SERVICE INSTRUCTIONS

8MM CARTRIDGE LOAD ZOOM REFLEX CAMERA

DESIGN 8315

finer products through imagination

Bell & Howell

PHOTO SALES COMPANY

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

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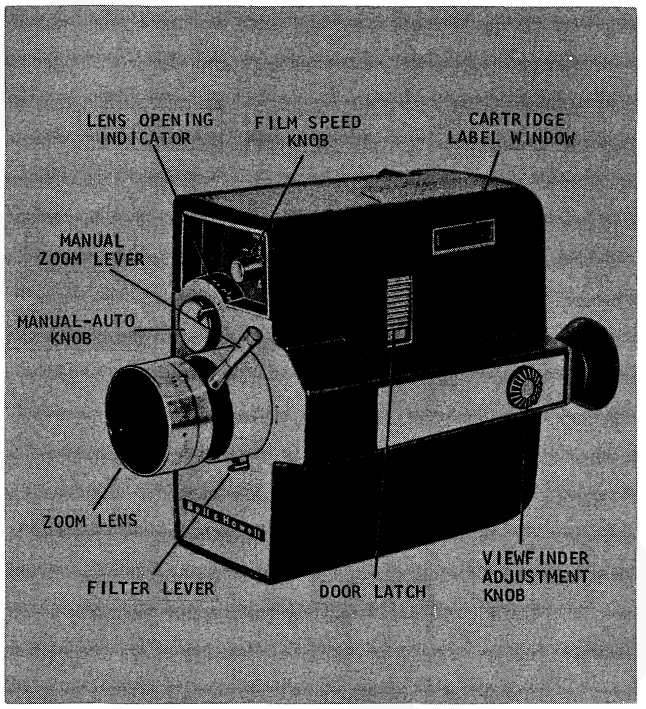
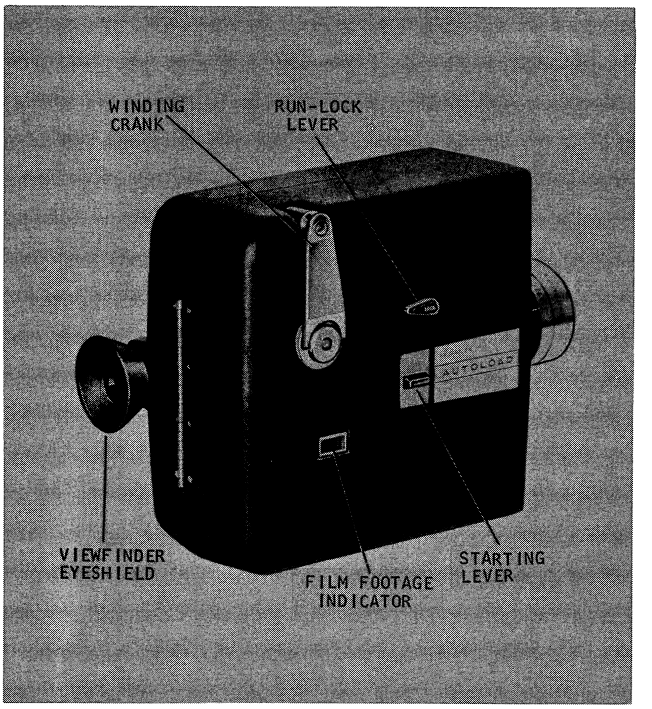


Front View of Design 8315 Camera



Rear View of Design 8315 Camera

FEATURE DESCRIPTION LIST

BELL & HOWELL DESIGN NUMBER: 8315

GENERAL DESCRIPTION: . . . . 8-mm Cartridge Load Camera with Zoom Lens

COLOR: . . . . . Black

LENS: . . . . Varizoom 9-29 mm f/1.8 with adjustable focusing ring; wide-angle, normal and telephoto coverage

FOCUSING RANGE: . . . . . .3 feet to infinity

ZOOM LENS OPERATION: . . . . Manual, with lever protruding from lens barrel

EXPOSURE CONTROL: . . . . . Manual (f/2.3 to f/22) and automatic (electric eye)

ELECTRIC EYE: . Automatic, battery-powered (Mallory PX640 or Eveready EPX640); Cds (cadmium sulphide) photocell

FILTERS: . . . . . Behind-the-lens, Haze and Type A, lever operated

VIEWFINDER: . . . . . .Reflex, through-the-lens viewer, with focusing knob

SPEED CONTROL: . . . . . Normal (16 fps) and Animation (single-frame)

LOCK-RUN FEATURE: . . . . . Separate Lock-Run knob

FILM RUN: . . . Approximately 10 feet on one full spring wind

FILM CAPACITY: . 50 feet with reversible pre-loaded cartridge

SPECIAL FEATURES: . . . . . Automatic footage indicator Cartridge indicator window

Introduction

This Instruction Book has been prepared to aid the serviceman in the repair and servicing of the Bell & Howell 8-mm Autoload Zoom Reflex Camera, Design 8315. Replacement parts are listed and illustrated in Parts Catalog section at the rear of these instructions.

The f/1.8 "zoom" lens is adjusted manually for wide angle or telephoto viewing with fine focus control from three feet to infinity. Through-the-lens viewing is accomplished by means of the optical system pictured in figure A. The viewfinder eyepiece is focused by means of an eccentric pin in the focus knob which, when turned, moves the eyepiece toward or away from the lens.

Because of the simplicity of design, no attempt has been made to elaborate on the disassembly or reassembly procedure. All parts shown in the exploded view illustrations of the Parts Catalog section are indexed in their suggested order of removal.

THEORY OF ELECTRIC EYE OPERATION.

The iris is actually two over-lapping gears, each with a tapered slot and supported on small and extremely precise instrument jewel bearings. A gear, mounted on a high-torque electrical meter, is engaged with each of these iris gears, actuating them whenever current from the photocell deflects the meter. The two tapered slots form the edges of an aperture which changes in size when the gears are rotated. Thus, light striking the photocell generates an electric current. This current, in turn, causes the meter to deflect, and the gear on the meter rotates the iris gears until the size of the aperture allows just the right amount of light to reach the film.

Because the output of a photocell will vary due to temperature changes, a thermistor is used to compensate for variations in temperature and thus maintain a very accurate exposure. Impending underexposure is indicated by a pointer which drops down into the field of view when light conditions become too poor for good photographic results.

ELECTRIC EYE EXCHANGE POLICY.

Due to the complex trimming and balancing equipment required in the assembly and matching of the electric eye components, the complete electric eye assembly must be returned to the Bell & Howell Co., Chicago, for repairs. An exchange plan has been covered in a separate bulletin to dealers.

SPECIAL MAINTENANCE PRECAUTIONS.

a. All parts shown in the exploded view illustrations of the Parts Catalog section are indexed in their order of removal. In general, parts should be removed in this indicated sequence. However, the serviceman must use his own judgement in eliminating unnecessary steps of disassembly when making specific repairs to the camera.

b. During repair operations, do not place the camera close to equipment characterized by strong magnetic fields (voltage regulators, etc) as this could damage the electric eye components.

c. Before disassembling the camera for repairs, perform the various tests in the Final Test section to make certain that the electric eye system is functioning properly.

d. Special tools required for camera repair are illustrated in figures B, D, G, H and J. Directions pertaining to their use will be found in the reassembly instructions.

e. When lubricating camera parts, it is strongly recommended that only Bell & Howell grease (part no. 070034) or oil (part no. 04978) be used. If these lubricants are not immediately available, use only the best commercial grades of ball bearing grease and instrument oil.

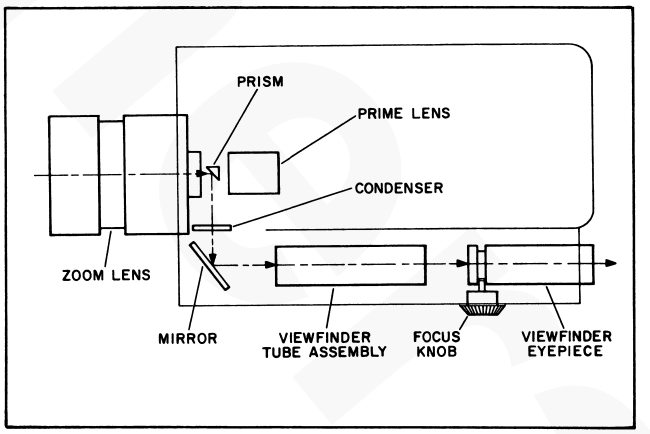


Figure A. Reflex Optical System

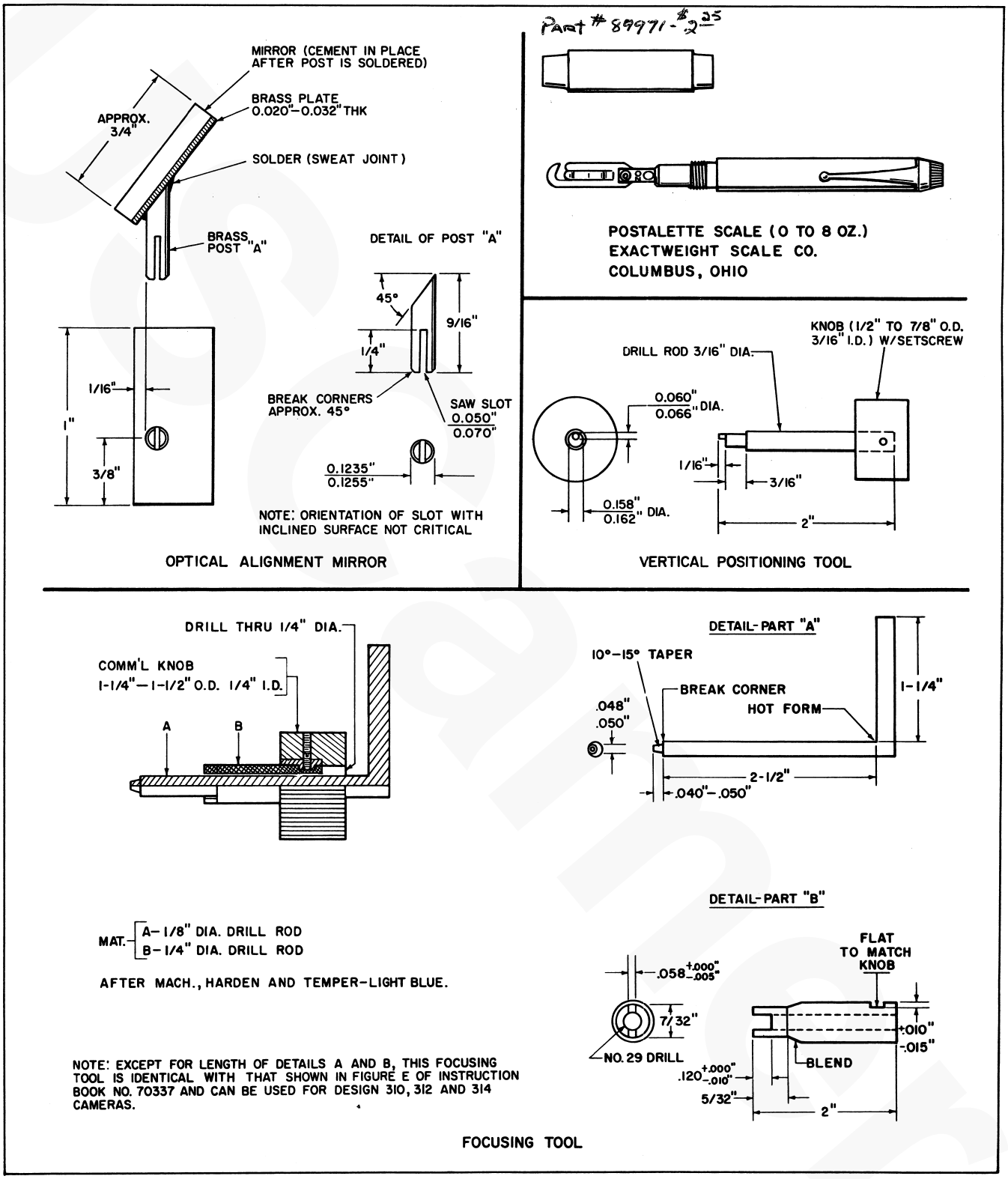


Figure B. Special Service Tools (Also see Figures D, G, H and J)

Disassembly Procedure

1. GENERAL PRECAUTIONS.

a. Before proceeding with the disassembly of the camera, first press the starting button and allow the spring motor to run down completely. Failure to do so may result in damage to the gears or other internal parts when the mechanism is removed.

b. Avoid leaving fingerprints on optical parts (mirrors, window, lenses). Handle such parts by their edges or metal holders, and wrap them in tissue after removal to prevent damage.

c. Be sure to handle the electric eye assembly with extreme care. Keep the camera away from equipment characterized by strong magnetic fields when performing disassembly and reassembly operations.

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

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

a. Nameplates and inserts for knobs are cemented in place with 3-M adhesive EC-880 (Bell & Howell Spec. No. 1782). Windows (37 and 54), mirror (14) and light seals (28A and 53) are cemented in place with General Cement Mfg. Co. plastic cement #32 (Bell & Howell Spec. No. 1758). Note that the lens handle (1) must be unscrewed from the lens to permit removal of front nameplate (2).

b. If filter assembly (8) must be replaced, note the manner in which filter spring (9) is engaged.

NOTE

The screws (10 and 11) are used to align the viewfinder optical system, and are sealed after adjustment. Do not loosen these screws unless bracket (13) is to be replaced.

c. The winding crank parts (24, 25 and 26) must be removed to permit the withdrawal of the complete mechanism assembly (29). Note that only rear mechanism screw (27) secures cover plate (28). Lift out mechanism carefully to avoid bending blade of shutter (33).

d. Loosen focus lock bushing (38) only if prime lens (40) is to be removed; then press lens from housing.

e. When removing viewfinder parts, note the manner in which the eccentric pin on the focus knob (47) engages the groove in the barrel of the eyepiece (45). Also note that the small ear at the front of tube assembly (44) rests in a matching depression in door casting.

f. The pin end of Lock-Run knob (35B) is staked over after assembly. Do not remove this knob unless replacement is necessary.

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

a. One end of the return spring (6) is hooked about an ear on the footage dial (7), and the ear is swaged to prevent the spring from becoming disengaged. Do not remove the spring from the dial unless one or both parts are in need of replacement.

b. The inner mechanism plate (17) with all parts (1 through 16) assembled can be removed to permit inspection and replacement of outer mechanism plate parts as follows: Remove five screws (5 and 14) and disengage the shuttle tension spring (18) from the lower end of the shuttle. Be careful not to lose the steel ball (19) located between the shuttle and its mounting plate. Disengage the U-hook end of the stop arm spring (36) from the bottom edge of inner mechanism plate and lift plate straight up from its mounting posts.

c. Lift spring motor (27) and main gear (28) from mechanism plate as a pair to avoid disengaging motor spring from gear hub. Be careful not to lose washers (29 and 30) when motor and gear are removed.

d. Do not attempt to disassemble the shuttle camshaft parts from the outer mechanism plate (45). If these parts are damaged or worn, the complete outer mechanism plate (45) must be replaced.

4. INSPECTION OF PARTS.

a. Inspect all gears for chipped or broken gear teeth and replace if damaged.

b. Replace all broken or distorted springs.

c. Replace badly defaced dials or nameplates.

d. Inspect shuttle tooth for burrs or signs of unusual wear. Remove burrs or nicks by careful filing or polishing.

e. Inspect shutter for damage. If bent, place the shutter blade on a flat hard wood or rubber surface and tap lightly with a hard rubber mallet.

f. Inspect all optical parts for bad scratches, nicks, or chips, and replace damaged items.

Reassembly and Adjustment

5. GENERAL PRECAUTIONS.

a. When the reassembly procedure includes the staking of rivets or other parts, such parts should be installed before proceeding with any other reassembly. Be sure to support castings or mounting plates solidly on a metal block to prevent distortion during the staking operation.

b. Before reassembly, wash all metal parts and subassemblies (except the electric eye) in naphtha or other non-corrosive grease solvent. Dry the parts, with a clean, lint-free cloth or a low-pressure jet of dry, compressed air. Clean lenses, when necessary, with lens cleaning fluid and lens tissue, and avoid placing the fingers on lens surfaces, when assembling optical parts.

c. Certain parts must be cemented in place. For rubber and glass items, use plastic cement #32 (General Cement Mfg. Co.) supplied by Bell & Howell under Spec. No. 1758. For metal items, use adhesive EC-880 (3-M Corp.) supplied by Bell & Howell under Spec. No. 1782.

d. As parts are reassembled, lubricate those parts specified in the following Lubrication Chart. Do not over-lubricate; in most instances, a very light film or speck or two of grease will suffice. Use only Bell & Howell grease (part no. 070034) and oil (part no. 04978) or the best available grades of ball bearing grease and instrument oil.

6. REASSEMBLY OF PARTS IN FIGURE 2. Reassemble parts in reverse order of disassembly, noting the following special precautions.

a. Be sure to lubricate parts as directed in the Lubrication Chart.

b. Hook shuttle lift spring (44) between the stop arm lever of the outer mechanism plate and the spring hole at the top of the shutter plate.

LUBRICATION CHART

ITEM	LUBRICATION
All revolving shafts	Speck ends of shafts with grease before inserting into mechanism plate bearings.
All gear teeth	Speck with grease.
Winding crank hub (item 1-26)	Light film of grease on both faces.
Starting button slide (item 1-30)	Light film of grease on friction surface.
Door latch button (item 1-50)	Light film of grease on friction surface.
Door latch spring (item 1-51)	Light film of grease on friction surface.
Felt washer (item 2-2)	Saturate with oil; drain off excess.
Starting lever (item 2-12)	Light film of grease on friction surface.
Lever (item 2-13)	Light film of grease on friction surface.
Washer (item 2-24)	Light film of grease on inner face.
Main gear (item 2-28)	Grease between hub face and inner plate.
Washer (item 2-30)	Light film of grease on both faces.
Washer (item 2-31)	Light film of grease on both faces.
Governor (item 2-41)	Speck of grease on each shaft end.

c. If the adjusting nut (42) was removed from the governor, reinstall the nut and the washer (43) and insert the governor shaft into the bearing hole in the outer mechanism plate.

d. Assemble clutch spring (40) and pinion (39) to gear and shaft assembly (37) with retaining ring (38). Install this assembly in the bearing hole of the outer mechanism plate, engaging large gear with governor pinion.

e. Assemble the stop arm (35) and spring (36) to the mounting post of the outer mechanism plate. The U-bent end of the spring must be toward the tapped end of the post.

f. Insert the take-up spindle (34) up through the bearing in the outer mechanism plate. Install the large washer (29) over the spring motor hub (27). Engage the motor spring with the hub of the main gear (28) and assemble these two parts together to the outer mechanism plate. Be sure to include thrust washer (30) between main gear and plate. Install the clutch spring (33), sleeve (32) and washer (31) over the take-up spindle and down inside the spring motor. The grooved end of the sleeve (32) must face away from the outer mechanism plate. Install the take-up bushing (26), securing it to the take-up spindle with the screw (22) and washers (23 and 24). Assemble the drive gear (25) over the hub of the bushing with the dimpled face up, away from the spring motor. Temporarily set aside the outer mechanism plate.

g. Assemble the cluster gear (20) and its shim washers (21) to the inner mechanism plate. Engage one end of tension spring (18) to the spring post adjacent to the starting lever slot in the inner mechanism plate. Carefully assemble the inner mechanism plate to the outer mechanism plate, shifting gear shafts as necessary with a tweezers or narrow blade screwdriver until the inner plate is seated solidly on the mounting posts of the outer plate. Install the four screws (14), noting that one screw also serves to secure the loop end of the gearshaft retaining spring (15).

h. With the shuttle facing up, insert the steel ball (19) between the shuttle and the shuttle mounting plate and hook the free end of the spring (18) into the small hole in the shuttle below the steel ball. Refer to figure C for proper installation of remaining parts. Pertinent items are indexed with the same index numbers used in Parts Catalog figure 2. Note the position of the footage dial "start" dot with spring motor unwound (figure C). If new return spring (6) or footage dial (7) were installed, be sure to swage the spring retainer ear of the dial after engaging the spring.

i. Temporarily install the winding crank parts, including the washers (1 and 2), and wind the spring motor one complete turn. With a gram gage, check the pull of the shuttle as it is released by the single-framing action of the camera. The shuttle must pull a minimum force of 210 grams. Repeat this check several times and, if the readings vary excessively, use a drop of oil on the steel ball (19) and on the shuttle camshaft. If the reading still does not fall within specifications, replace the steel ball (19) and spring (18).

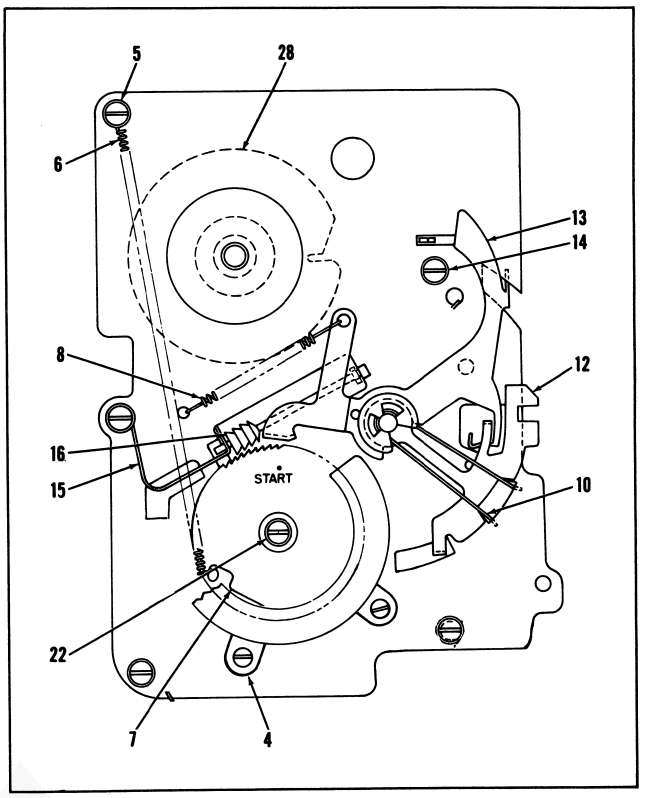


Figure C. Assembled Inner Mechanism Plate

j. Hold the shuttle protrusion gage, figure D, so that shoulders "A" of the gage bear against the front stops of the mechanism plate. Manually advance the shuttle until it is in the middle of its pull-down stroke. At this point, it should be possible to insert a 0.005 to 0.014-inch feeler gage between the end of the shuttle tooth and surface "B" of the gage. A 0.015-inch feeler gage must not clear. Remove the gage and correct the clearance, if necessary, by bending the shuttle carefully with a pliers.

k. Install the shutter (33, figure 1) on the end of the eccentric shaft, aligning the edge of the shutter blade with the rivet head as shown in figure E. Wind the spring motor fully and hold the starting lever in the "run" position. Using a Strobotac or other suitable speed indicator, adjust the governor to obtain a reading of 15 to 20 fps. Governor speed is adjusted by tightening or loosening the governor adjusting nut (42). Remove the shutter and the winding crank after performing the adjustment, and allow the spring motor to run down completely.

7. REASSEMBLY OF PARTS IN FIGURE 1. Reassemble parts in reverse order of disassembly, noting the following special precautions.

a. Refer to paragraph 5c for required cements used to secure nameplates, light seals, windows etc.

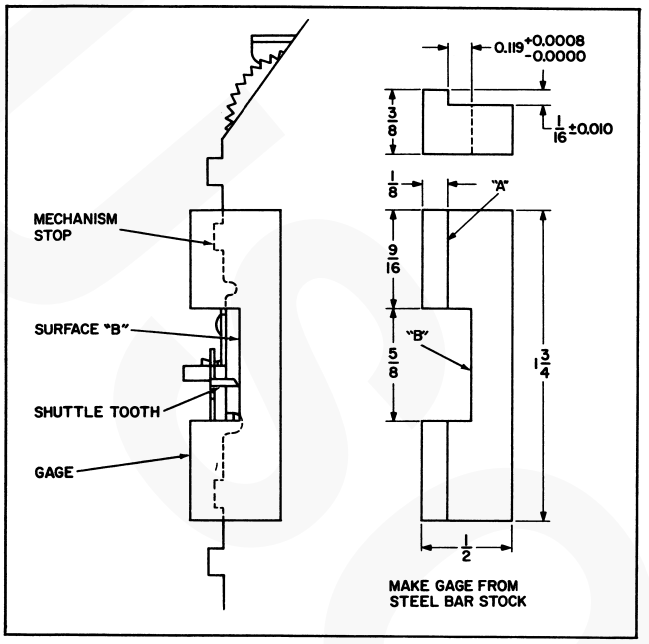


Figure D. Shuttle Protrusion Gage

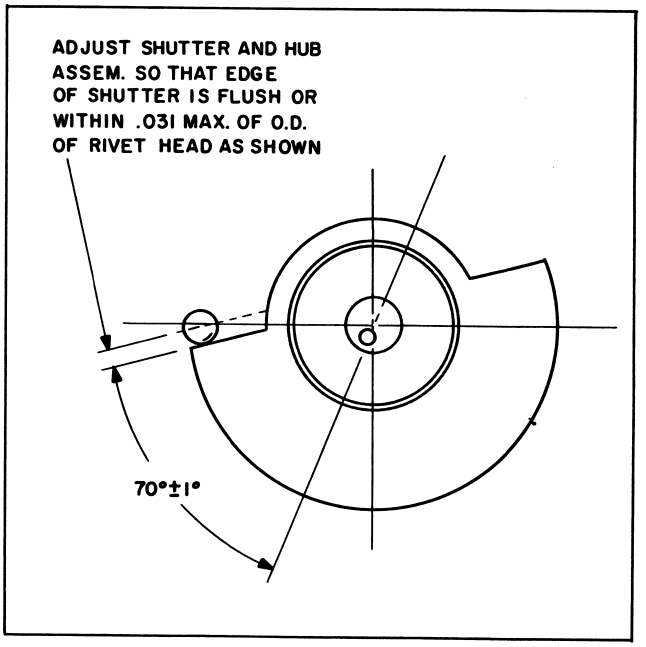


Figure E. Proper Shutter Installation

b. Lubricate and assemble the door latch button (50), spring (51) and slide (52) to the camera door. The latch button pin must be staked over to secure all parts to the door. The button must move smoothly with finger pressure but must not slide under its own weight.

c. Secure the viewfinder focus knob (47) to the camera door with the retaining ring (46), and check knob rotation for binding or stiffness. Insert the viewfinder tube assembly (44) into the viewfinder cavity of the door. The ear-like projection at the front of the tube must rest in a corresponding depression in the casting. Insert the eyepiece assembly (45) so that the eccentric pin of the focus knob engages the groove at one end of the eyepiece. Note that the flat spring (43) is bowed slightly. Position the spring over the tube and eyepiece cavity of the door so that it bows away from the tube and eyepiece. Install instruction plate (42).

d. Insert the prime lens (40) into the housing until the adjustment groove around the lens barrel is visibly centered as viewed through the hole for the focus bushing (38). Install, but do not tighten, the washer (39) and bushing (38).

e. The Design 8315 camera has a separate "run-lock" mechanism (items 35A through 35D). Assemble these parts to the camera housing, staking over the pin of lock-run knob (35B) to secure parts in place.

f. Assemble the starting button plate (31) and the slide and position these parts within the housing, open legs of the slide downward. Install the shutter (33) to the eccentric shaft of the mechanism assembly (29) as shown in figure E. Assemble the felt washer (2, figure 2) and steel washer (1, figure 2) to the threaded shaft of the spring motor. Carefully insert the assembled mechanism (29) into the camera housing, shifting the starting button slide if necessary until its pin engages the starting lever of the mechanism. Install the mechanism cover plate (28) with the screws (27), and assemble the winding crank parts (24, 25 and 26).

g. Install the filler plate (23) and aperture and plate assembly (22) with the screws (21). Loosen the mechanism attaching screws (27) slightly and press the mechanism forward against the aperture plate stops and downward toward the bottom of the housing. Then retighten screws (27) securely.

h. Install the viewfinder window (20), window retainer (19) and screws (18). Carefully insert the electric eye assembly (17) into the housing and secure the assembly with screws (16). Assemble the lens and plate assembly parts (6 through 15). Note that one bent leg of the filter detent spring (9) engages a small hole in the arm of filter assembly (8); the other leg is inserted into a small hole in a cast boss near the center of the casting. Carefully insert the lens and plate assembly into the casting and install screws (4 and 5).

8. SHUTTLE TOOTH ADJUSTMENTS.

a. Initial shuttle tooth height (protrusion) was checked and adjusted during reassembly of the mechanism (paragraph 6, step j). With the shuttle tooth at maximum protrusion, the end of the tooth should be at least 0.006-inch above the film contact surface of the aperture plate (figure F). Verify the initial adjustment with a feeler gage.

b. Check to make certain that the shuttle tooth is in the center of its slot as it moves downward on its film-advance stroke. Minor adjustment is possible by means of an adjusting lever, the top of which protrudes

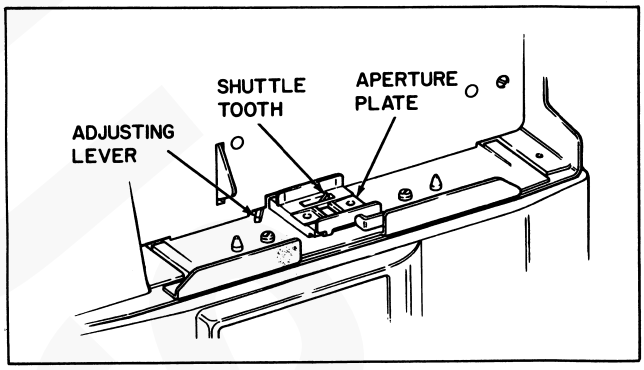


Figure F. Shuttle Tooth Final Adjustment

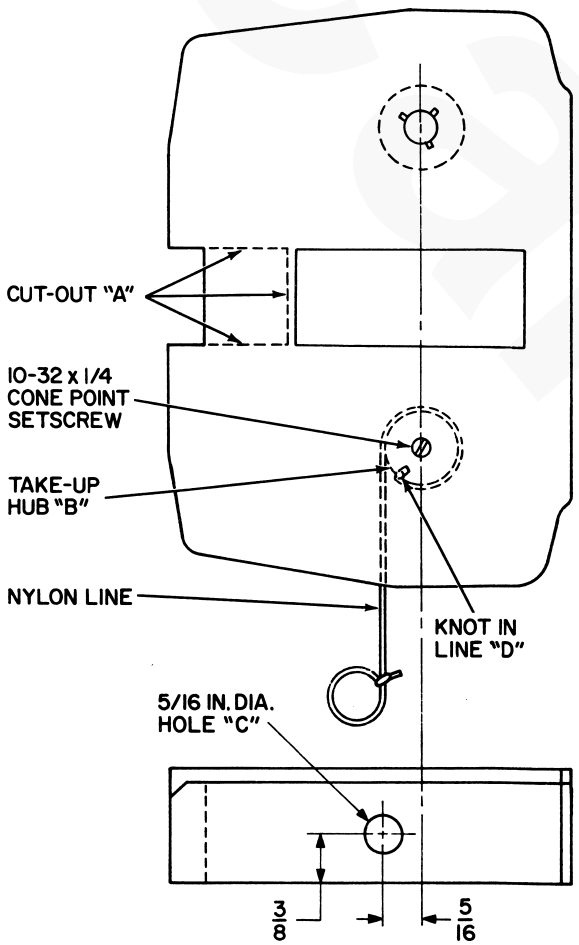
just above the aperture plate (figure F). Move the lever in one direction or the other, as necessary, with the blade of a small screwdriver.

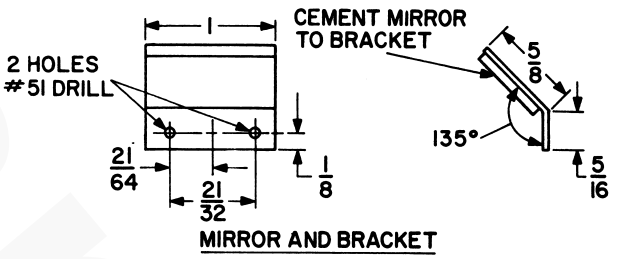
9. CHECKING TAKE-UP TORQUE. Since take-up torque can be checked only with a cartridge in place, a special cartridge must be prepared as illustrated in figure G. The cartridge, as illustrated, will also be used for viewfinder alignment (paragraph 11).

a. Insert special cartridge into camera and, with camera door open, rest camera on edge of table or bench with nylon cord hanging free.

b. Hook a Postalette scale (figure B) to the loop in the nylon cord and hold the scale steady while running the camera. The scale should register 0.42 inch-ounces minimum to 0.70 inch-ounces maximum. If torque does not fall within the specified limits, run camera in for 10 or 15 minutes and recheck. If torque is still below limits, replace clutch spring (33, figure 2); if above limits, relubricate washers (24 and 31, figure 2).

10. FOCUSING THE PRIME LENS. The prime lens has a smooth cylindrical barrel, and lens focusing is accomplished by sliding the lens toward or away from the main camera lens. Once focused, the setting is locked in position by means of a threaded focus bushing (38, figure 1). This bushing is hollow to permit





MIRROR AND BRACKET

NOTES:

1 OPEN CARTRIDGE COVER; REMOVE PRESSURE PLATE ASSEMBLY AND ATTACHING PARTS. CAREFULLY BREAK-OFF PLASTIC PRESSURE PLATE SUPPORT POSTS IN CARTRIDGE BODY.

2 CUT-AWAY COVER AS INDICATED BY DASH LINES "A."

3 COAT 1/8 INCH STEEL BALL WITH LIGHT FILM OF WHITE GREASE AND PLACE BALL IN COUNTERSUNK HOLE OF TAKE-UP HUB "B." GENTLY CLOSE COVER UNTIL IT STRIKES BALL. OPEN COVER AND CENTER PUNCH RESULTANT GREASE SPOT ON DOOR; DRILL AND TAP WITH NO. 10-32 THREAD TAP. LIGHTLY GREASE POINT OF SETSCREW AND, WITH COVER CLOSED, TURN SETSCREW IN UNTIL IT JUST TOUCHES TAKE-UP HUB. SECURE SETSCREW WITH DROP OF CEMENT ON HEAD.

4 DRILL 5/16 INCH DIAMETER HOLE "C" IN BOTTOM OF CARTRIDGE HOUSING. MAKE A LOOP AT ONE END OF 6-INCH LENGTH OF NYLON FISHING LINE (APPROX. 10 LB. TEST) AND HEAVY KNOT "D" AT OTHER END. WRAP LINE HALF-WAY AROUND HUB, TUCKING KNOT BETWEEN HUB AND SLEEVE.

5 MAKE MIRROR BRACKET OF 0.032 INCH BRASS OR STEEL STOCK AND CEMENT MIRROR TO BRACKET. FASTEN BRACKET INTO CARTRIDGE HOUSING WITH PRESSURE PLATE ATTACHING SCREWS.

Figure G. Special Cartridge Fixture for Take-Up Torque and Optical Alignment

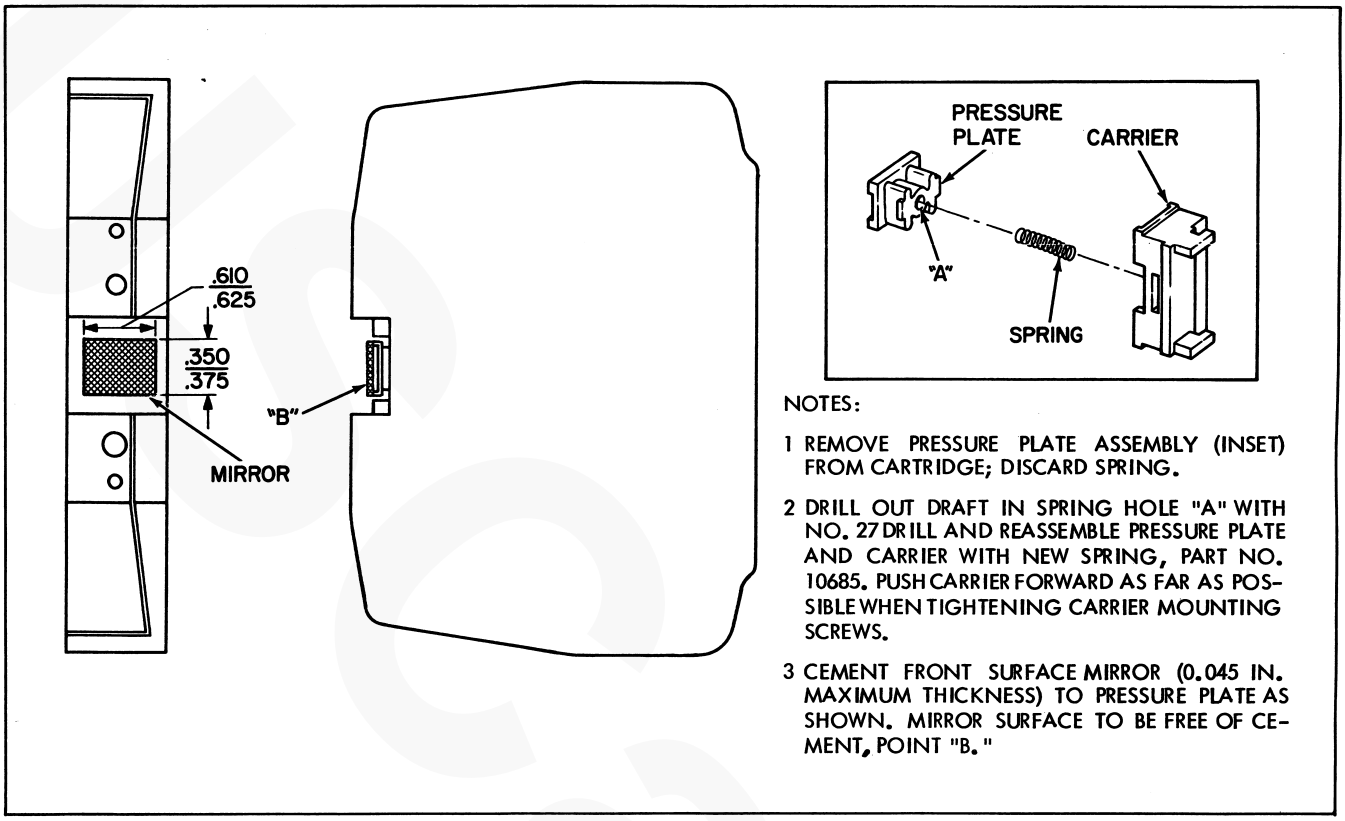


Figure H. Special Cartridge Fixture for Prime Lens Focusing

the insertion of the eccentric lens focusing tool (figure B). Lens focusing requires a collimator set for infinity and the special cartridge illustrated in figure H. A +0.12 diopter spectacle lens must be added to the collimator.

a. Insert the special cartridge into the camera and close the camera door. With the collimator, check the focus of the lens by noting the color compromise (equal banding of red and green).

b. If necessary to refocus the prime lens, insert the eccentric tip of the lens focusing tool through the hollow focus bushing until the eccentric pin engages the groove around the lens barrel and the spanner ears of the tool engage the slots of the focus bushing.

c. Turn knurled knob of tool counterclockwise until the focus bushing is loose. Then lock the LOCK-RUN button in "run" position and rotate the handle of focusing tool until lens is properly focused for color compromise (equal banding of red and green). Carefully turn knurled knob of tool clockwise until focus bushing is tight; then remove tool and special cartridge.

11. VIEWFINDER ALIGNMENT. Any disassembly which disturbs the position of the optics in the viewfinder system will necessitate a check of viewfinder alignment. The tools required for this check and adjustment are illustrated in figures B and G, with the adjustment procedure illustrated in figure J.

a. The horizontal centering and vertical locking screws (figure J) are located beneath the front nameplate of the camera and the heads of both screws are sealed with cement. Carefully scrape away cement.

b. Insert the special cartridge (figure G) into the camera housing and install the viewfinder alignment mirror (figure B) by inserting its split post into the hollow focus bushing (38, figure 1). These special fixtures are shown installed in figure J.

c. Place the filter knob in the TYPE A position and set the zoom lens in the TELE position and the lens focus ring at 3 feet.

d. Set up the camera three feet from a screen. If the room is not darkened, it may be necessary to use some sort of shadow box arrangement to shut out extraneous light.

e. Set up a 300-watt slide projector or similar light source, as shown in figure J, to illuminate both mirrors.

f. Hold the winding crank while pressing the starting button and allow the mechanism to run until the shutter is open. In the resultant "picture" on the screen, the red field is the camera aperture field and the pink-to-white field is the viewfinder field. The viewfinder field should be exactly centered within the darker rectangle.

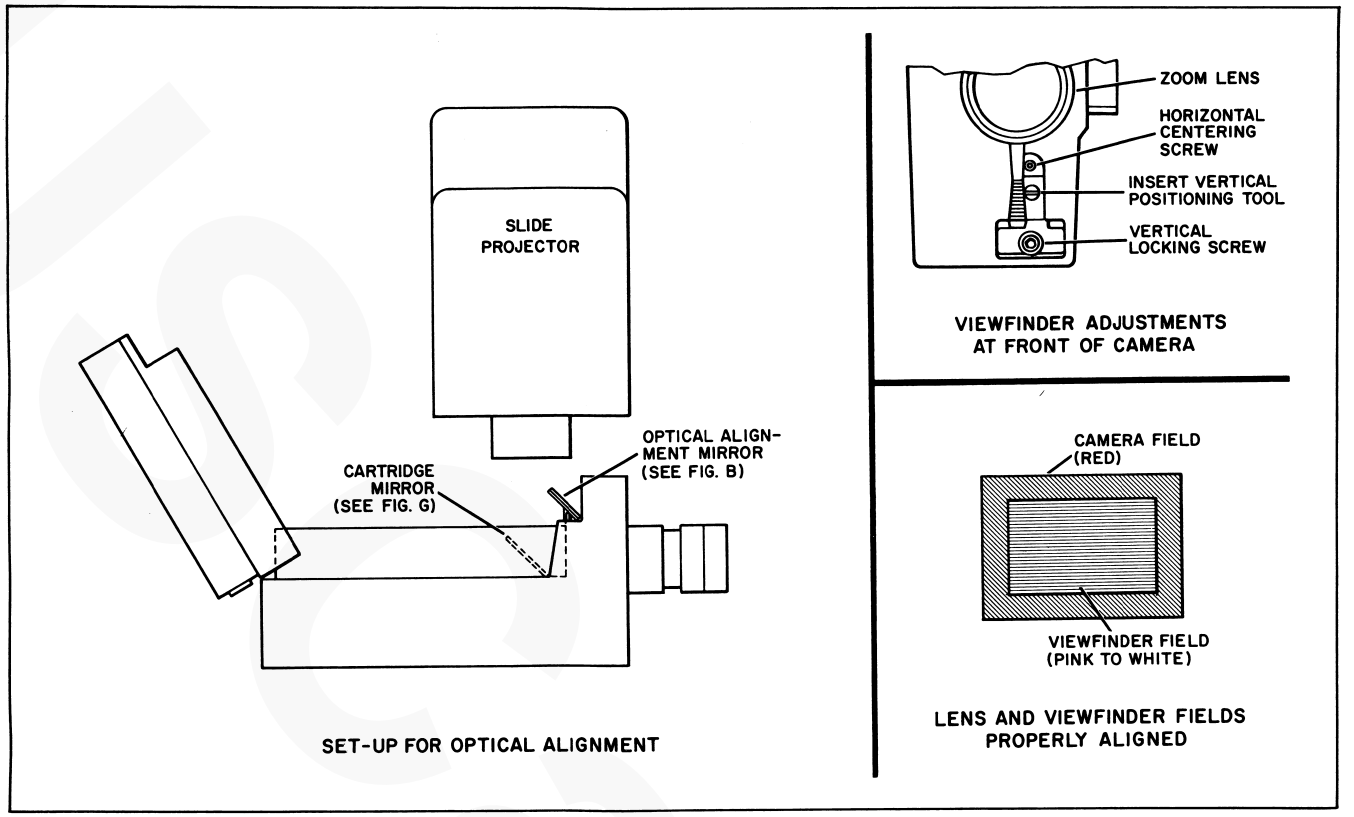


Figure J. Set-Up for Optical Alignment Adjustment

g. Loosen vertical locking screw (figure J) with a No. 10 Bristo wrench. Insert eccentric tip of viewfinder alignment tool (figure B) through the hole in casting and engage eccentric pin with the slit in alignment plate. Rotate tool to raise or lower viewfinder image within the aperture image. Tighten vertical locking screw without disturbing the adjustment.

h. Use a No. 4 Bristo wrench to adjust horizontal centering screw, shifting viewfinder image in a horizontal plane until it is centered within darker rectangle. Apply Glyptal #1276 to heads of both adjusting screws.

Trouble Shooting

TROUBLE	PROBABLE CAUSE	REMEDY
Sticking or binding (does not pull film)	1. Faulty film cartridge	1. Replace film cartridge
	2. Shuttle improperly adjusted	2. Adjust shuttle (para. 6j and 8)
	3. Too much grease; improper or old lubricant	3. Clean and relubricate camera parts
	4. Governor set too tight	4. Adjust governor (para. 6k)
	5. Take-up torque too strong	5. Adjust take-up torque (para. 9)
Camera speed too slow	1. Governor improperly adjusted	1. Adjust governor (para. 6k)
Improper exposure	1. Incorrect film speed setting	1. Set A.S.A. dial properly
	2. Camera speed incorrect	2. Adjust governor (para. 6k)
	3. Hand over photocell when operating	3. Do not cover photocell during operation
	4. Iris indicator not moving	4. See "iris indicator not moving"
Footage dial inoperative	1. Damaged or bent footage dial and counter stop	1. Check and replace footage dial and counter stop
	2. Dial return spring broken or disengaged	2. Remove mechanism and replace or reconnect spring
Iris indicator not moving	1. Interference in moving parts	1. Check freedom of indicator
	2. Electrical circuit broken or short-circuited	2. If short or break cannot be repaired, return electric eye assembly to factory
	3. Meter movement erratic or sticking	3. Return electric eye assembly to factory

Final Test

12. GENERAL TEST CHECKS.

a. Visually inspect the camera for obvious defects, such as loose nameplates, broken or badly scratched optics (viewfinder, lens), scratched or marred finish. Recement nameplates and touch up finish with matching paint. Damaged optics must be replaced.

b. Press the starting button and allow the camera to run down. Insert an empty cartridge into the camera and check to see that "START" appears in the footage window. It should require approximately 25 complete revolutions of the hand crank to wind the spring motor from the unwound to the fully-wound condition. When the fully-wound condition is reached, a definite feel of sudden resistance must be noticed. Press the starting button and allow the camera to run down completely.

c. Wind the spring motor fully and check starting button operation in all three positions. When pressed upward to ANIMATION position, the camera should advance one frame and the button must return to the normal position when released. When pressed to the RUN position, the camera should run steadily within the rated speed range (15 to 20 fps) until the button is released. The camera has a separate LOCK knob which must be pressed downward after the starting button is moved to the RUN position. When the LOCK knob is pressed upward, the starting button must return to the STOP position. While the camera is running, listen for any appreciable change in noise level which might indicate governor trouble binding in the mechanism, or insufficient lubrication.

d. Check filter lever operation. Make sure that spring action holds the lever firmly in either position (A or HAZE). Leave lever in HAZE position.

e. Check the operation of the lens zoom lever while looking through the viewfinder. The lever must move smoothly through the entire range. As the lever is moved toward the TELE position, the field of view shall decrease; as the lever is moved toward the WIDE position, the field of view shall increase.

f. Rotate the A.S.A. control knob to make certain that the detents hold the knob securely at each A.S.A. marking.

13. CAMERA RUNNING TEST.

a. Wind the spring motor fully and, using the Postalette scale and the special cartridge shown in figure G, press the starting button and check the take-up torque as instructed in paragraph 9.

b. The camera must run approximately seven feet on one complete winding of the spring motor. Use premarked test film to check the camera run. Note that the shutter blade must stop in the "closed" position (shutter over aperture opening) at the end of the run.

14. ELECTRIC EYE METERING TEST.

a. The automatic iris control system has been calibrated by means of a light transmission test. Equipment for making this type of test is not readily available in most service shops. If the customer has complained about improper exposure, check either by making test exposures with film or by comparing the position of the meter pointer on the suspected camera with that of a camera known to be in good condition when both cameras are equidistant from the same diffused light source.

b. If there has been no complaint about exposure, or if the trouble has been traced to the speed of the camera, the following test can be used as a rough check of electric eye calibration. Adjust the light fixture (Bell & Howell No. SER 220-7) to obtain a reading of 1040 foot-lamberts. Set the camera A.S.A. speed knob at A.S.A. 25 and place the camera in the light fixture. If properly calibrated, the camera meter pointer will be approximately in line with the number 40 on the A.S.A. dial (this is approximately f/11).

15. ELECTRIC EYE BALANCE TEST. The balance test is performed to check for variations in exposure readings when the camera is tilted in a vertical or horizontal plane from the normal position. Use the Bell & Howell light fixture (SER 220-7) connected to a variac, and proceed as follows:

a. Wind the camera fully and set the A.S.A. knob at 10. Place the camera in the light fixture and, with the camera running and in normal upright position, adjust the light intensity until the meter pointer is approximately at midrange. Carefully mark the needle position with a fine grease pencil mark.

b. With the camera running, slowly tilt the camera 45 degrees up and then 45 degrees down while noting any change in the position of the meter pointer. The pointer should not move from the marked position more than the width of the pointer itself.

c. Slowly tilt the camera 20 degrees to the left and then 20 degrees to the right. The meter pointer must not move more than twice the pointer width from the marked position.

16. ELECTRIC EYE FRICTION TEST. Excessive friction or drag in moving parts of the electric eye may cause improper film exposure. Use the light fixture (SER 220-7) connected to a variac and proceed as follows:

a. Set the A.S.A. knob at 10 and place the camera in the light fixture in its normal upright position.

b. With the light source at its lowest output, slowly increase the light intensity while watching the meter pointer closely. The pointer must move smoothly away from its lower limit instead of jumping.

c. Set the A.S.A. knob at 40 and increase the light output until the meter pointer is at the opposite end of the scale. Now slowly decrease the light intensity while watching the meter pointer carefully. The pointer must move smoothly away from its upper limit instead of jumping.

17. FINAL PHOTO TEST. Shoot a test strip toward the open sky and check the film for scratches. Scratches along the perforations probably are caused by a sharp shuttle tooth dragging on the edge of the film. If sharpness cannot be removed by stoning the edge of the tooth carefully, shuttle must be replaced.

Replacement Parts

The following pages illustrate and list, by part number and part name, all replacement parts for the Bell & Howell Design 8315 Cartridge Load 8-mm Zoom Reflex Camera. Since the illustrations are indexed in a suggested order of parts removal, they will serve as an aid to the repairman during the disassembly and reassembly procedure.

Cartridge Assembly . . . . . Part No. 011823

Lens Cap . . . . . Part No. 430866

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LENS PLATE, ELECTRIC EYE AND VIEWFINDER		
1-1	430849	HANDLE, Zoom lens	1	
-1A	040725	CAP ASSY, Battery	1	
-1B	430567	BATTERY, Mercury cell	1	
-2	430804	NAMEPLATE, Front	1	
-3	36156	INSERT, A.S.A. knob	1	
-4	35489	SCREW, Lens plate (left)	1	
-5	32330	SCREW, Lens plate (right)	2	
	040835	LENS AND PLATE ASSY (Includes items 6 through 15)	1	
-6	399005	. SCREW, Filter	1	
-7	35446	. WASHER, Shoulder	1	
-8	011976	. FILTER ASSY	1	
-9	36157	. SPRING, Filter detent	1	
-10	201500	. SCREW, Horizontal centering	1	
-11	201501	. SCREW, Vertical locking	1	
-12	34784	. WASHER	1	
-13	020429	. BRACKET ASSY, Viewfinder	1	
-14	201449	. MIRROR (Cement in place at edges)	1	
-15	No Number	. LENS AND PLATE ASSY (Order complete assy)	NP	
-15A	30169	SCREW, Battery contact	2	
-15B	040822	CONTACT ASSY, Battery	1	
-16	30169	SCREW, Electric eye assy	2	
-17	040820	ELECTRIC EYE ASSY	1	
-17A	29915	. CLIP, Retaining	2	
-17B	040819	. PHOTOCELL ASSY, CdS	1	
-17C	33740	. . SETSCREW, A.S.A. Knob	2	
-17D	040818	. . KNOB, A.S.A.	1	
-17E	430801	. . NAMEPLATE, A.S.A.	1	
-17F	No Number	. ELECTRIC EYE (Less photocell)	NP	
-18	30169	SCREW, Viewfinder window	2	
-19	36155	RETAINER, Window	1	
-20	201400	WINDOW, Viewfinder	1	
-21	32330	SCREW, Aperture plate	2	
-22	011819	APERTURE AND PLATE ASSY	1	
-23	37279	PLATE, Filler	1	
-24	011978	CRANK ASSY, Winding	1	
-25	36138	NUT, Winding crank	1	
-26	35777	HUB, Winding crank	1	
-27	32332	SCREW, Mechanism assy	3	
-28	430864	PLATE, Mechanism cover	1	
-28A	431144	LIGHT SEAL	1	
-29	040849	MECHANISM ASSY, Complete	1	
-30	430846	SLIDE, Starting button	1	
-31	430868	PLATE, Starting button	1	
-32	33740	SETSCREW, Shutter	1	
-33	011986	SHUTTER ASSY	1	
-34	29831	SCREW, Crank handle clip	1	
-35	29850	CLIP, Crank handle	1	
-35A	430844	LATCH, Lock-Run knob	1	
-35B	430909	KNOB, Lock-Run	1	
-35C	34456	WASHER, Lock-Run knob	1	
-35D	430911	NAMEPLATE, Lock-Run knob	1	
-36	430847	NAMEPLATE, Starting button	1	
-37	36686	WINDOW, Footage indicator	1	
-38	36154	BUSHING, Focus lock	1	
-39	34574	WASHER	1	
-40	020426	LENS ASSY, Prime	1	

FIG. & INDEX NO.	PART NO.	DESCRIPTION 1 2 3 4 5 6 7	UNITS PER ASSY	USABLE ON CODE
		LENS PLATE, ELECTRIC EYE AND VIEWFINDER (CONT)		
1-41	12075	SCREW, Instruction plate	2	
-42	430750	PLATE, Instruction	1	
-43	36135	SPRING, Viewfinder focus	1	
-44	020433	TUBE ASSY, Viewfinder	1	
-45	040853	EYEPIECE ASSY, Viewfinder	1	
-46	36142	RING, Retaining	1	
-47	36134	KNOB, Viewfinder focus	1	
-48	29825	INSERT, Focus knob	1	
1-	041118	HOUSING AND DOOR ASSY (Includes items 34 thru 37 and the following items 49 through 58)	NP	
-49	36159	. PLATE, Decorative	1	
-50	29843	. BUTTON, Door latch	1	
-51	36161	. SPRING, Door latch	1	
-52	29830	. SLIDE, Door latch	1	
-53	35703	. SEAL, Light, cartridge window	1	
-54	36685	. WINDOW, Cartridge indicator	1	
-55	35275	. RIVET, Tubular	8	
-56	35274	. HINGE, Door	1	
-57	35704	. SPRING, Cartridge tension	1	
-58	040824	. HOUSING AND DOOR, Matched	1	

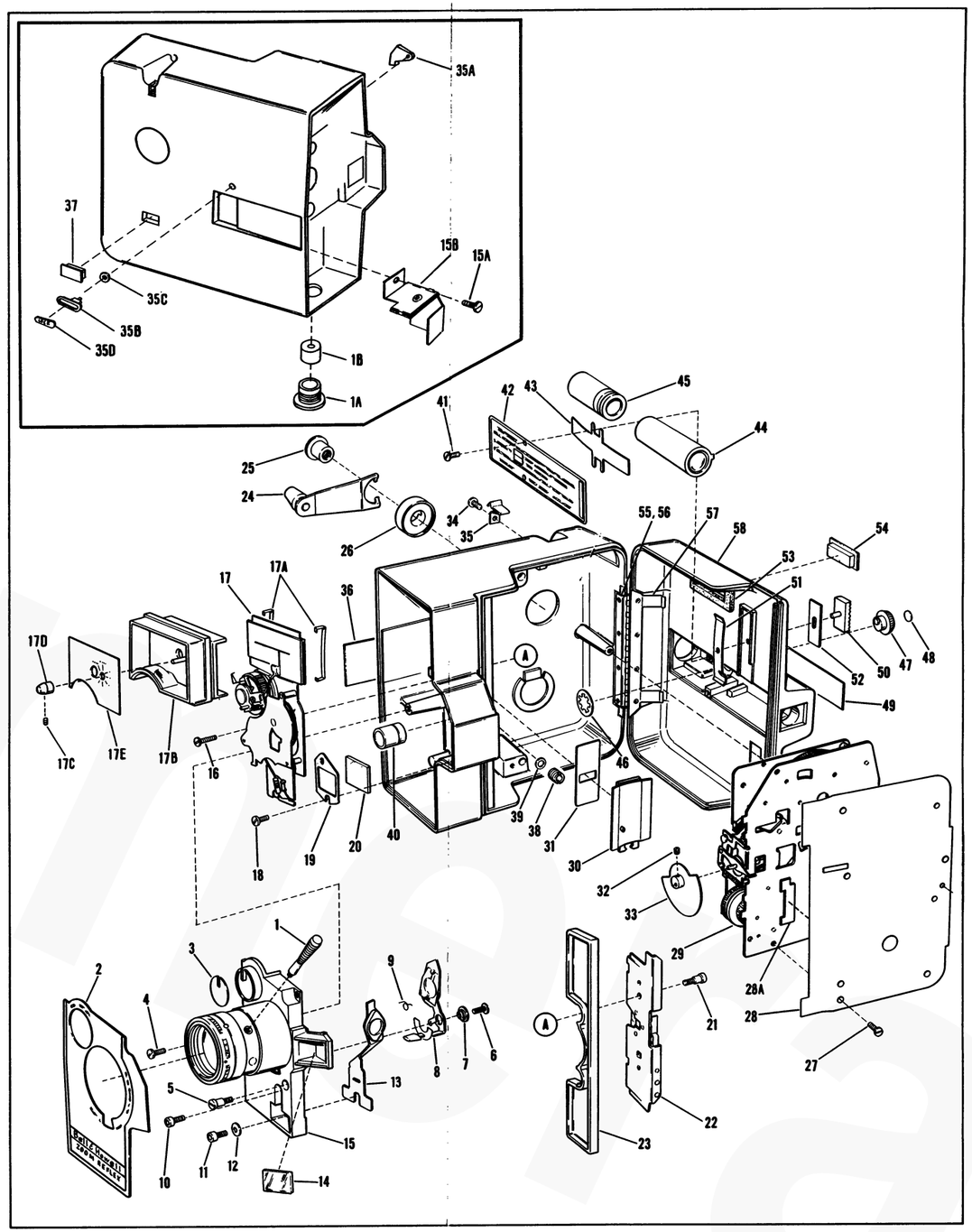


Figure 1. Lens Plate, Electric Eye and Viewfinder Parts, Exploded View

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
		MECHANISM ASSEMBLY		
2-1	29754	WASHER, Steel, winding crank	1	
-2	29887	WASHER, Felt, winding crank	1	
-3	29831	SCREW, Dial retainer	2	
-4	36697	RETAINER, Footage dial	1	
-5	30025	SCREW, Binding head	1	
-6	35686	SPRING, Footage dial return	1	
-7	431016	DIAL, Footage	1	
-8	35687	SPRING, Tension	1	
-9	32488	RING, Retaining	1	
-10	35717	SPRING, Torsion	1	
-11	35705	WASHER	1	
-12	35670	LEVER, Starting	1	
-13	35672	LEVER	1	
-14	30025	SCREW, Inner mechanism plate	4	
-15	35677	SPRING, Gearshaft retaining	1	
-16	35708	GEARSHAFT, Counterdrive	1	
-17	011979	PLATE ASSY, Inner mechanism	1	
-18	32796	SPRING, Shuttle tension	1	
-19	5238	BALL, Steel	1	
-20	36180	GEAR, Cluster	1	
-21	32763	WASHER, Shim, 0.002-inch thick	AR	
-21	32822	WASHER, Shim, 0.005-inch thick	AR	
-22	32487	SCREW, Take-up bushing	1	
-23	35692	WASHER, Thrust	2	
-24	35767	WASHER, Bronze	1	
-25	35691	GEAR, Take-up drive	1	
-26	35758	BUSHING, Take-up	1	
-27	011977	MOTOR ASSY, Spring	1	
-28	011982	MAIN GEAR ASSY	1	
-29	35709	WASHER, Spring motor hub	1	
-30	32106	WASHER, Thrust, main gear	1	
-31	35768	WASHER, Steel	1	
-32	36590	SLEEVE, Take-up clutch	1	
-33	35695	SPRING, Take-up clutch	1	
-34	05995	SPINDLE ASSY, Take-up	1	
-35	29792	ARM, Stop	1	
-36	29793	SPRING, Stop arm	1	
-37	041128	GEAR AND SHAFT ASSY	1	
-38	34965	RING, Retaining	1	
-39	35743	PINION, Compound gear	1	
-40	29764	SPRING, Clutch	1	
-41	011983	GOVERNOR ASSY	1	
-42	27759	NUT, Governor adjusting	1	
-43	36165	WASHER	1	
-44	35688	SPRING, Shuttle lift	1	
-45	011987	PLATE AND SHUTTLE ASSY, Outer	1	

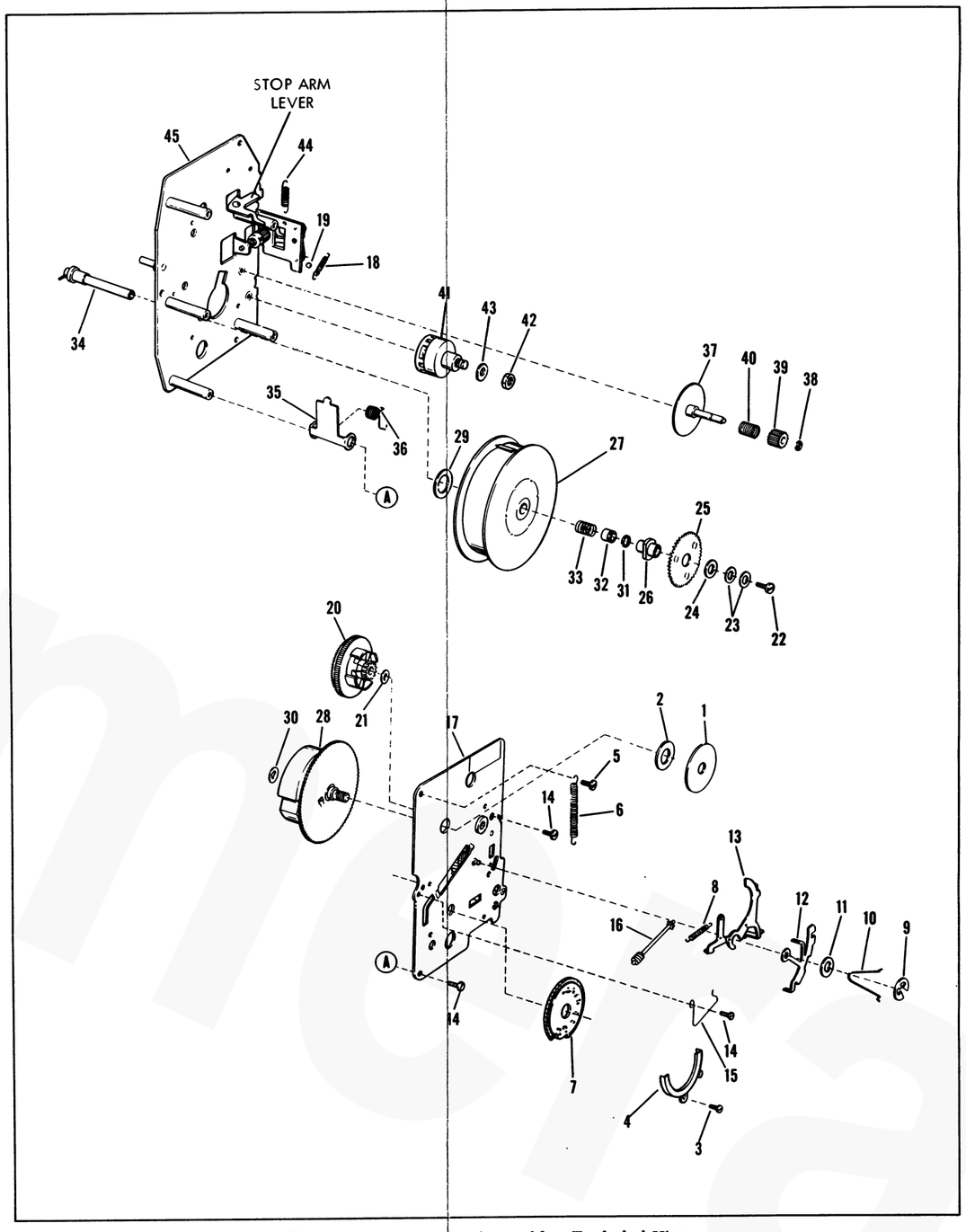


Figure 2. Mechanism Assembly, Exploded View

NUMERICAL INDEX OF PARTS

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011819	1-22
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011983	2-41
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040835	1-
040849	1-29
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29793	2-36
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29850	1-35
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32332	1-27
32339	1-5
32487	2-22
32488	2-9
32763	2-21
32796	2-18
32822	2-21
33740	1-17C, 1-32
34456	1-35C
34574	1-39
34784	1-12
34965	2-38
35274	1-57
35275	1-55
35446	1-7
35489	1-4
35670	2-12
35672	2-13
35677	2-15
35686	2-6
35687	2-8
35688	2-44
35691	2-25
35692	2-23
35695	2-33
35703	1-53
35704	1-56
35705	2-11
35708	2-16
35709	2-29
35717	2-10
35743	2-39
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35777	1-26
36134	1-47
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36697	2-4
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201400	1-20
201449	1-14
201500	1-10
201501	1-11
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430567	1-1B
430750	1-42
430801	1-17E
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430844	1-35A
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430847	1-36
430864	1-28
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430909	1-35B
430911	1-35D
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ADDED PART NUMBERS

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