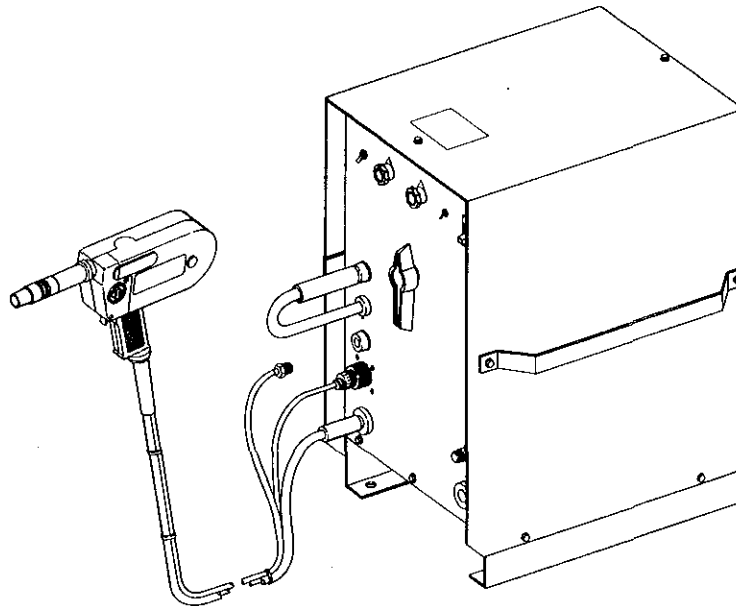


IMPORTANT: Read and understand the entire contents of this manual, with special emphasis on the safety material throughout the manual, before installing, operating, or maintaining this equipment. This unit and these instructions are for use only by persons trained and experienced in the safe operation 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.

Effective With Serial No. JD716241

MODEL
SPOOLMATE™ 200
SK-200 Spot Panel



OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.

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

LIMITED WARRANTY

EFFECTIVE: FEBRUARY 25, 1985

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

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

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

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

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

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

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

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

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

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

ACCESSORIES

115 VOLT AND CONTACTOR ADAPTOR CORD

For 50 Series Wire Feeders
10' (3m) Stock No. **041 669**
35' (11m) Stock No. **041 698**
For 10 and 30 Series Wire Feeders
10' (3m) Stock No. **086 541**

POWER CORD

Stock No. **041 688**
Twenty-five foot power cord extension with plug. For field installation.

SK-200 SPOT PANEL

Stock No. **070 941** (factory)
Stock No. **070 942** (field)
Regulates the spot weld time and burnback time when using either the Spoolmatic 1 gun.

EXTENSION HOSE & CABLE KITS

To extend leads between Spoolmatic 1 gun and Spoolmate 200.
25 ft. (7.6m) Stock No. **004 819**
50 ft. (15.24m) Stock No. **000 966**

9C RUNNING GEAR

Stock No. **041 492**
Four wheels with rubber tires, towing handle and cylinder rack.

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

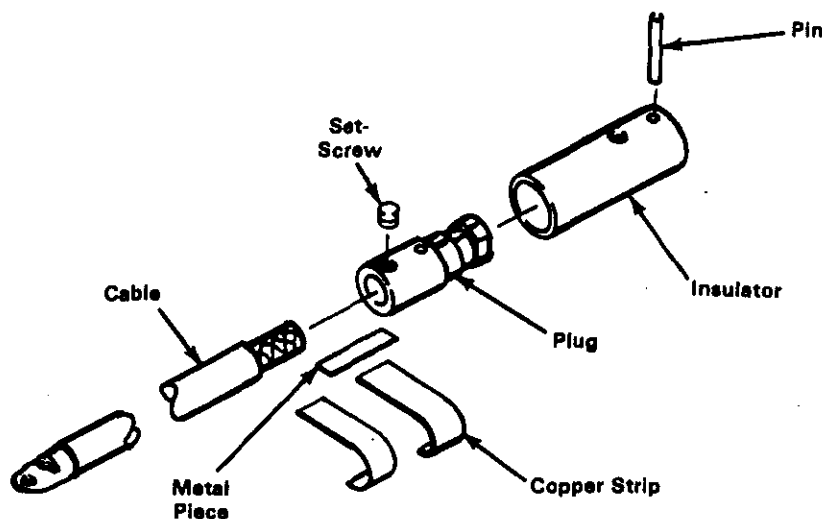
IMPORTANT: *The optional spot panel controls are functional only when using the SPOOLMATIC 1 welding gun. The controls are not functional when using a separate 50 Series wire feeder. Delete all reference to spot control panel used with 50 Series wire feeders throughout the Owner's Manual.*

AMENDMENT TO SECTION 3 - INSTALLATION

Amend Section 3 - 2A. WORK CABLE ASSEMBLY & INSTALLATION (For Units With Spoolmatic Gun): Assembly

1. Slide terminal lug on cable onto work clamp.
2. Secure terminal lug to work clamp.
3. Remove one inch (25.4 mm) of insulation from remaining end of cable.
4. Wrap copper strip tightly around cable.
5. Place metal piece on copper strip, and insert cable into wire setscrew end of male Camlok plug so that cable is snug against bottom in plug body and setscrew hole is over the metal piece.
6. Install and tighten setscrew to secure plug onto cable.
7. Slide insulator over plug so that setscrew and locking pin holes line up.
8. Secure insulator by driving pin through insulator and plug.

Amend Figure 3 - 1. Twistlock Plug Installation



Ref: TD-083 264-E

Figure 3 - 1. Twistlock Plug Installation

AMENDMENT TO SECTION 4 - FUNCTION OF CONTROLS

Amend Section 4 - 7A. OPTIONAL SPOT PANEL CONTROLS: Spot/Continuous Switch

This toggle switch allows the operator to choose between a normal wire feed operation or a timed spot weld operation. When the switch is in the SPOT position, weld time is determined by the setting on the SPOTWELD TIME PERCENTAGE control. When the switch is in the CONTINUOUS position, the operator controls the weld time.

AMENDMENT TO SECTION 6 - MAINTENANCE & TROUBLESHOOTING

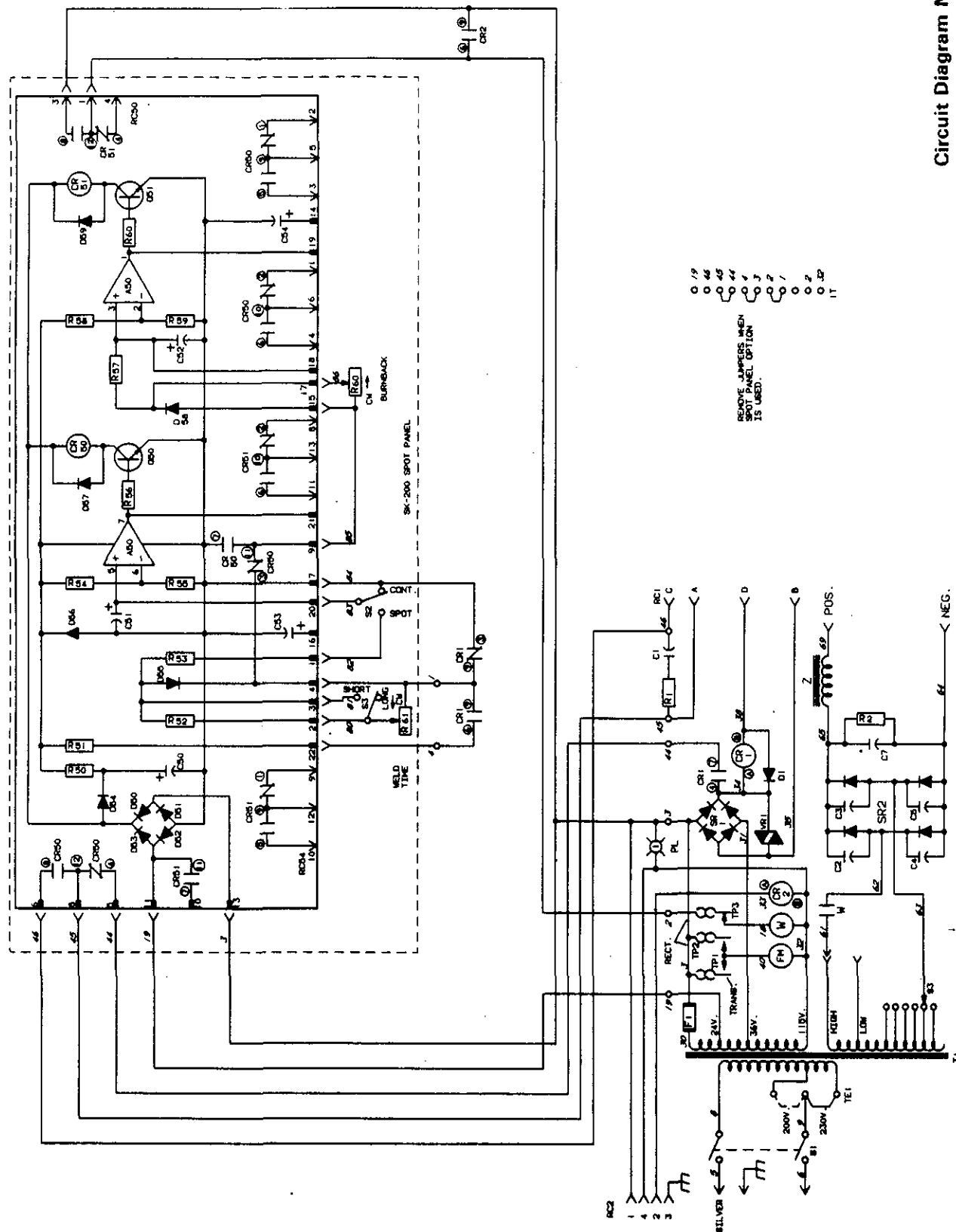


Figure 6 - 1. Circuit Diagram

ERRATA SHEET

Feb. 23, 1987 FORM: OM-1539B

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

AMENDMENT TO SECTION 6 - MAINTENANCE & TROUBLESHOOTING

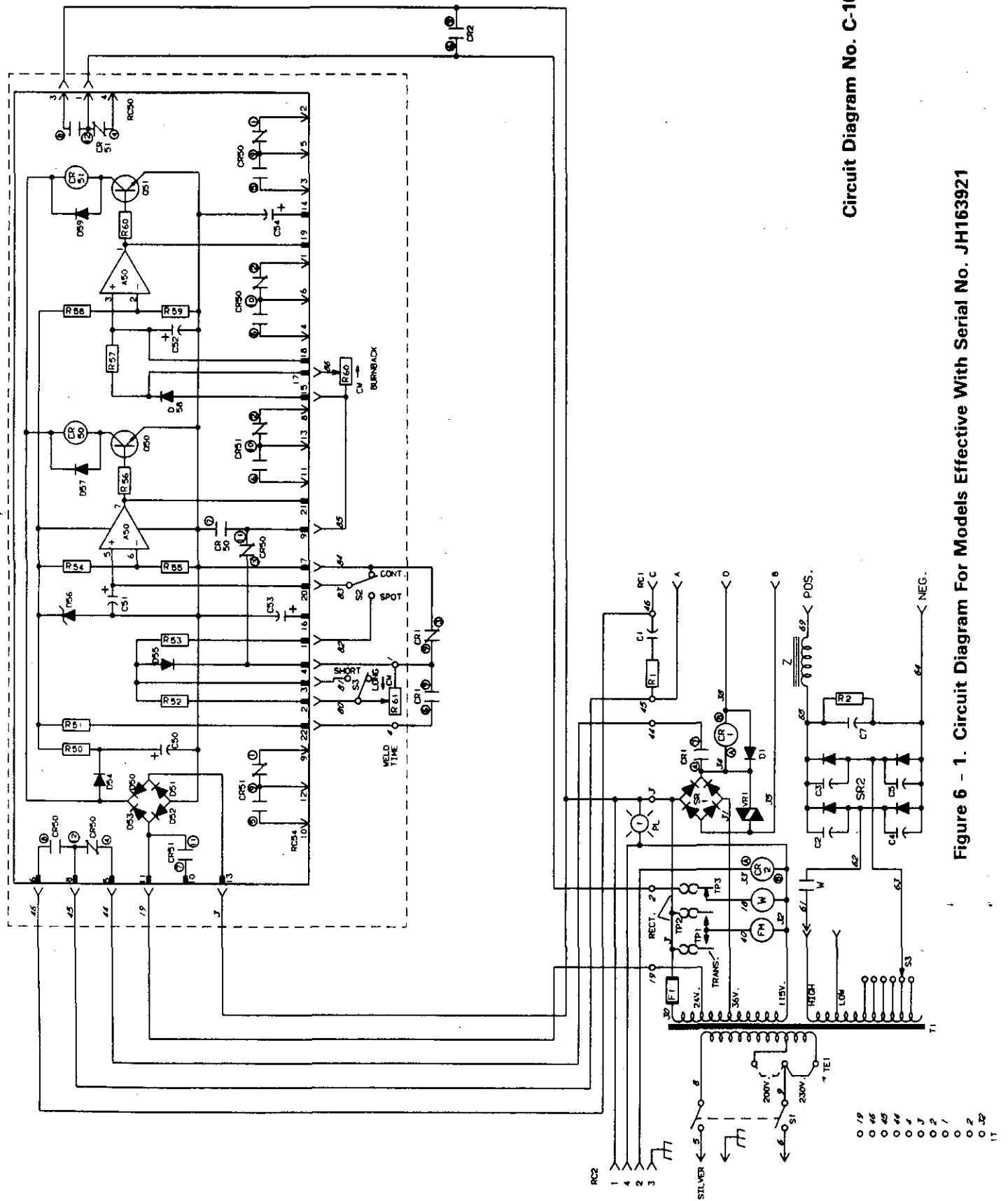
Amend Figure 6 - 1. Circuit Diagram

Effective With Serial No. JH163921

**	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
8.		070 766	106 295	BRACKET, mtg-component	1
8.		073 756	098 691	STAND-OFF, No. 6-32 x 1/2 x 1/4 hex	1
8.		024 366	097 992	KNOB	2
8.		082 168	084 440	CIRCUIT CARD, timer (consisting of)	1
	A50		009 159	. IC, linear 358	1
	C50		039 482	. CAPACITOR, electrolytic 100 uf 35 volts dc	1
	C51,53		032 820	. CAPACITOR, tantalum 2.2 uf 35 volts dc	2
	C52		073 714	. CAPACITOR, tantalum 0.22 uf 35 volts	1
	C54		072 113	. CAPACITOR, tantalum 4.7 uf 35 volts dc	1
	CR50,51		095 521	. RELAY, enclosed 24 volts dc 4PDT	2
			079 843	. SOCKET, relay	2
			079 844	. SPRING, holddown-relay	2
	D50-55,57-59		026 202	. DIODE, 1 amp 400 volts SP	9
	D56		037 449	. DIODE, zener 15 volts 1 watt SP	1
	Q50,51		037 200	. TRANSISTOR, 200MA 40 volts NPN	2
	R50		030 712	. RESISTOR, carbon 1 watt 1000 ohm	1
	R51		035 823	. RESISTOR, carbon 0.25 watt 100 ohm	1
	R52		003 272	. RESISTOR, carbon 0.25 watt 1 meg ohm	1
	R53,57		039 331	. RESISTOR, carbon 0.25 watt 4.7K	2
	R54,56,59,60		035 827	. RESISTOR, carbon 0.25 watt 10K ohm	4
	R55,58		035 886	. RESISTOR, carbon 0.25 watt 22K ohm	2
	RC50		079 793	. TERMINAL, header 4 pin	1
	RC54		079 795	. TERMINAL, header 13 pin	1
			073 730	TERMINAL, header 22 pin	1
	PLG50		079 797	HOUSING, terminal header 4 pin	1
	R60,61		028 770	POTENTIOMETER, carbon 1 turn 2 watt 1 meg ohm	2
	S3		011 770	SWITCH, toggle SPDT 5 amp 125 volts	1
	S2		011 609	SWITCH, toggle SPDT 15 amp 125 volts	1
			031 251	BRACKET, mtg-connector	2

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

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



Circuit Diagram No. C-106 972-A

Figure 6 - 1. Circuit Diagram For Models Effective With Serial No. JH163921

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

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

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

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

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

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

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

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

1-2. GENERAL PRECAUTIONS

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

A. Burn Prevention

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

Wear helmet with safety goggles or glasses with side shields underneath, appropriate filter lenses or plates (protected by clear cover glass). This is a MUST for

welding or cutting, (and chipping) to protect the eyes from radiant energy and flying metal. Replace cover glass when broken, pitted, or spattered. See 1-3A.2.

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

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

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

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

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

B. Toxic Fume Prevention

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

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

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

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

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

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

Vapors from chlorinated solvents can be decomposed by the heat of the arc (or flame) to form PHOSGENE, a

highly toxic gas, and other lung and eye irritating products. The ultraviolet (radiant) energy of the arc can also decompose trichloroethylene and perchloroethylene vapors to form phosgene. DO NOT WELD or cut where solvent vapors can be drawn into the welding or cutting atmosphere or where the radiant energy can penetrate to atmospheres containing even minute amounts of trichloroethylene or perchloroethylene.

C. Fire and Explosion Prevention

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

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

To prevent fires and explosion:

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

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

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

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

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

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

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

An empty container that held combustibles, or that can produce flammable or toxic vapors when heated, must

never be welded on or cut, unless container has first been cleaned as described in AWS Standard A6.0, listed 3 in Standards index.

This includes: a thorough steam or caustic cleaning (or a solvent or water washing, depending on the combustible's solubility) followed by purging and inerting with nitrogen or carbon dioxide, and using protective equipment as recommended in A6.0. Waterfilling just below working level may substitute for inerting.

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

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

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

D. Compressed Gas Equipment

Standard precautions. Comply with precautions in this manual, and those detailed in CGA Standard P-1, PRECAUTIONS FOR SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, listed 6 in Standards index.

1. Pressure Regulators

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

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

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

Leaks - if gas leaks externally.

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

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

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

2. Cylinders

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

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

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

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

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

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

Locate or secure cylinders so they cannot be knocked over.

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

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

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

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

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

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

Never refill any cylinder.

Cylinder fittings should never be modified or exchanged.

3. Hose

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

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

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

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

Coil excess hose to prevent kinks and tangles.

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

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

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

4. Proper Connections

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

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

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

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

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

5. Pressurizing Steps:

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

Stand to side of regulator while opening cylinder valve.

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

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

Check for leaks on first pressurization and regularly thereafter. Brush with soap solution (capful of Ivory

Liquid* or equivalent per gallon of water). Bubbles indicate leak. Clean off soapy water after test; dried soap is combustible.

E. User Responsibilities

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

F. Leaving Equipment Unattended

Close gas supply at source and drain gas.

G. Rope Staging-Support

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

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

A. Burn Protection

Comply with precautions in 1-2.

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

1. Protective Clothing

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

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

2. Eye and Head Protection

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

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

*Trademark of Proctor & Gamble.

Protect filter plate with a clear cover plate.

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

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

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

3. Protection of Nearby Personnel

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

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

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

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

B. Toxic Fume Prevention

Comply with precautions in 1-2B.

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

C. Fire and Explosion Prevention

Comply with precautions in 1-2C.

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

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

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

D. Compressed Gas Equipment

Comply with precautions in 1-2D.

E. Shock Prevention

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

To protect against shock:

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

1. Grounding the Equipment

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

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

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

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

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

2. Electrode Holders

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

3. Connectors

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

4. Cables

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

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

5. Terminals And Other Exposed Parts

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

6. Electrode

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

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

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

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

7. Safety Devices

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

Before installation, inspection, or service, of equipment, shut OFF all power and remove line fuses (or lock

or red-tag switches) to prevent accidental turning ON of power. Disconnect all cables from welding power source, and pull all 115 volts line-cord plugs.

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

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

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

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

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

1-4. STANDARDS BOOKLET INDEX

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

1. ANSI Standard Z49.1, SAFETY IN WELDING AND CUTTING obtainable from the American Welding Society, 550 Le Jeune Rd, P.O. Box 351040, Miami, FL 33135.
2. NIOSH, SAFETY AND HEALTH IN ARC WELDING AND GAS WELDING AND CUTTING obtainable from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.
3. OSHA, SAFETY AND HEALTH STANDARDS, 29CFR 1910, obtainable from the U.S. Government Printing Office, Washington, D.C. 20402.
4. ANSI Standard Z87.1, SAFE PRACTICES FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
5. ANSI Standard Z41.1, STANDARD FOR MEN'S SAFETY-TOE FOOTWEAR obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
6. ANSI Standard Z49.2, FIRE PREVENTION IN THE USE OF CUTTING AND WELDING PROCESSES obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.
7. AWS Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES obtainable from the American Welding Society, 550 Le Jeune Rd. P.O. Box 351040, Miami FL 33135.
8. NFPA Standard 51, OXYGEN - FUEL GAS SYSTEMS FOR WELDING AND CUTTING obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
9. NFPA Standard 70-1978, NATIONAL ELECTRICAL CODE obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
10. NFPA Standard 51B, CUTTING AND WELDING PROCESSES obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210.
11. CGA Pamphlet P-1, SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, NY 10036.
12. CSA Standard W117.2, CODE FOR SAFETY IN WELDING AND CUTTING obtainable from the Canadian Standards Association, Standards Sales, 178 Rexdale Boulevard, Rexdale, Ontario, Canada M9W 1R3.
13. NWSA booklet, WELDING SAFETY BIBLIOGRAPHY obtainable from the National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.
14. American Welding Society Standard AWSF4.1 "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", obtainable from the American Welding Society, 550 Le Jeune Rd. P.O. Box 351040, Miami, FL 33135.
15. ANSI Standard Z88.2 "Practice for Respiratory Protection" obtainable from the American National Standards Institute, 1430 Broadway, New York, NY 10018.

SECTION 2 - INTRODUCTION

Model	Rated DC Amperes Output 60% Duty Cycle	Maximum Open- Circuit Voltage	Input At Rated Load Output 60 Hz. Single-Phase					kva	kw	Dimensions	Weights	
			Amperes At								Net	Ship
			200V	230V	460V	575V						
Spoolmate™ 200	200 @ 28 Volts	42	46	40	20	16	9.15	8.3	Height - 23-1/4 in. (590 mm) Width* - 13-1/4 in. (336 mm) Length - 17-1/2 in. (444 mm)	Welding Power Source		
										145 lbs. (66 kg)	155 lbs. (70 kg)	
										Feeder Gun		
										17 lb. (7.8 kg)	20 lb. (9 kg)	

*Add 3 in. (76 mm) for handle.

Figure 2 - 1. Specifications

2-1. GENERAL INFORMATION AND SAFETY

A. General

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

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

B. Safety

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

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

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

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

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

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

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

2-3. DESCRIPTION - This constant potential dc arc welding power source is available with or without a self contained feeder gun system and is designed for the Gas Metal-Arc Welding process. The number in the model designation (200) refers to the rated output.

It is designed primarily for use with dc reverse polarity. This means that when the work cable is connected to the **NEGATIVE** weld output receptacle and the gun or separate wire feeder is connected to the **POSITIVE** weld output receptacle, the gun is positive (+) and the work negative (-).

This unit consists of a single-phase welding power source with or without a self contained feeder gun. Facilities are provided on the welding power source front panel for connecting the Spoolmatic 1 Gun. A receptacle is provided on the rear panel for connecting a separate 50 series wire feeder. Models with the optional spot weld panel provide the controls for regulating spot weld time and burnback time when using either the Spoolmatic 1 Gun or separate wire feeder.

Information pertaining to the gun/feeder is found in the Spoolmatic Owner's Manual 1210.

SECTION 3 - INSTALLATION

3-1. LOCATION

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

- Use equipment of adequate capacity to lift the unit.
- If using lift forks to handle this unit, be sure the lift forks are long enough to extend out of the opposite side of the base.

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

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

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

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

This welding power source has a lifting device and holes in the base for mounting purposes.

The location should allow room to remove cover and panels for maintenance and repair.

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

3-2. WORK CABLE ASSEMBLY & INSTALLATION (For Units With Spoolmatic Gun) (Figure 3-1) - A ten foot (3 m) cable and twistlock plug are provided with this unit to assemble for use as the work cable. A work clamp must be obtained to complete the assembly.

A. Assembly

1. Slide terminal lug on cable onto work clamp.
2. Secure terminal lug to work clamp.

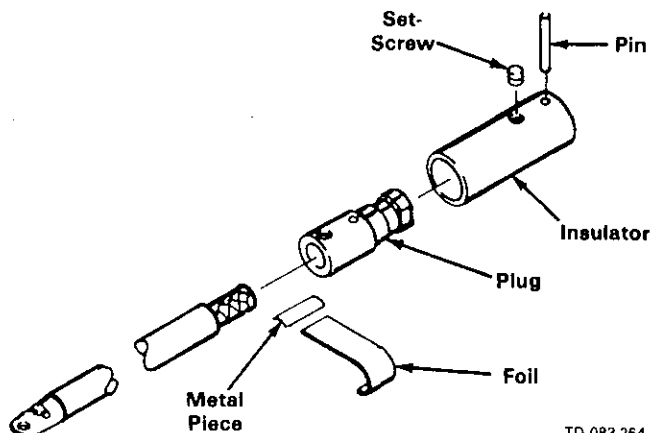


Figure 3-1. Twistlock Plug Installation

3. Remove one inch (25.4 mm) of insulation from remaining end of cable.
4. Wrap foil around wire.
5. Place metal piece on foil and slide plug onto wire so that the setscrew hole is over the metal piece.
6. Slide insulator over plug.
7. Secure plug by inserting and tightening set-screw.
8. Secure insulator by inserting pin into plug.

B. Installation

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut unit down and be sure it cannot be accidentally energized before making or changing weld output connections.

1. Insert plug into receptacle with flat side towards receptacle key.
2. Rotate plug clockwise.

3-3. INSTALLATION OF SPOOLMATIC 1 GUN (If Applicable)

A. Shielding Gas Connections

Connect the shielding gas hose from the Spoolmatic 1 to the gas regulator - flowmeter on the shielding gas supply.

B. Welding Cable Connections (Figure 4-1)

SPOOLMATIC



POSITIVE



The SPOOLMATIC POSITIVE weld output receptacle is provided for making welding cable connections. Insert Spoolmatic 1 welding cable plug into SPOOLMATIC POSITIVE weld output receptacle with flat side facing the receptacle key. Rotate plug clockwise.

C. Trigger Control Connections (Figure 4-1)



A four-socket receptacle is provided for making trigger control connections. Insert the plug from the Spoolmatic 1 into the receptacle and rotate plug threaded collar clockwise. When the gun switch is closed, the contactor energizes, shielding gas flows and wire feeds.

3-4. WELD CABLE SELECTION AND INSTALLATION (For Units Without Spoolmatic 1 Gun) (Figure 3-1) - Two male plugs are supplied with this unit for making weld output connections. Make up two weld cables (No. 2 size cable is recommended) of the desired length and install plugs onto one end of each cable as follows:

1. Remove one inch of insulation from end of cables.
2. Wrap foil around wire.
3. Place metal piece on foil and slide plug onto wire so that the setscrew hole is over the metal piece.
4. Slide insulator over plug.
5. Secure plug by inserting and tightening setscrew.
6. Secure insulator by inserting pin into plug.

Install lugs of adequate size and capacity onto remaining ends of both cables. Obtain and install a work clamp onto end of one cable. Install lug end of remaining cable to weld cable terminal on drive housing of wire feeder (see wire feeder owner's manual for location).

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut unit down and be sure it cannot be accidentally energized before making or changing weld output connections.

Connect plugs to weld output receptacles on front of welding power source as follows:

1. Insert plug from work clamp cable into **NEGATIVE** weld output receptacle (see Figure 4-1) with flat side toward receptacle key, and rotate plug clockwise.
2. Insert plug from weld cable connected to wire feeder drive housing into **POSITIVE** weld output receptacle (see Figure 4-1) with flat side toward receptacle key, and rotate plug clockwise.

3-5. WIRE FEEDER CONNECTIONS (For Units Without Spoolmatic 1 Gun) - The welding power source is equipped with a receptacle on the rear panel for making connections to a separate wire feeder. An optional interconnecting cord must be obtained for making connections. The rear panel receptacle provides 115 volts ac and contactor control. Connect one end of cord to rear welding power source receptacle, and connect remaining end to rear receptacle on wire feeder (see wire feeder owner's manual for correct location).

3-6. ELECTRICAL INPUT CONNECTIONS



A. Electrical Input Requirements

This welding power source is designed to be operated from single-phase, 60 Hertz, ac input power which has a voltage rating that corresponds with one of the electrical input voltages shown on the nameplate. Consult the local electric utility if there is any question about the type of electrical system available at the installation site or how proper connections to the welding power source are to be made.

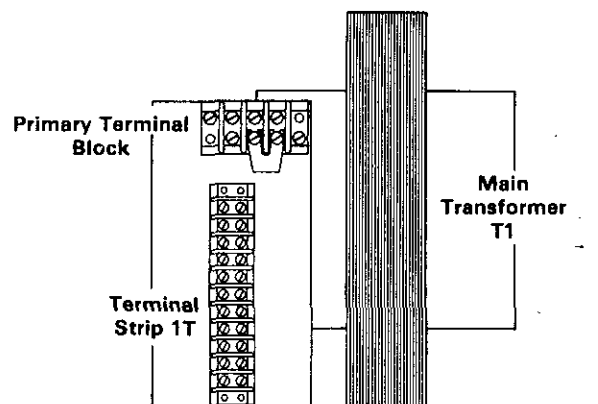
B. Matching The Welding Power Source To The Available Input Voltage

This unit is equipped with input voltage jumper links on the primary voltage changeover board which allow operation from different line voltages. This unit is shipped with the jumper links positioned for the highest voltage stated on the nameplate. If the unit is to be operated from a lower input voltage, remove the left side panel and locate the primary terminal block (see Figure 3-2). Reposition the jumper links to correspond to the available line voltage (see input voltage label on terminal block mounting strip).

CAUTION: INCORRECT INPUT VOLTAGE JUMPER LINK PLACEMENT can damage unit.

- Position jumper links as shown on the input voltage label located on terminal block mounting strip behind side panel.

IMPORTANT: Connect unused jumper links across linked terminals for possible reconnection to different primary voltage.



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Figure 3-2. Primary Terminal Block Location

C. Input Conductor Connections

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- It is recommended that a fusible line disconnect switch be installed in the input circuit to the welding power source.

This would provide a safe and convenient means to completely remove all electrical power from the welding power source whenever it is necessary to internally inspect or service the unit.

- Employ "lockout/tagging procedures" on input line before making input connections to the welding power source.

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

- Connect input conductors to the welding power source before connecting to input power.

Models with 200 or 230 volts primary input are equipped with a power cord that has a three-prong polarized plug. The corresponding wall receptacle is also provided. The wall receptacle should be installed and connected to a line disconnect switch by a competent electrician. Install the receptacle with the grounding terminal at the top so that the power cable can hang downward without bending or twisting.

Models with primary input above 230 volts have a power cord without plug. This power cord should be connected to line power at the line disconnect switch.

Table 3-1 provides guidelines for selecting the proper size input conductors and line fuses. The input conductors should be covered with an insulating material that meets local electrical standards.

WARNING: ELECTRICAL SHOCK can kill.

- Do not connect an input conductor to the ground conductor from the unit.
- Do not connect the ground conductor to an input conductor.

Incorrect input connections can result in an electrically energized welding power source chassis. The ground terminal is connected to the welding power source chassis and is for grounding purposes only.

Table 3-1. Input Conductor And Fuse Size

Input Conductor Size - AWG*				Fuse Size In Amperes			
200V	230V	460V	575V	200V	230V	460V	575V
8 (10)	8 (10)	12 (14)	12 (14)	60	50	25	20

*Input conductor sizes are based on National Electrical Code specifications for allowable ampacities of insulated copper conductors, having a temperature rating of 75°C, with not more than three conductors in a raceway or cable. Numbers in () are equipment ground conductor sizes.

SECTION 4 - FUNCTION OF CONTROLS

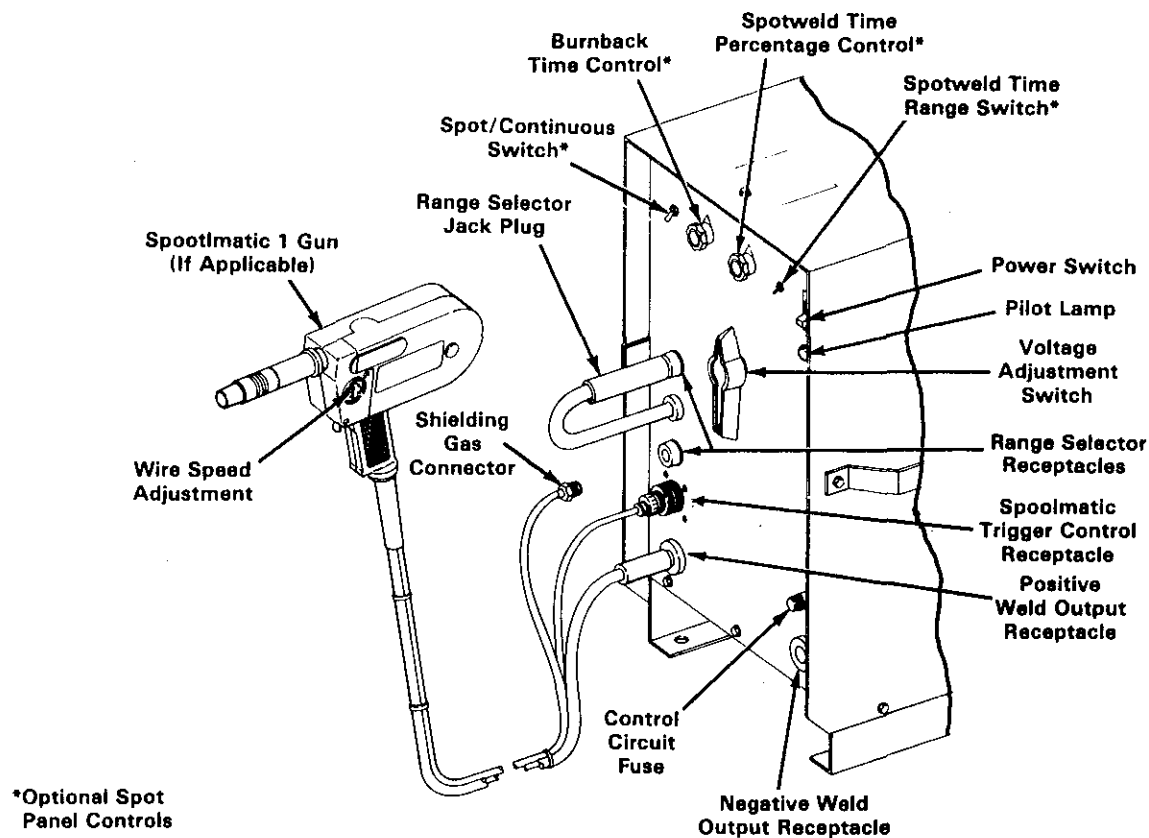


Figure 4-1. Front Panel View

4-1. POWER SWITCH (Figure 4-1)



Placing the POWER switch in the ON position energizes the welding power source, making the unit operational. Placing the POWER switch in the OFF position shuts the unit down.

4-2. VOLTAGE CONTROL (Figure 4-1)

VOLTAGE RANGE



CAUTION: ARCING can damage contacts.

- Do not change switch or jack plug position while welding or under load.

The HIGH/LOW VOLTAGE RANGE selector jack plug and VOLTAGE ADJUSTMENT switch provides selection of the open-circuit voltage range. The six-position VOLTAGE ADJUSTMENT switch provides selection of open-circuit voltage from Low 1 through High 6 within each coarse range.

4-3. VOLT-AMPERE CURVES (Figure 4-2) - The volt-ampere curves show the voltage and amperage output capabilities of the welding power source at min. and max. Voltage and amperage adjustment within each range is provided by the VOLTAGE ADJUSTMENT switch.

With the use of the volt-ampere curves it is possible to determine the load voltage at any particular weld current.

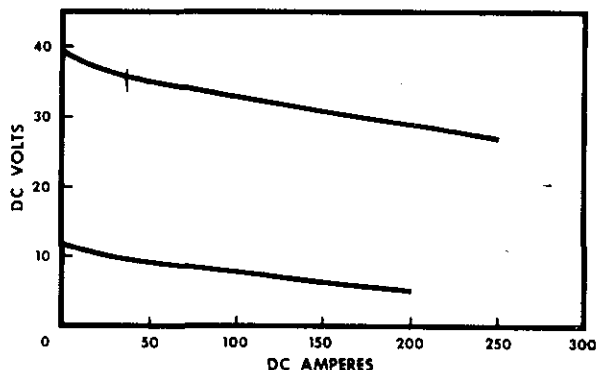


Figure 4-2. Volt-Ampere Curves

4-4. DUTY CYCLE (Figure 4-3)

The duty cycle of a welding power source is the percentage of a ten minute period that a welding power source can safely be operated at a given output. This welding power source is rated at 60 percent duty cycle. This

means that the welding power source can be safely operated at rated load for six minutes out of every ten. During the remaining four minutes, the unit should idle to permit proper cooling. If the welding amperes are decreased, the duty cycle will increase. Figure 4-3 enables the operator to determine the safe output of the welding power source at various duty cycles.

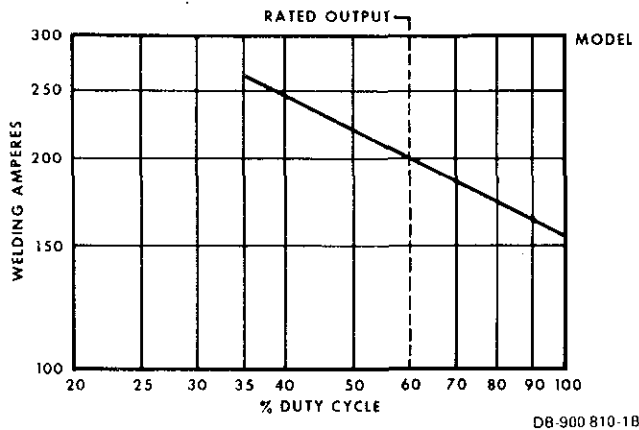


Figure 4-3. Duty Cycle Chart

4-5. PILOT LAMP (Figure 4-1) - The Pilot Lamp indicates when the welding power source is energized and in a ready-to-weld status. The Pilot Lamp will light whenever the POWER switch is in the ON position. The Pilot Lamp will remain lit if the welding power source shuts down because of overtemperature.

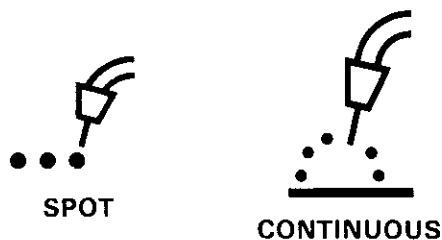
4-6. DEMAND FAN CONTROL

FAN CONTROLLED BY THERMOSTAT

The fan motor is thermostatically controlled to provide fan cooling of the transformer and rectifier if these components require cooling. Under normal loading the fan may not run. Two normally-open thermostats (TP1 in the transformer and TP2 in the rectifier assembly) regulate the operation of the fan motor FM. When the transformer and/or rectifier assembly warm up enough to close either of the thermostats, the fan motor starts running. The fan motor will continue running until the transformer and/or rectifier have cooled down enough to permit thermostats TP1 and/or TP2 to open or until the unit is shut down.

4-7. OPTIONAL SPOT PANEL CONTROLS (Figure 4-1)

A. Spot/Continuous Switch



This toggle switch allows the operator to choose between a normal wire feed operation or a timed spot weld operation. When the switch in the SPOT position weld time to determined by the setting of the SPOTWELD TIME PERCENTAGE control. When the switch is in the CONTINUOUS position, the operator controls the weld time.

B. Spotweld Time Range Switch



This toggle switch allows the operator to select from two spot weld time ranges. In the upper position, a time range of 0.2-2.5 seconds is available. In the lower position, a time range of 2.5-5 seconds is available.

C. Spotweld Time Percentage Control



This control allows the operator to select a percentage of the time range selected. Rotating the control clockwise increases the percentage of time of the spot weld.

D. Burnback Time Control (Figure 4-4)



The burnback circuitry allows the welding wire to remain energized after wire feed has stopped in order for the welding wire to burn back out of the weld puddle.

If the welding wire sticks in the weld puddle, increase the burnback time setting. If the welding wire burns back into the contact tube, decrease the burnback time setting.

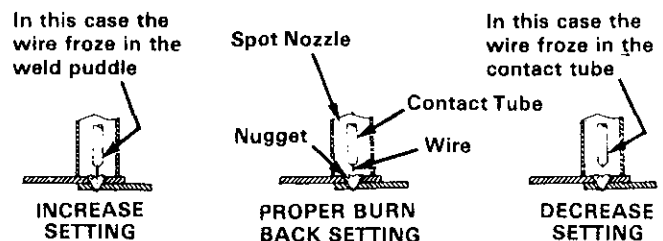


Figure 4-4. Burnback Settings

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SECTION 5 - SEQUENCE OF OPERATION

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

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

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

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

- Wear correct eye, ear, and body protection.

FUMES AND GASES can seriously harm your health.

- Use enough ventilation to keep fumes and gases from the breathing zone.

WELDING WIRE can cause puncture wounds.

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

The welding wire and all metal parts in contact with it are energized while welding.

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

5-1. GAS METAL-ARC WELDING

1. Make all necessary connections as instructed in Section 3.
2. Place the VOLTAGE RANGE selector jack plug in the desired receptacle and the VOLTAGE ADJUSTMENT switch at the desired setting (see Section 4-2).
3. Place the Line Disconnect Switch in the ON position.

IMPORTANT: Open the gas cylinder valve slowly to avoid excessive shock to the regulator indicator.

4. Open the gas cylinder valve.
5. Connect the work clamp to the work material.
6. Place the welding power source POWER switch in the ON position.
7. Extend the welding wire 1/4 in. (6.3 mm) beyond gun nozzle.
8. Place wire over seam.
9. Be sure to hold gun nozzle 1/4 in. - 5/16 in. (6.3 - 7.9 mm) from workpiece.
10. Lower welding helmet, press trigger, and begin welding.

5-2. GAS METAL-ARC SPOT WELDING (Models With Optional Spot Panel Only)

1. Make all necessary connections as instructed in Section 3.
2. Place the VOLTAGE RANGE selector jack plug in the desired receptacle and the VOLTAGE ADJUSTMENT switch at the desired setting (see Section 4-2).
3. Place the SPOT/CONTINUOUS switch in the SPOT position.
4. Place the SPOTWELD TIME RANGE switch in the desired position.
5. Set the SPOT WELD TIME PERCENTAGE Control for the desired time.
6. Rotate the BURNBACK TIME control to the desired setting.
7. Place the Line Disconnect Switch in the ON position.
8. Open the gas cylinder valve.

IMPORTANT: Open the gas cylinder valve slowly to avoid excessive shock to the regulator indicator.

9. Connect the work clamp to the work material.
10. Place the welding power source POWER switch in the ON position.
11. Place weld nozzle against work material and press trigger.

IMPORTANT: If wire sticks in weld puddle, release work clamp, and press gun trigger. Wire will feed out and raise gun from work. Cut wire off close to weld nugget, and 1/4 in. (6.3 mm) back in nozzle. Increase BURNBACK Time control setting ten percent.

5-3. SHUTDOWN PROCEDURES

1. Place the welding power source POWER switch in the OFF position.
2. Place the Line Disconnect Switch in the OFF position.
3. Close the gas cylinder valve.
4. Press gun trigger "in" to release gas in regulator. The gas pressure indicator will return to 0.

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

- Shut off gas supply when not in use.

5-4. CONTINUOUS WELDING TECHNIQUES

A. General

Before attempting to weld on a finished piece of work, it is recommended that practice welds be made on sample metal the same as that of the finished workpiece.

It is recommended that of all the weld positions this equipment is capable of (flat, vertical, and overhead), the beginner experiment with the flat position in making practice welds since this is the easiest to learn.

As with any other electric arc welding process, the metal to be welded should be free of paint, rust, or other non-conductive material.

B. Holding The Gun (Figure 5-1)

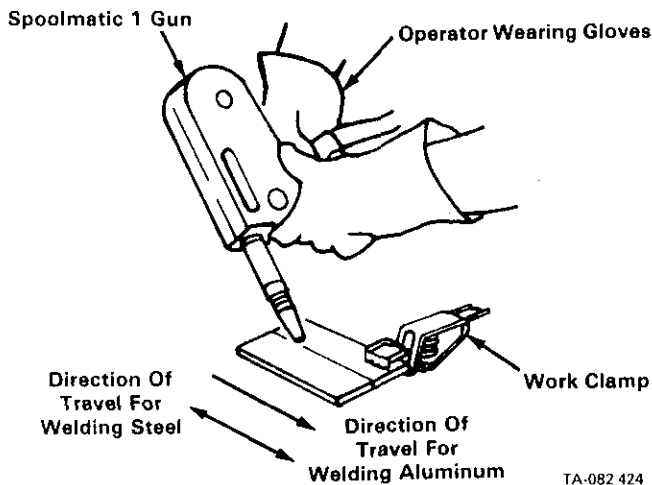


Figure 5-1. Gun Position

IMPORTANT: Sections 5-4, CONTINUOUS WELDING TECHNIQUES and 5-5. SPOT WELDING TECHNIQUES are provided as a general introduction to the Gas Metal-Arc Welding process. Read and thoroughly understand these instructions before attempting to operate this equipment.

The gun, held in either hand, should be at a 45 to 60 degree lead angle. It can also be tilted 45 to 60 degrees away from the operator. This gives good vision of the arc which is necessary to follow the seam. However, never view the arc directly. Always use a welding helmet with proper filter lens.

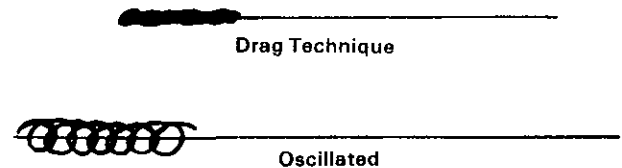
A 1/4 - 5/16 inch (6.3 - 7.9 mm) distance from the bottom side of the gun nozzle to the workpiece must be maintained during the arc starting and welding period.

IMPORTANT: Do not pull the gun back when the arc starts. This will create a long wire extension and a very poor weld.

Cradle the gun in one hand and rest side of hand on workpiece (avoid doing this on hot material); use other hand to hold gun and control gun trigger.

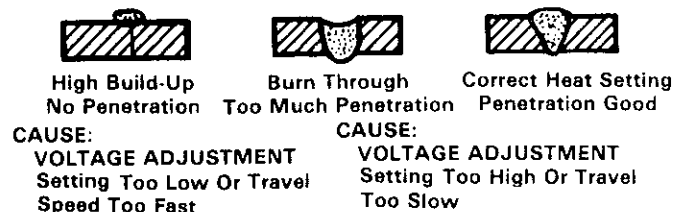
The wire is not energized until trigger is pressed. Therefore the wire can be placed on the seam before lowering helmet and pressing the gun trigger.

The gun can be moved along the seam in a steady movement known as the drag technique. (See Figure 5-2). It can also be oscillated in a full circle a few degrees beyond each side of the seam. Either one is good, and the technique desired will be easy to select. The speed of travel is regulated by the type of weld bead required. The average speed is 15 - 20 inches (0.4 - 0.5 m) per minute. Refer to Figure 5-3 for examples of acceptable or improper weld results.



TA-057 469-16

Figure 5-2. Welding Techniques



TA-057 469-8

Figure 5-3. Crosscut View Of Various Welds

C. Possible Problems

IMPORTANT: The gas nozzle will periodically fill up with weld spatter. Carefully clean it out with a hardwood stick. Never use a metal tool.

D. Techniques For Vertical And Overhead Welding

For vertical welding, the arc is started at the top of the seam and pulled downward in a steady drag method. When bridging a gap, the arc can be oscillated from one piece of the work to the other.

Overhead welding is easily done with the same techniques: drag or oscillating along the seam. If the puddle is too fluid (hot) using a given VOLTAGE RANGE and VOLTAGE ADJUSTMENT switch setting, move to a lower numbered setting and set the Wire Speed Adjustment control on the Spoolmatic gun at a higher setting. This will aid in cooling the weld puddle.

If welding is being performed in HIGH Range and moving to a lower VOLTAGE ADJUSTMENT setting does not result in more satisfactory weld characteristics, drop to LOW Range and VOLTAGE ADJUSTMENT set at 6. Lower the VOLTAGE ADJUSTMENT setting as required.

5-5. SPOT WELDING TECHNIQUES

A. Metal Preparation (Figures 5-4 & 5-5)

For the best spot welding results, the metal should be clean. Paint and rust should be removed before welding. The work cable clamp must be attached to parts being welded to insure proper grounding and to complete a current path.

Spot welds can be made in a variety of methods and in all positions, thru use of the various nozzles supplied with the spot weld panel.



Figure 5-4. Various Spot Welds

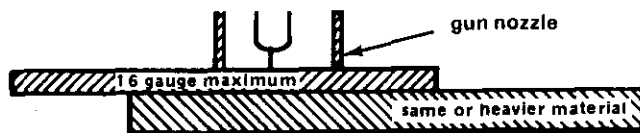


Figure 5-5. Metal Size

If the materials are of different thicknesses, the lightest gauge material should always be spotted to the heavy material. Recommended maximum thickness for the top piece for lap spot is 16 gauge.

For tack, inside corner or outside corner, the maximum material thickness will be determined by your acceptance of sufficient weld.

The .035 in. (0.9 mm) wire is best for spotting with this unit. The .030 in. (0.8 mm) will work, but not as well.

The gas can be either CO₂ or 75A-25CO₂. The latter is recommended for use with the lighter gauge materials.

B. Voltage Control

Spot welding usually requires greater heat input to the weld for a given size material than is required for continuous welding. VOLTAGE ADJUSTMENT settings of 3, 4 and 5 in the HIGH range are most generally used.

To start with, use sample materials and set VOLTAGE ADJUSTMENT at 5.

C. Weld Speed Adjustment Control

To determine the proper Wire Speed Adjustment control setting, begin in the 50 - 70% range. This will prevent the wire burning back in the contact tube during initial attempts to set proper wire speed. Decrease the Wire Speed Adjustment setting as required.

D. Nozzle Selection (Figure 5-6)

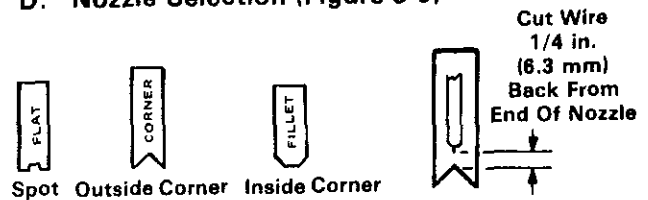


Figure 5-6. Spot Nozzles

Remove continuous weld nozzle from gun. Install spot nozzle. Check that wire is cut back 1/4 in. (6.3 mm) from the shortest end of weld nozzle.

E. Spot Weld Checklist (Figure 5-7)



Figure 5-7. Various Spot Welds

1. To check a spot weld, pull the two pieces apart. A good weld will tear a small hole out of the bottom piece.
2. If weld pulls apart easily, increase the weld time.
3. For a visual test, examine the reverse side of the spot; if a very dark blue circle or small metal protrusion appears, a good weld is indicated.

F. Checking Wire Length And Burnback

Wire should stick out of the contact tube 1/8 in. - 1/4 in. (3.2 - 6.3 mm). If a burnback has occurred (the wire has burned into the contact tube) the contact tube must be replaced as follows:

1. Shut down the welding power source.
2. Remove gun nozzle.
3. Remove contact tube and cut wire off behind tube.
4. Install new contact tube.
5. Replace nozzle.
6. Check wire length.

Decrease the BURNBACK TIME control setting at least ten percent.

SECTION 6 - MAINTENANCE & TROUBLESHOOTING

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Shut unit down and disconnect from line power employing "lockout/tagging procedures" before internally inspecting or servicing.

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

MOVING PARTS can cause serious injury.

- Keep clear of moving parts.

HOT SURFACES can cause severe burns.

- Allow cooling period before servicing.

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

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

6-1. FAN MOTOR - This unit is equipped with an exhaust fan and relies on forced draft for adequate cooling. The fan motor is manufactured with lifetime sealed bearings and requires no maintenance.

6-2. INTERNAL CLEANING - Occasional blowing out or vacuuming of the dust and dirt from around the internal components is recommended. This should be done periodically depending on the location of the unit and the amount of dust and dirt in the atmosphere. The welding power source outer enclosure should be removed and a clean, dry airstream or vacuum suction should be used for this cleaning operation.

6-3. OVERLOAD PROTECTION (Figure 4-1) - The control circuit in this unit is protected by a fuse F1. Should this fuse open the welding power source would completely shut down.

The main rectifier SR2 in this welding power source is protected by a normally closed thermostat TP3 wired in

series with the contactor W coil circuit. Should overheating of the main rectifier occur, this thermostat would open causing the contactor to drop out thereby suspending all weld output. If this condition occurs, it will be necessary to allow a cooling down period before operation can be resumed.

6-4. TROUBLESHOOTING

A. General

It is assumed that the unit was properly installed according to Section 3 of this manual, the operator is familiar with the function of controls, the welding power source was working properly, and that the trouble is not related to the welding process.

B. Troubleshooting Chart

WARNING: ELECTRIC SHOCK can kill.

- Do not touch live electrical parts.
- Disconnect unit from input power before internally inspecting or servicing.

MOVING PARTS can cause severe injury.

- Keep clear of moving parts.

HOT SURFACES can cause severe burns.

- Allow cooling period before servicing.

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

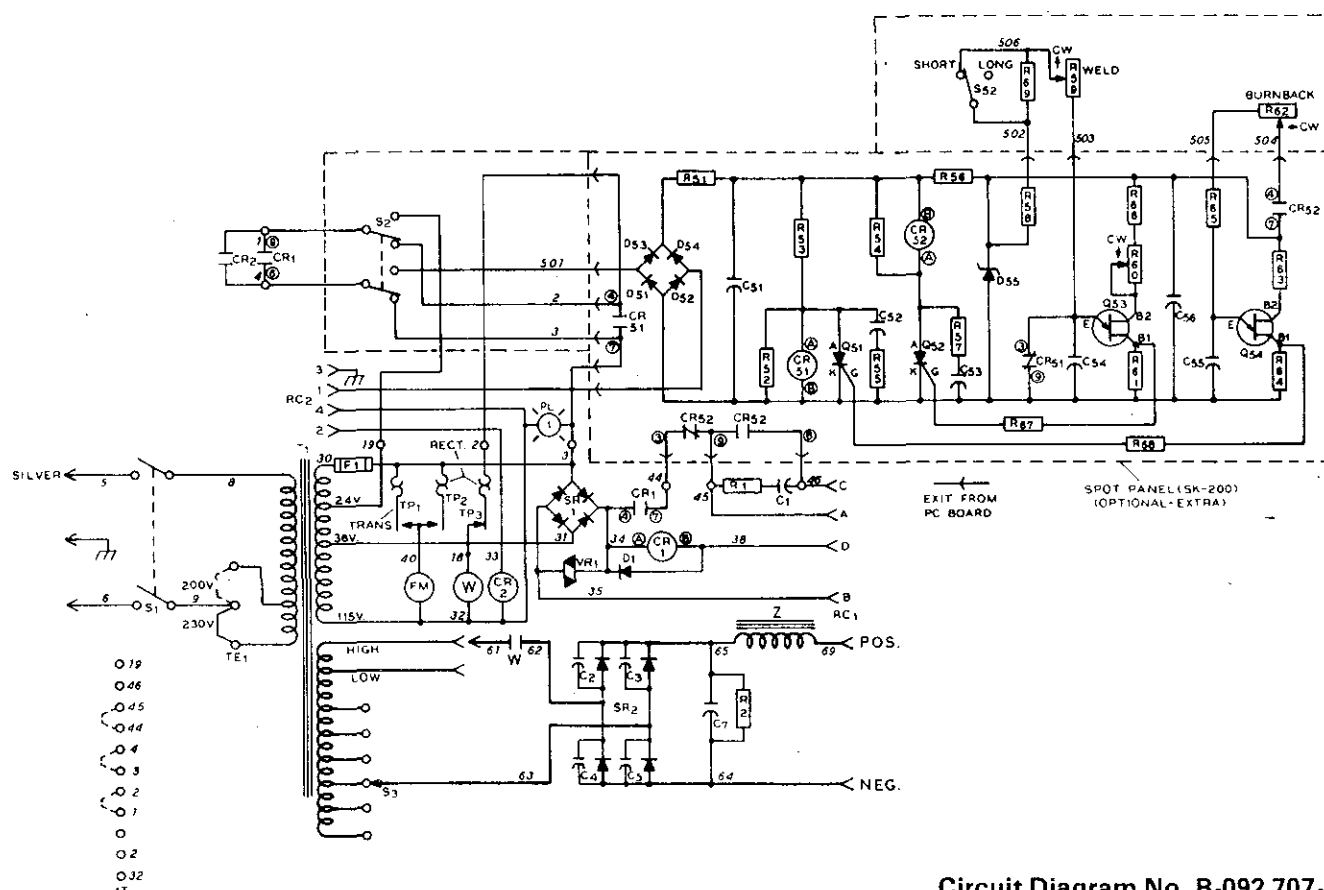
The following chart is designed to diagnose and provide remedies for some of the troubles that may develop in this welding power source.

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

TROUBLE	PROBABLE CAUSE	REMEDY
Low output; pilot light on.	Primary jumper link in wrong position.	Place jumper link in position for primary voltage being used. See Section 3-6.
	Low primary voltage.	Connect welding power source to proper primary input voltage.
No output; pilot light not on.	POWER switch S1.	Replace S1.
	Line fuse open.	Check and replace line fuses if necessary.
	Loose primary connections.	Check tightness of all primary connections.
	Primary disconnect switch or line circuit breaker open.	Place primary disconnect switch or line circuit breaker in closed position.
	Fuse F1 open.	*Replace F1.
No open-circuit voltage; pilot light on and wire feeds.	Contactor points	Replace points.
	Contactor coil W	Replace W.
	Range selector jack plug not secure in receptacle.	Secure plug into receptacle.
	Main rectifier SR2 overheating (thermal overload; thermostat TP3 open).	Allow unit to cool down (see Section 6-3).
No open-circuit voltage; pilot light on and wire does not feed.	Gun trigger inoperative, or gun trigger leads open.	Replace gun trigger (if applicable) or repair trigger leads.
	Control relay CR1 (or CR2 if using separate wire feeder).	Replace CR1 or CR2 as applicable.
	Plug from gun trigger not secure in receptacle in welding power source (or separate wire feeder if applicable).	Secure plug in receptacle.
	Spot panel (Spot Weld Models Only).	Replace spot panel.
Wire does not feed. Pilot light on and open-circuit voltage is normal.	Gun or wire feeder problems.	See gun or wire feeder Owner's Manual.
	Rectifier SR1.	Replace SR1.
	Spot panel (Spot Weld Models Only).	Replace spot panel.

TROUBLE	PROBABLE CAUSE	REMEDY
Erratic weld output.	Check leads and contacts of VOLTAGE ADJUSTMENT switch S3.	Discoloring of brass contacts could indicate heating caused by loose connections. Replace contact or switch plate.
	Capacitor(s) C7.	Replace C7.
	Range selector jack plug not secure in receptacle.	Secure plug into receptacle.
	Loose weld output connections.	Secure connections.
Spot Weld Timer and Spot Burnback Timer inoperative. Wire feeds continuously. Output normal.	Spot panel (Spot Weld Models Only).	Replace spot panel.
For units using separate 50 series wire feeder: No open-circuit voltage; pilot light on, but wire does feed.	Cord plug(s) to rear panel receptacle RC2 and to wire feeder not securely connected.	Secure plug(s) into receptacle(s).
	Control relay CR2.	Replace CR2.

*If fuse replacement is necessary, use only a fuse of the same size, type, and rating.



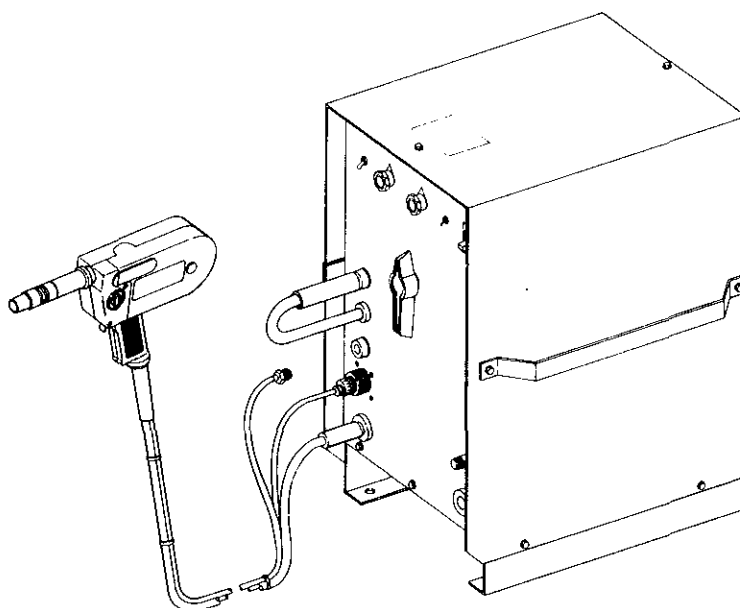
Circuit Diagram No. B-092 707-A

Figure 6-1. Circuit Diagram

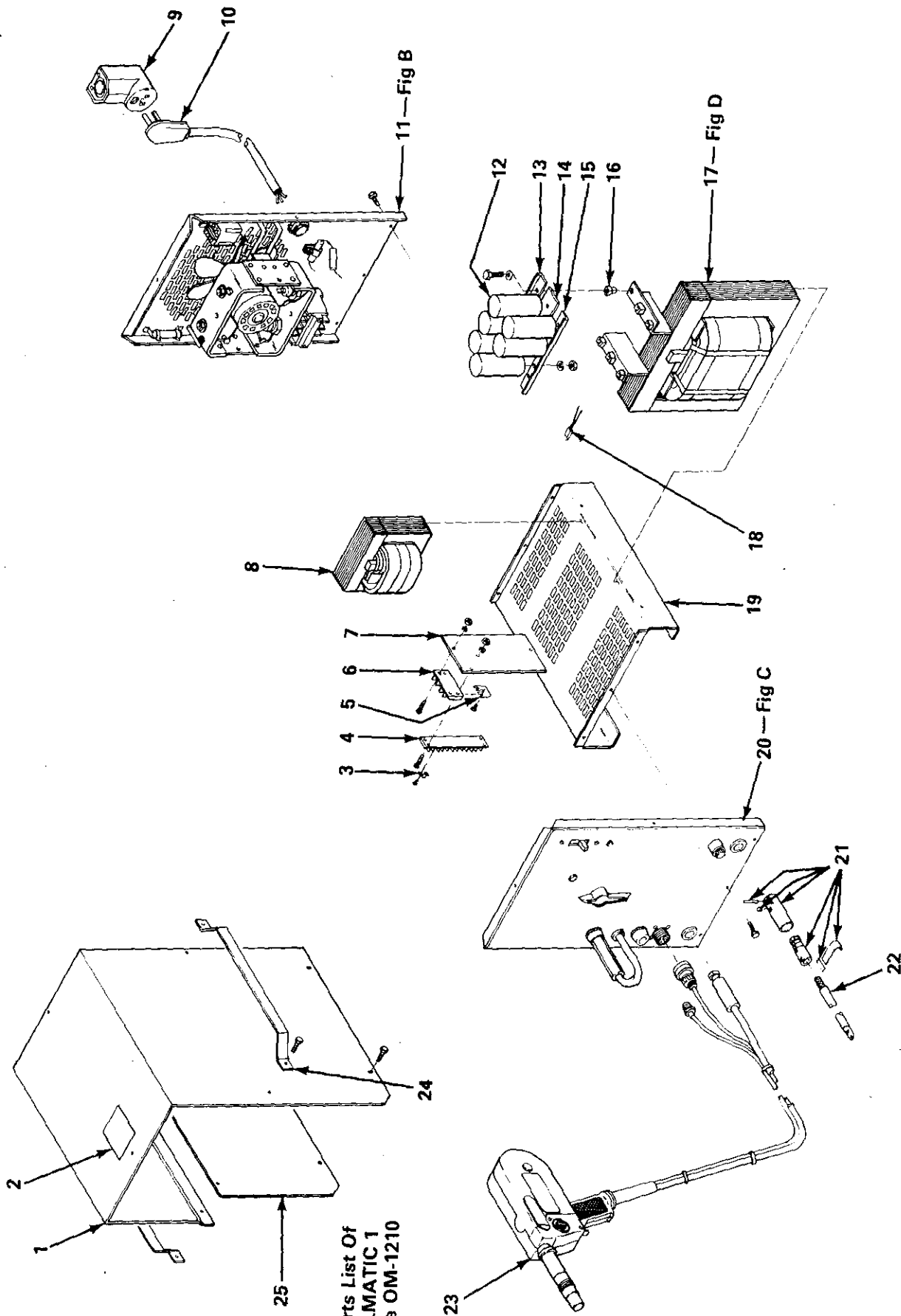
March 1986

FORM: OM-1539E

Effective With Serial No. JD716241



PARTS LIST



For Parts List Of
SPOOLMATIC 1
Gun See OM-1210

Figure A - Main Assembly

Item No.	Dia. Mkgs.	Part No.	Description	Quantity	
				Model	
				W/Gun	W/O Gun
Figure A Main Assembly					
1		+ 047 167	WRAPPER	1	1
2		047 497	LABEL, general precautionary	1	1
3		601 219	LINK, jumper - terminal block 20 amp	3	3
4	1T	073 586	BLOCK, terminal - 20 amp 11 pole	1	1
5		038 620	LINK, jumper - terminal block 30 amp	1	1
6	TE1	026 189	BLOCK, terminal 30 amp 3 pole	1	1
7		070 765	STRIP, mounting - terminal block	1	1
8	Z	081 716	STABILIZER	1	1
9		039 778	RECEPTACLE, straight 2P3W 50 amp 250 volts	1	1
10		047 721	CORD SET, power 250 volts 3/c 8 ft	1	1
11		Figure B	PANEL, rear-w/components (Pg 3)	1	1
12	C7	084 087	CAPACITOR, electrolytic 9000 uf 40 volts dc	8	8
13		081 594	ANGLE, right hand - mtg capacitor	1	1
14		081 590	STRIP, center - mtg capacitor	1	1
15		081 592	ANGLE, left hand - mtg capacitor	1	1
16		080 509	GROMMET, screw No. 8/10 panel hole 3/16	6	6
17	T1	**089 997	TRANSFORMER, power-main (200/230)(Fig D Pg 6)	1	1
17	T1	**092 214	TRANSFORMER, power-main (230/460)(Fig D Pg 6)	1	1
17	T1	**092 215	TRANSFORMER, power-main (230/460/575)(Fig D Pg 6)	1	1
18	TP1	088 592	THERMOSTAT, NO	1	1
19		081 586	BASE	1	1
20		Figure C	PANEL, front - w/components (Pg 4)	1	1
21		039 630	PLUG, male - twistlock insulated	1	2
22		023 100	CABLE, interconnecting - ground clamp	1	
23		+ +	SPOOLMATIC 1 gun	1	1
24		081 588	HANDLE, lifting	2	2
25		049 150	PANEL, side	1	1
		†070 941	SK-200 Spot Panel (Fig E Pg 8)	1	1

†Optional Equipment.

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

+ + For complete breakdown of SPOOLMATIC 1 gun see OM-1210.

**Replace at Factory or Factory Authorized Service Station

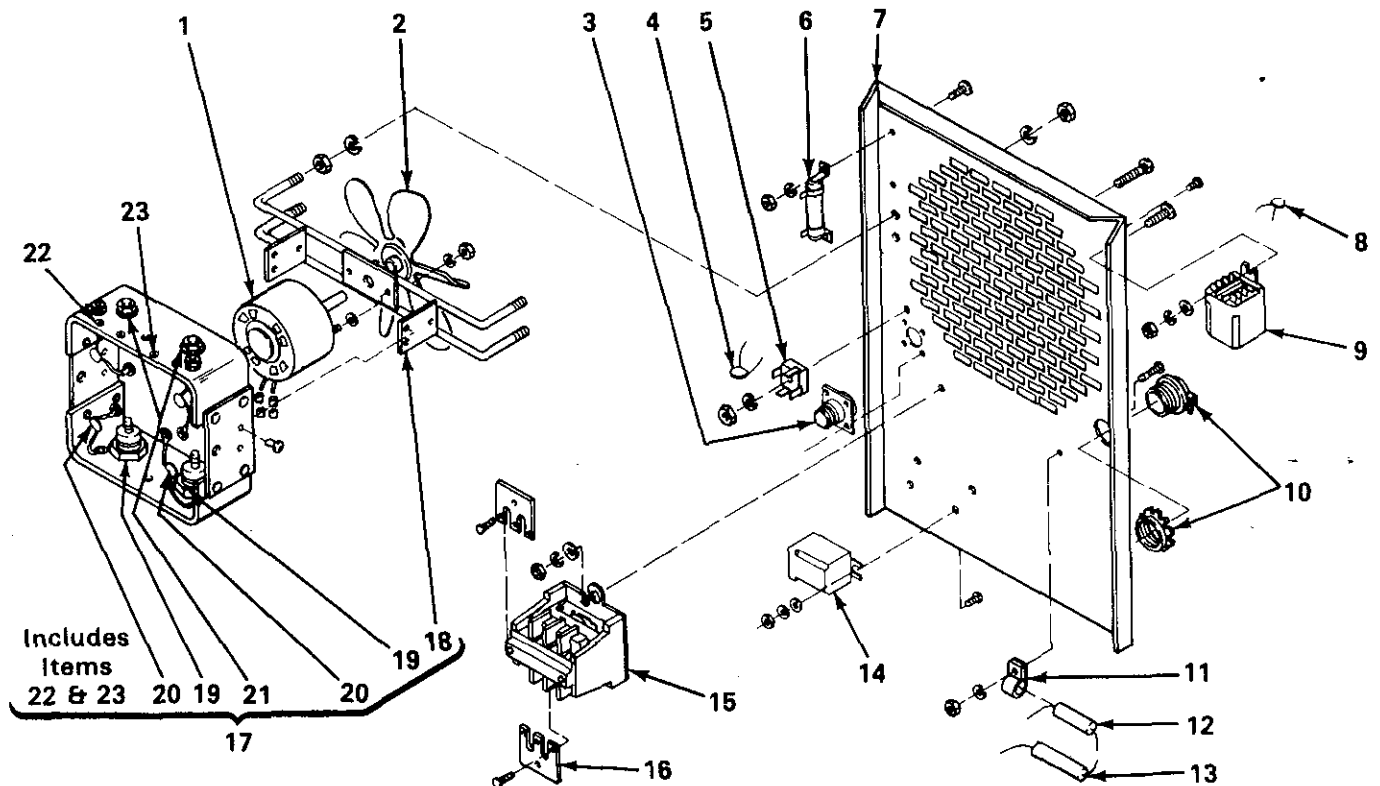
BE SURE TO PROVIDE MODEL AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure B

Panel, Rear-W/Components (Fig A Pg 2 Item 11)

1	FM	081 373	MOTOR, 1/15 HP 115 volts ac 60 Hz 3000 rpm	1
2		081 372	BLADE, fan 60 Hz 9 inch 5 wing 20 degree	1
3	RC2	048 282	RECEPTACLE W/SOCKET (consisting of)	1
		079 534	. TERMINAL, female	4
4	VR1	082 722	VARISTOR, 0.6 watt 175 volts dc	1
5	SR1	035 914	RECTIFIER, integrated 30 amp 400 volts	1
6	R2	079 781	RESISTOR, WW fixed 25 watt 50 ohm	1
7		070 803	PANEL, rear	1
8	D1	026 202	DIODE, 1 amp 400 volts SP	1
9	CR1	052 964	RELAY, enclosed 24 volts dc DPDT	1
10		044 426	CONNECTOR, clamp - cable 1 inch	1
11		010 143	CLAMP, 3/8 dia	1
12	C1	000 339	CAPACITOR, electrolytic 220 uf 50 volts dc	1
13	R1	604 288	RESISTOR, WW fixed 10 watt 2 ohm	1
14	CR2	059 266	RELAY, enclosed 120 volts ac DPDT	1
15	W	085 002	CONTACTOR, 75 amp 3 P (consisting of)	1
		092 679	. COIL, 120 volts	1
16		085 698	LINK, jumper-contact	2
17	SR2	087 660	RECTIFIER/WINDTUNNEL (consisting of)	1
18		081 678	. BRACKET, mtg-fan motor	1
19		037 957	. DIODE, 275 amp 300 volts RP	2
20	C2-5	031 689	. CAPACITOR, ceramic 0.01 uf 500 volts dc	4
21		037 956	. DIODE, 275 amp 300 volts SP	2
22	TP2	086 323	. THERMOSTAT, NO	1
23	TP3	006 334	. THERMOSTAT, NC	1



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Figure B - Panel, Rear-W/Components

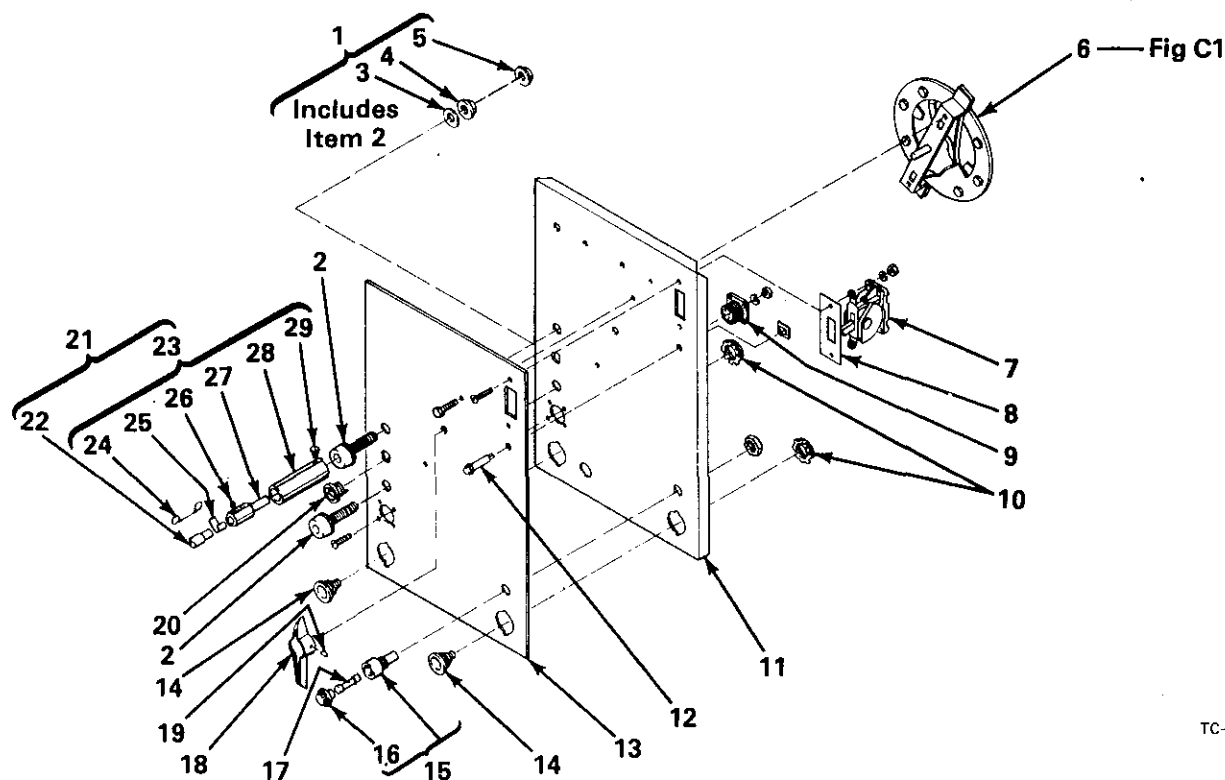
BE SURE TO PROVIDE MODEL AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
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Figure C

Panel, Front-W/Components (Fig A Pg 2 Item 20)

1		057 608	RECEPTACLE, jack plug - yellow (consisting of)	2
2		072 334	. RECEPTACLE & NUT, yellow	1
3		010 291	. WASHER, flat - nylofil 5/8 ID x 1-1/4 OD x 1/8	1
4		604 668	. NUT, selflocking - hex 1/2-20	1
5		601 881	. NUT, hex - jam 1/2-20	1
6	S3	049 280	SWITCH, selector (Fig C1 Pg 5)	1
7	S1	090 328	SWITCH, toggle 2PST 40 amp 600 volts ac	1
8		026 190	INSULATOR, switch	1
9	RC1	073 326	RECEPTACLE, 4 socket 97-3102-18-4S	1
10		010 907	NUT, locking 1 inch	2
11		070 770	PANEL, front	1
12	PL1	027 645	LIGHT, indicator-red lens 125 volts ac	1
13			NAMEPLATE (order by model and serial numbers)	1
14	POS,NEG	039 628	RECEPTACLE, twistlock - insulated	2
15		046 432	HOLDER, fuse - miniature (consisting of)	1
16		059 139	. CAP, fuse holder	1
17	F1	*012 618	FUSE, miniature - glass 5 amp	1
18		006 927	HANDLE, switch - range	1
19		010 647	PIN, spring 5/32 x 1-1/4	1
20		010 290	BUSHING, strain relief 1.09 x 1.03 hole	1
21		049 347	CABLE & PLUG, jack - yellow (consisting of)	1
22		082 067	. CABLE	1
23		039 878	. PLUG, jack - yellow (consisting of)	1
24		010 521	. WIRE, tie	1
25		019 833	. STRIP, copper 0.010 x 2-1/2 x 3/4	1
26		602 178	. SCREW, set - socket hd 1/4-20 x 3/8	2
27		101 219	. PLUG, jack	1
28		026 975	. INSULATOR, yellow	1
29		602 160	. SCREW, self - tapping fillister hd 8-32 x 1/4	1



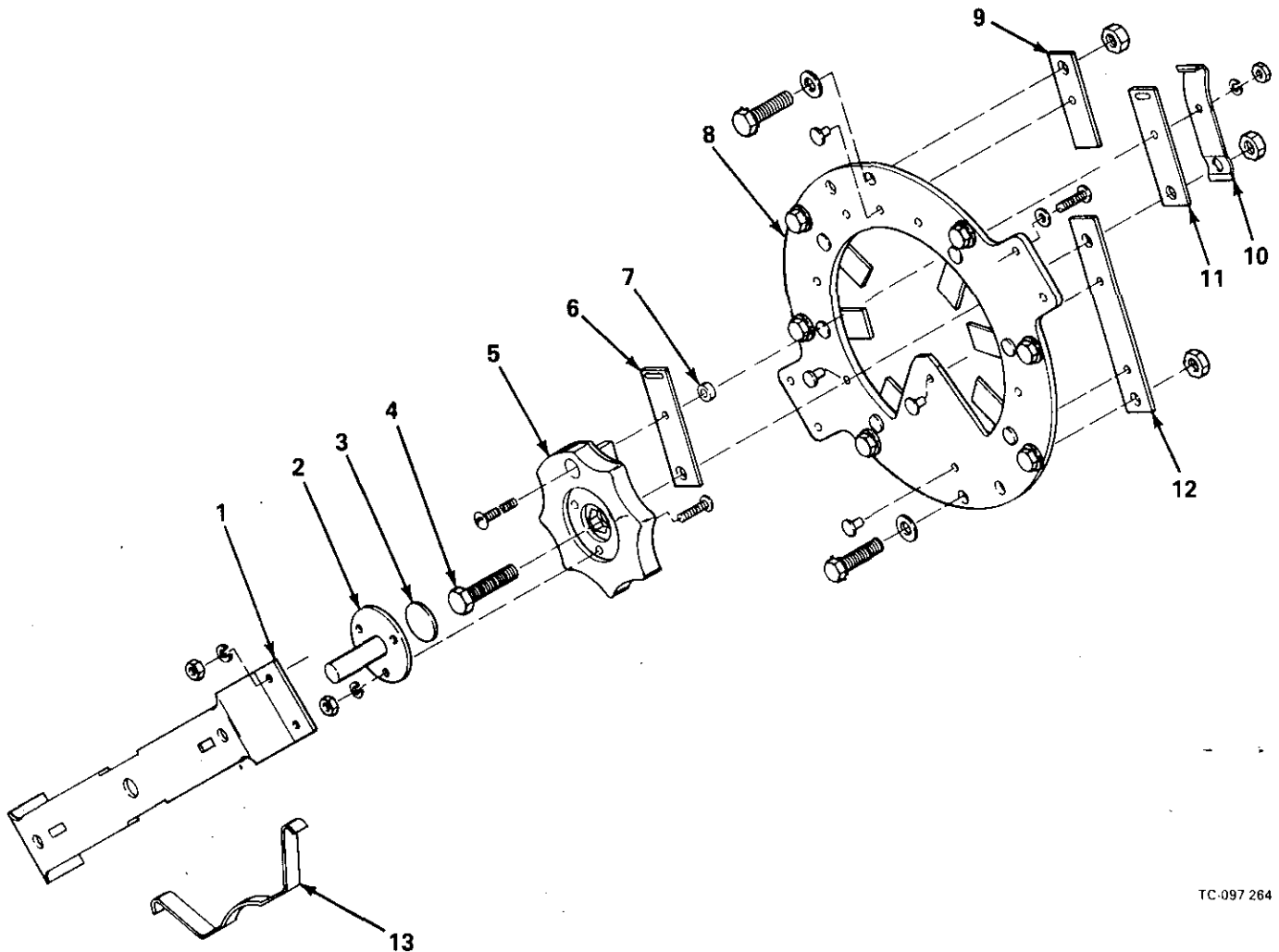
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Figure C - Panel, Front-W/Components

*Recommended Spare Parts.

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

Item No.	Part No.	Description	Quantity
Figure C1 049 280 Switch, Selector (Fig C Pg 4 Item 6)			
1	005 562	BRACKET, mounting - switch	1
2	005 561	SHAFT, rotor	1
3	005 564	INSULATOR, screw - switch	1
4	605 276	SCREW, cap - steel hex hd 1/4-20 x 1-1/4	1
5	005 559	CONTACT BOARD, movable - switch	1
6	005 560	CONTACT, switch - movable	1
7	008 485	SPACER, contact - switch	1
8	005 566	CONTACT BOARD, stationary - switch	1
9	011 644	CONTACT, stationary - switch	7
10	052 405	SPRING, pressure - contact switch	1
11	052 404	CONTACT, movable - switch	1
12	005 557	BUS BAR, switch - range	1
13	005 558	SPRING, selector - switch	1



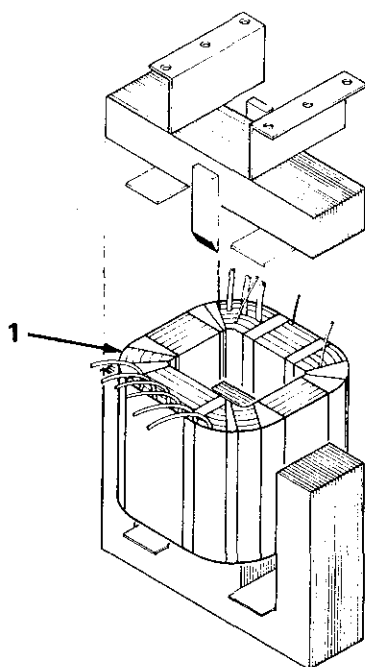
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Figure C1 - Switch, Selector

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

Item No.	Part No.	Description	Quantity
Figure D 070 908 Transformer, Power - Main (Fig A Pg 2 Item 17)			

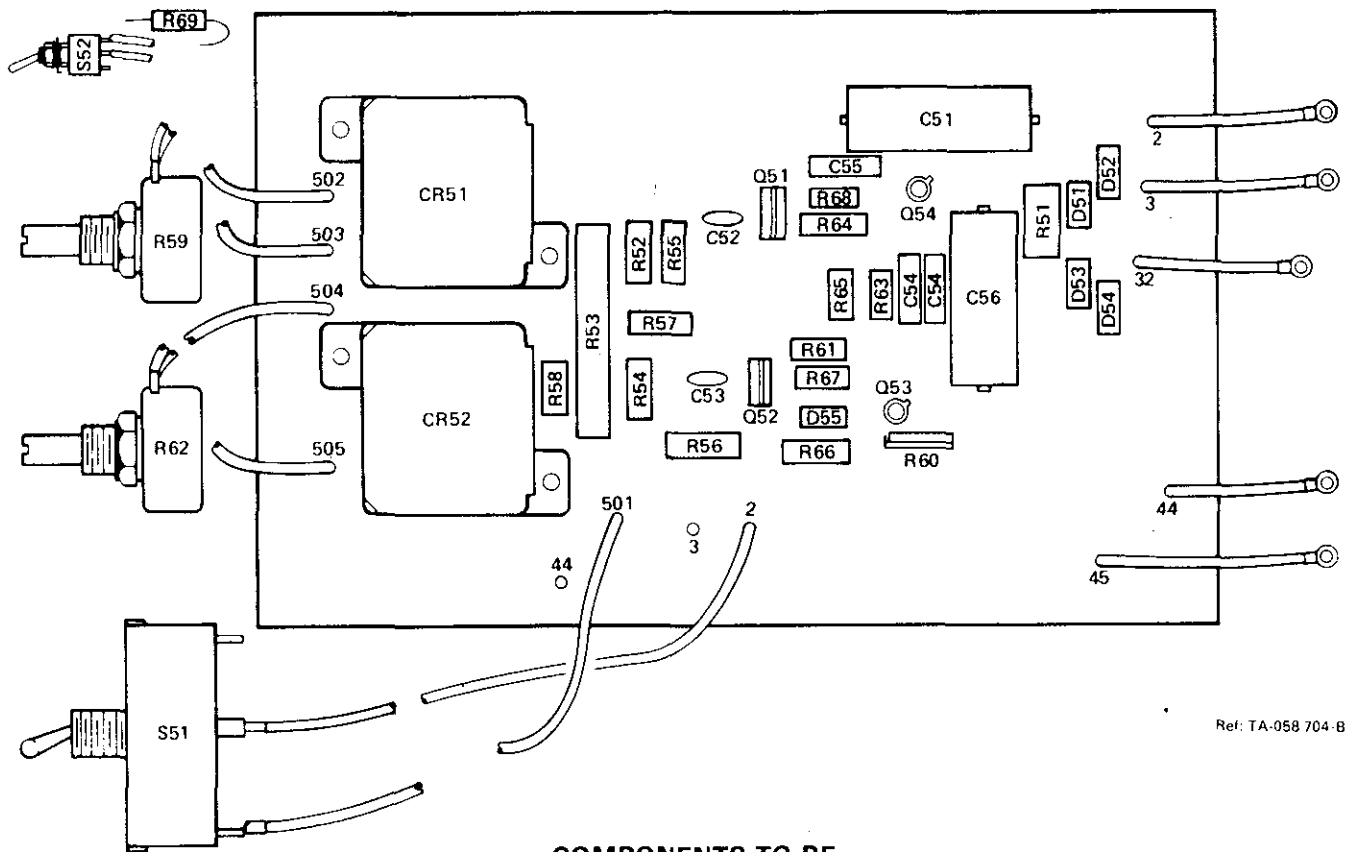
1	**089 780	COIL, pri/sec (200/230)	1
1	**092 026	COIL, pri/sec (230/460)	1
1	**092 027	COIL, pri/sec (230/460/575)	1



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Figure D - Transformer, Power-Main

****Replace At Factory Or Factory Authorized Service Station.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.**



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

Figure E - Circuit Card, W/Switch

CERTAIN NON CRITICAL PARTS LISTED BELOW MAY DIFFER FROM THOSE USED ON THE CIRCUIT CARD IN YOUR UNIT, BUT WILL SERVE AS SUITABLE REPLACEMENTS.

Dia. Mkgs.	Part No.	Description	Quantity
Figure E 070 941 SK-200 (Spot Panel)			
	†000 442	NOZZLE, spot	1
	†000 443	NOZZLE, spot - inside corner	1
	†009 925	NOZZLE, spot - outside corner	1
	070 766	BRACKET, mounting - circuit card	1
	073 756	STAND-OFF, 6-32 x 5/8 lg x 1/4 hex	4
	024 366	KNOB	2
	082 168	CIRCUIT CARD, w/switch (consisting of)	1
S2	011 611	SWITCH, toggle DPDT 15 amp 125 volts	1
C51	000 859	CAPACITOR, electrolytic 220 uf 35 volts dc	2
C52,53	000 340	CAPACITOR, ceramic 0.01 uf 50 volts	2
C54,55	072 113	CAPACITOR, tantalum 4.7 uf 35 volts dc	2
C54	072 130	CAPACITOR, tantalum 1 uf 35 volts dc	1
C56	045 868	CAPACITOR, electrolytic 100 uf 25 volts dc	11
CR51	032 944	RELAY, 12 volts dc DPDT	1
CR52	032 945	RELAY, 24 volts dc DPDT	1
	032 946	SOCKET, relay	2
	048 848	SPRING, holddown-relay	2
D51-54	026 202	DIODE, 1 amp 400 volts SP	4
D55	037 243	DIODE, zener 18 volts 1 watt	1
Q51,52	022 135	THYRISTOR, 4 amp 200 volts	2
Q53,54	037 289	TRANSISTOR, unijunction 50MA 35 volts	2
R51	030 055	RESISTOR, carbon 2 watt 10 ohm	1
R52,54,65	030 024	RESISTOR, carbon 0.5 watt 1000 ohm	3
R53	030 630	RESISTOR, WW fixed 11 watt 100 ohm	1
R55,57	030 937	RESISTOR, carbon 0.5 watt 10 ohm	2
R56	074 099	RESISTOR, carbon 1 watt 150 ohm	1
R58	030 004	RESISTOR, carbon 0.5 watt 10K ohm	1
R59	030 738	POTENTIOMETER, carbon 1 turn 2 watt 500K ohm	1
R60	030 049	POTENTIOMETER, carbon 1 turn 0.25 watt 5000 ohm	1
R61,64	074 052	RESISTOR, carbon 0.5 watt 120 ohm	2
R62	030 131	POTENTIOMETER, carbon 1 turn 2 watt 50K ohm	1
R63	028 276	RESISTOR, carbon 0.5 watt 2200 ohm	1
R66	030 105	RESISTOR, carbon 0.5 watt 680 ohm	1
R67,68	028 285	RESISTOR, carbon 0.5 watt 100 ohm	2
R69	032 819	RESISTOR, carbon 0.5 watt 390K ohm	1
S52	011 770	SWITCH, toggle SPDT 5 amp 125 volts	1
	†084 739	CORD, interconnecting (consisting of)	1
	604 571	CORD, No. 18/4 (order by ft)	3 ft
	079 878	HOUSING PLUG & PINS (consisting of)	1
	079 535	TERMINAL, male	4
	079 531	CLAMP, cable 29/64	2
	048 284	HOUSING PLUG & SOCKETS (consisting of)	1
	079 534	TERMINAL, female	4

†Optional Parts.

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

