Film-Tech

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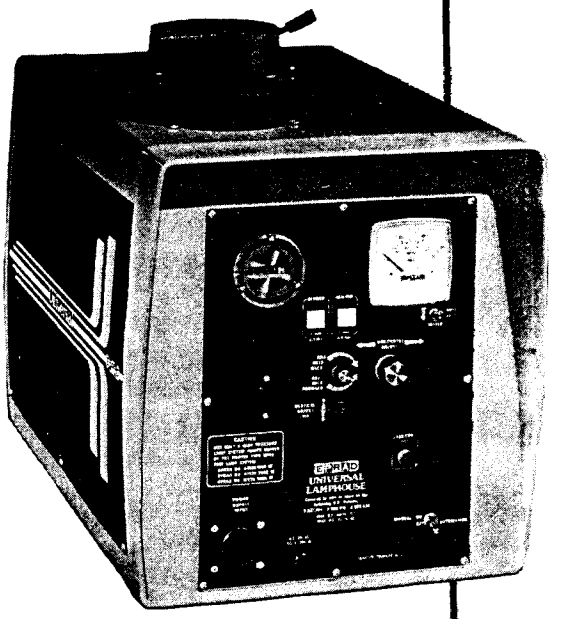
www.film-tech.com

EPRAD

PRODUCT OF EXCELLENCE

47000
UNIVERSAL LAMPHOUSE
MANUAL



- **OPERATION**
- **INSTALLATION**
- **SERVICE**

MANUAL

CAUTION

USE ONLY CLEAN, DRY CLOTH TO CLEAN MIRROR.

DO NOT USE CHEMICALS OR CLEANERS.

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INTRODUCTION

EPRAD UNIVERSAL XENON LAMPHOUSE

In any comparative test made between carbon arc and xenon light sources for motion picture projection, it was said that the xenon seemed to present a brighter picture, even when light meter readings were identical. Recently some painstaking research has proved that this is not an optical illusion.

The color of light from xenon bulbs is more nearly matched to sunlight than light from a carbon arc. Obviously, the human eye has evolved through several million years to be most efficient in the most commonly experienced condition--sunlight. It is tuned to peak efficiency within the color range of the sun's spectrum.

A light source which does not accurately match that range will appear inferior even if the same amount of energy reaches the screen.

The theory in designing an efficient lamphouse is to collect the maximum energy, deliver it evenly and accurately to the film, and to interfere as little as possible with the composition of the visible part of the energy. The invisible and useless heat rays must be filtered out.

The EPRAD Universal Xenon Lamphouse features all these qualities. You will present an appreciably better picture to your patrons while using less power.

The EPRAD Universal Lamphouse (Model 47000) is designed to use most makes of xenon bulbs made for horizontal burning. Any bulb of less than 5 kilowatts and mechanical specifications within the limits of the rectifier can be used in this one lamphouse. The lamphouse is manufactured for standard mounting and has accurate location rails under its base with appropriate holes for hold-down bolts.

Cooling by the high-speed, built-in blower is adequate for bulb sizes up to 1000 watts, although an external fan in the exhaust ducting system is desireable. When larger bulbs are used, an external exhaust fan is required. The usual ¼ hp fan for two lamps is adequate, providing that each lamp receives at least 500 cfm (cubic feet per minute) of draft.

Additional cooling for bulbs up to 2500 watts can be obtained by installing an EPRAD External Fan Box (47600). In most cases, this can eliminate the need for a roof exhaust; the fan box mounts directly to the top of the Universal Lamphouse and can be ducted to open air.

Infra-red (heat) rays are separated from the visible light by specially treated heat-reflecting glass panels ("hot mirrors") designed to reflect the IR rays sideways onto heat dissipating panels. The heat is then carried out through the stack in the cooling air. This holds down the temperature at the film plane; DO NOT operate the lamphouse with the heat glass removed or film damage may be incurred.

For lamphouses operated in excess of 3kw, EPRAD supplies an additional pane of heat glass with a bracket for installing it inside the lamphouse snood in front of the two standard panes. The top of the additional pane is to be installed tilted forward to deflect the IR rays upward into the stack.

Each pane of heat glass reflects 90% of the infra-red energy. If the first hot mirror removes 90%, the second removes 90% of the 10% remaining. The hot mirrors are coated on both sides, making them highly efficient.

Bulb cooling is effected by directing the flow of cooling air to the hottest places on the bulb. This assures that the bulb heats and cools uniformly; the difference in temperature from one part of the bulb to another never exceeds 50 degrees Fahrenheit (20 degrees C.). This factor greatly extends bulb life.

Once the heat glass panels have separated the heat from the light and the blower has removed the heat from the bulb, an adequate updraft above the lamphouse exhaust stack must be furnished to remove this heat from the housing of the lamp. Natural heat convection is not sufficient; for best performance and longest bulb life, the heat must be drawn from the lamphouse.

This, of course, is the function of the external exhaust fan. To determine if the lamphouse exhaust is adequate, operate the lamp for one hour and feel the side doors and front casting of the lamp. They should feel warm, but NOT HOT to the touch. All of these parts are protected inside the lamphouse by heat shields; if the heat is being conducted to the exterior of the lamphouse, the exhaust draft is inadequate.

Since the arc of the xenon bulb is enclosed, it is impossible to furnish too much draft. On the average, 500 cfm is adequate.

The double-door heat sink dowser is operated by the handle mounted on the top of the lamphouse. The doors are designed to remain at a safe temperature indefinitely when closed, even with the largest (4.2kw) bulb burning, provided that the bulb is correctly focused and the lamphouse blower and exhaust fan are running.

The reflector is a computer-designed deep dish and collects maximum light. It is all metal and will not shatter. Manufactured by electro-deposition of pure nickel, it provides a superb polished finish. To attain extremely high reflectivity, pure aluminum is then applied by vacuum coating. Finally, the aluminum is protected with a coating of an oxide of silicon. The finished reflector has a very high efficiency because of this surface finishing technique and because the deep dish shape collects so much more light which would otherwise escape.

The reflector system is unique because provision is made for adjustment to "tune" its shape. The outline of the usually circular light beam can be modified to form an ellipse. This will more closely match the aspect ratio of the aperture plate most often used. Again, this increases the overall level of screen illumination.

NOTE: USE ONLY CLEAN, DRY CLOTH TO CLEAN REFLECTOR!
DO NOT USE CHEMICALS OR CLEANERS OF ANY TYPE!

Not only are cleaning solutions unnecessary for cleaning xenon lamphouse reflectors, some solutions will destroy the reflector finish.

REFLECTORS DAMAGED BY IMPROPER CLEANING, RAIN, EXPLOSION, OR POLLUTION ARE NOT COVERED BY WARRANTY

CAUTION

USE ONLY CLEAN, DRY CLOTH TO CLEAN MIRROR.

DO NOT USE CHEMICALS OR CLEANERS.

MIRRORS FOR LAMPHOUSES

In the days of carbon arc, the crater of the carbon was the source of the radiant energy. The mirror did not have to see beyond the 90 degree angle of crater from the horizontal (there was no light visible beyond about 80 degrees).

An elliptical mirror was designed so that it magnified the crater of the carbon to cover the diagonal of the aperture plate.

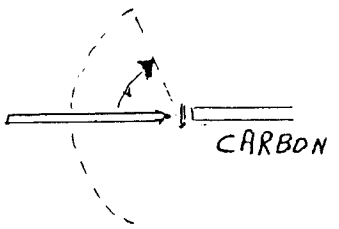
With the advent of the Xenon bulb, the requirements to pick up the available light changed. The plasma "fire ball" of the Xenon lamp essentially radiated almost at the same amplitude well beyond 90 degrees from the normal axis of the mirror. To collect as much light as possible, instead of using imaging optics such as an ellipse is, it became necessary and desirable to use aspherical optics. Aspherical optics simply means that it is not based on a circle and the mirror does not follow a fixed mathematical formula.

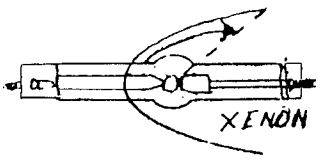
The objective is to transfer the maximum amount of radiant energy available from the gas ball to the optical system of the projector. Elliptical or glass mirriors can not be "bent" any deeper than an ellipse, therefore are very inefficient for they do not collect but about half the light or the radiant energy that is available in the fireball.

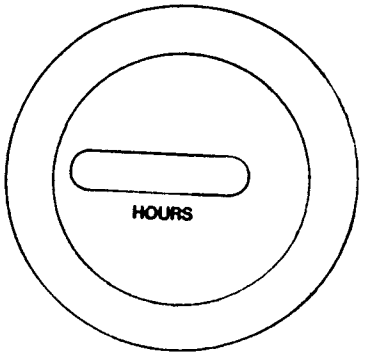
Another advantage with the aspherical deep dish mirror was that it was possible to control the distribution of light across the aperture. The elliptical glass mirror was tied to the cosine law which simply means that as you looked at the crater of a carbon more and more from the side you saw less area and this lessening of area was as is the cosine area. At 90 degrees to the crater you saw zero light, and facing straight on to the crater you saw 100% of the light.

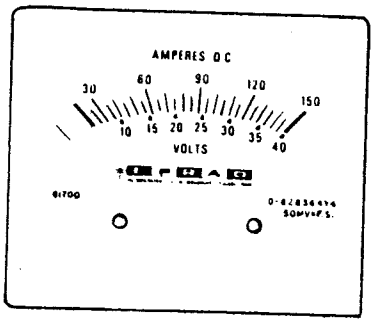
The aspherical deep dish mirror obviously was looking at a round radiant fireball that is of equal intensity well beyond a line 90 degrees to the axis of the bulb (approximately 135 degrees).

There is nothing more complicated to the problem than what has just been described. This explains why a Xenon lamp equipped with a deep dish aspherical reflector is much more efficient than a shallow mirror glass or otherwise.









METER

AMPS
VOLTS

BLOWER
FUSE
3 AMP
SLO BLO

IGNITER
FUSE
5 AMP
SLO BLO

HORIZONTAL ADJUST

ADJ. BULB BACK

ADJ. BULB FORWARD

VERTICAL ADJUST
"LOCK"

CAUTION:
USE ONLY A HIGH PRESSURE LAMP SYSTEM POWER SUPPLY OF THE PROPER TYPE WITH THIS LAMP SYSTEM.
EPRAD NO. 47300-1600 W
EPRAD NO. 47320-2500 W
EPRAD NO. 47325-3800 W

IGNITER
(TEST)

EPRAD

UNIVERSAL LAMPHOUSE

Covered by one or more of the following U.S. Patents.
3,827,782 3,508,819 3,988,626

MAX DC AMPS 150
MAX DC VOLTS 40

POWER SUPPLY INPUT

AC 60 HZ
120 V 300 W

MANUAL "ON"
OFF
AUTOMATION

IGNITER TRIGGER ADJ

OPERATOR CONTROLS

Aside from the dowser handle, all operator controls for the Universal Lamphouse are located on the back panel. There are no operator controls inside the housing, and work performed inside the housing should be referred to qualified personnel.

The HOUR METER registers the use time of the lamphouse. It does not re-set, and records must be kept relative to bulb service (i.e. installation, rotation--details in following section).

Graduations on the AMP/VOLT METER are factory pre-set to allow the operator to measure the current provided by the xenon rectifier. Amperes are registered on the upper scale; sliding the switch down indicates voltage on the lower scale. Wattage is determined by multiplying the amps times the volts (i.e. 20 volts X 100 amps = 2000 watts, or 2 kilowatts).
The amp/volt meter switch also discharges the rectifier capacitor. Before performing any work inside the lamphouse, or inspecting any electrical connections in the lamp or the rectifier, the amp/volt meter switch should be depressed to avoid possible electrical shock.

The BLOWER and IGNITER fuses are marked 3 amp and .5 amp respectively. Note that both fuses are the slow-blowing type. The purpose of these fuses is to protect the lamphouse wiring, and fuses of higher amperage ratings must not be substituted.
Failure of the BLOWER fuse indicates either a short circuit in the blower hook-up (110 V.AC) or an overheated blower motor.
The IGNITER fuse can blow for any of the following reasons:

a) Defective bulb--fails to strike as a result of age or manufacturing defect
b) Igniter trigger set too low to allow bulb to strike
c) Anode (positive) lead shorted or arcing to ground
d) Welded relay contacts in either igniter or rectifier control relay

The operator-accessible BULB ADJUSTMENT controls allow fine adjustment for locating the bulb relative to the reflector.
NOTE: Optical alignment of the reflector is a factory setting achieved through use of a laser beam; physical mounting of the bulb is covered in INSTALLATION. The operator-accessible controls are used only for final adjustment and will vary only slightly from bulb to bulb assuming the same type is used.

OPERATOR CONTROLS (Con't.)

The IGNITER TEST pushbutton is actually a bypass switch. In the event that a bulb fails to ignite, the igniter will continue striking until either the bulb lights, or in the case of a defective bulb, the igniter fuse blows. Pressing the igniter test button bypasses the igniter assembly and applies voltage directly to the transformer. If the bulb fails to light when the igniter test button is used, it must be considered defective, either from age or manufacturing error.

When installed independent of automation, the Universal Lamphouse is controlled manually with the ON/OFF switch. If the lamphouse is incorporated with an automation system, the switch is left in the OFF position. Lamphouse ignition will then be controlled by the automation, or can be overridden by placing the switch to ON.
To automate the lamphouse ignition, a circuit between lamphouse terminals 3 and 4 must be completed with a sustained dry contact.

The IGNITER TRIGGER ADJUSTMENT sets the point at which the "open circuit" voltage from the power supply (rectifier) fires the igniter. This is set at installation by turning the adjustment potentiometer with a small screwdriver until the bulb lights.
Initial setting is made by rotating the potentiometer counterclockwise to its stop, powering the lamphouse (with bulb installed), and then rotating the potentiometer clockwise until the bulb ignites.
The potentiometer may have to be set further clockwise as the bulb ages.

INTERLOCKS

Interlock, or "safety" switches are located in two places in the Universal Lamphouse. One switch is mounted to the reflector bulkhead and will not allow the lamphouse to ignite with the operator-side door removed. The door must be firmly latched with both the lock and thumbscrews to "clear" the switch.
The second switch is mounted to the housing of the lamphouse blower and will not allow the lamphouse to ignite unless the blower is operating and the air flow is adequate. This switch will also shut the lamp off if the blower fails in the course of operation.

Since these switches are incorporated for the protection of the operator, no bypasses are furnished.

SAFETY

There were many misconceptions about risks involved in the use and handling of xenon bulbs. If reasonable and simple precautions are taken, safety is assured.

Explosion: The bulb has a very carefully designed envelope of quartz glass cemented into metal end caps from which the anode (larger) and cathode (smaller) electrodes extend inward to provide an accurately set arc gap. Gas pressure inside the quartz is not exceptionally high when cold (room temperature), but is sufficient to cause injury if the envelope should ever shatter. YOUR EYES ARE ESPECIALLY VULNERABLE. ALWAYS WEAR A FACE MASK when handling the bulb outside its closed safety container, even if the bulb is cold. Clean safety gloves should also be worn, not only for hand protection, but also to avoid fingerprints on the quartz.

Gas pressure may be as high as 600 pounds per square inch while the lamp is burning and this dangerous condition will be reduced only as the bulb slowly cools. DO NOT, FOR ANY REASON, open the lamphouse door in less than 10 minutes after the bulb has been turned off. Leave the lamphouse blower ON.

ALWAYS wear a face mask and gloves when working on an open lamphouse with the bulb wxposed. A leather jacket with long sleeves (welder's type) is also recommended.

Keep both lamphouse doors properly in place in the course of operation. An exploding bulb in a closed lamphouse can cause no injury outside the housing.

Ozone Gas: Any electric arc will tend to convert oxygen in the air into ozone. This gas can be injurious to health if inhaled in heavy concentration for prolonged periods.

Therefore:

a) Always use "ozone free" xenon bulbs. A special quartz used for these bulbs reduces ozone generation to safe levels.
b) Do not operate any xenon lamphouse for more than a few minutes while not connected to an exhaust stack ducted to open air.

Bulb Care: DO NOT TOUCH THE QUARTZ ENVELOPE unless wearing gloves. Fingerprints will burn in making a permanent "hot spot" which can lead to bulb explosion. If the bulb should accidentally be touched, fingerprints must be immediately be cleaned off with alcohol.

HANDLE WITH CARE! It goes without saying that xenon bulbs are not known to bounce well if dropped, and care must be taken on simple installation of bulbs of current manufacture. To lessen the chance of bulb explosion, new bulbs have thinned-down portions in the envelope near the end caps to allow gas to leak from unstable bulbs prior to bursting. Avoid any "torque" on the bulb while installing.

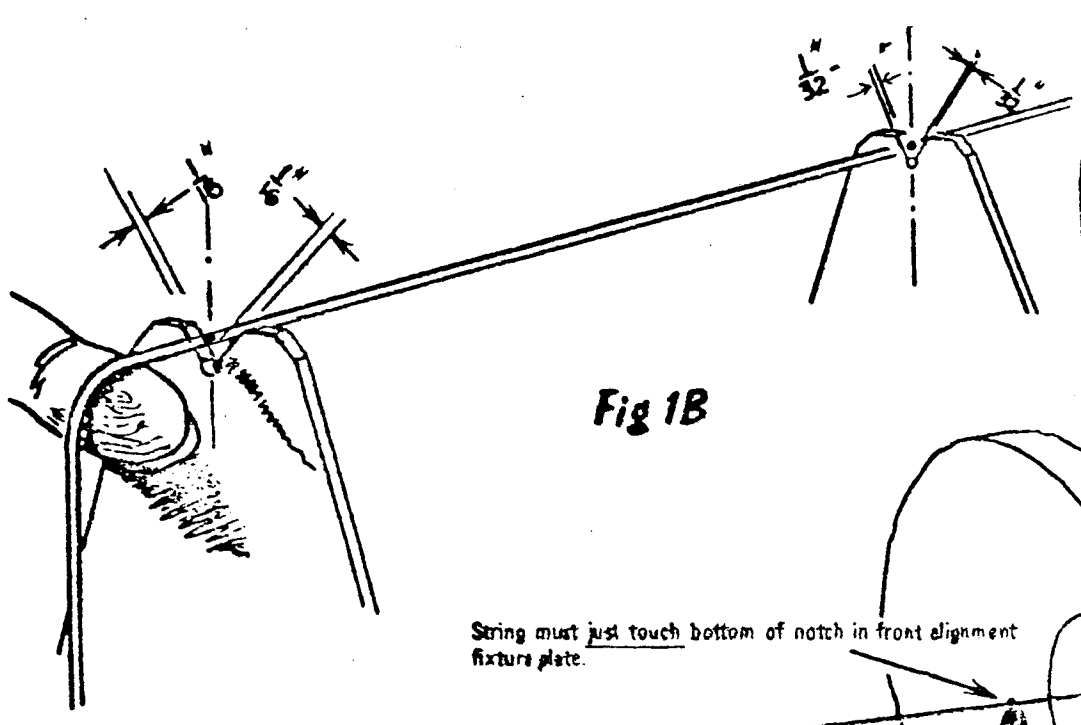


Fig 1B

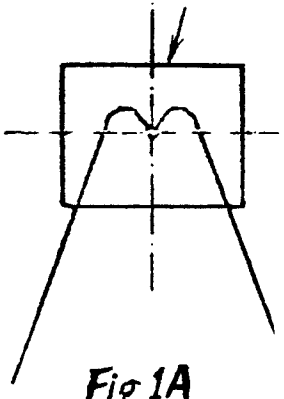


Fig 1A

String must just touch bottom of notch in front alignment fixture plate.

Hang weight to maintain tension

Fig 1

INSTALLATION

Optical center and optical height, as determined by the location of the reflector relative to the lamphouse mounting rails, is critically pre-set at the factory prior to testing. For this reason, the three screws holding the reflector flange to the bulkhead plate should NEVER be loosened.

For ease of installation and peak lamphouse performance, follow instructions in sequence:

A) Alignment of Lamphouse Table on Pedestal Base

Obtain the Lamphouse Alignment Kit from your EPRAD dealer or from the factory. This consists of two table alignment fixture plates and one lens tube plug. Mount the fixtures as illustrated in Figure 1. Fasten a weight and string to the lens tube plug, and assemble as shown.

The objective is to adjust the lamphouse TABLE on the pedestal in relation to the projector head until the following conditions are met:

1) The string must pass through the center of the aperture plate (Fig. 1A), measured accurately as possible across its horizontal and vertical center lines.
2) The string must rest precisely in the bottom of the "vee" notches in the triangular alignment plates (Fig. 1B). THe alignment is correct when:
   a) there is no clearance visible between the string and the bottom of the notch of the front plate (that nearest the projector)
   b) the string can be raised 1/16th inch straight out of the rear notch, and half that gap (1/32") appears in the notch of the front plate. The resulting gaps between the string and the sloping sides of the notches must be equal, as indicated by the dimensions in Fig. 1B.

If it is necessary to adjust the table to achieve the above conditions, do so with painstaking care; extreme accuracy at this stage saves a great deal of time in subsequent steps and ultimately will mean a brighter screen.

B) Checking for Vignetting

Before mounting the lamphouse, check the light cone path for obstructions. If you have reason to believe that obstructions exist, make a template from stiff cardboard as illustrated in Fig. 2.

Push the template through the projector from the back (Fig. 2A). It should touch the aperture plate before hitting anything else farther back. Try it horizontally and vertically; if anything obstructs appreciably, the condition must be corrected by filing or other available means.

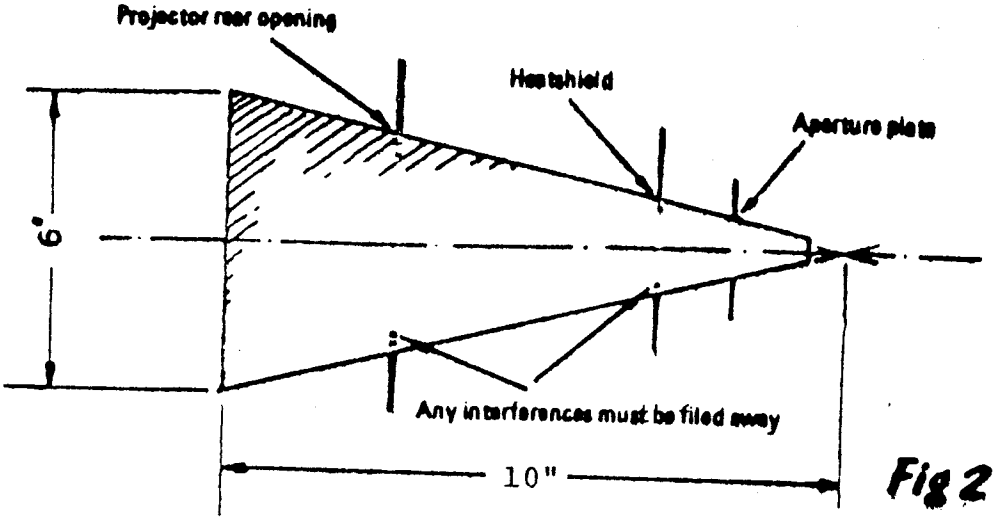


Fig 2

Cut cardboard accurately to dimensions shown. Card must touch aperture plate before any other parts.

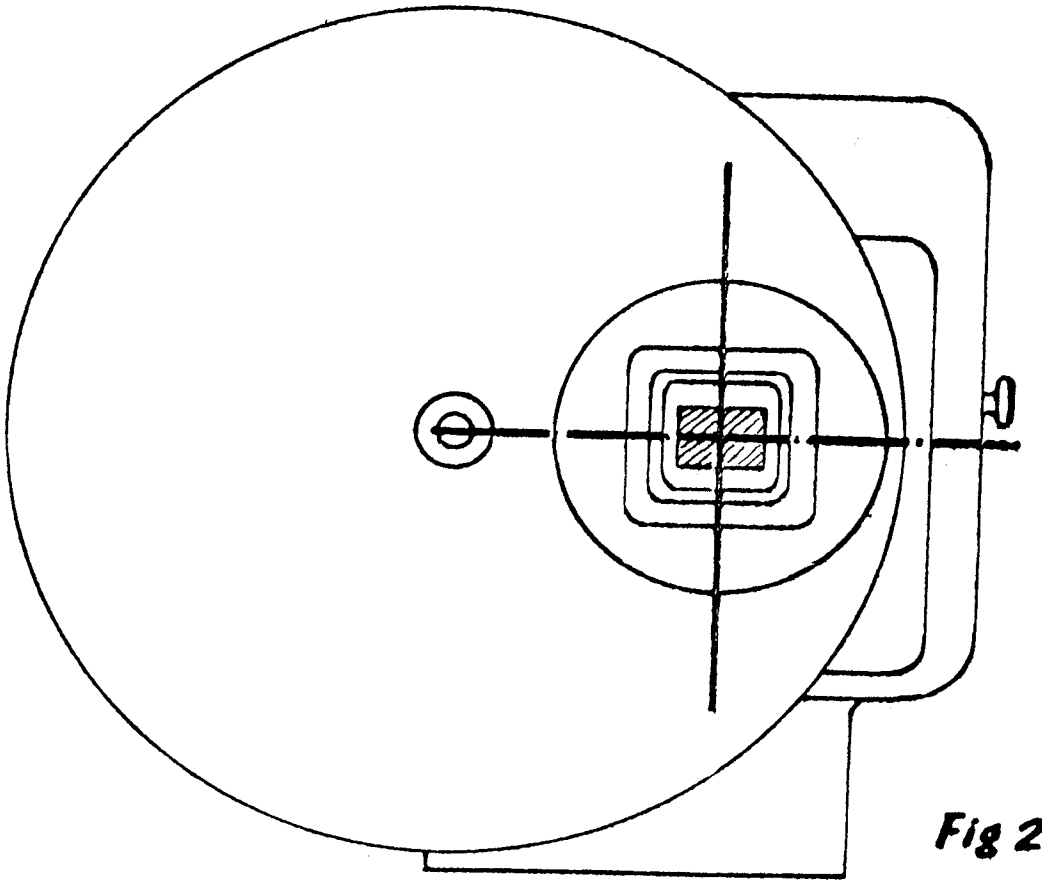


Fig 2A

INSTALLATION (Con't.)

C) Aligning Pedestal to Screen

Align the complete pedestal to the screen as accurately as possible by the usual means. It may be helpful to keep the two fixture plates on the table while doing this. Use the "vee" notches as rifle sights, targeting on the center of the screen.

D) Mounting the Lamphouse

Careful work on step A will be repaid at this point; a few minutes work should produce bright, "flat" screen illumination.

1) Place the lamphouse on the pedestal table, making sure the rails on the bottom of the lamphouse are seated fully between the guides on the table. Move the lamphouse forward until the front of the lamphouse casting is 7½ to 8 inches from the aperture plate. On some projectors, it may be necessary to remove the bezzle on the shutter guard. Bolt the lamphouse firmly to the table using the furnished ¼-20 hardware.
2) Install the heat reflecting glass as illustrated in Fig. 3. Make sure the inside edges butt together. The glass is meant to fit loosely to prevent breaking due to thermal expansion.
3) Connect the DC lamphouse leads to the proper rectifier terminals (the positive lamphouse lead is indicated by a red band).

   NOTE: These connections must be made and kept as tight as possible; loose DC connections will overheat.

   The three-conductor cable controls the rectifier power contactor. Connection to the EPRAD Xenon Rectifier is to the main terminal board as follows:

   Terminal 3 - white (low)
   4 - green (control)
   5 - black (high)

   Plug the line cord into a grounded 120 V.AC 15 amp receptacle. It is intended that the fan runs continuously to assure proper cooling of the bulb when the lamp is shut down. For this reason, it is advisable to use an outlet which can be switched off when the booth is closed for the day.

NOTE: Make sure the lamphouse exhaust is vented to open air.

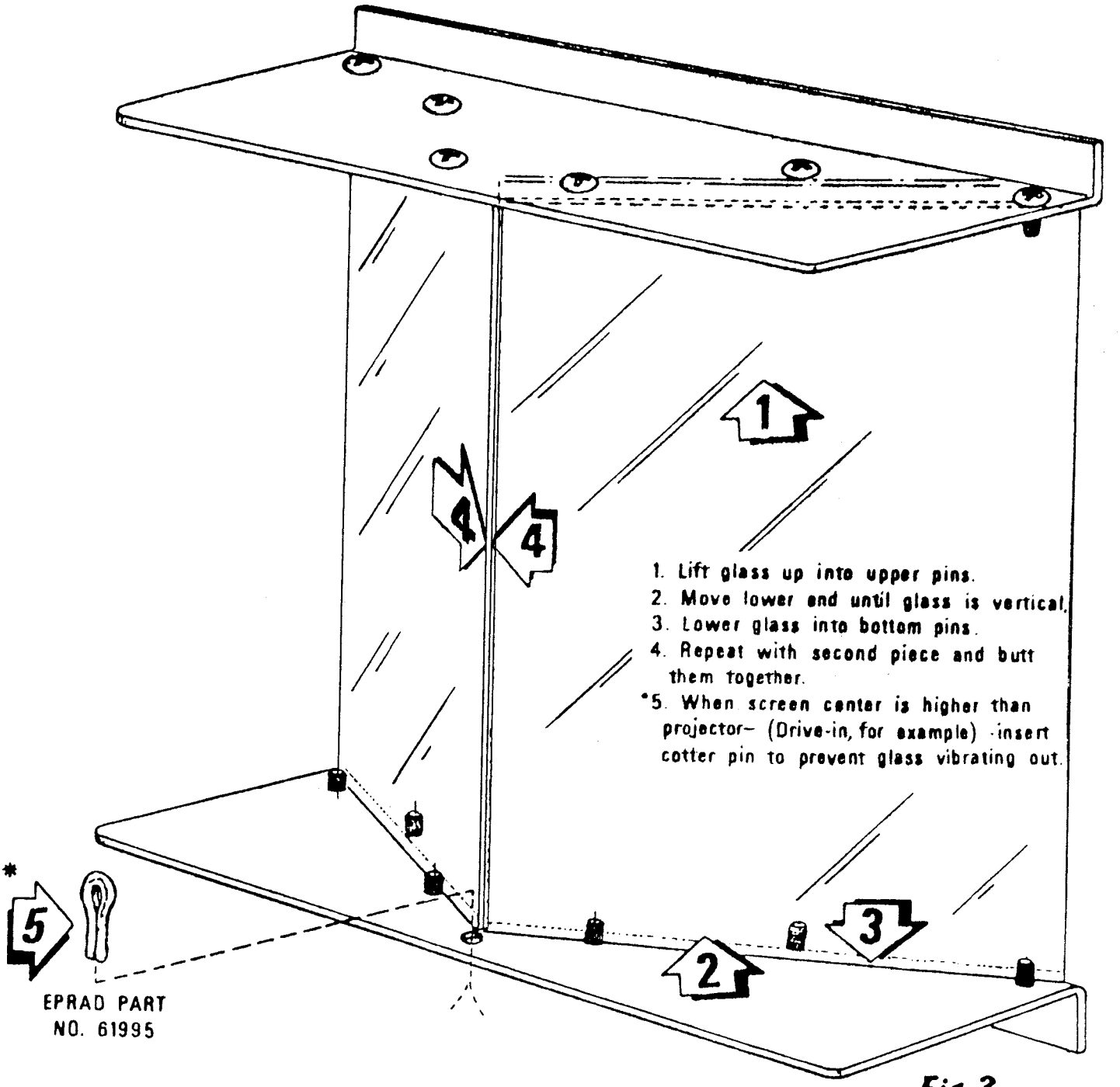
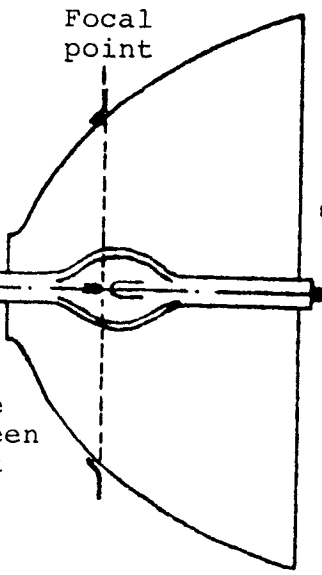

1
4
4
1. Lift glass up into upper pins.
2. Move lower end until glass is vertical.
3. Lower glass into bottom pins.
4. Repeat with second piece and butt them together.
*5. When screen center is higher than projector– (Drive-in, for example) insert cotter pin to prevent glass vibrating out.
*
5
EPRAD PART NO. 61995
2
3

Fig 3

The reflector bulkhead is at the focus of the reflector



If correct cathode extender is used, bulb will be in position shown. Cathode tip is in same plane as mirror mounting flange.

THEREFORE:
When the cathode tip is even with the bulkhead, the light on the screen is essentially at its best.

Fig 4

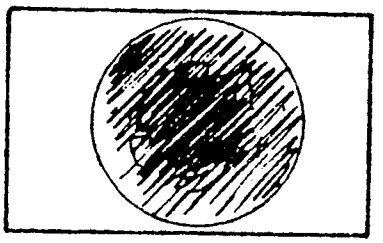


Fig 5

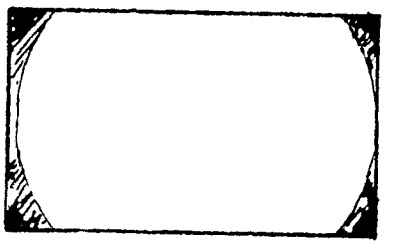


Fig 6

Light beam on wide-screen aperture (Reflector shaping, sec. H)

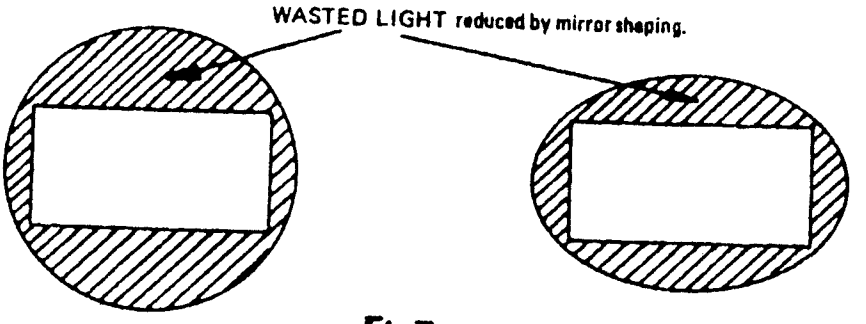
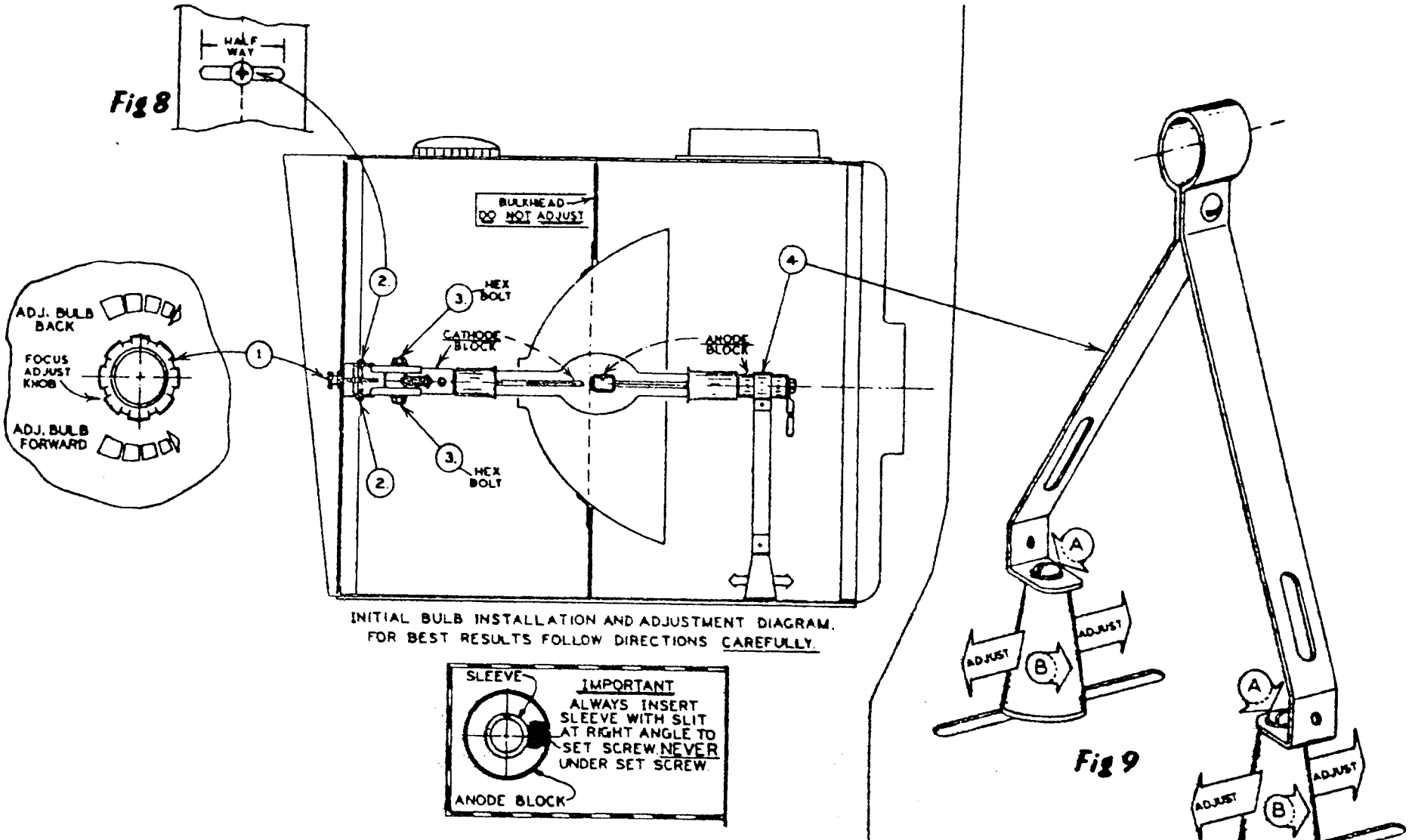


Fig 7



INITIAL BULB INSTALLATION AND ADJUSTMENT DIAGRAM.
FOR BEST RESULTS FOLLOW DIRECTIONS CAREFULLY.

INSTALLATION (Con't.)

E) Installation of Bulb

WEAR PROTECTIVE EQUIPMENT (MASK AND GLOVES) WHEN HANDLING AND INSTALLING THE XENON BULB

Refer to drawing SK-960 (Bulb Adaptor Chart) to select the proper bulb adaptors for the type of bulb to be used.

Remove the right (operator's side) door of the lamphouse.

Place the selected adaptors on the anode and cathode pins of the bulb. Insert the bulb, cathode end first, through the reflector and into the cathode block. Slide the anode block over the anode pin and tighten set screws (3/32 allen wrench) on both ends of the bulb. If a slit sleeve type adaptor is used, make sure the slit is 90 degrees from the set screw (lower detail, Fig. 8). Set screws must be TIGHT.

For extra safety, leave the protective plastic cover supplied with the bulb in place if possible. Avoid strain on the bulb while tightening.

Some bulbs, particularly those of higher wattages, are furnished with their own anode leads. Do not attempt to remove the lead from the bulb since doing so might seriously damage the bulb. Rather, remove the lamphouse anode lead from the anode block and connect it to the lead furnished with the bulb. Dress the anode cable carefully to keep it well away from any grounded metal parts. If the anode cable arcs to ground, the bulb will not ignite.

When installing a bulb with its own anode lead, it may be necessary to remove the left door to gain access to the anode wiring.

Next, set the "Bulb Adj." knob to the center of its travel, as illustrated in the top detail, Fig. 8.

Loosen the hex-head bolts (7/16 wrench) holding the cathode block in its bracket. The mounting bolts are those top and bottom in the cathode block; it is not necessary to loosen the bolts on the sides of the block. Adjust the block so that the bulb cathode tip is in line with the reflector flange plate (Fig. 4). Re-tighten the two bolts.

The anode (front) support bracket must now be located to allow the anode block one-half inch sliding travel. The front support is mounted on insulators and can be moved forward and back in the slots provided. Refer to Fig. 4. Loosen screws "A" and turn the insulators counterclockwise. The bracket can now be moved to the point where the anode block has its one-half inch of travel. Turn the insulators clockwise to tighten

INSTALLATION (Con't.)

and retighten screws "A". Make sure the anode block slides freely inside the bracket, and that the anode cable is away from grounded metal parts to which it might arc.

Replace the lamphouse door. Make certain the door interlock switch "clicks".

Make sure the lamphouse is plugged in and the fan is running. Turn on the primary power to the rectifier. Close the dowser. Be careful that the bulb is roughly "focused" (Fig. 4) before operating for an extended period, as a "hot-spotted" (unfocused) bulb can damage both the dowser doors and the lens.

If an external exhaust fan is used, make sure it is running and the lamphouse has adequate exhaust draft.

The lamp will strike when the manual ON/OFF switch is turned to ON, provided that the door and blower interlock switches have closed.

F) Alignment and Focus of Bulb

NOTE: Avoid prolonged running of projector without film, or lens will be damaged.

1) With the projector running without film and before installing lens, open the dowser. You should see a black circle on the screen. Adjust the bulb horizontally and vertically until the spot is centered on the screen. Adjust the focus ("Adj. Bulb Back/Forward") until the circle just fills the screen from top to bottom (Fig. 5).
2) Close the dowser and install the projector lens and aperture plate. It is preferable to use the wide screen ("flat") lens and aperture. Back the bulb off (bulb adjust knob clockwise) until the corners become dark (Fig. 6). If necessary, re-adjust the horizontal and vertical to achieve uniform brightness across the illuminated part of the screen (ignoring the dark corners). If the lamphouse is properly aligned, all four dark corners should look identical. If not, refer to section "G" following.
3) When proper alignment has been achieved, refocus the bulb to fill the corners and to flatten the field so there is uniform illumination. The picture will look brightest to the audience if your meter readings at the edges of the screen are approximately 85% of the reading at the center of the screen. However, it is possible to adjust for higher percentages if desired.

INSTALLATION (Con't.)

4) Adjust the current to the lamp so that proper screen brightness is obtained without "washout" of color prints because of excessive light. Bulb life can be greatly increased too if current is set to 75-85% of the bulb's rated wattage.
Observe the bulb manufacturer's recommended operating ranges for best results, being careful to select bulbs that operate within the limits of the power supply.
5) Finally, make sure the vertical adjust lock has been properly positioned and tightened. Make sure the horizontal position knob is snug.
No further adjustment is necessary.

CAUTION: When adjusting high wattage bulbs, 3-4kw, with the lens in the projector and running without film, do not leave the dowser open for any long period of time. To do so without film in the machine may damage the lens. The dowser in this lamphouse can be left closed indefinitely without damage provided the bulb is not focused on the dowser.

G) Bulkhead Adjustment

As mentioned previously, you could find that your corners are not as well "balanced" as they should be (sec. F, no. 2). If they are well balanced, SKIP THIS STEP and continue with the next section.

Unless this imbalance is very severe you should be able to correct by re-adjusting the position of the lamphouse table on the pedestal.

First make sure that the problem is not caused by an excessively long lens shade tube cutting off the corners as the light rays spread out when leaving the lens. Unscrew the tube and see if it alleviates your problem. Check also to see that the projection port is large enough, and that the pedestal is properly centered on the port.

If none of the above prove to be at fault, proceed as follows:

1) Remove the lamphouse and re-check the lamphouse table adjustments (sec. A).
2) If the table checks out correctly, re-mount the lamp and repeat the focus operation outlined in section "F".

If the results are still not satisfactory, it may be assumed that some displacement of the reflector has occured, probably because of violent handling during shipment. This is a very rare possibility, because the supporting structure will withstand all but the most brutal mistreatment. If all other adjustments are inadequate, proceed as follows:

INSTALLATION (Con't.)

1) Shut down lamp and ALLOW TO COOL with fans running AT LEAST 10 MINUTES.
2) WEAR PROTECTIVE EQUIPMENT (face mask and gloves).
3) Remove both lamphouse doors.

REFLECTOR ADJUSTMENT is done as follows:

4) Slack off the reflector shaping jacks until they are clear of the lip of the reflector.
5) DO NOT loosen the reflector from the bulkhead plate. All adjustments are done to the bulkhead and reflector together.
   The bulkhead plate is tilted by adjusting the hexagon nuts on the threaded tie rods. Do not move more than one "flat" of a hex nut at a time without checking results on the screen (replace right door to "clear" interlock prior to striking lamp).
6) If you need to move the light beam upward on the screen you will tilt the reflector/bulkhead assembly DOWN, and vice versa. The same "opposite" correction applies when adjusting for a horizontal move.

When the dark corners are balanced, make sure all the bulkhead hex nuts are re-tightened. Re-position the reflector shaping jacks (if necessary) to engage the lip of the reflector squarely, and continue to the last step.

H) Reflector Shape Adjustment

The EPRAD Universal Lamphouse provides a unique feature enabling you to shape the reflector to suit your screen format. When you project most of your features in wide screen format, you will get optimum evenness of screen illumination with minimum power consumption.

1) Re-adjust the bulb to produce the dark corners illustrated in Fig. 6.
2) Shut down the lamp, wait 10 minutes for cooling, put on protective clothing, and remove lamphouse door.
3) Turn the adjusting thumbscrew under the leading edge of the reflector until the pad plate on the end of screw JUST TOUCHES the lip of the reflector. Repeat with the upper screw. The object of this step is to remove all clearance; no more and no less. By twisting the pad to and fro while turning the thumbscrew you can feel the instant when the pad contacts the reflector.
4) Tighten each screw exactly a half turn (1/64 th inch) --tightening direction is toward you on the upper screw and away from you on the lower screw wheel rims.

INSTALLATION (Con't.)

5) Replace the door and ignite the lamp. Check the screen light pattern; the four dark corners should have disappeared, indicating that the light pattern has been changed from a circle to an ellipse with its longer axis across the screen. If necessary, the screws may be tightened an additional two notches. Any more is likely to create undesirable distortion, and if excessive, may permanently distort the reflector.
6) When the dark corners have been improved as far as possible within these limits, refocus the bulb until the screen has maximum overall brightness. Check that the horizontal and vertical bulb adjust knobs on the rear control panel are safely tight after all has been completed.

OPERATION AND MAINTAINANCE

Manual ignition can be effected at any time by pushing the MANUAL/AUTOMATION switch to ON. The MANUAL "ON" setting overrides any automation controls which may be incorporated into the projection system.

The magnet located on the rear of the reflector is critical in stabilizing the plasma of the electric arc. If it is jarred loose or removed for any reason, replace it by locating it above the center opening of the reflector; the hole in the middle of the magnet should be two inches from the lip of the center reflector opening, and the dot on the magnet must face the operator's side of the lamphouse.

Do not obstruct the air intake cowl on the top of the lamphouse. Even with the blower running, the air flow interlock switch will open if the air flow falls below a certain point.

BULB ROTATION

Periodic rotation of the xenon bulb greatly increases both bulb life and performance with minimum power comsumption. In the course of normal operation, a dark spot will form inside the quartz above the arc. If the dark spot is distributed evenly around the inside of the bulb, the small reduction in light output will be nearly undetectable.

Furthermore, uneven darkening may cause irregular stresses in the quartz and could result in premature bulb failure.

The timing of bulb rotation intervals depends on the estimated total useful life of the bulb. If the bulb is of a size adequate to be operated at 75% of its rated maximum wattage, it can be expected to average twice the manufacturer's guaranteed life.

The interval for bulb rotation is one-quarter of the bulb's estimated life. For example, if a bulb has an estimated life of 2000 hours, the bulb should be rotated every 500 hours. When this bulb is installed, note the hour meter reading, add 500 hours, and record the figure. The bulb record should be kept near the lamphouse so it can be checked periodically (for example, each time the operator makes up a new show).

The procedure for bulb rotation is as follows:

1) Make sure the bulb is fully cooled. WEAR PROTECTIVE CLOTHING. Remove the right door.
2) Carefully loosen the anode and cathode clamps. Rotate the bulb 90 degrees--always the same direction; for example, clockwise to the screen.

Bulb Rotation (Con't.)

3) Re-tighten both clamps firmly. Make certain that the set screw is properly seated on slit sleeve bulb adaptors (where used). Replace the right door.
4) Run the projector without film and check the screen illumination. Some minor bulb adjustments, using just the controls on the back panel, may be necessary; the cathode tip may sometimes be slightly eccentric in relation to the axis of the end pins.
At most, step F-2 (balancing the dark corners) may have to be repeated.
5) Record the hour meter setting and make note of the next bulb rotation.

BULB REPLACEMENT

Experience is the best guide in choosing when to replace bulbs. Not only is the manufacturer's guaranteed life to be considered, but also factors such as size of bulb, operating wattage, and to some extent, the brand of the bulb.

The manufacturers of xenon bulbs have found that by thinning down the neck of the quartz envelope near the end cap, catastrophic bulb failures can be almost entirely eliminated. As bulbs of this type approach the end of their useful lives, they will quietly and politely decompress rather than commit suicide in a loud and messy manner.

Still, DO NOT try to squeeze "a few more hours" out of an old bulb; explosions can mar the reflector and will certainly shatter the (expensive!!) heat glass panels.

When an older bulb will not ignite at its recommended wattage, even with re-adjustment of the igniter trigger and use of the IGNITER (TEST) button, DO NOT increase rectifier output over the rated maximum of the bulb. The results would probably be loud and exciting, but very unsatisfactory.

A rapid gas leak in a xenon bulb while it is operating can cause the bulb to turn bluish-black before it finally extinguishes. A slow leak is indicated by increased difficulty in ignition, current instability on ignition and heating of the bulb, and a drop in voltage with an increase in current as the bulb gets hot. In time, it will grow more unstable and darken.

While a leaking bulb will not explode, it also will not light a screen. It must be replaced regardless of its hours in use.

If the new bulb is the same type as the old one, it will be unnecessary to change the cathode block and anode bracket locations. All adjustments will be made with the back panel controls as outlined under "Alignment and Focus". If changing to an entirely different type of bulb, refer back to "Installation of Bulb", section E.

CLEANING

The enclosed arc of a xenon bulb causes no dust, and cleaning of the lamphouse needs to be done much less frequently than with carbon arc units. Cleaning once a month should be quite sufficient, unless special circumstances prevail (i.e. a dusty drive-in booth).

1) ALLOW BULB TO COOL. WEAR PROTECTIVE CLOTHING.
2) Remove right door.
3) Clean the reflector and both sides of the heat glass panels. Do so VERY CAREFULLY; the protective coatings are durable, but can be scratched if cleaned improperly.

USE ONLY A SOFT, CLEAN, DRY CLOTH TO CLEAN REFLECTORS AND HEAT GLASS PANELS. DO NOT, FOR ANY REASON, USE CHEMICALS, CLEANING SOLUTIONS, OR SCOURING POWERS!

4) While seldom necessary, the xenon bulb may be cleaned in the same manner, providing the bulb is COLD and NOT TOUCHED with FINGERS.
5) Be sure the heat glass panels are butted together after being replaced in their pin guides.
6) As a matter of routine, get into the habit of checking all bulb connection clamping screws EVERY TIME you clean the reflector. If these are not kept tight, there may be a rapid deterioration of the surfaces in contact, causing high resistance to current flow and possible failure to strike.

TROUBLE SHOOTING

Bulb Fails to Strike

--Is the power on?

--Is the fan running? If so, is anything obstructing the air flow? Is the air switch paddle (inside the blower "squirrel cage" housing) operating freely?

--Is the door firmly closed? The door must be closed and locked to "clear" the door interlock switch.

--Is the bulb reaching the end of its expected life? Refer to "Bulb Replacement" section preceeding.
DO NOT increase rectifier output in excess of bulb's rating.

--Are either the BLOWER or IGNITER fuses blown? If so, check for an appropriate problem in the circuit involved. DO NOT OVERFUSE.
The igniter fuse will blow when the bulb reaches the end of its life because the igniter will remain energized while attempting to strike the bulb.

--Has "IGNITER TRIGGER ADJ." on the back panel been adjusted? It sometimes has to be re-adjusted to accomodate an aging bulb.

--A rare component failure may occur which may be temporarily bypassed by use of the IGNITER (TEST) button. Success with this action indicates possible failure in the igniter circuit, or indicates that there was insufficient rectifier voltage to strike the bulb because of its age or condition.
If the bulb still fails to strike through use of the IGNITER (TEST), replace the bulb.

--Have ALL THREE 3-phase rectifier fuses been checked? Is the 3-phase OK "from the pole"? All booth equipment except the rectifier will operate without 3-phase, so a "black-out" is not obvious.

Bulb Goes Out While Running

--Is bulb decompressed? Look for internal bulb discoloration.

--Did the power fail momentarily? If the lamp was being run on MANUAL "ON", it would re-strike automatically on restoration of the power. If set on AUTOMATION, the external automation controls must re-close the starting contacts. To bypass, switch to MANUAL "ON".

--If bulb fails to re-strike, check the points listed above.

EPRAD INC.
ELECTRONIC PRODUCTS RESEARCH & DEVELOPMENT

TECHNICAL BULLETIN

DATE: December 28, 1979 NUMBER: 5299

SUBJECT: Xenon Bulbs

The Problem: The bulb ignites either with difficulty, or with low current, and slowly the current rises until it reaches the proper setting.

The Cause: The bulb is operating below 75% of its rated current, is a slow-leaker, or the gas pressure is low.

Finally, the bulb will fail to work at all, but if the bulb lit, the gas began to heat up and that increased the internal gas pressure. With the higher gas pressure the current increased through the bulb.

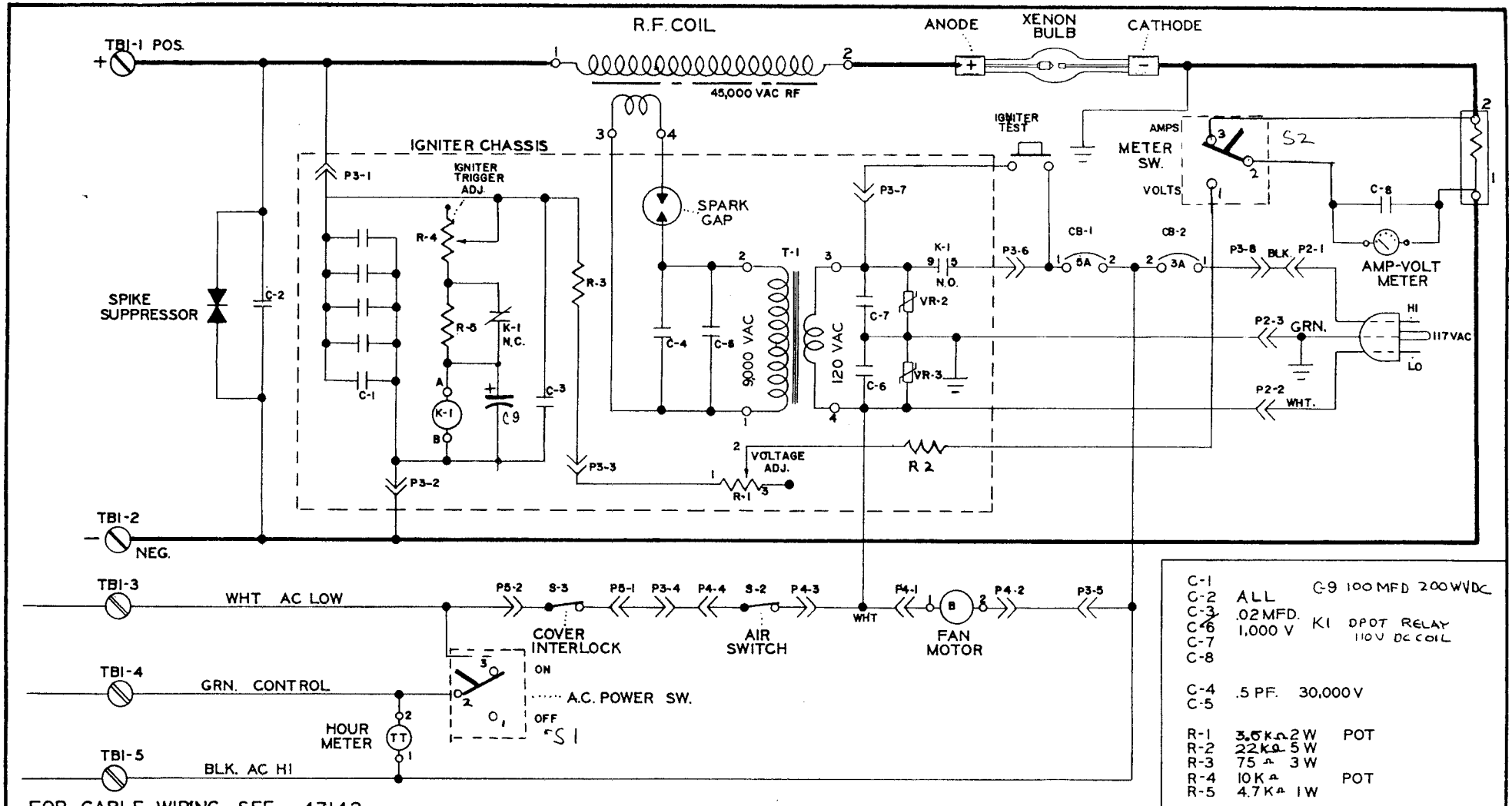
NOTE: This bulb is doomed to fail sooner or later, but its actions can be mysterious in the meanwhile.

EPRAD ENGINEERING DEPARTMENT

P.S. An improper magnetic field or stabilization, or when the magnet has been accidentally reversed can cause the above problems or aggravate them. EPRAD'S patented system of magnetizing the entire mirror is beneficial, if the bulb gas pressure is high (Osram). The bulbs will operate with stability at 40-50% of rated current with "life" being extended to OVER 4,000 operating hours.

NOTE: White dot on magnet is toward right side - facing the screen.

1123 W. Woodruff P.O. Box 4712 • Phone (419) 243-8106
Toledo, Ohio 43620 • Cable Address: EPRAD



FOR CABLE WIRING SEE 47142
47191
47502 W/P
47503 W/P
47504 W/P

C-1	G-9 100 MFD 200 WVDC
C-2	ALL
C-3	.02 MFD.
C-6	1,000 V
C-7	
C-8	
C-4	.5 PF. 30,000 V
C-5	
R-1	3.5 KΩ 2 W POT
R-2	22 KΩ 5 W
R-3	75 Ω 3 W
R-4	10 KΩ POT
R-5	4.7 KΩ 1 W

K1 DPDT RELAY 110V DC COIL

No.	E.C.N.	DATE	CHANGE	BY
8				
7				
6				
5				
4				
3				
2				
1		3-7-80	R1 & R2 REVISED R6 OUT	CA

EPRAD INCORPORATED 123 W. WOODRUFF TOLEDO, OHIO

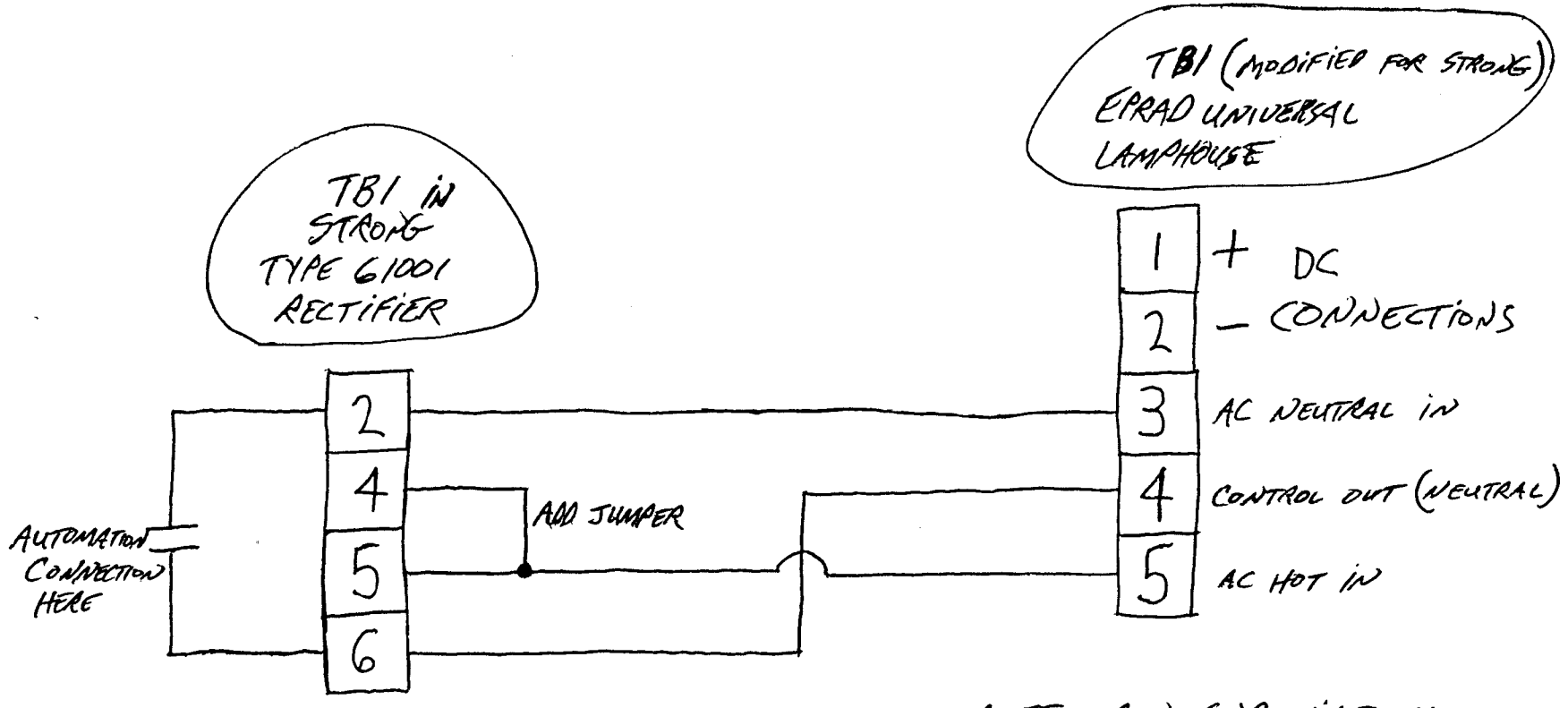
TITLE XENON LAMPHOUSE SCHEMATIC

MATERIAL | TOLERANCE (EXCEPT AS NOTED) | SCALE

FINISH | DEC. | FRACT. | ANGLES

DRAWN JC CATHER | CHECKED | APPR'D | DATE 11-9-78

ASSEMBLY No | DWG No B-47013-4

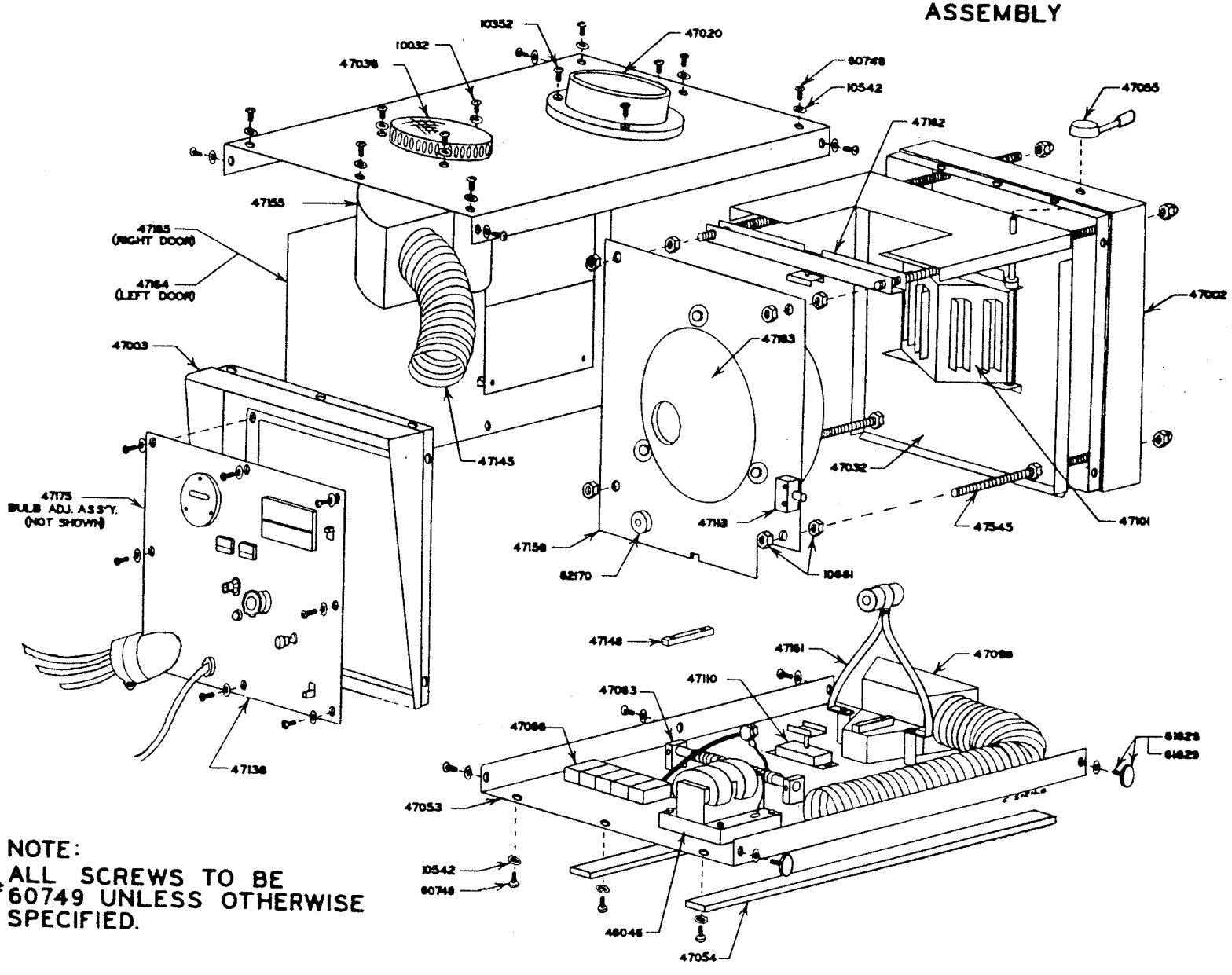


NOTE: RUN GND WIRE FROM RECTIFIER TO LAMPHOUSE CHASSIS!

WHEN CONNECTED AS ABOVE, THE CIRCUIT TO THE POWER SUPPLY CONTACTOR WILL BE COMPLETED WHEN EITHER THE LAMPHOUSE POWER SWITCH OR THE AUTOMATION CONTACTS ARE CLOSED. LAMPHOUSE BLOWER RUNS WHENEVER AC MAINS TO POWER SUPPLY ARE ON.

LAMPHOUSE – TO – POWER SUPPLY CONTROL WIRING FOR STRONG RECTIFIER & EFRAD UNIVERSAL LAMP.

Nº 47000
UNIVERSAL LAMPHOUSE ASSEMBLY



NOTE:
ALL SCREWS TO BE #60749 UNLESS OTHERWISE SPECIFIED.

47000 UNIVERSAL LAMPHOUSE

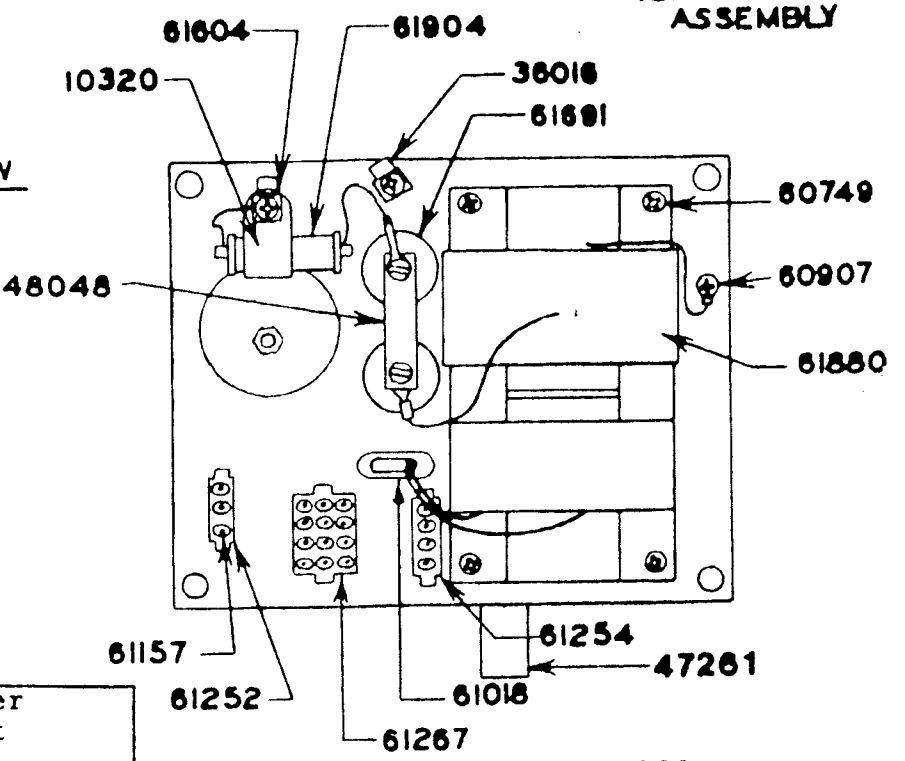
PARTS LIST

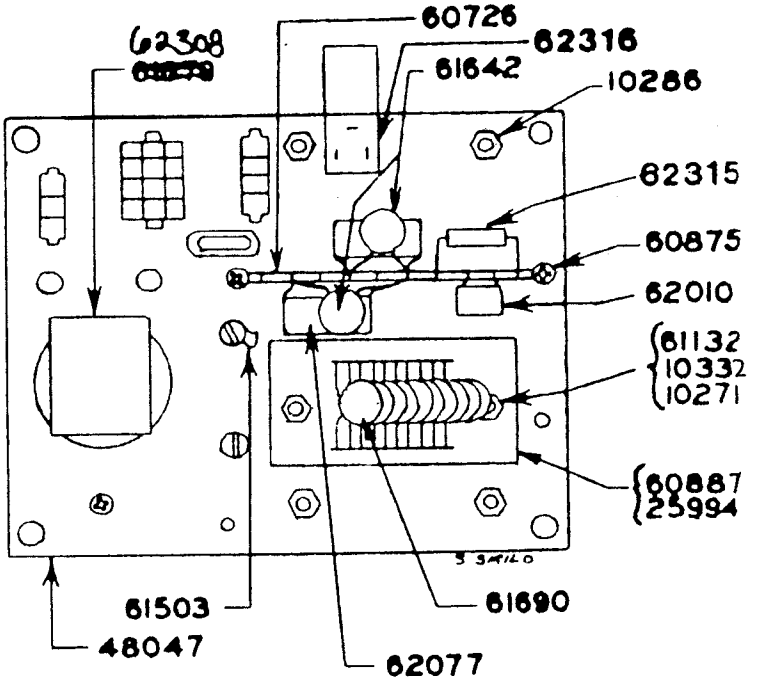
47022	I.R. Reflecting Glass Plate
47034	Anode Cable Assembly
47063	R.F. Coil and Transformer Assembly
47123	Spark Gap Assembly
47163	Reflector and Flange Assembly
47166	Air Flow Switch Assembly
48033	Cathode Block
47187	Anode Adaptor
47196	Anode Block
48067	Cathode Adaptor Extension
48074	Anode Sleeve
48075	Anode Sleeve
48077	Cathode Sleeve
48078	Anode Sleeve
48081	Cathode Sleeve
62010	75 Resistor 3w
61157	Female Pins
61159	Male Pins
61251	3- Pin Plug
61252	3- Pin Socket
61253	4- Pin Plug
61254	4- Pin Socket
61266	12- Pin Plug
61267	12- Pin Socket
61436	Igniter Test Switch
61518	AC Power Slide Switch
61519	Ampere-Volt Meter Spring Slide Switch
61642	G. E. M. O. Varistor
62012	Hour Meter
61671	Door Interlock Switch
61679	Relay 24 V.D.C.
61689	Blower Motor and Hardware
61690	.02 MFD Capacitor 1000v
61691	500 MFD Capacitor
61700	Ampere-Volt Meter
61880	9000v Igniter Transformer
10128	Fuses 3 Amp
62316	10K Pot

10032	#10-24x5/8 Screw
10352	#8-32x½ Machine Screw
10542	#8 Washer
10881	3/8" Hex Nut
47002	End Casting (Front)
47003	End Casting (Rear)
47020	Exhaust Stack Flange
47032	Heatshield - Front
47036	Assembled Fan Intake Cowl
47053	Assembled Bottom/Locating Plate
47054	Locating Strip-Bottom Pan
47055	Handle Dowser
47063	Transformer 35KV Ass'y.
47066	Terminal Block Ass'y.
47098	Air Box Ass'y.
47101	Dowser Door Ass'y.
47110	Reflect. Adj. Ass'y. Bottom
47113	Door Interlock Switch Ass'y.
47138	Rear Mtg. Panel
47145	Sleeve Adaptor
47148	Clamp Extension
47155	Lamphouse Blower Ass'y.
47159	Mirror & Bulkhead Ass'y.
47161	Anode Brkt. Ass'y.
47162	Mirror Squish Top
47163	Reflector & Flange Ass'y.
47164	Left Door Ass'y.
47165	Right Door
47175	Bulb Adj. Ass'y.
47545	3/8-16 Th'd Tie Rods
48046	Spring - Leaf
60749	#8-32x3/8 Round
61828	Shear - Loc #83-98-902
61829	#10-24x3/8 Allen Head
62170	Bushing - Porcelain Clamp

№ 48046
IGNITER UNIT
ASSEMBLY

TOP VIEW





BOTTOM VIEW

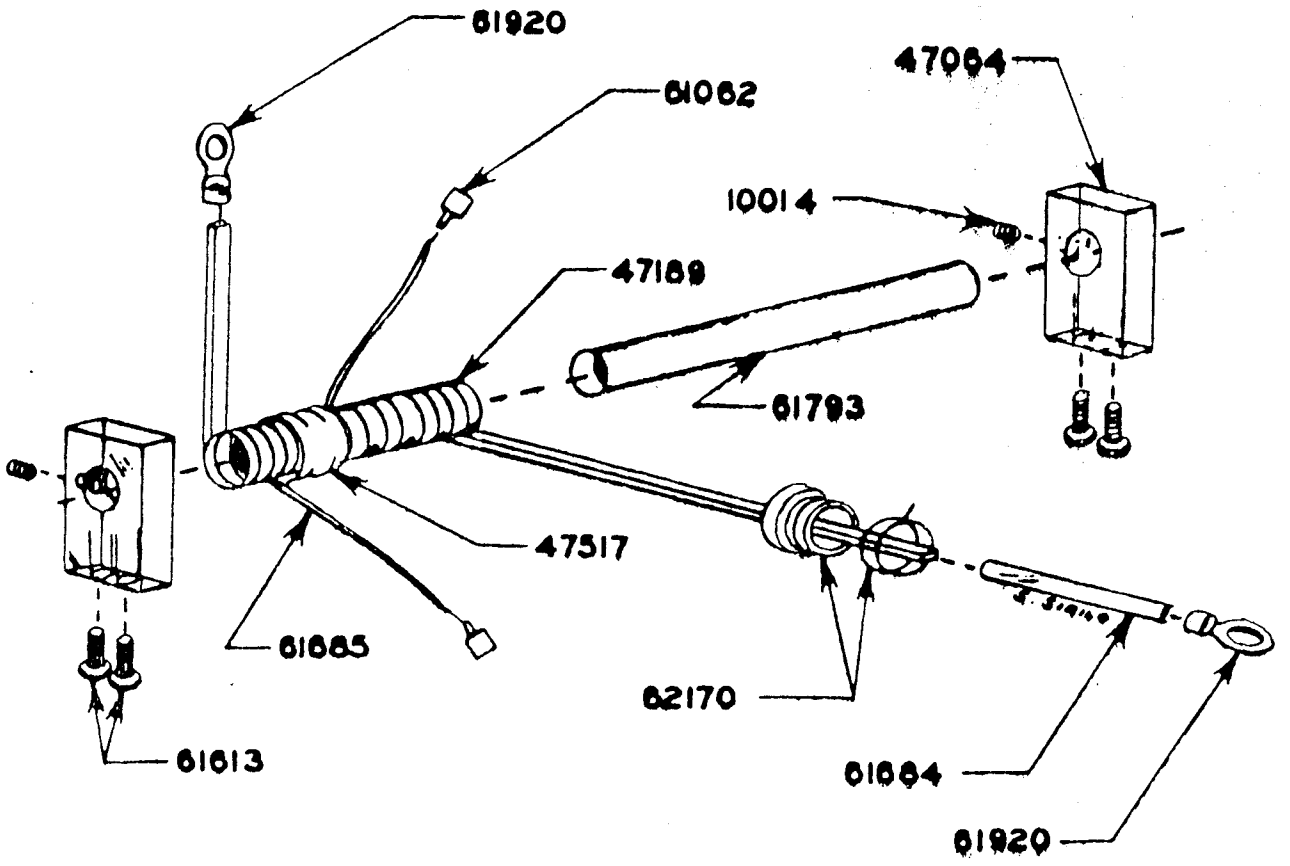
10271	#6 Lock Washer
10286	#8-32 Hex Nut
10320	Cable Clamp
10332	#6-32 Hex Nut
25994	Insulator Strip
36016	Tab Stud
47261	Guide Sleeve
48047	Chassis
48048	Capacitor
60726	10 Term Stand Off
60749	#8-32x3/8 Screw
60875	#6-32x¼ Pan
60887	10 Pair Term. Strip
60907	#8-32x¼ Pan
61018	3/4" Grommet
61132	#6-32x3/8
61157	Female Socket Pin
61252	3-Pin Socket
61254	4-Pin Socket
61267	12-Pin Socket
61503	Ring Terminal
61604	Ceramic Insulator
61642	Spike Suppressor
62308	Relay SPST
61690	Ceramic Disc Cap.
61691	Capacitor
61880	Transformer
61904	Spark Gap
62010	Resistor
62077	Capacitor
62315	4.7K 1W Resistor
62316	10K POT

Revised 4 10-78

11-4-76

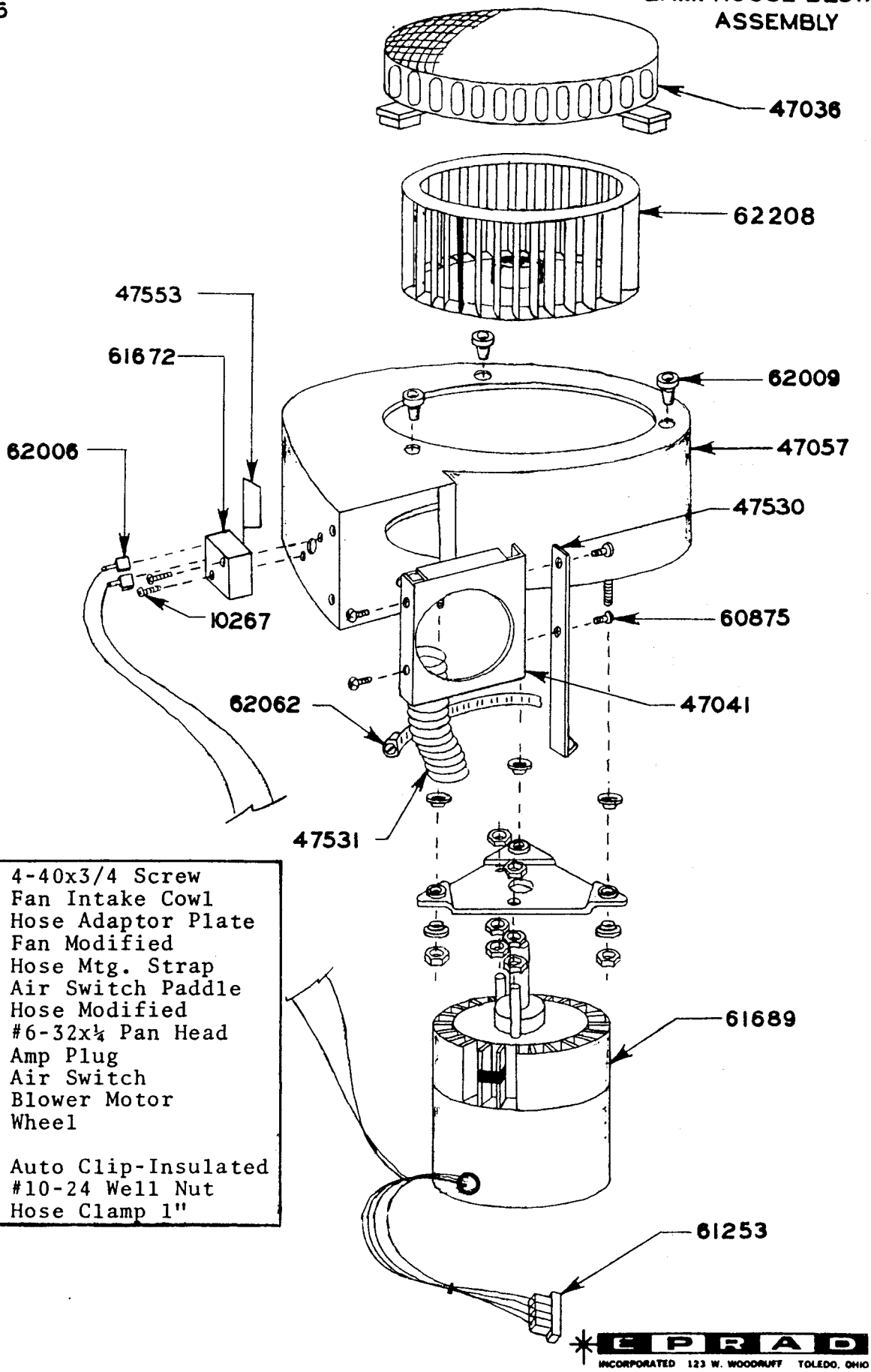
№ 47063
TRANSFORM
ASSEMBLY

10014	#8-32x¼ Set Screw
47064	End Block
47189	R.F. Coil
47517	Wire Wrap-RF Coil
61062	Auto Clip
61613	#8-32x½ Type F Screw
61684	#2 Teflon Tubing
61685	#14 Solid Wire T.W.
61793	Ferrite Rod
61920	#6 Terminal
62170	Bushing-Porcelain



12-24-76

№ 47155
LAMPHOUSE BLOWER ASSEMBLY



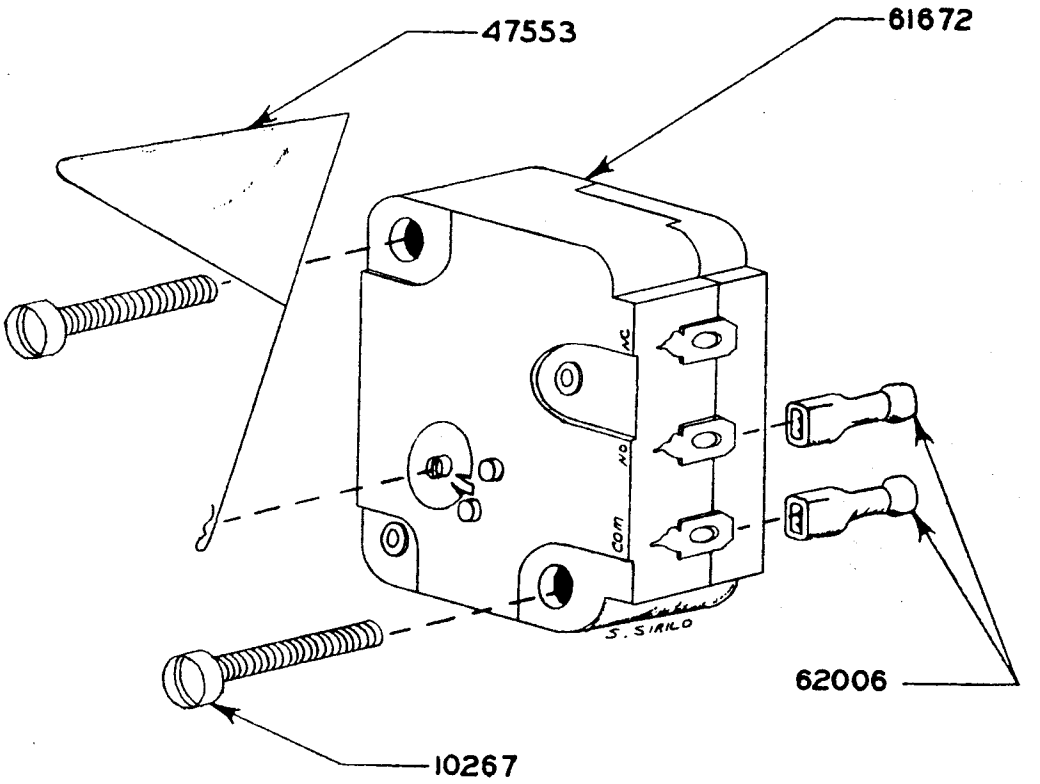
10267	4-40x3/4 Screw
47036	Fan Intake Cowl
47041	Hose Adaptor Plate
47057	Fan Modified
47530	Hose Mtg. Strap
47553	Air Switch Paddle
47531	Hose Modified
60875	#6-32x¼ Pan Head
61253	Amp Plug
61672	Air Switch
61689	Blower Motor
62208	Wheel
62006	Auto Clip-Insulated
62009	#10-24 Well Nut
62062	Hose Clamp 1"

EPRAD INCORPORATED 123 W. WOODRUFF TOLEDO, OHIO

12-24-76

№ 47554
AIR SWITCH
ASSEMBLY

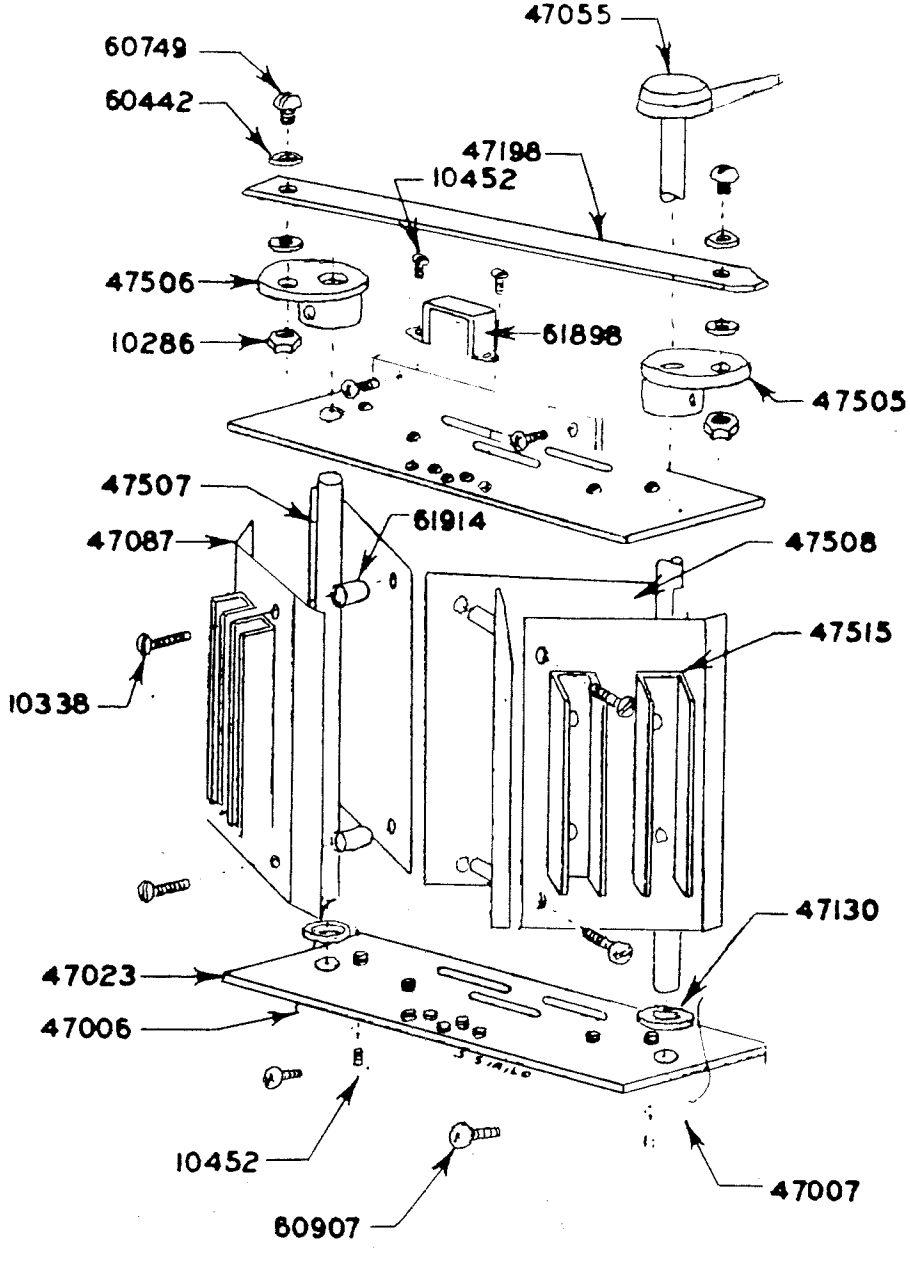
10267	#4-40x3/4 Screw
47553	Air Switch Paddle
61672	Air Switch
62006	Auto Clip-Insulated



EPRAD
INCORPORATED
123 W WOODRUFF, TOLEDO, OHIO

10286	#8-32 Hex Nut
10338	#6-32x3/4 Round Screw
10452	#6-32x¼ Pan Head Screw
47006	Reflect.Glass Spring-Left
47007	Reflect.Glass Spring-Right
47023	Dowser Bracket
47055	Dowser Door-Handle Mod.
47087	Heat Sink Ass'y.-Left
47130	Washer
47198	Dowser Tie Strip
47505	Dowser Cam Ass'y.-Right
47506	Dowser Cam Ass'y.-Left
47507	Dowser Door Plate & Shaft-Left
47508	Dowser Door Plate & Shaft-Right
47515	Heatsink Ass'y.-Right
60442	#8 Fiber Washer
60749	#8-32x3/8 Pan Head Screw
60907	#8-32x¼ Pan Head Screw
61898	Magnet Door Catch
61914	Spacer

10452 - GUIDE FOR HOLDING HEAT GLASS

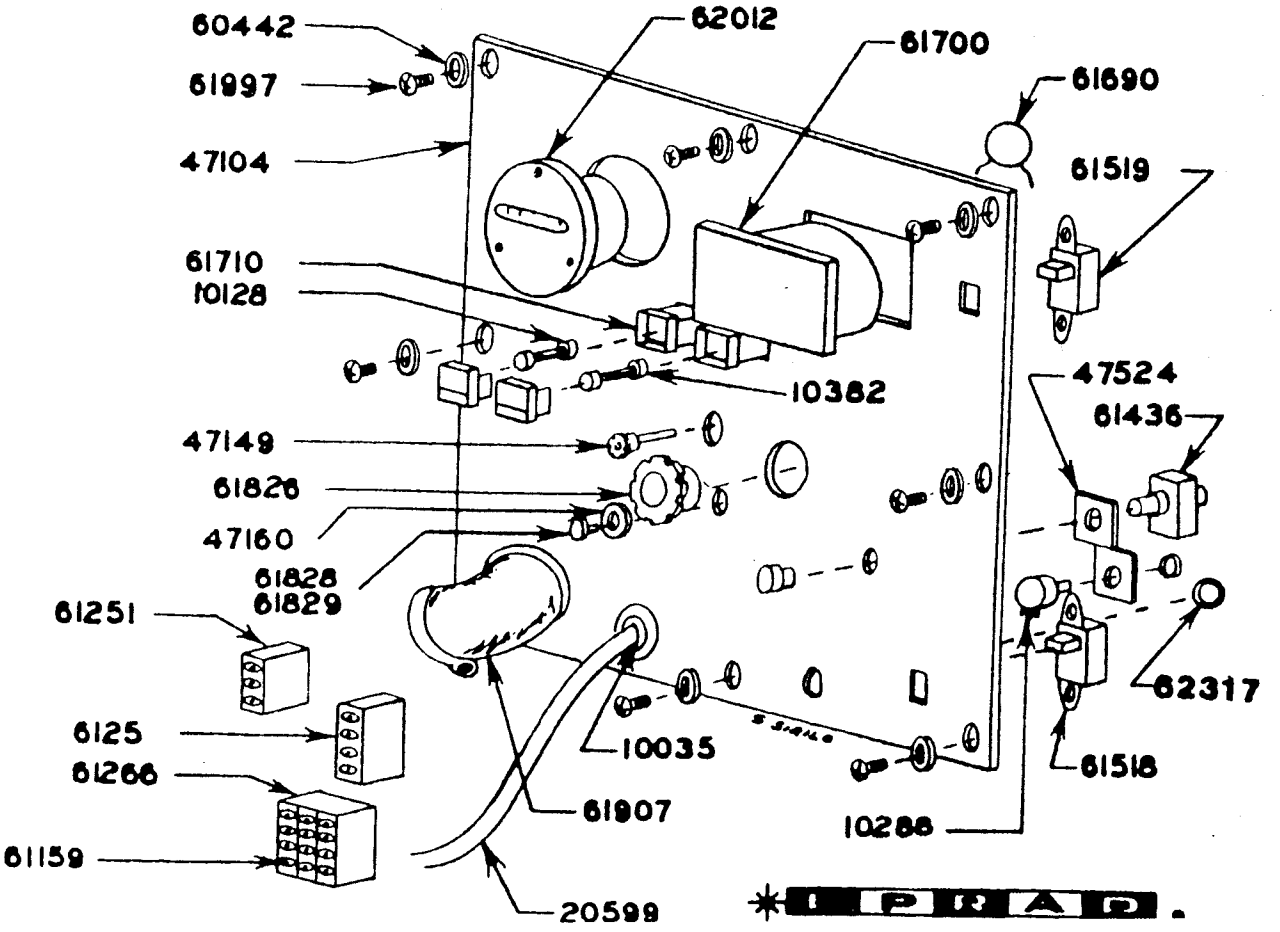


9/28/76

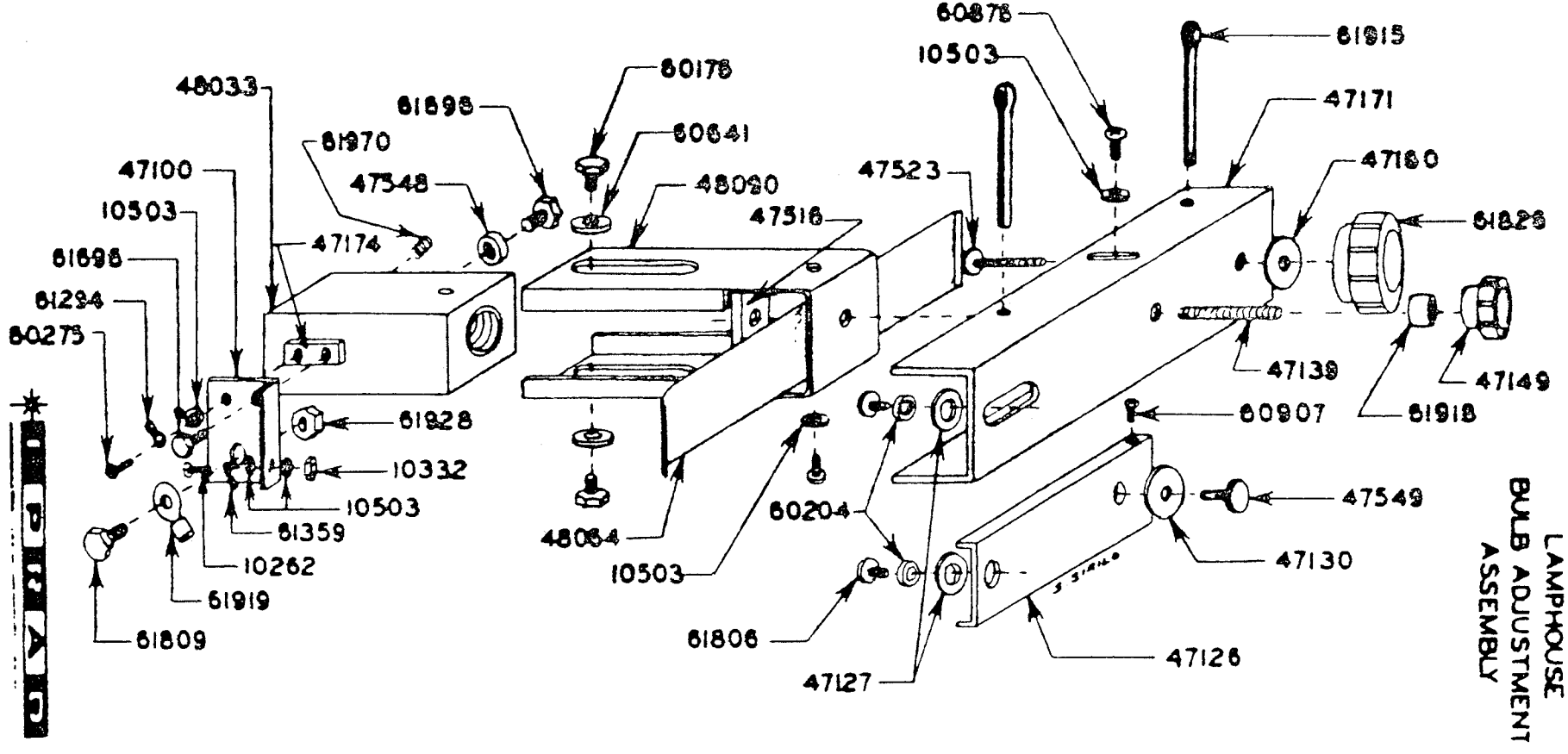
№ 47101
DOWSER DOOR
ASSEMBLY

10035	Strain Relief
10128	3 amp Slo-Blo Fuse
10288	50 ohm Pot
10382	.5 amp Slo-Blo Fuse
20599	AC Line Cord
47104	Rear Mtg. Panel
47149	Lateral Adj.Knob Ass'y.
47524	Pot Mtg. Brkt.
60442	#8 Fiber Washer -Flat
61159	Male Pins
61251	3-Pin Male Plug
61253	4-Pin Male Plug
61266	12-Pin Male Plug
61436	Push Button Switch
61518	Slide Switch DPDT
61519	Slide Switch SPST
61690	Capacitor .02 MFD
61700	Ammeter - 5%
61710	Fuseholder -Sq.
61826	Vertical Adj. Brkt
62317	Hole Plug
61828	#10 Screw Cap
61829	#10-24x½" Allen Head
61907	90' Squeeze Connector
61997	#8-32x3/4 Pan Head
62012	Hour Meter

№ 47138
REAR MNTG. PANEL ASSEMBLY



10262 #6-32x3/8 Screw	47171 Bulb Adj. (Hor)	60204 Flat Washer	
10332 #6-32 Hex Nut	47174 Spacer Block	60275 #6-32x¼ Slot	
10503 Washer	47516 Bulb Adj. Swivel Block	60641 Flat Washer	
47100 Meter Shunt	47523 Gulmite Screw-Mod.	60876 #6-32x½ Pan Hd. Screw	
47126 Bulb Adj. (Vert)	47548 Washer-Cathode Block	60907 #8-32x¼ Philip Screw	
47127 Washer	47549 Thumb Screw-Mod.	61294 Small Ring Spade	61915 1/8x1-3/4 Cotter Pin
47130 Washer	48033 Block	61696 ¼-20x½ Hex Bolt	61918 Spacer
47139 Bulb Adj. Screw	48064 Spring Leaf	61806 #10-24x¼ Screw	61919 #4 Terminal
47149 Bulb Lat. Adj. Knob	48090 Block Retainer	61809 5/16-18x½ Hex Bolt	61928 5/16-18x½ Nut
47160 Epoxy Washer	60176 ¼-20x½ Bolt	61826 Rogan Knob	61970 #10-24 Set Screw



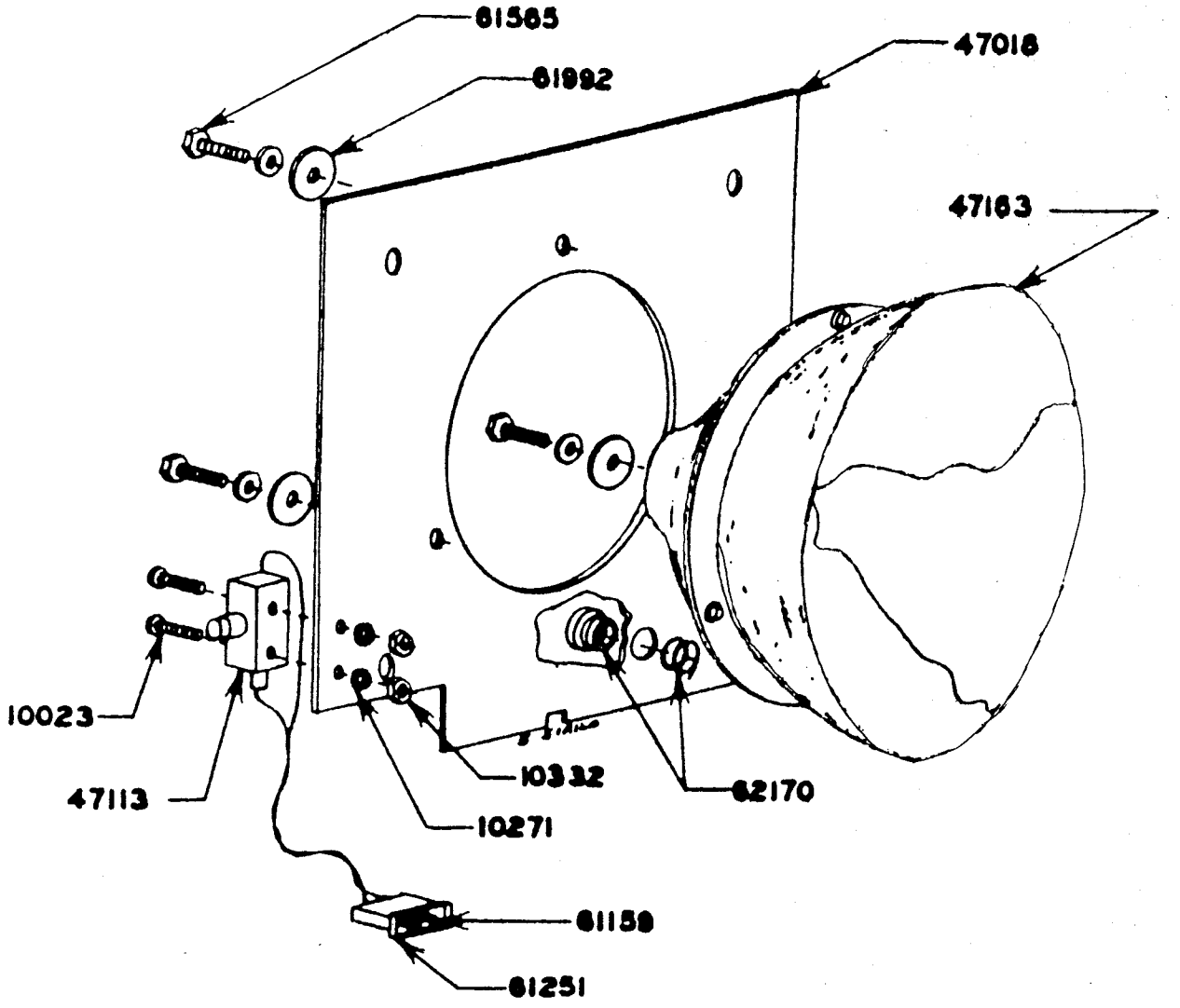
11-4-76

No. 47175
LAMPHOUSE
BULB ADJUSTMENT
ASSEMBLY

11-4-78

NO 47159 BULK HEAD ASSEMBLY

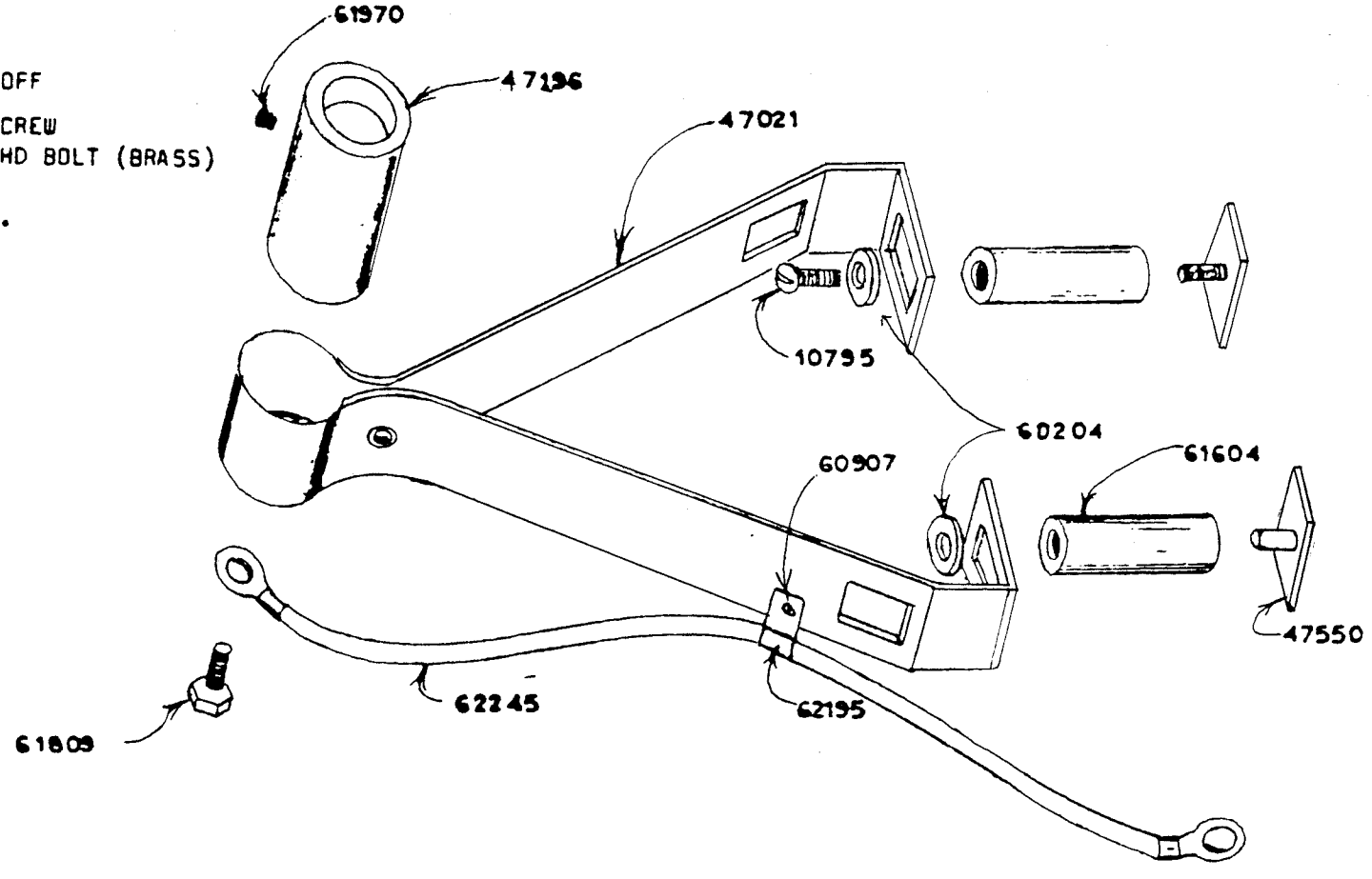
10023	#6-32x7/8 Screw
10271	#6 Washer
10332	#6-32 Hex Nut
47018	Bulkhead Plate
47113	Door Interlock Sw.Ass'y.
47163	Reflector & Flange Ass'y.
61159	Male Connector Pins
61251	AMP Plug 3P
61565	#10-32x3/4 Hex Screw
61992	Washer
62170	Bushing-Porcelain



UPRAD

ANODE BRKT ASS'Y 47161

60907	8-32x1/2 PAN HD MACH SCR.
10 795	10-32x1/2 PAN hd Mach Scr.
47021	ANODE SUPPORT BRACKET
47196	ADAPTOR
47550	STUD PLATE ASS'Y
61604	INSULATER STAND-OFF
61970	10-24x3/16 SET SCREW
61809	5/16-18x1/2 HEX HD BOLT (BRASS)
60130	POP RIVET
62195	CABLE CLAMP ALUM.
60204	FLAT WASHER



NO	E.C.N.	DATE	CHANGE	BY

EPRAD
TOLEDO OHIO

TITLE: ANODE BRKT ASS'Y

TOLERANCE (EXCEPT AS NOTED) DEC. ± FRACT. ±

SCALE NONE

DRAWN	CHECKED	APP'D	DATE
R.G.S.			

ASSEMBLY NO

DWG NO 47161

MATERIAL

FINISH

EPRAD

1214 CHERRY ST. • TOLEDO, OHIO • PHONE: CHerry 3-8106

TOLERANCE (EXCEPT AS NOTED)

DEC. ± XX-02 XXX-010 | FRACT. ± 1/32 | ANGLE ± 1/2°

TITLE:

SERVICE BULLETIN

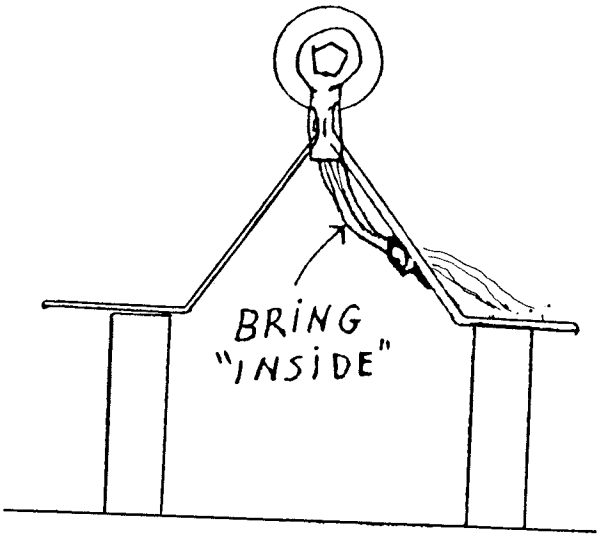
September 11, 1979

SUBJECT: Universal Lamphouse, 3 and 4 KW
ANODE (Plus) Bulb connector "Shorting out" to dowser with 3 and 4 KW bulbs.

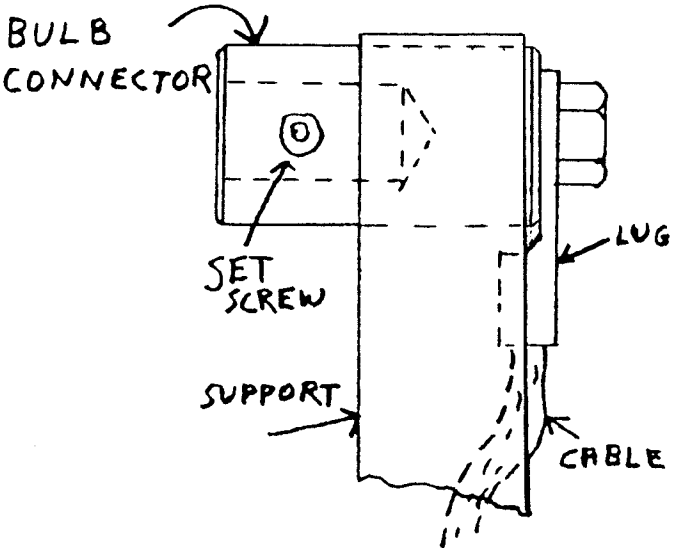
CORRECTION:

1. Remove flexible cable clamp
2. Route flexible cable <u>inside</u> of front lamp support
3. Remove "lug" from bulb connector
4. Reinstall "lug" with "lug" body toward back of lamp
5. Reinstall cable clamp <u>inside</u> of front lamp support
6. Route flexible cable AWAY from dowser door

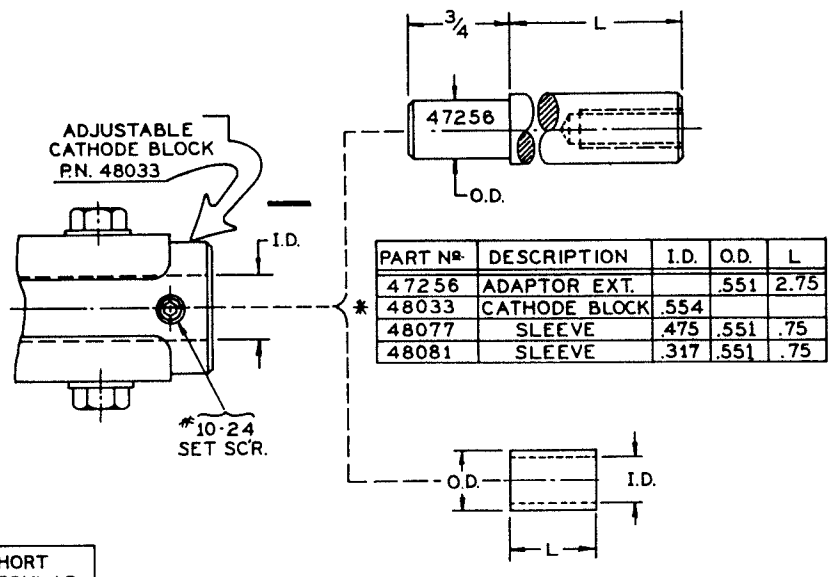
Failure to properly route positive cable may cause <u>SHORT</u> to dowser and may cause rectifier diode failure.



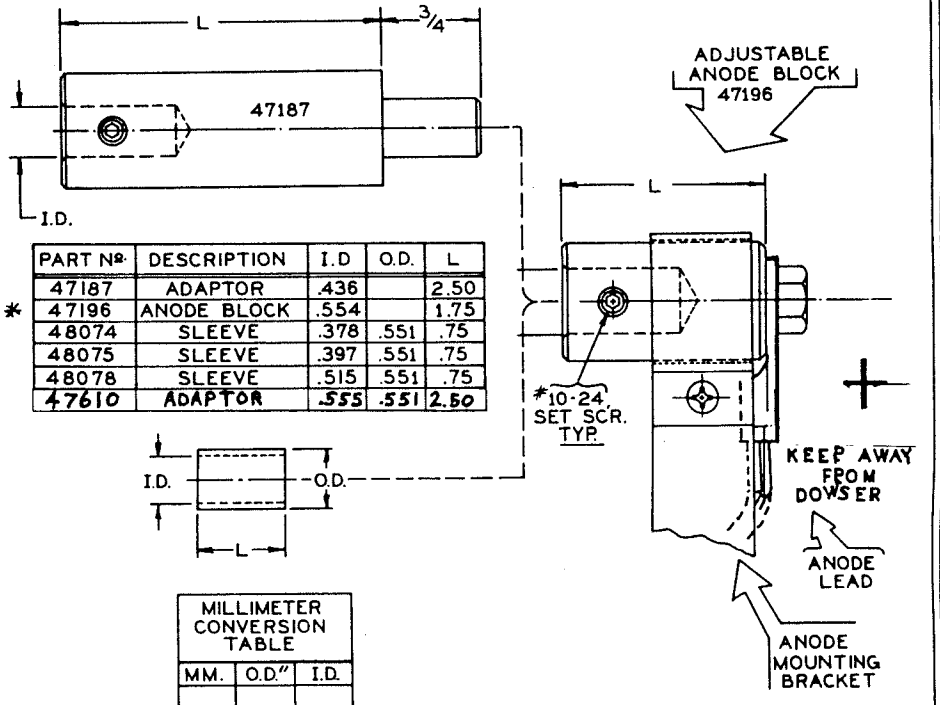
Engineering Department
EPRAD



GREAT LAKES 3000 11-71



PART Nº	DESCRIPTION	I.D.	O.D.	L
47256	ADAPTOR EXT.		.551	2.75
* 48033	CATHODE BLOCK	.554		
48077	SLEEVE	.475	.551	.75
48081	SLEEVE	.317	.551	.75

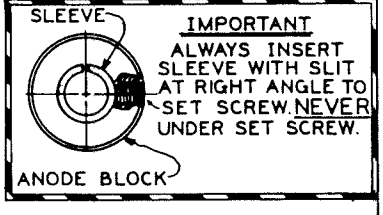


PART Nº	DESCRIPTION	I.D	O.D.	L
47187	ADAPTOR	.436		2.50
* 47196	ANODE BLOCK	.554		1.75
48074	SLEEVE	.378	.551	.75
48075	SLEEVE	.397	.551	.75
48078	SLEEVE	.515	.551	.75
47610	ADAPTOR	.555	.551	2.50

S = SHORT
R = REGULAR

MANUFACTURE	BULB RATING	CATHODE PIN O.D	TOTAL LENGTH	CATHODE LENGTH	ANODE PIN O.D.	ADAPTOR CATHODE	ADAPTOR ANODE
OSRAM	1.6K-S	5/16-18	7.953	3.750	.433	47256	47187
	1.6K-R	.472	12.6	5.71	.394	48077	48075
	2.0K	.472	12.6	5.61	.394	48077	48075
	2.5K-S	.314	11.810	5.709	.375	48081	48074
	2.5K-R	.551	14.960	6.594	.512	48033	48078
	3.0K	.551	14.960	6.594	.512	48033	48078
	4.0K	.314	14.488	6.732	.375	48081	48074
HANOVIA	1.6K-S	5/16-18	7.875	3.750	.433	47256	47187
	1.6K-R	.472	12.7	5.626	.394	48077	48075
	2.0K	.472	14.566	5.568	.394		
	2.0K	.551	14.567	5.591	.551		
	2.2K	.314	11.812	5.718	.375	48081	48074
	2.5K	.550	14.953	6.600	.512	48033	48078
	4.2K	.314	14.600	6.718	.375	48081	48074
ITT	1.6K-S	5/16-18	7.385	3.750	.433	47256	47187
	2.0K	.472	12.6	5.61	.394	48077	48075
	2.5K	.551	14.96	6.59	.512	48033	48078
USHIO, JAPAN (CHRISTY)	1.0K	.551	10.827	4.913	.551	48033	47610
	2.0K	.551	12.598	5.709	.551	48033	47196
	2.5K	.551	13.779	6.496	.551	48033	47196
	3.0K	.551	13.779	6.496	.551	48033	47196
	4.0K	.551	14.961	6.693	.551	48033	47196

MILLIMETER CONVERSION TABLE		
MM.	O.D"	I.D.
8	.314	+.003
9	.354	+.003
10	.394	+.003
11	.433	+.003
12	.472	+.003
13	.512	+.003
14	.551	+.003



* #48033-CATHODE BLOCK & #47196-ANODE BLOCK **USED** WITH ALL BULBS. THE ADDITION OF ADAPTORS, EXTENSIONS & SLEEVES ARE LISTED AT LEFT.

NOTE:
TO CONVERT DECIMAL INCHES TO MILLIMETERS MULTIPLY BY 25.4

EXAMPLE: .551 X 25.4 = 2204 + 2755 + 1102 = 13.9954 OR 14 MM.

MATERIAL

FINISH

EPRAD INCORPORATED 123 W WOODRUFF TOLEDO, OHIO

TITLE BULB ADAPTOR LISTING FOR LAMPHOUSE

TOLERANCE (EXCEPT AS NOTED) | SCALE

DEC ± | FRACT ± | ANGLE ±

DRAWN	CHECKED	APPR'D	DATE
J. OLMS	11 Sept 79	CS	7-30-74

ASSEMBLY No 47546 KIT | DWG No SK-960

Eprad Incorporated

Universal, Universal Console, Superstar

Eprad Model No.	Xenon Bulb Wattage	OSRAM Model No.
	Universal Lamphouse & Console	
47000 system	700 watt	XBO 700W/HS OFR
47000 system	1000 watt	XBO 1000W/HS OFR or XBO 1000W/HSC OFR*
47000 system	1600 watt	XBO 1600W/HS OFR or XBO 1600W/HSC OFR*
47000 system	2000 watt	XBO 2000W/H OFR (N-C) or XBO 2000W/HS OFR**
47000 system	2500 watt	XBO 2500W/HS OFR
47000 system	3000 watt	XBO 3000W/H OFR (N-C) or XBO 3000W/HS OFR**
47000 system	4000 watt	XBO 4000W/HS OFR
	Super Star	
48000 system	700 watt	XBO 700W/HS OFR
48000 system	1000 watt	XBO 1000W/HS OFR
48000 system	1600 watt	XBO 1600W/HS OFR
48000 system	2000 watt	XBO 2000W/H OFR (N-C)
48000 system	2500 watt	XBO 2500W/HS OFR

Eprad, Inc.
2573 Tracy Road
Northwood, Ohio 43619
(419) 666-3266

Eprad, Inc.
P.O. Box 73
Rossford, Ohio 43460
1-800-782-0170

NOTES: Eprad and Universal Console model lamphouses will accommodate any bulb size within the limitations of the power supply with adaptors supplied by Eprad.

* HSC can be used, but must be used with anode adaptor 1600-3 obtainable through OSC. Adaptor must be field adapted as per Eprad's installation instruction.

Eprad recommends that bulbs for lamphouses Serial Nos. 617 and up be ordered with cable on both ends.

**Lamphouse adaptors normally used with XBO 2500W/HS OFR must be used with these bulbs.

EPRAD INC

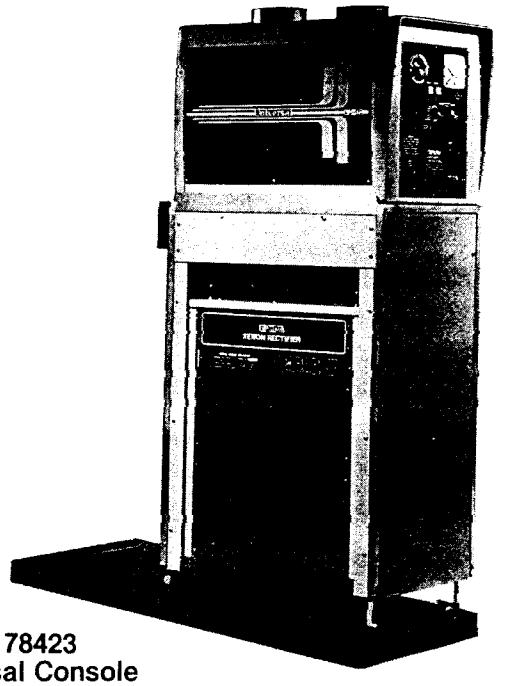
Brighten Your Profit Picture With an EPRAD Xenon Lighting System

Mate an Eprad Universal Xenon Lamphouse with the appropriate Eprad Xenon Power Supply, for a brilliant future...a future marked by substantial savings in electric power and long bulb life. Models to suit the lighting requirements for any size screen indoors or out.

47000 Universal Lamphouse
A truly great performer that will put the most light on your screen and put money in your pocket with long, long bulb life. Perfect for any projections system, including 70 mm.

87183 Universal Lamphouse/ 700-2000 Watt Power Supply Package
Combines Eprad's "light fantastic" lamphouse with the exceptionally efficient and reliable Eprad Xenon Rectifier for smaller size Xenon bulbs.

87423 Universal Lamphouse/ 1400-4200 Watt Power Supply Package
There isn't a Xenon lighting system to match this one for truly universal capability with the largest of Xenon bulbs and lighting those really king-size theatre screens.



78183 - 78423 Universal Console Xenon Lighting Systems
The Universal Lamphouse/Power Supply Package of your choice is beautifully integrated with a handsome stand alone pedestal. Many options to choose from for a total, smoothly functioning projection system with automation to suit your needs.

All Universal Lamphouses
(Individually and in Console Systems):

- Give Ozone free operation
- Use a horizontally mounted bulb
- Meet or exceed SMPTE screen brightness standards
- Feature large, deep dish electroformed mirrors with highest reflection, collecting 85% of all available light
- Have simple bulb installation and alignment
- Have a safety interlock for operator protection
- Have a high velocity internal forced air system for optimum bulb cooling and long bulb life
- Feature a solidly built case with castings for lasting durability and good looks
- Are compatible with EPRAD Co-Operator or other automation systems

EPRAD XENON LIGHTING SYSTEMS PRICE LIST
Effective August 9, 1982

	ITEM	LIST PRICE
XENON LAMPHOUSE ONLY		
47000	Universal Lamphouse	2330.77
LAMPHOUSE/POWER SUPPLY PACKAGE		
87183	Universal Lamphouse w/1 Phase 75 Amp Power Supply	4230.77
87303	Universal Lamphouse w/3 Phase 100 Amp Power Supply	4669.23
87423	Universal Lamphouse w/3 Phase 140 Amp Power Supply	5115.38
XENON CONSOLES		
78183	Universal Console w/1 Phase 75 Amp Power Supply	5192.31
78303	Universal Console w/3 Phase 100 Amp Power Supply	5630.77
78403	Universal Console w/3 Phase 140 Amp Power Supply	5992.31
ACCESSORIES		
47600	External Exhaust Blower	230.77
78000	Console Base Only	1076.92

For prices of Booth Automation Systems that can be built into Universal Consoles, See Automation Price Sheet.

Special savings are offered when Xenon Systems are purchased as part of a booth package, see Booth Packages Price Sheet.