Film-Tech

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Service Instructions

[redacted]

SLOT-THREADING FILMOSOUND® PROJECTOR

Models 1575C, 2575C, 2580C

BELL + HOWELL

GENERAL SERVICE DEPT.
7100 McCORMICK ROAD
CHICAGO, IL 60645

PART NO. 61074439

APRIL 1986

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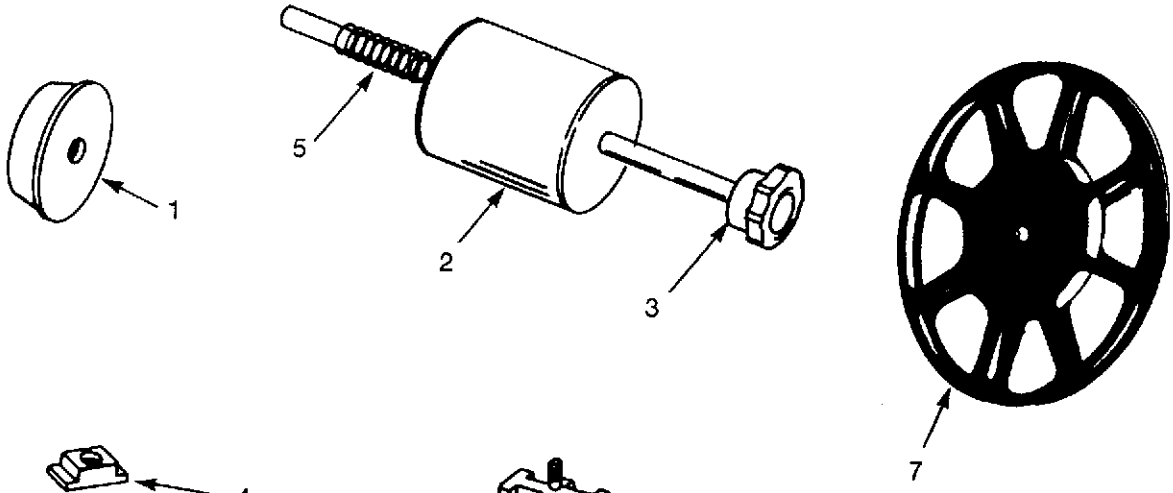
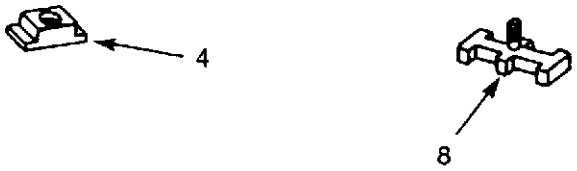
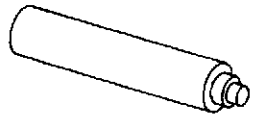
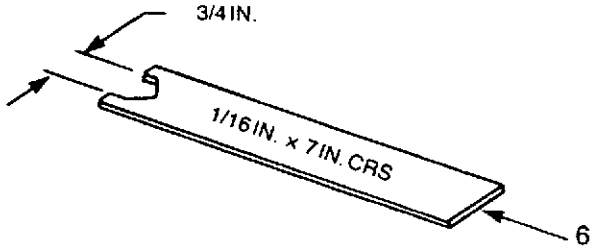
SERVICE TOOLS AND SUPPLIES CHART

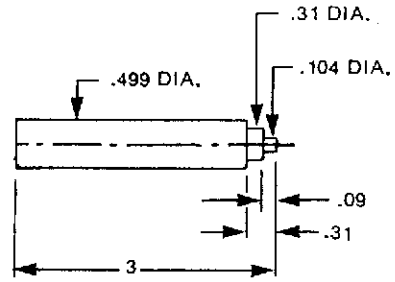
Figure A Index No.	Tool No.	Tool Description	Tool Usage
1	S-078175-6F-1	Lamp Plug	Optical system alignment (Fig. B).
2	S-550-2-N1	Lens Plug	Optical system alignment (Fig. B).
3	S-550-2-N2	Alignment Rod	Optical system alignment (Fig. B).
4	S-550-2-N3	Aperture Plug	Optical system alignment (Fig. B).
5	P/N 44507	Tension Spring	Optical system alignment (Fig. B).
6	Make in Shop	Torque Wrench	Adjust rewind torque (para. 20).
7	P/N 710365	Rewind Torque Reel	Adjust rewind torque (para. 20).
	Purchase	Push-Pull Torque Scale (Chatillon #LP-72, Master Gage Co., Chicago, IL 60622)	Adjust rewind torque (para. 20).
8	S-09701-35-N2	Shuttle Height Gage	Check shuttle protrusion (para. 16, step b).
9	Make in Shop	Alignment Tool	Align sound drum (Fig. H).
10	Make in Shop	Adjustment Tool	Adjust sprocket plate (para. 26).
11	P/N 48478	Cleaning Tool	Clean film path area.
	G1271-F1	Setscrew Wrench and Handle	For 4-40 Bristol type setscrews.
	G1271-X2	Setscrew Wrench	For 4-40 Bristol type setscrews.
	STK3852-B	Setscrew Wrench and Handle	For 6-32 Bristol type setscrews.
	STK3863-B	Setscrew Wrench	For 6-32 Bristol type setscrews.
	G165-F1	Setscrew Wrench and Handle	For 8-32 Bristol type setscrews.
	G165-F3	Special Setscrew Wrench	For setscrews in wrench handles.
	P/N 04978	Lubricating Oil	See Parts Catalog illustrations.
	P/N 078215	Lubricating Oil	See Parts Catalog illustrations.
	Purchase	Mobile® Co. Oil #DTE 25	See Figure 16 & 17.
	P/N 070034	General Purpose Grease	See Parts Catalog illustrations.
	P/N 070043	Grease	See Parts Catalog illustrations.
	P/N 070047	Grease	See Parts Catalog illustrations.
	713278	Grease	See Figure 22.
	TFL-D1580-NX6	Test Film Loop	Adjust centering and framing.
	TFL-D1580-NX3	Test Film Loop	Check buzz track
	TFL-2575-NX2	Test Film Loop	Check 7000Hz azimuth.
	Purchase	3M Co. Adhesive #EC847	See instructions and parts catalog illustrations.
	Purchase	3M Co. Adhesive #EC1711	See Figures 9 & 24.
	Purchase	3M Co. Adhesive #EC4475	See Figures 21 & 25.
	Purchase	Loctite Corp. Sealant #222	See Figure 25.
	Purchase	Dow Corning Corp. Heat Sync Compound #DC340	See Figure 25.



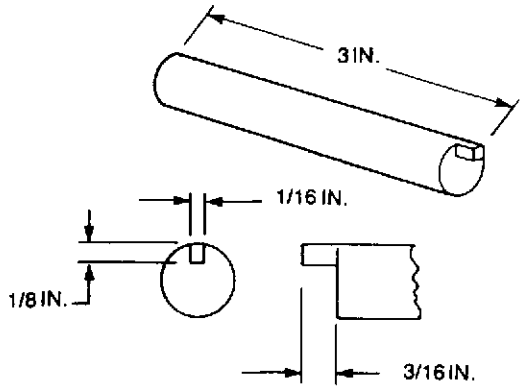






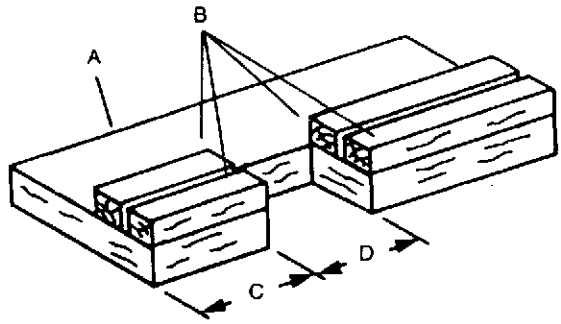


9 MAKE FROM ROUND STEEL BAR



10 SPROCKET PLATE
ADUSTING TOOL

MAKE FROM ALUMINUM ROD
(5/16 IN. OD BY 3 IN. LONG)



MAINPLATE HOLDING FIXTURE

A — PLYWOOD BASE (1-1/2 IN. THK. x 9 IN. x 14-1/2 IN.)
B — 1 IN. BY 2 IN. WOOD STRIPS (CUT TO FIT)
C — DISTANCE FROM EDGE OF MAINPLATE TO FLYWHEEL
D — BASE CUT-OUT TO PROVIDE CLEARANCE FOR FLYWHEEL

Figure A Service Tools

INTRODUCTION

1. SPECIAL MAINTENANCE PRECAUTIONS.

Refer to projector's serial number nameplate for correct model number and suffix letter to be used with code charts throughout the parts catalog.

Before beginning repairs, check specific customer complaints against the trouble shooting charts in this service manual for the most probable causes and suggested remedies. When repairs have been made, be sure to clean and lubricate the projector before it is returned to the customer.

2. CLEANING INSTRUCTIONS.

Use isopropyl alcohol and the special cleaning pad (Figure A-11) to remove hardened emulsion, and be careful not to scratch the surfaces that contact the film. Pay particular attention to the sound drum and the soundhead rollers.

Use isopropyl alcohol to clean plastic parts and be careful not to remove lubricants from critical areas, especially in the film threading linkage. Blow away dust and film chips with a low-pressure jet of compressed air and wipe with a soft, lint-free cloth.

3. LUBRICATIONS INSTRUCTIONS.

Parts and areas that require lubrication are shown in the Parts Catalog illustrations by means of ballooned letters "L" (for oil) and "G" (for grease). Specified lubricants are available from the Bell & Howell Company. Be sure that the part or area to be lubricated is clean before lubricant is applied, and be careful not to over-lubricate. A drop or two of oil or a very light film of grease will be adequate. Apply grease with a camel's hair brush and wipe away excess lubricant with a lint-free cloth.

Felt pads and wicks should be placed in a shallow pan containing the specified grease and allowed to stand until they are completely saturated. Wipe away excess grease before installing these felt parts.

4. GENERAL REPLACEMENT DATA.

The rear cover is secured to the projector base with three screws and to the end caps with two screws each. When these seven screws have been removed, carefully work the cover free from the projector to the limit of the interconnecting leadwires. The rear cover may be completely separated from the projector by disconnecting the input line at the power transformer module. The covers on the underside of the base can be removed to expose the amplifier and its controls.

5. FUSE REPLACEMENT.

a. The amplifier power input circuit and exciter supply is protected by two 2.0A Slo-Blo fuses which are located on the printed circuit assembly. The bottom cover must be removed to gain access to the fuse.

b. The electrical system of these projectors is protected against overheating by special thermal fuses. Fuses are installed in the drive motor windings and in the power transformer and can not be replaced. In the event a thermal fuse opens, repair cause of overheating and replace defective item.

6. LAMP REPLACEMENT.

CAUTION: Turn projector off and disconnect the line cord before removing lamps.

a. Projection Lamp. Press in on the top of the lamp retainer spring to release the lamp from its holder. Pull the lamp straight out from its socket (do not twist or wiggle the lamp during removal). Assemble the new lamp into the socket, position lamp in the lamp holder and clamp in place with the retainer spring.

b. Exciter Lamp. Note position of the orientation notch in the lamp base. Rotate lamp release ring (Figure 11-35).Twist the lamp counterclockwise and lift it from the contact pins. Position the new lamp on the lamp socket pins with notch oriented as above and twist clockwise to set in place. Return lamp release ring to original position.

c. Remove finger prints from the lamp with lens tissue or a lint-free cloth.

DISASSEMBLY/ REASSEMBLY PROCEDURES

7. GENERAL PRECAUTIONS.

a. Cemented or adhesive-backed parts are so noted in the parts lists and can be removed by carefully prying up one edge. Be careful not to scratch surrounding areas and remove traces of old adhesive with solvent before installing new labels or nameplates. If the new item is to be cemented in place, use 3M Co. Adhesive #EC 847. If the new item is adhesive-backed, peel off the protective tissue and smooth the item in place.

b. When removing riveted parts for replacement, drill out the old rivets with a drill equal in size or slightly smaller than the diameter of the rivets. Use screws and nuts of corresponding size to attach the replacement parts, making sure that these parts do not interfere with the proper operation of the equipment.

8. DRIVE BELT REPLACEMENT.

a. If the drive belt is badly worn or frayed and in need of replacement, cut the belt and remove it. Clean both belt pulleys with isopropyl alcohol.

b. Unplug the motor leads from the connector located atop the power transformer module. Remove the motor bracket strap from each end of the drive motor. Starting from the end of the motor nearest to the power transformer module, loop the new drive belt around the motor onto the motor pulley. Engage the upper end of the belt around the upper (mechanism) pulley with as little stretching as possible.

c. Reassemble the motor bracket straps and insert the motor leads connector.

9. INTERNAL SPEAKER REPLACEMENT.

When reattaching wire leads to the speaker refer to wiring diagram for proper connection to color coded terminal.

10. REEL ARM REPLACEMENT.

a. Be prepared for sudden pop-out of the lock button (Figure 6-16 and 6-17) and compression spring (Figure 6-18) when removing either reel arm. The lock button cups (Figure 6-19)may be removed by applying finger pressure to the cup from the gear side of the mainplate.

b. Model 2575 only. After the front reel arm has been replaced, raise the arm to the detent position, then secure the two screws (Figure 5-7D) in the link and bearing assembly (Figure 5-7). Failure to raise the front reel arm when securing these screws may cause the reel arm shaft to bind in the bearing and result in failure to rewind film through the system.

11. AMPLIFIER REPAIR.

NOTE: Amplifier circuit board repairs are not recommended except as an emergency measure and then only if qualified electronics personnel and test equipment are available. Using standard electronic shop test equipment and techniques, check the amplifier assembly and its components for continuity and for shorts and open circuits. Refer to the appropriate wiring diagram for voltages and ratings of components and for test points. If a faulty condition is tracked to the amplifier, replace the complete assembly (Figure 8-11).

12. MAIN PLATE REMOVAL.

A main plate holding fixture, illustrated in Figure A, should be made so that the main plate can be set in an upright position while performing inspection and maintenance procedures.

The main plate is secured to the base with four screws (Figure 9-13, 9-14). Before removing the main plate it will be necessary to unsolder the leads at the exciter lamp socket (Figure 11-34). Also disconnect the photocell (Figure 11-27) from the amplifier. Free hanging connectors, located near the blower, are provided to disconnect the projection lamp socket (Figure 2-11).

13. MECHANISM REPLACEMENT

The mechanism (Figure 9-6) is secured to the main plate with four screws (Figure 9-1, 9-5). To gain access to the two lower screws it will be necessary to remove the transformer (Figure 3-2) and drive motor (Figure 3-12). The tilt rack (Figure 9-16C) may be lowered to gain access to one of the lower screws.

Take care when moving the mechanism through the main plate opening to avoid bending sheet metal parts such as the shutter (Figure 14-3) and switch bracket (Figure 3-26).

When reassembly has been completed, determine that the torsion spring (Figure 11-16) is in place.

ADJUSTMENTS

14. GENERAL INSTRUCTIONS.

The alignment and adjustments covered in this section are necessary to the proper operation of the projector. Even though the projector may not have undergone a complete overhaul and repair, it is recomended that all adjustments be checked as a routine measure.

All special tools, test films and fixtures required to perform the adjustment procedures are illustrated and listed in Figure A. In addition, special electronic test equipment (voltohmmeter, oscillator and tachometer or Strobotac) are needed to check and adjust the sound system of the projector. For accurate results, connect the projector to a line variable transformer set at 120 volts 60Hz.

WARNING

Many of the procedures listed in this section require operation with rear cover removed. To avoid shock hazards, disconnect the power and, if applicable, discharge the motor starting capacitor when not required. The use an isolation transformer is recommended.

15. OPTICAL ALIGNMENT (Figure B).

It is important that these alignments be performed in the following listed sequence (steps a and b). Be sure to turn the mechanism manually until the shutter blade is clear of the aperture opening, before inserting alignment tools.

a. Aligning the Aperture Plate.

(1) Remove the projection lens and the projection lamp.

(2) Disassemble the pressure plate from the lens carrier.

(3) Loosen the two aperture plate mounting screws just enough to permit movement of the aperture plate, and insert the aperture plug (Figure A-4) into the aperture opening.

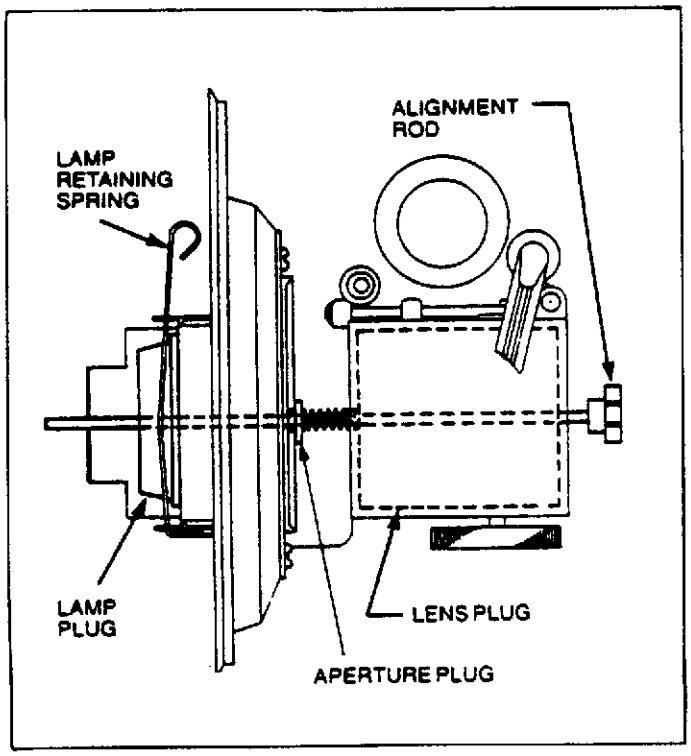


Figure B. Aligning the Opitical System

(4) Insert the alignment rod (Figure A-3) through the lens plug until the rod end protrudes enough to install the spring (Figure A-5). Insert the lens plug into the lens carrier until the tip of the alignmnet rod engages the aperture plug previously installed. Tip the projector carefully onto its rear end cap (lens opening facing up). The alignment rod must slide freely through the aperture plug without binding. If necessary, shift the aperture plate slightly keeping it horizontal (shuttle tooth travel is even from top to bottom) until free rod movement is obtained; then tighten aperture plate screws.

b. Aligning the lamp.

(1) Loosen the four heat shutter assembly mounting screws (Figure 10-1) just enough to permit movement of the heat shutter assembly. Insert lamp plug (Figure A-1) into lamp position and secure it with the lamp retainer spring. Insert the lens plug (Figure A-2) into the lens carrier. Slide the alignment rod completely into place until the tip of the rod engages the hole in the lamp plug. Shift the heat shutter assembly as necessary until rod slides freely in the lamp plug hole. Then tighten the screws securely.

NOTE: After alignment has been completed, touch up the aperture area with a flat black paint as required. This will prevent any reflections which may occur from the aperture.

16. ADJUSTING THE INTERMITTENT MECHANISM.

NOTE: All of the following mechanism adjustments must be made with framer knob in the "center" position. After each adjustment, manually rotate the cam shaft to "SEAT" the adjusted component and recheck the adjustment.

a. Checking Shuttle Tooth Side Clearance. Advance the mechanism manually until the shuttle is at the center of its stroke as shown in Figure C. The clearance from the edge of the shuttle slot to the inner end of the shuttle tooth (nearest the aperture opening) should be 0.007-inch (0.178mm) minimum. From the edge of the shuttle slot to the outer end of the shuttle tooth, the distance should be 0.050-inch (1.27mm) maximum. Check these clearances at both the upper tooth and lower tooth. If the clearances vary at the upper and lower teeth and inner clearance is less than 0.007-inch (0.178mm) at either end, the following possible causes should be checked and corrected:

(1) Aperture plate out-of-alignment:
See paragraph 15, step a, for aperture plate alignment.

(2) Shuttle stroke incorrect:
See paragraph 16, step d, for shuttle stroke adjustment.

(3) Link bearing missing from end of shuttle arm:
Partial disassembly is required to remove and replace the shuttle arm. Refer to Parts Catalog Figure 14.

(4) Ball and stud assembly loose on shuttle arm:
Reposition the shuttle arm (Figure D) and tighten stud nut securely.

(5) The shuttle tooth side clearances can be adjusted by loosening the ball and stud assembly nuts. Slide the shuttle arms as required to obtain the clearances as specified in Figure C. This adjustment may cause the shuttle to exceed the stroke limits.

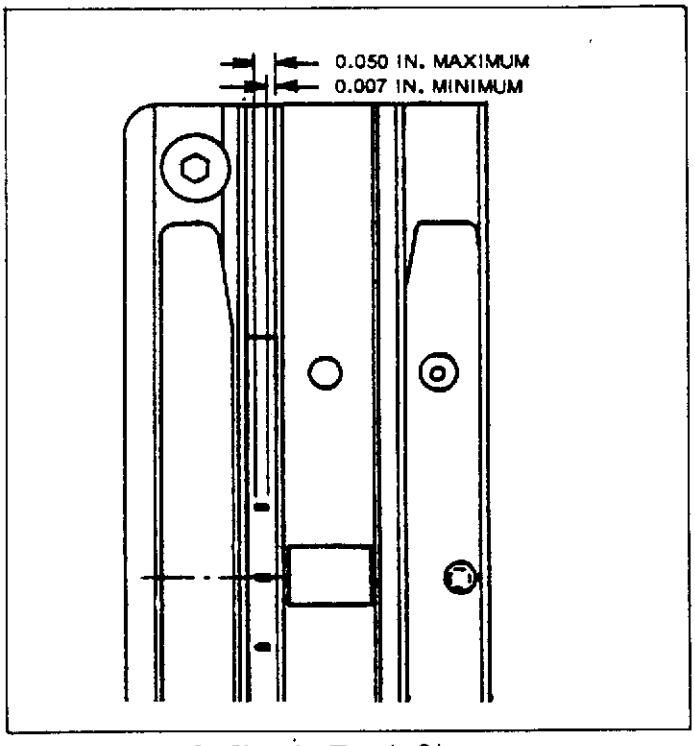


Figure C. Shuttle Tooth Clearance

b. Checking Shuttle Tooth Height. Unscrew the handle from the shuttle tooth height gage (Figure A-8). Carefully place the projector on its rear end cap with the front of the projector facing you, and disengage and remove the pressure plate. The steps at either end of the gage are the height limits and are marked "GO" and "NO-GO." Insert the gage into the film channel between the rails of the aperture plate and attempt to slide it over the shuttle teeth. The "GO" step should pass over the shuttle teeth without catching. The "NO-GO" step must not pass over the shuttle teeth. If the shuttle teeth are too high or too low, adjust height as follows:

(1) Remove the belt from the mechanism pulley. Turn the mechanism drive pulley manually until the access hole in the shutter and setscrew (Figure 14-14A) on the in-out bracket are aligned (Figure E).

(2) If the shuttle teeth were too low ("NO-GO" step passes over the shuttle teeth), turn the cam follower screw counter-clockwise to increase tooth height. If the shuttle teeth were too high ("GO" step catches against shuttle teeth), turn the adjusting screw clockwise. Recheck shuttle tooth height and continue to adjust the follower screw until the proper height is obtained.

(3) If only one tooth cannot be brought into tolerance, it may be necessary to loosen the screws (Figure 14-13) which secure the in-out bracket (Figure E) and adjust the bracket slightly. Then retighten the mounting screws and adjust shuttle tooth height as outlined above.

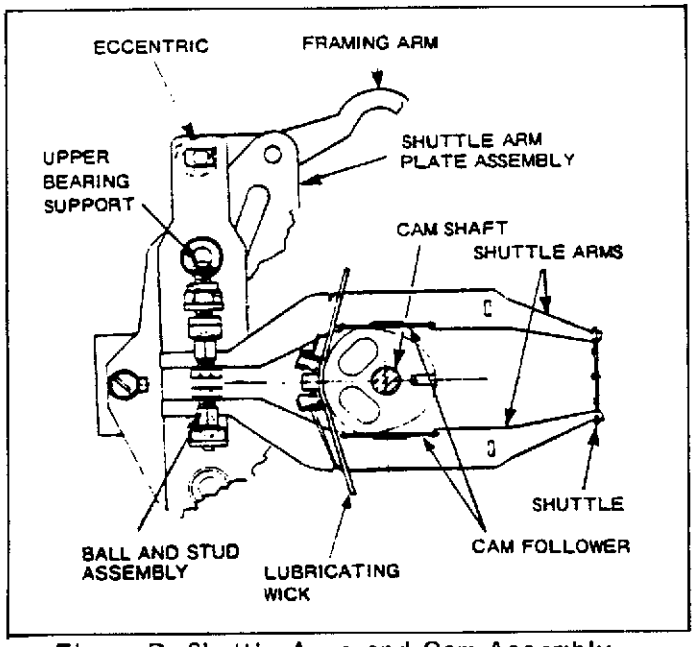


Figure D. Shuttle Arms and Cam Assembly

c. Checking Fit of Shuttle arms to Pull-Down Cam.

NOTE: If the projector has just been lubricated, run for two or three minutes before proceeding with this adjustment.

(1) Open the lens carrier and turn the projector mechanism by hand until the shuttle teeth are retracted and have moved downward to approximately the center of the stroke (center tooth approximately on horizontal center line of aperture). Tighten the upper bearing support assembly to the point of having a slight binding or ratcheting while turning the camshaft. Turn the upper bearing support assembly counter-clockwise approximately 1/16 turn, allowing the cam to turn freely without binding.

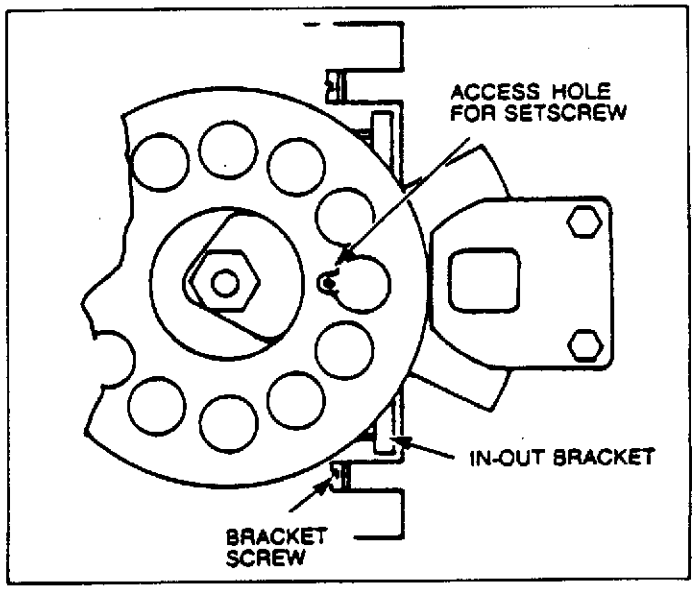


Figure E. Adjusting Shuttle Tooth Height

CAUTION

Do not tighten shuttle arms more than is specified in an attempt to remove cam noise. Excessive tightening of shuttle arms for the purpose of reducing other noises will affect speed, reduce life of cam, cam shoes and possible use of excess current by loading the motor.

d. Checking and Adjusting Shuttle Stroke (Figure F). Shuttle stroke (vertical travel on down stroke) is precision set at the factory. Therefore, the procedures for checking and adjusting shuttle stroke are required only when the shuttle arm plate assembly or arms have been moved. Before starting these procedures, make sure the mechanism is assembled correctly.

(1) Procedure for Checking Shuttle Tooth Stroke. Check for proper setting of the shuttle tooth side clearance (paragraph 16, step a), shuttle tooth height (paragraph 16, step b) and fit of the shuttle arms (paragraph 16, step c).

Manually rotate the cam shaft to position the shuttle at the extreme top of its movement. Turn the framer knob as required until the bottom edge of the center shuttle tooth is in line with the top edge of the aperture opening (Fig.F). Rotate the cam shaft until the shuttle is at the extreme bottom of its stroke. In this position the top edge of the center shuttle tooth should be in line with the bottom edge of the aperture opening for a close proximity of the factory setting without the use of special gages.

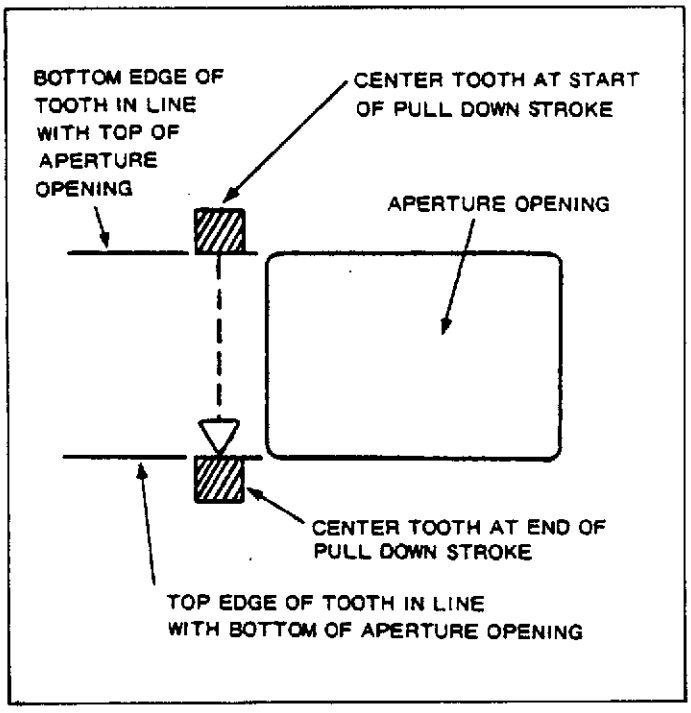


Figure F. Shuttle Stroke Adjustment

To further check the shuttle stroke, project a trial length of film. The projected image should be steady and there should be no noise as the shuttle teeth penetrate the film perforations. If these conditions are not present proceed to step 2.

(2) Procedure for Adjusting Shuttle Stroke. Loosen the two shuttle plate mounting screws (Figure 14-16) just enough to permit movement of the shuttle arm plate.

(a) To lengthen the stroke, shift the shuttle arm plate toward the pull-down cam.

(b) To shorten the stroke, shift the shuttle arm plate assembly away from the pull-down cam.

(c) After adjusting stroke, recheck shuttle tooth side clearance as instructed in paragraph 16, step a, and readjust the shuttle arms for proper tooth side clearance.

e. Framing Adjustment. Thread the projector with test film TFL-1580-NX6. Project the film and turn framing knob from one limit to the other. If at one limit a frame line is not visible, loosen the nut on the framing eccentric located at the top of the shuttle arm plate assembly (Figure D) and turn the eccentric until the frame line appears. Hold the eccentric while tightening the nut. Check the adjustment by again turning the framing knob from limit to limit while observing the picture. When the eccentric is properly adjusted, either frame line can be projected and movement of film should be approximately equal at top and bottom of framer travel.

17. ADJUSTING THE FLYWHEEL BRAKE.

a. Model 2575 only. In the forward and rewind modes the flywheel brake roller (Figure 7-18B) must clear the flywheel. In the load/off position the roller must rest on the flywheel. Bend the latch bracket (Figure 12-25) as required to achieve these conditions. Do not over-bend causing the brake lever (Figure 13-6) to touch the adjacent wall of the mechanism housing.

b. Model 1575 & 2580 only. The flywheel brake roller (Figure 7-11) must clear the flywheel in the forward run and rewind modes. The roller must rest on the flywheel in the "off" mode. Adjustment is accomplished by moving the brake cable (Figure 7-1) to a larger or smaller diameter groove in the sheave (Figure 7-14).

The brake roller should clear the flywheel when the load lever is in the load position. The brake release arm (Figure 7-12E) is adjustable to provide that clearance.

18. REWIND GEAR DISENGAGEMENT.

The rewind idler gear (Figure 5-14E) must move away from the rewind gear (Figure 5-19) when the control is moved from rewind to off.

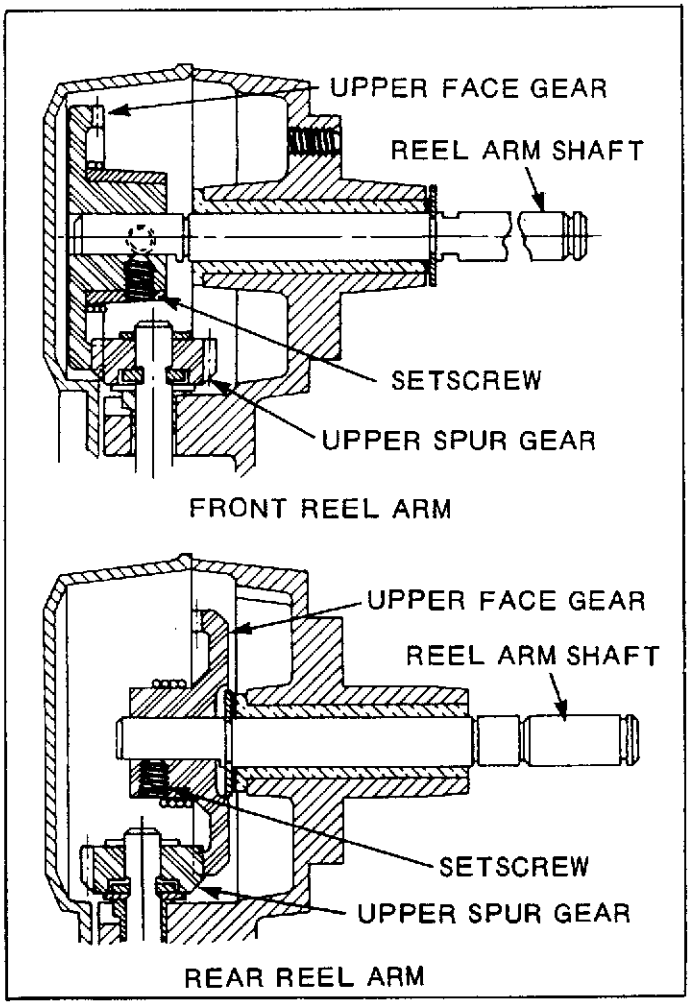


Figure G. Adjusting Reel Arms

a. Model 2575 only. Bend the pull rod (Figure 5-2) as required to provide .030-.060 inch between the rewind and idler gears when rewind is stopped by moving the load lever. Excessive clearance will result in gear chatter between the forward idler gears (Figure 5-14C and 6-21).

b. Model 1575 and 2580 only. Moving the rear reel arm to the rewind position shall allow the rewind gear idlers (Figure 4-22C) to engage the rewind clutch gear (Figure 4-17) and the rewind gear (Figure 4-4). Returning the reel arm to the horizontal position shall allow the rewind lever (Figure 4-22D) to stop against the adjustment bracket (Figure 9-4). Adjust the rewind cable disc (Figure 6-10) CW or CCW as required to accomplish these movements.

19. ADJUSTING THE REEL ARM GEARS. (Figure G)

Only the upper face gears of the reel arms are shown in Figure G; however, the lower face gears are adjusted in a similar manner. With the reel arm cover removed, check the backlash between the face gear and its mating spur gear through a full 360-degrees rotation of the gears. Gear backlash should be a minimum of 0.005-inch (0.127mm) and a maximum of 0.018-inch (0.460mm). To adjust the backlash of either face gear in the front reel arm and the upper face gear only in the rear reel arm, loosen the set screws in the face gear hubs and shift the gears as necessary. To adjust the lower face gear in the rear reel arm, loosen the set screw (Fig. 17-12) in the reel arm casting and move the lower gear shaft back and forth.

20. ADJUSTING THE REWIND CLUTCH.

The rewind clutch must be adjusted to produce a supply spindle torque for the rewind mode of operation. Install an empty reel (Figure A-7) on the supply spindle and wrap several turns of a short film strip around the reel hub. Hook a spring scale to the free end of the film strip and run the projector in rewind. At the point when the rewind clutch begins to slip the spring scale must register as follows:

Models 1575 & 2580 ..... 28 to 44 ounces.
Model 2575 ..... 72 to 84 ounces.

A special wrench (Figure A-6) must be used for adjusting the rewind clutch. Tighten or loosen the hex nut on the clutch hub as required.

21. ADJUSTING THE SOUND SYSTEM.

a. Photocell and Sound Drum Alignment.

(1) Loosen the photocell set screw (Figure 11-25) clamping screw (Figure 11-23) and the two sound drum mounting screws (Figure 11-28). Remove the exciter lamp and the optical slit.

(2) Insert the sound drum alignment tool (Figure A-9) into the optical slit opening as shown in Figure H.

(3) Press the sound drum in until its inner face just makes contact with the first step (.104 dia.) of the alignment tool, and maintain this contact while tightening the two sound drum mounting screws securely.

(4) Move the photocell so that its T-shaped face is flush with the face of the housing. Move the locking clamp against the T-shaped face of the photocell and tighten the set screw.

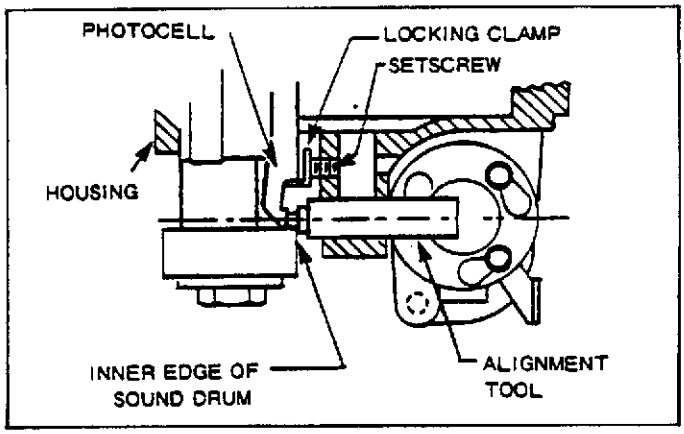


Figure H. Photocell and Sound Drum Alignment

b. Stabilizer Roller Tension Adjustment. The stabilizer roller protrudes through the vertical slot in the mechanism housing. Thread the projector with film and run with projection lamp on. Turn the adjusting screw (Figure 13-23) until the tension on the counter-balance spring is equalized and holds the roller at approximately mid-stroke. Finer adjustment will be made in the next step.

c. Optical Slit Adjustment.

(1) Insert the optical slit into its opening in the soundhead. The adjusting holes in the barrel of the slit must be at top center.

(2) Insert a 0.050-inch (1.27mm) feeler gage between the tip of the optical slit and the sound drum and press the optical slit in against the feeler gage. Hold in this position while tightening the clamping screw just enough to hold the slit in place.

(3) Thread the projector with 7000Hz optical setting film TFL-2575-NX2 (film emulsion toward slit lens) and connect an 8-ohm, 50-watt load resistor and voltmeter to the speaker jack.

NOTE: A pair of hairpin tongs approximately 6 inches long and formed with the ends turned inward and tapered to engage the holes in the end of the optical slit barrel are very useful in adjusting the optical slit. They can be made from 20 to 26 gage music wire or 1/16 inch diameter drill rod.

(4) Set the volume and tone controls at approximately midposition and start the projector. Move slit toward or away from film, as required, to obtain an output reading. Rotate the slit to obtain peak reading and simultaneously move in or out until maximum output is obtained. Tighten slit clamping screw securely to lock the adjustment. Fine tune the stabilizer roller adjustment for minimum flutter.

d. Buzz Track Adjustment. The lateral position of the film at the "soundhead" location is controlled by the impedance roller and adjusted by an adjustment nut located on the impedance roller pivot stud. Turn the adjustment nut in or out for precise lateral distance of the impedance roller to the surface of the mechanism.

(1) Connect a voltmeter with 8-ohm load to the speaker jack output, and thread the projector with buzz track test film TFL-D1580-NX3.

(2) Run the projector with the projection lamp on and adjust for minimum output on the voltmeter. Disconnect the voltmeter and adjust the volume control to a suitable listening level. Then check centering by listening to audio.

(3) Reconnect the voltmeter and adjust the lateral position of impedance roller in or out until the minimum voltage output reading is obtained.

22. PROJECTOR SPEED CHECKS.

Speed of the projector is not adjustable. Therefore, speed checks are primarily for the purpose of determining that the equipment is operating properly and as a means of detecting excessive mechanism loads, damaged drive belt or similar conditions.

Speeds at Nominal Voltage:

Sound Speed	24FPS +/-2%
Shutter	1440RPM +/-2%
Sprocket	102.86RPM +/-2%

23. SWITCH ADJUSTMENTS.

a. Motor Interlock Switch. Model 1575 & 2580 only. Loosen the switch mounting screws (Figure 13-24) just enough to permit the switch to be shifted. Move the load lever counterclockwise from its horizontal position so that the selector latch tab (Figure 12-26) is positioned at the halfway point on the radius of the mode selector arm (Figure 12-35). While holding a .020-inch feeler gage between the switch button and the actuator of the bracket (Figure 12-25), adjust the switch until the switch body is just making contact with the feeler gage. Retighten the switch mounting screws.

b. On-Off Switch. Model 2575 only. Loosen the screw (Figure 7-15) just enough to permit the switch actuator (Figure 7-16) to be moved. Rotate the load lever clockwise to its horizontal position. Move the switch actuator against the switch button leaving approximately .010-inch clearance between the switch actuator and the switch body. Retighten the screw. Check the switch function in the rewind mode. Reposition the switch actuator as required.

c. Mode Sensing Switch Adjustment. The mode sensing switch (Figure 3-26, S3 in electrical schematics) must "make" or "brake" only when switch S2 is open. Attach one lead from a continuity meter to the center terminal of S3 and the other lead to the upper terminal. Move the load lever to its extreme CW and CCW positions where switch S2 is closed. As the load lever is being moved observe the continuity meter and listen for the "click" of the switch S2. Repeat this procedure with the meter connected to the lower terminal. Switch S3 can be adjusted by loosening the two screws (Figure 3-25) and moving the switch up or down as required.

24. CHECKING THE THREADING SYSTEM.

a. Open the lamphouse door. Open and close the threading system several times and note the response of the load lever. The movement of the load lever must be smooth, and there must be no evidence of binding or jamming. When the load lever is in the load position note the position of the lens carrier. The front of the lens carrier should be in line with the front face of the cast lug for the lower lens carrier guide pin.

b. When the load lever is lightly pressed downward from its horizontal position and released, the load lever should

return smoothly to its original position. While depressing the load lever, a definite spring tension should be felt before any parts begin to move to open the system for threading. Close the lamphouse door, place a reel of film on the front reel arm and thread the film into the projector. Observe the film threading operation to determine the kind of problem that exists and in what threading area the trouble is located.

25. UPPER SPROCKET AREA ADJUSTMENT.

The upper sprocket guard plate should be adjusted so that it cannot be lifted enough to allow the film to be removed or to permit the film to escape from the sprocket. Adjustment is as follows:

Loosen the screw (Fig. 12-24) just enough so that the mode selector latch can be moved up and down. Move the mode selector latch down toward the mode selector bushing until the load lever is tight and there is no movement in the loopformer. However, this should not be so tight as to cause the load lever to bind. The load lever must move smoothly. While holding all parts securely, retighten the screw.

26. LOWER SPROCKET AREA ADJUSTMENT.

a. Loosen the screw (Figure 21-18) and open and close the system with the load lever.

b. Close the system. With the adjustment tool (Figure A-10) move the sprocket guard up against the lower sprocket and retighten the screw. This will balance the system so that the upper and lower sprocket guards will apply equal pressure on the sprockets.

27. IMPEDANCE ROLLER ADJUSTMENT.

The impedance roller (Fig. 11-21) must be moved out of the film path for the threading mode. With the system closed for forward projection, the roller must be resting on the sound drum. With the system open for loading and rewind, the roller must be lifted upward so that its flange is hidden behind the wall of the lens carrier cover (Fig. 1-9) without causing that cover to move.

Adjust the movement of the roller by loosening the two adjustment plate retaining screws (Fig. 12-1) and positioning the plate as required.

CAUTION: When retightening the screws be careful not to over torque them as this may strip the threads.

TROUBLESHOOTING

28. MISCELLANEOUS TROUBLES AND REMEDIES.

Trouble	Probable Cause	Remedy
Nothing runs	1. Defective switch.	1. Determine which switch is defective and replace.
	2. Damaged line cord.	2. Repair or replace line cord.
	3. Loose connections.	3. Repair connections.
	4. Load lever latch not activating switch.	4. Adjust switch (para. 23).
	5. Blown thermal fuse.	5. Replace drive motor and check for proper operation.
Motor hums but does not run	1. Starting circuit open or shorted.	1. Replace loose or transposed connections.
	2. Defective capacitor or drive motor.	2. Replace defective capacitor or drive motor.
	3. Foreign object(s) in mechanism.	3. Locate and remove.
Motor runs but mechanism does not run	1. Drive belt broken or unhooked from pulley.	1. Reinstall or replace drive belt (para. 8).
	2. Motor or mechanism pulley loose on shaft.	2. Reposition pulley. Tighten setscrews.
Rewind does not operate/stalls.	1. Front reel arm shaft binding in its bearing. (Model 2575)	1. Adjust Link & Bearings Assembly (para. 10b).
	2. Rewind clutch slipping.	2. Adjust (para. 20).
	3. Rewind gears not engaging.	3. Adjust (para. 18).
	4. Open mode sensing switch.	4. Adjust position (para. 23).
Rear spindle does not rotate for take-up.	1. Take-up belt worn/broke.	1. Replace belt.
	2. Take-up sleeve slipping.	2. Replace take-up sleeve (Fig. 17-11).
	3. Override clutch slipping or improperly installed.	3. Check installation. Replace Clutch & Gear Assembly (Fig. 6-2).
	4. Idler arm (Fig. 4-14C/5-14F) not functioning.	4. Clean idler arm and adjust.

28. MISCELLANEOUS TROUBLES AND REMEDIES (Continued)

Trouble	Probable Cause	Remedy
Short lamp life	1. Voltage at lamp too high.	1. Check for proper lamp code.
	2. Dirt and lint clogging blower housing.	2. Clean blower housing.
	3. Blower fan loose on drive motor shaft.	3. Tighten or replace blower fan setscrew.
	4. Contacts burned in lamp connector.	4. Replace lamp connector.
Projector speed slow.	1. Binding in mechanism.	1. Free binding condition.
	2. Drive belt slipping.	2. Clean or replace drive belt (para.8).
	3. Defective capacitor or motor.	3. Replace defective component.
Projector runs fast or slow	1. Drive belt incorrectly tracking on pulley.	1. Align and adjust pulleys
Film does not easily enter film slot when threading	1. Film catching on lower film stripper.	1. Loosen stop post (Fig. 11-19), push down stripper and tighten post.
	2. Film catching on impedance roller.	2. Adjust impedance roller (para. 27).
	3. Film catching on pressure plate and/or lower sprocket guard due to incomplete travel of lens carrier. (Model 2575)	3. a) Free binding of shifting link (Fig. 12-8). b) Lubricate lens carrier nyliner bearing. c) Replace spring (Fig. 12-32) d) Replace spring (Fig. 12-4).
	4. Flywheel locked.	4. Adjust flywheel brake (para. 17).

29. PICTURE TROUBLES AND REMEDIES.

Film jump	1. Damaged film.	1. Repair or replace.
	2. Loose shuttle arms.	2. Adjust and tighten (para. 16, step c).
	3. Dirty film aperture.	3. Clean film aperture.
	4. Damaged or lost pressure plate spring.	4. Replace spring.
	5. Pressure plate misaligned.	5. Realign pressure plate.
	6. Incorrect shuttle stroke.	6. Adjust (para. 16, step d).
	7. Short lower loop.	7. a) Reset loop with loop restorer. b) Check/repair retention pawl. c) Replace spring (Fig. 11-16).
	8. Lost loop in entire system.	8. Open and close load lever.

29. PICTURE TROUBLES AND REMEDIES. (Continued)

Trouble	Probable Cause	Remedy
Double image	1. Incorrect shuttle stroke. 2. Excessive shuttle protrusion.	1. Adjust (para. 16, step d). 2. Adjust (para. 16, step b).
Weave (due to faulty aperture plate)	1. Side tension spring missing. 2. Sticking edge guide. 3. Fixed edge guide out of position.	1. Replace spring (Fig. 23-6). 2. Clean edge guide. 3. Reposition edge guide.
Poor illumination	1. Optics out-of-line. 2. Projection lamp wearing out. 3. Dirt on projection lens.	1. Realign (para. 15). 2. Replace projection lamp. 3. Clean front and rear elements.
Poor focus	1. Dirty lens and/or aperture. 2. Warped film. 3. Pressure plate spring lost. 4. Bent pressure plate. 5. Pressure plate out-of-line. 6. Defective lens.	1. Clean lens and/or aperture. 2. Recondition or replace film. 3. Replace pressure plate spring. 4. Replace pressure plate. 5. Realign pressure plate. 6. Replace lens.
Frame line creeps	1. Framer eccentric loose.	1. Align and tighten (para. 16, step e).
Insufficient framing	1. Framer eccentric out-of-adjustment.	1. Adjust (para. 16, step e).
Trailer ghost	1.Shutter out-of-alignment.	1. Reassemble properly.

30. FILM TRANSPORT TROUBLES AND REMEDIES.

Trouble	Probable Cause	Remedy
Loss of loops	1. Damaged film.	1. Repair or replace film.
	2. Inadequate shuttle protrusion.	2. Adjust (para. 16, step b).
	3. Inadequate or excessive shuttle stroke.	3. Adjust (para. 16, step d).
	4. Pressure plate spring lost.	4. Replace spring.
	5. Pressure plate mounting screws loose.	5. Tighten mounting screws.
	6. Sprocket guards not closing.	6. Clean and adjust.
	7. In-out bracket spring broken.	7. Replace in-out bracket spring.
	8. Supply reel too small.	8. Use 400 foot reel with hub 2-1/2 inches in diameter (minimum).
	9. Excessive film tension.	9. Replace holdback spring (Fig. 16-11).
Excessive film slap	1. Damaged film.	1. Recondition or replace film.
	2. Green film.	2. Age or buff film.
	3. Dirty pressure plate.	3. Clean pressure plate.
	4. Pressure plate rubbing on aperture plate guide rails.	4. Realign pressure plate.
	5. Incorrect shuttle stroke.	5. Adjust (para. 16, step d).
	6. Short lower loop.	6. Check/repair retention pawl (Fig. 11-17) and spring.
Splices jam in sprocket shoes	1. Bad splices.	1. Replace splices.
	2. Emulsion build-up.	2. Clean film path components.
Shuttle runs but sprockets do not revolve	1. Worm loose on cam shaft.	1. Tighten set screws.

31. SOUND SYSTEM TROUBLES AND REMEDIES.

Projector runs, no voltage at PC board	1. Loose connection or connector.	1. Repair connection.
	2. Blown fuses on PC assembly.	2. Replace blown fuses.

31. SOUND SYSTEM TROUBLES AND REMEDIES. (Continued)

Trouble	Probable Cause	Remedy
Projector runs, voltage at PC board, but exciter lamp does not light	1. Exciter lamp cable disconnected. 2. Exciter lamp fuse open. 3. Wrong exciter lamp used. 4. Defective amplifier.	1. Connect cable. 2. Replace fuse. 3. Replace with correct lamp. 4. Repair or replace (para. 11).
Clicking noises	1. Dirt on sound drum.	1. Clean sound drum.
High frequencies fade (jumps focus)	1. Warped film. 2. Dirt on sound drum. 3. Slit lens out-of-focus or dirty.	1. Recondition or replace film. 2. Clean sound drum. 3. Clean and/or adjust.
Hum	1. Ground wiring. 2. Trouble in amplifier PC board. 3. Broken cable shield. 4. High ripple on D.C. supply.	1. Correct grounded condition. 2. Repair or replace (para. 11). 3. Repair or replace cable shield. 4. Circuit trace and correct. Could be CR3, CR4, etc.
Voltage at PC board, exciter lamp lights, but no sound	1. Speaker jack disconnected or speaker jack switch open. 2. Photocell cable disconnected. 3. Photocell out-of-line. 4. Dirt on end of photocell. 5. Defective amplifier.	1. Connect leads. Repair or replace jack. 2. Connect cable. Connect leads to proper terminals. 3. Realign (para. 21, step a). 4. Clean photocell. 5. Repair or replace (para 11).
Low volume	1. Trouble in amplifier PC board. 2. Photocell out-of-line. 3. Dirt on photocell or slit. 4. Slit misaligned. 5. Buzz track misaligned.	1. Circuit trace with schematic using test points 1, 2, 3, etc. Replace in faulty (para. 11). 2. Realign (para. 21, step a). 3. Clean photocell and slit. 4. Realign (para. 21, step c). 5. Realign (para. 21, step d).

31. SOUND SYSTEM TROUBLES AND REMEDIES. (Continued)

Trouble	Probable Cause	Remedy
Distortion at all Volume Levels	1. Trouble in amplifier PC board.	1. Circuit trace with schematic using test points 1, 2, 3, etc. Replace if faulty (para. 11).
	2. Improper film loops.	2. a) Press loop reset knob. b) Rethread film.
Crackling noises	1. Buzz track out-of-line.	1. Realign (para. 21, step d).
	2. Broken cable shield.	2. Repair shield or replace cable.
	3. Defective amplifier.	3. Circuit trace with schematic using test points 1, 2, 3, etc. Replace if faulty (para. 11).
Wow or flutter	1. Stabilizer roller sticking.	1. Clean roller and roller shaft.
	2. Stabilizer roller spring broken, unhooked or lost.	2. Repair or replace spring.
	3. Loose flywheel.	3. Replace tension washer (Fig. 7-28).
	4. Damaged sound drum bearing.	4. Replace sound drum (para. 21).
	5. Dirt causing stabilizer roller arm pivot bearing to bind.	5. Clean pivot shaft bearing.
	6. Chips or dirt in take-up sprocket gear teeth.	6. Remove and clean sprocket gear.
	7. Bent take-up reel.	7. Replace take-up reel.
	8. Dirt on sound drum or impedance roller.	8. Clean sound drum and impedance roller.
	9. External drags on flywheel such as braking roller or wire leads.	9. Repair and adjust as required.