

October 1984

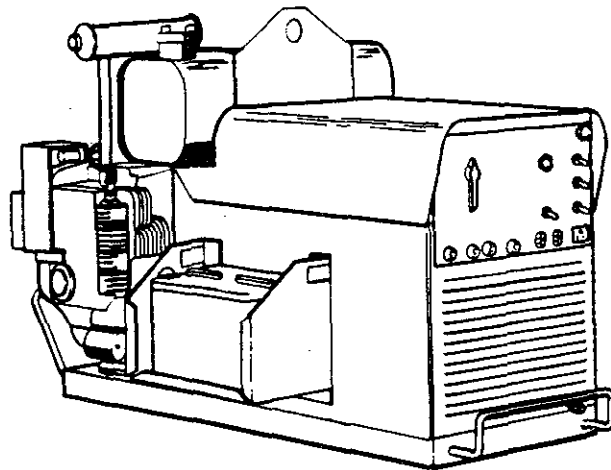
FORM: OM

411N

Effective With Serial No. JD661089

WARNING: Read and understand the entire contents of this manual before installing, operating, or maintaining this equipment.

MODEL
AEAD-200LE 60 Hz
AEAD-200LE 50 Hz



OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.

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

NWSA CODE NO. 4579
PRINTED IN U.S.A.

LIMITED WARRANTY

EFFECTIVE: JUNE 1, 1979

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

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2. Original main power rectifiers 3 years
(labor - 1 year only)
3. All welding guns and feeder guns 90 days
4. All other Millermatic Feeders 1 year
5. Replacement or repair parts, exclusive of labor . . 60 days
6. Batteries 6 months

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ERRATA SHEET

August 19, 1985 FORM: OM-411N

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

**	Part No.	Replaced With	Description	Quantity
2-13	020 185	Deleted	(Eff w/JE820397)	
2-14	602 898	Deleted	(Eff w/JE820397)	
2-15	015 602	096 439	VALVE, ball 1/8-27 NPTF x 1/4 TBG w/screen (Eff w/JE820397)	1
2-16	604 313	Deleted	(Eff w/JE820397)	
2-23	010 865	Deleted	(Eff w/JE820397)	
2-24	088 611	603 106	HOSE, No. 1 x 1/4 ID (order by ft)	3ft
		047 420	FILTER, fuel in line 1/4 w/hoses & clamps (Eff w/JE820397)	1
2-50	088 575	099 270	BASE (Eff w/JF916666)	1
		099 267	UPRIGHT, base LH (Eff w/JF916666)	1
		099 264	UPRIGHT, base RH (Eff w/JF916666)	1
		010 865	CLAMP, hose .430-33/64 dia (part of engine)	2
		010 311	CLAMP, 3/4 dia x 3/4	2

**First digit represents page no - digits following dash represents 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 steam 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 outergarments of untreated cotton.

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

2. Eye and Head Protection

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

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

*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

Magnetic fields from high currents can affect pacemaker operation. Persons wearing a pacemaker or other electronic life support equipment 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

Amperes Output 100% Duty Cycle	Amperes Welding Range	Welding Current Ranges In Amperes		Open-Circuit Voltage	Single-Phase Auxiliary Power	Weight	
		Coarse Ranges	Fine Range			Net	Ship
AC 225 @ 25 Volts	AC 35-225	Min.-40 40-55 55-75 70-105 90-135 115-165 140-Max.	From Min. To Max. Of Each Coarse Range	80 Volts AC	Power plant operation: 5 kva, 120/240 volts 42/21 amperes 60 Hz. ac*	585 lbs. (266 kg.)	590 lbs. (268 kg.)
DC 200 @ 25 Volts	DC 25-200			72 Volts DC	Power while welding: 1 kva, 115 volts 9 amperes 100 Hz. ac		

*4 kva, 115/230 volts, 34/17 amperes 50 Hz. ac on 50 Hz. models

Figure 2-1. Specifications

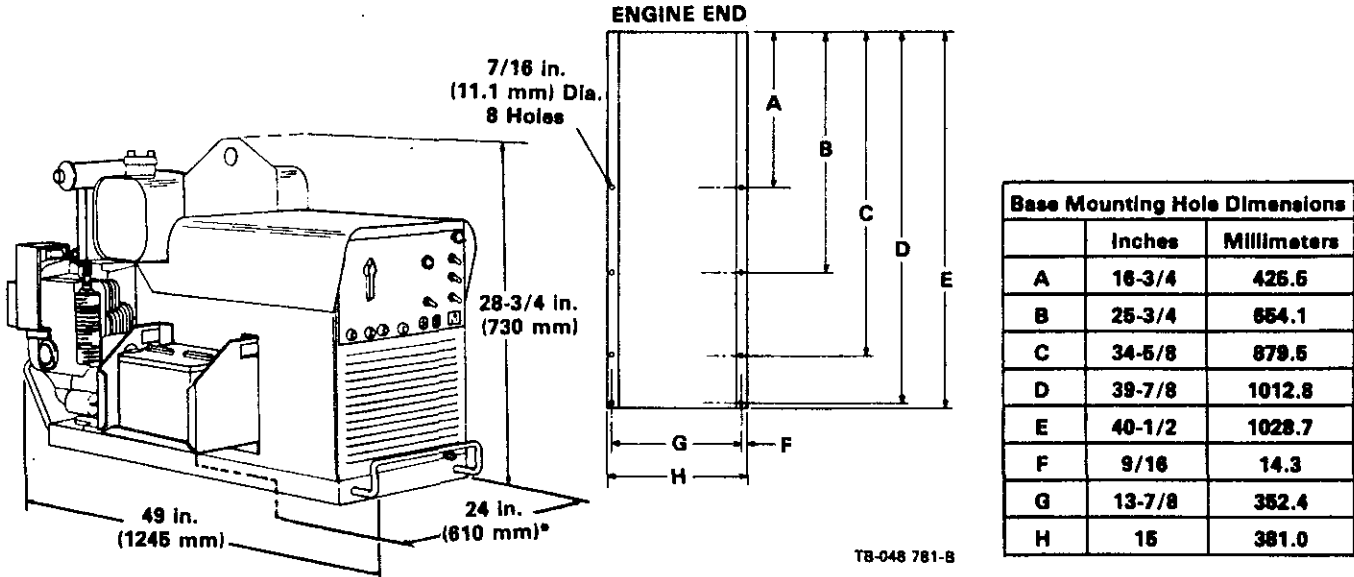
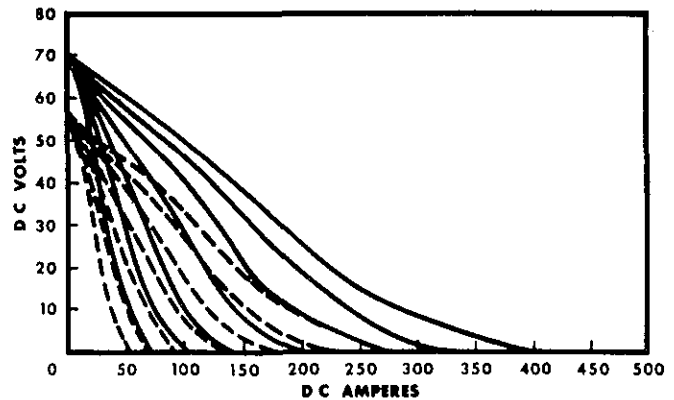
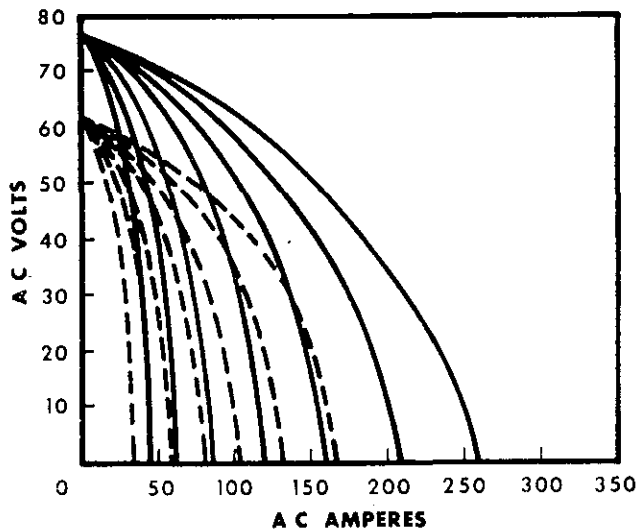


Figure 2 - 2. Overall Dimensions And Base Mounting Hole Layout

2 - 1. VOLT-AMPERE CURVES (Figure 2-3) - The Volt-Ampere curves show the output voltage and current of the welding generator available at any point from the minimum to maximum of each coarse current range.

With the use of the Volt-Ampere curves it is possible to determine what the weld current will be at a particular arc voltage. The Volt-Ampere curves show the minimum and maximum curves of each coarse current range.

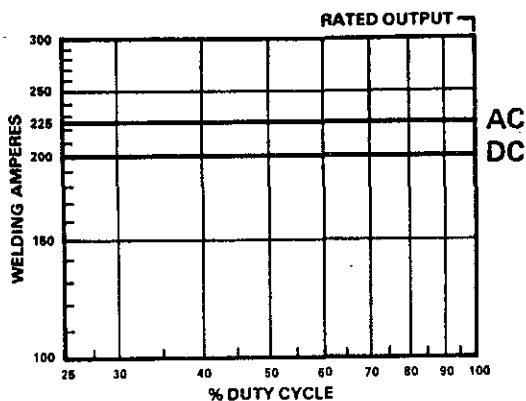


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B-047 089

Figure 2 - 3. Volt-Ampere Curves

2 - 2. DUTY CYCLE (Figure 2-4) - This welding generator is rated at 100 percent duty cycle. This means that the welding generator can be operated at rated load continuously without causing overheating and damage to the unit. This unit, however, does not offer output in excess of its rating if the duty cycle is decreased.



B-052 960-B

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 provided 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 ap-

plicable 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, operating, and maintenance procedures or practices which if not carefully followed could result in serious personal injury or loss of life.

CAUTION statements include installation, operating, 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 - Prior to 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 (or Style) Numbers of the equipment be supplied.

2 - 5. DESCRIPTION - This unit is a gasoline engine-driven constant current ac/dc welding generator. It is designed for use with the Shielded Metal-Arc Welding process. With proper optional accessories, this unit can also be used for the Gas Metal-Arc and Gas Tungsten-Arc Welding processes.

In addition to welding capability, this unit is equipped to provide 1 kva of 115 volts (9 amperes) 100 Hz., ac electrical power while welding. As a power plant, up to 5 kva of 120/240 volts (42/21 amperes) 60 Hz. (4 kva of 115/230 volts, 34/17 amperes, 50 Hz. ac on 50 Hz. models) ac electrical power is available when operating at power rpm.

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.

CAUTION: 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.

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.*

It is recommended that a proper fitting canvas cover (optional) be placed over the welding generator when not in operation to protect the unit from the environment. Be sure unit is cool before installing any cover.

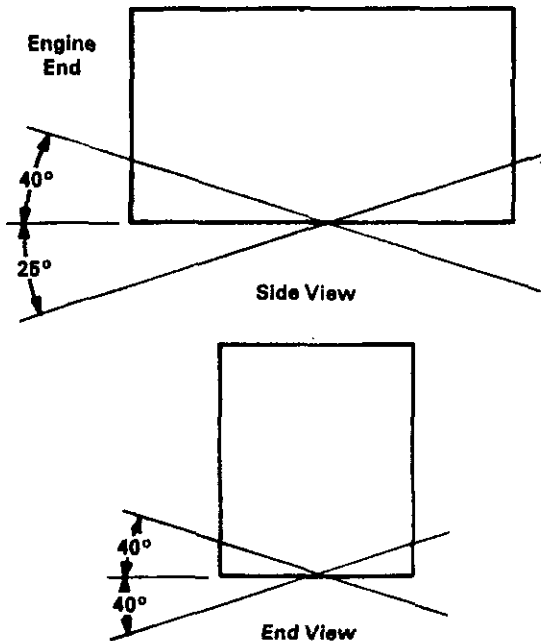


Figure 3 - 1. Allowable Tilt Angles

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.*

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.

A proper installation site permits freedom of air movement into and out of the welding generator, and also least subjects the unit to dust, dirt, moisture, and corrosive vapors. A minimum of 18 inches (457 mm) of unrestricted space must be maintained between the welding generator front and rear panels and the nearest

obstruction. Also, the underside of the welding generator must be kept completely free of obstructions. The installation site should also permit easy removal of the outer enclosure for maintenance functions.

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.

Holes are provided in the base for mounting purposes. Figure 2-2 gives overall dimensions and the base mounting hole layout.

On all welding generators a lifting device is provided for moving the unit. However, if a fork lift vehicle is used for lifting the unit, be sure that the lift forks are long enough to extend completely under the base.

CAUTION: IMPROPER LIFTING OF EQUIPMENT can result in personal injury and equipment damage.

- *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.

3 - 2. PREPARING NEW BATTERY FOR SERVICE

- This unit may be equipped with a maintenance-free battery, a conventional wet charged battery, or a dry charged battery. Maintenance-free batteries do not have conventional vent caps since they do not require the addition of water during normal service. Once the battery type is determined, read the following WARNING and proceed to the appropriate section: A. Maintenance-Free Battery; B. Wet Charged Battery; C. Dry Charged Battery.

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

- *Wear correct eye and body protection 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.*

A. Maintenance-Free Battery

To place this battery in service connect the negative (-) battery cable to the negative battery terminal. No other preparation should be required.

B. Wet Charged Battery

Connect the negative (-) battery cable to the negative terminal on the battery. If the battery has enough power to start the engine, it will charge up while the engine is running. However, if the battery fails to supply enough power to crank the engine, the battery will require recharging.

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

- Check the state of the electrolyte solution and allow battery to warm to 60°F (16°C) before charging if electrolyte is frozen or slushy.

Remove the vent caps and refer to Section 3-2C, Steps 7-9 for charging instructions.

C. Dry Charged Battery

1. Obtain battery grade (1.265 specific gravity) electrolyte solution.
2. Remove battery from unit and place on a level worktable or other suitable surface.
3. Remove vent caps.

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

- Wear correct eye and body protection.
- 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.
- Do not lean over battery when testing.
- Keep sparks, flames, cigarettes, and other ignition sources away from batteries.
- Use enough ventilation to keep battery gases from building up during activation.

4. Fill battery cells to top of separators with electrolyte.
5. Allow battery to stand for 20 minutes.
6. Recheck electrolyte level and add if necessary to fill to top of separators.
7. 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 8. For each 10°F (6°C) increment below 80°F (27°C), 0.004 must be subtracted.
8. 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).

WARNING: Follow the precautionary steps below in addition to those given in the previous **WARNING** statements.

- Use enough ventilation to keep battery gases from building up during and for several hours after battery charging.
 - Turn battery charger off before making connection 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.
 - Be sure that vent caps are tight and level and cover battery with a damp cloth.
 - Be sure battery charger output matches battery voltage.
9. If a corrected specific gravity reading of 1.260 at 80°F (27°C) is not obtained, replace the vent caps and recharge the battery following the battery charger manufacturer's instructions.

WARNING: BATTERY GASES can explode and shatter the battery.

- Turn the battery charger off before disconnecting the charger from the battery.

10. Recheck electrolyte level and add if necessary.

CAUTION: BATTERY ACID is corrosive to metals.

11. Thoroughly rinse with water and mutilate empty electrolyte containers before discarding.
12. Reinstall battery in welding generator.
13. Replace battery holddown and tighten securely. Do not overtighten.
14. Connect positive (+) battery cable to positive (+) battery terminal.
15. Connect negative (-) battery cable to negative (-) battery terminal.

3 - 3. FUEL

WARNING: ENGINE FUEL can cause fire or explosion.

- 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 3.5 gallons (U.S. Measure) (13 liters). See the Engine Manufacturer's Manual for fuel recommendations.

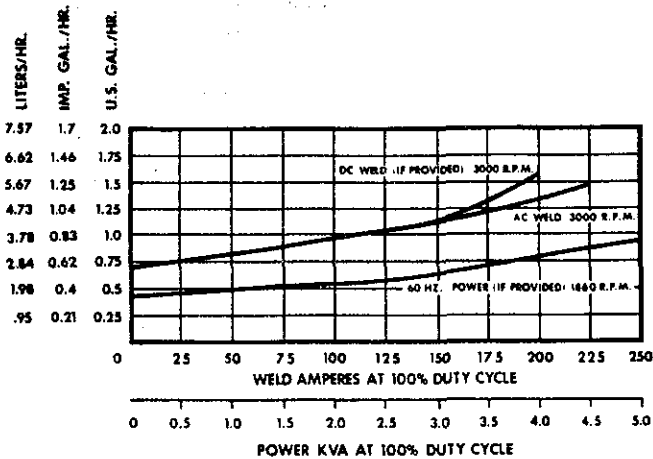


Figure 3 - 2. Fuel Consumption Chart

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.

- Do not mix oil with gasoline.
- Use only a good grade of "regular," "low-lead," or "no-lead" gasoline of at least 85 octane for this engine.
- Use of gasohol is not recommended.
- If regular gasoline is used continually, remove lead deposits from cylinder heads before using unleaded fuel.

Fuels with a lower octane rating may cause detonation (knocking) which could damage the engine. The "low-lead" or "no-lead" fuels lower the pollution factor and reduce combustion chamber deposits if used exclusively.

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 Manufacturer's Manual before starting the engine.

3 - 5. EQUIPMENT GROUNDING TERMINAL (Figure 3-3) - Normally engine-driven welding generators do not require grounding. However, this machine has auxiliary power plant capability; therefore, grounding of the frame and case is recommended. Also, unusual circumstances may require machine grounding. For these reasons a convenient grounding terminal is provided on all weld/power units.

For detailed grounding instructions consult your local and state codes and the latest issue of the National Electrical Code. If additional information regarding your particular operating circumstances and/or grounding re-

quirements 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.

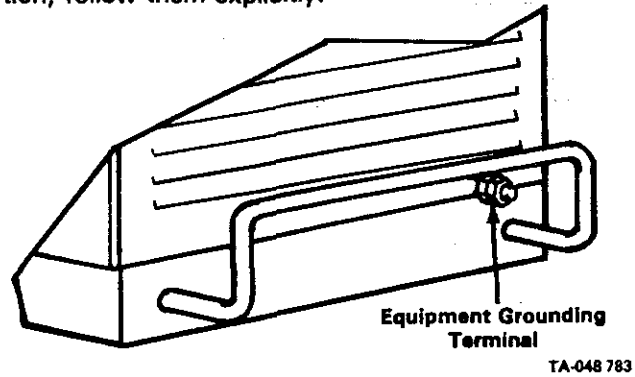


Figure 3 - 3. Equipment Grounding Terminal

3 - 6. WELD OUTPUT CONNECTIONS (Figure 5-1)



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.

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Ensure that the unit is completely shut down before making any weld output connections.

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 electrode holder is 75 feet (23 m) long and the work cable is 25 feet (8 m) long, select the size cable recommended in Table 3-1 for 100 feet (31 m).
3. Do not use damaged or frayed cables.
4. Install electrode holder to cable following manufacturer's instructions. An insulated electrode holder must be used to ensure operator safety.
5. Install a correct size lug onto one end of work cable, and install work clamp to cable.
6. Install jack plugs onto cables as instructed in Subsection B.

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	2	2	2	1	1/0	1/0
150	2	2	2	1	1/0	2/0	3/0	3/0
200	1	1	1	1/0	2/0	3/0	4/0	4/0
250	1/0	1/0	1/0	2/0	3/0	4/0	4/0	2-2/0

A-002 702-A

- NOTE:
- *A. 50 FEET OR LESS.
 - *B. CABLE SIZE IS BASED ON DIRECT CURRENT (DC), 100% 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 GENERATOR MUST BE USED. WHILE MOST WELDING GENERATORS HAVE AN OPEN-CIRCUIT VOLTAGE OF LESS THAN 100 VOLTS, SOME WELDING GENERATORS OF SPECIAL DESIGN MAY HAVE HIGHER OPEN-CIRCUIT VOLTAGE.

B. Jack Plug Installation (Figure 3-4)

The red jack plugs are supplied to provide correct connections to the weld output receptacles. Connect the red jack plugs to the weld cables as follows:

1. Remove 1 in. (25.4 mm) of insulation from one end of each welding cable.
2. Clamp cable in a vise with the uninsulated end extending upward out of vise approximately 1-3/4 in. (44.5 mm).
3. Place steel tie wire (item A) approximately 1/4 in. (6.4 mm) from end of insulation.
4. Make a half turn around the cable bringing the looped ends of tie wire together.

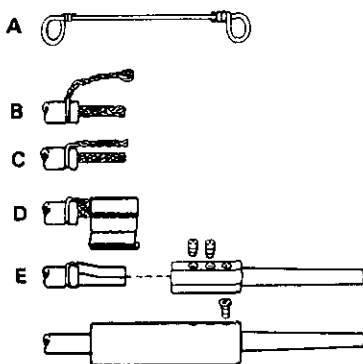
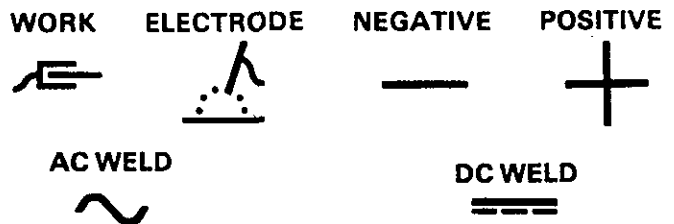


Figure 3 - 4. Jack Plug Installation

5. Insert a 3/8 in. (9.5 mm) diameter rod through looped ends of tie wire.
6. Twist tie wire (B) until entire tie wire is twisted and is tight around insulation of cable.
7. Clip off looped ends of tie wire.

8. Bend the twisted tie wire over and along the side (C) of uninsulated portion of cable.
9. Wrap the strip of copper foil tightly around uninsulated end of cable and twisted tie wire (D).
10. Push the jack plug onto cable over copper foil (E).
11. Insert the 1/4-20 setscrews into the center and bottom holes in jack plug and tighten (E).
12. Remove cable from vise and insert jack plug into insulating sleeve. Slide insulating sleeve over jack plug and cable until hole in insulating sleeve lines up with remaining hole in jack plug (F).
13. Insert the 8-32 self-tapping screw (F) through hole in insulating sleeve into jack plug and tighten.

C. Weld Output Receptacles (Figure 5-1)



Two AC WELD output receptacles and two DC WELD output receptacles are provided for making ac or dc weld output connections. Give the jack plugs a quarter turn when inserting into the receptacle. To remove the jack plugs, give a quarter turn in the opposite direction while withdrawing.

To obtain dc straight polarity weld output, connect the Work cable jack plug to the POSITIVE receptacle, and the Electrode cable jack plug on the NEGATIVE receptacle.

To obtain dc reverse polarity weld output, the above connections should be reversed.

For ac weld output, connect the Work cable jack plug to the WORK receptacle and the Electrode cable jack plug to the ELECTRODE receptacle.

WARNING: ELECTRIC SHOCK can kill; ARCING can burn skin or damage electrical connections.

- Do not touch live electrical parts.
- Ensure that the unit is completely shut down before making any weld output connections.
- Do not change position of the welding cable jack plugs while welding.
- Be sure the jack plugs are secure in correct receptacles before welding.

SECTION 4 - AUXILIARY POWER

POWER OUTPUT



WARNING: ELECTRICAL SHOCK can kill.

- Do not touch live electrical parts.
- Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed.

ELECTRIC SPARKS can cause fire.

- Isolate the electrode and work cables from each other and from any conductive surface when not welding.

The weld output terminals are electrically energized when the engine is running.

LOW VOLTAGE AND FREQUENCY can damage electrical equipment.

- Turn off all electrical equipment connected to the auxiliary power receptacles before starting or stopping the engine.
- Place the AUTO IDLE switch in the ON position when using the 115V 9A AC 100 Hz receptacle.
- Rotate the FINE AMPERAGE control to 100 when using 50/60 Hz. power.
- Place the AUTO IDLE switch in the OFF position for power plant operation.

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

4 - 1. 115 VOLTS 9 AMPERES AC 100 HZ RECEPTACLE (Figure 5-1)



This receptacle is provided to supply power for accessory equipment used with the welding process.

Power available at this receptacle is rated at 1 kva 9 amperes of 115 volts ac, 100 Hz. while welding.

CAUTION: IMPROPER FREQUENCY can damage equipment.

- Do not operate equipment rated only for 50 or 60 Hertz from this receptacle.
- Use receptacle power only for operating resistance heaters without fans, incandescent lights, and universal power tools.

The engine must be operating at weld rpm to obtain the power output. The output from this receptacle is designed for use with the ON position of the AUTO IDLE switch. However, the OFF position may be used if desired.

4 - 2. 120 VOLTS AC POWER PLANT (Figure 5-1)



Up to 5 kva of 120 volts ac, 42 amperes, 60 Hz. power (4 kva if the unit is a 50 Hz. model) is available at this duplex receptacle; however, the power supplied is

dependent on the amount of power being used from the 120/240 Volts AC terminal strip. In all cases, total ac auxiliary power output cannot exceed unit rating. Whenever this receptacle is used, the engine must be operating at power rpm and the WELD/POWER switch must be in the POWER position.

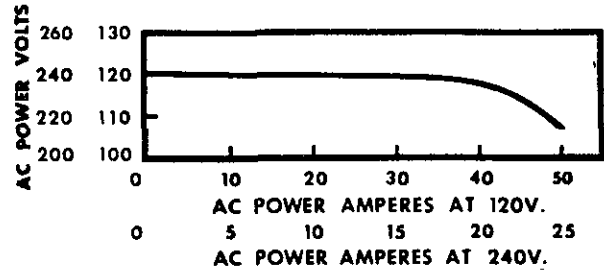


Figure 4-1. Auxiliary Power Curves For 120 Volt (And Optional 240 Volt) Duplex Receptacle

4 - 3. 120/240 VOLTS AC TERMINAL STRIP (Figures 4-2 & 4-3) - This welding generator is equipped with a four-pole terminal strip 1T located behind the right side panel. The terminal strip serves as a connection point when auxiliary power is needed. Because this unit has power plant capability, grounding of the generator frame and case may be required. See Section 3-5 for specific information on grounding this unit.

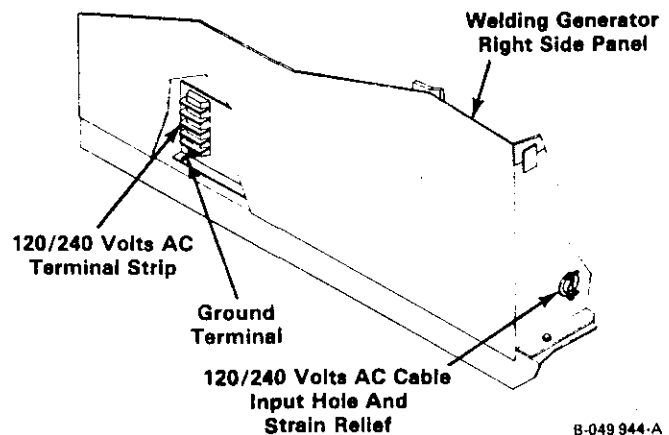


Figure 4-2. Location of 120/240 Volts Terminal Strip

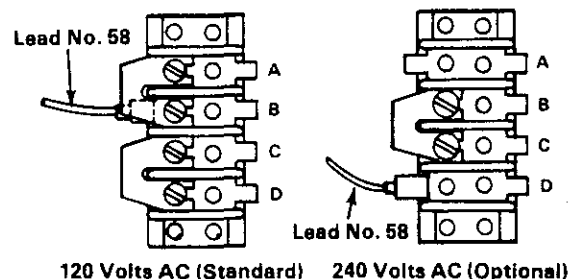


Figure 4-3. Jumper Link Arrangement For 120/240 Volts AC Terminal Strip

If there are any questions regarding proper connection to terminal strip 1T and/or correct circuit grounding procedures, consult a qualified electrician.

To make connection from an external load to terminal strip 1T proceed as follows:

1. Shut down the welding generator.
2. Remove the right side panel.
3. Insert leads through the strain relief provided on the generator rear panel. Route the leads over to terminal strip 1T. See Figure 4-2.

IMPORTANT: This unit is shipped with the jumper links on terminal strip 1T positioned for 120 volts (see Figure 4-3). (If the unit is equipped with an optional 240 volts ac receptacle, the jumper links will be positioned for 240 volts).

A total of 5 kva of 60 Hz. ac auxiliary power (4 kva if the unit is a 50 Hz. Model) is available from this unit. When the unit is linked for 120 volts, full kva is available at either half of the 120 volts ac duplex receptacle or from terminal strip 1T.

If the unit is linked for 240 volts, 1/2 of the total kva of the unit is available at either half of the 120 volts duplex receptacle or full kva at 240 volts can be obtained at the terminal strip. In all cases, when power is supplied to the duplex receptacle and/or the terminal strip, total ac auxiliary power cannot exceed unit rating.

When making lead connections to terminal strip 1T use ring terminals to ensure that proper connections are made.

4. For 120 volts ac auxiliary power:
 - a. Connect one lead to terminal A or B on terminal strip 1T.
 - b. Connect remaining lead to terminal C or D on terminal strip 1T.
 - c. Ensure that the jumper links on terminal strip 1T are positioned for 120 volts ac (see Figure 4-3).
 - d. If the circuit must be grounded, connect a ground lead to the ground terminal below terminal strip 1T.
 - e. Tighten strain relief on generator rear panel.
 - f. Install right side panel and resume operation.

For 240 volts ac auxiliary power:

- a. Remove and retain the jumper links from terminal strip 1T.
- b. Move lead No. 58 from terminal B to terminal D on the same side of terminal strip 1T.
- c. Position the jumper links on 1T for 240 volts ac (see Figure 4-3).
- d. Connect line leads to terminals A and D on terminal strip 1T.
- e. If the circuit must be grounded, connect a ground lead to the ground terminal below terminal strip 1T.
- f. Tighten strain relief on generator rear panel.
- g. Install right side panel and resume operation.

For 120/240 volts ac auxiliary power:

- a. Remove and retain the jumper links from terminal strip 1T.
- b. Move lead No. 58 from terminal B to terminal D on the same side of terminal strip 1T.
- c. Position the jumper links on 1T for 240 volts ac (see Figure 4-3).
- d. Connect line leads to terminals A and D on terminal strip 1T.
- e. Connect neutral lead to terminal B on terminal strip 1T.
- f. If the power supply neutral must be grounded, connect a ground lead from terminal C on terminal strip 1T to the ground terminal below terminal strip 1T.
- g. If the circuit must be grounded, connect a ground lead to the ground terminal below terminal strip 1T.
- h. Tighten strain relief on generator rear panel.
- i. Install right side panel and resume operation.

4 - 4. 240 VOLTS AC POWER PLANT (Optional) - Up to 5 kva of 240 volts ac (21 amperes), 60 Hz. (4 kva of 230 volts, 17 amperes 50 Hz. on 50 Hz. models) power is available at this receptacle for operating portable, cord-connected accessory equipment when the engine is operating at power rpm. The voltage at the receptacle varies according to the applied load. The voltage at various loads can be determined from Figure 4-1.

4 - 5. FIELD INSTALLATION INSTRUCTIONS FOR 240 VOLTS AC DUPLEX RECEPTACLE

WARNING: ELECTRIC SHOCK can kill.

- Shut down the engine and disconnect negative (-) battery cable from battery before making internal inspection or reconnection.

This welding generator is equipped with a voltage change-over terminal strip 1T and proper stator to provide reconnection capability for 240 volts ac. Although the capability for either 120 or 240 volts ac is present, an optional kit must be purchased if 240 volts is desired at the front panel.

IMPORTANT: All directions, such as left or right, are with respect to the operator facing the welding generator front panel. Retain all hardware removed during this procedure for reinstallation.

1. Remove the right side panel.
2. Remove 120 volts ac duplex receptacle RC2 located on the front panel. Remove leads and allow them to hang free.
3. Connect leads No. 56 and 58 removed from RC2 to the 240 volts ac duplex receptacle (one on each side of receptacle). Be sure that grounding lead No. 33 is connected from the receptacle

grounding terminal to the welding generator equipment grounding terminal.

4. Install the 240 volts ac duplex receptacle in the front panel.
5. Affix supplied 240 volts ac label over existing 120 volts ac designation for duplex receptacle on nameplate.
6. Locate terminal strip 1T on the right side of the welding generator (see Figure 4-2). Disconnect two leads No. 57 from terminal strip 1T. Tape up terminals on both leads No. 57 and tie leads into wiring harness.
7. Remove and retain the jumper links from terminal strip 1T.
8. Move lead No. 58 from terminal B to terminal D on the same side of terminal strip 1T.
9. Position the jumper links on 1T for 240 volts ac (see Figure 4-3).
10. Install right side panel.
11. Reconnect negative (-) battery cable and resume operation.

SECTION 5 - OPERATOR CONTROLS

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

A
AMPERE RANGES

The Range switch provides seven coarse amperage ranges. The range of each switch position is displayed on the scale 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 CONTROL (Figure 5-1)

A
FINE
AMPERAGE

The FINE AMPERAGE control permits the operator to select a welding current between the minimum and maximum values of the coarse range selected by the Range switch. The scale surrounding the control is calibrated from 0-100 percent in increments of five. The scale represents a percentage of the coarse range selected, not an actual amperage value.

When the welding generator is used to produce auxiliary power, the FINE AMPERAGE control must be set to 100.

IMPORTANT: The FINE AMPERAGE control may be adjusted while welding.

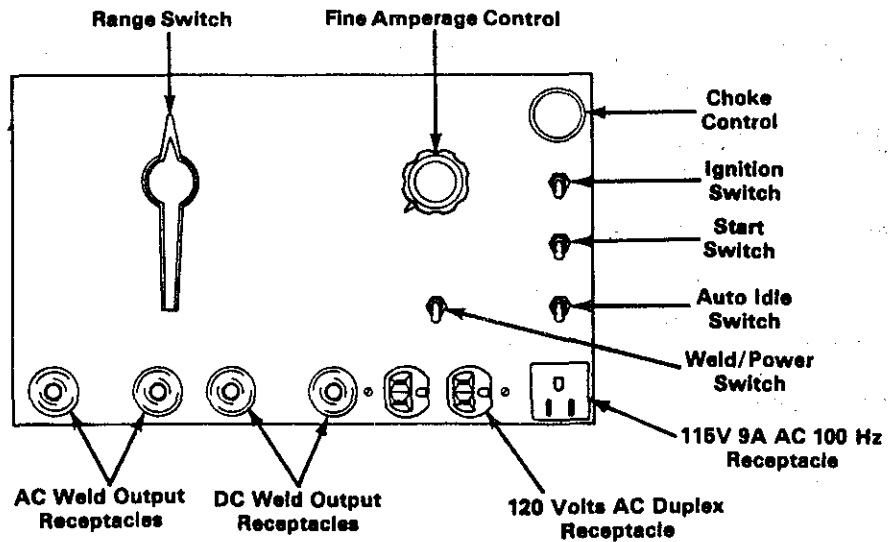
5 - 3. WELD/POWER SWITCH (Figure 5-1)



A two-position switch, labeled WELD/POWER, is provided for selecting weld current output or power plant output. In order for the welding generator to operate, the WELD/POWER switch must be in the WELD position when the engine is operating at weld rpm and in the POWER position when the engine is operating at power rpm. If it is desired to change from weld operation to power plant operation or vice versa, observe the following procedures:

WARNING: ELECTRIC SHOCK can kill.

- Shut down the unit and be sure it cannot be accidentally energized before making either welding or power connections.



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Figure 5-1. Control Panel View

A. Changing From Power Plant Operation To Weld Operation

1. Turn off or disconnect all equipment connected to the welding generator.
2. Place the Weld/Power switch in the WELD position.
3. Place the AUTO IDLE switch in the desired position.
4. Make connections to the weld output receptacles.

WARNING: ELECTRIC SHOCK can kill.

- Shut down unit and be sure it cannot be accidentally energized before making any electrical connections.
- Do not touch electrical parts while the engine is running.

ELECTRIC SPARKS can cause fire.

- Disconnect welding cables when using auxiliary power.

B. Changing From Weld Operation To Power Plant Operation

CAUTION: HIGH FREQUENCY AND VOLTAGE can damage electrical equipment.

- Turn off all electrical equipment connected to the auxiliary power receptacles and terminal strip while changing from weld rpm to power rpm.

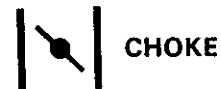
1. Break the arc and disconnect the welding cables from the welding generator.
2. Place the AUTO IDLE switch in the ON position.
3. Place the Weld/Power switch in the POWER position.

4. Set the FINE AMPERAGE control at the 100 position.

5. Make connections to the 120 VAC duplex receptacle and/or 120/240 Volts AC terminal strip (or optional 240 VAC receptacle).

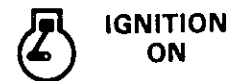
6. Do not turn on the equipment which is connected to the power plant until the engine has come up to proper speed.

5 - 4. 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 it will be necessary to 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 operation.

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. START SWITCH (Figure 5-1)



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

A. ON Position



When the AUTO IDLE switch is in the ON position, the engine will remain at idle rpm (1900 ± 100 for 60 Hz. Models; 1700 ± 100 for 50 Hz. Models) until an arc is struck or load applied to the 115V 9A AC 100 Hz receptacle. When an arc is struck or load applied to the 115V

9A receptacle, the engine speed will increase to weld rpm (3000). Approximately 10 seconds after the arc is broken or load is removed, the engine will return to idle rpm. This time delay is nonadjustable.

The ON position should be used for Shielded Metal-Arc Welding (SMAW) only.

B. OFF Position



When the AUTO IDLE switch is in the OFF position, engine speed remains at governed weld rpm when the generator is not loaded. The OFF position should be used for power while welding and for Gas Metal-Arc Welding (GMAW) and Gas Tungsten-Arc Welding (GTAW).

5 - 8. HOUR METER (Optional) - This unit can be equipped with an hour meter. 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: MOVING PARTS can cause serious injury; **IMPROPER AIR FLOW** can result in damage to internal parts; **EXPOSURE TO WEATHER** can shorten the life of internal components.

- Keep all covers and panels in place while operating.
- Keep clear of moving parts.

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

CAUTION: LOW VOLTAGE AND FREQUENCY can damage electrical equipment.

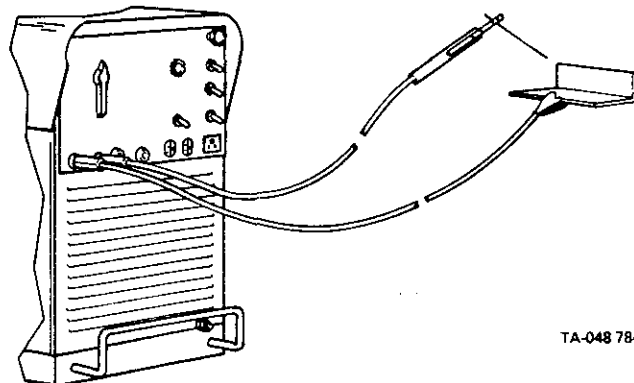
- Turn off all electrical equipment connected to the auxiliary power receptacles and terminal strip before starting or stopping the engine.

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

WARNING: ARC RAYS, HOT SLAG, AND SPARKS can burn eyes and skin; **NOISE** can damage hearing.

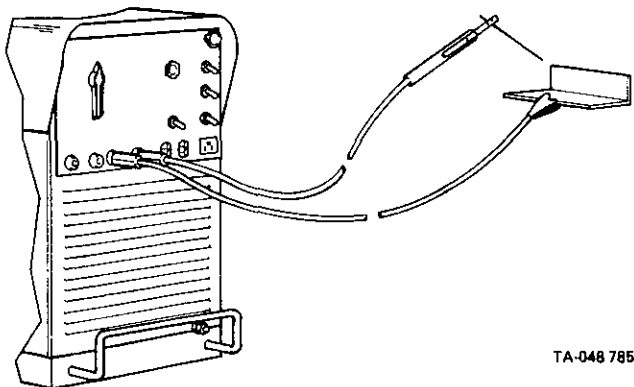
- Wear correct eye, ear, and body protection.
- MAGNETIC FIELDS FROM HIGH CURRENTS** can affect pacemaker operation.
- Wearers should consult with their doctor before going near arc welding, gouging, or spot welding operations.

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



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Figure 6-1. AC Welding Connections



TA-048 785

Figure 6-2. DC Reverse Polarity Welding Connections

6 - 1. SHIELDED METAL-ARC WELDING (Figures 6-1 & 6-2)

1. Ensure that the unit has been installed and prepared as instructed in Section 3.
2. Place the Range switch in the desired position.
3. Rotate the FINE AMPERAGE control to the desired setting.
4. Place the WELD/POWER switch in the WELD position.
5. Connect the work clamp to the object to be welded. Place the desired electrode into the electrode holder.
6. Connect desired accessory equipment to the 115V 9A AC 100 Hz receptacle.
7. Start the engine as instructed in Section 6-3.
8. Place the AUTO IDLE switch in the ON position.
9. Begin welding.

6 - 2. POWER PLANT OPERATION

CAUTION: LOW VOLTAGE can damage equipment.

- Do not use 115V 9A receptacle during power plant operation.
- Use only remaining auxiliary power receptacle(s) or terminal strip for power plant output connections.

1. Prepare the engine for operation as instructed in Section 3.
2. Make connections to the 120/240 Volts AC terminal strip and/or 120 VOLTS AC duplex receptacle as instructed in Sections 4-2 and 4-3.
3. Place the WELD/POWER switch in the POWER position.

4. Rotate the FINE AMPERAGE control to the 100 setting.
5. Start the engine as instructed in Section 6-3.
6. Turn on the auxiliary equipment and begin operation.

6 - 3. STARTING THE ENGINE

1. Fill the fuel tank and check to ensure that oil level is adequate.
2. Pull the CHOKE control fully out. Lesser degrees of choking may be required if the engine is warm.
3. Place the AUTO IDLE switch in the ON position.
4. The WELD/POWER switch may be in either the WELD or POWER position.
5. Place the IGNITION switch in the ON position and the START switch in the START position.

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

6. Once the 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. STOPPING THE ENGINE

1. Remove all weld and power loads from the welding generator.
2. Place the AUTO IDLE switch in the ON position.
3. Operate the engine at idle speed for 2 minutes to allow internal engine temperature to equalize.
4. Place the IGNITION switch in the OFF position.

SECTION 7 - MAINTENANCE

WARNING: HOT ENGINE PARTS can cause severe burns.

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

MOVING PARTS can cause serious injury.

- Keep clear of moving parts.
- Shut down the engine and disconnect negative (-) battery cable from battery before internally inspecting or servicing.

IMPORTANT: See the engine manufacturer's manual (B48M engine) for complete engine care.

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 Manufacturer's Manual (B48M 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 - 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: *Periodically 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.*

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 manufacturer's manual (B48M engine). Use correct type and grade of oil as listed in instructions for expected temperature range before next oil and filter change.

7 - 4. FUEL FILTER - The fuel filter is located below the fuel tank. Check the sediment bowl periodically for water and dirt deposits. How often the filter has to be checked will depend on the quality of gasoline used and how dusty and dirty the location is in which the engine is being used.

7 - 5. AIR CLEANER - 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. 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 according to maintenance label and engine manufacturer's instructions.

7 - 6. ELECTRICAL SYSTEM

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.*
Periodically inspect the battery for loose connections, defective cables, corrosion, cracked case or cover, loose holddowns, and loose or deformed terminal posts.

On units equipped with conventional wet or dry charged batteries with removable vent caps, check the electrolyte level frequently. Add clean, mineral-free or distilled water to bring the electrolyte in each cell up to the level indicator.

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

7 - 8. ENGINE SPEED ADJUSTMENTS

IMPORTANT: *Ensure that the points and plugs are clean and properly gapped and that the engine has reached normal operating temperature before proceeding with the engine speed adjustments. Also adjust the carburetor as outlined in the Engine Owner's Manual.*

The engine speeds have been factory adjusted and will not require frequent readjustment. After tuning the engine, check the speeds with a tachometer. With no load applied, the power speed should be 1860 rpm for 60 Hz. Models (1650 for 50 Hz. Models) and the weld speed 3000 rpm. If necessary adjust the speeds as follows:

1. Start the engine as outlined in Section 6-3.
2. Place the WELD/POWER switch in the POWER position.
3. Rotate the FINE AMPERAGE control to 100.
4. Pull the governor arm away from the carburetor to cause the engine to idle. While holding the arm against spring tension, make the following adjustments:
 - a. Rotate idle speed adjustment screw until the engine runs at 1800 rpm.
 - b. Rotate idle mixture adjustment screw in or out to obtain maximum rpm with idle speed adjustment screw against stop ($7/8 \pm 1/8$ turn open).

- c. Readjust idle speed adjustment screw for 1800 rpm.

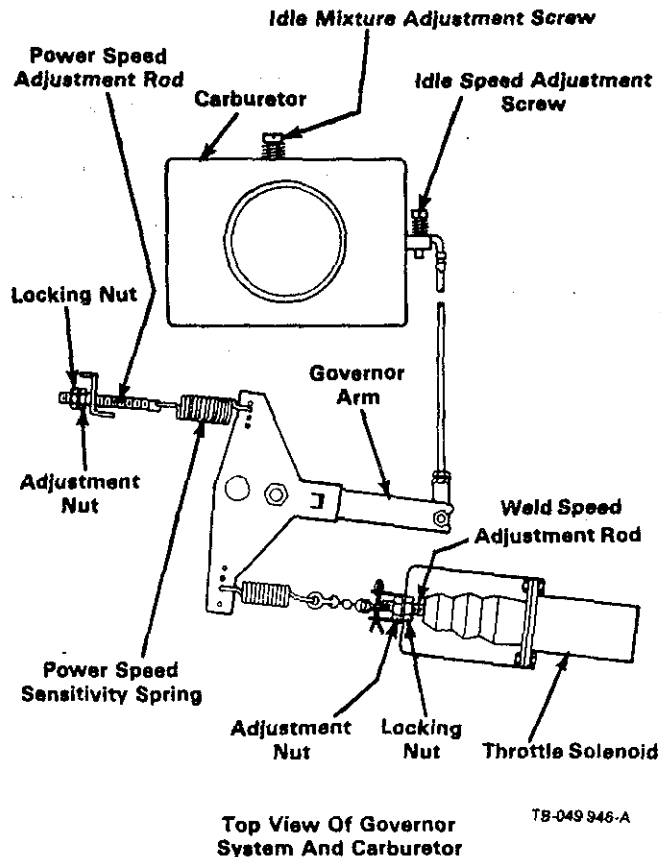


Figure 7 - 1. Engine Speed Adjustments

CAUTION: INCORRECT FUEL-AIR MIXTURE can damage engine.

- Ensure that the idle mixture adjustment screw is $7/8 \pm 1/8$ turn open.

If engine surges (is running lean) or spark plugs foul (is running too rich), especially after long periods of idling, repeat Step 4.

5. Readjust the throttle stop screw to obtain 1700 rpm on 60 Hz models and 1500 rpm on 50 Hz models. Release governor arm.
6. Loosen the locking nut on the power speed adjustment rod and rotate the adjustment nut until the engine runs at 1860 rpm (1650 rpm for 50 Hz. Models). Tighten locking nut.

IMPORTANT: If the engine surges (hunts) when running at power speed, move the power speed sensitivity spring out or enrichen the idle mixture slightly by rotating the idle mixture adjustment screw counterclockwise. Repeat Steps 4, 5, and 6.

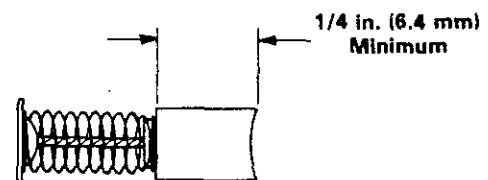
7. Place the WELD/POWER switch in the WELD position.
8. Place the AUTO IDLE switch in the OFF position.

9. Loosen the locking nut on the weld speed adjustment rod and rotate the adjustment nut until the engine runs at 3000 rpm. Tighten locking nut.

7 - 9. IDLE CONTROL CIRCUIT PROTECTION - The idle control printed circuit board and the throttle solenoid are protected by an automatic reset circuit breaker CB1 located behind the right side panel.

Normally, this circuit breaker should not trip. However, if an arc is struck or the AUTO IDLE switch is placed in the OFF position after the throttle solenoid has deenergized and the engine is slowing down, CB1 may trip. If this occurs, wait approximately one minute before resuming operation.

7-10. BRUSHES AND SLIP RINGS - Brush life is very good under normal 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.



TA-083 205

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.

7-11. HIGH-ALTITUDE CARBURETOR MODIFICATION (Optional) - The carburetor can be equipped with an adjustable main jet for high-altitude operation (above 5000 ft.). Minor adjustment will be necessary for proper operation at a particular altitude. Whenever a carburetor adjustment is deemed necessary, allow the engine to reach normal operating temperature.

1. Rotate the FINE AMPERAGE control to 100.
2. Place the WELD/POWER switch in the WELD position.
3. Place the AUTO IDLE switch in the OFF position.
4. While applying a continuous load to the welding generator, rotate the main adjustment screw for best output.

5. Check weld speed (3000 rpm) and power speed. (1860 rpm for 60 Hz. Models; 1650 rpm for 50 Hz. Models). Readjust if necessary.

7-12. SPARK ARRESTOR (Optional)

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.

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 fire 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.

A. Inspection

1. Visually examine the outside of the device for holes, cracks, or metal corrosion.
2. With the engine stopped, look inside the spark arrestor outlet tube with a flashlight or other light

source. Visually examine the vanes and the outlet tube for metal or weld failure. The vanes must be firmly attached to the inlet tube and the outlet tube must be completely intact (this is an important factor in maintaining spark arresting efficiency).

3. Check the mounting clamp to ensure that the spark arrestor is securely mounted.

Replace the spark arrestor if inspection reveals any signs of failure.

B. Servicing The Carbon Trap

WARNING: EXHAUST SPARKS can cause fire.

- *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.*

Removal of the device from the exhaust system is not necessary for servicing.

1. Stop the engine and allow the exhaust system to cool.
2. Remove the cleanout plug from the bottom of the spark arrestor with a wrench. 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. Replace and secure the cleanout plug.

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 and disable engine before internally inspecting or servicing.*
- *Remove spark plugs and disconnect negative (-) battery cable.*

MOVING PARTS can cause severe injury.

- *Keep clear of moving parts.*

HOT ENGINE PARTS can cause severe 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, the nearest Factory Authorized Service Station should be contacted. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly followed.

TROUBLE	PROBABLE CAUSE	REMEDY
Battery discharges between uses.	IGNITION switch S2 left in ON position.	Ensure that IGNITION switch S2 is left in OFF position when unit is shut down.
	Buildup of acid on top of battery (white-grayish substance).	Clean battery with soda solution; rinse with clear water.
	Infrequent use.	Periodically recharge battery (approximately every 3 months).
	Defective battery.	Replace battery.
No power output at power receptacles.	WELD/POWER switch S1 in WELD position.	Place WELD/POWER switch S1 in POWER position.
Low power output at power receptacles.	Low setting on FINE AMPERAGE control R1.	Rotate FINE AMPERAGE control R1 to 100.
	Engine running below required speed.	Check air filter; clean or replace as necessary.
		Clean and adjust points and plugs. Adjust carburetor (see Engine Owner's Manual, B48M engine).
		Adjust engine speed (see Section 7-8).
	Engine not developing proper horsepower.	Perform necessary engine maintenance (see engine manual).
	Voltage Regulator board PC2 defective.	Replace PC2.
Transformer T1 defective.	Replace T1.	
Low weld output.	Engine running below required speed (3000 rpm).	Check air filter; clean or replace as necessary.
		Clean and adjust points and plugs. Adjust carburetor (see Engine Owner's Manual, B48M engine).
		Adjust engine speed (see Section 7-8).
	Engine not developing proper horsepower.	Perform necessary engine maintenance (see engine manual).
Erratic weld output.	Damp, defective, or wrong type electrodes.	Try different electrodes.
	Improper connection to workpiece.	Check and tighten loose connections.
Erratic weld and power output.	Dirty slip rings and/or worn brushes.	Clean slip rings and/or replace worn brushes (see Section 7-10).
Engine will not remain at weld rpm when power (from 115V 9A receptacle) or weld load is applied with AUTO IDLE switch in ON position.	Insufficient load.	Place AUTO IDLE switch in OFF position.

TROUBLE	PROBABLE CAUSE	REMEDY
High power voltage.	Voltage Regulator board PC2 defective.	Replace PC2.
High weld voltage.	Voltage Regulator board PC2 defective.	Disconnect lead No. 48 from Voltage Regulator board PC2. If voltage drops to 80 volts ac, replace Voltage Regulator board PC2.

8 - 3. BOOSTER BATTERY JUMP STARTING - If jump starting is attempted, employ the safety precautions below and the following 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.*
- *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.*

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 (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.

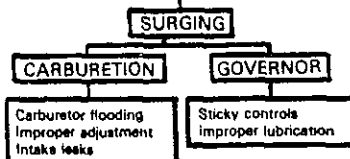
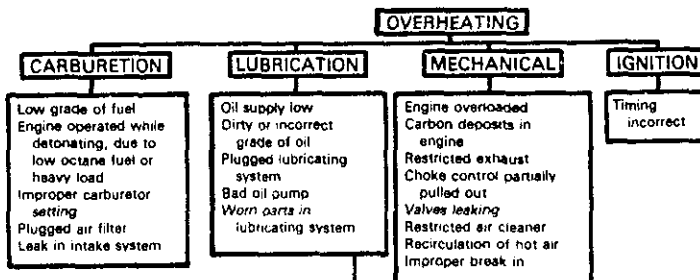
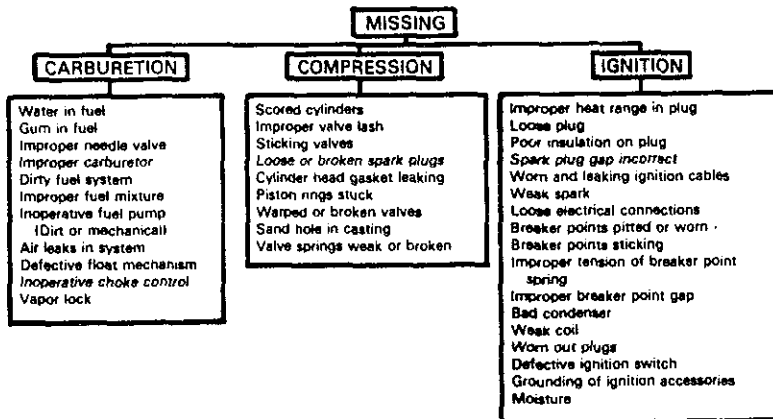
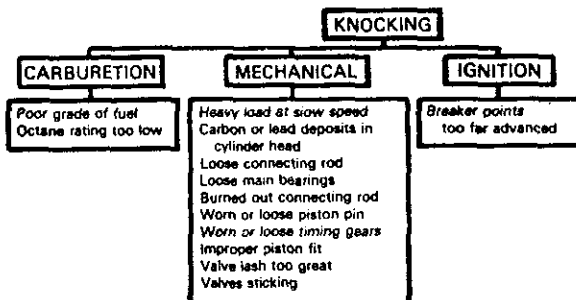
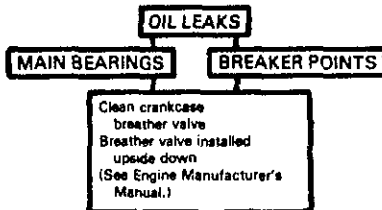
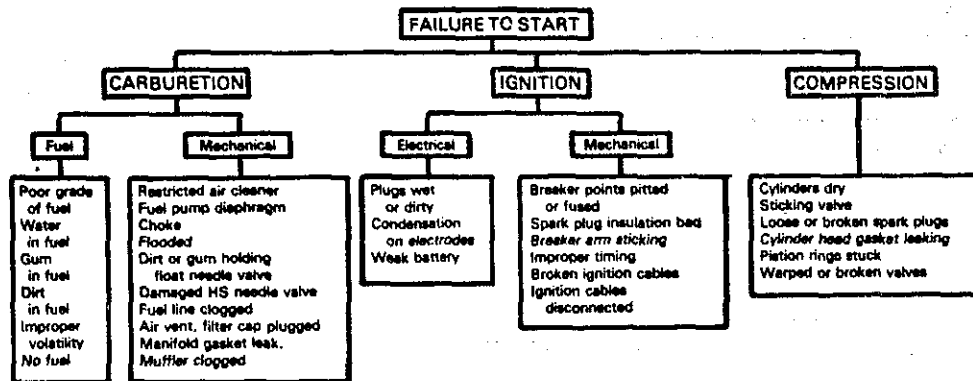
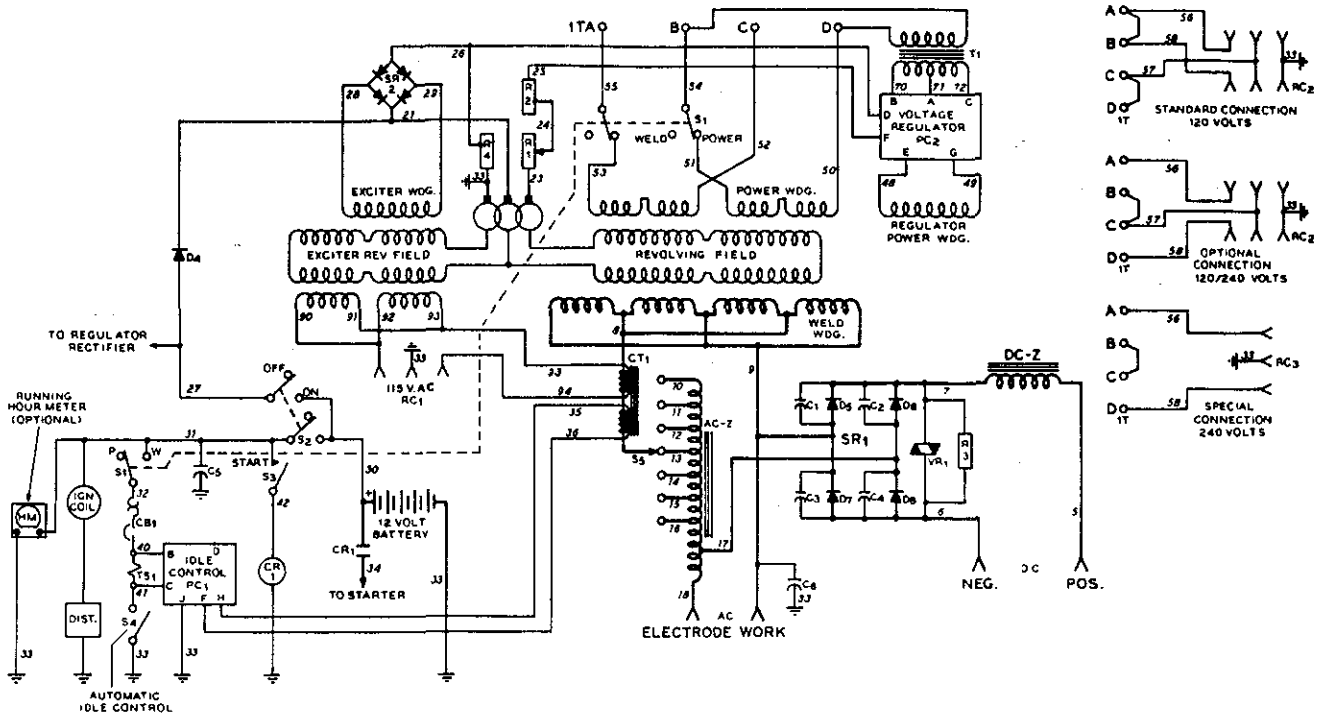
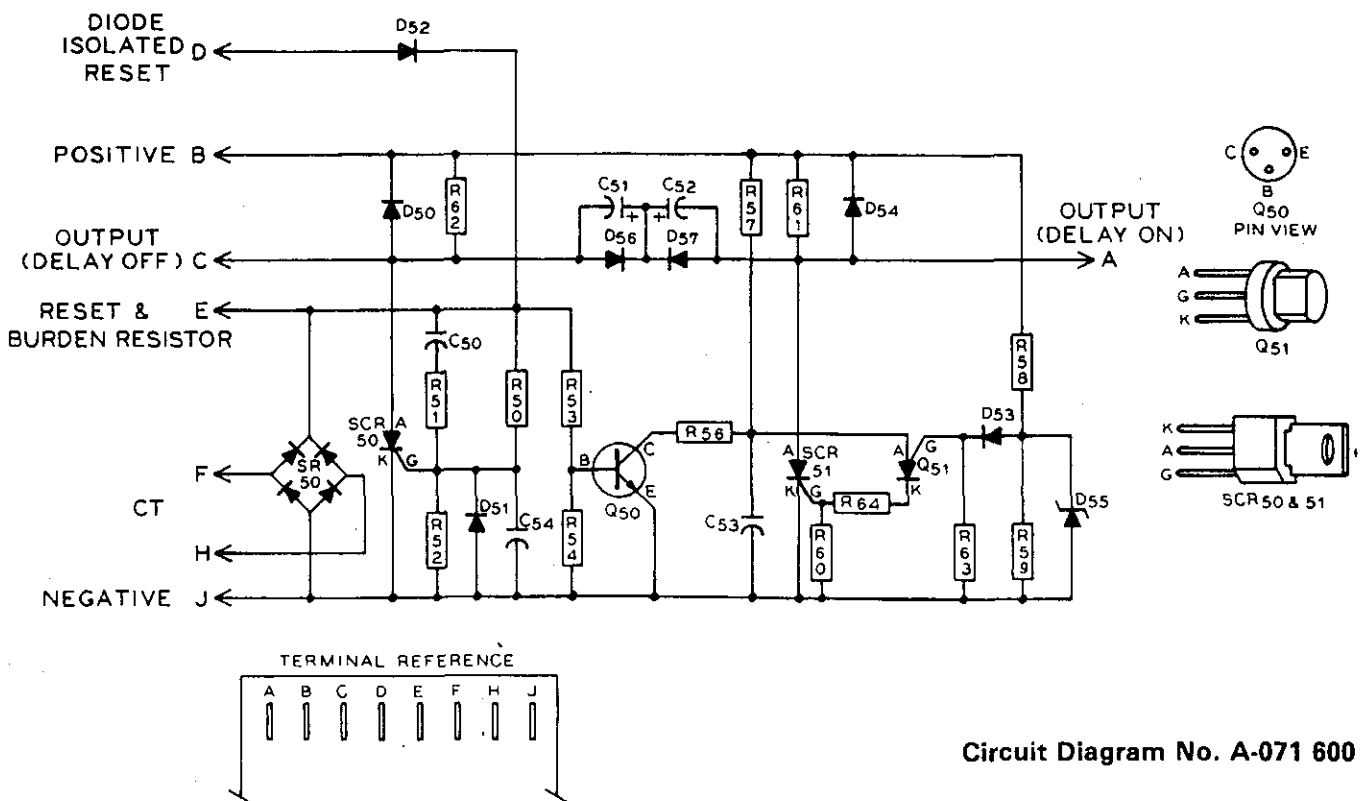


Figure 8-1. Engine Troubleshooting



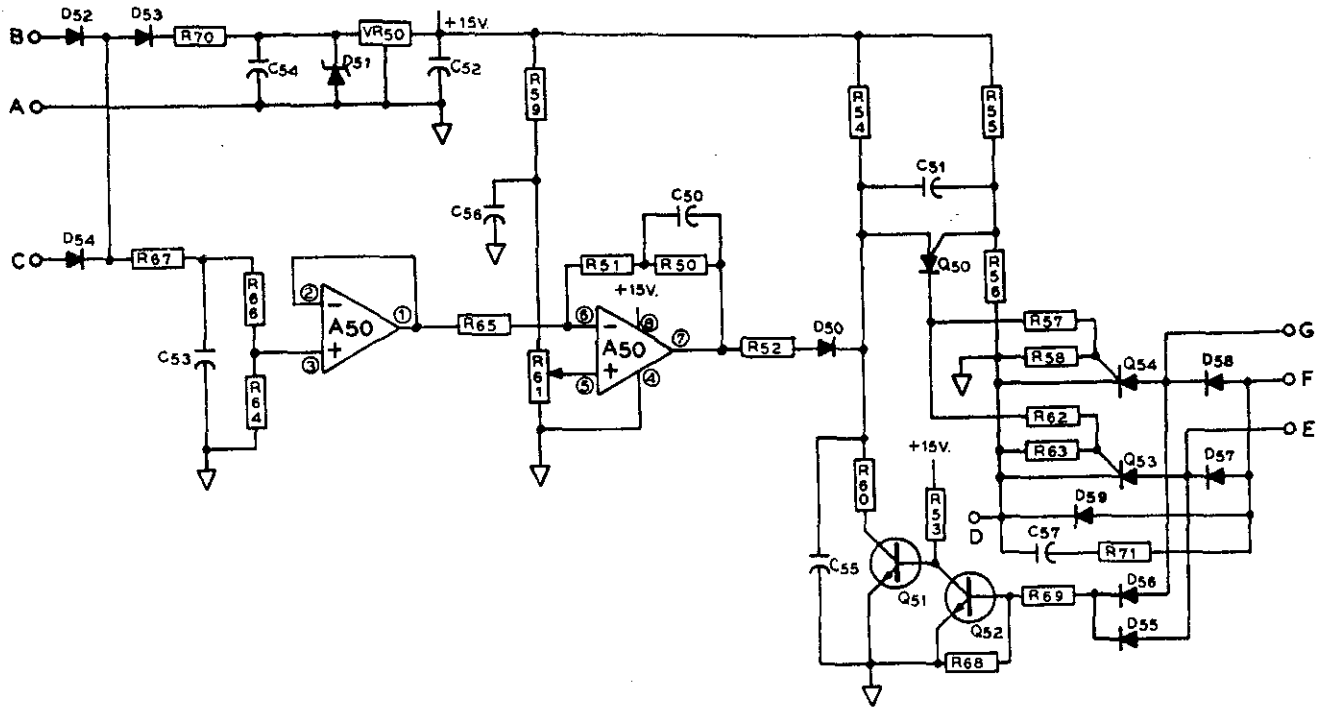
Circuit Diagram No. B-088 562

Figure 8-2. Circuit Diagram For Welding Generator



Circuit Diagram No. A-071 600

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



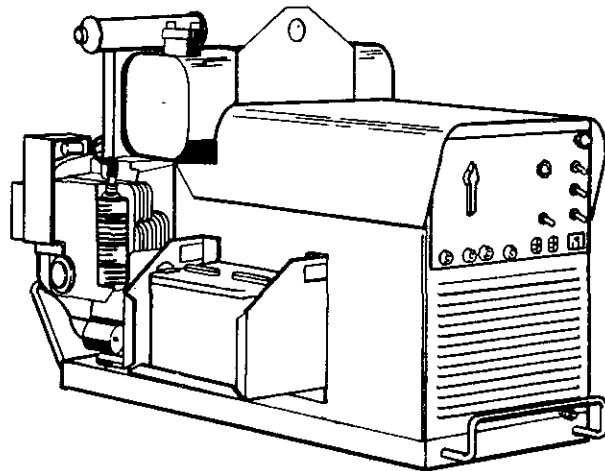
Circuit Diagram No. A-049 506-A

Figure 8-4. Circuit Diagram For Power Voltage Regulator Circuit Board PC2

October 1984

FORM: OM-411M

Effective With Serial No. JD661089



PARTS LIST

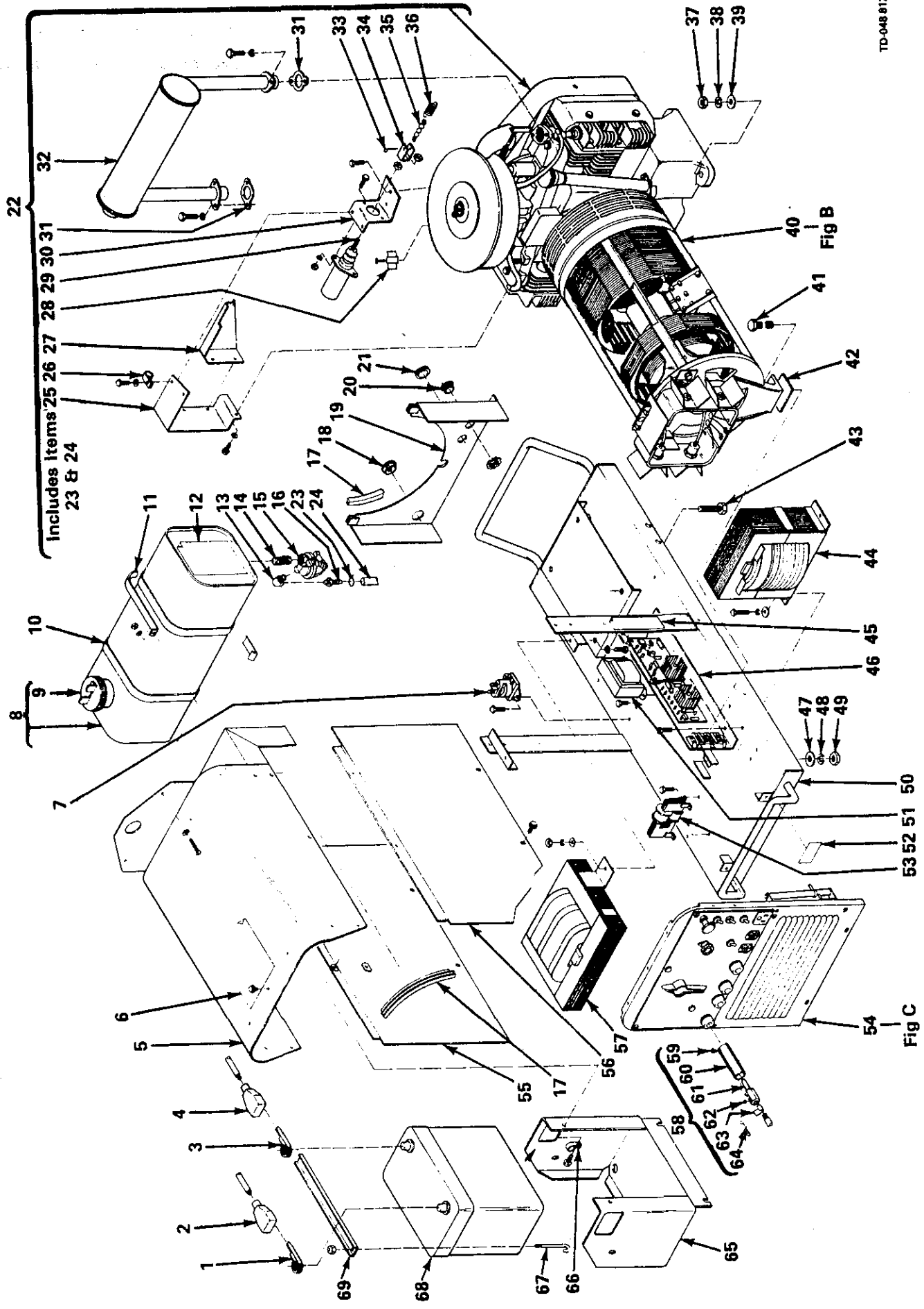


Figure A - Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure A Main Assembly				
1		088 577	CABLE, battery-positive	1
2		071 970	COVER, cable-battery post red	1
3		088 578	CABLE, battery-negative	1
4		071 971	COVER, cable-battery post black	1
5		+035 141	COVER, top	1
6		046 392	LABEL, general precautionary	1
7	CR1	070 109	CONTACTOR, solenod 12 volts dc	1
8		015 670	TANK, fuel (consisting of)	1
9		015 603	. CAP, tank-fuel	1
10		603 120	STRIP, felt 1/8 x 3/4 x 28-1/4	2
11		014 951	STRAP, mtg-fuel tank	2
12		088 601	LABEL, engine maintenance	1
13		020 185	FITTING, pipe-brass elbow st 1/8 NPT	1
14		602 898	FITTING, pipe-brass nipple close 1/8 NPT	1
15		015 602	VALVE, shut-off w/strainer fuel	1
16		604 313	FITTING, brass barbed male 1/4 TB x 1/8 NPT	1
17		095 970	STRIP, rubber 18 inches	2
18		057 357	BUSHING, snap 15/16 ID - 1.12 mtg hole	1
19		035 471	BAFFLE, air	1
20		010 610	CONNECTOR, clamp-cable 1 inch	1
21		010 493	BUSHING, snap 5/8 ID x 7/8	1
22		088 604	ENGINE, gas-electric (consisting of)	1
23		010 865	. CLAMP, hose 0.406 - 0.437 dia	1
24		088 611	. HOSE, No. 1 x 1/4 ID x 40	1
25		088 571	. GUARD, solenoid	1
26		010 021	. CLAMP, cushion 9/16 dia x 11/32	2
27		088 570	. GUARD, pump-fuel	1
28	C5	053 296	. CAPACITOR, ignition 0.5 uf	1
29	TS1	045 060	. SOLENOID, 12 volts 20 amp pull/hold type	1
		003 455	. KEY, woodruff 1/4 x 3/4	1
30		088 572	. BRACKET, mtg-solenoid/throttle	1
31		065 313	. GASKET	2
32		088 484	. MUFFLER	1
33		605 277	. PIN, cotter 3/32 x 3/4	1
34		049 839	. BRACKET, adjustment-solenoid	1
35		048 984	. CHAIN, throttle	1
36		064 646	. SPRING	1
		003 455	. KEY, woodruff 1/4 x 3/4	1
37		601 872	NUT, hex-full finish 3/8-16	4
38		602 213	WASHER, lock-split 3/8	4
39		010 910	WASHER, flat SAE 3/8	4
40		Figure B	GENERATOR (Pg 4)	1
41		601 933	SCREW, cap-hex hd 1/2-13 x 2-1/2	1
42		020 359	SHIM, foot-endbell (as req'd)	1
43		601 967	SCREW, cap-hex hd 3/8-16 x 1-1/2	4
44	AC-Z	049 466	REACTOR	1
	D4	049 943	DIODE, rectifier 3 amp 1000 volts SP (located in wiring harness)	1
45		047 491	LABEL, 120/240 volts terminal hook up	1
46		Figure D	BRACKET, w/components (Pg 7)	1
47		602 246	WASHER, flat 1/2	1
48		605 787	WASHER, lock-internal tooth 1/2	1
49		601 879	NUT, hex-full 1/2-13	1
50		088 575	BASE	1
51	T1	049 712	TRANSFORMER, control	1
52		027 698	LABEL, equipment ground terminal	1
53	CT1	081 359	TRANSFORMER, idle control	1
54		Figure C	PANEL, front-w/components (Pg 6)	1
		083 030	STUD, brass 1/4-20 x 1-3/4 ground	1
		601 836	NUT, brass-hex jam 1/4-20	2
55		035 136	PANEL, side-LH	1

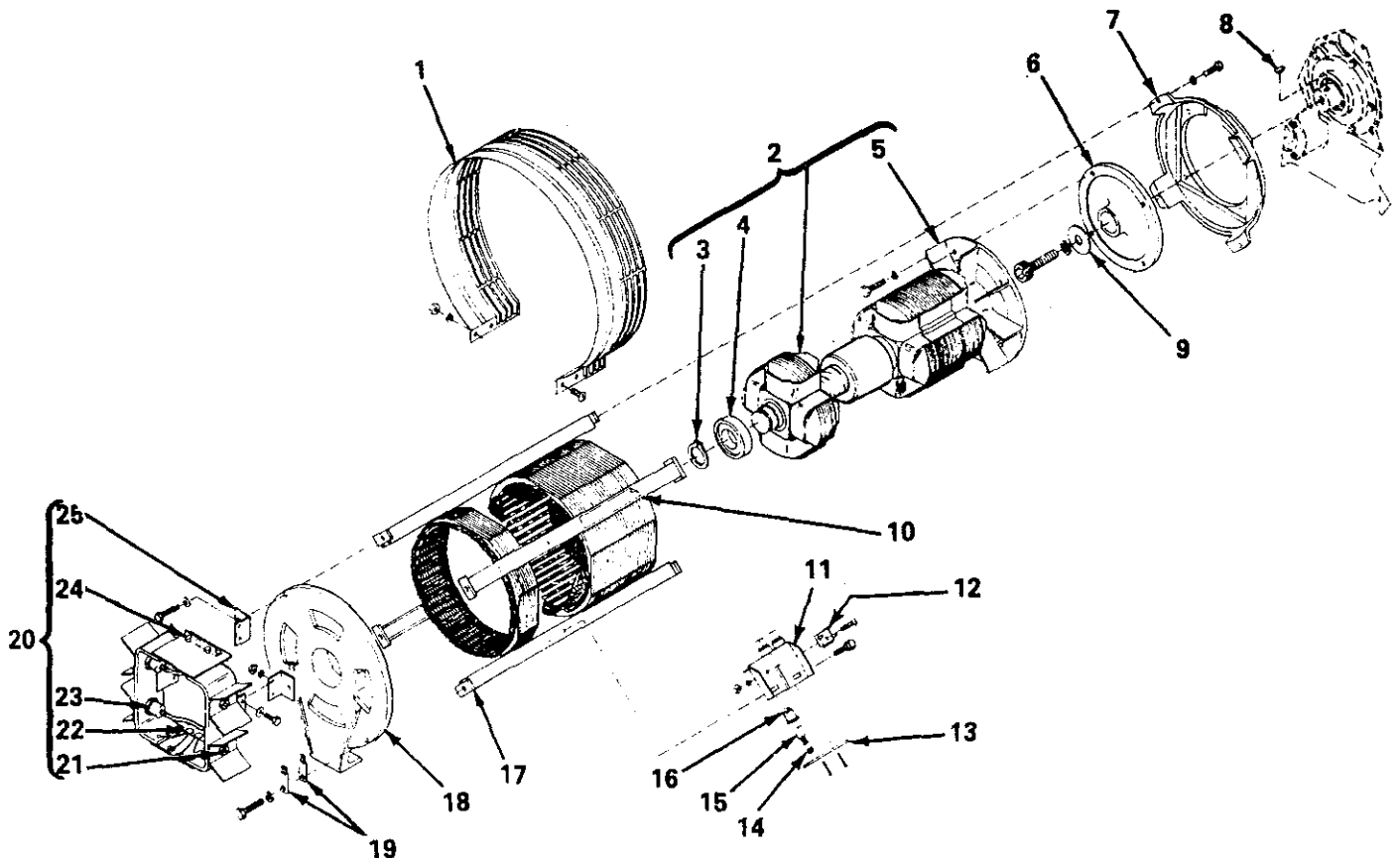
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure A Main Assembly (Cont'd)

56		035 135	PANEL, side-RH	1
57	DC-Z	035 429	STABILIZER.....	1
58		039 608	PLUG, jack-red (consisting of).....	2
59		602 160	. SCREW, self-tapping fillister hd 8-32 x 1/4	1
60		602 814	. INSULATION, jack plug	1
61		101 219	. PLUG, jack	1
62		602 178	. SCREW, socket hd 1/4-20 x 3/8	2
63		019 833	. STRIP, copper 0.010 x 2-1/2 x 3/4	1
64		010 521	. WIRE, tie	1
65		070 211	SHELF, battery box.....	1
66		010 021	CLAMP, cushion 9/16 dia x 11/32	2
67		070 010	BOLT, J 1/4-20 x 2-5/16	1
68		015 709	BATTERY, 12 volts 32 amp	1
69		070 213	HOLDDOWN, battery	1

*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 NUMBERS WHEN ORDERING REPLACEMENT PARTS.



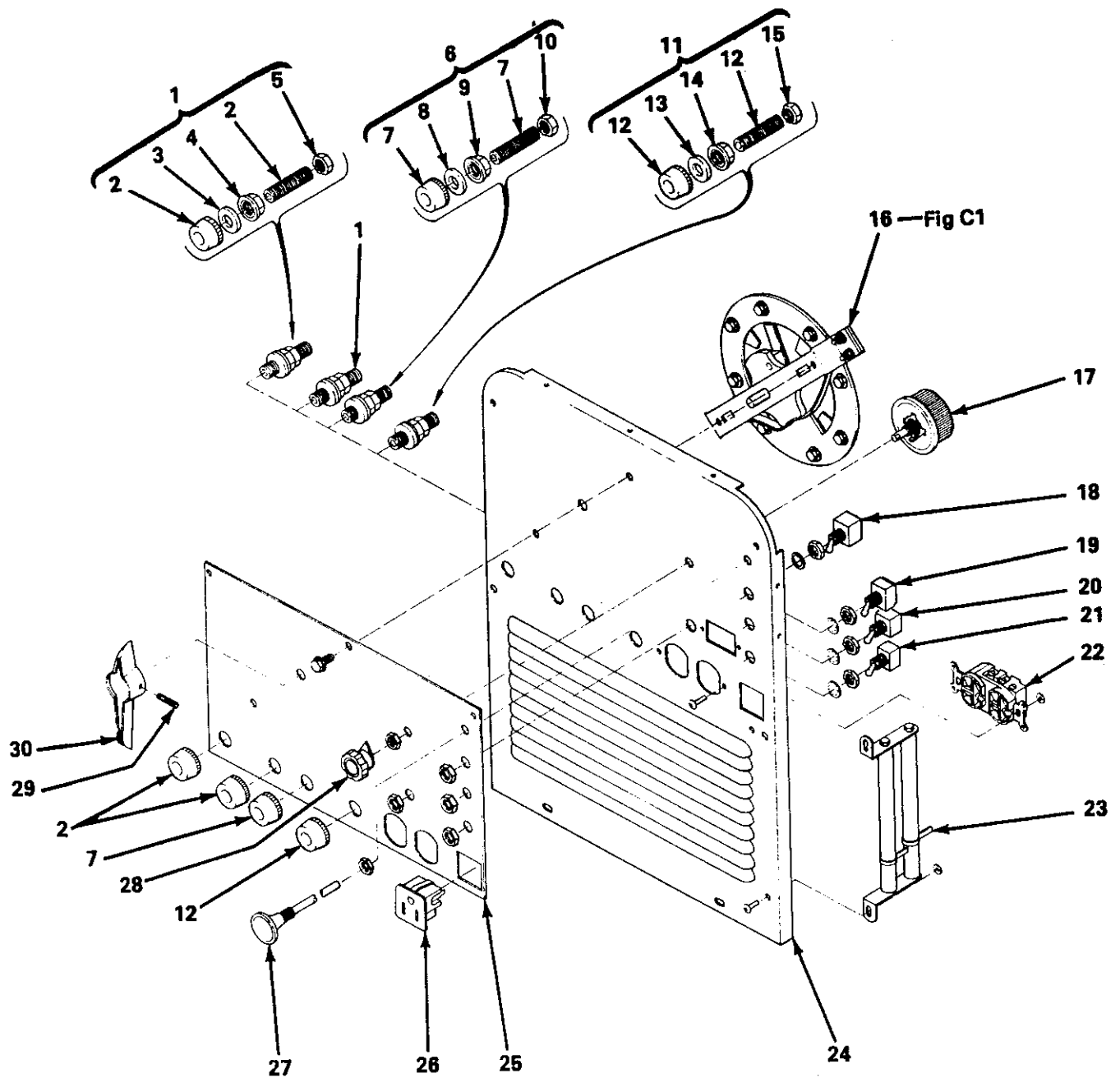
TD-048 813-B

Figure B - Generator Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure B Generator Assembly (Fig. A Pg 2 Item 40)				
1		014 376	GUARD, fan - rotor	1
2		049 286	ROTOR ASSEMBLY, generator (consisting of)	1
3		024 617	. RING, retaining - external	1
4		053 390	. BEARING, ball	1
5		017 624	. FAN, rotor - generator	1
		602 348	. KEY, 1/4 x 1/4 x 3/4	1
6		021 934	ADAPTER, fan - rotor	1
7		017 702	ADAPTER, engine	1
8		603 945	KEY, woodruff 1/4 x 7/8 (part of engine)	1
9		008 917	WASHER, flat 2-1/4 OD x 11/32 ID x 3/16	1
10		013 367	LABEL, caution compression release	1
11		007 250	BRACKET, mtg - brush holder	1
12	SR2	035 704	RECTIFIER, integrated 30 amp 600 volts	1
13		047 878	BAR, retaining - brush holder	1
14		047 885	CAP, holder - brush	3
15		*049 125	BRUSH, w/spring	3
16		005 614	HOLDER, brush - w/tabs	3
17		+086 961	STATOR, generator 60 Hz or	1
17		+086 960	STATOR, generator 50 Hz	1
18		020 908	ENDBELL, generator	1
19		010 222	CONNECTOR, rectifier - cell	3
20	SR1	045 032	RECTIFIER, silicon diode (consisting of)	1
21		037 305	. DIODE, rectifier 150 amp 300 volts straight polarity	2
22	C1-4	031 689	. CAPACITOR, ceramic 0.01 uf 500 volts dc	4
23		037 306	. DIODE, rectifier 150 amp 300 volts reverse polarity	2
24	VR1,R3	046 819	. SUPPRESSOR	1
25		035 410	. ANGLE, mounting - rectifier	2

***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 NUMBERS WHEN ORDERING REPLACEMENT PARTS.



TD-048 814

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 2 Item 54)

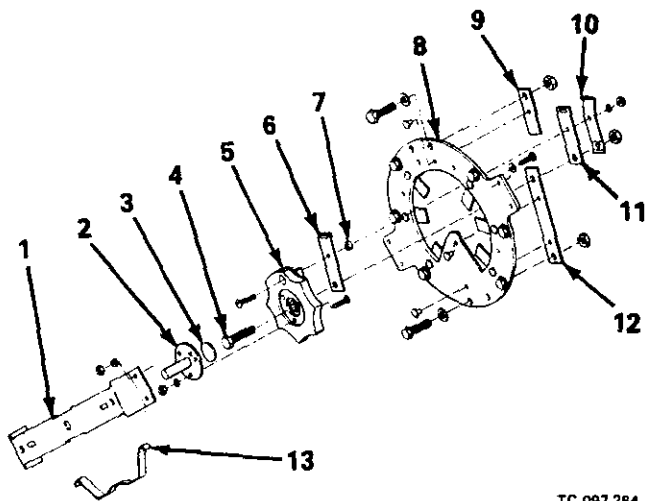
1		057 608	RECEPTACLE, jack plug - yellow (consisting of)	2
2		072 334	. RECEPTACLE & NUT, yellow	1
3		010 291	. WASHER, flat - nylafil 5/8 ID x 1-1/4 OD x 1/8	1
4		604 668	. NUT, self-locking hex 1/2-20	1
5		601 881	. NUT, hex jam 1/2-20	1
	C6	049 961	CAPACITOR, ceramic 0.1 uf 500 volts dc w/leads & terminals	1
6		039 801	RECEPTACLE, jack plug - black (consisting of)	1
7		091 542	. RECEPTACLE & NUT, black	1
8		010 291	. WASHER, flat - nylafil 5/8 ID x 1-1/4 OD x 1/8	1
9		604 668	. NUT, self-locking hex 1/2-20	1
10		601 881	. NUT, hex jam 1/2-20	1
11		039 800	RECEPTACLE, jack plug - red	1
12		091 541	. RECEPTACLE & NUT, red	1
13		010 291	. WASHER, flat - nylafil 5/8 ID x 1-1/4 OD x 1/8	1
14		604 668	. NUT, self-locking hex 1/2-20	1
15		601 881	. NUT, hex jam 1/2-20	1
16	S5	005 563	SWITCH, selector (Fig. C1 pg 7)	1
17	R1	081 712	RHEOSTAT, WW 100 watt 30 ohm	1
18	S1	011 622	SWITCH, toggle 3PDT 15 amp 125 volts	1
19	S2	011 611	SWITCH, toggle DPDT 15 amp 125 volts	1
20	S3	021 467	SWITCH, toggle SPST MD 3 amp 125 volts ac	1
21	S4	053 359	SWITCH, toggle SPST 20 amp 125 volts	1
22	RC2	039 864	RECEPTACLE, straight - duplex grounded 2P3W 15 amp 125 volts	1
23	R2,4	052 782	RESISTOR, dual adjustable 180 watt 12 ohm	1
24		049 213	PANEL, front	1
25			NAMEPLATE (order by model and serial numbers)	1
26	RC1	034 952	RECEPTACLE, straight 3P3W 15 amp 125 volts	1
27		049 960	CONTROL, push/pull	1
28		019 609	KNOB, pointer	1
29		010 647	PIN, spring - compression 5/32 x 1-1/4	1
30		006 927	HANDLE, switch - range	1

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

Item No.	Part No.	Description	Quantity
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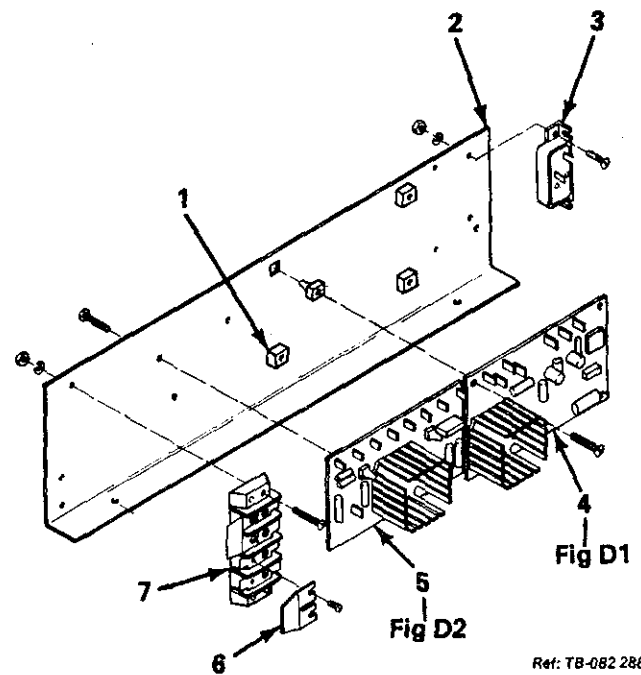
Figure C1 005 563 Switch, Selector (Fig. C Pg 6 Item 16)

1	005 562	BRACKET, mtg - switch	1
2	005 561	SHAFT, rotor	1
3	005 564	INSULATOR, screw - switch	1
4	605 276	SCREW, cap - hex hd 1/4-20 x 1-1/4	1
5	005 559	CONTACT BOARD, movable - switch	1
6	005 560	CONTACT, switch - movable	1
7	008 485	SPACER, contact - switch	1
8	005 566	CONTACT BOARD, stationary - switch	1
9	011 644	CONTACT, stationary - switch	7
10	052 405	SPRING, pressure - contact switch	1
11	052 404	CONTACT, movable - switch	1
12	005 557	BUS BAR, switch - range	1
13	005 558	SPRING, selector - switch	1



TC-097 284

Figure C1 - Switch, Selector



Ref: TB-082 288

Figure D - Bracket, W/Components

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure D Bracket, W/Components (Fig. A Pg 2 Item 46)

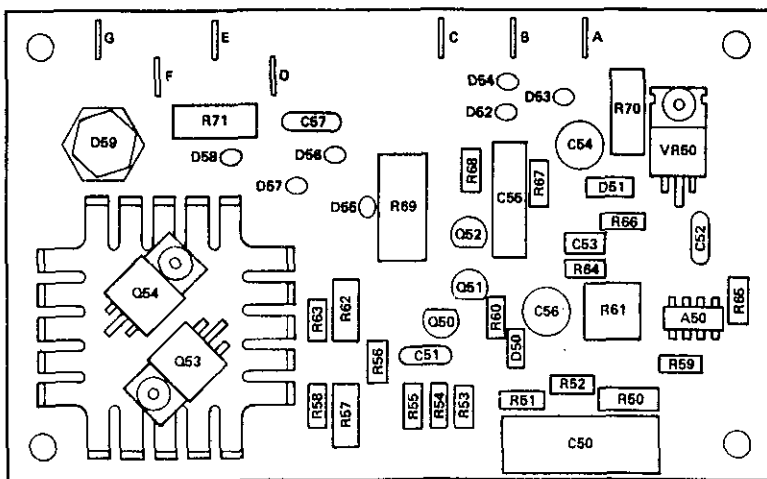
1		080 509	GROMMET, screw No. 8/10 panel hole	4
2		049 377	BRACKET, mtg - components	1
3	CB1	045 061	CIRCUIT BREAKER, automatic reset 24 volts dc 7 amp	1
4	PC2	049 404	CIRCUIT CARD, regulator 115 volts (Fig. D1 Pg 8)	1
5	PC1	071 609	CIRCUIT CARD, weld/idle control (Fig. D2 Pg 9)	1
6		038 620	LINK, jumper - terminal block 30 amp	2
7	1T	038 621	BLOCK, terminal 30 amp 4 pole	1

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

Dia. Mkgs.	Part No.	Description	Quantity
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Figure D1 049 404 Circuit Card, Regulator (Fig. D Pg 7 Item 4)

A50	009 159	IC, linear 358	1
C50	028 294	CAPACITOR, mylar 1 uf 200 volts dc	1
C51	053 992	CAPACITOR, ceramic 0.001 uf 1000 volts	1
C52	000 348	CAPACITOR, tantalum 0.47 uf 35 volts	1
C53	005 023	CAPACITOR, tantalum 2.2 uf 20 volts	1
C54,56	000 861	CAPACITOR, electrolytic 33 uf 35 volts	2
C55	038 585	CAPACITOR, mylar 0.22 uf 50 volts	1
C57	028 292	CAPACITOR, ceramic 0.005 uf 1000 volts dc	1
D50	028 351	DIODE, signal 0.020 amp 75 volts straight polarity	1
D51	049 641	DIODE, zener 27 volts 1 watt	1
D52,53,54	026 202	DIODE, rectifier 1 amp 400 volts straight polarity	3
D55,56	073 555	DIODE, rectifier 1 amp 600 volts straight polarity	2
D57,58	070 250	DIODE, rectifier 3 amp 600 volts straight polarity	2
D59	030 529	DIODE, rectifier 12 amp 600 volts reverse polarity	1
Q50	039 355	TRANSISTOR, unijunction 15MA 40 volts	1
Q51,52	037 200	TRANSISTOR, 200MA 40 volts NPN	2
Q53,54	049 642	THYRISTOR, SCR 8 amp 600 volts	2
R50	005 640	RESISTOR, carbon 0.5 watt 680K ohm	1
R51	035 884	RESISTOR, carbon film 0.25 watt 100K ohm	1
R52	039 328	RESISTOR, carbon film 0.25 watt 1500 ohm	1
R53,54,65	035 886	RESISTOR, carbon film 0.25 watt 22K ohm	3
R55	039 329	RESISTOR, carbon film 0.25 watt 2700 ohm	1
R56,64	035 827	RESISTOR, carbon film 0.25 watt 10K ohm	2
R57,62	028 285	RESISTOR, carbon film 0.5 watt 100 ohm	2
R58,63	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	1
R59	035 888	RESISTOR, carbon film 0.25 watt 2200 ohm	1
R60	074 026	RESISTOR, carbon 0.25 watt 150 ohm	1
R61	006 424	POTENTIOMETER, cermet 1 turn 0.5 watt 2K ohm	1
R66	039 332	RESISTOR, carbon film 0.25 watt 15K ohm	1
R67	039 334	RESISTOR, carbon film 0.25 watt 27K ohm	1
R68	039 331	RESISTOR, carbon film 0.25 watt 4700 ohm	1
R69	049 439	RESISTOR, carbon 2 watt 47K ohm	1
R71	030 707	RESISTOR, carbon 1 watt 47 ohm	1
R70	074 099	RESISTOR, carbon 1 watt 150 ohm	1
VR50	081 832	IC, linear 78M15	1
	080 506	HEAT SINK, dual	1



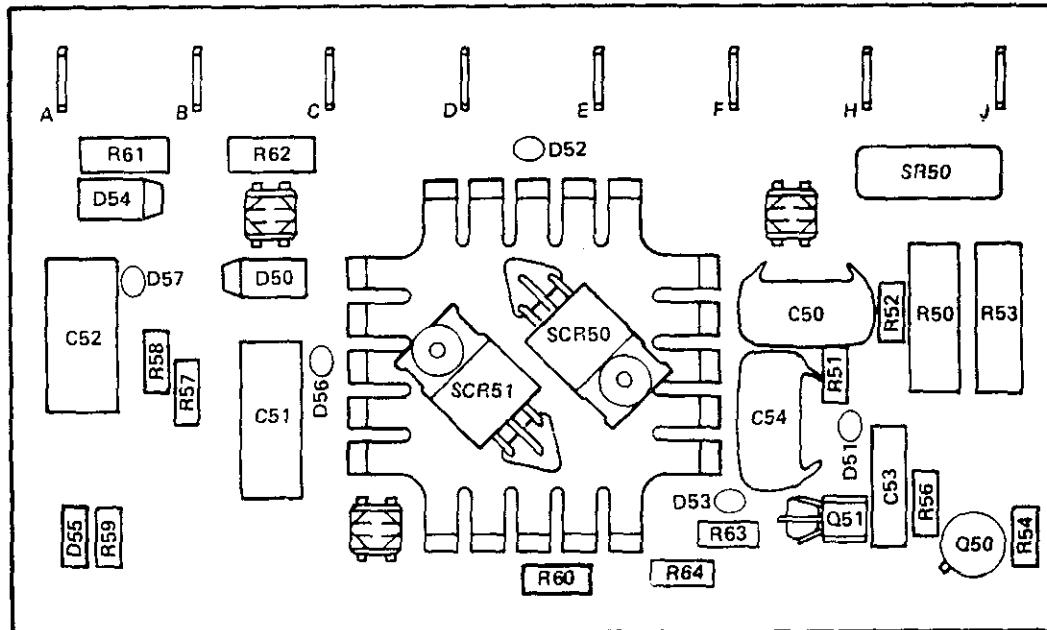
**COMPONENTS TO BE
REPLACED BY
QUALIFIED PERSONNEL ONLY**

TA-048815

Figure D1 - Circuit Card, Regulator

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

Dia. Mkgs.	Part No.	Description	Quantity
Figure D2	071 609	Circuit Card, Weld/Idle Control (Fig. D Pg 7 Item 5)	
C50,54	035 522	CAPACITOR, mylar 0.047 uf 100 volts	2
C51,52	045 868	CAPACITOR, electrolytic 100 uf 25 volts dc	2
C53	080 507	CAPACITOR, tantalum 22 uf 15 volts	1
D50,54	070 250	DIODE, rectifier 3 amp 600 volts straight polarity	2
D51-53, 56,57	026 202	DIODE, rectifier 1 amp 400 volts straight polarity	5
D55	037 243	DIODE, zener 18 volts 1 watt	1
Q50	000 088	TRANSISTOR, 800 MA 400 volts NPN	1
Q51	039 355	TRANSISTOR, unijunction 15 MA 40 volts	1
R50,53	000 039	RESISTOR, carbon 2 watt 680 ohm	2
R51,56	605 919	RESISTOR, carbon 0.25 watt 47 ohm	2
R52	605 916	RESISTOR, carbon 0.25 watt 1K ohm	1
R54	035 824	RESISTOR, carbon film 0.25 watt 270 ohm	1
R57	052 146	RESISTOR, carbon film 0.25 watt 620K ohm	1
R58	053 572	RESISTOR, carbon film 0.25 watt 12K ohm	1
R59	052 138	RESISTOR, carbon film 0.25 watt 20K ohm	1
R60	035 822	RESISTOR, carbon film 0.25 watt 10 ohm	1
R61,62	030 026	RESISTOR, carbon 0.5 watt 560 ohm	2
R63	003 272	RESISTOR, carbon film 0.25 watt 1 meg ohm	1
R64	071 595	RESISTOR, carbon film 0.25 watt 22 ohm	1
SCR50,51	080 508	THYRISTOR, SCR 8.5 amp 200 volts	2
SR50	035 841	RECTIFIER, integrated 1.5 amp 200 volts	1
	080 506	HEAT SINK, dual	1



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

Figure D2 - Circuit Card, Weld/Idle Control

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

Optional Parts

Dia. Mkgs.	Part No.	Description	Quantity
HM	032 936	METER, hour 4-40 volts dc	1
RC3	604 103	RECEPTACLE, straight duplex grounded 2P3W 15 amp 240 volts.....	1
	025 234	CAP, straight-grounded 2P3W 15 amp 250 volts	1
	041 746	HIGH ALTITUDE KIT	1
	041 057	FA-2 Flame Resistor Fuel Cap	1

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

