

# Film-Tech

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# *Instructions*

**FOR  
EQUIPMENT  
Type**

XENON POWER SUPPLY

77008-9

3-1-75

**STRONG ELECTRIC**  
87 CITY PARK AVE., TOLEDO, OHIO

## PREFACE

THE STRONG D. C. POWER SUPPLY is a continuous duty three phase, full wave bridge type transformer rectifier using silicon diodes as the power conversion elements and is designed for use with all models of the Strong X-60 150 Ampere xenon projection lamphouse.

THIS POWER SUPPLY is designed to operate from an A. C. source of 220 volts (190-245V.) and draws 39 Amperes maximum per phase from a 220 volt line with a 150 Ampere load.

THE RATED D. C. OUTPUT RANGE is from 110-150 Amperes at 30 to 35 volts D. C.

THIS POWER SUPPLY cannot be used with the Durotest 150 Ampere bulb, unless the A. C. input voltage is between 210 to 260V. A. C. A lower A. C. line voltage will not permit operating the Durotest bulb at the top of its recommended range.

THE OSRAM 4000 watt bulb is rated at 100-135 Amperes. Therefore this power supply has the capacity to overdrive this particular bulb. Carefully read the following installation and operating instructions before attempting to ignite this bulb.

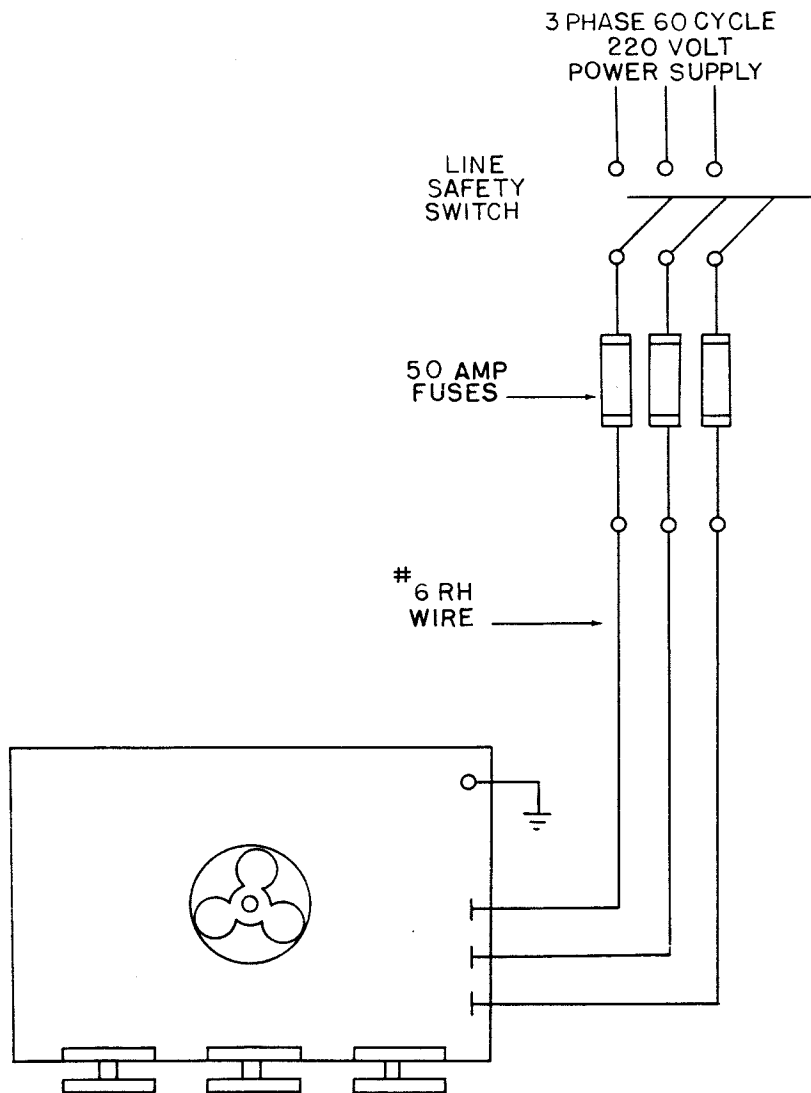
THE POWER SUPPLY is equipped with a cooling fan to maintain a safe operating temperature and a thermal switch, located on the rectifier heat sink, to stop operation of the equipment and protect the rectifier elements if temperatures reach an abnormal level.

A CHOKE and capacitors are provided in the DC circuit to reduce ripple to a minimum, consistent with the requirements of the xenon bulbs for long life.

CIRCUIT BREAKERS are installed in the 230V. AC control circuit to protect components in the event a malfunction occurs.

IF AT ANY TIME you have a suggestion, or desire aid in securing anticipated results, write directly to STRONG ELECTRIC, P.O. Box 1003, 87 City Park Ave., Toledo, Ohio 43697.

INSTALLATION DIAGRAM



## INSTALLATION - OPERATION

INSTALL THE POWER SUPPLY as close as possible to the lamp-house. Use the size wire specified on the installation diagram in the lamp-house manual, to keep the power loss between the power supply and lamphouse to a minimum.

THE D. C. CIRCUIT between the power supply and lamphouse must be a direct connection without fuses or switches in the circuit and avoid runs of over 15 feet, if possible.

THE A. C. INPUT POWER LINES between the power supply and fused safety switch should be as short as possible and conform to the size indicated on the installation diagram in this manual. A terminal lug, located inside the housing, is provided for the ground connection.

FOR BEST PERFORMANCE install the power supply in a well ventilated room. The power supply should not be operated in an ambient temperature over 120° Fahrenheit.

A THERMAL SWITCH, attached to the diode heat sink, senses the temperature and will open at 190°  $\pm$ 5° F., breaking the AC control circuit to the coil of the line relay and protect the rectifiers from over-heating. This switch will remain open and prevent operation of the power supply until the temperature at the heat sink falls below 185-190° Fahrenheit.

THE D. C. OUTPUT to the lamphouse is adjustable by means of the three dial switches, position #8 giving the highest output, and by moving the three AC leads from the relay across the tap panel from position "A" to "B", "C" and "D". These three leads at position "D" gives the highest output.

THE FOLLOWING TABLE is derived from the test results of only one bulb from one manufacturer. It is not indicative of the precise position for the AC line taps on the terminal panel. Due to permissible manufacturing tolerances for the power supply together with different characteristics of bulbs from various manufacturers and variations of bulbs from one manufacturer, it is recommended to place the AC line taps on the next lower rated tap and the dial switches on step "1" to insure that the xenon bulb is not overpowered on the first ignition.

THE THREE AC LEADS, from the relay to the tap panel must be in the same lettered position.

<u>Measured Line Volts</u>	<u>Desired Lamp Current</u>	<u>Connect to Terminals</u>
190	110	C
190	150	D
210	110	B
210	150	C
230	110	A
230	150	C
250	110	A
250	150	B

EACH DIAL SWITCH must be set on step (1). Each switch must be set on the same number and as they are moved from (1) to (8) the current to the bulb will be increased.

CONNECT THE LAMPHOUSE to the power supply in accordance with the lamp instruction manual and installation diagram. Make sure that the polarity of the D. C. leads to the lamphouse is not reversed. Reversed polarity will cause rapid destruction of the xenon bulb.

DO NOT BLOCK AIR VENT on top of the power supply, or operate with the front panel or top removed as this will cause the equipment to over-heat. Ignite the xenon lamp as specified in the lamp instruction manual. Wait a few minutes until the current stabilizes; then adjust the power supply for the current as specified by the bulb manufacturer.

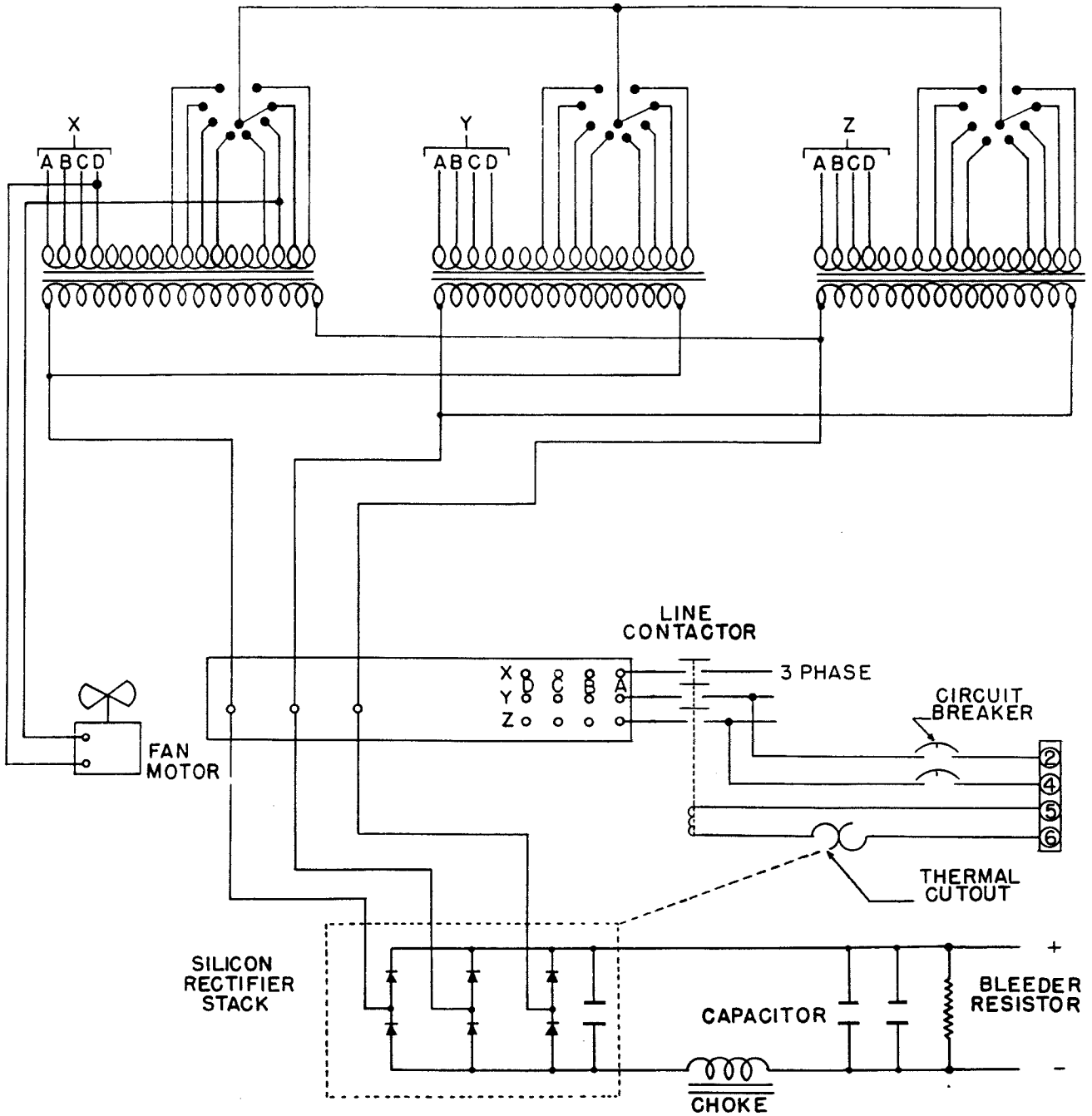
ARC CURRENT TOO LOW: (To increase current)

The arc current can be raised by turning the dial switch to a higher number. All 3 dial switches must be on the same number. If the switches are on number 8 and the current is still too low it can be raised by changing the coarse tap leads in the power supply to a higher tap (letter) i.e. tap "B" to tap "C". Again, when one lead is changed, all 3 must be changed. When the tap leads are changed, the dial switches must be set to number 1 step and then raised to a higher number if the current is too low. Do not exceed rated operating range of the xenon bulb being used in the lamphouse.

ARC CURRENT TOO HIGH: (To decrease current)

The arc current can be lowered by turning the dial switches to a lower number. All 3 switches must be on the same number. If the switches are on number 1, the current can be lowered by changing the coarse tap leads in the power supply, (see Figure 2 Item 12), to a lower tap (letter) i.e. tap "B" to tap "A". Again, when one tap lead is changed all 3 must be changed. When the coarse tap leads are changed, the dial switches must be set to number 1 step and then raised to a higher number if the current is too low.

WIRING DIAGRAM



## INSTRUCTIONS FOR REPLACEMENT OF SILICON STACK OR DIODES

IN CASE OF REPEATED BLOWN FUSES, noticeable reduction in light output, or excessive flicker, check for failure of a diode in the rectifier stack. Diodes of a silicon stack can be checked with an ohmmeter. In event of an open or shorted diode, it is relatively easy to make a replacement after the faulty element is located.

SINCE REPAIR OR REPLACEMENT of the unit or a diode will be required, it is best to remove the inoperative stack entirely from the rectifier by disconnecting the three AC and two DC leads, the two leads from the thermal switch and removing the four mounting bolts which fasten the unit to the bottom of the case.

WITH AN OHMMETER set on lowest range, check the resistance between the DC positive and each of the three AC terminals. Reverse ohmmeter leads and check the resistance again.

REPEAT THE ABOVE STEP between the negative terminal and each of the three AC terminals.

A GOOD DIODE will show high resistance in one direction and low resistance in the other. A shorted diode will have a very low resistance in either direction. An open diode will have infinite resistance in both directions.

ONCE THE FAULTY DIODE is located, two wrenches will be required for replacement. Proceed as follows:

- (1) Disconnect the flexible wire to the defective diode.
- (2) Remove the diode using two wrenches, one for the hex diode face and the other for the retaining nut and lock nut.
- (3) Install the new diode and tighten securely to insure perfect heat and electrical conductivity.
- (4) With the new diode in place; connect the diode flexible lead to the diode terminal.
- (5) Replace the diode stack in the power supply and connect the two D. C. leads, making sure the D. C. polarity is not reversed, connect the two leads to the thermal switch and the three A. C. leads to the rectifier stack.



## TROUBLE CHART

### NORMAL OPERATION:

When the line power switch is turned on, voltage is supplied to the line side of the line contactor in the power supply, and to the 230V. AC control circuit of the lamp. The control circuit to the lamphouse is protected by two circuit breakers. A thermal switch, fastened to the diode heat sink to protect the diodes from overheating, will open the coil circuit of the contactor and stop operation of the power supply in the event the temperature at the heat sink reaches  $190^{\circ} \pm 5^{\circ}$  Fahrenheit. Opening and closing of this switch due to excessive heat will cause intermittent operation of the xenon lamp.

When the power switch in the lamp is turned "On" the line contactor in the power supply will be energized, a loud click will be heard as the contacts close and line voltage will be applied to the transformers. The cooling fan in the power supply will start, and voltage will be applied to the silicon rectifier unit. A high no load DC voltage, necessary to ignite the lamp, will appear across the DC arc leads to the lamp. A choke in the negative DC lead and capacitors connected across the DC leads smooth the DC current to the bulb. Discharge of these capacitors contribute energy to the high voltage pulse required for sustained ignition of the xenon bulb. A ceramic disc capacitor is connected across the silicon rectifier unit to bypass any R. F. pulses that may come back through the DC leads.

When the ignite button is pushed and the bulb ignites, the DC voltage output of the power supply will drop, due to the design of the transformers, to the normal operating voltage of the bulb.

If the dial switches, or coarse taps are adjusted to a higher step, the voltage to the lamp is increased, and due to the bulb characteristics, the current is increased.

If the dial switches, or coarse taps are adjusted to a lower step, the voltage to the bulb is decreased, and due to the bulb characteristics, the current is decreased.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>TEST</u>	<u>REMEDY</u>
Line contactor does not energize (no loud click from contactor when lamp power switch is turned on. )	Line power switch not turned on.	Check line switch.	Turn on.
	Blown line fuses.	Check line fuses.	Replace blown fuses.
	Circuit breakers open.	Check for short in control circuit.	Reset circuit breakers, repair short.
	Open thermal switch.	To isolate switch, place a jumper on terminal #6 to the relay coil terminal where the lead from the thermal switch is connected.	Replace switch if defective.  Leave unit cool down. Unit running hot-opens switch.
	Contactors coil burned out.	Check for line voltage across terminals 5 and 6, Fig. 1 Item 1, with lamp power switch on.	If line voltage appears across these terminals replace contactor coil.
	Blown lamp fuses or lamp door switch inoperative.	If line voltage is not measured across 5 & 6 but is measured across 2 & 4 on terminal board.	See lamp manual "Trouble Chart" section.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>TEST</u>	<u>REMEDY</u>
Fan does not run but contactor clicks on.	Blown line fuse.	Check fuse.	Replace.
	Contacts in line contactor burned or defective.	Check for clicking sound from igniter relay, at back of lamp with lamp power switch on.	Replace defective contacts in line contactor if no clicking is heard from igniter relay.
	Defective fan motor.	Test same as above.	If clicking is heard from igniter relay, replace fan motor.
Repeatedly blows line fuses.	Wrong size fuses.	Check size of fuses.	Replace with proper size fuses (see installation diagram).
	Wired improperly.	Check wiring (see Installation Diagram).	Wire properly.
	Shorted silicon rectifier unit.	Check silicon unit (See instruction for replacement of silicon stack diodes) in this manual.	Replace defective diodes.
	Shorted transformer.	Disconnect silicon unit at terminal panel. Turn on lamp power switch.	If fuses still blower replace transformer bank.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>TEST</u>	<u>REMEDY</u>
Repeated shorted diodes.	Insufficient air flow thru power supply.	Check for blocking of air thru silicon unit, screen in bottom of case, air outlet on top of case.	Clean power supply and remove any obstructions to air circulation.
	Defective fan.	Fan blade moving slow, not much air.	Replace fan motor.
	Wrong replacement diode being used.		Replace defective with proper one.
	Defective ceramic RF capacitor on rectifier stack.	Remove and test with capacitor tester if available.	Replace capacitor.
Excessive light flicker.	Improper dial switch or coarse tap settings.	Check that all 3 dial switches are on the same step number. Check that all 3 coarse taps are on the same letter taps.	Set properly.
	Defective silicon unit.	Check silicon unit. See "Instruction for replacement of silicon stack diodes in this manual.	Replace defective diodes.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>TEST</u>	<u>REMEDY</u>
Low - No load DC voltage to lamp (less than 90 volts measured across terminals 10 & 15 at capacitors C4, C5 in lamp-house, behind rear access panel.	Coarse taps or dial switches set wrong.	Check installation procedure in this manual.	Adjust taps and dial switches properly.
	Blown line fuse.	Check line fuses.	Replace bad fuse.
	Defective diodes in silicon unit.	Check silicon unit (see "Instructions for replacement of silicon stack diodes" in this manual.	Replace defective diodes.
	Defective electrolytic filter capacitors.	Connect DC Voltmeter, capable of reading 150 volts across terminals 10 and 15 in lamp. Turn on lamp power switch for 5 seconds. Note voltmeter reading, turn off lamp power switch. Voltage must fall slowly.	If voltage rapidly falls to zero, replace capacitors.
	Contacts in line contactor defective or burned.	Check contacts.	Replace contacts.
	Dial switch	Check that fingers of switches make solid contact with switch contacts.	Replace dial switch fingers or entire dial switch.

<u>TROUBLE</u>	<u>PROBABLE CAUSE</u>	<u>TEST</u>	<u>REMEDY</u>
Bulb goes out during operation.	Defective fan.	Test for 115V. AC at "D" tap on term. board and #3 contact on Dial Switch.	Replace motor.
	Thermal switch on heat sink.	To isolate switch place a jumper on terminal #6 to the relay coil terminal where the lead from the thermal switch is connected.	Replace switch if defective. If temperature at heat sink reaches 190 $\pm$ 5°F. thermal switch will open.

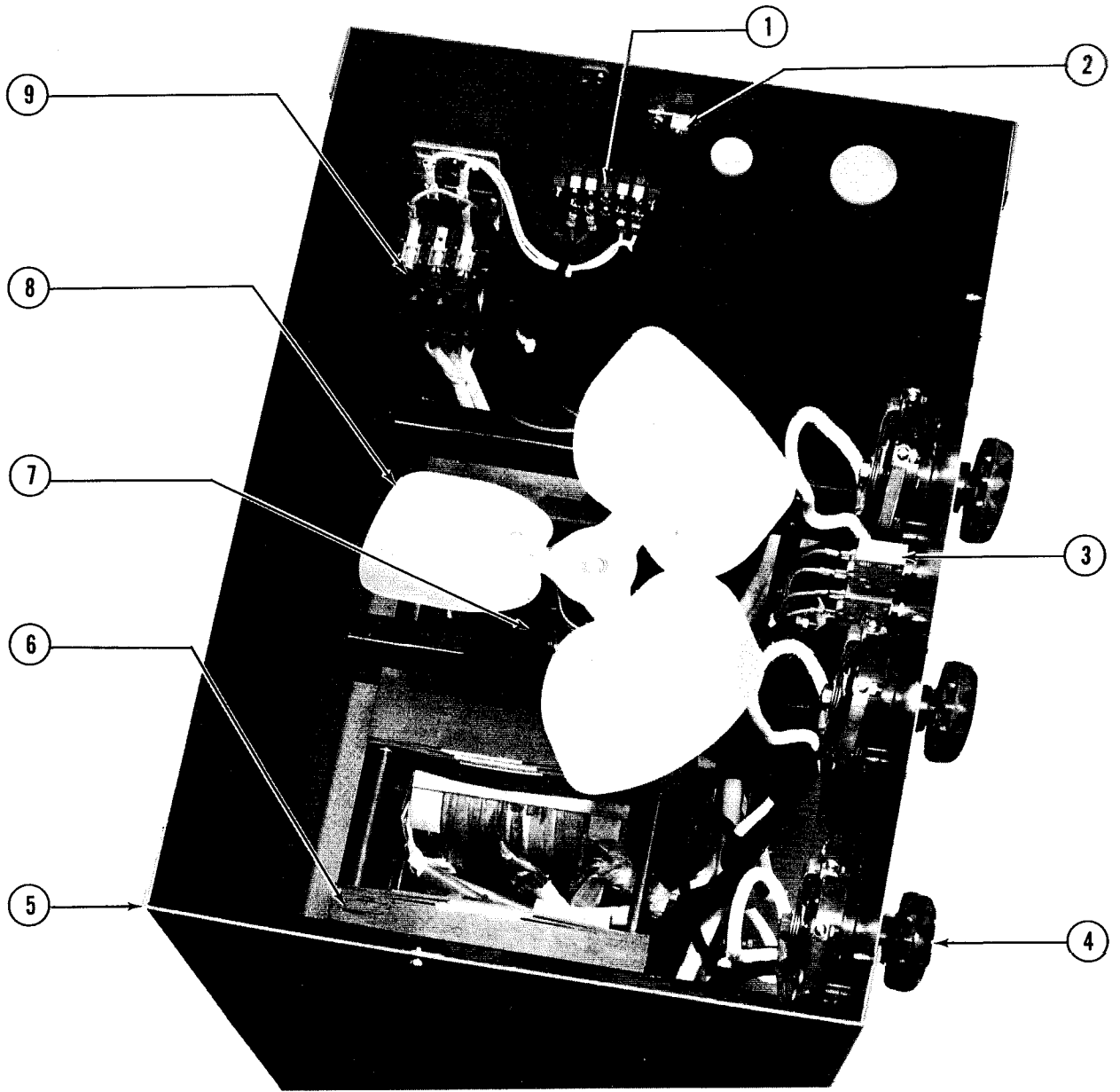


Fig. 1

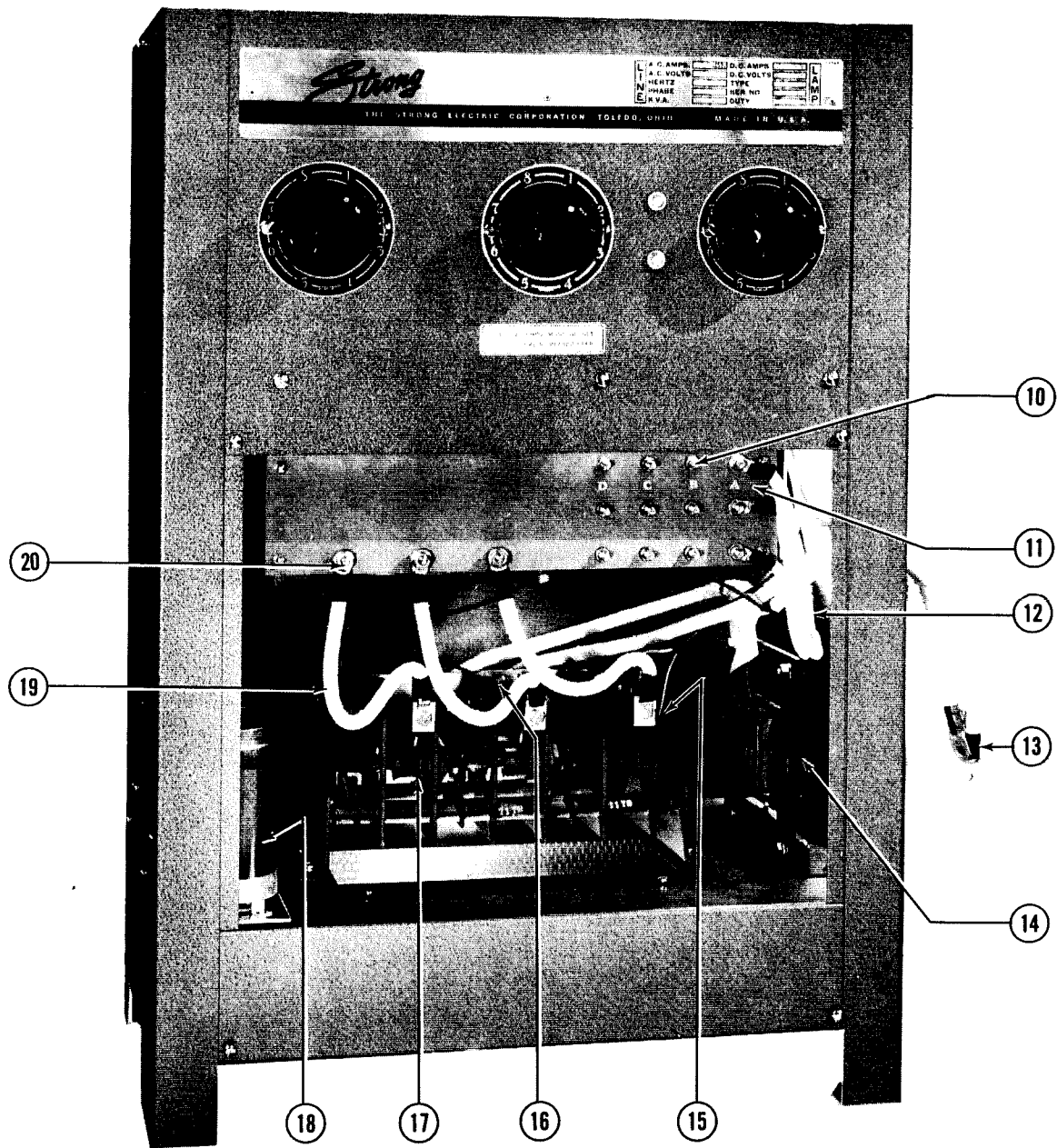


Fig. 2



PARTS LIST

<u>Item No.</u>	<u>Part No.</u>	<u>Description</u>
1	64149	Term. Block
	1448	Screw, #6-32 x 3/4" Bd.Hd.
	793	Steel Nut 6-32
	892	Lockwasher, #6 Shakeproof #1206 Internal
2	79131	Terminal Lug
	1307	Screw, 10-32 x 3/8" Lg. Bd.Hd.
	800	10-32 Steel Half Nut
	885	#10 Shakeproof #1910 Internal Lockwasher
3	79107	Circuit Breaker
4	15490B	Dial Switch
	543	Screw, 1/4-20 x 3/8" Oval Bd.Hd.Mach.
	15008	Bearing
	15014	Nut
	15035	Spring
	15489	Switch Body & Inserts
	15492A	Knob & Shaft
	15496B	Contact Finger & Wire
5	77979	Case
	94977	Cover
	1423	Screw, 10-32 x 5/16" Bd.Hd. (Steel)
	94109	Front Panel
	1307	Screw, 10-32 x 3/8" Lg. Bd.Hd.
6	77008-9BA	Transformer (3 Phase) Banked Assy.
	543	Screw, 1/4-20 x 3/8" Oval Bd.Hd.Mach.
7	94248	Motor, Fan 115V. 60 Hz.
	689	Screw, 1/4-20 x 5/8" Hex Hd. Mach.
	876	Lockwasher, 1/4" (Split Ring)
	805A	Nut, 1/4-20 Hex
	94117	Mounting Brkt., Fan
	691	Screw, 1/4-20 x 3/4" Hex Hd. Mach.
	876	Lockwasher, 1/4" (Split Ring)
	852	Washer, Steel 1/4" SAE
	805A	Nut, 1/4-20 Hex
8	94138-A	Blade, Fan
9	77161	Relay
	1423	Screw, 10-32 x 5/16" Bd.Hd.
	800	Nut, 10-32 Steel Half
	894	Lockwasher, #10 Split Ring
10	513	Screw, 1/4-20 x 1-1/4" Fil. Hd.Mach.
	893	Lockwasher, 1/4" Shakeproof #1914
	805A	Nut, 1/4-20 Hex
11	77141	Panel, Terminal
	323	Screw, 10-24 x 1" Rd.Hd.Mach.

<u>Item No.</u>	<u>Part No.</u>	<u>Description</u>
11	Cont'd.	
	1344	Lockwasher, #10 (Internal) #1210 Shakeproof
	982	Washer #5210 Bright Kromoide
	797	Steel Nut 10-24
12	77975	Cable Assy., Relay to AC Terminals
13	77976	D. C. Lead, Negative
	77977	D. C. Lead, Positive
14	CAAM	Choke
	74209	Mounting Bracket
	1447	Screw, 5/16-18 x 2-3/4" Hex Hd. Cap
	807	Steel Nut 5/16-18 U. S. S.
	877	Lockwasher, 5/16" (Split Ring)
	1346	Screw, 5/16-18 x 1/2" Hex Hd.
15	77160	Thermal Switch
	1311	Screw, 8-32 x 3/8" Bd. Hd.
	795	Steel Nut 8-32
16	77957	Capacitor Assy. (.01 MFD. 500 or 1000 VDC)
17	74262	Silicon Rectifier Stack Assy.
	504	Screw, 1/4-20 x 5/16" Fil. Hd. Mach.
	876	Lockwasher, 1/4" (Split Ring)
	74279	Diode (6 req'd) <i>1N3291 400V, 150 AMP ECG 6154</i>
	94945	Mounting Plate, Rectifier Stack
	1307	Screw, 10-32 x 3/8" Lg. Bd. Hd.
	982	Washer, #5210 Bright Kromoide
18	77941	Capacitors & Bracket Assy.
	84151	Capacitor, 12000 MFD-125 WVDC (Mallory) or 13500 MFD-150 WVDC (Cornell-Dublier)
		NOTE: Due to difficulty to buy the above two capacitors, it has become necessary at times to use as a substitute four capacitors from different manufacturers with various ratings. In the event any one of these capacitors fail, it is essential that the full description printed on the capacitor case by the manufacturer, along with the serial and model number of the power supply, is included with the order for the replacement part.
19	77978	A. C. Lead, Term. Panel to Stack
20	615	Screw, 5/16-18 x 1-1/2 Hex Hd. Mach.
	1502	Lockwasher, 5/16" Shakeproof
	853	Steel Washer, 5/16" SAE
	807	Steel Nut, 5/16-18 U. S. S.

## PARTS LIST

All the prices are quoted f.o.b. Toledo and are subject to change without notice.

When ordering parts be sure to advise the serial numbers and the model of lamps in addition to the name of the parts wanted and how shipment is to be made.

There will be a minimum charge of ten dollars on any one invoice and a service charge sufficient to cover the cost of handling on all merchandise returned to us for credit.