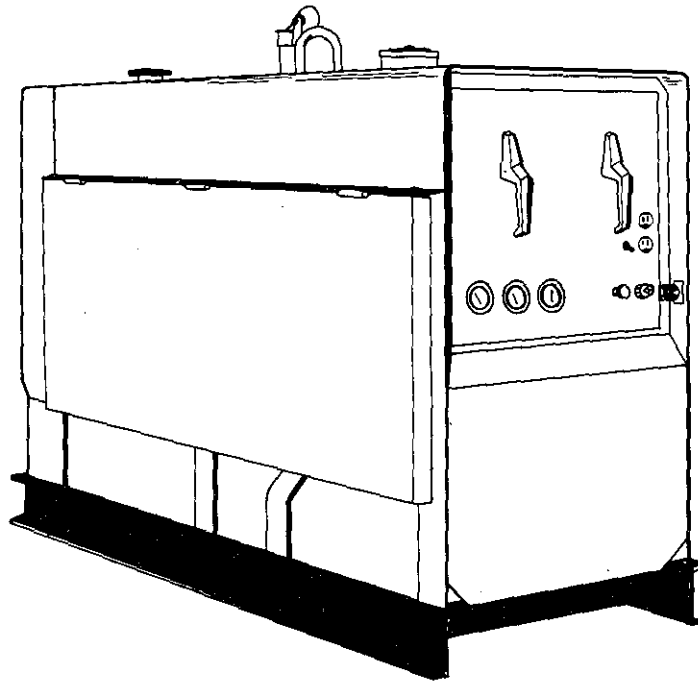


July 1973 FORM: OM-450

Effective with serial No. HD690740

MODEL  
BIG 40

STOCK NO.  
900 955



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

# OWNER'S MANUAL



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



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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)

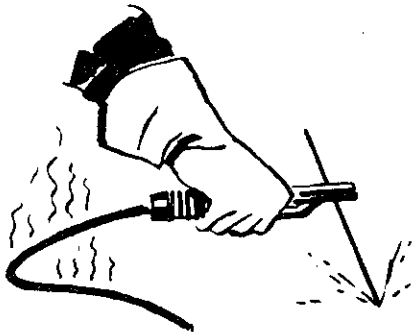


Figure 1-1. Don't overload cables

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)

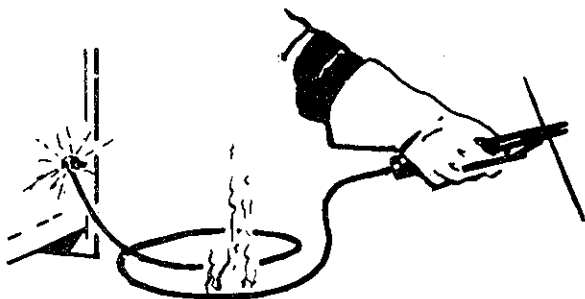


Figure 1-2. Don't use worn or poorly connected cables

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.

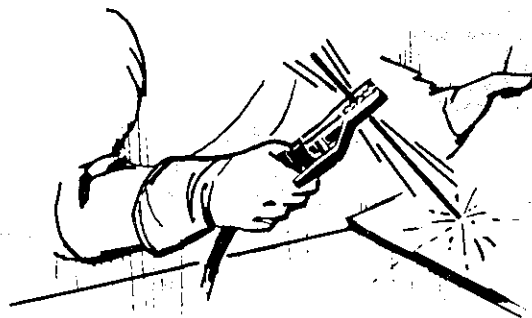


Figure 1-3. Don't use Electrode Holder with defective jaws

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.

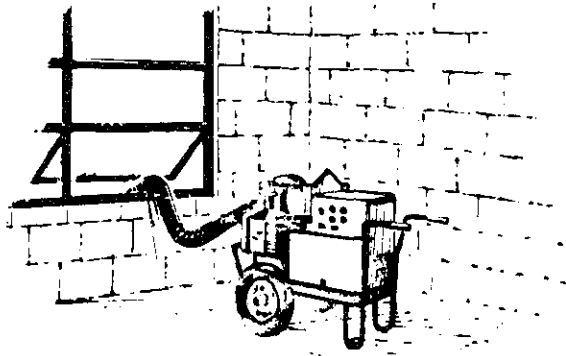


Figure 1-4. Vent exhaust gases

### 1-10. POWER CIRCUIT GROUND

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

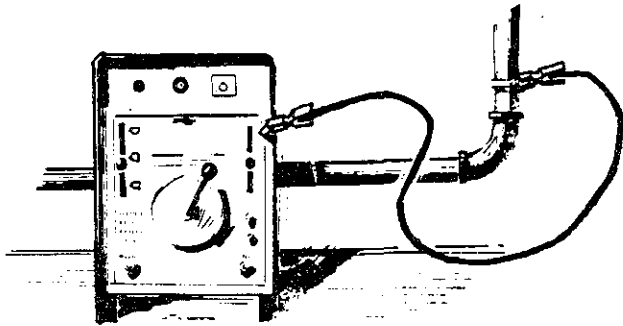


Figure 1-5. Ground frame or case

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.

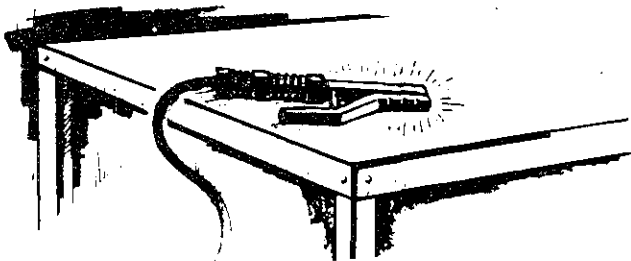


Figure 1-7. Don't leave electrode in contact with grounded metallic surface.

## 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.

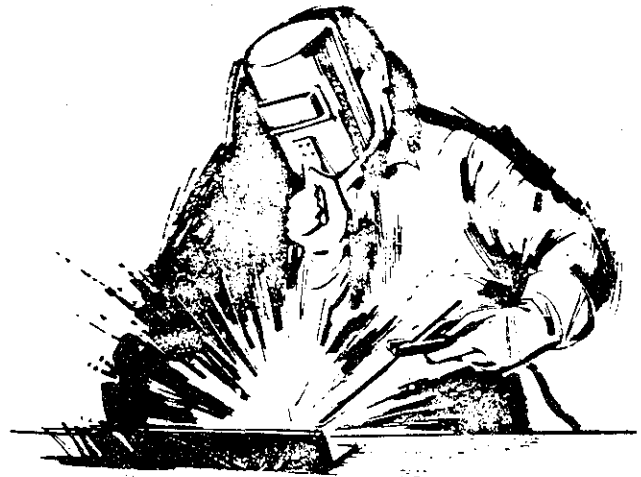


Figure 1-8. Use eye protection at all times

### 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)

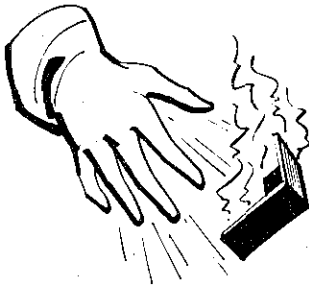


Figure 1-9. Never pick up hot objects

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.
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 Output	Welding Current Range	Welding Current Ranges In Amperes		Open Circuit Voltage Range	Power While Welding	Overall Dimensions (Inches)	Weight (Pounds)	
		Coarse Ranges	Fine Range				Net	Ship
300 Amps At 40 Volts DC	45 To 400 Amps	MIN. - 65 65 - 100 100 - 175 125 - 250 225 - MAX.	From Min. To Max. Of Each Course Range	55 To 80 Volts DC	3kva 120 Volts AC 60 Hertz AC Weld Speed	Length - 63" Width - 24-3/4" Depth - 41-1/2"	1397	1443

Figure 2-1. Specifications

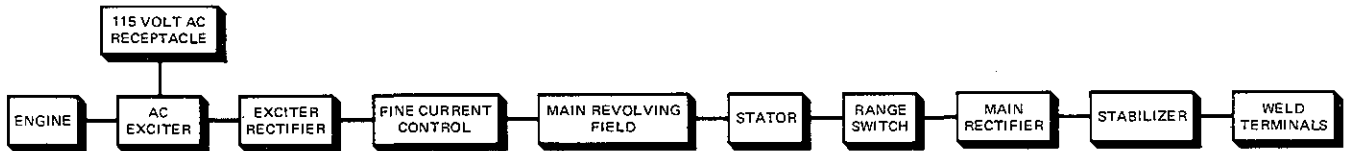


Figure 2-2. Block Diagram

### 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 generator is designed for use with the Shielded Metal-Arc Welding (SMAW) (Stick Electrode) process.

Welding power is furnished by a three phase main generator which is fed through the necessary slope or range transformer to a Range Switch. This switch controls the alternating current value fed to the main power rectifier, which rectifies alternating current to direct current for welding.

The main generator which is fed through the necessary slope or range transformer to a Range Switch. This switch controls the alternating current exciter generator. The exciter current is rectified to direct current, which in turn is regulated through the FINE CURRENT Control to the main generator revolving field. The FINE CURRENT Control determines the amount of exciter current in the main generator revolving field. This control allows fine current adjustment within each

one of the five coarse current control ranges. The alternating current exciter also provides up to 3kva of 120 volts ac, 60 Hertz auxiliary power, available at the duplex receptacle on the front panel of the unit, when the welding generator is operating at weld speed.

### 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

Good installation is essential if the generator and engine are to provide satisfactory and dependable service. Tilting not to exceed 15 degrees in any direction is considered standard industrial engine specifications.

Mounting holes are provided in the welding generator base for machines that require mounting. Figure 3-1 gives the overall dimensions and base mounting hole layout of the unit.

#### CAUTION

If this unit is to be operated indoors, it should be located in a place where the exhaust fumes from the engine can be vented out of the building. Failure to comply with proper venting may result in serious bodily injury or loss of life.

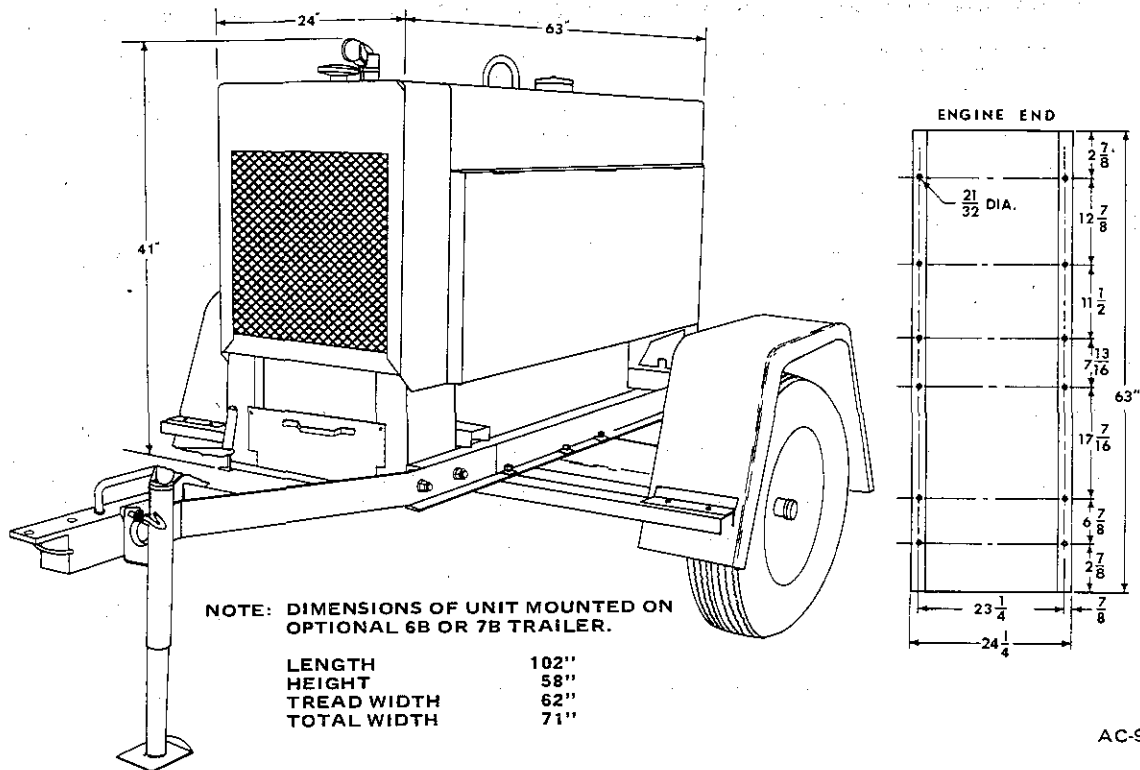


Figure 3-1. Dimensions And Base Mounting Hole Layout

AC-900 955-1

### 3 - 2. WELD OUTPUT CONNECTIONS

The POSITIVE and NEGATIVE Weld Output Terminals are located behind the lower front access panel. In order to gain access to the weld output terminals, remove the two 5/16 inch bolts from the bottom edge of the lower access panel and raise the panel in an upward direction.

Once the weld output cables have been connected to the weld output terminals, the cables are to exit from behind the lower front access panel through the two openings provided on the extreme lower left and right corners of the lower front access panel. (See Figure 3-2).

#### A. Welding Cables

If welding cables were not ordered with the welding generator, the following instructions should be followed to ensure the best welding generator performance.

1. Use Table 3-1 as a guide for selecting correct cable size for the anticipated maximum weld current which will be used. Table 3-1 shows total cable length, which includes the electrode and work cable. Example: If the electrode holder cable is 75 feet long and work cable is 25 feet long, select the size cable that is recommended for 100 feet at the maximum weld current that would be used.
2. Do not use damaged or frayed cables.
3. Follow the electrode holder manufacturer's instructions for installing the electrode holder on the electrode cable.
4. Use correct lugs on weld cables to connect grounding clamp and to connect the cable to the welding generator weld terminals.
5. Make sure all connections are clean and tight.

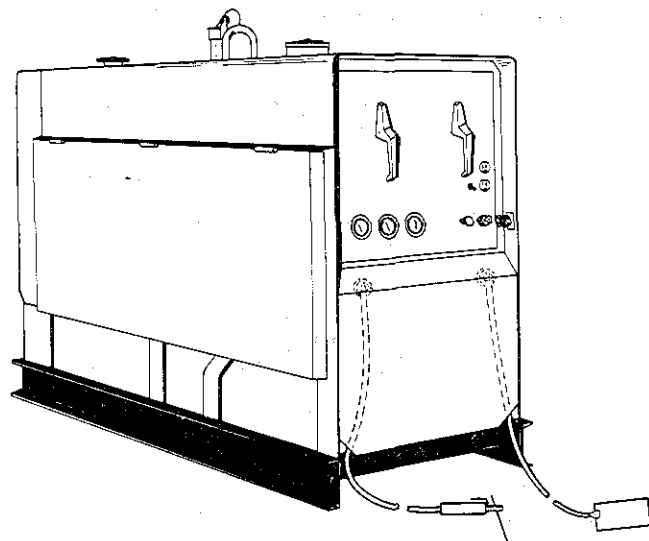


Figure 3-2. Weld Output Connections

Table 3-1. Weld Cable Size

Welding Amperes	*Total Length of Cable (copper) in Weld Circuit							
	*50	100	150	200	250	300	350	400
100	4	4	2	2	2	1	1/0	1/0
150	2	2	2	1	1/0	2/0	3/0	3/0
200	1	1	1	1/0	2/0	3/0	4/0	4/0
250	1/0	1/0	1/0	2/0	3/0	4/0	4/0	2-2/0
300	2/0	2/0	2/0	3/0	4/0	4/0	2-2/0	2-3/0
350	3/0	3/0	2/0	4/0	4/0	2-2/0	2-3/0	2-3/0
400	3/0	3/0	3/0	4/0	2-2/0	2-3/0	3-2/0	2-4/0

AA-901 181-10

- NOTE:
- \*A. 50 feet or less
  - \*B. Cable size is based on direct current (dc), 100% duty cycle and either a 4 volts or less drop or a current density of not over 300 circular MILS per amp.
  - \*C. Weld cable insulation with a voltage rating to withstand the open circuit voltage (OCV) of the welding generator must be used. While most welding generators have an open circuit voltage of less than 100 volts, some welding generators of special design may have higher open circuit voltage.

### 3 - 3. GENERATOR CHASSIS GROUND

Normally engine driven welding generators are not required to be grounded. However, this machine has auxiliary power plant capability, therefore grounding of the frame and case is recommended. For this reason a convenient grounding terminal is provided on all welding generators/power plant units. For detailed grounding instructions consult your local or state codes or the latest issue of the National Electrical Code.

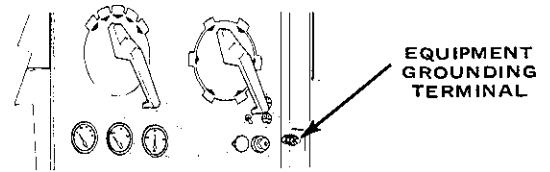


Figure 3-3. Generator Chassis Ground

## SECTION 4 - OPERATION OF GENERATOR CONTROLS

### 4 - 1. 120 VOLT AC RECEPTACLE (Figure 4-1)

Up to 3kva of 120 volts 60 Hertz power is available at this duplex receptacle for operating 120 volt ac or 120 volt universal power tools etc. when the welding generator is being operated at weld speed. Since the engine used to power this generator is equipped with an automatic idling device, care must be taken in the use of the 120 volt receptacle. The voltage at this receptacle will drop below 120 volts when engine speed is reduced to idling rpm. The low voltage may damage the 120 volt electrical equipment connected to this receptacle.

#### IMPORTANT

Ensure that the IDLE CONTROL Switch, located on the front control panel, is in the LOCKED OUT position when electrical equipment is being operated from the 120 VOLT AC Receptacle. See the OPERATION OF ENGINE CONTROLS Section for complete instructions on the operation of the Automatic Idling Device.

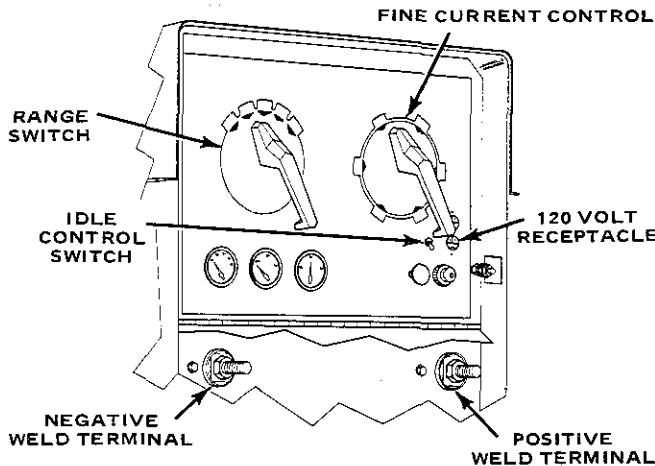


Figure 4-1. Generator Controls

AB-900 955-2A

### 4 - 2. RANGE SWITCH (Figure 4-1)

#### IMPORTANT

Do not operate the Range Switch while welding. Movement of the switch while under load will cause arcing across the switch contacts and thus cause the contacts to pit. Repeated arcing will cause the contacts to become completely deteriorated and thus cause the unit to become inoperative.

The Range Switch permits selection of five different amperage ranges. Each of the five switch positions has its amperage range indicated at the top end of the Range Switch Handle. Fine amperage adjustment of the coarse range selected may be obtained by utilizing the FINE CURRENT Control, the function of which will be explained in section 4-3.

### 4 - 3. FINE CURRENT CONTROL (Figure 4-1)

The FINE CURRENT Control permits the operator to select an exact amount of welding amperage. This control allows adjustment of the welding amperage from minimum to maximum of the coarse amperage range that was selected by the Range Switch.

The scale surrounding the FINE CURRENT Control is calibrated from 0 to 100 percent in increments of ten. Due to this percentage calibration, it should be noted that if the operator is using this scale to select a fine amperage setting, the operator is selecting a percentage of the coarse range selected and not an actual amperage value.

### 4 - 4. VOLT-AMPERE CURVES (Figure 4-2)

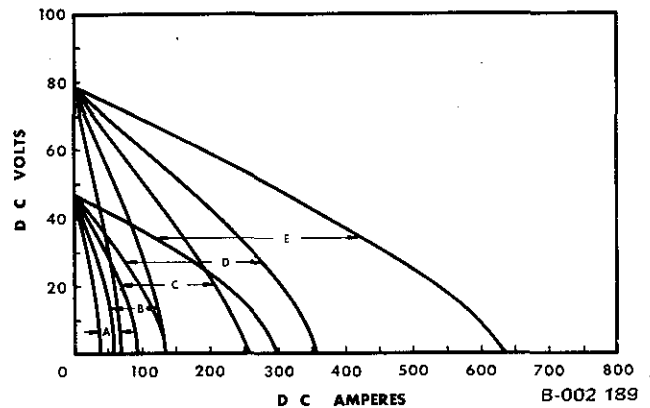


Figure 4-2. Volt-Ampere Curves

The Volt-Ampere curves show the output voltage and current of the welding generator available at any point from the minimum to maximum of each coarse current range. The FINE CURRENT Control, controls the output between the minimum and maximum curves of each coarse current range that is shown.

Load voltage is predetermined to a large extent by the arc characteristics. With the use of the Volt-Ampere curves it is possible to determine what the weld current will be at a particular arc voltage. Remember, the Volt-Ampere curves show the minimum and maximum curves of each coarse current range. When the FINE CURRENT Control is adjusted, the Volt-Ampere curve will fall between the minimum and maximum curves of the particular coarse current range in use.

## SECTION 5 - GENERATOR OPERATION

### CAUTION

Never operate the unit with the hinged side panels open or removed. If the sides are left open or removed, a safety hazard exists to personnel from moving and electrical components. Also, weather protection to the internal components of the unit will be greatly reduced.

### 5 - 1. SHIELDED METAL-ARC WELDING (SMAW) (STICK ELECTRODE)

1. Connections for Direct Current Straight Polarity (DCSP).
  - a. Connect the electrode cable to the negative weld terminal on the welding generator.
  - b. Connect the work cable to the positive weld terminal on the welding generator.
2. Connections for Direct Current Reverse Polarity (DCRP).
  - a. Connect the electrode cable to the positive weld terminal of the welding generator.
  - b. Connect the work cable to the negative weld terminal of the welding generator.

### IMPORTANT

Do not operate the Range Switch while an arc is established. Arcing caused by opening a switch carrying high current will severely burn the contact surfaces of the switch. This burning of the contact surfaces will decrease the maximum current carrying capacity of the switch and possibly cause the switch to become inoperative.

3. Place the Range Switch and FINE CURRENT Control to the desired position.
4. Ensure that the engine has been prepared for operation as stated in Section 7.
5. Start the engine. Refer to section 9 for proper engine starting procedures.
6. After the engine is operating properly, welding may commence.

### IMPORTANT

Whenever starting the welding generator or operating it at idle rpm, it is essential that all electrical equipment connected to the 120 VOLT AC Receptacle be turned off. Failure to comply may result in damage to the electrical equipment. Damage may be incurred because the welding generator is putting out a voltage and frequency far below 120 volts 60 Hertz when operating at idle speed.

7. The FINE CURRENT Control may be adjusted while welding.
8. After the welding operation has been completed, allow the engine to idle for a few minutes before shutting it down.

## SECTION 6 - GENERATOR MAINTENANCE

### 6 - 1. GENERAL

Economical operation and trouble-free service of this welding generator are based upon regular inspections and reasonable attention.

Occasional blowing out of the unit with clean dry compressed air is recommended. This should be performed periodically, depending upon the location of the unit and the amount of dust and dirt in the atmosphere.

### CAUTION

If any work is to be done on the armature of the generator, remove the spark plugs from the engine. This will prevent engine compression from turning the armature and catching the repairman's hand between the armature fan casting and the stationary adapter casting.

This welding generator is equipped with hinged side panels to permit easy access when performing inspection and maintenance functions on the generator and engine.

### 6 - 2. COLLECTOR RING BRUSHES

The brushes should be inspected periodically to ensure their proper function. The brush life is very good under normal conditions. If the generator has been operating in an extremely dusty or dirty place, a close check of the brushes for freedom of movement and cleanliness should be made weekly. Under normal use the commutator and slip rings will discolor to a dark brown. If it should become necessary to clean the slip rings or commutator, use a 3/0 or finer sandpaper followed by a crocus cloth. Never use emery cloth as part of the emery will embed itself into the exiter or collector rings and in turn destroy the carbon brushes.

### 6 - 3. WELDING CABLES

Check connections periodically for tightness. The cables should be inspected frequently and all breaks in the insulation should be repaired with electrical insulating tape or the cables replaced.

## SECTION 7 - ENGINE PREPARATION

### NOTE

See the Engine Manufacturer's manual (F-163 Engine) for complete engine care.

### 7 - 1. LUBRICATION

This engine was shipped from the factory with its crankcase filled with the correct amount and type of break-in oil unless otherwise ordered. Check the oil level before attempting to operate the engine. It should be up to the full mark on the bayonet type indicator. Add a quality brand of detergent oil if the oil level is low. See the oil selection chart, Table 10-1, in Section 10.

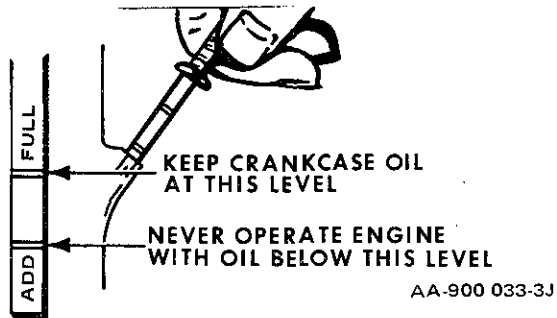


Figure 7-1. Oil Level Indicator

### IMPORTANT

New engines have very close clearance between their moving parts. Thus, it is recommended that loading of the engine be kept to a minimum during the first 50 hours of operation. Be sure to check the oil level several times each day during the engine break-in period. This engine requires about 50 hours of running time before it will be fully broken in.

After about 50 hours of running time, drain the break-in oil and change the oil filter. See the oil selection chart, Table 10-1, in Section 10 for correct oil type and grade to use after the break-in oil is drained.

### 7 - 2. COOLANT SYSTEM

The liquid capacity of the coolant system in this welding generator is 11 quarts (US measure). This unit is shipped from the factory with the proper amount of water and anti-freeze to permit operation of the unit at temperatures down to  $-15^{\circ}\text{F}$ .

### IMPORTANT

If this welding generator is to be operated in temperatures which are below  $-15^{\circ}\text{F}$ , additional anti-freeze will have to be added to the coolant system or the liquid in the system will freeze and thus cause the engine to overheat.

The coolant system is equipped with a  $180^{\circ}\text{F}$  thermostat. If the thermostat should become defective, be sure the replacement is of equal temperature rating.

### IMPORTANT

Do not run the engine with a defective thermostat or without one. If this is done, the engine will run cold and develop excess carbon accumulation and the oil will become contaminated with excessive sludge and dirt.

The radiator for this engine is equipped with a pressurized cap which is rated at 7 psi. If this cap is ever replaced, ensure that the replacement cap has a rating of 7 psi.

### CAUTION

Caution should be exercised at all times when removing the radiator pressure cap. The cap will turn to an almost full open position, at which point a provision has been made to permit venting built up pressure within the radiator. Allow the pressure to escape before completely removing the cap from the radiator neck. When removing the cap, it is recommended that a glove or rag be used to protect the operator's hand from possible exposure to extremely hot coolant.

### 7 - 3. READYING NEW BATTERY FOR SERVICE

This battery is shipped from the factory in a dry state. A sufficient amount of electrolyte is shipped along in separate containers to activate the dry charge battery. To prepare the new battery for operation, proceed as follows:

### CAUTION

Put on protective eye cover and clothing prior to pouring the electrolyte solution.

1. Remove the battery from the unit and place it on a level work table or other suitable area.
2. Fill the battery cells to the required level with electrolyte.

### NOTE

Do not dilute this electrolyte as it is pre-mixed to the required strength.

3. Place a battery thermometer in one of the center cells and check the specific gravity of each cell with a battery hydrometer.
4. The battery temperature must be above  $80^{\circ}\text{F}$  and the specific gravity reading above 1.240 prior to installation. If both conditions are not met, charge the battery following the below instructions:
  - a. Use an automotive type battery charger. This battery should be charged at about a 3.5 ampere rate until correct electrolyte conditions are met. Lower charging rates can be used. However, the time to obtain the correct electrolyte conditions will be longer.
  - b. When the battery is charged, remove it from the charger and re-check the electrolyte level. Add if necessary.
  - c. Rinse out the empty electrolyte containers with water before discarding. Since battery acid is corrosive to metals, do not pour into a metal sink or drain. Rinse and mutilate the empty electrolyte container before discarding. If acid has accidentally spilled on the battery or work area during filling or charging, flush off with clear water and neutralize with soda or ammonia solution. Use the same procedure if acid is spilled on clothing.
5. Re-install the battery in the unit making sure that the negative (-) terminal of the battery is connected to the ground cable.

### 7 - 4. AIR CLEANER

The air cleaner this engine is equipped with, is a dry element type with a replaceable filter element. The air cleaner requires no initial service.

### 7 - 5. FUEL

Use a good grade of "regular" gasoline, rated at least at 85 octane, for this engine. Fuels of lower octane ratings may cause detonations (knocking) which could result in damage to the engine bearings and head gasket. The fuel capacity of the fuel tank is 16.5 gallons (U.S. Measure).

The fuel tank is equipped with a trap area in the bottom of the tank. As a result, the tank will not go completely dry. The purpose of this trap area is to hold water and dirt back from the engine. A drain plug is located on the left, bottom of the tank to drain water and dirt from the tank if it should become necessary.

**CAUTION**

Never allow the fuel to drain on the engine, the generator, or other components. Arrange provisions for catching the fuel when being drained and if the tank must be drained frequently, install a valve and drain line in the tank. When filling the fuel tank, do not fill completely full. The reason being that the cold fuel will expand due to engine heat and the outside air when operating in a warm climate. If the tank is too full, it will overflow causing a potential fire hazard. Also, do not attempt to fill the fuel tank with the engine running, always shut the engine down first.

A fuel consumption chart is shown in Figure 7-2 to give an idea of the fuel consumption of this engine under load. The figures given on this chart will vary from one engine to

another. Also, different brands of fuel, operating conditions, condition of the engine, and numerous other conditions will determine the fuel usage of this engine.

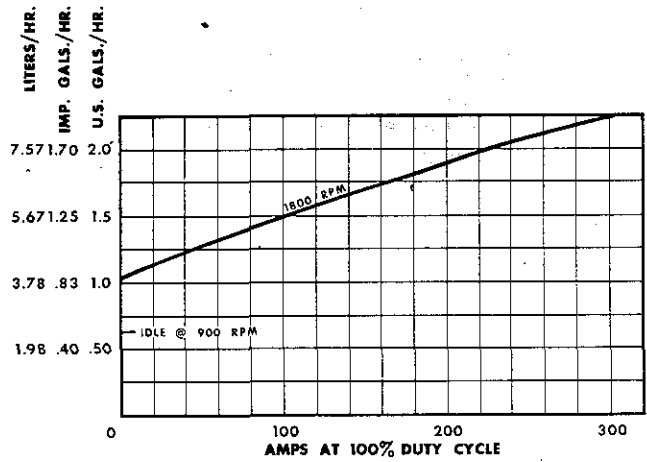


Figure 7-2. Fuel Consumption Chart

DB-900 955-1

**SECTION 8 - OPERATION OF ENGINE CONTROLS**

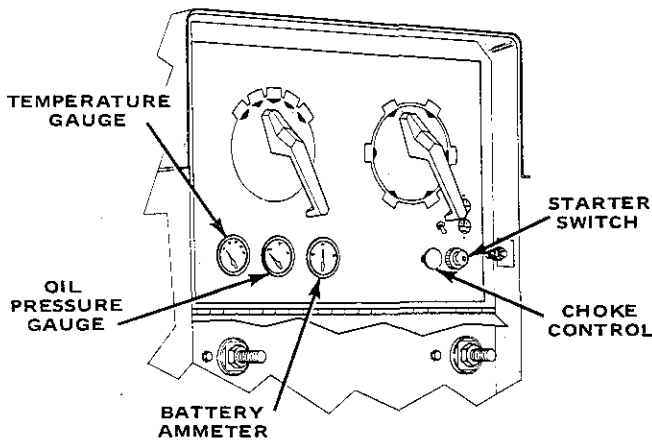


Figure 8-1. Engine Controls

**8 - 1. CHOKE CONTROL (Figure 8-1)**

A CHOKE Control for varying the fuel-air mixture to the engine, is provided on the front control panel of the welding generator. When the CHOKE Control is pushed fully out, very little air will be admitted to the engine thru the carburetor thereby supplying a richer mixture of fuel. This position is required if the engine is cold when started. As the engine warms up it will be necessary to push the CHOKE Control inward slowly until it is pushed in as far as it will go. When the CHOKE Control is fully in, the engine should be ready for operation.

**8 - 2. STARTER SWITCH (Figure 8-1)**

A key actuated Starter Switch is provided on the front panel for starting and stopping the engine. Rotating the key fully clockwise will engage the starter motor and start the engine. Once the engine has started, releasing the key will automatically return the Starter Switch to the On position. To stop the engine, rotate the key fully counterclockwise to the Off position.

**8 - 3. AUTOMATIC IDLE CONTROL (Figure 8-1 & 8-2)**

This engine is equipped with an automatic idling device as standard equipment. When the Idle Control is being employed, the engine will remain at idle rpm when the generator is not loaded, thus saving fuel etc.

The Idle Control uses a combination electric-vacuum control. An IDLE CONTROL switch, located on the generator con-

trol panel, allows control over the operation of the automatic idling device. The IDLE CONTROL Switch is labeled LOCK IN - LOCK OUT. The LOCK IN position allows the engine to idle until an arc is struck. The LOCK OUT position of the switch is used whenever it is necessary or desirable to operate the engine at constant weld rpm (1800), which would be the case when 120 volt ac power is required from the 120 volt receptacle.

The IDLE CONTROL Switch LOCK IN position would usually be used when Shielded Metal-Arc Welding (SMAW-Stick) is being done as this process does not require a constant speed. This only holds true if the 120 volt ac receptacle is not being used. In event accessory power tools are to be operated from the 120 volt ac receptacles, place the IDLE CONTROL Switch in the LOCK OUT position.

**IMPORTANT**

If 120 volt ac power equipment is going to be operated from the 120 volt ac power receptacle, be sure the equipment is "off" until the engine is operating at full speed (1800 rpm). The same holds true when returning the engine to idle. If power tools are operated while the engine is idling, low voltage and frequency (resulting from the lower engine idling rpm) at the power receptacle may cause damage to the 120 volt equipment.

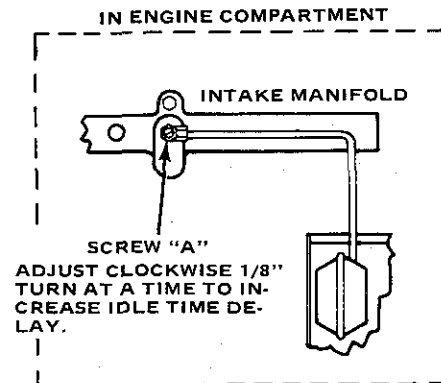


Figure 8-2. Idle Control Time Delay Adjustment

Operation of the idling device is automatic when the IDLE CONTROL Switch is in the LOCK IN position. When the engine is started, engine speed will remain at idle until an arc is established, at which time the engine immediately comes up to weld speed. When the arc is broken, a time delay will

exist before the engine begins to return to idle speed. The length of this time delay is controlled by the setting of Screw "A" in Figure 8-2. This screw is located on the vacuum line fitting going into the Intake Manifold of the engine. Figure 8-2 shows the adjustment of this screw.

#### 8 - 4. OIL PRESSURE GAUGE (Figure 8-1)

The Oil Pressure Gauge registers the lubricating system pressure in pounds per square inch. Normally, the pressure registered by the gauge should remain constant for a given engine speed. Should the pressure fluctuate or drop, stop the engine and do not operate the engine again until the trouble has been remedied.

#### 8 - 5. ENGINE AMMETER (Figure 8-1)

The Engine Ammeter, located on the front control panel, registers the charging current which is being supplied to the battery by the charging generator. It also registers a discharge equivalent to the amount of current being used by the engine electrical system when the generator is not charging.

#### 8 - 6. TEMPERATURE GAUGE (Figure 8-1)

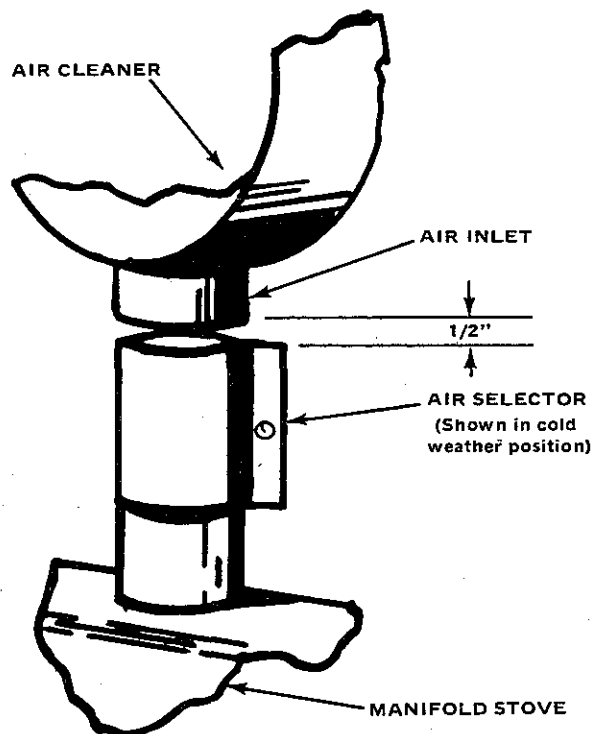
The Temperature Gauge registers the coolant temperature and will indicate when an overheated condition occurs.

#### 8 - 7. CARBURETOR AIR TEMPERATURE SELECTOR (Figure 8-3)

The air intake to the air cleaner is equipped with a selector tube which allows the air to be drawn either from the surrounding engine compartment air or heated air, drawn from around the exhaust manifold of the engine. Heated air will prevent carburetor icing in cold weather.

Figure 8-3 shows the selector tube in the cold weather operating position. When the tube is in this position, it must remain about 1/2" away from the air cleaner inlet.

For warm weather operation, loosen the selector tube and slide it all the way down against the manifold and re-tighten.



AA-900 955-4

Figure 8-3. Carburetor Air Temperature Selector

## SECTION 9 - ENGINE OPERATION

### 9 - 1. PREPARING TO START AND STARTING THE ENGINE

#### IMPORTANT

Check the engine oil level and radiator coolant level. Make sure no loose parts etc. are laying in the unit. Make the necessary connections to the generator before attempting to start the unit. Fill the fuel tank with the correct grade and type of fuel.

1. Make all necessary electrical connections to generator for the particular application it is to be used for.
2. Place the IDLE CONTROL Switch in the LOCK IN position. This should be done in order to allow the engine to warm up at idle speed.
3. Choke the engine as necessary.
4. Rotate the Starter Switch fully clockwise.

#### IMPORTANT

Always ensure that the starter pinion and flywheel have stopped rotating before re-engaging the starter motor, otherwise the ring or pinion may be damaged.

5. When the engine starts, release the Starter Switch. As the engine warms up, slowly push the CHOKE in.

### 9 - 2. ENGINE SHUT DOWN

1. Remove the load on the generator.
2. Allow the engine to idle for a few minutes, allow a longer length of time if the engine has been operating at full load. This idling time is to ensure that the internal engine temperature has a chance to equalize.
3. Place the Starter Switch in the OFF position.

## SECTION 10 - ENGINE MAINTENANCE

### 10-1. LUBRICATION

This engine will require at least 50 hours of running time to become fully broken in. During this period, the load on the engine should be kept as light as possible. The oil level should be checked a number of times during an operating day, as some engines will use oil during the break-in period. After about 50 hours of running time on the break-in oil, drain the oil. Premium heavy duty oil, manufactured by any one of the

major oil companies, should be used as a replacement oil. Table 10-1 gives a list of recommended grades and types of oil to use to keep oil level up during break-in and to use after the break-in oil is drained. The capacity of the engine with a filter change is 4-1/2 quarts, without a filter change, 4 quarts. Check the dip stick to make sure oil level is up to the required operating level.

In normal operation, oil should be changed after about 50

hours of operation with a filter change every 150 hours. The oil should be drained after the engine has been warmed up to normal operating temperature, thus promoting foreign particle suspension in the oil and thereby removal when the oil is drained. Foreign particles tend to settle at the bottom of the crankcase when the oil is allowed to cool, thereby avoiding removal and thus contaminating the new oil added.

**Table 10-1. Oil Selection Guide**

Above 90 degrees Fahrenheit Not lower than 32 degrees	SAE 30 or 10W-30 SAE 20 or 20W 10W-30 or 10W-20
As low as 10 degrees above zero Fahrenheit	SAE 20W 10W-30 or 10W-20
As low as 10 degrees below zero Fahrenheit	SAE 10W 10W-30 or 10W-20
Lower than 10 degrees below zero Fahrenheit	SAE 5W or 5W-20

## 10-2. COOLANT SYSTEM

If the engine is to be operated in a temperature below  $-15^{\circ}\text{F}$ , make sure a good grade of anti-freeze is added to the coolant system. Change the coolant solution as often as necessary. The coolant system capacity is 11 quarts (U.S. Measure).

During the break-in period of a new engine, one of the greatest dangers is over-heating. There are several possible causes of over-heating, but the basic items for consideration are engine lubrication and coolant circulation.

At the first sign of over-heating, shut the engine down and make a thorough check to determine the cause.

Temperature of the engine coolant is regulated by a thermostatic valve located in the outlet at the front of the cylinder head. This unit retards the flow of coolant until a predetermined temperature is reached, usually varying between  $170^{\circ}\text{F}$  and  $180^{\circ}\text{F}$ . When the desired temperature is achieved, the valve opens and free circulation of the coolant through the system begins.

If the thermostat valve becomes faulty and does not open at the correct temperature, the thermostat should be removed and a replacement installed immediately.

## 10-3. GOVERNOR SERVICE

The governor speed setting and sensitivity setting are factory set to obtain correct weld speed (1800 rpm) and engine response to changing load conditions. The governor speed control setting is factory locked with a lead seal. Do not remove this seal unless absolutely necessary.

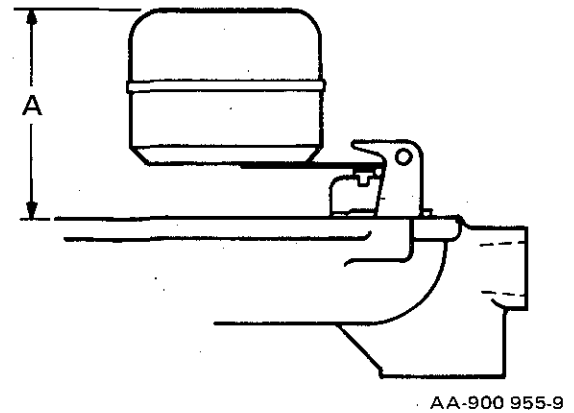
### NOTE

The governor, as used in conjunction with this engine, does not have a "No Load Surge" adjustment as described in the Engine Manual.

The engine is factory set to operate at 900 rpm idle speed and 1800 rpm when it comes up to weld speed. For information concerning governor adjustment, refer to the Engine Manual, Page 41, paragraph entitled "Pierce Governor".

## 10-4. CARBURETOR FLOAT SETTING

To ensure correct fuel level in the float chamber, check distance (dimension A, Figure 10-1) from top of floats to machined surface of throttle body (no gasket) with throttle body inverted. This dimension should be  $1\frac{5}{32}$  inches plus or minus  $\frac{1}{32}$  inch. To increase or decrease distance from the top of the float bodies to the machined surface, use a long nose pliers and bend the float lever at a point close to the float body.



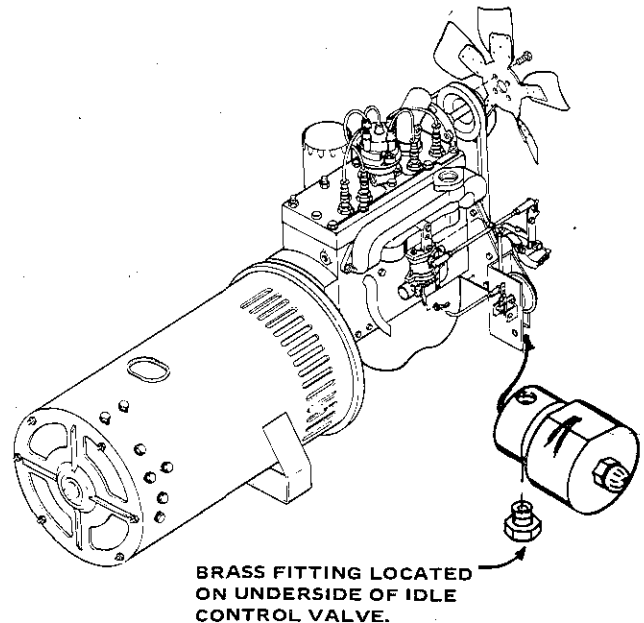
**Figure 10-1. Carburetor Float Setting**

### NOTE

Do not bend, twist or apply pressure on the float bodies. The float bodies when viewed from the free end of the bodies must be centered between and at right angles to the machined surface and must move freely on the float axle.

## 10-5. VACUUM CIRCUIT AIR FILTER

In order to provide clean air for the vacuum circuit, a brass fitting type air cleaner is provided on the underside of the idle control valve. See Figure 10-2 for location on the engine. This brass fitting will have to be removed and cleaned in gasoline or a suitable solvent periodically to ensure proper engine operation.



**Figure 10-2. Vacuum Circuit Air Filter Location**



## 10-6. AIR CLEANER SERVICE

### A. Daily Service

1. Open the engine compartment door nearest the air cleaner.
2. Make certain that the screen on the weather cap is free of dirt and foreign material.

### B. Weekly Service

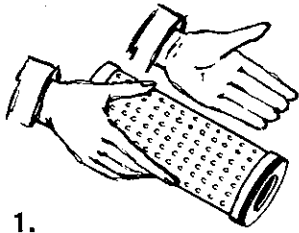
Service paper element once every week under normal conditions or when loss of power is noted. Servicing element is accomplished in the following manner:

1. Remove filter element lock assembly and seal.

2. Inspect the gasket on the end of the element for damage. Wipe out inside of air cleaner housing before installing element. Do not use the element if the gasket is damaged or missing.
3. It is recommended that the element should be replaced after ten washings or at the end of the season, whichever comes first.

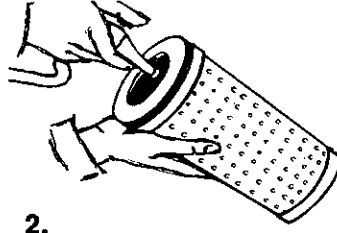
#### NOTE

When it becomes necessary to service the air cleaner in the field, follow the procedure outlined in Figure 10-3. It is recommended that a spare element always be kept on hand for replacement. New elements are available from your distributor.

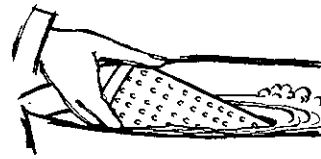


1. For a temporary expedient in the field, the element can be cleaned by tapping the side or the end carefully against the palm of the hand.

**CAUTION:** Do not tap element against a hard surface. The element may be damaged by doing so.



2. Compressed air, not to exceed 100 lbs. of pressure can clean the element. Insert nozzle inside the element and blow out dust. Clean dust from the outside of the element by holding the nozzle at least 6 inches from the element.

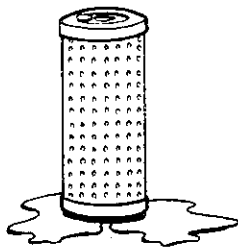


3. If compressed air is not available, or if soot, oily vapor, or any dirt is present which cannot be removed by compressed air, then the element is to be washed. Agitate element in warm water containing a non-sudsing detergent.

**CAUTION:** Do not use water hotter than the hand can stand; solvents or oil; fuel oil, or gasoline.

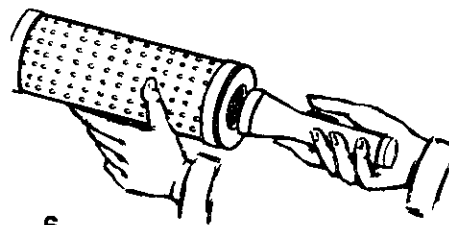


4. Reverse flush with clean water to thoroughly rinse all loosened foreign material from the filter.

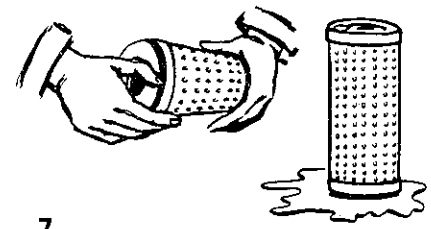


5. Shake out excess water from the element and allow to air dry.

**CAUTION:** Do not attempt to remove excess water by using compressed air.



6. An even fine pattern of light through the element, when a light is held inside the element, indicates that the element is clean. Any large spot of light indicates that the element is damaged and, therefore, is unfit for further use. Replace the element.

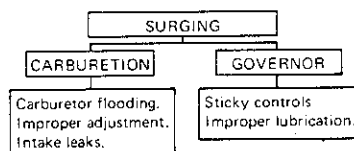
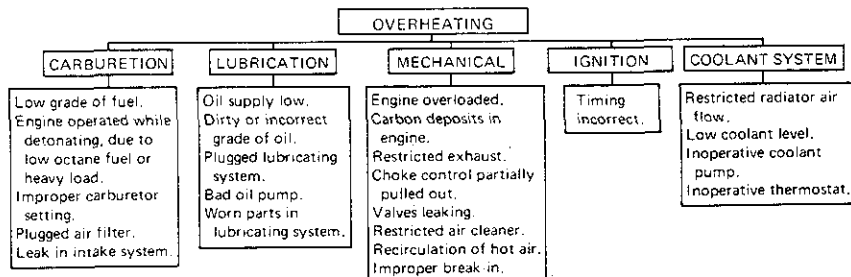
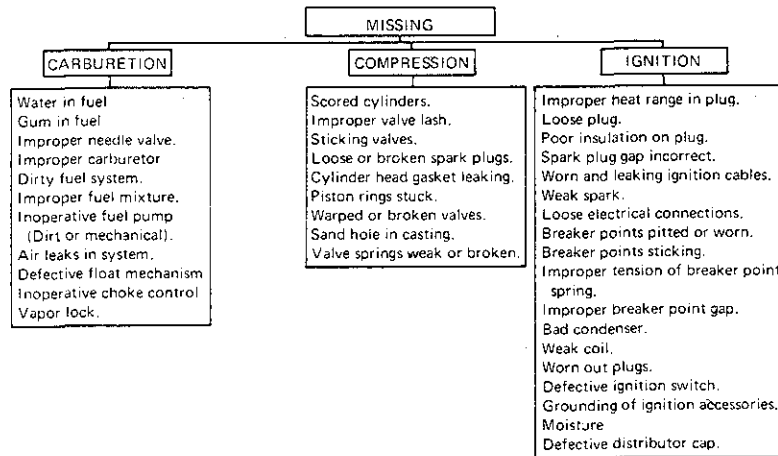
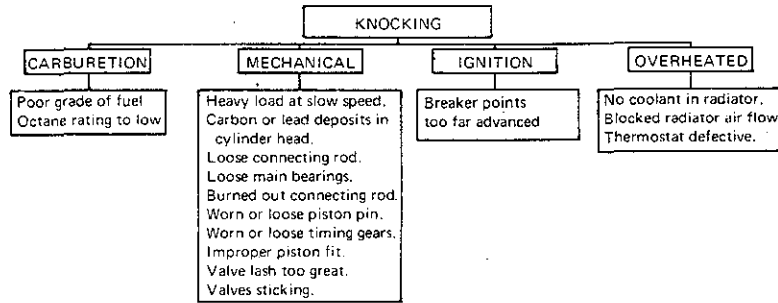
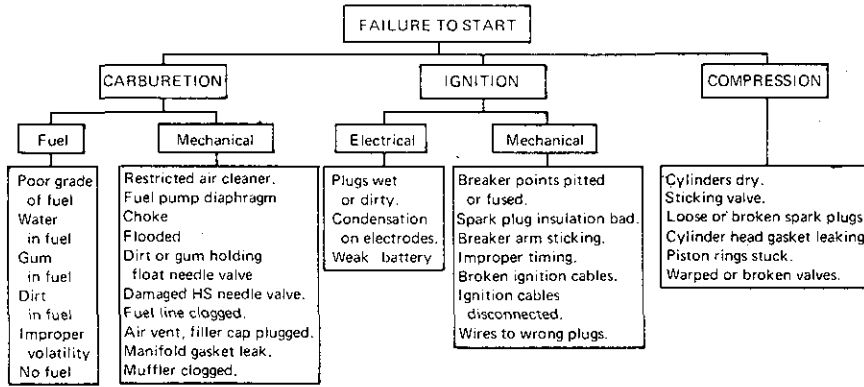


7. To minimize down time, created by waiting for the element to dry, it is suggested that the newly cleaned filter be replaced by a similar standby unit.

Figure 10-3. Air Cleaner Service

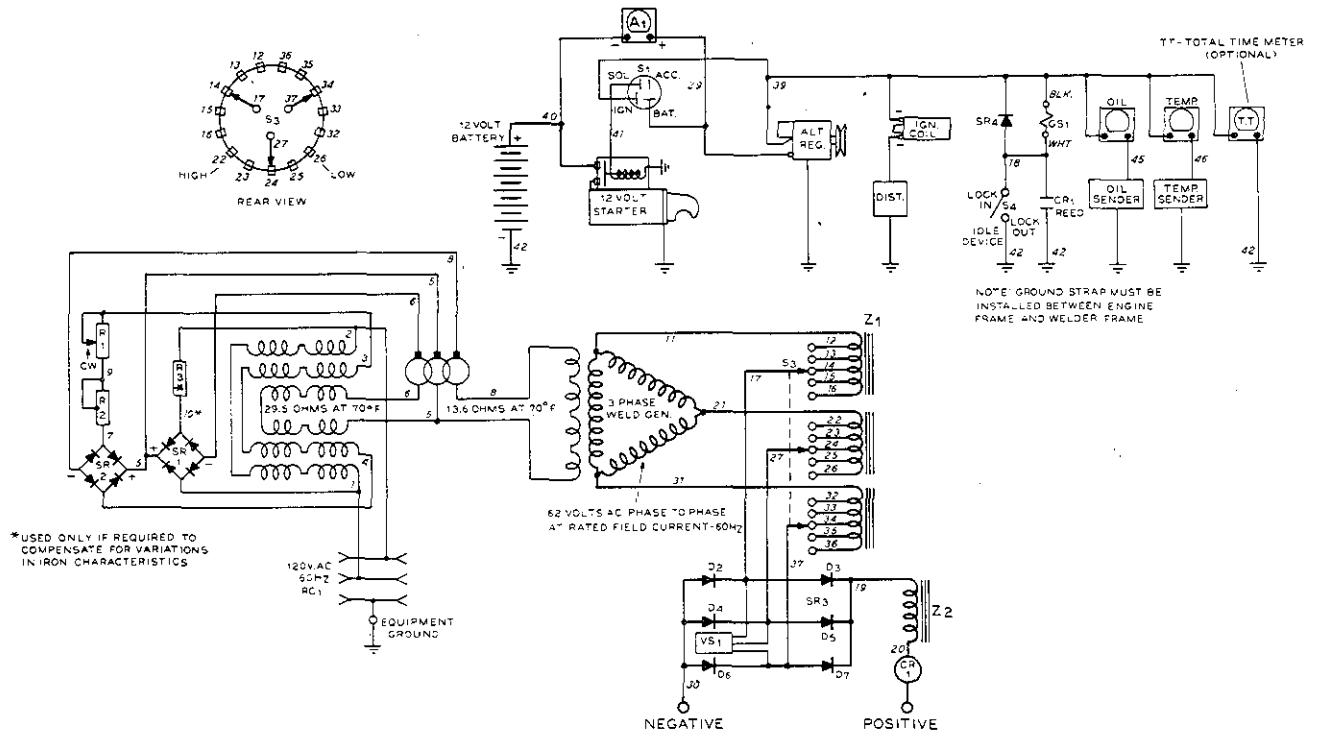
# SECTION 11 - TROUBLESHOOTING

## 11-1. ENGINE TROUBLESHOOTING



# 11-2. ENGINE/GENERATOR TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No output at 120 volt ac receptacle.	Poor contact between slip rings and brushes.	Clean the slip rings with 3/0 sandpaper and if necessary, install new brushes.
	Defective diode in rectifier SR1.	Replace defective rectifier.
120 vac available at receptacle but no output at weld terminals.	Poor contact between slip rings on welding generator.	Clean slip rings with 3/0 sandpaper and if necessary, install new brushes.
	Defective Fine Current Control rheostat (R1).	Check for open winding in R1 with ohmmeter.
	Defective stabilizer (Z2).	Remove both leads from Z2 and check for open or grounded coil.
	Defective diode in rectifier SR2.	Replace defective rectifier.
Erratic weld current	Damp or defective electrodes.	Try other electrodes.
	Loose or dirty connections.	Check connections both inside and outside of welding generator.
	Check leads and contacts of the Range Switch.	Discoloring of brass contacts could indicate heating caused by loose connection. Replace contact or switch plate.
	Defective diode in rectifier SR3.	Disconnect one lead on diodes D2 thru D7. Set ohmmeter on x1 range and check across diode for continuity. Diode should conduct in one direction and not in other. Replace if previous step is not true.
Engine speed remains at idle rpm when arc is struck.	Magnetic field not closing reed switch (CR1).	Replace CR1
	Coil of solenoid burned out.	Apply 12 vdc to solenoid coil & check for proper operation.
	Filter on solenoid plugged.	Clean filter. See paragraph 10-5 for cleaning procedure.
Engine will not return to idle rpm when arc is broken.	Idle control valve closed.	Open valve by turning in a counterclockwise direction.
	Idle control valve plugged.	Remove and clean.
	Leak in vacuum line.	Check Line.
	Shorted Idle Control Switch (S4).	Check switch with ohmmeter.



Circuit Diagram No. CB-900 955-1K

Figure 11-1. Circuit Diagram



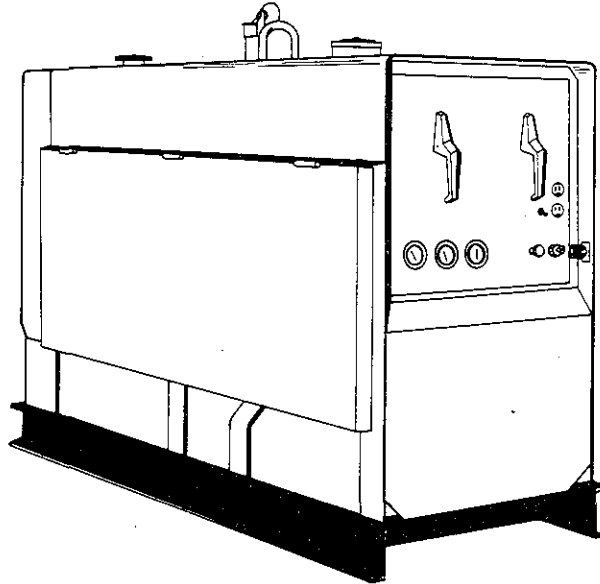
July 1973

FORM: OM-450

Effective with serial No. HD690740

MODEL  
BIG 40

STOCK NO.  
900 955



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

# PARTS LIST



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

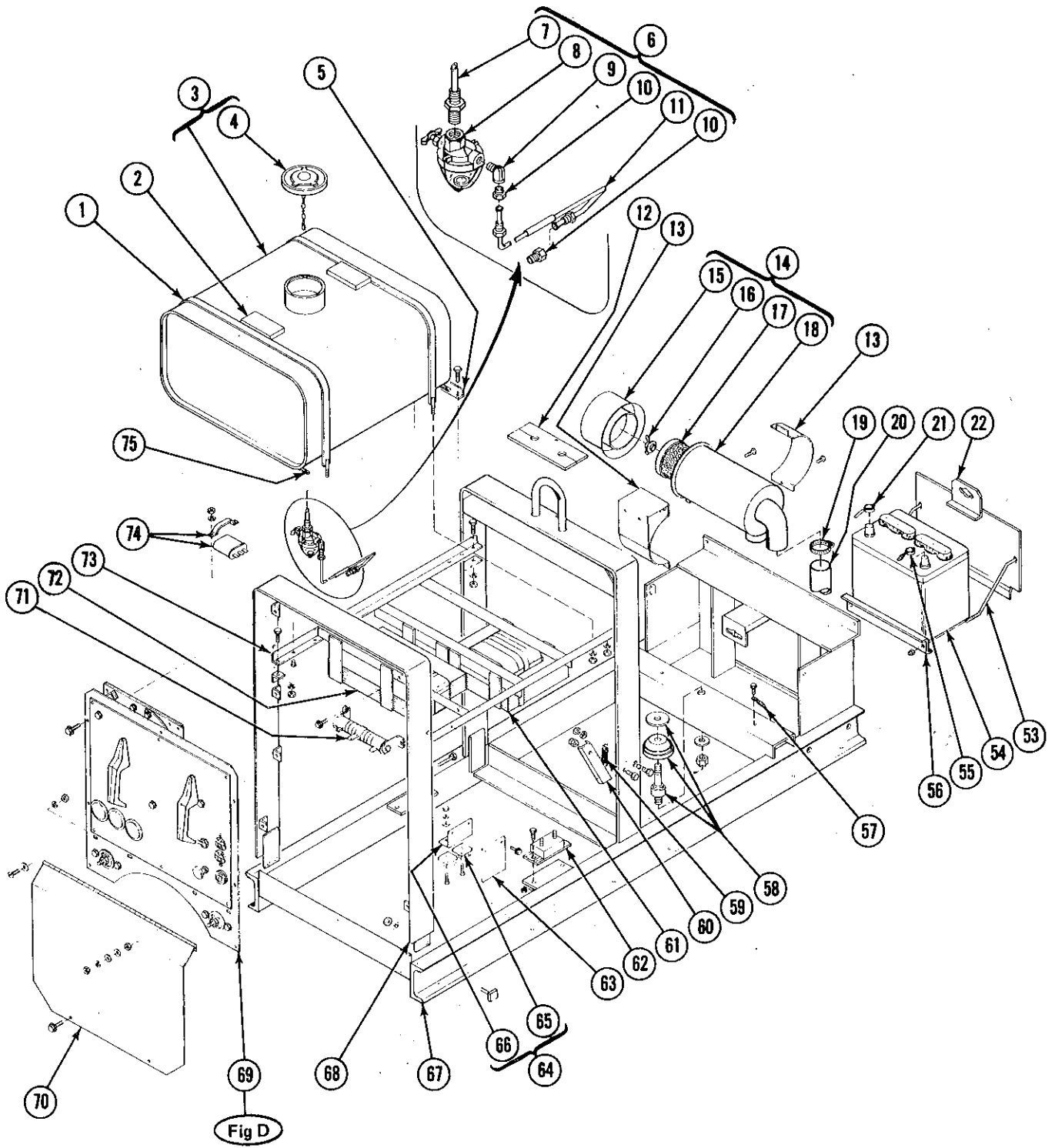
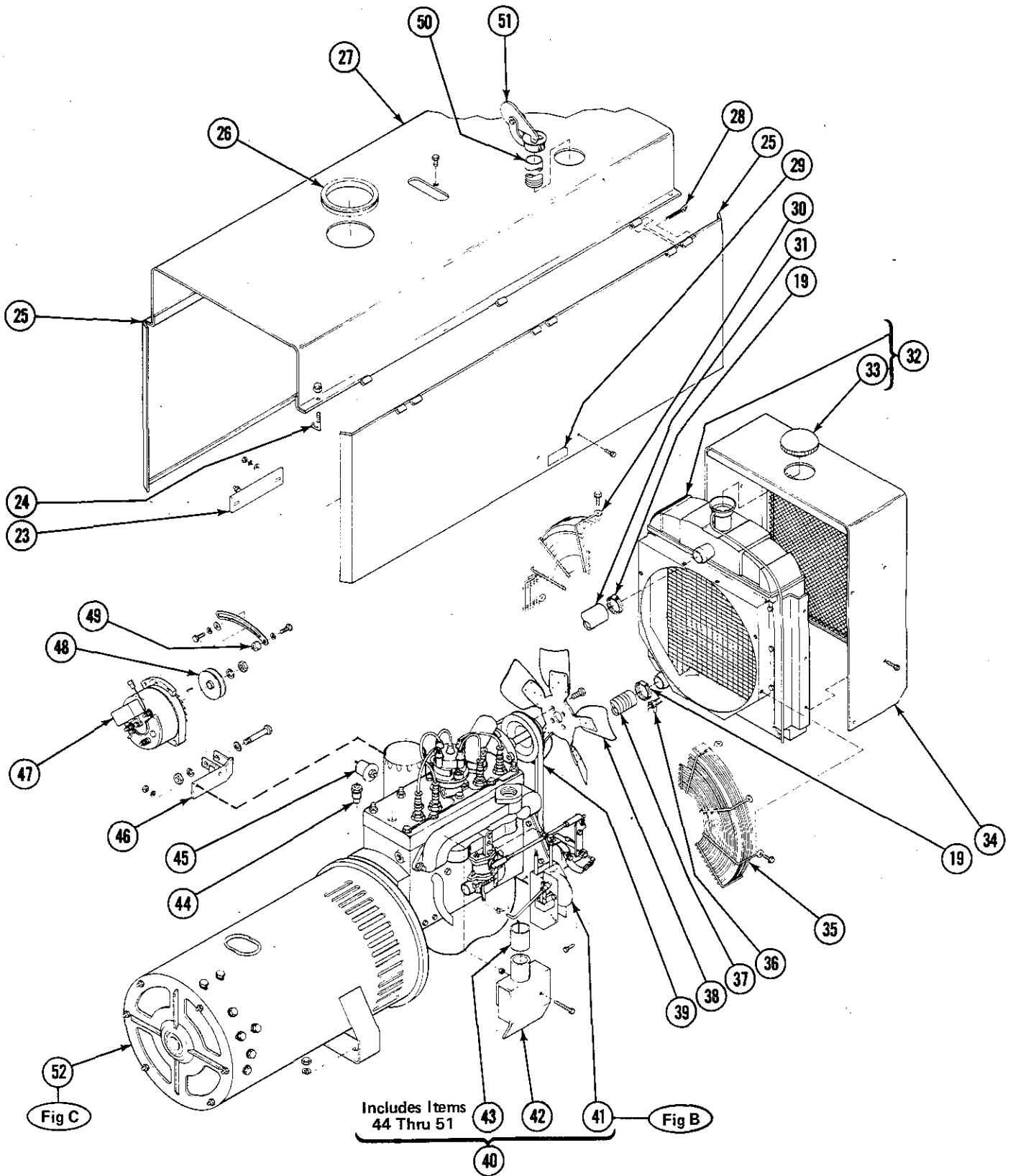


Figure A – Main Assembly



Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
Figure A			Main Assembly	
1		017 430	STRAP, holddown - fuel tank	2
2		010 434	STRIP, rubber 1/2 x 2 x 4-1/8"	2
3		017 168	TANK, fuel (consisting of)	1
4		018 858	.CAP	1
		602 938	PLUG, galv pipe 1/8 MPT (used on bottom of fuel tank)	1
5		017 456	BRACE, support - fuel tank	1
6		018 158	FUEL LINE (consisting of)	1
7		010 870	.NIPPLE, brass 1/8 MPT	1
8		010 318	.VALVE, shut off	1
9		010 867	.ELBOW, brass - street 90 degree 1/8 PT	1
10		010 289	.CONNECTOR, brass 1/4 TBG 1/8 PT	2
11		010 387	.LINE, fuel	1
12		017 479	SEAL, lifting eye	1
13		031 868	BRACKET, mtg - air cleaner	1
14		018 765	AIR CLEANER, intake (consisting of)	1
15		018 859	.CAP	1
16		010 433	.NUT, wing	1
17		*018 860	.ELEMENT	1
18		018 861	.BODY	1
19		010 861	CLAMP, hose	6
20		018 365	HOSE, intake - air	1
21		023 626	CABLE, battery - positive	1
22		022 899	DOOR, access - battery	1
23		017 421	CATCH, door	2
24		010 515	BOLT, J 5/16-18	4
25		017 481	DOOR, side	2
26		015 684	GROMMET, rubber 4-3/16" ID	1
27		017 485	COVER	1
28		604 559	PIN, cotter 1/4-3-1/2"	6
29		012 487	LABEL, push down to uniatch door	2
30		027 572	GUARD, fan - left hand	1
31		*017 363	HOSE, radiator - upper	1
32		028 404	RADIATOR (consisting of)	1
33		031 254	.CAP, radiator	1
34		019 231	ENCLOSURE, radiator	1
35		027 573	GUARD, fan right hand	1
36		010 386	COCK, brass - radiator drain	1
37		*017 362	HOSE, radiator - lower	1
38			BLADE, fan (included with engine-see engine parts list)	1
39			BELT, V (included with engine-see engine parts list)	1
40		031 980	ENGINE, gasoline (consisting of)	1
41		018 757	.CONTROL, weld & idle vacuum (See Fig. B Page 5)	1
42		020 365	.STOVE, manifold	1
43		017 594	.CLAMP, stove	1
44		025 453	.SENDER, temperature	1
45		025 884	.SENDER, oil pressure	1
46		025 182	.BRACKET, mtg - alternator	1
47		605 429	.ALTERNATOR, 35 ampere 12 volt	1
48		605 430	.PULLEY, single belt	1
49		025 181	.TUBING, steel 5/8 OD x 12 ga wall x 1/2"	1
50		027 541	.PIPE, exhaust	1
51		017 389	.CAP, weather No. 4	1
52		Figure C	GENERATOR ASSEMBLY (See Page 6)	1
53		017 477	ROD, holddown - battery	2
54	Batt	*015 709	BATTERY, 12 volt 53 ampere hour	1
55		023 641	CABLE, battery - negative	1
56		017 431	HOLDER, battery	1
57		023 892	CABLE, ground - engine	1
58			MOUNT, engine (included with engine-see engine parts list)	1
59		010 266	SPRING	2
60		017 420	LATCH, door	2
61	Z2	027 982	STABILIZER	1
62		010 679	MOUNT, rubber - generator	2
63		031 961	INSULATION, rectifier	1
64		031 888	RECTIFIER ASSEMBLY	1
65		037 346	.RECTIFIER, integrater 6.5 ampere 400 volt	2
66		031 926	.HEAT SINK	1
67		027 951	BASE	1
68		027 957	FRAME, upright - base front	1



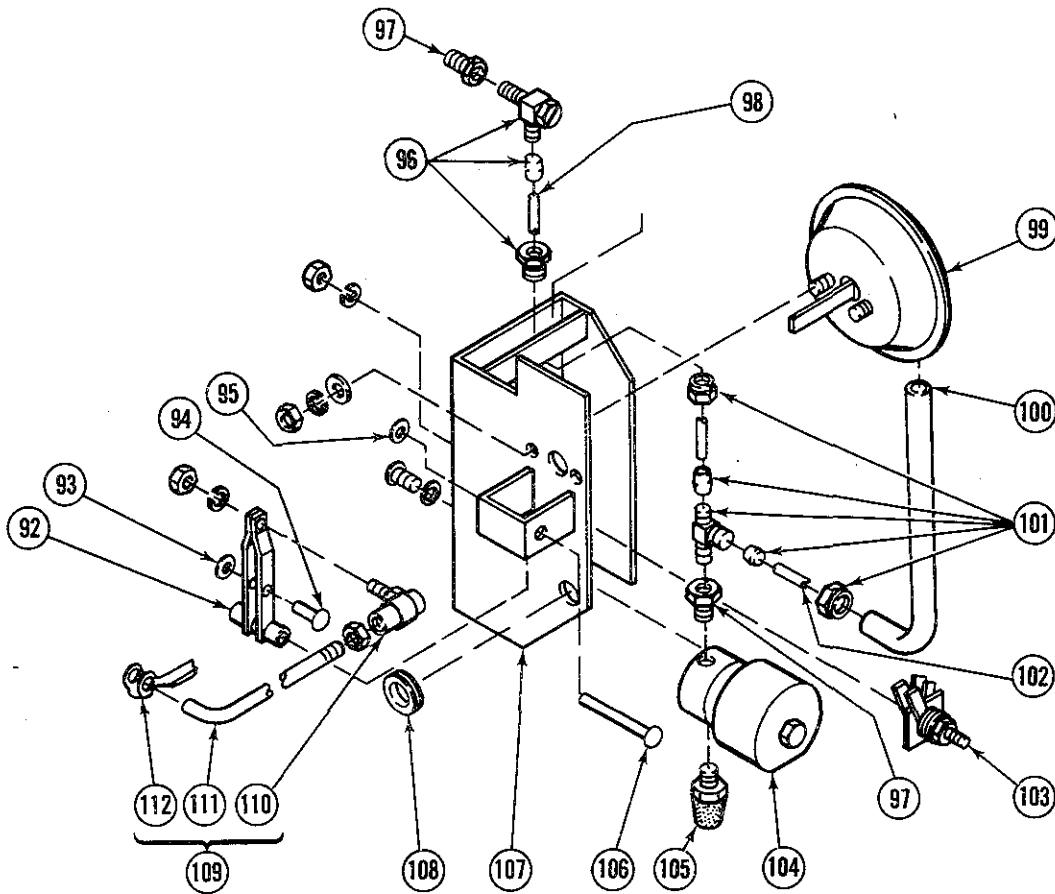
Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
<b>Figure A</b>		<b>Main Assembly (Cont.)</b>		
69		Figure D	PANEL, front with components (See Page 7)	1
70		027 846	PANEL, hinged - lower front	1
71	R2	030 060	RESISTOR, WW adj 375 watt 20 ohm	1
72	Z1	036 259	REACTOR	1
73		028 218	FRAME, mtg - stabilizer & reactor	1
74	VSI	025 932	SUPPRESSOR, 0.75 uf 10 ohm w/leads	1
75		027 105	STRIP, cotton 1/8 x 1 x 20"	2
		024 480	KIT, label (includes all labels)	1
		†028 262	MUFFLER, exhaust	1
		†010 875	CLAMP, muffler 2" dia	1
		†015 700	BRACKET ASSEMBLY, mtg - muffler	1
		†027 564	SPACER, anti-noise - mtg muffler	1
A		†025 663	METER, amperage dc 0-400	1
		†026 943	INSULATOR, ammeter	1
V		†025 638	METER, voltage dc 0-100	1
TT		†025 718	METER, hour 12 volt dc	1
		†028 653	BRACKET, mtg - hourmeter	1
TAC		†027 491	TACHOMETER, electric 12 volt	1
		†017 390	BRACKET, mtg - tachometer	1
		†020 374	BRACKET, mtg - tachometer to engine	1
S2		†011 620	SWITCH, toggle SPST 16 ampere 125 volt (remote current control)	1
RC2		†039 631	RECEPTACLE, twistlock 2P2W (remote current control)	1

\*Recommended Spare Parts.

†Optional Equipment.

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
<b>Figure B</b>		<b>018 757</b>	<b>Control, Weld &amp; Idle Vacuum (See Fig. A Page 3 Item 41)</b>	
92		017 417	LINKAGE ASSEMBLY .....	1
93		604 393	RECEPTACLE, screw 3/16" dia .....	1
94		604 392	RIVET, round head 3/16 x 3/4" .....	1
95		603 931	RECEPTACLE, screw 1/4" dia .....	1
96		603 470	VALVE, needle - shut off .....	1
97		010 869	BUSHING, brass 1/4 MPT 1/8 FPT .....	2
98		020 963	TUBING, copper 3/16 OD x 13-1/2" lg .....	1
99		018 097	CHAMBER, vacuum .....	1
100		020 962	HOSE, rubber 7/64 ID x 27/64 OD x 4" lg .....	1
101		010 561	TEE, brass 1/8 x 1/8 .....	1
102		020 964	TUBING, copper 1/8 OD x 1" lg .....	1
103	SR4	031 252	RECTIFIER, selenium .....	1
104	GS1	035 639	VALVE, 2 way 12 volt dc .....	1
105		023 030	BREATHER, brass - vent 1/4 MPT .....	1
106		603 802	RIVET, round head 1/4 x 2" .....	1
107		017 544	BRACKET, mtg - vacuum chamber .....	1
108		015 713	GROMMET, rubber 5/16" ID .....	1
109		018 160	LINKAGE ASSEMBLY (consisting of) .....	1
110		024 799	. BALL JOINT, 1/4-28 thread .....	1
111		018 098	. BOLT, hook .....	1
112		010 334	. CLIP, clevis .....	1

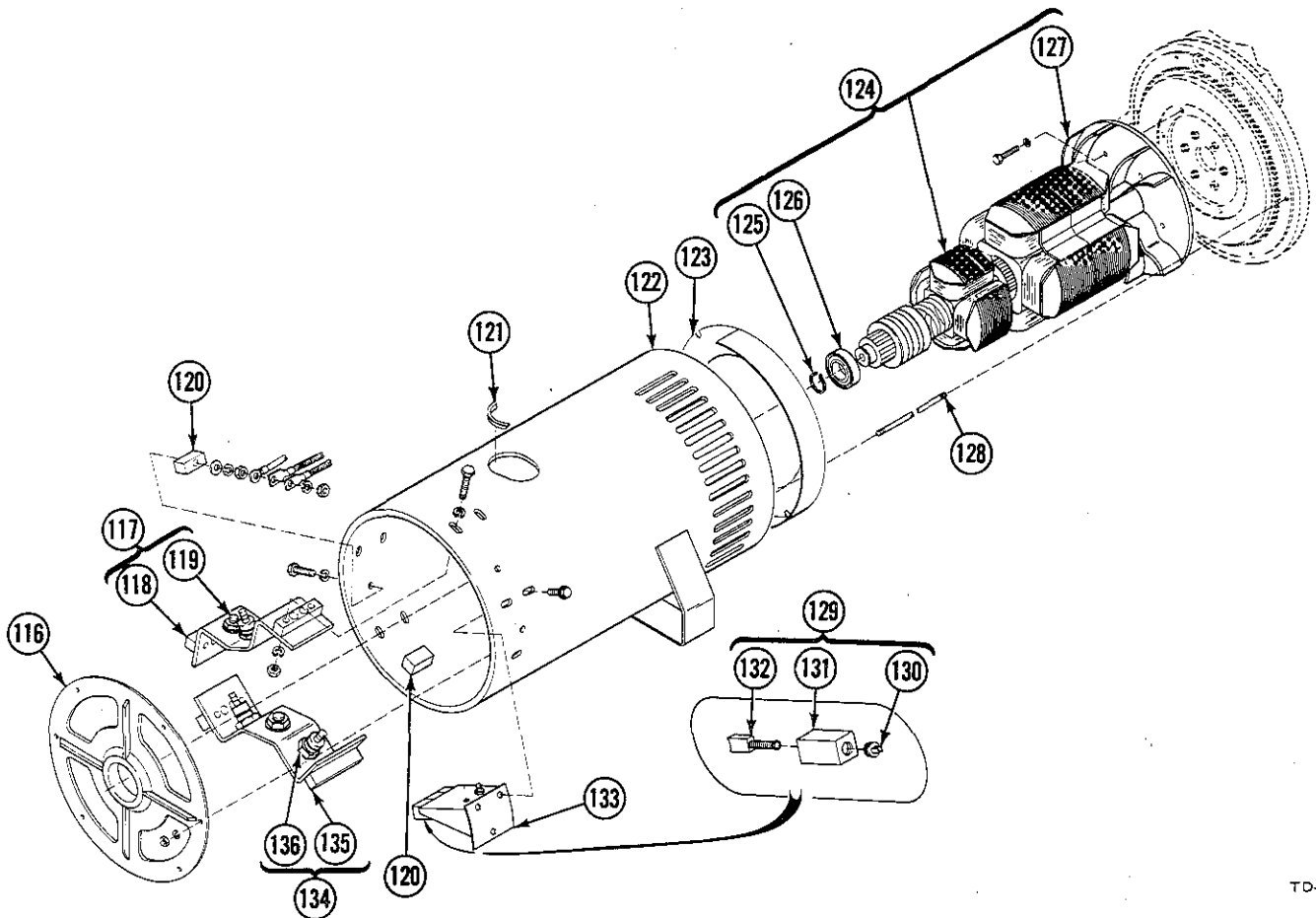


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Figure B - Control, Weld & Idle Vacuum

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

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
<b>Figure C Generator Assembly (See Fig. A Page 4 Item 52)</b>				
116		025 271	ENDBELL .....	1
117	SR3	025 517	DIODE ASSEMBLY, reverse polarity (consisting of) .....	1
118		025 305	. INSULATOR .....	2
119		037 957	. DIODE, 275 ampere 250 volt .....	3
120		025 306	INSULATOR .....	5
121		026 203	CHANNEL, neopreme 1/4 x 11-1/2" .....	1
122	**031	963	STATOR .....	1
123		026 393	BAFFLE, air .....	1
124	**031	964	ROTOR (consisting of) .....	1
125		024 617	. RING, retaining .....	1
126		024 616	. BEARING .....	1
		027 182	. KEY, 3/8 x 1/2 x 7" .....	1
		602 340	. KEY, 5/16 x 1-3/8" .....	1
127		017 725	. FAN .....	1
128		025 525	ROD, threaded end 3/8-16 x 29-7/16" .....	6
129		018 614	BRUSH SET (consisting of) .....	3
130		018 665	. CAP .....	1
131		600 270	. BRUSHHOLDER .....	1
132	*	020 034	. BRUSH .....	1
133		025 321	BRACKET, mtg - brushholder .....	1
134	SR3	025 516	DIODE ASSEMBLY, straight polarity (consisting of) .....	1
135		025 305	. INSULATOR .....	2
136		037 956	. DIODE, 275 ampere 250 volt .....	3



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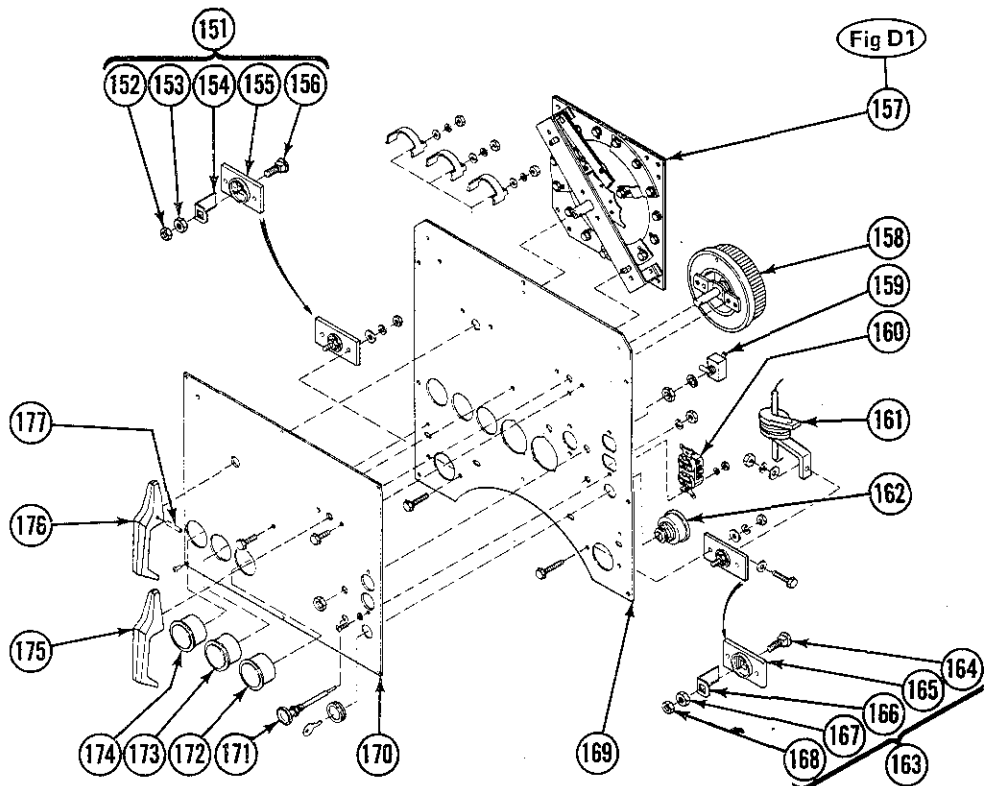
Figure C — Generator Assembly

\*Recommended Spare Parts.  
 \*\*Rotor and Stator are available on an Exchange Basis. Contact Service Department for Details.  
 BE SURE TO PROVIDE STOCK, MODEL, AND SERIAL NUMBERS WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Factory Part No.	Description	Quantity
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Figure D Panel, Front With Components (See Fig. A Page 4 Item 69)

151		038 878	TERMINAL, power output - black (consisting of)	1
152		601 839	. NUT, brass - hex 1/2-13 full	1
153		038 913	. NUT, brass - hex 1/2-13 special	1
154		038 129	. BAR, bus	1
155		038 865	. TERMINAL BOARD	1
156		038 912	. BOLT, shoulder 1/2-13 x 1-11/16"	1
157	S3	011 273	SWITCH, range (See Fig. D1 Page 8)	1
158	R1	*030 990	RHEOSTAT, WW 300 watt 25 ohm	1
159	S1	*011 801	SWITCH, toggle SPST 10 ampere 125 volt	1
160	RC1	604 176	RECEPTACLE, duplex - ground 2P3W	1
161	CR1	034 876	RELAY, switch (consisting of)	1
		022 230	. SWITCH, relay	1
162	S1	027 823	SWITCH, key type - ignition	1
163		038 886	TERMINAL, power output - red (consisting of)	1
164		038 912	. BOLT, shoulder 1/2-13 x 1-11/16"	1
165		038 885	. TERMINAL BOARD	1
166		038 129	. BAR, bus	1
167		038 913	. NUT, brass - hex 1/2-13 special	1
168		601 839	. NUT, brass - hex 1/2-13 full	1
169		031 858	PANEL, front - upper	1
170			NAMEPLATE (order by stock, model and serial number)	1
171		019 790	CONTROL, push - pull	1
172		025 451	GAUGE, oil pressure	1
173		030 530	METER, amperage 60-0-60	1
174		025 452	GAUGE, temperature	1
175		019 755	HANDLE, rheostat	1
		602 178	SCREW, set 1/4-20 x 3/8"	1
176		019 754	HANDLE, range switch	1
177		010 836	PIN, spring 3/16 x 1-1/4"	1



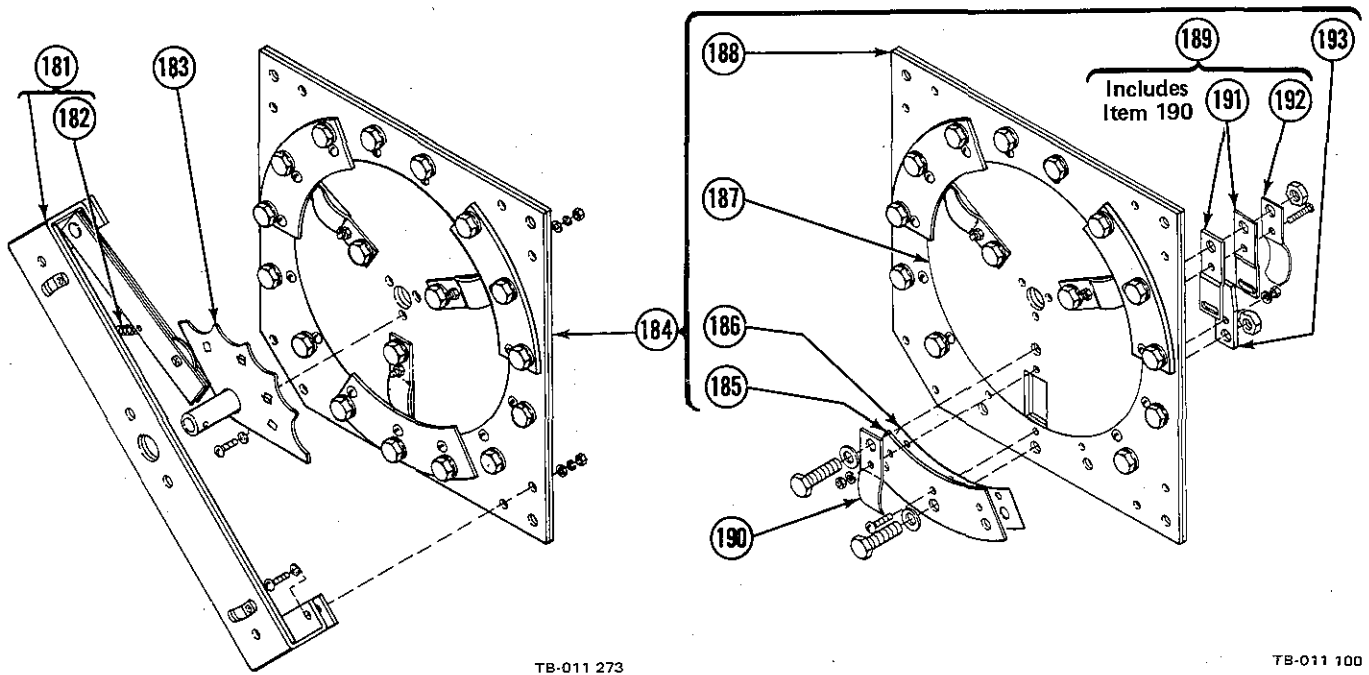
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Figure D - Panel, Front With Components

\*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
<b>Figure D1 011 273 Switch, Range (See Fig. D Page 7 Item 157)</b>				
181		011 322	BRACKET, mtg - switch (consisting of)	1
182		010 671	. SPRING	1
183		010 428	LOCATOR, quadrant	1
184		011 100	PLATE ASSEMBLY (consisting of)	1
185		011 013	. GUIDE, rotor	3
186		011 012	. SHIM, guide	6
187		011 019	. ROTOR	2
188		011 095	. PLATE	2
189		011 496	. CONTACT ASSEMBLY, movable (consisting of)	3
190		011 025	. SPRING, pressure	1
191		011 010	. CONTACT, copper w/dimple	2
192		011 007	. SPRING, pressure	1
193		011 018	. CONTACT, stationary	15



TB-011 273

TB-011 100

Figure D1 – Switch, Range

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

