Film-Tech

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SERVICE INSTRUCTIONS

FILMOSOUND® PROJECTORS

DESIGN 560A, 566A, 566X

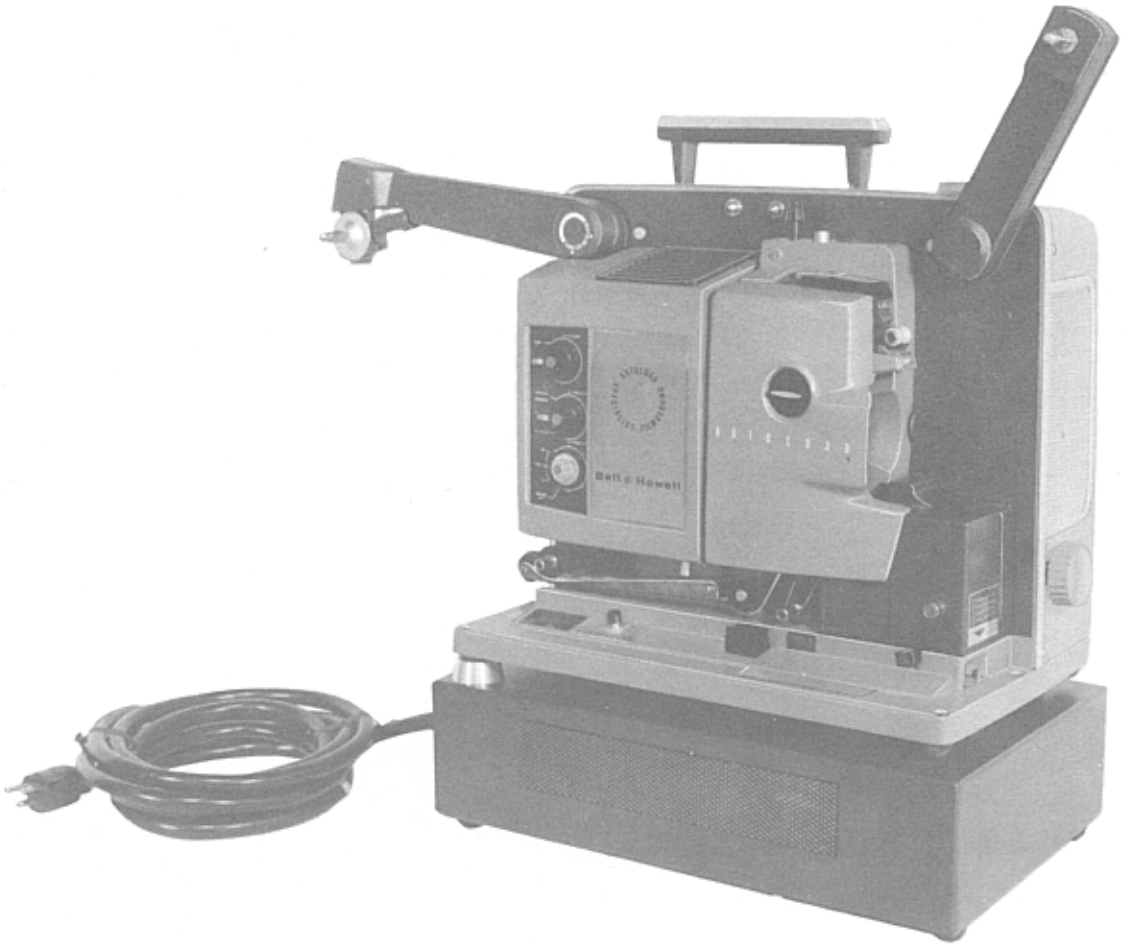
CONSUMER PRODUCTS GROUP

BELL & HOWELL

GENERAL SERVICE DEPT.
7100 McCORMICK ROAD
CHICAGO, ILLINOIS 60645

KEN LAYTON
1941½ E. State #8
Olympia, WA 98506
FILMS-ELECTRONICS-SPECIAL EFFECTS

PART NO. 70472 PRINTED IN U.S.A. REVISED DECEMBER 1969



Design 566A and 566X Automatic Threading High Intensity Arc Filmosound Projector

Design 560A (Not Shown) is a Manual Threading Projector

ADDITIONAL TECHNICAL SERVICE INFORMATION	SERVICE MANUAL NO.
014640 Lamp Power Supply for Model 567	72798-002
014660 Lamp Power Supply for Model 566	72798-002
077259 Lamp Power Supply for Model 566 or 567	74418
013310 Lamp Power Supply for Model 566A or 566T	70472-2

FACTORY SERVICE ADDRESSES

PRODUCT ONLY

CHICAGO

Bell & Howell Photo Sales Co.
General Service Department
2409 West Howard Street
Evanston, Illinois 60202
Area Code: 312-673-3300

NEW YORK

Bell & Howell Photo Sales Co.
General Service Department
200 Smith Street
E. Farmingdale, L.I., New York 11735
Area Code: 516-293-8910

GLENDALE

Bell & Howell Photo Sales Co.
General Service Department
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Glendale, California 91201
Area Code: 213-245-6631

PARTS ORDERS AND SERVICE INFORMATION

Bell & Howell Photo Sales Co.
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7100 McCormick Road
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Area Code: 312-673-3300

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FEATURE DESCRIPTION LIST

PROJECTION CONTROL	Forward, Reverse, Thread, Project
LAMP CONTROL	Off - Fan - Lamp
SPEED	Sound 24 FPS
CHANGEOVER SYSTEM	Switch activated with cables Interconnecting 2 Projectors
AUTOMATIC LOOP RESTORER	Roller, cam activated
FRAMER (TYPE)	Screw type fixed axis
DOUSER CONTROL	Automatic operated Opaque douser for changeover
PROJECTION LAMP	G.E. Marc 300 enclosed arc lamp 1500 LUMENS
EXCITER LAMP, SIZE & TYPE	BAK, 4 volt @ 75 AMP (300 WATTS)
PROJECTION LENS	2", f/1.4 Straw Coated, Super Proval
AUTOMATIC THREADING (566A, 566X)	Stainless Steel Loopformers, Self Latching
MANUAL THREADING (560A ONLY)	Plastic Guards
CORD TYPE	3 conductor with 2 blade and ground pin plug
SHUTTER	Rotating 2 Blade
OPERATING VOLTAGE (560A, 566A)	105-129 volt A.C. 60 cycles
OPERATING VOLTAGE (566X)	105-129 volt A.C. 50 cycles
MAIN DRIVE MOTOR (560A, 566A)	Heavy Duty Capacitor Start Induction Run 3450 R.P.M. 117 v. A.C. 60 cycle
MAIN DRIVE MOTOR (566X)	Heavy Duty Capacitor Start Induction Run 2850 R.P.M. 115 v. A.C. 50 cycle
VENTILATION MOTOR (560A, 566A)	Shaded Pole 117 v. A.C. 60 cycle
VENTILATION MOTOR (566X)	Shaded Pole 117 v. A.C. 50 cycle
LAMP SUPPLY UNIT	Auxiliary aluminum cased unit containing lamp power supply components, cable connected to projector.
FILM TRIMMER (566A, 566X)	Built-in Base
TILT FOOT	Rack & Pinion
SHUTTLE	Three Teeth, Stellite
CASE	Fiber Glass with Metal Trim
AMPLIFIER TYPE	A.C. Transformer Type Power Supply with Silicon Diode bridge Rectifier.
AMPLIFIER POWER OUTPUT	10 watt Continuous
AMPLIFIER CONTROLS	On-Off, Volume, Tone
SPEAKER TYPE	4" x 6" P.M., 8 Ohm
SPEAKER OUTPUT JACK	8 Ohm
EXCITER LAMP SUPPLY	RF Oscillator 120 KC
PHOTO ELECTRIC CELL	Silicon
AMPLIFIER OVERLOAD PROTECTION	Resettable Circuit Breaker
TUBE COMPLEMENT	1-12AX7; 2-6GW8; 1-2N2613; 1-6AQ5

FOR SCREEN SIZES — 6FT TO 30FT WIDE

Introduction

GENERAL.

This Service Manual has been prepared to aid in the repair and adjustment of Bell & Howell Design 560 (Manual Threading) and 566 (Automatic Threading) High Intensity Arc Filmosound Projectors. An illustrated Parts Catalog is included at the rear of the manual to identify replacement parts and to aid the serviceman during projector repairs.

All parts in Parts Catalog illustrations are indexed, as much as possible, in a suggested order of disassembly, and with attaching parts immediately preceding those parts which they attach. Where disassembly and reassembly procedures are quite obvious, no attempt has been made to elaborate on removal or installation instructions. When making specific projector repairs and replacements, the serviceman must use his own judgement in eliminating unnecessary steps of procedure.

In the Parts Catalog section, a coding system is used (Usable on Code column) to identify those parts which apply only to specific projector models. Parts applicable only to Design 566A projectors are coded "A"; parts applicable only to Design 566X projectors are coded "B"; and parts applicable only to Design 560A projectors are coded "C".

Before proceeding with repairs, refer to Trouble Shooting guide for possible causes and remedies of specific customer complaints.

MARC-300 PROJECTION LAMP.

The heart of the MARC-300 system is a tiny 300 watt quartz bodied arc lamp. The basic arc tube is permanently mounted within a precisely contoured optical glass reflector with a heat reducing dichroic coating.

The lamp supply unit specifically designed to use with the MARC-300 lamps, is a high efficiency supply unit that draws approximately 400 watts from the line. Although this wattage is considerably less than the 1000 to 1200 watts sometimes used in 16 mm projection, the high efficiency of the MARC-300 lamp gives brightness on the screen as much as four times as great. Since the arc tube is made of quartz, it should not be touched with bare hands. The normal secretions of the skin are capable of leaving residue on the clear outer quartz surface. This residue can, when heated. cause a cloudy light obscuring phenomenon that reduces useful lamp light and life. The use of clean tissue or cellophane is recommended.

One slight inconvenience, common to the MARC-300 at this time is the need for a short warm up period. Approximately 45 seconds after lamp starting, the light output of the lamp will reach a brilliant white color suitable for viewing. The only other main inconvenience can result from interruption of line current during film showing. Such an inconvenience will cause the lamp to go out and the projector to stop running. In this case, after restoration of normal power, a period of approximately 30 seconds is required before the unit will restart.

NOTICE

1. This lamp is a high intensity arc type intended for use in equipment which incorporates a special electrical supply unit and will not operate from ordinary outlets.
2. Be sure power is off when replacing lamp. Insert lamp plug into receptacle gently but fully. Follow instructions of the equipment manufacturer for proper installation.
3. For best results, neither the quartz arc tube nor the reflector coating should be handled. Finger prints or other contamination may upset the normal lamp operating cycle, causing shortened life or premature reduction in light output.
4. This lamp should not be operated for periods of less than three minutes. Short duration operating cycles will reduce life and degrade performance.

POWER SUPPLY SERIAL NUMBERS.

A nameplate is used on the power supply. Serial numbers that determine production lots are arranged in the following manner:

Serial numbers consist of two letters and three digits. The first letter indicates the month, and the second letter indicates the year. The three digits are the identification of the units built that month.

The year 1966 is designated as year "B". Months are designated starting with "A" for January, but eliminating the letter "I". The year 1966 bears serial numbers as follows:

January 1966	AB 001 to AB 999
February 1966	BB 001 to BB 999
March 1966	CB 001 to CB 999
April 1966	DB 001 to DB 999
May 1966	EB 001 to EB 999
June 1966	FB 001 to FB 999
July 1966	GB 001 to GB 999
August 1966	HB 001 to HB 999
September 1966	JB 001 to JB 999
October 1966	KB 001 to KB 999
November 1966	LB 001 to LB 999
December 1966	MB 001 to MB 999

For 1967 the serial numbers begin with AC 001 where C indicates the year 1967. For 1968 the serial numbers will begin with AD 001 where D indicates the year 1968.

MAINTENANCE PRECAUTIONS.

In addition to the tools normally available in most repair shops, complete projector repair will require the use of the special tools illustrated in Figure A and the Bristol setscrew wrenches listed in the following chart. In addition, wrench G165F-3 is required to tighten the setscrew in the wrench handles.

Setscrew Size	No. of Flutes	B&H Part No.	
		Handle	Wrench
No. 4-40NC	6	G1271-F1	G1271-X2
No. 6-32	6	STK3852-B	STK3863-B
No. 8-32	6	G165-F1	G165-F1

CAUTION: In the current design of all projector models, castings are drilled (but not tapped) to accept swage screws (all with part numbers in the 30800 series). If the swage screw is the same size as the corresponding machine screw used in earlier model castings (with tapped screw holes), the swage screw only is listed in the parts lists and can be used in both early and current model projectors. However, machine screws cannot be used in current model (untapped) castings. Therefore, if any early model casting must be replaced with a current model casting, all machine screws used with that casting must be replaced with the new swage-type screws. Where the thread size of the swage screw differs from that of the corresponding machine screws used in earlier models, refer to the parts lists for the listing of both screws.

SPECIAL SERVICE TOOLS (FIGURE A)

INDEX NO.	TOOL NO.	NOMENCLATURE	TOOL APPLICATION
1	SER-566-1-N1	Lamp Bracket Setting Gage	Alignment of optical system and lamp bracket (see Figure J)
2	SER-550-2-N1	Lens Plug	
3	SER-550-2-N2	Alignment Rod	
4	SER-550-2-N3	Aperture Plug	
5	SER-550-5-N2	Stroke Gage	Measure shuttle stroke
6	SER-09701-35-N2	Shuttle Height Gage	Check shuttle protrusion
7	SER-552-2-N1	Restorer Positioning Tool	Adjusting the loop restorer
8	SER-552-4-N1	Shuttle Tension Gage	Shuttle tension (see Figure M)
9	SER-552-4-N2	Weight for Item 8	Shuttle tension (see Figure M)
10	SER-552-1-N1	Timing and Alignment Plate	Timing the sprockets
11	SER-552-5-N1	Soundhead Locating Gage	Positioning the soundhead
12	SER-550-8-N1	Alignment Tool	Sound drum and photocell alignment (see Figure Q)
	SER-550-5-N1	Shuttle Stroke Target	Measurement of shuttle stroke (see Figure N)

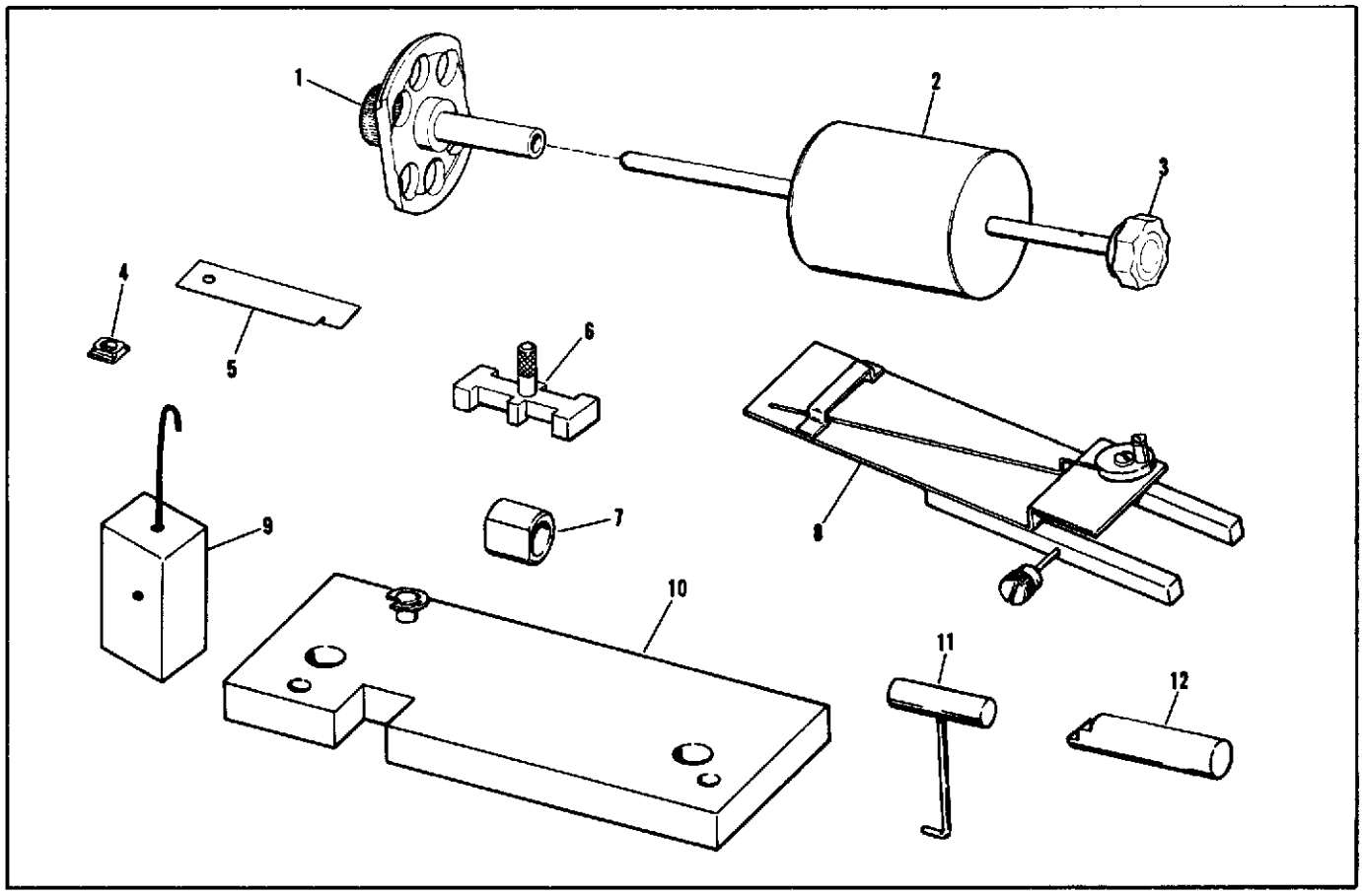


Figure A. Special Service Tools

TEST EQUIPMENT REQUIRED (NOT ILLUSTRATED)

APPLICATION	EQUIPMENT
1. To check speed over allowable voltage range.	1. Strobatac or equivalent. 2. 400 feet of film 3. 105-129 VAC voltage source 4. Variac with meter 5. AC Ammeter 0-20 Ampere
2. To check amplifier operation	1. External speaker 2. Film - Test 3. Oscilloscope

Cleaning and Lubrication

1. CLEANING.

All film path areas must be kept free from emulsion build-up, or film jamming will take place during the automatic threading operation. Use Toluol, and/or an orange stick to remove emulsion from film path areas, being careful not to scratch the surfaces. Pay particular attention to the soundhead cover around the soundhead.

Do not use Trichlorethylene solvents to clean plastic parts. Use a naphtha base cleaning fluid and be sure that grease is NOT wiped off critical areas of lubrication. Do not use solvents on these critical areas, especially in the auto-threading linkage, since lubrication is applied during assembly and it would be difficult to replace without disassembling the linkage. Use a soft lint-free cloth when necessary to remove any accumulation of dust or film chips.

During periodic maintenance of the projector, the transport mechanism should be removed and cleaned thoroughly. Brush or blow out all large particles of dirt. Wash all moving parts except "Oilite" bearings with any good petroleum solvent. Wash "Oilite" bearings and the pull-down cams with naphtha. Wash the cam oilers in naphtha, and replace if not thoroughly cleaned by washing. Discard and replace the cam wiper and cam wiper wick. As soon as parts have been washed and dried, coat with a light film of the specified lubricant.

2. LUBRICATION.

a. GENERAL. Unless otherwise specified, apply one or two drops of oil (Spec. 1705) to all shafts, sleeve bearings and sliding parts before assembly. Place felt pads in a shallow container of specified oil or grease until saturated; then allow to drain before installation.

b. LUBRICATION OF SPECIFIC PARTS. See the following table for lubrication of specific parts and lubricant to be used.

LUBRICATION CHART

PART NUMBER	LUBRICANT	PARTS TO BE LUBRICATED
	Grease, Spec. 1986	1. Face of ratchet and drive sprocket
08963	Oil, Spec. 341	1. Bearing surfaces of reel arm shafts 2. Clutch ball retainers 3. Sprocket shafts
04978	Oil, Spec. 1543	1. Framer shaft 2. Bearing face of worm gear 3. Pin of rewind sprocket
070031	Grease, Spec. 1553	1. Slots in bearing assembly
070033	Oil, Spec. 1918	1. Non-bearing machined surfaces of all castings
070032	Oil, Spec. 1705	1. All shafts, sleeve bearings and sliding parts (unless otherwise specified)
070034	Grease, Spec. 1956	1. Tilt rack and pinions 2. Meshing gears in reel arms 3. Reel arm release mechanisms 4. Friction surface of lamp release ring 5. In-out cam and cam follower 6. Shuttle link bearings 7. G.A. Shuttle guide shoe slots 8. All nylon gears 9. Cam wiper and wick 10. Pivot posts for all film guides 11. Upper and lower sprocket bearings 12. Shuttle guide and guide bearings 13. Loop restorer and self-centering assembly

LUBRICATION CHART (CONT)

PART NUMBER	LUBRICANT	PARTS TO BE LUBRICATED
070034 (Cont)		14. Pin of take-up drive sprocket assembly 15. Threads of frame shaft 16. All diameters of cam shaft bearing holes in mechanism 17. Teeth of focus knob pinion 18. Framer shaft assembly - threads and pilot dia of shortest groove 19. Between wiper and up and down cam 20. Loop restoring cam 21. Retracting lever on pressure plate of lens carrier 22. Teeth of crown gears 23. Reel arm lock plunger 24. Belt shaft stop bracket and rod

Trouble Shooting

3. MISCELLANEOUS TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
Nothing runs	1. Protective interlock switch not operating.	1. Use correct screw in lower left rear corner of case. Replace switch.
	2. Damaged power cable from line to lamp power supply.	2. Repair or replace cable.
	3. Loose connections.	3. Repair.
	4. Damaged power cable from lamp power supply to projector.	4. Repair or replace cable.
	5. Power supply fuse blown.	5. Replace fuse.
	6. Changeover and latching interlock switches out of adjustment.	6. Readjust switches, see (paragraph 57).
Motor hums but does not run	1. Starting circuit open or shorted.	1. Repair loose or transposed connections.
	2. Faulty starting capacitor or starting relay.	2. Replace starting capacitor or starting relay.
Motor runs but mechanism does not run	1. Drive belt off of pulley.	1. Reinstall belt.
	2. Motor or driven pulley loose on shaft.	2. Position pulley and tighten setscrews.
	3. Damaged belt.	3. Replace belt.
Rewind does not operate	1. Rewind clutch not engaging.	1. Adjust (paragraph 58).
	2. Rewind clutch slipping.	2. Adjust (paragraph 58).
Feed spindle does not revolve in reverse	1. Dirt in feed spindle clutch.	1. Clean.
Gate will not lock	1. Latch spring set too close to lens mount stop.	1. Adjust latch spring.
	2. Pressure shoe out of line.	2. Realign pressure shoe.
Take-up does not operate	1. Belt (15, Figure 3) slipping or badly worn.	1. Clean pulley (4) and sleeve (30), Figure 10; replace belt.
	2. Teeth on sprocket (20, Figure 3) worn, so that clutch slips.	2. Replace sprocket.
	3. Gears in reel arm not aligned.	3. Adjust per paragraph 58b.

3. MISCELLANEOUS TROUBLES AND REMEDIES (CONT)

TROUBLE	PROBABLE CAUSE	REMEDY
Projector lamp does not light - projector runs	1. Recycle attempted too soon.	1. Wait one full minute before attempting restart.
	2. Suspected lamp failure.	2. Observe the following procedure: a. Try a second lamp to isolate trouble to lamp or supply. b. If second lamp does not light, remove wall outlet power cord and check power supply fuses. c. Any lamp supply unit fuse failure which cannot be obviously accounted for should put the lamp supply unit in question. POWER SUPPLY SHOULD BE RETURNED TO FACTORY.
Speed is slow	1. Binding in mechanism.	1. Free binding condition.
	2. Slipping belt.	2. Clean or replace.
	3. Pulleys out of line.	3. Realign.
	4. Power line frequency other than 60 cycles. (560A) (566A)	4. Use proper voltage and frequency.
System locks when actuator is depressed 566A & 566X only	1. Linkage screws at rear of mechanism loose.	1. Reset linkage and tighten screws (see Adjustments). Paragraph 55
	2. Eccentric pivot (11, Figure 15) improperly aligned.	2. Readjust pivot (paragraph 63).
	3. Wear between locking lever (12) and film guide (23), Figure 15.	3. Replace worn parts.
Change-over does not operate	1. Change-over cable not connected.	1. Connect cable plugs.
	2. Broken cable leads.	2. Repair leads or replace cable.
	3. Loose plugs.	3. Tighten plugs.

4. PICTURE TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
Film jump	1. Damaged film.	1. Replace or repair.
	2. Loose shuttle.	2. Adjust and tighten (paragraph 54c).
	3. Dirty gate.	3. Clean gate.
	4. Damaged or lost pressure shoe spring.	4. Replace spring.
	5. Pressure shoe misaligned.	5. Realign.
	6. Incorrect shuttle stroke.	6. Adjust (paragraph 54d).
Double image	1. Incorrect shuttle stroke.	1. Adjust (paragraph 54d).
	2. Excessive shuttle protrusion.	2. Adjust (paragraph 54b).
Weave	1. Sticking edge guide.	1. Clean guide.
	2. Side tension spring lost.	2. Replace spring.
	3. Fixed edge guide out of position.	3. Reposition.
Poor illumination	1. Arc tube or reflector contaminated. (LAMP AT END OF USEFUL LIFE)	1. Replace lamp (Do not touch lamps, reflector or arc tube with bare hands).
Poor focus	1. Dirty lens or aperture.	1. Clean lens or aperture.
	2. Warped film.	2. Recondition or replace.
	3. Projector lens mount out of line.	3. Realign (paragraph 55).
	4. Pressure shoe spring lost.	4. Replace spring.
	5. Bent pressure shoe.	5. Replace shoe.
	6. Pressure shoe out of line.	6. Realign.
Frame line creeps	1. Framer eccentric loose.	1. Align and tighten (paragraph 54e).
Insufficient framing	1. Framer eccentric out of adjustment.	1. Adjust (paragraph 54e).
Trailer ghost	1. Shutter out of time.	1. Reassemble properly.

5. FILM TRANSPORT TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
Loss of loops	1. Damaged film.	1. Repair or replace.
	2. Inadequate shuttle protrusion.	2. Adjust (paragraph 54b).
	3. Inadequate or excessive shuttle stroke.	3. Adjust (paragraph 54d).
	4. Pressure shoe spring lost.	4. Replace spring.
	5. Pressure shoe mounting plate screws loose.	5. Tighten screws.
	6. Sprocket shoe locks not closing.	6. Clean or adjust.
	7. Sprocket drive gear loose on shaft.	7. Retime and tighten.
	8. In-out bracket spring broken.	8. Replace spring.
Lower loop not restored	1. Loop restorer stroke too short.	1. Adjust (paragraph 64).
	2. Loop restorer does not engage restorer cam.	2. Adjust (paragraph 64).
Film rubs on loop restorer roller	1. Restorer arm out of position.	1. Reposition (paragraph 64).
Excessive film slap	1. Damaged film.	1. Recondition or replace.
	2. Green film.	2. Age or buff.
	3. Dirty gate.	3. Clean gate.
	4. Pressure shoe rubbing on edge guides.	4. Realign.
	5. Incorrect shuttle stroke.	5. Adjust (paragraph 54d).
Splices jam in sprocket shoes	1. Bad splices.	1. Replace.
	2. Emulsion build-up.	2. Clean (paragraph 1).

6. SOUND SYSTEM TROUBLES AND REMEDIES.

TROUBLE	PROBABLE CAUSE	REMEDY
Projector runs, tubes do not light	1. Loose connection.	1. Repair connection.
	2. Tube burned out.	2. Replace tube.
	3. Amplifier switch damaged.	3. Replace switch.
	4. Heater series resistor open.	4. Replace resistor.
Tubes light, exciter does not light	1. Exciter lamp cable disconnected.	1. Connect cable.
	2. Wrong exciter lamp used.	2. Replace with correct lamp.
	3. Damaged oscillator tube.	3. Replace tube.
	4. Projector switch open or leads disconnected.	4. Replace switch or connect leads.
Tubes and exciter light, but no sound	1. Speaker jack disconnected.	1. Connect leads.
	2. Speaker jack switch open.	2. Repair or replace jack.
	3. Photocell cable disconnected.	3. Connect cable.
	4. Photocell cable leads reversed.	4. Connect to proper terminals.
	5. Damaged tubes.	5. Replace tubes.
	6. Photocell out of line.	6. Realign (paragraph 59b).
	7. Dirt on end of photocell.	7. Remove dirt.
	8. Wrong exciter lamp used.	8. Replace with correct lamp.
Low volume	1. Damaged tubes.	1. Replace tubes.
	2. Wrong exciter lamp used.	2. Replace with correct lamp.
	3. Photocell out of line.	3. Realign (paragraph 59b).
	4. Dirt on photocell or slit.	4. Remove dirt.
	5. Slit misaligned.	5. Realign (paragraph 59d).
	6. Buzz track misaligned.	6. Realign (paragraph 59e).
Distortion at all volume levels	1. Wrong exciter lamp used.	1. Replace with correct lamp.
	2. Inverter or output tubes damaged.	2. Replace tubes.
	3. Open element in one output tube.	3. Replace tube.
Crackling noises	1. Damaged tubes.	1. Replace tubes.
	2. Broken ground lead to mechanism or blower housing.	2. Repair lead.
	3. Grounding springs loose, bent or lost.	3. Repair or replace springs.

6. SOUND SYSTEM TROUBLES AND REMEDIES. (CONT)

TROUBLE	PROBABLE CAUSE	REMEDY
Crackling noises (cont)	4. Buzz track out of line.	4. Realign (paragraph 59e).
	5. Broken cable shield.	5. Repair shield.
Wow or flutter	1. Stabilizer guide roller sticking.	1. Clean roller.
	2. Stabilizer guide roller spring broken, unhooked or lost.	2. Repair or replace spring.
	3. Film edge guide (soundhead) out of line.	3. Realign (paragraph 59e).
	4. Loose flywheel.	4. Tighten flywheel.
	5. Damaged sound drum bearing.	5. Replace bearing.
	6. Dirt causing guide roller arm pivot bearing to bind.	6. Clean and polish.
	7. Photocell or exciter cable rubbing against flywheel.	7. Reposition.
	8. Chip or dirt in take-up sprocket gear teeth.	8. Remove chip or dirt.
	9. Loop restorer stroke is too short or restorer set too low.	9. Adjust (paragraph 64).
Clicking noise	1. Dirt on sound drum.	1. Clean sound drum.
	2. Broken ground lead to mechanism or blower housing.	2. Repair lead.
	3. Sound drum grounding spring loose, bent or lost.	3. Repair or replace spring.
High frequencies fade (jumps focus)	1. Warped film.	1. Recondition or replace.
	2. Film edge guide (soundhead) out of line.	2. Realign (paragraph 59c).
	3. Dirt on sound drum.	3. Clean sound drum.
Hum	1. Tube shield lost.	1. Replace tube shield.
	2. Screws holding amplifier base shield to PC board loose or lost.	2. Tighten or replace screws.
	3. Frame by-pass condenser open or disconnected.	3. Replace or repair condenser.
	4. Amplifier not at same potential as test equipment (TEST CONDITION).	4. Operate amplifier from isolation transformer.
	5. Grounded wiring.	5. Correct grounded condition.

7. TROUBLE SHOOTING THE AUTOLOAD SYSTEM (566A & 566X only).

a. GENERAL. Any obstruction in the film path, such as caked emulsion, film chips or splicing tape, can be expected to interfere with proper threading. Time will be saved by cleaning the threading path and, at the same time, making a visual inspection of all shoes and guides before attempting to localize the trouble. Do not use metal tools to remove material adhering to the guides or rollers. Use an orange stick, plastic rod or toothpick whenever scraping is necessary. Pipe cleaners dampened with tuoluol, naphtha or isopropyl-alcohol are very convenient for cleaning in restricted areas. Do not use trichlorethylene or carbon tetrachloride as cleaning solvents as they might damage or stain plastic parts. Do not use excessive amounts of solvents, or lubricants will be removed from linkage pivots, slides, etc., and will have to be replenished.

b. TEST FILM. The autoload system has been designed to function properly with all films which can be described as being in projectable condition (see Operators Instructions for limits of shrinkage, curl, etc.). Generally, any film which functions properly in other Bell & Howell projectors (such as Designs 399, 540 and 542) can be used for testing the autoload system. Any film which does not thread properly should be inspected. The end of the leader must be properly trimmed and free from sharp bends. All sprocket holes in the first 18-inches of leader must be in good condition. Splices must be properly registered and in good condition. Sprocket holes restricted by cement or splicing tape must be cleared or the splice remade. The repairman is cautioned that it would be a waste of time to adjust or attempt to adjust the autoload system to auto-thread a film which is in such poor condition as to be incapable of being the source of an uninterrupted film presentation of acceptable quality.

c. AUTOLOAD TROUBLE SHOOTING CHART.

TROUBLE	PROBABLE CAUSE	REMEDY
Film cannot be inserted into feed sprocket	1. Obstruction in film channel of sprocket guard.	1. Remove obstruction.
	2. Guide finger on channel (3, Figure 18) bent or binding.	2. Straighten or replace arm.
	3. Excessive pressure on leaf spring (30, Figure 15).	3. Adjust leaf spring (paragraph 63j).
Film will not pull between feed sprocket and sprocket shoe	1. Entrance guide (11, Figure S) mis-aligned.	1. Realign per paragraph 63h.
	2. Feed sprocket shoe sticking.	2. Clean sprocket shoe pivot.
	3. Feed sprocket shoe spring (31, Figure 14) broken.	3. Replace spring.
	4. Caked emulsion or burr on sprocket shoe film rails.	4. Clean; remove burr with crocus cloth.
Film comes out the side of top sprocket	1. Obstruction in sprocket shoe.	1. Remove obstruction.
	2. Damaged sprocket shoe.	2. Replace sprocket shoe.
	3. Sprocket shoe and sprocket mis-aligned laterally.	3. Realign.
Film strikes top of aperture plate and begins to pile up	1. Upper loop former (8, Figure T) bent or out of adjustment.	1. Straighten or replace if bent; or readjust per paragraph 63e.
	2. Lower loop former (4, Figure T) set too close to aperture plate.	2. Readjust per paragraph 63e.

7. TROUBLE SHOOTING THE AUTOLOAD SYSTEM. (CONT)

TROUBLE	PROBABLE CAUSE	REMEDY
Film butts into or goes under top end of aperture plate side tension rail or strikes fixed rail	1. Upper loop former (8, Figure T) bent, causing sidewise deflection of film.	1. Straighten or replace.
	2. Lower loop former (4, Figure T) bent or out of adjustment.	2. Straighten or replace if bent, or readjust per paragraph 63.
Film butts into top of film pressure plate (7, Figure 15) or passes over outside of pressure plate	1. Lower loop former (4, Figure T) out of adjustment.	1. Readjust per paragraph 63.
	2. Pressure shoe not lifting off of aperture plate when film gate is closed.	2. Bent parts need straightening (paragraph 63g) or replacing.
Film ejects between bottom of gate and top of take-up sprocket, or piles up in this area	1. Lower loop form (14, Figure 15) bent or sticking.	1. Straighten, remove bind, or replace as necessary.
	2. Lower loop form spring (15, Figure 15) broken.	2. Replace spring.
	3. Loop restorer out of adjustment or restorer roller stud bent.	3. Readjust loop restorer (paragraph 64); replaced damaged parts.
	4. Obstruction or burr in take-up sprocket upper shoe.	4. Clean; remove burr with crocus cloth.
	5. Sprockets out of time.	5. Time sprockets per paragraph 65.
Film not threading over take-up sprocket	1. Sprocket guard mounting plate (25, Figure 15) out of position.	1. Reposition per paragraph 63b.
	2. Obstruction in upper sprocket shoe.	2. Remove obstruction.
	3. Sprocket shoe spring (31, Figure 14) broken.	3. Replace spring.
	4. Take-up sprocket shaft loose in gear (33, Figure 14).	4. Retime sprockets (paragraph 65) and tighten setscrews (32, Figure 14).
Film piles up ahead of sound drum	1. Insufficient clearance between soundhead threading guides (4 and 5, Figure U).	1. Readjust all guides per paragraph 62.
	2. Backup bracket (20, Figure 15) bent downward.	2. Straighten bracket.
	3. Exciter lamp cover loose.	3. Tighten cover retaining screw.
	4. Obstruction in gap between sound drum and exciter lamp cover.	4. Remove obstruction.
	5. Not enough clearance between sound drum and cover.	5. Check clearance per paragraph 67.
	6. Edge guide adjusting screw (26, Figure 11) out too far.	6. Adjust per paragraph 59e.

7. TROUBLE SHOOTING THE AUTOLOAD SYSTEM. (CONT)

TROUBLE	PROBABLE CAUSE	REMEDY
Film ejects ahead of lower take-up sprocket shoe or piles up in this area	1. Insufficient clearance between soundhead threading guides (4 and 5, Figure U).	1. Readjust all guides per paragraph 62.
	2. Soundhead loose or improperly positioned.	2. Reposition per paragraph 66.
	3. Obstruction or burr in lower take-up sprocket shoe.	3. Remove obstruction; remove burr with crocus cloth.
	4. Film guide (7, Figure 11) improperly positioned.	4. Reposition guide.
Film sticks in or is ejected from lower take-up sprocket shoe	1. Obstruction or burr in lower take-up sprocket shoe.	1. Remove obstruction; remove burr with crocus cloth.
	2. Sprocket shoe sticking.	2. Clean sprocket shoe pivot.
	3. Broken sprocket shoe spring (31, Figure 14).	3. Replace spring.
	4. Sprocket shoe and sprocket mis-aligned laterally.	4. Realign.
	5. Film exit guide (7, Figure 15) bent or improperly positioned.	5. Reposition or straighten guide.
Film piles up ahead of idler roller (6, Figure 11) or is ejected from this area	1. Film exit guide (7, Figure 15) bent or improperly positioned.	1. Reposition or straighten guide.
	2. Idler roller sticking or roller stud loose or bent.	2. Remedy sticking condition; relocking lever (12, Figure 15).
System will not lock	1. Locking lever (12, Figure 15) binding.	1. Repair or replace lever.
	2. Release spring (18, Figure 15) disengaged or broken.	2. Engage spring with locking lever, or replace spring.
	3. Eccentric pivot (11, Figure 15) improperly adjusted.	3. Readjust pivot per paragraph 63i.
Loop restorer cycles continuously	1. Restorer out of adjustment.	1. Adjustment per paragraph 64.
	2. Shuttle retractor pin (43, Figure 17) sticking.	2. Clean and lubricate pin.
	3. Pressure plate (7, Figure 19) binding on aperture plate edge guide.	3. Realign pressure plate.
Slack film in soundhead area	1. Sprocket shoes sticking.	1. Clean sprocket shoe pivots.
	2. Take-up jerking.	2. Check take-up torque and check for binding in take-up reel arm.
	3. Jockey rollers sticking.	3. Clean and lubricate.
	4. Soundhead improperly positioned.	4. Reposition per paragraph 66.
	5. Dirt or obstruction between sound drum and exciter lamp cover.	5. Remove obstruction.

7. TROUBLE SHOOTING THE AUTOLOAD SYSTEM. (CONT)

TROUBLE	PROBABLE CAUSE	REMEDY
Film scratches	1. Caked emulsion on film path parts.	1. Clean film path.
	2. Film chips in sprocket shoes.	2. Remove film chips.
	3. Scratches or burrs on film guides, shoes, aperture or pressure plate.	3. Polish with chrocus cloth or replace.
	4. Jockey rollers sticking.	4. Clean and lubricate.
Perforations checked	1. Shuttle not retracting.	1. Adjust per paragraph 63f.
	2. Pressure plate not lifting from aperture plate.	2. Adjust per paragraph 63g.
	3. Excessive feed or take-up tension.	3. Adjust tension.
Film dimpled between perforations.	1. Sprocket shoes sticking.	1. Clean sprocket shoe pivots.
	2. Shuttle not retracting.	2. Adjust per paragraph 63g.
	3. Sprockets out of time.	3. Retime per paragraph 65.
	4. Inadequate pressure on leaf spring (30, Figure 15).	4. Adjust per paragraph 63j.
	5. End of film leader not cut clean and square.	5. Check film cutter; replace if dull or broken.
Film escape mechanism does not open to permit exit of film	1. Film exit latching is out of adjustment.	1. Readjust per paragraph 63d.
Film escape locking pawl does not seat properly; film exits constantly	1. Torsion spring (9, Figure 16) disconnected.	1. Connect torsion spring.
	2. Locking pawl (11, Figure 16) out of adjustment.	2. Readjust locking pawl per paragraph 63d.
AUTO LOAD RELEASE IS SLUGGISH	1. LUBRICATION ON GREASE HAS HARDENED	1. DISASSEMBLE AND CLEAN AND RE-LUBRICATE AUTOLOAD LINKAGE. (MAY REQUIRE REMOVING SPROCKETS)

Disassembly Procedure

8. GENERAL INSTRUCTIONS.

a. Physical differences in models are clearly shown in parts catalog illustrations and clarified in parts list "Notes." Be sure to review these differences and determine which parts are applicable to your projector.

b. When removing riveted parts for replacement, the old rivet must be drilled out with a drill equal to, or slightly smaller than, the diameter of the rivet to be installed.

c. When unsoldering is required to replace electrical parts, care must be used to avoid the application of heat to adjacent parts. Use a heat sink, if necessary, or grip the lead with a pliers to provide additional heat dissipation.

CAUTION: In the current design of all projector models, castings are drilled (but not tapped) to accept swage screws (all with part numbers in the 30800 series). If the swage screw is the same size as the corresponding machine screw used in earlier model castings (with tapped screw holes), the swage screw only is listed in the parts lists and can be used in both early and current model projectors. However, machine screws cannot be used in current model (untapped) castings. Therefore, if any early model casting must be replaced with a current model casting, all machine screws used with that casting must be replaced with the new swage-type screws. Where the thread size of the swage screw differs from that of the corresponding machine screws used in earlier models, refer to the parts lists for the listing of both screws.

9. POWER SUPPLY REPAIR (Figure 1).

CAUTION: Do not attempt to disassemble and repair the power supply unit unless proper tools and test equipment are available. Refer to Service Manual 70472A for repair instructions.

10. DISASSEMBLING FIGURE 2 PARTS.

Caution should be exercised in bending tabs on parts 1 and 2 in order to avoid crystalization and breakage.

11. DISASSEMBLING FIGURE 3 PARTS.

Remove parts, as necessary, in their indexed order of disassembly. When disassembling the reel arms from the projector, make a mental note of the manner in which the clutch and sprocket parts (16 through 27) are assembled so that they can be reassembled in the same way. When replacing clutch systems on front reel arms, note that the earlier Torrington clutch system will be available only until present stock is depleted. To modify reel arms, install the latest rewind sprocket P/N 012661 and take-up reverse sprocket P/N 012662 as a matched set.

12. DISASSEMBLING FIGURE 4 PARTS.

When removing the changeover switch (20) and lamp connector (34) note the manner in which the leadwires are connected.

CAUTION

When removing lamp (28) make sure that quartz arc and reflecting surface are not touched. Wrap carefully in Tissue or lint-free cloth for protection.

13. DISASSEMBLY FIGURE 5 PARTS.

Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Make a note of leadwire connections before disconnecting or unsoldering leads. Note also the manner in which the flat belt (32) threads around the motor pulley (34).

b. Handle the speaker (4) carefully so as not to damage the cone. If damaged, place on a shelf for possible repair.

c. The starting capacitor (9) can be replaced by disconnecting the spade lugs from its terminals; then loosening the screw (6) and sliding the capacitor from its clamp (8).

d. If the motor relay (12) is to be replaced, check the inset in Figure 5 for the style of relay to be used and the manner in which leadwires are connected to relay terminals. The relay is secured to the bracket (14) with two screws (10) and hex nuts (11).

e. The reel arm lock plungers (27) and their springs (26) are retained by the brackets (25). If the plungers are sticking or operating stiffly, remove them and check for burrs, caked lubricant or dirt, broken spring coils, etc. Remove burrs with crocus cloth, clean, re-lubricate and reinstall.

f. The drive motor (30) can be removed by loosening the screws in the bracket straps (28) and unhooking the straps from the motor mounting brackets (36). It should be noted that the motor discharge spring (29) is used only with earlier motors. Current motors are

equipped with a grounding device which automatically grounds the motor to the main plate when the motor bracket strap is tightened.

g. The amplifier power supply (38) can be replaced by removing screws (37). Note how the wiring harness is routed and fastened.

14. DISASSEMBLING FIGURE 6 PARTS.

Remove parts, as necessary, in their indexed order of disassembly, noting the following special procedures.

a. Remove screws (1) and (2) and lift the assembled clevis bracket (19) and receptacle mounting bracket (3) from the projector. Note the manner in which leadwires are attached and disconnect leads only where necessary to replace a damaged part. Receptacles (7) and (8) are secured to the bracket rivets (6).

b. One end of the clevis rod (9) is attached to the movable arm of the bracket and the other end to the arm of the douser assembly (item 8, Figure 17). Be careful not to bend either arm when removing the rod.

c. Remove screws (10) and washers (11) to release the solenoid (12). Note how solenoid spring (13) is hooked to the solenoid slug and the clevis bracket. Remove screws (14), lockwasher (15) and nut (16) to free the miniature switches (17).

15. DISASSEMBLING FIGURE 7 PARTS.

Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

NOTE: Be sure to check the Usable on Code column in the parts listing for proper application of parts. The Model 560 projector is not equipped with the shield assembly (1) or the film guide (16).

a. Remove the stud (15) at the front end of the film guide (16) thus freeing the spacer (17) located behind the film guide. Remove the idler roller screw (14) and disassemble the film guide and the idler roller (18) from the end of the snubber mounting post (27).

NOTE: Current idler rollers (18 and 21, P/N 41330) are not interchangeable with earlier rollers (P/N 39523) and can be used only with the current snubber roller shaft assembly (23, P/N 012329 on 566 models and 012330 on 560 models). If the snubber roller shaft assembly must be replaced, the current shaft assembly will be furnished, together with two of the current idler rollers.

b. Remove the snubber handle (19) and disassemble the idler roller (21) from the snubber shaft assembly (23). Remove the retaining ring (22) and disassemble the snubber shaft assembly (23), snubber spring (24), spring retainer (25), and spring cover (26) from the snubber mounting post (27).

c. If the flywheel (7) must be removed, insert a 1/16-inch punch carefully through the hole in the sound drum shaft housing and into the hole in the sound drum shaft (rotate the shaft until the punch drops into hole). Hold the punch and shaft stationary while loosening the flywheel nut (5). When withdrawing the flywheel, note if there are spacing washers located on the shaft behind the drum. These washers are used on later model projectors where the inner hub of the flywheel was enlarged to eliminate binding against the sound drum. On earlier models, flywheels have a small shoulder on the inner hub which eliminates the need for spacing washers.

d. Support the soundhead assembly (12) while removing the mounting screws (9) and (11) and washers (10), and withdraw the assembly carefully from the projector main plate.

e. The complete mechanism assembly (4) is secured to the main plate with four screws (2). Disengage the rewind timing belt and support the mechanism firmly while removing the mounting screws.

16. DISASSEMBLING FIGURE 8 PARTS.

Remove parts, as necessary, in their indexed order of disassembly, noting the manner in which lead wires are connected.

a. In all current projector models, the amplifier assembly (13) is secured to the main plate (36) with No. 6-32 swage-type screws (11) in place of the No. 5-40 machine screws used in earlier models. If the main plate and bearing assembly is replaced, be sure to order the necessary swage screws (P/N 30881) and lockwashers (P/N 17168) for remounting the amplifier.

b. The complete tilt mechanism assembly (26) can be removed by first disassembling the screw (21), lock washer (22) and tilt bar (23); then removing the two screws (25) that attach the tilt housing (26K) to the main frame. If the tilt housing has countersunk mounting holes, the attaching screws will either be slotted head Sems screws (P/N 36053) or swage-type screws (P/N 30857) used in the most current models.

17. DISASSEMBLING FRONT REEL ARM (Figure 9).

Remove Figure 9 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. To remove the spindle parts (5 through 10), drive out the spring pin (4). This pin must be replaced with a new one at reassembly. Withdraw the spindle (10) and its washer (11) from the reel arm, catching the collar (5), torsion spring (7), gear (8) and washers (9, (9A) and (9B) as they are freed.

b. Loosen the setscrews (12) and disassemble the upper gear assembly (13) and clutch spring (14) from the reel arm shaft (29). Remove the two retaining rings (15), the clutch disc assembly (16), the two brass washers (17) and the spring tension washer

(17A). The reel arm shaft (29) is now free and can be pressed from the splined bearing (30).

c. Remove the retaining ring (18) and clips (19) and disassemble the nylon spur gears (20) and (20A), the washer (21) and the drive shaft (22) from the reel arm. Inspect the nylon bearings for damage and replace, if necessary.

d. Remove the two retaining rings (24) and disassemble the friction shoe (25), the friction shoe bracket (26), the disc assembly (27), bronze washer (28) and splined bearing (30) from the reel arm. Do not press out the needle bearings (30A, 34A and 34B) unless obviously in need of replacement.

e. Some early model projectors were equipped with an eccentric spacer, or stop, located beneath the brake spring (32). This eccentric serves no purpose and can be eliminated; however, a 5-40 by 3/16 inch fillister head screw (P/N 25837) must then be used to attach the brake spring. The eccentric is not used in current model projectors, and brake spring is attached with a swage-type screw (P/N 30813). If reel arm must be replaced, current (untapped) arm will be furnished and the swage screw (P/N 30813) also must be ordered.

18. DISASSEMBLING REAR REEL ARM (Figure 10).

Remove Figure 10 parts, as necessary, in their indexed order of disassembly, noting the following precautions.

a. Disconnect and remove the take-up belt (1) and swivel the take-up arm assembly (6), catching the spring (2) as it is released. Remove the screw (3) and disassemble the take-up spindle (4) from the arm. The take-up arm need not be removed from the rear reel arm (29) unless in need of replacement. Note that in some earlier models, a split roll pin (P/N 303188) was used to mount the take-up arm in place of the dowel pin (5) currently used. In such instances, the split roll pin must be used when replacement is necessary.

b. In earlier projector models, the reel arm cover (8) was secured with two machine screws and lock washers. In current projector models, the cover is secured with two swage-type screws (7). If the reel arm cover must be replaced, be sure to order two swage screws (P/N 30879) for cover installation. When the cover is removed, note the presence of any shim washers (P/N 34874) between the reel arm and cover.

c. Remove the retaining ring (9) and clips (10) and remove the nylon gears (11) and (12) and the washer (13) from the drive shaft (22). Loosen the setscrews (24) and disassemble the gear assembly (25), the washers (26) and the reel arm shaft (27) from the reel arm.

d. Remove the retaining ring (14) and withdraw the pulley and gear assembly (15) from the rewind drive shaft (21). Inspect the nylon bearings (16) and the rubber sleeve (30) for damage or wear. The shaft (21) can be removed by loosening the setscrew (20) in the reel arm boss.

e. Withdraw the drive shaft (22) from the cast ears of the reel arm and press out the splined bearing assembly (28). Inspect the nylon bearings (23) for damage or wear. Do not press out the needle bearings (6A) or (28A) unless obviously in need of replacement.

19. DISASSEMBLING THE SOUNDHEAD (Figure 11). Remove soundhead parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Make a careful note of leadwire connections before disconnecting or unsoldering leads during disassembly.

b. The optical slit assembly (13) can be removed by loosening the clamping screw (12) and withdrawing the assembly from the housing (39).

c. Remove the retaining ring (14) and unscrew and remove the guide roller adjusting screw (15).

d. Remove the two Sems screws (21) and loosen the locking setscrew (20). Withdraw the sound drum assembly carefully, noting the manner in which the silicon cell assembly (24) and its retainer (23) are assembled into the slot in the sound drum shaft. Wrap the sound drum assembly and silicon cell assembly in tissue to protect them against damage.

e. The insets in Figure 11 illustrate the early and current style of exciter lamp retaining pins. Note that the springs are the same in both styles. However, the early style collar and pin are no longer available. If in need of replacement, order a set of current parts consisting of pin (P/N 41321) and bushing (P/N 41320). Refer to the Reassembly section for installation procedures.

f. Early style soundhead housings (with tapped screw holes) are no longer available. If the housing must be replaced, be sure to order the proper quantity of swage-type screws (items 12, 32, and 34) for reassembling parts to the new casting.

20. DISASSEMBLING LAMPHOUSE AND BLOWER AND MOTOR ASSEMBLIES (Figures 12 and 13).

No special instructions are required to disassemble the lamphouse (Figure 12) or the blower and motor assembly (Figure 13). Refer to the appropriate exploded view and disassemble as necessary for parts replacement.

a. Early style lamphouse grilles (6) with two drilled holes for mounting are no longer available. Refer to the reassembly instructions for the procedure involved in installing single-hole grilles on early style lamp housings.

b. Note that in the blower motor (Figure 13) the mounting brackets (9) are riveted to the blower motor

on 566A and 560A models. On 566X models the brackets are attached with 4 screws (7) and nuts (8).

21. DISASSEMBLING THE MECHANISM (Figure 14).

Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

NOTE: Refer to the Usable on Code column in the parts listing for mechanism assembly differences as used in the manual threading model (560A) and the autothreading models (566A and 566X). Differences in configuration are shown in insets and are clearly noted.

a. Pry out the hinge pins (1) and (2) with a wire cutter or similar tool to free the lens carrier assembly (5). Note that the spring washer (3) is used with the upper pin and the flat washer (4) with the lower pin. Refer to paragraph 26 for lens carrier disassembly procedure.

b. Remove the two retaining rings (12) and withdraw the clutch lever shaft (13). Remove three screws (11) and disassemble the outboard bearing assembly (14) and the rewind clutch lever (15) from the upper sprocket shaft. Withdraw the rewind button (16) and spring (17) from the opening in the mechanism casting.

c. Remove the rewind timing belt (18) and examine it for unusual wear or physical damage. Replace belt if necessary. Remove the retaining rings (19) and disassemble the rewind drive sprocket (20), flat washer (21), spring (22) and spline driver (23) from the upper sprocket shaft. Loosen the setscrews (24) and remove the take-up drive sprocket (25).

NOTE: The remaining instructions in paragraph 21 apply to autothread models (566A and 566X) only. Refer to paragraph 22 for removal of sprocket and guard components on Model 560A projectors.

d. The sprocket guard assembly (27) is secured with three screws (26) inserted from the rear of the mechanism casting. Refer to paragraph 26 for sprocket guard parts replacement. When removing the remaining sprocket guards (29) and (29A), note the manner in which the torsion springs (31) are assembled. Inspect all rollers (30) for nicks or deep scratches and replace if damaged.

e. Loosen the setscrews (32) and disassemble the gears (33), tension washers (34), sprocket assemblies (35) and (36), the lower sprocket flange (37) and the thrust washers (38) from the mechanism casting. Effective April, 1969, all production models were equipped with take-up drive sprocket P/N 013949 (item 25) and sprocket gear P/N 013948 (item 33). Sprocket gear 013948 is used only on the upper sprocket shaft and is interchangeable with earlier sprocket gear 012126. Take-up drive sprocket 013949 is not interchangeable with sprocket 012121 since it can be used only with the new sprocket gear.

f. Beginning with March 1968 production models, upper sprocket assembly (P/N 012327) has been used in all projectors. This new assembly has the sprocket pressed onto the shaft, thus differing from previous models in which the sprocket is secured with setscrews. Be sure to check the style of sprocket assembly used, because the timing adjustment is different for each.

g. Only the current (drilled but untapped) mechanism housing will be available for replacement. If the housing must be replaced, be sure to order a sufficient quantity of the swage-type screws (8) and (11) for reinstalling the hood (9) and outboard bearing (14) to the new casting.

22. REMOVING SPROCKETS AND GUARDS, MODEL 560 (Figure 14A). Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Before removing the sprocket guards (5), make a note of the manner in which the torsion springs (6) are assembled. Then remove the screws (3) and washers (3A) and disassemble the sprocket guards (5), film rollers (4) and springs (6) from the mounting posts of the sprocket guard plates (18) and (19).

b. Disassemble the outboard bearing, sprockets and sprocket gears from the rear of the sprocket shafts as outlined in paragraph 21. Withdraw the sprockets (7) and (8), the lower sprocket flange (9) and the thrust washers (10) from the mechanism casting.

c. Remove the screws (17) and disassemble the sprocket guard plate assemblies (18) and (19) from the mechanism casting.

d. Remove the screw (20) and washer (21) and disassemble the sprocket guard roller (22) from the roller post (24). Inspect the nylon bearings (23) and, if damaged, replace them.

23. REMOVING AUTOTHREAD PARTS, MODELS 566A/566X (Figure 15). Remove Figure 15 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Remove the screws (1) and three flanged rollers (2). Inspect the rollers for nicks and deep scratches and replace if damaged.

b. Remove the retaining ring (3) and disassemble the bracket and handle assembly (4) and torsion spring (5) from the shaft of the sprocket guard plate (25). Be sure to note the manner in which the torsion spring is installed.

c. Remove the screw (6) and film exit guide (7). Disassemble the screw (8) and idler roller (9) from the autothread locking lever (12). Inspect the roller for nicks or deep scratches and replace if damaged. Remove screw (10), pivot (11) and locking lever (12).

d. Note the manner in which torsion spring (15) is assembled. Remove the retaining ring (13) and withdraw the lower loop form (14) and torsion spring (15) from the lower stud of the connecting link assembly (41). Note the manner in which the legs of the release spring (18) are positioned before removing screw (16), bushing (17) and spring (18).

e. Remove the screw (19) and back-up bracket (20). Remove the retaining ring (21) and disassemble the film guide (23) and its washers (22) from the mechanism housing. Remove two screws (24) and the sprocket guard plate assembly (25). Remove the retaining ring (28) and disassemble the toggle lever assembly (26) and upper film guide (27) from the sprocket guard plate.

f. Remove two screws (29) and the leaf spring (30). Remove the retaining ring (33) from the upper stud of the connecting link assembly (41). Loosen the setscrew (31) and disassemble the threading lever (32) and lower loop form assembly (34) from the mechanism housing. Remove two screws (35) and the upper sprocket guard plate assembly (36). Disassemble the screw (37), lock washer (38), flat washer (39), shuttle retractor (40) and connecting link assembly (41) from the mechanism housing.

g. Only the current (drilled but untapped) mechanism housing will be available for replacement. If the housing must be replaced, be sure to order a swage-type screw (16) for reinstalling the release spring (18) to the new casting.

24. DISASSEMBLING THE MECHANISM (Figure 16). Remove Figure 16 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

NOTE: The film escape mechanism parts (items 4 through 12), the shaft and link assembly (25) and the spring (24) are used only on Models 566A and 566X.

a. The complete film escape mechanism (items 4 through 12) can be removed as an assembly. Loosen the setscrews (4) in the hub of the upper kickplate assembly (5) and withdraw the assembly and the washer (6) from the upper loop form shaft assembly (25). Unhook and remove the spring (24) and withdraw the shaft assembly from the mechanism housing. Note carefully the manner in which the film escape parts are assembled. Remove the locking pawl screw (10); then remove the two retaining rings (7) and disassemble the shaft (8), torsion spring (9), locking pawl (11) and pawl bracket hub (12) from the kickplate (5).

b. Screw (13A) is used only to secure one end of the tension spring (15). Screw (13) secures the cam follower and support assembly (16) to the arm assembly (18). Cam follower parts (16A through 16F) need not be disassembled unless in need of replacement. Loosen the hex head screw (17) and disassemble the arm assembly (18) and lever and shaft assembly (19) from the mechanism housing.

c. Remove the screws (20), lock washers (21), flat washers (22) and the self centering assembly (23). Do not attempt to disassemble this assembly as parts are not available for service.

d. Remove the two screws (26) and lift the aperture plate assembly (27) from the mechanism housing. Refer to paragraph 28 for aperture plate disassembly instructions.

e. Remove the screw (28), lens carrier catch (29) and flat washer (30). The screw (31) serves as an adjustable stop for the lens carrier and need not be removed.

f. Only the current (drilled but untapped) mechanism housing will be available for replacement. If the housing must be replaced, be sure to order one each of swage-type screws (13), (28) and (31) for reassembly of parts to the new casting.

25. DISASSEMBLING THE MECHANISM (Figure 17). Remove Figure 17 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Loosen the two setscrews (1) and withdraw the mechanism pulley (2) from the end of the shuttle shaft. Remove screws (3) and (4) and lift off the baffle assembly (5). Remove screw (7) and washer (7A) to free the douser assembly (8).

b. Remove the shutter nut (12), counterbalance weight (13), the shutter (14) and the fiber washer (15).

NOTE: When stock of early style shutters (P/N 59689) is depleted, it will be necessary to furnish the current shutter (P/N 41309) (2-blade) together with the current pull-down cam (23) (P/N 41307). The current cam and shutters are provided with identification markings (see inset, Figure 17).

c. Unless obviously in need of replacement, do not disassemble the ball and stud assemblies (17) or the shuttle link bearings (22A) from the shuttle arms (22). Inspect the pull-down cam followers (22B) for wear. These followers can be reversed or turned end-for-end if badly worn. In current model projectors, the followers are staked in place in the recess of the shuttle arm. Refer to the Reassembly section for replacement instructions. Unhook the extension spring (18) from the end of each arm and remove the felt wiper (19) and shuttle arms from the assembly. The cam wiper wick (20) is inserted within the coils of the spring (18). If unusually dirty, the wiper and wick should be replaced. Lubricate new wicks as outlined in the Lubrication instructions, paragraph 2.

d. Remove the pull-down cam (23) from the camshaft. Refer to the note following paragraph 25, step b, for pull-down cam and shutter replacement. Remove screws (24) and withdraw the in-out cam (26) and the in-out bracket assembly (25). Note that the in-out follower (25A) and in-out spring (25B) are replaceable.

e. Unscrew the bearing support assembly (29) from the shuttle arm plate assembly (28). Remove two screws (27) and disassemble the shuttle arm plate from the mechanism housing, disengaging the upper forked arm of the plate from the framer shaft assembly (47). Pull out the stop pin (44) and unscrew the framer shaft assembly from the mechanism housing. Remove the screw (41) and disassemble the in-out spring (42) and shuttle retractor pin (43) from the mechanism housing.

f. Remove the large retaining ring (30). Remove the two screws (31) and the bearing loading spring (32). Loosen setscrew (33) in the loop restorer cam (36) and the two setscrews (35) in the worm gear (37). Shift the camshaft (40) to the left until the bearing (34) is forced from its seat. Remove the bearing. Remove retaining ring (38) and slide the camshaft to the right, forcing out the large bearing (39). Remove the worm gear (37) and loop restorer cam (36) as the shaft is withdrawn. Loosen the setscrew (46) and unscrew the rewind adjustment and stud (45) from the top of the mechanism housing. Note that only the current (drilled but untapped) mechanism housing will be available for replacement. If the housing must be replaced, be sure to order new swage-type screws (31) and current bearing loading spring (P/N 42244) (item 32) as well. The No. 4-40 swage screw (P/N 30804) (item 31) cannot be used with earlier mechanism housings, since these screw holes were tapped with a No. 3-48 thread. Machine screws (P/N 31094) must be used in earlier castings to secure the bearing loading spring.

26. DISASSEMBLING FIGURE 18 PARTS.

Remove parts, as necessary, in their indexed order of disassembly.

a. Remove the screw (1), washer (2) and channel and post assembly (3). Remove screw (4) and cover strike (5).

27. DISASSEMBLING THE LENS CARRIER (Figure 19). Remove Figure 19 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Remove the screws (1) and hold-down spring (2) and lift out the focus knob assembly (3).

b. Remove the screws (4), spacers (5) and (6) and springs (8) and disassemble the pressure plate (7) and lever (9) from the lens carrier. Wrap the pressure plate in tissue for protection.

c. Remove screws (10) and adjustment plate (11). Note the difference in screws (10) used in earlier and current projector models. Machine screw (P/N 31905) can be used only with the early tapped lens carriers. Swage-type screws (P/N 30804) are required for current lens carriers (drilled but untapped). Only the current lens carrier will be available for replacement; therefore, if the lens carrier (13) must be replaced, be sure to order four swage-type screws (P/N 30804) for reassembly of the hold-down spring (2) and adjustment plate (11) to the new casting.

28. DISASSEMBLING THE APERTURE PLATE (Figure 20). Remove Figure 20 parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. As noted in the Figure 20 parts list, all projectors are now standardizing on chrome rails and spring retaining covers.

29. AMPLIFIER AND POWER SUPPLY REPAIR.

Replacement parts for the amplifier assembly and the amplifier power supply assembly are identified in Figures 21, 22, 23 and 24. When checking the amplifier, follow standard testing practices and refer to Figure J for location of amplifier test points. Pertinent DC voltages are shown on the amplifier schematic diagram, Figure 25, in the Parts Section.

Defective electrical parts can be removed by cutting the leads as close as possible to the body of the part or by unsoldering the leads from the terminal posts. When unsoldering, it is advisable to use a heat sink to avoid the direct application of heat to adjacent components.

Reassembly Procedure

30. GENERAL INSTRUCTIONS.

a. When the reassembly procedure includes staking of rivets or similar parts, all staking and riveting should be done in the early stages of reassembly to avoid damage to other parts. Be sure to support the main casting solidly when riveting or staking.

b. Parts which require lubrication are listed in paragraph 2. Lubricate sparingly and wipe away excess lubricant with a clean cloth. Use only the specified Bell & Howell lubricants. During assembly, place a drop of oil in each tapped hole to facilitate screw installation.

c. When installing electrical parts, refer to the appropriate wiring diagram (Figures 21 through 27) for proper leadwire connections. When soldering is required, use a heat sink to avoid the direct application of heat to adjacent parts.

d. The following component assemblies require no adjustment and can be reassembled by reversing the disassembly procedure.

Amplifier Power Supply Assembly	Figure 21
Amplifier Assembly	Figure 24
Sprocket Guard Assembly	Figure 18

e. Many of the nameplates and instruction plates have a protected adhesive backing. Remove the protective paper and brush the adhesive with a mixture of three parts Toluol to one part trichlorethylene. When adhesive is tacky, press the nameplate carefully but firmly in place. Wipe away excess adhesive with a damp cloth.

f. In current projectors, several of the projector castings are drilled (but not tapped) to accommodate swage-type screws. Except where screw sizes were changed, these swage-type screws can be used in both early and current projectors. However, the machine screws used in earlier models cannot be used in current untapped castings. Only the current castings are available for replacement; therefore, should such a casting be replaced, certain of the machine screws used in earlier models also must be replaced. These instances are noted in the reassembly instructions.

g. When repairing projectors, be sure to check the Usable on Code column of the parts listings for the applicability of parts to specific projector models. Note especially the specific differences between the manual thread model (560A) and the autothread models (566A and 566X), particularly evident in the projector mechanism assembly, Figures 14 through 17.

31. REASSEMBLING THE APERTURE PLATE (Figure 20). Reassemble the aperture plate as outlined in the following paragraph.

a. As noted in the Figure 20 parts list, all projectors are now standardizing on chrome rails and spring retaining covers. Be sure to check parts list carefully before ordering replacement parts.

32. REASSEMBLING THE LENS CARRIER (Figure 19). Reassemble the lens carrier parts as outlined in the following paragraphs.

a. Only the current lens carrier (12) with drilled but untapped screw holes is available for replacement. If the lens carrier casting is replaced, swage-type screws (P/N 30804) (items 1 and 10) also must be ordered for reassembling of parts.

b. Secure the adjustment plate (11) to the lens carrier with two screws (10). Assemble the pressure plate (7), springs (8), and spacer bushings (5 and 6) to the adjustment plate and install and tighten the screws (4).

c. Assemble the focus knob assembly (3) to the lens carrier (12), and install the hold-down spring (2) and screws (1).

33. REASSEMBLING THE MECHANISM (Figure 17). Reassemble Figure 17 parts as outlined in the following paragraphs.

NOTE: Only the current (drilled but untapped) mechanism housings will be available for replacement. The machine screws used to attach parts to earlier castings cannot be used with the current castings; therefore, if the mechanism housing was replaced, it will be necessary to order swage screws for reassembly of parts to the new casting. Note that the current bearing loading spring (P/N 42244) (item 32) also must be ordered because of the larger screw hole size.

a. Press the bearing (34) into mechanism housing. Install bearing (39) onto camshaft until it is seated against the shoulder of the shaft. Install retaining ring (38) onto camshaft with convex side of ring away from bearing (39).

b. Apply a light film of grease to bearing hole in the cast arm of the mechanism housing and insert unthreaded end of camshaft through bearing hole. Install cam (36) and worm gear (37).

c. Insert free end of camshaft into bearing (34) and press camshaft in place until bearing (39) is seated.

d. Install the bearing loading spring (32) with the two screws (31). (See Note preceding step a.) Assemble the large retaining ring into the ring groove of the housing arm, with the convex face of the ring against the bearing (39).

e. Assemble setscrew (35) to the hub of the worm gear. Set clearance of .610" between worm gear and front bearing post of mechanism housing, and tighten the two screws securely. Adjust by setting clearance between cam (36) (part no. 36042) and the cast arm of the mechanism housing at 0.190-inch. Press against cam to hold feeler gage against cast arm, and tighten the setscrew (33) against flat in camshaft. Remove the feeler gage. Screw the rewind adjustment stud (45) down into place so that the top of the stud is approximately 1/16-inch below the surface of the housing.

f. Assemble the shuttle retractor pin (43) and in-out spring (42) (566 models only) and insert the rounded end of the pin into the hole in the long cast arm, just to the right of the camshaft. Secure the loop end of the spring to the housing with screw (41). Screw the bearing support (29) up into the staked nut of the shuttle arm plate assembly (28) turning the support in all the way. Install the framer knob and shaft assembly (47) down into the mechanism housing and press the stop pin (46) into its opening so that the flat on the pin faces the shaft. Engage the fork-like end of the shuttle arm plate framing arm with the cut out of the framer shaft and secure the plate to the cast arm of the housing with screws (27).

g. Assemble the in-out cam (26) to in-out bracket assembly (25) so that the nylon pad of the cam follower (25A) will ride against polished surface of the cam. Install this assembled group over the end of the camshaft and fasten bracket assembly to the mechanism housing with two screws (24).

h. At this point, refer to Figure 16 and install the assembled aperture plate (27) with screws (26). Adjust the aperture plate as instructed in paragraph 53, step a; then return to Figure 17 and continue with reassembly as follows.

i. Check the ball and stud assemblies (17) to make certain that the locking hex nuts (16) are tightened on each shuttle arm (22). Press the link bearings (22A) into notches at the front of each shuttle arm. If previously removed install the cam followers (22B), burr side down, into the notched center section of each shuttle arm. (The cam followers are staked in place. If necessary, they can be removed by filing off one of the staked areas and slipping the follower out. A new follower can be inserted. Restaking is unnecessary.) Insert front end of upper shuttle arm between the guides of the bracket assembly (25) until the ball of item (17) rests in the socket of the nylon pad on the shuttle arm plate. Hold temporarily in place with a rubber band. Hang the shuttle (21) in the slot of the shuttle arm so that the shuttle teeth extend through slot in aperture plate and back toward camshaft.

j. Insert front end of lower shuttle arm between the two guides of the bracket assembly (25). Engage the slot of the arm with the shuttle (21) and rest the ball of item (17) in the socket of the nylon pad on the shuttle arm plate. Position the in-out cam (26) so that the tongue on the unpolished side of the cam rests in the slot in the shoulder of the camshaft. Install pull-down cam (23) onto camshaft so that the cam notch fits over the protrusion of the in-out cam (26). Temporarily install the shutter nut (12). Tighten the bearing support (29) just enough to hold all parts securely in place. Then remove the rubber band from around the shuttle arm, and install the felt wiper (19). Install cam wiper wick (20) into extension spring (18) and assemble spring to shuttle arms. Shuttle arm parts are shown assembled in Figure B.

NOTE: As indicated in the Figure 17 parts list, a new pull-down cam (23) and shutter (14) are being used in current projectors. These new parts are provided with identification markings (see inset, Figure 17) and are interchangeable with the earlier cam and shutter only as a set. When the stock of early style shutters is depleted, it will be necessary to furnish the current shutter (P/N 41309) (2-blade) together with the current pull-down cam (P/N 41307).

NOTE

At this point, adjust the shuttle as instructed in paragraph 46.

k. Remove the shutter nut (12). Install fiber washer (15) over camshaft and up against the pull-down cam

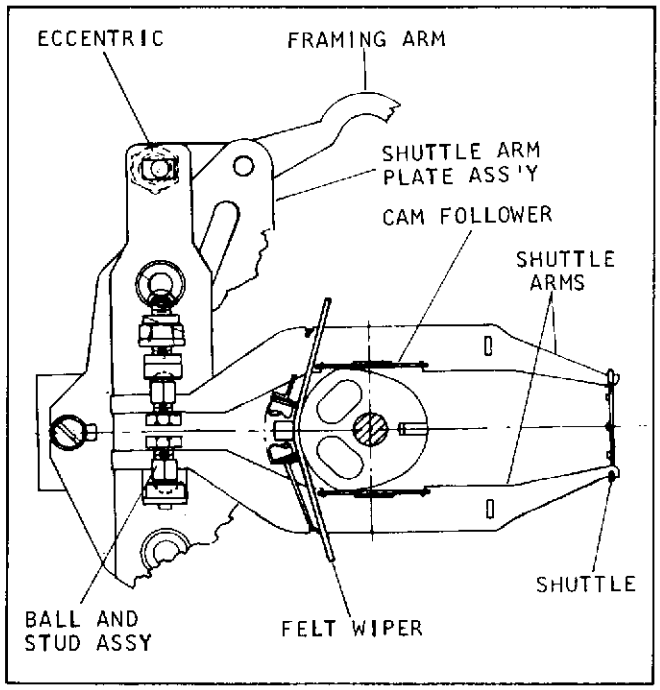


Figure B. Shuttle and Shuttle Arms Assembled

so that the slot in the washer is aligned with the slot in the cam. Assemble the shutter (14) to the camshaft and install counterbalance (13) so that pin of weight enters the slots in shutter and pull-down cam. Install nut (12) so that its shoulder enters center hole in weight (13) and tighten nut securely, holding the end of the camshaft with an open-end wrench.

l. Install heat baffle (10) with washers (11) and screws (9). Install pulley (2) on camshaft and tighten setscrews (1). Attach douser bracket assembly (8) with one screw (7) in lower hole, do not tighten. Slip screws (4) into mounting holes in baffle assembly (5). Place baffle spacers (6) over screws (4), and tighten. Install Sems screw (3) through hole in arm of baffle assembly (5) and hole in douser bracket assembly (8) and tighten.

34. REASSEMBLING THE MECHANISM (Figure 16). Reassemble Figure 15 parts as outlined in the following paragraphs. The aperture plate assembly (27) was installed in paragraph 32, step h.

NOTE: Only the current (drilled but untapped) mechanism housings will be available for replacement. If the mechanism housing was replaced, swage-type screws also must be ordered for reassembly of parts to the new casting.

a. Install the lens stop screw (31) into the housing casting until only one thread is visible. Attach lens carrier catch (29) and spacer washer (30) to casting with screw (28). Adjust the stopscrew, paragraph 47.

b. Attach self centering assembly (23) with screws (20) and washers (21) and (22). Assemble shaft assembly (19) to casting and install arm (18) on shaft. The forked finger on the arm must engage the pin of the self centering assembly between the two large washers. Maintain clearance of 0.0015-inch between casting and hub of arm (18) while tightening screw (17).

NOTE: Shaft assembly (19), when installed, must be positioned approximately as shown in Figure 16, with the notched out area in its upper edge beneath the lower bearing protruding from the mechanism housing. In autothread models, the roller (2) must not be installed until the lower loop former parts in Figure 15 have been assembled.

c. Assemble the cam follower parts (16A through 16F) in the sequence illustrated in Figure 16. Attach the cam follower assembly to the arm assembly (18) with the screw (13) and washer (14), tightening the screw just enough to hold the follower. Cam follower adjustment is made in final assembly as instructed in paragraph 64. Engage one end of the spring (15) around the shaft (19) and secure the other end to the casting with the screw (13) and washer (14).

d. Film escape parts (4 through 12) and items 24 and 25 are used only on autothread models. Assemble film escape components in the following manner: Assemble the hub assembly (12) to the locking pawl (11) with screw (10). Insert the shaft (8) through one ear of the kickplate assembly (5), install the spring (9) and assembled pawl and hub on the shaft, and insert the shaft through the second ear of the kickplate. Install one retaining ring (7) on the inner end of the shaft and the second retaining ring between the spring (9) and hub assembly (12). Hook one end of the spring over the outer ear of the kickplate and the other end behind the upper finger of the hub assembly so that the hub and locking pawl tend to rotate clockwise around the shaft. Insert the shaft of shaft assembly (25) through its bearing in the housing and install the washer (6) and assembled film escape parts on the shaft. Hold these parts together while tightening the setscrews (4). Hook one end of the spring (24) into the small hole in the link of the shaft assembly (25) and the other end around the lower end of the rewind adjustment stud (45, Figure 17). The film escape mechanism must be adjusted in final assembly as instructed in paragraph 63d.

35. REASSEMBLING THE MECHANISM (Figure 15). Reassemble Figure 15 parts as outlined in the following paragraphs. Adjustment views, Figures S through U show the autoload system parts assembled and will assist in reassembling of the parts for autothread models.

NOTE: Only the current (drilled but untapped) mechanism housings are available for replacement. If the mechanism housing was replaced, swage-type screws must be ordered for reassembly of spring (18) to the new housing.

a. Assemble the connecting link assembly (41) and the shuttle retractor (40) with the screw (37) and washers (38) and (39).

b. Attach the upper sprocket guard plate (36) to the mechanism housing with two screws (35), the upper screw being inserted through the half-moon slot of the kickplate assembly (item 5, Figure 16).

c. Attach the leaf spring (30) to the loop form assembly (34) with two screws (29). Assemble the small hole in the film guide (27) over the pin in the lower sprocket guard plate (25) and hold the guide while inserting the shaft of the toggle lever assembly (26) through the guard plate. The guard plate pin must engage the fork-like ears of the toggle lever. Secure the lever with the retaining ring (28).

d. Assemble the loop form assembly (34) on the upper pin of the connecting link (41) and install the retaining ring (33). Insert the shaft of the upper loop form through the upper guard plate (36) and the mechanism housing and install the threading lever (32) on the end of the shaft. Secure the threading lever with the locking screw (31). Engage the lower pin of the connecting link (41) with the remaining forked end of the toggle lever assembly (26) and secure the lower guard plate (25) to the mechanism housing with screws (24). The film guide (27) must be raised during this operation so that its large pivot hole slides onto the bearing protruding from the housing.

e. Assemble a large washer (22) and film guide (23) over the bearing protruding through the lower

guard plate (25), slipping the hole in the arm of the film guide over the lower pin of the connecting link (41). Install the second large washer (22) and secure all parts with the retaining ring (21). Attach the back-up bracket (20) to the lower guard plate with the screw (19). Assemble the loop form (14) and torsion spring (15) over the lower pin of the connecting link (41) and install retaining ring (13). The legs of the spring must be positioned so that they force the loop form (14) to pivot clockwise around the connecting link pin.

f. Assemble the screw (10) and pivot (11) to the locking lever (12). Rotate and hold the loop form (14) counterclockwise while installing the locking lever (12) tightening the screw (10) securely. Again rotate the loop form (14) counterclockwise while installing the film exit guide (7) to the lower guard plate (25) with screw (6). The curved lip of upper loop form (14) must touch the formed curve of exit guide (7). Install bushing (17) into release spring (18) and secure these parts to housing with screw (16). The long leg of the spring must hook behind the rear edge of the locking lever (12) and the short leg must press against the housing casting. This tension will tend to rotate the lever (12) in a counterclockwise direction around the pivot (11).

g. Assemble the bracket and handle assembly (4) and torsion spring (5) to the lower right stud of the guard plate (25). The bent end of the spring hooks behind the small finger at the front of the locking lever (12) and the straight end presses against the flat surface of the bracket (4), thus pivoting the bracket clockwise. Install small rollers (2) with screws (1) and the large roller (9) with screw (8). Then refer to Figure 16 and install the retaining ring (3), the loop restorer roller (2) and screw (1) on the protruding handle of the shaft assembly (19).

h. Refer to paragraphs 62 and 63 for autoload system adjustments to be performed after final assembly.

36. INSTALLING SPROCKETS AND GUARDS, MODEL 560A (Figure 14A). Reassemble the sprockets and guards as outlined in the following paragraphs, noting any special precautions.

a. Fasten the sprocket guard plates (18) and (19) to the mechanism casting with the screws (17) and tighten the screws securely. Attach the film exit guide assembly (16) to the lower plate and casting with screw (15). Assemble the roller (14) to the exit guide roller post and install the screw (13).

b. Assemble the sprocket flange (9) and thrust washer (10) to the lower sprocket assembly (8) and insert the sprocket shaft through the lower bearings in the mechanism casting. Assemble the thrust washer (10) to the upper sprocket assembly and insert the sprocket shaft through the upper bearings in the mechanism casting. Refer to paragraph 37 and install the sprocket gears, sprockets and outboard bearing parts on the sprocket shafts.

c. Assemble the springs (6) and rollers (4) to the molded sprocket guards (5) and install these parts on the posts of the sprocket guard plates (18) and (19). The inner bent end of each spring must be inserted into small holes in the sprocket guard plates. The outer bent end must hook over the outer ledge of the sprocket guard. Spring action will bend to hold the guards around the sprockets. Install the screws (3) and washers (3A).

d. Attach roller post (24) to mechanism casting. Insert the bearings (23), the roller (22) and assemble the roller to the post with washer (21) and screw (20).

37. REASSEMBLING THE MECHANISM (Figure 14). Reassemble Figure 14 parts as outlined in the following paragraphs. Adjustment views, Figures S through U show the autoload system parts assembled and will assist in reassembling parts. Note that items (6) through (9), (26) through (31) and (35) through (38) are used only on autothread models.

NOTE: Only the current (drilled but untapped) mechanism housing is available for replacement. If the mechanism housing was replaced, swage-type screws must be ordered for reassembly of the hood (9) and outboard bearing assembly (14) to the new housing.

a. Install thrust washer (38) over shaft of upper sprocket assembly (35) and insert the sprocket shaft through bearing hole in housing until shaft protrudes about 1/8-inch from rear of housing. Install tension washer (34) and sprocket gear (33), aligning either setscrew (32) with flat on sprocket shaft. Carefully mesh the sprocket gear with the worm gear (36, Figure 17); then slide the shaft through the sprocket gear until sprocket rests against the bearing in the housing. Tighten both setscrews (32). Install the take-up drive sprocket (25) and tighten setscrews (24).

NOTE: As noted in the Figure 14 parts list, production models after March 1968 are equipped with sprocket and shaft assembly (P/N 012327) in which the sprocket is pressed onto the shaft. In the earlier sprocket and shaft assembly (P/N 011228), the sprocket is held to the shaft with setscrews. The method used for timing the upper sprocket (paragraph 65) will depend on the type of sprocket assembly used in the projector.

b. Install rewind button (16) and spring (17). Depress the button while assembling the rewind clutch lever (15) to the mechanism. The small forked end engages a groove in the button shaft; the large forked end encircles the sprocket shaft. Install the spline driver (23) on sprocket shaft with the spline fitting through the forked end of the clutch lever and meshing with the drive sprocket (25). Install spring (22), washer (21), retaining rings (19) and rewind drive sprocket (20). Install the timing belt (18) over the rewind drive sprocket (20). Assemble outboard bearing assembly (14) onto the sprocket shaft and install clutch lever shaft (13) and retaining rings (12). Secure outboard bearing assembly to the mechanism housing with three screws (11).

c. Refer to Figure C and turn the rewind adjusting stud (45) in or out to obtain 0.010-inch clearance

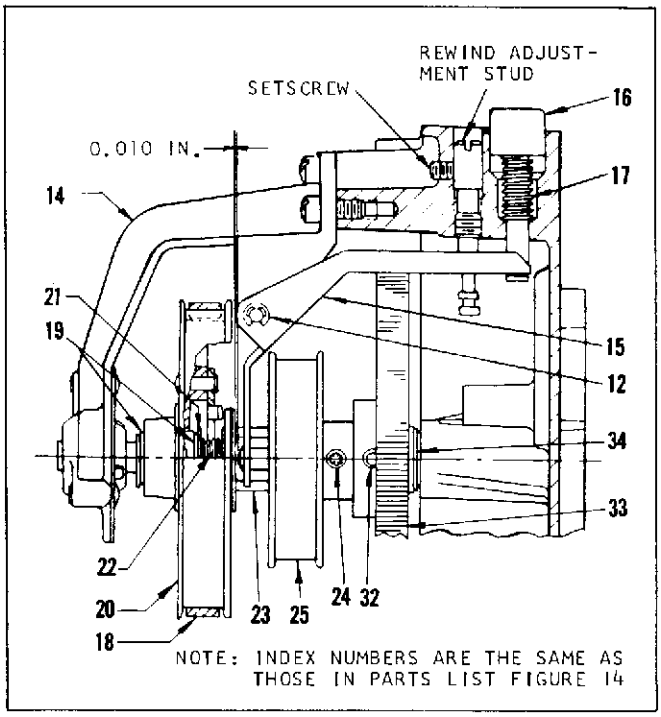


Figure C. Upper Sprocket Gear and Clutch Parts Assembled

between the rewind clutch lever (15, Figure 14) and the spline driver (23, Figure 14). Then tighten the setscrew (46, Figure 17) securely against the adjusting stud. Remove the paper backing from new rewind nameplate (32, Figure 16) and install nameplate.

d. Assemble flange (37) and thrust washer (38) onto lower sprocket assembly (36) and insert sprocket shaft through bearings in mechanism housing. Install tension washer (34) and sprocket gear (33) onto shaft, meshing teeth of sprocket gear with the worm gear. Tighten setscrews (32) securely so that sprocket shaft turns freely but without noticeable end play.

e. Assemble the springs (31) and rollers (30) to the molded sprocket guards (29 and 29A) and install these parts on the posts of the sprocket guard plates (25 and 36, Figure 15). The inner bent end of each spring must be inserted into small holes in the sprocket guard plates. The outer bent end must hook over the outer ledge of the sprocket guard. Spring action will bend to hold the guards around the sprockets. Install the screws (28) and washers (28A).

f. On autothread models only, attach the sprocket guard assembly (27) with three screws (26) inserted from rear of mechanism plate. Install actuating assembly (7) on protruding shaft and link assembly (25, Figure 16) with retaining ring (6, Figure 14). Attach hood (9) with screws (8). Remove backing from insert (10) and press in place.

g. Hold the lens carrier (5) between the hinge bosses of the mechanism housing. Insert washers (4) and (3) between the lens carrier hinge ears and mechanism housing hinge bosses and press hinge pins (1) and (2) into place. The lens carrier catch installed in paragraph 31, step a, must be adjusted as necessary to permit the lens carrier to be opened freely, yet must hold carrier firmly against the stop screw (31, Figure 16) in the closed position.

h. All critical adjustments are to be made in final assembly of the projector and are covered in the Adjustments section of this manual.

38. REASSEMBLING BLOWER AND MOTOR (Figure 13).

a. Insert blower wheel (4) into opening in housing (5) so hub is toward stud side of housing.

b. Assemble shaft of motor (3) to wheel through housing.

c. Secure motor to housing with 4 studs (1) and washers (2).

d. Visually center blower wheel in housing and tighten setscrew.

39. REASSEMBLING THE LAMPHOUSE (Figure 12). Reassemble Figure 12 parts as outlined in the following paragraphs.

a. In earlier model projectors, the lamphouse grille (6) was attached to the lamp housing (4) with two rivets (5) at the rear corners. In current model projectors, the new grille (P/N 41338) and its corresponding housings are provided with a single mounting hole at the center of the rear edge. Two-hole grilles and housings no longer will be available for service. If the earlier two-hole housing is in good condition but the grille was replaced, clamp new grille in place and drill mounting hole with a 1.65 mm (0.066 ± 0.002-inch) drill. Use the mounting hole in the grille as a guide. Attach the grille with a single rivet (P/N 36100). If the housing was replaced, the old two-hole grille can be redrilled in the same manner, using the mounting hole in the housing as a guide. In addition, however, be sure to order two swage-type screws (P/N 30806) (item 2) for attaching the lamp shield (3) to the new housing. Assemble the handle (7) and latch (8) to the lamphouse.

40. REASSEMBLING THE SOUNDHEAD (Figure 11). Reassemble Figure 11 parts as outlined in the following paragraphs.

NOTE: Only the current (drilled but untapped) soundhead housing (item 39) is available for replacement. If the housing was replaced, swage-type screws (items 12, 32 and 34) also must be ordered for reassembly of parts to the new housing.

a. As noted in the Figure 11 parts list and insets, exciter lamp mounting pins (39B) in current projectors differ from those used in earlier projector models. The early pin and keeper style has been discontinued; therefore, if pins must be replaced, the current pin (P/N 41321) and its bushing (P/N 41320)

must be ordered as a set. Spring (P/N 602339) is used with both styles of pin. Assemble the spring and bushing into the hole in the casting. Insert the pin, forcing the pin into the bushing as shown in Figure 11.

b. Screw the adjusting (edge guide) screw (26) into the housing (39). Insert the shaft of the upper stabilizer arm (38) carefully through the soundhead housing and adjusting screw and install the retaining ring (14). Install the lower stabilizer arm (36) and spring (37) on the rear end of the upper arm shaft and secure these parts with the half-moon stabilizer arm (35) or (35A) and two screws (34). Attach spring terminal (33) with screw (32) and hook spring (31) between terminal and ear of lower arm (36).

c. Assemble the silicon cell assembly (24) and its retainer (23) to the sound drum housing (22) and assemble the sound drum assembly carefully into the housing. Hold the sound drum while tightening the setscrew (20) against the retainer (23) just enough to hold all parts in place. The sound drum housing is drilled and tapped and two Sems screws (21) are turned into these holes to secure the assembly.

d. Assemble the contact assembly (17) and lamp release ring (19) to the soundhead housing with screws (16). Insert the optical slit assembly (13) into its opening in the housing and tighten the clamping screw (12) just enough to hold the slit assembly in place. Install the exciter lamp (10) on the lamp pins; press down and rotate clockwise to secure the lamp.

e. Lightly oil the roller shafts of both stabilizer arms (36) and (38) and install the rollers (29) and (30) with screws (27) and washers (28).

f. If the indicating ruby (5) was replaced, cement the new ruby into the exciter lamp cover (1). Attach the film guide (7) to the cover with the screw (6) (autothread models only). Assemble the retaining screw (3) to the cover and install the retaining ring (2). Temporarily install the cover to the soundhead assembly to protect parts until installation.

g. The soundhead must be adjusted after final assembly. Refer to paragraph 59 for soundhead adjustment procedure.

41. REASSEMBLING THE REAR REEL ARM (Figure 10). Reassemble Figure 10 parts as outlined in the following paragraphs.

NOTE: If the rear reel arm was disassembled merely as part of the conversion to the current Torrington style clutch system, only partial disassembly was required and certain of the following steps can be ignored. However, it would be advisable to inspect those parts which remain assembled and to clean and lubricate parts before reassembly.

a. Assemble the needle bearings (6A) and (28A) into the take-up arm assembly (6) and splined bearing assembly (28) respectively. Assemble nylon bearings (16) into the lower pulley and gear assembly (15) and nylon bearings (23) into the drive shaft support

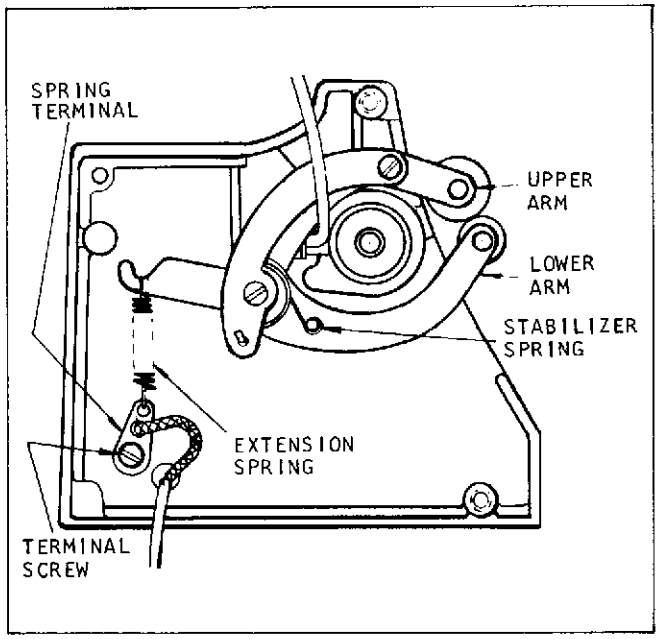


Figure D. Stabilizer Arms and Spring Assembled

arms of the rear arm (29). Place one drop of oil in each nylon bearing and two drops of oil in each needle bearing. Assemble the splined bearing (28) into the reel arm.

b. Assemble the rubber sleeve (30) to the hub of the lower gear assembly (15). Assemble the retaining ring (19) and lower gear to the rewind drive shaft (21) and install the second retaining ring (14). Install the spring (18) and plunger (17) and hold in place while inserting the shaft (21) into the reel arm. Secure with the setscrew (20).

c. Assemble the lower spur gear (11) to the end of the drive shaft (22) which has one retaining ring slot, and install the retaining clip (10). Insert the opposite end of the drive shaft through both bearings (23) and install the washer (13), retaining clip (10), upper spur gear (12) and retaining ring (9). The lower nylon gear (11) must mesh with the crown gear teeth of the lower gear assembly (15) with a minimum of backlash. Loosen the setscrew (20) and shift the gear (15) and its shaft (21) in or out as necessary; then retighten the setscrew securely.

d. Hold the upper gear assembly (25) in place, its teeth engaging those of the upper nylon gear (12) while inserting the rear reel arm shaft (27). Note the use of brass shims (26) located beneath the gear assembly (25). Use shims, as necessary, to reduce gear backlash to a minimum. When proper shimming has been determined, secure the gear assembly (25) with two setscrews (24).

e. In most earlier model projectors, a straight pin (5) was used to secure the take-up arm (6) to the reel arm. Dowel pin (P/N 41331) is used in current models and will be furnished as a replacement. If you should find, however, that the take-up arm was mounted with

a split roll pin (P/N 303188), a new split roll pin must be used in reassembly. Assemble the take-up spindle and pulley assembly (4) to the take-up arm with the socket head screw (3). Hold the take-up arm in place with the belt (1) looped around the pulley assembly and the hub of the lower gear (15). Spring (2) must be inserted into the drilled hole in the take-up arm and the free end of the spring will bear against the reel arm as shown in Figure E. Install the pin (5) to secure the take-up arm to the reel arm.

f. Refer to paragraph 58, step b, for final backlash adjustments and lightly lubricate all gear teeth. Check smoothness of gear train action by rotating the shaft (27). Assemble the reel arm cover (8) to the reel arm with the screws (7), using shims (P/N 34874) as necessary, between the reel arm bosses and cover bosses to eliminate dimpling of the cover as the screws are tightened. Note that only the current (drilled but untapped) cover (P/N 42218) is available for replacement. If the cover was replaced, be sure to order two swage-type screws (P/N 30879) for reassembling the new cover.

42. REASSEMBLING THE FRONT REEL ARM (Figure 9). Reassemble Figure 9 parts as outlined in the following paragraphs.

a. Only the current (drilled but untapped) reel arm (34) and cover (3) are available for replacement. Therefore, if the reel arm was replaced, new swage-type screw (P/N 30804) (item 31A) will be required for attaching the brake spring (32) to the new arm. If the cover was replaced, two swage-type screws (P/N 30879) (item 1) will be required for installing the new cover. Machine screw (P/N 25837) (item 31) must be used to attach the brake spring to earlier (drilled and tapped) reel arms.

b. If, during disassembly, an eccentric washer was found beneath the brake spring (32), this washer can be discarded. The brake spring eliminates the need for this eccentric washer.

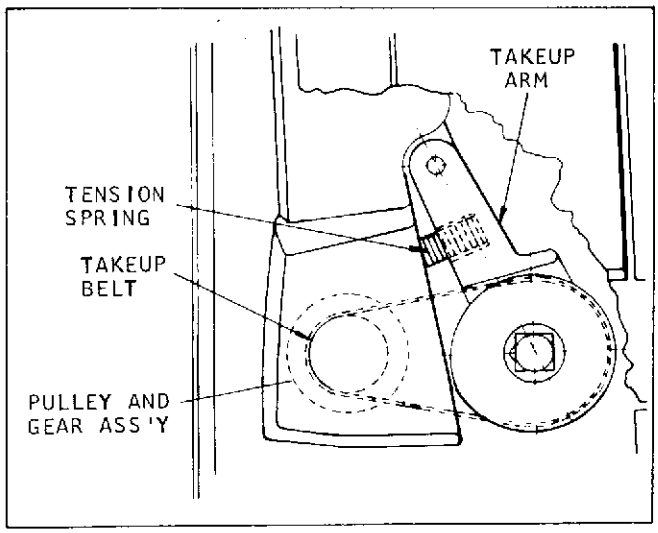


Figure E. Installing Take-Up Arm, Belt and Spring

c. Assemble needle bearings (34A) and (34B) into the front reel arm (34), needle bearings (30A) into the splined bearing assembly (30) and nylon bearings (23) into the drive shaft support arms of the front reel arm. Place one drop of oil in each nylon bearing and two drops of oil in each needle bearing.

d. Assemble the brake spring (32) to the reel arm with the screw (31) or (31A). Assemble the friction shoe (25) to the pin of the bracket assembly (26) with the retaining ring (24). Assemble the splined bearing assembly (30) into the reel arm (34) and install the large bronze washer (28) and the disc assembly (27). Assemble the bracket assembly (26) to the disc assembly shaft and install the retaining ring (24).

e. Insert the reel arm shaft (29) through the splined bearing (30) and assemble the washers (17) and (17A) and one retaining ring (15) on the shaft. Assemble the clutch disc (16), pin facing out, and the second retaining ring (15) to the shaft.

f. Assemble the lower spur gear (20) to the end of the drive shaft (22) with the retaining clip (19). Insert the shaft through the two nylon bearings (23) and assemble the flat washer (21), retaining clip (19), upper spur gear (20A) and retaining ring (18) to the upper end of the shaft.

g. Loosely assemble the spring (7), lower gear (8) and feed spindle collar (5). One end of the spring is inserted into a hole in the inner face of the gear (8) and the other end hooked beneath the pin (6) in the collar. Add washers (9), (9A) and (9B) to this group and hold up in place while inserting the feed spindle assembly (10), with washer (11) installed, through the bearing (34A) and the loosely assembled group of parts. Turn the collar (5) until the pin hole in the collar and spindle shaft are aligned; then install spring pin (4) to secure all parts.

h. Assemble the upper gear assembly (13) to the end of the reel arm shaft (29) and install and tighten the setscrews (12). Refer to paragraph 72, step a, for reel arm end play and backlash adjustments. Assemble the reel arm cover (2) to the reel arm with screws (1). Use shims (3), as necessary, between the reel arm bosses and cover bosses to eliminate dimpling of the cover as the cover screws are tightened.

43. REASSEMBLY OF FIGURE 8 PARTS. Reassemble Figure 8 parts as outlined in the following paragraphs.

a. In early model projectors, the amplifier assembly (13) is attached with No. 5-40 machine screws (11) and No. 5 lock washers (12). In current model projectors, No. 6-32 swage-type screws and No. 6 lock washers are used.

b. Assemble the washer (26J) to the tilt worm gear (26H). Lightly oil the gear shaft and insert it through

the bearing holes in the tilt housing (26K). Install the spring washer (26G) on the shaft, bowed face toward the housing; then install flat washer (26F) and retaining ring (26E). Assemble the tilt pinion (26D) into the housing with the large spring pin (26C). Apply a light film of grease to the pinion, the worm gear, and the teeth of the tilt rack (26B). Insert the tilt rack down into the tilt housing and install the two small spring pins (26A).

c. Fasten the tilt mechanism assembly (26) to the projector main plate with screws (25). Refer to the note following Figure 8 parts list for proper screws to be used. Attach the tilt bar (23) to the lower end of the tilt rack (26B) with screw (21) and lockwasher (22). Secure the tilt knob (20) to the end of the gear shaft (26H) with the setscrew (19). Rotate the knob to retract the tilt bar up against the base.

d. Secure the blower assembly (16) or (17) and air deflector (18) to the main plate with the screws (14) and lock washers (15).

e. Be sure to install washer (P/N 28718) on the rotary switch shaft before assembling the rotary switch (4) to the main plate. Refer to the projector wiring diagram (Figure 27) when making wiring connections to electrical components.

44. REASSEMBLY OF FIGURE 7 PARTS. Reassemble Figure 7 parts as outlined in the following paragraphs.

a. If repairs to the mechanism assembly (4) require that the mechanism housing be replaced with the current (drilled but untapped) style, new swage-type mounting screws (P/N 30824) (item 22) must be used to mount the mechanism to the main plate. Lift the assembled mechanism up into position against the main plate and install the mounting screws (22).

b. Lift the soundhead assembly (12) up into position against the main plate. Make certain that all leadwires are behind the main plate and not caught between the plate and soundhead housing. Install and tighten the screws (9) and (11) with their washers (10). Refer to the wiring diagram (Figure 27) for proper wiring connections between the soundhead and other components.

c. Install the washer (8) on the sound drum shaft, plus any shim washers removed during disassembly. Carefully guide the flywheel (7) onto the sound drum shaft and install the flywheel nut (5), turning the nut on by hand as far as possible. Insert a 1/16-inch punch through the guide hole in the sound drum shaft housing and hold it lightly while rotating the sound drum shaft. When the punch drops into the hole in the shaft, hold it firmly and tighten flywheel nut with a wrench. Remove the punch.

d. Install the washer (28) on the snubber mounting post (27) and screw the post into the tapped hole in the main plate. Insert the snubber spring retainer (25) between the last two coils at the inner end of the snubber spring (24) and insert the spring and retainer into the spring cover (26). Assemble these parts over the large diameter of the snubber mounting post (27). Assemble the hub of the snubber roller shaft assembly (23) over the snubber post and inside the spring (24). Before the shaft is fully in place, wind the spring one full turn counterclockwise and engage the bent end of the spring with the small hole in the crank arm of the shaft assembly. Press the shaft all the way in and install the retaining ring (22) to hold these parts in place.

e. Note in the inset of Figure 4 the appearance of current idler rollers (P/N 41330) (items 18 and 21). These rollers are not interchangeable with early style rollers (P/N 39523), which will continue to be available for service. However, when the early style snubber roller shaft assembly (P/N 011222) (item 23) is out-of-stock, the current shaft assembly (P/N 012329) will be supplied, together with two of the current rollers. Early style rollers must then be discarded or placed in stock as service spares. Assemble idler roller (21) to the shaft assembly (23) and install the snubber handle (19). Hold idler roller (18) between the arms of the film guide (16) and assemble these parts to the end of the snubber post (27). Install the screw (14). Lift the free end of the film guide (16) up in line with its mounting hole in the main plate. Insert the mounting stud (15) through the film guide and the spacer (17) and screw the stud tightly into place.

45. REASSEMBLING THE PROJECTOR (Figure 6).

Reassemble Figure 6 parts in reverse order of disassembly, noting the following special precautions.

a. Replace all wiring as noted at time of removal.

b. Assemble clevis and bracket assembly (19). Insert free end of clevis rod (9) into hole in end of douser bracket assembly (8, Figure 17). Screws (1) attach both the receptacle mounting bracket (3) and clevis and bracket assembly. Insert extension spring (13) into slot and under rivet in the rivet and solenoid assembly (12). Hook free end of extension spring (13) in hole in top arm of clevis and bracket assembly (19).

46. REASSEMBLING THE PROJECTOR (Figure 5).

Reassemble Figure 5 parts in reverse order of disassembly, noting the following special precautions.

a. All wiring connections are as illustrated in the wiring diagram (Figure 27).

b. Available motors for the projector are listed below. Identify replacement motor by referring to the motor nameplate for manufacturer and part number.

MOTOR	BRACKETS
60 Cycle	
P/N 09817 (General Electric) GE5KCM49EG135	31263 (two required)
50/60 Cycle	
P/N 011893 (Robbins-Myer) RMFRKL-E26AOTS	31263 (two required)
50 Cycle	
P/N 012312 (Robbins-Myer) RMFRKL-G26AOTS	31263 (one required) 39525 (one required)

After installing the motor mounting brackets (36) assemble pulley (34) to motor shaft with setscrew (33). Install belt (32) over mechanism assembly pulley. Engage other end of the belt with motor pulley (34) and install the motor, positioning the grooves of the motor cushion supports (30B) in the brackets (36). Then install motor bracket straps (28).

c. Assemble the amplifier supply assembly (38) to the base plate and install the screws (37). Note that the grounding spring (41) is assembled to the amplifier power supply with screw (39) and washer (40). The tip of the grounding spring must bear against the end of the sound drum shaft. Bend spring, if necessary, to insure contact.

d. If the motor pulley (34) was replaced, be sure to check Figure 5 parts list notes for the proper pulley to be used in the projector being repaired.

e. Reel arm locking parts (24 through 27) should not be installed until the reel arms and clutches are assembled to the main plate (paragraphs 48 and 49).

f. If rollers (20) and (23) were removed or replaced, place a drop of oil on each roller shaft before reassembly. Secure the idler assemblies (18 and 21) to the main plate with screws (15 and 16). Refer to paragraph 60 for method of adjusting the idler assemblies in final assembly to provide proper belt tension.

g. Two styles of motor relay (12) are used in projectors (see inset, Figure 5). If in need of replacement, be sure to order the correct relay and make wiring connections to relay terminals as shown.

NOTE: The resistor and terminal strip (12A) and (12B) are secured with one of the screws that attaches the relay (12). The terminal board and mounting bracket parts (36B) through (36E) were used only on very early Model 566A projectors.

47. REASSEMBLY OF FIGURE 4 PARTS. Reassemble Figure 4 parts as instructed in the following paragraphs.

a. Attach the pilot lamp bracket (17) to the main plate with screws (16). Assemble the lamphouse (2) to the bracket with three screws (1) inserted through holes in the lamphouse. Close the lamphouse and check to make certain that the lamphouse contour matches with that of the mechanism housing. If necessary, loosen the bracket attaching screws (16) and shift the bracket. Check to make certain that the lamphouse opens and closes without binding. It may be necessary to adjust the lamphouse latch (item 8, Figure 12) to insure proper latching operation.

b. Assemble the fan, lamp switch (12), with its switch guard and mounting plate, to the switch nameplate (14) and install switch screws and washers. Assemble the switch nameplate to the pilot lamp mounting bracket (17), threading the selector switch leadwires through the hole in the main plate and guiding the amplifier and relay switch control shafts through the lower two holes in the nameplate. Secure the nameplate to the pilot lamp bracket with three screws (13). Install the knobs (5), (6) and (7), with approximately 1/32-inch clearance between the knobs and the nameplate.

c. Fasten the lamp connector (34) to its mounting bracket (32) with fastener (32) and assemble the entire unit to the side of the pilot lamp bracket assembly (17).

d. Attach the lamp bracket (30) to the main frame mounting bosses with screws (29) and fasten the lamp (28) to the bracket with retainer clips (26) and (27).

e. Perform the optical alignment procedure outlined in paragraph 53.

48. INSTALLING FRONT REEL ARM AND CLUTCH PARTS. Note, in the Figure 3 parts lists, that certain parts of the interim Torrington clutch system will shortly be unavailable. If any one of the indicated parts is replaced, the clutch system must be modified to the new Torrington system. This is accomplished by discarding all of the indicated parts of the old system and replacing those parts with the latest rewind sprocket (P/N 012661) and take-up reverse sprocket (P/N 012662). This installation of the reel arm is covered in the following paragraphs.

a. Front Arm and Current Torrington Clutch System.

(1) Assemble the washer (30) over the spline of the front reel arm and insert the reel arm shaft through the main plate. Assemble the black lock disc (26) over the spline of the reel arm so that the notch in the disc is approximately at the position shown in Figure F. Install the retaining collar up against the lock disc and tighten its setscrews (16).

(2) Refer to Figure 5 and install lock plunger parts (items 24 through 27) as follows. Lightly oil the lock plunger (27) and assemble the spring (26) and lock plunger to the plunger bracket (25) so that the notch in the bracket straddles the narrow arm of the lock plunger bar. Secure this group of parts to the

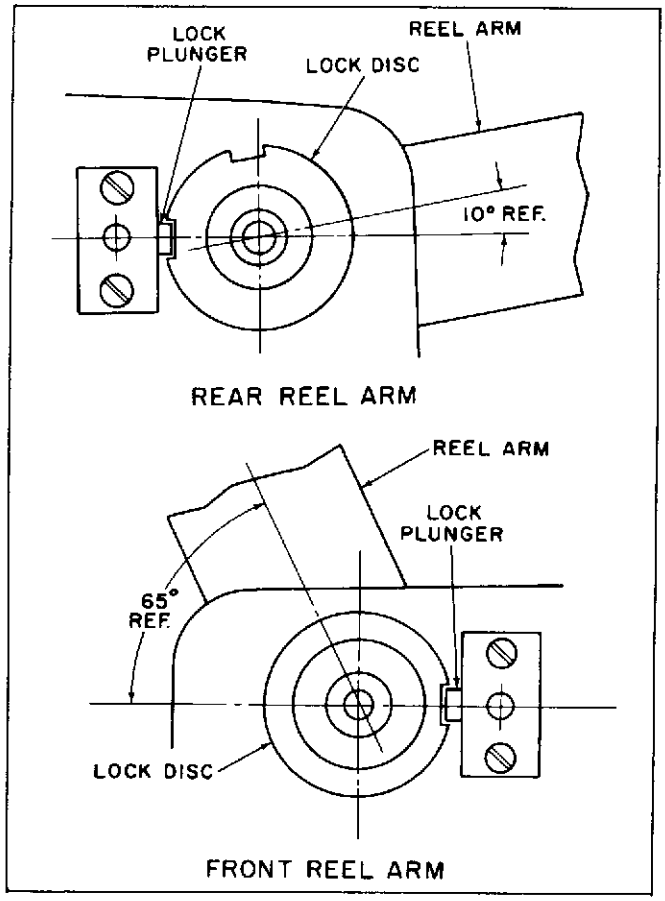


Figure F. Installing Reel Arm Lock Discs and Plungers

main plate with two screws (24) so that the narrow arm of the lock plunger bar is located in the notch of the reel arm lock disc (Figure F).

(3) Refer to Figure 3 and continue installation as follows: Apply a light film of oil to the reel arm shaft and install two brass washers (23), a nylon washer (19), reverse take-up sprocket (20), small diameter hub toward the main plate, and a second nylon washer (19) on the reel arm shaft. The rewind timing belt is hanging loose around the large rewind drive sprocket of the mechanism assembly. Loop this belt around the rewind sprocket (18) and slide the sprocket onto the reel arm shaft, slotted hub facing out. Install the locking collar (17) so that its tongue mates with the slot in the rewind sprocket hub. Insert a 0.003-inch feeler gage between nylon washer (19) and brass washer (23), press reel arm and clutch parts together and tighten setscrews (16). Remove feeler gage and refer to paragraph 60 for belt adjustment.

49. INSTALLING REAR REEL ARM AND CLUTCH PARTS (Figure 3).

a. Rear Arm and Current Torrington Clutch System.

(1) Assemble the washer (30) over the spline of the rear reel arm (29) and insert the reel arm shaft through the main plate. Assemble the nickel-plated lock disc (27) over the spline of the reel arm so that the notch in the disc is approximately at the position shown in Figure F. Install retaining collar (25) up against the lock disc and tighten its setscrews (24).

(2) Install lock plunger parts as outlined in paragraph 48, step a (2). Then apply a light film of oil to the reel arm shaft and install two brass washers (23) and nylon washer (19).

(3) Install the take-up timing belt (item 14), looping it beneath the take-up drive sprocket on the mechanism assembly and around the reverse take-up sprocket of the front reel arm. This belt is shown installed in Figure R to aid in installation. Make certain that both idler roller brackets are loose to eliminate tension on the belt. Loop the free end of the timing belt around the rear take-up sprocket (22) and slide the sprocket, the nylon washer (19) and brass washer (23) onto the reel arm shaft. Secure all parts with the retaining ring (21).

(4) Refer to paragraph 60 for belt tension adjustments.

50. REASSEMBLY OF FIGURE 3 PARTS. (cont) Reassemble Figure 3 parts as outlined in the following paragraphs.

a. Assemble the spring (13) to the spring pin at the right end of the cover release lever (12). Install the cover latch studs (11) and assemble the release lever to the studs with E rings (10). The free end of the spring (17) should be inserted in the recess of the main plate boss immediately to the right of the release lever (see Figure G).

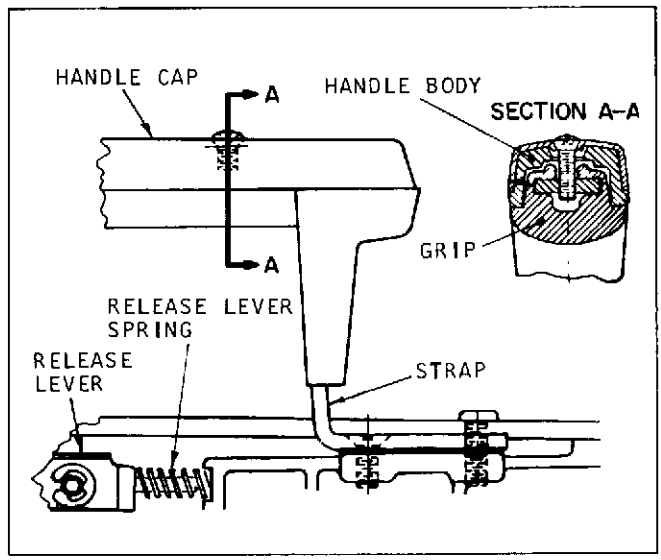


Figure G. Installing the Carrying Handle

b. When reassembling the carrying handle parts to the main plate, attach the carrying handle strap (8) to the main plate with two each of screws (6) and (7) (Figure G), and note the spacers (9) must be used on the front two screws between the strap and the main plate mounting bosses. Assemble the rubber grip (5), handle body (4) and cap (3) to the handle strap as shown in Figure G and install the screws (2).

c. Note, in Figure H (566A and 566X models only), the installation of film cutter parts. The film cutter assembly (33) is secured to the base with two screws (32) with the front screw also securing the loop of the cutter arm spring (31). Insert the tail of the film cutter arm (35) into the rectangular slot at the rear of the film cutter, engaging the hook-end of spring (31) over the arm as shown in Figure H. Insert the bent loop end of the tension spring (34) through the elongated hole in the film cutter and with one full coil beneath the cutter (Figure H).

d. Refer to the Adjustments section and perform all adjustments and alignments before installing the projector covers in Figure 2.

51. LAMP SUPPLY UNIT REPAIR (Figure 1). Repair and replacement instructions for the lamp supply unit are covered in Service Manual P/N 70472A.

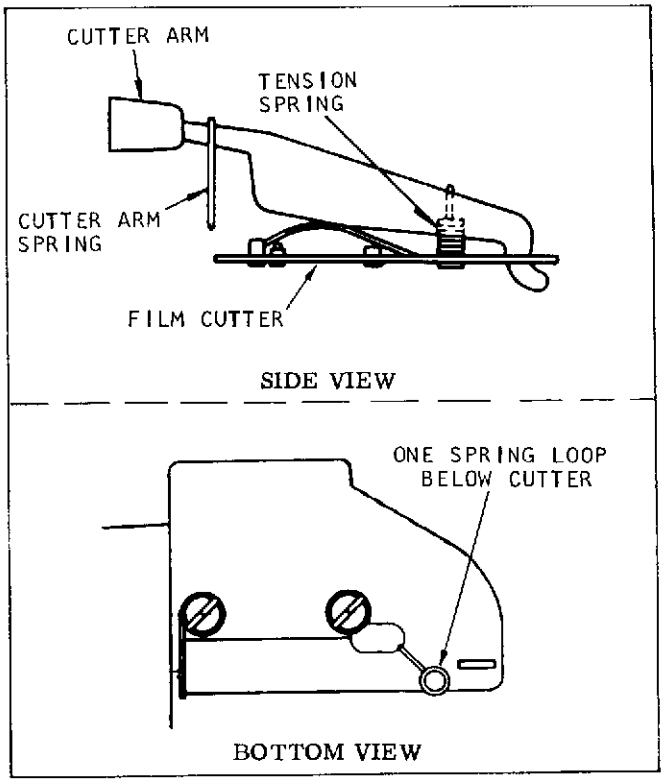


Figure H. Installing Film Cutter Parts

Adjustments

WARNING

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

52. INTRODUCTION.

The adjustments listed in this section are those which either require special tools, are of such nature as to require tolerances or sequential adjustments not readily determinable by inspection, or which differ radically from service procedures applicable to prior Filmosound designs. Routine adjustments such as those applicable to sliding fits, bearing clearances and end-play (within normal shop practices) have not been listed. All special tools required to perform adjustment procedures are illustrated in Figure A.

53. OPTICAL ALIGNMENT. (See Figure J). (Proceed in sequence listed.)

a. APERTURE PLATE. Remove projection lens, projection lamp, and pressure shoe assembly. Turn mechanism until shutter is opened. Loosen two screws (26 and 16) enough to permit free movement of the aperture plate. Tip projector over on its back, open lens mount and insert aperture plug (SER-550-2-N3) into aperture opening. Close lens mount and insert lens plug (SER-550-2-N1) into the lens mount. Insert alignment rod (SER-550-2-N2) into hole in lens plug. Lower rod carefully and shift aperture plate as required until rod enters hole in the aperture plug. Tighten the aperture plate retaining screws securely. Put the projector back on its base, leaving lens plug, aperture plug and aligning rod in place with the aligning rod extending about one inch through the aperture plate.

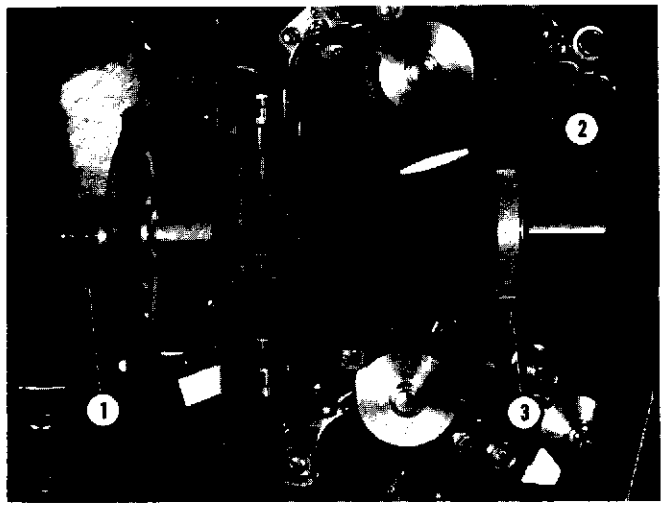
b. LAMP BRACKET. Mount the bracket to the main plate using screws (29, Figure 4), but do not tighten. Slide the upper and lower lamp bracket clips (26 and 27, Figure 4) outward to their stops. Place the bracket setting gage (1, Figure A) into the bracket with the long end toward the aperture plate and onto the aligning rod (3, Figure A). Slide the clips back into place to retain the gage (1, Figure A). Lightly adjust the bracket until the long end of the gage makes contact with the back of the aperture plate and the aligning rod slides easily through the gage. Tighten the mounting screws securely to a minimum torque of 14 in-lb.

c. FINAL CHECK. Slide the alignment rod back and forth in alignment plugs. Since rod is a lapped fit in holes, light resistance should be felt. If rod binds, determine point of binding and relocate the misaligned part. Tip projector over on its back and remove the alignment rod with plugs. Be careful not to lose the aperture plug. Install pressure shoe assembly and visually center in aperture plate before tightening the retaining screws.

54. ADJUSTING THE INTERMITTENT MECHANISM.

a. Checking Shuttle Tooth Side Clearance. Advance the mechanism manually until the shuttle is at the center of its stroke as shown in Figure K. 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 minimum. From the edge of the shuttle slot to the outer end of the shuttle tooth, the distance should be 0.050-inch 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 at either end, the following possible causes should be checked and corrected.

(1) Aperture plate out of alignment. See paragraph 53, step a, Aligning the Aperture Plate.



1. Lamp bracket setting gage
2. Alignment rod
3. Lens Plug

Figure J. Optical Alignment Adjustment

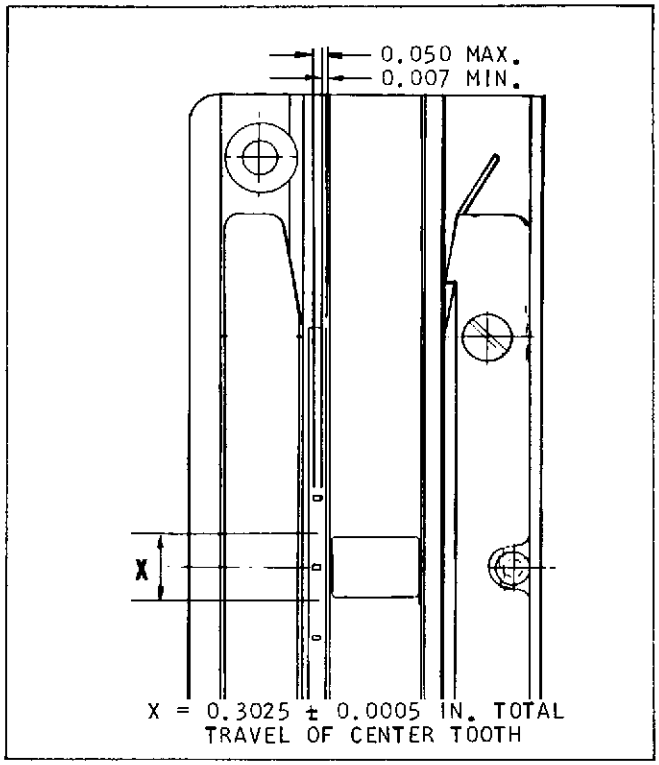


Figure K. Aperture Plate and Shuttle Tooth Clearances

(2) Shuttle stroke incorrect. See paragraph 54, step d, Shuttle Stroke Adjustment.

(3) Link bearing missing from end of shuttle arm. Partial disassembly required to remove shuttle arm and replace link bearing (refer to paragraph 33 and Figure B).

(4) Ball and stud assembly loose on shuttle arm. Reposition ball and stud assembly (Figure B) and tighten stud nut securely.

b. Checking Shuttle Tooth Height. Swing open the lens carrier and advance the mechanism manually until the shuttle is at the center of its stroke as shown in Figure K. Hold the shuttle tooth height gage (item 6, Figure A) by its knurled handle and place it against the aperture plate between the rails. The center ears, on either side of the gage handle, are the height gages. Slowly slide the gage downward. The "Go" ear should pass over the shuttle tooth without catching. Rotate the gage so that the "No-Go" ear is over the shuttle slot and once more slide the gage downward. The "No-Go" ear must not pass over the shuttle teeth. If the shuttle teeth are too high or two low, adjust height as follows.

NOTE: If the mechanism assembly is installed on the main frame, it will be necessary to open the lamphouse and remove the projection lamp, the lampholder and the pulley shield before proceeding with this check and adjustment procedure.

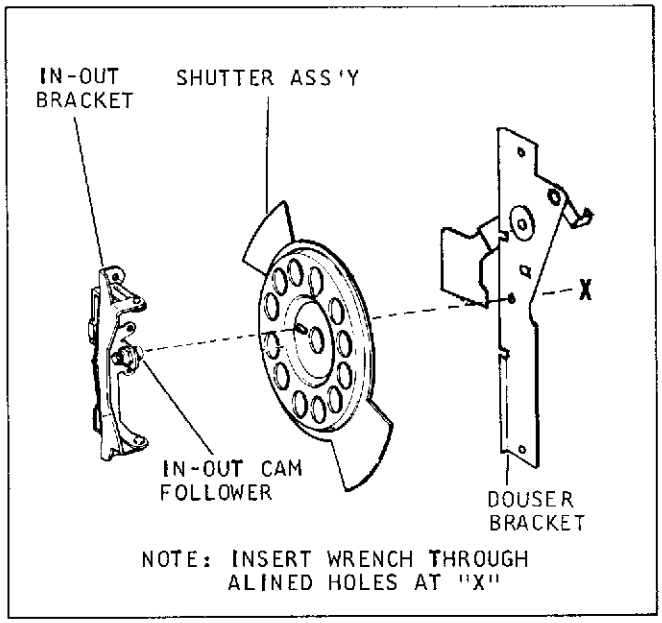


Figure L. Adjusting Shuttle Tooth Height

(1) Turn the mechanism drive pulley by hand until the access holes in the shutter and the fire shutter bracket are aligned as shown in Figure L.

(2) Insert a No. 4 Bristol Wrench into these access openings and engage it in the socket of the in-out cam follower screw.

(3) If the shuttle teeth were too low (No-Go ear passes over shuttle teeth), turn the cam follower screw counterclockwise to increase shuttle tooth height. If the shuttle teeth were too high (Go ear catches against shuttle teeth), turn the cam follower screw clockwise. It may be necessary to re-check shuttle tooth height with the gage several times before the proper height has been obtained.

(4) If one of the teeth cannot be brought into tolerance by the above method, it may be necessary to loosen the screws which attach the in-out bracket (Figure L) and shift the bracket slightly. Tighten the mounting screws securely and check and adjust shuttle tooth height as outlined above.

c. Checking Fit of Shuttle Arms to Pull-Down Cam. (See Figure M.) Remove rear cover, projection lamp and blower belt.

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

(1) Open film gate and turn projector mechanism by hand until shuttle teeth are retracted and have moved downward to approxi-

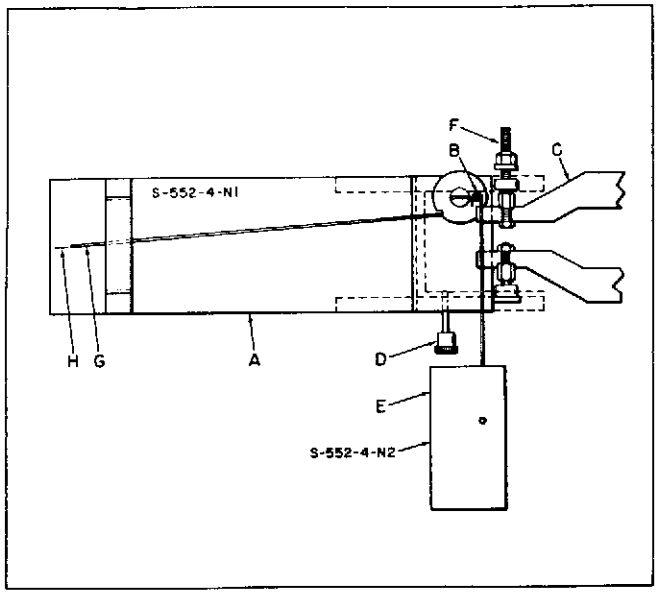


Figure M. Adjusting Fit of Shuttle Arms to Pull-Down Cam

mately the center of the stroke (center tooth approximately on horizontal center line of aperture). Slip guide bars of tool SER-552-4-N1 over casting to which shuttle mounting plate is attached (Figure M). When tool (A) is positioned so that stud (B) can bear on shuttle arm (C), tighten thumbscrew (D) just enough to hold tool in position. Engage hook of tool SER-552-4-N2 in slot of stud (B) as shown, and allow weight (E) to swing downward. Tilt projector, if required, so that the weight does not rub on any stationary parts.

(2) Loosen upper bearing support assembly (F) approximately one turn. Rotate projector framer knob so that pointer (G) moves above witness mark (H). Then turn framer knob in the opposite direction until pointer (G) moves back down in line with mark (H).

NOTE: If adjustment of framer knob does not permit movement of pointer (G) as specified, it may be necessary to rotate the camshaft slightly to bring cam into proper position.

(3) Carefully tighten upper bearing support assembly (F) while observing alignment of pointer (G) with witness mark (H). The instant that pointer (G) starts to move upward stop turning support assembly (F). This is the proper adjustment.

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 reduce life of cam and cam shoes.

d. Checking Shuttle Stroke. Normal shuttle stroke (vertical travel of shuttle teeth) is 0.3025 inches (Figure K). The most convenient means of measuring the stroke is to use the projector as an optical comparitor. The step on the stroke gage (item 6, Figure A) is the length of the nominal stroke. When it is inserted in the aperture and projected, it provides a reference dimension with which the actual stroke can be compared. Figure N is a sketch of a target. The A to B section is a 100 to 1 enlargement of the gage. The C and D lines represent 100 to 1 enlargements of the limits of tolerance.

(1) Procedure for Measuring Shuttle Stroke. (See Figure N.)

(a) Remove pressure plate assembly (paragraph 27), and the motor drive belt (item 32, Figure 5).

(b) Reinstall blower belt and set framer at the mid-point of its over-all travel.

(c) Suspend target approximately 18 feet from the projector with center of target on same horizontal line as optical axis of projector. If room arrangement necessitates tilting projector, target must also be tilted so that angle between target and optical axis is 90 degrees. If this is not done, "Keystone" error will be produced.

(d) Turn the projector mechanism by hand until shuttle is at bottom of stroke and shutter just clears aperture.

(e) Insert stroke gage (SER-550-5-N2) in the aperture plate and lightly press it down against the top tooth of the claw. Close the film gate.

(f) Turn on the projector lamp and focus shuttle slot on the target. Move projector toward or away from the target until a sharply focused image of the step at end of stroke gage just reaches from line A to line B (Figure N).

(g) Slide the stroke gage up out of field-of-view and turn mechanism pulley until center tooth of shuttle is at top of stroke indicated by image of tooth near line A. Adjust framer, if required, until projected image of edge of tooth just touches line A.

(h) Turn mechanism pulley until center tooth of shuttle reappears at top of target. Rock mechanism pulley to find top of shuttle stroke. Edge of tooth used as reference in step (g) must fall between lines (C) and (D) (Figure N). If image falls between (C) and (A), stroke is too short. If image falls beyond (D), stroke is too long.

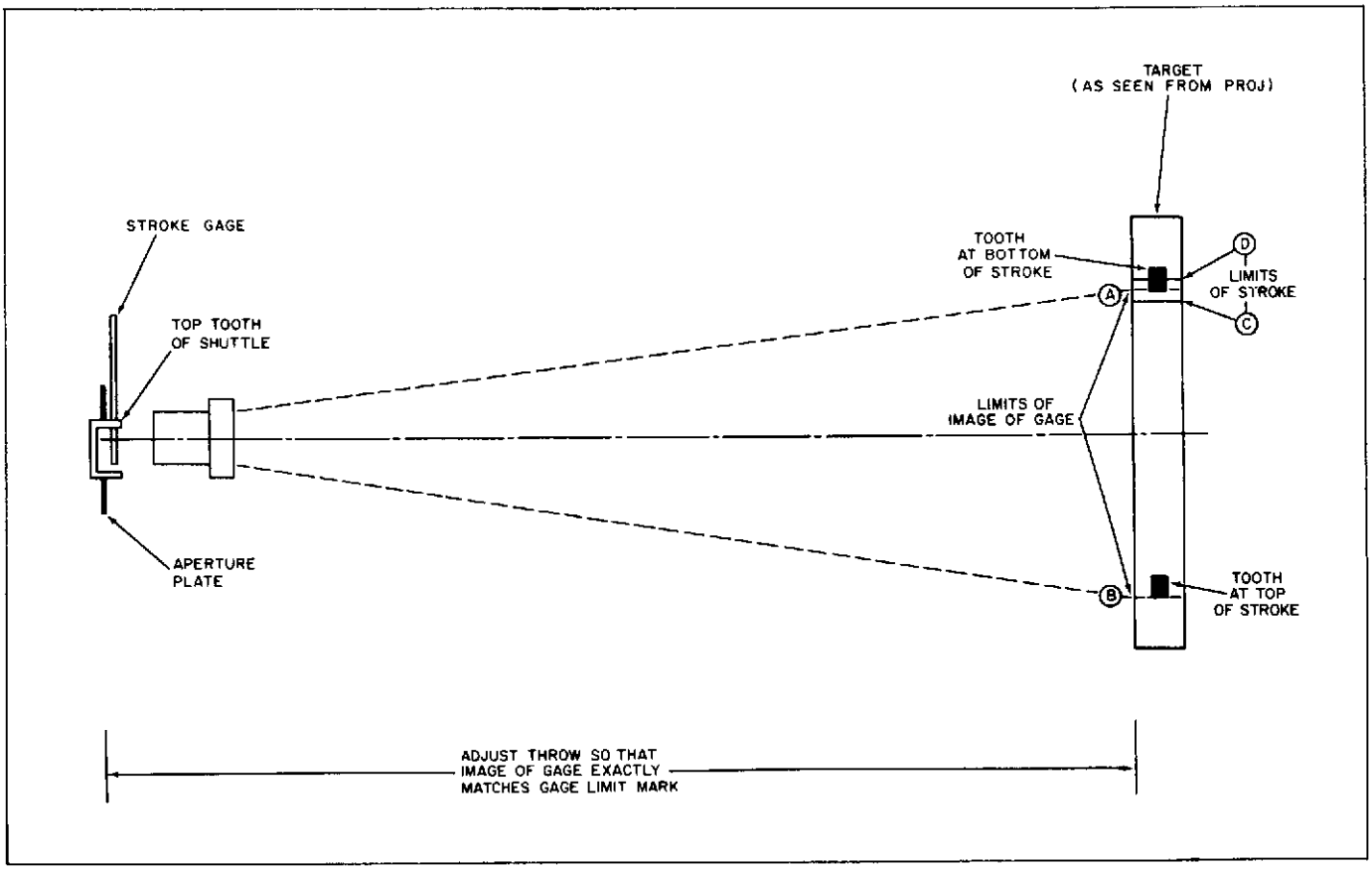


Figure N. Checking and Adjusting Shuttle Stroke with Target

(2) Procedure for Adjusting Shuttle Stroke. Loosen the two shuttle plate screws (Figure B) 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 54, step a, and readjust if necessary.

CAUTION: Do not attempt to eliminate film slap by setting stroke outside established tolerance. This will produce double image and/or jump with films having different shrink or stretch.

e. Framing Adjustment. Thread the projector with film having proper frame line position. Project film and turn framing knob from one limit to the other. If at one limit a frame line is not visible, loosen nut on the framing eccentric located at top of shuttle arm plate assembly (Figure B) and turn eccentric until the frame line appears. Hold eccentric while tightening nut. Check adjustment by again turning framing knob from limit to limit while observing 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.

f. Adjust Sprocket Guard (Manual Thread Models Only.) The sprocket guard (item 33, Figure 14 or item 2, Figure 14A) must be adjusted to hold the film in place around the sprocket and yet provide clearance for splices. Loosen the two screws which attach the sprocket guard to the mechanism casting. Place two thicknesses of film on the sprocket teeth and lightly press and hold the guard against the film. Shift the guard sidewise, if necessary, to insure full and even contact of the guard with the film strips; then tighten the retaining screws securely and remove the film strips.

55. LENS CARRIER ADJUSTMENT. Angular relationship between the lens carrier and the aperture plate is controlled by lens mount stop screw (item 31, Figure 16). Thread projector with roll title or target film having sharp images in corners and project a picture approximately 30 inches high onto a matte surface. Note: Projector must be square with the screen. Focus the picture and compare resolution of the two sides of the image when viewed from a distance of approximately twice the width of the picture. If one side appears to be soft, refocus to sharpen that edge of the picture and note whether the lens is moved toward or away from the aperture. For example, if image at the right-hand edge of the screen is soft until the lens is moved toward the aperture, then the lens stop screw

is set too far forward and should be turned clockwise.
CAUTION: This adjustment is critical. Lens stop screw should only be turned a few degrees between tests for sharpness.

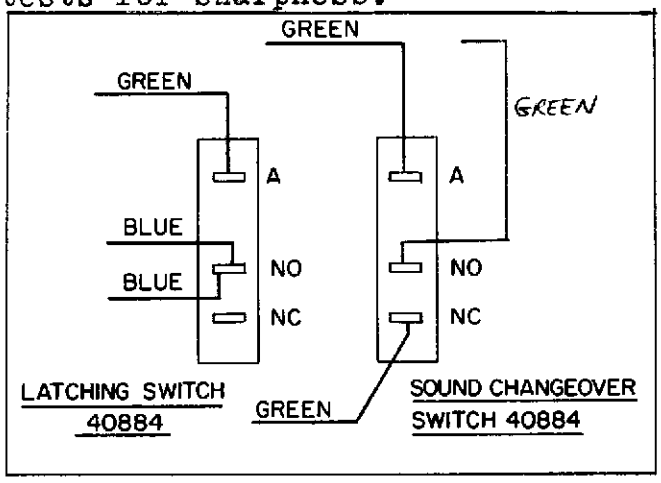


Figure P. Adjusting the Micro Switches

56. ADJUST DOUSER SOLENOID.

To adjust the douser solenoid use the following procedure:

a. Energize douser solenoid.

b. If douser solenoid does not move freely when energized and de-energized loosen two mounting screws (10, Figure 6) and reposition the solenoid until douser moves freely when energized and de-energized.

57. ADJUST MICRO SWITCHES (See Figure P).

CAUTION

Be certain no power is connected to the projector and that projector is in OFF condition.

a. Check to see that the mounting screws on each micro switch are tightened securely.

b. Connect a Simpson #260 Volt-Ohm Meter or equivalent between A and NO of the latching switch.

c. Depress douser solenoid manually and read continuity on meter.

d. Connect the meter between A and NC of sound changeover switch.

e. Depress douser solenoid and read open circuit on meter.

f. If above results are not obtained, loosen mounting screws of switch or switches and reposition until proper operation occurs.

58. ADJUSTING REEL ARMS AND REWIND CLUTCH.

a. Front Reel Arm Adjustment. (See Figure 9.) Adjust end play of drive shaft (22) to 0.008 inch ± 0.003 inch by positioning retaining ring (18) against an 0.008 inch shim. The backlash on the lower gear assembly (8) should be between 0.005 inch minimum and 0.018 inch maximum. Adjust by assembling, as required, a combination of 0.010 inch washers (9) and 0.005 inch washers (9B) on feed spindle assembly (10). Greater thickness in washer combinations reduces backlash.

b. Rear Reel Arm Adjustment. (See Figure 10.) Adjust end play of drive shaft (22) to 0.008 inch ± 0.003 inch by positioning retaining ring (9) against an 0.008 inch shim. The backlash on the upper gear assembly (25) should be 0.015 inch ± 0.003 inch. Adjust by increasing or decreasing a build-up of 0.005 inch and 0.0025 inch washers (26), as required, beneath the upper gear assembly (25). Greater thickness in washer combinations reduces backlash.

c. Rewind Clutch Adjustment. The rewind clutch system must be adjusted to produce a supply spindle torque of 5-1/2 to 6 inch-ounces when the rewind button is pressed during operation. Install an empty reel on the supply spindle and wrap several turns of a ten-inch film strip around the reel hub. Hook a spring scale to the free end of the film strip. Turn on the projector and press the rewind button. The spring scale must measure between 5-1/2 and 6 inch-ounces of torque. All clutch systems (Figures 2D, 2E and 2F) are adjusted in the same manner, by tightening (to increase torque) or loosening (to decrease torque) the hex adjusting nut on the outer end of the rewind sprocket (item 3). Hold the sprocket firmly and adjust the nut with an open-end wrench.

59. SOUNDHEAD ADJUSTMENTS.

a. REMOVAL. Due to the ease with which the head can be removed and the greater accessibility thereby obtained, time will be saved by removing the head if major work is required.

(1) Disconnect photocell and exciter lamp cable from amplifier and release cables from retaining clips.

(2) Remove grounding spring (41, Figure 5). Insert the end of an Allen wrench or short steel pin in hole in sound drum bearing housing directly behind flywheel until wrench or pin drops through the hole in sound drum shaft. Remove flywheel retaining nut (5, Figure 7), flywheel (7), and washer (8).

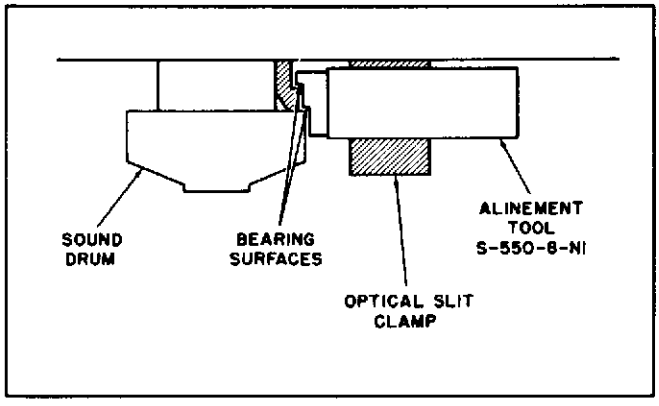


Figure Q. Adjusting the Photocell

(3) With a sharp pencil, draw a line on the main frame where the front edge of the soundhead meets the frame. This will provide a reference mark when reassembling.

(4) Take out the three screws (9 and 11, Figure 7) which tap into the soundhead from rear of main frame, and carefully withdraw soundhead.

b. PHOTOCELL ALIGNMENT. (See Figure Q).

CAUTION

Do not scratch light pipe surface of photocell. Clean with Opti-Kleen before adjusting.

(1) The adjustment of the light pipe is made with alignment tool (SER-550-8-N1). The setscrew (19) and screws (21) must be loosened and exciter lamp (10) and optical slit (13) removed.

(2) Insert alignment tool as shown in Figure Q and adjust sound drum in or out until inner face of drum contacts the first notch of tool and tighten the screws (19) securely. Withdraw tool and shift entire photocell so that forward end is aligned with inner face of sound drum. Tighten setscrew (20) securely; install lamp and optical slit and adjust slit (paragraph 59, d).

c. TENSION ROLLERS. (See Figure 11.) Arms upon which rollers (29) and (30) are mounted are linked by torsion spring (37). Therefore, roller arms move as a pair. Counterbalance spring (31) offsets the weight of the rollers and arms. Place soundhead on a level surface and move roller arms (as a set) to various positions. If spring tension is incorrect, roller arms will not remain in the position in which placed. If roller arms swing downward, loosen retaining screw (32) and move spring terminal downward until weight of arms is counterbalanced. If roller arms move upward, move terminal upward to reduce counterbalancing force.

d. OPTICAL SLIT ASSEMBLY. (See Figure 11.)

(1) Loosen clamping screw (11). If slit does not slide freely in holder, insert bit of small screwdriver in slot in clamp and wedge clamp open to free slit assembly. Thread projector with 7000 cps optical setting film and connect 16-ohm, 10-watt load resistor and output meter to speaker jack.

NOTE

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

(2) Set volume control at approximately 12 o'clock position and start projector. Move slit toward or away from film, as required, to obtain output reading. Rotate slit to obtain peak reading and simultaneously move in or out until maximum output is obtained. If film was threaded with emulsion toward slit, move slit toward film until output drops 1-1/2 to 2 db. If emulsion is toward sound drum, move slit away from film to obtain 1-1/2 to 2 db drop in output. Tighten slit clamping screw.

e. BUZZ TRACK ADJUSTMENT. (See Figure 11.) Lateral position of the film in the soundhead is controlled by the flanged roller (27) and edge guide screw (24). Unless the adjustment has been disturbed, it is not probable that the edge guide screw (24) will require resetting. Thread the projector with buzz track film and adjust volume control to a suitable listening level. Turn adjusting screw (14) to move flanged roller laterally.

NOTE

There are two types of buzz track in use. On one, the track spacing exceeds the length of the scanning beam. This track can be posi-

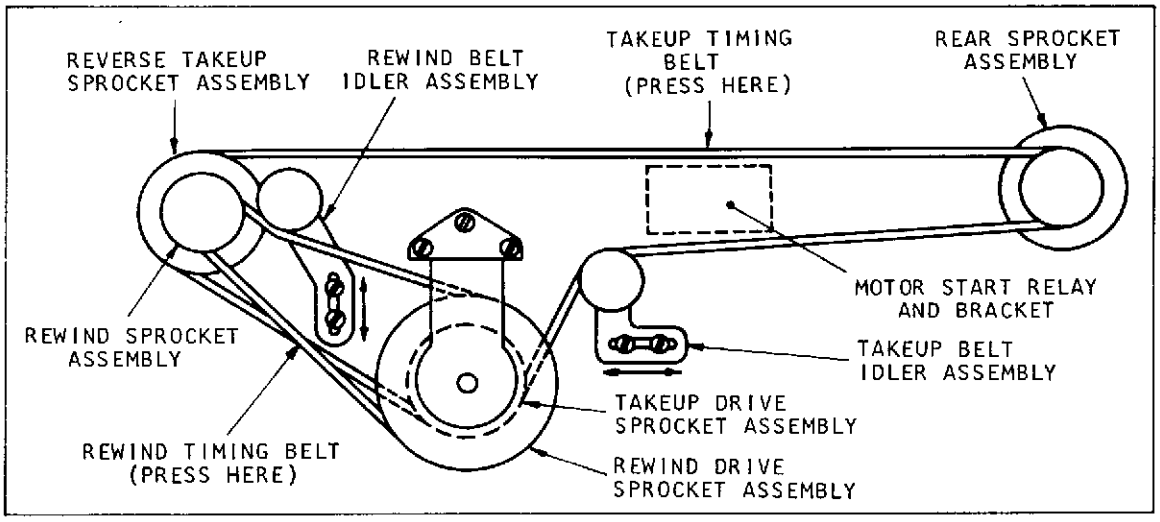


Figure R. Adjusting Timing Belt Tension

tioned so that little or no signal is reproduced. On the other type of track, spacing is less than the length of the beam. This track should be positioned so that both tones are reproduced at approximately the same volume level. If, after adjustment of guide roller position, signal levels cannot be balanced (or eliminated on wide track), or level of tones fluctuates, adjust edge guide screw (24) to clear up the condition. If the edge guide screw is far out of adjustment, turn it clockwise until it clears edge of film, adjust rollers and than set guide screw to stop side weave of film.

f. Installing the Soundhead (Figure 7). Lift the soundhead assembly up into place against the main plate, making certain that the cables are threaded through the hole and behind the plate. Loosely install the soundhead screws and washers (9, 10, 11). Align front edge of the soundhead casting with the pencil mark drawn on the main plate prior to removal and tighten the mounting screws securely. Assemble the flat washer (8) and flywheel (7) on the sound drum shaft and install the flywheel nut (6) finger-tight. Insert a small diameter pin through the hole in the sound drum housing and rotate the drum until the pin drops into a similar hole in the shaft. Hold the pin securely and tighten the flywheel nut with an open-end wrench. Install the grounding spring.

60. ADJUSTING TIMING BELT TENSION. Both timing belts are adjusted by means of the idler assemblies shown in Figure R. Although belt tension is not critical, excessive tension will reduce belt life. Loosen the rewind idler bracket screws (Figure R) and position the rewind belt idler until the rewind timing belt can be depressed at mid-point approximately 1/8-inch with light thumb pressure. Tighten the idler bracket screws securely. Loosen the take-up idler bracket screws and position the take-up belt idler until the belt can just touch the motor relay mounting bracket when light thumb pressure is applied to the belt. Tighten idler bracket screws securely.

61. PROJECTOR SPEED CHECKS. The 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.

a. METHODS OF MEASUREMENT. Various devices and procedures can be used to check projector speed. The most common ones are as follows:

(1) PHOTOCELL AND FREQUENCY METER. Used to measure the number of pulsations of the projection beam per second. Pulsations per second is then converted to projector speed. This method is quite practical in large volume shops.

(2) "STROBATAC" or similar strobe light. Is usually synchronized with interrupter shutter or shuttle. Shutter makes one revolution per frame. Shuttle makes one stroke per frame.

(3) TACHOMETER (preferably having a speed range with a maximum speed of 150-200 rpm). Used to measure rpm of sprocket.

(4) STROBE DISC. Attached to sprocket by means of suction cup or rubber foot. For viewing with light from 60 cps source, disc should have 70 dots for sound speed, 93 dots for silent speed. Count number of apparent revolutions of pattern for one minute. If pattern drifts in direction of rotation, add to design speed to obtain true speed. If pattern drifts against rotation, subtract from design speed to obtain true speed.

(5) TIMED LOOP. Make loop of exactly 120 frames. At sound speed splice will pass aperture 12 times per minute plus or minus the permissible variation in speed and the timing error.

b. SPEEDS AT 120 VOLTS 60 CPS AC. (566A)
SPEEDS AT 120 VOLTS 50 CPS AC. (566X)

SOUND SPEED (24 FPS ± 2%)

Shutter - 1440.00 RPM ± 2%
Sprocket - 102.86 RPM ± 2%

62. AUTO-LOAD SYSTEM ADJUSTMENT PROCEDURE — GENERAL (AUTOTHREAD MODELS ONLY).

a. The auto-load system consists of a series of guides and rollers which, when the system is in the load position, are so located as to guide the film through the threading path. When the system is in the open position, the guides and rollers clear the film path.

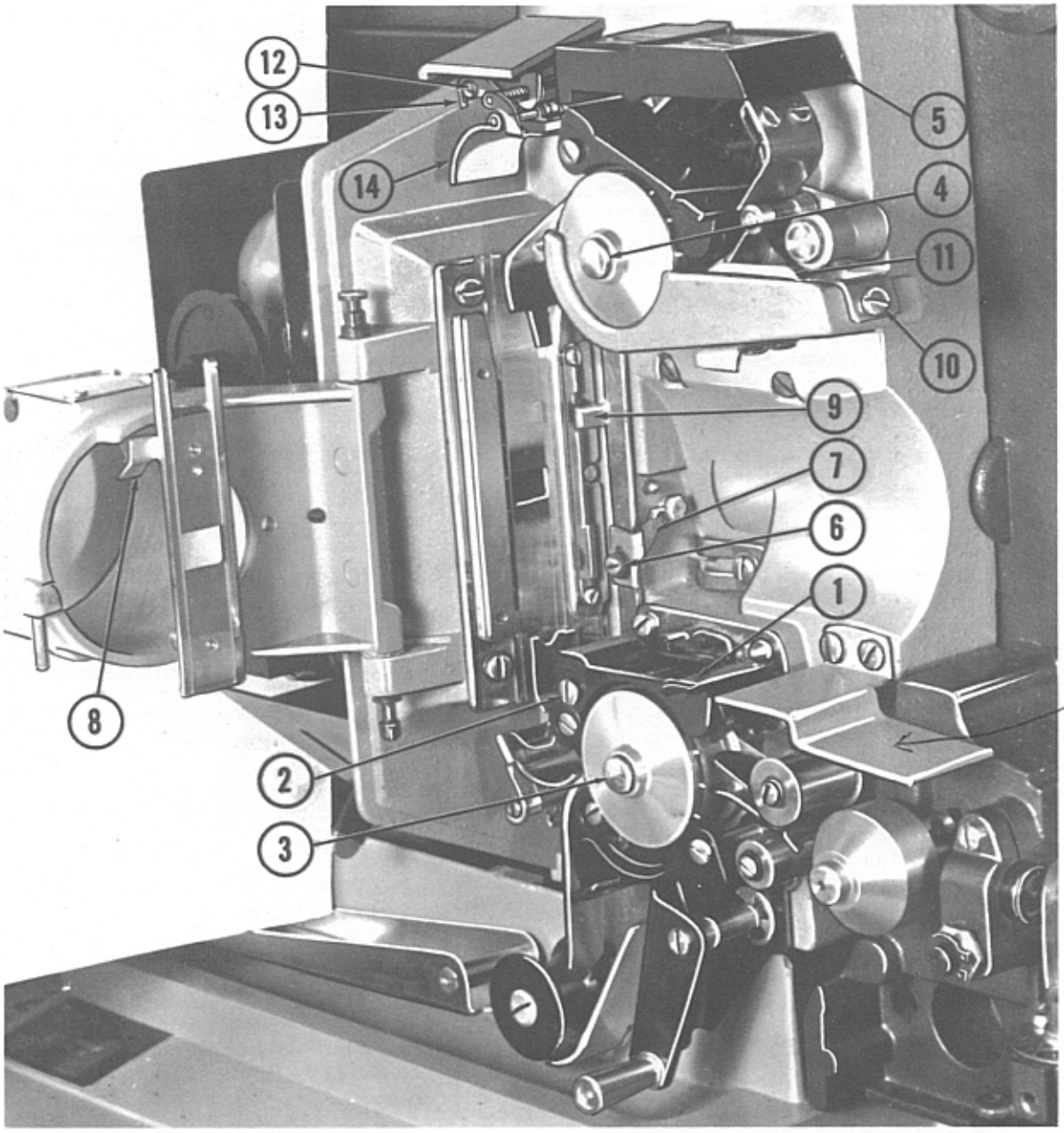
b. When the system is in the open position, the location of the guiding parts is not critical. Therefore, adjustments to assure proper location of the guiding parts are made with the system in the load position.

c. The guides are connected by mechanical linkage. The system is actuated by a cocking lever at the lower end of the linkage and the movement is stopped at the top end of the linkage. The specified clearances must be checked with the system in the load position. If the need for adjustments is detected, it is important that the repairmen proceeds in the sequence listed in this section. The sprocket timing and the locating of the soundhead may be done without disturbing the guide adjustments.

63. CHECKING AND ADJUSTING LOADING GUIDES.

a. Open the film gate and the upper take-up sprocket shoe (1, Figure S) and remove retaining screw (2).

b. Place timing plate (SER-552-1-N1) over the sprocket hubs (3) and (4). The timing plate locating pin should enter the counterbore from which screw (2) was removed. If the locating pin does not enter counterbore, loosen three sprocket guard plate attaching screws (1, Figure T) and rotate the lower guard plate (2) until pin enters hole. Then tighten the three screws securely.



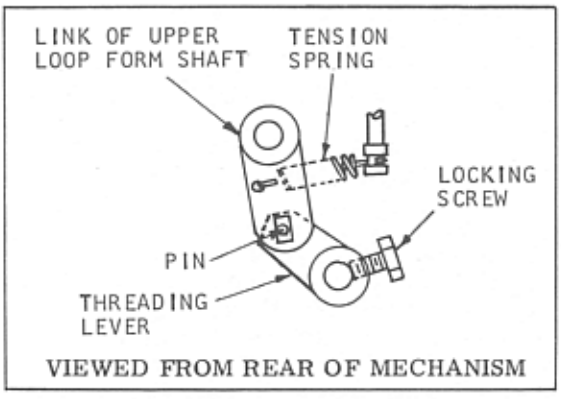


Figure S. Autoload System Adjustments — View I

c. Remove retaining ring that secures the actuating assembly (5, Figure S) and lock the auto-load system. Place a 0.015-inch feeler gage between the film support rails of the aperture plate and the rear surface of the lower loop form assembly (4, Figure T). This surface should touch the feeler gage just as the heel of the loop form (5, Figure T) strikes the shoulder on the mounting stud for the entrance guide roller (6, Figure T). To adjust, loosen two screws (7, Figure T) which attach the upper sprocket guard plate. Press downward on front end of loop form assembly and rotate upper sprocket guard plate until heel of loop form strikes shoulder of stud and rear surface clears aperture rails by 0.015-inch. Then tighten screws (7, Figure T) securely.

d. Check operation of the film escape mechanism by leaving the auto-thread system open. Manually advance the film and jam it in the upper channel. The film should fold and flow out through the kickplate in the loop-former (14, Figure S). If the kickplate does not release, the arm of the hub assembly (13, Figure S) is not striking the hood (9, Figure T) properly. The hood can be moved slightly and the hub assembly should be adjusted accordingly.

When the auto-system is activated and the kickplate does not lock in position loosen the screw (12, Figure S) holding the hub assembly to the locking pawl and adjust the hub assembly until the tip of the bracket touches the upper curved surface of the loop former. This will lock kickplate in position.

e. Again depress the loop form assembly and check to make certain that there is 0.012 to 0.015 inch clearance between the top surface of the lower loop form (4, Figure T) and the bottom surface of the upper loop form (8). If adjustment is required, remove the two screws which attach the hood (9). Loosen two setscrews (10) and rotate upper loop form (8) to obtain desired clearance. Tighten setscrews and reinstall hood. Before tightening hood retaining screws, press hood toward rear of projector.

f. With the auto-load system locked and film gate open, check to make certain that the shuttle teeth do not protrude through the slot in the aperture plate. If shuttle teeth protrude, loosen screw (6, Figure S) and carefully raise the shuttle retractor (7) until teeth are retracted; then tighten screw (6) securely.

CAUTION

The top end of the shuttle retractor must not strike the casting.

g. Close film gate while observing to see that the film pressure plate does not contact the aperture plate. If pressure plate remains in contact with aperture plate, either the pressure plate lift-off ear (8, Figure S) or the ear (9) on the threading guide linkage is bent. Reform ear, or ears, as necessary.

h. Loosen screw (10, Figure S) and align the film guide (11) so that film will feed squarely to the sprocket; then retighten screw (10).

i. Loosen screw (11, Figure T), lock the system, and check to make certain that loop form heel (5) is bearing on shoulder of roller stud (6). If necessary, rotate the eccentric pivot (12) with a wire pick or pin punch until heel bears against stud shoulder. When loop form is pressed downward, there must be no clearance between heel and stud shoulder. Recheck clearance between rear of loop form and aperture rails. Also, make certain that end of upper loop form (8) is tangent to or slightly ahead of the plane of the aperture plate film support rails. If readjustment is necessary, refer to steps c through e, preceding. Install actuating assembly (5, Figure S).

j. Lock the system and try inserting film into the feed sprocket. If film slips in too freely, loosen the two screws (13, Figure T) and move leaf spring (14) downward to increase pressure on the film. If the film buckles as it is inserted, move the leaf spring upward to reduce the pressure; then tighten screws (13).

64. CHECKING AND ADJUSTING LOOP RESTORER. Check the operation of the loop restorer by threading the projector with a loop of test film in which two or three successive perforations have been purposely enlarged at points approximately one foot apart. The first set of damaged holes should be located about two feet from the aperture. Run the projector in "forward" and observe the action of the loop restorer as the enlarged perforations run through the film gate. The lower loop should be automatically restored within five or six frames. To adjust the loop restorer, refer to Figure U and proceed as follows:

a. Slip the loop restorer position tool (item 7, Figure A) over the loop restorer roller (1, Figure U) with the flat on the tool facing the guide roller at the rear end of the upper sprocket shoe (6, Figure U). The flat of the tool should just touch the guide roller lightly. To adjust spacing between loop restorer roller and guide roller, loosen the mounting screws in the self-centering assembly (inset A, Figure U) and raise or lower that assembly until the proper spacing is obtained. Then tighten the mounting screws securely. Be sure that the ear of the loop restorer arm is positioned between the two spring-loaded keeper plates of the self-centering assembly.

b. Rotate the mechanism pulley until the setscrew in the loop restorer cam is at the bottom, directly below the camshaft (see inset A, Figure U). The clearance between the upper tip of the cam follower blade and the face of the cam should be 0.015 inch. To ad-

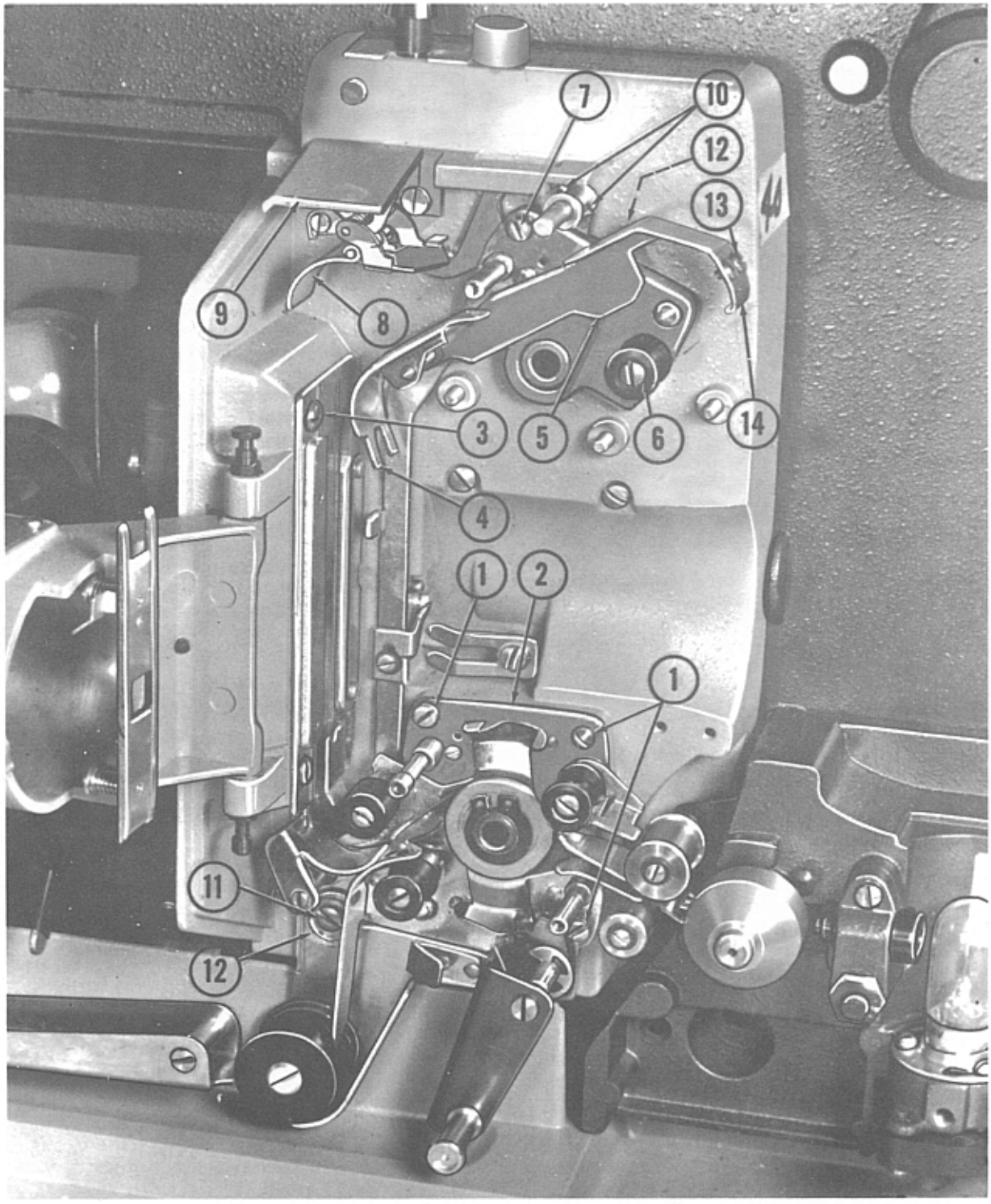
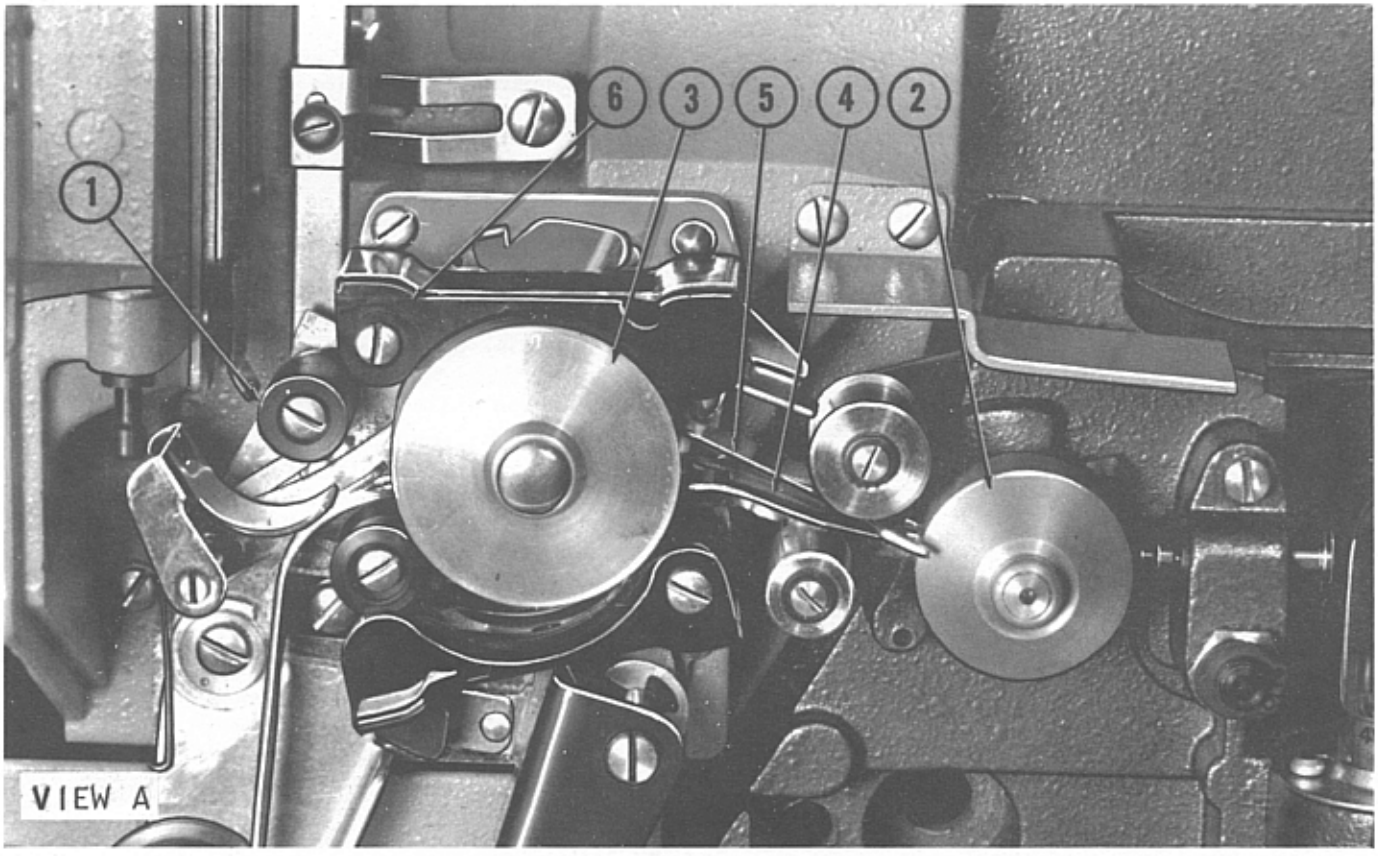


Figure T. Autoload System Adjustments — View II



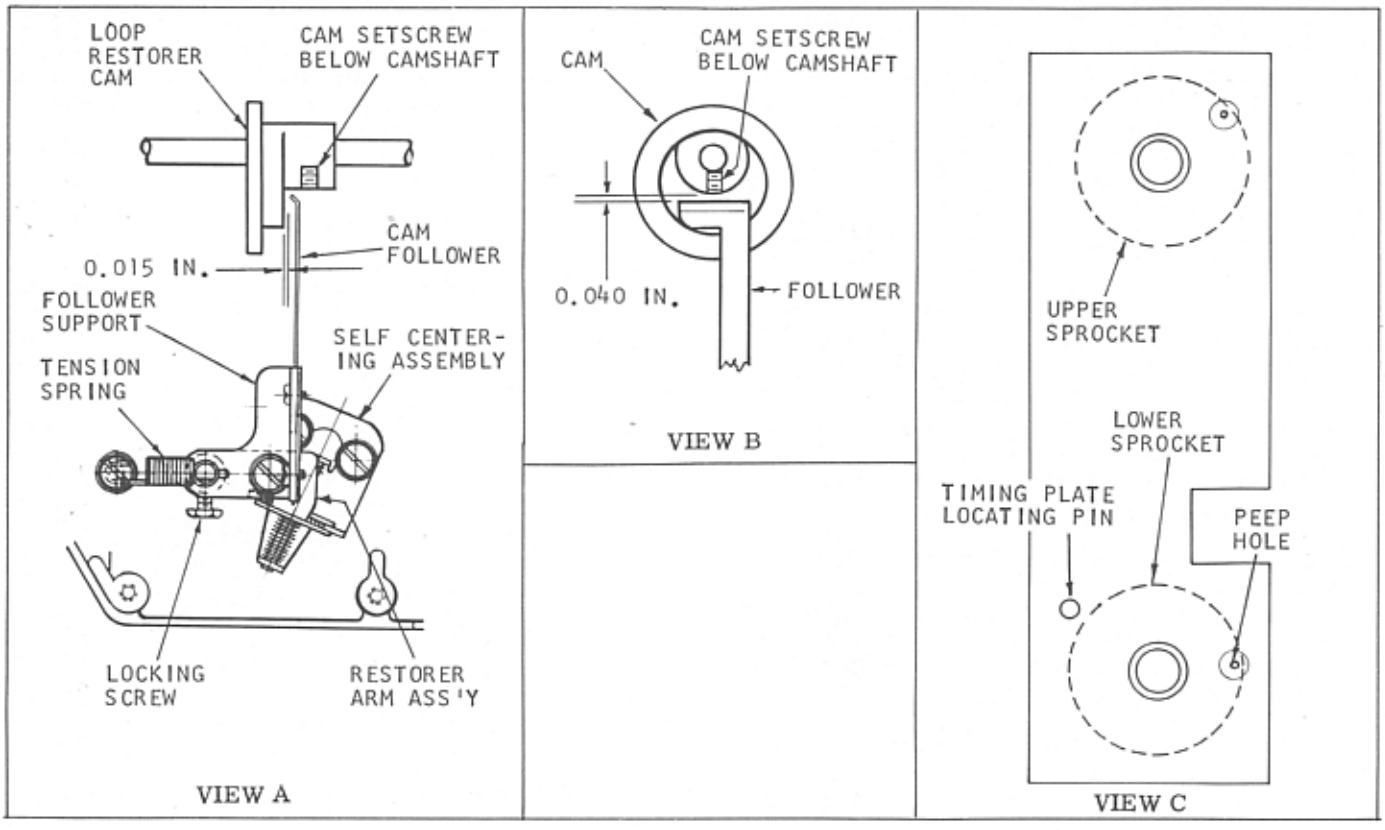


Figure U. Autoload System Adjustments — View III

just this clearance, loosen the cam follower support mounting screw (inset A) and rotate the support accordingly; then retighten the screw securely. Now check the clearance between the upper end of the cam follower and the small diameter of the loop restorer cam (inset B). This clearance should be 0.040-inch (± 0.005 inch). Be sure that the cam setscrew is still positioned at the bottom of the cam, below the camshaft. To adjust this clearance, loosen the two follower screws (inset A) and raise or lower the cam follower blade as necessary; then retighten the two screws securely.

c. Recheck the clearance between the loop restorer roller and upper sprocket shoe guide roller as outlined in step a, above. Remove the restorer positioning tool and once more check loop restorer operation with the loop of test film.

65. TIMING THE SPROCKETS.

a. Open the film gate and turn down the framer shaft as far as it will go. Then turn the mechanism manually until the shuttle is at the bottom of the stroke (teeth protruding) and the edge of the shutter blade bisects the aperture opening.

b. Timing of the sprockets requires the use of the timing and alignment plate SER-552-1-N1 and the soundhead locating gage SER-552-5-N1, both of which are illustrated in Figure A.

c. Open the film sprocket shoes and place the timing plate (item 10, Figure A) over the sprocket hubs (see inset C, Figure U). Dip the end of a straightened paper clip in red lacquer and insert it down through the peep holes to mark the face of each sprocket. Remove timing plate and place a light pencil mark on the face of each sprocket in line with the teeth nearest the red dot. If this pencil mark does not align with the red dot, the sprockets are out-of-time. Note the direction in which each sprocket must be rotated to bring teeth back in line with peep holes; then proceed as follows:

NOTE: In the most recent projectors, the upper sprocket is pressed on the sprocket shaft and is retimed in the same manner as the lower (take-up) sprocket (step e, following). In earlier projectors, the upper sprocket is secured to the shaft with two setscrews and these setscrews, in turn, are locked with two more setscrews. Retiming of this earlier sprocket is covered in step d, following.

d. To retime the feed (upper) sprocket on earlier models, remove the sprocket shoe. Remove the two sprocket setscrews to expose the inner setscrews and loosen the inner setscrews. Rotate the sprocket until the pencil mark appears in the upper peep hole. Then tighten all four setscrews securely.

e. To retime the feed (upper) sprocket on the latest models (see Note following step c, above), hold the large sprocket gear at the rear of the upper sprocket shaft stationary while loosening its setscrews; then carefully rotate the upper sprocket until the pencil mark appears in the center of the upper peep hole. Tighten the sprocket gear setscrews securely. To retime the take-up (lower) sprockets on all projectors, hold the lower sprocket gear stationary and loosen its setscrews; then rotate the lower sprocket until its pencil mark appears in the center of the lower peep hole and tighten the sprocket gear setscrews securely.

66. POSITIONING THE SOUNDHEAD. (566 ONLY).

a. Lock the system in the "thread" position and loosen the three screws (23 and 24, Figure 4) which attach the soundhead to the main frame casting.

b. Hold the soundhead locating gage (item 12, Figure A) by its handle and insert the gage carefully between the sound drum and take-up sprocket as shown in Figure V. The gage must be between the sound drum threading guides. Position the gage so that one end bears against the supporting ribs for the sound track edge of the film and with the round body of the gage in contact with the rear sprocket flange, as shown.

c. Tilt the gage so that it lies on a centerline between the take-up sprocket and sound drum. Shift the soundhead toward the take-up sprocket until the sound drum bears lightly against the end of the gage, and tighten the soundhead attaching screws securely.

67. CHECKING THE EXCITER LAMP COVER CLEARANCE. Since the film must pass between the sound drum and exciter lamp cover, the clearance between these two items should be checked. Insert a #77 drill or a straight piece of #25 wire into the channel between the drum and cover. Gage should enter channel with slight friction but without forcing. If clearance is inadequate, straighten the exciter cover locating pins to obtain proper clearance.

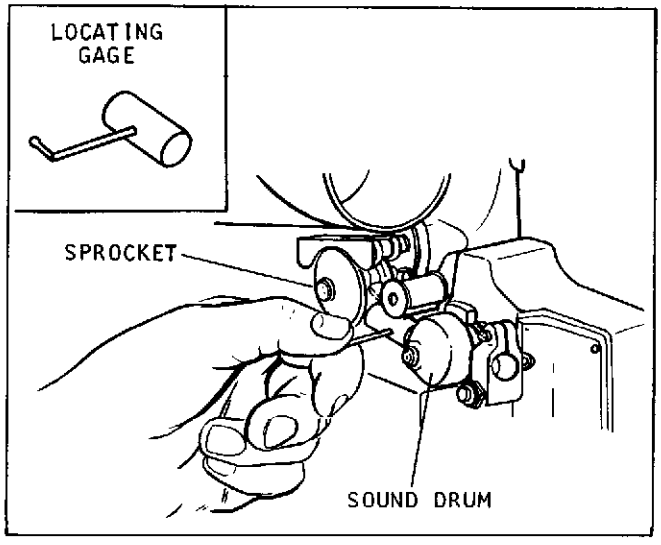


Figure V. Positioning the Sound Head

68. CHECKING OPERATING VOLTAGE, FILM SPEED AND MAXIMUM CURRENT.

a. Allow projector to attain sound speed (minimum of ten feet run through the projector).

b. Vary voltage from 105 to 129 volts. Speed of projector must be within limits specified.

c. Observe Strobotac for proper speed.

d. With 400 feet of film on front reel arm at 105-129 volts A.C. 60 cycle the film shall travel forward at the standard sound speed of 24 frames per second plus or minus 2%. This is equivalent to a camshaft speed of 1440 R.P.M. plus or minus 28.8 R.P.M.

e. Maximum current shall not exceed 12 amp. at 120 volts 60 cycles.

69. CHECKING FILM BURN AND DOUSER CONTROL OPERATION.

a. Operate projector without film and projector lamp on. Operate in "Forward Project" and "Reverse Project" position 25 times.

b. With film in gate, stop film by turning center switch to "Off" position.

c. Turn amplifier on and check operation of ventilation fan.

d. Douser shall fully open when operated in both "Forward Project" and "Reverse Project" positions.

e. With the lamp on and with the center control switch in "Thread Forward", "Off" and "Reverse" positions, the douser shall cover the aperture promptly and completely, allowing no blistering or burning of film.

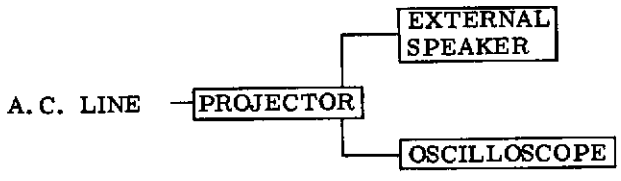
f. Solenoid Hum is acceptable, but Solenoid clatter is unacceptable during douser actuation.

g. Ventilation Fan must run when:

(1) The fan switch is in the "Fan" or "Lamp" position.

(2) With the fan switch "Off" and the amplifier turned "On".

70. CHECK SOUND REPRODUCTION CHARACTERISTICS OF AMPLIFIER AND SPEAKER.



a. Microphonics

(1) Turn amplifier "ON".

(2) Use external speaker.

(3) Volume control full C.W.

(4) Tone control normal.

(5) Projector "ON".

(6) Tap projector case with palm of hand near amplifier and on exciter lamp cover.

b. Parasitics & Noise

(1) Turn amplifier "ON".

(2) Use external speaker.

(3) Projector "ON".

(4) Tone control position 1) normal; 2) hi; 3) lo.

(5) Vary volume control slowly from full C.C.W. to C.W. in each tone position in (4).

c. Acoustical Feed Back

(1) Turn amplifier "ON".

(2) Use internal speaker.

(3) Volume control at 2 o'clock position.

(4) Tone normal.

(5) Projector "ON".

(6) Switch to tone hi and low positions.

d. Speaker Power Handling Ability

(1) Thread projector with sound test film.

(2) Amplifier "ON".

(3) Tone normal.

(4) Projector "ON".

(5) Advance volume control to full C.W. for short duration.

(6) Switch between internal and external speakers.

(7) Adjust volume control for 10 watt level. (Peaks of program material to align with calibrated lines on scope - peak of 8.5 V.R.M.S. at extejnal speaker jack).

(8) Repeat 6.

(9) Adjust volume control to 2 watt level. (Peaks of program material to align with calibrated lines on scope-peak of 4.0 V.R.M.S. at external speaker jack).

(10) Use internal speaker.

(11) Rotate tone control to hi and lo positions.

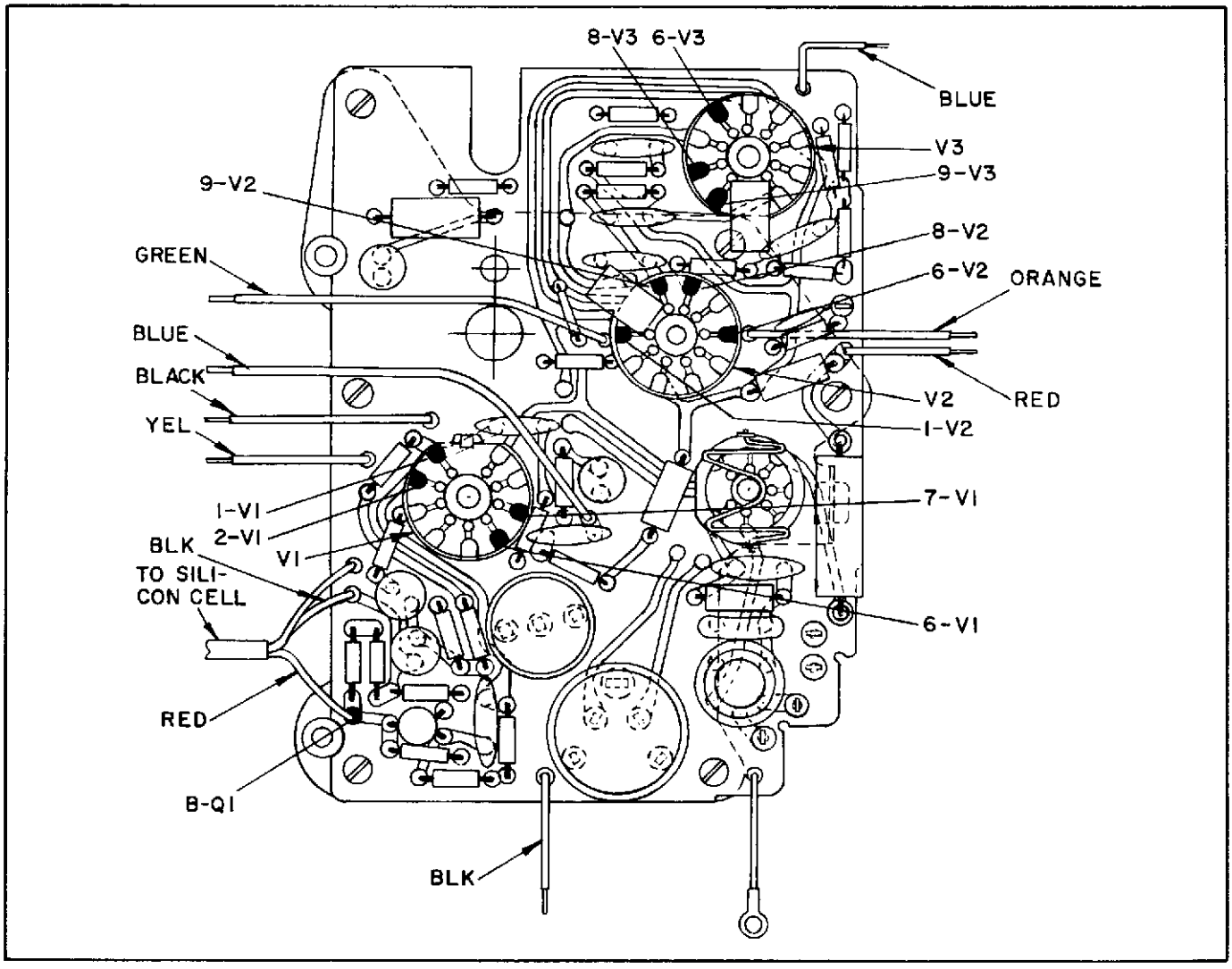


Figure W. Location of Amplifier Test Points

TUBE (Transistor)	INPUT "B"	PIN NUMBER AND VOLTAGES (± 10%)								
		1	2	3	4	5	6	7	8	9
V-1	-	.04	.02	-	-	-	1.35	.04	-	-
V-2	-	1.35	-	-	-	-	160	-	6.0	6.6
V-3	-	-	-	-	-	-	160	-	6.0	6.0
(Q-1)	.0006	-	-	-	-	-	-	-	-	-

TEST CONDITIONS:

LINE VOLTAGE - 120 V 60 CPS
INPUT SIGNAL - .0006 V @400 CPS

SIGNAL APPLIED AT B-Q1 THRU 0.5 MFD CAPACITOR AND 47K OHM RESISTER IN SERIES.

ADJUST VOLUME CONTROLS FOR 10 WATT (8.95V) ACROSS 8 OHM LOAD

ALL VOLTAGES MEASURED WITH HIGH INPUT IMPEDANCE VTVM TO COMMON GROUND (B-)

TONE CONTROL IN NORMAL POSITION.

71. AMPLIFIER OPERATIONAL TEST.

a. No prolonged - damped or sustained oscillations should be heard.

b. No objectionable audible parasitic oscillations or volume control noise shall exist.

c. No objectionable audible acoustical feedback shall exist.

d. Volume full C.W.: No objectionable speaker bottoming or break-up shall exist.

Volume at 10 watt level: (8.5 V.R.M.S.), No objectionable speaker rattle shall exist.

Volume at 2 watt level: (4 V.R.M.S.), All tone positions shall produce clear, clean, quality sound reproductions.