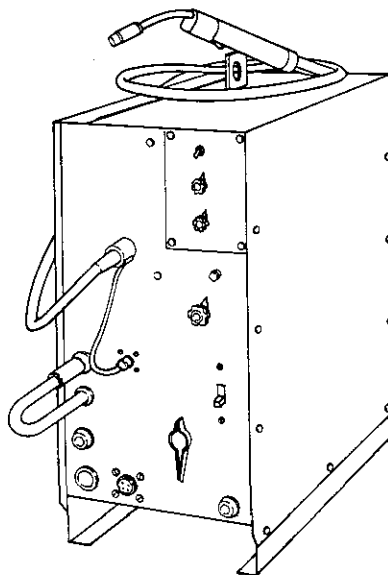


February 1979

FORM: OM-1303

Effective With Serial No. HK240615

MODEL
MILLERMATIC 200



OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.

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

LIMITED WARRANTY

EFFECTIVE: JANUARY 1, 1979

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. At the present time, the manufacturer's warranty on the Mag-Diesel engine on DEL-200 is limited to six months and on all other engines to one year.

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 and feeder/guns 90 days
4. All other Millermatic Feeders 1 year
5. Replacement or repair parts, exclusive of labor . . . 60 days
6. Batteries 6 months

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 therefor 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. 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.

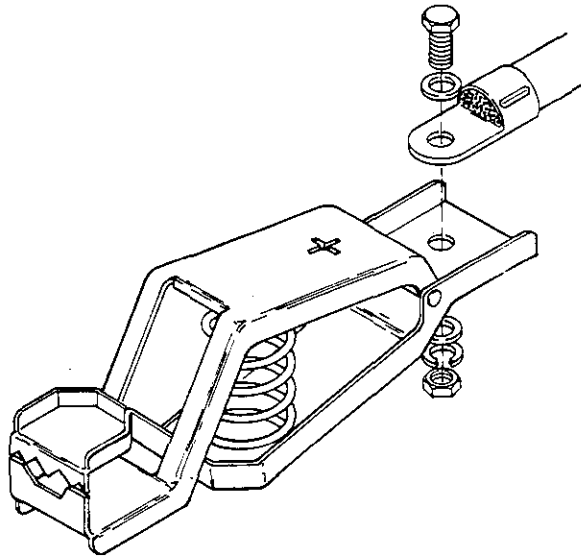
ERRATA SHEET

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

AMENDMENT TO SECTION 3 – INSTALLATION

Amend Section 3-6A. Installation Of Work Clamp and associated Figure 3-5. Work Clamp Installation

1. Insert the end of the work cable with the terminal lug on it between the tabs.
2. Secure the terminal lug to the work clamp with supplied nut and bolt.



A-047 211

Figure 3-5. Work Clamp Installation

Item No.	Dia. Mkgs.	Part No. Listed In Parts List	Replaced With Part No.	Description	Quantity
33		026 843	Deleted	(Eff with S/N HK308513)	
34		010 368	040 237	CLAMP No. 11 (Eff with S/N HK308513)	1
55		081 666	048 123	BAFFLE, air (Eff with S/N HK308513)	1
57		081 589	048 093	STRIP, mounting - center (Eff with S/N HK308513)	1
58		081 591	048 091	ANGLE, mounting - right hand (Eff with S/N HK308513) ..	1
60		081 593	048 092	ANGLE, mounting - left hand (Eff with S/N HK308513) ..	1
67	R16	030 886	079 781	RESISTOR, WW fixed 25 watt 50 ohm	1

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

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PARTS LIST

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

A. Burn Prevention

Wear protective clothing - leather (or asbestos) gauntlet gloves, 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

Adequate ventilation. 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:

- appreciable combustibles (including building construction) are within 35 feet
- appreciable combustibles are further than 35 feet but can be ignited by sparks
- openings (concealed or visible) in floors or walls within 35 feet may expose combustibles to sparks
- 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 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 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 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 requirement 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.

*Trademark of Proctor & Gamble.

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 Wire

Electrode wire becomes electrically HOT when the power switch of gas metal-arc welding equipment is ON and welding gun trigger is pressed. Keep hands and body clear of wire and other HOT parts.

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.

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, 2501 NW 7th St., Miami, Fla. 33125.
2. ANSI Standard Z87.1, SAFE PRACTICE FOR OCCUPATION AND EDUCATIONAL EYE AND FACE PROTECTION, obtainable from American National Standards Institute, 1430 Broadway, New York, N.Y. 10018.
3. American Welding Society Standard A6.0, WELDING AND CUTTING CONTAINERS WHICH HAVE HELD COMBUSTIBLES, obtainable same as item 1.
4. NFPA Standard 51, OXYGEN-FUEL GAS SYSTEMS FOR WELDING AND CUTTING, obtainable from the National Fire Protection Association, 470 Atlantic Avenue, Boston, Mass. 02210.
5. NFPA Standard 51B, CUTTING AND WELDING PROCESSES, obtainable same as item 4.
6. CGA Pamphlet P-1. SAFE HANDLING OF COMPRESSED GASES IN CYLINDERS, obtainable from the Compressed Gas Association, 500 Fifth Avenue, New York, N. Y. 10036.
7. OSHA Standard 29 CFR, Part 1910, Subpart Q, WELDING, CUTTING AND BRAZING.

SECTION 2 - INTRODUCTION

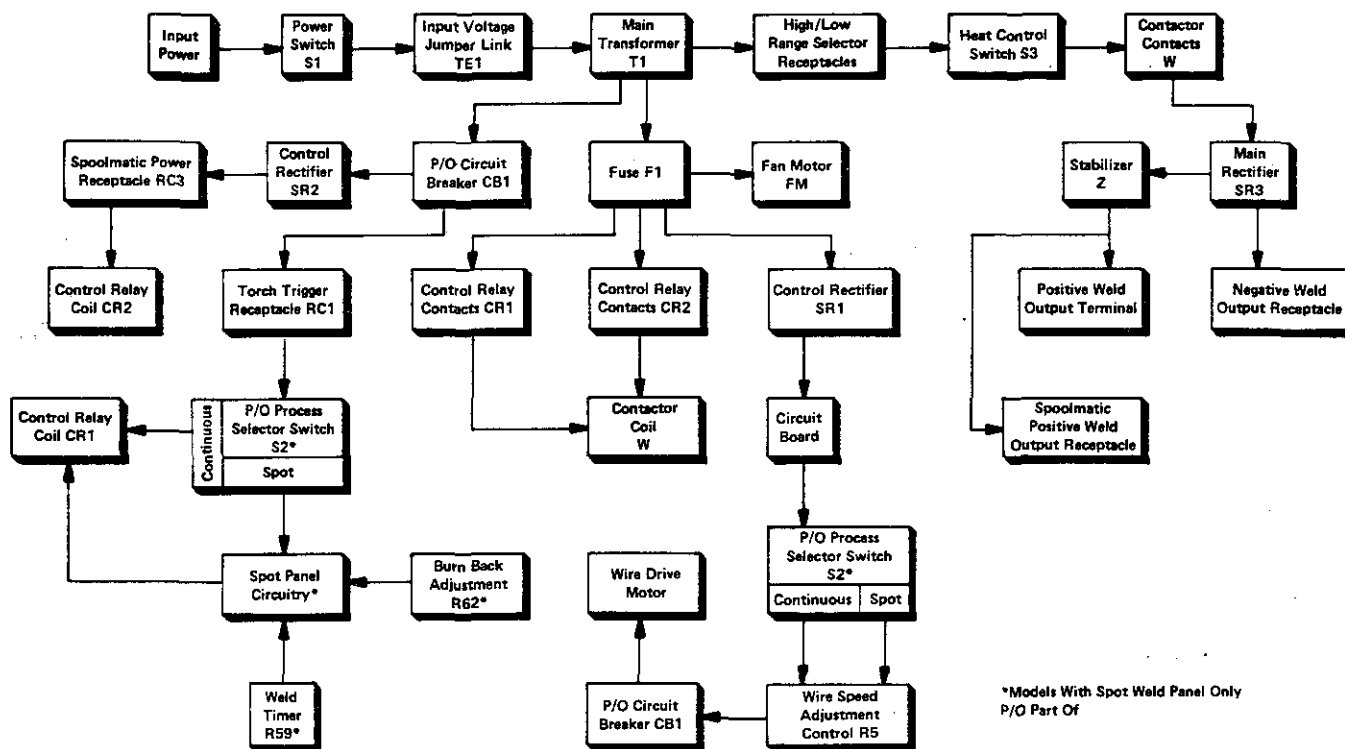
Rated Welding Current Amperes	Open- Circuit Volts	Input at Rated Load Output 60 Hz. Single-Phase					Control Circuit Voltage At Gun	Electrode Wire Feed Speed	Electrode Wire Diameter Capability	Dimensions (Inches)	Weight (Pounds)		
		Amperes At			kva	kw					Without Gun	With Gun	With Gun
		200V	230V	460V							Net	Net	Ship
200@ 28 Volts 60% Duty Cycle	40	44	38	19	8.75	7.5	24 Volts	60-600 lpm.	.030" To .045" Hard	Height - 27† Width - 13-1/2 Depth - 26-1/2	191*	198*	209**

†Add 3 inches for lifting eye.

*Add 2-3/4 pounds for units with spot panel.

**Add 5 pounds for units with spot panel.

Figure 2-1. Specifications



*Models With Spot Weld Panel Only
P/O Part Of

TB-048 413

Figure 2-2. Functional Diagram

2-1. GENERAL

This manual has been prepared especially for use in familiarizing personnel with the design, installation, operation, maintenance, and troubleshooting of this equipment. All information presented herein should be given careful consideration to assure optimum performance 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 and freight bill will be furnished by the carrier on request if occasion to file claim arises.

When requesting information concerning this equipment, it is essential that Model Description and/or Stock Number and Serial (or Style) Numbers of the equipment be supplied.

2-3. DESCRIPTION

This constant potential dc arc welding power source and wire control/feeder system is designed for the Gas Metal-Arc Welding (GMAW) process. The number in the model designation (200) refers to the rated output.

It is designed primarily for use as a dc reverse polarity machine. This means that when the work cable is connected to the NEGATIVE weld output receptacle and the gun is connected to the wire drive assembly, the gun is positive (+) and the work negative (-). This is the only way the unit will work properly using the Gas Metal-Arc Welding (GMAW) process.

This unit consists of a single-phase welding power source with built-in control/feeder and quick disconnect gun with all necessary interconnecting cables. Facilities are provided on the welding power source front panel for connecting an optional Spoolmatic Gun. Models with the optional spot weld panel provide the controls for regulating spot weld time and burnback time.

2-4. SAFETY

Before attempting to make primary or secondary connections, change parts or make repairs, be sure that the welding power source is completely disconnected from the main power line.

CAUTION

Before making any electrical connections, "machinery lockout procedures" should be employed. If the connection is to be made from a line disconnect switch, the switch should be padlocked in the open position. If the connection is made from a fuse box, remove the fuses from the box and padlock the cover in the closed position. If the unit is connected to a circuit breaker, or other disconnecting device without locking facilities, attach a red tag to the device to warn others that the circuit is being worked on.

Before the equipment is put into operation, the safety section at the front of this manual should be read completely. This will help avoid possible injury due to misuse or improper welding applications.

The following definitions apply to CAUTION, IMPORTANT, and NOTE blocks found throughout this manual:

CAUTION

Under this heading, installation, operating, and maintenance procedures or practices will be found that if not carefully followed may create a hazard to personnel.

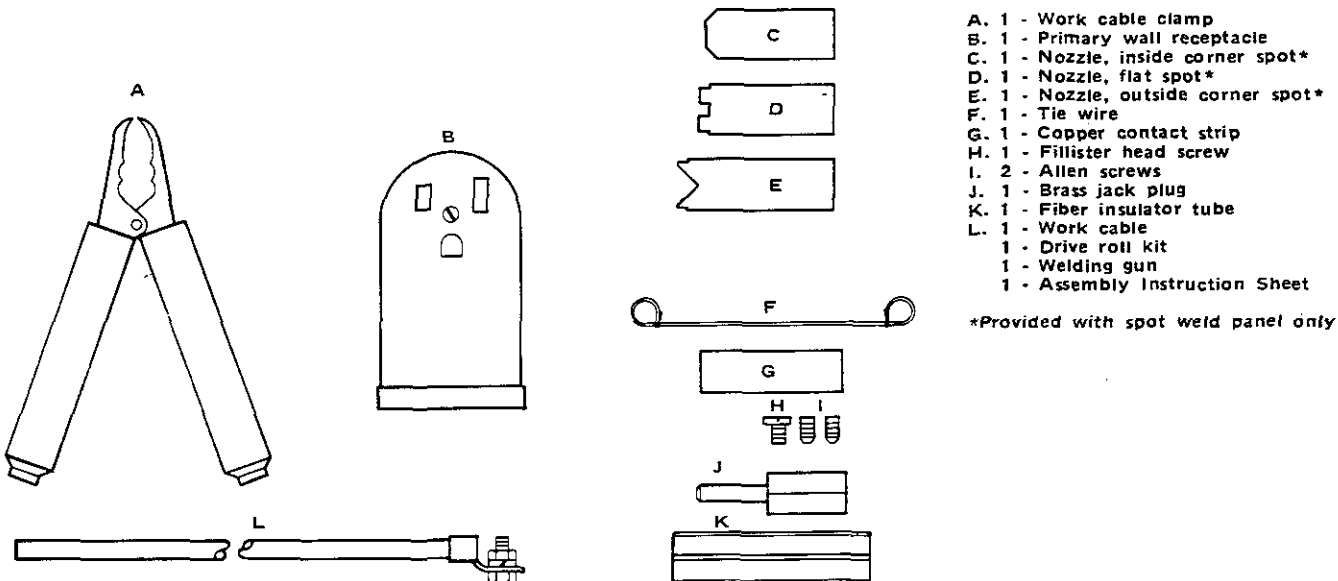
IMPORTANT

Under this heading, installation, operating, and maintenance procedures or practices will be found that if not carefully followed may result in damage to equipment.

NOTE

Under this heading, explanatory statements will be found that need special emphasis to obtain the most efficient operation of the equipment.

Parts which are included with this welding power source are as follows:



SECTION 3 - INSTALLATION

NOTE

All directions, such as left or right, are with respect to the operator facing the welding power source front panel.

NOTE

The timed weld operation provided by this spot panel is not applicable to the Spoolmatic I gun (optional).

3-1. INSTALLATION OF THE SPOT WELD PANEL (Optional)

1. Remove all items from the shipping carton.
2. If this is an initial installation of both the panel and welding power source, skip Step 3 and following CAUTION block. Be sure to read the two NOTE blocks.
3. Completely shut down the unit.

CAUTION

Placing the POWER switch in the OFF position does not remove power from all of the welding power source internal circuitry. Completely terminate all electrical power to the welding power source by employing "machinery lockout procedures" before attempting any inspection or work on the inside of the unit. If the welding power source is connected to a disconnect switch, padlock the switch in an open position. If connected to a fuse box, remove the fuses and padlock the cover in the closed position. If the unit is connected to a circuit breaker, or other disconnecting device without locking facilities, attach a red tag to the device to warn others that the circuit is being worked on.

NOTE

It is not necessary to remove the outer enclosure from the unit to accomplish this installation.

4. Remove blank panel from upper right-hand corner of welding power source front panel by removing the four sheet-metal screws. Save screws; discard panel.
5. Locate the wiring harness with the connector on the end immediately inside the unit. Remove the wiring harness from the first clamp inside the unit (upper left) by pushing the wiring harness up and pulling it to the right. This is easily done since half of the first clamp is not bolted down. If necessary, the clamp can

be bent open to remove the harness since this clamp will no longer be used.

6. Carefully pull connector with jumper leads and wiring harness through the opening in the front panel. (It will only come through approximately two inches).
7. Separate the connector with jumper leads from the receptacle on the wiring harness. Discard the section with the jumper leads.

NOTE

Carefully examine plug on rear of spot weld panel and receptacle on end of wiring harness. They can only go together one way.

8. Place plug from rear of spot weld panel into receptacle on end of wiring harness. Push together until they lock in place.
9. Carefully slide spot weld panel through the opening and into proper position on the welding power source.
10. Attach the spot weld panel to the unit by replacing the four sheet-metal screws and tightening them securely.
11. See Section 5-5 for spot welding information and instructions.

3-2. INSTALLATION OF THE WELDING POWER SOURCE ON RUNNING GEAR (See Figure 3-1).

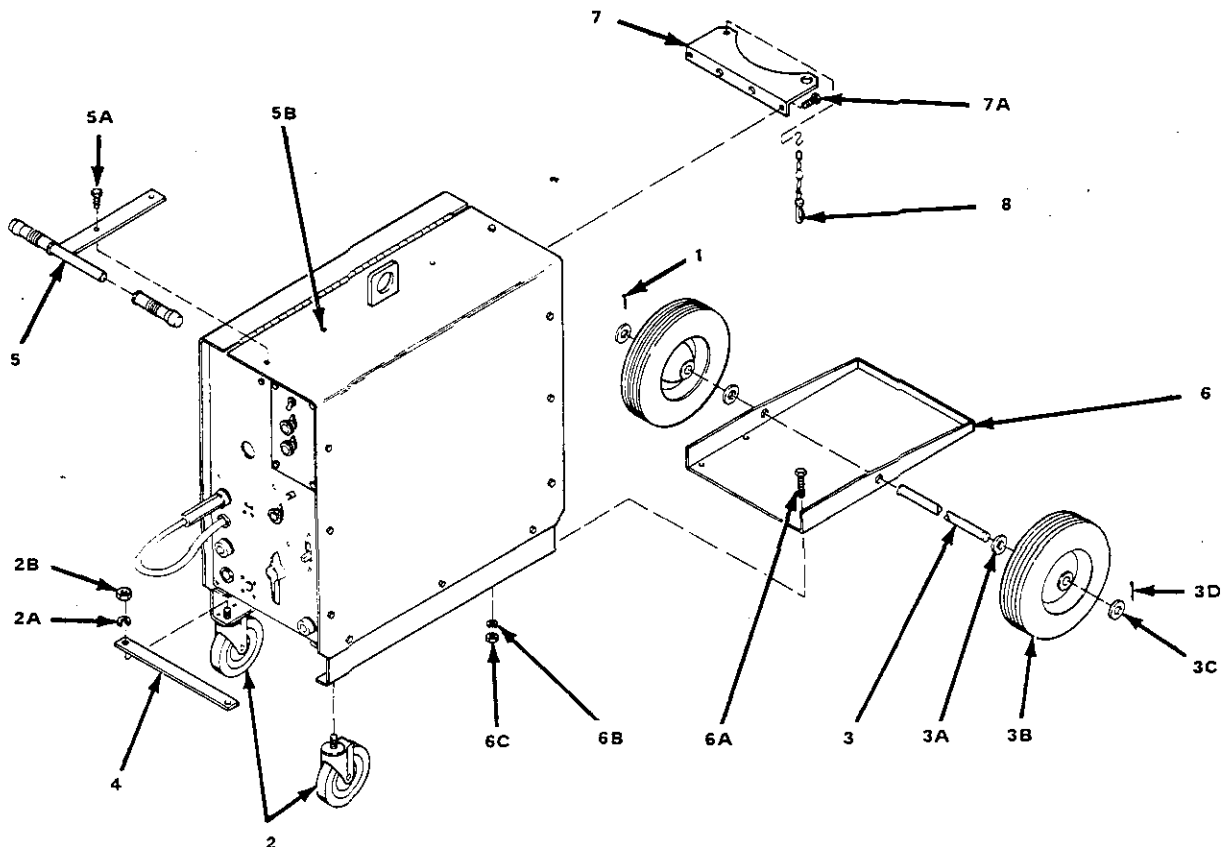


Figure 3-1. Installation of Running Gear

NOTE

Prior to installing the running gear to the welding power source, remove the shipping boards which are attached to the machine's base. Use a 7/16 inch wrench to remove the bolts and nuts which secure the boards to the base.

1. Remove running gear from shipping carton and cylinder rack from under the welding power source base.
2. Install the two 4" swivel wheels (2) onto the front corners of the welding power source by placing each bolt through one of the holes provided in the base. Install the spreader bar (4) onto bolts. Place lock washer (2A) and nut (2B) on bolts, and tighten with a suitable wrench.
3. Block the unit up securely in middle to ease installation of rear wheel/gas cylinder rack assembly.
4. Install large rear wheels onto cylinder rack by sliding axle (3) into position on cylinder rack (6), and then placing 3/4" flat washer (3A), wheel (3B), washer (3C) on axle (3). Place cotter pin (3D) through hole provided on axle, and spread cotter pin to hold wheels in position.
5. Place rear wheel/gas cylinder rack onto welding power source (see Figure 3-1). Align mounting holes in cylinder rack with mounting holes in base of welding power source. Insert one 5/16-18 x 3/4" bolt (6A) through cylinder rack and base of welding power source. Place lock washer (6B) and nut (6C) on bolt several turns, but do not tighten. Install the other three bolts in the same manner. When all bolts are installed, tighten the four nuts securely.
6. Remove screws (5A) and (5B) from top of welding power source. Put handle (5) in place as shown in Figure 3-1 and replace the screws. Tighten securely.
7. Two holes (with weld nuts inside) are provided on the back of the welding power source for attaching the cylinder bracket (7). Placing the flange down (see Figure 3-1), use two 1/4-20 x 3/4" cap screws (7A) to secure cylinder bracket (7) to case of welding power source. Tighten securely.
8. Place gas cylinder in rack and lock in with safety chain (8). Cylinder must be secured at all times.

3-3. LOCATION

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

A proper installation site permits freedom of air movement into and out of the welding power source, and also least subjects the unit to dust, dirt, moisture, and corrosive vapors. A minimum of 18 inches of unrestricted space must be maintained between the welding power source front and rear panels and the nearest obstruction. Also, the underside of the welding power source must be kept completely free of obstructions. The installation site should also permit easy removal of the welding power source outer enclosure for maintenance functions.

Preventive maintenance consists of removing the outer enclosure from the welding power source and blowing out the dust accumulation inside the unit with a clean, dry airstream.

IMPORTANT

Do not place any filtering device over the intake air passages of the welding power source as this would restrict the volume of intake air and thereby subject the welding power source internal components to an overheating condition and subsequent failure. Warranty is void if any type of filtering device is used.

If the unit has not been installed on the running gear, holes are provided in the base for mounting purposes in case a permanent location is desired.

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

IMPORTANT

The use of lift forks too short to extend out of the opposite side of the base will expose internal components to damage should the tips of the lift forks penetrate the bottom of the unit.

3-4. ELECTRICAL INPUT CONNECTIONS

A. Electrical Input Requirements

This welding power source is designed to be operated from a single-phase, 60 Hertz, ac power supply which has a line 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. Input Conductor Connections

NOTE

It is recommended that a 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 perform any internal function on the unit.

CAUTION

Before making electrical input connections to the welding power source, "machinery lockout procedures" should be employed. If the connection is to be made from a line disconnect switch, the switch should be padlocked in the open position. If the connection is made from a fuse box, remove the fuses from the box and padlock the cover in the closed position. If the unit is connected to a circuit breaker, or other disconnecting device without locking facilities, attach a red tag to the device to warn others that the circuit is being worked on.

IMPORTANT

Models having an electrical input voltage above 250 volts have 3 conductors which protrude from the power cable. The black and white conductors must be connected to the line terminals and the green conductor to the proper ground. Use a grounding method that is acceptable to the local electrical inspection authority.

Table 3-1. Input Conductor and Fuse Size

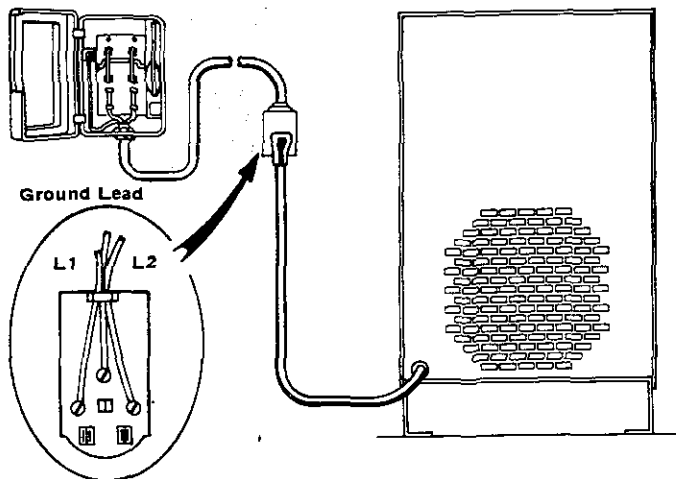
Input Conductor Size - AWG*				Fuse Size In Amperes			
200V	230V	460V	575V	200V	230V	460V	575V
8 (10)	8 (10)	12 (14)	12 (16)	60	50	25	20

*Input conductor sizes are based on 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.

IMPORTANT

This welding power source is a single-phase unit and must be connected to a single-phase power line.

All models are ordinarily equipped with a three-conductor power cable. Models requiring 200 or 230 volts primary input power are equipped with a three-prong polarized plug and wall receptacle. The wall receptacle should be installed in a convenient location by a competent electrician. The wall receptacle should be installed with the grounding terminal at the top. This would allow the power cable to hang downward without undue bending or twisting.

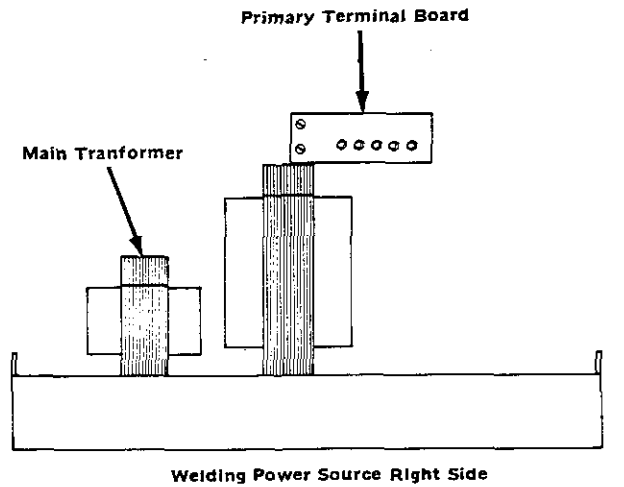


TA-049 806

Figure 3-2. Primary Connections

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

The input voltage jumper link provided on the primary terminal board permits the welding power source to be operated from various line voltages. The various voltages from which this unit may be operated are stated on the nameplate and on the input voltage label. See Figure 3-3 for location of the primary terminal board and this label. The input voltage jumper link is positioned for the highest of the voltages stated on the nameplate. If the welding power source is to be operated from a line voltage which is lower than the highest voltage for which the unit was designed, the jumper link will have to be moved to the proper position before operating the unit. Steps 1-5 below provide instructions on repositioning the jumper link. If the available input voltage matches the highest voltage of the unit, skip Steps 1-5.



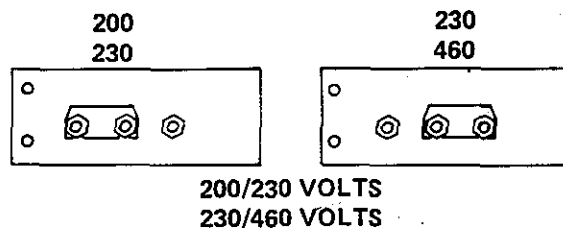
TA-048 331

Figure 3-3. Primary Terminal Board Location

1. Use a 3/8" wrench to remove the cap screws from the welding power source. Loosen the wing-headed screws which secure the door.
2. Lift outer enclosure upward to remove.
3. Locate primary terminal board.

NOTE

Figure 3-4 shows the various positions of the jumper link on the standard welding power sources. If the input voltages on the nameplate differ from those shown in Figure 3-4 the input voltage jumper link must be positioned as shown on the input voltage label.



A-048 339

Figure 3-4. Input Voltage Jumper Link Arrangement

4. Loosen the two screws securing the jumper link. Place the jumper link in the proper position and tighten all screws securely.
5. Replace outer enclosure and secure with hardware removed in Step 1.

3 - 5. GAS CONNECTIONS

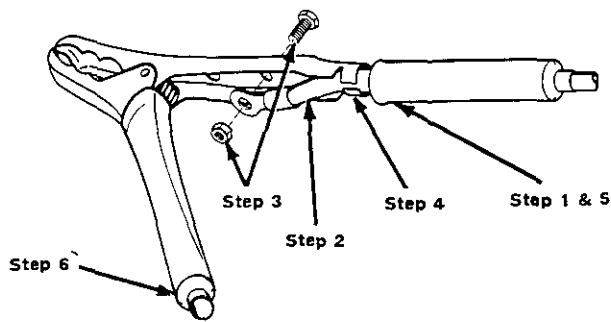
A shielding gas output fitting is provided at the rear of the welding power source for making gas connections from the shielding gas source. This fitting has a left-hand thread.

3 - 6. WORK CABLE ASSEMBLY

A 10 foot work cable with a lug on one end is included with this unit.

A. Installation Of Work Clamp (Figure 3-5)

1. Insert the end of the work cable with the terminal lug on it through one of the two supplied insulating sleeves.

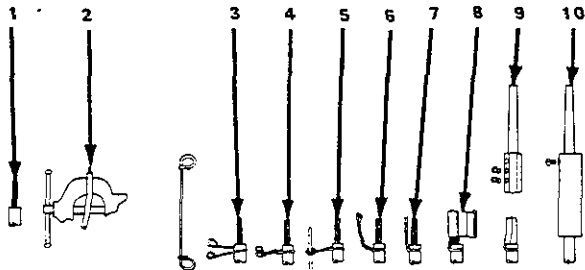


TB-025 190-A

Figure 3-5. Work Clamp Installation

2. Lay the work cable inside the half of the work clamp which has the flattest inner surface.
3. Align the smaller hole in the work clamp with the hole in the work cable terminal lug. Secure the terminal lug to the work clamp with the supplied nut and bolt.
4. Bend the tabs on the end of the work clamp around the work cable.
5. Slide the insulating sleeve on the work cable over the work clamp handle.
6. Slide the remaining insulating sleeve over the other work clamp handle.

B. Installation Of Jack Plug (Figure 3-6)



TB-057 469-12

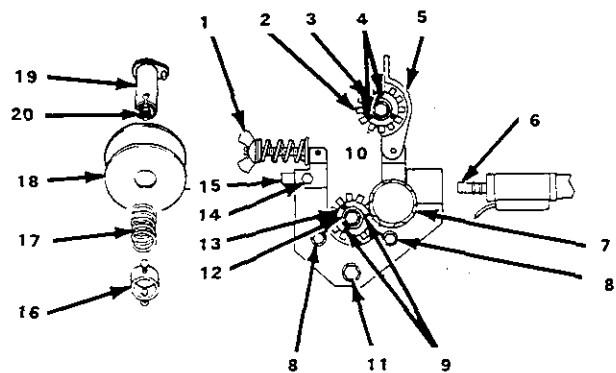
Figure 3-6. Jack Plug Installation

The jack plug, included in the parts package, must be attached to the plain end of the work cable as follows:

1. Remove 1 inch of insulation from end of cable.
2. Clamp the cable in a vise with the uninsulated end protruding upward out of the vise approximately 1-3/4 inches.
3. Place the steel tie wire approximately 1/4 inch from the end of the insulation.
4. Make a half turn around the cable bringing the looped ends of the tie wire together.
5. Insert a rod of approximately 3/8 inch diameter through the two looped ends of the tie wire.
6. Twist the tie wire until it is tight around the insulation of the cable.
7. Clip off the looped ends of the tie wire. Bend the twisted tie wire over along the side of the uninsulated portion of the cable.

8. Wrap the strip of copper foil tightly around the uninsulated end of the cable and the twisted tie wire.
9. Place the jack plug over the foil wrapped cable. Insert the 1/4-20 Allen set screws into the threaded holes in the jack plug and tighten with an Allen wrench.
10. Remove the cable from the vise and insert the jack plug into the fiber sleeve. Slide the sleeve over the jack plug until the hole in the fiber sleeve lines up with the remaining hole in the jack plug.
11. Insert the No. 8-32 self tapping screw through the hole in the fiber sleeve into the jack plug. Tighten the screw with a screw driver.
12. Insert jack plug into the NEGATIVE weld output receptacle on front panel of the welding power source. Secure work clamp to workpiece.

3-7. DRIVE ROLL AND WIRE GUIDE INSTALLATION



TA-049 804

Figure 3-7. Drive Rolls And Wire Guide Installation

Upon initial installation, or as a result of changes in wire size, it is necessary to install the required drive rolls and wire guides. Open the hinged door on the left side of the welding power source by turning the two wing-headed screw fasteners in a counterclockwise direction. Install the appropriate drive rolls and wire guides as follows:

A. Drive Roll Installation

1. Loosen pressure adjustment wing nut (item 1, Figure 3-7) and pivot it free of the cover.
2. Pivot gear cover (5) away until it is in an open position.
3. Loosen and remove the three securing screws (4 & 9) on each gear (2 & 10).
4. Slide one drive roll (13) onto drive gear (10) with holes aligned. Insert securing screws (9) and tighten.
5. Slide remaining drive roll (3) onto pressure gear (2) with holes aligned. Insert securing screws (4) and tighten.

B. Inlet Wire Guide Installation

1. Loosen the inlet wire guide securing screw (14).

NOTE

Wire guides should be installed so that the tip of the guide is as close to the drive roll as possible without touching.

2. Insert the inlet wire guide (15) into the drive assembly as illustrated in Figure 3-7. Secure by tightening screw (14).

NOTE

Behind the drive gear is a spring washer(s). To obtain proper alignment of the drive roll on the drive gear with the wire guides rotate the drive gear securing bolt (12) thereby moving the drive roll in or out to the desired position. The drive roll on the pressure gear will locate itself on the wire when the gear cover is replaced and the gears mesh together.

The wire drive housing is made with mounting holes of sufficient clearance to provide adjustment of the wire guides up or down in relation to the drive rolls. This adjustment has been factory set, but if readjustment becomes necessary, loosen mounting bolts (8), weld terminal nut (11) and bolt located behind mounting plate. Slide the wire drive housing upward or downward until the wire can be fed straight through the guides while seated in the drive roll groove. Tighten mounting bolts, weld terminal bolt and nut.

3-8. GA-20C WELDING GUN CONNECTIONS

A. Gun/Feeder Connector Installation (Figure 3-7)

NOTE

The outlet guide is provided as part of the gun assembly.

1. Loosen the gun/feeder connector securing knob (7).

NOTE

Wire guides should be installed so that the tip of the guide is as close to the drive roll as possible without touching.

2. Insert the gun/feeder connector (6) which includes the installed outlet guide, through the access hole in the welding power source front panel and into the drive assembly opposite the inlet wire guide as illustrated in Figure 3-7.
3. Tighten the gun/feeder connector securing knob (7).

B. Gun Switch Connection (Figure 4-1)

The TORCH TRIGGER receptacle is provided for making switch control connections. Align the keys on the gun switch connector with the keyway on the TORCH TRIGGER receptacle; insert the connector and rotate clockwise. When the switch connected across this receptacle is closed, the contactor in the welding power source will energize, shielding gas will flow and wire will feed.

CAUTION

If an optional Spoolmatic I gun has been connected to the welding power source, the electrode wire in the Spoolmatic I gun will be electrically energized when the GA-20C gun switch is closed.

3-9. INSTALLATION OF WELDING WIRE SPOOL (Figure 3-7)

1. Remove all packing from spool of wire.
2. Remove the retaining ring (16) by pressing the two spring loaded pins inward. Remove compression spring (17) from the welding power source wire spool hub (19).

3. Place the wire spool (18) on the wire spool hub so that the wire feeds from the bottom of the spool into the inlet wire guide as shown in Figure 3-7. Ensure that the small pin of the spool hub fits into the small hole of the wire spool.

4. Replace the retaining ring on the hub. Compression Spring (17) not required for 12" spools. For 8" spools, use compression spring.

3-10. ADJUSTMENT OF HUB TENSION (Figure 3-7)

Check the hub tension by slowly pulling the wire toward the feed roll. The wire should unwind freely, but the hub tension should be sufficient to keep the wire taut and prevent backlash when the wire feeding ceases. If adjustment is required, loosen or tighten the hex nut (20) on the end of the spindle support shaft accordingly.

3-11. WELDING WIRE THREADING (Figure 3-7)

1. Install the wire as instructed in Section 3-9.

NOTE

Spooled wire has a tendency to unravel when loosened from the spool. Maintain a firm grip on the wire during the threading operation.

2. Cut off any portion of the free end of the wire which is not straight. Ensure that the cut end is free from rough surfaces to permit proper feeding.
3. Loosen the wing nut on the drive roll pressure adjustment, pivot the pressure adjustment free of the cover, and pivot the pressure gear assembly away until it is in an open position.
4. Feed the wire through the inlet wire guide, past the drive rolls, and on into the outlet wire guide. Feed approximately 4 inches of wire into the outlet wire guide.
5. Close the gear cover making sure the teeth on the pressure gear mesh with the teeth on the drive gear. The welding wire must also be in the grooves of the drive rolls.
6. Pivot the pressure adjustment wing nut until the washer on the pressure adjustment is seated on top of the gear cover.
7. Turn the pressure adjustment wing nut in a clockwise direction until the drive rolls are tight against the welding wire. Do not overtighten. Further adjustment to attain desired clamping pressure can be made after the welding power source and the control/feeder are put into operation.
8. Draw the gun cable out straight.
9. Turn the Line Disconnect Switch and the welding power source POWER switch to the ON position. Fan will start. If the welding power source has spot welding capabilities, place the PROCESS SELECTOR SWITCH located on the welding power source front panel, in the CONTINUOUS WELDING position.
10. Press gun trigger and hold in until the wire extends about 1/4" out of the contact tube. Make sure the gas is flowing.

If excess wire feeds out, cut off to 1/4" length with side cutters.

CAUTION

When the welding power source is energized and the switch lever on the gun is depressed, open-circuit voltage will be present on the welding wire and any metal part making contact with it.

3-12. INSTALLATION OF SPOOLMATIC I (Optional)

A. Shielding Gas Connections

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

B. Welding Cable Connections (Figure 4-1)

The SPOOLMATIC POSITIVE weld output receptacle is provided for making welding cable connections. Insert the Spoolmatic I welding cable connector fully into the SPOOLMATIC POSITIVE weld output receptacle with the flat side of the connector facing the receptacle key. Rotate the connector clockwise 1/4 turn.

C. Switch Control Connections (Figure 4-1)

A four-socket receptacle, labeled SPOOLMATIC POWER, is provided for making switch control connections. Insert the plug from the Spoolmatic I fully into the SPOOLMATIC POWER receptacle and rotate the plug threaded collar clockwise. When the gun switch is closed, the contactor will energize, shielding gas will flow and wire will feed.

CAUTION

When the Spoolmatic I gun switch is closed, the electrode wire in the GA-20C gun will also be electrically energized.

D. Cannister Brake Connections (If Applicable)

1. Remove welding power source left side panel.
2. Locate hole in lower portion of front panel.
3. Cut a hole of equal size in the nameplate.
4. Slide a grommet or similar device over leads from cannister.
5. Insert cannister leads through hole in front panel until they reach the two-pole terminal strip 1T on bottom of welding power source.
6. Connect the green colored lead with larger ring terminal to ground stud below terminal strip 1T.
7. Connect two remaining leads to the terminals on terminal strip 1T.
8. Press grommet or similar device into hole in front panel.
9. Replace left side panel.

SECTION 4 - FUNCTION OF CONTROLS

*Models with spot weld panel only

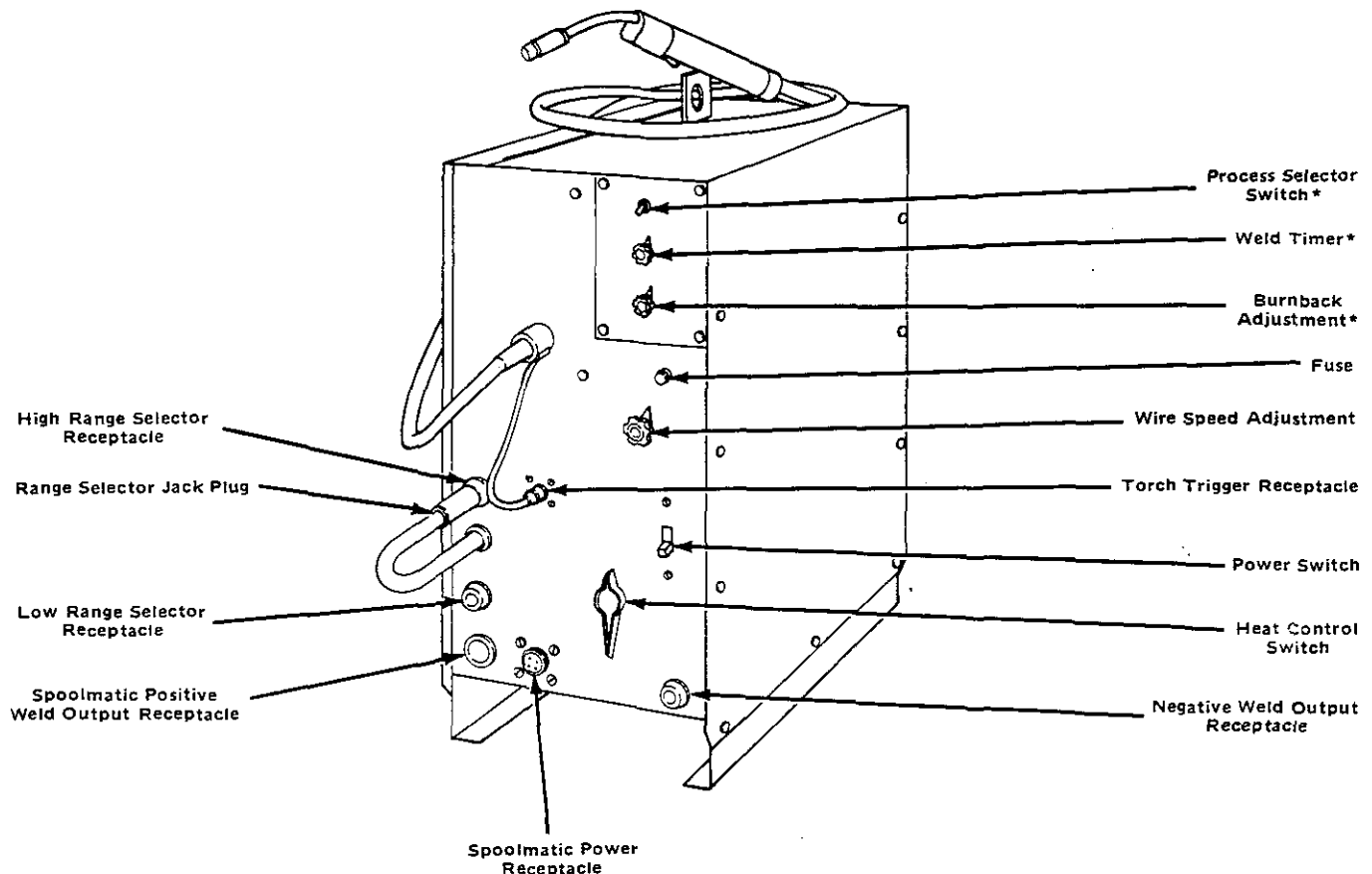


Figure 4-1. Front Panel View

TB-049 807

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

Placing the POWER switch in the ON position will energize the welding power source and place the unit in a ready-to-weld status. Placing the POWER switch in the OFF position will shut the unit down.

CAUTION

Placing the POWER switch in the OFF position does not remove power from all of the welding power source internal circuitry. Completely terminate all electrical power to the welding power source by employing "machinery lockout procedures" before attempting any inspection or work on the inside of the unit. If the welding power source is connected to a disconnect switch, padlock the switch in an open position. If connected to a fuse box, remove the fuses and padlock the cover in the closed position. If the unit is connected to a circuit breaker, or other disconnecting device without locking facilities, attach a red tag to the device to warn others that the circuit is being worked on.

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

The HIGH/LOW RANGE selector jack plug and receptacles provide selection of the coarse open-circuit voltage range indicated on the nameplate below each receptacle. The six-position HEAT CONTROL switch provides selection of heat input to the weld from LOW (1) through HIGH (6) within each coarse range.

If welding is to be performed on 16 gauge metal for example, the LOW RANGE position and No. 3 HEAT CONTROL setting provide a good starting point. Weld current (or penetration) can be adjusted by means of the WIRE SPEED ADJUSTMENT control.

IMPORTANT

Do not change the setting of the HEAT CONTROL switch or the position of the Range selector jack plug while welding as this will cause arcing across their respective contact surfaces. This arcing causes the contacts to become pitted and eventually inoperative.

NOTE

The Range selector jack plug will seat properly in the HIGH/LOW RANGE receptacles by giving it a 1/4 turn. To remove the jack plug from the receptacle give it a 1/4 turn while withdrawing it.

4-3. WIRE SPEED ADJUSTMENT CONTROL (Figure 4-1)

The WIRE SPEED ADJUSTMENT control provides a means of determining the rate at which welding wire feeds into the weld. Rotating the WIRE SPEED ADJUSTMENT control in a clockwise direction increases the rate of the wire feed. When the WIRE SPEED ADJUSTMENT control is set at 0, wire will feed at the slowest speed; when set at 100, the wire feeds at the fastest speed.

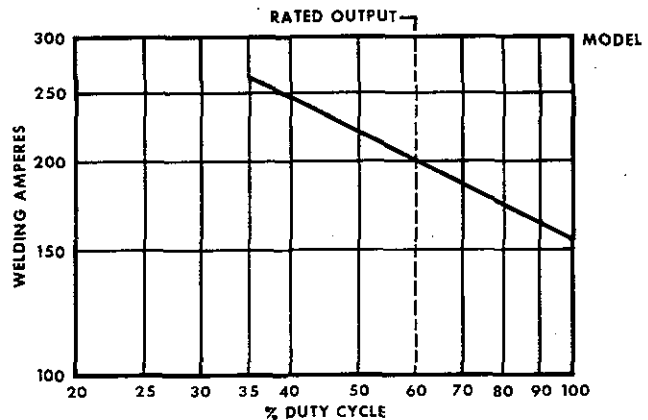
The scale which surrounds the WIRE SPEED ADJUSTMENT control is calibrated in increments of ten ranging from 0 to 100 percent. Due to this percentage calibration, it should be noted that if this scale is being used to select a wire feed

speed setting, only a percentage of the range in use is being selected and not an actual wire feed speed rate.

4-4. CIRCUIT BREAKER

A circuit breaker CB1, located immediately above the drive roll assembly on the center baffle, provides protection to the wire drive motor. Should the motor be placed in an overload condition, the breaker would trip and suspend all output. It would then be necessary to manually depress the circuit breaker to reset it.

4-5. DUTY CYCLE (Figure 4-2)

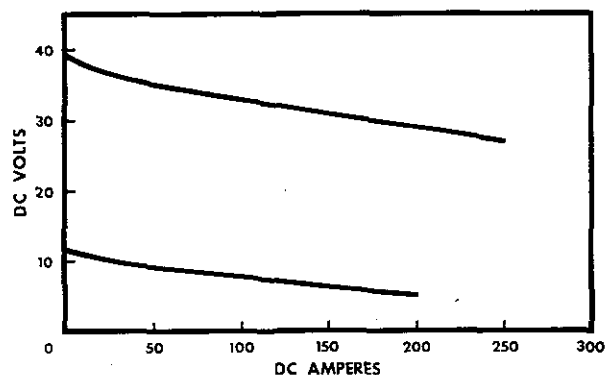


DB-900 810-18

Figure 4-2. Duty Cycle Chart

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 4-2 enables the operator to determine the safe output of the welding power source at various duty cycles.

4-6. VOLT AMPERE CURVES (Figure 4-3)



B-049 424

Figure 4-3. Volt-Ampere Curves

The volt-ampere curves are provided to show the minimum and the maximum available outputs of the welding power source from the minimum to maximum setting of the WIRE SPEED ADJUSTMENT control.

4-7. PROCESS SELECTOR SWITCH (Optional Spot Panel Models Only)(Figure 4-1)

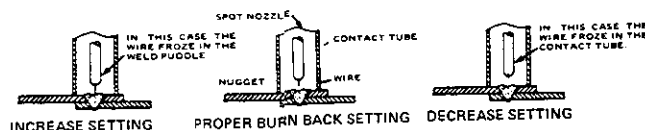
The purpose of the PROCESS SELECTOR SWITCH is to provide the capability of selecting either normal wire feed operation or a timed weld operation. Placing the PROCESS SELECTOR SWITCH in the SPOT WELDING position will provide a timed weld as determined by the WELD TIMER. Placing the PROCESS SELECTOR SWITCH in the CONTINUOUS WELDING position will cause the wire control/feeder system to operate normally.

4-8. WELD TIMER (Optional Spot Panel Models Only) (Figure 4-1)

The WELD TIMER provides the capability of selecting the desired spot weld time within the range selected. Rotating the WELD TIMER to 50 provides approximately one second of weld time. A setting of 100 provides approximately two seconds.

Once the proper HEAT CONTROL setting has been made, this control will regulate the nugget size and penetration. For set-up purposes, set this control at 50.

4-9. BURNBACK ADJUSTMENT CONTROL (Optional Spot Panel Models Only)(Figures 4-1 & 4-4)



TD-007 929

Figure 4-4. Burnback Settings

The burnback circuitry in this control/feeder provides a means of keeping the welding wire from sticking to the workpiece or the contact tube in the gun after the gun switch is released. The burnback capability in this control/feeder will, depending upon the setting of the BURNBACK ADJUSTMENT control, keep weld current present on the welding wire from 1/64 to 1/4 of a second after the wire has stopped feeding. This delay action will permit the welding wire to burn back to a point where it will neither stick to the workpiece nor the contact tube. If the welding wire sticks to the contact tube in the gun after the gun switch is released, rotate the BURNBACK ADJUSTMENT control to a setting closer to the 0 (1/64 second) position. If the welding wire sticks to the workpiece after the gun switch is released, rotate the BURNBACK ADJUSTMENT control to a setting closer to the 10 (1/4 second) position. (See Fig. 4-4).

SECTION 5 - SEQUENCE OF OPERATION

CAUTION

Never, under any circumstances, operate the welding power source with any portion of the outer enclosure removed. In addition to a hazard, improper cooling may result in damage to the welding transformer and the welding power source components. Warranty is void if the welding power source is operated with any portion of the outer enclosure removed.

NOTE

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.

CAUTION

Prior to welding, it is imperative that proper protective clothing (welding coat and gloves) and eye protection (glasses and/or welding helmet) be put on. Failure to comply may result in serious and even permanent bodily damage.

NOTE

When restarting, be sure that the gas cylinder valve is opened slowly to avoid excessive shock to the regulator indicator.

5-1. GAS METAL-ARC WELDING (GMAW)

1. Make all necessary connections as instructed in Section 3.
2. Place the Range selector jack plug in the desired HIGH/LOW RANGE receptacle and the HEAT CONTROL switch at the desired setting.

CAUTION

Do not change the setting of the HEAT CONTROL switch or the position of the Range selector jack plug while welding as this will cause arcing across their respective contact surfaces. This arcing causes the contacts to become pitted and eventually inoperative.

3. Rotate the WIRE SPEED ADJUSTMENT control to the desired setting.

4. Place the Line Disconnect Switch in the ON position.
5. Open the gas cylinder valve.
6. Connect the work clamp to the work material.
7. Place the welding power source POWER switch in the ON position.
8. Extend the welding wire 1/4" beyond gun nozzle.

9. Place wire over seam.
10. Be sure to hold gun nozzle 1/4" to 5/16" from workpiece.
11. 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 Range selector jack plug in the desired HIGH/LOW RANGE receptacle and the HEAT CONTROL switch at the desired setting.

CAUTION

Do not change the setting of the HEAT CONTROL switch or the position of the Range selector jack plug while welding as this will cause arcing across their respective contact surfaces. This arcing causes the contacts to become pitted and eventually inoperative.

3. Rotate the WIRE SPEED ADJUSTMENT control to the desired setting.
4. Place the PROCESS SELECTOR SWITCH in the SPOT WELDING position.
5. Set the WELD TIMER for the desired time.
6. Rotate the BURNBACK ADJUSTMENT control to the desired setting.
7. Place the Line Disconnect Switch in the ON position.
8. Open the gas cylinder valve.
9. Connect the work clamp to the work material.
10. Place the welding power source POWER switch in the ON position.

CAUTION

Prior to welding, it is imperative that proper protective clothing (welding coat and gloves) and eye protection (glasses and/or welding helmet) be put on. Failure to comply may result in serious and even permanent bodily damage.

11. Place weld nozzle against work material and press trigger.

NOTE

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" back in nozzle. Increase BURNBACK ADJUSTMENT control setting ten degrees.

NOTE

When restarting, be sure that the gas cylinder valve is opened slowly to avoid excessive shock to the regulator indicator.

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.

NOTE

The gas cylinder valve should be closed when the welding power source is not in periodic use.

CAUTION

If welding is performed in a confined area, failure to turn off the shielding gas supply could result in a build up of gas fumes, thereby endangering personnel reentering the welding area.

4. Press gun trigger "in" to release gas in regulator. The gas pressure indicator will return to 0.

5-4. CONTINUOUS WELDING TECHNIQUES

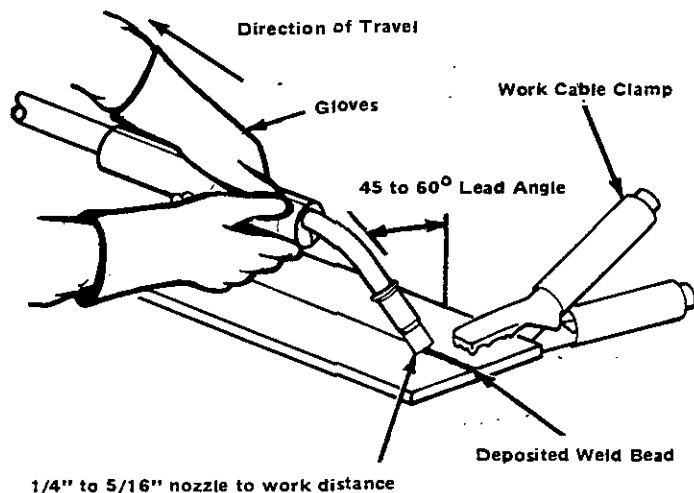
A. General

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)



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Figure 5-1. Gun Position

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 to 5/16 inch distance from the bottom side of the gun nozzle to the workpiece must be maintained during the arc starting and welding period.

NOTE

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 to 20 inches per minute. Refer to Figure 5-3 for examples of acceptable or improper weld results.

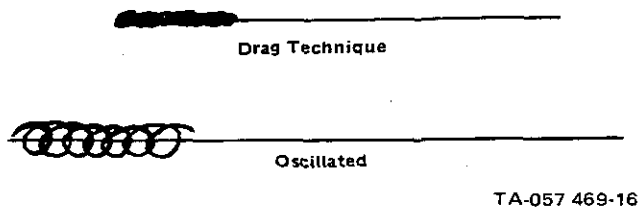


Figure 5-2. Welding Techniques

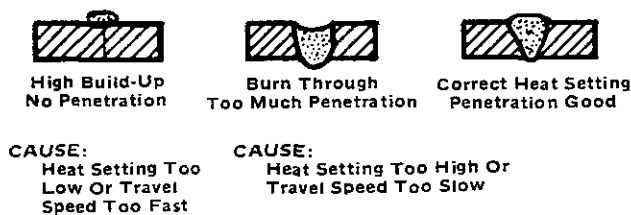


Figure 5-3. Crosscut View Of Various Welds

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 RANGE position and HEAT CONTROL setting, move to a lower numbered HEAT CONTROL setting and set the WIRE SPEED ADJUSTMENT control 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 HEAT CONTROL setting does not result in more satisfactory weld characteristics, drop to LOW RANGE and set HEAT CONTROL at 6. Lower the HEAT CONTROL setting as required.

CAUTION

Do not change the setting of the HEAT CONTROL switch or the Range selector jack plug while welding.

5-5. SPOT WELDING TECHNIQUES

A. Metal Preparation

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.

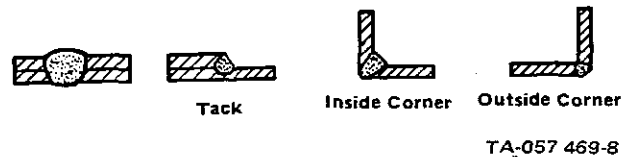


Figure 5-4. Various Spot Welds

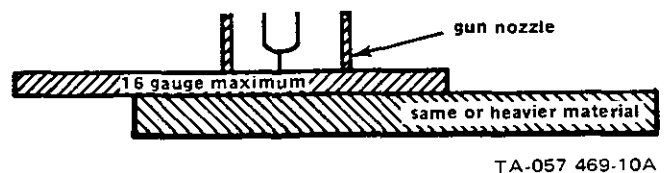


Figure 5-5. Metal Size

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" wire is best for spotting with this unit. The .030" 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. HEAT CONTROL settings of 3, 4 and 5 in the HIGH RANGE are most generally used.

To start with, use sample materials and set HEAT CONTROL 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)

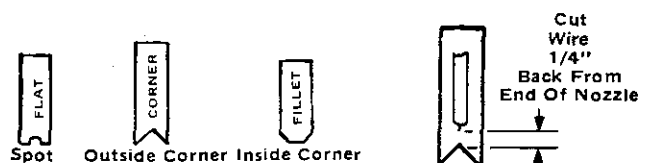
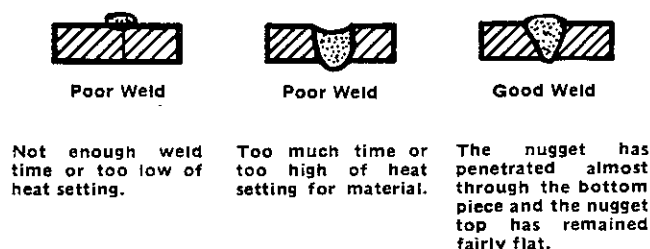


Figure 5-6. Spot Nozzles

Remove continuous weld nozzle from gun. Install spot nozzle. Check that wire is cut back 1/4" from the shortest end of weld nozzle.

E. Spot Weld Checklist (Figure 5-7)



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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" to 1/4". If a burnback has occurred (the wire has burned into the contact tube) the contact tube must be replaced as follows:

1. Shut down 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 ADJUSTMENT control setting at least ten degrees.

SECTION 6 - MAINTENANCE & TROUBLESHOOTING

CAUTION

Hazardous voltages are present on the internal circuitry of the welding power source as long as power is connected to the unit. Disconnect power before attempting any inspection or work on the inside of the unit. Maintenance and troubleshooting of internal circuitry should be performed by qualified personnel only.

NOTE

Failure to properly maintain the drive rolls can result in a build-up of wire particles which will decrease the efficiency of the wire feeding operation

6-1. WIRE FEED ADJUSTMENT

This welding power source is factory calibrated to provide the proper wire feed speed/heat adjustment range for each heat step. Minor variations due to line voltage, wear in, wire stiffness, dirt, etc., can normally be accommodated by the WIRE SPEED ADJUSTMENT control.

6-2. CLEANING OF DRIVE ROLLS

Occasionally it will become necessary to clean the wire groove on the drive rolls. This cleaning operation can be performed with a wire brush.

To clean the wire grooves it will be necessary to first remove the drive roll(s) (see Section 3-7 for removal and installation instructions).

6-3. OVERLOAD PROTECTION (Figure 4-1)

The 115 volts control circuit in this unit is protected by a fuse F1. Should this fuse open the welding power source would completely shut down.

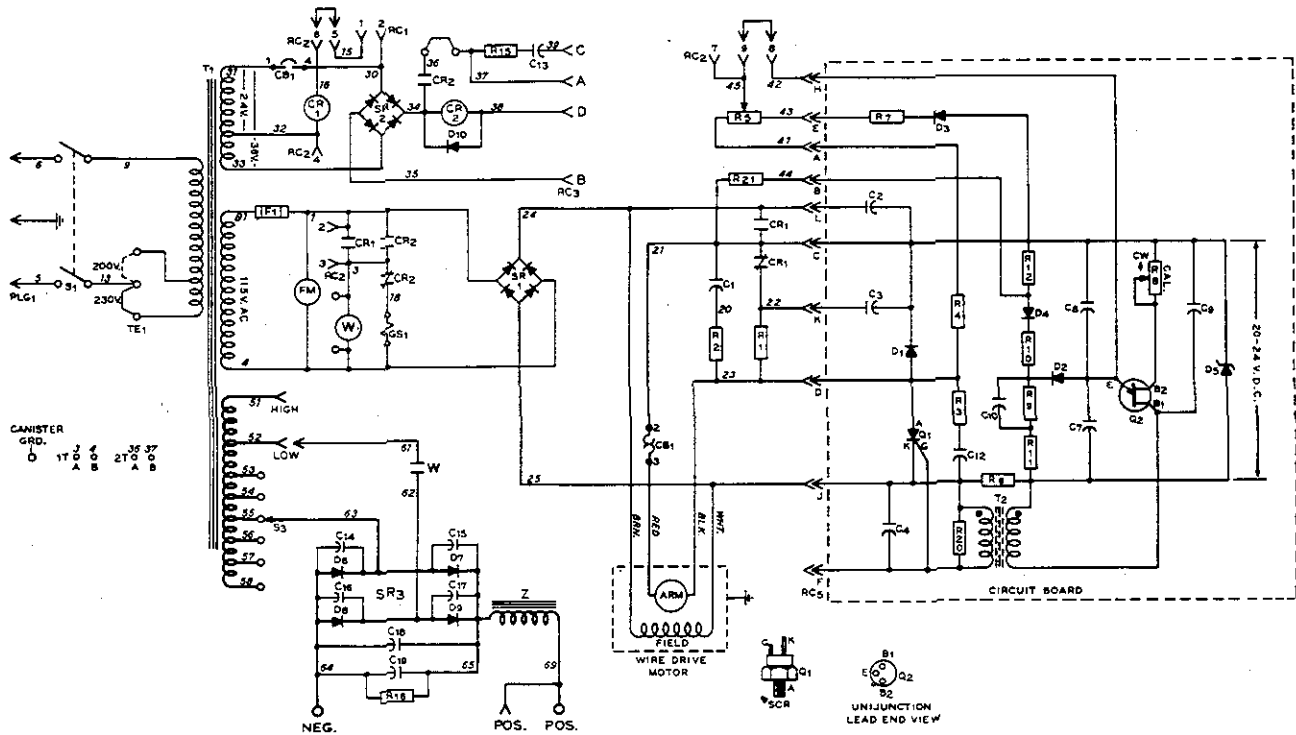
6-4. TROUBLESHOOTING CHART

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

It is assumed that proper installation has been made, according to Section 3 of this manual, and that the welding power source has been functioning properly until this trouble developed.

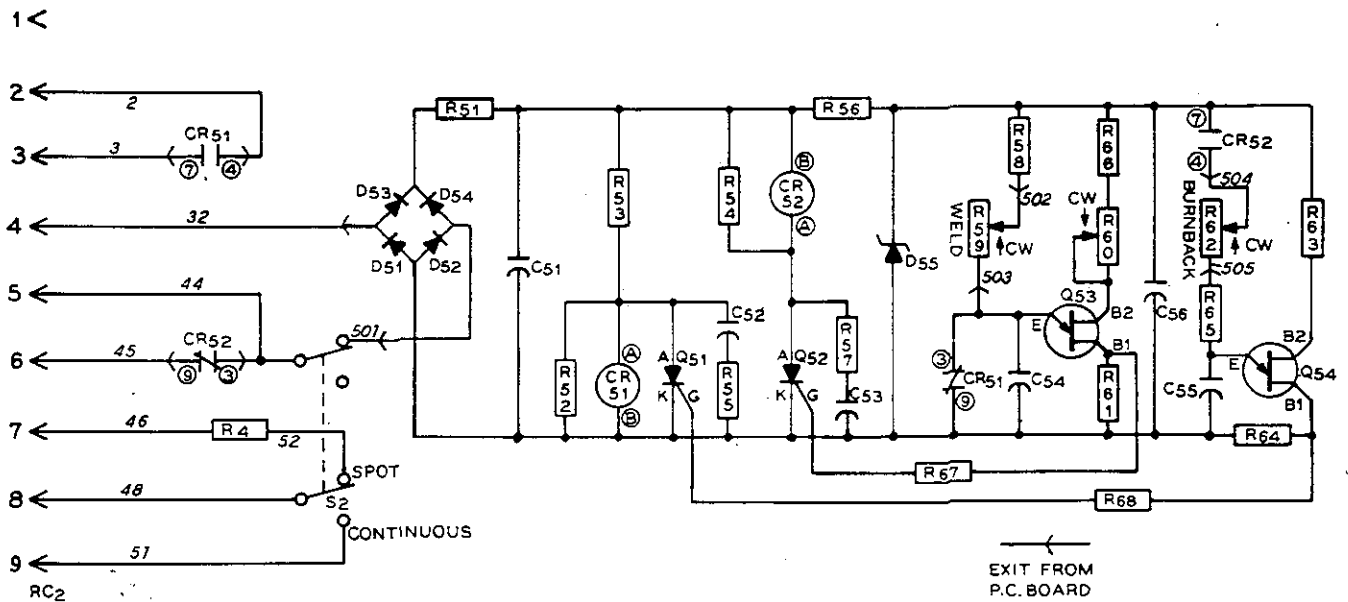
Use this chart in conjunction with the circuit diagram while performing troubleshooting procedures. If the trouble is not remedied after performing these procedures, the nearest Factory Authorized Service Station should be contacted. In all cases of equipment malfunction, the manufacturer's recommendations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

TROUBLE	PROBABLE CAUSE	REMEDY
Low output; fan motor FM runs slow.	Primary jumper link in wrong position.	Place jumper link in position for primary voltage being used. See Section 3-4 Figure 3-4.
	Low primary voltage.	Connect welding power source to proper primary input voltage.
Output normal; fan motor FM does not run.	Fan motor FM defective.	Replace fan motor FM.
	Loose connections to fan motor FM.	Tighten connections to fan motor FM.
No output; fan motor FM does not run.	POWER switch S1 defective.	Replace POWER switch 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 fuse F1.
No open-circuit voltage; fan motor FM runs and wire feeds.	Contactor points defective.	Replace points.
	Contactor coil W defective.	Replace contactor coil W.
	Range selector jack plug not secure in receptacle.	Secure plug into receptacle.
	Relay CR1 defective.	Replace relay CR1.
	Transformer T1 defective.	Replace transformer T1.
No open-circuit voltage; fan motor FM runs and wire does not feed.	Circuit breaker CB1 tripped.	Reset circuit breaker CB1.
	Gun switch defective, or gun switch leads open.	Replace gun switch (if applicable) or repair switch leads.
	Transformer T1 defective	Replace transformer T1.
	Relay CR1 defective.	Replace relay CR1.
	Plug from gun switch not secure in receptacle in welding power source.	Secure plug in receptacle.
	Spot panel defective (Spot Weld Models Only).	Replace defective spot panel.
Wire does not feed. Fan motor FM runs and open-circuit voltage is normal.	Circuit breaker CB1 tripped.	Reset circuit breaker CB1.
	WIRE SPEED ADJUSTMENT control R5 open.	Replace rheostat R5.
	Rectifier SR1 defective.	Replace rectifier SR1.
	Wire drive motor is defective.	Replace motor.
	Spot panel defective (Spot Weld Models Only)	Replace spot panel.
Erratic weld output.	Check leads and contacts of HEAT CONTROL switch S3.	Discoloring of brass contacts could indicate heating caused by loose connection. Replace contact or switch plate.
	Capacitor(s) C18 defective.	Replace capacitor(s) C18.
	Range selector jack plug not secure in receptacle.	Secure plug into receptacle.
	Loose secondary connections.	Secure connections.
Spot Weld Timer and Spot Burnback Timer inoperative. Wire feeds continuously. Output normal.	Spot panel defective (Spot Weld Models Only).	Replace spot panel.



Circuit Diagram No. B-081 561-B

Figure 6-1. Circuit Diagram For Welding Power Source



Circuit Diagram No. CA-007 633-1A1

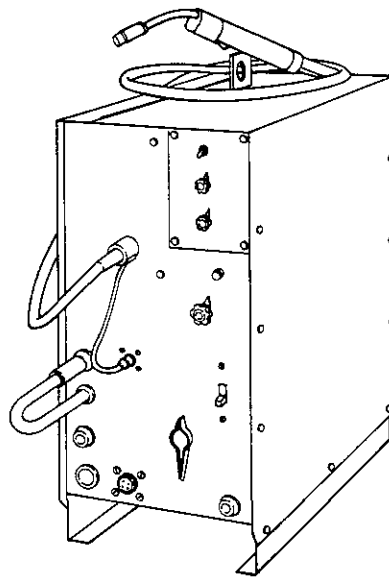
Figure 6-2. Circuit Diagram For Spot Weld Panel (Optional)

March 1979

FORM: OM-1303

Effective With Serial No. HK240615

MODEL
MILLERMATIC 200



PARTS LIST

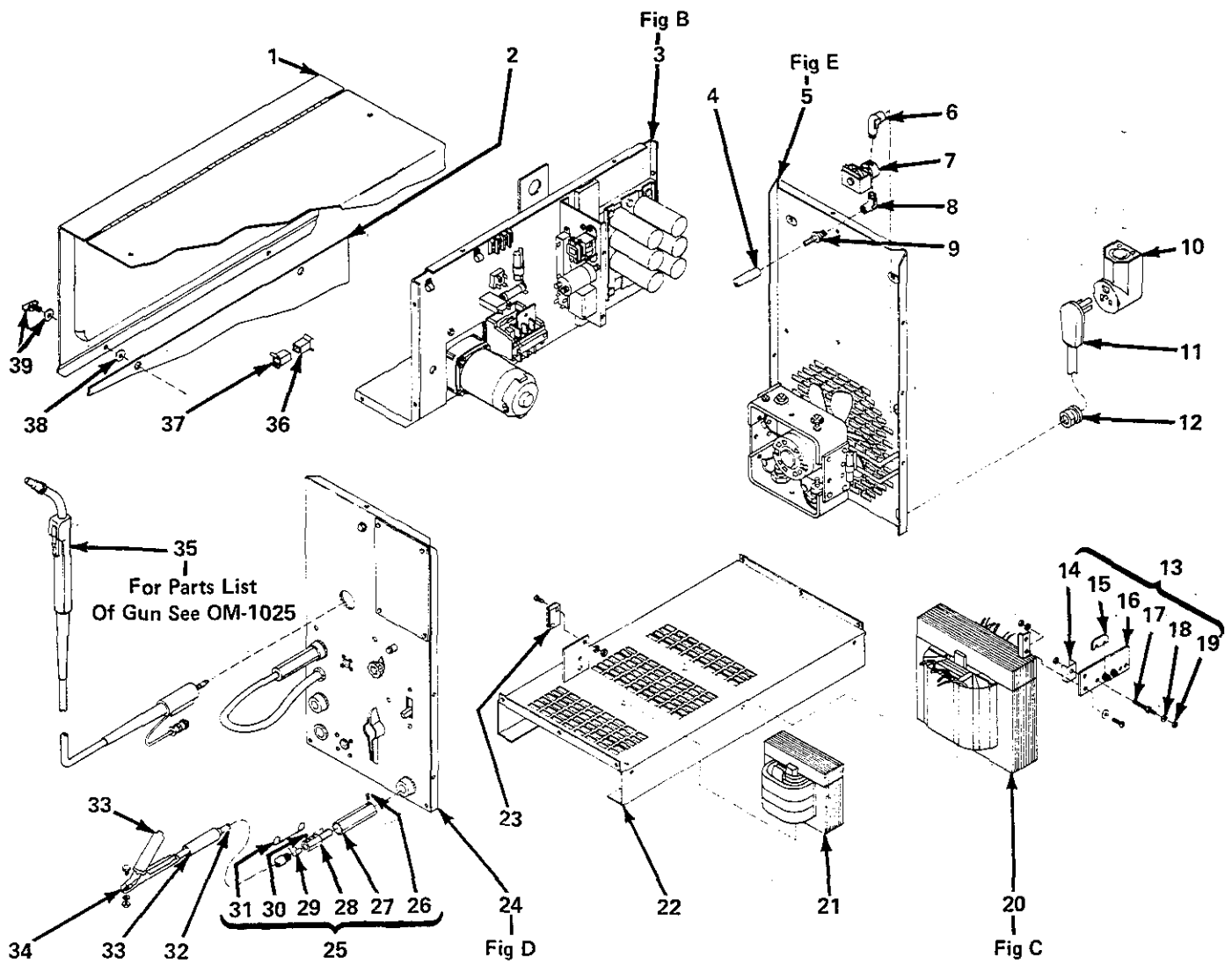


Figure A — Main Assembly

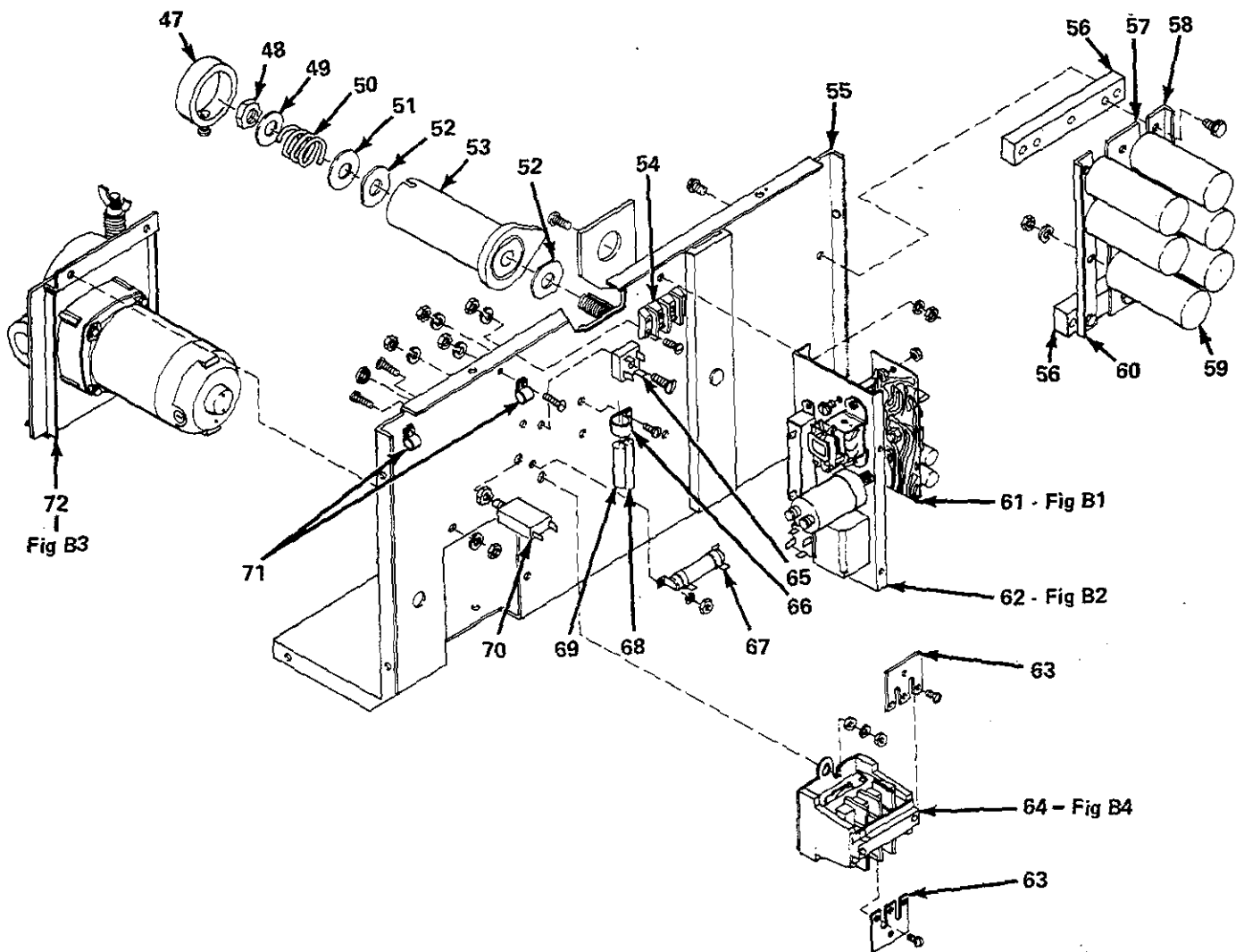
TD-049 812

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure A		Main Assembly		
1		007 778	WRAPPER	1
2		057 506	PANEL, side	1
3		Figure B	BAFFLE, air - with components (See Page 4)	1
4		604 550	HOSE, neoprene No. 1 x 3/16 (order by ft.)	3 ft.
5		Figure E	PANEL, rear - with components (See Page 12)	1
6		010 296	FITTING, hose - brass elbow male 1/4 NPT x 5/8-18 right hand	1
7	GS1	003 538	VALVE, 115 volts ac 2 way 1/4 IPS 1/8 orifice (consisting of)	1
		003 539	. COIL, 115 volts ac	1
8		010 678	FITTING, pipe - brass elbow st 1/4 NPT	1
9		073 433	FITTING, brass - barbed male 3/16 TBG x 1/4 NPT	1
10		039 778	RECEPTACLE, straight 2P3W 50 amp 250 volts	1
11	PLG1	023 210	CORD, power 10/ga 3C 9 ft.	1
11	PLG1	†057 609	CORD SET, power 10 ga 3C 25 ft.	1
12		010 290	BUSHING, strain relief	1
13	TE1	081 862	TERMINAL ASSEMBLY, primary (consisting of)	1
14		026 754	. INSULATION, primary - stud barrier	5
15		038 618	. LINK, jumper	1
16		081 671	. TERMINAL BOARD	1
17		038 887	. STUD, brass No. 10-32 x 1-3/8 w/hex collar	5
18		010 913	. WASHER, flat - brass 0.225 ID x 1/2 OD x 1/32	5
19		601 835	. NUT, brass - hex 10-32	10
20	T1	081 805	TRANSFORMER, power - main (See Fig. C Page 8)	1
21	Z	081 716	STABILIZER	1
22		081 853	BASE	1
23	2T	038 855	BLOCK, terminal 20 amp 2 pole	1
24		Figure D	PANEL, front - with components (See Page 10)	1
25		039 901	PLUG, jack - black (consisting of)	1
26		602 160	. SCREW, self - tapping fillister hd 8-32 x 1/4	1
27		026 978	. INSULATOR, jack plug - black	1
28		101 219	. PLUG, jack	1
29		019 833	. STRIP, copper 0.010 x 2-1/2 x 3/4	1
30		602 178	. SCREW, set - steel socket hd 1/4-20 x 3/8	2
31		010 521	. WIRE, tie	1
32		023 100	CABLE, interconnecting - ground No. 4	1
33		026 843	INSULATOR, vinyl - black	2
34		010 368	CLAMP, ground 100 ampere	1
35		See Note	GUN	1
36	RC2	008 073	HOUSING RECEPTACLE & RECEPTACLES	1
37		008 040	CONNECTOR, jumper	1
38		010 855	RETAINER, screw No. 2	2
39		605 217	FASTENER, screw - wing	2
		057 745	SPRING, compression - wire spool	1
		041 288	NO. 10B RUNNING GEAR (See Fig. G Page 14)	1

†Optional Parts.

Note: For complete breakdown of gun see OM-1025.

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



TC-049 810

Figure B - Baffle, Air - With Components

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B Baffle, Air - With Components (See Fig. A Page 2 Item 3)				
47		058 427	RING, retaining - spool.	1
48		601 884	NUT, steel - hex 5/8-11	1
49		605 941	WASHER, flat - steel 41/64 ID x 1 OD x 14 ga	1
50		057 543	SPRING, compression	1
51		057 971	WASHER, flat - steel keyed 1-1/2 dia	1
52		058 424	WASHER, fiber - brake	2
53		058 428	HUB, spool	1
54	1T	038 855	BLOCK, terminal 20 amp 2 pole	1
55		081 666	BAFFLE, air	1
56		059 721	INSULATOR, mounting - capacitor	2
57		081 589	STRIP, mounting - center	1
58		081 591	ANGLE, mounting - right hand	1
59	C19	031 728	CAPACITOR, electrolytic 9000 uf 35 volts dc	6
60		081 593	ANGLE, mounting - left hand	1
61		057 314	CIRCUIT CARD ASSEMBLY (See Fig. B1 Page 5)	1
62		Figure B2	PANEL, control - with components (See Page 6)	1
63		000 382	LINK, jumper - contactor	2
64	W	032 786	CONTACTOR, 60 amp 3 pole 600 volts (See Fig. B4 Page 8).	1
65	SR1	035 914	RECTIFIER, integrated 30 amp 400 volts	1
66		010 610	CONNECTOR, clamp - cable 1/2 inch	1
67	R16	030 886	RESISTOR, WW adj 25 watt 50 ohm	1
68	C13	000 339	CAPACITOR, electrolytic 200 uf 40 volts dc	1
69	R15	604 288	RESISTOR, WW fixed 10 watt 2 ohm	1
70	CB1	*011 002	CIRCUIT BREAKER, manual - reset 0.7 amp	1
71		010 145	CLAMP, nylon 1/2 dia	2
		010 357	RECEPTACLE, clip on	2
72		Figure B3	DRIVE ASSEMBLY, wire (See Page 7)	1

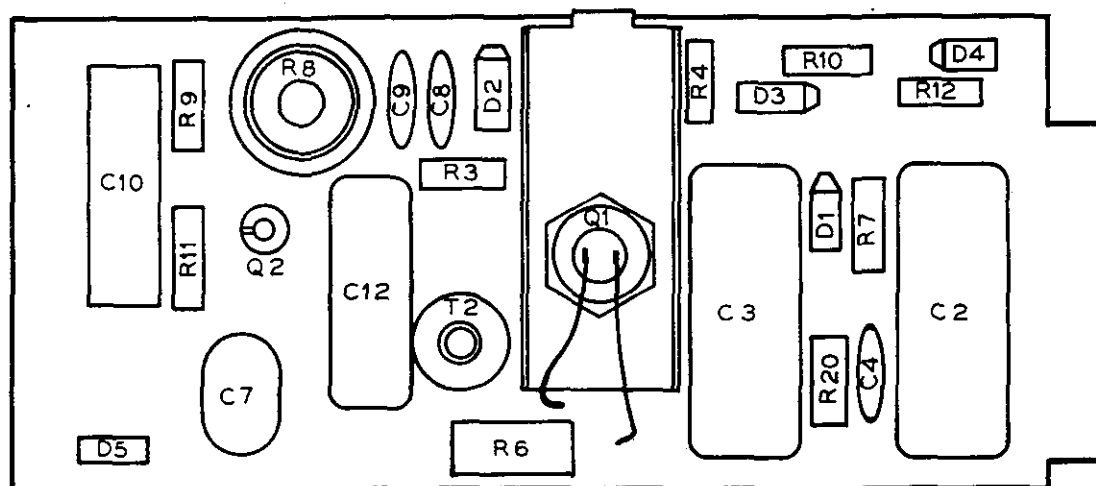
Wire Diameter & Type			Kit, Drive Roll & Guide Tube			
			*Roll, Drive			Guide
Fraction	Decimal	Metric	Kit No.	Type	Part No.	Inlet
.030"	.030	.8MM	079 594	V-Groove	053 695	056 192
.035"	.035	.9MM	079 595	V-Groove	053 700	056 192
.045"	.045	1.2MM	079 596	V-Groove	053 697	056 192

Drive Roll & Wire Guide Kits

*Recommended Spare Parts.

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

Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B1 057 314 Circuit Card Assembly (See Fig. B Page 4 Item 61)			
C2,3	031 694	CAPACITOR, mylar 0.47 uf 200 volts dc	2
C4,8,9	031 643	CAPACITOR, ceramic 0.01 uf 500 volts dc	3
C7	031 693	CAPACITOR, mylar 0.33 uf 75 volts dc	1
C10	031 633	CAPACITOR, electrolytic 80 uf 25 volts dc	1
C12	031 721	CAPACITOR, mylar 0.22 uf 200 volts dc	1
D1-4	026 202	DIODE, 1 amp 400 volts straight polarity	4
D5	037 250	DIODE, zener 24 volts 1 watt	1
Q1	037 824	THYRISTOR, 7.4 amp 200 volts	1
	010 915	WASHER, flat - brass 1/4 (mounting Q1)	1
	602 208	WASHER, lock - steel external tooth 1/4 (mounting Q1)	1
	601 867	NUT, steel - hex jam 1/4-20 (mounting Q1)	1
	037 261	HEAT SINK	1
Q2	037 289	TRANSISTOR, unijunction 50MA 35 volts	1
R3	030 937	RESISTOR, carbon 0.5 watt 10 ohm	1
R4	030 854	RESISTOR, carbon 0.5 watt 18K ohm	1
R6	030 945	RESISTOR, carbon 2 watt 4700 ohm	1
R7	028 276	RESISTOR, carbon 0.5 watt 2200 ohm	1
R8	030 944	POTENTIOMETER, WW 1 turn 2 watt 5000 ohm	1
R9	030 936	RESISTOR, carbon 0.5 watt 33K ohm	1
R10	030 853	RESISTOR, carbon 0.5 watt 2200 ohm	1
R11	030 938	RESISTOR, carbon 0.5 watt 1200 ohm	1
R12	030 934	RESISTOR, carbon 0.5 watt 6800 ohm	1
R20	030 090	RESISTOR, carbon 0.5 watt 47 ohm	1
T2	036 143	TRANSFORMER, pulse	1
	602 196	WASHER, lock - steel internal tooth No. 4 (mounting T2)	1
	601 858	NUT, steel - hex 4-40 (mounting T2)	1



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

TA-057 314

Figure B1 – Circuit Card Assembly

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B2 Panel, Control-With Components (See Fig. B Page 2 Item 62)				
85		026 837	INSULATOR, terminal - nylon	3
86	CR1	034 841	RELAY, 24 volts dc DPDT	1
	D10	026 202	DIODE, rectifier 1 amp 400 volts straight polarity	1
87		004 255	PANEL, mounting - component	1
88		010 301	BUSHING, brass 0.106 ID x 1/4 OD x 5/16	1
89		031 251	BRACKET, mounting - RC5	2
90	RC5	039 756	CONNECTOR, edge 10 pin	1
91		038 784	STRIP, terminal 1 pole	1
92	R21	028 276	RESISTOR, carbon 0.5 watt 2200 ohm	1
93		601 375	RING, mounting - capacitor	1
94	C1	031 698	CAPACITOR, electrolyte 250 uf 175 volts dc	1
95	CR2	052 964	RELAY, 24 volts dc DPDT	1
96	R1	030 942	RESISTOR, WW fixed 12 watt 10 ohm	1
97	SR2	035 914	RECTIFIER, integrated 30 amp 400 volts	1
98	R2	030 941	RESISTOR, WW fixed 100 watt 5 ohm	1

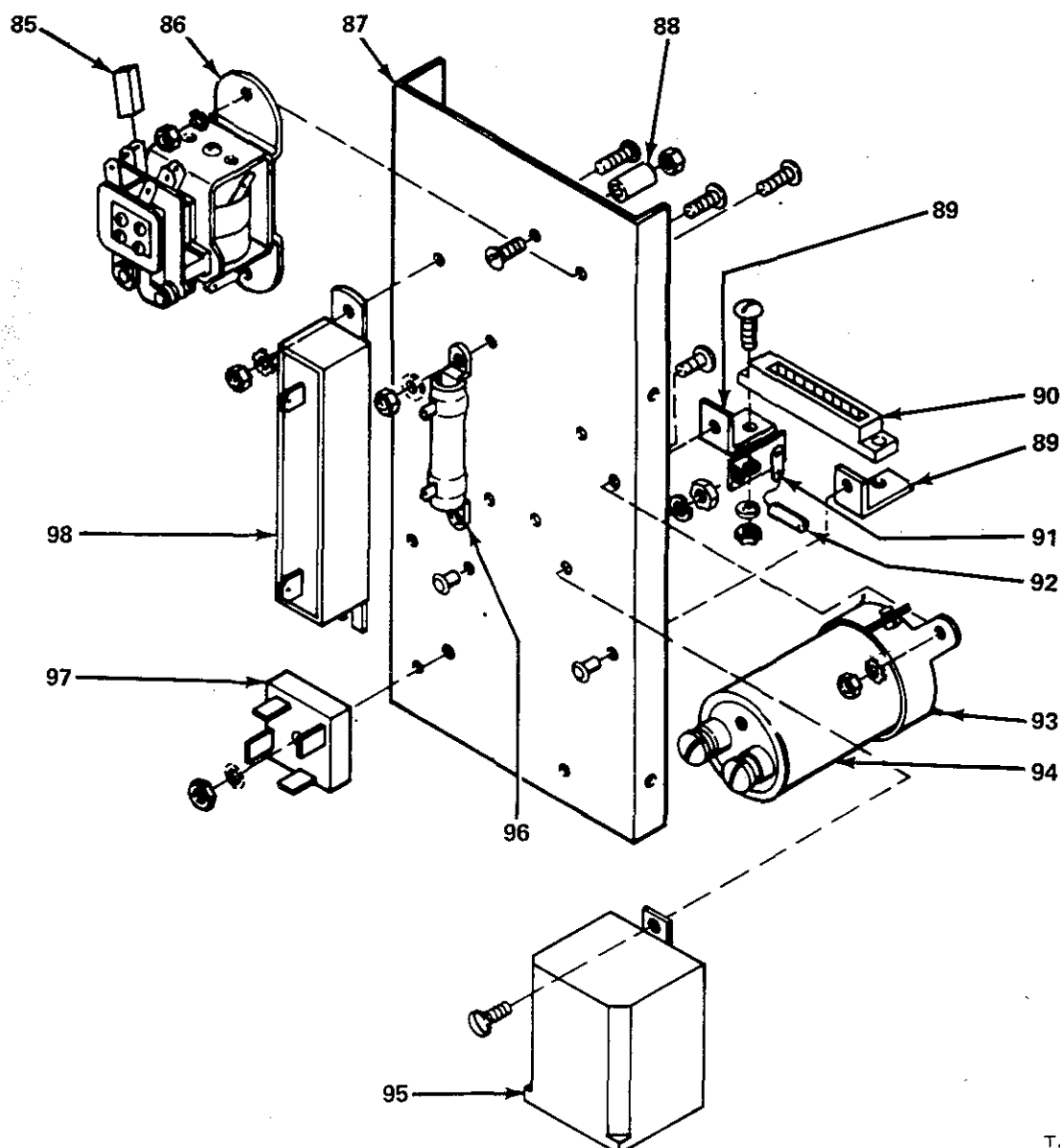


Figure B2 – Panel, Control - With Components

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

TA-049 815

Item No.	Factory Part No.	Description	Quantity
Figure B3 Drive Assembly, Wire (See Fig. B Page 4 Item 72)			
109	048 159	DRIVE ASSEMBLY, wire (consisting of)	1
110	079 633	. FITTING, hose - brass barbed nipple 3/16 TBG	1
111	081 709	. HOUSING, adapter - gun/feeder	1
112	604 590	. NUT, steel - wing 3/8-16	1
113	010 910	. WASHER, flat - steel SAE 3/8	1
114	010 231	. SPRING, compression	1
115	056 306	. FASTENER, pinned	1
116	602 243	. WASHER, flat - steel 3/8	1
117	010 232	. SPRING, compression	1
118	010 224	. PIN, spring - compression 3/16 x 1	1
119	601 925	. SCREW, cap - steel hex hd 1/4-20 x 1/2	1
120	604 741	. PIN, cotter - hair 0.042 x 15/16	1
121	079 669	. LEVER, mounting - pressure gear	1
122	079 634	. PIN, hinge	1
123	079 772	. KNOB, plastic	1
124	604 538	. WASHER, flat - steel SAE 5/16	3
125	605 518	SCREW, cap - steel hex hd 1/4-20 x 1-1/4	1
126	079 626	SCREW, machine - steel fillister hd 10-32 x 7/8	6
127	053 842	GEAR, spur - insulated w/bearing	1
128	605 308	RING, retaining	1
129	079 625	WASHER, spring - steel 5/16	1
130	053 841	GEAR, spur - insulated w/key	1
131	602 241	WASHER, flat - steel SAE 1/4	1
132	000 418	SCREW, cap - steel hex hd 1/2-20 x 1/2 self-locking	1
133	048 449	BUSHING, flanged - nylon	2
134	601 837	NUT, brass - hex 3/8-16	1
135	602 213	WASHER, lock - steel split 3/8	2
136	010 910	WASHER, flat - steel SAE 3/8	2
137	081 633	INSULATOR, motor	1
138	081 699	BRACKET, mounting - drive assembly wire	1
139	075 150	WASHER, fiber - shielded 0.622 x 1 x 3/8	1
140	038 804	STUD, brass 3/8 - 16 x 2-1/2	1
141	080 804	MOTOR, gear 1/20 hp 115 volts dc 3450 rpm (consisting of)	1
	*057 431	. BRUSH & SPRING	1
	057 432	. SCREW, cap - brush holder	2

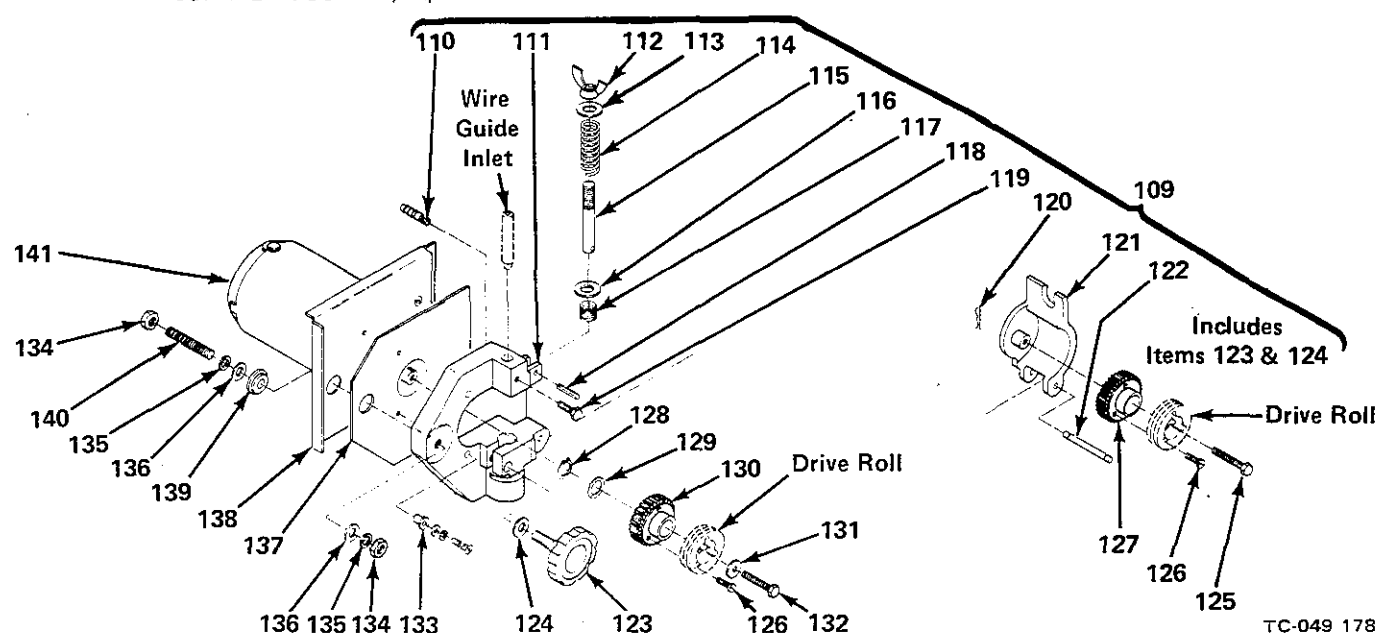


Figure B3 — Drive Assembly, Wire

*Recommended Spare Parts.

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

Item No.	Factory Part No.	Description	Quantity
Figure B4 032 786 Contactor (See Fig. B Page 4 Item 64)			
151	035 837	COIL, contactor 115 volts	1
152	*035 836	KIT, point - contact	1

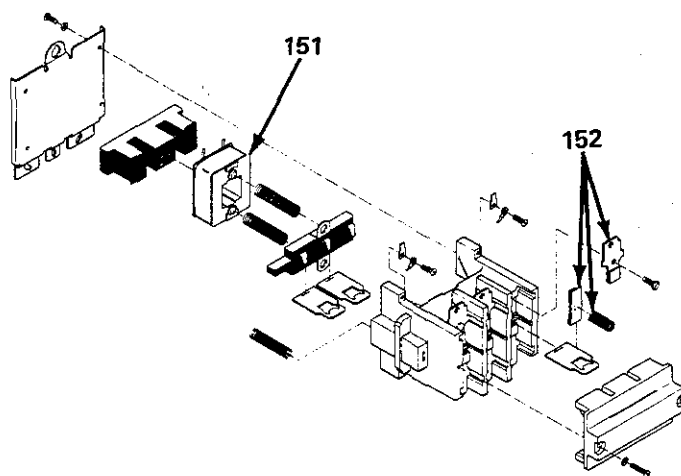
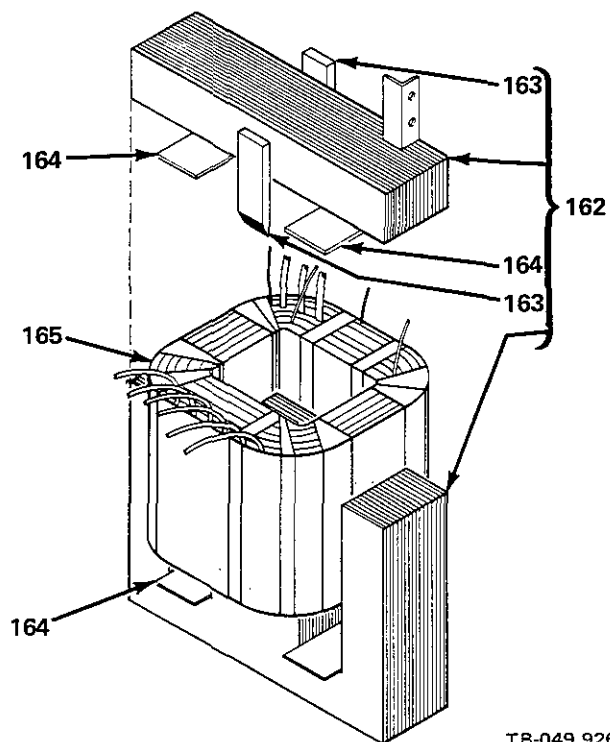


Figure B4 — Contactor

TC-032 786



TB-049 926

Figure C — Transformer, Power - Main

Item No.	Factory Part No.	Description	Quantity
Figure C 081 805 Transformer, Power - Main (See Fig. A Page 2 Item 20)			
162	081 702	TRANSFORMER SUBASSEMBLY (consisting of)	1
163	028 669	. WEDGE, phenolic 5/16 x 1 x 7	2
164	026 345	. STRIP, polyester - glass laminate 1/16 x 2 x 3-3/8	4
165	**081 741	COIL, primary/secondary	1

*Recommended Spare Parts.

**Replace At Factory Or Factory Authorized Service Station.

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

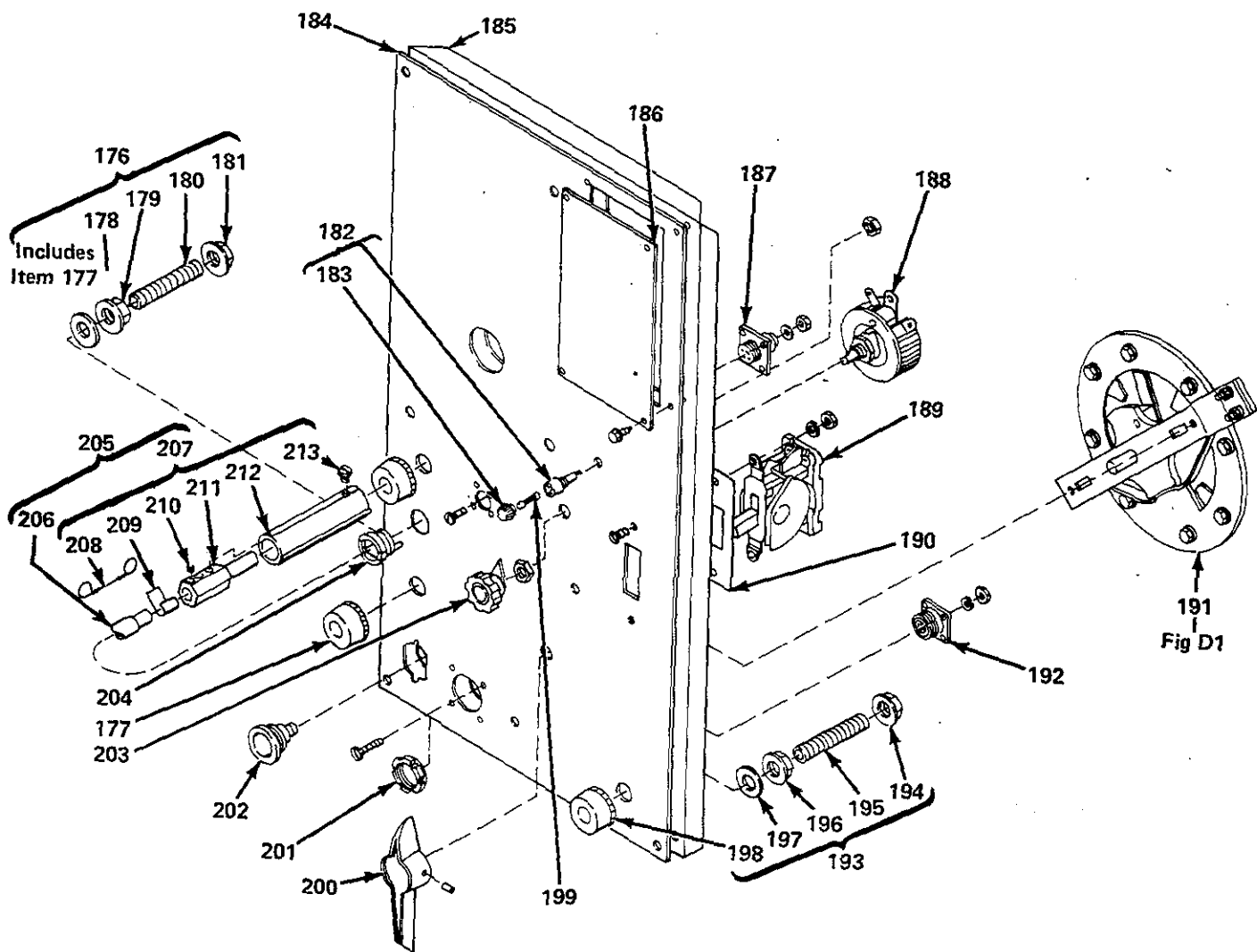


Figure D — Panel, Front - With Components

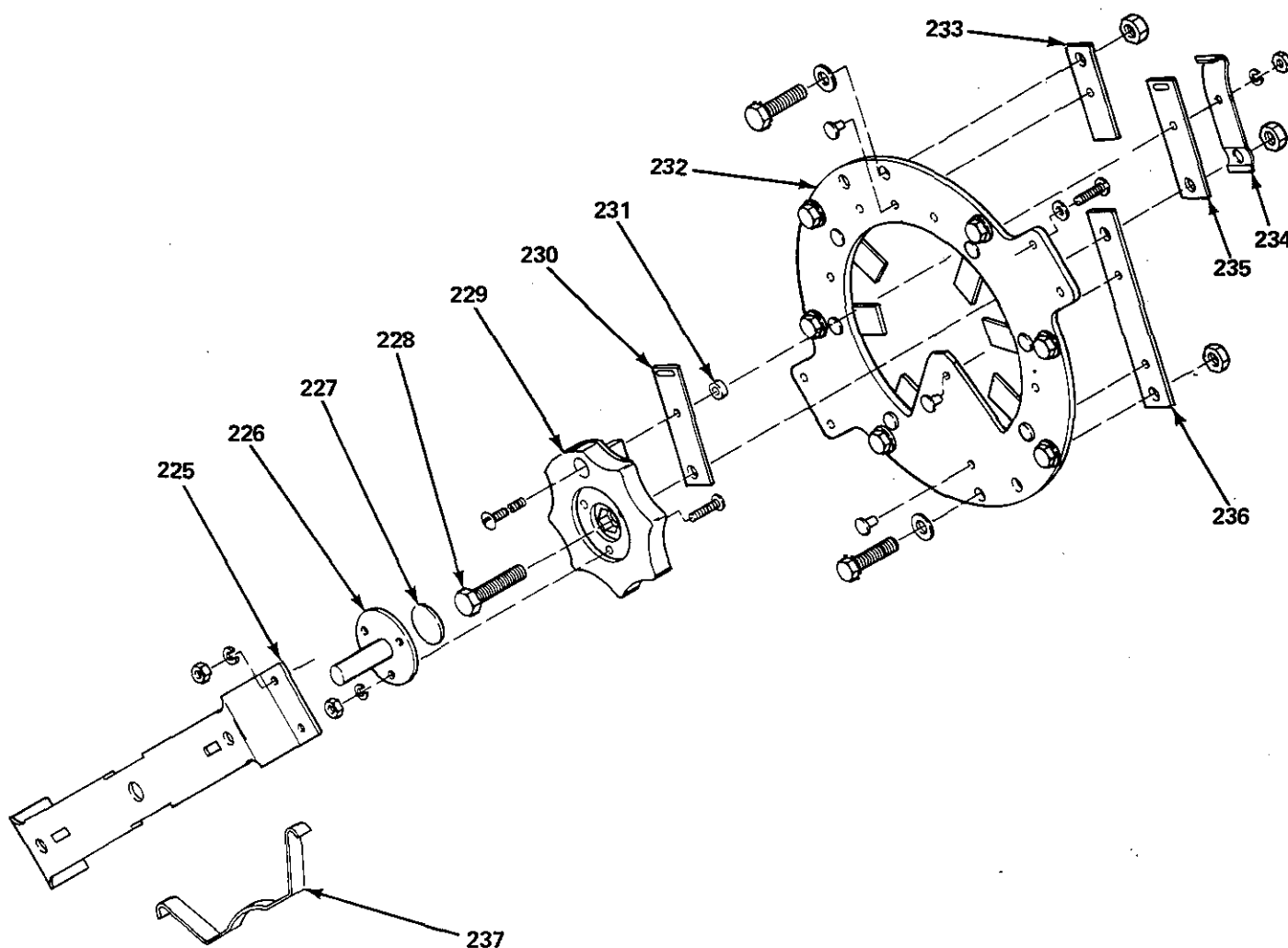
TC-049 809

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure D Panel, Front - With Components (See Fig. A Page 2 Item 24)				
176		057 608	RECEPTACLE, jack plug - yellow (consisting of)	2
177		039 889	. NUT, terminal - yellow	2
178		010 291	. WASHER, flat - nylafil 5/8 ID x 1-1/4 OD x 1/8	2
179		604 668	. NUT, steel - self-locking hex 1/2-20	2
180		020 015	. RECEPTACLE	2
181		601 881	. NUT, steel - hex jam 1/2-20	2
182		012 617	HOLDER, fuse - miniature (consisting of)	1
183		059 139	. CAP, fuseholder	1
184			NAMEPLATE (order by model and serial numbers)	1
185		081 631	PANEL, front	1
186		007 665	PLATE, cover - module	1
187	RC1	081 560	RECEPTACLE, 4 socket flanged size 11	1
188	R5	030 943	POTENTIOMETER, carbon 1 turn 2 watt 15K ohm	1
189	S1	011 629	SWITCH, toggle DPST 30 amp	1
190		026 190	INSULATOR, switch	1
191	S3	049 280	SWITCH, selector (See Fig. D1 Page 11)	1
192	RC3	073 326	RECEPTACLE, 4 socket 97-3102-18-4S	1
193		039 826	RECEPTACLE, jack plug - black (consisting of)	1
194		601 881	. NUT, steel - hex jam 1/2-20	1
195		020 015	. RECEPTACLE	1
196		604 668	. NUT, steel - self-locking hex 1/2-20	1
197		010 291	. WASHER, flat - nylafil 5/8 ID x 1-1/4 OD x 1/8	1
198		039 796	. NUT, terminal - black	1
199	F1	*012 618	FUSE, miniature - glass 5 amp	1
200		006 927	HANDLE, switch - range	1
201		010 907	NUT, locking 1 inch	1
202	POS	039 638	RECEPTACLE, twistlock - insulated	1
203		019 609	KNOB, pointer	1
204		010 290	BUSHING, strain - relief 1.09 x 1.03 hole	1
205		049 347	CABLE & PLUG, jack - yellow (consisting of)	1
206		082 067	. CABLE	1
207		039 878	. PLUG, jack - yellow (consisting of)	1
208		010 521	. WIRE, tie	1
209		019 833	. STRIP, copper 0.010 x 2-1/2 x 3/4	1
210		602 178	. SCREW, set - steel socket hd 1/4-20 x 3/8	1
211		101 219	. PLUG, jack	1
212		026 975	. INSULATOR, jack plug - yellow	1
213		602 160	. SCREW, self-tapping fillister hd 8-32 x 1/4	1

*Recommended Spare Parts.

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

Item No.	Factory Part No.	Description	Quantity
Figure D1 049 280 Switch, Selector (See Fig. D Page 10 Item 191)			
225	005 562	BRACKET, mounting - switch	1
226	005 561	SHAFT, rotor	1
227	005 564	INSULATOR, screw - switch	1
228	605 276	SCREW, cap - steel hex hd 1/4-20 x 1-1/4	1
229	005 559	CONTACT BOARD, movable - switch	1
230	005 560	CONTACT, switch - movable	1
231	008 485	SPACER, contact - switch	1
232	005 566	CONTACT BOARD, stationary - switch	1
233	011 644	CONTACT, stationary - switch	7
234	052 405	SPRING, pressure - contact switch	1
235	052 404	CONTACT, movable - switch	1
236	005 557	BUS BAR, switch - range	1
237	005 558	SPRING, selector - switch	1

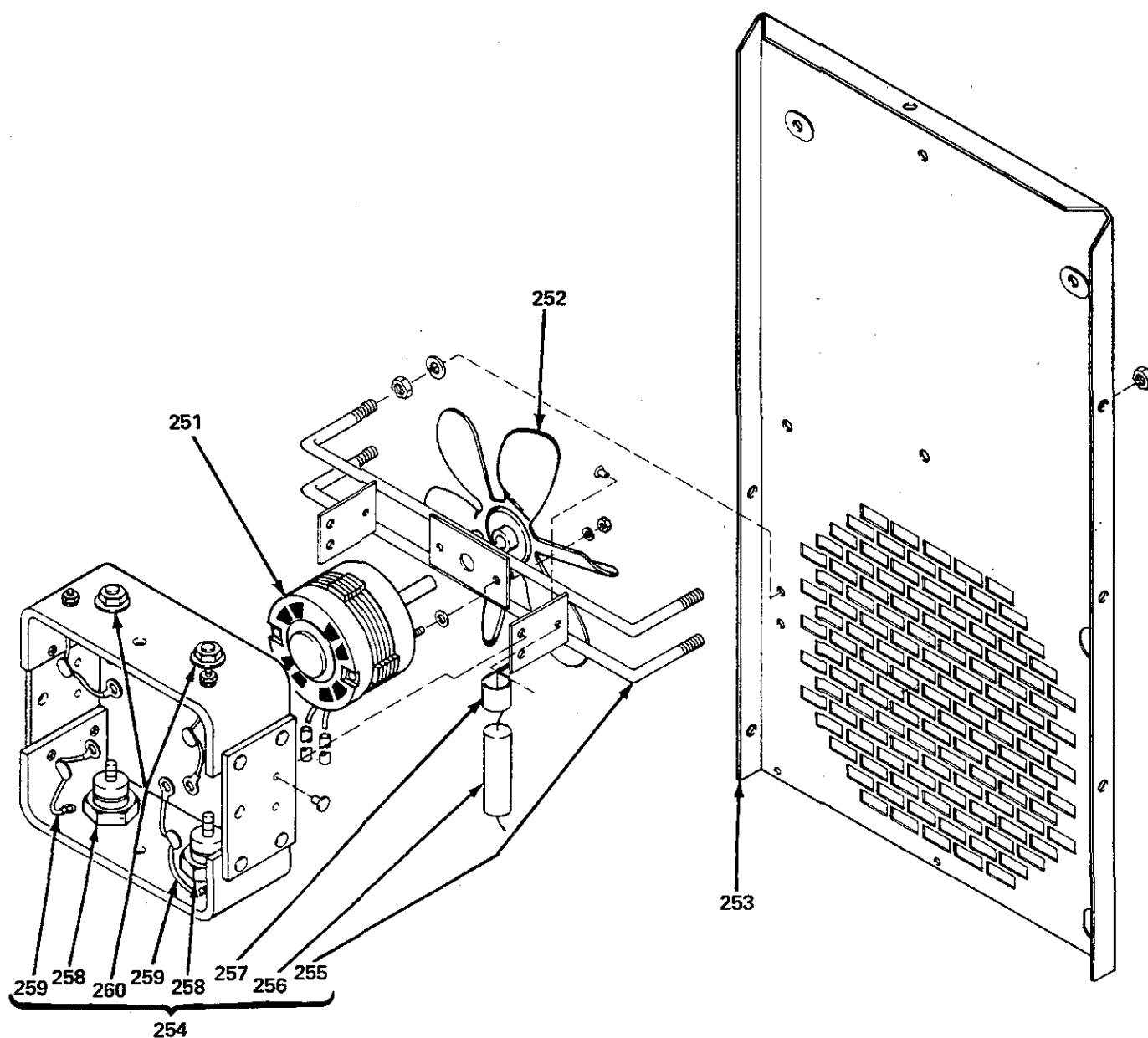


TC-052 524

Figure D1 — Switch, Selector

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure E Panel, Rear - With Components (See Fig. A Page 2 Item 5)				
251	FM	081 373	MOTOR, 1/15 hp 115 volts ac 60 hz 3000 rpm	1
252		081 372	BLADE, fan 60 hz 9 inch 20 degree	1
253		081 638	PANEL, rear	1
254	SR3	048 241	RECTIFIER, silicon diode (consisting of)	1
255		081 678	BRACKET, mounting - fan motor	1
256	C18	005 159	CAPACITOR, paper - oil 0.5 uf 200 volts dc	1
257		010 014	CLAMP, steel - cushioned 3/4 x 13/64	1
258		037 957	DIODE, rectifier 275 amp 300 volts reverse polarity	2
259	C14-17	031 689	CAPACITOR, ceramic 0.01 uf 500 volts dc w/3/16 x 1/4 terminals	4
260		037 956	DIODE, rectifier 275 amps 300 volts straight polarity	2

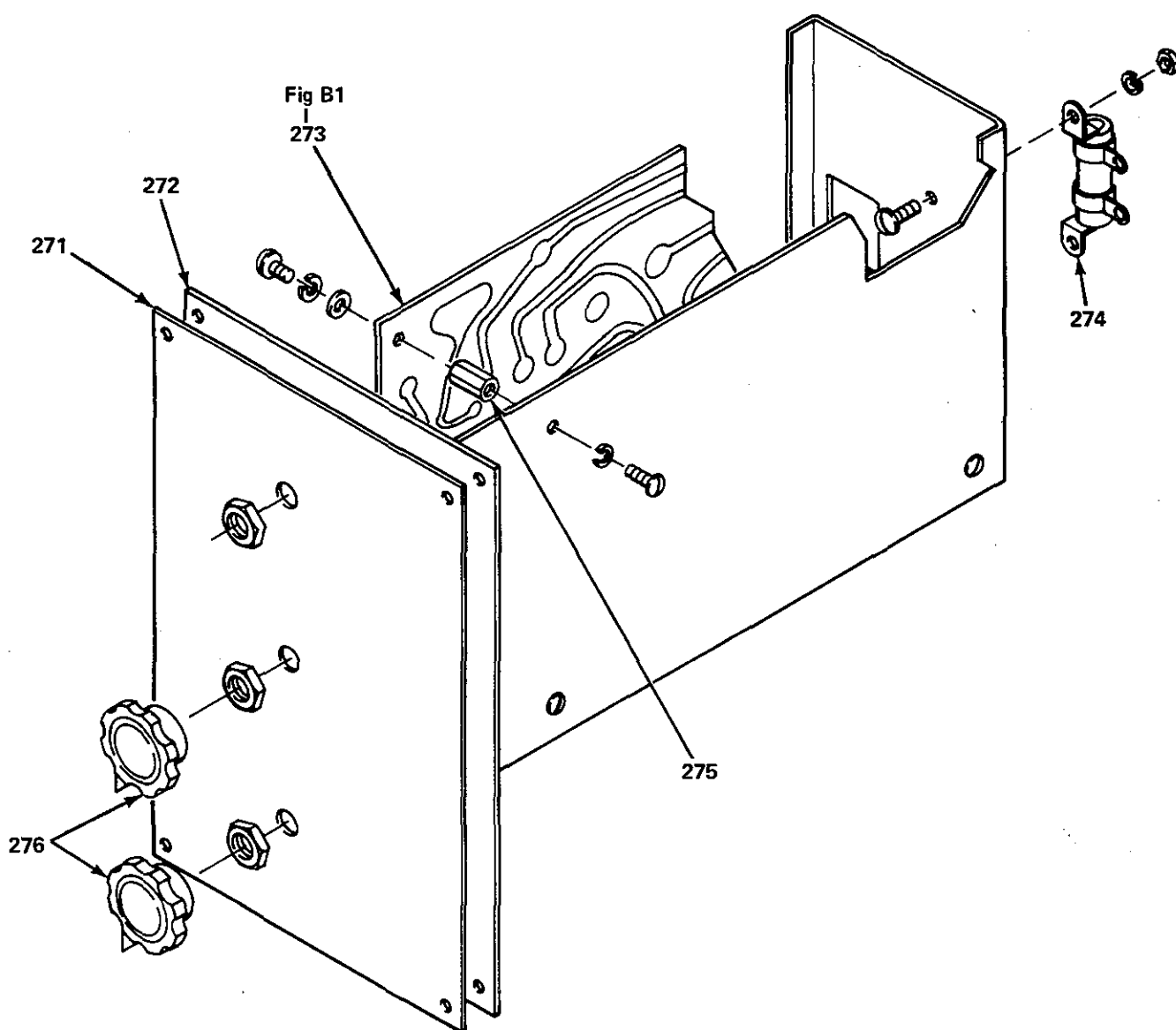


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Figure E — Panel, Rear - With Components

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

Item No.	Dia. Mkgs.	Factory Part No.*	Description	Quantity
Figure F 007 633 SK-35 Spot Weld Panel				
271			NAMEPLATE (order by model and serial numbers)	1
272		007 790	PANEL, spot timer	1
273		008 065	CIRCUIT CARD ASSEMBLY, w/switch - spot timer (See Fig. B1 Page 5)	1
274	R4	605 890	RESISTOR, WW fixed 15 watt 0.25 ohm.	1
275		073 756	STAND OFF, No. 6-32 x 5/8 long 1/4 hex	4
276		024 366	KNOB, pointer - line indicator	2
		058 375	NOZZLE, spot 0.745 ID x 2-3/8	1
		058 372	NOZZLE, inside corner 0.745 ID x 2-3/8	1
		058 374	NOZZLE, spot - outside 0.745 ID x 2-3/4	1

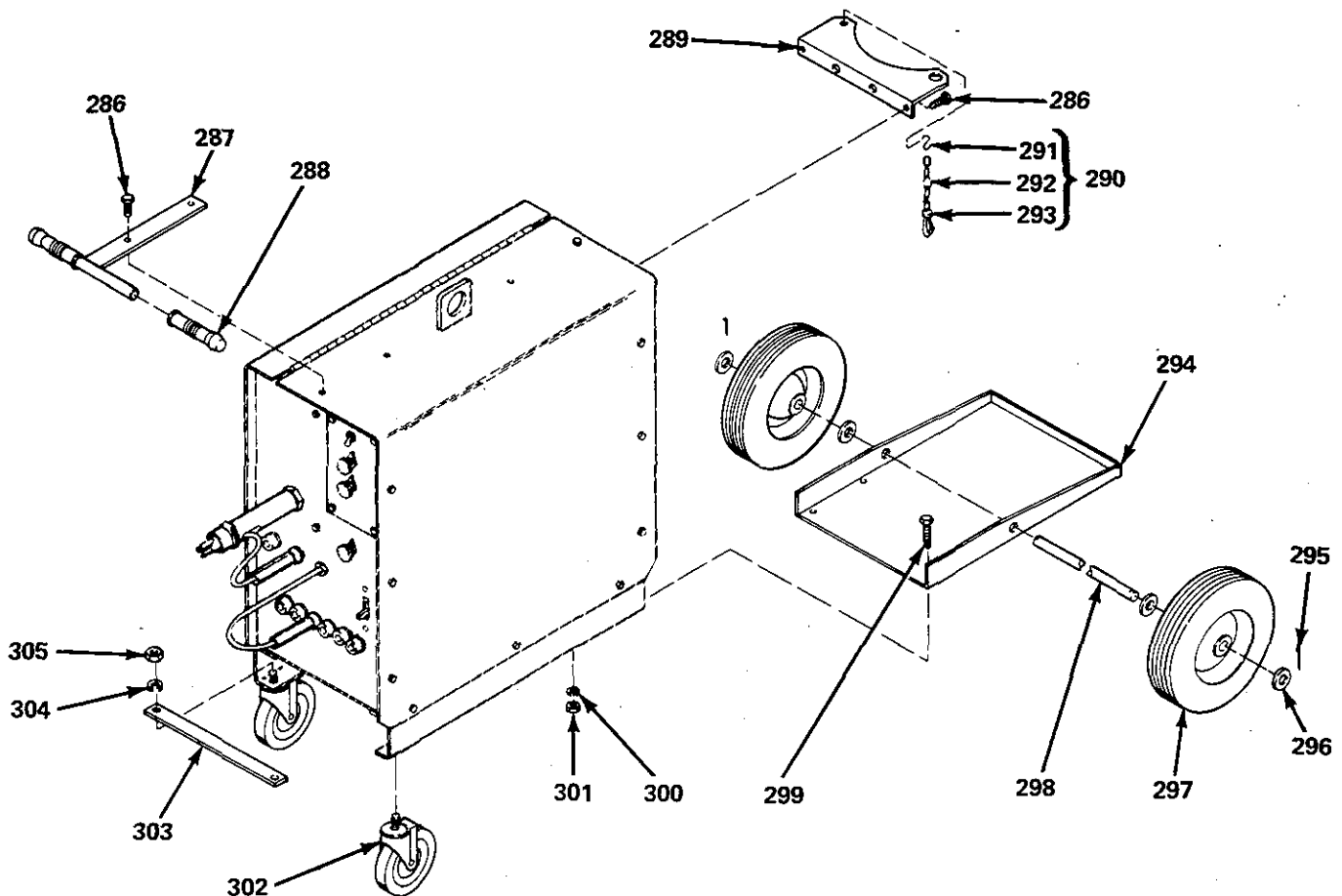


TB-008 082

Figure F — SK-35 Spot Weld Panel (Optional)

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

Item No.	Factory Part No.	Description	Quantity
Figure G		No. 10B Running Gear	
286	601 954	SCREW, cap - steel hex hd 1/4-20 x 3/4	4
287	025 193	HANDLE, running gear	1
288	604 423	GRIP, handle	2
289	057 478	BRACKET, support - tank	1
290	022 617	CHAIN, cylinder rack	1
291	602 389	HOOK, S blunt 1-1/2	1
292	602 387	CHAIN, weldless	1
293	602 384	SNAP, chain	1
294	052 693	RACK, cylinder	1
295	602 336	PIN, cotter 1/8 x 1-1/2	2
296	602 250	WASHER, flat - steel SAE 3/4 in	4
297	605 755	WHEEL, rubber, 3/4 bore 10 x 2-3/4	2
298	052 692	AXLE, running gear	1
299	601 944	SCREW, cap - steel hex hd 5/16-18 x 3/4	4
300	602 211	WASHER, lock - steel split 5/16	4
301	601 869	NUT, steel - hex jam 5/16-18	4
302	008 999	CASTER, swivel 4 in dia	2
303	052 691	BAR, spreader cylinder rack	1
304	602 213	WASHER, lock - steel split 3/8	2
305	601 871	NUT, steel - hex jam 3/8-16	2



TC-052 720

Figure G - No. 10B Running Gear

BE SURE TO PROVIDE MODEL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

