



**When the show must go on.**

E I K I  
P/N: 4400

**16MM SOUND PROJECTOR**

# **SERVICE MANUAL**

**- MODEL "N" SERIES -**

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

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

**Authorized EIKI Distributor or Dealer:**

# TABLE OF CONTENTS

"N" Series

Title	PAGE
INTRODUCTION	
314-1: PRINCIPLES OF OPERATIONS	
1-1 Introduction . . . . .	15
1-2 Mechanical System . . . . .	15
1-3 Electrical System . . . . .	15
1-4 Sound System . . . . .	15
314-2: SERVICE PROCEDURES	
2-1 Precautions . . . . .	17
2-2 Tools And Test Equipment . . . . .	17
2-3 Lubricants And Lubrication Charts . . . . .	18
2-4 Troubleshooting Hints . . . . .	24
314-3: MODULE REMOVAL AND INSTALLATION	
3-1 Cam Tank Module . . . . .	25
3-2 Amplifier Module . . . . .	25
3-3 Motor Module . . . . .	26
3-4 Transformer Module . . . . .	26
3-5 Lens Holder And Gate Module . . . . .	26
314-4: MODULE REPAIR AND ADJUSTMENTS	
4-1 Cam Tank Module . . . . .	27
A. Specifications . . . . .	27
B. Disassembly . . . . .	27
C. Re-Assembly . . . . .	28
D. Adjustments	
1. Claw Protrusion . . . . .	28
2. Claw Position And Framing . . . . .	29
E. Claw Replacement . . . . .	30
F. Changing Shutter Blades . . . . .	31
G. Still Picture Clutch . . . . .	32
4-2 Amplifier Module	
A. Specifications . . . . .	33
B. Power Supply Circuit . . . . .	33
C. Audio Amplifier Circuit . . . . .	33
D. Magnetic Record Amplifier . . . . .	34
E. Amplifier Circuit Diagrams . . . . .	34
4-3 Motor Module	
A. Specifications . . . . .	39
B. Motor Circuit Diagram . . . . .	39
C. Connector Wiring Code . . . . .	39
D. Silent Film Operation And 50 ↔ 60Hz Conversion . . . . .	40
4-4 Transformer Module	
A. Transformer Circuit Diagram . . . . .	41
B. Connector Wiring Code . . . . .	41
4-5 Lens Holder And Gate Module	
A. Film Gate Assy . . . . .	43
B. Film Shoe and Lens Holder Assy . . . . .	43
314-5: GENERAL MECHANICAL SERVICING AND ADJUSTMENTS	
5-1 Take-Up Arm	
A. Description . . . . .	47
B. Adjustments . . . . .	47

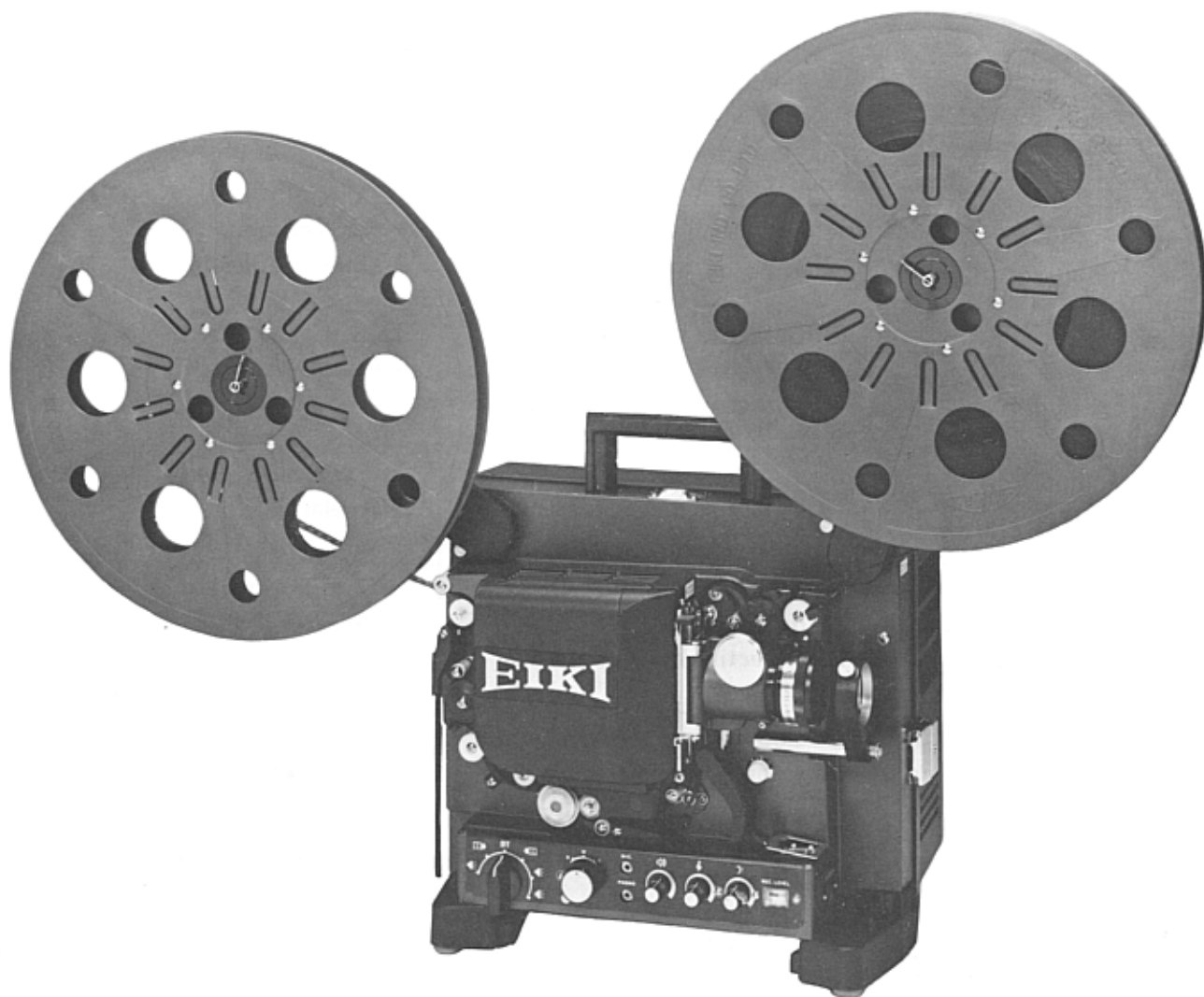
# TABLE OF CONTENTS

"N" Series

Title	PAGE
5-2 Supply Arm	
A. Description .....	48
B. Adjustments .....	49
5-3 Reverse Projection	
A. Description .....	49
B. Adjustments .....	49
5-4 Lower Loop Setter System	
A. Description .....	50
B. Adjustments .....	50
5-5 Self Threading Mechanism	
A. Description .....	52
B. Adjustments .....	55
1) #1 Sprocket shoe assembly .....	55
2) #1 Film guide .....	55
3) Retraction of the claw .....	56
4) #2 Film guide .....	56
5) Sound drum rubber pinch roller .....	56
6) Tension guide and roller assembly .....	57
7) #2 Sprocket and shoe assembly .....	58
5-6 Rewind Mechanism	
A. Description .....	59
B. Adjustments .....	59
5-7 Sound Drum And Flywheel	
A. Description .....	59
B. Adjustments .....	60
314-6: SOUND PICK-UP SYSTEM	
6-1 Optical Sound Focusing Procedure	
A. Description .....	61
B. Alignment .....	61
1) Tools and equipment .....	61
2) Set-up procedure .....	61
3) Sound focus adjustment .....	61
4) Buzz track adjustment .....	62
6-2 Magnetic Sound Playback System	
A. Description .....	63
B. Alignment .....	63
1) Tools and equipment .....	63
2) Set-up procedure .....	63
314-7: LAMP CIRCUIT	
7-1 Lamp Circuit .....	65
A. Description .....	65
B. Replacement and alignment .....	65
314-8: ELECTRICAL SYSTEM	
8-1 Electrical System .....	65
A. Function Control Switch .....	65
B. Electrical Circuit Diagram .....	65
314-9: SERVICE UPDATES AND MODIFICATIONS	
Attachment: CIRCUIT DIAGRAMS .....	67 ~ 79




## INTRODUCTION

1. This Service Manual provides the necessary informations for the repair, adjustment, and maintenance of EIKI NST/NT-series projectors, model NST-0, NST-1, NST-2, NST-3, NT-0, NT-1, NT-2, and NT-3, and also EX-2000-N series 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 NST/NT replacement parts list.
3. EIKI NST/NT-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.



# "N"SERIES TROUBLE SHOOTING CHART

## I: ELECTRICAL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
1. Pilot lamp not on	<ol style="list-style-type: none"> <li>1. No power to the AC wall outlet</li> <li>2. Defective power cord</li> <li>3. Faulty transformer or connection</li> <li>4. Defective pilot lamp</li> </ol>	<ol style="list-style-type: none"> <li>1. Check outlet</li> <li>2. Check &amp; repair or replace</li> <li>3. Repair or replace (See Sec 4-4)</li> <li>4. Replace</li> </ol>
2. Pilot lamp on, motor does not run in "forward" position (  )	<ol style="list-style-type: none"> <li>1. Defective motor module</li> <li>2. Defective or open motor connections</li> <li>3. Faulty motor capacitor</li> <li>4. Switch cam not activating micro switch #1</li> <li>5. Defective micro switch #1</li> <li>6. Motor thermal switch open. (UL &amp; CSA type)</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace or repair (See Sec 4-3)</li> <li>2. Check &amp; repair, or replace (See Sec 4-3-C)</li> <li>3. Check &amp; replace (See Sec 4-3)</li> <li>4. Check &amp; adjust (See Sec 8-1-A)</li> <li>5. Check &amp; replace (See Sec 8-1-A)</li> <li>6. Allow motor to cool and check again.</li> </ol>
3. Pilot lamp on, motor runs but the lamp does not come on in "forward lamp" position (  )	<ol style="list-style-type: none"> <li>1. Defective lamp</li> <li>2. Lamp not seated properly in the socket</li> <li>3. Defective lamp socket</li> <li>4. Defective micro switch #4 or #5 on the function control</li> <li>5. Open transformer connection</li> <li>6. Defective transformer module</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace lamp</li> <li>2. Check &amp; reseal</li> <li>3. Repair or replace</li> <li>4. Check &amp; replace (See Sec 8-1-A)</li> <li>5. Check &amp; repair (See Sec 4-4-B)</li> <li>6. Replace (See Sec 4-4)</li> </ol>
4. Pilot lamp on, motor runs in "forward", but not in "reverse" position (  )	<ol style="list-style-type: none"> <li>1. Micro switch #2 and/or #3 defective</li> <li>2. Defective motor module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check or replace (See Sec 8-1-A)</li> <li>2. Replace (See Sec 4-3)</li> </ol>
5. Function switch does not follow the indicated sequence	<ol style="list-style-type: none"> <li>1. Loose function switch knob</li> <li>2. Loose switch cam</li> <li>3. Reverse or take-up clutch cam's installed incorrectly</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-locate and tighten</li> <li>2. Re-position and tighten</li> <li>3. Check and repair (See Sec 5-1, &amp; 5-3)</li> </ol>

## II: SELF-THREADING SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
6. #2 film guide (or self-thread lever) does not set the mechanism to thread	<ol style="list-style-type: none"> <li>1. Cam bracket is loose on the #2 film guide shaft</li> <li>2. Main interlocking bracket is binding or not latching with the release bracket hook</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-position and tighten (See Sec 5-5-B4)</li> <li>2. Check &amp; adjust (See Sec 5-5-B)</li> </ol>
7. Leader or film is dimpled in the first few inches by the sprocket teeth	<ol style="list-style-type: none"> <li>1. Film is inserted with the sprocket holes opposite the sprocket teeth</li> <li>2. Not enough clearance between the sprocket plate and the film shoe</li> <li>3. Film path and #2 sprocket drive out of alignment</li> <li>4. Film leader too soft</li> </ol>	<ol style="list-style-type: none"> <li>1. Re-insert the film correctly</li> <li>2. Check &amp; adjust (See Sec 5-5-B1).</li> <li>3. Check alignment of the tension guide rollers (See Sec 5-5-B6)</li> <li>4. Check with another film leader.</li> </ol>
8. Leader jams in the #1 film guide	<ol style="list-style-type: none"> <li>1. Film leader not trimmed properly</li> <li>2. End of film is severely curled, or twisted.</li> <li>3. Very soft leader</li> <li>4. #1 film guide shaft loose or bent</li> <li>5. Aperture plate assembly misaligned</li> </ol>	<ol style="list-style-type: none"> <li>1. Trim and repeat threading</li> <li>2. Straighten and re-thread</li> <li>3. Replace leader</li> <li>4. Re-align and check. (See Sec 5-5-B2)</li> <li>5. Re-align and check (See Sec 4-5).</li> </ol>
9. Tip of the leader enters underneath the inner guide rail	<ol style="list-style-type: none"> <li>1. Inner guide rail bent or not aligned correctly</li> <li>2. Loose guide rail screws</li> <li>3. Film leader end severely curled or twisted.</li> </ol>	<ol style="list-style-type: none"> <li>1. Align or replace (See Sec 4-5)</li> <li>2. Tighten (See Sec 4-5)</li> <li>3. Trim and re-thread</li> </ol>
10. Film does not thread through the gate, and jams	<ol style="list-style-type: none"> <li>1. Film leader not trimmed properly</li> <li>2. Leader is severely curled or twisted, or too soft</li> <li>3. Too much #1 film shoe clearance</li> <li>4. Dirty and obstructed film gate</li> <li>5. Insufficient side travel of the inner guide rail</li> <li>6. Side pressure spring tension too strong</li> <li>7. Film shoe is not retracted during threading</li> </ol>	<ol style="list-style-type: none"> <li>1. Trim</li> <li>2. Trim, straighten or replace</li> <li>3. Check &amp; adjust (See Sec 5-5-B1)</li> <li>4. Clean &amp; check</li> <li>5. Check &amp; adjust (See Sec 4-5)</li> <li>6. Check &amp; adjust (See Sec 4-5)</li> <li>7. Check &amp; adjust (See Sec 4-5)</li> </ol>

(SELF-THREADING SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
11. Chattering noise during threading	1. Claw is not completely retracted	1. Check & adjust (See Sec 5-5-B3)
12. Clicking noise during threading	1. Claw is hitting the shutter blade	1. Check & adjust (See Sec 5-5-B3)
13. Curled film goes over the loop setter roller	1. Loop setter position is too low 2. Severely curled film	1. Check & adjust (See Sec 5-4) 2. Straighten the lead end
14. Film goes under the #3 film guide or comes out	1. #2 Film guide defective 2. #3 Film guide defective 3. #2 and #3 film guides are not aligned 4. Curled film	1. Replace 2. Replace 3. Check & adjust (See Sec 5-5-B4) 4. Straighten the lead end
15. Film will not thread over the sound drum	1. Rough surface on the lamp house casting, restricting the film travel 2. Rubber pinch roller not completely released from the sound drum 3. Rubber pinch roller bound up or out of alignment	1. Remove & inspect the casting guides 2. Check & adjust. (See Sec 5-5-B5) 3. Check, adjust and lubricate (See Sec 5-5-B5)
16. Film stops at the #2 sprocket	1. Rough surface or restriction to the film path on the lamp house casting 2. #2 sprocket teeth or cover plate loose. 3. Tension guide and roller assembly out of alignment 4. #2 sprocket shoe clearance is too tight	1. Remove the lamp house casting and inspect 2. Tighten and re-time (See Sec 5-4) 3. Check for correct film feeding from the sound drum to the #2 sprocket. (See Sec 5-5-B6) 4. Check and adjust (See Sec 5-5-B7)
17. Film comes out of the #2 sprocket shoe	1. #2 sprocket plate is loose 2. #2 sprocket shoe spring weak or missing	1. Tighten and check timing (See Sec 5-4) 2. Check & replace (See Sec 5-5-B7)
18. Self-threading mechanism not released with a tug on the film	1. Release bracket spring is too weak or broken 2. Release bracket pin binding	1. Check & adjust (See Sec 5-5-B) 2. Lubricate pin and adjust linkage (See Sec 5-5-B)
19. Film does not cross the auto-take-up guide (NST only)	1. Auto-take-up guide not aligned properly 2. Film twisted, or curled	1. Check & adjust. 2. Stretch, or replace the film leader.

### III: MECHANICAL SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
20. Pilot lamp on, motor runs but film does not advance	<ol style="list-style-type: none"> <li>1. Still picture lever engaged</li> <li>2. Broken or defective motor belt</li> <li>3. Cam tank plate washer loose</li> <li>4. Motor pulley loose</li> <li>5. Main drive belt broken</li> </ol>	<ol style="list-style-type: none"> <li>1. Release to normal run position</li> <li>2. Check &amp; replace</li> <li>3. Tighten (See Sec 4-1-B)</li> <li>4. Tighten</li> <li>5. Replace</li> </ol>
21. Film speed is too slow or too fast	<ol style="list-style-type: none"> <li>1. Belt is installed incorrectly</li> <li>2. Incorrect motor and shutter pulley combination</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; re-install</li> <li>2. Replace with correct pulleys (See Sec 4-3-D)</li> </ol>
22. Film comes out of the path near the sound drum	<ol style="list-style-type: none"> <li>1. Rubber pinch roller is binding</li> <li>2. Rubber roller and tension guide out of alignment</li> <li>3. #2 sprocket shoe not seating properly</li> </ol>	<ol style="list-style-type: none"> <li>1. Remove, lubricate and adjust (See Sec 5-5-B5)</li> <li>2. Check &amp; adjust (See Sec 5-5-B6)</li> <li>3. Check &amp; adjust (See Sec 5-5-B7)</li> </ol>
23. Excessive take-up torque in "forward"	<ol style="list-style-type: none"> <li>1. Dry cork of spindle assy</li> <li>2. Dirty or sticky take-up arm belt, or take-up pulley</li> </ol>	<ol style="list-style-type: none"> <li>1. Lubricate cork (See Sec 5-1)</li> <li>2. Clean or replace. (See Sec 5-1)</li> </ol>
24. Excessive take-up torque in "reverse"	<ol style="list-style-type: none"> <li>1. Reverse clutch spring too strong</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; adjust (See Sec 5-3)</li> </ol>
25. Take-up poor or not at all in "forward"	<ol style="list-style-type: none"> <li>1. Take-up arm belt broken, or stretched, or oily belt.</li> <li>2. Defective ball bearing.</li> <li>3. Loose spindle shaft</li> <li>4. Take-up pulley binding</li> <li>5. Excessive grease on take-up pulley</li> <li>6. Clutch cam defective.</li> <li>7. Too loose film on the take-up reel</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace or clean.</li> <li>2. Replace.</li> <li>3. Tighten screw.</li> <li>4. Clean or replace</li> <li>5. Avoid over-lubrication</li> <li>6. Check &amp; replace, or reposition clutch cam. (See Sec 5-1)</li> <li>7. Check &amp; absorb extra film slack.</li> </ol>
26. Take-up poor or not at all in "reverse"	<ol style="list-style-type: none"> <li>1. Broken or stretched or oily supply arm belt</li> <li>2. Reverse belt broken or oily</li> <li>3. Clutch cam not engaging</li> <li>4. Reverse clutch spring weak</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace</li> <li>2. Clean or replace</li> <li>3. Check &amp; repair (See Sec 5-3)</li> <li>4. Tighten knurled nut (See Sec 5-3)</li> </ol>

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
27. Weak back tension of the supply reel in "forward"	<ol style="list-style-type: none"> <li>1. Reverse clutch cover pulley binding and clutch cam is not releasing, or clutch cover pulley defective</li> <li>2. Clutch cover pulley has no end play on the #1 sprocket drum shaft.</li> <li>3. Clutch cam seated incorrect, or defective</li> <li>4. Clutch cam binding between clutch cover pulley and spacer</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; adjust, or replace. (See Sec 5-3)</li> <li>2. Check &amp; adjust. (See Sec 5-1)</li> <li>3. Check &amp; reposition, or replace. (See Sec 5-1)</li> <li>4. Check &amp; adjust</li> </ol>
28. Weak back tension of the take-up reel in "reverse"	<ol style="list-style-type: none"> <li>1. Drive gear is binding, or has no end play on the drive pulley shaft.</li> <li>2. Clutch cam seated incorrect, or binding between drive gear and clutch cover assy, or defective clutch cam</li> <li>3. Drive gear, or clutch cover defective</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; clean, or adjust. (See Sec 5-3)</li> <li>2. Check &amp; reposition (See Sec 5-1)</li> <li>3. Check &amp; replace</li> </ol>
29. Loop setter roller continues to activate, or activates erratically in "forward"	<ol style="list-style-type: none"> <li>1. Damaged or poor film</li> <li>2. Insufficient gear spring tension</li> <li>3. Loop setter roller in the wrong position.</li> <li>4. #2 sprocket plate loose</li> <li>5. Lower loop is too small</li> <li>6. Insufficient claw protrusion, or claw pitch.</li> <li>7. Broken claw</li> <li>8. Too much take-up tension</li> <li>9. Incorrect clearance between the loop setter gear and main drive belt</li> <li>10. Loop setter gear, or main drive belt defective, or broken</li> <li>11. Insufficient tension of the film shoe springs</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair or replace</li> <li>2. Stretch or replace (See Sec 5-4-B)</li> <li>3. Relocate &amp; check (See Sec 5-4).</li> <li>4. Check &amp; tighten</li> <li>5. Check #2 sprocket timing (See Sec 5-4-B).</li> <li>6. Check (See Sec 4-1-D1)</li> <li>7. Check &amp; replace</li> <li>8. Check &amp; lubricate take-up spindle cork (See Sec 5-1)</li> <li>9. Adjust clearance (See Sec 5-4)</li> <li>10. Replace</li> <li>11. Stretch or replace.</li> </ol>

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
30. Film continues to flap on loop setter roller in "forward"	<ol style="list-style-type: none"> <li>1. Loop setter gear shaft is binding, or tight in hub.</li> <li>2. Loop setter gear spring tension too strong</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; lubricate</li> <li>2. Adjust spring tension, or replace.</li> </ol>
31. Lower loop is lost in "reverse"	<ol style="list-style-type: none"> <li>1. Reverse rubber roller is not driving the flywheel set collar</li> <li>2. Reverse rubber roller binding</li> <li>3. #2 sprocket not transporting film.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check reverse rubber roller's function (See Sec 5-3)</li> <li>2. Clean &amp; remove the cause of binding</li> <li>3. Check &amp; adjust (See Sec 5-4)</li> </ol>
32. Upper loop is lost in "forward"	<ol style="list-style-type: none"> <li>1. Damaged, or poor film</li> <li>2. #1 sprocket teeth plate loose</li> <li>3. #1 sprocket shoe not seating properly.</li> <li>4. Loop setter roller continues to activate or activates erratically.</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair or replace</li> <li>2. Check &amp; tighten.</li> <li>3. Check &amp; adjust. (See Sec 5-5-B1)</li> <li>4. See Symptom No. 29</li> </ol>
33. Upper loop is lost in "reverse"	<ol style="list-style-type: none"> <li>1. Damaged, or poor film</li> <li>2. #1 sprocket shoe clearance is too great.</li> <li>3. Claw protrusion incorrect</li> </ol>	<ol style="list-style-type: none"> <li>1. Repair, or replace</li> <li>2. Check &amp; adjust (See Sec 5-5-B1)</li> <li>3. Check &amp; adjust (See Sec 4-1-D1)</li> </ol>
34. Excessive noise in the film gate in "forward" with a good undamaged film	<ol style="list-style-type: none"> <li>1. Upper loop too small</li> <li>2. Film contacting the loop setter roller.</li> <li>3. Dirty film gate</li> <li>4. Loose claw</li> <li>5. Incorrect claw protrusion</li> <li>6. Inner guide rail binding</li> <li>7. Film shoe bent, worn or binding</li> <li>8. Claw position incorrect</li> <li>9. Weak or broken cam follower spring</li> </ol>	<ol style="list-style-type: none"> <li>1. Check #1 sprocket timing</li> <li>2. Check #2 sprocket and loop setter timing (See Sec 5-4-B)</li> <li>3. Clean</li> <li>4. Tighten</li> <li>5. Check</li> <li>6. Check &amp; adjust</li> <li>7. Check &amp; replace</li> <li>8. Check &amp; adjust (See Sec 4-1-D2)</li> <li>9. Replace (See Sec 4-1-B)</li> </ol>
35. Unsteady picture	<ol style="list-style-type: none"> <li>1. See Symptom No. 34, noise in the film gate</li> </ol>	
36. Travel ghost	<ol style="list-style-type: none"> <li>1. Incorrect shutter blade position</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; adjust (See Sec 4-1-F)</li> </ol>

(MECHANICAL SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
37. Excessive noise in "reverse" only	1. Claw position incorrect 2. Claw angle is incorrect	1. Check & adjust (See Sec 4-1-D2) 2. Check & adjust (See Sec 4-1-E)
38. Insufficient framing	1. Claw position incorrect 2. Worn cam follower (or gliding pin)	1. Check & adjust (See Sec 4-1-D2) 2. Replace (See Sec 4-1-B)
39. Excessive noise when the still picture lever is depressed	1. Motor pulley misaligned 2. Shutter pulley binding on the shaft	1. Adjust 2. Remove, clean, inspect and lubricate (See Sec 4-1-G)
40. Film transport does not stop in still picture operation	1. Shutter pulley seized 2. Still picture lever shoulder screws loose	1. Remove cam tank, clean & lubricate pulley (See Sec 4-1-G) 2. Tighten screws (See Sec 4-1-G)
41. Film burns when still picture lever is depressed	1. Still picture lever not completely depressed 2. Heat filter misaligned or broken	1. Fully depress 2. Check, realign or replace
42. No rewind or poor rewind	1. Take-up spindle cork too dry or tight 2. Broken or stretched or oily supply arm belt 3. Defective rewind gears 4. Broken rewind arm tension spring 5. Take-up pulley binding on the shaft	1. Remove and lubricate (See Sec 5-1) 2. Check and replace 3. Inspect & replace 4. Check & replace (See Sec 5-6) 5. Clean & lubricate
43. Noisy rewind	1. Rewind gears not fully engaged. 2. Worn or defective rewind gears.	1. Adjust the gear position (See Sec 5-6) 2. Replace (See Sec 4-5)
44. Uneven focus	1. Dirty film gate 2. Film shoe binding and not completely seated 3. Inner guide rail binding 4. Lens holder misaligned	1. Clean 2. Check & realign (See Sec 4-5-B) 3. Check (See Sec 4-5) 4. Check & adjust (See Sec 4-5)

# IV: LAMP CIRCUIT

SYMPTOM	PROBABLE CAUSE	REMEDY
45. Lamp life is abnormally short	<ol style="list-style-type: none"> <li>1. Poor lamp socket connection.</li> <li>2. Cooling is restricted</li> <li>3. Defective lamps, or incorrect lamp other than EIKI ELC type</li> <li>4. Excessive or fluctuating AC line voltage</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace lamp socket</li> <li>2. Locate &amp; remove the cause.</li> <li>3. Check &amp; replace.</li> <li>4. Check AC line.</li> </ol>
46. Uneven or insufficient screen illumination	<ol style="list-style-type: none"> <li>1. Lamp not seated properly</li> <li>2. Foreign object in the light path</li> <li>3. Lamp not centered horizontally</li> <li>4. Defective lamps, or incorrect lamp other than EIKI ELC type</li> <li>5. Function switch in "low" position</li> <li>6. Slow or defective lens</li> <li>7. Low AC line voltage</li> <li>8. Improper shutter</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; reseal</li> <li>2. Remove</li> <li>3. Adjust knurled knob</li> <li>4. Check &amp; replace</li> <li>5. Switch to "high" position.</li> <li>6. Try another lens</li> <li>7. Check AC line</li> <li>8. Check or replace.</li> </ol>

# V: SOUND SYSTEM

SYMPTOM	PROBABLE CAUSE	REMEDY
47. No sound and the exciter lamp is not on	<ol style="list-style-type: none"> <li>1. Amplifier is not turned on.</li> <li>2. 9 pin amplifier plug defective</li> <li>3. Defective exciter lamp</li> <li>4. Defective exciter lamp socket</li> <li>5. Exciter lamp fuse blown</li> <li>6. Defective amplifier module</li> <li>7. Defective exciter lamp power supply of the transformer</li> </ol>	<ol style="list-style-type: none"> <li>1. Turn on.</li> <li>2. Check &amp; repair, or replace.</li> <li>3. Replace</li> <li>4. Repair or replace</li> <li>5. Check &amp; replace</li> <li>6. Replace, or repair (See Sec 3-2, &amp; 4-2)</li> <li>7. Locate &amp; repair, or replace. (See Sec 4-4)</li> </ol>
48. No sound, exciter lamp is on	<ol style="list-style-type: none"> <li>1. Amplifier volume is too low.</li> <li>2. Mag/Opt switch in the wrong position (NST/NT-2,-3 models only)</li> <li>3. Rear cover speaker not plugged in (not applicable on NST/NT-3 models), or extension speakers not connected.</li> <li>4. Defective rear cover speaker, or extension speaker, or speaker jack.</li> <li>5. Amplifier fuse blown</li> <li>6. Defective solar cell or connections</li> <li>7. Dirt or foreign object in the optical sound lens</li> <li>8. Defective amplifier module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; adjust.</li> <li>2. Check &amp; switch</li> <li>3. Check &amp; connect.</li> <li>4. Repair or replace.</li> <li>5. Replace</li> <li>6. Repair or replace (See Sec 4-2)</li> <li>7. Clean.</li> <li>8. Locate &amp; repair, or replace (See Sec 3-2 &amp; 4-2)</li> </ol>
49. Poor sound or low volume	<ol style="list-style-type: none"> <li>1. Incorrect, or defective exciter lamp, or sound lens.</li> <li>2. Dirty exciter lamp, or sound lens, or dirt, foreign object in the optical sound lens</li> <li>3. Sound optics incorrectly aligned.</li> <li>4. Low exciter lamp voltage, or low AC supply voltage.</li> <li>5. Weak or defective solar cell.</li> <li>6. Defective speakers, or poor speaker connection</li> <li>7. Poor film quality</li> <li>8. Defective amplifier module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; replace</li> <li>2. Clean, or replace.</li> <li>3. Check &amp; re-align sound pick-up system (See Sec 6-1)</li> <li>4. Check &amp; repair amplifier exciter lamp supply. (See Sec 4-2). Check wall outlet.</li> <li>5. Replace.</li> <li>6. Check &amp; replace</li> <li>7. Check with another film.</li> <li>8. Repair or replace. (See Sec 3-2, &amp; 4-2)</li> </ol>

(SOUND SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
50. No sound (magnetic only) (NST/NT-2, -3 models)	<ol style="list-style-type: none"> <li>1. Mag/Opt switch in the wrong position.</li> <li>2. Magnetic head not in contact with the sound track</li> <li>3. Defective or dirty magnetic head</li> <li>4. Mag/Opt switch defective, or bad connection</li> <li>5. Defective speakers, or speaker connections</li> <li>6. Defective amplifier module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; switch.</li> <li>2. Check &amp; adjust.</li> <li>3. Clean, or replace.</li> <li>4. Check &amp; replace</li> <li>5. Check &amp; replace.</li> <li>6. Repair or replace (See Sec 4-2 &amp; 3-2)</li> </ol>
51. Poor sound or low volume (magnetic only) (NST/NT-2, -3 models)	<ol style="list-style-type: none"> <li>1. Poor sound track.</li> <li>2. Dirty, or defective head</li> <li>3. Head not making good contact with the film</li> <li>4. Incorrect sound head alignment</li> <li>5. Defective speakers, or poor speaker connection</li> <li>6. Defective amplifier module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check with another film.</li> <li>2. Clean or replace.</li> <li>3. Adjust (See Sec 6-2)</li> <li>4. Align (See Sec 6-2)</li> <li>5. Check &amp; replace</li> <li>6. Repair or replace (See Sec 4-2 &amp; 3-2)</li> </ol>
52. Exciter lamp fuse blows	<ol style="list-style-type: none"> <li>1. Excessive AC line voltage</li> <li>2. Incorrect fuse</li> <li>3. Incorrect, or defective exciter lamp</li> <li>4. Defective exciter lamp power supply</li> <li>5. Defective exciter lamp socket</li> </ol>	<ol style="list-style-type: none"> <li>1. Check wall outlet.</li> <li>2. Check &amp; replace.</li> <li>3. Check &amp; replace.</li> <li>4. Check &amp; repair (See Sec 4-2)</li> <li>5. Replace</li> </ol>
53. Amplifier fuse blows.	<ol style="list-style-type: none"> <li>1. Incorrect fuse</li> <li>2. Improper connection to an external speaker system</li> <li>3. Defective amplifier module</li> </ol>	<ol style="list-style-type: none"> <li>1. Check &amp; replace</li> <li>2. Check</li> <li>3. Repair or replace (See Sec 4-2 &amp; 3-2)</li> </ol>
54. Excessive amplifier hum (optical)	<ol style="list-style-type: none"> <li>1. Exciter lamp cover missing or not installed correctly.</li> <li>2. Incorrect grounding when connecting the projector to an external amplifier or sound system</li> <li>3. Defective exciter lamp supply</li> <li>4. Defective solar cell or connections to amplifier.</li> </ol>	<ol style="list-style-type: none"> <li>1. Install cover</li> <li>2. Check for ground loop conditions.</li> <li>3. Check voltage and repair. (See Sec 4-2)</li> <li>4. Check &amp; repair</li> </ol>

— to be continued —

(SOUND SYSTEM)

SYMPTOM	PROBABLE CAUSE	REMEDY
54. Excessive amplifier hum (optical) — continued —	5. Front or rear cover speaker jacks not insulated from the chassis properly 6. Defective amplifier module	5. Check & repair. 6. Repair or replace (See Sec 4-2 & 3-2)
55. Excessive amplifier hum (magnetic)	1. Poor film recording 2. Motor shield not installed 3. Improper connection to an external amplifier or sound system. 4. Magnetic head in poor contact with the film. 5. Poor shielding to the head or the head coil shorted to the projector's frame 6. Defective amplifier module	1. Check with another film. 2. Check & install. 3. Check & re-connect properly  4. Adjust (See Sec 6-2) 5. Repair  6. Repair or replace (See Sec 4-2 & 3-2)
56. Distorted sound	1. Incorrect exciter lamp. 2. Exciter lamp cover not completely installed 3. Amplifier module is defective 4. Defective speaker 5. Magnetic sound recorded poorly 6. Optical sound lens not aligned correctly 7. Dirt on the sound drum or on the solar cell 8. See Symptom No. 57 also.	1. Check & replace 2. Check & re-install  3. Replace 4. Replace 5. Try a known good recording  6. Check & realign (See Sec 6-1) 7. Check & clean  8. See Symptom No. 57
57. Excessive wow & flutter	1. Rubber pinch roller binding 2. Sound drum bearings defective 3. Reverse rubber drive roller in contact with the set collar 4. Flywheel not installed 5. Flywheel rubbing on the power cord 6. Incorrect alignment or tension of the tension guide and roller assembly	1. Check, clean, lubricate & adjust (See Sec 5-5) 2. Check & replace (See Sec 5-7) 3. Check & adjust (See Sec 5-3) 4. Check 5. Check & adjust  6. Check & adjust (See Sec 5-5-B6)
58. Sound not stabilized soon after starting	1. Insufficient flywheel plate spring tension 2. Weak rubber pinch roller spring	1. Check & adjust (See Sec 5-7) 2. Check & replace (See Sec 5-5-B5)

## 314-1: PRINCIPLES OF OPERATIONS

### 1-1: INTRODUCTION

The EIKI "N" series self-threading projector is very similar to the earlier "R" series model with added improvements such as silent threading, flat response amplifier, lighter weight, etc. With few exceptions, such as color, most parts from the "N" series substitute directly into the previous "R" series. This manual also covers the NT manual threading models when excluding the sections on the threading mechanism.

### 1-2: MECHANICAL SYSTEM

The EIKI Self-threading projector is controlled by a single function switch for forward, reverse and high-low lamp positions.

#### A. THREADING:

Threading is accomplished by setting the threading guide lever to thread, function switch to forward and inserting the film into the threading channel. The threading mechanism is automatically released and engages the claw by a light tug of the film when attaching it to the take-up reel.

#### B. FORWARD/LAMP:

Advance the switch from forward to lamp low or high.

#### C. REVERSE:

To reverse the projector, return the function switch to "OFF" and then to reverse and lamp.

#### D. REWIND:

To rewind the film, engage the rewind lever. Attach the film to the empty supply reel and advance the function switch to "Forward".

### 1-3: ELECTRICAL SYSTEM

EIKI "N" series projectors are available in voltages of 100V, 110V, 120V, 220V and 240V. 110/220V and 120/240V dual voltage models are also available. To comply with 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 various electrical safety requirements. The secondary windings of all transformers provide 8V AC to the Pilot Lamp and Exciter Lamp circuits, 24V AC (HIGH) and 22V AC (LOW) to the Halogen Projection Lamp and 40V or 36V AC to the Amplifier.

(See Sec. 4-4 TRANSFORMER MODULE).

Motor ON/OFF and Lamp ON/OFF and reverse is controlled by the Function Switch which consists of a Cam and 5 micro switches.

The projection lamp is a Halogen ELC type 24V 250 watt. The "High-Low" position will extend the lamp life, depending upon operating conditions.

NOTE : The Halogen Lamp EJL 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 above. Optional Synchronous motor kits are also available for precise film speeds and tele-cine conversions.

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 countries listed.

### 1-4: SOUND SYSTEM

EIKI "N" series models are designated according to the sound playback and record capabilities with or without front cover extension speakers.

Optical Playback only: Model NST-0, -1 & NT-0, -1

Optical & Magnetic Playback: Model NST-2, NT-2

Optical & Magnetic Record/Playback: Model NST-3, NT-3

Model NST-1, -2 & -3 and NT-1, NT-2 & NT-3 are standard with two (4 ohm, 12.5cm) speakers built-in the front cover. Models NST-1 & 2, and NT-1 & 2 are also standard with one (8 ohm, 12.5cm) speaker built-in the rear cover.

Models NST-0, and NT-0 are standard with one speaker only (8 ohm, 12.5cm) built-in the rear cover.

The standard amplifier modules for the NST-0

**"N" Series**  
(1-4)

& NT-0 and NST-1 & NT-1 are optical sound reproduction only.

Amplifier modules for the NST-2 and NT-2 are capable of both optical and magnetic sound reproduction.

Amplifier modules for the NST-3 and NT-3 are capable of both optical playback and magnetic record/playback.

### 2-1: PRECAUTIONS

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

### 2-2: TOOLS AND TEST EQUIPMENT

#### A. Tools:

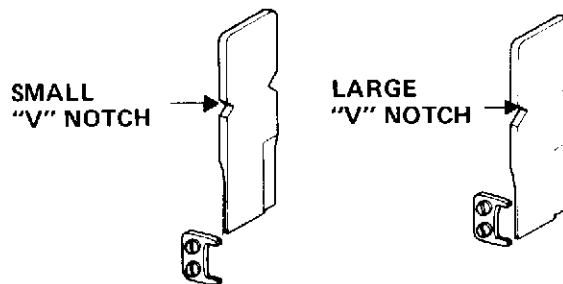
When servicing EIKI "N" series, ordinary ISO (Phillips type) screw drivers and single-bladed screw drivers should be enough. (EIKI screw driver kits, P/N 5615 are available.) A Molex extractor tool is most useful when replacing the pins of Nylon connectors to the transformer or motor.

#### B. Special Tools:

EIKI "N" series have been designed so that no special tools are required to service the projector. However, a common claw protrusion gauge (Tool No. 320-01T) is most helpful for accurately setting the claw protrusion. Standard 16mm film may be used as a thickness gauge where necessary. (Most film is about 0.15mm or .005" thick).

Tool No. 320-01T

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



#### 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:

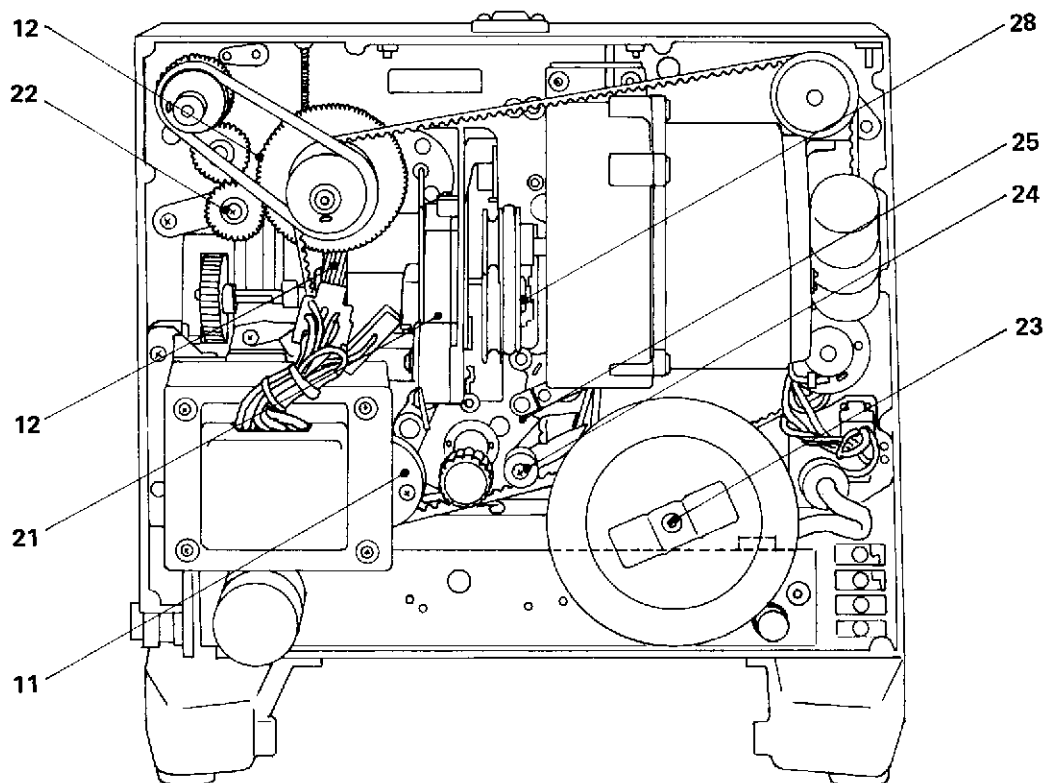
- a. Vom (Voltage/Ohm meter)
- b. Oscilloscope
- c. Audio AC VTVM
- d. Wow & Flutter Meter
- e. 400Hz SMPTE Test Film
- f. 3150Hz Wow & Flutter SMPTE Test Film
- g. Multi Frequency SMPTE Test Film
- h. 7000Hz Sound Focus SMPTE Test Film
- i. 7000Hz Mag. Azimuth SMPTE Test Film
- j. Buzz Track SMPTE Test Film.
- k. Audio Oscillator

## 2-3: LUBRICANTS & LUBRICATION CHARTS

Apply a few drops after every 500 operating hours. The items marked with \* would require more frequent lubrication.

**CAUTION: DO NOT OVERLUBRICATE.**

Fig. #1



EM #	DESCRIPTION	SUGGESTED LUBRICANT	EIKI PART #	ITEM #	DESCRIPTION	SUGGESTED LUBRICANT	EIKI PART #
#1 Sprocket Hub	Petroleum Oil	5631	15.	*Take-Up Pulley Cork Liner	Silicone Grease	5625	
#2 Sprocket Hub	Petroleum Oil	5631	16.	Loop Setter Shaft	Petroleum Oil	5631	
Duracon Guide Rollers	Silicone Oil #100	5629	17.	#3 Film Guide Pivot Pin	Silicone Oil #100	5629	
Duracon Guide Rollers	Silicone Oil #100	5629	18.	Tension Guide Roller & Bracket Pin	Silicone Oil #100	5629	
*Rubber Pinch Roller	Molybdenum Disulfide Grease	5628	19.	*Take-Up Pulley & Shaft	Molybdenum Disulfide Grease	5628	
Self-Thread Lever	Petroleum Oil	5631	20.	*Supply Arm Spindle Shaft	Petroleum Oil	5631	
Rubber Pinch Roller Pivot Shaft	Petroleum Oil	5631	21.	Cam Tank	Molybdenum Disulfide Grease	5628	
Rewind Lever Shaft	Petroleum Oil	5631	21-A	Cam Tank Felt	Molybdenum Disulfide Oil, or Grease	5632 (5628)	
Dampening Roller Pivot Shaft	Petroleum Oil	5631	22.	Rewind Gears' Shaft	Silicone Oil #100	5629	
Tension Gear Arm Pivot Pin	Petroleum Oil	5631	23.	Flywheel Hole	Petroleum Oil	5631	
Tension Gear Shaft	Silicone Oil #100	5629	24.	Loop Safety Roller	Silicone Oil #100	5629	
*#1 Sprocket Gear & Worm Gear	Petroleum Oil	5631	25.	Main Interlocking Bracket	Silicone Grease	5625	
*Reverse Rubber Roller Shaft	Petroleum Oil	5631	26.	Reel Guide Bracket Hole	Petroleum Oil	5631	
Sound Drum Ball Bearings	(Factory sealed)	OB-608Z					

# (LUBRICANTS & LUBRICATION CHARTS)

ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT PART #	ITEM #	DESCRIPTION	SUGGESTED EIKI LUBRICANT PART #
27.	Reel Guide Wire	Petroleum 5631	31.	Function Switch Cam	Molybdenum 5628
28.	Anchorage Fulcrum Pin	Oil		Bracket	Disulfide
	Shutter Pulley Bushing	Molybdenum 5628	32.	Function Switch Shaft	Grease
		Disulfide			Molybdenum 5628
29.	Cam Tank Fulcrum Pin	Grease			Disulfide
		Petroleum 5631	33.	Loop Safety Roller Arm	Grease
30.	All Ball Bearings	Oil		Pin	Silicon 5625
		(Factory sealed)	34.	Clutch Cover Pulley	Grease
		OB-608Z		Bushing	Petroleum 5631
		OB-608ZZ			Oil
		OB-6200ZZ			
		OB-626			

FILM PATH

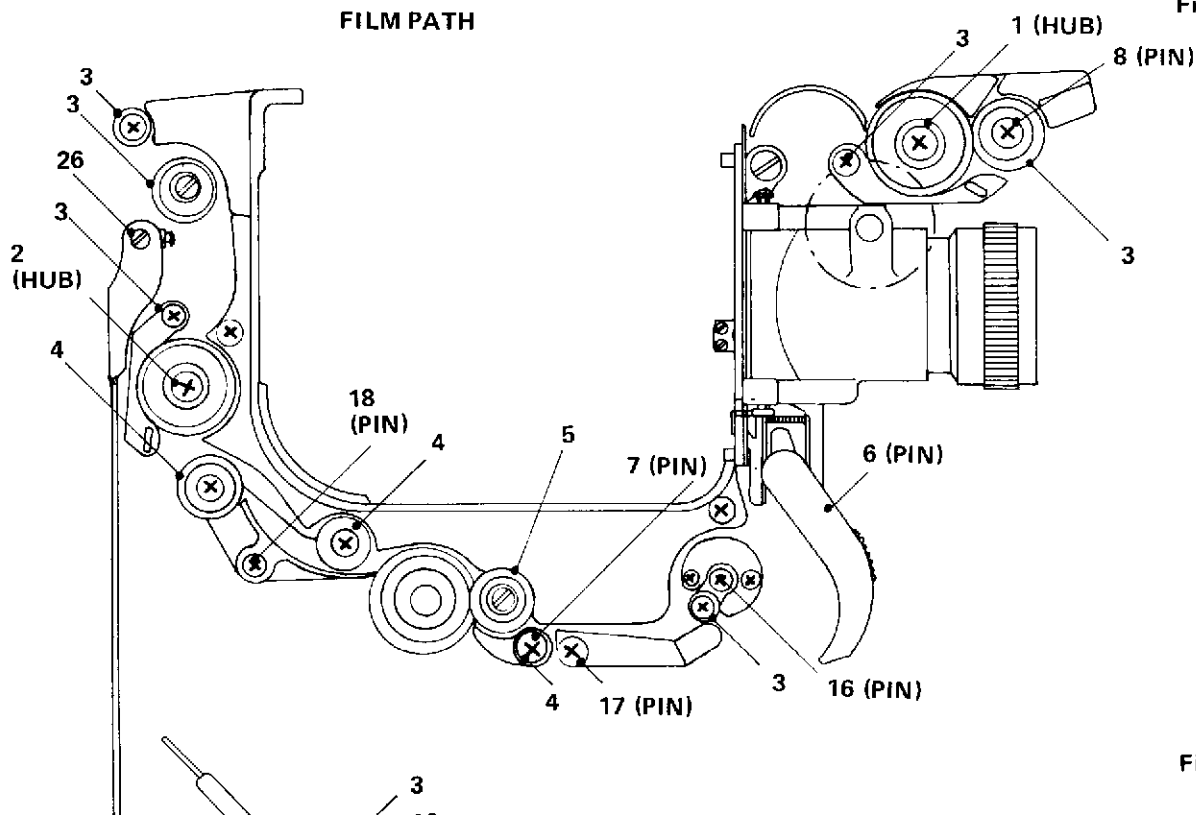


Fig. #3

SELF-THREADING MECHANISM  
(Main Interlocking Bracket)

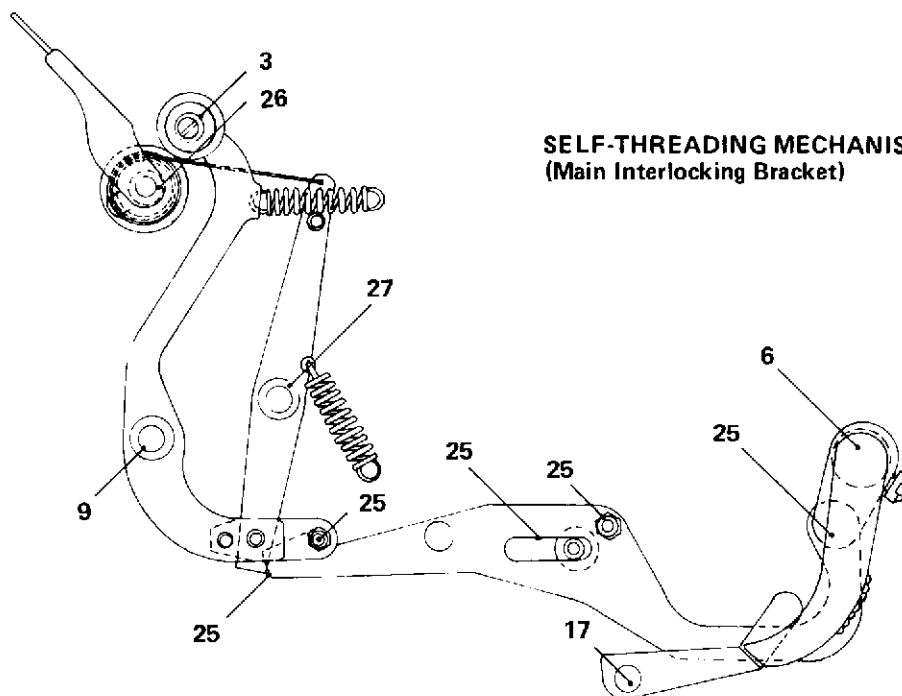
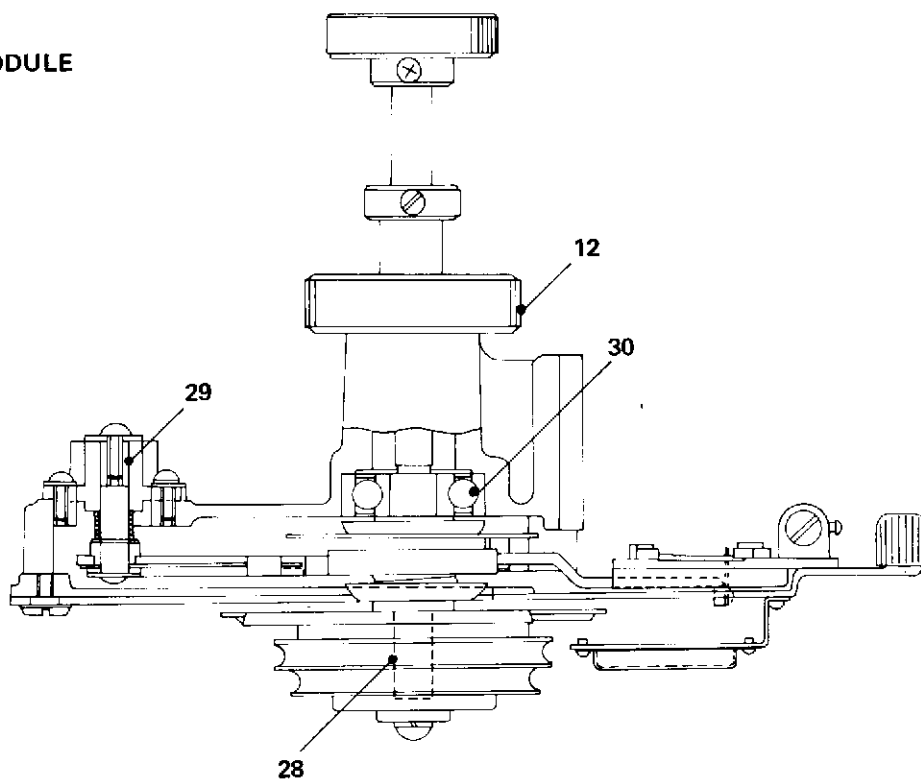


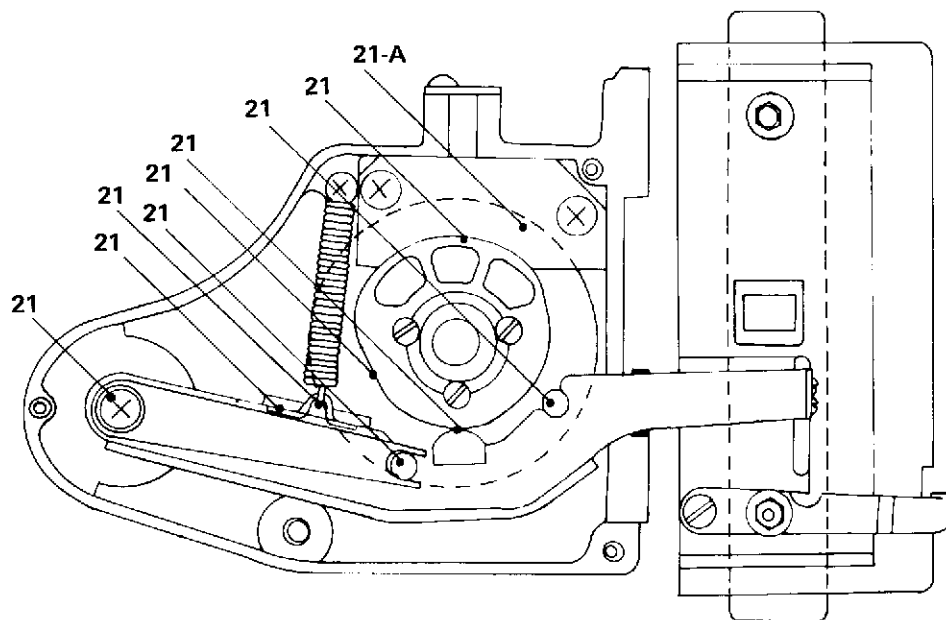
Fig. #4

CAM TANK MODULE



CAM TANK MODULE & FILM GATE

Fig. #5

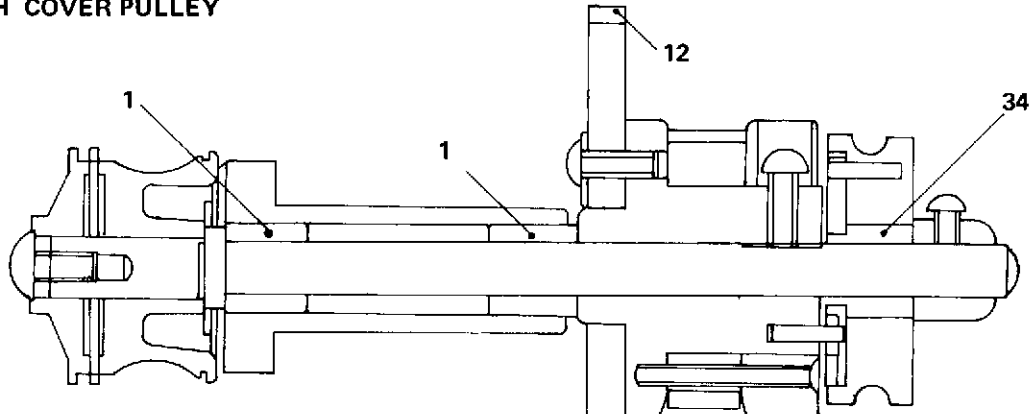


# (LUBRICANTS & LUBRICATION CHARTS)

"N" Series

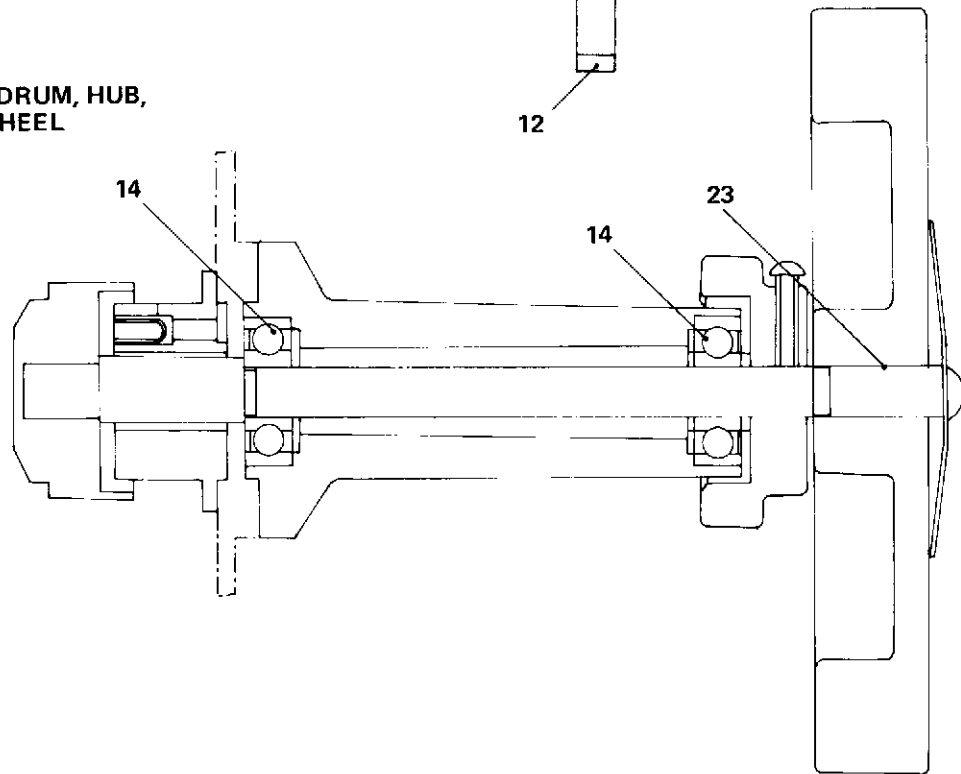
#1 SPROCKET GEAR & HUB,  
CLUTCH COVER PULLEY

Fig. #6



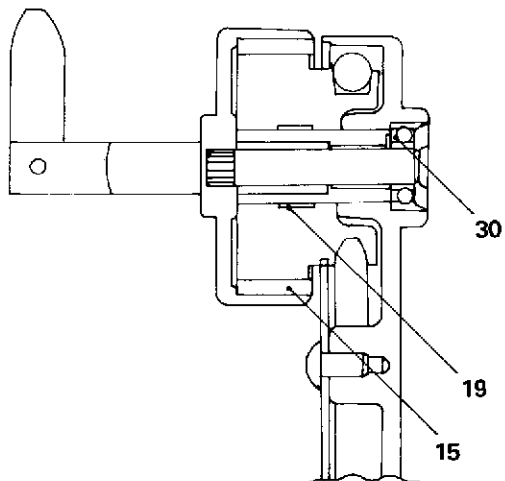
SOUND DRUM, HUB,  
& FLYWHEEL

Fig. #7



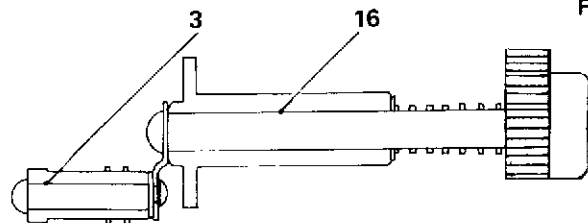
TAKE-UP PULLEY & SHAFT

Fig. #8



LOOP SETTER

Fig. #9



# (LUBRICANTS & LUBRICATION CHARTS)

"N" Series

Fig. #10

REWIND GEARS & CONTROL  
LEVER

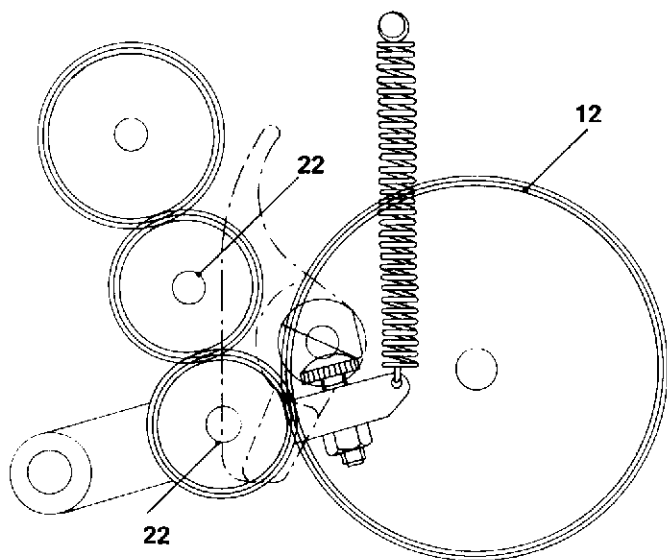
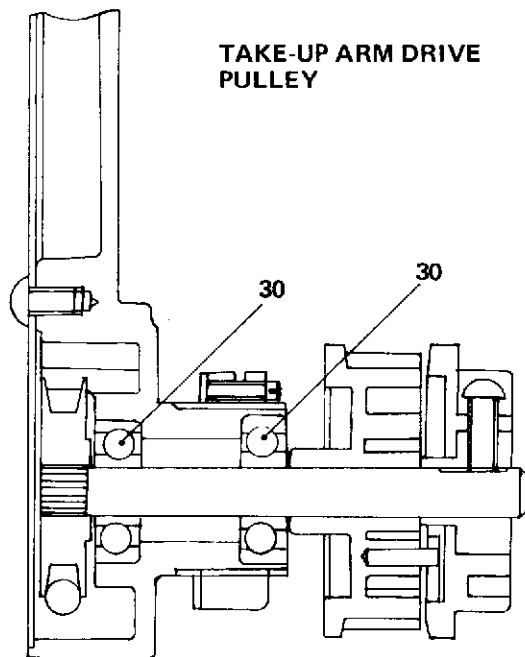


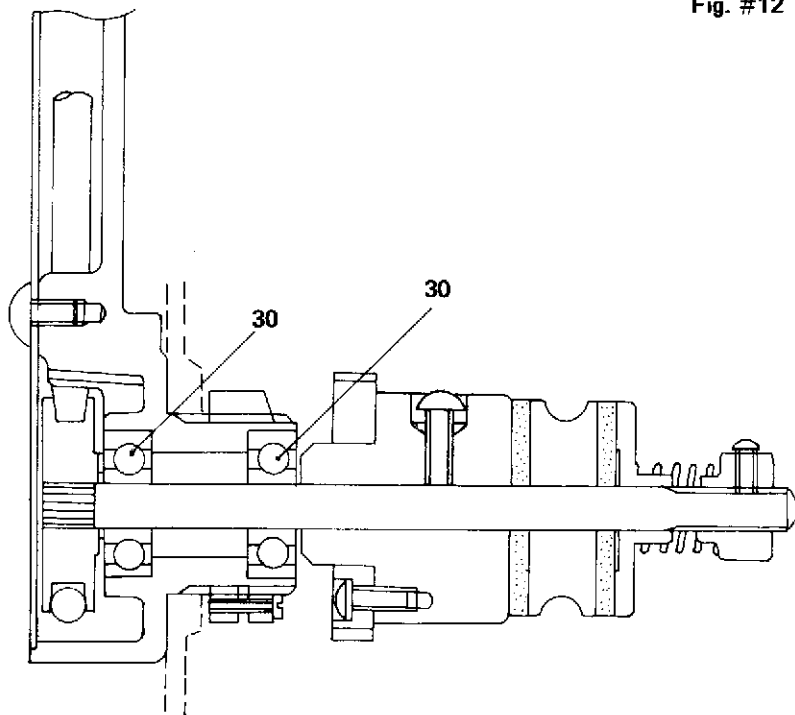
Fig. #11

TAKE-UP ARM DRIVE  
PULLEY



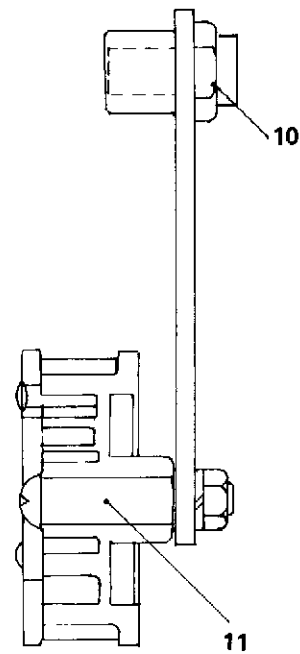
SUPPLY ARM DRIVE PULLEY

Fig. #12



TENSION GEAR

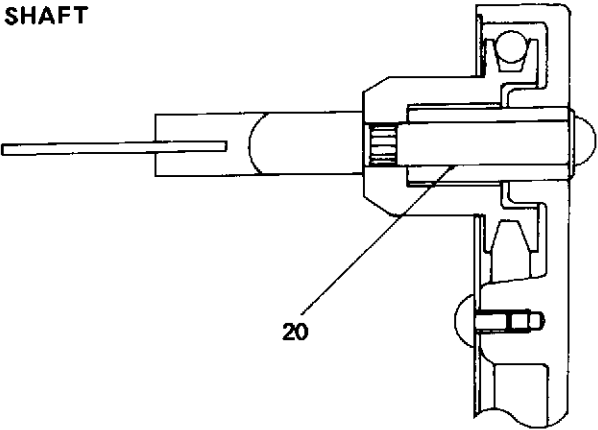
Fig. #13



(LUBRICANTS & LUBRICATION CHARTS)

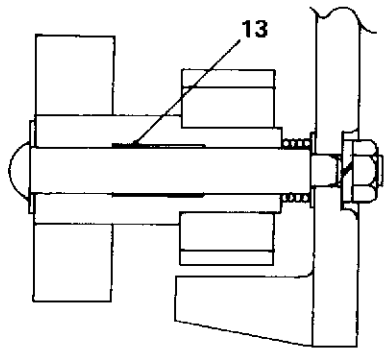
SUPPLY ARM SPINDLE  
SHAFT

Fig. #14



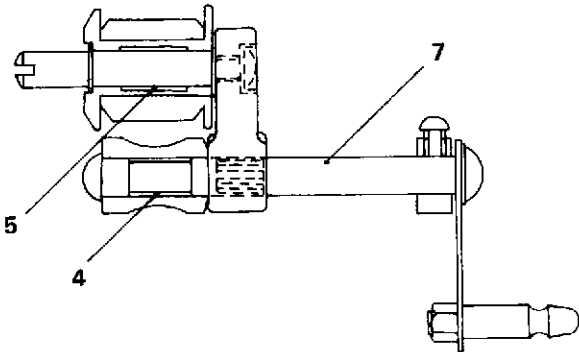
REVERSE RUBBER ROLLER  
PIN

Fig. #15



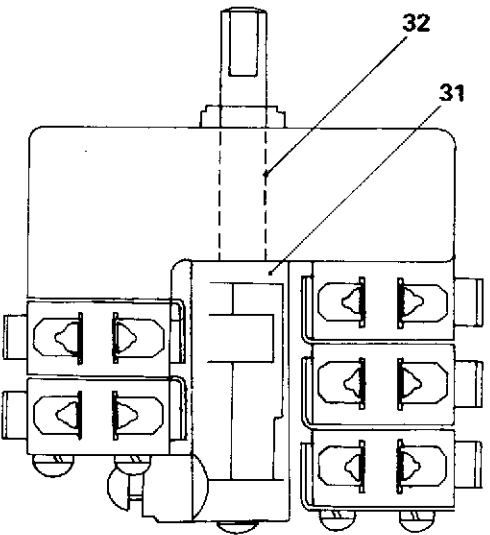
RUBBER PINCH ROLLER

Fig. #16



FUNCTION ROTARY SWITCH

Fig. #17



LOOP SAFETY  
ROLLER ARM

Fig. #18

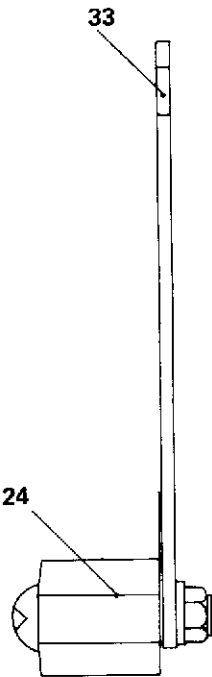
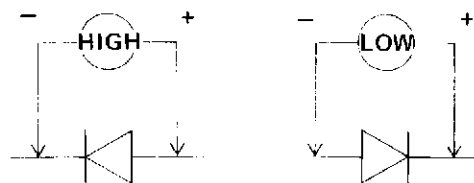


Fig. #21

## 2-4: TROUBLE SHOOTING HINTS

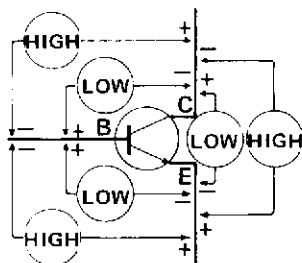
- A. There are four basic steps to trouble shooting this projector:
- Analyze the symptom
  - Localize the trouble to a functional system or module
  - Replace or repair that system or module
    - Isolate the trouble within the module
    - Locate and repair the specific trouble
- B. Checking Semiconductors With A VOM:
- Set the ohms scale to R x 10
  - The forward resistance should be low
  - The reverse resistance should be high

### DIODES

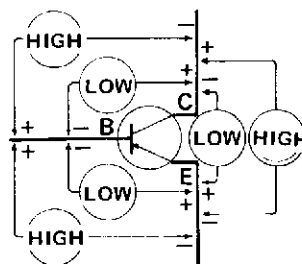


**NOTE:** Forward and reverse resistance LOW & HIGH is only a suggested quick and easy check of components out of circuit. This test is only for shorted and open junction test. A VOM will not test the quality of a semi-conductor accurately.

TRANSISTOR NPN TYPE (2SC, 2SD) Fig. #19



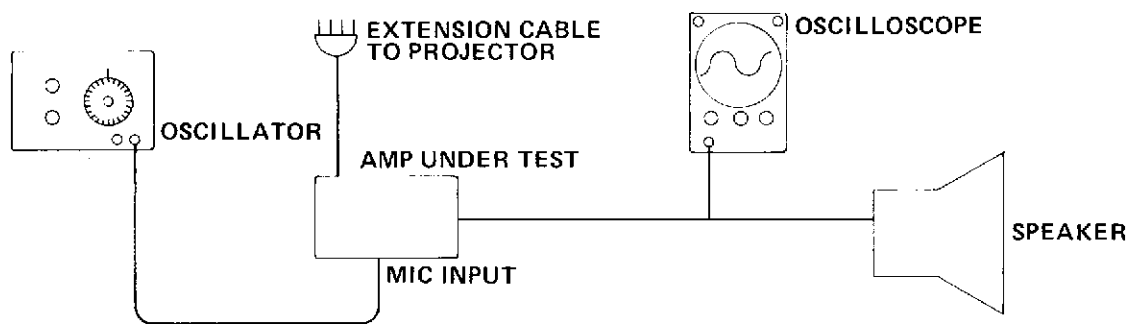
TRANSISTOR PNP TYPE (2SA, 2SB) Fig. #20



- C. IC's are best checked by checking the signal input and output condition. This can be done by inserting a low level audio tone into the MIC jack and the signal path from the input of IC-1 through IC-2 and to IC-3.
- D. Amplifier test cables can be easily made from locally available parts. A nine pin miniature tube socket and male plug can be wired as an extension power cable, allowing the amplifier to be operated away from the projector. The solar cell and exciter lamp connection can also be extended if so desired.

### Typical Amplifier Test Set-Up

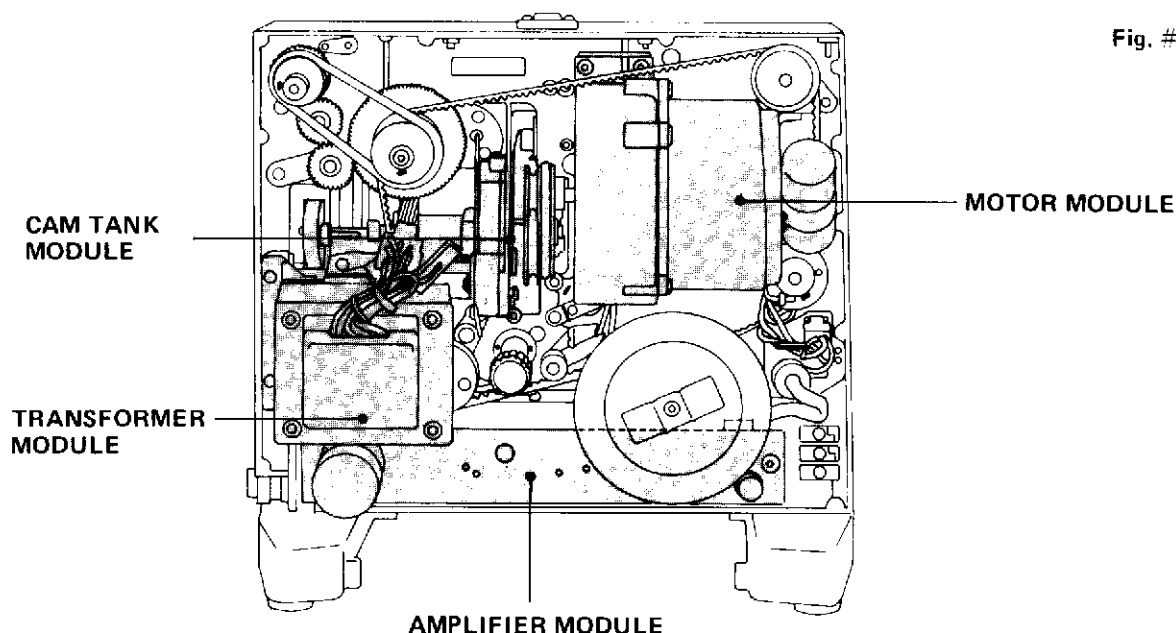
Fig. #22



## 314-3: MODULE REMOVAL AND INSTALLATION PROCEDURE

"N" Series  
(3-2)

Fig. #23



### 3-1: CAM TANK MODULE

1. Unplug the projector and open the rear cover.
2. Remove the 3 transformer mounting screws and unplug the transformer. (See Sec 3-4)
3. Remove the motor belt.
4. Remove the main driving belt by releasing the tension gear.
5. Retract the claw by turning the inching knob.
6. Open the lamphouse and remove the lamp and holder assembly by unscrewing the knurled nut.
7. Unscrew the two cam tank mounting screws.
8. Remove the cam tank slowly and carefully. Care should be taken to avoid damaging the claw by striking it against the main casting.
9. Re-installation can be done by the reverse procedure. Care should be taken that the cam tank worm gear and main drive fiber gear do not bind. A small amount of gear lash is required to prevent abnormal wear.
10. To check the timing and claw adjustments, refer to Sec. 5-1 and 6-3.

### 3-2: AMPLIFIER MODULE

1. Remove the flywheel.
2. Unplug the rear cover speaker cord.
3. Remove the volume, bass and treble knobs.  
**NOTE:** on magnetic models remove the mag/opt knob.
4. Unplug the MT 9 pin plug.
5. Unplug the solar cell and magnetic lead miniature plug.
6. Remove the two phillips screws, one at each end of the amplifier.
7. The amplifier can now be removed by sliding out.
8. To re-install, reverse the procedure above. Be sure that the indicator on the controls lines up and all the connectors are secured.

Fig. #25

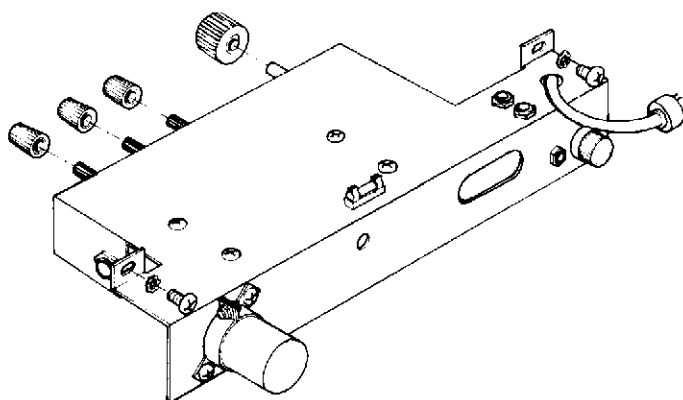
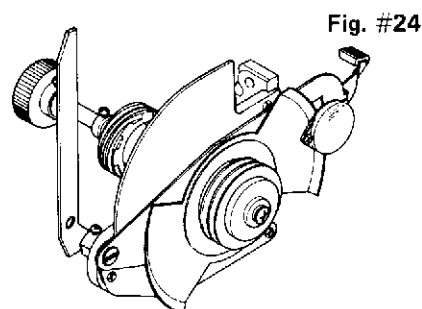


Fig. #28

### 3-3: MOTOR MODULE

1. Remove motor belt.
2. Disconnect motor nylon connector(s).
3. Unscrew 3 screws.
4. Remove motor module.
5. Motor modules are exchanged less pulley.
6. To re-install, reverse the above procedures.
7. Motors with plastic fan housings use the ground strap. NST after S/N 10484, and NT after S/N 18550, with metal fan housing (320-12141), the ground strap has been omitted.

**GROUND STRAP (FOR PLASTIC FAN HOUSING OF EARLY PRODUCTION)**

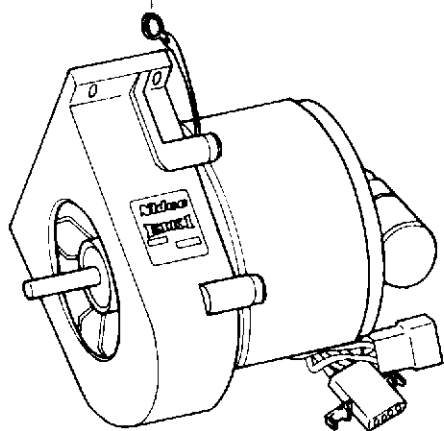


Fig. #26

### 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).

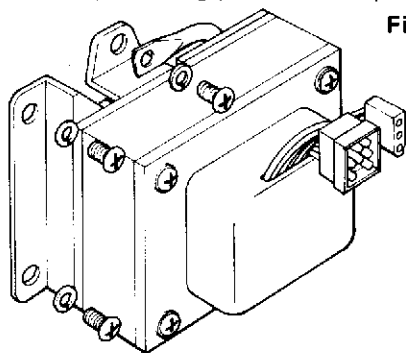


Fig. #27

### 3-5: LENS AND GATE MODULE

1. Swing open the gate and remove the lens. (Anti-theft screw on U.S.A. models).
2. Remove the two phillips screws (40) securing the film gate assembly to the main casting.  
(Fig. #29)

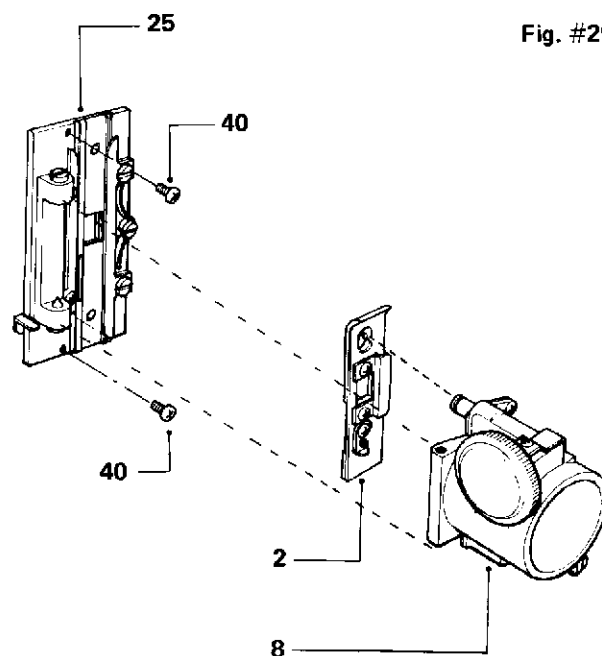
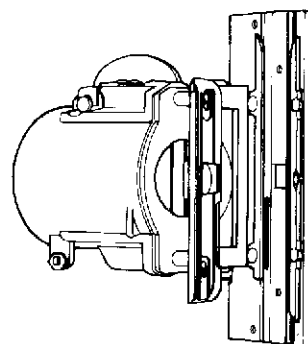


Fig. #29

3. To re-install the film gate assembly, follow the reverse procedure. It is also necessary to check and adjust the claw travel in the aperture plate assembly. (See section 4-2 claw position and framing).

## 314-4: MODULE REPAIR AND ADJUSTMENTS

### 4-1: CAM TANK MODULE

#### A. Specifications

##### Revolution

24 FPS. 1440 RPM

18 FPS. 1080 RPM

Cam Claw Protrusion MIN. 1.0mm — MAX. 1.2mm  
(.040" to .045")

Claw Pitch 7.64 — 7.67mm

\* 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. #30 & 31)

1. Set the still picture clutch to the still position with the shutter pulley (50) rotating freely.
2. Unscrew (53) at the end of the cam shaft and shutter pulley (50).
3. Remove shutter pulley (50) and the plate washer (51). Care should be taken not to loose the slim washer (54) behind the plate washer. The slim washer is selected where necessary to provide the correct clearance between the shutter pulley (50) and the shutter blade and hub (46).

4. While holding the shutter blade (46) slowly raise the still picture clutch, releasing the tension of the clutch spring (12) and shutter blade with hub.
5. Remove the shutter blade and hub assembly.
6. Position the still picture clutch where it exposes all three cam tank cover screws (45). Remove the screws and cover plate assembly.
7. The curved plate spring (24) fits over fulcrum control pin. Unscrew the screw (22) and remove curved plate spring.
8. Unhook the claw lever spring (36), and remove claw lever assy. (28)
9. To remove cam (10) and cam plate (9), unscrew the three set screws (11).
10. To remove cam shaft assy. (4), remove inching knob (8) and worm gear (7).
11. To replace the cam tank bearings, the inner bearing is pressed on the cam tank shaft and is replaced as part of the cam shaft with bearing assy.
12. Clean all the old dried molybdenum grease from the cam tank.

Fig. #30

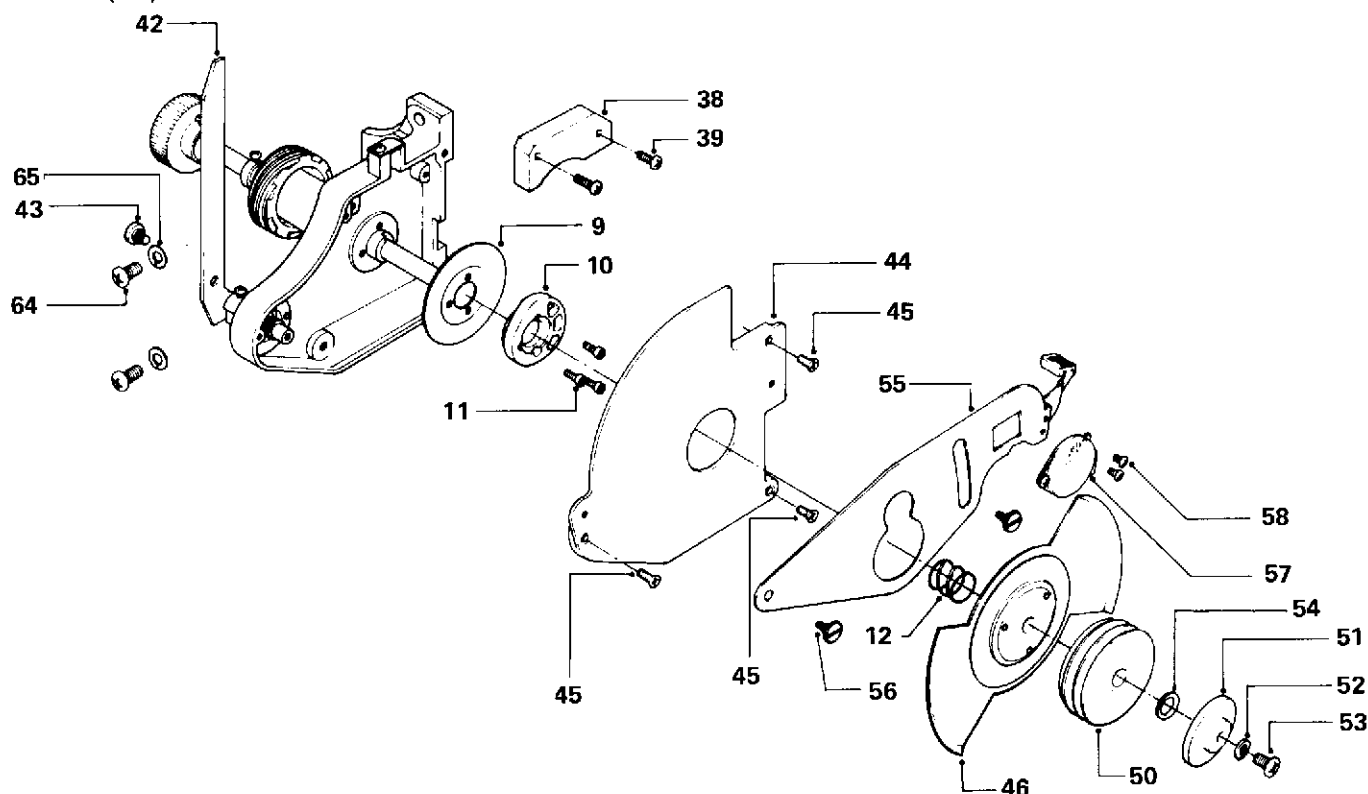
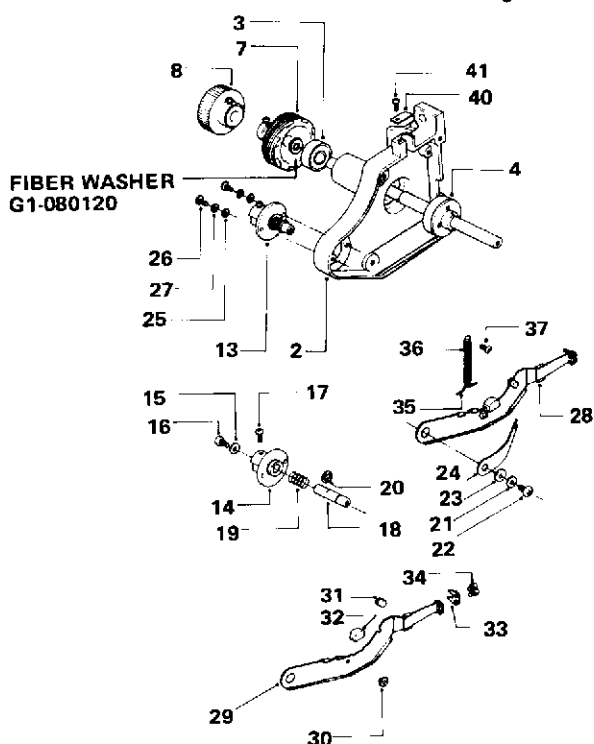


Fig. #31



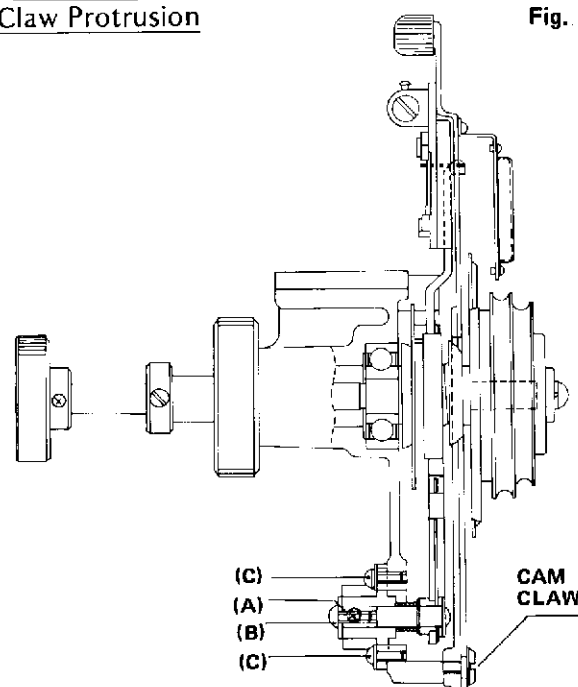
C. Reassembly of Cam Tank By Reversing The Above Procedure

1. Make sure curved plate spring (24) is not jammed between the end of fulcrum pin (18) and washer (23).
2. The cam shaft should have no end play.
3. Worm gear (7) 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 shutter blade and hub assembly, the hub must line up with the mating hub in the cam tank.

**NOTE:** In the event the shutter has been removed from the hub, See Sec. 320-4-1-F Changing Shutter Blades.

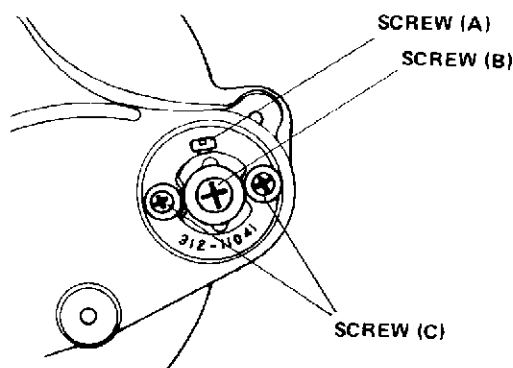
D. Adjustments  
1. Claw Protrusion

Fig. #32



- a. Claw protrusion can be adjusted by the screw (B) on the fulcrum collar. As the sliding pin (31) wears, the protrusion will increase requiring the adjustment of the protrusion.

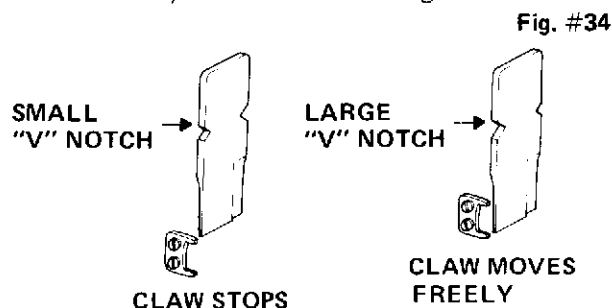
Fig. #33



- b. Loosen set screw (A) by 1/8 of turn as indicated in Fig. #32 & 33.
- 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. #34)

- (1) Open lens holder and gate assy.
- (2) Attach the tool between the inner guide rail and the outer guide rail.
- (3) With the small "V" notch toward the outer guide rail, the claw should just contact the tool.
- (4) With the large "V" notch toward the outer guide rail, the claw should move freely without contacting the tool.



- e. When using another type of claw protrusion gauge of similar specifications as (320-4-1), disregard items 2, 3, 4 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 the fulcrum assy. slightly loosen the two screws (C) shown in Fig. #32 & 33.

- (1) Checking the 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. #35) and in the down position the frame bar should appear as in (Fig. #36).

Fig. #35



Fig. #36



- (2) If the conditions in step 1 are not correct, adjust the vertical or up and down position of the fulcrum assy. (Fig. #32 & 33) by slightly loosening screws (C) on the fulcrum assembly.

Only a very small movement is required to effect the framing position.

NOTE: If framing range as indicated cannot be reached, check for a worn cam follower (32 of Fig. #31)

(3) Checking Position For Correct Alignment With The Sprocket Holes:

To view the claw 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. (Do not turn on the lamp).

- (4) Fig. #37 indicates the correct position of the claw just before the start of the pull-down. Fig. #38 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. #37 & 38. Upon completion of the position adjustment, tighten the fulcrum assy. screws and re-check the framing range with the projector running.

Fig. #37

BEFORE PULL DOWN

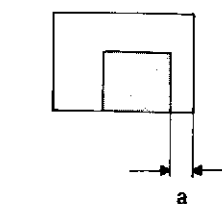
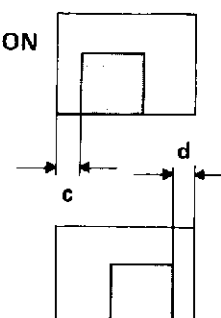
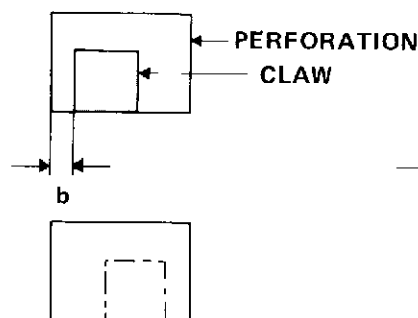
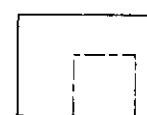


Fig. #38

AFTER PULL DOWN

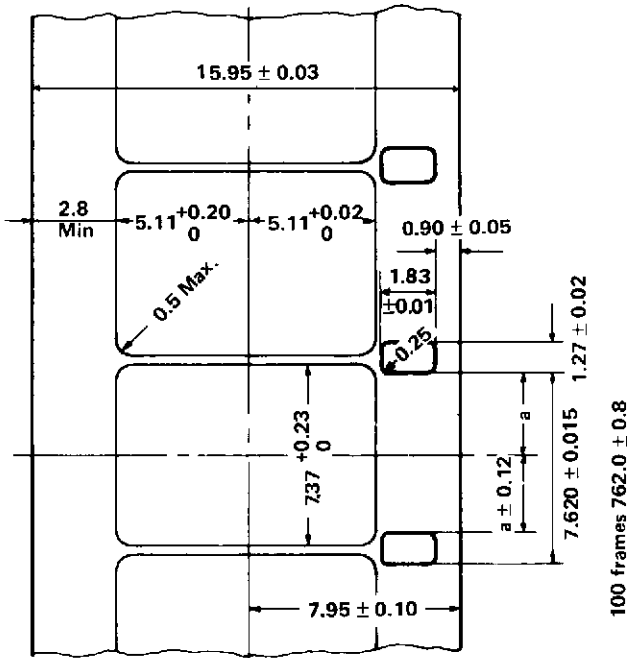


### E. Replacing The Claw

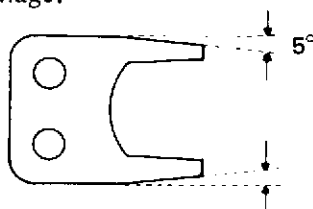
When replacing a worn or defective claw, it is important to mount the claw correctly before securing the mounting screws. Incorrect claw mounting may result in excessive film gate noise or unsteady picture.

### 1. Correct Claw Pitch

**The International dimensions of the 16mm film**      **Fig. #39**



- a. The International dimensions of the 16mm film are shown in Fig. #39. 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.
- b. 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.
- c. The claw as shown in (Fig. #40) has a 5 degree 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.

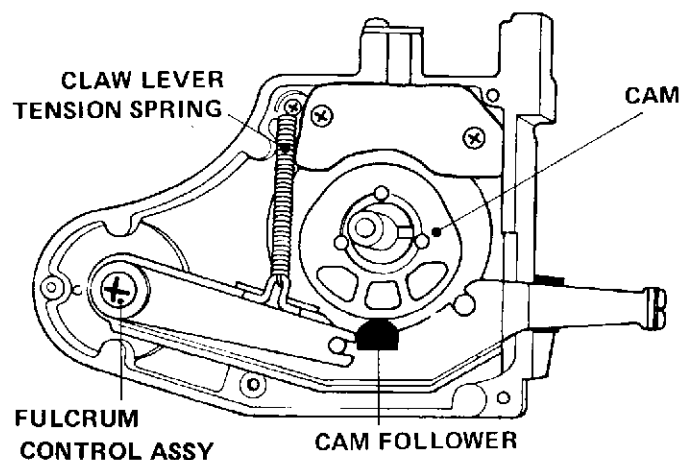


**Fig. #40**

## 2. Adjusting The Claw Pitch

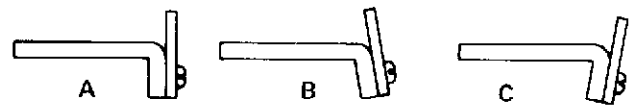
- a. Moving the fulcrum control assy: The fulcrum control assy (Fig. #41) horizontally adjusts the contact point between the cam follower and the cam which in turn effects the claw pitch. Moving the fulcrum control assy. to the left decreases the pitch and moving it to the right increases the pitch.

**Fig. #41**



- 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. #42-A. Under some circumstances a bent claw lever as shown in Fig. #42-B and 42-C may have to be corrected by straightening out the claw.

**Fig. #42**

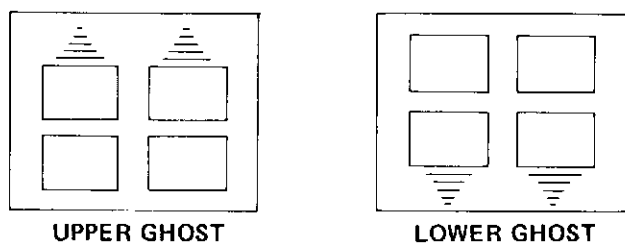


### 3. Claw Lever Tension (See Fig. #41)

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 of 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

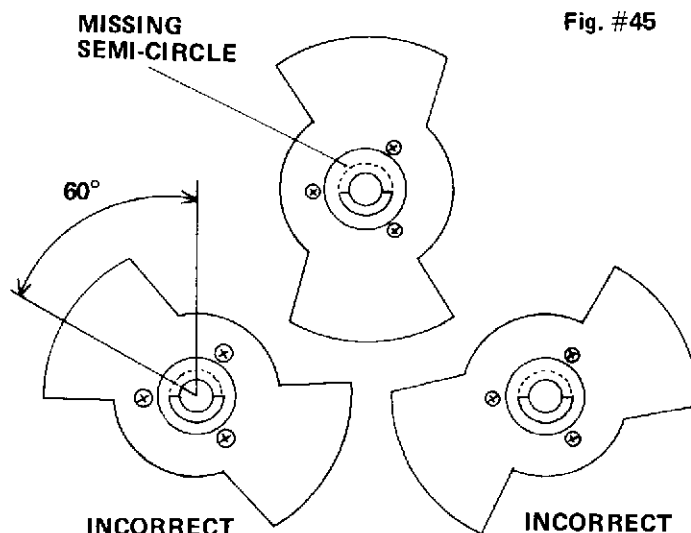
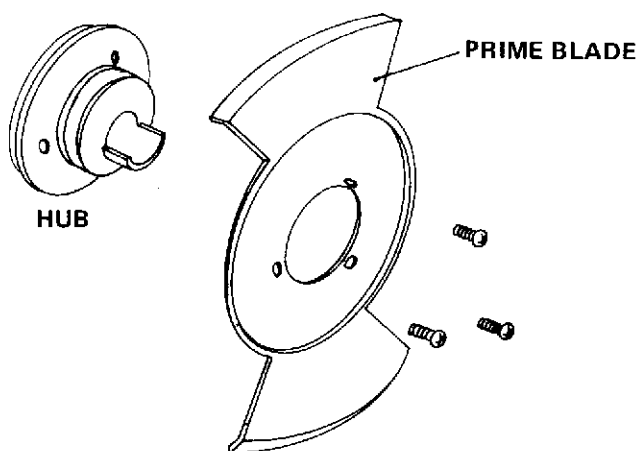
Fig. #43



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. #43). 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.

When mounting the 2 blade shutter, the missing semi circle on the hub must be positioned toward one of the blades. The curved edge of the blade faces away from the cam tank (See Fig. #44, 45).

Fig. #44



NOTE: 3 BLADED SHUTTERS WILL AUTOMATICALLY LINE UP CORRECTLY.

### G. Still Picture Clutch

The still picture clutch consists of the shutter pulley (50), the shutter blade and hub (46) and the still picture clutch lever (55) and tension spring (12). The friction between the shutter blade hub's coned surface and the coned surface of the shutter pulley is maintained by the tension spring (12) when the still picture clutch is in the up position, driving the cam tank and the rest of the projector mechanism. In the down position the still picture lever releases the spring tension, slightly separating the shutter blade hub and the shutter pulley. To adjust the still position clearance, spacer (54) may be added or deleted, as necessary. Lubricate the bushing with a small amount of molybdenum disulfide grease. In the still position the heat filter (57) allows a single frame to be shown without burning the film, however, the projector is not designed to operate in this position for extended periods of time. Long still operations will cause premature wear to the shutter pulley bushing and cam tank shaft.

