



When the show must go on.

16MM SOUND PROJECTOR

SERVICE MANUAL

**— MODEL SL II-SERIES —
(S/N 30001 and up)**

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INTRODUCTION

1. This Service Manual provides the necessary information for the repair, adjustment, and maintenance of EIKI SL II-series projectors, (S/N 30001 and Up), model SL-0, SL-1, SL-02; SL-2, and also EX-300-SL II series, (S/N 3001 and Up), except for the Xenon lamp supply.
2. This service manual contains some part numbers for convenience in identification only. When ordering replacement parts, refer to SL II replacement parts list.
3. EIKI SL II Series projectors may in the future be improved or modified.
Modifications made after the issue of this manual will be covered by Service Updates.
4. A copy of all of the pertinent diagrams are attached at the end of this manual.
5. CAUTION! Care must be exercised to avoid electrical shock while servicing the projector.

MAJOUR IMPROVEMENTS APPLICABLE FROM SL II SERIES:

1. The upper loop forming system is improved forming and keeping a larger upper loop.
2. The lower loop forming system is improved forming and keeping a larger lower loop.
3. Sound drum system like "N" series is used. The conventional rubber pinch roller has been deleted and the buzz roller with tension spring loaded activates also as the pinch roller on the sound head.
4. Wow and flutter is minimized. The adjustment of wow and flutter is easier since less parts are used in the film path near the sound head.
5. The rear dampening tension roller is given more allowance to move freely to absorb the jerky take-up and minimize wow and flutter.
6. The flywheel brake is added to stop instantly the flywheel and the sound drum rotation at "STOP" position.
7. The front cover is fitted firmly on the projector so that the cover would not come off too easily in transit or when the cover is pushed up.
8. The lamp house door has more ventilation holes on its top to cool down heated parts more efficiently.
9. Amplifier control knobs have better looking and are easy to operate.
10. Control knob of the function rotary switch is mounted more firmly avoiding slippage on the cam shaft.

SL II - Series TROUBLE SHOOTING CHART

I: ELECTRICAL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY (See Table of Contents)
1. Pilot lamp not on	1. Not plugged in 2. No power to the AC wall outlet 3. Defective power cord 4. Faulty transformer connector or defective transformer module 5. Defective pilot lamp 6. Film guard switch is actuated, or open	1. Check 2. Check outlet 3. Check and repair 4. Repair or replace (See Sec 4-4) 5. Replace 6. Check the position of upper loop roller. If down, pull up to loop forming position. Or check for defective micro switch behind loop roller (See Sec 5-4-B-2)
2. Pilot lamp on, motor does not rotate at function switch position #2	1. Motor thermal switch has opened (UL type only) 2. Defective micro switch #1, #3, #4 3. Defective motor connectors, or not plugged in 4. Faulty motor capacitor 5. Defective motor module 6. Mechanical linkage is not activating micro switch #1, #3, #4.	1. Allow motor to cool, check again (See Sec 4-3) 2. Check or replace (See Sec 8-1) 3. Check and repair (See Sec 4-3) 4. Check or replace (See Sec 4-3) 5. Replace (See Sec 4-3) 6. Check and adjust (See Sec 8-1)
3. Pilot lamp on, motor runs but lamp does not come on in switch position #3	1. Defective lamp 2. Lamp is not seated in the socket properly 3. Defective lamp socket 4. Faulty micro switch #2 5. Open Hi-low switch 6. Open transformer/lamp connection 7. Defective transformer module	1. Replace lamp 2. Check and reseal 3. Repair or replace 4. Check or replace (See Sec 8-1) 5. Check or replace 6. Check and repair (See Sec 4-4) 7. Replace (See Sec 4-4)

(ELECTRICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
4. Motor does not operate in the rewind position (operates in forward)	1. Faulty micro switch #3, #4 2. Defective motor connector wiring 3. Mechanical linkage loose or out of adjustment	1. Replace (See Sec 8-1) 2. Check and repair (See Sec 4-3) 3. Check and repair (See Sec 5-4)
5. Function switch does not follow the indicated sequence	1. Loose function switch knob 2. Loose micro switch cam 3. Mechanical linkage loose or out of adjustment	1. Reposition and tighten 2. Reposition and tighten 3. Check and repair (See Sec 5-4)

II: LOADING SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
6. Function control switch does not open the film path	1. Loose function control knob 2. Function switch cam is worn or loose on the shaft 3. Incorrect lens 4. Film shoe reception arm is loose	1. Reposition and tighten set screws 2. Replace, re-adjust 3. Check if SL type lens 4. Adjust and tighten (See Sec 5-4)
7. Function switch does not close the film path in the "MIC" position	1. Loose function control knob 2. Function switch cam is worn or loose 3. Film shoe reception arm is loose 4. #1 sprocket shoe assembly does not close	1. Adjust & tighten 2. Replace, reposition & tighten set screws (See Sec 5-4) 3. Reposition and tighten set screws (See Sec 5-4) 4. Check for proper alignment & adjust (See Sec 5-4)
8. Film will not thread properly over the sound pick up area	1. Sound drum buzz pinch roller not releasing in the "STOP" position 2. Sound drum tension roller may be out of position	1. Check for loose mechanical linkage (See Sec 5-4) 2. Check roller if loose, re-align & tighten screws (See Sec 5-4)
9. Film does not engage at the #1 sprocket	1. Sprocket shoe roller tension spring broken or off	1. Replace (See Sec 5-4)
10. Upper loop is not formed correctly	1. Upper loop roller arm is out of position 2. Film guard arm is out of position 3. Deformed plate spring	1. Adjust & correct position (See Sec 5-4-B-2) 2. Adjust & correct position (See Sec 5-4-B-2) 3. Replace (See Sec 5-4-B-2)
11. Lower loop is not formed correctly	1. Loop-setter roller is not positioned correctly 2. Loose loading mechanism not activating the loop-setter	1. Adjust (See Sec 5-3) 2. Check and repair (See Sec 5-4)
12. FILM GUARD does not shut off power when upper loop is lost	1. Upper loop arm is in wrong position 2. Film guard arm is in wrong position 3. Defective micro switch 4. Deformed plate spring	1. Check & adjust (See Sec 5-4-B-2) 2. Check & adjust. (See Sec 5-4-B-2) 3. Check & replace 4. Check & replace

III: MECHANICAL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
13. Pilot lamp on, motor runs but film does not advance	<ol style="list-style-type: none"> 1. Broken or defective motor belt 2. Motor pulley loose 3. Main drive belt off or broken 	<ol style="list-style-type: none"> 1. Replace 2. Check & tighten 3. Check & replace
14. Film speed is too slow or too fast	<ol style="list-style-type: none"> 1. Belt installed incorrectly 2. Incorrect motor pulley 3. Incorrect line voltage 	<ol style="list-style-type: none"> 1. Re-locate belt position 2. Replace 3. Check
15. Film comes out of the path, or lifts off near the sound drum	<ol style="list-style-type: none"> 1. Film is loaded incorrectly 2. #2 sprocket shoe rollers not seating properly 3. Buzz pinch roller's tension spring is off, or defective 	<ol style="list-style-type: none"> 1. Re-load 2. Check & adjust (See Sec 5-4) 3. Hook spring, or replace
16. Excessive take-up torque	<ol style="list-style-type: none"> 1. Adjusted too tight 2. Dirty or sticky take-up arm belt or spindle 3. Take-up arm belt installed incorrectly 	<ol style="list-style-type: none"> 1. Loosen tension adjustment screw (See Sec 5-1) 2. Clean or replace (See Sec 5-1) 3. Check & re-install (See Sec 5-1)
17. Insufficient take-up tension or no take-up	<ol style="list-style-type: none"> 1. Take-up tension adjusted too loose 2. Worn or oily belt 3. Binding spindle shaft 4. Defective take-up drive clutch 5. Broken take-up belt 	<ol style="list-style-type: none"> 1. Re-adjust (See Sec 5-1) 2. Clean or replace 3. Clean & lubricate 4. Check & repair 5. Replace
18. Weak back tension of the supply reel	<ol style="list-style-type: none"> 1. Missing or weak back tension spring 	<ol style="list-style-type: none"> 1. Replace (See Sec 5-2)
19. Lower loop setter roller continues to activate	<ol style="list-style-type: none"> 1. Damaged film 2. Lower loop is too small 3. Upper loop is too small 4. Too much take-up tension 5. #2 sprocket plate is loose 6. Loop setter eccentric gear dampening spring is weak 7. Loop setter gear is always in contact with the timing belt 8. Defective main drive belt 	<ol style="list-style-type: none"> 1. Check film sprocket holes for damage 2. Adjust loop setter roller position (See Sec 5-3) 3. Adjust upper loop forming system (See Sec 5-4-B-2) 4. Check take-up tension (See Sec 5-1) 5. Check & tighten 6. Stretch or replace (See Sec 5-3) 7. Adjust position of the loop setter gear, or main drive belt guide bracket (See Sec 5-3) 8. Inspect or replace

— to be continued —

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
19. Lower loop setter roller continues to activate — continued —	9. Insufficient claw protrusion or defective claw 10. Loop setter timing is incorrect	9. Check, adjust or replace (See Sec 4-1) 10. Check & adjust (See Sec 5-3)
20. Loss of upper loop	1. Damaged film 2. Loop setter is continually activated 3. #1 sprocket plate loose 4. #1 sprocket shoe rollers are not seating properly 5. #1 sprocket shoe position is incorrect. 6. Supply arm back tension too strong	1. Check film 2. See loop setter (See Sec 5-3) 3. Check & tighten 4. Check & adjust 5. Check & adjust 6. Check & adjust (See Sec 5-2)
21. Loss of lower loop	1. Damaged film 2. Excessive film lubricant 3. Main drive belt off or broken 4. Too much take-up torque 5. Loop setter continues to activate 6. Insufficient claw protrusion 7. Film shoe tension spring too strong 8. #2 Sprocket shoe position is incorrect	1. Check film 2. Clean film and film path 3. Check or replace 4. Check & adjust (See Sec 5-1) 5. See loop setter (5-3) 6. Adjust (See Sec 4-1) 7. Check & adjust (See Sec 4-5) 8. Check & adjust
22. Excessive film gate noise	1. Damaged or poor film 2. Emulsion and dirt build-up on the film shoe or aperture plate 3. Incorrect claw protrusion 4. Weak film shoe springs or film shoe not seating properly 5. Incorrect claw alignment or defective claw 6. Cam arm spring weak or broken 7. Worn cam follower (cam gliding pin) 8. Inner guide rail dirty, worn or binding 9. Film shoe closing mechanism does not completely close 10. Lower loop too small 11. Lower loop arm stop plate is out of position	1. Check film 2. Inspect & clean 3. Adjust (See Sec 4-1) 4. Check and adjust (See Sec 4-5) 5. Check, adjust or replace (See Sec 4-1) 6. Check or replace (See Sec 4-1) 7. Check and replace (See Sec 4-1) 8. Clean and adjust or replace (See Sec 4-5) 9. See Loading System (See Sec 5-4) 10. Re-set the function switch 11. Re-position & adjust

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
23. Unsteady picture	<ol style="list-style-type: none"> 1. Emulsion or dirt build-up on the aperture plate or film shoe 2. Incorrect claw protrusion 3. Film shoe not seating completely 4. Weak film shoe springs 5. Improper claw alignment or defective claw 6. Claw stroke not correct 7. Worn cam follower (cam gliding pin), or sliding pin 8. Weak claw lever spring 9. Inner guide rail spring missing or weak 10. Loading mechanism does not close the gate completely 11. Worn cam 12. Inner guide rail worn or binding 13. Outer guide rail loose 14. Worn claw lever fulcrum bushing 	<ol style="list-style-type: none"> 1. Clean 2. Check & adjust (See Sec 4-1) 3. Check & adjust (See Sec 4-5) 4. Adjust or replace (See Sec 4-5) 5. Check, adjust or replace (See Sec 4-1) 6. Adjust (See Sec 4-1) 7. Replace (See Sec 4-1) 8. Replace (See Sec 4-1) 9. Replace (See Sec 4-5) 10. See loading system (See Sec 5-4) 11. Check & replace (See Sec 4-1) 12. Check & replace or clean 13. Check & tighten 14. Check & replace (See Sec 4-1)
24. Travel ghost	<ol style="list-style-type: none"> 1. Incorrect shutter blade position 	<ol style="list-style-type: none"> 1. Adjust (See Sec 4-1)
25. Insufficient framing	<ol style="list-style-type: none"> 1. Aperture plate does not move freely, or loose 2. Claw position or stroke is incorrect 3. Worn cam follower (cam gliding pin) 	<ol style="list-style-type: none"> 1. Disassemble and clean, or check & tighten (See Sec 4-5) 2. Adjust (See Sec 4-1) 3. Replace (See Sec 4-1)
26. Excessive cam tank noise	<ol style="list-style-type: none"> 1. Defective claw lever spring 2. Defective plate spring 3. Worn cam follower (cam gliding pin) 4. Fulcrum bushing worn 5. Cam shaft bearings defective or worn 	<ol style="list-style-type: none"> 1. Replace (See Sec 4-1) 2. Replace (See Sec 4-1) 3. Replace (See Sec 4-1) 4. Replace (See Sec 4-1) 5. Replace (See Sec 4-1)

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
27. Weak or slow rewind	1. Worn or slipping motor belt 2. Take-up arm clutch not rotating freely 3. Rewind Clutch spring is weak 4. Rewind clutch cork pads slipping	1. Check & replace 2. Check & adjust (See Sec 5-1) 3. Tighten (See Sec 5-5) 4. Replace (See Sec 5-5)
28. No rewind	1. Micro switch #3 and #4 are not activated 2. Defective micro switch 3. Broken supply arm belt 4. Rewind gears not engaged	1. Check & adjust (See Sec 8-1) 2. Replace (See Sec 8-1) 3. Replace (See Sec 5-5) 4. Repair or replace
29. Noisy rewind	1. Rewind gears not fully engaged 2. Worn or defective rewind gears	1. Adjust position of rewind gears activating lever (See Sec 5-5) 2. Replace (See Sec 5-5)
30. Uneven focus	1. Projector not facing screen at right angles 2. Film shoe not seated properly 3. Dirty film shoe or aperture plate 4. Film not seated in the gate 5. Inner guide rails sticking 6. Defective or incorrect lens	1. Correct position for right angle 2. Check & adjust (See Sec 4-5) 3. Clean 4. Check and reload film 5. Remove and clean or replace rail spring (See Sec 4-5) 6. Replace

IV: LAMP CIRCUIT

SYMPTOM	PROBABLE CAUSE	REMEDY
31. Lamp life is abnormally short	<ol style="list-style-type: none"> 1. Poor lamp socket connection 2. Cooling is restricted 3. Defective lamps, or incorrect lamp other than EIKI ELC type 4. Excessive or fluctuating AC line voltage 	<ol style="list-style-type: none"> 1. Replace lamp socket 2. Locate & remove 3. Check & replace 4. Check AC line
32. Insufficient illumination	<ol style="list-style-type: none"> 1. Weak lamp, or incorrect lamp other than EIKI ELC type 2. Hi-low switch in the low position 3. Slow or defective lens 4. Low AC line voltage 5. Improper shutter 6. Light heat shield blocking part of the aperture 	<ol style="list-style-type: none"> 1. Check & replace 2. Switch to Hi position 3. Try another lens 4. Check AC line 5. Check or replace 6. Re-align heat shield

V: SOUND SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
33. No sound and the exciter lamp is not on	<ol style="list-style-type: none"> 1. Amplifier is not turned on 2. Function control not in the #2 or #3 position 3. 9 pin amplifier plug defective 4. Defective exciter lamp 5. Defective exciter lamp socket 6. Exciter lamp fuse blown 7. Slide switch in the mag position 8. Defective amplifier module 9. Defective exciter lamp power supply of the transformer module 10. Film guard switch is actuated or open 	<ol style="list-style-type: none"> 1. Turn on 2. Check 3. Check & repair, or replace. 4. Replace 5. Replace or repair 6. Check & replace 7. Switch to optical 8. Repair or replace (See Sec 4-2) 9. Repair or replace (See Sec 4-4) 10. Check & repair, or replace (See Sec 5-4-B-2)
34. No sound, Exciter lamp is on	<ol style="list-style-type: none"> 1. Amplifier volume is too low 2. Function switch not in the #2 or 3 position 3. Sound muting micro switch defective or not activated 4. 5 pin sound terminal plug disconnected or defective 5. Rear cover speaker unplugged 6. Defective speaker 7. Defective extension speaker jack 8. 2 amp fuse blown 9. Defective solar cell or connections 10. Dirt or foreign object in sound optics 11. Defective amplifier module 	<ol style="list-style-type: none"> 1. Check & adjust 2. Check (See Sec 8-1) 3. Check, replace or adjust 4. Check & replace (See Sec 4-2) 5. Check & plug in 6. Replace 7. Repair or replace 8. Replace 9. Repair & replace (See Sec 4-2) 10. Clean 11. Replace.
35. Poor sound or low volume	<ol style="list-style-type: none"> 1. Incorrect exciter lamp 2. Defective exciter lamp 3. Dirty exciter lamp 4. Dirt in the sound focus lens or defective lens 5. Sound optics incorrectly aligned 6. Low exciter lamp voltage, or low AC supply voltage 	<ol style="list-style-type: none"> 1. Check & replace 2. Replace 3. Clean 4. Clean or replace (See Sec 6-1) 5. Re-align sound pick-up system (See Sec 6-1) 6. Check & repair amplifier exciter lamp supply (See Sec 4-2) Check wall outlet.

— to be continued —

(SOUND SYSTEM)		
SYMPTOM	PROBABLE CAUSE	REMEDY
35. Poor sound or low volume — continued —	7. Weak or defective solar cell 8. Defective speakers 9. Poor film quality 10. Defective amplifier module	7. Replace 8. Replace 9. Check with another film 10. Replace (See Sec 3-2)
36. No sound (magnetic only)	1. Mag/opt switch in the optical position 2. Magnetic head not in contact with the sound track 3. Defective magnetic reproduce head 4. Mag/opt switch defective. 5. Defective amplifier module	1. Check 2. Check & adjust (See Sec 6-2) 3. Replace (See Sec 6-2) 4. Replace 5. Replace
37. Poor sound or low volume (magnetic only)	1. Dirty magnetic head 2. Head not making good contact with the film 3. Incorrect sound head alignment 4. Defective magnetic head 5. Defective speaker 6. Poor sound track 7. Defective amplifier module	1. Clean 2. Adjust (See Sec 6-2) 3. Align (See Sec 6-2) 4. Replace 5. Replace 6. Check with another film 7. Replace or repair (See Sec 4-2)
38. Exciter lamp fuse blows	1. Excessive AC line voltage 2. Incorrect fuse 3. Incorrect exciter lamp 4. Defective exciter lamp power supply 5. Defective exciter lamp 6. Defective exciter lamp socket	1. Check 2. Check & replace 3. Replace 4. Check & repair (See Sec 4-2) 5. Replace 6. Replace
39. Amplifier fuse blows	1. Incorrect fuse 2. Improper connection to an external speaker system 3. Defective amplifier module	1. Check & replace 2. Check 3. Repair or replace (See Sec 4-2)
40. Excessive amplifier hum (optical)	1. Defective exciter lamp supply 2. Improper connection to external speaker system 3. Defective solar cell or connections to amplifier 4. Front or rear cover speaker jacks not insulated from the chassis properly. 5. Defective amplifier module	1. Check voltage & repair (See Sec 4-2) 2. Re-connect correctly 3. Check & repair 4. Check & repair 5. Repair or replace (See Sec 4-2)

(SOUND SYSTEM)		
SYMPTOM	PROBABLE CAUSE	REMEDY
41. Excessive Hum (magnetic)	<ol style="list-style-type: none"> 1. Motor shield not installed 2. Defective magnetic head 3. Magnetic head not in contact with the film 4. Poor shielding to the head or the head coil shorted to the projector's frame. 5. Improper connection to external speaker 6. Poor film recording 7. Defective amplifier module 	<ol style="list-style-type: none"> 1. Check 2. Replace (See Sec 6-2) 3. Adjust 4. Repair 5. Re-connect correctly 6. Check with another film 7. Repair or replace (See Sec 4-2)
42. Excessive wow and flutter	<ol style="list-style-type: none"> 1. Flywheel is not installed 2. Insufficient flywheel plate spring tension 3. Buzz pinch roller not riding parallel to the sound drum 4. Buzz pinch roller tension spring insufficient 5. Tension roller spring is weak, or too strong 6. Uneven take-up torque 7. Rear dampening roller tension is weak 8. Defective sound drum bearings 9. Any film path rollers not rotating freely 10. Any drive gears rotating eccentrically 11. Uneven contact of film sound track 12. Film contacts the lower loop setter roller 13. Excessive film lubricant 	<ol style="list-style-type: none"> 1. Check & install 2. Adjust by bending or replace (See Sec 5-6) 3. Adjust & correct (See Sec 5-4-B-6) 4. Adjust or replace (See Sec 5-4-B-6) 5. Adjust or replace (See Sec 5-4-B-7) 6. Repair & adjust (See Sec 5-1) 7. Adjust or replace spring 8. Replace (See Sec 5-6) 9. Check & lubricate (See 2-3) 10. Check & adjust, lubricate (See 2-3) 11. Check & adjust (See Sec 5-4) 12. See loop setter adjustment (Sec 5-3) 13. Clean film and film path

1-1: MECHANICAL SYSTEM

The EIKI SLOT-LOADING projector is controlled by a single lock-out Rotary Function Switch. When the rotary function switch is positioned at;

"STOP": Film path is fully open. Holding the film by the finger tips, beginning at entrance guide #1, pull the film along the slot path as indicated by the orange arrows. Attaching the film to the take-up reel completes the film loading.

Turn Function Switch To;

"MIC": Film path is now closed. Film perforations and No. 1, and 2 sprockets, cam claw are engaged and the upper and lower loops have been formed. The PA (Public Address) system can be used at this position.

"2": Motor runs advancing the film forward.

"3": Projection lamp is on for forward projection.

"STOP": Motor is off and the film stops.

Turn Function Switch counter-clockwise to;

"⊙": Rewinds the film through the film path. Conventional rewinding from reel to reel can also be done.

1-2: ELECTRICAL SYSTEMS

EIKI SL II-series projectors are available for voltages ranging from 100V, 110V, 120V, 220V and 240V. 110/220V and 120/240V dual voltage models are also available. According to the electrical safety regulations of various countries, UL (USA), CSA (Canada), VDE (Germany), SEV (Switzerland), SAA (Australia), SEMKO (Sweden), NEMKO (Norway), FEMKO (Finland), DEMKO (Denmark), specific models are manufactured to meet such regulations, including the option of 50Hz, 60Hz, 50/60Hz operation.

Power Transformers vary according to the voltage range and also to the electrical safety requirements of each country. The secondary windings of all transformers provide 8V AC to the pilot lamp and exciter lamp circuits, 36V AC to the amplifier,

24V AC (high) and 22V AC (low) to the halogen projection lamp.

Motor ON/OFF, Lamp ON/OFF and Rewinding can be controlled by the function switch which consists of a cam bracket and 4 micro switches. The function switch cam also mutes the audio during rewind and the "STOP" or threading position.

The projection lamp is a HALOGEN ELC type 24V 250W. Inside of the lamp house is a "high-low" switch to help extend the lamp life. In the "high" position average lamp life is approximately 50 hours and at the "low" position about 150 hours.

NOTE: The HALOGEN LAMP EIL type 24V 200W may also be used with some reduction in light output.

The motor is an induction type with capacitor. Motors are available for all the voltage ranges.

Transformers and motors are simple and easy-to-replace modules. AC power cords, line terminals, and all other electrical parts are designed to meet the safety requirements of the individual countries listed.

1-3: SOUND SYSTEM

EIKI SLII-series models are designated according to the sound playback capabilities and front cover extension speakers.

Optical Playback only: Model SL-0, SL-1

Optical & Magnetic Playback: Model SL-02, SL-2

(Note: EIKI SL II-series does not offer a magnetic recording model.)

Model SL-1, and SL-2 are standard with two (4 ohm, 12.5cm) speakers built-in the front cover, also with one (8 ohm, 12.5cm) speaker built-in the rear cover.

Model SL-0 and SL-02 are standard with one (8 ohm, 12.5cm) speaker only built-in the rear cover.

The standard amplifier modules for the SL-0 and SL-1 are optical sound reproduction only.

Standard amplifier modules for the SL-02 and SL-2 are capable of both optical and magnetic sound reproduction.

321-2: SERVICE PROCEDURES

SL II Series
(2-2)

2-1: PRECAUTIONS

1. EIKI SL II-series projectors have been designed for the ultimate in simplicity, and ease of service and repair. Each screw is very important, and when servicing or reassembling the projector, screws should not be omitted or carelessly lost. All screws should be firmly tightened to assure reliable projector operation after disassembly.
2. When lubricating the projector's plastic parts, silicone oil or grease should be used. Other types of lubricants may harm plastic 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.

2-2: TOOLS AND TEST EQUIPMENT

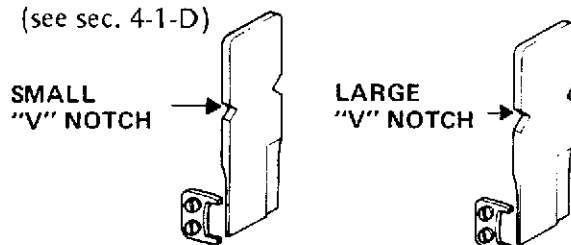
- A. Tools: When servicing EIKI SLII-series, ordinary ISO (Phillips type) screw drivers and single-bladed screw drivers should be enough. (EIKI Screw Driver Kit, P/N 5615 are available.)
- A Molex extractor tool is most useful when replacing the pins of nylon connectors to transformer or motor.

B. Special Tools:

EIKI SLII-series have been designed so that no special tools should be required to service the projector. However, several special tools are available to speed up adjustments and maintain a closer consistency between the projectors.

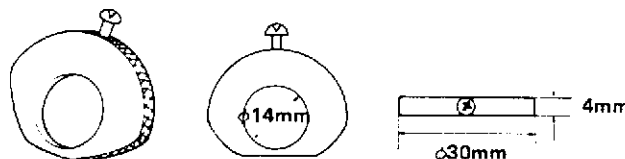
Tool No. 320-01T

Cam Claw Protrusion Tool
(see sec. 4-1-D)



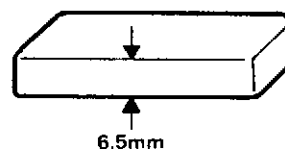
Tool No. 320-02T

Sound Lens Adjustment Tool
(see sec. 6-1-B)



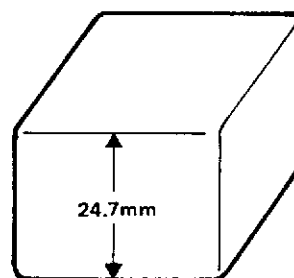
Tool No. 321-03T

Loop Setter Roller Position Tool
(see sec. 5-3-B1)



Tool No. 321-04T

Tension Roller Position Tool
(see sec. 5-4-B7b)



C. Test Equipment

A limited amount of test equipment is required for routine maintenance and modular replacement. However, 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 Metter
- 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

2-3: LUBRICANTS & LUBRICATION CHARTS

Apply a few drops after every 500 operating hours.

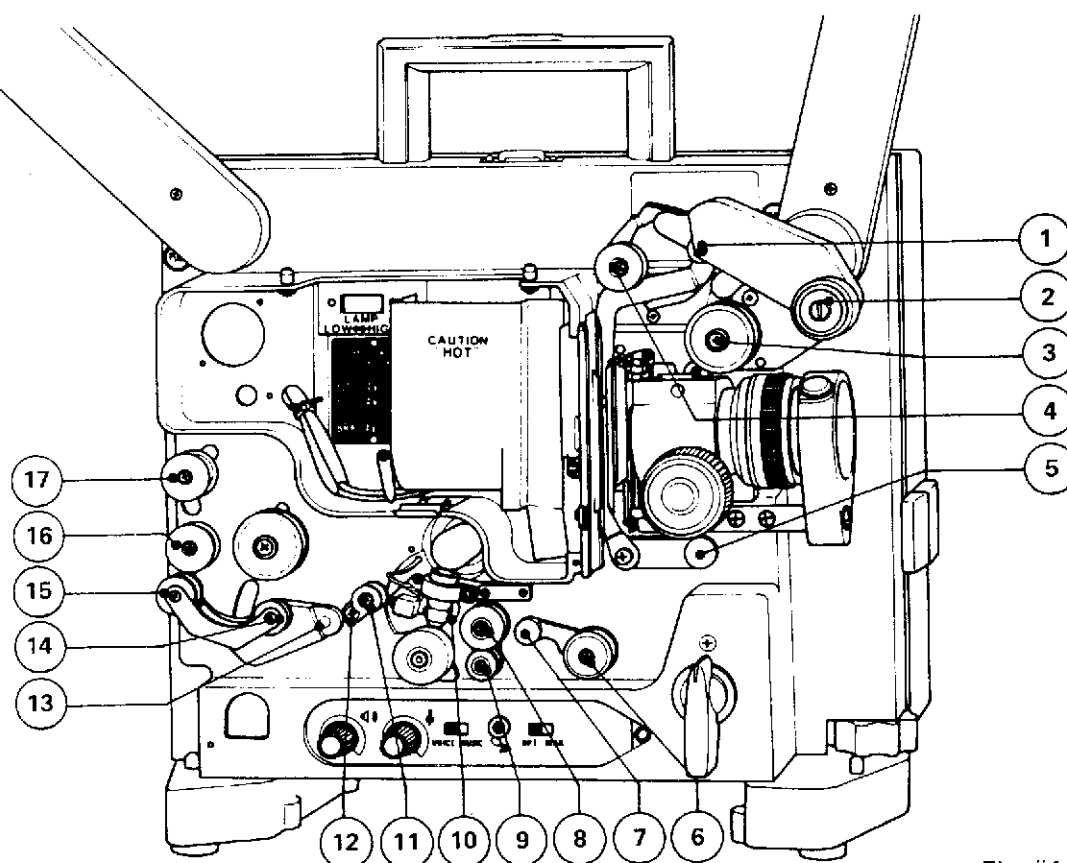


Fig. #1

ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT	EIKI PART #	ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT	EIKI PART #
1	#1 Sprocket Shoe Guide Roller 14mm ϕ Hole (320-15731)	Silicone Oil #10	5632	9	Buzz Roller Arm Fulcrum (321-17421)	Molybdenum Disulfide Grease	5628
2	#1 Guide Roller Hole (320-17551)	Molybdenum Disulfide Grease	5628	10	Mag. Head Arm Fulcrum (321-40501)	Petroleum Oil	5631
3	#1 Sprocket Drum Shaft (320-15301)	Petroleum Oil	5631	11	Tension Guide Roller 13.5mm ϕ Hole (321-17571)	Silicone Oil #10	5632
4	Upper Loop Forming Guide Roller Hole (320-17551)	Molybdenum Disulfide Grease	5628	12	Tension Guide Roller Arm Fulcrum Pin (321-17851)	Silicone Oil #100	5629
5	Set Arm Fulcrum Pin (320-17211)	Silicone Oil #100	5629	13	#2 Sprocket Shoe Arm Fulcrum (320-16501)	Silicone Oil #100	5629
6	Lower Loop Setter Roller Hole (320-18021)	Molybdenum Disulfide Grease	5628	14	#2 Sprocket Shoe Guide Roller 14.5mm ϕ Hole (320-16221)	Silicone Oil #10	5632
7	Lower Loop Setter Arm Fulcrum (320-18501)	Silicone Oil #100	5629	15	#2 Sprocket Shoe Larger Roller Hole (320-17561)	Silicone Oil #10	5632
8	Buzz Roller Hole (321-17411)	Molybdenum Disulfide Grease	5628				

2-3: LUBRICANTS & LUBRICATION CHARTS

SL II Series
(2-3)

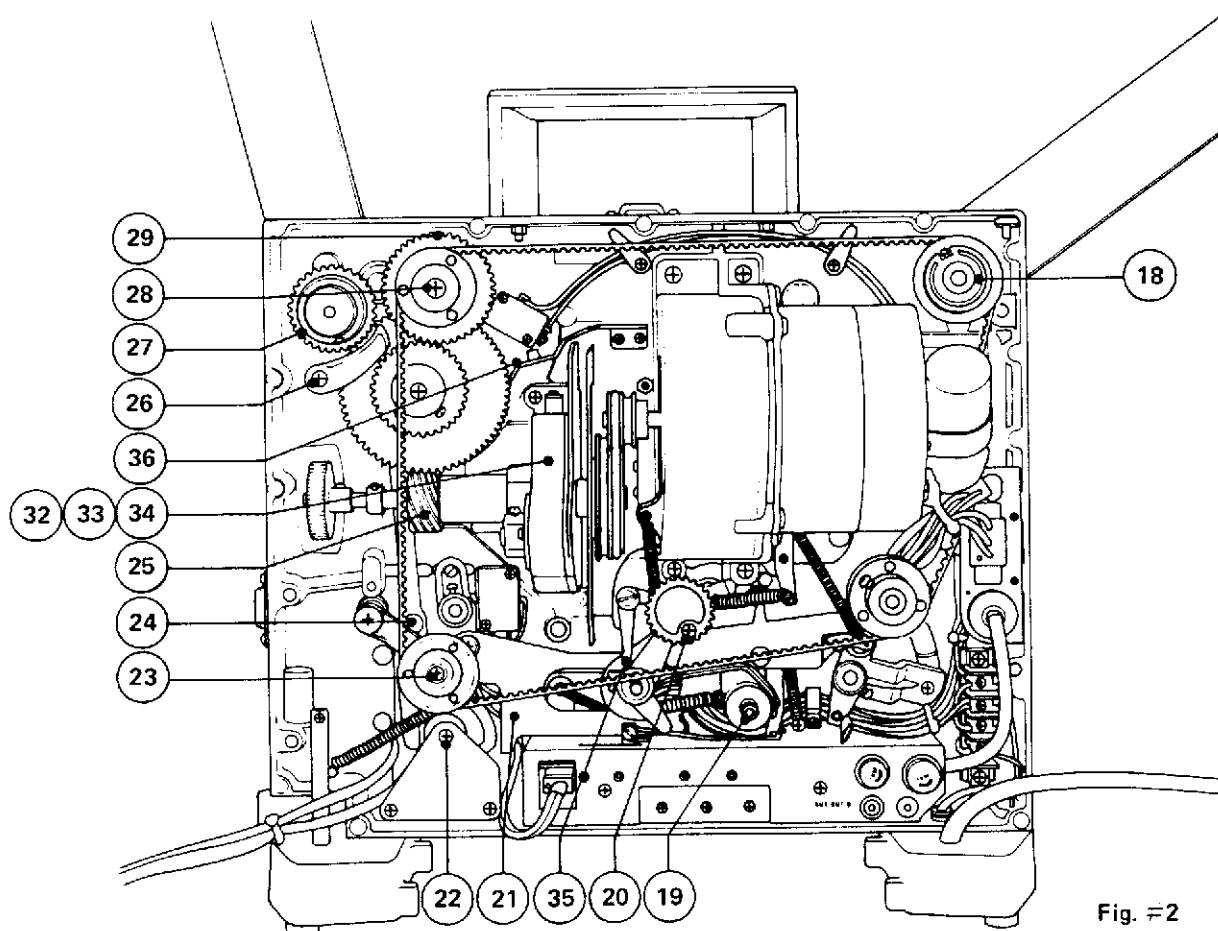


Fig. #2

ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT PART #	ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT PART #		
16	#2 Sprocket Shoe Guide Roller Hole (320-17441)	Molybdenum Disulfide Grease	5628	28	Idler Gear Shaft (320-15291)	Molybdenum Disulfide Grease	5628
17	Rear Dampening Tension Roller Hole (320-17441)	Silicone Oil #10	5632	29	Idler Gear (320-15401)	Molybdenum Disulfide Grease	5628
18	Take-Up Arm Drive Gear (320-14501)	Silicone Oil #100	5629	30	Supply Arm Spindle Shaft (320-13201)	Petroleum Oil	5631
19	Flywheel Hole (320-41051)	Silicone Grease	5625	31	Take-Up Arm Spindle Shaft (320-14201)	Petroleum Oil	5631
20	Loop Setter Gear Hole (320-18072)	Silicone Oil #100	5629	32	Cam Tank Module (320-11001)	Molybdenum Disulfide Grease	5628
21	Function Main Interlocking Bracket, at each contact (321-17091)	Silicone Grease	5625	33	Cam Tank Felt (320-11661)	Molybdenum Disulfide Grease (or Oil)	5628 (5632)
22	Function Rotary Switch Shaft Supporting Plate (320-60711)	Molybdenum Disulfide Grease	5628	34	Cam Tank Fulcrum Pin (312-11051)	Petroleum Oil	5631
23	Tension Gear Hole (320-15601)	Silicone Oil #100	5629	35	Loop Setter Interlocking Arm Fulcrum (320-18661)	Molybdenum Disulfide Grease	5628
24	Rewind Push Lever Slotted Hole (320-19311)	Silicone Grease	5625	36	Film Guard Plate Spring (321-17451)	Silicone Grease	5625
25	Wrom Gear assy (320-11501)	Silicone Grease	5625				
26	Rewind Control Arm Fulcrum (320-19121)	Silicone Grease	5625				
27	Rewind Drive Gear (320-13511)	Silicone Oil #1000	5630				

2-4: TROUBLE SHOOTING HINTS

A. There are four basic steps to trouble shooting this projector:

- Analyze the symptom
- Localize the trouble to a functional system or module
- Replace or repair that system or module
 - Isolate the trouble within the module
 - Locate and repair the specific trouble

B. Checking Semiconductors With A VOM:

- Set the ohms scale to $R \times 10$
- The forward resistance should be low
- The reverse resistance should be high
(See NOTE after Sec. D)

TRANSISTOR NPN TYPE (2SC, 2SD)

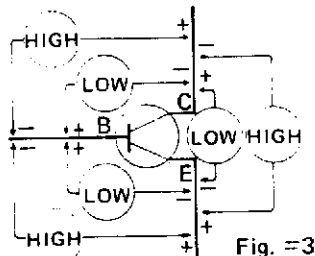


Fig. #3

TRANSISTOR PNP TYPE (2SA, 2SB)

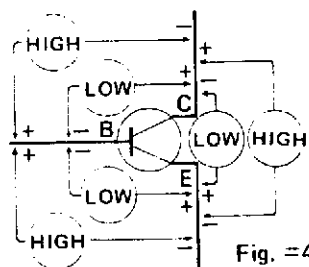


Fig. #4

Typical Amplifier Test Set-Up

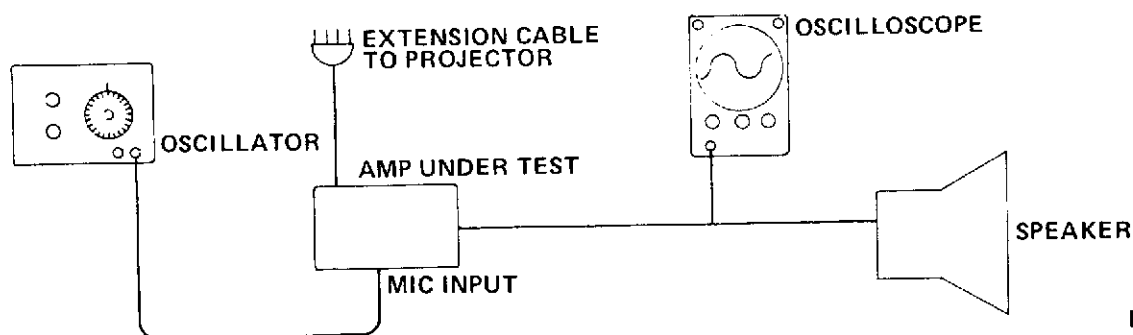


Fig. #6

DIODES

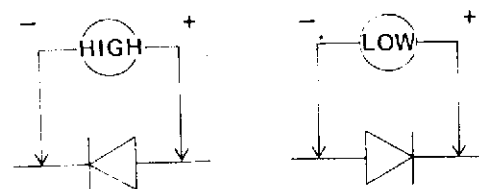


Fig. #5

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-1a through IC-1b and to IC-2.

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. (Fig. #6)

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 semiconductor accurately. A skilled technician will know this but an unskilled technician may be helped by making the VOM check and repairing the amplifier in case of shorted or open transistor.

321-3: MODULE REMOVAL AND INSTALLATION PROCEDURES

SL II Series
(3-2)

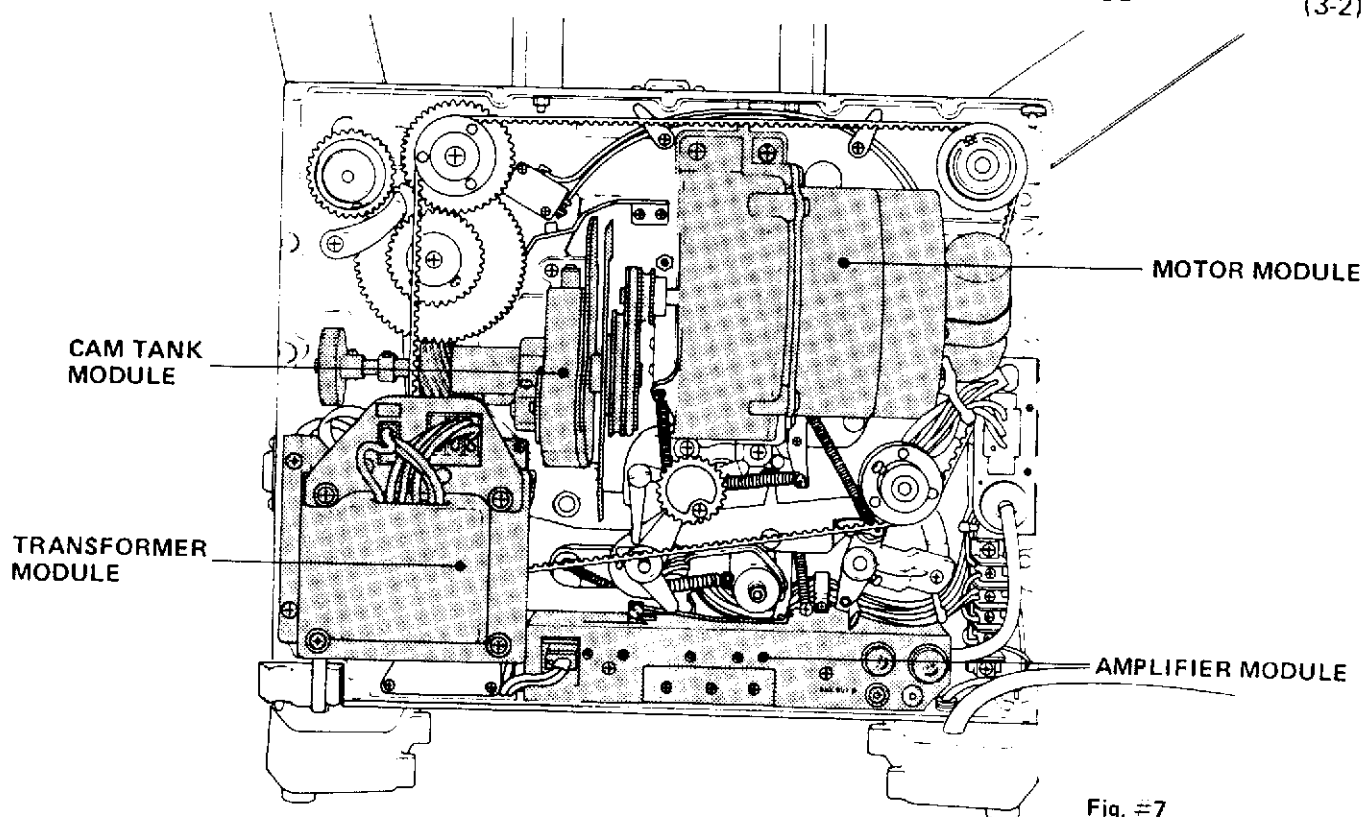


Fig. #7

3-1: CAM TANK MODULE

1. Turn function switch to "MIC" position.
2. Remove transformer module. (See Sec 3-4)
3. Remove motor belt, main drive belt. To remove main drive belt, it is easier with the function switch at "STOP" position.
4. Unscrew the 2 screws supporting the cam tank.
5. Remove cam tank slowly and carefully. Claw should not touch the main casting or any other metal parts.
6. Re-installation can be done by reversing the above procedure. Checking the adjustment of claw and No. 2 sprocket teeth timing is necessary and critical. See section No. 321-4-1. Also check loop setter timing adjustment, See section No. 321-5-3.

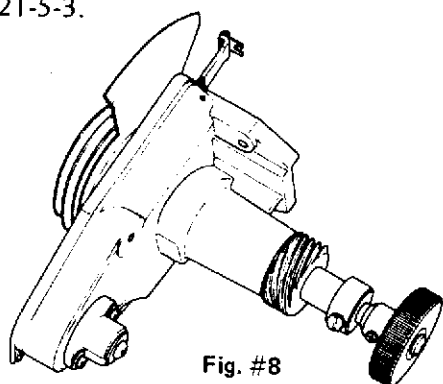


Fig. #8

3-2: AMPLIFIER MODULE

1. Remove flywheel.
2. Unplug the rear cover speaker cord.
3. (for SL-02, SL-2 models only) Unscrew the shoulder screw hooking up the OPT/MAG switch lever, and remove the lever.
4. Unplug 5 pin sound terminal connector.
5. Unplug MT 9 Pin socket.
6. Amplifier is hooked by the two screws. Push in on the amplifier's chassis, allowing the edge of the chassis to release from under the two screws mounted in the bottom of the casting. Sometimes a slight pry with a flat blade screw driver may be necessary to remove a stubborn amplifier. Slide the amplifier out.

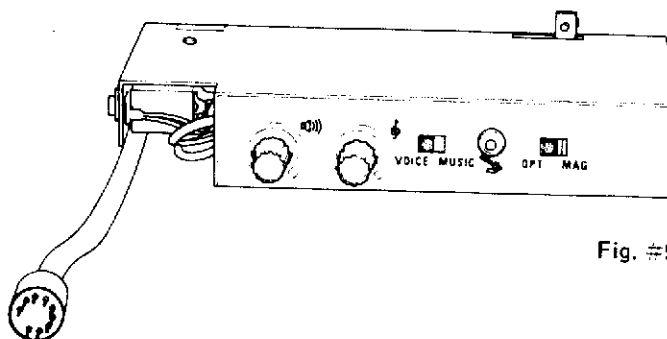


Fig. #9

3-3: MOTOR MODULE

1. Remove motor belt.
2. Disconnect motor nylon connector(s).
3. Unscrew 3 screws.
4. Remove motor module.
5. To re-install reverse the above procedures.
Don't forget to reset the nylon connector(s).

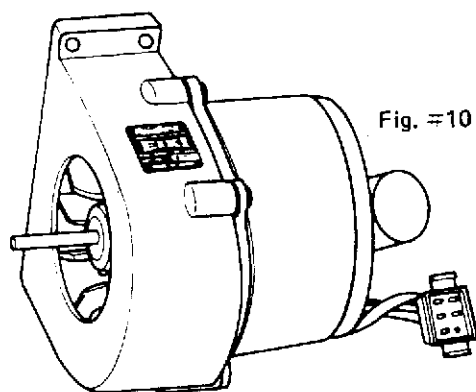


Fig. #10

3-4: TRANSFORMER MODULE

1. Unplug nylon connectors.
2. Unscrew 3 screws.
3. To re-install reverse the above procedures. (Care should be taken that the wires are routed away from any moving parts of the projector)

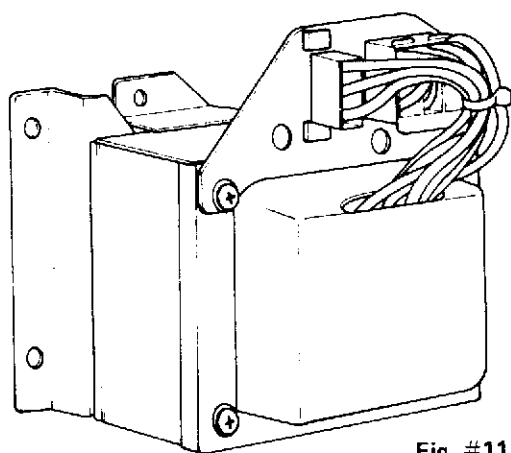


Fig. #11

3-5: FILM SHOE AND BRACKET ASSY, LENS HOLDER ASSY, FILM GATE ASSY.

(A) Film Shoe and Bracket Assy.

1. Set function rotary switch at "STOP" position.
2. Remove the lens holder cover plate assembly.
3. Pull from the top of the film shoe bracket.
4. To re-insert the film shoe and bracket assy., slide the pin into the lower slot of the reception bracket and swing the film shoe and bracket assy. into the upper slot until the plate spring latches it in place (Fig. #12)

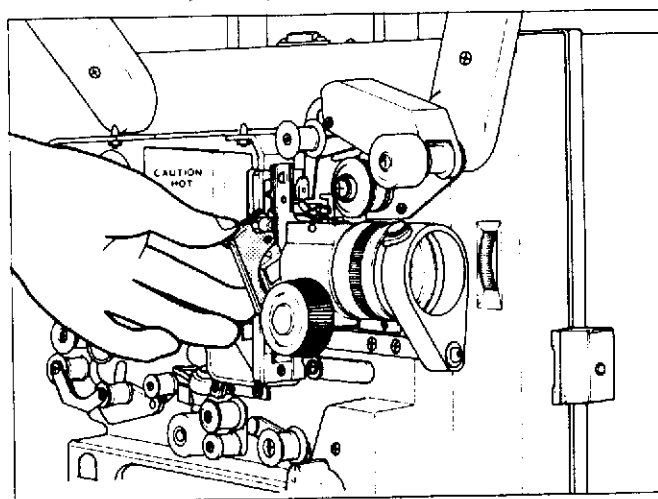


Fig. #12

(B) Lens Holder assy.

1. Remove the lens holder cover plate assy.
2. Rotate the lens focus knob and advance the lens until rear of the lens clears the film shoe.
3. Unscrew the mounting screws (1 on the top, 2 at the bottom).
4. To re-install, reverse the procedure. (Fig. #13)

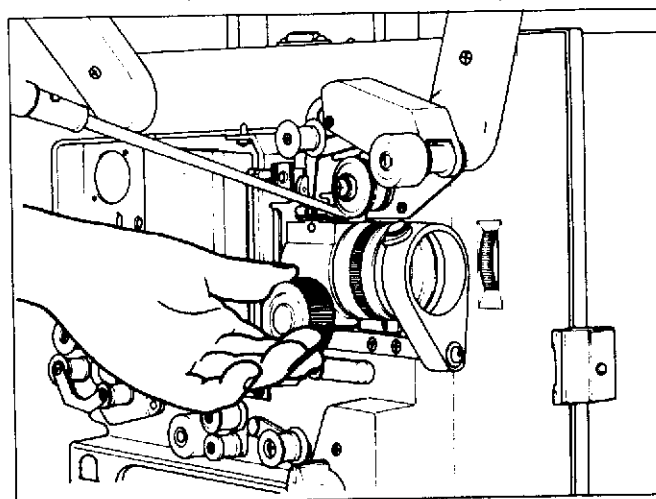


Fig. #13

(NOTE: For USA and Canada type models, anti-theft lock screw is mounted)

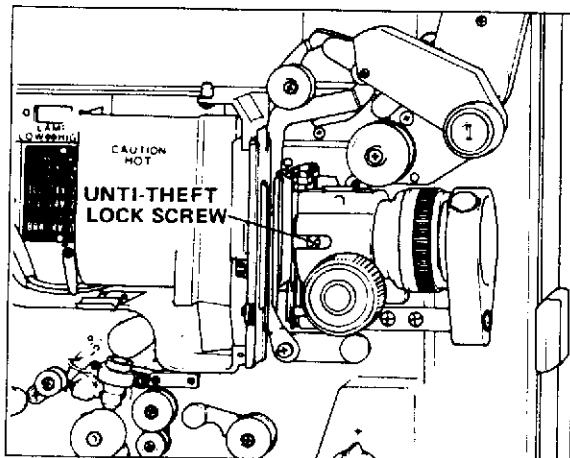


Fig. #13-A

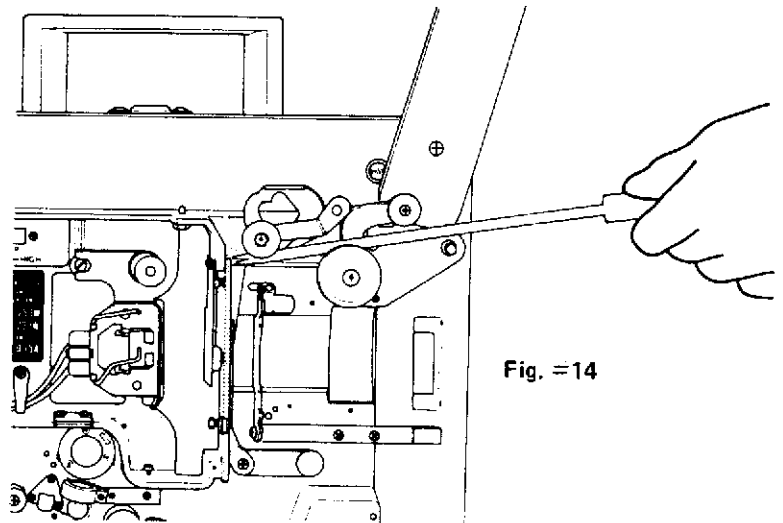


Fig. #14

(C) Film Gate Assembly

1. Remove the No. 1 sprocket shoe roller bushing.
2. Turn function switch to "MIC" position, while holding the larger shoe roller intending to come down. Keep holding the larger shoe roller, turn function switch to "STOP" position and remove the No. 1 film guide.
3. Using a long screw driver, unscrew the top and the bottom mounting screws. Care should be taken not to touch the claw.
4. Remove the side pressure control lever.
5. To re-install, reverse the above procedures.

(Fig. #14)

NOTE: Care should be taken to insure that the Inner Guide Rail interlocking system is working properly. (See Section No. 321-5-4).

321-4: MODULE REPAIR AND ADJUSTMENTS

4-1: CAM TANK MODULE

A. Specifications

1. Revolution
24 FPS. 1440 RPM.
18 FPS. 1080 RPM.
2. Cam Claw Protrusion MIN. 1.0mm — MAX.
1.2mm (.040" to .045")
3. Claw Pitch 7.64 — 7.67mm
4. 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. Disassembly of Cam Tank (Fig. #15)

1. Unscrew the screw (45) at the end of the cam shaft (3).
2. Remove shutter pulley (42) and the shutter blade (40).
3. Unscrew three screws (39) and remove cover plate (38).
4. A hole in the curved plate spring (24) fits over fulcrum control pin (14). Unscrew the screw (21) and remove curved plate spring.
5. Unhook the claw lever spring (32), and remove claw lever assy. (25).
6. To remove cam (9) and cam plate (8), unscrew the three set screws (10).
7. To remove cam shaft assy., remove inching knob (6) and worm gear (4).
8. To replace the cam tank bearings, the inner bearing is pressed on the cam tank shaft and should be replaced as part of the cam shaft bearing assy.
9. Clean all the old dried molybdenum grease from the cam tank.

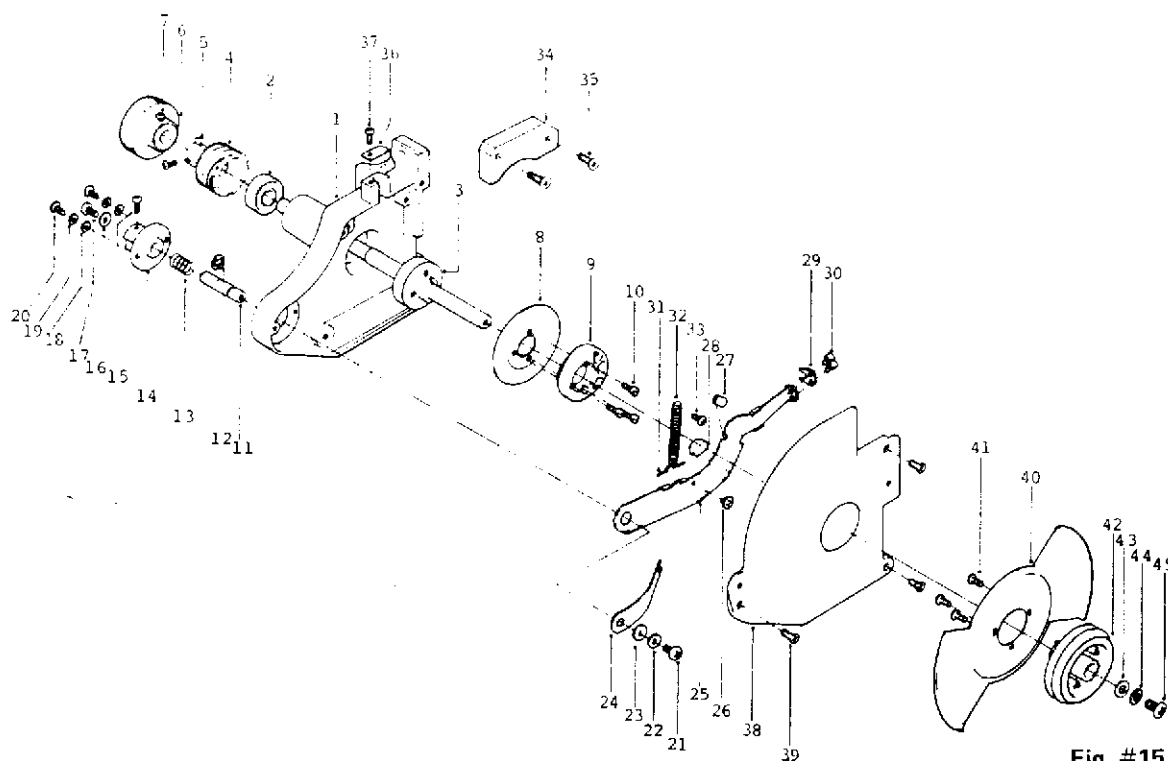


Fig. #15

C. Reassembly Of Cam Tank By Reversing The Above Procedure

1. Make sure curved plate spring is not jammed between the end of fulcrum pin and washer (22) ST-11231.
2. The cam shaft should have no end play.
3. Worm gear is mounted without any clearance between the cam tank bearing.
4. No end play is allowed for the ball bearings on the cam shaft.
5. When overhauling the cam tank, it is suggested that the felt oil pad be replaced.
6. Re-lubricate the cam area with a small amount of molybdenum disulfide grease and moisten the felt with a few drops of molybdenum oil.
7. When mounting the 2 bladed shutter, it automatically lines up correctly. However, a 3-bladed shutter can be positioned 180° out of synchronization. (see Sec 321-4-1-F).

D. Adjustments

1. Claw Protrusion

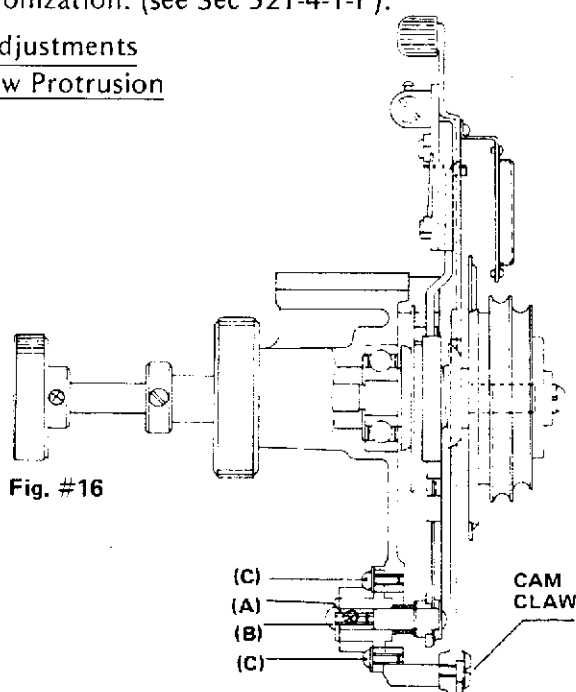


Fig. #16

- a. Claw protrusion can be adjusted by the fulcrum collar. As the sliding pin 312-11181 wears, the protrusion will increase.
- b. Loosen set screw (A) by 1/8 of turn as indicated in Fig. #16 & 17.

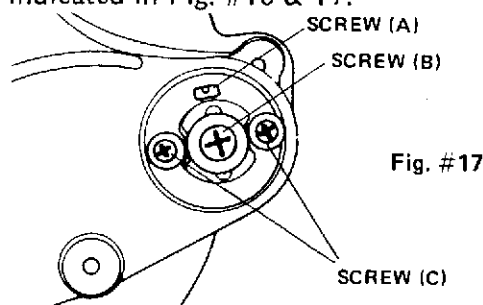
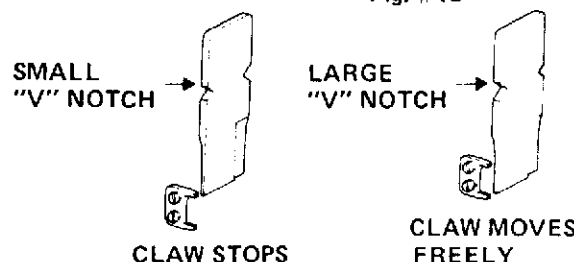


Fig. #17

- c. Turn screw (B). Loosening screw (B) (counter-clockwise) increases the claw protrusion. Tightening the screw (B) (clockwise) decreases the claw protrusion.
- d. Checking claw protrusion using Tool No. 320-01T (Fig. # 18), or equivalent.
 - (1) Set the function switch at "MIC" position.
 - (2) Remove Lens Holder Cover Plate.
 - (3) Remove Film Shoe and Bracket Assy.
 - (4) Attach the tool between the inner guide rail and the outer guide rail.
 - (5) With the edge-side that has the smaller "V" notch and claw protrusion should be enough to touch.
 - (6) Change to the side that has the larger "V" notch and the claw should move freely.

Fig. #18



- e. When using another type of claw protrusion gauge of similar specifications as (321-4-1-A), disregard Item (D) and follow the instructions associated with that gauge.

2. Claw Position And Framing Adjustments:

- a. If the claw does not enter the center of the film perforations, or if the framing adjustment is insufficient, the claw position should be adjusted. This adjustment can be either horizontal or vertical. To adjust, slightly loosen the two screws (C) of the fulcrum assy shown in Fig. #17.

- (1) Framing Adjustment: This is best accomplished with the projector running, showing a shop test film. With the framing control lever in the up position, the frame bar of the film should appear as in Fig. #19 and in the down position the frame bar should appear as in Fig. #20.

Fig. #19



Fig. #20



- (2) If the conditions in step 1 are not correct, adjust the vertical or up and down position of the fulcrum assy. by slightly loosening screws (C) (Fig. #17) The fulcrum assy. requires only a very small movement to effect the framing position.

NOTE: If framing range as indicated cannot be reached, check for a worn cam follower (or cam gliding pin. 312-11641)

- (3) Checking Position For Correct Alignment With The Sprocket Holes: To view the claws position in the sprocket holes, thread a strip of good film. Remove the film shoe and bracket assy. With a standard 50mm (2") lens installed, look through the lens. Focus and rotate the inching knob while observing the claw position in the film sprocket holes.
- (4) Fig. #21 Indicates the correct position of the claw just before the start of the pull-down. Fig. #22 indicates the position after completion of the pull down.
- (5) To adjust the claw position, move the fulcrum assy. horizontal and slightly vertical until the distances a, b, c, d are equal as indicated in Fig. #21 & 22. Upon completion of the position adjustment, tighten the fulcrum assy. screws and re-check the framing range with the projector running.

Fig. #21
BEFORE PULL DOWN

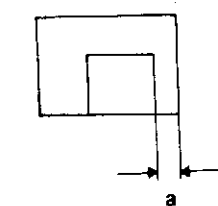
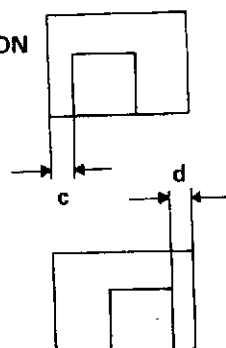
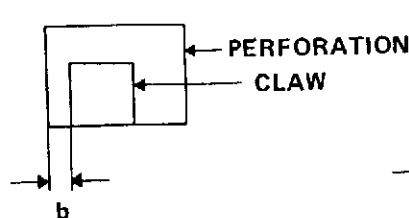


Fig. #22
AFTER PULL DOWN

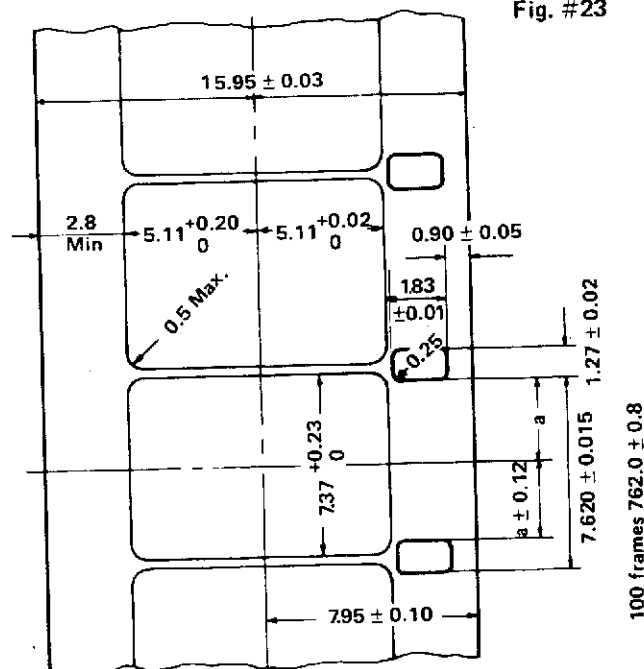


E. Replacing The Claw

When replacing a worn or defective claw, it is important to mount the claw correctly before securing the mounting screws. Incorrect claw mounting may result in excessive film gate noise or unsteady picture.

International Dimension of the 16mm Film

Fig. #23



1. Correct Claw Pitch

- The International dimensions of the 16mm film are shown in Fig. #23. Claw pitch is set at 7.64 – 7.67mm. A pitch less than 7.64mm will cause the claw to engage the film between perforations possibly causing film damage or unsteady pictures.
- A pitch more than 7.67mm will cause excessive gate noise. Typical film perforation should have a pitch of 7.605 – 7.635mm, but older films may have a smaller pitch due to shrinkage.
- The claw as shown in Fig. #24 has a 5° angle at the top tooth, and should the claw pitch become larger than the pitch of the perforations, this would help prevent any film damage.

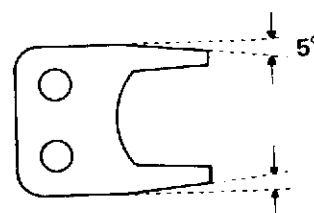
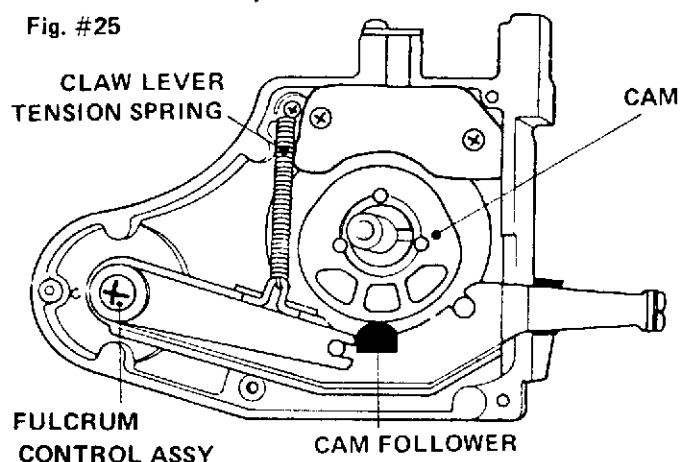


Fig. #24

2. Adjusting of The Claw Pitch

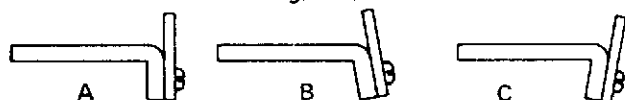
- a. Moving the fulcrum control assy: Fig. #25 shows the correct position between the cam and the cam follower (cam gliding pin, 312-11641). The contact point of the cam follower with the cam will change the pitch. Moving the fulcrum control assy. to the left decreases the pitch and moving it to the right increases the pitch.

Fig. #25



- b. The fulcrum control assy. should only be moved slightly. Too much adjustment will cause the claw to hit the sides of the film perforations causing film jitter.
- c. Correct claw angle is shown in Fig. 26-A. Under some circumstances a bent claw lever as shown in Fig. #26-B and -C may have to be corrected by straightening out the claw.

Fig. #26



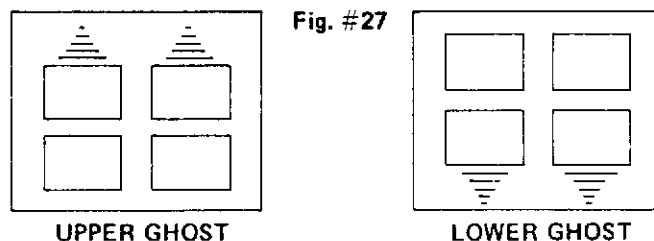
3. Claw Lever Tension

(See Fig. #25)

The claw lever tension force should be from 1.2 to 1.25kg when the spring is stretched to the maximum travel of the claw lever arm. If the tension is too weak, the cam follower may float off the cam surface causing excessive gate noise and an unsteady picture. On the other hand, if the spring is too strong the cam follower may wear out prematurely or cause a slight hesitation to the claw lever when the projector is initially started. To obtain the correct tension it may be necessary to replace the spring. A slight adjustment can be made by stretching the spring if necessary.

F. Changing Shutter Blades

Fig. #27



Two, three and five bladed shutters can be mounted on the shutter pulley. The mounting holes used to secure the blades to the pulley allow a small adjustment for shutter blade timings. Incorrect shutter timing results in what is commonly called "travel ghost". The adjustment is accomplished using the SMPTE test film and adjusting the blade position for minimum upper or lower image movement as shown in Fig. #27. Since the adjusting screws are only accessible with the cam tank removed, this becomes a trial and error adjustment. However, the skilled technicians can accomplish this in one or two adjustments.

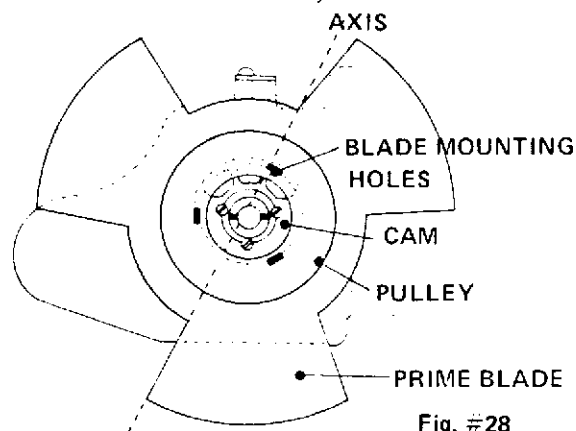


Fig. #28

Fig. #28 Illustrates the correct position for installing and adjusting the shutter blades.

To position the blade correctly, rotate the cam tank until the large lobe with the three holes is at the top, and the pulley keyway is parallel to the bottom of the cam tank case. Install the pulley an blade with the edge of the prime blade (bottom blade) along the axis as indicated by the dashed line. The curved edge of the blades should curve away from the cam tank.

If the blades have been removed from the pulley it may be necessary to reposition the blade on the pulley to achieve this synchronization. In each case, position the blades with the curved edge away from the cam tank, and the prime blade in line with the axis.

4-2: AMPLIFIER MODULE

Refer to Amplifier Circuit Diagrams for the following:

A. Specifications

1. Solid State, "1" IC "8" transistors
2. Output Power: 15 watts RMS 8 ohm load
3. Distortion: Less than 5% at 400Hz
Less than 3% at 1KHz
4. Wow & Flutter: Less than 0.2% WRMS.
5. Frequency Response:
Optical 50Hz – 7000Hz ± 4 db
Magnetic 50Hz – 12000Hz ± 4 db
6. S/N ratio of the amp: 60db
7. MIC input impedance: 600 ohm and up (Hi Z)
8. MIC input level: 10mv max.
9. Speaker Jacks: 8 ohms
10. Aux output: 10K ohm Hi z, 130mv nominal

B. Amplifier Power Supply Circuit

AC power to the amplifier is supplied from the 36V AC secondary windings of the transformer through pins #1 & #2 of the 9 pin socket (MT-9P), dual diodes D6 & D7 for a bridge rectifier, filtered by capacitor C-28 providing the amplifier voltage of approximately 49V DC. The 8V AC transformer secondary winding supplies AC exciter lamp voltage through pins #4 & #5 of the 9 pin socket. Dual diodes D4, D5 form a bridge rectifier which is filtered by capacitor C33, C32, C34 are ripple filters regulating the base input voltage to TR7. R45 is a current sense resistor serving as feedback to TR7's base. TR7 acts as a series regulator with a voltage sense from TR8 to maintain the 3.5 volt DC exciter lamp voltage.

In magnetic playback the base input voltage to TR7 is held at 0V, turning TR7 "OFF". 3.5 volt DC Exciter Lamp voltage is routed through pins #8-9 of 9 pin socket to the exciter lamp.

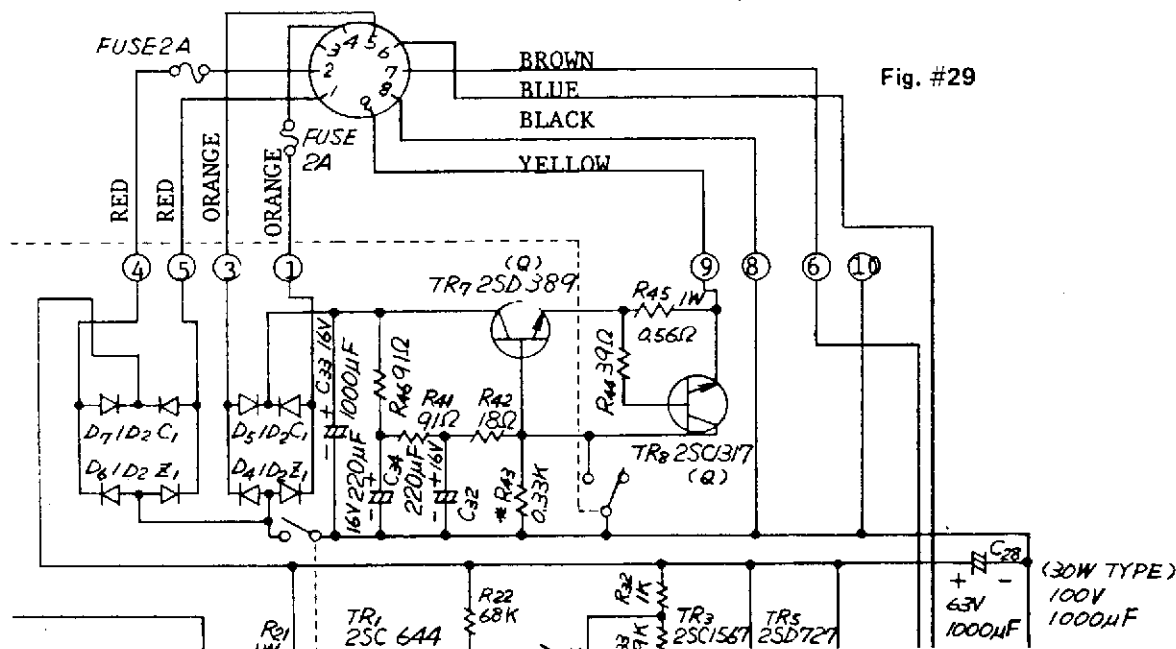














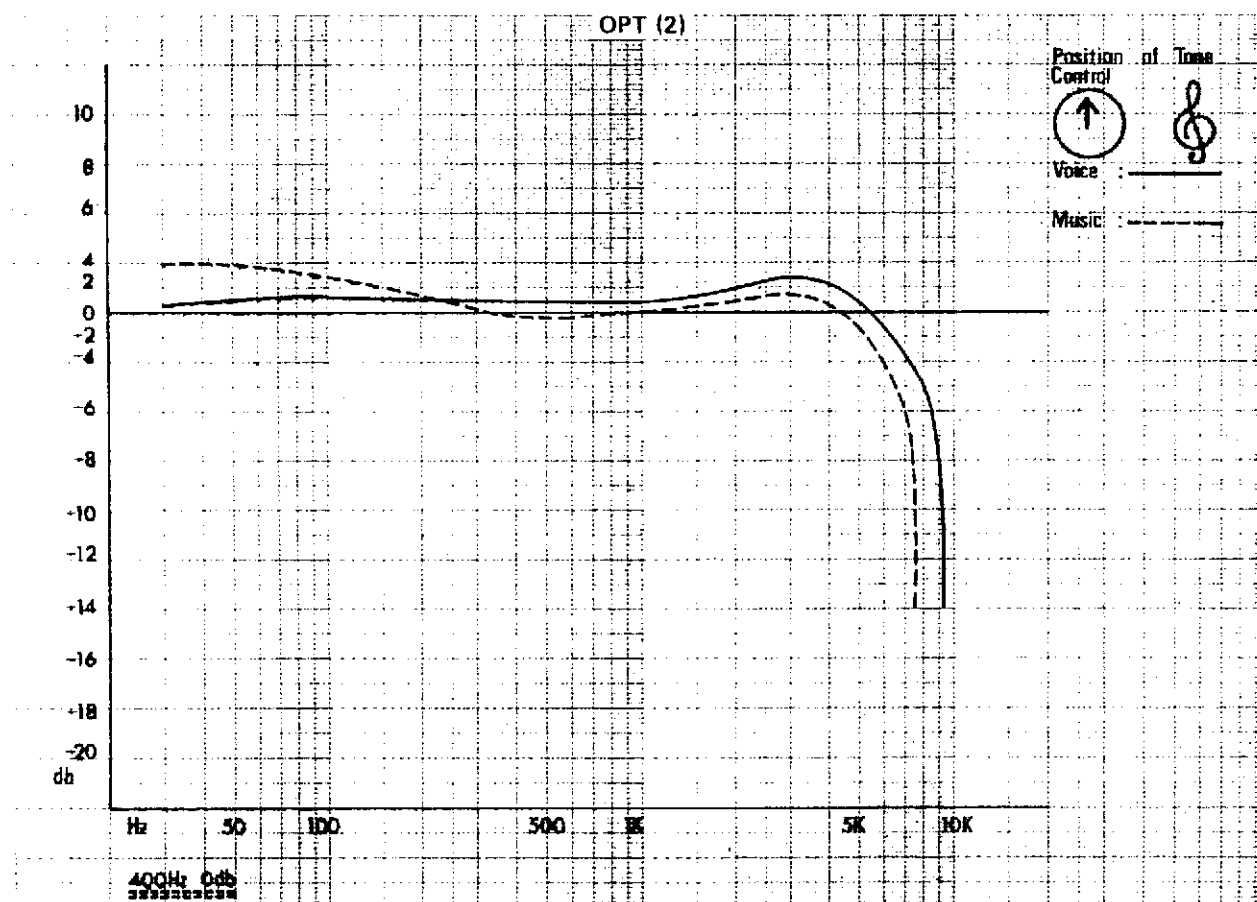
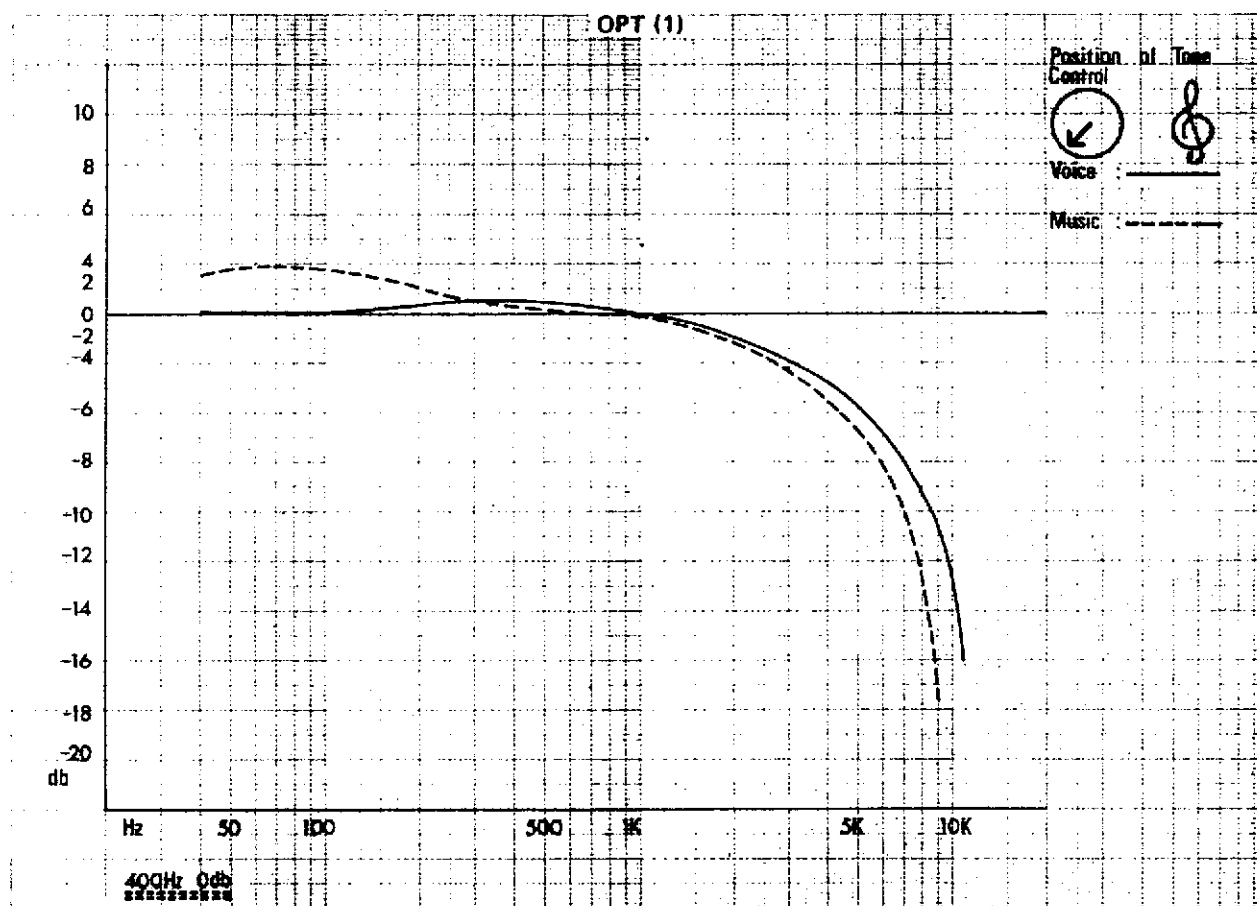
Fig. #29

D-3: SL II-series Amplifier Frequency Response

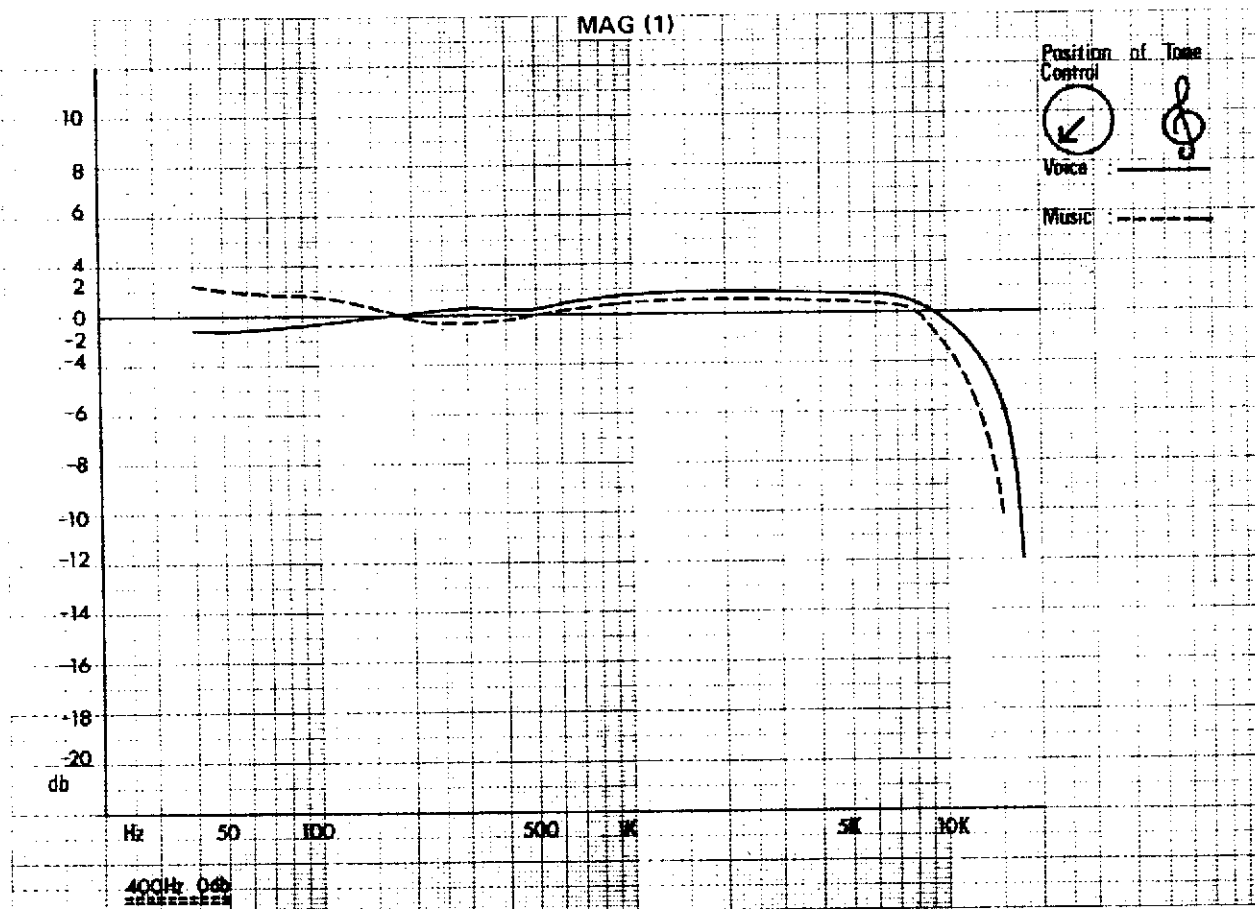
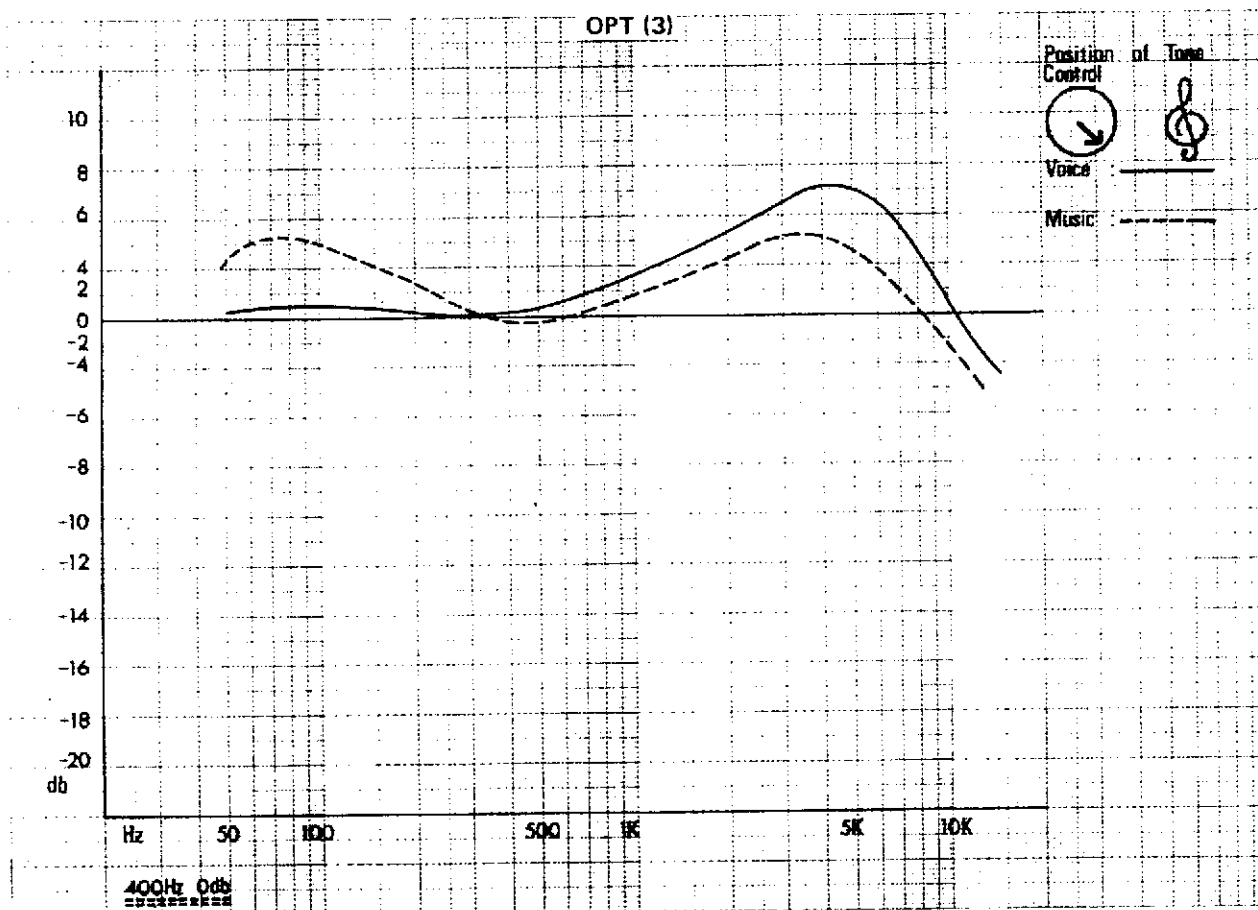
Note: This is one of the typical pattern, and the figure may vary slightly with each projector.

		OPTICAL						MAGNETIC					
		at VOICE position			at MUSIC position			at VOICE position			at MUSIC position		
Position of Tone Control													
Frequency Response (400Hz 0db)	50	0.0	0.0	0.0	3.5	4.0	4.5	-1.0	-1.0	-1.0	2.8	3.0	3.5
	100	0.5	1.0	1.0	4.5	5.0	5.2	-0.5	-0.5	-1.0	1.8	2.0	2.2
	200	1.0	1.0	1.0	3.0	3.0	3.2	-0.5	-0.5	-0.5	1.5	1.5	1.8
	300	0.8	1.0	0.5	1.5	1.5	1.5	-0.5	-0.3	-0.5	0.5	0.5	0.5
	500	0.0	1.0	1.0	0.0	0.0	1.0	0.0	0.0	0.3	-0.5	-0.5	0.0
	1K	0.5	1.2	3.0	-0.5	0.5	2.0	1.2	0.5	3.5	0.0	0.8	2.2
	2K	0.0	1.5	7.5	-1.5	1.0	6.0	1.5	1.5	7.5	0.5	1.5	6.0
	3K	-1.0	2.0	8.2	-3.0	1.5	6.7	1.0	2.5	8.5	-0.5	2.2	7.0
	4K	-4.5	2.5	9.5	-6.0	1.5	8.0	-0.5	2.5	9.0	-2.0	2.2	7.5
	5K	-8.0	2.0	7.5	-10.0	1.0	6.0	-2.5	2.6	8.5	-4.0	1.8	7.0
	6K	-12.0	-2.5	3.0	-14.0	-3.0	1.0	-4.0	2.5	8.0	-5.5	1.2	7.0
	7K	-16.0	-6.0	0.0	-18.0	-8.0	-2.0	-5.5	2.2	7.8	-7.0	0.5	6.5
	8K							-7.5	1.5	7.5	-8.5	0.0	6.0
	9K							-9.0	1.0	7.0	-10.0	-0.5	5.5
	10K							-11.0	0.0	6.0	-12.0	-1.5	4.5

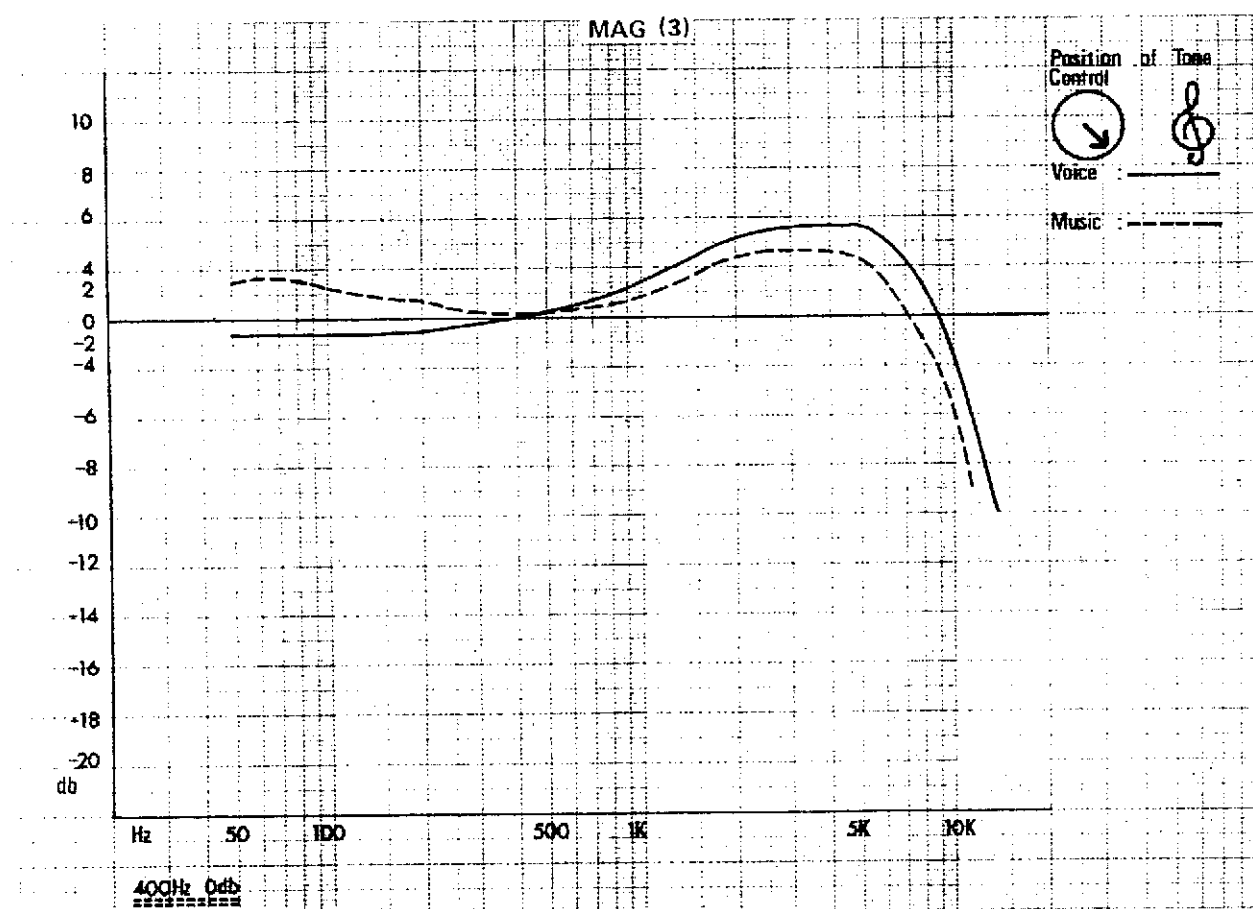
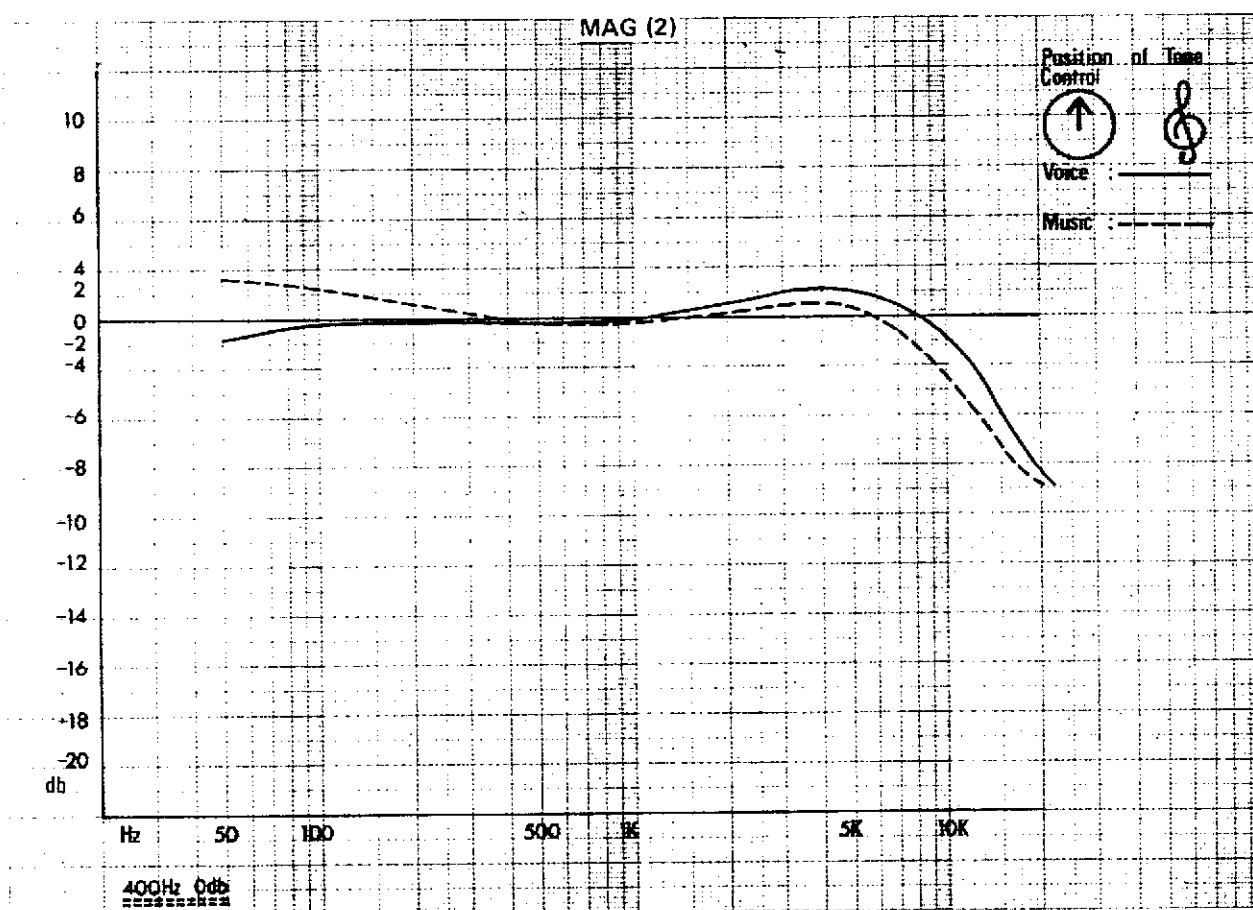
SL II-series Amplifier Frequency Response (typical pattern)



SL II-series Amplifier Frequency Response (typical pattern)



SL II-series Amplifier Frequency Response (typical pattern)



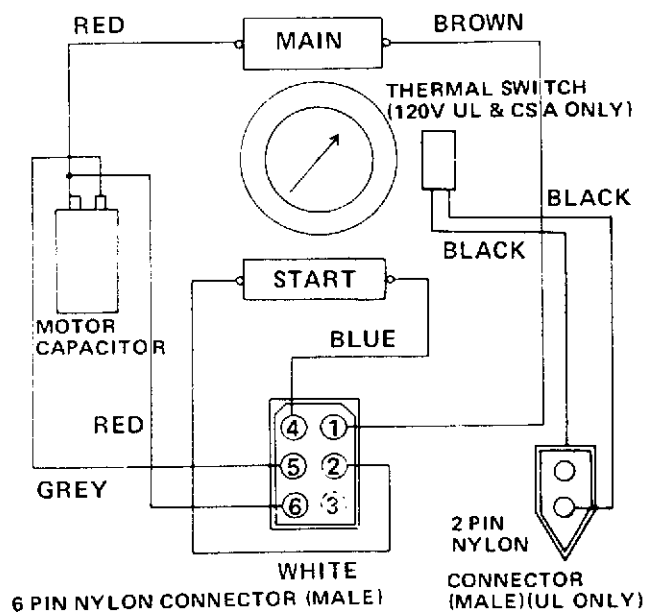
4-3: MOTOR MODULE

A. Specification

1. AC Induction type
2. 1/20HP
3. 100-120V, and 220-240V
4. Power consumption 144 — 168W (120V, 1.2A), or (220, 240V 0.7A)
5. Starting Torque: 1.6kg/cm
6. Rated Torque: 0.8kg/cm

B. Motor Circuit Diagram

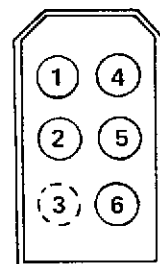
Fig. #31



C. 6 Pin Motor Connector (Female) (Fig. #32)

Pin #	Wire Color	Connected To:
1.	Brown	Micro Switch #1
2.	Yellow	Micro Switch #3
3.	N/C	
4.	Blue	Micro Switch #4
5.	Black	Micro Switch #4
6.	Red	AC Terminal #4 — #3

Fig. #32



D. Silent Film Operation and 50 ↔ 60Hz Conversion

1. Silent Film Operation

- Disconnect power cord.
- Open rear cover. Turn inching knob, at the same time guiding the motor belt first to the smaller motor pulley, then to the larger shutter pulley.
- To change back to sound speed, reverse the above procedure.

NOTE: 50/60Hz models do not have silent speed.

2. 50Hz ↔ 60Hz Conversion

The standard SL projector is available either as 50Hz sound & silent, or 60Hz sound & silent operations. Conversion from 50 to 60Hz, or from 60 to 50Hz can be accomplished by changing the motor pulley.

To allow the projector to be operated at either 50 or 60Hz sound only, it is necessary to change the motor pulley.


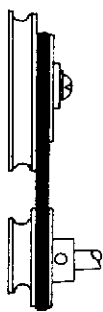



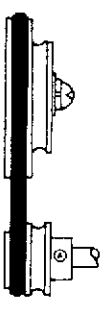
For 50Hz sound speed, the motor belt should be aligned on shutter pulley's smaller groove and motor pulley's larger groove.

For 60Hz sound speed, shift the motor pulley to the right and align the motor belt on motor pulley's smaller groove and shutter pulley's smaller groove.

The chart below indicates each speed combination:

NOTE: For Dual-Voltage models, such as 110/220V, or 120/240V, 50/60Hz, shutter pulley 320-11321 is always same, but motor pulley 320-12831 is used for 110/220V, and motor pulley 320-12841 is for 120/240V models.

Speed Change Combination Chart

	50Hz Sound & Silent (24fps & 18fps)	50/60Hz Sound/Sound (24fps & 24fps)	60Hz Sound & Silent (24fps & 18fps)
Shutter Pulley	320-11321	320-11321	320-11321
Motor Pulley	320-12821	320-12851	320-12811
	Sound (24fps) speed 	50Hz 24fps speed 	Sound (24fps) speed 
	Silent (18fps) speed 	60Hz 24fps speed Motor Pulley is shifted to the right 	Silent (18fps) speed 

4-4: TRANSFORMER MODULE

A. Transformer Circuit Diagram

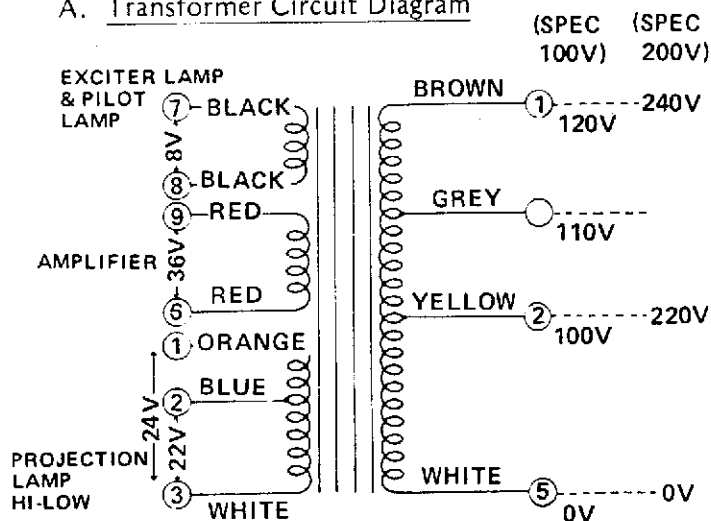


Fig. #33

B. 9 Pin Nylon Connector (Male) & 3 Pin Nylon Connector (Female) (Fig. #34)

9 Pin		3 Pin	
Pin #	Color of Wire	Pin #	Color of Wire
1.	Brown	1.	Orange
2.	Yellow	2.	Blue
3.	N/C	3.	White
4.	N.C		
5.	White		
6.	Red		
7.	Black		
8.	Black		
9.	Red		

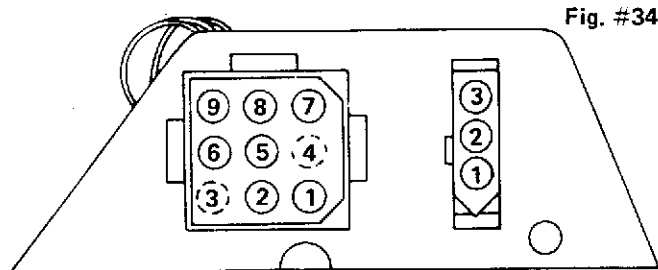


Fig. #34

C. 9 Pin Nylon Connector (Female) & 3 Pin Nylon Connector (Male) (Fig. #35 & 36)

Pin #	Color of Wire (for all 220V type all 110 type)	Color of Wire (for all 240V, & 120V UL/CSA)	Connection To:
1.	N/C	Brown	Micro Switch #1
2.	Brown	N/C	AC Terminal #2
3.	N/C	N/C	Micro Switch #1
4.	N/C	N/C	AC Terminal #2
5.	Yellow	Yellow	AC Terminal #4-3
6.	Orange	Orange	MT 9 Pin Socket #2
7.	Blue	Blue	MT 9 Pin Socket #5
8.	Blue	Blue	MT 9 Pin Socket #4
9.	Orange	Orange	MT 9 Pin Socket #1

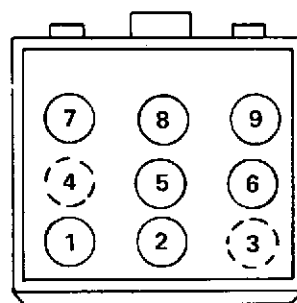


Fig. #35

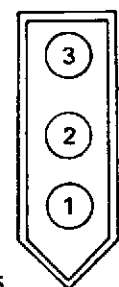


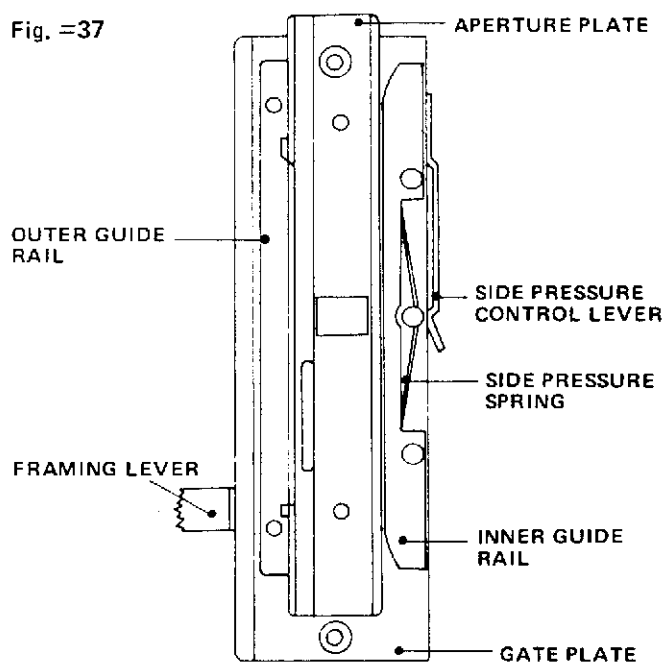
Fig. #36

Pin #	Color of Wire	Connection To:
1.	Red	Lamp Hi-Low Switch-Lamp
2.	Blue	Lamp Hi-Low Switch-Lamp
3.	White	Micro Switch #2-Lamp

4-5: FILM GATE ASSEMBLY

A. Aperture Plate (Film Gate) Assy

Fig. #37



1. Description

The aperture plate (4) is mounted on the gate plate (1) by two nuts and can slide up and down for framing adjustment. The outer guide rail (8) is fixed to the gate plate by two screws. The movable inner guide rail (13) is mounted by two shoulder screws and adjusted by the side pressure spring (15). The side pressure control lever (10) is linked to the film loading mechanism controlled by the function switch, opening and closing the inner guide rail.

2. Adjustment

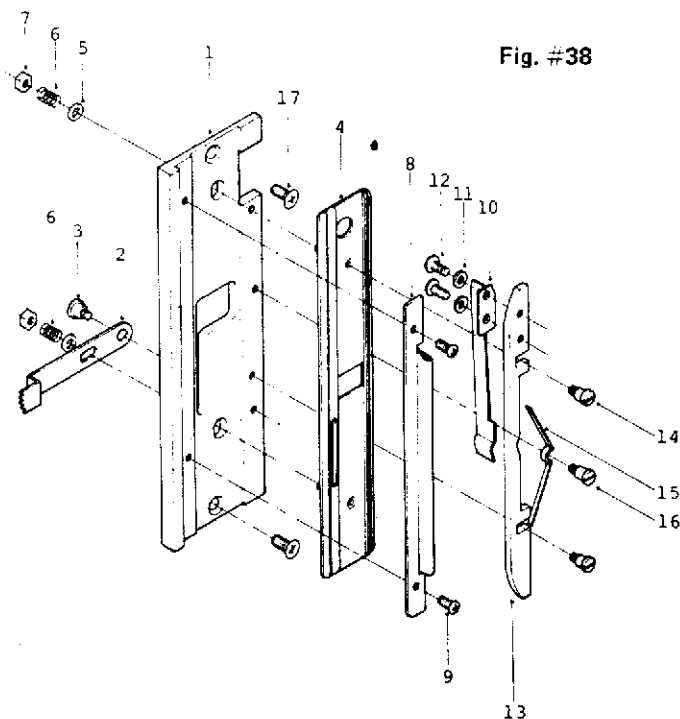
a. Tension of the Side Pressure Spring

The proper tension is about 60 – 75g. Excessive tension will cause earlier film wear, while insufficient tension causes an unsteady picture. The adjustment of tension can be made by bending or straightening the spring. A weak or incorrectly formed spring should be replaced.

b. Outer Guide Rail Position

When the film is loaded, the center of the film should align with the center of the aperture. To accomplish this, adjust the position of the outer rail.

Fig. #38



B. Film Shoe And Bracket Assembly

1. Description

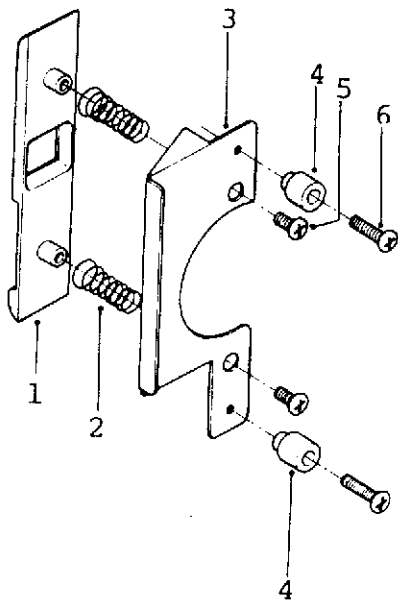


Fig. #39

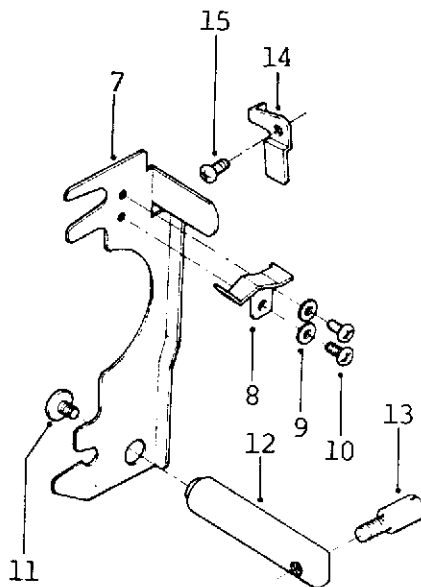


Fig. #40

2. Removable Film Shoe and Bracket Assembly

The spring loaded film shoe (1) is mounted to a bracket (3) and is easily removable as an assembly for cleaning and servicing the film gate. The film shoe and bracket assembly is then seated in the reception bracket (7). The reception bracket is linked to the loading mechanism which opens and closes the film gate as the function switch is activated.

3. Adjustment

a. Uneven Focus

Uneven focus occurs whenever the image of the film is not flat and perpendicular to the optical path of the lens. Since the lens holder assembly is mounted directly on the projector's casting, any adjustment would have to be as a result of improper mounting of the aperture plate, gate plate, or film shoe not seating completely.

b. Film Shoe Pressure

The pressure of the film shoe against the film is maintained by two small tension springs between the shoe and the mounting bracket. Excessive tension will cause unnecessary film wear, and insufficient tension can cause an unsteady picture, excessive film gate noise and uneven or erratic focus. To test the film shoe pressure, insert a strip of film in the gate, close the gate. Attach a gram scale to the end of the film at the top. A gentle but steady pull should produce about 90 to 110 grams of pull, indicating the correct film shoe pressure. To adjust this pressure, stretch, shorten or replace the shoe springs.

c. Film Shoe Position

With the gate closed, the film shoe should line up along the edge of the outer guide rail and seat evenly against the aperture plate. To adjust the position of the film shoe, close the film gate by setting the function control to the "MIC" position. Loosen the two screws (6) and align the film shoe with the outer guide rail, making sure that the shoe is flat against the aperture plate and secure the screws (6).

321-5: GENERAL MECHANICAL SERVICING AND ADJUSTMENTS

SL II Series
(5-1-A)

5-1: TAKE-UP ARM

A. Description

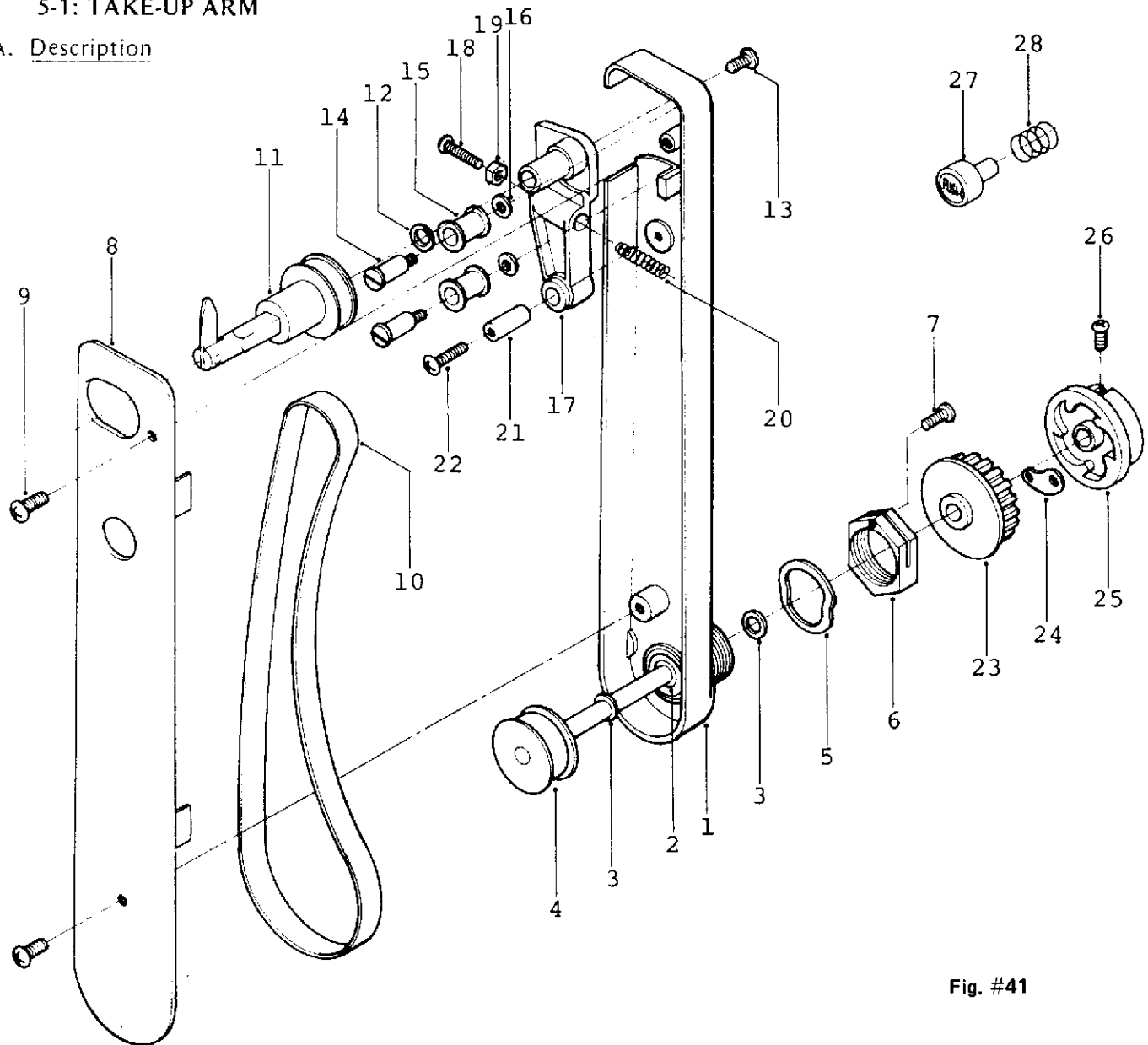


Fig. #41

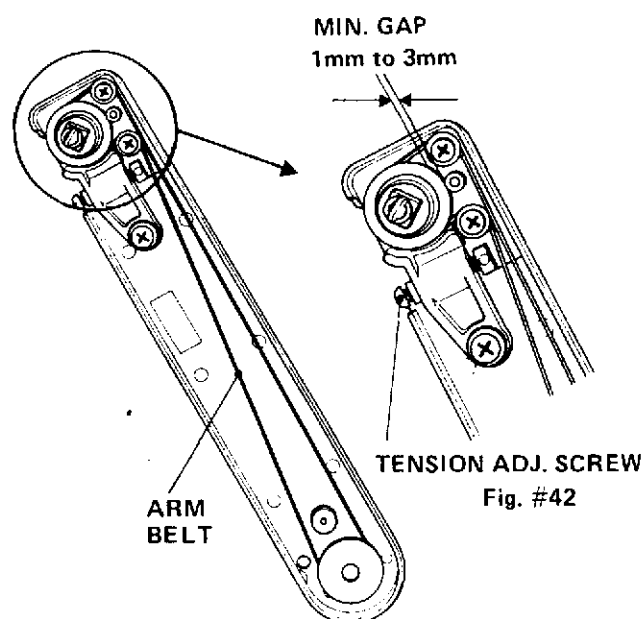
The drive to the take-up arm is obtained through the take-up clutch mechanism (items 23-26) during normal forward projection. During rewind the motor is reversed, disengaging the clutch cam (24) removing all drive to the take-up arm. In forward the drive is transmitted via the drive pulley (4) to the arm belt and the take-up spindle (11). The

amount of take-up torque is controlled by the friction of the belt against the pulley (4) and spindle pulley (11). The amount of friction is adjusted by a combination of the tension spring (20) and the weight of the take-up reel.

B. Adjustments

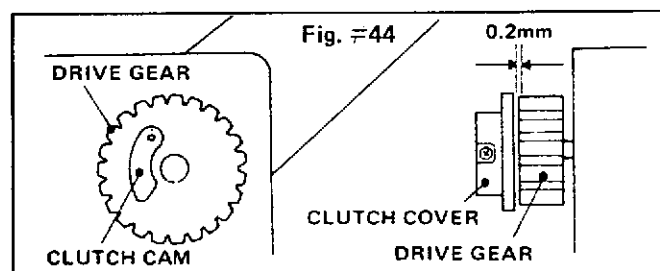
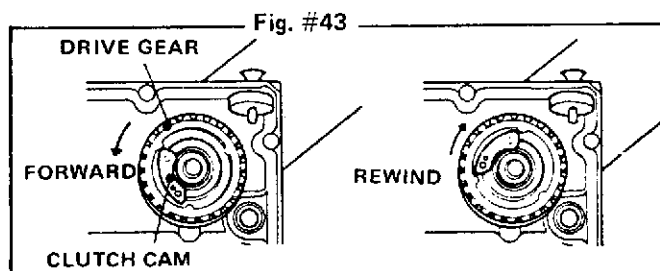
1. Take-Up Torque

The take-up arm belt must be kept clean with the blue side of the belt positioned towards the pulleys. Avoid any oily substances on the belt. Clean the belt with Isopropyl Alcohol. The take-up tension is adjusted by increasing or decreasing the belt tension with the adjustment screw (19). This tension should have a range from approximately 90 grams to 150 grams, depending on the reel size. Torque in excess of 150 grams should not be permitted on small film reels. Under normal operation where small to medium size reels are used, the tension screw should be adjusted to where it barely makes contact with the tension spring (1mm to 3mm). Clockwise adjustment increases the take-up torque. Counter clockwise adjustment decreases the take-up torque.



2. Take-Up Clutch Mechanism

The take-up clutch mechanism requires no lubrication. The clutch cam, clutch cover and drive gear should be kept clean and free from dirt. A small amount of silicone oil on the drive pulley shaft is sufficient. When re-assembling the clutch mechanism, it is important that the clutch cam be positioned correctly. A space of 0.2mm is required between the drive gear and clutch cover.



5-2: SUPPLY ARM

A. Description

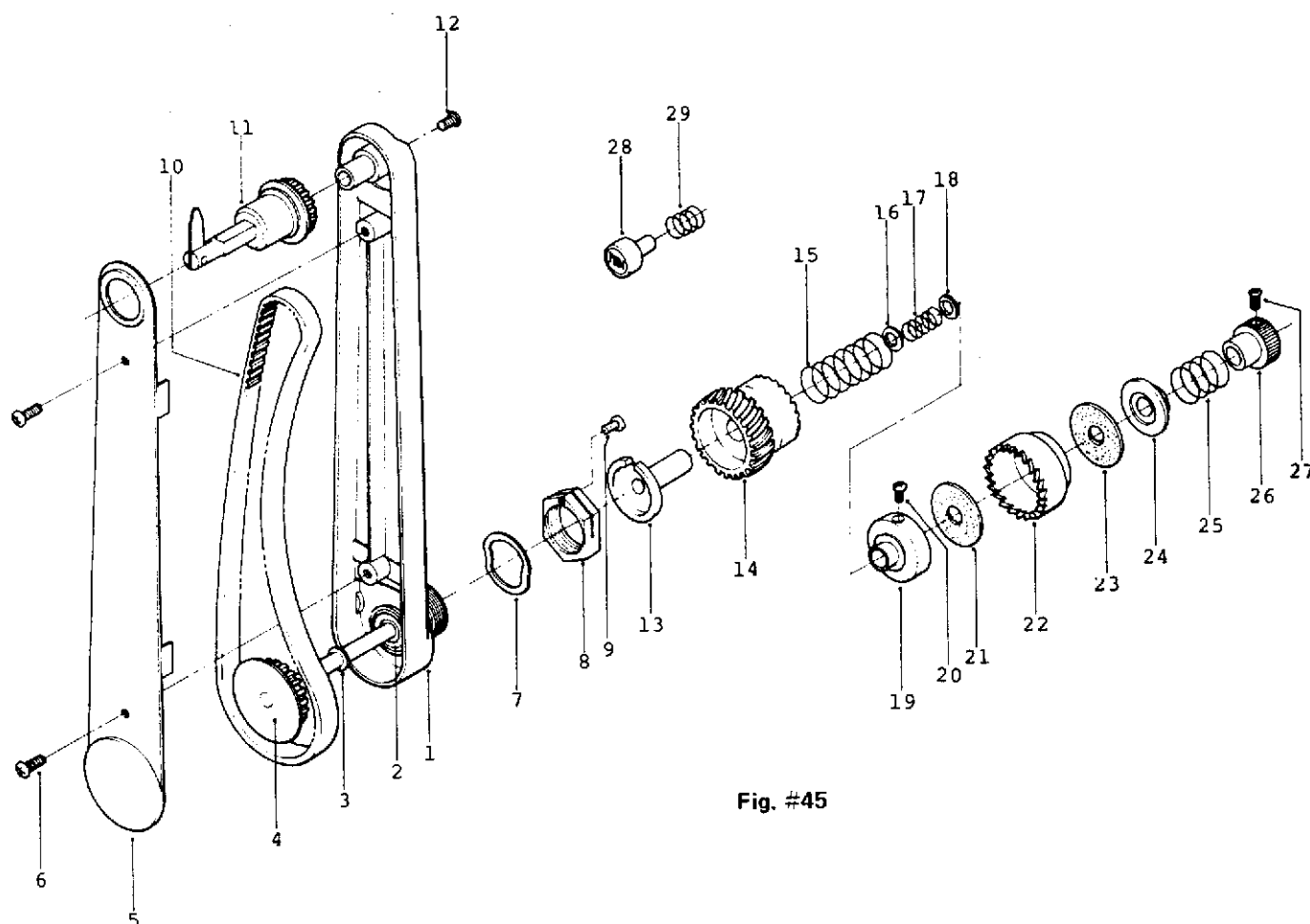


Fig. #45

During forward the supply arm only serves as a drag to provide a small amount of back tension to the film. The amount of back tension is controlled by spring (17)'s tension. For a more complete description of the supply arm, refer to the rewind section.

B. Adjustments

— None —

5-3: LOWER LOOP SETTER SYSTEM

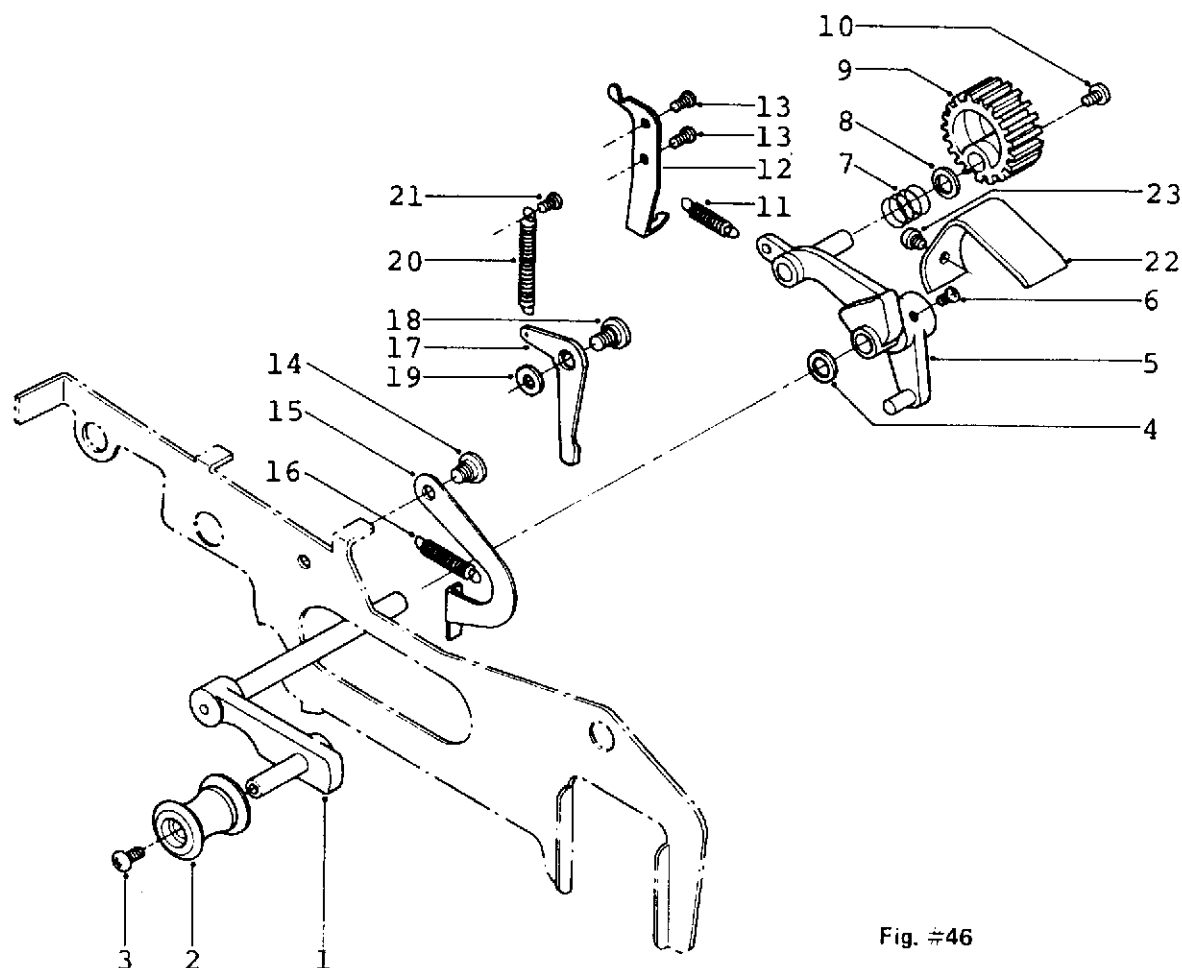
A. Description

Fig. #46

The lower loop setter mechanism is an integral part of the loading mechanism which is controlled by the function switch. At the "STOP" position the loop setter gear (9) is raised up away from the main drive belt. The loop setter arm (1) and the lower loop setter roller (2) is locked in the down position, functioning as the lower loop former while loading the film. Rotating the function switch to the "MIC" or "No. 2" position, the stop plate (17) is pushed to the left by the right angle tab of the main interlocking bracket until the loop setter interlocking arm (5) is released away from the stop plate (17). While the right angle tab on the interlocking bracket is pushing the stop plate, the film is seated in the #1 sprocket shoe

and the film gate is completely closed. The loop setter roller is then raised up away from the film and the loop setter gear is lowered into position near the main drive belt. In this position the loop setter is ready to be activated by any small amount of film pressure against the loop setter roller. When the loop setter roller is activated, the loop setter gear engages with the main drive belt, causing the eccentric gear to cycle the loop setter mechanism, pulling down the film from the gate, thus forming a new loop. In "Rewind" and "Stop" the lower loop setter roller is locked in position to guide and dampen the tension of the film during high speed rewind.

B. Adjustments

1. Position of the Lower Loop Setter Roller:

With the function switch in the "Stop" position, the loop setter roller must lock into the position as in Fig. #47.

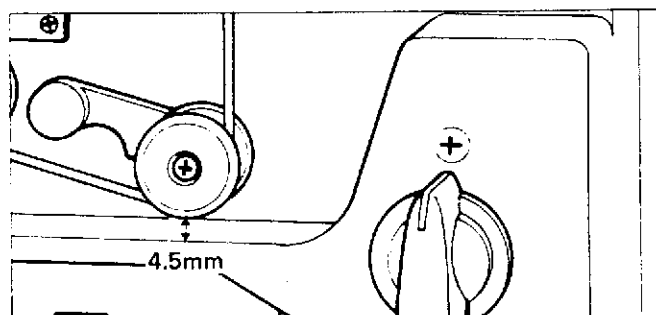


Fig. #47

To check for the correct position of the loop setter roller, set the function switch at "STOP". The distance between the outer edge of the roller and the main frame casting should measure 4.5mm. In this position, the film should clear the aperture plate, the film shoe, and sound drum when rewinding. To adjust the roller position, set the function switch to "STOP". Loosen the set screw on the loop setter interlocking arm, position the loop setter roller 4.5mm up from the main frame casting as Fig. #47. Then tighten the set screw. To obtain the correct position of the loop setter roller tool No. 321-03T (Fig. #48) may be used.

- (1) Set the function switch at "STOP".
- (2) Apply the tool No. 321-03T as Fig. #49. Push the roller against the tool.
- (3) Loosen the interlocking arm set screw.
- (4) Adjust the position of the interlocking arm and secure the set screw.

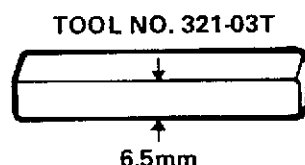


Fig. #48

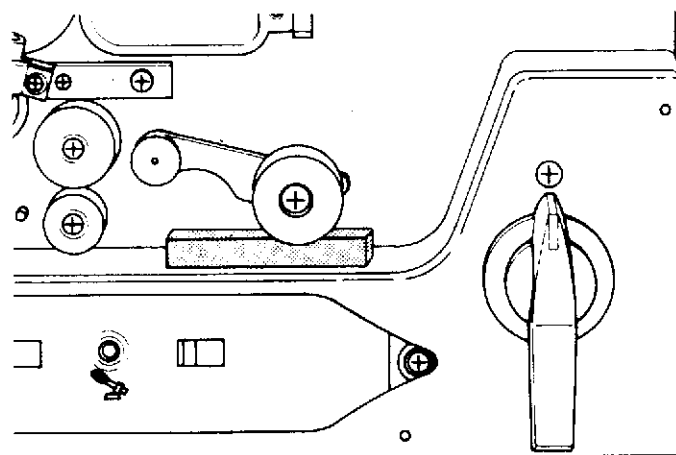
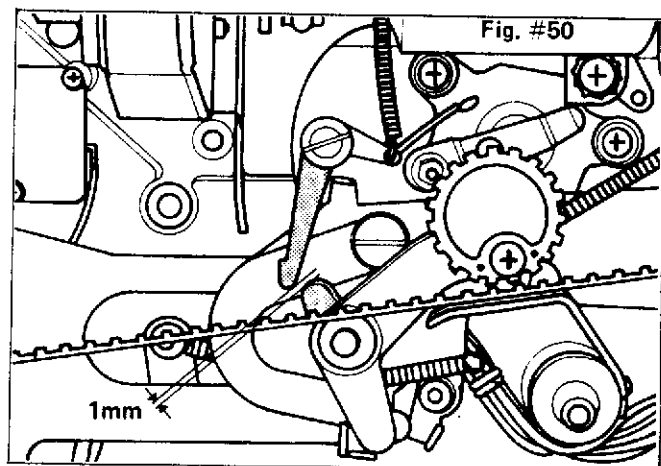


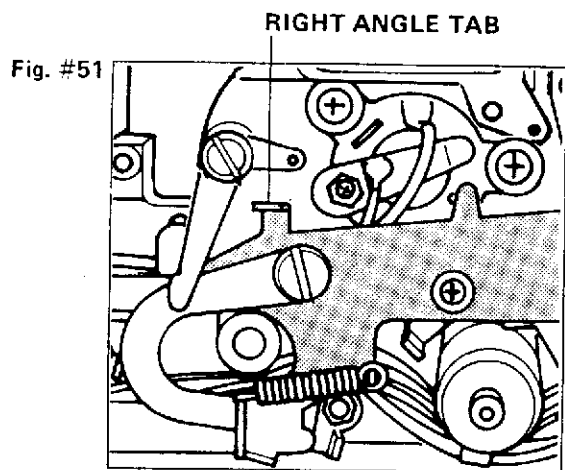
Fig. #49

2. Interlocking Arm and Stop Plate Clearance:

The correct clearance with the function switch in the "MIC" position is shown in Fig. #50.



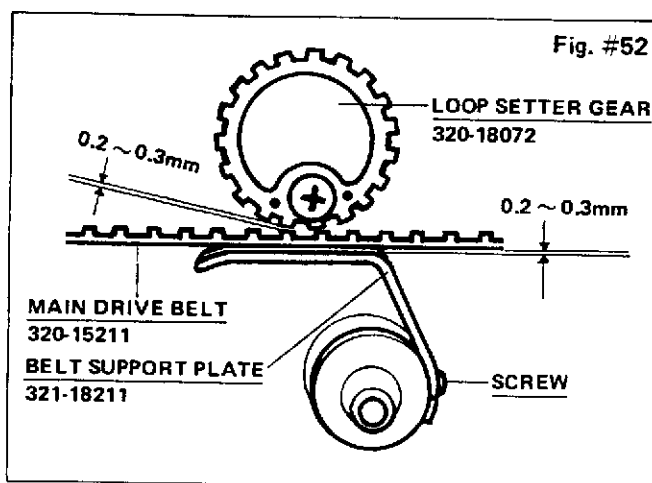
When the loop setter gear cycles, the tip of the interlocking arm should clear the end of the stop plate. Where it contacts the stop plate, the clearance is adjusted by slightly reforming the tab on the main interlocking bracket. (Fig. #51)



CAUTION: Avoid over-bending. Too much of a bend will cause the interlocking arm to release too early, forming too small a lower loop.

3. Loop Setter Gear And Main Drive Belt Clearance:

The correct clearance is indicated in Fig. #52



Insufficient clearance will cause the loop setter roller to be too sensitive or cause it to cycle continuously. Too much clearance will cause poor sensitivity and the loop setter will not reset the loop unless the film is severely damaged. To adjust, simply reform the belt support plate (22) and tighten the mounting screw.

4. Loop Setter Tension Springs

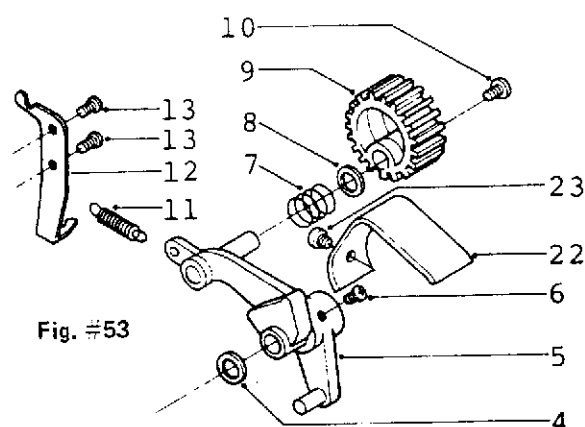


Fig. #53

Correct adjustment of the loop setter tension springs is essential to the proper operation of the automatic loop setter.

- a. The loop setter gear spring 320-18061 (7) acts as a dampener to the rotation of the loop setter gear.

Too strong a spring tension will cause a sluggish action of the loop setter while too weak a spring will cause the frequent and erratic action of the loop setter.

The spring can be adjusted by simply stretching or compressing it to obtain a smooth but dampened rotation of the loop setter gear.

- b. The arm spring 320-18111 (11) adjusts the tension of the loop setter arm and roller. Too tight a spring will cause the loop setter to be ineffective where too loose a spring will cause erratic rotations of the loop setter gear.

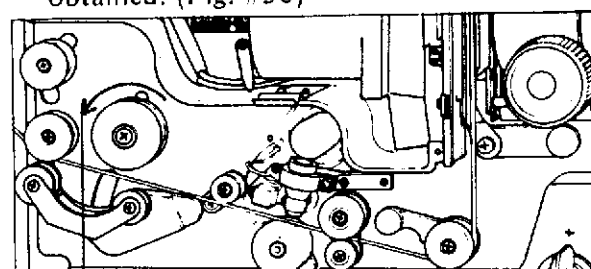
To adjust the loop setter's tension, change the position of the spring arm (12) until the loop setter function operates smoothly.

5. Loop Setter Timing

To check the loop setter timing, load the projector with film, advance the function control to position #2 and operate the projector. While observing the loop setter, insert a finger in the upper loop causing the lower loop to loose one frame. With only one frame lost, the loop setter will not activate. Loose one more frame. At this time the loop setter should be activated by too small a lower loop, causing it to reset the lower loop once only. If it requires holding the upper loop for more than two frames to activate the lower loop, the lower loop is too large. If the lower loop is always in contract with the loop setter roller, the lower loop is too small.

The correct lower loop should not come in contact with the loop setter roller, but at the same time the loop setter should easily activate when two frames of defective sprocket holes pass through the film gate.

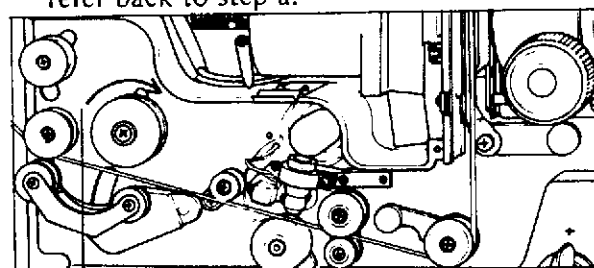
- a. To increase the size of the lower loop, loosen the #2 sprocket cover screw and rotate the sprocket teeth plate in the counter-clockwise direction until the correct size lower loop is obtained. (Fig. #50)



TOO SMALL A LOWER LOOP
TO INCREASE

Fig. #54

- b. To decrease the size of the lower loop, loosen the #2 sprocket cover screw and rotate the sprocket teeth plate in the clockwise direction. (Fig. #55) In the event of over-correction, refer back to step a.



TOO LARGE A LOWER LOOP
TO DECREASE

Fig. #55

5-4: LOADING MECHANISM

A. Description

All mechanical functions seating the film around the sprockets, forming the upper and lower loops, and closing the film gate are accomplished by a single rotary function switch.

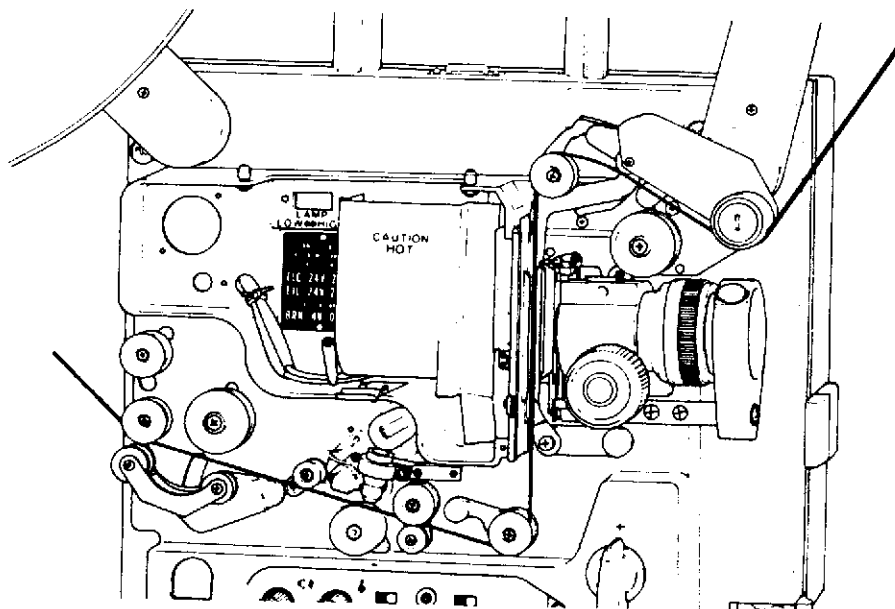
The action of the function switch activates a series

of levers, cams and roller arms in the sequence described below.

1. When the function switch is at the "STOP" position, the film loading path is fully open, and the #1 and #2 sprocket shoe rollers are away from the sprockets.

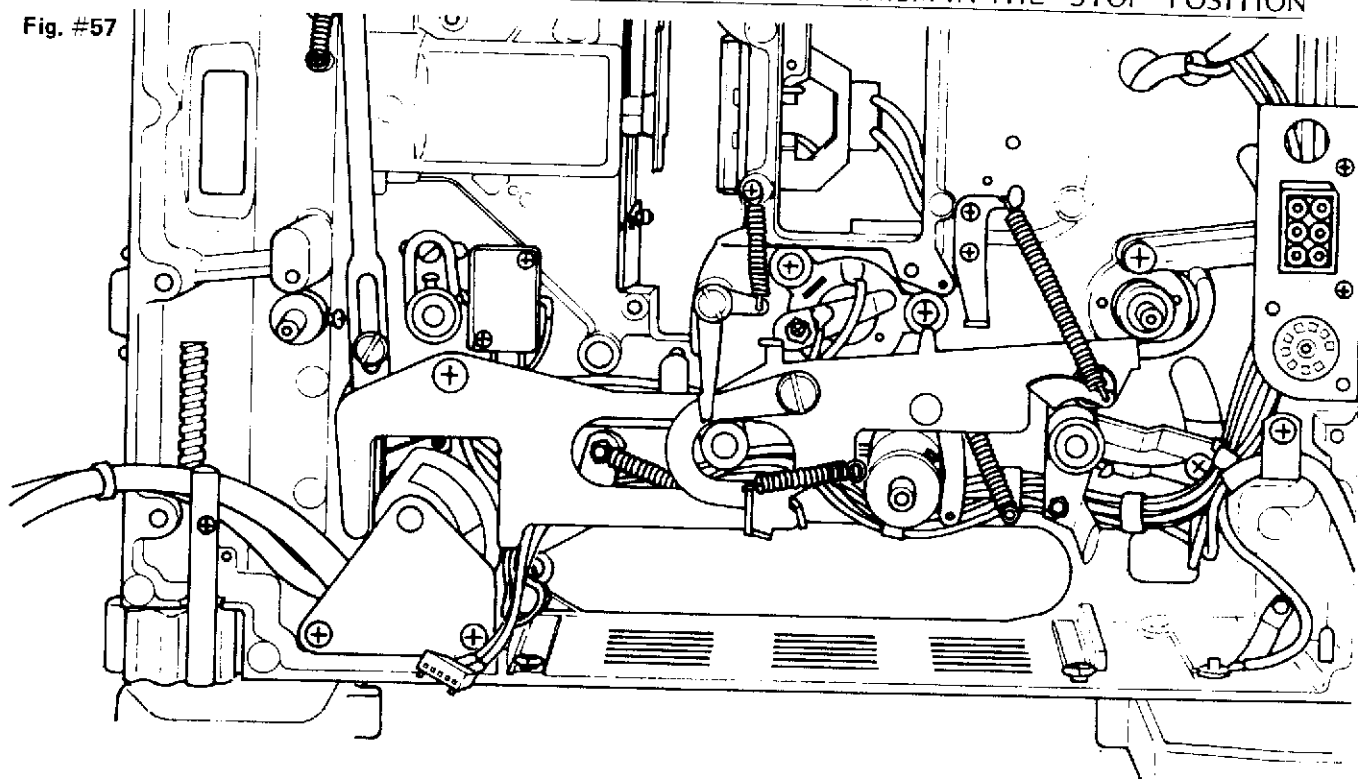
FILM LOADING POSITION ("STOP")

Fig. #56



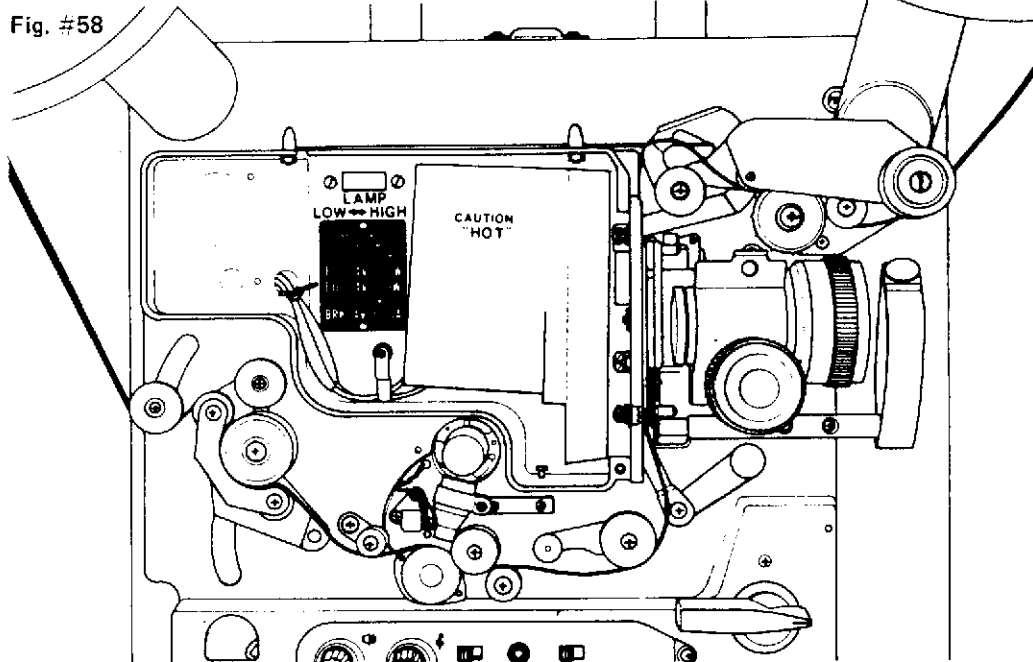
CORRESPONDING MAIN INTERLOCKING BRACKET MECHANISM IN THE "STOP" POSITION

Fig. #57

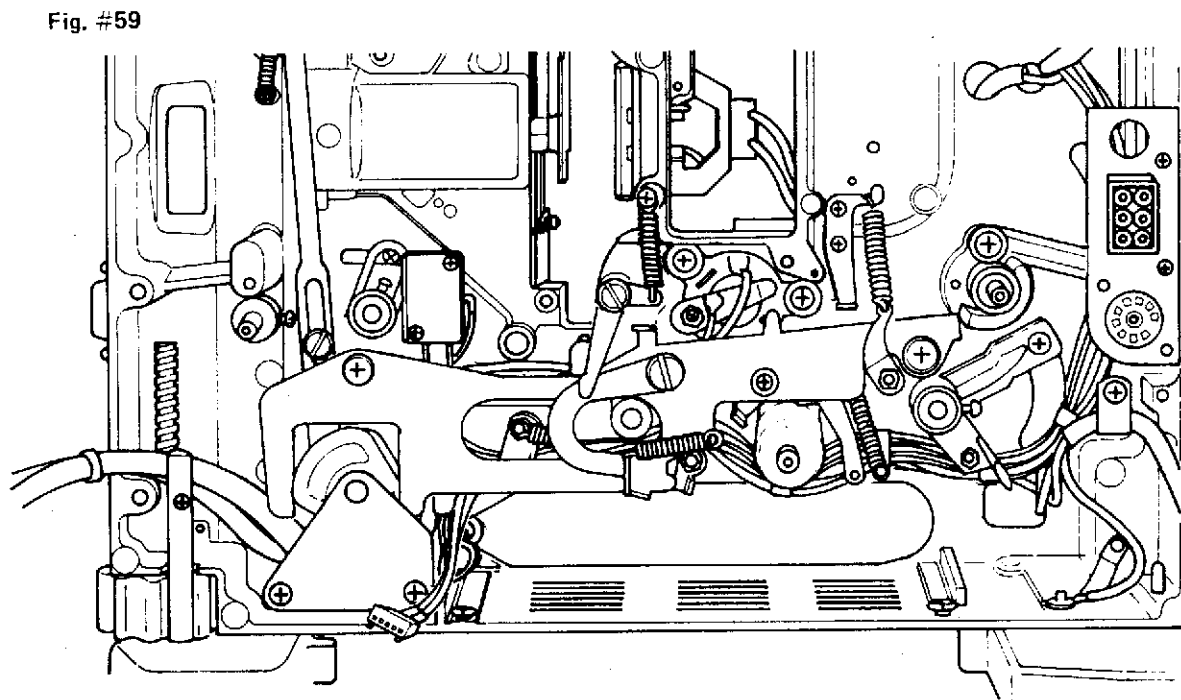


2. When the function switch is at the "MIC" or "No. 2, 3" position, the loading mechanism is closed forming the upper and lower loops while seating the film in #1 and #2 sprockets.

OPERATION POSITION ("MIC" "2" "3")



CORRESPONDING MAIN INTERLOCKING BRACKET MECHANISM IN THE "MIC" POSITION



3. OPERATIONAL SEQUENCE OF THE LOADING MECHANISM

Projector's Front Side (Loading Path)	Projector's Rear Side (Main Interlocking Bracket Mechanism)
<p>Turning Rotary Function Switch to "MIC" position;</p> <p>(1) Set Arm (320-17801) moves down by 40°, pulling down #1 Sprocket Shoe Interlocking Bracket (320-17511)</p> <p>* #1 Sprocket Shoe Interlocking Bracket pulls down #1 Sprocket Shoe (320-17941) and #1 Shoe Roller Arm (320-15911), Shoe Roller (large, 320-15231), #1 Sprocket Shoe Roller (321-15731) move down and seat in the proper position.</p> <p>* As #1 Sprocket Shoe Interlocking Bracket is pulled down, at the same time, Side Pressure Control Lever (320-31411) pushes and makes the Inner Guide Rail (320-31111) release to the operate position.</p> <p>* The Cam Claw (312-11191) advances to pull down stroke position.</p> <p>* The Sliding Pin Shaft (320-30451) pushes the Film Shoe Reception Bracket (320-30921) towards the Film Gate. Film Shoe (320-30101) is seated in the Film Gate.</p>	<p>Turning Rotary Function Switch to "MIC" position;</p> <p>(1) Rotary Switch Cam (320-60541) rotates to the counter-clockwise direction and Main Interlocking Bracket (321-17091) moves to the left.</p> <p>* Reception Arm (320-17501) hooked to Main Interlocking Bracket with a Shoulder Screw (320-17081) moves clockwise, which moves the Set Arm (320-17801) and Sliding Pin Shaft (320-30451).</p> <p>* Arm (320-15411) on the Shoe Roller Arm (320-15911) moves down and Tension Spring (320-15421) adds tension to Large Shoe Roller (320-15231).</p> <p>* Reception Arm (320-17501) turns clockwise releasing the Sound Muting Switch (312-60051).</p>
<p>(2) Prior to the "MIC" position the upper loop forming roller (320-17551) kicks upward to form the upper loop. The protrusion at the back of #1 Sprocket Shoe (320-17941) gives a soft push, as it moves down to its seating position, to the Upper Loop Arm (321-17901) and at the last moment drops down after forming the upper loop.</p>	<p>(2) Arm (320-17461) linked with Upper Loop Arm (321-17901) first slides quickly to the right and seated on the plate spring (321-17451) to form the upper loop roller's top position. Then the Arm (320-17461) turns clockwise and slips down from the plate spring.</p>
<p>(3) The last moment before the "MIC" position, Loop Setter Arm (320-18501) moves up and Loop Setter Roller (320-18021) is at the operate position.</p>	<p>(3) Convex tip of the Main Interlocking Bracket pushes the Stop Plate (321-18131) to the left, which slides and releases the Loop Setter Interlocking Arm (321-18601). Loop Setter Gear (320-18072) moves down near the Main Drive Belt. Spring (320-18111) maintains tension to the Loop Setter Interlocking Arm.</p>
<p>(4) Buzz Roller Arm (321-17391) swings down counter-clockwise and the Buzz Roller (321-17411) rides parallel and tight against the Sound Drum (321-41011).</p>	<p>(4) Buzz Roller Interlocking Arm (321-17031) is released from blocking the Main Interlocking Bracket and Spring (321-17441) adds tension to the Buzz Guide Roller (321-17411).</p>
<p>(5) Tension Arm assy (321-17601) swings down clockwise and the Tension Roller (321-17571) moves down parallel and close to the Sound Drum (321-41011).</p>	<p>(5) Tension Interlocking Arm (321-17111) linked with Tension Arm (321-17811) turns counter-clockwise and is released in the middle of the slot of the Main Interlocking Bracket. Spring (321-17121) gives tension to Tension Roller (321-17571).</p>
<p>(6) (SL-2-02 Mag. Models only) Mag. Head assy (321-40701) swings down to contact the Mag-sound track.</p>	<p>(6) Mag. Head Interlocking Plate A (321-40051) linked with Mag. Head Arm (321-40501) moves down. Spring (321-40251) gives tension to the Mag. Head assy (321-40701).</p>
<p>(7) #2 Sprocket Shoe (320-16501) swings up and is seated. #2 Shoe Roller (320-16221), Large Shoe Roller (320-17561), and Guide Roller (320-17441) are also seated.</p>	<p>(7) #2 Sprocket Shoe Interlocking Arm (321-16701) connected with a Shoulder Screw to the Main Interlocking Bracket is pulled and moves to the counter-clockwise direction, pushing up #2 Sprocket Shoe (320-16501). Flywheel Brake assy (321-16301) moves away and now Flywheel is free to rotate.</p>
<p>(8) Rear Dampening Roller (320-17441) swings up to operate position.</p>	<p>(8) Rear Dampening Roller Arm (321-16921) swings clockwise as the Main Interlocking Bracket recedes to the left. Spring (320-17292) gives tension to the roller (320-17441).</p>

REWINDING MECHANISM

Projector's Front Side (Loading Path)	Projector's Rear Side (Main Interlocking Bracket Mechanism)
Rotary Function Switch is turned to "Rewind" position.	Function Switch Cam turns to the clockwise direction, pushing up Rewind Push Lever (320-19311) which simultaneously pushes up Rewind Control Arm (320-19121) Rewind Control Arm now fits in the groove of Drive Gear (320-13511) engaging the counter Driven Gear (320-13521).

B. Adjustments

1. #1 Sprocket Shoe And Roller Assy. (Fig. #60, 61)

The #1 sprocket plate is spring loaded with limited travel to assist the film in seating around the sprocket drum.

Check to be sure the sprocket plate is moving freely before proceeding with the loading mechanism adjustments. (See Fig. #60).

a. Loading position: In the "STOP" position the shoe roller should be in contact with the top inside of the #1 sprocket shoe cover assy.

The spring tension keeping the shoe roller up during film loading can be adjusted by the position of the arm, mounted to the end of the shaft of the shoe roller arm.

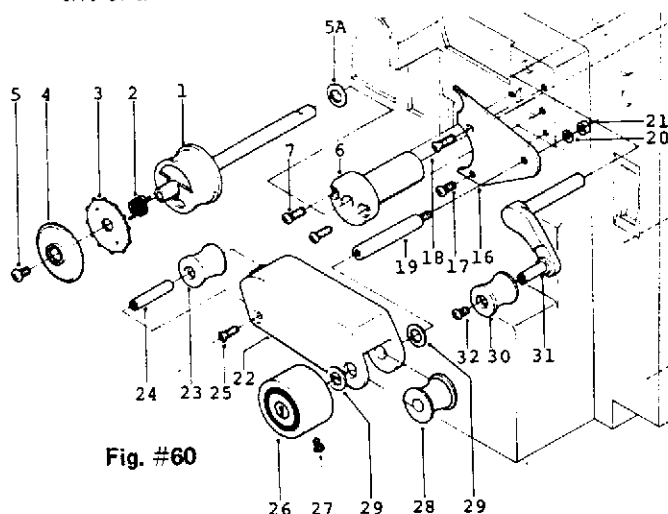


Fig. #60

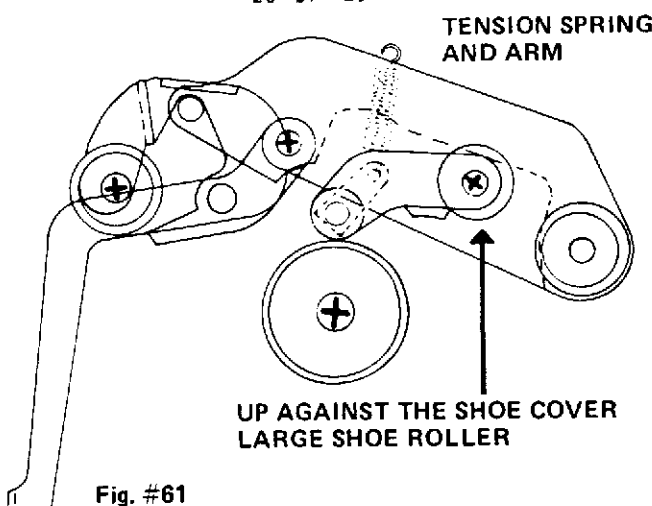


Fig. #61

b. Closed ("MIC") position: Loosen the two set screws on the reception arm directly behind the set arm shaft. Push down on the #1 sprocket film shoe assembly to make sure that the film shoe rollers are completely seated around the sprocket. Tighten the set screws. (Fig. #62)

NOTE: No end play is allowed for #1 Sprocket shaft.

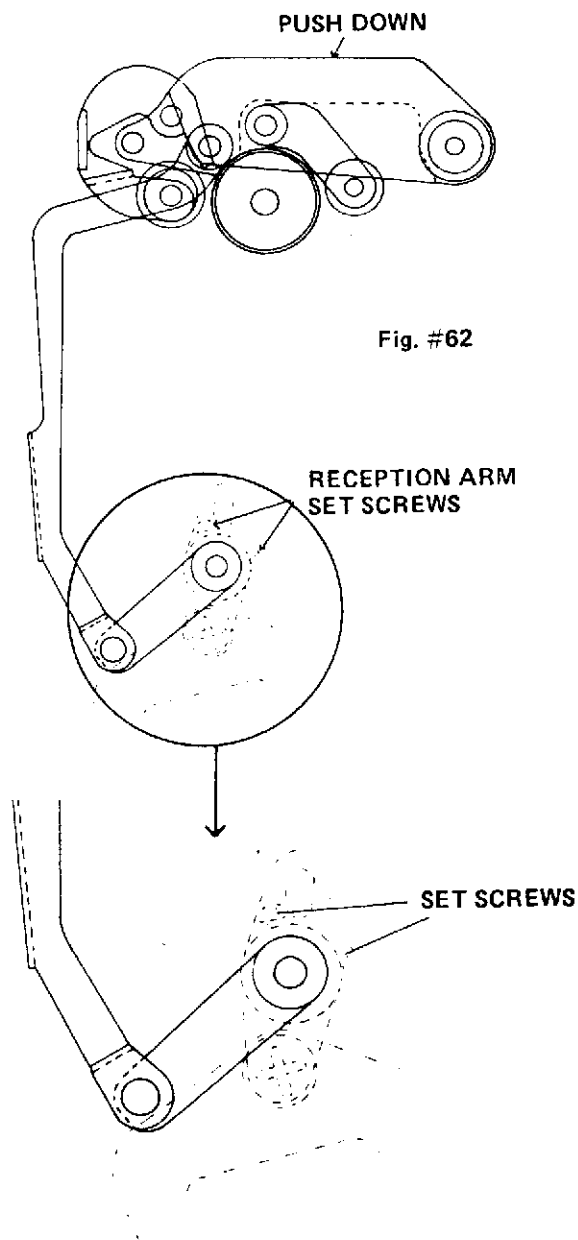
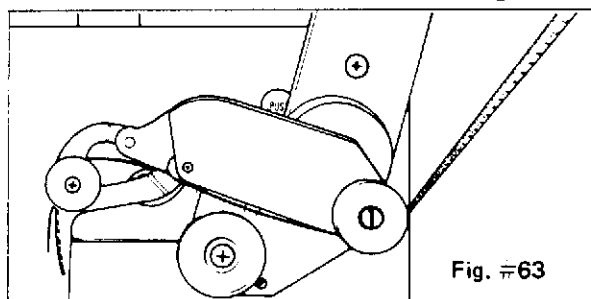


Fig. #62

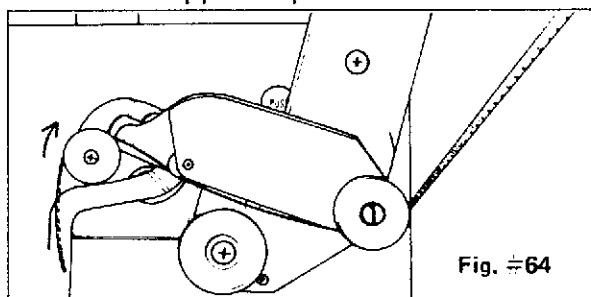
2. Upper Loop Forming Roller And Film Guard

a. Function: The position of the upper loop forming guide roller is determined by the position of the function switch;

Position A: The function switch is at "STOP" (Fig. #63) position for the film loading, or at "⊗" for the rewinding.

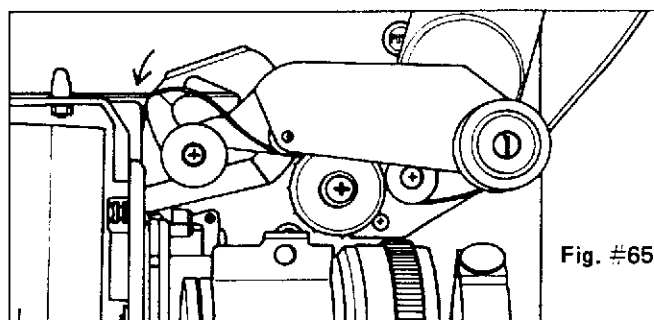


Position B: This is the actual upper loop forming position. When turning the function switch from "STOP" to "MIC", the upper loop forming guide roller kicks upward to form the enough upper loop.



Position C: As keep turning the function switch to "MIC" (or "2" "3") positions, the roller comes down and stays at this position "C", ready to activate the "Film Guard" switch should the upper loop be lost.

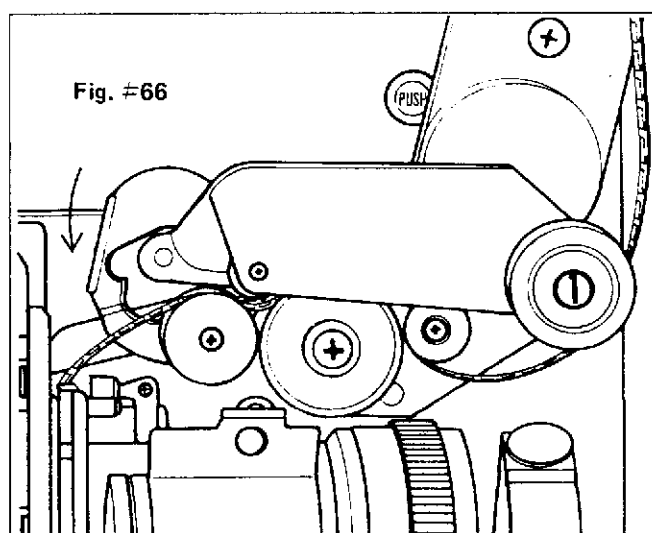
Note the distance between the roller and #1 sprocket cover plate's edge should be about 20mm.



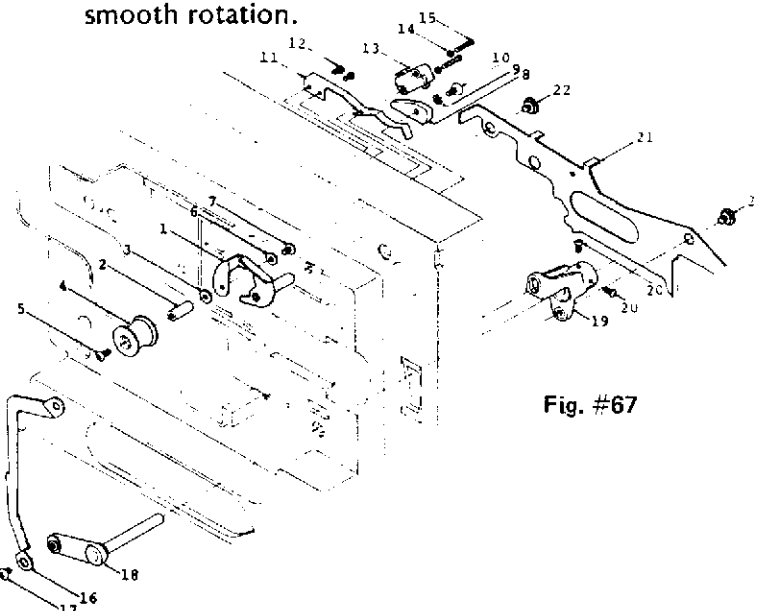
Position D: When the upper loop is lost due to the bad film with a series of damaged perforations by more than 4 frames, the loop forming guide roller is pulled by the film and moves to this position "D".

As the roller moves to this position, the film guard is activated at the same time and shuts off the power, stopping the projection to protect the film from the further damage.

To re-start the projection, turn the function switch to "STOP", then back to "3" position.



b. Adjustment: The upper loop arm assy, when inserted into the hole of the main frame casting without being engaged with the plate spring, should be free to rotate. Check for a smooth rotation.



The position of the film guard arm (8) is important and very critical.

To adjust;

- (1) Remove the #1 sprocket gear assy and the idler gear.
- (2) Mount the arm (8) on the upper loop arm shaft (1) and tighten the screw tentatively.
- (3) Turn the function switch to "STOP".
- (4) Make sure the convex mount on the end of the #1 sprocket shoe is seated in the slot of the upper loop arm (1).

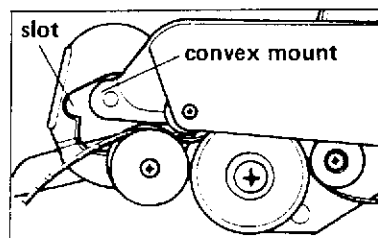


Fig. #68

- (5) The tip of the arm (8) should be seated on the plate spring (11) as Fig. #69. Tighten the screw of the arm. (Before tightening the screw, slightly move the arm tip to the right as the arm tip will retreat with the screw turning.)

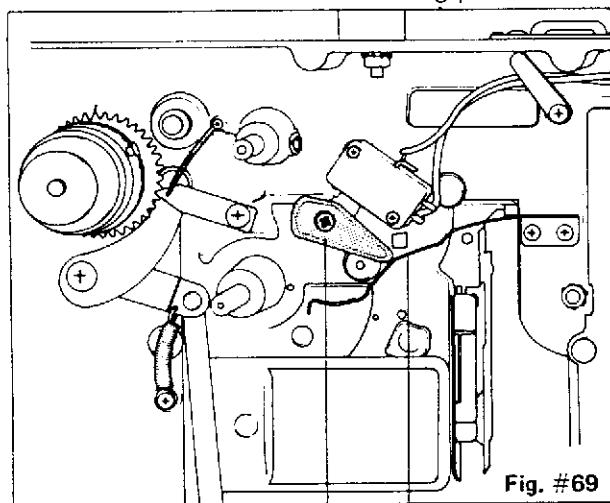


Fig. #69

ARM PLATE SPRING

- (6) Turn slowly the function switch to "MIC" to watch the movement of the arm tip, which should slide on the plate spring to the right and be seated as Fig. #70. This corresponds with the upper loop forming guide roller's position B (Fig. #64).

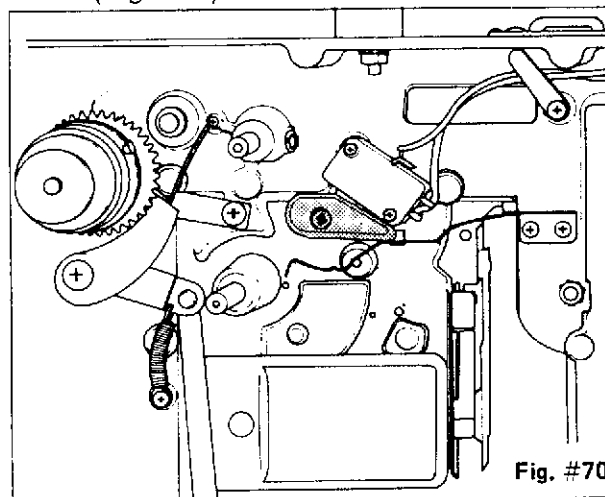


Fig. #70

- (7) Keep turning and set the function switch at "MIC". The arm tip now rotates clockwise sliding on the plate spring and is seated as Fig. #71.

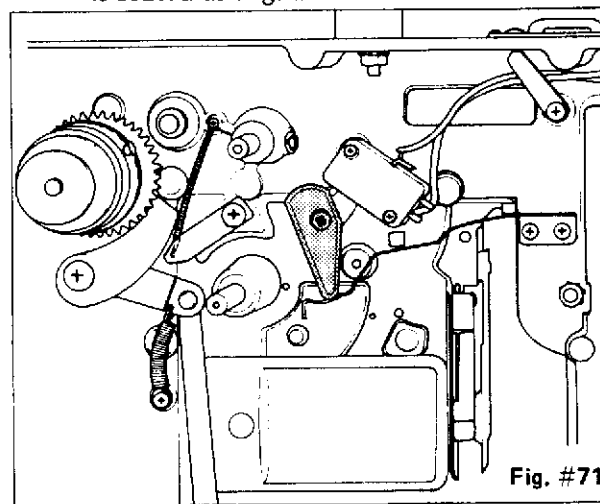


Fig. #71

- (8) Push down the upper loop forming guide roller and the arm tip slips off from the plate spring. (Fig. #72) This corresponds with the upper loop forming guide roller's position D (Fig. #66)

The roller should drop down with a little amount of pressure which means the tug of the film in the event of the upper loop being lost.

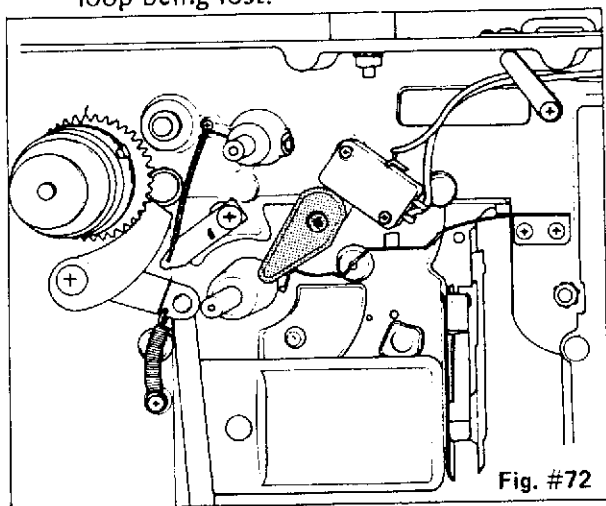


Fig. #72

- (9) Turn the function switch to "STOP" and see if the arm tip returns to the position of Fig. #69. Turn the function switch and make sure the arm rotates and the arm tip seats in the correct positions.
- (10) Lubricate the arm tip with silicone grease.
- (11) Apply lock-tight paint on the screw.

NOTE (1): The arm tip should not be seated too far beyond the curved point on the plate spring at "STOP" as Fig. #73.

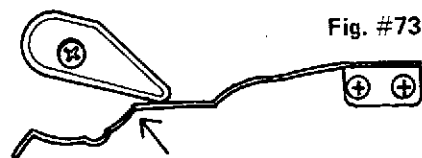


Fig. #73

In the event of the incorrect position as Fig. #73, the following troubles may be expected;

- (1) When the function switch is slowly turned from "MIC" to "STOP", the arm tip will not stop at the position as Fig. #69 and slip over to the position as Fig. #70, which means the upper loop forming guide roller is at its top position as Fig. #66.

Consequently,

- (2) The upper loop is not formed correctly.
- (3) In "Rewind" the film may be in contact with the parts in the film path.
- (4) The upper loop forming guide roller exceeds over the top of the lens holder cover and the film may not be loaded smoothly.

NOTE (2): The arm tip should not be positioned below the curved point on the plate spring as Fig. #74.

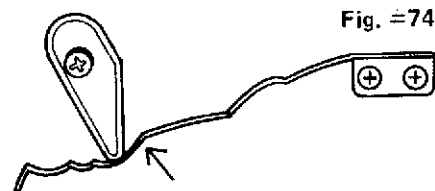


Fig. #74

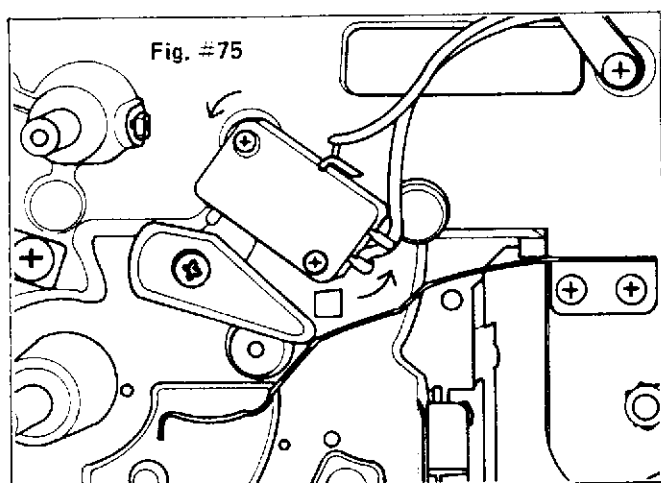
In the event of the incorrect position as Fig. #74, the following troubles may be expected;

- (1) The arm tip will not slide on the plate spring to the position as Fig. #70, which means the upper loop forming guide roller does not move to its top position as Fig. #64.

Consequently,

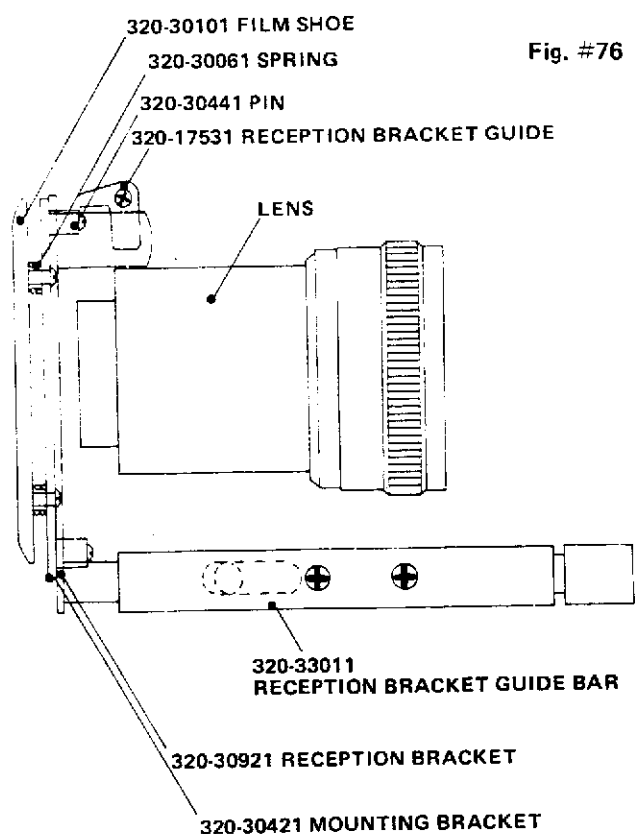
- (2) The upper loop is not formed correctly
- (3) The activation of the film guard switch will delay resulting in the switch not activating with the four frames consecutive film damage.

NOTE (3): The proper clearance between the film guard arm and the film guard switch shoulder is required. If being too close or with no clearance, the arm tip may stick fast and will not rotate resulting in the switch not activating. To adjust, re-mount the switch swinging clockwise so that the maximum clearance is obtained as Fig. #75.



3. Film Gate Opening And Closing

- a. The alignment of the film shoe is effected by the position of the guide shaft. (Fig. #76)



- b. To adjust, set the function control to "STOP", loosen the two mounting screws, rotate the function control to "MIC". The film shoe should be seated flat against the aperture plate, at the same time that it is aligned with the outer guide rail. Secure the mounting screws, open and close the gate, and re-check the position of the film shoe.
- c. Load up a film and check for even focus. If necessary, refer to the section on uneven focus.

4. Retraction of the Cam Claw

- a. In the "STOP" or load position the cam claw is retracted by the action of the #1 sprocket shoe interlocking bracket.
- b. Incorrect alignment of the cam claw retraction mechanism will result in some type of abnormal noise during forward or rewind without film.
 - (1) "Rewind": If the claw does not clear the shutter, locate the bent shutter blade and re-form to clear the claw.
 - (2) "Forward": Check the position of the reception arm as described in Sec. B-1-b.

5. Lower Loop Forming Mechanism

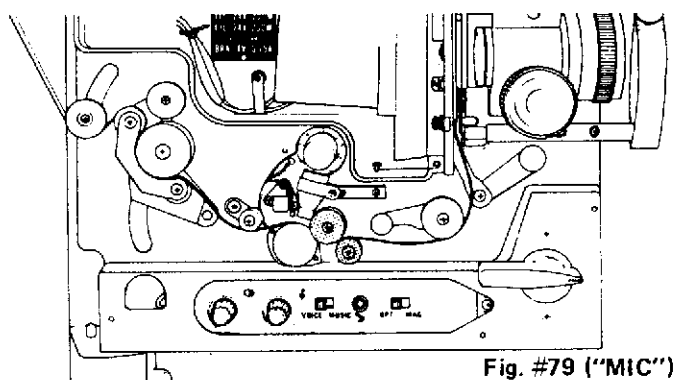
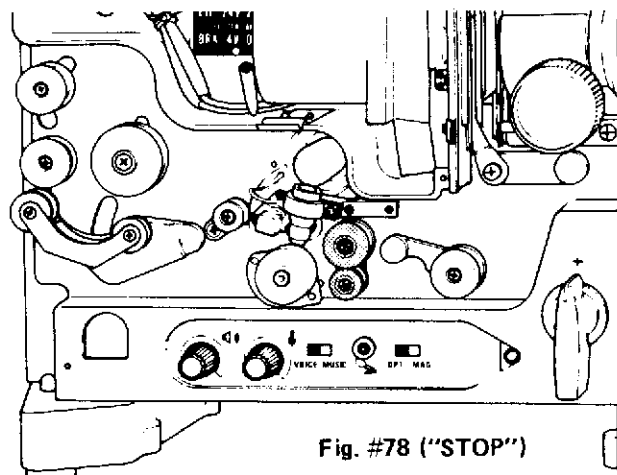
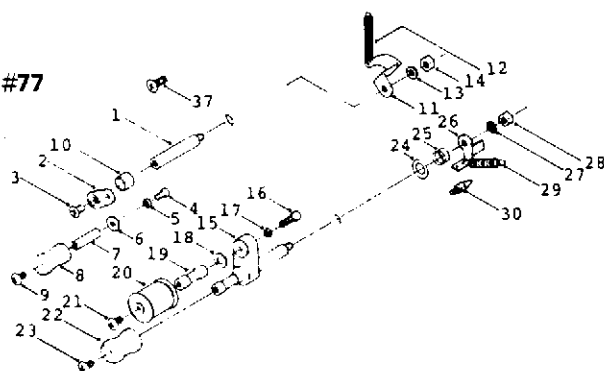
Refer to section 321-5-3 Lower Loop Setter System.

To check for correct adjustment of the loop setter roller, load a film and observe that the film is not in contact with the film shoe, aperture plate, rubber rollers, sound drum, and solar cell case.

6. Buzz Roller Tension and Position (Fig. #77)

- a. During normal projection the buzz roller (20) firmly holds the film against the sound drum by the tension of spring (25).
- b. The position of the buzz roller and its tension is critical for minimum wow and flutter. In "STOP" and "REWIND" it must be clear from the film path. It is also important that there is no end play. The end play of the buzz roller will cause variable or poor sound tracking. (See section 321-6)

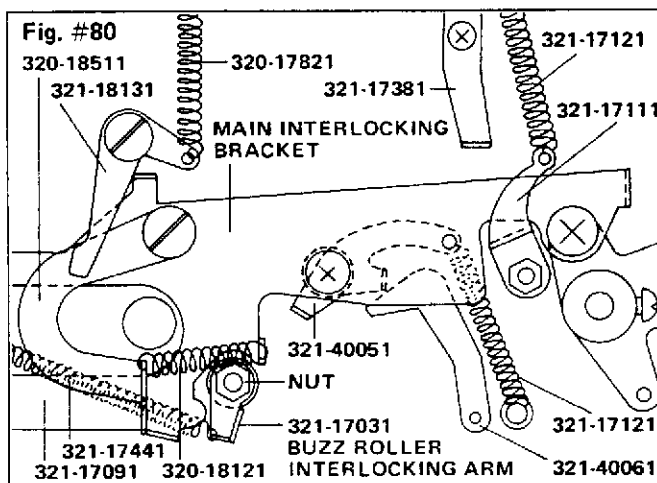
Fig. #77



c. To adjust the buzz roller tension and position, remove the function knob and control pannel. The re-install the function knob and turn the knob to the "MIC" position. (Parallel to the base of the projector)

- (1) Unhook the tension spring.
- (2) Slightly loosen the nut (7mm) (See Fig. #80)
- (3) Return the function switch to "STOP".
- (4) Push the buzz roller's interlocking arm (26) against the main interlocking bracket. (See Fig. #80)

- (5) Slowly swing the buzz roller assy clock-wise until the clearance between the buzz roller and loop setter arm is about 1mm. (See Fig. #81)



- (6) Turn the function switch to "MIC".
- (7) Tighten the 7mm nut firmly.
- (8) Hook up the tension spring.
- (9) Check the buzz roller position in "STOP" and "MIC" position.
- (10) Minor adjustments can also be made by slightly bending the tab on the buzz roller interlocking arm. (Fig. =82)

Fig. #81

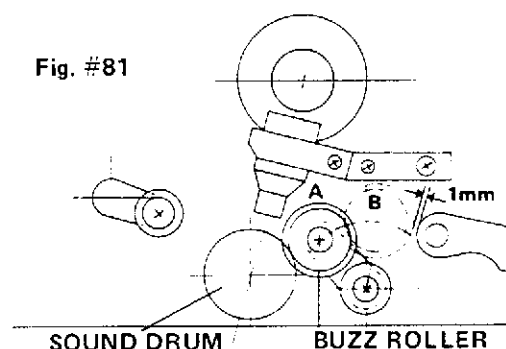
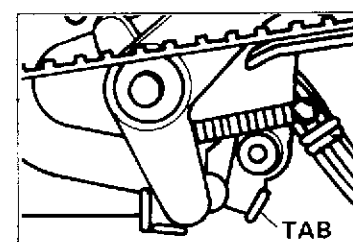


Fig. #82



7. Tension Roller

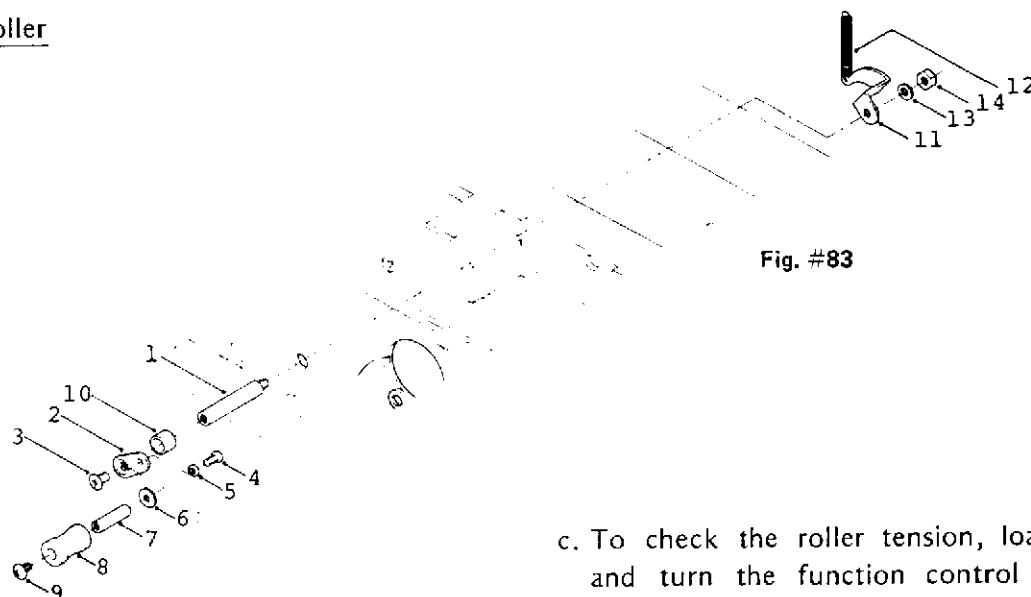
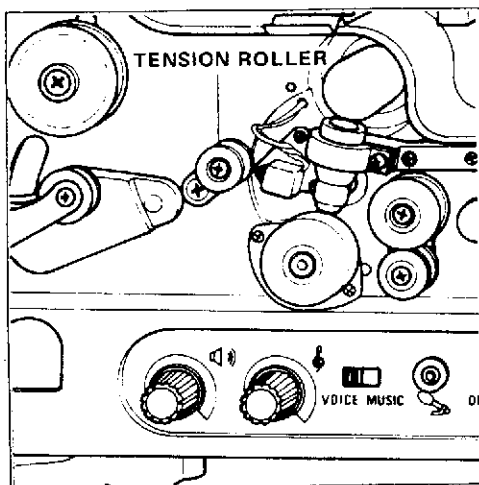


Fig. #83

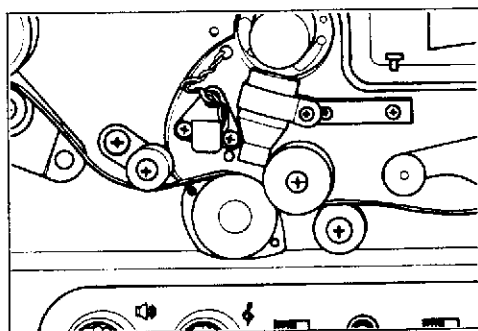
- The tension roller (8) applies constant but gentle tension to stabilize the film over the sound drum. The amount of tension is determined by tension spring (12).
- In the "STOP" and "REWIND" position, the tension roller is at the top (See Fig. #84) allowing the film to clear the sound drum.

Fig. #84



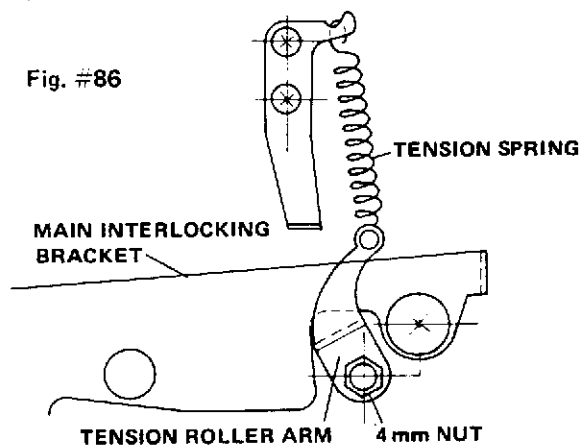
In the "MIC" or "FORWARD" position, the roller swings down as it is released by the main interlocking bracket. (See Fig. #85)

Fig. #85



- To check the roller tension, load the film and turn the function control to "MIC". The tension roller should ride on the film with gentle tension. A slight push on the roller should allow it to travel downward slightly. In "REWIND" the roller is raised up by the interlocking bracket to clear the film path.
- Adjustment: To adjust the tension roller's position, remove the control panel and turn function switch to "MIC" to expose the nut (7mm) from behind the interlocking bracket (See Fig. #86).

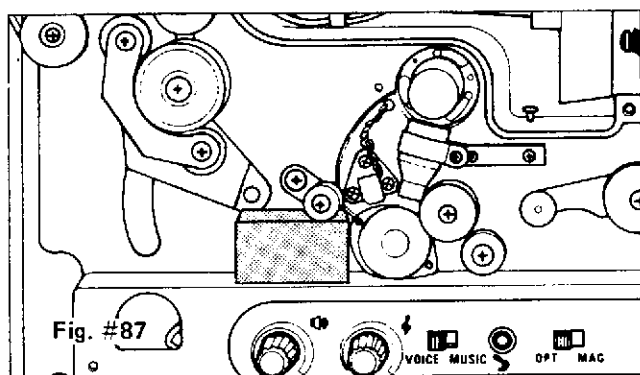
Fig. #86



Unhook the tension spring and using a 7mm nut driver, loosen the 4mm nut slightly and return the function switch to "STOP".

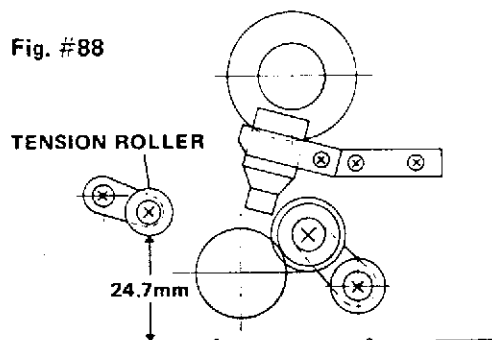
- Set the tension roller at the 12:00 o'clock position.
- Load up a film and set the function switch to "REWIND".
- Slowly rotate the tension roller arm clockwise until it just clears the film.

- (4) Holding the roller in this position, return the function switch to "MIC".
 - (5) Tighten the nut and hook up the spring.
 - (6) Check the position of the tension roller by switching back to "REWIND", then to "STOP", and "FORWARD".
- e. Another method using the EIKI (321-04T) adjustment gauge.



- (1) Set the function switch to "MIC" and slightly loosen the 7mm nut as shown in Fig. #86.
- (2) Unhook the tension spring.
- (3) Insert the EIKI (321-04T) tension roller gauge.
- (4) Push the tension roller down against the gauge. (24.7mm)
- (5) Push the tension roller interlocking arm against the main interlocking bracket and tighten the nut. (See Fig. #87).
- (6) Hook up the tension spring.
- (7) Remove the gauge and check the rollers position in "FORWARD" and "REWIND".

Fig. #88



- f. The tension spring may be adjusted by slightly stretching if necessary to minimize wow and flutter. A weak spring should be replaced. A properly adjusted tension roller should ride in the middle of it's travel.

8. #2 Sprocket Shoe Adjustment

The #2 Sprocket Shoe Assembly closes around the #2 sprocket when the projector is in the "MIC" or No. 2 or 3 position. (Fig. #89)

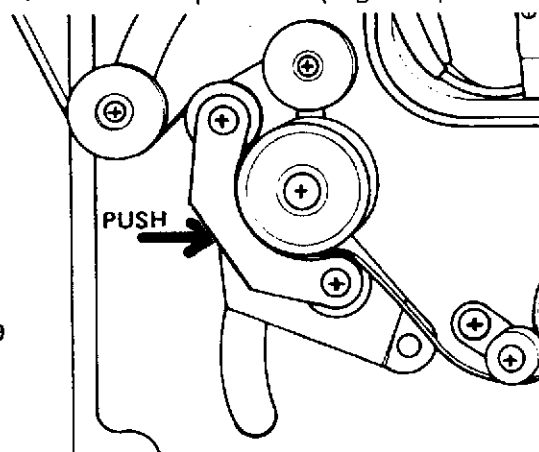


Fig. #89

Loosen the adjustment screw on the interlocking arm behind the #2 sprocket shoe, and the interlocking arm set screw.

Turn the function control to the "MIC" position. Push the sprocket shoe completely up against the #2 sprocket and secure the set screw and the adjustment screw. (Fig. #90)

NOTE: No end play is allowed for #2 sprocket shaft.

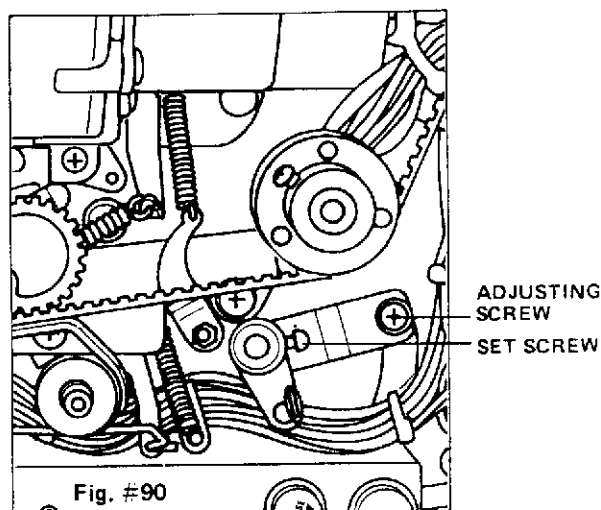
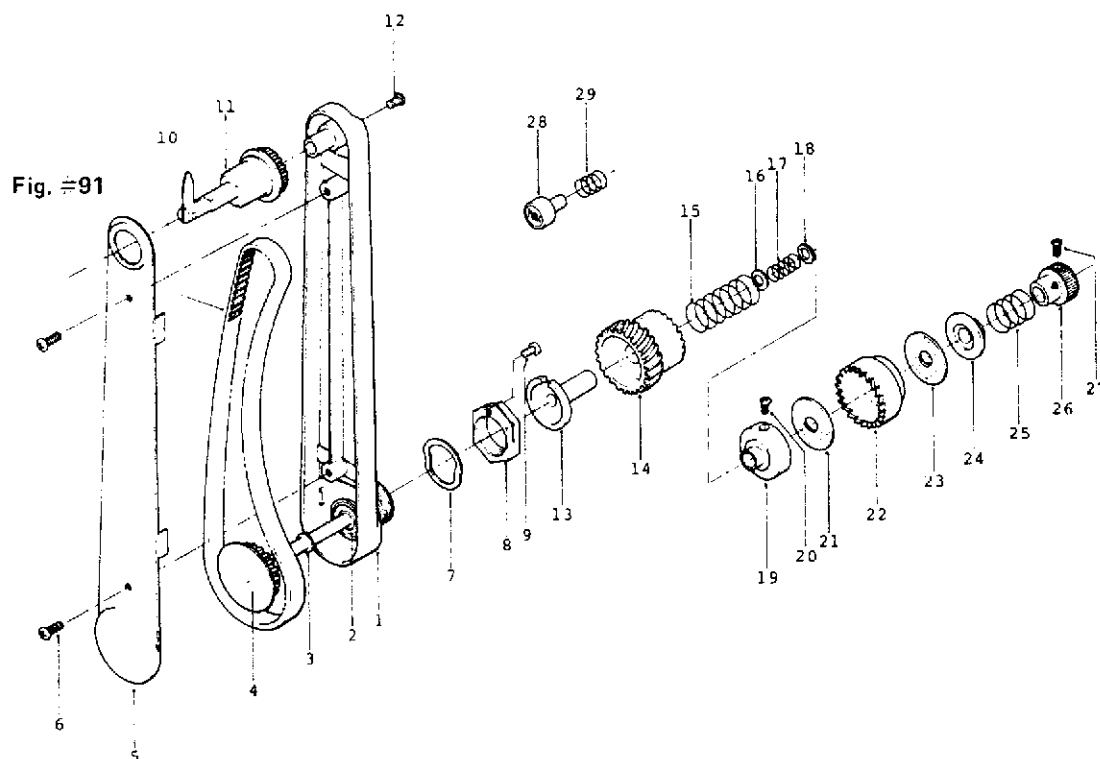


Fig. #90

5-5: REWIND SYSTEM



A. Description

In the rewind function, the film path is opened allowing the film only to contact the four film guide rollers. At the same time the rewind control arm moves the rewind drive gear (14) towards the opposite mating driven gear (22) which in turn drives the set collar (19) via a cork clutch plate which drives the pulley shaft, arm belt and arm spindle assy. When the drive gears are engaged, the function control switches the motor's direction and energizes the main drive motor.

The large drive gear tension spring (15) provides the tension keeping the drive gears A (14) & B (22) from engaging during forward. The smaller back tension spring (17) maintains a small amount of back tension to the supply reel. The rewind spring (25) sets up the rewind clutch tension by supplying pressure to the sleeve plate (24) the cork clutch liners (21) which in turn transmits the rewind drive from drive gear A to B and to the drive pulley shaft, belt and spindle. (Fig. #91, 92)

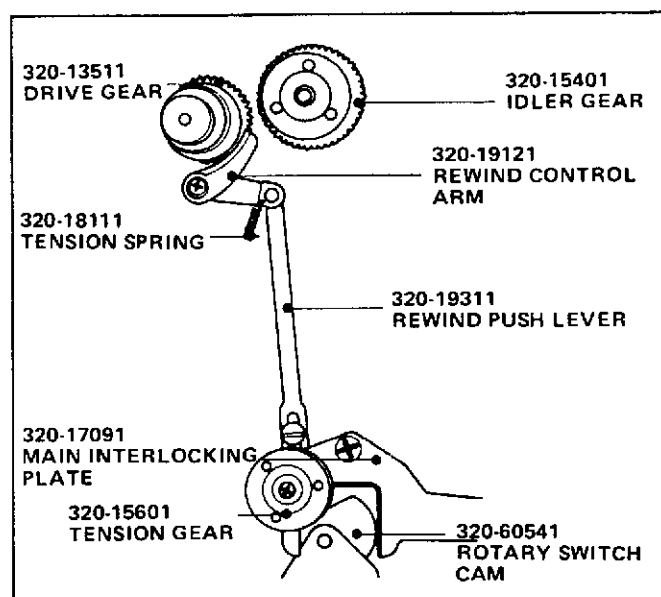


Fig. #92

B. Adjustments

1. Rewind Mechanism

A 0.5mm clearance between the two mating drive gears is critical for correct rewind engagement. This distance is maintained by fiber washers as indicated, adding or subtracting washers as may be necessary to accomplish the desired clearance. Too much clearance will result in improper mating of the gears and will

damage the gears. Too close a clearance will cause the gears to contact in forward, resulting in abnormal gear wear and noise. With the correct fiber washers the clutch springs should be compressed with the set collar pushed all the way towards drive gear A and secured with the set screw. (Fig. #93)

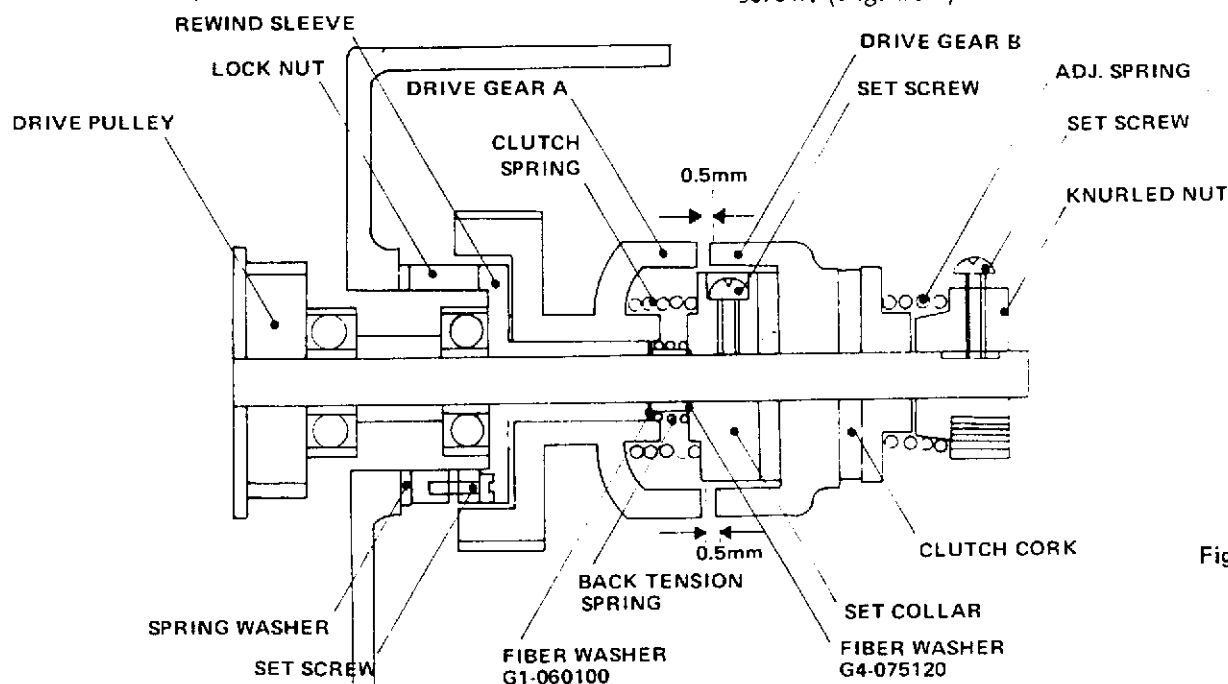


Fig. #93

2. Rewind Spring Adjustment

The knurled nut (26) adjusts the rewind torque. Excessive rewind torque will cause the motor belt to slip when rewinding a large full reel; too little rewind torque will not rewind a large 2000' reel. The correct adjustment is about 2mm of threaded shaft exposed beyond the nut.

After making the adjustment, it is important that the set screw (27) be secured tight.

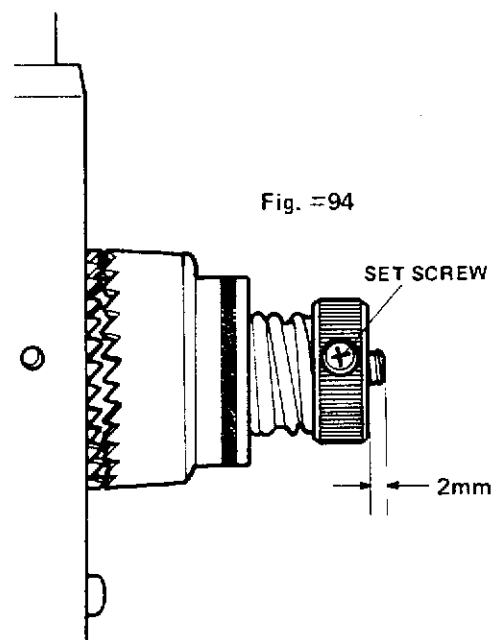


Fig. #94

NOTE: Turn the knurled nut clockwise until it is tight then back it off one half turn.

5-6: SOUND DRUM AND FLYWHEEL

A. Description

The sound drum and flywheel assembly'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 variations. 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 (46) is seated in two precision ball bearings (48) which are sealed and factory lubricated. The ball bearings are lightly press fitted into the sound hub casting (47). The shaft is secured in place by a set collar (52). 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 bearing will result in excessive wow & flutter. In the forward direction, the sound drum shaft (46) 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. The flywheel brake (56) mounted on the #2 sprocket shoe interlocking arm

stops the rotation of the flywheel instantly when the function switch is turned to "STOP" so that the film is not scratched by the sound drum which intends to keep turning. During projection the brake is off away from the flywheel. (Fig. #95, 96)

B. Adjustments

The ball bearings are life time lubricated and lightly presses into the hub (47). The amount of shaft (46) end play should not exceed 0.2mm and is determined by the set collar's (52) position. Care should be taken not to bend the shaft or lubricate the bearings. (Bearings are factory lubricated and should be replaced if defective). Defective or incorrect lubrication of the bearings will result in excessive wow and flutter. The plate spring (54) tension may be adjusted for minimum wow and flutter with the screw secured. Whenever removing the spring and flywheel is necessary, care should be taken to avoid changing the plate spring's tension. (Fig. #95)

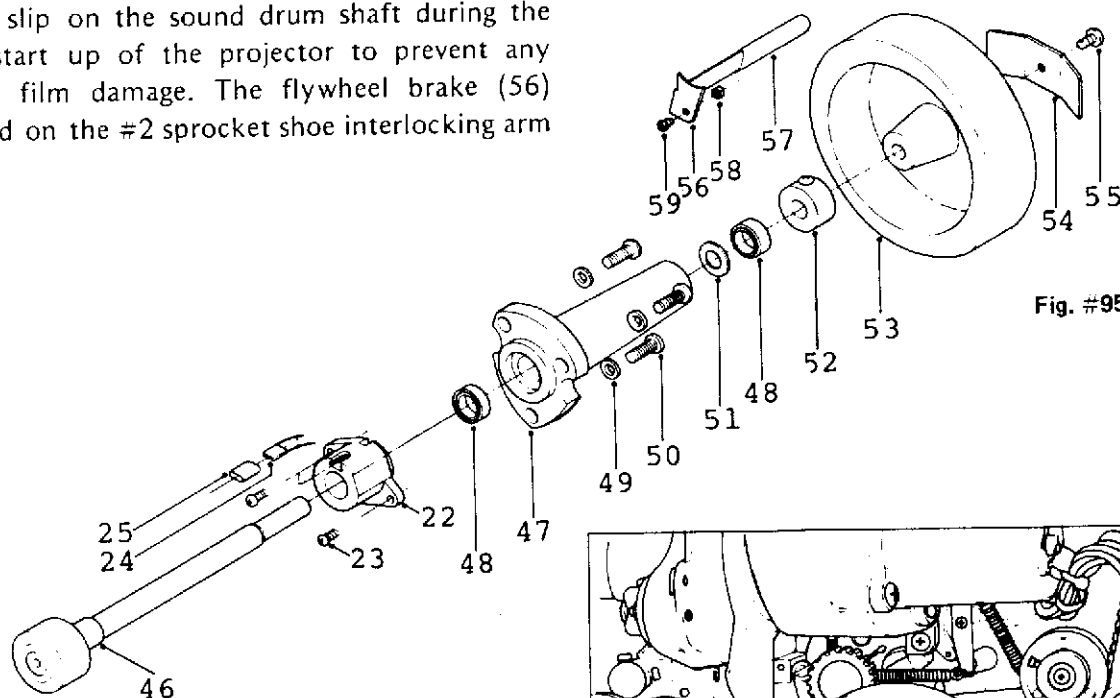


Fig. #95

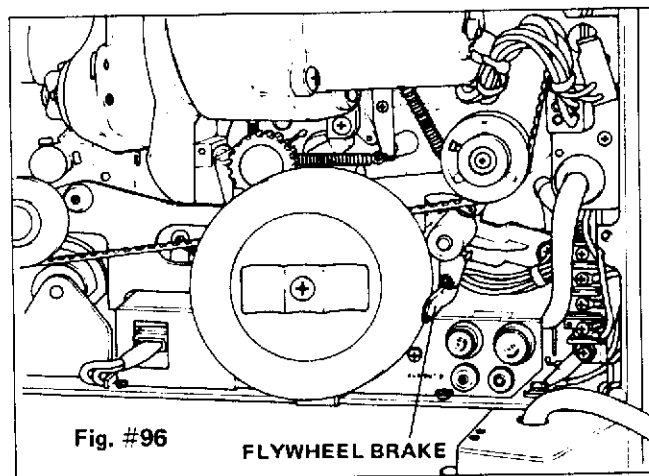


Fig. #96

FLYWHEEL BRAKE

321-6: SOUND PICK-UP SYSTEM

6-1: OPTICAL SOUND FOCUSING PROCEDURE

A. Description

Models SL-0 and SL-1 are optical sound playback only, models SL-02 and SL-2 are both optical and magnetic playback. 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 varied light intensity is converted into a minute electrical voltage change which is amplified and converted into acoustical variation or sound directly related to the photographic variations recorded on the film. (Fig. #97)

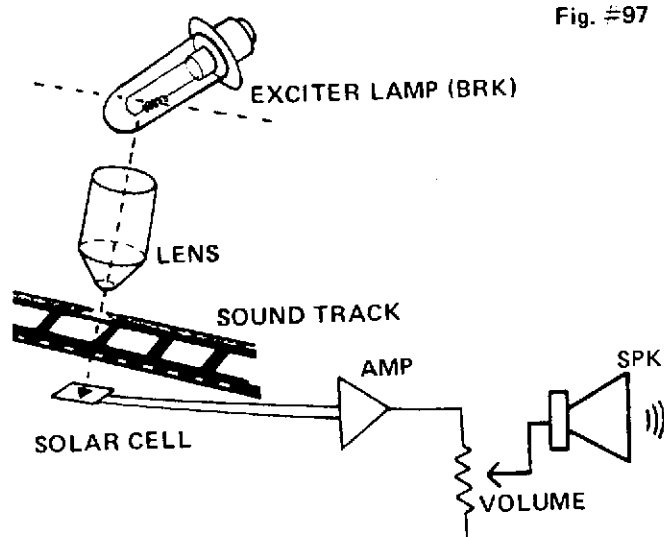


Fig. #97

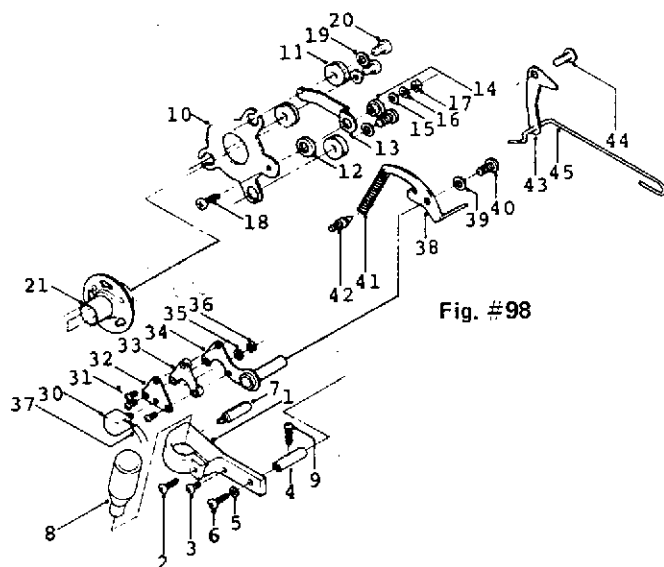
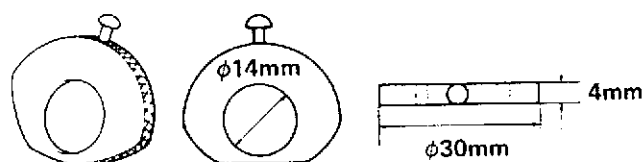


Fig. #98

B. Sound Focus Alignment Procedure

1: Tools and Equipment Required

- Screw driver set (Iso)
- Sound lens adjustment tool (Tool No. 320-02T. Fig. #99)
- SMPTE sound focus test film 7000Hz
- SMPTE buzz track test film
- AC VTUM (audio range) and or
- Oscilloscope
- 8 ohm 30 watt dummy load resistor
- External speaker (front cover)



SOUND LENS ADJUSTMENT TOOL

Fig. #99

2: Set-up Procedure

- Remove the lamp house cover, light shield and lamp.
- Load a SMPTE test loop.
- Turn the function control to "MIC" position.
- Loosen a screw mounting sound lens holder assy, and remove the lens holder assy.
- Insert the Tool No. 320-02T on the larger barrel of sound lens and tighten a set screw on the tool. (Fig. #100)

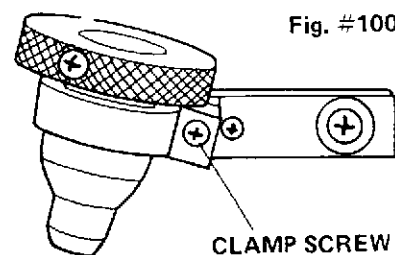


Fig. #100

- Loosen a sound lens lock screw, and mount the sound lens clamped to the tool to the lens holder assy.
- Mount the sound lens holder assy to the projector's casting and tighten the mounting screw. (Fig. #101)

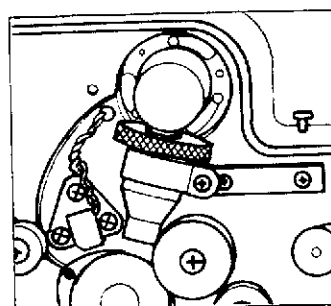
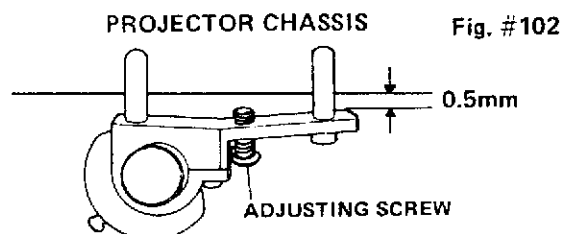


Fig. #101

NOTE: Keep 0.5mm distance from the casting.
(Fig. #102)

NOTE: The top of the adjusting screw should not touch the casting. (Fig. #102)



3. Sound Focusing Adjustment Procedure

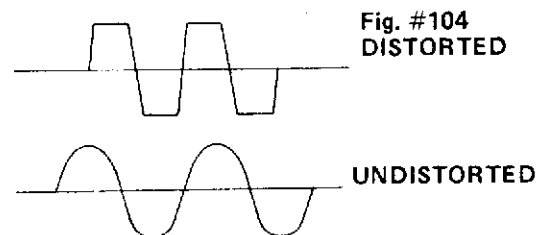
- Connect the dummy load resistor to the speaker output jack.
- Load the 7000Hz SMPTE test film loop with the emulsion side towards the film shoe.
- Connect either an AC VTVM (20 volt range) or an Oscilloscope across the dummy load resistor. (Fig. #103)

NOTE: When using instruments with a grounded shield input, avoid a ground loop condition by not connecting the shield at both ends.

- Set the voice/music selector switch to "voice" and turn the volume and tone controls to the maximum (clockwise) position.
- Loosen the sound focus lens clamp screw slightly to allow a rotation of the lens.
- Turn on the projector and observe the AC VTVM or the Oscilloscope.

- 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.

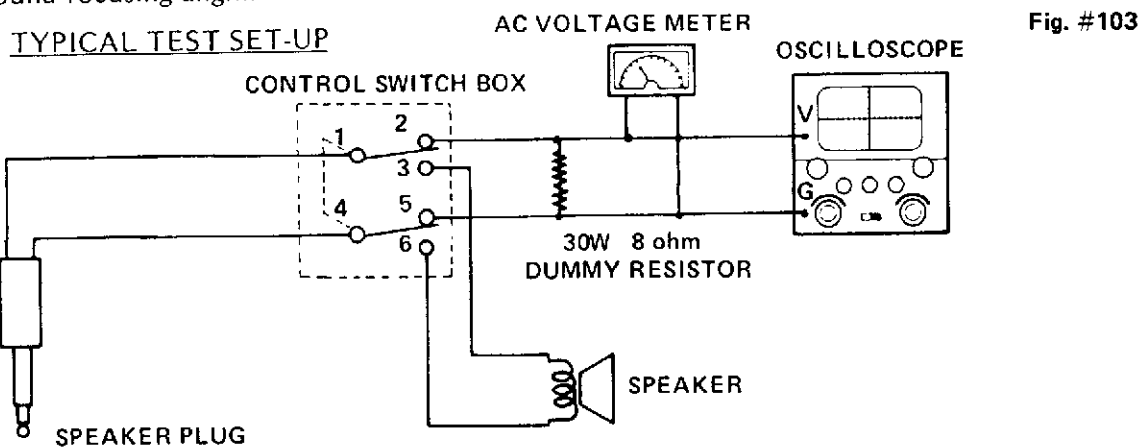
- With the Oscilloscope connected across the dummy load resistor a more precise alignment can be achieved. Observe the 7000Hz sine wave at both full volume and a lower volume at the same time adjusting the rotation and up or down position of the sound lens, for maximum P-P voltage of the sine wave. A clean undistorted sine wave should be observed as shown in Fig. #104 corresponding to the volume and tone control positions as indicated.



- This completes the Sound Focus adjustment. Clamp the sound lens clamp screw and test with a good sound track film.

4. Buzz Track Adjustment Procedures

- Connect an extension speaker to the speaker jack.
- Load an SMPTE buzz track test film loop with the emulsion side towards the film shoe.
- Turn the function control switch to the No. 2 position.
- Turn the amplifier volume and tone controls to maximum (clockwise) and listen for a clear 1000Hz tone.
- Adjust the buzz track alignment screw clockwise until the 1000Hz tone is inaudible and a 300Hz tone becomes audible.



- f. Turn the set screw counter-clockwise until neither the 300Hz or the 1000Hz tone is audible, indicating correct buzz track alignment.
- g. Re-check the 7000Hz sound focus alignment.
- h. Remove the exciter lamp. Remove the lens adjustment tool. Re-install the exciter lamp and wipe off any fingerprints.

6-2: MAGNETIC SOUND PLAYBACK SYSTEM

A. Description

Models SL-02 and SL-2 in addition to the standard optical sound reproduction are equipped with optional magnetic track (100 mil) playback only. The opt/mag slide switch on the amplifier effects this conversion by switching the input to the amplifier while at the same time moving the magnetic playback head into position against the film's magnetic sound track.

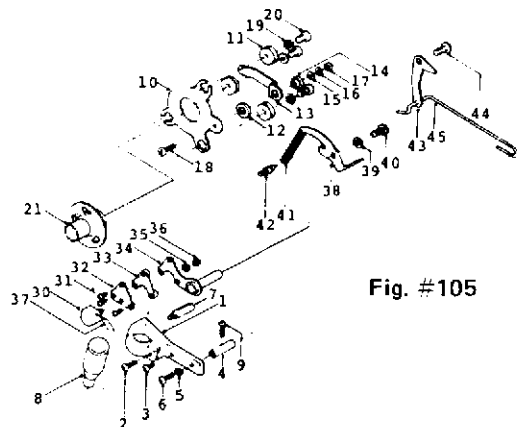


Fig. #105

B. Magnetic 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. Oscilloscope
- f. 8 ohm 30 watt dummy load resistor
- g. External speaker (front cover)

2. Set-Up Procedure

- a. Remove lamp house cover.
- b. Set the function control to "STOP".
- c. Load the magnetic test loop (oxide side toward the head)
- d. Turn the function control to "MIC".

- e. Slide the mag/opt switch to mag.
- f. Connect the output of the amplifier to the dummy load resistor.
- g. Connect the AC VTVM and or the Oscilloscope across the dummy load.
- h. Turn the function control to No. 2 operate position, and check for the correct engagement of the magnetic head and the rubber roller.
- i. Turn the volume and tone controls to the maximum (clockwise) position.
- j. Holding the magnetic head with the pliers coarsely adjust the three screws adjustment screws for the correct position as shown in (Fig. #104). The head should also contact the film parallel as illustrated in (Fig. #105).

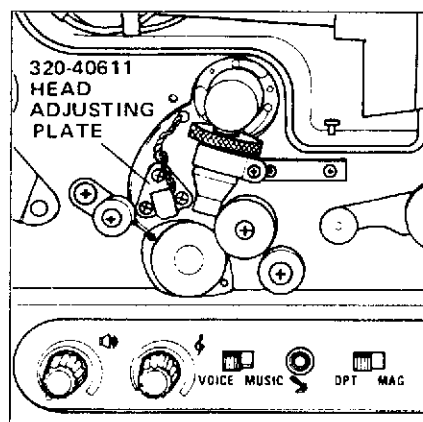


Fig. =106

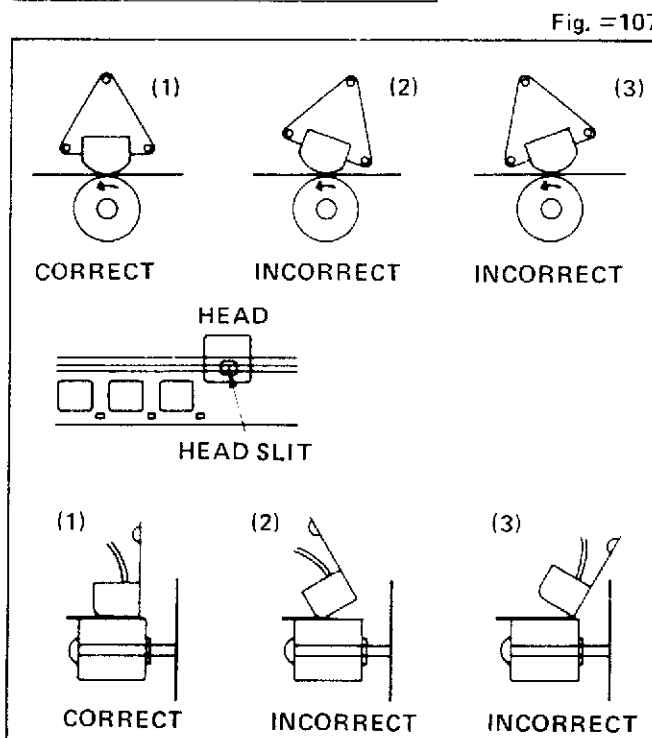


Fig. =107

- k. To precisely adjust the head azimuth using the AC VTVM or Oscilloscope:
 - (1). With the AC VTVM connected across the load resistor, observe the meter while making small adjustments to the three alignment screws in turn until the maximum voltage reading is achieved. This completes the azimuth alignment.
 - (2). With the Oscilloscope connected across the load resistor, observe the 7000Hz sine wave at full and low volume. Adjust the three head alignment screws until a maximum P-P sine wave voltage is observed. When a clean undistorted sine wave at maximum voltage is achieved the alignment is completed.
- l. This completes the Azimuth alignments.

321-7: LAMP CIRCUIT

7-1: Lamp Circuit

A. Description

The SL projector is designed with a 24 volt AC Quartz Halogen 250 watt ELC lamp. A 200 watt EJL lamp may also be used with some reduction in light output. A high low switch located in the lamp house allows the selection of either the normal 24 volt or the 22 volt secondary from the transformer.

B. Replacement and Alignment

1. Disconnect AC power cord.
2. Remove Lamp House cover.
3. Slide out black heat shield cover. (CAUTION: Shield may be hot.)
4. Push lamp ejection lever to the left and lamp will come out.
5. When replacing lamp be sure that it snaps into the lamp socket properly and that heat shield and lamp house cover are re-installed.
6. For maximum, even illumination, it may be necessary to adjust the lamp position to allow for slight variations in lamps. Turn knurled nut for horizontal adjustment.

321-8: ELECTRICAL SYSTEM ^{SL II Series} (8-1-B)

8-1: Electrical System

A. Function Switch

Micro Switch #	Type of Switch & Part #	Function
SW#1	V-15-1A3M 312-60051	Motor
SW#2	V-15-1A3M 312-60051	Lamp
SW#3	V-15-1A3M 312-60051	Rewind
SW#4	V-15-1A3M 312-60051	Rewind

Wire #	Colour	Type	Connected to ;
#1	Black	AWG #22	Motor 6 Pin Connector
#2	Blue	AWG #22	Motor 6 Pin Connector
#3	Yellow	AWG #22	Motor 6 Pin Connector
#4	Brown	AWG #22	Motor 6 Pin Connector
#5	White	AWG #18	Lamp "HI-LOW" Switch
#6	Brown	AWG #22	Transformer 9 Pin Connector
#7	White	AWG #18	Transformer 3 Pin Connector

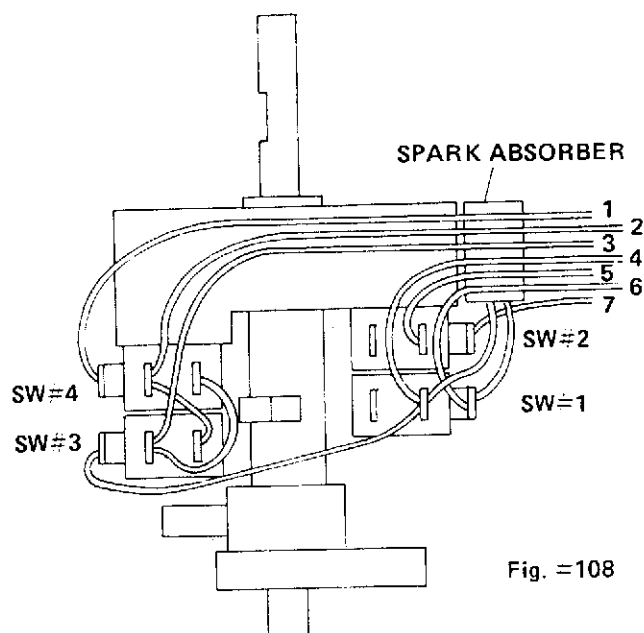


Fig. =108

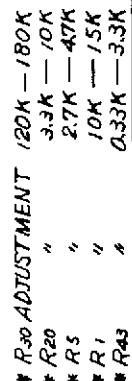
- #### B. Electrical Circuit Diagrams
- (Electrical Schematic)
 - (Electrical Block Diagram)
 - (See the end of this manual)

321-9: SERVICE UPDATES AND MODIFICATIONS

EIKI SLII-series has had several modifications. All the important modifications are included and discussed in this manual.

Further modification after the issue of this manual will be covered by SERVICE UPDATES, which are recommended to be filed in this section.

5P INPUT



Applicable on ;

SL-0. -1 : S/N 11590 and up

SI-2 : S/N 14601 and up

3L-2 : S/N 14001 and up
FY-300-SI-0-1 : S/N 1153 and up

EX-300-SL-0, -1 : S/N 1199 and up
EX-300-SL-2 : S/N 1218 and up

映瑞工業株式會社

5月 7月 30日

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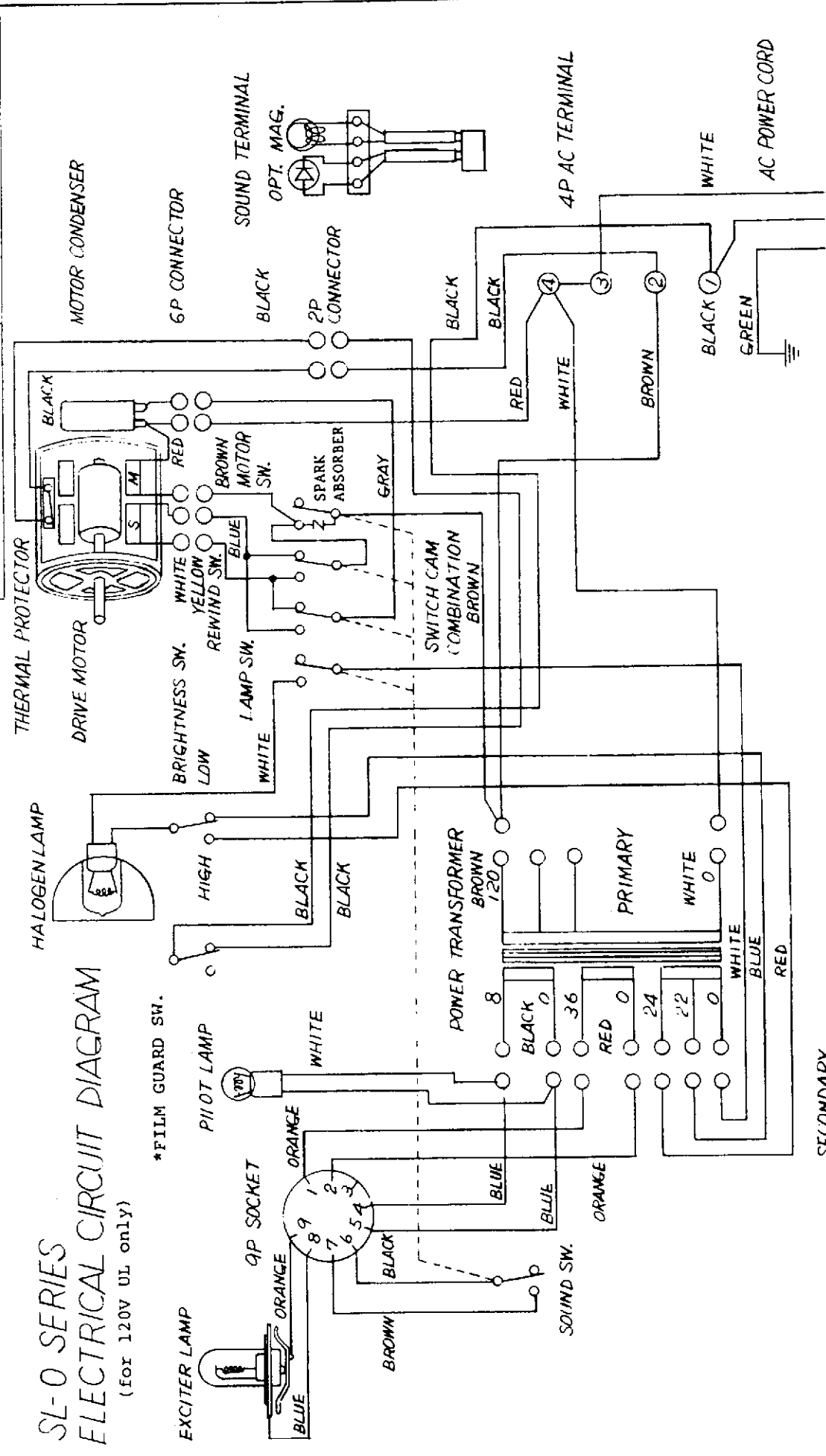
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5.

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SL-0 SERIES ELECTRICAL CIRCUIT DIAGRAM (for 120V UL only)



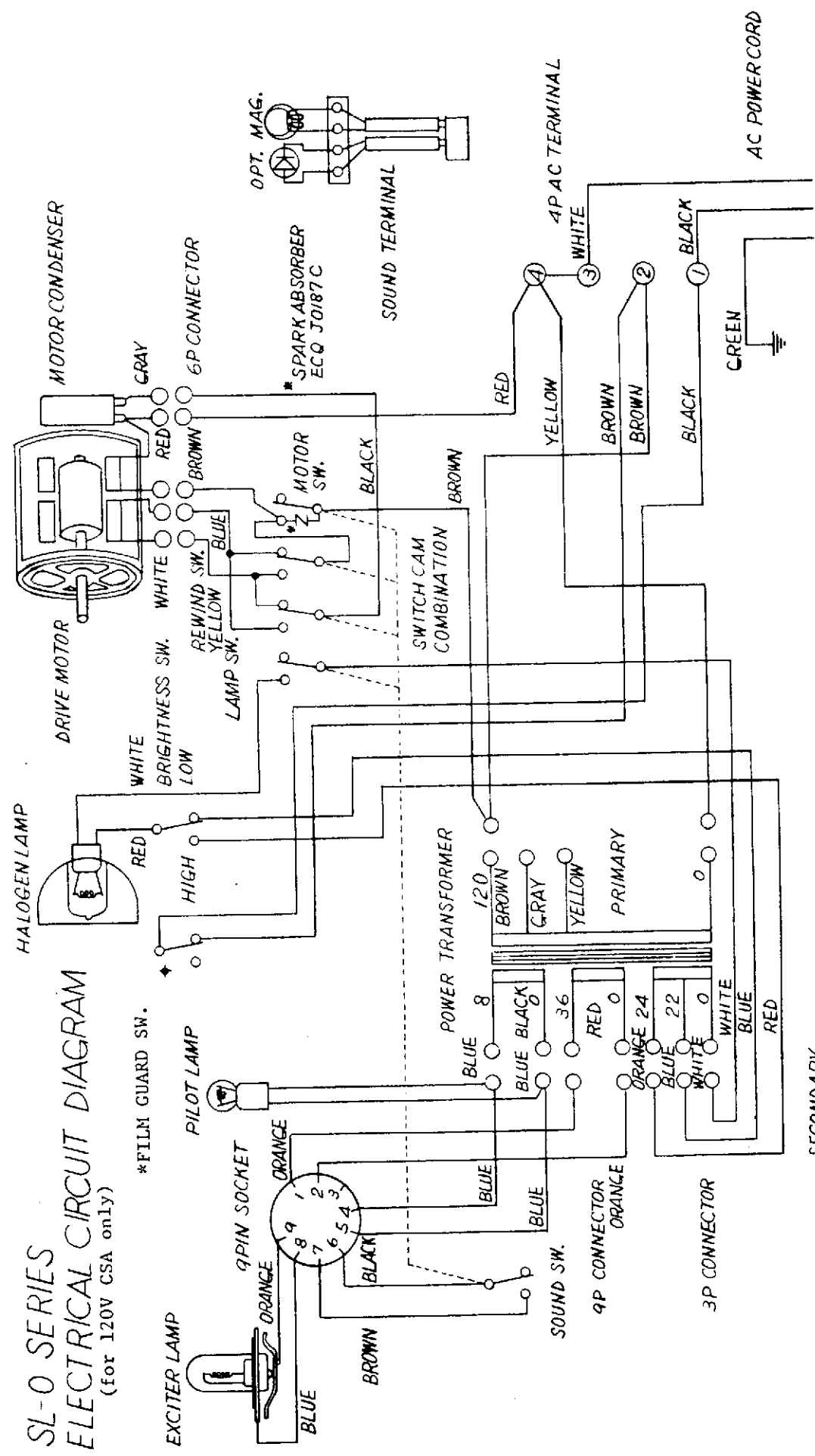
without FILM GUARD SW. : S/N 10001-15601
with FILM GUARD SW. : S/N 15602 and up

SECONDARY

映機工業株式会社	SL	320-61301
54年 7月 5日	AK	SL-0 SERIES
54年 7月 5日	AK	CIRCUIT DIAGRAM

SL-0 SERIES ELECTRICAL CIRCUIT DIAGRAM

(for 120V CSA only)



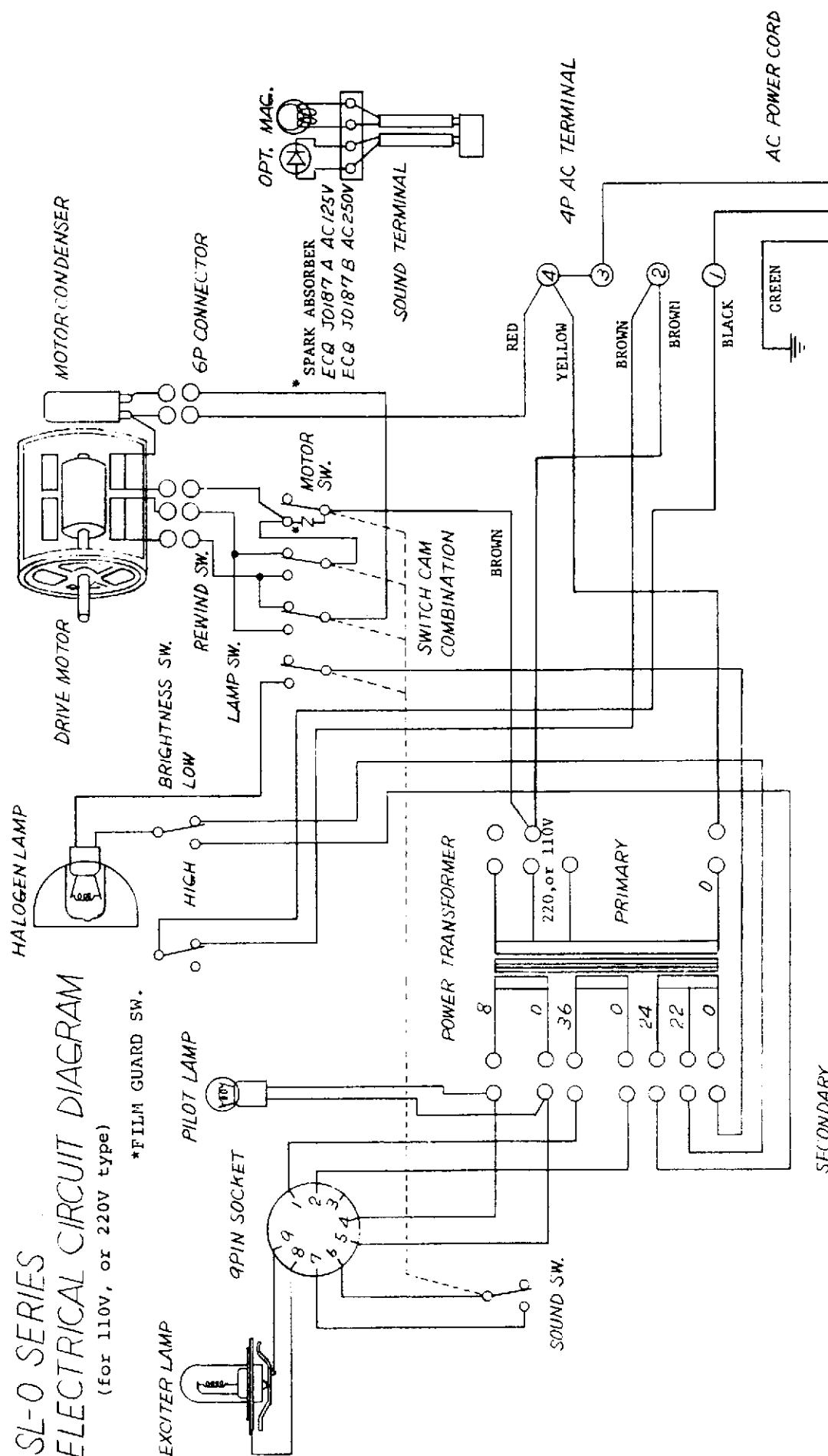
映機工業株式会社		SL II Series	
作 54年 9月 10日	品 名	SL-0 SERIES	
図 1	設計 番号	CIRCUIT DIAGRAM	
時 間	部 門	3206/401	
所 在	課 長	SL	

without FILM GUARD SW : S/N 10001-15601
with FILM GUARD SW : S/N 15602 and up

SL-0 SERIES ELECTRICAL CIRCUIT DIAGRAM

(for 110V, or 220V type)

*FILM GUARD SW.



NOTE. BASIC DIAGRAM

SECONDARY

without FILM GUARD SW. : S/N 10001-15601

with FILM GUARD SW. : S/N 15602 and up

映機工業株式会社

昭和53年10月10日

材料 管理 台帳 管理 台帳

承認 設計 課 長

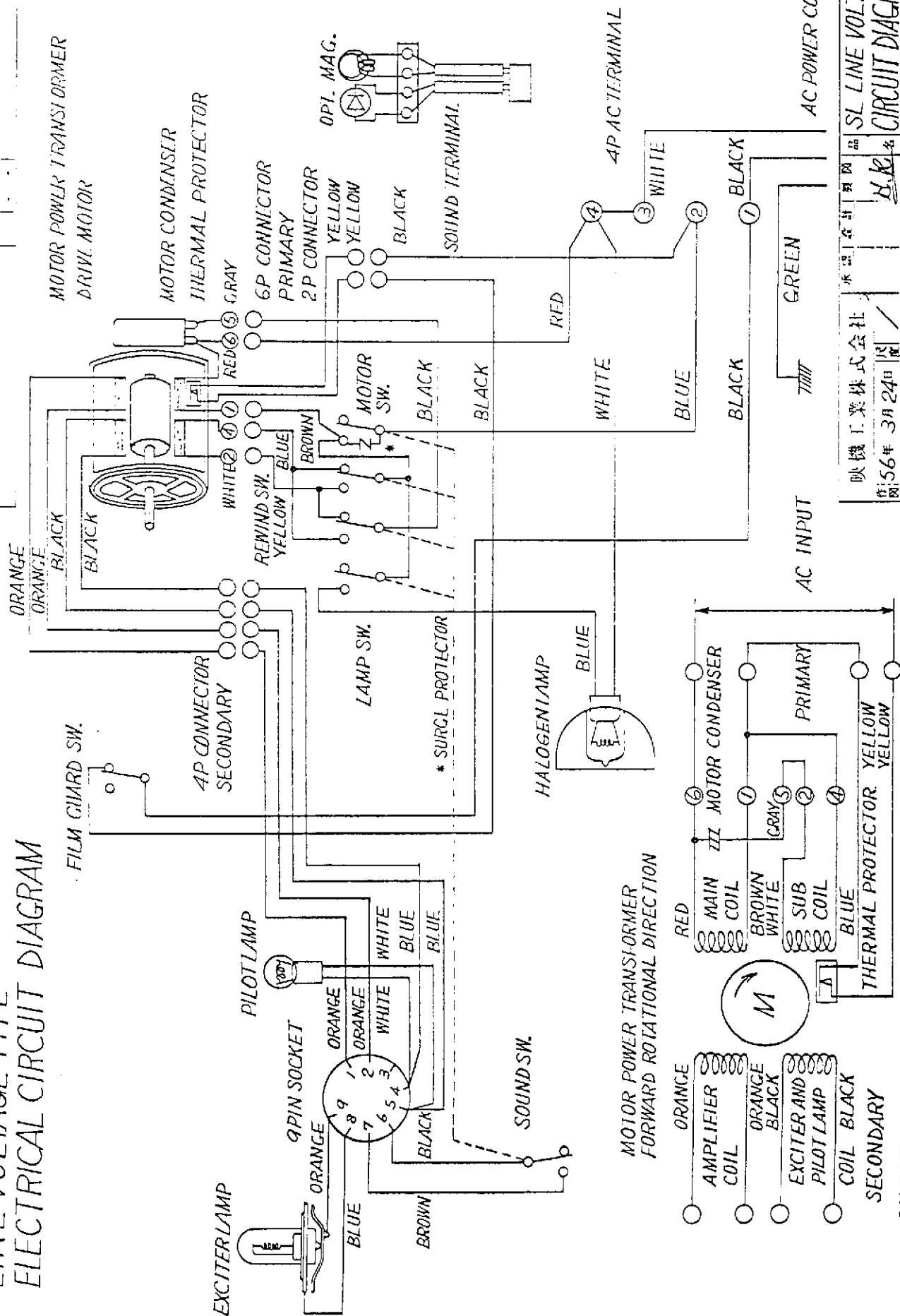
HAC

SL-0 SERIES

CIRCUIT DIAGRAM

320-61101

LINE VOLTAGE TYPE ELECTRICAL CIRCUIT DIAGRAM



映機工業株式会社
作: 56年 3月 24日
図: 321-60901

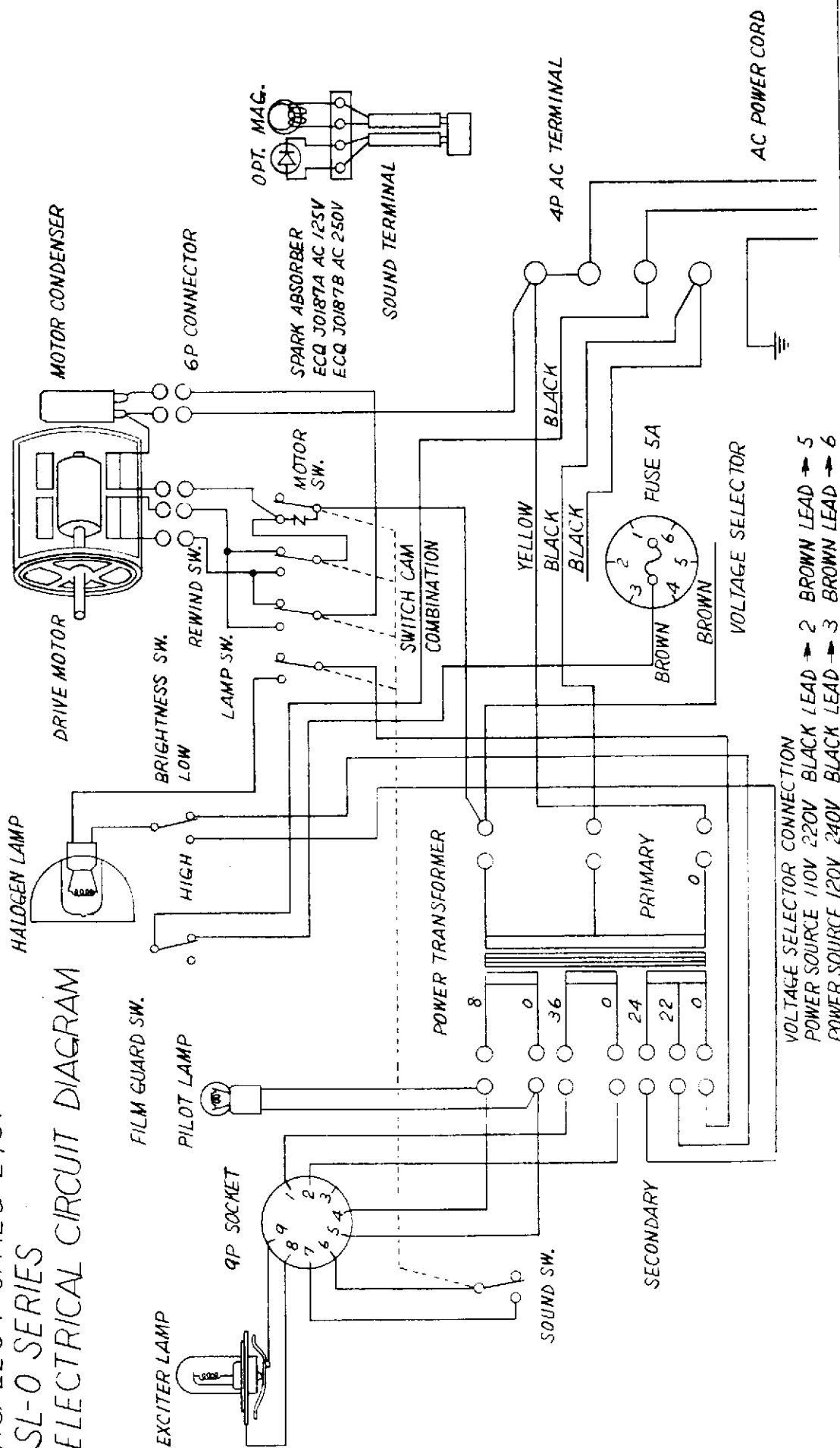
SL II Series
CIRCUIT DIAGRAM
321-60901

SAMPLE CIRCUIT DIAGRAM FOR EXAMINATION

110/220V OR 120/240V

SL-0 SERIES

ELECTRICAL CIRCUIT DIAGRAM



without FILM GUARD SW. : S/N 10001-15601

with FILM GUARD SW. : S/N 15602 and up

映機工業株式会社

作 54年 11月 28日

図 第 9 号

承認 技 術 図 書

品 名

型 号

SL-0 SERIES
CIRCUIT DIAGRAM

320-61501