SERVICE INSTRUCTIONS

AUTOLOAD ®
SUPER 8 PROJECTOR

DESIGN 346A

finer products through imagination

Bell & Howell
PHOTO SALES COMPANY

GENERAL SERVICE DEPT.
7125 N. KIMBALL AVE.
CHICAGO 45, ILLINOIS

PART NO. 70487 PRINTED IN U.S.A. JUNE 1966

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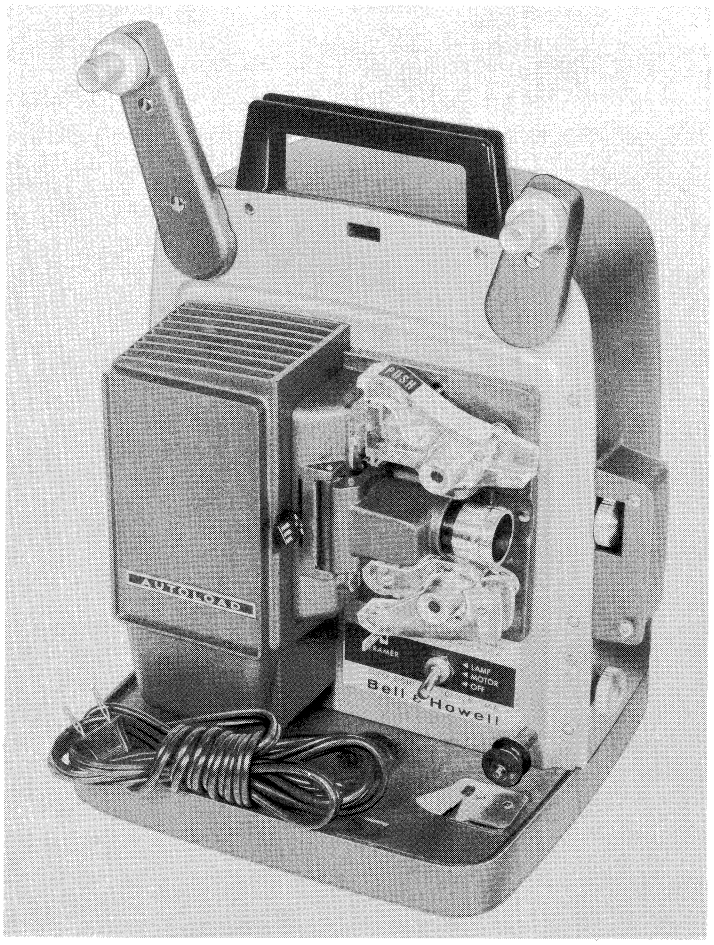


Design 346A Super 8-mm Autoload Projector

FEATURE DESCRIPTION LIST
(BELL & HOWELL DESIGN 346A SUPER 8 PROJECTOR)

Color	medium brown or dark mahogany
Type of film	super 8-mm
Projector operation	forward-still-reverse
Still projection heat filter	glass and metal screen
Type of framer	lever operation
Projection lamp	type DJL 120v, 155w, metal reflector
Projection lens	f/1.6 (p/n 020460)
Loopformer system	hold-down to thread
Operating voltage	120 volts, 60 cycles
Tilt device	gravity foot, knob locked
Weight	12 pounds, 5 ounces

Introduction

GENERAL.

This manual has been prepared to aid in servicing the Bell & Howell Design 346A Autoload Super 8-mm Projector. An Illustrated Parts Catalog is included at the rear of the manual to identify replacement parts and to aid the serviceman in the disassembly, reassembly, and adjustment of the projector.

All parts in the exploded view illustrations in the Parts Catalog section are indexed in their suggested order of removal. Where disassembly and reassembly of parts is quite obvious, no attempt has been made to elaborate on the removal and installation of such parts. When making specific projector repairs, the serviceman must use his own judgement in eliminating unnecessary steps of procedure.

In the disassembly and reassembly instructions, illustrations referred to by number (Figure 1, Figure 2, etc.) are those located in the Parts Catalog section. Those referred to by letter (Figure A, Figure B, etc.) will be found in the instruction portion of the book.

PRINCIPLES OF AUTO-LOAD THREADING.

a. Note, in Figure A, that when the upper loopformer (4) is pressed downward from its normal position "B" to the threading position "A," the linkage system automatically pivots the lower loopformer from position "B" to position "A." The upper loopformer must be held down firmly during entire threading process.

b. The end of the film leader is trimmed with the cutter mounted on the projector base. The projector is started and the cut end of the leader is inserted into opening (1). While holding the upper loopformer (4) down firmly, the film is pushed past the roller (2) and against the sprocket (3) where a sprocket tooth can engage a perforation. This starts the self-threading cycle.

c. Since the loopformer (4) keeps the film on the sprocket (3), the sprocket advances the film past the roller (5) and through the passage between the loopformer and upper bracket (6). The upper loopformer guides the film downward between the aperture plate (7) and pressure shoe (8). When the film reaches the shuttle (9), the shuttle tooth engages a perforation and assists in transporting the film.

d. When the film reaches the lower loopformer (10) it turns upward and passes through the passage between the loopformer and lower bracket (11), where it is guided to the take-up sprocket (12). The film then passes out through the opening (13).

e. After 20 to 24 inches of film have passed through the projector film path, the operator releases the upper loopformer (4) and places the film direction lever in the "still" position. The film then is threaded under the guide rollers and up to the take-up reel.

SPECIAL MAINTENANCE PRECAUTIONS.

The removal and installation of projector parts is comparatively simple and, for the most part, requires only the tools normally available in most repair shops (retaining ring pliers, Bristol setscrew wrenches, assorted screwdrivers and hex socket wrenches, etc.). Where required, special tools and gages are clearly noted in the instructions and illustrated in Figure B. Bristol setscrew wrenches required are listed on page 3.

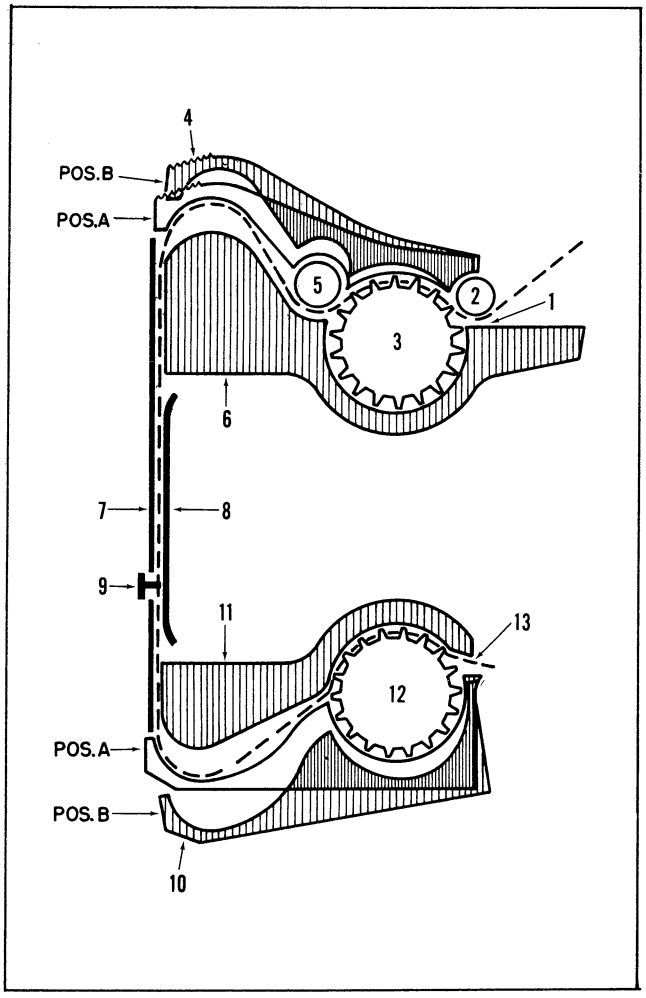
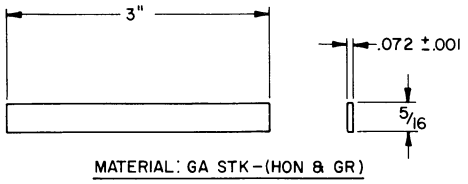


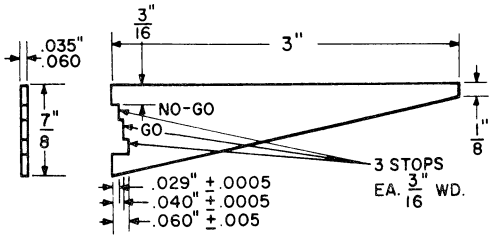
Figure A. Theory of Autothreading

TOOLS WHICH CAN BE "SHOP-MADE"



MATERIAL: GA STK-(HON & GR)

LENS CARRIER SETTING GAGE



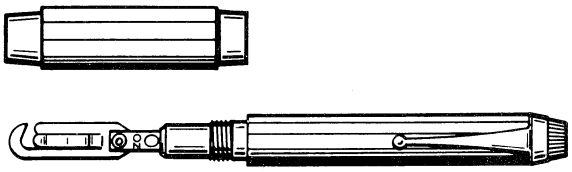
SHUTTLE TOOTH
PROTRUSION GAUGE

TOOLS WHICH CAN BE PURCHASED

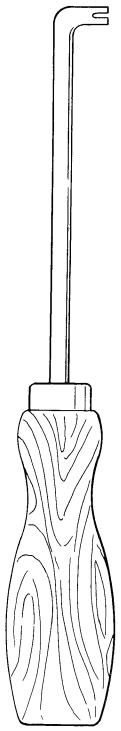
INSERT THIS LIP BETWEEN
LOOP FORMER AND SPROCKET

SPROCKET CLEARANCE
SETTING GAGE

BELL & HOWELL NO. S-012600-34N4

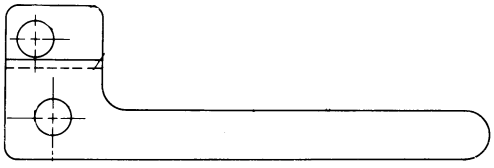


"POSTALETTE" 0 TO 8 OZ. SCALE
(AVAILABLE FROM EXACTWEIGHT SCALE
COMPANY, COLUMBUS, OHIO)



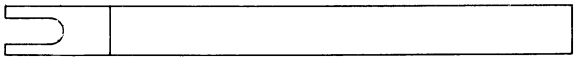
SHUTTLE BENDING TOOL

BELL & HOWELL NO. SER356-1-FX1



SHUTTLE TOOTH CENTERING TOOL

BELL & HOWELL NO. SER356-1-N1



DRIVE PINION CLEARANCE GAGE

BELL & HOWELL NO. SER356-2-N1

Figure B. Special Tools

When repairing equipment, be sure that the work table surface is clean. As parts are removed, group them in an orderly fashion to avoid confusion during reassembly. Clean dirt and old lubricant from parts (except electrical components) by washing them in a pan of solvent. Hardened film emulsion can be removed from film path parts by using alcohol and a wooden implement (tooth pick or orange stick). Do not use a knife or other metal tool to scrape film emulsion from film path components.

After the projector has been repaired, reassembled and adjusted, perform the inspections and test procedures outlined in the Final Test section to insure satisfactory projector operation.

During reassembly, be sure to lubricate parts as noted in the service instructions. If possible, use only recommended Bell & Howell lubricants as listed below. If Bell & Howell lubricants are not immediately available, use only the best grades of ball bearing grease and projector oil obtainable from local commercial outlets.

Grease (Bell & Howell Specs. 1516, 1956 and 1980).
Oil (Bell & Howell Spec. 1543).

BRISTOL SETSCREW WRENCHES REQUIRED FOR MAINTENANCE

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

NOTE: Wrench G165-F3 is required to tighten setscrew in tool handles.

Disassembly Procedure

1. GENERAL DISASSEMBLY INSTRUCTIONS.

a. Before beginning the disassembly procedure, be sure to disconnect the projector from the power source and remove the projector lamp and lens. Wrap the lamp and lens in tissue paper and place them on a shelf to protect them from possible damage.

b. If repairs require the replacement of electrical items (lamp socket, motor or switch), refer to the projector wiring diagram (Figure C) to aid in the color identification of leadwires, and unsolder or disconnect wires as necessary.

c. When removing riveted parts for replacement, the old rivet must be drilled out of the casting. Use a drill equal to, or slightly smaller than, the diameter of the rivet to be removed.

d. When attaching parts (screws, nuts, etc.) are removed, reassemble them loosely to the removed part or to the tapped casting to prevent loss.

2. REMOVAL OF PARTS IN FIGURE 1. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. The back cover (6) is secured by six screws. Four of these screws (4) are inserted through the mechanism plate and into tapped bosses in the cover; the remaining two screws (5) are inserted up through the base and into tapped bosses in the cover. Removal of cover plate (3) will facilitate removal of the back cover.

b. Except for the switch (18), parts illustrated in Figure 1 can be replaced without disassembling the mechanism plate assembly (17) from the base. To replace the switch, remove the switch mounting nut (14) and nameplate (15). Be sure to disconnect the lamp leads from the lamp socket (10); then disengage the drive belt (item 10, Figure 5) from the two drive pulleys on the back of the mechanism plate. Remove the four screws (16) and carefully move the mechanism plate assembly away from the uprights of the base while pressing the switch through its mounting hole in the plate. Note the manner in which the various leadwires are connected to the switch terminal lugs before unsoldering.

3. REMOVAL OF PARTS IN FIGURE 2. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Unless spindle parts (4 through 9, or 16 through 21) are in need of replacement or repair, they should not be disassembled. Spindle tension is adjusted by means of the nylon screws (4) and (16).

b. When the feed reel arm (2) is removed, note the manner in which the torque spring (3) is placed within the reel arm casting.

c. If complete disassembly of reel arm parts is required, be careful not to interchange the two cam washers (38) and (39). It would be wise to mark one of these washers in some way when they are removed. Removal of the screw (35) will free the gear mounting plate assembly (36), tension springs (37), cam washers (38) and (39) and the steel balls (40), two of which are located between each cam washer and the mechanism plate.

4. REMOVAL OF PARTS IN FIGURE 3. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Before disassembling sprocket and loopformer parts, note carefully the manner in which the sprocket gear retaining springs (1) and spring ratchets (3) are installed so that they can be reassembled in the same manner. Carefully remove the springs (1) and disassemble parts (2 through 9) from the rear of the two sprocket shafts.

b. Loosen screws (12) and (16) until they are free of their tapped holes in the mechanism casting. Grasp upper loopformer (13) and loopformer bracket assembly (17) between thumb and fingers and withdraw this group, the sprocket and shaft included, from the mechanism casting.

c. In similar fashion, loosen screws (19) and (21) until they are free of their tapped holes in the mechanism casting. Grasp lower loopformer bracket (20) and its loopformer assembly (22) between thumb and fingers and withdraw this group, sprocket and shaft included, from the mechanism casting.

d. The retaining spring (25), retainer plate (26) and pressure plate (27) can be removed from the lens carrier (29) without disassembling the carrier from the mechanism casting. Swing open the lens carrier and grasp the top and bottom ears of the pressure plate between thumb and forefinger of the right-hand. Press the upper end of the retainer plate away from the lens carrier casting, disengaging the plate and retaining spring from the pins in the casting. Remove the pressure plate parts.

e. To remove the lens carrier (29), the hinge pins (28) must be pried out.

f. If the aperture plate parts (30 through 35) are removed, note the manner in which side tension spring (32) and arm (33) are assembled.

5. REMOVAL OF PARTS IN FIGURE 4. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Before removing the spring-loading bracket assembly (2), note the manner in which the safety shutter ear (A, Figure 4) is engaged with the disc of the bracket assembly.

b. Before removing the pulley mounting bracket assembly (4), note the manner in which the legs of the torsion spring (5) are engaged with the ears on the safety shutter assembly (11). One of the drive roller assemblies (8) is exposed and can be removed for replacement without disassembling the pulley mounting bracket from the mechanism. To replace the inner drive roller, the mounting bracket must be removed.

c. To remove the safety shutter and bracket assembly (11), loosen the Sems screw (9) and remove the pivot screw (10). Slip out the assembly carefully, avoiding any damage to the heat filter.

d. Before removing the shuttle and framing lever assembly (21) note the manner in which the cam shoes (23) ride the surface of the pull-down cam (27).

6. REMOVAL OF PARTS IN FIGURE 5. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Be careful that the drive belt (10) does not become cut when it is removed.

b. The motor fan (13) is pressed onto the motor shaft and should not be removed unless in need of replacement.

c. Note the knot tied in the power cord leads where the cord (18) comes up through the opening in the base. Untie this knot and disassemble the strain relief bushing (17) from the base to remove the power cord.

d. The pin of the rewind shield (21) is heat-sealed. Do not remove shield unless in need of replacement.

Reassembly and Adjustment

7. GENERAL.

a. When the reassembly procedure includes the staking of rivets or other parts, all such riveting and staking should be accomplished before any other reassembly procedures are attempted. Be sure to support the casting or plate solidly while performing the riveting or staking operation.

b. Be sure to follow the lubrication procedures indicated in the reassembly instructions, using the Bell & Howell lubricants listed on page 3. Lubricate sparingly and wipe away excess lubricant with a lint-free cloth.

c. When installing electrical parts (motor, switch or lamp socket), refer to the wiring diagram (Figure C) for proper wiring connections.

8. REASSEMBLY OF PARTS IN FIGURE 5. Reassemble Figure 5 parts as outlined in the following paragraphs.

a. The rubber feet (23) and film cutter (20) are riveted in place. Be sure to support the base solidly when securing the rivets.

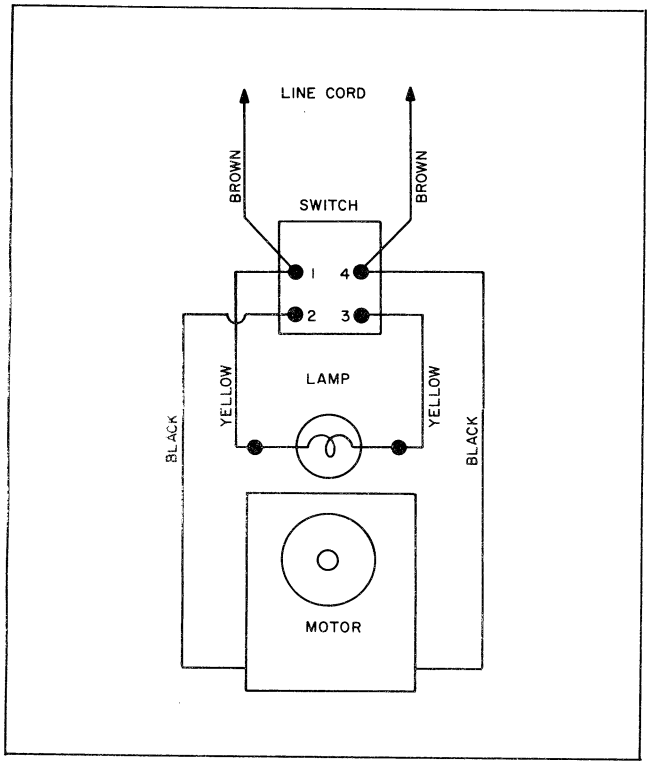


Figure C. Projector Wiring Diagram

b. If the rewind shield (21) was replaced, use a warm iron to heat seal the shield pin at the underside of the base.

c. Insert the stripped ends of the power cord (18) down through the hole in the corner of the base and bring the leads back up through the hole behind the tilt shaft boss. Tie a knob in the cord about three inches from the stripped ends; then assemble the strain relief bushing (17) to the cord and into the hole in the corner of the base, while taking up all slack below the base.

d. If the motor fan (13) was replaced, press the new fan onto the end of the motor shaft. Lift the motor (16) up into position, make sure that the insulator (15) is in place, and install the two screws (14). Slip the motor pulley (12), hub end first, onto the motor shaft until the face of the pulley just clears the cast housing for the blower fan, and tighten the setscrew (11) just enough to hold. Loop the drive belt (10) loosely around the pulley.

e. Install the blower fan (9) on the end of the motor shaft, hub end first. Visually center the fan in the cast blower housing and tighten the setscrew (8) securely down against the flat on the motor shaft. Install the blower housing cover (7).

f. Install the tilt shaft assembly (3), retaining ring (2) and tilt lock knob assembly (1).

9. REASSEMBLY OF PARTS IN FIGURE 4. Reassemble Figure 4 parts as outlined in the following paragraphs.

a. Assemble the friction washer (33) to the shaft assembly (31) and lightly oil the end of the shaft. Insert the shaft through the bearing in the short cast arm of the mechanism casting. Assemble the drive pinion (32), hub to the right, on the shaft and insert the shaft through the bearing in the long cast arm. Temporarily tighten the drive pinion setscrew (29) and install the retaining ring (30). Tap the knob end of the shaft lightly with a rubber mallet so that the washer (33) and its captivating retaining ring (30) are seated firmly against the short cast arm.

b. Assemble the thrust washer (28) over the end of the main shaft and up against the long cast arm of the mechanism. Note that one face of the pull-down cam (27) has a shallow identification mark (Figure D). Install the cam on the shaft with this mark toward the pinion (32), and the cam setscrew hole is accessible. Dip the setscrew (26) in shellac and install the

setscrew, tightening it securely down against the cut-out portion of the cam. Rotate the shaft to make certain that it turns freely, without binding or high spots. If binding does occur, tap the knob end of the shaft lightly to eliminate this condition. If binding still occurs, check to see if the shaft is bent or distorted.

c. Hold the shuttle pivot bracket (25) with its smooth face against the long cast arm of the mechanism casting, and install the screw (24) finger-tight. Assemble the pivot stud (13) through the remaining hole in the long cast arm and pivot bracket and tighten the Sems nut (12) finger-tight.

d. Lightly grease both faces of the spring tension washer (20). Assemble the washer to the pivot screw (19) with the bowed-out face of the washer against the head of the screw. Assemble the shuttle and framing lever assembly (21) and sleeve spacer (22) to the pivot screw and carefully assemble these parts to the mechanism plate so that the framing lever enters the rectangular cut-out in the mechanism plate and the threaded end of the screw enters the remaining hole in the pivot bracket (25). Engage the shuttle with the pull-down cam (27) so that the cam shoes (23) are riding the outer surface of the cam. Turn the main shaft knob one full turn in each direction. The fit between cam shoes and pull-down cam must be snug but there must be no binding. Any combination of cam shoes (two white, two black, or one of each) may be used to obtain the proper fit. Install and tighten the Sems nut (18) finger-tight on the pivot screw (19).

e. Install the in-out cam (17) so that its holes line up with those in the pull-down cam and the high section of its rim is toward the shuttle. Add the shutter (16) with the open side of the shutter away from the cams and the two screw holes lined up with those in the cams. Install the shutter washer (15), align all holes, and install the two screws (14). Before tightening the screws, hold the main shaft knob firmly and remove excess play in the in-out cam, shutter and washer by rotating these parts counterclockwise against the two screws; then tighten the screws securely. Turn the main shaft knob in both directions to make certain that all parts rotate freely and without binding. Now remove the drive pinion setscrew (29) and insert drive pinion clearance gage (Figure B) between the drive pinion and the face of the bearing in the short case arm. Rotate the main shaft until the main shaft pull-down cam is at the position shown in Figure D; then rotate the drive pinion until its setscrew hole is aligned with the identification mark on the pull-down cam. Dip the setscrew in shellac and, while pressing the drive pinion and main shaft knob toward one another, install and tighten the setscrew securely. Remove the clearance gage.

f. Carefully assemble the projector safety shutter and bracket assembly (11) to the mechanism plate. The "forward-reverse" lever of the assembly must be inserted through the slot in the mechanism casting behind the lens carrier, and the notch in the front upper corner of the fire shutter plate must engage the screw (9) which was loosened to permit shutter assembly removal. Tighten screw (9) securely. Align the holes at the rear corner of the assembly, and install and tighten the pivot screw (10) into the tapped hole in the pivot stud (13).

g. Lightly grease the three studs of the pulley mounting bracket assembly (4) and install a flat washer (7), drive roller assembly (8) and a second flat washer (7) on each pulley stud. Secure the rollers with the retaining rings (6). Install the torsion spring (5) on the lower bracket stud, with the longest leg of the spring closest to the face of the bracket. Guide the lower stud through the lower boss of the safety shutter assembly, engaging the tires of the driver rollers with the rim of the shutter (16) as shown in Figure L. Install the retaining ring (3) on lower stud. Bend legs of torsion spring (5) to engage the ears of safety shutter as shown in Figure 4 inset.

h. Assemble the spring-loading bracket assembly (2) to the pulley mounting bracket. The fork-like prong of the safety shutter (A, Figure 4) must straddle the spring shaft of the bracket between the large washer and the formed ear of the bracket. Install and tighten the two screws (1) just enough to hold. Refer to paragraph 17 for drive roller and safety shutter adjustment.

10. REASSEMBLY OF PARTS IN FIGURE 3. Reassemble Figure 3 parts as outlined in the following paragraphs.

a. If the lens carrier catch (37) was removed for replacement, tap the 0.095-inch diameter rivet holes in the mechanism casting with a No. 4-40NC thread. Fasten the new catch in place with two No. 4-40 by 1/4-inch binding head screws, part no. 30243.

b. Place the aperture plate (35) on the work bench with the stud up and away from you. Assemble the side tension arm (33) over the stud with the tension arm prongs down and into the aperture plate slots. Assemble the spring (32) with the center loop toward you

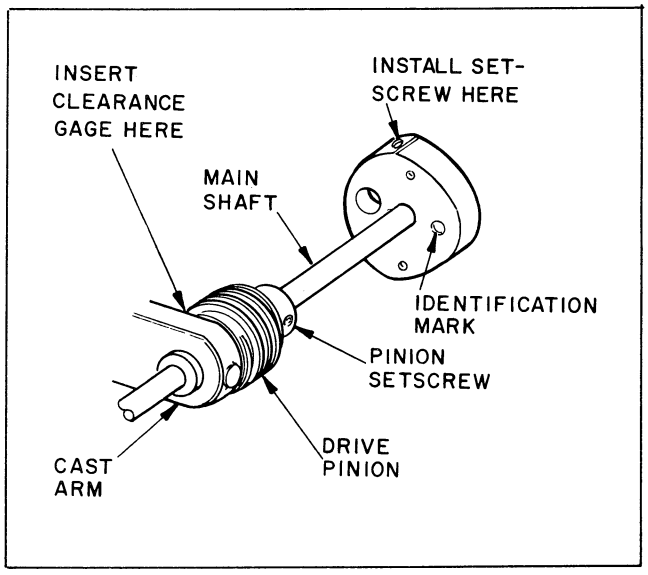


Figure D. Installing Pull-Down Cam and Drive Pinion

and the ends of the springs entering the holes in the side tension arm. Place the loop opening of the spring into the stud groove and press the spring in until it seats. Side tension arm should exert a tension of 2-1/2 inch-ounces minimum to 3 inch-ounces maximum. Check by pressing the side tension arm to the limit of its travel and slowly releasing the arm against the stem of a fixed tension gage. It may be necessary to adjust the side tension spring (32) as shown in Figure E until the proper tension is obtained. Then assemble the aperture plate loosely to the mechanism plate with the two screws (34). Line up the aperture opening and tighten the two screws securely. The aperture plate must be flush against the back edge of the casting. Assemble the guide rail (31) loosely to the aperture plate with two screws (30). Hold guide rail vertical with the fingers and push the rail forward so that both ears are against the sides of the slots in the aperture plate; then tighten the screws securely.

c. Apply a light film of grease to the lens bore of the lens carrier (29) and across the steel locking ball. Hold the lens carrier in position between the ears of the mechanism casting and insert the hinge pins (28), pressing them firmly into place. Insert the lens carrier setting gage (Figure B) between the fingers of the lens carrier catch (37) and close the lens carrier so that it bears against the gage. Slip a thin strip of paper down behind the lens carrier at the point where the lip of the adjusting setscrew (38) protrudes through the main plate. Dip the setscrew in shellac and trim it in a bit at a time until it first grips the paper. Remove the setting gage and wipe off excess shellac. Check to see that the carrier swings open easily and that it latches firmly in the closed position. If necessary, bend the ends of the lens carrier catch (37) to insure positive latching.

d. Hold the retainer plate (26) with the formed tabs facing up. Assemble the pressure plate spring (25) over the retainer plate with the elongated hole toward the narrow end of the plate, and engage the tabs of the spring with the slots at the ends of the plate. Assemble the pressure plate (27) to the spring and retainer plate, engaging the notched ear of the pressure plate with the notched end of the retainer plate. Compress this entire assembly and install it to the lens carrier with the slotted end of the pressure plate at the top. Lock in place over the boss at the top and bottom of the carrier while locating the carrier dowel pins in the holes of the retainer plate and spring.

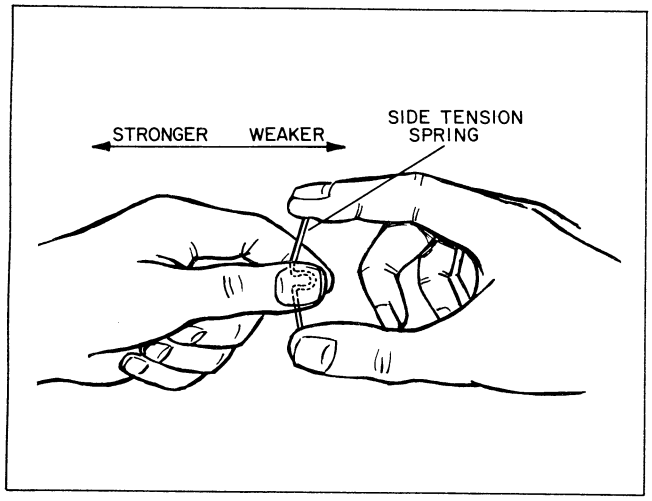


Figure E. Adjusting Tension of Side Tension Spring

e. Preassemble the lower threading mechanism as follows. Insert the idler roller (23), small diameter end toward head of screw (21), between the ears of the loopformer and against the loopformer stop pin. Insert screw (21) through loopformer and roller and install the washer (24) over the end of the screw. Place the sprocket assembly (10) in the cavity of the loopformer and trap the sprocket by placing loopformer bracket (20) over the end of the screw (21). Install a friction washer (11) over the sprocket shaft and down against the rear flange of the sprocket and apply a drop or two of oil to the sprocket shaft. Lift this assembled group up into position, guiding the sprocket shaft through the bearing hole in the mechanism casting. Install and tighten the screws (19) and (21) just enough to hold all parts in place. Note that the pin of the lower loopformer assembly (22) must be inserted through a hole in the mechanism casting to engage a notch in the latch lever (Figure F) behind the mechanism casting.

f. Preassemble the upper threading mechanism as follows. Install the roller (18) on the pin of the upper loopformer bracket (17). Place the sprocket assembly (10) in the cavity of the loopformer bracket and assemble the upper loopformer (13) to the bracket, trapping the sprocket and the roller (18). Hold the flanged roller (14), flange toward head of screw (12), between the ears of the loopformer, and install the screw (12). The screw must pass through the outer ear of the loopformer, the flanged roller, the inner ear of the loopformer, the washer (15) and the ear of the loopformer bracket, in that order. Insert screw (16) through its hole in the loopformer bracket. Install a friction washer (11) over the sprocket shaft and down against the rear flange of the sprocket and apply a drop or two of oil to the sprocket shaft. Lift this assembled group up into position, guiding sprocket shaft through the bearing hole in the mechanism casting. Note that the pin of the upper latch lever (Figure F) must enter a hole in the back of the upper loopformer. Secure the screws (12) and (16) just enough to hold all parts in place.

g. Tighten the upper threading mechanism screws (12) and (16) securely. Insert the lip of the setting gage (S-012600-34N4, Figure B) over the teeth of the lower sprocket. Press the lower loopformer bracket down lightly against the setting spacer while tightening the lower threading mechanism screws (19) and (21).

h. Lightly grease the gear stud of the gear lever and stud assembly (6) and secure the gear (8) to the stud with the retaining ring (7). Assemble the sprocket gear (9) to the upper sprocket shaft with the three gear projections facing out. Install the assembled gear lever assembly (6) over the sprocket shaft and over the projections of the gear (9). Assemble the outer sprocket gear (5) to the upper sprocket shaft, engaging its

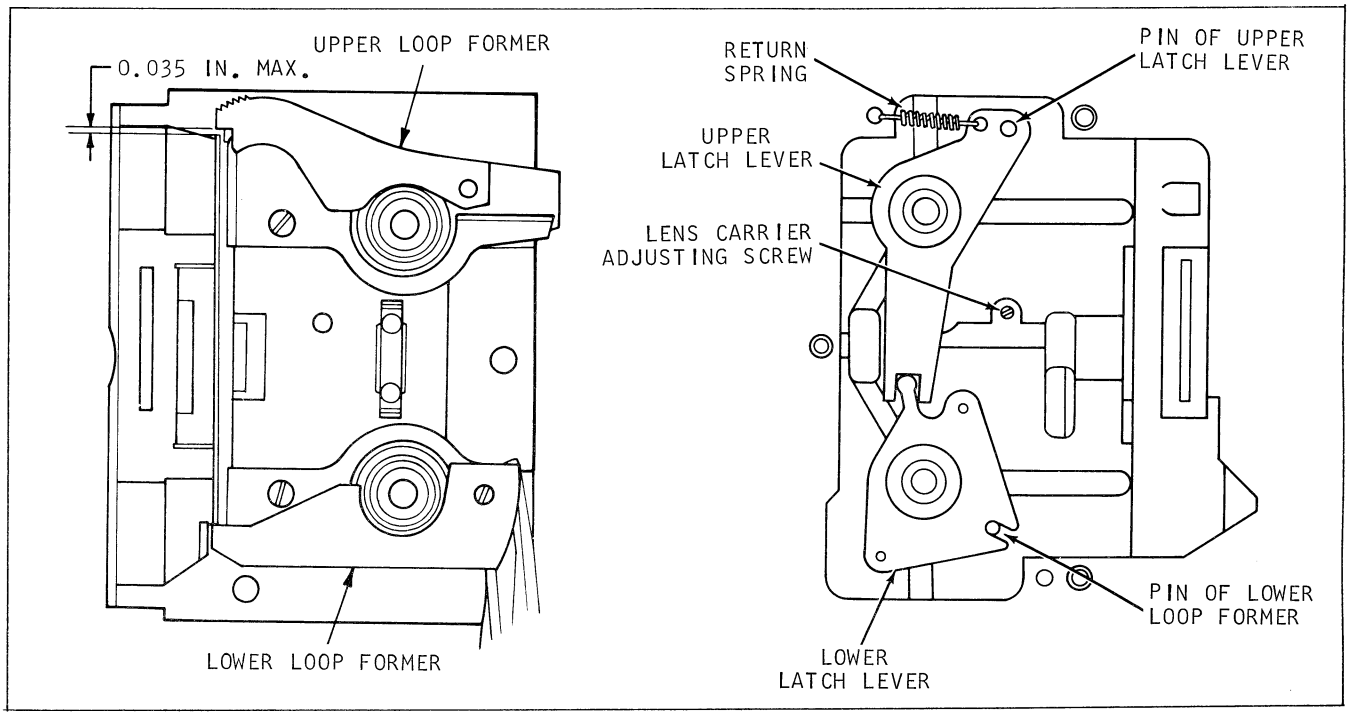


Figure F. Installation of Loopformers

three projections to those of the inner gear. Install the spacer washer (4), spring ratchet (3) and retaining spring (1), with the short end of the spring engaged in the slot of the sprocket shaft.

i. Assemble the sprocket gear (9) to the lower sprocket shaft, with the three gear projections facing out. Install the lower sprocket gear (5A) to the shaft, engaging its three projections with those of the inner gear. Install spacer washer (4), spring ratchet (3), friction washer (2) and retaining spring (1), with the short end of the spring engaged in the slot of the sprocket shaft.

11. REASSEMBLY OF PARTS IN FIGURE 2. Reassemble Figure 2 parts as outlined in the following paragraphs.

a. Insert bearing (32) through hole in feed arm support (33) from the unpainted side of the support and apply a film of grease to the arm around the protruding bearing sleeve. Repeat the process with the remaining bearing (32) and the take-up arm support (34) and assemble both support and bearing assemblies to the mechanism plate. Lay the mechanism plate on the work bench so that it is resting on the arm supports. Use a speck of grease to place a steel ball (40) on either side of each bearing as it protrudes through the mechanism plate. Add cam (39) over the bearing of take-up arm and cam (38) over the bearing of the feed arm, the prongs of the cam facing the middle of the mechanism plate. Install tension springs (37) over the bearings, small diameter down and end of small diameter toward top of mechanism plate. Assemble the gear mounting plate (36) and install the two large retaining rings (31) to secure all parts. Fasten the gear mounting plate to the mechanism plate with the single screw (35).

b. Lightly oil the end of the take-up arm gear shaft (26) and insert the shaft through the rear (take-up) bearing (32). Assemble spur gear (25), hub up, over end of gear shaft. Insert a 0.003-inch shim between gear face and bearing face, press down lightly on the spur gear, and tighten setscrew (24) securely. Check to make certain that the assembled spur gear and gear and shaft assembly have 0.002 to 0.003-inch end play. Repeat the above procedure with the feed gear shaft assembly (13) and its spur gear (12).

c. Lightly grease each gear stud of gear mounting plate (36). Install small nylon gear (30), hub up, onto its gear stud so that it meshes with feed spur gear (12). Install the large nylon spur gear (28), hub down, onto its gear stud so that it meshes with take-up spur gear (25). Secure both gears with the retaining rings (29 and 27, respectively).

d. Apply a drop or two of oil to the shaft of one spindle assembly (21) and insert the shaft through the bearing in the take-up arm (15). Install spring tension washer (20), bowed face down, over the spindle shaft. Add one friction disc (19) and brush lightly with grease. Add spur gear (18) and brush lightly with grease. Assemble remaining friction disc (19) and the spacer (17). Install screw (16) finger-tight. Repeat the above procedure with the feed arm assembly (2) and spindle parts (4 through 9). Spindles must turn freely and have a slight amount of end play. With a syringe, apply a light film of grease around the bottom of each spindle at the shaft hole. Assemble the torque spring (3), bulge up, into the lower end of the feed arm casting.

e. Lightly grease all gear studs of the reel arm supports (33) and (34). Assemble spur gears (22) and (23) to the studs of the take-up arm support and spur gear (10) to the stud of feed arm support. The hubs of all gears must face down. Lightly grease all gear teeth and carefully assemble the reel arms to the supports, installing and tightening the screws (1 and 14). Reel arm torque is checked and adjusted after projector is assembled (paragraph 13).

12. REASSEMBLY OF PARTS IN FIGURE 1. Reassemble Figure 1 parts as outlined in the following paragraphs.

a. If riveted parts, such as the carrying handle (23), lamp baffle (25) or front cover catch (1B) were replaced, be sure to support the mechanism plate or front cover solidly when riveting new parts in place.

b. Solder the motor and power cord leads to the OFF-MOTOR-LAMP switch (18) as shown in the wiring diagram, Figure C. Slip the insulating tube (18A) over the lamp leadwires, and solder these leadwires to the switch.

c. Carefully lift the mechanism plate assembly (17) up into place on the projector base while guiding the threaded switch mounting bushing through its opening in the mechanism plate. Install the switch nameplate (15) and mounting nut (14), tightening the nut securely. Align the screw holes in the mechanism plate with the tapped holes in the uprights of the base, being careful not to pinch the lamp leadwires; then install and tighten the four hex head tapping screws (16).

d. Install the lamp socket and bracket assembly (10) tightening the screws just enough to hold socket snugly. Twist the yellow lamp leadwires together and press the solderless lugs onto the lamp socket terminals. Refer to paragraph 14 for instructions pertaining to lamp socket alignment.

d. Use a light film of oil on the roller studs before installing the two film guide rollers (13) and be sure to wipe fingerprints from the projector lamp (8) after it has been pressed in place.

e. Installation of remaining Figure 1 parts requires no special instructions. It is suggested, however, that both covers (1) and (6) and the lamphouse assembly (7) not be installed until all adjustments and tests have been completed.

13. REEL SPINDLE TORQUE ADJUSTMENT. Spindle torque can be measured with a zero to eight-ounce Postalette scale and a modified 8-mm film reel as shown in Figure G. Note that the scale must be held vertically, directly above the screw in the reel, for a proper torque reading.

a. With the projector grounded and the line cord plugged into the 110 to 120 volts a-c outlet, swing both reel arms up to the operating position. Install the modified film reel on the take-up (rear) spindle and place the projector switch in the "motor" position. Engage Postalette scale with string loop and, holding

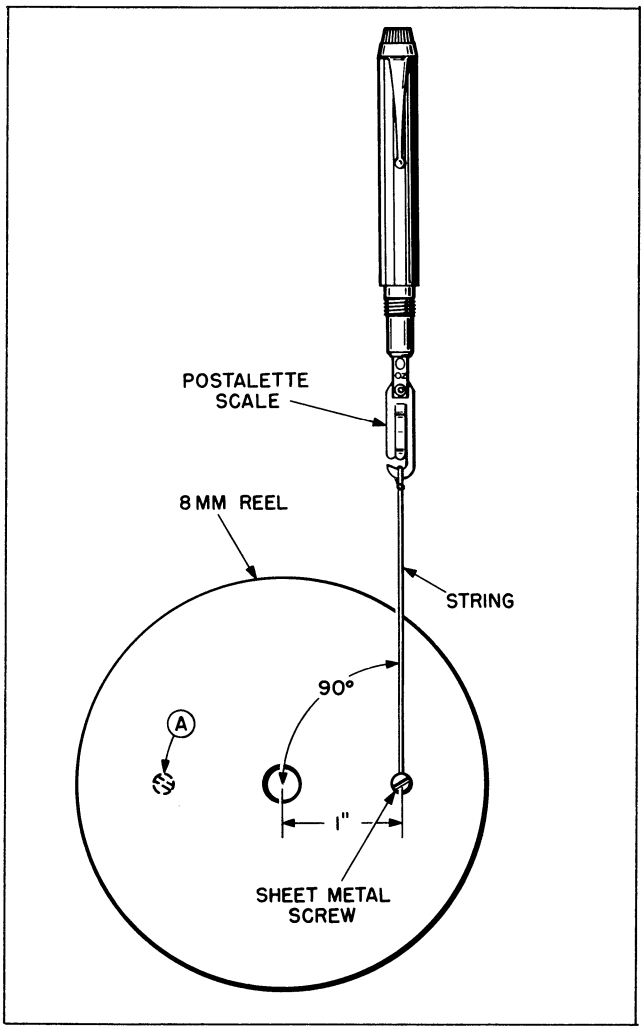


Figure G. Checking Reel Spindle Torque

the scale as shown in Figure G, press the forward-reverse lever up to the "forward" position. Proper torque (at the point where the spindle and film reel do not turn) should be 4.5 to 5-inch-ounces. Torque can be adjusted by tightening (to increase) or loosening (to decrease) the screw at the back of the reel arm support (Figure H).

b. Place forward-reverse lever in "still" (center) position and transfer the modified film reel to the feed (front) spindle. Note that the screw in the film reel must now be at position A. Engage Postalette scale with string loop and, holding the scale as shown in Figure G, press the forward-reverse lever down to the "reverse" position. Proper torque (at the point where the spindle and film reel do not turn) should be 5.5 to 6-inch ounces. Torque can be adjusted by tightening (to increase) or loosening (to decrease) the screw at the back of the reel arm support (Figure H).

14. LAMP SOCKET ALIGNMENT. As illustrated in Figure J, the lamp socket is secured with three attaching screws. Two of the screw holes in the mechanism plate are slightly oversize, thus permitting

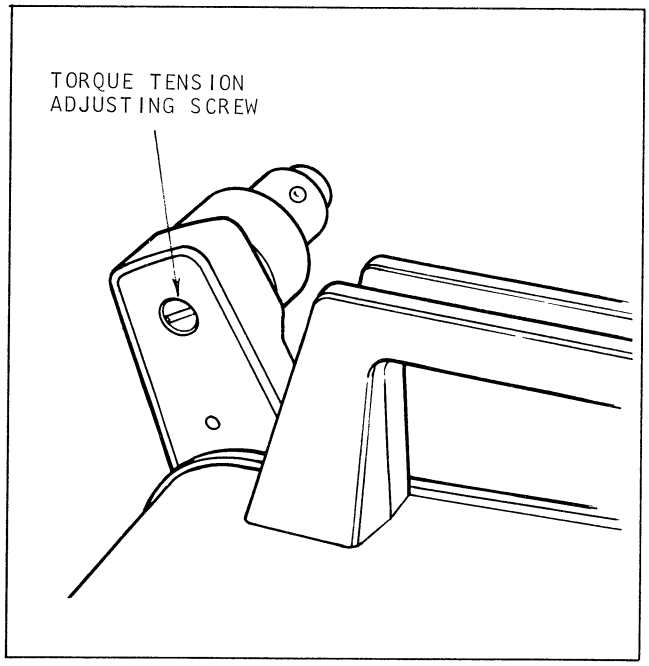


Figure H. Adjusting Reel Spindle Torque

some rotation of the lamp socket bracket. When all screws are loosened slightly, the socket (and thus the lamp) can be rotated by moving the socket bracket around the "pivot point" screw.

a. With the projector lamp and projection lens installed and the projector power cord connected to the 115 volt AC, 60 cycle power source, place the projector switch in the LAMP position. Rotate the manual knob until the shutter clears the aperture opening and focus the lens until the image of the aperture is sharply defined on the screen.

b. If the image appears dark across the top of the or the bottom, loosen the lamp socket attaching screws slightly so that the lamp socket bracket can be rotated. Grasp the edge of the bracket (rear of mechanism plate) and, while watching the image on the screen, shift the bracket until the aperture image is fully and evenly lighted. Hold the bracket steady while tightening the three screws.

NOTE

The bracket can be shifted with the back cover installed by using a screwdriver blade against the head of either screw in the oversize holes.

15. SHUTTLE TOOTH ADJUSTMENT. Excessive or inadequate protrusion of the shuttle teeth will result in improper film transport while operating. Proper shuttle tooth protrusion is checked with the shuttle tooth Go-No-Go gage shown in Figure B. Proceed as follows.

a. Set the framer knob at the approximate center of its travel range, and swing open the lens carrier.

c. Place the notched edge of the shuttle protrusion gage against the aperture plate with the deepest notch positioned directly over the shuttle teeth.

d. While holding the gage lightly but firmly against the aperture plate, slide the gage slowly downward. If the shuttle teeth catch against the "go" step of the gage, the teeth are protruding too far beyond the surface of the aperture plate. If teeth pass the "no go" step, the teeth are not protruding far enough. Also, make certain that teeth are protruding equally.

e. To adjust shuttle tooth protrusion, remove the lamphouse and lamp and rotate the manual knob until the shuttle teeth are at the center of the down stroke.

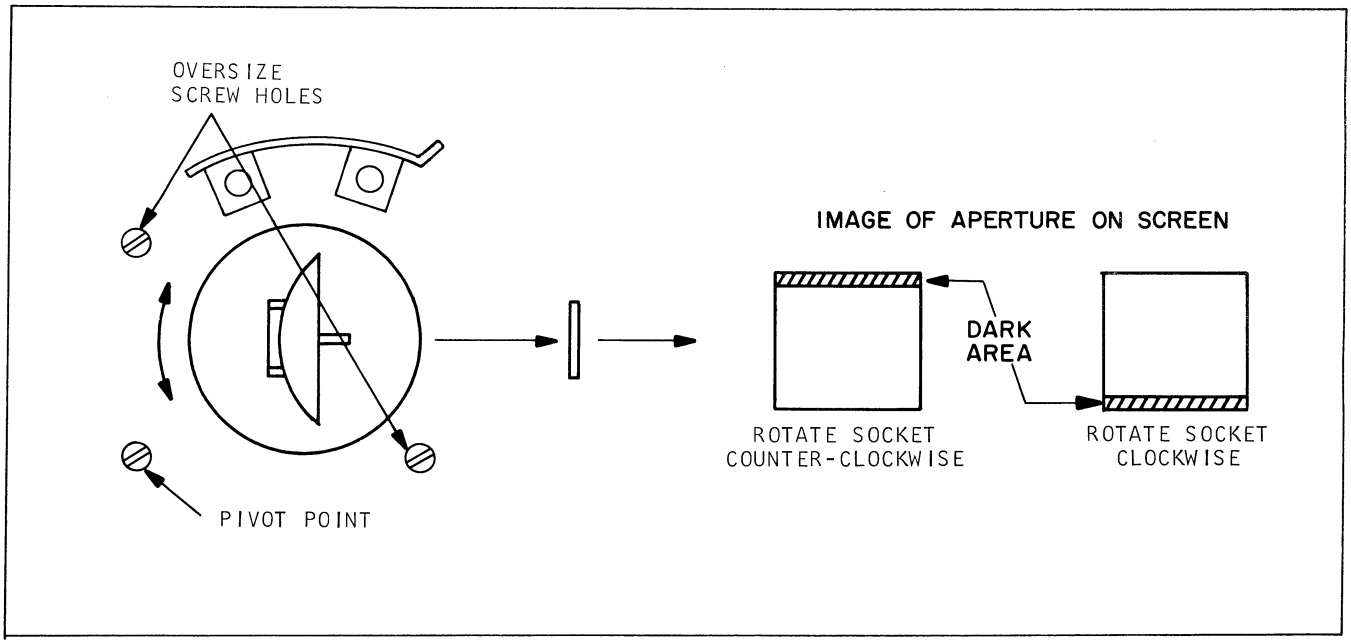


Figure J. Lamp Socket Alignment

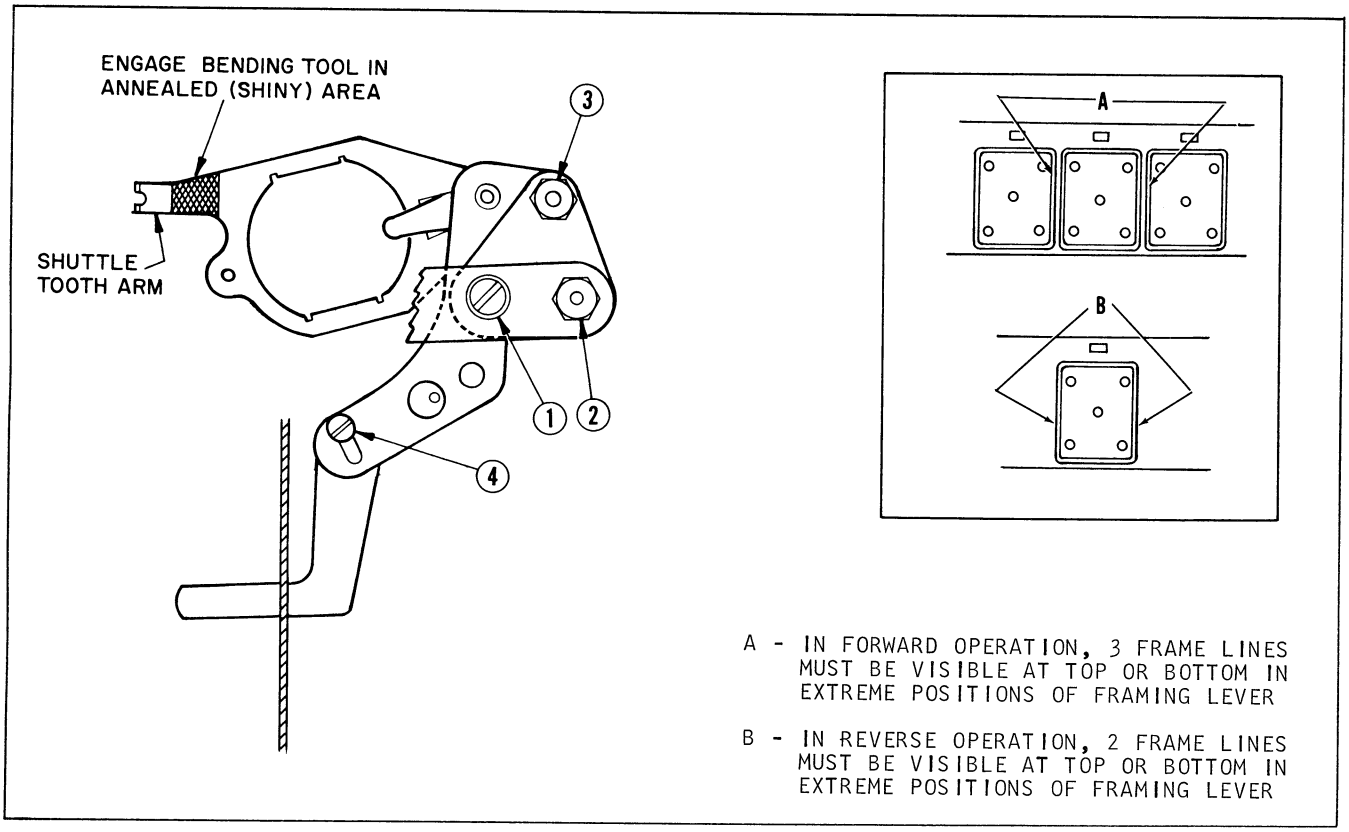


Figure K. Adjusting the Shuttle and Framer Lever

Insert the shuttle bending tool through the opening in casting, just forward of the lamp socket, and engage the slot of the tool with the shuttle tooth arm. Note, in Figure K, that the bending tool should engage the arm in the annealed (shiny) area. To increase the height of shuttle teeth above the aperture plate surface, move the handle of the tool away from the projector main plate; to decrease height, move handle toward main plate. If shuttle teeth are protruding unevenly (one tooth protruding more than the other), the bending tool can be raised or lowered, thereby twisting the shuttle tooth arm slightly.

CAUTION

The shuttle tooth arm must be bent carefully, and in small amounts, checking between each bending operation until shuttle tooth height is properly established.

f. Carefully rest the projector on its back surface (lens pointing up) and open film gate. Set the framer lever in the extreme "up" position and turn the manual knob until the shuttle teeth are at the extreme top and out position. With a magnifying glass, check to make certain that the teeth are centered in the slot. To adjust shuttle centering, refer to Figure K and loosen the screw (1) and Sems nut (2), leaving Sems nut (3) tight. Engage the 3/8-inch diameter holes of the shuttle tooth centering tool (Figure B) with the two nuts (2) and (3) and, while viewing the shuttle teeth through the magnifying glass, move the tool handle up or down until shuttle teeth are centered. Tighten the screw (1) and then Sems nut (2) to lock the adjustment.

16. PICTURE FRAMING ADJUSTMENT. The framing mechanism must be adjusted to permit maximum picture framing in either direction.

a. Thread the projector with a loop of test film and run the projector in the forward direction.

b. Place the framer lever to extreme "up" position and then in the extreme "down" position. The camera frame line of adjacent frames must be visible as noted in Figure K when framing lever is at extreme positions.

c. To adjust picture framing, loosen screw (4) at the knee of the shuttle framing lever (Figure K) and shift the framer lever up or down, as necessary, to center the frame in the aperture. Tighten the screw securely without disturbing the position of the framer lever and recheck picture framing.

17. SAFETY SHUTTER ADJUSTMENT. The rubber drive rollers which drive the shutter pulley must make contact and begin driving the mechanism (in forward and in reverse) before the safety shutter clears the aperture opening. With the back cover removed and the projector line cord connected to the power source, switch on the projector. This test is to be made without film.

a. Operate the projector, first in the forward direction and then in the reverse direction. Watch the safety shutter carefully as the lever is moved from the "still" position to either of the operating positions.

b. Proper operation of the safety shutter is controlled by the clearance between the upper drive roller and the rim of the shutter (Figure L). The nominal clearance is 0.062 ± 0.015-inch. If, when operating in reverse, the safety shutter tends to clear the aperature opening before the shutter begins to revolve, this clearance should be increased toward the high (0.077-inch) tolerance limit. If, when operating in forward, the safety shutter clears the aperture opening too soon, the clearance should be reduced toward the lower (0.047-inch) tolerance limit.

c. To adjust, place the lever in the "still" (center) position and loosen the two screws which attach the spring loading bracket to the pulley mounting bracket. Insert shim stock of the desired thickness (to increase or decrease nominal clearance of 0.062 inch) between upper drive roller and rim of shutter. While maintaining a light pressure on the roller, tighten the two loading bracket screws securely.

d. Retest safety shutter operation and readjust, if necessary, by changing the thickness of the shim stock inserted between roller and shutter rim.

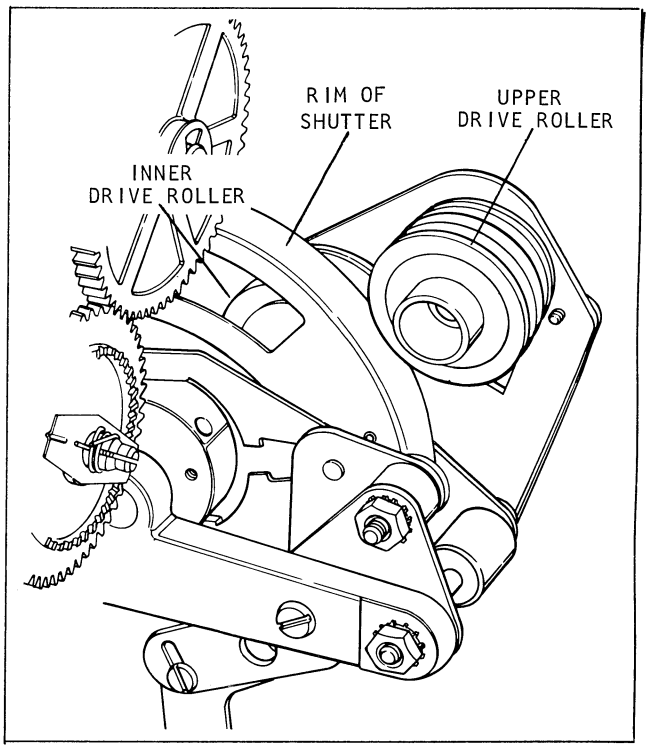


Figure L. Safety Shutter and Roller Adjustment

TROUBLE	PROBABLE CAUSE	REMEDY
Projector inoperative with switch in the MOTOR or LAMP position.	1. No electrical power.	1. Check power source.
	2. Loose motor pulley.	2. Tighten pulley setscrew.
	3. Broken drive belt.	3. Replace belt.
	4. Defective switch or wiring.	4. Check switch and circuitry.
Picture flicker.	1. Drive roller assemblies not adjusted properly.	1. Readjust as instructed in paragraph 17.
	2. Defective drive belt pulley.	2. Replace drive belt pulley.
	3. Dirt, wear or binding in gearing.	3. Clean and repair or adjust gearing as instructed in reassembly instructions.
Film scratches.	1. Excessively dirty film channel parts (sprockets, guides, etc.).	1. Clean projector thoroughly.
	2. Worn pressure and aperture plates (27 and 35, Figure 3).	2. Replace if worn or marred.

TROUBLE	PROBABLE CAUSE	REMEDY
Film scratches (cont)	3. Worn or damaged film guide rail (31, Figure 3).	3. Replace film guide rail.
Jumpy picture.	1. Loss of film loop due to damaged film.	1. Inspect and splice as required.
	2. Green film.	2. Run film through projector two or three times to age the film.
	3. Shuttle tooth worn.	3. Replace shuttle assembly (21, Figure 4).
	4. Misaligned shuttle tooth.	4. Adjust and align shuttle as instructed in paragraph 15.
	5. Grooves worn in film guide rail (31, Figure 3).	5. Replace film guide rail.
Soft focus.	1. Dirty projection lens.	1. Clean projector lens.
	2. Lens mount out of alignment.	2. Readjust as instructed in paragraph 10, step c.
	3. Loose lens mount catch (37, Figure 3).	3. Reset tension by bending catch carefully.
Autothreading not operating properly.	1. Loopformers not releasing.	1. Linkage binding or spring (39, Figure 3) stretched or broken.
Film spills.	1. Insufficient tension on feed spindle.	1. Adjust, paragraph 13.
Fails to take-up or rewind.	1. Defective drive belt.	1. Replace belt.
	2. Worn rim on drive roller.	2. Replace roller (8, Figure 4).
	3. Drive rollers not adjusted properly.	3. Readjust as instructed in paragraph 17.
Noisy.	1. Loose attaching parts.	1. Tighten as necessary.
	2. Gearing dry.	2. Lubricate as necessary.

Final Test

18. INSPECTION PROCEDURE.

a. Visually check the projector for missing parts. Pick up the projector, turn it over and shake it to make certain that no loose parts are lying inside.

b. Inspect attaching screws and nuts for tightness, and tighten if necessary.

c. Check all wires to make sure they are properly dressed out of the way and that all solderless connectors are securely pressed onto their lugs.

d. Press on ends of the sprocket shafts to check end play. Sprockets must be under spring tension and springs must not be loose.

d. Open and close the lens carrier to make certain that the carrier latches securely in place. If necessary, bend the fingers of the lens carrier catch (37, Figure 3) to increase the tension.

19. OPERATION TEST. Thread projector with film, using a full reel, and run the projector to check for proper operation. Check the following items during the test.

a. Listen for unusual noises that may indicate insufficient lubrication.

b. If film should spill from the feed reel during operation, it may be necessary to tighten screw (4, Figure 2) slightly to apply additional tension.

c. If the film fails to maintain its loop above or below the aperture, check the shuttle tooth protrusion as described in paragraph 15, and readjust if necessary.

d. If the projector image appears soft at the edges, check the alignment of the optical axis as instructed in paragraph 21, and adjust if necessary.

20. SAFETY SHUTTER OPERATION TEST. It is important that the drive rollers, which drive the shutter pulley, make contact and begin driving the mechanism (either in forward or reverse) before the fire shutter clears the aperture opening. With the back cover removed and the projector connected to the power source, switch on the projector. This test is to be made without film. Operate the projector, first in the forward direction and then in reverse. Watch the action of the safety shutter and the drive rollers against the shutter rim as the lever is moved from the "still" to either of the operating positions. If necessary, adjust the drive rollers as instructed in paragraph 17.

21. OPTICAL ALIGNMENT TEST. The alignment of the optical axis of the projection lens in the vertical plane is held to very close tolerance in the machining of the lens mount pivot. However, alignment in a horizontal plane is subject to possible variation, and provision has been made for adjusting the lens carrier accordingly. Check alignment as follows:

a. Thread the projector with resolution test film, roll title film, or other film known to have good resolution at the edges of the frame.

b. Project and focus the picture on a matte-surface screen. If the picture is "soft" along either edge, remove the back cover to gain access to the adjusting setscrew (Figure F). This setscrew bears against the machined surface of the lens carrier and determines the angular relationship between the optical axis and the aperture plate.

c. Turn adjusting setscrew in or out to obtain equal sharpness of the image along both sides of the picture. If the lens carrier is far out of alignment, it may be necessary to refocus the picture during the alignment procedure.

Replacement Parts

The following pages illustrated and list by part name and number all replacement parts of the Design 346A Autoload Super 8 Projector. Since the illustrations are arranged in the suggested order of disassembly, they will serve as an aid to the repairman during disassembly and reassembly of the projector. Be sure to check footnotes for special instructions regarding replacement procedures.

NOTE

Refer to the Bristol Wrench Chart on page 3 for proper wrenches required for removal of the fluted socket setscrews illustrated in these parts lists.

When ordering painted castings, be sure to note whether such parts are brown or mahogany in color. Refer to the parts list for the appropriate part number.

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		COVERS, LAMPHOUSE AND LAMP		
1-1	08181	COVER ASSEMBLY, Front (mahogany)	1	
1-1	07994	COVER ASSEMBLY, Front (brown)	1	
-1A	19025	. RIVET, Tubular, 0.123 inch diameter	1	
-1B	26321	. CATCH, Front cover	1	
-1C	26320	. BUTTON, Front cover release	1	
-1D	26310	. RIVET, Tubular, 0.089 inch diameter	2	
-1E	34946	. NAMEPLATE, Front cover	1	
-2	38320	SCREW, Recessed truss head, tapping, 4-40 by 1/8 inch	2	
-3	40743	PLATE, Cover, threading knob (mahogany)	1	
-3	39410	PLATE, Cover, threading knob (brown)	1	
-4	29065	SCREW, Hex head, tapping, 4-40 by 1/2 inch	4	
-5	39814	SCREW, Hex head, tapping, 6-32 by 1/2 inch	2	
-6	40739	COVER, Back (mahagony)	1	
-6	39405	COVER, Back (brown)	1	
-7	08182	LAMPHOUSE ASSEMBLY (mahognay)	1	
-7	07995	LAMPHOUSE ASSEMBLY (brown)	1	
-7A	29144	. RIVET, Tubular, 0.123 inch diameter	1	
-7B	35360	. LATCH, Spring	1	
-7C	39415	. NAMEPLATE, "AUTOLOAD"	1	
-8	39224	LAMP, Projector, Type DJL	1	
-9	32136	SCREW, Round head, 6-32 by 1/4 inch	3	
-10	07996	SOCKET AND BRACKET ASSEMBLY, Lamp	1	
-11	39225	DECAL, Lamp warning	1	
-12	20808	RING, Retaining, 0.145 inch ID	2	
-13	30662	ROLLER, Film guide	2	
-14	20415	NUT, Switch mounting	1	
-15	39412	NAMEPLATE, Switch and framer	1	
-16	29065	SCREW, Hex head tapping, 4-40 by 1/2 inch	4	
-17	No Number	MECHANISM PLATE ASSEMBLY, Complete	NP	
-18	26081	SWITCH, OFF-MOTOR-LAMP	1	
-18A	30529	TUBE, Insulating, lamp leadwire	1	
-19	30714	SCREW, Fillister head, 2-56 by 1/8 inch	1	
-20	30664	KNOB, Forward-Still-Reverse	1	
-21	30093	RIVET, Tubular, 0.146 by 0.822 inch	2	
-22	17632	WASHER, Flat	2	
-23	36103	HANDLE, Carrying	1	
-24	30226	RIVET, Tubular, 0.123 inch diameter	2	
-25	32478	BAFFLE, Lamp	1	

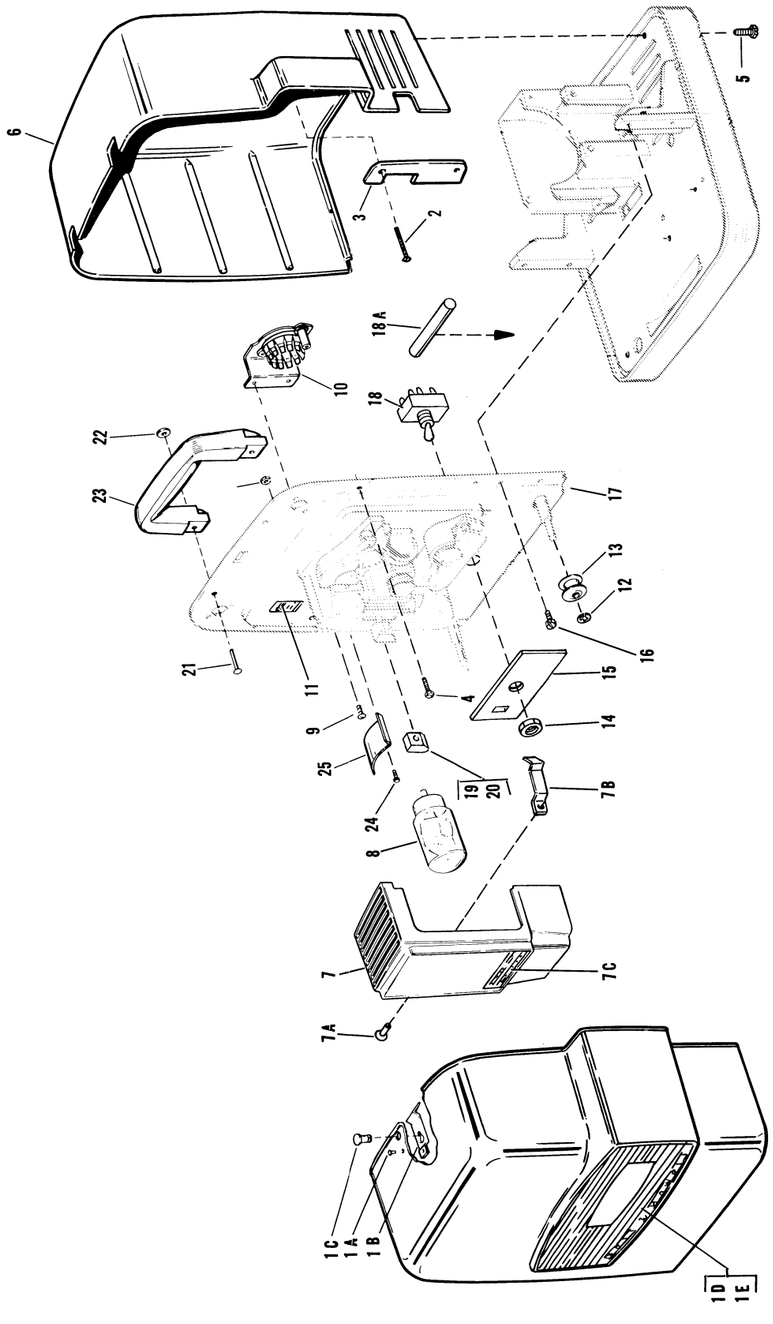


Figure 1. Lamphouse and Lamp Covers

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		REEL ARMS AND GEARS		
2-1	23822	SCREW, Binding head, 5-40 by 0.203 inch	1	
-2	012826	ARM AND BEARING ASSEMBLY, Feed reel (mahagony)	1	
-2	012817	ARM AND BEARING ASSEMBLY, Feed reel (brown)	1	
-3	32979	SPRING, Torque	1	
-4	32861	SCREW, Tension adjusting, nylon	1	
-5	29726	SPACER, Tension adjusting	1	
-6	35579	GEAR, Spur	1	
-7	35580	DISC, Friction	2	
-8	29724	WASHER, Spring	1	
-9	010374	SPINDLE ASSEMBLY, Feed	1	
-10	29706	GEAR, Spur	1	
-11	29192	SETSCREW, Fluted socket cup pt, 4-40 by 1/8 inch	1	
-12	35176	GEAR, Spur	1	
-13	010189	GEAR AND SHAFT ASSEMBLY, Feed arm	1	
-14	23822	SCREW, Binding head, 5-40 by 0.203 inch	2	
-15	012827	ARM AND BEARING ASSEMBLY, Take-Up (mahagony)	1	
-15	012816	ARM AND BEARING ASSEMBLY, Take-Up (brown)	1	
-16	32861	SCREW, Tension adjusting, nylon	1	
-17	29726	SPACER, Tension adjusting	1	
-18	35579	GEAR, Spur	1	
-19	35580	DISC, Friction	2	
-20	29724	WASHER, Spring	1	
-21	010374	SPINDLE ASSEMBLY, Take-Up	1	
-22	29706	GEAR, Spur	1	
-23	29707	GEAR, Spur	2	
-24	29192	SETSCREW, Fluted socket cup pt, 4-40 by 1/8 inch	1	
-25	30203	GEAR, Spur	1	
-26	010190	GEAR AND SHAFT ASSEMBLY, Take-Up	1	
-27	20808	RING, Retaining, 0.145 inch ID (IRRC 1000-18)	1	
-28	35919	GEAR, Spur, large nylon	1	
-29	21736	RING, Retaining, 0.207 inch ID (IRRC 1000-25)	1	
-30	29706	GEAR, Spur, small nylon	1	
-31	29744	RING, Retaining, external, 0.562 inch ID	2	
-32	34705	BEARING	2	
-33	012401	SUPPORT ASSEMBLY, Feed reel arm	1	
-34	012402	SUPPORT ASSEMBLY, Take-up arm	1	
-35	700222	SCREW, Binding head, recessed, 5-40 by 3/16 inch	1	
-36	05631	PLATE ASSEMBLY, Gear mounting	1	
-37	30238	SPRING, Reel arm tension	2	
-38	29736	WASHER, CAM (feed arm)	1	
-39	32948	WASHER, CAM (take-up arm)	1	
-40	145	BALL, Steel	4	

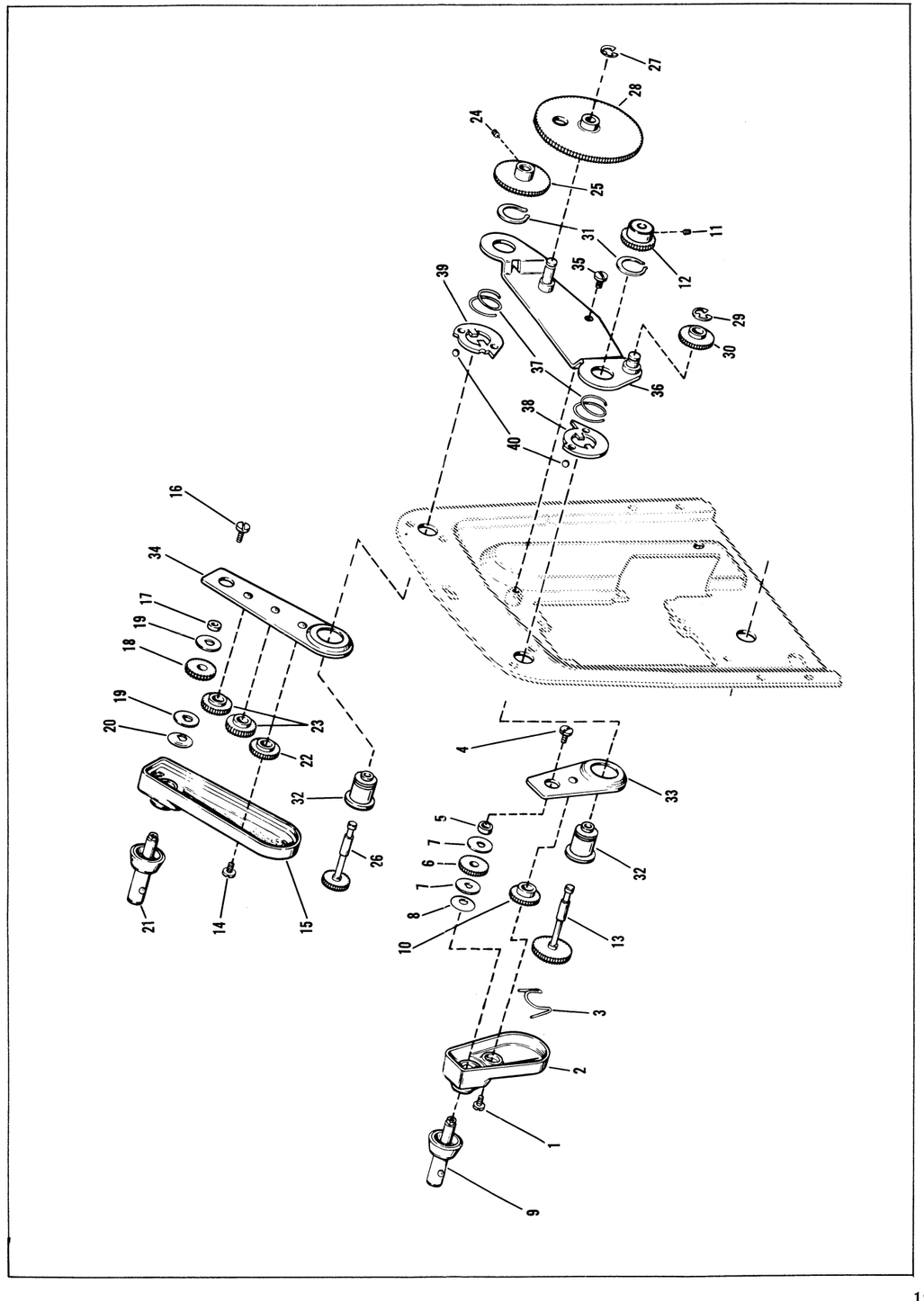


Figure 2. Reel Arms and Gears

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LOOPFORMERS, SPROCKETS AND GEARS		
3-1	35181	SPRING, Sprocket gear retaining	2	
-2	30667	WASHER, Friction (lower sprocket only)	1	
-3	35184	RATCHET, Spring	2	
-4	35186	WASHER, Spacer	2	
-5	35177	GEAR, Sprocket, upper	1	
-5A	33153	GEAR, Sprocket, lower	1	
-6	011459	LEVER AND STUD ASSEMBLY, Drive gear	1	
-7	21736	RING, Retaining 0.207 inch ID (IRRC 1000-18)	1	
-8	34718	GEAR, Spur	1	
-9	39005	GEAR, Sprocket, inner	2	
-10	012583	SPROCKET AND SHAFT ASSEMBLY	2	
-11	26085	WASHER, Friction	2	
-12	30612	SCREW, Pin type, 3-48NC	1	
-13	39015	LOOPFORMER, Upper	1	
-13A	36116	NAMEPLATE, "Push"	1	
-14	39237	ROLLER, Flanged	1	
-15	30613	WASHER, Flat	1	
-16	39383	SCREW, Pan head, 5-40 by 1 inch	1	
-17	010274	BRACKET ASSEMBLY, Upper loopformer	1	
-18	30625	ROLLER, Guide	1	
-19	39383	SCREW, Pan head, 5-40 by 1 inch	1	
-20	39018	BRACKET, Lower loopformer	1	
-21	39028	SCREW, Pin type, 3-48NC	1	
-22	010275	LOOPFORMER ASSEMBLY, Lower	1	
-23	39249	ROLLER, Tapered idler	1	
-24	30613	WASHER, Flat	1	
-25	39795	SPRING, Pressure plate retaining	1	
-26	39797	PLATE, Retainer	1	
-27	39798	PLATE, Pressure	1	
-28	26030	PIN, Hinge, lens carrier	2	
-29	08043	CARRIER ASSEMBLY, Lens (mahagoney)	1	
-29	010290	CARRIER ASSEMBLY, Lens (brown)	1	
-30	30621	SCREW, Truss head, 3-48 by 3/16 inch	2	
-31	39796	RAIL, Film guide	1	
-32	28067	SPRING, Side tension	1	
-33	30639	ARM, Side tension	1	
-34	30620	SCREW, Truss head, 3-48 by 1/8 inch	2	
-35	010346	PLATE ASSEMBLY, Aperture	1	
-36	26642	RIVET, Tubular, 0.089 inch diameter	2	
-37	30615	CATCH, Lens carrier	1	
-38	39254	SETSCREW, Fluted socket oval pt, 6-32 by 1/4 inch (Nyloc)	1	
-39	37961	SPRING, Tension, upper	1	

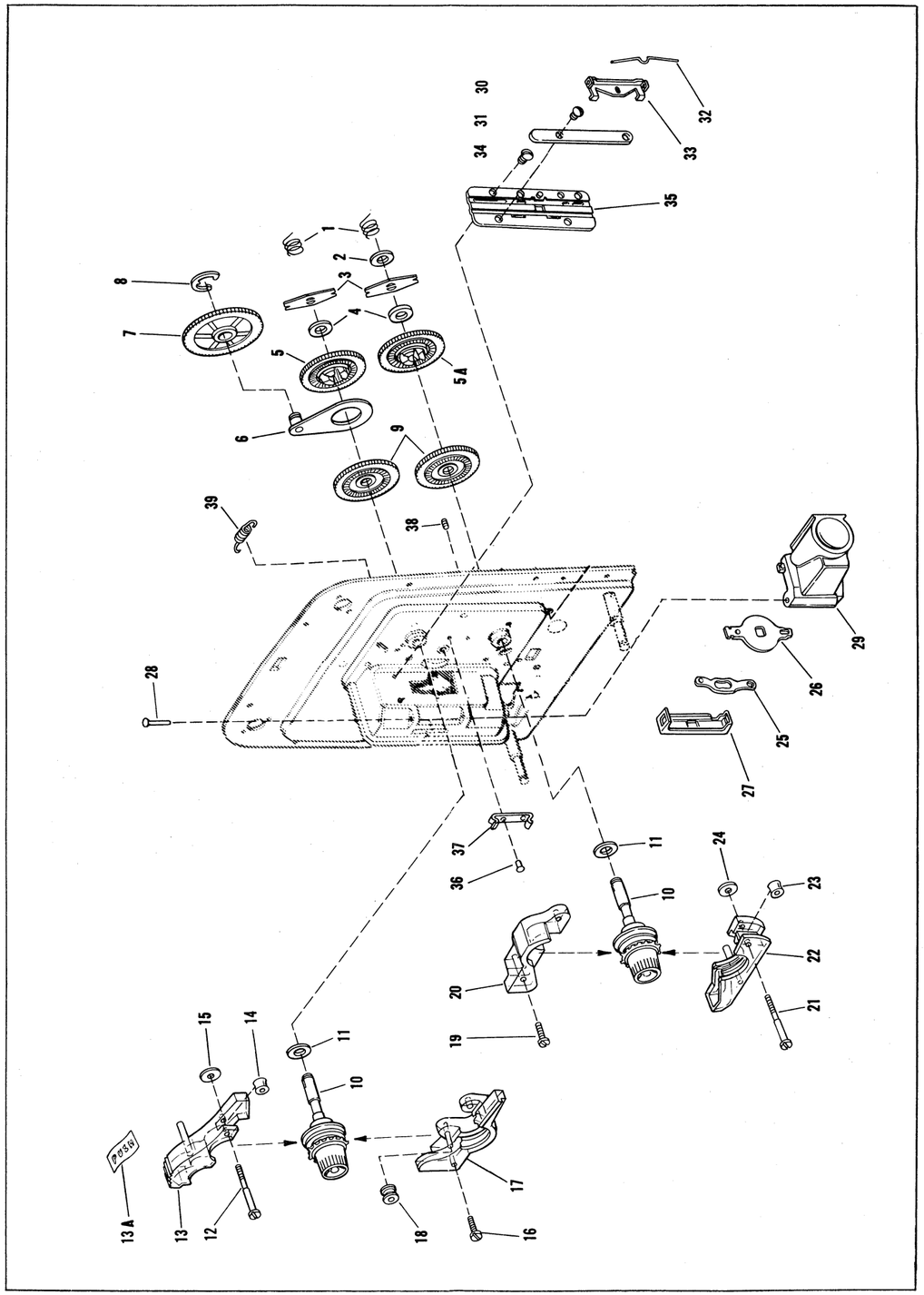


Figure 3. Loopformers, Sprockets and Gears

FIG. & INDEX NO.	PART NO.	1 2 3 4 5 6 7 DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
		SHUTTER AND SHUTTLE MECHANISM		
4-1	35956	SCREW, Pan head Sems, 3-48 by 0.187 inch	2	
-2	09167	BRACKET ASSEMBLY, Spring-loading	1	
-3	25715	RING, Retaining, bowed, 0.145 inch ID	1	
-4	012593	BRACKET ASSEMBLY, Pulley mounting	1	
-5	39245	SPRING, Torsion, fire shutter	1	
-6	27322	RING, Retaining, special	2	
-7	32172	WASHER, Flat	4	
-8	010667	ROLLER ASSEMBLY, Shutter drive	2	
-9	34656	SCREW, Round head Sems, 6-32 by 1/4 inch	1	
-10	39264	SCREW, Pivot	1	
-11	05632	SAFETY SHUTTER AND BRACKET ASSEMBLY	1	
-12	26906	NUT AND WASHER, Sems	1	
-13	39010	STUD, Pivot	1	
-14	30551	SCREW, Fillister head, 3-48 by 1/4 inch	2	
-15	29175	WASHER, Shutter	1	
-16	39020	SHUTTER, Projector	1	
-17	39382	CAM, In-Out	1	
-18	26906	NUT AND WASHER, Sems	1	
-19	39011	SCREW, Pivot	1	
-20	39027	WASHER, Spring tension	1	
-21	07998	SHUTTLE AND FRAMING LEVER ASSEMBLY	1	
-22	39263	SPACER, Sleeve	1	
-23	32947	SHOE, Cam, white (NOTE A)	AR	
-23	33712	SHOE, Cam, black (NOTE A)	AR	
-24	36842	SCREW, Pan head, 6-42 by 3/8 inch	1	
-25	39013	BRACKET, Shuttle pivot	1	
-26	36765	SETSCREW, Fluted socket cup pt, 6-32 by 1/4 inch	1	
-27	39030	CAM, Pull-down	1	
-28	26085	WASHER, Thrust	1	
-29	12498	SETSCREW, Fluted socket cup pt, 6-32 by 1/8 inch	1	
-30	26131	RING, Retaining, 0.219 inch ID	1	
-31	010448	KNOB AND SHAFT ASSEMBLY	1	
-32	39004	PINION, Drive	1	
-33	30667	WASHER, Friction	1	

NOTE A: Select any combination of cam shoes to obtain required fit on pulldown cam.

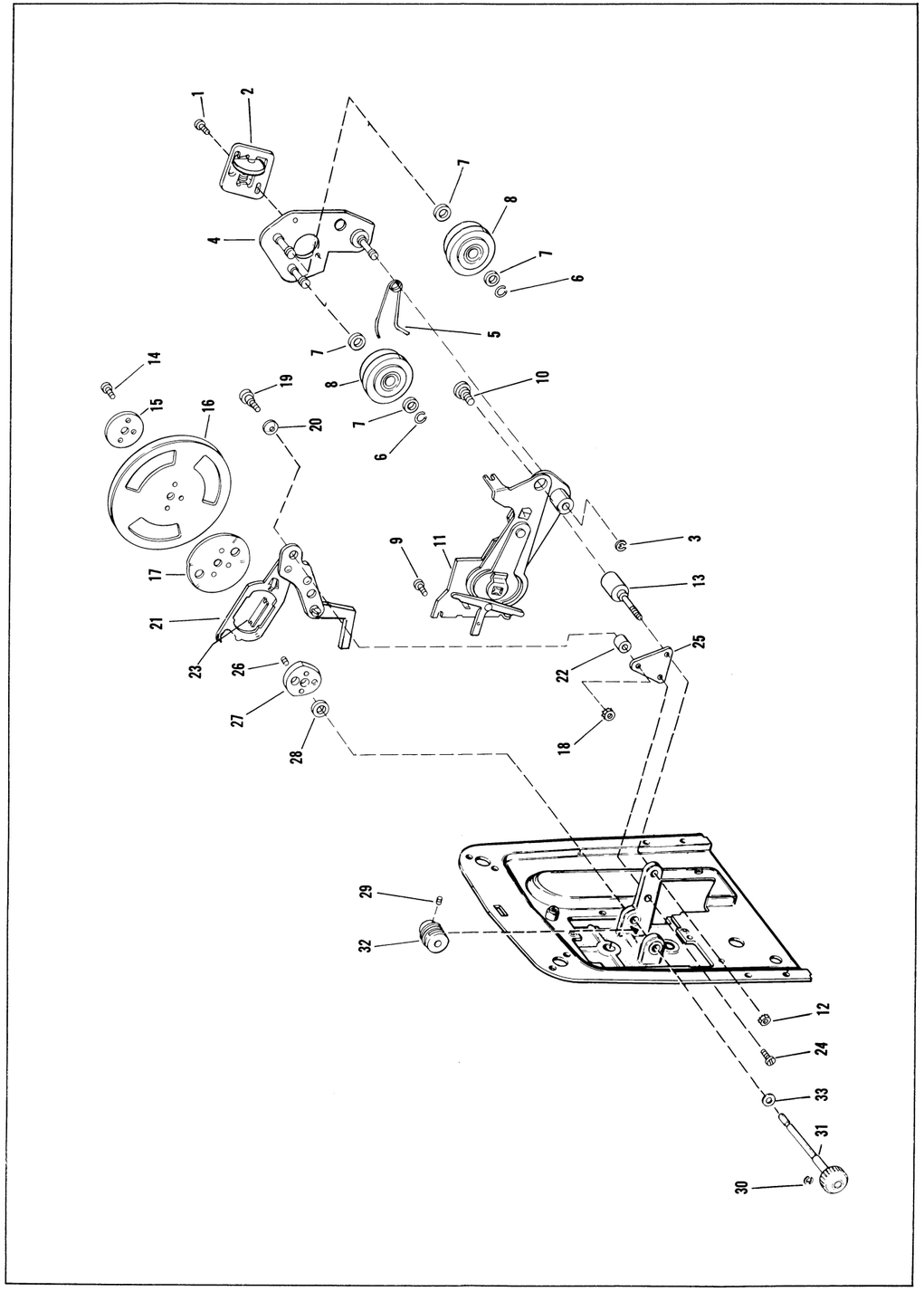


Figure 4. Shutter and Shuttle Mechanism

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		MOTOR AND BASE COMPONENTS		
5-1	010169	LOCK KNOB ASSEMBLY, Tilt	1	
-2	21736	RING, Retaining, Type E (IRRC No. 1000-25)	1	
-3	010373	SHAFT AND FOOT ASSEMBLY, Tilt	1	
-4	30237	SCREW, Hex head tapping, 4-40 by 1/4 inch	1	
-5	26329	SCREW, Hex head self-tapping, 4-36 by 0.187 inch	2	
-6	31020	WASHER, Flat	2	
-7	35595	COVER, Blower housing	1	
-8	32974	SETSCREW, Fluted socket cup pt, 8-32 by 1/8 inch	1	
-9	012169	FAN ASSEMBLY, Blower	1	
-10	37885	BELT, Drive	1	
-11	12498	SETSCREW, Fluted socket cup pt, 6-32 by 1/8 inch	1	
-12	36564	PULLEY, Motor	1	
-13	32485	FAN, Motor	1	
-14	30030	SCREW, Hex head tapping, 6-32 by 1/2 inch	2	
-15	26163	INSULATOR, Motor-to-switch	1	
-16	012050	MOTOR ASSEMBLY, Projector	1	
-17	22464	BUSHING, Strain relief	1	
-18	34957	CORD, Power	1	
5-	08183	BASE ASSEMBLY, Projector (mahogany)	1	
5-	07997	BASE ASSEMBLY, Projector (brown)	1	
-19	30648	. RIVET, Tubular, 0.099 inch diameter	2	
-20	39023	. CUTTER, Film	1	
-21	30663	. SHIELD, Rewind	1	
-22	26170	. RIVET, Tubular, 0.123 by 1.010 inch	2	
-23	26135	. FOOT, Rubber	2	
-24	40740	. BASE, Projector (mahogany) (order assembly #08183)	1	
-24	39404	. BASE, Projector (brown) (order assembly #07997)	1	

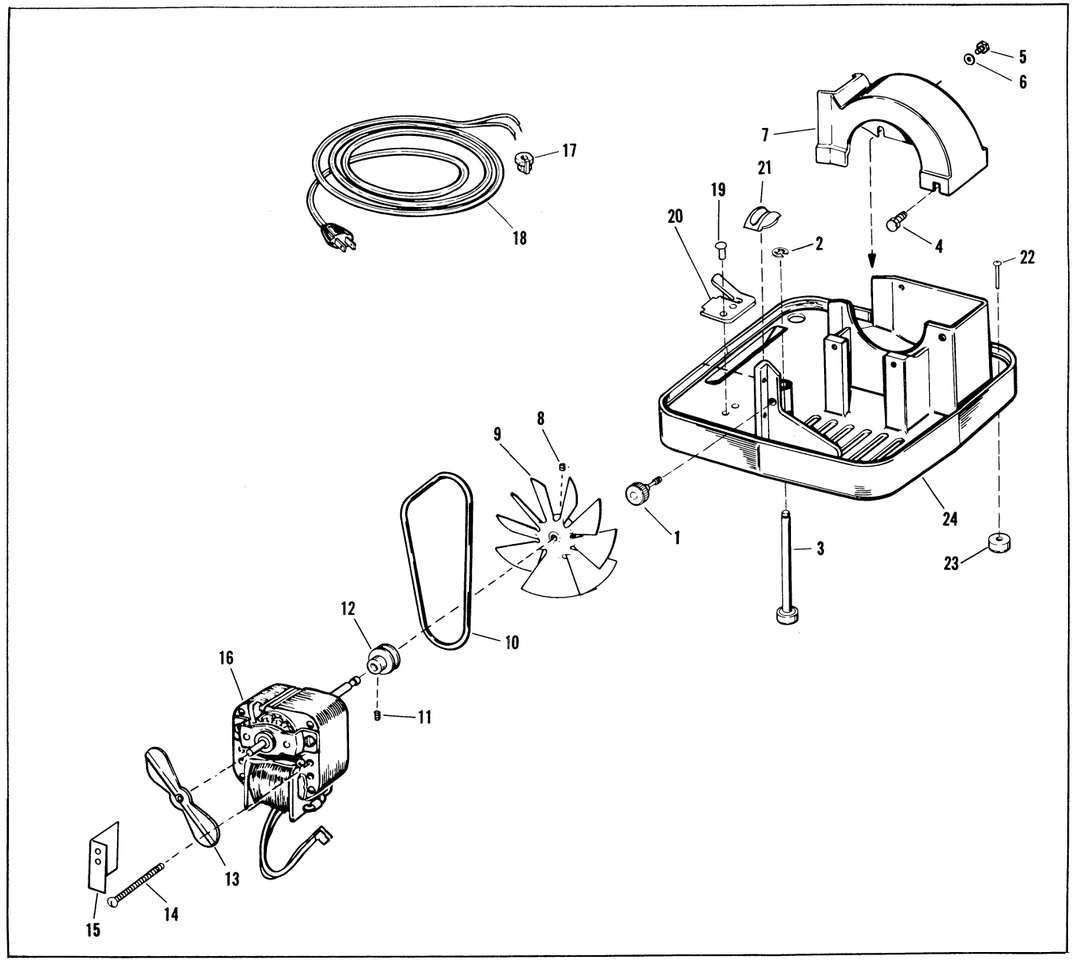


Figure 5. Motor and Base Components

NUMERICAL INDEX

PART NUMBER	FIG. & INDEX NO.	PART NUMBER	FIG. & INDEX NO.	PART NUMBER	FIG. & INDEX NO.
05631	2-36	26329	5-5	35177	3-5
05632	4-11	26642	3-36	35181	3-1
07994	1-1	26906	4-12, 4-18	35184	3-3
07995	1-7	27322	4-6	35186	3-4
07996	1-10	28067	3-32	35360	1-7B
07997	5-	29065	1-4, 1-16	35579	2-6, 2-18
07998	4-21	29144	1-7A	35580	2-7, 2-19
08043	3-29	29175	4-15	35595	5-7
08181	1-1	29192	2-11, 2-24	35919	2-28
08182	1-7	29706	2-10, 2-22,	35956	4-1
08183	5-		2-30	36103	1-23
09167	4-2	29707	2-23	36116	3-13A
010169	5-1	29724	2-8, 2-20	36564	5-12
010189	2-13	29726	2-5, 2-17	36765	4-26
010190	2-26	29736	2-38	36842	4-24
010274	3-17	29744	2-31	37885	5-10
010275	3-22	30030	5-14	37961	3-39
010290	3-29	30093	1-21	38320	1-2
010346	3-35	30203	2-25	39004	4-32
010373	5-3	30226	1-24	39005	3-9
010374	2-9, 2-21	30237	5-4	39010	4-13
010448	4-31	30238	2-37	39011	4-19
010667	4-8	30529	1-18A	39013	4-25
011459	3-6	30551	4-14	39015	3-13
012050	5-16	30612	3-12	39018	3-20
012169	5-9	30613	3-15, 3-24	39020	4-16
012401	2-33	30615	3-37	39023	5-20
012402	2-34	30620	3-34	39027	4-20
012583	3-10	30621	3-30	39028	3-21
012593	4-4	30625	3-18	39030	4-27
012816	2-15	30639	3-33	39224	1-8
012817	2-2	30648	5-19	39225	1-11
012826	2-2	30662	1-13	39237	3-14
012827	2-15	30663	5-21	39245	4-5
145	2-40	30664	1-20	39249	3-23
12498	4-29, 5-11	30667	3-2, 4-33	39254	3-38
17632	1-22	30714	1-19	39263	4-22
19025	1-1A	31020	5-6	39264	4-10
20415	1-14	32136	1-9	39382	4-17
20808	1-12, 2-27	32172	4-7	39383	3-16, 3-19
21736	2-29, 3-7,	32478	1-25	39404	5-24
	5-2	32485	5-13	39405	1-6
22464	5-17	32861	2-4, 2-16	39410	1-3
23822	2-1, 2-14	32947	4-23	39412	1-15
25715	4-3	32948	2-39	39415	1-7C
26030	3-28	32974	5-8	39795	3-25
26081	1-18	32979	2-3	39796	3-31
26085	3-11, 4-28	33712	4-23	39797	3-26
26131	4-30	34656	4-9	39798	3-27
26135	5-23	34705	2-32	39814	1-5
26163	5-15	34718	3-8	40739	1-6
26170	5-22	34946	1-1E	40740	5-24
26310	1-1D	34957	5-18	40743	1-3
26320	1-1C	35176	2-12	700222	2-35
26321	1-1B				

PARTS CATALOG

AUTOLOAD ®
SUPER 8 PROJECTOR

DESIGNS 346A, 346AX, 346AXB

PHOTO PRODUCTS GROUP

BELL & HOWELL

GENERAL SERVICE DEPT.
7100 McCORMICK ROAD
CHICAGO, ILLINOIS 60645

PART NO. 70487-1 PRINTED IN U.S.A. REVISED SEPTEMBER 1969

Replacement Parts

The following pages illustrated and list by part name and number all replacement parts of the Design 346A, 346AX and 346AXB Autoload Super 8 Projectors. Since the illustrations are arranged in the suggested order of disassembly, they will serve as an aid to the repairman during disassembly and reassembly of the projector. Be sure to check footnotes for special instructions regarding replacement procedures.

NOTE

Refer to the Bristol Wrench Chart on page 3 for proper wrenches required for removal of the fluted socket setscrews illustrated in these parts lists.

Original production models were manufactured with both brown and mahogany painted castings. All brown painted castings have been discontinued, and only the mahogany painted castings will be available for service replacement. When ordering replacement parts, be sure to check the Usable on Code column to determine if the part in question is applicable to the projector being repaired. Parts coded A apply only to Design 346A projectors; parts coded B apply only to Design 346AX projectors; parts coded C apply only to Design 346AXB projectors.

AVAILABLE ACCESSORIES

Film Reel Assembly	P/N 012581
Adapter Plug (346AXB only)	P/N 33438
Lens, 1-in. f/1.6	P/N 020460
Lens, 1-in. f/1.6	P/N 200877
Lens, 25mm f/1.5	P/N 203424

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		COVERS, LAMPHOUSE AND LAMP		
1-1	08181	COVER ASSEMBLY, Front	1	
-1A	30226	. RIVET, Tubular, 0.123 inch diameter	1	
-1B	39252	. CATCH, Front cover	1	
-1C	26320	. BUTTON, Front cover release	1	
-1D	26642	. RIVET, Tubular, 0.089 inch diameter	2	
-1E	34946	. NAMEPLATE, Front cover	1	
-2	38320	SCREW, Recessed truss head, tapping, 4-40 by 1/8 inch	2	
-3	40743	PLATE, Cover, threading knob	1	
-4	29065	SCREW, Hex head, tapping, 4-40 by 1/2 inch	4	
-5	39814	SCREW, Hex head, tapping, 6-32 by 1/2 inch	2	
-6	41988	COVER, Back	1	
-7	08182	LAMPHOUSE ASSEMBLY	1	
-7A	29144	. RIVET, Tubular, 0.123 inch diameter	1	
-7B	35360	. LATCH, Spring	1	
-7C	39415	. NAMEPLATE, "AUTOLOAD"	1	
-8	40591	LAMP, Projector, Type DJL	1	AB
-8	35300	LAMP, Projector, Type DEF, 155W low voltage	1	C
-9	32136	SCREW, Round head, 6-32 by 1/4 inch	3	
-10	07996	SOCKET AND BRACKET ASSEMBLY, Lamp	1	AB
-10	010271	SOCKET AND BRACKET ASSEMBLY, Lamp	1	C
-11	39225	DECAL, Lamp warning	1	AB
-11	39335	DECAL, Lamp warning	1	C
-12	20808	RING, Retaining, 0.145 inch ID	2	
-13	30662	ROLLER, Film guide	2	
-14	20415	NUT, Switch mounting	1	
-15	39412	NAMEPLATE, Switch	1	A
-15	42886	NAMEPLATE, Switch	1	B
-15	41987	NAMEPLATE, Switch	1	C
-16	29065	SCREW, Hex head tapping, 4-40 by 1/2 inch	4	
-17	No Number	MECHANISM PLATE ASSEMBLY, Complete	NP	
-18	26081	SWITCH, OFF-MOTOR-LAMP	1	AB
-18	36626	SWITCH, OFF-MOTOR-LAMP	1	C
-18A	30529	TUBE, Insulating, lamp leadwire	1	
-19	30714	SCREW, Fillister head, 2-56 by 1/8 inch	1	
-20	30664	KNOB, Forward-Still-Reverse	1	
-21	30093	RIVET, Tubular, 0.146 by 0.822 inch	2	
-22	17632	WASHER, Flat	2	
-23	36103	HANDLE, Carrying	1	
-24	30226	RIVET, Tubular, 0.123 inch diameter	2	
-25	32478	BAFFLE, Lamp	1	
-26	32350	SCREW, Round head Sems, 8-32 by 5/16 inch	3	C
-27	012059	TRANSFORMER ASSEMBLY (mounted in rear cover)	1	C

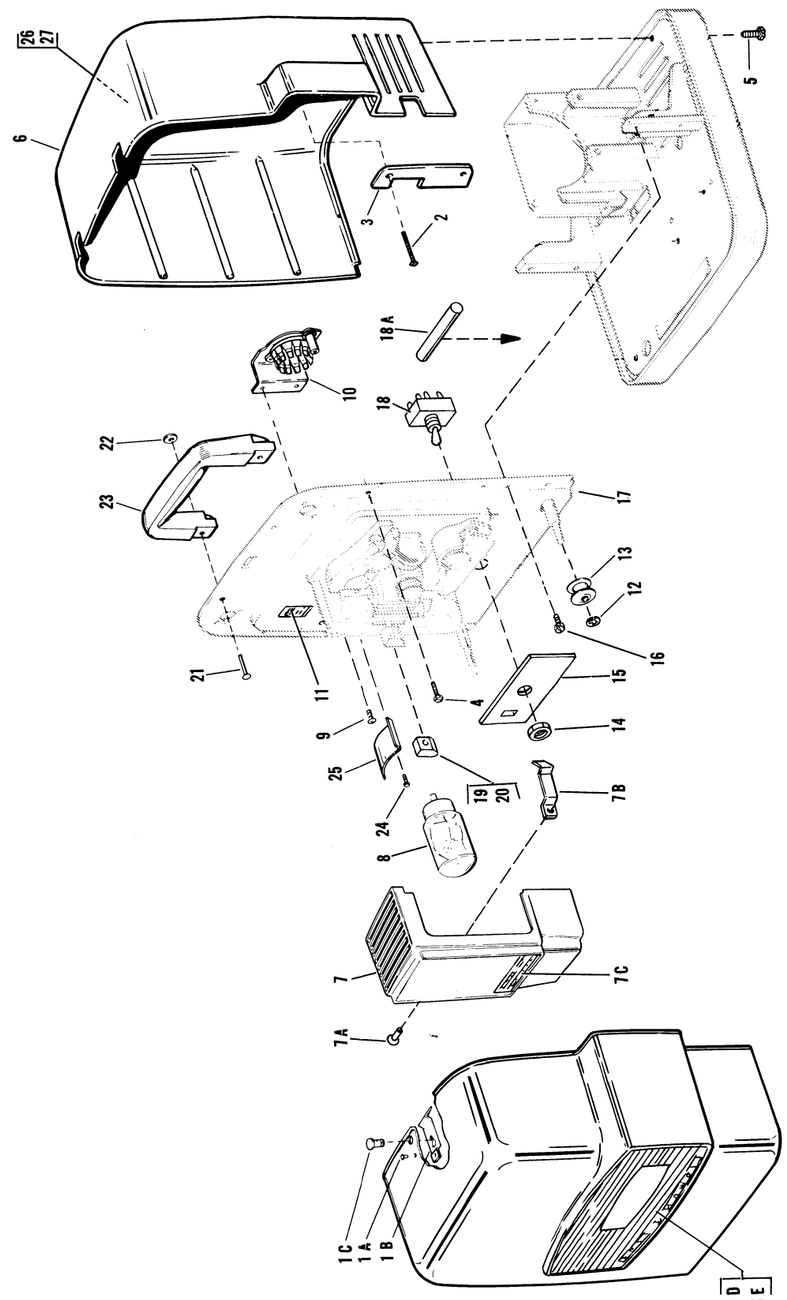


Figure 1. Lamphouse and Lamp Covers

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		REEL ARMS AND GEARS		
2-1	23822	SCREW, Binding head, 5-40 by 0.203 inch	1	
-2	012826	ARM AND BEARING ASSEMBLY, Feed reel	1	
-3	32979	SPRING, Torque	1	
-4	32861	SCREW, Tension adjusting, nylon	1	
-5	29726	SPACER, Tension adjusting	1	
-6	35579	GEAR, Spur	1	
-7	35580	DISC, Friction	2	
-8	29724	WASHER, Spring	1	
-9	010374	SPINDLE ASSEMBLY, Feed	1	
-10	29706	GEAR, Spur	1	
-11	29192	SETSCREW, Fluted socket cup pt, 4-40 by 1/8 inch	1	
-12	35176	GEAR, Spur	1	
-13	010189	GEAR AND SHAFT ASSEMBLY, Feed arm	1	
-14	23822	SCREW, Binding head, 5-40 by 0.203 inch	2	
-15	012827	ARM AND BEARING ASSEMBLY, Take-Up	1	
-16	32861	SCREW, Tension adjusting, nylon	1	
-17	29726	SPACER, Tension adjusting	1	
-18	35579	GEAR, Spur	1	
-19	35580	DISC, Friction	2	
-20	29724	WASHER, Spring	1	
-21	010374	SPINDLE ASSEMBLY, Take-Up	1	
-22	29706	GEAR, Spur	1	
-23	29707	GEAR, Spur	2	
-24	29192	SETSCREW, Fluted socket cup pt, 4-40 by 1/8 inch	1	
-25	30203	GEAR, Spur	1	
-26	010190	GEAR AND SHAFT ASSEMBLY, Take-Up	1	
-27	20808	RING, Retaining, 0.145 inch ID (IRRC 1000-18)	1	
-28	35919	GEAR, Spur, large nylon	1	
-29	21736	RING, Retaining, 0.207 inch ID (IRRC 1000-25)	1	
-30	29706	GEAR, Spur, small nylon	1	
-31	29744	RING, Retaining, external, 0.562 inch ID	2	
-32	34705	BEARING	2	
-33	012401	SUPPORT ASSEMBLY, Feed reel arm	1	
-34	012402	SUPPORT ASSEMBLY, Take-up arm	1	
-35	700222	SCREW, Binding head, recessed, 5-40 by 3/16 inch	1	
-36	05631	PLATE ASSEMBLY, Gear mounting	1	
-37	39099	SPRING, Reel arm tension	2	
-38	29736	WASHER, CAM (feed arm)	1	
-39	32948	WASHER, CAM (take-up arm)	1	
-40	1261	BALL, Steel	4	

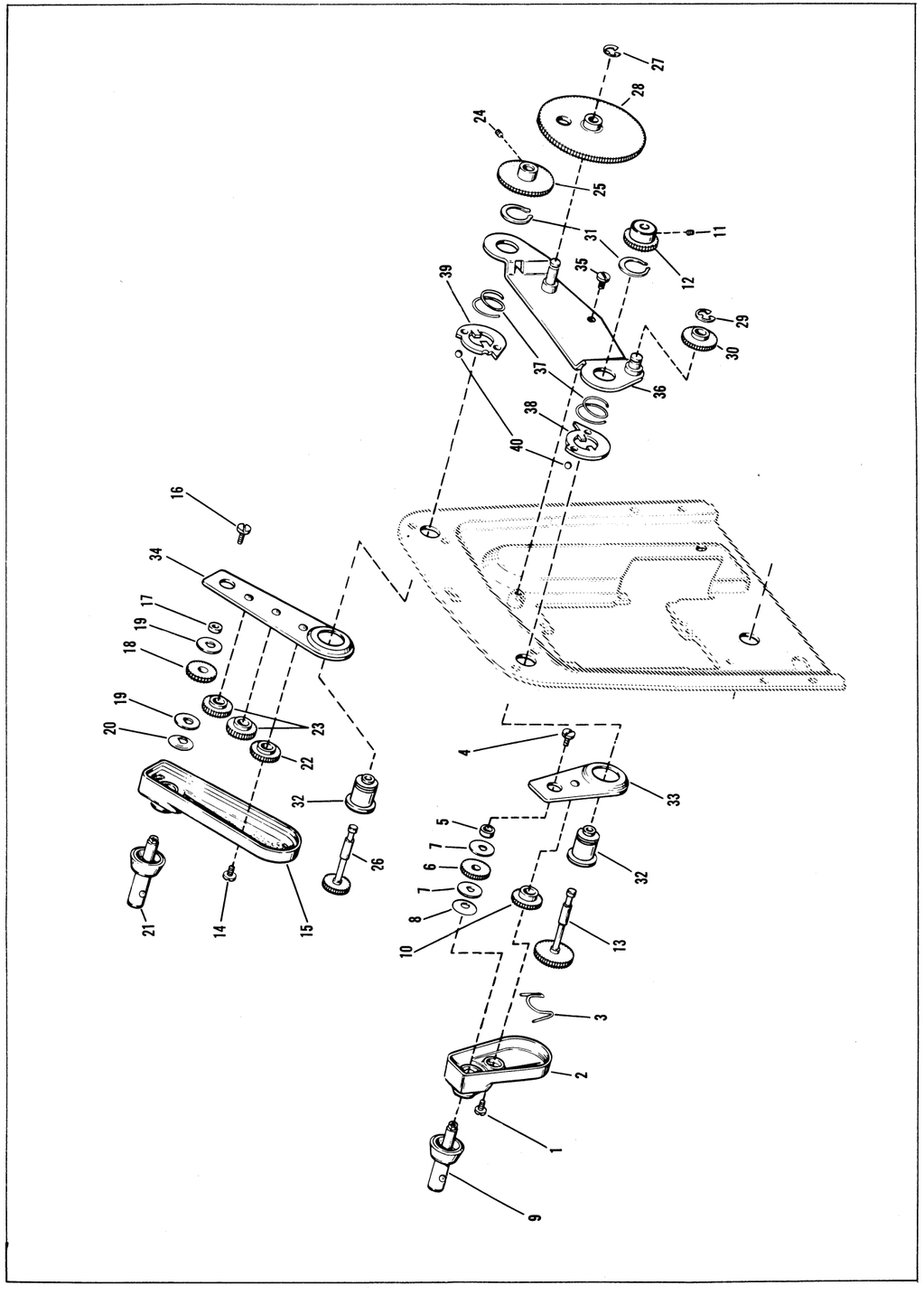


Figure 2. Reel Arms and Gears

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LOOPFORMERS, SPROCKETS AND GEARS		
3-1	35181	SPRING, Sprocket gear retaining	2	
-2	30667	WASHER, Friction (lower sprocket only)	1	
-3	35184	RATCHET, Spring	2	
-4	35186	WASHER, Spacer	2	
-5	35177	GEAR, Sprocket, upper	1	
-5A	33153	GEAR, Sprocket, lower	1	
-6	011459	LEVER AND STUD ASSEMBLY, Drive gear	1	
-7	21736	RING, Retaining 0.207 inch ID (IRRC 1000-18)	1	
-8	34718	GEAR, Spur	1	
-9	39005	GEAR, Sprocket, inner	2	
-10	012583	SPROCKET AND SHAFT ASSEMBLY	2	
-11	26085	WASHER, Friction	2	
-12	30612	SCREW, Pin type, 3-48NC	1	
-13	39015	LOOPFORMER, Upper	1	
-13A	43432	NAMEPLATE, "Push"	1	
-14	39237	ROLLER, Flanged	1	
-15	30613	WASHER, Flat	1	
-16	39383	SCREW, Pan head, 5-40 by 1 inch	1	
-17	010274	BRACKET ASSEMBLY, Upper loopformer	1	
-18	30625	ROLLER, Guide	1	
-19	39383	SCREW, Pan head, 5-40 by 1 inch	1	
-20	39018	BRACKET, Lower loopformer	1	
-21	39028	SCREW, Pin type, 3-48NC	1	
-22	010275	LOOPFORMER ASSEMBLY, Lower	1	
-23	39249	ROLLER, Tapered idler	1	
-24	30613	WASHER, Flat	1	
-25	39795	SPRING, Pressure plate retaining	1	
-26	39797	PLATE, Retainer	1	
-27	39798	PLATE, Pressure	1	
-28	26030	PIN, Hinge, lens carrier	2	
-29	08043	CARRIER ASSEMBLY, Lens	1	
-30	30621	SCREW, Truss head, 3-48 by 3/16 inch	2	
-31	39796	RAIL, Film guide	1	
-32	28067	SPRING, Side tension	1	
-33	30639	ARM, Side tension	1	
-34	30620	SCREW, Truss head, 3-48 by 1/8 inch	2	
-35	010346	PLATE ASSEMBLY, Aperture	1	
-36	26642	RIVET, Tubular, 0.089 inch diameter	2	
-37	30615	CATCH, Lens carrier	1	
-38	39254	SETSCREW, Fluted socket oval pt, 6-32 by 1/4 inch (Nyloc)	1	
-39	37961	SPRING, Tension, upper	1	

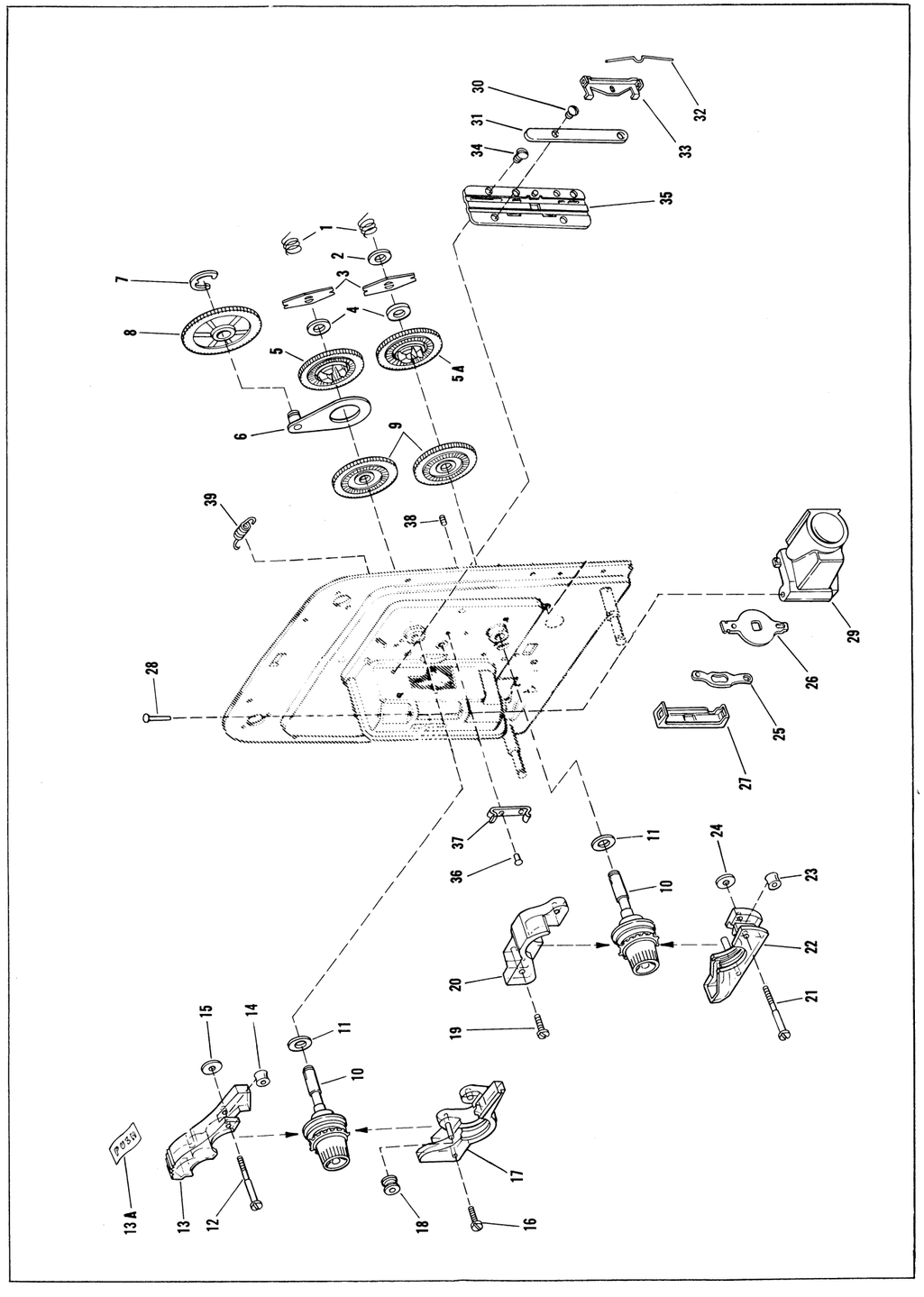


Figure 3. Loopformers, Sprockets and Gears

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		SHUTTER AND SHUTTLE MECHANISM		
4-1	35956	SCREW, Pan head Sems, 3-48 by 0.187 inch	2	
-2	09167	BRACKET ASSEMBLY, Spring-loading	1	
-3	25715	RING, Retaining, bowed, 0.145 inch ID	1	
-4	012593	BRACKET ASSEMBLY, Pulley mounting	1	
-5	39245	SPRING, Torsion, fire shutter	1	
-6	27322	RING, Retaining, special	2	
-7	32172	WASHER, Flat	4	
-8	010667	ROLLER ASSEMBLY, Shutter drive	2	
-9	34656	SCREW, Round head Sems, 6-32 by 1/4 inch	1	
-10	39264	SCREW, Pivot	1	
-11	05632	SAFETY SHUTTER AND BRACKET ASSEMBLY	1	
-12	26906	NUT AND WASHER, Sems	1	
-13	39010	STUD, Pivot	1	
-14	30551	SCREW, Fillister head, 3-48 by 1/4 inch	2	
-15	29175	WASHER, Shutter	1	
-16	39020	SHUTTER, Projector	1	
-17	39382	CAM, In-Out	1	
-18	26906	NUT AND WASHER, Sems	1	
-19	39011	SCREW, Pivot	1	
-20	39027	WASHER, Spring tension	1	
-21	07998	SHUTTLE AND FRAMING LEVER ASSEMBLY	1	
-22	39263	SPACER, Sleeve	1	
-23	32947	SHOE, Cam, white (NOTE A)	AR	
-23	33712	SHOE, Cam, black (NOTE A)	AR	
-24	36842	SCREW, Pan head, 6-42 by 3/8 inch	1	
-25	39013	BRACKET, Shuttle pivot	1	
-26	36765	SETSCREW, Fluted socket cup pt, 6-32 by 1/4 inch	1	
-27	39030	CAM, Pull-down	1	
-28	26085	WASHER, Thrust	1	
-29	12498	SETSCREW, Fluted socket cup pt, 6-32 by 1/8 inch	1	
-30	26131	RING, Retaining, 0.219 inch ID	1	
-31	010448	KNOB AND SHAFT ASSEMBLY	1	
-32	39004	PINION, Drive	1	
-33	30667	WASHER, Friction	1	

NOTE A: Select any combination of cam shoes to obtain required fit on pulldown cam.

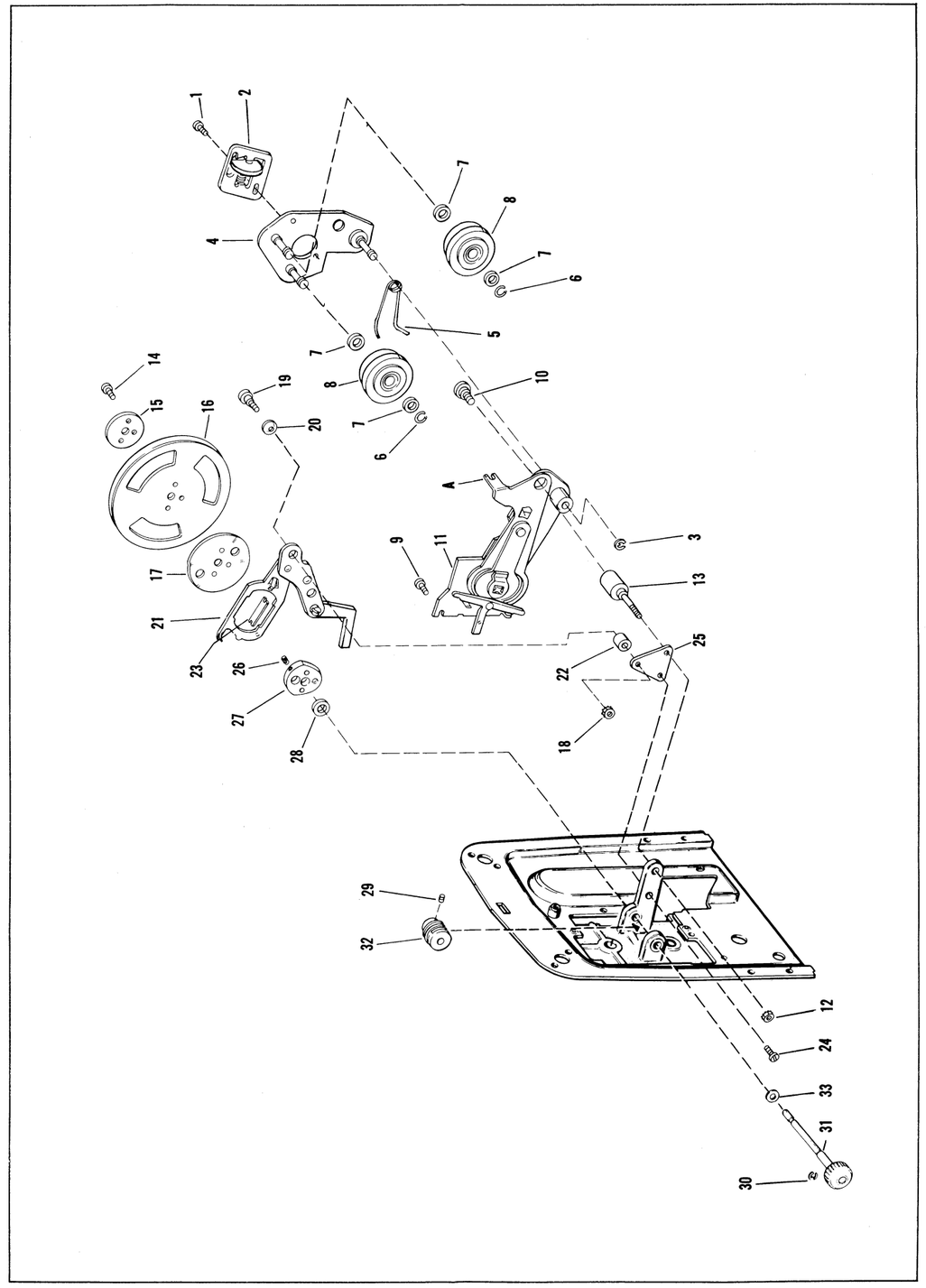


Figure 4. Shutter and Shuttle Mechanism

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		MOTOR AND BASE COMPONENTS		
5-1	010169	LOCK KNOB ASSEMBLY, Tilt	1	
-2	21736	RING, Retaining, Type E (IRRC No. 1000-25)	1	AB
-2	22113	RING, Retaining, 0.219 inch ID (WKI No. 5133-21)	1	C
-3	010373	SHAFT AND FOOT ASSEMBLY, Tilt	1	AB
-3	011294	SHAFT AND FOOT ASSEMBLY, Tilt	1	C
-4	30237	SCREW, Hex head tapping, 4-40 by 1/4 inch	2	
-5	Deleted			
-6	31020	WASHER, Flat	2	
-7	35595	COVER, Blower housing	1	
-8	32974	SETSCREW, Fluted socket cup pt, 8-32 by 1/8 inch	1	
-9	012873	FAN ASSEMBLY, Blower (see Note A)	1	
-10	37885	BELT, Drive	1	
-11	12498	SETSCREW, Fluted socket cup pt, 6-32 by 1/8 inch	1	A
-12	39324	PULLEY, Motor (see Note A)	1	A
-12	37412	PULLEY, Motor	1	BC
-13	32485	FAN, Motor	1	A
-13	32486	FAN, Motor	1	BC
-14	30030	SCREW, Hex head tapping, 6-32 by 1/2 inch	2	
-15	26163	INSULATOR, Motor-to-switch	1	A
-15	32271	INSULATOR, Motor-to-switch	1	BC
-16	012377	MOTOR ASSEMBLY, Projector (see Note A)	1	A
-16	36617	MOTOR, Projector	1	BC
-17	22464	BUSHING, Strain relief	1	A
-17	309761	BUSHING, Strain relief	1	BC
-18	34957	CORD, Power	1	AB
-18	012197	CORD ASSEMBLY, Power	1	C
5-	08183	BASE ASSEMBLY, Projector	1	
5-	No Number	BASE ASSEMBLY, Projector	1	C
-19	30648	. RIVET, Tubular, 0.099 inch diameter	2	
-20	39023	. CUTTER, Film	1	
-21	30663	. SHIELD, Rewind	1	
-22	26170	. RIVET, Tubular, 0.123 by 1.010 inch	2	
-23	26135	. FOOT, Rubber	2	
-24	40740	. BASE, Projector	1	AB
-24	41989	. BASE, Projector	1	C

NOTE A: Projectors with Serial Numbers CG30801 through CG31000 and CG5001 through CG5200 were equipped with combination Blower Fan and Pulley Assembly 013455 (replacing separate fan and pulley, items -9 and -12) and also use new motor assembly 013622.

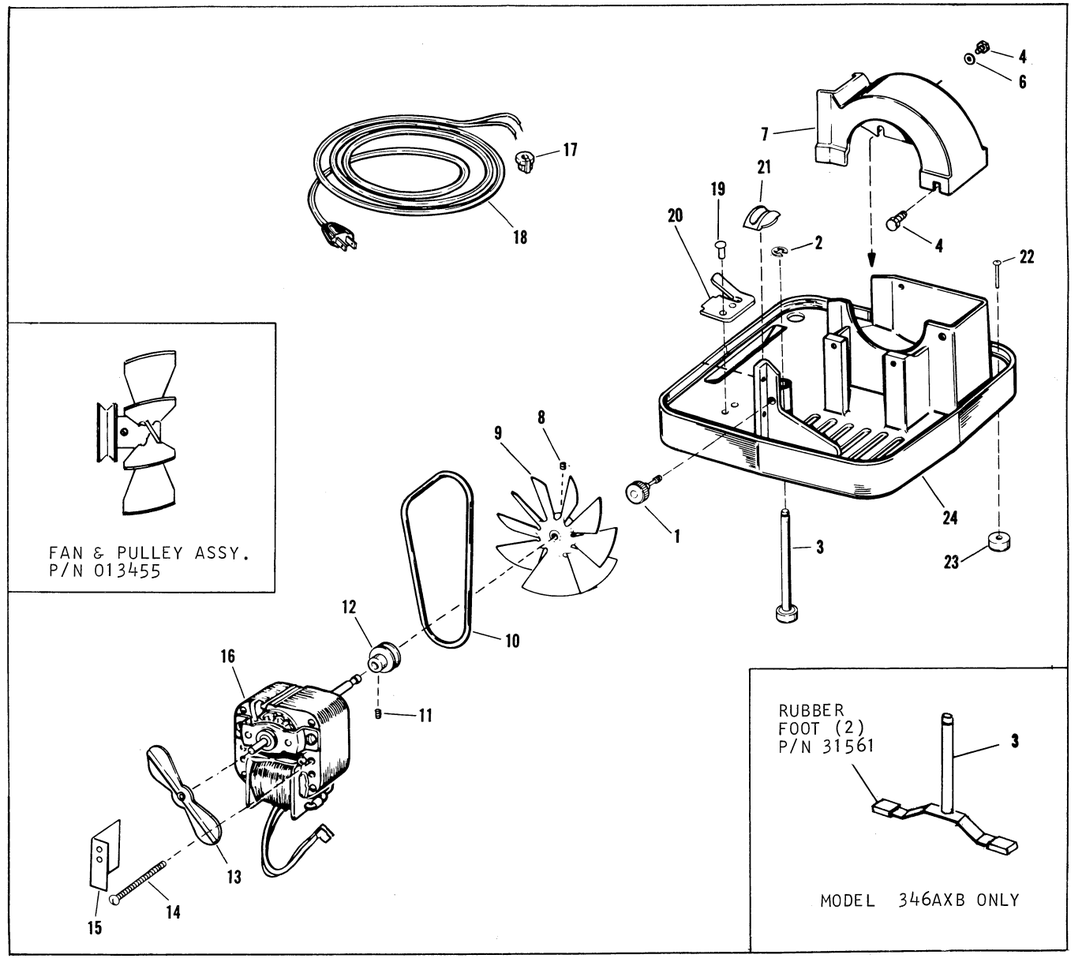


Figure 5. Motor and Base Components

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