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# INSTRUCTION MANUAL

## XENON POWER SUPPLY

High Reactance Type FXPS

Rev. 10/98



### **STRONG INTERNATIONAL**

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## PREFACE

THE FXPS XENON POWER SUPPLY manufactured by Strong International is a high reactance unit utilizing silicon diodes as the power conversion elements. All models are designed for 50/60 Hertz operation, and are available in varying AC input types, depending upon the configuration of the main power transformer. Check the Equipment Data Plate to determine the exact AC requirement prior to installation.

COARSE AND FINE TAPS are easily set to regulate the DC current to the xenon bulb. Some models of FXPS power supplies have the capability of overdriving a xenon bulb; carefully check the power requirements specified by the bulb manufacturer and do not exceed the maximum current stated.

DC OUTPUT to the xenon bulb is filtered by means of a choke and filter capacitors. A relay-operated resistor circuit reduces the inrush current upon ignition to prolong bulb life. Suppression capacitors prevent RF interference in the theatre sound system.

OVERSIZE HEAT SINKS disperse the heat normally generated by the silicon diodes. High-wattage power supplies include an internally wired blower for additional heat dissipation. Thermal switches act as safety interlocks to shut down the power supply and protect the rectifier diodes in the event temperatures reach excessive levels.

A STEPDOWN TRANSFORMER reduces the input line to supply 115 V.AC to power lamphouse control circuits as required. The transformer is protected by a three ampere in-line fuse.

## INSTALLATION

CHECK THE EQUIPMENT DATA PLATE and make certain that the AC source conforms to the power requirements of the main transformer. The location of the AC input terminals is shown on Pages 4 and 5. See the Installation Diagram on Page 6 for detailed AC hook-up, line protection, and lamp connections. The AC service wiring should be installed by a licensed electrician in conformance to local codes. The unit must be connected to an adequate earth ground.

THE AC LINE to the xenon power supply must include a marked line safety switch or other power disconnect device adjacent to the unit and accessible to the operator. For operator safety, it is necessary to turn off all power to the unit when adjusting or servicing the xenon power supply. This safety switch or power disconnect should be tagged "OFF - UNIT UNDER REPAIR" when the power supply is being serviced.

## INSTALLATION (continued)

OBSERVING ALL SAFETY PROCEDURES, install a xenon bulb of the desired wattage into the lamphouse. Check the bulb manufacturer's documentation to determine the recommended current range of the bulb. A new bulb is normally first operated at "nominal" current, which is around 85% of the maximum level. DO NOT, at any time, exceed the maximum current level specified by the bulb manufacturer.

IGNITE THE XENON BULB and check the current as indicated on the lamphouse ammeter. Allow (30) seconds for the current to stabilize and provide an accurate reading. If the current is not within the desired range, extinguish the bulb. It will be necessary to increase or decrease the DC output.

### WARNING



Turn off ALL primary AC power before making any adjustments or performing service procedures. Allow several minutes for the capacitors to drain stored energy. The power supply normally operates warm to hot; allow the unit to cool to room temperature.



## OUTPUT CURRENT ADJUSTMENT

*Fine adjustment* of the DC current is made to the *NUMBERED* taps found on the upper three terminal blocks (TB4, TB5, TB6). Fine taps are numbered 1-2-3-4, with "1" providing the **lowest** output, increasing to "4," yielding the **highest** output. A "fine" tap adjustment raises or lowers the current approximately four amperes. The three fine tap terminal blocks are interconnected by means of a three-lead jumper wire assembly attached to like-numbered terminals.

- To *increase* the DC output, move the jumper wire assembly to tap the next (3) *higher* numbered terminals, for example, move from terminals "2" to terminals "3." ALL TAPS MUST BE ON THE SAME NUMBERED POSITION (1-1-1, 2-2-2, 3-3-3, or 4-4-4). If the DC output is still too low when terminals "4" are interconnected, see the following instructions for adjusting "*coarse*" taps.
- To *decrease* the DC output, move the jumper wire assembly to tap the next (3) *lower* numbered terminals, for example, move from terminals "3" to terminals "2." ALL TAPS MUST BE ON THE SAME NUMBERED POSITION (1-1-1, 2-2-2, 3-3-3, or 4-4-4). If the DC output is still too high when terminals "1" are interconnected, see the following instructions for adjusting "*coarse*" taps.

*Coarse adjustment* of the DC current is made to the *LETTERED* taps found on the lower three terminal blocks (TB1, TB2, TB3). Coarse taps are lettered W-X-Y-Z, with "W" providing the **lowest** output, increasing to "Z" at the **highest** output. The coarse tap terminals connect to contactor terminals T1, T2, and T3. The (3) contactor leads must connect to the same lettered step (W-W-W, etc.). A "coarse" tap adjustment raises or lowers the current approximately twelve amperes.

## INSTALLATION (continued)

- To *increase* the coarse DC output, move each of the contactor leads to tap the next *higher* lettered terminals, for example, move from terminals “W” to terminals “X.” ALL TAPS MUST BE ON THE SAME LETTERED POSITION (W-W-W, X-X-X, Y-Y-Y, or Z-Z-Z). Place the fine tap jumper on 1-1-1. Ignite the lamp, check the output, and increase the fine tap setting as required.
- To *decrease* the coarse DC output, move each of the contactor leads to tap the next *lower* lettered terminals, for example, move from terminals “Y” to terminals “X.” ALL TAPS MUST BE ON THE SAME LETTERED POSITION (W-W-W, X-X-X, Y-Y-Y, or Z-Z-Z). Place the fine tap jumper on 1-1-1. Ignite the lamp, check the output, and increase the fine tap setting as required.

INSPECT TAP CONNECTIONS to verify that the terminal is clamping the copper conductor, not the insulation. Make certain all terminal clamping screws are tight.

WHENEVER MAKING A COARSE ADJUSTMENT, again check the lamphouse ammeter and make certain the current is within the desired range. A fine tap re-adjustment is frequently required after changing coarse taps.

AFTER PROLONGED OPERATION, the light output of the xenon bulb will decrease. This is a normal factor of bulb aging, and can be compensated by raising the DC output of the xenon power supply. If the bulb was first operated at “nominal” current, the power supply output can gradually be increased to, but not in excess of, the maximum current specified by the bulb manufacturer. Increase the current as instructed above. Decrease the power supply output to its former “nominal” current level upon the installation of a new replacement bulb.

## MAINTENANCE

VERY LITTLE MAINTENANCE is required to keep this power supply in good operating condition. Like most booth equipment, regularly scheduled cleaning is most important.

## WARNING

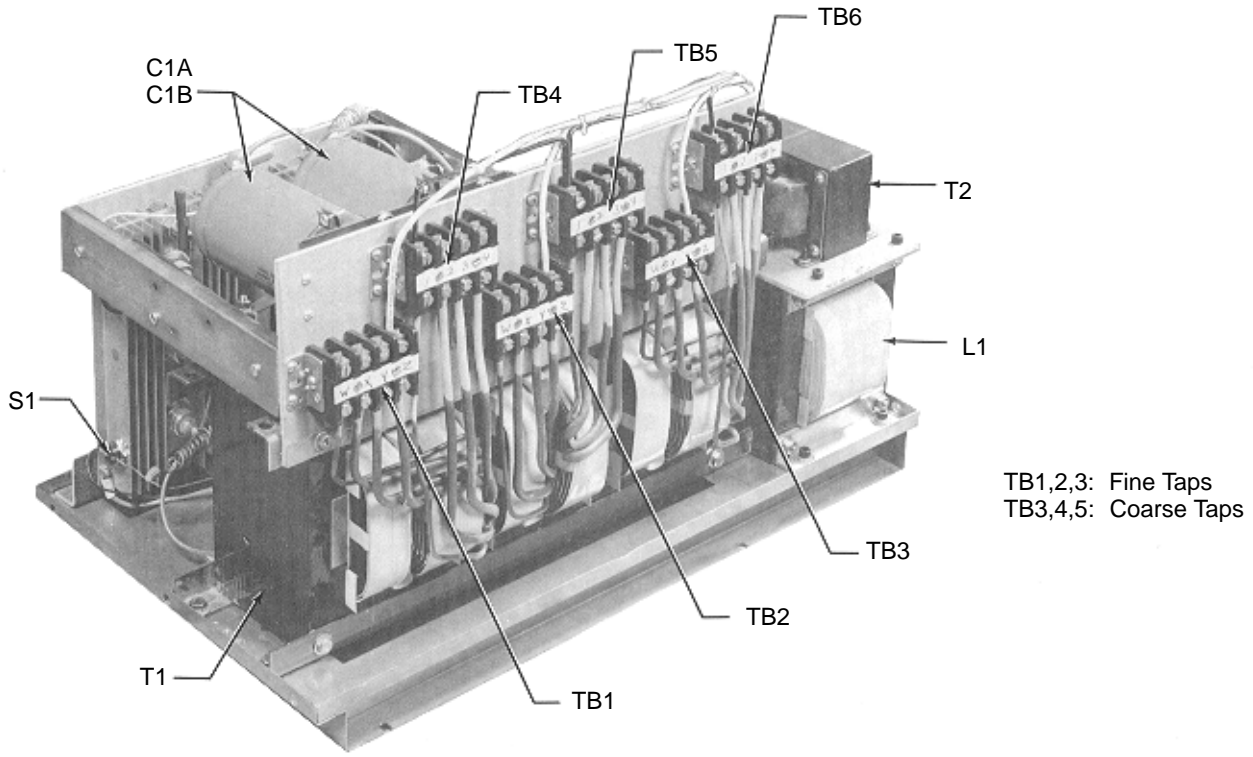


Turn off ALL primary AC power before making any adjustments or performing service procedures. Allow several minutes for the capacitors to drain stored energy. Allow the power supply to cool to room temperature.



1. Remove all accumulated dust and dirt from the rectifier. Vacuum the heat sinks. Make certain all air inlets and outlets are unobstructed.
2. Regularly check all electrical connections for tightness. Clean, retighten, or replace any discolored connections or terminals.
3. Every three months, apply a drop or two of SAE 20-weight oil to the squirrelcage blower motor bearings (on units so equipped). “Muffin” fans require no lubrication.

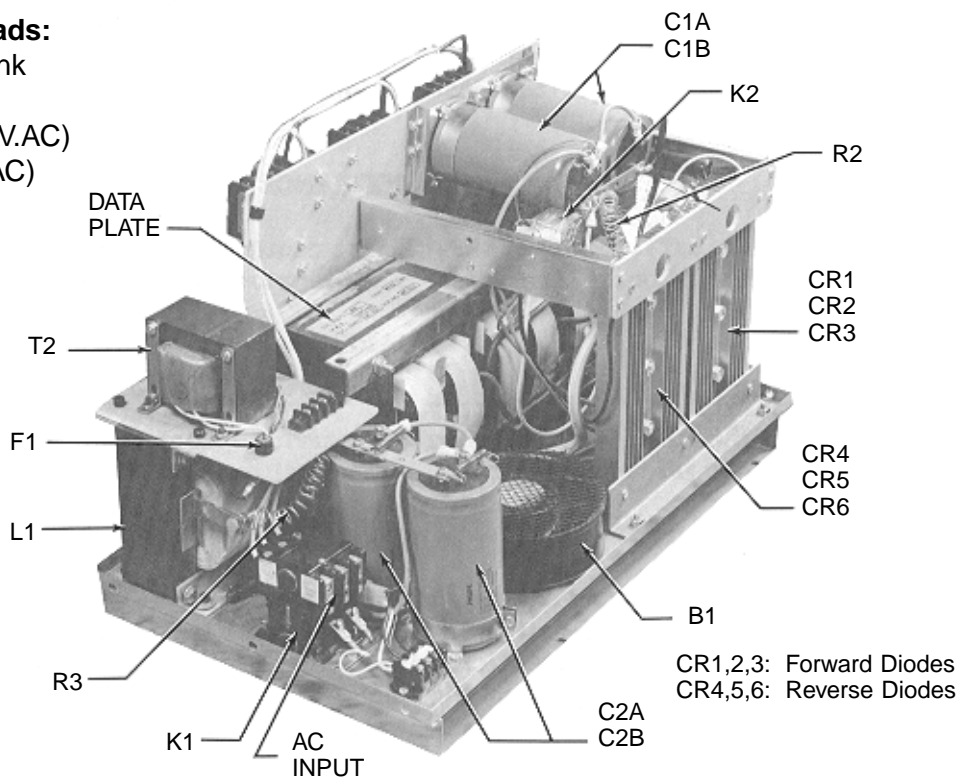
# Xenon Power Supply Type FXPS



TB1,2,3: Fine Taps  
 TB3,4,5: Coarse Taps

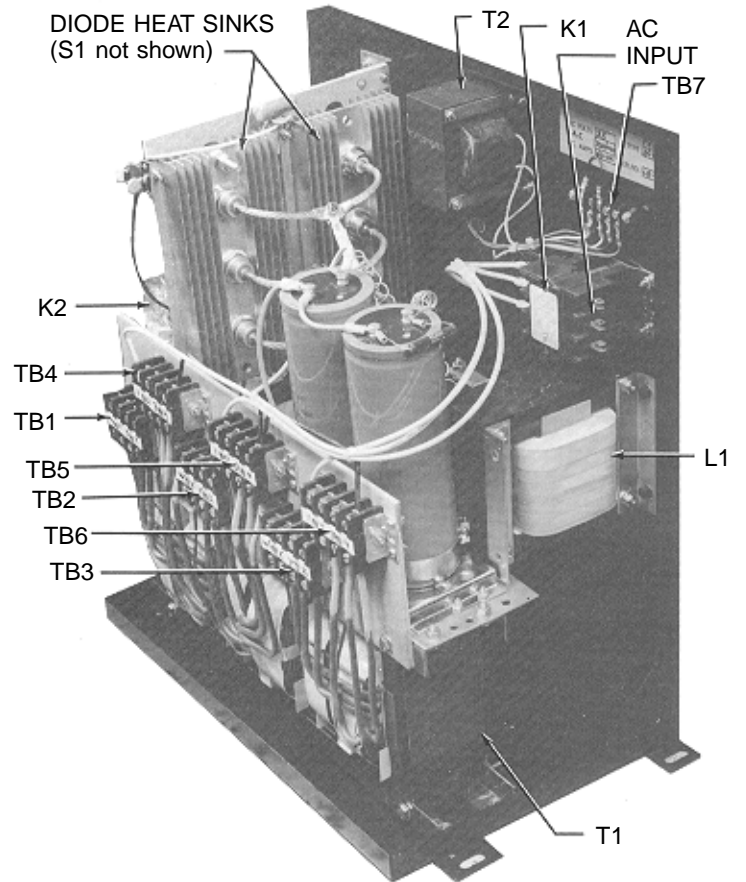
## Strong Lamphouse Leads:

- DC+ to CR1,2,3 Heat Sink
- DC- to L1 Buss Bar
- 2 & 4 to T2 Output (115 V.AC)
- 5 & 6 to K1 Coil (115 V.AC)
- 7 & 8 to 220 V.AC 1 ph.

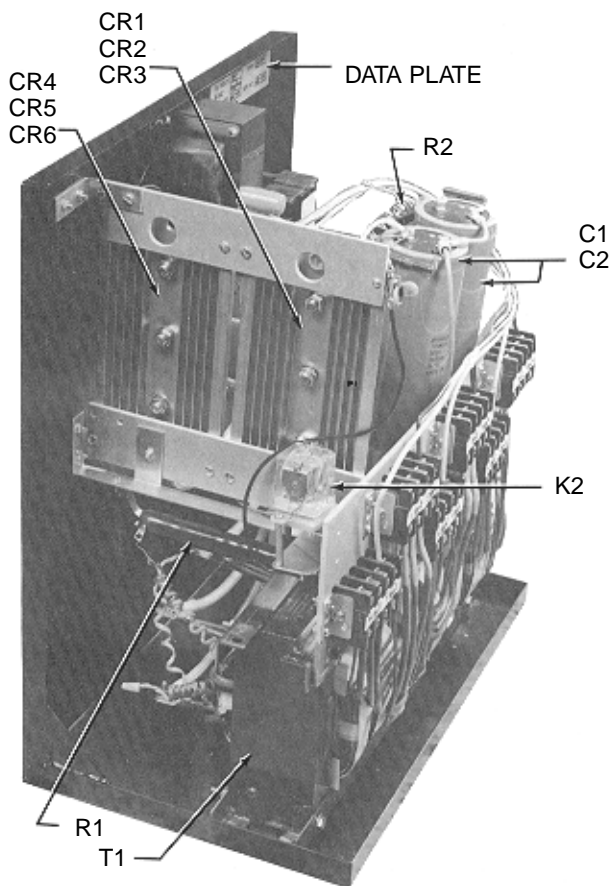


CR1,2,3: Forward Diodes  
 CR4,5,6: Reverse Diodes

FXPS Power Supply  
Model "LB"



CR1,2,3: Forward Diodes  
CR4,5,6: Reverse Diodes

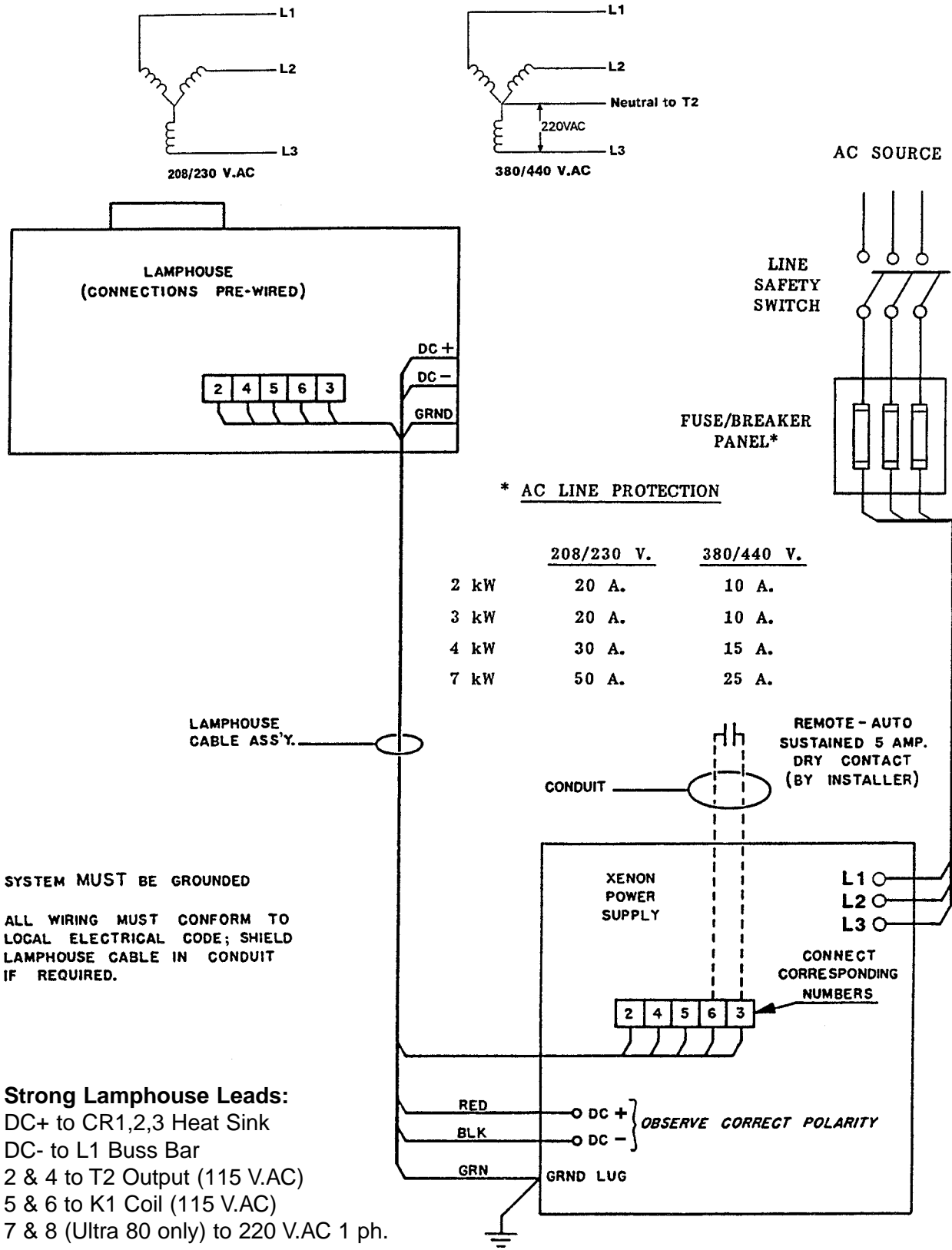


TB1,2,3: Fine Taps  
TB3,4,5: Coarse Taps

**Strong Lamphouse Leads:**  
DC+ to CR1,2,3 Heat Sink  
DC- to L1 Buss Bar  
2 & 4 to T2 Output (115 V.AC)  
5 & 6 to K1 Coil (115 V.AC)



# INSTALLATION WIRING DIAGRAM



SYSTEM MUST BE GROUNDED

ALL WIRING MUST CONFORM TO LOCAL ELECTRICAL CODE; SHIELD LAMPHOUSE CABLE IN CONDUIT IF REQUIRED.

**Strong Lamphouse Leads:**

- DC+ to CR1,2,3 Heat Sink
- DC- to L1 Buss Bar
- 2 & 4 to T2 Output (115 V.AC)
- 5 & 6 to K1 Coil (115 V.AC)
- 7 & 8 (Ultra 80 only) to 220 V.AC 1 ph.

## TROUBLESHOOTING



WARNING: Exercise extreme caution when taking voltage measurements in a power “ON” condition. Allow the capacitors (2) minutes to discharge.



### POWER LINE PROBLEMS

PRIMARY POWER (AC source) problems are most commonly (a) complete loss of AC power, or (b) phase loss, in which one phase loses power.

- a) Check line safety switch (“ON”). Check fuses or breakers in supply line. Using an AC voltmeter, measure input power at contactor terminals L1, L2, L3.
- b) When power is lost on one phase, the current ripple will increase and trip the AC line circuit breaker (at the wall, or in a Console Distribution Panel). To detect a lost phase, measure the AC voltage phase-to-phase at contactor input terminals L1, L2, and L3.

PROBLEMS of this nature, once detected, are generally corrected by the power supplier (i.e. the local utility company).

### BOOST CIRCUIT PROBLEMS

THE BOOST CIRCUIT generates the high open circuit (“no load”) DC voltage which, in conjunction with the igniter pulse, will ignite the xenon bulb. The open circuit voltage should measure at least 110 V.DC. It is displayed briefly on the lamphouse ammeter by pressing the “VOLT-AGE” button at ignition, or the reading can be sustained by disabling lamphouse ignition by removing one AC lead from the igniter feed (Strong lamphouse: 5 or 6).

A TERTIARY WINDING on the main transformer (T1) supplies the source for the Boost Circuit. Three wires derive from the T1 transformer; two are single conductors, and the third is a soldered pair. The Boost Circuit should be connected only to the (2) single conductors. Filter capacitors C1 & C2 store energy and also contribute to bulb ignition.

### CONTROL CIRCUITRY

THE MAIN POWER TRANSFORMER is energized by contactor K1, which is pulled by (a) an automation system closure or (b) manual actuation of the lamphouse “ON” switch. All lamphouse interlock switches (“Door,” “Air,” etc.) must also be closed to complete the contactor circuit.

ANY INTERRUPTION of the control circuit will disable K1 and open the AC circuit to the rectifier. In addition to the above lamphouse interlock switches, thermal switch S1, mounted to the rectifier heat sink, will open and disable K1 if the temperature at the heat sinks exceeds 190° F. (88° C.). The S1 switch will automatically re-set when temperatures fall to safe levels.

STEPDOWN TRANSFORMER T2 is protected by a (3) Ampere in-line fuse F1. In the event of a failure of a lamphouse control component (blower, igniter, etc.), the fuse will open. This, in turn, will disable the lamphouse control circuit and cause the power supply contactor K1 to open. Repair or replace the faulty lamphouse component before replacing the fuse (3 A. Std.); *do not overfuse.*

## TROUBLESHOOTING (continued)

### POWER CONVERSION PROBLEMS

RECTIFICATION (AC to DC) is performed by bridge diodes CR1 - CR6. CR1, CR2, and CR3 are **forward** diodes, and CR4, CR5, and CR6 are **reverse** diodes. The two types are *not interchangeable*.

AN OPEN DIODE will cause a pronounced flicker in the light output. Two or more open diodes will disable bulb ignition. A shorted diode will trip the circuit breaker (at the wall or in a Console Distribution Panel) protecting the AC input line. See the following DIODE TESTING & REPLACEMENT section.

BANKED CAN CAPACITORS C1 & C2, and Choke L1, filter the rectified DC output. C1 and C2 capacitors also store energy to contribute to the open circuit ignition discharge. A shorted capacitor can trip the AC circuit breaker. A faulty choke can allow excessive ripple, which can open the AC circuit breaker.

RELAY K2, in the presence of high DC open circuit voltage, will pull and place Resistor R2 in series with Capacitors C1 and C2. This resistor limits the inrush surge and prolongs the discharge of C1 & C2 to promote bulb ignition. If K2 relay fails, ignition may become erratic, and R2 may remain in circuit. With R2 in circuit, ripple will increase to a level noticeable in light output, but not necessarily enough to trip the AC line circuit breaker.

### DIODE TESTING & REPLACEMENT

1. Disconnect the diode from its circuit. Inspect for discoloration, oxidation, or loose crimp at lead junction.
2. A “shorted” diode will show low resistance in both directions. An “open” diode will have infinite resistance in both directions. An Ohmmeter test is required.
3. a) Analog VOM: Select R x 1 Ohm scale. With meter leads connected in one direction, the reading should be zero (or nearly so); reversing the meter leads should show very high resistance. If the diode does not exhibit these characteristics, replace it. NOTE DIODE TYPE: forward or reverse.  
b) Digital VOM: Select “Diode Test.” With meter leads connected in one direction, the reading should be “OL” (overload); reversing the meter leads should display approximately .4 volt. If the diode does not exhibit these characteristics, replace it. NOTE DIODE TYPE: forward or reverse.
4. Carefully clean the area of the heat sink in which the diode mounts. Apply heat sink compound (Radio Shack #276-1373 or equivalent) using a wood or plastic spatula or stick. A thin layer is adequate.

**WARNING: HEAT SINK COMPOUND IS HIGHLY CAUSTIC.** Do not apply with fingers; keep away from eyes. Carefully follow ALL the instructions printed on the package.

5. Install the new diode and tighten securely for maximum mechanical contact and electrical conduction. Clean and firmly secure the lead terminal to the buss.

## **TROUBLESHOOTING (continued)**

### **Contactors does not energize (no audible “click”)**

1. Line safety switch open. Turn “ON.”
2. Console “Rectifier” circuit breaker off. Turn “ON.”
3. Circuit breaker or fuse in AC line open. Check AC source.
4. Lamphouse interlock switch open. See lamphouse manual.
5. Faulty contactor coil or loose connection at coil terminals. Repair or replace.

### **Contactors pulls but lamphouse igniter does not fire**

1. Faulty contactor contacts. With coil energized, check for continuity across the contacts from the “L” side to the “T” side; repair or replace if defective.
2. Insufficient DC output. See INSTALLATION section; increase tap setting as required.
3. Faulty igniter. See lamphouse manual.
4. Low open circuit voltage (less than 110 V.DC).
  - a) Check ceramic resistor R1; should be in circuit and measure 100 Ohms.
  - b) Check boost diodes CR7 and CR8. See preceding DIODE TESTING section.
  - c) Check filter capacitors C1 and C2. Replace if defective.

NOTE: Lamphouse “Emergency Ignite” switch (if present) will frequently overcome low open circuit voltage condition, but will not permit normal auto-strike function.

### **Bulb requires multiple ignition pulses to light**

1. Insufficient DC output. See INSTALLATION section; set tap setting as required.
2. Faulty K2 relay. Replace if defective.
3. Faulty or expired xenon bulb. Check for darkened envelope, worn electrodes; replace if required.
4. One or more faulty bridge diodes. See preceding DIODE TESTING section.

### **Bulb goes out during operation**

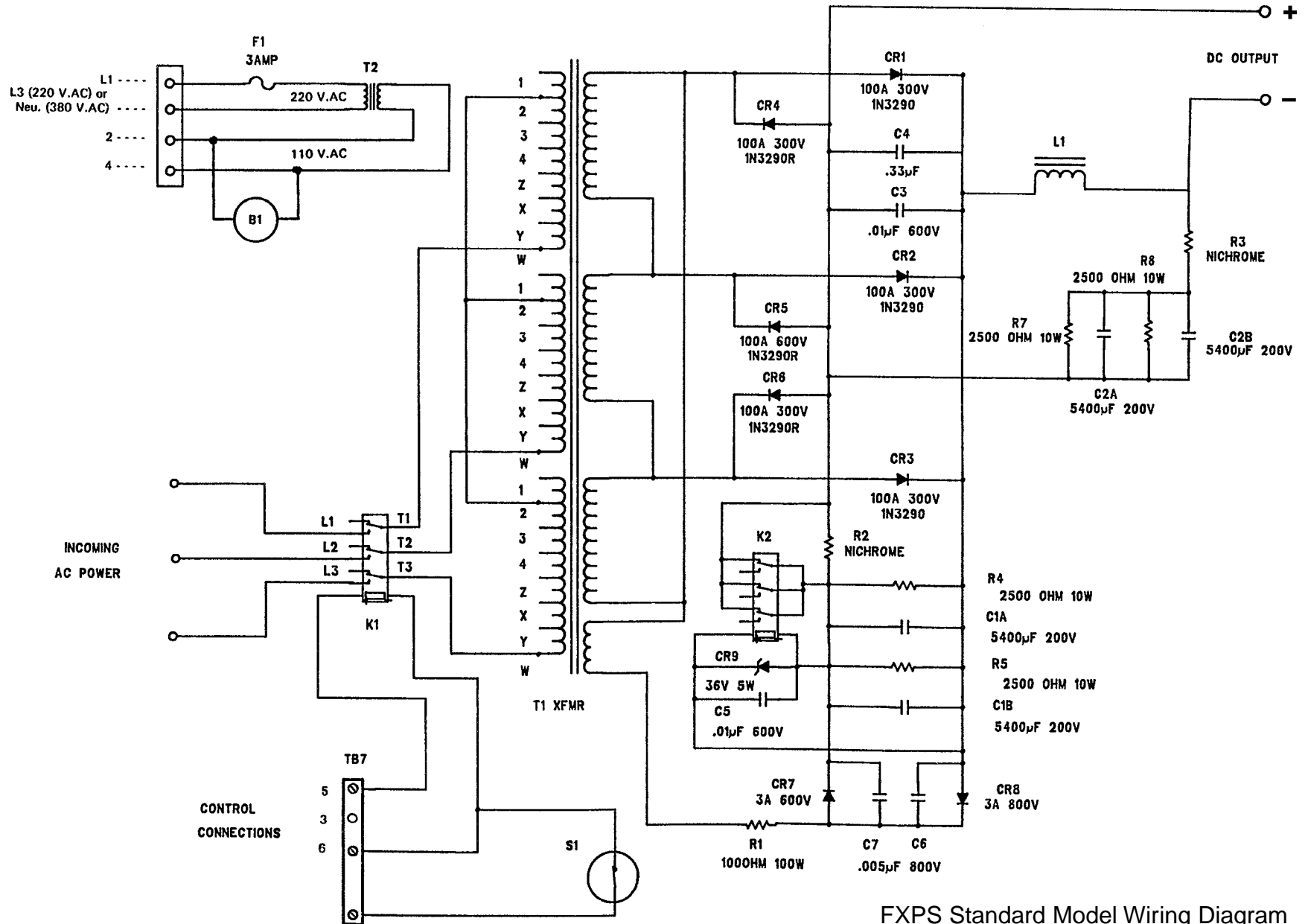
1. Excessive heat at rectifier heat sinks; thermal switch S1 opening. Check for free air flow, blower(s) operating at full speed. Check for loose connection.
2. Faulty lamphouse interlock switch (“Door,” “Air,” etc.). See lamphouse manual.

### **Excessive flicker in light output**

1. Improper tap setting. All taps must be on same numbered or lettered step.
2. Faulty bridge diode. See preceding DIODE TESTING section.
3. Faulty xenon bulb. Check for cracked or sagging electrode(s).
4. Open filter capacitor C1 or C2. Replace if defective.

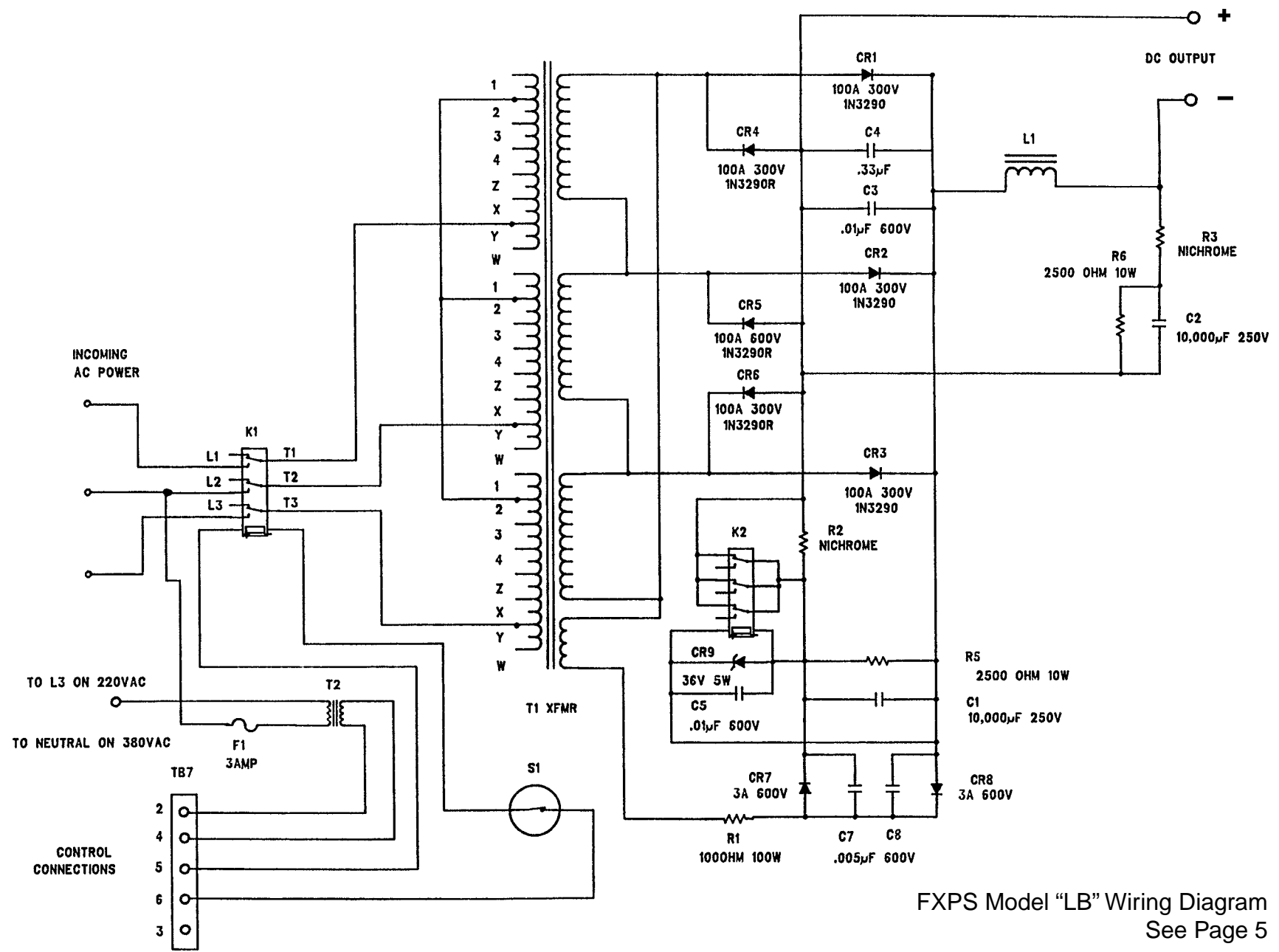
### **Bridge diodes (CR1-6) fail repeatedly**

1. Insufficient air flow; defective blower. Clean, repair, or replace as required.
2. Incorrect replacement diode. Use only the specified rated diode(s).



FXPS Standard Model Wiring Diagram  
See Page 4

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FXPS Model "LB" Wiring Diagram  
See Page 5

**PARTS LIST**  
**XENON POWER SUPPLY Type FXPS**  
**2000 - 7000 Watt**

Ref.		
<u>Desig.</u>	<u>Part No.</u>	<u>Description</u>
B1	91-98027	Blower, 115 V.AC, "Muffin" Type (as shown)
B1	81-98057	Blower, 115 V.AC, Squirrelcage (not shown)
C1,2	81-08007	Filter Capacitor, 10,000 $\mu$ f, 250 V.
-	61-06001	Capacitor Clamp (2 req'd.)
-	82-40256	Capacitor Mounting Plate (Model "LB")
C1A,B	61-08027	Filter Capacitor, 5400 $\mu$ f, 200 V.
-	61-06001	Capacitor Clamp (2 req'd.)
-	82-40264	Capacitor Mounting Plate
C2A,B	61-08027	Filter Capacitor, 5400 $\mu$ f, 200 V.
-	61-06001	Capacitor Clamp (2 req'd.)
-	82-40248	Shorting Bar, "A" to "B" (2 req'd.)
C3	81-08029	Capacitor, .01 $\mu$ f, 600 V.DC
C4	81-08005	Capacitor, .33 $\mu$ f
-	92-70045	Capacitor Assembly (C3 & C4)
C5	81-08029	Capacitor, .01 $\mu$ f, 600 V.DC
C6,7	81-08025	Ceramic Capacitor, .005 $\mu$ f, 30 V.DC
-	82-70012	Voltage Doubler Assembly (C6,C7,CR7,CR8)
CR1,2,3	81-47004	Forward Diode, 100 A. 300 V. (1N3290)
CR4,5,6	81-47001	Reverse Diode, 100 A. 300 V. (1N3290R)
-	91-98031	Buss Bar, Diode Lead Connection (3 req'd.)
-	82-20032	Heat Sink (2 req'd.)
-	82-40254	Upper Heat Sink Brace, Phenolic
-	82-40255	Lower Heat Sink "L" Bracket, Phenolic
CR7,8	81-47006	Boost Diode, 3 A. 600 V.
-	82-70012	Voltage Doubler Assembly (C6,C7,CR7,CR8)
CR9	81-17002	Zener Diode, 5 W. 36 V. (1N5365B)
F1	2353-0300	Fuse, 3 A. 250 V. (3AG)
-	81-21006	Fuse Holder, In-Line (Model "LB")
-	21-21039	Fuse Holder, Panel Mount
L1	**	Choke (Order by Equipment Type)
K1	81-14001	Contactor, 115 V.AC, 50/60 Hz. Coil
K2	2501-3150	Plug-In Relay, 48 V.DC Coil
-	82-70014	Relay Socket Assembly, with C5 Capacitor
-	81-56002	Spacer, Relay Socket (2 req'd.)
-	23862000	Relay Support Bracket (Model "LB")
-	91-37002	Relay Hold-Down Spring

**FXPS Parts List (continued)**

Ref.	<u>Desig.</u>	<u>Part No.</u>	<u>Description</u>
	R1	81-46026	Ceramic Resistor, 100 Ohm, 100 W.
	R2,3	92-70026	Nichrome Limiter Resistor
	R4-7	81-46006	Bleeder Resistor, 2500 Ohm, 10 W.
	S1	81-61010	Thermal Switch
	-	82-70013	Thermal Switch (S1) & Leads, Wired Assembly
	T1	**	Power Transformer (Order by Equipment Type)
	T2	61984000	Stepdown Transformer
	-	82-40353	Insulated Mounting Plate, T2 & F1
	-	21-62059	Barrier Strip, (3) Terminal
	TB1-6	81-62001	Tap Terminal Block (6 req'd.)
	-	82-40047	Insulated Mounting Plate, TB1-6
	TB7	21-62009	Control Circuit Barrier Strip, (5) Terminal

\*\* Order Numbers: Choke & Power Transformer

<u>Wattage, Input Voltage</u>	<u>L1 Choke</u>	<u>T1 Power Transformer</u>
2000 Watt, 208/230 V.	91-64005	91-64008
2000 Watt, 380/440 V.	91-64005	91-64009
3000 Watt, 208/230 V.	91-64005	91-64004
3000 Watt, 380/440 V.	91-64005	91-64006
4000 Watt, 208/230 V.	1249314-3	91-64012
4000 Watt, 380/440 V.	1249314-3	91-64001
7000 Watt, 208/230 V.	91-64013	91-64011
7000 Watt, 380/440 V.	91-64013	91-64007

Replacement T1 Transformer includes (6) 81-62001 Tap Terminal Blocks (TB1-6) and (1) 82-40047 Terminal Block Mounting Plate.

**Replacement Bridge Rectifiers**

92-70034	Diodes & Heat Sink Assembly, Complete (Standard model) See Page 4, CR1-6
82-70011	Diodes & Heat Sink Assembly, Complete (Model "LB") See Page 5, CR1-6



**FXPS Parts List (continued)**

**MECHANICAL & MISCELLANEOUS COMPONENTS  
(Not Otherwise Listed)**

Standard Model (See Page 4)

- 1249110-1 Base Chassis, Welded Assembly
  - 82-40040 Support Bracket, Rectifier Heat Sinks (2 req'd.)
  
  - 82-40267 Cabinet End Panel, Plain
  - 82-40268 Cabinet End Panel, with Grille & Knock-Outs
  - 82-40269 Cabinet Side Panel (2 req'd.)
  - 82-40275 Cabinet Top Cover
- Power Supply Cabinet (not shown) *not supplied*  
with Console-Mounted (Optimax, Highlight) units.

Model "LB" (See Page 5)

- 23881000 Chassis Welded Assembly, "L" Bracket
- 62-40069 Support Bracket, Rectifier Heat Sinks
- 82-70010 Lead Assembly, L1 Choke to Negative Heat Sink
- 82-70015 Lead Assembly, Bridge Diodes to T1 Transformer (3 req'd.)
- 77839000 Negative Lead Assembly, 60" (to Console Lamphouse)
- 77840000 Positive Lead Assembly, 48" (to Console Lamphouse)

## EQUIPMENT SPECIFICATIONS

### Xenon Power Supply Type FXPS

<u>MODEL</u>	<u>WATTAGE; AC INPUT</u>	<u>TYPE NO.</u>	<u>DC AMPS</u>	<u>DC VOLTS</u>
FXPS 2kW	2000 Watt; 208/230 V.	93-90007	60-100	25
FXPS 2kW	2000 Watt; 380/440 V.	93-90010	60-100	25
LBPS 2kW	2000 Watt; 208/230 V.	77052-01	60-100	25
LBPS 2kW	2000 Watt; 380/440 V.	77052-01	60-100	25
FXPS 3kW	3000 Watt; 208/230 V.	93-90013	80-120	30
FXPS 3kW	3000 Watt; 380/440 V.	93-90016	80-120	30
LBPS 3kW	3000 Watt; 208/230 V.	77053-01	80-120	30
LBPS 3kW	3000 Watt; 380/440 V.	77053-02	80-120	30
FXPS 4kW	4000 Watt; 208/230 V.	93-90019	100-150	30
FXPS 4kW	4000 Watt; 380/440 V.	93-90022	100-150	30
LBPS 4kW	4000 Watt; 208/230 V.	77054-01	100-150	30
LBPS 4kW	4000 Watt; 380/440 V.	77054-02	100-150	30
FXPS 7kW	7000 Watt; 208/230 V.	93-90025	130-180	40
FXPS 7kW	7000 Watt; 380/440 V.	93-90028	130-150	40
LBPS 7kW	7000 Watt; 208/230 V.	77057-01	130-150	40
LBPS 7kW	7000 Watt; 380/440 V.	77057-02	130-150	40

#### NOTES:

1. FXPS = Standard Chassis; available with Cabinet; See Pages 4 & 10
2. LBPS = "L" Bracket Chassis (Model "LB"); See Pages 5 & 11
3. For 2500 Watt Operation, use 2 kW or 3 kW Supply  
(Consult with Strong International Dealer per Application)
4. For 3600 Watt Operation, use 3 kW or 4 kW Supply  
(Consult with Strong International Dealer per Application)
5. 7000 Watt Operation for 70mm and Special Venue ONLY
6. Average Shipping Weight: Approx. 250 lb. (113.5 kg)

