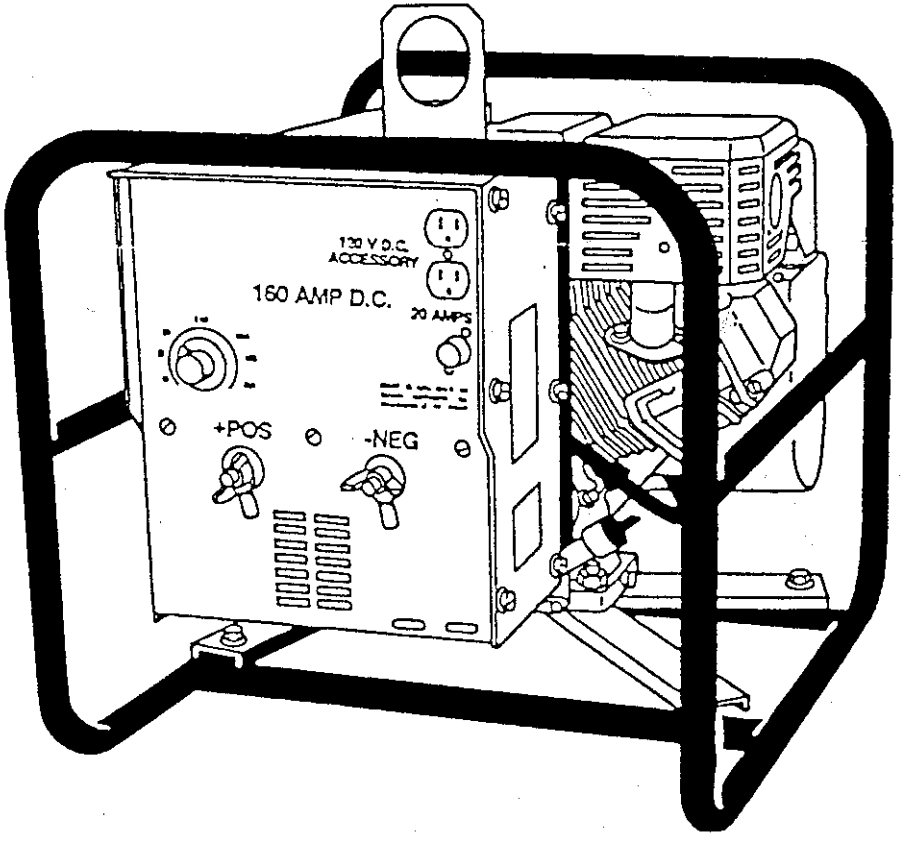
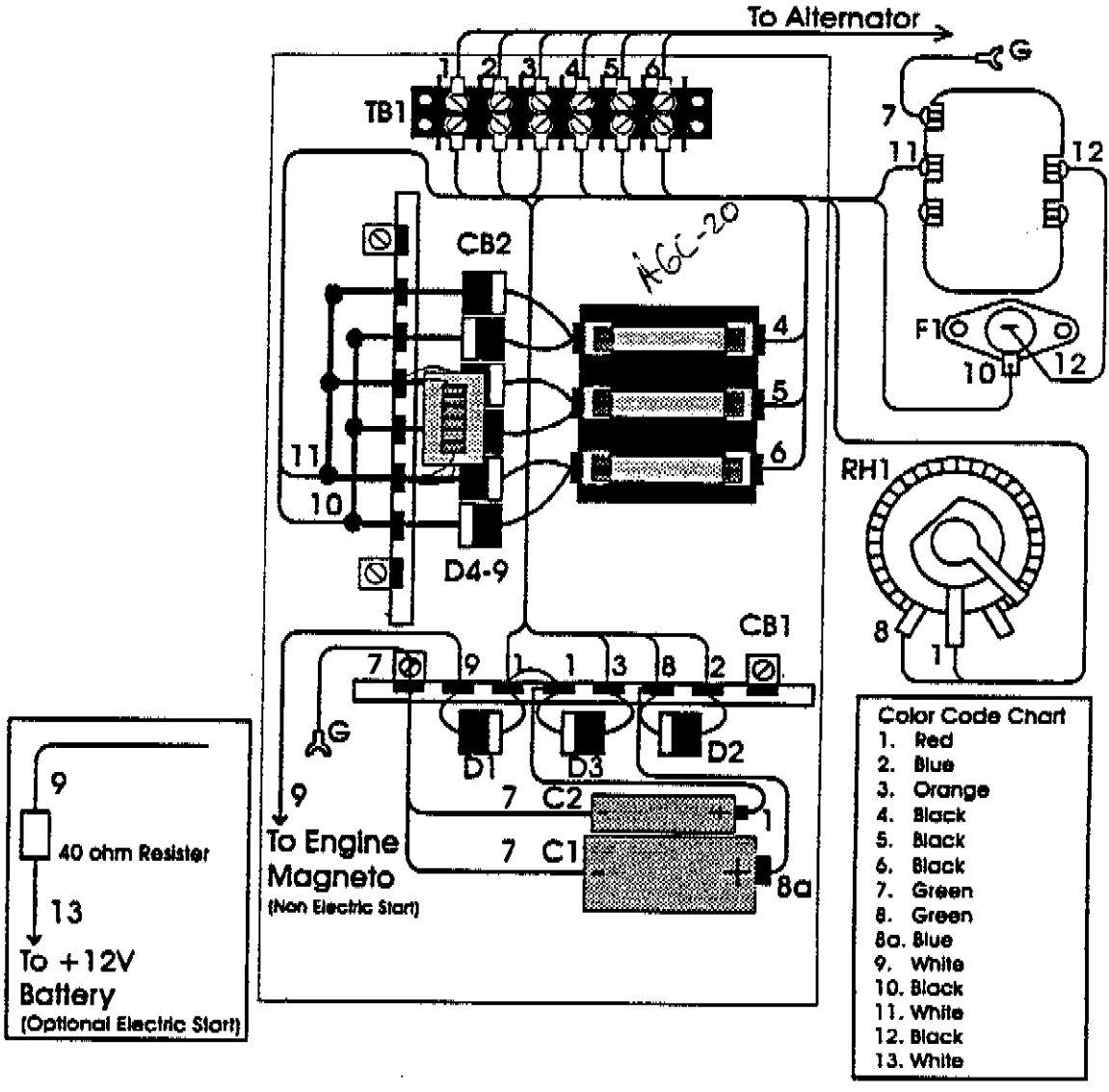
MARQUETTE®

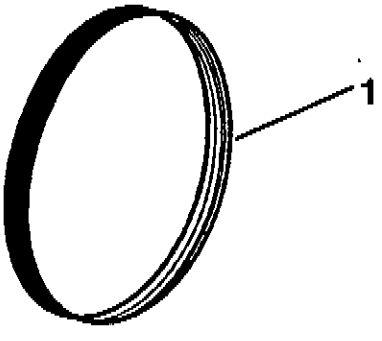
OWNERS MANUAL

ARC WELDER, 160 AMP DC
MODEL M10135

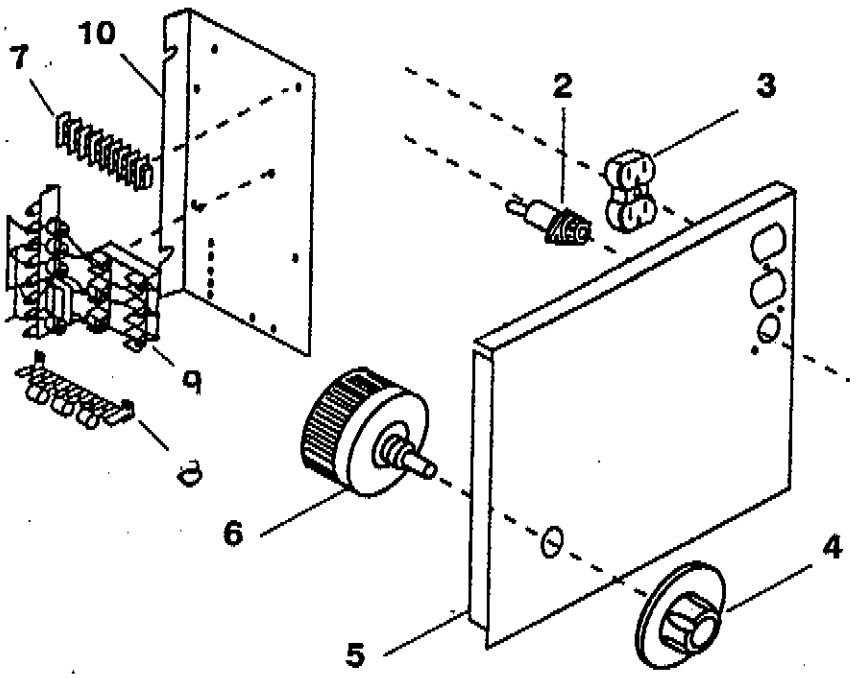




ELECTRICAL SCHEMATIC

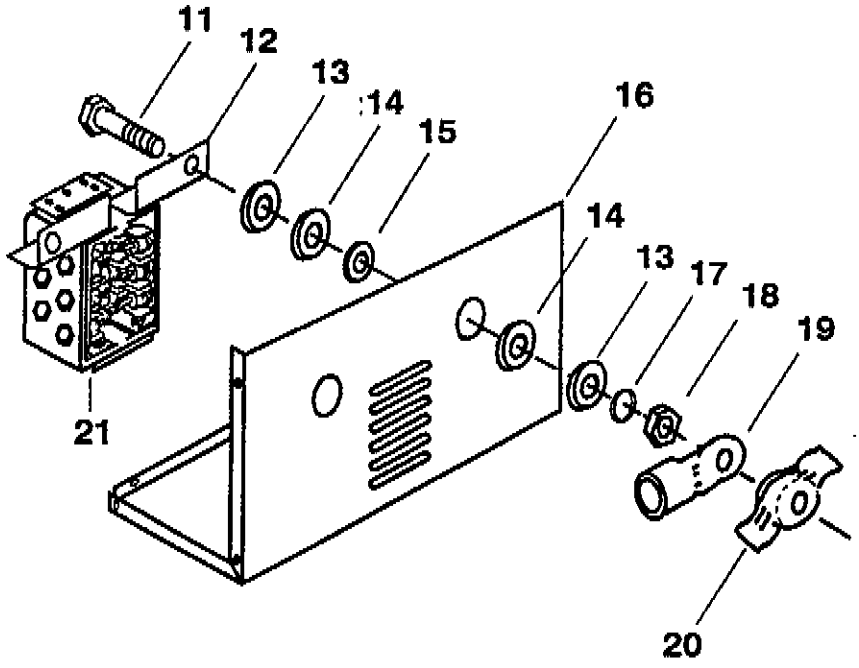


Ref.	Description	Part No.
1	Belt 6F288	247010



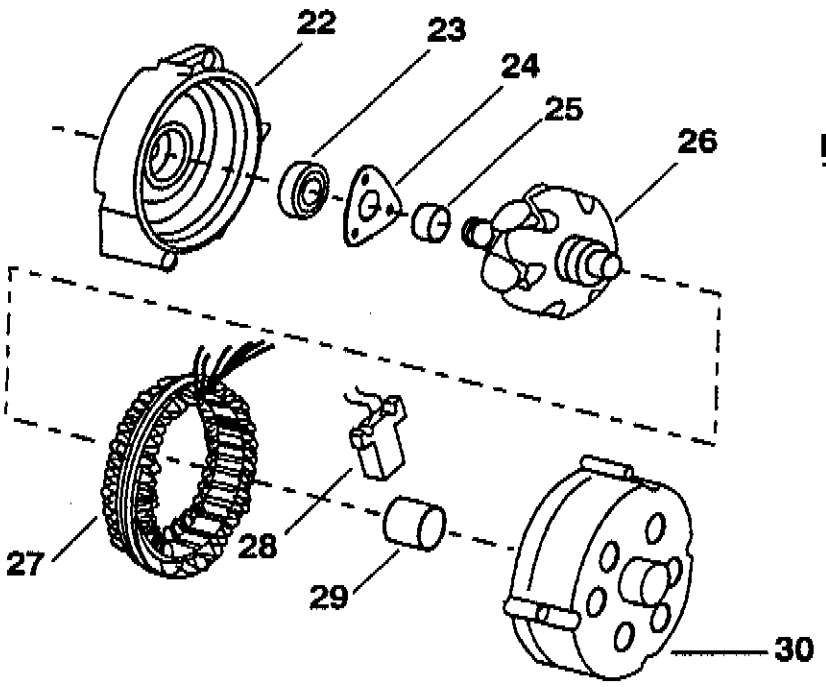
Ref.	Description
2	Fuse Holder
3	Duplex Receptacle
4	Rheostat Knob
5	Faceplate
6	Rheostat
7	Terminal Block
8	Circuit Board Assembly
9	Accessory Circuit Board
10	Control Circt. Brd. Assy.

CONTROL PANEL KIT
MARQUETTE Part #247016
NAPA Part #247015



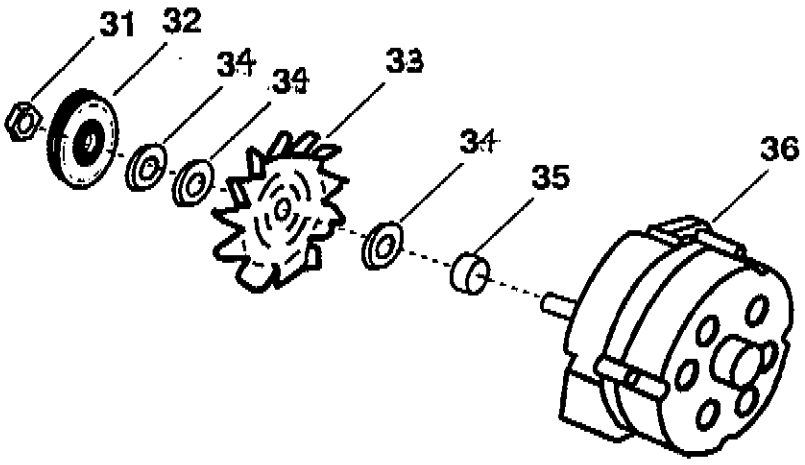
Ref.	Description
11	Weld Bolt
12	Heat Sink Term Right (pos)
	Heat Sink Term Left (neg)
13	Flat Washer (2)
14	Insulating Washer (2)
15	Insulating Washer
16	Panel
17	Lockwasher
18	Nut (2)
19	Cable Lug
20	Wing Nut
21	Heat Sink Assembly
	Diode, Positive
	Diode, Negative
	Fuse Wire Lead Assy.
	Insulator Top
	Insulator bottom

HEAT SINK PANEL KIT
Part #247011



Ref.	Description
22	Alternator Housing Drive End
23	Bearing
24	Bearing Retainer
25	Spacer
26	Rotor
27	Winding
28	Brush Kit Assembly
29	Bearing
30	Alternator Housing Slip Ring End

ALTERNATOR KIT
Part #247012



Ref.	Description
31	Shaft Nut
32	Pulley
33	Fan
34	Washer
35	Spacer (3)
36	Alternator

ALTERNATOR ASSEMBLY KIT
Part #247009

Congratulations, you have selected an ARC WELDER that has been engineered for quality and reliability. Proper maintenance and use of this unit will assure years of productive welding for the professional and home hobbyist. Please take a few moments and review the safety precautions and other sections of this manual to familiarize yourself with your unique ARC WELDER.

ARC WELDING SAFETY PRECAUTIONS

INTRODUCTION

As with any machinery, safe practices must be observed when operating an arc welder. The failure to observe prudent safety practices can result in serious injury, blindness, or death.

The following safety precautions are to be used as a guideline only. Additional and more complete safety information may be obtained from other sources including:

1). **ANS1249 Safety in Welding and Cutting**, published by American Welding Society, 2501 N.W. 7th St., Miami, Florida 33125.

2). **29CFR 1910 OSHA, Safety and Health**, standards from the U.S. Government Printing Office, Washington, D.C. 20402.

3). **CSA-W117 A Code for Safety in Welding & Cutting**, published by Canadian Standard Association, 178 Rexdale Blvd., Rexdale, Ontario, Canada M9W1R3.

4). **Welding Safety Bibliography**, obtainable from National Welding Supply Association, 1900 Arch Street, Philadelphia, PA 19103.

Other sources of safety information can be obtained from the National Electrical Code and local industrial and construction codes.

Arc welding, when properly performed, is a safe process; however, a careless operator invites trouble for himself and those around him.

BURN PROTECTION

A welding arc is intensely bright, causing eye damage to unprotected eyes and can penetrate light clothing resulting in severe "sunburn" like skin burns. To prevent these injuries always wear:...

1). Eye and head protection - NEVER look at a welding arc without wearing eye protection. Insist that any bystander turn away from the arc, wear filtered eye coverage, or leave the area.
Always use a welding helmet or shield containing a filter plate shaded No. 9 or darker. Cover the filter eye coverage with a protective clear plate. Do not use a cracked or damaged helmet and replace cracked, broken, or loose filter plates immediately. Looking at an arc, even for a moment, without adequate protection can result in retinal burn that may result in permanent eye damage.

2). Wear protective clothing including long sleeved, gloves, hats, and sturdy shoes. The addition of leather jackets or sleeve protection, flame-proof aprons and leggings may be required for some jobs. Avoid wearing lightweight untreated cotton outergarment.

TOXIC FUME PROTECTION

Without adequate ventilation, severe discomfort, illness, or death can result from fumes, vapors, heat, or changes in oxygen level that the welding process may produce.

Metals containing or coated with materials that emit toxic fumes should not be heated unless the coating is removed, the area is well ventilated, or the operator is wearing an air respirator. Safety precautions for others in the work area must also be observed.

Extensive precautions must be observed when welding lead, cadmium, zinc, mercury, and beryllium.

Properly ventilate the area when working in confined spaces or wear an air-supplied respirator.

Engine exhaust must be vented to outside air. Carbon monoxide can kill.

FIRE AND EXPLOSION PREVENTION

Flying sparks and falling slag can fly 35 feet, passing through cracks, along pipe, through wall, floor, window, or door openings, causing fire or explosions when safety precautions are not observed.

Move work to an area free of combustibles, if possible. If work cannot be moved, remove or move combustibles within 35 feet of sparks or heat; or protect combustible materials with fire resistant covers or shields.

A fire watcher with fire extinguisher must be standing-by during welding and for some time afterwards if there are combustibles within 35 feet or if walls, ceilings, roofs, or partitions can be ignited by radiant or conducted heat.

After work is completed, check to insure the area is free of sparks, glowing embers, and flames.

NEVER weld where the air may contain flammable dust, gas, or liquid vapors.

SHOCK PREVENTION

Do not stand, sit, lie, lean on, or touch a wet surface when welding without suitable protection. Stay on dry duckboard or a rubber mat when dampness or sweat can not be avoided.

When **GROUNDING EQUIPMENT** do not ground to electrical conduit or to a pipe carrying gas or flammable liquid. Before welding, check ground for continuity. Be sure conductors are touching bare metal.

ELECTRODE HOLDERS with protruding screws should not be used. Only use fully insulated electrode holders.

Join welding cable lengths with fully insulated lock-type connectors.

Inspect **CABLES** frequently for wear, cracks, and damage. Replace immediately excessively worn or damaged insulated cables to avoid possible deadly shock from bare cable. Damaged cables can be taped to give resistance equivalent to original cable. Protect cables from hot slag and flying sparks. Keeping cables dry, free of oil and grease will increase their life-span and insure safe usage.

Read the welder maintenance section of this manual and additional recommended publications for further information on welding machinery PRIOR to using your **ARC WELDER**.

HELPFUL OPERATING HINTS

BELT ADJUSTMENTS

Improper belt adjustment will result in excessive belt wear and a drop in the welding power output. Check the maintenance section of this manual for belt adjustment instructions.

IMPORTANT

Belt life is dependent on proper tension and alignment; when adjusting belt visually check alignment between drive pulley and generator pulley.

ENVIRONMENTAL NOISE POLLUTION

Whenever possible amperage should be adjusted by a combination of knob settings and reduced RPM....thereby lowering fuel consumption, noise levels, and improving engine longevity.

ENGINE LUGS DOWN

If the engine powering the **ARC WELDER** "lugs down", this does NOT indicate a welder problem but an engine problem. The problem is simply that the welder is calling for more power than the engine can supply and the RPM's drop. If a lugging condition occurs, more output can be obtained by turning the current adjustment knob down to a lower setting so the engine RPM's do not drop.

NOTE

A drop in output and engine lug can occur from an untuned or worn engine, high altitude or extremely hot days that cause a reduction in engine efficiency. (There is a 1 percent drop for each 10 degrees F above 60 degrees F, and a 3 1/2 percent drop for each 1000 feet above sea level. Contact engine manufacturer for further details.)

LOW OPEN CIRCUIT VOLTAGE

The open circuit voltage will be low if the engine is not running full speed (nominally 3600 RPM). Measure the open circuit voltage at the welding receptacles with the engine running full speed, not welding, no accessory power being used, and the current adjustment knob setting at full amperage.

GENERAL INFORMATION

***Unlike* any other welder on the market, your Arc Welder is a truly lightweight, dependable, and versatile tool. Your Arc Welder can do almost any welding job including stainless steel, aluminum, hard surface, sheet metal, and carbon brazing. Even the largest welding jobs can be accomplished with your Arc Welder by using multiple pass techniques.**

DIRECT CURRENT

This **ARC WELDER** is a **DIRECT CURRENT** machine. Some advantages of a DC unit over an AC machine are.....

- Choice of polarity. With an AC machine the polarity switches twice per cycle, or 120 times for a 60 cycle welder, thus the maximum benefit of the amperage choice is not available.
- Less current is needed with a DC unit to do the same job.
- Much less splatter (or loss of weld metal) because of the continuous current flow.
- Wider selection of rod usage. The "exotic" rods, such as aluminum, stainless, nickel, and hard surface rods, specify polarity and can't be used on AC units.
- Easier to strike or start a weld. A DC unit is smoother since it has a continuous current flow.

HIGH DUTY CYCLE

The **ARC WELDER** can be used continuously without damaging the unit from excessive heat build-up. (Some small plug-in welders are rated at 20 percent, or two minutes in ten usage. Also, some large engine driven machines are rated at only 40 to 60 percent duty cycle.) All **ARC WELDERS** are rated at 100% duty cycle, unless otherwise specified by the manufacturer of the engine powering the unit.

PARALLEL HOOK-UP

This **ARC WELDER** can be hooked together with a similiar machine in parallel, which increases the amperage to the total amount dialed on the machines. As an example: Two 200 amp units hooked in parallel will total up to 400 amps output. Any number of welding machines may be hooked in parallel, making the machine an excellent tool for a some construction situations where light weight and maximum output are vital.

WELDING CABLES

CHOICE OF STRAIGHT OR REVERSED POLARITY

With this **ARC WELDER** there is a choice of **STRAIGHT OR REVERSED** polarity which affects the weld characteristics, penetration and base heat of the metal being welded.

With straight polarity the electrode holder is connected to **NEGATIVE** and the ground is connected to **POSITIVE**. In reverse polarity the electrode holder is connected to **POSITIVE** and the ground to the **NEGATIVE.**

STRAIGHT POLARITY results in SHALLOW penetration

REVERSED POLARITY causes DEEPER penetration

Two brass welding lugs are provided with each machine. To prepare for use, strip the insulation from the welding cable approximately 1/2 inch from the end. Insert the cable into the lug and crimp the lug firmly.

ENGINE

The engine providing power for the **ARC WELDER** has been approved for this application by the manufacturer and is warranted by the engine manufacturer. Engine operating instructions, servicing information, and warranty is included with each unit.

OUTPUT CONTROL

The **ARC WELDER** provides infinite current control through the faceplates continuous dial knob. At maximum RPM's the nominal output will be that which is shown on the dial. Another means of current control is to reduce engine RPM's. This will result in reduced fuel consumption, less engine noise, and reduced wear and tear. **WHENEVER POSSIBLE, TO REDUCE CURRENT, TURN KNOB UP AND ENGINE RPM'S DOWN.**

TYPE OF WELDING RODS:

A.W.S. 6011—GENERAL PURPOSE Rod is used by maintenance and for farm or ranch purposes. Has deep penetration and is good for all positions including vertical and overhead. The light slag makes it harder to clean up. Splatter is heavy. Will weld dirty and rusty metals.

A.W.S. 6013—GENERAL PURPOSE Similar to 6011 with a medium penetration.

A.W.S 7014—GENERAL PURPOSE This rod strikes easily, has heavy slag and iron powder in flux. This heavy slag causes the inexperienced welder to confuse the slag with the weld. Low to medium penetration. The metal to be welded should be clean.

A.W.S. 7018—LOW HYDROGEN High strength weld and heavy slag. Slag chips away easily to produce a smooth bead. Has medium penetration. Works very well with the ARC WELDER. For use with high strength carbon steel.

TIG WELDING

Tungsten Inert Gas (TIG) Welding can be accomplished by utilizing the **ARC WELDER** as a power source. There are numerous TIG torches on the market that are perfect tools for welding stainless;

ROD SIZES AND AMPERAGE SETTINGS

TYPE	3/32"	1/8"	5/32"
		MILD STEEL	
6010	40-80 A	70-130 A	110-165 A
6011	50-70 A	85-125 A	130-160 A
6012	50-90 A	75-130 A	120-200 A
6013	40-85 A	70-120 A	130-160 A
7014	80-90 A	120-145 A	140-210 A
		LOW HYDROGEN/MILD STEEL	
7016		80-130 A	120-170 A
7018	80-110 A	90-150 A	110-230 A

carbon, and low alloy steel.

The ability to weld very thin sheets of metal is an important characteristic of TIG welding. To obtain low current for welding extremely thin sheets, a combination of RPM, dial control, and, in some cases, an external resistor can be used.

TIG welding is an excellent "on the spot" tool for dairies, stainless steel kitchen equipment installers, and maintenance shops.

ALUMINUM WELDING

Since the Arc Welder is a direct current arc welder, aluminum can be welded by using the shielded metal-arc (stick electrode) process.

Consult a welding supply dealer or rod manufacturer for metal preparation, rod type and cleaning process before using this method.

CARBON ARC BRAZING

Straight polarity is mandatory for carbon-arc brazing. By using carbon arc electrode and silicone-bronze rod, the Arc Welder is a perfect tool for sheet-metal duct work; very little of the galvanizing is disturbed and the weld is satisfactory with little distortion. Carbon-arc welding with silicone-bronze rod can also be used with untouched sheet steel.

HARD SURFACING

The Arc Welder is excellent for the application of hard surfacing electrodes to metals thereby increasing wear resistance and longevity of products subject to sever abrasion. Consult an electrode supplier for specific data on this process.

Repair and Maintenance

A quick check of a few items may save the welder operator both down time and repair expense. Four common and easily corrected problems are:

1. Loose belts.
2. Loose or broken exciter wire.
3. Loose connections or broken wires. (A visual check can sometimes spot this problem.)
4. An engine problem, see engine manufacturer's service manual included with the welder.

PART 1
BELT AND PULLEY

Your Arc Welder is driven by a long life industrial drive belt and pulley system. Improper belt adjustment or pulley alignment will reduce the life of the belt and alter the performance of the welder.
Correct belt alignment and proper tension is crucial to belt life. Make sure belt is aligned. The belt should be checked for tightness after a few hours of operation of a new machine.

Common Belt Problems	
Belt burns, melts or has small cracks on the inside. Belt makes "squealing" noise.	Belt too loose.
Belt breaks with clean break.	Belt too tight.
Belt breaks along one edge or jumps out of groove.	Belt not in alignment or too tight. Burr on pulley.

BELT

When the welder will not perform, CHECK first for a BROKEN belt. If the belt has broken, replace with a belt provided by a Service Center or with an exact duplicate replacement belt. The wrong sized belt will greatly affect the performance or damage the machine.

If the belt or alternator pulley is slipping, the arc will start strong and die away as the alternator slows down. This is noticeable at high amp settings. The belt may or may not make a squealing or screeching noise when it slips. The belt should be tight and have very little "give" when checked by hand after removing the belt screen. (*See Fig. 1*)

CAUTION - Replace the top cover and lift eye assembly before starting engine.

NOTE: The belt will burn (melt) and be ruined if allowed to slip for any length of time.

BELT ADJUSTMENT

To adjust the belt *(Figure 1)*:

1. Remove the Right Shroud
2. Remove Top Cover *(Fig 1, Ref 1)*
3. Loosen the Alternator Lock Bolt *(Fig 1, Ref 2)*
4. Tighten (or loosen) the Belt with adjustment bolt *(Fig 1, Ref 3)*
5. Check the belt tension by flexing the belt. It should be tight with very little give when flexed with the hand.
6. Tighten the Alternator Lock Bolt.

CAUTION - Replace the top cover before starting engine.

PULLEY ALIGNMENT & BELT TENSION

If belt break or jumps out of the grooves after a short period of time, or does not last when replaced there is something wrong with either the alignment or the tension of the belt. Replacing the belt without correcting the situation will not correct the problem.

PULLEY ALIGNMENT

Check the pulley alignment to make sure the alternator and engine pulleys are parallel and straight.

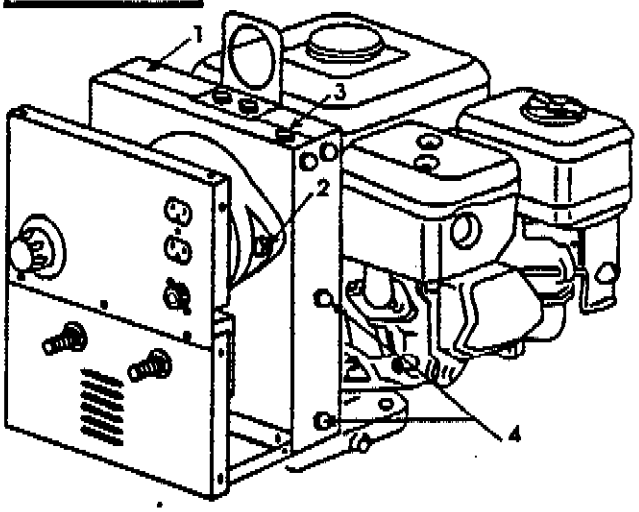
1. Visually "Sight" down from the top and sides at the pulleys and belt.

2. Loosen the welder unit mounting bolts (4) *(Fig 1, Ref 4)* and "rock" the unit forward or back to achieve perfect alignment. Tighten the mounting bolts with belts aligned.

3. Check the Belt Tension and adjust if necessary.

NOTE: If the above procedure will not align the belts properly the pulley position must be changed. This should not be necessary unless the engine shaft spacers have been changed.

Figure 1



PULLEY REMOVAL

To remove the alternator pulley:

1. Remove the alternator shaft nut.

2. Apply even pressure to the pulley with a screwdriver or wheel puller.

3. Heat the pulley (not the shaft) with a propane torch to loosen the Locktite.

4. Remove the pulley, fan and spacers.

To remove the engine pulley:

1. Remove the bolt located at the end of the engine shaft. Remove the washers and spacers. IMPORTANT: Take note when removing these items so they can be replaced in the same order. *See Parts Breakdown.*

2. Remove the pulley and key.

NOTE: A Wheel Puller may be necessary. Take Care to not bend the pulley. Cleaning the shaft and/or heating the pulley may help.

PART II
DETERMINING THE CAUSE OF WELDER FAILURE

EXCITATION CHECK

If the unit is completely dead, suspect excitation problems, especially if the unit has been sitting for a long time. Check the exciter wire connection at the engine to insure the exciter wire is not loose, broken or shorted to the frame. The welder should be running full speed with the knob setting at maximum amperage.

If the welder fails to excite immediately, especially at low amp setting, this could be an indication of brushes that are dirty or oily or brushes that bounce. The brushes and slip rings can be cleaned with a very fine sandpaper or emery cloth.

If excitation problems are suspected, the welder can be force excited by:

1. Disconnect the exciter wire from the engine.

VERY IMPORTANT: VOLTAGE ON THE ENGINE MAGNETO CAN CAUSE DAMAGE TO THE ENGINE.

2. Put + 12 volts on the exciter wire from a standard 12 volt battery and connect the negative to ground. The welder should be running at full speed.

NOTE: Some models may require -12 volts with positive ground. Connecting the wrong polarity will <u>not</u> harm the welder.

3. The welder should work normally when the + 12 volt is removed.

NOTE: With 12 volts on the exciter wire, the welder will not turn down to low amp settings. If the 12 volts is required to make the welder work, there is some problem with the welder control circuit.

ENGINE

The engine must be running at full speed for proper operation of the welder.

If the engine powering a welder "lugs down" an engine problem is indicated, NOT a welder problem. The welder is calling for more power than the engine can supply and the RPM's drop. If a lugging condition occurs, more output can be obtained by turning the current adjustment knob down to a lower setting so the engine RPM's do not drop.

NOTE : A drop in output and engine lug can occur because of an out of tune or worn engine, high altitude or extremely hot weather causing a reduction in engine power. (There is a 3.5% drop in engine power for each 1000 feet above sea level and a 1% drop in engine power for each 10 degrees F above 77 degrees F. Contact engine manufacturer for further details).

LOW OPEN CIRCUIT VOLTAGE

The open circuit voltage (ocv) will be low if the engine is not running full speed (3600 RPM). Measure the open circuit voltage at the welding receptacles with the engine running full speed, not welding, with no accessory power being used, and the current adjustment knob setting at maximum amps.

The welder Open Circuit Voltage (OVC) should be approximately 70 VDC. The voltage can lower somewhat when the amp setting is turned down.

The Alternator on a Welder has three separate circuits:

1. Control Circuit *(Fig 2)*
2. Accessory Circuit *(Fig 3)*
3. Welder Circuit *(Fig 4)*

Each of these circuits have their own individual winding and are not connected electrically to each other. All the fuses (front panel & on control board) have to do with 120v DC accessory circuit only. The fuses have nothing to do with the welder circuit operation.

CHECK TO DETERMINE FAILING CIRCUIT

By using the following procedure and examples before removing the shroud, the failing circuit (i.e. welder, accessory, or control) can normally be determined.

If the welder is putting out anything at all, measure the DC open circuit voltage of both the welder and accessory. Welder should be approximately 70v DC and the accessory should be about 120v DC. Measure with knob set at maximum. Make sure problem is not low engine power, low engine RPM's or exciter problem.
If the welder works but the accessory does not check the fuses (4 total) and check for broken wires or bad solder connection around the fuseblock and 6 diode bridge connected to it. Also check the panel fuse holder and wiring to the 120v DC accessory receptacle *(Fig 3)*.

If the 120v DC accessory works but the welder does not, Check the welding leads for bad connections. Check weld terminals for loose connections. Check heat sink area for burned or broken wires. Check the main diodes and wiring from the heat sink to the alternator *(Fig 4)*.

If the problem occurs in both the 120v DC accessory and the welder, the problem is most likely in the control circuit. This includes the alternator, alternator brushes and the resistors on the back of the alternator (if any). The Control Circuit also includes the wiring to the control board, the rheostat and wiring to the rheostat, the two capacitors, and 3 diode board on the control panel *(Fig 2)*.

PART III
CONTROL CIRCUIT TEST & REPAIR

COMPONENT ISOLATION

Disconnect the six wires (wires 1-6) red, blue, orange and three black [or white] from the terminal board at the top of the control plate.

NOTE: Refer to TB-1 on page 18 *(Part VI: Parts Manual)*. These are the 6 small wires from the alternator to the control plate.

Disconnect the exciter wire by undoing the wire nut near where the wire leaves the welder unit.

Disconnect the red and green rheostat wires at the wire nuts.

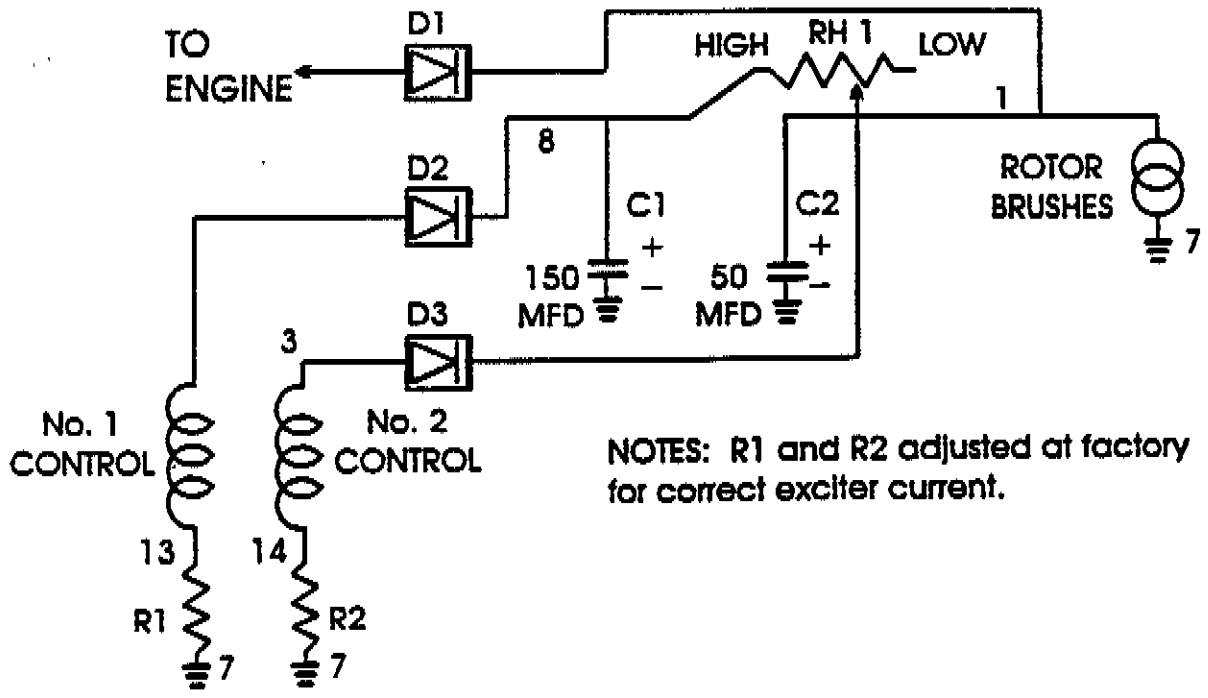
Disconnect the green and yellow (both wires are green on some models) wires coming out of the alternator and grounded on the back of the alternator. These wires may have resistors connected to them.

ROTOR AND BRUSHES

Check the rotor resistance with an ohmmeter (Rx1 scale). This is the red wire that was disconnected in the component isolation section and ground (the alternator housing). This reading should be between 4 and 20 ohms.

Start the engine. Take the resistance reading again with the engine RPM's from idle to full speed. The reading should be the same, approximately 4 ohms at low and high speed. If the resistance goes to 10 ohms or higher as RPM increases, the brushes are bouncing and the welder may be hard to excite. If the resistance goes above 20 ohms the welder probably will not

Figure 2
CONTROL CIRCUIT SCHEMATIC



work at all. If the reading is bad, the problem is inside the alternator in the brush area, and must be repaired. If the reading is good, resume testing. To repair a problem inside the brush area, the alternator must be taken apart to expose the brushes and rotor. Check the brushes for worn areas, broken wires or dirty brush pads. Clean the slip rings with fine sand paper. With the ohmmeter check the rotor for a reading of 4 ohms. If this reading is not in the 4 ohm range (+ or - 1 ohm) then the rotor may need to be replaced. Make sure there is no short to ground from either slip ring.

After repairing, put the alternator back together and resume testing. The brushes must be held in place with a steel wire that goes under the brushes and out the back of the alternator. (A straightened paperclip will work fine.) Pull this wire from the back after the alternator is reassembled.

CONTROL WINDINGS

The only thing that normally happens to a winding is for one of the wires to break inside the winding, or short to ground. Check with Rx1 scale to make sure there is a short, about 1/2 ohms (not including the resistor if any) between the blue wire from the alternator and the ungrounded green wire. Also there should be a short from the orange wire and yellow ungrounded wire (this wire can be green on some models). There should be an open circuit, between the orange or blue wire and ground, accessory windings and welder windings. If all readings check out, then the control windings are good. If any of these readings are bad then the winding could have to be replaced.

NOTE: The winding must be isolated from the ground or an incorrect reading will result. See component isolation steps. If the windings are open, check any resistors, if present, on back of the alternator. Also make sure they are not shorted to the housing.

CONTROL CIRCUIT BOARD COMPONENT TEST

NOTE: Alternator, exciter wire and rheostat must be disconnected, see component isolation. Reference Circuit Board Assembly Wiring Diagram (*page 18*)

1. Diode 1: Reading one way but not the other between the exciter wire and the red wire going to the rheostat.

2. Diode 2: Reading one way, but not the other between the terminal block position 2 (where the blue wire was connected) and the red wire going to the rheostat.

3. Diode 3: Reading one way but not the other between the terminal block position 1 (where the red wire was connected) and terminal block position 3 (where the orange wire is connected).

4. Capacitor 1: With the ohmmeter on the Rx10 scale, put one lead on ground (alternator housing, unpainted frame part, or terminal board ground wire). Touch the other lead to the red control plate wire that was connected to the rheostat. The meter needle should "flick" up and then return to open circuit, no reading position. Reverse the leads and the needle should "flick" again.

5. Capacitor 2: Repeat 4 above with the ground and green control plate wire that was connected to the rheostat.

CAPACITOR NOTE: The capacitor, when it fails, usually fails from heat buildup. The welder will work normally when cold but the

arc will "fade out" after the welder reaches normal temperature (10 or 15 minutes). If a capacitor problem is suspected, a problem is hard to identify, or the machine doesn't work when hot, replace the capacitors (C1 and C2).

6. Rheostat: Connect ohmmeter (Rx1 scale) to red and green rheostat wires. Turn the rheostat. The meter should go from 0 ohms (max current setting) to 8 or 12 ohms (min current setting).

PART IV
ACCESSORY CIRCUIT TEST & REPAIR

COMPONENT ISOLATION

Remove the 3 fuses on the accessory circuit board.

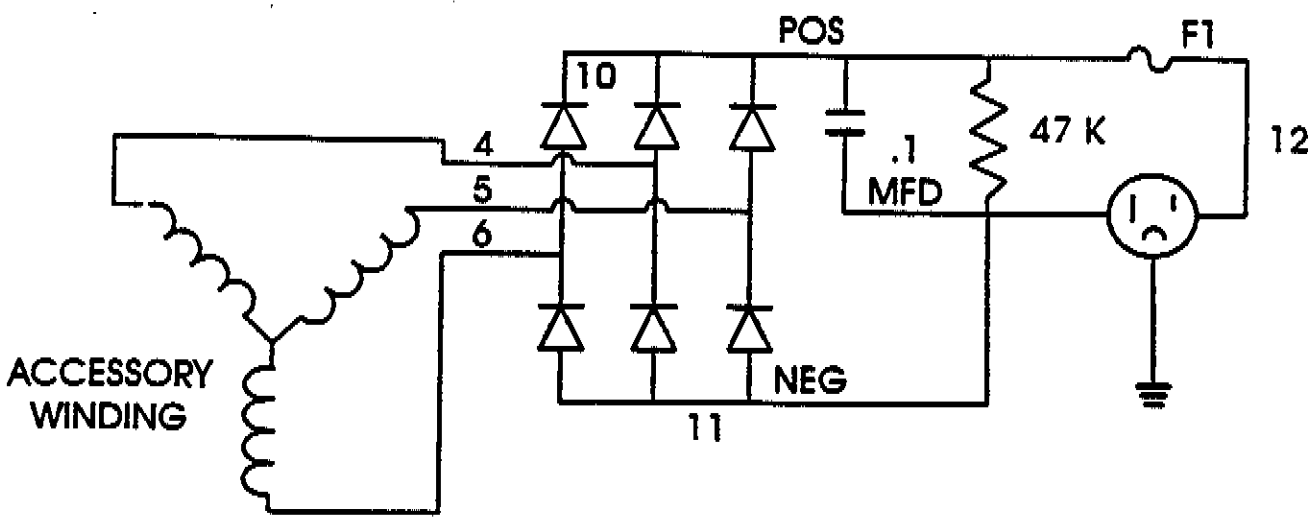
DIODE CHECK

Check with one lead on the fuseholder side of the accessory circuit board and the other lead on the black wire that is connected to the receptacle. The ohmmeter should register a reading one way and have a reading of infinite ohms with the leads reversed. Do the same test to the white wire connected on the receptacle. These readings should be opposite to the ones found with the black wire. The accessory circuit board is available as a replacement assembly.

WINDING CHECK

Check for a short between the black wires (white wires) removed from the terminal block position 4, 5, 6. These wires should not read to ground, control, or welder windings.

Figure 3
ACCESSORY CIRCUIT SCHEMATIC



PART V
WELDER CIRCUIT TEST & REPAIR

If the 120 Volt accessory works properly the problem could be in the welder circuit.

WELDER CIRCUIT INSPECTION

Make sure the problem is not with the welder cables or a bad ground connection where your are welding.

Since the welder current is high, a short or loose connection will usually show up as an arc and as burned wires, black marks and/or burned metal or insulation. Inspect around the heat sink and output terminals for these indications and repair as required.

Inspect the wire nuts that connect the heat sink to the alternator for a good connection.

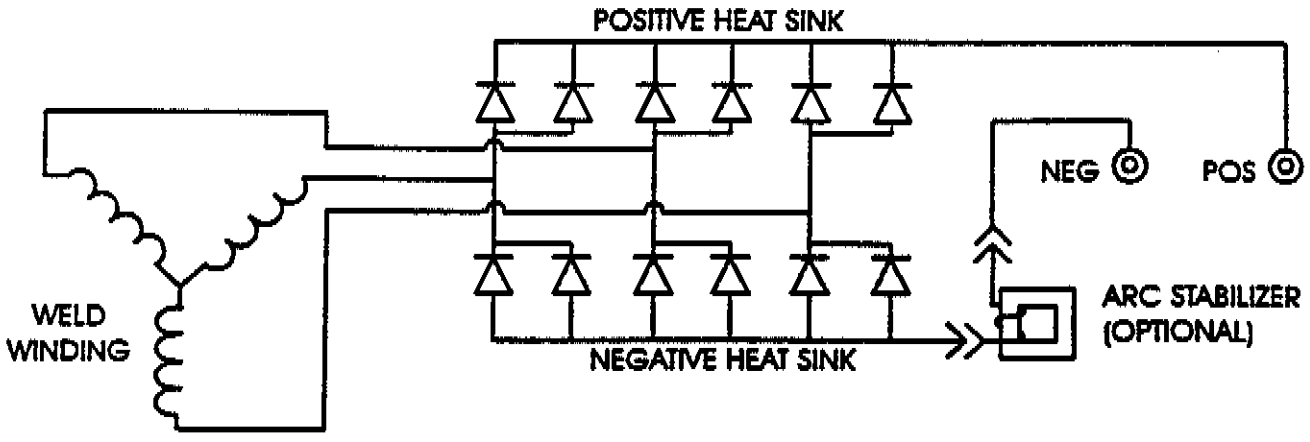
Each diode is connected with fuse wire which will burn in two if the diode shorts. Visually inspect the Heat Sink diode connections for burned wires or solder melted indicating that the diode has been hot.

Make sure weld terminals and all other heat sink hardware is tight.

WELDER CIRCUIT COMPONENT ISOLATION

Because of "back circuits" through the main winding checking one diode at a time is not possible. There is no need to remove the solder or disconnect the diodes to check them. Unscrew the wire nuts that connect the Heat Sink to the Alternator (On some models the wires are connected to insulated terminals on the Control Board). Separate the wires so that none of the ends touch.

Figure 4
WELDER SCHEMATIC



MAIN DIODE CHECK

A shorted diode, which is the most common way diodes fail, will cause all the welder current to go into one phase of the winding and damage the fuse wire. The burned wire will indicate the bad diode.

Caution: If a fuse wire is burned, be sure to change the bad diode or the fuse wire will burn again.

Take ohmmeter readings from the disconnected Heat Sink input wires one wire at a time to the positive weld terminal to check the Positive diodes and the negative weld terminal to check the negative diodes. Reverse the leads and recheck to the positive and negative terminals. There should be a reading in one direction and no reading with the ohmmeter leads reversed.

If there is no reading in either direction, BOTH of the diodes at the end of the wire you are checking are open and must be replaced. Make sure the wire is not broken, unsoldered, or corroded.

If there is a reading in both directions at least ONE of the diodes is bad or a wire is shorted. Undo the wires and unsolder the diodes until the fault is found.

NOTE: Since the diodes are paralleled through the fuse wire, you cannot be absolutely sure that one diode is not open because the reading checks both at the same time. Open diode are rare and the welder will work fine if one diode is open but the other one is good. Also if one diode opens the other one will take the full current and it may short, which would show up with the ohmmeter check as an open circuit (one open diode and open fuse wire). The chances of damaging the diode when checking it makes it better to assume <u>both</u> diodes are good if the readings are good.

MAIN DIODE CHANGE

There are two extra fuse wires at the end of the alternator to Heat Sink Wires. Connect the diode with one of these wires. If these wires are damaged, the Heat Sink Wire with Fuse Wire Assembly will have to be replaced.

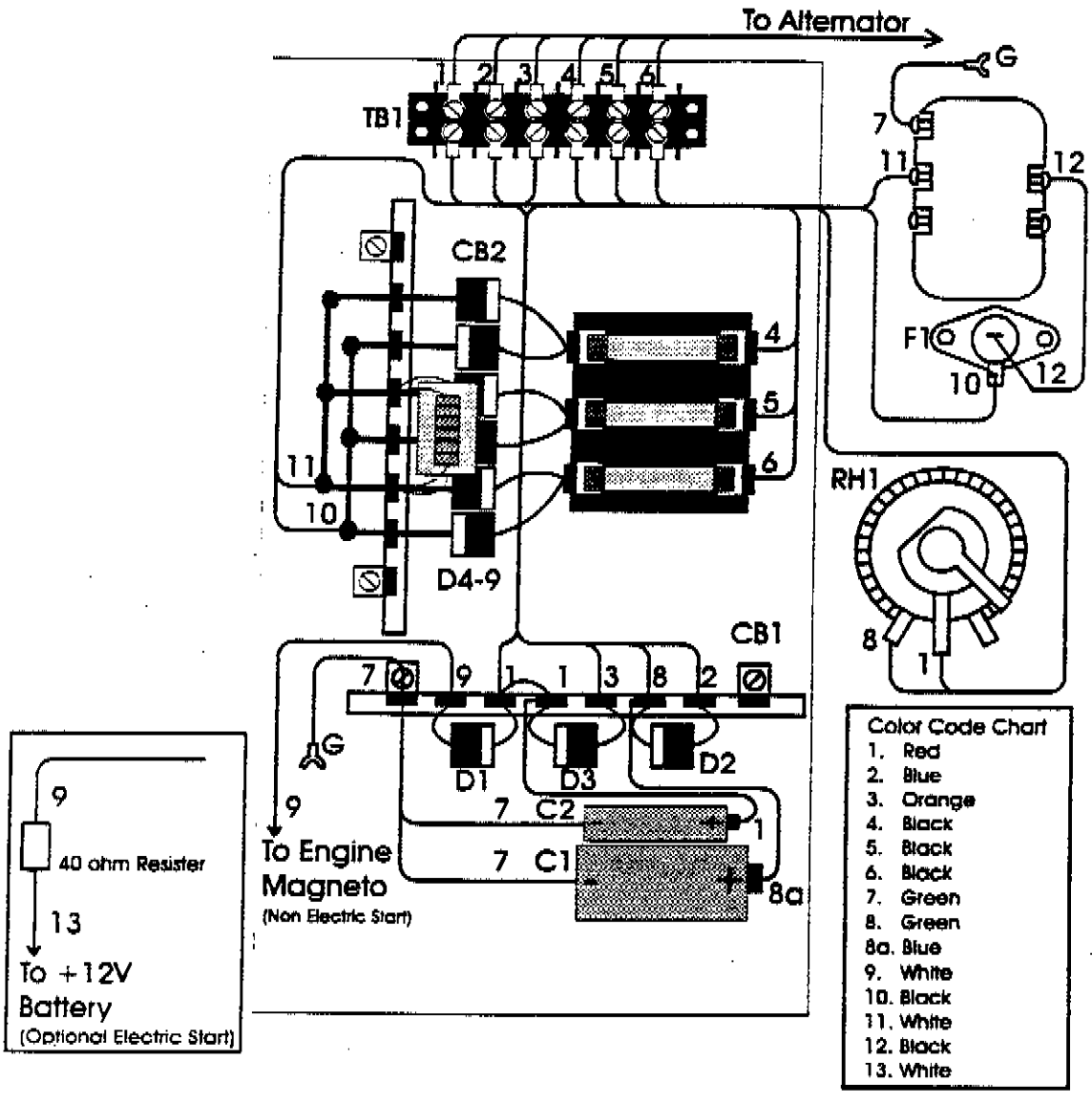
1. Remove the fuse wire by melting the solder and unwrapping it with needle-nose pliers.

2. Remove the faulty diode.

3. Put in the new diode, being careful not to damage it. Carefully solder the diode to a spare fusewire. Check with ohmmeter after completing to make sure the problem is solved. Make sure no wires touch a diode, another wire, or the Heat Sink.

MAIN WINDING CHECK

Check the wire ends going into the alternator with an ohmmeter and make sure they are <u>shorted</u> to each other and there is no reading from any of the wires to the Alternator Housing, the Accessory Winding or either Control Winding. A faulty reading would indicate a short inside the alternator or a defective winding (stator).



Ref.	Description
	Circuit Board Assembly
TB-1	Terminal Board
CB2	Accessory Circuit Board Fuseholder Three Fuse Capacitor .01 Resistor 47K Diode (6) Terminal Strip

Description	
CB1	Control Circuit Board Terminal Strip Diode (3)
C1	Capacitor
C2	Capacitor
	Fuse