISTOR, carbon film 0.25 watt 10K ohm	7
R12	044 633	RESISTOR, carbon film 0.25 watt 1.2K ohm	1
R13	039 337	RESISTOR, carbon film 0.25 watt 330K ohm	1
R15	035 887	RESISTOR, carbon film 0.25 watt 3.3K ohm	1
R18,27	035 896	RESISTOR, carbon film 0.25 watt 33K ohm	2
R19,29	039 106	RESISTOR, carbon film 0.25 watt 470 ohm	2
R21,23,28	030 025	RESISTOR, carbon 0.5 watt 100 ohm	3
R22,26	035 825	RESISTOR, carbon film 0.25 watt 1K ohm	2
R30	044 633	RESISTOR, carbon film 0.25 watt 1.2K ohm	1
R31	092 525	RESISTOR, carbon film 0.25 watt 2K ohm	1
R32	030 045	RESISTOR, WW fixed 3.25 watt 100 ohm	1
	092 648	RESISTOR, carbon film 0.25 watt zero ohm	3
SR1	035 841	RECTIFIER, integrated 1.5 amp 200 volts	1
VR1	081 832	IC, linear 78M15	1



**COMPONENTS TO BE REPLACED BY QUALIFIED PERSONNEL ONLY**

Ref. C 110 001

**Figure D2 - Circuit Card, Field Current**

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.





## ACCESSORIES

### EDT 1000-2 TWO WHEEL TRAILER Stock No. 041 777

A 1000 lbs. (453 kg) capacity trailer with welded structural steel frame, heavy duty axle with roller bearing hubs and leaf spring suspension. Mounting holes for all small Miller engine driven generators are propunched. Hardware for mounting is provided. Also included is a jack stand for raising and lowering the tongue, safety chains and universal tongue mounting for optional hitches. An optional fender and light kit is required when trailer is used on the highway. NOTE: Hitch must be ordered separately.

*When equipped with fender and light kit and 2" (50 mm) ball hitch this trailer conforms to all applicable U.S. Federal motor vehicle safety standards in effect on date of manufacture.*

#### Specifications

GVWR: 1200 lbs. (544 kg)  
Trailer weight: 186 lbs. (84 kg)  
Trailer capacity: 1000 lbs. (453 kg)  
Total width (without optional fender kit) 55" (1.4 m)  
Total length (without optional hitch) 72" (1.8 m)  
Width of bed 36" (914 mm)  
Track Width 49-1/2" (1257 mm)  
Height of bed 18" (457 mm)  
Tire size 4.80-12  
Shipping weight 186 lbs. (84 kg)

#### FENDER AND LIGHT KIT

Stock No. 041 778

Includes fenders, lights, wiring harness and mounting hardware. Shipping weight 37 lbs. (17 kg)

#### HITCHES

2" (51 mm) BALL

Stock No. 041 724

Shipping weight 11 lbs. (5 kg)

#### CLEVIS

(Not for highway use)

Stock No. 041 726

Shipping weight 11 lbs. (5 kg)

#### 2-1/2" (64 mm) LUNETTE EYE

Stock No. 041 725

Shipping weight 9 lbs. (4 kg)



*When ordering trailers without the fender and light kit and ball hitch the purchase order must include the statement, "For off the road use only."*

#### CANVAS COVER

Stock No. 040 252 - Heavy duty, olive drab, waterproof and mildew resistant.

#### SPARK ARRESTOR

Stock No. 041 747 (Field Only)  
Mandatory when operating on California grasslands, brush or forest covered land and all National Forests. For other areas, check your state and local laws.

#### No. 4B RUNNING GEAR

Stock No. 041 930

Two rear wheels with 480/400 x 8 pneumatic tires. Two 8" (203 mm) solid rubber tired front wheels and 30" (762 mm) towing handle.

#### CR-4B CYLINDER RACK

Stock No. 041 968

For use with No. 4B running gear.

#### No. 2 WA WELDING ACCESSORY PACKAGE

Stock No. 040 039 - Consists of 35' (10.6 m) No. 2 electrode cable, 30' (9 m) No. 2 work cable, No. 2 work clamp, 200 ampere electrode holder, welding helmet and wire scratch brush.

#### FA-1 LOCKABLE FLAME ARRESTOR FUEL CAP

Stock No. 041 057 (Field Only)

#### \*RHS-24

Stock No. 041 203

Momentary and maintained contact rocker switch for contactor/exciter control. Push forward for maintained contact back for momentary contact. 20 ft. (6 m) cord and 5 pin amphenol plug.

#### \*RFCS-23

Stock No. 041 148

Foot current and contactor/exciter control. 20 ft. (6 m) cord and 5 pin amphenol plug.

#### \*RHC-23

Stock No. 041 326

Miniature hand current and contactor/exciter control. 20 ft. (6 m) cord and 5 pin amphenol plug.

#### SEMI-AUTOMATIC WIRE FEEDERS

Listed by Model, Stock Number and Catalog Sheet Index Number.

#### S-32 SERIES

Model	Stock No.	Index No.
S-32P	188 817	M/6.2
S-32S	188 816	M/6.2

Note: S-32P and S-32S wire feeders are available with a 1 ft (254mm) cord with 14 pin amphenol connector for remote voltage and contactor control. Order feeder with:  
Stock No. 109 925 (Factory)  
Stock No. 109 926 (Field)

#### INTERCONNECTING CABLES SET,

14 pin to 14 pin amphenol  
10 ft (3m) Stock No. 109 896  
25 ft (6.7m) Stock No. 109 897  
50 ft (15m) Stock No. 109 898  
75 ft (23m) Stock No. 109 899

#### PORTA-MIG CONSTANT SPEED

Requires 115 volt and contactor control.

Plastic case	048 941	M/7.1
Metal case	081 574	M/7.1

#### \*FTC-23 REMOTE CONTACTOR AND CURRENT CONTROL

Stock No. 006 342

Fastens to electrode holder or GTAW torch. Includes 28 ft. (8.5 m) cord and 5 pin amphenol plug.

#### \*EXTENSION CABLES For Remote Controls and Switches

5 pin to 5 pin amphenol  
25' (7.6 m) Stock No. 041 294  
50' (15.2 m) Stock No. 041 293

*\*To use switches and controls indicated adaptor cord*

Stock No. 041 947 must be used.

#### ADAPTOR CORD

Stock No. 041 947

14 pin amphenol plug to 5 pin amphenol receptacle, 1 ft. (254 mm), for remote controls and switches.

#### SPOOLMATIC 3 FEEDER/GUN (24 volts)

Stock No. 109 940

Constant speed. Has 30 ft (9m) control cord which plugs directly into 14 pin amphenol receptacle providing contactor control and 24 volts power for feeder operation.