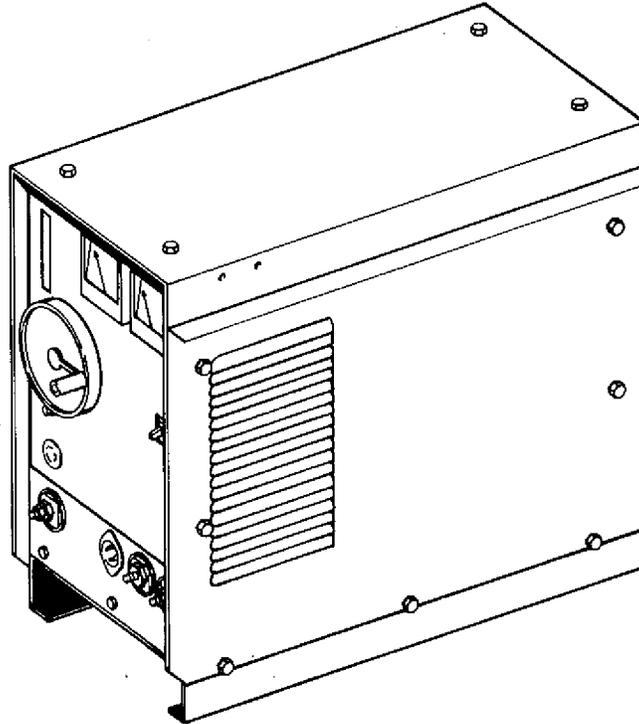


June 1973

FORM: OM-235

Effective with serial No. HD687439

MODEL	STOCK NO
CP-200 (208/230)	901 850
CP-200 (230/460)	901 851



MODEL/STOCK NO.	SERIAL/STYLE NO.	DATE PURCHASED

OWNER'S MANUAL



MILLER ELECTRIC MFG. CO.
APPLETON, WISCONSIN, USA 54911

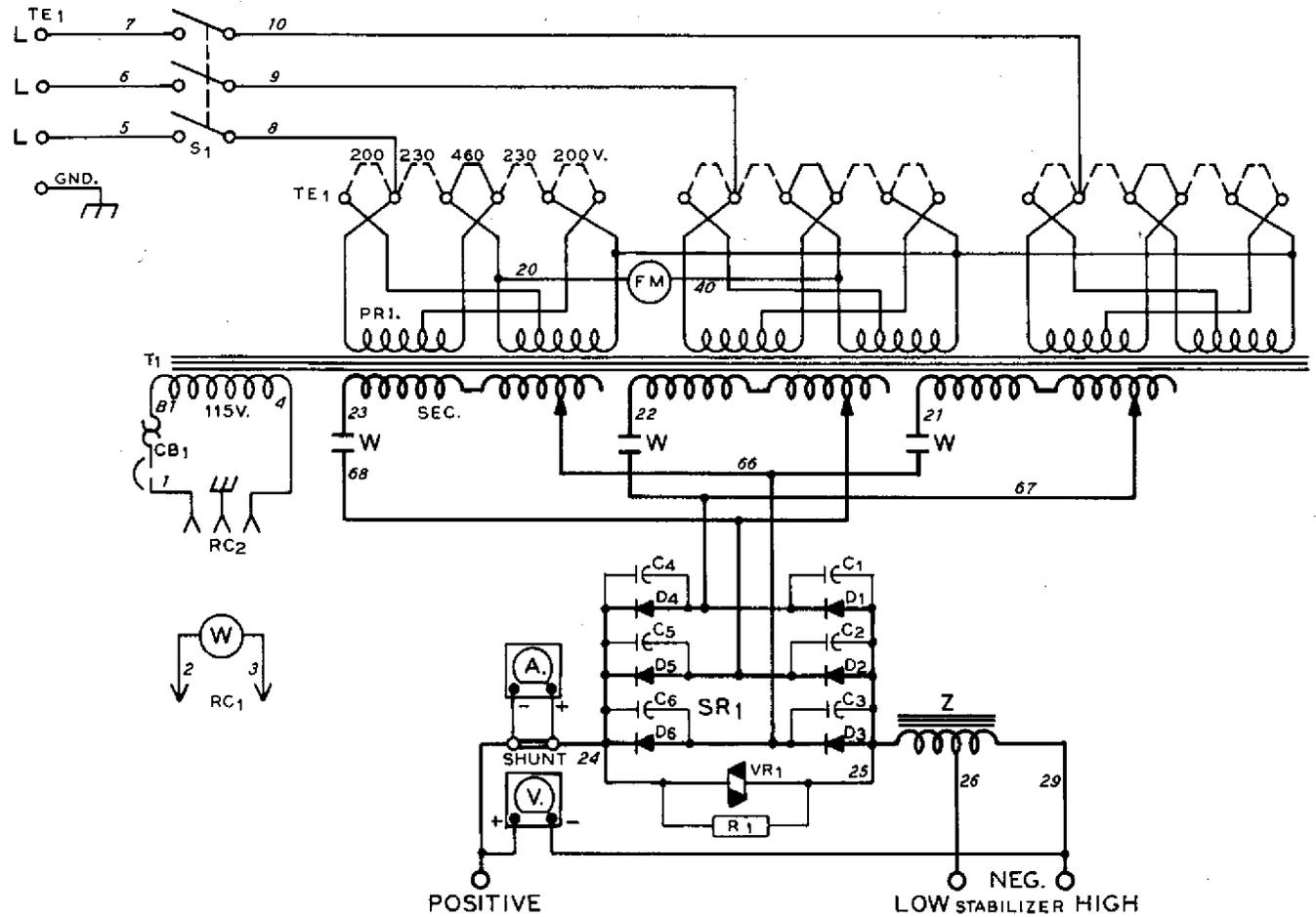
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PRINTED
IN
U.S.A.

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

AMENDMENT TO SECTION 6 - MAINTENANCE & TROUBLESHOOTING

Amend Figure 6 - 1. Circuit Diagram



Circuit Diagram No. A-098 124-A

Figure 6 - 1. Circuit Diagram

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SECTION 1- SAFETY RULES FOR OPERATION OF ARC WELDING MACHINE

1 - 1. GENERAL

These rules apply to ac and dc welding generators, ac transformer and ac/dc welding machines, and dc transformer rectifier welding machines.

In arc-welding operations, where electrically energized parts are exposed, observe the following safety rules to insure maximum personal safety and protect nearby persons.

Failure to observe these safety precautions may expose not only you, but fellow workers as well, to serious injuries. Once these rules are learned and kept in mind, proceed with maximum assurance.

1 - 2. WELDING CABLES

DON'T overload cables, (Figure 1-1)



Figure 1-1. Don't overload cables

NEVER use welding cables at currents in excess of their rated capacity. It will cause overheating and rapid deterioration of the insulation. It is also uneconomical.

DON'T use worn or poorly connected cables. (Figure 1-2)

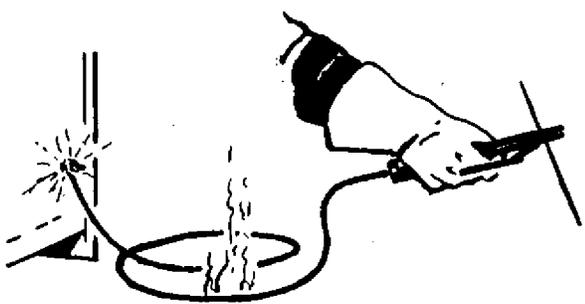


Figure 1-2. Don't use worn or poorly connected cables

Inspect the cables frequently. Immediately repair all breaks in the insulation with rubber and friction tapes. Tighten all cable connections and adequately insulate any joints where a connector may have an exposed conductive part. In addition to the potential hazard to life, a hazard occurs when exposed sections of cable come in contact with grounded metallic objects, causing an arc. Unprotected eyes may be injured and fire may result if combustible materials such as oil or grease are in the vicinity. The efficiency and quality of welding will be improved by elimination of these dangerous grounds, and by keeping connections tight.

1 - 3. ELECTRODE HOLDER

DON'T use electrode holders with defective jaws. (Figure 1-3)

Keep the jaws of the electrode holder tight and the gripping surfaces in good condition to provide close contact with the electrodes. Defective jaws will permit the electrode to wobble, making control of the welding operations difficult.

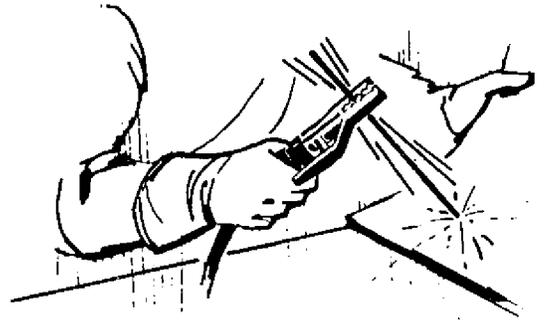


Figure 1-3. Don't use Electrode Holder with defective jaws

DON'T use electrode holder with loose cable connections.

Keep the connections of the electrode lead to the holder tight at all times.

Use only fully insulated electrode holders (and without protruding screwheads.)

Never touch two electrode holders from two separate welding machines at the same time.

1 - 4. CODE CONFORMANCE

The machine and its equipment must be installed and maintained in accordance with the National Electrical Code and local requirements.

1 - 5. PARALLEL CONNECTIONS

See diagrams in the instruction manual applying to the welding machine used.

1 - 6. POWER DISCONNECT SWITCH

If the welding machine does not include a power disconnect switch, install one at or near the machine.

1 - 7. POLARITY SWITCH

DON'T operate the polarity switch under load.

The polarity switch (when supplied) is provided for changing the electrode lead from positive (reverse polarity) to negative (straight polarity). Never move it while under the load of a welding current. Operate this switch only while the machine is idling and the welding circuit is open. The potential dangers of opening the circuit while carrying high current are:

1. An arc will form between the contact surfaces of the switch and severely burn them.
2. The person throwing the switch may receive a severe burn from this arcing.

1 - 8. RANGE SWITCH

DON'T operate the range switch under load.

The range switch (when supplied) is provided for obtaining required current settings. It must never be operated while the machine is under the load of welding current. Operate the range switch only while the machine is idling and the welding circuit is open. The potential danger of switching the circuit while carrying high current is the formation of an arc between the contact surface which will severely burn them. Repeated occurrences of this arcing will eventually prevent operation of the contacts.

1 - 9. EXHAUST GASES

DON'T use gas engine units in confined spaces without venting the exhaust gases. (Figure 1-4)

If gasoline or other fuel driven welding machines are operated indoors, provide means to pipe the exhaust gases to the outside air to avoid carbon monoxide poisoning.

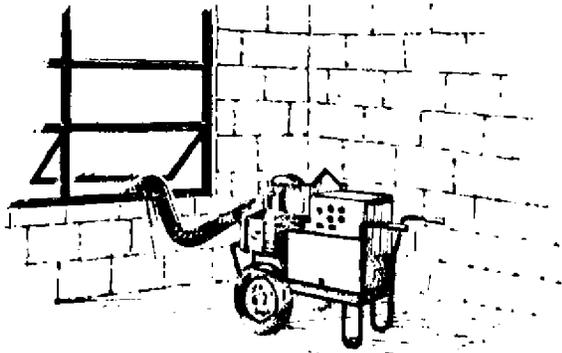


Figure 1-4. Vent exhaust gases

1-10. POWER CIRCUIT GROUND

DON'T use welding machine without grounding frame or case. (Figure 1-5)

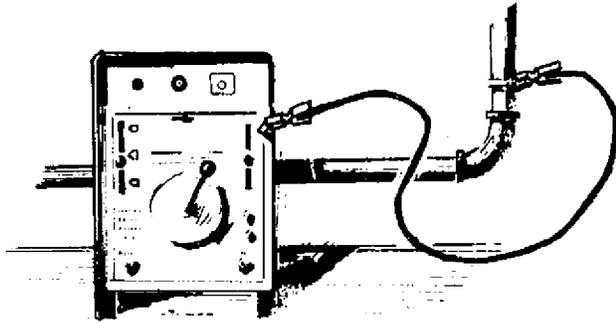


Figure 1-5. Ground frame or case

Ground the ground cable of every power circuit to prevent accidental shock by stray current. The potential danger is that development of a stray current may give a fatal shock should a person, for example, place one hand on the welding machine and the other on the switch box, or other grounded equipment. Do not ground to pipelines carrying gases or flammable liquids and conduits carrying electrical conductors. Be sure conductors can safely carry the ground current. When connecting the welding machine, properly ground the machine frame or case.

1-11. CONTAINERS WHICH HELD COMBUSTIBLES

DON'T weld on containers which have held combustible or flammable materials or materials which, when heated, give off flammable or toxic vapors without proper cleaning, purging, or inerting.

Welding containers which have held flammable or combustible materials may be extremely dangerous. To prevent a fire or explosion of the container, follow the recommendations of the American Welding Society Pamphlet A6.0 "Welding or Cutting Containers Which Have Held Combustibles".

DON'T depend on your eyes or nose to decide if it is safe to weld on a closed container.

Find out what was in the container or use an explosimeter. A very small amount of residual flammable gas or liquid can cause a serious explosion.

NEVER use oxygen to ventilate a container.

When you know the container held a gas or liquid which will readily dissolve in water:

1. Flush out with water several times and then fill with water as far as work permits, positioning container to permit introduction of as much water as possible.
2. Before welding be sure there is a vent or opening to provide for release of air pressure.

When you know the container held a gas or liquid which will not readily dissolve in water:

1. Clean out thoroughly with steam or a cleansing agent and purge all air or inert with a gas such as carbon dioxide or nitrogen before repairing. Carbon dioxide is heavier than air and will tend to remain in the container if the opening is at the top.
2. Use steam to clean out light material.
3. Use a strong caustic soda solution to clean out heavy oils or grease.
4. Be sure to purge all air or inert with a gas, such as nitrogen or carbon dioxide, no matter how well you have cleaned. There may still be traces of oil, grease, or other readily oxidizable material under the seams.

Be careful when cleaning with steam or caustic soda wear goggles and gloves.

DON'T clean where there is poor ventilation.

Ventilation is necessary to carry away harmful or explosive vapors.

DON'T clean where there are open flames.

When scraping or hammering to remove heavy sludge or scale, use a spark resistive tool and keep it wet to avoid sparks.

Keep your head and arms as far away from your work as possible.

1-12. HOLLOW CASTINGS

DON'T weld on hollow (cored) castings that have not been properly vented. The casting may explode. (Figure 1-6)



Figure 1-6. Don't weld on hollow (cored) castings

1-13. EXPLOSION HAZARDS

NEVER weld in or near explosive atmospheres. Such atmospheres can be created by flammable gas leaks or by vapors from flammable liquids (gasoline, alcohol, etc.) or by combustible dusts.

1-14. VENTILATION

DON'T weld in confined spaces without adequate ventilation.

When welding in confined spaces, provide ventilation in accordance with United States of American Standard Z49.1, 1967. Always provide adequate ventilation by blowers, air lines, or other acceptable means. Never use compressed oxygen. The depletion of the oxygen supply, the heat of welding, and the fumes given off may cause severe discomfort or a serious illness.

When toxic fumes from lead or cadmium bearing materials or any other substances are present in harmful concentrations, always use an air supplied respirator.

1-15. SOLVENTS

Do not weld where chlorinated hydrocarbon vapors from degreasing, cleaning, or spraying may reach or be drawn into air surrounding the welding operation. The heat of the arc can decompose solvent vapors to form phosgene, a highly toxic gas and other irritating decomposition products.

Do not weld where ultraviolet light from the electric arc can penetrate air containing even minute amounts of vapors from solvents such as trichloroethylene or perchloroethylene. Ultraviolet light can decompose the vapors to form phosgene, a highly toxic gas and other irritating products.

1-16. FIRE HAZARDS

DON'T weld near flammable or combustible materials.

Fires can be caused by the arc, by contact with the heated metal, by slag, or sparks. Keep combustibles at least 35 feet from the arc or suitably protected. If welding must be done in a particular area, move the combustibles away. If they cannot be moved, cover them completely with fire resistive screens. Cover cracks or openings in floors or walls; sweep floor free of combustibles and wet down, if wood, being sure welder wears insulation shoe coverings. Avoid welding on partition walls in contact with combustibles. Heated metal on the other side of partition wall being welded upon can ignite combustibles in contact with the partition. Where other than a minor fire might develop, have a fire watcher stand-by with suitable fire extinguishing equipment for at least one-half hour after the welding is completed.

1-17. ELECTRICAL SHOCK-VOLTAGE

OPEN power circuits before checking machines.

Before working on the wiring, switches, controls, etc., open the power line disconnect switch. In most welding shops the power supply used for arc welding machines is 230 or 460 volts. Open circuit voltages are usually less than 100 volts and welding or arc voltage drops are still lower. However, all of these voltages are capable of developing a harmful or fatal current to the body.

DON'T touch electrically "hot" parts.

NEVER touch any exposed or non-insulated part of the cables, cable connectors, clamps, electrode holders, electrodes, or the power supply equipment to prevent harmful or fatal electric shock or burns.

1-18. ELECTRICAL SHOCK-DAMPNESS

NEVER work in a damp area without suitable insulation against shock. Keep hands, feet, and clothing dry at all times.

To prevent harmful body shocks, keep hands, feet and clothing dry. Never stand or lie in puddles of water, damp ground, or against grounded metal when welding without suitable insulation against shock. Always find a dry board or rubber mat to stand on when water, moisture, or perspiration cannot be avoided. Dampness between the body and an energized or grounded metallic part lowers the resistance to the passage of current to the body which may produce a harmful or fatal shock. Salt in perspiration or sea water dangerously lowers contact resistances.

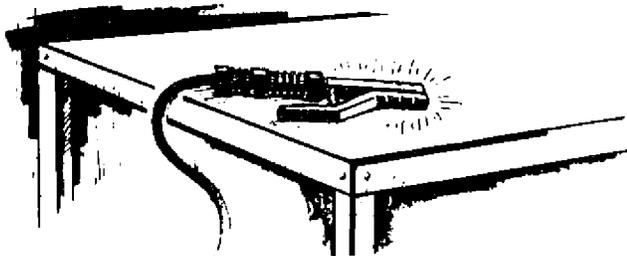


Figure 1-7. Don't leave electrode in contact with grounded metallic surface.

1-19. STARTING UNDER LOAD

DON'T leave an uninsulated electrode holder, or a "live"

electrode on the table top or in contact with a grounded metallic surface. (Figure 1-7)

When it is not in use, never place an electrode holder in contact with the tabletop or other metallic surface in contact with welding ground. Provide an insulated hook or holder for the electrode holder. A potential danger is that a holder in contact with the ground circuit provides a dead short circuit on the welding machine. If the machine should be started up, this short circuit would cause an excessive load on the machine and may damage the insulation.

1-20. FACE PROTECTION

DON'T use cracked or defective helmets or shields.

Keep the helmet, hand shields, or face shield in good condition. If cracks occur in the fibre material, replace the shield, since the leakage of arc rays may cause serious burns.

1-21. EYE PROTECTION

NEVER under any circumstances, look at an electric arc without eye protection.

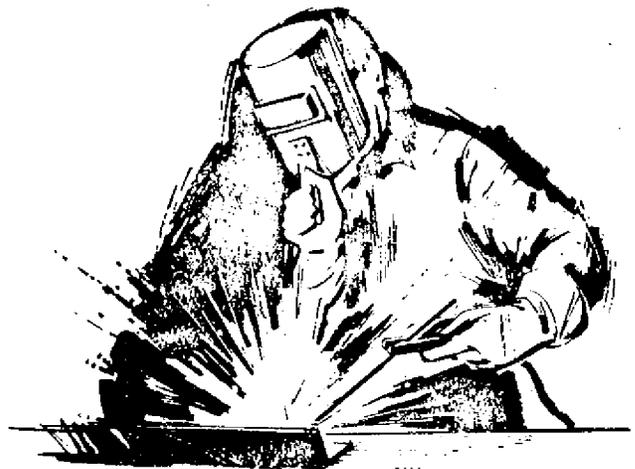


Figure 1-8. Use eye protection at all times

CAUTION

Make sure that flash goggles are used under the welding helmet at all times, particularly while gas shielded-arc welding.

In some type of arc welding, such as gas shielded-arc welding, ultra-violet and infra-red radiation from the arc is particularly intense and requires constant attention to avoid arc flashes to the welder when striking an arc and to avoid exposure to other welders.

NEVER strike an arc without ascertaining that nearby persons either have the necessary protective equipment or are looking in the opposite direction.

For welding operations in open areas, provide portable, non-reflecting screens to shield persons nearby from the rays of the arc. Eye burns from the arc, through not generally permanent injuries, are exceedingly painful. Such burns frequently referred to as "flashes", feel like hot sand in the eye. If the eye is focused on the arc without filter-glass protection, infra-red radiation can cause retinal scarring and impaired vision. For eye burns consult your first aid station or doctor.

NEVER use cracked, ill-fitting, or defective plates.

The filter glass plate provided in the helmets and shields must be of reputable manufacture conforming to the latest American National Standards Institute, Standard Z2.1. Replace cracked or ill-fitting filter plates promptly.

NEVER use filter plates without a protecting cover glass.

Keep a clean cover glass in front of the filter plate for the protection thereof. Frequent renewal of these cover glasses is necessary, since they become covered with spatter, reducing vision.

1-22. CLOTHING

NEVER use poor, inadequate, or worn-out clothing. Wear heavy shoes, tightly laced. Keep clothing dry.

Proper and dry, oil-free clothing is essential for the welder's protection. Clothing must not only keep off the spatter and molten particles, but must also obstruct the rays of the arc and, when necessary, insulate the body from harmful electrical currents.

Wear leather or asbestos gloves at all times to protect the hands and wrists. Dark colored shirts are preferred to light ones because light ones reflect arc rays to exposed parts of the body. In the case of gas shielded-arc welding, light colors are more reflective and may cause eye burns due to the intense ultra-violet rays given off by the process. Avoid cotton fabrics when gas shielded-arc welding.

An arc burn on the skin resembles a sunburn, except that it is usually more severe. Clothing can be made flame resistant by treatment with a solution of 3/4 pound of sodium stannate in 1 gallon of water, then wrung out and dipped in a solution of 1/4 pound ammonium sulphate per gallon of water. Don't wash clothing so prepared in water, but dry clean.

When welding operations are to be performed in vertical and overhead positions, leather sleevelets, aprons, and in some cases leggings and ear plugs should be used to prevent severe burns from spatter and molten metal.

1-23. HOT METAL BURNS

NEVER pick up hot objects. (Figure 1-9)



Figure 1-9. Never pick up hot objects

NEVER pick up pieces of metal which have just been welded or heated, or the stub ends of electrodes which have been discarded.

1-24. GRINDING AND CHIPPING

NEVER do any chipping or grinding without protective goggles. (Figure 1-10)



Figure 1-10. Never do any chipping or grinding without protective goggles.

Whenever it is necessary to grind or chip metal, wear protective goggles specifically designed for this purpose. Serious eye injuries may result from failure to wear protective goggles.

1-25. COMPRESSED GAS CYLINDERS

NEVER strike an arc on a compressed gas cylinder. Always observe the following precautions in regards to compressed gas cylinders:

1. Avoid accidental contact of the electrodes, electrode holder, or other electrically energized parts with a compressed gas cylinder or any other pressure vessel. Serious accidents or fires may result.
2. Use I.C.C. or D.O.T. cylinders. They are manufactured and maintained in accordance with D.O.T. requirements and are safe so long as they are properly handled. Don't drop cylinders.
3. Identify gas content by the name marked on the cylinder. If the cylinder is unmarked, do not use it. Return it to the supplier. Do not rely on a color code.
4. Never use a cylinder or its contents for other than intended purposes.
5. Keep oil and grease away from oxygen cylinders and cylinder valves.
6. Keep cylinders away from exposure to sparks, hot slag, open flame and all possible sources of ignition or excessive heat.
7. Be careful that cylinders are not placed so as to become a part of an electrical circuit. Avoid third rails, wires and electric welding circuits.
8. When transporting cylinders by crane, use cradle platform or other suitable support.
9. Never lift the cylinders by slings, by the caps or by electric magnets.
10. Never use cylinders as supports or rollers.
11. Never try to mix any gases in a cylinder.
12. Never try to refill a cylinder.
13. Mark or tag empty cylinders "Empty" or "MT".
14. Send "Emptys" back to the supplier promptly.
15. Keep "Emptys" and "Fulls" separate.
16. Never tamper with or alter cylinder numbers or other markings. This is not only foolish but may be illegal.
17. Do not tamper with or change fittings on cylinders.
18. If valves cannot be opened by hand, do not use hammer or wrench. Notify supplier.
19. Protect cylinder valves from bumps, falls, falling objects, and from weather. Keep them covered with cylinder caps when moving cylinders.
20. Keep valves closed on empty cylinders.
21. See that your cylinders are clear of passageways and active work areas and that they are secured against falling.
22. If adapter is required between cylinder and regulator, always use a standard adapter. These may be obtained from your supplier. Where right and left hand threads are used on adapter, use two wrenches to insure leak proof connections.
23. Do not store cylinders in unventilated areas.

SECTION 2 - INTRODUCTION

Rated Welding Current Amperes		Open Circuit Voltage	Amperes Input at Rated Load Output 60 Hz. Three Phase				Dimensions (Inches)	Weight (Pounds)	
			208 Volts	230 Volts	480 Volts	kw		Net	Ship
200 Amps @ 28 Volts 100% Duty Cycle	260 Amps @ 28 Volts 60% Duty Cycle	17 - 39	20.5 Amps	18.6 Amps	9.3 Amps	7	Height - 23-3/8" Width - 13-1/2" Depth - 26-1/2"	235	245

Figure 2-1. Specifications

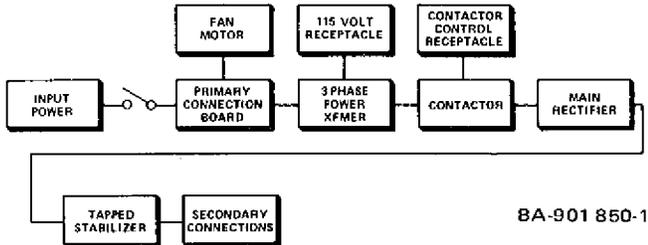


Figure 2-2. Block Diagram

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 Designation and/or Stock Number and Serial (or Style) Number of the equipment be supplied.

2-3. DESCRIPTION

This welding power source is intended to be used for Gas Metal-Arc Welding.

The open circuit voltage on this welding power source is controlled by the Voltage Control on the front panel. An indicator is provided to register the open circuit voltage. On-off control of the open circuit voltage may be obtained

through utilization of the 115 volt ac receptacle and contactor control receptacle. Two negative secondary terminals provide high or low weld stabilization for control of weld time response. Also, a dc voltmeter and ammeter are provided to give exact voltage and amperage readings.

2-4. SAFETY

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

Installation, operating, and maintenance procedures, practices, etc., which will result in personnel injury or loss of life if not carefully followed.

IMPORTANT

Installation, operating, and maintenance procedures, practices, etc., which will result in damage to equipment.

NOTE

Installation, operating, and maintenance procedures, practices, etc., which it is essential to emphasize.

SECTION 3 - INSTALLATION

3-1. LOCATION

A good installation is essential if the welding power source is to provide satisfactory and dependable service. Proper operating temperatures are maintained by the air stream produced by the welding power source fan unit.

The welding power source should be located so that the air passage from the rear of the welding power source will not be restricted. Therefore the back of the welding power source should be away from a wall or other obstructions, a minimum of eighteen inches.

The location should be such that a minimum amount of dust and dirt will be drawn into the air stream. Preventive maintenance consists of removing the wrapper from the welding power source and blowing out the dust accumulation inside the unit. For this reason it is desirable to locate the unit so that the wrapper can be removed without any difficulty.

3-2. PRIMARY CONNECTIONS

This welding power source is designed for and must be operated on a three phase, 60 Hertz, ac power supply, having a

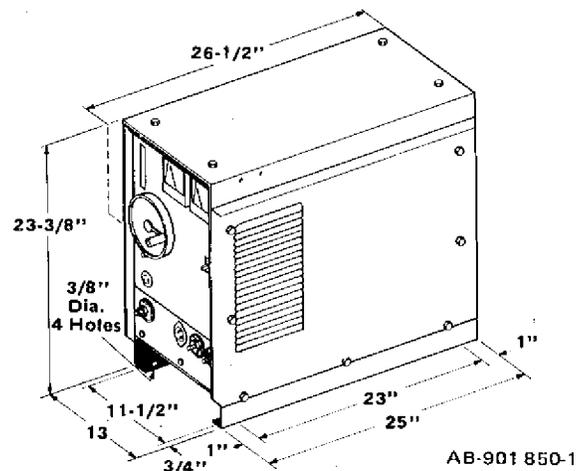


Figure 3-1. Dimensional Drawing

AB-901 850-1

voltage rating which corresponds to one of the voltages shown on the welding power source nameplate. If there is any question about the electrical system used locally, consult the local public electric utility.

A. Primary Wire Connections

NOTE

It is recommended that the primary wires be of the heavy rubber covered type or be run in either solid or flexible conduit. Table 3-1 is provided as a guide in selecting the proper primary wire and fuse size.

Table 3-1. Primary Wire And Fuse Sizes

Primary Wire Size				Fuse Size (Amperes)			
208V	230V	460V	575V	208V	230V	460V	575V
No. 12 (No. 14)	No. 12 (No. 14)	No. 14 (No. 16)	No. 14 (No. 16)	30	30	15	15

Numbers in () are ground wire sizes

Route three primary wires plus one ground wire through the inlet hole provided on the rear panel of the welding power source. This inlet hole will accept standard conduit and associated fittings.

NOTE

It is recommended that the ends of the primary and ground wires which are to be connected to the input terminals have a terminal lug of suitable amperage rating attached to them.

A bolt-on side panel is provided on the right side of the welding power source for the purpose of gaining access to the primary terminal board. After removing the side panel, connect the three primary wires to the terminals on the primary terminal board labeled L or LINE. Connect the ground wire to the terminal labeled GRD. The opposite end of the ground wire should be connected to a proper ground. Use whatever grounding method which is acceptable to the local electrical inspection authority.

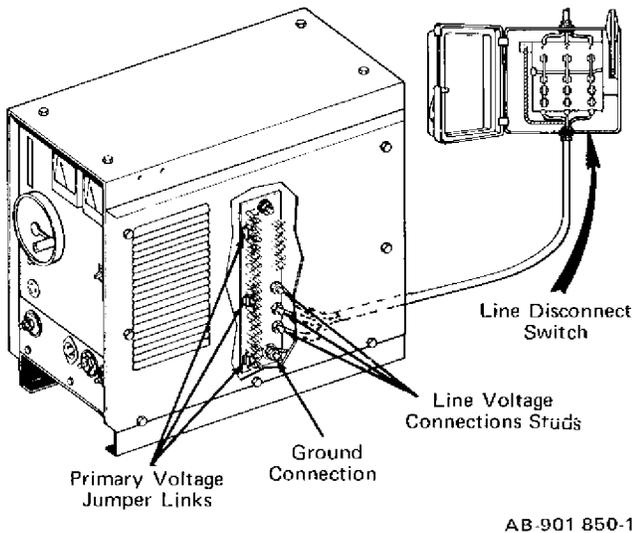


Figure 3-2. Primary Connections

B. Primary Voltage Jumper Links

The primary voltage jumper links are provided on the primary terminal board to permit the welding power source to be operated from various line voltages. The voltages which

this welding power source may be operated from are stated on the front panel nameplate and on the voltage sticker on the primary terminal board. This welding power source had the primary voltage jumper links set for the highest voltage position at the factory. If the welding power source is to be operated from a line voltage which is lower than the highest voltage the unit was designed for, the jumper links will have to be moved to the proper position before operation of the welding power source commences. Figure 3-3 shows the various primary voltage jumper link positions that the jumper links may be set for on the standard welding power source. If the welding power source has primary voltages different from those of the standard unit, that is, if the primary voltage on the welding power source nameplate differ from those shown in Figure 3-3, the primary voltage jumper links should be positioned as shown in the voltage sticker on the inside of the rear panel hinged door.

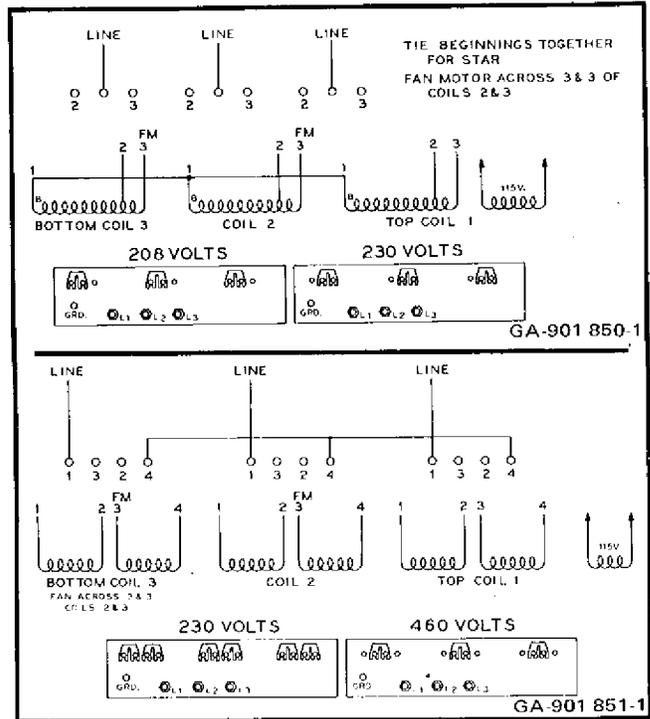


Figure 3-3. Primary Voltage Jumper Link Arrangement

3-3. SECONDARY CONNECTIONS

The secondary terminals, labeled NEGATIVE LOW, NEGATIVE HIGH, and POSITIVE, are located on the lower portion of the front panel. Always ensure that connections to these terminals are clean and tight. If longer Gas Metal-Arc welding gun secondary cables are required, follow the gun manufacturer's recommendations.

A. High-Low Stabilizer (Negative Secondary) Terminals

Through the use of either (LOW or HIGH) terminal, it is possible to obtain various arc characteristics which will affect the weld bead configuration.

The use of the LOW Stabilizer Terminal will produce the arc types which are generally most suitable on mild steel applications.

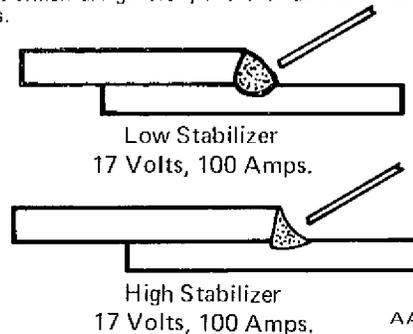


Figure 3-4. Low & High Stabilizer Bead Configurations

Using the HIGH Stabilizer Terminal produces the added softness required on some types of weld joint designs. The softening effect aids in spreading the weld puddle to a greater area, therefore, minimizing the bead crowning.

3-4. CONTACTOR CONTROL CONNECTIONS

The CONTACTOR CONTROL Receptacle (RC4) located on

the front panel, is a two pole, twistlock, motor base, male receptacle. The corresponding plug for this receptacle is supplied with the welding power source as standard equipment. The function of the CONTACTOR CONTROL Receptacle is to provide a connection point between the remote contactor control station and the contactor in the welding power source. To energize the contactor from a remote station, the remote station must feed 115 volts ac 60 Hertz electrical power to this receptacle.

SECTION 4 - FUNCTION OF CONTROLS

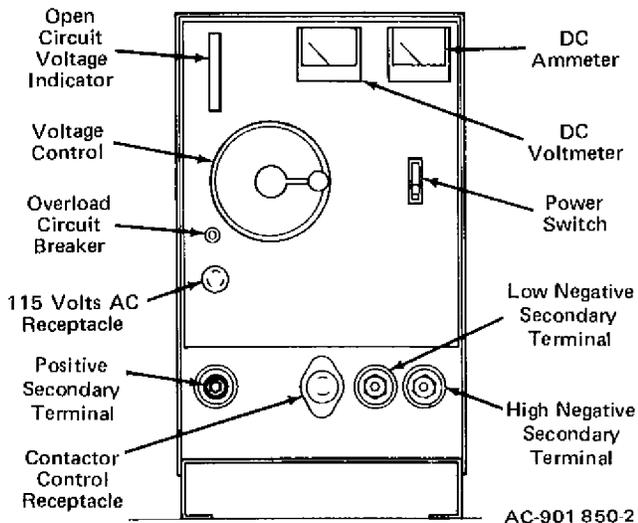


Figure 4-1. Component Location

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

The Voltage Control on the front panel of the welding power source provides the operator with the capability of selecting the exact desired open circuit voltage setting within the entire range of the unit. Rotating the Voltage Control in a clockwise direction will increase the open circuit voltage; counterclockwise rotation will decrease the open circuit voltage.

NOTE

Due to the fact that the contacts of the Voltage Control are of the continuous contact type, the Voltage Control can be adjusted while welding.

4-2. OPEN CIRCUIT VOLTS INDICATOR (Figure 4-1)

An indicator, labeled OPEN CIRCUIT VOLTS, is provided on the front panel in order to register the voltage selected. The indicator will change readings to coincide with the rotation of the Voltage Control.

4-3. 115 VOLT AC RECEPTACLE (Figure 4-1)

The three pole, twistlock receptacle on the front panel of the welding power source is intended to provide 115 volts, 60 Hertz electrical power for operation of accessory equipment. To secure the corresponding three pole plug in this receptacle, insert the plug into the receptacle and rotate it as far as it will turn in a clockwise direction.

4-4. OVERLOAD CIRCUIT BREAKER (Figure 4-1)

An OVERLOAD Circuit Breaker is supplied in order to provide protection to the 115 volt circuitry in the welding power source and to equipment being operated from the 115 VOLTS AC Receptacle.

Should an overload condition occur in the 115 volt circuit, the OVERLOAD Circuit Breaker would open and thereby suspend all output at the 115 VOLTS AC Receptacle. If this circuit breaker should open, it would be necessary to manually depress the circuit breaker in order to reset it.

IMPORTANT

Should the OVERLOAD Circuit Breaker continue to open upon reset, suspend all operation until the trouble in the 115 volt circuit is remedied.

4-5. METERS (Figure 4-1)

The welding power source is equipped with a dc ammeter and a dc voltmeter. These meters are internally connected to the welding power source output welding terminals. The voltmeter will indicate the dc voltage at the secondary terminals, but will not necessarily indicate the actual voltage at the welding arc. If the welding cables are excessively long, or have poor, loose connections, the difference between actual arc voltage and the voltage at the welding power source secondary terminals may be considerable.

4-6. POWER SWITCH (Figure 4-1)

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

CAUTION

Even though the POWER Switch is in the OFF position and the welding power source is apparently electrically shut down, primary electrical power is still present on all circuitry up to the POWER Switch. To completely cut - off all electrical power to the welding power source, it will be necessary to place the line disconnect switch in the OFF position or to disconnect the primary leads from terminal strip TE1 in the welding power source.

4-7. DUTY CYCLE (Figure 4-2)

The duty cycle is the percentage of a ten minute period of time that a welding power source can operate at a given output current setting. This power source is rated at 100 percent duty cycle, that is, this 200 ampere power source may be operated at 200 amperes welding current continuously. If the welding current is increased, the duty cycle will

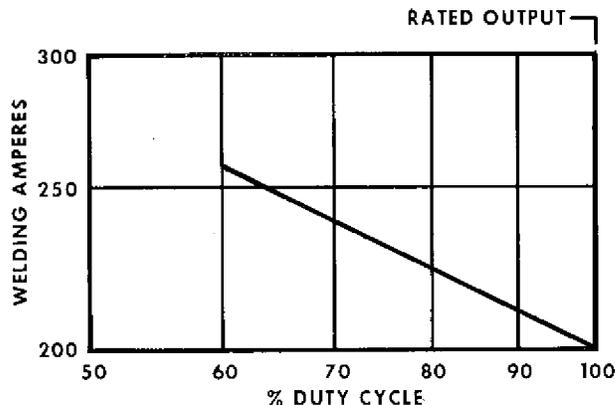


Figure 4-2. Duty Cycle Chart

DB-901 850-1

decrease. The duty cycle chart, Figure 4-2, enables the operator to determine the safe output of the welding power source at various duty cycles.

IMPORTANT

Exceeding the indicated duty cycle will cause the machine to overheat and thereby cause damage to the machine.

4-8. VOLT-AMPERE CURVES (Figure 4-3)

The volt-ampere curves show the output voltage available at any given output current within the limits of the minimum and maximum weld Voltage Control setting. Load voltage is predetermined to a large degree by arc characteristics. With the use of the volt-ampere curves, it is possible to determine the amperage required for a particular load voltage.

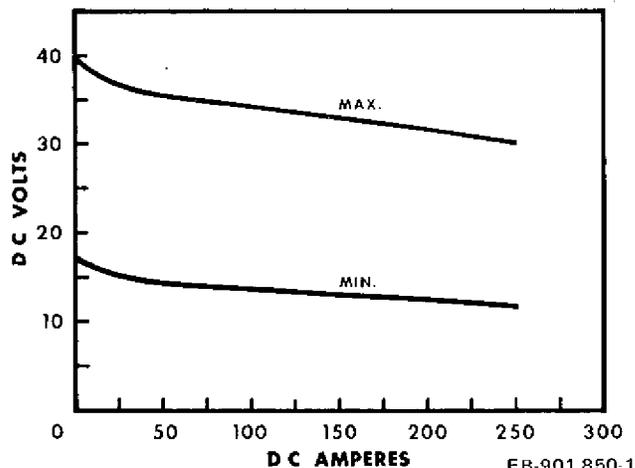


Figure 4-3. Volt-Ampere Curves

EB-901 850-1

SECTION 5 - SEQUENCE OF OPERATION

CAUTION

Never, under any circumstances, operate the welding power source with the cover removed. In addition to the safety hazard, improper cooling may result in damage to the welding transformer and welding power source components. Warranty is void if machine is operated with cover or sides removed.

5-1. GAS METAL-ARC WELDING

1. Make primary connections as outlined in Section 3-2.
2. Make secondary connections as outlined in Section 3-3.
3. Contactor Control connections are to be made to the control/feeder as outlined in Section 3-4.
4. If 115 volts ac is required to operate a Wire Feeder, see Section 4-3.
5. Connect the work clamp to the work.
6. Rotate the Voltage Control until the desired voltage is indicated on the OPEN CIRCUIT VOLTS Indicator.

7. Make all necessary adjustments on the Wire Feeder or Gun.
8. Place the 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.

9. Commence welding. The Voltage Control may be adjusted while welding.

5-2. SHUTTING DOWN

1. Place the POWER Switch to the OFF position.
2. Turn the shielding gas supply off.
3. Place the Line Disconnect Switch in the OFF position.

SECTION 6 - MAINTENANCE

CAUTION

Be sure the branch circuit or main disconnect switch is open or primary input circuit fuses are removed before attempting any inspection or work on the inside of the welding power source. Placing the ON-OFF Power Switch on the welding power source in the OFF position, does not remove voltage from the power terminals inside of the power source.

6-1. INPUT POWER & WELDING CABLES

Check connections periodically for tightness. The cables should be inspected frequently and all breaks in the insula-

tion should be repaired with electrical tape or electrical insulating tapes.

6-2. FAN MOTOR

All models are equipped with an exhaust fan and rely on forced draft for adequate cooling for high duty cycles and overloads. The fan motor is manufactured with lifetime lubricated sealed ball bearings and no attention should be required.

6-3. TRANSFORMER

Occasional blowing out of the dust and dirt from around the transformer is recommended. This should be done periodically depending upon the location of the unit and the amount of dust and dirt in the atmosphere. The welding power source case cover should be removed and a clean dry air stream should be used for this cleaning operation.

SECTION 7 - TROUBLESHOOTING

INTRODUCTION

The data collected here, discusses some of the common problems which may occur in this welding power source. A little thought will probably solve the problem involved through the information provided.

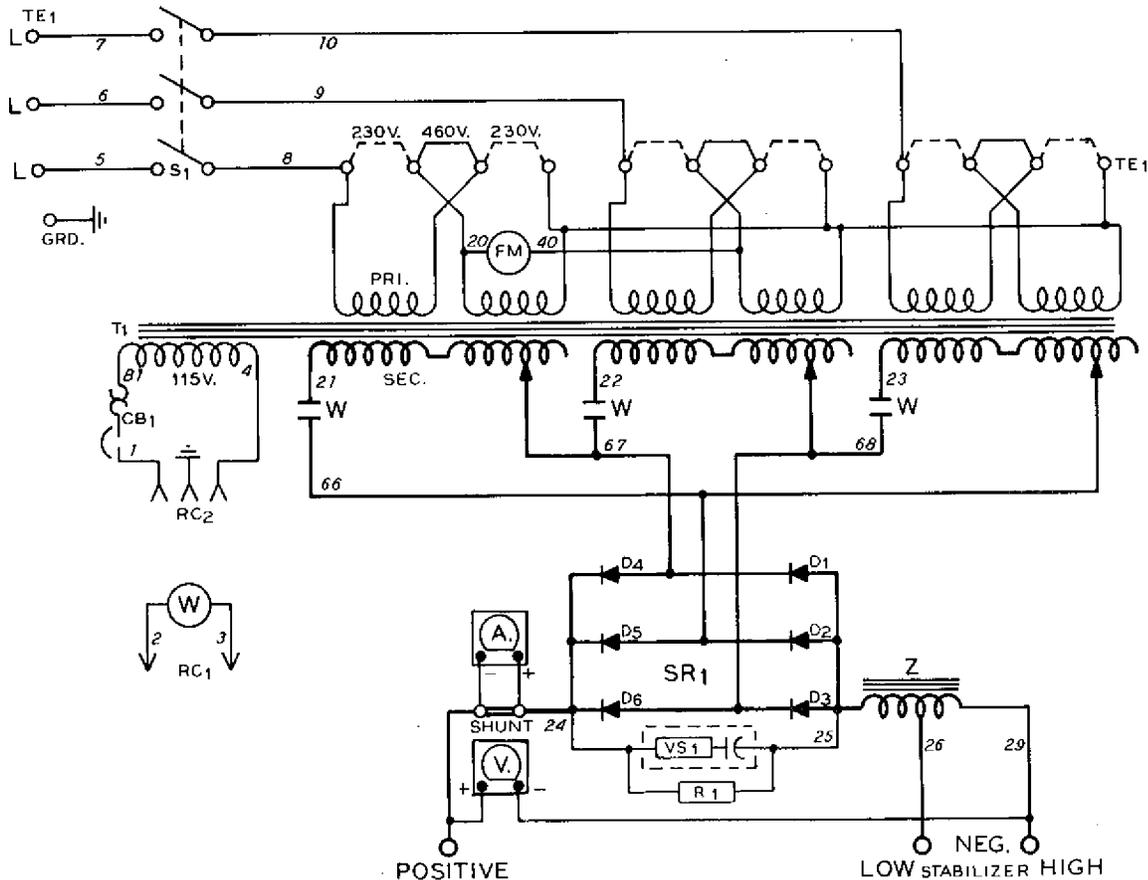
The assumption of this data is that a proper welding condition has been achieved and has been used until trouble developed. In all cases

of equipment malfunction, the manufacturer's recommendations should be strictly adhered to and followed.

If after performing the following procedures the trouble is still not remedied, it is recommended that a serviceman be called.

It is recommended that the circuit diagram be used for reference during the troubleshooting.

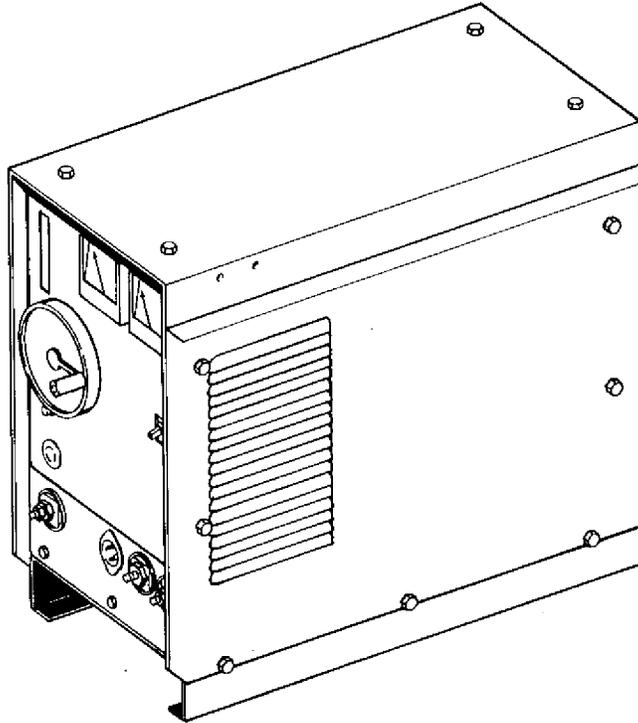
TROUBLE	PROBABLE CAUSE	REMEDY
Limited output and low open circuit voltage.	Primary jumper links connected to wrong terminals.	See Figure 3-3.
Welding Current suddenly reduced to zero while welding. Fan continues to operate.	Dirty rectifier or interference with good circulation of air.	Remove wrapper from machine and blow out dirt accumulation.
Fan does not run.	Fan motor defective.	Check fan motor leads. If O.K. and fan turns free the motor could be burned out.
	Line disconnect fuse blown.	Replace fuse.
Fan runs slow.	Voltage links on primary connection board connected for incorrect primary voltage.	See Figure 3-3. Connect jumper links for correct primary voltage.
Erratic weld current.	Incorrect welding cable size.	See gun manual for correct cable size.
	Loose welding cable connection.	Tighten all welding connections.
	Wire feeder defective.	See wire feeder instruction manual troubleshooting guide.



Circuit Diagram No. CA-901 851-1A

Figure 7-1. Circuit Diagram

MODEL	STOCK NO
CP-200 (208/230)	901 850
CP-200 (230/460)	901 851



MODEL/STOCK NO.	SERIAL/STYLE NO.	DATE PURCHASED

PARTS LIST

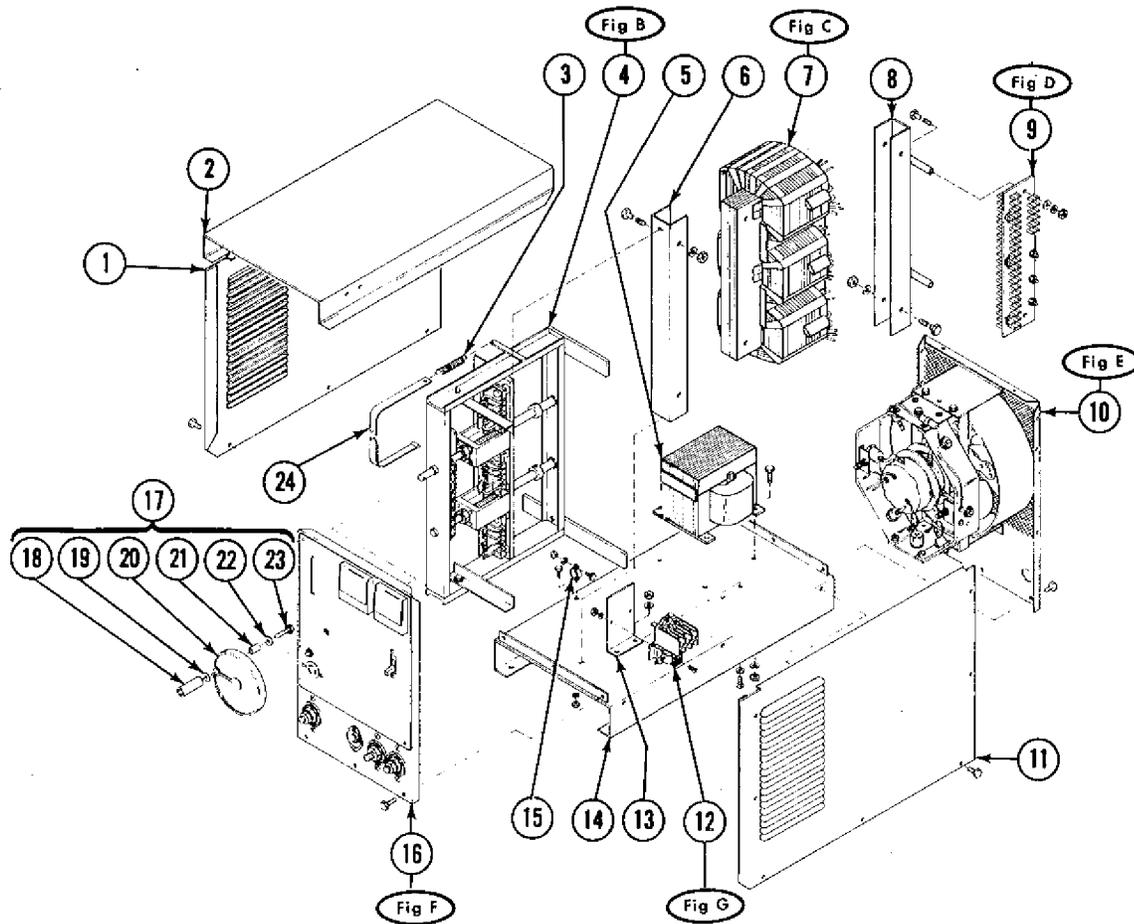


MILLER ELECTRIC MFG. CO.
APPLETON, WISCONSIN, USA 54911

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
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Figure A Main Assembly

1		022 224	PANEL, side - left	1
2		022 226	COVER	1
3		*010 615	SPRING, indicator band	1
4		022 210	RIGGING ASSEMBLY, brush (See Fig. B Page 2)	1
5	Z	036 585	STABILIZER	1
6		022 218	CHANNEL, clamping - core	1
7	T1	023 546	TRANSFORMER, power - main (See Fig. C Page 3)	1
8		022 219	CHANNEL, clamping - core	1
9	TE1	038 145	TERMINAL ASSEMBLY, primary (See Fig. D Page 3)	1
10	Figure E		PANEL, rear with components (See Page 4)	1
11		022 225	PANEL, side - right	1
12	W	034 740	CONTACTOR, 40 ampere 3 pole (See Fig. G Page 6)	1
13		022 220	BRACKET, mtg - contactor	1
14		022 222	BASE	1
15		010 872	HANGER, Minerallic No. 3	1
16	Figure F		PANEL, front with components (See Page 5)	1
17		019 724	HANDWHEEL ASSEMBLY (consisting of)	1
18		019 716	. KNOB, handwheel	1
19		010 929	. WASHER, flat - spring steel	1
20		019 715	. HANDWHEEL	1
21		021 795	. TUBING, steel 3/8 x 3/4"	1
22		602 241	. WASHER, flat - steel SAE 1/4"	1
23		601 956	. SCREW, cap - steel hex head 1/4-20 x 1-1/4"	1
24		022 248	BAND, indicator	1
		039 635	BODY, connector - twistlock 2P2W	1
		039 687	CAP, electrical - ground twistlock 2P3W	1



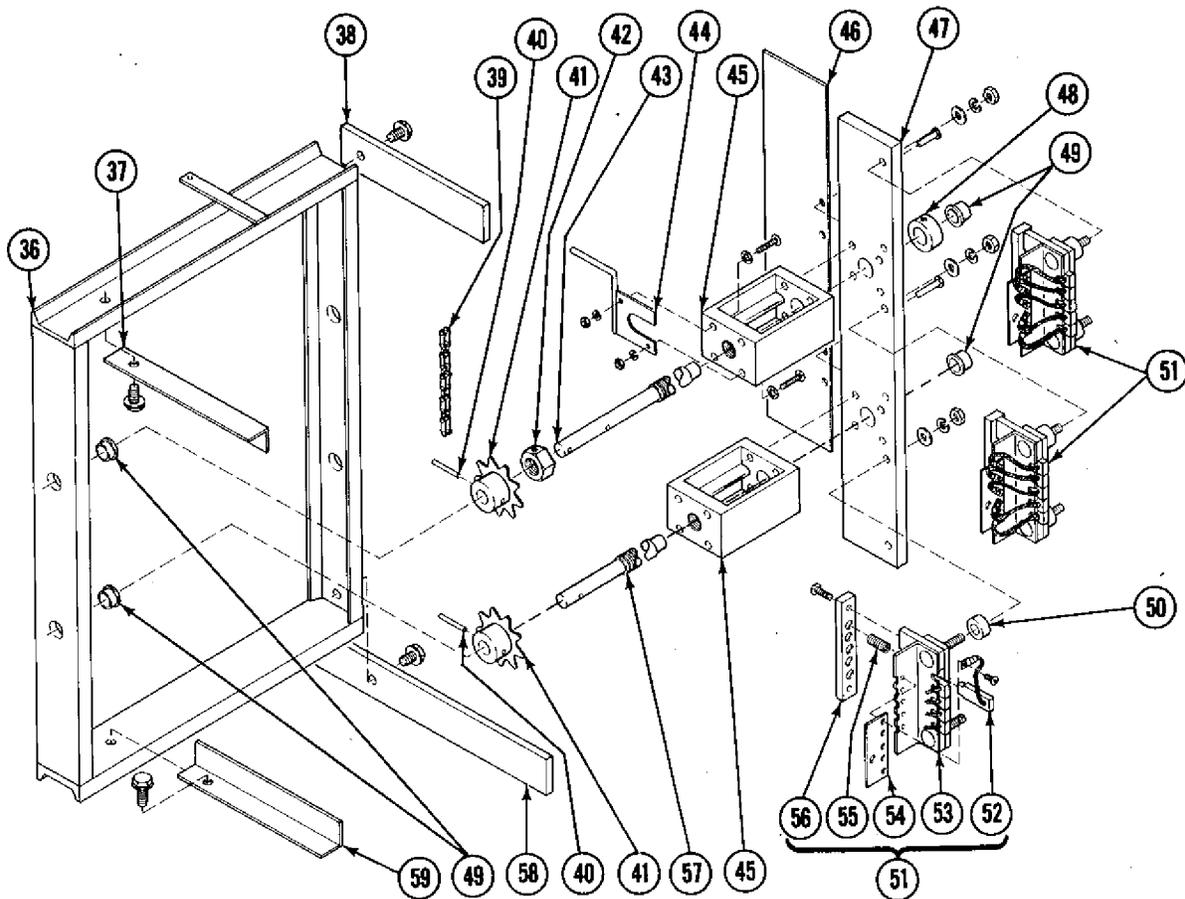
TD-901 851

Figure A - Main Assembly

*Recommended Spare Parts.

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

Item No.	Factory Part No.	Description	Quantity
Figure B	022 210	Rigging Assembly, Brush (See Fig. A Page 1 Item 4)	
36	022 203	FRAME	1
37	022 208	ANGLE, mtg - frame (upper)	1
38	022 215	BAR, mtg - transformer	1
39	024 843	CHAIN, roller No. 65 1/8 x 38 pitches	1
40	010 660	PIN, spring 1/8 x 1-1/8"	2
41	024 620	SPROCKET	2
42	024 622	NUT, stop 5/8-18	2
	602 177	SCREW, set 1/4-20 x 1/4"	2
43	024 841	SCREW, drive - brush 5/8-11 x 16"	1
44	022 246	BRACKET, mtg - indicator band	1
45	010 011	COLUMN	2
46	022 245	BAFFLE, air	1
47	022 207	MOUNTING BOARD	1
48	024 615	COLLAR SET	1
	602 180	SCREW, set 5/16-18 x 1/4"	2
49	024 619	BUSHING, nylon	4
50	602 855	SPACER, sleeve - nylon	6
51	022 206	BLOCK ASSEMBLY, brush (consisting of)	3
52	*022 205	. BRUSH, contact	5
53	018 636	. HOLDER, brush	1
54	018 637	. BUS BAR	1
55	018 606	. SPRING	5
56	018 638	. CONTAINER	1
57	024 840	SCREW, drive - brush 5/8-11	1
58	022 216	BAR, mtg - transformer	1
59	022 209	ANGLE, mtg - frame (lower)	1



TD-022 210

Figure B -- Rigging Assembly, Brush

*Recommended Spare Parts
 BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Factory Part No.	Description	Quantity
Figure C	023 546	Transformer, Power-Main (See Fig. A Page 1 Item 7)	
66	**022 176	COIL, primary - secondary with 115 volt winding	1
67	**022 177	COIL, primary - secondary	2
68	**036 590	TRANSFORMER SUBASSEMBLY (consisting of)	1
69	031 347	.STRIP, glastic .031 x 2-1/2 x 3-1/2"	2
70	023 505	.WEDGE, phenolic - single bevel 1/4 x 1 x 4-3/4"	6
71	021 970	.WEDGE, phenolic - single bevel 3/8 x 3/4 x 5"	6
72	021 895	.STRIP, glastic .062 x 2-1/2 x 3-1/2"	2

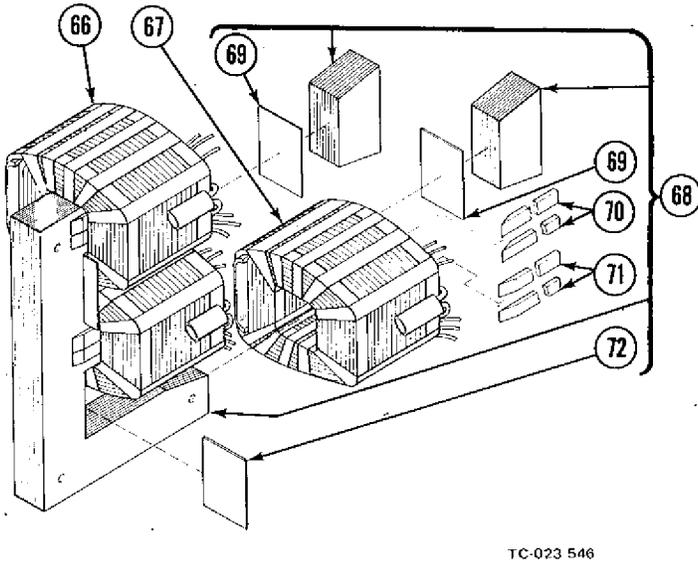


Figure C - Transformer, Power - Main

TC-023 546

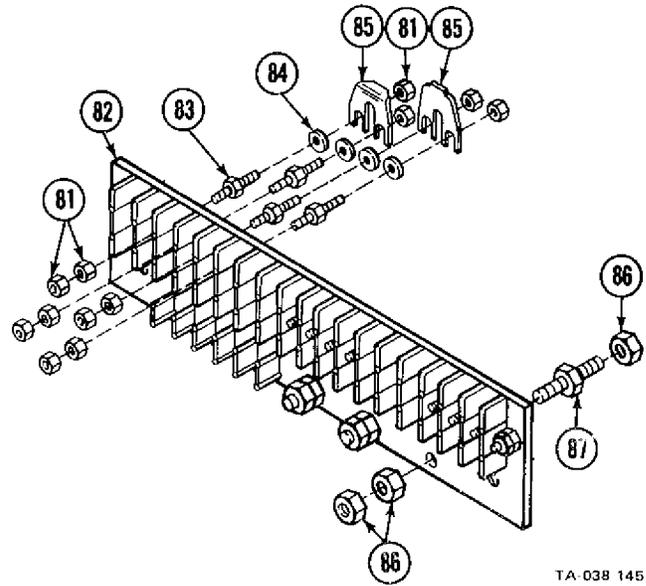


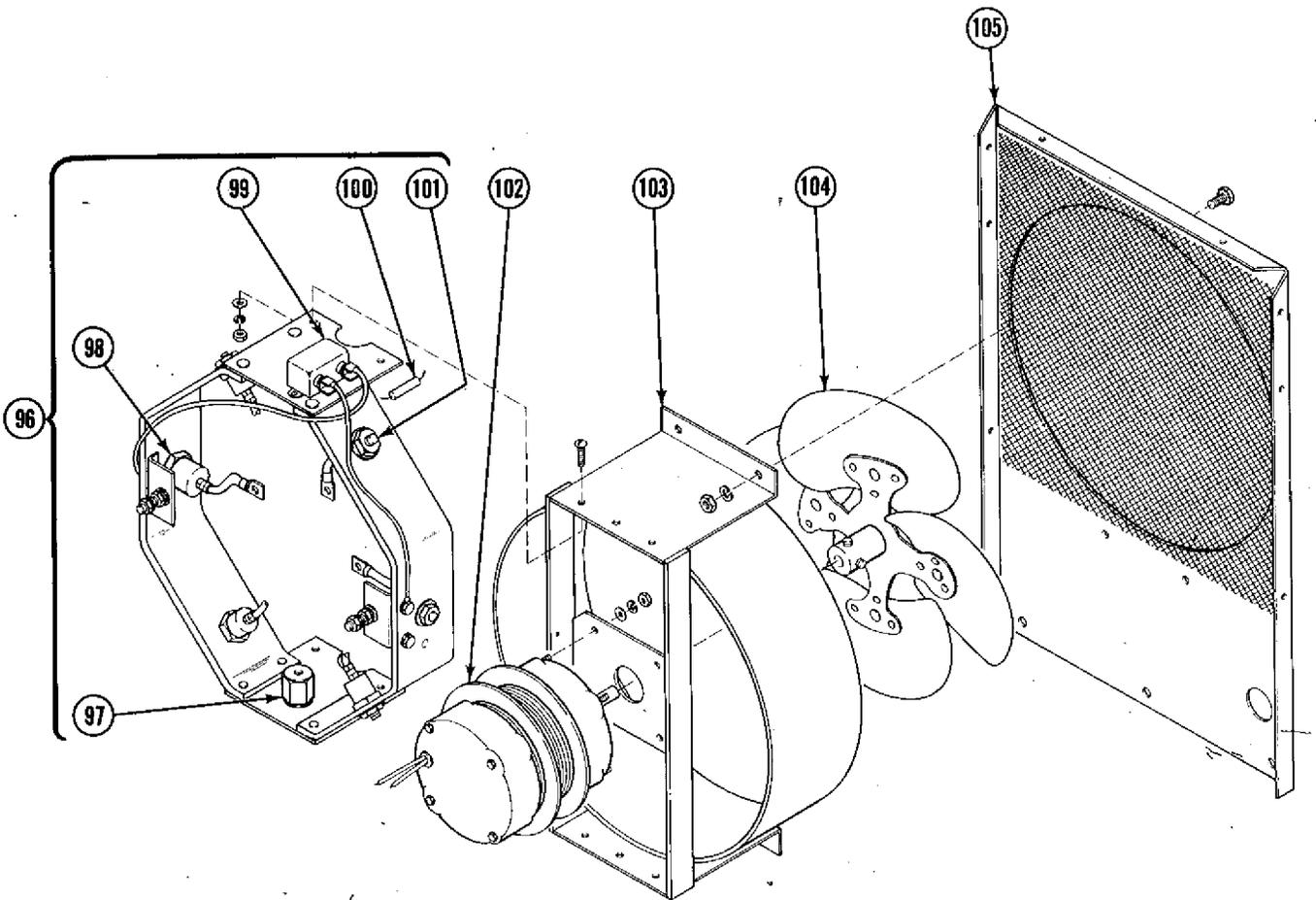
Figure D - Terminal Assembly, Primary

TA-038 145

Item No.	Factory Part No.	Description	Quantity
Figure D	038 145	Terminal Assembly, Primary (See Fig. A Page 1 Item 9)	
81	601 835	NUT, brass - hex regular 10-32	24
82	038 058	TERMINAL BOARD	1
83	038 887	STUD, brass - with hex collar 10-32 x 1-3/8"	12
84	010 913	WASHER, flat - brass 3/16"	12
85	038 618	LINK, jumper	6
86	601 836	NUT, brass - hex jam 1/4-20	6
87	038 888	STUD, brass - with hex collar 1/4-20 x 1-1/2"	3

**Replace At Factory Or Authorized Service Station.
 BE SURE TO PROVIDE STOCK, 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 1 Item 10)				
96	SR1	028 994	RECTIFIER, silicon (consisting of)	1
97		026 947	INSULATOR	2
98		037 306	DIODE, 150 ampere 300 volt - reverse polarity	3
99	VS1	024 471	SUPPRESSOR, 1 uf 2.7 ohm	1
100	R1	030 459	RESISTOR, carbon 2 watt 3900 ohm	1
101		037 305	DIODE, 150 ampere 300 volt - straight polarity	3
102	FM	032 603	MOTOR, fan 230 volt (consisting of)	1
		*024 601	BEARING	2
103		022 253	WINDTUNNEL	1
104		032 612	BLADE, fan 12 inch 4 wing 23 degree 60 Hz	1
105		022 228	PANEL, rear	1

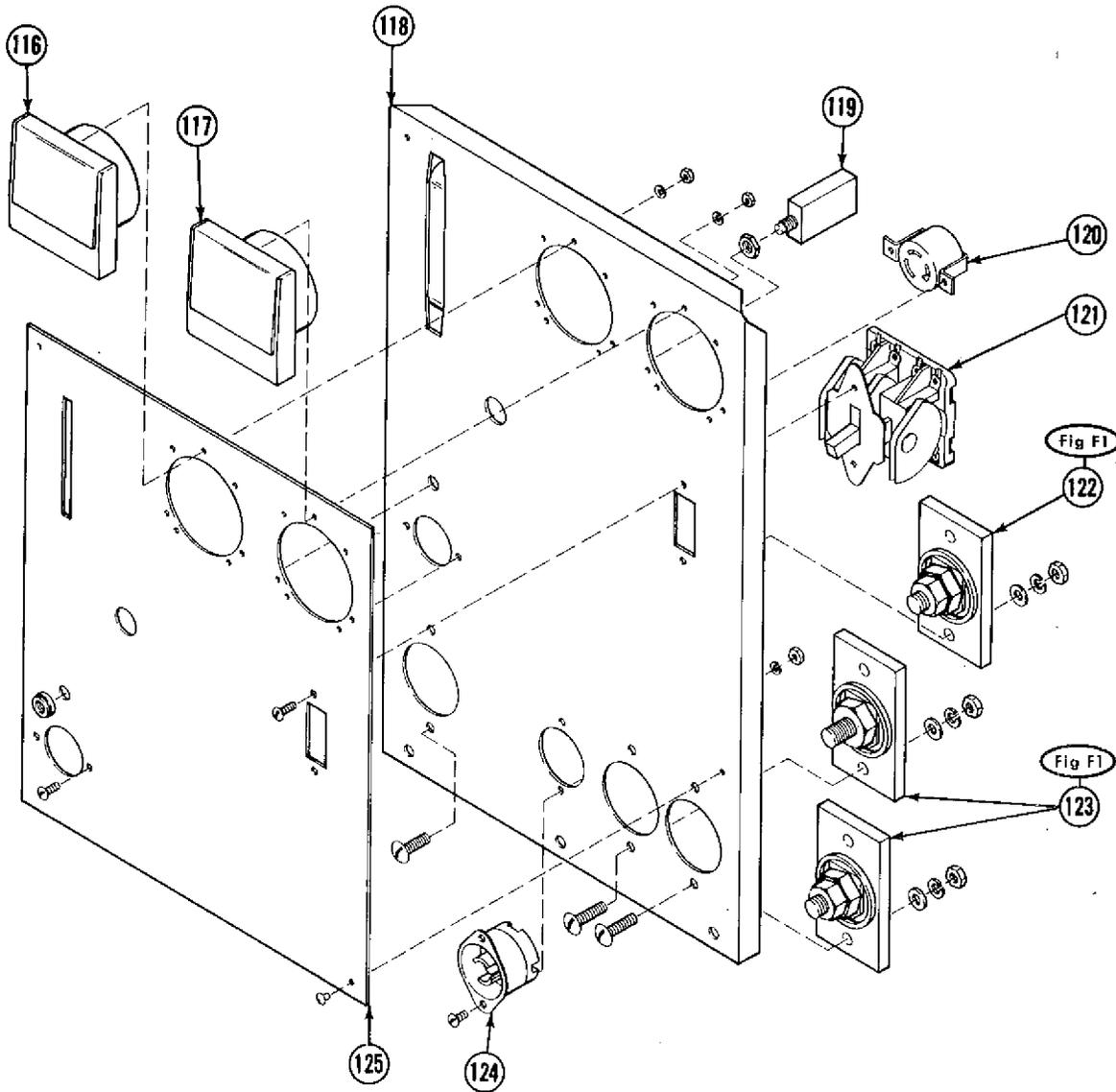


TD-024 094 A

Figure E — Panel, Rear With Components

*Recommended Spare Parts
 BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure F Panel, Front With Components (See Fig. A Page 1 Item 16)				
116	V	025 632	METER, voltage dc 0-50	1
117	A	025 603	METER, amperage dc 0-300	1
118		022 229	PANEL, front	1
119	CB1	*011 972	CIRCUIT BREAKER, 10 ampere 250 volt	1
120	RC2	039 686	RECEPTACLE, twistlock - ground 2P3W	1
121	S1	022 171	SWITCH, toggle 3 pole 30 ampere	1
		026 191	INSULATION, switch (S1)	1
122		038 886	TERMINAL, power output - pos (See Fig. F1 Page 6)	1
123		038 878	TERMINAL, power output - neg (See Fig. F1 Page 6)	2
124	RC1	039 634	RECEPTACLE, twistlock - male flange 2P2W	1
125			NAMEPLATE (order by stock, model, and serial numbers)	1

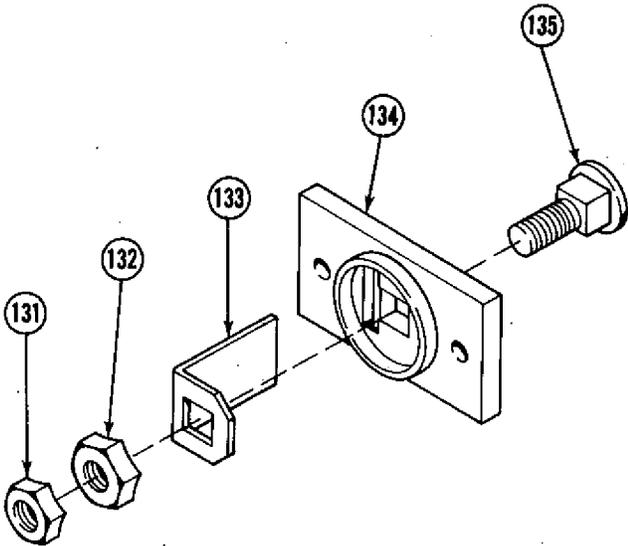


TD-024 093

Figure F – Panel, Front With Components

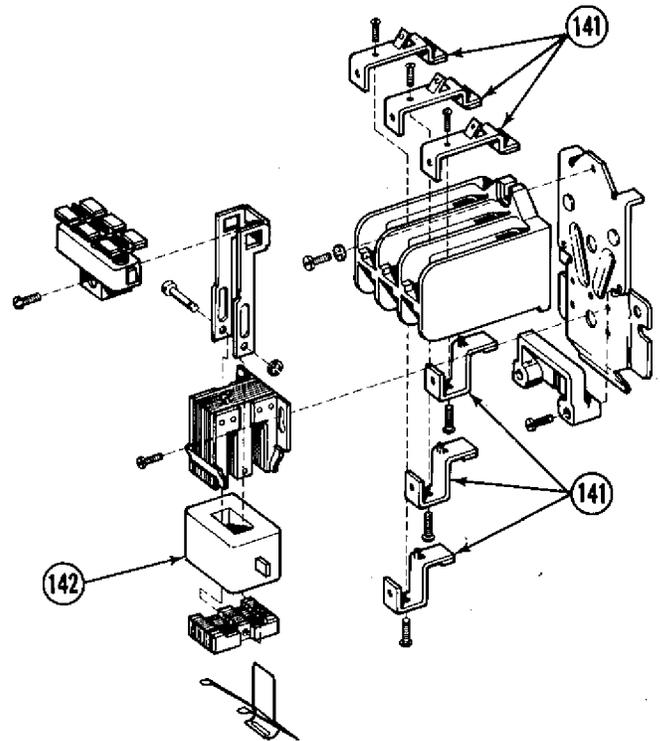
*Recommended Spare Parts
 BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Factory Part No.	Description	Quantity	
Figure F1		Terminal, Power Output (See Fig. F Page 5 Items 122 & 123)	038 886	038 878
131	601 839	NUT, brass - hex full 1/2-13	1	1
132	038 913	NUT, brass - hex special 1/2-13	1	1
133	038 129	BUS BAR	1	1
134	038 885	TERMINAL BOARD, red	1	
134	038 865	TERMINAL BOARD, black		1
135	038 912	BOLT, shoulder - sq neck 1/2-13 x 1-11/16"	1	1



TA-038 878-A

Figure F1 – Terminal, Power Output



TC-034 740

Figure G – Contactor

Item No.	Factory Part No.	Description	Quantity	
Figure G	034 740	Contactor (See Fig. A Page 1 Item 12)		
141	*034 753	KIT, contact points	1	
142	033 053	COIL		1

*Recommended Spare Parts
 BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.