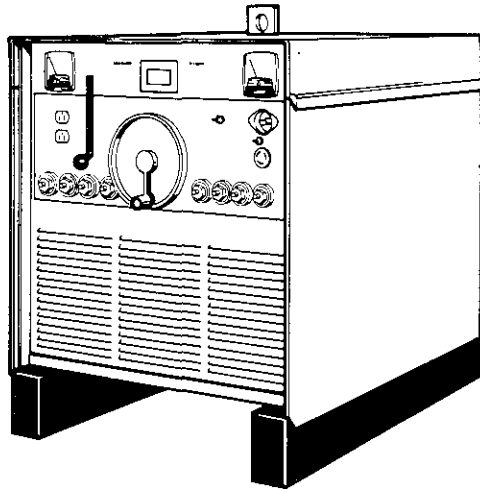


MODEL

FC-600

(900 794)

Effective with serial No. 5431627



**INSTALLATION
OPERATION AND
MAINTENANCE MANUAL**

Miller ELECTRIC MFG. CO., Appleton, Wisconsin



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SECTION I - INTRODUCTION

1.1 GENERAL

- A. This manual has been prepared especially for use in familiarizing personnel with the design, installation, operation and maintenance of the welding machine. In some cases, the contents of this publication are generalized. All information presented in this manual should be given careful consideration to assure optimum performance and service of the equipment.
- B. Welding process information is available from your nearest representative.

1.2 RECEIVING - HANDLING

- A. To prepare the welding machine for installation, several items should be checked. Clean all packing material from around the unit and carefully inspect for damage that may have been caused by shipping. Any claims for loss or damage that may have occurred in transit must be filed by the buyer with the carrier. Copy of bill of lading and freight bill will be furnished on request if occasion to file claim arises.
- B. Be sure to READ ALL THE INSTRUCTIONS before attempting to operate the welding machine.
- C. When requesting information concerning the welding machine BE SURE to furnish SERIAL AND MODEL NUMBERS.

1.3 DESCRIPTION

- A. This welding machine is a multi-purpose three phase rectifier type, dc output with mechanical controls. It is designed primarily for the Gas Metal-Arc welding (GMAW) process. With the wide selection of slope and stabilizer connections available (four (4) of each), this welding machine's capabilities are expanded to include using it as a power source for Shielded Metal-Arc welding (SMAW), Gas Tungsten-Arc welding (GTAW), Submerged-Arc Welding (SAW) and Carbon Arc Cutting and Gouging (CAC) processes.
- B. It is designed for use in job shops, production lines, construction sites, etc. where one welding machine must perform several functions.
- C. The design features three (3) voltage ranges with continuous voltage adjustment within each range. Along with the numerous voltage adjustments, four (4) positive (slope) terminals are available to expand the range of volt-ampere ratios which may be required for a particular welding condition. Also four (4) negative (stabilizer) terminals are available for selecting varying amounts of stabilization in the weld circuit.

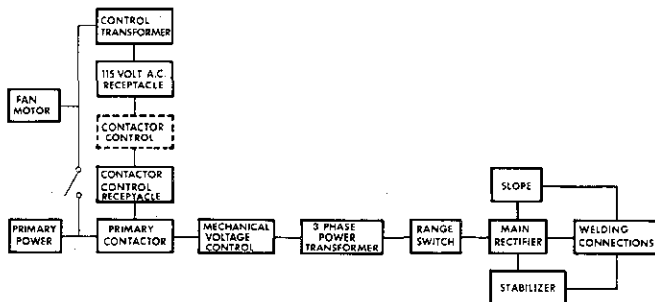


Figure 1 -- Block Diagram

- D. Surge current protectors are installed between the main transformer and rectifier to protect the welding machines major components in event of

abnormal use or overloading while the unit is in use.

- E. Permanently lubricated ball bearing cooling fan motor, primary contactor, thermal protection thermostat, remote contactor control provisions plus three 115 volt ac, 60 cycle receptacles are among the features of this welding machine.
- F. The welding machine design is such that "stacking" of two, or more, units is feasible. Valuable floor space may be used as increased working area. A sturdy lifting eye, and low center of gravity on the welding machine, make moving and handling the unit relatively easy.

1.4 SAFETY

- A. Before attempting to make primary or secondary connections, change parts or make repairs, BE SURE the welding machine is completely disconnected from the main power line.
- B. Caution should be exercised in taking voltage measurements when trouble shooting the unit. Always avoid contact between any part of the human body and any current carrying part of the welding machine.
- C. Compliance should be made with the requirements for arc welding established by industrial agreement and contained in the latest edition of American Standard "Safety in Electric and Gas Welding and Cutting Operations," Z49.1, and in "Recommended Safe Practices for Inert-Gas Metal Arc Welding," American Welding Society Pamphlet A6.1-58T.
- D. Increased ultraviolet radiation is emitted by the high-density arc used in Gas Metal-Arc welding. The use of flash goggles (medium shade), in addition to a welding helmet, is recommended both for the operator and for personnel in the vicinity of the welding area.
- E. Do not weld in the presence of even a minute quantity of chlorinated solvents (such as carbon tetrachloride). Ultraviolet light from the electric arc will break down these vapors to form phosgene, a poisonous gas.
- F. Before the welding machine is put into operation, read the complete safety section at the rear of this manual. This will help avoid any possible injury due to misuse or improper welding applications.
- G. The following definitions apply to CAUTIONS, IMPORTANTS and NOTES found throughout the 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.

SPECIFICATION

OPEN CIRCUIT VOLTAGE	RATED WELDING CURRENT 100 pct. DUTY CYCLE AT 40 V.	PRIMARY INPUT AT RATED LOAD 50/60 CYCLE THREE PHASE POWER				OVERALL DIMENSIONS IN INCHES			WEIGHT	
		230 V.	460 V.	kw.	kva.	Height	Width	Depth	Net	Shipping
A 24-31 B 30-39 C 39-51	600 Amperes	82 Amperes	41 Amperes	30	32.7	35 $\frac{1}{4}$	27 $\frac{3}{4}$	38	745	770

SECTION II - INSTALLATION

2.1 LINE DISCONNECT SWITCH

CAUTION

A precautionary measure should be taken to provide maximum protection against electrical shock. Before electrical connections are made from the welding machine to the main line disconnect switch, BE SURE that the line disconnect switch has been opened or that the line disconnect fuses have been removed.

- A. Proper installation can contribute materially to the satisfactory and trouble-free operation of the welding machine. It is suggested that each step in this section be studied carefully and followed in detail.

2.2 LOCATION

- A. A good installation is essential if the welding machine is to provide satisfactory and dependable service. Proper component operating temperatures are maintained by the air stream produced by the welding machine fan unit. Therefore, the welding machine should be located so that the air passage into the bottom of the welding machine will not be restricted. The back of the welding machine should be away from any wall (18 inches minimum distance) so that the air passage from the fan will not be blocked.
- B. The location should be such that a minimum amount of dirt and dust will be drawn into the air stream. Preventive maintenance will consist of removing the sides and blowing out the dust accumulation inside the welding machine. For this reason it is desirable to locate the unit so that the cover and sides can be removed without any restriction.

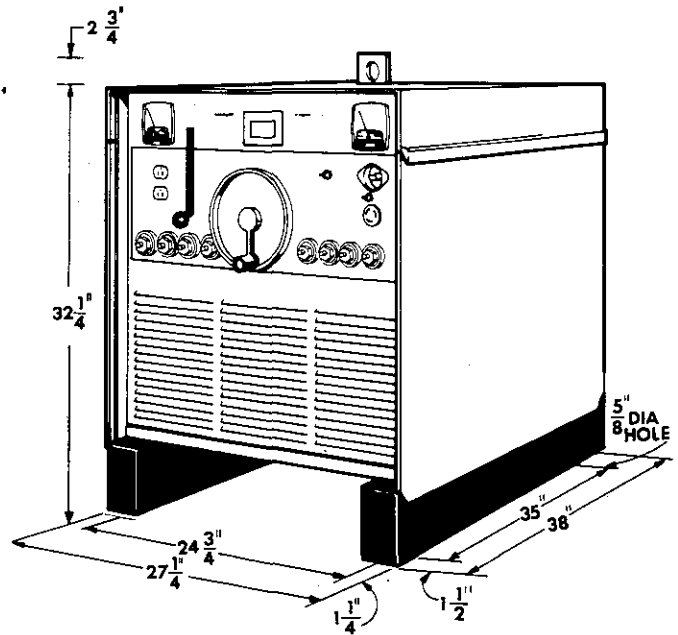


Figure 2 -- Dimensional Drawing and Base Mounting Hole Layout

2.3 PRIMARY CONNECTIONS

- A. This dc arc welding machine is a three phase unit and must be connected to a three phase primary power line. Remove the right hand side panel (view from front panel) from the welding machine. The primary input connection terminal panel is located on the right rear side, near the base of the machine. See Figure 4 for connections.
- B. The welding machine must be operated from a separately fused or circuit breaker protected circuit. The maximum output capability of the

TABLE I

RECOMMENDED PRIMARY WIRE AND FUSE SIZES

PRIMARY WIRE SIZE — AWG (GRD WIRE)				FUSE SIZE IN AMPERES			
208 V	230 V	460 V	575 V	208 V	230 V	460 V	575 V
#4 (#8)	#4 (#8)	#8 (#8)	#10 (#10)	110	100	50	40

Numbers in () are ground wire sizes.

welding machine is affected by the line voltage and if the circuit is overloaded, the performance of the welding machine will be impaired. Install three primary cables plus one ground wire into the rear of the welding machine. See Table I for proper wire, ground wire and fuse sizes.

An inlet hole is provided on the rear panel for this purpose. This opening will take standard conduit fittings. The service wires from the line disconnect switch to the welding machine should be of the heavy rubber covered type or run in solid or flexible conduit.

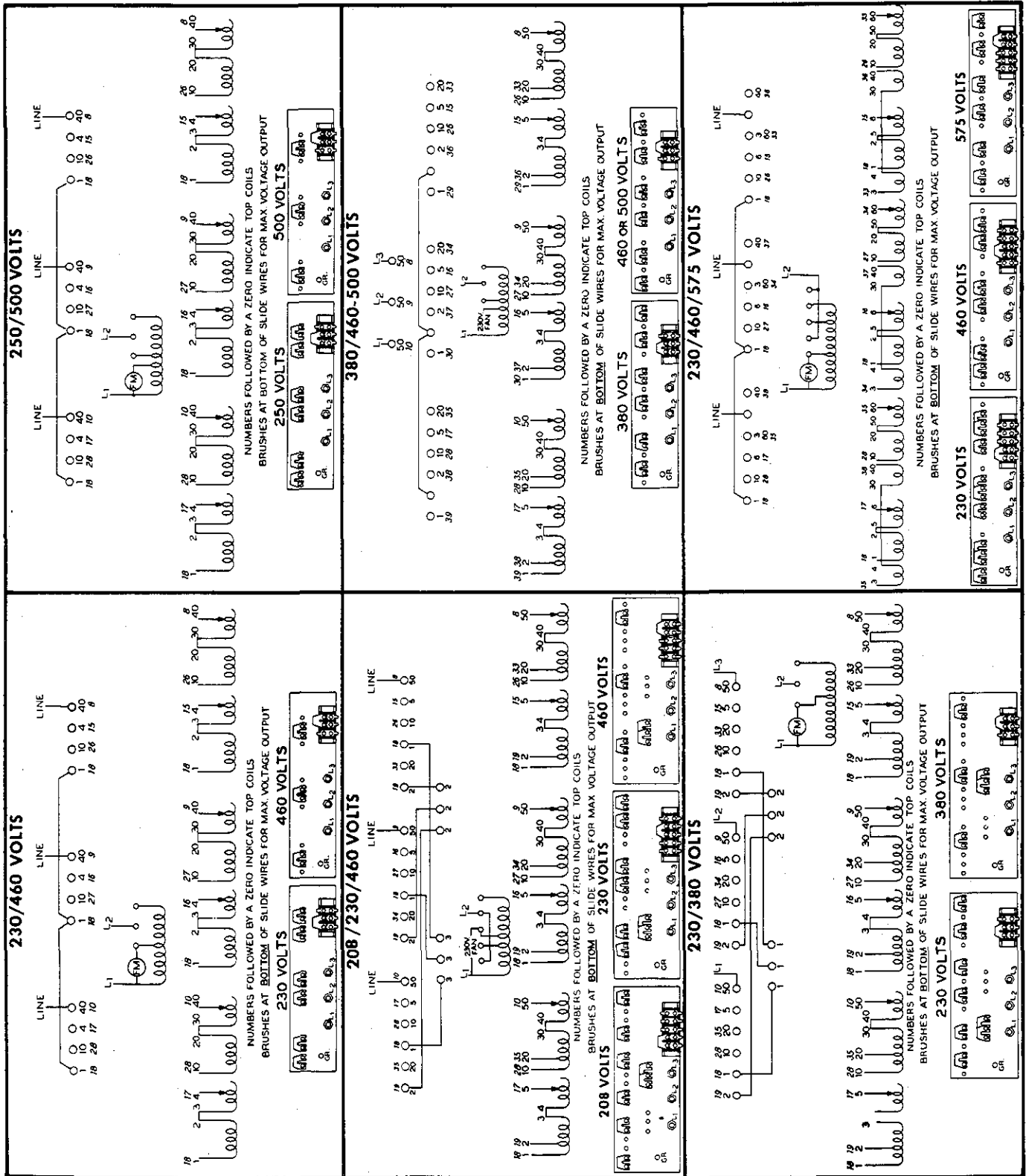


Figure 3 -- Primary Voltage Link Arrangement

- C. The primary cables connect to terminals L1, L2 and L3. A fourth wire cable ground connection, must be fastened to the terminal labeled GRD. See Figure 4. The other end of this cable should be attached to a suitable ground such as a water pipe, ground rod, etc. Use whatever grounding means is acceptable to the local electrical inspection authorities.

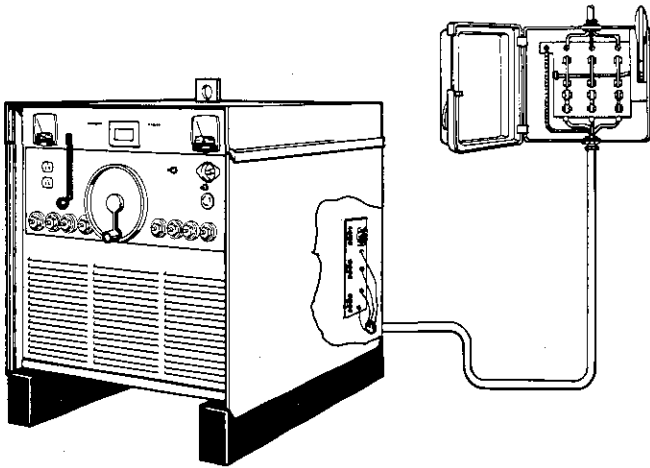


Figure 4 -- Primary Power Connections

CAUTION

The stud labeled GRD is connected to the welding machine chassis and is for grounding purposes only. Do not connect a wire from the terminal labeled GRD to one of the three phase line terminals as this may result in a hot welding machine chassis.

- D. The welding machine is designed to operate on either 230 or 460 volts, three phase, 60 cycle ac power line. Facilities for operation on other primary voltage, if ordered, are incorporated at the factory. To connect the welding machine properly for the voltage available, position the copper links as illustrated in Figure 5 and on the Primary Voltage Link Arrangement, Figure 3. This welding machine is shipped with the connections in the highest line voltage position for which the particular machine was built, unless otherwise ordered.



230 Volts 460 Volts
Figure 5 -- Standard Primary Voltage Link Arrangement

Whenever only one jumper link connection is necessary for proper input voltage, such as 460 volts, connect both jumper links across the same two terminals. This will prevent losing the second jumper link.

- E. Check all cables and links for tightness and correct connections.
- F. Replace the side panel on the welding machine.

2.4 SECONDARY CONNECTIONS

- A. It is recommended that the welding cables be kept as short as possible, placed close together and be of ADEQUATE CURRENT CARRYING CAPACITY. The resistance of the welding cable and connections cause a voltage drop which is added to the voltage of the arc. If the voltage drop is substantial, it will affect the welding arc. Excessive cable resistance may result in OVERLOADING as well as REDUCING the maximum current output of which the welding machine is capable. The proper operation of any arc welding machine is to a great extent dependent on the use of the welding cables and connections that are in good condition and of adequate size. AN INSULATED HOLDER MUST BE USED TO INSURE OPERATOR'S SAFETY.

TABLE II

GAS TUNGSTEN-ARC (TIG) OR GAS METAL-ARC (MIG) WELDING							
AMPERES	MAX. CABLE LENGTH					CABLE SIZE	
200	15 Feet					#1	
300	15 Feet					#2/0	
400	15 Feet					#3/0	
500	15 Feet					#4/0	
600	15 Feet					#2-2/0	
SHIELDED METAL-ARC (STICK ELECTRODE) WELDING							
WELDING AMPERES	DISTANCE IN FEET FROM WELDING MACHINE						
	50	75	100	125	150	175	200
100	2	2	2	2	1	1/0	1/0
150	2	2	1	1/0	2/0	3/0	3/0
200	2	1	1/0	2/0	3/0	4/0	4/0
250	2	1/0	2/0	3/0	4/0	4/0	2-2/0
300	1	2/0	3/0	4/0	4/0	2-2/0	2-3/0
350	1/0	2/0	4/0	4/0	2-2/0	2-3/0	2-3/0
400	1/0	3/0	4/0	2-2/0	2-3/0	3-2/0	2-4/0
500	2/0	3/0	2-2/0	2-3/0	2-3/0	2-4/0	3-3/0
600	3/0	2-2/0	2-3/0	3-2/0	2-4/0	3-3/0	3-4/0
700	4/0	2-3/0	2-4/0	3-4/0	3-4/0	4-4/0	4-4/0

If longer cables are required for either Gas Tungsten-Arc (TIG) or Gas Metal-Arc (MIG) welding, double the amount of cables shown.

- B. Table II shows welding cable size for Gas Metal-Arc welding (GMAW), Gas Tungsten-Arc welding (GTAW) and Shielded Metal-Arc welding (SMAW) processes. For Submerged Arc welding (SAW) and Carbon Arc Cutting (CAC) and other processes, use the cable size best suited as indicated in Table II. Table II shows total cable length of the weld circuit from the welding machine to the workpiece.
- C. Direct current reverse polarity (dcrp) is normally used for Gas Metal-Arc welding (GMAW) and Carbon Arc Cutting (CAC). This is accomplished by connecting a welding cable from the desired negative (stabilizer) terminal of the welding machine to the workpiece. Connect another cable from the selected Positive (slope) terminal to the wire feeder-control unit or electrode holder. These connections may vary with various makes of controls, etc. See Steps outlined in Section IV, Sequence of Operation Section for detailed connections of these and other welding processes. Make sure connections are clean and tight.

2.5 PARALLEL SECONDARY CONNECTIONS

- A. Two or more dc arc welding machines of the same type and model may be connected in parallel to

obtain output welding current in excess of the capabilities of one machine. To accomplish this see Figure 6 and proceed with connections as follows:

- (1) Connect separate welding cables of adequate size from the desired negative (stabilizer) terminal of each welding machine to the workpiece.

NOTE

These connections are for direct current reverse polarity (dcrp) operation. If direct current straight polarity (dcsp) is desired, reverse the negative and positive connections on the welding machine.

- (2) Connect separate welding cables of adequate size from the positive (slope) terminal of each welding machine to the electrode holder.

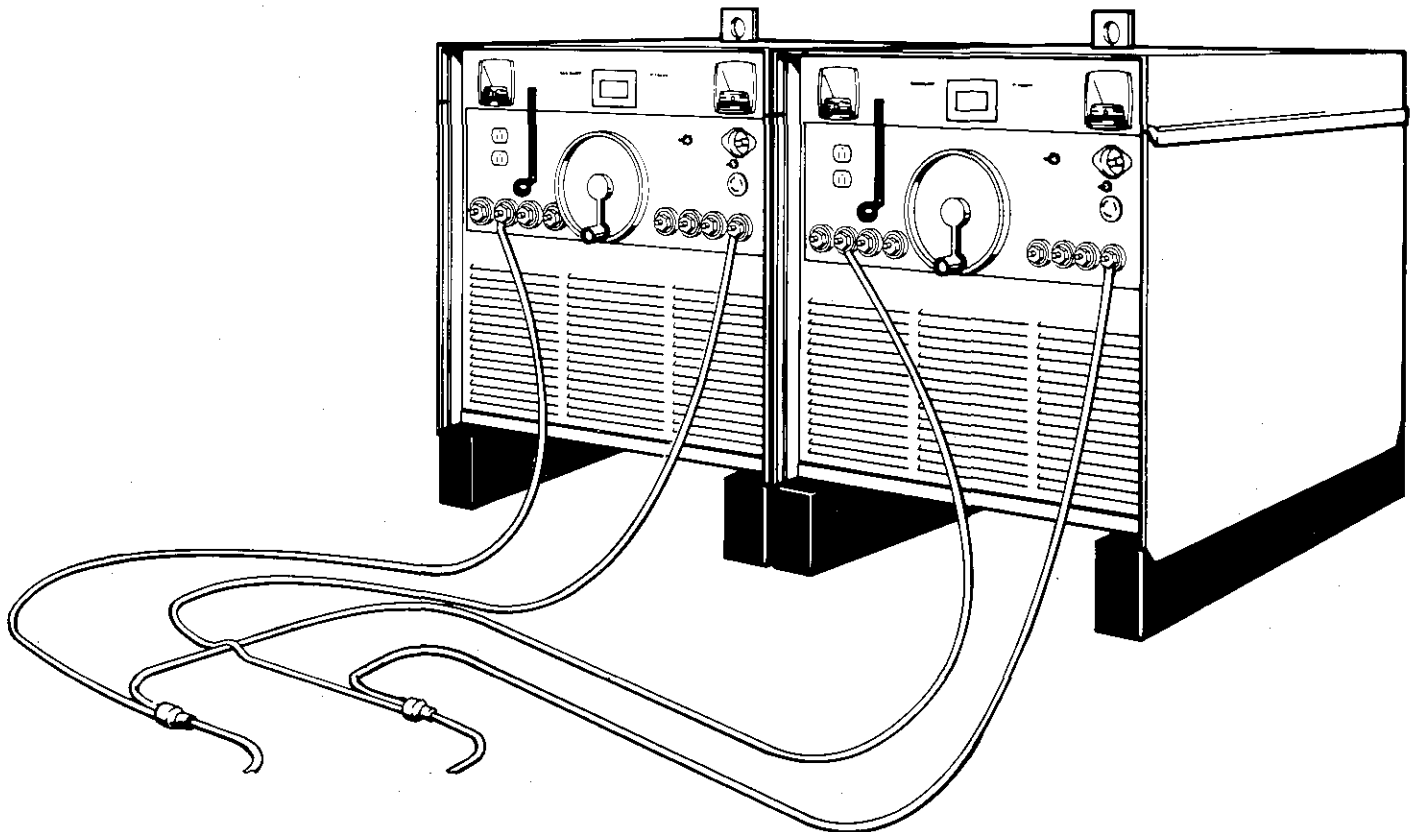


Figure 6 -- Parallel Secondary Connections

IMPORTANT

When paralleling two or more welding machines, it is of the utmost importance that all connections to each welding machine are the same. That is, if the 150 ampere positive (slope) terminal is selected to be used, all other welding machines to be connected in parallel must use their 150 ampere slope terminal. The same rule applies to the negative (stabilizer) connections. If the connections are not the same on all welding machines, serious damage may result to one or more of the units connected in parallel.

- (3) Place the Voltage Range Switch in the same position on all machines connected in parallel.
- (4) Turn the Weld Voltage Control to the same reading on the Voltage Indicator on all machines connected in parallel.

2.6 115 VOLT ac RECEPTACLE CONNECTIONS

- A. The two pole twistlock receptacle is a 115 volt ac single phase power source to supply operating power for a wire feed mechanism of Gas Metal-

Arc welding controls requiring 115 volt operating power. A duplex 115 volt ac receptacle is provided for connecting and operating 115 volt ac welding accessories.

2.7 CONTACTOR CONTROL RECEPTACLE CONNECTIONS AND SWITCH

- A. The Contactor Control Receptacle is a two pole twistlock motor base male receptacle. 115 volts 50/60 cycle, ac power must be supplied to this receptacle to operate the primary contactor when the Contactor Control Switch is in the Remote position.
- B. Normal connections for Gas Metal-Arc welding (GMAW) are to connect the 115 volt feeder-control supply cord to the 115 volt ac receptacle on the welding machine. The Contactor Control cord from the feeder-control is connected to the Contactor Control Receptacle. With these connections the switch on the Gas Metal-Arc (MIG) Gun or Torch will control the primary contactor if the Contactor Control Switch is in the Remote position. Provisions for Contactor Control when using other welding processes will depend on the welding equipment being used and their manufacturer.

SECTION III - OPERATION

CAUTION

Never, under any circumstances, operate the welding machine with sides or cover removed. In addition to the safety hazard, improper cooling may result in damage to the welding machine components. Be sure to read the complete safety section at the rear of the manual before operating the welding machine.

3.1 DUTY CYCLE

□A. The duty cycle is the percentage of a ten minute period time that a welding machine can operate at a given output current setting. This machine is rated at 100 percent duty cycle, that is, this 600 ampere machine may be operated at 600 amperes welding current continuously. If the welding current is increased, the duty cycle will decrease. Duty Cycle Chart, Figure 7, enables the operator to determine the safe output of the welding machine at various duty cycles.

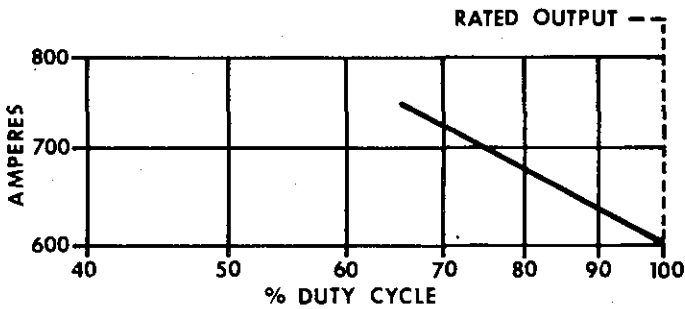


Figure 7 -- Duty Cycle Chart

IMPORTANT

This welding machine is rated at 600 amperes continuous duty when secondary connections are made to the flat positive (slope) terminal and the zero negative (stabilizer) terminal only. If any one of the other slope or stabilizer terminals are used, do not exceed the amperage rating that is indicated above each terminal. Use the welding machine ammeter as a guide to avoid exceeding the amperage rating of the secondary terminals being used.

3.2 VOLT-AMPERE CURVES

□A. The volt-ampere curves, Figure 8, show the output voltage available at each given output current within the limits of the minimum and maximum of each of the three (3) voltage ranges of the welding machine. Load voltage is predetermined to a

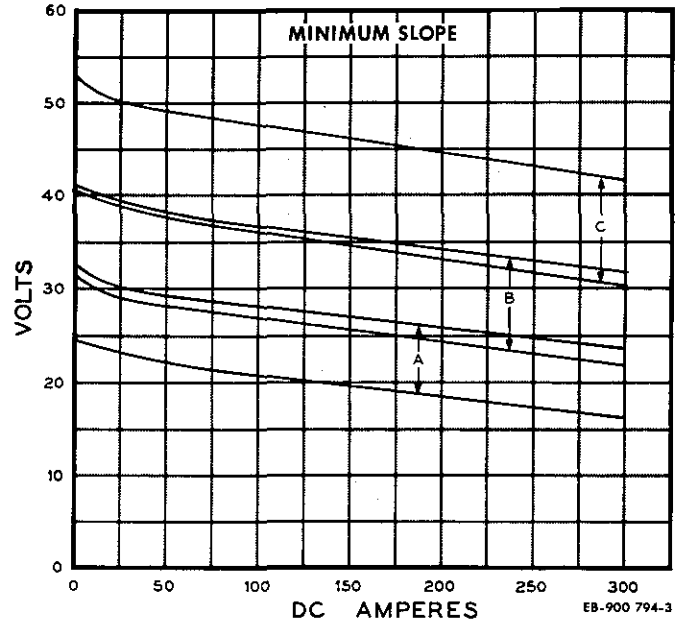
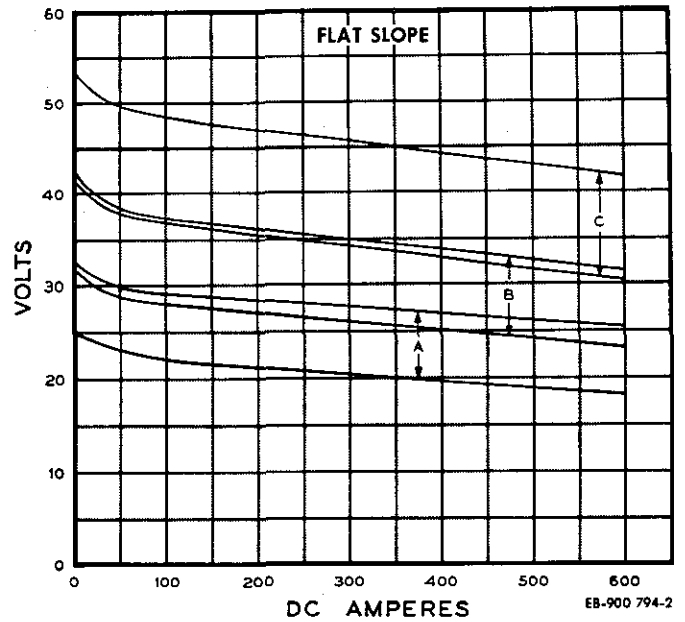


Figure 8 -- Volt-Ampere Curves

great degree by the open circuit voltage setting and the positive (slope) terminal connection that is being used. With the use of the volt-ampere curves, it is possible to determine the amperage required for a particular load voltage. With reference to the volt-ampere curves, the curves show the minimum and maximum only of each of the three (3) voltage ranges for each of the four (4) positive (slope) terminals. Curves for other settings will fall between the minimum and maximum of each voltage range.

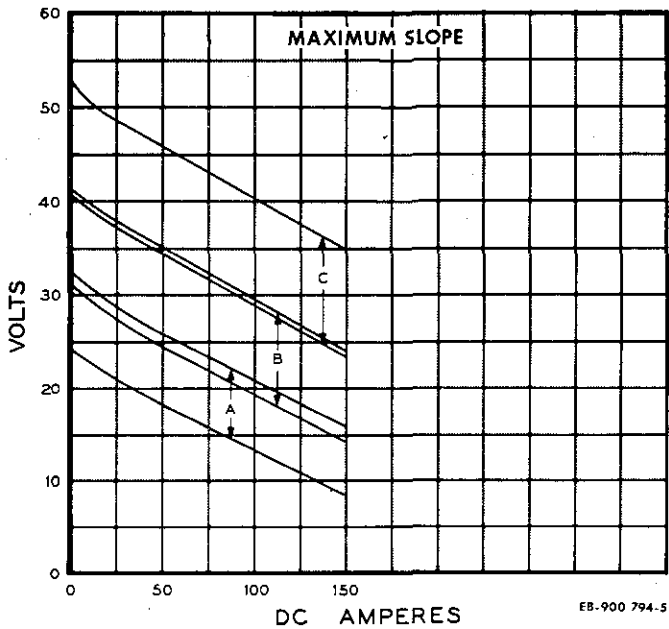
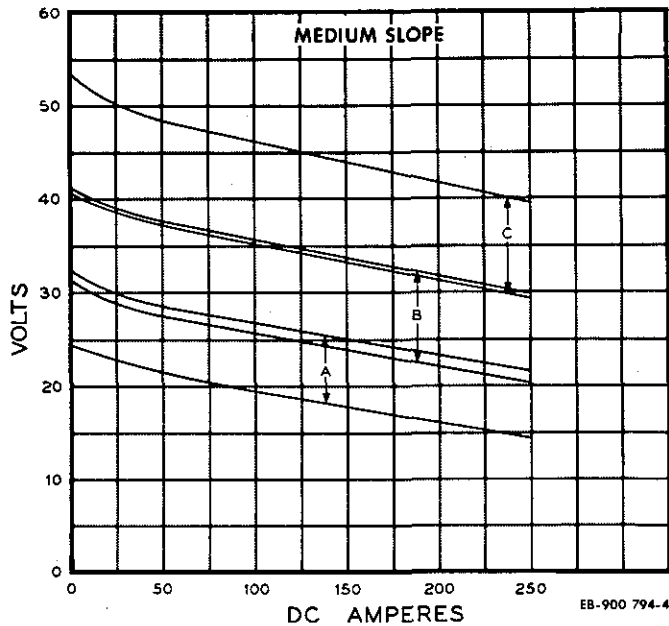


Figure 8 -- Volt-Ampere Curves

3.3 POSITIVE (SLOPE) TERMINALS

□A. A brief summary of what slope does to the welding circuit is necessary in order to render aid in selecting what slope terminal to use for a particular process.

□(1) As the amount of slope is increased in the weld circuit, a greater amount of droop is induced into the volt-ampere curve. This can readily be seen by comparing one of the volt-ampere curves, Figure 8, against another. For example, locate the 150 ampere setting on the minimum slope volt-ampere curve, Figure 8. Compare the arc voltage on this curve to the one on the maximum slope volt-ampere curve at 150 amperes. Notice how much lower the arc voltage is when a larger amount of slope is used in the weld circuit at a given amperage.

□(2) With the four (4) slope terminals available to select a given amount of slope, there also are the voltage range switch and weld voltage control to give a precise open circuit voltage. Through the use of the volt-ampere curves, Figure 8, an actual volt to ampere ratio can be arrived at and set through the use of the different slope connections and voltage controls.

□(3) In concluding this summary, it can be said that slope alters the shape and magnitude of the volt-ampere curve and it also determines the amount of short circuit amperage available at the arc.

□B. There are four (4) positive (slope) terminals available on this welding machine for making a selection of the needed amount of slope in the weld circuit for the particular welding application. Each positive (slope) terminal is labeled directly above it as to the amount of workable amperage that is available at each terminal.

IMPORTANT

Do not exceed the amperage rating of the positive (slope) terminal in use. Maximum allowable amperage ratings are labeled above each terminal. Use the ammeter on the welding machine as a guide to avoid overloading the positive (slope) terminal being used.

□C. The flat, positive (slope) terminal rating of 600 amperes may be exceeded, but a reduced duty cycle must be observed. Refer to the Duty Cycle Chart, Figure 7, for safe operating time above rated load when using the 600 ampere terminal. Remember, the amperage rating of the 600 ampere (flat) terminal may be exceeded with a reduced duty cycle being observed, however, this DOES NOT apply to the other slope terminals. This means that no more than the rated amperage which is shown above each terminal may be drawn from the other three (3) slope terminals.

□D. The flat positive (slope) terminal should be used when the Carbon Arc Cutting (CAC) and Fluxed Cored Gas Metal-Arc welding (GMAW) processes are used. Both of these processes generally require a high operating amperage. This will avoid damage to the slope components as the flat positive (slope) terminal is internally connected to by-pass the slope component in the welding machine.

□E. Refer to Section IV, Sequence of Operation, for additional information on proper welding connections and processes.

3.4 NEGATIVE (STABILIZER) TERMINALS

□A. The stabilizer induces a reactance (resist a change) in the weld circuit. As the amount of stabilizer (reactance) is increased, the ability of the welding machine to follow the change in arc conditions is decreased. When less stabilizer (reactance) is added to the weld circuit the welding machine's ability to follow changes in arc condition is increased. Thus, it is possible to control the time response or ability of the welding machine to respond to varying arc condition through the use of the dif-

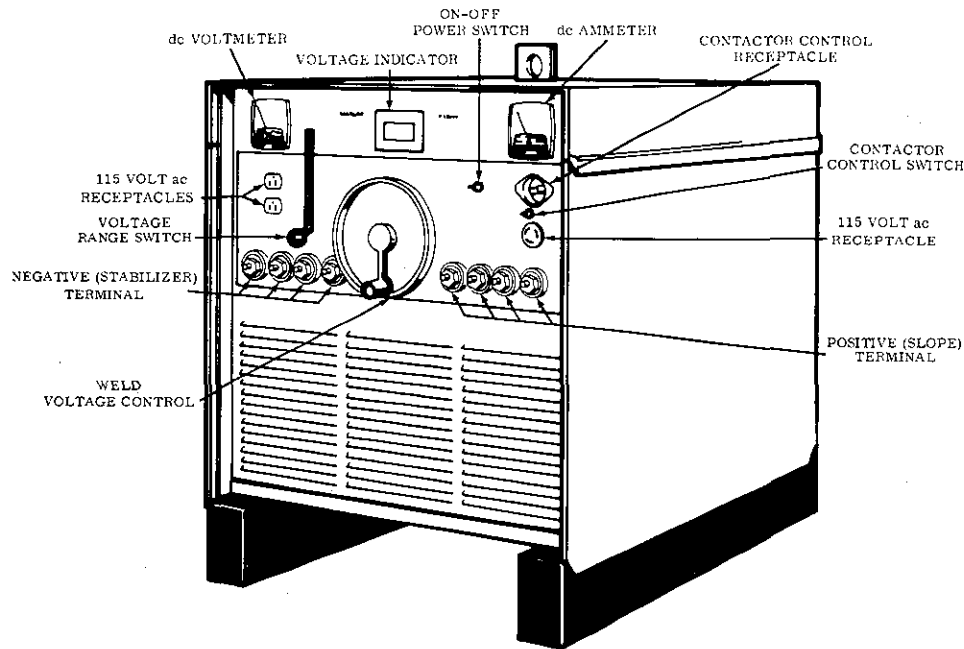


Figure 9 -- Control Panel View

ferent negative (stabilizer) terminals. The stabilizer controls to a point, the number of short circuit currents available at the arc in a given time when certain Gas Metal-Arc welding (GMAW) and Shielded Metal-Arc welding (SMAW) processes are used.

For example, if .035 wire is being used in the Gas Metal-Arc welding (GMAW) process and the electrode wire tends to explode or spatter excessively, the time response or ability of the welding machine to follow the change in arc conditions is too fast. By moving the negative (stabilizer) connection to a terminal that will slow the time response of the welding machine helps to overcome this condition.

- B. It is impossible to try to describe all the different conditions that may exist in actual weld conditions. Section IV, Sequence of Operation, gives a reference table with each process so the operator will have a starting point for the particular process. It is recommended that actual weld conditions be setup using scrap metal of the same composition as the material that will be welded on a production basis. In this way, the welding machine settings, etc., can be felt out and its best combinations of control settings, slope and stabilizer connections can be pre-set before actual production welding is started.
- C. The minimum, medium and maximum negative (stabilizer) terminals are rated at 300 amperes continuous duty cycle. The zero stabilizer terminal is rated at 600 amperes continuous duty cycle. This zero, 600 ampere stabilizer terminal is recommended for use when the welding machine is being used for the Carbon Arc Cutting (CAC) and Heavy Solid or Fluxed Cored Gas Metal-Arc welding (GMAW) processes, as these processes will generally require more than 300 amperes which would exceed the amperage rating of the other three (3) stabilizer terminals.

IMPORTANT

Do not exceed the ratings of the maximum, medium, and minimum negative (stabilizer) terminals which are rated at 300 amperes, 100 percent or continuous duty cycle.

- D. Through the use of the different negative (stabilizer) terminals, it is possible to obtain variety of bead configurations and to a certain degree by using a selected amount of stabilizer (reactance) it is possible to control penetration in some welding processes.

3.5 METERS

- A. The welding machine is equipped with a dc ammeter and a dc voltmeter. These meters are internally connected to the welding machine output welding terminals. The voltmeter will indicate the dc voltage at the terminals, but does 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 machine terminals may be considerable.

3.6 VOLTAGE CONTROL

- A. The voltage controls of this welding machine will control the open circuit voltage and arc voltage when the Gas Metal-Arc welding (GMAW) process is used. The speed and size of the Electrode wire will determine to a great degree the amperage or weld current that will be drawn.
- B. When this welding machine is to be used for Gas Tungsten-Arc welding (GTAW), Shielded Metal-Arc welding (SMAW) or any other type of constant current welding process, the voltage controls

will control the open circuit voltage and the amperage or weld current that will be required for the particular process.

□C. VOLTAGE RANGE SWITCH

- (1) The voltage range switch provides selection of three (3) different voltage ranges. Wire size and work will determine which voltage range is required.

IMPORTANT

Do not operate the voltage range switch under load. Operate the voltage range switch ONLY when the welding machine is idling and the welding circuit is open. Arcing caused by opening the circuit carrying high current will severely burn the contact surfaces of the voltage range switch. Burning the contact surfaces of the voltage range switch will decrease the maximum current carrying capacity of the switch and possibly cause it to become inoperative.

□D. WELD VOLTAGE CONTROL

- (1) The handwheel control on the front control

panel of the welding machine provides infinite fine voltage adjustment within each voltage range selected. The weld voltage control can be adjusted while welding. Its contacts are continuous and do not break the welding circuit when the control is varied from one voltage setting to another. This permits the operator to obtain exact voltage settings while welding.

□E. VOLTAGE INDICATOR

- (1) Voltage control adjustments made by rotating the weld voltage control, register the open circuit voltage on the voltage indicator located directly above the weld voltage control. The ranges labeled A, B and C correspond to the A, B and C settings of the voltage range switch. By keeping a record of indicator readings, the operator can obtain identical arc characteristics job after job by resetting to pre-selected voltages.

3.7 ON-OFF POWER SWITCH

- A. Its function is to turn the welding machine on or off thus eliminating the necessity of disengaging the primary line disconnect switch.

SECTION IV - SEQUENCE OF OPERATION

IMPORTANT

When various negative (stabilizer) terminals and positive (slope) terminals are used for a particular process, it must be understood that the amperage rating of the lowest rated terminal in use, must not be exceeded. Example: If the positive connection is to the 150 ampere or maximum slope terminal and the negative connection is to one of the 300

ampere stabilizer terminals, the weld current must not exceed the amperage rating of the 150 ampere maximum slope terminal. Use the welding machine ammeter as a guide in order to stay within the safe amperage range of the lowest rated slope or stabilizer terminal being used.

**TABLE III
GAS METAL-ARC WELDING (GMAW) USING FINE ELECTRODE WIRE**

ELECTRODE WIRE SIZE	ELECTRODE WIRE COMPOSITION	POSITIVE SLOPE TERMINAL	NEGATIVE STABILIZER TERMINAL	WELD AMPERES MIN - MAX
.030	Mild Steel	Max.(150A)	*Min-Med	42-150
.030	Mild Steel	Med.(250A)	*Min-Med	75-200
.030	Mild Steel	Min.(300A)	*Min-Med	96-210
.035	Mild Steel	Max.(150A)	*Min-Med	72-150
.035	Mild Steel	Med.(250A)	*Min-Max	75-220
.035	Mild Steel	Min.(300A)	*Med-Max	100-240
.045	Mild Steel	Max.(150A)	*Min-Med	132-150
.045	Mild Steel	Med.(250A)	*Med-Max	114-250
.045	Mild Steel	Min.(150A)	*Min-Max	118-300
.030	Stainless Steel	Max.(150A)	*Min-Med	45-130
.030	Stainless Steel	Med.(250A)	*Med-Max.	65-150
.030	Stainless Steel	Min.(300A)	*Med-Max	65-150
.035	Stainless Steel	Max.(150A)	*Min-Max	45-150
.035	Stainless Steel	Med.(250A)	*Med-Max	65-160
.035	Stainless Steel	Min.(300A)	*Med-Max	78-180
.045	Stainless Steel	Max. (150A)	*Zero-Min	120-150
.045	Stainless Steel	Med.(250A)	*Med-Max	120-180
.045	Stainless Steel	Min.(300A)	Max	138-220

*By using the different Stabilizer Terminals available it is possible to control the starting characteristics, bead configuration and time response of the welding machine.

All figures given in this table are approximate and will vary due to electrode wire manufacturer, shielding gas, base material and numerous other conditions that cannot be covered.

4.1 GAS METAL-ARC WELDING (GMAW)

- A. Remove primary power from the welding machine by opening the line voltage disconnect switch.
- B. Direct current reverse polarity (dcrp) connections are normally used for this process. Follow the wire feeder-control unit manufacturers instructions concerning electrode wire size, gas, welding current, etc.
- C. Refer to the volt-ampere curves, Figure 8, and Table III to determine what positive (slope) terminal connection should be used.
- D. Connect the wire feeder-control unit to the selected positive (slope) terminal.

- E. Connect a suitable size cable from the workpiece to the selected negative (stabilizer) terminal.

NOTE

Table III is included in this manual to help the operator establish a starting point for slope and stabilizer connections. This table was compiled using CO₂ shielding gas and mild steel electrode wire. While this table is confined to a limited range of application, it still will be an aid in initial slope and stabilizer connections.

- F. Make the necessary control connections between the wire feeder-control unit and the welding machine.

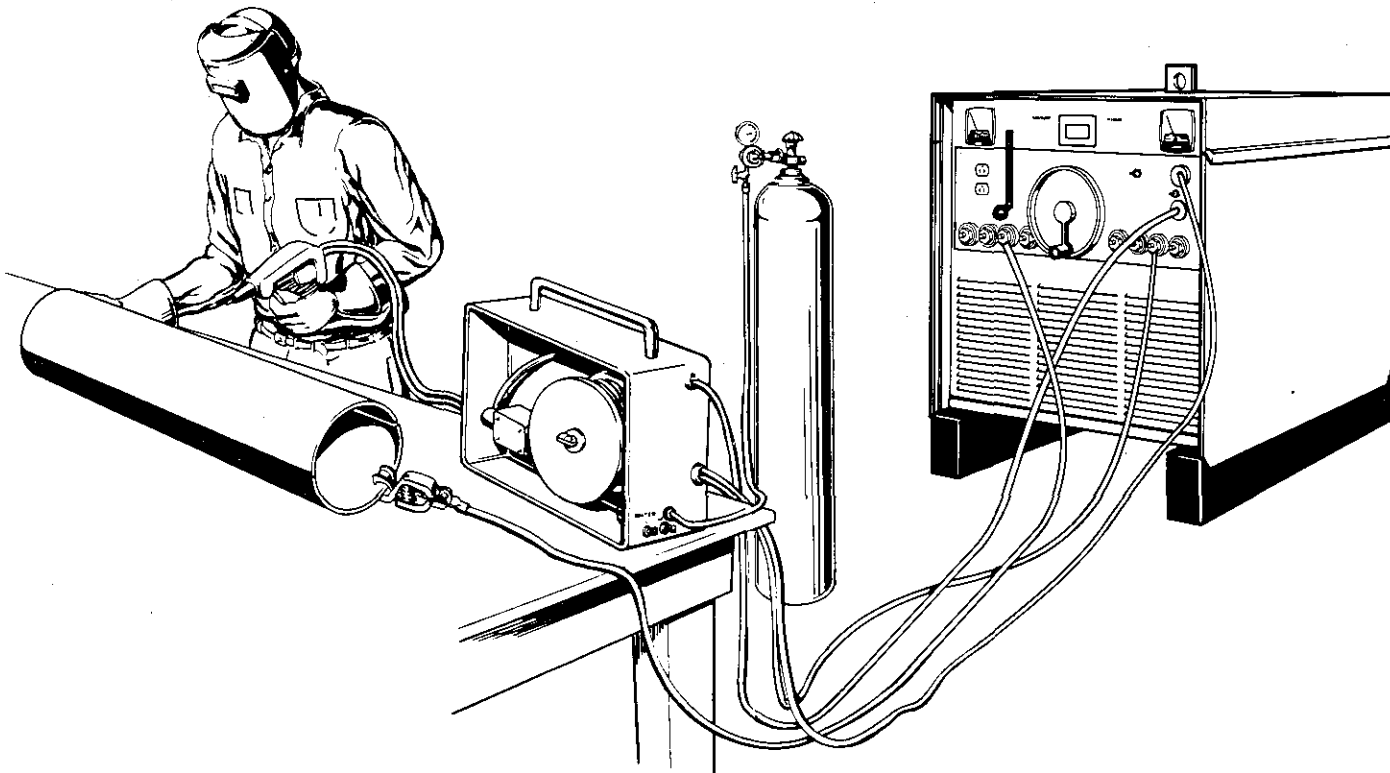


Figure 10 -- Connections for Gas Metal-Arc Welding (GMAW)

- G. Load the wire feed control with proper size and type of wire as recommended by the electrode wire manufacturer.
- H. Place the contactor control switch in the Remote position.
- I. Adjust the voltage range switch for the desired open circuit voltage.
- J. Adjust the weld voltage control for desired open circuit voltage.
- L. Turn the gas (and water) supply on.
- M. Close line disconnect switch connecting primary power to the welding machine.
- N. Energize the control switch on the torch or gun long enough to adjust the regulator on the gas supply. Adjust according to gas manufacturer recommendations.
- O. Bring the gun or torch nozzle close to the workpiece. Energize the control switch on the torch or gun and commence welding.
- P. Re-adjust welding controls, if necessary, until proper welding condition is obtained. The weld

voltage control can be adjusted while welding but not the voltage range switch. Place the on-off power switch on the welding machine in the Off position after the welding job is completed.

4.2 GAS METAL-ARC WELDING (GMAW) HEAVY SOLID AND FLUX CORED WIRE

- A. Heavy solid or fluxed cored wire usually requires a high operating amperage which necessitates the use of the 600 ampere secondary terminals in following Steps B and C. Table IV, is included to help get an idea of the arc voltage, amperage, type and amount of shielding gas required for different size fluxed cored wire.
- B. Connect the workpiece to the zero negative (stabilizer) terminal.
- C. Connect the wire feeder-control to the flat positive (slope) terminal.
- D. Make the control connections, etc., as described in Paragraph 4.1, Steps F through P.

TABLE IV

GAS METAL-ARC WELDING (GMAW) HEAVY SOLID AND FLUX CORED WIRE

ELECTRODE WIRE SIZE	POSITIVE SLOPE TERMINAL	NEGATIVE STABILIZER TERMINAL	AMPERAGE RANGE		ARC OR LOAD VOLTAGE		WIRE SPEED I.P.M.		SHIELDING GAS	RATE CFH
			MIN	MAX	MIN	MAX	MIN	MAX		
5/64"	Flat	Zero	350	400	29	32	241	290	CO ₂	35-45
3/32"	Flat	Zero	400	450	29	32	178	214	CO ₂	35-45
7/64"	Flat	Zero	425	475	29	32	139	156	CO ₂	35-45
1/8"	Flat	Zero	475	550	29	32	117	135	CO ₂	35-45

NOTE: These calibrations may differ with various wire manufacturer recommendations and their products.

4.3 GAS METAL-ARC WELDING (GMAW) OVERLAY AND BUILDUP WORK USING ALUMINUM BRONZE ELECTRODE FILLER WIRE

□A. Make all the connections as described in Section 4.1 and Figure 10. Again, slope and stabilizer selection will vary. Table V is included as a guide for initial selections. This table was compiled using mild steel as a base metal and then using aluminum bronze and silicon bronze electrode wire as a filler in overlay or buildup work.

□C. Wire feed speed controls the amount of current at the arc. Therefore, by adjusting wire speed it is possible to control amperage.

4.4 GAS METAL-ARC WELDING (GMAW) ALUMINUM

□A. Table VI is included as a guide in selecting the electrode wire, gas, feed rate, etc. The application of this welding machine to welding aluminum material with this process is somewhat limited. However, by following Table VI as a

TABLE V

GAS METAL-ARC WELDING (GMAW) OVERLAY AND BUILDUP USING ALUMINUM BRONZE AND SILICON BRONZE ELECTRODE FILLER WIRE

ELECTRODE WIRE SIZE	ELECTRODE WIRE COMPOSITION	POSITIVE SLOPE TERMINAL	NEGATIVE STABILIZER TERMINAL	SHIELDING GAS	RATE GAS FLOW CFH
.030	Aluminum Bronze	Med or Min	Min-Max	Argon	30
.035	Aluminum Bronze	Med or Min	Min-Max	Argon	30
.035	Silicon Bronze	Med or Min	Min-Med	Argon	30

NOTE: These figures will differ due to brand of electrode wire, shielding gas, arc conditions and numerous other conditions that cannot be foreseen.

□B. Prepare the surface of the material to be built-up.

NOTE

When overlay or buildup work is being done using a filler material that differs from the base material, it is important not to have too much amperage at the arc in order to hold to a minimum the mixing of the filler material and base material. The operator should strive to obtain a bond between the base material and filler material having a minimum of mixing of the two different materials.

guide, it is possible to obtain very satisfactory results welding aluminum material with the Gas Metal-Arc Welding Process (GMAW).

□B. Make all the connections, etc., as described in Section 4.1 and Figure 10. Remember the settings etc., in Table VI will vary due to different wire manufacturers, size of wire, type of base material, conditions of base material and numerous other variables that cannot be covered due to unknown welding conditions that may exist. It is recommended that scrap material of the same com-

TABLE VI

GAS METAL-ARC WELDING (GMAW) ALUMINUM

ELECTRODE WIRE SIZE	ELECTRODE WIRE COMPOSITION	POSITIVE SLOPE TERMINAL	NEGATIVE STABILIZER TERMINAL	SHIELDING GAS	RATE GAS FLOW CFH
.030	Aluminum 4043	Max.	Min-Med	Argon	30
3/64	Aluminum 4043	Med.	Zero-Med	Argon	30

NOTE: These figures are approximate. Different size electrode wire, wire manufacturer, shielding gas, etc., will all determine what the final connections and welding machine settings will be for production welding of aluminum.

position as the material to be welded be used to set the welding machine for the best performance.

- C. Consult your welding supplier for additional information.

4.5 SHIELDED METAL-ARC WELDING (SMAW)

- A. This welding machine will readily handle a wide range of coated electrodes that do not require a high open circuit voltage for starting. Remember, maximum open circuit voltage of this welding machine is 51 volts (range C-51). However, with the wide selection of positive (slope) terminals and negative (stabilizer) terminals that are available, it is possible to obtain very satisfactory starting and welding results using coated electrodes.
- B. Use the volt-ampere curves, Figure 8, and Table VII as a guide in selecting what slope and stabilizer terminals to use for the particular coated electrode that will be used. Table VII shows tests run on various coated electrodes and indicates which slope and stabilizer connections appear to be suited for these electrodes. These connections and the connections for coated electrodes not listed, are subject to change due to numerous welding conditions which cannot be foreseen. Consult your welding equipment supplier for additional information concerning arc voltage and amperage for the coated electrode to be used.
- C. Connections to the positive (slope) and negative (stabilizer) terminals will depend upon the type of coated electrode being used. For direct current straight polarity (dosp), connect the workpiece to the desired positive (slope) terminal and the electrode cable to the negative (stabilizer) terminal that will be used. For direct current reverse polarity (dcrp), reverse the positive and negative connections on the welding machine.
- D. Place the contactor control switch in the Standard position.
- E. Place the voltage control switch in the proper position.
- F. Turn the line power switch and welding machine power switch On.

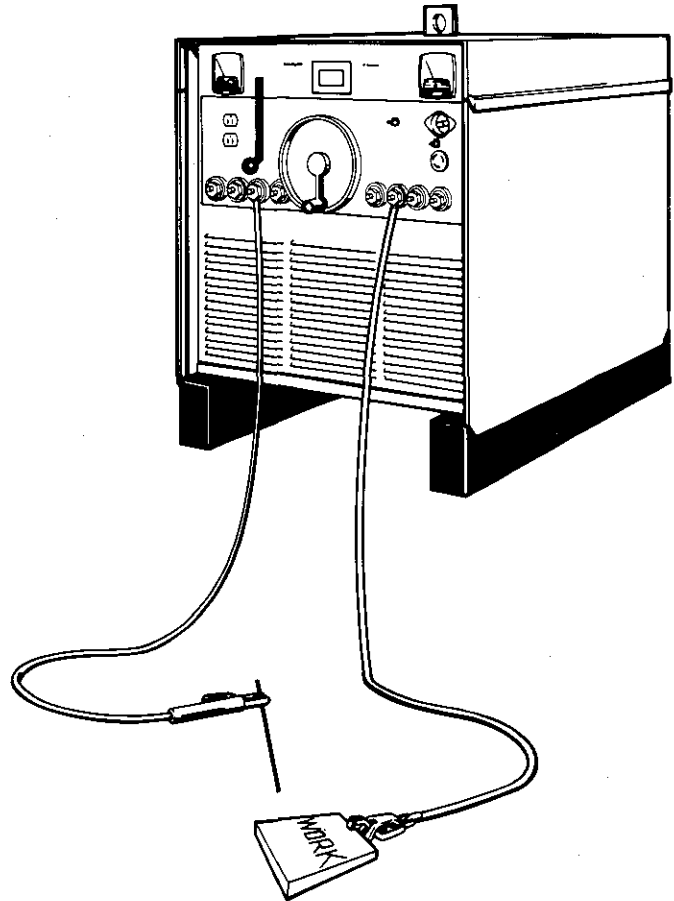


Figure 11 -- Connections for Shielded Metal-Arc Welding (SMAW)

IMPORTANT

Do not exceed the ratings of either the slope or stabilizer terminal being used. Use the welding machine ammeter as a guide to avoid damage to the welding machine components.

TABLE VII
SHIELDED METAL-ARC WELDING (SMAW) COATED ELECTRODE OR STICK WELDING

ELECTRODE SIZE	ELECTRODE TYPE	POSITIVE (Slope) TERMINAL	NEGATIVE (Stabilizer) TERMINAL	WELD AMPERES MIN-MAX
3/32"	E7024	Max.	Max.	84-120
1/8"	E7024	Max.	Max.	108-150
5/32"	E7024	Max.	Max.	132-150
5/32"	E7024	Med.	Max.	150-240
3/32"	E7016	Max.	Max.	68-120
1/8"	E7016	Max.	Max.	114-144
5/32"	E7016	Med.	Max.	140-180
3/32"	E6010	Max.	Max.	66-100
1/8"	E6010	Max.	Max.	120-144
5/32"	E6010	Med.	Max.	150-180
3/32"	308L	Max.	Max.	54- 96
1/8"	308L	Max.	Max.	60-138
5/32"	308L	Max.	Max.	120-150
3/16"	308L	Max.	Max.	128-150

NOTE: These settings and settings for other coated electrodes not shown will vary due to difference in electrode manufacturer, base metal and numerous other conditions that cannot be foreseen or covered in this table. This table is included to serve as a starting point or a guide in the initial setup of this welding machine for the Shielded Metal-Arc Welding (SMAW) process.

NOTE

In the shielded metal-arc welding process and any other process that requires a constant current power, the voltage controls of the welding machine will actually control the amperage at the arc rather than the arc voltage.

- G. Place the coated electrode in the electrode holder.
- H. Commence welding.
- I. Re-adjust the voltage control if necessary. Remember, the weld voltage control can be adjusted while welding, however, the voltage range switch must not be moved. If an attempt is made to adjust the voltage range switch while welding, damage to the switch contacts will result.
- J. To shut down the welding machine after completion of the job, place the power switch on the unit in the off position.

4.6 SUBMERGED ARC WELDING (SAW)

- A. Remove primary power from the welding machine by opening the line disconnect switch.
- B. Refer to Submerged Arc welding equipment instruction manual for proper polarity connections--either straight or reverse polarity. Control of the bead shape is best with direct current reverse polarity (dcrp), because of better wash-in and less molten metal. Highest deposition rates are obtained with direct current straight polarity (dosp).

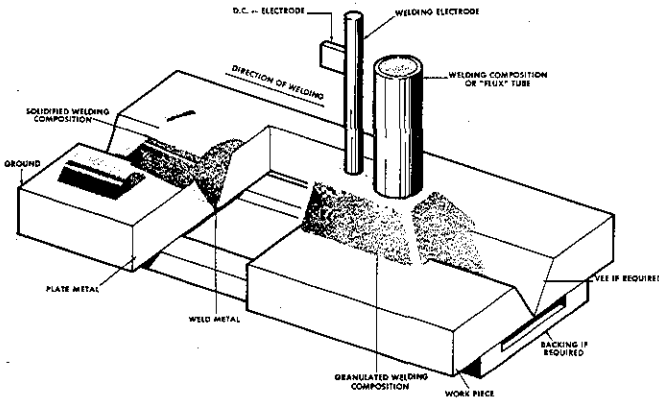


Figure 12 -- Connections for Submerged-Arc Welding (SAW)

- C. Make the secondary connections to the flat slope terminal and zero stabilizer terminal. Other slope and stabilizer terminals may be used as long as their amperage carrying capacity is not exceeded.
- D. Place the contactor control switch in the standard position if remote contactor control is not desired. If remote contactor control is desired, place the contactor control switch in the remote position and make remote control connections as explained in Section 2, Paragraph 7 (2.7).
- E. Place the voltage range switch in the position which will best match the electrode size used. Voltage control adjustments between maximum and minimum of each range can be made with the weld voltage control.
- F. Ready the submerged-arc unit with proper flux and electrode wire.
- G. Place the primary line disconnect switch in the On position.

- H. Place the on-off power switch on the welding machine in the On position. The welding machine with submerged-arc unit is now ready for operation.
- J. Place the on-off power switch on the welding machine in the Off position after the submerged-arc welding operation has been completed.

4.7 CARBON ARC CUTTING (CAC)

- A. Remove primary power from the welding machine by opening the line disconnect switch.
- B. Connect the air carbon-arc cutting torch to the welding machine. BE SURE SECONDARY CABLES ARE OF ADEQUATE SIZE FOR LENGTH AND AMPERAGE. See Table II. If dc electrode is used, be sure to connect the torch for reverse polarity.
 - (1) Connect a cable from the zero negative (stabilizer) terminal to the workpiece.
 - (2) Connect a cable from the flat positive (slope) terminal to the torch or electrode holder.

TABLE VIII

RECOMMENDED AMPERAGE RANGE FOR VARIOUS SIZE AIR CARBON-ARC CUTTING ELECTRODES

ELECTRODE SIZE, IN.	5/32	3/16	1/4	5/16
Minimum Amperes	90	150	200	250
Maximum Amperes	150	200	350	450

NOTE

Different slope and stabilizer connections can be used to control the depth and width of the gouge. However, the ammeter on the welding machine should be used as a guide to eliminate any chance of overloading the components of the welding machine when using slope and stabilizer connections other than described in Step 4.7 B.

- C. Provisions are made on the end of the cable assembly to connect a compressed air supply as well as power. Connect an air line to the torch having an air pressure of 80 to 100 p.s.i. Air pressure as low as 40 p.s.i. may be used for light work. The air supply hose should have a minimum inside diameter of 1/4 inch and be unrestricted. Although the actual pressure is not critical, it is important that sufficient volume of air is supplied to insure a clean, slag-free surface when gouging.
- D. Place the contactor control switch in the standard position.
- E. Place the voltage range switch in the position which will best match the carbon electrode size used. Voltage control adjustments between maximum and minimum of each range can be made with the weld voltage control.
- F. Place electrode in torch so that not more than 6" protrudes and air jets are pointed toward arc end of electrode. Essentially, the air carbon-arc cutting process is the melting of metal which is blown away by high velocity jets of compressed air. Power requirements are higher per diameter of electrode than is usually employed in normal arc welding. Carbon electrode no larger than 5/16 inch should be used with this welding machine. See Table VIII. If a larger carbon electrode is required for work, two or more welding machines of same type and model can be connected in parallel

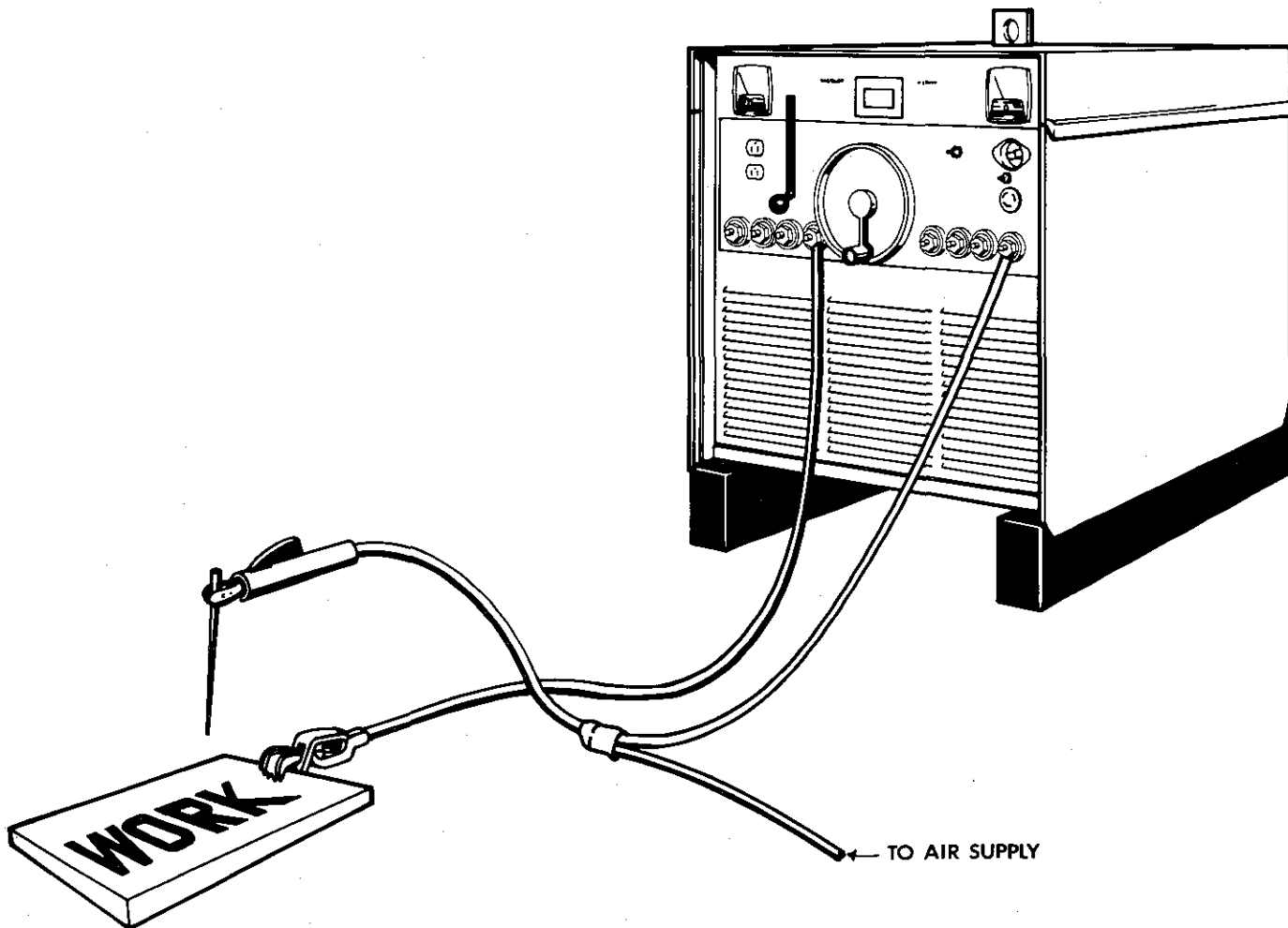


Figure 13 -- Connections for Carbon-Arc Cutting (CAC)

as explained in Section II, Parallel Secondary Connections.

- G. Close the line disconnect switch connecting primary power to the welding machine.
- H. Place the on-off power switch in the On position.
- I. Make sure air is on and torch air valve is open before striking arc.
- J. Strike an arc. Maintain a close arc but do not touch the electrode to the workpiece.
- K. Adjust speed of travel to produce a continuous hissing sound, and clean surface.
- L. Adjust angle of electrode for type and depth of groove desired. See Air Carbon-Arc Cutting Torch instruction manual for gouging, cutting, flushing, and beveling instructions.
- M. Place the on-off power switch on the welding

machine in the Off position after the air carbon-arc operation has been completed.

4.8 GAS TUNGSTEN-ARC WELDING (GTAW)

- A. Tungsten electrodes from 1/16" and up can readily be used in the Gas Tungsten-Arc Welding (GTAW) process using this welding machine as the power source. Since this welding machine is of the direct current (dc) type, a scratch or touch start must be used to initiate the arc. Table IX is included as a guide in selecting slope, stabilizer connections, etc.
- B. Connect a suitable size cable from the selected positive (slope) terminal to the workpiece. See Table II.
- C. Connect the torch or electrode lead to the selected negative (stabilizer) terminal.

TABLE IX

GAS TUNGSTEN-ARC WELDING (GTAW) GUIDE

ELECTRODE SIZE	ELECTRODE COMPOSITION	POSITIVE SLOPE TERMINAL	NEGATIVE STABILIZER TERMINAL	AMPERAGE RANGE	SHIELDING GAS	RATE GAS FLOW CFH
1/16"	1 or 2 pct. thoriated	Max. (150A)	Max.	90-150	Argon	30
3/32"	1 or 2 pct. thoriated	Max. (150A)	Max.	110-150	Argon	30
1/8"	1 or 2 pct. thoriated	Med. (250A)	Max.	140-250	Argon	30

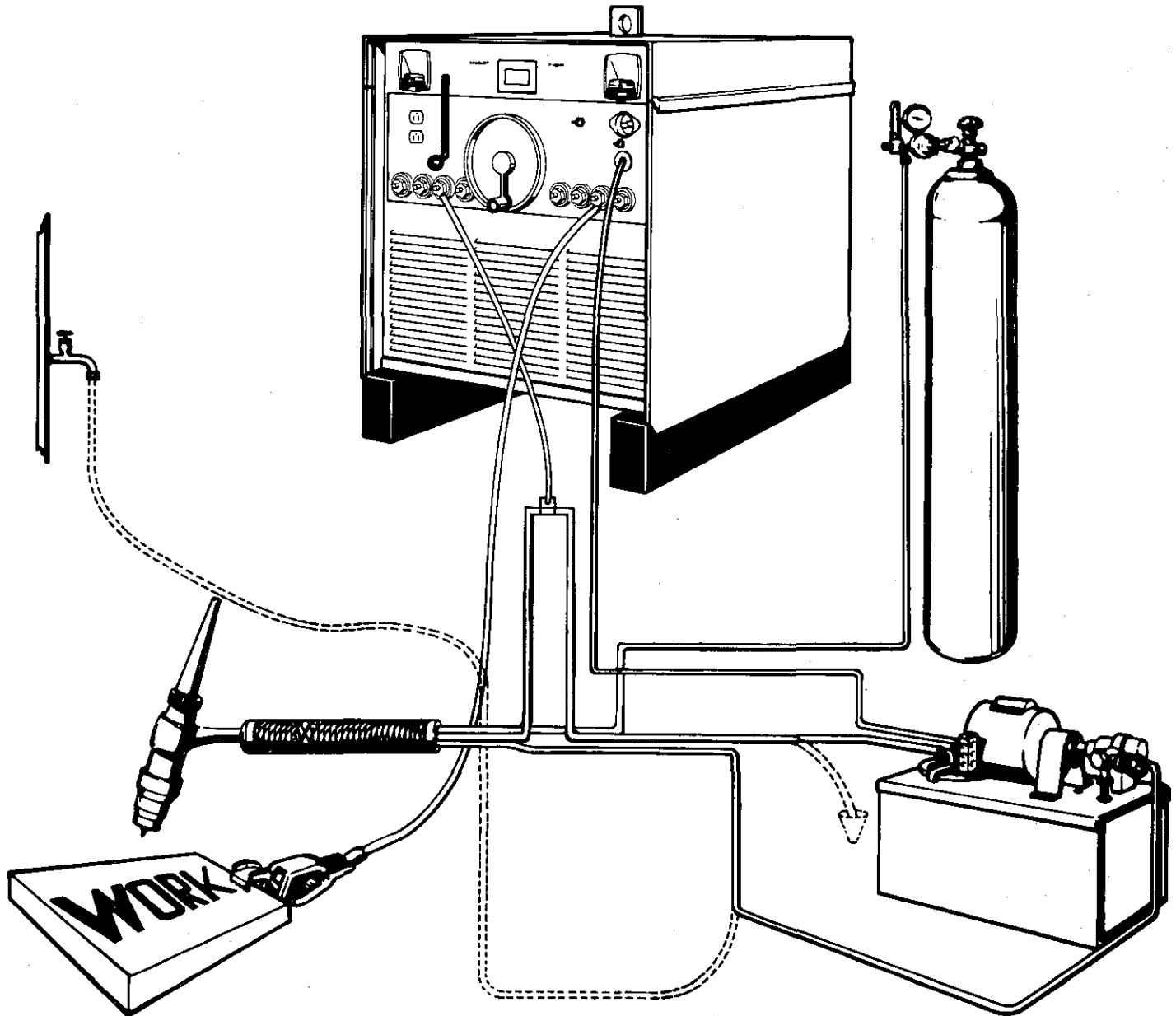


Figure 14 -- Connections for Gas Tungsten-Arc Welding (GTAW)

NOTE

These secondary connections are for direct current straight polarity (dcsp). If reverse polarity is desired, reverse the positive and negative connections on the welding machine.

- D. Place the voltage range switch and weld voltage control in the desired positions. Use volt-ampere curves, Figure 8, and Table IX as a guide.
- E. Place the contactor control switch in the standard position.
- F. Make the gas and water connections according to the torch manufacturers instructions.
- G. Turn gas and water supply On and adjust rate of gas flow if required.
- H. Turn the line power On and the welding machine power switch On. The primary contactor will energize as soon as the welding machine power switch is turned on.
- I. Momentarily touching the tungsten electrode lightly to the workpiece will start the arc.
- J. Material type, thickness, conditions, etc., will determine the welding conditions. Table IX is included as a guide to help achieve an initial setup of the welding machine slope and stabilizer connections as well as the open circuit voltage setting. Remember, that the gas tungsten-arc welding process requires a constant current type of power, therefore, the voltage controls will actually control the weld current.

IMPORTANT

Do not exceed the amperage capacity of the slope or stabilizer connections being used. Use the ammeter as a guide to insure operation within the limits of the slope and stabilizer conditions being used.

- K. After the arc is initiated, readjust the weld voltage control if necessary. Remember, the weld voltage control can be adjusted while welding, however, the voltage range switch must not be adjusted under

- load as damage to its contacts will result.
- L. After completing the job, place the welding machine power switch in the Off position.

SECTION V - MAINTENANCE

CAUTION

BE SURE the branch circuit, main disconnect switch or circuit fuses are removed before attempting any inspection or work on the inside of the welding machine. Placing the on-off power switch on the welding machine in the Off position, does not remove voltage from the power terminal inside of the machine. BE SAFE AND BE ALIVE, OPEN THE BRANCH CIRCUIT.

5.1 SURGE CURRENT PROTECTORS

- A. The surge current protector has two purposes. It helps minimize peak transient currents through the rectifier, and it helps protect the machine in case of damage to a rectifier. Normally the latter would be taken care of by use of the recommended fuse sizes on the primary input but this protector offers an added safeguard.
- B. The thermostats in the surge current protectors, when overheated, will close again after a short cooling period. If intermittent output voltage occurs, the welding machine should be removed from the primary line voltage circuit immediately before damage is done to the main power transformer. The main power rectifier should then be checked for shorted diodes.

5.2 CONTROL CIRCUIT FUSING

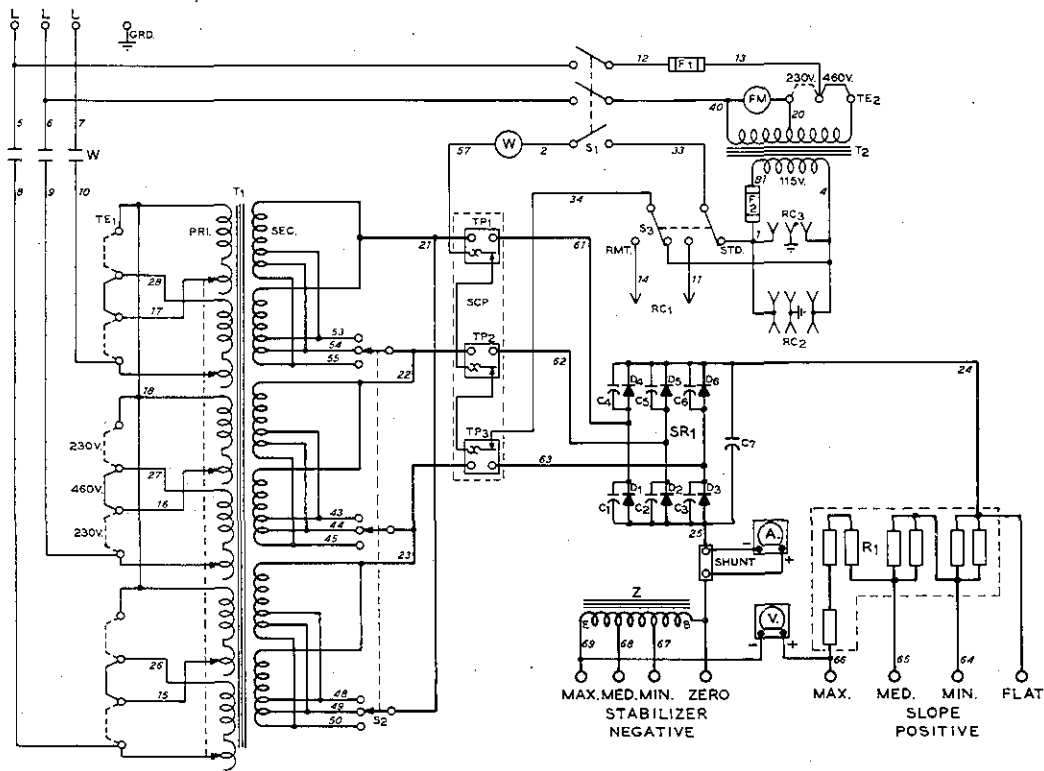
- A. This machine is equipped with a cartridge type fuse (F1) in the ac input of the control transformer. This fuse is accessible by removing the top cover of the machine. Replace with same type and ampere rating. The purpose of the fuse is to protect the control circuit components from failure in the event of misapplication of the control circuit. F2 is a 10 ampere fuse electrically located in the secondary circuit of the control transformer. The F2 fuse is also accessible by removing the top cover.

5.3 FAN MOTOR

- A. 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 bearing and no attention is required.

5.4 TRANSFORMER

- A. Occasional blowing out the dust and dirt from around the transformer is recommended. This should be done periodically. This will depend upon the location of the unit and the amount of dust and dirt in the atmosphere. A clean dry air stream should be used for this cleaning operation.



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Figure 15 -- Circuit Diagram

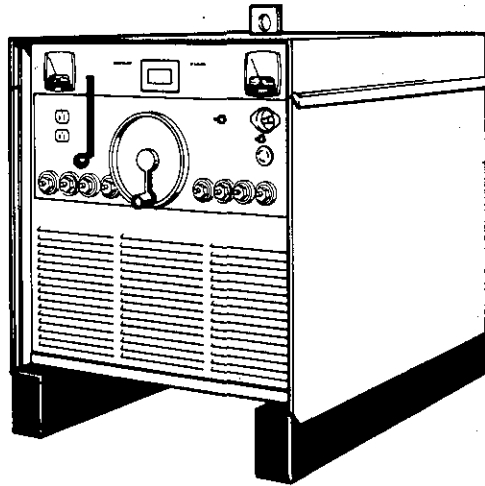
TROUBLE SHOOTING

TROUBLE	POSSIBLE CAUSE	REMEDY
Limited output. Open circuit voltage reduces to approximately 2/3 of normal.	One primary line fuse blown.	Check incoming 3 phase power for blown fuse. Replace if defective.
Sudden loss of output while welding.	Primary fuse blown.	Check incoming 3 phase power for blown fuse. Replace if defective.
	Fan motor does not run.	Check fan motor leads. If it is all O.K. and fan blade turns freely, the fan motor could be defective. Replace.
	Surge current protectors open due to shorted diode in main rectifier.	Replace shorted diode in main rectifier.
	Interference with good circulation of air.	Remove the case cover from the machine and blow out with compressed air.
	Fuse F1 or F2 blown.	Check for cause. Replace if defective.
Fan runs slow.	Voltage links on primary terminal board connected for incorrect primary voltage.	Check position of jumper links on primary board. Position to match incoming primary voltage.
Erratic weld current.	Incorrect welding cable size.	See Table II for welding cable size.
	Loose connection of welding cable.	Tighten welding cable connections.
	Incorrect drive gear for wire size.	See wire feeder instruction manual trouble shooting guide.
Does not weld, fan running.	Contactors Control Switch is in Remote position with no power or control switch connected to Contactor Control Receptacle. Welding cables shorted or disconnected.	Place Contactor Control Switch in the position to match the welding application. Steps under Sequence of Operation. Check welding cable leads. Make sure connections are correct.
	F2 fuse blown.	Replace if defective.
Does not weld, fan not running.	Blown primary line fuses.	Check incoming 3 phase power for blown fuses. Replace if defective.
	Power switch in OFF position or defective.	Replace if defective.
No weld current available at one or more slope terminals.	Slope component in welding machine defective due to overloading.	Replace slope component (located on fan motor bracket).

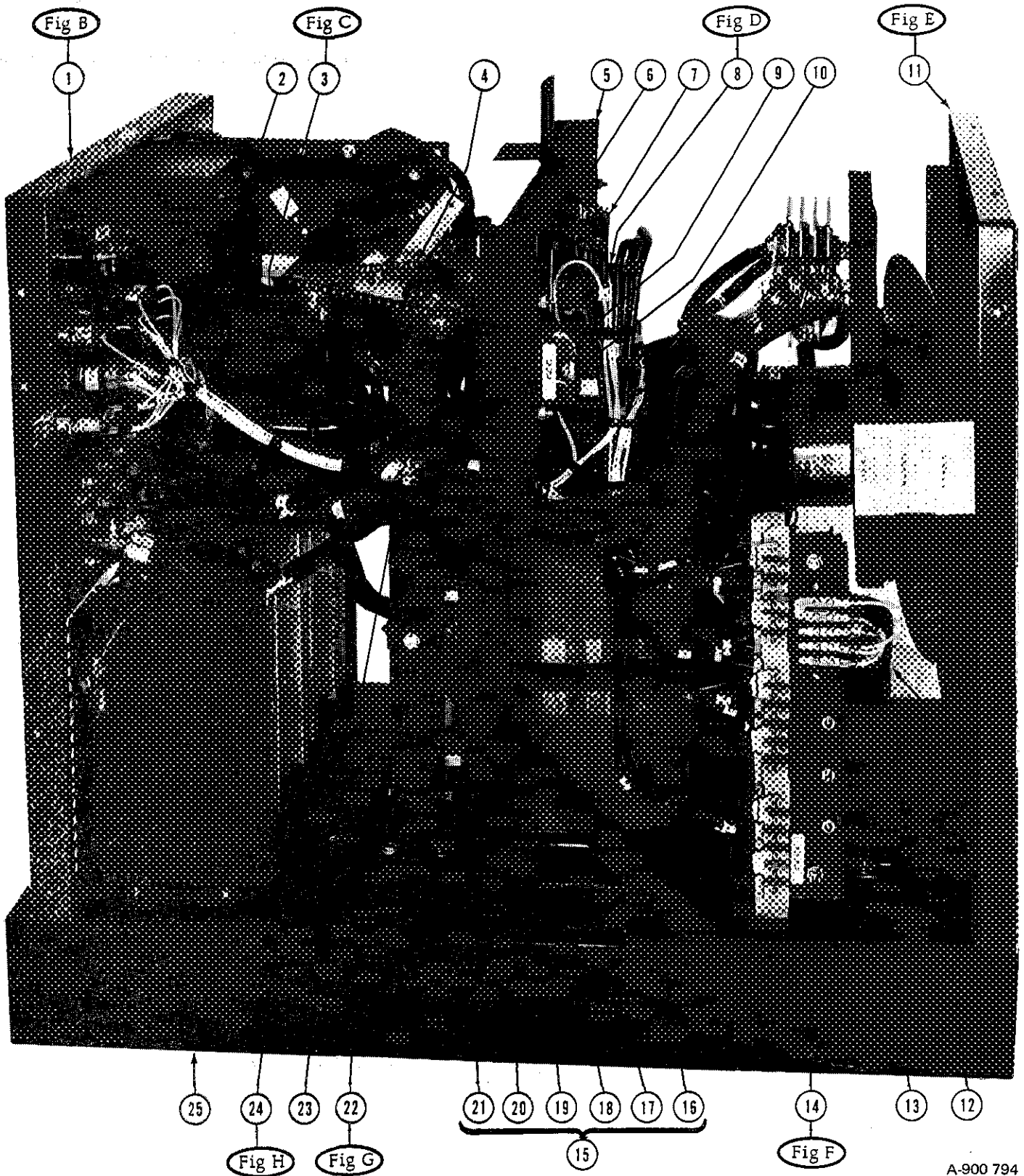
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FORM: PL-251A

Effective with serial No. S416075



Parts List Manual



A-900 794

Figure A - Main Assembly

Effective with serial No. S416075

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure A		Main Assembly		
1		Figure B	PANEL ASS'Y, front (See Page 4)	1
2		013 095	CHAIN, ladder (order by foot)	1
3		024 716	GEAR BOX ASS'Y (See Fig. C Page 8)	1
4		024 712	CHAIN, roller	1
5		014 471	BAFFLE, air vertical	1
6		012 638	HOLDER, fuse - cartridge	1
7	F1	*012 639	FUSE, 6 ampere 600 volts	1
		013 329	LABEL, 6 ampere fuse	1
8	W	034 652	CONTACTOR ASS'Y (See Fig. D Page 9)	1
9		012 604	HOLDER, fuse - cartridge	1
10	F2	*012 607	FUSE, 10 ampere 250 volts	1
		013 206	LABEL, 10 ampere fuse	1
11		Figure E	PANEL ASS'Y, rear (See Page 10)	1
12	Z	036 131	STABILIZER	1
13	T2	036 870	TRANSFORMER, control - 115 volt	1
14	TE1	038 125	BOARD ASS'Y, primary (See Fig. F Page 11)	1
		010 957	SPACER, mtg - pri. panel	2
15	T1	**036 067	TRANSFORMER ASS'Y, main (consisting of)	1
16		036 757	. FRAME, lower mtg.	1
17		033 078	. CORE ASS'Y	1
18		033 091	. COIL ASS'Y, primary - secondary	6
19		602 825	. SPACER, coil	4
20		015 969	. FRAME, upper mtg.	1
21		015 898	. BRACKET, support	1
22		018 666	BRUSH RIGGING ASS'Y (See Fig. G Page 12)	1
23		010 876	HANGER, minerallic	1
24	SR1	037 092	RECTIFIER ASS'Y (See Fig. H Page 13)	1
25		015 015	BASE	1
		019 695	HANDWHEEL ASS'Y, voltage control (consisting of)	1
		601 941	. SCREW, cap, hex head - 1/4-20 x 1-3/4"	1
		602 241	. WASHER, flat - 1/4" S.A.E.	1
		019 693	. HANDWHEEL	1
		010 929	. WASHER, spring steel 3/8"	1
		010 934	. SPACER, steel 1/4 I.D. x 3/8" O.D. x 1-1/16"	1
		019 697	. KNOB	1
		010 647	PIN, roll 5/32 x 1-1/4"	1
		014 322	PANEL, side - R. H.	1
		014 323	PANEL, side - L. H.	1
		014 325	COVER, top	1
		020 187	COVER, top (Effective with serial No. W518820)	1
	SCP	016 807	BOARD ASS'Y, surge current protector (See Fig. J Page 13)	1

*Recommended Spare Parts

**Replace at Factory or Authorized Service Station.

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

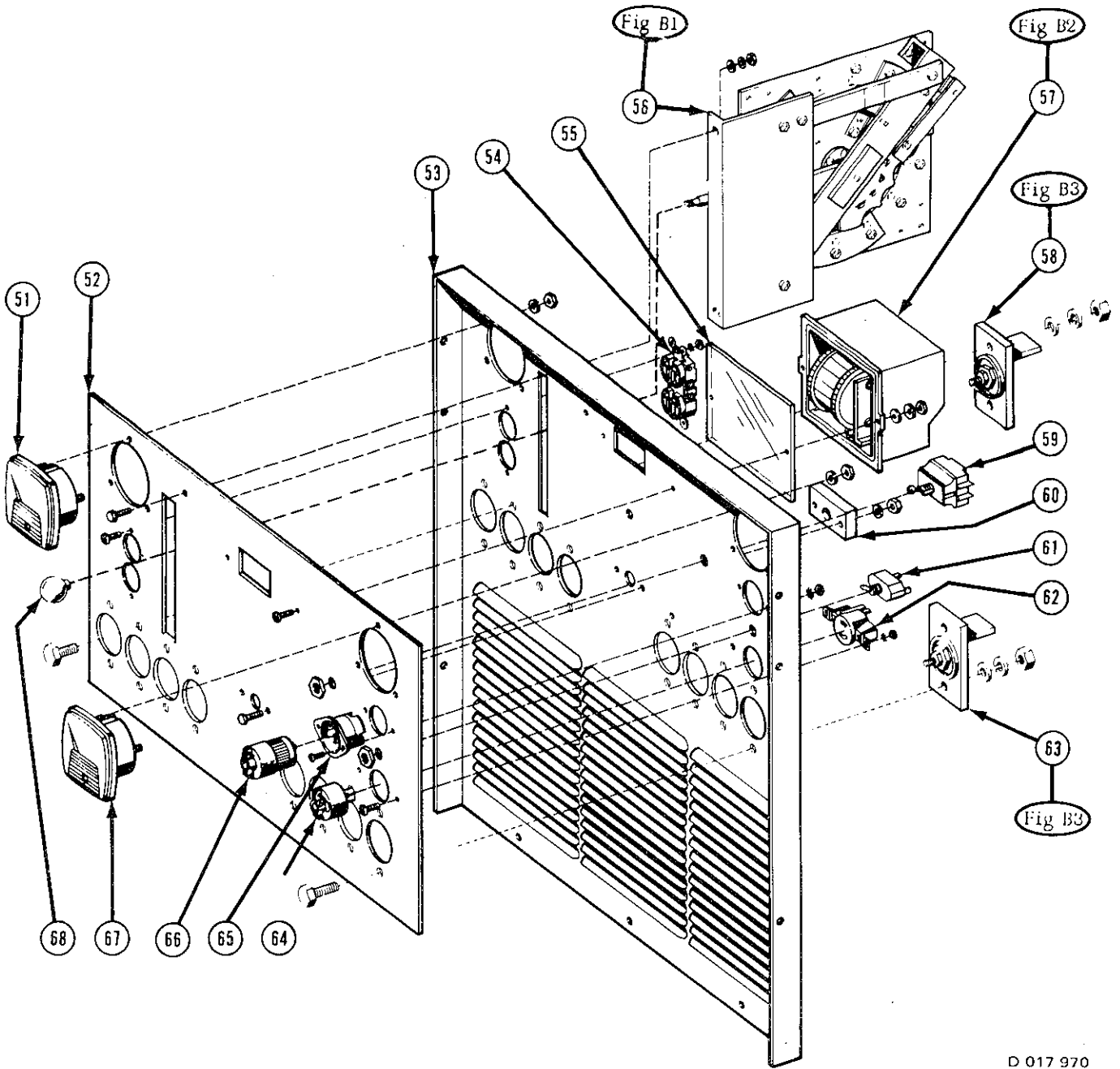


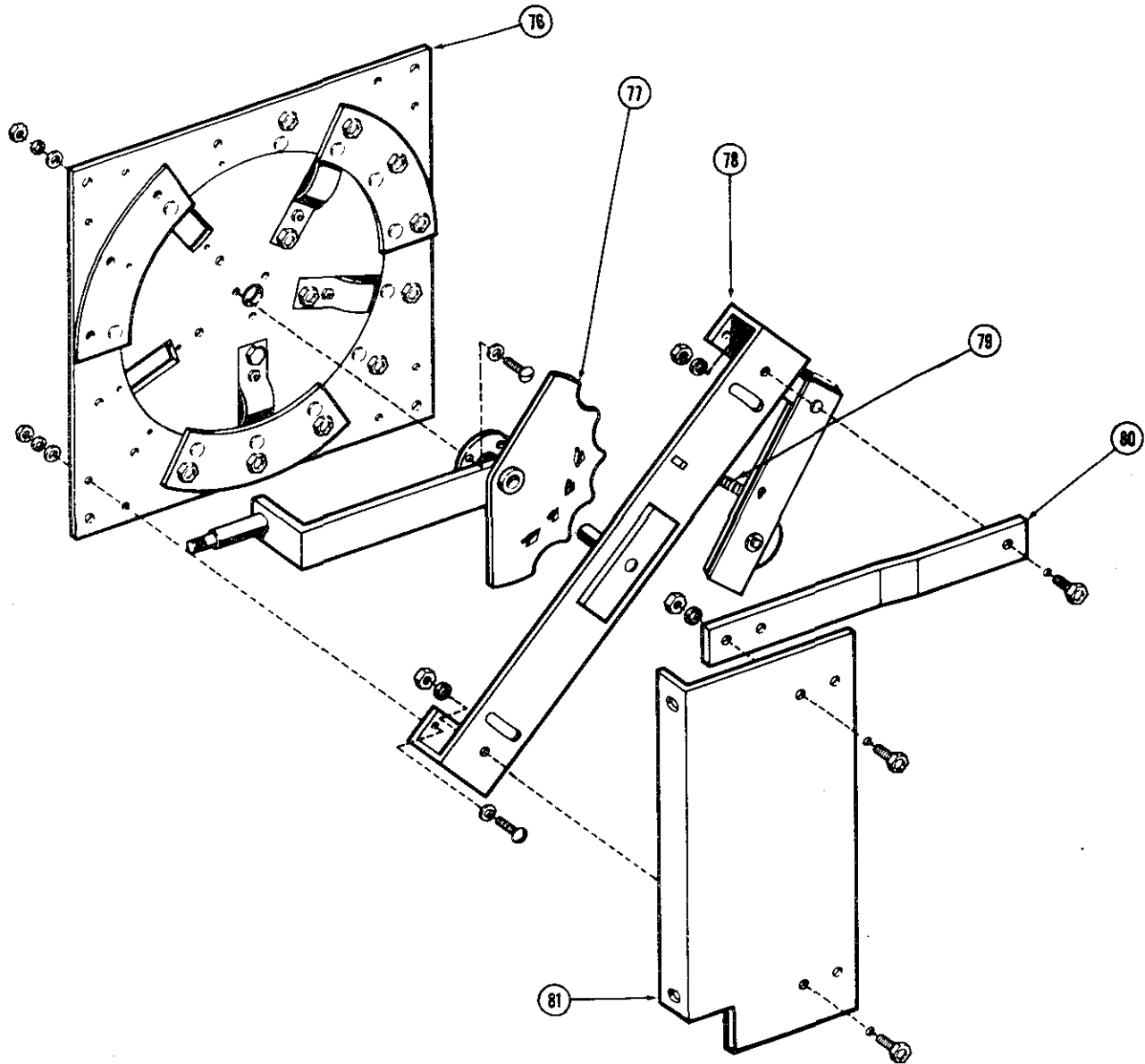
Figure B – Panel Assembly, Front

D 017 970

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B		Panel Assembly, Front (See Fig. A Page 2 Item 1)		
51	V	025 632	VOLTMETER, 0-50 v. dc	1
52			NAMEPLATE (order by stock, model and serial No.)	1
53		016 276	PANEL, front	1
54		604 176	RECEPTACLE, duplex 115 v. ac	1
55		013 010	PLATE, glass, indicator window	1
56	S1	011 073	SWITCH ASS'Y, voltage (See Fig. B1 Page 5)	1
57		013 084	INDICATOR ASS'Y, voltage (See Fig. B2 Page 6)	1
58		038 886	BOARD ASS'Y, sec. - pos. (See Fig. B3 Page 7)	4
59	S2	011 813	SWITCH, power	1
60		024 702	BEARING, indicator shaft	1
61	S3	011 611	SWITCH, contactor control	1
62		039 602	RECEPTACLE, 2 prong twistlock - 115 v. ac	1
62		039 773	RECEPTACLE, 3 prong twistlock - 115 v. ac (Effective with serial No. T437238)	1
63		038 878	BOARD ASS'Y, sec. - neg. (See Fig. B3 Page 7)	4
64		039 618	PLUG, twistlock 2 wire 115 v. ac	1
64		039 687	PLUG, twistlock 3 prong (Effective with serial No. T437238)	1
65	RC1	039 634	RECEPTACLE, contactor control	1
66		039 635	PLUG, contactor control	1
67		025 610	AMMETER, 0-800 amps dc	1
68		019 603	KNOB	1

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B1	011 073	Switch Assembly, Voltage (See Fig. B Page 4 Item 56)		
76	011 876	PLATE ASSEMBLY	.....	1
77	011 841	HANDLE ASSEMBLY	.....	1
78	011 840	BRACKET ASSEMBLY, mtg. (consisting of)	.....	1
79	010 671	SPRING, extension	.....	1
80	014 203	BAR, support	.....	1
81	011 988	BRACKET, mtg.	.....	1

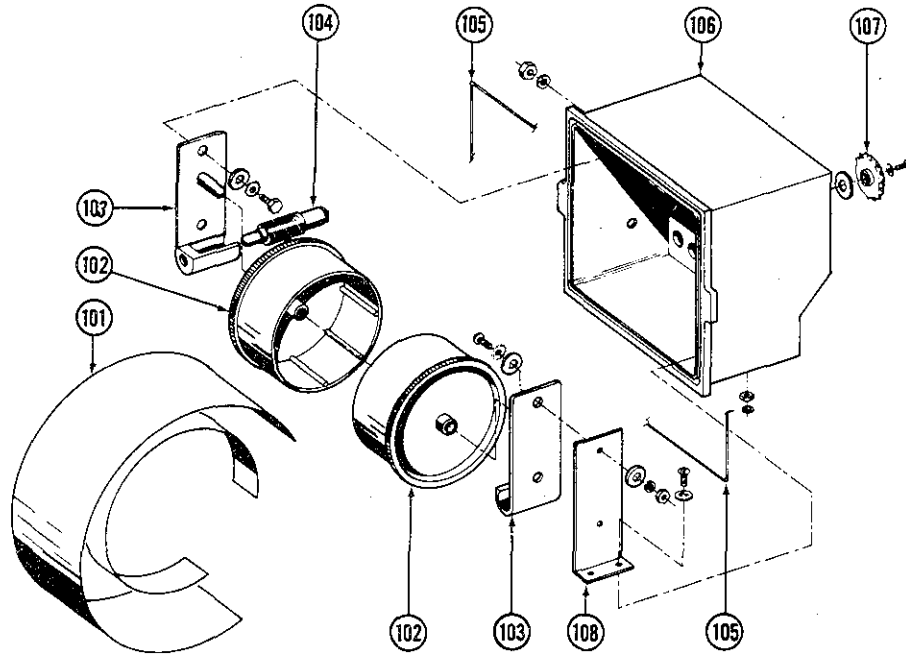


D 011 073

Figure B1 – Switch Assembly, Voltage

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure B2 013 084 Indicator Assembly, Voltage (See Fig. B Page 4 Item 57)				
101		013 085	DECAL, voltage indicator	1
102		013 952	DRUM, molded	2
103		013 929	BRACKET, mtg, drum	2
104		013 927	GEAR, worm	1
105		026 639	SEAL, rubber	1
106		013 799	CASE, molded	1
107		013 928	GEAR, sprocket	1
108		014 234	BRACKET, mtg, drum	1

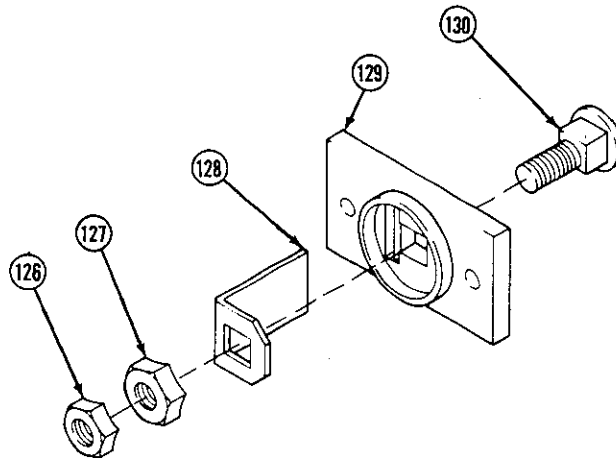


C-013 084

Figure B2 – Indicator Assembly, Voltage

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity	
Figure B3 Board Assembly, Secondary (See Fig. B Page 4 Item 58 & 63)				038 886 Page 4 Item 58	038 876 Page 4 Item 63
126	601 839		NUT, hex - brass 1/2-13	1	1
127	038 913		NUT, hex - w/special hd - brass 1/2-13	1	1
128	038 129		BAR, bus	1	1
129	038 885		BOARD, molded - red	1	1
129	038 865		BOARD, molded - black		
130	038 912		STUD, special	1	1

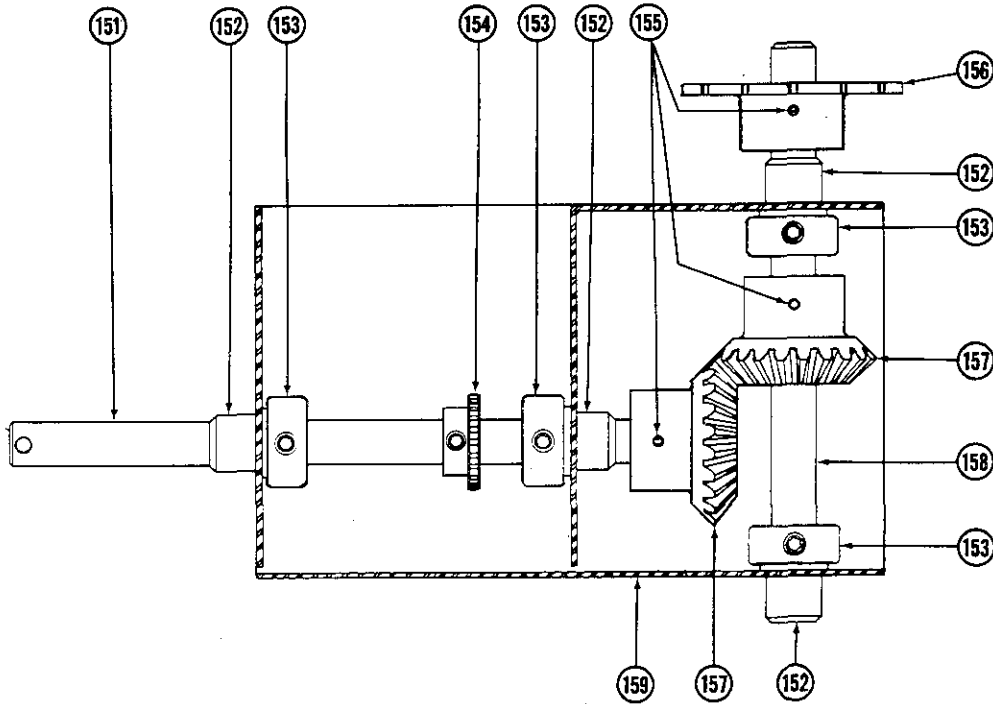


A-038 878-A

Figure B3 – Board Assembly, Secondary

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure C	024 716	Gear Box Assembly (See Fig. A Page 2 Item 3)		
151	024 699	SHAFT, drive		1
152	024 619	BUSHING, nylon		4
153	024 614	COLLAR, set		4
154	013 611	GEAR, sprocket		1
154	024 782	GEAR, 16 tooth (Effective with serial No. W520250)		1
155	010 660	PIN, roll, 1/8 x 1-1/8		3
156	024 777	SPROCKET, nylon		1
157	024 626	GEAR, miter		2
158	024 704	SHAFT, vertical		1
159	014 355	CASE		1

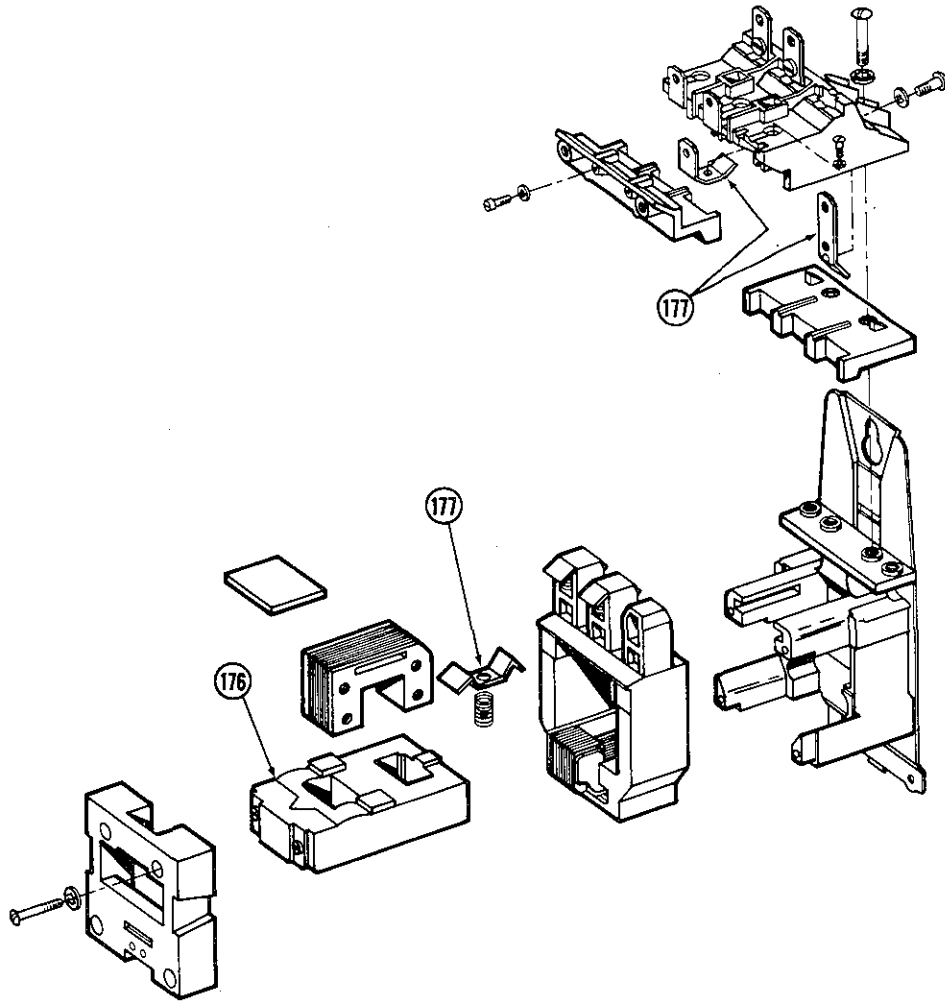


A-024 716

Figure C – Gear Box Assembly

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure D		Contactors Assembly (See Fig. A Page 2 Item 8)		
176		033 675	COIL, 115 v. ac	1
177		*034 661	KIT, contact points	1



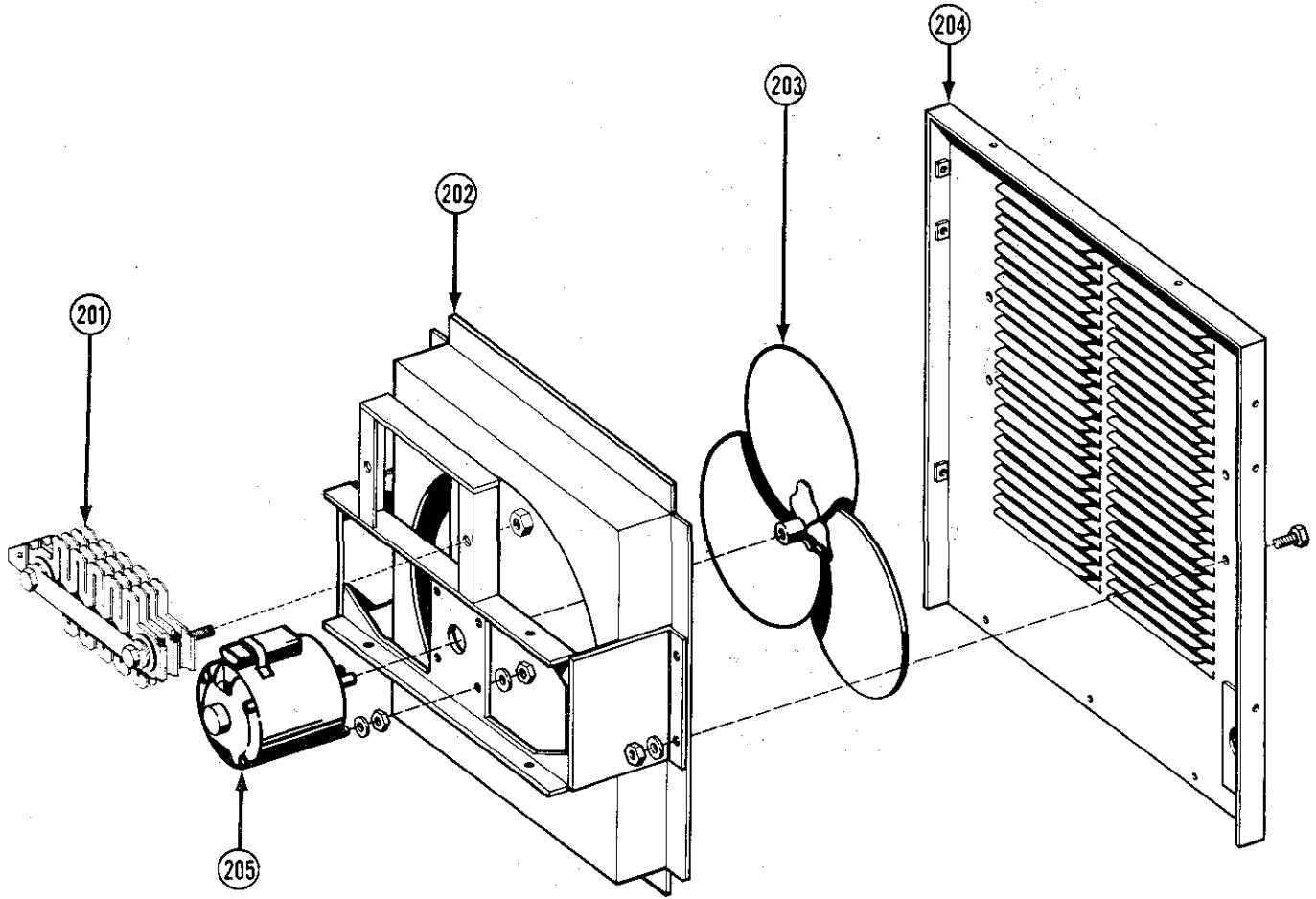
C-034 652

Figure D – Contactors Assembly

*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 E				
Panel Assembly, Rear (See Fig. A Page 2 Item 11)				
201	R1	030 929	RESISTOR, grid	1
201	R1	030 970	RESISTOR, grid (Effective with serial No. S431627)	1
201	R1	030 093	RESISTOR, grid (Effective with serial No. W520250)	1
202		014 424	WINDTUNNEL	1
203		032 606	BLADE, fan	1
204		014 324	PANEL, rear	1
204		020 190	PANEL, rear (Effective with serial No. W518820)	1
205	FM	032 605	MOTOR, fan 1/4 hp General Electric or	
205	FM	032 657	MOTOR, fan 1/4 hp Emerson	1

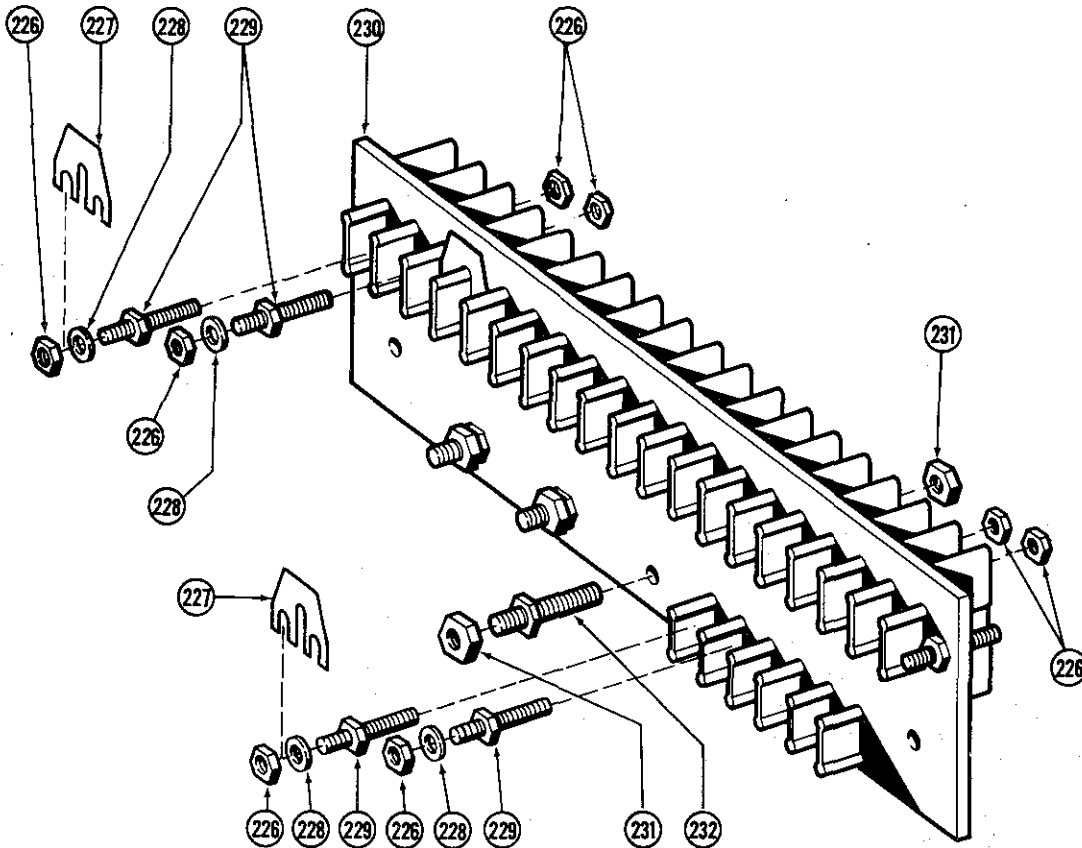


D-017 948

Figure E — Panel Assembly, Rear

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure F		038 125	Board Assembly, Primary (See Fig. A Page 2 Item 14)	
226		601 835	NUT, hex - brass 10-32	30
227		038 618	LINK, jumper	7
228		010 913	WASHER, flat - brass 3/16"	15
229		038 887	STUD, w/hex collar - brass 10-32 x 1-3/8"	15
230		038 058	BOARD, molded	1
231		601 836	NUT, hex - brass 1/4-20	6
232		038 888	STUD, w/hex collar - brass 1/4-20 x 1-1/2"	3

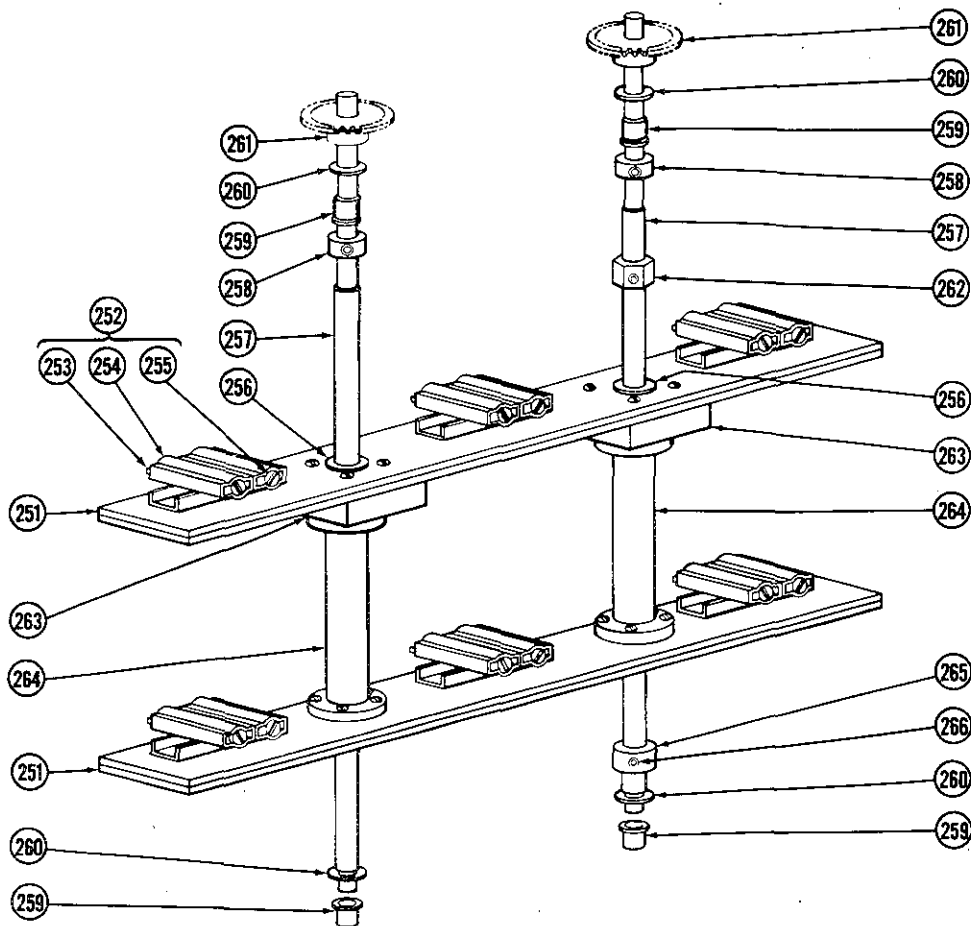


C-038 125

Figure F – Board Assembly, Primary

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure G	018 666	Brush Rigging Assembly (See Fig. A Page 2 Item 22)		
251	038 373	BOARD, mtg, brushholder		4
252	018 610	BRUSH HOLDER ASS'Y (consisting of)		6
253	018 607	BRUSH, with spring		2
254	018 613	CONTAINER, brush		1
255	018 667	CAP, brush holder		2
256	602 249	WASHER, 5/8 S.A.E.		2
257	024 623	ROD, guide		2
258	024 614	COLLAR, 1/2 I.D.		2
259	024 619	BUSHING, nylon		4
260	602 247	WASHER, 1/2 S.A.E.		4
261	024 620	SPROCKET, nylon		2
262	024 622	NUT, stop 5/8 thread		1
263	018 656	SPACER, mtg, brushholder board		2
264	010 664	COLUMN, nylon		2
265	024 615	COLLAR, 5/8 I. D.		1
266	010 660	PIN, roll 1/8 x 1-1/8		2
	014 330	FRAME		1

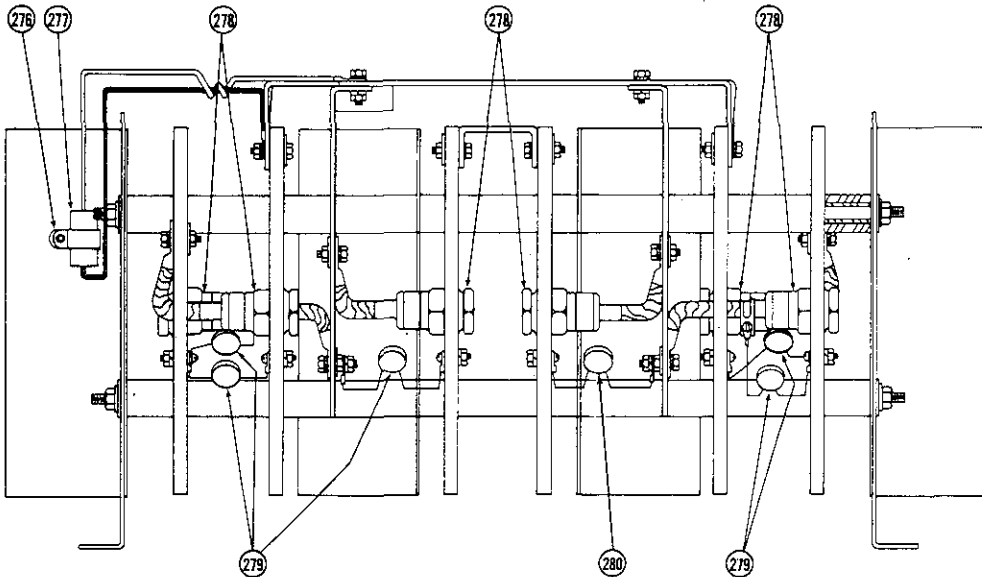


C-018 666

Figure G – Brush Rigging Assembly

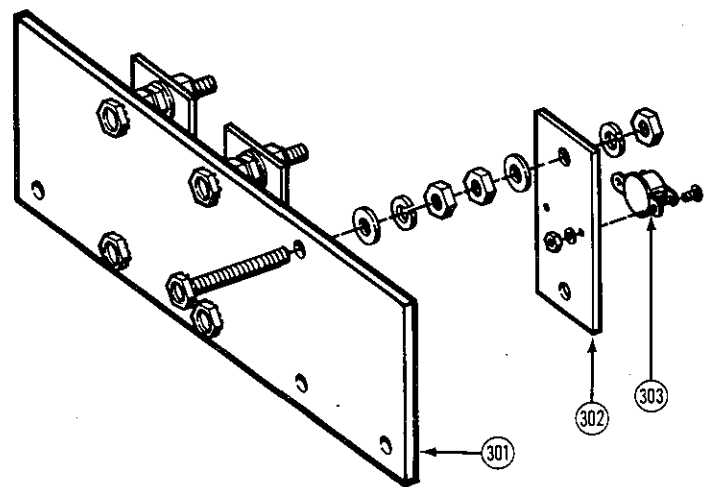
BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure H 037 092 Rectifier Assembly (See Figure A Page 2 Item 24)				
276		010 014	CLIP, mtg. capacitor	1
277	C7	031 683	CAPACITOR, 0.5 MFD 200 volts dc	1
278	D1-6	037 956	DIODE	6
279		031 688	CAPACITOR ASSEMBLY	5
280		031 689	CAPACITOR ASSEMBLY	1



B-037 092

Figure H – Rectifier Assembly

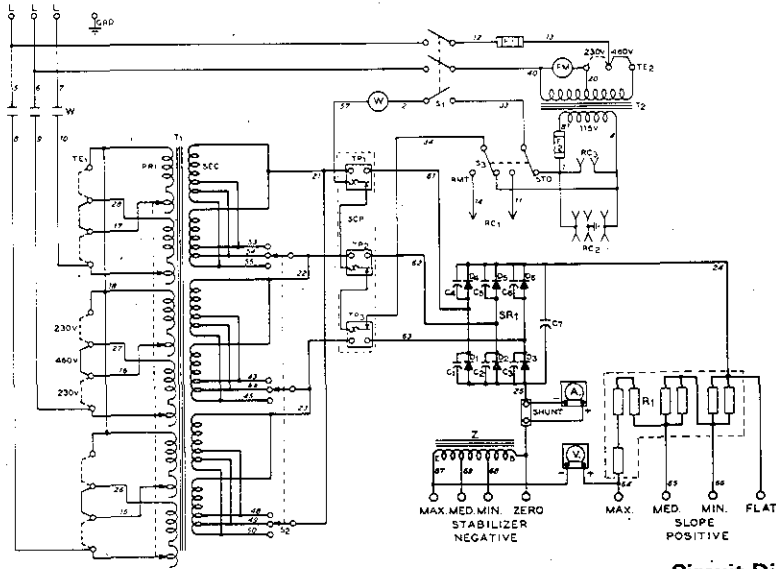


B-016 807

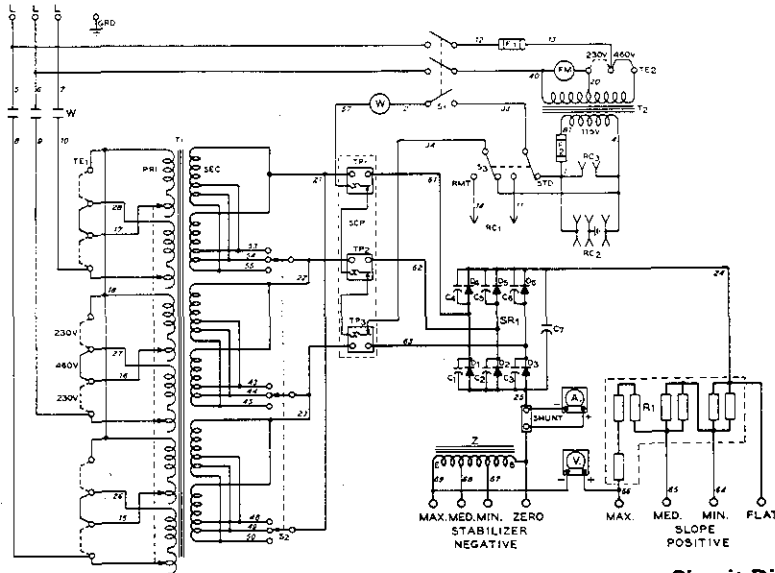
Figure J – Board Assembly, Surge Current Protector

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure J 016 807 Board Assembly, Surge Current Protector				
301		038 066	PANEL, mtg, glastic	1
302		030 922	PROTECTOR, surge current	3
303	TP1,2,3	604 180	THERMOSTAT	3

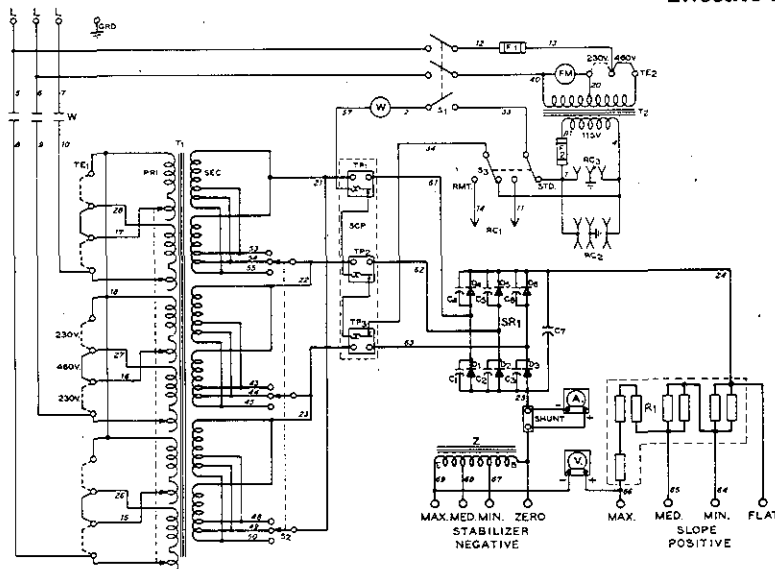
BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.



Circuit Diagram No. CB-900 794-1A
Effective with serial No. S416075



Circuit Diagram No. CA-900 794-1B
Effective with serial No. S419030



Circuit Diagram No. CB-900 794-1C
Effective with serial No. T437238

NUMERICAL PART NUMBER INDEX

Factory Part No.	Page No.	Item No.	Factory Part No.	Page No.	Item No.	Factory Part No.	Page No.	Item No.
010 014	13	276	016 807	2	*	032 657	10	205
010 647	2	*						
010 660	8	155	018 607	12	253	033 078	2	17
	12	266	018 610	12	252	033 091	2	18
010 664	12	264	018 613	12	254	033 675	9	176
010 671	5	79	018 656	12	263			
010 876	2	23	018 666	2	22	034 652	2	8
010 913	11	228	018 667	12	255	034 661	9	177
010 929	2	*						
010 934	2	*	019 603	4	68	036 067	2	15
010 957	2	*	019 693	2	*	036 131	2	12
			019 695	2	*	036 757	2	16
011 073	4	56	019 697	2	*	036 870	2	13
011 611	4	61						
011 813	4	59	020 187	2	*	037 092	2	24
011 840	5	78	020 190	10	204	037 956	13	278
011 841	5	77						
011 876	5	76	024 614	8	153	038 058	11	230
011 988	5	81				038 066	13	301
						038 125	2	14
012 604	2	9	024 615	12	265	038 129	7	128
012 607	2	10	024 619	8	152	038 373	12	251
012 638	2	6				038 618	11	227
012 639	2	7				038 865	7	129
			024 620	12	261	038 878	4	63
013 010	4	55	024 622	12	262	038 885	7	129
013 084	4	57	024 623	12	257	038 886	4	58
013 085	6	101	024 626	8	157	038 887	11	229
013 095	2	2	024 699	8	151	038 888	11	232
013 206	2		024 702	4	60	038 912	7	130
013 329	2	*	024 704	8	158	038 913	7	127
013 611	8	154	024 712	2	4			
013 799	6	106	024 716	2	3	039 602	4	62
013 927	6	104	024 777	8	156	039 618	4	64
013 928	6	107	024 782	8	154	039 634	4	65
013 929	6	103				039 635	4	66
013 952	6	102	025 610	4	67	039 687	4	64
			025 632	4	51	039 773	4	62
014 203	5	80						
014 234	6	108	026 639	6	105	601 835	11	226
014 322	2	*				601 836	11	231
014 323	2	*	030 093	10	201	601 839	7	126
014 324	10	204	030 922	13	302	601 941	2	*
014 325	2	*	030 929	10	201			
014 330	12	*	030 970	10	201	602 241	2	*
014 355	8	159				602 247	12	260
014 424	10	202	031 683	13	277	602 249	12	256
014 471	2	5	031 688	13	279	602 825	2	19
			031 689	13	280			
015 015	2	25				604 176	4	54
015 898	2	21	032 605	10	205	604 180	13	303
015 969	2	20	032 606	10	203			

*Part Not Called Out By Item Number

