

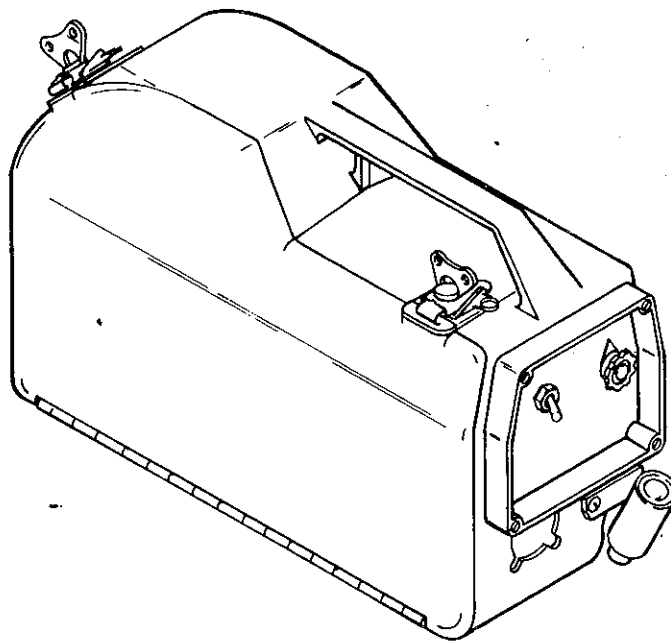
August 1983

FORM: OM-1545

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

Effective With Serial No. JD671331

**MODEL
S-32P**



OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.

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

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

LIMITED WARRANTY

EFFECTIVE: JUNE 1, 1979

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

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

Except 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.

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ERRATA SHEET

May 2, 1984

FORM: OM-1545

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

AMENDMENT TO SECTION 6 - MAINTENANCE & TROUBLESHOOTING

Amend Figure 6 - 2. Circuit Diagram

See page 2 for circuit diagram.

Amend Figure 6 - 5. Circuit Diagram For Models With 24 Volt Contactor Control Option

See page 3 for circuit diagram

Item Or Pg No.	Dia. Mkgs.	Part No.	Replaced With	Description	Quantity
2		088 425	Deleted		
33		604 525	049 455	CORD, No. 18 2/c (order by ft)	3 ft
56		053 841	093 664	GEAR, spur	1
			092 865	KEY, 1/4 x 1/4 x 3/4	2
57		085 243	092 237	KNOB, adj tension	1
Pg 4	C53	083 182	084 128	CAPACITOR, ceramic 0.01 uf 50 volts dc.	1
Pg 4	C58,64	072 130	072 130	CAPACITOR (qty chg)	2
Pg 4	R55,57	084 205	084 205	RESISTOR (qty chg)	2
Pg 4	R58,75,77	084 205	039 336	RESISTOR (qty chg)	3
Pg 4		035 827	035 827	RESISTOR, carbon film 0.25 watt 10K ohm (description chg)	11
Pg 4	R85,99,105	035 826	035 826	RESISTOR (qty chg)	3
Pg 4	SR50	035 914	093 747	RECTIFIER integrated 30 amp 400 volts	1
	R104		035 822	RESISTOR, carbon film 0.25 watt 10 ohm	1
			092 648	RESISTOR, carbon film 0.25 watt zero ohm.	7
			025 590	MOUNT, resilient	4
Pg 7		091 290	091 920	SPACER, gas valve mounting	1
Pg 7	R51,52,59, 67,71,72	000 885	000 885	RESISTOR, carbon film 0.25 watt 10K ohm	6
	R55		091 799	RESISTOR, carbon film 0.25 watt 8.2K ohm	1
Pg 8		007 826	007 826	CORD, No. 18 3/c (qty chg)	3ft
Pg 8		047 001	092 179	CORD, interconnecting-control/machine	1
Pg 8		600 341	600 341	CORD, No. 16 3/c (qty chg)	30ft
Pg 8	R103	072 462	035 897	POTENTIOMETER, carbon 1 turn 2 watt 1000 ohm	1

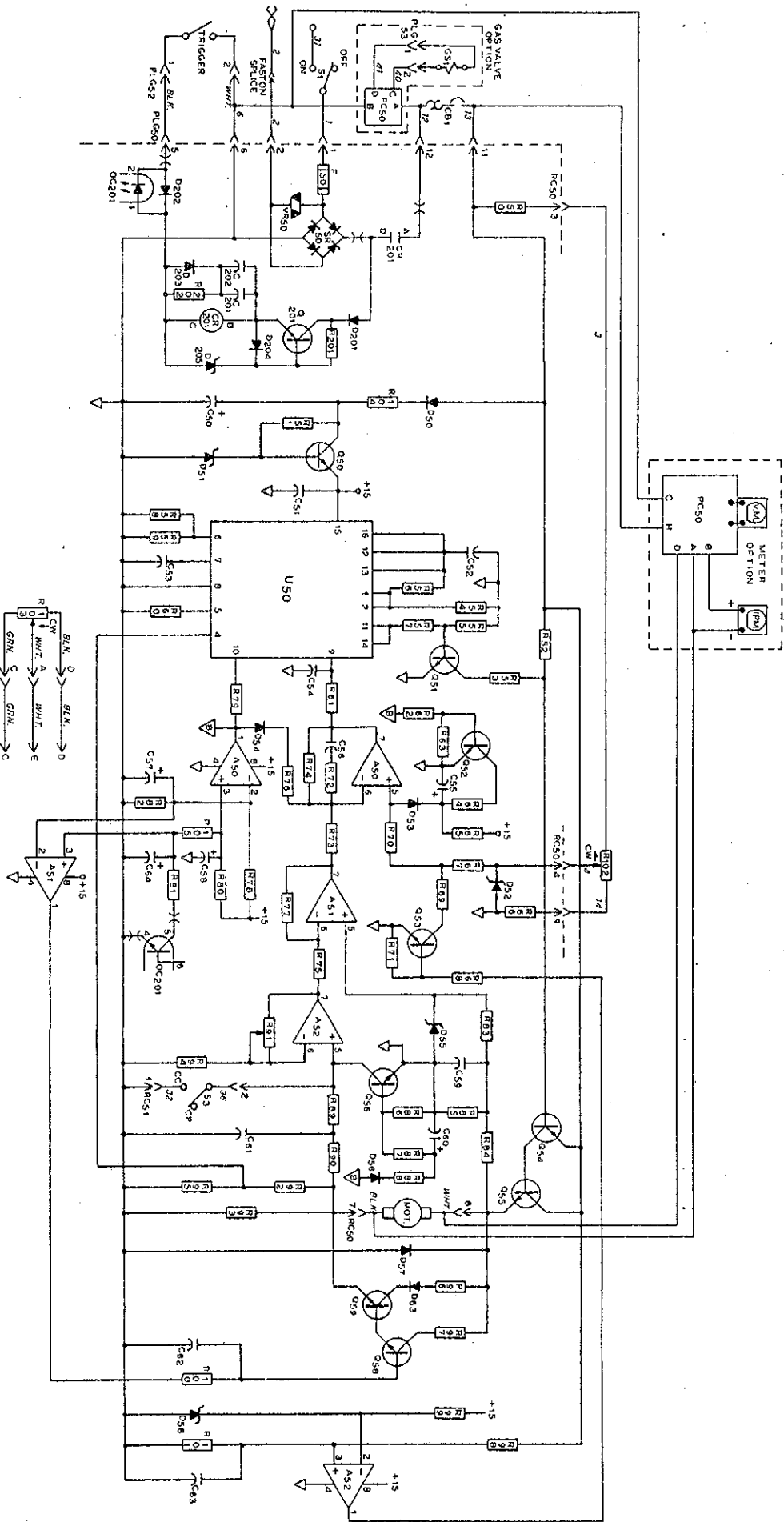
Optional Parts

IPM	091 962	METER, IPM 0-10 MVAT 0-1 MA 2.5 inches	1
V.M.	091 961	METER, volt dc 0-10 scale	1
	089 815	GUARD, meters	1
	010 423	CONNECTOR, tab	3
	092 365	STAND-OFF, No. 4-40 x 1-1/4 long x 1/4 hex	6
PC50	092 010	CIRCUIT CARD, meter option (consisting of)	1
C50	090 573	CAPACITOR, electrolytic 10 uf 50 volts	1
D50	091 960	DIODE, signal 50 MA 50 volts	1
D51	074 241	DIODE, zener 9.1 volts	1
R50	030 820	RESISTOR, carbon 2 watt 1000 ohm	1
R51,52	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	2
R53,54	030 020	POTENTIOMETER, cermet 15 turn 0.75 watt 1000 ohm ...	2
R55	052 138	RESISTOR, carbon film 0.25 watt 20K ohm	1
R56	039 360	POTENTIOMETER, 20 turn 0.5 watt 25K ohm	1
S50	092 367	SWITCH, DIP SPST slide actuated	1

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

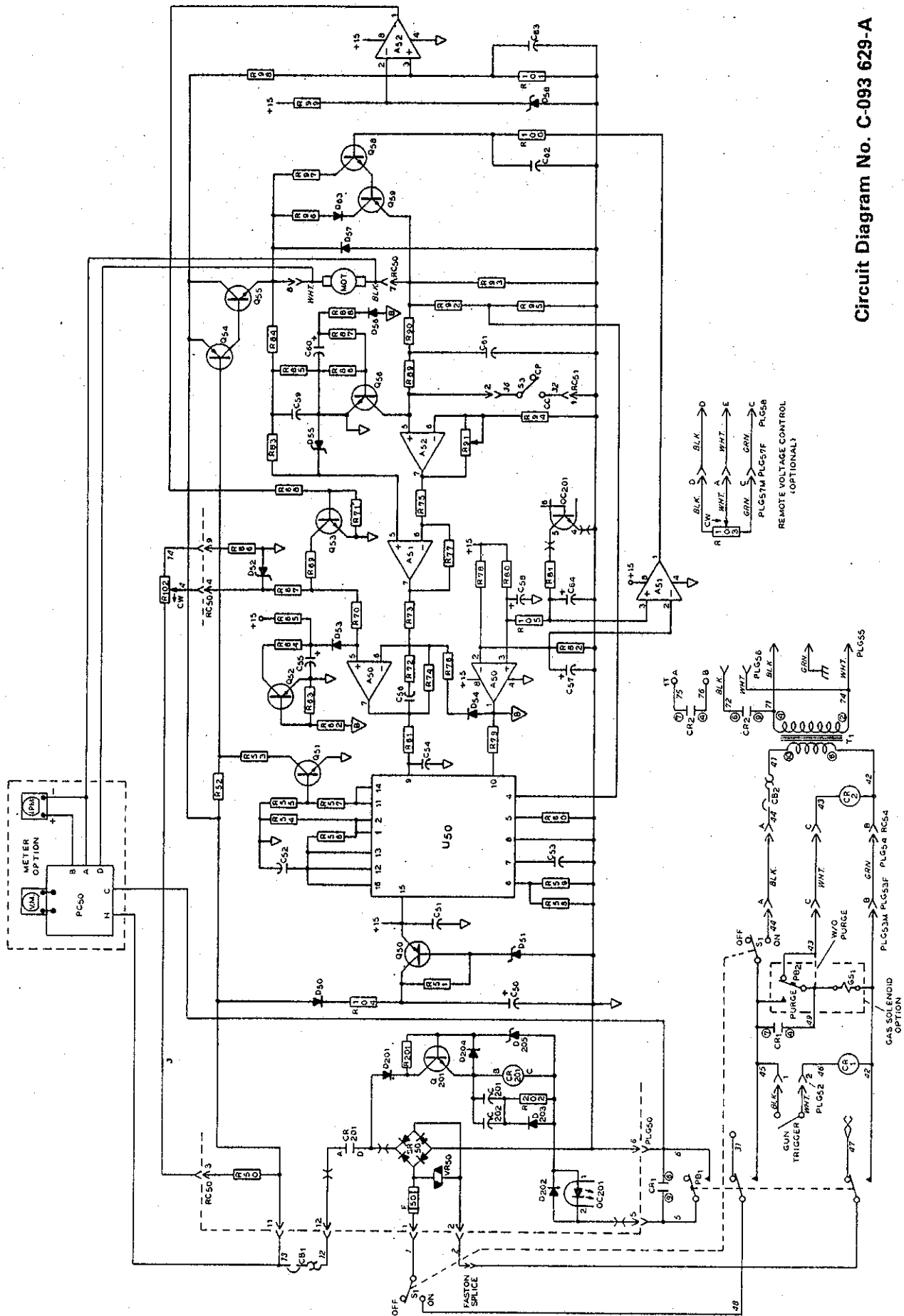
REMOTE VOLTAGE CONTROL
(OPTIONAL)

BLK. 0 → 0
 WHT. A → E
 GRN. C → C
 PLG57M, PLG57F, PLG58



Circuit Diagram No. C-094 598

Figure 6 - 2. Circuit Diagram For Standard Models Effective With Serial No. JE731708 And Following



Circuit Diagram No. C-093 629-A

Figure 6 - 5. Circuit Diagram For Models With 24 Volt Contactor Control Option Effective With Serial No. JE731708 And Following

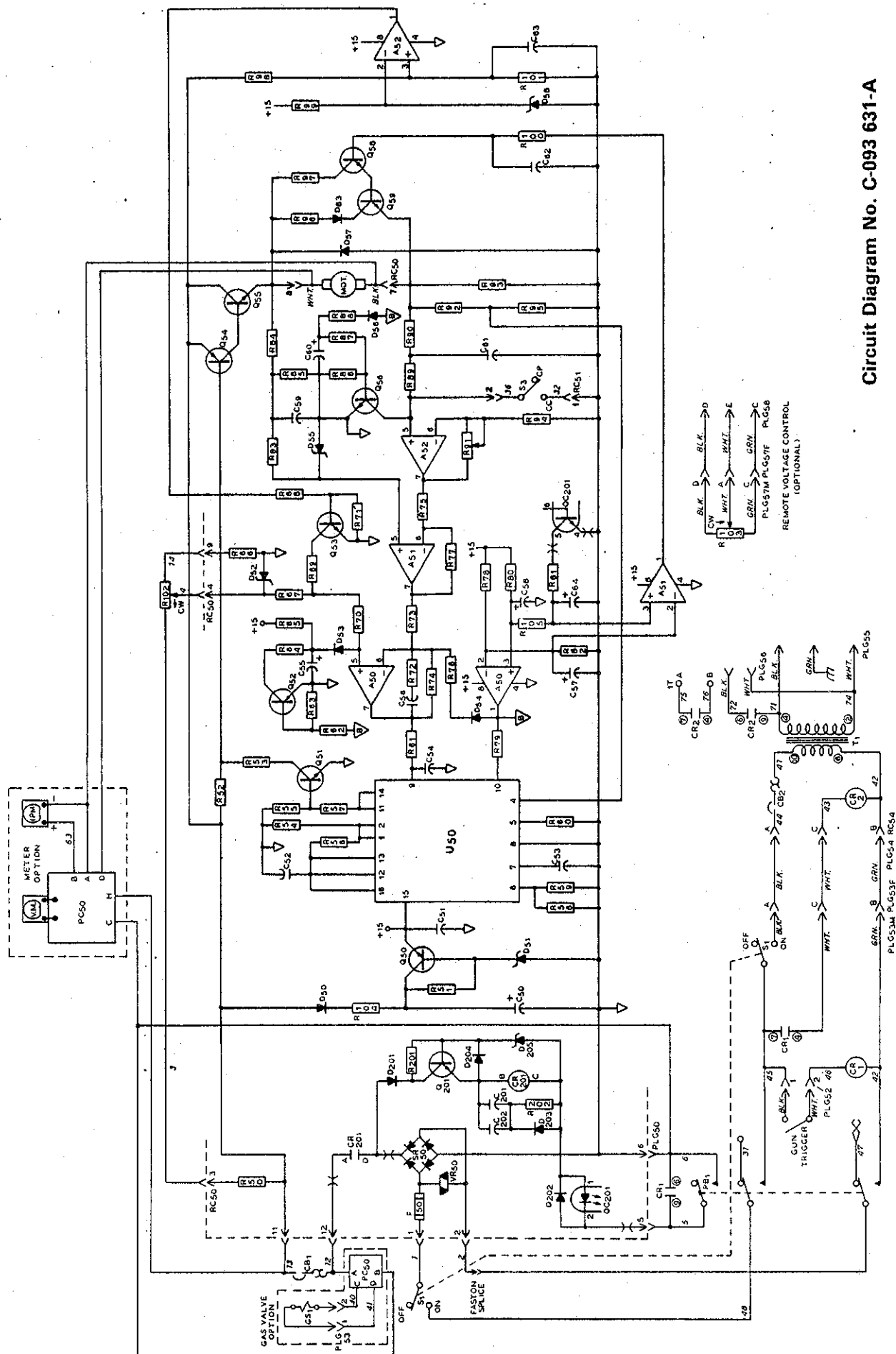


Figure 6 – 6. Circuit Diagram For 12 Volt Gas Valve And 24 Volt Contactor Option Effective With Serial No. JE731708 And Following

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

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

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

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

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

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

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

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

1-2. GENERAL PRECAUTIONS

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

A. Burn Prevention

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

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

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

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

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

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

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

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

B. Toxic Fume Prevention

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

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

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

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

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

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

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

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

C. Fire and Explosion Prevention

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

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

To prevent fires and explosion:

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

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

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

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

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

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

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

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

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

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

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

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

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

D. Compressed Gas Equipment

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

1. Pressure Regulators

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

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

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

Leaks - if gas leaks externally.

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

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

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

2. Cylinders

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

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

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

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

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

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

Locate or secure cylinders so they cannot be knocked over.

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

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

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

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

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

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

Never refill any cylinder.

Cylinder fittings should never be modified or exchanged.

3. Hose

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

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

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

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

Coil excess hose to prevent kinks and tangles.

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

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

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

4. Proper Connections

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

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

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

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

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

5. Pressurizing Steps:

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

Stand to side of regulator while opening cylinder valve.

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

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

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

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

E. User Responsibilities

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

F. Leaving Equipment Unattended

Close gas supply at source and drain gas.

G. Rope Staging-Support

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

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

A. Burn Protection

Comply with precautions in 1-2.

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

1. Protective Clothing

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

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

2. Eye and Head Protection

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

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

*Trademark of Proctor & Gamble.

Protect filter plate with a clear cover plate.

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

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

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

3. Protection of Nearby Personnel

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

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

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

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

B. Toxic Fume Prevention

Comply with precautions in 1-2B.

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

C. Fire and Explosion Prevention

Comply with precautions in 1-2C.

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

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

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

D. Compressed Gas Equipment

Comply with precautions in 1-2D.

E. Shock Prevention

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

To protect against shock:

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

1. Grounding the Equipment

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

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

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

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

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

2. Electrode Holders

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

3. Connectors

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

4. Cables

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

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

5. Terminals And Other Exposed Parts

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

6. Electrode

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

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

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

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

7. Safety Devices

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

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

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

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

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

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

1-4. STANDARDS BOOKLET INDEX

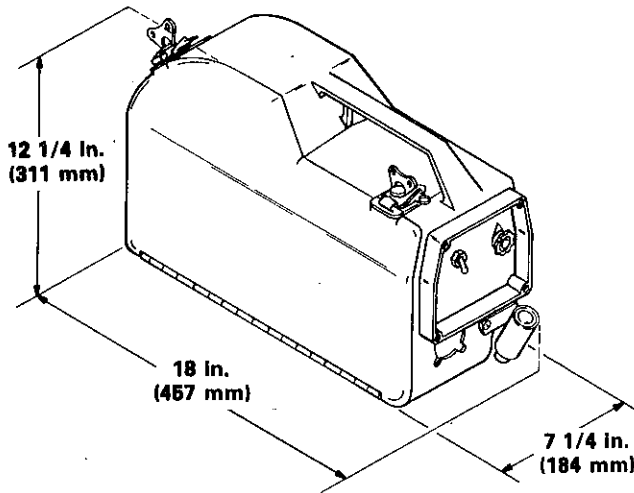
For more information, refer to the following standards or their latest revisions and comply as applicable:

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

SECTION 2 - INTRODUCTION

Input Welding Circuit Rating	Electrode Wire Diameter Capacity	Wire Spool Capacity	Electrode Wire Feed Speed	Weight	
				Net	Ship
15-100 Volts 500 Amps 100% Duty Cycle	.030 thru 5/64 in. (0.8 thru 2.0 mm)	10 & 15 lb. - 8 inch spools 14 lb. coils	See Figure 4-2	18 lbs. (8.2 kg.)	21 lbs. (9.5 kg.)

Figure 2-1. Specifications



TB-090 752

Figure 2-2. Overall Dimensions

2 - 1. GENERAL INFORMATION AND SAFETY

A. General

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

B. Safety

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

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

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

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

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

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

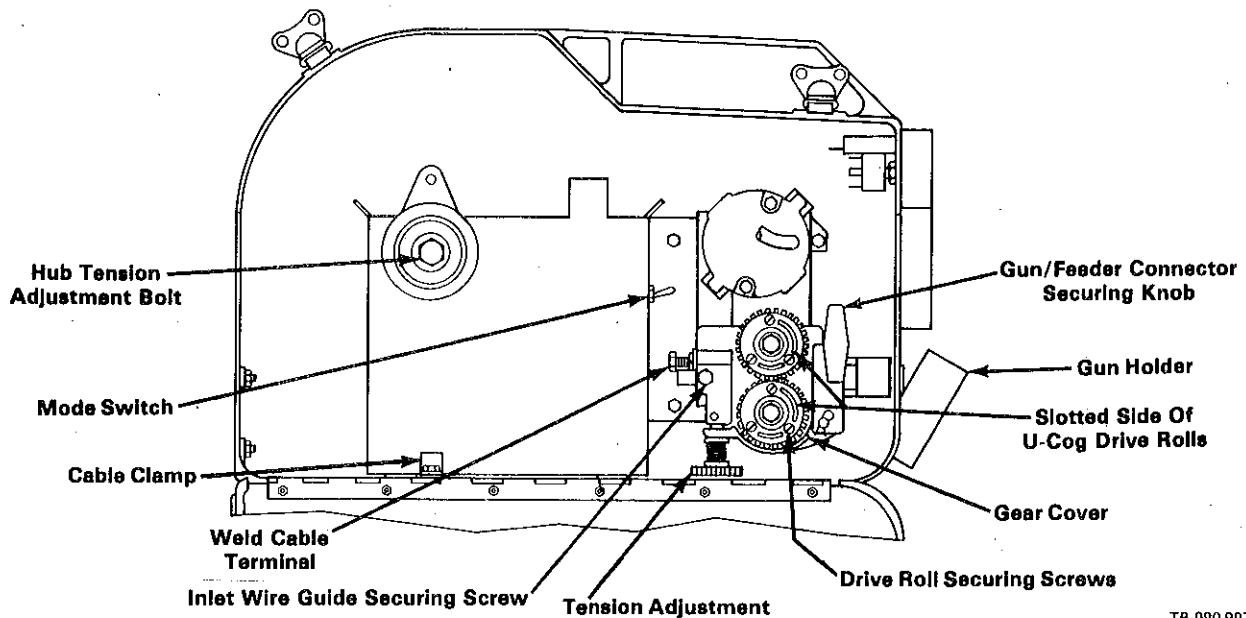
2 - 3. DESCRIPTION - This unit is a portable semi-automatic wire feeder which operates on the arc voltage from a constant current or constant potential dc arc welding power source. All components, including the wire supply, the two drive roll feeder and permanent magnet motor are housed in an impact resistant, molded, thermoplastic case.

CAUTION: INTENSE HEAT can damage thermoplastics.

- Do not set the wire feeder on a hot surface or place it in the near vicinity of a heat source such as the welding arc.

The case is designed with an integral, molded handle with a lifting eye for suspending the wire feeder over the work area. It also has positive latches securing the side door to prevent wire contamination.

SECTION 3 - INSTALLATION



TB-090 997-A

Figure 3-1. Drive Rolls, Wire & Gun Installation

WARNING: ELECTRIC SHOCK can kill.

- Shut down the welding power source before attempting to install the wire feeder, and make sure it cannot be energized

Welding voltage is still present inside the wire feeder even though the control switch is in the OFF position.

3 - 1. DRIVE ROLL AND WIRE GUIDE INSTALLATION (Figure 3-1) - Upon initial installation, or as a result of changes in wire size and type, it is necessary to install the required drive rolls and wire guides.

IMPORTANT: Base selection of drive rolls upon the following recommended usages.

1. U-Groove rolls for soft and soft shelled cored wires.
2. U-Cog rolls for extremely soft shelled wires (usually hard surfacing types).
3. Split V-Knurled rolls for hard shelled cored wires (self-shielding and CO₂ shielded types).
4. Drive roll types may be mixed to suit particular requirements (example: V-knurled roll in combination with U-groove).

The drive assembly is located behind the side door on the wire feeder. The door is held closed by draw latches. Lift the latch handle and turn to release door.

A. Drive Roll Installation

1. Loosen the tension adjustment on the wire drive housing and release the gear cover.
2. Install appropriate drive rolls on drive and pressure gears using securing screws in gears.

IMPORTANT: Both one-piece and split drive rolls are of the double usage type. When the grooves become worn, reverse the one-piece rolls or reverse the split roll halves to locate the unused grooves in position to feed the wire.

To ensure proper gripping action of U-Cog drive rolls, both rolls should be installed showing slots on the side or both should show the side without slots. Also, it is necessary to line up the blunted teeth on the pressure gear roll directly over the spaces between the teeth on the drive gear roll.

B. Wire Guide Installation

Install the appropriate inlet wire guide for the wire size used in the wire drive housing using the securing screw in the housing, so that the tip of the guide is as close to the drive roll as possible without touching.

IMPORTANT: 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 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.

3 - 2. SENSING LEAD CONNECTION - Connect the sensing lead clamp to the workpiece or work clamp.

3 - 3. WELDING GUN CONNECTIONS

1. Loosen the gun/feeder connector securing knob on the wire drive housing.
2. Insert the gun/feeder connector through the access hole in the front panel.
3. Insert the gun/feeder connector in the drive housing with the outlet wire guide as close to the drive rolls as possible without touching and tighten the securing knob.
4. Connect the gun trigger plug to the free hanging connector.

IMPORTANT: The gun holder on the wire feeder (see Figure 4-1) contains the insulator for the GL-40 gun.

3 - 4. WELDING CABLE CONNECTION - Route the appropriate welding cable from the welding power source through the access hole on the rear of the wire feeder through the cable clamp (see Figure 3-1) and connect the cable to the weld terminal on the drive assembly. If Reverse Polarity weld output is desired, connect the welding cable from the Positive output terminal to the drive assembly. If Straight Polarity weld output is desired, connect the welding cable from the Negative output terminal to the drive assembly.

3 - 5. WIRE SPOOL INSTALLATION

IMPORTANT: If it should become necessary to replace any part of the hub assembly, see hub assembly reinstallation instructions in Section 6-3.

1. Remove the retaining nut from the hub.
2. Slide wire spool on hub so that wire feeds off the bottom of the spool.

IMPORTANT: Some types of self shielding wire spool require installation of a wire spool adapter. The wire spool adapter is supplied with the unit. See Figure 3-2 for installation instructions.

3. Rotate wire spool until hole in spool slides over pin in hub and seats against back flange of the hub.
4. Reinstall retaining nut to secure wire spool on hub.

3 - 6. HUB TENSION ADJUSTMENT (Figure 3-1) - The welding wire should unwind freely off the wire spool, but hub tension should be sufficient to keep the wire taut and prevent backlash when the gun trigger is released. Check hub tension by slowly pulling the wire toward the drive assembly. If adjustment is necessary, tighten or loosen the hex bolt on the end of the hub assembly.

3 - 7. SHIELDING GAS VALVE (Optional) - The gas valve operates on arc voltage to provide gas shielding for gas metal-arc welding applications. Connect the gas hose from the shielding gas supply to the gas fitting on the rear of the wire feeder. This fitting has right hand threads.

3 - 8. 24 VOLTS CONTACTOR (Optional) - On units with the 24 volts contactor option, the free hanging connector on the rear of the wire feeder provides a connection point for a 24 volts ac contactor interface control. Insert the plug from the interface control into the connector and rotate the locking ring.

3 - 9. 24 VOLTS CONTACTOR AND SHIELDING GAS CONTROL (Optional) - On units with the 24 volts contactor and shielding gas control option the free hanging connector on the rear of the wire feeder provides a connection point for a 24 volts ac contactor and shielding gas interface control. Insert the plug from the interface control into the connector and rotate the locking ring.

3-10. REMOTE VOLTAGE CONTROL RECEPTACLE (Optional) - On units with the remote voltage control option the free hanging connector on the rear of the wire feeder provides a connection point for the remote voltage control cord. Insert the plug on the voltage control cord into the connector and rotate the locking ring.

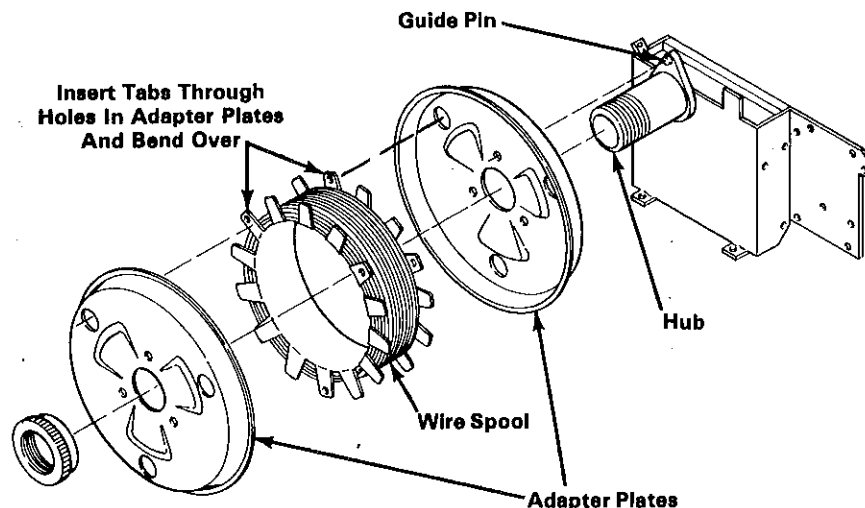


Figure 3-2. Wire Spool Adapter Installation

TB-090 996

SECTION 4 - OPERATOR CONTROLS

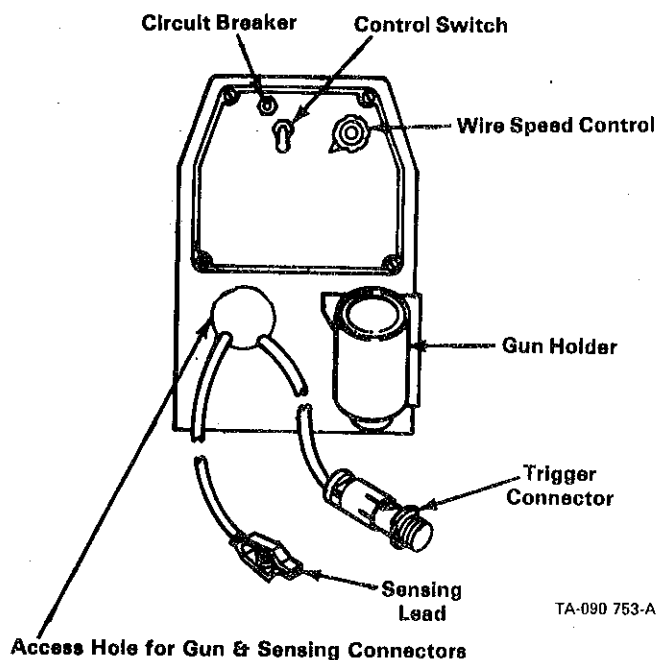


Figure 4-1. Control Panel View

4 - 1. MODE SWITCH (Figure 3-1) - Place the Mode switch in the CP position when using a constant potential welding power source. Place the Mode switch in the CC position when using a constant current welding power source.

4 - 2. CONTROL SWITCH (Figure 4-1) - Placing the Control switch in the ON position connects the wire feeder control circuitry to the weld output circuit. Placing the Control switch in the Off position disconnects the control circuitry.

4 - 3. WIRE SPEED CONTROL (Figure 4-1) - The WIRE SPEED control provides a means of selecting the rate of wire feed within the wire speed range for the arc voltage being used (see Figure 4-2). The scale around the control is calibrated in percent and does not indicate actual wire speed. Rotating the WIRE SPEED control clockwise increases wire feed speed.

4 - 4. RESET CIRCUIT BREAKER (Figure 4-1) - A circuit breaker provides protection to the feeder motor. In the event the motor should be placed in an overload condition, the breaker would trip and suspend all output. Should this breaker trip, the RESET button would have to be manually depressed in order to reset the circuit breaker.

4 - 5. FUSE - The control is protected from damage due to an internal short or excessive overload by fuse, F50 located on the control circuit board. Should the fuse open, the control would be completely inoperative.

4 - 6. PURGE BUTTON (Optional Only On Models With 24 VAC Contactor And Gas Control) (Figure 4-1) - The PURGE button is a momentary contact switch. This switch energizes the gas solenoid and purges the shielding gas line of the gun. The PURGE button also allows the shielding gas regulator to be adjusted without energizing the welding circuit.

4 - 7. JOG SWITCH (Optional Only On Models With 24VAC Contactor And Gas Control) (Figure 4-1) - The JOG switch is a spring loaded switch. When actuated it completes the circuit to the motor without having to depress the gun trigger switch. This switch

Wire Speed Setting CC Mode											Arc Voltage	Wire Speed Setting CP Mode										
100	90	80	70	60	50	40	30	20	10	0		0	10	20	30	40	50	60	70	80	90	100
222	205	188	170	153	136	119	102	84	67	50	15	50	76	102	127	153	179	205	231	256	282	308
254	234	213	193	172	152	132	111	91	70	50	16	50	78	106	133	161	189	217	247	272	300	328
268	246	224	203	181	159	137	115	94	72	50	17	50	81	112	143	174	205	235	266	297	328	359
295	271	246	222	197	173	148	124	99	75	50	18	50	84	118	152	186	220	254	288	322	356	390
314	288	261	235	208	182	156	129	103	76	50	19	50	88	126	164	202	241	277	317	355	393	431
342	313	284	254	225	196	167	138	108	79	50	20	50	91	134	174	215	256	297	338	380	421	462
365	334	302	271	239	208	176	145	113	82	50	21	50	94	138	183	227	271	315	359	404	448	492
388	354	320	287	253	219	185	151	118	84	50	22	50	97	145	192	239	287	334	381	428	476	523
406	370	335	299	264	228	192	157	121	86	50	23	50	100	151	201	252	302	352	403	453	503	554
429	391	353	315	277	240	202	164	126	88	50	24	50	103	156	209	262	315	367	420	473	526	579
452	412	372	331	291	251	211	171	130	90	50	25	50	106	161	217	272	328	383	439	494	550	605
480	437	394	351	308	265	222	179	136	93	50	26	50	109	167	226	284	343	402	460	519	577	636
498	453	408	364	319	274	229	184	140	95	50	27	50	111	172	234	294	356	417	478	540	601	662
526	478	430	383	336	288	240	193	145	98	50	28	50	114	177	241	305	369	432	496	560	623	687
549	499	449	399	349	300	250	200	150	100	50	29	50	116	183	249	315	382	448	514	580	647	713
572	520	468	415	363	311	259	207	154	102	50	30	50	119	188	256	325	394	463	532	600	669	738
595	541	486	432	377	323	268	214	159	105	50	31	50	122	194	266	338	410	481	553	625	697	769
623	566	508	451	394	337	279	222	165	107	50	32	50	124	198	272	346	420	494	568	642	716	790
INCHES PER MINUTE*												INCHES PER MINUTE*										

*Rounded off

Figure 4 - 2. Wire Speed Chart

permits jogging of the wire at whatever setting the WIRE SPEED control is at, without energizing the welding circuit or the shielding gas valve.

4 - 8. WELD METERS (Optional) - The voltmeter is connected to the welding circuit at the wire feeder. The voltmeter indicates the dc voltage across the arc at the wire feeder and will vary slightly from actual arc voltage. The wire speed meter indicates the rate at which wire is feeding in inches per minute.

SECTION 5 - SEQUENCE OF OPERATION

5 - 1. WELDING WIRE THREADING

WARNING: ELECTRIC SHOCK can kill.

- Do not energize welding power source or wire feeder until instructed to do so.
- Do not touch live electrical parts.

Welding wire and all metal parts in contact with it carry weld current when the welding power source contactor is energized.

CAUTION: WELDING WIRE can cause puncture wounds; HOT SURFACES can burn skin.

- Do not activate gun trigger until instructed to do so.
- Do not point gun towards any part of the body or other personnel when threading welding wire.
- Allow gun to cool before touching.

1. Install the wire as instructed in Section 3-5.
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 tension adjustment on the wire drive housing and release the gear cover.
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 and secure with tension adjustment, making sure the gear teeth mesh together properly and the welding wire is in the drive roll grooves. Be sure the U-cog drive rolls are properly aligned (see Section 3-1).
6. Tighten the pressure adjustment to obtain the proper clamping pressure on the welding wire. Do not overtighten. Further adjustment can be made when the wire feeder is put into operation.
7. Draw the gun cable out straight.
8. Clamp the wire feeder sensing lead to the work clamp.

4 - 9. VOLTAGE/CURRENT CONTROL (Optional) - The VOLTAGE/CURRENT control on the wire feeder provides a means of setting welding voltage/current at the wire feeder. The scale around the VOLTAGE/CURRENT control is calibrated in percent and does not indicate actual welding volts/amperes. Rotate the VOLTAGE/CURRENT control clockwise to increase welding voltage/current.

9. Energize the welding power source (and place the Remote Contactor Control switch, if applicable, in the OFF position).
10. Place the wire feeder Control switch in the ON position.
11. Depress the gun trigger. This will feed the welding wire through the gun. Release the gun trigger when the welding wire extends approximately one inch out of the gun tip.

5 - 2. FLUX CORED ARC WELDING

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

● Wear correct eye, ear, and body protection. FUMES AND GASES can seriously harm your health.

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

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

1. Make all necessary connections as instructed in Section 3.
2. Place the Mode switch in the proper position.
3. Rotate the WIRE SPEED control to the desired position.
4. Energize the welding power source.
5. Place the Control switch in the ON position.
6. Close the gun trigger and begin welding.

IMPORTANT: Drive roll clamping pressure should be adjusted to correct wire slippage. Make quarter turn adjustments until the feeding problem is corrected. Do not overtighten.

5 - 3. SHUTTING DOWN

1. Release gun trigger and break the arc.
2. Place the Control switch in the Off position.
3. Shut the welding power source down.

SECTION 6 - MAINTENANCE & TROUBLESHOOTING

WARNING: ELECTRIC SHOCK can kill; WELDING WIRE can cause puncture wounds; HOT SURFACES can burn skin.

- Do not touch live electrical parts.
- Shut down the welding power source and make sure it cannot be accidentally energized before internally inspecting or servicing.
- Allow gun and unit to cool before touching.
- Do not activate gun trigger while performing maintenance on gun.

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

6 - 1. INSPECTION AND UPKEEP - Usage and shop conditions will determine the frequency and type of maintenance. Inspect equipment as follows:

1. Make sure welding power source is shut down.
2. Inspect gun for broken areas, cracks and loose parts: tighten, repair, and replace as required.
3. Carefully remove any weld spatter or foreign matter which may accumulate around the nozzle orifice. Use a hardwood stick, never a metal tool.
4. Repair or replace, as required, all hose and cable; give particular attention to frayed and cracked insulation and areas where it enters equipment.
5. Remove grease and grime from components; moisture from electrical parts and cable.
6. Blow out the gun wire guide liner with compressed air when changing wire. This will remove any metal chips and dirt that may have accumulated.

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

6 - 2. CLEANING OF DRIVE ROLLS - Occasionally it is 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 is necessary to shut down the welding power source before removing the drive roll(s) (see Section 3-1 for removal and installation instructions).

IMPORTANT: 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.

WARNING: HIGH ROTATIONAL SPEED may cause damage to drive rolls.

- Do not allow drive rolls to rotate at high speed if compressed air is used for cleaning the drive roll assembly.

6 - 3. REINSTALLATION OF HUB ASSEMBLY (Figure 6-1) - If it should become necessary to replace any part of the assembly, obtain part and proceed as follows to reinstall the assembly.

1. Slide the following items onto the spindle support shaft in order given:
 - A. Fiber Washer
 - B. Flat Washer
 - C. Hub
 - D. Anti-turn Washer
 - E. Fiber Washer
 - F. Keyed Washer
 - G. Spring
 - H. Flat Washer
 - J. Bolt
2. Rotate hex bolt onto support shaft. Hex bolt should be rotated only until a slight drag is felt while turning hub.
3. Install retaining nut on hub.

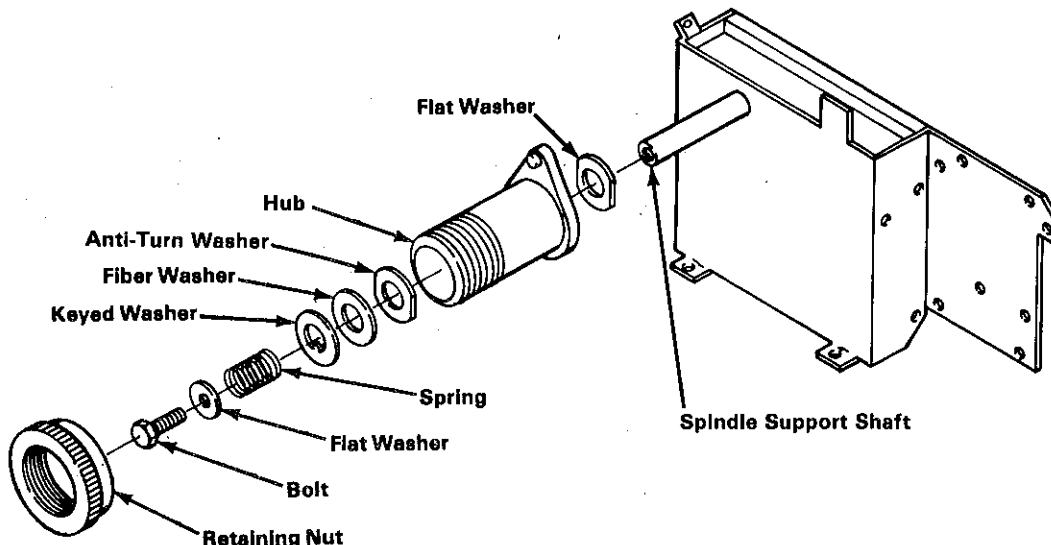


Figure 6-1. Reinstallation Of Hub Assembly

6 - 4. BRUSH INSPECTION AND REPLACEMENT

1. Place the Control switch in the OFF position and disconnect from the weld output circuits.
2. Remove the brush cap.
3. Remove brush holder and examine brush. Replace the brush if it is chipped or broken or if less than 1/4 in. (6 mm) of brush material remains.
4. Reinstall brush holder and cap.

6 - 5. CONTROL CIRCUIT BOARD REPLACEMENT

The control circuit board is mounted on the rear of the chassis subassembly. To gain access to the circuit board, open the side door and remove the screws securing the chassis subassembly to the wire feeder case. Remove the chassis subassembly from the feeder and remove the screws securing the circuit board to the subassembly.

6 - 6. TROUBLESHOOTING - The following chart is designed to diagnose and provide remedies for some of the troubles that may develop in this unit.

It is assumed that proper installation has been made, according to Section 3 of this manual, and that the unit 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.

CAUTION: DISASSEMBLY OF MOTOR FIELD MAGNETS can result in personal injury or equipment damage.

- Limit wire drive motor repairs to brush replacement.

The field magnets are very strong. If disassembly is attempted, injury to fingers and hands may result from the magnets drawing the armature back into the motor. The field magnets are matched sets and operation may be affected if the magnets are tampered with. Warranty is void if the motor is tampered with.

TROUBLE	PROBABLE CAUSE	REMEDY
Wire does not feed; open-circuit voltage available.	Circuit breaker open.	Reset circuit breaker (see Section 4-4).
	Poor or improper sensing lead connection.	Check sensing lead connection.
	Loose or improperly made gun trigger connection.	Check gun trigger connection (see Section 3-3).
	Gun trigger defective.	See gun Owner's Manual.
	Motor defective.	Replace motor.
	Control circuit board defective.	Replace circuit board.
Wire feed erratically.	Pressure on drive rolls is insufficient.	Rotate pressure adjustment wing nut clockwise in 1/4 turn increments until the wire stops slipping.
	Drive rolls wrong size for wire size used.	Change to correct size drive roll (see Section 3-1).
	Drive rolls worn.	Replace drive rolls (see Section 3-1).
	Dirt in drive rolls.	Clean drive rolls (see Section 6-2).
	Control circuit board defective.	Replace circuit board.
Wire stubbing on low end using a constant current power source.	Mode switch in CP position.	Place Mode switch in CC position.

*Be sure the replacement fuse is of the same size, type, and rating.

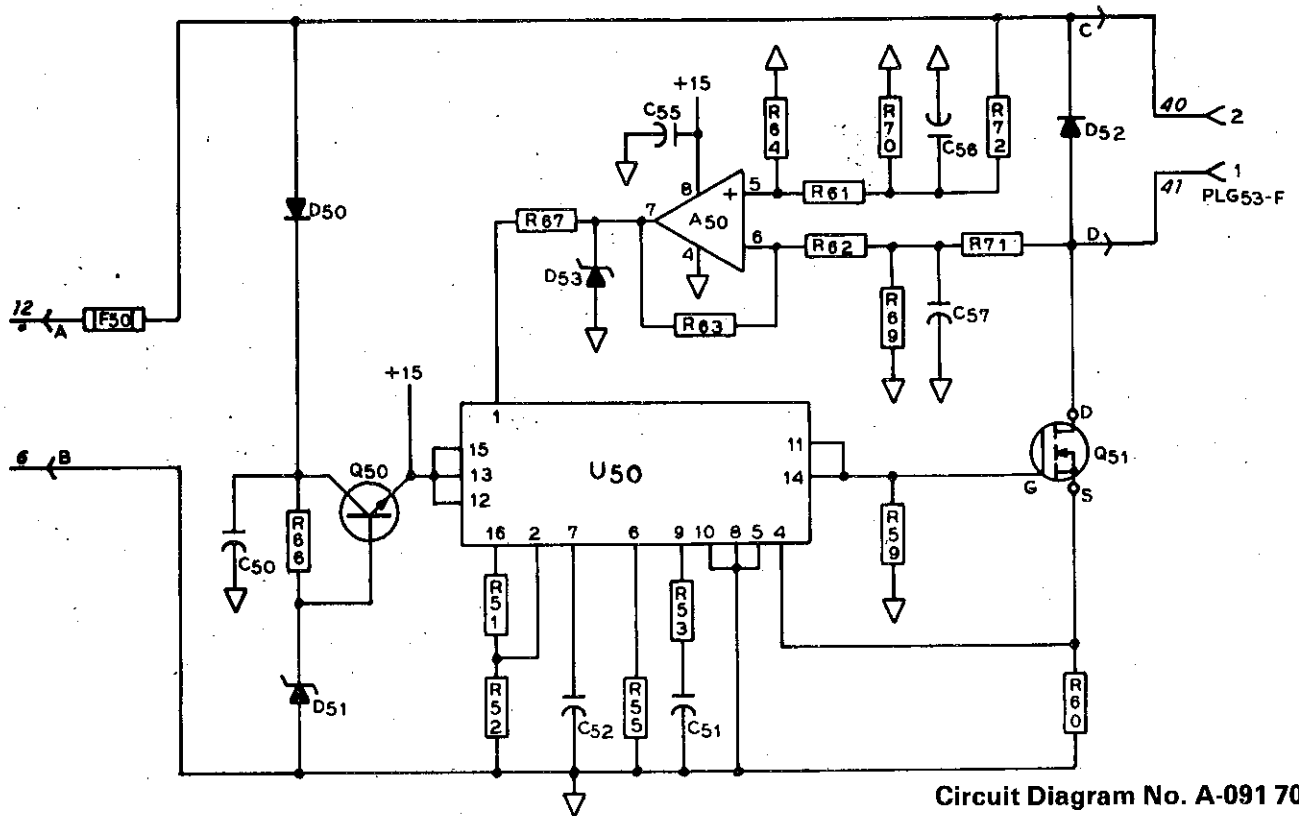


Figure 6 - 3. Circuit Diagram For 12 Volt Gas Valve Option Circuit Board

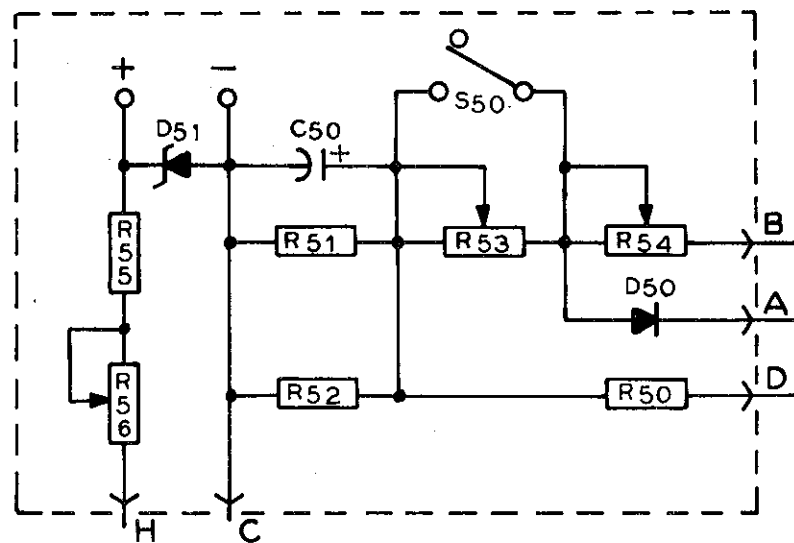
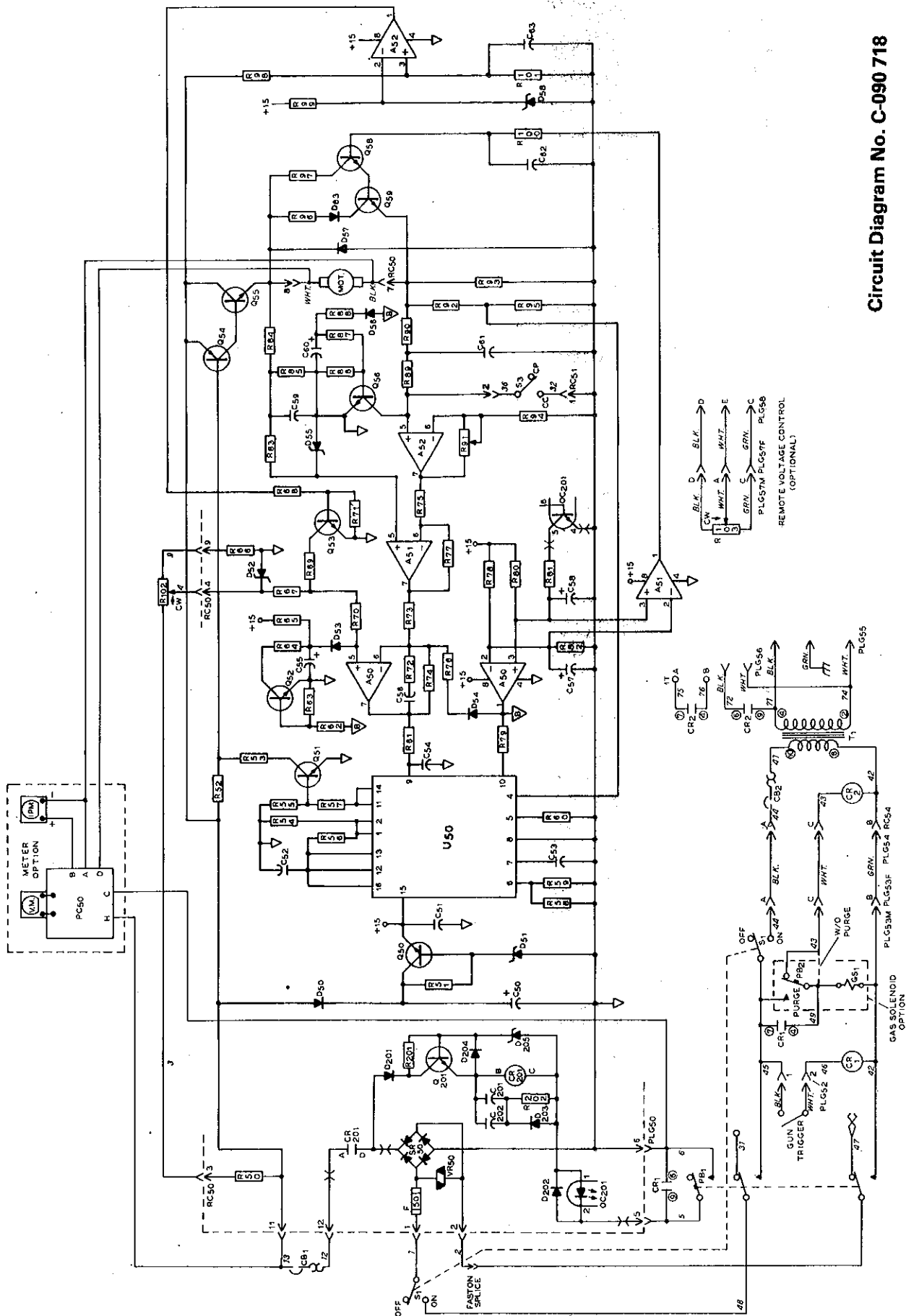
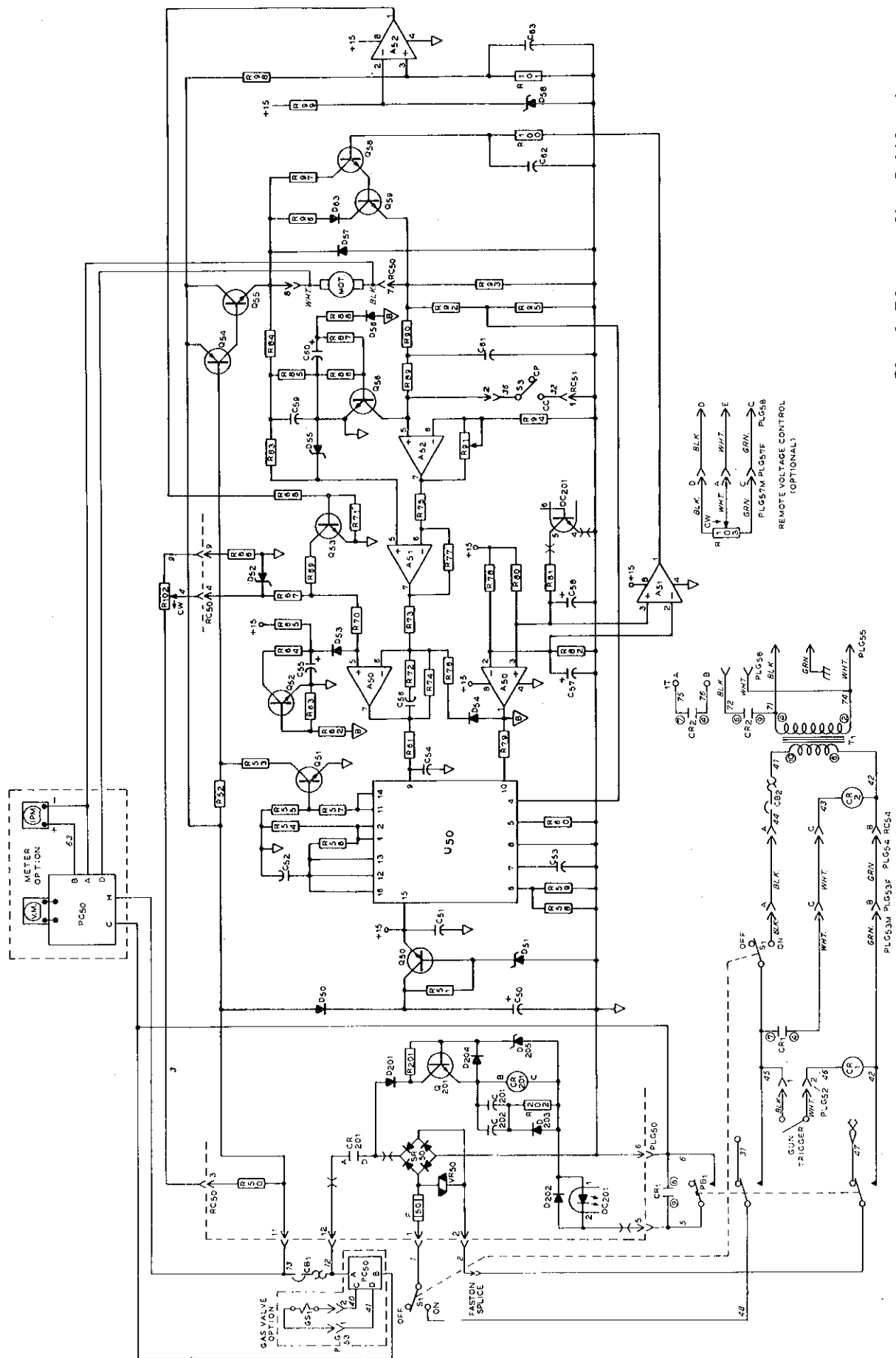


Figure 6 - 4. Circuit Diagram For Meter Option Circuit Board



Circuit Diagram No. C-090 718

Figure 6 - 5. Circuit Diagram For Models With 24 Volt Contactor Control Option



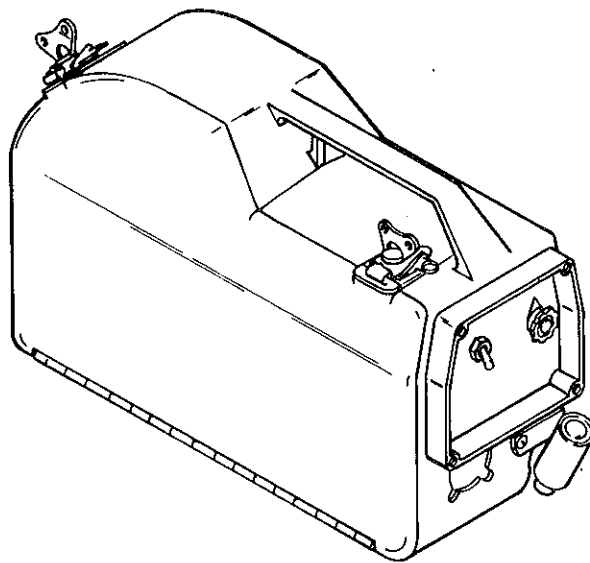
Circuit Diagram No. C-092 662

Figure 6 - 6. Circuit Diagram For 12 Volt Gas Valve And 24 Volt Contactor Option

August 1983

FORM: OM-1540

Effective With Serial No. JD671331



PARTS LIST

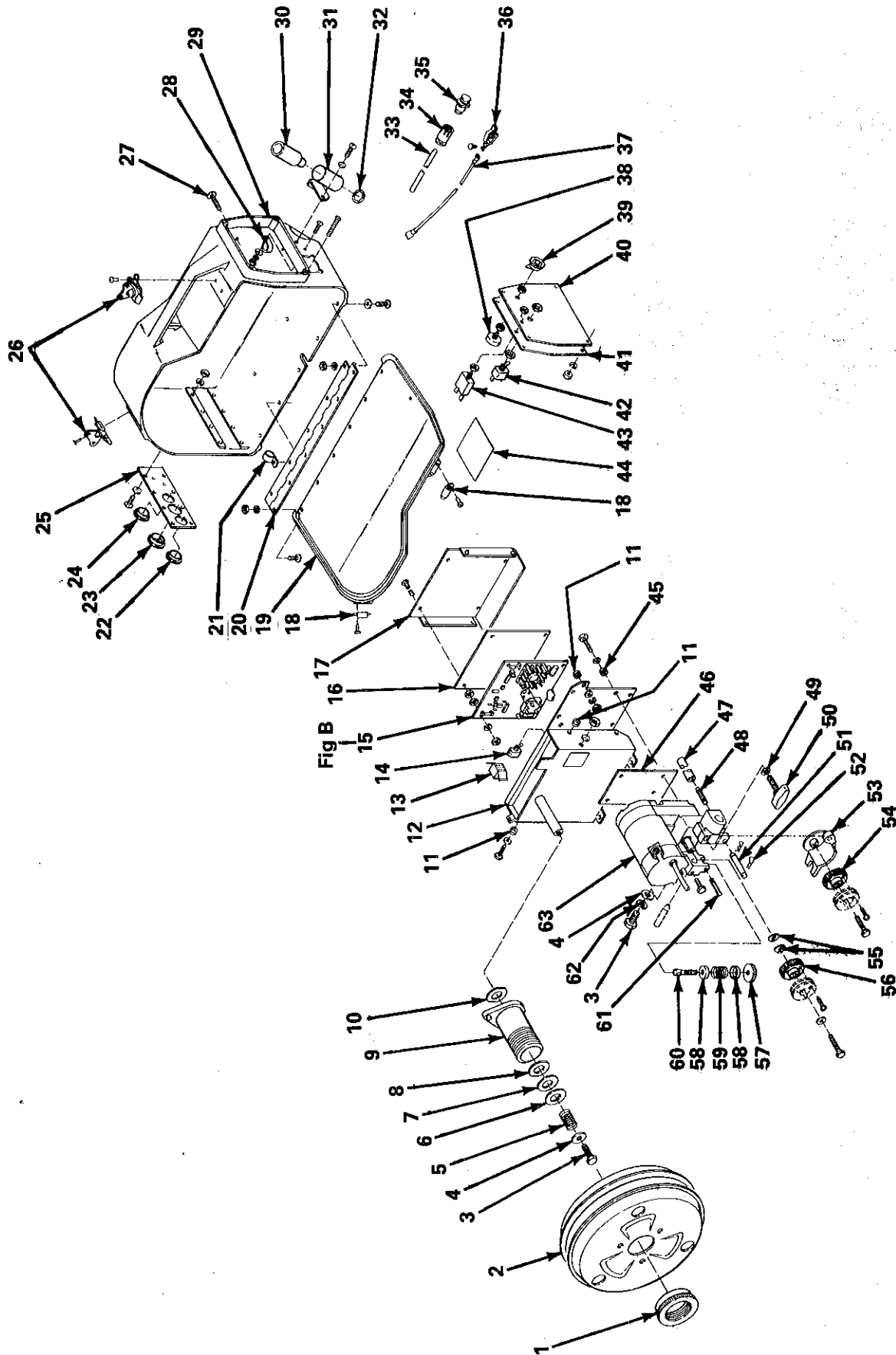


Figure A - Main Assembly

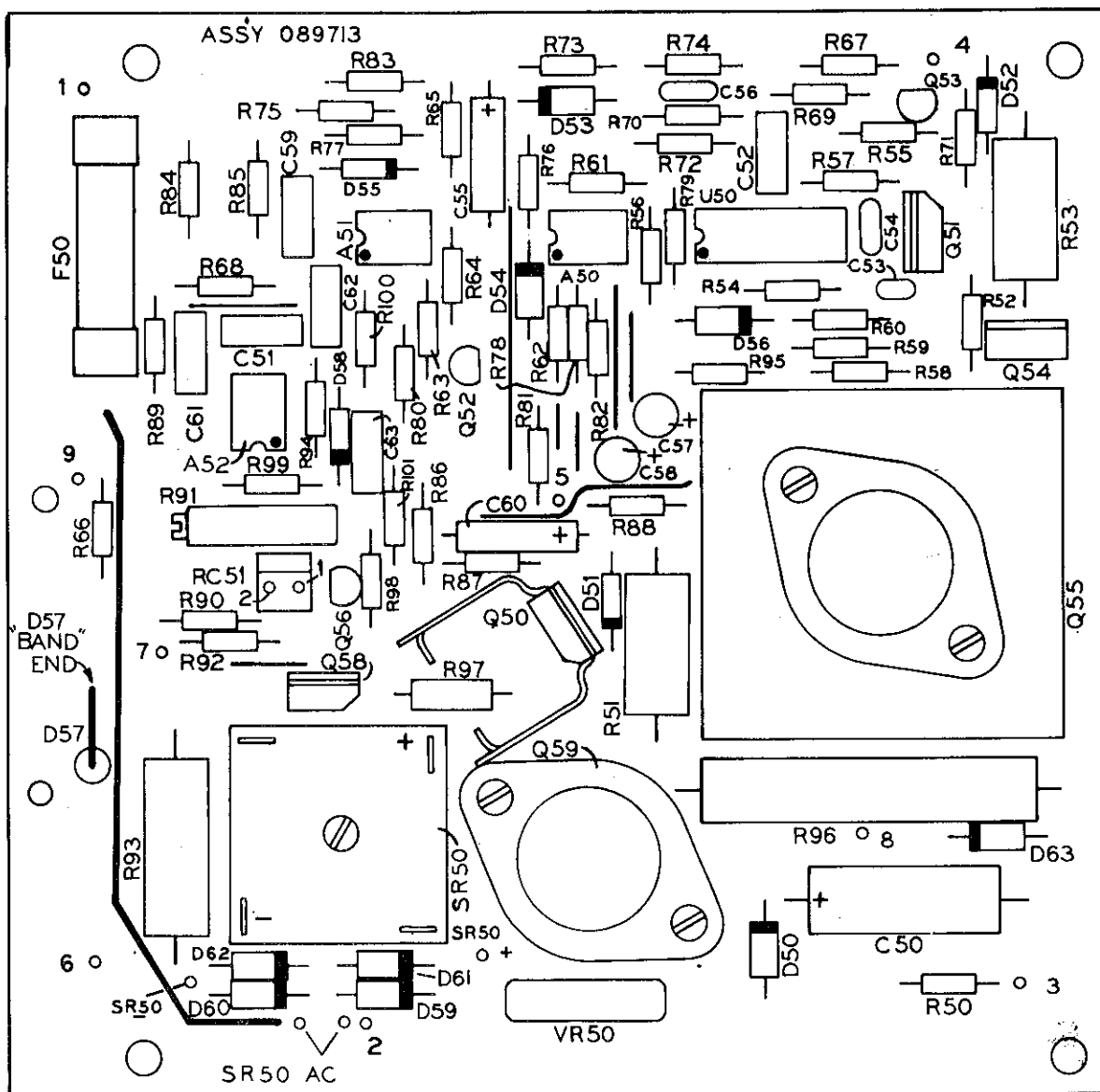
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure A Main Assembly				
1		089 554	NUT, retaining-spool	1
2		088 425	ADAPTER, spool	2
3		601 964	SCREW, cap-hex hd 3/8-16 x 3/4	2
4		602 243	WASHER, flat 3/8	2
5		010 233	SPRING, 0.97 OD x 1-1/4	1
6		057 971	WASHER, flat-keyed 1-1/2 dia	1
7		010 191	WASHER, fibre 5/8 ID x 1-1/2 OD x 1/8	1
8		089 561	WASHER, anti turn	1
9		089 571	HUB, spool	1
10		058 424	WASHER, fibre-brake	1
11		089 478	GROMMET, 13/64 ID x 5/16 mtg hole	4
12		089 567	PANEL, center	1
		010 493	BUSHING, snap 5/8 ID x 7/8 mtg hole	1
13	PLG50	083 526	RECEPTACLE & SOCKETS (consisting of)	1
		009 418	TERMINAL, female	12
14	S3	011 770	SWITCH, toggle SPDT 5 amp 125 volts	1
	PLG51	082 798	HOUSING, terminal 2 position	1
15		089 713	CIRCUIT CARD, motor control (Fig B Pg 4)	1
16		089 551	INSULATION, circuit card	1
17		089 564	PANEL, circuit card cover	1
18		089 573	PLATE, link lock keeper	2
19		+ 089 409	COVER, control/feeder	1
20		089 559	HINGE, cover	1
21		010 014	CLAMP, cushion 3/4 dia x 13/64 hole	1
22		000 527	BLANK, snap-in 7/8 hole	1
23		057 357	BUSHING, snap 15/16 ID x 1.12 mtg hole	1
24		047 838	BLANK, snap-in 1 inch hole	1
25		089 560	PANEL, cable-inlet	1
26		089 572	CATCH, link-lock	2
27		605 130	SCREW, machine-truss hd 10-32 x 1	8
28		010 142	CLAMP, 5/16	1
29		089 410	CASE, control/feeder	1
		025 590	MOUNT, resilient	4
		045 852	CLIP, 11/16 dia	2
30		090 099	INSULATOR, gun holder	1
31		090 102	BRACKET, gun holder	1
32		044 800	WASHER, spring grip-locking 3/4	1
33		604 525	CORD, No. 18 2/C (order by ft)	3ft
34		048 834	CLAMP, cable	1
35	PLG52	080 328	RECEPTACLE W/ SOCKETS, free hanging (consisting of)	1
		079 534	TERMINAL, female	4
36		601 222	CLAMP, universal 50 amp	1
37		600 399	WIRE, stranded 14 ga (order by ft)	15ft
38	R102	073 562	POTENTIOMETER, carbon 1 turn 2 watt 10K ohm	1
39		024 366	KNOB, pointer	1
40			NAMEPLATE, (order by model & serial numbers)	1
41		089 568	PANEL, front	1
42	S1	011 609	SWITCH, toggle SPDT 15 amp 125 volts ac	1
43	CB1	089 807	CIRCUIT BREAKER, manual reset 2.5 amp 250 volts	1
44		047 497	LABEL, general precautionary	1
45		089 479	WASHER, shoulder 3/8 OD x 0.194 ID	4
46		089 556	INSULATION, motor	1
47		604 550	HOSE, No. 1 x 3/16 ID (order by ft)	3ft
48		079 633	FITTING, hose-brass barbed nipple 3/16 TBG	1
49		604 538	WASHER, flat-SAE 5/16	1
50		079 772	KNOB, 1-3/4 OD x 5/16-18 x 1-1/2	1
51		089 555	PIN, hinge	1
52		604 741	PIN, cotter-hair 0.042 x 15/16	2
53		046 619	LEVER, mtg-pressure gear	1

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

54		053 842	GEAR, spur-insulated w/bearing	1
55		079 625	WASHER, spring 1/2	2
56		053 841	GEAR, spur-insulated w/key	1
57		085 243	KNOB, adjust tension	1
58		085 244	WASHER, cupped 21/64 ID x 13/16 OD	2
59		089 477	SPRING, 0.77 OD x 0.715 long x 0.105	1
60		089 562	FASTENER, pinned	1
61		010 224	PIN, spring 3/16 x 1	1
62		602 213	WASHER, lock-split 3/8	1
63	MOT	089 365	MOTOR, 24 volts dc 2.2 amp 114 RPM	1

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



089 713

Figure B - Circuit Card, Motor Control

Dia. Mkgs.	Part No.	Description	Quantity
Figure B	089 713	Circuit Card, Motor Control (Fig A Pg 2 Item 15)	
A50-52	009 159	1C, linear	3
C50	073 453	CAPACITOR, electrolytic 10 uf 150 volts	1
C51,52,59,61-63	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	6
C53	083 182	CAPACITOR, ceramic 0.1 uf 50 volts dc	1
C54	053 992	CAPACITOR, ceramic 0.001 uf 1000 volts	1
C55,60	072 113	CAPACITOR, tantalum 4.7 uf 35 volts dc	2
C56	003 530	CAPACITOR, ceramic 1 uf 50 volts	1
C57	039 481	CAPACITOR, electrolytic 3.3 uf 50 volts dc	1
C58	072 130	CAPACITOR, tantalum 1 uf 35 volts dc	1
D50,53,54, 56,63	026 202	DIODE, 1 amp 400 volts straight polarity	5
D51,55	037 449	DIODE, zener 15 volts 1 watt straight polarity	2
D52,58	074 240	DIODE, zener 8.2 volts 1 watt	2
D57	087 294	RECTIFIER, fast recovery WR 400 volts 3 amp	1
F50	027 419	FUSE, ceramic 15 amp 250 volts	1
	089 835	CLIP, fuse	2
Q50,51,58	087 295	TRANSISTOR, 0.5 amp	3
Q52,53,56	037 200	TRANSISTOR, 200MA 40 volts NPN	3
Q54	087 293	TRANSISTOR, 8 amp 150 volts PNP	1
Q55,59	087 292	TRANSISTOR, 20 amp 350 volts NPN	2
R50,65,67,70,84	039 335	RESISTOR, carbon film 0.25 watt 47K ohm	5
R51,53	074 121	RESISTOR, carbon 2 watt 3300 ohm	2
R52,66,92,100	035 825	RESISTOR, carbon film 0.25 watt 1K ohm	4
R54,56,61,87	035 884	RESISTOR, carbon film 0.25 watt 100K ohm	4
R55,57,58	084 205	RESISTOR, carbon film 0.25 watt 3.3K ohm	3
R59	072 677	RESISTOR, carbon film 0.25 watt 33K ohm	1
R60,64	044 634	RESISTOR, carbon film 0.25 watt 330 ohm	2
R62,63,79,88	035 888	RESISTOR, carbon film 0.25 watt 2.2K ohm	4
See Note	035 827	RESISTOR, carbon film 0.25 watt 6.8K ohm	11
R69,82	039 334	RESISTOR, carbon film 0.25 watt 27K ohm	2
R74	038 584	RESISTOR, carbon film 0.25 watt 470K ohm	1
R75,77	039 336	RESISTOR, carbon film 0.25 watt 220K ohm	2
R83,98	039 108	RESISTOR, carbon film 0.25 watt 82K ohm	2
R85,99	035 826	RESISTOR, carbon film 0.25 watt 6.8K ohm	2
R89	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	1
R91	030 034	POTENTIOMETER, cermet 15 turn 0.75 watt 100K ohm	1
R93	089 318	RESISTOR, WW fixed 5 watt 0.1 ohm	1
R95	039 106	RESISTOR, carbon film 0.25 watt 470 ohm	1
R96	604 288	RESISTOR, WW fixed 10 watt 2 ohm	1
R97	030 114	RESISTOR, carbon 0.5 watt 150 ohm	1
R101	052 138	RESISTOR, carbon film 0.25 watt 20K ohm	1
SR50	035 914	RECTIFIER, integrated 30 amp 400 volts	1
U50	087 291	1C, liner	1
VR50	047 183	VARISTOR, 50 joule 232 volts	1
RC50	072 802	HOUSING PLUG & PINS (consisting of)	1
	009 419	TERMINAL, male	12
RC51	082 799	TERMINAL, 2 pin header	1
	091 200	STAND-OFF, post 1/2 inch	2
	Figure B1	CIRCUIT CARD, relay (Pg 5)	1

Note: R68,71-73,76,78,80,81,86,90,94

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

Figure B1 **Circuit Card, relay (Pg 4)**

Figure B1 – Circuit Card, relay

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NOTE : Base selection of drive rolls upon the following recommended usages:

1. V-Groove rolls for hard wire.
2. U-Groove rolls for soft and soft shelled cored wires.
3. U-Cog rolls for extremely soft shelled wires (usually hard surfacing types).
4. Split V-Knurled rolls for hard shelled cored wires (self-shielding and CO₂ shielded types).
5. Drive roll types may be mixed to suit particular requirements (example: V-knurled roll in combination with U-groove).

Wire Diameter & Type			Kit No.*	Roll Drive		Inlet Wire Guide
Fraction	Decimal	Metric		Part No.	Type	
.030"	.030	.8MM	079 594	053 695	V-groove	056 192
.035"	.035	.9MM	079 595	053 700	V-groove	056 192
.045"	.045	1.2MM	079 596	053 697	V-groove	056 193
.052"	.052	1.3MM	079 597	053 698	V-groove	056 193
1/16"	.062	1.6MM	079 598	053 699	V-groove	056 195
.035"	.035	.9MM	044 749	072 000	U-groove	056 192
.045"	.045	1.2MM	079 599	053 701	U-groove	056 193
.052"	.052	1.3MM	079 600	053 702	U-groove	056 193
1/16"	.062	1.6MM	079 601	053 706	U-groove	056 195
5/64"	.079	2.0MM	079 602	053 704	U-groove	056 195
.035"	.035	.9MM	079 606	079 726	V-knurled	056 192
.045"	.045	1.2MM	079 607	079 728	V-knurled	056 193
.052"	.052	1.3MM	079 608	079 727	V-knurled	056 193
1/16"	.062	1.6MM	079 609	056 771	V-knurled	056 195
.072"	.072	1.8MM	089 984	090 860	V-knurled	056 195
5/64"	.079	2.0MM	079 610	056 773	V-knurled	056 195
1/16"	.062	1.6MM	079 614	053 708	U-cogged	056 195
5/64"	.079	2.0MM	079 615	053 710	U-cogged	056 195

Drive Roll & Wire Guide Kits

*When ordering replacement parts all kits listed with the exception of the V-KNURLED kits are one piece drive rolls. Two drive rolls are required for the one piece drive kits and four drive rolls for the split V-knurled kits.

Optional Parts

Dia. Mkgs.	Part No.	Description	Quantity
PB2	011 232	SWITCH, push button SPDT	1
GS1	091 646	VALVE, 24 volts ac 2 way 1/8 NPT 3/64 orifice	1
	091 290	SPACER, gas valve mounting	1
	073 432	FITTING, brass barbed M 3/16 TBG x 1/8 NPT	1
	020 185	FITTING, pipe-brass elbow st 1/8 NPT	1
	089 552	FITTING, pipe-brass elbow st 1/8 NPT x 5/8-18 RH	1
	604 550	HOSE, No. 1 x 3/16 ID (order by ft)	2ft
GS1	091 923	VALVE, 12 volts dc 2 way 1/8 NPT 3/64 orifice	1
PC50	091 746	CIRCUIT CARD, gas control (consisting of)	1
A50	009 159	. 1C, linear 358 operation amp dual	1
C50	073 453	. CAPACITOR, electrolyte 10 uf 150 volts	1
C51,52,55	083 182	. CAPACITOR, ceramic 0.1 uf 50 volts dc	3
C56,57	072 130	. CAPACITOR, tantalum 1 uf 35 volts dc	2
D50	026 202	. DIODE, rectifier 1 amp 400 volts SP	1
D51	037 449	. DIODE, zener 15 volts 1 watt SP	1
D52	087 294	. RECTIFIER, fast recovery WR 400 volts 3 amp	1
D53	074 438	. DIODE, zener 3 volts 500 MW	1
Q50	087 295	. TRANSISTOR, 0.5 amp 300 volts NPN	1
Q51	091 641	. TRANSISTOR, N channel mosfet to-220AB	1
R50	091 643	. FUSE, 2 amp axial lead	1
R51,52,55,59,67,71,72	000 885	. RESISTOR, carbon film 0.25 watt 10K ohm	7
R53	035 823	. RESISTOR, carbon film 0.25 watt 10 ohm	1
R60	091 642	. RESISTOR, WW fixed 1 watt 0.18 ohm	1
R61,62	039 326	. RESISTOR, carbon film 0.25 watt 68K ohm	2
R63,64	052 143	. RESISTOR, carbon film 0.25 watt 160K ohm	2
R66	030 004	. RESISTOR, carbon 0.5 watt 10K ohm	1
R69,70	072 560	. RESISTOR, carbon film 0.25 watt 1K ohm	1
U50	087 291	. 1C, linear 3524 regulator pulse width modulator	1
PLG53F	048 281	. RECEPTACLE W/SOCKETS (consisting of)	1
	058 972	. TERMINAL, female	2
	070 760	. HEAT SINK	1
	091 924	BRACKET, mtg-gas control board	1
	091 922	COVER, circuit card	1
	010 423	CONNECTOR, tab	1
	005 303	TUBING, 9/64 ID x 1/4 OD x 7/8	4
	604 550	HOSE, No. 1 x 3/16 ID (order by ft)	2ft
R51,52,55,59,67,71,72	000 885	. RESISTOR, carbon film 0.25 watt 10K ohm	7
R53	035 823	. RESISTOR, carbon film 0.25 watt 10 ohm	1
R60	091 642	. RESISTOR, WW fixed 1 watt 0.18 ohm	1
R61,62	039 326	. RESISTOR, carbon film 0.25 watt 68K ohm	2
R63,64	052 143	. RESISTOR, carbon film 0.25 watt 160K ohm	2
R66	030 004	. RESISTOR, carbon 0.5 watt 10K ohm	1
R69,70	072 560	. RESISTOR, carbon film 0.25 watt 1K ohm	1
U50	087 291	. 1C, linear 3524 regulator pulse width modulator	1
PLG53F	048 281	. RECEPTACLE W/SOCKETS (consisting of)	1
	058 972	. TERMINAL, female	2
	070 760	. HEAT SINK	1
	091 924	BRACKET, mtg-gas control board	1
	091 922	COVER, circuit card	1
	010 423	CONNECTOR, tab	1
	005 303	TUBING, 9/64 ID x 1/4 OD x 7/8	4
	604 550	HOSE, No. 1 x 3/16 ID (order by ft)	2ft
CB2	089 807	CIRCUIT BREAKER, manual reset 2.5 amp 250 volts	1
CR1,2	006 393	RELAY, enclosed 24 volts ac DPDT flanged	2
	091 921	BRACKET, mtg-relay	1
PB1	090 924	SWITCH, push button SPDT 5 amp 3 volts dc	1
RC54	073 383	RECEPTACLE, 3 socket MS-3102A-14S-1S	1
S1	011 611	SWITCH, toggle DPDT 15 amp 125 volts	1
T1	090 465	TRANSFORMER, signal 115 volts 24 VCT 4 amp	1
1T	038 861	BLOCK, terminal 20 amp 3 pole	1
	084 272	CORD SET, 125 volts 16 ga 3/C 3 ft	1

Dia. Mkgs.	Part No.	Description	Quantity
PLG53M	091 997	CORD, feeder/contacter control (consisting of)	1
	052 236	. RECEPTACLE, 3 pin MS-3101A-14S-1P	1
	007 826	. CORD, No. 18 3/C (order by ft)	2ft
	039 828	. CLAMP, cable	1
PLG54	091 996	CORD, interconnecting-contacter control (consisting of)	1
	052 236	. PLUG, 3 pin MS-3106A-14S-1P	1
	007 826	. CORD, No. 18 3/C (order by ft)	30ft
	092 219	. PLUG, 3 socket MS-3101A-14S-1S	1
PLG53F	039 828	. CLAMP, cable	2
	091 995	CORD, contacter control (consisting of)	1
	039 635	. CONNECTOR BODY, twistlock 2P2W 20 amp 240 volts	1
	049 455	. CORD, No. 18 2/C (order by ft)	3ft
PLG56	010 610	CONNECTOR, clamp-cable 1/2	1
	010 916	CONNECTOR, clamp-cable 3/4	1
	091 999	CASE SECTION, back/bottom/front	1
	091 998	WRAPPER, control box	1
PLG57M	019 663	MOUNT, neoprene 15/16 OD x 3/8	4
	047 497	LABEL, general precautionary	1
	092 079	CORD, interconnecting-voltage control (consisting of)	1
	088 913	. RECEPTACLE, 4 pin MS-3101A-14S-2PX	1
PLG58	007 826	. CORD, No. 18 3/C (order by ft)	3ft
	039 828	. CLAMP, cable	1
	047 001	CORD, interconnecting-control/machine (consisting of)	1
	039 273	. PLUG, 5 pin MS-3106A-16S-8P	1
PLG57F	039 685	. CLAMP, cable	1
	600 341	. CORD, No. 16 3/C (order by ft)	10ft
	047 544	. PLUG, 4 socket MS-3106A-14S-2SX	1
	039 828	. CLAMP, cable	1
R103	072 462	POTENTIOMETER, carbon 1 turn 2 watt 1000 ohm (consisting of)	1
	072 590	. LOCK, shaft	1
	079 772	KNOB	1

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

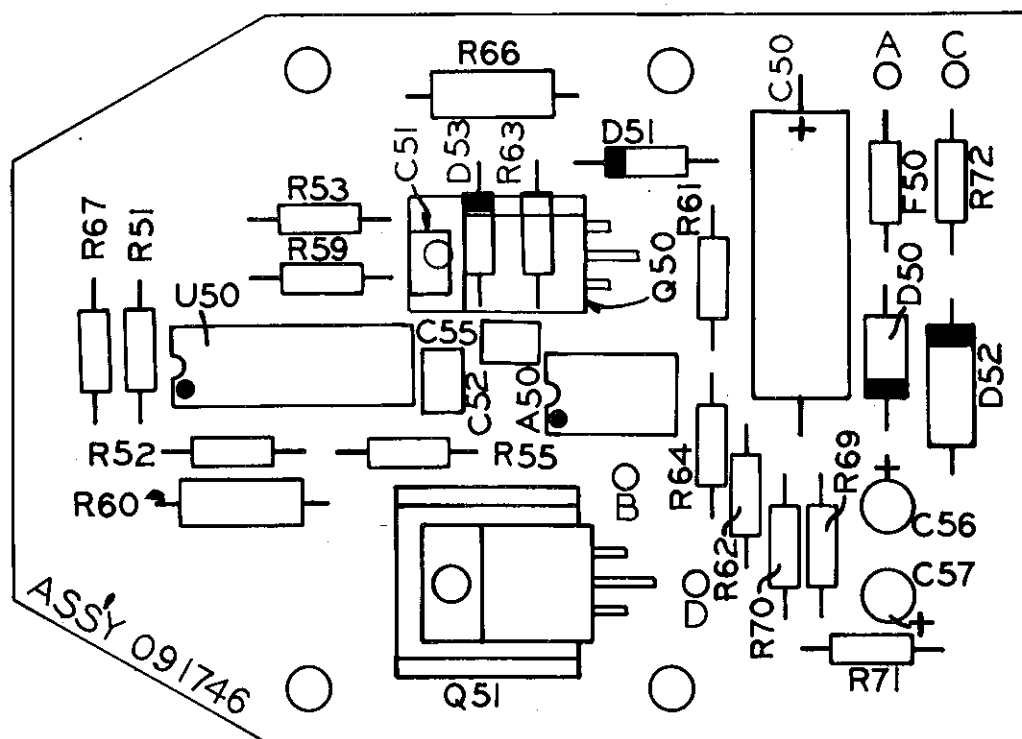


Figure C - Circuit Card, gas control (optional)

