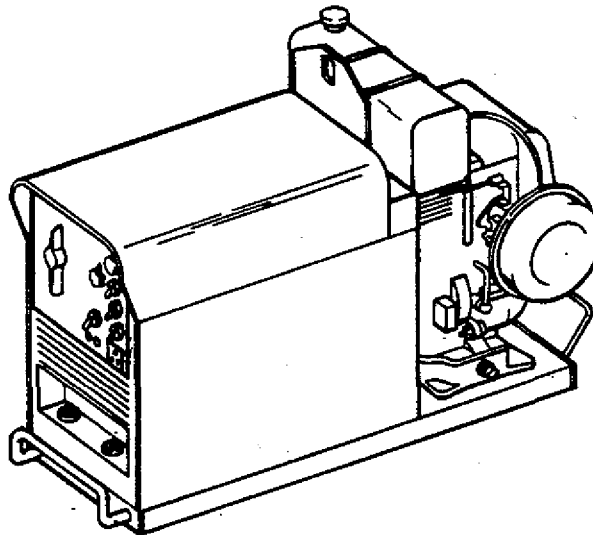


November 1988 FORM: OM-424E

Effective With Serial No. JJ420471



MODEL
BLUE STAR™ 2E
BLUE STAR™ 2E AC/DC



OWNER'S MANUAL

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

Miller Electric Mfg. Co.
A Miller Group Ltd. Company

P.O. Box 1079
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LIMITED WARRANTY

EFFECTIVE: FEBRUARY 16, 1988

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3. Original main power rectifiers 3 years (labor – 1 year only)
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5. All other Millermatic Feeders 1 year
6. Replacement or repair parts, exclusive of labor 60 days
7. Batteries 6 months

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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 Material Safety Data Sheets (MSDSs) 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 and 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 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 and, if necessary, while wearing 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 7 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 equip-

ment as recommended in A6.0. Waterfilling just below working level may substitute for inerting.

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

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

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

D. Compressed Gas Equipment

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

1. Pressure Regulators

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

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

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

Leaks-if gas leaks externally.

Excessive Creep-if delivery pressure continues to rise with downstream valve closed.

Faulty Gauge-if gauge pointer does not move off stop pin when pressurized, nor returns to stop pin after pressure release.

Repair. Do NOT attempt to 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 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 area, 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 thereafter. Brush with soap solution (capfull 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.

*Trademark of Proctor & Gamble.

1-3. ARC WELDING

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

A. Burn Protection

Comply with precautions in 1-2.

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

1. Protective Clothing

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

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

2. Eye and Head Protection

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

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

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 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:

Wear dry insulating gloves and body protection. 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 electrical resistance, and could enable dangerous and possibly lethal currents to flow through the body.

A voltage will exist between the electrode and any conducting object in the work circuit. 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.**

1. Grounding the Equipment

Arc welding equipment must be grounded according to the National Electrical Code, and the work must be grounded according to ANSI Z49.1 "Safety In Welding And Cutting."

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 flammable liquid such as oil or fuel.

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

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

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

2. Electrode Holders

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

3. Connectors

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

4. Cables

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

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

5. Terminals And Other Exposed Parts

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

6. Electrode

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

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

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

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

7. Safety Devices

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

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

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

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

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

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

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

1-4. STANDARDS BOOKLET INDEX

For more information, refer to the following standards or their latest revisions and comply as applicable:

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 550 N.W. LeJeune Rd, Miami, FL 33126.
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 Superintendent of Documents, 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 N.W. LeJeune Rd, Miami, FL 33126.
8. NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING, CUTTING, AND ALLIED PROCESSES obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
9. NFPA Standard 70, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES obtainable from the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS obtainable from the Compressed Gas Association, 1235 Jefferson Davis Highway, Suite 501, Arlington, VA 22202.
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 N.W. LeJeune Rd, Miami, FL 33126.
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

Table 2-1. Specifications

Model	Rated Amperes At 60% Duty Cycle	Weld Amperage Range	Weld Amperage Ranges		Max. Open-Circuit Voltage	Single-Phase, AC, Auxiliary Power	Weight
			Coarse Range	Fine Range			
BLUE STAR 2E	200 @ 25V DC	36 to 220	Min.-40 40-50 45-70 60-95 80-125 110-165 145-Max.	From Min. To Max. Of Each Coarse Range	80 (RMS)	1 kva, 115 Volts 8.7 amperes 100 Hz AC while welding 3 kva, 115 Volts 26 amperes or 230 Volts 13 amperes 50/60 Hz as power plant	Net 490 lbs. (222 kg) Shipping 531 lbs. (241 kg)
BLUE STAR 2E AC/DC	200 @ 25V AC/DC						

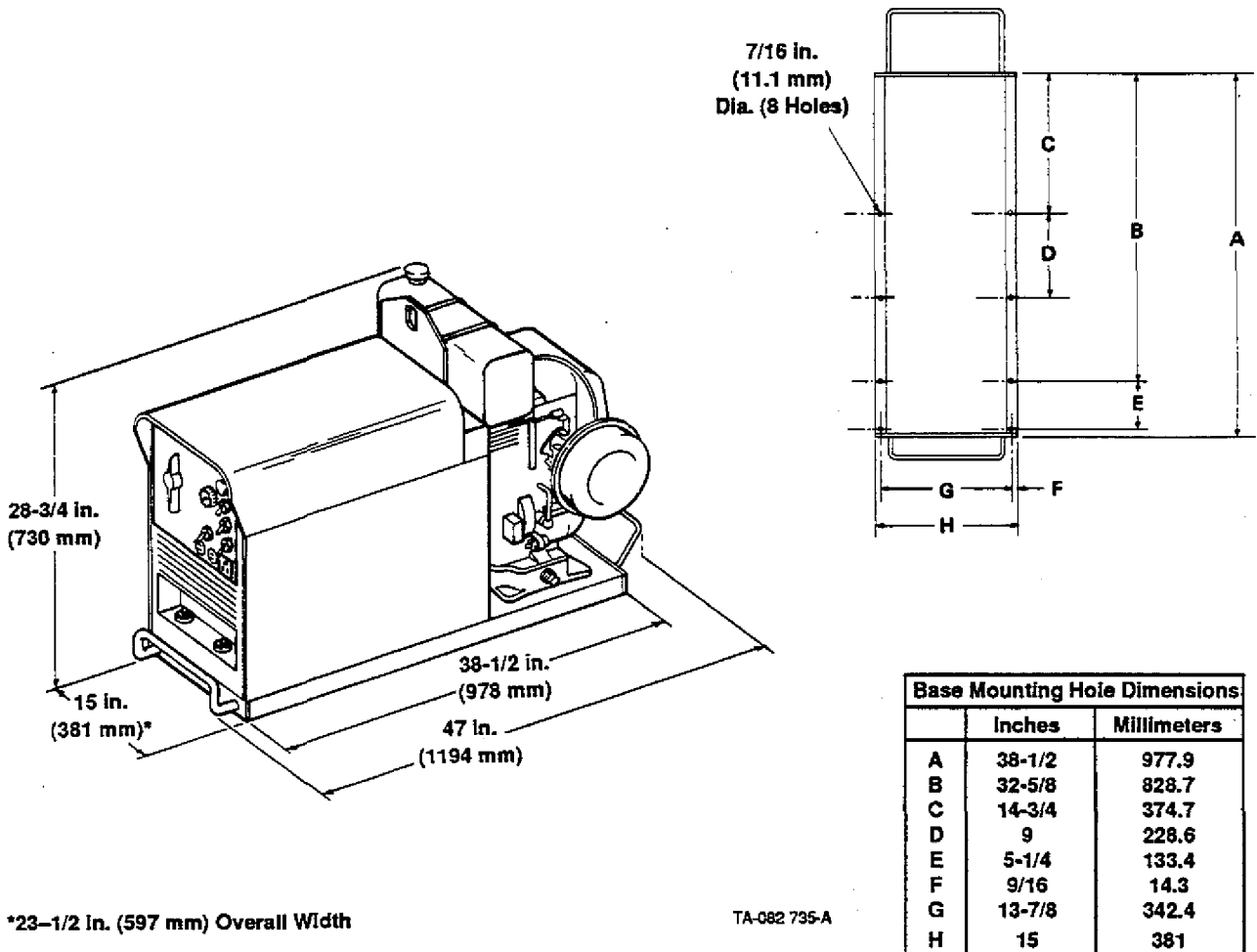


Figure 2-1. Overall Dimensions And Base Mounting Hole Layout

2-1. VOLT-AMPERE CURVES (Chart 2-1)



The volt-ampere curves show the voltage and amperage output capabilities of the welding generator. Refer to the volt-ampere curves (Chart 2-1) to determine the weld amperage at a particular load voltage.

Chart 2-1. Volt-Ampere Curves

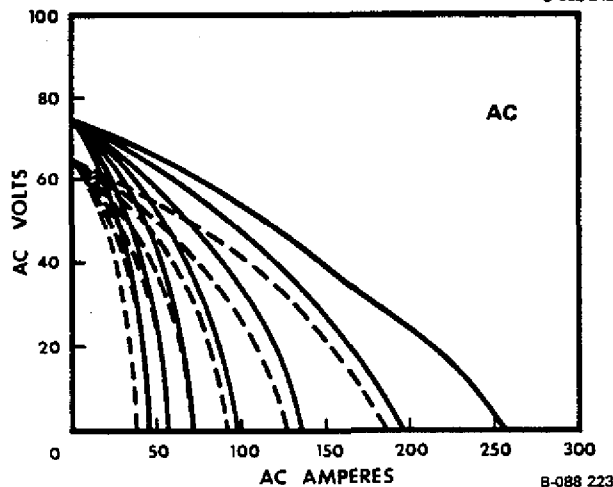
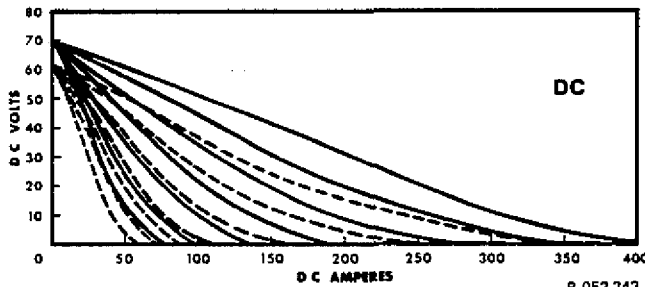
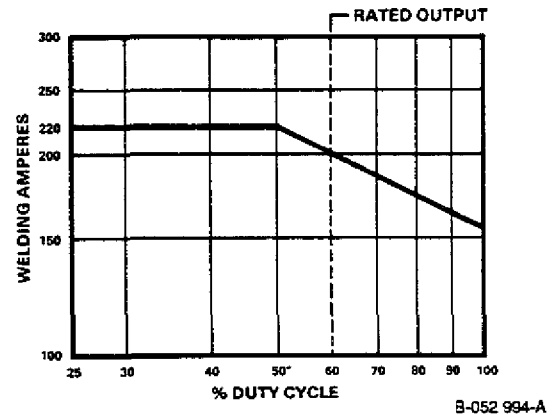


Chart 2-2. Duty Cycle



2-3. GENERAL INFORMATION AND SAFETY

A. General

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

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

B. Safety

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

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

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

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

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

2-4. RECEIVING-HANDLING

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

2-2. DUTY CYCLE (Chart 2-2)

The duty cycle of a welding generator is the percentage of a ten minute period that a welding generator can be operated at a given output without overheating and damaging the unit. This welding generator is rated at 60 percent duty cycle; therefore, the unit can be operated at rated load for six consecutive minutes, but it must idle for the remaining four minutes to allow proper cooling.

Refer to the Duty Cycle Chart (Chart 2-2) to determine the output of the welding generator at various duty cycles.

IMPORTANT: *Decreasing welding amperes increases duty cycle.*



CAUTION: EXCEEDING DUTY CYCLE RATINGS will damage the welding power source.

- Do not exceed indicated duty cycles.

When requesting information concerning this equipment, always provide Model Description and Serial Number.

2-5. DESCRIPTION

This unit is a gasoline engine-driven constant current (CC) single-phase AC/DC arc welding generator with auxiliary power capability. The welding generator is de-

signed to provide output for the Shielded Metal Arc Welding (SMAW) process.

In addition to welding capability, this unit can provide up to 1 kva of 115 volts (8.7 amperes) 100 Hz, ac auxiliary power while welding.

This unit is equipped to provide up to 3 kva of 115/230 volts 50/60 Hz ac auxiliary power for optional plug-connected equipment.

SECTION 3 – INSTALLATION

3-1. LOCATION (Figure 2-1)

A proper installation site should be selected for the welding generator if the unit is to provide dependable service and remain relatively maintenance free.



WARNING: ENGINE EXHAUST GASES can kill.

- Operate in open, well-ventilated areas or if operated indoors vent engine exhaust outside of the building.
- Do not place any filtering device over the intake air passages of this welding generator.

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

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

A. Lifting Of Equipment



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

- Use lifting eye to lift unit only, NOT running gear, gas cylinders, trailer, or any other heavy options, accessories, or devices.
 - Use equipment of adequate capacity to lift the unit.
 - If using lift forks to handle this unit, be sure the lift forks are long enough to extend out of the opposite side of the base.
- Using lift forks too short will expose internal components to damage should the tips of the lift forks penetrate the bottom of the unit.

B. Mounting



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

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

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

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

Exceeding these limits can cause severe engine damage.

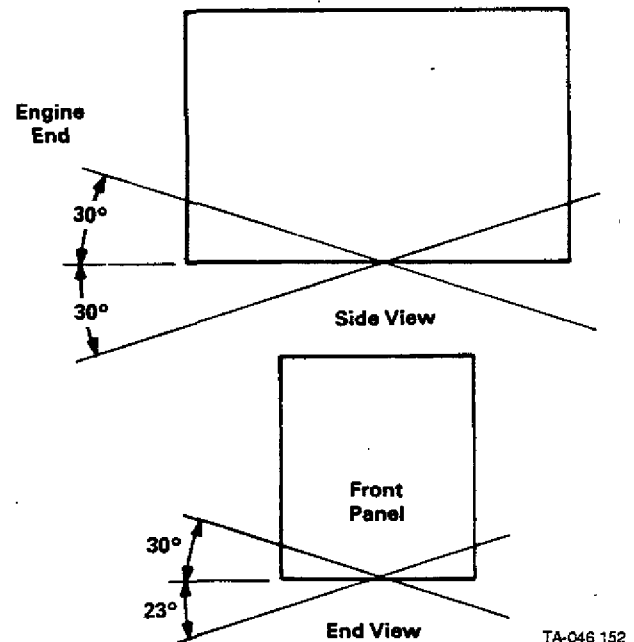


Figure 3-1. Allowable Tilt Angles

Holes are provided in the base for securing the unit in a permanent location, to a trailer running gear, or transport vehicle. Figure 2-1 gives overall dimensions and base mounting hole layout.

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

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

C. Spark Arrestor Considerations



WARNING: ENGINE EXHAUST SPARKS can cause fire.

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

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

3-2. CONNECTING THE BATTERY



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

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

ABNORMAL VOLTAGE can cause damage to engine electrical components.

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

This unit is equipped with a maintenance-free battery. To place the unit in service, make sure that the engine control switch is in the OFF position, and then connect the negative (-) battery cable to the negative battery terminal. No other preparation should be required. If the battery does not supply enough power to crank the engine, the battery will require charging. See Section 7-9 for battery charging procedures.

3-3. FUEL



WARNING: ENGINE FUEL can cause fire or explosion.

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

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

The capacity of the fuel tank is 3.5 gallons U.S. Measure (13.2 liters). See the Engine Manufacturer's Manual for fuel recommendations. Chart 3-1 illustrates typical fuel consumption under specific load conditions.

Fuel consumption varies from one engine to another. Different brands of fuel, operating conditions, condition of the engine, etc., also affect the fuel consumption level.

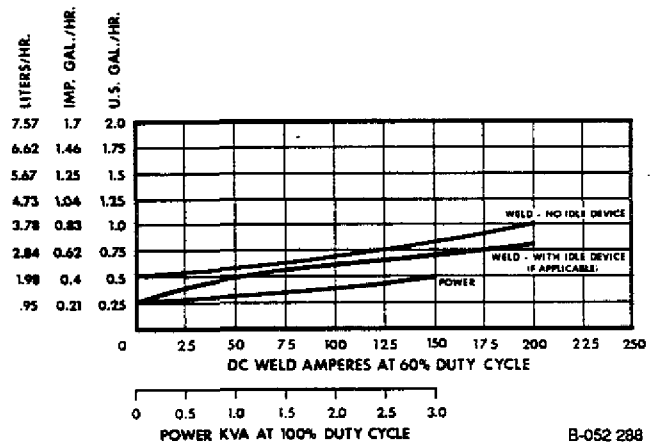


CAUTION: POOR QUALITY, LOW OCTANE FUEL can damage engine.

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

Gasoline with a lower octane rating than specified may cause detonation (knocking) which could damage the engine. Regular gasoline may be used, however unleaded gasoline is preferred because it reduces pollution and combustion chamber deposits. See Engine Owner's Manual (OH160 Engine) for complete fuel information.

Chart 3-1. Fuel Consumption



B-052 288

3-4. LUBRICATION

The engine is shipped with its crankcase filled with SAE20 break-in oil. If the oil level is not up to the full mark on the dipstick, add oil according to the recommendations in the Engine Owner's Manual (OH160 Engine) before starting the engine.

3-5. EQUIPMENT GROUNDING TERMINAL (Figure 5-1)



This unit is equipped with a grounding terminal for grounding the generator case. Since the generator neutral is connected to the frame, the equipment grounding terminal must be connected to a proper earth ground. Additionally, comply with all national, regional, and local codes concerning portable generators for the specific application.

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

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

3-6. WELD OUTPUT CONNECTIONS (Figure 3-2 And Table 3-1)

→ RATED OUTPUT

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

A. Weld Cable Selection

Use the following guidelines to select weld cables:

1. Use the shortest possible cables, and place cables close together. Excessive cable lengths may reduce output or cause unit overload due to added resistance.
2. Use weld cable with an insulation voltage rating equal to or greater than the maximum open-circuit voltage (ocv) of the welding generator (see Table 2-1 for unit maximum ocv rating).
3. Select weld cable size according to maximum weld output and total length of connecting cables in weld circuit. For example, if a 25 foot (7.5m) electrode holder cable is used with a 25 foot (7.5 m) work cable, select the cable size recommended in Table 3-1 for 50 feet (15 m).
4. Do not use damaged or frayed cables.

B. Weld Cable Preparation

1. Install terminal lugs of adequate amperage capacity and correct stud size onto ends of cables that connect to the work clamp, electrode holder, and weld output terminals.
2. When installing the electrode holder, follow manufacturer's instructions. Always use an insulated electrode holder to ensure operator safety.
3. Install work clamp onto cable.

C. Weld Cable Connections (Figure 3-2)

ELECTRODE



WORK



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Stop engine, and disconnect negative (-) battery cable from battery before making any weld output connections.
- Disconnect welding cables for process not in use.
- Do not connect to both electrode holder and gun output terminals at the same time. Both weld output terminals are electrically hot (energized) whenever the engine is running.

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

IMPORTANT: For AC/DC models only, type of weld current (AC, Electrode Positive, Electrode Negative) is determined by the Selector Switch. See Section 5-2 for information about this switch.

For Shielded Metal Arc Welding (SMAW)

1. Connect end of electrode holder cable to NEGATIVE (ELECTRODE for AC/DC Models) weld output terminal.
2. Connect one end of work cable to POSITIVE (WORK for AC/DC Models) weld output terminal.

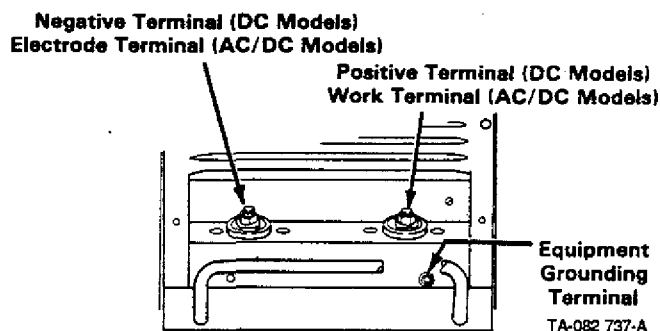


Figure 3-2. Equipment Grounding And Weld Output Terminals

Table 3-1. Weld Cable Size

Welding Amperes	Total Cable (Copper) Length In Weld Circuit Not Exceeding*							
	100 ft. Or Less (30 m)		150 ft. (45 m)	200 ft. (60 m)	250 ft. (70 m)	300 ft. (90 m)	350 ft. (105 m)	400 ft. (120 m)
	10 To 60% Duty Cycle	60 Thru 100% Duty Cycle	10 Thru 100% Duty Cycle					
100	4	4	4	3	2	1	1/0	1/0
150	3	3	2	1	1/0	2/0	3/0	3/0
200	3	2	1	1/0	2/0	3/0	4/0	4/0
250	2	1	1/0	2/0	3/0	4/0	2-2/0	2-2/0
300	1	1/0	2/0	3/0	4/0	2-2/0	2-3/0	2-3/0

*Weld cable size (AWG) is based on either a 4 volts or less drop or a current density of more than 300 circular mils per ampere.

SECTION 4 – AUXILIARY POWER

POWER OUTPUT



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

- Do not touch live electrical parts.
- Stop engine, and disconnect negative (-) battery cable from battery before making internal inspection or reconnection.
- Ground generator as required by any applicable national, state, and local electrical codes.

The generator neutral is connected to the frame; therefore, the equipment grounding terminal must be connected to a proper earth ground.

- Do not connect to any electrical distribution system normally supplied by utility power unless a proper transfer switch and grounding procedure are employed.
- Keep away from moving parts such as fans, belts, and rotors.
- Keep all covers and panels in place while operating.

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

ELECTRIC SPARKS can cause fire.

- Disconnect weld cables when using auxiliary power.

The weld output terminals are electrically energized when the engine is running and the contactor (if applicable) is energized.

- Watch for fire.
- Keep a fire extinguisher nearby, and know how to use it.

LOW VOLTAGE AND FREQUENCY can damage electrical equipment.

- Turn off or unplug all electrical equipment connected to auxiliary power before starting or stopping the engine.

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

4-1. 115 VOLTS AC WHILE WELDING RECEPTACLE (Table 4-1)

115 V  AC
WHILE WELDING

Receptacle RC2 is provided to supply power for accessory equipment used with the welding process. This circuit is not reconnectable to provide 230 volts ac while welding.

The wiring to this receptacle is protected by OVERLOAD BREAKER CB1. If this circuit breaker CB1 opens, the receptacle will not supply rated output. See Section 8-3 for circuit breaker resetting procedure.

Power available at this receptacle is rated at 1000 watts/8.7 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 receptacle rating is a continuous-duty rating that can be exceeded for short periods of time if necessary, but not for long-term loading. The engine must be operating at weld speed (3000 rpm) to obtain the power output. Be sure that the Automatic Idle Control switch is in the AUTO IDLE OFF position when using power from this receptacle.

Table 4-1 shows the amount of auxiliary power available at various weld settings. Amperage, voltage, and watts available depend on the position of the Range switch and FINE AMPERAGE control, as well as the actual welding load applied. The values given in the table are available when weld output load is equivalent to the Range switch markings.

Universal tools rated up to 5 amperes/600 watts can be used satisfactorily in all ranges and rheostat positions. However, when the weld output load conditions are such that the rated ac power available is less than 5 amperes/600 watts, the tool will produce less horsepower and operate hotter because of reduced speed of the tool's cooling fan.



CAUTION: REDUCED POWER FOR TOOLS may cause overheating and damage.

- Shut off tool or reduce welding load if tool overheating occurs.

Table 4-1. 115 Volts AC Auxilliary Power While Welding

Range Switch Position	Auxiliary Power Available - Watts		Auxiliary Power Available - Amperes	
	Fine Amperage Control At Max.	Fine Amperage Control At Min.	Fine Amperage Control At Max.	Fine Amperage Control At Min.
145-MAX.	60	0	0.5	0
110-165	1000	0	8.7	0
80-125	1500*	60	13*	0.5
60-95	1725*	100	15*	0.8
45-70	1725*	800	15*	4.3
40-50	1725*	800	15*	7.0
MIN.-40	1725*	1000	15*	8.7

*Overload Ratings

4-2. 115 VOLTS AC DUPLEX RECEPTACLE (Figure 4-1)

115 V 26A 

Up to 3 kva of 115 volts ac, 50/60 Hz power is available at the 115V 26A AC receptacle RC1 for operating portable, cord-connected accessory equipment when the engine is operating at power speed (1800 rpm). 15 amperes can be drawn from either half of the receptacle; however, total load on the receptacle cannot exceed 26 amperes. The voltage at the receptacle varies according to the applied load. The voltage at various loads can be determined from Figure 4-1.

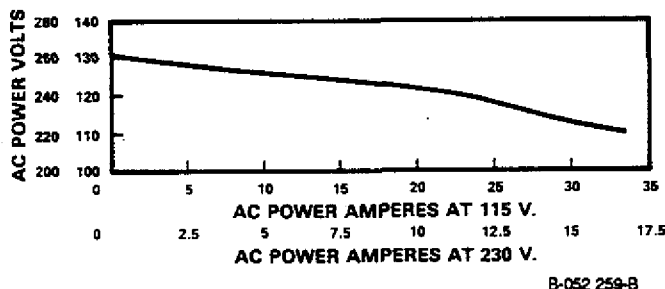


Figure 4-1. AC Power Curves

4-3. 230 VOLTS AC DUPLEX RECEPTACLE (Optional) (Figure 4-1)

Up to 3 kva of 230 volts ac (13 amperes), 50/60 Hz power is available at receptacle RC3 for operating portable, cord-connected accessory equipment when the engine is operating at power speed (1800 rpm). The voltage at the receptacle varies according to the applied load. The voltage at various loads can be determined from Figure 4-1.

4-4. FIELD INSTALLATION INSTRUCTIONS FOR 230 VOLTS AC RECONNECTION

This unit has 230 volts reconnection capability and can be equipped with a 230 volts ac duplex receptacle on the front panel; however, an optional reconnectable kit must be purchased. For the 230 volts auxiliary power output of the unit, see Section 4-3.



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Stop the engine and disconnect negative (-) battery cable from battery before making internal inspection or reconnection.

1. Remove right side panel.
2. Remove 115 V 26A AC duplex receptacle RC1 from front panel. Disconnect leads 14, 17, and 33 from RC1.
3. Connect leads 14 and 17 to 230 volts ac duplex receptacle (one on each side of receptacle). Connect lead 33 to ground terminal on receptacle.
4. Install 230 volts ac duplex receptacle in front panel.
5. Affix supplied label over 115V 26A AC designation for duplex receptacle on nameplate.
6. Locate in-line splice of leads 14 and 14A in wiring harness near Weld/Power switch S1 and disconnect lead 14 from 14A. Reconnect lead 14 to open terminal on S1 below terminal connecting other end of lead 14.
7. Disconnect lead 17A from S1 and reconnect to lead 14A in the wiring harness.
8. Reinstall right side panel and reconnect negative (-) battery cable.

SECTION 5 – OPERATOR CONTROLS

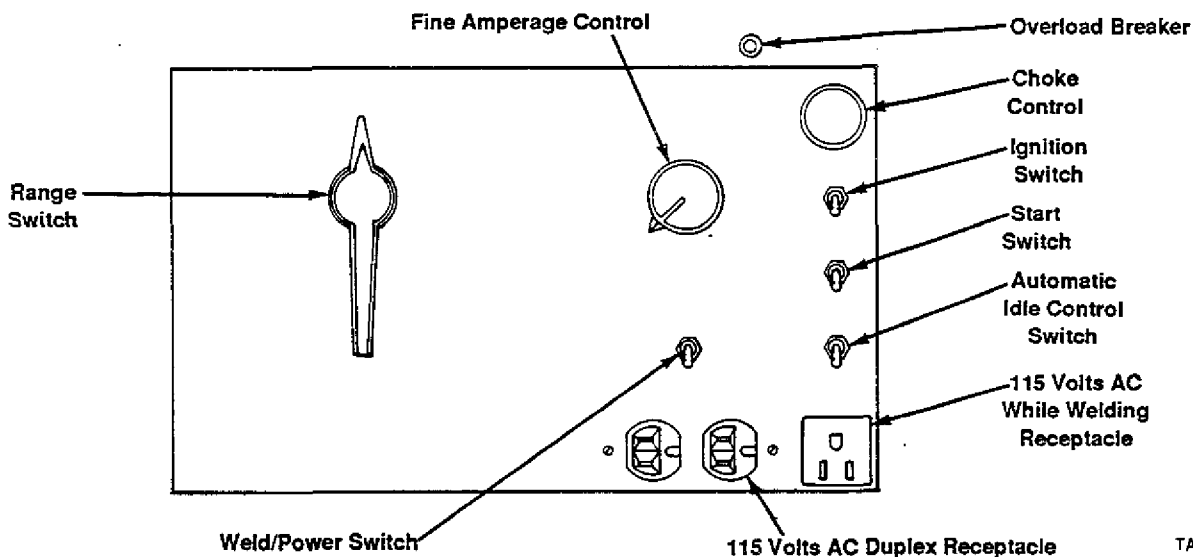


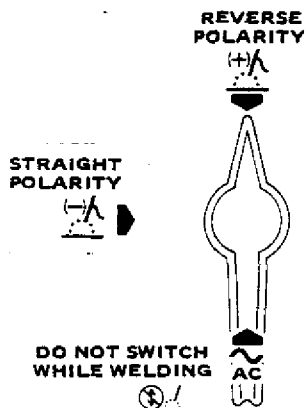
Figure 5-1. Front Panel View

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



The Weld/Power switch provides selection of weld or auxiliary power output. Placing the Weld/Power switch in the WELD position enables the engine to run at weld speed (3000 rpm). Placing the Weld/Power switch in the POWER position enables the engine to run at auxiliary power speed (1800 rpm).

5-2. SELECTOR SWITCH (AC/DC Models Only)



A-082 949-A

Figure 5-2. Selector Switch



WARNING: ELECTRIC SHOCK can kill.

- In wet or confined areas, use only DC output or remote output control.
- Read Safety Rules at beginning of this manual.

The selector switch is located on the left side panel of AC/DC models.

The selector switch enables the operator to select either ac, dc straight, or dc reverse polarity weld output without changing output cable connections. To ensure that weld output corresponds to the selector switch positions, connect the electrode holder cable to the ELECTRODE output terminal and the work cable to the WORK output terminal.



CAUTION: ARCING can damage switch contacts.

- Do not change the position of the selector switch while welding or under load.

Arcing causes the contacts to become pitted and eventually inoperative.

5-3. RANGE SWITCH (Figure 5-1)



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.

5-4. FINE AMPERAGE CONTROL (Figure 5-1)



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 in percent and does not indicate an actual amperage value.

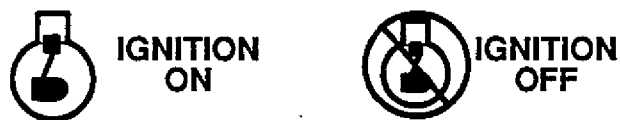
IMPORTANT: *The FINE AMPERAGE control can be adjusted while welding. However the FINE AMPERAGE control must be set at 100 to obtain the full rated output from the 115 (or 230) VOLTS AC receptacle when the welding generator is used to supply ac auxiliary power.*

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



A CHOKE control is provided for varying the fuel-air mixture to the engine. When the CHOKE control is pulled fully out, very little air will be admitted to the engine through the carburetor thereby supplying a richer mixture of fuel. This position is required if the engine is cold when started. As the engine warms up, push the CHOKE control inward slowly until it is in as far as it will go. When the CHOKE control is fully in, the engine should be ready for loading.

5-6. IGNITION SWITCH (Figure 5-1)



Placing the IGNITION switch in the ON position energized the welding generator ignition circuitry, and places the welding generator in a ready to start status. Placing the IGNITION switch in the OFF position shuts down the welding generator. (If left in the ON position it will discharge the battery.)

5-7. 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.



CAUTION: REENGAGING STARTER MOTOR while flywheel is rotating can damage starting components.

- Do not reengage starter motor until starter pinion and flywheel have stopped rotating.

5-8. AUTOMATIC IDLE CONTROL SWITCH (Figure 5-1)

The automatic idling device saves fuel by allowing the engine to idle when the generator is not loaded during welding applications only. The Automatic Idle Control switch controls the operation of the device.

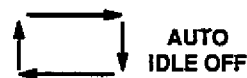
A. Auto Idle On Position



When the Automatic Idle control switch is in the AUTO IDLE ON position the engine will remain at idle speed (1900 ± 100 rpm) until an arc is struck. When an arc is struck, the engine speed will increase to weld speed (3000 rpm). Approximately 15 seconds after the arc is broken, the engine will return to idle rpm. This time delay is nonadjustable.

The Automatic Idle Control AUTO IDLE ON position can be used for Shielded Metal Arc Welding (SMAW).

B. Auto Idle Off Position



When the Automatic Idle control switch is in the AUTO IDLE OFF position, engine speed remains at weld rpm when the generator is not loaded.

The Automatic Idle Control switch must be in the AUTO IDLE OFF position when using 115V AC power while welding.

SECTION 6 – SEQUENCE OF OPERATION



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

- Do not touch live electrical parts.
- Stop engine, and disconnect negative (-) battery cable from battery before inspecting or servicing.
- Keep away from moving parts such as fans, belts, and rotors.
- Keep all covers and panels in place while operating.

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

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

- Wear correct eye, ear, and body protection.

FUMES AND GASES can seriously harm your health.

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

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

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

ENGINE FUEL can cause fire or explosion.

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

MAGNETIC FIELDS FROM HIGH CURRENTS can affect pacemaker operation.

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

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

6-1. SHIELDED METAL ARC WELDING (SMAW)



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

1. Install and connect unit as instructed in Section 3.
2. Place the Weld/Power switch in the WELD position.
3. Rotate the selector switch in the desired position, if applicable (see Section 5-2).



WARNING: ELECTRIC SHOCK can kill.

- In wet or confined areas, use only DC output or remote output control.
- Read Safety Rules at beginning of this manual.

4. Rotate the Range switch to the desired position (see Section 5-3).
5. Rotate the FINE AMPERAGE control to 100 (see Section 5-4).
6. Wear dry insulating gloves and clothing, and wear welding helmet with proper filter lens according to ANSI Z49.1.
7. Prepare for welding as follows:
 - a. Connect work clamp to clean, bare metal at workpiece.
 - b. Select and obtain proper electrode, and insert into electrode holder.
8. Start the engine as instructed in Section 6-3.
9. Connect desired auxiliary equipment to the 115V AC WHILE WELDING receptacle (see Section 4-1) and place the Automatic Idle Control switch in the AUTO IDLE OFF position.

If the automatic idling is desired, turn off or disconnect equipment connected to the 115V AC WHILE WELDING receptacle and place the Automatic Idle Control switch in the AUTO IDLE ON position.

10. Begin welding.

6-2. AUXILIARY POWER OPERATION



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

1. Install and connect unit as instructed in Section 3.
2. Read entire Section 4 for auxiliary power operation information.
3. Place the Weld/Power switch in the POWER position.
4. Rotate the FINE AMPERAGE control to 100.
5. Connect auxiliary equipment to the 115V 26A AC (or 230V 13A AC) receptacle.
6. Start the engine as instructed in Section 6-3.

6-3. STARTING THE ENGINE

IMPORTANT: *Read entire engine Owner's Manual (OH160) before operating engine.*

1. Engine Prestart Checks

a. Oil Level

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

b. Fuel Level

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

2. Place the CHOKE control in the full choke position (see Section 5-5).

3. Place the Starter switch in the START position (see Section 5-7).

4. Once the engine has started, release the Starter switch, and slowly push the Choke control in.



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

- Do not reengage starter motor until starter pinion and flywheel have stopped rotating.

- Do not exceed engine manufacturer's maximum cranking time of 20 seconds.

Allow two minutes cooling time before reattempting to start the engine.

5. Allow the engine to run a few minutes before applying a load. This is necessary to enable the engine to properly warm up and ensure proper lubrication.

SECTION 7 – MAINTENANCE

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

7-1. GENERAL

The service life of this welding generator can be prolonged and operating efficiency maintained under normal conditions by following the routine service and workshop maintenance procedures outlined in this section and in the Engine Owner's Manual (OH160 Engine). Where operating conditions are severe, more frequent attention must be given to all routine service categories; however, a special effort must be made to maintain clean internal and external engine surfaces.

7-2. PERIODIC CLEANING AND INSPECTION



WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Stop engine, and disconnect negative (–) battery cable from battery before inspecting maintaining, or services

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

HOT ENGINE PARTS can cause severe burns.

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

Maintenance to be performed only by qualified person.

IMPORTANT: *Clean and inspect the unit when performing routine oil changes at intervals specified on the engine maintenance label.*

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

1. Keep the inside of the welding generator clean by blowing out the unit with clean, dry compressed air.
2. Wipe oil and fuel spills from engine immediately to avoid accumulation of dust.
3. 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: *See the Engine Owner's Manual (OH160 Engine) for complete engine care.*

7-3. LUBRICATION

Change the oil and filter according to instructions on maintenance label and in Engine Owner's manual (OH160 Engine). Use correct type and grade oil as listed in instructions for expected temperature range before next oil and filter change.

7-4. AIR CLEANER



CAUTION: DIRTY AIR can damage engine.

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

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

This engine is equipped with a dry paper type filter element and a washable foam pre-cleaner. Dry paper element type cleaners can be cleaned by removing the element and tapping lightly, causing loose dirt to fall off. Replace the element 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 be sure that gasket surfaces of the element are not bent or damaged in any way. Gasket surfaces must seal tightly at the top and bottom of the cleaner shell to prevent foreign matter from entering the carburetor.

Whenever the air cleaner is removed, cover the air intake hole to prevent dirt from falling into the carburetor. Service air cleaner and foam pre-cleaner according to maintenance label and Engine Owner's Manual (OH160 Engine).

7-5. 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.

7-6. ENGINE SPEED ADJUSTMENTS (Figure 7-1)



WARNING: ELECTRIC SHOCK can kill.

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

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

HOT ENGINE PARTS can cause severe burns.

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

Maintenance to be performed only by qualified persons.

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

IMPORTANT: Before proceeding with engine speed adjustments, ensure that the spark plug is clean and properly gapped and adjust the carburetor as outlined in the Engine Owner's Manual.

The engine speeds have been factory adjusted and should not require frequent readjustment. After tuning the engine, check the speeds with a tachometer. Ensure that all generator and engine switches are in the proper positions when checking engine speeds. With no load applied, the idle speed should be 1650 rpm, the power speed 1800 rpm, and the weld speed 3000 rpm. If necessary adjust the speeds as follows:

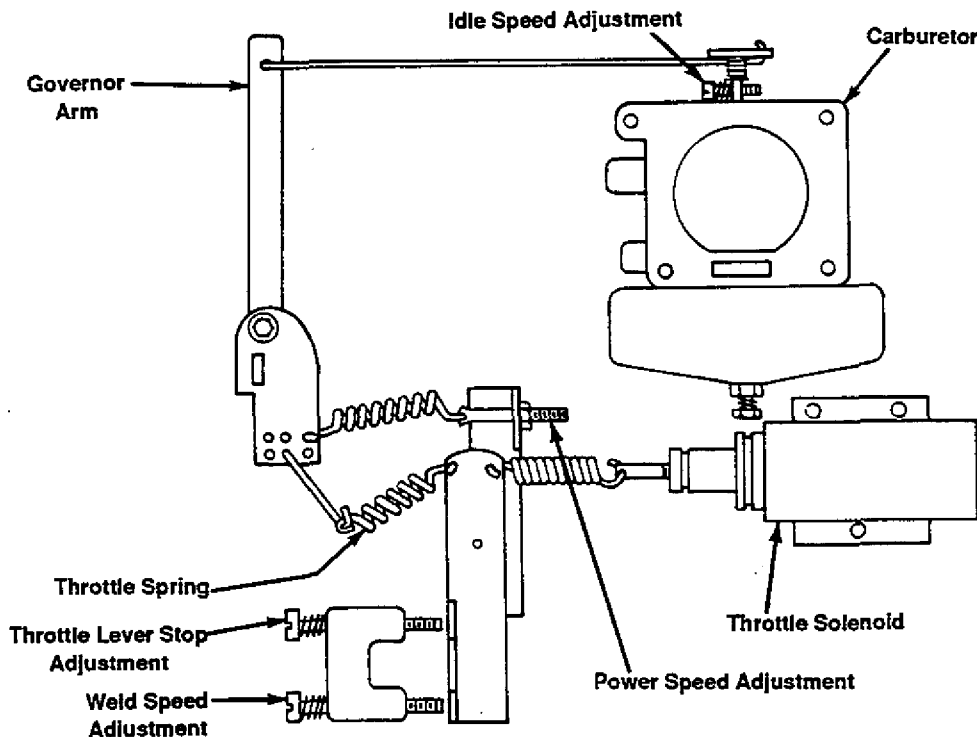


Figure 7-1. Engine Speed Adjustments (Tecumseh Engine)

TA-082 761

IMPORTANT: *The carburetor idle speed adjustment must be adjusted on all engines to obtain 1650 rpm to ensure proper engine operation. However, the weld idle speed may vary considerably, depending on the model. As long as the power speed is 1800 rpm and the weld speed 3000 rpm, the weld idle speed is not important.*

1. With the engine stopped, pull the governor arm towards the carburetor and hold.
2. Adjust the Throttle Lever Stop Adjustment until there is no tension on the throttle spring. Ensure that the spring will not disengage from the governor arm.

IMPORTANT: *If the Throttle Lever Stop Adjustment is not properly adjusted, the throttle spring may disengage from the governor arm causing the Throttle control to become inoperative.*

3. Release the governor arm.
4. Start the engine as outlined in Section 6-3.
5. Place the Weld/Power switch in the POWER position.
6. Ensure that the Throttle is against the stop in the POWER position.
7. Rotate the Power Speed Adjustment screw until the engine runs at 1800 rpm.
8. Push the governor arm towards the carburetor to cause the engine to idle. While holding the arm against spring tension, rotate the Idle Speed Adjustment screw until the engine runs at 1650 rpm.
9. Release the governor arm. The engine should return to power speed (1800 rpm).
10. Place the Weld/Power switch in the WELD position.
11. Place the Automatic Idle Control switch in the AUTO IDLE OFF position.
12. Rotate the Weld Speed Adjustment screw until the engine runs at 3000 rpm.

7-7. SERVICING THE SPARK ARRESTOR (Optional)



WARNING: ENGINE EXHAUST SPARKS can cause fire.

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

HOT ENGINE PARTS can cause severe burns.

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

The engine exhaust system on this welding generator is not equipped with a spark arrestor. A spark arrestor,

maintained in effective working order, is mandatory if this welding generator is to be operated in a National Forest or on California Grass lands, brush, or forest covered land (see Section 4442 or California Public Resources Code). For other areas, check your state and local laws. If a spark arrestor (optional) is desired, contact your dealer/distributor.

Internal combustion engines operating in a highly combustible environment are a common fire hazard. Glowing carbon particles blown out with the exhaust can retain sufficient heat to ignite materials. While no practical spark arresting device will stop all sparks, this device will minimize 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.

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

1. Stop the engine, and allow the exhaust system to cool.
2. Remove the cleanout plug from the bottom of the spark arrestor. If a crust has formed over the hole, break it loose with a screwdriver or similar tool.
3. Start the engine, and run it at idle rpm to blow collected particles out the cleanout hole. If particles are slow to discharge, momentarily cover the end of the exhaust stack.
4. Stop the engine, and allow the exhaust system to cool.
5. Replace and secure the clean out plug.

7-8. ELECTRICAL SYSTEM



WARNING: ELECTRIC SHOCK can kill.

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

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

HOT ENGINE PARTS can cause severe burns.

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

Maintenance to be performed only by qualified persons.

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

A. Cables And Wiring

Check interconnecting wiring and connections for tightness and flaws. Be sure 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 necessary.

B. Battery



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

- *Wear correct eye and body protection.*

Inspect the battery for loose connections, damaged cables, corrosion, cracked case or cover, loose holddowns, and loose or deformed terminal posts.

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

7-9. BRUSHES AND SLIP RINGS (Figure 7-2)



WARNING: ELECTRIC SHOCK can kill.

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

MOVING PARTS can cause serious injury.

- *Keep away from moving parts such as fans, belts, and rotors.*

HOT ENGINE PARTS can cause severe burns.

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

Maintenance to be performed only by qualified persons.

Brush life is very good under most operating conditions. The brushes and slip rings should be inspected every six months or whenever excitation voltage is lost. Check for cleanliness of the slip rings and the freedom of motion of the brushes. If the welding generator has been operating under extremely dusty or dirty conditions, increase the frequency of inspection.

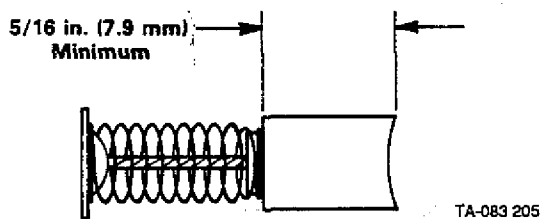


Figure 7-2. Brush Replacement

Under normal use the slip rings will discolor to a dark brown. If a buildup of brush material is noted, it may be necessary to clean the slip rings. Use a number 220 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 5/16 in. (7.9 mm) of brush material is left.

7-10. MAINTENANCE-FREE BATTERY CHARGING



WARNING: CHARGING A FROZEN BATTERY can cause the battery to explode and result in serious injury or damage to equipment; **BATTERY ACID** can burn eyes, skin, destroy clothing, and damage other material; **BATTERY GASES** can explode and shatter battery.

- *Allow battery to warm up to 60° F (16° C) before charging if battery is frozen.*
- *Wear a face shield, proper protective clothing, and remove all metal jewelry.*
- *Do not spill or splash battery fluid.*
- *Do not apply pressure to walls of filled battery – use battery carrier, or place hands on opposite corners when lifting battery.*
- *Keep sparks, flames, cigarettes, and other ignition sources away from batteries.*
- *Use enough ventilation to keep battery gases from building up during and for several hours after battery charging.*
- *Turn off battery charger before making connections to battery.*
- *Do not touch or move connections on battery while battery charger is on.*
- *Do not lean over battery when charging.*
- *Be sure battery charger connections to battery are clean and tight.*
- *Keep vent caps in place, and cover top of battery with damp cloth.*
- *Be sure battery charger output matches battery voltage.*
- *Turn off battery charger before disconnecting charger from battery.*

1. Remove battery from unit, and place on a level worktable or other suitable surface.
2. If battery has removable vent caps, check the condition of the electrolyte as follows:
 - a. Check electrolyte temperature in one of the center cells with a battery thermometer. For each 10°F (6°C) increment above 80°F (27°C), a correction factor of 0.004 specific gravity must be added to the specific gravity reading taken in Step 2b. For each 10°F (6°C) increment below 80°F (27°C), 0.004 must be subtracted from the reading taken in Step 2b.
 - b. Check the specific gravity of each cell with a hydrometer. (Draw in and expel the electrolyte two or three times from the first cell to be tested to adjust the temperature of the hydrometer to that of the electrolyte.)

- c. If a corrected specific gravity reading of 1.225 at 80°F (27°C) is not obtained, replace the vent caps and recharge the battery following the battery charger manufacturer's instructions.
3. If the battery does not have removable vent caps, check the condition of the battery as follows:
 - a. Check the stabilized open-circuit voltage of the battery. For a 12 volt battery any reading below 12.4 volts indicates the battery needs charging. Disconnect both battery cables from the battery and allow battery voltage to stabilize for several hours.
 - b. If the stabilized open-circuit voltage is below 12.4 volts, charge the battery following the battery charger manufacturer's instructions.
 4. Remove damp cloth from battery.
 5. Reinstall battery in unit.
 6. Replace battery holddown, and tighten securely. Do not overtighten.
 7. Connect positive (+) battery cable to positive (+) battery terminal.
 8. Connect negative (-) battery cable to negative (-) battery terminal.

7-11. CIRCUIT BOARD HANDLING PRECAUTIONS



WARNING: ELECTRIC SHOCK can kill.

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



CAUTION: ELECTROSTATIC DISCHARGE (ESD) can damage circuit board components.

- Put on properly grounded wrist strap BEFORE handling circuit boards.
- Transport all static-sensitive components in proper static-shielding carriers or packages.
- Perform work only at a static-safe work area.

INCORRECT INSTALLATION or misaligned plugs can damage circuit board.

- Be sure that plugs are properly installed and aligned.

EXCESSIVE PRESSURE can break circuit board.

- Use only minimal pressure and gentle movement when disconnecting or connecting board plugs and removing or installing board.

If the circuit board is not working, follow the precautions above, and contact nearest Factory Authorized Service Station.

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 functions of controls, the welding generator was functioning properly, and that the trouble is not related to the welding process.

8-2. BOOSTER BATTERY JUMP STARTING

If jump starting is attempted, use the following safety precautions and the step-by-step procedures in order of appearance.



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

- Keep sparks, flames, cigarettes, and other ignition sources away from battery.
- Be sure that all personnel are a safe distance from batteries and away from moving parts while starting.
- Do not jump start a frozen or completely discharged battery.

- Do not jump start a battery which has loose terminals or one having evidence of damage such as a cracked case or cover.

- Be sure that vent caps are tight and level on both batteries, and cover both batteries with a damp cloth.

- Wear correct eye and body protection, and remove all metal jewelry.

- Keep jumper cables away from moving parts.

- Be sure that both batteries are of 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 touch welding generator case or frame.

- Do not jump start by applying power to weld output receptacles or terminals.

- Do not allow jumper cable clamps to touch any other metal while attaching or removing cables.

1. Use properly insulated jumper cables of adequate size.
2. Connect ends of one cable to positive (+) terminals of each battery.
3. Connect one end of other cable to negative (-) terminal of booster battery.
4. Connect remaining end of cable to welding generator engine block at least 18 inches (457 mm) from battery (do not connect to welding generator case, frame, or equipment grounding terminal as damage to equipment can result).
5. Wait at least one minute after connecting cables before starting engine.
6. Start engine following procedures outlined in Section 6 (Sequence of Operation) of this manual and allow engine to return to idle speed. If the unit does not start after cranking for thirty seconds, stop the jump starting procedure. More than thirty seconds seldom starts the engine unless some mechanical adjustment is made.
7. Remove jumper cable from engine block.
8. Remove other end of same cable from booster battery negative (-) terminal.
9. Remove other jumper cable from welding generator battery positive (+) terminal.
10. Remove remaining end of cable from booster battery positive (+) terminal.
11. Discard damp cloths.

8-3. OVERLOAD PROTECTION



WARNING: ELECTRIC SHOCK can kill.

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

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

HOT ENGINE PARTS can cause severe burns.

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

INCORRECT FUSE can damage unit.

- Use only replacement fuse of same size, type, and rating (see Parts List).

A. Circuit Breaker CB1



WARNING: Read and follow safety information at beginning of entire Section 8-3 before proceeding.

Circuit breaker CB1 protects the 115 Volts While Welding receptacle RC2 from overload and fault conditions. Should an overload occur, the output to the receptacle would stop. If CB1 opens, correct the problem, and manually reset front panel OVERLOAD BREAKER.

B. Exciter Excitation Winding Protection Fuse F1



WARNING: Read and follow safety information at beginning of entire Section 8-3 before proceeding.

The exciter excitation winding is protected by fuse F1, located at the rear of the front panel on the component mounting panel. Should F1 open, there would be no weld or auxiliary power output.

IMPORTANT: If fuse F1 opens repeatedly, the problem is probable in the exciter winding; contact the nearest Factory Authorized Service Station.

To replace F1, proceed as follows:

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

8-4. TROUBLESHOOTING



WARNING: ELECTRIC SHOCK can kill.

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

MOVING PARTS can cause serious injury.

- Keep away from moving parts such as fans, belts, and rotors.

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.

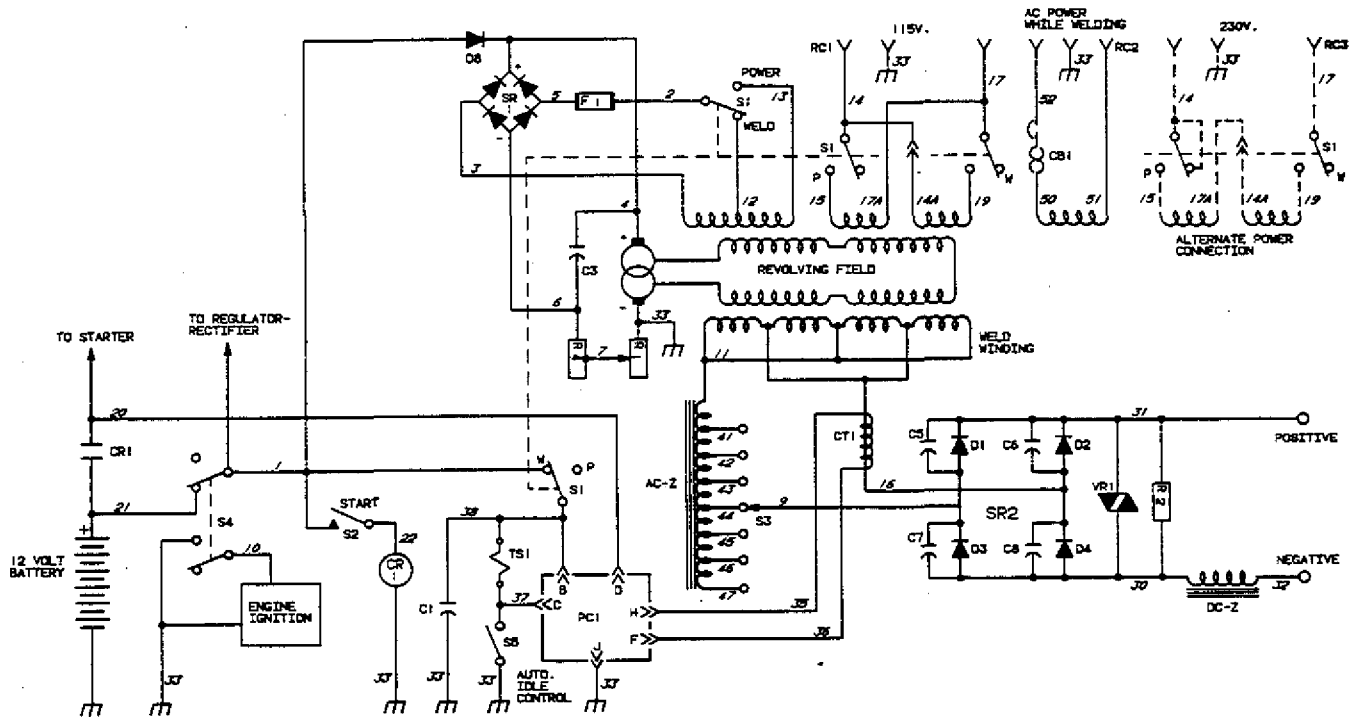
The following table is designed to diagnose and provide remedies for some of the troubles that may develop in this welding generator.

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

Table 8-1. Troubleshooting

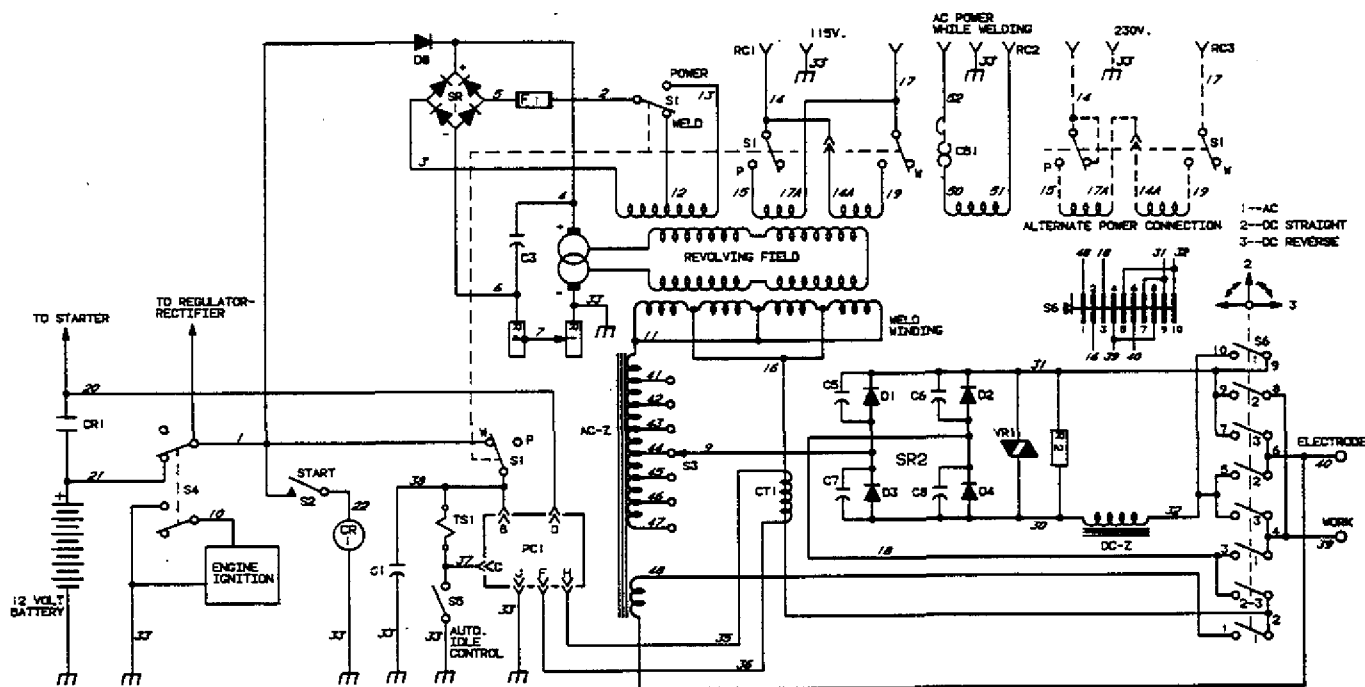
TROUBLE	PROBABLE CAUSE	REMEDY
Engine fails to turn over or turns over slowly.	Battery.	Inspect the electrical system (see Section 7-8). Rope start the engine (see the Engine Manufacturer's Manual), or jump start the engine employing approved safety practices and booster jump starting instructions provided in Section 8-2). If the trouble is isolated to the battery, replace the battery.
Battery discharges between uses.	IGNITION switch S4 left in ON position.	Ensure IGNITION switch S4 is left in OFF position when unit is shut down.
	Build up of acid on top of battery (white-grayish substance).	Clean battery with soda solution; rinse with clear water.
	Infrequent use (units with conventional batteries).	Periodically recharge battery (approximately every 3 months).
	Battery.	Replace battery.
No weld or power output.	Fuse F1	Replace F1 (see Section 8-3).
	Lost excitation on exciter.	Contact nearest Factory Authorized Service Station.
No power output at 115V 26A AC Receptacle.	Weld/Power switch S1 in WELD position.	Place Weld/Power switch S1 in POWER position.
No power output at 115V AC WHILE WELDING receptacle.	OVERLOAD BREAKER CB1 open.	Reset OVERLOAD BREAKER CB1 (see Section 8-3).
Low power output at 115V 26A AC receptacle.	Low setting on FINE AMPERAGE control R1.	Rotate FINE AMPERAGE control R1 to 100.
	Engine running below required speed (1800 rpm).	Tune engine (see Engine Manufacturer's Manual). Adjust engine speed (see Section 7-6).
Low weld output.	Engine running below required speed (3000 rpm).	Tune engine (see Engine Manufacturer's Manual).
		Adjust engine speed (see Section 7-6).
Erratic weld output.	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 7-9).
Engine idles, but does not come up to weld speed.	Loose or dirty connections.	Check connections to PC1 and CT1.
	Transformer CT1.	Check and replace CT1 if necessary.
	Idle Board PC1.	Contact nearest Factory Authorized Service Station (see Section 7-11).
Unstable or sluggish engine speeds.	Check Throttle Solenoid linkage for binding.	Readjust if necessary.
	Misadjusted governor arm.	Contact nearest Factory Authorized Service Station.
	Engine requires tune-up.	Refer to Engine Owner's Manual.

SECTION 9 – ELECTRICAL DIAGRAMS



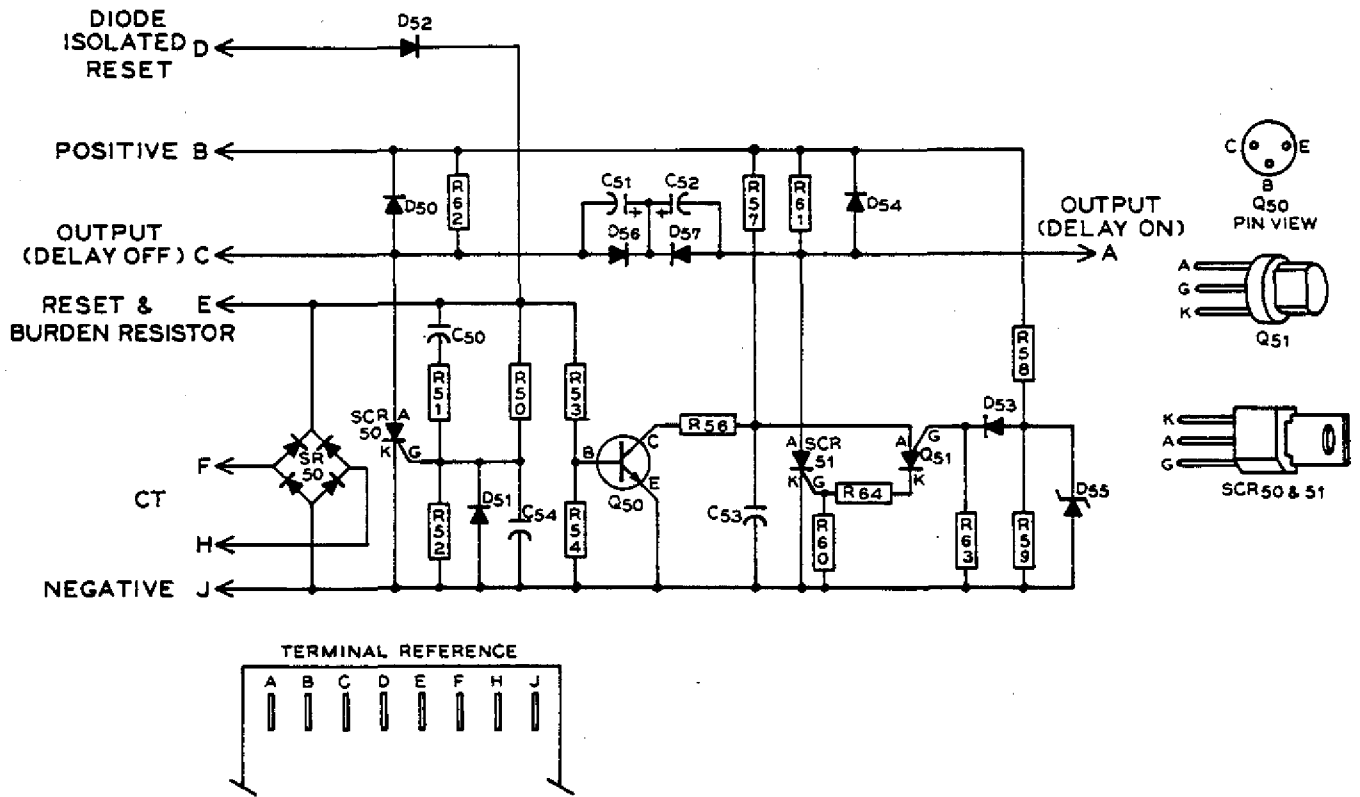
Circuit Diagram No. B-114 963-A

Diagram 9-1. Circuit Diagram For DC Welding Generator



Circuit Diagram No. B-114 962-A

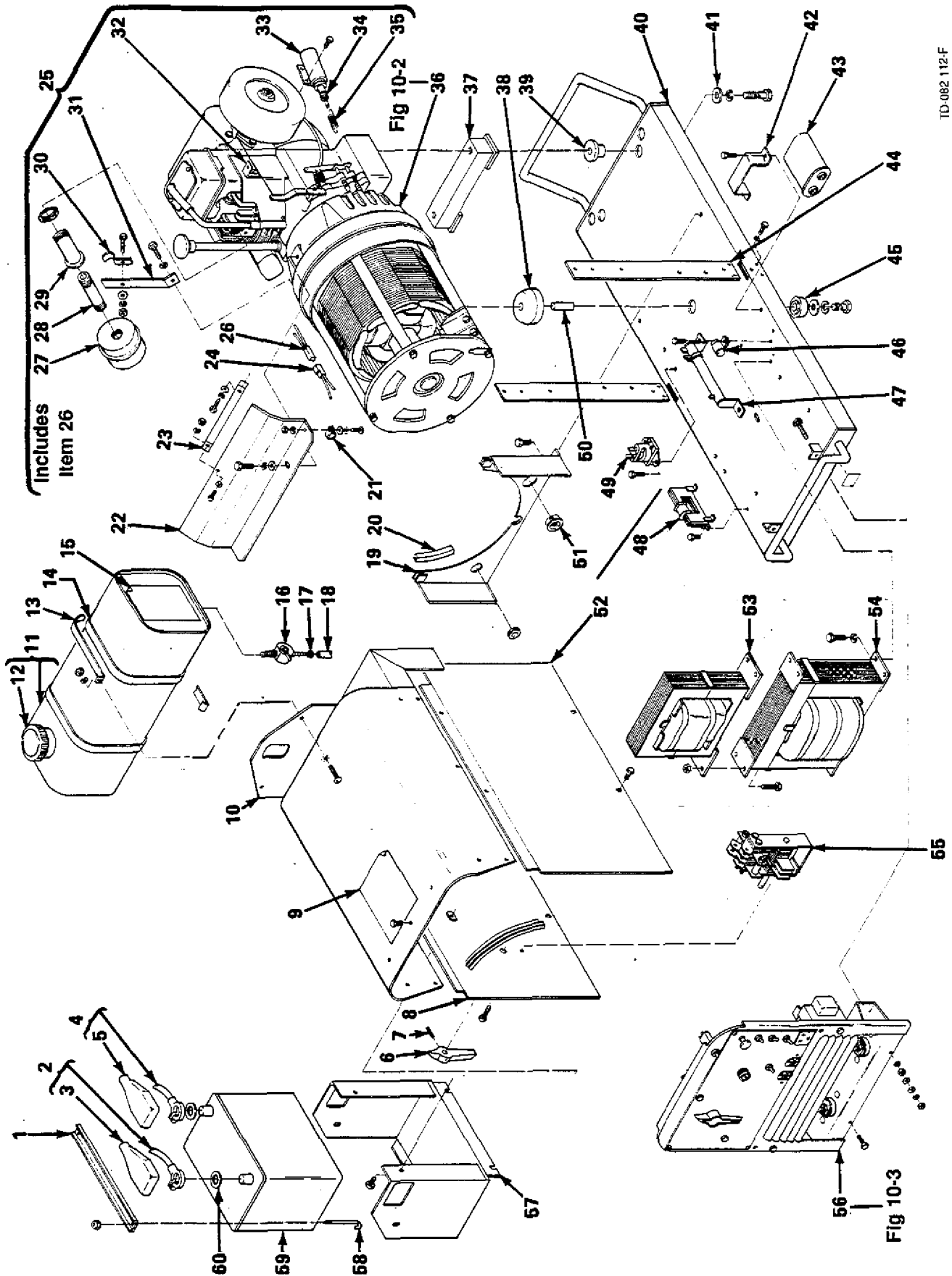
Diagram 9-2. Circuit Diagram For AC/DC Welding Generator



Circuit Diagram No. A-071 600

Diagram 9-3. Circuit Diagram For Automatic Idle Control Circuit Board

SECTION 10 - PARTS LIST



TD-082 112-F

Figure 10-1. Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model	
				DC	AC/DC
Figure 10-1			Main Assembly		
1		070 213	HOLDDOWN, battery	1	1
2		082 318	CABLE, battery-positive (consisting of)	1	1
3		071 970	· COVER, cable-battery post red	1	1
		010 021	CLAMP, 9/16 dia x 11/32 hole	2	2
4		082 319	CABLE, battery negative (consisting of)	1	1
5		071 971	· COVER, cable-battery post black	1	1
6		059 773	HANDLE, switch		1
7		010 647	PIN, spring 5/32 x 1-1/4		1
8		035 136	PANEL, side - left hand	1	
8		083 364	PANEL, side - left hand		1
9		046 392	LABEL, general precautionary	1	1
10		+009 971	WRAPPER	1	1
		108 487	LABEL, warning falling equipment etc		1
11		015 670	TANK, fuel (consisting of)	1	1
12		015 603	· CAP	1	1
13		014 951	STRAP, mounting - fuel tank	2	2
14		603 120	STRIP, felt 1/8 x 3/4 x 28-1/4	2	2
15		071 822	LABEL, engine maintenance	1	1
16		096 440	VALVE, needle 1/8-27 NPTF	1	1
17		084 173	CLAMP, hose .460-.545 dia	2	2
18		603 106	HOSE, No. 1 x 1/4 ID (order by ft)	2ft	2ft
19		009 943	BAFFLE, air - lower	1	1
		057 357	BUSHING, snap 15/16 ID x 1.12 mtg hole	1	1
20		095 970	STRIP, rubber 18 inches	2	2
21		010 517	CLIP, conduit 7/32 dia	1	1
22		070 135	BAFFLE, air	1	1
23		070 134	BRACKET, support - air baffle	1	1
		604 311	GROMMET, 1/4 ID x 3/8 mtg hole	1	1
24		005 005	CONNECTOR, body	1	1
25		070 732	ENGINE, gas - electric (consisting of)	1	1
26			· CONNECTOR (included w/engine - see engine parts list)	1	1
27		015 621	· MUFFLER, exhaust - engine	1	1
28		049 403	· FITTING, pipe - nipple 1 NPT x 7-1/2	1	1
29		032 867	· FITTING, pipe - elbow street 1 NPT	1	1
30		039 508	· CLAMP, pipe 1 inch	1	1
31		039 544	· BRACKET, support - exhaust	1	1
32		113 724	· BRACKET, support - choke cable	1	1
33	TS1	080 517	· SOLENOID, 12 volts dc	1	1
34		080 843	· ROD, throttle - control	1	1
35		080 514	· SPRING, extension	1	1
		008 916	· SCREW, cap - socket hd 5/16-24 x 7/8	1	1
		008 917	· WASHER, flat 2-1/4 OD x 11/32 ID x 3/16	1	1
		602 211	· WASHER, lock - split 5/16	1	1
		003 455	· KEY, woodruff 1/4 x 3/4	1	1
36		Fig 10-2	GENERATOR	1	1
37		084 313	BRACKET, mounting - generator	1	1
38		006 977	MOUNT, generator - top	1	1
		010 954	WASHER, flat 13/32 ID x 1-1/4 OD x 1/8	2	2
39		007 098	MOUNT, engine	2	2
40		099 404	BASE	1	1
41		010 955	WASHER, flat 13/32 ID x 2 OD x 1/8	1	1
42		007 197	BRACKET, mounting - capacitor	1	1
43	C3	059 523	CAPACITOR, paper oil 20 uf 500 volts dc	1	1
44		099 265	UPRIGHT, base	2	2
45		006 978	MOUNT, generator - bottom	1	1
46	C1	070 949	CAPACITOR, ignition 0.5 uf	1	1

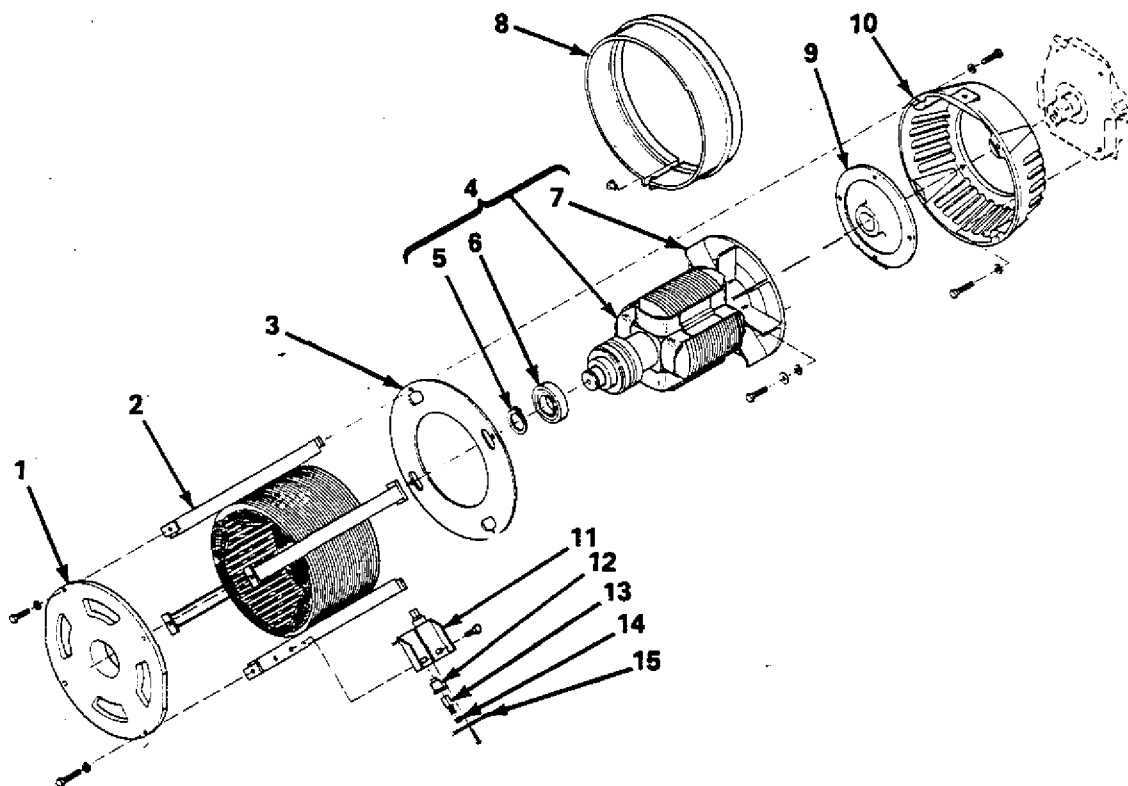
Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model	
				DC	AC/DC
Figure 10-1			Main Assembly (Cont'd)		
47	R4	008 951	RESISTOR, WW adj. 180 watt 12 ohm	1	1
48	CT1	095 041	TRANSFORMER, control - idle	1	1
		++106 577	CABLE, electric		1
49	CR1	119 722	CONTACTOR, solenoid 12 volts dc 400 amp	1	1
50		011 826	TUBING, steel 5/8 OD x 12 ga wall x 2	1	1
51		010 493	BUSHING, snap in - 5/8 ID x 7/8 mounting hole	1	1
52		035 135	PANEL, side - right hand	1	1
53	AC-Z	009 941	REACTOR	1	1
54	DC-Z	009 933	STABILIZER	1	1
55	S6	083 363	SWITCH, polarity/changeover		1
56		Fig 10-3	PANEL, front - w/components	1	1
		083 030	STUD, brass-ground 1/4-20 x 1-3/4	1	1
		601 836	NUT, brass-hex jam 1/4-20	3	3
57		070 211	SHELF, battery	1	1
58		097 829	BOLT, J1/4-20 x 2-3/4	2	2
59		071 678	BATTERY, 12 volt 74 amp	1	1
	D8	049 943	DIODE, 3 amp 1000 volts SP (located in wiring harness)	1	1
60		108 801	TERMINAL PROTECTOR, battery post	2	2

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

++Used with 009 941 Reactor on AC/DC Models

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

Item No.	Part No.	Description	Quantity
Figure 10-2 Generator (Fig 10-1 Item 36)			
1	017 763	ENDBELL, generator	1
2	+070 793	STATOR, generator	1
	013 367	LABEL, warning moving parts can etc	1
3	009 975	BAFFLE, air - stator	1
4	032 704	ROTOR, generator (consisting of)	1
5	024 617	· RING, retaining - external	1
6	053 390	· BEARING, ball	1
7	017 624	· FAN, rotor	1
	602 348	· KEY, 1/4 x 1/4 x 3/4	1
8	052 220	GUARD, fan	1
9	021 934	ADAPTER, fan - rotor	1
10	035 718	ADAPTER, engine	1
11	004 994	BRACKET, mounting - brushholder	1
12	005 614	HOLDER, brush - w/tabs	2
13	*049 125	BRUSH, w/spring	2
14	047 885	CAP, brushholder	2
15	047 879	BAR, retaining - brushholder	1

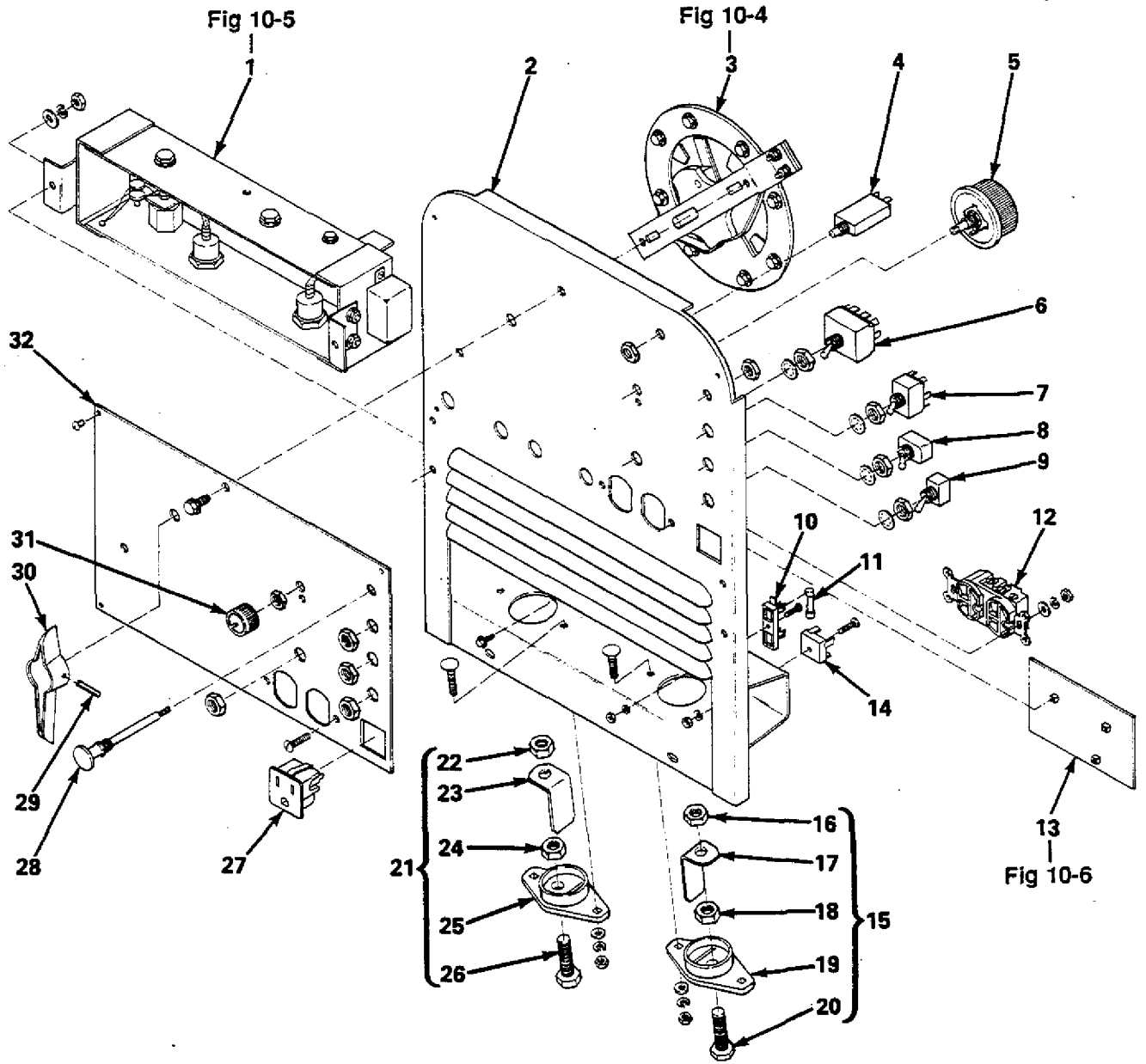


Ref. TD-052 525

Figure 10-2. Generator

*Recommended Spare Parts.

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



TD-082 113-C

Figure 10-3. Panel, Front-W/Components

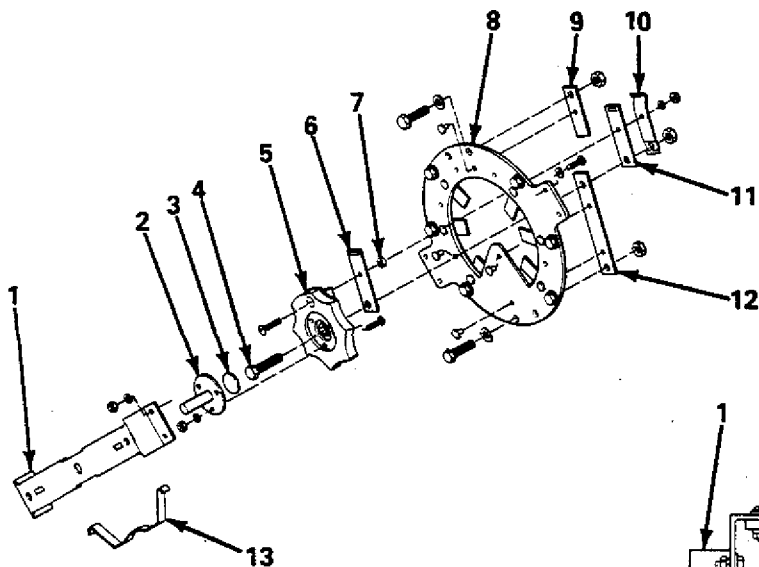
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 10-3 Panel, Front - W/Components (Fig 10-1 Item 56)				
1	SR2	009 987	RECTIFIER, silicon diode (Fig 10-5)	1
2		070 394	PANEL, front	1
3	S3	005 563	SWITCH, selector (Fig 10-4)	1
4	CB1	053 283	CIRCUIT BREAKER, manual reset 1 pole 15 amp 250 volts	1
5	R1	081 712	RHEOSTAT, WW 100 watt 30 ohm	1
6	S1	052 769	SWITCH, toggle 4PDT 15 amp 125 volts ac	1
7	S4	011 611	SWITCH, toggle DPDT 15 amp 125 volts	1
8	S2	021 467	SWITCH, toggle SPST MC 3 amp 250 volts	1
9	S5	089 085	SWITCH, toggle SPST 20 amp 125 volts ac	1
10		012 571	HOLDER, fuse	1
11	F1	012 655	FUSE, miniature-glass 10 amp 250 volts	1
12	RC1	604 176	RECEPTACLE, straight-duplex grd 2P3W 15 amp 125 volts	1
12	RC3	◆604 103	RECEPTACLE, straight duplex grd 2P3W 15 amp 250 volts	1
		025 234	CAP, straight - leviton 5443	1
13	PC1	071 609	CIRCUIT CARD, weld/idle control (Fig 10-6)	1
14	SR1	035 704	RECTIFIER, integrated 30 amp 600 volts	1
15		+039 047	TERMINAL, power output - red (consisting of)	1
16		601 879	· NUT, hex - full 1/2-13	1
17		039 044	· BUS BAR	1
18		601 880	· NUT, hex - jam 1/2-13	1
19		039 049	· TERMINAL BOARD, red	1
20		601 976	· SCREW, cap - hex 1/2-13 x 1-1/2	1
21		+039 046	TERMINAL, power output - black (consisting of)	1
22		601 879	· NUT, hex - full 1/2-13	1
23		039 044	· BUS BAR	1
24		601 880	· NUT, hex - jam 1/2-13	1
25		039 045	· TERMINAL BOARD, black	1
26		601 976	· SCREW, cap-hex hd 1/2-13 x 1-1/2	1
27	RC2	034 952	RECEPTACLE, straight 3P3W 15 amp 125 volts	1
		073 690	CAP, straight P & S 5266-DF (RC1 & RC2)	1
28		111 584	CONTROL, push - pull	1
29		010 647	PIN, spring - compression 5/32 x 1-1/4	1
30		006 927	HANDLE, switch range	1
31		097 924	KNOB, pointer	1
32			NAMEPLATE (order by model and serial number)	1

◆ Optional Equipment

+In AC/DC models quantity is two red - no black

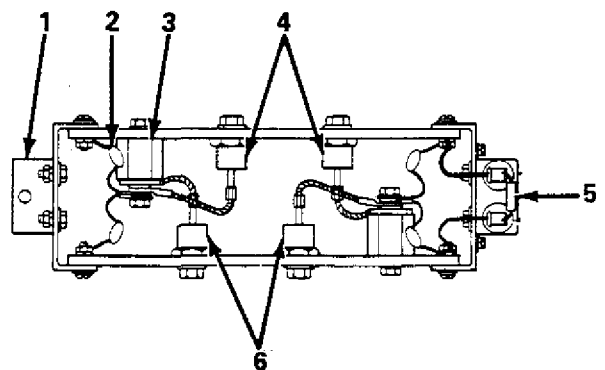
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Part No.	Description	Quantity
Figure 10-4	005 563	Switch, Selector (Fig 10-3 Item 3)	
1	005 562	BRACKET, mounting - switch	1
2	005 561	SHAFT, rotor	1
3	005 564	INSULATOR, screw	1
4	605 276	SCREW, cap-hex hd 1/4-20 x 1-1/4	1
5	005 559	CONTACT BOARD, movable	1
6	005 560	CONTACT, switch - movable	1
7	008 485	SPACER, contact	1
8	005 566	CONTACT BOARD, stationary	1
9	052 403	CONTACT, stationary	7
10	052 405	SPRING, pressure	1
11	052 404	CONTACT, movable	1
12	005 557	BUS BAR, switch - range	1
13	005 558	SPRING, selector	1



TC-097 264

Figure 10-4. Switch, Selector



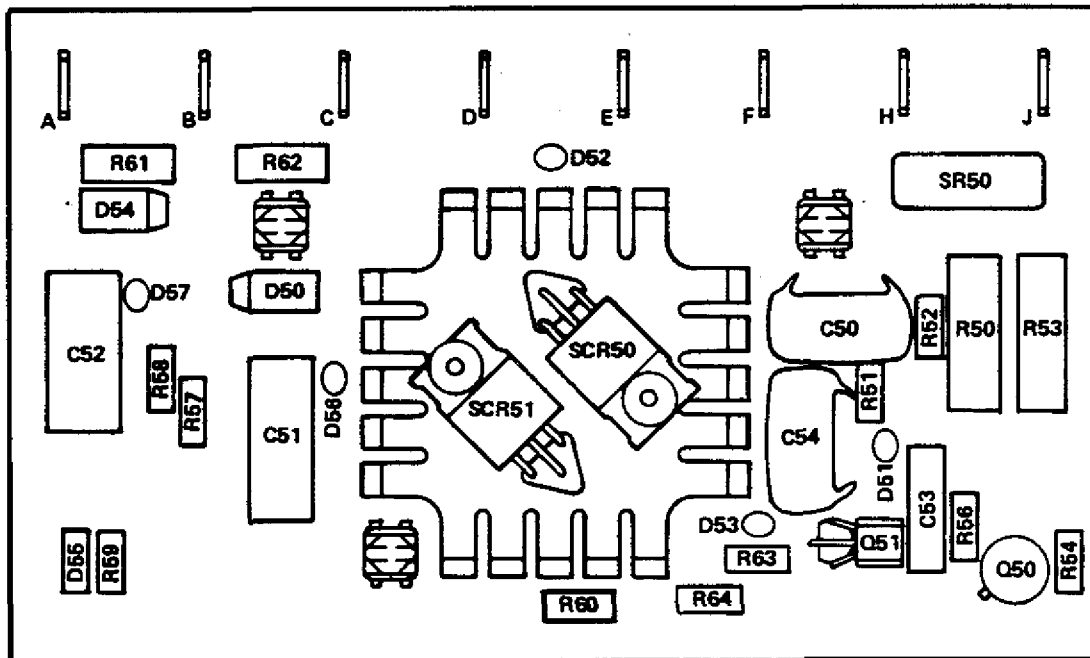
TA-052 523-A

Figure 10-5. Rectifier, Silicon Diode

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure 10-5		009 987	Rectifier, Silicon Diode (Fig 10-3 Item 1)	
1		009 970	BRACKET, mounting - rectifier	2
2	C5-8	031 689	CAPACITOR, ceramic 0.01 uf 500 volts dc	4
3		025 248	STAND-OFF, 1/4-20 x 1-1/4	2
4		037 306	DIODE, 150 amp 300 volts RP	2
5	R2,VR1	046 819	SUPPRESSOR	1
6		037 305	DIODE, 150 amps 300 volts SP	2

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

Dia. Mkgs	Part No.	Description	Quantity
Figure 10-6	071 609	Circuit Card, Weld/Idle Control (Fig 10-3 Item 13)	
C50,54	035 522	CAPACITOR, mylar 0.047 uf 100 volts	2
C51,52	045 868	CAPACITOR, electrolyte 100 uf 25 volts dc	2
C53	080 507	CAPACITOR, tantalum 22 uf 15 volts	1
D50,54	070 250	DIODE, 3 amp 600 volts	2
D51-53,56,57	026 202	DIODE, 1 amp 400 volts SP	5
D55	037 243	DIODE, zener 18 volts 1 watt	1
Q50	000 088	TRANSISTOR, 800MA 40 volts NPN	1
Q51	039 355	TRANSISTOR, unijunction 15MA 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 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

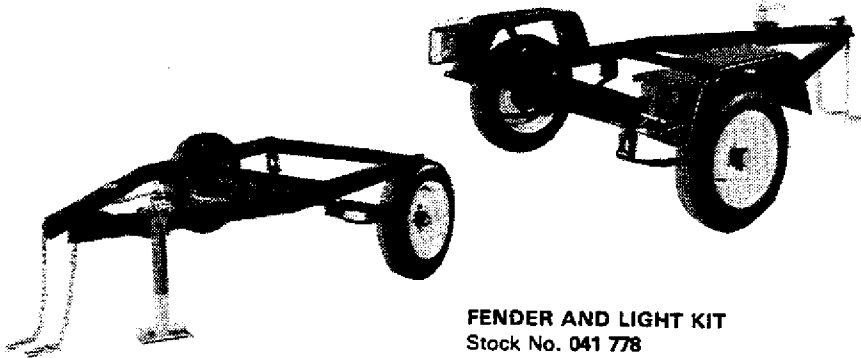


TA-048 816-A

Figure 10-6. Circuit Card, Weld/Idle Control

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

ACCESSORIES



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

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

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

Specifications

GVWR: 1200 lbs. (544 kg)
 Trailer weight: 186 lbs. (84 kg)
 Trailer capacity: 1000 lbs. (453 kg)
 Total width (without optional fender kit) 55" (1.4 m)
 Total length (without optional hitch) 72" (1.8 m)
 Width of bed 36" (914 mm)
 Track Width 49½" (1257 mm)
 Height of bed 18" (457 mm)
 Tire size 4.80-12
 Shipping weight 186 lbs. (84 kg)

FENDER AND LIGHT KIT

Stock No. 041 778
 Includes fenders, lights, wiring harness and mounting hardware.
 Shipping weight 37 lbs. (17 kg)

HITCHES

2" (51 mm) BALL
 Stock No. 041 724
 Shipping weight 5 lbs. (2 kg)



CLEVIS

(Not for highway use)
 Stock No. 041 726
 Shipping weight 11 lbs. (5 kg)



2¼" (64 mm) LUNETTE EYE
 Stock No. 041 725
 Shipping weight 9 lbs. (4 kg)



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

No. 4A RUNNING GEAR

Stock No. 040 020
 Two rear wheels with 480/400 x 8 pneumatic tires. Two 8" (203 mm) solid rubber tired front wheels and 30" (762 mm) towing handle.

No. 4 RUNNING GEAR

Stock No. 040 019
 Wheelbarrow type. Includes two wheels with 4.80-4.00/8 pneumatic tires, axles and lifting handles.

CC-1A CANVAS COVER

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

230 VOLT AUXILIARY POWER RECEPTACLE KIT

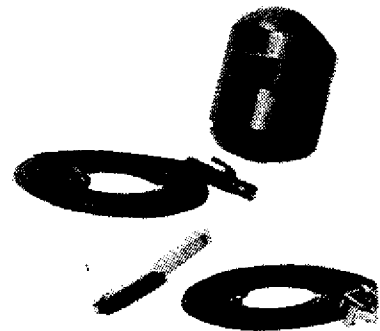
Stock No. 041 623 (Factory)
 Stock No. 041 624 (Field)
 Required to reconnect auxiliary power from 115 volts to 230 volts.

FA-2 FLAME ARRESTOR FUEL CAP

Stock No. 041 057

SPARK ARRESTOR MUFFLER

Stock No. 041 271 (Field Only)
 Mandatory when operating on California grasslands, brush or forest covered land and all National Forests. For other areas, check your state and local laws.



No. 2 WA WELDING ACCESSORY PACKAGE

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