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1 GENERAL

1.1 INTRODUCTION

The 802 Series are high voltage, switching power supplies designed specifically for charging capacitors in laser systems and other pulsed power applications. The 802 Series is available in three different models: the 802L, 802S and 8020EM. The different models allow the user to choose the method of controlling the power supply best suited to the overall system requirements. All three models have the same mechanical dimensions, are air cooled and can be mounted in a standard 19" rack occupying 8.75" of rack height. The 802 Series provide 8,000 Watts of average power and can be paralleled indefinitely for higher total system power. A.L.E. Systems also offers the 402 Series and 303 Series rated at 4,000 and 30,000 Watts respectively.

The 802 Series power supply incorporates a high-frequency IGBT Series-resonant inverter for efficient generation of the output power. A high-performance control module precisely regulates the output voltage, automatically compensating for line, load, temperature, rep rate, and program voltage variations. Normal external fault conditions such as line dropout, open or short circuit load, HV arc and overtemperature will not damage the unit.

![Figure 1: 802 Series Block Diagram](image-url)
The output voltage of the 802 power supply is fully adjustable over each range. The full output is available at rated voltage to supply a peak charge rate of 9000 J/sec.

Figure 2: Output Power and Current
2 SPECIFICATIONS

2.1 OUTPUT VOLTAGE/CURRENT:

The output voltage is fully adjustable over each range. The full output current is available at rated voltage to supply a peak charge rate of 9000 J/sec. Below rated voltage, the current is constant.

<table>
<thead>
<tr>
<th>Voltage Range</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 kV</td>
<td>18.0 A</td>
</tr>
<tr>
<td>0-2 kV</td>
<td>9.0 A</td>
</tr>
<tr>
<td>0-4 kV</td>
<td>4.5 A</td>
</tr>
<tr>
<td>0-5 kV</td>
<td>3.6 A</td>
</tr>
<tr>
<td>0-10 kV</td>
<td>1.8 A</td>
</tr>
<tr>
<td>0-20 kV</td>
<td>900 mA</td>
</tr>
<tr>
<td>0-30 kV</td>
<td>600 mA</td>
</tr>
<tr>
<td>0-40 kV</td>
<td>450 mA</td>
</tr>
<tr>
<td>0-50 kV</td>
<td>360 mA</td>
</tr>
</tbody>
</table>

2.2 CHARGE RATE:

9000 J/sec peak
8000 J/sec average

2.3 REGULATION:

±1.0% to 1 KHz standard
±0.1% to 1 KHz available
Total pulse-to-pulse variation with no series terminating resistance.

2.4 EFFICIENCY:

85% minimum at full load

2.5 INPUT VOLTAGE/CURRENT:

208V Configuration: 180-264 V, 3 Phase, 50/60 Hz, 40 Amps max
400V Configuration: 340-460 V, 3 Phase, 50/60 Hz, 25 Amps max
480V Configuration: 432-528 V, 3 Phase, 50/60 Hz, 20 Amps max

2.6 POWER FACTOR:

85% minimum with 180-264 VAC line

2.7 INRUSH CURRENT

Limited to below full power current.
2.8 PROTECTION FEATURES

Short circuit and HV arc-to-ground any time during operation, and open circuit at
turn-on, will not damage power supply: Shutdown on overtemp, over-voltage, and
open interlock. Highly buffered I/O for noise immunity in severe electrical
environments.

2.9 COOLING

Forced air with internal fan, -20°C to 40°C inlet temperature, 10% to 90% R.H.
non-condensing.

2.10 HV OUTPUT CONNECTOR

Standard A.L.E. two-piece coaxial HV connector and 10' coaxial hv cable with
grounded shield.

2.11 METERING ACCURACY

±2%

2.12 SIZE

Standard 19" rack mount. 8.75" high, 17" deep. Refer to Figure 1 for details.

2.13 WEIGHT

80 Lbs., 36 kg

2.14 OPTIONS:

802L, S, OEM: Custom output voltage, ±0.1% regulation, rack mount slides, EMI filter,
high rep rate unshielded HV connector with silicon HV cable, custom length HV cable.

802 OEM: Front panel circuit breaker or internal AC contactor.
Figure 3: Mechanical Details
3 INSTALLATION

3.1 SAFETY PRECAUTIONS

All model 802 power supplies contain hazardous voltage and energy. The power supply must only be operated by qualified personnel who have read this operator's manual and are familiar with the operation, hazards and application of the power supply. Proper care and judgment must always be observed. Ensure all covers are in place and securely fastened and the required grounding and cooling is supplied before connecting input AC power. Proper grounding from the input AC power is required to reduce the risk of electric shock. Use extreme caution when connecting input AC power and never apply the incorrect input power. Use extreme caution when connecting the high voltage output cable. Ensure all load capacitors are completely discharged prior to connection and never handle the output cable when the power supply is operating. Always replace fuses with the same type and Volt/Amp ratings. Never attempt to operate the power supply in any manner not described in this manual. Never remove DANGER or WARNING labels from the power supply, and replace lost or damaged labels immediately. The power supply should only be serviced by EMI factory qualified personnel.

3.2 INITIAL INSPECTION

The shipping container should contain the following items: power supply, HV output cable, male 25-pin "D" remote control connector and operator's manual. Examine the items immediately for damage. Locate the serial number label on the side of the power supply and verify the model number, the input voltage rating and the output voltage rating and polarity. In the event of any damage promptly notify the transportation company and the EMI customer service manager.

3.3 MOUNTING AND COOLING REQUIREMENTS

The power supply can be mounted in a standard 19" EIA enclosure or equivalent. Chassis support brackets or rails must be added to the bottom of the power supply for proper weight distribution. The power supply can also operate on a bench or table top. In all cases adequate clearances must be provided for proper air flow and cable bends. Generally, at least 4" of clearance should be allowed at the rear of the power supply and 1" at the sides.

When operating in an enclosed system, care must be taken to ensure the ambient inlet air to the power supply does not exceed the maximum operating temperature of 40°C. this often requires addition of a system heat exchanger.
3.4 ORIENTATION

The power supply must be operated in a level position. More than a quarter of an inch (6.25mm) difference in height in any direction could cause an arcing condition in the high voltage tank.

3.5 GROUNDING AND INPUT AC POWER

Proper grounding from the input AC power is required to reduce the risk of electric shock. The metal chassis of the power supply is grounded through the green earthing wire at the input AC power terminal block. Use extreme caution when connecting input AC power and never apply the incorrect input power. Connect the three lines of the input power to the L1, L2, L3 terminals and the earth ground to the terminal marked with the ground symbol. No neutral connection is required for the 200V and 480V configurations (200, 208, 220, 240)(482-528V). If the power supply was purchased with the 400V configuration (380, 415, 440), connect the neutral wire to terminal marked N. The power supply cannot be operated from a single phase line. Refer to Section 5 "Applications", to calculate line currents for various operating conditions such as reduced power or charging very large capacitor banks.

![Input AC Power Connections](image_url)

Figure 4: Input AC Power Connections

3.6 CONNECTING HIGH VOLTAGE OUTPUT

Ensure that the power supply is off and disconnected from the input power and that all load capacitors are discharged and shorted to ground before making any connections. Never handle the HV cable during operation.

Always use the HV connector and cable provided with the power supply or an equivalent substitute provided by EMI Systems. Fully insert the connector end of the HV cable and tighten the locking nut only "hand tight".

When operating above 20kV and 200 Hz rep rate it is recommended that a silicone grease (such as Dow Corning DC-4) be used on the HV cable before insertion into the HV connector. This displaces the air in the connector and reduces long term corona effects. When operating above 30kV and 300Hz rep rate it is recommended that the optional unshielded HV connector and silicone cable be used.
The HV cable shield is connected to the power supply chassis and should be used as the HV return. An additional grounding stud is provided adjacent to the HV connector and should also be connected to the HV return. The standard shielded HV cable can contact earth ground without consequence. The optional unshielded silicone HV cable can also contact ground, but isolating it will minimize the effects of corona in the system.

Keep the minimum HV cable bend radius greater than 4” to minimize stress on the insulation. Keep the HV cable as distant as possible from the input power and the input control signals.

Some peak current will flow out of the power supply during discharge and return through the HV return and system chassis. This current comes from voltage reversal in underdamped systems and from normal discharge of filter and cable capacitance. The path for this current should not parallel control signal returns since the resulting voltages could interfere with normal system operation. When due to voltage reversal at high rep rates, this current could damage the power supply. Generally a resistor in series with the HV output can be added to limit this current to an acceptable level. Refer to Section V "Applications" for more information.

The oil-filled HV assembly should not be opened. The oil and components have been specially cleaned and vacuum impregnated at the factory and the assembly hermetically sealed. Opening the assembly may compromise performance.
4 OPERATION

4.1 L, S, OEM MODELS

Model 802L:  This model has full front panel instrumentation for use in laboratory, prototype or OEM systems. The 802L can be operated either from the front panel or from the rear panel remote control connector. The front panel includes power on/off, remote/local and HV on/off switches, output voltage adjust, view set switch, digital voltage and current meters, quick reference bar graphs and status indicators. An internal AC contactor is included which is controlled by the front panel power switch. A BNC connector is provided on the front panel for easily connecting a pulsed INHIBIT signal when operating from the front panel. The model 802L can be operated as a "master" unit in parallel with several model 802S "slave" units for increased output power. Refer to Section 5.4 "Paralleling Units".

![Model 802L Diagram]

Figure 5: Model 802L

Model 802S:  This model has only a power switch and status indicators on the front panel. It must be operated through its remote control connector and can function as a standalone unit or in parallel with other units. Several model 802S units can be paralleled as "slaves" controlled by either a "master" 802L or a single remote control circuit. An internal AC contactor is included which is controlled by the front panel power switch.
Figure 6: Model 802S

Model 802 OEM: This model has a blank front panel and is operated the same as an 802S, from the remote control connector only. It can function as a standalone unit or in parallel for increased output power. The basic model 802 OEM is supplied by externally controlled AC power. It can also be configured with either an internal AC contactor or front panel circuit breaker option.

Figure 7: Model 802 OEM
4.2 REAR PANEL

Figure 8 shows the rear panel of the model 802L. The REMOTE connector is used to control the power supply when the CONTROL KEY SWITCH on the front panel is in the REMOTE position. The INTERLOCK terminal block (at 24 VAC) can be connected to system interlocks to disable the power supply when opened. Jumpering the two terminals together allows the power supply to operate. The INHIBIT connector allows for easily connecting a pulsed INHIBIT signal when operating from the front panel. The INHIBIT signal in the REMOTE connector can be used when operating in remote control mode. The SLAVE connector is used to control model 802S power supplies operating in parallel with an 802L "master" unit. The model 802S and model 802 OEM do not have the INHIBIT and SLAVE connectors.

4.3 FRONT PANEL CONTROL (L model only)

4.3.1 POWER SWITCH:

Connects AC input power to the control circuitry and closes the internal AC contactor if the interlock is closed.

4.3.2 CONTROL SWITCH:

Directs the power supply to take on/off and voltage program commands from either the front panel (LOCAL position) or the remote control connector (REMOTE position). The OFF position disables the power supply regardless of other commands.

4.3.3 HV ON SWITCH:

Turns on the high voltage output to the level set by the HV adjust knob. Also used with HV OFF to reset latched fault conditions: over-voltage, open circuit, over-temp, and interlock open.
4.3.4 HV OFF SWITCH:
Turns off the high voltage output.

4.3.5 VOLTAGE ADJUST:
Clockwise increases the output from zero to maximum, 10 turns full scale.

4.3.6 VIEW SET:
Previews the voltage adjust set point before HV ON. Also displays set point during operation to indicate whether a load condition is affecting the desired HV output level.

Figure 9: Model 802L Front Panel
### 4.4 REMOTE CONTROL (L, S, OEM models)

All three models are easily controlled through their remote connector on the rear of the unit. Only the ON/OFF, V PROGRAM and GND signals are required for operation. The remaining signals are provided for status monitoring and fault diagnosis. A schematic diagram showing the suggested interface circuit appears after the following description of control signals.

<table>
<thead>
<tr>
<th>PIN</th>
<th>SIGNAL NAME</th>
<th>I/O</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>ON/OFF</td>
<td>INPUT</td>
<td>15V = ON. GND or open = OFF</td>
</tr>
<tr>
<td>22</td>
<td>V PROGRAM</td>
<td>INPUT</td>
<td>0-10V</td>
</tr>
<tr>
<td>7</td>
<td>INHIBIT</td>
<td>INPUT</td>
<td>5 to 15V inhibits the unit. Open or GND allows operation. Use this signal to disable charging during HV switch recovery.</td>
</tr>
<tr>
<td>20</td>
<td>INHIBIT</td>
<td>INPUT</td>
<td>0 volts inhibits the unit. 15V or open allows operation.</td>
</tr>
<tr>
<td>9</td>
<td>PEAK VOLTS</td>
<td>OUTPUT</td>
<td>0-10V. Peak detector of output charging waveform. Can be used to drive a meter displaying peak charging voltage.</td>
</tr>
<tr>
<td>1</td>
<td>ANALOG OUT</td>
<td>OUTPUT</td>
<td>0-10V. Analog of output voltage waveform ±1%.</td>
</tr>
<tr>
<td>13</td>
<td>CHARGE CURRENT</td>
<td>OUTPUT</td>
<td>0-3.5V. Analog of output current waveform.</td>
</tr>
<tr>
<td>14</td>
<td>+15V</td>
<td>OUTPUT</td>
<td>15V through 100Ω series resistor.</td>
</tr>
<tr>
<td>12, 24</td>
<td>GND</td>
<td>OUTPUT</td>
<td>Control circuit return. Also chassis/earth ground.</td>
</tr>
<tr>
<td>25</td>
<td>+12V LED</td>
<td>OUTPUT</td>
<td>12V at 100mA available for powering status LEDs.</td>
</tr>
<tr>
<td>3</td>
<td>INHIBIT LED</td>
<td>OUTPUT</td>
<td>Open collector. Indicates that the power supply is receiving an INHIBIT signal.</td>
</tr>
<tr>
<td>5</td>
<td>EOC LED</td>
<td>OUTPUT</td>
<td>Open collector. Indicates that the power supply is reaching end-of-charge, i.e. the V PROGRAM set point.</td>
</tr>
<tr>
<td>18</td>
<td>LOAD FAULT LED</td>
<td>OUTPUT</td>
<td>Open collector. Indicates an output overload, over-voltage or open circuit condition.</td>
</tr>
<tr>
<td>16</td>
<td>OVERTEMP LED</td>
<td>OUTPUT</td>
<td>Open collector.</td>
</tr>
<tr>
<td>17</td>
<td>INTERLOCK LED</td>
<td>OUTPUT</td>
<td>Open collector.</td>
</tr>
<tr>
<td>23</td>
<td>HV OFF LED</td>
<td>OUTPUT</td>
<td>Open collector.</td>
</tr>
<tr>
<td>10</td>
<td>HV ON LED</td>
<td>OUTPUT</td>
<td>Open collector.</td>
</tr>
<tr>
<td>19</td>
<td>SUM FAULT LED</td>
<td>OUTPUT</td>
<td>Open collector.</td>
</tr>
</tbody>
</table>
4.5 INITIAL CHECK-OUT PROCEDURE

The power supply should have no visible damage or defects and the cover should be securely fastened. Properly connect the input power, control connector and HV output. If there is no load connected, the power supply will sense an open circuit and immediately shut down indicating a LOAD FAULT. If there is a short circuit or overload condition on the output, the power supply will operate in a 50% duty cycle protection mode and indicate a LOAD FAULT. An overload condition can occur if the INHIBIT signal is missing and the discharge rep rate is too high to allow the capacitor to fully charge to V PROGRAM. Double check all connections and ensure that all personnel are protected from the HV output. With the HV adjust at zero volts, turn the power supply on in the following sequence:

802L Front Panel Control:

1. Turn HV ADJUST knob fully counterclockwise.
2. Turn POWER switch to ON.
3. Turn CONTROL key switch to LOCAL.
4. Push HV ON switch.
5. Verify the HV output is at approx. zero volts.
6. Increase HV output slowly and verify adjustability.

802L Remote Control:

1. V PROGRAM signal (pin 22) at zero volts.
2. ON/OFF signal (pin 8) at zero volts.
3. Turn POWER switch to ON.
4. Turn CONTROL key switch to REMOTE position.
5. Assert ON/OFF signal to 15V.
6. Verify HV output is at approx. zero volts.
7. Increase HV output slowly and verify adjustability.

802S Remote Control:

1. V PROGRAM signal (pin 22) at zero volts.
2. ON/OFF signal (pin 8) at zero volts.
3. Turn POWER switch to ON.
4. Assert ON/OFF signal to 15V.
5. Verify HV output is at approx. zero volts.
6. Increase HV output slowly and verify adjustability.

802 OEM Remote Control:

1. V PROGRAM signal (pin 22) at zero volts.
2. ON/OFF signal (pin 8) at zero volts.
3. Assert ON/OFF signal to 15V.
4. Verify HV output is at approx. zero volts.
5. Increase HV output slowly and verify adjustability.
5 APPLICATIONS

5.1 DETERMINING CAPACITOR CHARGE TIME

The 802 Series is rated at 9000 J/sec peak and 8000 J/sec average charge rate. Although the measure of Joules/sec equates to Watts, it is more convenient when working with energy storage capacitors. The peak charge rate determines the capacitor charge time. The average charge rate determines the total power delivered from the power supply. It is possible to charge a capacitor at a rate of 9000 J/sec, but to discharge it at a low rep rate amounting to only 100 J/sec.

\[
\text{Peak charge rate} = \frac{1}{2} CV^2 \frac{1}{T_c}
\]

\[
\text{Average charge rate} = \frac{1}{2} CV^2 \frac{1}{T_p}
\]

From 0 to 100% of rated voltage the 802 Series delivers a constant charging current.

At any output voltage, the charge time is

\[
T_c = \frac{\frac{1}{2} CV \times V_{RATED}}{9000}
\]

**EX:** An 802 rated at 40kV charging a 90nF cap to 35kV.

\[
T_c = \frac{\frac{1}{2} CV \times V_{RATED}}{9000} = \frac{\frac{1}{2} (90nF) (40kV) (35kV)}{9000} = 7 \text{ m sec}
\]

**EX:** An 802 rated at 40kV charging a 90nF cap to 25kV.

\[
T_c = \frac{\frac{1}{2} CV \times V_{RATED}}{9000} = \frac{\frac{1}{2} (90nF) (25kV) (40kV)}{9000} = 5 \text{ m sec}
\]

5.2 VOLTAGE REVERSAL

When the capacitor or PFN is discharged, a high peak current may flow out of the power supply as a result of voltage reversal. This occurs in a system which is underdamped in order to clear the high voltage switch after each pulse. The average value of this peak current added to the normal output current may exceed the rating of the HV diodes in the power supply. This current can be measured with a current transformer as shown.
A series terminating resistor (or series inductor or clamp diode) must be added as shown if the average value of the peak current exceeds 10% of the normal output current.

When choosing $R_s$, ensure it can withstand the full output voltage across it as well as the power dissipation caused by discharging $C_o$ (230pF) and $C_c$ (20pF/ft) each cycle as well as conducting the normal output current. It's power dissipation can be calculated as,

$$P_D = I_o^2 R_s + \frac{1}{2}(C_o + C_c)V^2(F_{REP\ RATE})$$

### 5.3 PARALLELING UNITS

The 802 power supply is designed for simple parallel operation. Any model (L, S, OEM) can be paralleled with any other model. The input power and HV output should be connected directly together. The REMOTE connectors on the rear panel can also be connected directly together using a "daisy chain" ribbon cable from the system controller. Each of the power supplies operate at the same time with the total charge rate equal to the sum of each.

When operating an 802L as a master with either one or more 802S's as slaves, connect the SLAVE connector on the 802L to the REMOTE connector on each of the 802S's. This allows control of the entire system from the 802L front panel when in local mode, or the 802L REMOTE connector when in remote mode. The status of each individual 802L and 802S is displayed on its front panel.

Sometimes when operating several units in parallel, the high total power generates noise which interferes with the power supply control. This is usually due to the many interconnecting control cables acting as an antenna picking up noise. The problem usually appears as one or more of the power supplies shuts down when the output voltage increases beyond a certain level. Dressing the control cables as short as possible and close to ground or using shielded cables should help. In severe cases, it is necessary to wrap the cables several times through large ferrite cores at the rear panel of each unit.

### 5.4 MEASURING HIGH VOLTAGES

A sample of the output voltage is available in the REMOTE connector. If it desired to measure the HV output externally, care must be taken to understand the accuracy of the measurement.

When making a DC measurement, such as when the power supply is holding voltage on a capacitor, any HV probe and DMM combination can be used. The Fluke 80k - 40 probe with any 10MΩ input resistance DMM is adequate up to 40kV. Building a simple
resistor divider using appropriate HV resistors is also very straightforward. Keep in mind that all HV resistors, including the one in the Fluke probe, exhibit a negative voltage coefficient, changing by up to 4% from zero to max voltage. Derating the resistors and calibrating at the operating point solves this problem.

Making a pulsed measurement with an oscilloscope requires a compensated HV probe having a wide bandwidth. Simply connecting a DC probe, through the proper resistance, into a scope yields a slow response adequate for only low rep rate systems. As with DC probes, the pulsed probe resistor voltage coefficient is a problem. In addition, damage to the resistors can occur during pulsing due to high electric field gradients. Also, stray capacitance to nearby objects can significantly alter the pulse response. The Tektronix P6015 is a high-performance, shielded probe and a good choice up to 40kV.

Measurements accurate to better than 0.1% can be achieved using a bias technique. For example, if a 40V signal (40kV divided by 1000) is to be measured accurately, the minus input of the DMM would be biased up 40V. The original signal, with respect to ground, is fed to the plus input of the DMM. The bias can be measured accurately for absolute measurements, or relative measurements read directly as the line or load is varied. In the same manner, an oscilloscope return can be biased for accurate peak measurements during pulsing.

5.5 DETERMINING AC LINE CURRENT

\[ I_L = \frac{P}{\sqrt{3} V_L P_F \pi} \]

- \( I_L \) = Line current
- \( P \) = Average output power
- \( V_L \) = Line voltage
- \( P_F \) = Power factor (.85min)
- \( \pi \) = Efficiency (.85min)

**EX:** An 802 operating from 208V - 10% and delivering 8000W average.

\[ I_L = \frac{8000}{\sqrt{3} \times (0.9 \times 208)(.85)(.85)} = 34A \]

When charging very large capacitor banks requiring many seconds or minutes to reach end-of-charge, the power supply will display a load fault and go into a 50% duty cycle protection mode. If this feature is defeated and the power supply is allowed to
charge for an extended period, then the peak output power rather than the average must be used to determine line current.

5.6 OPERATION AS A DC POWER SUPPLY

The 802 Series power supply is a current source which simply turns off when the voltage reaches end-of-charge, and may cycle on/off to maintain the charge as required. Because the charging waveform is triangular, the average power delivered is one-half of the peak power times the duty cycle. Thus the 802 delivers 18,000 W peak and 8000W average power.

\[ P_{AVG} = \frac{V \cdot I}{2} \]

The 802 can provide a regulated voltage to a DC load such as an electron beam. The output current will be present at the factory to one-half the usual value in order to limit the average output power to 10,000 W, while making full rated HV steady state. The voltage ripple can be easily filtered to any desired level with an external capacitor across the load.
6 MAINTENANCE AND TROUBLESHOOTING

6.1 SAFETY PRECAUTIONS

The calibration and troubleshooting steps described in this section require operation of the power supply with the top cover removed. Proceed with extreme caution as hazardous voltages are exposed throughout the unit. Safety glasses must be worn to prevent serious injury in the event of a component failure (e.g., power transistors readily explode during fault conditions). Because the power supply does not receive proper cooling with the cover removed, operation at full power should be limited to less than ten minutes.

6.2 CALIBRATION

Calibration of the output is accomplished with trimpots located on the Control Board. This pc board is horizontally mounted on top of the high voltage output assembly on the right side of the unit as you face the front panel.

6.2.1 OUTPUT VOLTAGE LEVEL:

R30 (12 turns). Slowly adjust clockwise to increase output voltage for a given V PROGRAM level. Factory set for 10V = rated voltage.

6.2.2 OVER-VOLTAGE TRIP POINT:

R60 (12 turns). Slowly adjust clockwise to increase trip point. Factory set at 10% above rated voltage.

6.3 MAINTENANCE

No maintenance is required under normal operating conditions. Occasional vacuum or blow-out of the chassis may be required when operated in extremely dirty environments. The oil-filled HV assembly must not be opened. The oil and components have been specially cleaned and vacuum impregnated at the factory and the assembly hermetically sealed. Opening the assembly may compromise performance.
6.4 TROUBLESHOOTING

First check for obvious trouble such as input power, output connections, control connections and signal levels. In particular, the interlock, the INHIBIT and the ON/OFF signals. If there is no load connected, the power supply will sense an open circuit and immediately shut down indicating a LOAD FAULT. If there is a short circuit or overload condition on the output, the power supply will operate in a 50% duty cycle protection mode and indicate a LOAD FAULT. An overload condition can occur if the INHIBIT signal is missing and the discharge rep rate is too high to allow the capacitor to fully charge to V PROGRAM.

1. If the power supply is making high voltage but does not appear to be functioning properly in a specific application, the problem may be application related. Consult the EMI Systems customer service department.

2. If the power supply is not making high voltage, the problem is usually either failed HV output diodes or a problem on a pc board. Refer to the schematics provided in this manual.

   a. Check the DC bus voltage on the large filter capacitors C1, 2 in the front of the unit. Should be 250-350 V.
   b. Check for failed power transistors or diodes on the Inverter Board.
   c. Check the +15V and -5V on the Control Board.
   d. Check the +12V unregulated at J4-10. If reading zero, check fuses on the Aux Board.
   e. Check the output and inputs of the main OR-gate U12-1, 2, 3, 4, 5. A high level will disable the power supply.
   g. Check the input to the latch at U12-9, 10, 11, 12.
   h. Check the V PROGRAM input at U6-8.
   i. Check the clock at U9-3.
   j. Check the transistor gate drives at D26, 27, 28, 29 cathode.
OPTION 1
802 OEM VERSION WITH CONTROLLER