WINPOWER CORPORATION

Arc Welder

175 AMP D. C.

PART I BELT AND PULLEY

Preliminary Check

1. Check for broken belt.
2. Check for slipping belt or slipping pulley.

If the belt or alternator pulley is slipping, the arc will start strong and die away as the alternator slows down. It will be noticeable at high amp settings. The belt should be tight and have very little "give" when checked by hand after removing the belt screen. (Fig. 1-1)

Caution - Replace screen before starting the welder engine.

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

Pulley Alignment and Belt Tension

If belt breaks, turns over 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. It will do no good to replace the belt without correcting the problem.

SYMPTOMS	PROBABLE CAUSE
Belt burns, melts or has small cracks on inside.	Belt too loose.
Belt breaks with clean break.	Belt too tight.
Belt breaks along one edge, jumps out of groove or turns over in groove.	Belt not in alignment or too tight. Burr on Pulley

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.

Belt Adjustment

Remove belt screen (Fig. 1-1). CAUTION: Replace screen before starting the welder engine. Loosen the nut located between the belt and the belt tension hole (Fig. 1-2). Insert a screwdriver through the belt tension hole and pry up on the spacer behind the nut previously loosened. While maintaining tension tighten the nut loosened above.

Check the pulley alignment, making sure the top and bottom pulleys are parallel and straight. Check the belt tension. The belt should be tight so that there is very little give when flexed by hand.

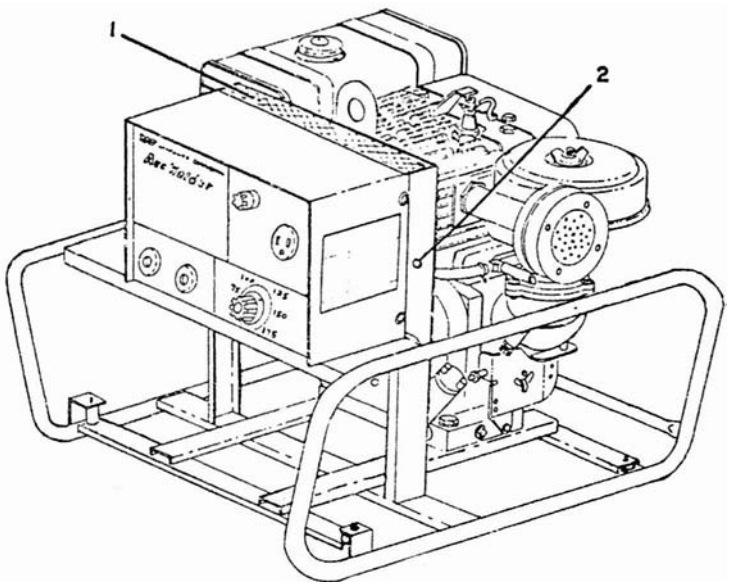


FIG. 1

Pulley Removal

To remove the alternator pulley, remove the nut and lockwasher, apply even pressure to the pulley with a screwdriver and heat with a propane torch until the Loctite loosens and the pulley will slip off.
Note: **Trying to remove the pulley without heat** will damage it. Both alternator and engine pulley must have Loctite to keep them from slipping. Use high strength Loctite, Cat. No. 271-41. Use instructions supplied with the Loctite.

To remove the engine pulley, clean the shaft of dirt and rust in front of the pulley, apply pressure to the pulley with a wheel puller and apply heat to the pulley until the Loctite loosens and the pulley will slip off. Note: Trying to remove with a wheel puller without heat will bend the pulley.

PART II DETERMINE THE FAILING UNIT

Engine Lugs Down

If the engine powering a Winpower welder "lugs down" this indicates an engine problem, not a welder 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 because of an uncuned or worn engine, high altitude or extremely hot days that cause a reduction in engine power. (There is a 1% drop for each 10 degrees F above 60 degrees F and a 3½% 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 (3600 RPM's).

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 175 amps.

Three Circuits

The alternator on the Winpower welder has three separate circuits.

1. Control Circuit
2. Welder Circuit
3. Accessory Circuit

All three of these circuits have their own individual winding and are not connected electrically to each other.

Exciter Check

If the unit is completely dead, suspect excitation problems, especially if the unit has been sitting unused for a long time. Check the exciter wire connection at the engine and 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 175A.

Voltage Check to determine failing circuit

By using the following procedure and examples before removing the shroud, the failing circuit can normally be determined (i.e. welder, accessory, or control). If the welder comes to you removed from the engine and no explanation of the problem, the checkout procedure in later parts of this book will still find the problem.

If the welder is putting out anything at all, measure the D.C. open circuit voltage of both the welder and accessory. **(Welder should be approximately 70 V.D.C. and the accessory should be about 125 V.D.C.** Measure with knob set at maximum amps.

BEFORE CHECKING VOLTAGE TO DETERMINE FAILING UNIT MAKE SURE PROBLEM IS NOT LOW ENGINE POWER, LOW ENGINE RPM's, OR EXCITER PROBLEM.

Example 1 Unit completely dead, no welder or accessory voltage. Problem is in the control circuit.

Example 2 Low voltage output. The maximum open circuit voltage welder is measured at 45 volts, (should be 70), and maximum open circuit voltage accessory is 74 volts, (should be 125). The problem is in the control circuit.

Example 3 Low current output. Maximum welder open circuit voltage is 73, (o.k.), and maximum accessory open circuit voltage is 122 (o.k.). Again, problem is in the control circuit.

Example 4 No welder output. Welder open circuit voltage zero (should be 70). Accessory open circuit voltage 120 (o.k.). Problem is in the welder circuit.

Example 5 Low welder output. Maximum welder open circuit voltage is 48 (should be 70). Maximum accessory open circuit voltage is 120 (o.k.). Problem is not in the control circuit, but in the welder circuit.

Example 6 No accessory output. Welder open circuit voltage 70 (o.k.). Accessory open circuit voltage zero (should be 125). Problem is in accessory circuit.

Example 7 Low accessory output. Welder open circuit voltage is 74 (o.k.). Accessory open circuit voltage is 80 (should be **125). Problem is not in the control** circuit but is in accessory circuit.

Note - If problem is in the accessory circuit, check the 4 fuses (1 on panel and 3 under the shroud). The fuses affect only the 120V accessory.

PART III CONTROL CIRCUIT MAINTENANCE

General

The control Circuit provides current to the rotor (through the brushes), to provide a rotating electromagnet (rotor) which in combination with the Stator (winding) generates its own control current. The control current is generated in the control winding, rectified to D.C. by the control diodes, adjusted by the rheostat, filtered by the capacitor and used by the rotor.

A failure in the control circuit will affect both the welder and 120 Volt accessory output equally. Since the control circuit has the most components and wires, a majority of failures will be in the control circuit. All of the 4 fuses in the machine have to do with accessory circuit and have nothing to do with the welder output or control.

Control Circuit Component Isolation

Before the testing begins, the components must be isolated so that "back circuits" will not give erroneous readings. This is done by taking the following steps:

1. Take top shroud off the welder unit (P. 7 Ref. 8).
2. Disconnect the rotor, control windings and the capacitor by removing and separating the two diodes, the two white wires, and the bare wire from terminal 4 on the control circuit board (P. 9 Ref. 90).
3. Disconnect the red and green control ground wires from the housing (P. 10, Ref. 107).

Component Testing

The only instrument needed to check out the machine is a Multimeter with an Ohmmeter. (RX1 scale). Do not start the engine while checking the welder.

Exciter Wire

Initial excitation is accomplished by a positive going pulse taken off the engine magneto. This electrical pulse travels along the yellow wire connected below the engine carburetor, through the brushes and returns by way of the ground wire between the frame and the engine. Either wire being broken can be determined by checking between terminal 1 on the control board (Fig. 3) and alternator ground with the ohmmeter. The reading should show a short (about 1/2 ohm) with the wires connected to the engine.

Brushes and Rotor (P. 10, Ref. 109 & 105)

Check with an ohmmeter (Rx1) for a reading of 4 to 20 ohms between the white brush wire disconnected from terminal 4 and ground. If the reading is bad, the problem is inside the alternator in the brush area. After removing the back housing from the alternator, check the rotor for approximately 4 ohms, check the brush area for problems.

NOTE: To service brushes or check rotor, do not remove fans or release belt tension. Remove the four screws holding the back housing and remove the housing. CAUTION: Do not lose the two springs which will come out from behind the brushes. These springs MUST NOT BE LEFT INSIDE THE ALTERNATOR. Insert a pin (paper clip) under the brushes to hold the brushes and springs in place while re-installing the brush block. Let the pin come out the hole in the alternator back.

NOTE: Remove pin after re-assembling.

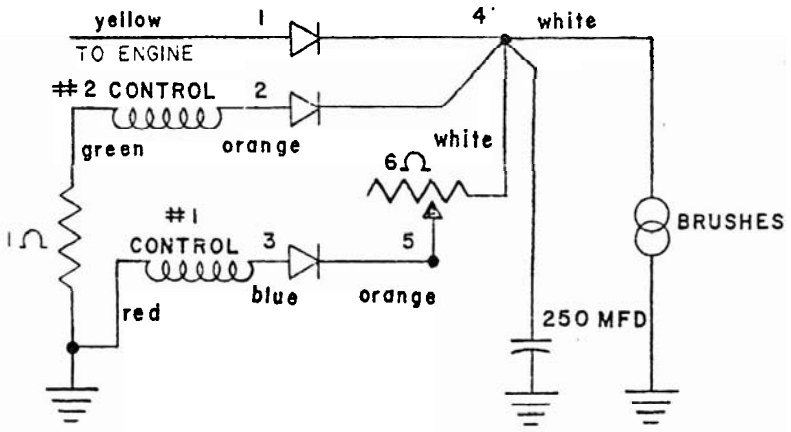


FIG. 2 CONTROL CIRCUIT SCHEMATIC

Control Windings

The only thing that normally happens to a winding is for the wire to break or short to ground. Check with the Ohmmeter (RX1) to make sure there is a short, (about 1/2 ohm) between terminal 2 and 3 (Fig. 3). Check for an open circuit (infinite ohms) between terminal 2 and the alternator housing. If these readings are correct the control windings are good.

NOTE: Winding must be isolated from ground or incorrect reading will result. See instructions above under "CONTROL CIRCUIT COMPONENT ISOLATION."

Capacitor (P. 9, Ref. 89)

Touch the ohmmeter leads (RX1) to ground and the bare capacitor wire which was removed from terminal 4 in step 2 of the control circuit component isolation. When first touched the ohmmeter pointer should flick as the capacitor charges and then returns to a high resistance reading. Reverse the leads and the pointer should 'flick' again.

NOTE: The capacitor can fail while the engine is running due to a breakdown when voltage is applied and still test normal with the ohmmeter. This will cause hard to analyze problems with the welder. IF THE CAPACITOR IS SUSPECTED, TEST IT BY REPLACEMENT. Also intermittent problems can be caused by the faulty capacitor, for instance the machine will work when cold but fade out when hot.

NOTE: If the capacitor is not isolated (see instructions above), incorrect reading will result.

Diodes (Control) (P. 9, Ref. 80)

Check each diode (3) on the control board for high resistance one way and low resistance with the leads reversed.

NOTE: Diodes must be isolated or incorrect readings will result.

Rheostat (P. 9 Ref. 87)

With the ohmmeter leads (RX1) between terminal 4 and 5, (Fig. 3), turn the control knob from maximum to minimum. The ohmmeter reading should vary with the knob setting from 0 to 6 ohms.

If the control circuit checks O.K. or when the problem is found and corrected then reconnect the two diodes, the two white wires, and the bare capacitor wire to terminal 4 of the control diode board, and reconnect the red and green control ground wires to the alternator housing.

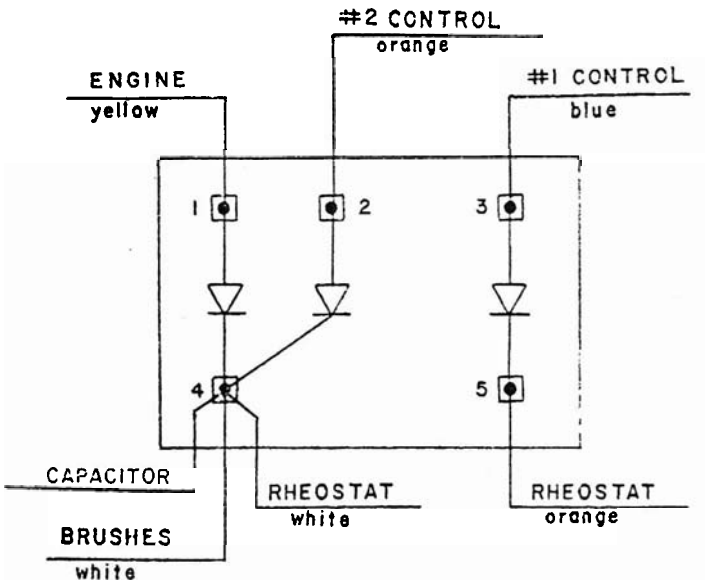


FIG. 3 CONTROL DIODE BOARD

PART IV WELDER CIRCUIT MAINTENANCE

General

The welder circuit provides the D. C. welding current and consists of a 3-phase winding and a full wave, 3-phase rectifier.

Welder Circuit Check (Fig. 4)

1. Check diodes with ohmmeter (Rx1) by touching the wire ends and the corresponding heat sink (P. 9 Ref. 71 & 73). The ohmmeter reading should read high resistance one way and low resistance with leads reversed.

2. Check welder windings at insulating terminals for infinite reading to alternator housing and make sure they are shorted one to another (RX1).

Component Isolation

Note that because of back circuits through the main winding, checking one diode at a time is not possible. **Normally there is no need to unsolder** or disconnect the diodes to check them. A shorted diode, which is the normal way the 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 open again.

If a diode opens (not very likely) the open circuit voltage (should be approximately 70V) will be reduced. The welder output will also be reduced. **The accessory voltage will be normal.** (Approx. 125).

Main Diode Change

1. **Remove the #16** fuse wire by melting the solder and unwrapping it with needle-nose pliers.

2. Screw out the faulty diode with an 11/16 socket.

3. Screw in the new diode, being careful not to damage it. **Replace the #16 fuse wire and** check with an ohmmeter after completing.

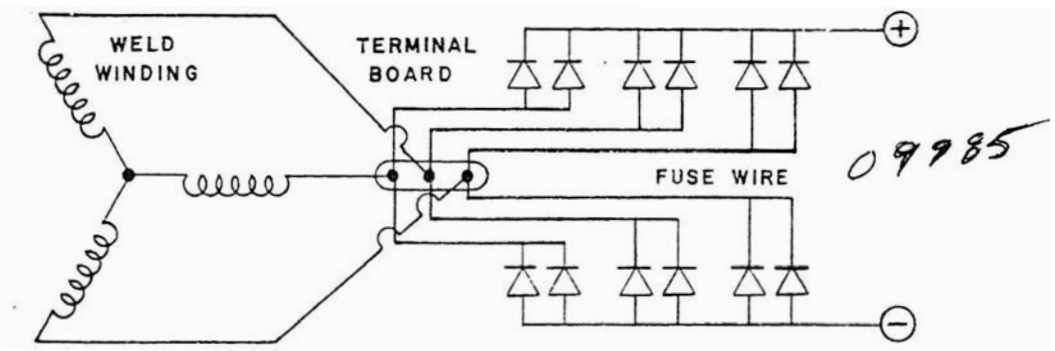


FIG. 4 WELD CIRCUIT SCHEMATIC

PART V ACCESSORY CIRCUIT MAINTENANCE

General

The accessory circuit has its own separate 3-phase winding which is rectified to DC by the accessory diodes (P. 9, Ref. 91). The winding is fused on the inside of the machine to prevent an external short (If the 15 amp fuse (P. 9 Ref. 80) has been bypassed) from damaging the accessory winding.

Accessory Circuit Testing (Fig. 5)

1. Isolate accessory circuit by removing the three 15 amp fuses (P. 9, Ref. 91) and the 15 amp fuse on the faceplate (P. 9 Ref. 80).

2. Check accessory winding on the winding side of the three fuse holders to make sure the three leads from the alternator are shorted to each other and do not read to ground.

NOTE - If there is a short to the alternator housing or an open between two leads, check the winding 'visually' for a loose wire, and repair if possible. If the short is inside the winding, the winding must be replaced.

NOTE - WINDING MUST BE ISOLATED FROM GROUND BY REMOVING THE THREE FUSES OR INCORRECT READING WILL RESULT.

3. Check diodes with ohmmeter for high resistance one way, low resistance with leads reversed. (Fig. 6).

4. Check accessory circuit wiring from accessory circuit board to fuse and receptacle (P. 9, Ref. 91, 80, & 92).

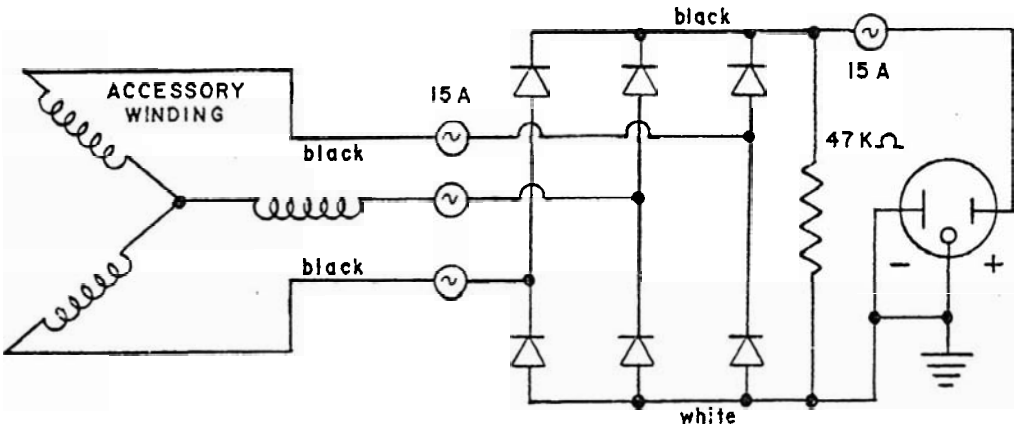


FIG. 5 ACCESSORY CIRCUIT SCHEMATIC

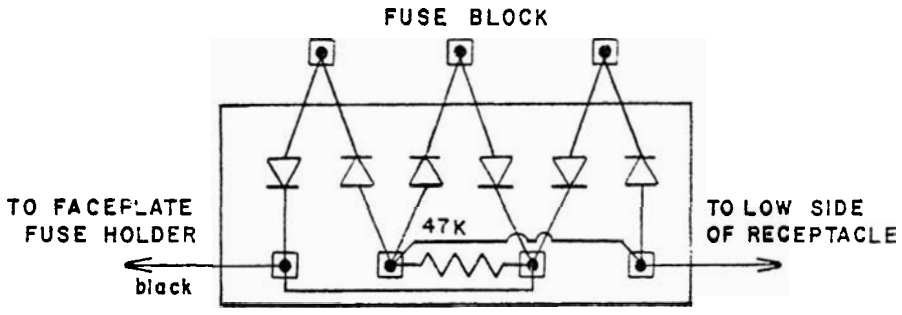
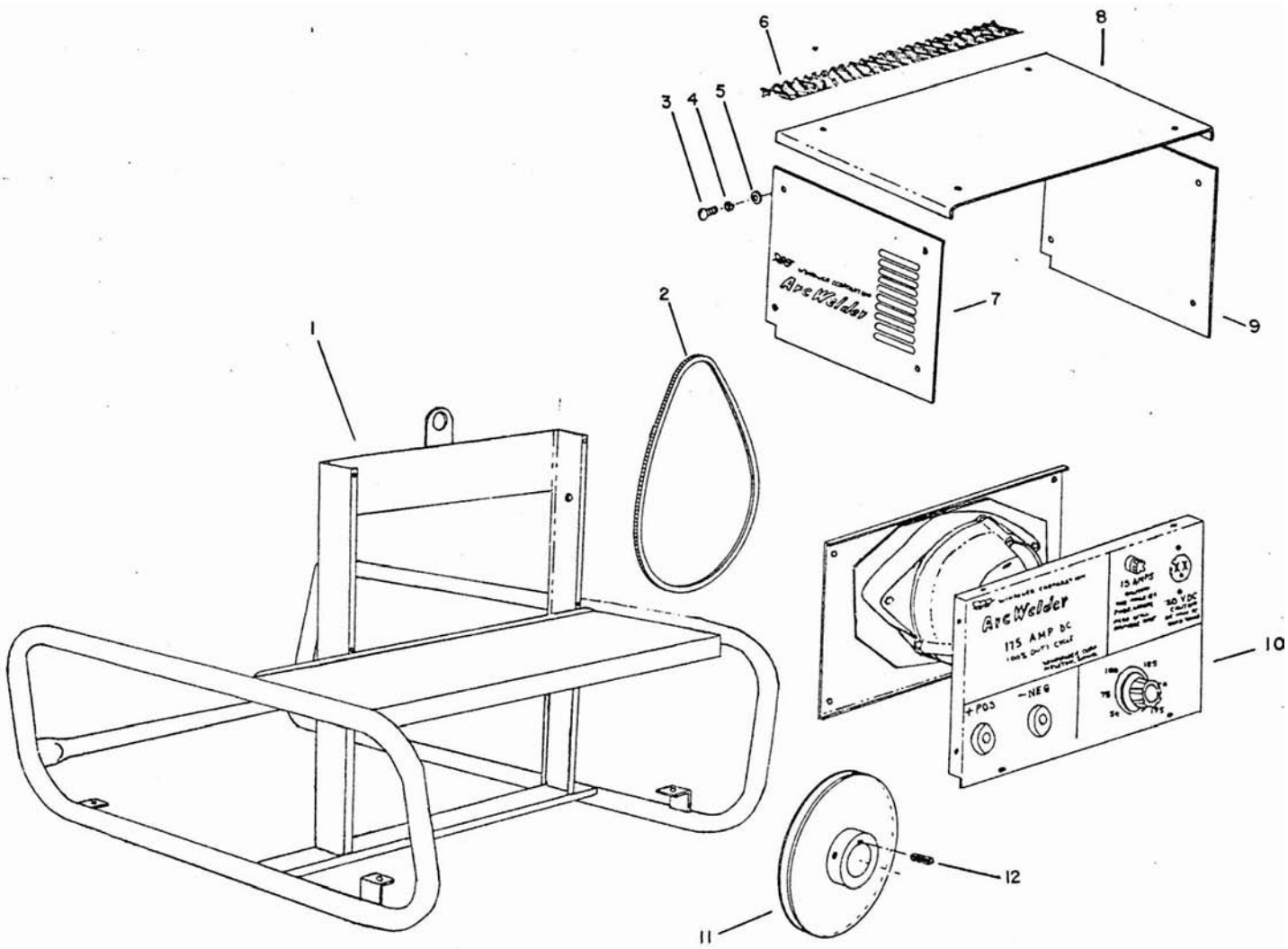
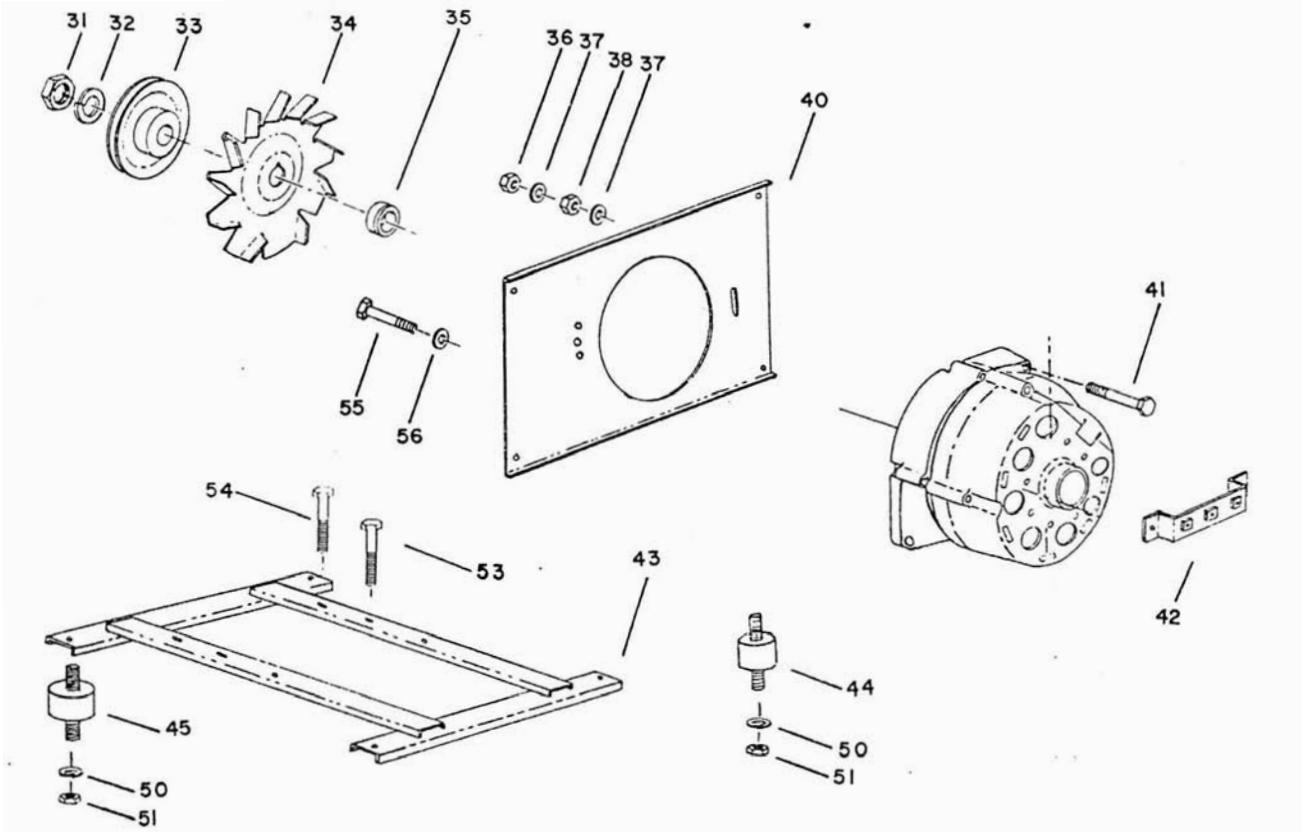


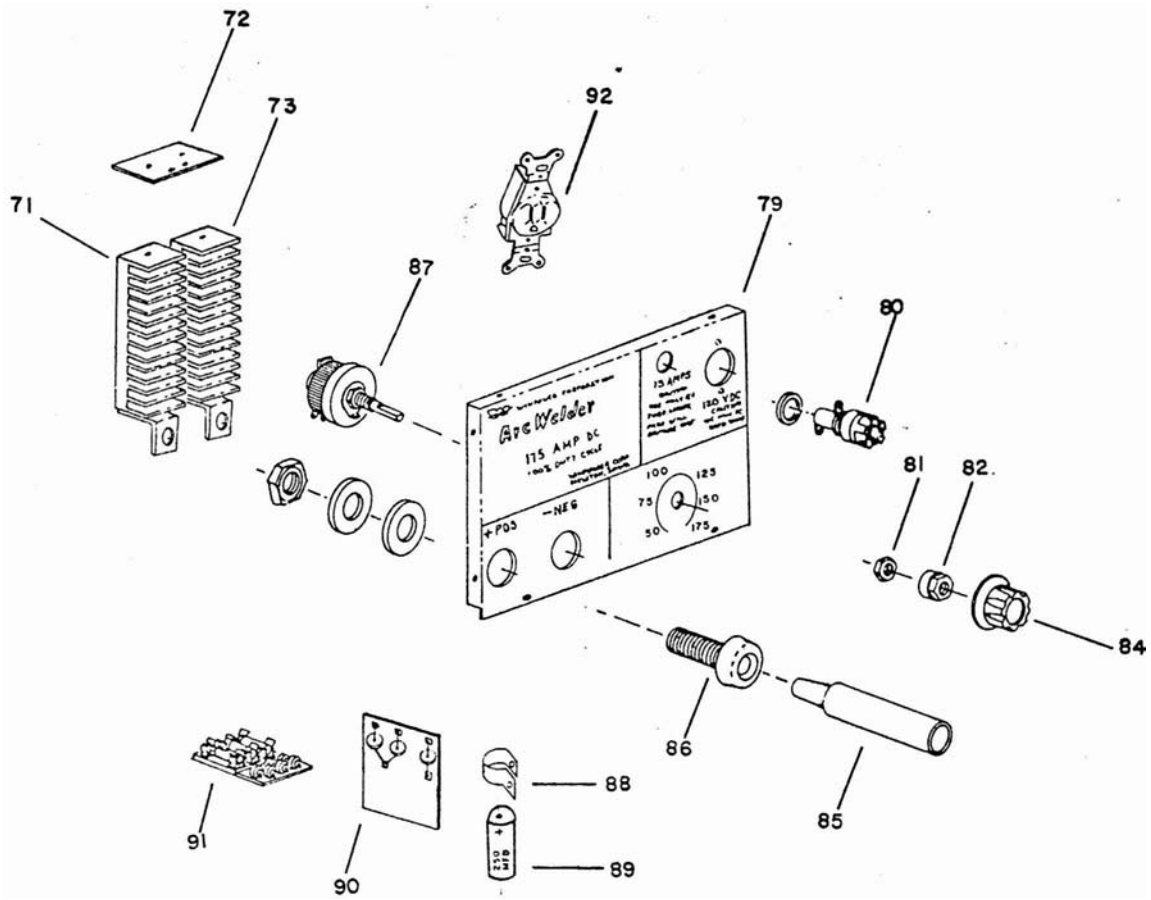
FIG. 6 ACCESSORY DIODE BOARD



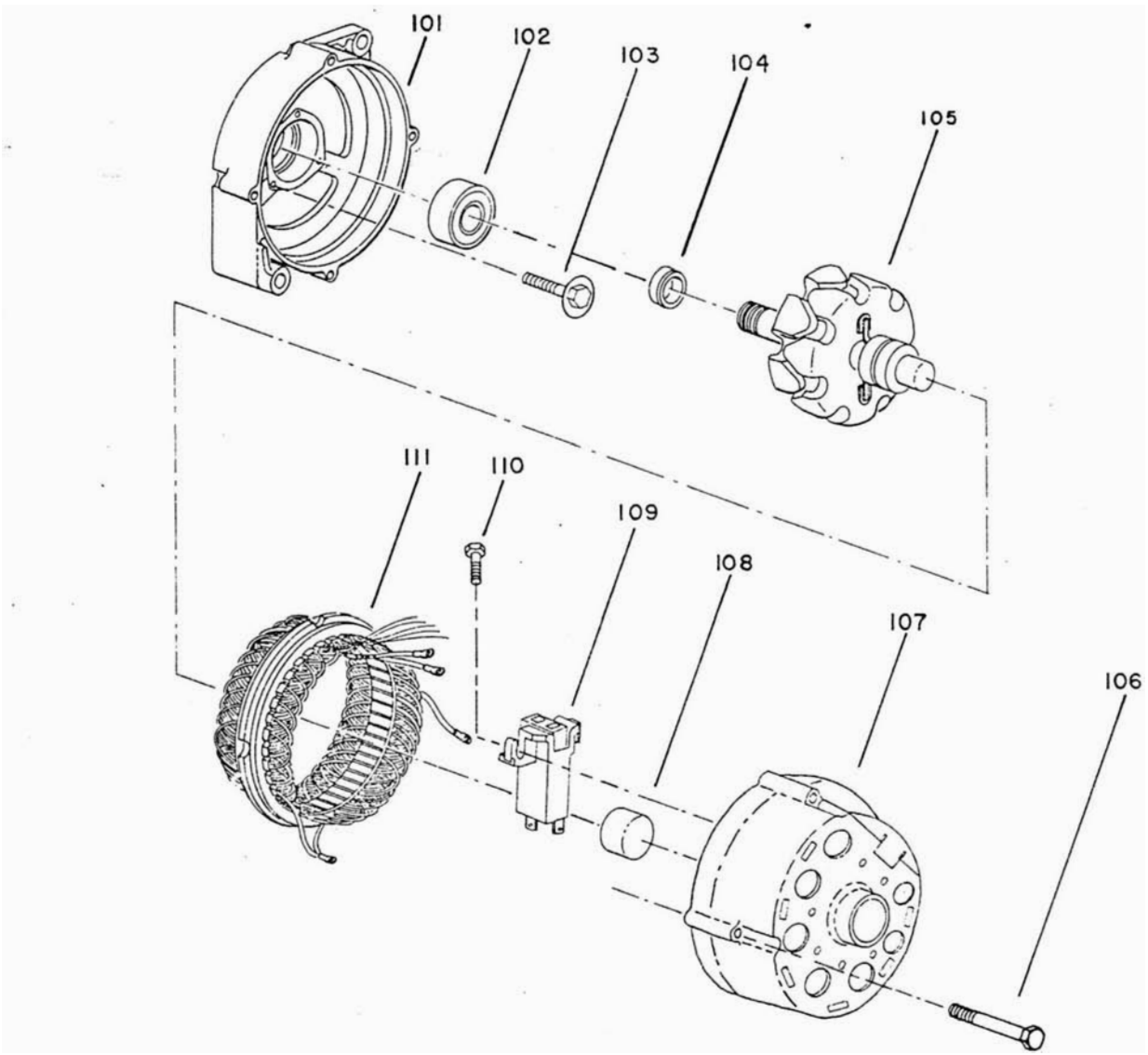
REF.	DESCRIPTION	PART NO.	REF.	DESCRIPTION	PART NO.
1.	Main Frame M-1151	2356	8.	Top Shroud M-1161	2293
2.	Belt M-1152	1024	9.	Left Shroud M-1163	2291
3.	Screw-Shroud (12) M-1153	1970	10.	Welder Unit (Ref. to other figures	
4.	Lock Washer (12) M-1154	2040		for breakdown.)	0975 M-1165
5.	Flat Washer (12) M-1155	2030	11.	Pulley, Engine	1291 M-1166
6.	Screen, Belt M-1157	2312	12.	Key M-1167	1210 M-1167
7.	Right Shroud M-1159	2292		Not Shown:	
				Briggs & Stratton 11 HP Engine	1124 M-1168



REF.	DESCRIPTION	PART NO.	REF.	DESCRIPTION	PART NO.
31.	Nut, Alternator Shaft m-1175	2210	41.	Bolt, Alternator Mounting m-1185	1901
32.	Lock Washer, Shaft m-1177	1560	42.	**Bracket, Insulated Terminal** m-1190	2443
33.	Pulley, Alternator m-1176	1266	43.	H Frame m-1192	2335
34.	Fan m-1178	1627	44.	Shockmount, Small m-1173	**1370**
35.	Spacer m-1186	1695	45.	Shockmount, Large m-1171	1371
36.	Nut, Alternator Mounting m-1181	2180	50.	**Lock Washer (12)** m-1193	2100
37.	Lock Washer m-1182	2110	51.	Nut (12) m-1194	2170
38.	Nut, Spacer m-1184	2453	53.	Bolt, Engine Mounting (2) m-1185	1877
40.	Alternator Mount m-1187	2281	54.	Bolt, Engine Mounting (2) m-1195	1875



REF.	DESCRIPTION	PART NO.	REF.	DESCRIPTION	PART NO.
71.	Heat Sink Assembly - Pos. m-1110	2532	85.	Welding Plug (2)	1231 - m-1129
	Positive Diode (6) m-1111	1764	86.	Welding Receptacle	1311 - m-1130
72.	Phenolic Insulator m-1114	2622	87.	Rheostat m-1119	1340
73.	Heat Sink Assembly-Neg. m-1116	2533	88.	Clamp	1078 - m-1131
	Negative Diode (6) m-1118	1774	89.	Capacitor	1735 - m-1106
79.	Faceplate m-1124	2262	90.	Control Cir. Bd. Asm.	2466 - m-1101
80	Fuseholder m-1121	1180		Diode (3)	1750 - m-1132
	Fuse	1155	91.	Accessory Cir. Bd. Asm.	2467 - m-1133
	Fuseholder Cap	1181		Fuseblock - m-1102	1186
82.	Rheostat Locknut m-1122	2220		Fuse (3)	1155 m-1104
84.	Rheostat Knob m-1124	2120		Diode (6)	1750 - m-1132
			92.	Accessory Receptacle	1330 m-1120



REF.	DESCRIPTION	PART NO.	REF.	DESCRIPTION	PART NO.
101.	Alternator Housing, Drive End	1635	107.	Alternator Housing, Slip Ring End	1631
102.	Bearing, Drive End	1590	108.	Bearing, Rear	1580
103.	Retainer Screws (3)	1663	109.	Brush Kit Assembly	1615
104.	Spacer	1696	110.	Screw, Brush Holder (2)	1946
105.	Rotor	1677		Washer, flat (2)	1935
106.	Bolt, Alternator (4)	1866	111.	Winding	2646