Film-Tech

The information contained in this Adobe Acrobat pdf file is provided at your own risk and good judgment.

These manuals are designed to facilitate the exchange of information related to cinema projection and film handling, with no warranties nor obligations from the authors, for qualified field service engineers.

If you are not a qualified technician, please make no adjustments to anything you may read about in these Adobe manual downloads.

www.film-tech.com

EIKI

When the show must go on.

EIKI

P/N: 4416

16MM SOUND PROJECTOR

SERVICE MANUAL

—MODEL EX-4000P SERIES—

AUG.8.1983

EIKI INDUSTRIAL CO., LTD.
C.P.O. BOX 1229 OSAKA JAPAN
(06) 311-9475

EIKI INTERNATIONAL, INC.
27882 Camino Capistrano
Laguna Niguel, California 92677, USA
(714) 831-2511

Authorized EIKI Distributor or Dealer:

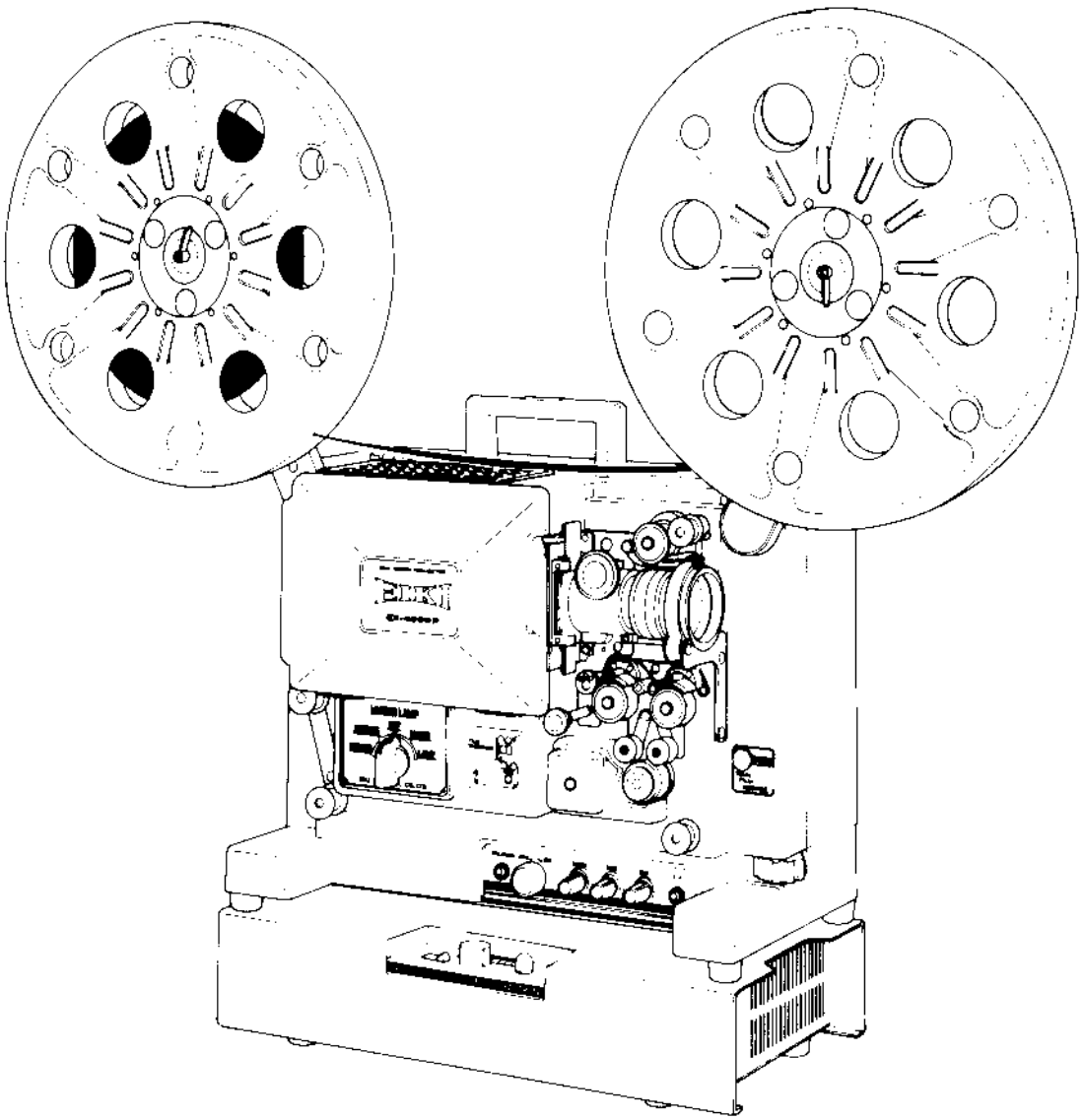
TABLE OF CONTENTS

TABLE OF CONTENTS

Title PAGE

INTRODUCTION

1. This Service Manual is intended to provide the necessary information for the normal repairs, adjustments and maintenance of the EIKI EX-4000P professional Xenon 16mm projector.
2. Manual contains a number of part numbers for the convenience of identification only. When ordering parts, refer to the EX-4000P replacement parts list.
3. The projector has been modified and improved a number of times. These modifications will be covered where practical.
4. All pertinent schematic diagrams are attached at the end of the appropriate sections.
5. CAUTION! Care must be exercised to avoid electrical shocks while servicing the projector.



241-1: GENERAL DESCRIPTION

The EX-4000P is a portable professional type 16mm small theatre or auditorium projector.

The projector offers features of a 550 watt ozone free Xenon lamp rated at 2100 lumens with a typical life expectancy of 1000 hours.

15° maximum vertical adjustment, optical framing and both magnetic and optical sound reproduction.

Amplifier is a plug-in module rated at 35 watts all solid state with individual bass and treble controls.

Inputs for a microphone and outputs for both 8 ohm speaker and 600 ohm balanced line.

1-1: APPLICATIONS

The EX-4000P is intended to be operated as a single unit or in pairs with an optional change-over system.

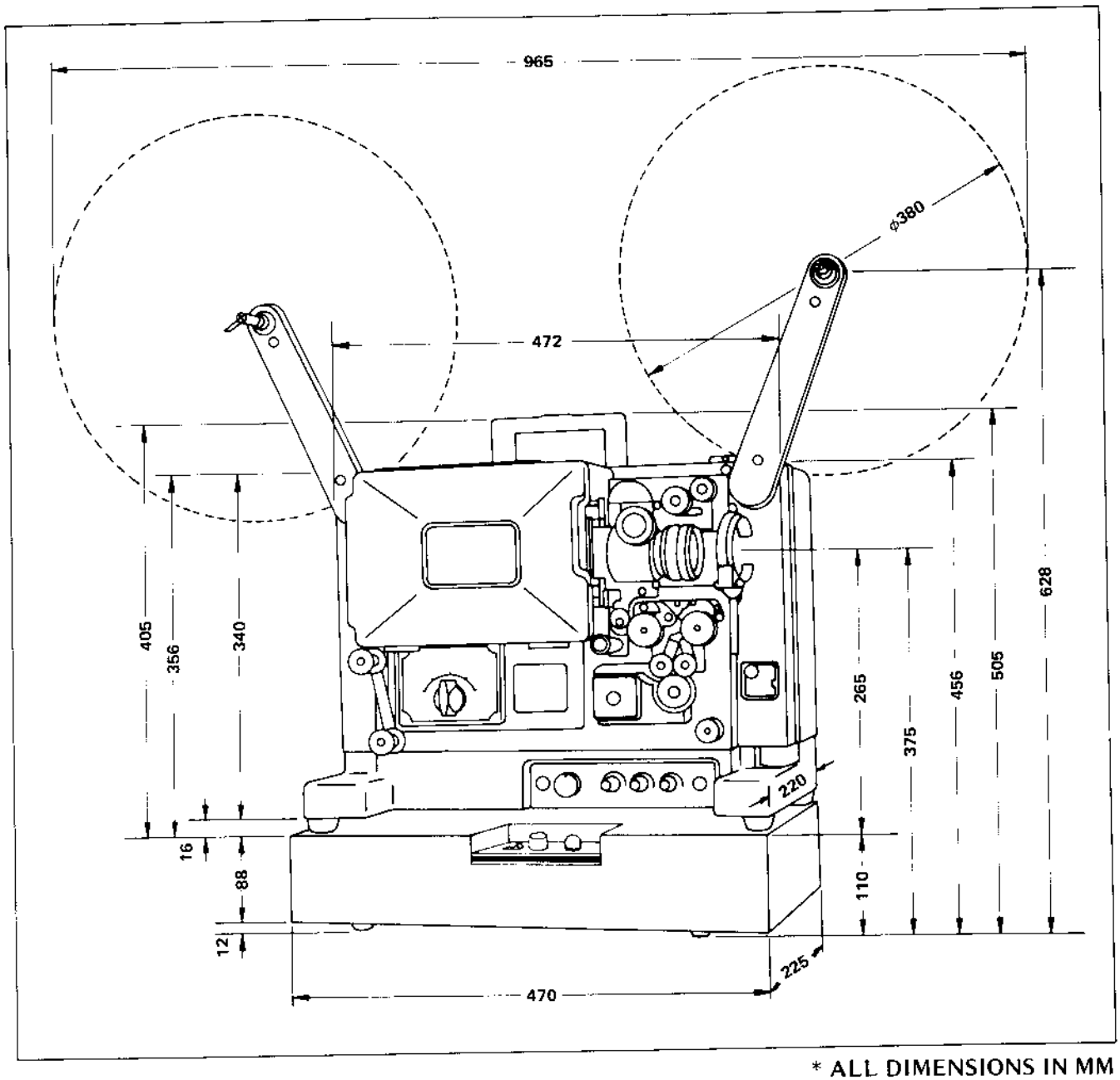
It is recommended that the operating instructions be carefully followed. Each application will determine the type of equipment and options required. For example, if the same length feature film is being shown repeatedly, a single projector with #5350 (for USA only. #5401 for other countries) Long Play Unit may be very convenient, eliminating the need to change reels or watch for change-over cues. In applications where a multiple reel, full-length film is shown only once or twice, it is more practical to operate two projectors with the change-over system.

One of the most important considerations is the brightness of the image. The choice of projector and lamp current adjustment effects screen illumination based on the following factors:

1. Size and type of theater or auditorium
2. Screen size and type
3. Ambient light conditions
4. Distance from the audience to the screen

It is a recommended practice that the projector deliver screen lumens sufficient to produce at least 15 to 16 foot lamberts of reflected light to a viewer in the audience within 15° off center and at least 3 times the screen height away. Less illumination will produce marginal results and excessive illumination will produce objectionable flicker.

1-2: PHYSICAL DIMENSIONS



* ALL DIMENSIONS IN MM

Power Requirements:	100, 120, 220, 240 volts AC Single Phase 50 or 60Hz 15 amps
Lamp:	UXL-550 DA 550 watt Ozone free Xenon lamp (P/N 5111)
Brightness:	2100 – 2200 Lumens Typical with two blade shutter, 50mm (2") F1.2 Lens
Exciter Lamp:	4 volt 0.75 amp (Type BRK)
Standard Lens:	50mm (2") F1.2 6 element coated Resolution exceeds 100 line/mm center
Anamorphic Lens & Holder:	"D" size ϕ52mm standard Optional "C" size ϕ43mm
Shutter:	2 blade standard, optional 3 blade
Main Drive Motor:	Induction type with capacitor, optional Synchronous Motor
Lamp Cooling:	Dual Squirrel cage fan on main drive motor
Take-Up & Rewind:	Independent Torque Motor
Film Speed:	24 FPS sound 50/60Hz (18 FPS optional)
Loop Restorer:	Automatic
Function Switch:	Single rotary, motor, lamp, reverse and rewind
Threading:	Manual, three sprocket drive system
Reel Capacity:	2000' max (optional 6000' with LP-pedestal)
Sound:	Optical and magnetic playback
Amplifier:	Solid State 35 watts RMS, plug in module with seperate volume, bass and treble controls
Audio Inputs:	6.4mm (1/4") high Z microphone jack
Speaker Output:	8 ohm 6.4mm (1/4") speaker jack
Line Output:	6.4mm (1/4") 3 conductor 600 ohm
Wow & Flutter:	Better than 0.2% weighted average
Picture Stability:	Better than 0.25% vertical jitter and 0.2% horizontal weave.
Elevation:	Maximum 15 degree of Horizontal

241-2:INSTALLATION

2-1: UNPACKING & SETTING UP

The EX-4000P is shipped in a carton with three sub-cartons containing:

A. Accessories
B. Power Supply
C. Projector

(1) Carefully remove each carton, unpack the lamp power supply.
This supply also serves as a base for the Projector.

(2) Place the Power Supply on a table or sturdy Projector stand with the cables and connector end away from the screen.

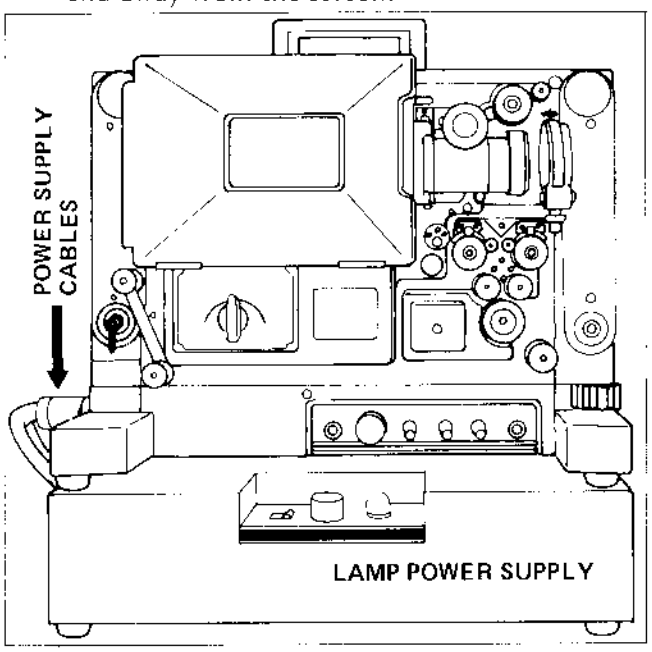


Fig. #1

(3) Position the Projector on the Power Supply so that the rubber feet fit squarely on the supply.

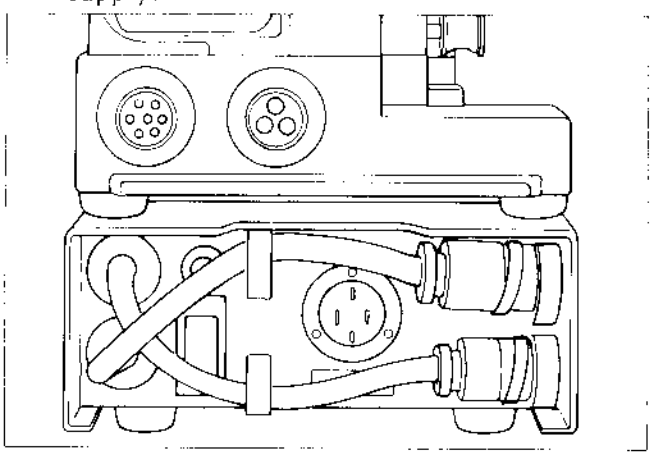


Fig. #2

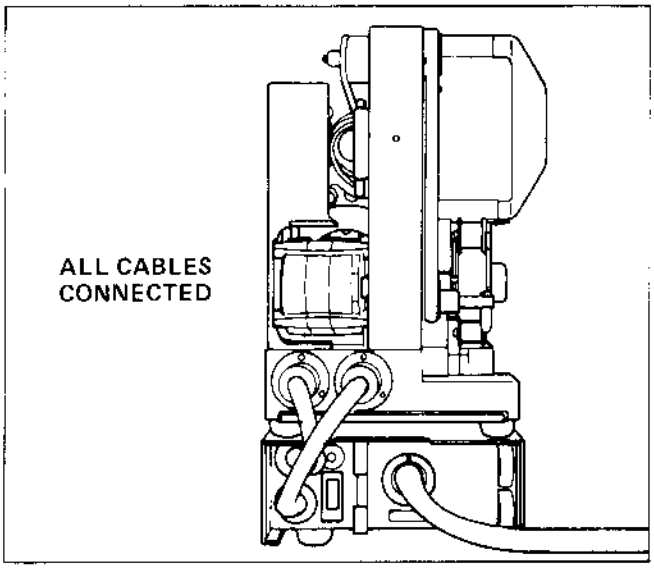


Fig. #3

(4) Raise the supply and take-up arms until they lock in place.

(5) Remove the lamp power supply interconnect cables from their storage position (Fig #2).

(6) Connect the 7 conductor power and control cable to the receptacle on the left.

(7) Connect the 3 conductor lamp power cable to the right receptacle. (Fig. #3).

(8) Care should be exercised as not to cross thread the retaining rings.

(9) Connect the power cord to the 3 conductor receptacle on the lamp power supply.

(10) Be sure the Projector's function switch is in the "OFF" position before connecting the wall outlet.

CAUTION: DO NOT TURN ON THE LAMP UNLESS THE XENON LAMP HAS BEEN INSTALLED.

2-2: XENON LAMP INSTALLATION

WARNING:
XENON LAMPS ARE UNDER EXTREME PRESSURE AND WILL EXPLODE IF HANDLED CARELESSLY. FINGER PRINTS ON THE GLASS MAY LEAD TO EARLY LAMP AND/OR PICTURE DEGRADATION. THEREFORE, LAMP INSTALLATION OR REPLACEMENT SHOULD ONLY BE PERFORMED BY A QUALIFIED SERVICE TECHNICIAN WEARING PROTECTIVE CLOTHING AND FACE SHIELD. BE SURE THE MAIN POWER SWITCH IS "OFF" WHILE CHANGING LAMPS.

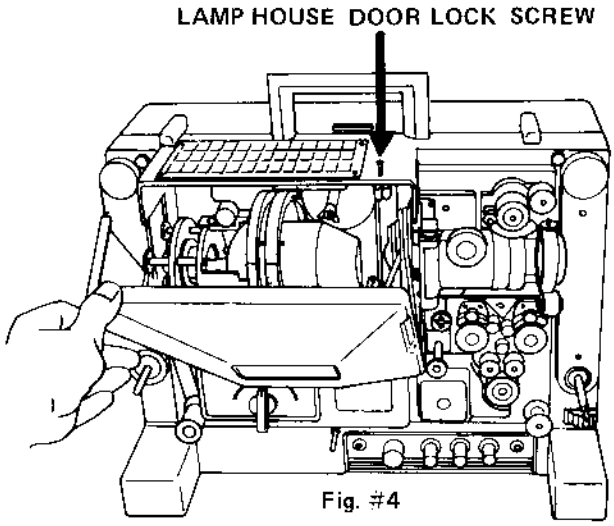


Fig. #4

(1) Loosen the lamp house lock screw.

(2) Open the lamp house door by pulling from the top and swinging it down. (Fig. #4)

(3) Remove the thumb nut and the lamp shield. (Fig. #5)

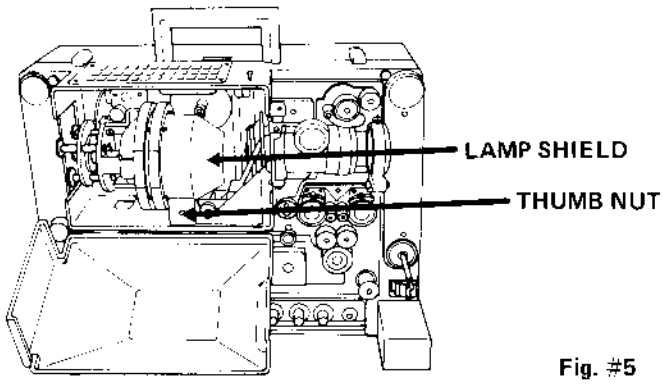


Fig. #5

(4) Carefully remove the lamp from the carton, holding the lamp by the metal ends only, and avoid touching the glass.

(5) Remove the knurled thumb nut from the cathode (–) end. (Fig. #6)

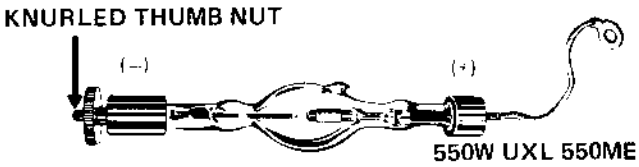


Fig. #6

(6) Holding the lamp by the metal anode (+) end, insert the cathode (–) end into the center of the parabolic reflector. (Fig. #7)

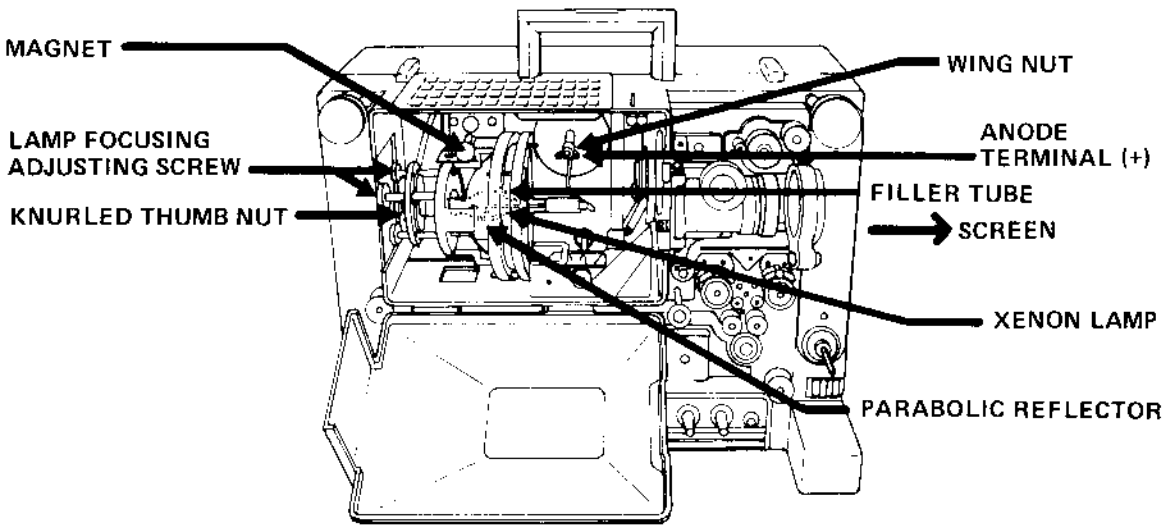


Fig. #7

(7) The threaded cathode (–) end should now extend through the center hole in the rear of the reflector.

(8) Rotate the lamp until the filler tube points up.

(9) Remove the Anode (+) terminal wing nut.

(10) Locate the lug on the braided anode (+) lead and secure it to the anode (+) terminal using the wing nut previously removed.

(11) Position the braided anode (+) so that it forms a loop to the terminal away from the metal parts of the projector.

(12) Screw the knurled thumb nut on the cathode end (–) securing the lamp in the reflector.

(13) Re-install the lamp shield, removed in step 3, and close the lamp house cover.

(14) The lamp installation is now complete, except for adjusting the lamp focus.

(15) Should the glass of the lamp have been accidently touched, clean the touched area with the alcohol moistened towel provided with the lamp.

2-3: ELECTRICAL POWER CONNECTIONS

The EX-4000P is designed to accept input voltages from 100 VAC to 240 VAC 50/60Hz.

A voltage range selector switch is located on the bottom of the lamp power supply. (Fig. #8)

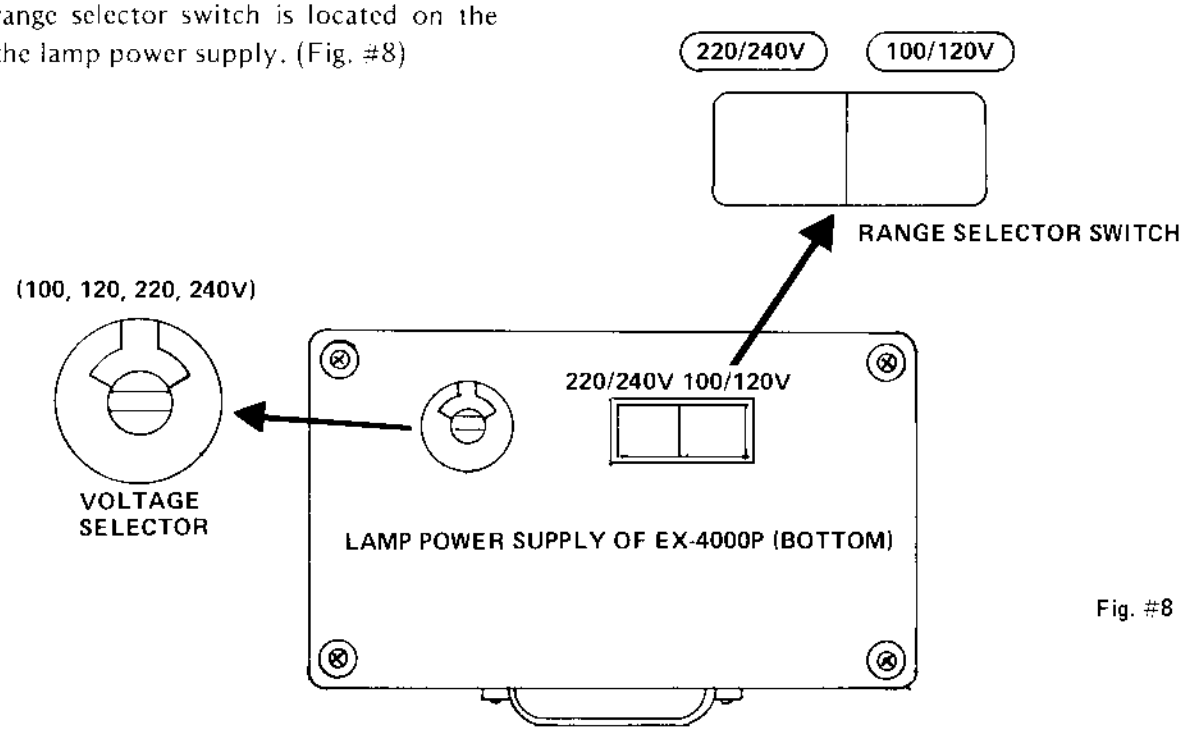


Fig. #8

The individual voltage selector located to the left of the range selector switch should be set at the appropriate voltage to which the projector will be operated. Insert a coin in the slot and rotate the selector until the desired voltage indicator appears. 100, 120, 220, or 240 VAC.

To avoid equipment damage it's important to check the position of the voltage selectors before connecting to the electrical wall outlet.

2-4: AUDIO CONNECTIONS

The EX-4000P is provided with both an 8 ohm speaker output from a 6.4mm (1/4") two conductor phone jack or 600 ohm balanced line level from a 6.4mm (1/4") three conductor phone jack. (See Fig. #9) To avoid possible ground loop conditions, the 8 ohm speaker line must be maintained above electrical or earth ground.

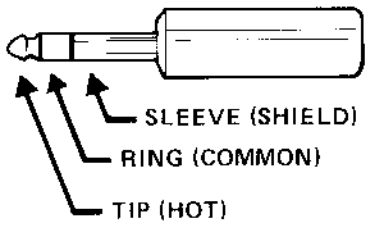


Fig. #9

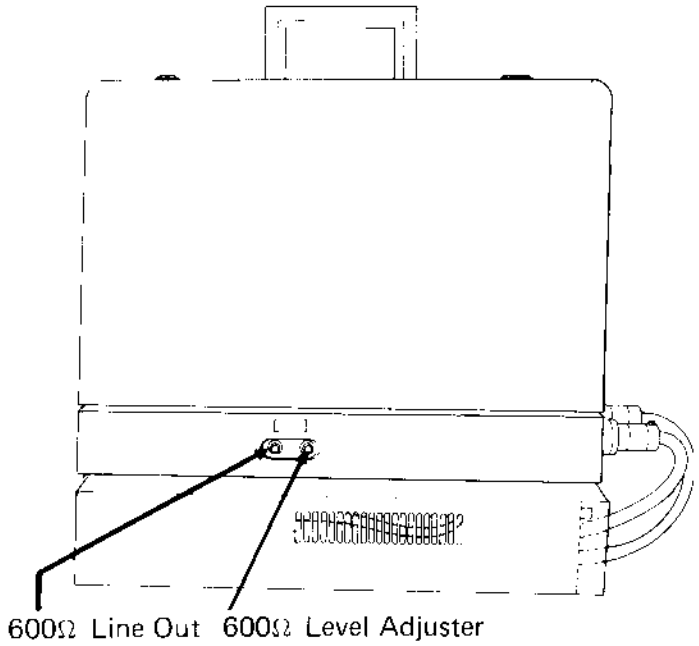


Fig. #11

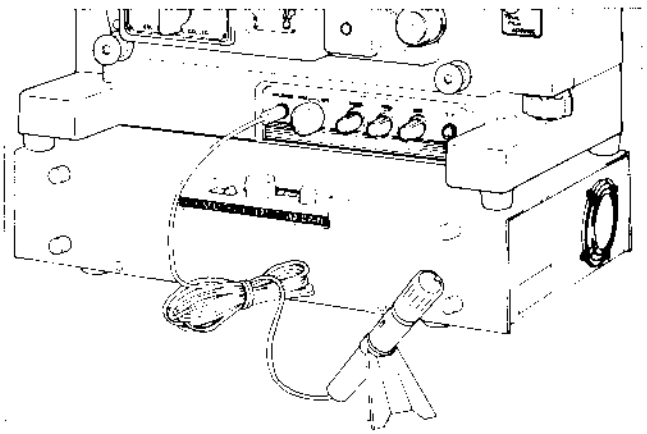


Fig. #10

The 600 ohm output signal level is adjustable from the volume control. For best results the volume control should be somewhere below 12 o'clock position. When making connections to a balance input of the house or auditorium amplifier system, a two conductor shielded cable is required. The projectors connections are shown in (Fig. #9) using a 6.4mm (1/4") 3 conductor phone plug. Where the input to the house amplifier is unbalanced, use the tip and ring connections only.

241-3: OPERATING INSTRUCTIONS

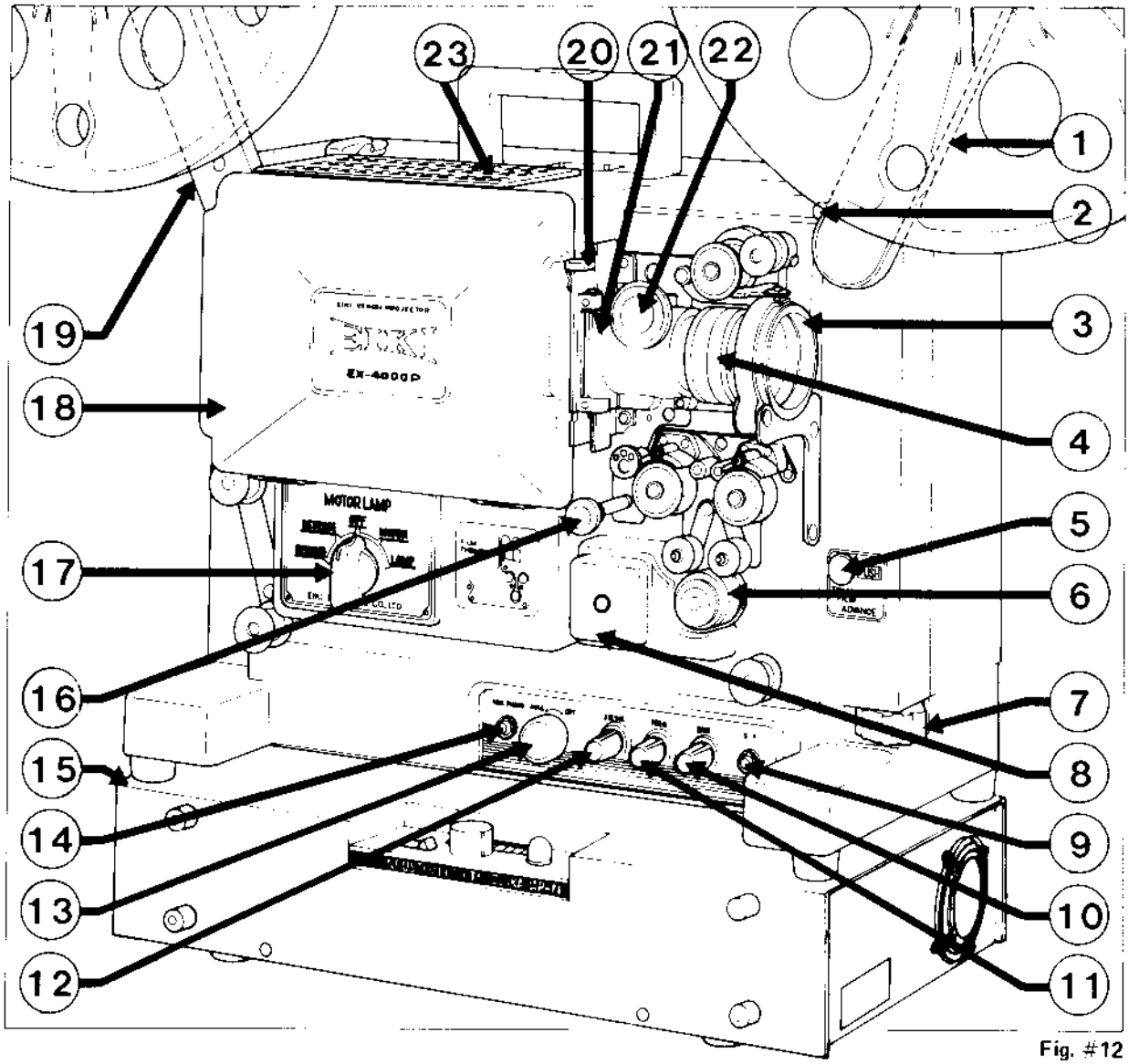


Fig. #12

1. Supply arm
2. Supply arm lock button
3. Anamorphic lens holder (D size)
4. Lens
5. Film trial advance button
6. Sound drum
7. Elevator knob
8. Exciter lamp cover
9. External speaker jack
10. Bass control
11. Treble control
12. Amplifier, ON/OFF and volume control
13. Magnetic/Optical selector switch
14. Microphone input
15. Power supply
16. Framing control
17. Rotary function switch
18. Lamp house cover
19. Take-up arm
20. Stop lever/douser
21. Film gate
22. Focus knob
23. Lamp house lock screw

3-1: OPERATING PROCEDURES

A. Threading

1. Place the film to be shown on the supply arm with the film reeling off in a clockwise direction.

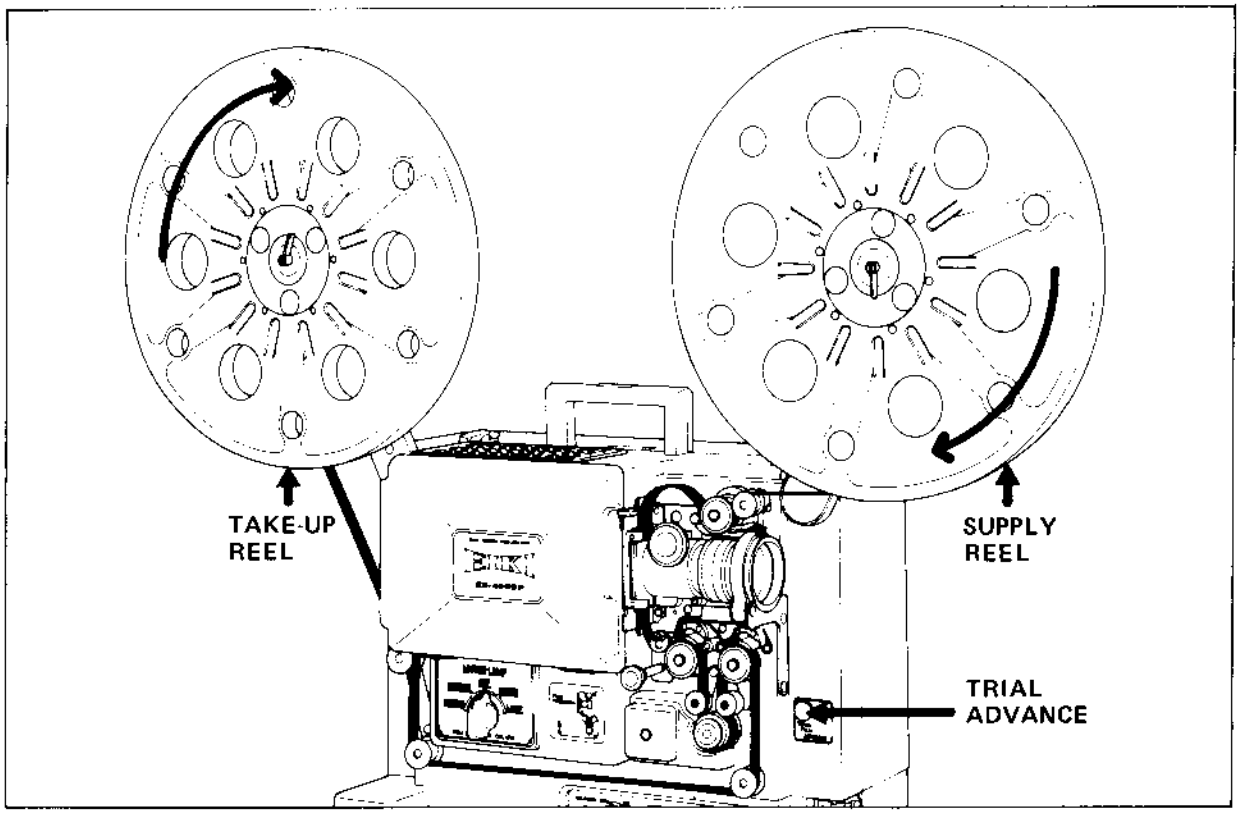


Fig. #13

2. Attach the empty reel to the take-up arm.
3. Pull on the lens towards you to swing open the film gate. (Fig. #14)
4. Reel off approximately 6 feet or (2m) of film.
5. Begin threading at the #1 sprocket by pressing down on the sprocket shoe. Insert the film onto the sprocket. When the film has been seated in the sprockets, close the film shoe.
6. Form the upper loop and insert the film in the gate. With the film seated in the gate, swing the lens closed until it snaps in place.
7. Form the lower loop, open the #2 sprocket shoe, seat the film and close the shoe.
8. Wrap the film around the sound drum on the inside of the two tension rollers.
9. Open sprocket shoe #3 and pull enough tension around the sound drum so that it causes the tension rollers to spread about 7mm – 9mm during projection.

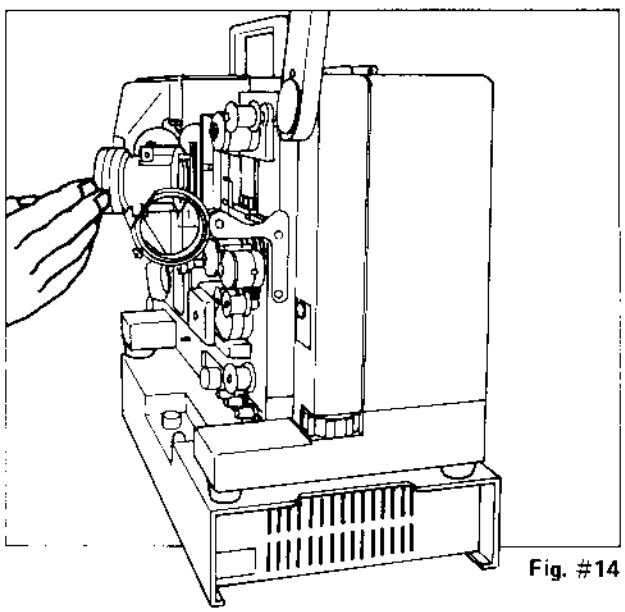


Fig. #14

10. Maintaining the tension, insert the film over the #3 sprocket and close the shoe.
11. The remainder of the film can now follow the guide rollers as shown on the diagram, attaching the film to the take-up reel in a clockwise direction.
12. After completing the threading, push the trial advance button.
    If the film is not transported smoothly, recheck the threading.
    NOTE: During the threading, if additional film is required, push the trial advance to obtain the film necessary for completing the threading.

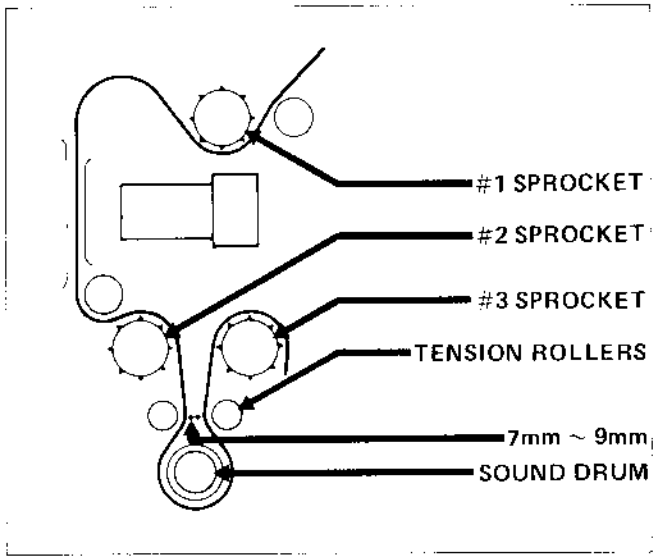


Fig. #15

B. Projecting

1. Thread the projector as previously described.
2. Rotate the function switch first to the motor position.

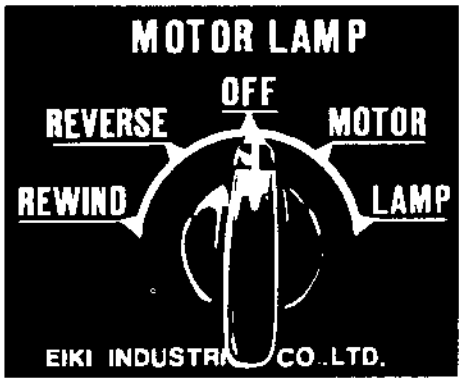


Fig. #16

3. Turn on the lamp and adjust the focus for sharp, crisp picture.
4. Adjust for proper framing.
5. Turn on the amplifier, adjust volume and tone controls for a clear and pleasing sound.

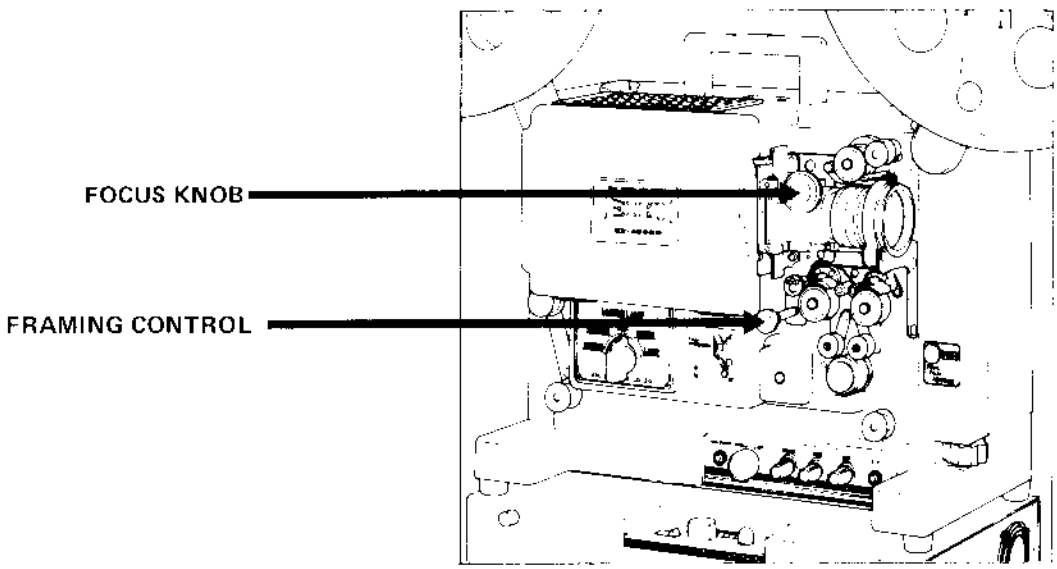


Fig. #17

C. Rewinding

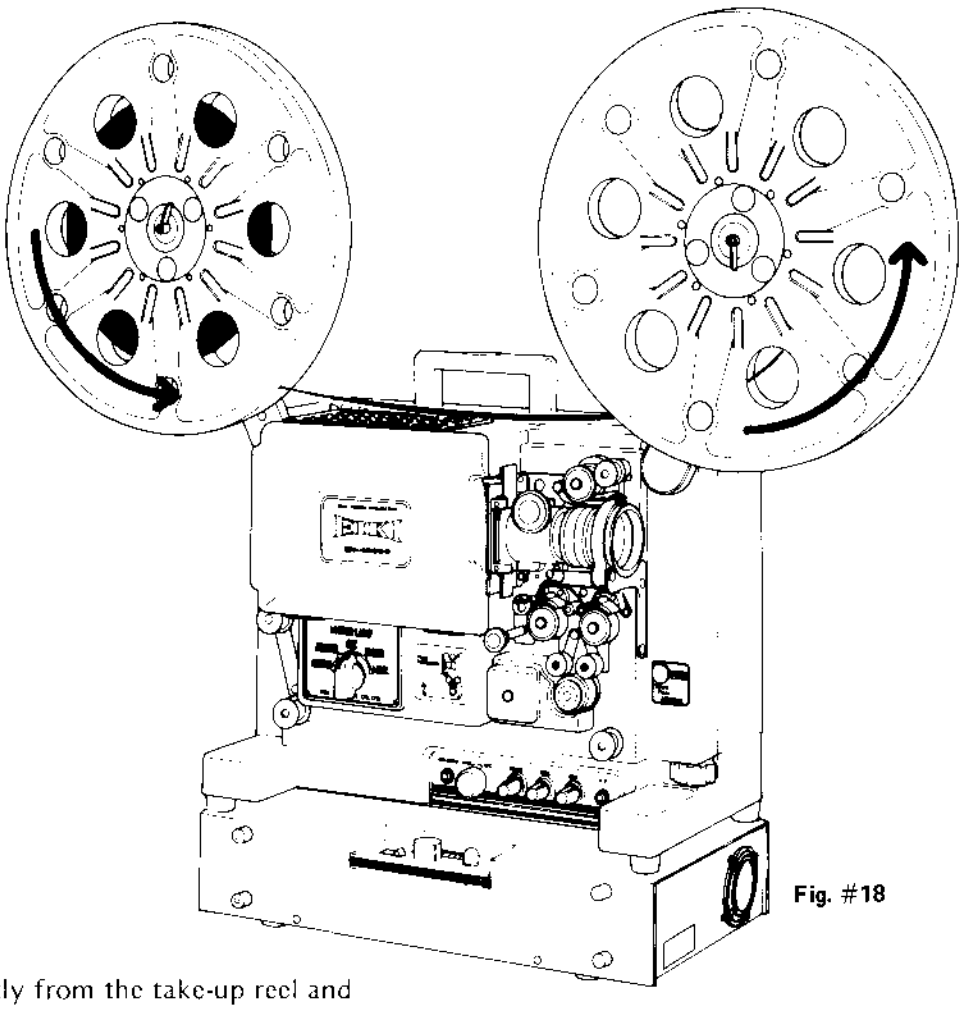


Fig. #18

1. Bring the film directly from the take-up reel and attach it to the supply reel in a counter clockwise direction.
2. Rotate the function switch counter-clockwise to the rewind position.
3. Return the function switch to "OFF" upon completion of the rewind.

D. Replacement of the Exciter Lamp

1. The Exciter Lamp is located behind the cover next to the sound drum.
2. To remove the Exciter Lamp cover, grasp and pull away from the projector.
3. Push in on the lamp and turn counter-clockwise to remove.
4. Insert a new lamp with the notch on the base flange in the upper right position, turn clockwise, clean finger-prints from the lamp and replace the cover.
5. A green light in the Exciter Lamp cover indicates that it is on.

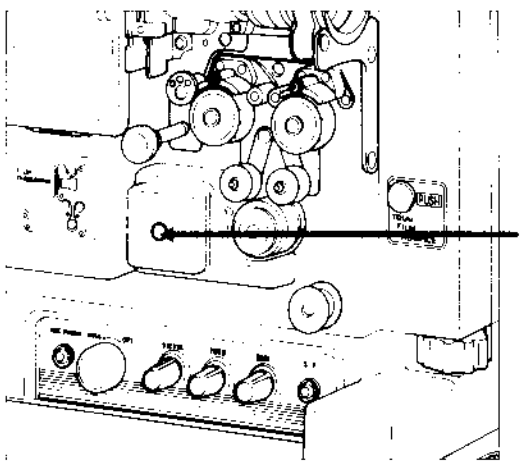


Fig. #19

3-2: SPECIAL OPERATING PRECAUTIONS

A. Xenon Lamp:

The Xenon lamp is under extreme pressure and will explode if handled carelessly. Lamp changing should be referred to a qualified service technician wearing protective clothing and a face shield. NEVER attempt to open the lamp house or change the lamp while it is hot. A Xenon lamp is exceptionally bright and emits light in the ultra violet spectrum. Do not attempt to look directly at the lamp with unprotected eyes. Weak or defective lamps will exhibit difficult striking, erratic light output and current fluctuation. When this occurs, the lamp is more susceptible to explosive failure and should be replaced.

B. Electrical Shock Hazzard:

To avoid electrical shock, all servicing of the projector should be referred to a qualified technician. Never attempt to remove or open the rear cover without first disconnecting all electrical power.

C. Shipping or Transporting the Projector:

The lamp power supply and Projector can be separated for easy carrying. Save the original cartons for future shipping. Never ship the Projector with Xenon lamp installed. Pack the lamp and Projector in its original carton for safe shipping.

3-3: XENON LAMP ADJUSTMENT

The position of the lamp in mirror is critical for maximum screen illumination. The three adjustment screws behind the lamp allow it to be positioned up and down and in and out from the mirror.

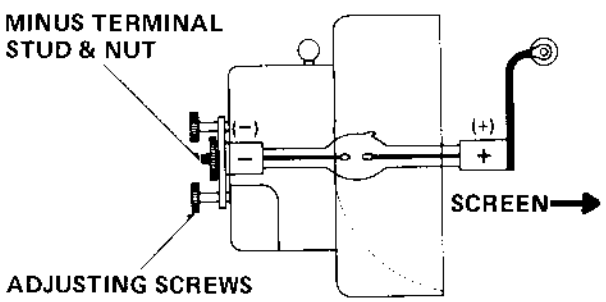


Fig. #20

1. Position the Projector for a screen image of at least 1 meter (3 feet) wide.
2. Without film in the aperture, turn "ON" the Projector and switch "ON" the lamp.
3. Set the lamp current adjustment to read 25 amps.

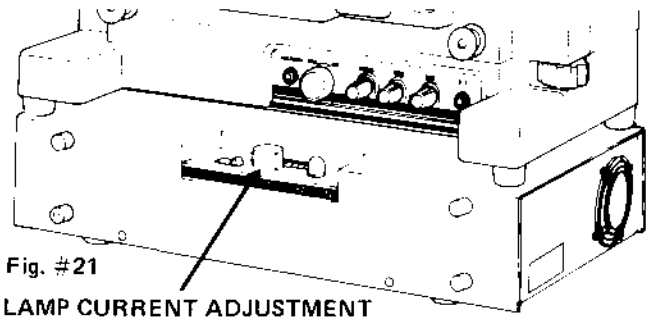


Fig. #21
LAMP CURRENT ADJUSTMENT

4. Open the film gate by swinging the lens out of the way.
5. Observe the dark center on the screen. Adjust the three lamp adjusting screws until the "boiling" appearance surrounding the dark center is in best focus and evenly distributed around the center. The dark spot should be in the center and distance A-A is approximately equal to distance B.

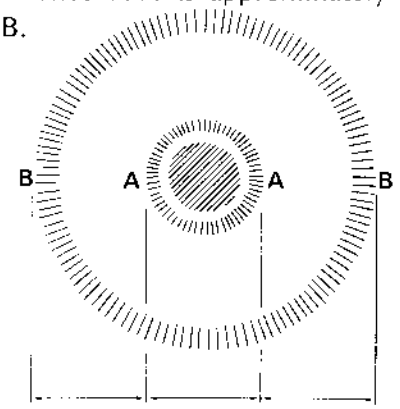


Fig. #22

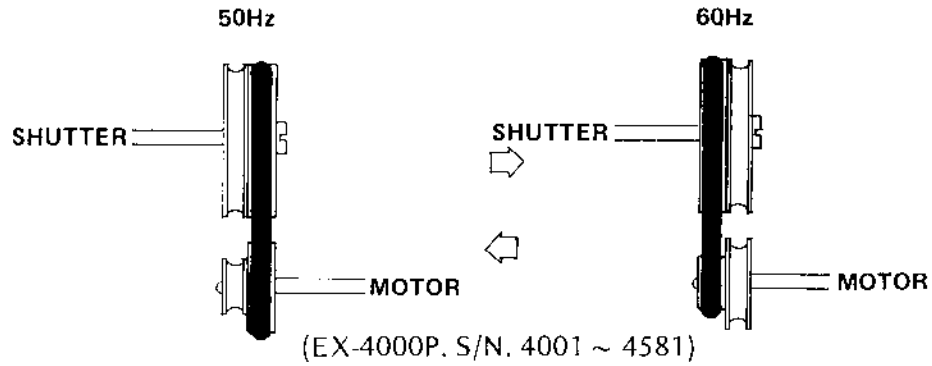
6. Close the film gate, swinging the lens and gate back into position. Examine the screen for severe hot spots. A severe hot spot can damage the lens – and re-check the adjustment.
7. If the illumination on the screen is brighter in some areas, it is necessary to make minor touch-up adjustments to the lamp's screws until even illumination is obtained. The center should not be more than 50% brighter than the darkest corner for proper screen illumination.
8. The lamp current control may be reduced, if maximum brightness is not required, thus increasing the life of the Xenon lamp.

3-4: 50/60Hz OPERATION

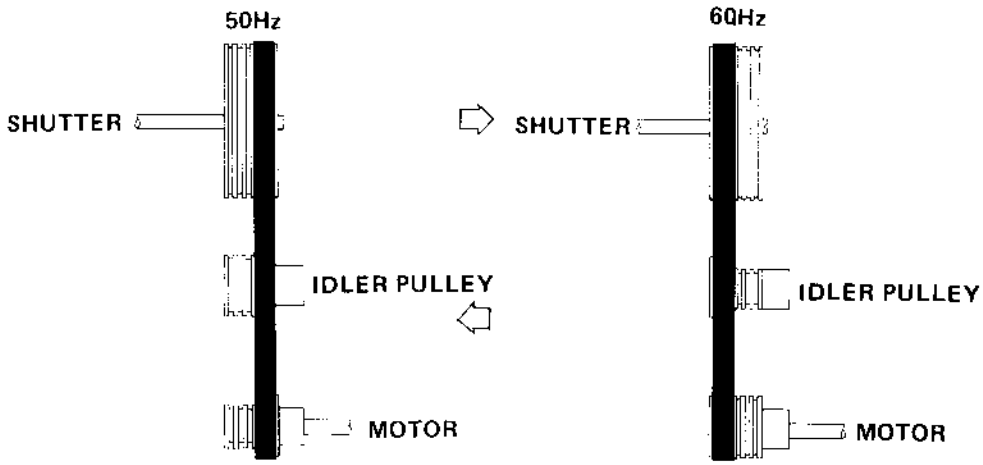
The standard EX-4000P Projector is available as 50Hz/60Hz sound only. Conversion from 50 to 60Hz or 60 to 50Hz can be accomplished by changing the location of the motor belt.

Optional 18/24 Frame Motor and Shutter Pulleys are available.
Models with synchro motors and belt drive systems are single speed only.

See the chart below for selection of pulleys for other than standard speeds.



(EX-4000P, S/N. 4001 ~ 4581) Fig. #23



(EX-4000P S/N 4582 and UP) **(Fig. #24)**

NOTE: 3V type motor belt with longer durability is used after S/N 4582

Motor Belt	Operation	Motor Pulley	Shutter Pulley
Round Belt (241-12181)	60Hz 18/24 FPS	241-12501	241-11801
	50Hz 18/24 FPS	241-12401	241-11901
	50/60Hz 24 FPS	241-12301	241-11901
Synch. Belt	60Hz 24 FPS	074-05401	074-05801
	60Hz 18 FPS	081-01101	074-05801
	50Hz 24 FPS	074-05401	074-05911
	50Hz 18 FPS	081-01101	074-05911
3V Belt 241-12182	60Hz 18/24 FPS (N/A)	N/A	N/A
	50Hz 18/24 FPS (N/A)	N/A	N/A
	50/60Hz 24 FPS	241-12302 (Requires 241-11401 Idler Pulley)	241-11902

241-4: TROUBLE SHOOTING

4-1: TROUBLESHOOTING HINTS AND AIDS

The EX-4000P is a professional 16mm projector, requiring service and operation by trained personnel.

"High voltage and currents are distributed throughout the machine; all precautions should be taken to avoid electrical shock. Always disconnect electrical power before opening or removing access doors and panels."

For simplicity the troubleshooting charts have been broken down into four major categories:

1. Electrical
2. Xenon Lamp Supply
3. Mechanical Functions
4. Sound System

The troubleshooting chart is intended to assist the technician in locating the specific area of a malfunction, thus eliminating the need to check all areas possibly suspected. There are four basic steps to logical troubleshooting:

1. Analyze the symptoms
2. Narrow the trouble to an area or function
3. Isolate the problem to the specific section within an area or function
4. Locate the specific component causing the problem.

4-1: TROUBLESHOOTING HINTS AND AIDS

A. There are four basic steps to troubleshooting this projector:

1. Analyze the symptom
2. Localize the trouble to a functional system or module
3. Replace or repair that system or module
   a. Isolate the trouble within the module
   b. Locate and repair the specific trouble

B. Checking Semiconductors With A VOM:

1. Set the ohms scale to R x 10
2. The forward resistance should be low
3. The reverse resistance should be high

DIODES

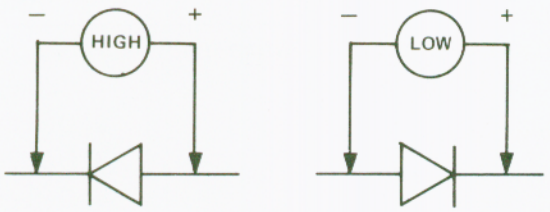
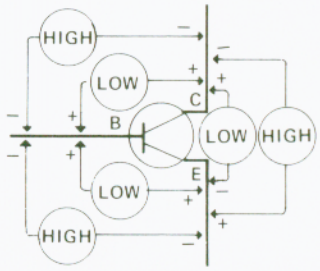


Fig. #26

TRANSISTOR NPN TYPE (2SC, 2SD)



TRANSISTOR PNP TYPE (2SA, 2SB)

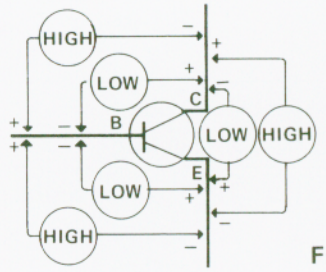


Fig. #25

NOTE: Forward and reverse resistance LOW & HIGH is only a suggested quick and easy check of components out of circuit. This test is only for shorted and open junction test. A VOM will not test the quality of a semi-conductor accurately.

C. IC's are best checked by checking the signal input and output condition. This can be done by inserting a low level audio tone into the MIC jack and the signal path from the input of IC-1 through IC-2 and to IC-3.

D. Amplifier test cables can be easily made from locally available parts. A nine pin miniature tube socket and male plug can be wired as an extension power cable, allowing the amplifier to be operated away from the projector. The solar cell and exciter lamp connection can also be extended if so desired.

Typical Amplifier Test Set-Up

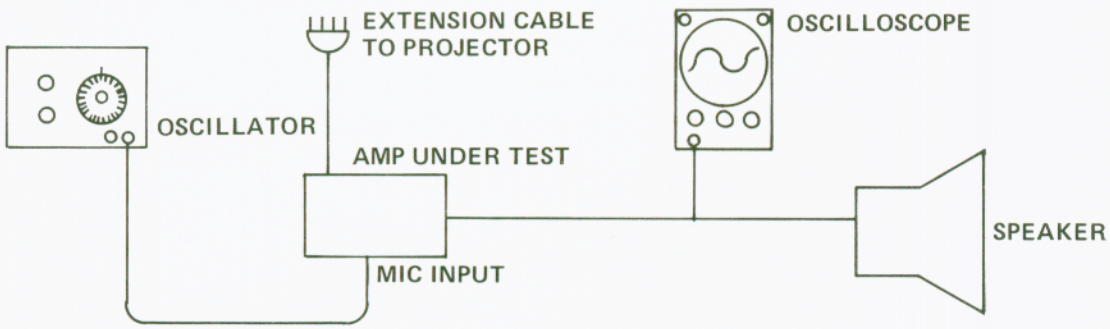


Fig. #27

4-2: EX-4000P TROUBLESHOOTING CHART

I: ELECTRICAL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Pilot lamp not on when main switch is on	1. No power to the AC wall outlet	1. Check outlet
	2. Defective power cord	2. Check & repair or replace
	3. Defective 10/15 amp fuse	3. Replace
	4. Defective pilot lamp	4. Replace
2. Pilot lamp on, but drive motor does not run in "Forward" position	1. Power supply cable not connected	1. Check
	2. Pause control down	2. Check
	3. Defective drive motor	3. Replace or repair
	4. Faulty motor capacitor	4. Check or replace
	5. Switch cam not activating micro SW #1	5. Check & Adjust
	6. Defective micro SW #1	6. Replace
3. Pilot lamp on, motor runs but the lamp does not come on in lamp position	SEE XENON LAMP AND RECTIFIER	
4. Pilot lamp on drive motor runs in "forward" but not in "reverse" position	1. Micro switch #2 and/or #3 defective	1. Check or replace
	2. Defective motor	2. Replace
5. Function switch does not follow the indicated sequence	1. Loose function switch knob	1. Re-locate & tighten
	2. Loose switch cam	2. Re-position & tighten
6. Poor or no take-up in forward	1. Take-up motor defective	1. Replace
	2. Take-up arm belt broken	2. Replace
7. Poor or no take-up in reverse	1. Take-up motor defective	1. Repair or replace
	2. Supply arm broken	2. Replace
	3. Rewind belt broken	3. Replace
	4. Incorrect rev. take-up torque	4. Adjust (see take-up section)
8. Poor or no rewind	1. Take-up/rewind motor defective	1. Repair or replace
	2. No voltage to take-up/rewind motor	2. Check & repair
	3. Too much back tension	3. Check and adjust
	4. Rewind belt slips or broken	4. Clean or replace

II: XENON LAMP & RECTIFIER CIRCUIT

SYMPTOM	PROBABLE CAUSE	REMEDY
9. Lamp life is abnormally short	1. Defective lamp	1. Check & replace
	2. Lamp current too high	2. Set current meter at lower setting
	3. Abnormal tilt from horizontal	3. Operate closer to horizontal
10. Uneven or insufficient screen illumination	1. Foreign object in lamp path	1. Remove
	2. Lamp not properly adjusted	2. Adjust
	3. Defective lamp	3. Replace
	4. Slow or defective lens	4. Try another lens
	5. Lamp current too low	5. Set current for higher setting
11. Fuse blows when lamp is switched on	1. Incorrect fuse	1. Install proper rating fuse 10A/15A
	2. Defective rectifier	2. See rectifier section
12. Unstable lamp current	1. Worn out lamp	1. Replace
	2. Defective rectifier	2. See rectifier section
	3. Abnormal tilt from horizontal	3. Operate closer to horizontal
13. Xenon Lamp will not light	1. Defective lamp	1. Replace
	2. Lamp starting relay defective	2. Check & replace
	3. Fuse blown (10/15 amp)	3. Check & replace
	4. Defective starter	4. See starter section
	5. Current adjuster too low	5. Adjust to higher setting
	6. Defective rectifier	6. See rectifier section
14. Xenon lamp lights but immediately goes off	1. Defective rectifier	1. See rectifier section

SYMPTOM	PROBABLE CAUSE	REMEDY
15. Motor runs but film does not advance	1. Stop lever engaged	1. Release to normal run position
	2. Broken or defective motor belt	2. Check & replace
	3. Cam tank plate washer loose	3. Tighten
	4. Motor pulley loose	4. Tighten
	5. Main drive belt broken	5. Replace
16. Film speed is too slow or too fast	1. Belt installed incorrectly	1. Check & reinstall
	2. Incorrect motor and shutter pulley combination	2. Replace with correct pulleys
17. Excessive take-up torque in "forward"	1. Too small take-up reel	1. Use larger reel
	2. Take-up torque out of adjustment	2. Adjust take-up torque
18. Excessive take-up torque in "reverse"	1. Too small reel	1. Use a larger reel
	2. Reverse take-up torque out of adjustment	2. Adjust
19. Take-up poor or not at all in "forward"	1. Take-up torque out of adjustment	1. Adjust
	2. Take-up motor defective	2. Replace
20. Take-up poor or not at all in "reverse"	1. Take-up torque out of adjustment	1. Adjust
	2. Defective supply arm belt	2. Check & replace
	3. Defective take-up motor	3. Replace
21. Loop setter roller continues to activate or activates erratically in "forward"	1. Damaged or poor film	1. Repair or replace
	2. Lower loop is too small	2. Check sprocket timing
	3. Insufficient claw protrusion or claw pitch	3. Check
	4. Broken claw	4. Replace
	5. Insufficient tension of the film shoe springs	5. Stretch or replace
22. Upper loop is lost in "forward"	1. Damaged or poor film	1. Repair or replace
	2. #1 sprocket teeth plate loose	2. Check & tighten
	3. #1 sprocket shoe not seating properly	3. Check & adjust
	4. Loop setter roller continues to activate or activates erratically	4. See sympton No. 21
23. Upper loop is lost in "reverse"	1. Damaged or poor film	1. Repair or replace
	2. #1 sprocket shoe clearance is too great	2. Check & adjust
	3. Supply reel too small	3. Use larger reel
	4. Claw protrusion incorrect	4. Check & adjust

SYMPTOM	PROBABLE CAUSE	REMEDY
24. Excessive noise in the film gate in "forward" with a good undamaged film	1. Upper loop too small	1. Check #1 sprocket timing
	2. Film contacting the loop setter roller	2. Check #2 sprocket & loop setter timing
	3. Dirty film gate	3. Clean
	4. Loose claw	4. Tighten
	5. Incorrect claw protrusion	5. Check
	6. Inner guide rail binding	6. Check & adjust
	7. Film shoe bent, worn or binding	7. Check & replace
	8. Claw position incorrect	8. Check & adjust
	9. Weak or broken cam follower spring	9. Replace
25. Unsteady picture	1. See symptom No. 24, noise in the film gate	
26. Travel ghost	1. Incorrect shutter blade position	1. Check & adjust (See cam tank section)
27. Excessive noise in "reverse" only	1. Claw position incorrect	1. Check & adjust
	2. Claw angle is incorrect	2. Check & adjust
28. Insufficient framing	1. Claw position incorrect	1. Check & adjust
	2. Worn cam follower (or gliding pin)	2. Replace
29. Excessive noise when the stop lever is depressed	1. Motor pulley misaligned	1. Adjust
	2. Shutter pulley binding on the shaft	2. Remove, clean, inspect and lubricate
30. Film transport does not stop in stop lever operation	1. Shutter pulley seized	1. Remove cam tank, clean & lubricate pulley (see cam tank sec.)
	2. Stop lever shoulder screws loose	2. Tighten screws
31. Uneven focus	1. Dirty film gate	1. Clean
	2. Film shoe binding and not completly seated	2. Check & re-align
	3. Inner guide rail binding	3. Check
	4. Lens holder mis-aligned	4. Check & adjust

SYMPTOM	PROBABLE CAUSE	REMEDY
32. No sound (magnetic only)	1. Mag/Opt switch in the wrong position	1. Check & switch
	2. Magnetic head not in contact with the sound track	2. Check & adjust
	3. Defective or dirty magnetic head	3. Clean, or replace
	4. Mag/Opt switch defective, or bad connection	4. Check & replace
	5. Defective amplifier module	5. Repair or replace
33. Poor sound or low volume (magnetic only)	1. Poor sound track	1. Check with another film
	2. Dirty, or defective head	2. Clean or replace
	3. Head not making contact with film	3. Adjust (see sound section)
	4. Incorrect sound head alignment	4. Align (see sound section)
	5. Defective amplifier	5. Repair or replace
34. Exciter lamp fuse blows	1. Excessive AV line voltage	1. Check wall outlet
	2. Incorrect fuse	2. Check & replace
	3. Incorrect, or defective exciter lamp (BRK)	3. Check & replace
	4. Defective exciter lamp power supply (defective amp)	4. Check & repair (replace amp)
35. Amplifier fuse blows	1. Incorrect fuse	1. Check & replace
	2. Improper connection to an external speaker system	2. Check
	3. Defective amplifier module	3. Repair or replace
36. Excessive amplifier hum (optical)	1. Exciter lamp cover missing or not installed correctly	1. Install cover
	2. Incorrect grounding when connecting the projector to an external amplifier or sound system	2. Check for ground loop conditions
	3. Defective exciter lamp supply	3. Check voltage & repair
	4. Defective solar cell or connections to amplifier	4. Check & repair
	5. Defective amplifier module	5. Repair or replace

SYMPTOM	PROBABLE CAUSE	REMEDY
37. Excessive amplifier hum (magnetic)	1. Poor film recording	1. Check with another film
	2. Improper connection to an external amplifier or sound system	2. Check & re-connect properly
	3. Magnetic head in poor contact with the film	3. Adjust
	4. Poor shielding to the head or the head coil shorted to the projector's frame	4. Repair
	5. Defective amplifier module	5. Repair or replace
38. Distorted sound	1. Incorrect exciter lamp (BRK)	1. Check & replace
	2. Exciter lamp cover not completely installed	2. Check & re-install
	3. Amplifier module is defective	3. Replace
	4. Defective speaker	4. Replace
	5. Magnetic sound recorded poorly	5. Try a known good recording
	6. Optical sound lens not aligned correctly	6. Check & re-align
	7. Dirt on the sound drum or the solar cell	7. Check & clean
	8. See symptom no. 39 also	8. See symptom no. 39
39. Excessive wow & flutter	1. Sound drum bearings defective	1. Check & replace
	2. Incorrect sound drum film tension	2. Check & adjust
	3. Flywheel not installed	3. Check
	4. Incorrect alignment or tension of the tension guide and roller assembly	4. Check & adjust
40. Sound not stabilized soon after starting	1. Insufficient flywheel plate spring tension	1. Check & adjust
	2. Incorrect sound drum film tension	2. Check & adjust

241-5: ELECTRICAL SYSTEM

5-1: DESCRIPTION

The EX-4000P is designed to be operated on voltages from 100 to 240 VAC. The lamp power supply contains an auto-transformer with several taps depending upon the position of the voltage selector switch.

Except for the Xenon lamp voltage all projector control and operating voltages is 100 VAC. All control functions are accomplished by means of a rotary function switch which consists of 5 individual micro switches. The functions controlled are forward, lamp on & off, reverse and rewind.

An additional switch fires the gate to an SCR which in turn activates a sound mute delay relay while the Xenon lamp is fired.

3 relays are employed to control the direction and torque settings of the take-up and rewind motor. The main drive motor is 100 VAC with a capacitor, driving the film advance mechanism and providing lamp cooling. The direction of the motor changes when the projector is operated in reverse.

Take-up is accomplished with an AC torque motor, the speed of which is controlled by the adjustable 100 ohm resistor.

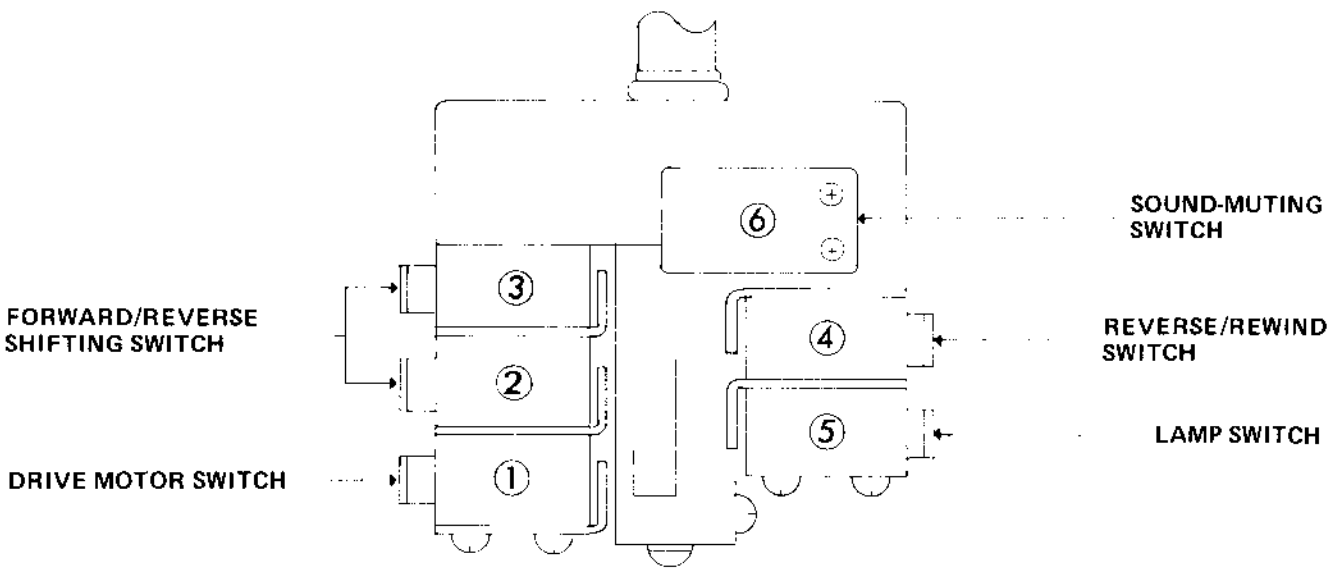
In the rewind operation the torque motor is supplied a full 100 volts for maximum rewind torque and speed.

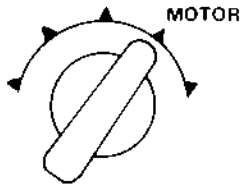
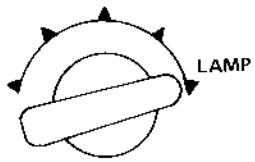
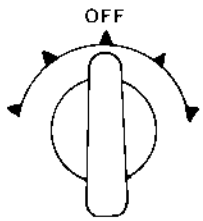
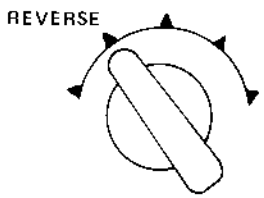
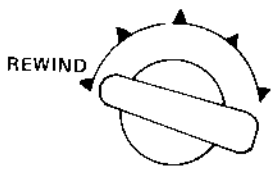
The projection head assembly also houses a small transformer for the AC supply voltage of the amplifier and exciter lamp circuit.

The starter H.V. circuit board is located directly besides the xenon lamp. This circuit is only activated when the lamp is initially started. 100 VAC is applied to the starter which instantly develops a 30KV arc across the lamps electrodes to fire the lamp. (See starter and rectifier section for more details).

Complete diagrams located at the end of this manual.

5-2: ROTARY SWITCH FUNCTION



Position of Sw.	Function	Torque of Take-Up Motor
	Sw. 1 : COM. connected to N.O. Drive Motor runs Forward. Take-Up Motor runs Forward. Sw. 2 : COM. connected to N.C. Sw. 3 : COM. connected to N.C. Sw. 4 : COM. connected to N.O.	With Sw. 1 ON, Take-Up Motor runs at 130g/cm. initially, and at 250g/cm 3 sec. later. (with 2000ft AUTO-Reel)
	Sw. 5 : COM. connected to N.O. Lamp is turned ON. (Main Relay in rectifier is ON.) When COM. is connected to N.C. Lamp is OFF.	– ditto –
	Sw. 1 : COM. connected to N.O. Sw. 5 : COM. connected to N.C.	With Sw. 1 OFF, Take-Up Motor stops 3 sec. later.
	Sw. 1 : COM. connected to N.O. Sw. 2 : COM. connected to N.O. Sw. 3 : COM. connected to N.O. Drive Motor runs Reverse, and Take-Up Motor runs Reverse to apply the back tension. Sw. 4 : COM. connected to N.O.	With Sw. 1 ON, Take-Up Motor runs Reverse at 100g/cm.
	Sw. 1 : COM. connected to N.C. Drive Motor stops. Sw. 4 : COM. connected to N.C. Take-Up Motor runs.	With Sw. 4 ON, Take-Up Motor runs at 100g/cm, and at 1kg/cm 3 sec. later.
	Sw. 6 : Sound Muting Switch mutes the sound 1-2 sec. while rotary sw. is rotated.	

241-6: MECHANICAL MAINTENANCE

6-1: SERVICE PROCEDURES

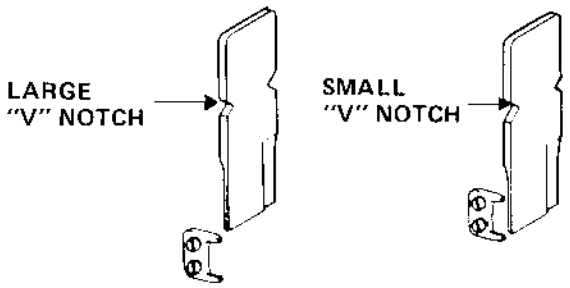
A. Precautions:

1. Eiki Projectors have been designed for the ultimate in simplicity and ease of service.
   Each screw is essential for proper operation. When servicing and re-assembling the projector screws and small parts should not be carelessly omitted or lost.
   All screws should be firmly tightened to assure reliable projector operation after re-assembly.
2. When lubricating the projector's plastic parts, silicon oil or grease should be used. Other types of lubricants may harm plastic parts.
   Avoid using any solvents such as Trichloroethylene, which will harm most plastic or painted parts.
3. EIKI projectors require a minimum of special tools. The most important is an ordinary ISO Phillips screw driver set.
4. To avoid damage to screw heads, it is important to remember the adage "70% push, 30% turn." It is also important to select the right size screw driver blade. A rule of thumb is to use the largest blade possible.
5. To avoid possible electrical shock, always disconnect the projector from the power source when servicing.

B. Tools and Test Equipment:

1. Tools: When servicing Eiki projectors the most important tool is a set of metric I.S.O. (Phillips type) screw drivers, and several small flat blade screwdrivers. (An Eiki Screw Driver Kit p/n 5615 is available from your local dealer). In addition normal electronic service tools such as pliers, needle nose pliers, solder irons, etc. are needed.
   A Molex type pin extracting tool is very handy when repairing any of the many nylon electrical connections.
2. Special Tools: Eiki projectors have been designed to avoid using special tools supplied only by Eiki.
   However, a claw protrusion gauge is most helpful for accurately setting of the claw protrusion. In absence of a gauge 6 layers of color film will approximate the correct protrusion.

Tool No. 320-01T
Cam Claw Protrusion Tool



3. Test Equipment: A limited amount of test equipment is required for routine maintenance when servicing the individual modules such as the amplifier, the following equipment and test films would be essential:
   a. VOM (Voltage/Ohm meter)
   b. Oscilloscope
   c. Audio AC VTVM
   d. Wow & Flutter Meter
   e. 400Hz SMPTE Test Film
   f. 3150Hz Wow & Flutter SMPTE Test Film
   g. Multi Frequency SMPTE Test Film
   h. 7000Hz Sound Focus SMPTE Test Film
   i. 7000Hz Mag. Azimuth SMPTE Test Film
   j. Buzz Track SMPTE Test Film
   k. Audio Oscillator

6-2: CAM TANK

A. Specifications:

1. Revolutions
   24 fps, 1440 rpm
   18 fps, 1080 rpm
2. Cam Claw Protrusion MIN. 1.0mm — MAX. 1.2mm (.040" to .045")
3. Claw Pitch 7.62 — 7.65mm
   Tension of Claw Lever Spring 312-11161 1.2 — 1.25kg.

NOTE: Tension of Claw Lever Spring is measured with a tension scale pulling on Cam Claw and the Claw Lever Spring stretched to maximum.

B. Removal and Disassembly:

The Cam Tank is removed as a complete unit including the lens holder and the film gate.

1. Remove the rear cover.
2. Remove the drive belt from the motor to the shutter pulley.
3. From the front of the projector, open the lamp house door and remove the two large (Phillips type) screws above and below the lens holder. (See Fig. #28)
4. The cam tank as an entire unit is removed from the front of the projector.
5. To disassemble the cam tank: (Fig. #29)
   a. Position the stop lever to the stop position. That is when the shutter pulley rotates freely without turning the cam and worm gear.
   b. Remove screw (49) in the center of the shutter pulley and remove the shutter pulley. Care should be taken as to not loose the small shim washer behind the plate washer (51). This is a selected shim washer to provide the correct clearance between the shutter pulley (52) and the shutter blade hub (53).
   c. While holding the shutter blade (54) slowly raise the stop lever, releasing the tension of the clutch spring (56) and shutter blade with the hub attached.
   d. Remove the shutter blade and hub assembly.

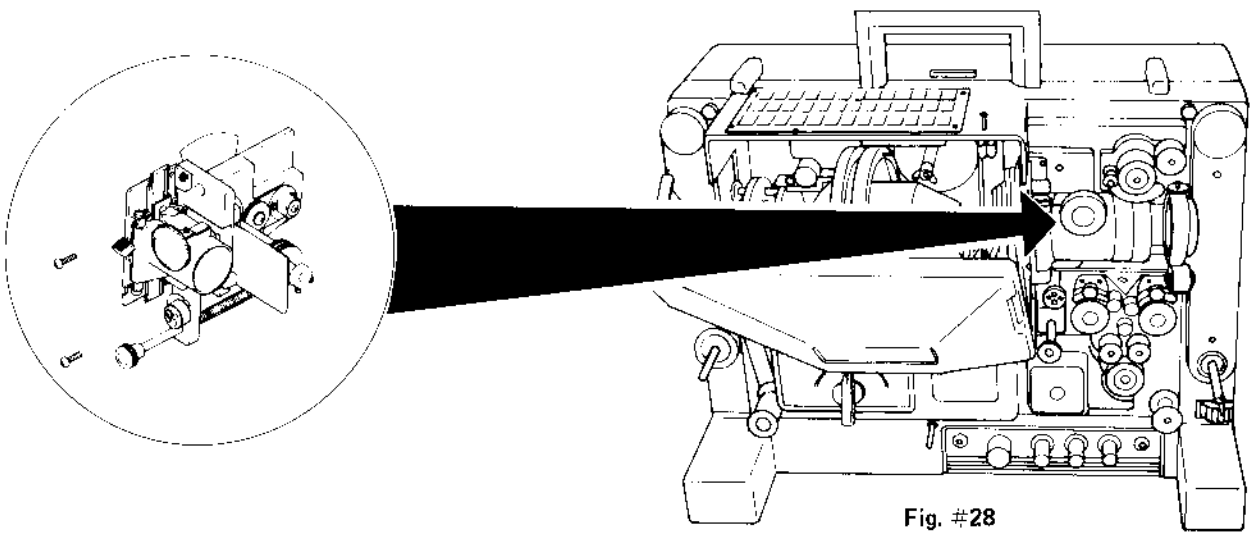


Fig. #28

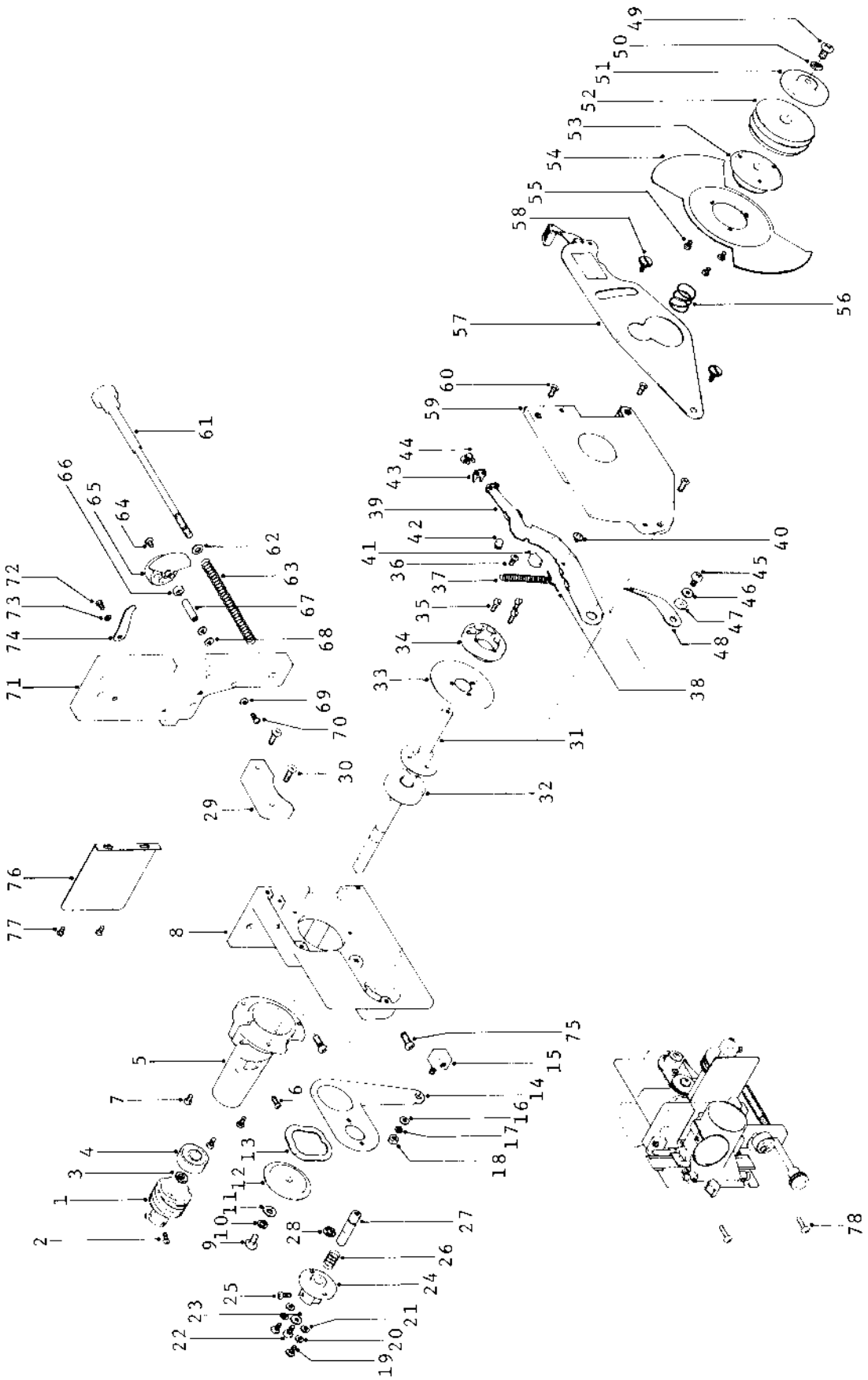


Fig. #29

e. Position the stop lever where all three cam tank cover screws (1, 2, 3) are accessible. (See Fig. #30)
f. The curved plate spring (48) fits over the fulcrum pin (27). Unscrew screw (45) to remove the plate spring and washer.
g. Unhook the claw lever (39) from the tension spring (37) and remove the claw lever assembly.

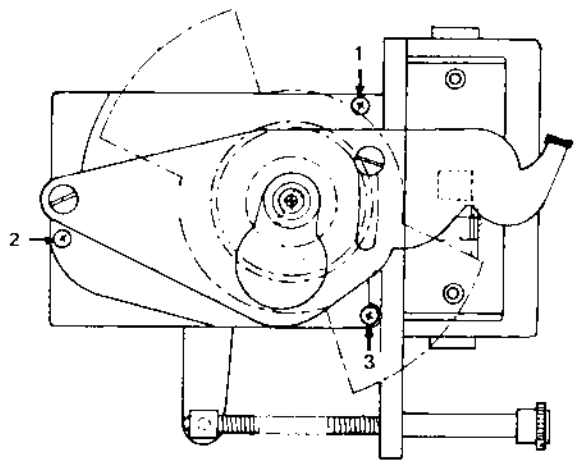


Fig. #30

h. To remove the cam (34) and cam plate (33), unscrew the three small screws (35).
i. Remove the cam shaft (31), the worm gear (1).
j. To remove the cam shaft ball bearings, loosen the inside bearing clamp screws (6) and remove the bearing collar (5). Lightly press out the bearings.
k. Remove the oil felt (29) and clean the old dried grease from all parts.
l. Carefully inspect each part for wear or damage, and replace before re-assembly.

C. Re-assembly:

Re-assembly may be accomplished by reversing the disassembly procedure while keeping in mind the the following points.

1. If the cam shaft bearing are at all noisy or do not rotate smoothly, they should be replaced with new bearings.
2. When installing the cam shaft use fiber washers (3) and position the worm gear (1) so the shaft rotates smoothly without any end play.
3. When overhauling the cam tank it is suggested that the felt oil pad (29) be replaced and lubricated with molybdenum oil. (Do not over oil).
4. Inspect the cam follower (41) and the glide pin (42) for wear, and replace if necessary.
5. The claw lever bushing (39) and fulcrum shaft (27) should be in good condition. Out of round or sloppy fitting bushings will cause erratic cam tank operation and should be replaced.
6. Clean and re-lubricate all parts as they are assembled.
7. Manually rotate the assembled cam tank to be sure all parts are functioning smoothly.

D. Cam Tank Lubrications:

1. Cam shaft bearings are sealed ball bearings requiring no periodical lubrication.
2. The cam and claw lever mechanism should be completely cleaned and re-lubricated every 500 hrs. with molybdenum disulfide grease p/n 5628 as indicated by the arrows in Fig. #31.

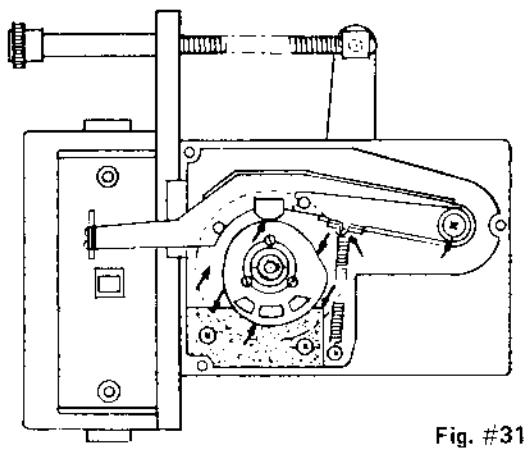


Fig. #31

3. At intervals of about 100 hrs the oil felt should be re-supplied with several drops of molybdenum oil p/n 5632.
4. The stop clutch and shutter pulley (3) (Fig. #32) bushings are lubricated with a drop of molybdenum oil. P/n 5632.

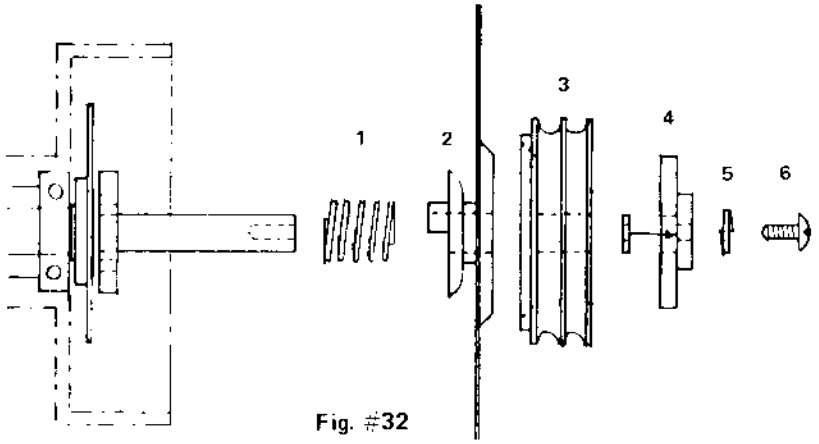


Fig. #32

E. Camtank Adjustments:

1. Claw Protrusion

If the protrusion is too great, the claw will extend and come in contact with the film shoe and releasing the film shoe pressure. The result is not only a noisy operating mechanism but excessive picture jump and jitter. If the protrusion is not enough the claw will miss the film perforations, resulting in loss of loop or possible film damage.

In a normally operating cam tank as the gliding pin (M) (Fig. #33) wears, the claw protrusion will increase. To adjust the claw protrusion loosen set screw (A) (Fig. #33) about 1/8 of a turn, this will allow the pivot shaft (F) to slide in the collar. Now turning screw (B) in a clockwise direction will decrease the protrusion, and counter clockwise will increase the protrusion. Correct protrusion is set with the claw penetrating thru the aperture plate at the upper part of its stroke. A claw protrusion gauge will determine a go-no-go situation, or 6 layers of color film will be approximately equal to the 1mm to 1.2mm protrusion when the claw penetrates through all 6 layers of film. Once the adjustment is set tighten set screw (A) locking the shaft in position.

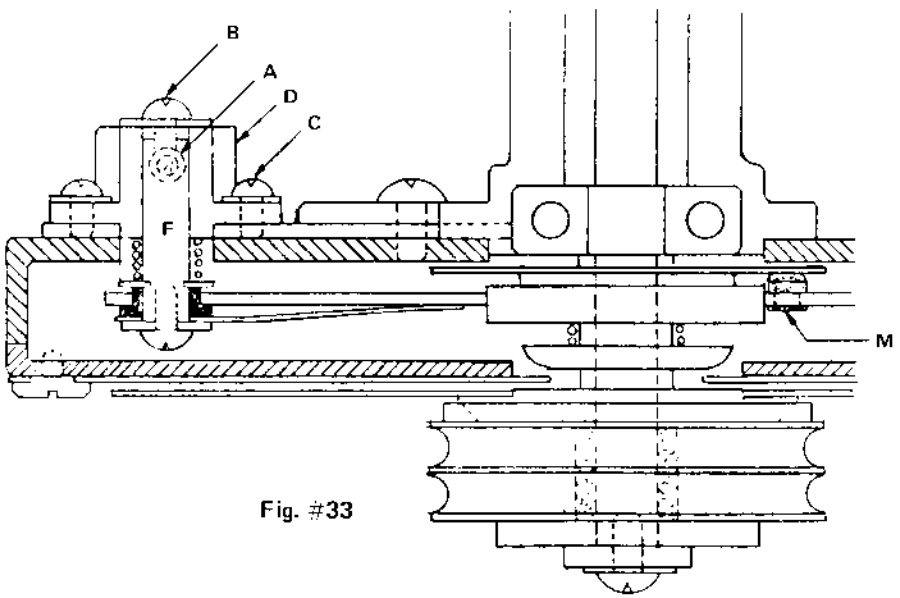


Fig. #33

2. Claw position and framing adjustments:

As the claw travels from the top of its stroke to the bottom, pulling the film down to the next frame a slight arc is scribed. For smooth handling of the film it is essential that the position of the claw in relationship to the films sprocket holes be such that at no time during the stroke does the claw contact the sides of the holes. (See Fig. #34) The distance A-B, C & D should all be approximately equal.

To adjust the claw position the fulcrum assembly may be slightly positioned in or out in the horizontal direction by loosening screws (C). (Fig. #34)

Care should be taken to only slightly loosen the screws and to make the adjustment in small increments. If the fulcrum assembly is moved up or down in the vertical position this will affect the framing control.

The EX-4000P is equipped with theatrical type framing which allows the fulcrum assembly to move slightly up or down when the framing knob is adjusted. To check the upper and lower framing range it is necessary to adjust the aperture plate location with respect to the film shoe aperture by loosening nuts (N) Fig. #35.

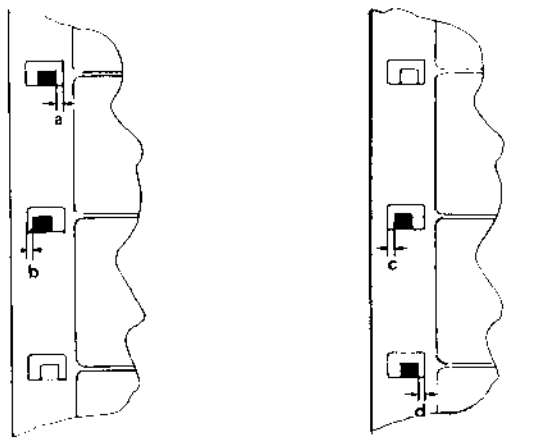


Fig. #34

Adjust the aperture plate to correspond with the film shoe and retighten nuts (M). Should you be unable to make the above adjustments, resulting in improper operation of the projector refer back to the section on disassembly and examine the condition of the cam follower (K) and the glide pin (M) for wear, replace if necessary and repeat the adjustments.

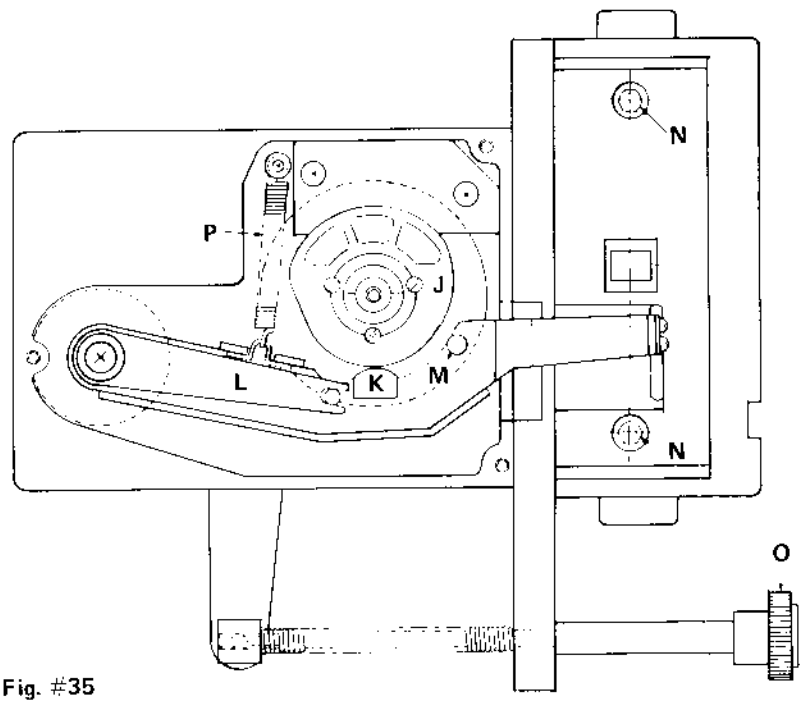
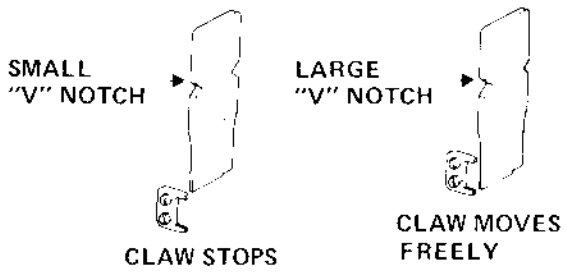


Fig. #35

3. Claw Protrution Adjustment Using Tool No. 320-01T

Fig #35



A. Open lens holder and gate assembly.
B. Hold the tool between the inner guide rail and the outer guide rail, flat against the aperture plate.
C. With the small "V" notch toward the outer guide rail, the claw should contact the tool at the top of its stroke.
D. With the large "V" notch toward the outer guide rail, the claw should move freely without contacting the tool.

4. Travel Ghost Adjustment:

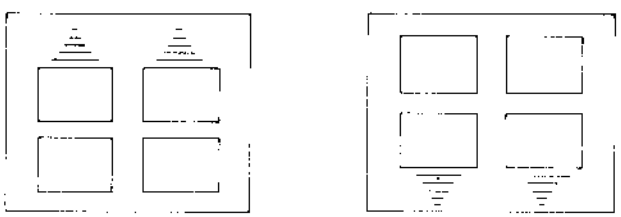
Travel Ghost is a term refered to when the rotating shutter does not correctly synchronize with the pull-down claw.

To a small degree it is best observed on a test film with a continuous pattern such as an SMPTE registration film.

Travel Ghost may be leading or trailing depending on the direction of film travel in relation to the shutters rotating direction.

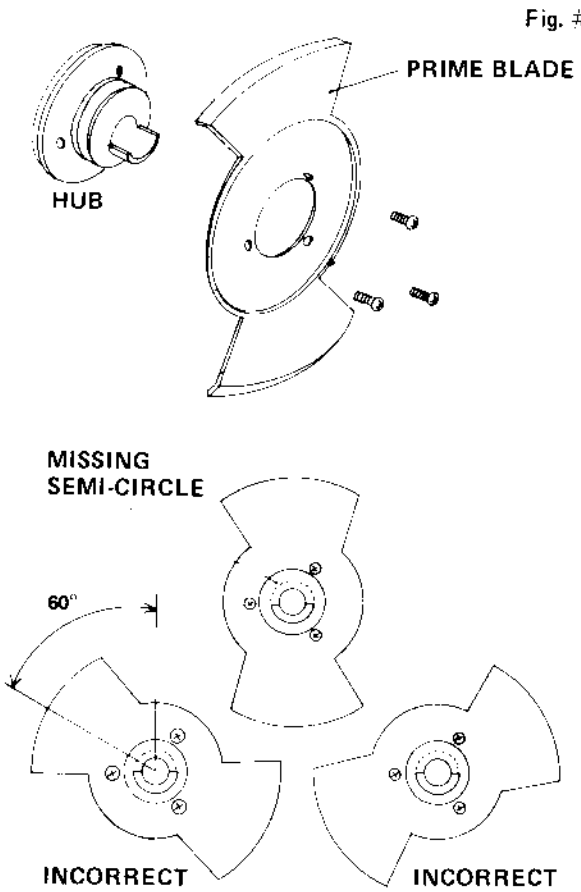
On the screen it is usually observed as shown in Fig. #36 with multiple images from a bright horizontal line. Leading Travel Ghost will be observed at the top of the screen and Trailing Ghost at the bottom.

Fig. #36



To adjust for minimun Travel Ghost the shutter blade mounting holes are slightly elongated allowing the shutter to be positioned on the hub for minimum ghost. Since the adjusting screws are only accessible with the cam tank removed this becomes a trial and error adjustment. With a little practice it is not too difficult if you start with the shutter mounted in center of the slot, then each adjustment can be to the right or left of center. When installing a new shutter, careful observance as to how the old shutter was mounted will nearly always assure that the new shutter will be correct. When mounting a 2 blade shutter, the missing semi-circle on the hub must be positioned toward one of the blades. The curved edge of the blade faces away from the cam tank (See Fig. #37). The prime blade is the blade which blocks the light path when the claw advances the film to the next frame.

Fig. #37



NOTE: 3 BLADED SHUTTERS WILL AUTOMATICALLY LINE UP CORRECTLY.

6-3: ADJUSTMENT OF THE SPROCKET SHOES

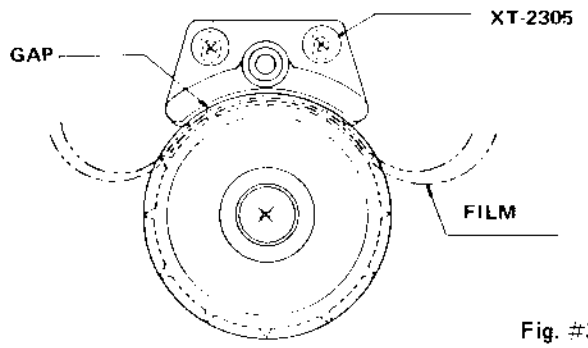


Fig. #38

A. Description:

By loosening screws XT-2305 it is possible to adjust the clearance between the sprocket drum and the shoe. If the gap is too great the film may skip over the sprocket teeth resulting in the loss of the film loops. If the gap is too narrow films with splices may be restriced as they pass over the sprocket, again resulting in loss of the loops or possible film damage.

B. Adjustment:

To set the correct clearance wrap two layers of film over the sprocket drum. With the XT-2305 screws loose gently press down on the film shoe until the shoe is in contact with the film. Secure the screws, remove one layer of film and close the shoe again. A single layer of film should seat well with sufficient clearance to allow a splice to pass unresticted. If it is not possible to achieve the correct clearance it may be as a result of a worn film shoe. Inspect and replace as required.

6-4: LOOP RESTORER

A. Description:

The loop restorer roller is a counter balanced eccentric roller. If necessary, remove the roller, clean the shaft and re-lubricate by wiping the shaft with a lightly soaked silicone oil cloth. When the lower loop is lost, the film will contact the loop setter roller, causing it to rotate. The eccentric action will pull down a new lower loop while the claw is retracted.

B. To Adjust the loop Setter Timing:

1. Open the transport mechanism access door and manually position the claw to where claw begins its' downward stroke. (See Fig. #39)
2. Position the loop setter so that the three holes point directly down. (See Fig. #39)
3. Thread up a film as normal while maintaining the claw and loop setter in this position.
4. In this position, pull the film up tightly against the loop setter roller. The claw should now line up with the film perforations.
   If the perforations do not line up, loosen the #2 sprocket cover screw slightly and adjust the film until it lines up and secure the cover screw.
   NOTE: It may be necessary to re-adjust the #3 sprocket to obtain good sound stabilization.
5. The film should now clear the loop setter roller (See Fig. #39) when the projector is running normal, undamaged film, if the above adjustments have been made correctly.

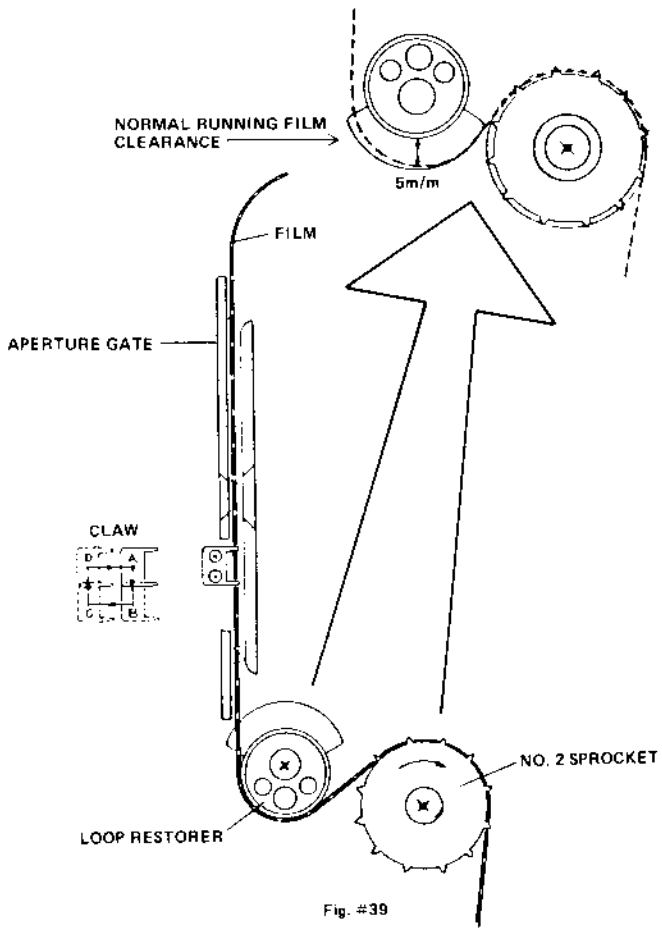


Fig. #39

6-5: MAIN DRIVE MOTOR AND BLOWER ASSEMBLY

A. Description:

Main drive motor assembly consists of an AC induction motor as a standard feature. (Some models are optionally equipped with a synchronous motor). The double shaft motor provides lamp cooling from the fans mounted on each end as well as drive to the projector mechanism by means of a belt. The motor bearings are sealed ball bearings requiring no periodical lubrication.

B. Specifications:

1/20HP
100V AC, 144 Watts
Starting Torque 1.6kg.
Rated Torque 0.8kg.

C. Assembly Breakdown:

The motor as an assembly may be removed from the main frame of the projector by the two large phillips type screws located in the chassis directly below the motor.

D. Electrical Diagram:

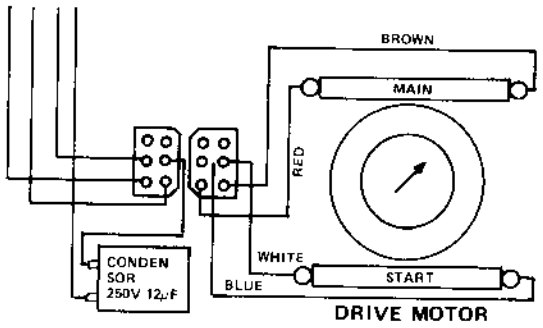


Fig. #41

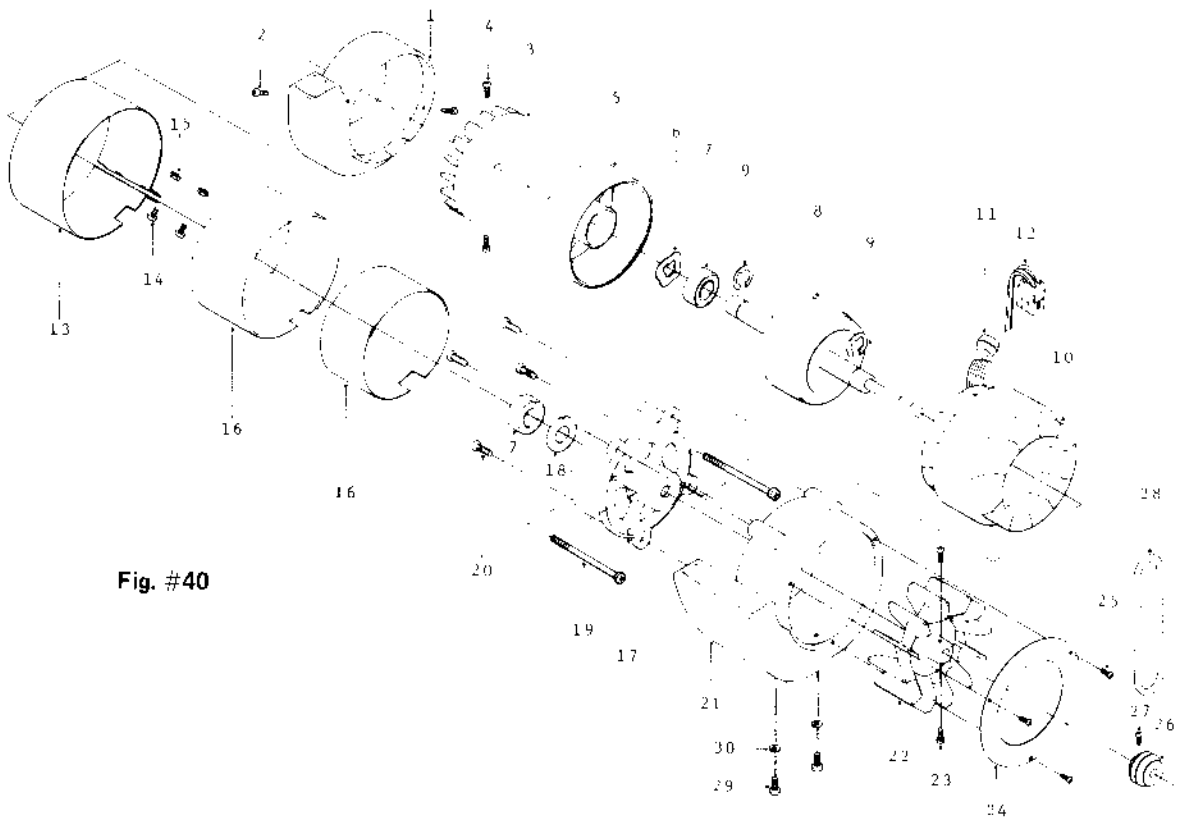


Fig. #40

6-6: SUPPLY ARM ASSEMBLY

A. Description (Fig. #42):

The supply arm serves two main functions:

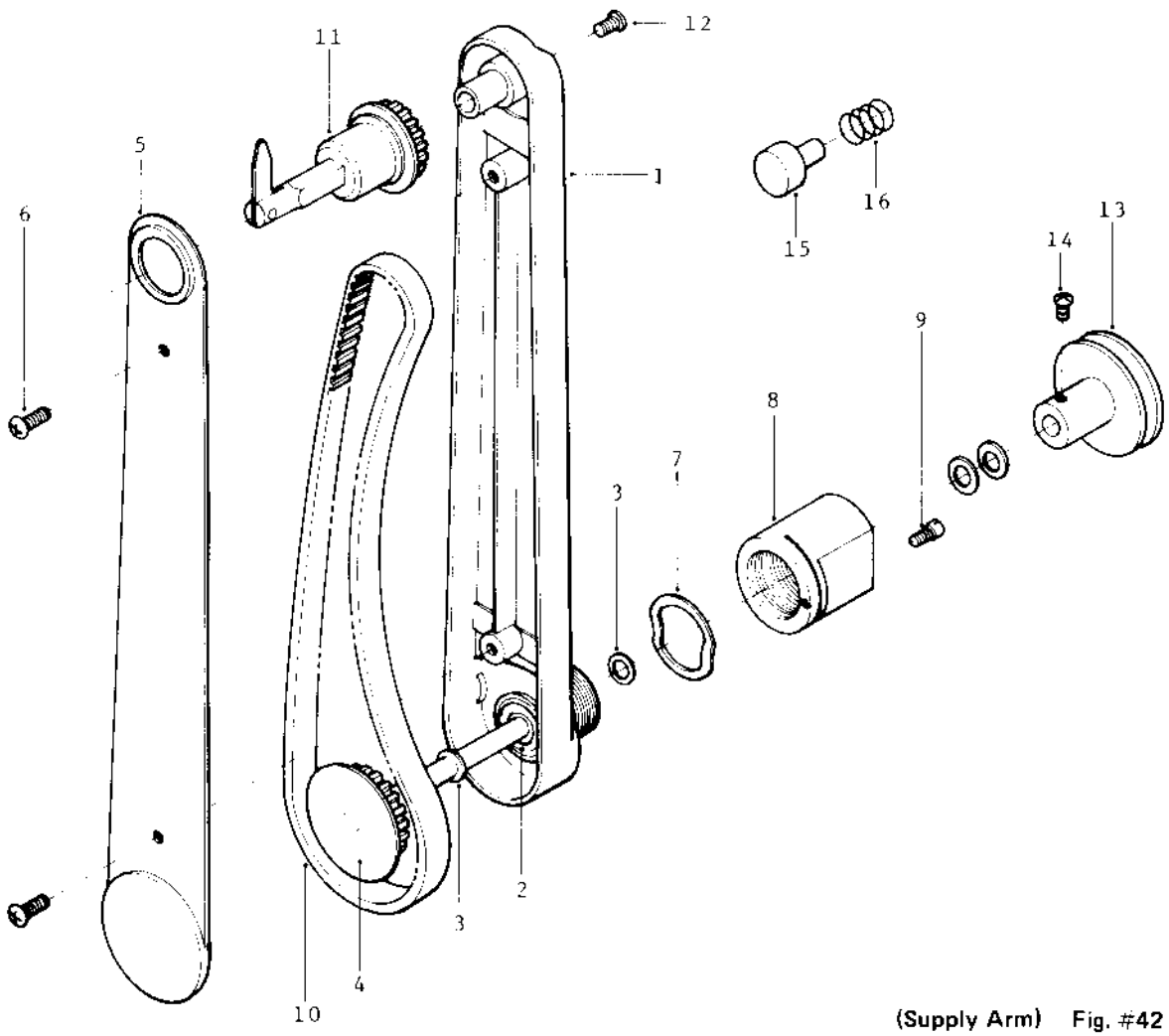
1. Provides a spindle to hold the film for normal forward projection.
2. Provides drive in reverse and rewind to take-up the film.

To assure a positive reverse or rewind take-up the drive from the lower arm pulley (4) to the supply spindle (11) is accomplished by a toothed arm belt.

The upper spindle is mounted in a bushing and the lower pulley is fitted with two ball bearings.

B. Maintenance and Adjustments:

Except for occasional lubrication of the supply spindle bushing no regular maintenance or adjustment is required. The tooth belt is expected to last for hundreds of hours of operation and should be carefully inspected for wear whenever the machine is serviced.



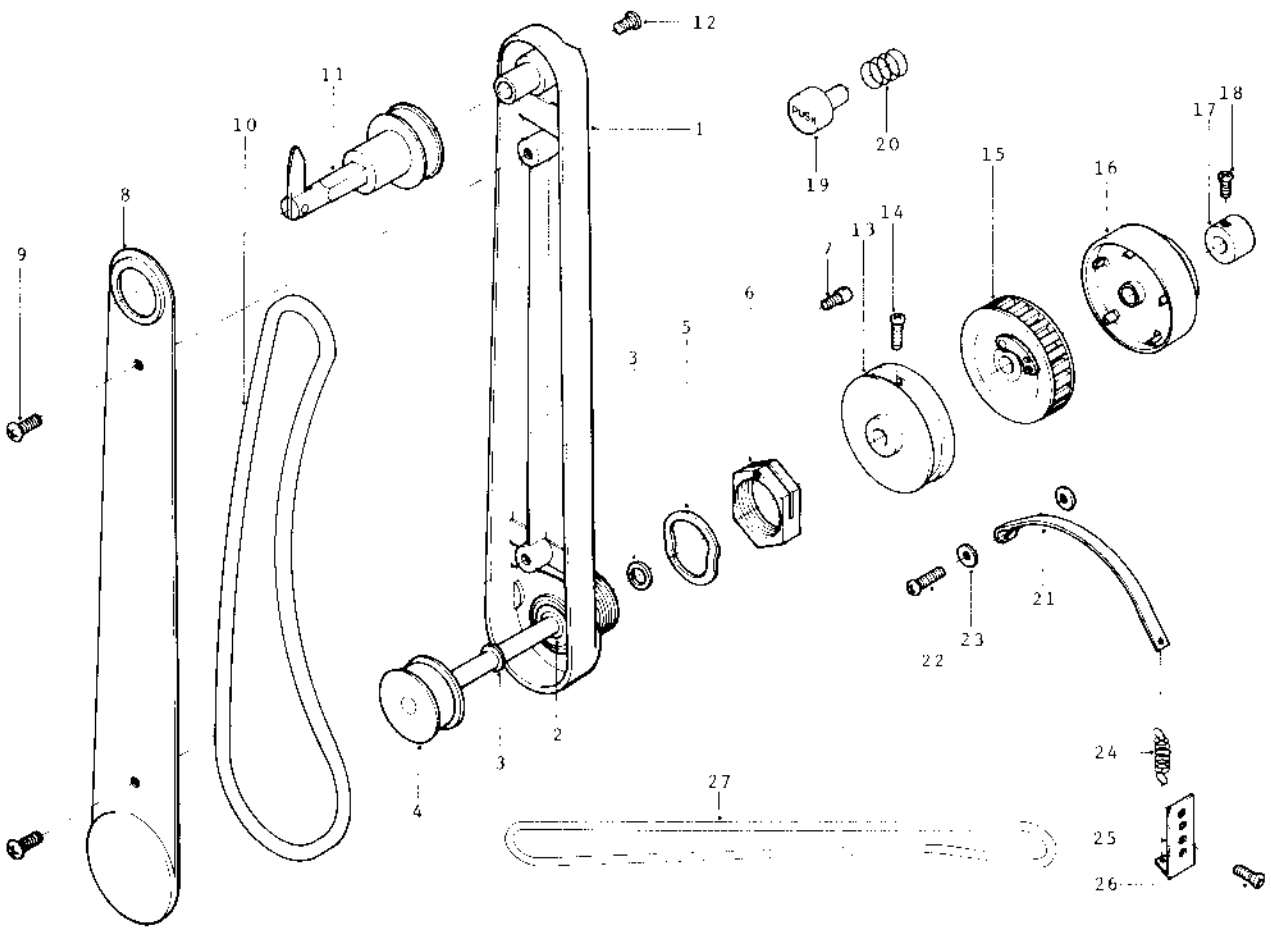
(Supply Arm) Fig. #42

6-7: TAKE-UP MOTOR AND ARM ASSEMBLY

A. Description (Fig. #43):

The take-up arm assembly is very similar to the supply arm except that the arm belt is a round "0" ring type belt allowing some slippage. The main drive pulley is powered by a seperate torque motor. A direction clutch (15) is engaged during take-up. In reverse or rewind the take-up arm frees wheels. A leather drag brake (21) is wrapped over the pulley (13) to provide a small amount of back tension during rewind.

The torque motor and relay central circuits are located on the torque motor bracket. The relay circuits control the torque motors direction for rewind or forward take-up. Capacitors and diodes are provided across the relay coils and contacts to reduce noise and pops in the audio system, whenever the relays are activated.



(Take-Up Arm) Fig. #43

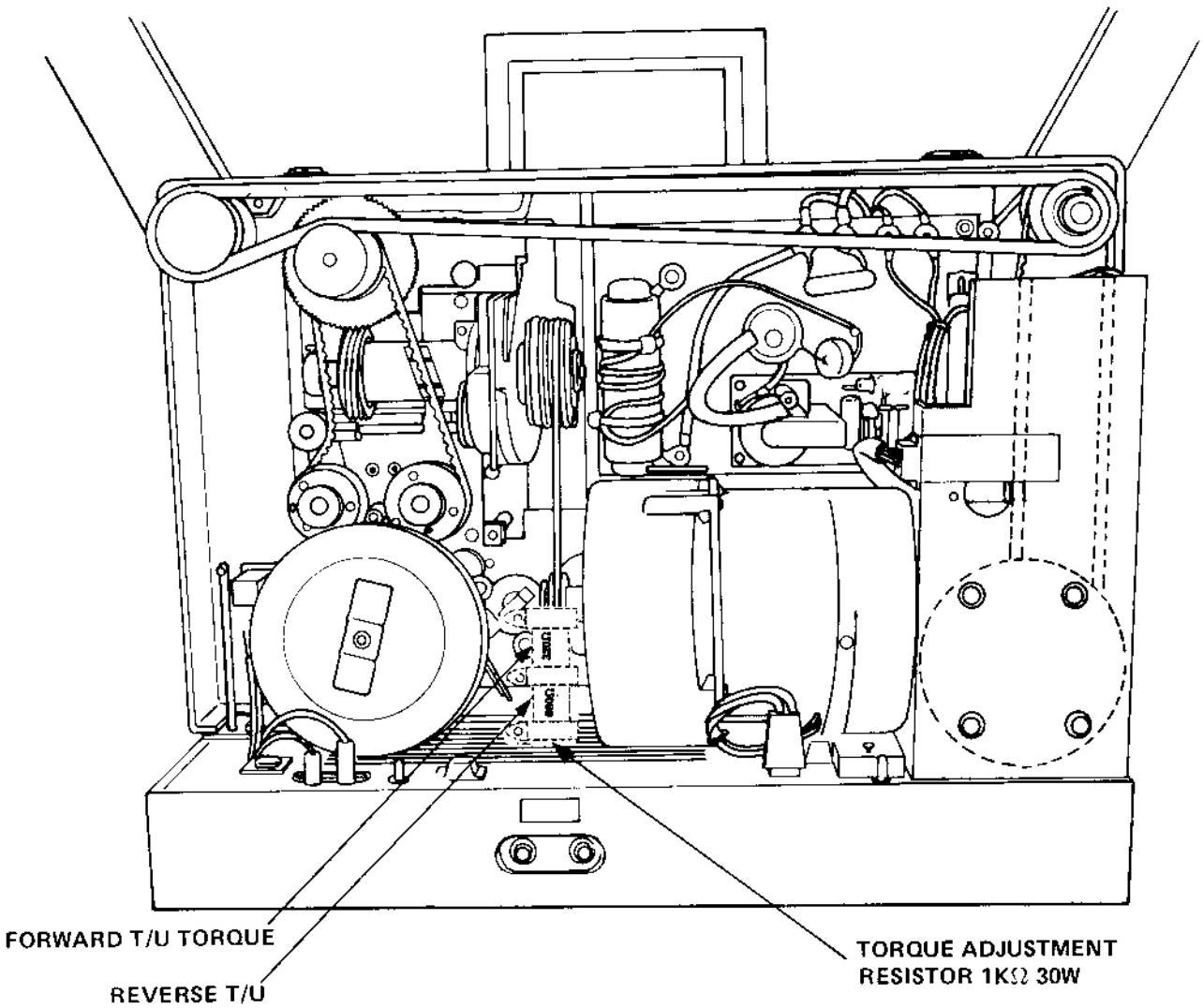


Fig. #44

B. Adjustments:

Rewind back tension is accomplished by the leather brake (21) tension. Too much back tension will result in weak or poor rewind. The torque motor in rewind operates at 100 VAC for full torque. 1KΩ 30 Watt resistor is used to set the take-up and reverse take-up torque.

The correct torque setting is approximately 320 ohms from the top to the center tap in forward and 680 ohms from the bottom to the center tap in reverse. Minor variations may be necessary to achieve optimum torque in either reverse or forward take-up.

A take-up motor defeat switch is also located on the torque motor bracket (9) of Fig. #45 for convenience in servicing the projector or operating with the long play pedestal.

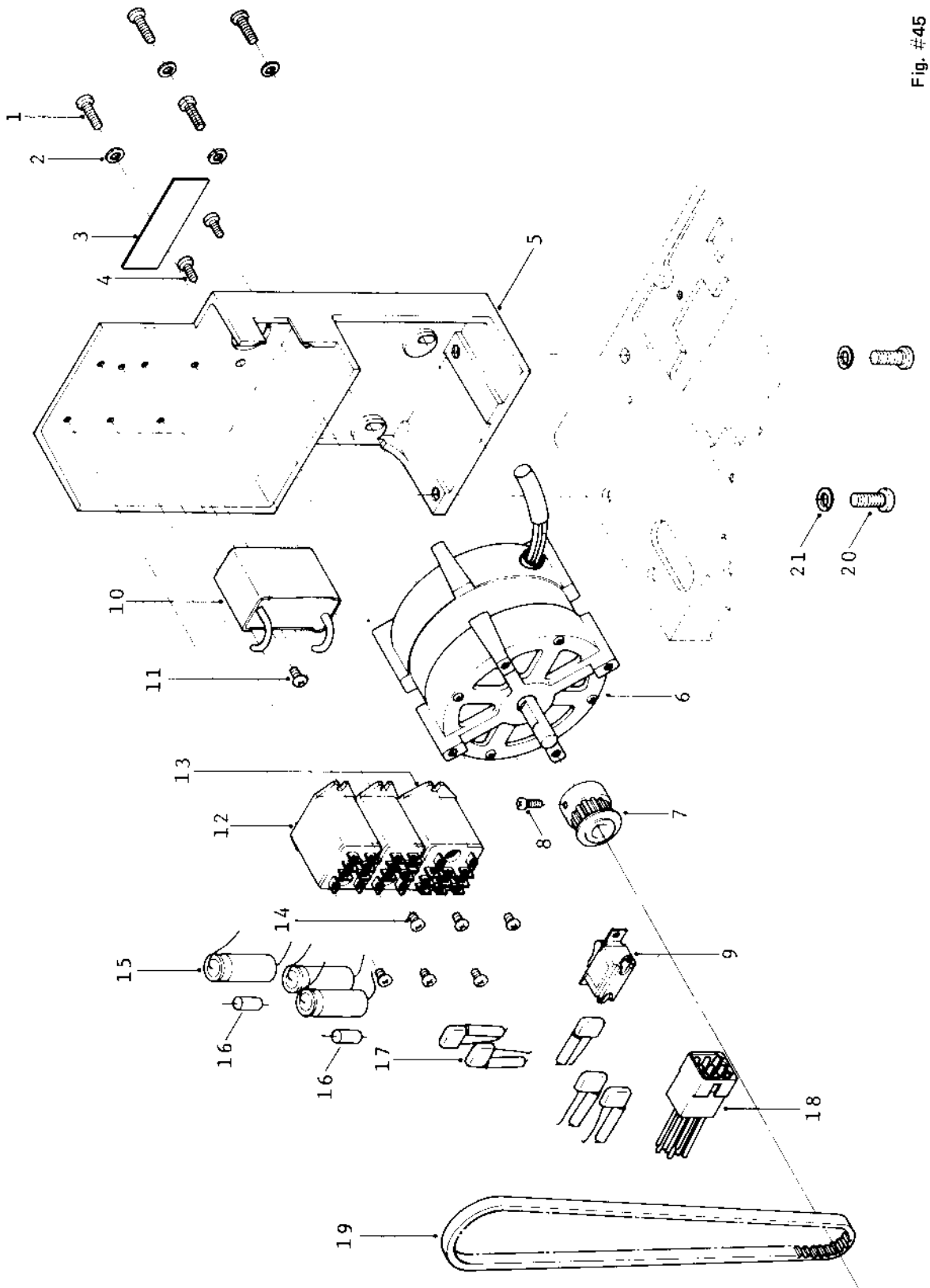
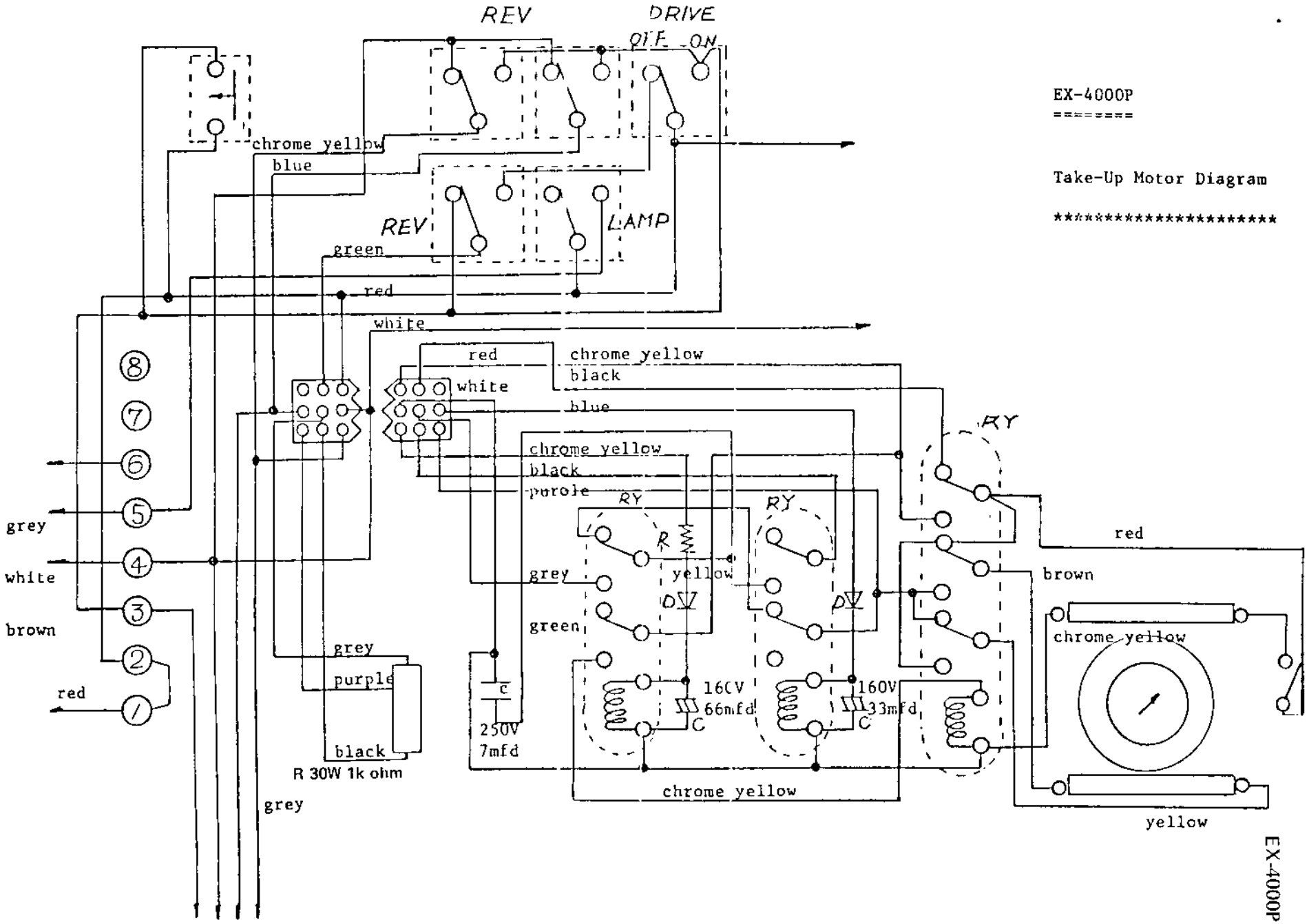


Fig. #45

EX-4000P
========

Take-Up Motor Diagram

****



EX-4000P

Fig. #46

6-8: SOUND DRUM AND FLYWHEEL

A. Description:

The sound drum and flywheel's main function is to stabilize the film, allowing the sound optics or magnetic head to read the sound tracks with a minimum of speed variation. The sound drum, shaft, bearing and flywheel are precision machined and balanced to maintain a consistent linear film speed. Care should be used when disassembling or re-assembling these precision parts.

The sound drum shaft (5) is seated in two precision ball bearings (3) which are sealed and factory lubricated. The ball bearings are lightly press fitted into the sound hub casing (2). The shaft is secured in place by a set collar (6). With the fiber washer in place, with no end play in the sound drum shaft, it must rotate freely and not bind. Any binding or imperfections in the ball bearings will result in excessive wow and flutter. The sound drum shaft (5) is driven by the tension of the film. The flywheel is free to slip on the sound drum shaft during the initial start up of the projector to prevent any possible film damage.

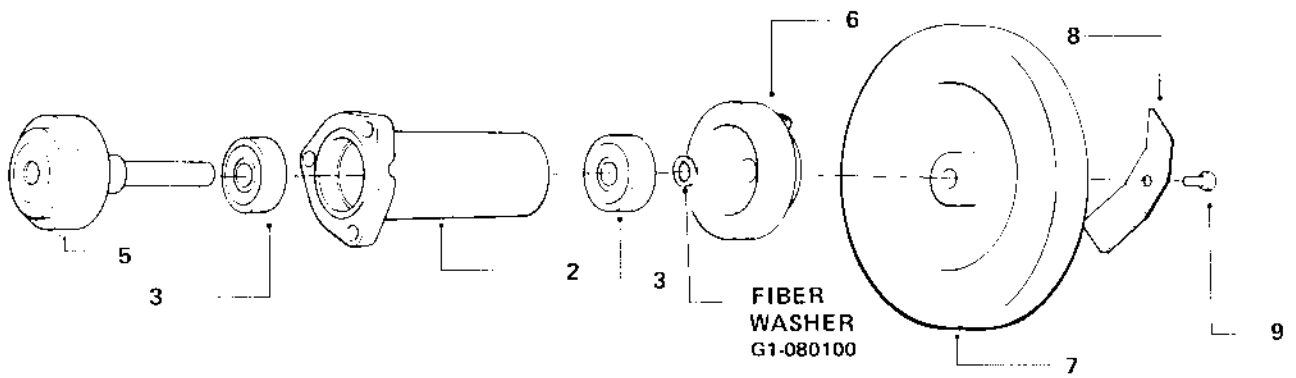
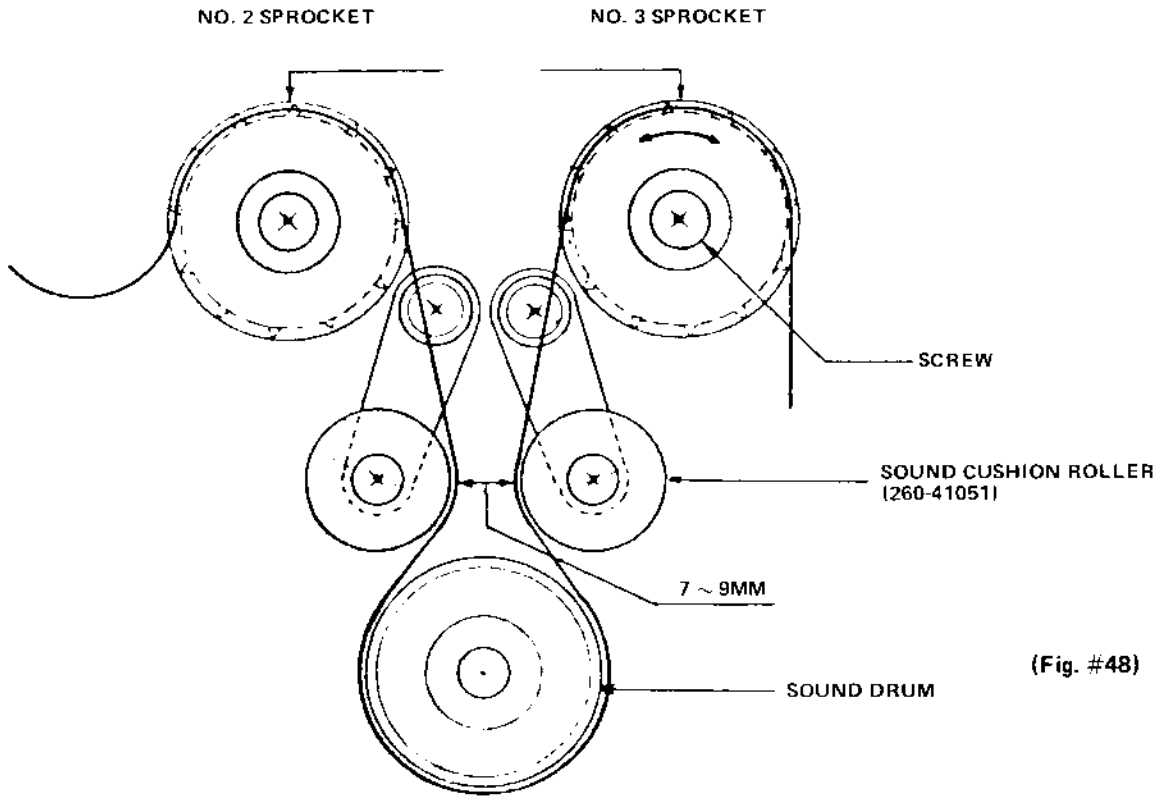


Fig. #47

B. Adjustments:

The tension of the film around the sound drum is critical for accurate sound reproduction with minimum wow and flutter. The sound cushion rollers maintain the correct tension. To adjust the film tension, loosen the cover of the #3 sprocket and rotate the sprocket plate until approximately 7 to 9mm spacing is obtained between the two cushion rollers. (See Fig. #48)



(Fig. #48)

C. Mechanical Assembly:

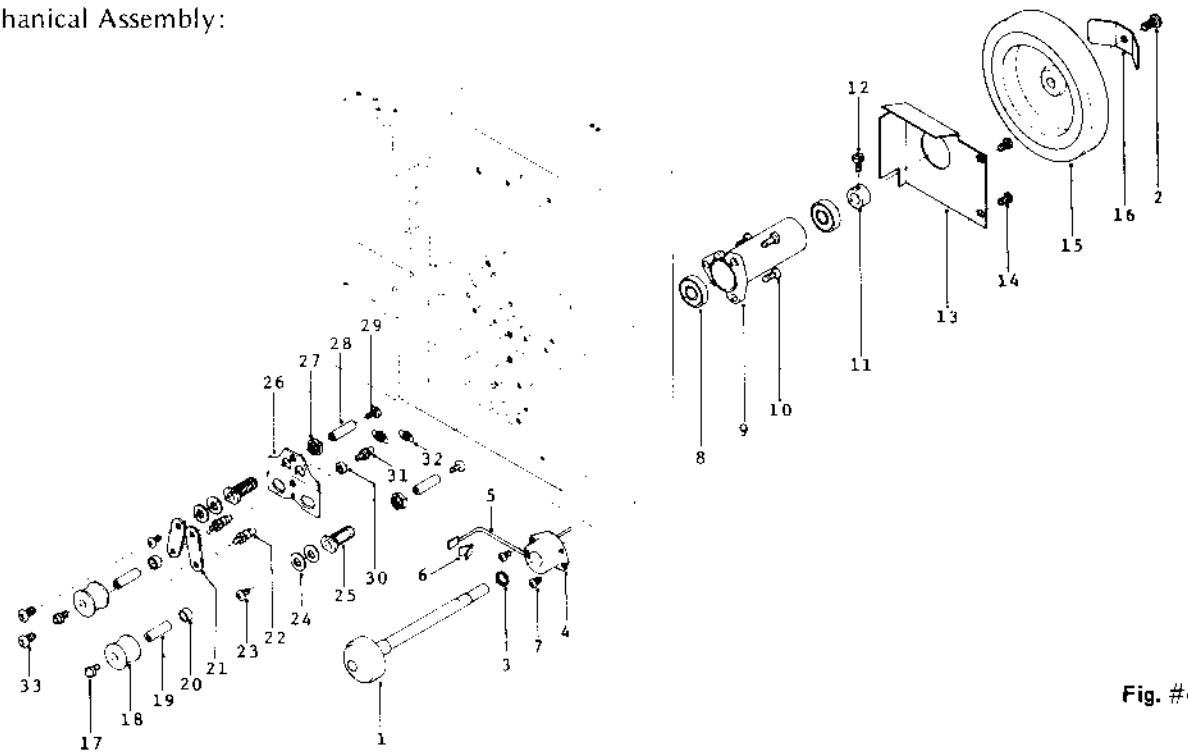


Fig. #49

241-7:SOUND SYSTEM

7-1: AMPLIFIER MODULE

Refer to the amplifier circuit diagram:

A. Specifications:

1. Solid state: 3 IC's 7 transistors (9 transistors)
2. Output power: 35 watts RMS 8 ohm load
3. Distortion: Less than 4% at 400Hz (measured with SMPTE 400Hz signal level test film)
4. Wow & flutter: Less than 0.2% WRMS
5. Frequency response: Optical 50Hz – 7000Hz ± 4dB
   Magnetic 50Hz – 10000 Hz ± 4dB
6. S/N ratio of the amp: 60dB
7. Mic input impedance: (high impedance)
8. Mic input level: 10mv max
9. Phono input level: 50mv (high impedance)
10. Speaker Jacks: 8 ohm
11. 600 ohm balanced line output with adjustable level control

B. Amplifier Power Supply:

52 volts AC is supplied through pins 1 & 2 of the 9 pin connector from T-1 located in the base of the projector. Dual diodes S1 and S2 form a bridge retifier, which output DC is filtered by C-36 (2200mfd.) supplying the amplifier with approximately 70 volts DC.

C. Exciter Lamp Circuit:

T-1 also provides 8 VAC through Pins #4 & 5 of the 9 pin socket. Dual diodes S-3 & S-4 form a bridge which DC is filtered by capacitors C-14, C-15 and C-16. R-32 is a current sense resistor serving as feedback to the base of the TR-2 through R-29. The DC constant current regulator TR-1 holds the exciter lamp voltage to approximately 3.5 volts. The exciter lamp voltage is routed through the 9 pin connector to the mag/opt selector switch, turning off the exciter lamp when switched to the mag position.

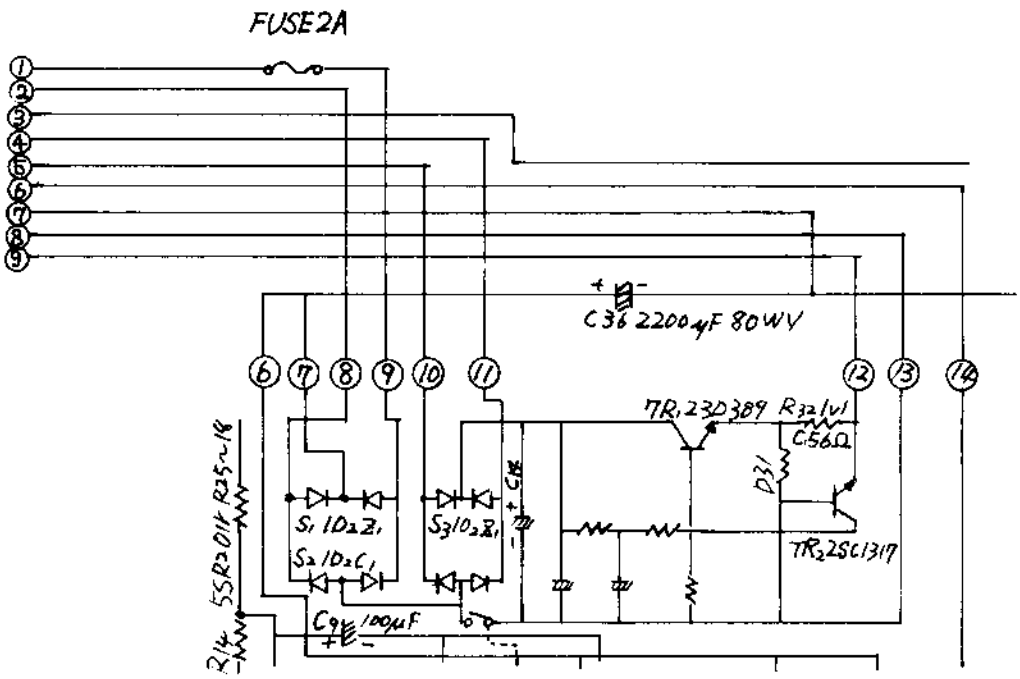
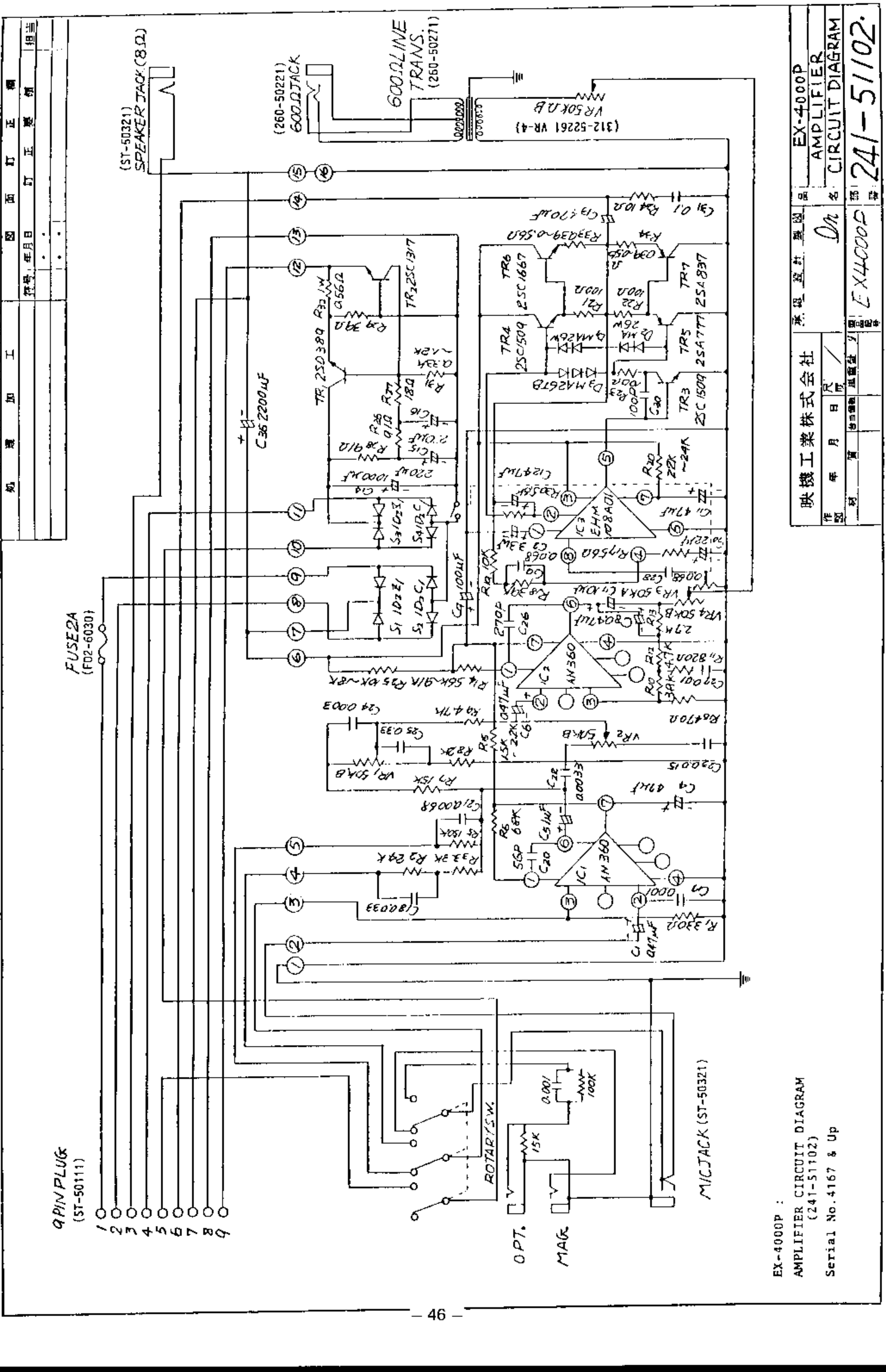


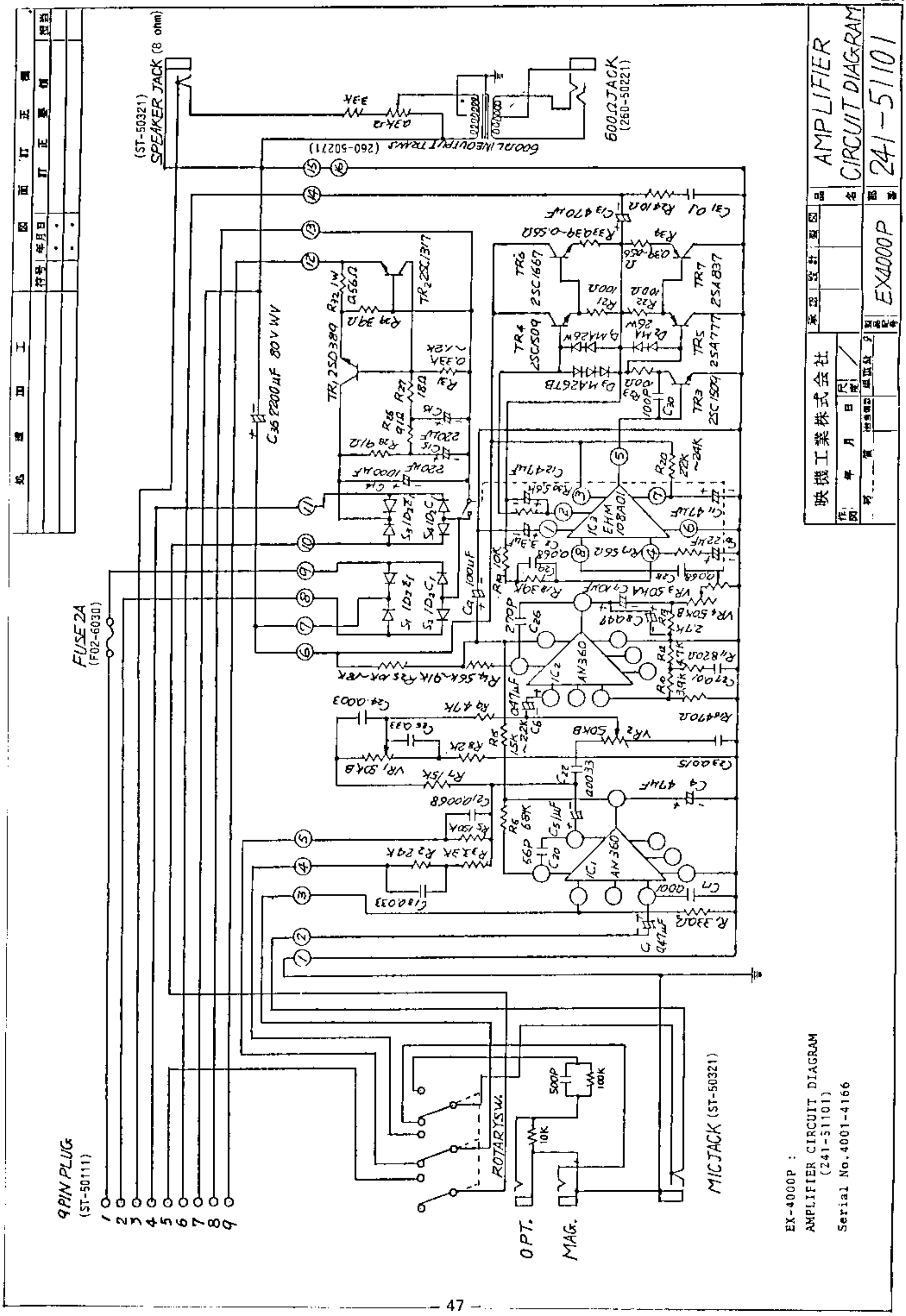
Fig. #50

D. Audio Amplifier Circuit

The signal from the optical solar cell and the magnetic head is routed through the opt/mag selector switch to the amplifier through the small mini plug to Pin 2 of 1C. The 3 pin nylon plug connects the equalization network to the mag/opt selector switch. The mic and phone input are fed through respective attenuator circuits VR-7 and a 10K resistor and VR6 and a 100K resistor to pin 2 of 1C1 (AN360) through capacitor C1. Feedback to 1C1 is accomplished through a selectable network consisting of C18, R2, R3, R5 and C21. The optical/magnetic selector switch provides the playback equalization required. Bass control VR-1, R8, C25, C24 and R9 form a low frequency boost and attenuation equalization network. Treble control VR-2 and C22, C23 provide for high frequency boost and attenuation. The signal from the tone controls is fed through C6 to pin 2 of 1C2. The output of 1C2 is coupled through C7 to volume control VR-3, to pin 8 of 1C3 through capacitor C28. Feedback for 1C2 is accomplished through the network consisting of C8, R12, R10, R11, C27 and R16. From 1C3 the signal is fed to TR3, TR4 and TR5. TR6 and TR7 act as complimentary final output drivers to an 8 ohm speaker through capacitor C13. Since this is a single ended common ground output, (so called O.T.L. – Output Transformer Less-circuit), care should be taken to avoid a ground loop condition which may result in amplifier damage, when connecting the speaker ground to an external earth or electrical ground. An auxiliary 600 ohm balanced transformer output is provided for convenient connections to external amplifiers or sound systems.



EX-4000P :
AMPLIFIER CIRCUIT DIAGRAM
(241-51102)
Serial No.4167 & Up



EX-4000P :
AMPLIFIER CIRCUIT DIAGRAM
(241-51101)
Serial No.4001-4166

7-2: OPTICAL SOUND PICK-UP SYSTEM

A. Description:

EX-4000P projectors are supplied with both optical and magnetic playback. In the optical position, the exciter lamp is on, and the mag head is raised away from the sound drum. The optical pick-up system resembles a small projector within a projector, consisting of a light source, a lens, an image, and a screen or target.

The light from the exciter lamp is focused through the sound track imaged onto the (target) solar cell where a varied light intensity is converted into minute electrical voltage changes that are amplified and converted into accoustical variation or sound which directly relate to the photographic variation recorded on the film.

B. Sound Focus Alignment Precedure:

1. Tools and equipment required
   a. Screw driver set (Iso)
   b. SMPTE sound focus test film 7000Hz
   c. SMPTE buzz track test film
   d. AC VTVM (audio range) and or
   e. Oscilloscope
   f. 8 ohm 50 watt dummy load resistor
   g. External speaker

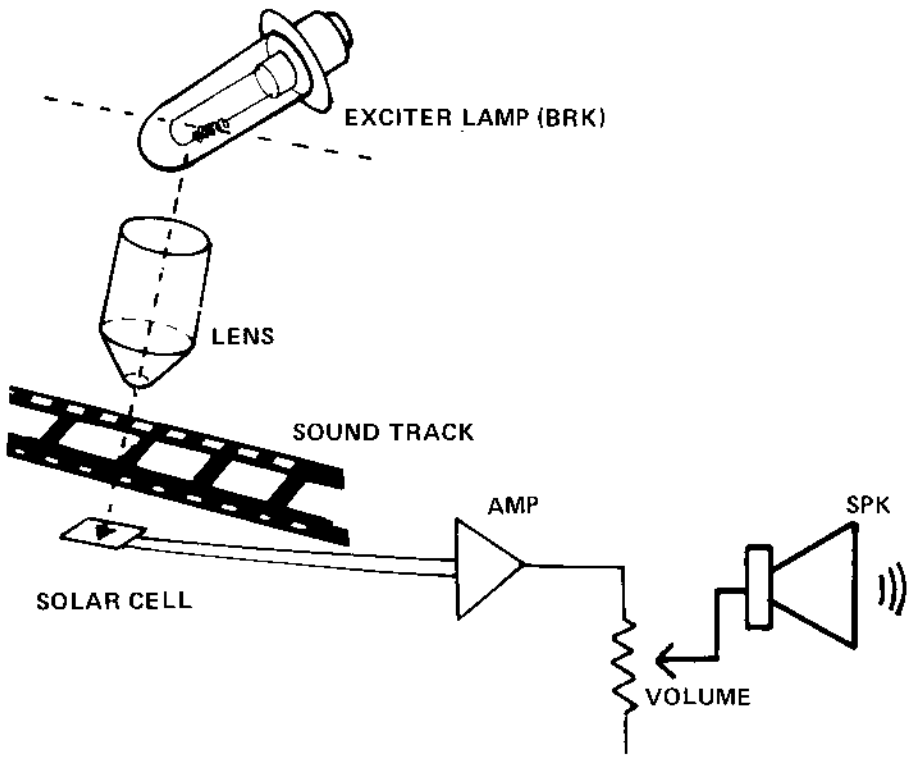


Fig. #51

2. Set-up Procedure
   a. Remove the exciter lamp cover by pulling straight out from the projector

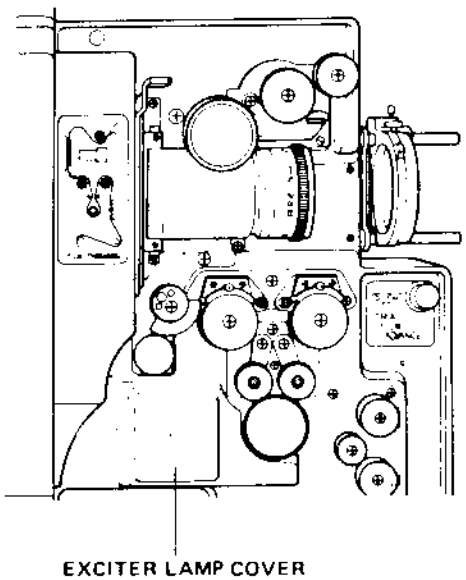


Fig. #52

3. Sound Focusing Adjustment Procedure
   a. Connect the dummy load resistor to the speaker output jack.
   b. Thread the 7000Hz SMPTE test film loop with the emulsion side towards the film shoe.

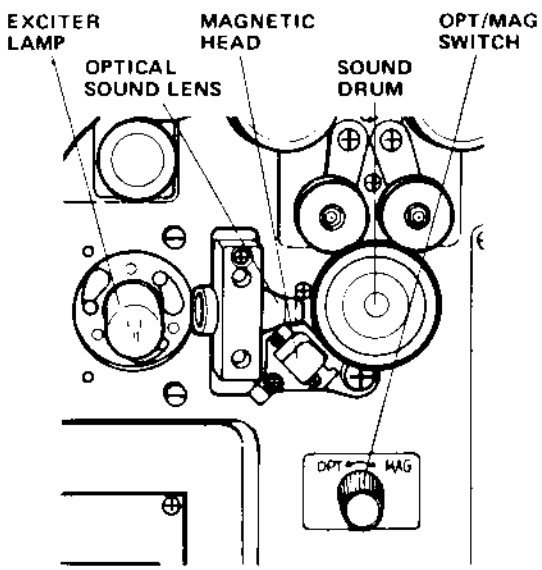


Fig. #53

   c. Connect either an AC VTVM (20 volt range) or an Oscilloscope across the dummy load resistor.
      NOTE: When using instruments with a grounded shield input, avoid a ground loop condition by not connecting the shield at the load resistor.
   d. Turn the projector's function switch to forward.
   e. Set the treble control to the max. position and the bass to the minimum. Loosen the sound focus lens clamp screw (2) slightly to allow a rotation of the lens.
   f. Turn on the volume control towards maximum and observe the AC VTVM or the Oscilloscope.
      (1) With the AC VTVM connected, observe the meter while slowly moving the lens up or down and slightly rotating until the maximum voltage reading is achieved. Clamp the sound lens and this completes the sound focusing alignment.
      (2) With the Oscilloscope connected across the dummy load resistor a more precise alignment can be achieved. Observe the 7000Hz sine wave at both full volume and a lower volume at the same time adjusting the rotation and up or down position of the sound lens, for maximum P-P voltage of the sine wave. A clean undistorted sine wave should be observed as shown in Fig. #54 corresponding to the volume and tone control positions as indicated.
   g. This completes the sound focus adjustment. Clamp the sound lens clamp screw and test with a good sound track film.

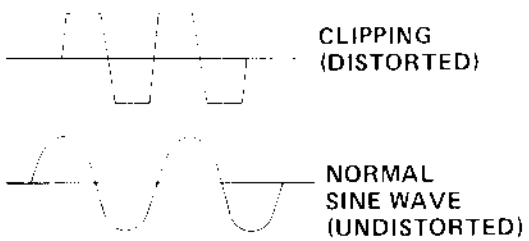
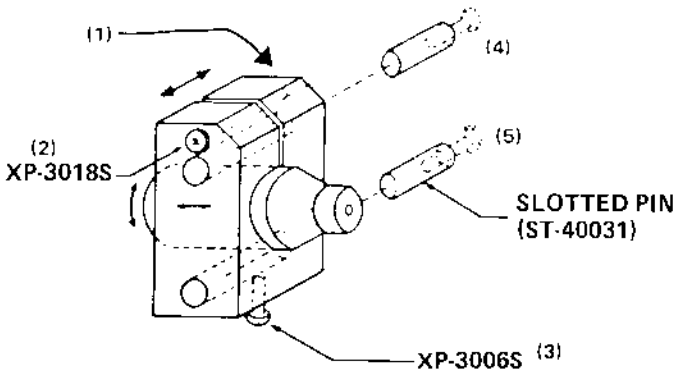
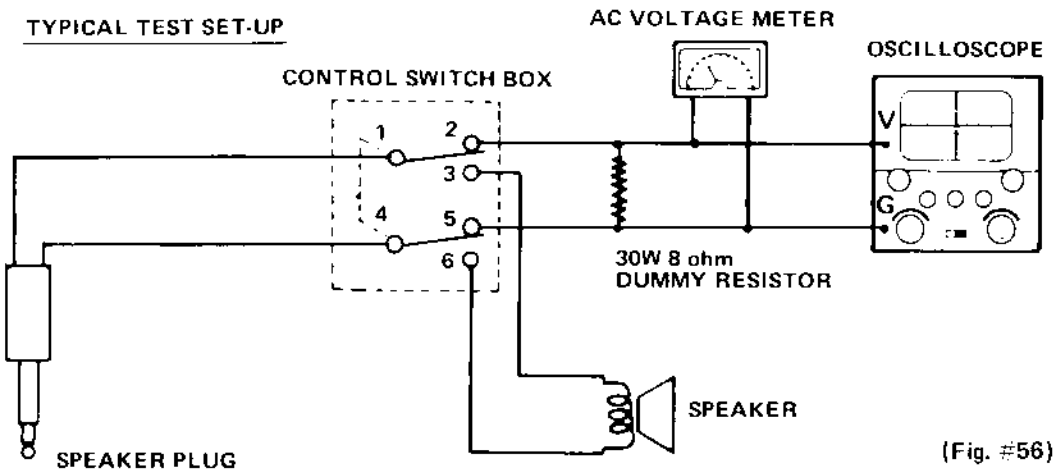


Fig. #54

4. Buzz Track Adjustment Procedure
   a. Connect the projector to the test set-up as Fig. #56.
   b. Load an SMPTE buzz track test film loop with the emulsion side towards the film shoe.
   c. Turn the function control switch to the forward position.
   d. Turn the amplifier volume and tone controls to maximum (clockwise) and listen for a clear 1000Hz tone.
   e. Sound lens holder is mounted on two pins (4) and (5) which slide into holes of the sound lens holder. Loosen the screw (3) to allow the adjustment. Adjust the buzz track by slowly sliding out the sound lend holder (1), until the 1000Hz tone is inaudible and a 300Hz tone becomes audible.
   f. Then slowly slide in the sound lens holder until neither the 300Hz or the 1000Hz tone is audible, indicating correct buzz track alignment. Tighten the lock screw (3).
   g. Re-check the 7000Hz sound focus alignment.
   h. Remove the exciter lamp. Remove the sound lens adjustment tool. Re-install the exciter lamp and wipe off any fingerprints.



(Fig. #55)



(Fig. #56)

7-3: MAGNETIC SOUND PLAYBACK SYSTEM

A. Description:

In addition to the standard optical sound playback, the EX-4000P includes magnetic sound track playback. The Mag/Opt selector switch operates a lever which positions the magnetic head against the film's sound track, at the same time the appropriate electrical connections are made.

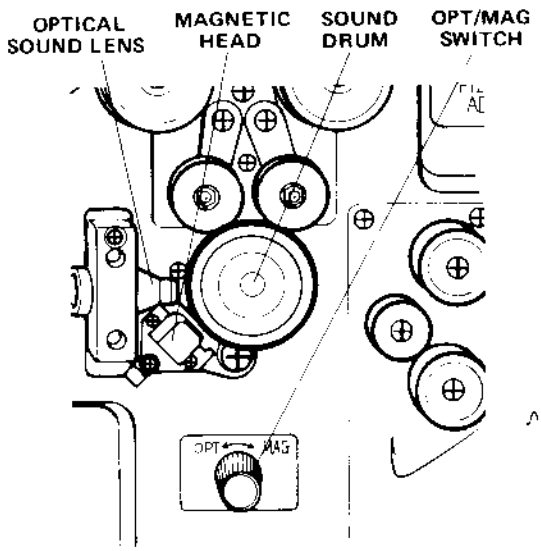


Fig. #57

B. Magnetic Head Alignment Procedure:

1. Tools and equipment required
   a. Screw driver set (Iso)
   b. Magnetic Azimuth 7000Hz alignment SMPTE test film loop
   c. Pliers
   d. AC VTVM (audio range) and or
   e. Oscillioscope
   f. 8 ohm 50 watt dummy load resistor
   g. External speaker
2. Set Up Procedure
   a. Remove the exciter lamp cover by pulling straight out from the projector to obtain access to the magnetic reproduce head.
   b. Thread a magnetic azimuth alignment test film.
   c. Set Opt/Mag switch to Mag.
   d. Connect the projector to a dummy load and test set up. (See Fig. 56)
   e. Turn on the projector and amplifier.
   f. Set the treble control to the "Max" position and the bass at minimum.
   g. Adjust the volume control to just before the amplifier clips.
3. Azimuth Adjustment
   a. Carefully loosen or tighten the three azimuth screws until maximum voltage reading is indicated on the AC VTVM, at the same time observing that the sine wave on the Oscilloscope is not clipped.
   b. While the Oscilloscope is connected across the dummy load resistor, observe that the 7000Hz sine wave is not unusually distorted or clipped at either the high or low volume. If necessary make additional minor adjustments to the head position.
   c. Secure the adjustment screws with a drop of lock tight sealer.
   d. Check the sound reproduction with well recorded magnetic striped film.

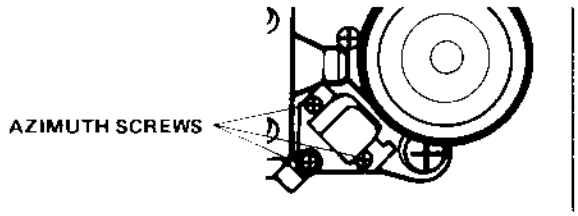


Fig. #58

241-8: XENON LAMP AND MIRROR

CAUTION: The Xenon Lamp is under extreme pressure and will explode if handled carelessly, protective clothing and a face shield must be worn while handling the lamp. NEVER attempt to handle the lamp while it is hot.
Xenon Lamps are extremely bright and emit light in the ultra-violet spectrum. Do not attempt to look directly at an operating lamp with unprotected eyes. Lamps which are cloudy, difficult to strike, or exhibit erratic lightout and current meter indications, are more susceptible to explosive failure and should be replaced.

8-1: DESCRIPTION

The Xenon Lamp is mounted horizontally in the Dichroic mirror, electrically, the cathode end (−) is connected through the center hole of the mirror, and the anode end (+) is connected to the braided cable in front of the mirror. The lamp and mirror are adjustable to achieve precise focus of the light through the aperture.
The mirror is aligned from the factory and should not be adjusted, unless it has been replaced or the mirror housing has been removed. For the lamp position adjustment see sec. 3-3.

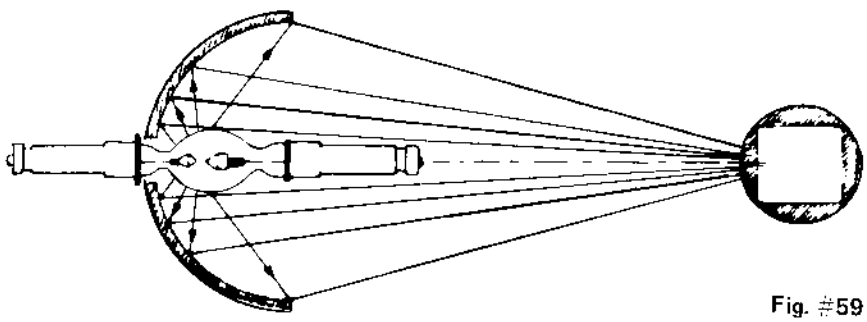


Fig. #59

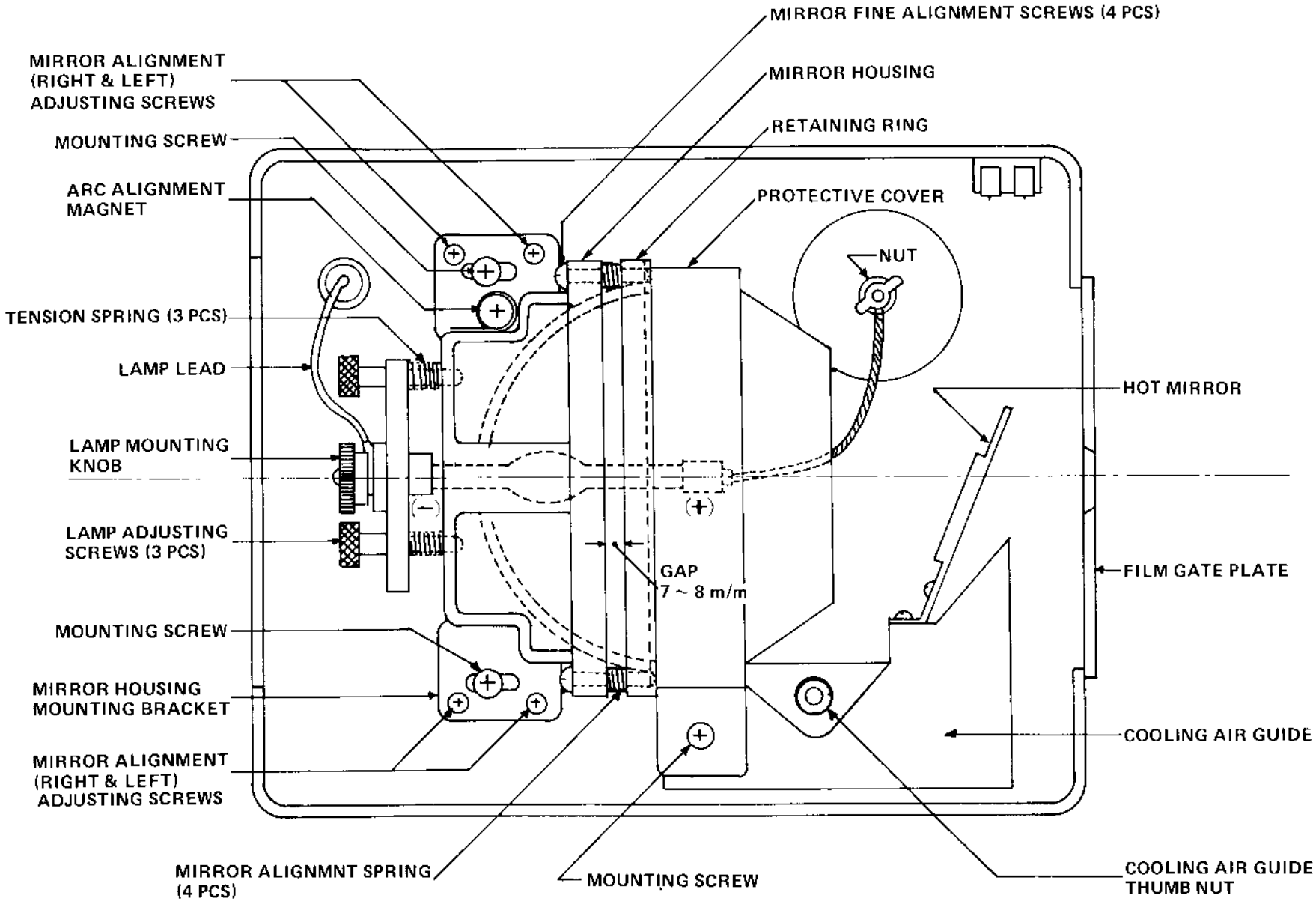

MIRROR FINE ALIGNMENT SCREWS (4 PCS)
MIRROR ALIGNMENT (RIGHT & LEFT) ADJUSTING SCREWS
MIRROR HOUSING
RETAINING RING
MOUNTING SCREW
ARC ALIGNMENT MAGNET
PROTECTIVE COVER
NUT
TENSION SPRING (3 PCS)
LAMP LEAD
HOT MIRROR
LAMP MOUNTING KNOB
LAMP ADJUSTING SCREWS (3 PCS)
GAP 7 ~ 8 m/m
FILM GATE PLATE
MOUNTING SCREW
MIRROR HOUSING MOUNTING BRACKET
COOLING AIR GUIDE
MIRROR ALIGNMENT (RIGHT & LEFT) ADJUSTING SCREWS
MIRROR ALIGNMNT SPRING (4 PCS)
MOUNTING SCREW
COOLING AIR GUIDE THUMB NUT

Fig. #60

8-2: MIRROR REPLACEMENT AND ALIGNMENT

A. Mirror Replacement:

1. Open lamp house door.
2. Remove the cooling air guide thumb nut and slide off the guide and lamp shield.
3. Remove the lamp (See lamp replacement section).
4. Scribe a mark on the mirrors retaining ring to identify top from bottom.
5. Remove the four alignment screws and compression springs, while at the same time holding on to the mirror.
6. The mirror may now be removed and a replacement re-installed by following the procedure in reverse.
7. Be sure to leave about a 7 to 8mm uniform gap between the mirror housing and the retaining ring.
8. Re-install the lamp and cooling guide.
9. Align the lamp for best illumination as desscribed in section 3-3.

B. Mirror Alignment:

If proper illumination cannot be achieved after replacing the mirror, minor adjustment of the 4 retaining ring screws will be necessary to optimize the illumination.

C. Mirror Housing Bracket Alignment:

CAUTION: Adjustments to the mirror housing bracket should only be made if it has been necessary to remove the bracket or it is not possible to achieve even illumination any other way.

1. Loosen by one rotation only the two mounting screws marked with red paint.
2. Before moving the mirror housing bracket, mark its original position.
3. The two adjustment screws at the top and bottom will move the mirror bracket from left to right.
4. Once proper alignment has been achieved the center screen illumination should be maximum and evenly distributed.

8-3: LAMP ARC ALIGNMENT

A. Description:

The Xenon Lamp is a high-pressure lamp with two electrodes, the (+) anode and the (−) cathode, which are directly aligned opposite each other. The anode is the larger element in order to dissipate the heat. The arc is discharged from the cathode to the anode and must be straight and direct. (See Fig. #61)

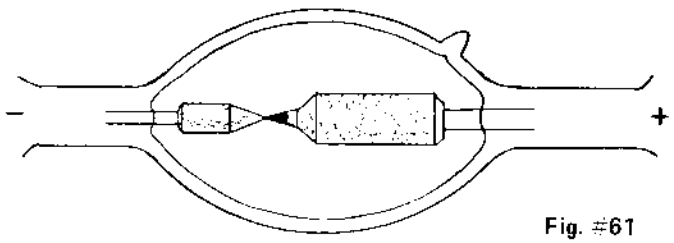


Fig. #61

Lamps which flare or curve the arc (See Fig. #62) indicate a worn or defective lamp and should be replaced. Lamps in this condition are more susceptible to explosion and should not be operated in this condition.

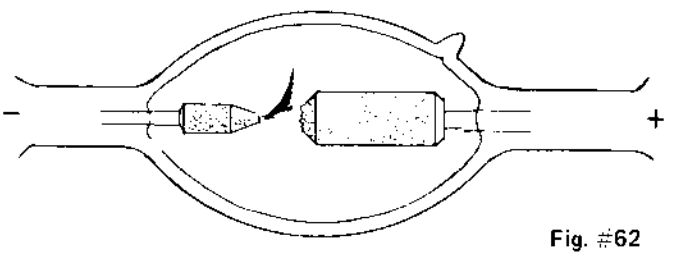


Fig. #62

CAUTION: Do not look directly at the lamp with unprotected eyes. A dark welders helmet may be used to observe the arc.

B. Adjustments:

The arc is affected by magnetic fields. In some installations where the projector is tilted to an extreme off the horizontal, it may be necessary to adjust the arc stabilizing magnets to prevent the arc from flaring.

To make the adjustment, the magnet bracket may be loosened, and re-positioned to where the arc is straight between the electrodes. (See Fig. #61) In some cases it may be necessary to add a few fiber washers between the lamp mount and the magnet bracket.

If the correct arc discharge cannot be obtained, the lamp may be defective or the projectors angle of tilt is beyond compensation. Maximum recommended angle is 15° off horizontal.

WARNING: Xenon Lamps are under extreme pressure. While making lamp and mirror adjustments it is recommended that a face shield and protective clothing be worn. Do not look directly at the lamp with unprotected eyes.

241-9:XENON LAMP STARTER AND RECTIFIER CIRCUITS

9-1: DESCRIPTION:

The EX-4000P uses the latest technology in a light weight efficient pulse-width modulated power supply for maximum illumination of its 550 watt Xenon lamp. .The switching regulator (P.W.M., pulse-width modulated) technique makes maximum efficiency of high frequency transformers, thus reducing the size and weight, while developing a highly regulated D.C. Lamp operating current.
The starter circuit as well employs a latest technology high frequency oscillating circuit consisting of a thydac high voltage pulse transformer.

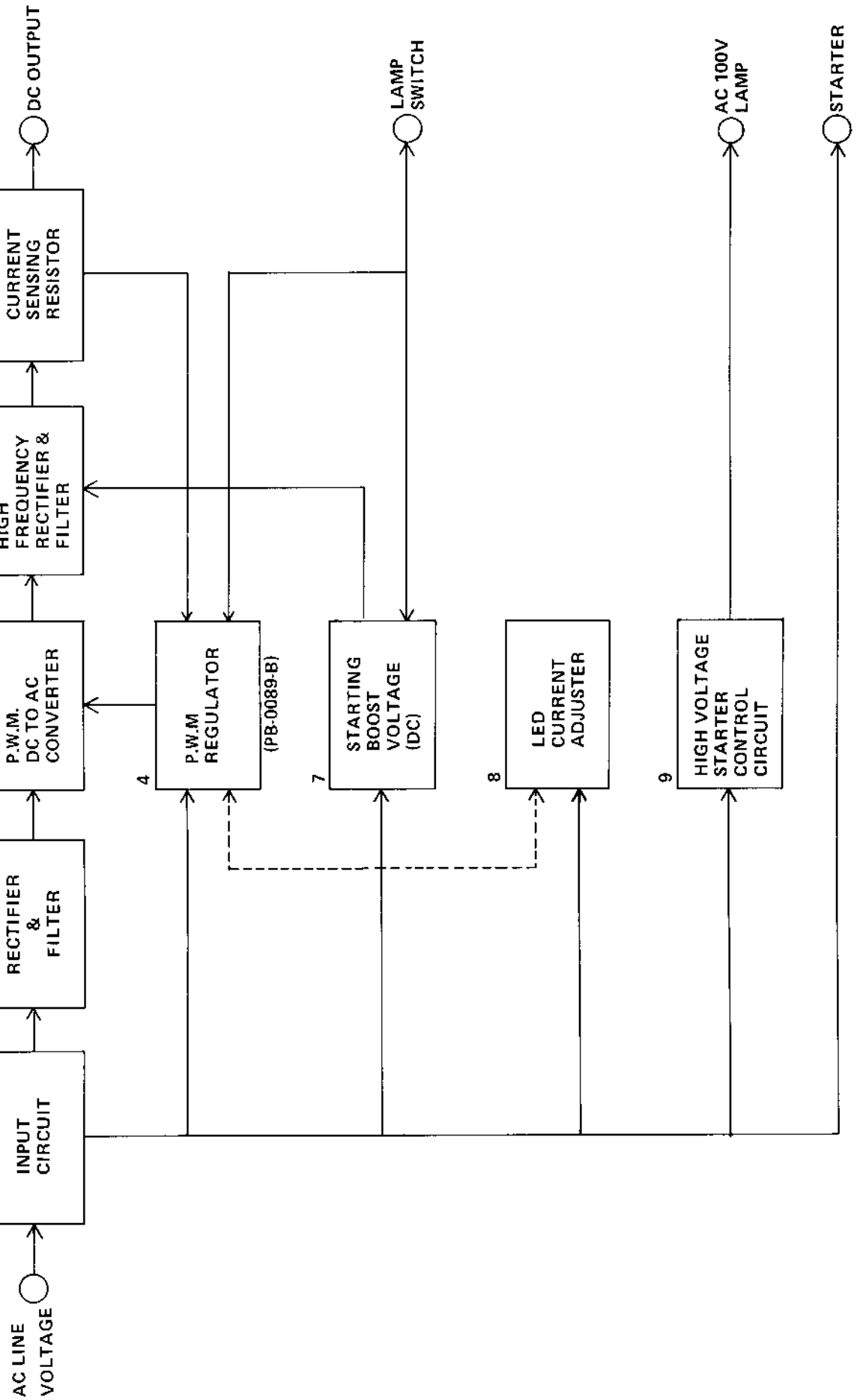
A. Rectifier Block Diagram Function:

1. Input circuit:
   This circuit consists of AC line input, fuse, voltage selector, transformer and main power switch as well as an RF line filter.
2. Rectifier and Filter:
   100/120 voltage selector switch RY-1 surge current protection relay, bridge D-1 and filter capacitor block PB-0082-A, providing the initial AC to DC conversion.
3. P.W.M. DC to AC converter:
   This is the heart of the power supply consisting of TR-1-TR-4 switching transistors (2SC2139), which are driven by the P.W.M. regulator circuit. These transistors switch the DC voltage at 20KHz from the rectifier and filter circuit to about 250 to 350 volts peak to peak.
4. P.W.M. Regulator:
   This circuit compares the lamp current from sensing resistor R-2 against the constant voltage source IC-1 and zener diode D-2. IC-2 adjusts the pulse range to transistors TR-1 and TR-2 which in turn drive the DC to AC converter circuit, ultimately resulting in a constant lamp current.
5. High Frequency Rectifier and Filter:
   Consist of high frequency ferrite transformer and rectifier, reactor and filter capacitors C-2, 3, 4 & 5 converting the 250 ~ 350V 120KHz pulse to approximately 40 to 60 volts D.C.
6. Current Sensing Resistor:
   The voltage developed across R-2 in series with the lamp is the control feedback voltage supplied to the P.W.M. regulator circuit.
7. Starting Boost Voltage:
   Bridge rectifier D-4 supplies a boost voltage across C-2 adding to the rectifier running voltage approximately 60 VDC to provide the lamp with about 90 volts open circuit prior to starting. Once the lamp has started this circuit is switched out by relay RY-3.
8. L.E.D. Current Adjuster:
   The current adjust control consists of a double gang potentiometer one which controls the P.W.M. regulator to establish the desired lamp current. The second to provide a current indication on the L.E.D. display. Trim controls are provided for calibration of the display in relationship to the actual lamp current.
9. High Voltage Starter Control Circuit:
   When the lamp's open circuit voltage exceeds approximately 70 volts relay RY-2 closes, supplying 100 volts AC to the high voltage starter board which in turn generates a 25 to 30KV striking pulse. When the lamp begins to draw current the open circuit voltage drops below the 70 volts and relay RY-2 disconnects the starter.

B. Starter Description:

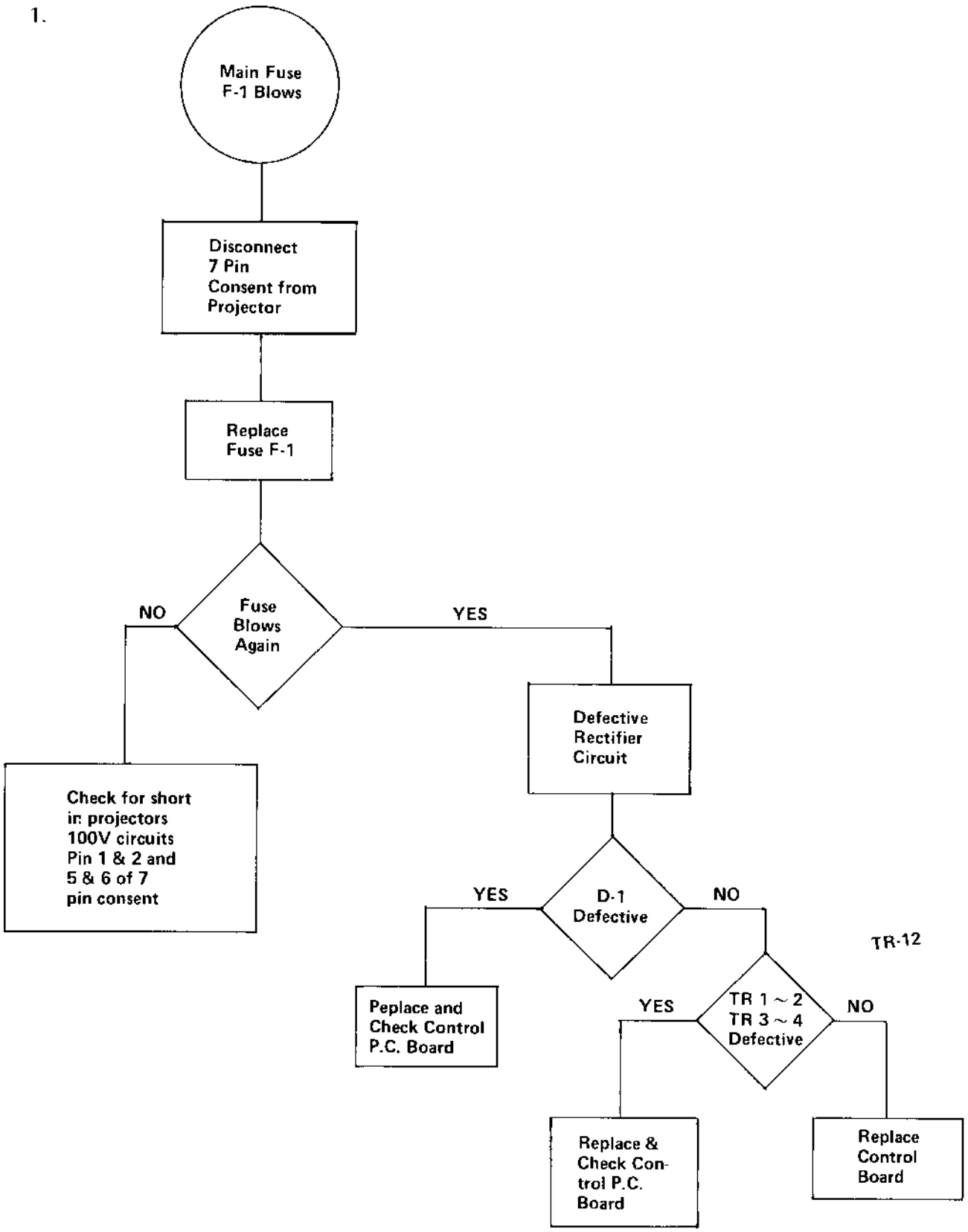
100 volts AC is supplied to terminals 3 & 4 on the starter P.C. Board. Diode D-1 half wave rectifies the AC current and charges C-5. When C-5 is charged to approximately 100 volts DC the Thydac fires and discharges C-5 through the primary winding of T-1. The secondary winding of T-1 developes approximately 10KV charging C-7, and the doubler circuit consisting of diodes D-2 & D-3 and C-6. When C-6 is charged to approximately 15KV, it discharges across the spark gap, and the resonant circuit of the primary of T-2 and C-6, resulting in a 25-30KV discharge of the secondary of T-2 across the Xenon Lamp electrodes, ionizing the gas.

BLOCK DIAGRAM OF EX-4000P RECTIFIER

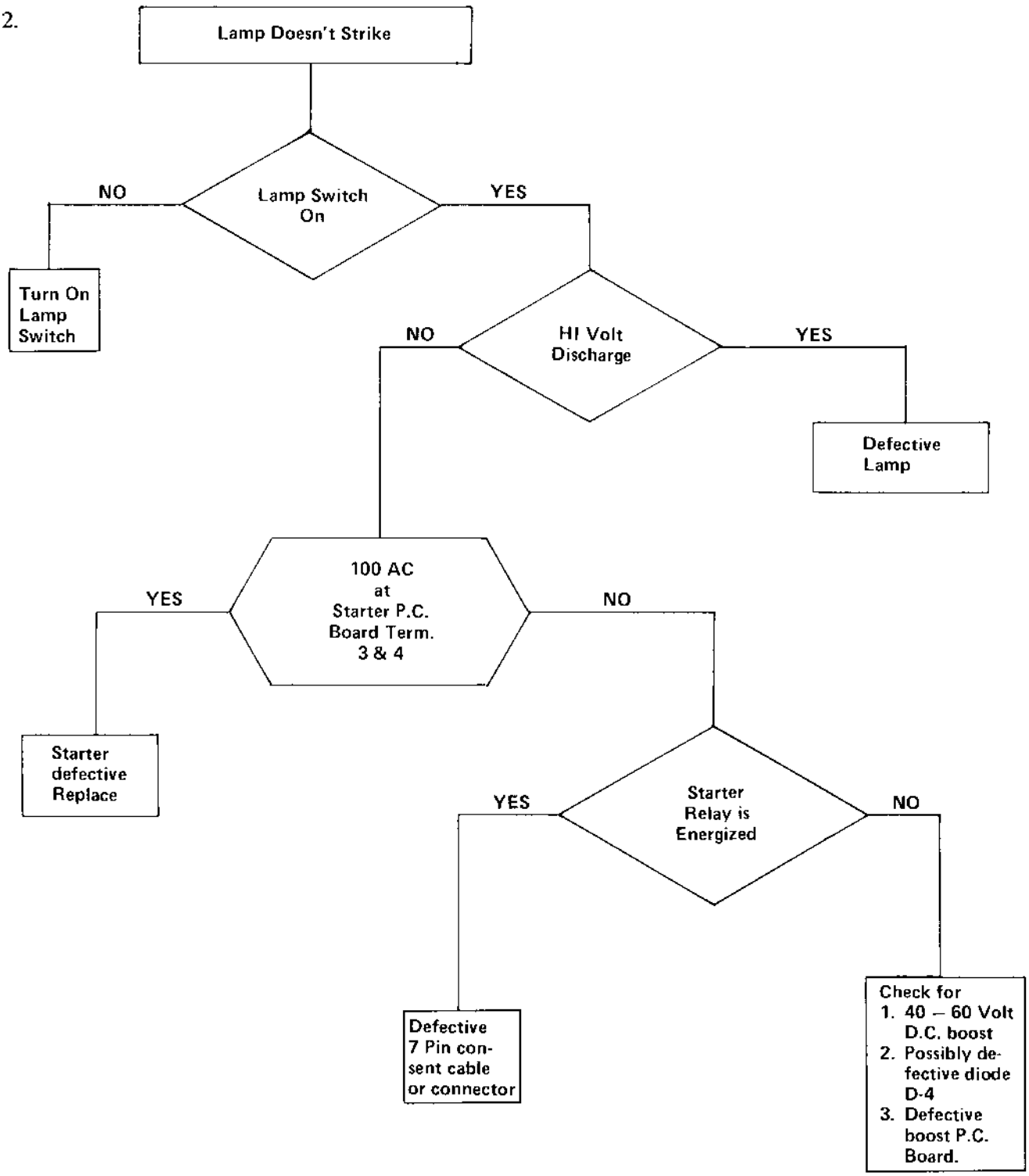


9-2: A. Rectifier Trouble Shooting Chart

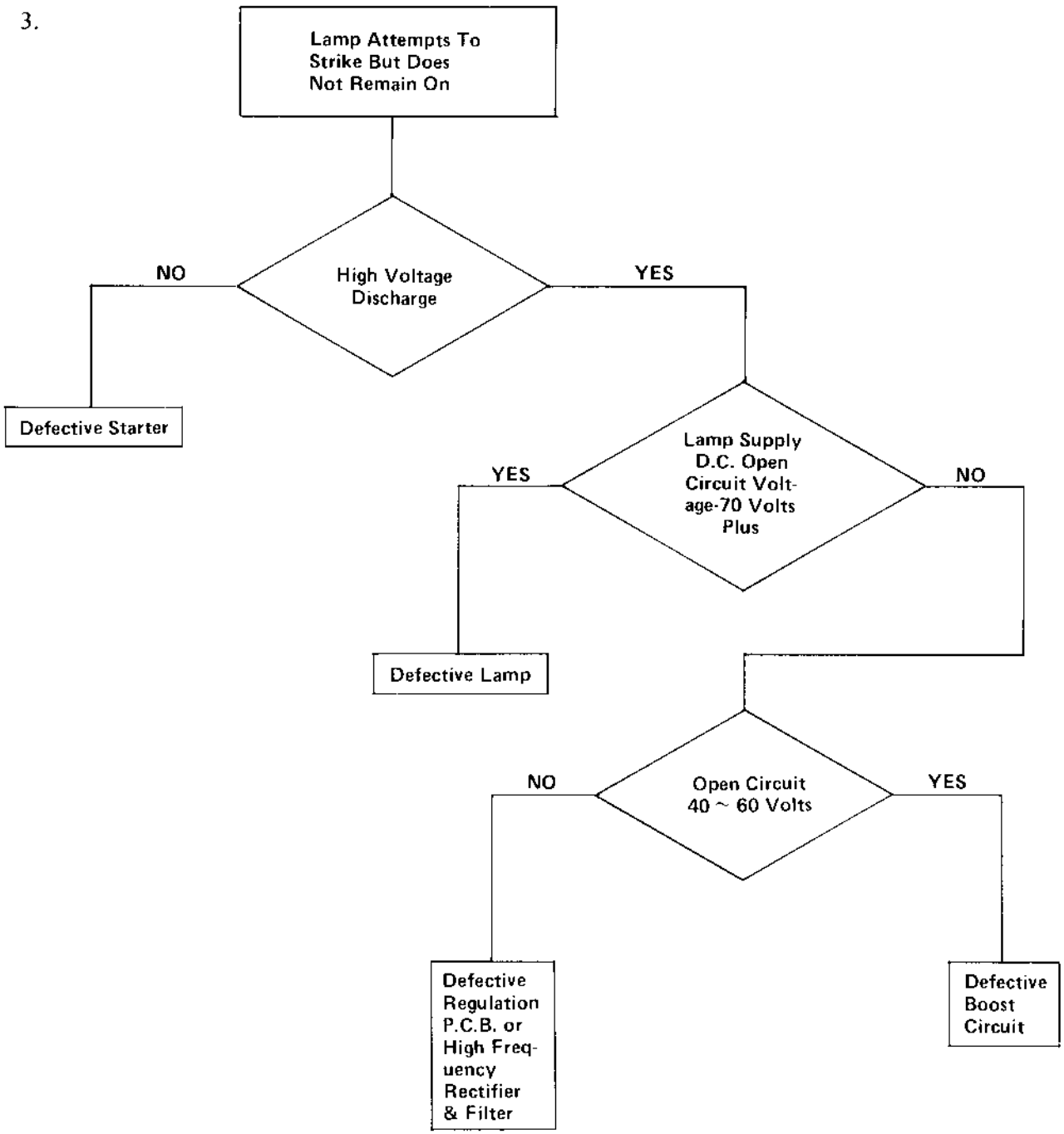
1.



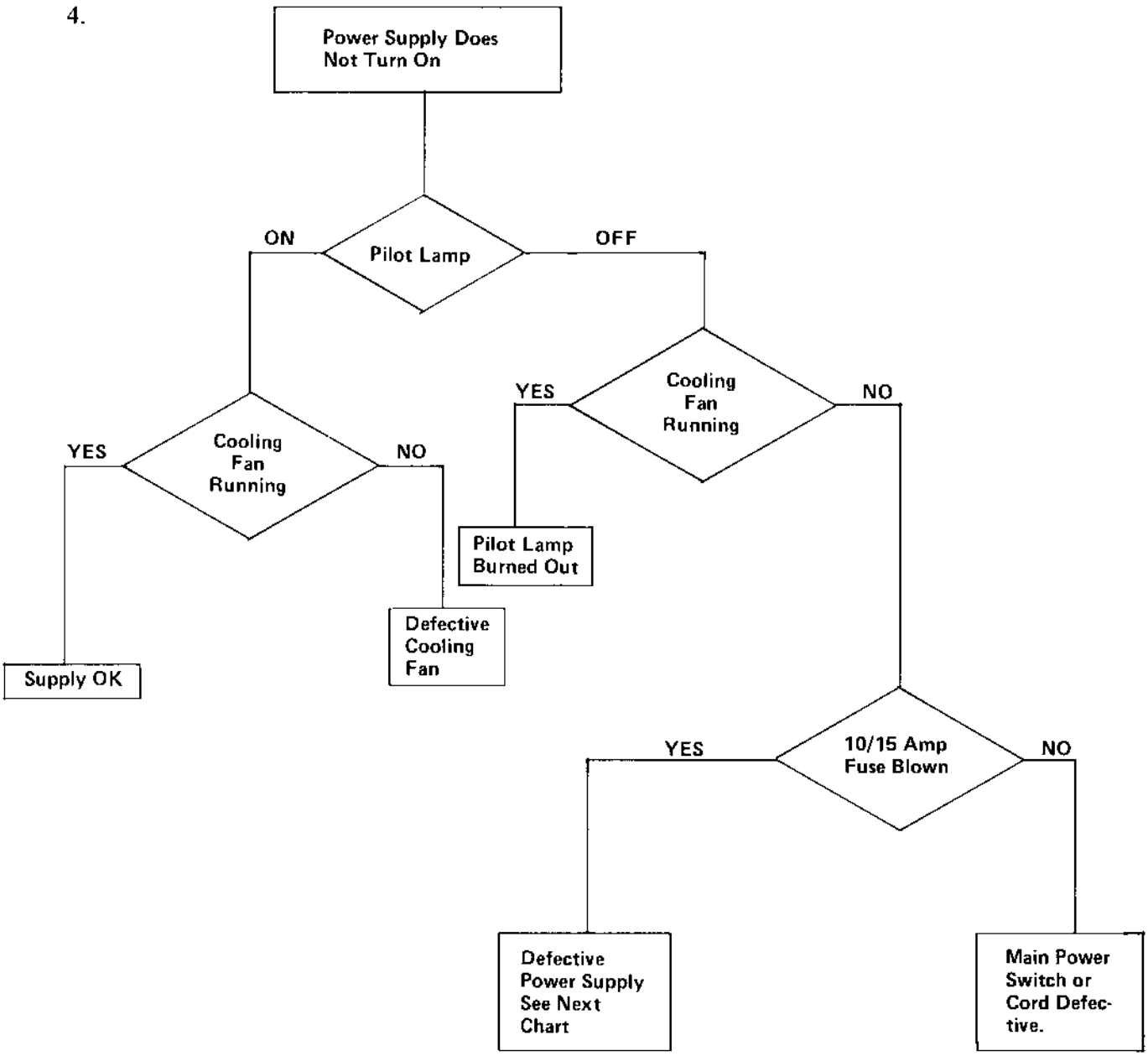
2.


Lamp Doesn't Strike
Lamp Switch On
NO
YES
Turn On Lamp Switch
HI Volt Discharge
NO
YES
Defective Lamp
100 AC at Starter P.C. Board Term. 3 & 4
YES
NO
Starter defective Replace
Starter Relay is Energized
YES
NO
Defective 7 Pin consent cable or connector
Check for
1. 40 – 60 Volt D.C. boost
2. Possibly defective diode D-4
3. Defective boost P.C. Board.

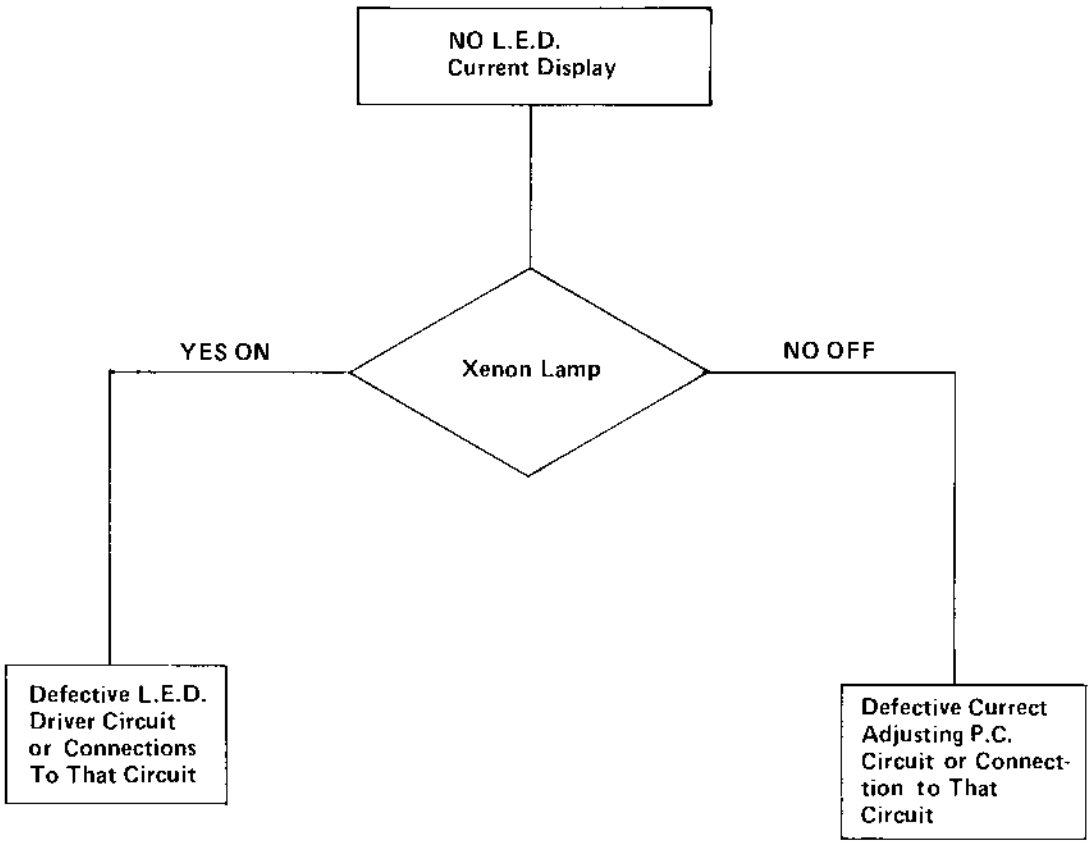
3.


Lamp Attempts To Strike But Does Not Remain On
High Voltage Discharge
NO
YES
Defective Starter
Lamp Supply D.C. Open Circuit Voltage-70 Volts Plus
YES
NO
Defective Lamp
Open Circuit 40 ~ 60 Volts
NO
YES
Defective Regulation P.C.B. or High Frequency Rectifier & Filter
Defective Boost Circuit

4.


Power Supply Does Not Turn On
Pilot Lamp
ON
OFF
Cooling Fan Running
YES
NO
Supply OK
Defective Cooling Fan
Cooling Fan Running
YES
NO
Pilot Lamp Burned Out
10/15 Amp Fuse Blown
YES
NO
Defective Power Supply See Next Chart
Main Power Switch or Cord Defective.

5.


NO L.E.D.
Current Display
Xenon Lamp
YES ON
NO OFF
Defective L.E.D.
Driver Circuit
or Connections
To That Circuit
Defective Currect
Adjusting P.C.
Circuit or Connect-
tion to That
Circuit

EX-4000P: List of All Circuit Diagrams

1. Head Machine Electrical Circuit Diagrams:

Diagram No. 241-60104
241-60103
241-60102
241-60101

2. Rectifier Circuit Diagrams:

Diagram No. 241-63121
241-63116
241-63113
241-63108
241-63105
241-63102
241-63101

3. Rectifier Printed Circuit Board Diagrams:

Diagram No. 241-63111 (PB-0035-A)
241-63117 (PB-0073-A)
241-63118 (PB-0082-A)
241-63122 (PB-0089-B)
241-63119 (PB-0066-B)
241-63120 (PB-0084-A)
241-63114 (PB-0068-B)
241-63109 (PB-0033-A)
241-63115 (PB-0066-A)
241-63112 (PB-0031-A)
241-63110 (PB-0019-A)
241-63103 (PM-149)

3. Amplifier Circuit Diagrams:

Diagram No. 241-51102 (See page 46)
241-51101 (See page 47)

– Refer to General Index to find Projector's Serial No. applicable –

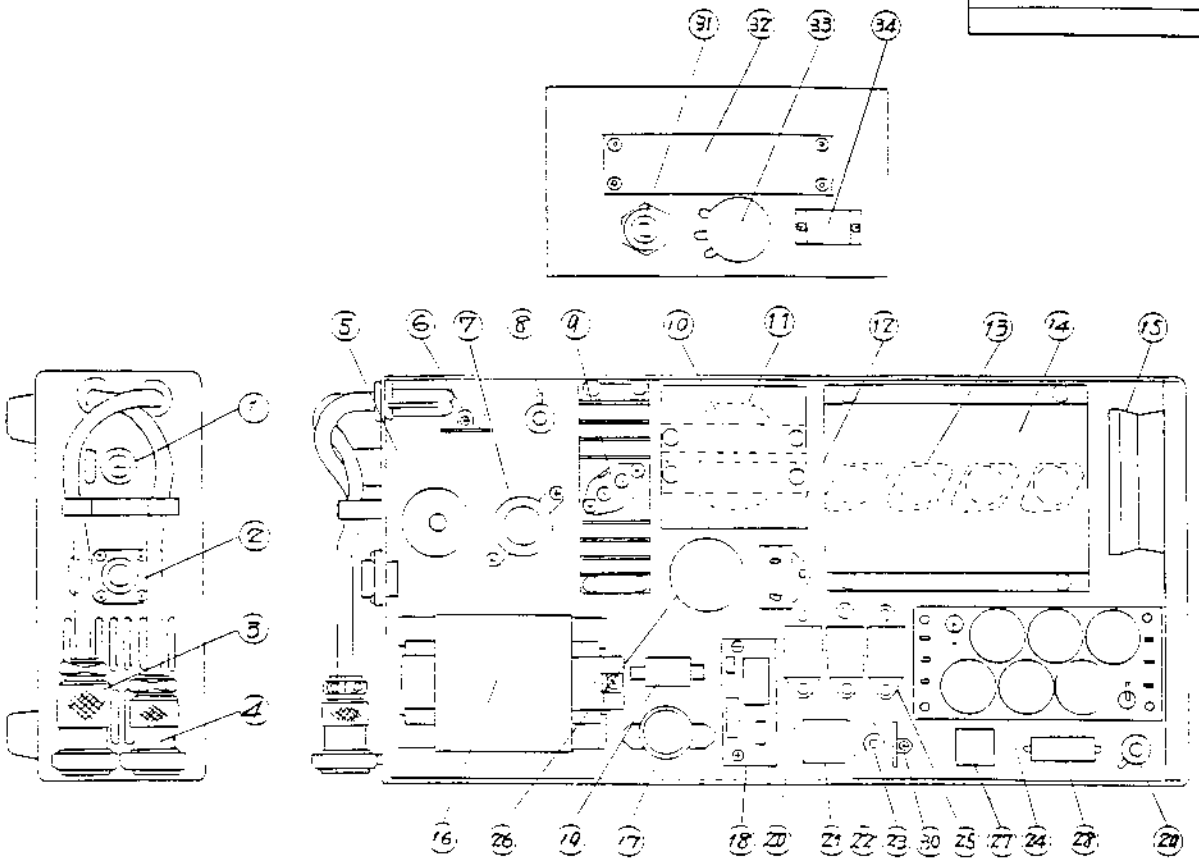
EX-4000P: GENERAL INDEX

Projector's S/R No.	Head Machine Electrical Circuit Diagram No.	Rectifier Unit Part No.	Rectifier Circuit Diagram No.	Rectifier P.C. Board Reference No. & Circuit Diagram No.	Amplifier Circuit Diagram No.
4001 ~ 4026	241-60101		241-63101	PB-008-A	241-51101
4028		(Saturable Reactor Type)			
4032 ~ 4036					
4047 ~ 4054					
4072 ~ 4084					
4102 ~ 4111					
4117 ~ 4125					
(Note: The above numbers were sold in Japan only)					
4027	241-60102	241-63001	241-63102	PM-149 (241-63103)	241-51101
4029 ~ 4031	(with Resistor 5W 300Ω)	(Sansha, Switching Type)		PM-156	
4037 ~ 4042		(without Main Power Switch)			
4043 ~ 4046	241-60102	241-63001a	241-63105	PM-180	241-51101
4055 ~ 4071		(Sansha, Switching Type)		PM-181	
4085 ~ 4101		(with Main Power Switch)		PM-182	
				PM-156	
4112 ~ 4116	241-60103 (with Resistor 30W 1kΩ)	241-63001a	241-63105		241-51101
4126 ~ 4129	241-60104	241-63002	241-63108	PB-0019-A (241-63110)	241-51101
		(USHIO, Switching Type, XB-Z0140-A)		PB-0031-A (241-63112)	
		(with Main Power Switch)		PB-0033-A (241-63109)	
		(with Current Adjuster)		PB-0035-A (241-63111)	

Projector's S/R No.	Head Machine Electrical Circuit Diagram No.	Rectifier Unit Part No.	Rectifier Circuit Diagram No.	Rectifier P.C. Board Reference No. & Circuit Diagram No.	Amplifier Circuit Diagram No.
4130 ~ 4131	241-60103	241-63001a	241-63105		241-51101
4132 ~ 4166	241-60104	241-63002	241-63108		241-51101
4167 ~ 4236	241-60104	241-63002a	241-63113	PB-0019-A (241-63110)	241-51102
		(USHIO, Switching Type, XB-Z040-B)		PB-0033-A (241-63109)	(with VR for 600Ω AUX. OUT)
		(with Main Power Switch)		PB-0035-A (241-63111)	
		(with Current Adjuster)		PB-0066-A (241-63115)	
				PB-0068-B (241-63114)	
4237 ~ 4281	241-60104	241-63002b	241-63116	PB-0035-A (241-63111)	241-51102
		(USHIO, Switching Type.)		PB-0066-B (241-63119)	
		(XB-55102 ~ 105AH, with Main Power Switch)		PB-0073-A (241-63117)	
		(with Current Adjuster)		PB-0082-A (241-63118)	
				PB-0084-A (241-63119)	
4282 and UP	241-60104	241-63002c	241-63121	PB-0035-A (241-63111)	241-51102
		(USHIO, Switching Type)		PB-0073-A (241-63117)	
		(XB-55106AH-A, with Main Power Switch)		PB-0082-A (241-63118)	
		(with Current Adjuster)		PB-0089-B (241-63122)	

EX-4000P :
MAIN PARTS OF RECTIFIER UNIT

処理工	図面訂正欄		
	符号	年月日	訂正要領 担当
		. .	
		. .	



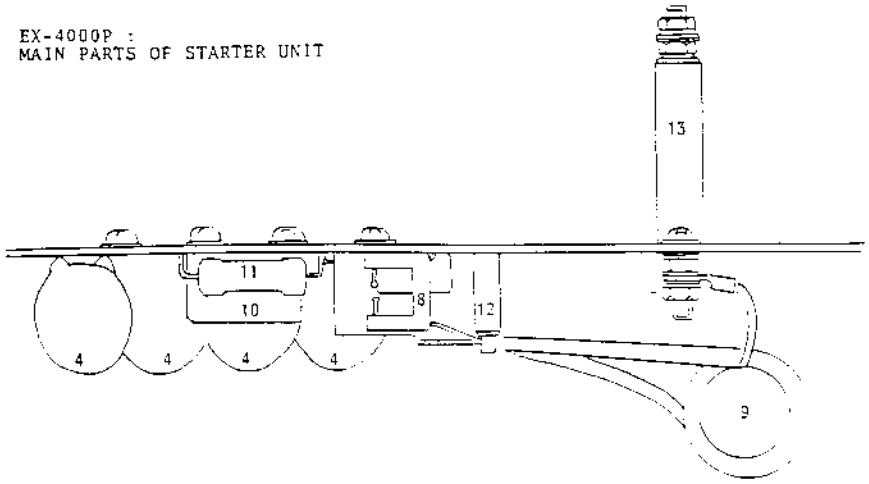
No.	PART NO.	DESCRIPTIONS	PCS.
1	241-63151	Fuse Holder, S-N2059	1
2	241-63161	AC Input Receptacle, NJC-203RM	1
3	X 1-62191	3P Plug, BTS-28P3	1
4	260-63371	7P Plug, NCS-307P	1
5	241-63421	Reactor, 3K4-13003	1
6		2P Terminal, 1L-2P	1
7	C E-161108	Capacitor, 160V 1000mfd.	1
8		Resistor, FAO 20W1H	1
9		Diode, 30GG2C11	1
10		Printed Circuit Board assy PB-0073A	1
11	241-63251	Inverter Main Transformer 3K4-13011	1
12		Capacitor, 180V 4.5mfd.	1
13	TR 2SC 2139P	Transistor 2SC 2139P	4
14		Printed Circuit Board assy PB-0089B	1
15	241-63451	Fan Motor, 109-040UL	1
16	241-63241	Stepdown Transformer 3K-13002	1
17		Switch, S-J2111 #03(S3)	1
18		Printed Circuit Board	1
19	241-63391	Switch, SL-210ND(S2)	1
20		Relay (RY1) LY2F DC48V	1
21		Diode, 15J4B41	1
22	241-63371	Relay (RY2) MY2F AC100V	1
23		Resistor, FWA05W 10 ohm	1
24		Printed Circuit Board assy PB-0082A	1
25		Relay (RY3) LY2F DC48V	1
26	241-63261	Noise Filter, FN-220-15-1	1
27	241-63591	Diode, S4V B40	1
28		Fuse Holder	1
29		Resistor, 20W 400 ohm	1
30		2P Terminal, 1L-2P	1
31	S T-60111	Pilot Lamp Holder	1
32		Printed Circuit Board assy PB-0035A	1
33	241-63061	Volume Control RV24YG20SB 500 ohm	1
34	241-63041	Main Switch, SW-3006A (S1)	1

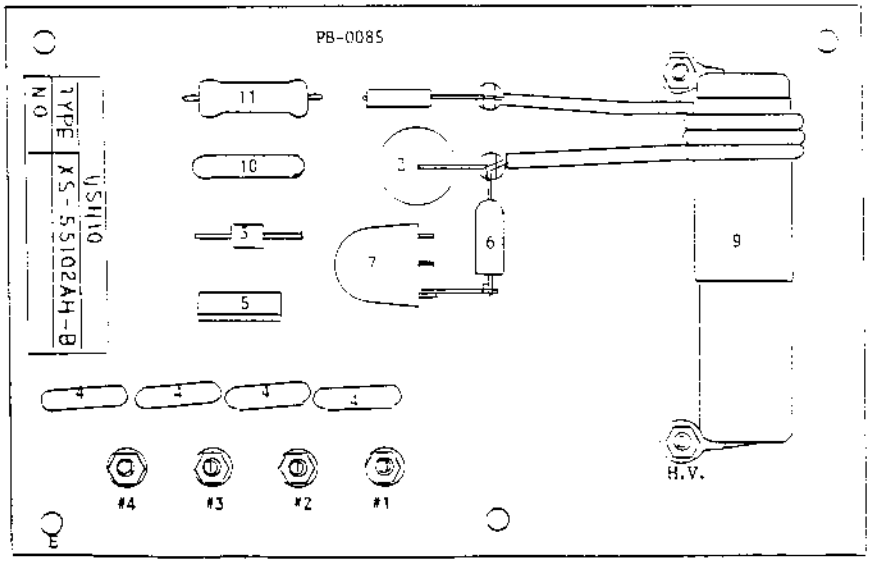
映機工業株式会社

年月日	品名
	部番

EX-4000P

EX-4000P :
MAIN PARTS OF STARTER UNIT





No.	PART NO.	DESCRIPTIONS	PCS.
1		Input Terminal	4
2		Capacitor(HVYK1465)	1
3	241-62051	Thydac (K1V10)	1
4		Capacitor(ECK-DAL472PE)	4
5		Diode (RB-154)	1
6	241-62071	Diode (HVT-30S)	2
7	241-62091	Pulse Transformer (IGT-D1D1)	1
8	241-62041	Spark Gap (AG4P 802J)	1
9	241-62031	Tesla Coil with lead wire	1
10		Capacitor (ECQ-E1155KZ)	1
11		Resistor (ERG-3ANJ152)	1
12	241-62081	Terminal (ST-A7)	2
13	241-62111	Output(DC) (Lamp Lead Stand-Off)	1

処　理　工　工	図　面　訂　正　欄			
	符号	年月日	訂　正　要　領	担当
		. .		
		. .		

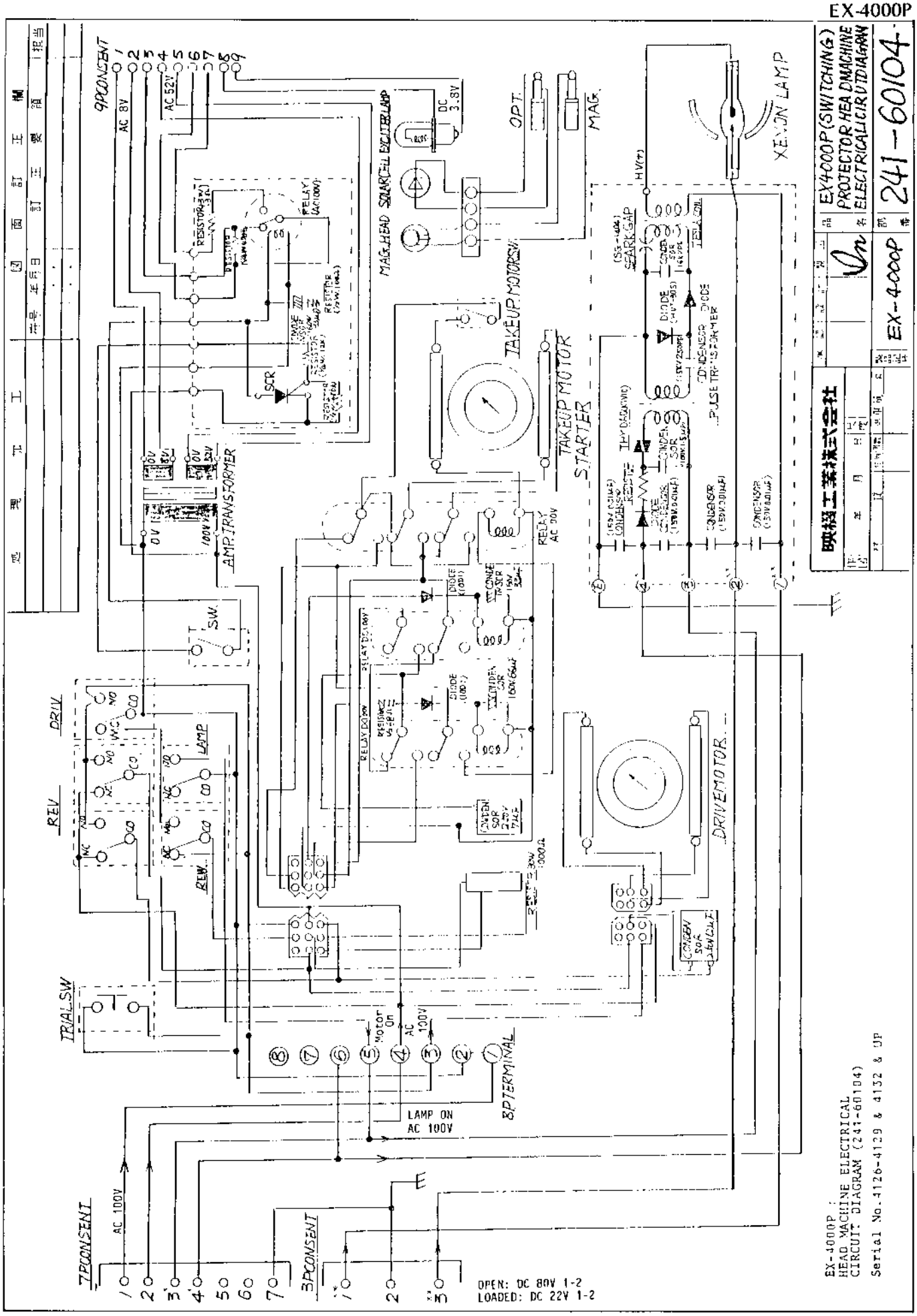
映機工業株式会社

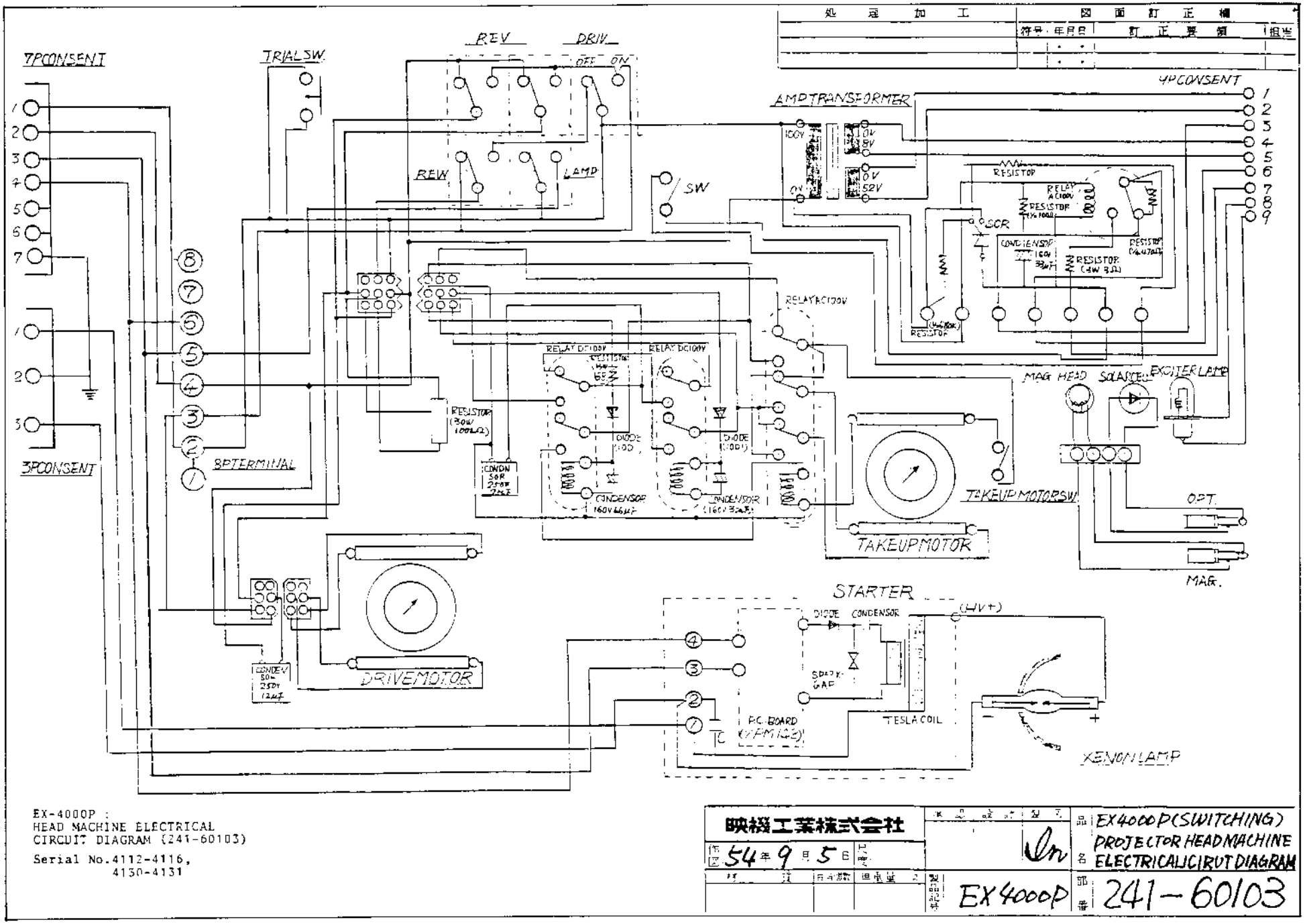
作図 年 月 日　尺度

材質　数量　重量

品名

部番


9PCONSENT
AC 8V
AC 52V
DC 3.8V
MAG.HEAD SOLENOID EXCITER LAMP
OPT.
MAG.
XENON LAMP
HV(+)
SPARK GAP
TESLA COIL
DIODE
PULSE TRANSFORMER
TAKEUP MOTOR STARTER
TAKEUP MOTOR SW.
AMP.TRANSFORMER
RELAY AC 90V
SW.
DRIV
REV
LAMP
REW
DRIVE MOTOR
TRIAL SW
Motor
AC 100V
8P TERMINAL
LAMP ON
AC 100V
7PCONSENT
AC 100V
3PCONSENT
OPEN: DC 80V 1-2
LOADED: DC 22V 1-2
EX-4000P :
HEAD MACHINE ELECTRICAL
CIRCUIT DIAGRAM (241-60104)
Serial No.4126-4129 & 4132 & UP
映画工業株式会社
EX4000P(SWITCHING)
PROJECTOR HEAD MACHINE
ELECTRICAL CIRCUIT DIAGRAM
EX-4000P
241-60104



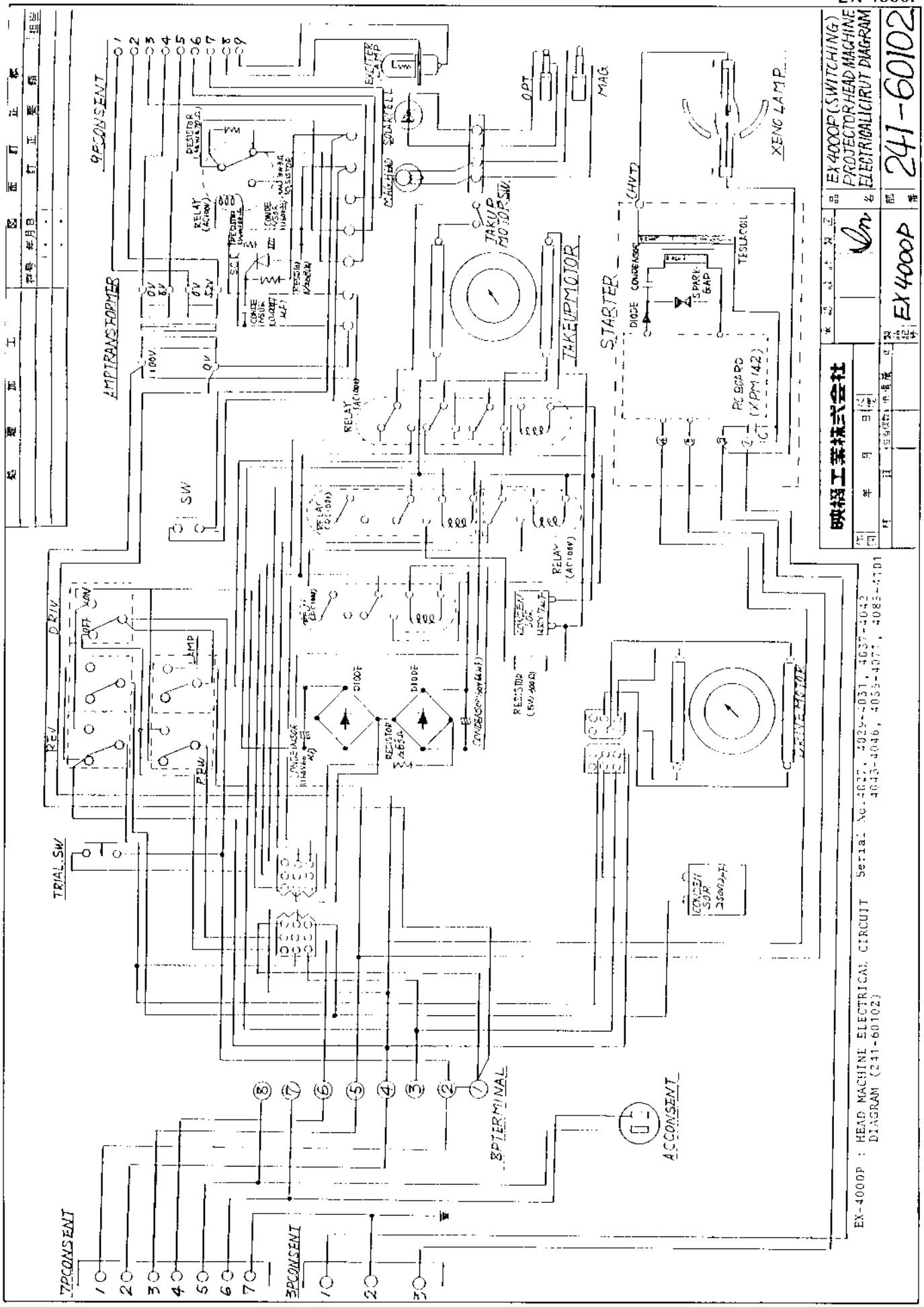
EX-4000P :
HEAD MACHINE ELECTRICAL
CIRCUIT DIAGRAM (241-60103)

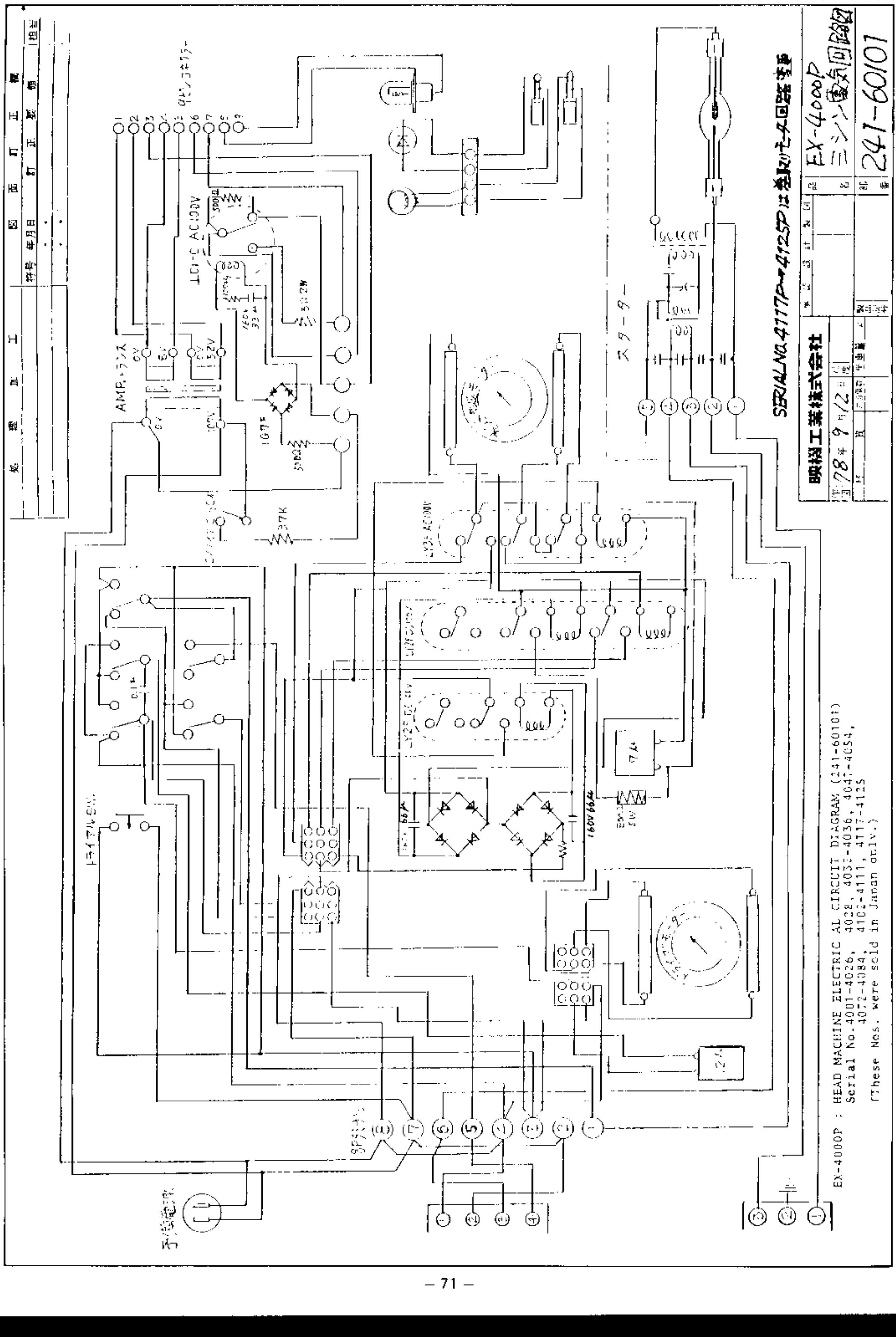
Serial No.4112-4116,
4130-4131

処理加工	図面訂正欄		
	符号	年月日	訂正要領 / 担当

映機工業株式会社		品名 EX4000P(SWITCHING) PROJECTOR HEADMACHINE ELECTRICAL/CIRUT DIAGRAM
作図 54年9月5日		
	EX4000P	図番 241-60103

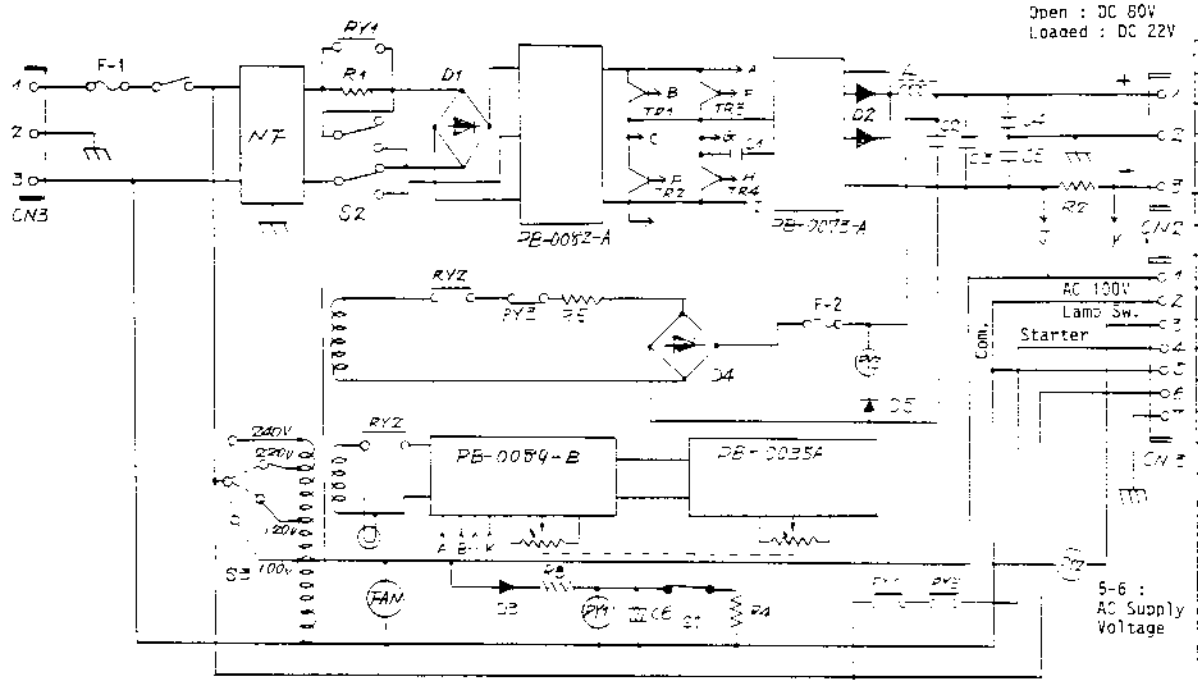
EX-4000P


EX-4000P (SWITCHING)
PROJECTOR/HEAD MACHINE
ELECTRICAL CIRCUIT DIAGRAM
241-60102
EX-4000P
映画工業株式会社
9PCONSENT
AMI TRANSFORMER
STARTER
TAKEUP MOTOR
TAKEUP SW
EXCITER LAMP
SOLENOID
OPT
MAG
XENO LAMP
SPARK GAP
TESLA COIL
DIODE
CONDENSER
RELAY
RESISTOR
SW
DRIV
REV
FWD
LAMP
TRIAL SW
8P TERMINAL
AC CONSENT
7P CONSENT
3P CONSENT
EX-4000P : HEAD MACHINE ELECTRICAL CIRCUIT Serial No. 4027, 4029-4031, 4037-4042
DIAGRAM (241-60102) 4043-4046, 4053-4057, 4083-4101



EX-4000P : HEAD MACHINE ELECTRIC AL CIRCUIT DIAGRAM (241-60101)
Serial No.4001-4026, 4028, 4033-4036, 4047-4054,
4072-4084, 4102-4111, 4117-4125
(These Nos. were sold in Japan only.)

処理加工	図面訂正欄		
	符号	年月日	訂正要領 ・担当



Functions of each P.C.Board :

PB-0082-A : Rectifier & Filter
(Capacitors, etc.)

PB-0073-A : P.W.M. DC to AC Converter
(Inverter Transformer,etc.)

PB-0089-B : P.W.M. Main Regulator

PB-0035A : LED Current Adjuster

EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63121)
(Ushio Switchin Type,XB-55106AH-A)
(With Main Power Switch & Current Adjuster)
Serial No.4282 & Up

(TYPE XB-55106AH-A)

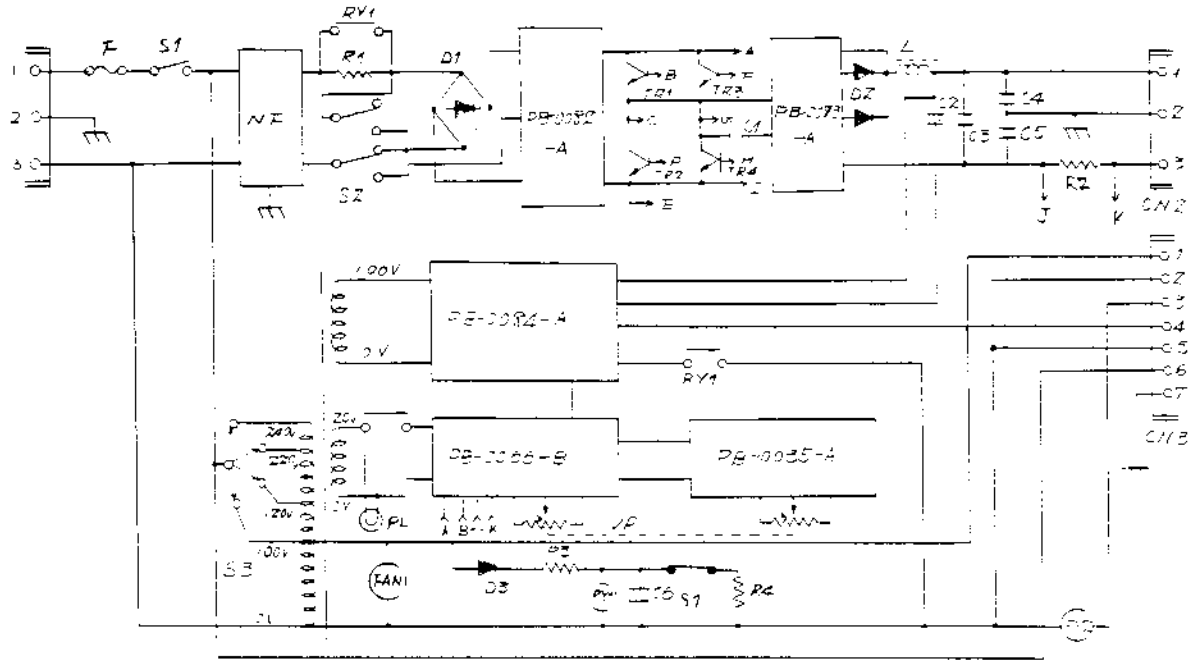
PARTS LIST

MARK	DESCRIPTION	PC	REMARK
TR1~4	TRANSISTOR	4	2SC2139 P
D 1	DIODE	1	1SJ45A7
D. 2	DIODE	1	30GGxZC11
D.3	DIODE	1	1S1888
C 1	CONDENSOR	1	CM-181-425 (100V4.5μF)
C 2	CONDENSOR	1	CE-161-10R (160V1000μF)
C.3~5	CONDENSOR	3	CC-151-103 (50V0.01μF)
C 6	CONDENSOR	1	CE101-[illegible] (100V 220μF)
R 1	RESISTOR	1	RE 5R0100 (5W 10Ω)
R 2	RESISTOR	1	RE 200-203+R05
R 3	RESISTOR	1	RA 3K0-1ZZ (3W 1.2kΩ)
R 4	RESISTOR	1	RA 2P0-470 (2W 47Ω)
V R	VOLUME CONTROL	1	PV24YG20S B 500Ω
	STEP DOWN TRANS	1	3K4-13002
L	REACTOR	1	3K4-13003
S 1	SWITCH	1	SW-3006A
S 2	SWITCH	1	SL-2101D
S 3	SWITCH	1	S-[illegible]Z111-02
RY1.3	RELAY	2	LY2F DC48V
RY 2	RELAY	1	MY2F AC100V
CN1	IN PUT CONNECTOR	1	NJC-203P.M
CN2	OUT PUT CONNECTOR	1	BTS-2PP3
CN3	CONTROL CONNECTOR	1	NCS-3CTP
FM	FAN MOTOR	1	109-040UL
NF	NOISE FILTER	1	NF-2Z0-15-1
F 1	FUSE	1	MF-50-NP1
F 2	FUSE	1	
PL	PILOT LAMP	1	PL-406 24V
D 4	DIODE	1	S4V640
D 5	ZENER DIODE	1	RD39F
R 5	RESISTOR	1	RE200-401 (20W 400Ω)

映機工業株式会社					
作成 57年9月18日	尺度				品名 EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM
材質	表面処理	重量		EX-4000P	部番 241-63121

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		. .		
		. .		



Function of P.C.Board PB-0094-A :
Starting Boost Voltage (DC) Circuit

PARTS LIST

MARK	DESCRIPTION	PC	REMARK
TR1-4	TRANSISTOR	4	2SC2138 P
D 1	DIODE	1	1SJ4841
D 2	DIODE	1	S-5331G
D 3	DIODE	1	1D1588
C 1	CONDENSOR	1	CM-181-455K(180V 4.5μ)
C 2	CONDENSOR	1	CE-161-[illegible](160V1000μ)
C 3-5	CONDENSOR	3	CC-151-103(150V0.01μ)
C 6	CONDENSOR	1	CE-101-227(100V220μ)
R 1	RESISTOR	1	RE-5RQ-100(5W 10Ω)
R 2	RESISTOR	1	RE-200-R03+R03
R 3	RESISTOR	1	RD-2PC-511(3W 510Ω)
R 4	RESISTOR	1	RA-2P0-470(2W 470Ω)
V R	VOLUMECONTROL	1	RVG-[illegible]Z25E500Ω
T	STEPDOWN TRANS	1	EK4-13002
L	REACTOR	1	EK4-13003
S 1	SWITCH	1	SW-E206A
S 2	SWITCH	1	SL-2104D
S 3	SWITCH	1	S-JZ111 #03
RY1	RELAY	1	G4B-1A
RY2	RELAY	1	MY1F AC100V
CN1	IN PUT CONNECTOR	1	HJ1-Z05R
CN2	OUT PUT CONNECTOR	1	BTS-[illegible]P3
CN3	CONTROL CONNECTOR	1	NCS-307D
FAN	FAN MOTOR	1	109-0421/L
NF	NOISE FILTER	1	NF-Z20-15-1
F	FUSE	1	MF-50-ND10-S
DL	PILOT LAMP	1	PL-406 24V

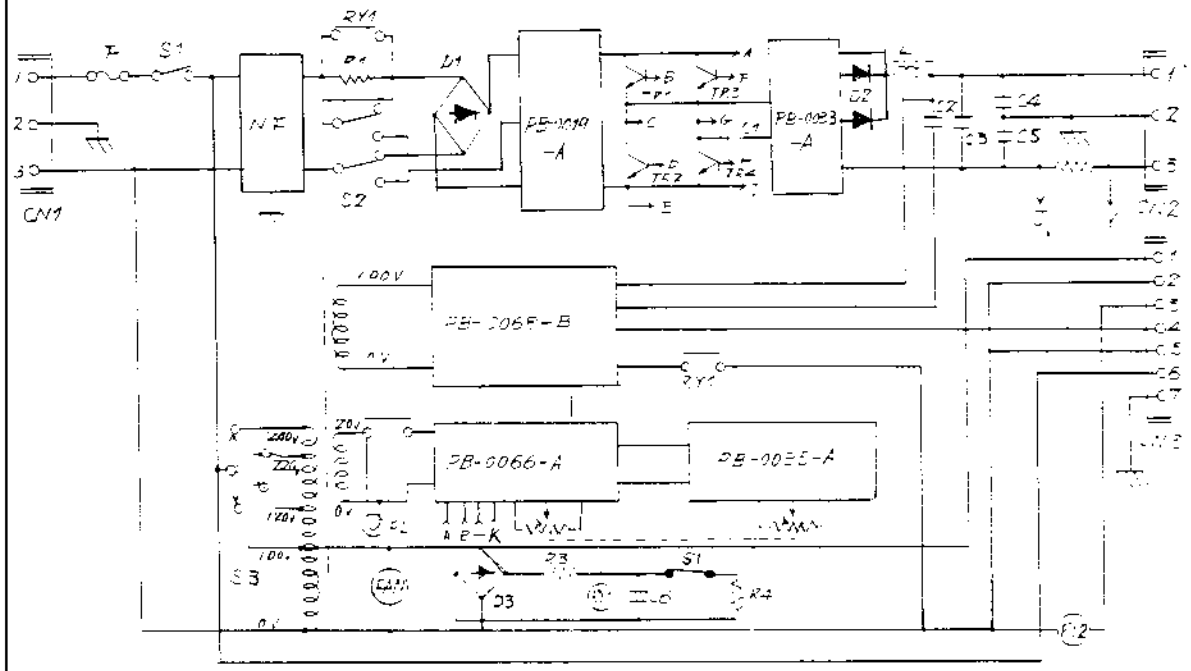
EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63116)
(Ushio Switching Type, XB-55102-105AH)
(With Main Power Switch & Current Adjuster)
Serial No.4237-4281

(TYPE XB-55102--105-AH)

映機工業株式会社			EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM
57年9月18日		EX-4000P	241-63116

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当



Function of P.C.Board PB-0068-B :
Starting Boost Voltage (DC) Circuit

EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63113)
(Ushio Switchin Type, XB-Z040-B)
(With Main Power Switch & Current Adjuster)
Serial No.4167-4236

(TYPE 13-Z140-B)

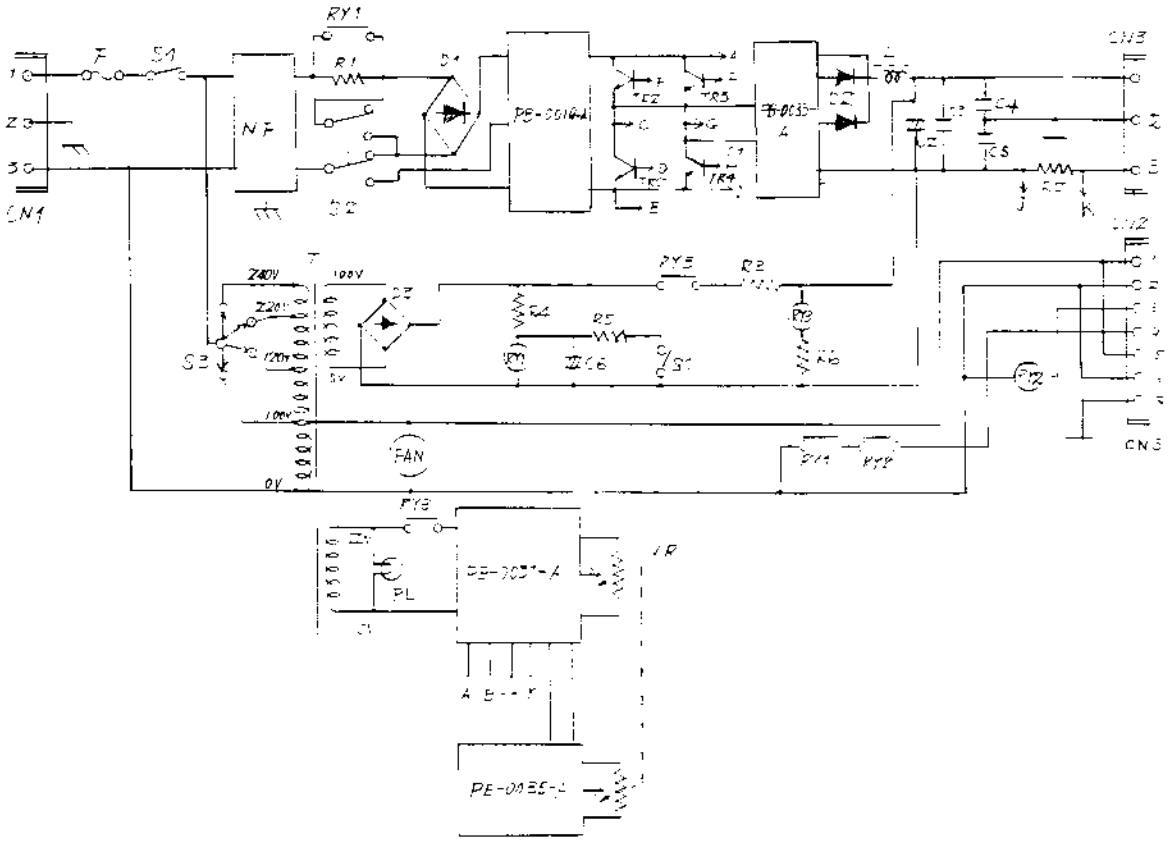
PARTS LIST

MARK	DESCRIPTION	PC	REMARK
TP1~4	TRANSISTOR	4	2SC2139
D 1	DIODE	1	VL-848
D 2	DIODE	1	S-5331G
D 3	DIODE	1	S-ZVB40
C 1	CONDENSOR	1	CM-Z51-605(250V0.6μ)
C 2	CONDENSOR	1	CE-161-128(160V1800μ)
C3~5	CONDENSOR	3	CC-151-105(150V1μ)
C 6	CONDENSOR	1	CE-101-ZZ70(10V220μ)
R 1	RESISTOR	1	RE-5B0-ZZ1(5W 2Ω)
R 2	RESISTOR	1	RE-200-R05+1ME
R 3	RESISTOR	1	RA-2B0-8Z1(2W 8Z1Ω)
R 4	PESISTOR	1	RA-2B0-470(2W 47Ω)
V R	VOLUMECONTROL	1	RV24YG 20E B50KΩ
S 1	SWITCH	1	SW-3006A
S 2	SWITCH	1	SL-210ND
S 3	SWITCH	1	S-3Z110
RY1	RELAY	1	MM2-U1
RY2	RELAY	1	MY2F-AC100V
CN1	INPUTCONNECTOR	1	NJC-203RM
CN2	OUTPUTCONNECTOR	1	BTS-2SP3
CN3	CONTROLCONNECTOR	1	NCS-307P
FAN	FAN MOTOR	1	109-240UL
NF	NOISEFILTER	1	NF-Z20-15-1
F	FUSE	1	MF-60-NP(S(U))-5
PL	PILOT LAMP	1	PL-406 24V
T	STEPDOWNTRANS	1	
L	REACTOR	1	

映機工業株式会社					
57年9月18日				品名	EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM
			EX-4000P	図番	241-63113

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当



PARTS LIST

MARK	DESCRIPTION	P.C	REMARK
TR1-4	TRANSISTOR	1	2SC2130
D 1	DIODE	1	VL748
D 2	DIODE	1	40CZS20
D 3	DIODE	1	S4VB40
C 1	CONDENSOR	1	CM-251-655(250V 6.8μ)
C 2	CONDENSOR	1	CE-101-476(100V 47μ)
C3-5	CONDENSOR	3	CC-151-103(1kV 0.01μ)
C 6	CONDENSOR	1	CE-101-227(100V 220μ)
R 1	RESISTOR	1	RE-5RC-105(5W 1MΩ)
R 2	RESISTOR	1	RE-200-103(2W 10KΩ)
R 3	RESISTOR	1	RE-200-501(2W 5/10Ω)
R 4	RESISTOR	1	RA-2R0-822(2W 8.2KΩ)
R 5	RESISTOR	1	RA-2Z0-471(2W 470Ω)
R 6	RESISTOR	1	RA-2R0-822(2W 8.2KΩ)
VR	VOLUME CONTROL	1	RV24YG20SE 500Ω
S 1	SWITCH	1	SW-3006A
S 2	SWITCH	1	SL-21GND
S 3	SWITCH	1	S-J-111
RY1,2	RELAY	2	MM2-U1
RY3	RELAY	1	MY2F AC100V
CN1	INPUT CONNECTOR	1	NJC-203PM
CN2	OUTPUT CONNECTOR	1	BTS-28P3
CN3	CONTROL CONNECTOR	1	MCS-307P
FAN	FAN MOTOR	1	109-040UL
NF	NOISE FILTER	1	NF-Z20-15-1
F	FUSE	1	MF60-NR15-S
PL	PILOT LAMP	1	PL-406 24V
T	STEP DOWN TRANS	1	
L	REACTOR	1	

EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63108)
(Ushio Switching Type, XB-Z040-A)
(With Main Power Switch & Current Adjuster)

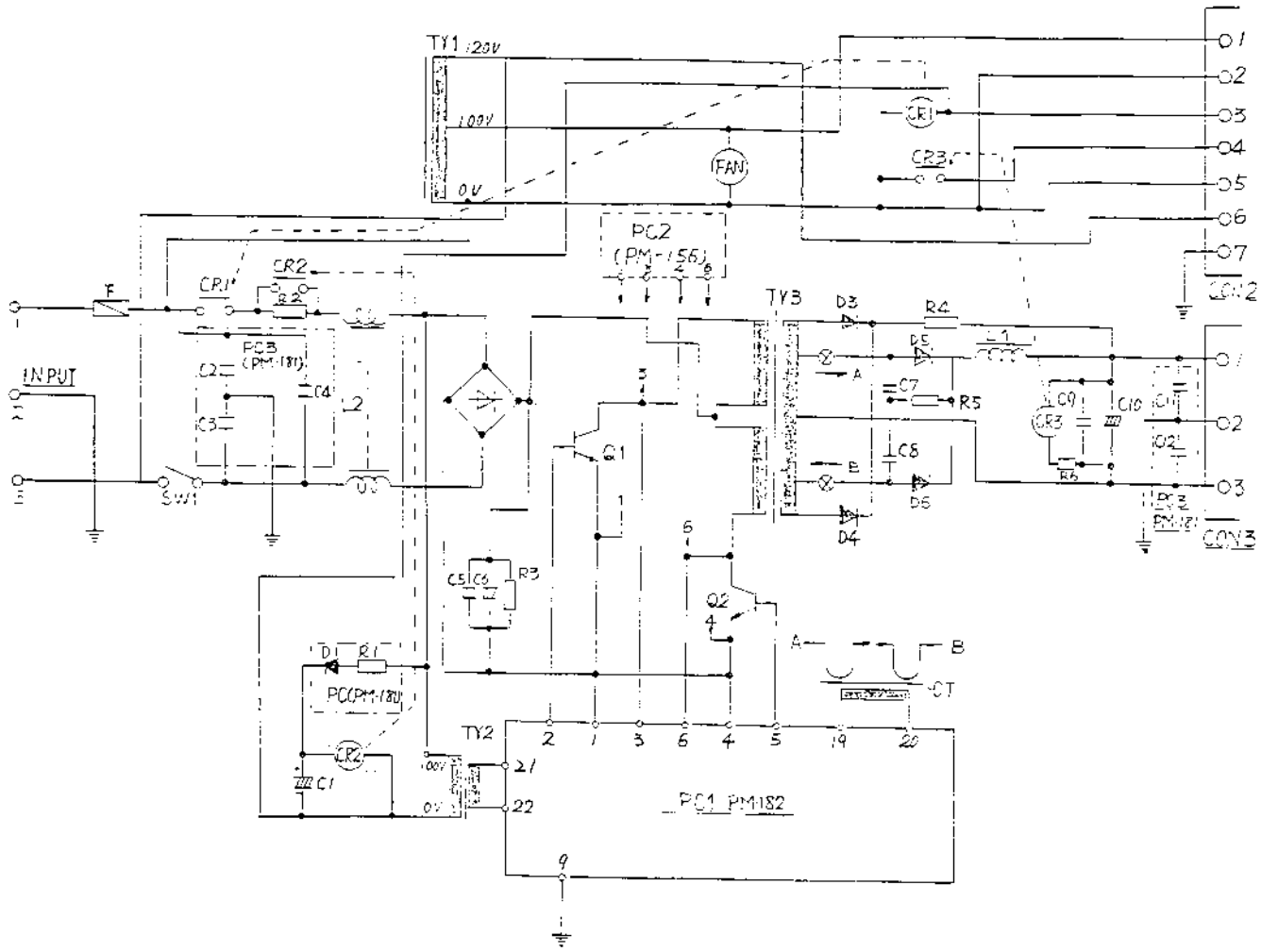
Serial No. 4126-4129, 4132-4166

(TYPE Y3-Z□□-□)

映機工業株式会社	承認	設計	製図	名称	EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM
作成 57年9月18日					
材質	当社図番	重量	製図番号	EX-4000P	部番 241-63108

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		. .		
		. .		



PARTS LIST

ITEMS	NOMENCLATURE	REMARKS	QTY
F	FUSE	15A 250V	1
SW1	MAIN SWITCH	SW-3001A	1
TY1	TRASFORMER	FIA-5101	1
TY2	〃	FIA-5021-B	1
TY3	〃	FIA-5026-A	1
L1	REACTOR	FIA-4856-A	1
CT	CURRENT TRANS	FIA-5020-A	1
FAN	EXHAUST FAN	NO 8500	1
Q1,2	TRANSISTOR	2SC-2147	2
D2	DIODE	S25VB40	1
D3,4	〃	U-05G	2
D5,6	〃	40DC1S-30	2
CR1	RELAY	LY2 . AC100V	1
CR23	〃	LY2 DC100V	2
L2	REACTOR	FIA-5117	1
C1	CAPACITOR	ECE-B160J22 160V 22μF	1
C7,8	〃	ECQ-E10103MZ 1000V 0.01μF	2
C5,6,10	〃	ECE-GA2DY471T 200V 470pF	3
C9	〃	ECQ-E2105MZ 250V 1μF	1
PC1	PRINTED CIRCUIT	PM-182	1
PC2	〃	PM-156	1
PC3	〃	PM-181	1
R2	RESISTOR	KG 10W 10Ω	1
R3	〃	ERG-3ANJ 203 3W 20kΩ	2
R4	〃	KHZ 20W 500Ω	1
R5	〃	ERX-2ANJ100 2W 10Ω	1
R6	〃	ERD-12TJ222 1/2W 2.2kΩ	1
CON1	INPUT CONNECTOR	25-3-B	1
CON2	CONTROL 〃	NCS-307-P	1
CON3	OUTPUT 〃	BTS-28	1

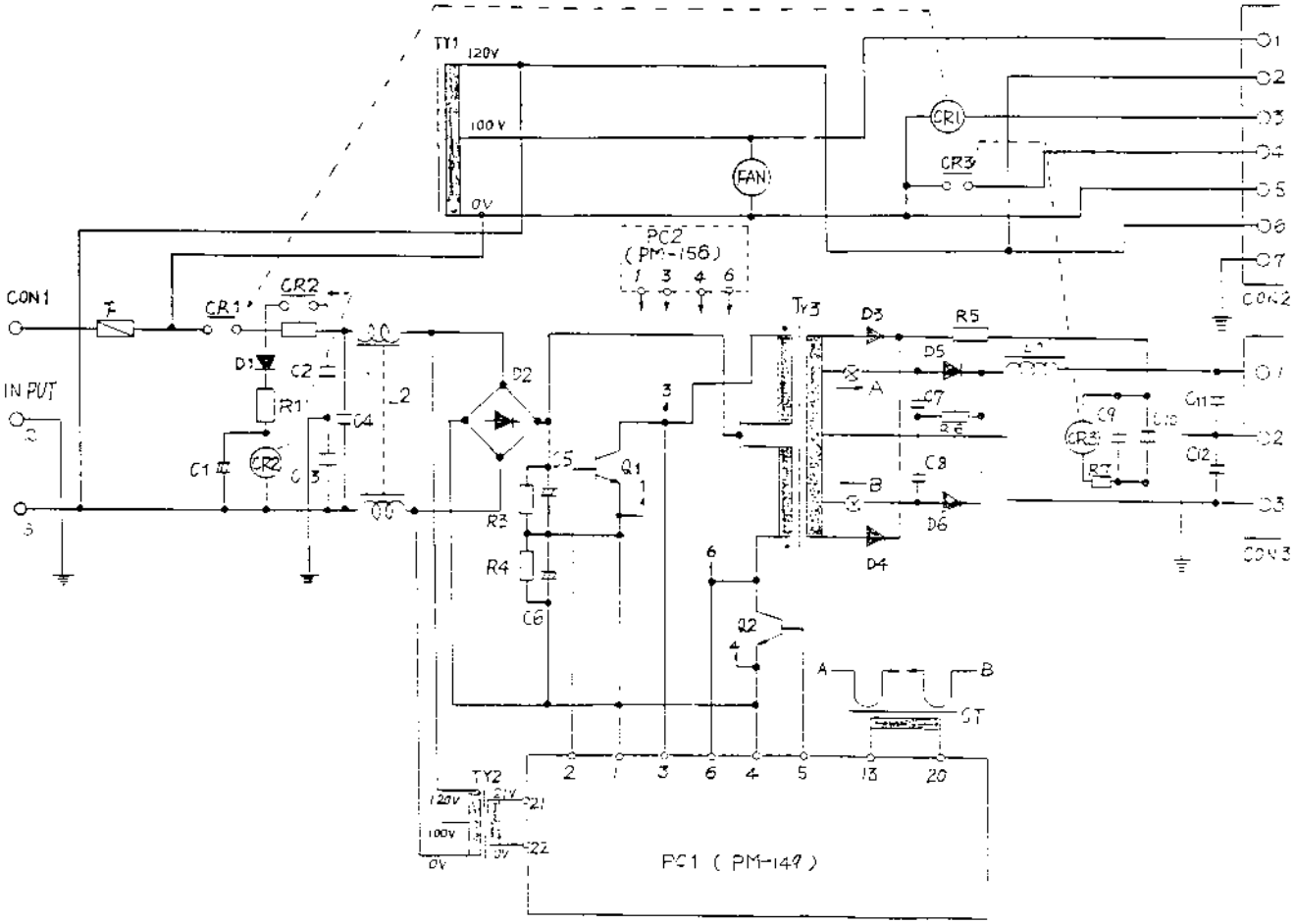
EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63105)
(Sansha Switching Type)
(With Main Power Switch)

Serial No. 4045-4046, 4053-4071, 4083-4101, 4113-4116, 4130-4131

映樹工業株式会社				
年月日	製図	品名	EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM	
M 製	工事番号	型番	EX-4000P	241-63105

EX-4000P

処理工	図面訂正欄			
	符号	年月日	訂正要領	担当



PARTS LIST

ITEMS	NOMENCLATURE	REMARKS	Q'N'TY
F	FUSE	20A 250V	1
TY1	TRANSFORMER	F1A-5021	1
TY2	〃	F1A-5026	1
L1	REACTOR	F1A-4856	1
CT	CURRENT TRANS	F1A-5020	1
PC1	PRINTED CIRCUIT	PM-149	1
FAN	EXHAUST FAN	NO 8500	1
Q1.2	TRANSISTOR	2SC-2147	2
D1	DIODE	F-14F	1
D2	〃	C25V840	1
D3.4	〃	U-06G	2
D5.6	〃	4DC1S-30	2
PM2	PRINTD CIRCUIT	PM-156	1
CR1	RELAY	LY2 AC100V	1
CR2.3	〃	LY2 DC100V	2
L2	REACTOR	F1A-5117	1
C1	CAPACITOR	ECE-B250J10 250V 10μF	1
C2.3.7.8.11.12	〃	ECQ-E10105MZ 1000V 1.0μF	6
C4	〃	ECQ-E10104MZ 1000V 0.1μF	1
C5.6	〃	ECE-GA2D471F 200V 470μF	2
C9	〃	ECQ-E2105MZ 250V 1μF	1
C10	〃	ECE-M160V470E 160V 470μF	1
R1	RESISTOR	ERG-2ANJ681 2W 680Ω	1
R2	〃	KG 10W 10Ω	1
R3	〃	ERG-3ANJ203 3W 20kΩ	1
R4	〃	KG 30W 500Ω	1
R5	〃	ERX-2ANJ100 2W 10Ω	1
CON1	INPUT CONNECTOR	25-3-B	1
CON2	CONTROL 〃	MCS-307-P	
CON3	OUTPUT 〃	E-2P	

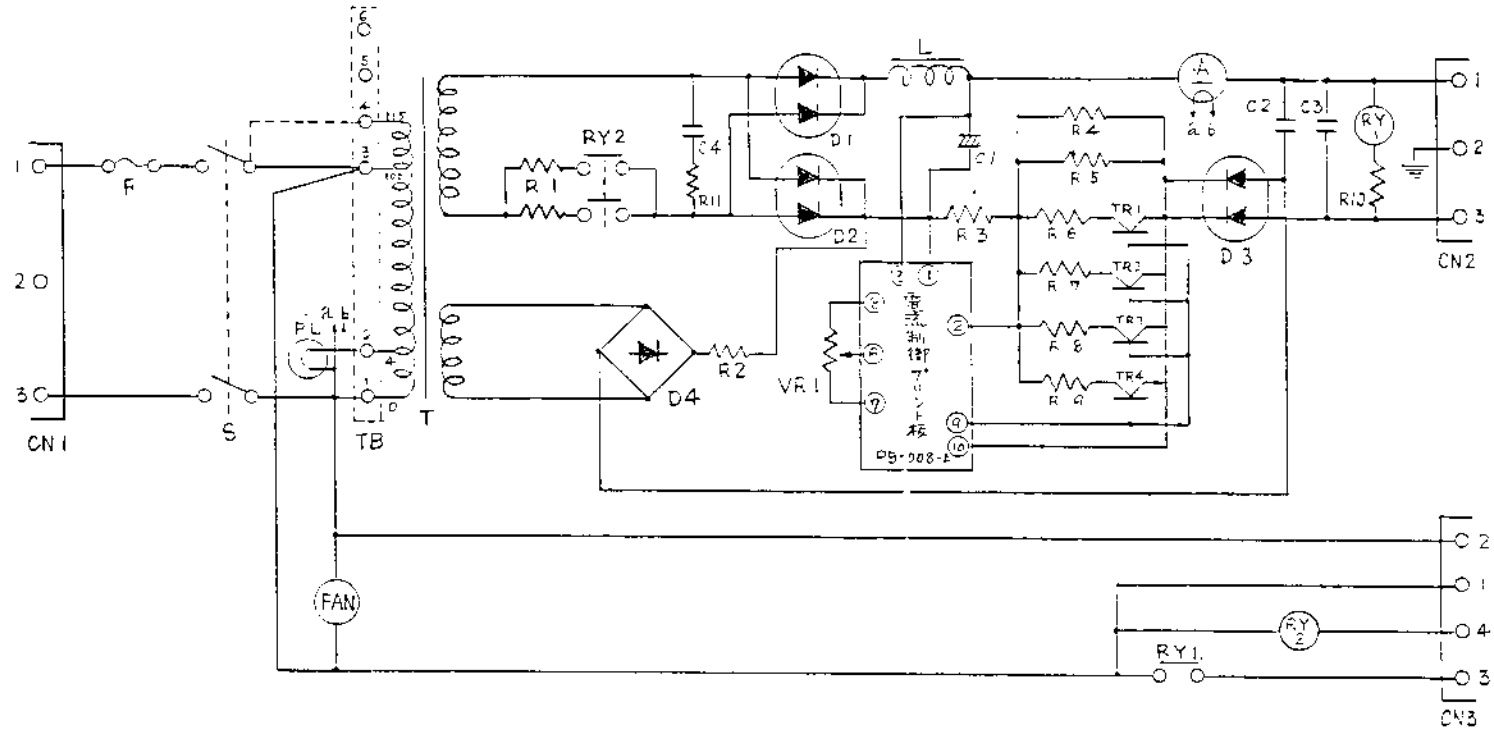
EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63102)
(Sansha Switching Type)
(W/O Main Power Switch)

Serial No.4027, 4029-4031, 4037-4042

映樹工業株式会社			
作図 56年1月6日		EX-4000P	EX-4000P SWITCHING RECTIFIER CIRCUIT DIAGRAM
		EX-4000P	241-63102

EX-4000P

処理工事	図面訂正欄			
	符号	年月日	訂正要領	担当



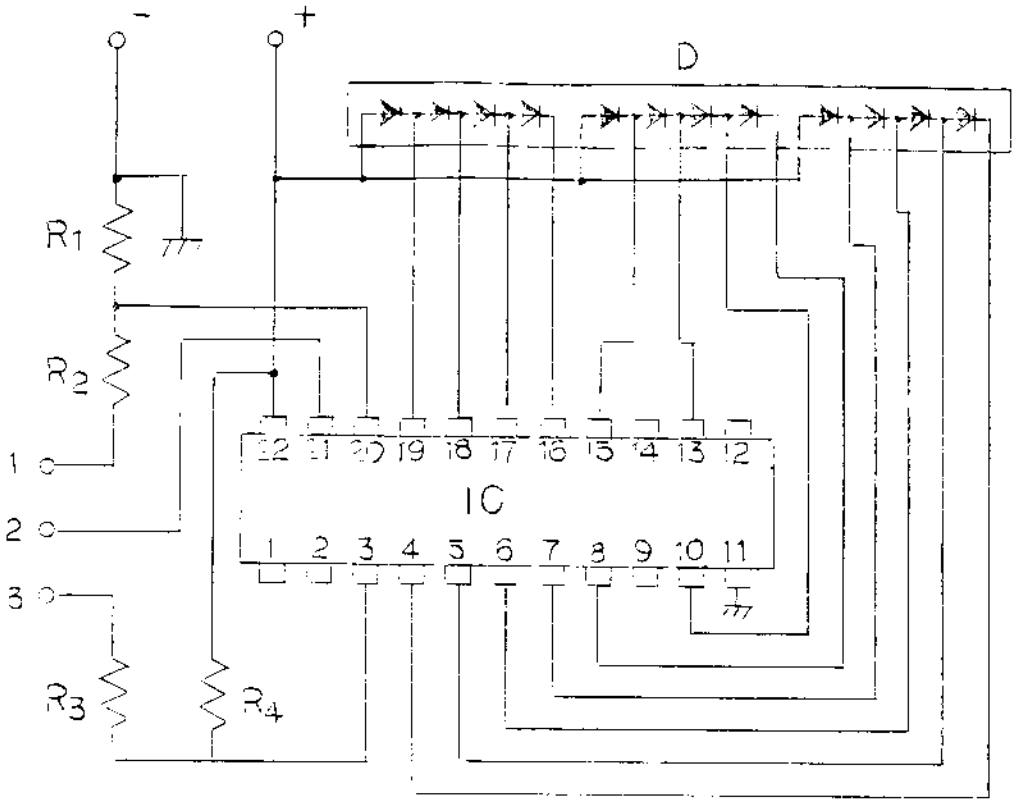
回路番号	品名	個数	形式
T	トランス	1	
L	チョーク	1	
D1	シリコンダイオード	2	SG5TS
D2	〃	1	SG5TR
D4	〃	1	S2VB40
R1	抵抗	1	20W C.03Ω
R2	〃	1	5W 500Ω
R3	〃	1	150W 0.04Ω
R4,5	〃	2	1.6Ω
R6-9	〃	4	5W 0.2Ω
R10	〃	1	2W 6.8Ω
R11	〃	1	5W 5Ω
VR1	可変抵抗	1	B 200Ω
C1	電解コンデンサー	1	80V 15700 μF
C2	〃	1	100V 470 μF
C3	コンデンサー	1	0.01 μF
C4	〃	1	45 PF
F	ヒューズ	1	15A
S	電源SW	1	S-21A
TB	電圧切換端子	1	A-04 6P
FAN	ファンモーター	1	CT3B 55
PL	表示灯	1	MP 023
A	電流計	1	30A
TR1-4	トランジスター	4	2SD-556
RY1	リレー	1	MM2-U1
RY2	〃	1	BW-E6501
CN1	コネクター	1	BTS-25R3
CN2	〃	1	BTS-29P3
CN3	〃	1	DA22P4

EX-4000P : RECTIFIER CIRCUIT DIAGRAM (241-63101)
(Saturable Reactor Type)
Serial No.4001-4026, 4028, 4032-4036
4047-4054, 4072-4084,
4102-4111, 4117-4125
(These Nos. were sold in Japan only.)

映機工業株式会社		品名	EX-4000P バラスト回路図
昭和 78 年 9 月 12 日	ウッオ	部番	241-63101

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・ ・		
		・ ・		



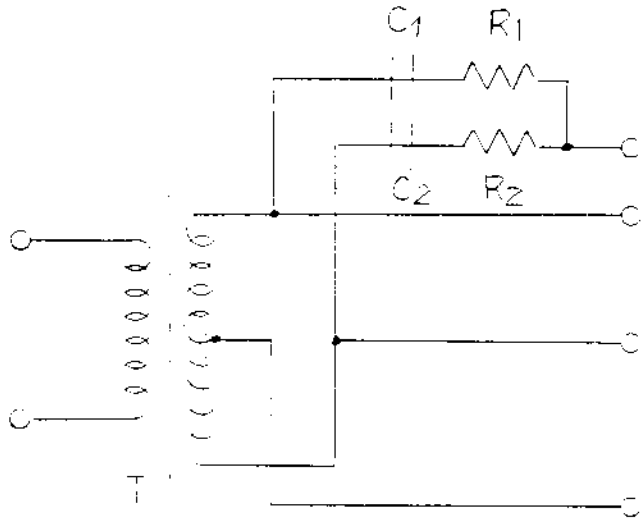
EX-4000P : Refer to Rectifier Diagram
No.241-63108, or 241-63113, or
241-63116, or 241-63121
Serial No.4126-4129, 4132 & Up

PARTS LIST

MARK	DESCRIPTION	P.C	REMARK
I C	IC	1	IR-Z406
D	LED	1	GL-11ZR3
R、1	RESISTOR	1	RA-RZ5-101 (1/4 100Ω)
R、2	RESISTOR	1	RA-RZ5-510 (1/4 51Ω)
R、3	RESISTOR	1	RA-RZ5-390 (1/4W 39Ω)
R、4	RESISTOR	1	RA-RZ5-102 (1/4W 1KΩ)

映機工業株式会社	承認	設計	製図	品名	PB-0035-A
作図 57年9月20日	尺度 /				
材質	台当個数	単重量 g	製品記号 EX-4000P	部番	Z41-63111

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・・		
		・・		



PARTS LIST

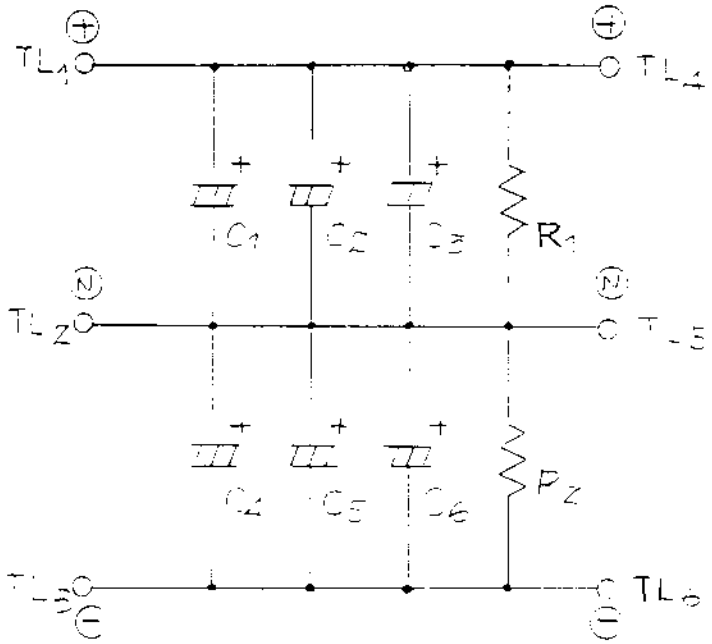
MARK	DESCRIPTION	Q.C	REMARK
T	TRANS	1	3K4-13011
C.1.2	CONDENSOR	2	CM-201-682(20φ,0.0068)
R.1.2	RESISTOR	2	RA-2R0-101 (2W 100Ω

EX-4000P : Refer to Rectifier Diagram
No.241-63116, or 241-63121

Serial No.4237 & Up

映機工業株式会社			承認	設計	製図	品名	PB-0073-A
作図 57年9月22日	尺度 1/						
材質	当個数	単重量 g	製品記号	EX4000P		部番	Z41-63117

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・・		
		・・		



PARTS LIST

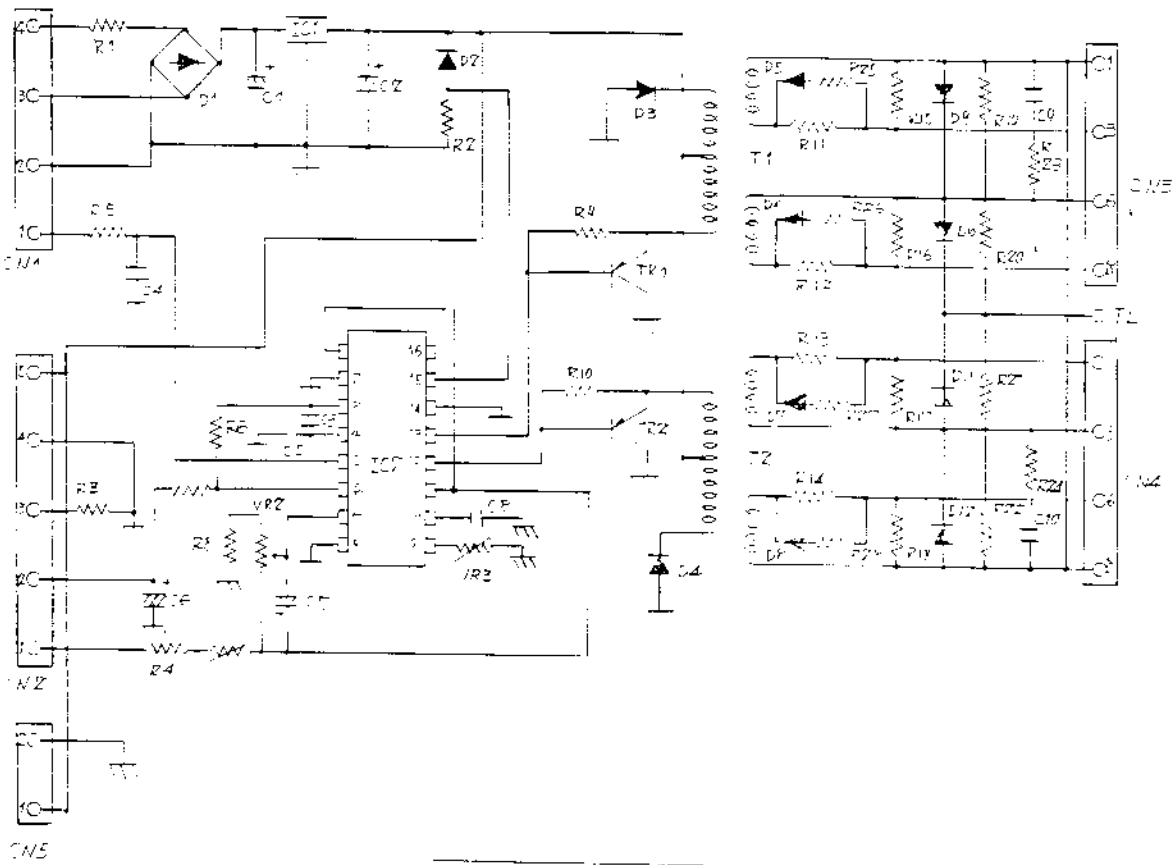
MARK	DESCRIPTION	PC	REMARK
TL.1~6		6	61134-1
R.1~2	RESISTOR	2	RA-3R0-153(3W 15kΩ)
C.1~6	CONDENSOR	1	CE-181-687(180V680μ)

EX-4000P : Refer to Rectifier Diagram
No.241-63116, or 241-63121

Serial No.4237 & Up

映機工業株式会社	承認	設計	製図	品名	PB-0082-A
作図 57年4月22日	尺度				
材質	所要個数	単重量	製品記号	EX-4000P	部番 241-63118

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当



PARTS LIST

MARK	DESCRIPTION	P.C	REMARK
TR1,2	TRANSISTOR	2	2SA965-O
IC 1	ZENER IC	1	TA79015P
IC 2	PWM CONTROL IC	1	μPC1042C
D 1	DIODE	1	RB-151
D 2	ZENER DIODE	1	05Z5.1L
D3-5	HIGH SPEED DIODE	6	1S1834
D 6~9	〃	4	1S1885
C 1	CONDENSOR	1	CE-350-108 (35V 1000μF)
C 2	〃	1	CE-250-107 (25V 100μF)
C 3	〃	1	CE-500-474 (50V 0.47μF)
C 4~5	〃	1	CM-401-103 (400V 0.01μF)
C 6	〃	1	CE-250-47A (25V 4.7μF)
C 7	〃	1	CE-251-476 (25V 47μF)
C 8	〃	1	CC-500-102 (50V 0.001μF)
C9,10	〃	2	CC-401-123 (400V 0.012μF)
S 1	DSC SW	1	RA-1R0-R47 (1W 0.47Ω)
R 2	〃	1	RA-R25-102 (1/4W 1KΩ)
R 3	〃	1	RA-R25-6P1 (1/4W 6.2Ω)
R4,57	〃	3	RA-R25-103 (1/4W 10KΩ)
R 6	〃	1	RA-R25-105 (1/4W 1MΩ)
R 8	〃	1	RA-R25-472 (1/4W 4.7KΩ)
R9,10	〃	2	RA-R25-470 (1/4W 47Ω)
R11,12	〃	4	RA-2R0-4R0 (2W 4.7Ω)
R13~16	〃	4	RA-2Z-101 (1/2W 100Ω)
R17~20	〃	4	RA-R25-274 (1/4W 270KΩ)
R21~24	〃	2	RE-100 181 (10W 180Ω)
VR1,2	VOLUME CONTROL	2	SR4R-B10KΩ
VR 3	〃	1	SR14R-B50KΩ
CN 1	CONNECTOR	1	IL-4P-S3E2
CN 2	〃	1	IL-5P-S3E2
CN3,4	〃	2	IL-8P-S3E2
RC1-28	RESISTOR	4	RA1R2-247 (1/2W 0.47Ω)

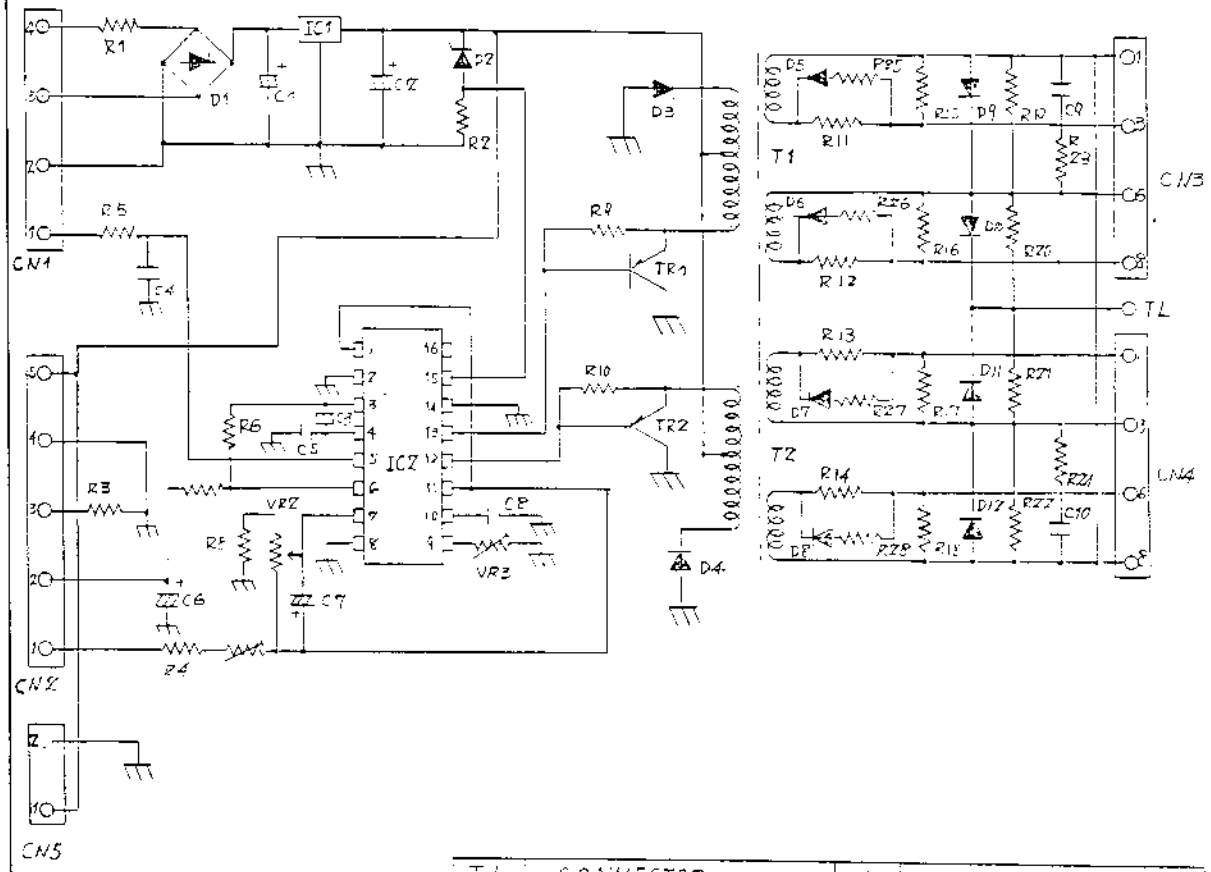
CN 5	CONNECTOR	1 B2P-3
T1,2	TRANS	2 SN4-13***
CN 5	CONNECTOR	1 IL-2P-S3E2

EX-4000P : Refer to Rectifier Diagram No.241-63121
Serial No.4282 & Up

映機工業株式会社			
57・9・22		PB-0089-B	EX-4000P
EX-4000P		241-63122	

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当



PARTS LIST

MARK	DESCRIPTION	P.C	RE MARK
TR1.2	TRANSISTOR	2	2SA965-O
IC.1	ZENER IC	1	TA78015P
IC.2	PWM CONTROL IC	1	μPC1042C
D.1	DIODE	1	RB-151
D.2	ZENER DIODE	1	0SZ5.1L
D.3~8	HIGH SPEED DIODE	6	1S1834
D.9~12	〃	4	1S1835
C.1	CONDENSOR	1	CE-350-108 (35V 1000μF)
C.2	〃	1	CE-250-107 (25V 100μF)
C.3	〃	1	CE-500-474 (50V 0.47μF)
C.4~5	〃	1	CM-401-103 (100V 0.01μF)
C.6	〃	1	CE-160-106 (16V 10μF)
C.7	〃	1	CE-250-475 (25V 4.7μF)
C.8	〃	1	CC-500-102 (50V 0.001μF)
C.9.10	〃	2	CC-401-123 (400V 0.012μF)
R.1	RESISTOR	1	RA-1R0-R47 (1W 0.47Ω)
R.2	〃	1	RA-R25-102 (1/4W 1KΩ)
R.3	〃	1	RA-R25-681 (1/4 W 680Ω)
R4.5.7	〃	3	RA-R25-103 (1/4 W 10KΩ)
R.6	〃	1	RA-R25-105 (1/4 W 1MΩ)
R.8	〃	1	RA-R25-622 (1/4 W 6.2KΩ)
R.9.10	〃	2	RA-R25-472 (1/4 W 4.7KΩ)
R.11~14	〃	4	RA-2R0-4R0 (2W 4.7Ω)
R.15~18	〃	4	RA-1RZ-101 (1/2W 100Ω)
R.19~22	〃	4	RA-R25-274 (1/4W 270KΩ)
R23~26	〃	2	RE-100.431 (10W 130Ω)
VR1~2	VOLUME CONTROL	2	SR19R-B10KΩ
VR-3	〃	1	SR19R-B50KΩ
CN.1	CONNECTOR	1	IL-4P-S3E112
CN.2	〃	1	IL-5P-S3E112
CN3.4	〃	2	IL-8P-S3E112
R25~28	RESISTOR	4	2E1R0-1R0 (1W 1.0Ω)

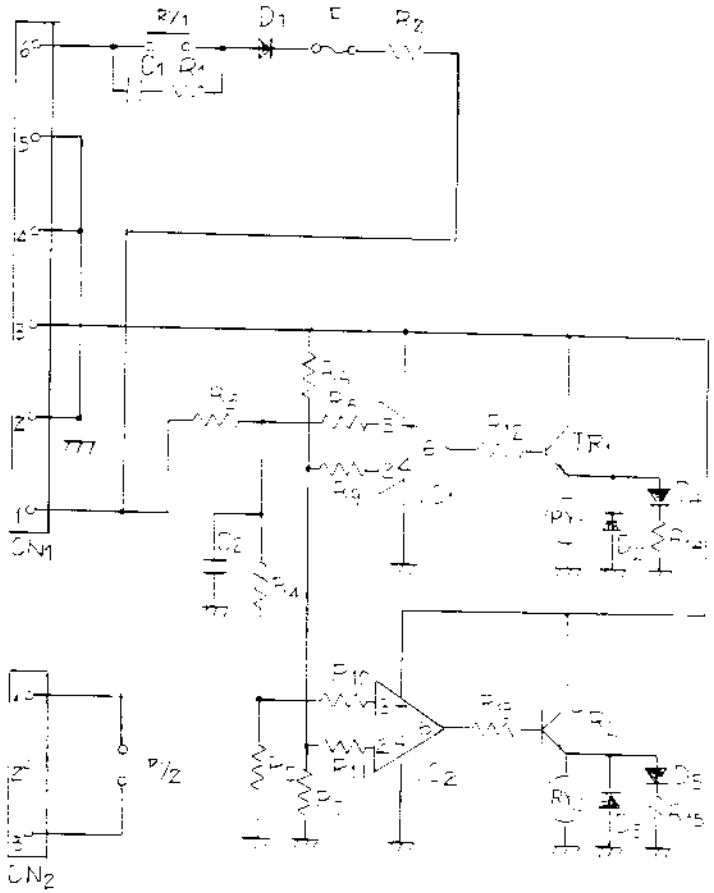
TL	CONNECTOR	1	R6Z-3
TR1~2	TRANS	2	3K4-13013
CN5	CONNECTOR	1	IL-2P-S3ENZ

EX-4000P : Refer to Rectifier Diagram No.241-63116

Serial No.4237~4281

映樹工業株式会社			
57年9月22日		PB-0066-B	
	EX-4000P	241-63119	

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当



PARTS LIST

MARK	DESCRIPTION	P C	REMRK
TR 1'	TRANSISTOR	2	2SC2655
IC 1,2	IC	2	μPA 741CP
D 1	DIODE	1	1S1888
D 2,3	HIGH SPEED DIODE	2	TFR1L
D 4	LED	1	TLF113
C	CONDENSOR	1	CM-201-104 (200V 0.1μF)
C 2	"	1	CM-500-103 (50V 0.01μ
R 1	RELISTOR	1	RA-52-1R0 (1W 1Ω J)
R 2	"	1	RA-7B5-680 (7W 68Ω J)
R 3	"	1	RA-2B0-1E3 (2W 1KΩ J)
R 4	"	1	RA-B2S-751 (1/2W 750Ω J)
R5,16	"	3	RA-B2S-471 (1/2W 470Ω J)
R 6	"	1	RA-B2S-392 (1/2W 3.9KΩ J)
R7,12,18	"	3	RA-B2S-102 (1/2W 1KΩ J)
R8,11	"	4	RA-B2S-103 (1/2W 10KΩ J)
LED 5	LED	1	TLG-113
F	FUSE	1	MF47-N1N0 5
CN 1	CONNECTOR	1	IL-6P-S3FPZ
CN 2	"	1	IL-3P-S3FPZ
RY1,2	RELAY	2	AW22111 DC12V

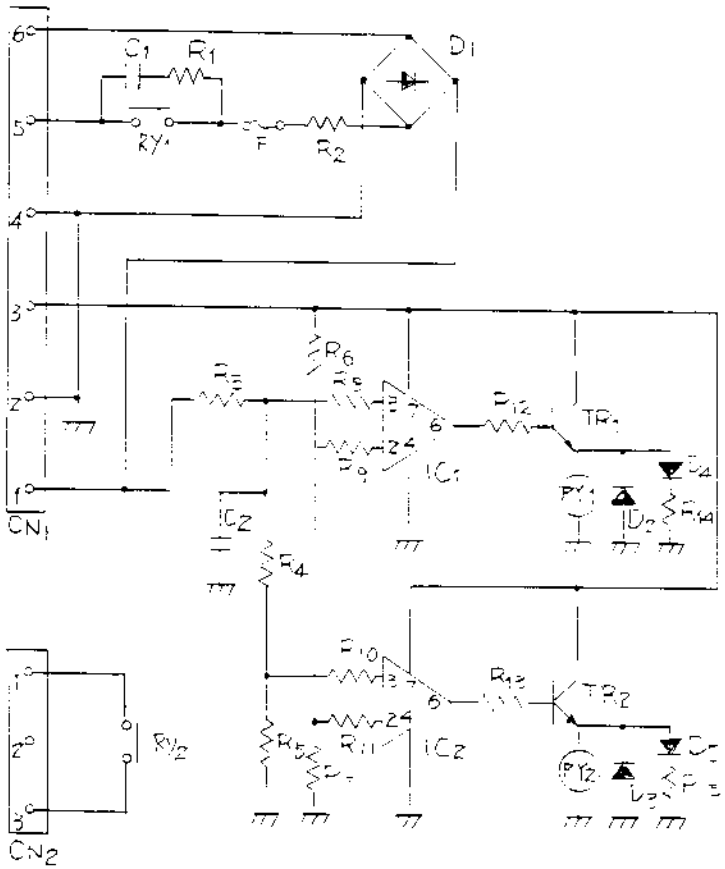
EX-4000P : Refer to Rectifier Diagram No.241-63116

Serial No.4237-4281

映機工業株式会社				
昭57年9月22日			品名	PB-0084-A
		EX-4000P	部番	241-63120

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・・		
		・・		



PARTS LIST

MARK	DESCRIPTION	P.C	REMARK
TR1,2	TRANSISTOR	2	2SC2235
IC1,2	IC	2	μA741CP
D	DIODE	1	RB-154
D2,3	HIGH SPEED DIODE	2	1S1834
D4	LED	1	TLR113
C1	CONDENSOR	1	CM-101-104 (100V 0.1μF)
C2	〃	1	CM-500-103 (50V 0.01μF)
R1	RESISTOR	1	RA-1R0-100 (1W 10Ω)
R2	〃	1	RM-7R0-680 (7W 68Ω)
R3	〃	1	RA-2R0-123 (1/4W 12kΩ)
R4	〃	1	RA-RD5-751 (1/4W 750Ω)
R5,11,13	〃	3	RA-RD5-471 (1/4W 470Ω)
R6	〃	1	RA-RD5-392 (1/4W 3.9kΩ)
R7,12,14	〃	3	RA-RD5-102 (1/4W 1kΩ)
R8~11	〃	4	RA-RD5-103 (1/4W 10kΩ)
D5,6	LED	1	TLG-113
F	FUSE	1	MT4285A
CN1	CONNECTOR	1	IL-6P-S3FPZ
CN2	〃	1	IL-3P-S3FPZ
RY1,2	RELAY	2	AWZ211 DC12V

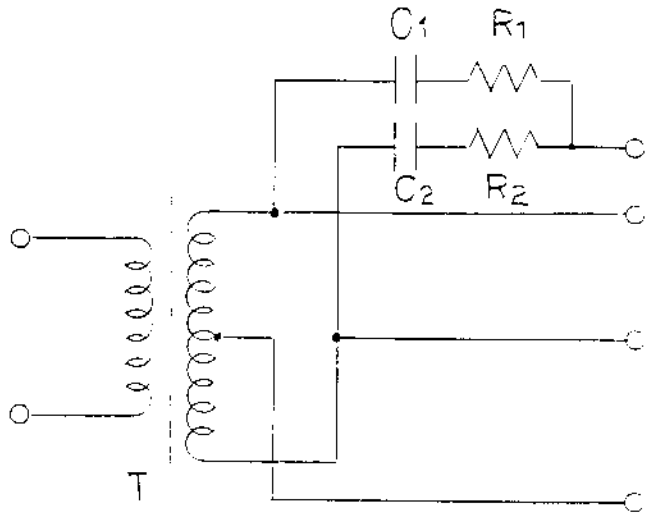
EX-4000P : Refer to Rectifier Diagram No.241-63113

Serial No.4167-4236

映機工業株式会社	承認	設計	製図	品名	PB-0068-B
作図 57年9月21日 尺度					
材質	表面処理	重量 kg	製品番号	EX-4000P	部番 241-63114

EX-4000P

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・ ・		
		・ ・		



EX-4000P : Refer to Rectifier Diagram No.241-63108, or 241-63113

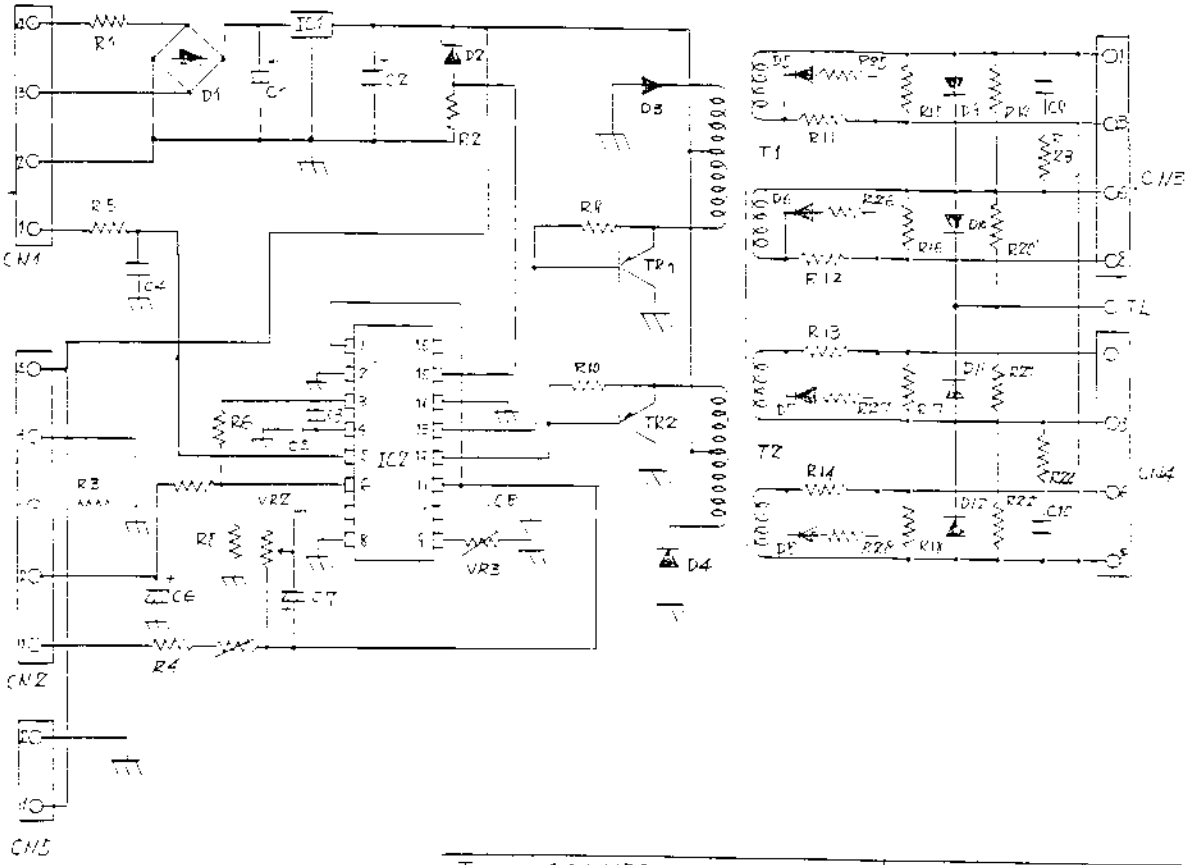
Serial No.4126-4129, 4132-4166, 4167-4236

PARTS LIST

MARK	DESCRIPTION	P.C	REMARK
T	TRANS	1	
C	CONDENSOR	2	CC-201-472(200V0.0047)
R	RESISTOR	2	RA-2R0-101(2W100Ω)

映機工業株式会社	承認	設計	製図	品名	PB-0033-A
作図 57年9月20日 尺度 /					
材質 台当個数 単重量 g	製品記号	EX-4000P		部番	241-63109

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		. .		
		. .		



MARK	DESCRIPTION	P.C	RE MARK
TR1 2	TRANSISTOR	2	2SA965-O
IC. 1	ZENER IC	1	TA78015P
IC. 2	PWM CONTROL IC	1	μPC1042C
D. 1	DIODE	1	RB-151
D. 2	ZENER DIODE	1	05Z5.1L
D.3~5	HIGH SPEED DIODE	6	1S1834
D.6~12	〃	4	1S1835
C. 1	CONDENSOR	1	CE-350-108 (35V 1000μF)
C. 2	〃	1	CE-250-107 (25V 100μF)
C. 3	〃	1	CE-500-105 (50V 1MF)
C.4~5	〃	2	CM-401-103 (100V 0.01μF)
C. 6	〃	1	CE-160-106 (16V 10μF)
C. 7	〃	1	CE-250-475 (25V 4.7μF)
C. 8	〃	1	CC-500-102 (50V 0.001μF)
C.9.10	〃	2	CC-401-153 (400V 0.015μF)
R. 1	RESISTOR	1	RA-1R0-R47 (1W 0.47Ω)
R. 2	〃	1	RA-R25-102 (¼W 1KΩ)
R. 3	〃	1	RA-R25-681 (½W 680Ω)
R4.5.7	〃	3	RA-R25-103 (½W 10KΩ)
R. 6	〃	1	RA-R25-105 (¼W 1MΩ)
R. 8	〃	1	RA-R25-6221 (½W 6.2KΩ)
R.9.10	〃	2	RA-R25-4711 (½W 4.7KΩ)
R.11~14	〃	4	RA-2R0-3901 (2W 3.9Ω)
R.15~17	〃	4	RA-1R2-1011 (2W 100Ω)
R.19~22	〃	4	RA-R25-2741 (½W 270KΩ)
R.23~24	〃	2	RE-100-681 (10W 680Ω)
VR1~2	VOLUME CONTROL	2	SR19R-B10KΩ
VR-3	〃	1	SR19R-B50KΩ
CN 1	CONNECTOR	1	IL-4P-S3ENZ
CN 2	〃	1	IL-5P-S3ENZ
CN3.4	〃	2	IL-8P-S3ENZ
R25~28	RESISTOR	4	RA-R2-1R5 (¼W 1.5Ω)

T. 1	CONNECTOR	1	R6Z-3
T. 2	TRANS	2	〃
CN 5	CONNECTOR	1	IL-2P-S3ENZ
			〃

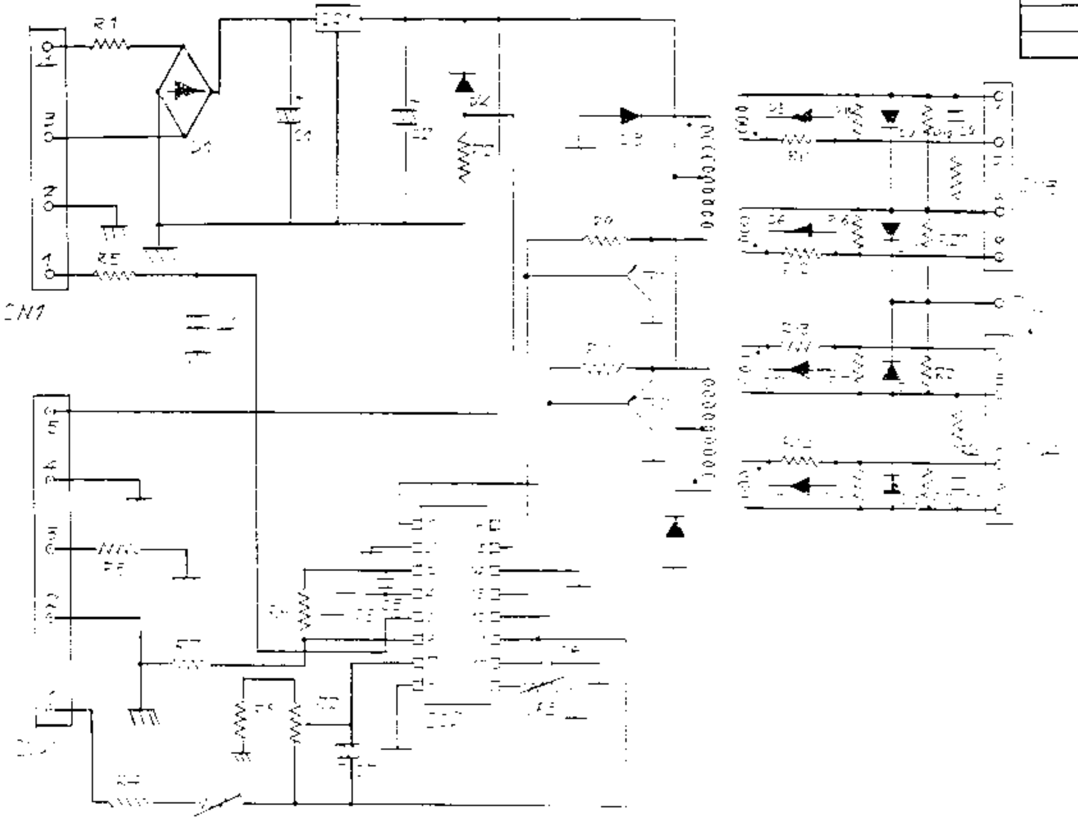
EX-4000P : Refer to Rectifier Diagram No.241-63113

Serial No.4167-4236

映樹工業株式会社				
57年9月22日			品名	PB-0066-A
			型式	EX-4000P
			部番	241-63115

EX-4000P

処理加工	符号	年月日	図面訂正欄 訂正要領	担当
		. .		
		. .		



PARTS LIST

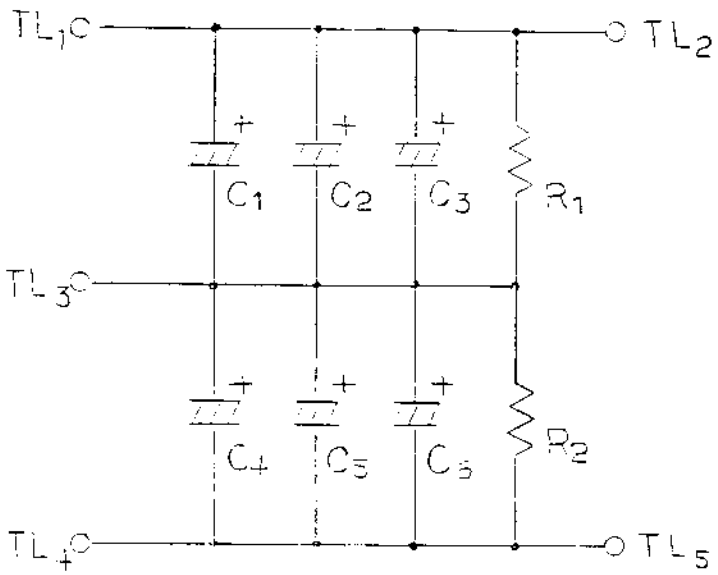
MARK	DESCRIPTION	Q'TY	REMARK
TR1,2	TRANSISTOR	2	2SC965-0
IC 1	[illegible] IC	1	TA78015P
IC 2	[illegible] CONTROL IC	1	μPC1042C
D 1	DIODE	1	RB151
D 2	ZENER DIODE	1	05Z [illegible]
D 3-8	DIODE	6	1S1934
D 9-12	DIODE	4	[illegible]
C 1	[illegible]	1	CE-250-[illegible]
C 2		1	CE-250-107 (25V 100μF)
C 3		1	CE-500-105 (50V 1μF)
C 4,5		2	[illegible]
C 6		1	CE-160-106 (16V 10μF)
C 7		1	CE-250-475 (25V 4.7μF)
C [illegible]		1	[illegible]
C [illegible]		2	[illegible]
R 1	[illegible]	1	RE-1P-R47 (1W 0.47Ω)
R 2		1	RE-RZ5-102 (1/4W 1KΩ)
R 3		1	RE-RZ5-681 (1/4W 680Ω)
R [illegible]		3	RE-RZ5-103 (1/4W 10KΩ)
R [illegible]		1	RE-RZ5-105 (1/4W 1MΩ)
R [illegible]		1	RE-RZ5-[illegible]
R [illegible]		7	RE-RZ5-471 (1/4W 470Ω)
R [illegible]		4	[illegible]
R [illegible]		4	[illegible]
R [illegible]		4	RE-RZ5-273 (1/4W 27KΩ)
[illegible]		9	[illegible]
[illegible]	[illegible]	1	[illegible]
[illegible]		1	[illegible]
[illegible]	[illegible]	9	
[illegible]	[illegible]		[illegible]
[illegible]		1	[illegible]
[illegible]		7	[illegible]
[illegible]		1	[illegible]

EX-4000P : Refer to Rectifier Diagram No.241-63108

Serial No.4126-4129, 4132-4166

映梠工業株式会社	承認	設計	製図	品名	PB-0031-A
作図 57年 9月 20日					
製品記号	EX-4000P			部番	241-63172

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		・ ・		
		・ ・		



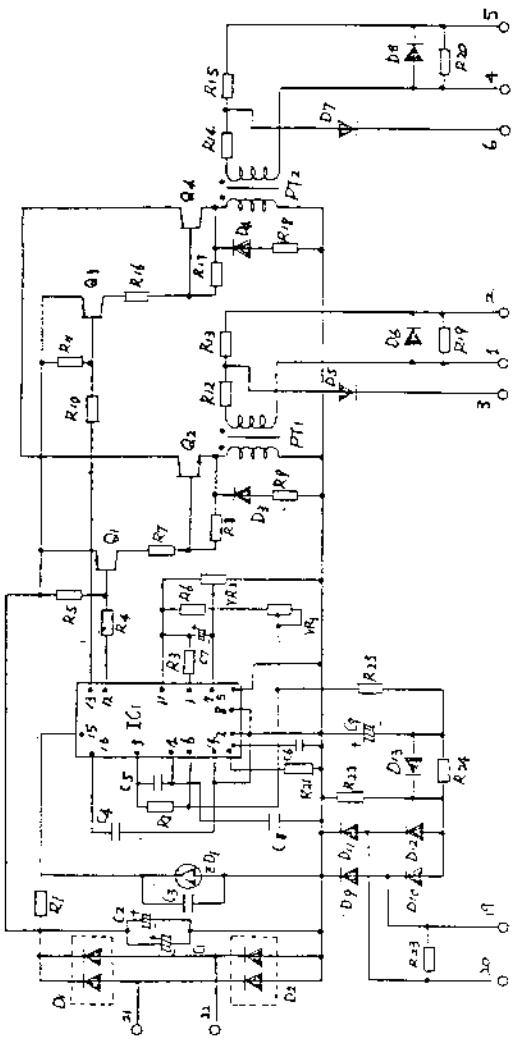
EX-4000P : Refer to Rectifier Diagram
No.241-63108, or 241-63113
Serial No.4126-4129, 4132-4236

MARK	DESCRIPTION	P.C	REMARK
C1~6	CONDENSER	1	CE-291-477 (200V 470μ)
R1~2	RESISTOR	2	RA-3R0-153 (3Ω 15Ω)
TL1~5	CONNECTOR	5	R-73-31

映機工業株式会社	承認	設計	製図	品名	PB-0019-A
作図 57年 9月 18日	尺度		On		
材質	台当個数	単重量 g	製品記号	EX-4000P	部番	241-63110

処理加工	図面訂正欄			
	符号	年月日	訂正要領	担当
		. .		
		. .		

EX4000P Switching Rectifier's P.C.Board assy PC-1 (PM-149)



Item #	Description	Remarks	Q'ty
R 1	Resistor	ERG-2ANJ221 2W 220 Ohm	1
R 2	〃	ERD-14TJ683 1/4W 68K 〃	1
R 3	〃	ERD-14TJ103 〃 10K 〃	1
R 4	〃	〃 〃 222 〃 2.2K 〃	1
R 5	〃	〃 〃 471 〃 470 〃	1
R 6	〃	〃 〃 472 〃 4.7K 〃	1
R 7	〃	ERG-2ANJ471 2W 470 〃	1
R 8	〃	ERD-14TJ101 1/4W 100 〃	1
R 9	〃	ERD-12TJ221 1/2W 220 〃	1
R 10	〃	ERD-14TJ222 1/4W 2.2K 〃	1
R 11	〃	〃 〃 471 〃 470 〃	1
R 12	〃	ERG-3ANJR47 3W 0.47 〃	1
R 13	〃	ERG-2ANJ1R0 2W 1.0 〃	1
R 14	〃	ERG-3ANJR47 3W 0.47 〃	1
R 15	〃	ERG-2ANJ1R0 2W 1.0 〃	1
R 16	〃	〃 〃 471 2W 470 〃	1
R 17	〃	ERD-14TJ101 1/4W 100 〃	1
R 18	〃	ERD-12TJ221 1/2W 220 〃	1
R 19	〃	〃 〃 470 〃 47 〃	1
R 20	〃	〃 〃 470 〃 〃	1
R 21	〃	ERD-14TJ332 1/4W 33K 〃	1
R 22	〃	ERD-12TJ470 1/2W 47 〃	1
R 23	〃	〃 〃 100 〃 10 〃	1
R 24	〃	ERD-14TJ472 1/4W 4.7K 〃	1
R 25	〃	〃 〃 〃 〃	1
D 1	Diode	MI-152	1
D 2	〃	MI-152R	1
D 3	〃	MA-162	1
D 4	〃	〃	1
D 5	〃	V-09A	1
D 6	〃	V-09C	1
D 7	〃	V-09A	1
D 8	〃	V-09C	1
D 9	〃	〃	1
D 10	〃	〃	1
D 11	〃	〃	1
D 12	〃	〃	1
D 13	〃	MA-162	1

Item #	Description	Remarks	Q'ty
ZD 1	Zenner Diode	RD-10FB	1
IC 1	Control IC	UPC-1042C	1
Q 1	Transistor	2SA-720	1
Q 2	〃	2SC-1975	1
Q 3	〃	2SA-720	1
Q 4	〃	2SC-1975	1
PT 1	Pulse Transformer	KF1A-68	1
PT 2	〃 〃	〃	1
VR 1	Volume Control	EVM-GCGA01B54	1
VR 2	〃 〃	EVM-G1GA01B14	1
C 1	Capacitor	ECE-A1HS221 50V 220mfd	1
C 2	〃	〃 〃 〃 〃	1
C 3	〃	ECG-M05104K2 50V 0.1mfd	1
C 4	〃	ECH-D2H101KB2 500V 100pfd	1
C 5	〃	ECG-M05102K2 50V 1000pfd	1
C 6	〃	〃 〃 472K2 50V 0.0047mfd	1
C 7	〃	ECE-A1ES470E 25V 47mfd	1
C 8	〃	ECH-D1H221KB2 25V 220pfd	1
C 9	〃	ECE-A1ES470F 25V 47mfd	1

映樹工業株式会社			
作成 年 月 日	第 回 改訂 製図	品名	PM-149 P.C.BOAD.DIAGRAM
尺度	重量 g	型番	EX-4000P
		図番	241-63103

EX-4000P