XENON PROJECTORS
EX2000-A&N

STEP BY STEP TROUBLESHOOTING MANUAL for
THE XENON LAMP, STATER AND RECTIFIER CIRCUITS
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INTRODUCTION

1. This manual describes the starter and rectifier circuits as they apply to projectors after Serial No. 4860. Since the troubleshooting procedures are similar, they are also applicable to machines prior to Serial No. 4860, with minor variations in the schematics.

2. The EX-2000A has had several major and minor modifications to the electrical, amplifier, rectifier and starter circuits. To help identify a particular EX-2000 projector, a cross reference table is attached at the end of this manual.

3. All voltage measurements are made with reference to common ground under actual operating conditions. Some minor variation may exist from one projector to another as a result of component tolerances and meter accuracy.

4. All resistance measurements are made in-circuit with the power disconnected. The values indicated are approximate and may vary as a result of component tolerances and meter accuracy.

5. A copy of all of the pertinent diagrams are attached at the end of this Troubleshooting manual.

6. CAUTION! Care must be exercised to avoid electrical shock while servicing this projector.
SYMPTOM NO. 222-1  XENON LAMP ATTEMPTS TO STRIKE BUT DOES NOT COME ON.

Probable Cause & Remedy:

222-1-1 : Check Circuit Breaker (222-63471)?
Note : If Circuit Breaker should trip off, see SYMPTOM NO. 222-4.

222-1-2 : Rotary Function Switch (micro switch #4) may be defective. Check and replace.

FIG. #1  EX-2000A: Rotary Switch assy.

222-1-3 : Defective High-Voltage Wire (222-62151) may be arching internally. Replace if necessary.

222-1-4 : Xenon Lamp may be defective. Replace with a known good lamp. If it strikes O.K., the original lamp obviously is defective.

Note (1) : Xenon lamps are manufactured to the highest quality and are carefully inspected and tested by manufacturers, and are again inspected and tested to meet EIKI's quality control standards.

FIG. #2  (350W UXL-350E-O)

Note (2) : It is often difficult to detect a defective lamp by appearance. An obvious symptom such as a slow leak can result in a black center or a muddy-grey colour formed on the glass, however, the silver foil connecting the lead to the electrode could be broken off, in which case the lamp would appear normal.

Note (3) : If the lamp attempts to strike, causing a spark to discharge between the anode (+) and the cathode (−) of the lamp, and the open voltage described in remedy No. 222-3-1 is correct, it can be assumed that the lamp is defective.
222-1-5: 5A Fuse (222-63381 for 220/240V) or 10A Fuse (222-63341 for 100/120V) blown. Replace with a new fuse. If it blows again, refer to SYMPTOM NO. 222-4.

222-1-6: Temperature Fuse (222-63531) may be open. To check, remove base cover-plate. Using a Vom on the ohms x 10 scale, measure the continuity between points A and B. (FIG. #4) If there is continuity the Temperature Fuse is good. If open, replace.

Note: Should the Fuse blow again, refer to SYMPTOM NO. 222-4.
After checking items 222-1-1 to 222-1-6 without any results, it can be assumed that the Starter or the Rectifier circuit may be defective.
To test the Starter proceed as follows:

(a) Disconnect and remove the two black AC input wires from the Starter.
Remove the red high voltage wire and the yellow and black wire from the top screw terminals.

(b) Remove the Starter Unit from the Rectifier chassis.

(c) Prepare two copper wires and connect them.
(FIG. #5) The ends of the wires should be spaced at a distance of about 6mm.

(d) Using a small transformer capable of 28–30 volts AC pulse the AC input terminals of the Starter 5 or 6 times.

(e) There should be a spark discharged across the 6mm gap indicating a good starter unit.
Remount and connect Starter to the Rectifier chassis and proceed to remedy No. 222-2-1.

(f) If there is no discharge spark across the 6mm gap, it can be assumed that the Starter is defective and should be replaced or repaired following the procedure outlined in remedy No. 222-1-8.

CHECKING AND REPAIRING THE STARTER CIRCUIT

FUNCTION: The lamp Starter circuit is actuated by 30 volts AC supplied through the contacts of Relay Switch MK2P. This Relay senses the open circuit voltage of 112V DC from the Rectifier supply. The full wave bridge rectifier 2B4DM and capacitor C4 supply approximately 30V DC to starting oscillator circuit consisting of TR1, TR2, T1. The Piezo-Electric Element SSHT provides a feedback path to TR1 from the High voltage side of T1. Silicon rectifiers D3 and D4 rectify the High voltage AC to provide a positive pulse to Tesla Coil T2. The secondary of T2 develops the High voltage spark necessary to strike the lamp. The lamp then forms a current path, and the Rectifier supply which drops from 112 volts to the 22 volts DC lamp operating voltage which in turn drops out Relay Switch disabling the starter circuit.
Part No. | Description | 222-62381 | Capacitor C-3 700pfd.
--- | --- | --- | ---
222-62041 | Starter Mounting Bracket | 222-62391 | Spark Gap
222-62301 | Starter Unit assy | 222-62431 | Capacitor C-5 0.002mfd. (2pcs)
222-62051 | Starter Case | 222-62531 | Red Terminal Screw (2pcs)
222-62321 | Tesla Coil | 222-62541 | Black Terminal Screw
222-62331 | Piezo-Electric Element SSHT | 222-62201 | Starter Printed Circuit Board assy
222-62341 | Diode D3 & D4 HVT-305 (2pcs) |
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First check high power components such as the power Transistors and Diodes.

222-1-8: TR-2 2SC1454 (222-62511)
(a) In-circuit forward resistance between Collector and Emitter should be about 800 ohms.
(b) The reverse resistance should be about 1600 ohms.
(c) If measurements are similar to the above, it can be assumed that TR-2 is O.K.
(d) If not, replace TR-2 or the complete board assembly (222-62201).

222-1-9: T-1 Oscillator Transformer (222-62311)
(a) If Transformer appears to be burned, replace.
(b) When the transformer is burnt, it can be assumed that TR-2 2SC1454 is also defective.
(c) Replace both T-1 and TR-2, or the complete circuit board assembly (222-62201).
(d) It is possible that T-1 can be defective even though it doesn't appear burned.
   Check windings for the open circuit.
(e) In the event that the problem is not located by steps 222-1-18, replace the complete P.C.
   Board assembly (222-62201).

222-1-10: Variable Resistors VR-1 (1K ohm, 222-62262), and VR-2 (4.7K ohm, 222-62271)
(a) If VR-1 & VR-2 appear burnt, replace P.C. board assembly (222-62201).
(b) VR-1 & VR-2 may be open even if they physically appear O.K. Check and replace if defective.
(c) When replacing TR-2 (2SC1454) it may be necessary to adjust VR-1 & VR-2 for proper
   biasing of TR-2.
   Adjust VR-1 for approximately 16.5 volts at the emitter of TR-1, and set VR-2 for 5.8 volts
   at the base of TR-2, for 5.6 volts at the emitter of TR-2.
   All measurements are to be referenced to the negative side of C-4, and 30 volts AC input
   being pulsed to the starter circuit.

222-1-11: TR-1 2SC1627 (222-62611)
(a) To check the in-circuit resistance between Collector and Emitter, use the R x 100 scale.
The forward resistance should be 1.4K ohms, and the reverse should be about 4K ohms.
(b) If these measurements are close it can be assumed that TR-1 is O.K.
(c) If very different or a short circuit is measured, replace TR-1 or P.C. Board assembly (222-
   62201).
222-1-12 : Piezo-electric Element SSHT (222-62331)
(a) Check the solder connections of the black and red wire designated below as (P) & (Q). (FIG. #10)
(b) Set Vom to R x 1 scale and measure the resistance between (P) & (Q). This should be approximately 9 ohms.
(c) Reverse the polarity of the meter and measure between (P) & (Q) 9 ohms.
(d) If measurements are close to this, the SSHT can be assumed to be O.K.
(e) If it shows a short circuit, replace the Element SSHT.

222-1-13 : Diode D3 & D4 HVT-30S (222-62341)
(a) Set Vom to the R x 100 scale and check Diode (R) & (S) as shown below (FIG. #11).
(b) An infinite resistance should be measured in both the forward and reverse direction.
(c) Any resistance at all would indicate a shorted diode which should be replaced.
222-1-14: Capacitor C3 700pfd. (222-62381)

(a) Set Vom to R x 100 scale and check (T) as shown below. (FIG. #12)

(b) Any resistance other than infinity would indicate a defective capacitor.

---

222-1-15: Capacitor C5 0.02mfd. (222-62431)

(2pcs. of 0.01mfd. in parallel)

(a) Set the Vom to R x 100 scale. Check (U) as shown below. (FIG. #13)

(b) Any resistance other than infinity would indicate a defective capacitor.

---

222-1-16: Tesla Coil (222-62321)

(a) Set the Vom to R x 100 scale and check (V) as FIG. #13.

(b) Resistance should be 0 ohms. An open circuit would indicate a defective coil.
222-1-17 : Spark Gap (222-62391)
(a) Set Vom to R x 100 scale and check continuity (W) as illustrated below. (FIG. #14)
(b) The resistance should be infinity. Any resistance would indicate a shorted or defective Spark Gap.

FIG. #14

222-1-18 : Resistors and Capacitors on P.C. Board assembly (222-62201)
(a) Check resistors for open circuit and capacitors for short circuit.
(b) Replace as required or replace P.C. Board assembly.

Note (1) : The foregoing procedure has been to locate the defective component or components preventing the Starter from striking the lamp.
In the event that this procedure did not locate the faulty component(s), it is recommended that the complete P.C. Board assembly (222-62201) be replaced.

Note (2) : It is very unlikely that D1 2B4DM Bridge Rectifier (222-62411) is defective.
SYMPTOM NO. 222-2
XENON LAMP DOES NOT LIGHT, ATTEMPTS TO STRIKE AND STARTER CIRCUIT IS WORKING O.K.

Probable Cause & Remedy:

222-2-1 : Relay MK2P (222-63351)

Checking Procedure:
(a) Make sure AC power cord is plugged into the projector correctly.
(b) Remove Relay MK2P.
(c) Turn Rotary Function Switch to "LAMP ON" position.
(d) Set Vom to DC 200 volts scale.
(e) Check for approximately 105 to 112V DC between the anode and cathode of the Starter unit as shown below. (FIG. #15)

(f) If there is no voltage or less than 100 volts DC see Remedy No. 222-2-1 note (3).
(g) If the 105 to 112 volts DC is measured and the Starter Circuit is working O.K., Relay MK2P may be defective.

(h) Check the relay voltage between Pin No. 7 (red wire) and Pin No. 2 (yellow wire) of the Relay Socket (222-63361).
(i) If the 100V DC is present between the terminals, Relay MK2P is defective and must be replaced.
Note (1) : It is possible that the Relay Socket has a poor contact between Pin No. 6 and Pin No. 8. After checking wiring for poor solder connections, replace the Relay Socket.

Note (2) : Refer to rectifier diagram No. 222-63971
The open starting voltage mentioned in Remedy No. 222-2-1 DC-105 to 112V is the combined voltage developed from the 54V and 57V power supplies. (FIG. #17)

Note (3) : If the open starting voltage is only about 45V DC, it can be assumed that the problem is in the rectifier circuit of either the 54V or 57V supply.

FIG. #17

EX-2000A RECTIFIER STAGE CIRCUIT DIAGRAM
SYMPTOM NO. XENON LAMP DOES NOT LIGHT, ATTEMPTS TO STRIKE, WITH STARTING CIRCUIT WORKING O.K., OPEN VOLTAGE IS ONLY ABOUT 45V DC.

CHECKING AND REPAIRING THE RECTIFIER CIRCUIT:

FUNCTION:

POWER TRANSFORMER SECONDARY WINDINGS provide;
20V AC: Lamp striking Boost Voltage
41V AC: Lamp striking and running supply voltage
38V AC: P.C. Board Regulator Circuit
48V AC: Amplifier running supply voltage
8.5V AC: Exciter Lamp voltage

The Lamp Striking Boost Voltage Circuit
Consisting of D1, D2, and C1 etc. provides an additional "Boost" voltage during striking. When the lamp has struck properly D3 is turned on hard, supplying running current and voltage to the lamp. The boost voltage circuit unable to supply the voltage is shut down.

Lamp Striking and Running Circuit
Consists of D4, D5, Choke Coil, C2, C3, C4, C5 etc. This circuit supplies part of the initial striking voltage and continues to supply the running voltage and current.

Regulator Circuit
Diodes D9, D10, D11 and D12 supply a constant DC reference voltage as determined by D7 21.8V DC Zener Diode. Through the resistor network R4, R5, R6, R7 and VR1 and Q2 (TR2) is bias on controlling the base of Q3 – Q8 (TR3 – TR8), which are parallel transistors.

The error voltage is sensed across R13 setting the bias on Q1 (TR1) which adjusts the bias on Q2 (TR2), thereby controlling Q3 – Q8 which establishes a constant lamp current.

CAUTION: Relay MK2P must be removed while performing the checks below.

Probable Cause & Remedy:

222-3-1: Secondary winding of Power Transformer (222-63081 for 100V/120V, or 222-63091 for 220V/240V)

(a) Check for 20V AC between terminals No. 10 and No. 11 of the Power Transformer. (See diagram, FIG. #18)
(b) Check for 20V AC at point (a) on the Rectifier P.C. Board (222-63601) as shown. (FIG. #19)
(c) If there is not 20V AC on the P.C. Board, it can be suspected that the Nylon 12 pin connector is defective. Check Pin No. 7 (blue wire) or Pin No. 9 (white wire). Check soldering joints at the P.C. board and replace the 12 pin connector if necessary.
(d) It is possible that the 45V DC measured at the anode and cathode of the lamp starter terminals may gradually increase. If this is the case, check the 38V AC at point (b) on the P.C. Board. (FIG. #19)

(e) If there is not 38V AC supplied to the P.C. Board, check the connections at the 12 pin Nylon Plug Pin No. 1 (orange wire) and Pin No. 2 (yellow wire).

(f) Check secondary terminals No. 8 and No. 9 of the Power Transformer for 38V AC. If no voltage, replace Power Transformer.

Note: After completing the above checks with no results and the symptom is low open voltage with 20V and 38V AC supplied to P.C. Board (222-63601), proceed to Remedy No. 222-3-2.

222-3-2: Diode Bridge D9, D10, D11, D12 (222-63611)

CAUTION: MAKE SURE AC POWER CORD IS UNPLUGGED FOR THE TEST PROCEDURE BELOW.

Using the Vom set to the R x 10 scale, check each Diode in-circuit as follows:

(a) The forward resistance should be approximately 600 ohms.
(b) The reverse resistance should be approximately 70K ohms.
(c) In the event that the resistance is considerably higher or lower than indicated above, it can be assumed that the Diode is defective. Remove from the circuit and check again for normal diode characteristics.

Note: Diodes would normally measure near infinity in the reverse direction, but since they are in the circuit they measure as above.

222-3-3: Capacitor C1 250V 22mfd. (222-63651)
When the 54V DC supply is too low as described in Remedy No. 222-2-1, it is possible that this is caused by a defective C1 Capacitor. To check the Capacitor with a Vom set to the R x 10 scale, meter should give an instantaneous indication and then read infinity. Should the Capacitor continue to measure a resistance, it is obviously shorted, or leaking. Replace.

222-3-4: 54 Volt DC Supply Diodes D1 & D2 (222-63611)
(a) To check Diodes D1 & D2, set Vom to R x 10 scale.
(b) Forward resistance should be approximately 600 ohms.
(c) Reverse resistance should be near infinity.
(d) If readings are considerably different from the above, replace Diodes D1 & D2.
222-3-5: Zener Diode D7 (222-63631)
(a) To check the Zener Diode set the Vom to R x 100 scale.
(b) The forward resistance should be approximately 700 ohms.
(c) The reverse resistance should be approximately 4K ohms.
(d) If the measurements are considerably different from the above, replace D7.
(e) To check Zener voltage, plug in projector. Set Rotary Function Switch to "OFF" position and measure the voltage across D7 which should be about 21.8V DC.

FIG. #21

CAUTION: BE SURE PROJECTOR IS UNPLUGGED BEFORE MAKING THE FOLLOWING CHECKS.

222-3-6: Capacitors and Resistors on P.C. Board assembly (222-63601)
Check for shorted capacitors or open resistors. After checking items 222-3-2 to 222-3-6 and not locating the problem, replace P.C. Board assembly (222-63601).
Probable Cause & Remedy:

222-4-1: Mica or Polyester Insulator
Check insulation between Diodes and the Metal Heat Sink (222-63581) using a Vom R x 10 scale. (FIG. #22)

Diode D5:
(a) Forward resistance between points (A) and (F1) should be approximately 500 ohms.
(b) Reverse resistance between (F1) and (A) should be infinity.

Diode D4:
(a) Forward resistance between points (B) and (F2) should initially be about 500 ohms and gradually increase.
(b) Reverse resistance between points (F2) and (B) should be infinity.

Diode D3:
(a) Forward resistance between points (C) and (F3) should initially show a resistance and quickly read infinity.
(b) Reverse resistance between points (F3) and (C) should initially show a resistance and quickly read infinity.

If the measurements are similar to the above, it can be assumed that the Mica insulation is O.K.

222-4-2: Diode D3 & D4 SG5TS (222-63211) and Diode D5 SG5TR (222-63141)
To check Diodes with the Vom using the R x 10 scale. (FIG. #23)

Diode D3:
(a) Forward resistance “C” should be about 500 ohms.
(b) Reverse resistance “C” should be infinity.

Diode D4:
(a) Forward resistance between points (B1) and (B) should be about 500 ohms.
(b) Reverse resistance between (B) and (B1) should be infinity.

Diode D5:
(a) Forward resistance between points (A) and (A1) should be about 500 ohms.
(b) Reverse resistance between (A1) and (A) should be infinity.

If the above resistances are reasonably close, it can be assumed that Diode D3, D4, and D5 are probably O.K. Should the reading show a short circuit in the forward or reverse directions, the Diodes are obviously shorted. Likewise, if they measure infinity in the forward direction, they would be open.
222-4-3: Capacitors C2, C3, C4, 50V 2200mfd.
Checking the capacitors for shorts using a Vom set to the R x 10 scale, as illustrated below. (FIG. #24)
Check each capacitor one by one. The meter should instantly read some resistance charging the capacitor then it should return to infinity. If the capacitor continues to read a resistance, it is an indication that it is shorted or leaking.

FIG. #24

222-4-4: Transistors 2SD556, TR4, TR5, TR6, TR7 & TR8 (222-63261)
Checking Transistors for emitter and collector shorts using a Vom set to the R x 10 scale, as shown in FIG. #24. “C” denotes the collector, and “E” the emitter. (soldering with brown wire)
(a) Forward resistance between “E” and “C” should be about 600 ohms.
(b) The reverse resistance between “C” and “E” should be infinity.
If the Transistors check as above, it can be assumed that Transistors TR4, TR5, TR6, TR7 and TR8 are O.K.
In the event that there is one shorted, it will be necessary to disassemble the heat sink to remove and check each Transistor individually.
To assist in locating the defective Transistor 2SD556, the following methods can be followed:
Method (1): Disassemble the Heat Sink (222-63201) from the Rectifier Chassis and check each Transistor for shorts.

Note: To disassemble the Heat Sink assembly from the chassis:
(1) Remove Heat Sink Chassis mounting screws.
(2) Remove Resistor R13 30W 0.1 ohm (222-63311).
(3) Cut wire ties as necessary.
(4) Remove Fan Belt (222-12181) and Fan (222-12802 or 222-12901)
(5) Unsolder wires to the Heat Sink frame as necessary.
(6) Remove Heat Sink.

Method (2): Unsolder one Brown Wire from the emitter Resistor (222-63321) and check the resistance between (C) and (E) as referred to in steps (a) and (b).
If the resistance is normal, unsolder another Brown Wire and check the resistance until the defective Transistor is located. Replace the defective Transistor 2SD556 and check the resistance again. When all the Transistors check normal re-install the Heat Sink assembly (222-63201).

222-4-5: Checking for shorted or open-circuit Transistors 2SD556 between the collector and the base, and the emitter and the base.
Check the previous illustration (FIG. #25) and note that the Brown Wire is the emitter, the Yellow is the base, and the Heat Sink is the collector. Using a Vom check as follows with the meter set on the R x 100 scale.
(a) Between the base (B) and the emitter (E) the forward resistance should be about 600 ohms, and the reverse resistance should be infinity.
(b) Between the base (B) and the collector (C) the forward resistance should be about 600 ohms, and the reverse resistance should be infinity.
After completing steps 222-4-4 and 222-4-5 with results similar to those indicated, it can be assumed that the Transistors TR4, TR5, TR6, TR7 and TR8 are O.K.
222-4-6: Defective Transistor 2SD202 (222-63251)
   It is unlikely that this transistor is defective, however it can be checked the same way as the
   TR2SD556.

222-4-7: Zener Diode D7 1Z22 (222-63631)
   Refer Remedy No. 222-3-5. Sometimes a defective D7 can cause the circuit breaker to trip.

222-4-8: Adjusting the Lamp Circuit
   (a) Use a DC Ampmeter capable of measuring up to 25 amps.
   (b) Unplug the projector. Turn the 17 amp Circuit Breaker off.
   (c) Connect the amp meter across the Circuit Breaker terminals (A) and (B) shown below. (FIG. #26)

   FIG. #26

   VR1 470 ohms

   (d) Plug in the projector and turn on the lamp.
   (e) Adjust VR1 (222-62521, 470 ohms) very slowly on the Rectifier P.C. Board assembly until
   the current measures 16 amps (clockwise will increase the current and counter-clockwise will
   decrease the current).

CAUTION: EXCESSIVE LAMP CURRENT CAN CAUSE THE XENON LAMP TO EXPLODE.

Note (1): The Circuit Breaker is rated at 17 amps continues, but will trip off with surge currents ex-
ceeding 21 amps.

Note (2): IMPORTANT – Do not attempt to measure the current across the Circuit Breaker with the
Breaker turned ON. The meter will then read only 5 to 6 amps.

222-4-9: Improper AC Supply voltage
   (a) Excessive AC Supply voltage above the projectors rating will cause the Circuit Breaker to
   trip.
   (b) Incorrect supply voltage may also cause the lamp to flicker.

Note: For further discussion on flicker, see Step 222-5.

222-4-10: Fan-Motor Belt (222-12181)
   (a) Check for worn or broken Fan Motor Belt.
   (b) Also check that projector receives adequate ventilation.
222-4-11: Silister C-5A3 (222-63271) and C-5A1 (222-63281)
The resistance of the Silisters should be infinity. If not, they are defective.

FIG. #27

SYMPTOM NO. 222-5  FLICKERING ON THE SCREEN

Probable Cause & Remedy:

222-5-1: Enameled Resistor R-13 0.1 ohm 30W (222-63311)
Using a precision digital ohm meter, the Resistor should measure between 0.1 and 0.13 ohms.
Resistance greater than 0.13 ohms can cause flicker.

222-5-2: Too high or low AC supply.
AC supply voltages lower or higher than the projectors rating can cause flicker.

222-5-3: Improper shielding of Motor assembly
Check for proper shielding.

SYMPTOM NO. 222-6  XENON LAMP EXPLODED

Probable Cause & Remedy:

222-6-1:
(a) Explosion of the Xenon Lamp is never caused by a defective Starter or Rectifier circuit, or
the Circuit Breaker.
(b) The explosion of a lamp is always related to a defect in the lamp itself. Check item 222-1-4
concerning checking the lamps.

CAUTION: NEVER TOUCH THE QUARTZ GLASS OF A XENON LAMP.
Finger-prints leave oil on the glass causing a change in the rate expansion of the glass with
temperatures which may cause the lamp to explode.
**SYMPTOM NO. 222-7**

**CONTACTS OF RELAY MK130J DO NOT MAKE OR BREAK PROPERLY.**

**Remedy:**

(a) Replace Relay MK130J (222-63781 for 100/120V) (222-63791 for 220/240V).
(b) Install a non-polarized Capacitor 0.1mfd. 600V as shown below. *(FIG. #28)*
(c) Install a Silister SA3 as shown below. *(FIG. #28)*

*FIG. #28*
<table>
<thead>
<tr>
<th>EX-2000A Serial No.</th>
<th>Electrical Circuit Diagram Number, &amp; Identification</th>
<th>Amplifier Diagram Number &amp; Identification</th>
<th>Rectifier Circuit Diagram Number, &amp; Identification</th>
<th>Starter Circuit Diagram Number, &amp; Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001 – 2097</td>
<td>No. 222-60211</td>
<td>No. 312-51111 * with WA-206 type * with 1A Fuse only</td>
<td>No. 222-63151</td>
<td>No. 222-62061 * with TR 2SC 901A</td>
</tr>
<tr>
<td>2098 – 2227</td>
<td>No. 222-60211</td>
<td>No. 222-50141 (or 312-51121) * with WA-206 type * with 2A MT Fuse</td>
<td>No. 222-63151</td>
<td>No. 222-62061</td>
</tr>
<tr>
<td>2228 – 2297</td>
<td>No. 222-60211</td>
<td>No. 222-50141 (or 312-51121)</td>
<td>No. 222-63151</td>
<td>No. 222-62061 (Modification #:51-23 5/11/76)</td>
</tr>
<tr>
<td>2298 – 2397</td>
<td>No. 222-60251 (Modification #:50-02 21/1/75) * AC power supply to Amplifier from Transformer Secondary windings</td>
<td>No. 222-50141 (or 312-51121) (Lamp Relay Switch MK130J was mounted)</td>
<td>No. 222-63151</td>
<td>No. 222-62061</td>
</tr>
<tr>
<td>2398 – 2497</td>
<td>No. 222-60251</td>
<td>No. 222-50141 (or 312-51121)</td>
<td>No. 222-63911 (Modification #:51-25 5/11/76) * with New Printed Circuit Board assy</td>
<td>No. 222-62061</td>
</tr>
<tr>
<td>2498 – 2547</td>
<td>No. 222-60251</td>
<td>No. 312-51151 (Modification #:50-14 18/8/75) * with WA-414 type * with 2A MT Fuse</td>
<td>No. 222-63911</td>
<td>No. 222-62061</td>
</tr>
<tr>
<td>2548 – 3077</td>
<td>No. 222-60251</td>
<td>No. 312-51151</td>
<td>No. 222-63911</td>
<td>No. 222-62071 (Modification #:51-24 5/11/76) * VR-1 470 ohm (new)</td>
</tr>
</tbody>
</table>
### Changes Made on Model EX-2000A

<table>
<thead>
<tr>
<th>EX-2000A Serial No.</th>
<th>Electrical Circuit Diagram Number &amp; Identification</th>
<th>Amplifier Diagram Number &amp; Identification</th>
<th>Rectifier Circuit Diagram Number &amp; Identification</th>
<th>Starter Circuit Diagram Number &amp; Identification</th>
</tr>
</thead>
<tbody>
<tr>
<td>3078 – 4398</td>
<td>No. 222-60251</td>
<td>No. 312-51151 (or 222-50241)</td>
<td>No. 222-63911</td>
<td>No. 222-62071</td>
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<tr>
<td></td>
<td></td>
<td>* with WA-526 type</td>
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<td>* with TR4 : 2SC 1509</td>
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<td>&amp; TR5 : 2SA 777</td>
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<td>(Modification #51-20 5/11/76)</td>
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<tr>
<td>4399 – 4738</td>
<td>No. 222-60251</td>
<td>No. 222-50241</td>
<td>No. 222-63971</td>
<td>No. 222-62071</td>
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<tr>
<td></td>
<td></td>
<td>* with WA-526 type</td>
<td>* Transistors (Q4-8) on</td>
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<td></td>
<td></td>
<td>* with TR4 : 2SC 1567</td>
<td>Fin assy changed from;</td>
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<td></td>
<td></td>
<td>&amp; TR5 : 2SA 794</td>
<td>2SD 213 to 2SD 556</td>
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<td>(Modification #52-24 25/11/77)</td>
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<td>4739 – 4859</td>
<td>No. 222-60251</td>
<td>No. 222-50241</td>
<td>No. 222-63971</td>
<td>No. 222-62071</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>* with 2SD 556</td>
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<td></td>
<td>* with R-15 5W 16 ohm</td>
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<td></td>
<td>* AC Supply to Starter from</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Transformer's Secondary Windings</td>
<td></td>
</tr>
<tr>
<td>4860 – &amp; up</td>
<td>No. 222-60251</td>
<td>No. 222-50241</td>
<td>No. 222-63971</td>
<td>No. 222-62071a</td>
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<td>(Modification #52-15 25/11/76)</td>
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<td>* with New Strengthened</td>
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<td></td>
<td>Printed Circuit Board assy</td>
</tr>
</tbody>
</table>
EX-2000A
ELECTRICAL CIRCUIT DIAGRAM

Remove motor two secondary wiring circuit on and after serial number A2265/120V and A2298/240V.
9 pin socket #1,2 and #3,4,5 circuit is connected to 9 pin nylon connector. Serial number ditto.


EX-2000A Electrical Diagram
222-60211
Serial No. 2001-2297

4P NYLON CONNECTOR
6P NYLON CONNECTOR
7P NYLON CONNECTOR

See Rectifier circuit diagram 222-63151.

Ballast (Rectifier Stage) Power Transformer
EX 2000A ELECTRIC CIRCUIT DIAGRAM

EXCITER LAMP

PILOT LAMP

9PIN SOCKET

BLUE

ORANGE

220V 240V 24μF
MOTOR CONDENSER

6P NYLON CONNECTOR

BLUE

BROWN

GRAY

RED

MOTOR

SWITCH CAM COMBINATION

LAMP

REVERSE

GRAY

YELLOW

YELLOW

SOUND TERMINAL

OPT. MAG.

4PAC TERMINAL

9P NYLON CONNECTOR

Serial No.2298- and up

EX-2000A Electrical Diagram

JUNE 21, 1977

222-60251

EX-2000A CIRCUIT DIAGRAM

EX-2000A
EX-2000A Amplifier Diagram
312-51111
Serial No.2001-2097

Eiki 16mm Sound Projector
AMPLIFIER DIAGRAM for RST, RT, RM Series
Effective with Serial No. 10001 and one
August, 1973 Eiki Industrial Co., Ltd.
EX-2000A Amplifier Diagram
312-51151
Serial No.2498-3077

MARCH 24, 1975.
EX-2000A Amplifier Diagram

222-50241

(TR4 : 2SC 1599, TR5 : 2SA 777)

Serial No. 3078-4398
EX-2000A RECTIFIER STAGE CIRCUIT DIAGRAM

POWER TRANSFORMER

1. 2 KINDS OF POWER TRANSFORMER FOR 100V RANGE AND FOR 200V RANGE.
   100V RANGE CONNECTION
   3.5, 6~8 100V, 3.5, 7~8 110V, 4~5, 7~8 118V.
   200V RANGE CONNECTION
   3.5, 6~8 220V, 4~5, 7~8 240V.

ALL SAME CIRCUIT, EXCEPT POWER TRANSFORMER AND FUSE.

NOTES:
1. Direct connection to 9P nylon connector pin No.3 without relay switch but no connection for AC consent.
2. Before serial number 2297.
3. A 2% connection power transformer terminal No.17, No.19, No.21 and No.23 to 9P nylon connector pin No.7, No.8, No.2 and No.5 before serial number 2297.

NOTE:

LIGHTING WORKING VOLTAGE WITH RELAY SWITCH.
The parentheses means open voltage without relay switch.

EX-2000A Rectifier Diagram
222-63151
Serial No. 2001-2397

JANUARY, 1974
EX 2000A RECTIFIER STAGE CIRCUIT DIAGRAM

ALL SAME CIRCUIT, EXCEPT POWER TRANSFORMER, LAMP RELAY SW. AND FUSE.

2 KINDS OF POWER TRANSFORMER, FOR 100V RANGE AND FOR 200V RANGE.
100V RANGE CONNECTION: 3-0, 6-0, 100V.
200V RANGE CONNECTION: 3-0, 6-8, 200V.

LAMP RELAY SW.
WHITE COIL AC 220V OR AC 100V
220V-240V CA 100V-125V GA

THERMAL FUSE

9P NYLON CONNECTOR
EX-2000A RECTIFIER STAGE CIRCUIT DIAGRAM

POWER TRANSFORMER
2 KINDS OF CONNECTION FOR 100V RANGE AND FOR 200V RANGE
100V RANGE CONNECTION
3～0, 6～8 100V, 3～0, 7～8 110V, 4～0, 7～8 118V.
200V RANGE CONNECTION
3～0, 6～8 220V, 4～0, 7～8 240V.
ALL SAME CIRCUIT EXCEPT POWER TRANSFORMER, LAMP RELAY SW, R14 AND FUSE
C ) SHOWS WORKING VOLTAGE

SEP. 1, 1977.

EX-2000A Rectifier Diagram
222-63971
Serial No.4739- and up
EX-2000A STARTER CIRCUIT DIAGRAM

OLD Q1 CIRCUIT

1. Take care high voltage parts before consult circuit.
2. Stop power source current within 20 seconds working.
3. Described voltage of circuit is consulted value with Circuit tester.

EX-2000A STARTER CIRCUIT DIAGRAM

O(-) LINE
But this is auto power transformer primary connection.
(a) Except norway specification (secondary connection)

1. Take care high voltage parts before consult circuit.
2. Stop power source current within 10 seconds working.
3. Described voltage of circuit is consulted value with Circuit tester.

EX-2000A Starter Diagram
222-62071
Serial No. 2548-4859

(a) Revised JUNE 23, 1977.
EX-2000A STARTER CIRCUIT DIAGRAM

EX-2000A Starter Diagram
222-62071a
Serial No.4860 and up

Aug. 3, 1977
Feb. 10, 1979