

SERVICE INSTRUCTIONS

SLIDE CUBE PROJECTOR^{T.M.}

<u>MODEL NUMBER</u>	<u>CATALOG NUMBER</u>
CP40	854A
1000PS	856A
RC50	857A
----	858A
RF60	859A & Z
AF70	861A, Z and H
3000PS	862A, Z and D



GENERAL SERVICE DEPT.
7100 McCORMICK ROAD
CHICAGO, ILLINOIS 60645

FACTORY SERVICE RECEIVING ADDRESSES

CHICAGO

*Bell & Howell Company
General Service Department
2200 Brummel Place
Evanston, Illinois 60202
Area Code: 312-273-5820

NEW YORK

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

GLENDALE

Bell & Howell Company
General Service Department
623 Rodier Drive
Glendale, California 91201
Area Code: 213-245-6631

*For parts orders and service information.

DALLAS

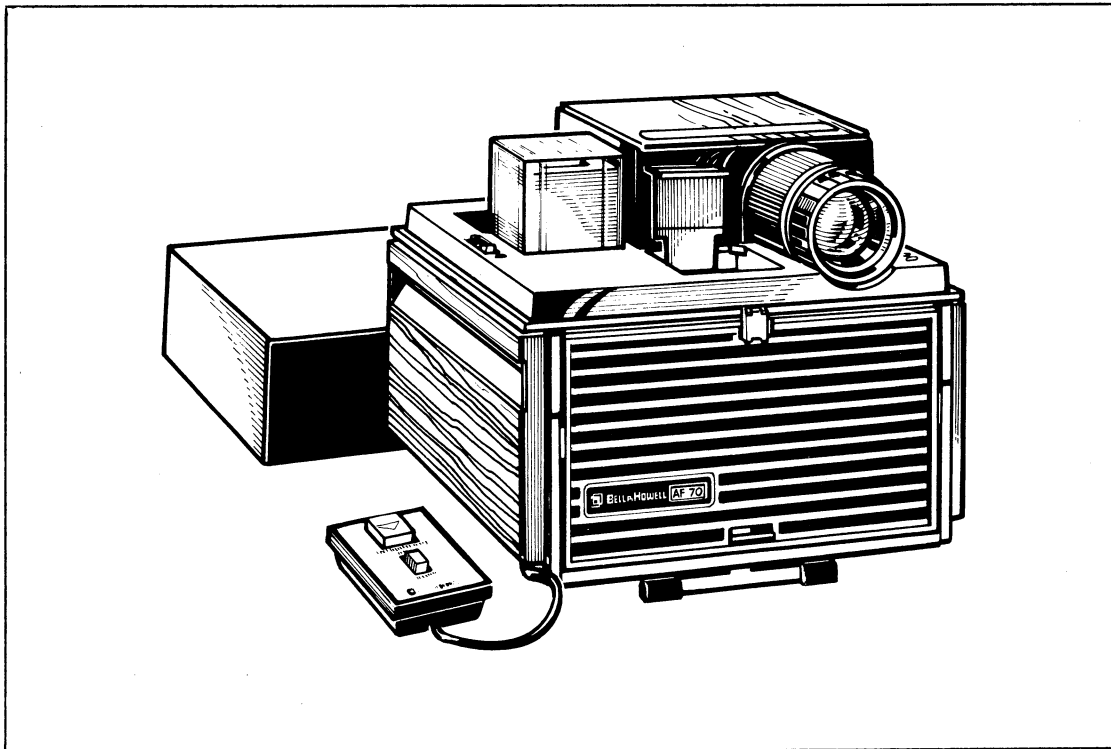
Bell & Howell Company
General Service Department
433 Regal Road
Dallas, Texas 75207
Area Code: 214-631-2550

ATLANTA

Bell & Howell Company
General Service Department
4801 Fulton Industrial Building
Atlanta, Georgia 30336
Area Code: 404-696-1162

Table of Contents

	Page
INTRODUCTION	1
DISASSEMBLY	5
REASSEMBLY	8
ADJUSTMENTS	14
General Instructions	14
Adjusting the Index Lever	14
Centering Switch Adjustment	14
Remote Focus Check	15
Shutter and Index Solenoid Adjustment	15
Transport Disc Speed Adjustment	16
Slide Projection Adjustment	17
Automatic Focusing Adjustment	17
FINAL TEST	19
TROUBLESHOOTING	20



Catalog No. 862D Slide Cube Projector

FEATURE DESCRIPTION LIST

Slide Cube Capacity	40 slides
Slide Feed	Gravity, drop-in loading
Slide Advance	CCW rotation of transport disc
Standard Lens (*):	
Cat. No. 856/862	100mm (4") f/2.8 lens
All other models	100mm (4") f/3.5 lens
Lens for 110-size Viewing	64mm (2-1/2") f/3.5 lens
Projection Lamp (all models)	300 watt Type ELH axial quartzline
Lens Focusing:	
Cat. No. 858/861/862	Automatic electronic focusing
All other models	Manual focusing
Slide Control (advance and recall):	
Models 854/856/857	Push buttons on control panel
All other models	Built-in remote control
Overall Dimensions	8 by 9 by 9 inches

* All "Z" models are equipped with an 85mm to 100mm 3-1/2 to 4-1/2 in. f/3.5 zoom lens

Introduction

GENERAL.

These Service Instructions have been prepared to assist in the repair and adjustment of the Bell & Howell Company Slide Cube™ Projectors listed in the following chart. General design and operating characteristics are noted in the Feature Description List preceding this section, with more detailed differences between models covered in the following paragraphs.

<u>MODEL NUMBER</u>	<u>CATALOG NUMBER</u>
CP40	854A
1000PS	856A
RC50	857A
(None)	858A
RF60	859A and Z
AF70	861A, Z and H
3000PS	862A, Z and D

You will note that all Catalog Numbers include a suffix letter. This letter merely indicates a change in, or the addition of one of the projector features. In all other respects, the basic projector will be the same. For example:

The letter "A" indicates that the basic projector is equipped with a standard fixed focus lens.

The letter "Z" indicates that the basic projector is equipped with a zoom lens.

The letter "H" (Catalog No. 861 Only) means that the basic projector has been designed for 50/60Hz operation. (All others are 60Hz only.)

The letter "D" (Catalog No. 862 Only) means that the basic projector is provided with a deluxe storage top which holds nine cube cartridges.

Because the differences involving suffix letters do not significantly affect projector repair, these instructions will refer only to the basic Catalog Numbers (854, 856, etc.). Lenses provided with the basic projector models are listed in the Parts Catalog section at the rear of this manual.

The illustrated Parts Catalog section provides a quick reference to replacement parts for all projectors. Also, since parts are listed in a suggested order of disassembly, the lists will assist the repairman when making the necessary repairs and replacements. Each model has been assigned

a code letter which may appear in the "Usable on Code" column. The letter, or letters, will serve to identify parts which are applicable only to one or more models (see following chart). Where the "Usable on Code" column is blank, the listed part applies to all models.

<u>CATALOG NO.</u>	<u>CODE</u>
854	A
856	B
857	C
858	D
859	E
861	F
862	G

DESCRIPTION.

The cube projectors covered by these instructions are very similar in appearance, mechanical construction and operating characteristics. All projectors are basically the same in regard to the method of slide feed, circular slide advance and slide collection. However, the activating method for advancing (cycling) the slides differs between some of the models. Three models (858, 861 and 862) are provided with a motor-driven, automatic focusing system. Lens focusing for the 859 projectors also is accomplished by means of a motor-driven system but is not automatic. The lens focusing system is actuated by means of a separate switch on the remote control unit. The remaining models (854, 856 and 857) must be focused by rotating the lens manually.

The 854 and 858 projectors are similar in that the forward and reverse operation of the transport disc cannot be remotely controlled, but must be activated by the "Reverse-Forward" switch on the controls panel. On the 854 model, slide advance is accomplished by pressing the spring-loaded "Cycle" button above the forward-reverse switch. However, the 858 model is equipped with a phone jack (also located above the forward-reverse switch), so that film advance can be accomplished remotely by means of a cord and plunger-type switch supplied with the projectors.

All other projector models (856, 857, 859, 861 and 862) are equipped with a remote control unit which snaps into a recessed area near the front end of the control panel. Each remote control unit is provided with a pushbutton "Cycle" switch for

SERVICE INSTRUCTIONS

slide advance and a two-position toggle switch for "Forward" and "Recall" operation. The remote control unit for the 859 projector only has an additional "Focus" switch for remotely sharpening the focus of the lens.

Just forward of the lens housing on all projectors is a "Preview-Edit" screen which permits slides to be viewed before they reach the projection station. The 862 projector is equipped with a separate preview lamp which is lighted when the master switch is placed in the center position. In all other projectors the previewing screen is illuminated by the projection lamp via a angled mirror in the lens housing. All projector models are provided with a spring-loaded "Slide Ejector" lever which tilts the slide upward at the previewing station to facilitate slide removal.

The 854 and 858 projectors are equipped with a two-position "On-Off" master switch. The remaining projector models are provided with a three-position "Off-Fan-Lamp" switch. In the "Fan" (center) position, only the blower circuit is energized to allow fast cooling of the projector before storage.

The upper platen of all projectors is hinged at the side opposite the control panel and can be raised to completely expose the slide transport disc. This permits an instant access to all slides in the mechanism in case of accidental jamming.

The lens housing is fixed and elevation of the lens is accomplished by means of a tilt foot device at the front of the projector.

THE SLIDE TRANSPORT SYSTEM.

A recessed channel on the upper platen is keyed to accept the notched cover plate of the slide cube. When the cube is seated and then slid forward to the front of the channel, the cube cover plate is held back by the keys and the exposed slides are free to drop into the feeding area one by one.

Slides are advanced through a complete cycle by a transport disc, located beneath the hinged upper platen. This disc contains four recessed cut-outs spaced 90 degrees apart, each of which will accept a standard two-by-two slide mount. (See Figure A.) You will also note four notches in the edge of the disc, each spaced 90 degrees apart. These notches are provided to precisely position the cut-outs at each station and to insure that the transport disc makes only one quarter turn at a time. This is accomplished by means of an index finger which is located at a position directly above the remote control.

With the projector switch "on" and the "Forward/Recall" switch in the "Forward" position, the projector is ready to advance slides. When the "Cycle" button is pressed and released, the index solenoid is

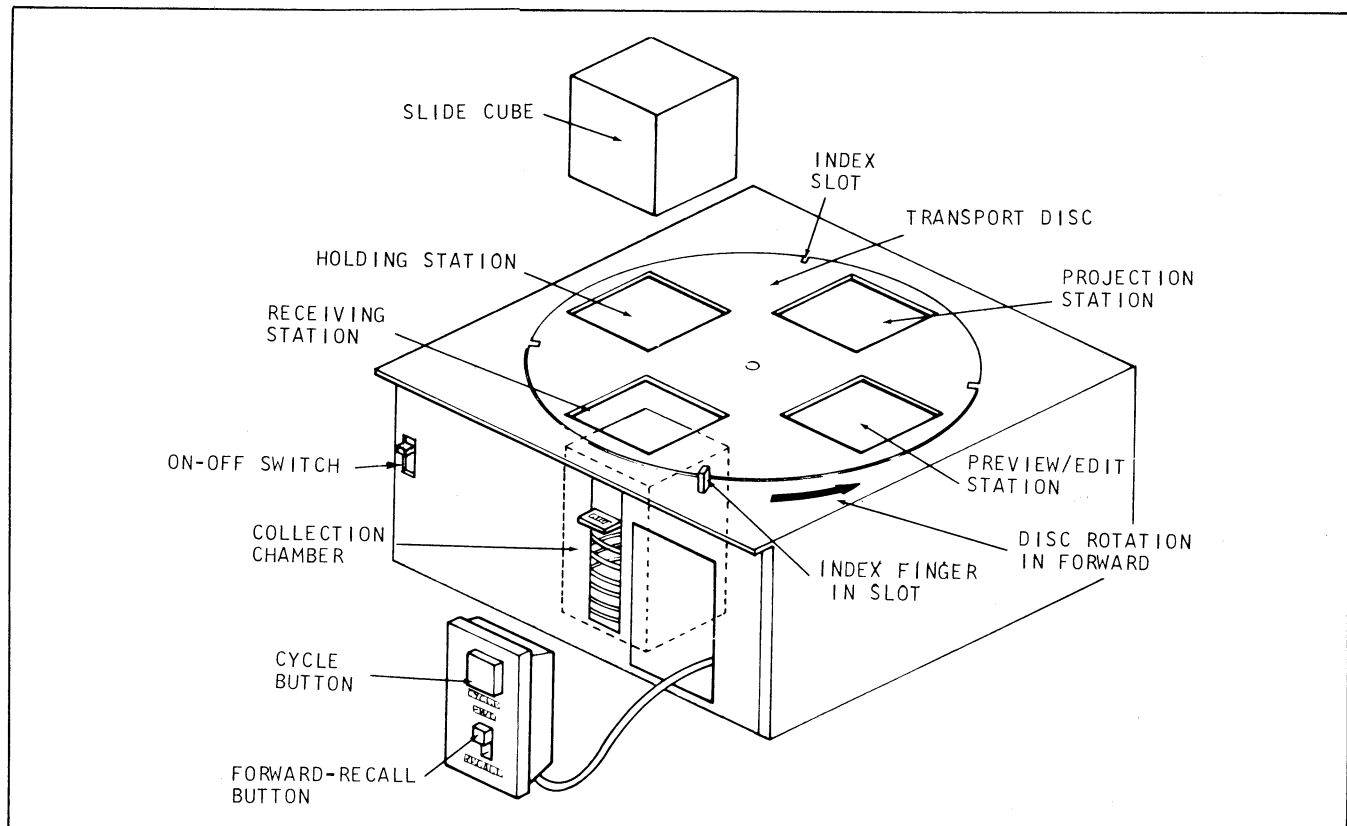


Figure A. The Slide Transport System

energized to momentarily move the index finger out of the slot in the transport disc. At the same time, the slide index motor begins to rotate the disc in a counterclockwise direction, while the index finger rides the outer edge of the disc. When the next index slot in the disc reaches the index finger, the finger drops into the slot to halt disc rotation. This action is repeated every time the "Cycle" button is pressed.

During normal projection of transparencies fed from a loaded slide cube, the sequence is as follows. The recessed opening in the transport disc directly beneath the slide cube receives the bottom transparency (slide No. 1) from the stack of slides. When the "Cycle" button is pressed and released, the transport disc rotates one-quarter turn counterclockwise to carry slide No. 1 to the "Preview/Edit" station and bring the next recessed opening in the disc beneath the slide cube to receive slide No. 2. The second cycling brings slide No. 1 to the projection position and slide No. 2 to the editing station, while slide No. 3 drops into the receiving well. The projection lamp is located near the base of the projector directly beneath the projection station aperture. Behind the lens and above the aperture is a mirror tilted forward at a 45-degree angle which reflects the image through the lens and onto the screen (Figure B).

On the third cycling, slide No. 1 is tilted and guided down a shallow ramp to a holding station, while slide No. 2 is moved to the projection position and slide No. 3 to the editing station. Simultaneously, slide No. 4 drops into the receiving well of the transport disc. On the fourth cycling, slide No. 1 is moved to the collection chamber, into which it drops, while all other slides are advanced accordingly.

The collection chamber is located directly below the slide cube but is separated from the cube by the transport disc and two narrow spring-loaded arms, which prevent the transparencies from falling directly into the collection chamber from the slide cube. When the last transparency has been projected, the projector must be cycled twice to drop the final transparency into the collection chamber. The "Lift" lever is raised to return all slides to the slide cube and the cube can be removed by sliding it back to the rear of the slide channel.

Rapid cycling of transparencies is accomplished by pressing and holding the "Cycle" button. The solenoid will remain energized as long as the button is held in, thus holding the index finger out beyond the rim of the transport disc. When operating in the "Recall" position, the index motor will reverse rotation when the "Cycle" button is pressed, and the transport disc will make a one-quarter clockwise turn and stop. The tip of the reverse stop (Figure H) will drop into an opening in the transport disc just to the right of the index slot to prevent the disc from being cycled more than once in the "Recall" position. This safety feature is provided to eliminate the possibility of accidental jamming.

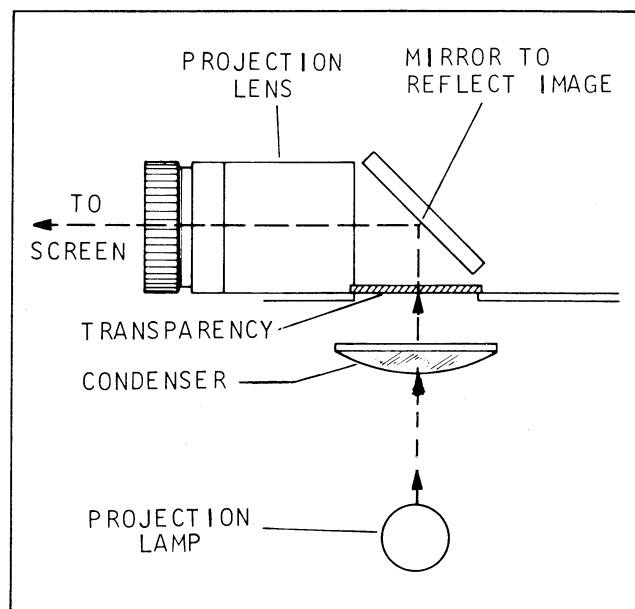


Figure B. The Slide Projection System

THE AUTOFOCUS SYSTEM (861 AND 862 PROJECTORS ONLY).

The following discussion of Autofocus operation references the appropriate schematic diagrams located at the end of the Parts Catalog. In brief, the Autofocus system electronic circuitry incorporates the following primary functions.

- a. Detects slide changes from ± 0.005 to ± 0.060 inch by unbalancing two equal resistance photocells arranged with two equal resistors to form a bridge circuit.
- b. The unbalance causes a differential bridge output voltage to be produced. This voltage is sufficient in amplitude to drive a Darlington transistor amplifier.
- c. The amplifier will produce sufficient half-wave sinusoid collector current to drive a DC motor, properly phased with a four-diode bridge, in the direction necessary to correct the distance from slide to lens, thus bringing the system back into focus and rebalancing the photocells.

SPECIAL MAINTENANCE PRECAUTIONS.

The removal and installation of projector parts is comparatively simple and, for the most part, requires only those tools normally available in most repair shops. The special holding fixture illustrated in Figure C is required for the proper reassembly and adjustment of the projector.

In addition, the following special tools are available for adjustment purposes.

Spacing Clip (B&H #S-072575-110-FX1) for index solenoid to index switch spacing.

SERVICE INSTRUCTIONS

Mirror Adjusting Tool (B&H #S-072581-16-F1) for Autofocus system adjustment (861 and 862 projectors only).

90-degree Offset Pliers (Waldes-Kohinoor #0209) for lens focusing.

When repairing the projector, 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.

Before proceeding with any repairs, the repairman should perform the operating tests outlined in the Final Test section of this manual to verify customer complaints and determine the extent of repair necessary. Reference then can be made to the Trouble Shooting Chart, where the most common causes of specific troubles are listed. Unless the initial inspection of the projector indicates that extensive overhaul is required, disassemble only those parts necessary to remove the faulty components.

Always check the "Usable on Code" column of the parts lists to make certain that the proper replacement part is used in the specific projector model being repaired. The repairman also is cautioned to observe all "notes" in the parts catalog section pertaining to design changes and special replacement instructions.

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

LUBRICANTS AND ADHESIVES.

a. Lubricants. Lubricants should be applied sparingly. Make certain that the component or surface to be lubricated is clean, and use only recommended lubricants as follows:

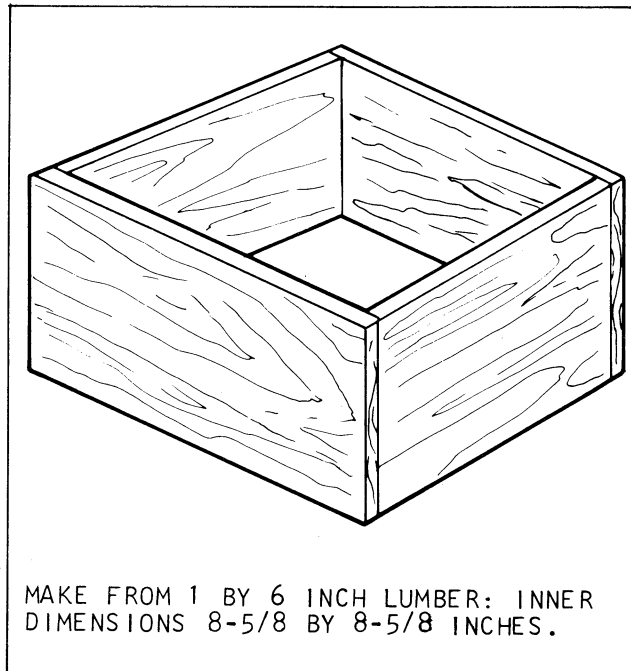


Figure C. Projector Holding Fixture

Oil — Bell & Howell Part No. 067480 (2 oz. bottle)

Grease — Bell & Howell Part No. 070034 (1 lb. can)

Silicon Lubricant — Bell & Howell Part No. 70910 (Dow-Corning DC-340).

b. Adhesives. Several parts (instruction labels, heat shields) used on the projector are pre-coated with adhesive, protected by a paper backing. To apply these parts, remove the paper backing and activate the adhesive by moistening with a solvent (use a mixture of three parts Toluol and one part trichlorethylene). Where adhesive is required for mounting other parts, use 3-M Company adhesive EC-847. Tubes of this adhesive are available from Bell & Howell (Part No. 70507).

Disassembly Procedure

1. GENERAL INSTRUCTIONS.

a. Before beginning disassembly procedures, be sure to disconnect projector from the power source. Remove the projector lens and wrap the lens in tissue paper; store lens in a safe place.

b. If repairs required replacement of electrical items, refer to the appropriate wiring diagram at the end of the Parts Catalog as an aid to wire identification, and unsolder or disconnect wires as necessary.

c. When replacing components that have been soldered in place, take care to limit the heat to the area being worked upon.

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

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

f. When removing cemented or adhesive-backed items, lift up one edge with a knifeblade or tweezers. If necessary, solvent can be used to assist in the removal, but care must be exercised to avoid getting solvent on plastic parts. After removal, clean the mounting surface with naphtha to remove old adhesive or cement.

g. The insulating sleeves used on leadwire retaining clips are heat-shrunk to the tab of the clip. If the sleeves should work free or become loose, replace with a new clip and sleeve assembly.

2. REMOVAL OF DOORS AND GRILLES (Figure 1). Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Unlatch and remove the lamp access door assembly (1) from the bottom of the projector case. Disengage the lamp (2) from its socket by swinging down the lamp ejector arm and lift the lamp from the socket.

b. The top cover (3) has tabs which snap into mating slots in the upper platen. Press lightly against the rear of the cover to disengage the rear tabs and lift off the cover, thereby freeing the slide ejector (5) and its spring (6).

NOTE: If the top cover (3) is damaged and must be replaced, be sure to order the appropriate nameplate (4) and assemble it to the new cover.

c. Open (swing down) the left side door assembly (7) and disengage its latches from the latch springs on the case. Remove the single screw (13A) with lockwasher (13B). This screw is inserted through the side of the case and threaded into a captive nut in the blower motor bracket.

d. Unlatch and raise the upper platen assembly and remove the four screws (13) that secure the lower platen to the projector case. Close the upper platen and carefully lift the complete platen assembly (14) from the case. Disengage the latches of the right side door (9) from the latch springs at the bottom of the controls panel. Place the platen assembly in the special holding fixture (Figure C), until ready to begin platen repairs and adjustments. Remove the two grilles (11) and (12).

NOTE: If the right side door (9) is damaged and must be replaced, be sure to order the appropriate instruction label (10) and assemble it to the new door. The top of the label must be located at the lower latching edge of the door.

e. On the 854 and 858 model projectors, the carrying handle is riveted to the case. On all other projectors, the handle (18) can be removed by pressing it in toward the case and carefully flexing the handle arms to disengage them from the case studs.

f. Inspect the case for presence and condition of replacement parts (18 through 21C) and replace as necessary.

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

a. If the upper platen assembly (3) is to be completely removed, unlatch and raise the platen to the upright position. On all automatic focusing models, the cable from the focusing motor comes up through a hole in the upper platen and is held securely with a cable clamp. To accomplish complete upper platen removal, the motor wires must be unsoldered from the various upper platen components and the cable clamp loosened sufficiently so that the cable can be withdrawn as the upper platen is removed. To completely free the upper platen, hold it in the upright position while removing the two hinge screws (1) and washers (2).

b. Disassemble the reverse stop plate (6) and eccentric (8) from the lower platen. Invert the platen and place it on a felt pad on the work bench, resting on the lower platen.

SERVICE INSTRUCTIONS

c. All electrical components mounted on the control panel (12) are accessible for replacement without removing the panel from the upper platen. Electrical components for the 854 and 858 model projectors are listed and illustrated as items (13) through (24C). Electrical components for the remaining projector models are listed and illustrated as items (25) through (37). The control panel itself (item 12) is secured to the underside of the lower panel by three screws (9). In addition, it will be necessary to remove two screws (10) and a single washer (11) that attach the index switch (15) or (28) to the lower platen and unhook the index spring (16) or (29) from the bent tab on the arm of the lower shutter blade.

NOTE: When replacing electrical components, refer to the appropriate wiring diagram for proper wiring connections.

4. REMOVAL OF PARTS IN FIGURE 3A — 854, 856 AND 857 MODELS ONLY. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. Loosen the two lens carriage mounting screws (11) so that there is some up-and-down play at the rear end of the lens carriage. Remove the four screws (1) that secure the mirror mount bracket (2) to the upper platen. While lifting up on the lens carriage, carefully slip the outer mounting foot of the mirror bracket from beneath the carriage and lift the mirror bracket from the platen. While doing this, note the manner in which the slide retainer (3) is assembled to the bent tab of the bracket. If the mirror (6) is to be replaced, remove the two screws (4) and washers (5) and separate the mirror and mount assembly (6) from the bracket.

b. Check for the presence of the spring (7) in the upper notch inside the lens barrel. If the lens carriage (15) is to be replaced, remove the two mounting screws (11) with washers (12) and (13), as well as the shim washers (14) located between the lens carriage and the upper platen. With a punch, carefully drive out the stud (8) at the front (lens barrel end) of the lens carriage. Note the manner in which the washers (12) and (13) are assembled to the stud.

c. Check for the presence of the lock knob (16) which should be pressed onto the tab of the platen lock lever at the center of the platen edge opposite the hinge. If missing, install a new lock knob.

5. REMOVAL OF PARTS IN FIGURE 3B — 858, 859, 861 AND 862 MODELS ONLY. Remove parts, as necessary, in their indexed order of disassembly, noting the following special precautions.

a. 858, 861 and 862 Projector Models Only. Remove two screws (1) and the retainer (2) and lift the scan lamp (3) from its molded cradle in the lens carriage. If the lamp must be replaced, the leads must be unsoldered from the lamp terminals. Loosen the setscrews (4) and disassemble the mirror

and support assemblies from the lens carriage. Use a solvent to soften the adhesive on the mounting pins for the covers (7), (9) and (11) as necessary. Remove these covers to replace the lenses (8) and (10) and photocell (12) respectively. The leads must be unsoldered from the photocell.

b. 859 Projector Model Only. Check the condition of the centering spring bracket (15) and centering spring (16). If either part needs replacing, unsolder its leadwire and remove the mounting screw (14) and washer (14A).

NOTE: The following instructions apply to all models covered in Figure 3B.

c. Note the manner in which the P.C. board (13) is oriented in relationship to the focusing motor (18). With a pencil-type soldering gun, carefully unsolder the plus (+) and minus (-) motor terminals protruding up through the board. Straighten the terminals with a long-nose pliers and lift off the board.

d. The focusing bracket (18B) is secured to the platen by two screws (17). If the motor (18C) is to be replaced, disassemble it from the bracket and unsolder the motor leads.

e. Remove the retaining ring (19) and lift off the focusing cam and gear (20). The remaining gears (21) and (22) are now free to be lifted from their gear studs.

f. Check to make sure that the tension spring (29) is hooked between the lens carriage (39) and the spring anchor (31). The clamp (32) serves to hold the motor cable to the platen and need not be removed.

g. Loosen the two carriage mounting screws (37) so that there is some up-and-down play at the rear end of the lens carriage (39). Remove the four screws (23) that secure the mirror mount bracket (24) to the upper platen. While lifting up on the lens carriage, carefully slip the upper mounting foot of the mirror bracket from beneath the lens carriage and lift the mirror bracket from the platen. While doing this, note the manner in which the slide retainer (25) is assembled to the bent tab of the bracket. If the mirror (28) is to be replaced, remove the two screws (26) and washers (27) and separate the mirror and mount assembly (28) from the bracket.

h. Check for the presence of the detent spring (33) in the upper notch inside the lens barrel. If the lens carriage (39) is to be replaced, remove the two mounting screws (37) and washers (38). With a punch, carefully drive out the stud (34) at the front (lens barrel end) of the carriage. Note the manner in which the washers (35) and (36) are assembled to the stud.

i. Check for the presence of the lock knob (40) which should be pressed onto the tab of the platen

lock lever at the center of the platen edge opposite the hinges. If missing, install a new lock knob.

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

a. If the line cord (3) is to be replaced, unsolder its leads and remove the screw (1) that secures the cable clamp (2) to the platen.

b. Unhook the fan belt (7) from the small pulley on the blower motor (12). Remove the retaining ring (4) and washer (5) and disassemble the fan assembly (6) and a second washer (5) from the motor shaft. Remove the fan belt.

NOTE: Before removing the blower motor mounting screws (8), note the location and orientation of leadwire clips (9) used to dress the leadwires after installation. Also note that on 862 projector models only, one of the motor mounting screws serves to attach the preview lampholder (11). To replace the motor, disconnect leadwires as necessary.

c. Remove two screws (14) and Sems nuts (15) and disassemble the lamp socket (16) and heat baffle (17) from the mirror and bracket assembly (21). The lamp support (19) need not be removed unless the lamp socket is to be replaced.

d. Remove the screws (20) and lift off the mirror and bracket assembly (21). Inspect the mirror (21A) for good condition and replace if necessary.

e. Lift the condenser lens bracket (22) from its position on the platen. If the condenser lens (23) is damaged, it can be replaced by flexing the retaining tabs until it can be slipped from the bracket.

f. Remove four screws (24) and the receiver clamps (25); then the single screw (26) and the slide receiver spring (27). Lift the assembled receiver (28) from the platen. Flex the walls of the receiver until the tab of the slide lifter (29) can be disengaged from the slot in the receiver. Disassemble the slide lifter and spring (30) from the receiver.

g. Check for the presence and condition of the shutter bounce pad (31). If loose or in bad condition, pry it from the platen with a knife blade. Refer to paragraph 10, step b. Check to make certain that the locator strip (32) is securely cemented in place in the preview window recess.

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

a. Remove two screws (1) and lift the shuttle retainer (2) from the bosses of the lower platen.

b. 854 Projectors Only. Remove the screw (3) and lift the index finger and bracket assembly (4) from the platen. Inspect parts (5) through (9) for good condition, and replace any which are damaged.

c. All Projectors Except 854. Remove the screw (10) and lift the solenoid and bracket assembly (11) from the platen. If the solenoid (15) is to be replaced, disconnect its leads and drill out the plunger yoke rivet (12). Remove two screws (13) and washers (14) and separate the solenoid (15) from the bracket (18).

NOTE: The remaining paragraphs apply to all projector models.

d. Remove the two screws (23) and lift the motor assembly (25) from the platen. Check the condition of the teeth on drive gear (26) and motor pinion. Disassemble, as necessary, to replace worn or damaged parts.

e. Remove the stop nut (31), spacer (32) and two washers (33) from the pivot stud of the lower platen to free the shutter assemblies (34) and (35) and shutter link assembly (36). Inspect for presence and condition of the shutter bumper (37) and the preview opening light baffle (38).

f. Invert the lower platen and remove the retaining ring (39) and bowed washer (40) from the pivot stud. Lift the transport disc (41) from the stud. The slide supports (42) and (43) need not be disassembled from the platen unless obviously damaged and in need of replacement.

Reassembly Procedure

8. GENERAL PRECAUTIONS.

a. Before reassembling parts, clean them thoroughly. Metal parts can be immersed in a pan of non-flammable solvent or wiped with a cloth dampened with solvent; then dried with a clean, lint-free cloth or compressed air. Do not immerse electrical components in solvent. Clean optical parts (mirrors, lenses, etc.) with lens cleaner and lens tissue. During the reassembly procedure, handle optical parts by their edges to avoid fingerprints.

b. When the reassembly procedure includes the staking of rivets or other parts, all riveting and staking should be done first to avoid the possibility of damage to other parts. Be sure to support the parts solidly before riveting or staking.

c. All soldering should be done carefully; avoid cold soldered joints; avoid short circuits caused by dripping solder; and use only the best grades of resin cored solder.

d. When installing electrical parts, refer to the appropriate wiring diagram at the end of the Parts Catalog for proper wiring connections.

e. When adhesive backed parts are to be installed, clean the mounting area of the casting with naphtha to insure positive adhesion.

f. Unless otherwise specified, use 3M Company adhesive EC-847 (Bell & Howell Specification 327) for all items which are to be cemented in place.

9. REASSEMBLY OF PARTS IN FIGURE 5. Reassemble parts as outlined in the following paragraphs, noting any special precautions.

a. Place the lower platen (44) on the holding fixture (Figure C) with the top surface (transport disc side) facing up. Assemble the slide supports (42) and (43) into their recesses in the platen, making certain that they are fully seated. Lightly grease the center pivot stud of the upper platen and assemble the transport disc (41) to the stud. Assemble the spring tension washer (40), concave surface up, to the stud and secure the disc and washer with the retaining ring (39). Be sure that the washer (40) is completely beneath the retaining ring after assembly. Invert the lower platen on the holding fixture so that the transport disc is facing down.

b. Locate one edge of the light baffle (38) into one groove of the holding tabs of the platen preview opening. Flex the baffle slightly until the opposite edge can be engaged in its groove. Clean

the baffle to remove fingerprints. Assemble the shutter bumper (37) to the indicated boss on the platen and press it down until it is flush with the top of the boss.

c. Assemble the link assembly (36) to the platen with the two pins facing up. Assemble the right-hand shutter assembly (35), a washer (33), the left-hand shutter assembly (34) and a second washer (33) over the center pivot stud of the platen, engaging the link pins with the holes in the two shutter arms. Place a 0.006-inch (0.152mm) shim beneath the upper washer (33) and assemble the center pivot spacer (32) to the pivot stud. Install and tighten the stop nut (31) until the shim is held snugly; then loosen the nut just enough to permit the shim to be removed.

d. Assemble the index motor assembly (29) to the motor plate assembly (30) so that the two elongated depressions in the motor housing are toward the elongated mounting hole in the plate (see Figure D). Install and tighten the two screws (28). Lightly grease the motor pinion and the gear shaft of the motor plate. Assemble the bowed washer (27), concave face up, and the drive gear (26) to the gear shaft. Rotate the transport disc to align the small hole in the disc with the rectangular hole in the platen. Assemble the motor and plate assembly (25) to the platen,

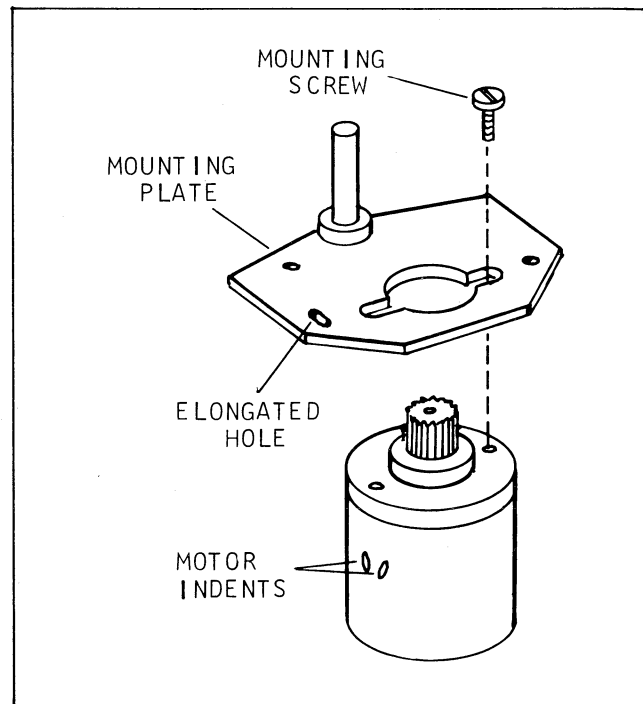


Figure D. Assembling Index Motor Assembly

engaging the teeth of the pinion gear with the teeth of the transport disc. Install the leadwire retaining clips (24) and motor plate mounting screws (23), tightening the screws finger tight. Rotate the transport disc back and forth manually to check backlash, shifting the motor position slightly until minimum backlash is obtained. Hold the motor firmly in this position while tightening the screws (23).

e. Assemble the adjusting post (22) and the washer (21) to the index finger assembly (8) or (17). Assemble the hex nut (20) to the adjusting post and tighten it securely.

f. All Models Except 854. Route the appropriate leadwires (see wiring diagrams) through the strain relief (19) and assemble the strain relief into the large opening in the index bracket (18). Assemble the plunger of the solenoid (15) to the index finger (17) with the rivet (12). Lightly grease the pivot stud of the bracket (18), the stud of the index finger (17) and the small stud at the end of the shutter link (36). Assemble the index finger (17) to the bracket pivot stud while guiding the solenoid plunger into the solenoid (15). Secure the index finger to the stud with the retaining ring (16). Secure the solenoid to the bracket with the two screws (13) and washers (14), tightening both screws finger tight. Position the assembled solenoid/bracket group on the platen with the locating bosses properly seated and the small stud of the shutter link (36) engaged in the off-center hole in the adjusting post (22). Install and tighten the mounting screw (10).

g. Model 854 Only. Lightly grease the pivot stud of the bracket (9), the index finger (8) and the small stud at the end of the shutter link (36). Assemble the index finger (8) to the bracket stud and secure it with the retaining ring (7). Assemble the index lever assembly (6) to the bracket (9) with the two screws (5), tightening the screws finger tight. The index lever assembly must be adjusted for proper cycle button operation after the two platens are completely assembled (refer to paragraph 13). Position the index finger and bracket assembly (4) on the platen with the locating bosses properly seated and the small stud of the shutter link (36) engaged in the off-center hole in the adjusting post (22). Install and tighten the mounting screw (3).

10. REASSEMBLY OF PARTS IN FIGURE 4. Reassemble parts as outlined in the following paragraphs, noting any special precautions.

a. Using a syringe with hypodermic needle, apply adhesive (B&H Spec. 327) to the platen recess ("X," Figure 4). Assemble the locator strip (32) to the recess with the arrows pointing toward the preview window and seat it by pressing with a Q-tip.

b. If the bounce pad (37) was replaced, be sure to clean the pad mounting surface of the platen with naphtha to remove old adhesive. Remove the paper backing from the bounce pad. Carefully pivot the solenoid index finger until the shutter arms form a rectangular opening the approximate width of the

bounce pad. Using this rectangular opening as a locating guide, press the bounce pad firmly into place on the platen.

NOTE: (All Models Except 854). Before continuing with the reassembly of Figure 4 components, adjust the solenoid and shutter as instructed in paragraph 19.

c. Insert the lifter spring (30) into the slide receiver (28). Assemble the slide lifter (29) to the receiver by tipping the lifter slightly to engage the finger tab of the lifter with the slot in the receiver. Flex the walls of the receiver to secure the assembly. Check to make certain that the receiver corners have closed properly after flexing and that the lifter moves freely without binding.

d. Position the assembled receiver (28) to the platen, guiding the receiver between the two slide supports (42 and 43, Figure 5) until the receiver is fully seated on the platen. Engage the ends of the spring (27, Figure 4) into the center recesses of the slide supports. The "V" of the spring must incline upward. Install one screw (26). Assemble the slide holder clamps (25) onto their tapped mounting posts with the clamp tabs engaging corresponding slots in the receiver. Secure the clamps with four screws (24).

e. Flex the retaining clips on the condenser bracket assembly (22) until the condenser lens (23) can be slipped into place beneath the clips. The high curvature of the condenser must face up. Clean the condenser with lens cleaner and lens tissue to remove any finger prints or smudges. Bend up the leadwire retaining clips of the index motor so that they do not interfere with the installation of the condenser bracket (22) and mirror bracket (21).

f. Clean the mirror mounting surface of the bracket (21B) with naphtha. Remove the paper backing from the mirror (21A) and assemble the mirror to the bracket, keeping the front edge of the mirror flush with the edge of the bracket. Apply finger pressure to secure the mirror and clean the mirror surface with lens cleaner and tissue.

g. Assemble the lamp support (19) to the lamp socket (16) with the screw (18). Assemble the heat baffle (17) and lamp socket (16) to the mirror bracket (21) with the two screws (14) and Sems nuts (15).

h. If necessary, bend up the leadwire ties of the index motor to make clearance for the condenser bracket (22). Locate the condenser and bracket assembly on the platen. Position the lamp socket and bracket assembly on the platen and install the three screws (20) finger tight. Leave the screw in the small center foot loose while tightening the other two screws; then tighten the center foot screw.

i. Check to make sure the clinch nut (13) in the motor bracket is secure. Make certain that the motor fan shaft, fan pulley and motor pulley are thoroughly clean by scrubbing with a cloth saturated with Freon or naphtha. If there is any

doubt about the condition of the belt (7), discard it and replace with a new one (P/N 766791). Assemble a washer (5) to the fan shaft. Apply a thin film of grease (P/N 070034) to the entire length and circumference of the fan shaft, using a brush. Assemble the belt (7) to the fan pulley (6) and assemble the fan and pulley assembly to the shaft. Be careful not to allow the belt to come in contact with the grease and stretch the belt as little as possible while looping it around the motor pulley. Lift the fan slightly and, with a "Q" tip, apply grease to the open end of the fan bearing; then press the fan assembly fully down into place. Assemble two more washers (5) to the fan shaft and down against the fan bearing, and secure all parts with the retaining ring (4).

j. Position the motor assembly (12) with two of the mounting feet located above the outer hole in the condenser bracket (22) and the third foot on a tapped post of the platen. Install the three mounting screws (8), also securing the leadwire clip (9) with one of the screws as shown.

NOTE: The Model 862 only is equipped with a preview lamp (10) and lampholder (11). Secure the lampholder with one of the mounting screws (8). Orient the lamp to the lampholder and push the lamp in until it snaps in place.

k. Assemble the cable clamp (2) to the line cord (3) so that 3 inches of the tinned leads extend beyond the clamp. Secure the clamp to the platen with the screw (1). Refer to the appropriate wiring diagram at the end of the Parts Catalog and make all wiring connections between components of the lower platen.

11. REASSEMBLY OF UPPER PLATEN — MODELS 858, 859, 861 AND 862 (Figure 3B). Reassemble upper platen parts as outlined in the following paragraphs, noting any special precautions.

a. Assemble the lock knob (40) to the tab of the lock lever which protrudes up through the slot in the upper platen assembly (41).

b. If the nameplate (39A) and/or accent trim (39B) are to be replaced, be sure to clean the lens barrel areas of the lens carriage with non-flammable solvent to remove traces of old adhesive. Lightly grease the four contact points on the underside of the carriage (39). Position the lens carriage (39) on the upper platen and loosely install two screws (37) with washers (38). Align the hole in the lens barrel with the mating hole in the platen. Assemble the bowed washer (36), concave side down, to the stud (34); then assemble the flat washer (35) to the stud and press the stud through the hole in the lens barrel and into the platen. Insert the detent spring (33) into the lens detent slot in the top of the lens barrel.

c. Loosely assemble the cable clamp (32) and tension spring anchor (31) to the upper platen with the screw (30). The screw is not to be tightened until after the upper platen has been assembled

to the lower platen (paragraph 13), at which time the five-wire motor cable assembly can be brought up through the adjacent hole in the upper platen. Hook one end of the tension spring (29) to the small hole in the spring anchor and the other end into the hole in the lens carriage.

d. Assemble the mirror and mount assembly (28) between the arms of the mirror mount bracket (24). Align the holes in the bracket and mirror mount and install the two screws (26) with washers (27). Remove finger prints from mirror with lens cleaner and lens tissue. Assemble the slide retainer (25) to the bent tab of the mirror bracket (24). Raise the lens carriage enough so that the outer mounting foot of the bracket (24) can be inserted beneath the carriage while inserting the slide retainer into the slot in the platen. Align mirror bracket (24) with the tapped holes in the platen and secure the bracket with the four screws (23). Then tighten the lens carriage screws (37).

e. Assemble the black gear (22), pinion up, on the platen stud closest to the focusing motor (18). Assemble one white gear (21), pinion up, to its stud with its large spur gear engaging the black pinion. Assemble the second white gear (21), pinion up, with its large spur gear engaging the first white pinion. Assemble the focusing cam and gear (20), cam down, to its stud and secure the cam gear with the retaining ring (19).

f. Assemble the focusing motor (18C) to the motor bracket (18B) with two screws (18A). Position the motor assembly (18) to the platen, engaging the motor pinion with the black pinion gear (22). Install the two screws (17) finger-tight. Shift the motor assembly to obtain a slight amount of backlash between motor pinion and pinion gear (22). Hold motor firmly while tightening the screws (17). Assemble the P.C. board (13) to the motor terminals and carefully bend terminals.

g. Model 859 Only. Assemble the centering spring bracket (15) to the small boss on the lens carriage and secure the bracket with a screw (14). Position the centering spring (16) on the platen with its long tab inserted up through the slot in the free end of the spring bracket (15). Hold the spring so that the long tab is centered in the bracket slot while tightening the second screw (14).

h. Models 858, 861 and 862. Refer to the appropriate wiring diagram and solder the leadwires to the terminals of the photocell (12). Assemble the photocell into the holder of the lens carriage with the ear of the photocell oriented with the notch of the holder. Assemble the cover (11) onto the four molded pins and place a drop of adhesive (B&H Spec. 327) on the protruding end of each pin. Assemble the lenses (8) and (10) into their respective lens holders. The gate of the lens (8) must be at the 11 o'clock position (viewed from the rear end of the lens carriage). Assemble the covers (7) and (9) to the molded pins of the lens carriage and seal the protruding ends of the pins with a drop

of adhesive (B&H Spec. 327). Assemble the mirror and support assemblies (5) and (6) to the holes in the lens carriage and secure each one with a set-screw (4). Remove fingerprints from lenses with lens cleaner and lens tissue. Insert the scan lamp (3) into its cradle in the lens carriage. Insert the undrilled end of the lamp retainer (2) into the slot in the lens carriage lamp arm and secure the other end of the retainer with the screw (1). Refer to the appropriate wiring diagram and make wiring connections accordingly.

12. REASSEMBLY OF UPPER PLATEN — MODELS 854, 856 AND 857 (Figure 3A). Reassemble upper platen parts as outlined in the following paragraphs, noting any special precautions.

a. Assemble the lock knob (16) to the tab of the lock lever which protrudes up through the slot in the upper platen assembly (17).

b. If the nameplate (15A) and/or accent trim (15B) are to be replaced, be sure to clean the lens barrel areas of the lens carriage with non-flammable solvent to remove traces of old adhesive. Lightly grease the four contact points on the underside of the carriage (15). Lightly grease the two mounting posts for the lens carriage and place a shim washer (14) on each post. Position the lens carriage (15) on the upper platen and loosely install two screws (11) with star washers (12) and flat washers (13). Assemble a star washer (9) and flat washer (10) to the stud (8) and press the stud through the hole in the lens barrel and into the platen. Insert the detent spring (7) into the lens detent slot in the top of the lens barrel.

d. Assemble the mirror and mount assembly (6) between the arms of the mirror mount bracket (2). Align the holes in the bracket and mirror mount and install the two screws (4) with washers (5). Remove finger prints from mirror with lens cleaner and lens tissue. Assemble the slide retainer (3) to the bent tab of the mirror bracket (2). Raise the lens carriage enough so that the outer mounting foot of the bracket (2) can be inserted beneath the carriage while inserting the slide retainer into the slot in the platen. Align mirror bracket (2) with the tapped holes in the platen and secure the bracket with the four screws (1). Then tighten the lens carriage screws (11).

13. REASSEMBLY OF PARTS IN FIGURE 2. Reassemble parts as outlined in the following paragraphs, noting any special precautions.

NOTE: Before assembling electrical components (switches, potentiometer, terminal strip, etc.) to the control panel it is recommended that all wiring components first be made to those components as shown in the appropriate wiring diagram.

a. Model 859 Only. Assemble the shorting switch (37) to the control panel with the switch oriented as shown in Figure 2. Secure the switch with two rivets (36).

NOTE: Steps b through f apply only to Models 856, 857, 859, 861 and 862.

b. Assemble the terminal strip (34) to the molded pin of the control panel and heat seal the end of the pin.

c. The electrical tape (33A) is 1/2-inch wide and 9/16 inch long. If a new heat sink (33) is to be installed, apply tape as follows. Place the heat sink on the work bench with the diagonal corner and bent tab toward you and on the right. Apply a strip of tape so that it is 1/4 inch from the right edge of the heat sink and 3/8 inch down from the top of the heat sink and press to secure. Fold the remaining length of the tape over the top edge of the heat sink and press securely to the back side.

d. Assemble the heatsink (33) and potentiometer (32) into the recess of the control panel as shown in Figure E, aligning the rivet holes over the slot in the panel. Assemble the terminal lug (31) to the rivet (30) and rivet the potentiometer to the panel.

e. Make all wiring connections to the index switch assembly (28). This switch will hang loose until the control panel is secured to the lower platen. Hook one end of the spring (29) to the switch. The other spring end hooks around a tab of the lower shutter arm after the control panel is installed. Activate insulating shield (35) with solvent and assemble shield to control panel rib behind switch and the potentiometer.

f. Assemble a washer (27) or (27A) on each of the molded mounting bosses for the master switch (26). For the Model 859 only, assemble the switch slide (27B) to the bosses with the narrow leg toward the bottom edge of the control panel and the bent tab pointing up. Assemble the master switch (26) to both bosses and heat seal to secure the switch.

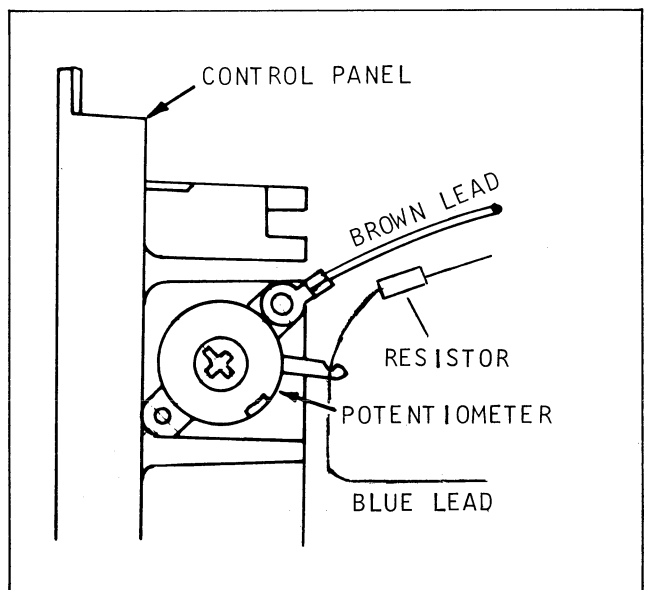


Figure E. Installing the Potentiometer

Pass all switch wiring through the shield (25) before soldering leads per appropriate wiring diagram. Assemble the shield to the switch with the stop on the shield toward the inside of the panel. Press shield until it snaps in place.

NOTE: Steps g through l apply to Models 854 and 858 only.

g. Model 858 Only. Assemble the phone jack (24C) to the control panel with the rivets (24B). Apply a bead of adhesive (B&H Spec. 987) around the perimeter of the control panel opening for the closure (24A). Assemble the closure into the recess, visually centering the hole with the phone jack.

h. Model 854 Only. Assemble the cycle button (23C) and spring (23D) to the control panel recess with the word CYCLE facing up. Assemble washer (23B) to screw (23A). Depress the cycle button and install and tighten the screw.

i. Assemble the forward-reverse switch (21) to the molded pins on the control panel and heat seal the pins to secure the switch.

j. The electrical tape (20A) is 1/2-inch wide and 9/16 inch long. If a new heat sink (20) is to be installed, apply tape as follows. Place the heat sink on the work bench with the diagonal corner and bent tab toward you and on the right. Apply the strip of tape so that it is 1/4 inch from the right-hand edge and 3/8 inch down from the top edge, and press to secure. Fold the remaining length of tape over the top edge of the heat sink and press securely to the back side.

k. Assemble the heat sink (20) and potentiometer (19) into the recess of the control panel as shown in Figure E, aligning the rivet holes over the slot in the panel. Assemble the terminal lug (18) to the rivet (17) and rivet the potentiometer to the panel.

l. Make all wiring connections to the index switch assembly (15). This switch and its spring (16) will hang loose until the control panel is secured to the lower platen.

NOTE: The remaining paragraphs apply to all projector models.

m. Assemble the control panel (12) to the mounting rail of the lower platen and install the three screws (9) finger tight. Align the bracket holes of the index switch (15) or (28) with the holes in the platen and install the two screws (10), using a washer (11) on the screw furthest from the control panel. Tighten both screws; then the three screws (9). Hook the index switch spring (16) or (29) around the bent tab on the arm of the lower shutter.

n. Assemble the reverse stop plate (6) to the stud of the lower platen, with the bent finger of the stop engaged in the round hole of the transport disc (Figure F). Assemble the washer (5) onto the stud and secure with the retaining ring (4). Assemble the eccentric (8) into its recess in the lower

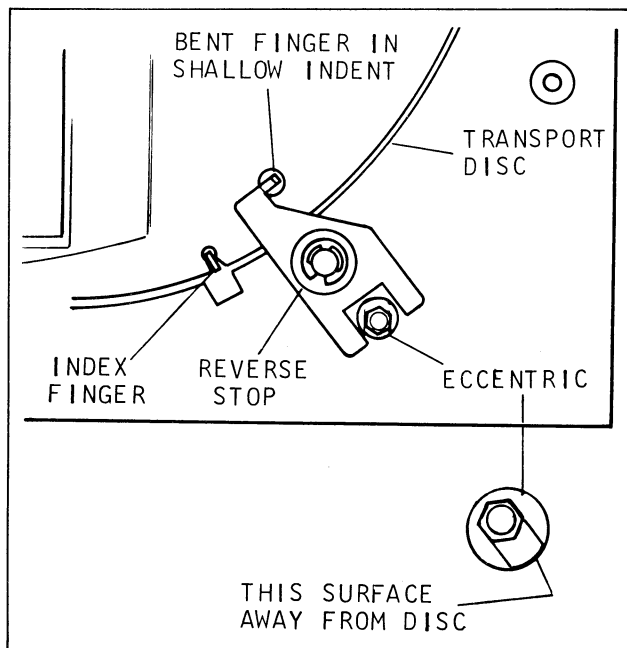


Figure F. Adjusting Eccentric and Reverse Stop

platen and between the ears of the reverse stop. Position the eccentric so that the side "A" (see inset, Figure F) is away from the transport disc, and secure the eccentric with the screw (7) tightened just enough to hold. With the index finger (Figure F) visually centered in its slot in the disc, adjust the eccentric until the tip of the reverse stop finger resists clockwise rotation of the transport disc. Hold all parts firmly while tightening the eccentric screw (7).

o. Open the hinges on the upper platen assembly (3) and position the upper platen on the lower platen with the hinge plates in the shallow recesses. Assemble the screws (1) through the hinges and into the lower platen and tighten just enough so that the upper platen can still be shifted slightly. Close the upper platen to check the latching action. Shift the upper platen, if necessary, until the proper latching and unlatching action is obtained; then carefully raise the upper platen and tighten the hinge screws securely. On Models 858, 859, 861 and 862 only, thread the five-wire motor cable up through the slot in the upper platen and secure it with the cable clamp (32, Figure 3B).

NOTE: All adjustments should be made before installing covers and grilles (Figure 1). Refer to the Adjustments section following. Then install covers as follows.

14. REASSEMBLY OF PARTS IN FIGURE 1. Reassemble parts as outlined in the following paragraphs, noting any special precautions.

a. If labels (21B) and (21C) or the fixed rubber foot (21A) are being replaced, refer to Figure G for proper orientation. Remove the paper backing

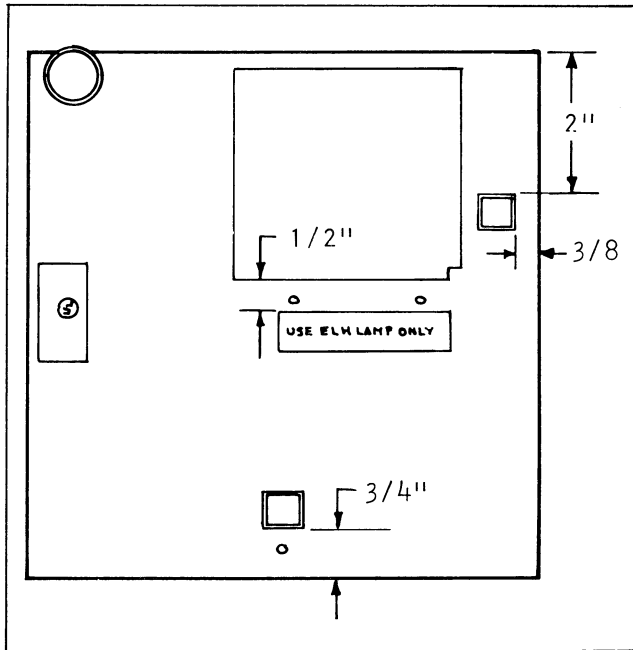


Figure G. Assembling Labels and Feet to Case

from the labels and apply them to the bottom of the case, smoothing them down with a dry, clean cloth. Assemble the threaded level adjusting foot (19) to the bottom corner of the case. If missing, assemble an adhesive-backed pad (20) to the leveling foot. Turn the case right-side up and assemble the flexible grommet (17) into the U-shaped notch of the case partition, pressing it down as far as possible.

b. On 854 and 857 models, the carrying handle is a riveted component of the case assembly. On all other models, install the carrying handle (18) as follows: Flex the arm of the handle sufficiently to engage the large diameter holes of the handle arms over the studs in the projector case. Then pull outward on the handle until it latches in place.

c. Place the assembled upper and lower platen (14) on the holding fixture (Figure C) with the upper platen facing down. Hook the molded hinges of the right side door (9) into the hinge springs at the

bottom edge of the control panel and swing the door up into the latched position. Make a final check to be certain that all leadwires are properly connected and dressed out of the way of moving parts. Hold the case in properly oriented position above the platen and lower it carefully and squarely into place. Be sure that none of the leadwires becomes clamped between the lower platen and the case partition. When the case is firmly seated, grip the case and platens firmly and turn the unit right-side up on the work bench. Unlatch and open the upper platen and loosely assemble the four screws (13) through the lower platen and into the shear forms of the case.

d. Assemble the rear grille (11) and front grille (12) to the projector, engaging the molded tabs at the bottom of each grille with the corresponding notches in the case. Raise the assembled platen slightly until the upper edge of each grille can be snapped in place.

e. Turn the unit until the case side opposite the controls panel is facing you. Note the small screw hole in the case side located approximately two inches up from the bottom of the case and two and one-half inches from the front grille. Shift the platen assembly until this hole is aligned with the stop nut (item 31, Figure 5) pressed into the index motor bracket. Install the screws (13A) with lock-washer (13B) and tighten the screw securely. Then tighten the four screws (13).

f. Hook the molded hinges of the left side door (7) into the hinge springs at the bottom of the case and swing the door up into the latched position.

g. If the top cover (3) was replaced, remove the paper backing from the new nameplate (4) and assemble the nameplate into the rectangular recess in the cover. Assemble the slide ejector (5) into front slot of the top cover, lettering facing up. Assemble the spring (6) up into the hole in the slide ejector and hold it in place with a piece of shim stock while lowering the top cover into place. Engage the front tabs of the cover into the slots in the upper platen. Then apply pressure at the rear of the cover until the rear tabs snap into their respective slots.

Adjustments

15. GENERAL INSTRUCTIONS.

a. All adjustments should be performed before the assembled platens are inserted into the projector case and the covers and grilles are installed. This will permit access to wiring connections and to components requiring adjustment.

b. Use a variac when making electrical checks and adjustments so that the input voltage can be accurately set.

c. After all adjustments have been made, it is advisable to briefly check each adjusted operation to make certain that the projector is performing properly. Then complete the assembly of the projector as outlined in paragraph 14.

16. ADJUSTING THE INDEX LEVER — 854 ONLY (Figure H).

a. Depress the "Cycle" button on the control panel and insert a 0.025 inch (0.635mm) shim between the contact blade under the large washer and the molded base on the panel.

b. Loosen the two screws that attach the index lever assembly to the solenoid bracket, and shift the lever assembly until the lever is in contact with both the index finger and the large washer. Hold in this position while tightening the two mounting screws securely.

c. Remove the shim and depress the "Cycle" button while checking for freedom of shutter blade movement and adequate overlap of shutter blades. Release the button and check to make certain that the shutter blades are completely clear of the aperture. Readjust the index lever, as necessary, to obtain the proper results.

CAUTION: Do not adjust the index lever to a loaded position, as this will prevent the shutters from completely clearing the aperture when open.

17. CENTERING SWITCH ADJUSTMENT — 859 ONLY (Figure J).

a. Check to make certain that the raised aligning mark on the face of the cam gear is at 90 degrees (perpendicular) to the front-to-rear axis of the lens carriage.

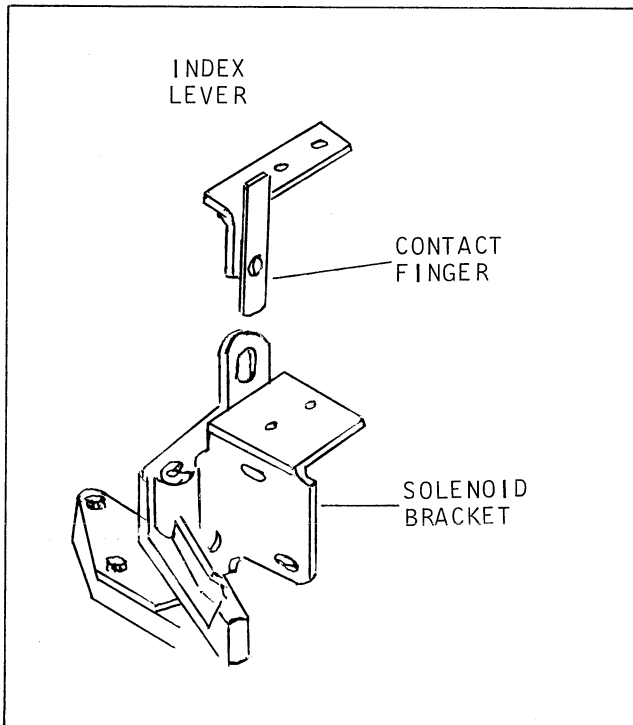


Figure H. Index Lever Adjustment — 854 Only

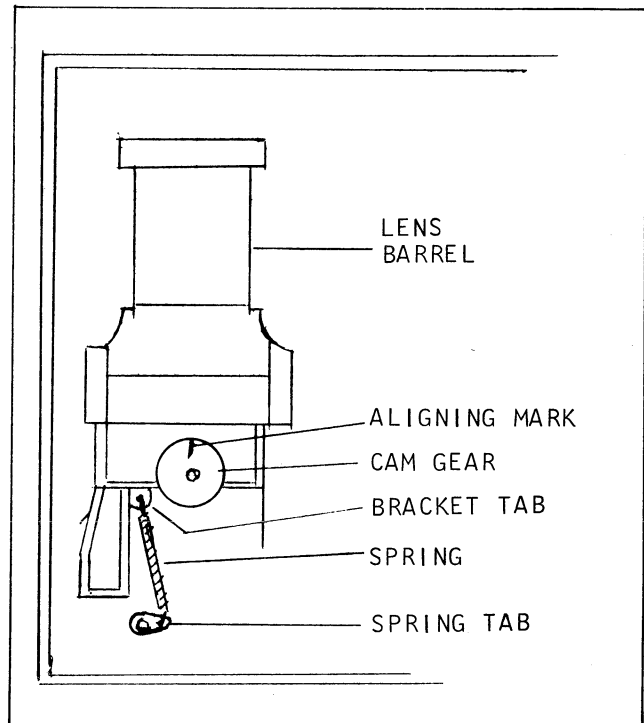


Figure J. Centering Switch Adjustment — 859 Only

b. Connect the leads of an ohmmeter to the terminal tabs of the centering switch spring and bracket. Then loosen the spring mounting screw and carefully adjust the spring until the ohmmeter registers an open circuit.

c. Retighten the spring mounting screw, making certain that the circuit remains open. Then disconnect the ohmmeter leads.

18. REMOTE FOCUS CHECK — 859 ONLY.

a. Connect the projector power cord to a 115-volt line source and place the projector in the "fan-on" position. Wait at least ten seconds before proceeding. Note that the aligning mark on the face of the cam gear is perpendicular to the front-to-rear axis of the lens carriage.

b. Depress the focus button of the remote control and check that the cam gear aligning mark moves counterclockwise approximately 45 degrees from its preset position.

c. Actuate the focus button a second time. The aligning mark should now move clockwise until it is approximately 45 degrees beyond its preset position.

d. Switch off the main switch; then once more place the switch in the "fan on" position. The aligning mark should automatically return to the preset position perpendicular to the axis of the lens carriage.

e. If the focusing operation does not function as noted above, check for proper mesh of gear train gears and be sure that the cam gear is preset, with its aligning mark perpendicular to the lens carriage.

19. SHUTTER AND INDEX SOLENOID ADJUSTMENT (ALL MODELS EXCEPT 854). This adjustment is to be made with the projector line cord connected to a power supply set at 105 volts AC.

a. Hold the index finger (Figure F) out of its slot in the transport disc and manually rotate the disc counterclockwise until the index finger can be released against the outer rim of the disc.

b. Loosen the locking nut (item 20, Figure 5) and rotate the adjusting post (item 22, Figure 5) until the shutter blades are overlapping slightly as shown in Figure K; then tighten the locking nut securely without disturbing this adjustment.

c. Manually rotate the transport disc counterclockwise until the index finger drops into the next indexing slot. The shutter blades should release and be completely clear of the aperture opening.

d. Slightly loosen the two screws which secure the solenoid to its mounting bracket (Figure K) and insert a 0.030-inch (0.762mm) shim beneath

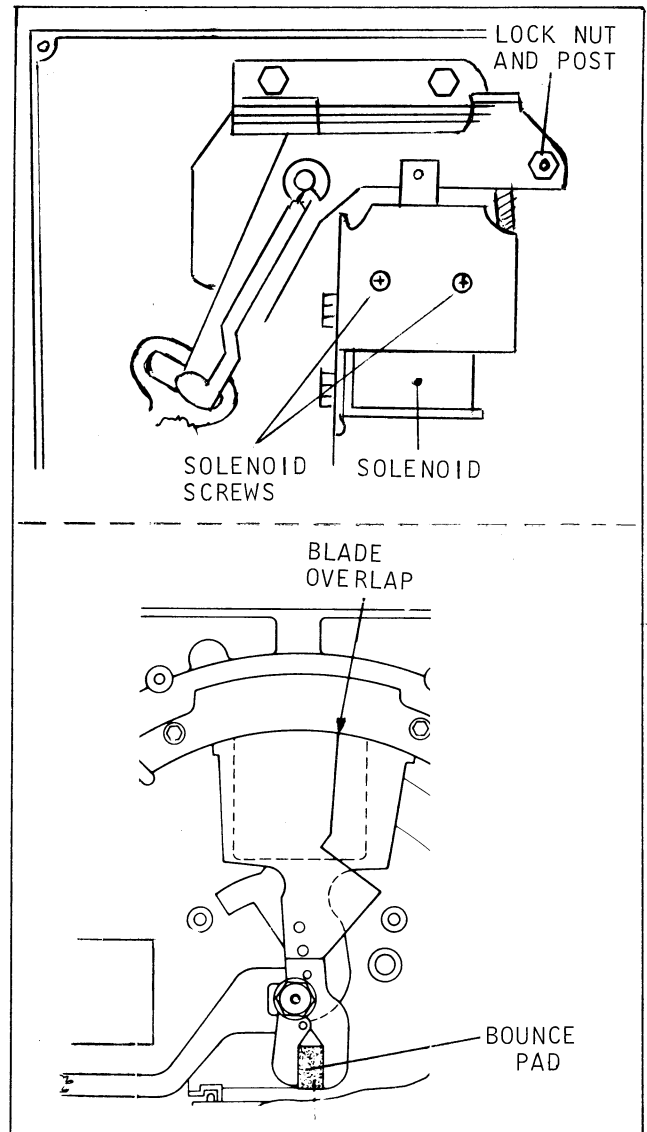


Figure K. Shutter and Solenoid Adjustment

the coil to hold it level. Connect the power supply leads to the solenoid and slowly move the coil toward the aperture spring until the solenoid begins to "buzz;" then slowly move the coil back in until the buzzing stops. Hold the coil firmly in this position while tightening the two mounting screws securely.

e. With the projector switch "off," connect the red and white leads of the power supply to the index motor terminals, the red lead to the plus (+) terminal. Connect the white and grey power supply leads to the index switch. Switch on the projector and depress the "Cycle" button as often as is necessary to check the following operations.

- (1) Each time the "Cycle" button is pressed and released, the index finger must disengage from the slot in the transport disc and the disc must rotate to the next detent position.

SERVICE INSTRUCTIONS

- (2) When the "Cycle" button is depressed and held, the transport disc must continue to rotate until the button is released.
- (3) While the index finger is riding the rim of the disc during transport, there must be adequate overlap of the shutter blades. When the index finger drops into the indexing slot, the shutter blades must completely clear the aperture opening.

20. TRANSPORT DISC SPEED ADJUSTMENT. The transport disc should make one complete revolution within the speed range of 3.33 to 3.53 seconds. Speed is to be checked and adjusted with the projector connected to a variac set at 117.5 volts AC.

a. Raise the upper platen and place a small piece of masking tape on both the lower platen and the transport disc so that aligning marks can be penciled on both tapes.

b. Using an accurate stop watch, activate the watch and "Cycle" button simultaneously, pressing the stop watch a second time when the aligning marks once more coincide. It may be necessary to repeat the check several times in order to obtain a "mean" reading.

c. The speed of the transport disc is adjusted by means of a potentiometer located behind the front grille at the control panel side of the projector.

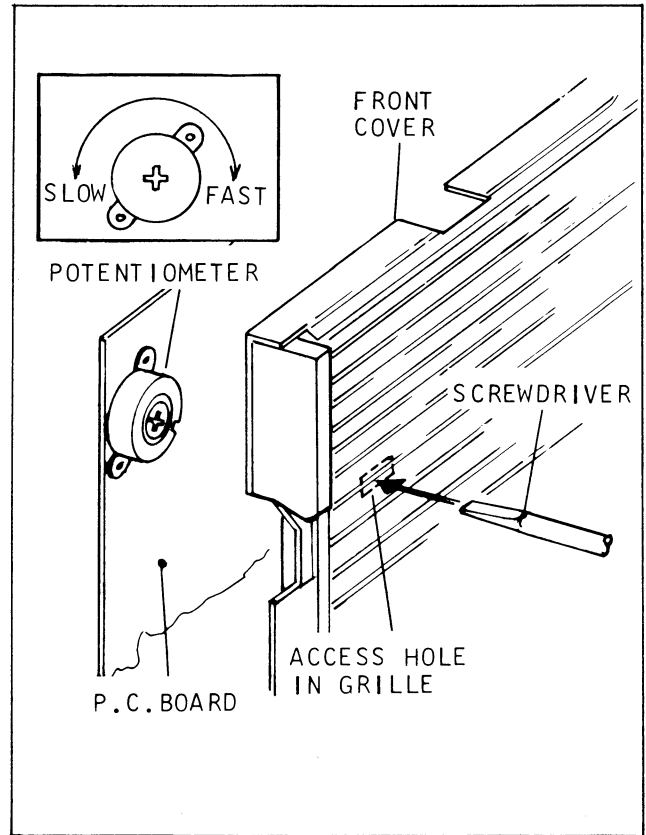


Figure L. Transport Disc Speed Adjustment

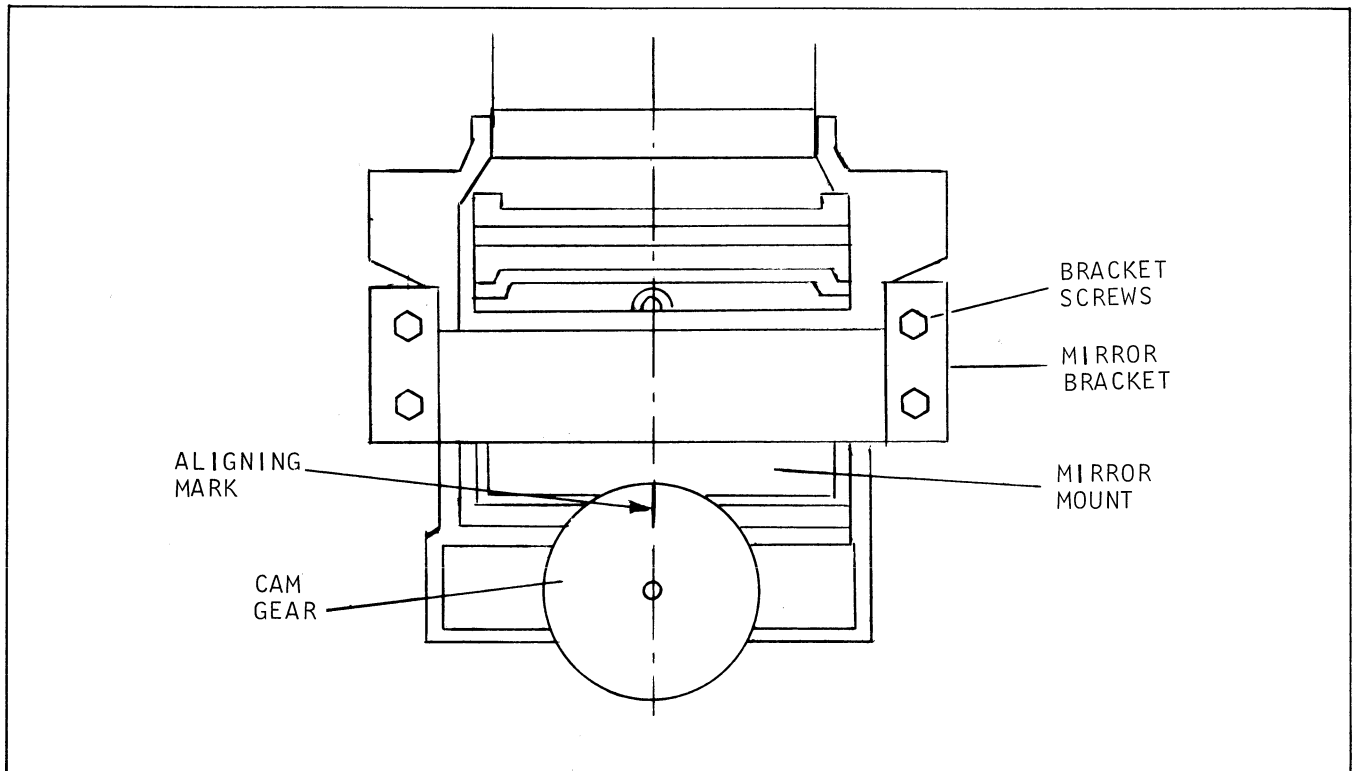


Figure M. Adjusting the Mirror Mount

If the grille is in position, insert a small Phillips screwdriver through the access hole at the left end of the grille (Figure L) to engage the potentiometer adjusting screw. Turn the screw clockwise to increase the speed; counterclockwise to decrease the speed. Adjustments should be made in very small increments, with speed checks repeated between adjustments.

21. SLIDE PROJECTION ALIGNMENT (Figure M).

a. Place the projector on a leveling plate so that slides can be projected against the wall or a screen located at least ten feet away. Make certain that the plate is level in all directions.

b. Slightly loosen the four screws that secure the mirror mount bracket to the upper platen and the two pivot screws that attach the mirror mount to the bracket.

c. Insert a slide into the transport disc and switch on the projector. Advance the slide until it is positioned at the projection position and manually focus the slide on the screen.

d. If necessary, twist the mirror bracket slightly in either direction until the projected image is centered on the screen from side to side. Hold the bracket firmly while tightening the four bracket screws.

e. Tilt the mirror mount up or down, as necessary, to center the projected image vertically on the screen. Hold the mirror mount firmly while tightening the two mirror mount screws. Switch off the projector.

22. AUTOMATIC FOCUSING ADJUSTMENT — 861 AND 862 ONLY (Figure N). The automatic focusing adjustment requires the use of the following test slides available from Bell & Howell Company. The projector must be connected to a variac set at 130 volts ac.

0.030 inch Test Slide

0.035 inch Test Slide

0.040 inch Test Slide

Opaque Screen

a. Check to make certain that the aligning mark on the cam gear is at the 12 o'clock position (perpendicular to the axis of the lens carriage), and unlock and open the upper platen.

b. Insert the 0.040 inch Test Slide into the projection station of the transport disc and close and lock the upper platen.

c. Turn the potentiometer on the P.C. board assembly to the fully clockwise position and switch the projector to the "lamp on" position. Focus the test slide on the screen.

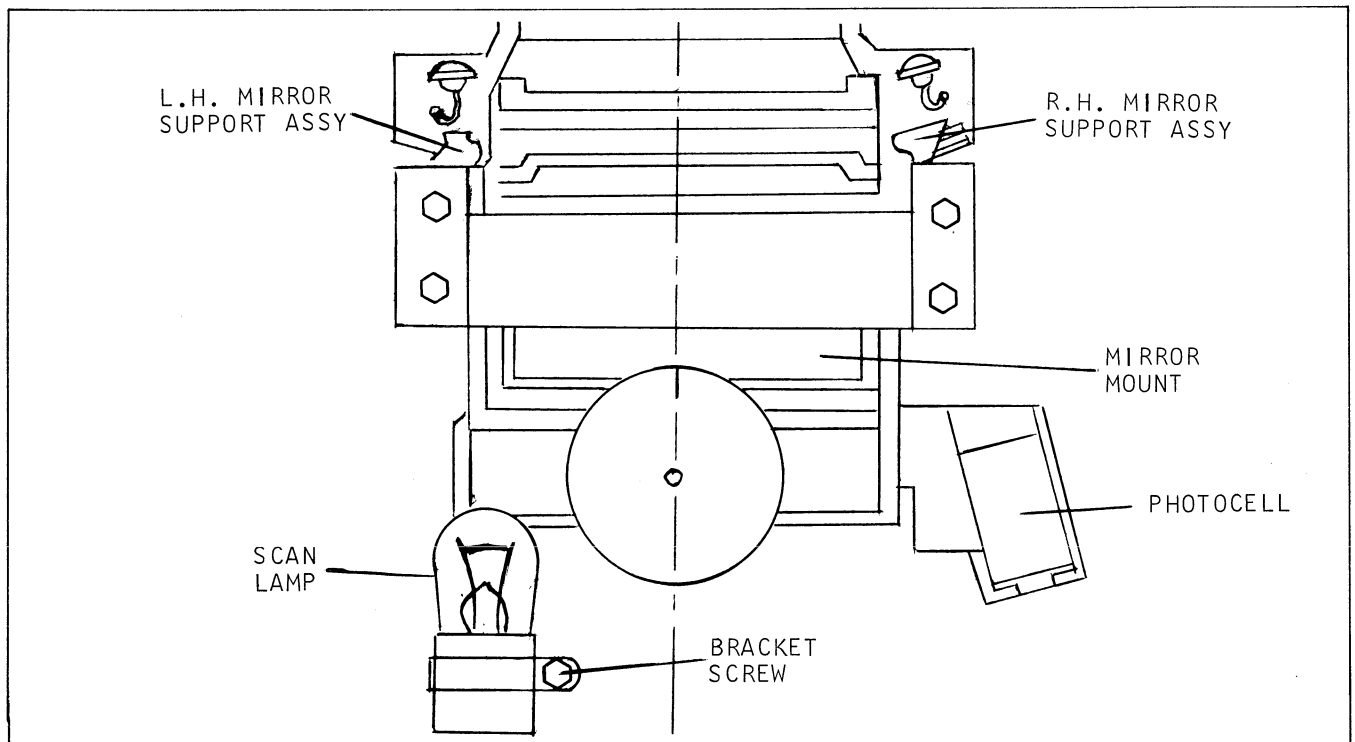


Figure N. Adjusting the Autofocusing System

SERVICE INSTRUCTIONS

d. Loosen the mirror mount setscrew (left side of carriage) and adjust the mirror so that the image of the scan lamp filament appears at the center of the test slide.

e. Adjust the scan lamp until the filament image is centered on the horizontal line (3 o'clock position) of the test slide. Move the scan lamp bracket forward or backward to obtain the sharpest possible filament image on the slide, and tighten the scan lamp bracket screw securely. Then readjust the scan lamp mirror, as necessary, so that the horizontal line of the test slide lies at the center of the filament image.

f. Insert the opaque screen into the photocell groove of the lens carriage and temporarily install the photocell cover. Adjust the mirror and mount on the photocell side of the lens carriage so that the filament image is at the center of the opaque screen. Remove the cover and opaque screen.

g. Assemble the photocell into its nest in the lens carriage with the black and brown leads at the bottom. Assemble the photocell cover and recheck the cam gear to make certain that the aligning mark is still at the 12 o'clock position. Readjust the larger mirror if necessary.

h. Unlock and open the upper platen. Remove the 0.040 inch test slide and insert the 0.035 inch test slide into the projection station and the 0.045 inch test slide into the previewing station. Close the upper platen and turn the P.C. board potentiometer slightly counterclockwise.

i. Advance the 0.045 inch test slide to the projection station. The cam gear should move without overshooting by more than two gear teeth maximum. Recall the 0.035 inch test slide to the projection station. Again the cam gear should move without overshooting by more than two gear teeth maximum.

j. If the cam gear overshoots beyond the maximum allowable limit of two gear teeth, turn the P.C. board potentiometer slightly counterclockwise. If the cam gear does not move at all, turn the potentiometer slightly clockwise. Repeat the check and adjustment procedures until the cam gear moves within the specified limits.

k. Set the variac at 100 volts AC and replace the 0.035 inch test slide with the 0.030 inch test slide. Recheck cam gear movement; adjusting the potentiometer as necessary.

l. When cam gear movement falls within the specified limits, lock the mirror mount setscrews securely. With a syringe, apply adhesive to the back side of both mirror support posts and allow it to run down to the lens carriage. With the mirror covers and photocell cover in place, apply adhesive to the molded pins of the lens carriage so that the covers are held in place. (Use B&H Co. Spec. 327 adhesive).

m. Switch off the main switch and remove all test slides from the platen.

Final Test

23. GENERAL INSPECTION PROCEDURES.

a. Visually inspect the projector for missing parts and exterior damage (scratches, cracks, etc.). Pick up the projector, turn it over and gently shake it to make certain that no loose parts are inside.

b. Open and close the side doors to check the latching action. Check for the presence of the instruction label on the inside of the control panel side door and make certain that the instructions are legible.

c. Raise and lower the upper platen several times to check smoothness of movement and positive latching action. If the upper platen does not latch properly, slightly loosen the platen hinge screws and shift the upper platen until positive unlatching and latching action is obtained. Then raise upper platen carefully and tighten the hinge screws.

d. Inspect the slide cube recess in the upper platen to make certain that the cube cover keys are not chipped or broken.

24. ELECTRICAL TEST CHECK.

a. Make sure the master switch is in the OFF position and connect the line cord to any 110 to 120 volt AC, 60 Hertz outlet.

b. Place the master switch in the FAN position. The blower motor should operate and (in the 862 only) the preview lamp should light.

c. Place the master switch in the LAMP position. The blower motor should continue to operate, the projection lamp should light and (in the 862 only) the preview lamp should remain lit.

d. Raise the upper platen. Place the FORWARD-RECALL button in the FORWARD position and, while watching the transport disc, press and release the CYCLE button. The transport disc must make a one-quarter counterclockwise rotation and stop. Press and hold the CYCLE button. The transport disc should rotate steadily in a counterclockwise direction until the CYCLE button is released.

e. Place the FORWARD-RECALL button in the RECALL position and press and release the CYCLE button. The transport disc must make a one-quarter clockwise rotation and stop. Press the CYCLE button a second time. The transport disc must not rotate. Switch off the projector.

NOTE: Should the projector fail to function as described in any of the previous test checks, the platens should be removed from the projector case and all leadwire connections checked against the appropriate wiring diagram.

25. SLIDE HANDLING TEST.

a. Assemble a fully-loaded slide cube to the projector and switch the projector to the FAN position.

b. Operate the projector in "forward" until approximately half the slides have been advanced, watching to see that the slides are transporting and storing smoothly and without jamming.

c. Operate the projector between "recall" and "forward" several times to make certain that the slides transport smoothly in both directions.

d. Cycle all remaining slides through the projector and raise the slide receiver lift lever to return the slides to the cube; then slide the cube to the left and lift it from the projector. Place the master switch in the OFF position.

26. AUTOFOCUSING TEST (861 AND 862 ONLY).

a. Raise the upper platen and insert a standard two-by-two slide into the projection station recess of the projector. Insert the 0.030 inch test slide (described in paragraph 22) into the PREVIEW-EDIT station recess.

b. Place the master switch in the LAMP position and manually focus the lens to obtain the sharpest possible image of the standard slide on the screen.

c. Cycle the projector "forward" to bring the test slide to the projection station. The autofocusing system should immediately respond to the change in film-to-lens distance and the focus motor must operate to refocus the lens without "overshooting."

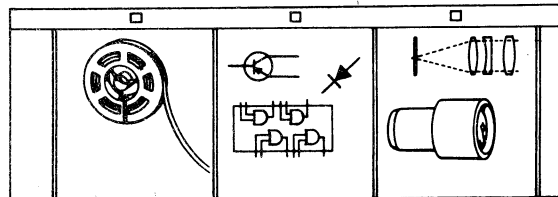
NOTE: "Overshooting" is the tendency of the system to search back and forth one or more times before finally stabilizing in the focused position. This can be verified by removing the cover from the lens carriage and observing the rotation of the cam gear during the focusing operation. The cam gear should not "overshoot" by more than two gear teeth in either direction. Refer to paragraph 22 for adjustment procedure.

d. Remove the test slides from the transport disc.

Trouble Shooting

TROUBLE	PROBABLE CAUSE	REMEDY
Projector completely	1. Defective master switch.	1. Replace master switch.
	2. Line cord leads disconnected or shorted.	2. Reconnect leads or replace line cord.
	3. Thermal fuse opened.	3. Replace thermal fuse on motor.
	4. Electrical short in system.	4. Check electrical system for shorts and correct condition.
	5. Transport disc binding.	5. Disassemble and correct binding condition.
	6. Shutter blades bent and jammed.	6. Replace shutter blades.
	7. Solenoid inoperative.	7. Replace solenoid (item 15, Figure 5).
Projector operates but does not cycle	1. Slide sticking in third position.	1. Remove damaged slide.
	2. Defective or disconnected wiring.	2. Check wiring and reconnect or replace as necessary.
	3. Defective cycle control.	3. Replace remote control (item 15, Figure 1).
	4. Defective index solenoid.	4. Replace solenoid (item 15, Figure 5).
	5. Defective index motor.	5. Replace motor (item 25, Figure 5).
	6. Defective index switch.	6. Replace switch (item 15 or 28, Figure 4).
	7. Indexing components out-of-adjustment.	7. Readjust indexing components.
Poor image quality	1. Dirty elements.	1. Clean mirror, condensers and lens.
	2. Mirror out of alignment.	2. Align projection system (paragraph 21).
	3. Mirror and/or condenser broken.	3. Check and replace broken parts.
	4. Defective or dirty projection lamp.	4. Clean or replace lamp.
	5. Defective lens.	5. Replace lens.
	6. Autofocusing system not adjusted properly. (861 and 862 only.)	6. Adjust autofocusing system (paragraph 22).

TROUBLE	PROBABLE CAUSE	REMEDY
Autofocusing system not operating properly	1. Autofocusing system out-of-adjustment.	1. Adjust autofocusing system (paragraph 22).
	2. Defective focus motor.	2. Replace motor (item 18, Figure 3B).
	3. Burned out scan lamp.	3. Replace scan lamp (item 3, Figure 3B).
	4. Defective photocell.	4. Replace photocell (item 12, Figure 3B).
	5. Short in printed circuit board wiring.	5. Correct shorted condition.
Projector malfunctions in "Recall"	1. Defective remote control or advance/recall switch.	1. Replace remote control or switch.
	2. Reverse stop improperly adjusted.	2. Adjust reverse stop per paragraph 13 and Figure F.
	3. Solenoid sticking.	3. Remove and clean solenoid (item 15, Figure 5).
	4. Transport speed too slow.	4. Adjust transport speed (paragraph 20).
	5. Defective slide separator.	5. Replace upper platen assembly.
	6. Transport disc warped.	6. Replace transport disc.
Forward transport malfunction or slide jams	1. Upper platen not completely closed.	1. Raise upper platen and loosen hinge screws slightly. Lower platen and shift until it latches; then carefully raise platen and retighten hinge screws.
	2. Slides warped or too thick.	2. Use slides with mounts in good condition.
	3. Slide cube not properly seated over receiving well.	3. Position cube over well.
	4. Warped upper platen and/or transport disc.	4. Replace defective part.
	5. Transport speed too slow.	5. Readjust speed per paragraph 20.
	6. Indexing components out-of-adjustment.	6. Readjust per paragraph 19.
	7. Defective index motor.	7. Replace index motor (item 25, Figure 5).
Unit becomes excessively warm	1. Broken or disengaged fan belt (item 7, Figure 4).	1. Replace belt.
	2. Fan belt slipping (loose belt or grease on pulleys).	2. Clean pulleys thoroughly with Freon or alcohol; replace belt.
	3. Blower motor not operating (leadwire disconnected or motor defective).	3. Check wiring connections; replace defective motor (item 12, Figure 4).



(Revised)

SUBJECT MIRROR & BRACKET ASSEMBLY, RIGHT HAND P/N 046886

DATE 2-16-79

Reference: Bell & Howell Company Slide CubeTM Projector
Models 858, 861 and 862 Service Manual P/N 74406
Figure 3B-6

Purpose: To properly align mirror and adjust auto-focus.

The General Service Department has noted in some projectors a condition of being unable to properly align the right hand auto-focus mirror figure 3B-6 P/N 046686. This is caused by the mirror being slightly crooked. Check the focus alignment as follows:

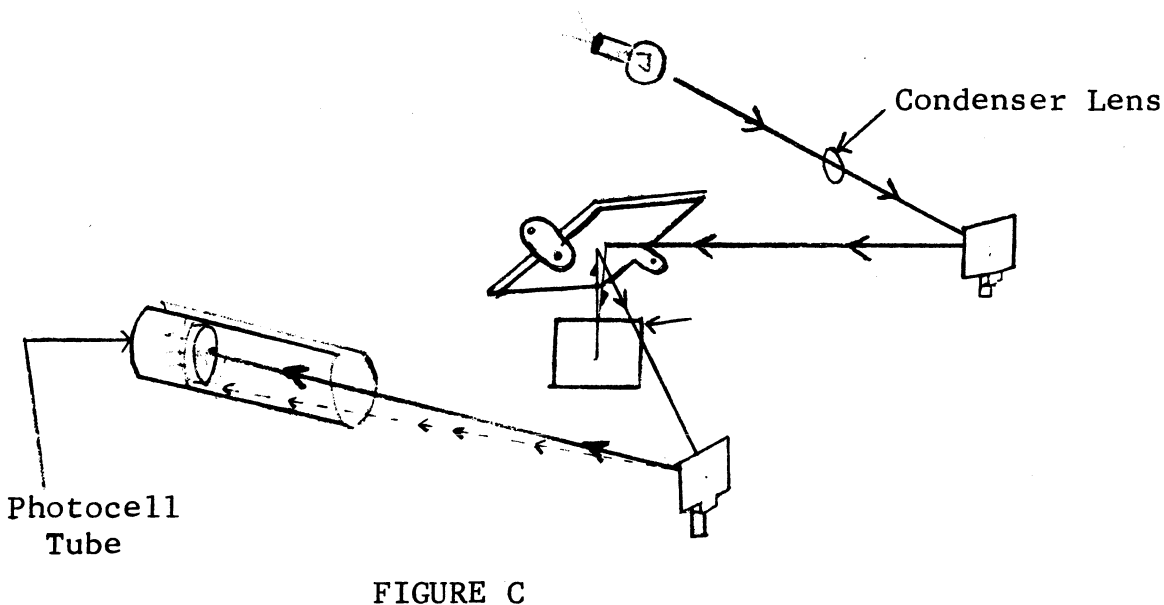
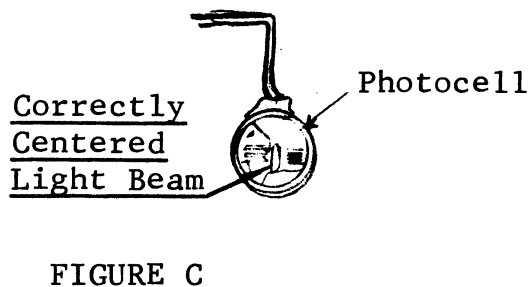
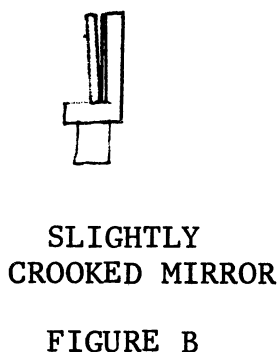
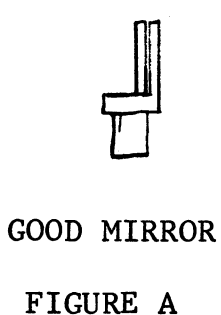
1. Remove the top cover in figure 1-3.
2. Snap off the photocell cover figure 3B-11.
3. Remove the photocell figure 3B-12 and block off the light from it.
4. Insert a modified photocell (see figure C below).
5. Unlatch the platen and insert the slide tool S-072581-96-FX40.
6. Place your hand or a cover over the photocell tool in the holder to better see the location of the light beam.
7. Move the aligning mark on the cam gear to the 12 o'clock position.
8. If the light beam on the photocell tool is not in the middle of the two cells (see figure C), adjust the mirror.
9. After adjusting the mirror, if the light beam still cannot be located, turn the mirror to the approximate position where the light beam should reflect on the mirror.
10. Carefully pull back slightly on the mirror bracket as shown in figure D below. While pulling back on the mirror and/or turning it, the light beam should be located. If after adjusting and locating the light beam by the backward pressure, the light beam will not stay located on the photocell, replace the mirror assembly and realign and adjust as explained above. Also shown in figure D below is how the light should look under good and bad conditions.

Problems an out-of-alignment light beam can cause are constant scanning or no scanning and no auto-focus.

Mirror assembly P/N 046686 will be shipped to dealers, free of charge, only when the attached order sheet has the information requested and returned.

The SOLID LINE shows correct light beam as in Fig. A with straight mirror.

The BROKEN LINE shows how light will be reflected to the photo-cell with a slightly crooked mirror as shown in Fig. B. Position finger on top of the large mirror and pull back slightly. If the mirror is crooked, this action will locate the beam.



PARTS CATALOG

SLIDE CUBE PROJECTOR^{T.M.}

<u>MODEL NUMBER</u>	<u>CATALOG NUMBER</u>
CP40	854A
1000PS	856A
RC50	857A
----	858A
RF60	859A & Z
AF70	861A, Z and H
3000PS	862A, Z and D



**GENERAL SERVICE DEPT.
7100 McCORMICK ROAD
CHICAGO, ILLINOIS 60645**

Replacement Parts

The following pages illustrate and list, by part number and description, all replacement parts for the Bell & Howell Company Slide Cube^{T.M.} Projectors listed below. The basic differences between models are noted in the Introduction section of the Service Instructions.

When ordering replacement parts, be sure to check the "Usable on Code" column to be certain that the part in question is applicable to the projector being serviced. Where this column is blank, the listed part applies to all models. As noted in the following list of models, each projector been assigned a code letter to identify parts which are peculiar to one or more models.

<u>Model No.</u>	<u>Cat. No.</u>	<u>Code</u>
CP40	854A	A
1000PS	856A	B
RC50	857A	C
(None)	858A	D
RF60*	859A/Z	E
AF70*	861A/Z/H	F
3000PS*	862A/Z/D	G

*Refer to the Service Instructions Introduction section for an explanation of variations designated by the suffix letters D, H, and Z.

OPTIONAL ACCESSORIES

64mm (2-1/2") f/3.5 lens	Cat. No. 021249
Slide Cube Cartridge Library Book	Cat. No. 072706
Slide Cube Cartridge 3-pack	Cat. No. 072626
Deluxe Storage Top (Std. on 862D)	Cat. No. 046620
85mm to 115mm Zoom Lens	Cat. No. 021329

*Note: All projectors except Cat. No. 854 are provided with a smoked acrylic top cover (Cat. No. 072796) which can be ordered, if desired, for 854 projectors.

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY							USABLE ON CODE
			1	2	3	4	5	6	7	
DOORS AND GRILLES										
1-1	046675	ACCESS DOOR ASSEMBLY, Lamp							1	
-2	766916	LAMP, Projection, Type ELH							1	
-3	451143	COVER, Top (NOTE A)							1	ACEF
-3	451140	COVER, Top (NOTE A)							1	BDG
-4	451701	NAMEPLATE, Top cover (NOTE A)							1	A
-4	451710	NAMEPLATE, Top cover (NOTE A)							1	B
-4	451704	NAMEPLATE, Top cover (NOTE A)							1	C
-4	451712	NAMEPLATE, Top cover (NOTE A)							1	DG
-4	451707	NAMEPLATE, Top cover (NOTE A)							1	E
-4	451156	NAMEPLATE, Top cover (NOTE A)							1	F
-5	451124	EJECTOR, Slide							1	
-6	766053	SPRING, Slide ejector							1	
-7	450635	DOOR, Left side							1	A
-7	046618	DOOR ASSEMBLY, Left side							1	B
-7	046621	DOOR ASSEMBLY, Left side							1	CDEF
-7	046619	DOOR ASSEMBLY, Left side							1	G
-7A	766798	TRIMPLATE, Door (adhesive backed)							1	B thru G
-8	766932	PAD, Rubber (adhesive backed)							2	
-9	450635	DOOR, Right (operating) side (NOTE B)							1	A
-9	046617	DOOR ASSEMBLY, Right (operating) side (NOTE B)							1	BG
-9	046621	DOOR ASSEMBLY, Right (operating) side (NOTE B)							1	CDEF
-9A	766798	TRIMPLATE, Door (adhesive backed)							1	B thru G
-10	451194	LABEL, Instruction (adhesive backed) (NOTE B)							1	A
-10	451195	LABEL, Instruction (adhesive backed) (NOTE B)							1	BCDFG
-10	451196	LABEL, Instruction (adhesive backed) (NOTE B)							1	E
-11	451149	GRILLE, Rear							1	
-12	046679	GRILLE ASSEMBLY, Front							1	A
-12	046680	GRILLE ASSEMBLY, Front							1	BG
-12	046681	GRILLE ASSEMBLY, Front							1	C
-12	046682	GRILLE ASSEMBLY, Front							1	D
-12	046683	GRILLE ASSEMBLY, Front							1	E
-12	046693	GRILLE ASSEMBLY, Front							1	F
-12A	451700	NAMEPLATE, Grille (adhesive backed)							1	A
-12A	451709	NAMEPLATE, Grille (adhesive backed)							1	BG
-12A	451703	NAMEPLATE, Grille (adhesive backed)							1	C
-12A	451721	NAMEPLATE, Grille (adhesive backed)							1	D
-12A	451706	NAMEPLATE, Grille (adhesive backed)							1	E
-12A	451130	NAMEPLATE, Grille (adhesive backed)							1	F
-13	450649	SCREW,							4	
-13A	766219	SCREW, Hex washer head, 4-40 by 3/8 inch							1	
-13B	700732	LOCKWASHER, External tooth							1	
-14	No Number	PLATEN ASSEMBLY, Upper and lower (see Figure 2 for replacement parts)							NP	
-15	451727	PAD, Bumper (adhesive backed)							2	
-16	072897	REMOTE CONTROL ASSEMBLY							1	BCEFG
-16	046103	REMOTE CONTROL ASSEMBLY							1	D
-17	450522	GROMMET, Flexible							1	
-18	450665	HANDLE, Carrying							1	BDEFG
-19	766056	FOOT, Level adjusting							1	
-20	766109	PAD, Leveling foot (adhesive backed)							1	
-21	046698	CASE ASSEMBLY, Projector							1	AC
-21	046699	CASE ASSEMBLY, Projector							1	BDEFG
-21A	451171	FOOT, Fixed							1	
-21B	766997	LABEL, Lamp type (adhesive backed)							1	
-21C	766846	LABEL, U.L. (adhesive backed)							1	

NOTE A: If top cover (1-3) is replaced, order appropriate new nameplate (1-4) also.

NOTE B: If right side door (1-9) is replaced, order appropriate instruction label (1-10) also.

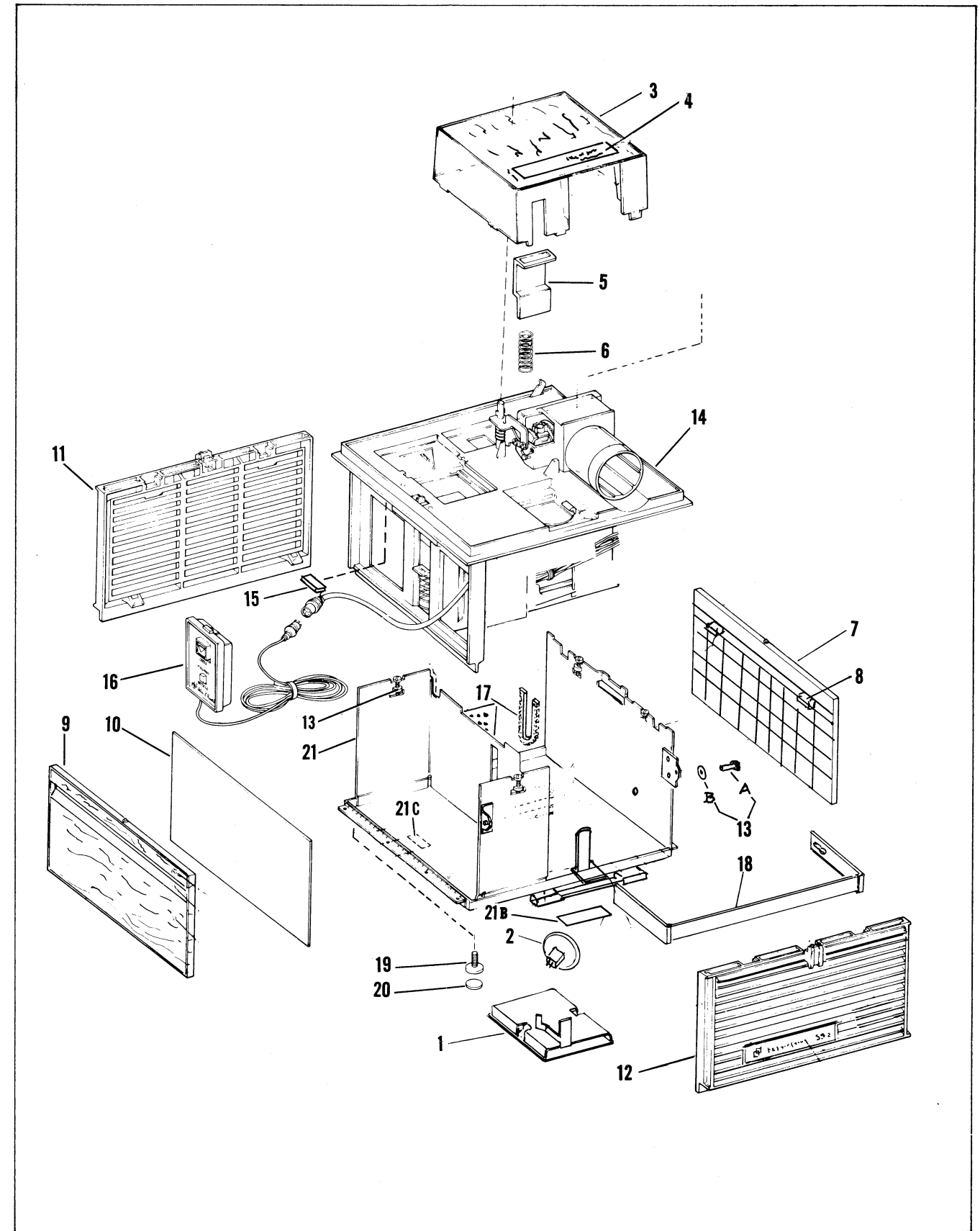


Figure 1. Doors and Grilles

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY							USABLE ON CODE
			1	2	3	4	5	6	7	
PLATENS AND CONTROL PANELS										
2-1	87098	SCREW, Posidrive pan head, 6-32 by 5/16 inch							2	
-2	766184	WASHER, Flat							2	
-3	No Number	PLATEN AND CARRIAGE ASSEMBLY, Upper (See Figure 3A or Figure 3B for replacement parts)							NP	
-4	308858	RING, Retaining, Type E, 0.188 inch ID							1	
-5	766293	WASHER, Flat							1	
-6	766002	PLATE, Reverse stop							1	
-7	451464	SCREW,							1	
-8	766000	ECCENTRIC, Reverse stop							1	
-9	766224	SCREW, Posidrive pan head, 6-32 by 1/4 inch							3	
-10	451655	SCREW, Control panel							2	
-11	17632	WASHER, Flat							1	
-12	766359	PANEL, Control							1	AD
-12	766945	PANEL, Control							1	Bcfg
-12	450317	PANEL, Control							1	E
-12A	766199	LABEL, Preview (adhesive backed)							1	G
NOTE: Items 2-13 through 2-24 are for Models 854 and 858. Items 2-25 through 2-37 are for Models 856, 857, 859, 861 and 862.										
-13	765686	SHIELD, Switch							1	AD
-14	49940	SWITCH, Master ON-OFF							1	AD
-15	046674	INDEX SWITCH ASSEMBLY							1	AD
-16	765965	SPRING, Index switch							1	AD
-17	115482	RIVET, Semitubular							1	AD
-18	766059	LUG, Terminal							1	AD
-19	450641	POTENTIOMETER							1	AD
-20	766388	HEAT SINK							1	AD
-20A	766462	TAPE, Insulating							1	AD
-21	765972	SWITCH, Forward-Reverse							1	AD
-22	No Number	NAMEPLATE, Forward-Reverse (adhesive backed)							NP	AD
-23A	766224	SCREW, Posidrive pan head, 6-32 by 1/4 inch							1	A
-23B	42412	WASHER, Flat							1	A
-23C	766049	BUTTON, Cycle							1	A
-23D	766048	SPRING, Cycle button							1	A
-24A	766775	CLOSURE, Jack							1	D
-24B	115482	RIVET, Semitubular							2	D
-24C	766777	PHONE JACK							1	D
-25	45874	SHIELD, Switch							1	BCEFG
-26	49655	SWITCH, Master ON-OFF							1	BCEFG
-27	309180	WASHER, Bowed							2	BCFG
-27A	99589	WASHER, Flat							2	E
-27B	450310	SLIDE, Switch							1	E
-28	046674	INDEX SWITCH ASSEMBLY							1	BCEFG
-29	765965	SPRING, Index switch							1	BCEFG
-30	115482	RIVET, Semitubular							1	BCEFG
-31	766059	LUG, Terminal							1	BCEFG
-32	450641	POTENTIOMETER							1	BCEFG
-33	046694	HEAT SINK ASSEMBLY							1	BCEFG
-33A	766462	TAPE, Insulating							1	BCEFG
-34	765194	TERMINAL STRIP							1	BCEFG
-35	766995	SHIELD, Insulating (cement in place)							1	BCEFG
-36	450318	RIVET, Semitubular							2	E
-37	47986	SWITCH, Shorting							1	E
-38	No Number	PLATEN ASSEMBLY, Lower, complete (see Figures 4 and 5 for replacement parts)							NP	

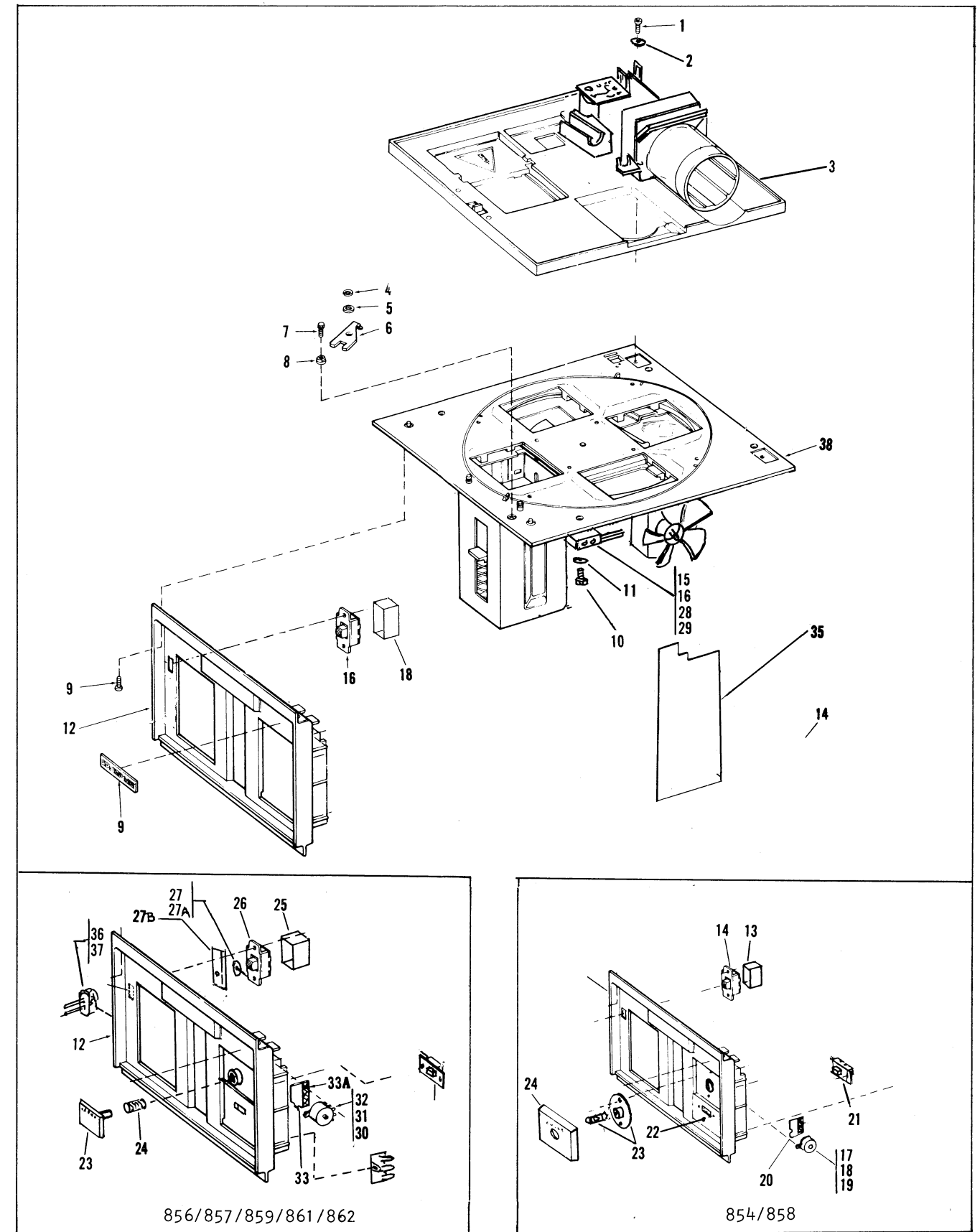


Figure 2. Platens and Control Panels

FIG & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE	1	2	3	4	5	6	7
LENS CARRIAGE COMPONENTS (854/856/857)											
3A-1	766218	SCREW, Hex washer head, 4-40 by 1/4 inch	4	ABC							
-2	451105	BRACKET, Mirror mount	1	ABC							
-3	451104	RETAINER, Slide	1	ABC							
-4	766219	SCREW, Hex washer head, 4-40 by 3/8 inch	2	ABC							
-5	766188	WASHER, Flat	2	ABC							
-6	046684	MIRROR AND MOUNT ASSEMBLY	1	ABC							
-7	451126	SPRING, Lens detent	1	ABC							
-8	451111	STUD, Lens carriage	1	ABC							
-9	9517	WASHER, Star	1	ABC							
-10	34861	WASHER, Flat	1	ABC							
-11	30802	SCREW, Hex washer head, 4-40 by 1/8 inch	2	ABC							
-12	9517	WASHER, Star	2	ABC							
-13	766188	WASHER, Flat	2	ABC							
-14	451738	WASHER, Shim	2	ABC							
-15	046687	LENS CARRIAGE ASSEMBLY	1	A							
-15	046688	LENS CARRIAGE ASSEMBLY	1	B							
-15	046689	LENS CARRIAGE ASSEMBLY	1	C							
-15A	451702	NAMEPLATE, Lens (adhesive backed)	1	A							
-15A	451711	NAMEPLATE, Lens (adhesive backed)	1	B							
-15A	451705	NAMEPLATE, Lens (adhesive backed)	1	C							
-15B	451157	TRIM, Accent (adhesive backed)	1	AC							
-15B	451193	TRIM, Accent (adhesive backed)	1	B							
-16	451138	KNOB, Lock	1	ABC							
-17	046696	UPPER PLATEN ASSEMBLY	1	ABC							

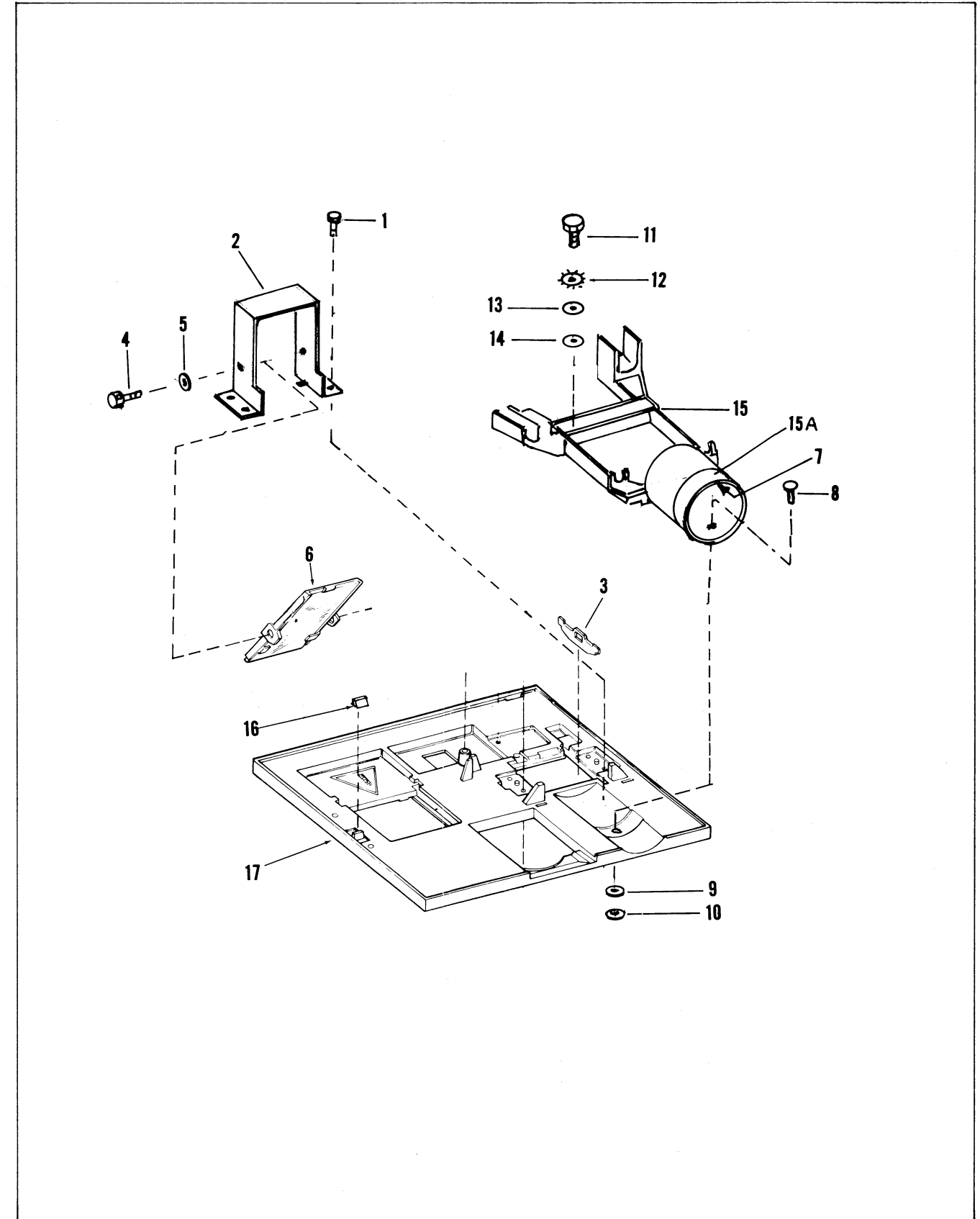


Figure 3A. Lens Carriage Components
(854/856/857)

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY	USABLE ON CODE
AUTOFOCUS COMPONENTS (858/859/861/862)				
3B-1	766218	SCREW, Hex washer head, 4-40 by 1/4 inch	2	DFG
-2	451116	RETAINER, Scan lamp	1	DFG
-3	766012	LAMP, Scan	1	DFG
-4	87029	SETSCREW, Mirror support	2	DFG
-5	046685	MIRROR AND SUPPORT ASSEMBLY, Left-hand	1	DFG
-6	046686	MIRROR AND SUPPORT ASSEMBLY, Right-hand	1	DFG
-7	451107	COVER, Round lens (adhesive on retaining tabs)	1	DFG
-8	451110	LENS, Round	1	DFG
-9	451742	COVER, Square lens (adhesive on retaining tabs)	1	DFG
-10	204647	LENS, Square	1	DFG
-11	451108	COVER, Photocell (adhesive on retaining tabs)	1	DFG
-12	046636	PHOTOCELL	1	DFG
-13	046612	PRINTED CIRCUIT BOARD ASSEMBLY	1	DFG
-13	046613	PRINTED CIRCUIT BOARD ASSEMBLY	1	E
-14	766218	SCREW, Hex washer head, 4-40 by 1/4 inch	2	E
-14	34874	WASHER, Flat	2	E
-15	451163	BRACKET, Centering spring	1	E
-16	451164	SPRING, Centering	1	E
-17	766218	SCREW, Hex washer head, 4-40 by 1/4 inch	2	DEFG
-18	No Number	MOTOR AND BRACKET ASSEMBLY	NP	DEFG
-18A	450642	SCREW, Motor bracket	2	DEFG
-18B	451114	BRACKET, Motor	1	DEFG
-18C	450631	MOTOR, Autofocus	1	DEFG
-19	17639	RING, Retaining, Type E, 0.125 inch ID	1	DEFG
-20	451115	CAM AND GEAR, Autofocus	1	DEFG
-21	766341	GEAR, Pinion (white)	2	DEFG
-22	451159	GEAR, Pinion (black)	1	DEFG
-23	766218	SCREW, Hex washer head, 4-40 by 1/4 inch	4	DEFG
-24	451105	BRACKET, Mirror mount	1	DEFG
-25	451104	RETAINER, Slide	1	DEFG
-26	766219	SCREW, Hex washer head, 4-40 by 3/8 inch	2	DEFG
-27	766188	WASHER, Flat	2	DEFG
-28	046684	MIRROR AND MOUNT ASSEMBLY	1	DEFG
-29	451190	SPRING, Tension	1	DEFG
-30	766219	SCREW, Hex washer head, 4-40 by 3/8 inch	1	DEFG
-31	766059	ANCHOR, Tension spring	1	DEFG
-32	451132	CLAMP, Cable	1	DEFG
-33	451126	SPRING, Lens detent	1	DEFG
-34	451111	STUD, Lens carriage	1	DEFG
-35	34878	WASHER, Flat	1	DEFG
-36	17684	WASHER, Bowed	1	DEFG
-37	30802	SCREW, Hex washer head, 4-40 by 1/8 inch	2	DEFG
-38	766188	WASHER, Flat	2	DEFG
-39	046690	LENS CARRIAGE ASSEMBLY	1	D
-39	046690	LENS CARRIAGE ASSEMBLY	1	E
-39	046691	LENS CARRIAGE ASSEMBLY	1	F
-39	046692	LENS CARRIAGE ASSEMBLY	1	G
-39A	No Number	NAMEPLATE, Lens (adhesive backed)	1	D
-39A	451708	NAMEPLATE, Lens (adhesive backed)	1	E
-39A	451158	NAMEPLATE, Lens (adhesive backed)	1	F
-39A	451711	NAMEPLATE, Lens (adhesive backed)	1	G
-39B	451157	TRIM, Accent (adhesive backed)	1	DEF
-39B	451193	TRIM, Accent (adhesive backed)	1	G
-40	451138	KNOB, Lock	1	DEFG
-41	046697	UPPER PLATEN ASSEMBLY	1	DEFG

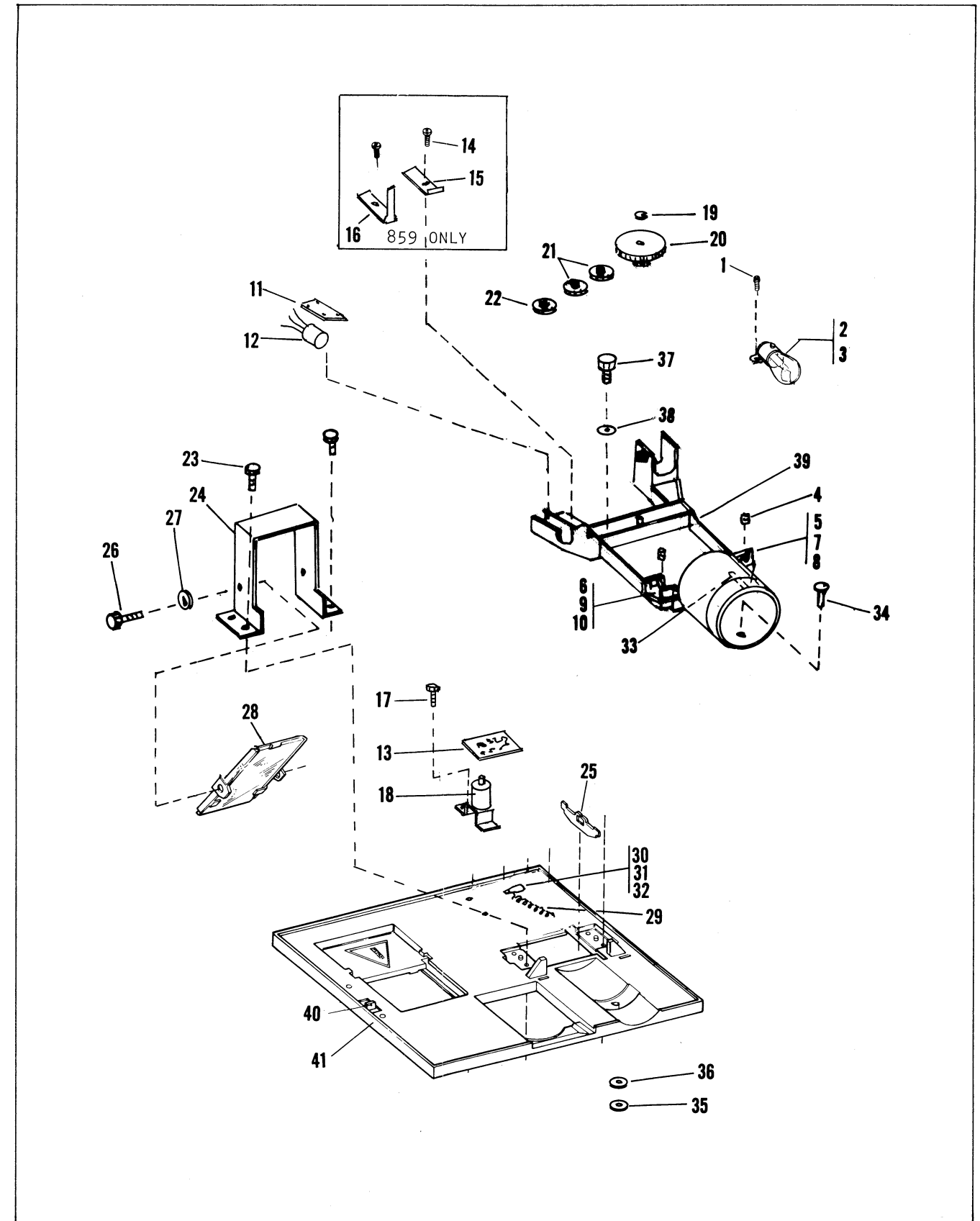


Figure 3B. Autofocus Components
(858/859/861/862)

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS PER ASSY							USABLE ON CODE
			1	2	3	4	5	6	7	
LOWER PLATEN COMPONENTS										
4-1	30809	SCREW, Hex washer head, 6-32 by 3/8 inch							1	
-2	39186	CLAMP, Cable							1	
-3	451191	LINE CORD							1	AD
-3	451189	LINE CORD							1	BCEFG
-4	766877	RING, Retaining							1	
-5	47823	WASHER, Flat							3	
-6	046611	FAN AND PULLEY ASSEMBLY							1	
-7	766791	BELT, Fan							1	
-8	451655	SCREW, Motor mounting							3	
-9	046443	CLIP ASSEMBLY, Leadwire							1	
-10	451174	LAMP, Preview							1	G
-11	451173	LAMPHOLDER, Preview							1	G
-12	046601	MOTOR ASSEMBLY, Blower							1	A
-12	046603	MOTOR ASSEMBLY, Blower							1	BC
-12	046607	MOTOR ASSEMBLY, Blower							1	D
-12	046605	MOTOR ASSEMBLY, Blower							1	E
-12	046607	MOTOR ASSEMBLY, Blower (Model 861A Only)							1	F
-12	046610	MOTOR ASSEMBLY, Blower (Model 861H Only)							1	F
-12	046616	MOTOR ASSEMBLY, Blower							1	G
-13	46257	NUT, Clinch							1	
-14	48834	SCREW, Special							2	
-15	42154	NUT, Hex Sems							2	
-16	451172	LAMP SOCKET							1	
-17	451148	BAFFLE, Heat							1	
-18	450480	SCREW, Lamp support							1	
-19	451152	SUPPORT, Lamp							1	
-20	451655	SCREW, Mirror bracket							3	
-21	No Number	MIRROR AND BRACKET ASSEMBLY							NP	
-21A	451153	MIRROR, Preview (adhesive backed)							1	
-21B	451145	BRACKET, Mirror							1	
-22	046677	BRACKET ASSEMBLY, Condenser holder							1	
-23	202087	CONDENSER LENS							1	
-24	451655	SCREW, Slide receiver							4	
-25	765862	CLAMP, Slide receiver							2	
-26	30807	SCREW, Hex washer head, 6-32 by 1/4 inch							1	
-27	766151	SPRING, Slide receiver							1	
-28	451121	RECEIVER, Slide							1	
-29	765884	LIFTER, Slide							1	
-30	451723	SPRING, Slide lifter							1	
-31	766307	BOUNCE PAD, Shutter (adhesive backed)							1	

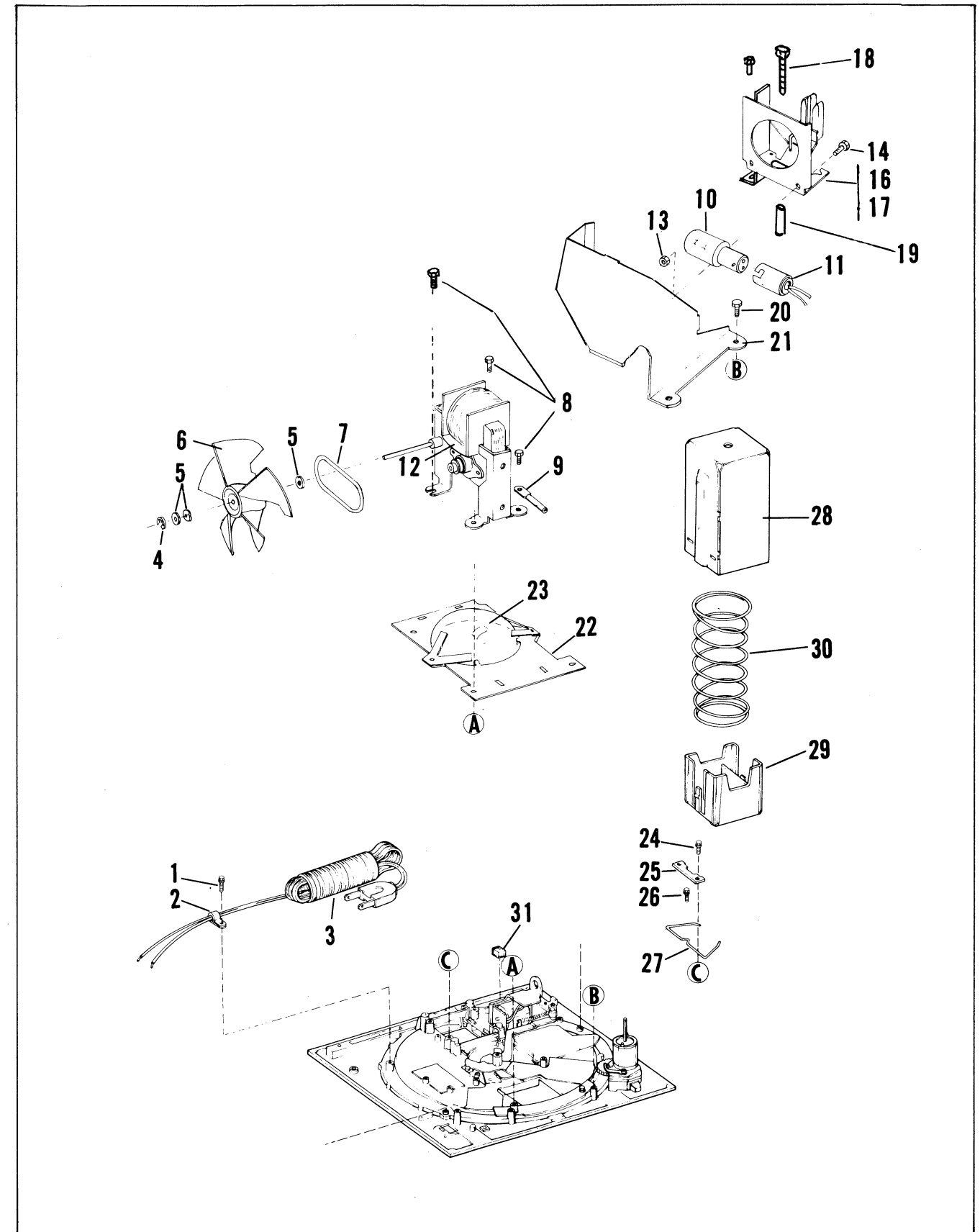


Figure 4. Lower Platen Components

FIG. & INDEX NO.	PART NO.	DESCRIPTION	UNITS							USABLE ON CODE
			1	2	3	4	5	6	7	
LOWER PLATEN COMPONENTS (CONT'D)										
5-1	30807	SCREW, Hex washer head, 6-32 by 1/4 inch							2	
-2	766878	RETAINER, Shuttle							1	
-3	451655	SCREW, Index bracket							1	A
-4	No Number	FINGER AND BRACKET ASSEMBLY, Index							NP	A
-5	30807	SCREW, Hex washer head, 6-32 by 1/4 inch							2	A
-6	072572	LEVER ASSEMBLY, Index							1	A
-7	308858	RING, Retaining, Type E, 0.188 inch ID							1	A
-8	046623	FINGER ASSEMBLY, Index							1	A
-9	072572	BRACKET ASSEMBLY, Index							1	A
-10	451655	SCREW, Index bracket							1	BCDEFG
-11	No Number	SOLENOID AND BRACKET ASSEMBLY, Index							NP	
-12	705733	RIVET, Semitubular							1	
-13	766147	SCREW, Slotted hex head, 6-32 by 3/16 inch							2	
-14	17632	WASHER, Flat							2	
-15	766052	SOLENOID, Index							1	
-16	308858	RING, Retaining, Type E, 0.188 inch ID							1	
-17	046623	FINGER ASSEMBLY, Index							1	
-18	072572	BRACKET ASSEMBLY, Index							1	BCDEFG
-19	706011	STRAIN RELIEF, Heyco							1	BCDEFG
-20	3123	NUT, Plain hex, 6-32							1	
-21	17632	WASHER, Flat							1	
-22	766337	POST, Adjusting							1	
-23	451655	SCREW, Cable clamp							2	
-24	046443	CLAMP, Cable							2	
-25	No Number	MOTOR AND GEAR ASSEMBLY, Index							NP	
-26	450637	GEAR, Drive							1	
-27	86914	WASHER, Bowed							1	
-28	450642	SCREW, Index motor							2	
-29	450631	MOTOR, Index							1	
-30	072576	PLATE ASSEMBLY, Index motor							1	
-31	615925	NUT, Stop							1	
-32	766423	SPACER, Center pivot							1	
-33	765958	WASHER, Flat							2	
-34	046673	SHUTTER ASSEMBLY, Left-hand							1	
-35	046672	SHUTTER ASSEMBLY, Right-hand							1	
-36	072571	LINK ASSEMBLY, Shutter							1	
-37	766826	BUMPER, Shutter (adhesive backed)							1	
-38	451750	LIGHT BAFFLE, Preview opening							1	
-39	17676	RING, Retaining, Type E, 0.156 inch ID							1	
-40	766400	WASHER, Bowed							1	
-41	451751	TRANSPORT DISC, Slide							1	
-42	451167	SUPPORT, Slide, inner							1	
-43	451144	SUPPORT, Slide, outer							1	
-44	046676	LOWER PLATEN ASSEMBLY							1	

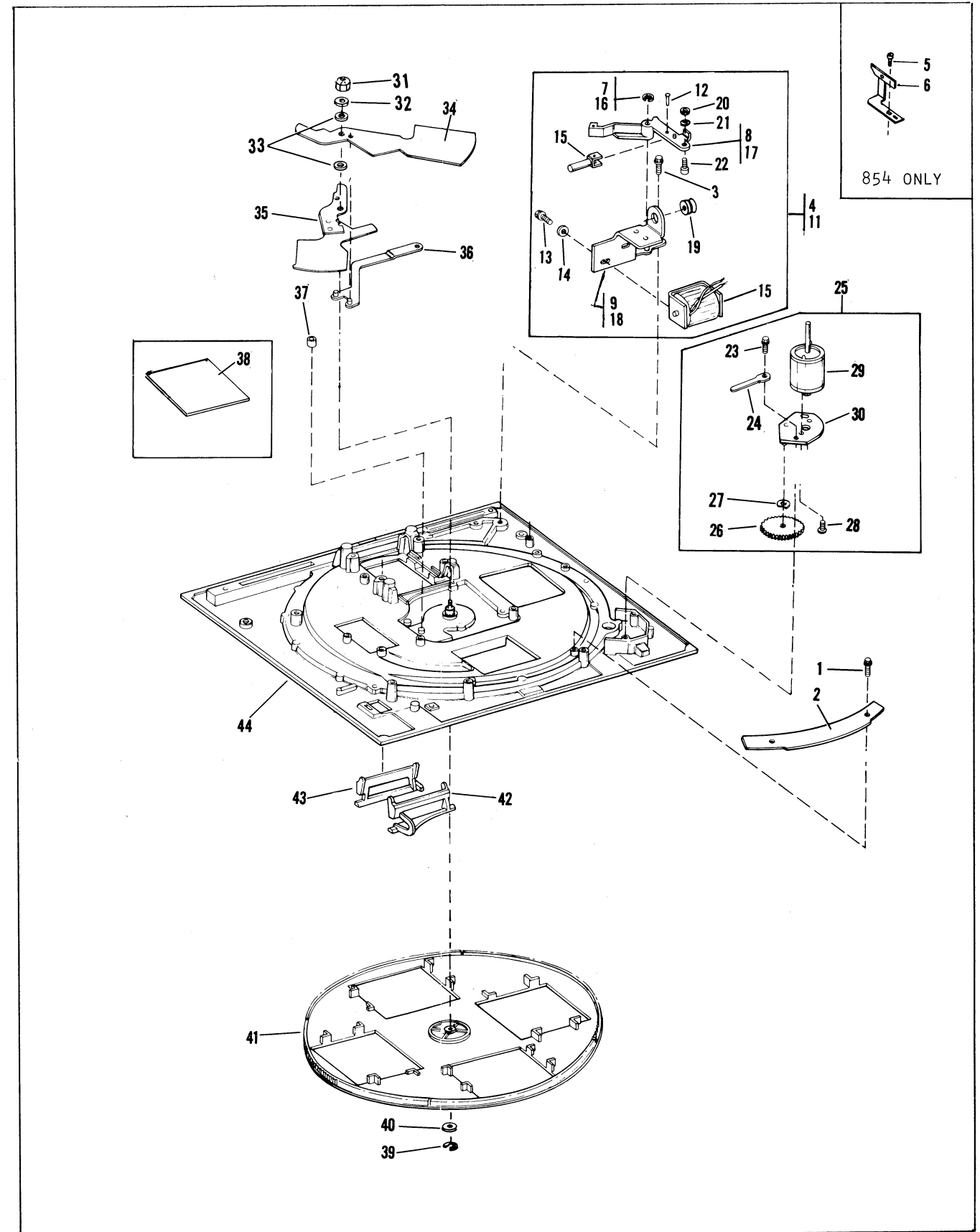


Figure 5. Lower Platen Components (Continued)

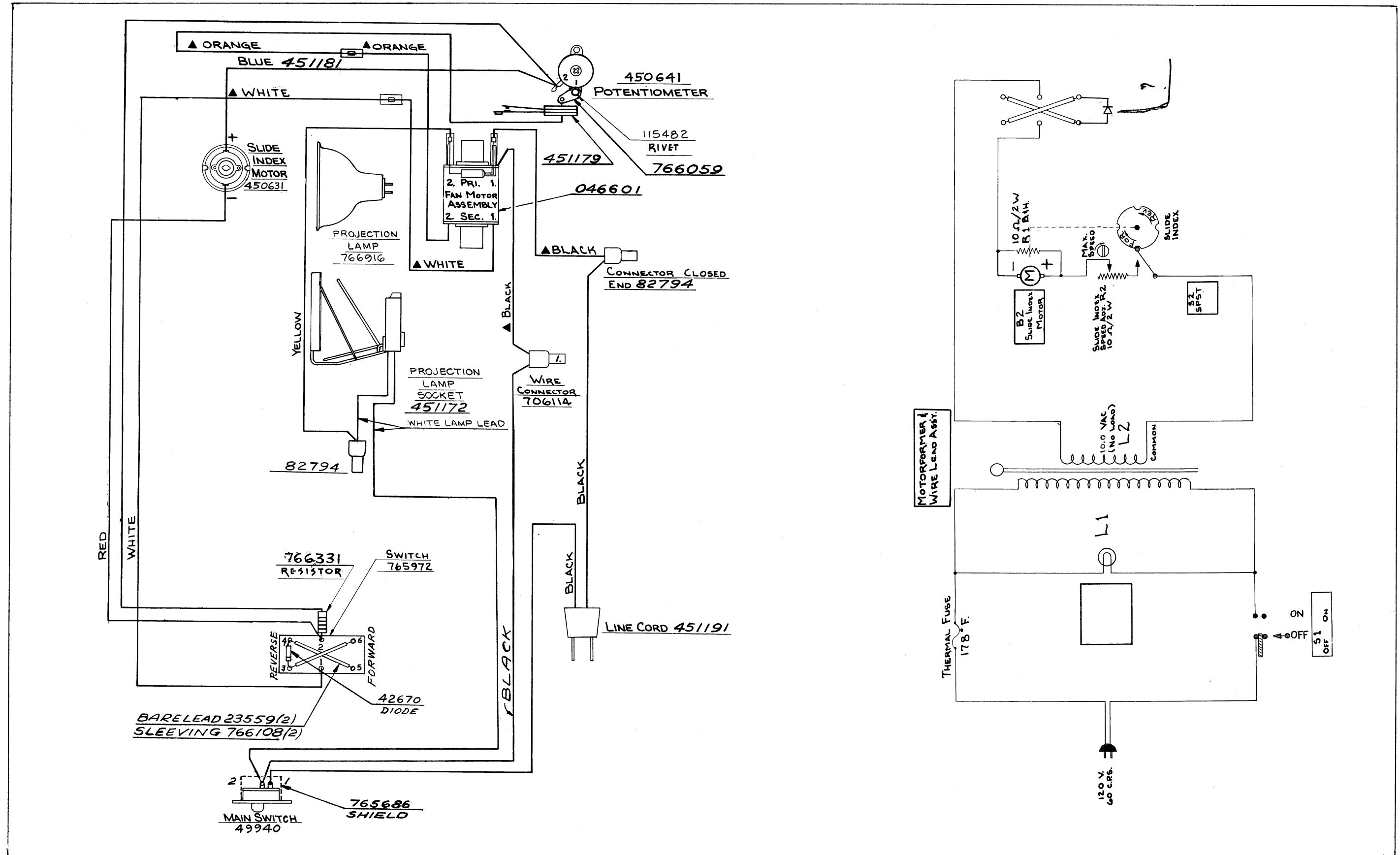


Figure 6. Wiring Diagrams - Model 854

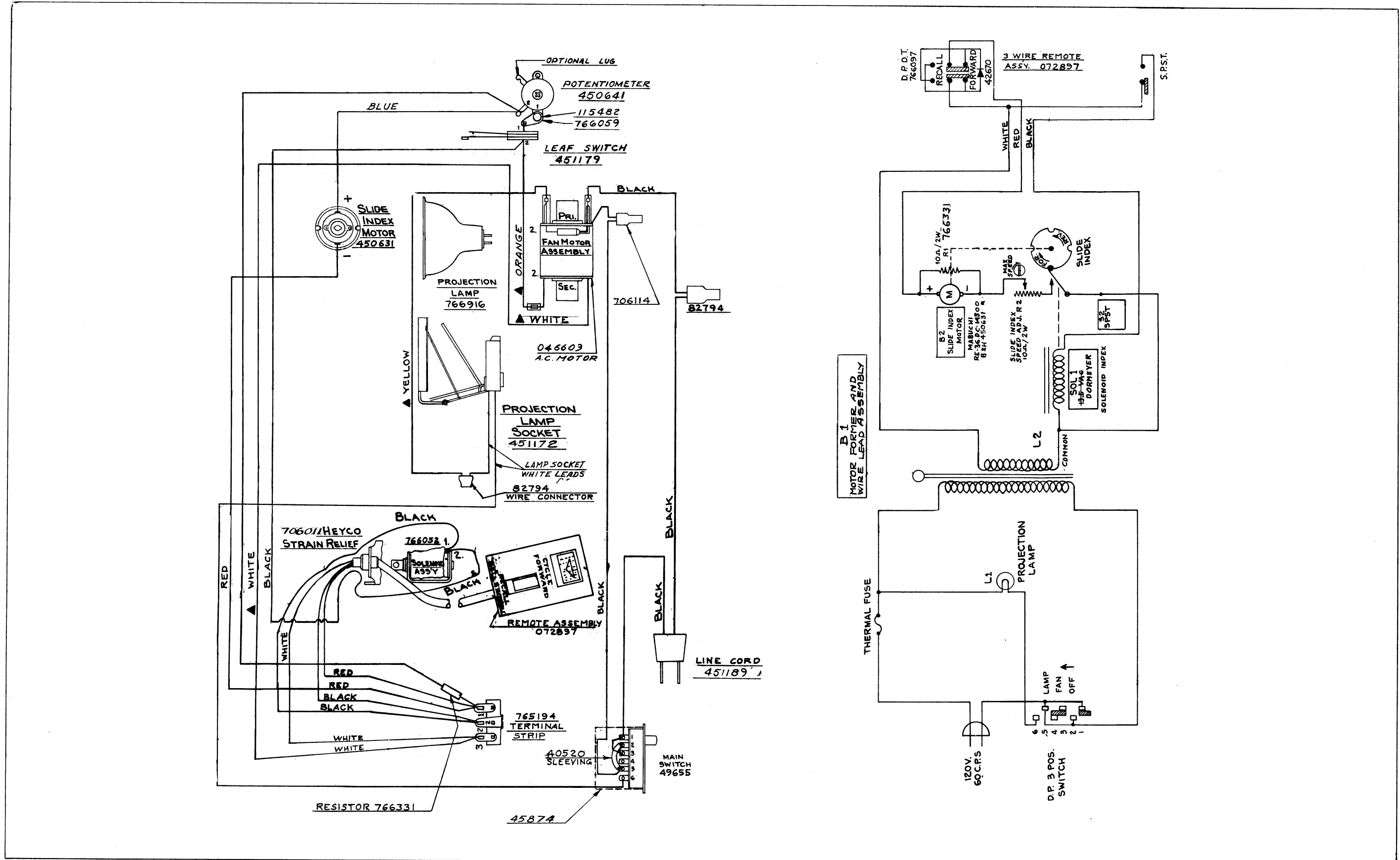


Figure 7. Wiring Diagrams - Models 856 and 857

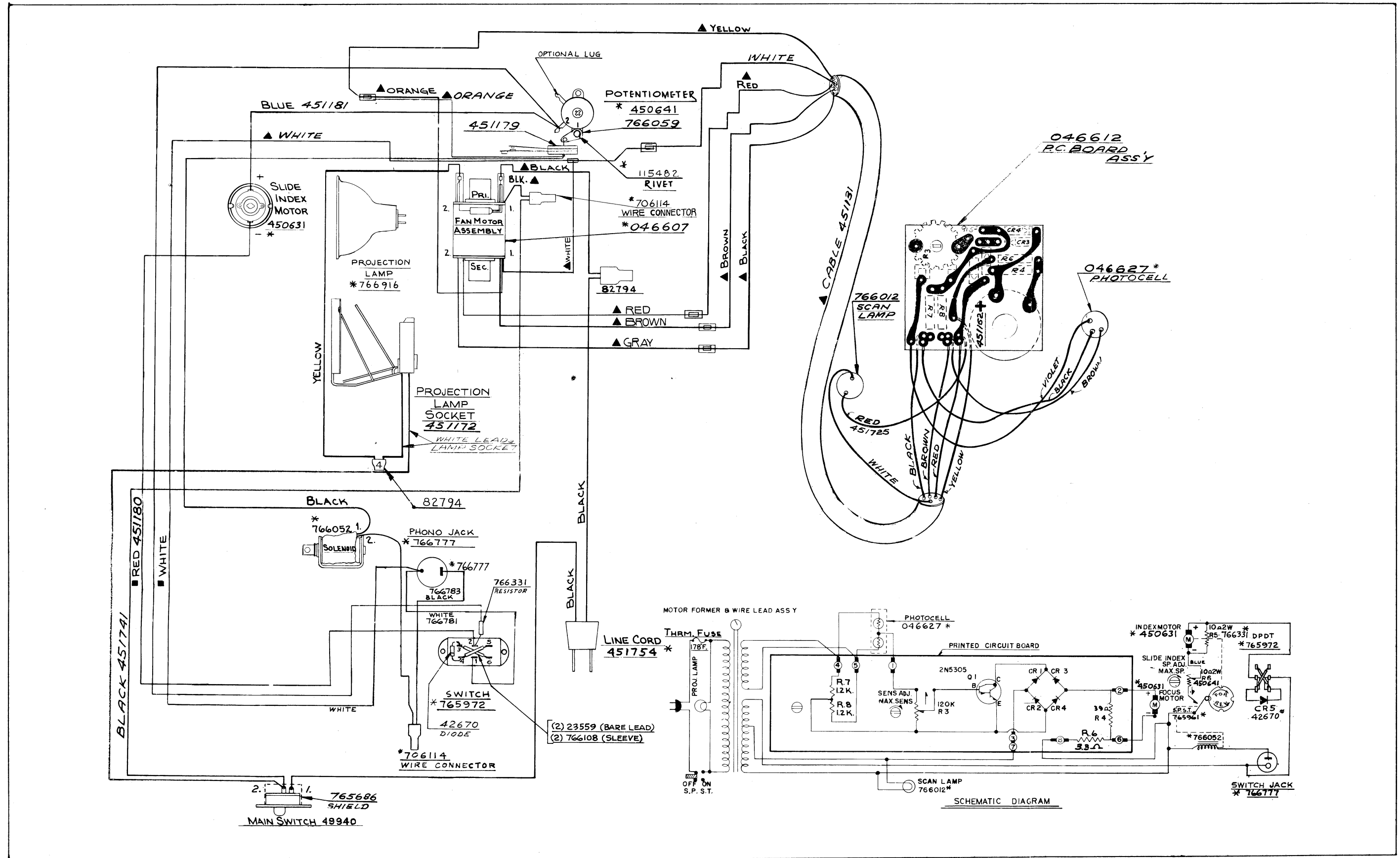


Figure 8. Wiring Diagrams - Model 858

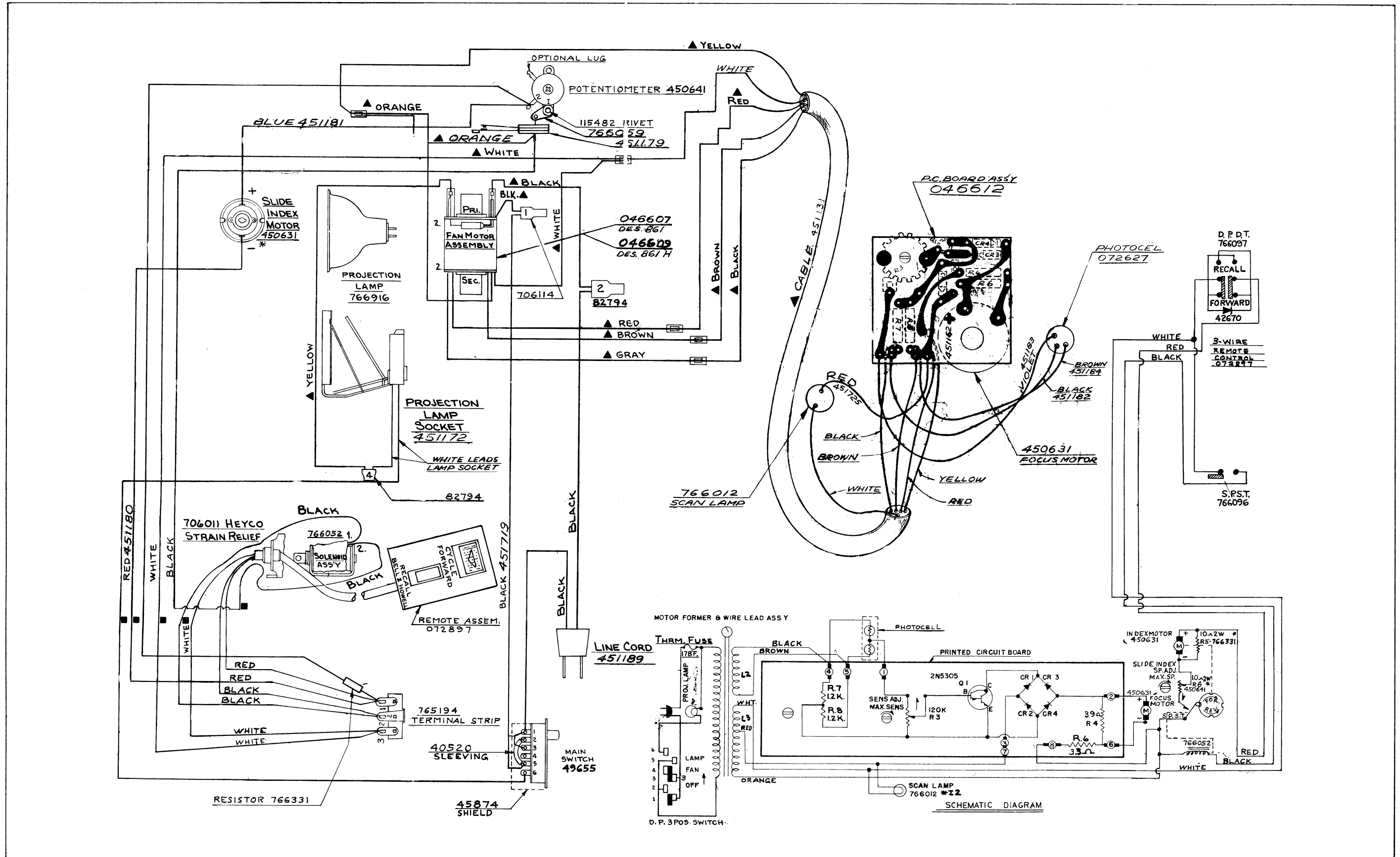


Figure 9. Wiring Diagrams - Model 859

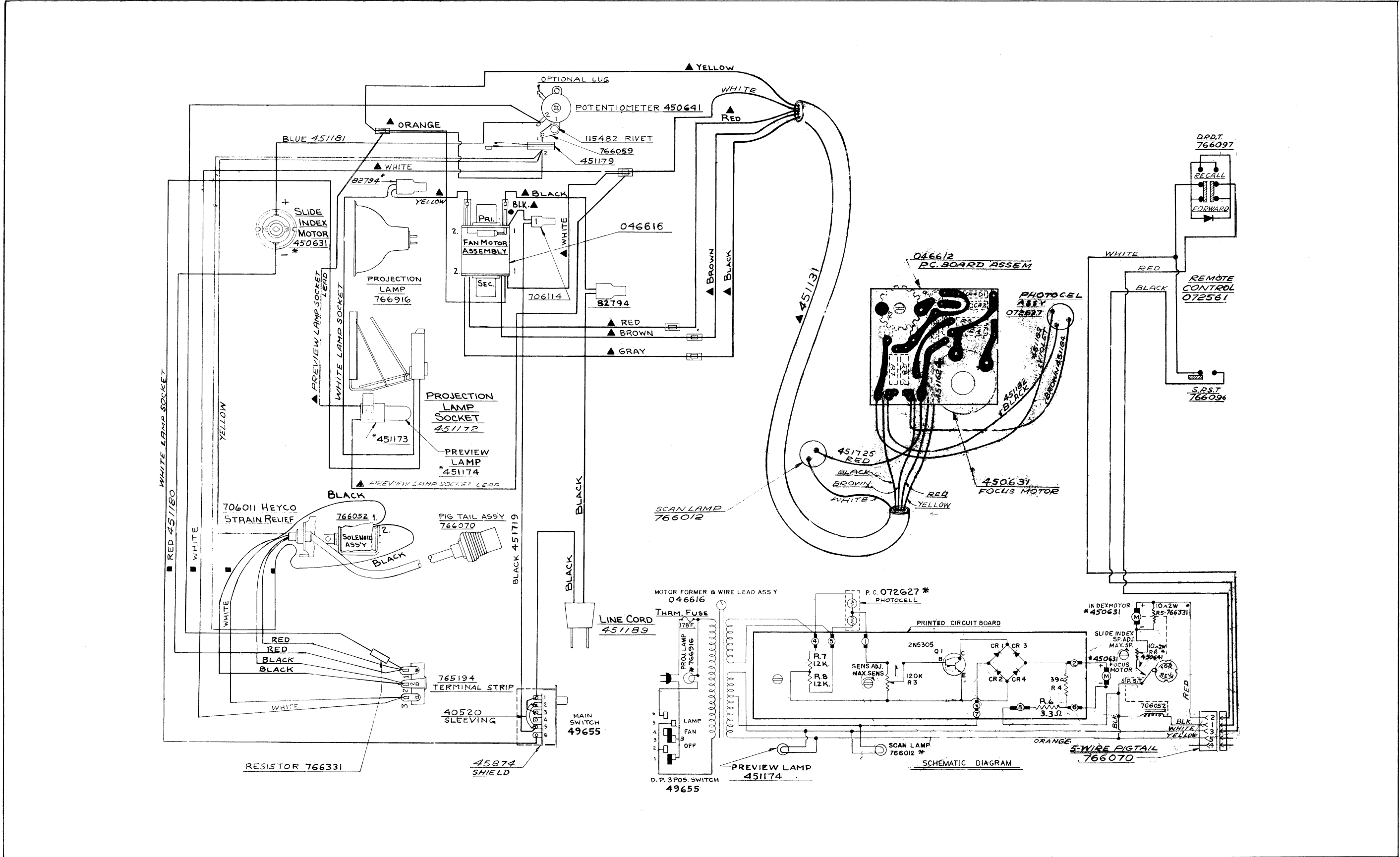


Figure 10. Wiring Diagrams - Models 861 and 862